FINAL DRAINAGE REPORT

Pima Road Project From Pinnacle Peak To Thompson Peak

Entellus™
Intelligent Engineering
Environmental Solutions

ENTELLUS
PROJECT NO. 410061A

FINAL DRAINAGE REPORT

Pima Road Project From Pinnacle Peak To Thompson Peak

CITY OF SCOTTSDALE

Prepared for the City of Scottsdale

February 2010

CITY OF SCOTTSDALE™
ARIZONA

DRAINAGE REPORT

PIMA ROAD PROJECT FROM
PINNACLE PEAK TO
THOMPSON PEAK

Project # S-0901

February 2010

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PRELIMINARY DRAINAGE REPORT
PIMA ROAD PROJECT FROM PINNACLE PEAK TO THOMPSON PEAK

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SECTION 1 INTRODUCTION

1.1 Project Background

This report was prepared as part of the Pima Road Design from Pinnacle Peak Road to Thompson Peak Parkway and also documents work performed for the analysis of infrastructure elsewhere along the Pima Road corridor. **Figure 1.1.1 Vicinity Map** shows the general project location, and general subdivision layout for the area. The drainage analyses of the area have been an on-going process for several years that has been affected not only by watershed characteristics, but also by public concerns expressed to the City. The area has experienced significant drainage problems and flooding in the past and, if no improvement is made, the issues will persist.

The general grade and drainage pattern in the project area is from the northeast to the southwest with various culverts and wet-crossings along Pima Road. It is along Pima Road itself and adjacent lands where the majority of the drainage issues addressed in this report are focused. This report documents the drainage analyses that have taken place for the project area, both on-site and off-site hydrologic and hydraulic analyses.

Additionally, this report addresses the hydrologic and initial hydraulic analysis of the Sierra Pinta outfall into the Pima Road channel referred to as the Sierra Pinta Outfall and Pima Road Improvements. The purpose of this portion of the project was to incorporate the initial design of the Sierra Pinta collector channel by Wood/Patel & Associates, Inc. (**Reference 33**) into the hydrologic model, and assess the impacts of the improvements along the Pima Road corridor. The various proposed improvements and sections are divided as shown in **Figure 1.1.2**.

FIGURE 1.1 .1
VICINITY MAP
PIMA ROAD DRAINAGE REPORT

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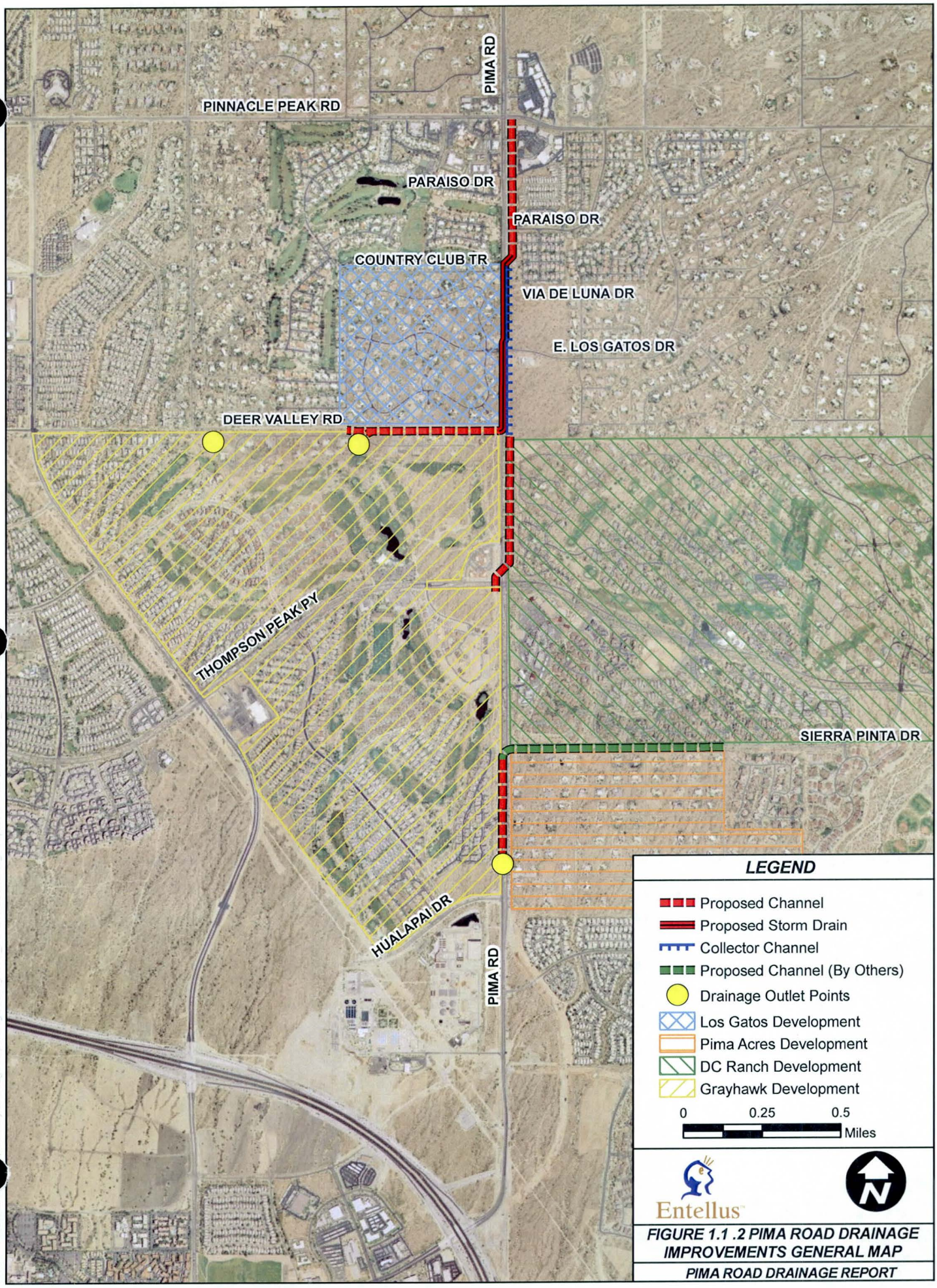


FIGURE 1.1 .2 PIMA ROAD DRAINAGE IMPROVEMENTS GENERAL MAP

PIMA ROAD DRAINAGE REPORT

SECTION 2 EXISTING CONDITIONS

2.1 General Existing Conditions

2.1.1 Pinnacle Peak to Deer Valley

In general, storm runoff reaches the drainage facilities along the Pima Road alignment via a series of natural washes, roadways and drainage structures. Currently, the existing grade of Pima Road from the Pinnacle Peak Parkway to the Deer Valley Road Alignment follows the existing topography with significant off-site flow crossing Pima Road at various culverts and wet crossings. The City has received numerous complaints from residents regarding the perceived inadequacies of the existing drainage conditions and infrastructure. A complete description of the existing hydrologic conditions can be found in **SECTION 5.**

The east and west sides of Pima Road has been developed mainly as single family and master planned communities between Country Club Trail and Pinnacle Peak with the neighborhood commercial centers located near Pinnacle Peak Road. On the south ½ of the project (Country Club Trail to Deer Valley Road alignment) the land to the east is an undeveloped State Land parcel with the exception of a City owned pump station. On the west side of Pima Road lays Los Gatos, an existing large lot residential gated community. The Los Gatos subdivision has constructed a perimeter wall along Pima Road. The wall was not designed as a flood wall and may or may not withstand hydrostatic and hydrodynamic forces generated by a significant runoff event. The various developments in the area have provided some retention, mainly along the east side of Pima Road, and a wide drainage easement exists along the east side of Pima Road from Pinnacle Peak Parkway to the undeveloped State Land parcel (approximately 1/2 mile south of Pinnacle Peak). Additionally, a drainage easement with some infrastructure exists along the Deer Valley alignment west of Pima Road along the northern boundary of the Grayhawk subdivision.

2.1.2 Deer Valley to Thompson Peak

The DC Ranch development exists on the east side of Pima Road between Deer Valley and Thompson Peak Parkway. This development provided a desert landscaped area next to the roadway containing a small channel and a concrete path. The west side of Pima Road is mostly undeveloped land within the Grayhawk planned development but still under State Trust Land Department control. The northwest corner of Thompson Peak and Pima Road contains a commercial development which includes a detention basin and a channel along the west side of Pima Road. The Pima Road storm drain begins at the northeast corner of Thompson Peak and Pima Road with 2-60" pipe inlets.

2.1.3 Thompson Peak to Union Hills

This portion of the watershed is affected hydrologically by the Reata Pass alluvial fan. The presence of this fan creates some uncertainties regarding the distribution of flow in any given flood event. This makes it difficult to predict the exact amount of flow reaching any one location associated with the project as the various splits at apex can change with any given storm event. In a similar manner to the drainage area north of Deer Valley, flows in this portion of the watershed tend to flow in a southwesterly direction, collecting along Pima Road and continuing south beyond there. Various subdivisions have been built within this portion of the watershed including DC Ranch east of Pima Road and north of Sierra Pinta, Pima Acres just south of DC Ranch and Grayhawk along the west side of Pima Road.

A previous drainage study was conducted by Entellus and approved by the City for the Pima Road realignment from AZ101 to Thompson Peak Parkway that incorporated this portion of the watershed. The report is entitled *Pima Road DCR AZ101 to Thompson Peak PKWY Final Hydrology and Preliminary Drainage Design Report* (**Reference 31**). Details regarding the assumptions made for this portion of the watershed can be found in the above referenced report.

2.2 Desert Greenbelt Project

Many existing developments in the watershed were designed and constructed based on the assumption that the Scottsdale Desert Greenbelt Flood Control Project improvements were in place. However, the Desert Greenbelt project was terminated in 2000 by the City without the construction of the proposed channel and basin network. These proposed improvements included, but were not limited to the channelization of the Reata Pass flows to stabilize the alluvial fan, retention basins at key locations including Happy Valley Road, Deer Valley Road and others, and a Pima Road collector channel. Because the Desert Greenbelt and the proposed improvements were never implemented in their full regional drainage solution form as originally designed, many of the existing upstream drainage structures may be inadequately sized creating the potential for flow diversions and possible flooding, which add to the unpredictable nature of flow direction and quantity within the watershed.

SECTION 3 PROPOSED DRAINAGE PLAN

As the duration of time that this project entails is significant (2005 – 2009), numerous memoranda have been created to document some of the steps and decisions that have occurred in the process. These memoranda are summarized in the following sections.

3.1 Memoranda and Analyses

Various analyses regarding off-site flows have been prepared by Entellus, Inc. on the watershed since 2005. A memorandum was prepared for each analysis conducted and they are summarized in the following sections. Additionally, several analyses for the area south of Thompson Peak parkway have been produced regarding the Sierra Pinta Channel Outfall into the Pima Road channel. These are also contained in the following sections. Full copies of each of the memorandum and analyses can be found in **SECTION 8** and the supporting models and documentation can be found on the accompanying CD.

3.1.1 Memorandum Dated February 11th, 2005

This memorandum documents a preliminary 100-year, 6-hour hydrological analysis along the 1 mile stretch of Pima Road between Pinnacle Peak Road and Deer Valley. This analysis utilizes a model that is an updated version of the Core North Detention Basin model by Ward and others and assumes fully developed conditions entitled FU100-6.IH1 from the *Pima Road Three Basins* project as performed by Stantec (**Reference 10**).

Flows were estimated along this 1 mile stretch of Pima Road between Pinnacle Peak and Deer Valley for the purpose of a preliminary sizing of a possible channel or storm drain along the Pima Road alignment. No field visit or verification was conducted. It was assumed that all flow would be conveyed via the potential infrastructure, so no flow was allowed to cross Pima Road, and it was also assumed that the Stantec model was sufficient for this preliminary analysis which was the ultimate Desert Greenbelt conditions, with a few minor modifications.

This memorandum can be found in its entirety in **Section 8.2** and the HEC-1 files can be found on the CD in **APPENDIX E**.

3.1.2 Memorandum Dated October 19th, 2005

This memorandum to Alex McLaren at the City of Scottsdale analyzes the existing conditions and three (3) potential flow scenarios along the Pima Road corridor north of the Deer Valley channel. The base model for this analysis was the model utilized for the *2005//02/11 Memorandum* (100-year, 6-hour). A field visit was conducted on 2005/10/14 to verify the diversion and flow path assumptions along Pima Road. The assumptions were that all wet crossings conveyed the full flow across Pima Road to the west, and culverts would flow to their existing capacity. In particular, with regards to the

diversion at the Los Gatos entrance (HEC-1 ID D1B2), "Through a field visit it was determined that all the flow crosses Pima Road by this point, therefore all flow was routed across Pima Road at this point" and through the Los Gatos subdivision. A brief description of each of the three (3) scenarios is as follows:

- **Scenario 1:** Collects all flow along Pima Road in a storm drain from Pinnacle Peak to Deer Valley, except flow that currently crosses Pima Road through existing culverts and conveys it south to Deer Valley.

- **Scenario 2:** Similar to Scenario 1 with the addition of allowing flow to cross Pima Road via additional culverts at some of the existing wet crossing. Those locations are at Pariaso Dr, Country Club Trail and Los Gatos Drive.

- **Scenario 3:** Similar to .Scenario 1 with the addition of potential off-line storage along the Pima Road alignment to reduce the peak flows in the storm drain.

This memorandum can be found in its entirety in **Section 8.3** and the HEC-1 files can be found on the CD in **APPENDIX E**.

3.1.3 Preliminary HEC-1 Analyses for Potential Off-Line, On-Line, and Channel Configuration June 16th, 2006

A simple HEC-1 analysis was conducted to determine the effects of on-line, versus, off-line, versus channelized flow along the Pima Rd. corridor north of Deer Valley Road. This analysis was never formalized into memorandum form but was the initial analysis and basis for the memorandum in **Section 3.1.4**. The HEC-1 models can be found on the attached CD in **APPENDIX E**.

3.1.4 Memorandum Dated November 15th, 2006:

This memorandum analyzed the effect of additional on-line storage along the Pima Road alignment. The additional storage was located at various locations on the east side of Pima Road between Pinnacle Peak Parkway and the Deer Valley Road alignment. The analysis was performed for the 2, 5, and 100-year 6-hour storm events.

This memorandum can be found in its entirety in **Section 8.4** and the HEC-1 files can be found on the CD in **APPENDIX E**.

3.1.5 Memorandum Dated March 1st, 2007:

This memorandum summarizes the results of previous memoranda (2005/02/11 and 2005/10/19), generally states what the City of Scottsdale roadway design codes are for drainage, and describes some of the project constraints (topography, previous drainage complaints). The finality of the memorandum was a meeting request with the City to discuss the project constraints, budgetary limitations and socio-political atmosphere regarding the project.

This memorandum can be found in its entirety in **Section 8.5.**

3.1.6 Memorandum Dated October 8th, 2007:

This memorandum is a result of the progress meeting with the City of Scottsdale and Entellus on September 24th, 2007. At the meeting it was determined that the drainage solution should mimic existing conditions per the City's current ordinance. Culverts would be constructed to collect storm water on the east side of Pima Road at locations where runoff currently crosses Pima Road and discharges to existing flow paths. Four alternatives were discussed and are summarized below:

- **Alternative 1 - Culverts naturally outfall without revising the proposed grades of Pima Road:** This alternative will allow a minimum of one foot of cover, mimic historical conditions but will require additional easement on private property to daylight culvert outlets.

- **Alternative 2 - Construct bubble-up structures between the proposed roadway and sound wall:** This alternative would mimic historical conditions and eliminate points of discharge but will create potential maintenance problems and potential utility conflicts.

- **Alternative 3 - Raise roadway to allow culverts to outfall naturally between the roadway and sound wall:** This alternative requires a minimum 48-inch pipe, mimics historical conditions and minimizes utility conflicts, but will create point of discharges, outfall on private property and require the re-design of existing roadway.

- **Alternative 4 - Intercept storm water on the east side of Pima Road and route to the Deer Valley Channel:** This alternative would intercept storm water along the east side of Pima Road via a channel for half (½) a mile and then convey the flow to the Deer Valley Channel in a culvert for the last half (½) mile.

It was determined at the meeting that alternatives 1 and 2 were not acceptable alternatives in terms of impact to the property owners and long-term impacts. A comparative cost analysis was prepared for alternatives 3 and 4. This memorandum can be found in its entirety in **Section 8.6**.

3.1.7 Memorandum Dated February 22nd, 2008:

This memorandum summarizes the results of FLO-2D modeling conducted between Pinnacle Peak and Deer Valley. The proposed improvements were analyzed here to determine how they would perform hydraulically along the corridor. The proposed improvements included a ½ mile channel from Pinnacle Peak Road to approximately Via de Luna capable of carrying the 100-year event, a box culvert from Via de Luna to Deer Valley Road capable of conveying the 100-year event within the right-of-way, the upsizing of the culverts across Pinnacle Peak, improvements to basins on the northeast corner Pima and Pinnacle Peak, and potential improvements to the Deer Valley channel. The existing conditions inundation limits were compared to the proposed conditions inundation limits.

The existing conditions HEC-1 assumptions for this model included the routing of all flow across Pima Road near or through the Los Gatos subdivision. No off-site flow continued south along Pima Road beyond the Los Gatos subdivision. This was verified in the existing conditions FLO-2D model, which showed the flow crossing Pima Road. This memorandum can be found in its entirety in **Section 8.7**, and the associated FLO-2D and HEC-1 files can be found on the report CD.

3.1.8 Memorandum Dated August 25th, 2008:

The purpose of this memorandum was to determine if the designed Sierra Pinta Outlet by Wood/Patel & Associates, Inc. (**Reference 32**) met City of Scottsdale requirements for storm drain design. The analysis concluded that while pressurized flow and very high velocities existed for much of the pipe length, the design did in fact appear to meet City of Scottsdale requirements for storm drain design. This memorandum can be found in its entirety in **Section 8.8**).

3.1.9 Memorandum Dated August 26th, 2008:

The purpose of this memorandum was to size the rip-rap and protection requirements for the Sierra Pinta Outfall into the Pima Road channel. Based on the analysis it was determined that rip-rap with a D_{50} of approximately 1 ft for approximately 260 feet beyond the outlet would suffice. If energy dissipaters were utilized the length of rip-rap could be decreased to approximately 200 ft. This memorandum can be found in its entirety in **Section 8.9**.

3.1.10 Memorandum Dated October 16th, 2008:

The purpose of this memorandum was to identify and quantify the modifications that can be attributed to the design and construction of the Sierra Pinta channel and Pima Road Outlet. The following items were examined:

- Verify and modify existing conditions hydrology models
- Create future conditions hydrology models (post Sierra Pinta Channel)
- Determine the quantity of flow under existing and future conditions on the west and east portions of Pima Road
- Determine changes in flow, maximum channel velocity and maximum flow depth that occur due to the addition of the Sierra Pinta channel and outlet

HYDROLOGY

The hydrology was based on the previously submitted and approved hydrologic models from Entellus *Pima Road DCR AZ101 to Thompson Peak PKWY Final Hydrology and Preliminary Drainage Design Report* (**Reference 31**). It was assumed at this point that no flow continued south along Pima past the Deer Valley alignment. Various assumptions from the existing conditions HEC-1 model were analyzed.

- The Pima Road storm drain diversion was increased from 255 cfs to 600 cfs.
- The diversion at Thompson Peak and Pima Road was looked at and it determined that indeed a split occurred to the west along Thompson Peak. No additional analysis was conducted to determine the quantity of the split.
- The assumption of a 30% split at Sierra Pinta and Pima Road out of the watershed was evaluated. Upon the investigation it was determined that some flow could potentially overtop the flood wall parallel to the Pima Road channel, but it appeared unlikely that the diversion would be substantial, therefore the model was modified so no flow along the Pima Road channel was allowed to leave the watershed at Sierra Pinta.
- The assumption that some of the flow from Sierra Pinta Drive reaches the intersection of Pima Road instead of simply flowing south was looked at. The previous Entellus drainage report documents the validity of this assumption (**Reference 31**). Upon field visits it appeared as though flow could potentially enter the intersection from the subbasin immediately adjacent to Pima Road along Sierra Pinta Drive, thus it was assumed that this assumption was valid.

- In the original Pima Road model, it was assumed in the HEC-1 model that the future Sierra Pinta channel was in place and would have a capacity of 2200 cfs (based on the master plan). The future Sierra Pinta channel was thus removed from the existing conditions HEC-1 model.
- The Sierra Pinta channel was added to the future conditions model with a flow of 1330 cfs as shown in the improvement plan (**Reference 32**). It was assumed that the Sierra Pinta channel would take the first 1330 cfs and all additional flow arriving at the Sierra Pinta alignment would pass unimpeded.

Additionally, 2-year and 10-year 6-hour HEC-1 models were generated.

HYDRAULICS

The hydraulic analysis focused on quantifying the flow on the east and west sides of Pima Road near the Sierra Pinta alignment, and the effects of the proposed Sierra Pinta channel on the Pima Road channel. The results revealed that the east portion of Pima Road could carry approximately 550 cfs. Flow beyond this would weir across to the west side of Pima Road and the associated channel.

This memorandum can be found in its entirety in **Section 8.10** and all associated HEC-1 and HEC-RAS models can be found on the CD.

3.1.11 Memorandum Dated December 17th, 2008:

It was discovered normal depth routing had been utilized for a portion of the HEC-1 models that were being utilized for this project, but were being left unmodified as previously modeled by others not associated with the current project. The associated NSTP for each of these normal depth routes had been left at 1 and not specifically calculated for the individual routing reach. The memorandum identified the routes in question, briefly explained the theory behind NSTPS and why it was important to modify the routing NSTPS, gave a recommendation on what the NSTPS should be and explained the difference in peak discharges associated with NSTP adjustment. This memorandum is included in **Section 8.11**.

3.1.12 Meeting with City of Scottsdale December 22nd, 2008

A meeting between Entellus and the City of Scottsdale was held on December 22nd, 2008 at the City of Scottsdale. This meeting followed a field visit to the Pima Road project area by Entellus and the City on December 12th, 2008. The purpose of the field visit was to determine the existing conditions assumptions to be applied for the Sierra Pinta modeling effort. During the field visit it was concluded that negligible flow would be able to leave Pima Road and enter the Deer Valley Channel from the road. Additionally,

in regards to the Los Gatos subdivision and diversion, it was concluded that although not designed to withstand the hydrostatic and hydrodynamic forces that accompany a large flood, flow would be modeled as not being able to cross or penetrate the Los Gatos wall on the west side of Pima. Instead flow would be routed south past Deer Valley along Pima Road and continue on to Thompson Peak Parkway

In order to accomplish this task a combined hydrologic model of the Sierra Pinta model HEC-1 with portion north of Deer Valley Road, which up to this point had been two independent models, was created. **Section 8.12** contains the materials provided to the City at the meeting including an explanation of what was needed to combine the two hydrologic models and an explanation of the flows for the Sierra Pinta Outlet channel.

3.1.13 Memorandum Dated December 23rd, 2008

There are several drainage reports covering the Deer Valley and Pima Road area. The City asked Entellus to prepare a review of the various reports and summarize the finding in a memorandum. The assumptions made by the various reports were widely varied and often times conflicting. The memorandum can be found in its entirety in **Section 8.13**.

3.1.14 Memoranda Dated January 12th, 2009 and Revised on January 19th 2009

Two memoranda were produced on January 12th and subsequently revised on January 19th 2009.

SIERRA PINTA OUTFALL CHANNEL AND STORM DRAIN ANALYSIS

The first memorandum involved the hydrologic and hydraulic modeling of the Sierra Pinta outfall channel. Several modifications were made to the hydrologic models including the addition of 2 subbasins along the west side of Pima Road, and the running of various alternatives: A Pima Road channel from Pinnacle Peak to Deer Valley and A split at Deer Valley Road, and an alternative with the Pima Road channelization but assuming all flow continues south along Pima Road past Deer Valley. Additionally 2-year models were created for the alternatives.

The first memorandum also documented the hydraulic modeling of the Sierra Pinta outfall channel. Several recommendations were made to the hydraulic analysis at two locations: downstream from Sierra Pinta Outfall and the Deer Valley/Pima channels split. The recommendations were suggested based upon the results in these areas not accurately reflecting existing flow conditions. Other issues were noted which include hydraulic jumps and locations of critical depth within the reach.

PIMA ROAD CHANNEL SCOUR ANALYSIS

The purpose of the memorandum is to present the scour analysis of the Pima Road Channel south of Sierra Pinta Drive. Both the 100-year 6-hour and 2-year 6-hour flood events were considered. The analysis performed includes channel vertical stability, total scour, and lateral migration.

These memoranda can be found in their entirety in **Section 8.14** and all associated HEC-1 models, HEC-RAS models, and scour analysis calculations can be found on the accompanying CD.

3.2 Proposed Improvement

There are several locations where improvements are proposed and these locations have been analyzed separately and will be discussed separately in detail in the following sections. See **Figure 1.1.2: Pima Road Drainage Improvements General Map** for the location of the various improvements. The need and configuration of proposed infrastructure was based on hydrologic and hydraulic modeling for various portions of the entire Pima Road corridor (See **SECTION 5** for details regarding the hydrologic and hydraulic modeling).

3.2.1 Pima Road Channel - Pinnacle Peak Road To Via De Luna Drive

The Pima Road Channel on the east side of Pima Road from Pinnacle Peak to approximately Via De Luna Drive is designed to convey flow along the eastern side of Pima Road. The flows that are conveyed come primarily from the north. Flooding complaints from the commercial area at the southwest corner of Pinnacle Peak and Pima Road are very common. This is due to the inability of the existing infrastructure to convey flows south. As the FLO-2D analysis shows (see **Section 5.3**) flows during a large storm event sheet across the intersection of Pima Road and Pinnacle Peak and into the commercial area. Flows cross Pima Road by either sheeting across the road, through a small set of culverts or through a wet crossing further downstream. The purpose of the Pima Road Channel from Pinnacle Peak to Via De Luna Drive was to alleviate these flooding hazards.

The proposed Pima Road Channel is within the existing drainage easement currently containing several small detention basins along the east side of Pima Road. There is a typical cross-section for the Pima Road channel. The typical cross section was developed in an effort to maintain a natural and aesthetically pleasing looking channel. The typical cross section entails a 12 foot bottom width, an inner channel slope of 2% for 21.7 ft on both sides, followed by bank slopes of 4H:1V with a flow depth of 4 feet, for a total top width of 92 feet that includes 1 foot of freeboard. The proposed channel section is designed to be earthen channel with a Manning's roughness of 0.040 for the main channel and both overbanks.

The existing slope along Pima Road is approximately in the range of 2 to 3%, which is substantial. Building a channel at the existing grade would result in extremely large

velocities and super-critical flow. In an effort to reduce the channel velocity to a manageable level during a 100-year storm event, a milder channel slope of approximately 0.4% is proposed with various drop structures of a maximum drop of 4 feet at a 1H:1V slope. These drop structures will be protected to mitigate the higher velocities produced by the steeper slopes. See the construction plans for detailed drawing of the channel and drop structures.

The existing drainage easement contains various retention basins for the developments along the east side of Pima Road and these retention basins will be removed and the area utilized for the channel. These retention basins were mostly ineffective in capturing and reducing peak flows along Pima Road, therefore their removal is of little consequence. An equestrian path is proposed as part of the Pima Road improvements approximately from Pinnacle Peak Road to Via de Luna Drive. The proposed Pima Channel is designed to accommodate the equestrian path within the channel.

Near Via De Luna Drive, the channel outlets into a proposed Pima Road storm drain. The proposed channel outlets into a proposed outfall structure that conveys flow into the proposed storm drain. In addition to the channel itself, drainage improvements need to extend further north beyond Pinnacle Peak in order to adequately capture and direct runoff into the drainage channel. However, a further investigation north of Pinnacle Peak is beyond the scope of work of this project and it is highly recommended that additional analysis needs to be determined for this area. See the Conceptual Plans in **APPENDIX K** for details regarding the Pima Road channel.

3.2.2 Pima Road Storm Drain – Via De Luna Drive to Deer Valley

The inlet of the proposed Pima Road storm drain is the downstream end of the Pima Road Channel near Via De Luna Drive. The storm drain extends south to the Deer Valley Road alignment where it outfalls into the proposed Deer Valley Channel improvements. This proposed storm drain begins along the eastern portion of Pima Road as a double 78" RGRCP until approximately E. Los Gatos Drive where the storm drain crosses the road and transitions into a triple 78" RGRCP. The proposed storm drain continues to the Deer Valley Road alignment where it outfalls into the improved Deer Valley Channel.

There are various inlets along the storm drain alignment to intercept local flow from the east along Pima Road. The inlets typically consist of small sediment basins that capture flow from the east in a small channel along the east side of Pima Road. See the construction plans for full detailed drawing of the storm drain inlets and sediment basins as well as the Conceptual Plans in **APPENDIX K**.

3.2.3 Deer Valley Channel

The existing Deer Valley Channel is two separate channels that have no connection. The first channel begins just west of Pima Road and continues for approximately ½ mile

before entering the Grayhawk Golf Course through an existing 1 – 10' x 5' RCBC. The second channel begins just west of the end of the first channel and continues for another ½ mile ending at a small sediment basin that outfalls into the Grayhawk Golf Course.

The proposed Deer Valley Channel will consist of a single continuous channel from Pima Road to ½ mile west of Pima Road at the existing sedimentation basin. The proposed infrastructure includes a control side-outlet to the Grayhawk golf course (end of first existing channel) which is designed to mimic the flows entering the golf course under the existing design without freeboard by PACE (**Reference 37**). Details regarding the proposed alternatives and hydraulic analysis of the Deer Valley Channel can be found in the Project Assessment Report for Deer Valley (**Reference 34**).

3.2.4 Pima Road Improvements – Deer Valley to Thompson Peak Parkway

There is a significant amount of flow entering Pima Road along this reach from the east in addition to local flows continuing south of Deer Valley along the west side of Pima Road. The best location to intercept the flow from the east is along the east side of the road before it crosses at the intersection of Pima Road and Thompson Peak Parkway. A proposed channel on the east side of Pima Road would be placed to convey the flows from the north and east of Pima Road. The entire flow would be conveyed in a proposed trapezoidal earthen channel with a bottom width of 72 feet and 4H:1V side slopes. This channel would be located within the existing drainage easement. For large storms, the flow could be conveyed in the channel and a small portion of the flow could be conveyed along the northbound roadway of Pima Road. A preliminary normal depth analysis of the conceptual plan shows that the total depth for the 100yr-6hr storm is approximately 5.5 feet, with velocities of 6.3 ft/s, and a slope of 0.4%. A Manning's roughness of 0.040 for the main channel and overbanks was used; and 0.015 for the roadway. Additional analysis of this proposed channel area would need to be conducted prior to final design.

At the downstream end of the proposed channel, several box culverts are proposed to convey the flow south of Thompson Peak Parkway. The proposed 10 – 10' x 5' RCBC's would parallel 2-60" existing storm drain pipes and cross underneath Pima Road and Thompson Peak Parkway and outlet at the southwest corner of the intersection. The proposed box culverts would be the downstream constraints. As a result of the proposed box culvert improvements to the northwest commercial drainage area the existing 3 – 8' x4' culverts would not be needed. As the design presented herein is a conceptual design only, additional analysis of these proposed box culverts, the proposed drainage channel, and the drainage area of the commercial development would need to be completed prior to final design. See the Conceptual Plans in **APPENDIX K** for details.

Although the existing drainage infrastructure is insufficient to handle the existing offsite flows, the proposed roadway improvements do not worsen the drainage conditions. The proposed conceptual drainage improvements could be further analyzed and implemented when funds are available at a future date.

3.2.5 Sierra Pinta and Pima Road Improvements South of Thompson Peak Parkway

The Sierra Pinta channel was designed by Wood/Patel & Associates, Inc. (**Reference 32**) to intercept flows arriving at the DC Ranch subdivision from the north and allow control of flows to continue to the south while the majority of the flow would be conveyed to the Pima Road channel (located on the west side of Pima Road). The Sierra Pinta channel was part of the original Desert Greenbelt project and a dual 96" pipe crossing under Pima Road was constructed several years back and buried awaiting the implementation of the plan. The Sierra Pinta Channel is proposed to cross Pima Road via a double 96" (existing buried) pipes into the proposed channel along the west side of Pima Road. This report details the hydrologic and hydraulic modeling of the structures. The final design of the improvements is to be carried out by others and is not a part of the scope of work.

3.2.6 Pima Road Roadway Pavement Drainage Plan – Pinnacle Peak to Deer Valley

Roadway drainage for Pima Road from Pinnacle Peak to south of Deer Valley will be handled by various catch basins and scuppers. These improvements will drain to either the proposed Pima Road Channel, the proposed Pima Road storm drain, other roadside ditch or will be carried within the roadway by maintaining the required dry roadway lane criteria.

SECTION 4 SPECIAL CONDITIONS

As proposed, construction of the drainage improvements along Pima Road from Pinnacle Peak Road to Deer Valley Road and along Deer Valley Road from Pima Road to the west will outlet into Grayhawk Golf Course at two existing inlets into the golf course approximately 2100 feet and 5000 feet west of Pima Road. The amount of flow proposed to go into the golf course at these two locations is based on the drainage study performed by PACE for Grayhawk. Since analysis of the existing golf course was outside of Entellus' scope of work, no analysis of the drainage system within the golf course was done by Entellus. The City and Entellus presented this concept to the Grayhawk HOA and Grayhawk developer in a meeting towards the end of 2009 and they both agreed with the proposed approach.

As part of the drainage study for Pima Road, Entellus developed a concept plan to convey the flows impacting Pima Road from approximately Deer Valley Road to just south of Thompson Peak Parkway. In developing this concept plan, two items were identified that will require additional consideration by the City. They are as follows:

1. The existing drainage facilities located downstream of Thompson Peak Parkway do not have adequate capacity to convey the 100-year flows being conveyed to this location by the proposed concept plan developed in this study. Entellus recommends that the City evaluate the downstream conditions and that the necessary improvements be constructed downstream of Thompson Peak Parkway to convey the flows along the downstream portion of the drainage system before proceeding with the construction of improvements along Pima Road from south of Deer Valley Road to Thompson Peak Parkway.
2. The existing channel at approximately the Deer Valley Road alignment east of Pima Road does not have the necessary capacity to convey the 100-year flows to the proposed improvement along Pima Road. As a result, flows for the 100-year event will impact the residential development to the south. Entellus recommends that this existing channel be improved so it can convey the 100-year flows to the proposed channel along Pima Road from Deer Valley Road to Thompson Peak Parkway.

The FLO-2D analysis between Deer Valley and Thompson Peak Parkway (see **Section 5.4**) shows that there is a considerable amount of flow that does not travel south along the Pima Road alignment or west along the Thompson Peak alignment. Instead this flow leaves the intersection in a southwesterly direction which is the historical flow direction. It is unclear as to the ultimate outfall of this flow but through aerial photography it appears the southwesterly flow may either continue through the existing subdivision or be redirected towards Pima Road or a combination of the two may occur. Additionally, a wall exists along the Pima Road channel south of Thompson Peak Parkway that may restrict flow from entering the Pima Road channel from the subdivision. It is recommended that an analysis be conducted regarding the ultimate outfall of this southwesterly flow and any downstream impacts caused by its redirection.

SECTION 5 DATA ANALYSIS METHODS

5.1 Offsite Hydrology

5.1.1 Previous Hydrology Models

Nearly all of the current hydrology for the region is based on original modeling developed for the Core North State Land parcel by Robert L. Ward, hereto after 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; hereto after referred to as the Three Basins Model (**Reference 10**). The Three Basins Model makes many assumptions based on the implementation of the Scottsdale Desert Greenbelt Flood Control Project improvements. In order to model current existing conditions, it was necessary to modify the Three Basins Model to adequately account for current conditions. This was first explored in the drainage report prepared for the design of offsite drainage for the south portion of Pima Road. Detailed information regarding the modeling utilized can be found in the *Pima Road DCR AZ101 to Thompson Peak Pkwy Final Hydrology and Preliminary Design Report* (**Reference 31**). Additional modifications were documented in the memorandum dated October 19th, 2005, and included in **Section 8.3**.

Portions of the Grayhawk Villages 2 and 3 (**Reference 22**) composite model (filename GH23E1K.H1I) were utilized and inserted to model the Deer Valley channel as designed. This appears to be the model that was utilized by Grayhawk to design the Deer Valley channel and other downstream drainage improvements.

In addition to the incorporation of the Deer Valley channel from the Grayhawk model, other modifications were required to the Three Basins model including additional subdivision of some of the subbasins, modifications to split flow parameters, and the addition of some new routes. These modifications are discussed in the following sections.

5.1.2 Recent Hydrologic Modeling Efforts

In addition to the previously mentioned hydrologic modeling, various recent hydrologic modeling refinements have been incorporated into the base model. Many of these are documented in **Section 3.1 Memoranda and Analyses**. Entellus initially modified the hydrologic model for Pima Road south of Deer Valley. This hydrology model was part of the *Pima Road DCR AZ101 to Thompson Peak Parkway Final Hydrology and Preliminary Drainage Design Report* (**Reference 31**), hereto after referred to as the Pima Road South Model, and accepted by the City of Scottsdale. Subsequent efforts were

engaged to model the Pima Road corridor north of Deer Valley, hereto after referred to as the Pima Road North Model (see **Section 3.1 Memoranda and Analyses** for details regarding the development of the Pima Road North Model) by modifying the Three Basins Model. These were initially modeled as hydrologically separate models, however, based on some field visits and discussions with the City of Scottsdale regarding possible drainage solutions for the entire Pima Road corridor, it was decided to combine the previously accepted Pima Road South Model with the Pima Road North Model to form a single hydrologic model with which to model various alternatives through the corridor. This combined model is the model described in the following sections.

5.1.3 Definition of Existing Conditions

Numerous iterations have been under taken to define what constitutes existing conditions for the watershed. At the heart of the issue is whether or not what appears to be a non-engineered wall (not a flood wall), which could potentially cause a significant diversion during a large flood event, should be modeled as diverting the flow or as though the wall did not exist. The wall in question is that of the Los Gatos subdivision along the west side of Pima Road immediately north of Deer Valley Road. The wall has various small openings to allow some flow through, but the quantity of flow allowed to pass would be minimal and many of these have been blocked or rendered inoperative.

The Three Basins Model by Stantec ignored the existence of the Los Gatos wall allowing all flow to cross through the subdivision along the washes historic paths. The initial modeling for the Pima Road corridor carried the same assumption forward from the Three Basins Model that the wall in essence did not exist. Although it is improbable that the wall would withstand the hydrostatic and hydrodynamic forces associated with a large flood event this assumption was revisited, the finality of which was the decision to model 2 existing conditions scenarios: with Los Gatos wall, and without Los Gatos wall. These two existing conditions scenarios are described further later in this report.

5.1.4 Model Notation

The same model notation from the Three Basins Model was utilized for the Pima Road North Model. The only differentiating items are the inclusion of subbasin boundaries from the *Deer Valley Road Channel Spillway Improvement Project* performed by Engineering and Environmental Consultants, Inc (EEC) for the City of Scottsdale (**Reference 33**). The subbasin boundaries were generated by EEC and provided to Entellus by the City. The notation of the subbasins, routes and concentration points reflects the original generator of the work with the prefix notation "SEEC", "REEC", and "CEEC" for subbasins, routes and concentration points, respectively. Additionally all model notation as previously utilized in the Pima Road South Model was kept as modeled in the combined Pima Road Model. See **Conceptual Plans**

Plate 1: Hydrology Map.

5.1.5 Subbasin Parameters

It was assumed that for all subbasins that did not require subdivision, the parameters in the Three Basins model were adequate. For the remaining subbasins (including the added subbasins from EEC) kinematic wave parameters were assigned based on current conditions. Some of the modified subbasins also included increases in the percent impervious to reflect current conditions in the subbasin.

Additionally, two small subbasins have been added to the hydrologic model. One subbasin (52A0) of 0.0369 sq miles begins on the west side of Pima at Deer Valley and continues to Thompson Peak Parkway, and the second (52B0) of 0.0188 sq miles begins on the west side of Pima at Thompson Peak Parkway and continues until Sierra Pinta. The TR-55 program was utilized to compute the SCS curve number for these additional subbasins. It was determined that both subbasins fall within an area of hydrologic soil group B and the majority of both subbasins are of the land use type open desert landscape, with a small portion of roadway and 52A0 contains a commercial site. The calculated CN for 52A0 and 52B0 are 85 and 83 respectively. Additionally, kinematic wave parameters were determined for the two subbasins.

5.1.6 Diversions and Storage

There where several diversions and splits incorporated or modified in the models to reflect existing conditions. The diversions identified apply to both the existing conditions with the Los Gatos wall and without Los Gatos wall unless otherwise specified. The model modifications are as follows:

- *Pima Road and Happy Valley Road*: In the Three Basins model, some of the flow arriving at Happy Valley Road was allowed to flow along Pima Road. From a field visit a large wet crossing and hump in Pima Road was observed that would prevent any flow from continuing along Pima Road and instead forces flow towards the Alta Sonora development. The diversion south along Pima Road was set to zero.
- *Pima Road and a ½ mile south of Happy Valley Road (De La O Road)*: From a field visit it was determined flow will cross Pima Road either just north or just south of De La O Road and enter Pinnacle Peak Estates. The flow continuing south along Pima Road was set to zero.
- *Pima Road just north of Pinnacle Peak Road*: An existing 2-3'x4.5' RCBC diverts flow to the west under Pinnacle Peak Road. Flow was diverted to the west up to the estimated capacity of the box culvert (234 cfs). All additional flow was allowed to continue south along Pima Road. See model for details (HEC-1 ID D36R1C).

- *Pima Road ~ 500ft to 1000ft south of Pinnacle Peak Road*: From field observations it was determined that all flow will cross Pima Road (whether by the existing 2-36" culverts or over the road) at or near C1A2F and flows into subbasin SEEC01 and the diversion card was modified to reflect this. See model for details (D1A2F).
- *Pima Road and Paraiso*: From field observation it was determined that all flow will cross Pima Road at or near C1A2E and enter subbasin SEEC04. A diversion was added to the model to reflect this. See model for details (D1A2E).
- *Pima Road and 200' north of 91st St.*: From field observation it was determined that all flow will cross Pima Road at or near C1A2D. A diversion was added to the model to reflect this. See model for details (D1A2D).
- *Pima Road 250' north of Country Club Trail*: This diversion accounts for the flow that crosses Pima Road just south of the intersection of Pima Road and 91st St. Based on the FLO-2D results (see **Section 5.3**), it was determined that a flow split in which approximately 87% of the flow crosses Pima Road to the west and through the Pinnacle Peak Country Club subdivision exists and the remaining 13% of the flow continues south along Pima Road. A diversion was added to the model to reflect this. See model for details (D1A2G).
- *Pima Road and 1000ft north of E. Los Gatos Dr.*:
    - *With Los Gatos Wall*: With the wall in place the flow simply crosses from the east side of Pima Road to the west side of Pima and continues south along the east easement. Therefore no flow is allowed to enter the Los Gatos subdivision at this point, and it is simply routed south along Pima Road. See model for details (D1B4)
    - *Without Los Gatos Wall*: Flow is allowed to cross the Los Gatos Wall, and at this location without the wall to contain the flows all runoff would enter the Los Gatos subdivision. See model for details (D1B4)
- *Just north of Pima Road and E. Los Gatos Dr*. This diversion occurs along the east side of the Los Gatos subdivision and Pima Road north of Los Gatos Dr. This diversion accounts for the flow that enters through the Los Gatos entrance, but actually crosses Pima Road north of the entrance. Based on the FLO-2D analysis (see **Section 5.3**) it was determined that all flow on the west side of the Pima Road (from concentration point C1B3) enters the Los Gatos subdivision through the entrance at E. Los Gatos Dr.. However, the flow coming from the east side of the Pima Road (subbasins S1B1 and S1B2) does not contribute to the flow entering the subdivision at this location. Thus this diversion occurs after the flow has been routed from C1B3 to the Los Gatos entrance but before the combine with flows from the east (C1B2). This condition exists for both existing conditions – with and without the Los Gatos wall. See model for details (D1B3)
- Pima Road and Los Gatos Dr:

- *With Los Gatos Wall*: This diversion only considers flow arriving at the intersection of Pima Road and Los Gatos Dr. from the east via subbasins S1B2 and S1B1. It was assumed that all flow arriving at this intersection from the north (route R1B3) had already crossed Pima Road and entered the Los Gatos subdivision at Los Gatos Dr. Based on the results of the FLO-2D analysis (see **Section 5.3**) flow from the east does not cross Pima Road at this intersection, instead, this flow crosses Los Gatos Dr. and continues south along Pima Road beyond Deer Valley. This assumes that the wall along the east side of the Los Gatos subdivision is in place and withstands the forces of the flood event. See model for details (D1B2).
- *Without Los Gatos Wall*: Similar to the with Los Gatos wall scenario except that flow continues south a distance and crosses Pima Road and enters the Los Gatos subdivisions. See model for details (D1B2).

- *Pima Road and Deer Valley*: It was assumed that flow along the Pima Road corridor reaching the Deer Valley Road alignment would continue south along Pima Road and not enter the Deer Valley channel. See model for details (D51.1D).
- *Deer Valley Channel Diversion to Grayhawk Golf Course ~ ½ mile west of Pima Road*: Under existing conditions all flow is directed towards the golf course and there is no diversion continuing west on the Deer Valley corridor. The existing Deer Valley Channel ends at this location and empties into the golf course to the south. See model for details (37AE).
- *Pima Road and Thompson Peak Parkway*: This diversion was previously modeled as a 30% diversion out of the watershed. However a FLO-2D analysis was conducted at this location to determine the existing conditions split. A rating curve was developed from the results showing a maximum of approximately 9.5% of the flow leaving the study area to the west. See **Section 5.4** for the analysis and detailed rating curve.
- *Pima Road Storm Drain at Thompson Peak Parkway*: The Pima Road South Model had previously assumed that the existing 2-60" inlets to the Pima Road storm drain were the only inlets to the storm drain. This assumption however, is no longer valid. Additional inlets to the Pima Road storm drain have been created including 48" inlet pipes at two separate locations, and numerous curb inlets along Thompson Peak Parkway near the Pima Road intersection (including one in an apparent sump condition) as well as other curb inlets along Pima Road closer to Sierra Pinta Drive. Because of this, the previous model, which only allowed 255 cfs to enter the storm drain, was modified to allow storm water to enter the pipe up to the pipes assumed capacity of 600 cfs. This was accomplished by modifying the diversion route PRSDEX in the HEC-1 model to allow the first 600 cfs into the storm drain.

- *Pima Road Between Thompson Peak Parkway and Sierra Pinta*: Previously a 30% diversion had been modeled as leaving the watershed over the Grayhawk wall and out of the model. Upon close examination of the channel and wall along the west side of Pima Road it was noted that there are two walls. One is a screen wall for Grayhawk and the other is a retaining wall protecting the buried storm drain pipe mentioned previously. At the location where the storm drain crosses Pima Road the retaining wall ends and at this location flow could spill over the top of the screening wall. Based on field observations, flow appears to have spilt over the wall in the past, but it is unlikely that a significant amount of flow would leave the system at this location. This loss is relatively inconsequential and may occur only during low frequency events (high flows); therefore the assumption was modified to allow no flow (0%) to spill over the wall to the west at this location. This was accomplished by modifying diversion D52W in the HEC-1 model.
- *Sierra Pinta and Pima Road*: The Pima Road South Model had assumed that flow from Sierra Pinta Drive reaches the intersection of Pima Road instead of simply flowing south. The previous Entellus drainage report documents the validity of this assumption (**Reference 31**). Upon field visits it appeared as though flow could potentially enter the intersection from the subbasin immediately adjacent to Pima Road along Sierra Pinta Drive, thus it was assumed that this assumption was valid.
- *Sierra Pinta Channel*: The previous Pima Road South Model (existing conditions), Entellus was directed by the City of Scottsdale to include the conceptually designed Sierra Pinta channel (maximum flow of 2200 cfs). This was subsequently removed from the existing conditions models and diversion associated with the design by Wood/Patel & Associates, Inc. (**Reference 32**) was included only in proposed conditions model.

There are several locations under existing conditions where storage was assumed and added to the model. Those locations are as follows:

- *Happy Valley Road Detention Basin*: This detention basin was modeled in the original Three Basins model but does not currently exist. However, for the purpose of this report we were directed by the City to model this basin based on the 10% design plans developed by Stantec (**Reference 23**). See model for details (HVDB-I).
- *La Mirada Pinnacle Peak / Pima Shopping Center #7DR-95*: From field observations three detention basins act as online storage at this location. Online storage was added to the model by means of a diversion card totaling 1.61 acre-ft. See the model for details (DS-R1D).
- *Desert Village Retail Center #1365*: From field observations detention basins act as online storage at this location. Online storage was added to the model by

means of a diversion card totaling 3.18 acre-ft (**Reference 42**). See the model for details (DS-A2E).

- *Mirage Village #25-DR-96*: From field observations a detention basin acts as online storage at this location. Online storage was added to the model by means of a diversion card totaling 0.81 acre-ft (**Reference 43**). See the model for details (DS-A2A).
- *Cañada Vistas WP#93075*: From field observations a detention basin acts as online storage at this location. Online storage was added to the model by means of a diversion card totaling 1.67 acre-ft (**Reference 44**). See the model for details (DS-1B4).
- *Pima Road and Deer Valley Detention Basin*: This is the DC ranch detention basin on the corner of Pima Road and Deer Valley. Online storage was added to the model by means of a diversion card totaling 4.5 acre-ft. (DETPDV)
- *Grayhawk Sedimentation Basin along Deer Valley Road*: A stage-storage-discharge relationship was added for the online basin along the Grayhawk property and Deer Valley alignment approximately 1 mile west of Pima Road. The maximum storage of the basin was approximated as being 4.04 acre-ft. This was based on field survey of the basin (See **APPENDIX A**). See model for details (D37A2).

5.1.7 Route Parameters

Whenever possible the original routing parameters from the Three Basins Model (normal depth) or Pima Road South (normal depth and kinematic wave) models were maintained. However, several new routes were added and a few existing routes were modified to better meet the needs of this project. The normal depth methodology was used in the development of all routes that were added to the model with the exception being the modeling of the Pima Road storm drain under the proposed conditions which utilizes kinematic wave routing. The geometry for the new normal depth routes were obtained from the topography and aerial photography supplied by the City. Modifications to existing kinematic wave routes were limited to minor adjustments to better represent the current conditions.

5.1.8 Precipitation Input

No modification to the precipitation data was needed for the 100-year 6-hour analysis. The Three Basins models utilized a 6-hour duration storm with a total precipitation depth of 3.40 inches (NOAA 2) and used the PH card to input the hypothetical storm into the model. The PH card was modified to model the 10 and 2-year storm events. The additional precipitation data was generated as part of the *Pima Road DCR AZ101 to Thompson Peak Parkway Design* report (**Reference 31**) and is shown in **APPENDIX A**.

5.1.9 Model Modifications for Proposed Conditions

There were several modifications that were needed in order to model the proposed conditions as shown on **Figure 1.1.2**.

5.1.9.1 Pima Road Retention

Existing retention along the east side of Pima Road between Pinnacle Peak and Country Club Trail was removed from the model. This is due to the Proposed Pima Road channel that replaces these retention basins.

5.1.9.2 Pima Road Channel and Storm Drain (North of Deer Valley)

The routes along the proposed alignment of the Pima Road channel were modified to reflect the proposed geometry and slope of the channel. Additionally, the proposed Pima Road storm drain (north of Deer Valley) was added by modifying the route geometry at that location. Kinematic wave modeling in HEC-1 allows for the input of pipes within the model, and so this was utilized for the storm drain. Only single pipes can be modeled using this methodology in HEC-1, so diversions and parallel routings equal to the number of pipes were utilized to model the multiple pipes.

5.1.9.3 Pima Road Diversions

The diversions along Pima Road from Pinnacle Peak to Los Gatos Dr. were modified. The proposed improvements remove all flow diversions across Pima Road south of Pinnacle Peak and north of Los Gatos Dr. with the exception of the existing pipe culverts (2-36" pipes) approximately 500' south of Pinnacle Peak Road. The proposed improvements allow up to the estimated existing capacity of the culverts (100 cfs) to continue crossing Pima Road (HEC-1 ID D1A2F). No modifications were made to diversions north of Pinnacle Peak.

The diversion into the Grayhawk golf course (HEC-1 ID 37AE) was modified. The proposed improvements mimic the design flows of the Deer Valley channel (without freeboard). Thus a rating curve based on the conceptual design of a structure at that location was created and added to the HEC-1 model. The flow into the golf course matches the design flow into the golf course by PACE (**Reference 37**). See the Deer Valley Project Assessment Report for details (**Reference 34**).

Diversions for the Sierra Pinta Channel were modified to reflect future improvements along Sierra Pinta Channel and Pima Road. These diversions, DVSP1, DVSP2 and DVSP3 remove all flow up to the maximum capacity of the Sierra Pinta channel (1328 cfs) as designed by Wood/Patel & Associates, Inc. (**Reference 32**) and route it to the Pima Road channel. All flow above the channel design capacity continues south along its natural course through the Pima Acres subdivision.

5.1.10 Existing Conditions Hydrology Results

Table 5.1 lists key HEC-1 ID's and their descriptions. While there are many other key locations in the models those listed are of particular interest to the proposed drainage solutions in this report. See **Conceptual Plans**

Plate 1 and Plate 2 for locations of concentration points.

HEC-1 ID	HEC-1 ID Description
C36R1C	North of Pinnacle Peak (prior to box culvert diversion across Pima Road)
C36R1D	Total flow arriving at intersection of Pima Road and Pinnacle Peak.
C1A2F	Flow along Pima Road, ~500-1000 ft south of Pinnacle Peak prior to pipe and wet crossing
C1A2E	Pima Road at E. Paraiso Dr.
C1A2D	Pima Road ~200-300 ft north of 91st St.
C1A2C	Pima Road at 91st St.
C1A2G	Pima Road ~ 250 ft north of Country Club Trail
C1B4	Pima Road ~ 400 ft south of Country Club Trail
C1B3	Pima Road ~ 600 ft north of E. Los Gatos Drive
C1B2	Pima Road: flow arriving along east side of Pima Road that does not cross Pima Road through the Los Gatos entrance
CD1A2G	Total flow entering the Los Gatos subdivision near the Los Gatos entrance (includes flow just north of E. Los Gatos Dr. from C1B3 and flow just south of e. Los Gatos Dr.)
DO1B2	Flow continuing south along Pima Road beyond the Deer Valley alignment.
D51.1D	Pima Road and Deer Valley – This is the split flow to the Deer Valley Channel from Pima Road
CEEC05	Flow arriving at diversion to Grayhawk golf course (37AE/37AW)
37AE	Approximately ½ mile west of Pima Road along Deer Valley alignment – Diversion into Grayhawk golf course
C37A2	Approximately 1 mile west of Pima Road along Deer Valley alignment – Flow arriving at Grayhawk detention basin prior to entering golf course.

HEC-1 ID	HEC-1 ID Description
C52A	Flow arriving at the intersection of Pima Road and Thompson Peak from the east
DV52AW	Pima Road and Thompson Peak – Split flow to the west and out of the watershed.
PRSD	Flow entering the Pima Road storm drain just northeast of the intersection of Pima Road and Thompson Peak.
CPCH3	Pima Road and Sierra Pinta – Total flow arriving at the intersection.
DV52W	Pima Road between Thompson Peak and Sierra Pinta - Split flow over wall and out of watershed
UHIC2	Pima Road and Union Hills – Flow along Pima Road Channel

Table 5.1: Summary of HEC-1 ID Descriptions

The results of the existing conditions hydrologic modeling follows what was observed in the field along Pima Road. That being that runoff flows along Pima Road along the east and west sides, in some instances but eventually all flow crosses and exits the roadway to the west mostly through a series of wet crossing along the road.

Table 5.2 shows a summary of peak flows for different storm frequencies at some of the key project drainage facility locations. See **Conceptual Plans**

Plate 1 and **Plate 2** in **APPENDIX K** for the hydrology map and **APPENDIX A** for the HEC-1 output files.

	With Los Gatos Wall			Without Los Gatos Wall		
	2-Yr [cfs]	10-Yr [cfs]	100-Yr [cfs]	2-Yr [cfs]	10-Yr [cfs]	100-Yr [cfs]
C36R1C	103	399	1140	103	399	1140
C36R1D	36	317	1300	36	317	1300
C1A2F	36	318	1306	36	318	1306
C1A2E	0	0	0	0	0	0
C1A2D	4	13	33	4	13	33
C1A2C	9	38	169	9	38	169
C1A2G	10	36	174	10	36	174
C1B4	1	4	21	1	4	21
C1B3	22	82	256	20	79	239
C1B2	9	36	115	9	36	115
CD1A2G	21	82	254	29	112	343
DO1B2	9	36	115	0	0	0
D51.1D	0	0	0	0	0	0
CEEC05	59	196	632	70	227	743
37AE	0	0	0	0	0	0
C37A2	106	381	1504	106	381	1504
C52A	384	1351	3388	381	1338	3355
DV52AW	6	121	274	6	120	273
PRSD	377	600	600	375	600	600
CPCH3	437	1511	3995	434	1500	3963
DV52W	0	0	0	0	0	0
UHIC2	861	3170	8732	858	3153	8689

Table 5.2: Existing Conditions Hydrology Summary Table

5.1.11 Proposed Conditions Results

The proposed conditions entails significantly higher peak flows along Pima Road from Pinnacle Peak to Deer Valley due to the removal of the diversions to the west. The full 100-year peak discharge is carried in the proposed Pima Road channel south of Pinnacle Peak, the Pima Road storm drain, and the Pima Road channel south of Deer Valley. The peak discharge in the Pima Road channel south of Pinnacle Peak was estimated as being approximately 1300 cfs prior to the 2-36" culvert diversion across Pima Road and approximately 1200 cfs after the diversion. The estimated peak discharge to the Pima

Road storm drain is approximately 1260 cfs and the estimated discharge for the Pima Road channel south of Deer Valley is approximately 3350 cfs.

The first segment of the proposed Deer Valley channel (prior to the diversion to the golf course) has an estimated peak discharge of approximately 1310 cfs with approximately 640 cfs being diverted into the Grayhawk golf course and the remaining 670 cfs continuing along the Deer Valley channel to the west. The peak discharge arriving at the Grayhawk sedimentation basin at the end of the Deer Valley channel is approximately 1075 cfs.

	Proposed Conditions		
	2-Yr [cfs]	10-Yr [cfs]	100-Yr [cfs]
C36R1C	103	399	1140
C36R1D	36	317	1300
C1A2F	34	310	1291
C1A2E	28	270	1188
C1A2D	28	266	1185
C1A2C	28	271	1206
C1A2G	27	264	1199
C1B4	27	265	1202
C1B3	39	278	1241
C1B2	47	284	1258
CD1A2G	0	0	0
DO1B2	47	284	1258
D51.1D	47	284	1257
CEEC05	80	297	1308
37AE	40	150	669
C37A2	134	400	1074
C52A	379	1331	3337
DV52AW	114	401	273
PRSD	267	600	600
CPCH3	792	2531	5291
DV52W	0	0	0
UHIC2	821	2994	8723

Table 5.3: Proposed Conditions Flow Summary

5.2 Pavement Drainage Facilities

5.2.1 Criteria

The pavement drainage analysis was performed for the proposed Pima Road roadway improvements which include Pima Road from Pinnacle Peak to 1400 feet north of

Thompson Peak Parkway to size and space catch basins and scuppers. The design criteria were to maintain one 12 foot dry driving lane in each direction and not to overtop the curb during a 100-year storm event.

5.2.2 Methods

The pavement flows were estimated by utilizing the Rational Method as described in the Flood Control District of Maricopa County's Hydrology Manual (**Reference 35**). This methodology bases peak flow estimates on contributing area, rainfall intensity and a run-off coefficient. Rainfall intensity was determined through utilizing the District's published IDF (intensity-duration-frequency) curves, and the velocity was estimated by manning's equation. A run-off coefficient of 0.95 was utilized for all pavement calculations. HY-22 (**Reference 36**) was then utilized for the sizing of all catch basins and scuppers, the determination of the roadway flow spread and all other hydraulic calculations.

5.2.3 Results

A summary of the contributing area and peak flows can be found in **Table 5.4. Table 5.5** summarizes the outlet location and the opening type. Drainage areas 1 and 2 will outfall into existing 36-inch box culverts at station 205+00. Drainage area 3, 4, and 6 will outfall into proposed channel. Drainage area 5 will outfall to the golf course through wall openings, south of Paraiso Drive. Drainage areas 7 to 16 will outfall into proposed storm drain pipes. Drainage areas 17 to 20 will outfall into existing road side ditches. See the plans and **APPENDIX B** for details.

Drainage Area #	Contributory Area [ft^2]	Q_{10} [cfs]	Q_{100} [cfs]
West Side of Pima Road			
1	24,000	3.1	4.7
3	32,000	4.2	6.3
5	17,100	2.2	3.4
7	46,000	6.0	9.0
9	34,000	4.4	6.7
11	29,800	3.9	5.8
13	15,700	2.1	3.1
15	20,000	2.6	3.9
17	42,300	5.5	8.3
19	24,300	3.2	4.8
East Side of Pima Road			
2	28,000	3.7	5.5
4	37,900	5.0	7.4
6	32,400	4.2	6.4
8	35,500	4.6	7.0
10	34,800	4.6	6.8
12	26,200	3.4	5.1
14	21,200	2.8	4.2
16	20,100	2.6	3.9
18	42,000	5.5	8.2
20	29,000	3.8	5.7

Table 5.4: Pavement Analysis Peak Flow Summary

Location of Outlet	Drainage Area ID	Opening [ft]	Q By-Pass [cfs]	Opening Type
West Side of Pima Road				
205+25	1	14.5	0.2	catch basin
199+30	3	22.5	0.0	catch basin
196+40	5	12	0.1	scupper
185+57	7	22.5	0.5	catch basin
177+00	9	14.5	1.0	catch basin
171+60	11	22.5	0.0	catch basin
167+00	13	14.5	0.0	catch basin
162+00	15	14.5	0.1	catch basin
152+00	17	16	0.9	scupper
146+34	19	16	0.5	scupper
East Side of Pima Road				
205+74	2	14.5	0.4	catch basin
198+84	4	22.5	0.2	catch basin
192+55	6	14.5	0.8	catch basin
185+57	8	22.5	0.2	catch basin
177+00	10	22.5	0.1	catch basin (sump)
171+60	12	10.5*	0.0	catch basin
167+00	14	14.5	0.3	catch basin
162+00	16	14.5	0.2	catch basin
152+10	18	16	1.2	scupper
145+50	20	16	0.8	scupper

Table 5.5: Pavement Analysis Outlet Location and Opening Summary

5.3 FLO-2D Analysis – Pinnacle Peak to Deer Valley

This FLO-2D analysis was initially performed in 2007. Two base models were generated originally, one for existing conditions assuming the Los Gatos wall failed and the other assuming a conveyance structure along Pima road would intercept most of the flow (similar to the current proposed infrastructure). A third model was generated in 2009 to model the existing conditions with the Los Gatos wall in place. The modeled flows and proposed infrastructure does not exactly match what is currently being proposed in this drainage report. The concept of picking up all flow along Pima Road and conveying it south towards the Deer Valley alignment via a channel and subsequent storm drain remains the same. The concept at the time for the existing conditions was to assume that the Los Gatos wall did not prevent the passing of flow and all flow was allowed to continue through the Los Gatos subdivision. It was not until early 2009 that through ensuing discussions and analyses with the City it was decided to look at two different existing conditions for the drainage plan: one with the Los Gatos Wall in place and one without the wall. Additionally, the initial FLO-2D models were generated utilizing FLO-2D version 2006.01 (**Reference 29**).

A follow up to these initial models targeted at determining the flow split through the Los Gatos entrance with the varied existing conditions assumptions that the Los Gatos Wall was in place was performed in 2009 utilizing FLO-2D version 2007.06 (**Reference 38**). See **Section 5.3.11** for details on this analysis.

5.3.1 Models and Assumptions

The flood flow simulation was modeled utilizing the FLO-2D Flood Routing Simulation model version 2006.01 (**Reference 29**). FLO-2D is a quasi-2 dimensional numerical model that is accepted by FEMA as meeting the requirements for use under the National Flood Insurance Program (**Reference 30**). A flood simulation was performed for three model conditions:

- Existing topographic conditions (assuming Los Gatos wall was not in place 2007)
- Proposed conditions (channel / storm drain on east of Pima Road 2007)
- Existing topographic conditions (assuming Los Gatos wall in place 2009)

5.3.2 FLO-2D Grid

FLO-2D utilizes a square grid cell over which parameters are lumped and estimated. The model run time is directly dependant on the number of grid cells in the model and thus the selected grid size. For this model, a 15-foot grid was chosen resulting in a modeling grid composed of approximately 75,000 cells. A model simulation time of 10 hours was adequate to route all flows through the system.

5.3.3 Model Elevation Datasets

Three elevation datasets were utilized for the FLO-2D modeling. The base elevation dataset for both the existing conditions and proposed conditions model was an existing conditions DEM provided by the City of Scottsdale in 2007 with supplemental survey performed by Entellus along the Pima Road corridor (2005 to 2007). The Entellus survey data was exclusively utilized along the roadway corridor. The proposed improvements model utilized Autodesk's Civil 3D software to generate elevation data for the preliminary Pima Road and Pima Road Channel. This elevation data replaced the existing elevation data which was checked for accuracy, and modified as necessary to accurately represent proposed condition configuration.

5.3.4 Manning's "n" Values

Manning "n" values are defined for the entire modeling area for existing and future conditions and can be seen in **Figure 5.3.1** and **Figure 5.3.2**. Minor modifications were made for the future conditions. Manning "n" values were assigned in a very broad scale

utilizing the aerial photography provided by the City of Scottsdale and are summarized below in **Table 5.6**.

Manning's "n" Value	Description
0.016	Roadway
0.022	Commercial
0.028	Residential
0.030	Golf Course
0.035	Desert Landscape

Table 5.6: FLO-2D Manning's "n" Values

5.3.5 Model Boundary

The boundary chosen for the FLO-2D model was selected based on the needs of the program to model the area from Pima Road to the Deed Valley Channel which requires the model to begin a sufficient distance upstream of Pinnacle Peak Road and continuing to the Deer Valley Channel.

5.3.6 Flow Input/Outflow locations

There are 15 input locations used in the FLO-2D model as shown in **Figure 5.3.3**. The inflow hydrographs were taken from the existing conditions hydrologic model and placed just upstream of the concentration point locations. This allows the flow to spread over many cells, as would occur in normal conditions prior to reaching Pima Road instead of being a point discharge. The original purpose of the model was to determine the impacts directly on Pima Road under existing and proposed conditions. Thus only inflow hydrographs for areas draining to Pima Road were included in the model. No inflow locations to the west of Pima Road were considered in this modeling effort. Outflow locations were placed on the western and southern model boundary to allow flows to exit the model. If no outflow locations are specified the model simply show ponding against the lowest boundary cells.

5.3.7 Cross-Section Locations

FLO-2D can provide hydrographs for any cross-section of adjacent cells specified within the simulation area. Cross-sections can be placed in strategic locations such as existing culverts, wet crossings and current areas of interest throughout the model to determine the flow passing through it. 43 cross-sections were placed for the existing conditions model. See **Figure 5.3.4** for existing conditions FLO 2D cross-section locations. Additional cross-sections were placed along the preliminary proposed Pima Road channel alignment and the existing Deer Valley channel to evaluate future conditions. Some of the cross section numbers changed from the existing FLO 2D model. See **Figure 5.3.5** for future conditions cross-section locations. Because FLO-2D version 2006.01 limits

the number of cells that can be utilized in a given cross-section, in order to get the complete flow for some reaches multiple cross sections must be combined (such is the case for cross-sections #3 and 4).

5.3.8 Existing Conditions (2007 Flo-2D Model)

Figure 5.3.6 through **Figure 5.3.11** show the existing conditions flow depth for the 2, 5, 10, 25, 50 and 100-year events for the modeling area without Los Gatos wall. **Figure 5.3.12** illustrates the FLO 2D, existing conditions velocity for the 100-year event. A summary of the cross-sectional peak flows can be found in **Table 5.7**.

As shown in **Figure 5.3.6** through **Figure 5.3.14**, large flows cross Pima Road through culverts and along wet crossings following the existing topography. These flows are discharged westward to existing residential and commercial development including Pinnacle Peak Country Club and Los Gatos and eventually arrive at the Deer Valley Channel.

FLO-2D Existing Conditions Flow Summary						
X-Section ID	**2yr-Peak** [cfs]	**5yr-Peak** [cfs]	**10yr-Peak** [cfs]	**25yr-Peak** [cfs]	**50yr-Peak** [cfs]	**100yr-Peak** [cfs]
X-Sec 1	0.16	5.57	20.70	116.81	162.89	259.53
X-Sec 2	0.00	0.31	16.81	58.27	98.16	141.24
X-Sec 3,4	0.00	1.29	6.68	43.74	67.10	103.04
X-Sec 5,36	0.00	3.86	53.37	67.89	71.13	71.56
X-Sec 6	0.00	1.80	36.61	48.75	51.74	52.34
X-Sec 8,9	2.81	6.15	21.86	24.20	25.98	28.44
X-Sec 12	0.00	11.49	84.64	83.75	85.87	87.38
X-Sec 15	5.17	14.21	35.32	53.23	56.41	89.58
X-Sec 17	3.30	10.47	23.00	39.21	42.58	69.67
X-Sec 18	2.59	11.31	22.97	38.56	46.50	69.50
X-Sec 20	0.00	1.35	2.62	7.83	18.15	27.06
X-Sec 22	18.45	42.38	67.18	117.80	170.30	206.40
X-Sec 23	16.34	37.83	55.64	99.19	145.12	178.07
X-Sec 24	7.04	14.97	25.45	52.37	74.00	101.23
X-Sec 25,26	14.21	38.07	62.57	99.14	136.66	179.37
X-Sec 27	2.40	5.37	9.97	22.14	33.49	56.90
X-Sec 30,31	0.08	3.75	4.97	10.17	17.63	24.10
X-Sec 32	0.76	2.32	4.92	7.34	11.00	19.38
X-Sec 33	1.76	4.42	9.92	24.59	37.40	51.14
X-Sec 34	0.00	6.04	19.00	48.91	85.88	125.50
X-Sec 35	1.56	4.78	9.29	18.02	26.27	38.73
X-Sec 37	2.37	5.18	51.42	102.42	150.08	175.99
X-Sec 38	46.36	112.84	135.26	186.57	270.62	333.76
X-Sec 39	7.70	20.43	60.24	81.72	108.33	116.62

X-Sec 40	0.00	26.17	125.12	197.78	246.60	268.27
X-Sec 41	46.00	138.74	271.79	387.80	484.39	563.49
X-Sec 42	119.20	198.27	141.60	164.67	214.38	289.74
X-Sec 43	0.05	0.08	12.47	45.95	69.04	100.97

Table 5.7: FLO-2D Existing Conditions Flow Summary

5.3.9 Future Conditions (2007 FLO-2D Model)

The proposed infrastructure modeled was a channel along the east side of Pima from Pinnacle Peak to the beginning of the State Land parcel with sufficient capacity to convey the 100-year flows followed by a storm drain with sufficient capacity to convey the 50-year flows and maintain the 100-year flow within the street cross-section. As mentioned before this model was prepared prior to the final configuration of the proposed improvements were finalized and may not match this final configuration.

Figure 5.3.13 illustrates the proposed conditions flow depth for the 100-year event and **Figure 5.3.14** shows the velocity for the same event. A summary of the peak flows for the more relevant cross-sections are shown below in **Table 5.8**. As can be seen in the plates, the channel is able to convey the flow south without inundating the road, and at the transition to the storm drain flow is allowed to leave the channel area and flow within the street. The only spillage out of the street cross section occurs when local flows enter the roadway. These could be minimized by storm drain lintels along this stretch of Pima Road. Additional storm drain inlets, however were not modeled in the FLO-2D analysis.

Proposed Conditions Flow Summary			
X-Section ID	**100yr-Peak** [cfs]	**X-Section ID**	**100yr-Peak** [cfs]
X-Sec 1	0.26	**X-Sec 37**	266.07
X-Sec 3	91.90	**X-Sec 38**	0.85
X-Sec 4	999.48	**X-Sec 39**	299.82
X-Sec 6	1309.58	**X-Sec 40**	1.02
X-Sec 8,10	106.13	**X-Sec 41**	4.80
X-Sec 9	243.93	**X-Sec 42**	284.67
X-Sec 11	16.09	**X-Sec 43**	274.25
X-Sec 12	1169.97	**X-Sec 44,45**	7.09
X-Sec 16	1172.52	**X-Sec 46**	293.01
X-Sec 24	1200.93	**X-Sec 47**	1024.74
X-Sec 29	0.98	**X-Sec 48**	1023.38
X-Sec 30	154.75	**X-Sec 49**	1021.41
X-Sec 31	0.00	**X-Sec 50**	1017.50
X-Sec 32	233.22	**X-Sec 51**	650.00
X-Sec 34	3.15	**X-Sec 52**	200.00
X-Sec 35	56.30	**X-Sec 53**	105.00
X-Sec 36	285.17	**X-Sec 54**	1030.00

Table 5.8: FLO-2D Proposed Conditions Flow Summary

Cross-section 6 was placed near the input hydrograph and utilized to ensure that the model was inputting this hydrograph correctly. The data matches well: Subbasin S1A3F - 1306 cfs while cross-section 6 - 1310 cfs.

As shown on the corresponding plates, the proposed alternative will significantly decrease the amount of flow crossing Pima Road. In this initial analysis flows were allowed to cross Pima Road along existing culvert locations including just north of Pinnacle Peak and approximately 500 feet south of Pinnacle Peak. Proposed conditions cross-section #52 was placed downstream of the existing culvert just north of Pinnacle Peak Road and resulted in flows for a 100-year, 6-hour event of 200cfs and proposed conditions cross-section #53 was placed downstream of the culvert 500 feet south of Pinnacle Peak and had a peak flow of 105 cfs..

The Los Gatos residential development has had a history of drainage complaints including storm water crossing Pima Road via wet crossings. Cross-sections 30 through 32 were placed in strategic locations to evaluate existing flooding conditions. The model shows that under proposed conditions the flows entering the Los Gatos subdivision are substantially reduced. These flows could be completely removed by modifying the street cross section, and/or increasing the capacity of the storm drain and adding additional inlets to the storm drain for local flows.

Proposed conditions cross-sections 6, 12, 16 and 24 were placed along the preliminary proposed Pima Road Channel alignment to evaluate future conditions. Since the preliminary Pima Road channel designed for flows of a magnitude of approximately 1300 cfs, the FLO 2D model shows that flows will be contained within the proposed channel. At the end of Pima Road channel near Via de Luna, proposed cross-section #54, 1030 cfs peak flow for the 100-year 6 hour event, represents the amount of flow that the storm drain will have to carry. The 100-year flow for this analysis was allowed to spill out of the culvert but was restricted to within the new Pima Road cross-section.

The total maximum peak flow that exits the model along Pima Road at Deer Valley is approximately 300 cfs. This flow was not combined in the Deer Valley channel. The model shows that the peak flow in the Pima Road channel ranges from 1100 to 1300 cfs. Also, the 100-year peak flow in the Deer Valley channel is 1025 cfs, however this flow does not include local flows contributing from the west side of Pima Road. Modifications were made to the model to contain the flow within the existing Deer Valley channel. This may be due to the lack of adequate elevation data (at the time of the analysis), or lack of channel capacity. No field survey or verification as to the exact size or capacity of the channel was conducted at the time of this analysis for this modeling exercise.

This hydraulic analysis shows that the initial proposed infrastructure is hydraulically feasible and would potentially provide significant flood reduction and protection to the area.

5.3.10 Summary of the Initial Proposed Improvements along Pima Road Corridor for FLO-2D Analysis (2007)

The following list summarizes the modeling outcomes as to the proposed improvements that would be required along the Pima Road corridor from the 2007 FLO-2D analysis. These items are taken primarily from the memorandum produced for the FLO-2D analysis and can be found in their entirety in **Section 8.7**. These do not necessarily represent the current proposed improvements along the Pima Road corridor.

- Improve basins on the northeast corner of Pinnacle Peak and Pima Roads - These improvements may include the construction of a dike to prevent flow from spilling into Pima Road. This could also be hydraulic improvements to convey the flow into the Pima Road channel.
- Upsize culvert across Pinnacle Peak from basins to proposed Pima Road channel
- Construct ½ mile Pima Road channel from Pinnacle Peak Road to Via de Luna. The new channel would be designed following the City of Scottsdale standards. This area would require an earthen channel with a bottom width of approximately 60 feet and side slopes of 4 to 1 feet with a total capacity of approximately 1,300 - 1,400 cfs. All culverts along the proposed channel location would need to be upsized appropriately to convey the capacity of the channel flow.
- Design and construction of an approximate ½ mile long storm drain. The storm drain would need to be adequately designed depending on final design criteria (allowing spillage onto Pima Road, 50 vs. 100-yr etc.), but would consist approximately of a four barrel 10' X 5' box culvert
- Deer Valley channel improvements. If the City decides to daylight the storm drain into the Deer Valley channel, the upstream end of the channel would need to be modified to be able to daylight the culvert as well as an increase in capacity to handle the increased peak discharge. It appears that adequate easements are in place to be able to improve this channel.
- Pima Road Storm drain: If the City decides to continue the proposed storm drain further south along Pima Road additional analysis will be needed to determine its impacts on the downstream area.

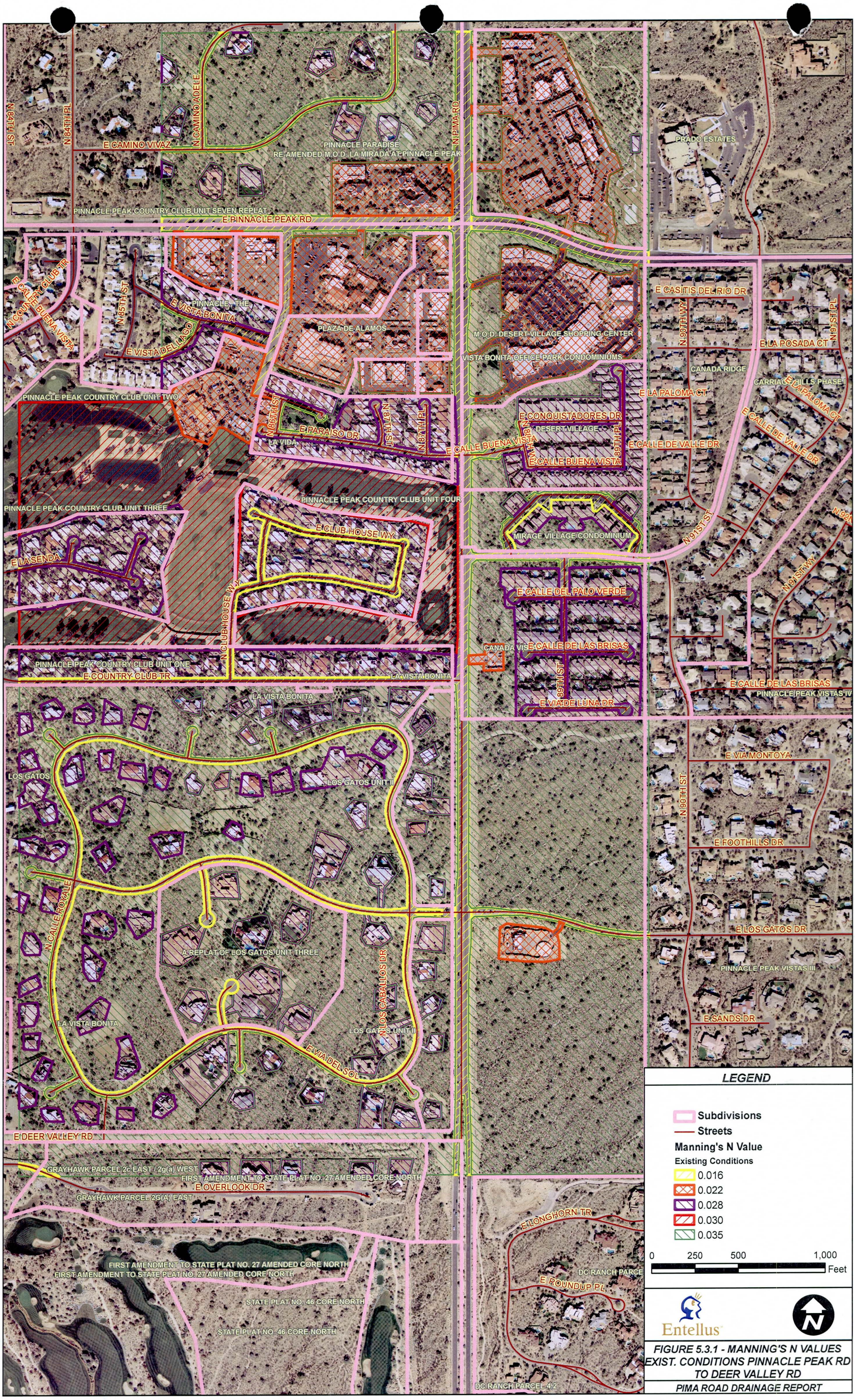
5.3.11 Existing Conditions with Los Gatos Wall (2009 FLO-2D Model)

In 2009, various discussions regarding the "existing conditions" versus what constituted "historical conditions" of the watershed were held. The finality of the discussions was

(as described in Section **5.1.3**) to model two separate existing conditions: one with the Los Gatos wall and one without Los Gatos wall. Additional discussion was held regarding flows entering the Los Gatos entrance at E. Los Gatos Dr. To determine the flow entering the Los Gatos entrance, another FLO-2D model was utilized.

This FLO-2D model utilized the latest version of FLO-2D version 2007.06 (**Reference 38**) and took the previous existing conditions model (without the Los Gatos wall) and added a wall to the model. The wall was added by simply raising the grid cells along the wall alignment by 10 feet. Additional cross-sections were added to the model to determine the various flow splits at the entrance. The maximum flow depth and added cross-sections can be seen on **Figure 5.3.15**. As can be seen in the figure, the flow from the north of the Los Gatos entrance crosses to the west side of Pima Road (shown as higher flow depth) and then almost completely enters the Los Gatos entrance at E. Los Gatos Dr. Flow from the east of E. Los Gatos Dr. crosses and continues south without adding significant flow into the Los Gatos entrance.

The finality of this model was to modify the existing conditions (with Los Gatos wall) HEC-1 model to properly model the flow splits along the Los Gatos subdivision.



LEGEND

- Subdivisions
- Streets

Manning's N Value

Existing Conditions

- 0.016
- 0.022
- 0.028
- 0.030
- 0.035

0 250 500 1,000 Feet

Entellus

FIGURE 5.3.1 - MANNING'S N VALUES EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

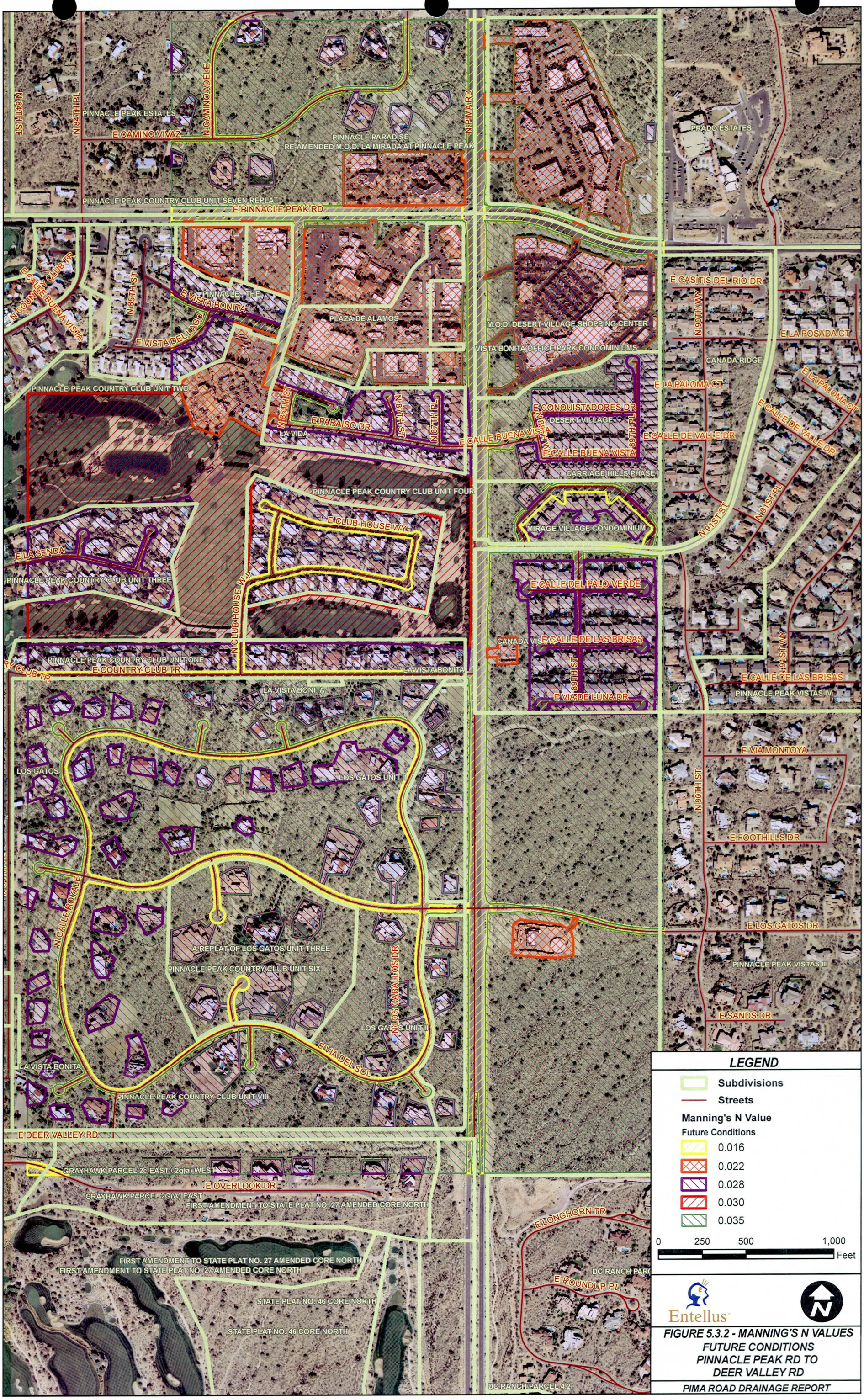


FIGURE 5.3.2 - MANNING'S N VALUES FUTURE CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

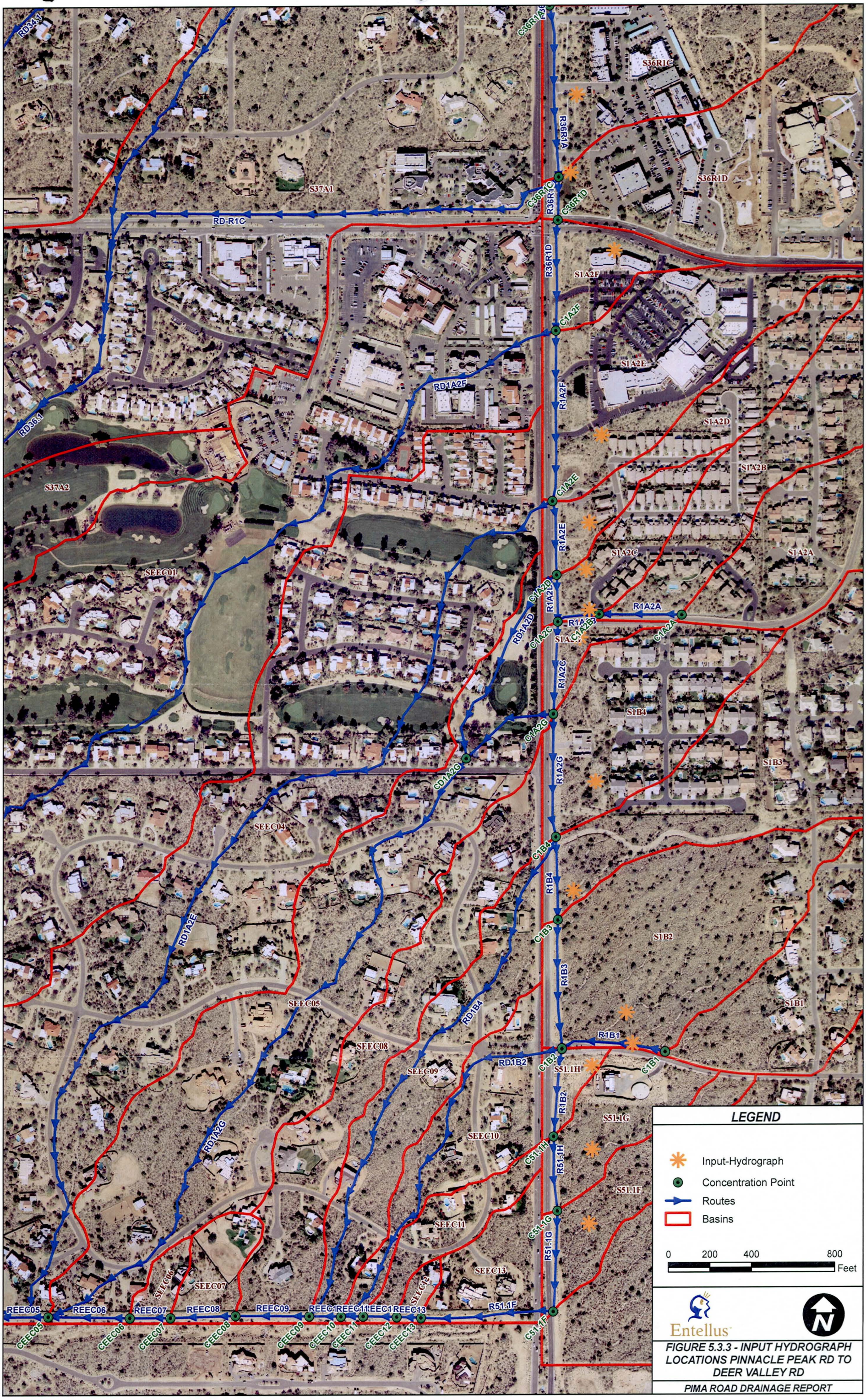
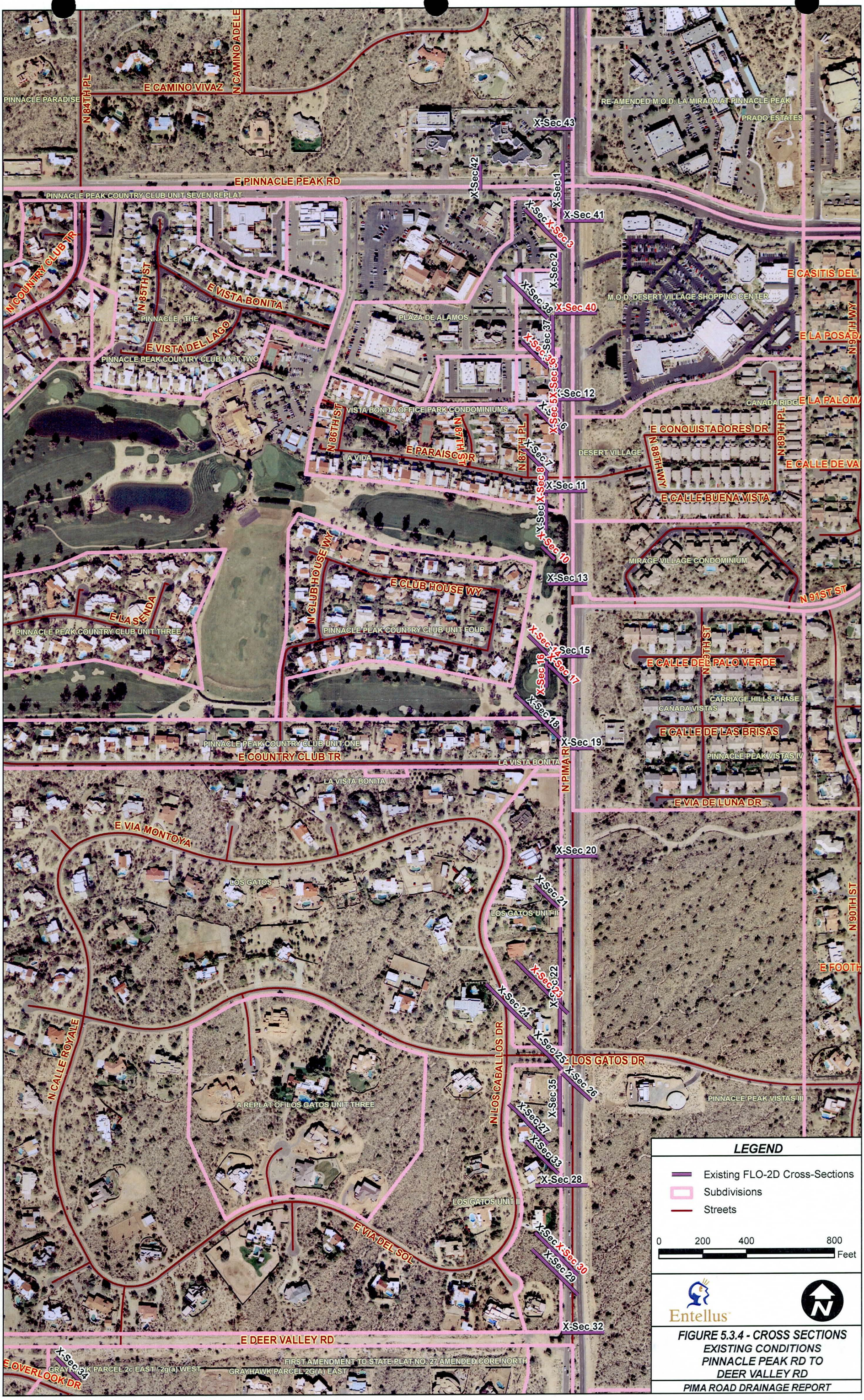
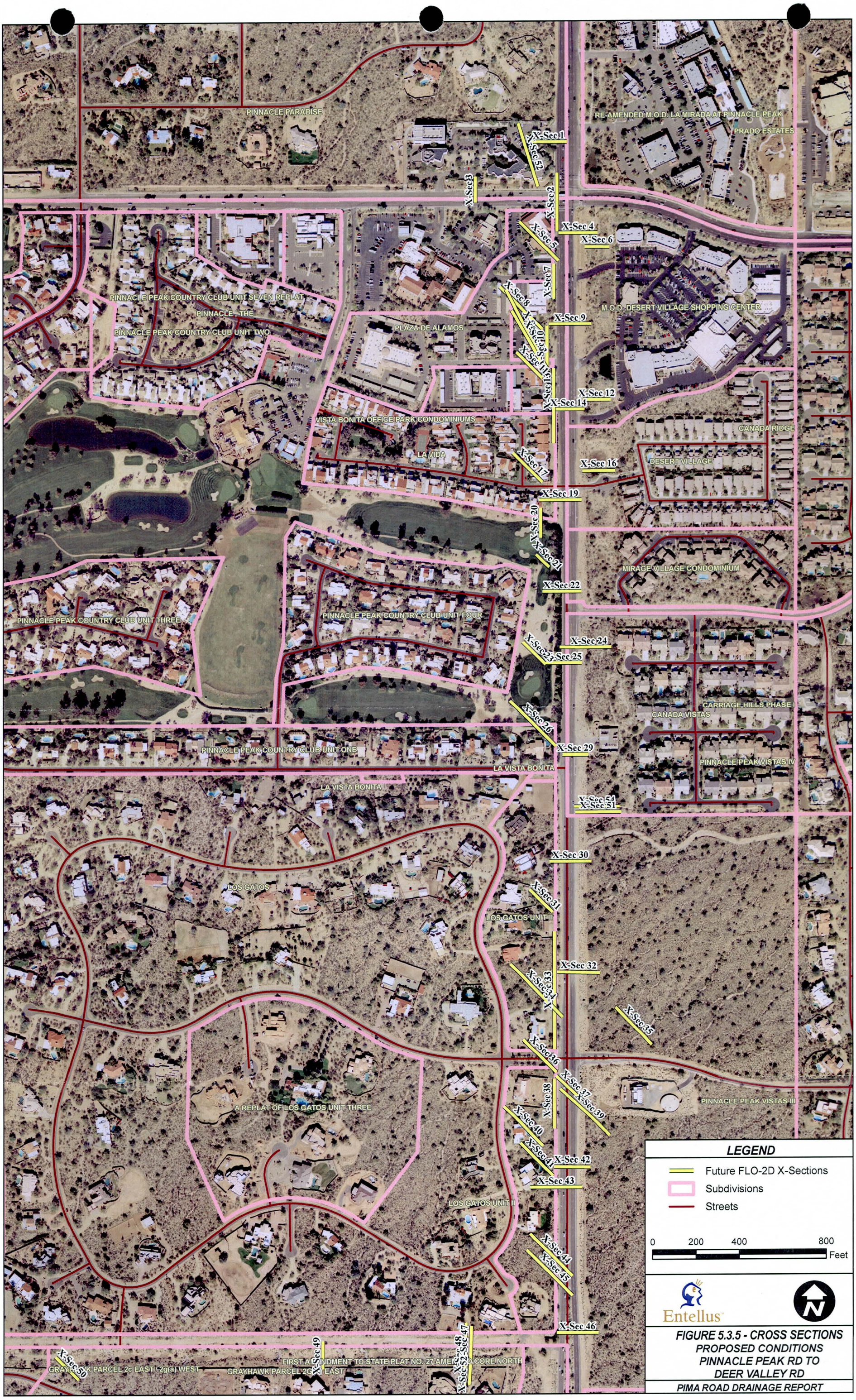


FIGURE 5.3.3 - INPUT HYDROGRAPH LOCATIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT


E CAMINO VIVAZ
N CAMINO ADELE
N 84TH PL
PINNACLE PARADISE
E PINNACLE PEAK RD
PINNACLE PEAK COUNTRY CLUB UNIT SEVEN REPLAT
RE-AMENDED M.O.D. LA MIRADA AT PINNACLE PEAK
PRADO ESTATES
X-Sec 43
X-Sec 42
X-Sec 1
X-Sec 41
X-Sec 3
X-Sec 2
X-Sec 38
X-Sec 40
X-Sec 37
X-Sec 39
X-Sec 12
X-Sec 5
X-Sec 6
X-Sec 7
X-Sec 8
X-Sec 11
X-Sec 10
X-Sec 13
X-Sec 15
X-Sec 16
X-Sec 17
X-Sec 18
X-Sec 19
X-Sec 20
X-Sec 21
X-Sec 22
X-Sec 23
X-Sec 24
X-Sec 25
X-Sec 26
X-Sec 35
X-Sec 27
X-Sec 33
X-Sec 28
X-Sec 30
X-Sec 29
X-Sec 32
X-Sec 34
N COUNTRY CLUB TR
N 85TH ST
E VISTA BONITA
E VISTA DEL LAGO
PINNACLE , THE
PINNACLE PEAK COUNTRY CLUB UNIT TWO
PLAZA DE ALAMOS
M.O.D. DESERT VILLAGE SHOPPING CENTER
E CASITIS DEL
E LA POSA
N 91ST WY
N 86TH ST
VISTA BONITA OFFICE PARK CONDOMINIUMS
N 87TH ST
E PARAISO DR
N 87TH PL
LA VIDA
CANADA RIDGE
E LA PALOMA
E CONQUISTADORES DR
N 89TH PL
DESERT VILLAGE
N 88TH WY
E CALLE DE VA
E CALLE BUENA VISTA
MIRAGE VILLAGE CONDOMINIUM
N 91ST ST
N CLUB HOUSE WY
E CLUB HOUSE WY
PINNACLE PEAK COUNTRY CLUB UNIT FOUR
E LA SENDA
PINNACLE PEAK COUNTRY CLUB UNIT THREE
N 90TH ST
E CALLE DEL PALO VERDE
CARRIAGE HILLS PHASE I
CANADA VISTAS
E CALLE DE LAS BRISAS
PINNACLE PEAK VISTAS IV
PINNACLE PEAK COUNTRY CLUB UNIT ONE
E COUNTRY CLUB TR
LA VISTA BONITA
N PIMA RD
E VIA DE LUNA DR
E VIA MONTOYA
LOS GATOS
LOS GATOS UNIT II
E FOOTH
N CALLE ROYALE
N LOS CABALLOS DR
E LOS GATOS DR
A REPLAT OF LOS GATOS UNIT THREE
PINNACLE PEAK VISTAS III
E VIA DEL SOL
E DEER VALLEY RD
E OVERLOOK DR
FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED CORE NORTH
GRAYHAWK PARCEL 2G(A) EAST
GRAYHAWK PARCEL 2c EAST / 2g(a) WEST
LEGEND
Existing FLO-2D Cross-Sections
Subdivisions
Streets
0
200
400
800
Feet
Entellus
N
FIGURE 5.3.4 - CROSS SECTIONS
EXISTING CONDITIONS
PINNACLE PEAK RD TO
DEER VALLEY RD
PIMA ROAD DRAINAGE REPORT


PINNACLE PARADISE
RE-AMENDED M.O.D. LA MIRADA AT PINNACLE PEAK
PRADO ESTATES
X-Sec 1
X-Sec 52
X-Sec 3
X-Sec 2
X-Sec 4
X-Sec 5
X-Sec 6
X-Sec 7
X-Sec 8
X-Sec 9
X-Sec 10
X-Sec 11
X-Sec 13
X-Sec 12
X-Sec 14
PINNACLE PEAK COUNTRY CLUB UNIT SEVEN REPLAT
PINNACLE, THE
PINNACLE PEAK COUNTRY CLUB UNIT TWO
PLAZA DE ALAMOS
M.O.D. DESERT VILLAGE SHOPPING CENTER
VISTA BONITA OFFICE PARK CONDOMINIUMS
LA VIDA
CANADA RIDGE
DESERT VILLAGE
X-Sec 16
X-Sec 17
X-Sec 19
X-Sec 20
X-Sec 21
MIRAGE VILLAGE CONDOMINIUM
X-Sec 22
PINNACLE PEAK COUNTRY CLUB UNIT THREE
PINNACLE PEAK COUNTRY CLUB UNIT FOUR
X-Sec 24
X-Sec 23
X-Sec 25
CARRIAGE HILLS PHASE I
CANADA VISTAS
X-Sec 26
X-Sec 29
PINNACLE PEAK COUNTRY CLUB UNIT ONE
LA VISTA BONITA
PINNACLE PEAK VISTAS IV
X-Sec 54
X-Sec 51
LA VISTA BONITA
X-Sec 30
LOS GATOS
X-Sec 31
LOS GATOS UNIT II
X-Sec 32
X-Sec 33
X-Sec 34
X-Sec 35
X-Sec 36
X-Sec 37
X-Sec 39
X-Sec 38
PINNACLE PEAK VISTAS III
A REPLAT OF LOS GATOS UNIT THREE
X-Sec 40
X-Sec 41
X-Sec 42
X-Sec 43
LOS GATOS UNIT II
X-Sec 44
X-Sec 45
X-Sec 46
X-Sec 50
GRAYHAWK PARCEL 2c EAST / 2g(a) WEST
X-Sec 49
GRAYHAWK PARCEL 2G EAST
X-Sec 48
X-Sec 47
FIRST AMENDMENT TO STATE PLAT NO. 27 AMENDED CORE NORTH
LEGEND
Future FLO-2D X-Sections
Subdivisions
Streets
0
200
400
800
Feet
Entellus
N
FIGURE 5.3.5 - CROSS SECTIONS
PROPOSED CONDITIONS
PINNACLE PEAK RD TO
DEER VALLEY RD
PIMA ROAD DRAINAGE REPORT

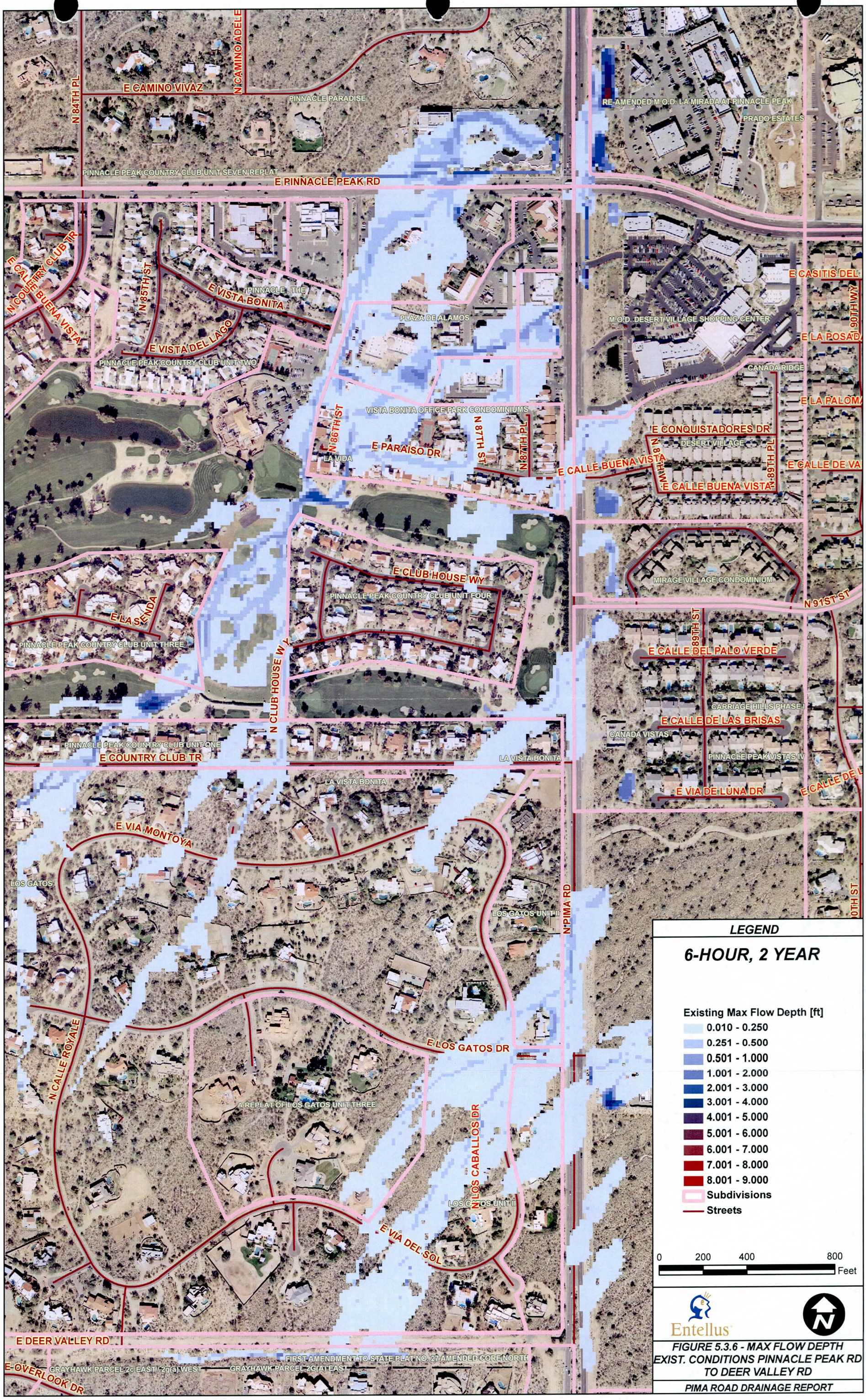
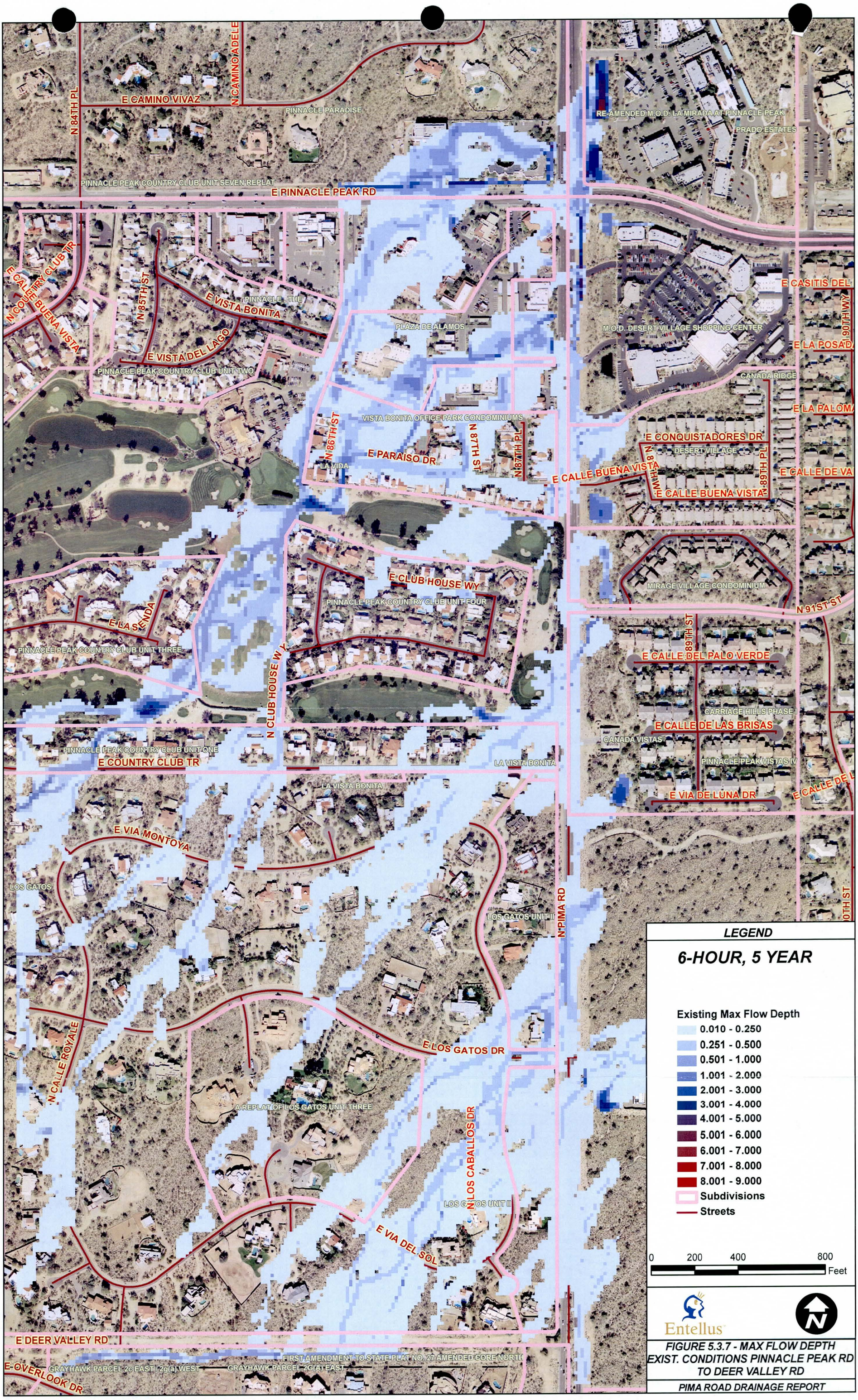


FIGURE 5.3.6 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT



LEGEND

6-HOUR, 5 YEAR

Existing Max Flow Depth

- 0.010 - 0.250
- 0.251 - 0.500
- 0.501 - 1.000
- 1.001 - 2.000
- 2.001 - 3.000
- 3.001 - 4.000
- 4.001 - 5.000
- 5.001 - 6.000
- 6.001 - 7.000
- 7.001 - 8.000
- 8.001 - 9.000
- Subdivisions
- Streets

0 200 400 800 Feet

Entellus

FIGURE 5.3.7 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

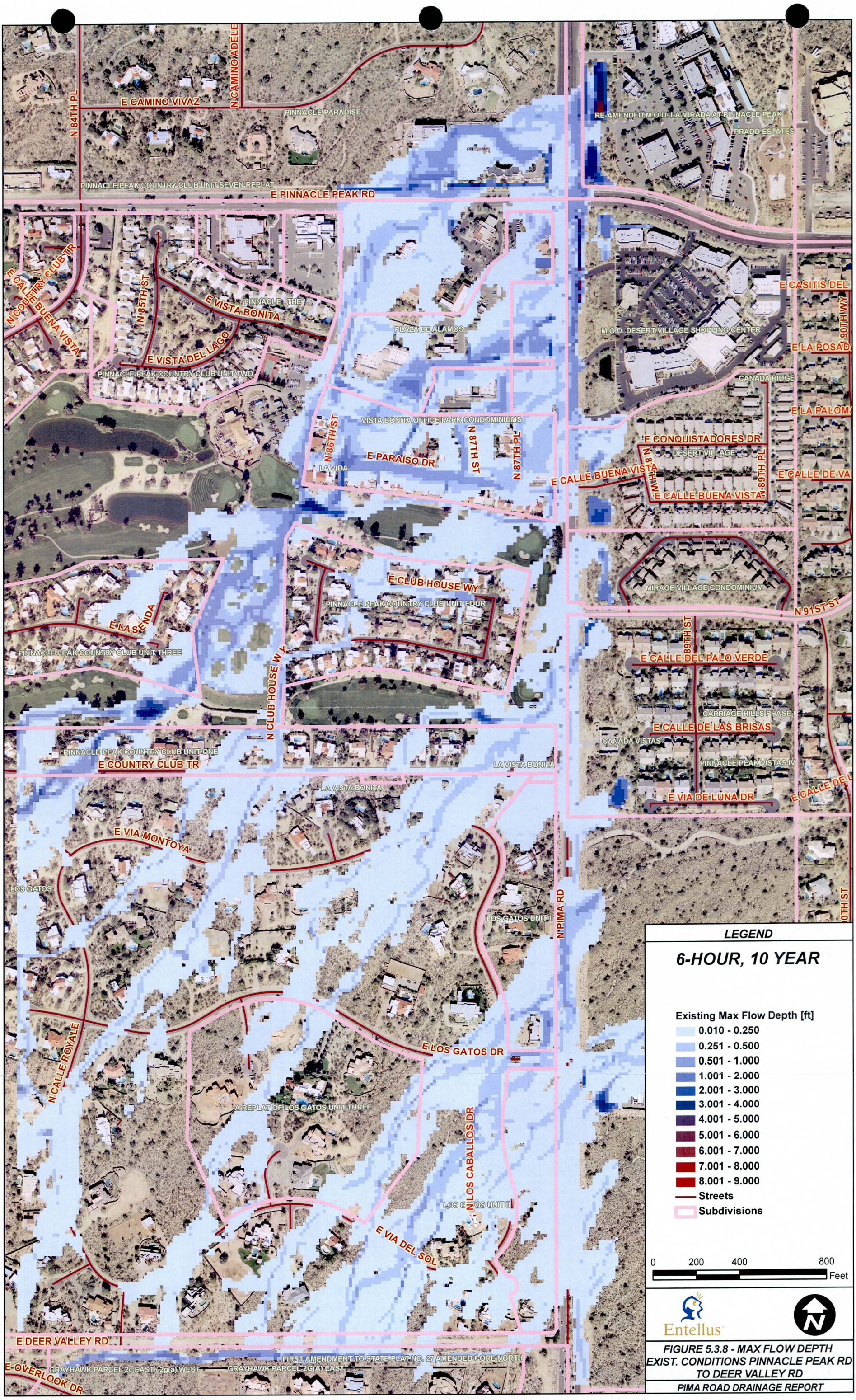


FIGURE 5.3.8 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

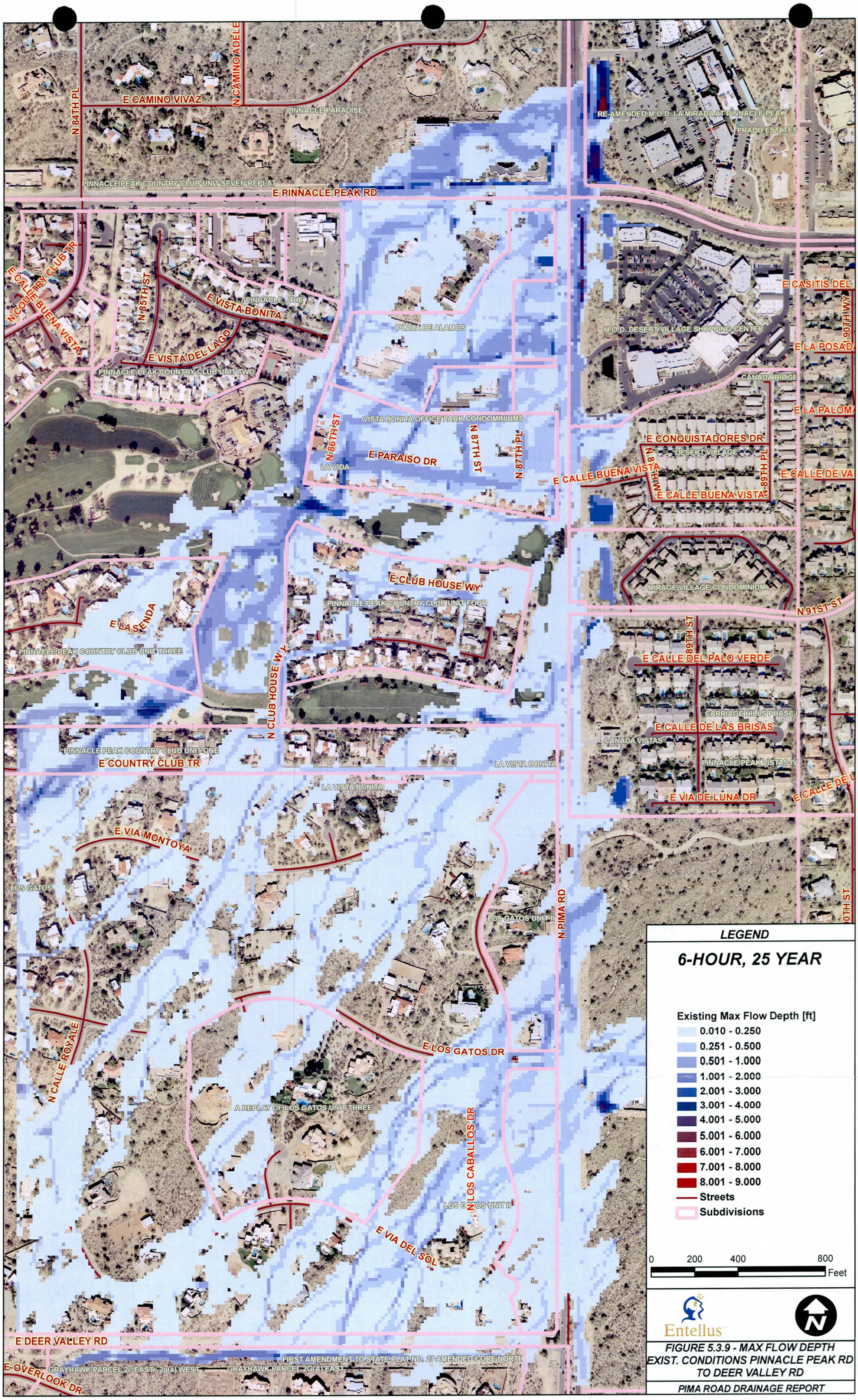


FIGURE 5.3.9 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

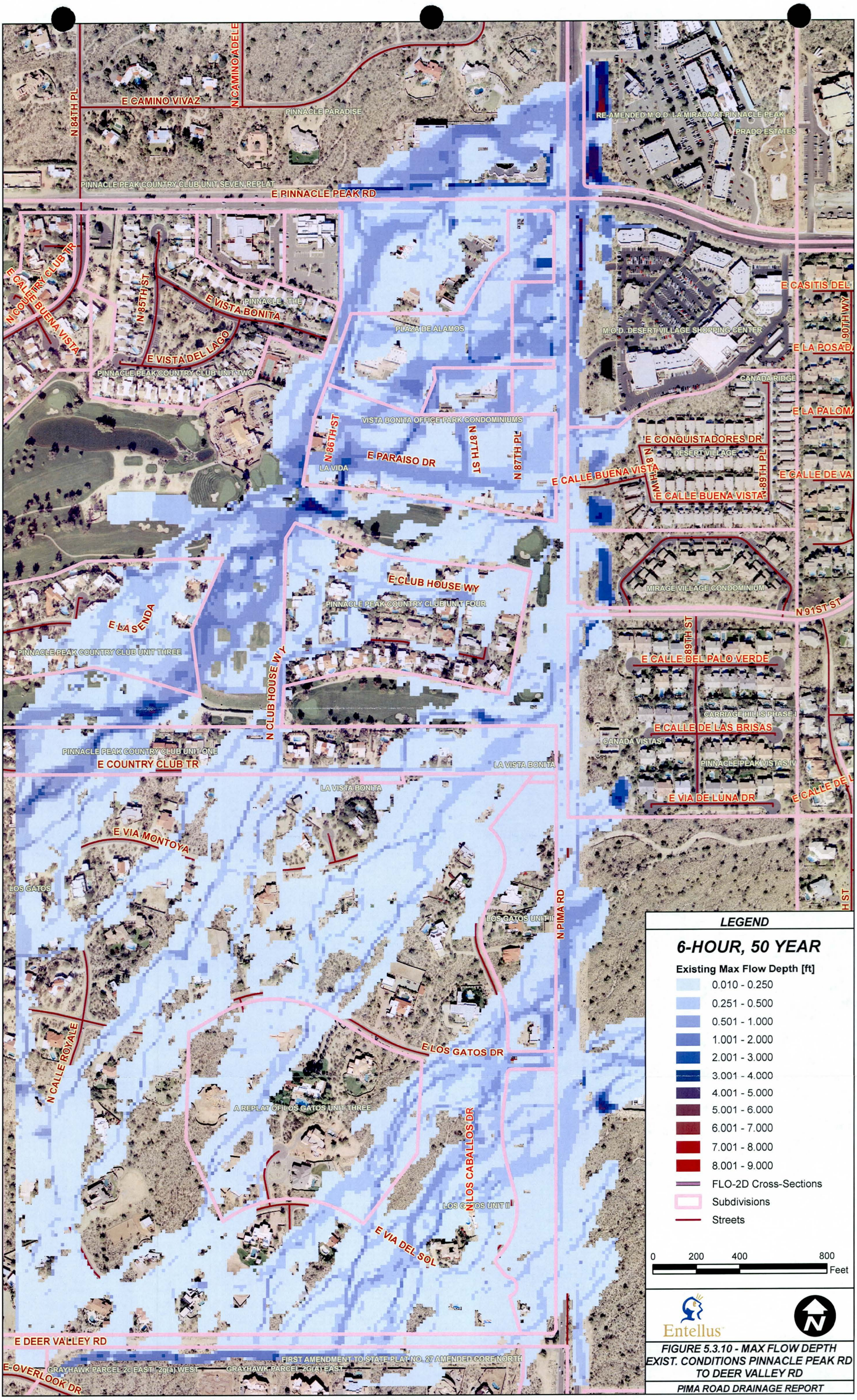


FIGURE 5.3.10 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

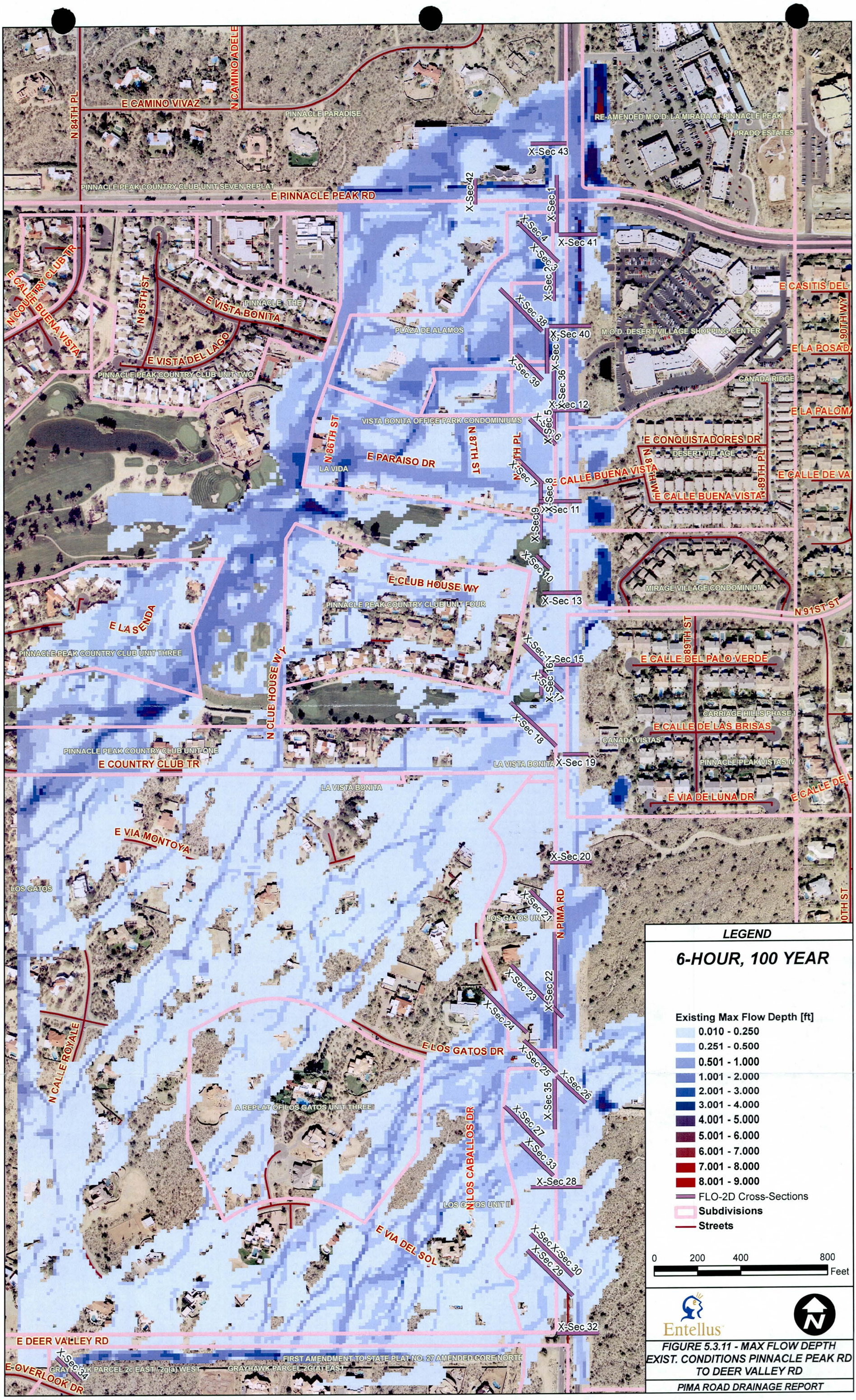


FIGURE 5.3.11 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

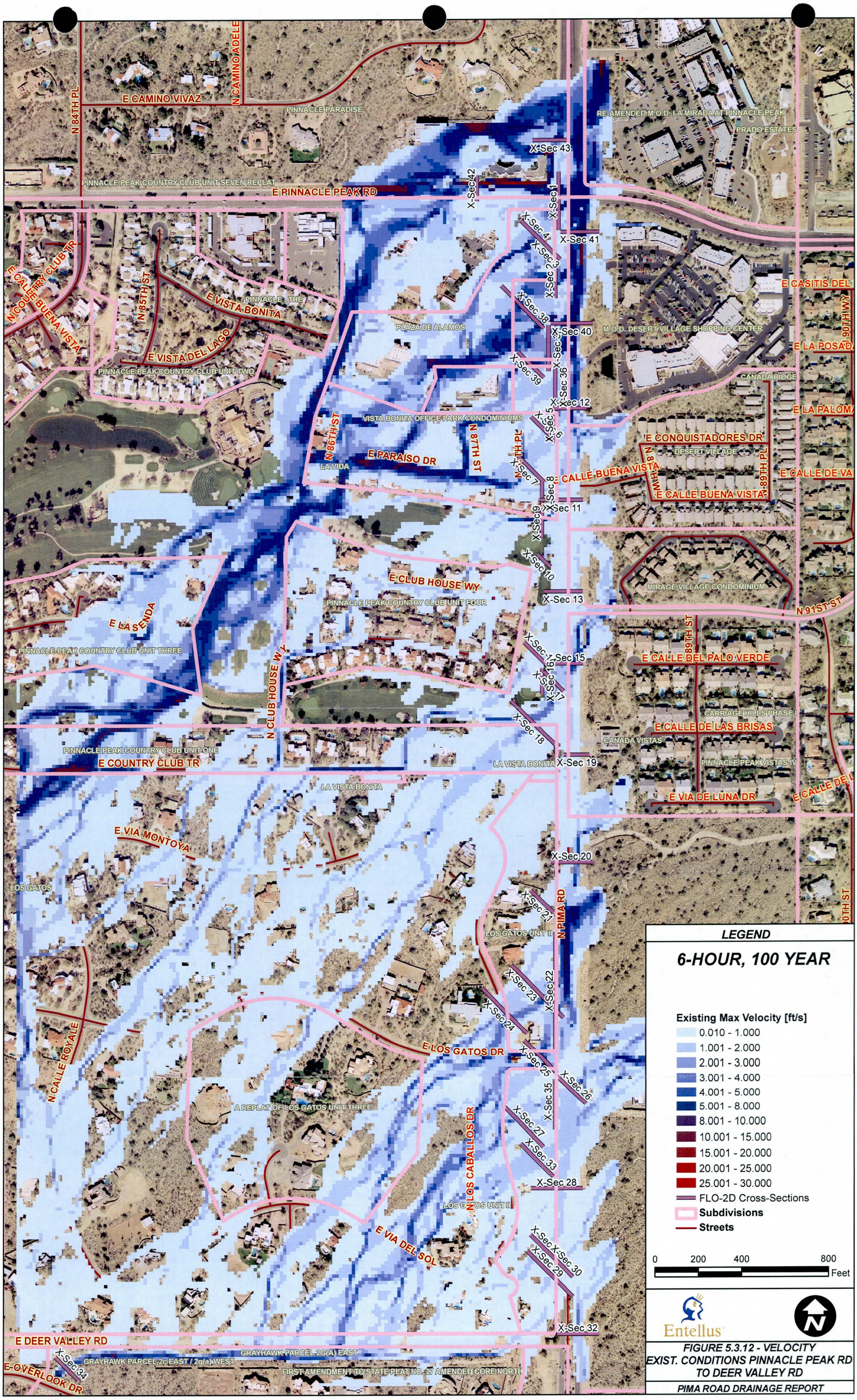


FIGURE 5.3.12 - VELOCITY EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

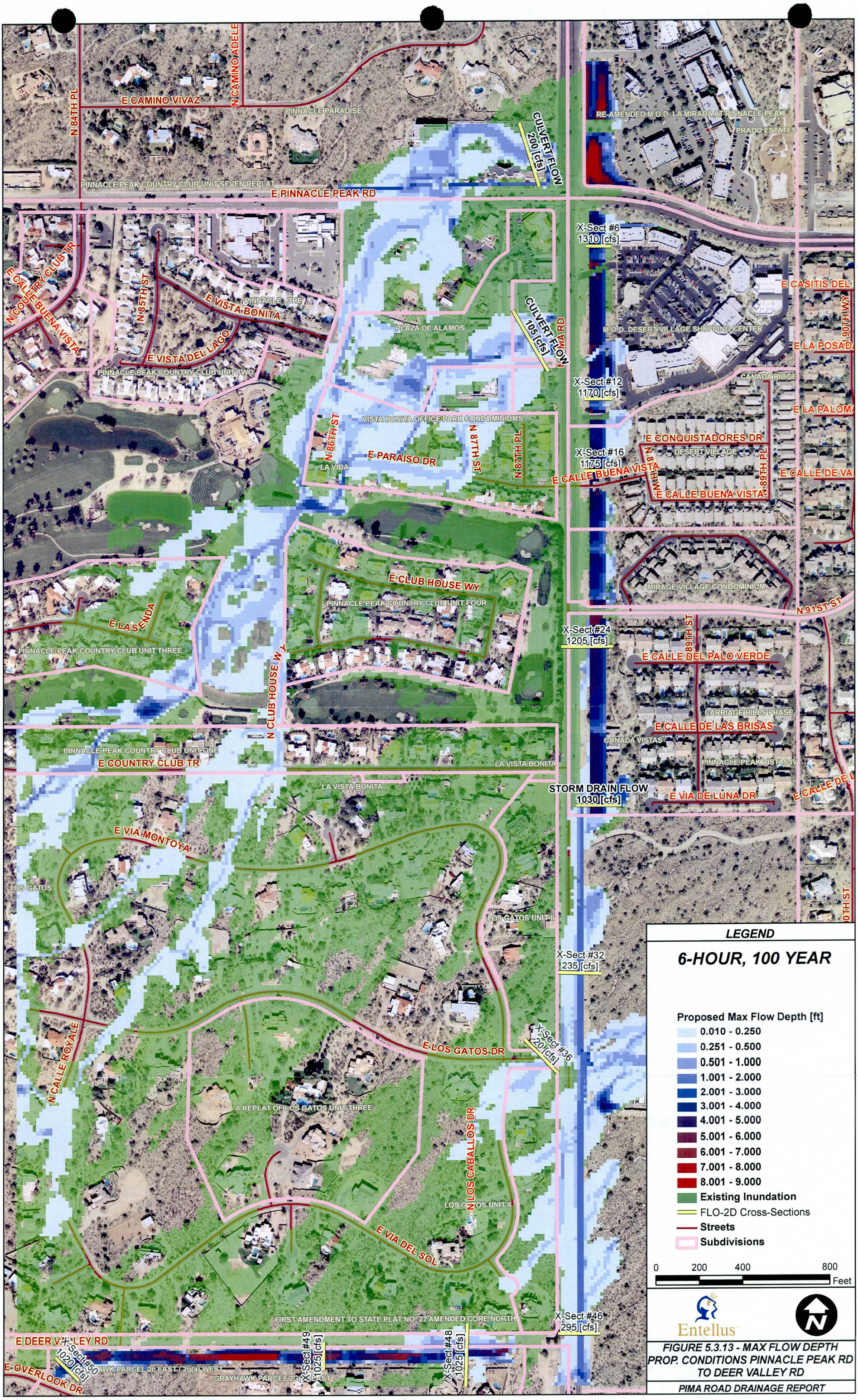
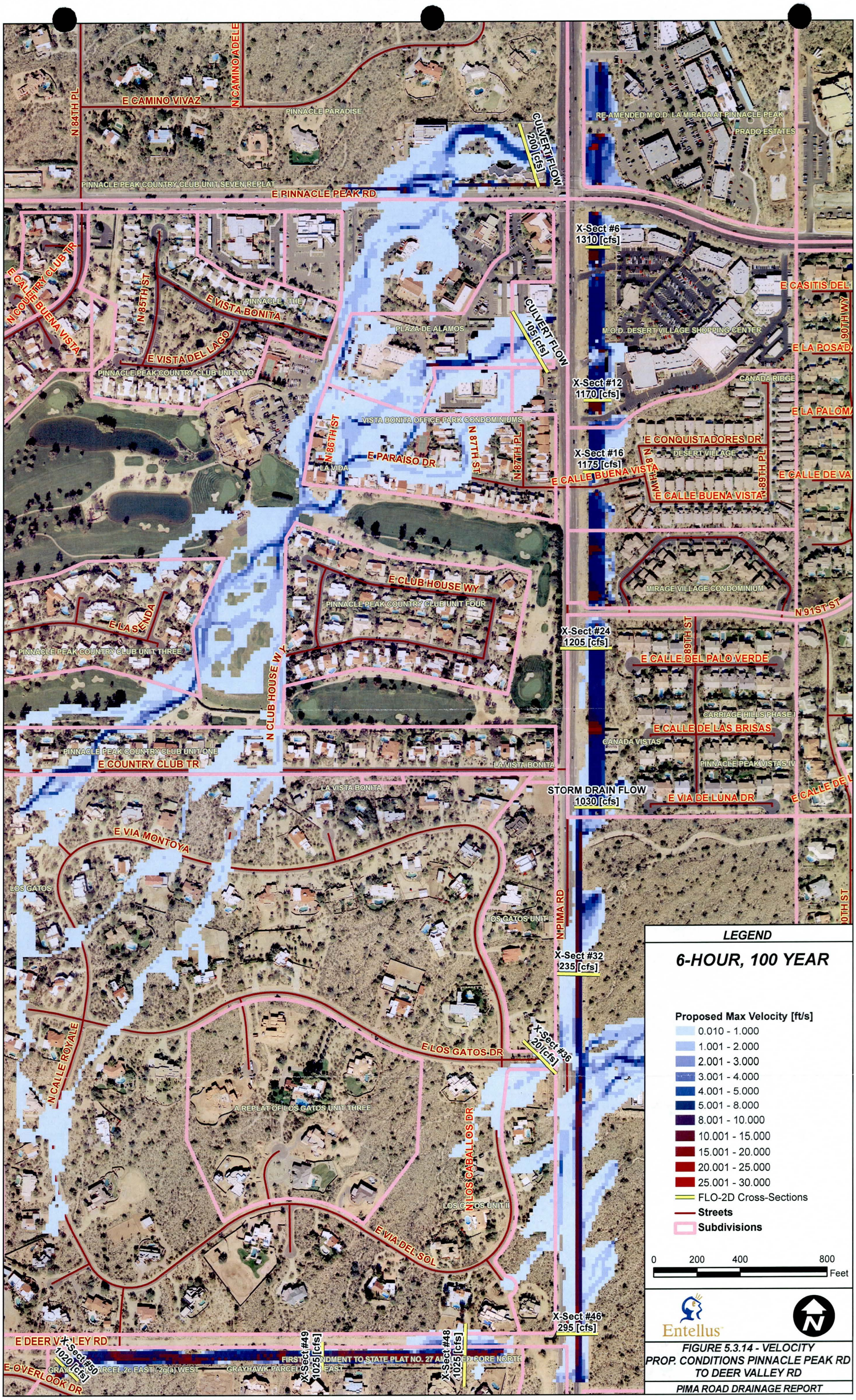


FIGURE 5.3.13 - MAX FLOW DEPTH PROP. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT


E CAMINO VIVAZ
N CAMINO ADELE
N 84TH PL
PINNACLE PARADISE
PINNACLE PEAK COUNTRY CLUB UNIT SEVEN REPLAT
E PINNACLE PEAK RD
CULVERT FLOW 200 [cfs]
RE-AMENDED M.O.D. LA MIRADA AT PINNACLE PEAK
PRADO ESTATES
X-Sect #6 1310 [cfs]
E CASITIS DEL
E COUNTRY CLUB TR
N CO
E CALLE BUENA VISTA
N 85TH ST
E VISTA BONITA
PINNACLE THE
E VISTA DEL LAGO
PINNACLE PEAK COUNTRY CLUB UNIT TWO
PLAZA DE ALAMOS
CULVERT FLOW 105 [cfs]
M.O.D. DESERT VILLAGE SHOPPING CENTER
E LA POSA D
X-Sect #12 1170 [cfs]
CANADA RIDGE
E LA PALOM
VISTA BONITA OFFICE PARK CONDOMINIUMS
N 86TH ST
N 87TH PL
N 87TH ST
E PARAISO DR
LA VIDA
X-Sect #16 1175 [cfs]
E CONQUISTADORES DR
DESERT VILLAGE
N 88TH PL
E CALLE BUENA VISTA
N 89TH PL
E CALLE DE VA
E CALLE BUENA VISTA
E CLUB HOUSE WY
PINNACLE PEAK COUNTRY CLUB UNIT FOUR
MIRAGE VILLAGE CONDOMINIUM
N 91ST ST
E LA SENDA
PINNACLE PEAK COUNTRY CLUB UNIT THREE
N CLUB HOUSE WY
X-Sect #24 1205 [cfs]
N 89TH ST
E CALLE DEL PALO VERDE
CARRIAGE HILLS PHASE I
E CALLE DE LAS BRISAS
CANADA VISTAS
PINNACLE PEAK VISTAS IV
PINNACLE PEAK COUNTRY CLUB UNIT ONE
E COUNTRY CLUB TR
LA VISTA BONITA
LA VISTA BONITA
STORM DRAIN FLOW 1030 [cfs]
E VIA DE LUNA DR
E CALLE DE L
E VIA MONTOYA
LOS GATOS
LOS GATOS UNIT II
N PIMA RD
X-Sect #32 235 [cfs]
X-Sect #36 20 [cfs]
E LOS GATOS DR
N CALLE ROYALE
A REPLAT OF LOS GATOS UNIT THREE
N LOS CABALLOS DR
LOS GATOS UNIT II
E VIA DEL SOL
X-Sect #46 295 [cfs]
E DEER VALLEY RD
X-Sect #50 1020 [cfs]
X-Sect #49 1025 [cfs]
X-Sect #48 1025 [cfs]
E OVERLOOK DR
GRAYHAWK PARCEL 2c EAST / 2g(a) WEST
GRAYHAWK PARCEL 2c EAST
LEGEND
6-HOUR, 100 YEAR
Proposed Max Velocity [ft/s]
0.010 - 1.000
1.001 - 2.000
2.001 - 3.000
3.001 - 4.000
4.001 - 5.000
5.001 - 8.000
8.001 - 10.000
10.001 - 15.000
15.001 - 20.000
20.001 - 25.000
25.001 - 30.000
FLO-2D Cross-Sections
Streets
Subdivisions
0 200 400 800
Feet
Entellus
FIGURE 5.3.14 - VELOCITY
PROP. CONDITIONS PINNACLE PEAK RD
TO DEER VALLEY RD
PIMA ROAD DRAINAGE REPORT

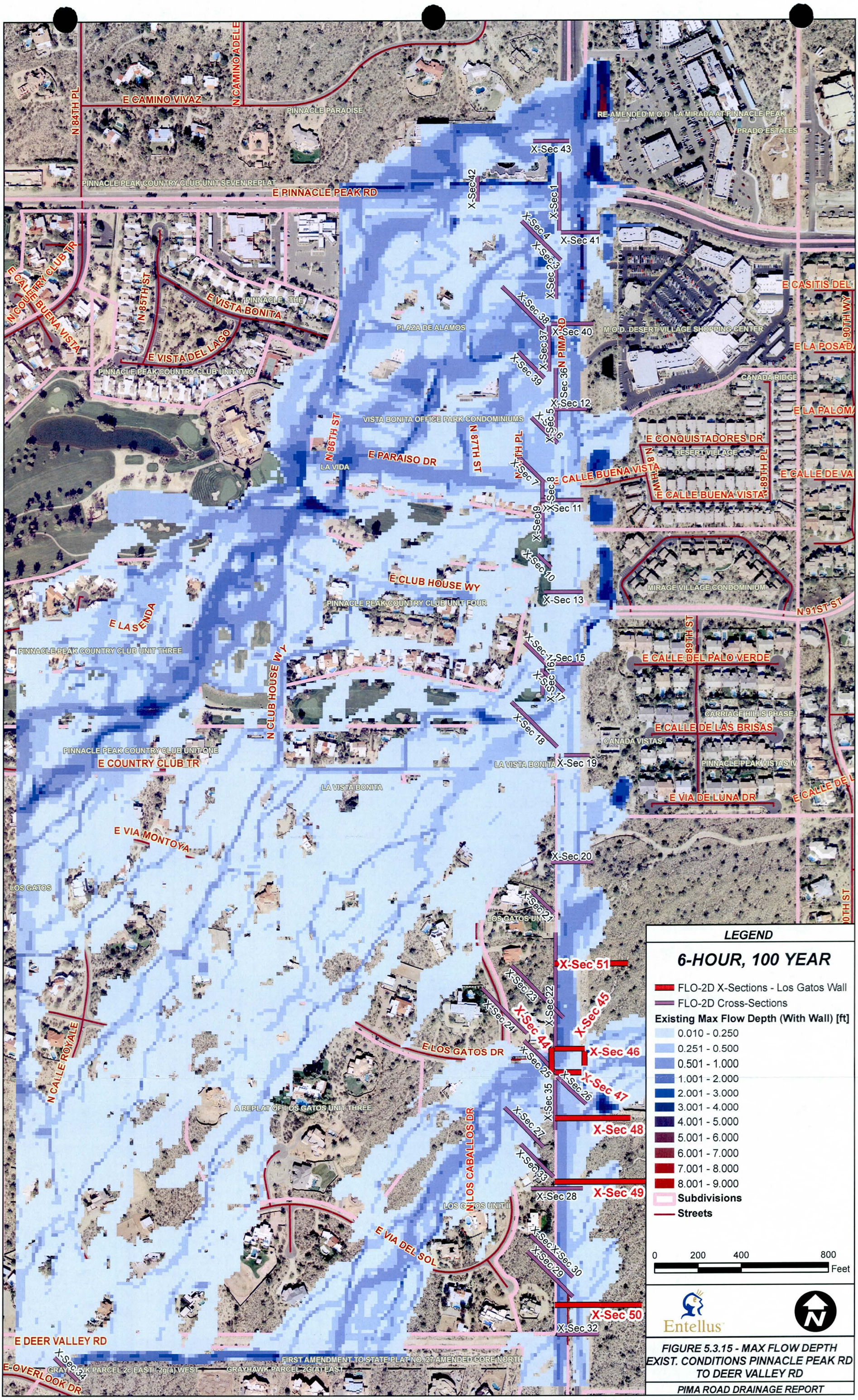


FIGURE 5.3.15 - MAX FLOW DEPTH EXIST. CONDITIONS PINNACLE PEAK RD TO DEER VALLEY RD

PIMA ROAD DRAINAGE REPORT

5.4 FLO-2D Analysis – Deer Valley to Thompson Peak Parkway

This FLO-2D analysis was performed to determine the flow split at the Pima Road and Thompson Peak Parkway intersection as it is under the existing conditions. Findings from this analysis will help in determining the best option to convey the flow through the intersection preserving the existing condition flow split.

5.4.1 Method Description

The flood flow simulation was modeled utilizing the FLO-2D Flood Routing Simulation model version 2007.06 (**Reference 38**). FLO-2D is a quasi-2 dimensional numerical model that is accepted by FEMA as meeting the requirements for use under the National Flood Insurance Program (**Reference 30**).

5.4.2 FLO-2D Grid

FLO-2D utilizes a square grid cell over which parameters are lumped and estimated. The model run time is directly dependant on the number of grid cells in the model and thus the selected grid size. For this model, a 10-foot grid was chosen resulting in a modeling grid composed of approximately 33,000 cells. A model simulation time of 5.5 hours was adequate to route all flows through the system.

5.4.3 Model Elevation Datasets

Two elevation datasets were utilized for the FLO-2D modeling. The base elevation dataset was an existing conditions DEM provided by the City of Scottsdale (**Reference 41**) with supplemental survey performed by Entellus in January 2009, at the Pima Rd. and Thompson Peak Parkway intersection. The Entellus survey data was exclusively utilized along the roadway corridor near the intersection.

5.4.4 Manning's "n" Values

Manning "n" values are defined for the entire modeling area and can be seen in **Figure 5.4.1**. Manning "n" values were assigned in a very broad scale utilizing the aerial photography provided by the City of Scottsdale and are summarized below in **Table 5.9**.

Manning's "n" Value	Description
0.016	Roadway
0.022	Commercial
0.028	Residential
0.030	Golf Course
0.035	Desert Landscape

Table 5.9: FLO-2D Manning's "n" Values

5.4.5 Area Reduction Factors

Area reduction factors (ARF) were utilized for residential and commercial areas to properly model the building obstructions in the existing conditions. The ARF's are used to model areas where flow is blocked due to the existence of structures such as commercial or residential buildings by limiting the grid elements area available for volume storage. An ARF of 0.5 and 0.2 (50% and 20% reductions) were used for commercial and residential areas respectively and can be seen in **Figure 5.4.3**. A high reduction value was utilized for the commercial areas due to the increased flow and volume restriction that might occur due to the large building. A complete removal of the commercial and residential grid elements from the model was not appropriate as flooding will likely occur in these structures, thus allowing for some storage within the buildings grid element. The FLO-2D user's manual states that for the simulation of large flood events such as this model, the utilization of ARF's will generally have only a minor impact on the inundated area (**Reference 38**).

5.4.6 Model Boundary

The boundary chosen for the FLO-2D model was chosen based on the need to begin the model a sufficient distance upstream of Pima Road and Thompson Peak Parkway intersection.

5.4.7 Flow Input/Outflow locations

There are 3 input locations used in the FLO-2D model as shown in **Figure 5.4.2**. The inflow hydrographs (see **APPENDIX D**) were taken from the existing conditions hydrologic model and placed just upstream of the concentration point locations. This allows the flow to spread over multiple cells as it progresses downstream, as would occur in normal conditions, prior to reaching Pima Road and Thompson Peak intersection. The purpose of the model was to determine the flow split at the aforementioned intersection under existing conditions. Thus only inflow hydrographs for areas draining to the area of interest were included in the model. The largest inflow hydrograph comes from concentration point C52A. This inflow was split in half and inputted into two grid cells in the channel upstream of the Deer Valley Detention basin. This was done to improve

the model run time. Outflow locations were placed on the western and southern model boundaries to allow flows to exit the model.

5.4.8 Cross-Section Locations

FLO-2D can provide hydrographs for any cross-section of adjacent cells specified within the simulation area. Cross-sections can be placed in strategic locations such as existing culverts, wet crossings and current areas of interest throughout the model to determine the flow passing through it. **Figure 5.4.4** shows the 34 cross-section locations placed throughout modeling area.

5.4.9 Existing Conditions

Figure 5.4.5 and **Figure 5.4.6** show the existing conditions flow depth and velocity for the 100-year event for the modeling area. A summary of the cross-sectional peak flows can be found in **Table 5.10** below.

Existing Conditions Flow Summary			
ID	**Peak Flow [cfs]**	**ID**	**Peak Flow [cfs]**
X-Sec 1	659	X-Sec 23	2136
X-Sec 2	711	X-Sec 24	849
X-Sec 3	215	X-Sec 25	90
X-Sec 4	2	X-Sec 27	1115
X-Sec 5	698	X-Sec 28	983
X-Sec 6	726	X-Sec 29	26
X-Sec 8	306	X-Sec 30	489
X-Sec 9	1000	X-Sec 32	362
X-Sec 11	1077	X-Sec 37	667
X-Sec 12	249	X-Sec 38	904
X-Sec 13	308	X-Sec 41	481
X-Sec 14	94	X-Sec 42	897
X-Sec 15	1756	X-Sec 43	74
X-Sec 16	213	X-Sec 44	322
X-Sec 17	928	X-Sec 45	1297
X-Sec 18	14	X-Sec 46	311
X-Sec 19 & 20	2825	X-Sec 47	260
X-Sec 21	441	X-Sec 48	1265
X-Sec 22 & 26	133	X-Sec 52	88

Table 5.10: FLO-2D Existing Conditions Flow Summary

As shown in **Figure 5.4.5** the entire Pima Road and the intersection at Thompson Peak Parkway are inundated under the 100-year event. A portion of the flow is conveyed

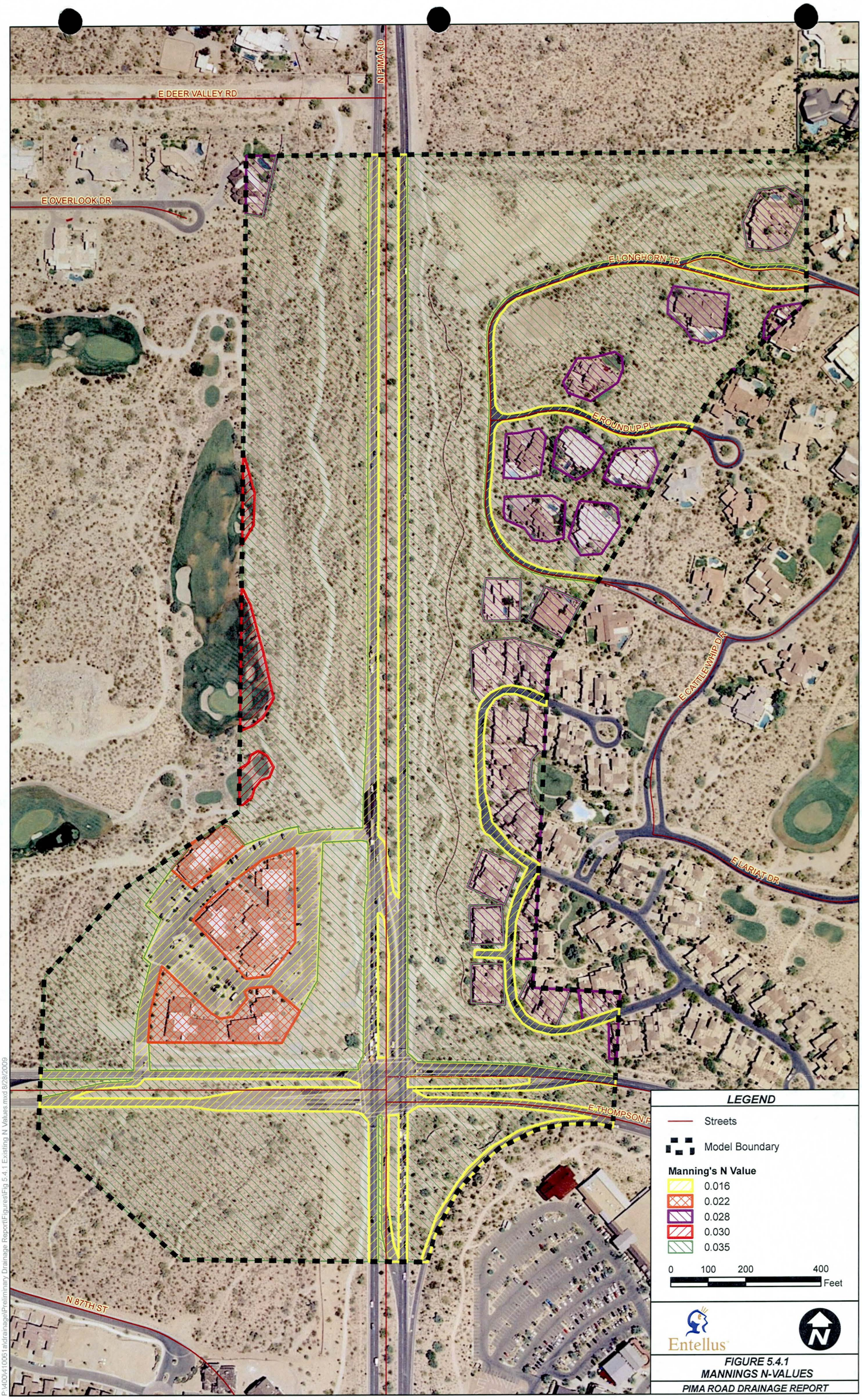
south through the existing channels located on both sides of Pima Road. A portion of the flow from the east channel enters the existing 2 – 60" storm drains, whereas the majority spills into the intersection. On the west side of Pima Road the 3 – 8'x4' RCBC conveys flow southerly under Thompson Peak Parkway. The results show that of the flow reaching Pima Road and Thompson Peak intersection (**Figure 5.4.7**), a peak flow as determined by FLO-2D of about 260 cfs (X-section # 47) continues west, 971 cfs (X-section # 42 & 43) continues south while 1746 cfs (X-section # 41 & 48) crosses Thompson Peak in a southwesterly direction away from both Thompson Peak and Pima Road. Further analysis is needed to determine the ultimate destination of the flow that leaves the intersection in a southwesterly direction. For this analysis it was assumed that this flow would ultimately end up in the Pima Road channel further south.

Figure 5.4.8 shows the output flow data retrieved from the FLO-2D model run and the rating curve that was created from the FLO-2D output and subsequently utilized in the HEC-1 model. Both the rising and falling limbs of the hydrographs (which can be seen in **APPENDIX D**) were utilized for the determination of the rating curve. As stated above it was assumed that all flow to the southwest would end up in the Pima Road channel downstream (consisting of X-Sections #41, 42, 43 and 48). X-section #47 was utilized to represent the flow to the west along Thompson Peak Parkway. **Table 5.11** shows the rating curve found in **Figure 5.4.8** in tabular format. Thus, as shown in **Figure 5.4.8** as well as **Table 5.11** below, about 8 to 9.5% of the high flows entering the Pima Road and Thompson Peak intersection continues west along Thompson Peak Parkway and the remaining 90.5 to 92% continues south along the Pima Road corridor. The precise percentage varies based on the flow.

The results show that the channel conveying flow to the sedimentation basin on the southeast corner of Pima and Deer Valley Roads does not have the capacity to convey the full upstream flow. As a result a portion of the flow spills over the channel and follows the historical topography in a southwesterly direction, flooding the residential areas on the east side of Pima Road. It is recommended that this channel be re-evaluated and its capacity potentially increased. This would reduce the potential for flooding on the residential developments along the east side of Pima Road.

South		West		Total
% Flow	Flow [cfs]	% Flow	Flow [cfs]	Flow [cfs]
0.0%	0	0.0%	0	0
99.0%	99	1.0%	1	100
98.5%	246	1.5%	4	250
98.4%	369	1.7%	6	375
97.5%	488	2.5%	13	500
96.5%	603	3.5%	22	625
94.5%	709	5.5%	41	750
92.8%	812	7.2%	63	875
91.8%	918	8.2%	82	1000
91.5%	1029	8.5%	96	1125
91.3%	1141	8.7%	109	1250
91.0%	1251	9.0%	124	1375
90.9%	1364	9.1%	137	1500
90.8%	1589	9.2%	161	1750
90.7%	1814	9.3%	186	2000
90.5%	2263	9.5%	238	2500
90.7%	2494	9.3%	256	2750
91.0%	2616	9.0%	259	2875
91.5%	2745	8.5%	255	3000
92.0%	3220	8.0%	280	3500

Table 5.11: Pima Road and Thompson Peak Parkway Rating Curve


N PIMA RD
E DEER VALLEY RD
E OVERLOOK DR
E LONGHORN TR
E ROUNDUP PL
E CATTLEWHIP DR
E LARIAT DR
E THOMPSON P
N 87TH ST
LEGEND
Streets
Model Boundary
Manning's N Value
0.016
0.022
0.028
0.030
0.035
0
100
200
400
Feet
Entellus
N
FIGURE 5.4.1
MANNINGS N-VALUES
PIMA ROAD DRAINAGE REPORT
P:\400\410061\drainage\Preliminary Drainage Report\Figures\Fig 5.4.1 Existing N Values.mxd 8/28/2009

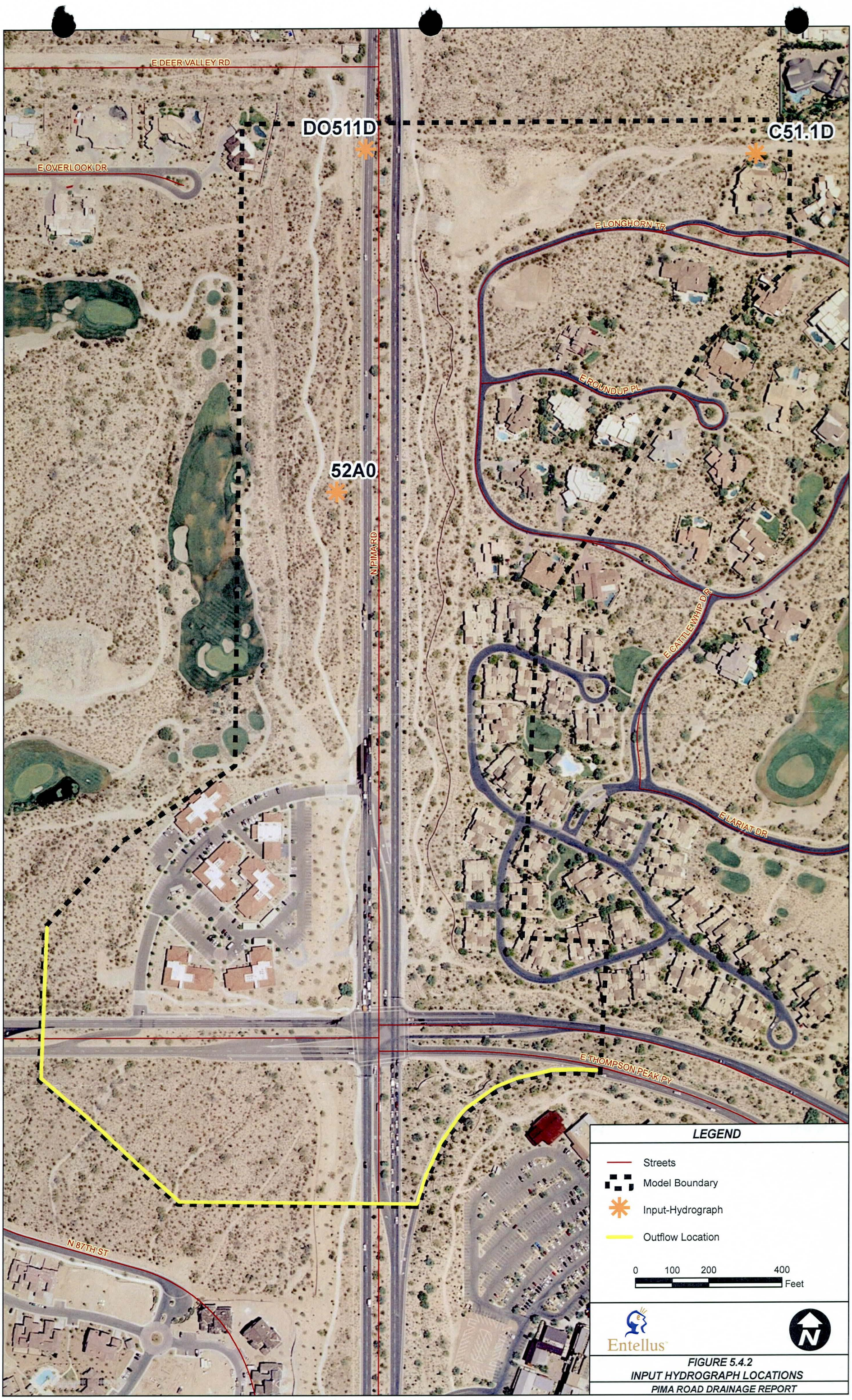


FIGURE 5.4.2
INPUT HYDROGRAPH LOCATIONS
PIMA ROAD DRAINAGE REPORT

P:\40014100\61a\drainage\Preliminary Drainage Report\Figures\Fig 5.4.2 Input hydrograph Locations.mxd 8/28/2009

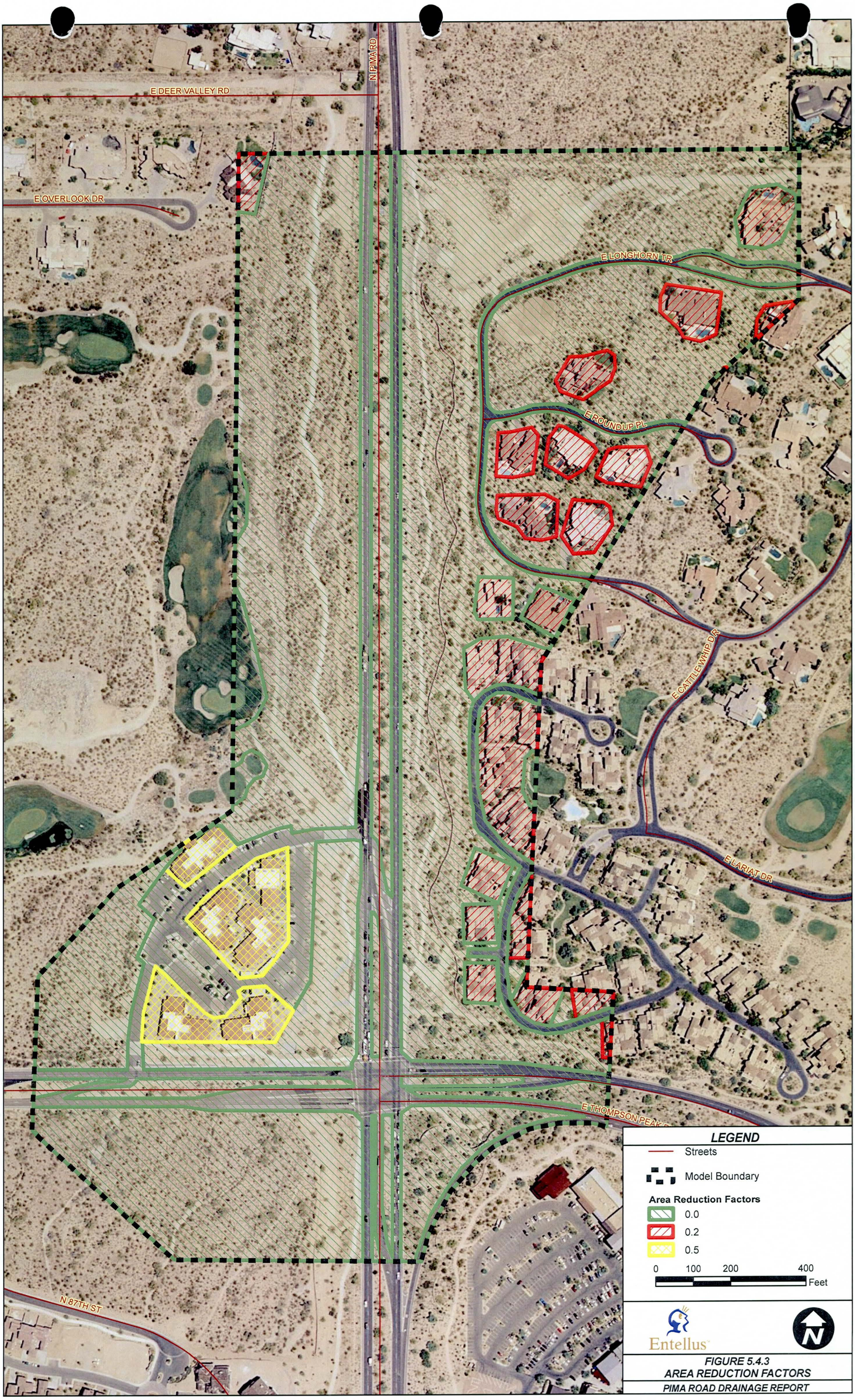


FIGURE 5.4.3
AREA REDUCTION FACTORS
PIMA ROAD DRAINAGE REPORT

P:\400\410061\drainage\Preliminary Drainage Report\Figures\Fig 5.4.3 Area Reduction Factors.mxd 8/28/2009

P:\40041006 1\aldrainage\Preliminary Drainage Report\Figures\Fig 5.4.4 Existing Conditions_X-Sec_Location.mxd 8/28/2009

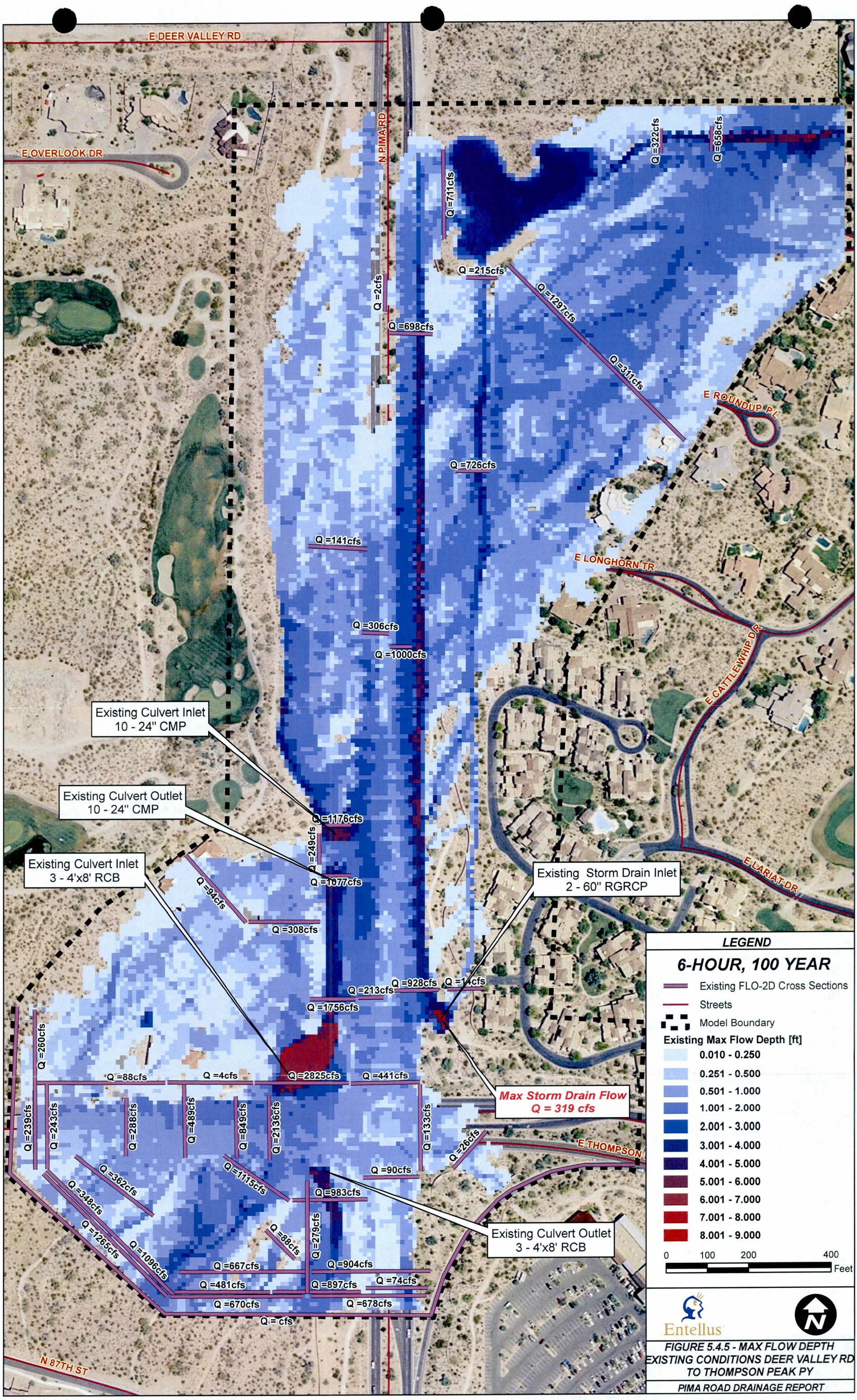


FIGURE 5.4.5 - MAX FLOW DEPTH
EXISTING CONDITIONS DEER VALLEY RD
TO THOMPSON PEAK PY

PIMA ROAD DRAINAGE REPORT

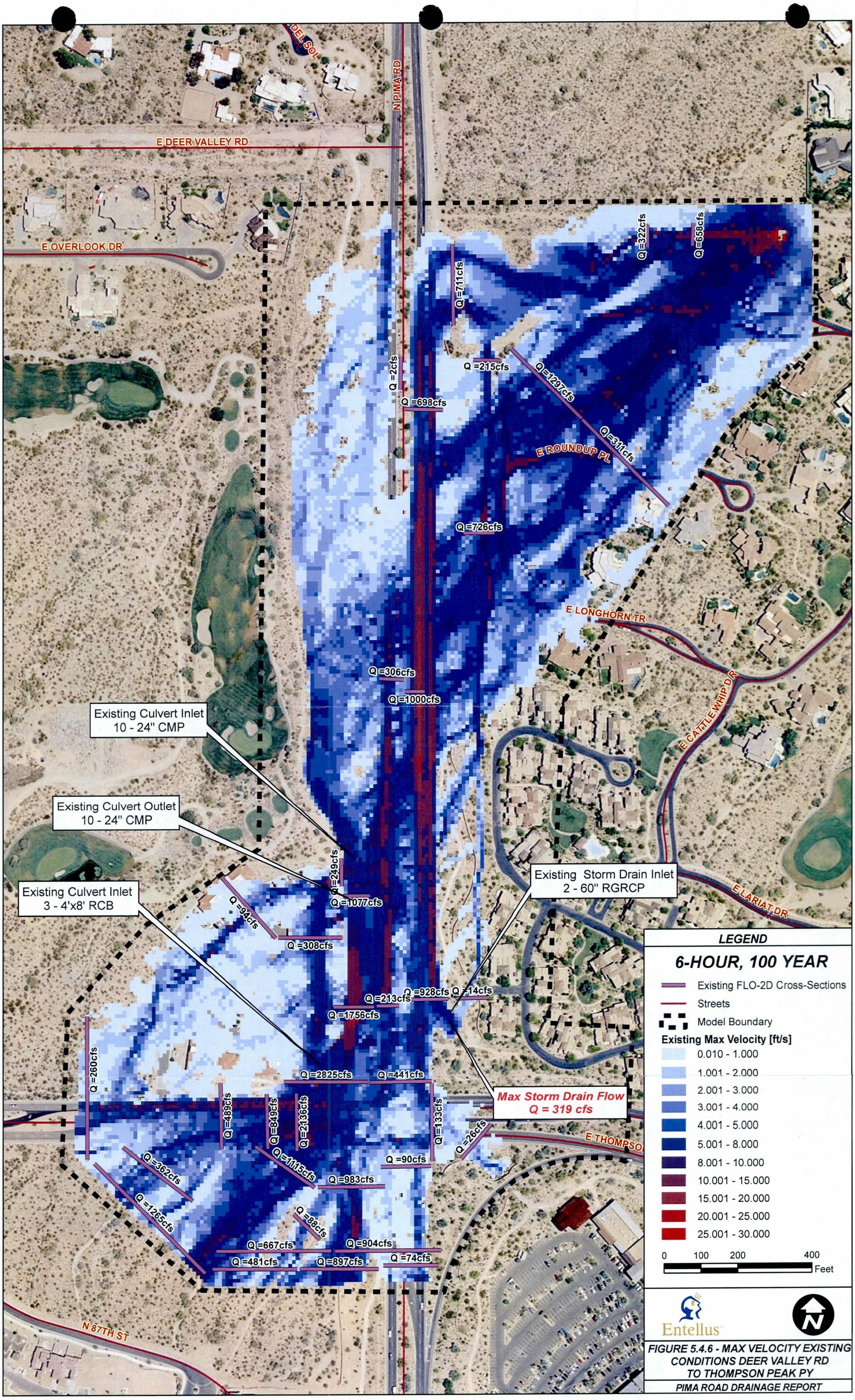


FIGURE 5.4.6 - MAX VELOCITY EXISTING CONDITIONS DEER VALLEY RD TO THOMPSON PEAK PY

PIMA ROAD DRAINAGE REPORT

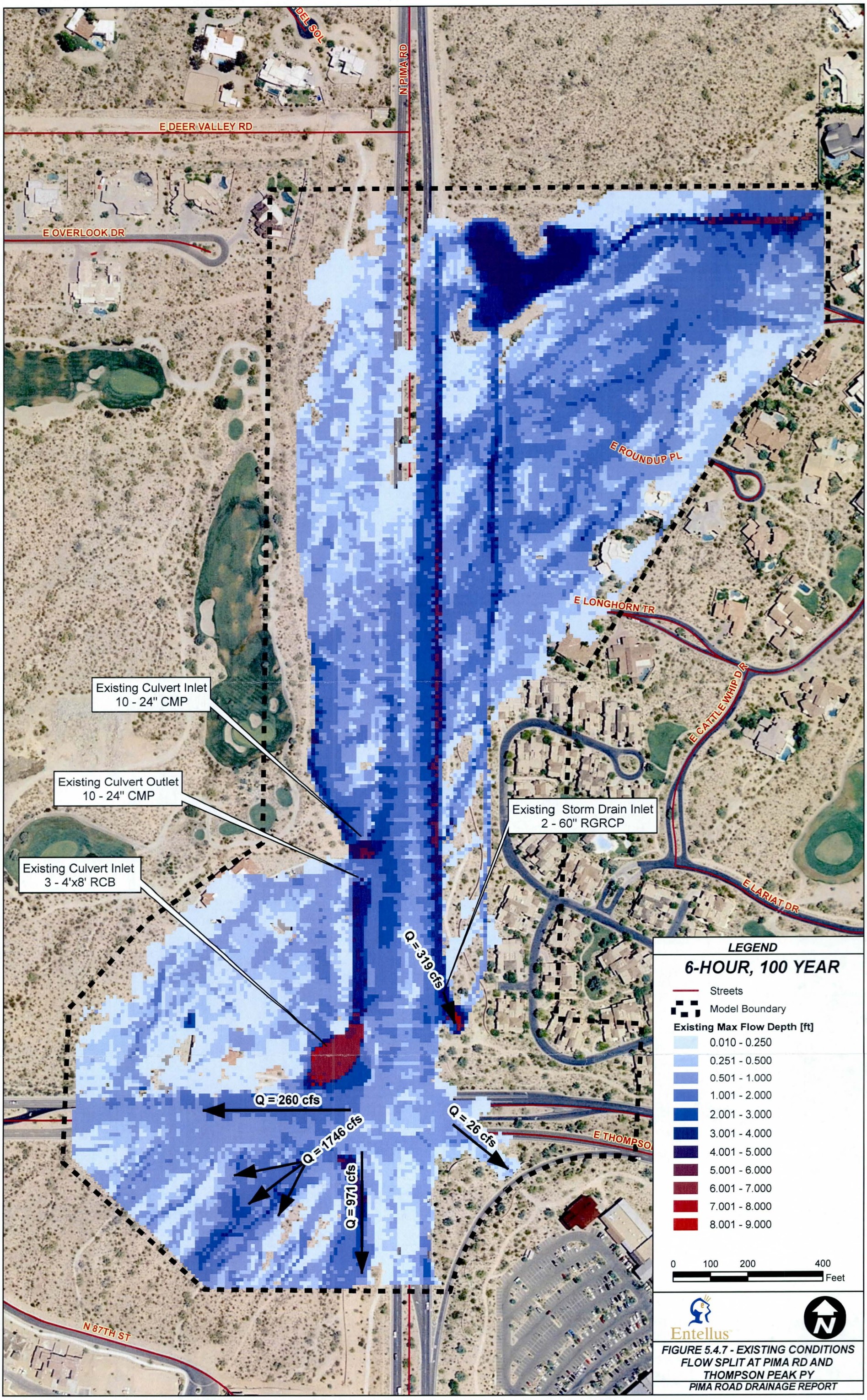
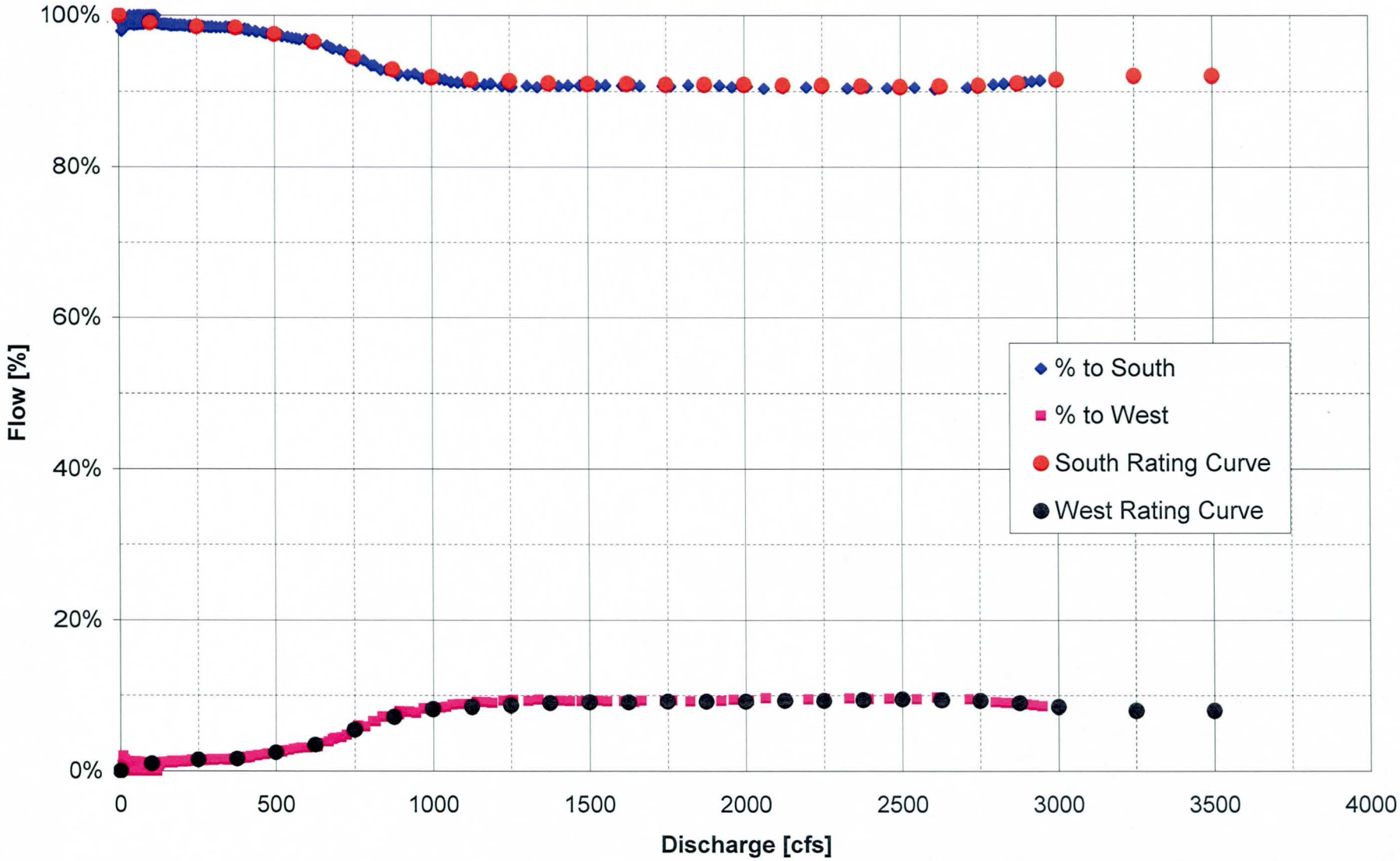


FIGURE 5.4.7 - EXISTING CONDITIONS FLOW SPLIT AT PIMA RD AND THOMPSON PEAK PY

PIMA ROAD DRAINAGE REPORT

Figure 5.4.8 Pima Road and Thompson Peak Parkway Flow Split



5.5 Pima Road Channel Analysis – Pinnacle Peak to Via De Luna Drive

5.5.1 Pima Road Channel Configuration

The channel section as described in **Section 3.2.1** is summarized in **Table 5.12.**

	Pima Road Channel Typical Cross-Section Pinnacle Peak to Via De Luna Drive
Total Bottom Width [ft]	12
Inner Side Slope	2% (for 21.7 ft)
Outer Side Slope	4H:1V (for 18.3 ft)
Flow Depth [ft]	4
Total Channel Depth [ft]	5
Total Top Width [ft]	92

Table 5.12: Pima Channel Geometry

Additionally, there are several drop structures throughout the entire length of the channel. These drop structures are limited to a maximum of 4 feet in depth with a 1 to 1 slope.

The channel begins south of Pinnacle Peak Road with the proposal to upsize the existing culverts across Pinnacle Peak to 5-10'x4' RCBC's. This proposed structure would be sufficient to convey the channel design flow of 1310 cfs. All driveway structures along the east side of Pima Road will also be upsized to 5-10'x4' RCBC's. It is also proposed to maintain the existing 2 – 36" culverts approximately 500 feet south of Pinnacle Peak.

5.5.2 Hydrologic Modeling

The hydrologic modeling was modified for the proposed Pima Road channel to determine the quantity of flow entering the channel. The major modifications to the hydrologic model was the removal (zeroing out of) the numerous diversions along Pima Road and modification of the routed cross-sections along Pima Road to represent the proposed channel geometry and slope. Two diversions were modified but left in place in the model. It was assumed that the existing 2-3'x4.5' RCBC just north of Pinnacle Peak Road as well as the existing 2-36" culverts approximately 500 feet south of Pinnacle Peak Road were still in place and passed flow up to their estimated current capacities of 234 cfs and 100 cfs respectively.

5.5.3 Hydraulic Modeling

The proposed Pima Road channel was modeled hydraulically utilizing HEC-GeoRAS 4.1.1 (**Reference 39**). A TIN (Triangulated Irregular Network) with the proposed

geometry was created utilizing Autodesk's Civil 3D 2009 software and then imported into ESRI's ArcMap where HEC-GeoRAS was utilized to create geometric data that was imported into HEC-RAS V.3.1.3 (**Reference 45**) to perform the hydraulic analysis. A mixed flow regime was utilized to better represent the channel characteristics especially due to the relatively steep slopes of the drop structures. The velocities in the earthen channel section were limited to approximately 6 fps, while the velocities in the drops were allowed to exceed that to approximately 19 fps. Protection will be utilized at the drop structures to mitigate these higher velocities. See the construction plan and profiles for details on the channel and associated drop structures.

A manning's n-value of 0.040 was used for the main channel and both overbanks for the entire length of the proposed Pima Road channel, with the drop structures having an n-value of 0.065 due to the added protection efforts to limit the velocities over the drops. The HEC-RAS output can be found in **APPENDIX E**.

5.5.4 Additional Required Improvements

In addition to the improvements proposed here, improvements are necessary north of Pinnacle Peak to ensure that the design flows are able to reach the Pima Road channel. Without these additional improvements flow may not be able to reach the channel. These improvements may be the extension of the Pima Road channel further north. The analysis of these improvements was beyond the scope of work; however the Pima Road design could easily incorporate upstream improvements into the infrastructure.

5.6 Pima Road Storm Drain Analysis – Via De La Luna Drive to Deer Valley

5.6.1 Pima Road Storm Drain Configuration

The Pima Road drainage improvements transition from the Pima Road channel (see **Section 5.5**) to the Pima Road storm drain at approximately station 187+00, or near Via De Luna. The transition to the proposed 2-78" RGRCP storm drain pipes occurs along the east side of Pima Road after which the storm drain is shifted to approximately the roadway median. To avoid numerous utilities the upstream portion of the storm drain is very steep followed by a mild slope of 0.0010 ft/ft. The slope is increased further downstream to a range of 0.015 to 0.021 ft/ft. A transition to 3-78" RGRCP occurs just south of E. Los Gatos Dr. At this transition a special junction that ties the 2-78" pipes to the 3-78" pipes is designed. Just south of the transition the section of pipes have a milder slope ranging from 0.0110 to 0.014 ft/ft with 2 drops in the pipe of 6 feet each to compensate for the steep natural grade of 2-3%. The 3 – 78" RGRCP's outlet into the improved Deer Valley channel near the intersection of Pima and Deer Valley Roads. The outlet of the storm drain pipes is an outfall structure that is lined with rip-rap to protect the channel from the high velocities (see **Section 5.6.2** for details).

In addition to the storm drain itself a local storm water collection system that runs parallel to the storm drain alignment along the eastside of Pima Road is proposed between Paraiso Drive and Deer Valley Road. The system would serve to collect local storm water from the east side of Pima Road and convey it to the storm drain. The total top width of the collection channel will vary based on location (see **Table 5.13**) with a total flow depth of approximately 1.5 feet. The flows captured by the channel will pass through the proposed sediment basins before entering the laterals to the storm drain itself. The sediment basins are proposed to capture most of the sediment, but there is a possibility that not all the sediment will be collected, therefore maintenance of the sediment basins, connector pipes, and the storm drain is recommended. Due to the maintenance need, access ramps are proposed at the sediment basins to easily gain access to the basins.

5.6.2 Hydrologic Modeling

The storm drain itself was added to the proposed HEC-1 model. Kinematic wave routing was utilized for the storm drain modeling with an assumed Manning's n-value of 0.013. Since the kinematic wave procedure in HEC-1 cannot do multiple pipes, diversions were added at the routing locations to equally divert the storm drain flow into the appropriate number of pipes and then subsequently route it to the next concentration point. It was assumed that the storm drain did not allow any flow to pass Pima Road and was able to pick up all flow.

5.6.3 Hydraulic Modeling

The proposed Pima Road storm drain was modeled utilizing StormCAD version V8i (**Reference 46**) for the 100-year, 6-hour storm event. The majority of the storm drain velocities are in the range of 17 to 19 fps. There is a single pipe section with a velocity of 24 fps. This occurs in the pipe segment prior to the transition from 2-78" RGRCP to 3-78" RGRCP. All hydraulic grade lines meet the City's criteria of 1 foot or more below existing grade. The 2-78" RGRCP are shown as flowing under pressure, and this switches to open channel flow after the transition to 3-78" RGRCP. There is a potential for hydraulic jumps, especially near the transition from 2 to 3 78" RGRCP's and at the outlet.

5.6.4 Collector System Analysis

FlowMaster (**Reference 47**) was utilized to perform a normal depth analysis on the storm drain collector system. 4 typical cross sections were analyzed for 4 distinct areas reflecting varying inflows and easement conditions. **Table 5.13** shows the channel geometries and analysis output.

Channel Section [Sta. to Sta.]	Q [cfs]	Channel Slope [ft/ft]	Left Side Slope [H:Z]	Right Side Slope [H:Z]	Bottom Width [ft]	Top Width [ft]	Depth [ft]	Manning's n-value	Velocity [fps]
158+00 to 170+50	28	0.015	4	2	1.0	10.0	1.5	0.045	3.4
171+00 to 177+00	120	0.015	4	3	13.0	23.5	1.5	0.045	4.4
177+00 to 181+00	250	0.015	4	2	12.5	24.6	2.0	0.035	6.7
181+00 to 191+00	50	0.015	4	3	3.5	14.0	1.5	0.045	3.8

Table 5.13: Pima Channel Collector System Summary

In addition to the collector channels that will be located in the existing drainage easement, sedimentation basins are proposed to remove sediment before entering the storm drain system. Details regarding the sediment yield analysis can be found in **Section 5.7**.

5.7 Pima Road Scour and Sediment Yield Analysis – Pinnacle Peak to Deer Valley

The purpose of this analysis is to present the findings of the scour and sediment yield analysis of the proposed Pima Road channel and storm drain system from Pinnacle Peak Road to Deer Valley Road. Scour depths were evaluated for a 100-year, 6-hour flood event, whereas sediment yield was evaluated for each of the following:

- 2-year, 6 hour event
- 100-year, 6-hour event
- annually averaged

At this point no sediment gradation analysis is available for the Pima or Deer Valley Roads. Thus, gradation test results from the Southwest Corner of Pima Road and Sierra Pinta Drive, approximately 1 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 48**) 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 revaluated 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.

5.7.1 Method Description

5.7.1.1 Scour

The scour depth calculations follow procedures described in the Arizona State Standard 5-96 (**Reference 49**) and Arizona Floodplain Management Association (AFMA) Scour Analysis for Small to Mid-Size Desert Washes short course (**Reference 50**).

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 proposed 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.

5.7.1.2 Sediment Loss

Sediment loss calculations follow the procedures described in the Agricultural Handbook 537 (AH-537) (**Reference 51**). Universal Soil Loss Equation was used to estimate the sediment loss for the proposed Pima Road Channel and Storm drain. Soil erodibility factor (K) (**Figure 5.7.2**) 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. To determine the average slope for each subarea (**Figure 5.7.3**) ArcMap was utilized to perform a zonal statistic on the DEM provided by the City of Scottsdale.

5.7.2 Results

Scour depth analysis for Pima Road Channel is presented in **Table 5.14** below. The equilibrium (stable) slope for the channel was found to be a very mild 0.00025 ft/ft with the total scour depth of 2.56 ft. The channel design discharge and depth were used in these calculations. Also, the greatest distance of 400 ft, between grade control structures was used. The distance between grade control structures for the proposed channel ranges from 100 ft to 400 ft, therefore the total scour depths should be smaller for some segments of the channel.

K_{mpm}	0.19	Dimensionless coefficient
Q / Q_{bf}	1	Ratio of total flow to flow over the channel
Q [cfs]	1300	Discharge, (cfs)
n_s	0.04	Manning's *n* for the stream bed
D_{90} [mm]	5	Bed sediment diameter for 90% finer, (mm)
D_{50} [mm]	1	Mean sediment diameter
d [ft]	4	Mean depth
S_L [ft/ft]	**0.00025**	Stable slope $S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D_{50}/d$
S_o [ft/ft]	0.004	Existing channel slope
S_L [ft/ft]	0.00025	Equilibrium (Stable) slope
L [ft]	400	Distance between downstream control point and point of interest
y_{lt} [ft]	**1.50**	Long-term degradation $y_{lt} = (S_o - S_L) L$
L_f	1.76	Dimensionless Lacey's silt factor $L_f = 1.76(D_m)^{1/2}$
Q [cfs]	1300	Design discharge
D_m [mm]	1	Mean grain size of bed material
Y_m [ft]	4.2	Mean water depth at design discharge $Y_m = 0.47 (Q/ L_f)^{1/3}$
Z	0.25	Multiplying factor from Table 7
y_{gs} [ft]	**1.06**	General scour depth using Lacey's Equation $y_{gs} = Z(Y_m)$
y_{lt} [ft]	1.50	Long-term scour depth
y_{gs} [ft]	1.06	General scour depth
y_s [ft]	**2.56**	Total Scour depth $y_s = y_{lt} + y_{gs}$

Table 5.14: Pima Road Channel Total Scour

Sediment loss calculations for Pima Road channel and storm drain are presented in **Table 5.15** below. Contributing areas used for sediment loss calculation are based on the HEC-1 hydrology model and are shown in **Figure 5.7.1**. Sediment loss was calculated for three alternatives:

- 2-year, 6-hour,
- 100-year, 6 hour
- Annually averaged

Even though determining sediment loss for specific storm events is not recommended it is presented here as an additional analysis. For detailed calculations of rainfall and runoff factor R and other reference materials see **APPENDIX G**. The sediment entering Pima Road Channel was found to be 822.4 tons annually. The sediment amount entering the storm drain system is estimated at each entrance and ranges from 92.3 to 1.6 ton annually. At these locations sediment basins will collect most of the sediment. It is recommended that these basins and Pima Rd channel be cleaned periodically, especially after significant storm events.

Procedure follows USDA AH 537 - Predicting Rainfall Erosion Losses, 1978								
Universal Soil Loss Equation (USLE) A = RKLSCP								
ID	Area Contributing	Area [acre]	$A_{annually}$ [tons/acre/year]	$A_{2\text{-yr,6-hr}}$ [tons/acre]	$A_{100\text{-yr,6-hr}}$ [tons/acre]	Soil $Loss_{annually}$ [tons]	Soil $Loss_{2\text{-yr,6-hr}}$ [tons]	Soil $Loss_{100\text{-yr,6-hr}}$ [tons]
1	Pima Rd Channel	865.5	0.95	0.156	0.461	822.4	134.8	398.7
2	Storm drain	92.0	1.00	0.164	0.486	92.3	15.1	44.8
3	Storm drain	43.5	1.06	0.173	0.512	45.9	7.5	22.3
4	Storm drain	8.0	0.84	0.138	0.409	6.8	1.1	3.3
5	Storm drain	2.0	0.79	0.130	0.384	1.6	0.3	0.8
6	Storm drain	7.2	0.79	0.130	0.384	5.7	0.9	2.8
7	Storm drain	15.2	0.61	0.100	0.297	9.3	1.5	4.5

Table 5.15: Pima Road Soil Loss

As is shown in **Table 5.16** below the sediment basins located at storm drain entrances have enough capacity to contain the sediment discharge from 2-year, 6-hour storm. For large storm events the storm drain will clean it self due to high flow velocities in the system.

ID	Volume of Soil $Loss_{2\text{-yr,6-hr}}$ [ft^3]	Sediment Basin Capacity [ft^3]	Difference [ft^3]
	γ_{soil} = 110 lb/ft^3		
2	275	500	225
3	137	500	363
4	20	500	480
5	5	500	495
6	17	500	483
7	28	500	472

Table 5.16: Pima Road Storm drain Sediment Basin Capacity

ID#1
Area=865.54ac

ID#2
Area=92.04ac

ID#7
Area=15.24ac

ID#3
Area=43.52ac

ID#5
Area=1.98ac

ID#6
Area=7.18ac

ID#4
Area=8.02ac

P:\400\410061a\drainage\Preliminary Drainage Report\Figures\Fig 5.7.1 Contributing Areas.mxd

LEGEND

Structures
- Pima Rd. Channel
- Pima Rd. Storm Drain
- CP's
- Routes
- Subbasins

Contributing Areas [acres]
- 1
- 2
- 3
- 4
- 5
- 6
- 7

600 300 0 600 1,200
Feet

Entellus

N

FIGURE 5.7.1 - CONTRIBUTING AREAS SOIL LOSS ANALYSIS

PIMA ROAD DRAINAGE IMPROVEMENTS

K=.15
K=.10
K=.20
K=.15
K=.15
K=.24
K=.10
K=.15
K=.10
K=.24
K=.24
K=.10
K=.15
K=.15
K=.24
K=.15
K=.24
K=.15
K=.15

LEGEND

Structures

- Pima Rd. Channel
- Pima Rd. Storm Drain

Soil Erodibility Factor (K)

- .10
- .15
- .20
- .24

600 300 0 600 1,200 Feet

Entellus

N

FIGURE 5.7.2 - SOIL ERODIBILITY FACTORS SOIL LOSS ANALYSIS

PIMA ROAD DRAINAGE IMPROVEMENTS

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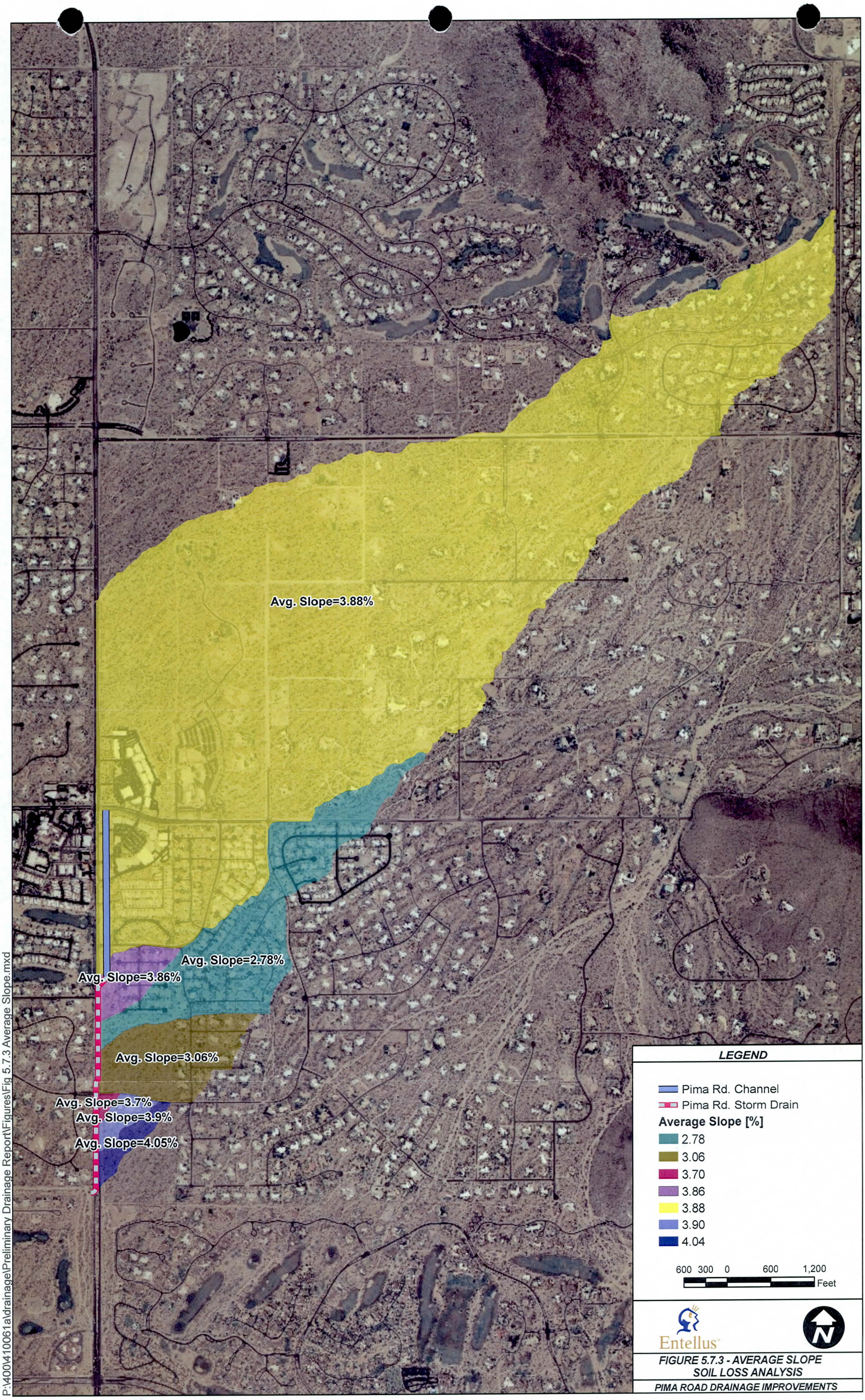

FIGURE 5.7.3 - AVERAGE SLOPE
SOIL LOSS ANALYSIS

PIMA ROAD DRAINAGE IMPROVEMENTS

P:\400\410061a\drainage\Preliminary Drainage Report\Figures\Fig 5.7.3 Average Slope.mxd

5.8 Deer Valley Channel Analysis

Various alternatives were looked at for the Deer Valley channel improvements including upsizing the channel, the addition of a storm drain for a portion of the channel, and various channel linings to protect the channel and minimize the channels footprint. The proposed alternative includes the upsizing of the easternmost portion (from just west of Pima Road to ½ mile west of Pima Road) of the channel to handle the additional flows from the Pima Road storm drain, a flow control structure at the first Grayhawk golf course entrance (~½ mile west of Pima Road) allowing up to design interim conditions flow of 640 cfs (**Reference 37**) to enter the Grayhawk golf course and allow all remaining flow to continue west along the existing Deer Valley channel to the existing sedimentation basin (~1 mile west of Pima Road). The complete project assessment and alternatives for the Deer Valley channel analysis are documented in the *Project Assessment Report For Deer Valley Road Drainage Channel Improvements – Pima Road to Approximately 5000 feet West* (**Reference 34**).

5.9 Pima Road Channel Analysis – Deer Valley Road to Thompson Peak Parkway

5.9.1 Pima Road Channel Configuration

The Pima Road channel from Deer Valley to Thompson Peak Parkway is constrained by the existing easement of 150 feet on the east side of Pima Road. The channel geometry entails a 72' bottom channel width, a channel bottom slope of 0.003 ft/ft with 4H:1V side slopes to match existing grade with a total top width of 112 feet for the channel itself. The channel is proposed to extend from the Deer Valley retention basin (approximately 350 feet south of the Deer Valley Road alignment) on the east side of Pima Road, then continues south along Pima Road to approximately 200 feet north of the intersection of Pima Road and Thompson Peak Parkway near the existing 2-60" RGRCP storm drain inlets. At this point it is proposed to have 10 - 10' x 5' RCBC's crossing parallel to the existing 2-60" RGRCP storm drain across Pima Road to the west and subsequently continue south across Thompson Peak and outlet at the southwest corner of Pima Road and Thompson Peak in the existing swale along the west side of Pima Road. The proposed box culverts are proposed to be buried underground since there is no room for an open channel at this location. The conceptual plan view of the improvements can be found in **APPENDIX K**.

5.9.2 Hydrologic Modeling

The peak flows for this analysis are taken from the existing conditions model described in **Section 5.1**. The vast majority of the contributing area and flow comes from off-site flows to the east. The flow utilized for the conceptual design of this system comes from the HEC-1 concentration point C51.1D with a total flow of nearly 3250 cfs.

5.9.3 Hydraulic Modeling

FlowMaster (**Reference 47**) was utilized to perform a normal depth analysis on the channel system. Six cross sections were cut using the mapping provided by the City (**Reference 41**). The main constraint of the channel design was the easement on the east side of Pima Road. After reviewing the normal depth analysis, it was determined that flow during a 100-year 6-hour storm event could be conveyed by combination of the proposed channel and a portion of the northbound lane of Pima Road. Based on the normal depth calculations, the criteria for dry road lanes for major roadways would still be met. The normal depth calculations show that the roadway median would not be overtopped. To maintain the existing split to the west along Thompson Peak Parkway, a storm drain pipe could be connected to the proposed box culverts to allow a certain amount of flow to continue flowing westward at this location. The normal depth output box culvert calculations can be found in **APPENDIX H**.

5.9.4 Additional Required Improvements

In addition to the proposed improvements for the Pima Road channel between Deer Valley and Thompson Peak Parkway, there are other modifications that need to be considered. The channel upstream of the Deer Valley retention basin is not of sufficient capacity to convey the full 100-year 6-hour storm event flows to the retention basin, which in turn flows into the proposed channel. Instead, as **Section 5.4** demonstrates the flow sheets across the landscape of existing homes until arriving at Pima Road and the proposed channel. Therefore, it is recommended to improve the existing channel to convey the flows from the north to the existing retention basin and towards the proposed channel.

The proposed Pima Road channel, as described in **Section 5.9** will require the removal of the existing privacy wall located within the existing drainage easement between 350 feet south of the Deer Valley Road alignment to 200 feet north of the intersection of Pima Road and Thompson Peak Parkway. With the wall in place there is not sufficient room to place the proposed channel. A proposed equestrian trail as part of the Pima Road improvements should be analyzed to include potentially in the bottom of the channel for the final improvements for the area.

The existing 3 – 8'x4' RCBC located at the northwest corner of Pima Road and Thompson Peak Parkway must be removed and/or relocated if the proposed box culverts are to be placed in this area. There is not sufficient room due to the skew of the existing drainage structures for the proposed 10 -10' x 5' RCBC's. The proposed 10 – 10'x5' RCBC's are proposed to outlet into a Pima Road channel that does not appear to be adequate to handle high velocities and flows. The capacity of this channel to handle high flow events and the stability of the channel under these conditions is questionable. It is imperative that downstream improvements be constructed to handle proposed upstream improvements.

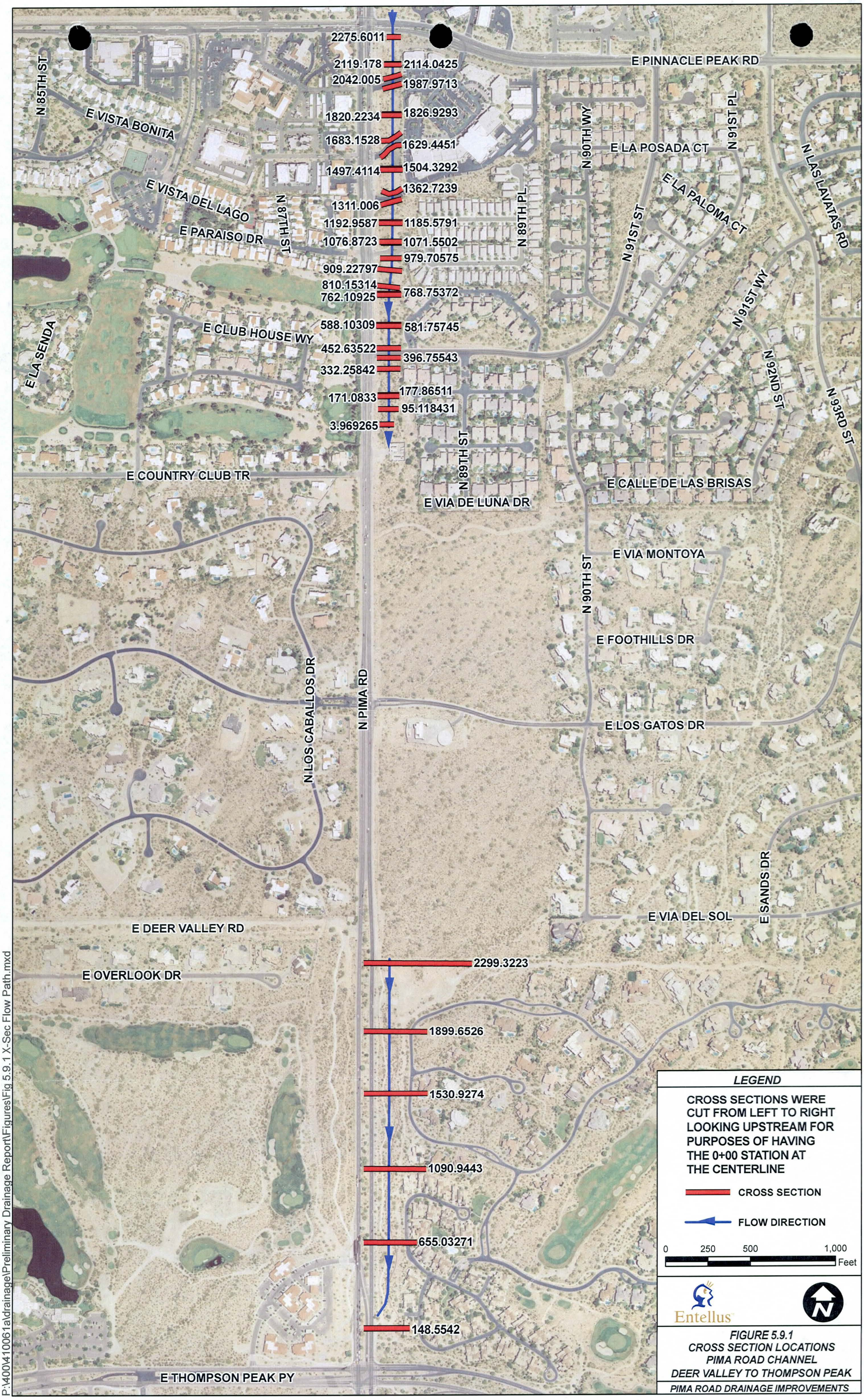

FIGURE 5.9.1
CROSS SECTION LOCATIONS
PIMA ROAD CHANNEL
DEER VALLEY TO THOMPSON PEAK

PIMA ROAD DRAINAGE IMPROVEMENTS

P:\400\410061a\drainage\Preliminary Drainage Report\Figures\Fig 5.9.1 X-Sec Flow Path.mxd

5.10 Pima Road Channel Analysis – South of Sierra Pinta

The Pima Road channel improvements analysis south of Sierra Pinta includes the initial analysis of the Sierra Pinta Outlet into the Pima Road channel just south of Sierra Pinta. The Sierra Pinta channel was designed to alleviate flooding issues in the Pima Acres subdivision by conveying flows from the Sierra Pinta alignment to the Pima Road channel. See the *DC Ranch Sierra Pinta Channel Improvements Plan* by Wood/Patel & Associates, Inc. for details regarding the design (**Reference 32**). Also see the plans for the *Sierra Pinta Drainage Improvements* (**Reference 40**).

5.10.1 Preliminary Pima Road Channel Configuration

It is preliminarily proposed that the Sierra Pinta Channel outlet into the Pima Road channel via 2 - 96" (buried) existing pipes. The design flow for the Sierra Pinta channel is approximately 1,330 cfs (see **Reference 32**).

5.10.2 Hydrologic Modeling

There are several significant factors that affect the hydrologic flows at Sierra Pinta. For the proposed Sierra Pinta channel infrastructure it was assumed the channel would take all the flow arriving at Sierra Pinta up to the capacity of the channel itself (~1330 cfs) after which all flow was assumed to continue south through the Pima Acres subdivision.

The last documented hydrologic and hydraulic analysis performed by Entellus specifically for the Sierra Pinta outfall is documented in the Memorandum discussed in **Section 3.1.14**). In this memorandum 3 hydrologic conditions were examined:

- *Existing conditions* – with the wall in place and other flow restrictions along Pima Rd
- *Deer Valley Split* – allowed for a certain split flow at the Deer Valley Road alignment
- All Flow South Along Pima Road past Deer Valley – All flow from along Pima Road was assumed to continue south along Pima Road

This analysis was performed prior to the FLO-2D analysis between Deer Valley and Thompson Peak Parkway. Due to this, it was previously modeled that a 30% diversion existed at Thompson Peak Parkway to the west and out of the study area. This diversion was analyzed and modified based on a FLO-2D analysis (see **Section 5.4** for details).

A 2-year 6-hour analysis was also conducted for the Sierra Pinta Outfall for all three scenarios described above. See **Section 3.1.14** for details.

5.10.3 Hydraulic Modeling

The hydraulic conditions of the Pima Road channel were analyzed using HEC-Geo RAS V.4.1.1. HEC-GeoRAS is an ArcGIS extension that allows geometry data to be extracted from GIS and utilized in HEC-RAS V.3.1.3. Numerous iterations and analyses were conducted on the proposed Sierra Pinta outfall into the Pima Road channel, all of which are documented in the memoranda discussed in **Section 3.1**. The focus of the various analytical iterations was the pre versus post Sierra Pinta Outfall conditions, that is what the impacts of the outfall had on the Pima Road channel.

The existing Pima Road section allows for a significant quantity of flow to be carried by the east side of Pima Rd (northbound lanes). This flow remains separate from the Pima Road Channel along the west drainage easement. Based on the hydraulic analysis, it was determined that while the capacity of the east side of Pima Road varied as it continues downstream, the maximum capacity is approximately 550 cfs. This analysis is often referred to in accompanying memoranda and documentation as the "Weir Flow Model". See memorandum in **Section 3.1.10** for details.

Based on the "Weir Flow Model" analysis, flows for the Pima Road channel were determined for the 3 scenarios described above for both pre and post Sierra Pinta outfall conditions. These results are discussed in detail in the memoranda described in **Sections 3.1.13** and **3.1.14**. Some general concerns with the modeling include the deviation from the HEC-RAS general assumption of gradually varied flow. The post Sierra Pinta Outfall conditions model includes a drop over the proposed headwall of approximately 10 feet. 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. Another issue includes 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 regimens from subcritical to supercritical back and forth throughout the entire reach. If the channel is left unprotected this could be devastating to the channel itself. Also under post Sierra Pinta Outlet conditions, the velocities downstream of the outlet show a significant increase over existing conditions velocities due to the increase in flow in the channel. This can be designed for and mitigated in the channel, however public perception of increased flow conditions due to the outfall is difficult to mitigate. This will be particularly difficult for the Grayhawk subdivision that does not necessarily see a significant benefit from the Sierra Pinta Outfall; however their driveway is impacted by increased flow conditions within the channel.

5.10.4 Sedimentation Yield and Scour Analysis

A sediment yield and scour analysis was performed on the Sierra Pinta Outfall. This analysis is fully documented in the memorandum discussed in **Section 3.1.14**. The conclusion of the scour analysis was that the channel was unlikely to reach a natural

armoring layer depth for either the 100-year or 2-year flood event. The total scour throughout the reach was also significant ranging from just over 5 ft to more than 25 feet during the 100-year event. The equilibrium slope is in general a very mild 0.055% and 0.22% for the 100-year and 2-year event respectively, when compared to the existing channel slope of over 2%. Additionally the sediment yield was estimated to be 0.0486 tons/acre. See **Section 3.1.14** and the associated memorandum for full details.

5.10.5 Additional Required Improvements

The final analyses performed in January of 2009 (see **Section 3.1.14**) on the Sierra Pinta Outfall included several recommendations of additional improvements. Some of those and other recommendations are shown below:

- *Lower the channel invert for the entire reach by 2 to 4 feet* – This would allow for adequate conveyance without overtopping the existing privacy wall and/or retaining wall; or flow in the roadway (southbound lanes).

- *Bridge at Grayhawk Entrance* – If the Pima Road channel invert were to be lowered by 2 to 4 feet then the driveway entrance into Grayhawk is recommended to be a bridge which could potentially solve the issue of frequent storm flows overtopping the driveway entrance. For larger storms this would have to be evaluated and more detailed analysis would be recommended for this type of structure and the affects downstream and upstream of the bridge location.

- *Armoring of the Channel* – Even under existing conditions, the velocities through the channel section are high enough to cause significant damage and place the integrity of the channel as well as the roadway and adjacent development in jeopardy.

- *Install at least a 2-year crossing at the Grayhawk Entrance* – This would include scour protection both upstream and downstream of the driveway.

- *Analysis on the retaining wall* – No as-built information was obtained for the retaining wall along the Pima Road channel so no analysis as to the walls capability of retaining high flows such as those that might be experienced under the post Sierra Pinta outfall could be analyzed. Improvements to this wall are potentially necessary.

- *More detailed hydraulic analysis* – A more detailed hydraulic analysis is necessary for the entire Sierra Pinta Channel and outlet system. This should include an analysis as to the 550 cfs that stays on the east side of Pima Rd (southbound lanes). An analysis needs to be conducted to determine the downstream consequences of allowing 550 cfs to continue along an unchannelized portion of right-of-way and roadway. Also, what would be the

consequences of allowing the total flow in the Pima channel and assuming no flow is in Pima Road. The output could be reviewed to determine what downstream improvements could be made or other options for the channel itself.

- *More detailed topography* – A more detailed topography of the area from approximately Thompson Peak Parkway to Hualapai Drive. This mapping could be used to do a hydraulic analysis that would analyze both existing conditions and proposed conditions with the Sierra Pinta Outfall plus the future hydrology flows as part of this Drainage Report. These models would show a better representation of the future hydrology flows and the Sierra Pinta Outfall and the affects of the improvements for different alternatives.

- *Construction of downstream outlet* – Currently there is no ultimate outfall for the Pima Road channel. The existing channel continues a little ways downstream and empties onto State Trust Land. Increasing the flow to a channel with no ultimate outfall could potentially be a huge liability for the City to undertake.

- *Hydraulic Analysis and Alternatives for the existing 2-96" pipes (buried)* – A hydraulic model that includes modeling the existing 2-96" pipes is recommended with better modeling programs and/or tools. Several alternatives could be evaluated to determine if the drop at the Sierra Pinta Outlet, that is a result of tying into the existing 2-96" pipes, could be less in vertical drop. The alternatives could potentially result in creating a better hydraulic system with lower velocities and no hydraulic jumps and more aesthetically pleasing results for the surrounding communities.

- *Coordination with affected stakeholders* – This includes all those that might see flow changes due to the Sierra Pinta Outfall. These may include but are not solely limited to: the Grayhawk Home Owners Association, the Grayhawk Developer, State Trust Land, Pima Acres Home Owners Association, and any land owners south of the Sierra Pinta Outfall.

- *Alternatives Analysis for Pima Road Channel between Thompson Peak Parkway and Hualapai Drive* – It is recommended for an alternative analysis for the Pima Road channel, since this could result in a better hydraulic system in the area and the surrounding communities could be a participant in this analysis.

SECTION 6 CONCLUSIONS

While there are various proposed improvements detailed in this drainage report, it is important to complete the drainage system. While these proposed improvements would have a positive affect on adjacent properties, if there is no outlet for the improvements then the problem is simply shifted downstream. It is recommended that an analysis and design of the whole drainage system be conducted to the ultimate outfall of all the drainage improvements, whether through a channel along Pima Road or the power line corridor, or other route. Design for construction plans from Pinnacle Peak to Deer Valley are addressed in this project, with all other improvements discussed here being conceptual plans only. The entire drainage system should be designed and constructed to adequately address flood hazards in the area.

SECTION 7 WARNING AND DISCLAIMER OF LIABILITY

HEC-1 Models:

The base for all the hydrologic HEC-1 modeling was completed by modifying existing models approved by the City whose work was performed by others. There are several portions of the utilized models that were created by various parties. While Entellus examined and modified the model in the locations near the proposed Pima Road and Deer Valley improvements, no verification as to the reasonableness or accuracy of the regionally upstream parameters relating to the previously approved models was conducted. It was assumed that this previous modeling was correct.

Conceptual Channel Design: Deer Valley Road to Thompson Peak Parkway:

Per the City's request Entellus prepared conceptual plans for a channel from approximately the Deer Valley alignment to Thompson Peak Parkway. The analysis was simply conceptual. Further analysis and a full design to determine where the channel should be located, crossings, how to deal with the flow that continues southwesterly past the intersection of Pima Road and Thompson Peak, and other details are still necessary. Although the existing drainage infrastructure is insufficient to handle the existing offsite flows, the proposed roadway improvements do not worsen the drainage conditions. The proposed conceptual drainage improvements could be further analyzed and implemented when funds are available at a future date.

FLO-2D Model Pinnacle Peak to Deer Valley:

The elevation data utilized for this model came from 3 sources, survey of the existing roadway, DEM provided by the City of Scottsdale, and elevation data created through software to represent the proposed roadway and channel sections. The purpose of this model was not to determine the floodplain inundation limits for any set storm frequency, but to approximate the benefit of a proposed channel along Pima Road. The results of this study should not be utilized in any way to determine FEMA inundation limits of any kind. Additionally, the roadway, storm drain and channel sections utilized in the model are not the final design sections. See the roadway, storm drain and channel design plans for final values.

Flow Into Grayhawk Golf Course:

The design flows allowed to enter the Grayhawk golf course at the 2 separate locations along Deer Valley in the HEC-1 models for the proposed condition was taken from work performed by others. These flow values were not verified to ensure that there is adequate downstream capacity. It was assumed that the drainage infrastructure was built to sufficiently handle the interim flows determined in the respective drainage reports.

Sediment Yield Analysis:

The sediment yield analysis was performed on limited soils data. Only a single soil sample was utilized approximately 1 mile south of the project site. More samples and analysis are necessary to have a complete sediment yield analysis.

Sierra Pinta Channel Analysis:

The analysis on the Sierra Pinta Channel outfall was preliminary. No final design was completed as a part of this project. Additionally, the capacity of the Sierra Pinta Channel itself was taken from the

design and analysis of it performed by Wood/Patel & Associates, Inc. No analysis of the Sierra Pinta Channel itself was performed as part of this project. Further analysis is required prior to designing the outfall.

SECTION 8 REFERENCES

8.1 References

Ref. #	Report Title	Prepared by	Date Prepared	Obtained From
1.	Drainage Improvements: Basin 53R to Desert Golf Course	KVL Consultants, Stantec Consulting and Robert Ward	10/25/02	City of Scottsdale
2.	Drainage Design Report, Pima Acres Paving and Drainage Improvements District No. 18901 Scottsdale, Arizona	Kleinfelder, Inc, and Stantec Consulting	5/1/98	City of Scottsdale
3.	Pima Road Channel Hydrology Report, City of Scottsdale Desert Greenbelt Project	Greiner, Inc.	2/14/95	City of Scottsdale
4.	Rawhide Wash Hydrologic Report, Scottsdale Desert Greenbelt	Greiner, Inc and City of Scottsdale	6/30/94	City of Scottsdale
5.	Reata Pass/Beardsley Wash Hydrology Report, Scottsdale Desert Greenbelt	Greiner, Inc and City of Scottsdale	2/14/95	City of Scottsdale
6.	Planning Unit 1, North Flood Protection, Design Report for DC Ranch	Wood/Patel & Associates, Inc.	6/18/03	DC Ranch, L.L.C.
7.	DC Ranch Planning Unit 1 Master Drainage, Addendum to DC Ranch Planning Unit 1 and second Amendment to Planning Units III, V, and VI, Part 4 Drainage Plan Study	Wood/Patel & Associates, Inc.	4/10/03	DC Ranch, L.L.C.
8.	DC Ranch Planning Units III, V & VI Addendum to Part 4 Drainage Plan Study	Wood/Patel & Associates, Inc.	6/30/01	DC Ranch, L.L.C.
9.	Supplement No. 3 Master Drainage Plan Report for Ironwood Village	Carter Associates, Inc.	9/16/88	UDC Homes
10.	Desert Greenbelt Pima Road Three Basins Project: Ultimate Condition Design Hydrology Report Phase 2 of PR3B.	Stantec Consulting	3/1/99	City of Scottsdale
11.	Desert Greenbelt Pima Road Three Basins Project: Interim Condition Design Hydrology Report Phase 1 of PR3B.	Stantec Consulting	3/1/99	City of Scottsdale

Ref. #	Report Title	Prepared by	Date Prepared	Obtained From
12.	Core North Detention Basin Concept Design Report Draft and Final Hydrology HEC-1 input file	BRW in Association with Robert Ward PE	Rpt. 10/17/01 HEC-1 5/15/02	City of Scottsdale and HEC-1 file via email from B. Ward
13.	Addendum 1 to Planning Unit Drainage Study for Planning Units II and IV and Final Drainage Report for DC Ranch, Phase 1A (Thompson Peak Parkway)	Wood/Patel & Associates, Inc.	5/11/96	City of Scottsdale
14.	Desert Greenbelt Pima Road Three Basins Project: Watershed Hydrology and Concept Design Report	Stantec Consulting	11/1/97	City of Scottsdale
15.	Desert Greenbelt Pima Road Three Basins Project: Pima Road Conduits Hydraulics Memorandum	Stantec Consulting	4/1/98	City of Scottsdale
16.	Pima Road Three Basin Project Design Memo for Deer Valley Basin to Sierra Pinta Channel Junction Proposed Alternatives	Stantec Consulting	8/28/97	City of Scottsdale
17.	Master Drainage Plan Report for Ironwood Village	Carter Associates, Inc.	12/1/87	City of Scottsdale
18.	Drainage Report, Cachet at Grayhawk Phase 2	Rick Engineering	12/1/03	City of Scottsdale
19.	Basis of Drainage Design Report, Parcel 3i, Village 3 Grayhawk	Gilbertson Assoc., Inc.	6/20/01	City of Scottsdale
20.	Drainage Report for Off-Site Improvements Grayhawk-Parcel 3i	Gilbertson Assoc., Inc.	10/10/01	City of Scottsdale
21.	Grayhawk Parcel 3i Berm Inlet Addition Report	Gilbertson Assoc., Inc.	10/17/01	City of Scottsdale
22.	Addendum to Planning Unit Drainage Plan: for Grayhawk Villages 2 and 3	DEI Professional Services	6/21/96	City of Scottsdale
23.	Pima Road Three Basin Project, Pima Road Storm Drain Drainage Design Rpt.	Stantec Consulting	4/27/98	Stantec

Ref. #	Report Title	Prepared by	Date Prepared	Obtained From
24.	Final Drainage Report Pima Freeway 9A, Part II: Scottsdale Road to Pima Road	HDR	3/26/2001	HDR
25.	Pima Road Paving Plans	JMI and Associates	9/11/98	City of Scottsdale
26.	Drainage Design Manual - Hydraulics	Flood Control District of Maricopa County	9/2000	District Website
27.	PREFRE as included in the Drainage Design Management System Version 1.8	Flood Control District of Maricopa County		FCDMC
28.	2002 Aerial Photography and 1' Digital Contours	City of Scottsdale		City of Scottsdale
29.	FLO-2D Flood Routing Simulation model version 2006.01	J.S. O'Brien		
30.	FEMA accepted modeling software.	FEMA		http://www.fema.gov/plan/prevent/fhm/en_hydra.shtm,
31.	Pima Rd DCR AZ101 to Thompson Peak Parkway Final Hydrology and Preliminary Drainage Design Report	Entellus, Inc.	October 2004	
32.	DC Ranch Sierra Pinta Channel Improvement Plan	Wood/Patel and Associates, Inc.	July 2008	City of Scottsdale
33.	Deer Valley Road Channel Spillway Improvement Project	Engineering and Environmental Consultants, Inc COS on call contract # 2004-157-COS Task 6		City of Scottsdale
34.	Project Assessment Report For Deer Valley Road Drainage Channel Improvements – Pima Road to Approximately 5000 feet West	Entellus, Inc. COS Contract No. S-0602	August 2009	
35.	Drainage Design Manual – Hydrology	Flood Control District of Maricopa County	01/1995	District Website
36.	Federal Highway Association Urban Drainage Design Program, HY-22	FHWA	01/2002	FHWA Website
37.	Deer Valley Channel Phase 2 Hydrologic & Hydraulic Design Report for Grayhawk Development	Pacific Advanced Civil Engineering	11/1996	City of Scottsdale

Ref. #	Report Title	Prepared by	Date Prepared	Obtained From
38.	FLO-2D Flood Routing Simulation model version 2007.06	J.S. O'Brien		
39.	HEC-GeoRAS 4.1.1, Version 4	Army Corps of Engineers	September 2005	ACE Website
40.	Sierra Pinta Drainage Improvement Plans, Project No. F-0503, Bid No. 09PB024	Entellus, Inc	10/2008	
41.	Elevation TIN from City of Scottsdale, Received 2007-05-03	City of Scottsdale	2007-05-03	City of Scottsdale
42.	Preliminary Drainage Study for Desert Village	Norman Engineering Group, Inc	June 30, 1995	City of Scottsdale
43.	Preliminary Drainage Study for Mirage Village	Wood/Patel & Associates, Inc	February 8, 1998	City of Scottsdale
44.	Preliminary Drainage Study for Canada Vistas	Wood/Patel & Associates, Inc	June 4, 1994	City of Scottsdale
45.	HEC-RAS V.3.1.3	USACE	May, 2005	USACE website
46.	Bentley StormCAD V8i	Bentley Systems, Inc.	2009	Bentley Systems, Inc.
47.	Bentley FlowMaster V8	Bentley Systems, Inc.	2008	Bentley Systems, Inc.
48.	Geotechnical Evaluation Pima Road Drainage Junction Structure Southwest Corner of Pima Road and Sierra Pinta Drive Scottsdale, Arizona	Ninyo & Moore	Nov. 2007	Ninyo & Moore
49.	State Standard for Watercourse System Sediment Balance (SSA 5-96), Flood Warning and Dam Safety Section	Arizona Department of Water Resources (ADWR)	September 1996	ADWR
50.	Scour Analysis for Small to Mid-Size Desert Washes Short Course	Arizona Floodplain Management Association (AFMA)	January 2004	AFMA
51.	Predicting Rainfall Erosion Losses (AH-537)	Wischmeier, W. H., Smith, D.D; United States Department of Agriculture (USDA), Science and Education Administration	1978	USDA
52.				

8.2 Memorandum Dated February 11th, 2005

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TO:
FROM: Ryan Sauer
JOB NO: 410061A
DATE: 02/11/2005

PROJECT NAME: PIMA ROAD

MEMORANDUM

Pinnacle Peak to Deer Valley Drainage

Drainage issues were reviewed along the 1 mile stretch of Pima Road from Pinnacle Peak to the Deer Valley alignment. The 2004 Entellus hydrology model was modified to generate flows at various locations along Pima Rd. assuming fully developed conditions. The 2004 Entellus hydrology model is an updated version of the Core North Detention Basin model by Ward and others, assuming fully developed conditions. The following table shows the generated preliminary flows:

	Concentration Point	Location	10-yr Flow	25-yr Flow	50-yr Flow	100-yr Flow
1	1A1	Pinnacle Peak	318	471	610	764
2	C1A2P	2500' S. of P.P.	366	532	675	843
3	C1BP	4500' S. of P.P.	475	696	900	1082
4	C51.1P	Deer Valley	487	718	902	1104

The flows were utilized to determine drainage structure size along the 1 mile stretch of road. Various options were analyzed. The first two (2) options are channels along the east side of Pima road. The following characteristics were assumed in the approximation of the channel sizing:

- 5:1 slope on west channel bank
- 4:1 slope on east channel bank
- Natural slope of 0.020-0.023 ft/ft
- Channel slope of 0.0030-0.020 ft/ft
- Flow depth less than or equal to 5ft
- 3ft drop structures (accounts for steepness of terrain)
- Channel Manning's n value of 0.0035
- Maximum channel velocity of 5 fps

Based on these assumptions the following channel sizes were approximated for the given storms and reach lengths and one of two additional assumptions:

- Maximum roadway ponding of 8 inches
- Maximum roadway ponding up to top of median (~15 inches)

The results from both assumptions are shown in the table below.

Reach Length [ft]	Storm Frequency [year]	Design Flow [cfs]	Street Flow [cfs]	Channel Flow [cfs]	Flow Depth [ft]	# of Drops	Flow Top Width [ft]	Channel Top Width [ft]	Channel Slope [ft/ft]
Assumed flow depth of 8"									
Pinnacle Peak (1A1) to Approximately midway point to Deer Valley (C1A2P)									
2500	100	764	73	691	4.89	15	51.3	77.7	0.0037
2500	50	610	73	537	4.47	15	45.0	70.4	0.0044
2500	25	471	73	398	3.60	14	39.0	64.9	0.0054
2500	10	318	73	245	3.29	12	30.3	57.0	0.0074
C1A2P to C1BP									
2000	100	843	73	770	4.98	11	54.6	80.7	0.0034
2000	50	675	73	602	4.90	11	47.5	72.4	0.0041
2000	25	532	73	459	4.06	10	42.0	68.6	0.0047
2000	10	366	73	293	3.15	9	33.5	59.8	0.0065
C1BP to Deer Valley (C51.1P)									
1100	100	1082	73	1009	4.97	7	64.0	91.2	0.0030
1100	50	902	73	829	4.99	7	56.8	83.6	0.0033
1100	25	718	73	645	4.90	7	49.3	75.2	0.0039
1100	10	487	73	414	3.63	6	39.8	68.2	0.0053
Assumed flow depth to top of median (~15")									
Pinnacle Peak (1A1) to Approximately midway point to Deer Valley (C1A2P)									
2500	100	764	259	505	4.33	15	44.0	69.4	0.0044
2500	50	610	259	351	3.93	13	36.2	63.2	0.0059
2500	25	471	259	212	2.88	11	28.0	55.0	0.0085
2500	10	318	259	59	0.77	0	20.0	19.9	0.0220
C1A2P to C1BP									
2000	100	843	259	584	4.76	11	47.0	72.0	0.0041
2000	50	675	259	416	3.75	10	40.0	66.0	0.0051
2000	25	532	259	273	2.53	9	34.0	59.8	0.0068
2000	10	366	259	107	0.89	0	28.0	27.9	0.0020
C1BP to Deer Valley (C51.1P)									
1100	100	1082	259	823	4.68	7	58.0	85.0	0.0032
1100	50	902	259	643	4.39	7	51.0	77.5	0.0036
1100	25	718	259	459	3.74	7	43.0	68.3	0.0045
1100	10	487	259	228	2.26	6	31.0	55.2	0.0080

As can be seen in the difference between the "Flow Top Width" and "Channel Top Width" columns, a large portion of the required channel width is to accommodate the drop structures

The next option is the use of storm drain along Pima Road as well as flow conveyance in Pima Road. This was approximated using the following assumptions:

- Storm drain flows full
- Pipe Slope of 0.02 ft/ft
- Pipe Manning's n value of 0.015
- Road Manning's n value of 0.016
- Subcritical flow in street
- Pipe size increments of 6 inches were utilized
- Total system capacity will be greater than or equal to design flow

Two (2) options were looked at for the stormdrain street flow combination. The first is assuming that the maximum allowable flow depth for a given storm is 8 inches. The second assumes that flow can occur up to the top of median curb. The following table summarizes the approximated storm drain sizes for both conditions.

Reach Length [ft]	Storm Frequency [year]	Design Flow [cfs]	Street Flow [cfs]	Pipe Diameter [in]	# of Pipes	Total Pipe Flow [cfs]	Total Flow]cfs]
Assumed flow depth of 8"							
Pinnacle Peak (1A1) to Approximately midway point to Deer Valley (C1A2P)							
2500	100	764	73	66	2	826	899
2500	50	610	73	60	2	640	713
2500	25	471	73	54	2	484	557
2500	10	318	73	54	1	320	393
C1A2P to C1BP							
2000	100	843	73	66	2	826	899
2000	50	675	73	60	2	640	713
2000	25	532	73	54	2	504	557
2000	10	366	73	60	1	320	393
C1BP to Deer Valley (C51.1P)							
1100	100	1082	73	72	2	1040	1113
1100	50	902	73	66	2	826	899
1100	25	718	73	60	2	640	713
1100	10	487	73	66	1	520	593
Assumed flow depth to top of median (~15")							
Pinnacle Peak (1A1) to Approximately midway point to Deer Valley (C1A2P)							
2500	100	764	259	60	2	688	947
2500	50	610	259	48	2	354	613
2500	25	471	259	42	2	248	507
2500	10	318	259	36	1	82	341
C1A2P to C1BP							
2000	100	843	259	60	2	640	899
2000	50	675	259	54	2	484	743
2000	25	532	259	48	2	354	613
2000	10	366	259	42	1	124	383
C1BP to Deer Valley (C51.1P)							
1100	100	1082	259	72	2	1040	1299
1100	50	902	259	66	2	826	1085
1100	25	718	259	54	2	484	743
1100	10	487	259	54	1	242	501

2 similar pipes were assumed for all storm frequencies greater than the 10-year storm.

8.3 Memorandum Dated October 19th, 2005

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TO:	Alex McLaren
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DATE:	October 19, 2005

PROJECT NAME: **Pima Road Drainage Improvements**

MEMORANDUM

Introduction

The purpose of this memorandum is to present the results of the analysis performed to estimate the drainage impact the Pima Road improvements will have on the Pima Road Deer Valley Channel and adjacent development. This included estimating existing conditions and proposed alternative scenarios.

EXISTING CONDITIONS

Previous Studies

The base hydrology model used to develop this condition was taken from the *City of Scottsdale Desert Greenbelt: Pima Road Three Basins Project by Stantec (Three Basins Model)*, in particular, the portion of the model where flows are shown to affect the Deer Valley Channel. All other records were removed from the hydrology model.

Previous Model Assumptions

Many existing developments in the Pima Road area were developed based on the assumption that the Scottsdale Desert Greenbelt Flood Control Project improvements were in place. The original Stantec hydrology model makes many assumptions based on the implementation of these improvements such as a detention basin at Happy Valley Road that does not currently exist, and a channel along Pima Road that does not exist.

Grayhawk's design of the Deer Valley Channel included a 30% split to the south golf course between Pima and Hayden Roads. This split was incorporated into the model and is at concentration point CEEC05 in the Entellus model, and is called 37AW in the *Addendum to Planning Unit Drainage Plan for Grayhawk Villages 2 and 3,* as prepared by DEI Professional Services and dated June 27, 1996.

Existing Conditions Model Modifications

In order to model existing conditions, it was necessary to modify the model Three Basins Model to adequately account for current Pima Road conditions.

Subbasins

Subbasins were modified in order to more accurately predict the flow through the area. Kinematic Wave was used to route the flow through the subbasins. These parameters were estimated based on 1' contours and aerial photography provided to Entellus by the City of Scottsdale. Similar to the previous Stantec study, curve numbers were utilized for rainfall losses. The curve numbers and RTIMP from the original Three Basins Model basins were examined based on the TR-55 publication, and the parameters appear to reflect the existing conditions in the area.

Routes

In order to adequately determine the existing conditions route flow paths, field survey and verification were conducted. In particular how and where flows cross Pima Road.

Diversions

Diversions were established along Pima Road at all concentration point locations. Diversions were established based on whether flow was allowed to cross via culvert or wet crossing.

Results

As seen in **Figure 1: Existing Conditions**, the amount of flow along Pima Road is moderate. Most of the flow crosses Pima Road at some point or another via culverts or wet crossings. The flow in the Deer Valley Channel at Pima Rd is only Q_{100}=47cfs. The flow at concentration point CEEC05 (prior to 37AW diversion to golf course) is Q_{100}=735 cfs. This is less than the design flow Q_{100}=1100cfs from the Grayhawk report. The flow in the Deer Valley Channel increases as the channel heads west. According to the Grayhawk report the channel west of CEEC05 has a capacity of 1796 cfs. The Entellus model shows that under existing conditions, the 100-year flows reaching this reach of the Deer Valley Channel range from Q_{100}=515 cfs downstream from the diversion to approximately Q_{100}=2200 cfs near the power line corridor.

FUTURE CONDITIONS MODELS

Scenario #1

The first scenario assumes that all flow is taken into the storm drain, except flow that currently crosses Pima Road through culverts. No modifications were made to the subbasins. However, the routes along Pima Road were modified to better represent an underground storm drain.

As can be seen in **Figure 2: Scenario #1**, the flows along Pima Road are significantly increased from the existing conditions. Approximately Q_{100}=1100-1300 cfs would need to be carried in the storm drain. A point of particular interest is the beginning of the Deer Valley Channel. The existing conditions flow here is a mere Q_{100}=57 cfs, but by routing all flow to the channel, the flow increases to Q_{100}=1256 cfs. This flow is larger than the design flow of Q_{100}=1100 cfs. The

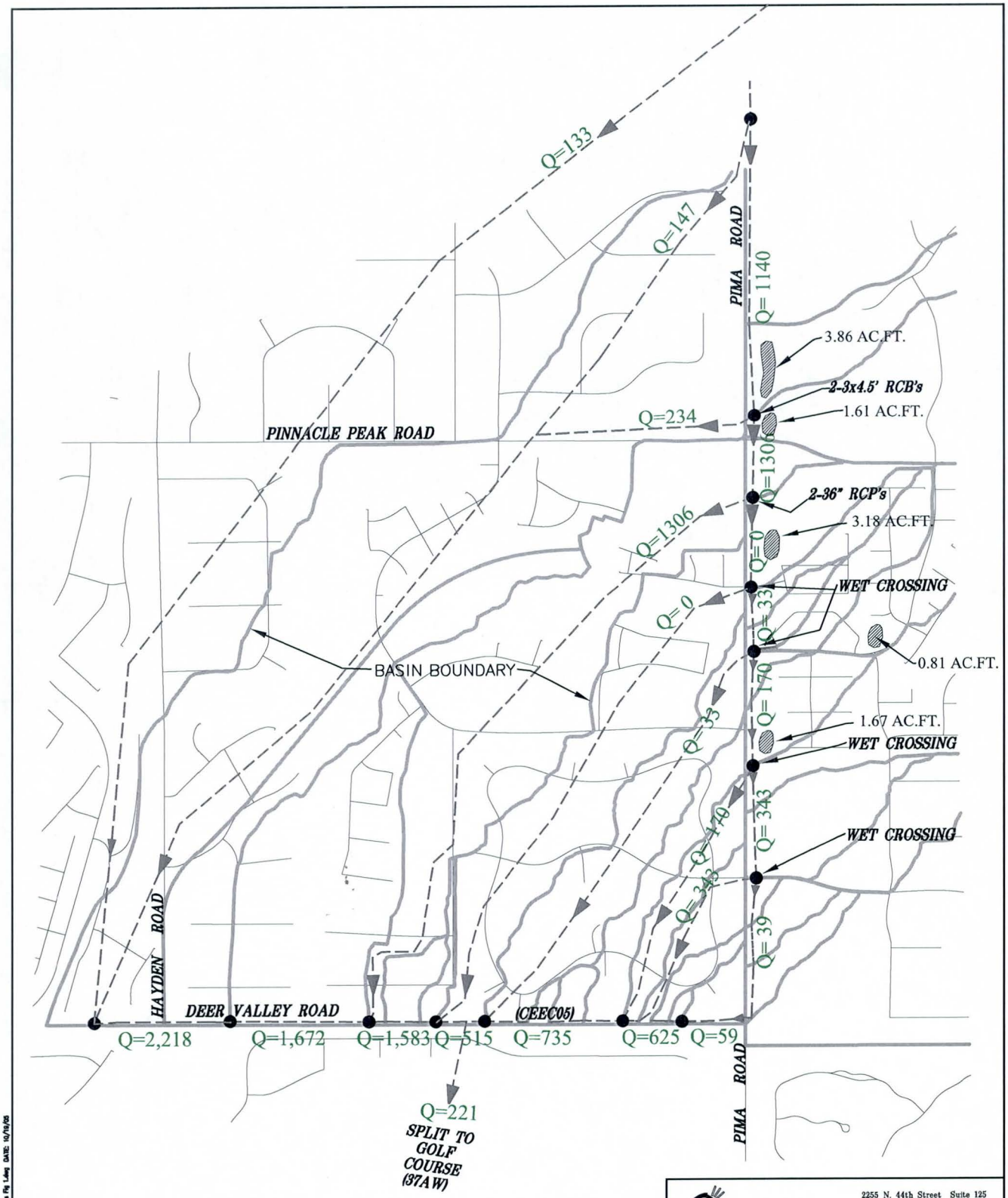
flow at the west end of the channel decreases from Q_{100}=2218 cfs for the existing conditions to Q_{100}=1853 cfs for scenario #1, which is very similar to the channel capacity of 1796 cfs.

Scenario #2

Scenario #2 is identical to Scenario #1, but additional flow is allowed to cross Pima Road through future culverts. Subbasin flow at Paraiso Drive east of Pima Road (C1A2C), and subbasin flow between Country Club Trail and Los Gatos Drive were allowed to cross via future culverts. This scenario does not appear to decrease the peak flows in the Deer Valley Channel significantly (see **Figure 3**).

Scenario #3

Scenario #3 is a modification of Scenario #1, and it looks at the idea of utilizing offline storage to reduce the peak flow in the storm drain. This was accomplished by adding a diversion card where a possible future retention basin could be located. This location was determined to be on the northeast corner of Los Gatos Drive and Pima Road. This storage could actually occur anywhere space allows. The total storage required to reduce the flow at the Deer Valley Channel is in the range of 11 acre-ft. 11-acre feet was the volume of retention utilized for Scenario #3 also assuming that any flow over 700 cfs would enter the retention basin. As can be seen in Figure #4, the peak flow in the Deer Valley Channel, CEEC05 still has an increased peak flow from the existing conditions, but has been reduced significantly from scenario #1 and #2 (see **Figure 4**).



LEGEND

EXISTING STORAGE

PROPOSED STORAGE

BASIN BOUNDARY

Entellus™
2255 N. 44th Street Suite 125
Phoenix, AZ 85008.3279
Tel 602.244.2566
Fax 602.244.8947
Project No. 410.061

Pima Road Drainage Improvements

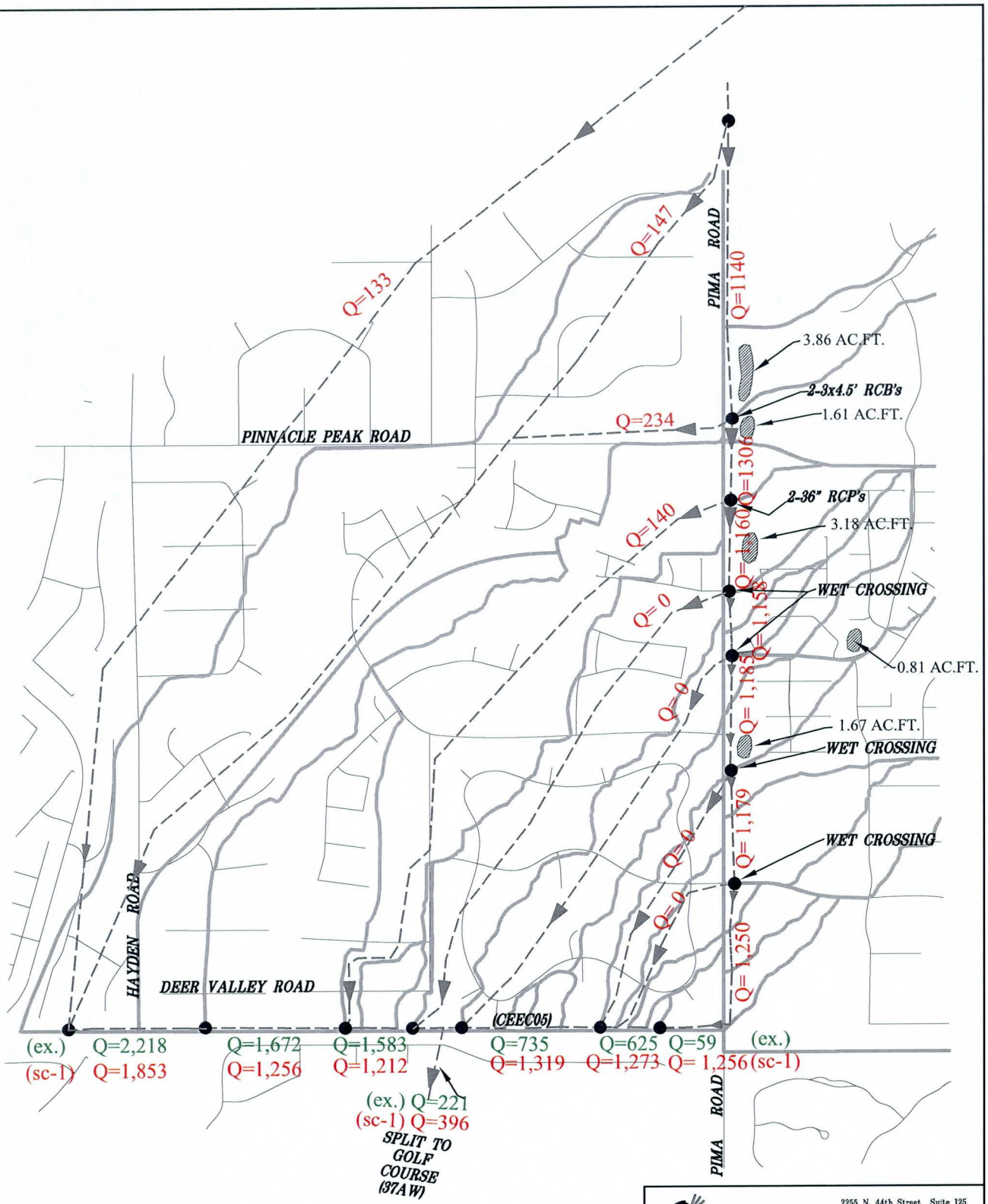
City Of Scottsdale

CONTRACT #2003-114-COS

FIGURE 1

EXISTING CONDITIONS

P:\60\410061\Drainage Staff\Design enter if\Hydrology Exhibits\Existing Conditions Fig 1.dwg DATE: 10/19/05



LEGEND

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Project No. 410.061

Pima Road Drainage Improvements

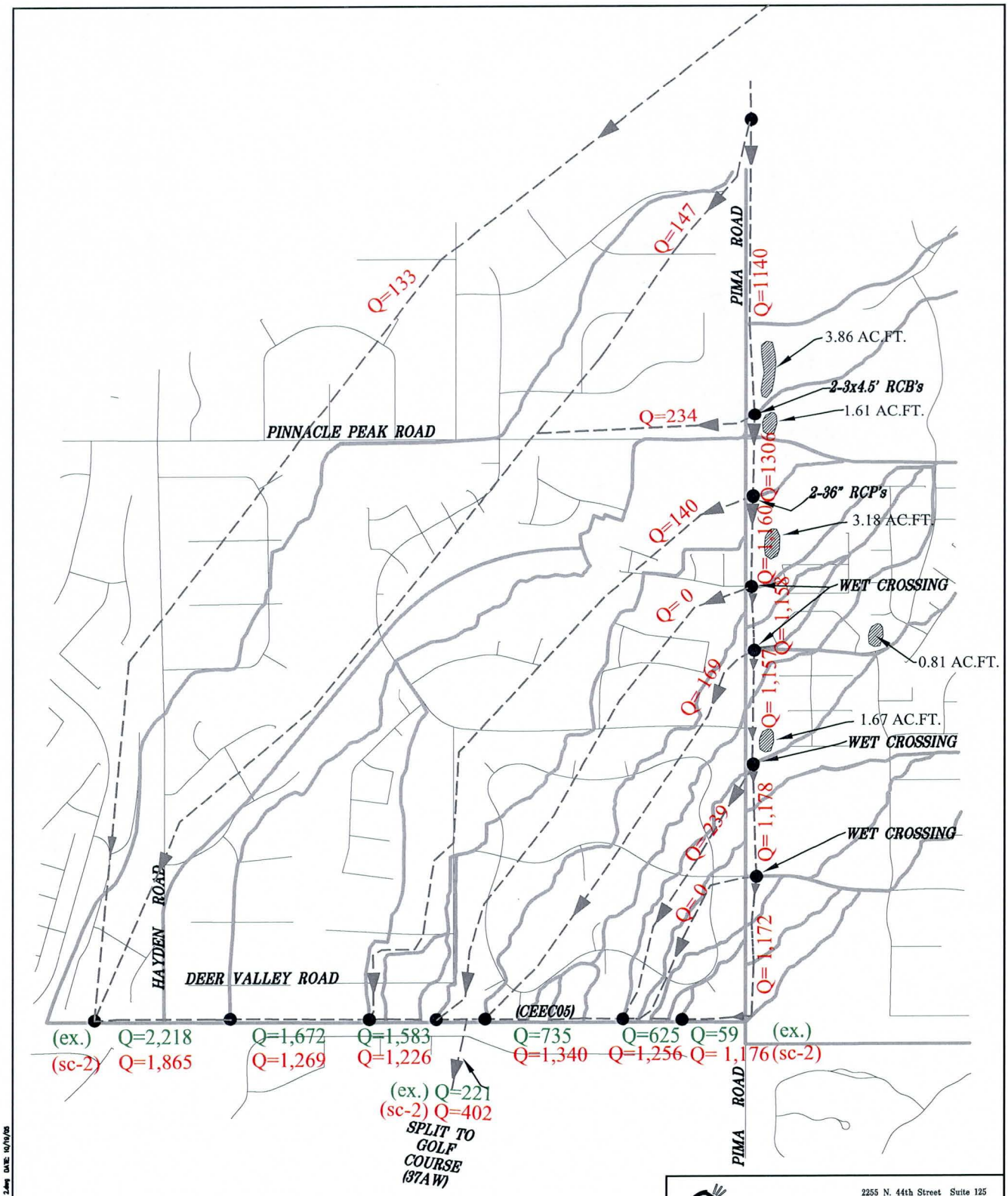
City Of Scottsdale

CONTRACT #2003-114-COS

FIGURE 2

SCENARIO #1

P:\WP\410061\Drainage Staff\Design order if\Hydrology Exhibits\Scenario One Fig 2.dwg DATE: 10/10/05



LEGEND

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Project No. 410.061

Pima Road Drainage Improvements

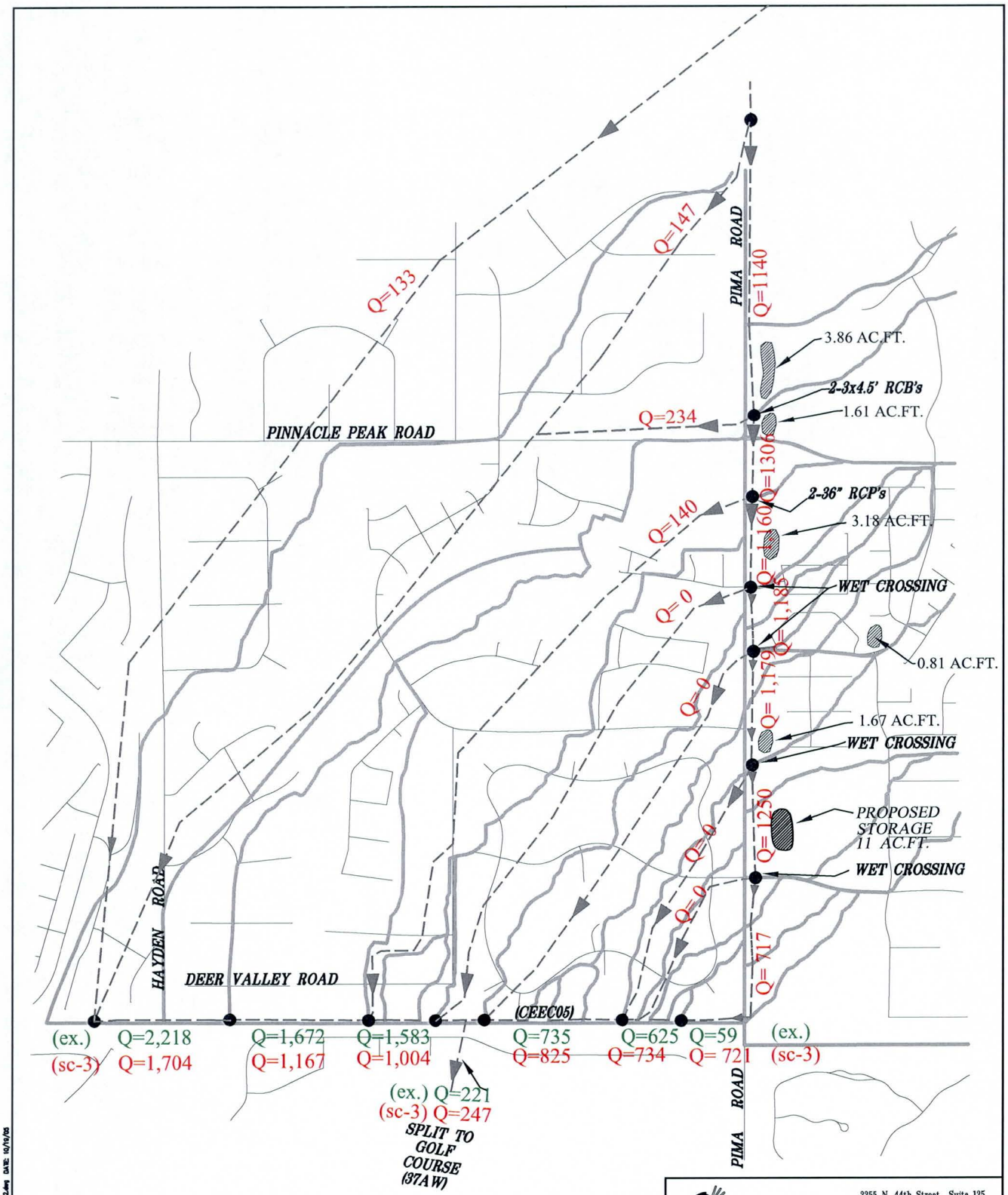
City Of Scottsdale

CONTRACT #2003-114-COS

FIGURE 3

SCENARIO #2

P:\410\410061\Drainage Staff\Design enter it\Hydrology Exhibits\Scenario One Fig 2.dwg DATE: 10/19/05



LEGEND

EXISTING STORAGE

PROPOSED STORAGE

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Pima Road Drainage Improvements

City Of Scottsdale

CONTRACT #2003-114-COS

FIGURE 4

SCENARIO #3

P:\600\410061\Drainage Staff\Design enter 2\Hydrology Exhibits\Scenario One Fig 2.dwg DATE: 10/10/05

8.4 Memorandum Dated November 15th, 2006

Entellus
8355 N. 44th Street Suite 125
Phoenix, AZ 85028-2379
Tel 602.944.5500
Fax 602.944.5947
Email: www.entellus.com

TO:	William Linck
FROM:	Urmas Grossthal
JOB NO:	410061A
DATE:	11/15/2006

PROJECT NAME: PIMA ROAD

MEMORANDUM

Drainage Alternatives
Pinnacle Peak to Deer Valley Drainage

Drainage issues were reviewed along the 1 mile stretch of Pima Road from Pinnacle Peak to the Deer Valley alignment. The Entellus hydrology model, which is an updated version of the Core North Detention Basin model by Ward and others, generated flows at various locations along Pima Road, assuming fully developed conditions.
The table on next sheet shows the flows at 12 concentration points along east side of Pima Road. In addition, flows crossing the Pima Road are included in the table.

Conc. Point	Distance, South of Pinnacle Peak	2-yr Existing	2-yr Added Ret.	2-yr Ex. Crosses Pima	5-yr Existing	5-yr Added Ret.	5-yr Ex. Crosses Pima	100-yr Existing	100-yr Added Ret.	100-yr Ex. Crosses Pima
C36R1C	-200	103	103	103	254	234	0	1140	1140	234
C36R1D	0	36	36	0	114	114	0	1300	1300	0
C1A2F	700	36	31	36	114	114	114	1306	1306	1306
C1A2E	1300	0	0	0	0	0	0	0	0	0
C1A2D	1700	4	0	4	9	0	9	33	0	33
C1A2C	1900	9	0	0	18	3	0	169	145	0
C1A2G	2400	10	0	0	19	0	0	174	85	0
C1B4	3000	9	0	9	19	0	19	170	21	170
C1B3	3400	20	20	0	49	49	0	239	239	0
C1B2	4000	29	29	29	69	69	69	343	343	343
C51.1H	4400	0	0	0	1	1	0	5	5	0
C51.1G	4800	2	2	0	4	4	0	21	21	0
C51.1F	5250	3	3	0	7	7	0	39	39	0

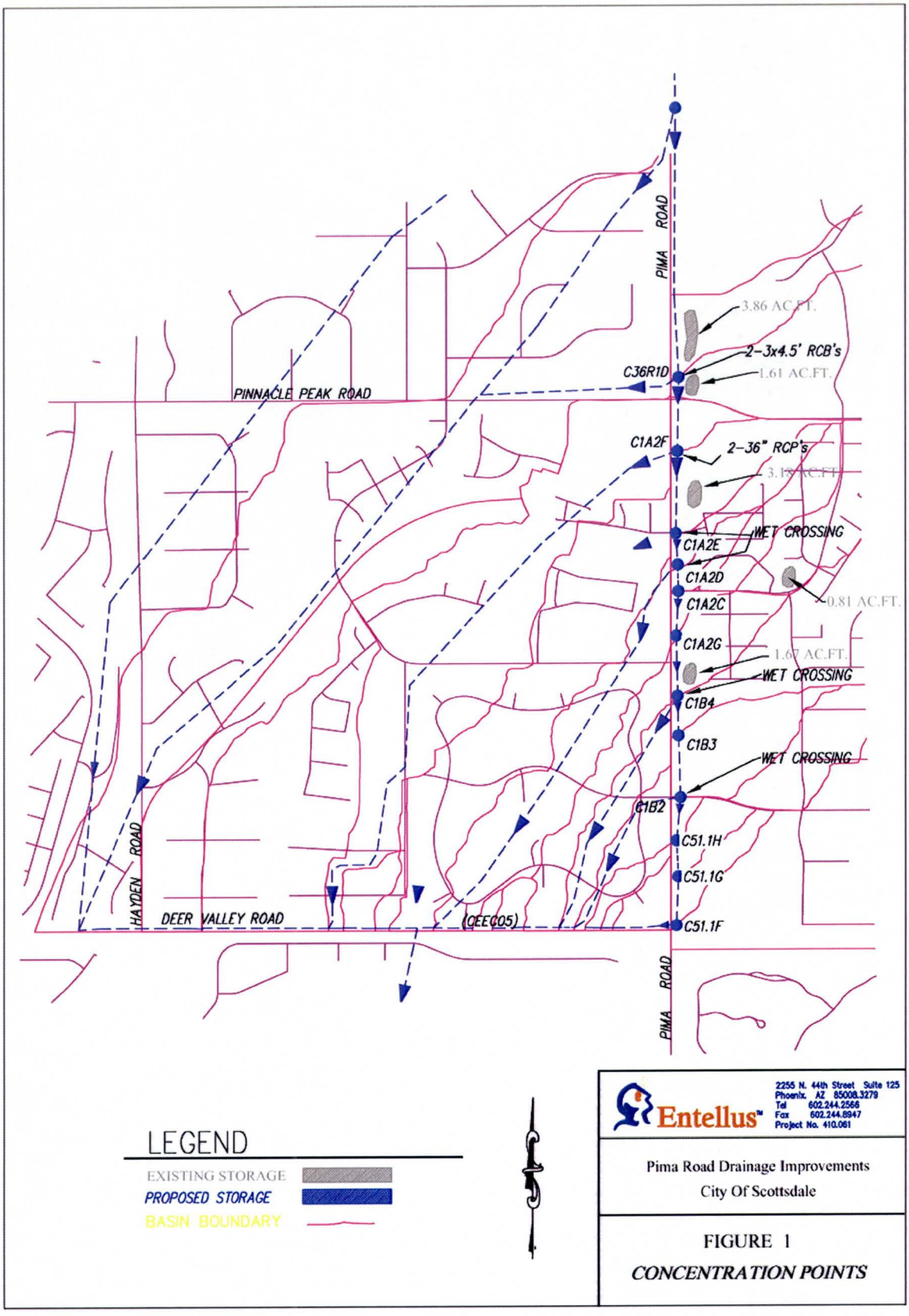
Additional retention was assumed for the "Added Ret." model runs. The locations of the added retention were determined based on aerial photography and field visits and are located at the following concentration points:

Concentration Point Location	Additional Retention [acre-ft]
C1A2F	0.95
C1A2E	1.20
C1A2D	2.10
C1A2C	1.20
C1A2G	1.00
C1B4	1.70

The additional retention basins were assumed to be online, that is all flow reaching the concentration point would enter the retention basin until the retention basin volume was filled, at which point all flow would pass through following the schematic. The drawing on next sheet shows the schematic of the flow paths and concentration point locations.

Based on flows in the hydrology model, Manning's equation is used to determine capacity of various pipe sizes. Table below includes pipes from 42-inch to 96-inch diameter and up to three pipes.

s	n	**Diameter**	Area	P	R	Q	Q	Q
		in	in^2	in		[cfs]	[cfs]	[cfs]
							2 pipes	3 pipes
0.0025	0.014	**42**	33	132	0.25	70	139	209
0.0025	0.014	**48**	38	151	0.25	80	159	239
0.0025	0.014	**60**	47	188	0.25	100	199	299
0.0025	0.014	**72**	57	226	0.25	119	239	358
0.0025	0.014	**84**	66	264	0.25	139	279	418
0.0025	0.014	**96**	75	302	0.25	159	318	478


PIMA ROAD
3.86 AC.FT.
2-3x4.5' RCB's
C36R1D
1.61 AC.FT.
PINNACLE PEAK ROAD
C1A2F
2-36" RCP's
3.1? AC.FT.
WET CROSSING
C1A2E
C1A2D
C1A2C
0.81 AC.FT.
C1A2G
1.67 AC.FT.
WET CROSSING
C1B4
C1B3
WET CROSSING
C1B2
C51.1H
C51.1G
HAYDEN ROAD
DEER VALLEY ROAD
(CEEC05)
C51.1F
PIMA ROAD
LEGEND
EXISTING STORAGE
PROPOSED STORAGE
BASIN BOUNDARY
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Fax 602.244.8947
Project No. 410.061
Pima Road Drainage Improvements
City Of Scottsdale
FIGURE 1
CONCENTRATION POINTS

8.5 Memorandum Dated March 1st, 2007

Entellus™
2255 North 44th Street
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Phoenix, AZ 85008-3299
Ph (602) 244-2566
Fax (602) 244-8947

TO:	Elaine Mercado, P.E.
FROM:	Bill Linck, P.E.
JOB NO:	410.061A
DATE:	March 1, 2007

PROJECT NAME: Pima Road Improvement, Deer Valley & Pinnacle Peak Drainage

MEMORANDUM

Currently, the existing grade of Pima Road from the Deer Valley alignment to Pinnacle Peak Parkway generally follows the existing topography. There is significant off-site flow which crosses Pima Road at several "dip" sections. It is our understanding that there have been multiple complaints by residents in the area about the existing drainage conditions, including the stormwater crossing Pima Road.

The current roadway plans intend to straighten the grades of Pima Road-remove the dips. Per the City Code, culverts should be installed where these dips are removed to fully pass the 50-year storm event and enough of the 100-year storm event so that flow over the road is no more than six inches deep. Ideally, the inverts of the culverts would match the historical invert of the washes. However, it may not be possible to raise the road to allow due to existing development. Additionally, the culvert(s) creates a point discharge rather than overland flow.

The purpose of this memorandum is to document previous studies which Entellus has completed as part of this project and determine the drainage improvements which shall be included as part Pima Road Improvements from the Deer Valley Road alignment to Pinnacle Peak Parkway.

Previous Studies

In a memorandum dated February 11, 2005, Entellus reviewed the drainage conditions using a hydrology model based on the Core North Detention Basin model by Ward and others. The model generated flows for the 10, 25, 50 and 100 year storm events assuming no flows are allowed to cross Pima Road. Open channel flow and storm drain solutions were analyzed based on two conditions-maximum ponding in the roadway of eight inches and maximum ponding to the top of the median (approximately 15 inches above gutter). This memorandum is attached for reference.

In a memorandum dated October 19, 2005, Entellus reviewed the drainage conditions based on the Three Basins Model by Stantec. Four scenarios for the 100-year storm event were evaluated:

- Existing Conditions
- Collect all Flow in a Storm Drain except Flow Currently Crossing Pima Road Through Culverts
- Collect all Flow in a Storm Drain except Install Culverts to Allow Additional Flow to Cross Pima Road
- Collect all Flow in a Storm Drain except Flow Currently Crossing Pima Road Through Culverts and Construct a Retention Basin

A copy of this memorandum is also included.

New Study

As requested by the City, Entellus evaluated utilizing existing drainage easements on the east side of Pima Road from just south of Paraiso to Pinnacle Peak Country Club to construct retention basins. The benefit of this would be to reduce the peak runoff which would cross Pima Road or be directed south along the east side of Pima Road. It was assumed that these basins would be four feet deep to allow for three feet of retention and one foot of freeboard. The table below shows the impact the basins have on flows at various concentration points for the 2, 5, and 100 year storm events.

Conc. Point	Distance, South of Pinnacle Peak	2-yr Existing	2-yr Added Ret.	2-yr Ex. Crosses Pima	5-yr Existing	5-yr Added Ret.	5-yr Ex. Crosses Pima	100-yr Existing	100-yr Added Ret.	100-yr Ex. Crosses Pima
C36R1C	-200	103	103	103	254	234	0	1140	1140	234
C36R1D	0	36	36	0	114	114	0	1300	1300	0
C1A2F	700	36	31	36	114	114	114	1306	1306	1306
C1A2E	1300	0	0	0	0	0	0	0	0	0
C1A2D	1700	4	0	4	9	0	9	33	0	33
C1A2C	1900	9	0	0	18	3	0	169	145	0
C1A2G	2400	10	0	0	19	0	0	174	85	0
C1B4	3000	9	0	9	19	0	19	170	21	170
C1B3	3400	20	20	0	49	49	0	239	239	0
C1B2	4000	29	29	29	69	69	69	343	343	343
C51.1H	4400	0	0	0	1	1	0	5	5	0
C51.1G	4800	2	2	0	4	4	0	21	21	0
C51.1F	5250	3	3	0	7	7	0	39	39	0

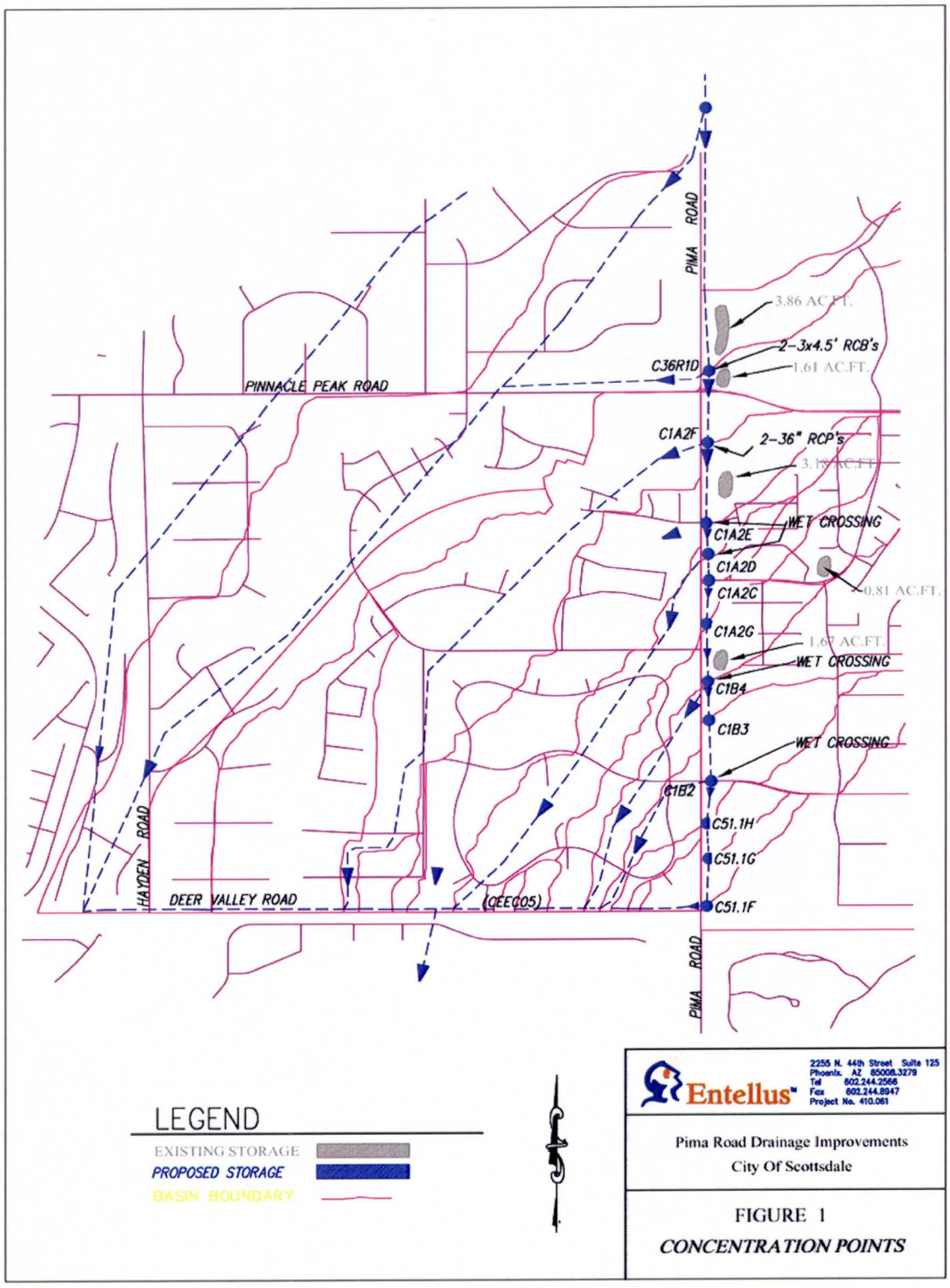
Additional retention was assumed for the "Added Ret." model runs. The locations of the added retention were determined based on aerial photography and field visits and are located at the following concentration points:

Concentration Point Location	Additional Retention [acre-ft]
C1A2F	0.95
C1A2E	1.20
C1A2D	2.10
C1A2C	1.20
C1A2G	1.00
C1B4	1.70

The additional retention basins were assumed to be online, that is all flow reaching the concentration point would enter the retention basin until the retention basin volume was exceeded, at which point all flow would pass through following the schematic. Figure 1 shows the schematic of the flow paths and concentration point locations. These basins did reduce runoff. However, in areas of larger flow, their impact is negligible.

Next Steps

As part of this and previous memoranda, several different scenarios of managing the drainage have been evaluated. The next step is to recommend a drainage solution to be included as part of the Pima Road widening. Standard City design would require culverts to be installed to pass the 50-year storm event and enough of the 100-year storm event so that flow over the road is no more than six inches deep. There are two major concerns with this; the overland flows will become point discharges and the routing of these flows will be towards residents who have had previous drainage complaints. We would like to meet with the City to determine the best drainage solution considering budget and socio-political constraints.


PIMA ROAD
3.86 AC.FT.
2-3x4.5' RCB's
1.61 AC.FT.
C36R1D
PINNACLE PEAK ROAD
C1A2F
2-36" RCP's
3.1 AC.FT.
WET CROSSING
C1A2E
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C1A2C
0.81 AC.FT.
C1A2G
1.67 AC.FT.
WET CROSSING
C1B4
C1B3
WET CROSSING
C1B2
C51.1H
C51.1G
C51.1F
HAYDEN ROAD
DEER VALLEY ROAD
(CEEC05)
PIMA ROAD
LEGEND
EXISTING STORAGE
PROPOSED STORAGE
BASIN BOUNDARY
Entellus
2255 N. 44th Street Suite 125
Phoenix, AZ 85008-3279
Tel 602.244.2566
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Project No. 410.061
Pima Road Drainage Improvements
City Of Scottsdale
FIGURE 1
CONCENTRATION POINTS

8.6 Memorandum Dated October 8th, 2007

Entellus™
2255 North 44th Street
Suite 125
Phoenix, AZ 85008-3299
Ph (602) 244-2566
Fax (602) 244-8947

TO:	Elaine Mercado
FROM:	Bill Linck
JOB NO:	410.061A
DATE:	October 8, 2007

PROJECT NAME: **Pima Road Drainage Improvements**

MEMORANDUM

The following memorandum is the result of a drainage progress meeting with the City of Scottsdale and Entellus on September 24, 2007. A list of the meeting attendees is attached.

The existing drainage conditions have been analyzed and documented in three memoranda dated February 2, 2005, October 19, 2005 and March 1, 2007. Following review and discussion of these memoranda with the City, it was determined that the drainage solution for the Pima Road widening should "mimic" the existing conditions per the City's current ordinance. Culverts would be constructed to collect stormwater on the east side of Pima Road at locations where runoff currently crosses and discharges to apparent existing flow paths on the west side. Flow paths were verified by survey and field visits. Several outfall and culvert size alternatives were analyzed. Drainage improvements in the commercial area south of Pinnacle Peak Parkway were not included in the analysis because of the issues associated with discharging into a parking lot. The advantages and disadvantages of each alternative are presented below.

Alternative No. 1 – Culverts Naturally Outfalling without Revising the Proposed Grades of Pima Road

In this scenario, the culverts were designed with a minimum one foot cover from the proposed finished grade of Pima Road. Since the proposed longitudinal slope of the road will be over 2%, it was assumed the cross-slope could be flat. This saves approximately one additional foot of depth on the culverts. A cross-section sketch of this alternative is shown as **Exhibit 1**. Initially, this alternative was evaluated using a 36-inch minimum diameter for pipes and heights for box culverts. The outlets of these culverts were approximately 80 feet onto private property. The City's Street Maintenance Department requested that pipes and culverts be a minimum five foot diameter, but are willing to allow four feet. This would require approximately 20 additional feet to daylight, as well as the acquisition of several drainage easements on residential property.

Advantages

- "Mimics" historical conditions
- Minimizes costs
- Allows construction of a decomposed granite path between the roadway and noise wall without major drainage issues

Disadvantages

- Creates point discharges at outfalls
- Requires drainage easements on private property
- Creates a large number of potential utility conflicts
- Introduces stormwater to properties which currently have blocked it off

Alternative No. 2 – Construct Bubble-Up Structures between the Proposed Roadway and Soundwall

Culverts would be designed and located as discussed in Alternative No. 1. However, they would not outfall directly onto private property. Instead the pipes would terminate into structures, and the stormwater would then bubble up between the roadway and sound wall. The stormwater would be directed to openings in the noise wall at existing locations. **Exhibit 2** provides a cross section view of this alternative.

Advantages

- "Mimics" historical conditions
- Eliminates point discharges at outfalls
- Minimizes costs

Disadvantages

- Creates a potential maintenance problem
- Creates a large number of potential utility conflicts
- Drainage openings in walls have been historically blocked in this area
- Causes stormwater to cross the granite path between the roadway and noise wall and causes potential ADA issues in areas where there is limited space between the road and wall

Alternative No. 3 – Raise the Road to allow Culverts to Outfall Naturally between the Roadway and Noise Wall

In this alternative, the proposed roadway profile will be raised to allow a minimum 48-inch pipe or box culvert to outfall between the roadway and noise wall. The cross sections for this alternative are shown in **Exhibit 3A** and **3B, however only Exhibit 3A was analyzed for cost**.

Advantages

- "Mimics" historical conditions
- Minimizes utility conflicts
- Allows construction of a decomposed granite path between the roadway and noise wall without major drainage issues

Disadvantages

- Creates point discharges at outfalls
- Requires outfall control on private property
- Introduces stormwater to properties which currently have blocked it off
- Requires a large amount of fill material
- Requires that the noise wall be raised as much as four feet
- Requires that the noise wall be retaining
- Causes constructability issues

Alternative No. 4 – Intercept Stormwater on the East Side of Pima Road and Route to the Deer Valley Channel

At the meeting discussing the three alternatives above, the original recommendation presented in the February 11, 2005 memorandum was further discussed. In this alternative, stormwater flows south on the east side of Pima Road in open channels and is directed to the Deer Valley channel, which flows west along the southern boundary of the Los Gatos Subdivision. From Pinnacle Peak to approximately Country Club Trail, there is a drainage easement which can be utilized to construct a channel. From approximately Country Club Trail to the Deer Valley alignment, property, which is currently owned by the Arizona State Land Department (ASLD) and proposed to be held for auction Summer 2008, will need to be acquired to construct a channel or a box culvert would need to be constructed in the roadway right-of-way. The cost estimate presented accounts for a box culvert, with an estimate provided for additional right-of-way that was needed to be acquired for an open channel. The following are advantages and disadvantages of this alternative:

Advantages

- Creates a solution for existing drainage problems in the area
- Minimizes culverts crossing Pima Road
- Eliminates point discharges
- Eliminates drainage improvements on private property

Disadvantages

- Requires an upgrade of the Deer Valley channel
- Potential for additional property acquisition from ASLD for a channel or the construction of a box culvert
- Requires a large amount of earthwork for channel construction
- Allows construction of a decomposed granite path between the roadway and noise wall without major drainage issues
- Routes drainage past historical washes

At the meeting, it was determined that Alternative Nos. 1 and 2 were not acceptable solutions in terms of the impact to property owners and long-term maintenance issues, and it was requested that Alternative Nos. 3 and 4 should be further evaluated. Comparative cost estimates were prepared for each alternative. As stated above, for Alternative No. 3, the cross-section shown in **Exhibit 3A** was used for pricing.

Alternative No. 3

Item	Quantity	Unit	Unit Cost	Total Cost
Earthwork (Fill)	24074	CY	$15	$361,111
Outlet Control	12	EA	$2,000	$24,000
48-Inch Concrete Pipe	1170	LF	$175	$204,750
3'x5' Box Culvert	390	LF	$520	$202,800
Additional Masonry Wall (4 feet additional)	4800	SF	$25	$120,000
Additional Wall Foundation	1200	LF	$35	$42,000

Note: This estimate does not include the cost to re-evaluate the noise wall height.

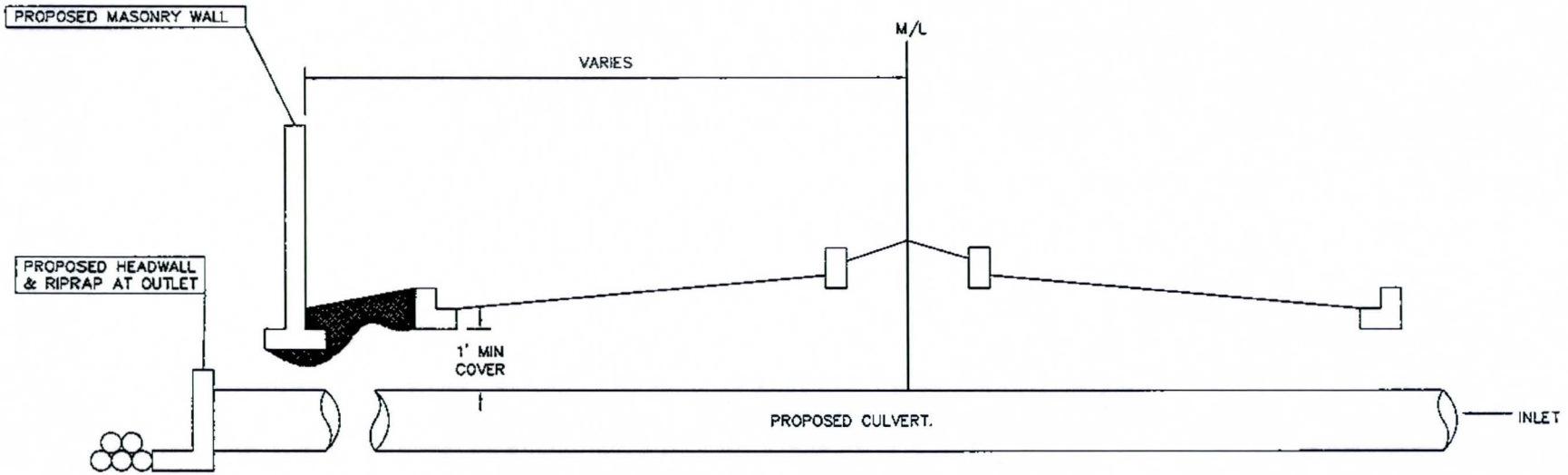
Total Cost $954,661

Alternative No. 4

Item	Quantity	Unit	Unit Cost	Total Cost
Earthwork (Cut)	29850	CY	$15	$447,750
Drop Structures	15	EA	$10,000	$150,000
60-Inch Concrete Pipe	2400	LF	$225	$540,000
66-Inch Concrete Pipe	2400	LF	$250	$600,000
Landscaping	1	LS	$50,000	$50,000
Outfall Structure	1	EA	$100,000	$100,000

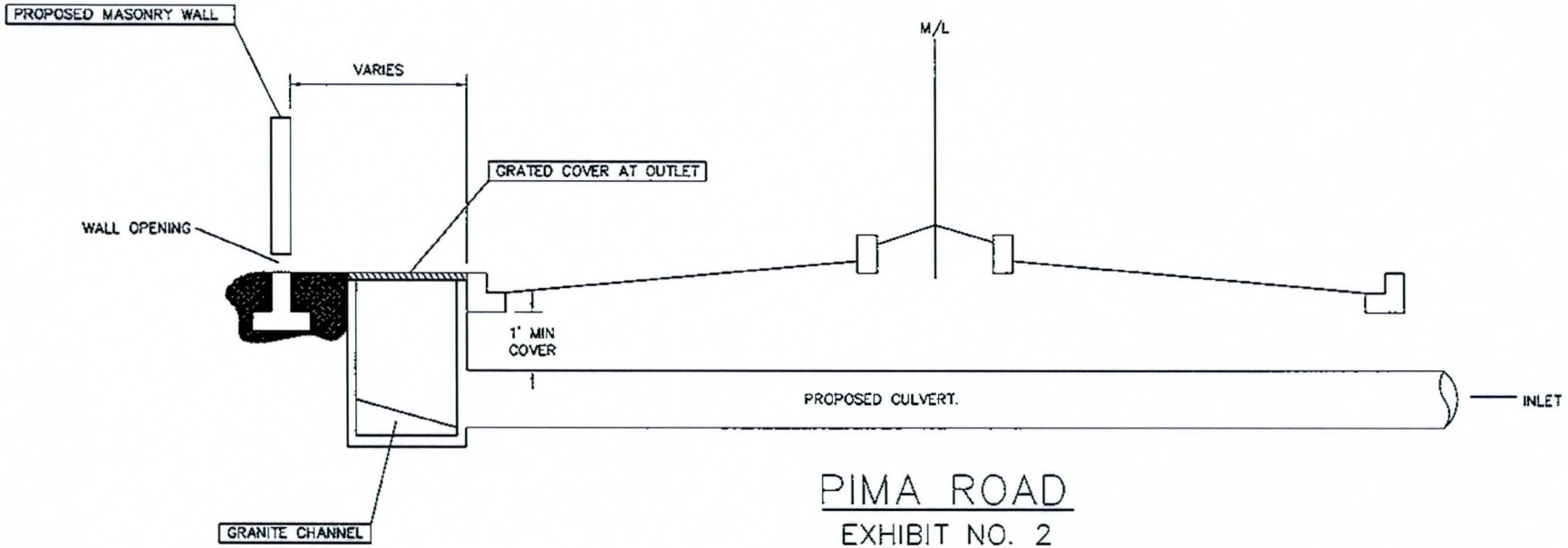
Note: Approximately 240,000 square feet of right-of-way is needed to construct a channel on State Land property

Total Cost $1,887,750



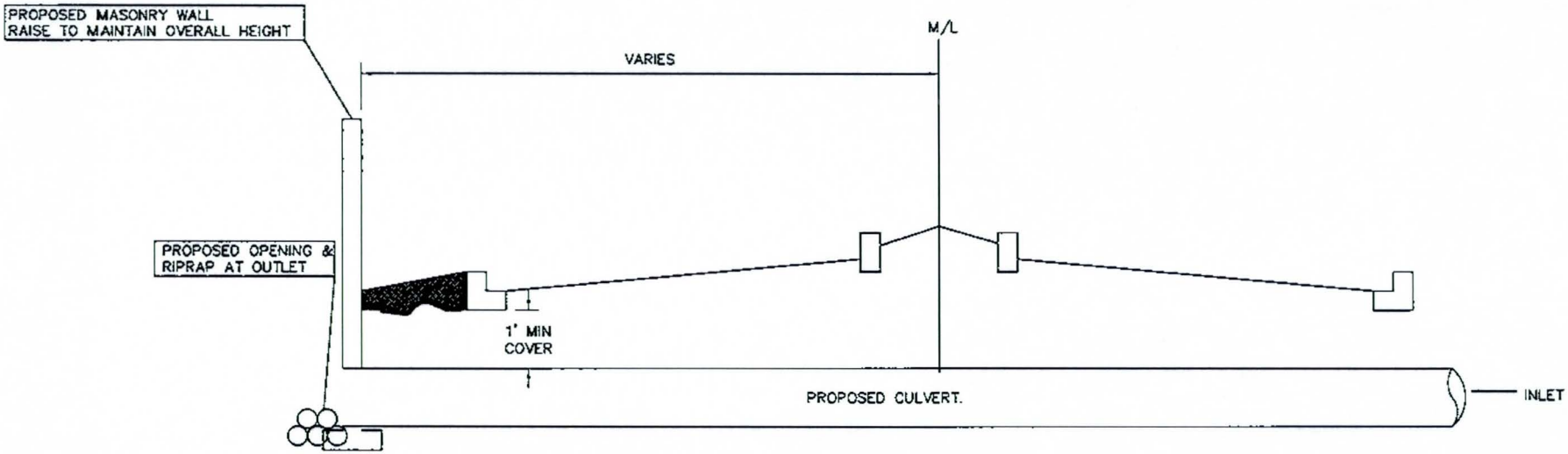
PIMA ROAD

EXHIBIT NO. 1
(LOOKING NORTH)
NOT TO SCALE



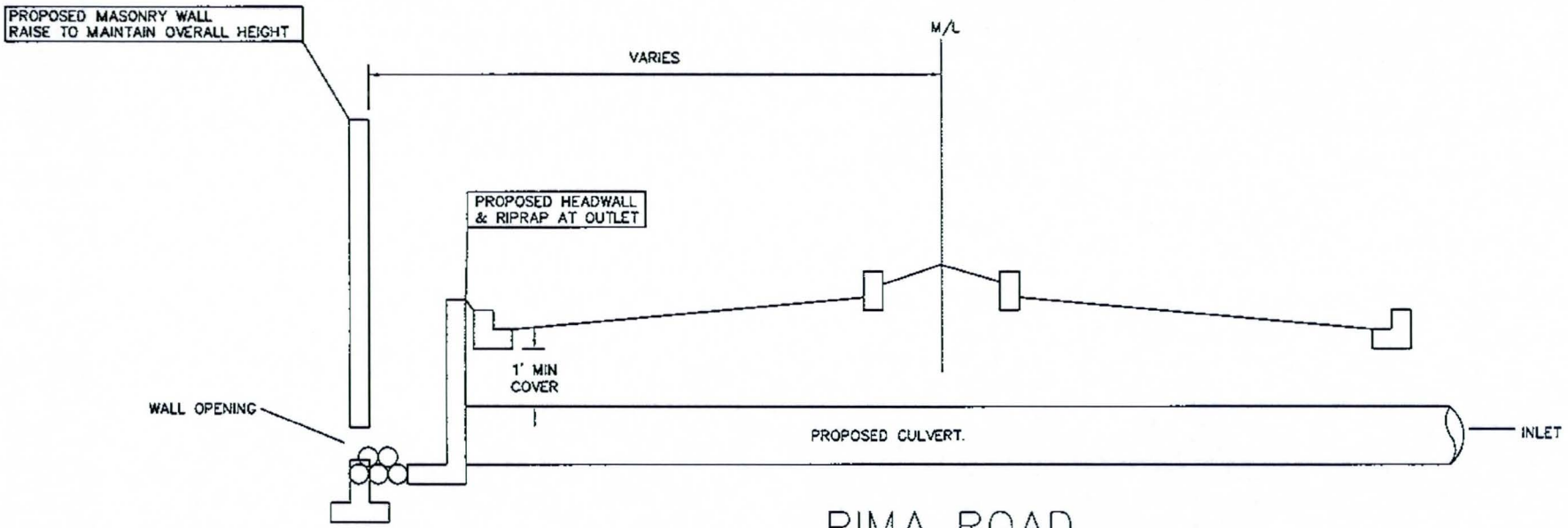
PIMA ROAD

EXHIBIT NO. 2
(LOOKING NORTH)
NOT TO SCALE



PIMA ROAD

EXHIBIT NO. 3A
(LOOKING NORTH)
NOT TO SCALE



PIMA ROAD

EXHIBIT NO. 3B
(LOOKING NORTH)
NOT TO SCALE

8.7 Memorandum Dated February 22nd, 2008

TO:	City of Scottsdale
FROM:	Entellus, Inc.
PROJECT NO.:	410.061A
DATE:	February 22, 2008

Project: **Pima Road Drainage Improvements**

TECHNICAL MEMORANDUM

Re: Drainage Improvements along Pima Road from Pinnacle Peak Road to the Deer Valley Road Alignment.

INTRODUCTION

The main focus of this memorandum is to document the impact that the proposed Pima Rd. improvements will have on the flows along and crossing Pima Rd. and on the Deer Valley channel. All existing flow along Pima Rd, except the flow passing through existing culverts, for the new proposed conditions will be carried by a drainage channel that extends along the east side of Pima Rd. from Pinnacle Peak Rd. to just south of Cañada Vistas. From that point the flow will be carried by a storm drain and Pima Rd. itself. The flow that currently crosses Pima Rd. through culverts would still be allowed to cross at the same locations and in the same quantity. The outfall for the system would be the Deer Valley channel which was designed to handle these flows but would need some modifications to accommodate the proposed infrastructure. According to the Grayhawk report the design capacity of the Deer Valley channel east of CEEC05 (just west of Pima Road) is 1100 cfs and 1796 cfs beyond that point (approximately ½ mile west of Pima Rd.).

METHODOLOGY

The flood simulation was modeled utilizing the FLO-2D Flood Routing Simulation model version 2006.01. FLO-2D is a numerical model that is accepted by FEMA as meeting the minimum requirements under the National Flood Insurance Program. A flood simulation was performed for: Existing conditions, and modified conditions (proposed Pima Rd improvements) for the 6-hour 100-year storm.

FLO-2D utilizes a square grid cell over which parameters are lumped and estimated. The model run time is directly dependant on the selected grid size. A 15 foot grid was chosen for this model which resulted in a modeling grid composed of approximately 75,000 cells, and a model simulation time of 10 hours was adequate to route all flows through the system.

Three elevation datasets were utilized for the FLO-2D modeling. The base elevation dataset for the existing conditions and proposed conditions model was the existing conditions DEM's as provided by the City of Scottsdale with supplemental survey performed by Entellus along the Pima Rd. corridor. The Entellus survey data was exclusively utilized along the road corridor.

The modified conditions model utilized AutoDesk's Civil 3D software to generate elevation data for the new proposed Pima Rd. and channel. These new points replaced the existing elevation data. This new surface, which is a combination of existing and proposed data, approximated the proposed conditions of the roadway and the channel. Once the FLO-2D model generated the interpolated surface, it was checked for accuracy, and modifications made where necessary.

Manning's "n" values were assigned on a broad scale utilizing the aerial photography provided by the City. Manning's "n" values utilized are summarized below in Error! Reference source not found..

Table 1: Manning's "n" Values

Manning's "n" Value	Description
0.016	Roadway
0.022	Commercial
0.028	Residential
0.030	Golf Course
0.035	Natural

Several hydrographs were input at appropriate locations in the model. These hydrographs were obtained from the hydrology model developed for Pima Road, which is documented in previous memos. Outflow locations in FLO-2D are utilized to remove flow from the modeling space. Outflow locations were chosen at all locations where flow could leave the modeling boundary.

FLO-2D can provide a hydrograph of any cross-section specified along a simulation reach. Cross-sections were placed at strategic locations throughout the modeling area to determine the flow quantities passing through it. The main areas of interest where the cross-sections were placed are the in the Deer Valley channel, new proposed channel along Pima Rd., and flows along and crossing Pima Rd.

RESULTS

As can be seen from **Figure 1** the modified conditions model has limited the flow crossing Pima road to be contained within the existing culverts at the northern portion of the model. In order to accomplish this, it was assumed that the capacity of the detention basins just north of Pinnacle Peak Rd, and the existing culverts in this area were large enough to convey the 100-year flows. From a modeling standpoint, the retention volume was increased, and the culverts were upsized to approximate the bottom width of the Pima Rd. channel. Without these modifications, the flow could not be conveyed across Pinnacle Peak Rd., and would simply flow across the Pima-Pinnacle Peak intersection into the commercial development on the southeast corner.

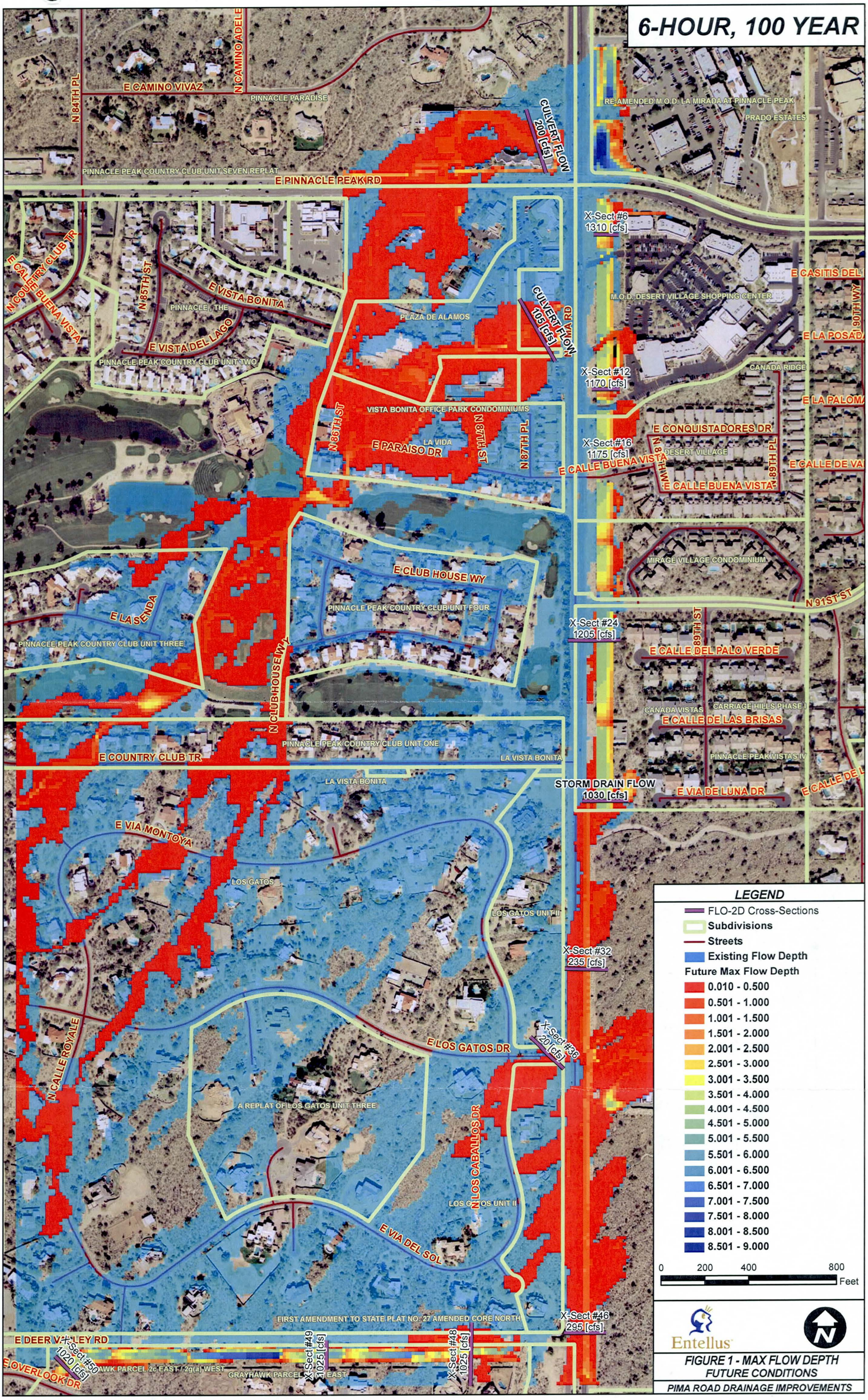
At the end of the Pima Rd. channel where the box culvert begins at Via de Luna, the 100-year flow was allowed to spill out of the culvert but was restricted to being contained within the new Pima Rd. cross-section. Additional inlets to the storm drain were not modeled. Due to this, the model does show some flow spillage from Pima Rd. south of East Los Gatos onto adjacent

properties to the west of Pima Rd. This spillage can be eliminated by the addition of inlets where these flows enter the Pima Road system. The total maximum peak flow that exits the model along Pima Road at Deer Valley is approximately 300 cfs. This flow was not combined in the Deer Valley channel. The model shows that the flow rate in the Pima Road channel is approximately in the range of Q_{100} =1100-1300 cfs. Also, the flow rate in the Deer Valley channel is Q_{100} = 1025 cfs. If the additional flow is added to the storm drain, the total flow at the Deer Valley channel would be approximately 1350 cfs which is greater than the design flow of 1100 cfs at this location. The design flow was taken from Grayhawk report. The design flow of the Deer Valley channel increases to 1,796 cfs approximately ½ mile west of Pima Rd. Although the design flow in the Deer Valley channel at Pima Rd. is 1100 cfs, the model did not depict the channel with sufficient capacity for even the 1025 cfs. Modifications were made to model to contain the flow in the Deer Valley channel. This may be due to lack of adequate elevation data, or lack of channel capacity. No field survey or verification as to the exact size of the channel was conducted for this modeling exercise.

SUMMARY OF PROPOSE IMPROVEMENTS

- Improve basins on the northeast corner of Pinnacle Peak and Pima Roads - These improvements may include the construction of a dike to prevent flow from spilling into Pima Road
- Upsize culvert across Pinnacle Peak from basins to proposed Pima Rd. channel
- Construct ½ mile Pima Rd. channel from Pinnacle Peak Rd. to Via de Luna. The new channel would be designed following the City of Scottsdale standards. This area would require an earthen channel with a bottom width of approximately 60 feet and side slopes of 4 to 1 feet with a total capacity greater than 1,350 cfs. All culverts crossing the proposed channel location would need to be upsized appropriately to convey the capacity of the channel flow.
- Design and construction of a ½ mile storm drain. The storm drain would need to be adequately designed, but would consist approximately of a four barrel 10' X 5' RBC main drain with roadway inlets and connector pipes, and offsite inlets.
- Deer Valley channel improvements. The upstream end of the channel would need to be modified to be able to daylight the culvert as well as increased in capacity to handle the increased peak discharge. It appears that adequate easements are in place to be able to improve this channel.

6-HOUR, 100 YEAR



LEGEND

- FLO-2D Cross-Sections
- Subdivisions
- Streets
- Existing Flow Depth

Future Max Flow Depth

- 0.010 - 0.500
- 0.501 - 1.000
- 1.001 - 1.500
- 1.501 - 2.000
- 2.001 - 2.500
- 2.501 - 3.000
- 3.001 - 3.500
- 3.501 - 4.000
- 4.001 - 4.500
- 4.501 - 5.000
- 5.001 - 5.500
- 5.501 - 6.000
- 6.001 - 6.500
- 6.501 - 7.000
- 7.001 - 7.500
- 7.501 - 8.000
- 8.001 - 8.500
- 8.501 - 9.000

0 200 400 800 Feet

Entellus

FIGURE 1 - MAX FLOW DEPTH
FUTURE CONDITIONS
PIMA ROAD DRAINAGE IMPROVEMENTS

8.8 Memorandum Dated August 25th, 2008

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Conduit Detailed Report: P-4

Scenario Summary

ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Pipe Characteristics

Start Node	J-2	Conduit Type	Catalog Conduit
Stop Node	O-2	Conduit Shape	Circular Pipe
Bend Angle (Unified)	0.00 degrees	Material	CMP
Length	432.0 ft	Hazen-Williams C	100.0
Slope (Calculated)	0.001 ft/ft	Conduit Description	96 inch
Number of Barrels	1		

Hydraulic Summary

Profile Description	Composite M2 Pressure	Capacity (Full Flow)	291.03 ft³/s
Slope (Calculated)	0.001 ft/ft	Capacity (Design)	291.03 ft³/s
Velocity (Average)	13.21 ft/s		

	Elevation (Ground) (ft)	Crown (ft)	Average Conduit Cover (ft)	Depth (ft)	Hydraulic Grade Line (ft)	Energy Grade Line (ft)
Upstream	1,734.00	0.00	2.89	9.42	1,731.92	1,734.64
Downstream	1,732.20	0.00	2.89	6.53	1,728.44	1,731.99

Pipe Design Options

Design Conduit?	True

User Data

Date Installed	1/1/0001 12:00:00 AM

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Conduit Detailed Report: P-3

Scenario Summary

ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Pipe Characteristics

Start Node	J-1	Conduit Type	Catalog Conduit
Stop Node	J-2	Conduit Shape	Circular Pipe
Bend Angle (Unified)	5.87 degrees	Material	CMP
Length	32.0 ft	Hazen-Williams C	100.0
Slope (Calculated)	0.006 ft/ft	Conduit Description	96 inch
Number of Barrels	1		

Hydraulic Summary

Profile Description	Pressure	Capacity (Full Flow)	661.62 ft³/s
Slope (Calculated)	0.006 ft/ft	Capacity (Design)	661.62 ft³/s
Velocity (Average)	13.21 ft/s		

	Elevation (Ground) (ft)	Crown (ft)	Average Conduit Cover (ft)	Depth (ft)	Hydraulic Grade Line (ft)	Energy Grade Line (ft)
Upstream	1,735.00	0.00	3.90	9.43	1,732.13	1,734.84
Downstream	1,734.00	0.00	3.90	9.42	1,731.92	1,734.64

Pipe Design Options

Design Conduit?	True

User Data

Date Installed	1/1/0001 12:00:00 AM

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Conduit Detailed Report: P-2

Scenario Summary

ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Pipe Characteristics

Start Node	I-3	Conduit Type	Catalog Conduit
Stop Node	J-1	Conduit Shape	Circular Pipe
Bend Angle (Unified)	4.13 degrees	Material	CMP
Length	193.0 ft	Hazen-Williams C	100.0
Slope (Calculated)	0.017 ft/ft	Conduit Description	96 inch
Number of Barrels	1		

Hydraulic Summary

Profile Description	Composite Pressure S1	Capacity (Full Flow)	1,120.51 ft³/s
Slope (Calculated)	0.017 ft/ft	Capacity (Design)	1,120.51 ft³/s
Velocity (Average)	23.19 ft/s		

	Elevation (Ground) (ft)	Crown (ft)	Average Conduit Cover (ft)	Depth (ft)	Hydraulic Grade Line (ft)	Energy Grade Line (ft)
Upstream	1,750.00	0.00	10.20	6.89	1,732.79	1,736.02
Downstream	1,735.00	0.00	10.20	9.43	1,732.13	1,734.84

Pipe Design Options

Design Conduit?	True

User Data

Date Installed	1/1/0001 12:00:00 AM

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Manhole Detailed Report: J-1

Scenario Summary	
ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Element Details			
ID	6	Notes	
Label	J-1		

Geometry Summary			
X	10,125.61 ft	Y	10,093.49 ft

Elevations			
Elevation (Ground)	1,735.00 ft	Hydraulic Grade In	1,732.13 ft
Elevation (Rim)	1,735.00 ft	Hydraulic Grade Out	1,732.13 ft
Elevation (Invert)	1,722.70 ft		

System Flow Summary			
System Flow Time	0.139 min	System Rational Flow	0.00 ft³/s
System Intensity	8.000 in/hr	System Known Flow	664.00 ft³/s
System CA	0.000 acres	System Additional Flow	0.00 ft³/s

Design Constraints Summary			
Matchline Offset	0.00 ft	Local Pipe Matching Constraints?	False
Design Structure Elevation?	True	Desired Sump Depth	0.00 ft
Allow Drop Structure?	True		

User Data	
Date Installed	1/1/0001 12:00:00 AM

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Manhole Detailed Report: J-2

Scenario Summary	
ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Element Details			
ID	5	Notes	
Label	J-2		

Geometry Summary			
X	10,179.72 ft	Y	10,087.07 ft

Elevations			
Elevation (Ground)	1,734.00 ft	Hydraulic Grade In	1,731.92 ft
Elevation (Rim)	1,734.00 ft	Hydraulic Grade Out	1,731.92 ft
Elevation (Invert)	1,722.50 ft		

System Flow Summary			
System Flow Time	0.179 min	System Rational Flow	0.00 ft³/s
System Intensity	8.000 in/hr	System Known Flow	664.00 ft³/s
System CA	0.000 acres	System Additional Flow	0.00 ft³/s

Design Constraints Summary			
Matchline Offset	0.00 ft	Local Pipe Matching Constraints?	False
Design Structure Elevation?	True	Desired Sump Depth	0.00 ft
Allow Drop Structure?	True		

User Data	
Date Installed	1/1/0001 12:00:00 AM

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City of Scottsdale
Entellus Project #410.061A

Outfall Detailed Report: O-2

Scenario Summary	
ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Element Details			
ID	4	Notes	
Label	O-2		

Geometry Summary			
X	10,308.24 ft	Y	10,085.04 ft

Elevations			
Elevation (Ground)	1,732.20 ft	Elevation (Invert)	1,721.91 ft

Tailwater Hydraulics			
Boundary Condition Type	Free Outfall	Hydraulic Grade Line	1,721.91 ft

System Flow Summary			
System Flow Time	0.724 min	System Rational Flow	0.00 ft³/s
System Intensity	8.000 in/hr	System Known Flow	664.00 ft³/s
System CA	0.000 acres	System Additional Flow	0.00 ft³/s

Design Constraints Summary			
Matchline Offset	0.00 ft	Local Pipe Matching Constraints?	False
Design Structure Elevation?	True	Desired Sump Depth	0.00 ft
Allow Drop Structure?	True		

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

User Data	
Date Installed	1/1/0001 12:00:00 AM

Entellus, Inc.
27 Siemon Company Drive Suite 200 W
Watertown, CT 06795 USA +1-203-755-1666

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Catch Basin Detailed Report: I-3

Scenario Summary

ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Element Details

ID	3	Notes	
Label	I-3		

Geometry Summary

X	10,071.16 ft	Y	10,103.98 ft

Elevations

Elevation (Ground)	1,750.00 ft	Hydraulic Grade In	1,732.79 ft
Elevation (Rim)	1,750.00 ft	Hydraulic Grade Out	1,732.79 ft
Elevation (Invert)	1,725.90 ft		

Headlosses

Headloss	0.00 ft	Depth (In)	6.89 ft
Headloss Method	Absolute	Downstream Conduit Velocity	14.42 ft/s
Absolute Headloss	0.00 ft	Downstream Conduit Velocity Head	3.2 ft
HEC-22 Benching Method	Depressed		

Inlet Flow Summary

Total Inlet CA	0.000 acres	Carryover CA	0.000 acres
Total Rational Flow to Inlet	0.00 ft³/s	Total Inlet Intensity	8.000 in/hr
Total Inlet Additional Carryover Flow	0.00 ft³/s	Total Inlet Tc	0.000 min

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Inlet Flow Summary			
Flow (Total Surface)	664.00 ft³/s	Total Inlet Known Flow	664.00 ft³/s

Inlet Characteristics			
Inlet Type	Percent Capture	Inlet Location	In Sag
Capture Efficiency	100.0 %		

External Pipe Flow			
External CA	0.000 acres	External Tc	0.000 min

Upstream Piped Flow Summary			
Local Rational Flow	0.00 ft³/s	Local Known Flow	664.00 ft³/s
Local Additional Flow	0.00 ft³/s		

Design Constraints Summary			
Matchline Offset	0.00 ft	Local Pipe Matching Constraints?	False
Design Structure Elevation?	True	Desired Sump Depth	0.00 ft
Allow Drop Structure?	True		

User Data	
Date Installed	1/1/0001 12:00:00 AM

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Title	Sierra Pinta
Engineer	UG
Company	Entellus, Inc.
Date	11/5/2007
Notes	

Scenario Summary

ID	87
Label	Base
Notes	
Active Topology	Base-Active Topology
Physical	Base-Physical Properties
Headloss	Base-Structure Headlosses
Boundary Condition	Base-Boundary Conditions
Rainfall Runoff	Base Rainfall
Hydrologic	Base-Catchments
Design	Base-Design Constraints
System Flows	Base-System Flows
Gravity Varied Flow Numerical Engine Calculation Options	Base-Scenario Options

Network Inventory

Conduits	4	Manholes	2
-Circular Pipe	3	Outfalls	2
-Box Pipe	1	Catch Basins	2
-Elliptical Pipe	0	-Maximum Capacity	0
-Catalog Conduit	0	-Percent Capture	2
-Virtual	0	-Catalog Inlet	0
-Irregular Channel	0	--n/a (n/a)	0
-Trapezoidal Channel	0	Transitions	0
-Triangular Channel	0	Gutters	0
-Rectangular Channel	0		

Conduit Inventory

8 x 4 ft	660.0 ft	All Sizes	1,317.0 ft
96 inch	657.0 ft		

Outfall: O-2

Label	System Additional Flow (ft^3/s)	System Known Flow (ft^3/s)	System Rational Flow (ft^3/s)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
O-2	0.00	664.00	0.00	8.000	0.724	0.000

Sierra Pinta
City of Scottsdale
Entellus Project #410.061A

Conduit elements for network with outlet: O-2

Label	Conduit Shape	Conduit Description	Length (ft)	Number of Barrels	Slope (Calculated) (ft/ft)	Flow (ft³/s)	Velocity (Average) (ft/s)	Invert (Upstream) (ft)	Invert (Downstream) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
P-2	Circular Pipe	96 inch	193.0	1	0.017	664.00	23.19	0.00	0.00	1,732.79	1,732.13
P-3	Circular Pipe	96 inch	32.0	1	0.006	664.00	13.21	0.00	0.00	1,732.13	1,731.92
P-4	Circular Pipe	96 inch	432.0	1	0.001	664.00	13.21	1,722.50	1,721.91	1,731.92	1,728.44

Catch Basin elements for network with outlet: O-2

Label	Inlet Type	Flow (Total Intercepted) (ft³/s)	Flow (Total Bypassed) (ft³/s)	Capture Efficiency (Calculated) (%)	Hydraulic Grade In (ft)	Hydraulic Grade Out (ft)	Headloss (ft)	Headloss Method
I-3	Percent Capture	0.00	0.00	100.0	1,732.79	1,732.79	0.00	Absolute

Manhole elements for network with outlet: O-2

Label	Hydraulic Grade In (ft)	Hydraulic Grade Out (ft)	Headloss (ft)	Headloss Method	System Additional Flow (ft³/s)	System Known Flow (ft³/s)	System Rational Flow (ft³/s)	System Intensity (in/hr)	System Flow Time (min)	System CA (acres)
J-2	1,731.92	1,731.92	0.00	Absolute	0.00	664.00	0.00	8.000	0.179	0.000
J-1	1,732.13	1,732.13	0.00	Absolute	0.00	664.00	0.00	8.000	0.139	0.000

ID\Label		8 \ P-2		9 \ P-3		10 \ P-4	
Link Length (ft)		187.4		24		426.5	
Rise\Material		8 \ CMP		8 \ CMP		8 \ CMP	
Flow (ft^3/s)		664		664		664	
Slope (ft/ft)		0.017		0.006		0.001	
ID\Label	3 \ I-3		6 \ J-1		5 \ J-2		4 \ O-2
Ground (ft)	1750		1735		1734		1732.2
Invert (ft)	1725.9		1722.7		1722.5		1721.91
Station (ft)	0		193		225		657

8.9 Memorandum Dated August 26th, 2008

Entellus™

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Suite 125
Phoenix, AZ 85008
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fax (602) 244-8947
web www.entellus.com

TO:	Elaine Mercado
FROM:	Bill Linck
JOB NO:	410.061A
DATE:	8/26/08

PROJECT NAME: **Sierra Pinta Drainage Improvements**

MEMORANDUM

A 100-year hydraulic analysis of the Sierra Pinta storm drain was performed as part of the City of Scottsdale Public Improvements project. The hydraulic analysis was performed and results of this analysis in summarized in memorandum dated 8/25/2008.

Analysis of the channel was done to determine the velocity, normal depth, and flow area using the program *FlowMaster* (Reference 1). Using the acquired data, hand calculations where performed following the *US department of transportation Hydraulic design of Energy Dissipaters for Culverts and Channels* (Reference 2). Calculations show that a Rip-Rap size of 1ft (D_{50}) will be adequate. Using a flow of 664-cfs, it was determined that the design length of erosion protection is 260-ft but was determined that the length could be reduced to 200ft with the use of energy decimators at the outlet of the dual 96-inch pipes. Relevant reference information and hand calculations area attached.

References

1) *FlowMaster*, Copyright © 2005 Bentley Systems, Incorporated

2) *Hydraulic Design of Energy Dissipaters for Culverts and Channels (1983)* Washington, DC: U.S. Department of Transportation, Federal Highway Administration.

Entellus

SHEET 1 OF _____
BY CDA DATE 8/25/08
CHECK _____ DATE _____

CLIENT _____

JOB NAME _____ JOB NO 410.061A

RIP-RAP PROTECTION:

- $Q = 664$ cfs (per pipe)
- $D = 96"$
- $y_t = 5.5$ Ft (Flow Master)
- $A_t = 287$ Ft^2 (Flow Master)
- $D_a = \frac{1}{2}(D + y_n)$ (for supercritical flow)

  $y_n = 6.75$ Ft (Normal supercritical depth in pipe)

$D_a = \frac{1}{2}(8\text{ Ft} + 6.75\text{ Ft})$

$= 7.38$ Ft.

- $D_{50} = \left[\frac{0.023\,(Q/D_a^{2.5})}{(y_t/D_a)}\right] \cdot D_a$

$= \left[\frac{0.023\,(664\text{ cfs}/7.38\text{ Ft}^{2.5})}{(5.5\text{ Ft}/7.38\text{ Ft})}\right] \cdot 7.38\text{ Ft}$

$= 1.02$ Ft $\rightarrow$ 1 Ft.

- $y_t/D_a = 5.5\text{ Ft}/7.38\text{ Ft}$

$= 0.75$

- $Q/D_a^{2.5} = 664\text{ cfs}/7.38\text{ Ft}^{2.5}$

$= 4.49$

Entellus

SHEET _____ OF _____
BY _____ DATE _____
CHECK _____ DATE _____

CLIENT _____

JOB NAME _____ JOB NO _____

- FROM FIGURE 5-9
  - $\frac{1}{2\tan\theta} = 5.80$
  - $L = \frac{1}{2\tan\theta}\left[\frac{A_b}{y_t} - D_a\right]$

$= (5.80)\left[\frac{287\,Ft^2}{5.5\,Ft} - 7.38\,Ft\right]$

$= 260\,Ft.$

Worksheet for Trapezoidal Channel

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00200	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	1328.00	ft^3/s

Results

Normal Depth	5.51	ft
Flow Area	287.05	ft^2
Wetted Perimeter	75.47	ft
Top Width	74.11	ft
Critical Depth	3.36	ft
Critical Slope	0.01329	ft/ft
Velocity	4.63	ft/s
Velocity Head	0.33	ft
Specific Energy	5.85	ft
Froude Number	0.41	
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	5.51	ft
Critical Depth	3.36	ft
Channel Slope	0.00200	ft/ft
Critical Slope	0.01329	ft/ft

Cross Section for Trapezoidal Channel

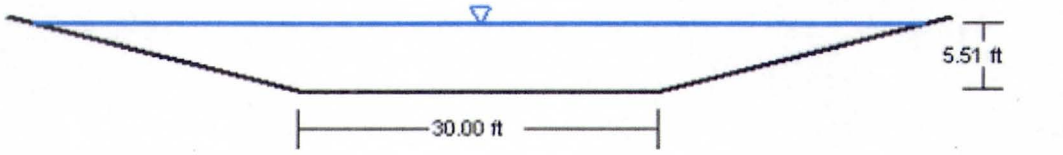
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00200	ft/ft
Normal Depth	5.51	ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	30.00	ft
Discharge	1328.00	ft³/s

Cross Section Image



V: 1
H: 1

$A_t = Q/V$

$$L = \frac{1}{2\tan\theta}\left[\frac{A_t}{Y_t} - D\right]$$

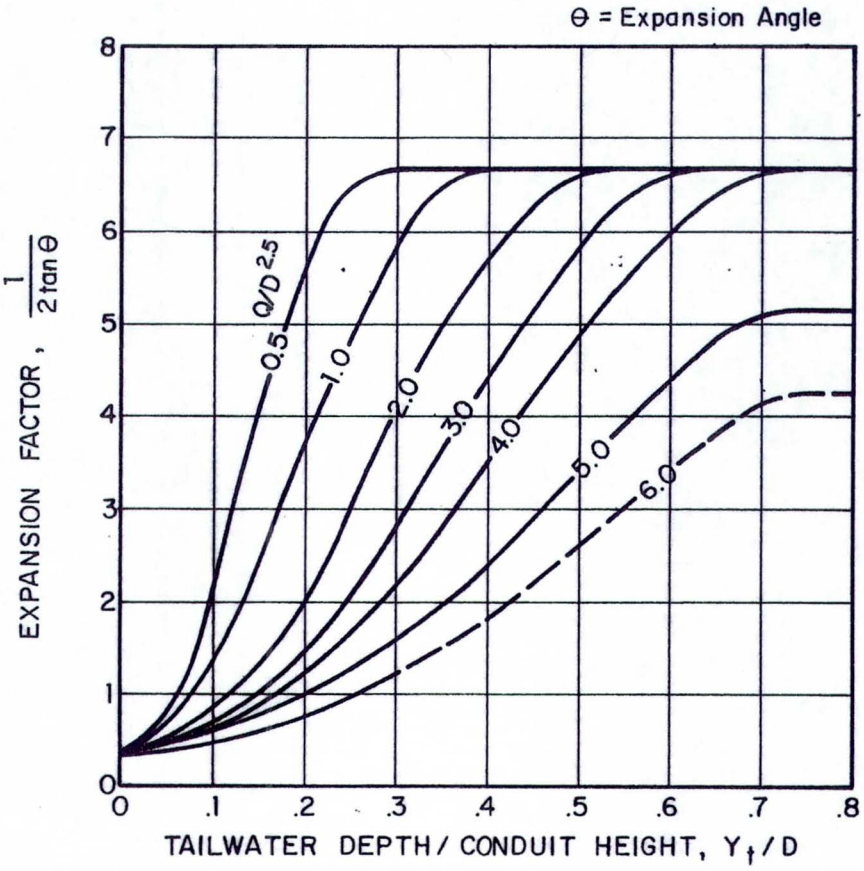
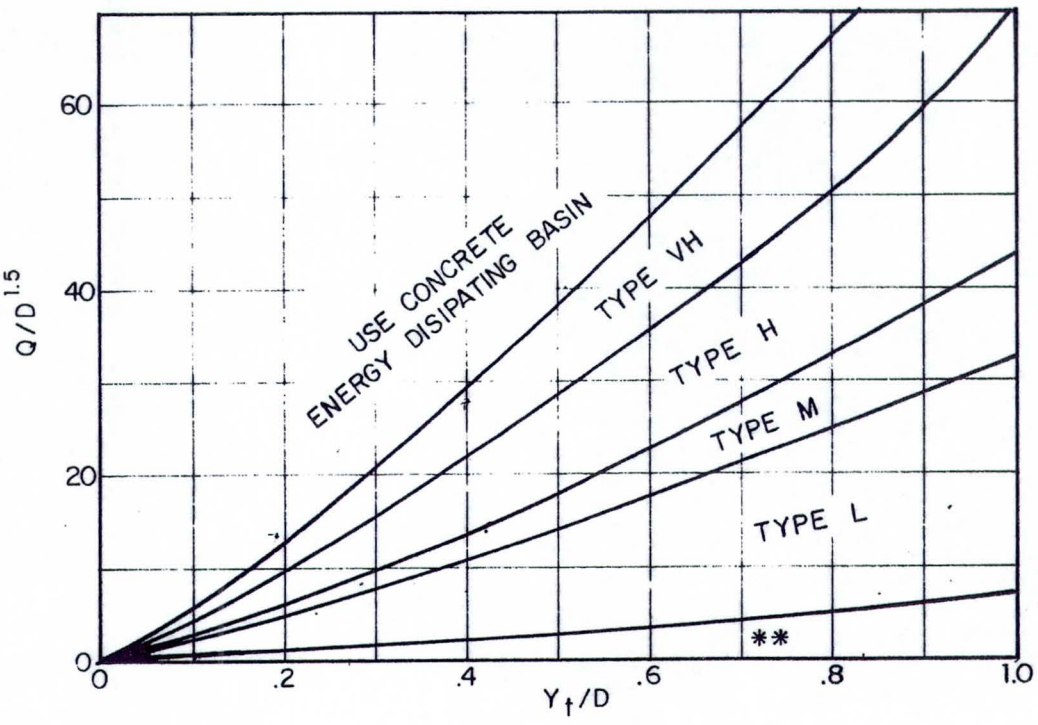


FIGURE 5-9. EXPANSION FACTOR FOR CIRCULAR CONDUITS

$$D_{so} = \left[\frac{0.023\ (Q/D^{2.5})}{Y_t/D}\right] D$$

Y_t = tail water
D = diameter
Y_n = normal supercritica depth in pipe.

For supercritical flow
$D_a = \frac{1}{2}(D + Y_n)$



Use D_a instead of D whenever flow is supercritical in the barrel.
** Use Type L for a distance of 3D downstream.

FIGURE 5-7. RIPRAP EROSION PROTECTION AT CIRCULAR CONDUIT OUTLET.

8.10 Memorandum Dated October 16th, 2008

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TO:	Elaine Mercado
FROM:	Entellus
JOB NO:	410.061A
DATE:	10/16/08

PROJECT NAME: **Sierra Pinta Outfall Channel and Stormdrain Analysis**

MEMORANDUM

The purpose of this memorandum is to identify and quantify the modifications that can be attributed to the design and construction of the Sierra Pinta channel and Pima Road Outlet. This consisted of the following items:

- Verifying and modifying the existing conditions hydrology models
- Creating the future conditions hydrology model (post Sierra Pinta Channel)
- Determining the quantity of flow under existing and future conditions on the west and east portions of Pima Road
- Determining changes in flow, maximum channel velocity and maximum flow depth that occur due to the addition of the Sierra Pinta channel and outlet.

The above objectives were performed for the 100-year, 10-year and 2-year models and are described in detail below.

Hydrology:

The hydrology for the Sierra Pinta Channel outfall analysis was based on the model developed for the Pima Road drainage report performed by Entellus in 2004 (**Reference 1**). The HEC-1 model utilized for the Pima Road analysis by Entellus was originally created by Robert Ward, but was subsequently modified by numerous others. See the Pima Road drainage Report (**Reference 1**) for more details on the evolution of the HEC-1 hydrology model.

The Pima Road Drainage Report (**Reference 1**) HEC-1 hydrology model was prepared prior to some of the current improvements along this portion of Pima Road (South of Thompson Peak Parkway). Due to this, some of the original assumptions were evaluated to determine if they were still valid. The assessments of those assumptions are as follows.

Thompson Peak Parkway and Pima Road Intersection

The previous Entellus model assumed that the existing 2-60″ inlets to the Pima Road stormdrain were the only inlets to the stormdrain. This assumption is no longer valid. Additional inlets to the Pima Road

stormdrain have been created including 48″ inlet pipes at two separate locations, and numerous curb inlets along Thompson Peak Parkway near the Pima Road intersection (including one in an apparent sump condition) as well as other curb inlets along Pima Road closer to Sierra Pinta Drive. Because of this the previous model, which only allowed 255 cfs to enter the stormdrain was modified to allow stormwater to enter the pipe up to the pipes assumed capacity of 600 cfs. This was performed by modifying the diversion route PRSDEX in the HEC-1 model to allow the first 600 cfs into the stormdrain.

Additionally, the original model included a diversion of 30% at the intersection of Thompson Peak Parkway and Pima Road leaving westward out of the study area. Upon a field visit to the area it was determined that flow is allowed to spill westward and out of the study area. However, without more detailed topographic information and a more detailed analysis it is impossible to predict with any additional level of certainty beyond what previous models have predicted the split flow at this location. Therefore, the split flow of 30% leaving the study area was maintained at Thompson Peak Parkway and Pima Road.

Sierra Pinta Drive and Pima Road

There are three main assumptions at Sierra Pinta Drive and Pima Road that were evaluated. The first was the assumption that 30% of the flow at this intersection is allowed to spill westward and out of the study area. Upon close examination of the channel and retaining wall along the west side of Pima Road, there is a location where some spillage over the top of the wall might occur due to the wall being relatively low at this location. At this location the retaining wall stops and only the development screen wall remains. Based on field observations, flow has spilled over the wall in the past, but it is unlikely that a significant amount of flow would leave the system at this location. This loss is relatively inconsequential and may occur only during low frequency events (high flows); therefore the assumption was modified to allow no flow (0%) to spill over the wall to the west at this location. This was accomplished by modifying diversion D52W in the HEC-1 model.

The second major assumption was that some of the flow from Sierra Pinta Drive reaches the intersection of Pima Road instead of simply flowing south. The previous Entellus drainage report documents the validity of this assumption (**Reference 1**). Upon field visits it appeared as though flow could potentially enter the intersection from the subbasin immediately adjacent to Pima Road along Sierra Pinta Drive, thus it was assumed that this assumption was valid.

The third assumption was the Sierra Pinta Channel itself. In the original Pima Road model it was assumed in the HEC-1 model that the future Sierra Pinta Channel was in place and would have a capacity of 2200 cfs (based on the Master Plan). This flow would be conveyed to the west side of Pima Road through the double 96 inch culverts under Pima Road.

The existing conditions model was modified to remove the future Sierra Pinta Channel and allow flows to continue south except for the flows concentrating near the intersection. This was accomplished by setting the diversions for the Sierra Pinta Channel to 0 cfs. The modified diversions include DVSP1, DVSP2, DVSP3 and DVSP4.

For the future conditions model the same Sierra Pinta Channel diversion was modified to reflect the design conditions (**Reference 2**). This model assumed that the capacity of the channel was 1330 cfs. Once again this was accomplished by modifying the Sierra Pinta Channel diversions DVSP1, DVSP2, DVSP3 and DVSP4 in the HEC-1 code. It was assumed the channel will take the first 1330cfs and all remaining flow will be allowed to pass by unimpeded.

Flow diagrams showing these modification made to the model are included with the attachments.

2-Year Rational Method Flow Calculations

Under existing and future conditions, the existing stormdrain along Pima Road has sufficient capacity to carry all the 2-year flow that might be traveling south along Pima Road/Pima Channel, therefore the model removes all this flow from the model. However, there is a relatively small local drainage area along the west side of Pima Rd where flow cannot be intercepted by the stormdrain.

Since the HEC-1 model does not have the level of detail required to determine the flows in this area for the 2-year storm, a rational methodology calculation was utilized to estimate this flow. The estimated area for this flow includes the channel and open area on the west side of Pima Road between Sierra Pinta Drive and Deer Valley Road, and the commercial development on the northwest corner of Thompson Peak Parkway and Pima Road.

The estimates were developed using the rational methodology included in the *Drainage Design Manual for Maricopa County Arizona - Volume 1 Hydrology.* Detailed calculations are included in the attachments.

Hydraulics:

Purpose

The purpose of this analysis was to determine the affects of the construction of the Sierra Pinta Channel outfall on the Pima Road Channel. In order to accomplish this, the existing conditions were analyzed to act as a basis of comparison for the post construction analysis. The first part of the analysis consisted in determining how much runoff crosses from the east portion over to the west portion of Pima Road; and how much of this runoff is conveyed in the east side of Pima Road. The second is to determine the flow characteristics in the Pima Road Channel for both existing and post construction conditions.

For the first part of the analysis a HEC-RAS model was created to estimate how much flow moves across Pima Road from the east half of the road to the west half of the road. A reach length of approximately 2700 feet was analyzed along Pima Road. The upstream end of the reach is approximately 750 feet north of Sierra Pinta Drive and the downstream end is approximately 500 feet north of Hualapai Drive.

For the second part, another hydraulic model was created to determine the flows, velocities, and hydraulic depth of the channel alongside the western side of Pima Road. The existing and post construction conditions were modeled and the differences between these conditions was noted.

Method Description

The hydraulic conditions of the Pima Road Channel were analyzed using HEC-Geo RAS V.4.1.1 (**Reference 3**). HEC-GeoRAS is an ArcGIS extension that allows the geometry data to be extracted from GIS and use in HEC-RAS V.3.1.3 (**Reference 3**). 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 both the existing and future conditions model. After reviewing the geometry data, interpolated cross sections were added to both the existing and future conditions model. The interpolated cross sections were added to increase the stability of the model and address some of the warnings generated by HEC-RAS.

Cross sections were cut at roadway crossings, Sierra Pinta Outfall location, and spaced no more than 500 feet apart. The aerial photographs from the ESRI server and topographic mapping were used to locate the critical areas for cross sections. The expansion contraction coefficients used were 0.1 and 0.3 respectively. The reach lengths were measured from the base map with the aid of HEC-GeoRAS and the n-values used were 0.035 for the landscape areas and 0.018 for paved and concrete surfaces.

The downstream boundary condition used the slope-area method. The longitudinal slope at the downstream end was measured from topographic mapping to be 0.0225 ft/ft. The upstream boundary condition was set to critical depth. For the analysis of the existing and post construction models a mix flow option was used because the like hood of flows are changing from subcritical to supercritical and vice versa. The models used the average conveyance option of HEC-RAS to calculation of the friction slope.

Weir Flow Model

The weir flow (from east side of Pima Road to Pima Road Channel) model was created using existing conditions without any interpolated cross sections. Only the east half of Pima Road right-of-way was modeled to compute the flows moving across the median at Pima Road. Between the cross sections a lateral weir was added and weir flow was defined at the right bank station where the median is located. The location of where the

weir is defined is critical to modeling the weir flow, as this is the location where HEC-RAS starts to model weir flow.

There were a total 14 lateral weir's defined in the model; the locations of these weirs identifies where flow would move across the median at Pima Road and towards the west side of Pima Road and eventually into the channel. The results from the HEC-RAS model show that weir flow would only occur for the 100 year flows. The typical n-values in this model were 0.018 for the roadway and 0.035 for the channel alongside the east side of the roadway. A weir coefficient of 3.0 was used in the model, which is a typical coefficient for use with broad crested weirs.

The water surface on the west side was assumed not to be high enough to affect the weir flow across the median. This assumption was verified by both conditions in the hydraulic models.

Existing Conditions Model

The existing model shows the existing conditions based on Pima Road design Plans and topographic mapping developed for the Design Plans for Pima Road Improvements – Loop 101 to Thompson Peak Parkway (**Reference 5**). The topographic mapping was used to create a TIN from which cross sections were cut and imported into HEC-RAS. Interpolated cross sections were added throughout the entire reach and defined between two cut cross sections. The distances defined between two cut cross sections varied throughout the model, but the maximum distance between interpolated cross-sections was set to 19.66 feet.

The storms modeled were the 2-year, 10-year, 100-year, and the Pima Channel design flow of 2300 cfs (design performed by others). Weir flows calculated from the Weir Flow Model were added to the hydrology flows as determined by the model. The typical n-values in this model were 0.018 for the roadway and 0.035 for the channel. The n-values for interpolated cross sections were automatically generated by HEC-RAS based on the interpolation points. No modifications were made to these.

A levee was added at the median of Pima Road to restrict flow from returning back to the east side of Pima Road. However, none of the water surface elevations from the storm flows ever reached the median, so this was not an issue.

Post Construction Conditions Model

The future model utilizes the same topographic information as the existing conditions model, except in the area of the proposed Sierra Pinta Outfall Channel. The future conditions model includes the same portion of Pima Road as the Existing Conditions Model. Interpolated cross sections were added throughout most of the model and defined between two cut cross sections to a maximum distance of 19.66 feet. Interpolated cross sections were not added between the Sierra Pinta Channel headwall and the upstream cross section (#1792.679). This was due to the rapid change of geometry that would be misinterpreted by interpolated cross sections.

The storms modeled were the 2-year, 10-year, 100-year, and the design flow of 2300 cfs (design performed by others). Weir flows calculated from the Weir Flow Model were added to the hydrology flows as determined by the model. The typical n-values in this model were 0.018 for the roadway, 0.035 for the channel, and 0.065 for a small portion of the outfall channel where the large boulder energy dissipaters are located. This area was designed to handle high velocities and extreme turbulence, therefore, a higher n-value was appropriate. The n-values for the interpolated cross sections were automatically generated by HEC-RAS based on the interpolation points. No modifications were made to these.

A levee was added at the median of Pima Road to restrict flow from returning back to the east side of Pima Road. However cross over the median towards the east side of Pima Road if the flows got higher than the median. The levees for the interpolated cross sections were varied based upon the interpolation and these were not modified. However, none of the water surface elevations from the storm flows ever reached the median, so this was not an issue.

Hydraulic Model Results

The results of the weir flow analysis show that the east portion of Pima Road can only handle a maximum flow of approximately 550 cfs. Flow beyond this threshold weirs across the median and onto the western portion of Pima Road and eventually into the Pima Road Channel. For the 2-year and 10-year storms the flows reaching the east side of Pima Road are less than the maximum flow capacity and do not overtop the road, therefore the weir analysis was only applicable to the 100-year storm.

For the existing and post construction condition models, output was reviewed and at specific locations the flows, water surface elevations, velocities, and maximum hydraulic depths were used for reference on maps provided to the City and included in the attachments. The output results were also placed on the design plans for the Sierra Pinta Outfall Channel.

There are several modeling issues that should be mentioned. The first is deviation from the HEC-RAS general assumption of gradually varied flow. The post construction conditions model includes a drop over the proposed headwall of approximately 10 feet. 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.

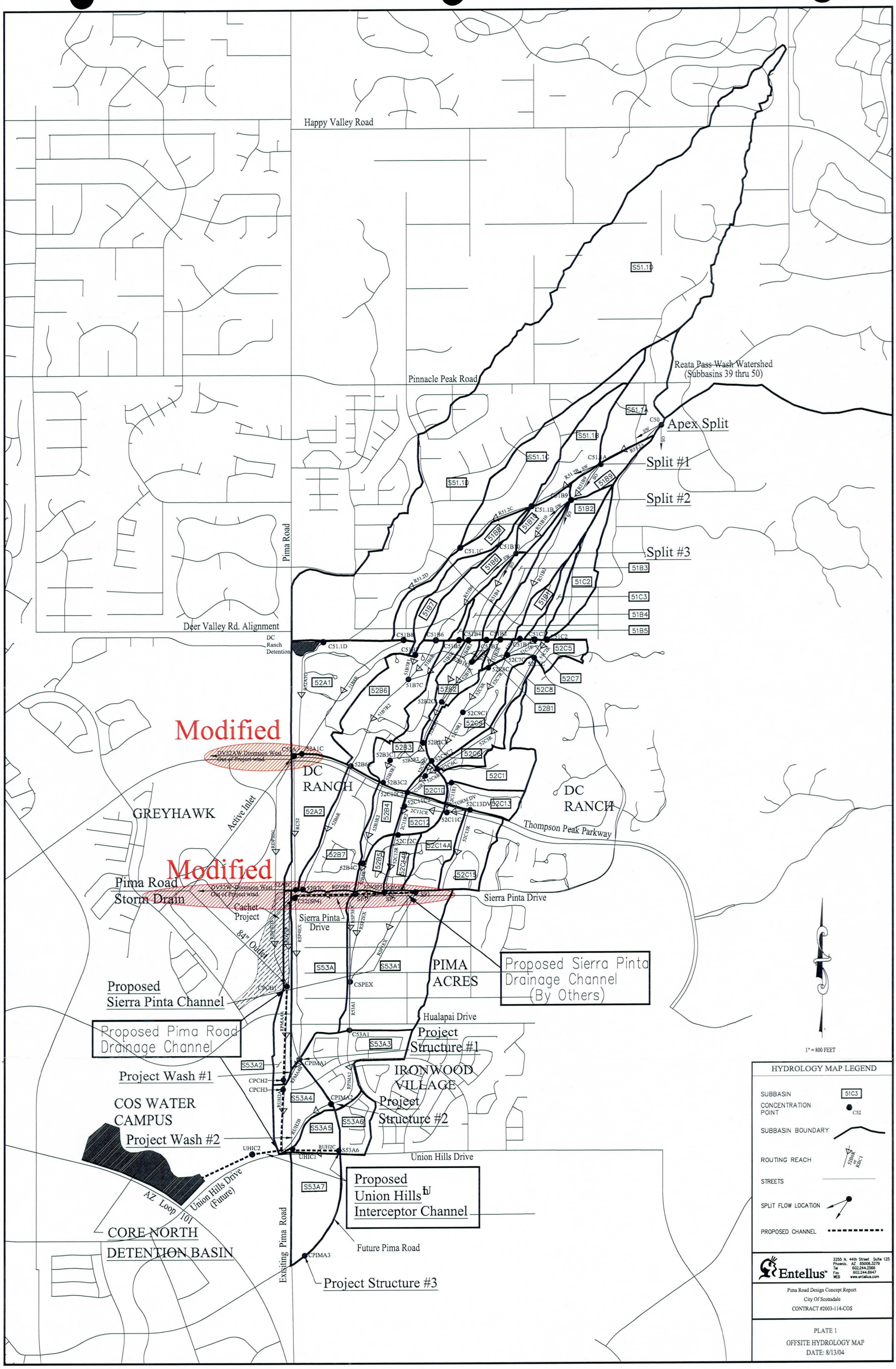
Other issues include the various hydraulic jumps and locations of critical depth within the modeling reach. Based on the Froude numbers calculated by HEC-RAS the flow does change flow regimen from subcritical to supercritical back and forth throughout the entire reach.

As the attached graphics show, when comparing existing to post construction conditions, there are significant differences in flow, velocity, and flow depth at the various cross sections of the channel. For example, the flow, velocity and depth are essentially the same upstream of the Sierra Pinta Channel

Outlet, however downstream of the outlet the flows, velocities, and depths increase. The magnitude of these increases varies and can viewed in the HEC-RAS model.

References

1. Final Hydrology and Drainage Preliminary Drainage Design Report as Part of Pima Road Design Concept Report - AZ101 To Thompson Peak Parkway for the Pima Road realignment Project, Pima Road Drainage Channel Analysis, Union Hills Interceptor Channel Analysis, October 2004, Entellus Project No. 410.061A, City of Scottsdale Contract No. 2003-114-COS
2. *DC Ranch Sierra Pinta Channel Improvement Plan* Wood/Patel 24 July 2008
3. *HEC-Geo RAS V.4.1.1*, US Army Corps of Engineers, September 2005
4. *HEC-RAS V.3.1.3*, US Army Corps of Engineers, May 2005
5. Design Plans for Pima Road Improvements – Loop 101 To Thompson Peak Parkway, April 2006, Entellus Project No. 410.061A, City of Scottsdale Project No. S-2104


Happy Valley Road
Pinnacle Peak Road
Pima Road
Deer Valley Rd. Alignment
DC Ranch Detention
Reata Pass Wash Watershed (Subbasins 39 thru 50)
Apex Split
Split #1
Split #2
Split #3
Modified
DV52AW Diversion West Out of Project wlsd.
DC RANCH
GREYHAWK
Active Inlet
Thompson Peak Parkway
Modified
Pima Road Storm Drain
DV52W Diversion West Out of Project wlsd.
Cachet Project
84" Outlet
Sierra Pinta Drive
PIMA ACRES
Proposed Sierra Pinta Drainage Channel (By Others)
Proposed Sierra Pinta Channel
Proposed Pima Road Drainage Channel
Hualapai Drive
Project Structure #1
IRONWOOD VILLAGE
Project Wash #1
Project Structure #2
COS WATER CAMPUS
Project Wash #2
Union Hills Drive
AZ Loop 101
Union Hills Drive (Future)
Proposed Union Hills Interceptor Channel
CORE NORTH DETENTION BASIN
Future Pima Road
Existing Pima Road
Project Structure #3
1" = 800 FEET
HYDROLOGY MAP LEGEND
SUBBASIN
CONCENTRATION POINT
SUBBASIN BOUNDARY
ROUTING REACH
STREETS
SPLIT FLOW LOCATION
PROPOSED CHANNEL
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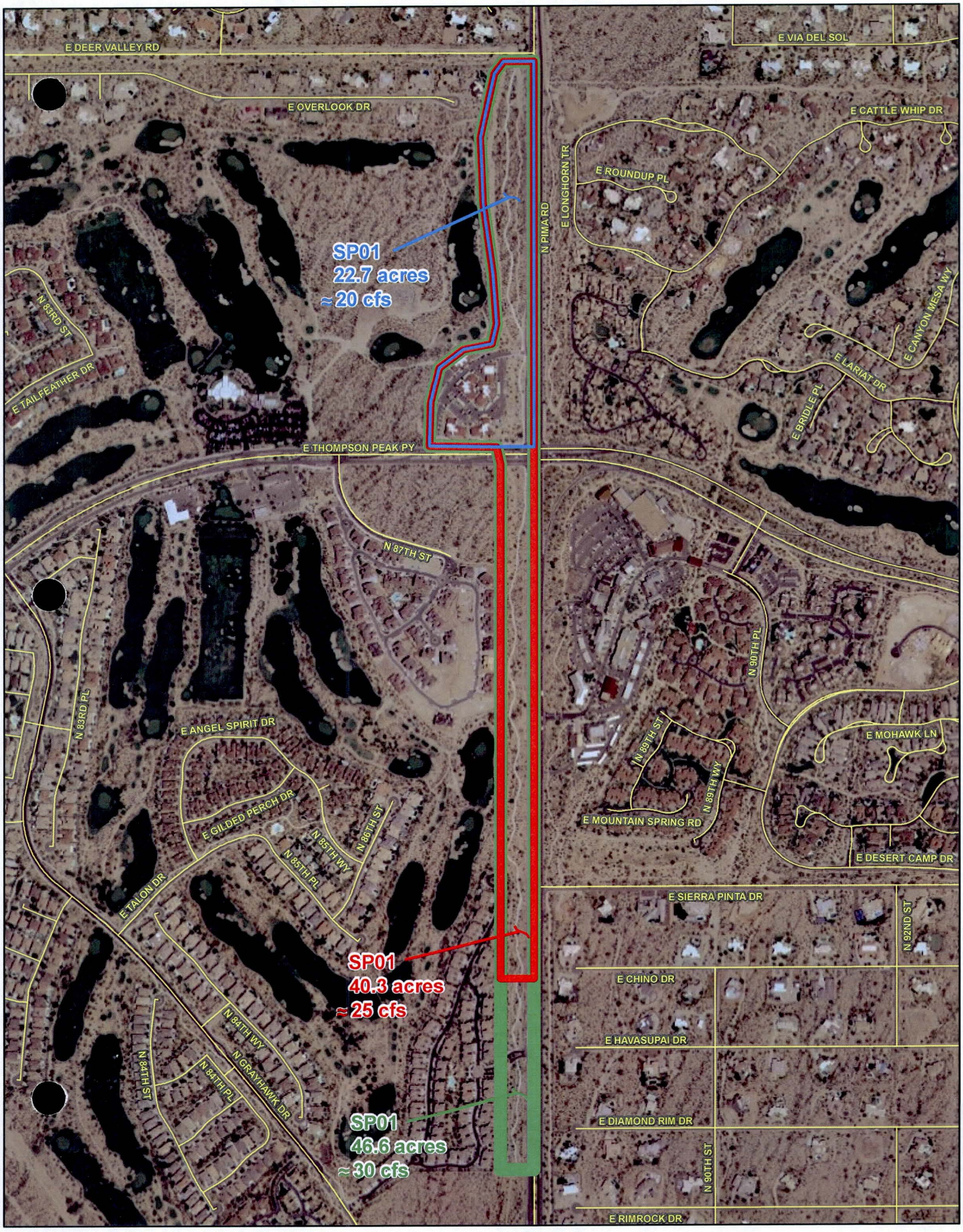
WEB www.entellus.com
Pima Road Design Concept Report
City Of Scottsdale
CONTRACT #2003-114-COS
PLATE 1
OFFSITE HYDROLOGY MAP
DATE: 8/13/04

2-YEAR RATIONAL METHOD MAP



Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Rainfall Method: NOAA						
5 MIN	0.350	0.440	0.500	0.600	0.670	0.740
10 MIN	0.520	0.670	0.770	0.910	1.020	1.130
15 MIN	0.630	0.830	0.970	1.160	1.310	1.450
30 MIN	0.840	1.110	1.300	1.560	1.770	1.970
1 HOUR	1.020	1.370	1.610	1.950	2.210	2.470
2 HOUR	1.160	1.550	1.810	2.180	2.470	2.760
3 HOUR	1.250	1.670	1.950	2.340	2.650	2.950
6 HOUR	1.430	1.890	2.200	2.640	2.980	3.320
12 HOUR	1.650	2.160	2.510	3.010	3.390	3.770
24 HOUR	1.870	2.440	2.820	3.370	3.800	4.220

Sub Basin	Land Use Code	Area (acres)	Area (%)	Kb	Runoff Coefficient C					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin ID: 01										
SP01	700	22.65	100.0	LOW	0.40	0.40	0.40	0.44	0.48	0.50
		22.650	**100.0**							
SP02	700	40.33	100.0	LOW	0.40	0.40	0.40	0.44	0.48	0.50
		40.330	**100.0**							
SP03	700	46.63	100.0	LOW	0.40	0.40	0.40	0.44	0.48	0.50
		46.630	**100.0**							

ID	Sub Basin Data								Sub Basin Hydrology Summary					
	Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb	CustomTc (min)		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin ID: 01														
SP01	22.7	2,500	1,867.00	1,810.00	120.4	0.06	-	Q (cfs)	21	29	35	48	61	72
								C	0.40	0.40	0.40	0.44	0.48	0.50
								CA (ac)	9.06	9.06	9.06	9.97	10.87	11.33
								Tc (min)	18	16	15	14	13	12
								i (in/hr)	2.32	3.23	3.88	4.79	5.58	6.37
SP02	40.3	5,940	1,867.00	1,730.00	121.8	0.06	-	Q (cfs)	27	40	49	69	87	103
								C	0.40	0.40	0.40	0.44	0.48	0.50
								CA (ac)	16.13	16.13	16.13	17.75	19.36	20.17
								Tc (min)	31	26	24	22	21	20
								i (in/hr)	1.65	2.47	3.05	3.86	4.48	5.10
SP03	46.6	7,210	1,867.00	1,704.00	119.4	0.06	-	Q (cfs)	29	41	51	73	93	110
								C	0.40	0.40	0.40	0.44	0.48	0.50
								CA (ac)	18.65	18.65	18.65	20.52	22.38	23.32
								Tc (min)	35	30	28	25	24	23
								i (in/hr)	1.55	2.22	2.74	3.56	4.14	4.72

10/16/2008

0		100-yr ex	100-yr fut	10-yr ex	10-yr fut	2-yr ex	2-yr fut
1	52C13	62	62	28	28	11	11
4	STORM	40	40	28	28	11	11
7	2C13DV	22	22	0	0	0	0
10	52C13R	20	20	0	0	0	0
13	52C15	155	155	85	85	43	43
16	52C14A	139	139	77	77	39	39
19	SP1	294	294	161	161	82	82
22	DVSP1	0	294	0	161	0	82
25	SP1EX	294	0	161	0	82	0
28	RSP1EX	229	0	126	0	64	0
32	39	3982	3982	1587	1587	431	431
35	40	1473	1473	601	601	158	158
38	C40	5122	5122	2007	2007	539	539
41	R41	3599	3599	1436	1436	378	378
45	41	1050	1050	296	296	45	45
48	C41	4526	4526	1729	1729	416	416
51	42	1118	1118	368	368	71	71
54	43	2606	2606	1087	1087	300	300
57	44	2032	2032	837	837	232	232
60	C44	4638	4638	1922	1922	532	532
63	R45	4039	4039	1747	1747	487	487
67	45	544	544	218	218	50	50
70	C45	4336	4336	1861	1861	516	516
73	45A	489	489	222	222	68	68
76	46	2927	2927	1360	1360	438	438
79	C46	6837	6837	2844	2844	766	766
82	R47	5481	5481	2290	2290	623	623
86	47	451	451	138	138	25	25
89	C47.1	5870	5870	2379	2379	633	633
92	C47.2	11071	11071	4252	4252	1064	1064
95	R50	11022	11022	4208	4208	1063	1063
99	50	1064	1064	438	438	115	115
102	C50	11517	11517	4390	4390	1110	1110
105	APEXSO	5758	5758	2195	2195	555	555
108	APEXSW	5758	5758	2195	2195	555	555
111	R51.2A	5693	5693	2181	2181	554	554
115	S51.1A	113	113	46	46	16	16
118	C51.1A	5794	5794	2218	2218	564	564
121	SPT1SW	1680	1680	643	643	164	164
124	SPT1SO	4114	4114	1575	1575	401	401
127	R51B9	4112	4112	1574	1574	401	401
130	51B9	59	59	25	25	9	9
133	C51B9	4128	4128	1580	1580	402	402
136	SPT2SW	1321	1321	506	506	129	129
139	SPT2SO	2807	2807	1075	1075	273	273
142	R51B2	2800	2800	1072	1072	273	273
145	51B2	109	109	46	46	17	17
148	C51B2	2850	2850	1091	1091	278	278
151	51B2R	2848	2848	1090	1090	278	278
154	52C8	20	20	9	9	3	3
157	52C8C	2852	2852	1091	1091	278	278
160	52C8R	2849	2849	1090	1090	278	278
163	51C3	32	32	13	13	5	5
166	51C3R	32	32	13	13	5	5
169	51B1	34	34	14	14	5	5
172	51B1R	33	33	14	14	5	5
175	52C7	16	16	7	7	2	2
178	52C7C	75	75	32	32	12	12
181	52C7R	74	74	31	31	11	11
184	52C9C1	2879	2879	1101	1101	281	281
187	52C9R1	2876	2876	1101	1101	281	281
190	52C9	151	151	66	66	26	26
193	52C9C2	2922	2922	1118	1118	286	286
196	52C9R2	2920	2920	1117	1117	286	286
199	51C2	81	81	34	34	12	12
202	51C2R	80	80	33	33	12	12
205	52C5	38	38	16	16	6	6
208	52C5C	107	107	44	44	16	16
211	52C5R	107	107	44	44	16	16
214	52C6	72	72	31	31	12	12
217	52C6C	159	159	67	67	25	25

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0		100-yr ex	100-yr fut	10-yr ex	10-yr fut	2-yr ex	2-yr fut
220	52C6R	159	159	67	67	25	25
223	2C10C1	3014	3014	1151	1151	295	295
226	2C10R1	3012	3012	1150	1150	295	295
229	52C10	27	27	9	9	2	2
232	2C10C2	3019	3019	1153	1153	295	295
235	52C11	85	85	35	35	13	13
238	2C11R1	85	85	35	35	13	13
241	52C13D	40	40	28	28	11	11
244	52C11C	124	124	53	53	20	20
247	2C11CR	122	122	53	53	20	20
250	2C11C2	3063	3063	1168	1168	299	299
253	2C11R2	3058	3058	1168	1168	299	299
256	52C12	100	100	61	61	33	33
259	52C12C	3074	3074	1174	1174	301	301
262	52C12R	3071	3071	1173	1173	301	301
265	52C14B	70	70	38	38	19	19
268	DVSP1	0	294	0	161	0	82
271	RDVSP1	0	291	0	160	0	82
274	SP2	3084	3147	1178	1202	303	311
277	DVSP2	0	1328	0	1202	0	311
280	DSP2	3084	1819	1178	0	303	0
283	RSP2EX	2929	1669	1141	0	299	0
287	51B3	38	38	16	16	6	6
290	51B3R	38	38	16	16	6	6
293	52B1	7	7	3	3	1	1
296	52B1C	41	41	17	17	6	6
299	52B1R	41	41	17	17	6	6
302	SPT2SW	1321	1321	506	506	129	129
305	R51B10	1319	1319	505	505	129	129
308	51B10	52	52	22	22	8	8
311	C51B10	1336	1336	512	512	130	130
314	SPT3SW	534	534	205	205	52	52
317	SPT3SO	802	802	307	307	78	78
320	R51B4	799	799	307	307	78	78
323	51B4	47	47	20	20	7	7
326	C51B4	816	816	313	313	80	80
329	51B4R1	815	815	312	312	80	80
332	52B2C1	841	841	322	322	82	82
335	52B2R1	840	840	321	321	82	82
338	52B2	59	59	22	22	7	7
341	52B2C2	858	858	327	327	84	84
344	52B2R2	858	858	327	327	84	84
347	52B3R1	856	856	327	327	83	83
350	52B3	125	125	54	54	21	21
353	52B3C2	896	896	341	341	87	87
356	52B3R2	895	895	341	341	87	87
359	52B4	83	83	45	45	22	22
362	52B4C	910	910	346	346	89	89
365	52B4R	909	909	346	346	89	89
368	52B5	68	68	36	36	17	17
371	DVSP2	0	1328	0	1202	0	311
374	RDVSP2	0	1328	0	1201	0	311
377	SP3	921	2249	350	1538	91	398
380	DVSP3	0	1328	0	1328	0	398
383	DSP3	921	921	350	210	91	0
386	RSP3EX	919	918	349	209	91	0
389	CSPEX	3906	2580	1503	209	390	0
392	R53A1	3902	2575	1501	207	390	0
395	S53A1	317	317	129	129	44	44
398	C53A1	4041	2714	1554	256	406	44
401	RPIMA2	4038	2709	1553	255	405	44
404	S53A3	159	159	69	69	25	25
407	CPIMA2	4080	2750	1569	268	410	58
410	RUH2B	4007	2671	1544	212	402	53
414	S53A6	68	68	30	30	11	11
417	RUH2C	63	63	27	27	10	10
421	S53A5	66	66	31	31	12	12
424	UHIC1	115	115	49	49	18	18
427	SPT1SW	1680	1680	643	643	164	164
430	R51.2B	1663	1663	638	638	162	162
434	S51.1B	77	77	32	32	11	11

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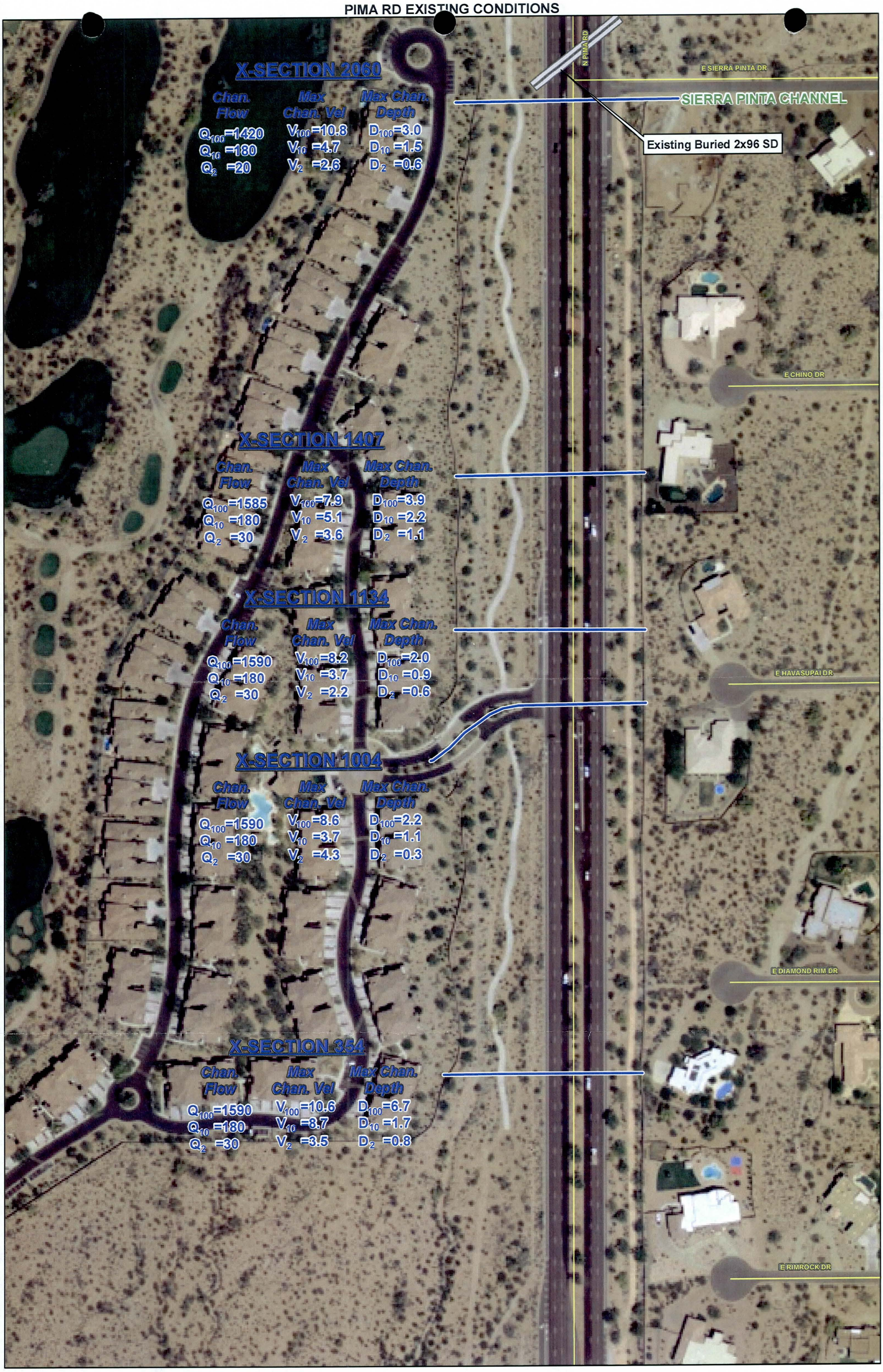
0		100-yr ex	100-yr fut	10-yr ex	10-yr fut	2-yr ex	2-yr fut	
437	C51.1B	1732	1732	665	665	170	170	
440	R51.2C	1713	1713	658	658	168	168	
444	S51.1C	129	129	53	53	19	19	
447	C51.1C	1842	1842	711	711	183	183	
450	R51.2D	1779	1779	686	686	176	176	
454	S51.1D	1030	1030	425	425	152	152	
457	C51.1D	2799	2799	1110	1110	321	321	
460	R52A1C	2728	2728	1066	1066	312	312	
464	51B8	58	58	24	24	9	9	
467	51B8R	58	58	24	24	9	9	
470	52A1	294	294	131	131	51	51	
473	52A1C	297	297	132	132	52	52	
476	C52A	2849	2849	1111	1111	327	327	Flow at intersection of Pima and Thompson Peak
479	DV52AW	855	855	333	333	98	98	Flow diverted out of study area
482	D52AW	1994	1994	778	778	229	229	flow continuing south of Thompson peak
485	PRSD	600	600	600	600	229	229	Flow entering Pima Rd. SD
488	PRSDEX	1394	1394	178	178	0	0	total flow along Pima after SD
491	RC52	1245	1245	116	116	0	0	
495	51B5	10	10	4	4	2	2	
498	51B5R	10	10	4	4	2	2	
501	SPT3SW	534	534	205	205	52	52	
504	R51B6	533	533	204	204	52	52	
507	51B6	86	86	36	36	13	13	
510	C51B6	562	562	214	214	55	55	
513	51B6R	561	561	214	214	55	55	
516	51B7	49	49	20	20	7	7	
519	51B7R1	49	49	20	20	7	7	
522	51B7C	584	584	222	222	57	57	
525	51B7R2	583	583	222	222	57	57	
528	52B6	202	202	85	85	31	31	
531	52B6C	635	635	239	239	62	62	
534	52B6R	633	633	239	239	62	62	
537	52B7	285	285	163	163	86	86	
540	52B7C1	679	679	254	254	93	93	flow entering pima rd from Sierra Pinta
543	52A2	236	236	137	137	74	74	flow being added to east side of Pima Rd. north of Sierra Pinta
546	52A2C2	1956	1956	385	385	167	167	
549	DV52W	0	0	0	0	0	0	
552	D52W	1956	1956	385	385	167	167	
555	DVSP3	0	1328	0	1328	0	398	Q entering Sierra Pinta Channel at Pima Rd
558	RDVSP3	0	1328	0	1328	0	397	
561	C52SP4	1956	3284	385	1713	167	468	Total flow at Sierra Pinta and Pima: Channel + Pima Rd.
564	DVSP4	0	1328	0	1328	0	468	
567	DSP4	1956	1956	385	385	167	0	Flow continuing DS along Pima Rd.
570	RSP4EX	1825	1812	342	276	111	0	
574	53HW	0	0	0	0	0	0	
577	53PS	1825	1812	342	276	111	0	
580	S53A	225	225	91	91	31	31	flow being added to east side of Pima Rd. south of Sierra Pinta
583	CPIMA1	1893	1880	367	301	139	31	
586	RPMA4B	1890	1877	365	296	138	30	
590	PRSD	600	600	600	600	229	229	
593	RDPSD1	600	600	600	600	229	229	
596	RDPSD2	600	600	600	600	229	229	
599	DVSP4	0	1328	0	1328	0	468	
602	RDVSP	0	1328	0	1328	0	466	
606	CPCH1	600	1928	600	1928	229	678	
609	RPMA4A	600	1928	600	1928	225	671	
613	S53A2	131	131	57	57	20	20	
616	CPCH2	629	1963	608	1935	228	674	
619	CPCH3	2508	3823	972	2230	291	684	Total Flow along Pima after outlets
622	RUH2A	2493	3810	968	2222	289	680	
626	S53A4	128	128	56	56	20	20	
629	CPCH4	2510	3827	975	2229	293	683	
632	UHIC2	6443	6434	2493	2445	687	714	
635	CPIMA3	251	251	145	145	75	75	

PIMA RD EXISTING CONDITIONS



HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	139.7268	2Year	30.00	1697.55	3.87	0.89	0.74
Pima	139.7268	10Year	180.00	1698.71	6.61	1.01	1.90
Pima	139.7268	100Year	1625.00	1700.92	9.38	1.27	4.10
Pima	139.7268	DesignFlow	2300.00	1701.19	10.69	1.34	4.38
Pima	158.446*	2Year	30.00	1697.89	3.46	0.80	0.82
Pima	158.446*	10Year	180.00	1699.23	5.17	0.75	2.16
Pima	158.446*	100Year	1625.00	1701.28	9.79	1.27	4.21
Pima	158.446*	DesignFlow	2300.00	1701.56	11.19	1.35	4.49
Pima	177.166*	2Year	30.00	1698.16	3.36	0.81	0.83
Pima	177.166*	10Year	180.00	1699.42	5.09	0.76	2.09
Pima	177.166*	100Year	1625.00	1701.67	9.79	1.22	4.34
Pima	177.166*	DesignFlow	2300.00	1701.95	11.41	1.33	4.62
Pima	195.885*	2Year	30.00	1698.45	3.05	0.74	0.86
Pima	195.885*	10Year	180.00	1699.61	4.95	0.75	2.02
Pima	195.885*	100Year	1625.00	1702.06	9.60	1.15	4.47
Pima	195.885*	DesignFlow	2300.00	1702.34	11.36	1.28	4.75
Pima	214.605*	2Year	30.00	1698.69	2.90	0.72	0.84
Pima	214.605*	10Year	180.00	1699.81	4.82	0.73	1.96
Pima	214.605*	100Year	1625.00	1702.45	9.29	1.07	4.60
Pima	214.605*	DesignFlow	2300.00	1702.75	11.17	1.21	4.90
Pima	233.324*	2Year	30.00	1698.91	2.77	0.69	0.81
Pima	233.324*	10Year	180.00	1700.00	4.67	0.72	1.89
Pima	233.324*	100Year	1625.00	1702.82	8.91	0.99	4.72
Pima	233.324*	DesignFlow	2300.00	1703.15	10.88	1.14	5.05
Pima	252.044*	2Year	30.00	1699.12	2.67	0.68	0.76
Pima	252.044*	10Year	180.00	1700.17	4.55	0.71	1.81
Pima	252.044*	100Year	1625.00	1703.03	9.05	0.97	4.67
Pima	252.044*	DesignFlow	2300.00	1703.58	10.42	1.05	5.22
Pima	270.764*	2Year	30.00	1699.32	2.58	0.66	0.70
Pima	270.764*	10Year	180.00	1700.35	4.46	0.70	1.73
Pima	270.764*	100Year	1625.00	1703.25	9.15	0.96	4.63
Pima	270.764*	DesignFlow	2300.00	1704.18	9.33	0.88	5.56
Pima	289.483*	2Year	30.00	1699.52	2.49	0.64	0.64
Pima	289.483*	10Year	180.00	1700.51	4.36	0.69	1.63
Pima	289.483*	100Year	1625.00	1702.77	11.76	1.28	3.89
Pima	289.483*	DesignFlow	2300.00	1703.47	12.96	1.32	4.59
Pima	308.2033	2Year	30.00	1699.70	2.43	0.63	0.56
Pima	308.2033	10Year	180.00	1700.67	4.29	0.68	1.53
Pima	308.2033	100Year	1625.00	1702.29	15.29	1.77	3.14
Pima	308.2033	DesignFlow	2300.00	1703.09	15.84	1.66	3.95
Pima	323.659*	2Year	30.00	1699.83	2.60	0.63	0.64
Pima	323.659*	10Year	180.00	1700.52	6.71	1.08	1.33
Pima	323.659*	100Year	1587.00	1703.04	15.08	1.66	3.85
Pima	323.659*	DesignFlow	2300.00	1704.21	14.62	1.44	5.02
Pima	339.115*	2Year	30.00	1699.96	2.90	0.67	0.72
Pima	339.115*	10Year	180.00	1700.61	8.28	1.32	1.37

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	339.115*	100Year	1587.00	1704.20	13.79	1.37	4.96
Pima	339.115*	DesignFlow	2300.00	1705.65	12.46	1.17	6.41
Pima	354.5711	2Year	30.00	1700.09	3.48	0.75	0.80
Pima	354.5711	10Year	180.00	1701.02	8.71	1.22	1.72
Pima	354.5711	100Year	1587.00	1705.99	10.60	1.03	6.69
Pima	354.5711	DesignFlow	2300.00	1706.35	12.18	1.12	7.05
Pima	373.922*	2Year	30.00	1700.61	4.60	1.19	0.61
Pima	373.922*	10Year	180.00	1701.63	8.61	1.25	1.63
Pima	373.922*	100Year	1587.00	1706.37	10.35	1.04	6.37
Pima	373.922*	DesignFlow	2300.00	1706.76	11.92	1.13	6.75
Pima	393.274*	2Year	30.00	1701.31	4.48	1.18	0.60
Pima	393.274*	10Year	180.00	1702.27	8.47	1.26	1.56
Pima	393.274*	100Year	1587.00	1706.76	10.13	1.05	6.05
Pima	393.274*	DesignFlow	2300.00	1707.16	11.69	1.13	6.45
Pima	412.625*	2Year	30.00	1702.00	4.40	1.19	0.58
Pima	412.625*	10Year	180.00	1702.92	8.32	1.27	1.50
Pima	412.625*	100Year	1587.00	1707.13	9.98	1.06	5.71
Pima	412.625*	DesignFlow	2300.00	1707.58	11.47	1.14	6.16
Pima	431.977*	2Year	30.00	1702.70	4.29	1.18	0.57
Pima	431.977*	10Year	180.00	1703.57	8.24	1.29	1.44
Pima	431.977*	100Year	1587.00	1707.48	10.00	1.10	5.35
Pima	431.977*	DesignFlow	2300.00	1707.99	11.27	1.15	5.86
Pima	451.328*	2Year	30.00	1703.40	4.26	1.20	0.57
Pima	451.328*	10Year	180.00	1704.23	8.12	1.30	1.40
Pima	451.328*	100Year	1587.00	1707.87	9.94	1.13	5.03
Pima	451.328*	DesignFlow	2300.00	1708.42	11.06	1.15	5.59
Pima	470.68*	2Year	30.00	1704.11	4.06	1.15	0.57
Pima	470.68*	10Year	180.00	1704.90	8.00	1.31	1.36
Pima	470.68*	100Year	1587.00	1708.29	9.82	1.15	4.75
Pima	470.68*	DesignFlow	2300.00	1708.84	10.89	1.16	5.30
Pima	490.031*	2Year	30.00	1704.80	4.15	1.22	0.55
Pima	490.031*	10Year	180.00	1705.57	7.89	1.32	1.32
Pima	490.031*	100Year	1587.00	1708.71	9.80	1.18	4.46
Pima	490.031*	DesignFlow	2300.00	1709.27	10.73	1.18	5.02
Pima	509.382*	2Year	30.00	1705.52	3.88	1.13	0.56
Pima	509.382*	10Year	180.00	1706.25	7.75	1.32	1.29
Pima	509.382*	100Year	1587.00	1709.18	9.63	1.19	4.22
Pima	509.382*	DesignFlow	2300.00	1709.71	10.58	1.19	4.75
Pima	528.734*	2Year	30.00	1706.21	4.06	1.24	0.54
Pima	528.734*	10Year	180.00	1706.92	7.69	1.33	1.25
Pima	528.734*	100Year	1587.00	1709.65	9.47	1.20	3.98
Pima	528.734*	DesignFlow	2300.00	1710.16	10.42	1.20	4.49
Pima	548.085*	2Year	30.00	1706.94	3.70	1.11	0.57
Pima	548.085*	10Year	180.00	1707.61	7.56	1.33	1.24
Pima	548.085*	100Year	1587.00	1710.15	9.25	1.20	3.78
Pima	548.085*	DesignFlow	2300.00	1710.61	10.28	1.21	4.24

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Froude # Chl	Max Chl Dpth (ft)
Pima	567.437*	2Year	30.00	1707.62	3.98	1.26	0.54
Pima	567.437*	10Year	180.00	1708.28	7.52	1.35	1.20
Pima	567.437*	100Year	1587.00	1710.64	9.06	1.20	3.56
Pima	567.437*	DesignFlow	2300.00	1711.07	10.12	1.21	3.99
Pima	586.788*	2Year	30.00	1708.36	3.51	1.07	0.57
Pima	586.788*	10Year	180.00	1709.05	6.83	1.20	1.26
Pima	586.788*	100Year	1587.00	1711.13	8.88	1.21	3.34
Pima	586.788*	DesignFlow	2300.00	1711.54	9.98	1.22	3.75
Pima	606.140*	2Year	30.00	1709.01	4.31	1.48	0.51
Pima	606.140*	10Year	180.00	1709.96	5.06	1.16	1.46
Pima	606.140*	100Year	1587.00	1711.63	8.73	1.21	3.13
Pima	606.140*	DesignFlow	2300.00	1712.01	9.85	1.23	3.51
Pima	625.491*	2Year	30.00	1709.76	3.66	1.18	0.56
Pima	625.491*	10Year	180.00	1710.56	5.04	1.20	1.36
Pima	625.491*	100Year	1587.00	1712.12	8.59	1.22	2.92
Pima	625.491*	DesignFlow	2300.00	1712.48	9.72	1.24	3.28
Pima	644.843*	2Year	30.00	1710.47	3.50	1.13	0.56
Pima	644.843*	10Year	180.00	1711.21	4.66	1.12	1.30
Pima	644.843*	100Year	1587.00	1712.62	8.45	1.22	2.71
Pima	644.843*	DesignFlow	2300.00	1712.96	9.58	1.24	3.05
Pima	664.194*	2Year	30.00	1711.14	4.01	1.22	0.52
Pima	664.194*	10Year	180.00	1711.78	4.86	1.22	1.16
Pima	664.194*	100Year	1587.00	1713.11	8.33	1.23	2.49
Pima	664.194*	DesignFlow	2300.00	1713.44	9.45	1.25	2.82
Pima	683.546*	2Year	30.00	1711.87	3.61	1.11	0.54
Pima	683.546*	10Year	180.00	1712.47	3.80	0.99	1.14
Pima	683.546*	100Year	1587.00	1713.61	8.23	1.23	2.28
Pima	683.546*	DesignFlow	2300.00	1713.93	9.31	1.26	2.60
Pima	702.897*	2Year	30.00	1712.60	2.88	1.07	0.56
Pima	702.897*	10Year	180.00	1712.97	4.36	1.23	0.93
Pima	702.897*	100Year	1587.00	1714.09	8.19	1.26	2.05
Pima	702.897*	DesignFlow	2300.00	1714.42	9.11	1.25	2.38
Pima	722.2492	2Year	30.00	1713.23	2.34	0.94	0.48
Pima	722.2492	10Year	180.00	1713.61	3.66	0.97	0.86
Pima	722.2492	100Year	1587.00	1714.80	6.73	0.97	2.06
Pima	722.2492	DesignFlow	2300.00	1715.16	7.56	0.98	2.41
Pima	741.370*	2Year	30.00	1713.57	1.61	0.59	0.57
Pima	741.370*	10Year	180.00	1713.99	2.98	0.73	0.98
Pima	741.370*	100Year	1587.00	1715.06	7.11	1.04	2.06
Pima	741.370*	DesignFlow	2300.00	1715.41	7.92	1.04	2.41
Pima	760.491*	2Year	30.00	1713.79	1.90	0.71	0.54
Pima	760.491*	10Year	180.00	1714.23	3.26	0.83	0.98
Pima	760.491*	100Year	1587.00	1715.44	6.80	0.97	2.19
Pima	760.491*	DesignFlow	2300.00	1715.73	8.03	1.05	2.48
Pima	779.613*	2Year	30.00	1714.05	1.81	0.64	0.54

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	779.613*	10Year	180.00	1714.53	3.18	0.80	1.02
Pima	779.613*	100Year	1587.00	1715.70	7.05	1.01	2.19
Pima	779.613*	DesignFlow	2300.00	1716.07	7.93	1.02	2.56
Pima	798.734*	2Year	30.00	1714.29	1.98	0.70	0.53
Pima	798.734*	10Year	180.00	1714.81	3.24	0.82	1.05
Pima	798.734*	100Year	1587.00	1716.02	7.01	1.00	2.25
Pima	798.734*	DesignFlow	2300.00	1716.35	8.12	1.05	2.59
Pima	817.855*	2Year	30.00	1714.54	2.03	0.70	0.52
Pima	817.855*	10Year	180.00	1715.09	3.31	0.80	1.07
Pima	817.855*	100Year	1587.00	1716.30	7.07	1.02	2.28
Pima	817.855*	DesignFlow	2300.00	1716.69	7.99	1.02	2.67
Pima	836.976*	2Year	30.00	1714.80	2.07	0.69	0.52
Pima	836.976*	10Year	180.00	1715.36	3.43	0.81	1.08
Pima	836.976*	100Year	1587.00	1716.63	6.88	0.98	2.35
Pima	836.976*	DesignFlow	2300.00	1717.05	7.72	0.98	2.77
Pima	856.097*	2Year	30.00	1715.05	2.18	0.71	0.52
Pima	856.097*	10Year	180.00	1715.65	3.49	0.81	1.11
Pima	856.097*	100Year	1587.00	1716.93	6.85	0.98	2.40
Pima	856.097*	DesignFlow	2300.00	1717.31	7.84	1.00	2.78
Pima	875.219*	2Year	30.00	1715.32	2.23	0.71	0.53
Pima	875.219*	10Year	180.00	1715.93	3.53	0.82	1.14
Pima	875.219*	100Year	1587.00	1717.24	6.75	0.97	2.45
Pima	875.219*	DesignFlow	2300.00	1717.59	7.90	1.02	2.80
Pima	894.340*	2Year	30.00	1715.58	2.36	0.74	0.54
Pima	894.340*	10Year	180.00	1716.22	3.55	0.82	1.18
Pima	894.340*	100Year	1587.00	1717.54	6.73	0.97	2.50
Pima	894.340*	DesignFlow	2300.00	1717.95	7.62	0.98	2.91
Pima	913.461*	2Year	30.00	1715.86	2.45	0.75	0.56
Pima	913.461*	10Year	180.00	1716.52	3.54	0.82	1.22
Pima	913.461*	100Year	1587.00	1717.86	6.63	0.96	2.56
Pima	913.461*	DesignFlow	2300.00	1718.22	7.67	1.00	2.92
Pima	932.582*	2Year	30.00	1716.14	2.49	0.76	0.59
Pima	932.582*	10Year	180.00	1716.82	3.45	0.82	1.27
Pima	932.582*	100Year	1587.00	1718.16	6.56	0.96	2.61
Pima	932.582*	DesignFlow	2300.00	1718.55	7.54	0.98	2.99
Pima	951.704*	2Year	30.00	1716.45	2.48	0.75	0.64
Pima	951.704*	10Year	180.00	1717.14	3.28	0.80	1.33
Pima	951.704*	100Year	1587.00	1718.48	6.44	0.95	2.67
Pima	951.704*	DesignFlow	2300.00	1718.79	7.72	1.03	2.98
Pima	970.8254	2Year	30.00	1716.76	2.42	0.75	0.69
Pima	970.8254	10Year	180.00	1717.45	3.11	0.78	1.39
Pima	970.8254	100Year	1587.00	1718.58	7.38	1.19	2.51
Pima	970.8254	DesignFlow	2300.00	1718.91	8.55	1.22	2.84
Pima	987.527*	2Year	30.00	1717.21	3.07	1.02	0.60
Pima	987.527*	10Year	180.00	1717.84	3.46	0.86	1.23
Pima	987.527*	100Year	1586.00	1719.05	7.51	1.13	2.44

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	987.527*	DesignFlow	2300.00	1719.31	9.10	1.27	2.70
Pima	1004.230	2Year	30.00	1717.48	4.26	1.89	0.33
Pima	1004.230	10Year	180.00	1718.16	3.68	0.85	1.01
Pima	1004.230	100Year	1586.00	1719.33	8.58	1.27	2.18
Pima	1004.230	DesignFlow	2300.00	1719.73	9.56	1.27	2.58
Pima	1017.59*	2Year	30.00	1717.99	2.97	1.21	0.43
Pima	1017.59*	10Year	180.00	1718.47	4.54	1.08	0.91
Pima	1017.59*	100Year	1586.00	1719.77	8.42	1.26	2.21
Pima	1017.59*	DesignFlow	2300.00	1720.18	9.29	1.25	2.62
Pima	1030.95*	2Year	30.00	1718.49	2.24	0.81	0.51
Pima	1030.95*	10Year	180.00	1718.87	4.74	1.15	0.89
Pima	1030.95*	100Year	1586.00	1720.21	8.23	1.24	2.23
Pima	1030.95*	DesignFlow	2300.00	1720.61	9.08	1.24	2.63
Pima	1044.313	2Year	30.00	1718.87	2.68	1.04	0.48
Pima	1044.313	10Year	180.00	1719.32	4.46	1.07	0.93
Pima	1044.313	100Year	1586.00	1720.78	7.27	1.08	2.39
Pima	1044.313	DesignFlow	2300.00	1721.15	8.26	1.11	2.76
Pima	1062.38*	2Year	30.00	1719.42	2.14	0.76	0.49
Pima	1062.38*	10Year	180.00	1719.89	3.84	0.88	0.96
Pima	1062.38*	100Year	1586.00	1721.30	7.00	1.00	2.37
Pima	1062.38*	DesignFlow	2300.00	1721.62	8.30	1.08	2.69
Pima	1080.46*	2Year	30.00	1719.91	2.58	0.96	0.44
Pima	1080.46*	10Year	180.00	1720.32	4.36	1.07	0.85
Pima	1080.46*	100Year	1586.00	1721.59	8.00	1.18	2.12
Pima	1080.46*	DesignFlow	2300.00	1721.96	9.07	1.20	2.49
Pima	1098.54*	2Year	30.00	1720.44	2.98	1.26	0.44
Pima	1098.54*	10Year	180.00	1720.84	4.46	1.16	0.84
Pima	1098.54*	100Year	1586.00	1722.17	7.57	1.07	2.17
Pima	1098.54*	DesignFlow	2300.00	1722.55	8.59	1.08	2.55
Pima	1116.61*	2Year	30.00	1721.06	2.35	0.97	0.52
Pima	1116.61*	10Year	180.00	1721.43	3.89	1.00	0.89
Pima	1116.61*	100Year	1586.00	1722.48	8.64	1.28	1.94
Pima	1116.61*	DesignFlow	2300.00	1722.77	10.03	1.35	2.23
Pima	1134.695	2Year	30.00	1721.65	2.18	0.96	0.57
Pima	1134.695	10Year	180.00	1721.96	3.67	1.01	0.88
Pima	1134.695	100Year	1586.00	1723.09	8.20	1.18	2.01
Pima	1134.695	DesignFlow	2300.00	1723.47	9.41	1.20	2.39
Pima	1154.15*	2Year	30.00	1722.09	1.77	0.71	0.72
Pima	1154.15*	10Year	180.00	1722.41	3.46	0.90	1.03
Pima	1154.15*	100Year	1585.00	1723.52	8.11	1.16	2.15
Pima	1154.15*	DesignFlow	2300.00	1723.89	9.41	1.20	2.52
Pima	1173.61*	2Year	30.00	1722.41	2.56	0.89	0.73
Pima	1173.61*	10Year	180.00	1722.78	3.78	0.99	1.11
Pima	1173.61*	100Year	1585.00	1723.93	8.09	1.15	2.26
Pima	1173.61*	DesignFlow	2300.00	1724.29	9.48	1.22	2.62

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	1193.07*	2Year	30.00	1722.79	2.48	0.80	0.83
Pima	1193.07*	10Year	180.00	1723.20	3.72	0.94	1.24
Pima	1193.07*	100Year	1585.00	1724.34	8.17	1.17	2.38
Pima	1193.07*	DesignFlow	2300.00	1724.70	9.51	1.22	2.74
Pima	1212.53*	2Year	30.00	1723.08	2.95	0.82	0.82
Pima	1212.53*	10Year	180.00	1723.49	5.23	1.46	1.23
Pima	1212.53*	100Year	1585.00	1724.76	8.16	1.16	2.50
Pima	1212.53*	DesignFlow	2300.00	1725.11	9.54	1.22	2.85
Pima	1231.99*	2Year	30.00	1723.40	3.09	0.84	0.85
Pima	1231.99*	10Year	180.00	1723.97	4.32	1.10	1.42
Pima	1231.99*	100Year	1585.00	1725.17	8.21	1.17	2.62
Pima	1231.99*	DesignFlow	2300.00	1725.52	9.58	1.23	2.97
Pima	1251.44*	2Year	30.00	1723.72	3.17	0.85	0.87
Pima	1251.44*	10Year	180.00	1724.46	3.61	0.84	1.61
Pima	1251.44*	100Year	1585.00	1725.60	8.22	1.17	2.74
Pima	1251.44*	DesignFlow	2300.00	1725.94	9.59	1.23	3.09
Pima	1270.90*	2Year	30.00	1724.04	3.22	0.85	0.90
Pima	1270.90*	10Year	180.00	1724.77	4.40	1.09	1.63
Pima	1270.90*	100Year	1585.00	1726.01	8.27	1.17	2.87
Pima	1270.90*	DesignFlow	2300.00	1726.37	9.60	1.23	3.23
Pima	1290.36*	2Year	30.00	1724.37	3.30	0.85	0.94
Pima	1290.36*	10Year	180.00	1725.25	3.83	0.88	1.82
Pima	1290.36*	100Year	1585.00	1726.43	8.32	1.18	3.00
Pima	1290.36*	DesignFlow	2300.00	1726.79	9.62	1.23	3.36
Pima	1309.82*	2Year	30.00	1724.69	3.37	0.86	0.96
Pima	1309.82*	10Year	180.00	1725.59	4.33	1.04	1.85
Pima	1309.82*	100Year	1585.00	1726.86	8.30	1.17	3.13
Pima	1309.82*	DesignFlow	2300.00	1727.22	9.59	1.22	3.49
Pima	1329.28*	2Year	30.00	1725.01	3.41	0.86	0.99
Pima	1329.28*	10Year	180.00	1726.03	4.02	0.92	2.01
Pima	1329.28*	100Year	1585.00	1727.27	8.41	1.19	3.25
Pima	1329.28*	DesignFlow	2300.00	1727.64	9.61	1.22	3.62
Pima	1348.74*	2Year	30.00	1725.33	3.50	0.87	1.01
Pima	1348.74*	10Year	180.00	1726.36	4.48	1.00	2.04
Pima	1348.74*	100Year	1585.00	1727.70	8.41	1.18	3.38
Pima	1348.74*	DesignFlow	2300.00	1728.08	9.61	1.22	3.76
Pima	1368.20*	2Year	30.00	1725.65	3.52	0.86	1.04
Pima	1368.20*	10Year	180.00	1726.74	4.56	0.98	2.13
Pima	1368.20*	100Year	1585.00	1728.12	8.49	1.20	3.51
Pima	1368.20*	DesignFlow	2300.00	1728.48	9.76	1.24	3.87
Pima	1387.66*	2Year	30.00	1725.97	3.61	0.87	1.06
Pima	1387.66*	10Year	180.00	1727.08	4.84	0.97	2.17
Pima	1387.66*	100Year	1585.00	1728.55	8.55	1.20	3.64
Pima	1387.66*	DesignFlow	2300.00	1728.90	9.82	1.25	3.99
Pima	1407.121	2Year	30.00	1726.29	3.63	0.86	1.09
Pima	1407.121	10Year	180.00	1727.42	5.13	0.99	2.21

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	1407.121	100Year	1585.00	1729.10	7.88	1.07	3.90
Pima	1407.121	DesignFlow	2300.00	1729.34	9.82	1.24	4.14
Pima	1425.55*	2Year	25.00	1726.61	2.58	0.60	1.13
Pima	1425.55*	10Year	180.00	1727.85	3.88	0.71	2.37
Pima	1425.55*	100Year	1533.00	1729.32	8.62	1.17	3.84
Pima	1425.55*	DesignFlow	2300.00	1729.71	9.94	1.24	4.23
Pima	1443.98*	2Year	25.00	1726.77	2.98	0.74	1.01
Pima	1443.98*	10Year	180.00	1728.01	4.00	0.72	2.25
Pima	1443.98*	100Year	1533.00	1729.66	8.72	1.16	3.90
Pima	1443.98*	DesignFlow	2300.00	1730.09	9.93	1.22	4.33
Pima	1462.41*	2Year	25.00	1727.00	2.96	0.75	0.96
Pima	1462.41*	10Year	180.00	1728.18	4.07	0.73	2.14
Pima	1462.41*	100Year	1533.00	1730.04	8.47	1.10	4.00
Pima	1462.41*	DesignFlow	2300.00	1730.47	9.82	1.19	4.43
Pima	1480.85*	2Year	25.00	1727.25	2.86	0.75	0.92
Pima	1480.85*	10Year	180.00	1728.35	4.14	0.74	2.02
Pima	1480.85*	100Year	1533.00	1730.41	8.21	1.04	4.08
Pima	1480.85*	DesignFlow	2300.00	1730.84	9.64	1.14	4.51
Pima	1499.28*	2Year	25.00	1727.51	2.70	0.74	0.90
Pima	1499.28*	10Year	180.00	1728.53	4.17	0.74	1.92
Pima	1499.28*	100Year	1533.00	1730.76	7.90	0.98	4.15
Pima	1499.28*	DesignFlow	2300.00	1731.22	9.39	1.09	4.61
Pima	1517.71*	2Year	25.00	1727.76	2.51	0.71	0.87
Pima	1517.71*	10Year	180.00	1728.71	4.20	0.74	1.82
Pima	1517.71*	100Year	1533.00	1731.00	7.94	0.97	4.11
Pima	1517.71*	DesignFlow	2300.00	1731.60	9.06	1.03	4.71
Pima	1536.14*	2Year	25.00	1727.99	2.44	0.69	0.82
Pima	1536.14*	10Year	180.00	1728.90	4.22	0.75	1.73
Pima	1536.14*	100Year	1533.00	1731.25	7.95	0.96	4.08
Pima	1536.14*	DesignFlow	2300.00	1731.69	9.77	1.12	4.52
Pima	1554.57*	2Year	25.00	1728.21	2.37	0.69	0.76
Pima	1554.57*	10Year	180.00	1729.08	4.22	0.75	1.63
Pima	1554.57*	100Year	1533.00	1731.48	7.98	0.95	4.03
Pima	1554.57*	DesignFlow	2300.00	1731.92	9.90	1.13	4.46
Pima	1573.01*	2Year	25.00	1728.43	2.32	0.68	0.70
Pima	1573.01*	10Year	180.00	1729.27	4.23	0.75	1.54
Pima	1573.01*	100Year	1533.00	1731.71	7.99	0.94	3.98
Pima	1573.01*	DesignFlow	2300.00	1732.20	9.73	1.09	4.47
Pima	1591.443	2Year	25.00	1728.65	2.24	0.67	0.63
Pima	1591.443	10Year	180.00	1729.46	4.23	0.75	1.45
Pima	1591.443	100Year	1533.00	1731.19	11.34	1.41	3.17
Pima	1591.443	DesignFlow	2300.00	1731.86	12.44	1.46	3.84
Pima	1610.27*	2Year	25.00	1729.19	3.33	1.16	0.53
Pima	1610.27*	10Year	180.00	1729.79	6.29	1.31	1.13
Pima	1610.27*	100Year	1502.00	1731.78	11.22	1.43	3.12
Pima	1610.27*	DesignFlow	2300.00	1732.47	12.29	1.45	3.81

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Froude # Chl	Max Chl Dpth (ft)
Pima	1629.09*	2Year	25.00	1729.80	4.37	1.72	0.48
Pima	1629.09*	10Year	180.00	1730.45	6.26	1.31	1.14
Pima	1629.09*	100Year	1502.00	1732.42	11.04	1.43	3.11
Pima	1629.09*	DesignFlow	2300.00	1733.08	12.16	1.45	3.77
Pima	1647.92*	2Year	25.00	1730.53	3.23	1.12	0.57
Pima	1647.92*	10Year	180.00	1731.12	6.22	1.31	1.16
Pima	1647.92*	100Year	1502.00	1733.05	10.87	1.42	3.09
Pima	1647.92*	DesignFlow	2300.00	1733.69	12.03	1.45	3.73
Pima	1666.75*	2Year	25.00	1731.20	3.19	1.10	0.59
Pima	1666.75*	10Year	180.00	1731.78	6.17	1.30	1.17
Pima	1666.75*	100Year	1502.00	1733.67	10.73	1.42	3.06
Pima	1666.75*	DesignFlow	2300.00	1734.28	11.93	1.45	3.67
Pima	1685.57*	2Year	25.00	1731.86	3.27	1.14	0.59
Pima	1685.57*	10Year	180.00	1732.45	6.13	1.30	1.19
Pima	1685.57*	100Year	1502.00	1734.28	10.60	1.42	3.02
Pima	1685.57*	DesignFlow	2300.00	1734.88	11.83	1.45	3.62
Pima	1704.40*	2Year	25.00	1732.53	3.14	1.09	0.63
Pima	1704.40*	10Year	180.00	1733.12	6.03	1.29	1.21
Pima	1704.40*	100Year	1502.00	1734.89	10.49	1.42	2.99
Pima	1704.40*	DesignFlow	2300.00	1735.47	11.74	1.45	3.57
Pima	1723.23*	2Year	25.00	1733.18	3.26	1.15	0.63
Pima	1723.23*	10Year	180.00	1733.78	5.98	1.29	1.23
Pima	1723.23*	100Year	1502.00	1735.49	10.39	1.41	2.94
Pima	1723.23*	DesignFlow	2300.00	1736.06	11.66	1.45	3.51
Pima	1742.06*	2Year	25.00	1733.86	3.17	1.09	0.66
Pima	1742.06*	10Year	180.00	1734.45	5.84	1.28	1.25
Pima	1742.06*	100Year	1502.00	1736.10	10.29	1.41	2.89
Pima	1742.06*	DesignFlow	2300.00	1736.66	11.57	1.44	3.46
Pima	1760.88*	2Year	25.00	1734.50	3.36	1.15	0.65
Pima	1760.88*	10Year	180.00	1735.12	5.65	1.25	1.27
Pima	1760.88*	100Year	1502.00	1736.69	10.20	1.41	2.84
Pima	1760.88*	DesignFlow	2300.00	1737.25	11.49	1.44	3.40
Pima	1779.71*	2Year	25.00	1735.17	3.25	1.09	0.67
Pima	1779.71*	10Year	180.00	1735.81	5.14	1.21	1.31
Pima	1779.71*	100Year	1502.00	1737.29	10.13	1.40	2.79
Pima	1779.71*	DesignFlow	2300.00	1737.83	11.43	1.44	3.33
Pima	1798.54*	2Year	25.00	1735.81	3.57	1.19	0.66
Pima	1798.54*	10Year	180.00	1736.42	5.17	1.23	1.27
Pima	1798.54*	100Year	1502.00	1737.88	10.03	1.40	2.73
Pima	1798.54*	DesignFlow	2300.00	1738.42	11.35	1.44	3.27
Pima	1817.37*	2Year	25.00	1736.46	3.69	1.19	0.67
Pima	1817.37*	10Year	180.00	1737.06	4.87	1.14	1.27
Pima	1817.37*	100Year	1502.00	1738.47	10.01	1.40	2.68
Pima	1817.37*	DesignFlow	2300.00	1739.00	11.28	1.43	3.21
Pima	1836.19*	2Year	25.00	1737.14	3.45	1.10	0.69

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	1836.19*	10Year	180.00	1737.62	5.27	1.29	1.18
Pima	1836.19*	100Year	1502.00	1739.06	9.94	1.40	2.62
Pima	1836.19*	DesignFlow	2300.00	1739.59	11.19	1.42	3.15
Pima	1855.02*	2Year	25.00	1737.82	2.52	1.00	0.73
Pima	1855.02*	10Year	180.00	1738.29	4.55	1.06	1.20
Pima	1855.02*	100Year	1502.00	1739.65	9.85	1.39	2.56
Pima	1855.02*	DesignFlow	2300.00	1740.19	11.06	1.41	3.10
Pima	1873.85*	2Year	25.00	1738.36	2.98	1.12	0.62
Pima	1873.85*	10Year	180.00	1738.79	5.49	1.39	1.05
Pima	1873.85*	100Year	1502.00	1740.26	9.61	1.35	2.52
Pima	1873.85*	DesignFlow	2300.00	1740.80	10.84	1.38	3.06
Pima	1892.679	2Year	25.00	1738.96	2.61	0.92	0.57
Pima	1892.679	10Year	180.00	1739.52	4.17	0.95	1.14
Pima	1892.679	100Year	1502.00	1741.21	7.70	1.01	2.82
Pima	1892.679	DesignFlow	2300.00	1741.46	10.33	1.30	3.07
Pima	1911.38*	2Year	20.00	1739.40	2.31	0.83	0.70
Pima	1911.38*	10Year	180.00	1739.89	4.81	1.15	1.19
Pima	1911.38*	100Year	1417.50	1741.32	8.95	1.25	2.62
Pima	1911.38*	DesignFlow	2300.00	1741.94	10.22	1.28	3.24
Pima	1930.08*	2Year	20.00	1739.70	2.70	0.79	0.69
Pima	1930.08*	10Year	180.00	1740.40	4.19	0.93	1.39
Pima	1930.08*	100Year	1417.50	1741.78	8.88	1.24	2.77
Pima	1930.08*	DesignFlow	2300.00	1742.41	10.12	1.26	3.40
Pima	1948.78*	2Year	20.00	1740.01	2.66	0.79	0.68
Pima	1948.78*	10Year	180.00	1740.74	4.68	1.07	1.42
Pima	1948.78*	100Year	1417.50	1742.24	8.79	1.22	2.92
Pima	1948.78*	DesignFlow	2300.00	1742.86	10.06	1.25	3.54
Pima	1967.48*	2Year	20.00	1740.31	2.68	0.80	0.67
Pima	1967.48*	10Year	180.00	1741.16	4.49	0.93	1.52
Pima	1967.48*	100Year	1417.50	1742.68	8.73	1.20	3.03
Pima	1967.48*	DesignFlow	2300.00	1743.31	9.98	1.24	3.67
Pima	1986.19*	2Year	20.00	1740.61	2.65	0.80	0.66
Pima	1986.19*	10Year	180.00	1741.46	4.65	0.93	1.51
Pima	1986.19*	100Year	1417.50	1743.12	8.58	1.17	3.17
Pima	1986.19*	DesignFlow	2300.00	1743.74	9.92	1.23	3.79
Pima	2004.89*	2Year	20.00	1740.91	2.64	0.80	0.65
Pima	2004.89*	10Year	180.00	1741.78	4.62	0.90	1.52
Pima	2004.89*	100Year	1417.50	1743.49	8.70	1.18	3.23
Pima	2004.89*	DesignFlow	2300.00	1744.15	9.94	1.23	3.89
Pima	2023.59*	2Year	20.00	1741.22	2.62	0.80	0.65
Pima	2023.59*	10Year	180.00	1742.07	4.69	0.91	1.50
Pima	2023.59*	100Year	1417.50	1743.88	8.68	1.16	3.31
Pima	2023.59*	DesignFlow	2300.00	1744.57	9.80	1.20	4.00
Pima	2042.29*	2Year	20.00	1741.53	2.61	0.80	0.64
Pima	2042.29*	10Year	180.00	1742.37	4.68	0.91	1.48
Pima	2042.29*	100Year	1417.50	1744.42	7.93	1.02	3.53

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2042.29*	DesignFlow	2300.00	1744.82	10.49	1.29	3.93
Pima	2060.999	2Year	20.00	1741.84	2.56	0.79	0.64
Pima	2060.999	10Year	180.00	1742.67	4.65	0.90	1.47
Pima	2060.999	100Year	1417.50	1744.20	10.76	1.43	3.00
Pima	2060.999	DesignFlow	2300.00	1744.79	12.73	1.60	3.59
Pima	2080.27*	2Year	20.00	1742.14	2.72	0.81	0.71
Pima	2080.27*	10Year	180.00	1742.96	5.48	1.06	1.53
Pima	2080.27*	100Year	1390.00	1744.56	11.81	1.53	3.13
Pima	2080.27*	DesignFlow	2300.00	1745.44	12.73	1.51	4.01
Pima	2099.552	2Year	20.00	1742.46	3.08	0.87	0.79
Pima	2099.552	10Year	180.00	1743.32	6.11	1.18	1.66
Pima	2099.552	100Year	1390.00	1745.74	9.90	1.16	4.08
Pima	2099.552	DesignFlow	2300.00	1746.76	10.61	1.17	5.09
Pima	2119.12*	2Year	20.00	1742.87	4.09	1.23	0.69
Pima	2119.12*	10Year	180.00	1743.87	5.93	1.15	1.69
Pima	2119.12*	100Year	1390.00	1746.20	9.60	1.16	4.02
Pima	2119.12*	DesignFlow	2300.00	1747.12	10.49	1.19	4.94
Pima	2138.70*	2Year	20.00	1743.41	3.69	1.09	0.72
Pima	2138.70*	10Year	180.00	1744.38	5.90	1.16	1.69
Pima	2138.70*	100Year	1390.00	1746.66	9.25	1.15	3.97
Pima	2138.70*	DesignFlow	2300.00	1747.52	10.16	1.18	4.83
Pima	2158.27*	2Year	20.00	1743.91	3.78	1.13	0.70
Pima	2158.27*	10Year	180.00	1744.90	5.77	1.13	1.69
Pima	2158.27*	100Year	1390.00	1747.11	8.94	1.14	3.90
Pima	2158.27*	DesignFlow	2300.00	1747.90	9.90	1.17	4.69
Pima	2177.85*	2Year	20.00	1744.41	3.87	1.17	0.69
Pima	2177.85*	10Year	180.00	1745.39	5.73	1.12	1.67
Pima	2177.85*	100Year	1390.00	1747.54	8.64	1.14	3.82
Pima	2177.85*	DesignFlow	2300.00	1748.29	9.67	1.17	4.57
Pima	2197.43*	2Year	20.00	1744.91	3.84	1.17	0.67
Pima	2197.43*	10Year	180.00	1745.88	5.62	1.11	1.64
Pima	2197.43*	100Year	1390.00	1747.97	8.37	1.14	3.73
Pima	2197.43*	DesignFlow	2300.00	1748.67	9.44	1.16	4.43
Pima	2217.00*	2Year	20.00	1745.46	3.33	0.99	0.71
Pima	2217.00*	10Year	180.00	1746.36	5.52	1.10	1.61
Pima	2217.00*	100Year	1390.00	1748.38	8.14	1.13	3.63
Pima	2217.00*	DesignFlow	2300.00	1749.04	9.27	1.17	4.29
Pima	2236.58*	2Year	20.00	1745.96	3.29	0.99	0.69
Pima	2236.58*	10Year	180.00	1746.85	5.35	1.08	1.58
Pima	2236.58*	100Year	1390.00	1748.78	8.01	1.14	3.51
Pima	2236.58*	DesignFlow	2300.00	1749.43	9.00	1.15	4.16
Pima	2256.15*	2Year	20.00	1746.46	3.19	0.97	0.68
Pima	2256.15*	10Year	180.00	1747.32	5.24	1.07	1.54
Pima	2256.15*	100Year	1390.00	1749.20	7.76	1.12	3.42
Pima	2256.15*	DesignFlow	2300.00	1749.80	8.85	1.16	4.02

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2275.73*	2Year	20.00	1746.95	3.23	1.01	0.65
Pima	2275.73*	10Year	180.00	1747.79	5.11	1.06	1.49
Pima	2275.73*	100Year	1390.00	1749.60	7.57	1.12	3.30
Pima	2275.73*	DesignFlow	2300.00	1750.17	8.72	1.16	3.87
Pima	2295.30*	2Year	20.00	1747.46	3.04	0.95	0.65
Pima	2295.30*	10Year	180.00	1748.25	5.02	1.06	1.44
Pima	2295.30*	100Year	1390.00	1750.00	7.41	1.11	3.19
Pima	2295.30*	DesignFlow	2300.00	1750.55	8.53	1.15	3.74
Pima	2314.88*	2Year	20.00	1747.94	3.14	1.00	0.62
Pima	2314.88*	10Year	180.00	1748.73	4.75	1.02	1.41
Pima	2314.88*	100Year	1390.00	1750.40	7.23	1.10	3.08
Pima	2314.88*	DesignFlow	2300.00	1750.93	8.37	1.14	3.61
Pima	2334.46*	2Year	20.00	1748.45	2.89	0.93	0.61
Pima	2334.46*	10Year	180.00	1749.17	4.76	1.05	1.33
Pima	2334.46*	100Year	1390.00	1750.78	7.13	1.10	2.94
Pima	2334.46*	DesignFlow	2300.00	1751.30	8.25	1.14	3.46
Pima	2354.03*	2Year	20.00	1748.93	2.96	0.97	0.58
Pima	2354.03*	10Year	180.00	1749.66	4.46	1.00	1.31
Pima	2354.03*	100Year	1390.00	1751.17	7.02	1.09	2.82
Pima	2354.03*	DesignFlow	2300.00	1751.66	8.19	1.15	3.31
Pima	2373.61*	2Year	20.00	1749.44	2.76	0.93	0.57
Pima	2373.61*	10Year	180.00	1750.09	4.53	1.06	1.22
Pima	2373.61*	100Year	1390.00	1751.57	6.88	1.08	2.69
Pima	2373.61*	DesignFlow	2300.00	1752.04	8.08	1.15	3.16
Pima	2393.18*	2Year	20.00	1749.94	2.70	0.94	0.56
Pima	2393.18*	10Year	180.00	1750.54	4.39	1.05	1.16
Pima	2393.18*	100Year	1390.00	1751.92	6.97	1.12	2.54
Pima	2393.18*	DesignFlow	2300.00	1752.40	8.01	1.15	3.02
Pima	2412.76*	2Year	20.00	1750.44	2.54	0.92	0.54
Pima	2412.76*	10Year	180.00	1751.04	3.90	0.93	1.14
Pima	2412.76*	100Year	1390.00	1752.39	6.39	1.02	2.49
Pima	2412.76*	DesignFlow	2300.00	1752.91	7.25	1.02	3.01
Pima	2432.338	2Year	20.00	1750.95	2.30	0.90	0.53
Pima	2432.338	10Year	180.00	1751.45	4.09	1.03	1.04
Pima	2432.338	100Year	1390.00	1752.67	6.92	1.14	2.26
Pima	2432.338	DesignFlow	2300.00	1753.08	8.22	1.24	2.67
Pima	2452.00*	2Year	20.00	1751.41	2.07	0.82	0.54
Pima	2452.00*	10Year	180.00	1751.93	3.82	0.95	1.06
Pima	2452.00*	100Year	1390.00	1753.10	6.92	1.16	2.23
Pima	2452.00*	DesignFlow	2300.00	1753.49	8.29	1.25	2.62
Pima	2471.66*	2Year	20.00	1751.85	2.12	0.86	0.52
Pima	2471.66*	10Year	180.00	1752.34	4.04	1.02	1.01
Pima	2471.66*	100Year	1390.00	1753.52	6.91	1.17	2.19
Pima	2471.66*	DesignFlow	2300.00	1753.91	8.31	1.25	2.58
Pima	2491.33*	2Year	20.00	1752.30	2.07	0.84	0.52
Pima	2491.33*	10Year	180.00	1752.81	3.80	0.95	1.03

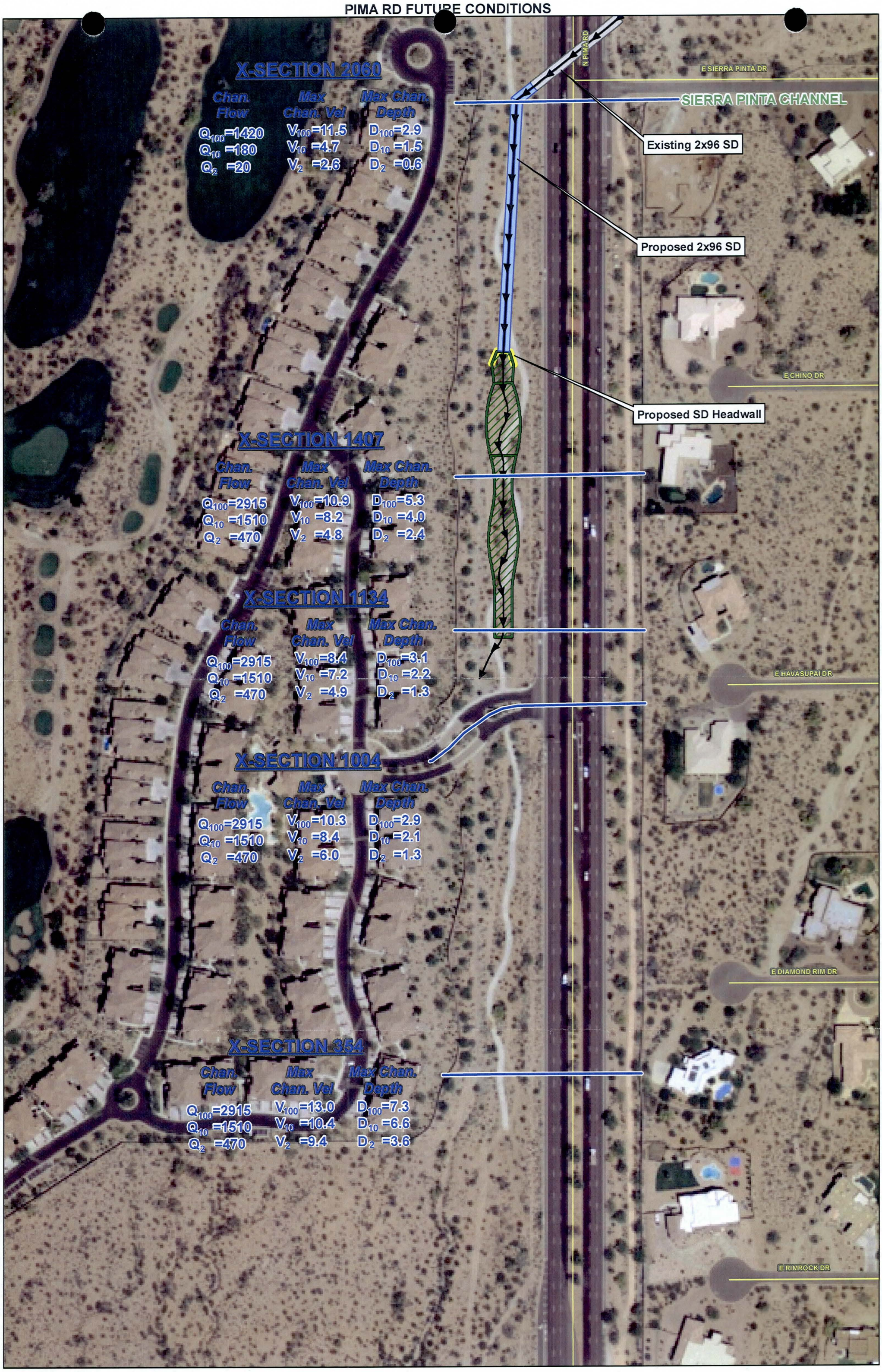
HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2491.33*	100Year	1390.00	1753.95	6.86	1.17	2.17
Pima	2491.33*	DesignFlow	2300.00	1754.33	8.28	1.25	2.55
Pima	2510.99*	2Year	20.00	1752.66	3.28	1.35	0.42
Pima	2510.99*	10Year	180.00	1753.24	3.87	0.98	1.00
Pima	2510.99*	100Year	1390.00	1754.36	6.88	1.17	2.12
Pima	2510.99*	DesignFlow	2300.00	1754.74	8.31	1.25	2.50
Pima	2530.66*	2Year	20.00	1753.17	2.36	0.98	0.48
Pima	2530.66*	10Year	180.00	1753.64	4.25	1.11	0.95
Pima	2530.66*	100Year	1390.00	1754.78	6.89	1.18	2.09
Pima	2530.66*	DesignFlow	2300.00	1755.17	8.29	1.25	2.48
Pima	2550.32*	2Year	20.00	1753.65	1.88	0.75	0.50
Pima	2550.32*	10Year	180.00	1754.09	4.11	1.07	0.94
Pima	2550.32*	100Year	1390.00	1755.19	6.93	1.19	2.04
Pima	2550.32*	DesignFlow	2300.00	1755.58	8.34	1.26	2.43
Pima	2569.98*	2Year	20.00	1754.06	2.20	0.92	0.45
Pima	2569.98*	10Year	180.00	1754.59	3.57	0.90	0.98
Pima	2569.98*	100Year	1390.00	1755.62	6.91	1.18	2.01
Pima	2569.98*	DesignFlow	2300.00	1756.00	8.32	1.26	2.39
Pima	2589.65*	2Year	20.00	1754.53	1.94	0.79	0.47
Pima	2589.65*	10Year	180.00	1754.99	3.92	1.03	0.93
Pima	2589.65*	100Year	1390.00	1756.03	6.95	1.19	1.97
Pima	2589.65*	DesignFlow	2300.00	1756.42	8.34	1.26	2.36
Pima	2609.31*	2Year	20.00	1754.96	2.14	0.90	0.44
Pima	2609.31*	10Year	180.00	1755.46	3.60	0.92	0.94
Pima	2609.31*	100Year	1390.00	1756.45	6.94	1.19	1.93
Pima	2609.31*	DesignFlow	2300.00	1756.83	8.37	1.26	2.31
Pima	2628.98*	2Year	20.00	1755.42	1.97	0.80	0.44
Pima	2628.98*	10Year	180.00	1755.87	3.79	1.00	0.89
Pima	2628.98*	100Year	1390.00	1756.87	6.92	1.18	1.89
Pima	2628.98*	DesignFlow	2300.00	1757.24	8.41	1.26	2.26
Pima	2648.64*	2Year	20.00	1755.85	2.09	0.88	0.42
Pima	2648.64*	10Year	180.00	1756.33	3.59	0.94	0.90
Pima	2648.64*	100Year	1390.00	1757.28	6.95	1.19	1.85
Pima	2648.64*	DesignFlow	2300.00	1757.65	8.46	1.27	2.22
Pima	2668.31*	2Year	20.00	1756.30	1.97	0.81	0.41
Pima	2668.31*	10Year	180.00	1756.73	3.91	1.06	0.84
Pima	2668.31*	100Year	1390.00	1757.70	6.95	1.19	1.81
Pima	2668.31*	DesignFlow	2300.00	1758.07	8.50	1.27	2.18
Pima	2687.97*	2Year	20.00	1756.72	2.25	0.98	0.37
Pima	2687.97*	10Year	180.00	1757.22	3.39	0.89	0.87
Pima	2687.97*	100Year	1390.00	1758.12	6.98	1.20	1.77
Pima	2687.97*	DesignFlow	2300.00	1758.48	8.55	1.28	2.13
Pima	2707.64*	2Year	20.00	1757.20	1.84	0.75	0.40
Pima	2707.64*	10Year	180.00	1757.59	3.93	1.09	0.79
Pima	2707.64*	100Year	1390.00	1758.52	7.04	1.21	1.72
Pima	2707.64*	DesignFlow	2300.00	1758.89	8.60	1.29	2.09

HEC-RAS Plan: no_L_EX_woWr River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2727.30*	2Year	20.00	1757.62	2.13	0.92	0.36
Pima	2727.30*	10Year	180.00	1757.99	4.32	1.25	0.73
Pima	2727.30*	100Year	1390.00	1758.96	6.95	1.19	1.69
Pima	2727.30*	DesignFlow	2300.00	1759.30	8.65	1.29	2.04
Pima	2746.96*	2Year	20.00	1758.08	1.85	0.77	0.36
Pima	2746.96*	10Year	180.00	1758.49	3.58	1.01	0.76
Pima	2746.96*	100Year	1390.00	1759.35	7.08	1.22	1.63
Pima	2746.96*	DesignFlow	2300.00	1759.71	8.71	1.30	1.99
Pima	2766.63*	2Year	20.00	1758.51	2.05	0.90	0.34
Pima	2766.63*	10Year	180.00	1758.95	3.24	0.91	0.78
Pima	2766.63*	100Year	1390.00	1759.80	6.86	1.16	1.63
Pima	2766.63*	DesignFlow	2300.00	1760.12	8.76	1.30	1.95
Pima	2786.29*	2Year	20.00	1758.97	1.81	0.78	0.34
Pima	2786.29*	10Year	180.00	1759.34	3.46	1.01	0.71
Pima	2786.29*	100Year	1390.00	1760.14	7.39	1.29	1.51
Pima	2786.29*	DesignFlow	2300.00	1760.53	8.81	1.31	1.90
Pima	2805.962	2Year	20.00	1759.40	1.95	0.87	0.31
Pima	2805.962	10Year	180.00	1759.78	3.25	0.93	0.70
Pima	2805.962	100Year	1390.00	1760.75	6.24	1.00	1.66
Pima	2805.962	DesignFlow	2300.00	1761.27	7.18	0.97	2.19

PIMA RD FUTURE CONDITIONS



8.11 Memorandum Dated December 17th, 2008

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TO:	Elaine Mercado
FROM:	Entellus
JOB NO:	410.061
DATE:	12/17/08

PROJECT NAME: Pima Rd.: Explanation of NSTP's

MEMORANDUM

The NSTP's identified as needing modification from models performed by others are as follows:

- R41
- R45
- R47
- R50

These normal depth routes were part of the Reata Pass watershed model above the apex and were taken from the model originally created by Robert L. Ward as part of the Core North State Land parcel and modified by Wood Patel for the DC Ranch. The file name where the routes were taken was called DB53RFD5.6I and was created on 5/30/02 by Robert L. Ward.

The NSTP's for the aforementioned routes were set to 1. The following table shows some of the information regarding the routes and what the NSTP should be if the wave celerity in the route were 6 fps. The terrain is very steep and the potential flow wave celerities should be very high in the area. The equation for calculating the NSTP's as found in the HEC-1 manual is shown below as well:

ID	NMIN	Left	Channel	Right	Length	slope	NSTP's
	[min]	n Value	n Value	n Value	[ft]	[ft/ft]	V= 6fps
R41	1	0.055	0.04	0.055	9400	0.0282	26
R45	1	0.055	0.04	0.055	3600	0.0366	10
R47	1	0.055	0.04	0.055	7600	0.0268	21
R50	1	0.055	0.04	0.055	1000	0.02	3

NSTP's = (L / V) / NMIN
Where:

L = length of reach in feet
V = wave celerity in fps
NMIN = computation time interval in seconds

The wave celerity in the model for an NSTP of 1 would be as shown in the table below under "No Mod." (the previous models computational interval, NMIN, was 5 minutes). Also shown in the table below are the inflows Q_{in}, routed outflow Q_{out} and attenuation of flow Q_{in}-Q_{out} for both the modified and unmodified NSTP situations. The difference in routed peak discharge between the two scenarios is also shown under the Q_{diff} column.

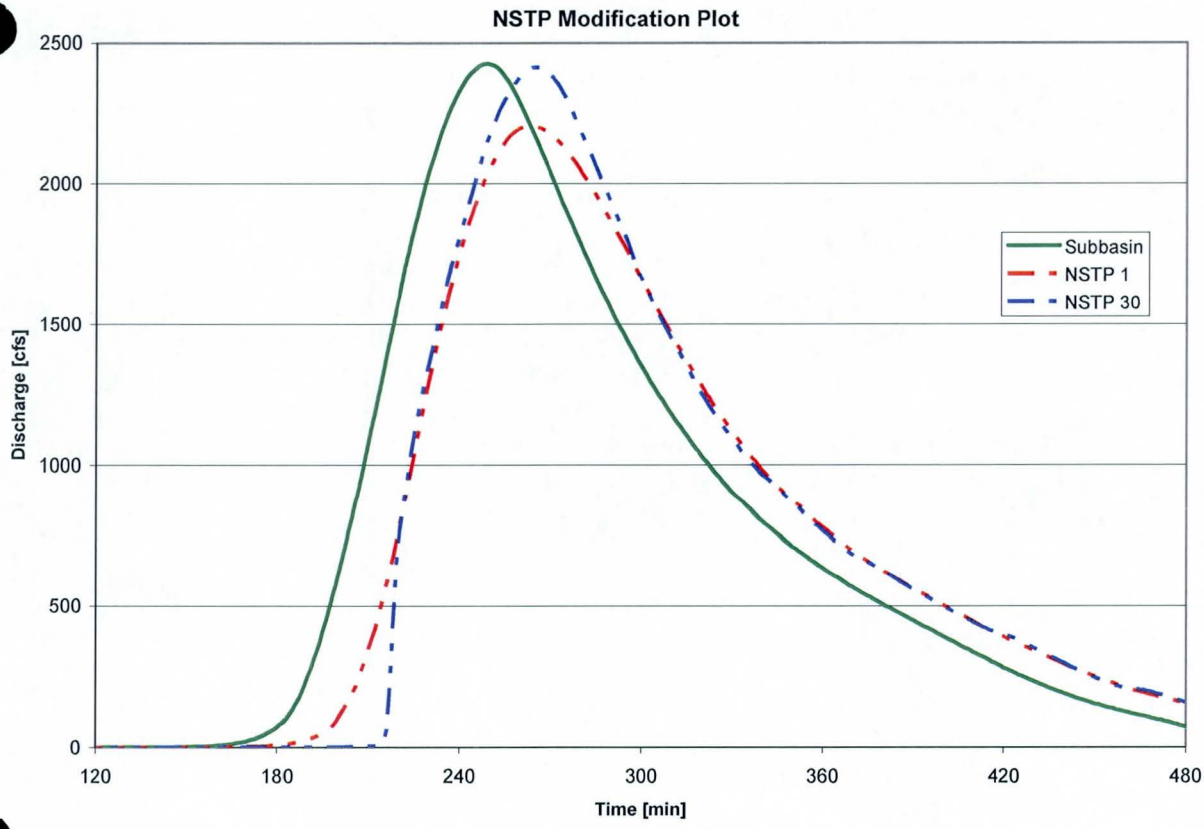
ID	Vel.	Q_{in}	Q_{out}	Q_{in}-Q_{out}	Q_{in}	Q_{out}	Q_{in}-Q_{out}	Q_{diff}	Notes
		No Mod.	No Mod.	No Mod.	Mod.	Mod.	Mod.		
	[fps]	[cfs]	[cfs]	[cfs]	[cfs]	[cfs]	[cfs]	[cfs]	
R41	31.3	5122	3599	1523	5122	4955	167	1356	
R45	12.0	4638	4039	599	4638	4547	91	508	
R47	25.3	6837	5481	1356	6999	6883	116	1402	Combines R45
R50	3.3	11071	11022	49	13518	13489	29	2467	Combines R41& R47

The reason the time step is the decisive factor in the quantifying of the subreaches is that in theory the flood wave should travel approximately 1 subreach for each routing time step. With the channel properly divided into subreaches, this means that in 1 time step, as the flood wave is moving through the channel, it only has access to the storage available in that individual subreach and not the entire channel storage. This makes sense because the flood wave that entered subreach #1 at time step #1 would not have been able to travel to subreach #5 until 4 additional time steps have passed. Thus the storage for subreach #5 does not become available to that portion of the floodwave until time step #5.

So as the channel is subdivided into more and more segments, the storage capacity of the channel decrease, and so does the attenuation. Thus it is necessary to match the flood wave progression through the reach to the NSTP to properly account for the storage, without under or over estimating the storage capacity of the channel.

A quick example of how this is applied in HEC-1. A fictitious subbasin and channel were created with the only modification made being the NSTP. NSTP's of 1, 5, 15 and 30 were utilized. The input and output is shown at the end of this write-up. The table below summarizes the results and the figure bellows shows inflow hydrograph and routed hydrographs for NSTP's of 1 and 30. As can be seen, as the NSTP's increases the peak discharge does as well. Thus it is important to not over or under estimate the number of NSTP's chosen for a routing reach.

NSTP	Inflow	Outflow	Attenuation	% Attenuation
	[cfs]	[cfs]	[cfs]	
1	2423	2205	218	9.0%
5	2423	2364	59	2.4%
15	2423	2402	21	0.9%
30	2423	2412	11	0.5%


NSTP Modification Plot
2500
2000
1500
1000
500
0
Discharge [cfs]
120
180
240
300
360
420
480
Time [min]
Subbasin
NSTP 1
NSTP 30

```
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


```
LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
   1      ID
   2      ID   THIS IS A DEMONSTRATION ON HOW NSTP's CAN ATTENUATE FLOWS IN ROUTING REACHES
   3      ID
   4      IT       1                    2000
   5      IO       5
          *
          * ********************************************************************
          * ************************ NSTP = 1 ******************************
          * ********************************************************************

   6      KK    S_01
   7      KM   AN NSTP of 1
   8      BA    4.00
   9      PH              14      .74    1.46    2.48    2.79     3.0     3.4
  10      LS              85
  11      UC     1.2     0.8
          *
  12      KK    R_01
  13      RS       1    FLOW      -1
  14      RC    .055    .040    .055    9400     .01
  15      RX       0       1     101     107     157     163     263     264
  16      RY      10       8       3       0       0       3       8      10
          *
          *
          *
          *
          *
          * ********************************************************************
          * ************************ NSTP = 5 ******************************
          * ********************************************************************
          *
  17      KK    S_05
  18      KM   AN NSTP of 5
  19      BA    4.00
  20      PH              14      .74    1.46    2.48    2.79     3.0     3.4
  21      LS              85
  22      UC     1.2     0.8
          *
  23      KK    R_05
  24      RS       5    FLOW      -1
  25      RC    .055    .040    .055    9400     .01
  26      RX       0       1     101     107     157     163     263     264
  27      RY      10       8       3       0       0       3       8      10
          *
          *
          *
          *
          * ********************************************************************
          * ************************ NSTP = 15 *****************************
          * ********************************************************************
          *
```



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

  28      KK    S_15
```

```
29          KM   AN NSTP of 15
30          BA    4.00
31          PH              14      .74    1.46    2.48    2.79     3.0     3.4
32          LS              85
33          UC     1.2     0.8
            *

34          KK    R_15
35          RS      15    FLOW      -1
36          RC    .055    .040    .055    9400     .01
37          RX       0       1     101     107     157     163     263     264
38          RY      10       8       3       0       0       3       8      10
            *
            *
            *
            *
            *
            *
            * ********************************************************************
            * ************************ NSTP = 30 *********************************
            * ********************************************************************
            *

39          KK    S_30
40          KM   AN NSTP of 30
41          BA    4.00
42          PH              14      .74    1.46    2.48    2.79     3.0     3.4
43          LS              85
44          UC     1.2     0.8
            *

45          KK    R_30
46          RS      30    FLOW      -1
47          RC    .055    .040    .055    9400     .01
48          RX       0       1     101     107     157     163     263     264
49          RY      10       8       3       0       0       3       8      10
50          ZZ
```

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									
+		S_01	2423.	4.12	783.	196.	141.	4.00		
	ROUTED TO									
+		R_01	2205.	4.35	775.	196.	141.	4.00		
+									4.14	4.35
	HYDROGRAPH AT									
+		S_05	2423.	4.12	783.	196.	141.	4.00		
	ROUTED TO									
+		R_05	2364.	4.38	780.	196.	141.	4.00		
+									4.29	4.38
	HYDROGRAPH AT									
+		S_15	2423.	4.12	783.	196.	141.	4.00		
	ROUTED TO									
+		R_15	2402.	4.38	782.	196.	141.	4.00		
+									4.32	4.38
	HYDROGRAPH AT									
+		S_30	2423.	4.12	783.	196.	141.	4.00		
	ROUTED TO									
+		R_30	2412.	4.38	782.	196.	141.	4.00		
+									4.33	4.38

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

8.12 Meeting with City of Scottsdale December 22nd, 2008

Hydrology:

The City of Scottsdale and Entellus conducted a field visit to determine the existing drainage conditions along the Pima Rd corridor. In particular, attention was given to the potential flow split at Pima Rd and Deer Valley. From the field visit it was concluded that negligible flow would be able to leave Pima Rd. and enter the Deer Valley Channel. Additionally, it was concluded that, although not designed to withstand the hydrostatic and hydrodynamic forces that accompany a large flood, flow would be modeled as not being able to cross or penetrate the Los Gatos wall on the west side of Pima. Instead flow would be routed south past Deer Valley along Pima Rd to Thompson Peak Parkway.

To accomplish this task the combining of two hydrological models was required. The northern model along Pima Rd stretches from Jomax Rd southerly to Deer Valley Rd (hereto after referred to as the Northern Model). This model has originally developed as part of the City of Scottsdale Desert Greenbelt, Pima Road Three Basin Project by Stantec Consulting Inc., dated March 1999 and subsequently modified by Entellus in 2005 to develop drainage solutions along the Pima Rd corridor from Pinnacle Peak to Deer Valley. The southerly model begins slightly north of Deer Valley along the Pima Rd. corridor and extends southward just beyond Union Hills Dr (hereto after referred to as the Southern Model).

This model was originally created by Robert L. Ward as part of the Core North State Land parcel and modified by Wood Patel for the DC Ranch. Entellus modified these models in 2003 to design drainage solutions as part of the Pima Road Design Concept from Thompson Peak Parkway to the Pima Freeway (PRDCR).

To combine the two models several modifications were required. First some reconciliation of drainage basins was required just upstream of Deer Valley. The Northern Model required some subdivision of a drainage subbasin that was originally shown to pass through the Los Gatos subdivision to the Deer Valley Channel. The subdivision of this subbasin was no longer warranted and was removed. The combined subbasin S51.1D replaced subbasins S51.1H, S51.1G, and S51.1F. This also called for the replacement of several shorter routes (R1B2, R51.1H, R51.1G) with a single longer route (R1B2) and the removal of concentration points C51.1H, C51.1G, C51.1F and CEEC13. Some reordering of the model was also required.

Diversions that had been modeled at the Los Gatos wall along Pima Rd were modified. D1B4 and D1B2 were modified to allow all flow to continue south along Pima Rd. and remove any diversion occurring onto and through the Los Gatos subdivision.

The detention basin on the east side of Pima Rd at Deer Valley Rd. had not been included in any model. Though relatively small, this detention basin was incorporated into the model as an online detention basin for subbasin S51.1D.

Finally, NSTPS were modified as necessary for all normal depth routes. This included the modification of four (4) normal depth NSTPS that were not created by Entellus. R41, R45, R47, and R50 were taken directly from the Core North Model DB53RFD5.6I as created by Robert L. Ward on 05/30/2002 and included the Wood Patel Model OF DC Ranch dated 01/1996. The NSTPS for these four (4) normal depth routes had been set to one (1). The NSTPS were adjusted based on the HEC-1 manual. The modification of the NSTPS can have a significant impact on the final flow values of a hydrology model. Therefore the results will be presented in two (2) parts: 1.) as though the NSTPS for these four (4) routes had not been adjusted, and 2.) As a completed modified model.

RESULTS:

The aforementioned hydrology modifications were made to two (2) model conditions:

1. Existing Conditions (pre-Sierra Pinta Channel)
2. Post-Sierra Pinta Channel

There are several key locations where flow values will discussed here:

1. Flow continuing south along Pima Rd. past Deer Valley
2. Flow arriving at the corner of Pima Rd and Thompson Peak Parkway
3. Flow continuing south along Pima Rd / easement past Thompson Peak Parkway
4. Additional subbasin flow contributing at Sierra Pinta
5. Sierra Pinta Channel Flow
6. Combined Flow along Pima Rd. Corridor after Sierra Pinta Outlet Channel Outfall

The table below summarizes the flow from the various models at the above locations followed by an explanation of the results.

HEC-1 ID	Description	Fully modified Model		No WARD NSTP Modification	
		100-yr Ex	100-yr Post Sierra Pinta	100-yr Ex	100-yr Post Sierra Pinta
		[cfs]	[cfs]	[cfs]	[cfs]
DO1B2	Approximate flow crossing Deer Valley along Pima Rd.	510	510	510	510
C52A	Flow arriving at Corner of Pima and Thompson Peak	3500	3500	3200	3200
PRSDEX	Flow continuing South past TPP along Pima Rd. Corridor	1850	1850	1640	1640
52B7C1 + 52A2	Additional subbasin flow contributing south of Sierra Pinta	1000	1000	920	920
DVSP4	Sierra Pinta Channel Flow	0	1330	0	1330
PRSDEX + 52B7C1 + 52A2 + DVSP4	Total Flow Along Pima Rd. After Sierra Pinta Outlet	West Side 2300 East Side 550	West Side 3630 East Side 550	West Side 2010 East Side 550	West Side 3340 East Side 550

The following explains the above referenced table with the first item being the HEC-1 ID followed by an explanation of the results.

1. DO1B2: In previous models no flow was allowed to continue south along Pima Rd. past. Deer Valley. This was modified and the flow value for all models slowed to continue south was 511 cfs plus the contributing area associated with the combined subbasin S51.1D (≈ 30 cfs of the total 1035 cfs subbasin flow). This was the same for all models
2. C52A: Flow arriving at the corner of Pima Rd and Thompson Peak Parkway prior to entering the Pima Rd storm drain and the 30% assumed split out of the modeling area was affected by the modification to the NSTPS of the Core North model. A difference of approximately 300 cfs at this location was attributed to the NSTP modification. The flow for just the Southern Model at C52A was previously determined to be 2850 cfs. The remainder of the difference (~350 cfs) can be attributed to the continuation of the flow along Pima Rd. past Deer Valley.
3. PRSDEX: This is flow continuing south beyond Thompson Peak along Pima Rd. after the first 600 cfs is removed by storm drain flow and also after the 30% diversion out of the project area. A difference of approximately 210 cfs at this location was attributed to the NSTP modification and 250 cfs can be attributed to the continuation of the flow along Pima Rd. past Deer Valley
4. 52B7C1 + 52A2: This is additional subbasin flow that enters Pima Rd. south of Sierra Pinta. The 80 cfs difference can be attributed to the modification of the NSTPS.
5. DVSP4: This is the approximate design flow of the Sierra Pinta Channel. N0 modification has been made to this.
6. PRSDEX + 52B7C1 + 52A2 + DVSP4: This is the total flow along Pima Rd. following the Sierra Pinta channel Outfall for both the west and east side of Pima Rd.

2008-12-19
The assumptions of the flows for Pima Rd.

100-year flows

Existing Conditions:
For the existing conditions model, the flows crossing Deer Valley were limited to the subbasins that will contribute to that point (Los Gatos wall closed). This equates to approximately 511 cfs (C1B2) at Pima Rd. and Deer Valley (does not include subbasin S51.1D). All flows are combined together at Thompson Peak, a 30% diversion (DV52AW) out of the area is assumed (1050 cfs) followed by the Pima Rd Storm Drain (PRSD, 600 cfs). All remaining flow (PRSDEX 1852 cfs) travels south beyond Thompson Peak along the west side of Pima Rd. Just south of Sierra Pinta weir flow begins to contribute. It was assumed that all the weir flow (52B7C1 + 52A2) will contribute at this point (450cfs) and the remaining flow (550 cfs) is the approximate capacity on the east side of Pima Rd. The 84" Pima Rd. stormdrain outlet (PRSD, 600 cfs) is just north of Hualapai, and this plus the additional flow from the east side of Pima Rd. account for the southern most flow value (CPCH3 3307 cfs).

Deer Valley Split:
For this proposed condition, it was assumed that the split flow at Deer Valley would mimic the existing conditions for the quantity of flow and volume traveling south along Pima Rd. Therefore all conditions are the same as the existing conditions up to south of Thompson Peak (C1B2 = 511 cfs, DV52AW = 1050 cfs, PRSD = 600 cfs, PRSDEX = 1852 cfs).

It was also assumed that just south of Sierra Pinta weir flow begins to contribute, and that all the weir flow (52B7C1 + 52A2) will contribute at this point (450cfs) and the remaining flow (550 cfs) is the approximate capacity on the east side of Pima Rd. The Sierra Pinta outfall also occurs just south of the Sierra Pinta alignment and this contributes an additional 1328 cfs (DVSP4) for a total flow of 3630 cfs. The 84" Pima Rd. stormdrain outlet (PRSD, 600 cfs) is just north of Hualapai, and this plus the additional flow from the east side of Pima Rd. account for the southern most flow value (CPCH3 4631 cfs).

All Flow South Along Pima Rd. Past Deer Valley:
For this proposed condition all flow south of Pinnacle Peak was assumed to be conveyed along a Pima Rd. Channel. This increases the flow at C1B2 to 1394 cfs. The Pima Rd. stormdrain was limited to 600 cfs and the split out of the area at Thompson Peak was limited to the existing conditions split of 1050 cfs (DV52AW). Thus the flow traveling south of Thompson Peak along Pima Rd. is 2835 cfs (PRSDEX).

It was assumed that just south of Sierra Pinta weir flow begins to contribute, and that all the weir flow (52B7C1 + 52A2) will contribute at this point (450cfs) and the remaining flow (550 cfs) is the approximate capacity on the east side of Pima Rd. The Sierra Pinta outfall also occurs just south of the Sierra Pinta alignment and this contributes an additional 1328 cfs (DVSP4) for a total flow of 4610 cfs. The 84" Pima Rd. stormdrain outlet (PRSD, 600 cfs) is just north of Hualapai, and this plus the additional flow from the east side of Pima Rd. account for the southern most flow value (CPCH3 5611 cfs).

2-year flows

Existing Conditions:

It was assumed that for the existing conditions, only local subbasin flow will contribute to the Sierra Pinta area. This is due to the Pima Rd. stormdrain and capacity of the east side of Pima Rd. Thus the flow traveling south of Thompson Peak along Pima is 15 cfs (52A0) and this is combined with additional local flow at Sierra Pinta (52B0 = 5 cfs) for a total flow of 20 cfs. Additional local drainage area increases the flow in the Pima Channel to 40 cfs (S53A2 = 20 cfs). The total flow following the outlet of the 84" Pima Rd. stormdrain (PRSD = 275 cfs) and flow contained on the east side of the road (52B7C1 + 52A2+ S53A = 198 cfs) is 365 cfs (CPCH3).

Deer Valley Split:

For the contributing flow at Thompson Peak parkway it was assumed that the additional flow from subbasins north of Deer Valley would be routed to the west of Pima in the future Pima Rd. channel and thus they would not be picked up by the existing stormdrain. This increase the flow north of Thompson Peak by 38 cfs (C1B2) for a total flow continuing south past Thompson Peak (no diversion assumed) of 53 cfs (C1B2 + 52A0). The Sierra Pinta Channel adds an additional 546 cfs (DVSP4) for a total of 599 cfs. The channel picks up the majority of what would be flow along the east side of Pima (52B7C1 and 52A2). The total flow following the outlet of the 84" Pima Rd. stormdrain and flow from the east side of Pima Rd is 796 cfs (CPCH3).

All Flow South Along Pima Rd. Past Deer Valley:

For this proposed condition all flow south of Pinnacle Peak was assumed to be conveyed along a Pima Rd. Channel, and this entire area would contribute to the Sierra Pinta Channel. This constitutes 394 cfs (C52A) being conveyed south along Pima Rd. beyond Thompson Peak (no diversion assumed). The Sierra Pinta Channel adds an additional 546 cfs (DVSP4) for a total of 940 cfs. The channel picks up the majority of what would be flow along the east side of Pima (52B7C1 and 52A2). The total flow after the 84" Pima Rd. stormdrain does not increase.

8.13 Memorandum Dated December 23rd, 2008

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TO:	Elaine Mercado
FROM:	Hernan Aristizabal
JOB NO:	410.061A
DATE:	December 23, 2008

PROJECT NAME: **Sierra Pinta Drainage Improvements**

MEMORANDUM

At the request of the City Entellus reviewed several drainage reports for developments that could affect the Pima Road drainage. These reports are for the most part the drainage reports for the different parcels of the Grayhawk development.

1 Drainage Analysis for Scottsdale Core North, Carter and Associates, Sep 1989.
2 Drainage Plan Village 1 - Phase 1, Gilberson Associates, Inc, February 1995
3 Addendum to Planning Unit Drainage Plan for Grayhawk Villages 2 and 3, DEI professional Services, 1996. Original prepared on March 1995.
4 Deer Valley Road Channel Phase 2 – Hydrologic and Hydraulic Design Report, Pacific Advanced Civil Engineering, 1996
5 Basis for Drainage Design Parcel 3a &3h, Village 3 Grayhawk – Amended, February 2004
6 Bases for drainage design Parcel 2o (b), Village 2, Gilbertson Associates, July 2003.

There are significant inconsistencies between the flow assumptions in most of the reviewed reports. Most of the inconsistencies had to do with assuming that the Desert Green Belt (DGB) facilities would or would not be constructed. The DGB facility that would affect Pima Road the most is the Pima Road Channel and the Reata Pass Channel. Neither of these facilities has been constructed and may never be constructed. To facilitate understanding of the flows used in the design, a graphic was created for each of the reports reviewed showing the flows used in the design/plan. These graphs show both the ultimate and the interim flows.

The earlier reports assume that both of these facilities would be constructed and design their offsite infrastructure for smaller flows than what it would be expected under current conditions. The following sections discuss the main differences at key locations including the Deer Valley Channel and several locations along Pima Road.

Deer Valley Road Interim Flows

Since the DGB improvements had not been constructed, most of the reports developed interim conditions to insure the developments were not at risk.

The Original Core North report (1) shows a 100-year flow (Between Pima and Hayden Road) of 2610 cfs. The Village 2 and 3 Report (3) shows an interim flow of 1330 cfs for the same reach and the Deer Valley Channel report (4) show an interim flow of 1070 cfs. All of these numbers was obtained assuming no DGB improvements in place. The main difference between the different estimates is the contributing area The Core North assumed 4.77 square miles contributing area while the Deer Valley Channel assumed 1.68 square miles which ignores any split flow from basins 35L and 36L. (See attached watershed boundaries)

Deer Valley Channel Interim Conditions

Source of Data/Location	East Channel	Middle Channel	West Channel	East Diversion	West Diversion
Core North (1)	2,610	2,610	2,060	0	All
Village 1 (2)			3080		All
Village 1, 2 and 3 (3)	1327	1327	1790		
Deer Valley Channel (4)	1070	1070			

Deer Valley Road Ultimate Conditions

Only reports (3) and (4) have flows for this channel. The original Village 2 and 3 report calls for a continuous channel from Pima Road to a detention basin near Scottsdale Road. The flows in the channel range for 1,100 cfs on the east end to 1,790 cfs on the west end with two diversions into the Village 2 golf course on of 330 cfs and 700 cfs.

The Deer Valley Channel report shows two independent channels between Pima and The Hayden Road Alignment. The east channel was designed for 310 cfs and the west for 720 cfs and there is no channel continuing west to the power line corridor. The Village 1 report (2) shows an 1860 cfs ultimate flow and a 3080 cfs interim flow channel running from the Hayden Road alignment (approximately ½ mile east of the actual road crossing) to Scottsdale Road. It appears that the channel will not get any flow from the channel to the east.

Deer Valley Channel Ultimate Design Flows

Source of Data/Location	East Channel	Middle Channel	West Channel	East Diversion	West Diversion
Core North (1)	2,610	2,610	2,060	0	All
Village 1 (2)			1860		All
Village 1, 2 and 3 (3)	1100	770	1790	330	700
Deer Valley Channel (4)	310	720		310	720

Pima Road Channel

Four reports, (1, 3, 5, and 6) of the reports reviewed contained information about flows along Pima Road. There are two proposed DGB improvements that would impact the flows along the road. The most odious one is the Pima Road Channel. The DGB indicated that the Pima Channel would extend all the way to Happy Valley Road and intercept all flows from the east. The second improvement is the Reata Pass Channel. This would stabilize the apex of the Reata Pass alluvial fan and control the amount that would break to the west towards Pima Road. Without this structure, the Village 1, 2 and 3 reports estimate that the Pima Channel could have a peak 100-year flow of approximately 10,240 cfs.

The design flows used in the Parcel 2o report was 200 cfs. The bases for this flow is not explained especially considering that the report states that there is over 1,400 cfs reaching this area. The Parcel 3a & 3h shows 710 cfs reaching the detention basin just north of Thompson Peak Parkway. This report assumes that approximately 550 cfs is conveyed along the east side of Pima Road and most of the flow is lost into the 60 to 84 inch storm drain. The following tables summarize the flows obtained from the different reports.

Pima Road Channel Ultimate Design Flows

Source of Data/Location	North of Deer Valley	South of Deer Valley	North of Thomson Peak	South of Thomson Peak	At Union Hills
Core North (1)		2,490	2,490	2,490	3,860
Village 1, 2 and 3 (3)		6,100*	6,100*	6,100*	6,100*
Parcels 3a & 3h(5)	400	300	710	660	
Parcel 2o(6)	370	1,400	200	184	

* 100-year flow along Village 2, but channel design for 10-year flow of 2230 cfs

Pima Road Channel Interim Flows

Source of Data/Location	North of Deer Valley	South of Deer Valley	North of Thomson Peak	South of Thomson Peak	At Union Hills
Core North (1)		2,490	2,490	2,490	3,860
Village 1, 2 and 3 (3)		10,240	10,240	10,240	10,240
Parcels 3a & 3h(5)	400	300	710	660	
Parcel 2o (6)	370	1,400	200	184	

Legend

- Ultimate Flow Path
- Streets
- 720 Ultimate Flow
- 1070 Interim Flow

NORTH

0 0.25 0.5 Miles

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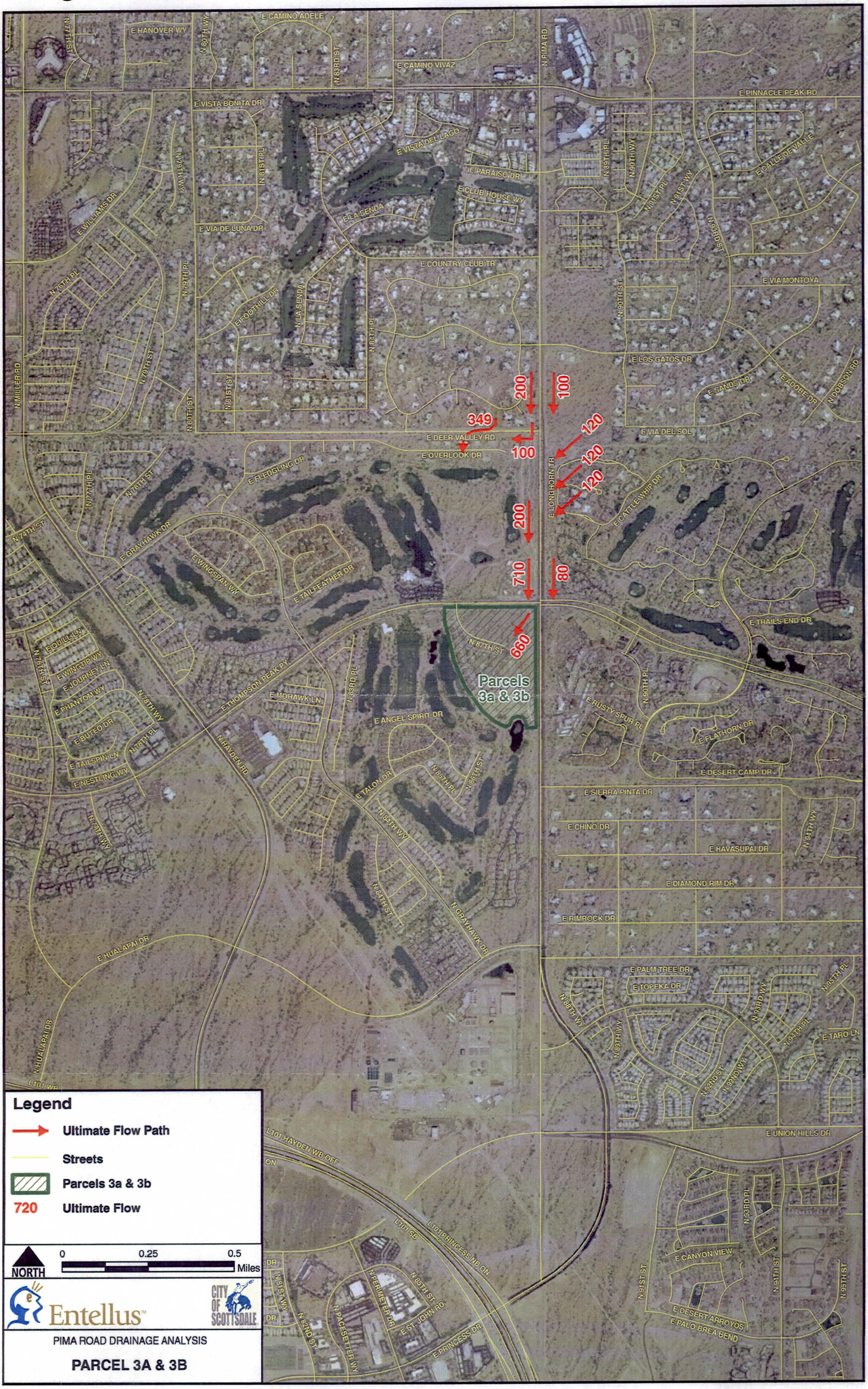
PIMA ROAD DRAINAGE ANALYSIS

DEER VALLEY ROAD CHANNEL PACE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E PINNACLE PEAK RD
E VISTA BONITA DR
E VISTA DEL LAGO
E PARAISO DR
E CLUB HOUSE WY
E LA SENDA
E VIA DE LUNA DR
N 81ST PL
N 88TH PL
N 90TH WY
N 91ST PL
N 91ST WY
N 93RD ST
E CALLE DE VALLE
E WILLIAMS DR
N 79TH WY
N 76TH PL
N 79TH PL
E COUNTRY CLUB TR
E VIA MONTOYA
E FOOTHILL DR
N LA SENDA
N 84TH PL
N 90TH ST
N MILLER RD
N 79TH ST
N 81ST ST
N 80TH ST
E LOS GATOS DR
E SANDS DR
E ADOBE DR
N DOBSON RD
E VIA DEL SOL
200
100
349
120
E DEER VALLEY RD
E OVERLOOK DR
100
E LONGHORN TR
120
120
E FLEDGLING DR
N 77TH PL
N 76TH ST
E CATTLE WHIP DR
200
N 74TH ST
E GRAYHAWK DR
E WINGSPAN WY
E TAILFEATHER DR
710
80
E TRAILS END DR
660
N 87TH ST
E QUILL LN
E WINGTIP WY
E JOURNEY LN
E PHANTOM WY
E BUTEO DR
E TAILSPIN LN
E NESTLING WY
N 76TH ST
N 78TH WY
N 78TH PL
N 77TH WY
E THOMPSON PEAK PY
E MOHAWK LN
N 83RD PL
E ANGEL SPIRIT DR
Parcels
3a & 3b
N HAYDEN RD
E TALON DR
N 85TH PL
N 86TH ST
N 84TH WY
N 84TH ST
N GRAYHAWK DR
E RUSTY SPUR PL
N 90TH PL
E FLATHORN DR
E DESERT CAMP DR
E SIERRA PINTA DR
E CHINO DR
E HAVASUPAI DR
N 94TH WY
E DIAMOND RIM DR
E RIMROCK DR
E HUALAPAI DR
N HUALAPAI DR
E PALM TREE DR
E TOPEKA DR
N 88TH WY
N 93RD WY
N 95TH PL
N 94TH PL
E TARO LN
N 92ND ST
N 92ND WY
L101 WB
E UNION HILLS DR
L101 HAYDEN WB OFF
ON
L101 SB
L101 PRINCESS NB ON
N 91ST ST
N 93RD PL
E CANYON VIEW
N 94TH ST
N 95TH ST
E DESERT ARROYOS
E PALO BREA BEND
N 81ST WY
DR
N 82ND ST
N PERIMETER DR
N PACESETTER WY
N 85TH ST
E ST. JOHN RD
E PRINCESS DR
Legend
Ultimate Flow Path
Streets
Parcels 3a & 3b
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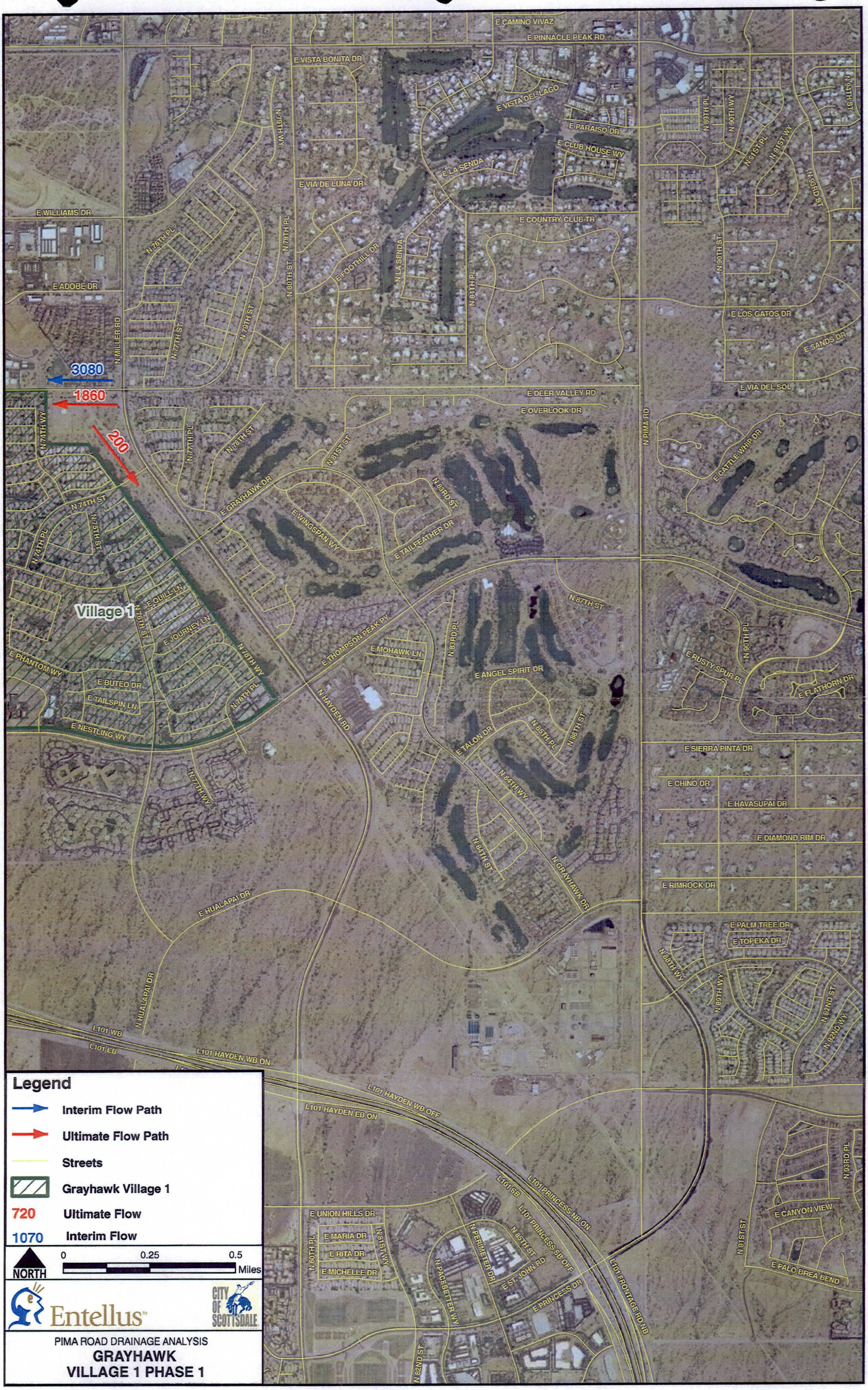
PIMA ROAD DRAINAGE ANALYSIS
PARCEL 3A & 3B



Legend

- Interim Flow Path
- Ultimate Flow Path
- Streets
- Grayhawk Village 1
- 720 Ultimate Flow
- 1070 Interim Flow

NORTH

0 0.25 0.5 Miles

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PIMA ROAD DRAINAGE ANALYSIS

GRAYHAWK

VILLAGE 1 PHASE 1

8.14 Memoranda Dated January 12th, 2009 and Revised on January 19th 2009

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FROM:	Entellus
JOB NO:	410061A
DATE:	1/12/2009
REVISED:	1/19/2009

PROJECT NAME: **Sierra Pinta Outfall Channel and Stormdrain Analysis**

MEMORANDUM

The purpose of this memorandum is to identify and quantify the modifications that can be attributed to the design and construction of the Sierra Pinta channel and Pima Road Outlet. This consisted of the following items:

- Verifying and modifying the existing conditions hydrology models
- Creating the future conditions hydrology model
  - All flow south past Deer Valley with flows from Sierra Pinta Channel
  - Split at Deer Valley with flows from Sierra Pinta Channel
- Determining the quantity of flow under existing and future conditions on the west and east portions of Pima Road
- Determining changes in flow, maximum channel velocity and maximum flow depth that occur due to the addition of the Sierra Pinta channel and outlet.

The above objectives were performed for the 100-year and 2-year models and are described in detail below.

Hydrology:

Existing Conditions

Previous memoranda document many of the modifications and assumptions in the hydrological modeling and should be consulted. The City of Scottsdale and Entellus conducted a field visit to determine the existing drainage conditions along the Pima Rd corridor. In particular, attention was given to the potential flow split at Pima Rd and Deer Valley. From the field visit it was concluded that negligible flow would be able to leave Pima Rd. and enter the Deer Valley Channel. Additionally, it was concluded that, although not designed to withstand the hydrostatic and hydrodynamic forces that accompany a large flood, flow would be modeled as not being able to cross or penetrate the Los Gatos wall on the west side of Pima.

Instead flow would be routed south past Deer Valley along Pima Rd to Thompson Peak Parkway for the existing conditions.

To accomplish this task the combining of two hydrological models was required. The northern model along Pima Rd stretches from Jomax Rd southerly to Deer Valley Rd (hereto after referred to as the Northern Model). This model has originally developed as part of the City of Scottsdale Desert Greenbelt, Pima Road Three Basin Project by Stantec Consulting Inc., dated March 1999 and subsequently modified by Entellus in 2005 to develop drainage solutions along the Pima Rd corridor from Pinnacle Peak to Deer Valley. The southerly model begins slightly north of Deer Valley along the Pima Rd. corridor and extends southward just beyond Union Hills Dr (hereto after referred to as the Southern Model). This model was originally created by Robert L. Ward as part of the Core North State Land parcel and modified by Wood Patel for the DC Ranch. Entellus modified these models in 2003 to design drainage solutions as part of the Pima Road Design Concept from Thompson Peak Parkway to the Pima Freeway (PRDCR)

To combine the two models several modifications were required. First some reconciliation of drainage basins was required just upstream of Deer Valley. The Northern Model required some subdivision of a drainage subbasin that was originally shown to pass through the Los Gatos subdivision to the Deer Valley Channel. The subdivision of this subbasin was no longer warranted and was removed. The combined subbasin S51.1D replaced subbasins S51.1H, S51.1G, and S51.1F. This also called for the replacement of several shorter routes (R1B2, R51.1H, R51.1G) with a single longer route (R1B2) and the removal of concentration points C51.1H, C51.1G, C51.1F and CEEC13. Some reordering of the model was also required.

Diversions that had been modeled at the Los Gatos wall along Pima Rd were modified. D1B4 and D1B2 were modified to allow all flow to continue south along Pima Rd. and remove any diversion occurring onto and through the Los Gatos subdivision. The detention basin on the east side of Pima Rd at Deer Valley Rd. had not been included in any model. Though relatively small, this detention basin was incorporated into the model as an online detention basin for subbasin S51.1D.

Finally, NSTPS were modified as necessary for all normal depth routes. This included the modification of four (4) normal depth NSTPS that were not created by Entellus. R41, R45, R47, and R50 were taken directly from the Core North Model DB53RFD5.6I as created by Robert L. Ward on 05/30/2002 and included the Wood Patel Model OF DC Ranch dated 01/1996.

Proposed Conditions

Modifications were also made to the hydrologic models for two proposed conditions:

1. Assumes all flow is routed south beyond Deer Valley with the Sierra Pinta Channel in place

2. Assumes there is a split at Deer Valley with the Sierra Pinta Channel in place

These modifications were made by modifying the diversions in the hydrologic model as presented above.

Results

For the results an explanation of all the flows and their origin is given below for the 100-year and 2-year storm events for the 3 modeling conditions.

100-Year Storm Event

Existing Conditions:

For the existing conditions model, the flows crossing Deer Valley were limited to the subbasins that will contribute to that point (Los Gatos wall closed). This equates to approximately 511 cfs (C1B2) at Pima Rd. and Deer Valley (does not include subbasin S51.1D). All flows are combined together at Thompson Peak, a 30% diversion (DV52AW) out of the area is assumed (1050 cfs) followed by the Pima Rd Storm Drain (PRSD, 600 cfs). All remaining flow (PRSDEX 1852 cfs) travels south beyond Thompson Peak along the west side of Pima Rd. Just south of Sierra Pinta weir flow begins to contribute. It was assumed that all the weir flow (52B7C1 + 52A2) will contribute at this point (450cfs) and the remaining flow (550 cfs) is the approximate capacity on the east side of Pima Rd. The 84" Pima Rd. stormdrain outlet (PRSD, 600 cfs) is just north of Hualapai, and this plus the additional flow from the east side of Pima Rd. account for the southern most flow value (CPCH3 3307 cfs).

Deer Valley Split:

For this proposed condition, it was assumed that the split flow at Deer Valley would mimic the existing conditions for the quantity of flow and volume traveling south along Pima Rd. Therefore all conditions are the same as the existing conditions up to south of Thompson Peak (C1B2 = 511 cfs, DV52AW = 1050 cfs, PRSD = 600 cfs, PRSDEX = 1852 cfs). It was also assumed that just south of Sierra Pinta weir flow begins to contribute, and that all the weir flow (52B7C1 + 52A2) will contribute at this point (450cfs) and the remaining flow (550 cfs) is the approximate capacity on the east side of Pima Rd. The Sierra Pinta outfall also occurs just south of the Sierra Pinta alignment and this contributes an additional 1328 cfs (DVSP4) for a total flow of 3630 cfs. The 84" Pima Rd. stormdrain outlet (PRSD, 600 cfs) is just north of Hualapai, and this plus the additional flow from the east side of Pima Rd. account for the southern most flow value (CPCH3 4631 cfs).

All Flow South Along Pima Rd. Past Deer Valley:

For this proposed condition all flow south of Pinnacle Peak was assumed to be conveyed along Pima Rd. This increases the flow at C1B2 to 1394 cfs. The Pima Rd. stormdrain was limited to 600 cfs and the split out of the area at Thompson Peak was limited to the existing conditions split of 1050 cfs (DV52AW). Thus the flow traveling south of Thompson Peak along Pima Rd. is 2835 cfs (PRSDEX). It was assumed that just south of Sierra Pinta weir flow begins to contribute, and that all the weir flow (52B7C1 + 52A2) will contribute at this point (450cfs) and the remaining flow (550 cfs) is the approximate capacity on the east side of Pima Rd. The Sierra Pinta outfall also occurs just south of the Sierra Pinta alignment and this contributes an additional 1328 cfs (DVSP4) for a total flow of 4610 cfs. The 84" Pima Rd. stormdrain outlet (PRSD, 600 cfs) is just north of Hualapai, and this plus the additional flow from the east side of Pima Rd. account for the southern most flow value (CPCH3 5611 cfs).

2-Year Storm Event

Existing Conditions:

It was assumed that for the existing conditions, only local subbasin flow will contribute to the Sierra Pinta area. This is due to the Pima Rd. stormdrain and capacity of the east side of Pima Rd. Thus the flow traveling south of Thompson Peak along Pima is 15 cfs (52A0) and this is combined with additional local flow at Sierra Pinta (52B0 = 5 cfs) for a total flow of 20 cfs. Additional local drainage area increases the flow in the Pima Channel to 40 cfs (S53A2 = 20 cfs). The total flow following the outlet of the 84" Pima Rd. stormdrain (PRSD = 275 cfs) and flow contained on the east side of the road (52B7C1 + 52A2+ S53A = 198 cfs) is 365 cfs (CPCH3).

Deer Valley Split:

For the contributing flow at Thompson Peak parkway it was assumed that the additional flow from subbasins north of Deer Valley would be routed to the west of Pima in the future Pima Rd. channel and thus they would not be picked up by the existing stormdrain. This increases the flow north of Thompson Peak by 38 cfs (C1B2) for a total flow continuing south past Thompson Peak (no diversion assumed) of 53 cfs (C1B2 + 52A0). The Sierra Pinta Channel adds an additional 546 cfs (DVSP4) for a total of 599 cfs. The channel picks up the majority of what would flow along the east side of Pima (52B7C1 and 52A2). The total flow following the outlet of the 84" Pima Rd. stormdrain and flow from the east side of Pima Rd is 796 cfs (CPCH3).

All Flow South Along Pima Rd. Past Deer Valley:

For this proposed condition all flow south of Pinnacle Peak was assumed to be conveyed along Pima Rd. Channel, and this entire area would contribute to the Sierra Pinta Channel. This constitutes 394 cfs (C52A) being conveyed south along Pima Rd. beyond

Thompson Peak (no diversion assumed). The Sierra Pinta Channel adds an additional 546 cfs (DVSP4) for a total of 940 cfs. The channel picks up the majority of what would flow along the east side of Pima (52B7C1 and 52A2). The total flow after the 84" Pima Rd. stormdrain does not increase.

Hydraulics:

Purpose

The purpose of this analysis was to determine the effects of the construction of the Sierra Pinta Channel outfall on the Pima Road Channel. In order to accomplish this, the existing conditions were analyzed to act as a basis of comparison for the post construction analysis. Survey field work was used to update the cross section geometry, which included the elevation of the retaining wall on the western side of Pima Road. This part of the analysis consisted of determining the flow characteristics in the Pima Road Channel for both existing and post construction conditions.

For this analysis, several hydraulic models were created to determine the flows, velocities, and hydraulic depth of the channel alongside the western side of Pima Road. The existing and post construction conditions were modeled and the differences between these conditions were noted. The conditions modeled in HEC-RAS are:

- Existing Conditions 2-year
- Existing Conditions 100-year
- Post Construction – With Deer Valley Split 2-year
- Post Construction – With Deer Valley Split 100-year
- Post Construction – Without Deer Valley Split 2-year
- Post Construction – Without Deer Valley Split 100-year

Method Description

The hydraulic conditions of the Pima Road Channel were analyzed using HEC-Geo RAS V.4.1.1 (**Reference 3**). HEC-GeoRAS is an ArcGIS extension that allows the geometry data to be extracted from GIS and use in HEC-RAS V.3.1.3 (**Reference 3**). 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 both the existing and future conditions model. After reviewing the geometry data, interpolated cross sections were added to both the existing and future conditions model, where applicable. The interpolated cross sections were added to increase the stability of the model and address some of the warnings generated by HEC-RAS.

Cross sections were cut at roadway crossings, Sierra Pinta Outfall location, and spaced no more than 500 feet apart. The aerial photographs from the ESRI server and topographic mapping were used to locate the critical areas for cross sections. The expansion / contraction coefficients used were 0.1 and 0.3 respectively. The reach lengths were measured from the base map with the aid of HEC-GeoRAS and the n-values used were 0.035 for the landscape areas, 0.018 for paved and concrete surfaces, and 0.065 in the proposed Sierra Pinta Outfall Channel energy dissipaters.

The downstream boundary condition used the slope-area method. The longitudinal slope at the downstream end was measured from topographic mapping to be 0.0225 ft/ft. The upstream boundary condition was set to critical depth. For the analysis of the existing and post construction models a mix 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 in HEC-RAS to calculate the friction slope.

Weir Flow Model

As part of the submittal in October 2008 a weir flow analysis was used to estimate the flow. The weir flow (from east side of Pima Road to Pima Road Channel) model was created using existing conditions without any interpolated cross sections. The HEC-RAS model estimated the capacity of the eastern side of Pima Road to be 550 cfs, therefore, the remainder of the flow moved across the median onto Pima Road on the western portion.

Existing Conditions Model

The existing model shows the existing conditions based on survey field work conducted in December 2008. Survey was used to cut cross sections to build the HEC-RAS model. Interpolated cross sections were added throughout the entire reach and defined between two cut cross sections. The distances defined between two cut cross sections varied throughout the model, but the maximum distance between interpolated cross-sections was set to 18.35 feet.

The storms modeled were the 2-year and 100-year. The typical n-values in this model were 0.018 for the roadway and 0.035 for the channel. The n-values for interpolated cross sections were automatically generated by HEC-RAS based on the interpolation points. No modifications were made to these.

A levee was added at the median of Pima Road to restrict flow from returning back to the east side of Pima Road. However, none of the water surface elevations from the existing conditions storms reached the median, so this was not an issue.

Post Construction Conditions Model

The future model utilizes the same topographic information as the existing conditions model, except in the area of the proposed Sierra Pinta Outfall Channel. Interpolated cross sections were added throughout most of the model and defined between two cut cross sections to a maximum distance

of 18.35 feet. Interpolated cross sections were not added between the Sierra Pinta Channel headwall and the upstream cross section (#2102.3369). This was due to the rapid change of geometry that would be misinterpreted by interpolated cross sections.

The storms modeled were the 2-year and 100-year for two conditions (Deer Valley Split and No Deer Valley Split), as mentioned earlier. The typical n-values in this model were 0.018 for the roadway, 0.035 for the channel, and 0.065 for a small portion of the outfall channel where the large boulder energy dissipaters are located. This area was designed to handle high velocities and extreme turbulence, therefore, a higher n-value was appropriate. The n-values for the interpolated cross sections were automatically generated by HEC-RAS based on the interpolation points. No modifications were made to these.

A levee was added at the median of Pima Road to restrict flow from returning back to the east side of Pima Road. However, a few cross-sections in both of the 100-year profiles appear to overtop the median, therefore, these two profiles were modified. The first profile *With Deer Valley Split 100 year* had flow overtopping the median between cross sections #2188.41* (an interpolated cross section) and #2141.619. The levee was removed from the median and the area of the eastern portion of Pima Road was blocked out using the blocked obstructions option in HEC-RAS (the east side of Pima Road is already carrying 550 cfs and is not available for additional flow below the median). The second profile *Without Pima Deer Valley Split 100 year* had flow overtopping the median between cross sections #2235.211 and #2046.47* (an interpolated cross section). Again, the levee was removed and blocked obstructions were added to remove the eastern portion of Pima Road below the median from the cross section. The remainder of the profiles never reached the median, therefore, this was not an issue.

Hydraulic Model Results

As part of the submittal in October 2008 the weir flow analysis results show that the east portion of Pima Road can carry a maximum flow of approximately 550 cfs. Flow beyond this threshold weirs across the median and onto the western portion of Pima Road and eventually into the Pima Road Channel. For the 2-year storm the flows reaching the east side of Pima Road are less than the maximum flow capacity and do not overtop the road, therefore the weir analysis only applies to the 100-year storm.

For the existing and post construction condition models, the output was reviewed and at specific locations. The accompanying cross section graphs illustrate the conditions at four locations throughout the reach including flow, water surface elevation, maximum velocity, and retaining wall elevation. The retaining wall protecting the 84 inch storm drain at the western side of the channel corridor is overtopped at a few locations for the 100-year storms. These are areas that would need to evaluated or considered for additional protection.

There are several modeling issues that should be mentioned. The first is deviation from the HEC-RAS general assumption of gradually varied flow. The post construction conditions model includes a drop over the proposed headwall of approximately 10 feet. 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.

As the attached graphics show, when comparing existing to post construction conditions, there are significant differences in flow and velocity at the various cross sections of the channel. For example, the flow and velocity are essentially the same upstream of the Sierra Pinta Channel Outlet, however downstream of the outlet the flows and velocities increase. The magnitude of these increases varies and can be viewed in the HEC-RAS model.

Recommendations

There are several recommendations for the area in question.

1. Downstream from Sierra Pinta
    a. Lower the channel invert for the entire reach by 2 to 4 feet.
    b. Armoring the channel must be performed, because even under existing conditions, velocities are high enough to cause significant damage and place the integrity of the channel, road and adjacent development in jeopardy. In regards to the retaining wall as-builts were not available to determine the adequacy of that structure in the channel.
    c. Install a 2-year crossing at the Grayhawk entrance.
    d. Scour protection upstream and downstream of the driveway
    e. Modify grades to be steeper through the driveway section to clear out the sediment that accumulates during small storm events. That will potentially not be permanent fix due to the potential for the channel to return to its natural grade
2. Deer Valley/Pima channels split
    a. Mimic the existing conditions for the Deer Valley Split. This would include improvements to the Deer Valley Channel and improvements to the Pima Channel from Deer Valley to Sierra Pinta. Also a closer look must be made downstream of the Deer Valley Channel to the powerline corridor and beyond

References

1. Final Hydrology and Drainage Preliminary Drainage Design Report as Part of Pima Road Design Concept Report - AZ101 To Thompson Peak

Parkway for the Pima Road realignment Project, Pima Road Drainage Channel Analysis, Union Hills Interceptor Channel Analysis, October 2004, Entellus Project No. 410.061A, City of Scottsdale Contract No. 2003-114-COS

2. *DC Ranch Sierra Pinta Channel Improvement Plan* Wood/Patel 24 July 2008
3. *HEC-Geo RAS V.4.1.1*, US Army Corps of Engineers, September 2005
4. *HEC-RAS V.3.1.3*, US Army Corps of Engineers, May 2005
5. Design Plans for Pima Road Improvements – Loop 101 To Thompson Peak Parkway, April 2006, Entellus Project No. 410.061A, City of Scottsdale Project No. S-2104

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JOB NO:	410061A
DATE:	1/12/2009
REVISED:	1/19/2009

PROJECT NAME: PIMA ROAD CHANNEL SCOUR ANALYSIS

TECHNICAL MEMORANDUM

The purpose of this memorandum is to present the findings of the scour analysis of the Pima Road Channel south of Sierra Pinta Drive. Both the 100-year and 2-year 6-hour flood events were considered for three different scenarios:

- Existing conditions
- Pima Channel - Deer Valley Channel split and Sierra Pinta flows
- All flow down Pima Channel past Deer Valley and Sierra Pinta flows

Scour analysis was evaluated at four locations along Pima Road channel (see **Figure 1**) and HEC-RAS was utilized to obtain the input information (see **Appendix C**) necessary for the scour analysis. Gradation test results from the Southwest Corner of Pima Road and Sierra Pinta Drive by Ninyo and Moore were used in this analysis. This gradation sample was obtained from a depth of 6-6.8 feet. Results that show scour or degradation beyond that depth will require additional sampling to confirm. This is due to the fact that the soil gradation will probably differ as the depth is increased.

Methodology

The scour analysis performed for the Pima Road channel includes, channel vertical stability, total scour, and lateral migration. The analysis follows procedures described in the Arizona State Standard 5-96 (**Reference 2**) and Arizona Floodplain Management Association (AFMA) Scour Analysis for Small to Mid-Size Desert Washes short course (**Reference 1**).

First, the potential for armoring during a flood event was consider. Shields formula was utilized to evaluate the grain size at incipient motion, and then this was utilized to determine the depth of armoring layer. The equilibrium (stable) slope at each location was determined utilizing the Meyer-Peter, Muller methodology. The long term degradation was determined based on the calculated stable slopes and assuming that the

Sierra Pinta Drive or the Grayhawk driveway would act as control elevations. The smallest of the stable slope or armor layer depth was used as 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.

Lateral migration (setback) for 100 year flood event was calculated using the Level I analysis as described in SSA 5-96. Level II analysis was utilized to evaluate if the setback distance calculated from Level I could be reduced. This was done by comparing the reference tractive stress with the allowable tractive stress. If setbacks are unpractical the bank would need to be armored to prevent erosion of the bank.

In addition, sediment yield was estimated for all scenarios using the Universal Soil Loss Equation (**Reference 3**) to get an idea of the relative sediment deposition for each scenario.

Results

The scour analysis and sediment yield estimation are shown in **Table 1 2** and **3**. The detailed calculations for scour analysis are presented in **Appendix A**.

Flood Event	HEC-RAS Cross Section	Case	Flow [cfs]	Armoring Layer Depth [ft]	Stable Slope Meyer-Peter, Muller Method [ft/ft]	Long Term Degradation [ft]	General Scour Depth (Lacey's Equation) [ft]	Total Scour Depth [ft]	Reference Tractive Stress [lbs/ft^2]	Allowable Tractive Stress [lbs/ft^2]	Lateral Migration (Setback) [ft]
100 Year	1934.738	Existing	2300	424	0.00044	4.51	1.28	5.79	0.792	0.06	48
		Deer Valley Split	3630	536	0.00035	4.53	1.50	6.02	0.958	0.06	60
		Past Deer Valley	4610	603	0.00031	4.54	1.62	6.16	0.647	0.06	68
	1448.784	Existing	2300	130	0.00019	16.44	1.28	17.73	0.459	0.06	48
		Deer Valley Split	3630	193	0.00020	16.44	1.50	17.93	0.739	0.06	60
		Past Deer Valley	4610	235	0.00019	16.44	1.62	18.06	0.484	0.06	68
	1086.57	Existing	2300	393	0.00053	23.5	1.28	24.79	0.776	0.06	48
		Deer Valley Split	3630	497	0.00042	23.62	1.50	25.11	0.939	0.06	60
		Past Deer Valley	4610	574	0.00038	23.67	1.62	25.29	1.007	0.06	68
	764.0201	Existing	2300	329	0.00046	4.20	1.28	5.48	0.603	0.06	48
		Deer Valley Split	3630	389	0.00036	4.22	1.50	5.72	0.729	0.06	60
		Past Deer Valley	4610	422	0.00032	4.23	1.62	5.85	0.782	0.06	68
2 Year	1934.738	Existing	40	1.8	0.00219	4.15	0.33	4.48			
		Deer Valley Split	600	21.0	0.00085	4.42	0.82	5.25			
		Past Deer Valley	940	61.0	0.00067	4.46	0.95	5.42			
	1448.784	Existing	40	0.0	0.00089	14.77	0.33	15.10			
		Deer Valley Split	600	0.4	0.00030	15.18	0.82	16.01			
		Past Deer Valley	940	1.0	0.00025	15.21	0.95	16.17			
	1086.57	Existing	40	5.0	0.00193	21.40	0.33	21.73			
		Deer Valley Split	600	22.0	0.00087	22.52	0.82	23.34			
		Past Deer Valley	940	29.0	0.00078	22.61	0.95	23.57			
	764.0201	Existing	40	0.1	0.00333	4.71	0.33	5.05			
		Deer Valley Split	600	0.1	0.00095	5.31	0.82	6.13			
		Past Deer Valley	940	22.0	0.00072	5.36	0.95	6.32			

Table 1 – Scour Analysis Summary

Universal Soil Loss Equation (USLE)		
A = RKLSCD		
R =	50	Rainfall-erodibility factor (see **Appendix B, Figure 18.7.1**)
K =	0.27	Soil-erodibility factor (**see Appendix B, Table 18.7.1**)
LS =	0.4	L = Slope-length factor normalized to a plot length of 72.6 ft (**see Appendix B, Figure 18.7.2**) S = Slope-steepness factor normalized to a field slope of 9 percent (see **Appendix B, Figure 18.7.2**)
C =	0.009	Cropping-management factor normalized to a tilled area with continuous fallow (see **Appendix B, Table 18.7.2**)
D =	1	Conservation practice factor normalized to a straight-row farming up and down the slope (**No Conservation Measures D = 1**)
A =	**0.0486**	**Soil loss, [tons/acre/year]**

Table 2 – Sediment Loss

Case	Approximate Contributing Area [acre]	Soil Loss [tons]
Existing	1691	82.2
Deer Valley Split	3668	178.3
Past Deer Valley	4535	220.4

Table 3 – Sediment Loss Summary

Conclusions

The results show, that natural armoring layer depth is unlikely to be reached for the 100 year flood event. The armoring layer depth ranges from 130 ft to 603 ft for 100 year flood and from 0 ft to 61 ft for 2 year event. These depths are all out of the range of the soil sample collected. However, it can easily be seen that armoring will not occur naturally in the upper 7 feet of soil.

Equilibrium slope for the channel is generally very mild, less than 0.055% and 0.22% for 100-year and 2-year storms respectively. This results in a significant amount of long term degradation as the channel will attempt to reach equilibrium. Once again the majority of the calculated depths are beyond the bounds of the soil sample.

Total scour ranges from 5.48 ft to 25.29 ft for 100 year, where the largest value of scour occurs at cross section #1086.57 Grayhawk entrance. Level II lateral migration analysis determined that the reference tractive stress is larger than allowable tractive stress in all cases, so the Level I setback distance was used. The setback distance from the channel ranges from about 50 – 70 ft.

In general, as one would expect, as the flow rate increases, the scour depths increase as well. Thus the scour was determined to be smaller for the existing condition scenario at all cross sections analyzed. Sediment yield was estimated to be 0.0486 tons/acre.

REFERENCES

1. *Scour Analysis for Small to Mid-Size Desert Washes Short Course,* by Arizona Floodplain Management Association (AFMA), January 2004.

2. *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.
3. *Water Resources Engineering,* by Larry W. Mays, John Wiley & Sons, Inc., 2005 Edition.

Appendix A – Scour Calculations

Appendix A1 – Scour Calculations (2-Year)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1086.57**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Deer Valley Split, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	6.69	Average Flow Velocity Through the Reach, (ft/s)
A =	89.7	Cross Sectional Flow area, (ft^2)
W_p=	93.15	Wetted perimeter, (ft)
R =	0.96	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	0.96	Hydraulic depth, (ft)
S_e =	0.0261	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.067**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.324	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.030	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**22**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.201	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.009	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Deer Valley Split, 2 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00087**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	600	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.96	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**22.52**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00087	Equilibrium (Stable) slope, (ft/ft)
L	1054	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	600	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	3.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.82**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	22.52	Long-term scour depth, (ft)
y_{gs} =	0.82	General scour depth, (ft)
y_s =	**23.34**	Total Scour depth, (ft)

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Existing Condition, 2 Year

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Hydraulic Input Parameters

V =	4.17	Average Flow Velocity Through the Reach, (ft/s)
A =	9.6	Cross Sectional Flow area, (ft^2)
W_p=	22.15	Wetted perimeter, (ft)
R =	0.43	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	0.43	Hydraulic depth, (ft)
S_e =	0.0293	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f\rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.034**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.164	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.039	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**5**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.102	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.02	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Existing Condition, 2 Year

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JOB #	410061A		
SHEET	2	**OF**	2

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00193**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	40	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.43	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**21.40**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00193	Equilibrium (Stable) slope, (ft/ft)
L	1054	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	40	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	1.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.33**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	21.40	Long-term scour depth, (ft)
y_{gs} =	0.33	General scour depth, (ft)
y_s =	**21.73**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1086.57**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	7.32	Average Flow Velocity Through the Reach, (ft/s)
A =	128.33	Cross Sectional Flow area, (ft^2)
W_p=	120.57	Wetted perimeter, (ft)
R =	1.06	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.07	Hydraulic depth, (ft)
S_e =	0.0274	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.078**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.375	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.029	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**29**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.233	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.008	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Past Deer Valley, 2 Year

BY	ZM	**DATE**	1/9/2009	
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00078**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	940	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.07	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**22.61**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00078	Equilibrium (Stable) slope, (ft/ft)
L	1054	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	940	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	3.8	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.95**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	22.61	Long-term scour depth, (ft)
y_{gs} =	0.95	General scour depth, (ft)
y_s =	**23.57**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1448.784**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Deer Valley Split, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
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Hydraulic Input Parameters

	V =	3.73	Average Flow Velocity Through the Reach, (ft/s)
	A =	160.69	Cross Sectional Flow area, (ft^2)
	W_p=	58.22	Wetted perimeter, (ft)
	R =	2.76	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
	D_h =	2.81	Hydraulic depth, (ft)
	S_e =	0.0045	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_p / [0.047 (\gamma_s - \gamma)]$	**D_c =**	**0.015**	Diameter of the sediment particle at incipient motion conditions, (ft)
$\tau_p = 1/8\ f \rho V^2$	τ_p =	0.071	Boundary shear stress, (lb/ft^2)
	γ_s =	165	Specific weight of sediment, lb/ft^3
	Coeff. =	0.047	Shields parameter, (dimensionless)
	γ =	62.4	Specific weight of water, lb/ft3
$f = 116.5\ n^2 / R^{1/3}$	*f* =	0.021	Friction factor, (dimensionless)
	ρ =	1.94	Density of the water,($slugs/ft^3$)
$n = D_{90}^{1/6} / 26$	**n =**	0.016	Manning resistance value, (dimensionless)
	D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$	**ΔZ_a =**	**0.36**	Depth of degradation or scour required to form armor layer, (ft)
Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions	**y_a =**	0.044	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
	P_c =	0.11	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.

CLIENT: City of Scottsdale

JOB: Pima Road Channel Scour Analysis

Cross Section 1448.784

Deer Valley Split, 2 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00030**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	600	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	2.81	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**15.18**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00030	Equilibrium (Stable) slope, (ft/ft)
L	692	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	600	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)

$Y_m = 0.47 (Q/ Lf)^{1/3}$

Ym =	3.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7

$y_{gs} = Z(Y_m)$

y_{gs} =	**0.82**	General scour depth using Lacey's Equation, (ft)

Total Scour

y_{lt} =	15.18	Long-term scour depth, (ft)
y_{gs} =	0.82	General scour depth, (ft)

$y_s = y_{lt} + y_{gs}$

y_s =	**16.01**	Total Scour depth, (ft)

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1448.784
Existing Condition, 2 Year

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Hydraulic Input Parameters

V =	1.1	Average Flow Velocity Through the Reach, (ft/s)
A =	36.24	Cross Sectional Flow area, (ft^2)
W_p=	39.29	Wetted perimeter, (ft)
R =	0.92	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	0.93	Hydraulic depth, (ft)
S_e =	0.0022	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f \rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.002**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.009	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.030	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no decredation will occur under design conditions

ΔZ_a =	**0.01**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.006	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.48	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1448.784
Existing Condition, 2 Year

BY	ZM	**DATE**	1/9/2009
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00089**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	40	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.93	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**14.77**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00089	Equilibrium (Stable) slope, (ft/ft)
L	692	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	40	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	1.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.33**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	14.77	Long-term scour depth, (ft)
y_{gs} =	0.33	General scour depth, (ft)
y_s =	**15.10**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1448.784**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	4.6	Average Flow Velocity Through the Reach, (ft/s)
A =	204.21	Cross Sectional Flow area, (ft^2)
W_p=	63.55	Wetted perimeter, (ft)
R =	3.21	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	3.28	Hydraulic depth, (ft)
S_e =	0.0053	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_p / [0.047 (\gamma_s - \gamma)]$

$\tau_p = 1/8\ f \rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.021**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_p =	0.102	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.020	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**1**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.064	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.05	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1448.784
Past Deer Valley, 2 Year

BY	ZM	**DATE**	1/9/2009	
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JOB #	410061A			
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00025**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	940	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	3.28	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**15.21**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00025	Equilibrium (Stable) slope, (ft/ft)
L	692	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	940	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	3.8	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.95**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	15.21	Long-term scour depth, (ft)
y_{gs} =	0.95	General scour depth, (ft)
y_s =	**16.17**	Total Scour depth, (ft)

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1934.738
Deer Valley Split, 2 Year

BY	ZM	**DATE**	1/9/2009
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JOB #	410061A		
SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	6.59	Average Flow Velocity Through the Reach, (ft/s)
A =	91.08	Cross Sectional Flow area, (ft^2)
W_p=	93.31	Wetted perimeter, (ft)
R =	0.98	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	0.98	Hydraulic depth, (ft)
S_e =	0.0249	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f \rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.065**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.313	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.030	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**21**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.195	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.009	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1934.738
Deer Valley Split, 2 Year

BY	ZM	**DATE**	1/9/2009	
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00085**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	600	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.98	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.42**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00085	Equilibrium (Stable) slope, (ft/ft)
L	207	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	600	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	3.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.82**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.42	Long-term scour depth, (ft)
y_{gs} =	0.82	General scour depth, (ft)
y_s =	**5.25**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1934.738**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Existing Condition, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

	V =	3.5	Average Flow Velocity Through the Reach, (ft/s)
	A =	11.44	Cross Sectional Flow area, (ft^2)
	W_p=	30.06	Wetted perimeter, (ft)
	R =	0.38	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
	D_h =	0.38	Hydraulic depth, (ft)
	S_e =	0.0246	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$	**D_c =**	**0.025**	Diameter of the sediment particle at incipient motion conditions, (ft)
$\tau_\rho = 1/8\ f \rho V^2$	τ_ρ =	0.121	Boundary shear stress, (lb/ft^2)
	γ_s =	165	Specific weight of sediment, lb/ft^3
	Coeff. =	0.047	Shields parameter, (dimensionless)
	γ =	62.4	Specific weight of water, lb/ft3
$f = 116.5\ n^2 / R^{1/3}$	f =	0.041	Friction factor, (dimensionless)
	ρ =	1.94	Density of the water,($slugs/ft^3$)
$n = D_{90}^{1/6} / 26$	**n =**	0.016	Manning resistance value, (dimensionless)
	D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$	**ΔZ_a =**	**1.8**	Depth of degradation or scour required to form armor layer, (ft)
Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions	**y_a =**	0.075	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
	P_c =	0.04	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1934.738
Existing Condition, 2 Year

BY	ZM	**DATE**	1/9/2009
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00219**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	40	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.38	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.15**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00219	Equilibrium (Stable) slope, (ft/ft)
L	207	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	40	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	1.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.33**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.15	Long-term scour depth, (ft)
y_{gs} =	0.33	General scour depth, (ft)
y_s =	**4.48**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1934.738**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
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Hydraulic Input Parameters

V =	7.7	Average Flow Velocity Through the Reach, (ft/s)
A =	120.97	Cross Sectional Flow area, (ft^2)
W_p=	98.32	Wetted perimeter, (ft)
R =	1.23	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.24	Hydraulic depth, (ft)
S_e =	0.0254	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f\rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.082**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.395	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.028	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**61**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.246	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.004	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1934.738**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00067**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	940	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.24	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.46**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00067	Equilibrium (Stable) slope, (ft/ft)
L	207	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	940	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	3.8	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.95**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.46	Long-term scour depth, (ft)
y_{gs} =	0.95	General scour depth, (ft)
y_s =	**5.42**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 764.0201**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Deer Valley Split, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	2.36	Average Flow Velocity Through the Reach, (ft/s)
A =	100.11	Cross Sectional Flow area, (ft^2)
W_p=	114.55	Wetted perimeter, (ft)
R =	0.87	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	0.88	Hydraulic depth, (ft)
S_e =	0.0234	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f\rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.009**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.042	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.031	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**0.08**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.026	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.24	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Deer Valley Split, 2 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00095**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	600	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.88	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**5.31**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00095	Equilibrium (Stable) slope, (ft/ft)
L	249	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	600	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	3.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.82**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	5.31	Long-term scour depth, (ft)
y_{gs} =	0.82	General scour depth, (ft)
y_s =	**6.13**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 764.0201**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Existing Conditions, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	2.36	Average Flow Velocity Through the Reach, (ft/s)
A =	16.97	Cross Sectional Flow area, (ft^2)
W_p=	69.36	Wetted perimeter, (ft)
R =	0.24	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	0.25	Hydraulic depth, (ft)
S_e =	0.0202	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f \rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.013**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.064	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.047	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**0.14**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.040	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.22	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Existing Conditions, 2 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00333**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	40	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	0.25	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.71**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00333	Equilibrium (Stable) slope, (ft/ft)
L	249	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	40	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	1.3	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**0.33**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.71	Long-term scour depth, (ft)
y_{gs} =	0.33	General scour depth, (ft)
y_s =	**5.05**	Total Scour depth, (ft)

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CLIENT: City of Scottsdale	**Cross Section 764.0201**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	2

Hydraulic Input Parameters

V =	6.86	Average Flow Velocity Through the Reach, (ft/s)
A =	131.61	Cross Sectional Flow area, (ft^2)
W_p=	114.86	Wetted perimeter, (ft)
R =	1.15	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.16	Hydraulic depth, (ft)
S_e =	0.0218	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$	**D_c =**	**0.067**	Diameter of the sediment particle at incipient motion conditions, (ft)
$\tau_\rho = 1/8\ f \rho V^2$	τ_ρ =	0.321	Boundary shear stress, (lb/ft^2)
	γ_s =	165	Specific weight of sediment, lb/ft^3
	Coeff. =	0.047	Shields parameter, (dimensionless)
	γ =	62.4	Specific weight of water, lb/ft3
$f = 116.5\ n^2 / R^{1/3}$	*f* =	0.028	Friction factor, (dimensionless)
	ρ =	1.94	Density of the water,($slugs/ft^3$)
$n = D_{90}^{1/6} / 26$	**n =**	0.016	Manning resistance value, (dimensionless)
	D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$	**ΔZ_a =**	**22**	Depth of degradation or scour required to form armor layer, (ft)
Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions	**y_a =**	0.200	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
	P_c =	0.009	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.

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JOB: Pima Road Scour Channel Analysis	**Past Deer Valley, 2 Year**	**CHECK**	AL	**DATE**	1/9/2009
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00072**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	940	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.16	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**5.36**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00072	Equilibrium (Stable) slope, (ft/ft)
L	249	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	940	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)

$Y_m = 0.47 (Q/ Lf)^{1/3}$

Ym =	3.8	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7

$y_{gs} = Z(Y_m)$

y_{gs} =	**0.95**	General scour depth using Lacey's Equation, (ft)

Total Scour

y_{lt} =	5.36	Long-term scour depth, (ft)
y_{gs} =	0.95	General scour depth, (ft)

$y_s = y_{lt} + y_{gs}$

y_s =	**6.32**	Total Scour depth, (ft)

Appendix A2 – Sour Calculations (100-Year)

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CLIENT: City of Scottsdale	**Cross Section 1086.57**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Deer Valley Split, 100 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	3

Hydraulic Input Parameters

V =	11.83	Average Flow Velocity Through the Reach, (ft/s)
A =	293.06	Cross Sectional Flow area, (ft^2)
W_p=	149.56	Wetted perimeter, (ft)
R =	1.96	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.96	Hydraulic depth, (ft)
S_e =	0.0317	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f\rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.166**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.799	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.024	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**497**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.497	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Deer Valley Split, 100 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00042**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	3630	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.96	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**23.62**	Long-term degradation, (ft)
S_o =	0.02284	Existing channel slope, (ft/ft)
S_L =	0.00042	Equilibrium (Stable) slope, (ft/ft)
L	1054	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	3630	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.0	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.50**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	23.62	Long-term scour depth, (ft)
y_{gs} =	1.50	General scour depth, (ft)
y_s =	**25.11**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	Cross Section 1086.57	BY	ZM	DATE	1/9/2009
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Level I Procedure

$Setback = 1.0\ (Q_{100})^{0.5}$

Setback =	**60**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	3630	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	11.83	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0317	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.2E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	144.2	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	17	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.939	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**60**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.
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Cross Section 1086.57
Existing Condition, 100 Year

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Hydraulic Input Parameters

V =	10.12	Average Flow Velocity Through the Reach, (ft/s)
A =	227.19	Cross Sectional Flow area, (ft^2)
W_p=	146.24	Wetted perimeter, (ft)
R =	1.55	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.56	Hydraulic depth, (ft)
S_e =	0.0316	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.131**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.632	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.025	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**393**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.393	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Existing Condition, 100 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00053**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	2300	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.56	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**23.50**	Long-term degradation, (ft)
S_o =	0.02284	Existing channel slope, (ft/ft)
S_L =	0.00053	Equilibrium (Stable) slope, (ft/ft)
L	1054	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	2300	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)

$Y_m = 0.47 (Q/ Lf)^{1/3}$

Ym =	5.1	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7

$y_{gs} = Z(Y_m)$

y_{gs} =	**1.28**	General scour depth using Lacey's Equation, (ft)

Total Scour

y_{lt} =	23.50	Long-term scour depth, (ft)
y_{gs} =	1.28	General scour depth, (ft)

$y_s = y_{lt} + y_{gs}$

y_s =	**24.79**	Total Scour depth, (ft)

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Existing Condition, 100 Year

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Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**48**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	2300	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	10.12	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0316	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	7.2E+07	Enter Fig. 9 or 10 from the top
$V / (gk_s S_e)^{1/2}$ =	123.5	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	16	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.776	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**48**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.

CLIENT: City of Scottsdale

JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Past Deer Valley, 100 Year

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JOB #	410061A		
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Hydraulic Input Parameters

V =	12.95	Average Flow Velocity Through the Reach, (ft/s)
A =	327.33	Cross Sectional Flow area, (ft^2)
W_p=	149.56	Wetted perimeter, (ft)
R =	2.19	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	2.19	Hydraulic depth, (ft)
S_e =	0.0327	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f \rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.191**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.923	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.023	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**574**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.574	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Past Deer Valley, 100 Year

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JOB #	410061A				
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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00038**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	4610	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	2.19	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**23.67**	Long-term degradation, (ft)
S_o =	0.02284	Existing channel slope, (ft/ft)
S_L =	0.00038	Equilibrium (Stable) slope, (ft/ft)
L	1054	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	4610	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.5	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.62**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	23.67	Long-term scour depth, (ft)
y_{gs} =	1.62	General scour depth, (ft)
y_s =	**25.29**	Total Scour depth, (ft)

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1086.57
Past Deer Valley, 100 Year

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Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**68**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	4610	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	12.61	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0327	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.3E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	151.2	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	17.5	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	1.007	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**68**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1448.784**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Deer Valley Split, 100 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
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Hydraulic Input Parameters

V =	8.33	Average Flow Velocity Through the Reach, (ft/s)
A =	435.73	Cross Sectional Flow area, (ft^2)
W_p=	106.84	Wetted perimeter, (ft)
R =	4.08	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	4.2	Hydraulic depth, (ft)
S_e =	0.0097	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.064**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.310	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.018	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**193**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.193	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 1448.784
Deer Valley Split, 100 Year

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00020**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	3630	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	4.2	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**16.44**	Long-term degradation, (ft)
S_o =	0.02395	Existing channel slope, (ft/ft)
S_L =	0.00020	Equilibrium (Stable) slope, (ft/ft)
L	692	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	3630	Design discharge, (cfs) from **Sheet 6**
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.0	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.50**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	16.44	Long-term scour depth, (ft)
y_{gs} =	1.50	General scour depth, (ft)
y_s =	**17.93**	Total Scour depth, (ft)

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Level I Procedure

$\text{Setback} = 1.0\ (Q_{100})^{0.5}$

Setback =	**60**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	3630	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	8.33	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0975	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.3E+07	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	57.9	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	13.5	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.739	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**60**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

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Cross Section 1448.784

Existing Condition, 100 Year

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Hydraulic Input Parameters

V =	6.9	Average Flow Velocity Through the Reach, (ft/s)
A =	333.32	Cross Sectional Flow area, (ft^2)
W_p=	77.25	Wetted perimeter, (ft)
R =	4.31	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	4.42	Hydraulic depth, (ft)
S_e =	0.0072	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.043**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.209	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.018	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**130**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.130	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00019**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	2300	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	4.42	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**16.44**	Long-term degradation, (ft)
S_o =	0.02395	Existing channel slope, (ft/ft)
S_L =	0.00019	Equilibrium (Stable) slope, (ft/ft)
L	692	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	2300	Design discharge, (cfs) from **Sheet 6**
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	5.1	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.28**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	16.44	Long-term scour depth, (ft)
y_{gs} =	1.28	General scour depth, (ft)
y_s =	**17.73**	Total Scour depth, (ft)

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Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**48**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	2300	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	9.24	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0072	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	2.4E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	235.9	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	19	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.459	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**48**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

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Cross Section 1448.784

Past Deer Valley, 100 Year

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Hydraulic Input Parameters

	V =	9.24	Average Flow Velocity Through the Reach, (ft/s)
	A =	498.78	Cross Sectional Flow area, (ft^2)
	W_p=	118.86	Wetted perimeter, (ft)
	R =	4.20	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
	D_h =	4.33	Hydraulic depth, (ft)
	S_e =	0.0111	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$	**D_c =**	**0.078**	Diameter of the sediment particle at incipient motion conditions, (ft)
$\tau_\rho = 1/8\ f\rho V^2$	τ_ρ=	0.378	Boundary shear stress, (lb/ft^2)
	γ_s =	165	Specific weight of sediment, lb/ft^3
	Coeff. =	0.047	Shields parameter, (dimensionless)
	γ =	62.4	Specific weight of water, lb/ft3
$f = 116.5\ n^2 / R^{1/3}$	f =	0.018	Friction factor, (dimensionless)
	ρ =	1.94	Density of the water,($slugs/ft^3$)
$n = D_{90}^{1/6} / 26$	**n =**	0.016	Manning resistance value, (dimensionless)
	D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$	**ΔZ_a =**	**235**	Depth of degradation or scour required to form armor layer, (ft)
Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions	**y_a =**	0.235	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
	P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00019**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	4610	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	4.33	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**16.44**	Long-term degradation, (ft)
S_o =	0.02395	Existing channel slope, (ft/ft)
S_L =	0.00019	Equilibrium (Stable) slope, (ft/ft)
L	692	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	4610	Design discharge, (cfs) from **Sheet 6**
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.5	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.62**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	16.44	Long-term scour depth, (ft)
y_{gs} =	1.62	General scour depth, (ft)
y_s =	**18.06**	Total Scour depth, (ft)

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Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**68**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	4610	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	9.24	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0111	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.6E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	190.5	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	18.5	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.484	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**68**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

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Cross Section 1934.738

Deer Valley Split, 100 Year

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Hydraulic Input Parameters

V =	12.65	Average Flow Velocity Through the Reach, (ft/s)
A =	285.66	Cross Sectional Flow area, (ft^2)
W_p=	122.32	Wetted perimeter, (ft)
R =	2.34	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	2.35	Hydraulic depth, (ft)
S_e =	0.0289	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f \rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.179**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.862	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, a dimensionless coefficient which typically varies between 0.02 to 0.10
γ =	62.4	Specific weight of water, lb/ft3
f =	0.022	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**536**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.536	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00035**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel, (always 1)
Q_{bf} =	3630	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	2.35	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.53**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00035	Equilibrium (Stable) slope, (ft/ft)
L	207	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	3630	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.0	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.50**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.53	Long-term scour depth, (ft)
y_{gs} =	1.50	General scour depth, (ft)
y_s =	**6.02**	Total Scour depth, (ft)

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Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**60**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	3630	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case 2: $D_{75} \leq 0.25$ in

V =	12.65	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0289	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.5E+08	Enter Fig. 9 or 10 from the top
$V / (gk_s S_e)^{1/2}$ =	161.6	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	18	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.958	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.060	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**60**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

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Hydraulic Input Parameters

V =	10.86	Average Flow Velocity Through the Reach, (ft/s)
A =	211.73	Cross Sectional Flow area, (ft^2)
W_p=	112.18	Wetted perimeter, (ft)
R =	1.89	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.9	Hydraulic depth, (ft)
S_e =	0.0281	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_p / [0.047 (\gamma_s - \gamma)]$

$\tau_p = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.141**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_p =	0.682	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.024	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**424**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.424	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

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Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00044**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	2300	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.9	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.51**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00044	Equilibrium (Stable) slope, (ft/ft)
L	207	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	2300	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	5.1	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.28**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.51	Long-term scour depth, (ft)
y_{gs} =	1.28	General scour depth, (ft)
y_s =	**5.79**	Total Scour depth, (ft)

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Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**48**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	2300	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	10.86	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0281	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.0E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	140.6	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	17	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.792	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**48**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 1934.738**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 100 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	3

Hydraulic Input Parameters

V =	13.71	Average Flow Velocity Through the Reach, (ft/s)
A =	328.77	Cross Sectional Flow area, (ft^2)
W_p=	124	Wetted perimeter, (ft)
R =	2.65	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	2.67	Hydraulic depth, (ft)
S_e =	0.0291	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.201**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ=	0.971	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.021	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**603**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.604	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.0010	percent of material coarser than the critical particle size expressed as a decimal fraction

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00031**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	4610	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	2.67	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.54**	Long-term degradation, (ft)
S_o =	0.02224	Existing channel slope, (ft/ft)
S_L =	0.00031	Equilibrium (Stable) slope, (ft/ft)
L	207	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	4610	Design discharge, (cfs) from **Sheet 6**
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.5	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.62**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.54	Long-term scour depth, (ft)
y_{gs} =	1.62	General scour depth, (ft)
y_s =	**6.16**	Total Scour depth, (ft)

Level I Procedure

$Setback = 1.0\ (Q_{100})^{0.5}$

Setback =	**68**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	4610	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	9.24	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0291	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	6.0E+07	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	117.4	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	16	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.647	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**68**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 764.0201**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Deer Valley Split, 100 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	3

Hydraulic Input Parameters

	V =	10.73	Average Flow Velocity Through the Reach, (ft/s)
	A =	264.73	Cross Sectional Flow area, (ft^2)
	W_p=	116.14	Wetted perimeter, (ft)
	R =	2.28	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
	D_h =	2.32	Hydraulic depth, (ft)
	S_e =	0.0213	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$	**D_c =**	**0.130**	Diameter of the sediment particle at incipient motion conditions, (ft)
$\tau_\rho = 1/8\, f \rho V^2$	τ_ρ =	0.625	Boundary shear stress, (lb/ft^2)
	γ_s =	165	Specific weight of sediment, lb/ft^3
	Coeff. =	0.047	Shields parameter, (dimensionless)
	γ =	62.4	Specific weight of water, lb/ft3
$f = 116.5\, n^2 / R^{1/3}$	f =	0.022	Friction factor, (dimensionless)
	ρ =	1.94	Density of the water,($slugs/ft^3$)
$n = D_{90}^{1/6} / 26$	**n =**	0.016	Manning resistance value, (dimensionless)
	D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$	**ΔZ_a =**	**389**	Depth of degradation or scour required to form armor layer, (ft)
Note: if armor layer is stable for the design event, reasonable to conclude no degredation will occur under design conditions	**y_a =**	0.389	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
	P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Deer Valley Split, 100 Year

BY	ZM	**DATE**	1/9/2009	
CHECK	AL	**DATE**	1/9/2009	
JOB #	410061A			
SHEET	2	**OF**	3	

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00036**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	3630	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	2.32	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.22**	Long-term degradation, (ft)
S_o =	0.01729	Existing channel slope, (ft/ft)
S_L =	0.00036	Equilibrium (Stable) slope, (ft/ft)
L	249	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	3630	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.0	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.50**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.22	Long-term scour depth, (ft)
y_{gs} =	1.50	General scour depth, (ft)
y_s =	**5.72**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Deer Valley Split, 100 Year

BY	ZM	DATE	1/9/2009	
CHECK	AL	DATE	1/9/2009	
JOB #	410061A			
SHEET	3	OF	3	

Level I Procedure

$Setback = 1.0\ (Q_{100})^{0.5}$

Setback =	**60**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	3630	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	10.73	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0213	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.3E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	159.6	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	17.5	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.729	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**60**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 764.0201**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Existing Condition, 100 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	3

Hydraulic Input Parameters

V =	9.48	Average Flow Velocity Through the Reach, (ft/s)
A =	207.09	Cross Sectional Flow area, (ft^2)
W_p=	115.58	Wetted perimeter, (ft)
R =	1.79	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	1.82	Hydraulic depth, (ft)
S_e =	0.0229	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_\rho / [0.047 (\gamma_s - \gamma)]$

$\tau_\rho = 1/8\ f\rho V^2$

$f = 116.5\ n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.110**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_ρ =	0.529	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.024	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**329**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.329	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Existing Condition, 100 Year

BY	ZM	**DATE**	1/9/2009		
CHECK	AL	**DATE**	1/9/2009		
JOB #	410061A				
SHEET	2	**OF**	3		

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00046**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	2300	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	1.82	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.20**	Long-term degradation, (ft)
S_o =	0.01729	Existing channel slope, (ft/ft)
S_L =	0.00046	Equilibrium (Stable) slope, (ft/ft)
L	249	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	2300	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	5.1	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.28**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.20	Long-term scour depth, (ft)
y_{gs} =	1.28	General scour depth, (ft)
y_s =	**5.48**	Total Scour depth, (ft)

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Existing Condition, 100 Year

BY	ZM	DATE	1/9/2009
CHECK	AL	DATE	1/9/2009
JOB #	410061A		
SHEET	3	OF	3

Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**48**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	2300	100 year flow, (cfs)

Level II Procedure

This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	9.48	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0229	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	8.2E+07	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	135.9	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	17	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.603	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**48**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Entellus Inc.

CLIENT: City of Scottsdale	**Cross Section 764.0201**	**BY**	ZM	**DATE**	1/9/2009
JOB: Pima Road Channel Scour Analysis	**Past Deer Valley, 100 Year**	**CHECK**	AL	**DATE**	1/9/2009
		JOB #	410061A		
		SHEET	1	**OF**	3

Hydraulic Input Parameters

V =	11.43	Average Flow Velocity Through the Reach, (ft/s)
A =	301.89	Cross Sectional Flow area, (ft^2)
W_p=	116.49	Wetted perimeter, (ft)
R =	2.59	Hydraulic radius of channel, (ft) (Cross-sectional area of flow divided by wetted perimeter)
D_h =	2.64	Hydraulic depth, (ft)
S_e =	0.0204	Energy slope, (ft/ft)

Incipient Motion Anaylsis

$D_c = \tau_p / [0.047 (\gamma_s - \gamma)]$

$\tau_p = 1/8\, f \rho V^2$

$f = 116.5\, n^2 / R^{1/3}$

$n = D_{90}^{1/6} / 26$

D_c =	**0.141**	Diameter of the sediment particle at incipient motion conditions, (ft)
τ_p =	0.680	Boundary shear stress, (lb/ft^2)
γ_s =	165	Specific weight of sediment, lb/ft^3
Coeff. =	0.047	Shields parameter, (dimensionless)
γ =	62.4	Specific weight of water, lb/ft3
f =	0.021	Friction factor, (dimensionless)
ρ =	1.94	Density of the water,($slugs/ft^3$)
n =	0.016	Manning resistance value, (dimensionless)
D_{90} =	0.005	Particle size which is larger than 90% of all sizes, (m)

Armoring Potential Evaluation

$\Delta Z_a = y_a(1 / P_c - 1)$

Note: if armor layer is stable for the design event, reasonable to conclude no degradation will occur under design conditions

ΔZ_a =	**422**	Depth of degradation or scour required to form armor layer, (ft)
y_a =	0.423	Thickness of the armor layer, (ft) - three times the armor particle size (D_c)
P_c =	0.001	percent of material coarser than the critical particle size expressed as a decimal fraction

Entellus Inc.
CLIENT: City of Scottsdale
JOB: Pima Road Channel Scour Analysis

Cross Section 764.0201
Past Deer Valley, 100 Year

BY	ZM	**DATE**	1/9/2009
CHECK	AL	**DATE**	1/9/2009
JOB #	410061A		
SHEET	2	**OF**	3

Meyer-Peter, Muller Method

$S_L = K_{mpm} (Q / Q_{bf}) (n_s / D_{90}^{1/6})^{3/2} D/d$

S_L =	**0.00032**	Stable slope, (ft/ft)
K_{mpm} =	0.19	Dimensionless coefficient
Q / Q_{bf} =	1	Ratio of total flow to flow over the channel
Q_{bf} =	4610	Dominant discharge, (cfs)
n_s =	0.035	Manning's *n* for the stream bed
D_{90} =	5	Bed sediment diameter for 90% finer, (mm)
D =	1	Mean sediment diameter, D_{50} (mm)
d =	2.64	Mean depth, (ft)

Long-term Degradation

$y_{lt} = (S_o - S_L) L$

y_{lt} =	**4.23**	Long-term degradation, (ft)
S_o =	0.01729	Existing channel slope, (ft/ft)
S_L =	0.00032	Equilibrium (Stable) slope, (ft/ft)
L	249	Distance between downstream control point and point of interest, (ft)

General Scour Equations and Results

$Lf = 1.76(D_m)^{1/2}$

$Y_m = 0.47 (Q/ Lf)^{1/3}$

$y_{gs} = Z(Y_m)$

Lf =	1.760	Lacey's silt factor, (dimensionless)
Q =	4610	Design discharge, (cfs)
D_m =	1	Mean grain size of bed material, D_{50} (mm)
Ym =	6.5	Mean water depth at design discharge, (ft)
Z =	0.25	Multiplying factor from Table 7
y_{gs} =	**1.62**	General scour depth using Lacey's Equation, (ft)

Total Scour

$y_s = y_{lt} + y_{gs}$

y_{lt} =	4.23	Long-term scour depth, (ft)
y_{gs} =	1.62	General scour depth, (ft)
y_s =	**5.85**	Total Scour depth, (ft)

Entellus Inc.

CLIENT: City of Scottsdale	Cross Section 764.0201	BY	ZM	DATE	1/9/2009
JOB: Pima Road Channel Scour Analysis	Past Deer Valley, 100 Year	CHECK	AL	DATE	1/9/2009
		JOB #	410061A		
		SHEET	3	OF	3

Level I Procedure

Setback = 1.0 $(Q_{100})^{0.5}$

Setback =	**68**	Setback for straight channel reaches or reaches with minor curvature, (ft)
Q_{100} =	4610	100 year flow, (cfs)

Level II Procedure

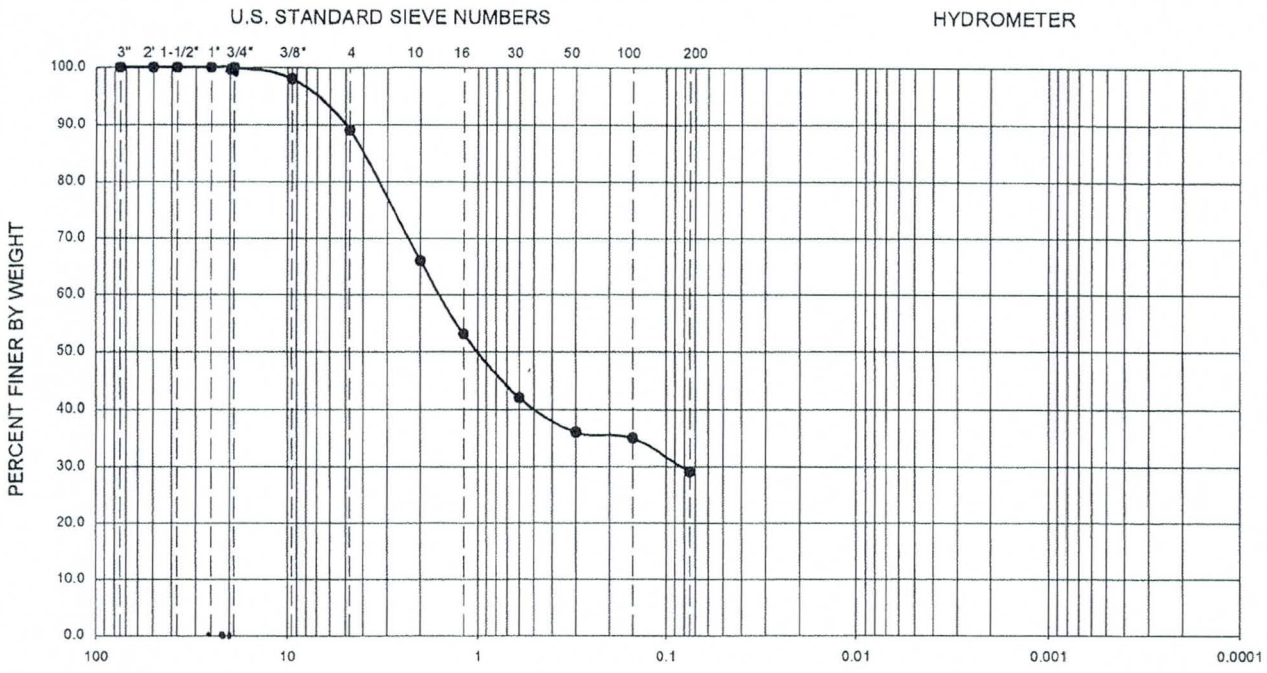
This approach may be applied to demonstrate the stability of the channel material under 100-year flood conditions, and justify a lesser setback requirement than that computed using Level I equations.

Case: $D_{75} \leq 0.25$ in

V =	11.43	Velocity, (ft/s)
ν =	0.0000141	Kinematic viscosity, (ft2/s)
S_e =	0.0204	Energy slope, (ft/ft)
$V^3 / (g\nu S_e)$ =	1.6E+08	Enter Fig. 9 or 10 from the top
$V / (gk_sS_e)^{1/2}$ =	173.7	Find the point of intersection with the above value
k_s =	0.0066	Equivalent roughness height = D65, (ft)
$V / (\tau/\rho)^{1/2}$ =	18	Move horizontally along the Figures 9 or 10 to read the numerical value
ρ =	1.94	Density of water, (slugs/ft3)
Reference τ =	0.782	Reference tractive stress, (lbs/ft2) [Can be found by equating the numerical value read from Fig 9 or 10 to this expression]
D_{50} =	1	Meduian grain size, (mm)
Allowable τ =	0.06	Allowable tractive stress, (lbs/ft2) from Figure 12
Setback =	**68**	If reference tractive stress is smaller than allowable tractive stress then Level I setback can be reduced.

Appendix B – Reference Materials

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

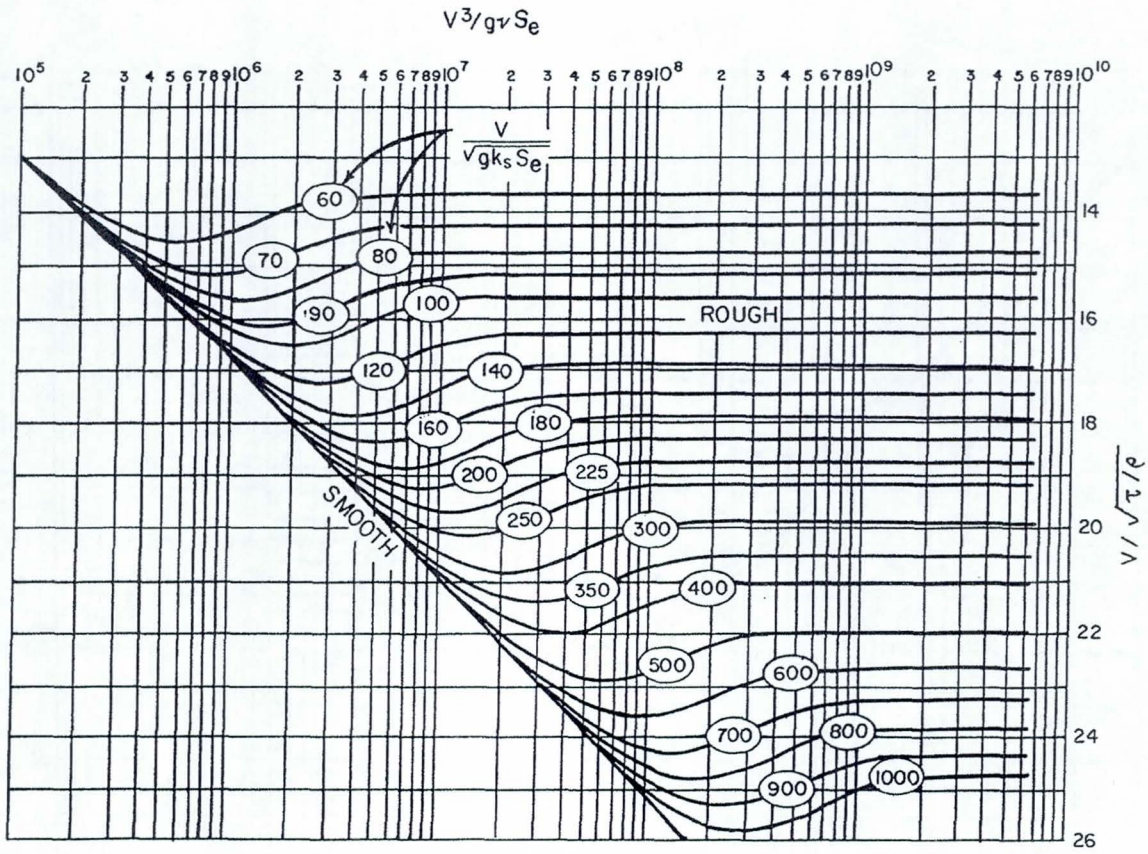


FIGURE 9

GRAPHIC SOLUTION OF REFERENCE TRACTIVE STRESS

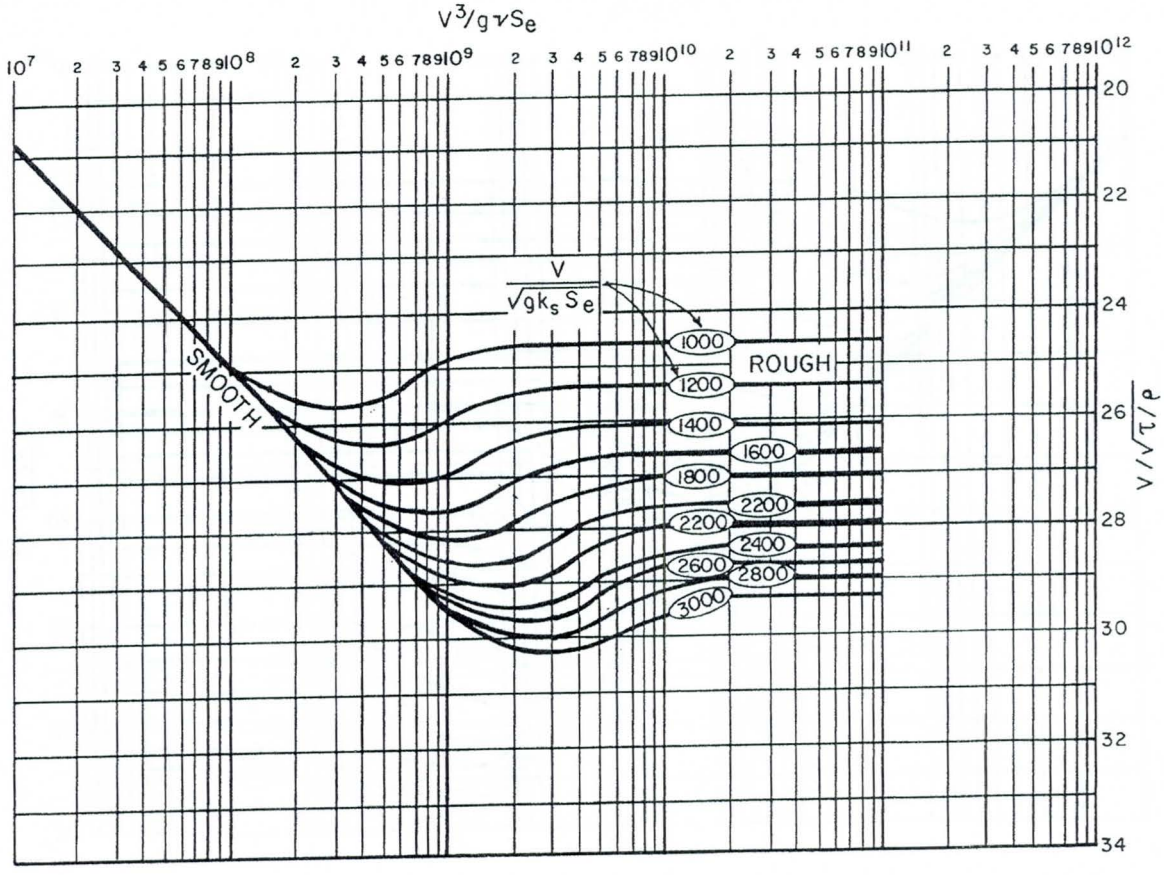


FIGURE 10

GRAPHIC SOLUTION OF REFERENCE TRACTIVE STRESS (CONTINUED)

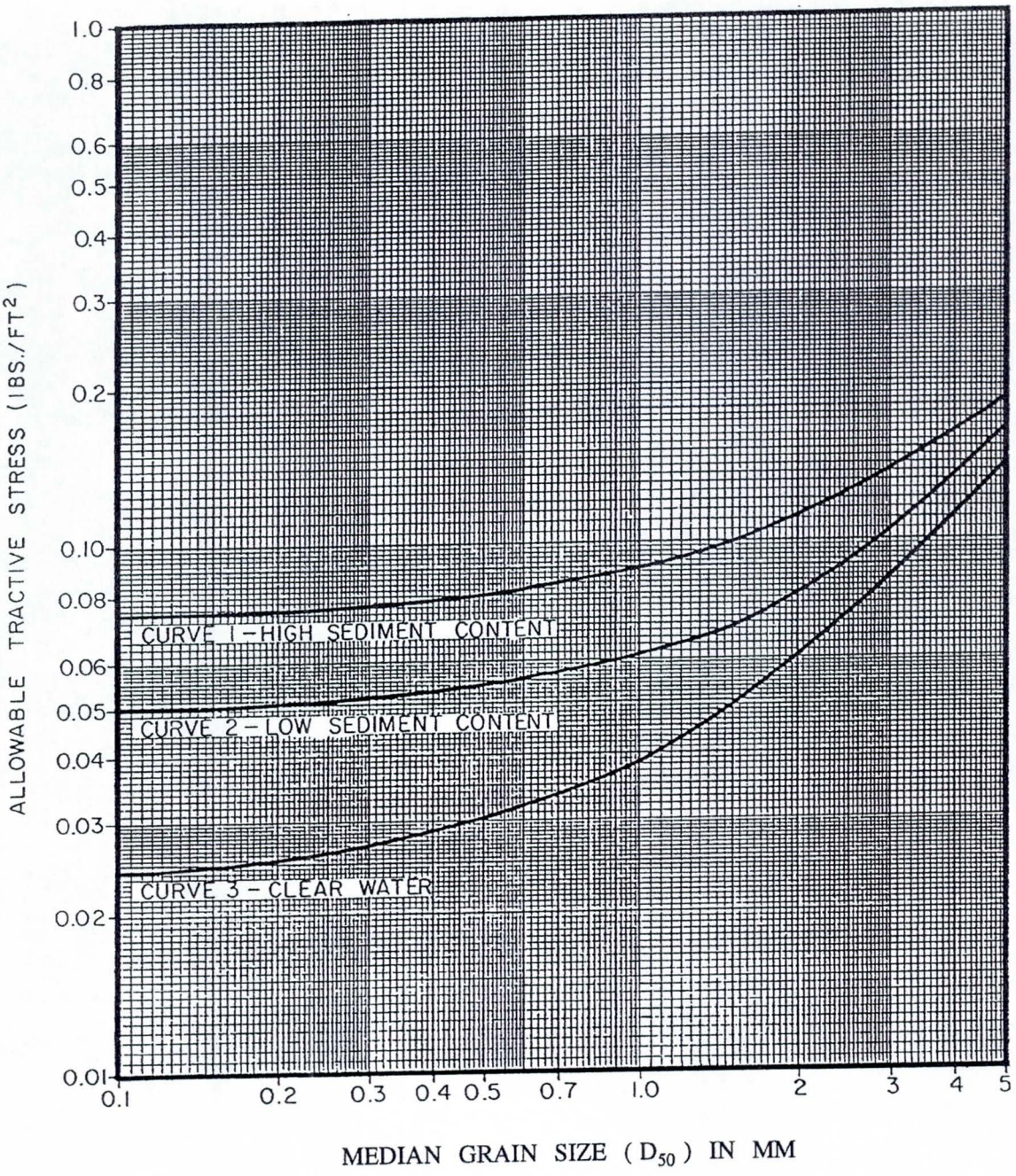


FIGURE 12

MAXIMUM ALLOWABLE TRACTIVE STRESS FOR NON-COHESIVE SOILS, D_{75} <0.25"

Table 7. Multiplying Factors, Z, for Use in Scour Depths by Regime Equation (Pemberton and Lara, 1984)

Condition	Value of Z		
	Neill $d_s = Z\ d_f$	Lacey $d_s = Z\ d_m$	Blench $d_s = Z\ d_{fo}$
Equation Types A and B			
Straight reach	0.5	0.25	1/ 0.6
Moderate bend	0.6	0.5	
Severe bend	0.7	0.75	
Right angle bends		1.0	1.25
Vertical rock bank or wall		1.25	

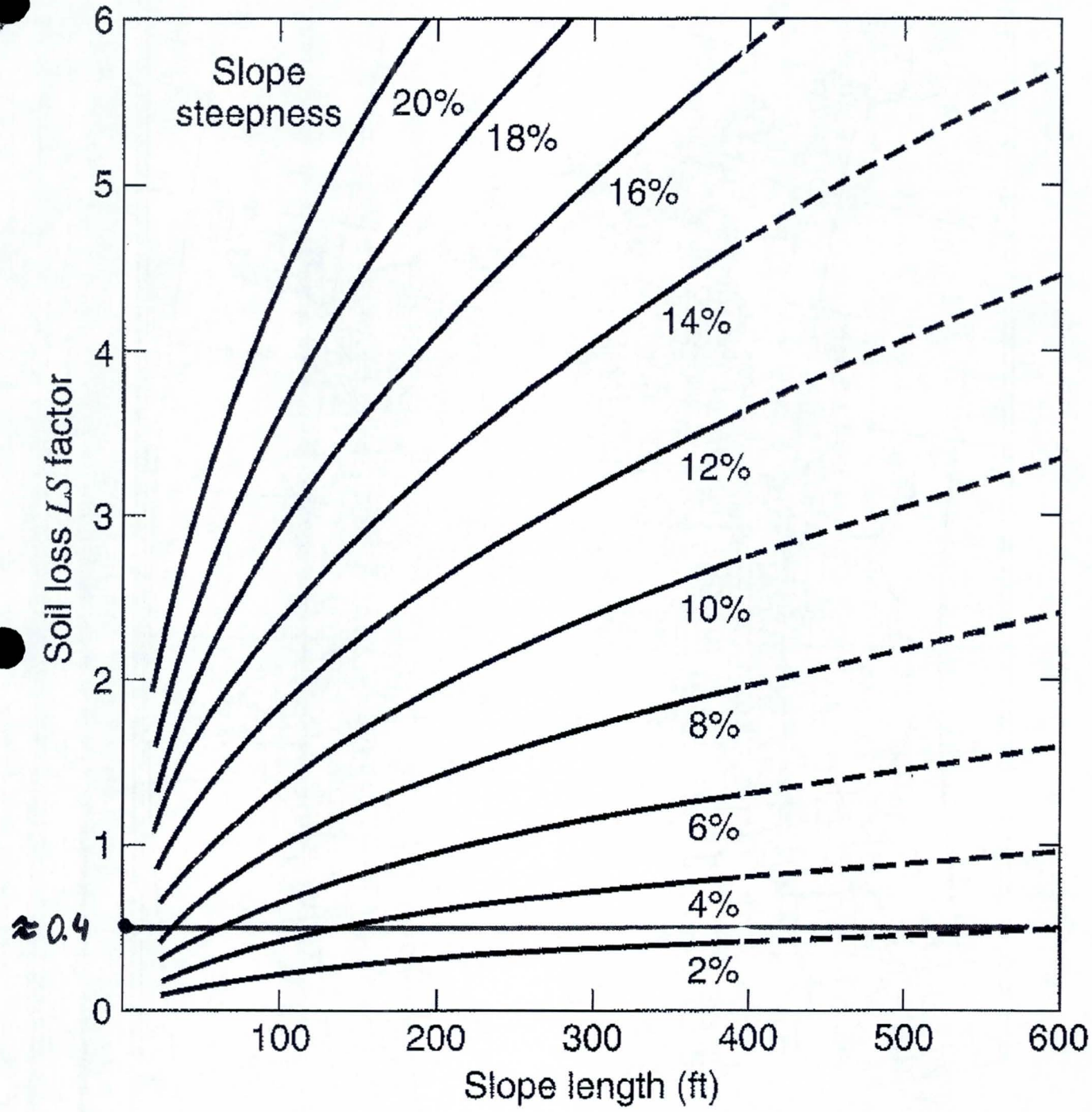


Figure 18.7.2 Topographic-effect graph used to determine *LS*-factor values for different slop-steepness–slope-length combinations (Wischmeier and Smith, 1965).

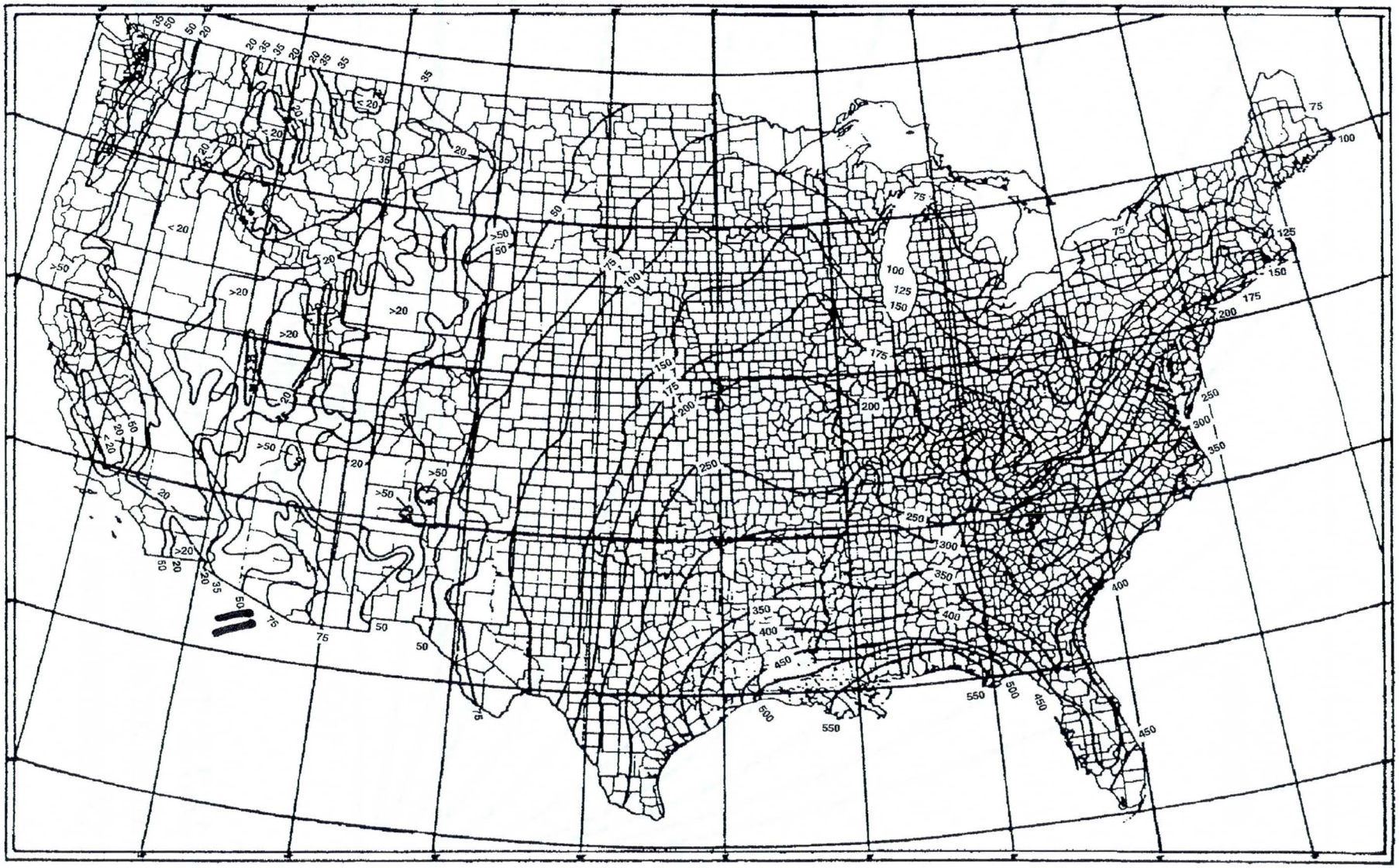


Figure 18.7.1 Average annual values of the rainfall erosion index R (*Wischmeier and Smith*, 1978).

Table 18.7.2 Croppi Management Factor C

Undisturbed forest land		
Percent of area covered by canopy of trees and undergrowth	Percent of area covered by duff at least 2 in deep	Factor C
100–75	100–90	0.0001–0.001
70–45	85–75	0.002–0.004
40–20	70–40	0.003–0.009

Permanent pasture, range, and idle land*							
		Cover that contacts the soil surface					
Vegetative canopy		Percent ground cover					
Type and height†	Type‡	0	20	40	60	80	95+
No appreciable canopy	G	0.45	0.20	0.10	0.042	0.013	0.003
	W	0.45	0.24	0.15	0.091	0.043	0.011
Tall weeds or short brush with average drop fall height of 20 in.	G	0.17–0.36	0.10–0.17	0.06–0.09	0.032–0.038	0.011–0.013	0.003
	W	0.17–0.36	0.12–0.20	0.09–0.13	0.068–0.083	0.038–0.041	0.011
Appreciable brush or bushes, with average drop fall height of 6 1/2 ft	G	0.28–0.40	0.14–0.18	0.08–0.09	0.036–0.040	0.012–0.013	0.003
	W	0.28–0.40	0.17–0.22	0.12–0.14	0.078–0.087	0.040–0.042	0.011
Trees, but no appreciable low brush. Average drop fall height of 13 ft	G	0.36–0.42	0.17–0.19	0.09–0.10	0.039–0.041	0.012–0.013	0.003
	W	0.36–0.42	0.20–0.23	0.13–0.14	0.084–0.089	0.041–0.042	0.011

Table 18.7.1 Soil Erodibility Factor K in tons/acre

Textural class	Organic matter content, %	
	0.5	2
Fine sand	0.16	0.14
Very fine sand	0.42	0.36
Loamy sand	0.12	0.10
Loamy very fine sand	0.44	0.38
Sandy loam	0.27	0.24
Very fine sandy loam	0.47	0.41
Silt loam	0.48	0.42
Clay loam	0.28	0.25
Silty clay loam	0.37	0.32
Silty clay	0.25	0.23

Source: From Schwab et al. (1981).

Appendix C – HEC-RAS Cross Section Data

HEC-RAS Cross Sections Output Table
Existing Conditions (100-Year)

Plan: FU	Pima	PimaChannel RS: 1934.738	Profile: EX_100yr		
E.G. Elev (ft)	1742.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.83	Wt. n-Val.		0.035	
W.S. Elev (ft)	1740.85	Reach Len. (ft)	301.6	301.6	301.6
Crit W.S. (ft)	1741.37	Flow Area (sq ft)		211.73	
E.G. Slope (ft/ft)	0.028067	Area (sq ft)		211.73	1.41
Q Total (cfs)	2300	Flow (cfs)		2300	
Top Width (ft)	115.05	Top Width (ft)		111.53	3.52
Vel Total (ft/s)	10.86	Avg. Vel. (ft/s)		10.86	
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)		1.9	
Conv. Total (cfs)	13728.7	Conv. (cfs)		13728.7	
Length Wtd. (ft)	301.6	Wetted Per. (ft)		112.18	
Min Ch El (ft)	1737.29	Shear (lb/sq ft)		3.31	
Alpha	1	Stream Power (lb/ft s)		35.93	
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	0.61	12.19	0.03
C & E Loss (ft)	0.01	Cum SA (acres)	1.01	5.57	0.1

Plan: FU	Pima	PimaChannel RS: 1448.784	Profile: EX_100yr		
E.G. Elev (ft)	1728.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.		0.048	
W.S. Elev (ft)	1727.79	Reach Len. (ft)	19.4	19.4	19.4
Crit W.S. (ft)	1726.15	Flow Area (sq ft)		333.32	
E.G. Slope (ft/ft)	0.007215	Area (sq ft)		333.32	
Q Total (cfs)	2300	Flow (cfs)		2300	
Top Width (ft)	75.49	Top Width (ft)		75.49	
Vel Total (ft/s)	6.9	Avg. Vel. (ft/s)		6.9	
Max Chl Dpth (ft)	6.21	Hydr. Depth (ft)		4.42	
Conv. Total (cfs)	27077.4	Conv. (cfs)		27077.4	
Length Wtd. (ft)	19.4	Wetted Per. (ft)		77.25	
Min Ch El (ft)	1721.57	Shear (lb/sq ft)		1.94	
Alpha	1	Stream Power (lb/ft s)		13.41	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.61	8.66	0.02
C & E Loss (ft)	0.01	Cum SA (acres)	1.01	4.56	0.09

Plan: FU	Pima	PimaChannel RS: 1086.570	Profile: EX_100yr		
E.G. Elev (ft)	1723	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.59	Wt. n-Val.		0.035	
W.S. Elev (ft)	1721.41	Reach Len. (ft)	40.14	40.14	40.14
Crit W.S. (ft)	1721.96	Flow Area (sq ft)		227.19	
E.G. Slope (ft/ft)	0.031602	Area (sq ft)	2.3	251.04	
Q Total (cfs)	2300	Flow (cfs)		2300	
Top Width (ft)	219.52	Top Width (ft)	22.15	197.36	
Vel Total (ft/s)	10.12	Avg. Vel. (ft/s)		10.12	
Max Chl Dpth (ft)	3.59	Hydr. Depth (ft)		1.56	
Conv. Total (cfs)	12938.1	Conv. (cfs)		12938.1	
Length Wtd. (ft)	40.14	Wetted Per. (ft)		146.24	
Min Ch El (ft)	1717.82	Shear (lb/sq ft)		3.07	
Alpha	1	Stream Power (lb/ft s)		31.03	
Frctn Loss (ft)	2.2	Cum Volume (acre-ft)	0.57	6.45	0.02
C & E Loss (ft)	0.01	Cum SA (acres)	0.85	3.62	0.08

Plan: FU	Pima	PimaChannel RS: 764.0201	Profile: EX_100yr		
E.G. Elev (ft)	1716.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.38	Wt. n-Val.	0.02	0.035	
W.S. Elev (ft)	1714.89	Reach Len. (ft)	18.38	18.38	18.38
Crit W.S. (ft)	1715.23	Flow Area (sq ft)	36.74	207.09	
E.G. Slope (ft/ft)	0.022896	Area (sq ft)	36.74	207.09	0.22
Q Total (cfs)	2300	Flow (cfs)	337.57	1962.44	
Top Width (ft)	165.42	Top Width (ft)	51.26	113.93	0.23
Vel Total (ft/s)	9.43	Avg. Vel. (ft/s)	9.19	9.48	
Max Chl Dpth (ft)	3.3	Hydr. Depth (ft)	0.72	1.82	
Conv. Total (cfs)	15200.1	Conv. (cfs)	2230.9	12969.2	
Length Wtd. (ft)	18.38	Wetted Per. (ft)	51.76	115.58	
Min Ch El (ft)	1712.22	Shear (lb/sq ft)	1.01	2.56	
Alpha	1	Stream Power (lb/ft s)	9.32	24.27	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	0.37	4.74	0
C & E Loss (ft)	0	Cum SA (acres)	0.46	2.74	0

HEC-RAS Cross Sections Output Table
Existing Conditions (2-Year)

Plan: FU	Pima	PimaChannel RS: 1934.738	Profile: EX_2yr		
E.G. Elev (ft)	1738.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.035	
W.S. Elev (ft)	1738.54	Reach Len. (ft)	301.6	301.6	301.6
Crit W.S. (ft)	1738.54	Flow Area (sq ft)		11.44	
E.G. Slope (ft/ft)	0.024575	Area (sq ft)		11.44	
Q Total (cfs)	40	Flow (cfs)		40	
Top Width (ft)	29.86	Top Width (ft)		29.86	
Vel Total (ft/s)	3.5	Avg. Vel. (ft/s)		3.5	
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)		0.38	
Conv. Total (cfs)	255.2	Conv. (cfs)		255.2	
Length Wtd. (ft)	301.6	Wetted Per. (ft)		30.06	
Min Ch El (ft)	1737.29	Shear (lb/sq ft)		0.58	
Alpha	1	Stream Power (lb/ft s)		2.04	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)		1.5	0
C & E Loss (ft)	0.05	Cum SA (acres)		2.18	0

Plan: FU	Pima	PimaChannel RS: 1448.784	Profile: EX_2yr		
E.G. Elev (ft)	1722.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.06	
W.S. Elev (ft)	1722.6	Reach Len. (ft)	19.4	19.4	19.4
Crit W.S. (ft)	1721.93	Flow Area (sq ft)		36.24	
E.G. Slope (ft/ft)	0.002206	Area (sq ft)		36.24	
Q Total (cfs)	40	Flow (cfs)		40	
Top Width (ft)	39	Top Width (ft)		39	
Vel Total (ft/s)	1.1	Avg. Vel. (ft/s)		1.1	
Max Chl Dpth (ft)	1.02	Hydr. Depth (ft)		0.93	
Conv. Total (cfs)	851.7	Conv. (cfs)		851.7	
Length Wtd. (ft)	19.4	Wetted Per. (ft)		39.29	
Min Ch El (ft)	1721.57	Shear (lb/sq ft)		0.13	
Alpha	1	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		1.17	0
C & E Loss (ft)	0	Cum SA (acres)		1.78	0

Plan: FU	Pima	PimaChannel RS: 1086.570	Profile: EX_2yr		
E.G. Elev (ft)	1718.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.035	
W.S. Elev (ft)	1718.69	Reach Len. (ft)	40.14	40.14	40.14
Crit W.S. (ft)	1718.73	Flow Area (sq ft)		9.6	
E.G. Slope (ft/ft)	0.029338	Area (sq ft)		9.6	
Q Total (cfs)	40	Flow (cfs)		40	
Top Width (ft)	22.08	Top Width (ft)		22.08	
Vel Total (ft/s)	4.17	Avg. Vel. (ft/s)		4.17	
Max Chl Dpth (ft)	0.87	Hydr. Depth (ft)		0.43	
Conv. Total (cfs)	233.5	Conv. (cfs)		233.5	
Length Wtd. (ft)	40.14	Wetted Per. (ft)		22.15	
Min Ch El (ft)	1717.82	Shear (lb/sq ft)		0.79	
Alpha	1	Stream Power (lb/ft s)		3.31	
Frctn Loss (ft)	2.47	Cum Volume (acre-ft)		0.99	0
C & E Loss (ft)	0.01	Cum SA (acres)		1.5	0

Plan: FU	Pima	PimaChannel RS: 764.0201	Profile: EX_2yr		
E.G. Elev (ft)	1713.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.035	
W.S. Elev (ft)	1713.09	Reach Len. (ft)	18.38	18.38	18.38
Crit W.S. (ft)	1713.06	Flow Area (sq ft)		16.97	
E.G. Slope (ft/ft)	0.02015	Area (sq ft)		16.97	0
Q Total (cfs)	40	Flow (cfs)		40	
Top Width (ft)	68.99	Top Width (ft)		68.98	
Vel Total (ft/s)	2.36	Avg. Vel. (ft/s)		2.36	
Max Chl Dpth (ft)	1.5	Hydr. Depth (ft)		0.25	
Conv. Total (cfs)	281.8	Conv. (cfs)		281.8	
Length Wtd. (ft)	18.38	Wetted Per. (ft)		69.36	
Min Ch El (ft)	1712.22	Shear (lb/sq ft)		0.31	
Alpha	1	Stream Power (lb/ft s)		0.73	
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)		0.88	0
C & E Loss (ft)	0	Cum SA (acres)		1.19	

HEC-RAS Cross Sections Output Table • Sierra Pinta Drive Channel with Deer Valley Split (100-Year)					
Plan: FU	**Pima**	**PimaChannel RS: 1934.738**	**Profile: DVSPLT_100yr**		
E.G. Elev (ft)	1743.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.5	Wt. n-Val.	0.018	0.035	
W.S. Elev (ft)	1741.49	Reach Len. (ft)	301.6	301.6	301.6
Crit W.S. (ft)	1742.37	Flow Area (sq ft)	1.21	285.66	
E.G. Slope (ft/ft)	0.028851	Area (sq ft)	1.21	285.66	4.54
Q Total (cfs)	3630	Flow (cfs)	4.12	3625.88	
Top Width (ft)	137.78	Top Width (ft)	9.89	121.54	6.35
Vel Total (ft/s)	12.65	Avg. Vel. (ft/s)	3.41	12.69	
Max Chl Dpth (ft)	4.19	Hydr. Depth (ft)	0.12	2.35	
Conv. Total (cfs)	21371.2	Conv. (cfs)	24.2	21346.9	
Length Wtd. (ft)	301.6	Wetted Per. (ft)	10.06	122.32	
Min Ch El (ft)	1737.29	Shear (lb/sq ft)	0.22	4.21	
Alpha	1.01	Stream Power (lb/ft s)	0.74	53.39	
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	1.34	15.88	0.1
C & E Loss (ft)	0.01	Cum SA (acres)	1.67	6.23	0.12
Plan: FU	**Pima**	**PimaChannel RS: 1448.784**	**Profile: DVSPLT_100yr**		
E.G. Elev (ft)	1730	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.08	Wt. n-Val.		0.045	
W.S. Elev (ft)	1728.92	Reach Len. (ft)	19.4	19.4	19.4
Crit W.S. (ft)	1727.48	Flow Area (sq ft)		435.73	
E.G. Slope (ft/ft)	0.009749	Area (sq ft)		435.73	
Q Total (cfs)	3630	Flow (cfs)		3630	
Top Width (ft)	103.67	Top Width (ft)		103.67	
Vel Total (ft/s)	8.33	Avg. Vel. (ft/s)		8.33	
Max Chl Dpth (ft)	7.34	Hydr. Depth (ft)		4.2	
Conv. Total (cfs)	36764	Conv. (cfs)		36764	
Length Wtd. (ft)	19.4	Wetted Per. (ft)		106.84	
Min Ch El (ft)	1721.57	Shear (lb/sq ft)		2.48	
Alpha	1	Stream Power (lb/ft s)		20.68	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	1.34	11.22	0.09
C & E Loss (ft)	0.01	Cum SA (acres)	1.63	5.13	0.1
Plan: FU	**Pima**	**PimaChannel RS: 1086.570**	**Profile: DVSPLT_100yr**		
E.G. Elev (ft)	1723.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.11	Wt. n-Val.	0.019	0.035	
W.S. Elev (ft)	1721.85	Reach Len. (ft)	40.14	40.14	40.14
Crit W.S. (ft)	1722.46	Flow Area (sq ft)	22.88	293.06	
E.G. Slope (ft/ft)	0.031672	Area (sq ft)	22.88	339.65	
Q Total (cfs)	3630	Flow (cfs)	162.74	3467.26	
Top Width (ft)	264.56	Top Width (ft)	63.88	200.68	
Vel Total (ft/s)	11.49	Avg. Vel. (ft/s)	7.11	11.83	
Max Chl Dpth (ft)	4.03	Hydr. Depth (ft)	0.36	1.96	
Conv. Total (cfs)	20397.1	Conv. (cfs)	914.4	19482.6	
Length Wtd. (ft)	40.14	Wetted Per. (ft)	64.41	149.56	
Min Ch El (ft)	1717.82	Shear (lb/sq ft)	0.7	3.87	
Alpha	1.03	Stream Power (lb/ft s)	5	45.84	
Frctn Loss (ft)	2.25	Cum Volume (acre-ft)	1.17	8.4	0.08
C & E Loss (ft)	0.02	Cum SA (acres)	1.28	4.13	0.08
Plan: FU	**Pima**	**PimaChannel RS: 764.0201**	**Profile: DVSPLT_100yr**		
E.G. Elev (ft)	1717.3	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.91	Wt. n-Val.	0.02	0.035	
W.S. Elev (ft)	1715.39	Reach Len. (ft)	18.38	18.38	18.38
Crit W.S. (ft)	1715.87	Flow Area (sq ft)	64.23	264.73	
E.G. Slope (ft/ft)	0.021278	Area (sq ft)	64.23	264.73	0.35
Q Total (cfs)	3630	Flow (cfs)	790.37	2839.63	
Top Width (ft)	171.9	Top Width (ft)	57.45	114.15	0.29
Vel Total (ft/s)	11.03	Avg. Vel. (ft/s)	12.3	10.73	
Max Chl Dpth (ft)	3.8	Hydr. Depth (ft)	1.12	2.32	
Conv. Total (cfs)	24885.1	Conv. (cfs)	5418.3	19466.8	
Length Wtd. (ft)	18.38	Wetted Per. (ft)	58.32	116.14	
Min Ch El (ft)	1712.22	Shear (lb/sq ft)	1.46	3.03	
Alpha	1.01	Stream Power (lb/ft s)	18	32.48	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	0.73	6.24	0
C & E Loss (ft)	0	Cum SA (acres)	0.8	3.23	0

HEC-RAS Cross Sections Output Table
• Sierra Pinta Drive Channel with Deer Valley Split (2-Year)

Plan: FU	Pima	PimaChannel RS: 1934.738	Profile: DVSPLT_2yr		
E.G. Elev (ft)	1740.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.		0.035	
W.S. Elev (ft)	1739.67	Reach Len. (ft)	301.6	301.6	301.6
Crit W.S. (ft)	1739.77	Flow Area (sq ft)		91.08	
E.G. Slope (ft/ft)	0.024868	Area (sq ft)		91.08	
Q Total (cfs)	600	Flow (cfs)		600	
Top Width (ft)	92.9	Top Width (ft)		92.9	
Vel Total (ft/s)	6.59	Avg. Vel. (ft/s)		6.59	
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)		0.98	
Conv. Total (cfs)	3804.8	Conv. (cfs)		3804.8	
Length Wtd. (ft)	301.6	Wetted Per. (ft)		93.31	
Min Ch El (ft)	1737.29	Shear (lb/sq ft)		1.52	
Alpha	1	Stream Power (lb/ft s)		9.98	
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	0.07	5.21	0
C & E Loss (ft)	0.01	Cum SA (acres)	0.26	4	0

Plan: FU	Pima	PimaChannel RS: 1448.784	Profile: DVSPLT_2yr		
E.G. Elev (ft)	1725.4	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.052	
W.S. Elev (ft)	1725.19	Reach Len. (ft)	19.4	19.4	19.4
Crit W.S. (ft)	1723.64	Flow Area (sq ft)		160.69	
E.G. Slope (ft/ft)	0.004492	Area (sq ft)		160.69	
Q Total (cfs)	600	Flow (cfs)		600	
Top Width (ft)	57.2	Top Width (ft)		57.2	
Vel Total (ft/s)	3.73	Avg. Vel. (ft/s)		3.73	
Max Chl Dpth (ft)	3.61	Hydr. Depth (ft)		2.81	
Conv. Total (cfs)	8951.7	Conv. (cfs)		8951.7	
Length Wtd. (ft)	19.4	Wetted Per. (ft)		58.22	
Min Ch El (ft)	1721.57	Shear (lb/sq ft)		0.77	
Alpha	1	Stream Power (lb/ft s)		2.89	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.07	3.59	0
C & E Loss (ft)	0	Cum SA (acres)	0.26	3.27	0

Plan: FU	Pima	PimaChannel RS: 1086.570	Profile: DVSPLT_2yr		
E.G. Elev (ft)	1721.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.69	Wt. n-Val.		0.035	
W.S. Elev (ft)	1720.32	Reach Len. (ft)	40.14	40.14	40.14
Crit W.S. (ft)	1720.48	Flow Area (sq ft)		89.7	
E.G. Slope (ft/ft)	0.026102	Area (sq ft)		89.7	
Q Total (cfs)	600	Flow (cfs)		600	
Top Width (ft)	92.99	Top Width (ft)		92.99	
Vel Total (ft/s)	6.69	Avg. Vel. (ft/s)		6.69	
Max Chl Dpth (ft)	2.5	Hydr. Depth (ft)		0.96	
Conv. Total (cfs)	3713.7	Conv. (cfs)		3713.7	
Length Wtd. (ft)	40.14	Wetted Per. (ft)		93.15	
Min Ch El (ft)	1717.82	Shear (lb/sq ft)		1.57	
Alpha	1	Stream Power (lb/ft s)		10.5	
Frctn Loss (ft)	2	Cum Volume (acre-ft)	0.07	2.64	0
C & E Loss (ft)	0.01	Cum SA (acres)	0.26	2.64	0

Plan: FU	Pima	PimaChannel RS: 764.0201	Profile: DVSPLT_2yr		
E.G. Elev (ft)	1714.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.	0.021	0.035	
W.S. Elev (ft)	1713.94	Reach Len. (ft)	18.38	18.38	18.38
Crit W.S. (ft)	1714.04	Flow Area (sq ft)	1.95	100.11	
E.G. Slope (ft/ft)	0.023431	Area (sq ft)	1.95	100.11	0.05
Q Total (cfs)	600	Flow (cfs)	5.31	594.69	
Top Width (ft)	129.04	Top Width (ft)	15.41	113.51	0.11
Vel Total (ft/s)	5.88	Avg. Vel. (ft/s)	2.72	5.94	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)	0.13	0.88	
Conv. Total (cfs)	3919.7	Conv. (cfs)	34.7	3885	
Length Wtd. (ft)	18.38	Wetted Per. (ft)	15.58	114.55	
Min Ch El (ft)	1712.22	Shear (lb/sq ft)	0.18	1.28	
Alpha	1.01	Stream Power (lb/ft s)	0.5	7.59	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	0.06	1.92	0
C & E Loss (ft)	0	Cum SA (acres)	0.21	1.95	0

HEC-RAS Cross Sections Output Table
Sierra Pinta Drive Channel with Pima Channel Past Deer Valley (100-Year)

Plan: FU	Pima	PimaChannel RS: 1934.738	Profile: PastDV_100yr		
E.G. Elev (ft)	1744.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.97	Wt. n-Val.	0.018	0.035	
W.S. Elev (ft)	1741.84	Reach Len. (ft)	301.6	301.6	301.6
Crit W.S. (ft)	1742.79	Flow Area (sq ft)	7.57	328.77	
E.G. Slope (ft/ft)	0.029144	Area (sq ft)	7.57	328.77	7.05
Q Total (cfs)	4610	Flow (cfs)	45.49	4564.51	
Top Width (ft)	157.41	Top Width (ft)	26.34	123.15	7.92
Vel Total (ft/s)	13.71	Avg. Vel. (ft/s)	6.01	13.88	
Max Chl Dpth (ft)	4.54	Hydr. Depth (ft)	0.29	2.67	
Conv. Total (cfs)	27004.1	Conv. (cfs)	266.5	26737.7	
Length Wtd. (ft)	301.6	Wetted Per. (ft)	26.7	124	
Min Ch El (ft)	1737.29	Shear (lb/sq ft)	0.52	4.82	
Alpha	1.02	Stream Power (lb/ft s)	3.1	66.97	
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	1.86	17.92	0.16
C & E Loss (ft)	0.01	Cum SA (acres)	1.9	6.31	0.14

Plan: FU	Pima	PimaChannel RS: 1448.784	Profile: PastDV_100yr		
E.G. Elev (ft)	1730.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.33	Wt. n-Val.	0	0.044	
W.S. Elev (ft)	1729.49	Reach Len. (ft)	19.4	19.4	19.4
Crit W.S. (ft)	1728.53	Flow Area (sq ft)	0	498.78	
E.G. Slope (ft/ft)	0.011066	Area (sq ft)	3.4	498.78	
Q Total (cfs)	4610	Flow (cfs)	0	4610	
Top Width (ft)	132.87	Top Width (ft)	17.72	115.15	
Vel Total (ft/s)	9.24	Avg. Vel. (ft/s)	0.36	9.24	
Max Chl Dpth (ft)	7.92	Hydr. Depth (ft)	0.03	4.33	
Conv. Total (cfs)	43823.4	Conv. (cfs)	0	43823.3	
Length Wtd. (ft)	19.4	Wetted Per. (ft)	0.09	118.86	
Min Ch El (ft)	1721.57	Shear (lb/sq ft)		2.9	
Alpha	1	Stream Power (lb/ft s)		26.8	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	1.84	12.59	0.13
C & E Loss (ft)	0.02	Cum SA (acres)	1.8	5.16	0.12

Plan: FU	Pima	PimaChannel RS: 1086.570	Profile: PastDV_100yr		
E.G. Elev (ft)	1724.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.51	Wt. n-Val.	0.019	0.035	
W.S. Elev (ft)	1722.08	Reach Len. (ft)	40.14	40.14	40.14
Crit W.S. (ft)	1722.81	Flow Area (sq ft)	38.32	327.33	
E.G. Slope (ft/ft)	0.032737	Area (sq ft)	38.32	385.71	
Q Total (cfs)	4610	Flow (cfs)	371.38	4238.62	
Top Width (ft)	268.45	Top Width (ft)	67.77	200.68	
Vel Total (ft/s)	12.61	Avg. Vel. (ft/s)	9.69	12.95	
Max Chl Dpth (ft)	4.26	Hydr. Depth (ft)	0.57	2.19	
Conv. Total (cfs)	25479.1	Conv. (cfs)	2052.6	23426.5	
Length Wtd. (ft)	40.14	Wetted Per. (ft)	68.42	149.56	
Min Ch El (ft)	1717.82	Shear (lb/sq ft)	1.14	4.47	
Alpha	1.02	Stream Power (lb/ft s)	11.09	57.92	
Frctn Loss (ft)	2.26	Cum Volume (acre-ft)	1.54	9.43	0.12
C & E Loss (ft)	0.02	Cum SA (acres)	1.38	4.15	0.09

Plan: FU	Pima	PimaChannel RS: 764.0201	Profile: PastDV_100yr		
E.G. Elev (ft)	1717.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.28	Wt. n-Val.	0.02	0.035	
W.S. Elev (ft)	1715.72	Reach Len. (ft)	18.38	18.38	18.38
Crit W.S. (ft)	1716.29	Flow Area (sq ft)	83.22	301.89	
E.G. Slope (ft/ft)	0.020365	Area (sq ft)	83.22	301.89	0.45
Q Total (cfs)	4610	Flow (cfs)	1159.13	3450.87	
Top Width (ft)	173.25	Top Width (ft)	58.62	114.3	0.33
Vel Total (ft/s)	11.97	Avg. Vel. (ft/s)	13.93	11.43	
Max Chl Dpth (ft)	4.13	Hydr. Depth (ft)	1.42	2.64	
Conv. Total (cfs)	32304	Conv. (cfs)	8122.4	24181.5	
Length Wtd. (ft)	18.38	Wetted Per. (ft)	59.61	116.49	
Min Ch El (ft)	1712.22	Shear (lb/sq ft)	1.78	3.29	
Alpha	1.02	Stream Power (lb/ft s)	24.72	37.66	
Frctn Loss (ft)	0.4	Cum Volume (acre-ft)	0.94	6.97	0
C & E Loss (ft)	0.01	Cum SA (acres)	0.88	3.25	0

HEC-RAS Cross Sections Output Table
Sierra Pinta Drive Channel with Pima Channel Past Deer Valley (2-Year)

Plan: FU	Pima	PimaChannel RS: 1934.738	Profile: PastDV_2yr		
E.G. Elev (ft)	1740.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.94	Wt. n-Val.		0.035	
W.S. Elev (ft)	1739.99	Reach Len. (ft)	301.6	301.6	301.6
Crit W.S. (ft)	1740.18	Flow Area (sq ft)		120.97	
E.G. Slope (ft/ft)	0.025406	Area (sq ft)		120.97	
Q Total (cfs)	940	Flow (cfs)		940	
Top Width (ft)	97.85	Top Width (ft)		97.85	
Vel Total (ft/s)	7.77	Avg. Vel. (ft/s)		7.77	
Max Chl Dpth (ft)	2.69	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	5897.4	Conv. (cfs)		5897.4	
Length Wtd. (ft)	301.6	Wetted Per. (ft)		98.32	
Min Ch El (ft)	1737.29	Shear (lb/sq ft)		1.95	
Alpha	1	Stream Power (lb/ft s)		15.16	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	0.15	6.52	0
C & E Loss (ft)	0.02	Cum SA (acres)	0.41	4.24	0

Plan: FU	Pima	PimaChannel RS: 1448.784	Profile: PastDV_2yr		
E.G. Elev (ft)	1726.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.051	
W.S. Elev (ft)	1725.91	Reach Len. (ft)	19.4	19.4	19.4
Crit W.S. (ft)	1724.27	Flow Area (sq ft)		204.21	
E.G. Slope (ft/ft)	0.005292	Area (sq ft)		204.21	
Q Total (cfs)	940	Flow (cfs)		940	
Top Width (ft)	62.32	Top Width (ft)		62.32	
Vel Total (ft/s)	4.6	Avg. Vel. (ft/s)		4.6	
Max Chl Dpth (ft)	4.34	Hydr. Depth (ft)		3.28	
Conv. Total (cfs)	12922.1	Conv. (cfs)		12922.1	
Length Wtd. (ft)	19.4	Wetted Per. (ft)		63.55	
Min Ch El (ft)	1721.57	Shear (lb/sq ft)		1.06	
Alpha	1	Stream Power (lb/ft s)		4.89	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	0.15	4.44	0
C & E Loss (ft)	0	Cum SA (acres)	0.41	3.46	0

Plan: FU	Pima	PimaChannel RS: 1086.570	Profile: PastDV_2yr		
E.G. Elev (ft)	1721.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.83	Wt. n-Val.		0.035	
W.S. Elev (ft)	1720.68	Reach Len. (ft)	40.14	40.14	40.14
Crit W.S. (ft)	1720.88	Flow Area (sq ft)		128.33	
E.G. Slope (ft/ft)	0.027392	Area (sq ft)		128.33	
Q Total (cfs)	940	Flow (cfs)		940	
Top Width (ft)	120.39	Top Width (ft)		120.39	
Vel Total (ft/s)	7.32	Avg. Vel. (ft/s)		7.32	
Max Chl Dpth (ft)	2.86	Hydr. Depth (ft)		1.07	
Conv. Total (cfs)	5679.6	Conv. (cfs)		5679.6	
Length Wtd. (ft)	40.14	Wetted Per. (ft)		120.57	
Min Ch El (ft)	1717.82	Shear (lb/sq ft)		1.82	
Alpha	1	Stream Power (lb/ft s)		13.33	
Frctn Loss (ft)	2.06	Cum Volume (acre-ft)	0.15	3.19	0
C & E Loss (ft)	0.01	Cum SA (acres)	0.41	2.75	0

Plan: FU	Pima	PimaChannel RS: 764.0201	Profile: PastDV_2yr		
E.G. Elev (ft)	1714.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.71	Wt. n-Val.	0.021	0.035	
W.S. Elev (ft)	1714.22	Reach Len. (ft)	18.38	18.38	18.38
Crit W.S. (ft)	1714.37	Flow Area (sq ft)	8.34	131.61	
E.G. Slope (ft/ft)	0.021769	Area (sq ft)	8.34	131.61	0.09
Q Total (cfs)	940	Flow (cfs)	37.28	902.72	
Top Width (ft)	143.5	Top Width (ft)	29.72	113.64	0.15
Vel Total (ft/s)	6.72	Avg. Vel. (ft/s)	4.47	6.86	
Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)	0.28	1.16	
Conv. Total (cfs)	6371.1	Conv. (cfs)	252.7	6118.4	
Length Wtd. (ft)	18.38	Wetted Per. (ft)	30.03	114.86	
Min Ch El (ft)	1712.22	Shear (lb/sq ft)	0.38	1.56	
Alpha	1.02	Stream Power (lb/ft s)	1.69	10.68	
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	0.12	2.24	0
C & E Loss (ft)	0.02	Cum SA (acres)	0.28	2.02	0

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	139.7268	2Year	470.00	1700.00	6.03	1.00	3.19
Pima	139.7268	10Year	1510.00	1700.89	8.84	1.21	4.08
Pima	139.7268	100Year	2954.90	1701.44	11.37	1.35	4.63
Pima	139.7268	DesignFlow	2300.00	1701.21	10.41	1.30	4.40
Pima	158.446*	2Year	470.00	1700.41	5.28	0.83	3.34
Pima	158.446*	10Year	1510.00	1701.24	9.02	1.20	4.17
Pima	158.446*	100Year	2954.90	1701.80	11.79	1.37	4.73
Pima	158.446*	DesignFlow	2300.00	1701.58	10.71	1.31	4.51
Pima	177.166*	2Year	470.00	1700.60	5.53	0.85	3.27
Pima	177.166*	10Year	1510.00	1701.61	9.00	1.16	4.28
Pima	177.166*	100Year	2954.90	1702.17	12.10	1.37	4.84
Pima	177.166*	DesignFlow	2300.00	1701.94	10.93	1.30	4.61
Pima	195.885*	2Year	470.00	1700.80	5.64	0.83	3.21
Pima	195.885*	10Year	1510.00	1701.98	8.85	1.10	4.39
Pima	195.885*	100Year	2954.90	1702.54	12.35	1.36	4.95
Pima	195.885*	DesignFlow	2300.00	1702.31	11.04	1.28	4.72
Pima	214.605*	2Year	470.00	1701.00	5.67	0.81	3.15
Pima	214.605*	10Year	1510.00	1702.29	8.85	1.08	4.44
Pima	214.605*	100Year	2954.90	1702.91	12.52	1.35	5.06
Pima	214.605*	DesignFlow	2300.00	1702.70	10.98	1.23	4.85
Pima	233.324*	2Year	470.00	1701.18	5.67	0.78	3.08
Pima	233.324*	10Year	1510.00	1702.65	8.61	0.99	4.55
Pima	233.324*	100Year	2954.90	1703.27	12.64	1.33	5.17
Pima	233.324*	DesignFlow	2300.00	1703.09	10.80	1.17	4.99
Pima	252.044*	2Year	470.00	1701.36	5.65	0.76	3.00
Pima	252.044*	10Year	1510.00	1702.86	8.85	0.99	4.50
Pima	252.044*	100Year	2954.90	1703.65	12.67	1.29	5.29
Pima	252.044*	DesignFlow	2300.00	1703.53	10.39	1.07	5.17
Pima	270.764*	2Year	470.00	1701.52	5.62	0.73	2.90
Pima	270.764*	10Year	1510.00	1703.07	8.98	0.97	4.45
Pima	270.764*	100Year	2954.90	1704.03	12.53	1.22	5.41
Pima	270.764*	DesignFlow	2300.00	1704.18	9.17	0.88	5.56
Pima	289.483*	2Year	470.00	1701.68	5.55	0.70	2.80
Pima	289.483*	10Year	1510.00	1702.63	11.55	1.29	3.75
Pima	289.483*	100Year	2954.90	1704.19	13.20	1.27	5.31
Pima	289.483*	DesignFlow	2300.00	1703.46	12.98	1.33	4.57
Pima	308.2033	2Year	470.00	1700.78	10.28	1.58	1.64
Pima	308.2033	10Year	1510.00	1702.12	15.29	1.81	2.98
Pima	308.2033	100Year	2954.90	1703.96	15.33	1.48	4.81
Pima	308.2033	DesignFlow	2300.00	1703.09	15.84	1.66	3.95
Pima	323.659*	2Year	470.00	1701.15	11.41	1.55	1.96
Pima	323.659*	10Year	1510.00	1702.92	15.05	1.69	3.73
Pima	323.659*	100Year	2916.90	1705.28	13.41	1.22	6.09
Pima	323.659*	DesignFlow	2300.00	1704.21	14.61	1.44	5.02
Pima	339.115*	2Year	470.00	1701.64	11.71	1.38	2.40
Pima	339.115*	10Year	1510.00	1704.01	13.98	1.41	4.77

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	339.115*	100Year	2916.90	1705.97	13.13	1.19	6.73
Pima	339.115*	DesignFlow	2300.00	1705.65	12.44	1.16	6.41
Pima	354.5711	2Year	470.00	1702.90	9.42	1.10	3.60
Pima	354.5711	10Year	1510.00	1705.94	10.37	1.02	6.64
Pima	354.5711	100Year	2916.90	1706.59	13.04	1.17	7.30
Pima	354.5711	DesignFlow	2300.00	1706.35	12.16	1.12	7.05
Pima	373.922*	2Year	470.00	1703.38	9.39	1.15	3.38
Pima	373.922*	10Year	1510.00	1706.32	10.14	1.03	6.32
Pima	373.922*	100Year	2916.90	1707.01	12.80	1.17	7.01
Pima	373.922*	DesignFlow	2300.00	1706.76	11.91	1.13	6.76
Pima	393.274*	2Year	470.00	1703.93	9.19	1.17	3.22
Pima	393.274*	10Year	1510.00	1706.69	9.94	1.03	5.98
Pima	393.274*	100Year	2916.90	1707.43	12.57	1.17	6.72
Pima	393.274*	DesignFlow	2300.00	1707.17	11.67	1.13	6.46
Pima	412.625*	2Year	470.00	1704.48	9.03	1.20	3.06
Pima	412.625*	10Year	1510.00	1707.05	9.84	1.06	5.63
Pima	412.625*	100Year	2916.90	1707.85	12.35	1.18	6.43
Pima	412.625*	DesignFlow	2300.00	1707.58	11.46	1.14	6.16
Pima	431.977*	2Year	470.00	1705.07	8.78	1.21	2.94
Pima	431.977*	10Year	1510.00	1707.39	9.89	1.10	5.26
Pima	431.977*	100Year	2916.90	1708.27	12.15	1.19	6.14
Pima	431.977*	DesignFlow	2300.00	1707.99	11.26	1.15	5.86
Pima	451.328*	2Year	470.00	1705.68	8.45	1.21	2.85
Pima	451.328*	10Year	1510.00	1707.78	9.83	1.13	4.95
Pima	451.328*	100Year	2916.90	1708.70	11.94	1.19	5.87
Pima	451.328*	DesignFlow	2300.00	1708.42	11.05	1.16	5.59
Pima	470.68*	2Year	470.00	1706.28	8.18	1.22	2.74
Pima	470.68*	10Year	1510.00	1708.19	9.79	1.16	4.65
Pima	470.68*	100Year	2916.90	1709.13	11.75	1.20	5.59
Pima	470.68*	DesignFlow	2300.00	1708.85	10.88	1.17	5.30
Pima	490.031*	2Year	470.00	1706.88	7.94	1.23	2.63
Pima	490.031*	10Year	1510.00	1708.64	9.67	1.18	4.39
Pima	490.031*	100Year	2916.90	1709.57	11.56	1.20	5.32
Pima	490.031*	DesignFlow	2300.00	1709.28	10.72	1.18	5.03
Pima	509.382*	2Year	470.00	1707.47	7.75	1.24	2.51
Pima	509.382*	10Year	1510.00	1709.10	9.56	1.20	4.14
Pima	509.382*	100Year	2916.90	1710.01	11.39	1.21	5.05
Pima	509.382*	DesignFlow	2300.00	1709.72	10.56	1.19	4.76
Pima	528.734*	2Year	470.00	1708.06	7.60	1.24	2.39
Pima	528.734*	10Year	1510.00	1709.59	9.37	1.20	3.91
Pima	528.734*	100Year	2916.90	1710.45	11.23	1.22	4.78
Pima	528.734*	DesignFlow	2300.00	1710.16	10.42	1.20	4.49
Pima	548.085*	2Year	470.00	1708.65	7.43	1.24	2.28
Pima	548.085*	10Year	1510.00	1710.08	9.15	1.20	3.71
Pima	548.085*	100Year	2916.90	1710.90	11.08	1.23	4.53
Pima	548.085*	DesignFlow	2300.00	1710.62	10.27	1.21	4.24

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	567.437*	2Year	470.00	1709.25	7.26	1.24	2.17
Pima	567.437*	10Year	1510.00	1710.58	8.97	1.20	3.50
Pima	567.437*	100Year	2916.90	1711.35	10.93	1.24	4.27
Pima	567.437*	DesignFlow	2300.00	1711.08	10.12	1.21	4.00
Pima	586.788*	2Year	470.00	1709.84	7.11	1.25	2.05
Pima	586.788*	10Year	1510.00	1711.08	8.77	1.21	3.29
Pima	586.788*	100Year	2916.90	1711.81	10.78	1.24	4.02
Pima	586.788*	DesignFlow	2300.00	1711.54	9.97	1.22	3.75
Pima	606.140*	2Year	470.00	1710.45	6.86	1.22	1.95
Pima	606.140*	10Year	1510.00	1711.58	8.60	1.21	3.08
Pima	606.140*	100Year	2916.90	1712.27	10.65	1.25	3.77
Pima	606.140*	DesignFlow	2300.00	1712.01	9.84	1.23	3.51
Pima	625.491*	2Year	470.00	1711.10	6.32	1.18	1.90
Pima	625.491*	10Year	1510.00	1712.08	8.44	1.21	2.88
Pima	625.491*	100Year	2916.90	1712.73	10.51	1.26	3.53
Pima	625.491*	DesignFlow	2300.00	1712.48	9.71	1.24	3.28
Pima	644.843*	2Year	470.00	1711.68	6.02	1.19	1.77
Pima	644.843*	10Year	1510.00	1712.58	8.30	1.21	2.67
Pima	644.843*	100Year	2916.90	1713.21	10.37	1.27	3.30
Pima	644.843*	DesignFlow	2300.00	1712.97	9.57	1.24	3.05
Pima	664.194*	2Year	470.00	1712.22	6.01	1.21	1.60
Pima	664.194*	10Year	1510.00	1713.08	8.17	1.22	2.46
Pima	664.194*	100Year	2916.90	1713.68	10.23	1.27	3.06
Pima	664.194*	DesignFlow	2300.00	1713.45	9.45	1.25	2.83
Pima	683.546*	2Year	470.00	1712.83	5.48	1.11	1.50
Pima	683.546*	10Year	1510.00	1713.58	8.04	1.22	2.25
Pima	683.546*	100Year	2916.90	1714.17	10.05	1.27	2.84
Pima	683.546*	DesignFlow	2300.00	1713.93	9.30	1.26	2.60
Pima	702.897*	2Year	470.00	1713.32	5.92	1.27	1.28
Pima	702.897*	10Year	1510.00	1714.07	7.96	1.23	2.03
Pima	702.897*	100Year	2916.90	1714.67	9.74	1.25	2.63
Pima	702.897*	DesignFlow	2300.00	1714.43	9.09	1.25	2.39
Pima	722.2492	2Year	470.00	1714.01	4.71	0.96	1.26
Pima	722.2492	10Year	1510.00	1714.72	6.84	1.02	1.98
Pima	722.2492	100Year	2916.90	1715.39	8.22	1.01	2.65
Pima	722.2492	DesignFlow	2300.00	1715.15	7.57	0.99	2.41
Pima	741.370*	2Year	470.00	1714.37	4.25	0.83	1.37
Pima	741.370*	10Year	1510.00	1715.09	6.62	0.96	2.09
Pima	741.370*	100Year	2916.90	1715.73	8.22	1.00	2.73
Pima	741.370*	DesignFlow	2300.00	1715.41	7.92	1.04	2.41
Pima	760.491*	2Year	470.00	1714.63	4.44	0.88	1.37
Pima	760.491*	10Year	1510.00	1715.34	7.00	1.03	2.09
Pima	760.491*	100Year	2916.90	1715.98	8.70	1.06	2.73
Pima	760.491*	DesignFlow	2300.00	1715.73	8.01	1.04	2.48
Pima	779.613*	2Year	470.00	1714.92	4.42	0.88	1.41

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	779.613*	10Year	1510.00	1715.71	6.66	0.95	2.20
Pima	779.613*	100Year	2916.90	1716.29	8.76	1.07	2.78
Pima	779.613*	DesignFlow	2300.00	1716.05	8.01	1.04	2.54
Pima	798.734*	2Year	470.00	1715.21	4.43	0.88	1.45
Pima	798.734*	10Year	1510.00	1715.98	6.85	0.99	2.22
Pima	798.734*	100Year	2916.90	1716.60	8.85	1.08	2.84
Pima	798.734*	DesignFlow	2300.00	1716.36	8.08	1.04	2.60
Pima	817.855*	2Year	470.00	1715.50	4.43	0.88	1.48
Pima	817.855*	10Year	1510.00	1716.29	6.78	0.98	2.27
Pima	817.855*	100Year	2916.90	1716.92	8.86	1.07	2.90
Pima	817.855*	DesignFlow	2300.00	1716.69	7.99	1.02	2.67
Pima	836.976*	2Year	470.00	1715.80	4.40	0.88	1.52
Pima	836.976*	10Year	1510.00	1716.58	6.75	0.98	2.30
Pima	836.976*	100Year	2916.90	1717.26	8.71	1.05	2.98
Pima	836.976*	DesignFlow	2300.00	1717.06	7.66	0.97	2.78
Pima	856.097*	2Year	470.00	1716.10	4.38	0.88	1.57
Pima	856.097*	10Year	1510.00	1716.89	6.71	0.98	2.36
Pima	856.097*	100Year	2916.90	1717.63	8.42	1.00	3.10
Pima	856.097*	DesignFlow	2300.00	1717.31	7.85	1.01	2.78
Pima	875.219*	2Year	470.00	1716.41	4.33	0.87	1.62
Pima	875.219*	10Year	1510.00	1717.20	6.62	0.96	2.41
Pima	875.219*	100Year	2916.90	1717.89	8.56	1.03	3.10
Pima	875.219*	DesignFlow	2300.00	1717.61	7.82	1.01	2.82
Pima	894.340*	2Year	470.00	1716.71	4.33	0.87	1.67
Pima	894.340*	10Year	1510.00	1717.50	6.60	0.97	2.46
Pima	894.340*	100Year	2916.90	1718.20	8.47	1.02	3.16
Pima	894.340*	DesignFlow	2300.00	1717.91	7.77	1.00	2.87
Pima	913.461*	2Year	470.00	1717.01	4.33	0.86	1.71
Pima	913.461*	10Year	1510.00	1717.81	6.50	0.96	2.51
Pima	913.461*	100Year	2916.90	1718.54	8.26	0.99	3.24
Pima	913.461*	DesignFlow	2300.00	1718.23	7.64	0.99	2.93
Pima	932.582*	2Year	470.00	1717.31	4.31	0.86	1.76
Pima	932.582*	10Year	1510.00	1718.12	6.43	0.95	2.57
Pima	932.582*	100Year	2916.90	1718.84	8.20	0.99	3.29
Pima	932.582*	DesignFlow	2300.00	1718.53	7.59	0.99	2.98
Pima	951.704*	2Year	470.00	1717.61	4.27	0.86	1.80
Pima	951.704*	10Year	1510.00	1718.44	6.31	0.94	2.63
Pima	951.704*	100Year	2916.90	1719.14	8.15	0.99	3.33
Pima	951.704*	DesignFlow	2300.00	1718.85	7.47	0.98	3.04
Pima	970.8254	2Year	470.00	1717.92	4.19	0.85	1.85
Pima	970.8254	10Year	1510.00	1718.58	7.00	1.13	2.52
Pima	970.8254	100Year	2916.90	1719.12	9.55	1.28	3.06
Pima	970.8254	DesignFlow	2300.00	1718.93	8.42	1.20	2.87
Pima	987.527*	2Year	470.00	1718.23	4.81	1.00	1.62
Pima	987.527*	10Year	1510.00	1718.97	7.46	1.14	2.36
Pima	987.527*	100Year	2915.90	1719.49	10.37	1.36	2.88

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	987.527*	DesignFlow	2300.00	1719.26	9.33	1.30	2.65
Pima	1004.230	2Year	470.00	1718.45	6.04	1.23	1.30
Pima	1004.230	10Year	1510.00	1719.29	8.42	1.26	2.14
Pima	1004.230	100Year	2915.90	1720.03	10.30	1.26	2.88
Pima	1004.230	DesignFlow	2300.00	1719.73	9.60	1.27	2.57
Pima	1017.59*	2Year	470.00	1718.94	5.63	1.14	1.38
Pima	1017.59*	10Year	1510.00	1719.73	8.24	1.25	2.17
Pima	1017.59*	100Year	2915.90	1720.45	10.07	1.25	2.89
Pima	1017.59*	DesignFlow	2300.00	1720.15	9.41	1.27	2.59
Pima	1030.95*	2Year	470.00	1719.29	6.29	1.27	1.31
Pima	1030.95*	10Year	1510.00	1720.15	8.15	1.26	2.17
Pima	1030.95*	100Year	2915.90	1720.91	9.68	1.22	2.92
Pima	1030.95*	DesignFlow	2300.00	1720.59	9.14	1.26	2.61
Pima	1044.313	2Year	470.00	1719.86	5.23	0.99	1.47
Pima	1044.313	10Year	1510.00	1720.75	7.08	1.06	2.36
Pima	1044.313	100Year	2915.90	1721.47	8.79	1.09	3.08
Pima	1044.313	DesignFlow	2300.00	1721.24	7.88	1.04	2.84
Pima	1062.38*	2Year	470.00	1720.33	4.90	0.92	1.43
Pima	1062.38*	10Year	1510.00	1721.22	6.93	1.01	2.32
Pima	1062.38*	100Year	2915.90	1721.78	9.53	1.18	2.88
Pima	1062.38*	DesignFlow	2300.00	1721.56	8.48	1.11	2.66
Pima	1080.46*	2Year	470.00	1720.65	5.64	1.13	1.25
Pima	1080.46*	10Year	1510.00	1721.49	7.83	1.18	2.08
Pima	1080.46*	100Year	2915.90	1722.11	10.24	1.28	2.71
Pima	1080.46*	DesignFlow	2300.00	1721.88	9.21	1.22	2.47
Pima	1098.54*	2Year	470.00	1721.19	5.08	1.01	1.28
Pima	1098.54*	10Year	1510.00	1721.91	8.03	1.20	2.00
Pima	1098.54*	100Year	2915.90	1722.50	10.71	1.34	2.59
Pima	1098.54*	DesignFlow	2300.00	1722.26	9.70	1.29	2.35
Pima	1116.61*	2Year	470.00	1721.56	5.86	1.26	1.15
Pima	1116.61*	10Year	1510.00	1722.28	8.73	1.34	1.87
Pima	1116.61*	100Year	2915.90	1723.05	10.44	1.27	2.64
Pima	1116.61*	DesignFlow	2300.00	1722.69	10.08	1.35	2.28
Pima	1134.695	2Year	470.00	1722.19	4.91	1.00	1.27
Pima	1134.695	10Year	1510.00	1723.07	7.18	0.99	2.16
Pima	1134.695	100Year	2915.90	1724.01	8.38	0.92	3.09
Pima	1134.695	DesignFlow	2300.00	1723.70	7.73	0.91	2.78
Pima	1154.15*	2Year	470.00	1722.59	3.72	0.65	1.63
Pima	1154.15*	10Year	1510.00	1723.51	6.22	0.79	2.55
Pima	1154.15*	100Year	2914.90	1724.08	9.12	1.02	3.12
Pima	1154.15*	DesignFlow	2300.00	1723.89	7.86	0.91	2.93
Pima	1173.61*	2Year	470.00	1722.73	3.81	0.65	1.72
Pima	1173.61*	10Year	1510.00	1723.67	6.36	0.80	2.66
Pima	1173.61*	100Year	2914.90	1724.19	9.60	1.07	3.18
Pima	1173.61*	DesignFlow	2300.00	1724.11	7.85	0.89	3.10

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	1193.07*	2Year	470.00	1722.87	3.87	0.65	1.81
Pima	1193.07*	10Year	1510.00	1723.83	6.47	0.81	2.77
Pima	1193.07*	100Year	2914.90	1724.35	9.86	1.10	3.29
Pima	1193.07*	DesignFlow	2300.00	1724.31	7.92	0.89	3.25
Pima	1212.53*	2Year	470.00	1723.00	3.90	0.62	1.90
Pima	1212.53*	10Year	1510.00	1724.00	6.59	0.82	2.90
Pima	1212.53*	100Year	2914.90	1724.54	10.00	1.10	3.44
Pima	1212.53*	DesignFlow	2300.00	1724.49	8.02	0.89	3.39
Pima	1231.99*	2Year	470.00	1723.11	3.95	0.60	1.96
Pima	1231.99*	10Year	1510.00	1724.17	6.71	0.82	3.02
Pima	1231.99*	100Year	2914.90	1724.73	10.15	1.11	3.58
Pima	1231.99*	DesignFlow	2300.00	1724.68	8.16	0.90	3.53
Pima	1251.44*	2Year	470.00	1723.22	4.01	0.59	2.02
Pima	1251.44*	10Year	1510.00	1724.34	6.84	0.82	3.14
Pima	1251.44*	100Year	2914.90	1724.94	10.23	1.10	3.74
Pima	1251.44*	DesignFlow	2300.00	1724.87	8.32	0.91	3.66
Pima	1270.90*	2Year	470.00	1723.32	4.07	0.58	2.08
Pima	1270.90*	10Year	1510.00	1724.51	6.96	0.81	3.27
Pima	1270.90*	100Year	2914.90	1725.12	10.47	1.12	3.88
Pima	1270.90*	DesignFlow	2300.00	1725.05	8.46	0.91	3.81
Pima	1290.36*	2Year	470.00	1723.41	4.15	0.58	2.12
Pima	1290.36*	10Year	1510.00	1724.66	7.11	0.81	3.37
Pima	1290.36*	100Year	2914.90	1725.30	10.72	1.13	4.01
Pima	1290.36*	DesignFlow	2300.00	1725.23	8.66	0.92	3.94
Pima	1309.82*	2Year	470.00	1723.51	4.24	0.58	2.16
Pima	1309.82*	10Year	1510.00	1724.80	7.28	0.81	3.46
Pima	1309.82*	100Year	2914.90	1725.48	10.98	1.13	4.14
Pima	1309.82*	DesignFlow	2300.00	1725.41	8.86	0.92	4.07
Pima	1329.28*	2Year	470.00	1723.60	4.34	0.58	2.22
Pima	1329.28*	10Year	1510.00	1724.95	7.47	0.81	3.56
Pima	1329.28*	100Year	2914.90	1725.64	11.27	1.14	4.26
Pima	1329.28*	DesignFlow	2300.00	1725.58	9.09	0.92	4.20
Pima	1348.74*	2Year	470.00	1723.68	4.47	0.59	2.25
Pima	1348.74*	10Year	1510.00	1725.08	7.70	0.82	3.65
Pima	1348.74*	100Year	2914.90	1725.85	11.43	1.13	4.42
Pima	1348.74*	DesignFlow	2300.00	1725.72	9.40	0.94	4.29
Pima	1368.20*	2Year	470.00	1723.77	4.60	0.60	2.29
Pima	1368.20*	10Year	1510.00	1725.21	7.95	0.84	3.73
Pima	1368.20*	100Year	2914.90	1726.12	11.43	1.10	4.64
Pima	1368.20*	DesignFlow	2300.00	1725.88	9.69	0.95	4.40
Pima	1387.66*	2Year	470.00	1723.86	4.77	0.61	2.33
Pima	1387.66*	10Year	1510.00	1725.33	8.26	0.85	3.80
Pima	1387.66*	100Year	2914.90	1726.58	10.88	1.00	5.05
Pima	1387.66*	DesignFlow	2300.00	1726.02	10.09	0.97	4.49
Pima	1407.121	2Year	470.00	1724.01	4.78	0.59	2.44
Pima	1407.121	10Year	1510.00	1725.60	8.19	0.82	4.02

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	1407.121	100Year	2914.90	1726.88	10.91	0.98	5.31
Pima	1407.121	DesignFlow	2300.00	1726.45	9.65	0.89	4.88
Pima	1425.55*	2Year	470.00	1724.31	4.32	0.52	2.69
Pima	1425.55*	10Year	1510.00	1726.22	6.95	0.66	4.61
Pima	1425.55*	100Year	2863.00	1728.06	8.33	0.69	6.44
Pima	1425.55*	DesignFlow	2300.00	1727.26	8.04	0.70	5.65
Pima	1443.98*	2Year	470.00	1724.53	4.03	0.47	2.88
Pima	1443.98*	10Year	1510.00	1726.59	6.43	0.59	4.94
Pima	1443.98*	100Year	2863.00	1728.44	7.84	0.62	6.79
Pima	1443.98*	DesignFlow	2300.00	1727.67	7.48	0.63	6.01
Pima	1462.41*	2Year	470.00	1724.72	3.82	0.44	3.03
Pima	1462.41*	10Year	1510.00	1726.85	6.12	0.55	5.16
Pima	1462.41*	100Year	2863.00	1728.73	7.51	0.58	7.04
Pima	1462.41*	DesignFlow	2300.00	1727.96	7.16	0.59	6.27
Pima	1480.85*	2Year	470.00	1724.87	3.65	0.41	3.15
Pima	1480.85*	10Year	1510.00	1727.07	5.89	0.52	5.35
Pima	1480.85*	100Year	2863.00	1728.97	7.25	0.55	7.25
Pima	1480.85*	DesignFlow	2300.00	1728.21	6.91	0.56	6.49
Pima	1499.28*	2Year	470.00	1725.00	3.52	0.39	3.24
Pima	1499.28*	10Year	1510.00	1727.26	5.72	0.49	5.50
Pima	1499.28*	100Year	2863.00	1729.18	7.07	0.53	7.42
Pima	1499.28*	DesignFlow	2300.00	1728.43	6.70	0.53	6.66
Pima	1517.71*	2Year	470.00	1725.12	3.40	0.37	3.32
Pima	1517.71*	10Year	1510.00	1727.42	5.58	0.47	5.62
Pima	1517.71*	100Year	2863.00	1729.36	6.92	0.51	7.56
Pima	1517.71*	DesignFlow	2300.00	1728.61	6.53	0.51	6.81
Pima	1536.14*	2Year	470.00	1725.22	3.30	0.35	3.38
Pima	1536.14*	10Year	1510.00	1727.57	5.46	0.46	5.73
Pima	1536.14*	100Year	2863.00	1729.52	6.79	0.49	7.68
Pima	1536.14*	DesignFlow	2300.00	1728.79	6.38	0.49	6.94
Pima	1554.57*	2Year	470.00	1725.32	3.21	0.34	3.44
Pima	1554.57*	10Year	1510.00	1727.71	5.35	0.44	5.83
Pima	1554.57*	100Year	2863.00	1729.68	6.67	0.48	7.80
Pima	1554.57*	DesignFlow	2300.00	1728.94	6.25	0.47	7.06
Pima	1573.01*	2Year	470.00	1725.41	3.12	0.32	3.50
Pima	1573.01*	10Year	1510.00	1727.84	5.25	0.43	5.93
Pima	1573.01*	100Year	2863.00	1729.82	6.55	0.46	7.91
Pima	1573.01*	DesignFlow	2300.00	1729.09	6.12	0.45	7.18
Pima	1591.443	2Year	470.00	1725.48	3.04	0.31	3.53
Pima	1591.443	10Year	1510.00	1727.95	5.16	0.41	6.00
Pima	1591.443	100Year	2863.00	1729.93	6.53	0.45	7.98
Pima	1591.443	DesignFlow	2300.00	1724.09	26.25	3.33	2.14
Pima	1792.679	2Year	25.00	1738.49	2.78	1.00	0.55
Pima	1792.679	10Year	180.00	1739.05	4.32	1.00	1.11
Pima	1792.679	100Year	1502.00	1740.77	7.66	1.00	2.83
Pima	1792.679	DesignFlow	2300.00	1741.54	7.94	0.91	3.60

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Vel Chnl (ft/s)	Froude # Chl	Max Chl Dpth (ft)
Pima	1892.679	2Year	25.00	1739.22	1.12	0.32	0.83
Pima	1892.679	10Year	180.00	1739.96	2.34	0.42	1.58
Pima	1892.679	100Year	1502.00	1742.08	4.96	0.56	3.69
Pima	1892.679	DesignFlow	2300.00	1742.70	5.66	0.57	4.31
Pima	1911.38*	2Year	20.00	1739.35	2.76	1.01	0.65
Pima	1911.38*	10Year	180.00	1739.92	4.55	1.06	1.22
Pima	1911.38*	100Year	1417.50	1742.06	5.93	0.73	3.36
Pima	1911.38*	DesignFlow	2300.00	1741.94	10.23	1.28	3.24
Pima	1930.08*	2Year	20.00	1739.73	2.53	0.73	0.72
Pima	1930.08*	10Year	180.00	1740.36	4.47	1.02	1.35
Pima	1930.08*	100Year	1417.50	1741.78	8.87	1.24	2.77
Pima	1930.08*	DesignFlow	2300.00	1742.41	10.13	1.27	3.40
Pima	1948.78*	2Year	20.00	1740.00	2.74	0.82	0.68
Pima	1948.78*	10Year	180.00	1740.77	4.53	1.02	1.44
Pima	1948.78*	100Year	1417.50	1742.23	8.83	1.23	2.91
Pima	1948.78*	DesignFlow	2300.00	1742.86	10.08	1.26	3.54
Pima	1967.48*	2Year	20.00	1740.31	2.66	0.80	0.67
Pima	1967.48*	10Year	180.00	1741.14	4.62	0.97	1.50
Pima	1967.48*	100Year	1417.50	1742.67	8.79	1.21	3.03
Pima	1967.48*	DesignFlow	2300.00	1743.31	10.01	1.24	3.67
Pima	1986.19*	2Year	20.00	1740.61	2.66	0.80	0.66
Pima	1986.19*	10Year	180.00	1741.47	4.61	0.92	1.52
Pima	1986.19*	100Year	1417.50	1743.12	8.60	1.17	3.16
Pima	1986.19*	DesignFlow	2300.00	1743.75	9.91	1.23	3.80
Pima	2004.89*	2Year	20.00	1740.92	2.62	0.79	0.66
Pima	2004.89*	10Year	180.00	1741.77	4.66	0.92	1.51
Pima	2004.89*	100Year	1417.50	1743.49	8.73	1.18	3.23
Pima	2004.89*	DesignFlow	2300.00	1744.16	9.88	1.22	3.90
Pima	2023.59*	2Year	20.00	1741.22	2.62	0.80	0.65
Pima	2023.59*	10Year	180.00	1742.07	4.67	0.91	1.50
Pima	2023.59*	100Year	1417.50	1743.89	8.61	1.15	3.32
Pima	2023.59*	DesignFlow	2300.00	1744.58	9.78	1.19	4.01
Pima	2042.29*	2Year	20.00	1741.53	2.60	0.80	0.64
Pima	2042.29*	10Year	180.00	1742.36	4.70	0.91	1.47
Pima	2042.29*	100Year	1417.50	1744.34	8.26	1.07	3.45
Pima	2042.29*	DesignFlow	2300.00	1744.80	10.58	1.30	3.91
Pima	2060.999	2Year	20.00	1741.83	2.57	0.79	0.64
Pima	2060.999	10Year	180.00	1742.66	4.66	0.90	1.47
Pima	2060.999	100Year	1417.50	1744.08	11.52	1.56	2.88
Pima	2060.999	DesignFlow	2300.00	1744.77	12.87	1.62	3.57
Pima	2080.27*	2Year	20.00	1742.14	2.84	0.84	0.71
Pima	2080.27*	10Year	180.00	1742.95	5.56	1.10	1.52
Pima	2080.27*	100Year	1390.00	1744.72	11.48	1.42	3.29
Pima	2080.27*	DesignFlow	2300.00	1745.68	12.18	1.42	4.25
Pima	2099.552	2Year	20.00	1742.47	2.98	0.83	0.81

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2099.552	10Year	180.00	1743.36	5.86	1.11	1.69
Pima	2099.552	100Year	1390.00	1745.76	9.82	1.15	4.09
Pima	2099.552	DesignFlow	2300.00	1746.87	10.11	1.09	5.20
Pima	2119.12*	2Year	20.00	1742.91	3.40	0.99	0.73
Pima	2119.12*	10Year	180.00	1743.83	5.90	1.13	1.65
Pima	2119.12*	100Year	1390.00	1746.24	9.43	1.13	4.06
Pima	2119.12*	DesignFlow	2300.00	1747.24	9.90	1.09	5.06
Pima	2138.70*	2Year	20.00	1743.40	3.42	1.01	0.71
Pima	2138.70*	10Year	180.00	1744.31	5.84	1.12	1.62
Pima	2138.70*	100Year	1390.00	1746.69	9.13	1.12	4.00
Pima	2138.70*	DesignFlow	2300.00	1747.62	9.68	1.09	4.93
Pima	2158.27*	2Year	20.00	1743.91	3.35	1.00	0.70
Pima	2158.27*	10Year	180.00	1744.78	5.83	1.12	1.57
Pima	2158.27*	100Year	1390.00	1747.13	8.85	1.11	3.92
Pima	2158.27*	DesignFlow	2300.00	1748.00	9.45	1.09	4.79
Pima	2177.85*	2Year	20.00	1744.42	3.21	0.97	0.70
Pima	2177.85*	10Year	180.00	1745.27	5.73	1.11	1.55
Pima	2177.85*	100Year	1390.00	1747.54	8.66	1.12	3.82
Pima	2177.85*	DesignFlow	2300.00	1748.38	9.23	1.08	4.66
Pima	2197.43*	2Year	20.00	1744.86	3.77	1.20	0.62
Pima	2197.43*	10Year	180.00	1745.74	5.75	1.12	1.50
Pima	2197.43*	100Year	1390.00	1747.98	8.36	1.10	3.74
Pima	2197.43*	DesignFlow	2300.00	1748.75	9.02	1.08	4.51
Pima	2217.00*	2Year	20.00	1745.39	3.38	1.06	0.64
Pima	2217.00*	10Year	180.00	1746.24	5.57	1.09	1.49
Pima	2217.00*	100Year	1390.00	1748.40	8.13	1.09	3.65
Pima	2217.00*	DesignFlow	2300.00	1749.12	8.82	1.08	4.37
Pima	2236.58*	2Year	20.00	1745.90	3.16	0.99	0.63
Pima	2236.58*	10Year	180.00	1746.71	5.62	1.12	1.44
Pima	2236.58*	100Year	1390.00	1748.82	7.87	1.08	3.55
Pima	2236.58*	DesignFlow	2300.00	1749.48	8.68	1.09	4.21
Pima	2256.15*	2Year	20.00	1746.41	3.07	0.97	0.63
Pima	2256.15*	10Year	180.00	1747.22	5.37	1.08	1.44
Pima	2256.15*	100Year	1390.00	1749.23	7.62	1.07	3.45
Pima	2256.15*	DesignFlow	2300.00	1749.83	8.60	1.09	4.05
Pima	2275.73*	2Year	20.00	1746.91	2.97	0.96	0.61
Pima	2275.73*	10Year	180.00	1747.69	5.33	1.10	1.39
Pima	2275.73*	100Year	1390.00	1749.64	7.38	1.06	3.34
Pima	2275.73*	DesignFlow	2300.00	1750.19	8.46	1.08	3.89
Pima	2295.30*	2Year	20.00	1747.40	2.92	0.97	0.59
Pima	2295.30*	10Year	180.00	1748.19	5.09	1.06	1.38
Pima	2295.30*	100Year	1390.00	1749.99	7.39	1.07	3.18
Pima	2295.30*	DesignFlow	2300.00	1750.55	8.37	1.09	3.74
Pima	2314.88*	2Year	20.00	1747.90	2.90	0.96	0.58
Pima	2314.88*	10Year	180.00	1748.66	5.06	1.08	1.34
Pima	2314.88*	100Year	1390.00	1750.38	7.26	1.07	3.06

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2314.88*	DesignFlow	2300.00	1750.91	8.31	1.09	3.59
Pima	2334.46*	2Year	20.00	1748.39	2.93	0.97	0.55
Pima	2334.46*	10Year	180.00	1749.15	4.78	1.04	1.31
Pima	2334.46*	100Year	1390.00	1750.77	7.08	1.05	2.93
Pima	2334.46*	DesignFlow	2300.00	1751.28	8.20	1.09	3.44
Pima	2354.03*	2Year	20.00	1748.89	2.86	0.95	0.54
Pima	2354.03*	10Year	180.00	1749.61	4.74	1.06	1.26
Pima	2354.03*	100Year	1390.00	1751.14	7.10	1.07	2.78
Pima	2354.03*	DesignFlow	2300.00	1751.64	8.16	1.10	3.29
Pima	2373.61*	2Year	20.00	1749.38	2.92	0.99	0.51
Pima	2373.61*	10Year	180.00	1750.10	4.44	1.02	1.23
Pima	2373.61*	100Year	1390.00	1751.53	6.94	1.06	2.66
Pima	2373.61*	DesignFlow	2300.00	1752.00	8.16	1.11	3.13
Pima	2393.18*	2Year	20.00	1749.84	3.41	1.23	0.46
Pima	2393.18*	10Year	180.00	1750.54	4.38	1.03	1.16
Pima	2393.18*	100Year	1390.00	1751.88	7.11	1.11	2.50
Pima	2393.18*	DesignFlow	2300.00	1752.37	8.10	1.11	2.99
Pima	2412.76*	2Year	20.00	1750.39	2.81	0.99	0.49
Pima	2412.76*	10Year	180.00	1751.02	4.10	1.00	1.12
Pima	2412.76*	100Year	1390.00	1752.41	6.32	0.97	2.51
Pima	2412.76*	DesignFlow	2300.00	1752.81	7.76	1.06	2.91
Pima	2432.338	2Year	20.00	1750.95	2.26	0.88	0.54
Pima	2432.338	10Year	180.00	1751.47	3.96	0.99	1.06
Pima	2432.338	100Year	1390.00	1752.63	7.23	1.17	2.21
Pima	2432.338	DesignFlow	2300.00	1753.04	8.54	1.23	2.63
Pima	2452.00*	2Year	20.00	1751.41	2.07	0.82	0.54
Pima	2452.00*	10Year	180.00	1751.91	3.93	0.98	1.04
Pima	2452.00*	100Year	1390.00	1753.04	7.25	1.17	2.17
Pima	2452.00*	DesignFlow	2300.00	1753.49	8.45	1.22	2.62
Pima	2471.66*	2Year	20.00	1751.85	2.18	0.87	0.52
Pima	2471.66*	10Year	180.00	1752.35	3.90	0.98	1.02
Pima	2471.66*	100Year	1390.00	1753.49	7.06	1.13	2.16
Pima	2471.66*	DesignFlow	2300.00	1753.94	8.29	1.19	2.61
Pima	2491.33*	2Year	20.00	1752.30	2.03	0.82	0.52
Pima	2491.33*	10Year	180.00	1752.79	3.85	0.97	1.01
Pima	2491.33*	100Year	1390.00	1753.90	7.10	1.14	2.12
Pima	2491.33*	DesignFlow	2300.00	1754.34	8.42	1.21	2.56
Pima	2510.99*	2Year	20.00	1752.74	2.14	0.86	0.49
Pima	2510.99*	10Year	180.00	1753.22	3.85	0.98	0.98
Pima	2510.99*	100Year	1390.00	1754.33	7.05	1.13	2.09
Pima	2510.99*	DesignFlow	2300.00	1754.77	8.41	1.20	2.53
Pima	2530.66*	2Year	20.00	1753.19	2.02	0.82	0.50
Pima	2530.66*	10Year	180.00	1753.66	3.80	0.97	0.97
Pima	2530.66*	100Year	1390.00	1754.74	7.07	1.13	2.05
Pima	2530.66*	DesignFlow	2300.00	1755.19	8.42	1.20	2.50

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2550.32*	2Year	20.00	1753.63	2.09	0.86	0.48
Pima	2550.32*	10Year	180.00	1754.10	3.78	0.98	0.95
Pima	2550.32*	100Year	1390.00	1755.16	7.08	1.14	2.01
Pima	2550.32*	DesignFlow	2300.00	1755.61	8.39	1.19	2.46
Pima	2569.98*	2Year	20.00	1754.08	1.97	0.81	0.47
Pima	2569.98*	10Year	180.00	1754.54	3.74	0.97	0.93
Pima	2569.98*	100Year	1390.00	1755.57	7.13	1.16	1.96
Pima	2569.98*	DesignFlow	2300.00	1756.00	8.59	1.23	2.39
Pima	2589.65*	2Year	20.00	1754.51	2.05	0.86	0.45
Pima	2589.65*	10Year	180.00	1754.97	3.74	0.98	0.91
Pima	2589.65*	100Year	1390.00	1755.99	7.13	1.17	1.93
Pima	2589.65*	DesignFlow	2300.00	1756.41	8.62	1.23	2.35
Pima	2609.31*	2Year	20.00	1754.96	1.99	0.83	0.44
Pima	2609.31*	10Year	180.00	1755.42	3.69	0.97	0.90
Pima	2609.31*	100Year	1390.00	1756.40	7.14	1.17	1.88
Pima	2609.31*	DesignFlow	2300.00	1756.83	8.58	1.23	2.31
Pima	2628.98*	2Year	20.00	1755.41	2.02	0.85	0.43
Pima	2628.98*	10Year	180.00	1755.85	3.68	0.97	0.87
Pima	2628.98*	100Year	1390.00	1756.82	7.14	1.18	1.84
Pima	2628.98*	DesignFlow	2300.00	1757.24	8.63	1.24	2.26
Pima	2648.64*	2Year	20.00	1755.85	1.93	0.81	0.42
Pima	2648.64*	10Year	180.00	1756.29	3.60	0.96	0.86
Pima	2648.64*	100Year	1390.00	1757.24	7.15	1.18	1.81
Pima	2648.64*	DesignFlow	2300.00	1757.66	8.61	1.24	2.23
Pima	2668.31*	2Year	20.00	1756.29	1.99	0.86	0.40
Pima	2668.31*	10Year	180.00	1756.73	3.60	0.98	0.84
Pima	2668.31*	100Year	1390.00	1757.65	7.19	1.20	1.76
Pima	2668.31*	DesignFlow	2300.00	1758.07	8.62	1.24	2.18
Pima	2687.97*	2Year	20.00	1756.74	1.93	0.82	0.39
Pima	2687.97*	10Year	180.00	1757.17	3.49	0.96	0.82
Pima	2687.97*	100Year	1390.00	1758.08	7.16	1.20	1.72
Pima	2687.97*	DesignFlow	2300.00	1758.49	8.62	1.24	2.14
Pima	2707.64*	2Year	20.00	1757.19	1.92	0.83	0.39
Pima	2707.64*	10Year	180.00	1757.60	3.50	0.97	0.80
Pima	2707.64*	100Year	1390.00	1758.49	7.17	1.21	1.69
Pima	2707.64*	DesignFlow	2300.00	1758.90	8.62	1.25	2.10
Pima	2727.30*	2Year	20.00	1757.63	1.96	0.84	0.36
Pima	2727.30*	10Year	180.00	1758.05	3.40	0.95	0.78
Pima	2727.30*	100Year	1390.00	1758.93	7.07	1.19	1.67
Pima	2727.30*	DesignFlow	2300.00	1759.32	8.64	1.25	2.06
Pima	2746.96*	2Year	20.00	1758.07	1.93	0.84	0.35
Pima	2746.96*	10Year	180.00	1758.47	3.45	0.99	0.75
Pima	2746.96*	100Year	1390.00	1759.34	7.10	1.20	1.62
Pima	2746.96*	DesignFlow	2300.00	1759.73	8.66	1.26	2.01
Pima	2766.63*	2Year	20.00	1758.52	1.92	0.84	0.35
Pima	2766.63*	10Year	180.00	1758.91	3.34	0.95	0.74

HEC-RAS Plan: Fut_WO Weir River: Pima Road Reach: Pima (Continued)

Reach	River Sta	Profile	Q Total	W.S. Elev	Vel Chnl	Froude # Chl	Max Chl Dpth
			(cfs)	(ft)	(ft/s)		(ft)
Pima	2766.63*	100Year	1390.00	1759.80	6.84	1.14	1.63
Pima	2766.63*	DesignFlow	2300.00	1760.14	8.68	1.27	1.97
Pima	2786.29*	2Year	20.00	1758.96	1.89	0.83	0.33
Pima	2786.29*	10Year	180.00	1759.33	3.43	0.99	0.70
Pima	2786.29*	100Year	1390.00	1760.15	7.32	1.27	1.52
Pima	2786.29*	DesignFlow	2300.00	1760.56	8.69	1.27	1.93
Pima	2805.962	2Year	20.00	1759.40	1.90	0.84	0.32
Pima	2805.962	10Year	180.00	1759.78	3.30	0.95	0.69
Pima	2805.962	100Year	1390.00	1760.74	6.25	1.00	1.66
Pima	2805.962	DesignFlow	2300.00	1761.24	7.32	1.00	2.15

Flood Control District of Maricopa County
PIMA - Wittmann Area Drainage Master Study Update
Rainfall Data

Primary Zone Number: 7 Latitude: 0.0 Elevation: 0

Short Duration Zone Number: 8 Longitude: 0.0

100-year Values from Ward. Model

Duration	Point Values (in) 2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
5 MIN	0.31	0.42	0.49	0.59	0.67	0.74	.74
10 MIN	0.47	0.63	0.74	0.90	1.02	1.14	
15 MIN	0.57	0.79	0.94	1.14	1.30	1.46	1.45
30 MIN	0.75	1.06	1.26	1.55	1.76	1.98	
1 HOUR	0.91	1.30	1.57	1.92	2.20	2.48	2.46
2 HOUR	1.08	1.50	1.79	2.18	2.49	2.79	2.77
3 HOUR	1.19	1.64	1.94	2.36	2.68	3.00	2.99
6 HOUR	1.40	1.89	2.22	2.68	3.04	3.40	3.4
12 HOUR	1.70	2.23	2.60	3.11	3.50	3.90	
24 HOUR	2.00	2.57	2.97	3.53	3.97	4.40	

The point values were obtained using the COS Design Standards and Policy Manual 1999

The values used were

	6hr	24hr
2yr	1.9 inches	2.0 inches
100yr	3.4 inches	4.4 inches

PREFRE OUTPUT FROM DDMS VER 1.8

Subbasin Data

KK Record	BA Record	LS Record		UK Record				RK Record						
Subbasin	Area	Curve Number	% Impervious	Length	Slope	Roughness	Subcatchment Contributing Area	Length	Slope	Roughness	Subcatchment Contributing Area	Shape	Bottom Width or Diameter	Routing Increments
[ID]	[sq. mi.]	[CN]	[RTIMP]	[ft]	[ft/ft]	[N]	[%]	[ft]	[ft/ft]	[N]	[%]		[ft]	
S30N	0.6518	82.0	13	300	0.350	0.13	20	1550	0.0690	0.045	0.0096	TRAP	0	12
				300	0.050	0.13	80	10520	0.0380	0.040		TRAP	15	15
S31.1	0.2663	76.6	13	300	0.567	0.13	10	1950	0.0560	0.045	0.0147	TRAP	0	10
				300	0.050	0.13	90	7600	0.0350	0.040		TRAP	22	8
S34.2	0.4441	77.3	12	50	0.100	0.13	10	2200	0.0452	0.045	0.0538	TRAP	0	10
				300	0.040	0.13	90	8150	0.0386	0.045		TRAP	0	10
S35N	0.5482	82.0	13	300	0.491	0.13	15	2700	0.0790	0.045	0.0242	TRAP	3	6
				300	0.113	0.13	85	5050	0.0280	0.040		TRAP	15	15
S36.2	0.2087	76.6	13	300	0.580	0.13	5	1800	0.0360	0.045	0.0145	TRAP	10	10
				300	0.100	0.13	95	3520	0.0280	0.040		TRAP	20	6
S34.1	1.1700	77.3	12	300	0.590	0.13	25	2570	0.0850	0.045	0.0214	TRAP	0	10
				300	0.040	0.13	75	8800	0.0325	0.040		TRAP	20	10
S36.1	0.1394	73.4	11	300	0.042	0.13	100	2330	0.0320	0.045	0.0134	TRAP	10	30
								3200	0.0270	0.040		TRAP	20	30
S36R1A	0.6310	74.3	10	300	0.020	0.13	100	1420	0.0320	0.045	0.0061	TRAP	0	13
								10800	0.0330	0.040		TRAP	10	9
S36R1C	0.0793	74.3	10	300	0.020	0.13	100	4600	0.0320	0.045		TRAP	10	18
S36R1D	0.5049	74.3	10	300	0.020	0.13	100	10500	0.0360	0.045		TRAP	10	18
S1A2F	0.0086	72.0	20	100	0.045	0.13	100	750	0.0260	0.017		TRAP	14	7
S1A2E	0.0295	72.0	20	100	0.045	0.13	100	1400	0.0290	0.017		TRAP	14	7
S1A2D	0.0158	72.0	20	100	0.045	0.13	100	2000	0.0320	0.017		TRAP	14	7
S1A2A	0.0474	72.0	20	100	0.045	0.13	100	2200	0.0290	0.017		TRAP	14	7
S1A2B	0.0231	72.0	20	100	0.045	0.13	100	2100	0.0310	0.017		TRAP	14	7
S1A2C	0.0091	72.0	20	100	0.045	0.13	100	1000	0.0310	0.017		TRAP	14	7
S1A2G	0.0038	72.0	20	100	0.045	0.13	100	500	0.0270	0.017		TRAP	14	7
S1B4	0.0238	72.0	12	100	0.045	0.10	100	1400	0.0280	0.017		TRAP	15	7
S1B3	0.1438	72.0	12	100	0.045	0.10	100	6300	0.0300	0.017		TRAP	15	7
S1B1	0.0319	72.0	12	100	0.045	0.10	100	1800	0.0340	0.017		TRAP	15	7
S1B2	0.0361	72.0	12	280	0.045	0.10	100	1700	0.0330	0.017		TRAP	15	7
SEEC13	0.0091	74.0	24.8	61	0.021	0.10	100	700	0.0270	0.045		TRAP	5	50
SEEC12	0.0013	74.0	24.8	61	0.021	0.10	100	300	0.0340	0.045		TRAP	5	15
SEEC11	0.0071	74.0	24.8	61	0.021	0.10	100	1200	0.0280	0.045		TRAP	10	50
SEEC10	0.0161	74.0	24.8	61	0.021	0.10	100	1900	0.0280	0.045		TRAP	10	15
SEEC09	0.0234	74.0	24.8	61	0.021	0.10	100	2500	0.0280	0.045		TRAP	10	15
SEEC08	0.0293	74.0	24.8	61	0.021	0.10	100	3100	0.0270	0.045		TRAP	10	15
SEEC07	0.0054	74.0	24.8	61	0.021	0.10	100	500	0.0280	0.045		TRAP	0	100
SEEC06	0.0024	74.0	24.8	61	0.021	0.10	100	400	0.0250	0.045		TRAP	0	100
SEEC05	0.0725	74.0	24.8	61	0.021	0.10	100	4300	0.0250	0.045		TRAP	20	15
SEEC04	0.1265	74.0	24.8	61	0.021	0.10	100	5600	0.0220	0.045		TRAP	10	15
SEEC03	0.0057	74.0	24.8	61	0.021	0.10	100	1600	0.0230	0.045		TRAP	10	50
SEEC02	0.0105	74.0	24.8	61	0.021	0.10	100	700	0.0220	0.045		TRAP	10	50
SEEC01	0.1869	74.0	24.8	61	0.021	0.10	100	6600	0.0220	0.045		TRAP	20	15
S37A3	0.1211	74.0	24.8	61	0.021	0.10	100	3400	0.0240	0.045		TRAP	10	50

Subbasin Data															
KK Record	BA Record	LS Record		UK Record				RK Record							
Subbasin	Area	Curve Number	% Impervious	Length	Slope	Roughness	Subcatchment Contributing Area	Length	Slope	Roughness	Subcatchment Contributing Area	Shape	Bottom Width or Diameter	Routing Increments	
[ID]	[sq. mi.]	[CN]	[RTIMP]	[ft]	[ft/ft]	[N]	[%]	[ft]	[ft/ft]	[N]	[%]		[ft]		
S37A2	0.0842	74.0	24.8	61	0.021	0.10	100	6100	0.0230	0.045		TRAP	10	50	
S37A1	0.3955	74.0	24.8	61	0.021	0.10	100	9000	0.0220	0.045		TRAP	10	50	
52C13	0.0230	75.0	31	100	0.020	0.10	100	950	0.0400	0.045		TRAP	30	10	
52C15	0.0460	75.0	64.4	100	0.020	0.10	100	2050	0.0360	0.045		TRAP	30	10	
52C14A	0.0410	75.0	67.7	100	0.020	0.10	100	2050	0.0310	0.045		TRAP	30	10	
39	1.8807	87.7	0	330	0.043	0.20	100	11240	0.0253	0.045		TRAP	30	3	
40	0.5844	86.0	0	160	0.063	0.20	100	7000	0.0350	0.045		TRAP	20	3	
41	0.8270	77.8	0	280	0.239	0.20	100	9400	0.0282	0.045		TRAP	50	3	
42	0.5844	81.1	0	280	0.239	0.20	100	8750	0.0573	0.045		TRAP	20	3	
43	1.0665	87.7	0	260	0.052	0.20	100	7400	0.0255	0.045		TRAP	25	3	
44	0.8389	87.7	0	260	0.052	0.20	100	9840	0.0622	0.045		TRAP	25	3	
45	0.2037	84.0	0	125	0.117	0.20	100	3600	0.0366	0.045		TRAP	30	3	
45A	0.1720	88.5	0	275	0.220	0.20	100	5400	0.0411	0.045		TRAP	15	3	
46	0.9268	88.5	0	265	0.496	0.20	100	3300	0.2271	0.045	0.1110	TRAP	10	3	
								7100	0.0535	0.045		TRAP	25	3	
47	0.3757	80.2	0	375	0.100	0.20	100	9300	0.0357	0.045		TRAP	50	3	
50	0.4052	86.0	0	300	0.356	0.20	100	730	0.1506	0.045	0.0360	TRAP	10	3	
								6400	0.0453	0.045		TRAP	25	3	
S51.1A	0.0690	75.0	27	300	0.037	0.13	100	1800	0.0380	0.045	0.0161	TRAP	0	12	
								3037	0.0320	0.040		TRAP	40	15	
51B9	0.0237	75.0	27	100	0.021	0.10	100	975	0.0300	0.045		TRAP	50	25	
51B2	0.0623	75.0	27	100	0.021	0.10	100	3261	0.0300	0.045		TRAP	50	25	
52C8	0.0080	75.0	27	100	0.020	0.10	100	750	0.0340	0.045		TRAP	30	10	
51C3	0.0151	75.0	27	100	0.021	0.10	100	1962	0.0375	0.045		TRAP	30	10	
51B1	0.0148	75.0	27	100	0.021	0.10	100	1211	0.0300	0.045		TRAP	50	25	
52C7	0.0060	75.0	27	100	0.020	0.10	100	550	0.0400	0.045		TRAP	30	10	
52C9	0.0690	75.0	31.85	100	0.020	0.10	100	3150	0.0360	0.045		TRAP	30	10	
51C2	0.0423	75.0	27	100	0.021	0.10	100	3309	0.0375	0.045		TRAP	30	10	
52C5	0.0160	75.0	27	100	0.020	0.10	100	1200	0.0300	0.045		TRAP	30	10	
52C6	0.0360	75.0	31.4	100	0.020	0.10	100	3100	0.0350	0.045		TRAP	30	10	
52C10	0.0140	75.0	7.85	100	0.020	0.10	100	800	0.0320	0.045		TRAP	30	10	
52C11	0.0425	75.0	27	100	0.020	0.10	100	2800	0.0310	0.045		TRAP	30	10	
52C12	0.0230	75.0	85	100	0.020	0.10	100	900	0.0300	0.045		TRAP	30	10	
52C14B	0.0210	75.0	60	100	0.020	0.10	100	1250	0.0290	0.045		TRAP	30	10	
51B3	0.0242	75.0	27	100	0.021	0.10	100	3003	0.0300	0.045		TRAP	50	25	
52B1	0.0030	75.0	27	100	0.020	0.10	100	600	0.0390	0.045		TRAP	30	10	
51B10	0.0238	75.0	27	100	0.021	0.10	100	1587	0.0300	0.045		TRAP	50	25	
51B4	0.0243	75.0	27	100	0.021	0.10	100	2053	0.0300	0.045		TRAP	50	25	
52B2	0.0320	75.0	17	100	0.020	0.10	100	2350	0.0370	0.045		TRAP	30	10	
52B3	0.0620	75.0	31.8	100	0.020	0.10	100	3450	0.0300	0.045		TRAP	30	10	
52B4	0.0260	75.0	62	100	0.020	0.10	100	1700	0.0240	0.045		TRAP	30	10	
52B5	0.0210	75.0	56.9	100	0.020	0.10	100	1400	0.0300	0.045		TRAP	30	10	
S53A1	0.1845	77.0	27	300	0.022	0.13	100	1250	0.0230	0.045	0.0087	TRAP	4	5	

Subbasin Data															
KK Record	BA Record	LS Record		UK Record				RK Record							
Subbasin [ID]	Area [sq. mi.]	Curve Number [CN]	% Impervious [RTIMP]	Length [ft]	Slope [ft/ft]	Roughness [N]	Subcatchment Contributing Area [%]	Length [ft]	Slope [ft/ft]	Roughness [N]	Subcatchment Contributing Area [%]	Shape	Bottom Width or Diameter [ft]	Routing Increments	
								2742	0.0170	0.040		TRAP	37	30	
S53A3	0.0720	77.0	30	150	0.027	0.13	100	1250	0.0230	0.045	0.0087	TRAP	4	5	
								1831	0.0180	0.040		TRAP	57	4	
S53A6	0.0261	77.0	30	150	0.027	0.13	100	669	0.0179	0.040		TRAP	10	5.25	
S53A5	0.0222	77.0	27	100	0.027	0.13	100	993	0.0170	0.040		TRAP	35	5	
S51.1B	0.0496	75.0	27	300	0.037	0.13	100	1800	0.0380	0.045	0.0161	TRAP	0	12	
								3350	0.0320	0.040		TRAP	40	15	
S51.1C	0.0965	75.0	27	300	0.037	0.13	100	1800	0.0380	0.045	0.0161	TRAP	0	12	
								5833	0.0320	0.040		TRAP	40	15	
S51.1D	0.9015	75.0	27	300	0.037	0.13	100	1800	0.0380	0.045	0.0161	TRAP	0	12	
								14557	0.0320	0.040		TRAP	40	15	
51B8	0.0397	75.0	27	100	0.021	0.10	100	3891	0.0300	0.045		TRAP	50	25	
52A1	0.1300	75.0	32.25	100	0.020	0.10	100	3400	0.0330	0.045		TRAP	30	10	
52A0	0.0369	85.0	0	100	0.230	0.20	100	2500	0.2300	0.045		TRAP	20	8	
51B5	0.0043	75.0	27	100	0.021	0.10	100	719	0.0300	0.045		TRAP	50	25	
51B6	0.0446	75.0	27	100	0.021	0.10	100	2481	0.0300	0.045		TRAP	50	25	
51B7	0.0270	75.0	27	100	0.021	0.10	100	2451	0.0300	0.045		TRAP	50	25	
52B6	0.0960	75.0	27	100	0.020	0.10	100	3200	0.0330	0.045		TRAP	30	10	
52B7	0.0800	75.0	78.45	100	0.020	0.10	100	2750	0.0280	0.045		TRAP	30	10	
52A2	0.0650	75.0	88.8	100	0.020	0.10	100	2900	0.0230	0.045		TRAP	30	10	
52B0	0.0188	83.0	0	100	0.230	0.20	100	2500	0.2300	0.045		TRAP	20	8	
S53A	0.1250	77.0	27	300	0.022	0.13	100	1475	0.0260	0.045	0.0111	TRAP	3	5	
								2625	0.0210	0.040		TRAP	25	5	
S53A2	0.0544	77.0	27	100	0.022	0.13	100	2080	0.0210	0.040		TRAP	25	5	
S53A4	0.0528	77.0	30	150	0.027	0.13	100	1621	0.0170	0.040		TRAP	35	5	
CPIMA3	0.0669	77.0	65	300	0.027	0.13	100	2100	0.0170	0.040		TRAP	10	6	

Existing Conditions - Normal Depth Route Data

KK Record	RS Record		RC Record						RX Record									RY Record							
Route ID	NSTPS	Route Type	Left Overbank	Channel	Right Overbank	Length	Slope	Max Elevation	Cross-Section Station									Cross-SectionElevation							
			Roughness [N]			[ft]	[ft/ft]	[ft]	[ft]									[ft]							
R30N	8	FLOW	0.022	0.022	0.022	2470	0.0100	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R35NR	12	FLOW	0.060	0.040	0.060	3500	0.0343	1000	1006	1026	1027	1057	1058	1078	1084	105	103	105	103	101	100	100	101	103	105
R36.2R	26	FLOW	0.060	0.040	0.060	7800	0.0321	1000	1043	1053	1068	1093	1098	1133	1218	103	101	103	101	101	100	100	101	101	103
R34.1	8	FLOW	0.022	0.022	0.022	2200	0.0100	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R36.1	6	FLOW	0.022	0.022	0.022	1520	0.0100	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R35NL	44	FLOW	0.060	0.040	0.060	14480	0.0318	1000	1040	1080	1086	1091	1097	1137	1174	105	104	105	104	103	100	100	103	104	105
R36.2L	33	FLOW	0.060	0.040	0.060	10160	0.0342	1000	1030	1060	1066	1076	1082	1112	1142	103	103	103	103	102	100	100	102	103	103
R36R1A	3	FLOW	0.022	0.022	0.022	830	0.0157	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R36R1D	2	FLOW	0.022	0.022	0.022	530	0.0188	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1A2F	3	FLOW	0.022	0.022	0.022	820	0.0195	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1A2E	1	FLOW	0.022	0.022	0.022	350	0.0198	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1A2D	1	FLOW	0.022	0.022	0.022	225	0.0177	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1A2C	1	FLOW	0.022	0.022	0.022	450	0.0225	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1A2G	2	FLOW	0.022	0.022	0.022	600	0.0210	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1B4	1	FLOW	0.022	0.022	0.022	400	0.0225	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1B3	2	FLOW	0.022	0.022	0.022	620	0.0194	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R1B1	2	FLOW	0.022	0.022	0.022	500	0.0256	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
RD1B2	6	FLOW	0.035	0.035	0.035	1900	0.0270	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
R1B2	4	FLOW	0.022	0.022	0.022	1250	0.0280	1000	1012	1020	1028	1036	1044	1052	1064	107	104	107	104	102	100	100	102	104	107
R51.1D	2	FLOW	0.030	0.030	0.030	640	0.0100	1000	1016	1026	1030	1050	1054	1064	1080	6	2	6	2	2	0	0	2	2	6
REEC13	1	FLOW	0.030	0.030	0.030	120	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC12	1	FLOW	0.030	0.030	0.030	160	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC11	1	FLOW	0.030	0.030	0.030	110	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC10	1	FLOW	0.030	0.030	0.030	150	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC09	1	FLOW	0.030	0.030	0.030	350	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC08	1	FLOW	0.030	0.030	0.030	310	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC07	1	FLOW	0.030	0.030	0.030	200	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC06	1	FLOW	0.030	0.030	0.030	390	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
RD1A2D	3	FLOW	0.035	0.035	0.035	1040	0.0251	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
RD1A2G	12	FLOW	0.035	0.035	0.035	3610	0.0251	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
REEC05	1	FLOW	0.030	0.030	0.030	440	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
RD1A2E	18	FLOW	0.035	0.035	0.035	5500	0.0233	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
REEC04	1	FLOW	0.030	0.030	0.030	140	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC03	1	FLOW	0.030	0.030	0.030	320	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
REEC02	1	FLOW	0.030	0.030	0.030	150	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
RD1A2F	23	FLOW	0.035	0.035	0.035	6900	0.0218	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
REEC01	4	FLOW	0.030	0.030	0.030	1260	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
R37A3	2	FLOW	0.030	0.030	0.030	600	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
R37A2	2	FLOW	0.030	0.030	0.030	650	0.0100	0	16	26	30	50	54	64	80	6	2	6	2	2	0	0	2	2	6
RD-R1C	26	FLOW	0.035	0.035	0.035	9100	0.0212	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
RD36.1	30	FLOW	0.035	0.035	0.035	10700	0.0226	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
RD34.1	37	FLOW	0.035	0.035	0.035	13300	0.0218	50	100	108	115	135	143	150	200	101	100	101	100	98	95	95	98	100	101
RSP1EX	7	FLOW	0.055	0.040	0.055	2310	0.0264	0	5	10	12	13	15	19	24	4	2	4	2	1	1	1	1	2	4
R41	26	FLOW	0.055	0.040	0.055	9400	0.0282	0	1	101	107	157	163	263	264	10	8	10	8	3	0	0	3	8	10
R45	10	FLOW	0.055	0.040	0.055	3600	0.0366	0	1	101	107	137	143	243	244	10	8	10	8	3	0	0	3	8	10
R47	21	FLOW	0.055	0.040	0.055	7600	0.0268	0	1	101	109	159	167	267	268	10	9	10	9	4	0	0	4	9	10
R50	3	FLOW	0.055	0.040	0.055	1000	0.0200	0	35	135	150	225	240	340	375	10	3	10	3	3	0	0	3	3	10
R51.2A	4	FLOW	0.055	0.040	0.055	1524	0.0338	0	1	101	107	137	143	243	244	10	8	10	8	3	0	0	3	8	10
RSP2EX	6	FLOW	0.055	0.040	0.055	2028	0.0256	0	15	20	30	35	45	50	60	7	2	7	2	1	1	1	1	2	7

Existing Conditions - Normal Depth Route Data																															
KK Record		RS Record			RC Record							RX Record										RY Record									
Route ID		NSTPS	Route Type		Left Overbank	Channel	Right Overbank	Length	Slope	Max Elevation		Cross-Section Station										Cross-SectionElevation									
					Roughness [N]			[ft]	[ft/ft]	[ft]		[ft]										[ft]									
RUH2B		4	FLOW		0.055	0.040	0.055	1453	0.0096	0		14	21	32	80	94	100	107	7	3		7	4	2	1	1	3	4	7		
RUH2C		3	FLOW		0.055	0.040	0.055	993	0.0880	0		10	22	32	33	34	35	36	3	0		3	3	0	3	3	3	3	3		
R51.2B		5	FLOW		0.055	0.040	0.055	1666	0.0338	0		1	101	107	137	143	243	244	10	8		10	8	3	0	0	3	8	10		
R51.2C		5	FLOW		0.055	0.040	0.055	1742	0.0338	0		1	101	107	137	143	243	244	10	8		10	8	3	0	0	3	8	10		
R51.2D		9	FLOW		0.055	0.040	0.055	3123	0.0338	0		1	101	107	137	143	243	244	10	8		10	8	3	0	0	3	8	10		
R52A1C		7	FLOW		0.045	0.014	0.045	2636	0.0262	0		0	4	7	7	11	27	95	2	0		5	2	0	10	0	0	2	5		
RC52		8	FLOW		0.045	0.014	0.045	2763	0.0232	0		6	36	76	96	136	236	237	10	0		10	2	2	2	2	2	2	10		
RSP4EX		9	FLOW		0.045	0.014	0.045	3366	0.0214	0		6	36	76	96	136	236	237	10	0		10	2	2	2	2	2	2	10		
RPMA4B		2	FLOW		0.040	0.014	0.040	631	0.0206	0		6	36	76	96	136	236	237	10	0		10	2	2	2	2	2	2	10		
RDVSP		5	FLOW		0.045	0.014	0.045	1873	0.0219	0		0	1	2	20	37	38	90	6	1		3	2	2	2	0	2	2	3		
RPMA4A		6	FLOW		0.035	0.035	0.035	2080	0.0183	0		24	64	88	89	90	91	92	6	0		6	0	0	6	6	6	6	6		
RUH2A		4	FLOW		0.035	0.035	0.035	1389	0.0158	0		28	78	106	107	108	109	110	7	0		7	0	0	7	7	7	7	7		

Existing Conditions - Kinematic Wave Route Data						
KK Record	RK Record					
Route ID	Length	Slope	Roughness	Shape	Bottom Width or Diameter	Side Slope
	[ft]	[ft/ft]	[N]		[ft]	1:Z
52C13R	1800	0.035	0.045	TRAP	10	10
R51B9	975	0.03	0.045	TRAP	50	25
R51B2	3261	0.03	0.045	TRAP	50	25
51B2R	750	0.034	0.045	TRAP	10	10
52C8R	1100	0.036	0.045	TRAP	10	10
51C3R	700	0.04	0.045	TRAP	10	10
51B1R	450	0.04	0.045	TRAP	10	10
52C7R	1550	0.036	0.045	TRAP	10	10
52C9R1	1050	0.036	0.045	TRAP	10	10
52C9R2	500	0.032	0.045	TRAP	10	10
51C2R	700	0.03	0.045	TRAP	10	10
52C5R	3100	0.035	0.045	TRAP	10	10
52C6R	450	0.032	0.045	TRAP	10	10
2C10R1	300	0.032	0.045	TRAP	10	10
2C11R1	650	0.02	0.045	CIRC	3	0
2C11CR	750	0.02	0.045	CIRC	3	0
2C11R2	700	0.03	0.045	TRAP	10	10
52C12R	1150	0.029	0.045	TRAP	10	10
RDVSP1	624	0.0143	0.035	TRAP	50	4
51B3R	600	0.039	0.045	TRAP	10	10
52B1R	930	0.037	0.045	TRAP	10	10
R51B10	1587	0.03	0.045	TRAP	50	25
R51B4	2053	0.03	0.045	TRAP	50	25
51B4R1	1350	0.037	0.045	TRAP	10	10
52B2R1	1000	0.037	0.045	TRAP	10	10
52B2R2	850	0.026	0.045	TRAP	10	10
52B3R1	500	0.024	0.045	TRAP	10	10
52B3R2	1700	0.024	0.045	TRAP	10	10
52B4R	550	0.027	0.045	TRAP	10	10
RDVSP2	597	0.0143	0.035	TRAP	50	4
RSP3EX	1773	0.0237	0.04	TRAP	37	30
R53A1	969	0.0217	0.04	TRAP	37	30
RPIMA2	1831	0.018	0.04	TRAP	57	4
51B8R	3400	0.033	0.045	TRAP	10	10
51B5R	1250	0.035	0.045	TRAP	10	10
R51B6	2481	0.03	0.045	TRAP	50	25
51B6R	925	0.033	0.045	TRAP	10	10
51B7R1	530	0.033	0.045	TRAP	10	10
51B7R2	2300	0.033	0.045	TRAP	10	10
52B6R	2750	0.028	0.045	TRAP	10	10
RDVSP3	1530	0.0143	0.035	TRAP	50	4
RDPSD1	1570	0.022	0.015	CIRC	5.5	
RDPSD2	970	0.022	0.015	CIRC	6	

Proposed Conditions - Normal Depth Route Data

KK Record	RS Record		RC Record						RX Record								RY Record							
Route ID	NSTPS	Route Type	Left Overbank	Channel	Right Overbank	Length	Slope	Max Elevation	Cross-Section Station								Cross-SectionElevation							
			Roughness [N]			[ft]	[ft/ft]	[ft]	[ft]								[ft]							
R30N	8	FLOW	0.022	0.022	0.022	2470	0.0100	1000	1000	1012	1020	1028	1036	1044	1052	1064	107	104	102	100	100	102	104	107
D35NR	12	FLOW	0.060	0.040	0.060	3500	0.0343		1000	1006	1026	1027	1057	1058	1078	1084	105	103	101	100	100	101	103	105
R36.2R	26	FLOW	0.060	0.040	0.060	7800	0.0321	1000	1000	1043	1053	1068	1093	1098	1133	1218	103	101	101	100	100	101	101	103
R34.1	8	FLOW	0.022	0.022	0.022	2200	0.0100	1000	1000	1012	1020	1028	1036	1044	1052	1064	107	104	102	100	100	102	104	107
R36.1	6	FLOW	0.022	0.022	0.022	1520	0.0100	1000	1000	1012	1020	1028	1036	1044	1052	1064	107	104	102	100	100	102	104	107
R35NL	44	FLOW	0.060	0.040	0.060	14480	0.0318	1000	1000	1040	1080	1086	1091	1097	1137	1174	105	104	103	100	100	103	104	105
R36.2L	33	FLOW	0.060	0.040	0.060	10160	0.0342	1000	1000	1030	1060	1066	1076	1082	1112	1142	103	103	102	100	100	102	103	103
R36R1A	3	FLOW	0.022	0.022	0.022	830	0.0157	1000	1000	1012	1020	1028	1036	1044	1052	1064	107	104	102	100	100	102	104	107
R36R1D	2	FLOW	0.045	0.045	0.045	530	0.0040	1000	0	5	23	45	57	79	97	102	5	5	0	0	0	0	5	5
R1A2F	3	FLOW	0.045	0.045	0.045	820	0.0040	1000	0	5	23	45	57	79	97	102	5	5	0	0	0	0	5	5
R1A2E	1	FLOW	0.045	0.045	0.045	350	0.0040	1000	0	5	23	45	54	76	94	99	5	5	0	0	0	0	5	5
R1A2D	1	FLOW	0.045	0.045	0.045	225	0.0040	1000	0	5	23	45	54	76	94	99	5	5	0	0	0	0	5	5
R1A2C	1	FLOW	0.045	0.045	0.045	450	0.0040	1000	0	5	23	45	54	76	94	99	5	5	0	0	0	0	5	5
R1B1	2	FLOW	0.022	0.022	0.022	500	0.0256	1000	1000	1012	1020	1028	1036	1044	1052	1064	107	104	102	100	100	102	104	107
RD1B2	6	FLOW	0.035	0.035	0.035	1900	0.0270	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
R51.1D	2	FLOW	0.030	0.030	0.030	640	0.0070	1000	100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC13	1	FLOW	0.030	0.030	0.030	120	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC12	1	FLOW	0.030	0.030	0.030	160	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC11	1	FLOW	0.030	0.030	0.030	110	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC10	1	FLOW	0.030	0.030	0.030	150	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC09	1	FLOW	0.030	0.030	0.030	350	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC08	1	FLOW	0.030	0.030	0.030	310	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC07	1	FLOW	0.030	0.030	0.030	200	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
REEC06	1	FLOW	0.030	0.030	0.030	390	0.0070		100	105	110	120	150	160	165	170	100	99	98	95	95	98	99	100
RD1A2D	3	FLOW	0.035	0.035	0.035	1040	0.0251	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
RD1A2G	12	FLOW	0.035	0.035	0.035	3610	0.0251	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
REEC05	1	FLOW	0.030	0.030	0.030	440	0.0050		100	105	110	120	164	174	179	184	100	99	98	95	95	98	99	100
RD1A2E	18	FLOW	0.035	0.035	0.035	5500	0.0233	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
REEC04	1	FLOW	0.030	0.030	0.030	140	0.0050		100	105	110	120	164	174	179	184	100	99	98	95	95	98	99	100
REEC03	1	FLOW	0.030	0.030	0.030	320	0.0050		100	105	110	120	164	174	179	184	100	99	98	95	95	98	99	100
REEC02	1	FLOW	0.030	0.030	0.030	150	0.0050		100	105	110	120	164	174	179	184	100	99	98	95	95	98	99	100
RD1A2F	23	FLOW	0.035	0.035	0.035	6900	0.0218	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
REEC01	4	FLOW	0.030	0.030	0.030	1260	0.0050		100	105	110	120	164	174	179	184	100	99	98	95	95	98	99	100
R37A3	2	FLOW	0.030	0.030	0.030	600	0.0050		100	105	110	120	164	174	179	184	100	99	98	95	95	98	99	100
R37A2	2	FLOW	0.030	0.030	0.030	650	0.0100		0	16	26	30	50	54	64	80	6	2	2	0	0	2	2	6
RD-R1C	26	FLOW	0.035	0.035	0.035	9100	0.0212	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
RD36.1	30	FLOW	0.035	0.035	0.035	10700	0.0226	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
RD34.1	37	FLOW	0.035	0.035	0.035	13300	0.0218	50	50	100	108	115	135	143	150	200	101	100	98	95	95	98	100	101
RSP1EX	7	FLOW	0.055	0.040	0.055	2310	0.0264		0	5	10	12	13	15	19	24	4	2	1	1	1	1	2	4
R41	26	FLOW	0.055	0.040	0.055	9400	0.0282		0	1	101	107	157	163	263	264	10	8	3	0	0	3	8	10
R45	10	FLOW	0.055	0.040	0.055	3600	0.0366		0	1	101	107	137	143	243	244	10	8	3	0	0	3	8	10
R47	21	FLOW	0.055	0.040	0.055	7600	0.0268		0	1	101	109	159	167	267	268	10	9	4	0	0	4	9	10
R50	3	FLOW	0.055	0.040	0.055	1000	0.0200		0	35	135	150	225	240	340	375	10	3	3	0	0	3	3	10
R51.2A	4	FLOW	0.055	0.040	0.055	1524	0.0338		0	1	101	107	137	143	243	244	10	8	3	0	0	3	8	10
RSP2EX	6	FLOW	0.055	0.040	0.055	2028	0.0256		0	15	20	30	35	45	50	60	7	2	1	1	1	1	2	7
RUH2B	4	FLOW	0.055	0.040	0.055	1453	0.0096		0	14	21	32	80	94	100	107	7	3	2	1	1	3	4	7
RUH2C	3	FLOW	0.055	0.040	0.055	993	0.0880		0	10	22	32	33	34	35	36	3	0	0	3	3	3	3	3

Proposed Conditions - Normal Depth Route Data																													
KK Record		RS Record			RC Record							RX Record									RY Record								
Route ID		NSTPS	Route Type		Left Overbank	Channel	Right Overbank	Length	Slope	Max Elevation		Cross-Section Station									Cross-SectionElevation								
					Roughness [N]			[ft]	[ft/ft]	[ft]		[ft]									[ft]								
R51.2B		5	FLOW		0.055	0.040	0.055	1666	0.0338			0	1	101	107	137	143	243	244		10	8	3	0	0	3	8	10
R51.2C		5	FLOW		0.055	0.040	0.055	1742	0.0338			0	1	101	107	137	143	243	244		10	8	3	0	0	3	8	10
R51.2D		9	FLOW		0.055	0.040	0.055	3123	0.0338			0	1	101	107	137	143	243	244		10	8	3	0	0	3	8	10
R52A1C		7	FLOW		0.045	0.014	0.045	2636	0.0262			0	0	4	7	7	11	27	95		2	0	0	10	0	0	2	5
RC52		8	FLOW		0.045	0.014	0.045	2763	0.0232			0	6	36	76	96	136	236	237		10	0	2	2	2	2	2	10
RSP4EX		9	FLOW		0.045	0.014	0.045	3366	0.0214			0	6	36	76	96	136	236	237		10	0	2	2	2	2	2	10
RPMA4B		2	FLOW		0.040	0.014	0.040	631	0.0206			0	6	36	76	96	136	236	237		10	0	2	2	2	2	2	10
RDVSP		5	FLOW		0.045	0.014	0.045	1873	0.0219			0	0	1	2	20	37	38	90		6	1	2	2	0	2	2	3
RPMA4A		6	FLOW		0.035	0.035	0.035	2080	0.0183			0	24	64	88	89	90	91	92		6	0	0	6	6	6	6	6
RUH2A		4	FLOW		0.035	0.035	0.035	1389	0.0158			0	28	78	106	107	108	109	110		7	0	0	7	7	7	7	7

Proposed Conditions - Kinematic Wave Route Data							
KK Record		RK Record					
Route ID		Length	Slope	Roughness	Shape	Bottom Width or Diameter	Side Slope
		[ft]	[ft/ft]	[N]		[ft]	1:Z
RA2G1		600	0.010	0.013	CIRC	6.5	
RA2G2		600	0.010	0.013	CIRC	6.5	
RB4_2		400	0.022	0.013	CIRC	6.5	
RB4_1		400	0.022	0.013	CIRC	6.5	
RB3_2		620	0.022	0.013	CIRC	6.5	
RB3_1		620	0.022	0.013	CIRC	6.5	
RB2_3		1300	0.014	0.013	CIRC	6.5	
RB2_2		1300	0.014	0.013	CIRC	6.5	
RB2_1		1300	0.014	0.013	CIRC	6.5	
52C13R		1800	0.035	0.045	TRAP	10.0	10
R51B9		975	0.030	0.045	TRAP	50.0	25
R51B2		3261	0.030	0.045	TRAP	50.0	25
51B2R		750	0.034	0.045	TRAP	10.0	10
52C8R		1100	0.036	0.045	TRAP	10.0	10
51C3R		700	0.040	0.045	TRAP	10.0	10
51B1R		450	0.040	0.045	TRAP	10.0	10
52C7R		1550	0.036	0.045	TRAP	10.0	10
52C9R1		1050	0.036	0.045	TRAP	10.0	10
52C9R2		500	0.032	0.045	TRAP	10.0	10
51C2R		700	0.030	0.045	TRAP	10.0	10
52C5R		3100	0.035	0.045	TRAP	10.0	10
52C6R		450	0.032	0.045	TRAP	10.0	10
2C10R1		300	0.032	0.045	TRAP	10.0	10
2C11R1		650	0.020	0.045	CIRC	3.0	
2C11CR		750	0.020	0.045	CIRC	3.0	
2C11R2		700	0.030	0.045	TRAP	10.0	10
52C12R		1150	0.029	0.045	TRAP	10.0	10
RDVSP1		624	0.014	0.035	TRAP	50.0	4
51B3R		600	0.039	0.045	TRAP	10.0	10
52B1R		930	0.037	0.045	TRAP	10.0	10
R51B10		1587	0.030	0.045	TRAP	50.0	25
R51B4		2053	0.030	0.045	TRAP	50.0	25
51B4R1		1350	0.037	0.045	TRAP	10.0	10
52B2R1		1000	0.037	0.045	TRAP	10.0	10
52B2R2		850	0.026	0.045	TRAP	10.0	10
52B3R1		500	0.024	0.045	TRAP	10.0	10
52B3R2		1700	0.024	0.045	TRAP	10.0	10
52B4R		550	0.027	0.045	TRAP	10.0	10
RDVSP2		597	0.014	0.035	TRAP	50.0	4
RSP3EX		1773	0.024	0.040	TRAP	37.0	30
R53A1		969	0.022	0.040	TRAP	37.0	30
RPIMA2		1831	0.018	0.040	TRAP	57.0	4
51B8R		3400	0.033	0.045	TRAP	10.0	10
51B5R		1250	0.035	0.045	TRAP	10.0	10
R51B6		2481	0.030	0.045	TRAP	50.0	25
51B6R		925	0.033	0.045	TRAP	10.0	10
51B7R1		530	0.033	0.045	TRAP	10.0	10
51B7R2		2300	0.033	0.045	TRAP	10.0	10
52B6R		2750	0.028	0.045	TRAP	10.0	10
RDVSP3		1530	0.014	0.035	TRAP	50.0	4
RDPSD1		1570	0.022	0.015	CIRC	5.5	
RDPSD2		970	0.022	0.015	CIRC	6.0	

Entellus

Deer Valley Sedimentation Basin
~ 1 mile west of Pima Road.

Stage [ft]	Area [acre]	H [ft]	delta Volume [acre-ft]	Total Volume [acre-ft]	
1784	0.0045		0	**0**	
1785	0.0931	1	0.04	**0.04**	
1786	0.3018	1	0.19	**0.23**	
1787	0.592	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	0.9	**3.02**	
1791	1.0864	1	1.02	**4.04**	
1792	1.2136	1	1.15	**5.19**	above top of basin
1793	1.3486	1	1.28	**6.47**	above top of basin

* Volume calculated utilizing the conic method

** Based on Field survey

Entellus

2-36" Culvert out of Pima Road Channel
~1000' south of Pinnacle Peak

Stage [ft]	Total Flow [cfs	Pima Channel Flow [cfs]	Culvert Flow [cfs]
0	0	0	**0**
1	132	116	**16**
2	417	377	**40**
3	835	765	**70**
4	1375	1275	**100**

* Flows estimated by normal depth and nomographs

Pima Road (02/17/2005)

100 ft E Pin Peak Road to West

AP at City Water Station E Side Pima

Box Culvert 100 ft E NE Corner Pin Peak

Box Culvert @ NW Corner Pin Peak

Box Culvert Pin Peak Road NE Corner

Calle Buena Vista N Gate

City Well W Side OF Pima from N

City Well W Side OF Pima from N

City Well Corner

E Side Pima & Vista Del Lago

E Side Pima S of Pin Peak

E Side S of Vista Del Lago

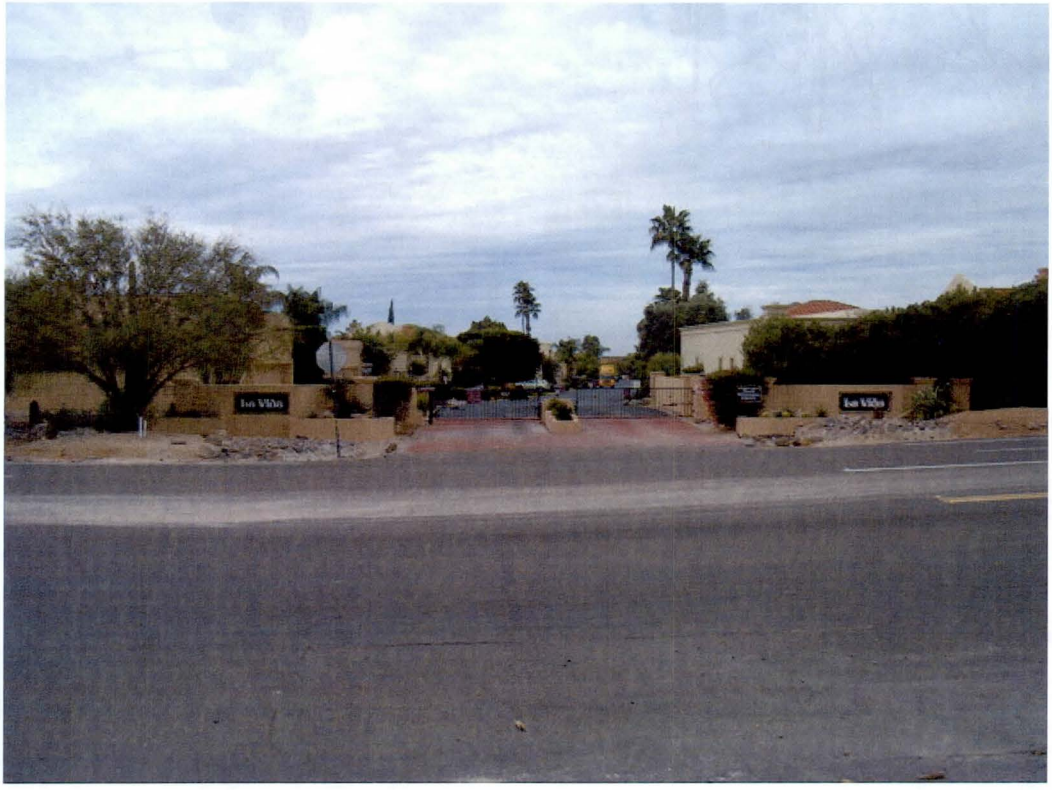
E Side Water Station N side

E Water station S side

Elect Trans. @ City Well

Headwall @ NE Corner Pin Peak

Headwall At Unknown St E side Pima



La Vida Gate

Los Gatos Entrance NW Corner

Los Gatos Entrance SE to NW

Los Gatos Entrance SW Corner

Los Gatos to S

Median N of Pin Peak to S

Median @ Pin Peak E Bound To W

Median @ Pin Peak to E

N Bound Pima SMH sign

N Bound Pima to S on E Side @ Deer Valley Rd

N on E side Pima above Deer Valley

NE Corner Calle Buena Vista

NE Corner Pima & Los Gatos

NE Corner Pin Peak to N

NE Corner Pin Peak to S

NE Corner Pin Peak to SW

NW Corner Paraiso to N

NW Corner Pin Peak Basin & Wall

NW Corner Pin Peak to S

Photo Radar @ NW Corner Pin Peak

Pima & Calle Buena Vista

Pima & Los Gatos

Pima & Los Gatos NE Corner

Pima & Los Gatos NE Corner to SW

Pima & Los Gatos SE Corner to N

Pima & Los Gatos to E

Pima & Los Gatos W Bound to E

Pima & Paraiso Drainage SW Corner

Pima & Paraiso NW Corner Drain

Pima & Paraiso SW Corner

Pima & Paraiso SW Corner to S

Pima & Paraiso to W

Pima & Vista Del Lego N

Pima & Vista Del Lago

Pima N of Paraiso to N

Retention Walls @ NE Corner Pin Peak

S from unknown St

Scupper @ NE Corner Pin Peak

Scupper N of NE Corner Pin Peak

SE Corner Bus Entrance

SE Corner Dolra Vista

SE Corner Pima & Los Gatos Head Wall

SE Corner Pin Peak to N

Side St E Side Pima Name Unknown

Side St To E N side

Side St to E S Side

SW Corner Country Club Trail

SW Corner Country Club Trail to N

SW Corner Pin Peak Basin & Wall to S

Typical Cable Maker W Side

Typical Drainage

Typical SMH Containment E side of Pima

West Side

West side Pima to N at Deer Valley

West side Pima to N of Los Gatos

West Side Pima to S @ Pin Peak

West side to N wall

Pima Road (02/23/2005)

NW Corner Pinnacle Peak 200 Ft N

NW Corner Pinnacle Peak Basin to W

NW Corner Pinnacle Peak FCL

NW Corner Pinnacle Peak From SW

NW Corner Pinnacle Peak Retention

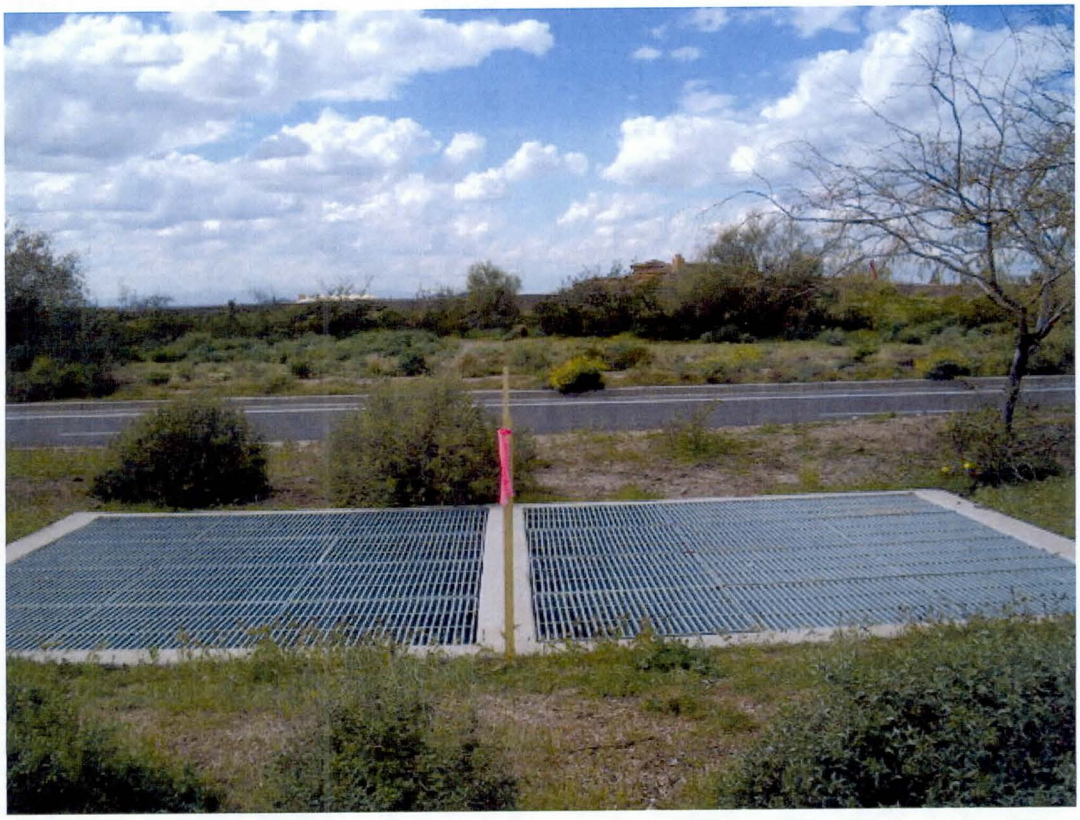
NW Corner Pinnacle Peak To E

NW Corner Pinnacle Peak Tree Over

Pima Equest Xing E Side to S

Pima Equest Xing Grate N to S

Pima Equest Xing grate W to E



Pima Equest Xing Median Grate E to W

Pima Equest Xing Median S to N

Pima Equest Xing to E

Pima Equest Xing to N

Pima Equest Xing to S

Pima Equest Xing to W from E

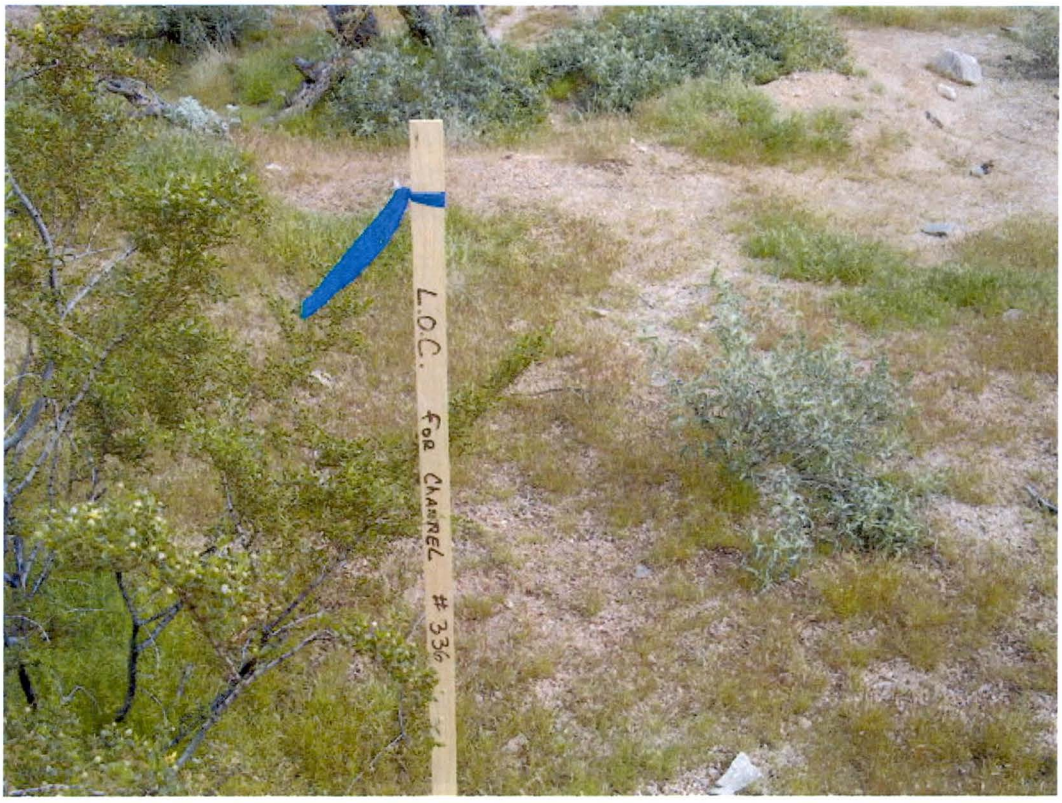
Pima Equest Xing W side S to N

Pima Equest Xing W side to S

Pima Equest Xing W side W to E

Pinnacle PEAK SW Corner Elect

SW Corner Pinnacle Peak Channel Area



SW Corner Pinnacle Peak Channel Stake

SW Corner Pinnacle Peak S to N

SW Corner Pinnacle Peak To N Corner

SW Corner Pinnacle Peak To S

Chama & Pima Road (10/14/2005)

Chama 1

Chama 2

Chama 3

Chama 4

Chama 5

Chama 6

De La O & Pima Road (10/14/2005)

De La O 1

De La O 2

De La O 3

De La O 4

De La O 5

De La O 6

De La O 7

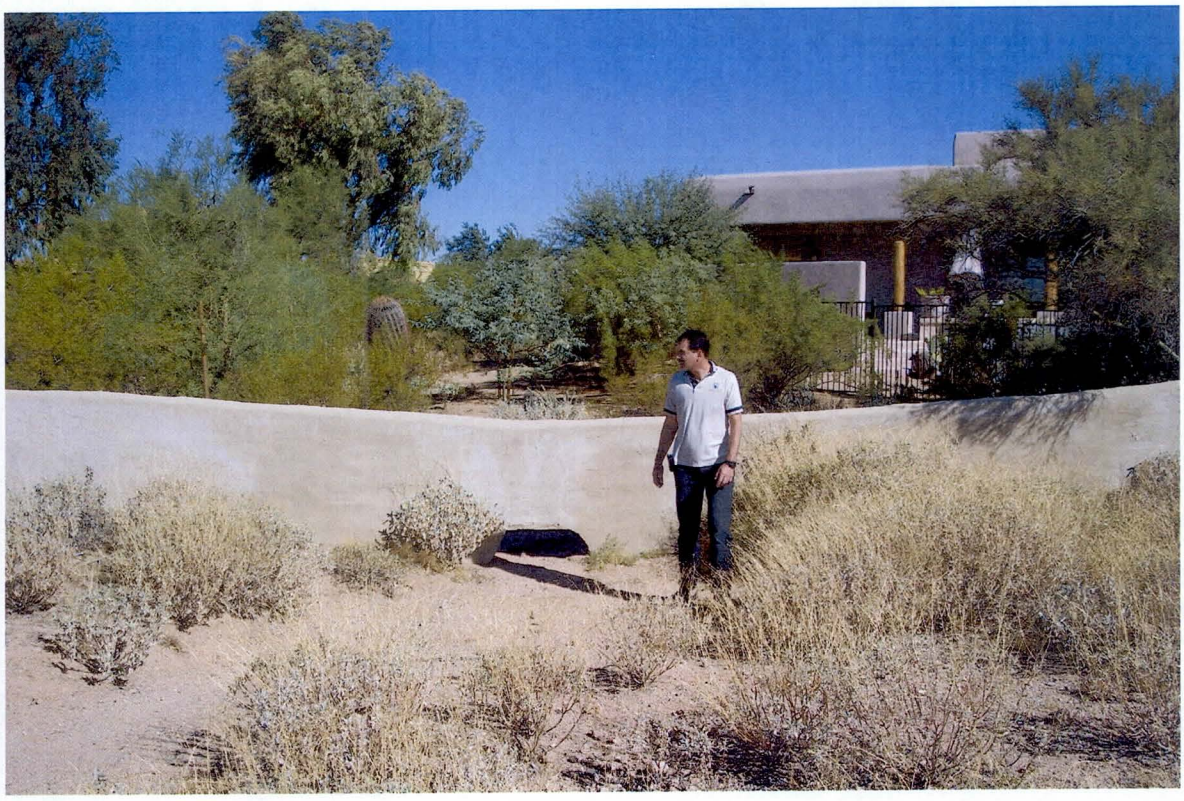
Deer Valley & Pima Road (10/14/2005)

Deer Valley 1

Deer Valley 2

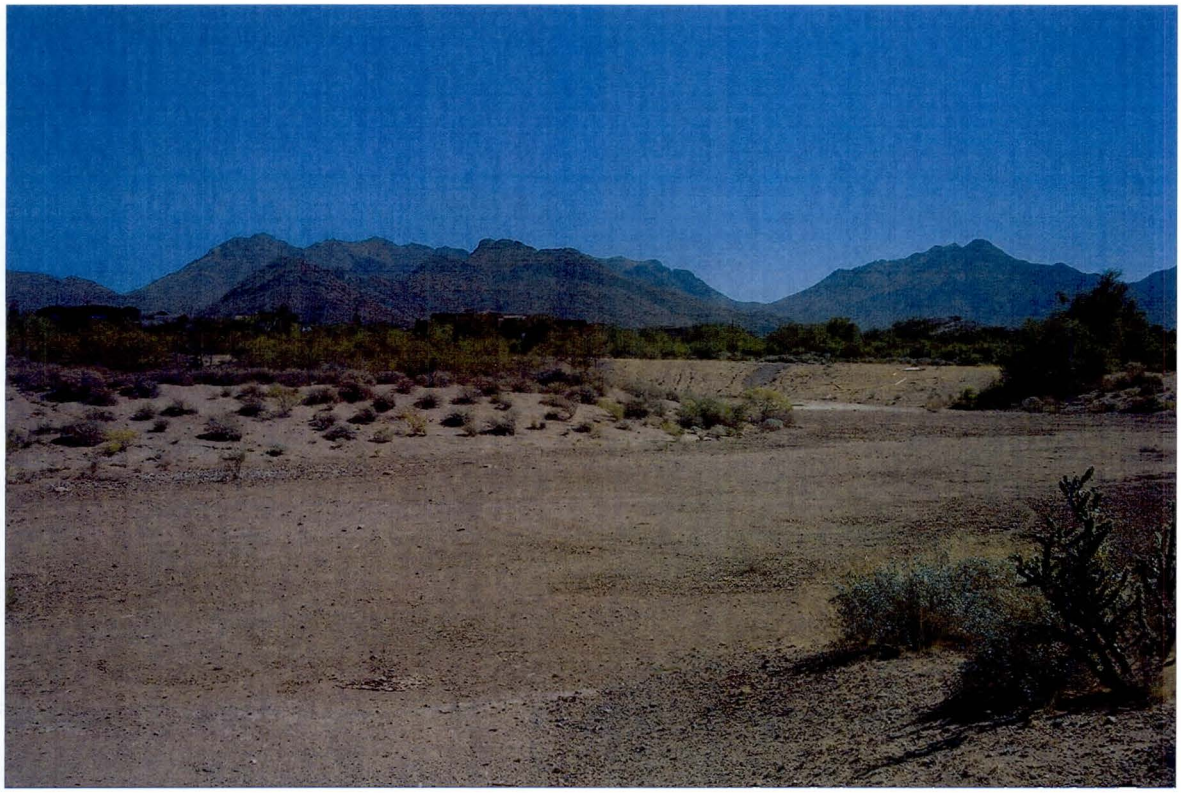
Deer Valley 3

Deer Valley 4



Deer Valley 5

Deer Valley 6



Deer Valley 7

Deer Valley 8

Deer Valley 9

Happy Valley & Pima Road (10/14/2005)

Happy Valley 1

Happy Valley 2

Happy Valley 3

Happy Valley 4

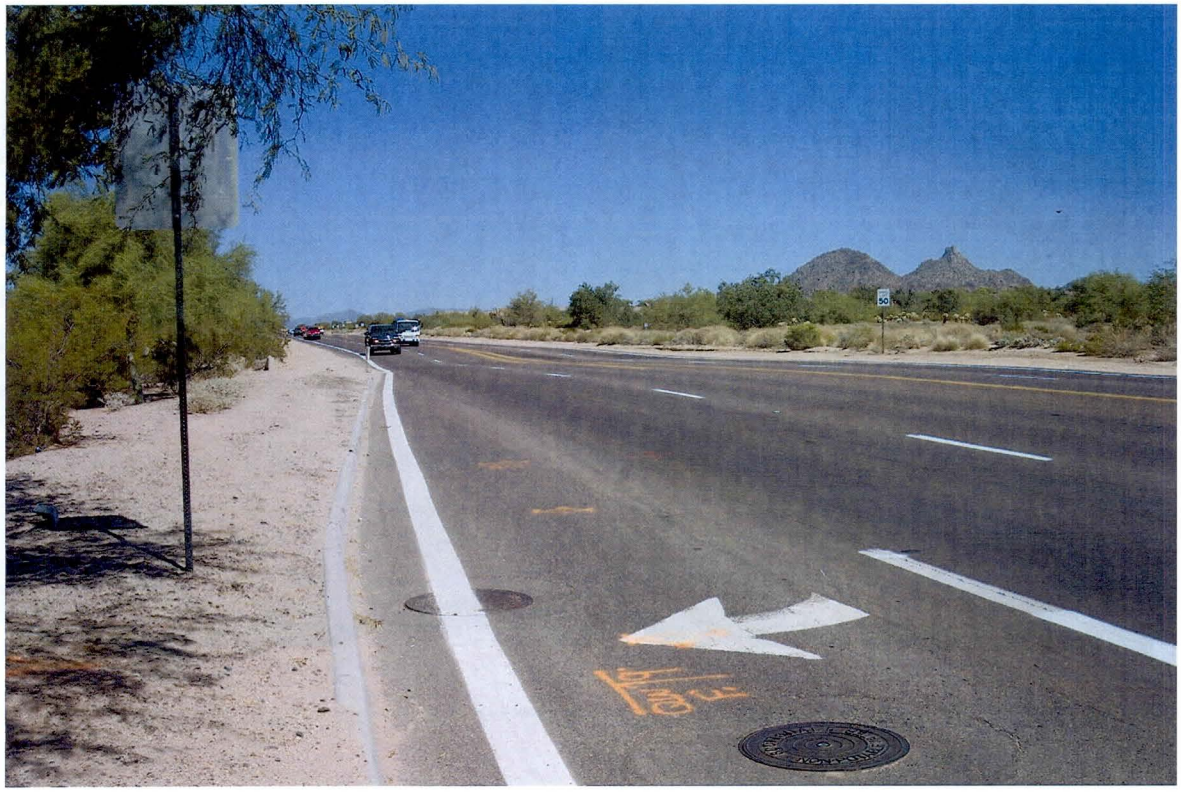
Happy Valley 5

Happy Valley 6

Los Gatos & Pima Road (10/14/2005)

Los Gatos 1

Los Gatos 2



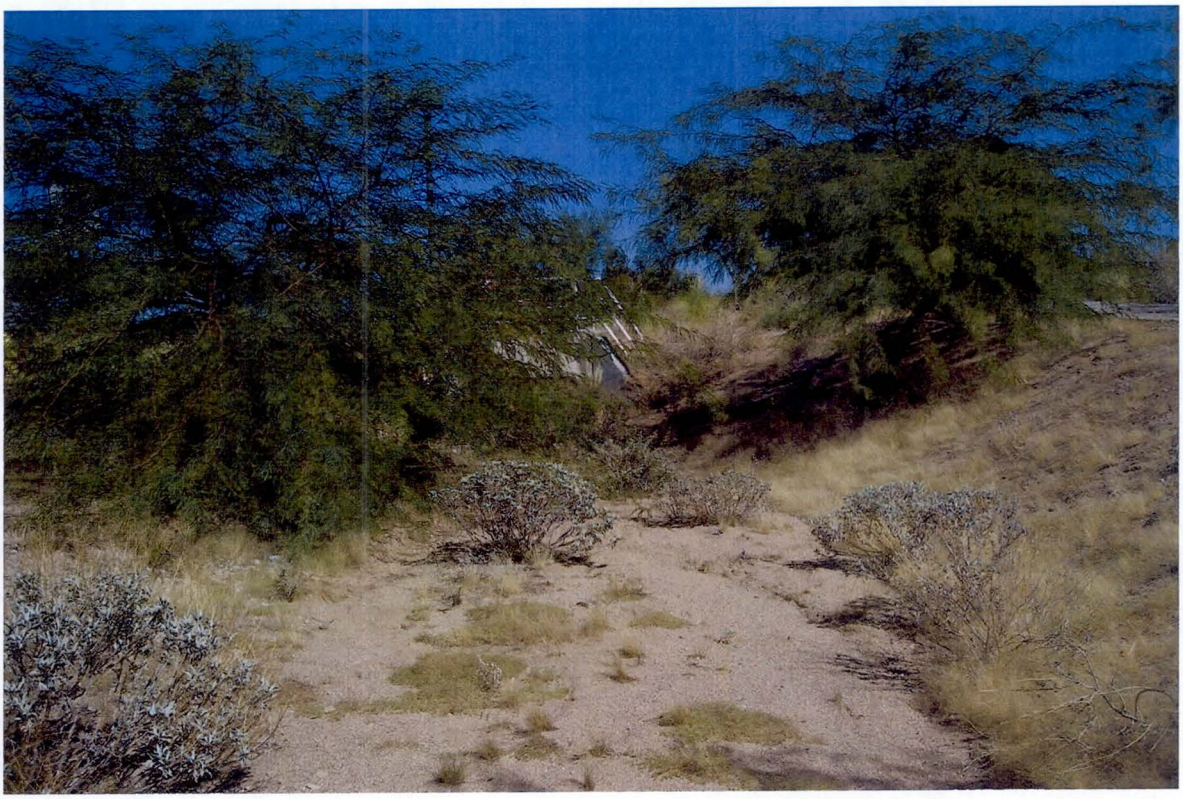
Los Gatos 3

Los Gatos 4

Los Gatos 5

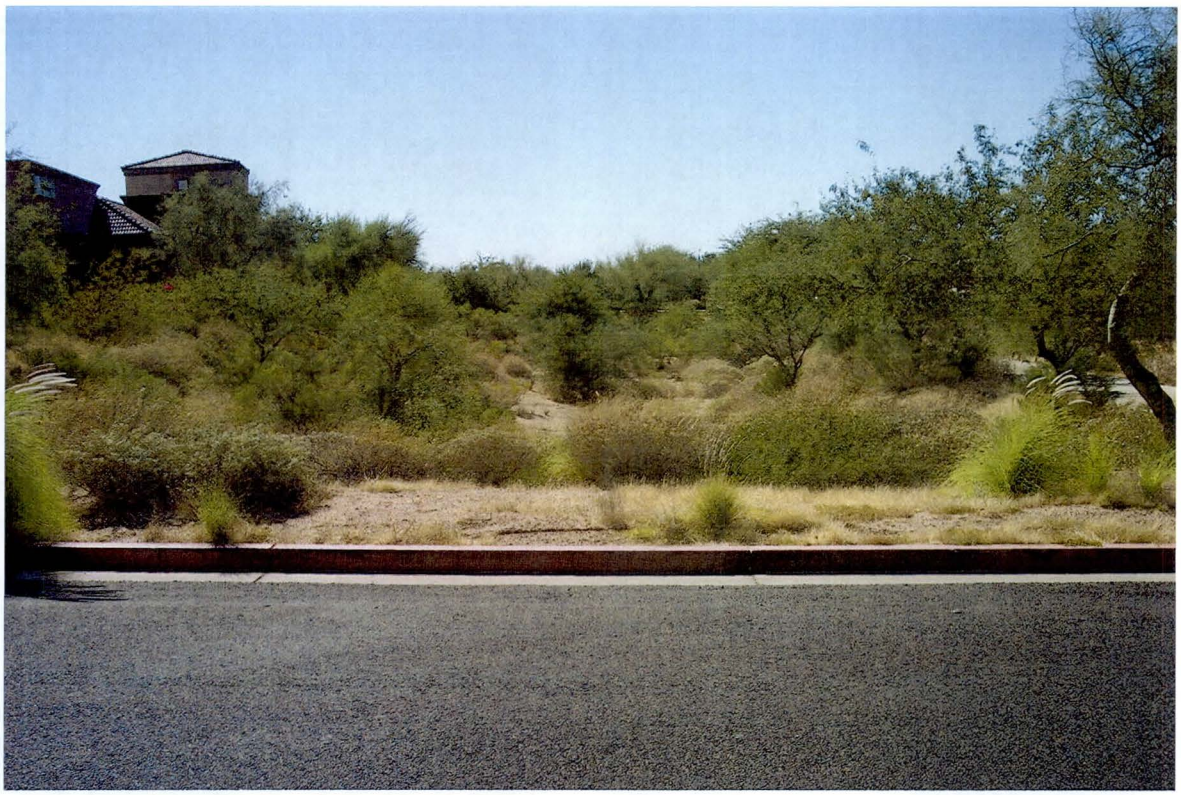
Los Gatos 6

Pinnacle Peak & Pima Road (10/14/2005)



Pinnacle Peak 1

Pinnacle Peak 2



Pinnacle Peak 3

Pinnacle Peak 4

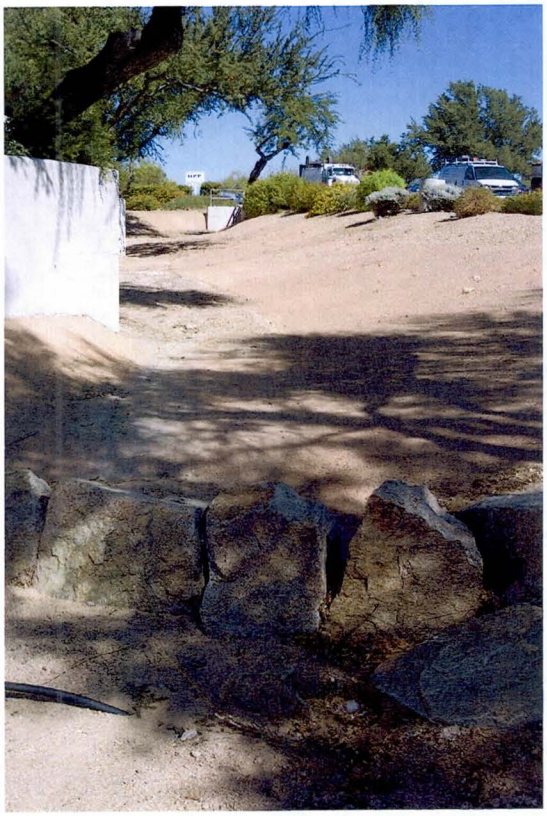
Pinnacle Peak 5

Pinnacle Peak 6

Pinnacle Peak 7

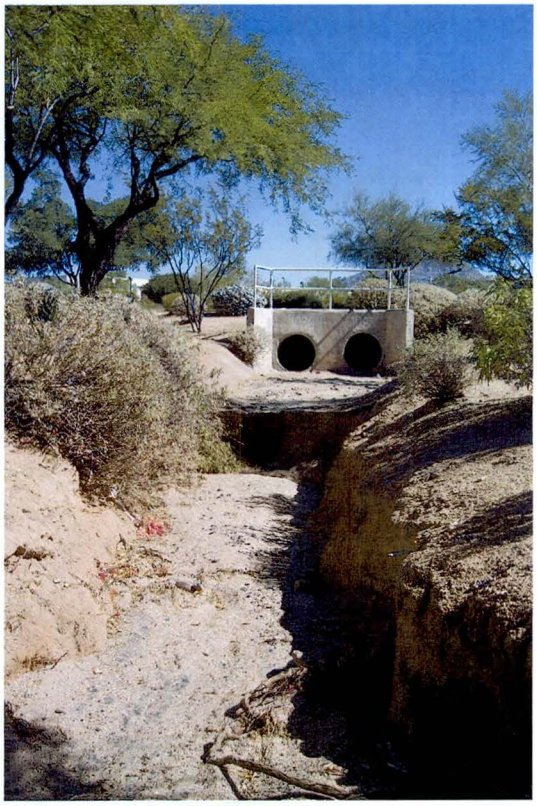
Pinnacle Peak 8

Pinnacle Peak 9



Pinnacle Peak 10

Pinnacle Peak 11

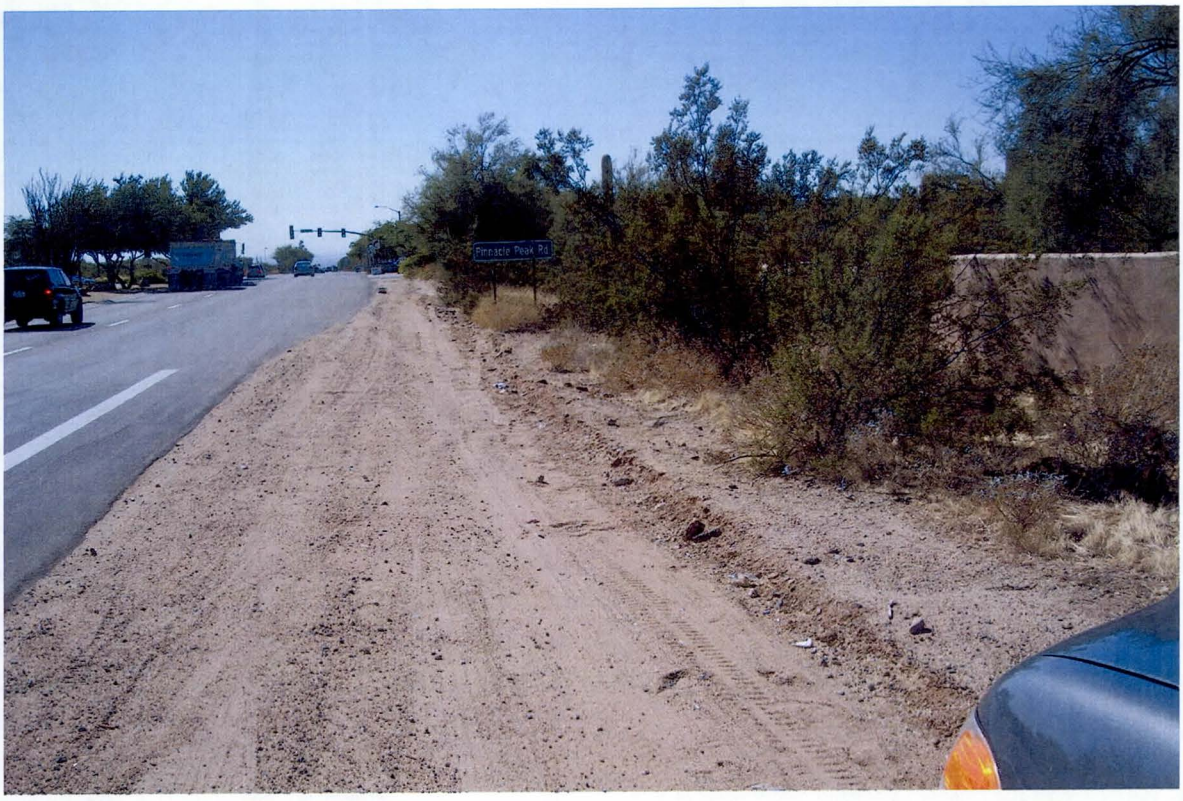


Pinnacle Peak 12

North of Pinnacle Peak and West side of Pima Road
(10/14/2005)

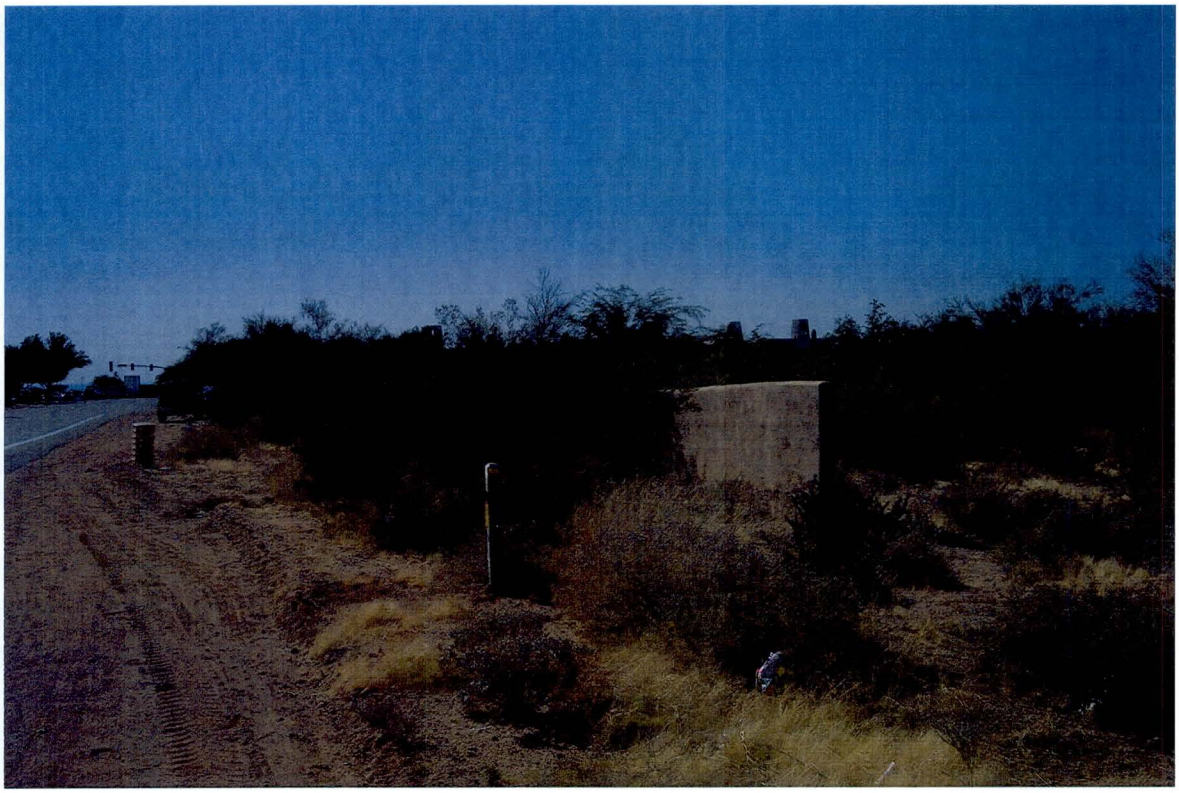
Pinnacle Peak-north of PP, W side of road 1

Pinnacle Peak-north of PP, W side of road 2



Pinnacle Peak-north of PP, W side of road 3

Pinnacle Peak-north of PP, W side of road 4



Pinnacle Peak-north of PP, W side of road 5

```
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           *
*                                   *
*************************************
```


```
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 HEC-1 INPUT PAGE 1

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

    1         ID   ********************************************************************************
    2         ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
    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_Existing_Conditions_no_wall-100yr.hc1              ***
    9         ID   ***                                                                          ***
   10         ID   ***  Client Project#:                                                       ***
   11         ID   ***  Entellus Prj#:    410.061                                             ***
   12         ID   ***  Modelers:         RAS                                                 ***
   13         ID   ***  Storm:            100-year, 6-hour                                    ***
   14         ID   ***  Development Cond: Existing Conditions Without Los Gatos Wall In Place***
   15         ID   ***                                                                        ***
   16         ID   ***                                                                        ***
   17         ID   ***  It was decided that various flow conditions needed to be modeled.     ***
   18         ID   ***    This was to enable the best decision making in regards to the       ***
   19         ID   ***    Pima Road Channel, Deer Valley channel and Sierra Pinta Outlet.     ***
   20         ID   ***    Three scenarios will be modeled and they are as follows:            ***
   21         ID   ***                                                                        ***
   22         ID   ***    1) Existing conditions assuming the Los Gatos wall is in place.     ***
   23         ID   ***         This scenario will model the Los Gatos wall as though it      ***
   24         ID   ***         does not allow flow to cross it.  The Los Gatos entrance      ***
   25         ID   ***         will, however allow flow in, and this diversion into the      ***
   26         ID   ***         subdivision will be modeled.                                  ***
   27         ID   ***                                                                        ***
   28         ID   ***    2) Existing Conditions assuming the Los Gatos Wall is not in place.***
   29         ID   ***         This scenario will model the Los Gatos wall as though it      ***
   30         ID   ***         does not exist and all flow will be allowed to cross Pima     ***
   31         ID   ***         Rd. unimpeded along the Los Gatos subdivision boundary.       ***
   32         ID   ***                                                                        ***
   33         ID   ***    3) Proposed Conditions:                                           ***
   34         ID   ***         The proposed conditions for the design of the Pima Rd         ***
   35         ID   ***         Channel, Deer Valley Channel and the Sierra Pinta Outfall.    ***
   36         ID   ***                                                                        ***
   37         ID   ***                                                                        ***
   38         ID   ***  PIMA ROAD DIVERSION ASSUMPTIONS                                       ***
   39         ID   ***     The following assumptions were made for this model                 ***
   40         ID   ***     regarding the diversion along Pima Rd:                            ***
   41         ID   ***       1) DO361C - Northeast side of Pinnacle Peak and Pima Rd.        ***
   42         ID   ***            This diversion to the west was assumed to be equal to the  ***
   43         ID   ***            capacity of the existing 2-3x4.5' box culverts.            ***
   44         ID   ***            The capacity was estimated as being 234 cfs.               ***
   45         ID   ***            Flow was diverted to the west up to the capacity of        ***
   46         ID   ***            the culvert before flow was allowed to continue            ***
   47         ID   ***            south along Pima Rd.                                       ***
   48         ID   ***                                                                       ***
   49         ID   ***       2) DO1A2F - Flow crossing Pima Rd. 1000' S. of Pinnacle Peak    ***
   50         ID   ***            Based on field observations any flow that does not         ***
   51         ID   ***            cross through the existing 2-36" culverts will             ***
   52         ID   ***            cross Pima Rd prior to the following driveway.             ***
```

```
   53          ID   ***          Thus it was assumed that all flow crosses Pima Rd.          ***
   54          ID   ***          and heads to the west through subbasin SEEC01 at            ***
   55          ID   ***          this location.                                              ***
1                                      HEC-1 INPUT                                                PAGE  2

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

   56          ID   ***                                                                      ***
   57          ID   ***       3) DO1A2E - Flow Crossing Pima Rd. at/near E. Paraiso Dr.     ***
   58          ID   ***          Based on field observations it was determined             ***
   59          ID   ***          that all flow crosses Pima Rd. at or near                 ***
   60          ID   ***          E. Paraiso / E. Calle Buena Vista and flows               ***
   61          ID   ***          to the west through subbasin SEEC04.                      ***
   62          ID   ***                                                                    ***
   63          ID   ***       4) DO1A2D - Flow Crossing Pima Rd. north of N 91st St.       ***
   64          ID   ***          Based on field observations, it was determined that       ***
   65          ID   ***          flow from subbasin S1A2D crosses Pima Rd. and does        ***
   66          ID   ***          not continue south along Pima Rd.                         ***
   67          ID   ***                                                                    ***
   68          ID   ***       5) DO1A2G - Flow crossing Pima Rd. 250' N. of Country Club Trl ***
   69          ID   ***          This diversion accounts for the flow that crosses         ***
   70          ID   ***          Pima Rd. just south of the intersection of Pima Rd.       ***
   71          ID   ***          and 91st St.  Based on the FLO-2D Results,                ***
   72          ID   ***          it was determined that a flow split in which              ***
   73          ID   ***          approximately 87% of the flow crosses Pima Rd.            ***
   74          ID   ***          to the west and through the Pinnacle Peak Country         ***
   75          ID   ***          Club subdivision.  The diversion occurs just north        ***
   76          ID   ***          of the concentration point C1A2G, but flow from           ***
   77          ID   ***          subbasin S1A2G would be contributing to the diversion,    ***
   78          ID   ***          therefore the diversion was taken out after the           ***
   79          ID   ***          concentration point.  The remaining 13% of the flow       ***
   80          ID   ***          continues south along Pima Rd.                            ***
   81          ID   ***                                                                    ***
   82          ID   ***       6) DO1B4 - Flow crossing Pima Rd. 1000' N. of Los Gatos Dr.  ***
   83          ID   ***          It was decided for this model that the Los Gatos          ***
   84          ID   ***          wall would be modeled as though it were not in place      ***
   85          ID   ***          and flow would cross it.  Therefore flow                  ***
   86          ID   ***          crosses Pima Rd, then enters and flows through the        ***
   87          ID   ***          Los Gatos subdivision at this point, and no flow          ***
   88          ID   ***          continues south along Pima Rd.                            ***
   89          ID   ***                                                                    ***
   90          ID   ***       7) DO1B3 - Flow along Pima Rd. north of Los Gatos Dr.        ***
   91          ID   ***          This diversion occurs along the east side of the          ***
   92          ID   ***          Los Gatos subdivision and Pima Rd. north of Los           ***
   93          ID   ***          Gatos Dr.  This diversion accounts for the flow           ***
   94          ID   ***          that enters through the Los Gatos entrance.  Based        ***
   95          ID   ***          on the FLO-2D model it was determined that all flow       ***
   96          ID   ***          from concentration point C1B3 flows along Pima Rd.        ***
   97          ID   ***          and enters through the Los Gatos entrance.  However,      ***
   98          ID   ***          the flow coming from the east (subbasins S1B1 and S1B2)   ***
   99          ID   ***          does not contribute to flow entering the subdivision      ***
  100          ID   ***          at this location.  Thus this diversion occurs after       ***
  101          ID   ***          the flow has been routed from C1B3 to the Los Gatos       ***
  102          ID   ***          entrance but before the combine with flows from the       ***
  103          ID   ***          east (C1B2).                                              ***
  104          ID   ***                                                                    ***
  105          ID   ***       8) DO1B2 - Flow arriving at the intersection of Los Gatos Dr. & ***
  106          ID   ***                  Pima Rd. from the subbasins to the east: S1B2 & S1B1.***
  107          ID   ***          This diversion only considers flow arriving at the        ***
  108          ID   ***          intersection of Pima Rd. and Los Gatos Dr. from the       ***
  109          ID   ***          east via subbasins S1B2 and S1B1.  It was assumed         ***
  110          ID   ***          that all flow arriving at this intersection from the      ***
1                                      HEC-1 INPUT                                                PAGE  3

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

  111          ID   ***          north (route R1B3) had already crossed Pima Rd. and       ***
  112          ID   ***          enters the Los Gatos subdivision at Los Gatos Dr.         ***
  113          ID   ***          Based on the results of the Flo-2D analysis flow from     ***
  114          ID   ***          the east does not cross Pima Rd at this intersection,     ***
  115          ID   ***          instead, this flow crosses Los Gatos Dr. and continues    ***
  116          ID   ***          south a short distance and then crosses Pima Rd.          ***
  117          ID   ***          This continues the assumption that the wall along         ***
  118          ID   ***          the east side of the Los Gatos subdivision is not         ***
  119          ID   ***          in place to divert flows.                                 ***
  120          ID   ***                                                                    ***
  121          ID   ***       9) D51.1D - Diversion at Pima Rd. and Deer Valley            ***
  122          ID   ***          Based on field observations it was assumed that           ***
  123          ID   ***          flow along Pima Rd. at Deer Valley would not get          ***
  124          ID   ***          into the Deer Valley channel.  Therefore it was           ***
  125          ID   ***          assumed that all flow continues south along Pima Rd.      ***
```

```
126          ID   ***                                                                ***
127          ID   ***      10) D52AW - Diversion at Pima Rd and Thompson Peak Parkway   ***
128          ID   ***          Modified Diversions DV52AW representing the split at    ***
129          ID   ***          Pima Rd. and Thompson Peak Parkway. This diversion      ***
130          ID   ***          represent the existing conditions and the rating curve  ***
131          ID   ***          is based on the FLO-2D results.                         ***
132          ID   ***                                                                  ***
133          ID   ***                   Total Q    West Q    South Q                  ***
134          ID   ***                       0.0       0.0        0.0                  ***
135          ID   ***                     100.0       1.0       99.0                  ***
136          ID   ***                     250.0       4.0      246.0                  ***
137          ID   ***                     375.0       6.0      369.0                  ***
138          ID   ***                     500.0      13.0      487.0                  ***
139          ID   ***                     625.0      22.0      603.0                  ***
140          ID   ***                     750.0      41.0      709.0                  ***
141          ID   ***                     875.0      63.0      812.0                  ***
142          ID   ***                    1000.0      82.0      918.0                  ***
143          ID   ***                    1125.0      96.0     1029.0                  ***
144          ID   ***                    1250.0     109.0     1141.0                  ***
145          ID   ***                    1375.0     124.0     1251.0                  ***
146          ID   ***                    1500.0     137.0     1363.0                  ***
147          ID   ***                    1750.0     161.0     1589.0                  ***
148          ID   ***                    2000.0     186.0     1814.0                  ***
149          ID   ***                    2500.0     238.0     2262.0                  ***
150          ID   ***                    2750.0     256.0     2494.0                  ***
151          ID   ***                    2875.0     259.0     2616.0                  ***
152          ID   ***                    3000.0     255.0     2745.0                  ***
153          ID   ***                    3500.0     280.0     3220.0                  ***
154          ID   ***                                                                ***
155          ID   ***     Modifications made to model:                                ***
156          ID   ***       1) Diversion added after C1A2G:                          ***
157          ID   ***           This diversion was added to account for additional flow ***
158          ID   ***           that crosses Pima Road prior to the Los Gatos subdivision. ***
159          ID   ***           Previous assumptions were that the flow crosses Pima Rd. ***
160          ID   ***           and is taken out at the next diversion.  This assumption ***
161          ID   ***           was made due to the assumption that the Los Gatos Wall   ***
162          ID   ***           would not act as a flood wall and would not be modeled,  ***
163          ID   ***           thus allowing all flow to cross. Based on FLO-2D         ***
164          ID   ***           modeling results, flow crosses Pima Rd prior to the      ***
165          ID   ***           Los Gatos subdivision, and approximately 87% of the      ***
```



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

166          ID   ***           flow crosses to the west and 13% stays along Pima Rd.    ***
167          ID   ***           to the south.                                            ***
168          ID   ***                                                                    ***
169          ID   ***       2) Added Concentration Point CD1A2G:                       ***
170          ID   ***           This concentration point was added to account for the    ***
171          ID   ***           combine of route RD1A2D and the newly added diversion D1A2G.***
172          ID   ***                                                                    ***
173          ID   ***       3) Added Route RD1A2G and Modified Route RD1A2D:           ***
174          ID   ***           Route RD1A2D was modified to account for the added       ***
175          ID   ***           concentration point.  It essentially has been truncated  ***
176          ID   ***           at E. Country Club Trail.  Route RD1A2G picks up after   ***
177          ID   ***           the combine of the diversion recovery of DO1A2G and routes ***
178          ID   ***           the combined routes to Deer Valley.                      ***
179          ID   ***                                                                    ***
180          ID   ***       4) Added Diversion D1B3:                                   ***
181          ID   ***           Added a diversion D1B3 following route R1B3.  This       ***
182          ID   ***           diversion represents the flow into the Los Gatos         ***
183          ID   ***           Subdivision entrance from the north.  Through a FLO-2D   ***
184          ID   ***           analysis it was determined that the majority of the flow ***
185          ID   ***           from C1B3crosses Pima Rd. to the west and enters the Los ***
186          ID   ***           Gatos subdivision entrance.  The analysis also determined ***
187          ID   ***           that minimal flow from the east at the intersection of E. ***
188          ID   ***           Los Gatos Dr. crosses Pima Rd at this location, thus all ***
189          ID   ***           flow from here was routed south along Pima Rd.           ***
190          ID   ***                                                                    ***
191          ID   ***       5) Added Concentration Point CD1B2:                        ***
192          ID   ***           Added a concentration Point CD1B2 that combines          ***
193          ID   ***           the diversion recovery Do1B3 and the diversion           ***
194          ID   ***           recovery of DO1B2.  This concentration point             ***
195          ID   ***           represents the total flow entering the Los Gatos         ***
196          ID   ***           Subdivision entrance and passing through the             ***
197          ID   ***           wall south of the entrance (if allowed):                 ***
198          ID   ***           DO1B3 (flow from the north along Pima Rd through entrance) ***
199          ID   ***           and DO1B2 (flow from the east of E. Los Gatos Dr.        ***
200          ID   ***           and crossing the wall to the west).                      ***
201          ID   ***                                                                    ***
202          ID   ***                                                                    ***
```

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203          ID   ********************************************************************************
204          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
205          ID   ********************************************************************************
206          ID   ***                                                                          ***
207          ID   ***  Modified:         December 2008                                         ***
208          ID   ***  Project:          PIMA ROAD                                             ***
209          ID   ***  Client:           City of Scottsdale                                    ***
210          ID   ***  File Name:        2008-12_Pima_Rd_Combined_100-yr.hc1                   ***
211          ID   ***                                                                          ***
212          ID   ***  Client Project#:                                                        ***
213          ID   ***  Entellus Prj#:    410.061                                               ***
214          ID   ***  Modelers:         RAS                                                   ***
215          ID   ***  Storm:            100-year, 6-hour                                      ***
216          ID   ***  Development Cond: Existing Conditions                                   ***
217          ID   ***                                                                          ***
218          ID   ***                                                                          ***
219          ID   ***                                                                          ***
220          ID   ***     Reasons for Modifications to model:                                   ***
1                                          HEC-1 INPUT                                        PAGE   5

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

221          ID   ***                                                                          ***
222          ID   ***       1) It was determined that the wall along Pima Rd. at            ***
223          ID   ***          Los Gatos subdivision should be considered.  Doing           ***
224          ID   ***          this requires routing flow south along Pima Rd.  This        ***
225          ID   ***          flow will cross Deer Valley Rd and not flow into the         ***
226          ID   ***          Deer Valley Channel.  To accomplish this the two (2)         ***
227          ID   ***          HEC-1 models (1. North of Deer Valley and 2. South of        ***
228          ID   ***          Deer Valley) were combined.  This model combines the         ***
229          ID   ***          two models.                                                  ***
230          ID   ***                                                                       ***
231          ID   ***                                                                       ***
232          ID   ***     Modifications made to model:                                       ***
233          ID   ***       1) The Deer Valley North and Deer Valley South models were      ***
234          ID   ***          combined.                                                    ***
235          ID   ***                                                                       ***
236          ID   ***       2) Modified Diversions D1B4 and D1B2.  It was decided that      ***
237          ID   ***          no flow will pass through the wall of Los Gatos.  This       ***
238          ID   ***          diversion has been modified to have all flow continue        ***
239          ID   ***          south along Pima Rd.                                         ***
240          ID   ***                                                                       ***
241          ID   ***       3) Removed subbasins S51.1H, S51.1G and S51.1F.              ***
242          ID   ***          These subbasins were replaced by S51.1D which was            ***
243          ID   ***          modified slightly to include the area all the way            ***
244          ID   ***          to E. Los Gatos Dr.                                          ***
245          ID   ***                                                                       ***
246          ID   ***       4) Combined routes R1B2, R51.1H, R51.1G and extended to C51.1D. ***
247          ID   ***          This combined/extended route is called R1B2.                 ***
248          ID   ***                                                                       ***
249          ID   ***       5) Removed concentration point C51.1H, C51.1G, C51.1F,       ***
250          ID   ***          and CEEC13.                                                  ***
251          ID   ***                                                                       ***
252          ID   ***       6) Modified NSTPS for all necessary routes.                  ***
253          ID   ***          Some of the modified NSTPS were for routes taken directly    ***
254          ID   ***          from other models.  The routes taken from other models       ***
255          ID   ***          that were updated include: R41, R45, R47, R50.               ***
256          ID   ***          Other modified NSTPS routes that were nodified are:          ***
257          ID   ***          RD-R1C, RD36.1, RD34.1, RSP1EX, R51.2A, RSP2EX, RUH2B,       ***
258          ID   ***          RUH2C, R51.2B, R51.2C, R51.2D, R1B2, R52A1C, RC52, RSP4EX,   ***
259          ID   ***          RPMA4B, RDVSP, RPMA4A, RUH2A                                 ***
260          ID   ***                                                                       ***
261          ID   ********************************************************************************
262          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
263          ID   ********************************************************************************
264          ID
265          ID
266          ID   --------------------------------------------------------------------------
267          ID   |//////////////////////////////////////////////////////////////////////////|
268          ID   |============== BEGIN DEER VALLEY NORTH IDENTIFICATION CARDS ==============|
269          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
270          ID   |--------------------------------------------------------------------------|
271          ID   |PROJECT:                PIMA ROAD DRAINAGE IMPROVEMENTS:                  |
272          ID   |                         (DEER VALLEY TO PINNACLE PEAK)                   |
273          ID   |                                                                          |
274          ID   |CLIENT:                 City of Scottsdale                                |
275          ID   |PREPARED BY:            Entellus, Inc.                                    |
1                                          HEC-1 INPUT                                        PAGE   6

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
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276          ID   |PROJECT No:                                        Entellus 410.061A          |
277          ID   |FILE NAME: PIMA_II-100y6h-ex.hc1          CREATED DATE: SEP 14, 2005          |
278          ID   |                                         MODIFIED DATE: OCT 18, 2005          |
279          ID   |                                                                              |
280          ID   |STORM:                                                                        |
281          ID   |                      100-year 6-hour Storm                                   |
282          ID   |                                                                              |
283          ID   |DEVELOPMENT CONDITIONS:                                                       |
284          ID   |                      Existing Conditions                                     |
285          ID   |                                                                              |
286          ID   |MODELING ASSUMPTIONS:                                                         |
287          ID   |                      The Model base was taken directly from the "Pima        |
288          ID   |                      Road Three Basins" project as performed by Stantec      |
289          ID   |                      for the City of Scottsdale: file name FU1100-6.IH1,     |
290          ID   |                      revised on 01-20-99 by MCG.                             |
291          ID   |                                                                              |
292          ID   |                      To reflect existing developed conditions, percent       |
293          ID   |                      impervious was increased.                               |
294          ID   |                                                                              |
295          ID   |                      It was assumed that for all basins that were not        |
296          ID   |                      subdivided, that the UK and RK records, as used by      |
297          ID   |                      Stantec were correct.                                   |
298          ID   |                                                                              |
299          ID   |                      It was assumed that the Happy Valley Detention Basin,   |
300          ID   |                      which does not currently exist, was in place and        |
301          ID   |                      designed to at least meet the 10% design performed      |
302          ID   |                      by Stantec.                                             |
303          ID   |                                                                              |
304          ID   |                                                                              |
305          ID   |MODELING METHODS:                                                             |
306          ID   |                      Field verification was conducted to determine the       |
307          ID   |                      existing path of flow routes through the study area.    |
308          ID   |                      This field verification occured on 10-14-2005           |
309          ID   |                      and included all portions of the study area along       |
310          ID   |                      Pima Rd south of Happy Valley Rd.                       |
311          ID   |                                                                              |
312          ID   |                      Normal Depth Routing was utilized for all new routes.   |
313          ID   |                                                                              |
314          ID   |                      Kinematic wave was utilized for all subdivided basins.  |
315          ID   |                                                                              |
316          ID   |------------------------------------------------------------------------------|
317          ID   |//////////////////////////////////////////////////////////////////////////////|
318          ID   |=============== END DEER VALLEY NORTH IDENTIFICATION CARDS ===================|
319          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
320          ID   ------------------------------------------------------------------------------
321          ID
322          ID
323          ID
324          ID   ------------------------------------------------------------------------------
325          ID   |//////////////////////////////////////////////////////////////////////////////|
326          ID   |============== BEGIN DEER VALLEY SOUTH IDENTIFICATION CARDS ================|
327          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
328          ID   |------------------------------------------------------------------------------|
329          ID   ********************************************************************************
330          ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
1                                          HEC-1 INPUT                                  PAGE   7

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

331          ID   ********************************************************************************
332          ID   ***                                                                          ***
333          ID   ***  Modified:         NOVEMBER 2008                                        ***
334          ID   ***  Project:          PIMA ROAD                                            ***
335          ID   ***  Client:           City of Scottsdale                                   ***
336          ID   ***  File Name:        2008-11_Deer_Valley_to_Thompson_                     ***
337          ID   ***                     Peak-Modifications_100-yr.hc1                        ***
338          ID   ***  Client Project#:                                                       ***
339          ID   ***  Entellus Prj#:    410.061                                              ***
340          ID   ***  Modelers:         RAS                                                  ***
341          ID   ***  Storm:            100-year, 6-hour                                     ***
342          ID   ***  Development Cond: Existing Conditions                                  ***
343          ID   ***                                                                          ***
344          ID   ***                                                                          ***
345          ID   ***     Reasons for Modifications to model:                                  ***
346          ID   ***                                                                          ***
347          ID   ***       1) A small portion of the Pima Road corridor is not included       ***
348          ID   ***          in either this HEC-1 model or the model for the area            ***
349          ID   ***          between Pinnacle Peak and Deer Valley Rd.  The area in          ***
350          ID   ***          question is between Deer Valley and Sierra Pinta and is         ***
351          ID   ***          along the west side of Pima Rd.                                 ***
352          ID   ***                                                                          ***
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353          ID   ***                                                                    ***
354          ID   ***     Modifications made to model:                                   ***
355          ID   ***                                                                    ***
356          ID   ***         1) Added subbasin 52A0 (west side of Pima Rd between       ***
357          ID   ***            Deer Valley and Thompson Peak Parkway).  The subbasin   ***
358          ID   ***            cards utilized are as follows:                          ***
359          ID   ***              KK 52A0     SUB                                       ***
360          ID   ***              KM      RUNOFF FROM SUB-BASIN 52A0                    ***
361          ID   ***              BA0.0369                                              ***
362          ID   ***              LS            85                                      ***
363          ID   ***              UK   100   .2300     .20     100                      ***
364          ID   ***              RK  2500   .2300    .045           TRAP      20       8 ***
365          ID   ***                                                                    ***
366          ID   ***         2) Added subbasin 52B0 (west side of Pima Rd between       ***
367          ID   ***            Thompson Peak Parkway and Sierra Pinta ).  The subbasin ***
368          ID   ***            cards utilized are as follows:                          ***
369          ID   ***              KK 52B0     SUB                                       ***
370          ID   ***              KM      RUNOFF FROM SUB-BASIN 52B0                    ***
371          ID   ***              BA0.0188                                              ***
372          ID   ***              LS            83                                      ***
373          ID   ***              UK   100   .2300     .20     100                      ***
374          ID   ***              RK  2500   .2300    .045           TRAP      20       8 ***
375          ID   ***                                                                    ***
376          ID   ***         3) Modified concentration point C52A to include the        ***
377          ID   ***            newly added subbasin 52A0.  changed HC=2 to HC=3        ***
378          ID   ***                                                                    ***
379          ID   ***         4) Modified concentration point 52A2C2 to include the      ***
380          ID   ***            newly added subbasin 52B0.  changed HC=3 to HC=4        ***
381          ID   ***                                                                    ***
382          ID   ***         5) Corrected roughness coefficient for subbasins S53A5     ***
383          ID   ***            and CPIMA3.  Modified value from 0.013 to 0.13.         ***
384          ID   ***                                                                    ***
385          ID   ********************************************************************************
1                                        HEC-1 INPUT                                    PAGE  8

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

386          ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
387          ID   ********************************************************************************
388          ID
389          ID
390          ID
391          ID
392          ID   ********************************************************************************
393          ID   ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
394          ID   ********************************************************************************
395          ID   ***                                                                    ***
396          ID   ***  Modified:          October 2008                                   ***
397          ID   ***  Project:           Sierra Pinta Storm Drain Outlet                ***
398          ID   ***  Client:            City of Scottsdale                             ***
399          ID   ***  File Name:         2008-10_Sierra-Pinta-Modifications.hc1         ***
400          ID   ***  Client Project#:                                                  ***
401          ID   ***  Entellus Prj#:     410.061                                        ***
402          ID   ***  Modelers:          RAS                                            ***
403          ID   ***  Storm:             100-year, 6-hour                               ***
404          ID   ***  Development Cond:  Existing Conditions                            ***
405          ID   ***                                                                    ***
406          ID   ***                                                                    ***
407          ID   ***     Modifications made to model:                                   ***
408          ID   ***                                                                    ***
409          ID   ***         1) The assumed Sierra Pinta Channel was removed from the   ***
410          ID   ***            model.  This entailed the modification of diversions:   ***
411          ID   ***               - DVSP1                                              ***
412          ID   ***               - DVSP2                                              ***
413          ID   ***               - DVSP3                                              ***
414          ID   ***            These diversions were modified to allow 0.01 cfs to flow to***
415          ID   ***            the alignment of the currently unconstructed channel. The  ***
416          ID   ***            value was set at 0.01 cfs due to errors with the Kinematic ***
417          ID   ***            wave routing when there is 0 cfs in the routing reach.  ***
418          ID   ***                                                                    ***
419          ID   ***         2) The assumption that 2-60" inlet pipes to the Pima Rd     ***
420          ID   ***            stormdrain exists North of Thompson Peak Parkway was    ***
421          ID   ***            maintained.  Additionally, there are other inlets,      ***
422          ID   ***            48" inlets in 2 locations, as well as numerous curb     ***
423          ID   ***            inlets.  It was assumed that the pipe capcity was met.  ***
424          ID   ***            This was done by modifiying diversion PRSDEX to the     ***
425          ID   ***            capacity of 600cfs.                                     ***
426          ID   ***                                                                    ***
427          ID   ***         3) There is a small weir diversion on the west portion of  ***
428          ID   ***            Pima channel where flow overtops the wall.  This only   ***
429          ID   ***            occurs under high flow conditions, and the weir flow    ***
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430          ID   ***            out of the system is relatively small.  There is no        ***
431          ID   ***            other flow out of the system besides what was discussed    ***
432          ID   ***            previously between Thompson Peak and Sierra Pinta.         ***
433          ID   ***            Therefore the diversion at Sierra Pinta out of the         ***
434          ID   ***            system was removed.  This was done by modifying diversion  ***
435          ID   ***            D52W and setting equal to 0.                               ***
436          ID   ***                                                                       ***
437          ID   ***************************************************************************
438          ID   ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
439          ID   ***************************************************************************
440          ID
1                                        HEC-1 INPUT                                    PAGE  9

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

441          ID
442          ID
443          ID   ***************************************************************************
444          ID   **
445          ID   **                        FINAL HYDROLOGY REPORT
446          ID   **                  Pima Road Design Concept Report
447          ID   **        from Thompson Peak Parkway to the Pima Freeway (PRDCR)
448          ID   **
449          ID   **
450          ID   ***************************************************************************
451          ID   Project: Pima Road Design Concept Report (PRDCR)
452          ID   Client: City of Scottsdale
453          ID   Prepared By: Entellus Inc.                      Modelers: J.S. and C.L.
454          ID   Project Number: #2003-114-COS                   Entellus 410.061
455          ID   File Name: EBASE                                Created 01/16/2004
456          ID   Storm: 100 year 6 hour
457          ID   Development Conditions: Existing as of Fall 2003, WITH SIERRA PINTA
458          ID                                                          CHANNEL TO SP1
459          ID   Original Model by ROBERT L. WARD, P.E., CONSULTING ENGINEER
460          ID
461          ID   Original MODEL file DB53RFD5.6I CREATED ON 5/30/02, INCLUDED WOOD PATEL'S
462          ID   MODEL OF DC RANCH DATED 1/1996
463          ID
464          ID   NOTE: Entellus developed this model in order to design the following:
465          ID
466          ID   1) Pima Realignment Structure#1 (New Bridge at Pima, south of Hualapai)
467          ID   2) Pima Realignment Structure#2 (Existing Bridge at Downing Olsen and Pima)
468          ID   3) Pima Drainage Channel from 84" storm drain outlet north of Hualapai-
469          ID      to Union Hills Interceptor Channel
470          ID   4) Union Hills Interceptor Channel from New Pima Alignment to future-
471          ID      channel west of the existing Pima Road Alignment
472          ID
473          ID   ***************************************************************************
474          ID   **  The changes listed below were made to the Ward and
475          ID   **              DC Ranch models by Entellus in
476          ID   **         order to develop the hydrology for the PRCDR.
477          ID   ***************************************************************************
478          ID   ** 1)The split at Reata Apex was modeled as 50-50 and apex flows routed
479          ID   **    through DC Ranch per existing conditions as of Fall 2003.
480          ID   ** 2)Basins 51B and 51C were subdivided in order to model split flows
481          ID   **    occuring below the apex. 51B was divided into 51B1 through 51B10.
482          ID   **    51C was divided into 51C1 throught 51C3.
483          ID   **    The split flows labeled SPLIT1 through SPLIT3 route flow south
484          ID   **    through DC Ranch.
485          ID   ** 3)Diversions into a channel along Sierra Pinta were included per COS
486          ID   **    even though the channel does not exist at the time of this model.
487          ID   **    2200 cfs capacity assumed.
488          ID   ** 4)The existing Pima Road Storm Drain system that is currently functional
489          ID   **    from Thompson Peak Pkwy to Haulapai Road was added to the model.
490          ID   ** 5)Basin S53A1 was modified in order to determine flow at key points
491          ID   **    along the project alignment.
492          ID   **    The basin was subdivided into S53A1 through S53A6
493          ID   ** 6)Curve numbers and % impervious in DC Ranch were increased to 75
494          ID   **    and 27% in order to reflect developed conditions,
495          ID   **    in previously undeveloped watersheds. These values match those
1                                        HEC-1 INPUT                                    PAGE 10

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

496          ID   **    used by Wood-Patel in adjacent developed areas.
497          ID   ** 7)The 50-50 Diversion of flow west of Pima Road modeled by Ward
498          ID   **    at Hualapai was set to zero because the Pima Rd Channel will
499          ID   **    itntercept these flows.
500          ID   ** 8)Line by line changes by Entellus are noted within the model
501          ID   **
502          ID   ***************************************************************************
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503          ID
504          ID    ************************************************************************
505          ID    **  The changes below are Ward's changes to his previous model
506          ID    **  as listed by Ward. The changes were made in order
507          ID    **  to develop the model DB53RFD5, which was created to design the
508          ID    **  detention basin 53R.
509          ID    ************************************************************************
510          ID    **
511          ID    ** STAGE-STORAGE DATA FOR DB53R HAS BEEN REVISED TO REFLECT NEW BRW DATA
512          ID    ** PROVIDED ON 4/20/02.
513          ID    **
514          ID    **STAGE-DISCHARGE DATA HAS BEEN REVISED TO REFLECT LEVEL OUTLET CHANNELS
515          ID    **
516          ID    **
517          ID    ** to THE INVERT ELEVATIONS OF THE PIMA FREEWAY CULVERT INLETS, MAY 2002
518          ID    **
519          ID    ** REATA PASS DRAINAGE NETWORK INSERTED IN-PLACE OF HDR UD RECORD
520          ID    ** REATA PASS CURVE NUMBERS HAVE BEEN ADJUSTED TO 6-HOUR VALUES
521          ID    **
522          ID    ** DETENTION BASIN DESIGN MODEL
523          ID    **
524          ID    ** ALL CORE NORTH/SOUTH CURVE NUMBERS HAVE BEEN SET TO 77.
525          ID    **
526          ID    ************************************************************************
527          ID   |------------------------------------------------------------------------|
528          ID   |////////////////////////////////////////////////////////////////////////|
529          ID   |=============== END DEER VALLEY SOUTH IDENTIFICATION CARDS ==============|
530          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
531          ID    ------------------------------------------------------------------------
532          ID
533          ID
534          ID
535          IT       1                    2000
536          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 ***
             * ***************************************************************************
             *
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

537          KK    S30N
538          KM     RUNOFF FROM SUBBASIN 30N
539          KM        ARF BASED ON 14 SQ MILE WATERSHED, WHICH INCLUDES REATA PASS.
540          BA  0.6518
541          PH             14      .74    1.46    2.48    2.79     3.0     3.4
542          LS             82       13              82      13
543          UK     300   0.350    0.13      20
544          UK     300   0.050    0.13      80
545          RK    1550   0.069   0.045  0.0096    TRAP       0      12
546          RK   10520   0.038   0.040            TRAP      15      15
             *

547          KK    R30N
548          KM     NORMAL DEPTH CHANNEL ROUTE FROM C30N TO C31.1 THROUGH PIMA CHANNEL
549          RS       8    FLOW      -1
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```
550          RC   0.022   0.022   0.022    2470    0.01
551          RX    1000    1012    1020    1028    1036    1044    1052    1064
552          RY     107     104     102     100     100     102     104     107
             *
553          KK   S31.1
554          KM     RUNOFF FROM SUBBASIN 31.1
555          BA  0.2663
556          LS           76.6      13           76.6      13
557          UK     300   0.567    0.13      10
558          UK     300   0.050    0.13      90
559          RK    1950   0.056   0.045  0.0147    TRAP       0       10
560          RK    7600   0.035   0.040            TRAP      22        8
             *
561          KK   C31.1
562          KM     COMBINE ROUTED HYDROGRAPH FROM S30N WITH RUNOFF FROM SUBBASIN 31.1
563          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
             *
564          KK   S34.2
565          KM     RUNOFF FROM SUBBASIN 34.2
566          KM        RAINFALL LOSSES FOR GREINER SUBBASINS 31.2 AND 34.1 ARE WEIGHTED BY AREA
567          BA  0.4441
568          LS           77.3      12           77.3      12
569          UK      50    0.10    0.13      10
570          UK     300   0.040    0.13      90
571          RK    2200  0.0452   0.045  0.0538    TRAP       0       10
572          RK    8150  0.0386   0.045            TRAP       0       10
             *
```



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

573          KK   C34.2
574          KM     COMBINE ROUTED HYDROGRAPH FROM C31.1 WITH RUNOFF FROM SUBBASIN 34.2
575          HC       2
             *
576          KK    S35N
577          KM     RUNOFF FROM SUBBASIN 35N
578          BA  0.5482
579          LS             82      13             82      13
580          UK     300   0.491    0.13      15
581          UK     300   0.113    0.13      85
582          RK    2700   0.079   0.045  0.0242    TRAP       3        6
583          RK    5050   0.028   0.040            TRAP      15       15
             *
584          KK   D35NR
585          KM     DIVERSION JUST DOWNSTREAM OF THE ALMA SCHOOL ROAD CULVERT
586          KM        RIGHT BRANCH IS ROUTED TO C36.2
587          KM        LEFT BRANCH (CODED ON DQ RECORD) IS ROUTED TO C36R1
588          DT   D35NL
589          DI       0      10      66     168     343     581     805     977    1168    1320
590          DQ       0       4      28      73     154     261     360     435     518     575
             *
591          KK   R35NR
592          KM     NORMAL DEPTH CHANNEL ROUTE FROM S35N TO C36.2
593          KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
594          RS      12    FLOW      -1
595          RC    0.06    0.04    0.06    3500  0.0343
596          RX    1000    1006    1026    1027    1057    1058    1078    1084
597          RY     105     103     101     100     100     101     103     105
             *
598          KK   S36.2
599          KM     RUNOFF FROM SUBBASIN 36.2
600          BA  0.2087
601          LS           76.6      13           76.6      13
602          UK     300   0.580    0.13       5
```

```
 603          UK     300   0.100    0.13       95
 604          RK    1800   0.036   0.045  0.0145    TRAP       10       10
 605          RK    3520   0.028   0.040             TRAP       20        6
              *

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

 609          KK  D36.2R
 610          KM     DIVERSION AT DESERT HIGHLANDS DRIVE
 611          KM        RIGHT BRANCH, AT GOLF CART CROSSING IS ROUTED TO C34.1
 612          KM        LEFT BRANCH (CODED ON DQ RECORD) IS ROUTED TO C36R1
 613          DT  D36.2L
 614          DI       0      36     166     288     360     430     538     681     859    1074
1                                      HEC-1 INPUT                                          PAGE 13

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

 615          DQ       0       0       0       0       0      18      60     123     208     315
              *

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

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

 636          KK   C34.1
 637          KM     COMBINE ROUTED HYDROGRAPH FROM C36.2 W/RUNOFF FROM SUBBASIN 34.1
 638          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.  *
              * ********************************************************************************
              *

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

 642          KK  HVDB-O
 643          KM     DETENTION BASIN AT HAPPY VALLEY ROAD - NONREGULATORY STRUCTURE
 644          KM        PRINCIPAL SPILLWAY:  42" x 800' RCP WITH A SLOPE OF 0.5%
 645          KM        11 ACRE-FEET OF STORAGE FOR SEDIMENTAION
 646          RS       1    STOR      -1
 647          SV       0     0.2     0.7     1.8     3.4     5.4    36.3    89.1   151.2   225.3
 648          SV   241.0
 649          SE    2065    2066    2067    2068    2069    2070    2075    2080    2085    2090
 650          SE    2091
 651          SQ       0      10      20      30      40      50      60      70      80      90
 652          SQ     100     110     120     130     140
 653          SE  2065.0 2066.47 2067.13 2067.67 2068.14 2068.58 2069.04 2071.26 2073.33 2075.68
1                                      HEC-1 INPUT                                          PAGE

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

 654          SE  2078.3 2081.19 2084.37 2087.82 2091.54
              *
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655          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.      *
             *  ************************************************************************
656          DT  DO34.1
657          DI       0    5000
658          DQ       0    5000
             *
659          KK   R34.1
660          KM     NORMAL DEPTH CHANNEL ROUTE FROM C34.1 TO C36.1 THROUGH PIMA CHANNEL
661          RS      8    FLOW      -1
662          RC   0.022   0.022   0.022    2200    0.01
663          RX    1000    1012    1020    1028    1036    1044    1052    1064
664          RY     107     104     102     100     100     102     104     107
             *
             *
665          KK   S36.1
666          KM     RUNOFF FROM SUBBASIN 36.1
667          BA  0.1394
668          LS            73.4      11
669          UK     300  0.0420   0.130     100
670          RK    2330  0.0320   0.045  0.0134    TRAP      10      30
671          RK    3200  0.0270   0.040            TRAP      20      30
             *
672          KK   C36.1
673          KM     COMBINE ROUTED HYDROGRAPH FROM C34.1 WITH RUNOFF FROM SUBBASIN 36.1
674          HC       2
             *
675          KK   D36.1
676          KM   ************************************************************************
677          KM   * ENTELLUS COMMENT: BASED ON A FIELD VISIT ON 10-14-2005, IT WAS DETERMINED *
678          KM   * ENTELLUS COMMENT: THAT BASED ON EXISTING CONDITIONS, ALL FLOW CROSSES     *
679          KM   * ENTELLUS COMMENT: PIMA RD EITHER JUST NORTH R JUST SOUTH OF              *
680          KM   * ENTELLUS COMMENT: E. De La O Rd. AND ENTERS THE PINNACLE PEAK ESTATES    *
681          KM   * ENTELLUS COMMENT: SUBDIVISION.  IT WAS ASSUMED THAT ALL FLOW ENTERS      *
682          KM   * ENTELLUS COMMENT: BASIN S37A1.                                          *
683          KM   ************************************************************************
684          DT  DO36.1
685          DI       0    5000
686          DQ       0    5000
             *
1                                        HEC-1 INPUT                                    PAGE 15

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


687          KK   R36.1
688          KM       NORMAL DEPTH CHANNEL ROUTE FROM C36.1 TO C36R1 THROUGH PIMA CHANNEL
689          RS       6    FLOW      -1
690          RC   0.022   0.022   0.022    1520    0.01
691          RX    1000    1012    1020    1028    1036    1044    1052    1064
692          RY     107     104     102     100     100     102     104     107
             *
             *
693          KK   B35NL
694          KM     BRING BACK DIVERTED HYDROGRAPH FROM C35N
695          DR   D35NL
             *
696          KK   R35NL
697          KM     NORMAL DEPTH CHANNEL ROUTE FROM S35N TO C36R1
698          KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
699          RS      44    FLOW      -1
700          RC    0.06    0.04    0.06   14480  0.0318
701          RX    1000    1040    1080    1086    1091    1097    1137    1174
702          RY     105     104     103     100     100     103     104     105
             *
703          KK  B36.2L
```

```
704          KM     BRING BACK DIVERTED HYDROGRAPH FROM C36.2
705          DR  D36.2L
             *

706          KK  R36.2L
707          KM     NORMAL DEPTH CHANNEL ROUTE FROM C36.2 TO C36R1
708          KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
709          RS      33    FLOW      -1
710          RC    0.06    0.04    0.06   10160  0.0342
711          RX    1000    1030    1060    1066    1076    1082    1112    1142
712          RY     103   102.5     102     100     100     102   102.5     103
             *

713          KK  S36R1A
714          KM     RUNOFF FROM SUBBASIN 36R1A
715          KM        RAINFALL LOSSES FOR GREINER SUBBASINS 36.3, 36R1 AND 35R ARE AREA WEIGHT
716          BA  0.6310
717          LS           74.3      10
718          UK     300   0.020   0.130     100
719          RK    1420   0.032   0.045  0.0061    TRAP       0       13
720          RK   10800   0.033   0.040            TRAP      10        9
             *

721          KK  C36R1A
722          KM   ********************************************************************************
723          KM   * ENTELLUS COMMENT: EXISTING CONDITIONS OF C36R1A WAS CHANGED FROM A HARD   *
724          KM   * ENTELLUS COMMENT: CODED AREA OF 4.0530 SQMILES TO 1.3914 SQMILES           *
725          KM   * ENTELLUS COMMENT:   PREVIOUS MODEL:                                       *
726          KM   * ENTELLUS COMMENT:     (C36.1 + S36R1 + S35N*40% + C36.2*30%)(A=4.0530)    *
727          KM   * ENTELLUS COMMENT:   EXISTING CONDITIONS:                                  *
1                                          HEC-1 INPUT                                                PAGE 16

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

728          KM   * ENTELLUS COMMENT:      (C36.1*0% + S36R1  + S35N*40% + C36.2*30%)(A=1.3914)*
729          KM   * ENTELLUS COMMENT:       A =   0 + 0.6310 + 0.2193   + 0.5411    =  1.3914 *
730          KM   ********************************************************************************
731          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**ENTELLUS** ***
             * ********************************************************************************
             * ***                          BEGIN ENTELLUS MODIFICATIONS                      ***
             * ********************************************************************************
             * *** ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS** ***
             * ********************************************************************************
             *

732          KK  R36R1A
733          KM     NORMAL DEPTH CHANNEL ROUTE FROM C36R1A TO C36R1C THROUGH PIMA CHANNEL
734          KM    THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
735          RS       3    FLOW      -1
736          RC   0.022   0.022   0.022     830  0.0157
737          RX    1000    1012    1020    1028    1036    1044    1052    1064
738          RY     107     104     102     100     100     102     104     107
             *

739          KK  S36R1C
740          KM     ORIGINAL BASIN S36R1B WAS SUBDIVIDED INTO S36R1C & S36RID
741          BA  0.0793
742          LS           74.3      10
743          UK     300   0.020   0.130     100
744          RK    4600   0.032   0.045            TRAP      10       18
             *

745          KK  DS-R1C
746          KM    THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE ALONG PIMA RD
747          KM    AS SEEN DURING A FIELD VISIT ON 10-14-2005.  THE DIMENSIONS OF THE 2 BASINS
748          KM    WERE APPROXIMATED AS BEING L=240', W=70' D=5'.  THESE WERE VERIFIED THROUGH
749          KM    AERIAL PHOTOGRAPHY.  THE TOTAL POSSIBLE STORAGE VOLUME IS APPROXIMATED AS
750          KM    BEING 3.86 ACRE-FT (1.93 ACRE-FT EACH).  IT IS ASSUMED THAT ALL BASIN FLOW
751          KM    ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
```

```
752          DT  DOSR1C    3.86
753          DI    1000
754          DQ    1000
             *
1                                        HEC-1 INPUT                                                    PAGE 17

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


755          KK  C36R1C
756          HC       2
             *
             *

757          KK  D36R1C
758          KM   DIVERTS FLOW WEST ACROSS PIMA ROAD JUST NORTH OF PINNACLE PEAK
759          KM   THROUGH 2-3x4.5" BOXES JUST NORTH OF PINNACLE PEAK
760          KM        DS INVERT~1982.5'
761          KM        ~2' OF HEAD ABOVE TOP OF BOX OPENING.
762          KM   ALL FLOW GOES THROUGH CULVERT UNTIL CAPACITY IS REACHED AT WHICH
763          KM   POINT FLOW IS ASSUMED TO GO SOUTH ALONG THE EAST SIDE OF PIMA ROAD.
764          KM   CAPACITY IS ESTIMATED TO BE 234 CFS.
765          DT  DO361C
766          DI       0     234     500    5000
767          DQ       0     234     234     234
             *
             * TOO SHORT TO ROUTE (~200')
             * KKR36R1C
             *

768          KK  S36R1D
769          BA  0.5049
770          LS            74.3      10
771          UK     300   0.020   0.130     100
772          RK   10500   0.036   0.045           TRAP      10      18
             *

773          KK  DS-R1D
774          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
775          KM   THE PRELIMINARY DRAINAGE REPORT FOR LA MIRADA PINNALCLE PEAK/ PIMA
776          KM   SHOPPING CENTER #7DR-95. BASED ON FIELD OBSERVATIONS THE TOTAL ACTUAL
777          KM   STORAGE IS SLIGHTLY LARGER THAN 4.5 ACRE-FT.  STORAGE IS DIVIDED INTO 3
778          KM   RETENTIN BASINS. 2 OF THESE BASINS (3.86 TOTAL ACRE-FT) WERE TAKEN OUT AT
779          KM   S36R1C. A BASIN AT THE NE CORNER OF PINNACLE PEAK AND PIMA WITH APPROXIMATE
780          KM   DIMENSIONS OF L=200', W=70', D=5'AND STORAGE CAPACITY OF 1.61 ACRE-FT
781          KM   ATTENUATES THE FLOW FROM BASIN S36R1D. IT IS ASSUMED THAT ALL BASIN FLOW
782          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
783          DT  DOSR1D    1.61
784          DI    1000
785          DQ    1000
             *

786          KK  C36R1D
787          HC       2
             *

788          KK  R36R1D
789          KM     NORMAL DEPTH CHANNEL ROUTE FROM C36R1D TO C1A2F THROUGH PIMA CHANNEL
790          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
791          RS       2    FLOW      -1
792          RC   0.022   0.022   0.022     530  0.0188
793          RX    1000    1012    1020    1028    1036    1044    1052    1064
794          RY     107     104     102     100     100     102     104     107
             *
1                                        HEC-1 INPUT                                                    PAGE 18

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


795          KK   S1A2F
796          BA  0.0086
797          LS             72      20
798          UK     100   0.045   0.130     100
799          RK     750   0.026   0.017           TRAP      14       7
             *

800          KK   C1A2F
801          KM   COMBINES R36R1D AND S1A2F
802          HC       2
             *
```

```
803          KK   D1A2F
804          KM   BASED ON FIELD OBSERVATIONS FLOW THAT DOES NOT CROSS PIMA RD
805          KM   THROUGH THE 2-36" CULVERTS AT C1A2F WILL CROSS PRIOR TO THE
806          KM   FOLLOWING DRIVEWAY.  THUS IT WAS ASSUMED THAT ALL EXISTING CONDTIONS FLOW
807          KM   CROSSES PIMA  RD AT C1A2F INTO BASIN SEEC01.
808          DT  DO1A2F
809          DI       0    5000
810          DQ       0    5000
             *

811          KK   R1A2F
812          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
813          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
814          RS       3    FLOW      -1
815          RC   0.022   0.022   0.022     820  0.0195
816          RX    1000    1012    1020    1028    1036    1044    1052    1064
817          RY     107     104     102     100     100     102     104     107
             *

818          KK   S1A2E
819          BA  0.0295
820          LS              72      20
821          UK     100   0.045   0.130     100
822          RK    1400   0.029   0.017             TRAP      14       7
             *

823          KK  DS-A2E
824          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
825          KM   THE PRELIMINARY DRAINAGE REPORT FOR DESERT VILLAGE RETAIL CENTER #1365
826          KM   THE TOTAL VOLUME TO STORED IS 3.18 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
827          KM   STORAGE WILL OCCUR IN BASIN S1A2E BECAUSE THE MAJORITY OF THE COMPLEX IS
828          KM   LOCATED WITHIN THIS BASIN.  IT IS ASSUMED THAT ALL BASIN FLOW ENTERS THE
829          KM   RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
830          DT  DOSA2E    3.18
831          DI    1000
832          DQ    1000
             *
```



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

833          KK   C1A2E
834          HC       2
             *

835          KK   D1A2E
836          KM   BASED ON FIELD OBSERVATIONS ALL FLOW CROSSES PIMA RD AT PARAISO DR.
837          DT  DO1A2E
838          DI       0    5000
839          DQ       0    5000
             *

840          KK   R1A2E
841          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
842          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
843          RS       1    FLOW      -1
844          RC   0.022   0.022   0.022     350  0.0198
845          RX    1000    1012    1020    1028    1036    1044    1052    1064
846          RY     107     104     102     100     100     102     104     107
             *

847          KK   S1A2D
848          BA  0.0158
849          LS              72      20
850          UK     100   0.045   0.130     100
851          RK    2000   0.032   0.017             TRAP      14       7
             *

852          KK   C1A2D
853          KM   COMBINES R1A2E AND S1A2D
854          HC       2
             *

855          KK   D1A2D
856          KM   BASED ON A FIELD VISIT IT WAS DETERMINED THAT THE FLOW FROM BASIN S1A2D
857          KM   CROSSES PIMA ROAD, AND DOES NOT FLOW SOUTH ALONG PIMA ROAD.
858          DT  DO1A2D
859          DI       0    5000
860          DQ       0    5000
             *
```

```
861          KK   R1A2D
862          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
863          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
864          RS       1    FLOW      -1
865          RC   0.022   0.022   0.022     225  0.0177
866          RX    1000    1012    1020    1028    1036    1044    1052    1064
867          RY     107     104     102     100     100     102     104     107
             *
1                                        HEC-1 INPUT                                    PAGE 20

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

868          KK   S1A2A
869          BA  0.0474
870          LS              72      20
871          UK     100   0.045   0.130     100
872          RK    2200   0.029   0.017             TRAP      14       7
             *

873          KK  DS-A2A
874          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
875          KM   THE PRELIMINARY DRAINAGE REPORT FOR MIRAGE VILLAGE #25-DR-96.
876          KM   THE TOTAL VOLUME TO STORED IS 0.81 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
877          KM   STORAGE WILL OCCUR IN BASIN S1A2A.  IT IS ASSUMED THAT ALL BASIN FLOW
878          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
879          DT  DOSA2A    0.81
880          DI    1000
881          DQ    1000
             *
             * TOO SHORT TO ROUTE (~400')
             * KK R1A2A
             *

882          KK   S1A2B
883          BA  0.0231
884          LS              72      20
885          UK     100   0.045   0.130     100
886          RK    2100   0.031   0.017             TRAP      14       7
             *

887          KK   C1A2B
888          KM   COMBINES R1A2A AND S1A2B
889          HC       2
             *
             * TOO SHORT TO ROUTE (~200')
             * KK R1A2B
             *

890          KK   S1A2C
891          BA  0.0091
892          LS              72      20
893          UK     100   0.045   0.130     100
894          RK    1000   0.031   0.017             TRAP      14       7
             *

895          KK   C1A2C
896          KM   COMBINES R1A2D, R1A2C AND S1A2B
897          HC       3
             *

898          KK   R1A2C
899          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2C TO C1A2G THROUGH PIMA CHANNEL
900          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
901          RS       1    FLOW      -1
902          RC   0.022   0.022   0.022     450  0.0225
903          RX    1000    1012    1020    1028    1036    1044    1052    1064
1                                        HEC-1 INPUT                                    PAGE 21

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

904          RY     107     104     102     100     100     102     104     107
             *

905          KK   S1A2G
906          BA  0.0038
907          LS              72      20
908          UK     100   0.045   0.130     100
909          RK     500   0.027   0.017             TRAP      14       7
             *
```

```
910           KK   C1A2G
911           KM   COMBINES R1A2C AND S1A2G
912           HC       2
              *
              * ***************************************************** *
              * ********** Begin Modifications July 16 2009 ********** *
              * ***************************************************** *

913           KK   D1A2G
914           KM   This diversion was added to account for additional flow that crosses Pima
915           KM   Road prior to the Los Gatos subdivision.  Previous assumptions were that
916           KM   the flow crosses Pima Rd. and is taken out at the next diversion.  This
917           KM   assumptions was made due toe the assumption that the Los Gatos Wall would
918           KM   not act as a flood wall and would not be modeled, thus allowing all flow
919           KM   to cross.
920           KM   Based on FLO-2D modeling results, flow crosses Pima Rd prior to the
921           KM   Los gatos subdivision, and approximately 87% of the flow crosses to the
922           KM   west and 13% stays along Pima Rd. to the south.
923           DT  DO1A2G
924           DI       0   10000
925           DQ       0    8700
              * ***************************************************** *
              * *********** End Modifications July 16 2009 *********** *
              * ***************************************************** *
              *
              *

926           KK   R1A2G
927           KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2G TO C1B4 THROUGH PIMA CHANNEL
928           KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
929           RS       2    FLOW      -1
930           RC   0.022   0.022   0.022     600   0.021
931           RX    1000    1012    1020    1028    1036    1044    1052    1064
932           RY     107     104     102     100     100     102     104     107
              *

933           KK    S1B4
934           BA  0.0238
935           LS              72      12
936           UK     100   0.045   0.100     100
937           RK    1400   0.028   0.017            TRAP      15       7
              *
```



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

938           KK  DS-1B4
939           KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
940           KM   THE PRELIMINARY DRAINAGE REPORT FOR CANADA VISTAS WP#93075
941           KM   THE TOTAL VOLUME TO STORED IS 1.67 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
942           KM   STORAGE WILL OCCUR IN BASIN S1B4.  IT IS ASSUMED THAT ALL BASIN FLOW
943           KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
944           DT  DOSR1D    1.67
945           DI    1000
946           DQ    1000
              *

947           KK    C1B4
948           KM   COMBINES R1A2G AND S1B4
949           HC       2
              *
              *  ------------------------------------------------------------------------
              *  |////////////////////////////////////////////////////////////////////////|
              *  |=============== BEGIN DEER VALLEY NORTH MODEL MODIFICATIONS ==============|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  |------------------------------------------------------------------------|

950           KK    D1B4
951           KM   THROUGH A FIELD VISIT IT WAS DETERMINED THAT ALL THE FLOW CROSSES PIMA RD
952           KM   BY THIS POINT, THEREFORE ALL FLOW WAS ROUTED ACROSS PIMA RD AT THIS POINT
953           KM
954           KM   MODIFIED: It was decided that no flow will pass through the wall of
955           KM   MODIFIED: Los Gatos.  This diversion has been modified to have all flow
956           KM   MODIFIED: continue south along Pima Rd.
957           DT   DO1B4
958           DI       0    5000
959           DQ       0    5000
              * DQ     0    5000 * ORIGINAL DQ CARD
              *  |------------------------------------------------------------------------|
```

```
*   |////////////////////////////////////////////////////////////////////////|
*   |================ END DEER VALLEY NORTH MODEL MODIFICATIONS ===============|
*   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
*   ------------------------------------------------------------------------
*

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
*

KK    S1B3
BA  0.1438
LS              72      12
UK     100   0.045   0.100     100
RK    6300   0.030   0.017             TRAP      15       7
*
```



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

KK    C1B3
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
*

KK    D1B3
KM   This is the assumed flow diversion into the Los Gatos subdivision entrance
DT   DO1B3
DI       0   10000
DQ       0   10000
*

KK    S1B1
BA  0.0319
LS              72      12
UK     100   0.045   0.100     100
RK    1800   0.034   0.017             TRAP      15       7
*

KK    R1B1
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       2    FLOW      -1
RC   0.022   0.022   0.022     500  0.0256
RX    1000    1012    1020    1028    1036    1044    1052    1064
RY     107     104     102     100     100     102     104     107
*

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

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

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

1007        KK    D1B2
            * KM THROUGH A FIELD VISIT IT WAS DETERMINED THAT ALL THE FLOW CROSSES PIMA RD
            * KM BY THIS POINT, THEREFORE ALL FLOW WAS ROUTED ACROSS PIMA RD AT THIS POINT
1008        KM
            * KM MODIFIED: It was decided that no flow will pass through the wall of
            * KM MODIFIED: Los Gatos.  This diversion has been modified to have all flow
            * KM MODIFIED: continue south along Pima Rd.  This was done by changing the
            * KM MODIFIED: order of the cards.
1009        DT   DO1B2
1010        DI       0    5000
1011        DQ       0       0
            *

1012        KK   DO1B3
1013        DR   DO1B3
            *

1014        KK  CD1A2G
1015        HC       2
            *

1016        KK   RD1B2
1017        KM   Moved route from the diversion recovery to this point in model
1018        RS       6    FLOW      -1
1019        RC   0.035   0.035   0.035    1900  0.0270
1020        RX      50     100   107.5     115     135   142.5     150     200
1021        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

1022      KK    D1B2
1023      KM    RECOVERS DIVERSION FROM C1B2
1024      KM    Diversion recovery moved due to combining of models
1025      DR    DO1B2
          *

1026      KK    R1B2
1027      KM    THIS X-SECTION WAS ASSUMED FOR THIS SHORT ROUTE TO PIMA CHANNEL
1028      KM      NORMAL DEPTH CHANNEL ROUTE FROM S1B1 TO C1B2 THROUGH PIMA CHANNEL
1029      KM    THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
1030      KM
1031      KM    Route moved to follow diversion recovery.  Modified length to 1250 feet
          * RC 0.022   0.022   0.022    1500  0.0280
1032      RS       4    FLOW      -1
1033      RC   0.022   0.022   0.022    1250  0.0280
1034      RX    1000    1012    1020    1028    1036    1044    1052    1064
1035      RY     107     104     102     100     100     102     104     107
          *

1036      KK  D51.1D
1037      KM    This is the split at Deer Valley and Pima Roads.
1038      KM    This split was determined based on the existing conditions.
1039      KM    It was assumed that all flow under existing conditions would continue
1040      KM    south along Pima RD.
1041      DT  DO511D
1042      DI       0   10000
1043      DQ       0   10000
          *

1044      KK  R51.1D
1045      KM    This routes flow from the proposed diversion structure at PIMA Rd
1046      KM    and Deer Valley to the Deer Valley Channel.
1047      KM    The route utilized under previous versions of the model was called R51.1F
1048      KM
1049      KM    THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1050      KM    FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1051      RS       2    FLOW      -1
1052      RC    0.03    0.03    0.03     640    0.01
1053      RX    1000    1016    1026    1030    1050    1054    1064    1080
1054      RY       6       2       2       0       0       2       2       6
          *

1055      KK  SEEC13
1056      BA  0.0091
1057      LS              74    24.8
```

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1058          UK      61  0.0213   0.100     100
1059          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.
1                                        HEC-1 INPUT                                        PAGE

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


1060          KK  CEEC13
1061          KM   re-added Combine for Deer Valley Split
1062          HC       2
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *

1063          KK  REEC13
1064          KM   DEER VALLEY CHANNEL
1065          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1066          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1067          RS       1    FLOW      -1
1068          RC    0.03    0.03    0.03     120    0.01
1069          RX       0      16      26      30      50      54      64      80
1070          RY       6       2       2       0       0       2       2       6
              *
              *

1071          KK  SEEC12
1072          BA  0.0013
1073          LS              74    24.8
1074          UK      61  0.0213   0.100     100
1075          RK     300   0.034   0.045           TRAP       5      15
              *

1076          KK  CEEC12
1077          HC       2
              *

1078          KK  REEC12
1079          KM   DEER VALLEY CHANNEL
1080          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1081          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1082          RS       1    FLOW      -1
1083          RC    0.03    0.03    0.03     160    0.01
1084          RX       0      16      26      30      50      54      64      80
1085          RY       6       2       2       0       0       2       2       6
              *
              *

1086          KK  SEEC11
1087          BA  0.0071
1088          LS              74    24.8
1089          UK      61  0.0213   0.100     100
1090          RK    1200   0.028   0.045           TRAP      10      50
              *
1                                        HEC-1 INPUT                                        PAGE 27

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


1091          KK  CEEC11
1092          HC       2
              *

1093          KK  REEC11
1094          KM   DEER VALLEY CHANNEL
1095          KM   THIS ROUTE WAS TAKEN FROM THE GRAHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1096          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1097          RS       1    FLOW      -1
1098          RC    0.03    0.03    0.03     110    0.01
1099          RX       0      16      26      30      50      54      64      80
1100          RY       6       2       2       0       0       2       2       6
              *
              *

1101          KK  SEEC10
```

```
1102          BA  0.0161
1103          LS              74    24.8
1104          UK      61  0.0213   0.100     100
1105          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 ================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ------------------------------------------------------------------------------

1106          KK  CEEC10
1107          HC       3
              *

1108          KK  REEC10
1109          KM   DEER VALLEY CHANNEL
1110          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1111          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1112          RS       1    FLOW      -1
1113          RC    0.03    0.03    0.03     150    0.01
1                                          HEC-1 INPUT                                                    PAGE 28

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

1114          RX       0      16      26      30      50      54      64      80
1115          RY       6       2       2       0       0       2       2       6
              *
              *

1116          KK  SEEC09
1117          BA  0.0234
1118          LS              74    24.8
1119          UK      61  0.0213   0.100     100
1120          RK    2500   0.028   0.045            TRAP      10      15
              *

1121          KK   DO1B4
1122          KM   RECOVERS DIVERSION FROM C1B4
1123          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
              *

1124          KK  CEEC09
1125          HC       3
              *

1126          KK  REEC09
1127          KM   DEER VALLEY CHANNEL
1128          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1129          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1130          RS       1    FLOW      -1
1131          RC    0.03    0.03    0.03     350    0.01
1132          RX       0      16      26      30      50      54      64      80
1133          RY       6       2       2       0       0       2       2       6
              *
              *

1134          KK  SEEC08
```

```
1135          BA  0.0293
1136          LS              74    24.8
1137          UK      61  0.0213   0.100     100
1138          RK    3100   0.027  0.045            TRAP      10      15
              *

1139          KK  CEEC08
1140          HC       2
              *

1141          KK  REEC08
1142          KM   DEER VALLEY CHANNEL
1143          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1144          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1145          RS       1    FLOW      -1
1146          RC    0.03    0.03    0.03     310    0.01
1                                        HEC-1 INPUT                                        PAGE 29

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

1147          RX       0      16      26      30      50      54      64      80
1148          RY       6       2       2       0       0       2       2       6
              *
              *

1149          KK  SEEC07
1150          BA  0.0054
1151          LS              74    24.8
1152          UK      61  0.0213   0.100     100
1153          RK     500   0.028   0.045            TRAP       0     100
              *

1154          KK  CEEC07
1155          HC       2
              *

1156          KK  REEC07
1157          KM   DEER VALLEY CHANNEL
1158          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1159          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1160          RS       1    FLOW      -1
1161          RC    0.03    0.03    0.03     200    0.01
1162          RX       0      16      26      30      50      54      64      80
1163          RY       6       2       2       0       0       2       2       6
              *
              *

1164          KK  SEEC06
1165          BA  0.0024
1166          LS              74    24.8
1167          UK      61  0.0213   0.100     100
1168          RK     400   0.025   0.045            TRAP       0     100
              *

1169          KK  CEEC06
1170          HC       2
              *

1171          KK  REEC06
1172          KM   DEER VALLEY CHANNEL
1173          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1174          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1175          RS       1    FLOW      -1
1176          RC    0.03    0.03    0.03     390    0.01
1177          RX       0      16      26      30      50      54      64      80
1178          RY       6       2       2       0       0       2       2       6
              *
              *

1179          KK  SEEC05
1180          BA  0.0725
1181          LS              74    24.8
1182          UK      61  0.0213   0.100     100
1183          RK    4300   0.025   0.045            TRAP      20      15
              *
1                                        HEC-1 INPUT                                        PAGE

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

1184          KK  DO1A2D
```

```
1185          KM   RECOVERS FLOW FROM C1A2D
1186          DR  DO1A2D
              *
              * ************************************************** *
              * ********** Begin Modifications July 16 2009 ********** *
              * ************************************************** *

1187          KK  RD1A2D
1188          KM   This route was shortened to account for the addition of the diverted
1189          KM   flow from C1A2G.  The route is later continued as RD1A2G.
1190          RS       3    FLOW      -1
1191          RC   0.035   0.035   0.035    1040  0.0251
1192          RX      50     100   107.5     115     135   142.5     150     200
1193          RY     101     100    97.5      95      95    97.5     100     101
              *

1194          KK  DO1A2G
1195          KM   This recovers the diversion from Pima Rd. just north of the
1196          KM   north Los Gatos property edge.
1197          DR  DO1A2G
              *

1198          KK  CD1A2G
1199          KM   This combines RD1A2D and the recovered diversion DO1A2G
1200          HC       2
              *

1201          KK  RD1A2G
1202          KM   This route is the continuation of RD1A2D and carries the flow
1203          KM   to the Deer valley Channel
1204          RS      12    FLOW      -1
1205          RC   0.035   0.035   0.035    3610  0.0251
1206          RX      50     100   107.5     115     135   142.5     150     200
1207          RY     101     100    97.5      95      95    97.5     100     101
              * ************************************************** *
              * ********** End Modifications July 16 2009 ********** *
              * ************************************************** *
              *

1208          KK  CEEC05
1209          HC       3
              *
              *
1210          KM   ********************************************************************************
1211          KM   * ENTELLUS COMMENT: EXISTING CONDITIONS OF AT DV CHANNEL AND GOLF           *
1212          KM   * ENTELLUS COMMENT: COURSE MODIFIED TO SHOW EXISTING CONDITIONS, EASTERN    *
1213          KM   * ENTELLUS COMMENT: CHANNEL EMPTIES THROUGH THE CULVERT INTO THE GOLF       *
1214          KM   * ENTELLUS COMMENT: COURSE AND THERE IS NO DIVERSION ALONG DEER VALLEY.     *
1215          KM   ********************************************************************************
              *
1                                        HEC-1 INPUT                                    PAGE 31

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


1216          KK    37AE
1217          DT    37AW
1218          DI       0   10000
1219          DQ       0   10000
              *
              *
              * 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
*
*

KK  REEC05
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       1    FLOW      -1
RC    0.03    0.03    0.03     440    0.01
RX       0      16      26      30      50      54      64      80
RY       6       2       2       0       0       2       2       6
*
*

KK  SEEC04
BA  0.1265
LS              74    24.8
UK      61  0.0213   0.100     100
RK    5600   0.022   0.045            TRAP      10      15
*
```

1 HEC-1 INPUT PAGE 32

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

KK  DO1A2E
KM   RECOVERS FLOW CROSSING FLOW AT PARAISO DR.
DR  DO1A2E
*

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

KK  CEEC04
HC       3
*

KK  REEC04
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       1    FLOW      -1
RC    0.03    0.03    0.03     140    0.01
RX       0      16      26      30      50      54      64      80
RY       6       2       2       0       0       2       2       6
*
*

KK  SEEC03
BA  0.0057
LS              74    24.8
UK      61  0.0213   0.100     100
RK    1600   0.023   0.045            TRAP      10      50
*

KK  CEEC03
HC       2
*

KK  REEC03
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       1    FLOW      -1
RC    0.03    0.03    0.03     320    0.01
RX       0      16      26      30      50      54      64      80
RY       6       2       2       0       0       2       2       6
*
*
```

1 HEC-1 INPUT PAG.

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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
1266          KK  SEEC02
1267          BA  0.0105
1268          LS              74    24.8
1269          UK      61  0.0213   0.100     100
1270          RK     700   0.022   0.045             TRAP      10      50
              *

1271          KK  CEEC02
1272          HC       2
              *

1273          KK  REEC02
1274          KM   DEER VALLEY CHANNEL
1275          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1276          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1277          RS       1    FLOW      -1
1278          RC    0.03    0.03    0.03     150    0.01
1279          RX       0      16      26      30      50      54      64      80
1280          RY       6       2       2       0       0       2       2       6
              *
              *

1281          KK  SEEC01
1282          BA  0.1869
1283          LS              74    24.8
1284          UK      61  0.0213   0.100     100
1285          RK    6600   0.022   0.045             TRAP      20      15
              *

1286          KK  DO1A2F
1287          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT C1A2F
1288          DR  DO1A2F
              *

1289          KK  RD1A2F
1290          RS      23    FLOW      -1
1291          RC   0.035   0.035   0.035    6900  0.0218
1292          RX      50     100   107.5     115     135   142.5     150     200
1293          RY     101     100    97.5      95      95    97.5     100     101
              *

1294          KK  CEEC01
1295          HC       3
              *

1296          KK  REEC01
1297          KM   DEER VALLEY CHANNEL
1298          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1299          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1300          RS       4    FLOW      -1
1301          RC    0.03    0.03    0.03    1260    0.01
1302          RX       0      16      26      30      50      54      64      80
1303          RY       6       2       2       0       0       2       2       6
              *
              *
```



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

1304          KK   S37A3
1305          BA  0.1211
1306          LS              74    24.8
1307          UK      61   .0213     .10     100
1308          RK    3400   0.024    .045             TRAP      10      50
              *

1309          KK   C37A3
1310          HC       2
              *

1311          KK   R37A3
1312          KM   DEER VALLEY CHANNEL
1313          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1314          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1315          RS       2    FLOW      -1
1316          RC    0.03    0.03    0.03     600    0.01
1317          RX       0      16      26      30      50      54      64      80
1318          RY       6       2       2       0       0       2       2       6
              *
              *
```

```
1319          KK   S37A2
1320          BA  0.0842
1321          LS              74    24.8
1322          UK      61   .0213     .10     100
1323          RK    6100   0.023    .045            TRAP      10      50
              *

1324          KK   C37A2
1325          HC       2
              *
              *

1326          KK  D37A2
1327          KM   This is stage-Storage-Discharge for the Deer Valley Detention Basin along
1328          KM   the grayhawk property. The elevation and area data are based on survey
1329          KM   conducted in April of 2009 by Entellus.  It is an online retention basin
1330          KM   and no outlet was found by survey.  If one exists it is at this time buried.
1331          KM   It was assumed that all flow enters the basin, and once the basin is
1332          KM   full flow will bypass the basin without additional storage occuring.
1333          KM   Storage volume was calculated utilizing the conic method.
1334          RS       1    STOR
1335          SV       0    0.04    0.23    0.37    1.33    2.12    3.02    4.04 4.04001
1336          SQ       0  0.0001  0.0002  0.0003  0.0004  0.0005  0.0006  0.0007   10000
1337          SE    1784    1785    1786    1787    1788    1789    1790    1791 1791.01
              *
              *
1                                        HEC-1 INPUT                                    PAGE 35

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

1338          KK   R37A2
1339          KM   DEER VALLEY CHANNEL
1340          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1341          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1342          RS       2    FLOW      -1
1343          RC    0.03    0.03    0.03     650    0.01
1344          RX       0      16      26      30      50      54      64      80
1345          RY       6       2       2       0       0       2       2       6
              *

1346          KK   S37A1
1347          BA  0.3955
1348          LS              74    24.8
1349          UK      61   .0213     .10     100
1350          RK    9000   0.022    .045            TRAP      10      50
              *

1351          KK  DO361C
1352          DR  DO361C
              *

1353          KK  RD-R1C
1354          RS      26    FLOW      -1
1355          RC   0.035   0.035   0.035    9100  0.0212
1356          RX      50     100   107.5     115     135   142.5     150     200
1357          RY     101     100    97.5      95      95    97.5     100     101
              *

1358          KK  D036.1
1359          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT De La O RD
1360          DR  DO36.1
              *

1361          KK  RD36.1
1362          RS      30    FLOW      -1
1363          RC   0.035   0.035   0.035   10700  0.0226
1364          RX      50     100   107.5     115     135   142.5     150     200
1365          RY     101     100    97.5      95      95    97.5     100     101
              *
              *

1366          KK  DO34.1
1367          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT HAPPY VALLEY INTERSECTION
1368          DR  DO34.1
              *

1369          KK  RD34.1
1370          RS      37    FLOW      -1
1371          RC   0.035   0.035   0.035   13300  0.0218
```

```
1372          RX      50     100   107.5     115     135   142.5     150     200
1373          RY     101     100    97.5      95      95    97.5     100     101
              *
```



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


1374          KK   C37A1
1375          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
              * ************************************************************************

1376          KK   52C13
1377          KM   RUNOFF FROM SUBBASIN 52C13
1378          BA    .023
1379          LS             75      31
1380          UK    100     .02     .10     100
1381          RK    950    .040    .045            TRAP      30      10
              *

1382          KK  2C13DV
1383          KM   DIVERT FIRST 40 CFS INTO STORM DRAIN; REMAINDER FLOWS OVER ROAD
1384          DT   STORM
1385          DI       0      40    1000
1386          DQ       0      40      40
              *

1387          KK  52C13R
1388          KM   ROUTE 52C13 THROUGH SUBBASIN 52C15 TO CP 52C15C1
1389          RK    1800    .035    .045            TRAP      10      10
              *
```



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


1390          KK   52C15
1391          KM   RUNOFF FROM SUBBASIN 52C15
1392          BA    .046
1393          LS             75    64.4
1394          UK    100     .02     .10     100
1395          RK   2050    .036    .045            TRAP      30      10
              *

1396          KK  52C14A
1397          KM   RUNOFF FROM SUBBASIN 52C14A
1398          BA    .041
1399          LS             75    67.7
1400          UK    100     .02     .10     100
1401          RK   2050    .031    .045            TRAP      30      10
              *

1402          KK    SP1
1403          KM   COMBINE 52C14A, 52C15 AND 52C13R AT BEGINNING OF SIERRA PINTA CHANNEL
1404          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 *
*  ******************************************************************************
*
1405          KK   SP1EX     DIV
1406          KM   This was modified to reflect existing conditions: no sierra Pinta Channel
              * 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.
1407          DT   DVSP1
              * DI     0     100     200     500    2200   10000
              * DQ     0     100     200     500    2200    2200
              *
              *
1408          DI       0   10000
1409          DQ       0    0.01
              *
              *  ******************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ******************************************************************************
              *
1                                      HEC-1 INPUT                                      PAGE 38

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


1410          KK  RSP1EX
1411          KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
1412          KM   THROUGH PIMA ACRES, EAST OF 92ND
1413          KM   Modified x-section 12/2008
1414          RS       7    FLOW      -1
1415          RC   0.055    0.04   0.055    2310   .0264
1416          RX       0       5      10   12.25    12.5      15      19    23.5
1417          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
              *
              * ***************************************************************************
              *
              *

1418          KK      39     SUB
1419          KM        RUNOFF FROM SUB-BASIN 39
1420          BA  1.8807
1421          LS            87.7
1422          UK     330   .0433     .20     100
1423          RK   11240   .0253    .045            TRAP      30       3

1424          KK      40     SUB
1425          KM        RUNOFF FROM SUB-BASIN 40
1426          BA   .5844
1427          LS             86
1428          UK     160   .0627     .20     100
1429          RK    7000   .0350    .045            TRAP      20       3

1430          KK     C40
1431          KM        COMBINE HYDROGRAPHS SUB 39 & SUB 40
1432          HC       2

1433          KK     R41
1434          KM        ROUTE C40 TO D.S. END OF SUB 41
1435          RS      26    FLOW      -1
1436          RC    .055    .040    .055    9400   .0282
1437          RX       0       1     101     107     157     163     263     264
1438          RY      10       8       3       0       0       3       8      10
```

```
1439          KK      41     SUB
1440          KM        RUNOFF FROM SUB-BASIN 41
1441          BA   .8270
1442          LS            77.8
1443          UK     280   .2386     .20     100
1444          RK    9400   .0282     .045            TRAP      50       3
1                                    HEC-1 INPUT                                                    PAGE 39

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


1445          KK     C41
1446          KM        COMBINE HYDROGRAPHS R41 & SUB 41
1447          HC       2

1448          KK      42     SUB
1449          KM        RUNOFF FROM SUB-BASIN 42
1450          BA   .5844
1451          LS            81.1
1452          UK     280   .2386     .20     100
1453          RK    8750   .0573     .045            TRAP      20       3

1454          KK      43     SUB
1455          KM        RUNOFF FROM SUB-BASIN 43
1456          BA  1.0665
1457          LS            87.7
1458          UK     260   .0515     .20     100
1459          RK    7400   .0255     .045            TRAP      25       3

1460          KK      44     SUB
1461          KM        RUNOFF FROM SUB-BASIN 44
1462          BA   .8389
1463          LS            87.7
1464          UK     260   .0515     .20     100
1465          RK    9840   .0622     .045            TRAP      25       3

1466          KK     C44
1467          KM        COMBINE HYDROGRAPHS SUB 43 & SUB 44
1468          HC       2

1469          KK     R45
1470          KM        ROUTE C44 TO D.S. END OF SUB 45
1471          RS      10    FLOW      -1
1472          RC    .055    .040    .055    3600   .0366
1473          RX       0       1     101     107     137     143     243     244
1474          RY      10       8       3       0       0       3       8      10

1475          KK      45     SUB
1476          KM        RUNOFF FROM SUB-BASIN 45
1477          BA   .2037
1478          LS              84
1479          UK     125   .1166     .20     100
1480          RK    3600   .0366     .045            TRAP      30       3

1481          KK     C45
1482          KM        COMBINE HYDROGRAPHS R45 & SUB 45
1483          HC       2

1484          KK     45A     SUB
1485          KM        RUNOFF FROM SUB-BASIN 45A
1486          BA   .1720
1487          LS            88.5
1488          UK     275   .2200     .20     100
1489          RK    5400   .0411     .045            TRAP      15       3
1                                    HEC-1 INPUT                                                    PAGE 40

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


1490          KK      46     SUB
1491          KM        RUNOFF FROM SUB-BASIN 46
1492          BA   .9268
1493          LS            88.5
1494          UK     265   .4958     .20     100
1495          RK    3300   .2271     .045    .111    TRAP      10       3
1496          RK    7100   .0535     .045            TRAP      25       3

1497          KK     C46
1498          KM        COMBINE HYDROGRAPHS C45, SUB 45A, & SUB 46
1499          HC       3
```

```
1500          KK     R47
1501          KM        ROUTE C46 TO D.S. END OF SUB 47
1502          RS      21    FLOW      -1
1503          RC    .055    .040    .055    7600   .0268
1504          RX       0       1     101     109     159     167     267     268
1505          RY      10       9       4       0       0       4       9      10

1506          KK      47     SUB
1507          KM        RUNOFF FROM SUB-BASIN 47
1508          BA   .3757
1509          LS            80.2
1510          UK     375   .1000     .20     100
1511          RK    9300   .0357    .045            TRAP      50       3

1512          KK   C47.1
1513          KM        COMBINE HYDROGRAPHS SUB 47 & R47
1514          HC       2

1515          KK   C47.2
1516          KM        COMBINE HYDROGRAPHS C47.1, C41 & SUB 42
1517          HC       3

1518          KK     R50
1519          KM        ROUTE C47.2 TO D.S. END OF SUB 50 (BEGINNING OF REATA DESERT
1520          KM        GREENBELT CHANNEL)
1521          RS       3    FLOW      -1
1522          RC    .055    .040    .055    1000   .0200
1523          RX       0      35     135     150     225     240     340     375
1524          RY      10       3       3       0       0       3       3      10

1525          KK      50     SUB
1526          KM        RUNOFF FROM SUB-BASIN 50
1527          BA   .4052
1528          LS              86
1529          UK     300   .3555     .20     100
1530          RK     730   .1506    .045    .036    TRAP      10       3
1531          RK    6400   .0453    .045            TRAP      25       3
1                                      HEC-1 INPUT                                                    PAGE 41

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


1532          KK     C50
1533          KM        COMBINE HYDROGRAPHS OF SUB 50 AND R50
1534          KM        THIS IS THE TOTAL DISCHARGE TO THE REATA PASS ALLUVIAL FAN APEX
1535          HC       2
              *
              * ************************************************************************
              *
              *                      END REATA PASS WATERSHED MODEL ABOVE APEX
              *                   BEGIN ENTELLUS MODIFICATIONS TO ROUTE APEX FLOW
              *
              * ************************************************************************
              *

1536          KK  APEXSW     DIV
1537          KM   50-50 FLOW SPLIT AT REATA PASS APEX
1538          DT  APEXSO
1539          DI       0   10000
1540          DQ       0    5000
              *

1541          KK  R51.2A
1542          KM   ROUTE HYDROGRAPH FROM THE REATA PASS WASH FAN APEX THROUGH SUB S51.1A
1543          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING THE ORIGINAL ROUTE 51.2
1544          RS       4    FLOW      -1
1545          RC   0.055    0.04   0.055    1524   .0338
1546          RX       0       1     101     107     137     143     243     244
1547          RY      10       8       3       0       0       3       8      10
              *
              *

1548          KK  S51.1A
1549          KM   RUNOFF FROM SUBBASIN 51.1A
1550          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
1551          KM   ENTELLUS CHANGED THE RUNOFF CURVE TO 75
1552          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1553          BA   .0690
1554          LS              75      27
1555          UK     300   0.037   0.130     100
1556          RK    1800   0.038   0.045  0.0161    TRAP       0      12
```

```
1557          RK    3037   0.032   0.040            TRAP      40      15
              *
              *
              *

1558          KK  C51.1A      CP
1559          KM   COMBINE SUB S51.1A and R51.2A
1560          HC       2
              *
              *
```



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

1561          KK  SPT1SO     DIV
1562          KM   DIVERSION OF SPLIT FLOW FROM C51.1A TO C51B9
1563          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1564          DT  SPT1SW
1565          DI       0   10000
1566          DQ       0    2900
              *

1567          KK   R51B9
1568          KM   ROUTE SPLIT FROM C51.1A TO C51B9
1569          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
1570          RK     975   .0300    .045            TRAP      50      25
              *
              *

1571          KK    51B9     SUB
1572          KM   RUNOFF FROM SUB 51B9
1573          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1574          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1575          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1576          BA   .0237
1577          LS              75      27
1578          UK     100   .0213     .10     100
1579          RK     975   .0300    .045            TRAP      50      25
              *
              *
              *

1580          KK   C51B9
1581          KM   COMBINE BASIN 51B9 AND R51B9
1582          HC       2
              *

1583          KK  SPT2SO     DIV
1584          KM   DIVERSION OF SPLIT FLOW FROM C51B9 TO C51B2
1585          KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1586          DT  SPT2SW
1587          DI       0   10000
1588          DQ       0    3200
              *

1589          KK   R51B2
1590          KM   ROUTE SPLIT FROM C51B9 TO C51B2
1591          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
1592          RK    3261   .0300    .045            TRAP      50      25
              *

1593          KK    51B2     SUB
1594          KM   RUNOFF FROM SUB 51B2
1595          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1596          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1597          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1598          BA   .0623
1599          LS              75      27
```



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

1600          UK     100   .0213     .10     100
1601          RK    3261   .0300    .045            TRAP      50      25
              *
              *

1602          KK   C51B2
1603          KM   COMBINE 51B2R AND 52C8
1604          HC       2
```

```
                *
                * ****************************************************************************
                *
                *                    RETURN TO WOOD PATELS DC RANCH MODEL
                *                    WITH ENTELLUS MODIFICATIONS
                * ****************************************************************************
                *
                *

1605            KK   51B2R
1606            KM   ROUTE C51B2 THROUGH SUBBASIN 52C8 TO CP 52C8C
1607            RK     750    .034    .045            TRAP      10      10
                *

1608            KK    52C8
1609            KM   RUNOFF FROM SUBBASIN 52C8
1610            BA    .008
1611            LS              75      27
1612            UK     100     .02     .10     100
1613            RK     750    .034    .045            TRAP      30      10
                *

1614            KK   52C8C
1615            KM   COMBINE 51B2R AND 52C8
1616            HC       2
                *

1617            KK   52C8R
1618            KM   ROUTE 52C8C THROUGH SUBBASIN 52C9 TO CP 52C9C1
1619            RK    1100    .036    .045            TRAP      10      10
                *

1620            KK    51C3     SUB
1621            KM   RUNOFF FROM SUB 51C3
1622            KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51C
1623            KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1624            KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1625            BA   .0151
1626            LS              75      27
1627            UK     100   .0213     .10     100
1628            RK    1962   .0375    .045            TRAP      30      10
                *
1                                       HEC-1 INPUT                                    PAGE 44

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


1629            KK   51C3R
1630            KM   ROUTE 51C3 THROUGH SUBBASIN 52C7 TO CP 52C7C
1631            RK     700    .040    .045            TRAP      10      10
                *

1632            KK    51B1     SUB
1633            KM   RUNOFF FROM SUB 51B1
1634            KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1635            KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1636            KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1637            BA   .0148
1638            LS              75      27
1639            UK     100   .0213     .10     100
1640            RK    1211   .0300    .045            TRAP      50      25
                *
                *

1641            KK   51B1R
1642            KM    ROUTE 51B1D THROUGH SUBBASIN 52C7 TO CP 52C7C
1643            RK     450     .04    .045            TRAP      10      10
                *

1644            KK    52C7
1645            KM   RUNOFF FROM SUBBASIN 52C7
1646            BA    .006
1647            LS              75      27
1648            UK     100     .02     .10     100
1649            RK     550     .04    .045            TRAP      30      10
                *

1650            KK   52C7C
1651            KM   COMBINE 51B1R, 51C3R, AND 52C7
1652            HC       3
                *
```

```
1653          KK   52C7R
1654          KM   ROUTE 52C7C THROUGH SUBBASIN 52C9 TO CP 52C9C1
1655          RK    1550    .036    .045            TRAP      10      10
              *

1656          KK  52C9C1
1657          KM   COMBINE 52C7R AND 52C8R
1658          HC       2
              *

1659          KK  52C9R1
1660          KM   ROUTE 52C9C1 THROUGH SUBBASIN 52C9 TO CP 52C9C2
1661          RK    1050    .036    .045            TRAP      10      10
              *
```



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

1662          KK    52C9
1663          KM   RUNOFF FROM SUBBASIN 52C9
1664          BA    .069
1665          LS             75   31.85
1666          UK     100     .02     .10     100
1667          RK    3150    .036    .045            TRAP      30      10
              *

1668          KK  52C9C2
1669          KM   COMBINE 52C9R1 AND 52C9
1670          HC       2
              *

1671          KK  52C9R2
1672          KM   ROUTE 52C9C2 THROUGH SUBBASIN 52C10 TO CP 52C10C1
1673          RK     500    .032    .045            TRAP      10      10
              *
              *

1674          KK    51C2     SUB
1675          KM   RUNOFF FROM SUB 51C2
1676          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51C
1677          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1678          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1679          BA   .0423
1680          LS             75      27
1681          UK     100   .0213     .10     100
1682          RK    3309   .0375    .045            TRAP      30      10
              *
              *

1683          KK   51C2R
1684          KM   ROUTE 51C2D THROUGH SUBBASIN 52C5 TO CP 52C5C
1685          RK     700    .030    .045            TRAP      10      10
              *

1686          KK    52C5
1687          KM   RUNOFF FROM SUBBASIN 52C5
1688          BA    .016
1689          LS             75      27
1690          UK     100     .02     .10     100
1691          RK    1200     .03    .045            TRAP      30      10
              *

1692          KK   52C5C
1693          KM   COMBINE 51C2R AND 52C5
1694          HC       2
              *
```



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

1695          KK   52C5R
1696          KM   ROUTE 52C5C THROUGH SUBBASIN 52C6 TO CP 52C6C
1697          RK    3100    .035    .045            TRAP      10      10
              *

1698          KK    52C6
1699          KM   RUNOFF FROM SUBBASIN 52C6
1700          BA    .036
```

```
1701          LS              75    31.4
1702          UK     100     .02     .10     100
1703          RK    3100    .035    .045            TRAP       30       10
              *

1704          KK   52C6C
1705          KM   COMBINE 52C5R AND 52C6
1706          HC       2
              *

1707          KK   52C6R
1708          KM   ROUTE 52C6C THROUGH SUBBASIN 52C10 TO CP 52C10C2
1709          RK     450    .032    .045            TRAP       10       10
              *
              *

1710          KK  2C10C1
1711          KM   COMBINE 52C9R2 AND 52C6R
1712          HC       2
              *

1713          KK  2C10R1
1714          KM   ROUTE 52C10C1 THROUGH SUBBASIN 52C10 TO CP 52C10C2
1715          RK     300    .032    .045            TRAP       10       10
              *

1716          KK   52C10
1717          KM   RUNOFF FROM SUBBASIN 52C10
1718          BA    .014
1719          LS              75    7.85
1720          UK     100     .02     .10     100
1721          RK     800    .032    .045            TRAP       30       10
              *

1722          KK  2C10C2
1723          KM   COMBINE 52C10R1 AND 52C10
1724          HC       2
              *

1725          KK   52C11
1726          KM   RUNOFF FROM SUBBASIN 52C11
1727          BA   .0425
1728          LS             75      27
1729          UK     100     .02     .10     100
1730          RK    2800    .031    .045            TRAP       30       10
              *
1                                        HEC-1 INPUT                                        PAGE 47

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


1731          KK  2C11R1
1732          KM   PIPE ROUTE 52C11 TO CP 52C11C
1733          RK     650     .02    .045            CIRC       3
              *

1734          KK  52C13D
1735          KM   RETRIEVE DIVERTED FLOW
1736          DR   STORM
              *

1737          KK  52C11C
1738          KM   COMBINE 52C13D AND 52C11R1
1739          HC       2
              *

1740          KK  2C11CR
1741          KM   PIPE ROUTE 52C11C TO CP 52C11C2
1742          RK     750     .02    .045            CIRC       3
              *

1743          KK  2C11C2
1744          KM   COMBINE 52C11CR AND 52C10C2
1745          HC       2
              *

1746          KK  2C11R2
1747          KM   ROUTE 52C11C2 THROUGH SUBBASIN 52C12 TO CP 52C12C
1748          RK     700     .03    .045            TRAP       10       10
              *
```

```
1749          KK   52C12
1750          KM   RUNOFF FROM SUBBASIN 52C12
1751          BA    .023
1752          LS              75      85
1753          UK     100     .02     .10     100
1754          RK     900     .03    .045             TRAP      30      10
              *

1755          KK  52C12C
1756          KM   COMBINE 52C11R2 AND 52C12
1757          HC       2
              *

1758          KK  52C12R
1759          KM   ROUTE 52C12C THROUGH SUBBASIN 52C14 TO CP 52C14C1
1760          RK    1150    .029    .045             TRAP      10      10
              *

1761          KK  52C14B
1762          KM   RUNOFF FROM SUBBASIN 52C14B
1763          BA    .021
1764          LS              75      60
1765          UK     100     .02     .10     100
1766          RK    1250    .029    .045             TRAP      30      10
              *
```



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

1767          KK   DVSP1
1768          KM   RETRIEVE DIVERTED FLOW FROM SIERRA PINTA CHANNEL
1769          DR   DVSP1
              *

1770          KK  RDVSP1
1771          KM    ROUTE FLOW FROM SP1 TO SP2 VIA SIERRA PINTA CHANNEL
1772          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED MY WARD
1773          RK     624   .0143    .035             TRAP      50       4
              *

1774          KK     SP2
1775          KM   COMBINE 52C14B AND 52C12R
1776          HC       3
              *
              *  ********************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ********************************************************************************
              *

1777          KK    DSP2     DIV
1778          KM   This was modified to reflect existing conditions: no Sierra Pinta Channel
              * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT 52C14BC1
              * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1779          DT   DVSP2
              * DI     0     100     200     500    2200   10000
              * DQ     0     100     200     500    2200    2200
              *
1780          DI       0   10000
1781          DQ       0    0.01
              *
              *  ********************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ********************************************************************************
              *
              *
              * ***************************************************************************
              *
              *                                STOP DC RANCH MODEL
              *
              * ***************************************************************************
              *

1782          KK  RSP2EX
1783          KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
1784          KM   THROUGH PIMA ACRES EAST OF 92ND
1785          KM   Modified X-section 12/2008
```

```
1786          RS       6    FLOW      -1
1787          RC   0.055    0.04   0.055    2028   .0256
1788          RX       0      15      20      30      35      45      50      60
1                                      HEC-1 INPUT                                    PAGE 49

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

1789          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
              * ************************************************************************
              *

1790          KK    51B3     SUB
1791          KM   RUNOFF FROM SUB 51B3
1792          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1793          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1794          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1795          BA   .0242
1796          LS             75      27
1797          UK     100   .0213     .10     100
1798          RK    3003   .0300    .045            TRAP      50      25
              *
              *

1799          KK   51B3R
1800          KM   ROUTE 51B3D THROUGH SUBBASIN 52B1 TO CP 52B1C
1801          RK     600    .039    .045            TRAP      10      10
              *
1                                      HEC-1 INPUT                                    PAGE 50

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


1802          KK    52B1
1803          KM   RUNOFF FROM SUBBASIN 52B1
1804          BA    .003
1805          LS             75      27
1806          UK     100     .02     .10     100
1807          RK     600    .039    .045            TRAP      30      10
              *

1808          KK   52B1C
1809          KM   COMBINE 51B3R AND 52B1
1810          HC       2
              *

1811          KK   52B1R
1812          KM   ROUTE 52B1C THROUGH SUBBASIN 52B2 TO CP 52B2C1
1813          RK     930    .037    .045            TRAP      10      10
              *
              *
```

```
*****************************************************************************
*
*                                STOP DC RANCH MODEL
*
*****************************************************************************

KK  SPT2SW
KM   RETRIEVE DIVERTED SPLIT FLOW FROM C51B9
DR  SPT2SW
*

KK  R51B10
KM   ROUTE SPLIT FROM C51B9 TO C51B10
KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
RK    1587   .0300    .045            TRAP      50      25
*
*

KK   51B10     SUB
KM   RUNOFF FROM SUB 51B10
KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
BA   .0238
LS              75      27
UK     100   .0213     .10     100
RK    1587   .0300    .045            TRAP      50      25
*
*

KK  C51B10
KM   COMBINE BASIN 51B10 AND R51B10
HC       2
*
*
```

1 HEC-1 INPUT PAGE 51

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

KK  SPT3SO     DIV
KM   SPLIT FLOW AT C51B10
KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERISON
DT  SPT3SW
DI       0   10000
DQ       0    4000
*
*

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

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

KK   C51B4
KM   COMBINE BASIN 51B4 AND R51B4
HC       2
*
*****************************************************************************
*
*                RETURN TO WOOD PATEL DC RANCH MODEL
*                     WITH ENTELLUS MODIFICATIONS
*****************************************************************************
*

KK  51B4R1
KM   ROUTE C51B4 THROUGH SUBBASIN 52B2 TO CP 52B2C1
```

```
1857          RK    1350    .037    .045            TRAP      10      10
              *

1858          KK  52B2C1
1859          KM   COMBINE 51B4R1 AND 52B1R
1860          HC       2
              *
1                                    HEC-1 INPUT                                    PAGE 52

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


1861          KK  52B2R1
1862          KM   ROUTE 52B2R1 THROUGH SUBBASIN 52B2 TO CP 52B2C2
1863          RK    1000    .037    .045            TRAP      10      10
              *

1864          KK    52B2
1865          KM   RUNOFF FROM SUBBASIN 52B2
1866          BA    .032
1867          LS              75      17
1868          UK     100     .02     .10     100
1869          RK    2350    .037    .045            TRAP      30      10
              *

1870          KK  52B2C2
1871          KM   COMBINE 52B2 AND 52B2R1
1872          HC       2
              *

1873          KK  52B2R2
1874          KM   ROUTE 52B2C2 THROUGH SUBBASIN 52B3 TO CP 52B3C2
1875          RK     850    .026    .045            TRAP      10      10
              *

1876          KK  52B3R1
1877          KM   ROUTE 52B3C1 THROUGH SUBBASIN 52B3 TO CP 52B3C2
1878          RK     500    .024    .045            TRAP      10      10
              *

1879          KK    52B3
1880          KM   RUNOFF FROM SUBBASIN 52B3
1881          BA    .062
1882          LS              75    31.8
1883          UK     100     .02     .10     100
1884          RK    3450    .030    .045            TRAP      30      10
              *

1885          KK  52B3C2
1886          KM   COMBINE 52B3 AND 52B3R1
1887          HC       2
              *

1888          KK  52B3R2
1889          KM   ROUTE 52B3C2 THROUGH 52B4 TO CP 52B4C
1890          RK    1700    .024    .045            TRAP      10      10
              *

1891          KK    52B4
1892          KM   RUNOFF FROM SUBBASIN 52B4
1893          BA    .026
1894          LS              75      62
1895          UK     100     .02     .10     100
1896          RK    1700    .024    .045            TRAP      30      10
              *
1                                    HEC-1 INPUT                                    PAGE 53

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


1897          KK   52B4C
1898          KM   COMBINE 52B4 AND 52B3R2
1899          HC       2
              *

1900          KK   52B4R
1901          KM   ROUTE 52B4C THROUGH SUBBASIN 52B5 TO CP SP3
1902          RK     550    .027    .045            TRAP      10      10
              *

1903          KK    52B5
```

```
1904          KM   RUNOFF FROM SUBBASIN 52B5
1905          BA    .021
1906          LS              75    56.9
1907          UK     100      .02     .10     100
1908          RK    1400      .03    .045             TRAP      30      10
              *
              *

1909          KK   DVSP2
1910          KM   RETRIEVE DIVERTED FLOW FROM SIERRA PINTA CHANNEL
1911          DR   DVSP2
              *

1912          KK  RDVSP2
1913          KM    ROUTE FLOW FROM SP2 TO SP3 VIA SIERRA PINTA CHANNEL
1914          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED BY WARD
1915          RK     597   .0143    .035             TRAP      50       4
              *

1916          KK     SP3
1917          KM   COMBINE 52B5 AND 52B4R AND RDVSP2
1918          HC       3
              *
              *  ********************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ********************************************************************************
              *

1919          KK    DSP3     DIV
1920          KM   This was modified to reflect existing condtions: no Sierra Pinta Channel
              * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT SP3
              * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1921          DT   DVSP3
              * DI      0     100     200     500    2200   10000
              * DQ      0     100     200     500    2200    2200
              *
1922          DI       0   10000
1923          DQ       0    0.01
              *
              *  ********************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ********************************************************************************
              *
              *
              * ***************************************************************************
              *
              *                                STOP DC RANCH MODEL
              *
              * ***************************************************************************
              *
1                                          HEC-1 INPUT                                          PAGE 54

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


1924          KK  RSP3EX
1925          KM   ROUTE SP3 THROUGH S53A1 INTO C53A1
1926          KM   ENTELLUS CREATED THIS ROUTE
1927          RK    1773   .0237    0.04             TRAP      37      30
              *
              *

1928          KK   CSPEX
1929          KM   COMBINE RSPEX1, RSPEX2 AND RSPEX3
1930          HC       3
              *
              *

1931          KK   R53A1
1932          KM   ROUTE SP3 THROUGH S53A1 INTO C53A1
1933          KM   ENTELLUS CREATED THIS ROUTE
1934          RK     969   .0217    0.04             TRAP      37      30
              *
              *

1935          KK   S53A1
1936          KM   RUNOFF FROM SUB S53A1
```

```
1937          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
1938          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1939          KM   ENTELLLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1940          KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
1941          KM   ENTELLLUS REMOVED THE FIRST OVERLAND FLOW CATACHMENT,
1942          KM   (IT REPRESENTED IRONWOOD VILLAGE WHICH IS NOT A PART OF THIS BASIN)
1943          BA   .1845
1944          LS             77      27
1945          UK     300   0.022    0.13     100
1946          RK    1250   0.023   0.045  0.0087    TRAP       4       5
1947          RK    2742   .0170    0.04            TRAP      37      30
              *
              *

1948          KK   C53A1
1949          KM   COMBINE S53A1 AND RSPEX
1950          HC       2
              *
              *

1951          KK  RPIMA2
1952          KM   ROUTE C53A1 THROUGH S53A3 INTO CPIMA2
1953          KM   ROUTE FROM PROJECT STRUCTURE #1 TO PROPOSED PIMA RD DRAINAGE CHANNEL
1954          KM   THE ROUTE GEOMETRY WAS FOUND USING MAPPING AND AERIALS FROM THE
1955          KM   CITY OF SCOTTSDALE.
1956          RK    1831    .018    0.04            TRAP      57       4
              *
              *
```



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


1957          KK   S53A3
1958          KM   RUNOFF FROM SUBBASIN S53A3
1959          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
1960          KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
1961          KM   ENTELLLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT,
1962          KM   (IT REPRESENTED PIMA ACRES WHICH IS NOT A PART OF THIS BASIN)
1963          BA   .0720
1964          LS             77      30
1965          UK     150   0.027    0.13     100
1966          RK    1250   0.023   0.045  0.0087    TRAP       4       5
1967          RK    1831    .018    0.04            TRAP      57       4
              *
              *  *************************
              *  PROJECT STRUCTURE #2
              *
              *  *************************
              *

1968          KK  CPIMA2      CP
1969          KM   COMBINE SUB S53A3 AND RPIMA2 (EXISTING BRIDGE ADJACENT TO IRONWOOD VILLAGE)
1970          HC       2
              *
              *

1971          KK   RUH2B
1972          KM   ROUTE CPIMA2 TO CUH2
1973          KM   ENTELLUS CREATED THIS ROUTE
1974          KM   Modified x-section 12/2008
1975          RS       4    FLOW      -1
1976          RC   0.055    0.04   0.055    1453   .0096
1977          RX       0      14      21      32      80      94     100     107
1978          RY       7       3       2       1       1       3       4       7
              * RY     5       3       2       1       1       3       4       5
              *
              *

1979          KK   S53A6
1980          KM   RUNOFF FROM SUBBASIN S53A6, ORIGINAL BASIN S53A1
1981          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
1982          KM   ENTELLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
1983          KM   ENTELLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT
1984          KM   (IT REPRSENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN)
1985          BA   .0261
1986          LS             77      30
1987          UK     150   0.027    0.13     100
1988          RK     669   .0179    0.04            TRAP      10    5.25
              *
```

```
1989          KK   RUH2C
1990          KM   ROUTE S53A6 TO CUH2
1991          KM   EAST SEGMENT OF PROPOSED UNION HILLS INTERCEPTOR CHANNEL BETWEEN PIMA RD
1992          KM   ALIGNMENT AND PROPOSED PIMA RD DRAINAGE CHANNEL
1993          RS       3    FLOW      -1
1994          RC    .055     .04    .055     993    .088
1                                    HEC-1 INPUT                                                    PAGE 56

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

1995          RX       0      10      22      32      33      34      35      36
1996          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 ***************
              * ********************************************************************************

1997          KK   S53A5
1998          KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
1999          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2000          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2001          KM   ENTELLUS MODIFIED THE CATCHMENT PARAMETERS
2002          KM   ENTELLUS NOV 2008: CORRECTED N VALUE TO BE 0.13, NOT 0.013
2003          BA   .0222
2004          LS             77      27
2005          UK     100   0.027     .13     100
2006          RK     993   0.017    0.04            TRAP      35       5
              *
              *
              *  *************************
              *  UNION HILLS INTERCEPTOR CHANNEL
              *          SEGMENT 1
              *  *************************
              *

2007          KK   UHIC1      CP
2008          KM   COMBINE S53A6 AND S53A5 (UNION HILLS INTERCEPTOR CHANNEL SEGMENT 1)
2009          HC       2
              *
              *

2010          KK  SPT1SW
2011          KM   RETRIEVE DIVERTED SPILT FLOW FROM C51.1A
2012          DR  SPT1SW
              *

2013          KK  R51.2B
2014          KM   ROUTE C51.1A to C51.1B
2015          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING ROUTE 51.2
2016          RS       5    FLOW      -1
2017          RC   0.055    0.04   0.055    1666   .0338
2018          RX       0       1     101     107     137     143     243     244
2019          RY      10       8       3       0       0       3       8      10
              *
1                                    HEC-1 INPUT                                                    PAGE 57

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


2020          KK  S51.1B
2021          KM   RUNOFF FROM SUBBASIN 51.1B
2022          KM   ENTELLUS CREATED THIS BASIN BY MODIFYING BASIN S51.1
2023          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2024          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2025          BA   .0496
2026          LS             75      27
2027          UK     300   0.037   0.130     100
2028          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2029          RK    3350   0.032   0.040            TRAP      40      15
              *
              *

2030          KK  C51.1B      CP
2031          KM        COMBINE SUB S51.1B and R51.2B
2032          HC       2
              *
```

```
2033          KK  R51.2C
2034          KM   ROUTE C51.1B to C51.1C
2035          KM   ENTELLUS CREATED THIS ROUTE BY MODIFIYING ROUTE 51.2
2036          RS       5    FLOW      -1
2037          RC   0.055    0.04   0.055    1742   .0338
2038          RX       0       1     101     107     137     143     243     244
2039          RY      10       8       3       0       0       3       8      10
              *

2040          KK  S51.1C
2041          KM   RUNOFF FROM SUBBASIN 51.1C
2042          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
2043          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2044          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2045          BA   .0965
2046          LS              75      27
2047          UK     300   0.037   0.130     100
2048          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2049          RK    5833   0.032   0.040            TRAP      40      15
              *
              *

2050          KK  C51.1C      CP
2051          KM        COMBINE SUB S51.1C and R51.2C
2052          HC       2
              *

2053          KK  R51.2D
2054          KM   ROUTE C51.1C to C51.1D
2055          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING ROUTE 51.2
2056          RS       9    FLOW      -1
2057          RC   0.055    0.04   0.055    3123   .0338
2058          RX       0       1     101     107     137     143     243     244
2059          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.
              *
1                                        HEC-1 INPUT                                    PAGE 58

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


2060          KK  S51.1D
2061          KM   RUNOFF FROM SUBBASIN 51.1D
2062          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
2063          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2064          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2065          KM
2066          KM   Modified basin area to include all the way to E. Los Gatos Dr.
              * BA .8980 * Original Basin Area
2067          BA  0.9015
2068          LS              75      27
2069          UK     300   0.037   0.130     100
2070          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2071          RK   14557   0.032   0.040            TRAP      40      15
              *

2072          KK  D51.1D
2073          KM   This diversion recovery was too short to route (200 ft +-)
2074          DR  DO511D
              *

2075          KK  C51.1D      CP
2076          KM        COMBINE SUB S51.1D and R51.2D
2077          KM   HC modified to include R1B2
2078          HC       3
              *

2079          KK  DETPDV
2080          KM   DET = Detention Basin
2081          KM   P = Pima Rd.
2082          KM   DV = Deer Valley
```

```
KM   STO = Stored
KM   This is the DC Ranch Detention basin on the corner of Pima Rd.
KM   and Deer Valley.  It was assumed that the detention basin was online.
KM   The stage storage was determined by field survey of the detention
KM   basin (12/15/2008).
DT  STOPDV     4.5
DI       0   10000
DQ       0   10000
*
*  |------------------------------------------------------------------------|
*  |////////////////////////////////////////////////////////////////////////|
*  |================ END DEER VALLEY SOUTH MODEL MODIFICATIONS ==============|
*  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
*  ------------------------------------------------------------------------
*

KK  R52A1C
KM   ROUTE C51.1D THROUGH 52A1 INTO 52A1C
KM   ROUTE OF FLOW ALONG EAST SIDE OF PIMA RD AND WEST SIDE OF DC RANCH
KM   BETWEEN DEER VALLEY AND THOMPSON PEAK
KM   ENTELLUS CREATED THIS ROUTE USING THE TYPICAL SECTIONS DETAIL SHEET
KM   OF THE PIMA ROAD PAVING PLANS BY JMI AND ASSOCIATES
RS       7    FLOW      -1
RC    .045    .014    .045    2636   .0262
1                              HEC-1 INPUT                                  PAGE 59

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

RX        0      .1       4       7    7.25      11      27      95
RY        2       0       0      10       0       0       2     4.5
*

KK    51B8     SUB
KM   RUNOFF FROM SUB 51B8
KM   ENTELLUS CREATED THIS BASIN BY MODIFYING BASIN 51B
KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
BA   .0397
LS             75      27
UK     100   .0213     .10     100
RK    3891   .0300    .045            TRAP      50      25
*
* ************************************************************************
*
*                                BEGIN DC RANCH MODEL
*
* ************************************************************************

KK   51B8R
KM   ROUTE 51B7DV THROUGH SUBBASIN 52A1 TO CP 52A1C
RK    3400    .033    .045            TRAP      10      10
*

KK    52A1
KM   RUNOFF FROM SUBBASIN 52A1
BA    .130
LS             75   32.25
UK     100     .02     .10     100
RK    3400    .033    .045            TRAP      30      10
*

KK   52A1C
KM   COMBINE 52A1, 51B8R
HC       2
*
*
* ************************************************************************
* ******************** NOVEMBER 2008 *** NOVEMBER 2008 ********************
* ************************************************************************
* ********** ADDED SUBBASIN 52A0, MODIFIED C52A from HC=2 to HC=3 **********
* ************************************************************************

KK    52A0
KM   ENTELLUS NOVEMBER 2008: SUBBASIN 52A0 WAS ADDED TO THE MODEL TO ACCOUNT FOR
KM   ENTELLUS NOVEMBER 2008: FLOW ALONG THE WEST SIDE OF PIMA RD BETWEEN DEER
KM   ENTELLUS NOVEMBER 2008: VALLEY AND THOMPSON PEAK PARKWAY
KM        RUNOFF FROM SUB-BASIN 52A0
BA  0.0369
LS             85
UK     100   .2300     .20     100
RK    2500   .2300    .045            TRAP      20       8
```

```
                *
1                                        HEC-1 INPUT                                                    PAGE 60

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

2131          KK    C52A      CP
2132          KM         COMBINE CP 52A1C & 51.6
2133          KM    ENTELLUS NOVEMBER 2008: MODIFIED HC=2 to HC=3 TO INCLUDE THE NEWLY
2134          KM    ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52A0
2135          HC        3
              *

2136          KK    D52AW     DIV
2137          KM    SPLIT FLOW AT ITXN OF PIMA ROAD AND THOMPSON PEAK PKWY
2138          KM    THIS DIVERSION REPRESENTS FLOW ON THE WEST SIDE OF PIMA ROAD
2139          KM    THAT HEADS WEST
2140          DT   DV52AW
2141          DI        0     100     250     375     500     625     750     875    1000    1125
2142          DI     1250    1375    1500    1750    2000    2500    2750    2875    3000    3500
2143          DQ        0       1       4       6      13      22      41      63      82      96
2144          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 *
              *  ************************************************************************
              *

2145          KK  PRSDEX     DIV
2146          KM    DIVERT FLOW INTO 2 60" PIPES AT THOMPSON PEAK PKY AND PIMA
2147          KM    ENTELLUS ADDED THIS DIVERSION, 265 CFS IS FROM STANTEC'S REPORT
2148          KM    Additionally, it was assumed that the additional 2-48" culverts and
2149          KM    numerous curb inlets are able to fully utilize the stormdrains capacity of:
2150          KM    600cfs
2151          DT     PRSD
              * DI      0      255   10000
              * DQ      0      255     255
2152          DI        0      600   10000
2153          DQ        0      600     600
              *
              *  ************************************************************************
              *  **       END      *       END      *       END      *       END      *       END      *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ************************************************************************
              *
              *
              *

2154          KK     RC52      CP
2155          KM    ROUTE C52A TO C52(SP4)
2156          KM    ROUTE ALONG PIMA RD BETWEEN THOMPSON PEAK AND SIERRA PINTA
2157          KM    THE ROUTE GEOMOETRY WAS TAKEN FROM THE TYPICAL SECTIONS DETAIL SHEET
2158          KM    OF THE PIMA RD PAVING PLANS BY JMI AND ASSOCIATES.
2159          RS        8     FLOW      -1
1                                        HEC-1 INPUT                                                    PAGE 61

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

2160          RC     .045    .014    .045    2763   .0232
2161          RX        0       6      36      76      96     136     236     237
2162          RY       10       0       2       2       2       2       2      10
              *

2163          KK     51B5     SUB
2164          KM    RUNOFF FROM SUB 51B5
2165          KM    ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2166          KM    ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2167          KM    ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2168          BA    .0043
2169          LS              75      27
2170          UK      100   .0213     .10     100
2171          RK      719   .0300    .045            TRAP      50      25
              *
              *
```

```
2172          KK   51B5R
2173          KM   ROUTE 51B5 THROUGH SUBBASIN 52B6 TO CP 51B7C
2174          RK    1250    .035    .045            TRAP      10      10
              *
              *

2175          KK  SPT3SW
2176          KM   RETRIEVE DIVERTED SPILT FLOW FROM C51B10
2177          DR  SPT3SW
              *
              *

2178          KK   R51B6
2179          KM   ROUTE C51B10 TO C51B6
2180          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
2181          RK    2481   .0300    .045            TRAP      50      25
              *
              *

2182          KK    51B6     SUB
2183          KM   RUNOFF FROM SUB 51B6
2184          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2185          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2186          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2187          BA   .0446
2188          LS             75      27
2189          UK     100   .0213     .10     100
2190          RK    2481   .0300    .045            TRAP      50      25
              *

2191          KK   C51B6
2192          KM   COMBINE BASIN 51B6 AND R51B6
2193          HC       2
              *
              *
```



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

2194          KK   51B6R
2195          KM   ROUTE C51B6 THROUGH SUBBASIN 52B6 TO CP 51B7C
2196          RK     925    .033    .045            TRAP      10      10
              *
              *

2197          KK    51B7     SUB
2198          KM   RUNOFF FROM SUB 51B7
2199          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2200          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2201          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2202          BA    .027
2203          LS             75      27
2204          UK     100   .0213     .10     100
2205          RK    2451   .0300    .045            TRAP      50      25
              *
              *

2206          KK  51B7R1
2207          KM   ROUTE 51B7D THROUGH SUBBASIN 52B6 TO CP 51B7C
2208          RK     530    .033    .045            TRAP      10      10
              *

2209          KK   51B7C
2210          KM   COMBINE 51B7R1, 51B5R, AND 51B6R
2211          HC       3
              *

2212          KK  51B7R2
2213          KM   ROUTE 51B7C THROUGH SUBBASIN 52B6 TO CP 52B6C
2214          RK    2300    .033    .045            TRAP      10      10
              *

2215          KK    52B6
2216          KM   RUNOFF FROM SUBBASIN 52B6
2217          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2218          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2219          BA    .096
2220          LS             75      27
2221          UK     100     .02     .10     100
2222          RK    3200    .033    .045            TRAP      30      10
```

```
                *
2223            KK   52B6C
2224            KM   COMBINE 51B7R2 AND 52B6
2225            HC       2
                *

2226            KK   52B6R
2227            KM   ROUTE 52B6C THROUGH SUBBASIN 52B7 TO CP 52B7C1
2228            RK    2750    .028    .045           TRAP      10      10
                *
1                                        HEC-1 INPUT                                        PAGE 63

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


2229            KK    52B7
2230            KM   RUNOFF FROM SUBBASIN 52B7
2231            BA    .080
2232            LS             75   78.45
2233            UK     100     .02     .10     100
2234            RK    2750    .028    .045           TRAP      30      10
                *

2235            KK  52B7C1
2236            KM   COMBINE 52B7 AND 52B6R
2237            HC       2
                *
                *

2238            KK    52A2
2239            KM   RUNOFF FROM SUBBASIN 52A2
2240            BA    .065
2241            LS             75    88.8
2242            UK     100     .02     .10     100
2243            RK    2900    .023    .045           TRAP      30      10
                *
                * ******************************************************************************
                * ******************** NOVEMBER 2008 *** NOVEMBER 2008 ************************
                * ******************************************************************************
                * ********** ADDED SUBBASIN 52B0, MODIFIED 52A2C2 from HC=3 to HC=4 ************
                * ******************************************************************************

2244            KK    52B0     SUB
2245            KM        RUNOFF FROM SUB-BASIN 52B0
2246            KM   ENTELLUS NOVEMBER 2008: SUBBASIN 52B0 WAS ADDED TO THE MODEL TO ACCOUNT FOR
2247            KM   ENTELLUS NOVEMBER 2008: FLOW ALONG THE WEST SIDE OF PIMA RD BETWEEN THOMPSON
2248            KM   ENTELLUS NOVEMBER 2008: PEAK PARKWAY AND SIERRA PINTA
2249            BA  0.0188
2250            LS             83
2251            UK     100   .2300     .20     100
2252            RK    2500   .2300    .045           TRAP      20       8
                *

2253            KK  52A2C2
2254            KM   COMBINE 52B7C2 AND 52A2 and 52B0
2255            KM   ENTELLUS NOVEMBER 2008: MODIFIED HC=3 to HC=4 TO INCLUDE THE NEWLY
2256            KM   ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52B0
2257            HC       4
                *
                *
                *  ******************************************************************************
                *  **     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 64

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


2258            KK    D52W     DIV
2259            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
2260            DT   DV52W
                * DI      0   10000
                * DQ      0    3000
2261            DI       0   10000
2262            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
* ********************************************************************
*
2263          KK   DVSP3
2264          KM    RETRIEVE FLOW FROM SIERRA PINTA CHANNEL
2265          DR   DVSP3
              *
2266          KK  RDVSP3
2267          KM    ROUTE FLOW FROM SP3 TO C52(SP4) VIA SIERRA PINTA CHANNEL
2268          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED BY WOOD-PATEL
2269          RK    1530   .0143    .035            TRAP      50       4
              *
2270          KK  C52SP4      CP
2271          KM     COMBINE CP521 AND FLOW FROM SIERRA PINTA CHANNEL
2272          HC       2
              *
              *  ************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ************************************************************************
              *
2273          KK    DSP4     DIV
2274          KM   This was modified to reflect existing conditions, no Sierra Pinta channel
2275          KM   and the 2-96" pipes are closed.
              * KM  FLOW FROM SIERRA PINTA DIVERTED INTO 2-96 PIPES TO CROSS PIMA
              * KM ENTELLUS CREATED THIS DIVERSION
2276          DT   DVSP4
              * DI     0     100     200     500    1328   10000
              * DQ     0     100     200     500    1328    1328
1                                     HEC-1 INPUT                                    PAGE 65

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

2277          DI       0   10000
2278          DQ       0    0.01
              *
              *  ************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ************************************************************************
              *
              *
              *
2279          KK  RSP4EX     CP
2280          KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
2281          KM   THROUGH PIMA ACRES ALONG PIMA ROAD TO PROJECT STRUCTURE #1
2282          RS       9    FLOW      -1
2283          RC    .045    .014    .045    3366   .0214
2284          RX       0       6      36      76      96     136     236     237
2285          RY      10       0       2       2       2       2       2      10
              *
2286          KK    53PS     DIV
2287          KM    ALLOCATE FLOW BETWEEN PIMA ROAD AND HUALAPAI DRIVE
2288          KM    ENTELLUS CHANGED THIS DIVERSION TO ZERO PER FIELD INVESTIGATIONS
2289          KM   THIS DIVERSION REPRESENTS FLOWS HEADING WEST ON HUALAPAI FORM THE
2290          KM   WEST SIDE OF PIMA ROAD BUT WAS SET TO ZERO BECAUSE THE PIMA ROUTE CHANNEL
2291          KM   WILL INTERCEPT THESE FLOWS
2292          DT    53HW
2293          DI       0   10000
2294          DQ       0       0
              *
```

```
2295          KK    S53A
2296          KM    RUNOFF FROM SUBBASIN S53A
2297          KM    ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2298          BA    .1250
2299          LS              77      27
2300          UK     300   0.022    0.13     100
2301          RK    1475   0.026   0.045  0.0111    TRAP       3       5
2302          RK    2625   0.021    0.04            TRAP      25       5
              *
              *
              *  *************************
              *  PROJECT STRUCTURE #1
              *
              *  *************************
              *

2303          KK  CPIMA1
2304          KM     COMBINE R53A WITH RUNOFF FROM SUBBASIN S53A
2305          HC       2
              *
              *
1                                        HEC-1 INPUT                                                    PAGE 66

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


2306          KK  RPMA4B      CP
2307          KM   ROUTE CPIMA1 TO CPCH2 (ACROSS PIMA ROAD)
2308          KM   ROUTE FROM PROJECT STRUCTURE#1 TO PROPOSED PIMA RD CHANNEL
2309          KM   THE ROUTE GEOMETRY WAS TAKEN FROM THE TYPICAL SECTIONS DETAIL SHEET
2310          KM   OF THE PIMA RD PAVING PLANS BY JMI AND ASSOCIATES.
2311          RS       2    FLOW      -1
2312          RC     .04    .014     .04     631   .0206
2313          RX       0       6      36      76      96     136     236     237
2314          RY      10       0       2       2       2       2       2      10
              *
              *

2315          KK    PRSD
2316          KM   RETRIEVE FLOW DIVERTED INTO PIPE AT THOMPSON PEAK
2317          DR    PRSD
              *
              *

2318          KK  RDPSD1
2319          KM   ROUTE FLOW THROUGH PIMA STORM DRAIN TO BEARDSLEY
2320          KM   ENTELLUS CREATED THIS ROUTE
2321          RS       1    FLOW      -1
2322          RK    1570    .022    .015            CIRC     5.5
              *
              *

2323          KK  RDPSD2
2324          KM   ROUTE FLOW THROUGH PIMA STORM DRAIN TO OUTLET NORTH OF HAULAPAI
2325          KM   ENTELLUS CREATED THIS ROUTE
2326          RS       1    FLOW      -1
2327          RK     970    .022    .015            CIRC       6
              *

2328          KK   DVSP4
2329          KM    RETRIEVE SIERRA PINTA CHANNEL FLOW AND ROUTE ALONG WEST SIDE OF PIMA RD
2330          DR   DVSP4
              *

2331          KK   RDVSP
2332          KM   OUTFLOW FROM SIERRA PINTA CHANNEL ALONG THE WEST SIDE OF PIMA RD BETWEEN
2333          KM   SIERRA PINTA AND THE PROPOSED PIMA RD DRAINAGE CHANNEL
2334          RS       5    FLOW      -1
2335          RC    .045    .014    .045    1873   .0219
2336          RX       0      .1       1       2      20      37      38      90
2337          RY       6       1       2       2       0       2       2       3
              *

2338          KK   CPCH1
2339          KM     COMBINE FLOW FROM 84" PIPE OUTLET WITH FLOW FROM SP CHANNEL
2340          HC       2
              *
1                                        HEC-1 INPUT                                                    PAGE 67

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

```
2341          KK  RPMA4A
2342          KM   ROUTE CHANNEL FLOW TO CPCH2
2343          KM   NORTH SEGMENT OF PROPOSED PIMA RD DRAINAGE CHANNEL BETWEEN DOWNING OLSEN
2344          KM   AND PIMA RD STORM DRAIN OUTLET
2345          RS       6    FLOW      -1
2346          RC    .035    .035    .035    2080   .0183
2347          RX       0      24      64      88      89      90      91      92
2348          RY       6       0       0       6       6       6       6       6
              *
              *

2349          KK   S53A2
2350          KM   RUNOFF FROM SUBBASIN S53A2
2351          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2352          BA   .0544
2353          LS             77      27
2354          UK     100   0.022    0.13     100
2355          RK    2080   0.021    0.04            TRAP      25       5
              *
              *
              *  *************************
              *  PIMA ROAD DRAINAGE CHANNEL
              *          SEGMENT 1
              *  *************************
              *
              *

2356          KK   CPCH2
2357          KM     COMBINE RPMA4A WITH S53A2 (PIMA ROAD DRAINAGE CHANNEL SEGMENT 1)
2358          HC       2
              *
              *

2359          KK   CPCH3
2360          KM     COMBINE RPMA4A, RPMA4B AND S53A2
2361          HC       2
              *
              *

2362          KK   RUH2A
2363          KM   ROUTE CHANNEL FROM CPCH2 TO CUH2
2364          KM   SOUTH SEGMENT OF PROPOSED PIMA RD DRAINAGE CHANNEL BETWEEN UNION HILLS
2365          KM   AND DOWNING-OLSEN
2366          RS       4    FLOW      -1
2367          RC    .035    .035    .035    1389   .0158
2368          RX       0      28      78     106     107     108     109     110
2369          RY       7       0       0       7       7       7       7       7
              *
```



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

2370          KK   S53A4
2371          KM   RUNOFF FROM SUBBASIN S53A4
2372          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2373          KM   THE FIRST OVERLAND FLOW CATACHMENT WAS REMOVED
2374          KM   IT REPRESENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN
2375          BA   .0528
2376          LS             77      30
2377          UK     150   0.027    0.13     100
2378          RK    1621   0.017    0.04            TRAP      35       5
              *

2379          KK   CPCH4      CP
2380          KM   COMBINE SUB S53A4 AND RUH2A
2381          HC       2
              *
              *
              *  *************************
              *  UNION HILLS INTERCEPTOR CHANNEL
              *          SEGMENT 2
              *  *************************
              *
              *

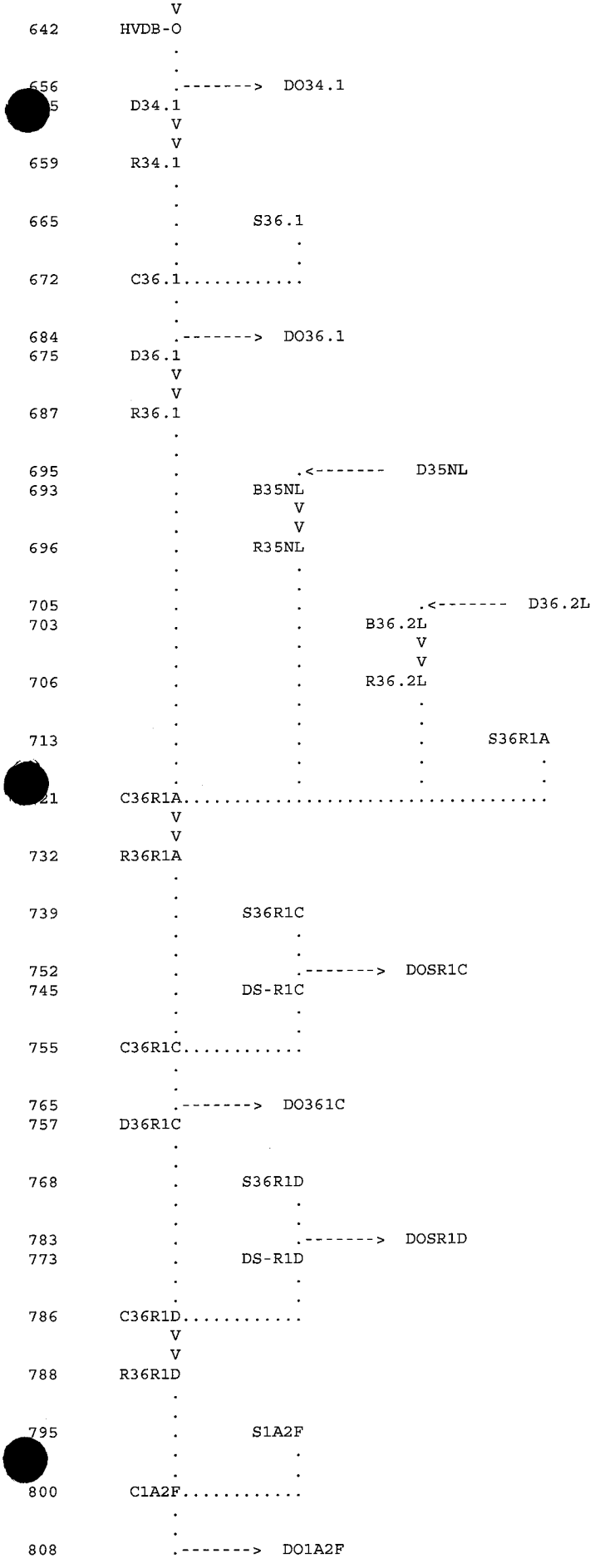
2382          KK   UHIC2      CP
2383          KM    UNION HILLS INTERCEPTOR CHANNEL SEGMENT 2
2384          HC       3
```

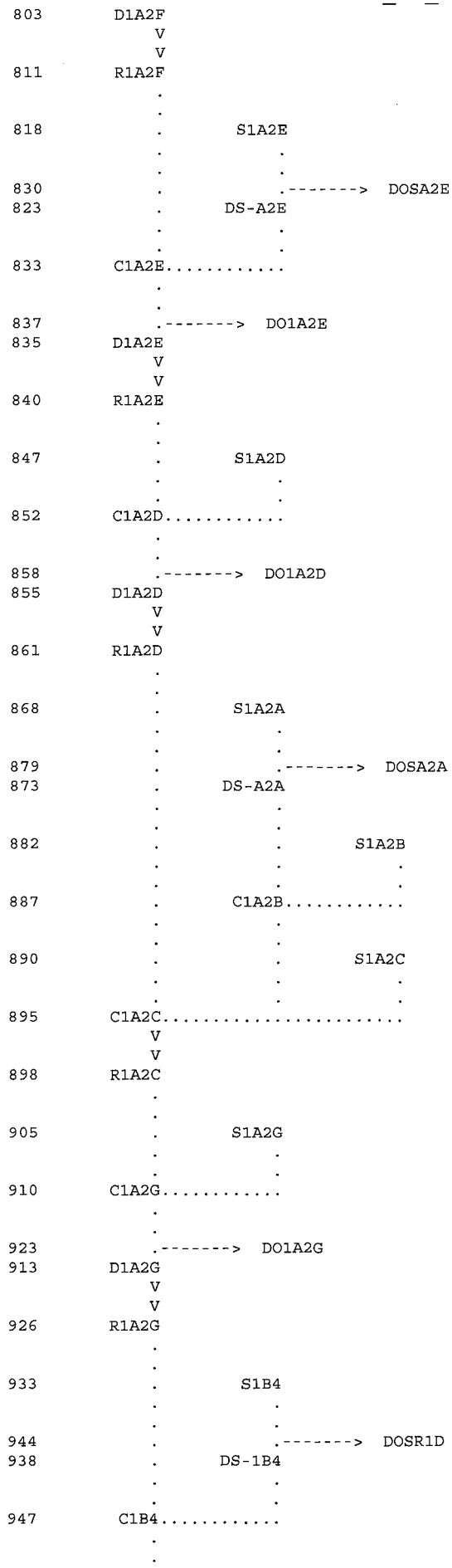
```
                    *
                    *
                    * ************************************************************************
                    * ********** NOVEMBER 2008 *** NOVEMBER 2008 *********************************
                    * ************************************************************************
                    * *** CORRECTED roughness coefficient to be 0.13, from 0.013 ******************
                    * ************************************************************************

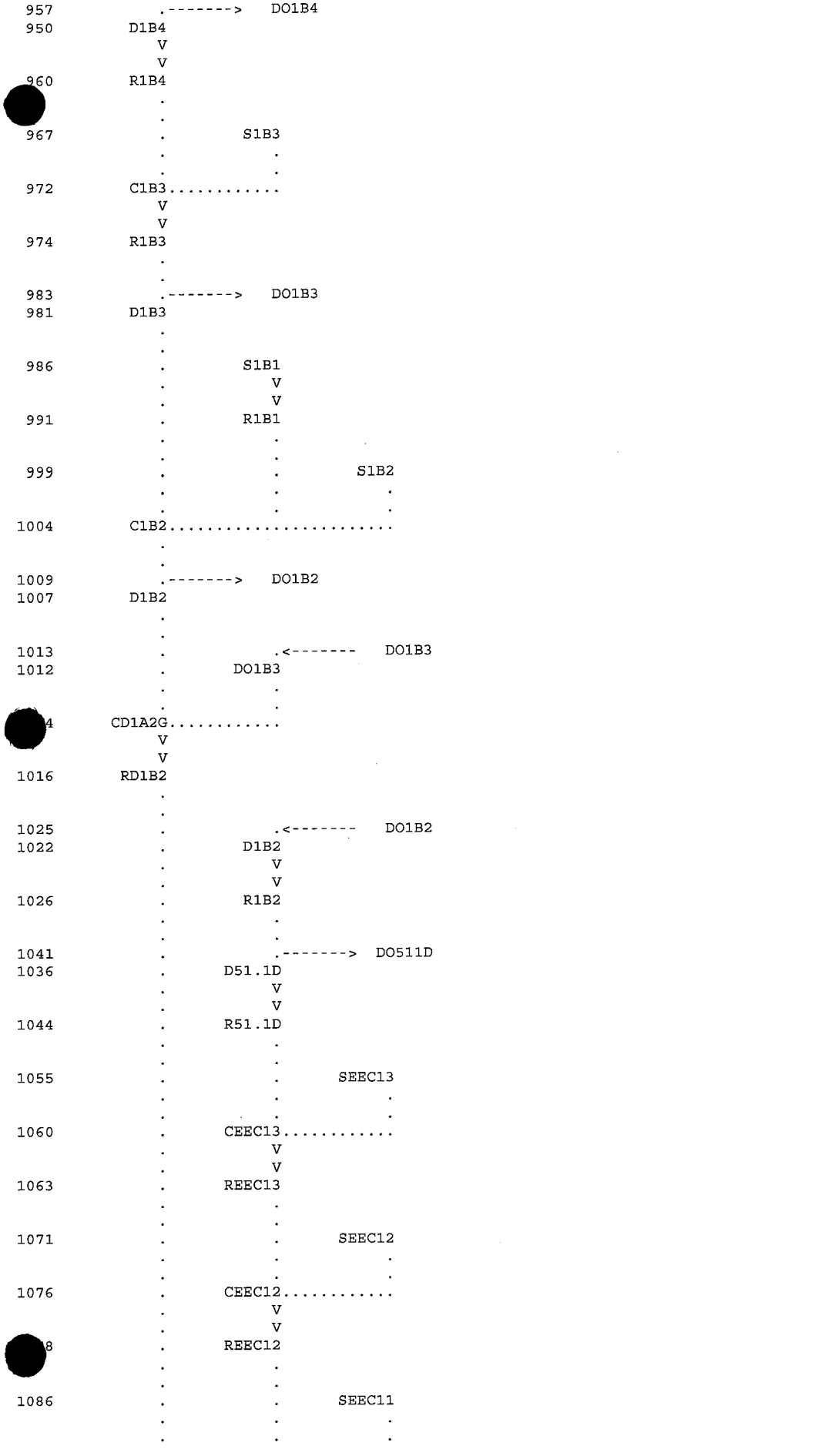
          2385      KK  CPIMA3
          2386      KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
          2387      KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
          2388      KM   THE PERCENT IMPERVIOUS WAS ESTIMATED USING A B-C SOIL
          2389      KM   ENTELLUS MODIFIED THE CATACHMENT PARAMETERS
          2390      KM   ENTELLUS NOV 2008: CORRECTED N VALUE TO BE 0.13, NOT 0.013
          2391      BA   .0669
          2392      LS              77      65
          2393      UK     300   0.027     .13     100
          2394      RK    2100   0.017    0.04            TRAP      10       6
                    *
                    *  |-------------------------------------------------------------------------|
                    *  |/////////////////////////////////////////////////////////////////////////|
                    *  |======================== END DEER VALLEY SOUTH MODEL ======================|
                    *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
                    *  -------------------------------------------------------------------------
          2395      ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

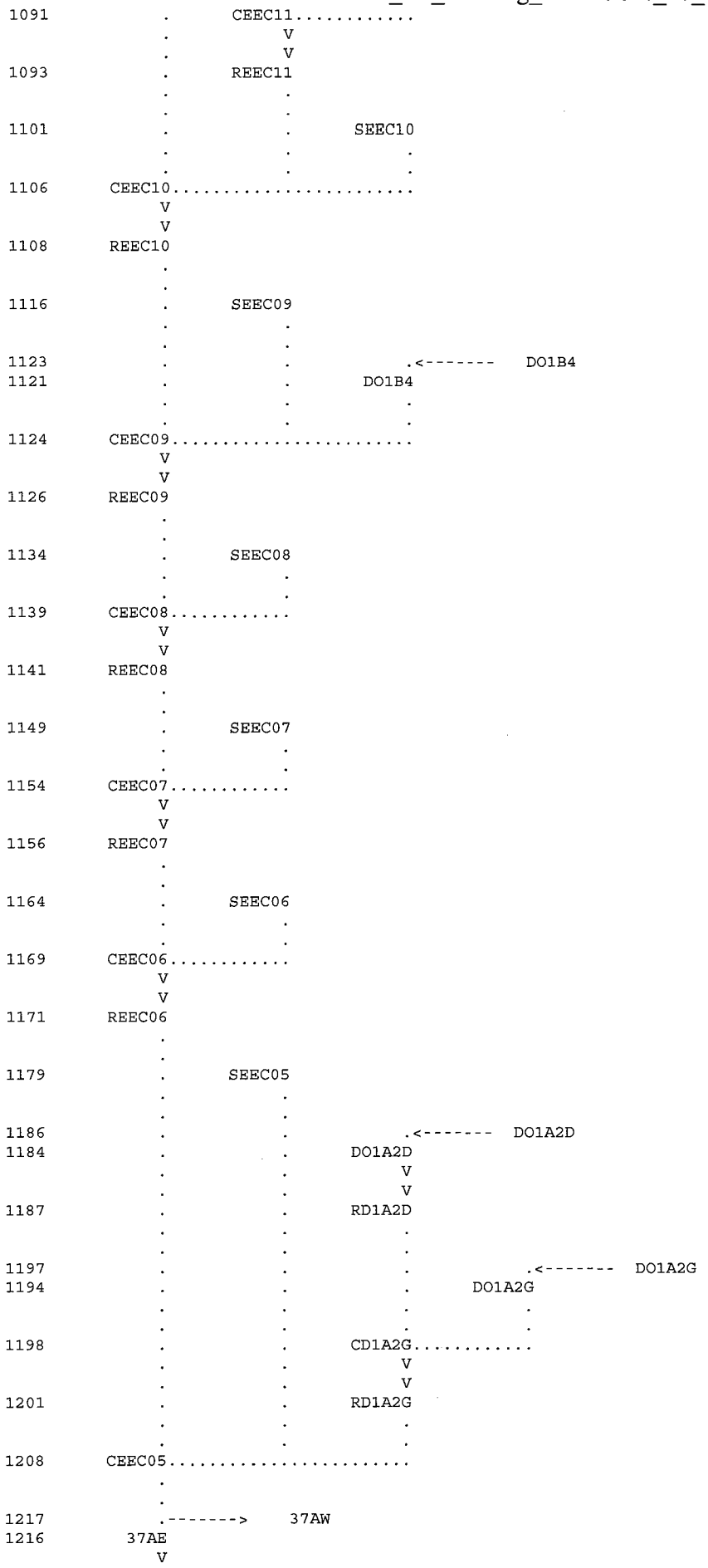
   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   537        S30N
                V
                V
   547        R30N
                .
                .
   553          .       S31.1
                .         .
                .         .
   561       C31.1.............
                .
                .
   564          .       S34.2
                .         .
                .         .
   573       C34.2.............
                .
                .
   576          .        S35N
                .         .
                .         .
   588          .         .--------->   D35NL
   584          .       D35NR
                .         V
                .         V
   591          .       R35NR
                .         .
                .         .
   598          .         .       S36.2
                .         .         .
                .         .         .
   606          .       C36.2.............
                .         .
                .         .
   613          .         .--------->  D36.2L
   609          .      D36.2R
                .         V
                .         V
   616          .      R36.2R
                .         .
                .         .
   623          .         .       S34.1
                .         .         .
                .         .         .
   636          .       C34.1.............
                .         .
                .         .
   639       HVDB-I.............
                V
```


V
642 HVDB-O
.
.
656 .-------> DO34.1
5 D34.1
V
V
659 R34.1
.
.
665 . S36.1
. .
. .
672 C36.1.....
.
.
684 .-------> DO36.1
675 D36.1
V
V
687 R36.1
.
.
695 . .<------- D35NL
693 . B35NL
. V
. V
696 . R35NL
. .
. .
705 . . .<------- D36.2L
703 . . B36.2L
. . V
. . V
706 . . R36.2L
. . .
. . .
713 . . . S36R1A
. . . .
. . . .
21 C36R1A.....
V
V
732 R36R1A
.
.
739 . S36R1C
. .
. .
752 . .-------> DOSR1C
745 . DS-R1C
. .
. .
755 C36R1C.....
.
.
765 .-------> DO361C
757 D36R1C
.
.
768 . S36R1D
. .
. .
783 . .-------> DOSR1D
773 . DS-R1D
. .
. .
786 C36R1D.....
V
V
788 R36R1D
.
.
795 . S1A2F
. .
. .
800 C1A2F.....
.
.
808 .-------> DO1A2F


803 D1A2F
V
V
811 R1A2F
818 S1A2E
830 DOSA2E
823 DS-A2E
833 C1A2E
837 DO1A2E
835 D1A2E
V
V
840 R1A2E
847 S1A2D
852 C1A2D
858 DO1A2D
855 D1A2D
V
V
861 R1A2D
868 S1A2A
879 DOSA2A
873 DS-A2A
882 S1A2B
887 C1A2B
890 S1A2C
895 C1A2C
V
V
898 R1A2C
905 S1A2G
910 C1A2G
923 DO1A2G
913 D1A2G
V
V
926 R1A2G
933 S1B4
944 DOSR1D
938 DS-1B4
947 C1B4


957 .--------> DO1B4
950 D1B4
960 R1B4
967 S1B3
972 C1B3
974 R1B3
983 .--------> DO1B3
981 D1B3
986 S1B1
991 R1B1
999 S1B2
1004 C1B2
1009 .--------> DO1B2
1007 D1B2
1013 .<-------- DO1B3
1012 DO1B3
CD1A2G
1016 RD1B2
1025 .<-------- DO1B2
1022 D1B2
1026 R1B2
1041 .--------> DO511D
1036 D51.1D
1044 R51.1D
1055 SEEC13
1060 CEEC13
1063 REEC13
1071 SEEC12
1076 CEEC12
REEC12
1086 SEEC11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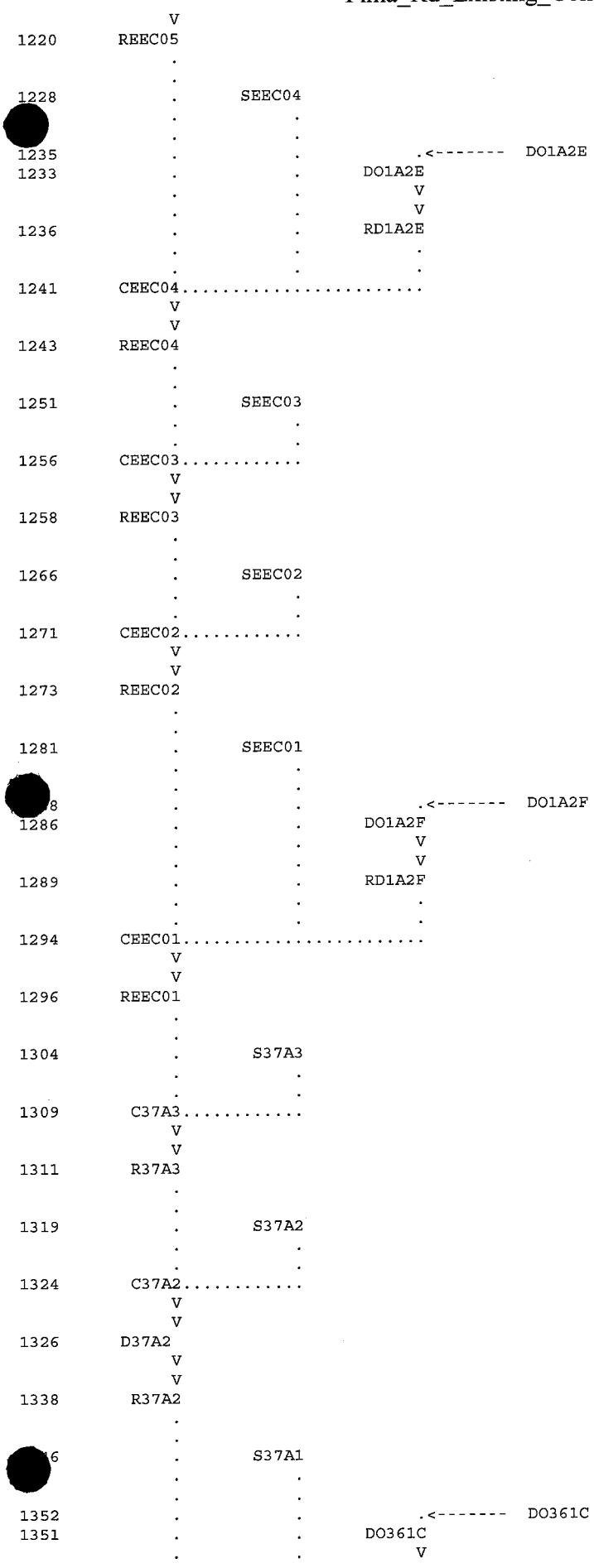
1093 REEC11
1101 SEEC10
1106 CEEC10
1108 REEC10
1116 SEEC09
1123
1121 DO1B4
1124 CEEC09
1126 REEC09
1134 SEEC08
1139 CEEC08
1141 REEC08
1149 SEEC07
1154 CEEC07
1156 REEC07
1164 SEEC06
1169 CEEC06
1171 REEC06
1179 SEEC05
1186
1184 DO1A2D
1187 RD1A2D
1197
1194 DO1A2G
1198 CD1A2G
1201 RD1A2G
1208 CEEC05
1217 37AW
1216 37AE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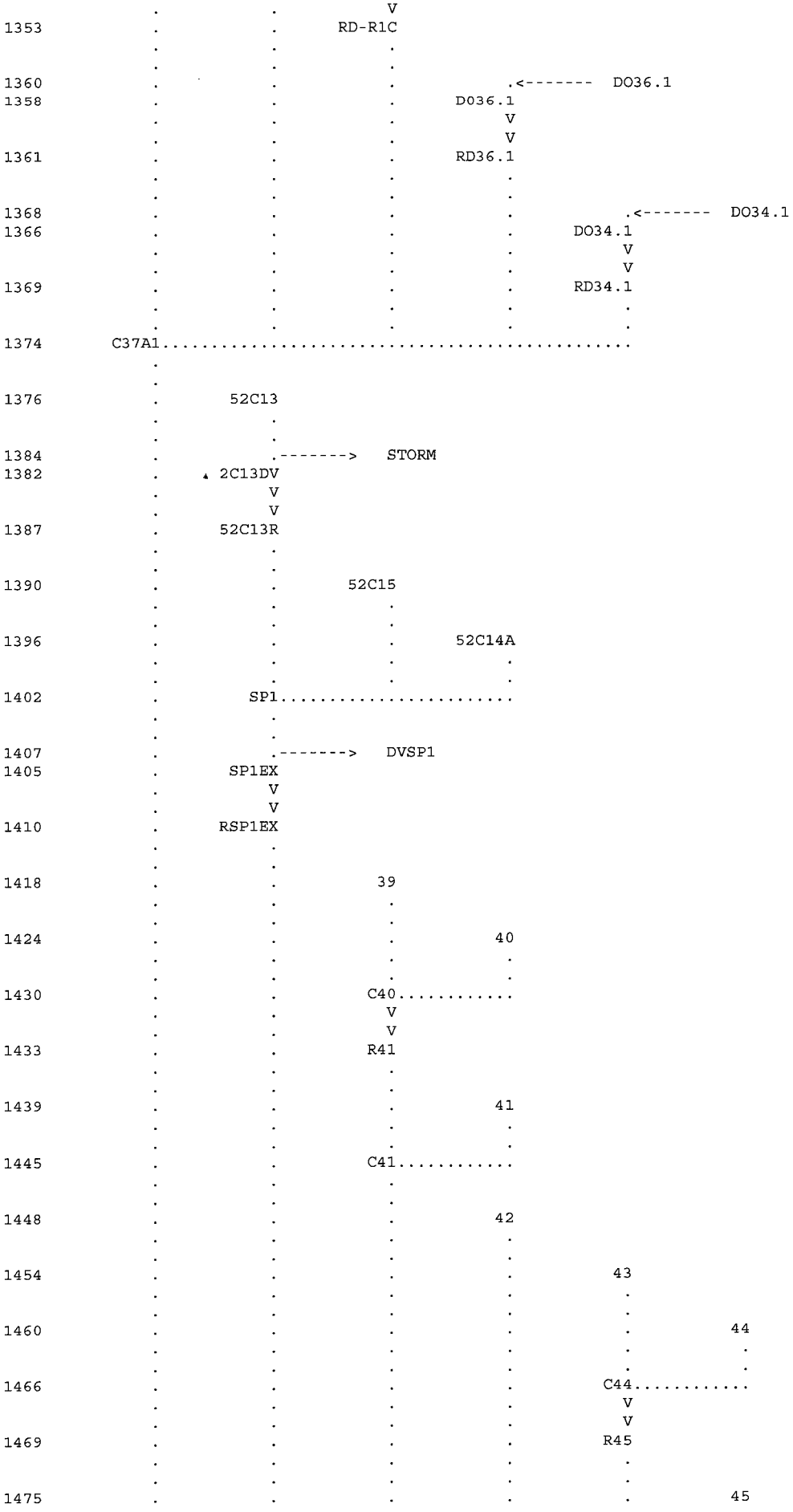
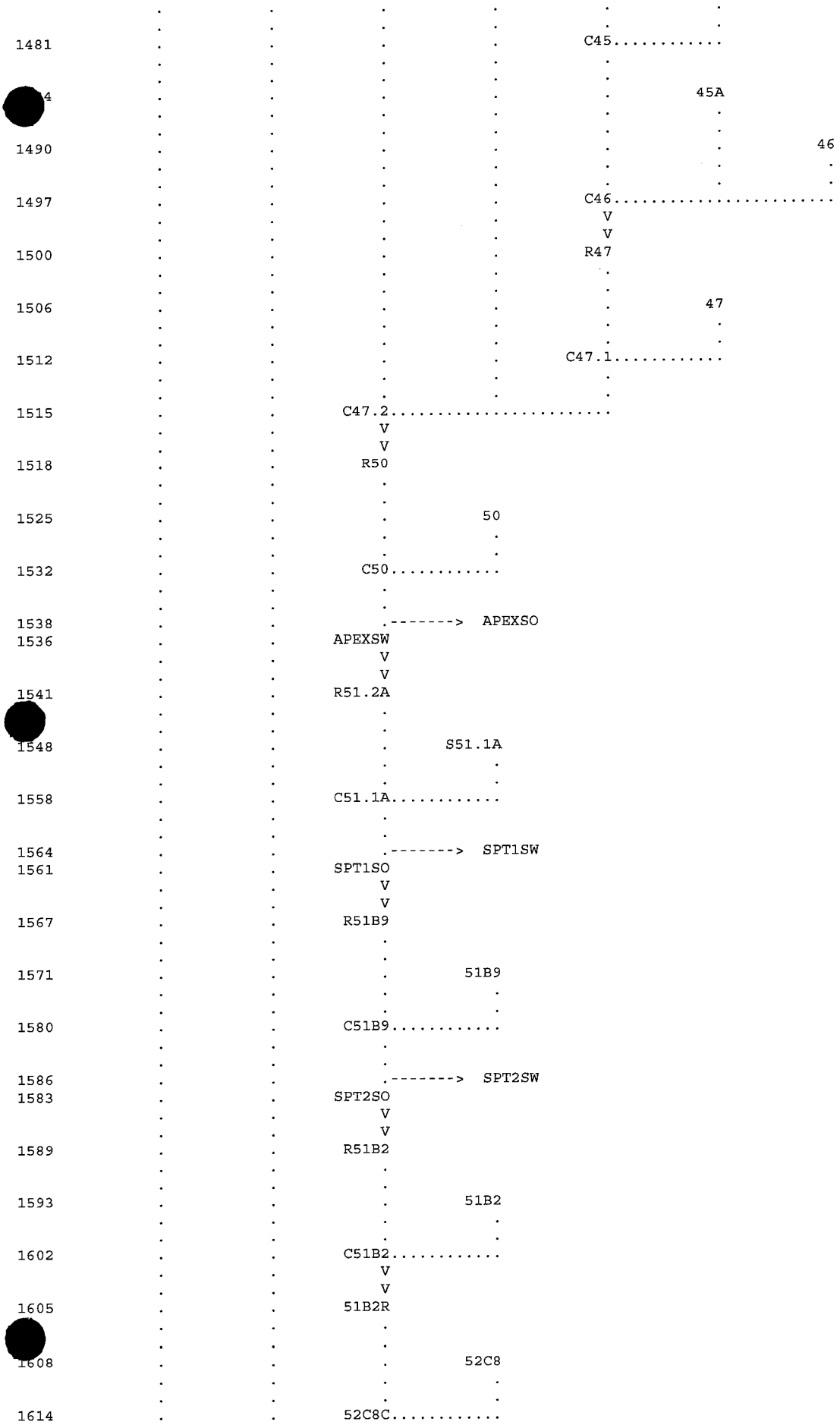
1235 .<------- DO1A2E
1233 DO1A2E
1236 RD1A2E
1241 CEEC04
1243 REEC04
1251 SEEC03
1256 CEEC03
1258 REEC03
1266 SEEC02
1271 CEEC02
1273 REEC02
1281 SEEC01
1286 .<------- DO1A2F
1286 DO1A2F
1289 RD1A2F
1294 CEEC01
1296 REEC01
1304 S37A3
1309 C37A3
1311 R37A3
1319 S37A2
1324 C37A2
1326 D37A2
1338 R37A2
1352 .<------- DO361C
1351 DO361C


RD-R1C
DO36.1
RD36.1
DO34.1
RD34.1
C37A1
52C13
STORM
2C13DV
52C13R
52C15
52C14A
SP1
DVSP1
SP1EX
RSP1EX
39
40
C40
R41
41
C41
42
43
44
C44
R45
45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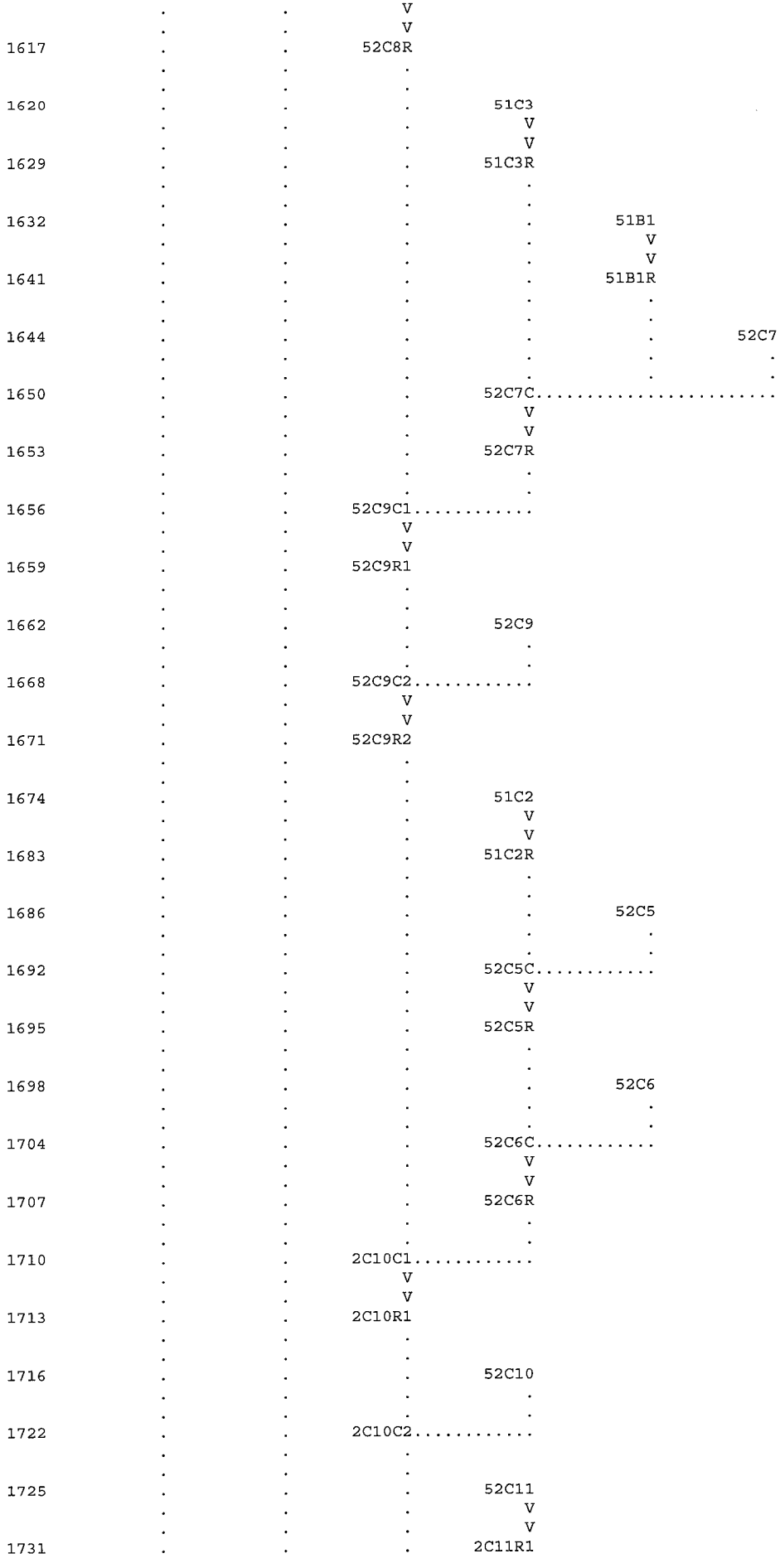
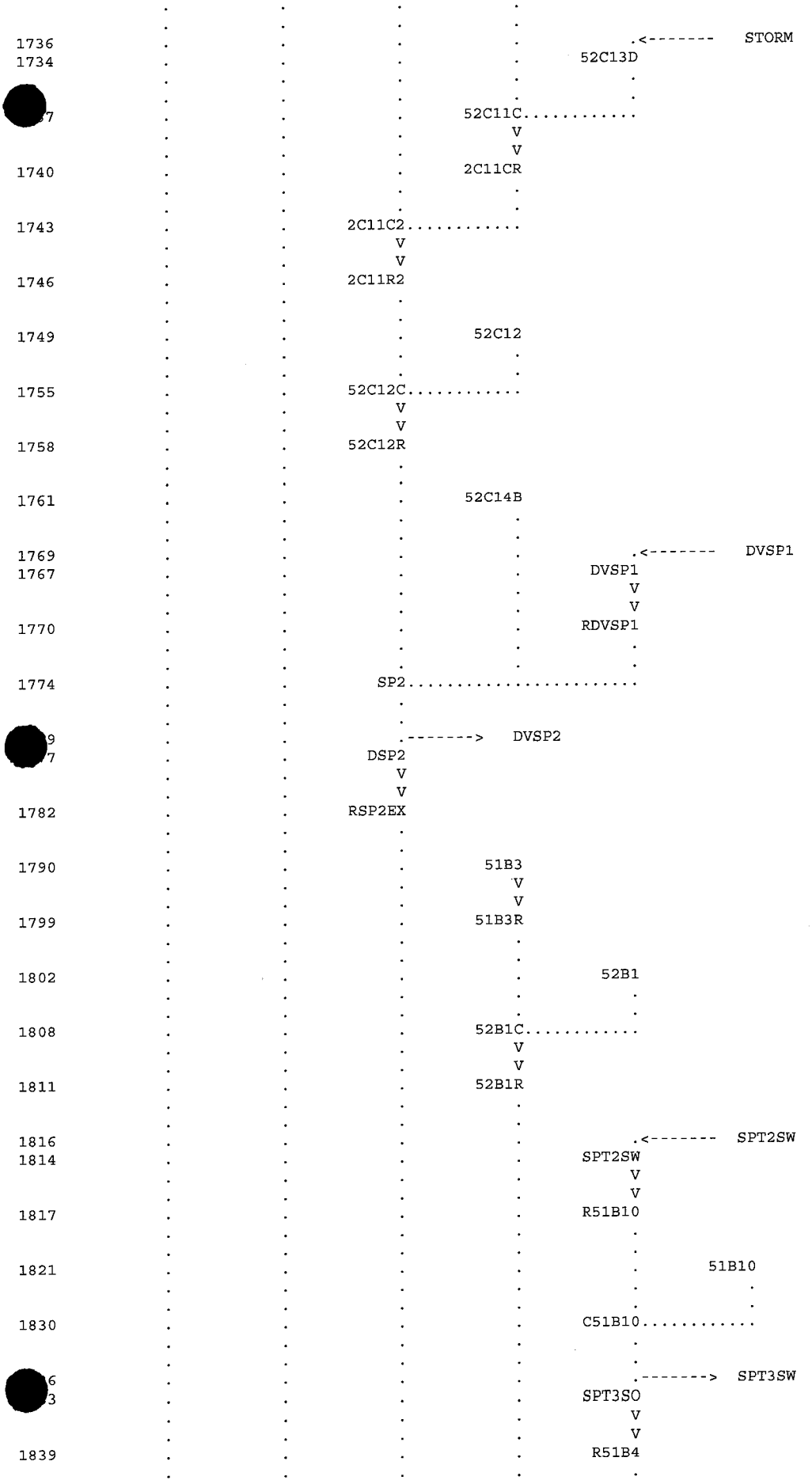
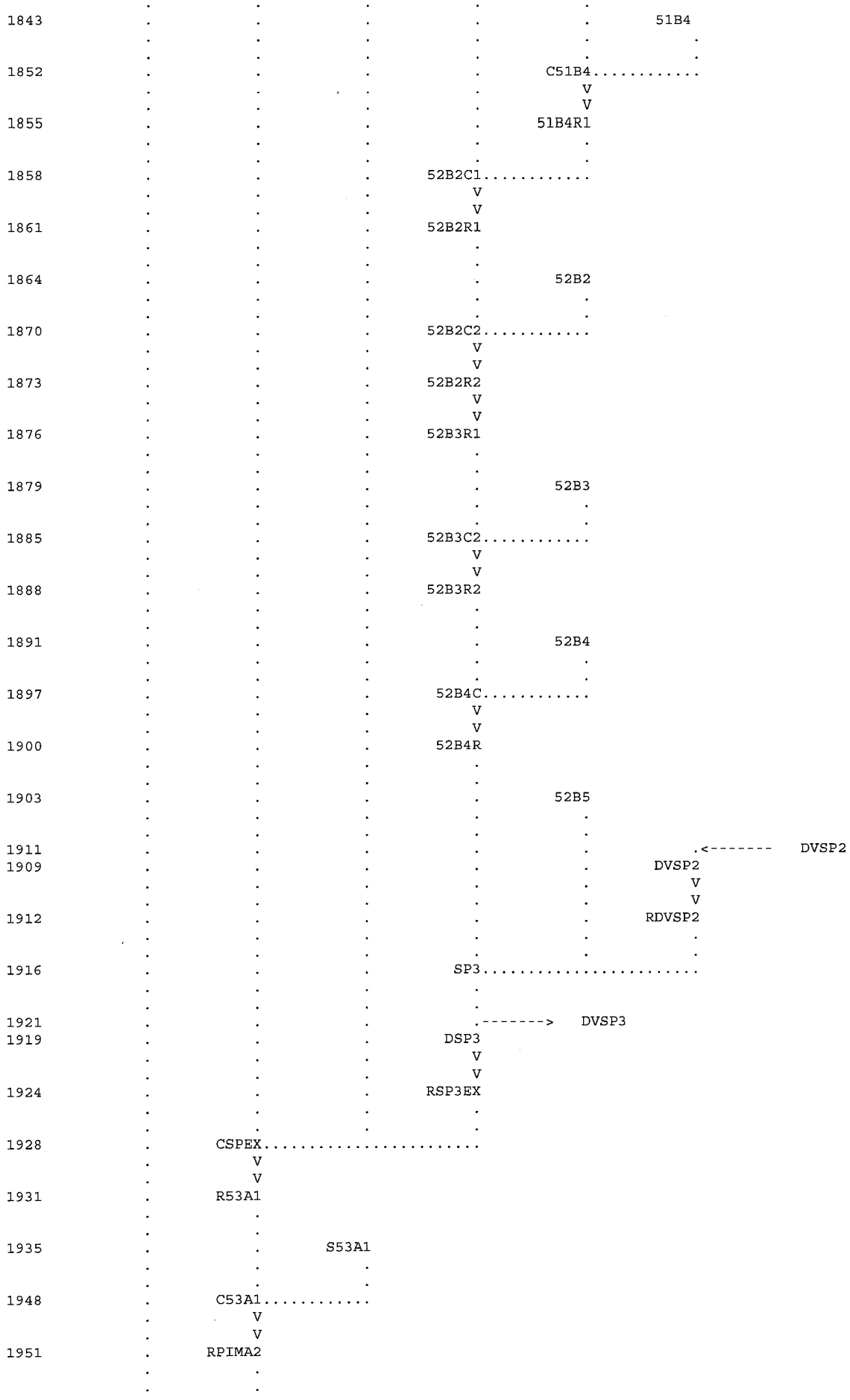
C45
45A
1490
46
1497
C46
1500
R47
1506
47
1512
C47.1
1515
C47.2
1518
R50
1525
50
1532
C50
1538
APEXSO
1536
APEXSW
1541
R51.2A
1548
S51.1A
1558
C51.1A
1564
SPT1SW
1561
SPT1SO
1567
R51B9
1571
51B9
1580
C51B9
1586
SPT2SW
1583
SPT2SO
1589
R51B2
1593
51B2
1602
C51B2
1605
51B2R
1608
52C8
1614
52C8C


1617 52C8R
1620 51C3
1629 51C3R
1632 51B1
1641 51B1R
1644 52C7
1650 52C7C
1653 52C7R
1656 52C9C1
1659 52C9R1
1662 52C9
1668 52C9C2
1671 52C9R2
1674 51C2
1683 51C2R
1686 52C5
1692 52C5C
1695 52C5R
1698 52C6
1704 52C6C
1707 52C6R
1710 2C10C1
1713 2C10R1
1716 52C10
1722 2C10C2
1725 52C11
1731 2C11R1


1736
1734
STORM
52C13D
52C11C
2C11CR
1740
1743
2C11C2
1746
2C11R2
1749
52C12
1755
52C12C
1758
52C12R
1761
52C14B
1769
1767
DVSP1
1770
RDVSP1
1774
SP2
DVSP2
DSP2
1782
RSP2EX
1790
51B3
1799
51B3R
1802
52B1
1808
52B1C
1811
52B1R
1816
1814
SPT2SW
1817
R51B10
1821
51B10
1830
C51B10
SPT3SW
SPT3SO
1839
R51B4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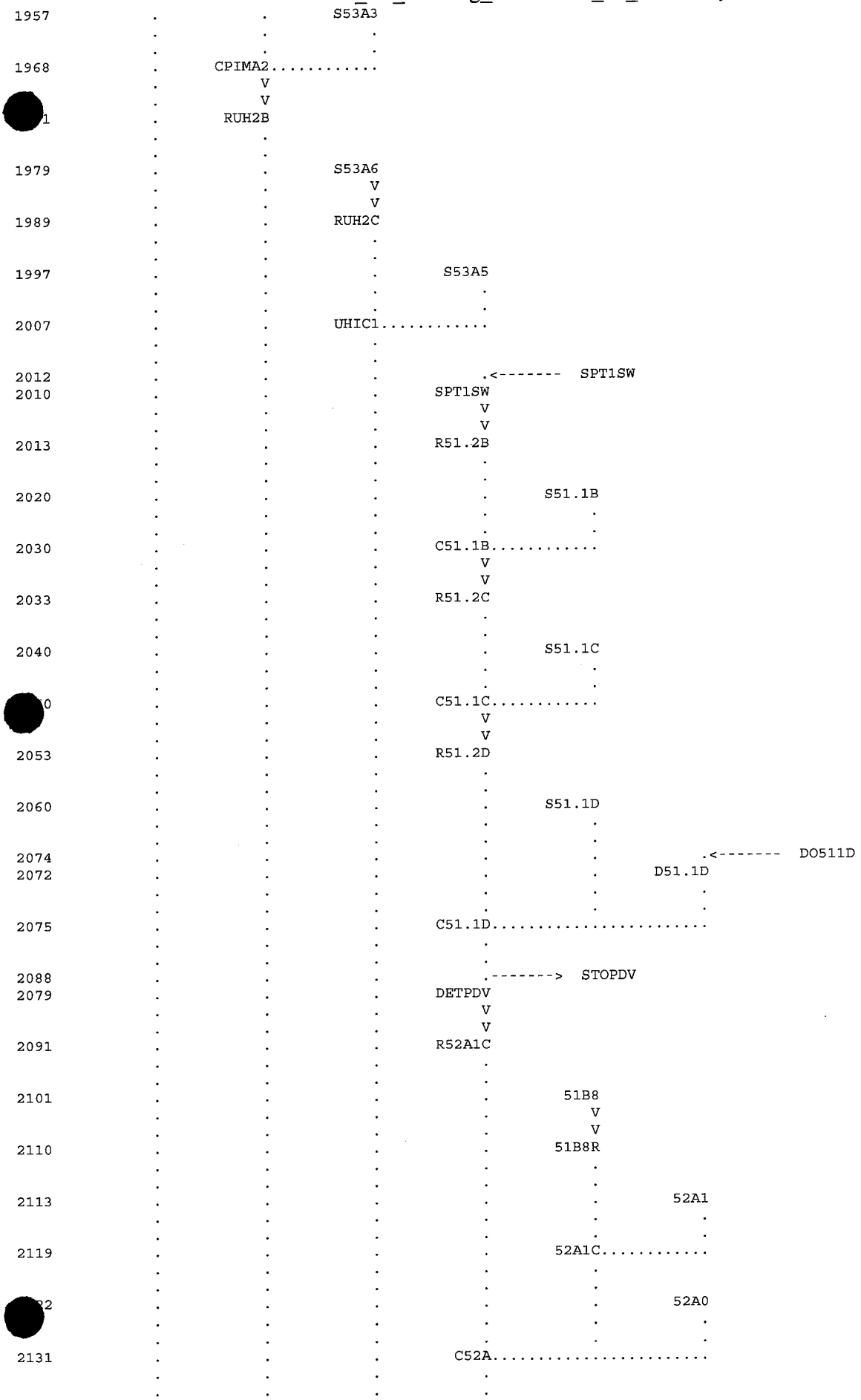
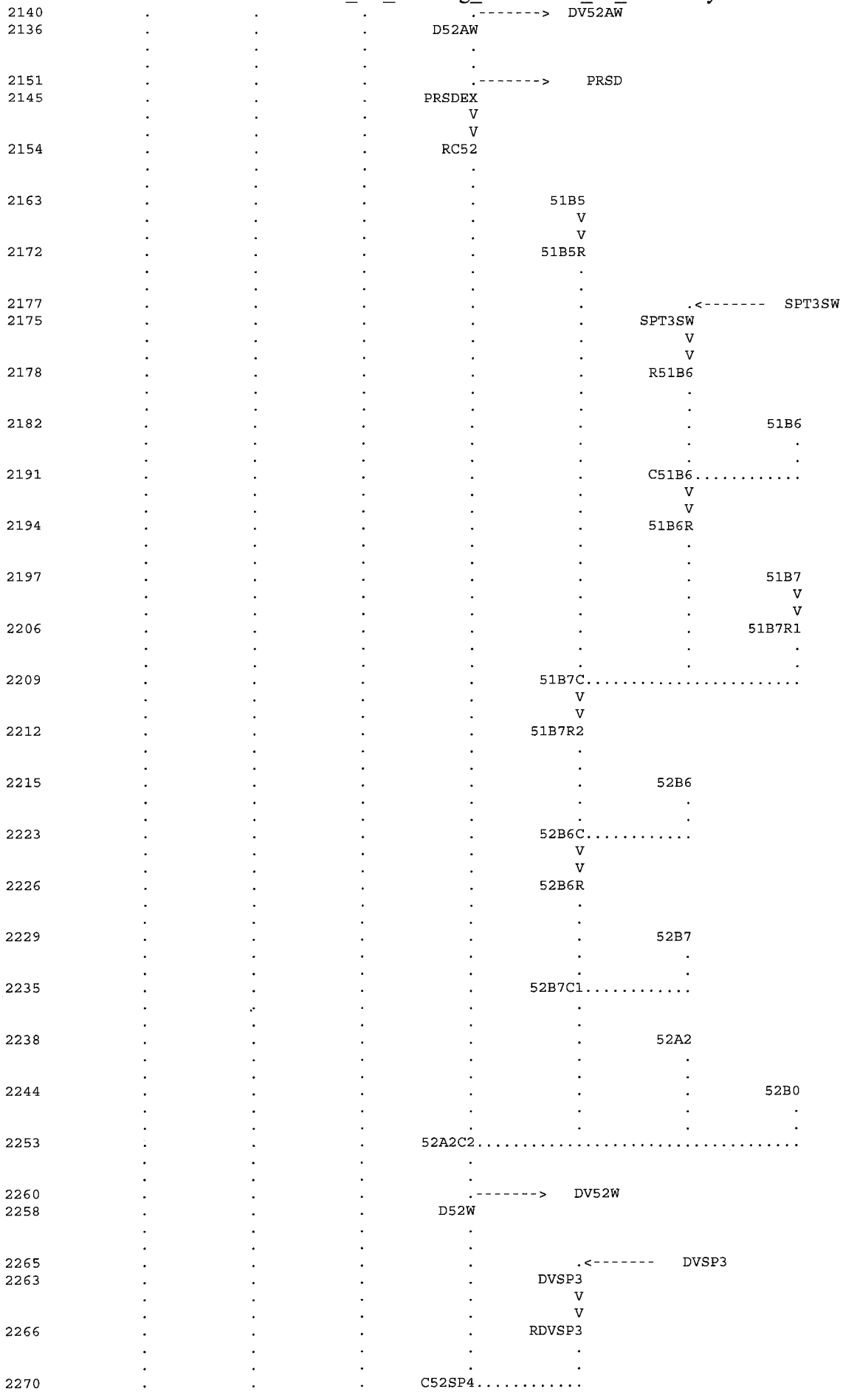
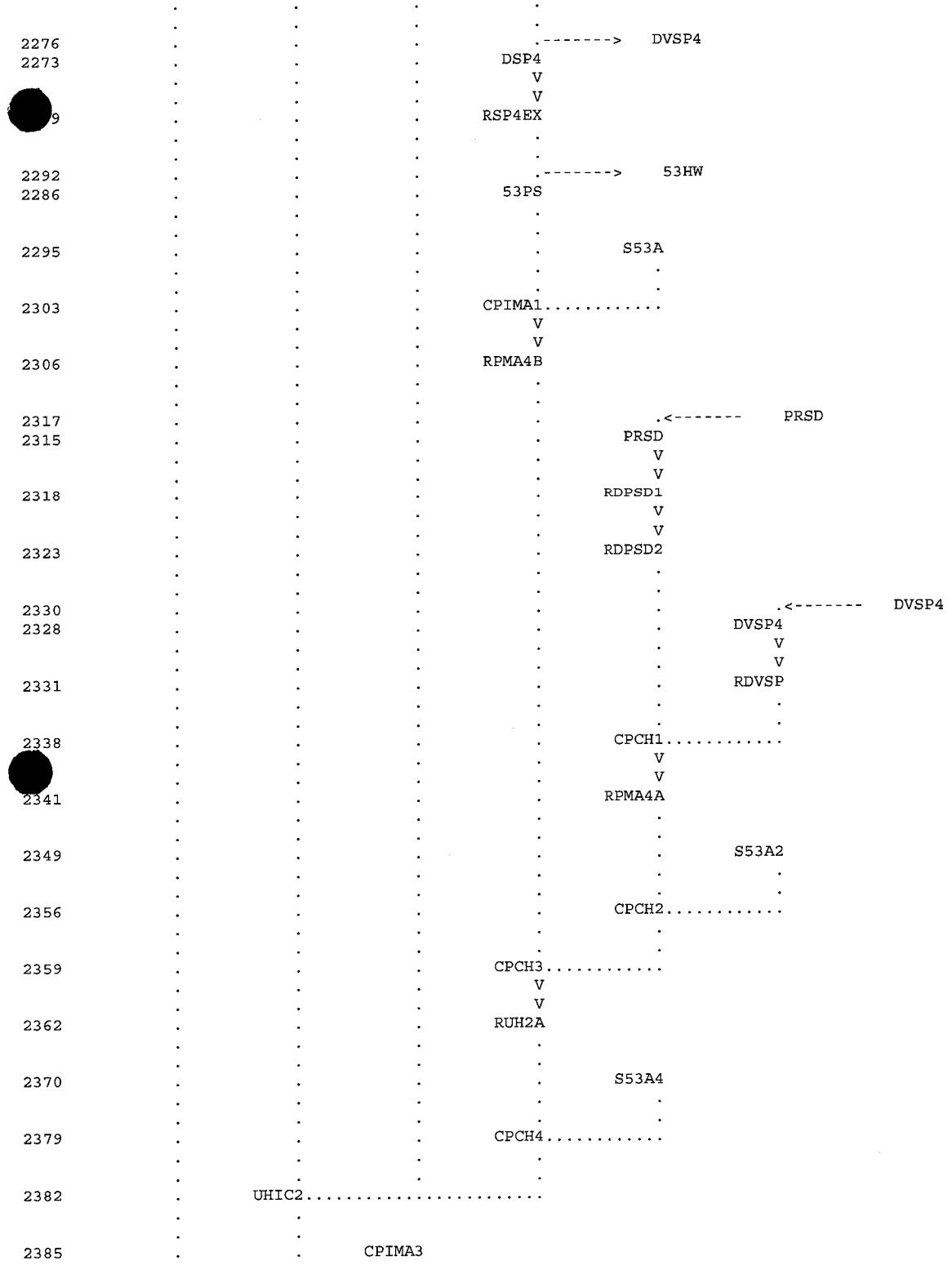
51B4
1852
C51B4
1855
51B4R1
1858
52B2C1
1861
52B2R1
1864
52B2
1870
52B2C2
1873
52B2R2
1876
52B3R1
1879
52B3
1885
52B3C2
1888
52B3R2
1891
52B4
1897
52B4C
1900
52B4R
1903
52B5
1911
DVSP2
1909
DVSP2
1912
RDVSP2
1916
SP3
1921
DVSP3
1919
DSP3
1924
RSP3EX
1928
CSPEX
1931
R53A1
1935
S53A1
1948
C53A1
1951
RPIMA2


1957
S53A3
1968
CPIMA2
RUH2B
1979
S53A6
1989
RUH2C
1997
S53A5
2007
UHIC1
2012
SPT1SW
2010
SPT1SW
2013
R51.2B
2020
S51.1B
2030
C51.1B
2033
R51.2C
2040
S51.1C
C51.1C
2053
R51.2D
2060
S51.1D
2074
DO511D
2072
D51.1D
2075
C51.1D
2088
STOPDV
2079
DETPDV
2091
R52A1C
2101
51B8
2110
51B8R
2113
52A1
2119
52A1C
52A0
2131
C52A


2140
DV52AW
2136
D52AW
2151
PRSD
2145
PRSDEX
2154
RC52
2163
51B5
2172
51B5R
2177
SPT3SW
2175
SPT3SW
2178
R51B6
2182
51B6
2191
C51B6
2194
51B6R
2197
51B7
2206
51B7R1
2209
51B7C
2212
51B7R2
2215
52B6
2223
52B6C
2226
52B6R
2229
52B7
2235
52B7C1
2238
52A2
2244
52B0
2253
52A2C2
2260
DV52W
2258
D52W
2265
DVSP3
2263
DVSP3
2266
RDVSP3
2270
C52SP4



(***) 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	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	1304.	3.58	129.	32.	23.	4.64	103.48
+									
3.58									
+	HYDROGRAPH AT	S1A2F	19.	3.08	1.	0.	0.	.01	
+	2 COMBINED AT	C1A2F	1306.	3.58	130.	33.	24.	4.65	
+	DIVERSION TO	DO1A2F	1306.	.00	130.	33.	24.	4.65	

	HYDROGRAPH AT							
+		D1A2F	0.	.00	0.	0.	0.	4.65	
	ROUTED TO							
+		R1A2F	0.	.00	0.	0.	0.	4.65	
+									100.00
.00									
	HYDROGRAPH AT							
+		S1A2E	65.	3.08	5.	1.	1.	.03	
	DIVERSION TO							
+		DOSA2E	65.	.00	5.	1.	1.	.03	
	HYDROGRAPH AT							
+		DS-A2E	0.	.00	0.	0.	0.	.03	
	2 COMBINED AT							
+		C1A2E	0.	.00	0.	0.	0.	4.68	
	DIVERSION TO							
+		DO1A2E	0.	.00	0.	0.	0.	4.68	
	HYDROGRAPH AT							
+		D1A2E	0.	.00	0.	0.	0.	4.68	
	ROUTED TO							
+		R1A2E	0.	.00	0.	0.	0.	4.68	
+									100.00
.00									
	HYDROGRAPH AT							
+		S1A2D	33.	3.10	2.	1.	0.	.02	
	2 COMBINED AT							
+		C1A2D	33.	3.10	2.	1.	0.	4.70	
	DIVERSION TO							
+		DO1A2D	33.	.00	2.	1.	0.	4.70	
	HYDROGRAPH AT							
+		D1A2D	0.	.00	0.	0.	0.	4.70	
	ROUTED TO							
+		R1A2D	0.	.00	0.	0.	0.	4.70	
+									100.00
.00									
	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	169.	3.10	11.	3.	2.	4.78	
	ROUTED TO							
+		R1A2C	166.	3.10	11.	3.	2.	4.78	
+									101.29
3.10									
	HYDROGRAPH AT							
+		S1A2G	8.	3.08	1.	0.	0.	.00	
	2 COMBINED AT							
+		C1A2G	174.	3.10	11.	3.	2.	4.78	

+	DIVERSION TO	DO1A2G	151.	3.10	10.	2.	2.	4.78	
+	HYDROGRAPH AT	D1A2G	23.	3.10	1.	0.	0.	4.78	
+	ROUTED TO	R1A2G	21.	3.13	1.	0.	0.	4.78	
+									100.42
3.13									
+	HYDROGRAPH AT	S1B4	47.	3.08	3.	1.	1.	.02	
+	DIVERSION TO	DOSR1D	47.	.00	3.	1.	1.	.02	
+	HYDROGRAPH AT	DS-1B4	0.	.00	0.	0.	0.	.02	
+	2 COMBINED AT	C1B4	21.	3.13	1.	0.	0.	4.80	
+	DIVERSION TO	DO1B4	21.	.00	1.	0.	0.	4.80	
+	HYDROGRAPH AT	D1B4	0.	.00	0.	0.	0.	4.80	
+	ROUTED TO	R1B4	0.	.00	0.	0.	0.	4.80	
+									100.00
.00									
+	HYDROGRAPH AT	S1B3	239.	3.13	19.	5.	4.	.14	
+	2 COMBINED AT	C1B3	239.	3.13	19.	5.	4.	4.95	
+	ROUTED TO	R1B3	238.	3.15	19.	5.	4.	4.95	
+									101.62
3.15									
+	DIVERSION TO	DO1B3	238.	.00	19.	5.	4.	4.95	
+	HYDROGRAPH AT	D1B3	0.	.00	0.	0.	0.	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	115.	3.12	9.	2.	2.	5.02	
+	DIVERSION TO	DO1B2	0.	3.12	0.	0.	0.	5.02	
+	HYDROGRAPH AT	D1B2	115.	3.12	9.	2.	2.	5.02	
+	HYDROGRAPH AT	DO1B3	238.	3.15	19.	5.	4.	.00	
+	2 COMBINED AT	CD1A2G	343.	3.13	29.	7.	5.	5.02	
+	ROUTED TO	RD1B2	338.	3.18	29.	7.	5.	5.02	
+									96.61
3.18									

```
          HYDROGRAPH AT
+                          D1B2          0.     .00          0.          0.          0.          .00
          ROUTED TO
+                          R1B2          0.     .00          0.          0.          0.          .00
+                                                                                                          100.00
.00
          DIVERSION TO
+                         DO511D         0.     .00          0.          0.          0.          .00
          HYDROGRAPH AT
+                         D51.1D         0.     .00          0.          0.          0.          .00
          ROUTED TO
+                         R51.1D         0.     .00          0.          0.          0.          .00
          HYDROGRAPH AT
+                         SEEC13        22.    3.10          2.          0.          0.          .01
          2 COMBINED AT
+                         CEEC13        22.    3.10          2.          0.          0.          .01
          ROUTED TO
+                         REEC13        22.    3.10          2.          0.          0.          .01
+                                                                                                           .39
3.10
          HYDROGRAPH AT
+                         SEEC12         3.    3.07          0.          0.          0.          .00
          2 COMBINED AT
+                         CEEC12        25.    3.10          2.          0.          0.          .01
          ROUTED TO
+                         REEC12        25.    3.10          2.          0.          0.          .01
+                                                                                                           .42
3.10
          HYDROGRAPH AT
+                         SEEC11        15.    3.13          1.          0.          0.          .01
          2 COMBINED AT
+                         CEEC11        39.    3.12          3.          1.          1.          .02
          ROUTED TO
+                         REEC11        39.    3.12          3.          1.          1.          .02
+                                                                                                           .55
3.12
          HYDROGRAPH AT
+                         SEEC10        33.    3.13          3.          1.          1.          .02
          3 COMBINED AT
+                         CEEC10       398.    3.18         34.          9.          6.         5.05
          ROUTED TO
+                         REEC10       398.    3.18         34.          9.          6.         5.05
+                                                                                                          2.17
3.18
          HYDROGRAPH AT
+                         SEEC09        44.    3.17          4.          1.          1.          .02
          HYDROGRAPH AT
+                         DO1B4         21.    3.13          1.          0.          0.          .00
          3 COMBINED AT
+                         CEEC09       458.    3.18         40.         10.          7.         5.07
          ROUTED TO
+                         REEC09       454.    3.20         40.         10.          7.         5.07
+                                                                                                          2.30
3.20
          HYDROGRAPH AT
+                         SEEC08        34.    3.37          5.          1.          1.          .03
          2 COMBINED AT
+                         CEEC08       483.    3.20         45.         11.          8.         5.10
```

+	ROUTED TO	REEC08	481.	3.20	45.	11.	8.	5.10
+								2.36
3.20								
+	HYDROGRAPH AT	SEEC07	13.	3.08	1.	0.	0.	.01
+	2 COMBINED AT	CEEC07	488.	3.20	46.	12.	8.	5.11
+	ROUTED TO	REEC07	486.	3.22	46.	12.	8.	5.11
+								2.37
3.22								
+	HYDROGRAPH AT	SEEC06	6.	3.08	0.	0.	0.	.00
+	2 COMBINED AT	CEEC06	489.	3.22	46.	12.	8.	5.11
+	ROUTED TO	REEC06	484.	3.22	46.	12.	8.	5.11
+								2.37
3.22								
+	HYDROGRAPH AT	SEEC05	114.	3.22	13.	3.	2.	.07
+	HYDROGRAPH AT	DO1A2D	33.	3.10	2.	1.	0.	.00
+	ROUTED TO	RD1A2D	30.	3.15	2.	1.	0.	.00
+								95.38
3.15								
+	HYDROGRAPH AT	DO1A2G	151.	3.10	10.	2.	2.	.00
+	2 COMBINED AT	CD1A2G	169.	3.12	12.	3.	2.	.00
+	ROUTED TO	RD1A2G	149.	3.25	12.	3.	2.	.00
+								96.02
3.25								
+	3 COMBINED AT	CEEC05	743.	3.23	71.	18.	13.	5.18
+	DIVERSION TO	37AW	743.	.00	71.	18.	13.	5.18
+	HYDROGRAPH AT	37AE	0.	.00	0.	0.	0.	5.18
+	ROUTED TO	REEC05	0.	.00	0.	0.	0.	5.18
+								.00
3.28								
+	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	184.	3.27	22.	6.	4.	5.31
+	ROUTED TO	REEC04	184.	3.27	22.	6.	4.	5.31

+								1.41
3.27								
	HYDROGRAPH AT							
+		SEEC03	9.	3.20	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC03	192.	3.27	23.	6.	4.	5.32
	ROUTED TO							
+		REEC03	192.	3.27	23.	6.	4.	5.32
+								1.45
3.27								
	HYDROGRAPH AT							
+		SEEC02	26.	3.10	2.	0.	0.	.01
	2 COMBINED AT							
+		CEEC02	202.	3.27	25.	6.	5.	5.33
	ROUTED TO							
+		REEC02	202.	3.27	25.	6.	5.	5.33
+								1.49
3.27								
	HYDROGRAPH AT							
+		SEEC01	254.	3.28	33.	8.	6.	.19
	HYDROGRAPH AT							
+		DO1A2F	1306.	3.58	130.	33.	24.	.00
	ROUTED TO							
+		RD1A2F	1273.	3.70	130.	33.	24.	.00
+								98.41
3.70								
	3 COMBINED AT							
+		CEEC01	1421.	3.68	186.	47.	34.	5.51
	ROUTED TO							
+		REEC01	1415.	3.72	186.	47.	34.	5.51
+								3.81
3.72								
	HYDROGRAPH AT							
+		S37A3	204.	3.20	21.	5.	4.	.12
	2 COMBINED AT							
+		C37A3	1457.	3.70	206.	52.	38.	5.63
	ROUTED TO							
+		R37A3	1456.	3.72	206.	52.	38.	5.63
+								3.85
3.72								
	HYDROGRAPH AT							
+		S37A2	89.	3.43	15.	4.	3.	.08
	2 COMBINED AT							
+		C37A2	1504.	3.72	221.	56.	41.	5.72
	ROUTED TO							
+		D37A2	1504.	3.72	216.	54.	39.	5.72
+								1791.00
3.67								
	ROUTED TO							
+		R37A2	1502.	3.73	216.	54.	39.	5.72
+								3.90
3.73								
	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
3.73								

+	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	2126.	3.75	503.	209.	165.	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	0.	3.10	0.	0.	0.	.11	
+	HYDROGRAPH AT	SP1EX	294.	3.10	24.	6.	4.	.11	
+	ROUTED TO	RSP1EX	280.	3.17	24.	6.	4.	.11	
+									3.46
3.17									
+	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
+								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	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							
+	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	0.	.00	0.	0.	0.	.00
ROUTED TO							
+	RDVSP1	0.	.00	0.	0.	0.	.00
3 COMBINED AT							
+	SP2	3617.	3.53	465.	118.	85.	8.33
DIVERSION TO							
+	DVSP2	0.	3.53	0.	0.	0.	8.33
HYDROGRAPH AT							
+	DSP2	3617.	3.53	465.	118.	85.	8.33
ROUTED TO							
+	RSP2EX	3610.	3.55	465.	118.	85.	8.33
+							6.41
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
+	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	0.	3.43	0.	0.	0.	.00
+	ROUTED TO RDVSP2	0.	4.62	0.	0.	0.	.00
+	3 COMBINED AT SP3	1067.	3.58	150.	38.	28.	.22

	DIVERSION TO							
+		DVSP3	0.	3.58	0.	0.	0.	.22
	HYDROGRAPH AT							
+		DSP3	1067.	3.58	150.	38.	28.	.22
	ROUTED TO							
+		RSP3EX	1064.	3.63	150.	38.	28.	.22
	3 COMBINED AT							
+		CSPEX	4652.	3.58	637.	163.	117.	8.65
	ROUTED TO							
+		R53A1	4642.	3.60	637.	163.	118.	8.65
	HYDROGRAPH AT							
+		S53A1	317.	3.28	36.	9.	6.	.18
	2 COMBINED AT							
+		C53A1	4775.	3.60	673.	172.	124.	8.84
	ROUTED TO							
+		RPIMA2	4768.	3.62	673.	172.	124.	8.84
	HYDROGRAPH AT							
+		S53A3	159.	3.18	14.	4.	3.	.07
	2 COMBINED AT							
+		CPIMA2	4808.	3.62	687.	176.	127.	8.91
	ROUTED TO							
+		RUH2B	4791.	3.63	687.	176.	127.	8.91
+								6.66
3.63								
	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
	HYDROGRAPH AT						
+	52A0	118.	3.08	7.	2.	1.	.04
	3 COMBINED AT						
+	C52A	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	0.	3.53	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP3	0.	.00	0.	0.	0.	.00
	2 COMBINED AT							
+		C52SP4	3266.	3.60	327.	83.	60.	1.59
	DIVERSION TO							
+		DVSP4	0.	3.60	0.	0.	0.	1.59
	HYDROGRAPH AT							
+		DSP4	3266.	3.60	327.	83.	60.	1.59
	ROUTED TO							
+		RSP4EX	3258.	3.63	327.	83.	60.	1.59
+								3.19
3.63								
	DIVERSION TO							
+		53HW	0.	3.63	0.	0.	0.	1.59
	HYDROGRAPH AT							
+		53PS	3258.	3.63	327.	83.	60.	1.59
	HYDROGRAPH AT							
+		S53A	225.	3.25	24.	6.	4.	.13
	2 COMBINED AT							
+		CPIMA1	3335.	3.63	351.	89.	64.	1.71
	ROUTED TO							
+		RPMA4B	3342.	3.65	351.	89.	64.	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	0.	3.50	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP	0.	3.62	0.	0.	0.	.00
+								.00
3.72								
	2 COMBINED AT							
+		CPCH1	600.	3.65	252.	65.	47.	.00
	ROUTED TO							
+		RPMA4A	600.	3.67	252.	65.	47.	.00
+								1.69
3.73								
	HYDROGRAPH AT							
+		S53A2	131.	3.12	11.	3.	2.	.05
	2 COMBINED AT							
+		CPCH2	642.	3.37	262.	67.	48.	.05
	2 COMBINED AT							
+		CPCH3	3963.	3.65	611.	156.	113.	1.77
	ROUTED TO							
+		RUH2A	3938.	3.68	611.	156.	113.	1.77
+								4.54
3.68								
	HYDROGRAPH AT							
+		S53A4	128.	3.13	11.	3.	2.	.05
	2 COMBINED AT							
+		CPCH4	3957.	3.68	621.	159.	115.	1.82
	3 COMBINED AT							
+		UHIC2	8689.	3.67	1317.	337.	243.	10.78
	HYDROGRAPH AT							
+		CPIMA3	192.	3.15	18.	5.	3.	.07

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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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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

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	437.	3.45	64.	16.	12.	.65		
+	ROUTED TO	R30N	434.	3.50	64.	16.	12.	.65	102.47	3.50
+	HYDROGRAPH AT	S31.1	128.	3.48	20.	5.	4.	.27		
+	2 COMBINED AT	C31.1	562.	3.50	85.	21.	15.	.92		
+	HYDROGRAPH AT	S34.2	222.	3.45	34.	9.	6.	.44		
+	2 COMBINED AT	C34.2	779.	3.48	119.	30.	22.	1.36		
+	HYDROGRAPH AT	S35N	485.	3.28	54.	14.	10.	.55		
+	DIVERSION TO	D35NL	218.	3.28	24.	6.	4.	.55		
+	HYDROGRAPH AT	D35NR	267.	3.28	31.	8.	6.	.55		
+	ROUTED TO	R35NR	262.	3.38	31.	8.	6.	.55	101.14	3.38
+	HYDROGRAPH AT	S36.2	126.	3.33	16.	4.	3.	.21		
+	2 COMBINED AT	C36.2	382.	3.37	47.	12.	8.	.76		
+	DIVERSION TO	D36.2L	6.	3.37	0.	0.	0.	.76		
	HYDROGRAPH AT									

+		D36.2R	376.	3.37	47.	12.	8.	.76	
	ROUTED TO								
+		R36.2R	322.	3.78	47.	12.	8.	.76	
+									101.02
3.78									
	HYDROGRAPH AT								
+		S34.1	611.	3.42	91.	23.	17.	1.17	
	2 COMBINED AT								
+		C34.1	633.	3.75	137.	35.	25.	1.93	
	2 COMBINED AT								
+		HVDB-I	1367.	3.45	256.	65.	47.	3.29	
	ROUTED TO								
+		HVDB-O	107.	6.42	104.	65.	47.	3.29	
+									2080.21
6.40									
	DIVERSION TO								
+		DO34.1	107.	.00	104.	65.	47.	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	48.	3.58	9.	2.	2.	.14	
	2 COMBINED AT								
+		C36.1	48.	3.58	9.	2.	2.	3.43	
	DIVERSION TO								
+		DO36.1	48.	.00	9.	2.	2.	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	218.	3.28	24.	6.	4.	.00	
	ROUTED TO								
+		R35NL	199.	3.67	24.	6.	4.	.00	
+									102.37
3.67									
	HYDROGRAPH AT								
+		B36.2L	6.	3.37	0.	0.	0.	.00	
	ROUTED TO								
+		R36.2L	1.	4.77	0.	0.	0.	.00	
+									100.02
4.78									
	HYDROGRAPH AT								
+		S36R1A	201.	3.68	40.	10.	7.	.63	
	4 COMBINED AT								
+		C36R1A	400.	3.67	63.	16.	12.	4.06	
	ROUTED TO								
+		R36R1A	399.	3.68	63.	16.	12.	4.06	
+									102.17
3.68									
	HYDROGRAPH AT								
+		S36R1C	27.	3.52	5.	1.	1.	.08	
	DIVERSION TO								
+		DOSR1C	27.	.00	5.	1.	1.	.08	

+	HYDROGRAPH AT	DS-R1C	0.	.00	0.	0.	0.	.08	
+	2 COMBINED AT	C36R1C	399.	3.68	63.	16.	12.	4.14	
+	DIVERSION TO	DO361C	234.	3.68	57.	15.	11.	4.14	
+	HYDROGRAPH AT	D36R1C	165.	3.68	6.	1.	1.	4.14	
+	HYDROGRAPH AT	S36R1D	153.	3.65	32.	8.	6.	.50	
+	DIVERSION TO	DOSR1D	97.	3.65	3.	1.	1.	.50	
+	HYDROGRAPH AT	DS-R1D	153.	3.65	29.	7.	5.	.50	
+	2 COMBINED AT	C36R1D	317.	3.68	35.	9.	6.	4.64	
+	ROUTED TO	R36R1D	317.	3.68	35.	9.	6.	4.64	
+									101.88
3.68									
+	HYDROGRAPH AT	S1A2F	7.	3.12	1.	0.	0.	.01	
+	2 COMBINED AT	C1A2F	318.	3.68	35.	9.	7.	4.65	
+	DIVERSION TO	DO1A2F	318.	.00	35.	9.	7.	4.65	
+	HYDROGRAPH AT	D1A2F	0.	.00	0.	0.	0.	4.65	
+	ROUTED TO	R1A2F	0.	.00	0.	0.	0.	4.65	
+									100.00
.00									
+	HYDROGRAPH AT	S1A2E	25.	3.12	2.	1.	0.	.03	
+	DIVERSION TO	DOSA2E	25.	.00	2.	1.	0.	.03	
+	HYDROGRAPH AT	DS-A2E	0.	.00	0.	0.	0.	.03	
+	2 COMBINED AT	C1A2E	0.	.00	0.	0.	0.	4.68	
+	DIVERSION TO	DO1A2E	0.	.00	0.	0.	0.	4.68	
+	HYDROGRAPH AT	D1A2E	0.	.00	0.	0.	0.	4.68	
+	ROUTED TO	R1A2E	0.	.00	0.	0.	0.	4.68	
+									100.00
.00									
+	HYDROGRAPH AT	S1A2D	13.	3.13	1.	0.	0.	.02	
+	2 COMBINED AT	C1A2D	13.	3.13	1.	0.	0.	4.70	
+	DIVERSION TO	DO1A2D	13.	.00	1.	0.	0.	4.70	
+	HYDROGRAPH AT	D1A2D	0.	.00	0.	0.	0.	4.70	

```
                ROUTED TO
+                                R1A2D      0.     .00        0.        0.        0.       4.70
+                                                                                                100.00
.00

                HYDROGRAPH AT
+                                S1A2A     39.    3.13        4.        1.        1.        .05

                DIVERSION TO
+                                DOSA2A    39.    3.25        2.        0.        0.        .05

                HYDROGRAPH AT
+                                DS-A2A    23.    3.25        2.        1.        0.        .05

                HYDROGRAPH AT
+                                S1A2B     19.    3.13        2.        0.        0.        .02

                2 COMBINED AT
+                                C1A2B     34.    3.25        4.        1.        1.        .07

                HYDROGRAPH AT
+                                S1A2C      8.    3.12        1.        0.        0.        .01

                3 COMBINED AT
+                                C1A2C     38.    3.25        4.        1.        1.       4.78

                ROUTED TO
+                                R1A2C     34.    3.27        4.        1.        1.       4.78
+                                                                                                100.53
3.27

                HYDROGRAPH AT
+                                S1A2G      3.    3.10        0.        0.        0.        .00

                2 COMBINED AT
+                                C1A2G     36.    3.27        5.        1.        1.       4.78

                DIVERSION TO
+                                DO1A2G    31.    3.27        4.        1.        1.       4.78

                HYDROGRAPH AT
+                                D1A2G      5.    3.27        1.        0.        0.       4.78

                ROUTED TO
+                                R1A2G      4.    3.32        1.        0.        0.       4.78
+                                                                                                100.10
3.32

                HYDROGRAPH AT
+                                 S1B4     16.    3.12        1.        0.        0.        .02

                DIVERSION TO
+                                DOSR1D    16.     .00        1.        0.        0.        .02

                HYDROGRAPH AT
+                                DS-1B4     0.     .00        0.        0.        0.        .02

                2 COMBINED AT
+                                 C1B4      4.    3.32        1.        0.        0.       4.80

                DIVERSION TO
+                                DO1B4      4.     .00        1.        0.        0.       4.80

                HYDROGRAPH AT
+                                 D1B4      0.     .00        0.        0.        0.       4.80

                ROUTED TO
+                                 R1B4      0.     .00        0.        0.        0.       4.80
+                                                                                                100.00
.00

                HYDROGRAPH AT
+                                 S1B3     79.    3.20        9.        2.        2.        .14

                2 COMBINED AT
+                                 C1B3     79.    3.20        9.        2.        2.       4.95

                ROUTED TO
+                                 R1B3     78.    3.22        9.        2.        2.       4.95
```

+								100.90
3.22								
	DIVERSION TO							
+		DO1B3	78.	.00	9.	2.	2.	4.95
	HYDROGRAPH AT							
+		D1B3	0.	.00	0.	0.	0.	4.95
	HYDROGRAPH AT							
+		S1B1	21.	3.13	2.	0.	0.	.03
	ROUTED TO							
+		R1B1	21.	3.15	2.	0.	0.	.03
+								100.40
3.15								
	HYDROGRAPH AT							
+		S1B2	17.	3.22	2.	1.	0.	.04
	3 COMBINED AT							
+		C1B2	36.	3.17	4.	1.	1.	5.02
	DIVERSION TO							
+		DO1B2	0.	3.17	0.	0.	0.	5.02
	HYDROGRAPH AT							
+		D1B2	36.	3.17	4.	1.	1.	5.02
	HYDROGRAPH AT							
+		DO1B3	78.	3.22	9.	2.	2.	.00
	2 COMBINED AT							
+		CD1A2G	112.	3.22	13.	3.	2.	5.02
	ROUTED TO							
+		RD1B2	110.	3.27	13.	3.	2.	5.02
+								95.83
3.27								
	HYDROGRAPH AT							
+		D1B2	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		R1B2	0.	.00	0.	0.	0.	.00
+								100.00
.00								
	DIVERSION TO							
+		DO511D	0.	.00	0.	0.	0.	.00
	HYDROGRAPH AT							
+		D51.1D	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		R51.1D	0.	.00	0.	0.	0.	.00
	HYDROGRAPH AT							
+		SEEC13	10.	3.12	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC13	10.	3.12	1.	0.	0.	.01
	ROUTED TO							
+		REEC13	9.	3.13	1.	0.	0.	.01
+								.20
3.13								
	HYDROGRAPH AT							
+		SEEC12	2.	3.08	0.	0.	0.	.00
	2 COMBINED AT							
+		CEEC12	11.	3.13	1.	0.	0.	.01
	ROUTED TO							
+		REEC12	10.	3.15	1.	0.	0.	.01
+								.22
3.15								
	HYDROGRAPH AT							
+		SEEC11	6.	3.18	1.	0.	0.	.01

	2 COMBINED AT							
+		CEEC11	16.	3.17	2.	0.	0.	.02	
	ROUTED TO							
+		REEC11	16.	3.17	2.	0.	0.	.02	
+									.33
3.17									
	HYDROGRAPH AT							
+		SEEC10	14.	3.18	1.	0.	0.	.02	
	3 COMBINED AT							
+		CEEC10	132.	3.27	16.	4.	3.	5.05	
	ROUTED TO							
+		REEC10	132.	3.27	16.	4.	3.	5.05	
+									1.16
3.27									
	HYDROGRAPH AT							
+		SEEC09	18.	3.22	2.	1.	0.	.02	
	HYDROGRAPH AT							
+		DO1B4	4.	3.32	1.	0.	0.	.00	
	3 COMBINED AT							
+		CEEC09	152.	3.27	19.	5.	3.	5.07	
	ROUTED TO							
+		REEC09	151.	3.27	19.	5.	3.	5.07	
+									1.26
3.27									
	HYDROGRAPH AT							
+		SEEC08	14.	3.47	3.	1.	0.	.03	
	2 COMBINED AT							
+		CEEC08	164.	3.28	21.	5.	4.	5.10	
	ROUTED TO							
+		REEC08	164.	3.28	21.	5.	4.	5.10	
+									1.32
3.28									
	HYDROGRAPH AT							
+		SEEC07	6.	3.12	0.	0.	0.	.01	
	2 COMBINED AT							
+		CEEC07	166.	3.28	22.	5.	4.	5.11	
	ROUTED TO							
+		REEC07	166.	3.30	22.	5.	4.	5.11	
+									1.33
3.30									
	HYDROGRAPH AT							
+		SEEC06	3.	3.12	0.	0.	0.	.00	
	2 COMBINED AT							
+		CEEC06	167.	3.30	22.	6.	4.	5.11	
	ROUTED TO							
+		REEC06	166.	3.30	22.	6.	4.	5.11	
+									1.33
3.30									
	HYDROGRAPH AT							
+		SEEC05	46.	3.30	7.	2.	1.	.07	
	HYDROGRAPH AT							
+		DO1A2D	13.	3.13	1.	0.	0.	.00	
	ROUTED TO							
+		RD1A2D	11.	3.23	1.	0.	0.	.00	
+									95.17
3.23									
	HYDROGRAPH AT							
+		DO1A2G	31.	3.27	4.	1.	1.	.00	

	2 COMBINED AT							
+		CD1A2G	42.	3.27	5.	1.	1.	.00
	ROUTED TO							
+		RD1A2G	36.	3.45	5.	1.	1.	.00
+								95.43
3.								
	3 COMBINED AT							
+		CEEC05	227.	3.35	34.	9.	6.	5.18
	DIVERSION TO							
+		37AW	227.	.00	34.	9.	6.	5.18
	HYDROGRAPH AT							
+		37AE	0.	.00	0.	0.	0.	5.18
	ROUTED TO							
+		REEC05	0.	.00	0.	0.	0.	5.18
+								.00
3.23								
	HYDROGRAPH AT							
+		SEEC04	75.	3.33	11.	3.	2.	.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	75.	3.33	11.	3.	2.	5.31
	ROUTED TO							
+		REEC04	75.	3.33	11.	3.	2.	5.31
+								.83
3.								
	HYDROGRAPH AT							
+		SEEC03	4.	3.27	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC03	79.	3.33	12.	3.	2.	5.32
	ROUTED TO							
+		REEC03	79.	3.35	12.	3.	2.	5.32
+								.85
3.35								
	HYDROGRAPH AT							
+		SEEC02	11.	3.12	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC02	82.	3.33	13.	3.	2.	5.33
	ROUTED TO							
+		REEC02	82.	3.35	13.	3.	2.	5.33
+								.88
3.35								
	HYDROGRAPH AT							
+		SEEC01	103.	3.38	17.	4.	3.	.19
	HYDROGRAPH AT							
+		DO1A2F	318.	3.68	35.	9.	7.	.00
	ROUTED TO							
+		RD1A2F	301.	3.88	35.	9.	7.	.00
+								96.60
3.88								
	3 COMBINED AT							
+		CEEC01	357.	3.88	64.	17.	12.	5.51
	ROUTED TO							
+		REEC01	350.	3.93	64.	17.	12.	5.51
+								2.03
3.93								

	HYDROGRAPH AT							
+		S37A3	84.	3.27	11.	3.	2.	.12	
	2 COMBINED AT							
+		C37A3	365.	3.93	74.	19.	14.	5.63	
	ROUTED TO							
+		R37A3	363.	3.95	74.	19.	14.	5.63	
+									2.07
3.95									
	HYDROGRAPH AT							
+		S37A2	37.	3.53	8.	2.	1.	.08	
	2 COMBINED AT							
+		C37A2	381.	3.95	82.	21.	15.	5.72	
	ROUTED TO							
+		D37A2	381.	3.95	76.	19.	14.	5.72	
+									1791.00
3.93									
	ROUTED TO							
+		R37A2	378.	3.97	76.	19.	14.	5.72	
+									2.11
3.97									
	HYDROGRAPH AT							
+		S37A1	170.	3.55	35.	9.	7.	.40	
	HYDROGRAPH AT							
+		DO361C	234.	3.62	57.	15.	11.	.00	
	ROUTED TO							
+		RD-R1C	234.	4.05	57.	15.	11.	.00	
+									96.39
4.03									
	HYDROGRAPH AT							
+		D036.1	48.	3.58	9.	2.	2.	.00	
	ROUTED TO							
+		RD36.1	43.	4.17	9.	2.	2.	.00	
+									95.50
4.17									
	HYDROGRAPH AT							
+		DO34.1	107.	6.42	104.	65.	47.	.00	
	ROUTED TO							
+		RD34.1	107.	6.87	104.	65.	47.	.00	
+									95.88
6.88									
	5 COMBINED AT							
+		C37A1	774.	3.97	265.	110.	79.	6.11	
	HYDROGRAPH AT							
+		52C13	28.	3.12	2.	1.	0.	.02	
	DIVERSION TO							
+		STORM	28.	.00	2.	1.	0.	.02	
	HYDROGRAPH AT							
+		2C13DV	0.	.00	0.	0.	0.	.02	
	HYDROGRAPH AT							
+		52C15	85.	3.12	8.	2.	1.	.05	
	HYDROGRAPH AT							
+		52C14A	77.	3.13	7.	2.	1.	.04	
	3 COMBINED AT							
+		SP1	161.	3.12	15.	4.	3.	.11	
	DIVERSION TO							
+		DVSP1	0.	3.12	0.	0.	0.	.11	
	HYDROGRAPH AT							
+		SP1EX	161.	3.12	15.	4.	3.	.11	

	ROUTED TO							
+		RSP1EX	154.	3.20	15.	4.	3.	.11
+								2.78
3.20								
	HYDROGRAPH AT							
+		39	1587.	3.35	213.	54.	39.	1.88
	HYDROGRAPH AT							
+		40	601.	3.23	60.	15.	11.	.58
	2 COMBINED AT							
+		C40	2007.	3.33	273.	69.	50.	2.47
	ROUTED TO							
+		R41	1975.	3.48	272.	69.	50.	2.47
+								2.95
3.48								
	HYDROGRAPH AT							
+		41	296.	3.50	49.	12.	9.	.83
	2 COMBINED AT							
+		C41	2270.	3.48	321.	81.	59.	3.29
	HYDROGRAPH AT							
+		42	368.	3.30	44.	11.	8.	.58
	HYDROGRAPH AT							
+		43	1087.	3.27	121.	30.	22.	1.07
	HYDROGRAPH AT							
+		44	837.	3.28	95.	24.	17.	.84
	2 COMBINED AT							
+		C44	1922.	3.27	216.	54.	39.	1.91
	ROUTED TO							
+		R45	1901.	3.33	216.	54.	39.	1.91
+								3.48
	HYDROGRAPH AT							
+		45	218.	3.17	19.	5.	3.	.20
	2 COMBINED AT							
+		C45	2015.	3.32	235.	59.	43.	2.11
	HYDROGRAPH AT							
+		45A	222.	3.20	21.	5.	4.	.17
	HYDROGRAPH AT							
+		46	1360.	3.18	111.	28.	20.	.93
	3 COMBINED AT							
+		C46	2957.	3.28	366.	92.	66.	3.21
	ROUTED TO							
+		R47	2942.	3.38	366.	92.	66.	3.21
+								3.79
3.38								
	HYDROGRAPH AT							
+		47	138.	3.62	26.	7.	5.	.38
	2 COMBINED AT							
+		C47.1	3020.	3.38	392.	99.	71.	3.58
	3 COMBINED AT							
+		C47.2	5327.	3.45	756.	191.	138.	7.46
	ROUTED TO							
+		R50	5313.	3.47	756.	191.	138.	7.46
+								3.97
3								
	HYDROGRAPH AT							
+		50	438.	3.22	42.	10.	8.	.41
	2 COMBINED AT							

+		C50	5504.	3.47	797.	201.	145.	7.87
	DIVERSION TO							
+		APEXSO	2752.	3.47	399.	101.	73.	7.87
	HYDROGRAPH AT							
+		APEXSW	2752.	3.47	399.	101.	73.	7.87
	ROUTED TO							
+		R51.2A	2743.	3.50	399.	101.	73.	7.87
+								4.25
3.50								
	HYDROGRAPH AT							
+		S51.1A	46.	3.38	7.	2.	1.	.07
	2 COMBINED AT							
+		C51.1A	2782.	3.50	405.	102.	74.	7.93
	DIVERSION TO							
+		SPT1SW	807.	3.50	117.	30.	21.	7.93
	HYDROGRAPH AT							
+		SPT1SO	1975.	3.50	288.	73.	52.	7.93
	ROUTED TO							
+		R51B9	1973.	3.52	288.	73.	52.	7.93
	HYDROGRAPH AT							
+		51B9	25.	3.13	2.	1.	0.	.02
	2 COMBINED AT							
+		C51B9	1980.	3.52	289.	73.	53.	7.96
	DIVERSION TO							
+		SPT2SW	634.	3.52	93.	23.	17.	7.96
	HYDROGRAPH AT							
+		SPT2SO	1346.	3.52	197.	50.	36.	7.96
	ROUTED TO							
+		R51B2	1339.	3.60	197.	50.	36.	7.96
	HYDROGRAPH AT							
+		51B2	46.	3.28	6.	2.	1.	.06
	2 COMBINED AT							
+		C51B2	1358.	3.60	202.	51.	37.	8.02
	ROUTED TO							
+		51B2R	1355.	3.62	202.	51.	37.	8.02
	HYDROGRAPH AT							
+		52C8	9.	3.13	1.	0.	0.	.01
	2 COMBINED AT							
+		52C8C	1357.	3.62	203.	52.	37.	8.03
	ROUTED TO							
+		52C8R	1354.	3.63	203.	52.	37.	8.03
	HYDROGRAPH AT							
+		51C3	13.	3.20	1.	0.	0.	.02
	ROUTED TO							
+		51C3R	13.	3.23	1.	0.	0.	.02
	HYDROGRAPH AT							
+		51B1	14.	3.17	1.	0.	0.	.01
	ROUTED TO							
+		51B1R	14.	3.18	1.	0.	0.	.01
	HYDROGRAPH AT							
+		52C7	7.	3.12	1.	0.	0.	.01
	3 COMBINED AT							
+		52C7C	32.	3.20	3.	1.	1.	.04
	ROUTED TO							
+		52C7R	31.	3.27	3.	1.	1.	.04

+	2 COMBINED AT	52C9C1	1365.	3.63	206.	52.	38.	8.06
+	ROUTED TO	52C9R1	1364.	3.65	206.	52.	38.	8.06
+	HYDROGRAPH AT	52C9	66.	3.20	7.	2.	1.	.07
+	2 COMBINED AT	52C9C2	1381.	3.65	212.	54.	39.	8.13
+	ROUTED TO	52C9R2	1380.	3.65	212.	54.	39.	8.13
+	HYDROGRAPH AT	51C2	34.	3.25	4.	1.	1.	.04
+	ROUTED TO	51C2R	33.	3.27	4.	1.	1.	.04
+	HYDROGRAPH AT	52C5	16.	3.15	2.	0.	0.	.02
+	2 COMBINED AT	52C5C	44.	3.23	6.	1.	1.	.06
+	ROUTED TO	52C5R	44.	3.38	6.	1.	1.	.06
+	HYDROGRAPH AT	52C6	31.	3.23	4.	1.	1.	.04
+	2 COMBINED AT	52C6C	67.	3.33	9.	2.	2.	.09
+	ROUTED TO	52C6R	67.	3.35	9.	2.	2.	.09
+	2 COMBINED AT	2C10C1	1415.	3.65	221.	57.	41.	8.23
+	ROUTED TO	2C10R1	1412.	3.65	221.	57.	41.	8.23
+	HYDROGRAPH AT	52C10	9.	3.17	1.	0.	0.	.01
+	2 COMBINED AT	2C10C2	1414.	3.65	222.	57.	41.	8.24
+	HYDROGRAPH AT	52C11	35.	3.22	4.	1.	1.	.04
+	ROUTED TO	2C11R1	35.	3.25	4.	1.	1.	.04
+	HYDROGRAPH AT	52C13D	28.	3.12	2.	1.	0.	.00
+	2 COMBINED AT	52C11C	53.	3.17	7.	2.	1.	.04
+	ROUTED TO	2C11CR	53.	3.20	7.	2.	1.	.04
+	2 COMBINED AT	2C11C2	1430.	3.65	228.	59.	42.	8.28
+	ROUTED TO	2C11R2	1429.	3.67	228.	59.	42.	8.28
+	HYDROGRAPH AT	52C12	61.	3.08	5.	1.	1.	.02
+	2 COMBINED AT	52C12C	1435.	3.67	232.	60.	43.	8.31
+	ROUTED TO	52C12R	1431.	3.68	232.	60.	43.	8.31

	HYDROGRAPH AT							
+		52C14B	38.	3.12	3.	1.	1.	.02
	HYDROGRAPH AT							
+		DVSP1	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP1	0.	.00	0.	0.	0.	.00
	3 COMBINED AT							
+		SP2	1436.	3.68	235.	61.	44.	8.33
	DIVERSION TO							
+		DVSP2	0.	3.68	0.	0.	0.	8.33
	HYDROGRAPH AT							
+		DSP2	1436.	3.68	235.	61.	44.	8.33
	ROUTED TO							
+		RSP2EX	1429.	3.72	235.	61.	44.	8.33
+								4.16
3.72								
	HYDROGRAPH AT							
+		51B3	16.	3.33	2.	1.	0.	.02
	ROUTED TO							
+		51B3R	16.	3.37	2.	1.	0.	.02
	HYDROGRAPH AT							
+		52B1	3.	3.13	0.	0.	0.	.00
	2 COMBINED AT							
+		52B1C	17.	3.35	3.	1.	0.	.03
	ROUTED TO							
+		52B1R	17.	3.40	3.	1.	0.	.03
	HYDROGRAPH AT							
+		SPT2SW	634.	3.52	93.	23.	17.	.00
	ROUTED TO							
+		R51B10	632.	3.57	93.	23.	17.	.00
	HYDROGRAPH AT							
+		51B10	22.	3.18	2.	1.	0.	.02
	2 COMBINED AT							
+		C51B10	638.	3.57	95.	24.	17.	.02
	DIVERSION TO							
+		SPT3SW	255.	3.57	38.	10.	7.	.02
	HYDROGRAPH AT							
+		SPT3SO	383.	3.57	57.	14.	10.	.02
	ROUTED TO							
+		R51B4	381.	3.63	57.	14.	10.	.02
	HYDROGRAPH AT							
+		51B4	20.	3.23	2.	1.	0.	.02
	2 COMBINED AT							
+		C51B4	388.	3.63	59.	15.	11.	.05
	ROUTED TO							
+		51B4R1	386.	3.67	59.	15.	11.	.05
	2 COMBINED AT							
+		52B2C1	395.	3.67	61.	16.	11.	.08
	ROUTED TO							
+		52B2R1	395.	3.68	61.	16.	11.	.08
	HYDROGRAPH AT							
+		52B2	22.	3.23	3.	1.	0.	.03
	2 COMBINED AT							
+		52B2C2	401.	3.68	64.	16.	12.	.11

+	ROUTED TO 52B2R2	400.	3.70	64.	16.	12.	.11
+	ROUTED TO 52B3R1	400.	3.72	64.	16.	12.	.11
+	HYDROGRAPH AT 52B3	54.	3.23	7.	2.	1.	.06
+	2 COMBINED AT 52B3C2	414.	3.72	70.	18.	13.	.17
+	ROUTED TO 52B3R2	413.	3.77	70.	18.	13.	.17
+	HYDROGRAPH AT 52B4	45.	3.13	4.	1.	1.	.03
+	2 COMBINED AT 52B4C	418.	3.77	74.	19.	14.	.20
+	ROUTED TO 52B4R	418.	3.77	74.	19.	14.	.20
+	HYDROGRAPH AT 52B5	36.	3.12	3.	1.	1.	.02
+	HYDROGRAPH AT DVSP2	0.	3.60	0.	0.	0.	.00
+	ROUTED TO RDVSP2	0.	5.32	0.	0.	0.	.00
+	3 COMBINED AT SP3	422.	3.77	76.	20.	14.	.22
+	DIVERSION TO DVSP3	0.	3.77	0.	0.	0.	.22
+	HYDROGRAPH AT DSP3	422.	3.77	76.	20.	14.	.22
+	ROUTED TO RSP3EX	420.	3.83	76.	20.	14.	.22
+	3 COMBINED AT CSPEX	1767.	3.78	325.	84.	61.	8.65
+	ROUTED TO R53A1	1764.	3.80	325.	84.	61.	8.65
+	HYDROGRAPH AT S53A1	129.	3.38	19.	5.	3.	.18
+	2 COMBINED AT C53A1	1817.	3.80	343.	89.	64.	8.84
+	ROUTED TO RPIMA2	1812.	3.82	343.	89.	64.	8.84
+	HYDROGRAPH AT S53A3	69.	3.25	8.	2.	1.	.07
+	2 COMBINED AT CPIMA2	1827.	3.82	351.	91.	66.	8.91
+	ROUTED TO RUH2B	1814.	3.87	351.	91.	66.	8.91
+							4.36
3.87							
+	HYDROGRAPH AT S53A6	30.	3.13	3.	1.	1.	.03
+	ROUTED TO RUH2C	29.	3.17	3.	1.	1.	.03
+							.46
3.17							
+	HYDROGRAPH AT S53A5	25.	3.13	2.	1.	0.	.02

	2 COMBINED AT							
+		UHIC1	54.	3.15	5.	1.	1.	.05	
	HYDROGRAPH AT							
+		SPT1SW	807.	3.50	117.	30.	21.	.00	
	ROUTED TO							
+		R51.2B	805.	3.52	117.	30.	21.	.00	
+									2.21
3.52									
	HYDROGRAPH AT							
+		S51.1B	32.	3.42	5.	1.	1.	.05	
	2 COMBINED AT							
+		C51.1B	833.	3.52	122.	31.	22.	.05	
	ROUTED TO							
+		R51.2C	831.	3.55	122.	31.	22.	.05	
+									2.25
3.55									
	HYDROGRAPH AT							
+		S51.1C	53.	3.53	9.	2.	2.	.10	
	2 COMBINED AT							
+		C51.1C	884.	3.55	131.	33.	24.	.15	
	ROUTED TO							
+		R51.2D	877.	3.62	131.	33.	24.	.15	
+									2.32
3.62									
	HYDROGRAPH AT							
+		S51.1D	427.	3.65	86.	22.	16.	.90	
	HYDROGRAPH AT							
+		D51.1D	0.	.00	0.	0.	0.	.00	
	3 COMBINED AT							
+		C51.1D	1299.	3.62	216.	55.	40.	1.05	
	DIVERSION TO							
+		STOPDV	248.	3.62	9.	2.	2.	1.05	
	HYDROGRAPH AT							
+		DETPDV	1299.	3.62	210.	53.	38.	1.05	
	ROUTED TO							
+		R52A1C	1283.	3.70	210.	53.	38.	1.05	
+									4.01
3.70									
	HYDROGRAPH AT							
+		51B8	24.	3.38	4.	1.	1.	.04	
	ROUTED TO							
+		51B8R	24.	3.58	4.	1.	1.	.04	
	HYDROGRAPH AT							
+		52A1	131.	3.18	14.	3.	3.	.13	
	2 COMBINED AT							
+		52A1C	132.	3.18	18.	4.	3.	.17	
	HYDROGRAPH AT							
+		52A0	53.	3.10	4.	1.	1.	.04	
	3 COMBINED AT							
+		C52A	1338.	3.68	229.	58.	42.	1.25	
	DIVERSION TO							
+		DV52AW	120.	3.68	10.	3.	2.	1.25	
	HYDROGRAPH AT							
+		D52AW	1218.	3.68	219.	56.	40.	1.25	
	DIVERSION TO							
+		PRSD	600.	3.68	185.	47.	34.	1.25	

HYDROGRAPH AT	PRSDEX	618.	3.68	34.	9.	6.	1.25
ROUTED TO	RC52	602.	3.78	34.	9.	6.	1.25
							2.28
HYDROGRAPH AT	51B5	4.	3.15	0.	0.	0.	.00
ROUTED TO	51B5R	4.	3.27	0.	0.	0.	.00
HYDROGRAPH AT	SPT3SW	255.	3.57	38.	10.	7.	.00
ROUTED TO	R51B6	254.	3.67	38.	10.	7.	.00
HYDROGRAPH AT	51B6	36.	3.23	4.	1.	1.	.04
2 COMBINED AT	C51B6	265.	3.67	42.	11.	8.	.04
ROUTED TO	51B6R	265.	3.68	42.	11.	8.	.04
HYDROGRAPH AT	51B7	20.	3.27	3.	1.	0.	.03
ROUTED TO	51B7R1	20.	3.28	3.	1.	0.	.03
3 COMBINED AT	51B7C	273.	3.68	45.	11.	8.	.08
ROUTED TO	51B7R2	271.	3.75	45.	11.	8.	.08
HYDROGRAPH AT	52B6	85.	3.20	9.	2.	2.	.10
2 COMBINED AT	52B6C	289.	3.75	53.	14.	10.	.17
ROUTED TO	52B6R	287.	3.83	54.	14.	10.	.17
HYDROGRAPH AT	52B7	163.	3.13	15.	4.	3.	.08
2 COMBINED AT	52B7C1	303.	3.83	67.	18.	13.	.25
HYDROGRAPH AT	52A2	137.	3.15	14.	3.	2.	.06
HYDROGRAPH AT	52B0	22.	3.12	2.	0.	0.	.02
4 COMBINED AT	52A2C2	911.	3.80	116.	30.	22.	1.59
DIVERSION TO	DV52W	0.	3.80	0.	0.	0.	1.59
HYDROGRAPH AT	D52W	911.	3.80	116.	30.	22.	1.59
HYDROGRAPH AT	DVSP3	0.	.00	0.	0.	0.	.00
ROUTED TO	RDVSP3	0.	.00	0.	0.	0.	.00
2 COMBINED AT	C52SP4	911.	3.80	116.	30.	22.	1.59
DIVERSION TO							

+		DVSP4	0.	3.80	0.	0.	0.	1.59	
	HYDROGRAPH AT							
+		DSP4	911.	3.80	116.	30.	22.	1.59	
	ROUTED TO							
+		RSP4EX	873.	3.92	116.	30.	22.	1.59	
+									2.43
3.92									
	DIVERSION TO							
+		53HW	0.	3.92	0.	0.	0.	1.59	
	HYDROGRAPH AT							
+		53PS	873.	3.92	116.	30.	22.	1.59	
	HYDROGRAPH AT							
+		S53A	91.	3.33	13.	3.	2.	.13	
	2 COMBINED AT							
+		CPIMA1	899.	3.92	129.	33.	24.	1.71	
	ROUTED TO							
+		RPMA4B	893.	3.95	129.	33.	24.	1.71	
+									2.42
3.95									
	HYDROGRAPH AT							
+		PRSD	600.	3.55	185.	47.	34.	.00	
	ROUTED TO							
+		RDPSD1	600.	3.57	185.	47.	34.	.00	
	ROUTED TO							
+		RDPSD2	600.	3.58	185.	47.	34.	.00	
	HYDROGRAPH AT							
+		DVSP4	0.	.00	0.	0.	0.	.00	
	ROUTED TO							
+		RDVSP	0.	.00	0.	0.	0.	.00	
+									.00
3.93									
	2 COMBINED AT							
+		CPCH1	600.	3.58	185.	47.	34.	.00	
	ROUTED TO							
+		RPMA4A	600.	3.67	185.	47.	34.	.00	
+									1.69
3.67									
	HYDROGRAPH AT							
+		S53A2	57.	3.17	6.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH2	612.	3.65	190.	49.	35.	.05	
	2 COMBINED AT							
+		CPCH3	1500.	3.95	317.	82.	59.	1.77	
	ROUTED TO							
+		RUH2A	1496.	3.97	317.	82.	59.	1.77	
+									2.65
3.97									
	HYDROGRAPH AT							
+		S53A4	56.	3.17	6.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH4	1502.	3.97	322.	83.	60.	1.82	
	3 COMBINED AT							
+		UHIC2	3153.	3.93	678.	176.	127.	10.78	
	HYDROGRAPH AT							
+		CPIMA3	101.	3.18	11.	3.	2.	.07	

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*                                   *
*   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

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	MAX TIME OF 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	36.	4.03	9.	2.	2.	4.64	
+									100.58
4.03									
+	HYDROGRAPH AT	S1A2F	2.	3.13	0.	0.	0.	.01	
+	2 COMBINED AT	C1A2F	36.	4.03	9.	2.	2.	4.65	
+	DIVERSION TO	DO1A2F	36.	.00	9.	2.	2.	4.65	
+	HYDROGRAPH AT	D1A2F	0.	.00	0.	0.	0.	4.65	
+	ROUTED TO	R1A2F	0.	.00	0.	0.	0.	4.65	
+									100.00
.00									
+	HYDROGRAPH AT	S1A2E	8.	3.15	1.	0.	0.	.03	
+	DIVERSION TO	DOSA2E	8.	.00	1.	0.	0.	.03	
+	HYDROGRAPH AT	DS-A2E	0.	.00	0.	0.	0.	.03	
+	2 COMBINED AT	C1A2E	0.	.00	0.	0.	0.	4.68	
+	DIVERSION TO	DO1A2E	0.	.00	0.	0.	0.	4.68	
+	HYDROGRAPH AT	D1A2E	0.	.00	0.	0.	0.	4.68	
+	ROUTED TO	R1A2E	0.	.00	0.	0.	0.	4.68	
+									100.00
.00									
+	HYDROGRAPH AT	S1A2D	4.	3.17	1.	0.	0.	.02	
+	2 COMBINED AT	C1A2D	4.	3.17	1.	0.	0.	4.70	
+	DIVERSION TO	DO1A2D	4.	.00	1.	0.	0.	4.70	
+	HYDROGRAPH AT	D1A2D	0.	.00	0.	0.	0.	4.70	

```
          ROUTED TO
+                         R1A2D      0.    .00       0.       0.       0.      4.70
+                                                                                      100.00
.00

          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      9.   3.17       1.       0.       0.      4.78

          ROUTED TO
+                         R1A2C      9.   3.18       1.       0.       0.      4.78
+                                                                                      100.19
3.18

          HYDROGRAPH AT
+                         S1A2G      1.   3.13       0.       0.       0.       .00

          2 COMBINED AT
+                         C1A2G     10.   3.18       1.       0.       0.      4.78

          DIVERSION TO
+                         DO1A2G     8.   3.18       1.       0.       0.      4.78

          HYDROGRAPH AT
+                         D1A2G      1.   3.18       0.       0.       0.      4.78

          ROUTED TO
+                         R1A2G      1.   3.22       0.       0.       0.      4.78
+                                                                                      100.03
3.22

          HYDROGRAPH AT
+                          S1B4      4.   3.17       1.       0.       0.       .02

          DIVERSION TO
+                         DOSR1D     4.    .00       1.       0.       0.       .02

          HYDROGRAPH AT
+                         DS-1B4     0.    .00       0.       0.       0.       .02

          2 COMBINED AT
+                          C1B4      1.   3.22       0.       0.       0.      4.80

          DIVERSION TO
+                         DO1B4      1.    .00       0.       0.       0.      4.80

          HYDROGRAPH AT
+                          D1B4      0.    .00       0.       0.       0.      4.80

          ROUTED TO
+                          R1B4      0.    .00       0.       0.       0.      4.80
+                                                                                      100.00
.00

          HYDROGRAPH AT
+                          S1B3     20.   3.28       3.       1.       1.       .14

          2 COMBINED AT
+                          C1B3     20.   3.28       3.       1.       1.      4.95

          ROUTED TO
+                          R1B3     20.   3.30       3.       1.       1.      4.95
+                                                                                      100.42
3.30
```

	DIVERSION TO							
+		DO1B3	20.	.00	3.	1.	1.	4.95	
	HYDROGRAPH AT							
+		D1B3	0.	.00	0.	0.	0.	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	9.	3.22	2.	0.	0.	5.02	
	DIVERSION TO							
+		DO1B2	0.	3.22	0.	0.	0.	5.02	
	HYDROGRAPH AT							
+		D1B2	9.	3.22	2.	0.	0.	5.02	
	HYDROGRAPH AT							
+		DO1B3	20.	3.30	3.	1.	1.	.00	
	2 COMBINED AT							
+		CD1A2G	29.	3.28	5.	1.	1.	5.02	
	ROUTED TO							
+		RD1B2	28.	3.37	5.	1.	1.	5.02	
+									95.37
3.37									
	HYDROGRAPH AT							
+		D1B2	0.	.00	0.	0.	0.	.00	
	ROUTED TO							
+		R1B2	0.	.00	0.	0.	0.	.00	
+									100.00
.00									
	DIVERSION TO							
+		DO511D	0.	.00	0.	0.	0.	.00	
	HYDROGRAPH AT							
+		D51.1D	0.	.00	0.	0.	0.	.00	
	ROUTED TO							
+		R51.1D	0.	.00	0.	0.	0.	.00	
	HYDROGRAPH AT							
+		SEEC13	4.	3.15	0.	0.	0.	.01	
	2 COMBINED AT							
+		CEEC13	4.	3.15	0.	0.	0.	.01	
	ROUTED TO							
+		REEC13	4.	3.17	0.	0.	0.	.01	
+									.08
3.17									
	HYDROGRAPH AT							
+		SEEC12	1.	3.10	0.	0.	0.	.00	
	2 COMBINED AT							
+		CEEC12	4.	3.17	0.	0.	0.	.01	
	ROUTED TO							
+		REEC12	4.	3.18	0.	0.	0.	.01	
+									.08
3									
	HYDROGRAPH AT							
+		SEEC11	2.	3.23	0.	0.	0.	.01	
	2 COMBINED AT							

```
+                    CEEC11      6.   3.18      1.      0.      0.      .02
          ROUTED TO
+                    REEC11      6.   3.20      1.      0.      0.      .02
+                                                                              .13
3.20

          HYDROGRAPH AT
+                    SEEC10      5.   3.23      1.      0.      0.      .02
          3 COMBINED AT
+                    CEEC10     35.   3.35      7.      2.      1.     5.05
          ROUTED TO
+                    REEC10     35.   3.37      7.      2.      1.     5.05
+                                                                              .52
3.37

          HYDROGRAPH AT
+                    SEEC09      7.   3.27      1.      0.      0.      .02
          HYDROGRAPH AT
+                     DO1B4      1.   3.22      0.      0.      0.      .00
          3 COMBINED AT
+                    CEEC09     42.   3.35      8.      2.      1.     5.07
          ROUTED TO
+                    REEC09     41.   3.38      8.      2.      1.     5.07
+                                                                              .58
3.38

          HYDROGRAPH AT
+                    SEEC08      5.   3.55      1.      0.      0.      .03
          2 COMBINED AT
+                    CEEC08     46.   3.38      9.      2.      2.     5.10
          ROUTED TO
+                    REEC08     46.   3.40      9.      2.      2.     5.10
+                                                                              .62
3.40

          HYDROGRAPH AT
+                    SEEC07      2.   3.15      0.      0.      0.      .01
          2 COMBINED AT
+                    CEEC07     46.   3.40      9.      2.      2.     5.11
          ROUTED TO
+                    REEC07     46.   3.42      9.      2.      2.     5.11
+                                                                              .63
3.42

          HYDROGRAPH AT
+                    SEEC06      1.   3.15      0.      0.      0.      .00
          2 COMBINED AT
+                    CEEC06     47.   3.42      9.      2.      2.     5.11
          ROUTED TO
+                    REEC06     46.   3.43      9.      2.      2.     5.11
+                                                                              .62
3.43

          HYDROGRAPH AT
+                    SEEC05     17.   3.37      3.      1.      1.      .07
          HYDROGRAPH AT
+                    DO1A2D      4.   3.17      1.      0.      0.      .00
          ROUTED TO
+                    RD1A2D      4.   3.27      1.      0.      0.      .00
+                                                                            95.06
3.27

          HYDROGRAPH AT
+                    DO1A2G      8.   3.18      1.      0.      0.      .00
          2 COMBINED AT
+                    CD1A2G     12.   3.20      2.      0.      0.      .00
```

	ROUTED TO							
+		RD1A2G	10.	3.55	2.	0.	0.	.00
+								95.15
3.55								
	3 COMBINED AT							
+		CEEC05	70.	3.45	14.	4.	3.	5.18
	DIVERSION TO							
+		37AW	70.	.00	14.	4.	3.	5.18
	HYDROGRAPH AT							
+		37AE	0.	.00	0.	0.	0.	5.18
	ROUTED TO							
+		REEC05	0.	.00	0.	0.	0.	5.18
+								.00
3.82								
	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	27.	3.40	5.	1.	1.	5.31
	ROUTED TO							
+		REEC04	27.	3.42	5.	1.	1.	5.31
+								.44
3.42								
	HYDROGRAPH AT							
+		SEEC03	1.	3.33	0.	0.	0.	.01
	2 COMBINED AT							
+		CEEC03	28.	3.40	6.	1.	1.	5.32
	ROUTED TO							
+		REEC03	28.	3.42	6.	1.	1.	5.32
+								.45
3.42								
	HYDROGRAPH AT							
+		SEEC02	4.	3.15	0.	0.	0.	.01
	2 COMBINED AT							
+		CEEC02	30.	3.40	6.	2.	1.	5.33
	ROUTED TO							
+		REEC02	30.	3.42	6.	2.	1.	5.33
+								.46
3.42								
	HYDROGRAPH AT							
+		SEEC01	37.	3.45	8.	2.	1.	.19
	HYDROGRAPH AT							
+		DO1A2F	36.	4.03	9.	2.	2.	.00
	ROUTED TO							
+		RD1A2F	31.	4.60	9.	2.	2.	.00
+								95.41
4.60								
	3 COMBINED AT							
+		CEEC01	67.	3.43	22.	6.	4.	5.51
	ROUTED TO							
+		REEC01	67.	3.50	22.	6.	4.	5.51
+								.77
3.50								
	HYDROGRAPH AT							

+		S37A3	31.	3.32	5.	1.	1.	.12	
	2 COMBINED AT							
+		C37A3	94.	3.38	28.	7.	5.	5.63	
	ROUTED TO							
+		R37A3	94.	3.40	28.	7.	5.	5.63	
+									.95
3.40									
	HYDROGRAPH AT								
+		S37A2	13.	3.63	4.	1.	1.	.08	
	2 COMBINED AT								
+		C37A2	106.	3.42	31.	8.	6.	5.72	
	ROUTED TO								
+		D37A2	103.	3.50	24.	6.	5.	5.72	
+									1791.00
3.50									
	ROUTED TO								
+		R37A2	98.	3.58	24.	6.	5.	5.72	
+									.98
3.58									
	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	228.	4.33	136.	46.	33.	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	0.	3.15	0.	0.	0.	.11	
	HYDROGRAPH AT								
+		SP1EX	82.	3.15	9.	2.	2.	.11	
	ROUTED TO								

+		RSP1EX	78.	3.25	9.	2.	2.	.11
+								2.20
3.25								
	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	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP1	0.	.00	0.	0.	0.	.00
	3 COMBINED AT							
+		SP2	372.	4.07	100.	26.	19.	8.33
	DIVERSION TO							
+		DVSP2	0.	4.07	0.	0.	0.	8.33
	HYDROGRAPH AT							
+		DSP2	372.	4.07	100.	26.	19.	8.33
	ROUTED TO							
+		RSP2EX	370.	4.12	100.	26.	19.	8.33
+								2.34
4.12								
	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	0.	.00	0.	0.	0.	.00
+	ROUTED TO RDVSP2	0.	.00	0.	0.	0.	.00
+	3 COMBINED AT SP3	110.	4.20	33.	9.	6.	.22
+	DIVERSION TO DVSP3	0.	4.20	0.	0.	0.	.22
+	HYDROGRAPH AT DSP3	110.	4.20	33.	9.	6.	.22
+	ROUTED TO RSP3EX	110.	4.30	33.	9.	6.	.22
+	3 COMBINED AT CSPEX	458.	4.22	141.	38.	27.	8.65
+	ROUTED TO R53A1	458.	4.25	141.	38.	27.	8.65
+	HYDROGRAPH AT S53A1	44.	3.52	9.	2.	2.	.18
+	2 COMBINED AT C53A1	473.	4.25	150.	40.	29.	8.84
+	ROUTED TO RPIMA2	473.	4.30	150.	40.	29.	8.84
+	HYDROGRAPH AT S53A3	25.	3.35	4.	1.	1.	.07
+	2 COMBINED AT CPIMA2	477.	4.30	153.	41.	30.	8.91
+	ROUTED TO RUH2B	473.	4.37	153.	41.	30.	8.91
+							2.65
4.37							
+	HYDROGRAPH AT S53A6	11.	3.17	1.	0.	0.	.03
+	ROUTED TO RUH2C	10.	3.23	1.	0.	0.	.03
+							.25
3							
+	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	
	HYDROGRAPH AT							
+		52A0	15.	3.17	1.	0.	0.	.04	
	3 COMBINED AT							
+		C52A	381.	4.07	98.	25.	18.	1.25	
	DIVERSION TO							
+		DV52AW	6.	4.07	1.	0.	0.	1.25	
	HYDROGRAPH AT							
+		D52AW	375.	4.07	97.	25.	18.	1.25	
	DIVERSION TO							
+		PRSD	375.	.00	97.	25.	18.	1.25	
	HYDROGRAPH AT							
+		PRSDEX	0.	.00	0.	0.	0.	1.25	

+	ROUTED TO RC52	0.	.00	0.	0.	0.	1.25
+							.00
5.00							
+	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	0.	.00	0.	0.	0.	.00
+	ROUTED TO RDVSP3	0.	.00	0.	0.	0.	.00
+	2 COMBINED AT C52SP4	171.	3.18	40.	11.	8.	1.59
+	DIVERSION TO DVSP4	0.	3.18	0.	0.	0.	1.59

	HYDROGRAPH AT							
+		DSP4	171.	3.18	40.	11.	8.	1.59
	ROUTED TO							
+		RSP4EX	148.	3.42	40.	11.	8.	1.59
+								1.83
3.42								
	DIVERSION TO							
+		53HW	0.	3.42	0.	0.	0.	1.59
	HYDROGRAPH AT							
+		53PS	148.	3.42	40.	11.	8.	1.59
	HYDROGRAPH AT							
+		S53A	31.	3.47	6.	2.	1.	.13
	2 COMBINED AT							
+		CPIMA1	178.	3.43	46.	12.	9.	1.71
	ROUTED TO							
+		RPMA4B	176.	3.47	46.	12.	9.	1.71
+								1.88
3.47								
	HYDROGRAPH AT							
+		PRSD	375.	4.07	97.	25.	18.	.00
	ROUTED TO							
+		RDPSD1	375.	4.07	97.	25.	18.	.00
	ROUTED TO							
+		RDPSD2	375.	4.08	97.	25.	18.	.00
	HYDROGRAPH AT							
+		DVSP4	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP	0.	.00	0.	0.	0.	.00
+								.00
3.28								
	2 COMBINED AT							
+		CPCH1	375.	4.08	97.	25.	18.	.00
	ROUTED TO							
+		RPMA4A	373.	4.13	97.	25.	18.	.00
+								1.29
4.13								
	HYDROGRAPH AT							
+		S53A2	20.	3.23	3.	1.	1.	.05
	2 COMBINED AT							
+		CPCH2	376.	4.13	99.	26.	19.	.05
	2 COMBINED AT							
+		CPCH3	434.	4.12	144.	38.	28.	1.77
	ROUTED TO							
+		RUH2A	433.	4.17	144.	38.	28.	1.77
+								1.29
4.17								
	HYDROGRAPH AT							
+		S53A4	20.	3.23	3.	1.	1.	.05
	2 COMBINED AT							
+		CPCH4	436.	4.17	147.	39.	28.	1.82
	3 COMBINED AT							
+		UHIC2	858.	4.33	302.	81.	58.	10.78
	HYDROGRAPH AT							
+		CPIMA3	47.	3.22	7.	2.	1.	.07

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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

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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
    1         ID   ********************************************************************************
    2         ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
    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_Existing_Conditions_w_wall-100yr.hc1               ***
    9         ID   ***                                                                          ***
   10         ID   ***  Client Project#:                                                       ***
   11         ID   ***  Entellus Prj#:    410.061                                             ***
   12         ID   ***  Modelers:         RAS                                                 ***
   13         ID   ***  Storm:            100-year, 6-hour                                    ***
   14         ID   ***  Development Cond: Existing Conditions With Los Gatos Wall In Place    ***
   15         ID   ***                                                                          ***
   16         ID   ***                                                                          ***
   17         ID   ***  It was decided that various flow conditions needed to be modeled.     ***
   18         ID   ***    This was to enable the best decision making in regards to the       ***
   19         ID   ***    Pima Road Channel, Deer Valley channel and Sierra Pinta Outlet.     ***
   20         ID   ***    Three scenarios will be modeled and they are as follows:            ***
   21         ID   ***                                                                        ***
   22         ID   ***    1) Existing conditions assuming the Los Gatos wall is in place.     ***
   23         ID   ***         This scenario will model the Los Gatos wall as though it      ***
   24         ID   ***         does not allow flow to cross it.  The Los Gatos entrance      ***
   25         ID   ***         will, however allow flow in, and this diversion into the      ***
   26         ID   ***         subdivision will be modeled.                                  ***
   27         ID   ***                                                                        ***
   28         ID   ***    2) Existing Conditions assuming the Los Gatos Wall is not in place.***
   29         ID   ***         This scenario will model the Los Gatos wall as though it      ***
   30         ID   ***         does not exist and all flow will be allowed to cross Pima     ***
   31         ID   ***         Rd. unimpeded along the Los Gatos subdivision boundary.       ***
   32         ID   ***                                                                        ***
   33         ID   ***    3) Proposed Conditions:                                           ***
   34         ID   ***         The proposed conditions for the design of the Pima Rd         ***
   35         ID   ***         Channel, Deer Valley Channel and the Sierra Pinta Outfall.    ***
   36         ID   ***                                                                        ***
   37         ID   ***                                                                        ***
   38         ID   ***  PIMA ROAD DIVERSION ASSUMPTIONS                                      ***
   39         ID   ***     The following assumptions were made for this model               ***
   40         ID   ***     regarding the diversion along Pima Rd:                           ***
   41         ID   ***       1) DO361C - Northeast side of Pinnacle Peak and Pima Rd.       ***
   42         ID   ***            This diversion to the west was assumed to be equal to the  ***
   43         ID   ***            capacity of the existing 2-3x4.5' box culverts.            ***
   44         ID   ***            The capacity was estimated as being 234 cfs.               ***
   45         ID   ***            Flow was diverted to the west up to the capacity of        ***
   46         ID   ***            the culvert before flow was allowed to continue            ***
   47         ID   ***            south along Pima Rd.                                       ***
   48         ID   ***                                                                       ***
   49         ID   ***       2) DO1A2F - Flow crossing Pima Rd. 1000' S. of Pinnacle Peak   ***
   50         ID   ***            Based on field observations any flow that does not         ***
   51         ID   ***            cross through the existing 2-36" culverts will            ***
   52         ID   ***            cross Pima Rd prior to the following driveway.            ***
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  53          ID   ***          Thus it was assumed that all flow crosses Pima Rd.          ***
  54          ID   ***          and heads to the west through subbasin SEEC01 at            ***
  55          ID   ***          this location.                                              ***
1                                      HEC-1 INPUT                                              PAGE  2

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

  56          ID   ***                                                                      ***
  57          ID   ***       3) DO1A2E - Flow Crossing Pima Rd. at/near E. Paraiso Dr.     ***
  58          ID   ***          Based on field observations it was determined             ***
  59          ID   ***          that all flow crosses Pima Rd. at or near                 ***
  60          ID   ***          E. Paraiso / E. Calle Buena Vista and flows               ***
  61          ID   ***          to the west through subbasin SEEC04.                      ***
  62          ID   ***                                                                    ***
  63          ID   ***       4) DO1A2D - Flow Crossing Pima Rd. north of N 91st St.       ***
  64          ID   ***          Based on field observations, it was determined that       ***
  65          ID   ***          flow from subbasin S1A2D crosses Pima Rd. and does        ***
  66          ID   ***          not continue south along Pima Rd.                         ***
  67          ID   ***                                                                    ***
  68          ID   ***       5) DO1A2G - Flow crossing Pima Rd. 250' N. of Country Club Trl ***
  69          ID   ***          This diversion accounts for the flow that crosses         ***
  70          ID   ***          Pima Rd. just south of the intersection of Pima Rd.       ***
  71          ID   ***          and 91st St.  Based on the FLO-2D Results,                ***
  72          ID   ***          it was determined that a flow split in which              ***
  73          ID   ***          approximately 87% of the flow crosses Pima Rd.            ***
  74          ID   ***          to the west and through the Pinnacle Peak Country         ***
  75          ID   ***          Club subdivision.  The diversion occurs just north        ***
  76          ID   ***          of the concentration point C1A2G, but flow from           ***
  77          ID   ***          subbasin S1A2G would be contributing to the diversion,    ***
  78          ID   ***          therefore the diversion was taken out after the           ***
  79          ID   ***          concentration point.  The remaining 13% of the flow       ***
  80          ID   ***          continues south along Pima Rd.                            ***
  81          ID   ***                                                                    ***
  82          ID   ***       6) DO1B4 - Flow crossing Pima Rd. 1000' N. of Los Gatos Dr.  ***
  83          ID   ***          It was decided for this model that the Los Gatos          ***
  84          ID   ***          wall would be modeled as though it were in place          ***
  85          ID   ***          and no flow would cross it.  Therefore no flow            ***
  86          ID   ***          crosses Pima Rd and enters the Los Gatos subdivision      ***
  87          ID   ***          at this point, instead flow travels south along Pima Rd.  ***
  88          ID   ***                                                                    ***
  89          ID   ***       7) DO1B3 - Flow along Pima Rd. north of Los Gatos Dr.        ***
  90          ID   ***          This diversion occurs along the east side of the          ***
  91          ID   ***          Los Gatos subdivision and Pima Rd. north of Los           ***
  92          ID   ***          Gatos Dr.  This diversion accounts for the flow           ***
  93          ID   ***          that enters through the Los Gatos entrance.  Based        ***
  94          ID   ***          on the FLO-2D model it was determined that all flow       ***
  95          ID   ***          from concentration point C1B3 flows along Pima Rd.        ***
  96          ID   ***          and enters through the Los Gatos entrance.  However,      ***
  97          ID   ***          the flow coming from the east (subbasins S1B1 and S1B2)   ***
  98          ID   ***          does not contribute to flow entering the subdivision      ***
  99          ID   ***          at this location.  Thus this diversion occurs after       ***
 100          ID   ***          the flow has been routed from C1B3 to the Los Gatos       ***
 101          ID   ***          entrance but before the combine with flows from the       ***
 102          ID   ***          east (C1B2).                                              ***
 103          ID   ***                                                                    ***
 104          ID   ***       8) DO1B2 - Flow arriving at the intersection of Los Gatos Dr. & ***
 105          ID   ***                Pima Rd. from the subbasins to the east: S1B2 & S1B1.***
 106          ID   ***          This diversion only considers flow arriving at the        ***
 107          ID   ***          intersection of Pima Rd. and Los Gatos Dr. from the       ***
 108          ID   ***          east via subbasins S1B2 and S1B1.  It was assumed         ***
 109          ID   ***          that all flow arriving at this intersection from the      ***
 110          ID   ***          north (route R1B3) had already crossed Pima Rd. and       ***
1                                      HEC-1 INPUT                                              PAGE  3

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

 111          ID   ***          enters the Los Gatos subdivision at Los Gatos Dr.         ***
 112          ID   ***          Based on the results of the Flo-2D analysis flow from     ***
 113          ID   ***          the east does not cross Pima Rd at this intersection,     ***
 114          ID   ***          instead, this flow crosses Los Gatos Dr. and continues    ***
 115          ID   ***          south along Pima Rd. beyond Deer Valley.  This continues  ***
 116          ID   ***          the assumption that the wall along the east side of       ***
 117          ID   ***          the Los Gatos subdivision is in place and withstands      ***
 118          ID   ***          the forces of the flood event.                            ***
 119          ID   ***                                                                    ***
 120          ID   ***       9) D51.1D - Diversion at Pima Rd. and Deer Valley            ***
 121          ID   ***          Based on field observations it was assumed that           ***
 122          ID   ***          flow along Pima Rd. at Deer Valley would not get          ***
 123          ID   ***          into the Deer Valley channel.  Therefore it was           ***
 124          ID   ***          assumed that all flow continues south along Pima Rd.      ***
 125          ID   ***                                                                    ***
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126          ID   ***      10) D52AW - Diversion at Pima Rd and Thompson Peak Parkway       ***
127          ID   ***          Modified Diversions DV52AW representing the split at         ***
128          ID   ***          Pima Rd. and Thompson Peak Parkway. This diversion           ***
129          ID   ***          represent the existing conditions and the rating curve       ***
130          ID   ***          is based on the FLO-2D results.                              ***
131          ID   ***                                                                       ***
132          ID   ***                    Total Q    West Q    South Q                       ***
133          ID   ***                        0.0       0.0        0.0                       ***
134          ID   ***                      100.0       1.0       99.0                       ***
135          ID   ***                      250.0       4.0      246.0                       ***
136          ID   ***                      375.0       6.0      369.0                       ***
137          ID   ***                      500.0      13.0      487.0                       ***
138          ID   ***                      625.0      22.0      603.0                       ***
139          ID   ***                      750.0      41.0      709.0                       ***
140          ID   ***                      875.0      63.0      812.0                       ***
141          ID   ***                     1000.0      82.0      918.0                       ***
142          ID   ***                     1125.0      96.0     1029.0                       ***
143          ID   ***                     1250.0     109.0     1141.0                       ***
144          ID   ***                     1375.0     124.0     1251.0                       ***
145          ID   ***                     1500.0     137.0     1363.0                       ***
146          ID   ***                     1750.0     161.0     1589.0                       ***
147          ID   ***                     2000.0     186.0     1814.0                       ***
148          ID   ***                     2500.0     238.0     2262.0                       ***
149          ID   ***                     2750.0     256.0     2494.0                       ***
150          ID   ***                     2875.0     259.0     2616.0                       ***
151          ID   ***                     3000.0     255.0     2745.0                       ***
152          ID   ***                     3500.0     280.0     3220.0                       ***
153          ID   ***                                                                       ***
154          ID   ***     Modifications made to model:                                      ***
155          ID   ***       1) Diversion added after C1A2G:                                 ***
156          ID   ***           This diversion was added to account for additional flow     ***
157          ID   ***           that crosses Pima Road prior to the Los Gatos subdivision.  ***
158          ID   ***           Previous assumptions were that the flow crosses Pima Rd.    ***
159          ID   ***           and is taken out at the next diversion.  This assumption    ***
160          ID   ***           was made due to the assumption that the Los Gatos Wall      ***
161          ID   ***           would not act as a flood wall and would not be modeled,     ***
162          ID   ***           thus allowing all flow to cross. Based on FLO-2D            ***
163          ID   ***           modeling results, flow crosses Pima Rd prior to the         ***
164          ID   ***           Los Gatos subdivision, and approximately 87% of the         ***
165          ID   ***           flow crosses to the west and 13% stays along Pima Rd.       ***
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LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

166          ID   ***           to the south.                                             ***
167          ID   ***                                                                     ***
168          ID   ***       2) Added Concentration Point CD1A2G:                          ***
169          ID   ***           This concentration point was added to account for the     ***
170          ID   ***           combine of route RD1A2D and the newly added diversion D1A2G.***
171          ID   ***                                                                     ***
172          ID   ***       3) Added Route RD1A2G and Modified Route RD1A2D:              ***
173          ID   ***           Route RD1A2D was modified to account for the added        ***
174          ID   ***           concentration point.  It essentially has been truncated   ***
175          ID   ***           at E. Country Club Trail.  Route RD1A2G picks up after    ***
176          ID   ***           the combine of the diversion recovery of DO1A2G and routes ***
177          ID   ***           the combined routes to Deer Valley.                       ***
178          ID   ***                                                                     ***
179          ID   ***       4) Added Diversion D1B3:                                      ***
180          ID   ***           Added a diversion D1B3 following route R1B3.  This        ***
181          ID   ***           diversion represents the flow into the Los Gatos          ***
182          ID   ***           Subdivision entrance from the north.  Through a FLO-2D    ***
183          ID   ***           analysis it was determined that the majority of the flow  ***
184          ID   ***           from C1B3crosses Pima Rd. to the west and enters the Los  ***
185          ID   ***           Gatos subdivision entrance.  The analysis also determined ***
186          ID   ***           that minimal flow from the east at the intersection of E. ***
187          ID   ***           Los Gatos Dr. crosses Pima Rd at this location, thus all  ***
188          ID   ***           flow from here was routed south along Pima Rd.            ***
189          ID   ***                                                                     ***
190          ID   ***       5) Added Concentration Point CD1B2:                           ***
191          ID   ***           Added a concentration Point CD1B2 that combines           ***
192          ID   ***           the diversion recovery Do1B3 and the diversion            ***
193          ID   ***           recovery of DO1B2.  This concentration point              ***
194          ID   ***           represents the total flow entering the Los Gatos          ***
195          ID   ***           Subdivision entrance and passing through the              ***
196          ID   ***           wall south of the entrance (if allowed):                  ***
197          ID   ***           DO1B3 (flow from the north along Pima Rd through entrance)***
198          ID   ***           and DO1B2 (flow from the east of E. Los Gatos Dr.         ***
199          ID   ***           and crossing the wall to the west).                       ***
200          ID   ***                                                                     ***
201          ID   ***                                                                     ***
202          ID   *******************************************************************************
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203          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
204          ID   ********************************************************************************
205          ID   ***                                                                          ***
206          ID   ***  Modified:          December 2008                                        ***
207          ID   ***  Project:           PIMA ROAD                                            ***
208          ID   ***  Client:            City of Scottsdale                                   ***
209          ID   ***  File Name:         2008-12_Pima_Rd_Combined_100-yr.hc1                  ***
210          ID   ***                                                                          ***
211          ID   ***  Client Project#:                                                       ***
212          ID   ***  Entellus Prj#:     410.061                                              ***
213          ID   ***  Modelers:          RAS                                                  ***
214          ID   ***  Storm:             100-year, 6-hour                                     ***
215          ID   ***  Development Cond:  Existing Conditions                                  ***
216          ID   ***                                                                          ***
217          ID   ***                                                                          ***
218          ID   ***                                                                          ***
219          ID   ***     Reasons for Modifications to model:                                  ***
220          ID   ***                                                                          ***
1                                          HEC-1 INPUT                                        PAGE  5

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

221          ID   ***       1) It was determined that the wall along Pima Rd. at              ***
222          ID   ***          Los Gatos subdivision should be considered.  Doing             ***
223          ID   ***          this requires routing flow south along Pima Rd.  This          ***
224          ID   ***          flow will cross Deer Valley Rd and not flow into the           ***
225          ID   ***          Deer Valley Channel.  To accomplish this the two (2)           ***
226          ID   ***          HEC-1 models (1. North of Deer Valley and 2. South of          ***
227          ID   ***          Deer Valley) were combined.  This model combines the           ***
228          ID   ***          two models.                                                    ***
229          ID   ***                                                                         ***
230          ID   ***                                                                         ***
231          ID   ***     Modifications made to model:                                        ***
232          ID   ***       1) The Deer Valley North and Deer Valley South models were       ***
233          ID   ***          combined.                                                      ***
234          ID   ***                                                                         ***
235          ID   ***       2) Modified Diversions D1B4 and D1B2.  It was decided that       ***
236          ID   ***          no flow will pass through the wall of Los Gatos.  This         ***
237          ID   ***          diversion has been modified to have all flow continue          ***
238          ID   ***          south along Pima Rd.                                           ***
239          ID   ***                                                                         ***
240          ID   ***       3) Removed subbasins S51.1H, S51.1G and S51.1F.                  ***
241          ID   ***          These subbasins were replaced by S51.1D which was              ***
242          ID   ***          modified slightly to include the area all the way              ***
243          ID   ***          to E. Los Gatos Dr.                                            ***
244          ID   ***                                                                         ***
245          ID   ***       4) Combined routes R1B2, R51.1H, R51.1G and extended to C51.1D. ***
246          ID   ***          This combined/extended route is called R1B2.                   ***
247          ID   ***                                                                         ***
248          ID   ***       5) Removed concentration point C51.1H, C51.1G, C51.1F,          ***
249          ID   ***          and CEEC13.                                                    ***
250          ID   ***                                                                         ***
251          ID   ***       6) Modified NSTPS for all necessary routes.                     ***
252          ID   ***          Some of the modified NSTPS were for routes taken directly     ***
253          ID   ***          from other models.  The routes taken from other models       ***
254          ID   ***          that were updated include: R41, R45, R47, R50.               ***
255          ID   ***          Other modified NSTPS routes that were nodified are:          ***
256          ID   ***          RD-R1C, RD36.1, RD34.1, RSP1EX, R51.2A, RSP2EX, RUH2B,       ***
257          ID   ***          RUH2C, R51.2B, R51.2C, R51.2D, R1B2, R52A1C, RC52, RSP4EX,   ***
258          ID   ***          RPMA4B, RDVSP, RPMA4A, RUH2A                                 ***
259          ID   ***                                                                         ***
260          ID   ********************************************************************************
261          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
262          ID   ********************************************************************************
263          ID
264          ID
265          ID   --------------------------------------------------------------------------
266          ID   |//////////////////////////////////////////////////////////////////////////|
267          ID   |============== BEGIN DEER VALLEY NORTH IDENTIFICATION CARDS ==============|
268          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
269          ID   |--------------------------------------------------------------------------|
270          ID   |PROJECT:                PIMA ROAD DRAINAGE IMPROVEMENTS:                  |
271          ID   |                         (DEER VALLEY TO PINNACLE PEAK)                   |
272          ID   |                                                                          |
273          ID   |CLIENT:                 City of Scottsdale                                |
274          ID   |PREPARED BY:            Entellus, Inc.                                    |
275          ID   |PROJECT No:                                        Entellus 410.061A      |
1                                          HEC-1 INPUT                                        PAGE  6

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
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276          ID   |FILE NAME: PIMA_II-100y6h-ex.hc1        CREATED DATE: SEP 14, 2005          |
277          ID   |                                       MODIFIED DATE: OCT 18, 2005          |
278          ID   |                                                                            |
279          ID   |STORM:                                                                      |
280          ID   |                      100-year 6-hour Storm                                 |
281          ID   |                                                                            |
282          ID   |DEVELOPMENT CONDITIONS:                                                     |
283          ID   |                      Existing Conditions                                   |
284          ID   |                                                                            |
285          ID   |MODELING ASSUMPTIONS:                                                       |
286          ID   |                      The Model base was taken directly from the "Pima      |
287          ID   |                      Road Three Basins" project as performed by Stantec    |
288          ID   |                      for the City of Scottsdale: file name FU1100-6.IH1,   |
289          ID   |                      revised on 01-20-99 by MCG.                           |
290          ID   |                                                                            |
291          ID   |                      To reflect existing developed conditions, percent     |
292          ID   |                      impervious was increased.                             |
293          ID   |                                                                            |
294          ID   |                      It was assumed that for all basins that were not      |
295          ID   |                      subdivided, that the UK and RK records, as used by    |
296          ID   |                      Stantec were correct.                                 |
297          ID   |                                                                            |
298          ID   |                      It was assumed that the Happy Valley Detention Basin, |
299          ID   |                      which does not currently exist, was in place and      |
300          ID   |                      designed to at least meet the 10% design performed    |
301          ID   |                      by Stantec.                                           |
302          ID   |                                                                            |
303          ID   |                                                                            |
304          ID   |MODELING METHODS:                                                           |
305          ID   |                      Field verification was conducted to determine the     |
306          ID   |                      existing path of flow routes through the study area.  |
307          ID   |                      This field verification occured on 10-14-2005         |
308          ID   |                      and included all portions of the study area along     |
309          ID   |                      Pima Rd south of Happy Valley Rd.                     |
310          ID   |                                                                            |
311          ID   |                      Normal Depth Routing was utilized for all new routes. |
312          ID   |                                                                            |
313          ID   |                      Kinematic wave was utilized for all subdivided basins.|
314          ID   |                                                                            |
315          ID   |----------------------------------------------------------------------------|
316          ID   |////////////////////////////////////////////////////////////////////////////|
317          ID   |=============== END DEER VALLEY NORTH IDENTIFICATION CARDS ================|
318          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
319          ID   ------------------------------------------------------------------------------
320          ID
321          ID
322          ID
323          ID   ------------------------------------------------------------------------------
324          ID   |////////////////////////////////////////////////////////////////////////////|
325          ID   |============== BEGIN DEER VALLEY SOUTH IDENTIFICATION CARDS ===============|
326          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
327          ID   |----------------------------------------------------------------------------|
328          ID   ******************************************************************************
329          ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
330          ID   ******************************************************************************
1                                        HEC-1 INPUT                                    PAGE  7

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

331          ID   ***                                                                        ***
332          ID   ***  Modified:          NOVEMBER 2008                                     ***
333          ID   ***  Project:           PIMA ROAD                                         ***
334          ID   ***  Client:            City of Scottsdale                                ***
335          ID   ***  File Name:         2008-11_Deer_Valley_to_Thompson_                  ***
336          ID   ***                      Peak-Modifications_100-yr.hc1                     ***
337          ID   ***  Client Project#:                                                      ***
338          ID   ***  Entellus Prj#:     410.061                                           ***
339          ID   ***  Modelers:          RAS                                               ***
340          ID   ***  Storm:             100-year, 6-hour                                  ***
341          ID   ***  Development Cond:   Existing Conditions                               ***
342          ID   ***                                                                        ***
343          ID   ***                                                                        ***
344          ID   ***     Reasons for Modifications to model:                                ***
345          ID   ***                                                                        ***
346          ID   ***       1) A small portion of the Pima Road corridor is not included     ***
347          ID   ***          in either this HEC-1 model or the model for the area          ***
348          ID   ***          between Pinnacle Peak and Deer Valley Rd.  The area in        ***
349          ID   ***          question is between Deer Valley and Sierra Pinta and is       ***
350          ID   ***          along the west side of Pima Rd.                               ***
351          ID   ***                                                                        ***
352          ID   ***                                                                        ***
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353          ID   ***     Modifications made to model:                                    ***
354          ID   ***                                                                     ***
355          ID   ***         1) Added subbasin 52A0 (west side of Pima Rd between        ***
356          ID   ***            Deer Valley and Thompson Peak Parkway).  The subbasin    ***
357          ID   ***            cards utilized are as follows:                           ***
358          ID   ***              KK 52A0     SUB                                        ***
359          ID   ***              KM       RUNOFF FROM SUB-BASIN 52A0                    ***
360          ID   ***              BA0.0369                                               ***
361          ID   ***              LS            85                                       ***
362          ID   ***              UK   100   .2300     .20     100                      ***
363          ID   ***              RK  2500   .2300    .045            TRAP      20       8 ***
364          ID   ***                                                                     ***
365          ID   ***         2) Added subbasin 52B0 (west side of Pima Rd between        ***
366          ID   ***            Thompson Peak Parkway and Sierra Pinta ).  The subbasin  ***
367          ID   ***            cards utilized are as follows:                           ***
368          ID   ***              KK 52B0     SUB                                        ***
369          ID   ***              KM       RUNOFF FROM SUB-BASIN 52B0                    ***
370          ID   ***              BA0.0188                                               ***
371          ID   ***              LS            83                                       ***
372          ID   ***              UK   100   .2300     .20     100                      ***
373          ID   ***              RK  2500   .2300    .045            TRAP      20       8 ***
374          ID   ***                                                                     ***
375          ID   ***         3) Modified concentration point C52A to include the        ***
376          ID   ***            newly added subbasin 52A0.  changed HC=2 to HC=3         ***
377          ID   ***                                                                     ***
378          ID   ***         4) Modified concentration point 52A2C2 to include the      ***
379          ID   ***            newly added subbasin 52B0.  changed HC=3 to HC=4         ***
380          ID   ***                                                                     ***
381          ID   ***         5) Corrected roughness coefficient for subbasins S53A5      ***
382          ID   ***            and CPIMA3.  Modified value from 0.013 to 0.13.          ***
383          ID   ***                                                                     ***
384          ID   *******************************************************************************
385          ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
1                                    HEC-1 INPUT                                          PAGE  8

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

386          ID   *******************************************************************************
387          ID
388          ID
389          ID
390          ID
391          ID   *******************************************************************************
392          ID   ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
393          ID   *******************************************************************************
394          ID   ***                                                                     ***
395          ID   ***  Modified:          October 2008                                   ***
396          ID   ***  Project:           Sierra Pinta Storm Drain Outlet                ***
397          ID   ***  Client:            City of Scottsdale                             ***
398          ID   ***  File Name:         2008-10_Sierra-Pinta-Modifications.hc1         ***
399          ID   ***  Client Project#:                                                  ***
400          ID   ***  Entellus Prj#:     410.061                                        ***
401          ID   ***  Modelers:          RAS                                            ***
402          ID   ***  Storm:             100-year, 6-hour                               ***
403          ID   ***  Development Cond: Existing Conditions                             ***
404          ID   ***                                                                     ***
405          ID   ***                                                                     ***
406          ID   ***     Modifications made to model:                                    ***
407          ID   ***                                                                     ***
408          ID   ***         1) The assumed Sierra Pinta Channel was removed from the    ***
409          ID   ***            model.  This entailed the modification of diversions:    ***
410          ID   ***               - DVSP1                                               ***
411          ID   ***               - DVSP2                                               ***
412          ID   ***               - DVSP3                                               ***
413          ID   ***            These diversions were modified to allow 0.01 cfs to flow to***
414          ID   ***            the alignment of the currently unconstructed channel. The  ***
415          ID   ***            value was set at 0.01 cfs due to errors with the Kinematic ***
416          ID   ***            wave routing when there is 0 cfs in the routing reach.     ***
417          ID   ***                                                                     ***
418          ID   ***         2) The assumption that 2-60" inlet pipes to the Pima Rd      ***
419          ID   ***            stormdrain exists North of Thompson Peak Parkway was     ***
420          ID   ***            maintained.  Additionally, there are other inlets,       ***
421          ID   ***            48" inlets in 2 locations, as well as numerous curb      ***
422          ID   ***            inlets.  It was assumed that the pipe capcity was met.   ***
423          ID   ***            This was done by modifiying diversion PRSDEX to the      ***
424          ID   ***            capacity of 600cfs.                                      ***
425          ID   ***                                                                     ***
426          ID   ***         3) There is a small weir diversion on the west portion of   ***
427          ID   ***            Pima channel where flow overtops the wall.  This only    ***
428          ID   ***            occurs under high flow conditions, and the weir flow     ***
429          ID   ***            out of the system is relatively small.  There is no      ***
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430         ID   ***            other flow out of the system besides what was discussed    ***
431         ID   ***            previously between Thompson Peak and Sierra Pinta.         ***
432         ID   ***            Therefore the diversion at Sierra Pinta out of the         ***
433         ID   ***            system was removed.  This was done by modifying diversion  ***
434         ID   ***            D52W and setting equal to 0.                               ***
435         ID   ***                                                                       ***
436         ID   *************************************************************************
437         ID   ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
438         ID   *************************************************************************
439         ID
440         ID
1                                        HEC-1 INPUT                                    PAGE  9

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

441         ID
442         ID   *************************************************************************
443         ID   **
444         ID   **                        FINAL HYDROLOGY REPORT
445         ID   **                  Pima Road Design Concept Report
446         ID   **       from Thompson Peak Parkway to the Pima Freeway (PRDCR)
447         ID   **
448         ID   **
449         ID   *************************************************************************
450         ID   Project: Pima Road Design Concept Report (PRDCR)
451         ID   Client: City of Scottsdale
452         ID   Prepared By: Entellus Inc.                    Modelers: J.S. and C.L.
453         ID   Project Number: #2003-114-COS                 Entellus 410.061
454         ID   File Name: EBASE                              Created 01/16/2004
455         ID   Storm: 100 year 6 hour
456         ID   Development Conditions: Existing as of Fall 2003, WITH SIERRA PINTA
457         ID                                                 CHANNEL TO SP1
458         ID   Original Model by ROBERT L. WARD, P.E., CONSULTING ENGINEER
459         ID
460         ID   Original MODEL file DB53RFD5.6I CREATED ON 5/30/02, INCLUDED WOOD PATEL'S
461         ID   MODEL OF DC RANCH DATED 1/1996
462         ID
463         ID   NOTE: Entellus developed this model in order to design the following:
464         ID
465         ID   1) Pima Realignment Structure#1 (New Bridge at Pima, south of Hualapai)
466         ID   2) Pima Realignment Structure#2 (Existing Bridge at Downing Olsen and Pima)
467         ID   3) Pima Drainage Channel from 84" storm drain outlet north of Hualapai-
468         ID      to Union Hills Interceptor Channel
469         ID   4) Union Hills Interceptor Channel from New Pima Alignment to future-
470         ID      channel west of the existing Pima Road Alignment
471         ID
472         ID   *************************************************************************
473         ID   **  The changes listed below were made to the Ward and
474         ID   **             DC Ranch models by Entellus in
475         ID   **         order to develop the hydrology for the PRCDR.
476         ID   *************************************************************************
477         ID   ** 1)The split at Reata Apex was modeled as 50-50 and apex flows routed
478         ID   **    through DC Ranch per existing conditions as of Fall 2003.
479         ID   ** 2)Basins 51B and 51C were subdivided in order to model split flows
480         ID   **    occuring below the apex. 51B was divided into 51B1 through 51B10.
481         ID   **    51C was divided into 51C1 throught 51C3.
482         ID   **    The split flows labeled SPLIT1 through SPLIT3 route flow south
483         ID   **    through DC Ranch.
484         ID   ** 3)Diversions into a channel along Sierra Pinta were included per COS
485         ID   **    even though the channel does not exist at the time of this model.
486         ID   **    2200 cfs capacity assumed.
487         ID   ** 4)The existing Pima Road Storm Drain system that is currently functional
488         ID   **    from Thompson Peak Pkwy to Haulapai Road was added to the model.
489         ID   ** 5)Basin S53A1 was modified in order to determine flow at key points
490         ID   **    along the project alignment.
491         ID   **    The basin was subdivided into S53A1 through S53A6
492         ID   ** 6)Curve numbers and % impervious in DC Ranch were increased to 75
493         ID   **    and 27% in order to reflect developed conditions,
494         ID   **    in previously undeveloped watersheds. These values match those
495         ID   **    used by Wood-Patel in adjacent developed areas.
1                                        HEC-1 INPUT                                    PAGE 10

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

496         ID   ** 7)The 50-50 Diversion of flow west of Pima Road modeled by Ward
497         ID   **    at Hualapai was set to zero because the Pima Rd Channel will
498         ID   **    itntercept these flows.
499         ID   ** 8)Line by line changes by Entellus are noted within the model
500         ID   **
501         ID   *************************************************************************
502         ID
```

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ID    **********************************************************************
ID    **  The changes below are Ward's changes to his previous model
ID    **  as listed by Ward. The changes were made in order
ID    **  to develop the model DB53RFD5, which was created to design the
ID    **  detention basin 53R.
ID    **********************************************************************
ID    **
ID    ** STAGE-STORAGE DATA FOR DB53R HAS BEEN REVISED TO REFLECT NEW BRW DATA
ID    ** PROVIDED ON 4/20/02.
ID    **
ID    **STAGE-DISCHARGE DATA HAS BEEN REVISED TO REFLECT LEVEL OUTLET CHANNELS
ID    **
ID    **
ID    ** to THE INVERT ELEVATIONS OF THE PIMA FREEWAY CULVERT INLETS, MAY 2002
ID    **
ID    ** REATA PASS DRAINAGE NETWORK INSERTED IN-PLACE OF HDR UD RECORD
ID    ** REATA PASS CURVE NUMBERS HAVE BEEN ADJUSTED TO 6-HOUR VALUES
ID    **
ID    ** DETENTION BASIN DESIGN MODEL
ID    **
ID    ** ALL CORE NORTH/SOUTH CURVE NUMBERS HAVE BEEN SET TO 77.
ID    **
ID    **********************************************************************
ID   |----------------------------------------------------------------------|
ID   |//////////////////////////////////////////////////////////////////////|
ID   |=============== END DEER VALLEY SOUTH IDENTIFICATION CARDS ============|
ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
ID   ----------------------------------------------------------------------
ID
ID
ID
IT       1                    2000
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 ***
* ************************************************************************
*
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

536       KK    S30N
537       KM     RUNOFF FROM SUBBASIN 30N
538       KM        ARF BASED ON 14 SQ MILE WATERSHED, WHICH INCLUDES REATA PASS.
539       BA  0.6518
540       PH             14      .74    1.46    2.48    2.79     3.0     3.4
541       LS             82       13              82      13
542       UK     300   0.350    0.13      20
543       UK     300   0.050    0.13      80
544       RK    1550   0.069   0.045  0.0096    TRAP       0      12
545       RK   10520   0.038   0.040            TRAP      15      15
          *
546       KK    R30N
547       KM     NORMAL DEPTH CHANNEL ROUTE FROM C30N TO C31.1 THROUGH PIMA CHANNEL
548       RS       8    FLOW      -1
549       RC   0.022   0.022   0.022    2470    0.01
```

```
550          RX    1000    1012    1020    1028    1036    1044    1052    1064
551          RY     107     104     102     100     100     102     104     107
             *

552          KK   S31.1
553          KM     RUNOFF FROM SUBBASIN 31.1
554          BA  0.2663
555          LS            76.6      13            76.6      13
556          UK     300   0.567    0.13      10
557          UK     300   0.050    0.13      90
558          RK    1950   0.056   0.045  0.0147    TRAP       0      10
559          RK    7600   0.035   0.040            TRAP      22       8
             *

560          KK   C31.1
561          KM     COMBINE ROUTED HYDROGRAPH FROM S30N WITH RUNOFF FROM SUBBASIN 31.1
562          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
             *

563          KK   S34.2
564          KM     RUNOFF FROM SUBBASIN 34.2
565          KM        RAINFALL LOSSES FOR GREINER SUBBASINS 31.2 AND 34.1 ARE WEIGHTED BY AREA
566          BA  0.4441
567          LS            77.3      12            77.3      12
568          UK      50    0.10    0.13      10
569          UK     300   0.040    0.13      90
570          RK    2200  0.0452   0.045  0.0538    TRAP       0      10
571          RK    8150  0.0386   0.045            TRAP       0      10
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

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

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

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

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

597          KK   S36.2
598          KM     RUNOFF FROM SUBBASIN 36.2
599          BA  0.2087
600          LS            76.6      13            76.6      13
601          UK     300   0.580    0.13       5
602          UK     300   0.100    0.13      95
```

```
 603          RK    1800   0.036   0.045  0.0145    TRAP      10       10
 604          RK    3520   0.028   0.040             TRAP      20        6
              *

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

 608          KK  D36.2R
 609          KM     DIVERSION AT DESERT HIGHLANDS DRIVE
 610          KM        RIGHT BRANCH, AT GOLF CART CROSSING IS ROUTED TO C34.1
 611          KM        LEFT BRANCH (CODED ON DQ RECORD) IS ROUTED TO C36R1
 612          DT  D36.2L
 613          DI       0      36     166     288     360     430     538     681     859    1074
1                                        HEC-1 INPUT                                          PAGE 13

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

 614          DQ       0       0       0       0       0      18      60     123     208     315
              *

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

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

 635          KK   C34.1
 636          KM     COMBINE ROUTED HYDROGRAPH FROM C36.2 W/RUNOFF FROM SUBBASIN 34.1
 637          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.  *
              * ********************************************************************************
              *

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

 641          KK  HVDB-O
 642          KM     DETENTION BASIN AT HAPPY VALLEY ROAD - NONREGULATORY STRUCTURE
 643          KM        PRINCIPAL SPILLWAY:  42" x 800' RCP WITH A SLOPE OF 0.5%
 644          KM        11 ACRE-FEET OF STORAGE FOR SEDIMENTAION
 645          RS       1    STOR      -1
 646          SV       0     0.2     0.7     1.8     3.4     5.4    36.3    89.1   151.2   225.3
 647          SV   241.0
 648          SE    2065    2066    2067    2068    2069    2070    2075    2080    2085    2090
 649          SE    2091
 650          SQ       0      10      20      30      40      50      60      70      80      90
 651          SQ     100     110     120     130     140
 652          SE  2065.0 2066.47 2067.13 2067.67 2068.14 2068.58 2069.04 2071.26 2073.33 2075.68
1                                        HEC-1 INPUT                                          PAGE 14

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

 653          SE  2078.3 2081.19 2084.37 2087.82 2091.54
              *
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654          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.      *
             *  ************************************************************************
655          DT  DO34.1
656          DI       0    5000
657          DQ       0    5000
             *

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

664          KK   S36.1
665          KM     RUNOFF FROM SUBBASIN 36.1
666          BA  0.1394
667          LS           73.4      11
668          UK     300  0.0420   0.130     100
669          RK    2330  0.0320   0.045  0.0134    TRAP      10      30
670          RK    3200  0.0270   0.040            TRAP      20      30
             *

671          KK   C36.1
672          KM     COMBINE ROUTED HYDROGRAPH FROM C34.1 WITH RUNOFF FROM SUBBASIN 36.1
673          HC       2
             *

674          KK   D36.1
675          KM   ************************************************************************
676          KM   * ENTELLUS COMMENT: BASED ON A FIELD VISIT ON 10-14-2005, IT WAS DETERMINED *
677          KM   * ENTELLUS COMMENT: THAT BASED ON EXISTING CONDITIONS, ALL FLOW CROSSES     *
678          KM   * ENTELLUS COMMENT: PIMA RD EITHER JUST NORTH R JUST SOUTH OF              *
679          KM   * ENTELLUS COMMENT: E. De La O Rd. AND ENTERS THE PINNACLE PEAK ESTATES     *
680          KM   * ENTELLUS COMMENT: SUBDIVISION.  IT WAS ASSUMED THAT ALL FLOW ENTERS      *
681          KM   * ENTELLUS COMMENT: BASIN S37A1.                                          *
682          KM   ************************************************************************
683          DT  DO36.1
684          DI       0    5000
685          DQ       0    5000
             *
1                                        HEC-1 INPUT                                    PAGE 15

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

686          KK   R36.1
687          KM       NORMAL DEPTH CHANNEL ROUTE FROM C36.1 TO C36R1 THROUGH PIMA CHANNEL
688          RS       6    FLOW      -1
689          RC   0.022   0.022   0.022    1520    0.01
690          RX    1000    1012    1020    1028    1036    1044    1052    1064
691          RY     107     104     102     100     100     102     104     107
             *
             *

692          KK   B35NL
693          KM     BRING BACK DIVERTED HYDROGRAPH FROM C35N
694          DR   D35NL
             *

695          KK   R35NL
696          KM     NORMAL DEPTH CHANNEL ROUTE FROM S35N TO C36R1
697          KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
698          RS      44    FLOW      -1
699          RC    0.06    0.04    0.06   14480  0.0318
700          RX    1000    1040    1080    1086    1091    1097    1137    1174
701          RY     105     104     103     100     100     103     104     105
             *

702          KK  B36.2L
703          KM     BRING BACK DIVERTED HYDROGRAPH FROM C36.2
```

```
704           DR  D36.2L
              *
705           KK  R36.2L
706           KM     NORMAL DEPTH CHANNEL ROUTE FROM C36.2 TO C36R1
707           KM        SOURCE: 1993 MAPPING (2' CI) PROVIDED BY COS
708           RS      33     FLOW      -1
709           RC    0.06     0.04     0.06   10160  0.0342
710           RX    1000     1030     1060    1066    1076    1082    1112    1142
711           RY     103    102.5      102     100     100     102   102.5     103
              *
712           KK  S36R1A
713           KM     RUNOFF FROM SUBBASIN 36R1A
714           KM        RAINFALL LOSSES FOR GREINER SUBBASINS 36.3, 36R1 AND 35R ARE AREA WEIGHT
715           BA  0.6310
716           LS            74.3      10
717           UK     300   0.020   0.130     100
718           RK    1420   0.032   0.045  0.0061    TRAP       0      13
719           RK   10800   0.033   0.040            TRAP      10       9
              *
720           KK  C36R1A
721           KM   ********************************************************************************
722           KM   * ENTELLUS COMMENT: EXISTING CONDITIONS OF C36R1A WAS CHANGED FROM A HARD   *
723           KM   * ENTELLUS COMMENT: CODED AREA OF 4.0530 SQMILES TO 1.3914 SQMILES           *
724           KM   * ENTELLUS COMMENT:   PREVIOUS MODEL:                                       *
725           KM   * ENTELLUS COMMENT:     (C36.1 + S36R1 + S35N*40% + C36.2*30%)(A=4.0530)    *
726           KM   * ENTELLUS COMMENT:   EXISTING CONDITIONS:                                 *
1                                          HEC-1 INPUT                                                PAGE 16

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

727           KM   * ENTELLUS COMMENT:     (C36.1*0% + S36R1  + S35N*40% + C36.2*30%)(A=1.3914)*
728           KM   * ENTELLUS COMMENT:       A =   0 + 0.6310 + 0.2193   + 0.5411    =  1.3914 *
729           KM   ********************************************************************************
730           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**ENTELLUS** ***
              * ********************************************************************************
              * ***                         BEGIN ENTELLUS MODIFICATIONS                       ***
              * ********************************************************************************
              * *** ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS**ENTELLUS** ***
              * ********************************************************************************
              *
731           KK  R36R1A
732           KM     NORMAL DEPTH CHANNEL ROUTE FROM C36R1A TO C36R1C THROUGH PIMA CHANNEL
733           KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
734           RS       3     FLOW      -1
735           RC   0.022    0.022    0.022     830  0.0157
736           RX    1000     1012     1020    1028    1036    1044    1052    1064
737           RY     107      104      102     100     100     102     104     107
              *
738           KK  S36R1C
739           KM     ORIGINAL BASIN S36R1B WAS SUBDIVIDED INTO S36R1C & S36RID
740           BA  0.0793
741           LS            74.3      10
742           UK     300   0.020   0.130     100
743           RK    4600   0.032   0.045            TRAP      10      18
              *
744           KK  DS-R1C
745           KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE ALONG PIMA RD
746           KM   AS SEEN DURING A FIELD VISIT ON 10-14-2005.  THE DIMENSIONS OF THE 2 BASINS
747           KM   WERE APPROXIMATED AS BEING L=240', W=70' D=5'.  THESE WERE VERIFIED THROUGH
748           KM   AERIAL PHOTOGRAPHY.  THE TOTAL POSSIBLE STORAGE VOLUME IS APPROXIMATED AS
749           KM   BEING 3.86 ACRE-FT (1.93 ACRE-FT EACH).  IT IS ASSUMED THAT ALL BASIN FLOW
750           KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
751           DT  DOSR1C    3.86
```

```
752          DI    1000
753          DQ    1000
             *
1                                        HEC-1 INPUT                                        PAGE 17

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


754          KK  C36R1C
755          HC       2
             *
             *

756          KK  D36R1C
757          KM   DIVERTS FLOW WEST ACROSS PIMA ROAD JUST NORTH OF PINNACLE PEAK
758          KM   THROUGH 2-3x4.5" BOXES JUST NORTH OF PINNACLE PEAK
759          KM        DS INVERT~1982.5'
760          KM        ~2' OF HEAD ABOVE TOP OF BOX OPENING.
761          KM   ALL FLOW GOES THROUGH CULVERT UNTIL CAPACITY IS REACHED AT WHICH
762          KM   POINT FLOW IS ASSUMED TO GO SOUTH ALONG THE EAST SIDE OF PIMA ROAD.
763          KM   CAPACITY IS ESTIMATED TO BE 234 CFS.
764          DT  DO361C
765          DI       0     234     500    5000
766          DQ       0     234     234     234
             *
             * TOO SHORT TO ROUTE (~200')
             * KKR36R1C
             *

767          KK  S36R1D
768          BA  0.5049
769          LS            74.3      10
770          UK     300   0.020   0.130     100
771          RK   10500   0.036   0.045           TRAP      10      18
             *

772          KK  DS-R1D
773          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
774          KM   THE PRELIMINARY DRAINAGE REPORT FOR LA MIRADA PINNALCLE PEAK/ PIMA
775          KM   SHOPPING CENTER #7DR-95. BASED ON FIELD OBSERVATIONS THE TOTAL ACTUAL
776          KM   STORAGE IS SLIGHTLY LARGER THAN 4.5 ACRE-FT.  STORAGE IS DIVIDED INTO 3
777          KM   RETENTIN BASINS. 2 OF THESE BASINS (3.86 TOTAL ACRE-FT) WERE TAKEN OUT AT
778          KM   S36R1C. A BASIN AT THE NE CORNER OF PINNACLE PEAK AND PIMA WITH APPROXIMATE
779          KM   DIMENSIONS OF L=200', W=70', D=5'AND STORAGE CAPACITY OF 1.61 ACRE-FT
780          KM   ATTENUATES THE FLOW FROM BASIN S36R1D. IT IS ASSUMED THAT ALL BASIN FLOW
781          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
782          DT  DOSR1D    1.61
783          DI    1000
784          DQ    1000
             *

785          KK  C36R1D
786          HC       2
             *

787          KK  R36R1D
788          KM     NORMAL DEPTH CHANNEL ROUTE FROM C36R1D TO C1A2F THROUGH PIMA CHANNEL
789          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
790          RS       2    FLOW      -1
791          RC   0.022   0.022   0.022     530  0.0188
792          RX    1000    1012    1020    1028    1036    1044    1052    1064
793          RY     107     104     102     100     100     102     104     107
             *
1                                        HEC-1 INPUT                                        PAGE 18

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


794          KK   S1A2F
795          BA  0.0086
796          LS             72      20
797          UK     100   0.045   0.130     100
798          RK     750   0.026   0.017           TRAP      14       7
             *

799          KK   C1A2F
800          KM   COMBINES R36R1D AND S1A2F
801          HC       2
             *

802          KK   D1A2F
```

```
803          KM   BASED ON FIELD OBSERVATIONS FLOW THAT DOES NOT CROSS PIMA RD
804          KM   THROUGH THE 2-36" CULVERTS AT C1A2F WILL CROSS PRIOR TO THE
805          KM   FOLLOWING DRIVEWAY.  THUS IT WAS ASSUMED THAT ALL EXISTING CONDTIONS FLOW
806          KM   CROSSES PIMA  RD AT C1A2F INTO BASIN SEEC01.
807          DT  DO1A2F
808          DI       0    5000
809          DQ       0    5000
             *

810          KK   R1A2F
811          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
812          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
813          RS       3    FLOW      -1
814          RC   0.022   0.022   0.022     820  0.0195
815          RX    1000    1012    1020    1028    1036    1044    1052    1064
816          RY     107     104     102     100     100     102     104     107
             *

817          KK   S1A2E
818          BA  0.0295
819          LS              72      20
820          UK     100   0.045   0.130     100
821          RK    1400   0.029   0.017            TRAP      14       7
             *

822          KK  DS-A2E
823          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
824          KM   THE PRELIMINARY DRAINAGE REPORT FOR DESERT VILLAGE RETAIL CENTER #1365
825          KM   THE TOTAL VOLUME TO STORED IS 3.18 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
826          KM   STORAGE WILL OCCUR IN BASIN S1A2E BECAUSE THE MAJORITY OF THE COMPLEX IS
827          KM   LOCATED WITHIN THIS BASIN.  IT IS ASSUMED THAT ALL BASIN FLOW ENTERS THE
828          KM   RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
829          DT  DOSA2E    3.18
830          DI    1000
831          DQ    1000
             *
1                                        HEC-1 INPUT                                    PAGE 19

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

832          KK   C1A2E
833          HC       2
             *

834          KK   D1A2E
835          KM   BASED ON FIELD OBSERVATIONS ALL FLOW CROSSES PIMA RD AT PARAISO DR.
836          DT  DO1A2E
837          DI       0    5000
838          DQ       0    5000
             *

839          KK   R1A2E
840          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
841          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
842          RS       1    FLOW      -1
843          RC   0.022   0.022   0.022     350  0.0198
844          RX    1000    1012    1020    1028    1036    1044    1052    1064
845          RY     107     104     102     100     100     102     104     107
             *

846          KK   S1A2D
847          BA  0.0158
848          LS              72      20
849          UK     100   0.045   0.130     100
850          RK    2000   0.032   0.017            TRAP      14       7
             *

851          KK   C1A2D
852          KM   COMBINES R1A2E AND S1A2D
853          HC       2
             *

854          KK   D1A2D
855          KM   BASED ON A FIELD VISIT IT WAS DETERMINED THAT THE FLOW FROM BASIN S1A2D
856          KM   CROSSES PIMA ROAD, AND DOES NOT FLOW SOUTH ALONG PIMA ROAD.
857          DT  DO1A2D
858          DI       0    5000
859          DQ       0    5000
             *
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```
860          KK   R1A2D
861          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2F TO C1A2E THROUGH PIMA CHANNEL
862          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
863          RS       1    FLOW      -1
864          RC   0.022   0.022   0.022     225  0.0177
865          RX    1000    1012    1020    1028    1036    1044    1052    1064
866          RY     107     104     102     100     100     102     104     107
             *
1                                        HEC-1 INPUT                                    PAGE 20

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

867          KK   S1A2A
868          BA  0.0474
869          LS              72      20
870          UK     100   0.045   0.130     100
871          RK    2200   0.029   0.017             TRAP      14       7
             *

872          KK  DS-A2A
873          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
874          KM   THE PRELIMINARY DRAINAGE REPORT FOR MIRAGE VILLAGE #25-DR-96.
875          KM   THE TOTAL VOLUME TO STORED IS 0.81 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
876          KM   STORAGE WILL OCCUR IN BASIN S1A2A.  IT IS ASSUMED THAT ALL BASIN FLOW
877          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
878          DT  DOSA2A    0.81
879          DI    1000
880          DQ    1000
             *
             * TOO SHORT TO ROUTE (~400')
             * KK R1A2A
             *

881          KK   S1A2B
882          BA  0.0231
883          LS              72      20
884          UK     100   0.045   0.130     100
885          RK    2100   0.031   0.017             TRAP      14       7
             *

886          KK   C1A2B
887          KM   COMBINES R1A2A AND S1A2B
888          HC       2
             *
             * TOO SHORT TO ROUTE (~200')
             * KK R1A2B
             *

889          KK   S1A2C
890          BA  0.0091
891          LS              72      20
892          UK     100   0.045   0.130     100
893          RK    1000   0.031   0.017             TRAP      14       7
             *

894          KK   C1A2C
895          KM   COMBINES R1A2D, R1A2C AND S1A2B
896          HC       3
             *

897          KK   R1A2C
898          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2C TO C1A2G THROUGH PIMA CHANNEL
899          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
900          RS       1    FLOW      -1
901          RC   0.022   0.022   0.022     450  0.0225
902          RX    1000    1012    1020    1028    1036    1044    1052    1064
1                                        HEC-1 INPUT                                    PAGE 21

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

903          RY     107     104     102     100     100     102     104     107
             *

904          KK   S1A2G
905          BA  0.0038
906          LS              72      20
907          UK     100   0.045   0.130     100
908          RK     500   0.027   0.017             TRAP      14       7
             *
```

```
909          KK   C1A2G
910          KM   COMBINES R1A2C AND S1A2G
911          HC       2
             *
             * ***************************************************** *
             * ********** Begin Modifications July 16 2009 ********** *
             * ***************************************************** *

912          KK   D1A2G
913          KM   This diversion was added to account for additional flow that crosses Pima
914          KM   Road prior to the Los Gatos subdivision.  Previous assumptions were that
915          KM   the flow crosses Pima Rd. and is taken out at the next diversion.  This
916          KM   assumptions was made due toe the assumption that the Los Gatos Wall would
917          KM   not act as a flood wall and would not be modeled, thus allowing all flow
918          KM   to cross.
919          KM   Based on FLO-2D modeling results, flow crosses Pima Rd prior to the
920          KM   Los gatos subdivision, and approximately 87% of the flow crosses to the
921          KM   west and 13% stays along Pima Rd. to the south.
922          DT  DO1A2G
923          DI       0   10000
924          DQ       0    8700
             * ***************************************************** *
             * *********** End Modifications July 16 2009 *********** *
             * ***************************************************** *
             *
             *

925          KK   R1A2G
926          KM     NORMAL DEPTH CHANNEL ROUTE FROM C1A2G TO C1B4 THROUGH PIMA CHANNEL
927          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
928          RS       2    FLOW      -1
929          RC   0.022   0.022   0.022     600   0.021
930          RX    1000    1012    1020    1028    1036    1044    1052    1064
931          RY     107     104     102     100     100     102     104     107
             *

932          KK    S1B4
933          BA  0.0238
934          LS              72      12
935          UK     100   0.045   0.100     100
936          RK    1400   0.028   0.017            TRAP      15       7
             *
```



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

937          KK  DS-1B4
938          KM   THIS DIVERSION IS UTILIZED TO ACCOUNT FOR THE STORAGE CALCULATED FROM
939          KM   THE PRELIMINARY DRAINAGE REPORT FOR CANADA VISTAS WP#93075
940          KM   THE TOTAL VOLUME TO STORED IS 1.67 ACRE-FT.  IT WAS ASSUMED THAT ALL THE
941          KM   STORAGE WILL OCCUR IN BASIN S1B4.  IT IS ASSUMED THAT ALL BASIN FLOW
942          KM   ENTERS THE RETENTION BASIN UNTIL FULL, AND THEN ALL FLOW PASSES THROUGH.
943          DT  DOSR1D    1.67
944          DI    1000
945          DQ    1000
             *

946          KK    C1B4
947          KM   COMBINES R1A2G AND S1B4
948          HC       2
             *
             *  ---------------------------------------------------------------------------
             *  |/////////////////////////////////////////////////////////////////////////|
             *  |=============== BEGIN DEER VALLEY NORTH MODEL MODIFICATIONS ===============|
             *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
             *  |-------------------------------------------------------------------------|

949          KK    D1B4
950          KM   THROUGH A FIELD VISIT IT WAS DETERMINED THAT ALL THE FLOW CROSSES PIMA RD
951          KM   BY THIS POINT, THEREFORE ALL FLOW WAS ROUTED ACROSS PIMA RD AT THIS POINT
952          KM
953          KM   MODIFIED: It was decided that no flow will pass through the wall of
954          KM   MODIFIED: Los Gatos.  This diversion has been modified to have all flow
955          KM   MODIFIED: continue south along Pima Rd.
956          DT   DO1B4
957          DI       0    5000
958          DQ       0       0
             * DQ     0    5000 * ORIGINAL DQ CARD
             *  |-------------------------------------------------------------------------|
             *  |/////////////////////////////////////////////////////////////////////////|
```

```
*  |================ END DEER VALLEY NORTH MODEL MODIFICATIONS ================|
*  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
*  ------------------------------------------------------------------------------
*

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
*

KK    S1B3
BA  0.1438
LS              72      12
UK     100   0.045   0.100     100
RK    6300   0.030   0.017             TRAP      15       7
*
```



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

KK    C1B3
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
*

KK    D1B3
KM   This is the assumed flow diversion into the Los Gatos subdivision entrance
DT   DO1B3
DI       0   10000
DQ       0   10000
*

KK    S1B1
BA  0.0319
LS              72      12
UK     100   0.045   0.100     100
RK    1800   0.034   0.017             TRAP      15       7
*

KK    R1B1
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       2    FLOW      -1
RC   0.022   0.022   0.022     500  0.0256
RX    1000    1012    1020    1028    1036    1044    1052    1064
RY     107     104     102     100     100     102     104     107
*

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

KK    C1B2
KM   COMBINES R1B3, R1B1 AND S1B2
HC       3
*
*  ------------------------------------------------------------------------------
*  |//////////////////////////////////////////////////////////////////////////////|
*  |================ BEGIN DEER VALLEY NORTH MODEL MODIFICATIONS ================|
*  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
*  |------------------------------------------------------------------------------|
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
```

```
1006          KK    D1B2
1007          KM   THROUGH A FIELD VISIT IT WAS DETERMINED THAT ALL THE FLOW CROSSES PIMA RD
1008          KM   BY THIS POINT, THEREFORE ALL FLOW WAS ROUTED ACROSS PIMA RD AT THIS POINT
1009          KM
1010          KM   MODIFIED: It was decided that no flow will pass through the wall of
1011          KM   MODIFIED: Los Gatos.  This diversion has been modified to have all flow
1012          KM   MODIFIED: continue south along Pima Rd.  This was done by changing the
1013          KM   MODIFIED: order of the cards.
1014          DT   DO1B2
1015          DI       0    5000
1016          DQ       0    5000
              *

1017          KK   DO1B3
1018          DR   DO1B3
              *

1019          KK  CD1A2G
1020          HC       2
              *

1021          KK   RD1B2
1022          KM   Moved route from the diversion recovery to this point in model
1023          RS       6    FLOW      -1
1024          RC   0.035   0.035   0.035    1900  0.0270
1025          RX      50     100   107.5     115     135   142.5     150     200
1026          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

1027          KK    D1B2
1028          KM   RECOVERS DIVERSION FROM C1B2
1029          KM   Diversion recovery moved due to combining of models
1030          DR   DO1B2
              *

1031          KK    R1B2
1032          KM   THIS X-SECTION WAS ASSUMED FOR THIS SHORT ROUTE TO PIMA CHANNEL
1033          KM     NORMAL DEPTH CHANNEL ROUTE FROM S1B1 TO C1B2 THROUGH PIMA CHANNEL
1034          KM   THIS ROUTE X-SECTION WAS TAKEN FROM THE STANTEC MODEL
1035          KM
1036          KM   Route moved to follow diversion recovery.  Modified length to 1250 feet
              * RC 0.022   0.022   0.022    1500  0.0280
1037          RS       4    FLOW      -1
1038          RC   0.022   0.022   0.022    1250  0.0280
1039          RX    1000    1012    1020    1028    1036    1044    1052    1064
1040          RY     107     104     102     100     100     102     104     107
              *

1041          KK  D51.1D
1042          KM   This is the split at Deer Valley and Pima Roads.
1043          KM   This split was determined based on the existing conditions.
1044          KM   It was assumed that all flow under existing conditions would continue
1045          KM   south along Pima RD.
1046          DT  DO511D
1047          DI       0   10000
1048          DQ       0   10000
              *

1049          KK  R51.1D
1050          KM   This routes flow from the proposed diversion structure at PIMA Rd
1051          KM   and Deer Valley to the Deer Valley Channel.
1052          KM   The route utilized under previous versions of the model was called R51.1F
1053          KM
1054          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1055          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1056          RS       2    FLOW      -1
1057          RC    0.03    0.03    0.03     640    0.01
1058          RX    1000    1016    1026    1030    1050    1054    1064    1080
1059          RY       6       2       2       0       0       2       2       6
              *

1060          KK  SEEC13
1061          BA  0.0091
1062          LS              74    24.8
1063          UK      61  0.0213   0.100     100
```

```
1064          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.
1                                        HEC-1 INPUT                                        PAGE

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


1065          KK  CEEC13
1066          KM   re-added Combine for Deer Valley Split
1067          HC       2
              *
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *  *-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
              *

1068          KK  REEC13
1069          KM   DEER VALLEY CHANNEL
1070          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1071          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1072          RS       1    FLOW      -1
1073          RC    0.03    0.03    0.03     120    0.01
1074          RX       0      16      26      30      50      54      64      80
1075          RY       6       2       2       0       0       2       2       6
              *
              *

1076          KK  SEEC12
1077          BA  0.0013
1078          LS              74    24.8
1079          UK      61  0.0213   0.100     100
1080          RK     300   0.034   0.045            TRAP       5      15
              *

1081          KK  CEEC12
1082          HC       2
              *

1083          KK  REEC12
1084          KM   DEER VALLEY CHANNEL
1085          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1086          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1087          RS       1    FLOW      -1
1088          RC    0.03    0.03    0.03     160    0.01
1089          RX       0      16      26      30      50      54      64      80
1090          RY       6       2       2       0       0       2       2       6
              *
              *

1091          KK  SEEC11
1092          BA  0.0071
1093          LS              74    24.8
1094          UK      61  0.0213   0.100     100
1095          RK    1200   0.028   0.045            TRAP      10      50
              *
1                                        HEC-1 INPUT                                        PAGE 27

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


1096          KK  CEEC11
1097          HC       2
              *

1098          KK  REEC11
1099          KM   DEER VALLEY CHANNEL
1100          KM   THIS ROUTE WAS TAKEN FROM THE GRAHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1101          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1102          RS       1    FLOW      -1
1103          RC    0.03    0.03    0.03     110    0.01
1104          RX       0      16      26      30      50      54      64      80
1105          RY       6       2       2       0       0       2       2       6
              *
              *

1106          KK  SEEC10
1107          BA  0.0161
```

```
1108          LS              74    24.8
1109          UK      61  0.0213   0.100     100
1110          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 ================|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ------------------------------------------------------------------------------

1111          KK  CEEC10
1112          HC       3
              *

1113          KK  REEC10
1114          KM   DEER VALLEY CHANNEL
1115          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1116          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1117          RS       1    FLOW      -1
1118          RC    0.03    0.03    0.03     150    0.01
1                                    HEC-1 INPUT                                          PAGE 28

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

1119          RX       0      16      26      30      50      54      64      80
1120          RY       6       2       2       0       0       2       2       6
              *
              *

1121          KK  SEEC09
1122          BA  0.0234
1123          LS              74    24.8
1124          UK      61  0.0213   0.100     100
1125          RK    2500   0.028   0.045            TRAP      10      15
              *

1126          KK   DO1B4
1127          KM   RECOVERS DIVERSION FROM C1B4
1128          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
              *

1129          KK  CEEC09
1130          HC       3
              *

1131          KK  REEC09
1132          KM   DEER VALLEY CHANNEL
1133          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1134          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1135          RS       1    FLOW      -1
1136          RC    0.03    0.03    0.03     350    0.01
1137          RX       0      16      26      30      50      54      64      80
1138          RY       6       2       2       0       0       2       2       6
              *
              *

1139          KK  SEEC08
1140          BA  0.0293
```

```
1141          LS              74    24.8
1142          UK      61  0.0213   0.100     100
1143          RK    3100   0.027  0.045            TRAP      10      15
              *

1144          KK  CEEC08
1145          HC       2
              *

1146          KK  REEC08
1147          KM   DEER VALLEY CHANNEL
1148          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1149          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1150          RS       1    FLOW      -1
1151          RC    0.03    0.03    0.03     310    0.01
1                                      HEC-1 INPUT                                    PAGE 29

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

1152          RX       0      16      26      30      50      54      64      80
1153          RY       6       2       2       0       0       2       2       6
              *
              *

1154          KK  SEEC07
1155          BA  0.0054
1156          LS              74    24.8
1157          UK      61  0.0213   0.100     100
1158          RK     500   0.028   0.045            TRAP       0     100
              *

1159          KK  CEEC07
1160          HC       2
              *

1161          KK  REEC07
1162          KM   DEER VALLEY CHANNEL
1163          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1164          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1165          RS       1    FLOW      -1
1166          RC    0.03    0.03    0.03     200    0.01
1167          RX       0      16      26      30      50      54      64      80
1168          RY       6       2       2       0       0       2       2       6
              *
              *

1169          KK  SEEC06
1170          BA  0.0024
1171          LS              74    24.8
1172          UK      61  0.0213   0.100     100
1173          RK     400   0.025   0.045            TRAP       0     100
              *

1174          KK  CEEC06
1175          HC       2
              *

1176          KK  REEC06
1177          KM   DEER VALLEY CHANNEL
1178          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1179          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1180          RS       1    FLOW      -1
1181          RC    0.03    0.03    0.03     390    0.01
1182          RX       0      16      26      30      50      54      64      80
1183          RY       6       2       2       0       0       2       2       6
              *
              *

1184          KK  SEEC05
1185          BA  0.0725
1186          LS              74    24.8
1187          UK      61  0.0213   0.100     100
1188          RK    4300   0.025   0.045            TRAP      20      15
              *
1                                      HEC-1 INPUT                                    PAGE 30

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

1189          KK  DO1A2D
1190          KM   RECOVERS FLOW FROM C1A2D
```

```
1191          DR  DO1A2D
              *
              * ***************************************************** *
              * ********** Begin Modifications July 16 2009 ********** *
              * ***************************************************** *

1192          KK  RD1A2D
1193          KM   This route was shortened to account for the addition of the diverted
1194          KM   flow from C1A2G.  The route is later continued as RD1A2G.
1195          RS       3    FLOW      -1
1196          RC   0.035   0.035   0.035    1040  0.0251
1197          RX      50     100   107.5     115     135   142.5     150     200
1198          RY     101     100    97.5      95      95    97.5     100     101
              *

1199          KK  DO1A2G
1200          KM   This recovers the diversion from Pima Rd. just north of the
1201          KM   north Los Gatos property edge.
1202          DR  DO1A2G
              *

1203          KK  CD1A2G
1204          KM   This combines RD1A2D and the recovered diversion DO1A2G
1205          HC       2
              *

1206          KK  RD1A2G
1207          KM   This route is the continuation of RD1A2D and carries the flow
1208          KM   to the Deer valley Channel
1209          RS      12    FLOW      -1
1210          RC   0.035   0.035   0.035    3610  0.0251
1211          RX      50     100   107.5     115     135   142.5     150     200
1212          RY     101     100    97.5      95      95    97.5     100     101
              * ***************************************************** *
              * ************ End Modifications July 16 2009 ************ *
              * ***************************************************** *
              *

1213          KK  CEEC05
1214          HC       3
              *
              *
1215          KM   ********************************************************************************
1216          KM   * ENTELLUS COMMENT: EXISTING CONDITIONS OF AT DV CHANNEL AND GOLF           *
1217          KM   * ENTELLUS COMMENT: COURSE MODIFIED TO SHOW EXISTING CONDITIONS, EASTERN    *
1218          KM   * ENTELLUS COMMENT: CHANNEL EMPTIES THROUGH THE CULVERT INTO THE GOLF       *
1219          KM   * ENTELLUS COMMENT: COURSE AND THERE IS NO DIVERSION ALONG DEER VALLEY.     *
1220          KM   ********************************************************************************
              *
```



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


1221          KK    37AE
1222          DT    37AW
1223          DI       0   10000
1224          DQ       0   10000
              *
              *
              * 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
*
*

KK  REEC05
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       1    FLOW      -1
RC    0.03    0.03    0.03     440    0.01
RX       0      16      26      30      50      54      64      80
RY       6       2       2       0       0       2       2       6
*
*

KK  SEEC04
BA  0.1265
LS              74    24.8
UK      61  0.0213   0.100     100
RK    5600   0.022   0.045            TRAP      10      15
*
```

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

KK  DO1A2E
KM   RECOVERS FLOW CROSSING FLOW AT PARAISO DR.
DR  DO1A2E
*

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

KK  CEEC04
HC       3
*

KK  REEC04
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       1    FLOW      -1
RC    0.03    0.03    0.03     140    0.01
RX       0      16      26      30      50      54      64      80
RY       6       2       2       0       0       2       2       6
*
*

KK  SEEC03
BA  0.0057
LS              74    24.8
UK      61  0.0213   0.100     100
RK    1600   0.023   0.045            TRAP      10      50
*

KK  CEEC03
HC       2
*

KK  REEC03
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       1    FLOW      -1
RC    0.03    0.03    0.03     320    0.01
RX       0      16      26      30      50      54      64      80
RY       6       2       2       0       0       2       2       6
*
*
```

1 HEC-1 INPUT PAGE

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

KK  SEEC02
```

```
1272          BA  0.0105
1273          LS              74    24.8
1274          UK      61  0.0213   0.100     100
1275          RK     700   0.022   0.045            TRAP      10      50
              *

1276          KK  CEEC02
1277          HC       2
              *

1278          KK  REEC02
1279          KM   DEER VALLEY CHANNEL
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       1    FLOW      -1
1283          RC    0.03    0.03    0.03     150    0.01
1284          RX       0      16      26      30      50      54      64      80
1285          RY       6       2       2       0       0       2       2       6
              *
              *

1286          KK  SEEC01
1287          BA  0.1869
1288          LS              74    24.8
1289          UK      61  0.0213   0.100     100
1290          RK    6600   0.022   0.045            TRAP      20      15
              *

1291          KK  DO1A2F
1292          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT C1A2F
1293          DR  DO1A2F
              *

1294          KK  RD1A2F
1295          RS      23    FLOW      -1
1296          RC   0.035   0.035   0.035    6900  0.0218
1297          RX      50     100   107.5     115     135   142.5     150     200
1298          RY     101     100    97.5      95      95    97.5     100     101
              *

1299          KK  CEEC01
1300          HC       3
              *

1301          KK  REEC01
1302          KM   DEER VALLEY CHANNEL
1303          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1304          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1305          RS       4    FLOW      -1
1306          RC    0.03    0.03    0.03    1260    0.01
1307          RX       0      16      26      30      50      54      64      80
1308          RY       6       2       2       0       0       2       2       6
              *
              *
```



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

1309          KK   S37A3
1310          BA  0.1211
1311          LS              74    24.8
1312          UK      61   .0213    .10     100
1313          RK    3400   0.024   .045            TRAP      10      50
              *

1314          KK   C37A3
1315          HC       2
              *

1316          KK   R37A3
1317          KM   DEER VALLEY CHANNEL
1318          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1319          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1320          RS       2    FLOW      -1
1321          RC    0.03    0.03    0.03     600    0.01
1322          RX       0      16      26      30      50      54      64      80
1323          RY       6       2       2       0       0       2       2       6
              *
              *
```

```
1324          KK   S37A2
1325          BA  0.0842
1326          LS              74     24.8
1327          UK      61    .0213      .10      100
1328          RK    6100    0.023     .045             TRAP       10       50
              *

1329          KK   C37A2
1330          HC       2
              *
              *

1331          KK  D37A2
1332          KM   This is stage-Storage-Discharge for the Deer Valley Detention Basin along
1333          KM   the grayhawk property. The elevation and area data are based on survey
1334          KM   conducted in April of 2009 by Entellus.  It is an online retention basin
1335          KM   and no outlet was found by survey.  If one exists it is at this time buried.
1336          KM   It was assumed that all flow enters the basin, and once the basin is
1337          KM   full flow will bypass the basin without additional storage occuring.
1338          KM   Storage volume was calculated utilizing the conic method.
1339          RS       1    STOR
1340          SV       0    0.04    0.23    0.37    1.33    2.12    3.02    4.04 4.04001
1341          SQ       0  0.0001  0.0002  0.0003  0.0004  0.0005  0.0006  0.0007   10000
1342          SE    1784    1785    1786    1787    1788    1789    1790    1791 1791.01
              *
              *
1                                        HEC-1 INPUT                                    PAGE 35

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

1343          KK   R37A2
1344          KM   DEER VALLEY CHANNEL
1345          KM   THIS ROUTE WAS TAKEN FROM THE GRAYHAWK VILLAGES 2 AND 3 COMPOSITE MODEL
1346          KM   FILE NAME: GH23E1K.H1I, ROUTE NAMED "R14R"
1347          RS       2    FLOW      -1
1348          RC    0.03    0.03    0.03     650    0.01
1349          RX       0      16      26      30      50      54      64      80
1350          RY       6       2       2       0       0       2       2       6
              *

1351          KK   S37A1
1352          BA  0.3955
1353          LS              74     24.8
1354          UK      61    .0213      .10      100
1355          RK    9000    0.022     .045             TRAP       10       50
              *

1356          KK  DO361C
1357          DR  DO361C
              *

1358          KK  RD-R1C
1359          RS       26    FLOW      -1
1360          RC   0.035   0.035   0.035    9100  0.0212
1361          RX       50     100   107.5     115     135   142.5     150     200
1362          RY      101     100    97.5      95      95    97.5     100     101
              *

1363          KK  D036.1
1364          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT De La O RD
1365          DR  DO36.1
              *

1366          KK  RD36.1
1367          RS       30    FLOW      -1
1368          RC   0.035   0.035   0.035   10700  0.0226
1369          RX       50     100   107.5     115     135   142.5     150     200
1370          RY      101     100    97.5      95      95    97.5     100     101
              *
              *

1371          KK  DO34.1
1372          KM   RECOVERS FLOW THAT CROSSES PIMA RD AT HAPPY VALLEY INTERSECTION
1373          DR  DO34.1
              *

1374          KK  RD34.1
1375          RS       37    FLOW      -1
1376          RC   0.035   0.035   0.035   13300  0.0218
1377          RX       50     100   107.5     115     135   142.5     150     200
```

```
1378          RY     101     100    97.5      95      95    97.5     100     101
              *
1                                        HEC-1 INPUT                                        PAGE 36

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


1379          KK   C37A1
1380          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
              * ************************************************************************

1381          KK   52C13
1382          KM   RUNOFF FROM SUBBASIN 52C13
1383          BA    .023
1384          LS             75      31
1385          UK     100     .02     .10     100
1386          RK     950    .040    .045            TRAP      30      10
              *
1387          KK  2C13DV
1388          KM   DIVERT FIRST 40 CFS INTO STORM DRAIN; REMAINDER FLOWS OVER ROAD
1389          DT   STORM
1390          DI       0      40    1000
1391          DQ       0      40      40
              *
1392          KK  52C13R
1393          KM   ROUTE 52C13 THROUGH SUBBASIN 52C15 TO CP 52C15C1
1394          RK    1800    .035    .045            TRAP      10      10
              *
1                                        HEC-1 INPUT                                        PAGE 37

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


1395          KK   52C15
1396          KM   RUNOFF FROM SUBBASIN 52C15
1397          BA    .046
1398          LS             75    64.4
1399          UK     100     .02     .10     100
1400          RK    2050    .036    .045            TRAP      30      10
              *
1401          KK  52C14A
1402          KM   RUNOFF FROM SUBBASIN 52C14A
1403          BA    .041
1404          LS             75    67.7
1405          UK     100     .02     .10     100
1406          RK    2050    .031    .045            TRAP      30      10
              *
1407          KK     SP1
1408          KM   COMBINE 52C14A, 52C15 AND 52C13R AT BEGINNING OF SIERRA PINTA CHANNEL
1409          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 *
                *  ***************************************************************************
                *
1410            KK   SP1EX     DIV
1411            KM   This was modified to reflect existing conditions: no sierra Pinta Channel
                * 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.
1412            DT   DVSP1
                * DI     0     100     200     500    2200   10000
                * DQ     0     100     200     500    2200    2200
                *
                *
1413            DI       0   10000
1414            DQ       0    0.01
                *
                *  ***************************************************************************
                *  **       END     *       END     *       END     *       END     *       END     *
                *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
                *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
                *  ***************************************************************************
                *
1                                          HEC-1 INPUT                                          PAGE 38

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


1415            KK  RSP1EX
1416            KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
1417            KM   THROUGH PIMA ACRES, EAST OF 92ND
1418            KM   Modified x-section 12/2008
1419            RS       7    FLOW      -1
1420            RC   0.055    0.04   0.055    2310   .0264
1421            RX       0       5      10   12.25    12.5      15      19    23.5
1422            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
                *
                * ***************************************************************************
                *
                *

1423            KK      39     SUB
1424            KM        RUNOFF FROM SUB-BASIN 39
1425            BA  1.8807
1426            LS           87.7
1427            UK     330   .0433     .20     100
1428            RK   11240   .0253    .045            TRAP      30       3

1429            KK      40     SUB
1430            KM        RUNOFF FROM SUB-BASIN 40
1431            BA   .5844
1432            LS            86
1433            UK     160   .0627     .20     100
1434            RK    7000   .0350    .045            TRAP      20       3

1435            KK     C40
1436            KM        COMBINE HYDROGRAPHS SUB 39 & SUB 40
1437            HC       2

1438            KK     R41
1439            KM        ROUTE C40 TO D.S. END OF SUB 41
1440            RS      26    FLOW      -1
1441            RC    .055    .040    .055    9400   .0282
1442            RX       0       1     101     107     157     163     263     264
1443            RY      10       8       3       0       0       3       8      10

1444            KK      41     SUB
```

```
1445          KM         RUNOFF FROM SUB-BASIN 41
1446          BA    .8270
1447          LS             77.8
1448          UK      280    .2386      .20      100
1449          RK     9400    .0282     .045             TRAP       50        3
```



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

1450          KK      C41
1451          KM         COMBINE HYDROGRAPHS R41 & SUB 41
1452          HC        2

1453          KK       42      SUB
1454          KM         RUNOFF FROM SUB-BASIN 42
1455          BA    .5844
1456          LS             81.1
1457          UK      280    .2386      .20      100
1458          RK     8750    .0573     .045             TRAP       20        3

1459          KK       43      SUB
1460          KM         RUNOFF FROM SUB-BASIN 43
1461          BA   1.0665
1462          LS             87.7
1463          UK      260    .0515      .20      100
1464          RK     7400    .0255     .045             TRAP       25        3

1465          KK       44      SUB
1466          KM         RUNOFF FROM SUB-BASIN 44
1467          BA    .8389
1468          LS             87.7
1469          UK      260    .0515      .20      100
1470          RK     9840    .0622     .045             TRAP       25        3

1471          KK      C44
1472          KM         COMBINE HYDROGRAPHS SUB 43 & SUB 44
1473          HC        2

1474          KK      R45
1475          KM         ROUTE C44 TO D.S. END OF SUB 45
1476          RS       10     FLOW       -1
1477          RC     .055     .040     .055     3600    .0366
1478          RX        0        1      101      107      137      143      243      244
1479          RY       10        8        3        0        0        3        8       10

1480          KK       45      SUB
1481          KM         RUNOFF FROM SUB-BASIN 45
1482          BA    .2037
1483          LS               84
1484          UK      125    .1166      .20      100
1485          RK     3600    .0366     .045             TRAP       30        3

1486          KK      C45
1487          KM         COMBINE HYDROGRAPHS R45 & SUB 45
1488          HC        2

1489          KK      45A      SUB
1490          KM         RUNOFF FROM SUB-BASIN 45A
1491          BA    .1720
1492          LS             88.5
1493          UK      275    .2200      .20      100
1494          RK     5400    .0411     .045             TRAP       15        3
```



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

1495          KK       46      SUB
1496          KM         RUNOFF FROM SUB-BASIN 46
1497          BA    .9268
1498          LS             88.5
1499          UK      265    .4958      .20      100
1500          RK     3300    .2271     .045     .111    TRAP       10        3
1501          RK     7100    .0535     .045             TRAP       25        3

1502          KK      C46
1503          KM         COMBINE HYDROGRAPHS C45, SUB 45A, & SUB 46
1504          HC        3

1505          KK      R47
```

```
1506          KM        ROUTE C46 TO D.S. END OF SUB 47
1507          RS      21    FLOW      -1
1508          RC    .055    .040    .055    7600   .0268
1509          RX       0       1     101     109     159     167     267     268
1510          RY      10       9       4       0       0       4       9      10

1511          KK      47     SUB
1512          KM        RUNOFF FROM SUB-BASIN 47
1513          BA   .3757
1514          LS            80.2
1515          UK     375   .1000     .20     100
1516          RK    9300   .0357    .045            TRAP      50       3

1517          KK   C47.1
1518          KM        COMBINE HYDROGRAPHS SUB 47 & R47
1519          HC       2

1520          KK   C47.2
1521          KM        COMBINE HYDROGRAPHS C47.1, C41 & SUB 42
1522          HC       3

1523          KK     R50
1524          KM        ROUTE C47.2 TO D.S. END OF SUB 50 (BEGINNING OF REATA DESERT
1525          KM        GREENBELT CHANNEL)
1526          RS       3    FLOW      -1
1527          RC    .055    .040    .055    1000   .0200
1528          RX       0      35     135     150     225     240     340     375
1529          RY      10       3       3       0       0       3       3      10

1530          KK      50     SUB
1531          KM        RUNOFF FROM SUB-BASIN 50
1532          BA   .4052
1533          LS              86
1534          UK     300   .3555     .20     100
1535          RK     730   .1506    .045    .036    TRAP      10       3
1536          RK    6400   .0453    .045            TRAP      25       3
1                                      HEC-1 INPUT                                    PAGE 41

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


1537          KK     C50
1538          KM        COMBINE HYDROGRAPHS OF SUB 50 AND R50
1539          KM        THIS IS THE TOTAL DISCHARGE TO THE REATA PASS ALLUVIAL FAN APEX
1540          HC       2
              *
              * ************************************************************************
              *
              *                     END REATA PASS WATERSHED MODEL ABOVE APEX
              *                  BEGIN ENTELLUS MODIFICATIONS TO ROUTE APEX FLOW
              *
              * ************************************************************************
              *

1541          KK  APEXSW     DIV
1542          KM   50-50 FLOW SPLIT AT REATA PASS APEX
1543          DT  APEXSO
1544          DI       0   10000
1545          DQ       0    5000
              *

1546          KK  R51.2A
1547          KM   ROUTE HYDROGRAPH FROM THE REATA PASS WASH FAN APEX THROUGH SUB S51.1A
1548          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING THE ORIGINAL ROUTE 51.2
1549          RS       4    FLOW      -1
1550          RC   0.055    0.04   0.055    1524   .0338
1551          RX       0       1     101     107     137     143     243     244
1552          RY      10       8       3       0       0       3       8      10
              *
              *

1553          KK  S51.1A
1554          KM   RUNOFF FROM SUBBASIN 51.1A
1555          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
1556          KM   ENTELLUS CHANGED THE RUNOFF CURVE TO 75
1557          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1558          BA   .0690
1559          LS             75      27
1560          UK     300   0.037   0.130     100
1561          RK    1800   0.038   0.045  0.0161    TRAP       0      12
1562          RK    3037   0.032   0.040            TRAP      40      15
```

```
                *
                *
                *
1563            KK  C51.1A      CP
1564            KM   COMBINE SUB S51.1A and R51.2A
1565            HC       2
                *
                *
1                                       HEC-1 INPUT                                     PAGE 42

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


1566            KK  SPT1SO     DIV
1567            KM   DIVERSION OF SPLIT FLOW FROM C51.1A TO C51B9
1568            KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1569            DT  SPT1SW
1570            DI       0   10000
1571            DQ       0    2900
                *
1572            KK   R51B9
1573            KM   ROUTE SPLIT FROM C51.1A TO C51B9
1574            KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
1575            RK     975   .0300    .045            TRAP      50      25
                *
                *

1576            KK    51B9     SUB
1577            KM   RUNOFF FROM SUB 51B9
1578            KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1579            KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1580            KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1581            BA   .0237
1582            LS              75      27
1583            UK     100   .0213     .10     100
1584            RK     975   .0300    .045            TRAP      50      25
                *
                *
                *

1585            KK   C51B9
1586            KM   COMBINE BASIN 51B9 AND R51B9
1587            HC       2
                *

1588            KK  SPT2SO     DIV
1589            KM   DIVERSION OF SPLIT FLOW FROM C51B9 TO C51B2
1590            KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1591            DT  SPT2SW
1592            DI       0   10000
1593            DQ       0    3200
                *

1594            KK   R51B2
1595            KM   ROUTE SPLIT FROM C51B9 TO C51B2
1596            KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
1597            RK    3261   .0300    .045            TRAP      50      25
                *

1598            KK    51B2     SUB
1599            KM   RUNOFF FROM SUB 51B2
1600            KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1601            KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1602            KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1603            BA   .0623
1604            LS              75      27
1                                       HEC-1 INPUT                                     PAGE 43

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

1605            UK     100   .0213     .10     100
1606            RK    3261   .0300    .045            TRAP      50      25
                *
                *

1607            KK   C51B2
1608            KM   COMBINE 51B2R AND 52C8
1609            HC       2
                *
```

```
*****************************************************************************
*
*                    RETURN TO WOOD PATELS DC RANCH MODEL
*                    WITH ENTELLUS MODIFICATIONS
*****************************************************************************
*
*

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

KK    52C8
KM   RUNOFF FROM SUBBASIN 52C8
BA    .008
LS              75      27
UK     100     .02     .10     100
RK     750    .034    .045            TRAP      30      10
*

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

KK   52C8R
KM   ROUTE 52C8C THROUGH SUBBASIN 52C9 TO CP 52C9C1
RK    1100    .036    .045            TRAP      10      10
*

KK    51C3     SUB
KM   RUNOFF FROM SUB 51C3
KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51C
KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
BA   .0151
LS              75      27
UK     100   .0213     .10     100
RK    1962   .0375    .045            TRAP      30      10
*
```



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

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

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

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

KK    52C7
KM   RUNOFF FROM SUBBASIN 52C7
BA    .006
LS              75      27
UK     100     .02     .10     100
RK     550     .04    .045            TRAP      30      10
*

KK   52C7C
KM   COMBINE 51B1R, 51C3R, AND 52C7
HC       3
*
```

```
1658          KK   52C7R
1659          KM   ROUTE 52C7C THROUGH SUBBASIN 52C9 TO CP 52C9C1
1660          RK    1550    .036    .045            TRAP      10      10
              *

1661          KK  52C9C1
1662          KM   COMBINE 52C7R AND 52C8R
1663          HC       2
              *

1664          KK  52C9R1
1665          KM   ROUTE 52C9C1 THROUGH SUBBASIN 52C9 TO CP 52C9C2
1666          RK    1050    .036    .045            TRAP      10      10
              *
```



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

1667          KK    52C9
1668          KM   RUNOFF FROM SUBBASIN 52C9
1669          BA    .069
1670          LS              75   31.85
1671          UK     100     .02     .10     100
1672          RK    3150    .036    .045            TRAP      30      10
              *

1673          KK  52C9C2
1674          KM   COMBINE 52C9R1 AND 52C9
1675          HC       2
              *

1676          KK  52C9R2
1677          KM   ROUTE 52C9C2 THROUGH SUBBASIN 52C10 TO CP 52C10C1
1678          RK     500    .032    .045            TRAP      10      10
              *
              *

1679          KK    51C2     SUB
1680          KM   RUNOFF FROM SUB 51C2
1681          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51C
1682          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1683          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1684          BA   .0423
1685          LS              75      27
1686          UK     100   .0213     .10     100
1687          RK    3309   .0375    .045            TRAP      30      10
              *
              *

1688          KK   51C2R
1689          KM   ROUTE 51C2D THROUGH SUBBASIN 52C5 TO CP 52C5C
1690          RK     700    .030    .045            TRAP      10      10
              *

1691          KK    52C5
1692          KM   RUNOFF FROM SUBBASIN 52C5
1693          BA    .016
1694          LS              75      27
1695          UK     100     .02     .10     100
1696          RK    1200     .03    .045            TRAP      30      10
              *

1697          KK   52C5C
1698          KM   COMBINE 51C2R AND 52C5
1699          HC       2
              *
```



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

1700          KK   52C5R
1701          KM   ROUTE 52C5C THROUGH SUBBASIN 52C6 TO CP 52C6C
1702          RK    3100    .035    .045            TRAP      10      10
              *

1703          KK    52C6
1704          KM   RUNOFF FROM SUBBASIN 52C6
1705          BA    .036
1706          LS              75    31.4
```

```
1707          UK     100     .02     .10     100
1708          RK    3100    .035    .045            TRAP      30      10
              *

1709          KK   52C6C
1710          KM   COMBINE 52C5R AND 52C6
1711          HC       2
              *

1712          KK   52C6R
1713          KM   ROUTE 52C6C THROUGH SUBBASIN 52C10 TO CP 52C10C2
1714          RK     450    .032    .045            TRAP      10      10
              *
              *

1715          KK  2C10C1
1716          KM   COMBINE 52C9R2 AND 52C6R
1717          HC       2
              *

1718          KK  2C10R1
1719          KM   ROUTE 52C10C1 THROUGH SUBBASIN 52C10 TO CP 52C10C2
1720          RK     300    .032    .045            TRAP      10      10
              *

1721          KK   52C10
1722          KM   RUNOFF FROM SUBBASIN 52C10
1723          BA    .014
1724          LS             75    7.85
1725          UK     100     .02     .10     100
1726          RK     800    .032    .045            TRAP      30      10
              *

1727          KK  2C10C2
1728          KM   COMBINE 52C10R1 AND 52C10
1729          HC       2
              *

1730          KK   52C11
1731          KM   RUNOFF FROM SUBBASIN 52C11
1732          BA   .0425
1733          LS             75      27
1734          UK     100     .02     .10     100
1735          RK    2800    .031    .045            TRAP      30      10
              *
1                                      HEC-1 INPUT                                                    PAGE 47

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

1736          KK  2C11R1
1737          KM   PIPE ROUTE 52C11 TO CP 52C11C
1738          RK     650     .02    .045            CIRC       3
              *

1739          KK  52C13D
1740          KM   RETRIEVE DIVERTED FLOW
1741          DR   STORM
              *

1742          KK  52C11C
1743          KM   COMBINE 52C13D AND 52C11R1
1744          HC       2
              *

1745          KK  2C11CR
1746          KM   PIPE ROUTE 52C11C TO CP 52C11C2
1747          RK     750     .02    .045            CIRC       3
              *

1748          KK  2C11C2
1749          KM   COMBINE 52C11CR AND 52C10C2
1750          HC       2
              *

1751          KK  2C11R2
1752          KM   ROUTE 52C11C2 THROUGH SUBBASIN 52C12 TO CP 52C12C
1753          RK     700     .03    .045            TRAP      10      10
              *

1754          KK   52C12
```

```
1755          KM   RUNOFF FROM SUBBASIN 52C12
1756          BA    .023
1757          LS              75      85
1758          UK     100     .02     .10     100
1759          RK     900     .03    .045            TRAP      30      10
              *

1760          KK  52C12C
1761          KM   COMBINE 52C11R2 AND 52C12
1762          HC       2
              *

1763          KK  52C12R
1764          KM   ROUTE 52C12C THROUGH SUBBASIN 52C14 TO CP 52C14C1
1765          RK    1150    .029    .045            TRAP      10      10
              *

1766          KK  52C14B
1767          KM   RUNOFF FROM SUBBASIN 52C14B
1768          BA    .021
1769          LS              75      60
1770          UK     100     .02     .10     100
1771          RK    1250    .029    .045            TRAP      30      10
              *
```



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


1772          KK   DVSP1
1773          KM   RETRIEVE DIVERTED FLOW FROM SIERRA PINTA CHANNEL
1774          DR   DVSP1
              *

1775          KK  RDVSP1
1776          KM    ROUTE FLOW FROM SP1 TO SP2 VIA SIERRA PINTA CHANNEL
1777          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED MY WARD
1778          RK     624   .0143    .035            TRAP      50       4
              *

1779          KK     SP2
1780          KM   COMBINE 52C14B AND 52C12R
1781          HC       3
              *
              *  ***************************************************************************
              *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ***************************************************************************
              *

1782          KK    DSP2     DIV
1783          KM   This was modified to reflect existing conditions: no Sierra Pinta Channel
              * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT 52C14BC1
              * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1784          DT   DVSP2
              * DI     0     100     200     500    2200   10000
              * DQ     0     100     200     500    2200    2200
              *
1785          DI       0   10000
1786          DQ       0    0.01
              *
              *  ***************************************************************************
              *  **      END     *      END     *      END     *      END     *      END     *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ***************************************************************************
              *
              *
              * ***************************************************************************
              *
              *                              STOP DC RANCH MODEL
              *
              * ***************************************************************************
              *

1787          KK  RSP2EX
1788          KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
1789          KM   THROUGH PIMA ACRES EAST OF 92ND
1790          KM   Modified X-section 12/2008
1791          RS       6    FLOW      -1
```

```
1792          RC   0.055    0.04   0.055    2028   .0256
1793          RX       0      15      20      30      35      45      50      60
1                                        HEC-1 INPUT                                        PAGE 49

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

1794          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
              * ************************************************************************
              *

1795          KK    51B3     SUB
1796          KM   RUNOFF FROM SUB 51B3
1797          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
1798          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1799          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1800          BA   .0242
1801          LS              75      27
1802          UK     100   .0213     .10     100
1803          RK    3003   .0300    .045            TRAP      50      25
              *
              *

1804          KK   51B3R
1805          KM   ROUTE 51B3D THROUGH SUBBASIN 52B1 TO CP 52B1C
1806          RK     600    .039    .045            TRAP      10      10
              *
1                                        HEC-1 INPUT                                        PAGE 50

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


1807          KK    52B1
1808          KM   RUNOFF FROM SUBBASIN 52B1
1809          BA    .003
1810          LS              75      27
1811          UK     100     .02     .10     100
1812          RK     600    .039    .045            TRAP      30      10
              *

1813          KK   52B1C
1814          KM   COMBINE 51B3R AND 52B1
1815          HC       2
              *

1816          KK   52B1R
1817          KM   ROUTE 52B1C THROUGH SUBBASIN 52B2 TO CP 52B2C1
1818          RK     930    .037    .045            TRAP      10      10
              *
              *
              * ************************************************************************
```

```
*
*                              STOP DC RANCH MODEL
*
* ************************************************************************

KK  SPT2SW
KM   RETRIEVE DIVERTED SPLIT FLOW FROM C51B9
DR  SPT2SW
*

KK  R51B10
KM   ROUTE SPLIT FROM C51B9 TO C51B10
KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
RK    1587   .0300    .045            TRAP      50      25
*
*

KK   51B10     SUB
KM   RUNOFF FROM SUB 51B10
KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
BA   .0238
LS              75      27
UK     100   .0213     .10     100
RK    1587   .0300    .045            TRAP      50      25
*
*

KK  C51B10
KM   COMBINE BASIN 51B10 AND R51B10
HC       2
*
*
```



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

KK  SPT3SO     DIV
KM   SPLIT FLOW AT C51B10
KM   ENTELLUS ADDED THIS SPLIT FLOW DIVERISON
DT  SPT3SW
DI       0   10000
DQ       0    4000
*
*

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

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

KK   C51B4
KM   COMBINE BASIN 51B4 AND R51B4
HC       2
*
* ************************************************************************
*
*                 RETURN TO WOOD PATEL DC RANCH MODEL
*                      WITH ENTELLUS MODIFICATIONS
* ************************************************************************
*

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

```
                *
1863            KK  52B2C1
1864            KM   COMBINE 51B4R1 AND 52B1R
1865            HC       2
                *
1                                          HEC-1 INPUT                                          PAGE

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


1866            KK  52B2R1
1867            KM   ROUTE 52B2R1 THROUGH SUBBASIN 52B2 TO CP 52B2C2
1868            RK    1000    .037    .045            TRAP      10      10
                *

1869            KK    52B2
1870            KM   RUNOFF FROM SUBBASIN 52B2
1871            BA    .032
1872            LS              75      17
1873            UK     100     .02     .10     100
1874            RK    2350    .037    .045            TRAP      30      10
                *

1875            KK  52B2C2
1876            KM   COMBINE 52B2 AND 52B2R1
1877            HC       2
                *

1878            KK  52B2R2
1879            KM   ROUTE 52B2C2 THROUGH SUBBASIN 52B3 TO CP 52B3C2
1880            RK     850    .026    .045            TRAP      10      10
                *

1881            KK  52B3R1
1882            KM   ROUTE 52B3C1 THROUGH SUBBASIN 52B3 TO CP 52B3C2
1883            RK     500    .024    .045            TRAP      10      10
                *

1884            KK    52B3
1885            KM   RUNOFF FROM SUBBASIN 52B3
1886            BA    .062
1887            LS              75    31.8
1888            UK     100     .02     .10     100
1889            RK    3450    .030    .045            TRAP      30      10
                *

1890            KK  52B3C2
1891            KM   COMBINE 52B3 AND 52B3R1
1892            HC       2
                *

1893            KK  52B3R2
1894            KM   ROUTE 52B3C2 THROUGH 52B4 TO CP 52B4C
1895            RK    1700    .024    .045            TRAP      10      10
                *

1896            KK    52B4
1897            KM   RUNOFF FROM SUBBASIN 52B4
1898            BA    .026
1899            LS              75      62
1900            UK     100     .02     .10     100
1901            RK    1700    .024    .045            TRAP      30      10
                *
1                                          HEC-1 INPUT                                          PAGE 53

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


1902            KK   52B4C
1903            KM   COMBINE 52B4 AND 52B3R2
1904            HC       2
                *

1905            KK   52B4R
1906            KM   ROUTE 52B4C THROUGH SUBBASIN 52B5 TO CP SP3
1907            RK     550    .027    .045            TRAP      10      10
                *

1908            KK    52B5
1909            KM   RUNOFF FROM SUBBASIN 52B5
```

```
1910          BA    .021
1911          LS              75    56.9
1912          UK     100     .02     .10     100
1913          RK    1400     .03    .045            TRAP      30       10
              *
              *

1914          KK   DVSP2
1915          KM   RETRIEVE DIVERTED FLOW FROM SIERRA PINTA CHANNEL
1916          DR   DVSP2
              *

1917          KK  RDVSP2
1918          KM    ROUTE FLOW FROM SP2 TO SP3 VIA SIERRA PINTA CHANNEL
1919          KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED BY WARD
1920          RK     597   .0143    .035            TRAP      50        4
              *

1921          KK     SP3
1922          KM   COMBINE 52B5 AND 52B4R AND RDVSP2
1923          HC       3
              *
              *  ********************************************************************************
              *  **      BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ********************************************************************************
              *

1924          KK    DSP3     DIV
1925          KM   This was modified to reflect existing condtions: no Sierra Pinta Channel
              * KM DIVERSION OF FLOW INTO SIERRA PINTA CHANNEL AT SP3
              * KM ENTELLUS ADDED THIS SPLIT FLOW DIVERSION
1926          DT   DVSP3
              * DI     0     100     200     500    2200   10000
              * DQ     0     100     200     500    2200    2200
              *
1927          DI       0   10000
1928          DQ       0    0.01
              *
              *  ********************************************************************************
              *  **      END      *      END      *      END      *      END      *      END      *
              *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
              *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
              *  ********************************************************************************
              *
              *
              * ************************************************************************
              *
              *                              STOP DC RANCH MODEL
              *
              * ************************************************************************
              *
1                                        HEC-1 INPUT                                        PAGE 54

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


1929          KK  RSP3EX
1930          KM   ROUTE SP3 THROUGH S53A1 INTO C53A1
1931          KM   ENTELLUS CREATED THIS ROUTE
1932          RK    1773   .0237    0.04            TRAP      37       30
              *
              *

1933          KK   CSPEX
1934          KM   COMBINE RSPEX1, RSPEX2 AND RSPEX3
1935          HC       3
              *
              *

1936          KK   R53A1
1937          KM   ROUTE SP3 THROUGH S53A1 INTO C53A1
1938          KM   ENTELLUS CREATED THIS ROUTE
1939          RK     969   .0217    0.04            TRAP      37       30
              *
              *

1940          KK   S53A1
1941          KM   RUNOFF FROM SUB S53A1
1942          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
```

```
1943          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
1944          KM   ENTELLLUS CHANGED THE PERCENT IMPERVIOUS TO 27
1945          KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
1946          KM   ENTELLLUS REMOVED THE FIRST OVERLAND FLOW CATACHMENT,
1947          KM   (IT REPRESENTED IRONWOOD VILLAGE WHICH IS NOT A PART OF THIS BASIN)
1948          BA   .1845
1949          LS             77      27
1950          UK     300   0.022    0.13     100
1951          RK    1250   0.023   0.045  0.0087    TRAP       4       5
1952          RK    2742   .0170    0.04            TRAP      37      30
              *
              *

1953          KK   C53A1
1954          KM   COMBINE S53A1 AND RSPEX
1955          HC       2
              *
              *

1956          KK  RPIMA2
1957          KM   ROUTE C53A1 THROUGH S53A3 INTO CPIMA2
1958          KM   ROUTE FROM PROJECT STRUCTURE #1 TO PROPOSED PIMA RD DRAINAGE CHANNEL
1959          KM   THE ROUTE GEOMETRY WAS FOUND USING MAPPING AND AERIALS FROM THE
1960          KM   CITY OF SCOTTSDALE.
1961          RK    1831    .018    0.04            TRAP      57       4
              *
              *
1                                        HEC-1 INPUT                                    PAGE 55

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

1962          KK   S53A3
1963          KM   RUNOFF FROM SUBBASIN S53A3
1964          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
1965          KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
1966          KM   ENTELLLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT,
1967          KM   (IT REPRESENTED PIMA ACRES WHICH IS NOT A PART OF THIS BASIN)
1968          BA   .0720
1969          LS             77      30
1970          UK     150   0.027    0.13     100
1971          RK    1250   0.023   0.045  0.0087    TRAP       4       5
1972          RK    1831    .018    0.04            TRAP      57       4
              *
              *  *************************
              *  PROJECT STRUCTURE #2
              *
              *  *************************
              *

1973          KK  CPIMA2      CP
1974          KM   COMBINE SUB S53A3 AND RPIMA2 (EXISTING BRIDGE ADJACENT TO IRONWOOD VILLAGE)
1975          HC       2
              *
              *

1976          KK   RUH2B
1977          KM   ROUTE CPIMA2 TO CUH2
1978          KM   ENTELLUS CREATED THIS ROUTE
1979          KM   Modified x-section 12/2008
1980          RS       4    FLOW      -1
1981          RC   0.055    0.04   0.055    1453    .0096
1982          RX       0      14      21      32      80      94     100     107
1983          RY       7       3       2       1       1       3       4       7
              * RY     5       3       2       1       1       3       4       5
              *
              *

1984          KK   S53A6
1985          KM   RUNOFF FROM SUBBASIN S53A6, ORIGINAL BASIN S53A1
1986          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
1987          KM   ENTELLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
1988          KM   ENTELLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT
1989          KM   (IT REPRSENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN)
1990          BA   .0261
1991          LS             77      30
1992          UK     150   0.027    0.13     100
1993          RK     669   .0179    0.04            TRAP      10    5.25
              *

1994          KK   RUH2C
```

```
1995          KM   ROUTE S53A6 TO CUH2
1996          KM   EAST SEGMENT OF PROPOSED UNION HILLS INTERCEPTOR CHANNEL BETWEEN PIMA RD
1997          KM   ALIGNMENT AND PROPOSED PIMA RD DRAINAGE CHANNEL
1998          RS       3    FLOW      -1
1999          RC    .055     .04    .055     993    .088
                                    HEC-1 INPUT                                                    PAGE 56

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

2000          RX       0      10      22      32      33      34      35      36
2001          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 ****************
              * ********************************************************************************

2002          KK   S53A5
2003          KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
2004          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2005          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2006          KM   ENTELLUS MODIFIED THE CATCHMENT PARAMETERS
2007          KM   ENTELLUS NOV 2008: CORRECTED N VALUE TO BE 0.13, NOT 0.013
2008          BA   .0222
2009          LS              77      27
2010          UK     100   0.027     .13     100
2011          RK     993   0.017    0.04            TRAP      35       5
              *
              *
              *  **************************
              *  UNION HILLS INTERCEPTOR CHANNEL
              *          SEGMENT 1
              *  **************************
              *

2012          KK   UHIC1      CP
2013          KM   COMBINE S53A6 AND S53A5 (UNION HILLS INTERCEPTOR CHANNEL SEGMENT 1)
2014          HC       2
              *
              *

2015          KK  SPT1SW
2016          KM   RETRIEVE DIVERTED SPILT FLOW FROM C51.1A
2017          DR  SPT1SW
              *

2018          KK  R51.2B
2019          KM   ROUTE C51.1A to C51.1B
2020          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING ROUTE 51.2
2021          RS       5    FLOW      -1
2022          RC   0.055    0.04   0.055    1666   .0338
2023          RX       0       1     101     107     137     143     243     244
2024          RY      10       8       3       0       0       3       8      10
              *
1                                   HEC-1 INPUT                                                    PAGE 57

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


2025          KK  S51.1B
2026          KM   RUNOFF FROM SUBBASIN 51.1B
2027          KM   ENTELLUS CREATED THIS BASIN BY MODIFYING BASIN S51.1
2028          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2029          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2030          BA   .0496
2031          LS              75      27
2032          UK     300   0.037   0.130     100
2033          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2034          RK    3350   0.032   0.040            TRAP      40      15
              *
              *

2035          KK  C51.1B      CP
2036          KM         COMBINE SUB S51.1B and R51.2B
2037          HC       2
              *
```

```
2038          KK  R51.2C
2039          KM   ROUTE C51.1B to C51.1C
2040          KM   ENTELLUS CREATED THIS ROUTE BY MODIFIYING ROUTE 51.2
2041          RS       5    FLOW      -1
2042          RC   0.055    0.04   0.055    1742   .0338
2043          RX       0       1     101     107     137     143     243     244
2044          RY      10       8       3       0       0       3       8      10
              *

2045          KK  S51.1C
2046          KM   RUNOFF FROM SUBBASIN 51.1C
2047          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
2048          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2049          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2050          BA   .0965
2051          LS              75      27
2052          UK     300   0.037   0.130     100
2053          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2054          RK    5833   0.032   0.040            TRAP      40      15
              *
              *

2055          KK  C51.1C      CP
2056          KM        COMBINE SUB S51.1C and R51.2C
2057          HC       2
              *

2058          KK  R51.2D
2059          KM   ROUTE C51.1C to C51.1D
2060          KM   ENTELLUS CREATED THIS ROUTE BY MODIFYING ROUTE 51.2
2061          RS       9    FLOW      -1
2062          RC   0.055    0.04   0.055    3123   .0338
2063          RX       0       1     101     107     137     143     243     244
2064          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.
              *
```



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


2065          KK  S51.1D
2066          KM   RUNOFF FROM SUBBASIN 51.1D
2067          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S51.1
2068          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2069          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2070          KM
2071          KM   Modified basin area to include all the way to E. Los Gatos Dr.
              * BA .8980 * Original Basin Area
2072          BA  0.9015
2073          LS              75      27
2074          UK     300   0.037   0.130     100
2075          RK    1800   0.038   0.045  0.0161    TRAP       0      12
2076          RK   14557   0.032   0.040            TRAP      40      15
              *

2077          KK  D51.1D
2078          KO       1
2079          KM   This diversion recovery was too short to route (200 ft +-)
2080          DR  DO511D
              *

2081          KK  C51.1D      CP
2082          KM        COMBINE SUB S51.1D and R51.2D
2083          KM   HC modified to include R1B2
2084          HC       3
              *

2085          KK  DETPDV
2086          KM   DET = Detention Basin
2087          KM   P = Pima Rd.
2088          KM   DV = Deer Valley
```

```
2089          KM   STO = Stored
2090          KM   This is the DC Ranch Detention basin on the corner of Pima Rd.
2091          KM   and Deer Valley.  It was assumed that the detention basin was online.
2092          KM   The stage storage was determined by field survey of the detention
2093          KM   basin (12/15/2008).
2094          DT  STOPDV     4.5
2095          DI        0   10000
2096          DQ        0   10000
              *
              *  |-------------------------------------------------------------------------|
              *  |/////////////////////////////////////////////////////////////////////////|
              *  |================ END DEER VALLEY SOUTH MODEL MODIFICATIONS ===============|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  -------------------------------------------------------------------------
              *

2097          KK  R52A1C
2098          KM   ROUTE C51.1D THROUGH 52A1 INTO 52A1C
2099          KM   ROUTE OF FLOW ALONG EAST SIDE OF PIMA RD AND WEST SIDE OF DC RANCH
2100          KM   BETWEEN DEER VALLEY AND THOMPSON PEAK
2101          KM   ENTELLUS CREATED THIS ROUTE USING THE TYPICAL SECTIONS DETAIL SHEET
2102          KM   OF THE PIMA ROAD PAVING PLANS BY JMI AND ASSOCIATES
2103          RS        7    FLOW      -1
1                                        HEC-1 INPUT                                                    PAGE 59

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

2104          RC    .045    .014    .045    2636   .0262
2105          RX       0      .1       4       7    7.25      11      27      95
2106          RY       2       0       0      10       0       0       2     4.5
              *

2107          KK    51B8     SUB
2108          KM   RUNOFF FROM SUB 51B8
2109          KM   ENTELLUS CREATED THIS BASIN BY MODIFYING BASIN 51B
2110          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2111          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2112          BA   .0397
2113          LS              75      27
2114          UK     100   .0213     .10     100
2115          RK    3891   .0300    .045            TRAP      50      25
              *
              * ************************************************************************
              *
              *                                BEGIN DC RANCH MODEL
              *
              * ************************************************************************

2116          KK   51B8R
2117          KM   ROUTE 51B7DV THROUGH SUBBASIN 52A1 TO CP 52A1C
2118          RK    3400    .033    .045            TRAP      10      10
              *

2119          KK    52A1
2120          KM   RUNOFF FROM SUBBASIN 52A1
2121          BA    .130
2122          LS              75   32.25
2123          UK     100     .02     .10     100
2124          RK    3400    .033    .045            TRAP      30      10
              *

2125          KK   52A1C
2126          KM   COMBINE 52A1, 51B8R
2127          HC       2
              *
              *
              * ************************************************************************
              * ******************** NOVEMBER 2008 *** NOVEMBER 2008 ********************
              * ************************************************************************
              * ********** ADDED SUBBASIN 52A0, MODIFIED C52A from HC=2 to HC=3 *************
              * ************************************************************************

2128          KK    52A0
2129          KM   ENTELLUS NOVEMBER 2008: SUBBASIN 52A0 WAS ADDED TO THE MODEL TO ACCOUNT FOR
2130          KM   ENTELLUS NOVEMBER 2008: FLOW ALONG THE WEST SIDE OF PIMA RD BETWEEN DEER
2131          KM   ENTELLUS NOVEMBER 2008: VALLEY AND THOMPSON PEAK PARKWAY
2132          KM        RUNOFF FROM SUB-BASIN 52A0
2133          BA  0.0369
2134          LS              85
2135          UK     100   .2300     .20     100
2136          RK    2500   .2300    .045            TRAP      20       8
```

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                *
1                                        HEC-1 INPUT                                        PAGE 60

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

      2137      KK    C52A      CP
      2138      KM         COMBINE CP 52A1C & 51.6
      2139      KM    ENTELLUS NOVEMBER 2008: MODIFIED HC=2 to HC=3 TO INCLUDE THE NEWLY
      2140      KM    ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52A0
      2141      HC        3
                *

      2142      KK    D52AW     DIV
      2143      KM    SPLIT FLOW AT ITXN OF PIMA ROAD AND THOMPSON PEAK PKWY
      2144      KM    THIS DIVERSION REPRESENTS FLOW ON THE WEST SIDE OF PIMA ROAD
      2145      KM    THAT HEADS WEST
      2146      DT   DV52AW
      2147      DI        0     100     250     375     500     625     750     875    1000    1125
      2148      DI     1250    1375    1500    1750    2000    2500    2750    2875    3000    3500
      2149      DQ        0       1       4       6      13      22      41      63      82      96
      2150      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 *
                *  ***************************************************************************
                *

      2151      KK  PRSDEX     DIV
      2152      KM    DIVERT FLOW INTO 2 60" PIPES AT THOMPSON PEAK PKY AND PIMA
      2153      KM    ENTELLUS ADDED THIS DIVERSION, 265 CFS IS FROM STANTEC'S REPORT
      2154      KM    Additionally, it was assumed that the additional 2-48" culverts and
      2155      KM    numerous curb inlets are able to fully utilize the stormdrains capacity of:
      2156      KM    600cfs
      2157      DT     PRSD
                * DI      0     255   10000
                * DQ      0     255     255
      2158      DI        0     600   10000
      2159      DQ        0     600     600
                *
                *  ***************************************************************************
                *  **      END      *      END      *      END      *      END      *      END      *
                *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
                *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
                *  ***************************************************************************
                *
                *
                *

      2160      KK     RC52      CP
      2161      KM    ROUTE C52A TO C52(SP4)
      2162      KM    ROUTE ALONG PIMA RD BETWEEN THOMPSON PEAK AND SIERRA PINTA
      2163      KM    THE ROUTE GEOMOETRY WAS TAKEN FROM THE TYPICAL SECTIONS DETAIL SHEET
      2164      KM    OF THE PIMA RD PAVING PLANS BY JMI AND ASSOCIATES.
      2165      RS        8    FLOW      -1
1                                        HEC-1 INPUT                                        PAGE 61

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

      2166      RC     .045    .014    .045    2763   .0232
      2167      RX        0       6      36      76      96     136     236     237
      2168      RY       10       0       2       2       2       2       2      10
                *

      2169      KK     51B5     SUB
      2170      KM    RUNOFF FROM SUB 51B5
      2171      KM    ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
      2172      KM    ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
      2173      KM    ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
      2174      BA    .0043
      2175      LS              75      27
      2176      UK      100   .0213     .10     100
      2177      RK      719   .0300    .045            TRAP      50      25
                *
                *
```

```
2178          KK   51B5R
2179          KM   ROUTE 51B5 THROUGH SUBBASIN 52B6 TO CP 51B7C
2180          RK    1250    .035    .045            TRAP      10      10
              *
              *

2181          KK  SPT3SW
2182          KM   RETRIEVE DIVERTED SPILT FLOW FROM C51B10
2183          DR  SPT3SW
              *
              *

2184          KK   R51B6
2185          KM   ROUTE C51B10 TO C51B6
2186          KM   ENTELLUS CREATED THIS ROUTE USING THE MAIN CHANNEL GEOMETRY OF BASIN 51B
2187          RK    2481   .0300    .045            TRAP      50      25
              *
              *

2188          KK    51B6     SUB
2189          KM   RUNOFF FROM SUB 51B6
2190          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2191          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2192          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2193          BA   .0446
2194          LS             75      27
2195          UK     100   .0213     .10     100
2196          RK    2481   .0300    .045            TRAP      50      25
              *

2197          KK   C51B6
2198          KM   COMBINE BASIN 51B6 AND R51B6
2199          HC       2
              *
              *
```



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

2200          KK   51B6R
2201          KM   ROUTE C51B6 THROUGH SUBBASIN 52B6 TO CP 51B7C
2202          RK     925    .033    .045            TRAP      10      10
              *
              *

2203          KK    51B7     SUB
2204          KM   RUNOFF FROM SUB 51B7
2205          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN 51B
2206          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2207          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2208          BA    .027
2209          LS             75      27
2210          UK     100   .0213     .10     100
2211          RK    2451   .0300    .045            TRAP      50      25
              *
              *

2212          KK  51B7R1
2213          KM   ROUTE 51B7D THROUGH SUBBASIN 52B6 TO CP 51B7C
2214          RK     530    .033    .045            TRAP      10      10
              *

2215          KK   51B7C
2216          KM   COMBINE 51B7R1, 51B5R, AND 51B6R
2217          HC       3
              *

2218          KK  51B7R2
2219          KM   ROUTE 51B7C THROUGH SUBBASIN 52B6 TO CP 52B6C
2220          RK    2300    .033    .045            TRAP      10      10
              *

2221          KK    52B6
2222          KM   RUNOFF FROM SUBBASIN 52B6
2223          KM   ENTELLUS CHANGED THE RUNOFF CURVE NUMBER TO 75
2224          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2225          BA    .096
2226          LS             75      27
2227          UK     100     .02     .10     100
2228          RK    3200    .033    .045            TRAP      30      10
```

```
                *
2229            KK   52B6C
2230            KM   COMBINE 51B7R2 AND 52B6
2231            HC       2
                *
2232            KK   52B6R
2233            KM   ROUTE 52B6C THROUGH SUBBASIN 52B7 TO CP 52B7C1
2234            RK    2750    .028    .045           TRAP      10      10
                *
1                                       HEC-1 INPUT                                        PAGE 63

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


2235            KK    52B7
2236            KM   RUNOFF FROM SUBBASIN 52B7
2237            BA    .080
2238            LS             75   78.45
2239            UK     100     .02     .10     100
2240            RK    2750    .028    .045           TRAP      30      10
                *

2241            KK  52B7C1
2242            KM   COMBINE 52B7 AND 52B6R
2243            HC       2
                *
                *

2244            KK    52A2
2245            KM   RUNOFF FROM SUBBASIN 52A2
2246            BA    .065
2247            LS             75    88.8
2248            UK     100     .02     .10     100
2249            RK    2900    .023    .045           TRAP      30      10
                *
                * ********************************************************************************
                * ******************** NOVEMBER 2008 *** NOVEMBER 2008 ************************
                * ********************************************************************************
                * ********** ADDED SUBBASIN 52B0, MODIFIED 52A2C2 from HC=3 to HC=4 ***********
                * ********************************************************************************

2250            KK    52B0     SUB
2251            KM        RUNOFF FROM SUB-BASIN 52B0
2252            KM   ENTELLUS NOVEMBER 2008: SUBBASIN 52B0 WAS ADDED TO THE MODEL TO ACCOUNT FOR
2253            KM   ENTELLUS NOVEMBER 2008: FLOW ALONG THE WEST SIDE OF PIMA RD BETWEEN THOMPSON
2254            KM   ENTELLUS NOVEMBER 2008: PEAK PARKWAY AND SIERRA PINTA
2255            BA  0.0188
2256            LS             83
2257            UK     100   .2300     .20     100
2258            RK    2500   .2300    .045           TRAP      20       8
                *

2259            KK  52A2C2
2260            KM   COMBINE 52B7C2 AND 52A2 and 52B0
2261            KM   ENTELLUS NOVEMBER 2008: MODIFIED HC=3 to HC=4 TO INCLUDE THE NEWLY
2262            KM   ENTELLUS NOVEMBER 2008: ADDED SUBBASIN 52B0
2263            HC       4
                *
                *
                *  ********************************************************************************
                *  **     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 64

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


2264            KK    D52W     DIV
2265            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
2266            DT   DV52W
                * DI      0   10000
                * DQ      0    3000
2267            DI       0   10000
2268            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
                * ***********************************************************************
                *
2269            KK   DVSP3
2270            KM    RETRIEVE FLOW FROM SIERRA PINTA CHANNEL
2271            DR   DVSP3
                *
2272            KK  RDVSP3
2273            KM    ROUTE FLOW FROM SP3 TO C52(SP4) VIA SIERRA PINTA CHANNEL
2274            KM    PROPOSED SIERRA PINTA CHANNEL AS MODELED BY WOOD-PATEL
2275            RK    1530   .0143    .035            TRAP      50       4
                *
2276            KK  C52SP4      CP
2277            KM     COMBINE CP521 AND FLOW FROM SIERRA PINTA CHANNEL
2278            HC       2
                *
                *  ********************************************************************************
                *  **     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *     BEGIN    *
                *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
                *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
                *  ********************************************************************************
                *
2279            KK    DSP4     DIV
2280            KM   This was modified to reflect existing conditions, no Sierra Pinta channel
2281            KM   and the 2-96" pipes are closed.
                * KM  FLOW FROM SIERRA PINTA DIVERTED INTO 2-96 PIPES TO CROSS PIMA
                * KM ENTELLUS CREATED THIS DIVERSION
2282            DT   DVSP4
                * DI     0     100     200     500    1328   10000
                * DQ     0     100     200     500    1328    1328
1                                       HEC-1 INPUT                                          PAGE 65

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

2283            DI       0   10000
2284            DQ       0    0.01
                *
                *  ********************************************************************************
                *  **      END     *      END     *      END     *      END     *      END     *
                *  ** SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA * SIERRA-PINTA *
                *  ** MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION * MODIFICATION *
                *  ********************************************************************************
                *
                *
                *
2285            KK  RSP4EX     CP
2286            KM   EXCESS FLOW NOT CARRIED BY THE SIERRA PINTA CHANNEL, ROUTED FROM DC RANCH
2287            KM   THROUGH PIMA ACRES ALONG PIMA ROAD TO PROJECT STRUCTURE #1
2288            RS       9    FLOW      -1
2289            RC    .045    .014    .045    3366   .0214
2290            RX       0       6      36      76      96     136     236     237
2291            RY      10       0       2       2       2       2       2      10
                *
2292            KK    53PS     DIV
2293            KM    ALLOCATE FLOW BETWEEN PIMA ROAD AND HUALAPAI DRIVE
2294            KM    ENTELLUS CHANGED THIS DIVERSION TO ZERO PER FIELD INVESTIGATIONS
2295            KM   THIS DIVERSION REPRESENTS FLOWS HEADING WEST ON HUALAPAI FORM THE
2296            KM   WEST SIDE OF PIMA ROAD BUT WAS SET TO ZERO BECAUSE THE PIMA ROUTE CHANNEL
2297            KM   WILL INTERCEPT THESE FLOWS
2298            DT    53HW
2299            DI       0   10000
2300            DQ       0       0
                *
```

```
2301          KK    S53A
2302          KM   RUNOFF FROM SUBBASIN S53A
2303          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2304          BA   .1250
2305          LS              77      27
2306          UK     300   0.022    0.13     100
2307          RK    1475   0.026   0.045  0.0111    TRAP       3       5
2308          RK    2625   0.021    0.04            TRAP      25       5
              *
              *
              *  *************************
              *  PROJECT STRUCTURE #1
              *
              *  *************************
              *

2309          KK  CPIMA1
2310          KM     COMBINE R53A WITH RUNOFF FROM SUBBASIN S53A
2311          HC       2
              *
              *
1                                        HEC-1 INPUT                                                    PAGE 66

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


2312          KK  RPMA4B      CP
2313          KM   ROUTE CPIMA1 TO CPCH2 (ACROSS PIMA ROAD)
2314          KM   ROUTE FROM PROJECT STRUCTURE#1 TO PROPOSED PIMA RD CHANNEL
2315          KM   THE ROUTE GEOMETRY WAS TAKEN FROM THE TYPICAL SECTIONS DETAIL SHEET
2316          KM   OF THE PIMA RD PAVING PLANS BY JMI AND ASSOCIATES.
2317          RS       2    FLOW      -1
2318          RC     .04    .014     .04     631   .0206
2319          RX       0       6      36      76      96     136     236     237
2320          RY      10       0       2       2       2       2       2      10
              *
              *

2321          KK    PRSD
2322          KM   RETRIEVE FLOW DIVERTED INTO PIPE AT THOMPSON PEAK
2323          DR    PRSD
              *
              *

2324          KK  RDPSD1
2325          KM   ROUTE FLOW THROUGH PIMA STORM DRAIN TO BEARDSLEY
2326          KM   ENTELLUS CREATED THIS ROUTE
2327          RS       1    FLOW      -1
2328          RK    1570    .022    .015            CIRC     5.5
              *
              *

2329          KK  RDPSD2
2330          KM   ROUTE FLOW THROUGH PIMA STORM DRAIN TO OUTLET NORTH OF HAULAPAI
2331          KM   ENTELLUS CREATED THIS ROUTE
2332          RS       1    FLOW      -1
2333          RK     970    .022    .015            CIRC       6
              *

2334          KK   DVSP4
2335          KM    RETRIEVE SIERRA PINTA CHANNEL FLOW AND ROUTE ALONG WEST SIDE OF PIMA RD
2336          DR   DVSP4
              *

2337          KK   RDVSP
2338          KM   OUTFLOW FROM SIERRA PINTA CHANNEL ALONG THE WEST SIDE OF PIMA RD BETWEEN
2339          KM   SIERRA PINTA AND THE PROPOSED PIMA RD DRAINAGE CHANNEL
2340          RS       5    FLOW      -1
2341          RC    .045    .014    .045    1873   .0219
2342          RX       0      .1       1       2      20      37      38      90
2343          RY       6       1       2       2       0       2       2       3
              *

2344          KK   CPCH1
2345          KM     COMBINE FLOW FROM 84" PIPE OUTLET WITH FLOW FROM SP CHANNEL
2346          HC       2
              *
1                                        HEC-1 INPUT                                                    PAGE 67

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

```
2347          KK  RPMA4A
2348          KM   ROUTE CHANNEL FLOW TO CPCH2
2349          KM   NORTH SEGMENT OF PROPOSED PIMA RD DRAINAGE CHANNEL BETWEEN DOWNING OLSEN
2350          KM   AND PIMA RD STORM DRAIN OUTLET
2351          RS       6    FLOW      -1
2352          RC    .035    .035    .035    2080   .0183
2353          RX       0      24      64      88      89      90      91      92
2354          RY       6       0       0       6       6       6       6       6
              *
              *

2355          KK   S53A2
2356          KM   RUNOFF FROM SUBBASIN S53A2
2357          KM   ENTELLUS CHANGED THE PERCENT IMPERVIOUS TO 27
2358          BA   .0544
2359          LS             77      27
2360          UK     100   0.022    0.13     100
2361          RK    2080   0.021    0.04            TRAP      25       5
              *
              *
              *  *************************
              *  PIMA ROAD DRAINAGE CHANNEL
              *         SEGMENT 1
              *  *************************
              *
              *

2362          KK   CPCH2
2363          KM     COMBINE RPMA4A WITH S53A2 (PIMA ROAD DRAINAGE CHANNEL SEGMENT 1)
2364          HC       2
              *
              *

2365          KK   CPCH3
2366          KM     COMBINE RPMA4A, RPMA4B AND S53A2
2367          HC       2
              *
              *

2368          KK   RUH2A
2369          KM   ROUTE CHANNEL FROM CPCH2 TO CUH2
2370          KM   SOUTH SEGMENT OF PROPOSED PIMA RD DRAINAGE CHANNEL BETWEEN UNION HILLS
2371          KM   AND DOWNING-OLSEN
2372          RS       4    FLOW      -1
2373          RC    .035    .035    .035    1389   .0158
2374          RX       0      28      78     106     107     108     109     110
2375          RY       7       0       0       7       7       7       7       7
              *
```



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

2376          KK   S53A4
2377          KM   RUNOFF FROM SUBBASIN S53A4
2378          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2379          KM   THE FIRST OVERLAND FLOW CATACHMENT WAS REMOVED
2380          KM   IT REPRESENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN
2381          BA   .0528
2382          LS             77      30
2383          UK     150   0.027    0.13     100
2384          RK    1621   0.017    0.04            TRAP      35       5
              *

2385          KK   CPCH4      CP
2386          KM   COMBINE SUB S53A4 AND RUH2A
2387          HC       2
              *
              *
              *  *************************
              *  UNION HILLS INTERCEPTOR CHANNEL
              *         SEGMENT 2
              *  *************************
              *
              *

2388          KK   UHIC2      CP
2389          KM    UNION HILLS INTERCEPTOR CHANNEL SEGMENT 2
2390          HC       3
```

```
                    *
                    *
                    * ************************************************************************
                    * ********** NOVEMBER 2008 *** NOVEMBER 2008 ***************************
                    * ************************************************************************
                    * *** CORRECTED roughness coefficient to be 0.13, from 0.013 **************
                    * ************************************************************************

          2391      KK  CPIMA3
          2392      KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
          2393      KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
          2394      KM   THE PERCENT IMPERVIOUS WAS ESTIMATED USING A B-C SOIL
          2395      KM   ENTELLUS MODIFIED THE CATACHMENT PARAMETERS
          2396      KM   ENTELLUS NOV 2008: CORRECTED N VALUE TO BE 0.13, NOT 0.013
          2397      BA   .0669
          2398      LS              77      65
          2399      UK     300   0.027     .13     100
          2400      RK    2100   0.017    0.04            TRAP      10       6
                    *
                    *  |-------------------------------------------------------------------------|
                    *  |/////////////////////////////////////////////////////////////////////////|
                    *  |======================== END DEER VALLEY SOUTH MODEL ====================|
                    *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
                    *  -------------------------------------------------------------------------
          2401      ZZ
1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   536        S30N
                V
                V
   546        R30N
                .
                .
   552          .       S31.1
                .         .
                .         .
   560       C31.1.............
                .
                .
   563          .       S34.2
                .         .
                .         .
   572       C34.2.............
                .
                .
   575          .        S35N
                .         .
                .         .
   587          .         .--------->   D35NL
   583          .       D35NR
                .         V
                .         V
   590          .       R35NR
                .         .
                .         .
   597          .         .       S36.2
                .         .         .
                .         .         .
   605          .       C36.2.............
                .         .
                .         .
   612          .         .--------->  D36.2L
   608          .      D36.2R
                .         V
                .         V
   615          .      R36.2R
                .         .
                .         .
   622          .         .       S34.1
                .         .         .
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                .         .
   638       HVDB-I.............
                V
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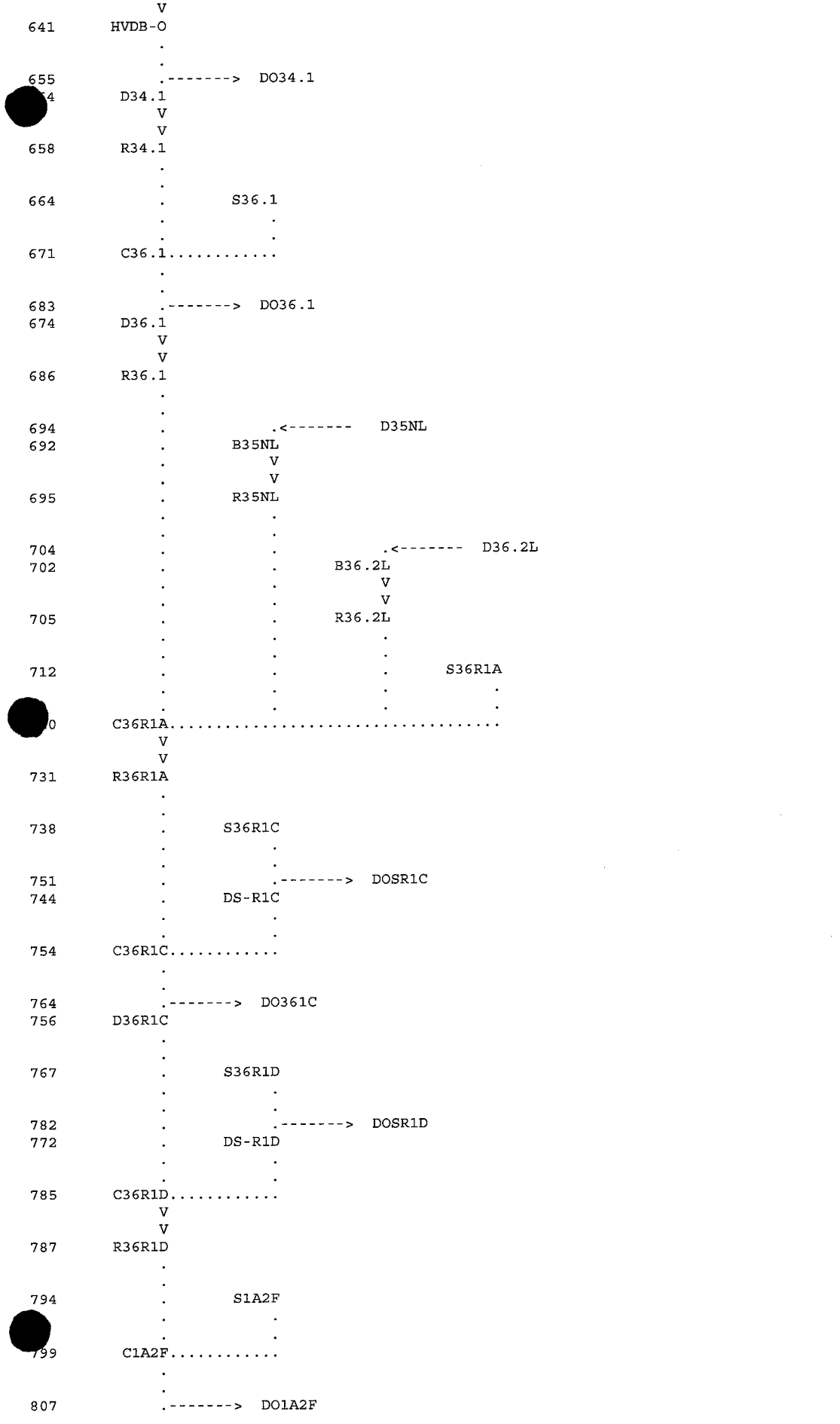
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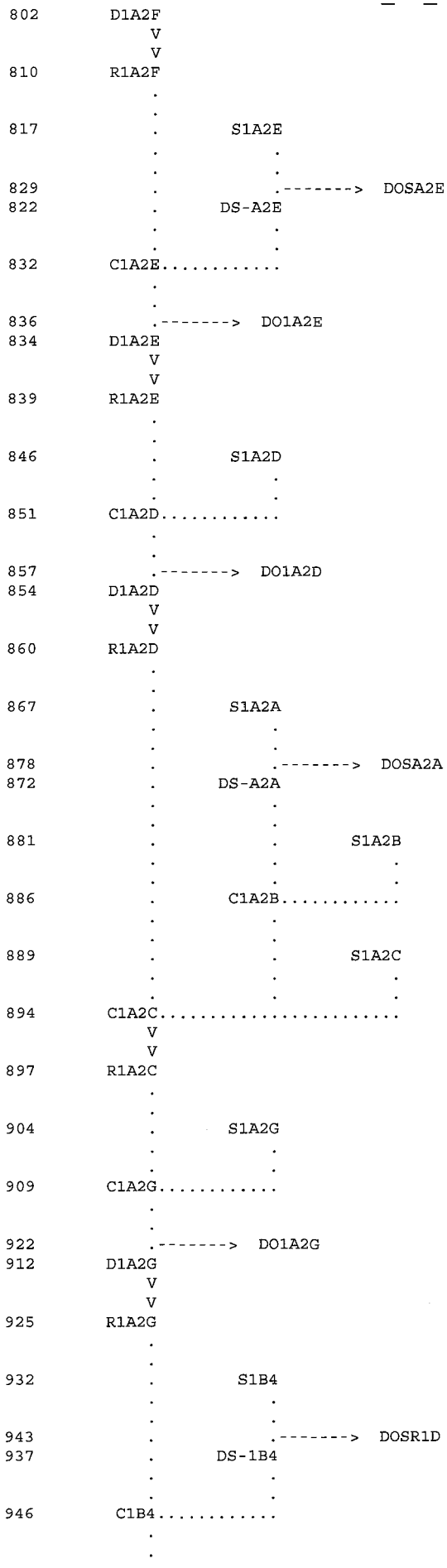
655 .-------> DO34.1
D34.1
658 R34.1
664 S36.1
671 C36.1.....
683 .-------> DO36.1
674 D36.1
686 R36.1
694 .<-------- D35NL
692 B35NL
695 R35NL
704 .<------- D36.2L
702 B36.2L
705 R36.2L
712 S36R1A
C36R1A.....
731 R36R1A
738 S36R1C
751 .-------> DOSR1C
744 DS-R1C
754 C36R1C.....
764 .-------> DO361C
756 D36R1C
767 S36R1D
782 .-------> DOSR1D
772 DS-R1D
785 C36R1D.....
787 R36R1D
794 S1A2F
C1A2F.....
807 .-------> DO1A2F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V
V
810 R1A2F
817 S1A2E
829 DOSA2E
822 DS-A2E
832 C1A2E
836 DO1A2E
834 D1A2E
V
V
839 R1A2E
846 S1A2D
851 C1A2D
857 DO1A2D
854 D1A2D
V
V
860 R1A2D
867 S1A2A
878 DOSA2A
872 DS-A2A
881 S1A2B
886 C1A2B
889 S1A2C
894 C1A2C
V
V
897 R1A2C
904 S1A2G
909 C1A2G
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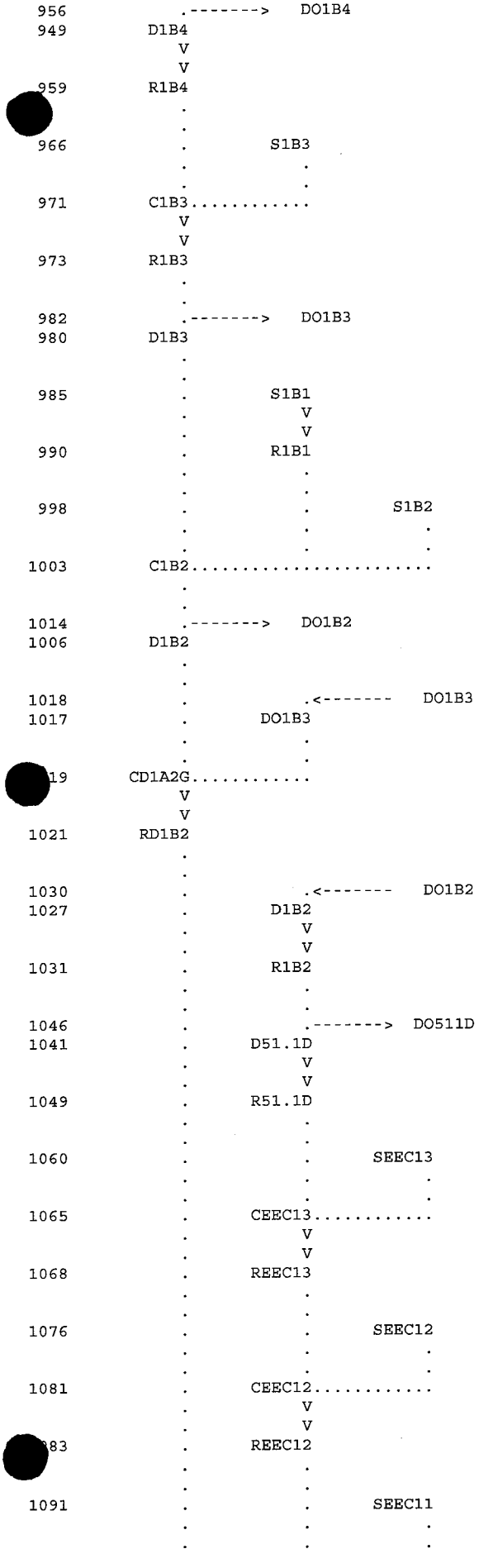
V
V
925 R1A2G
932 S1B4
943 DOSR1D
937 DS-1B4
946 C1B4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D1B4
V
V
959
R1B4
966
S1B3
971
C1B3
V
V
973
R1B3
982
.-------> DO1B3
980
D1B3
985
S1B1
V
V
990
R1B1
998
S1B2
1003
C1B2
1014
.-------> DO1B2
1006
D1B2
1018
.<------- DO1B3
1017
DO1B3
CD1A2G
V
V
1021
RD1B2
1030
.<------- DO1B2
1027
D1B2
V
V
1031
R1B2
1046
.-------> DO511D
1041
D51.1D
V
V
1049
R51.1D
1060
SEEC13
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CEEC13
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V
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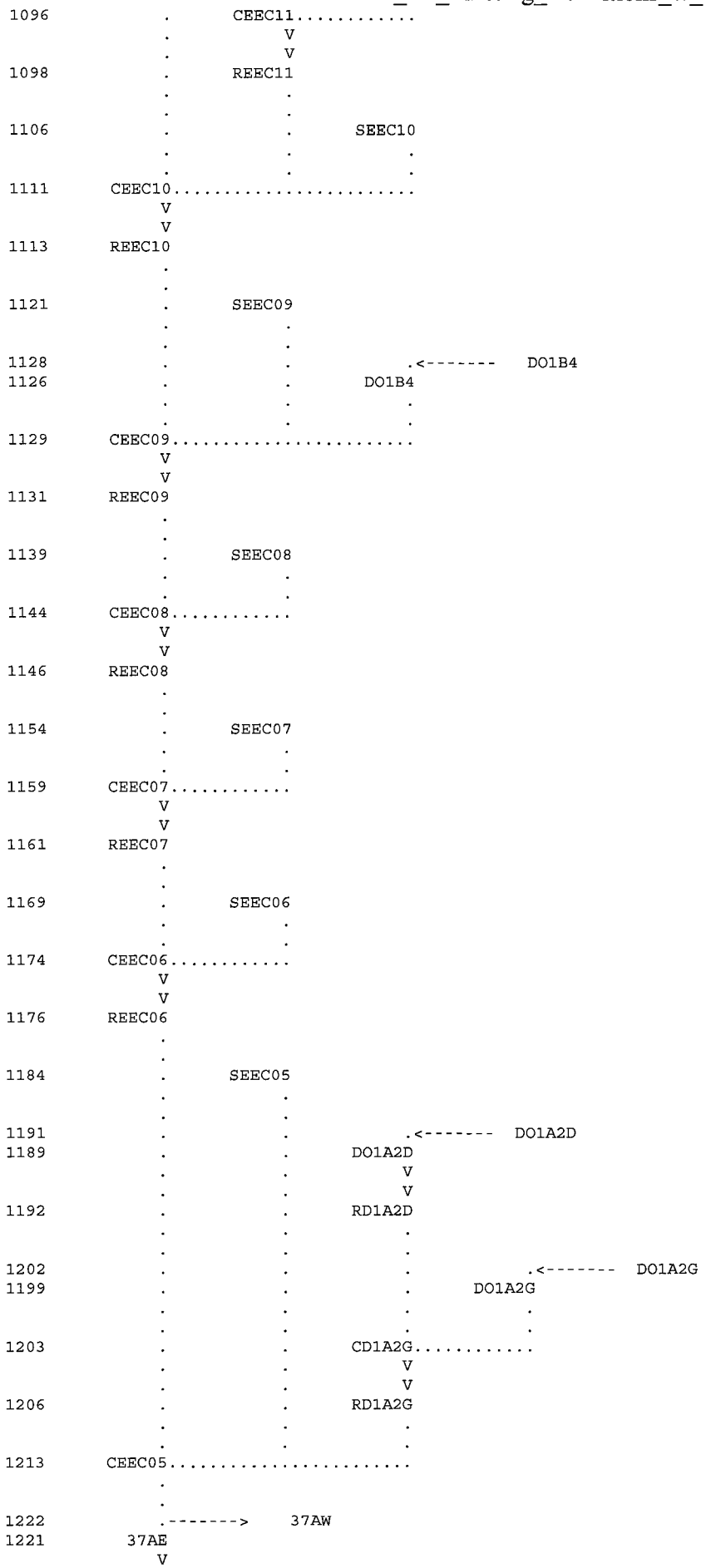
SEEC11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1139 SEEC08
1144 CEEC08
1146 REEC08
1154 SEEC07
1159 CEEC07
1161 REEC07
1169 SEEC06
1174 CEEC06
1176 REEC06
1184 SEEC05
1191
1189 DO1A2D
1192 RD1A2D
1202
1199 DO1A2G
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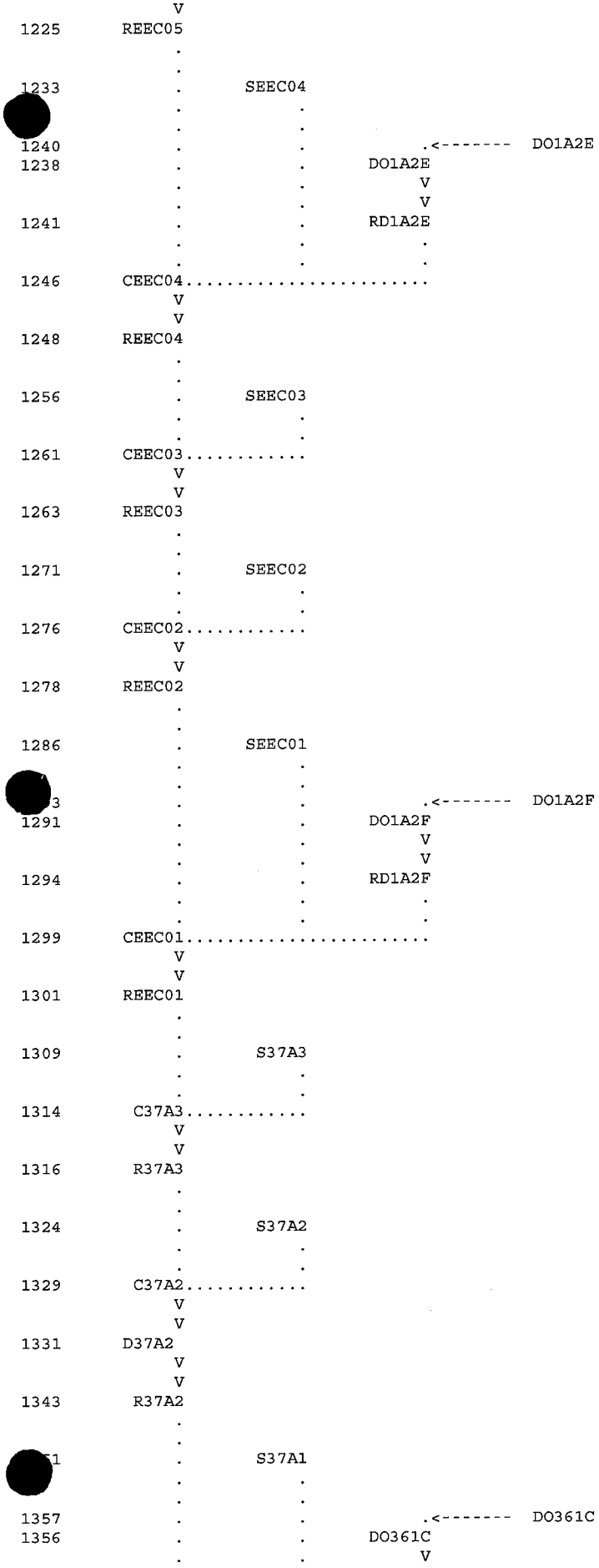
DO1A2D
DO1A2G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1256 SEEC03
1261 CEEC03
V
V
1263 REEC03
1271 SEEC02
1276 CEEC02
V
V
1278 REEC02
1286 SEEC01
.<------- DO1A2F
1291 DO1A2F
V
V
1294 RD1A2F
1299 CEEC01
V
V
1301 REEC01
1309 S37A3
1314 C37A3
V
V
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S37A1
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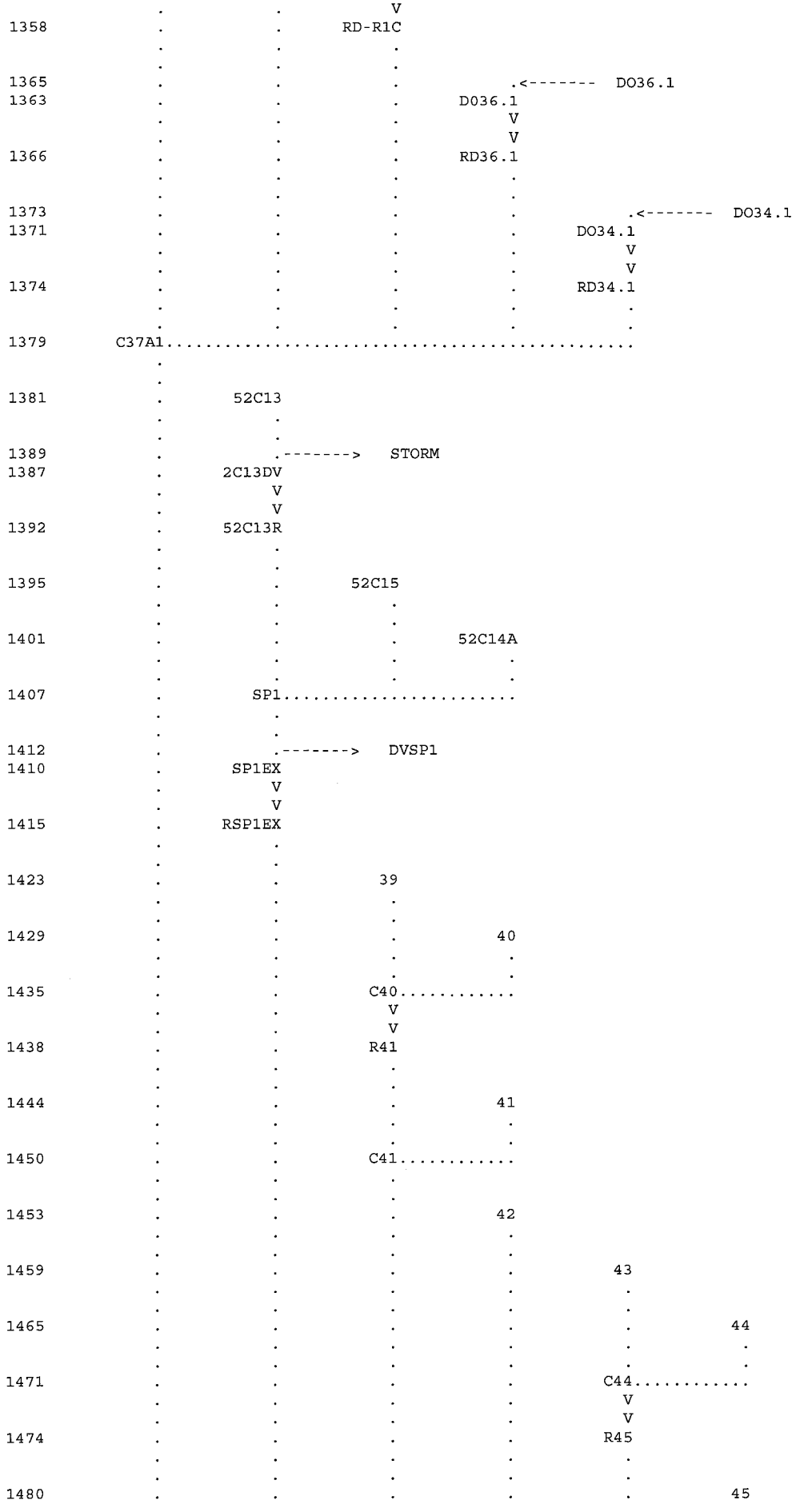
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52C13R
52C15
52C14A
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C40
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C41
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43
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C44
R45
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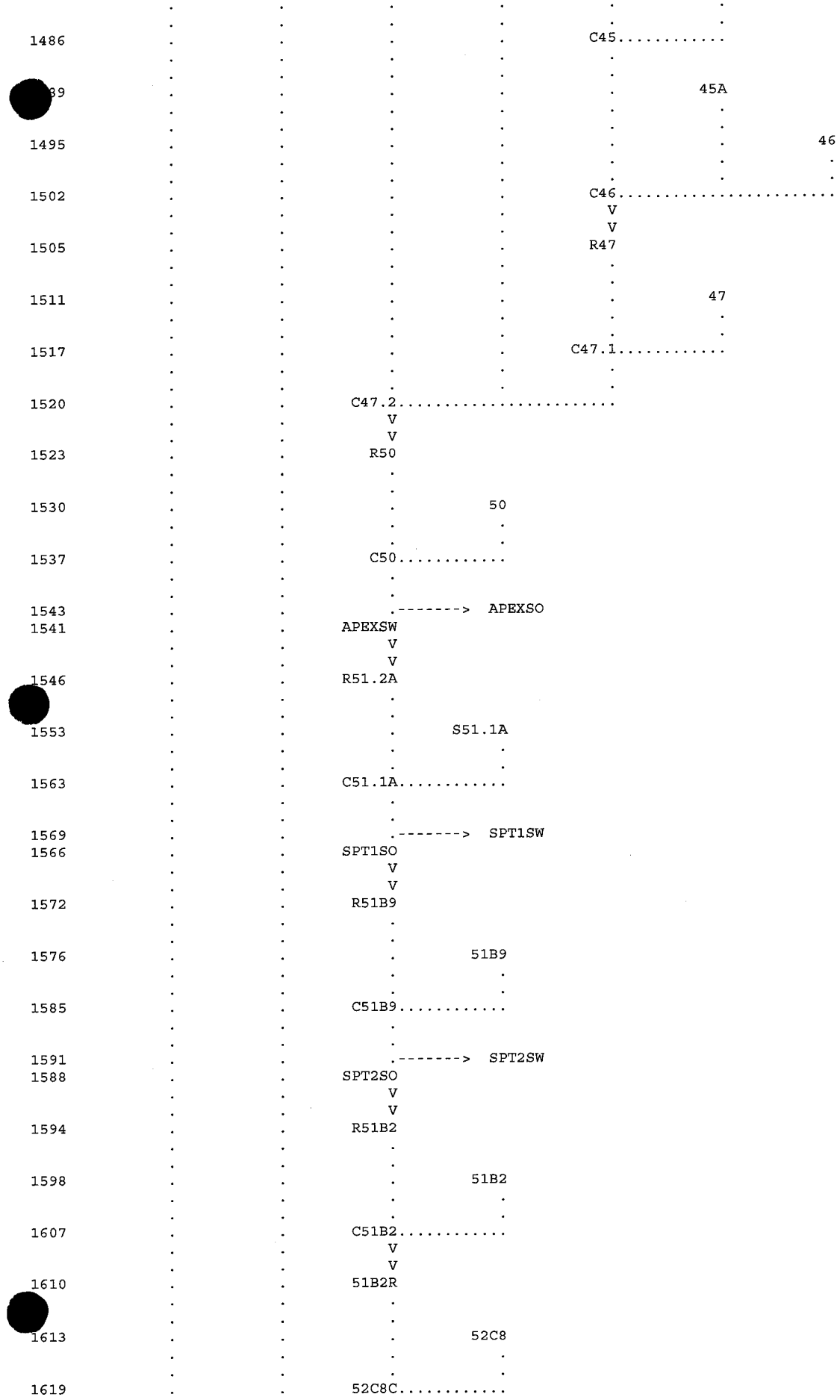
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C46
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C47.2
1523
R50
1530
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1537
C50
1543
APEXSO
1541
APEXSW
1546
R51.2A
1553
S51.1A
1563
C51.1A
1569
SPT1SW
1566
SPT1SO
1572
R51B9
1576
51B9
1585
C51B9
1591
SPT2SW
1588
SPT2SO
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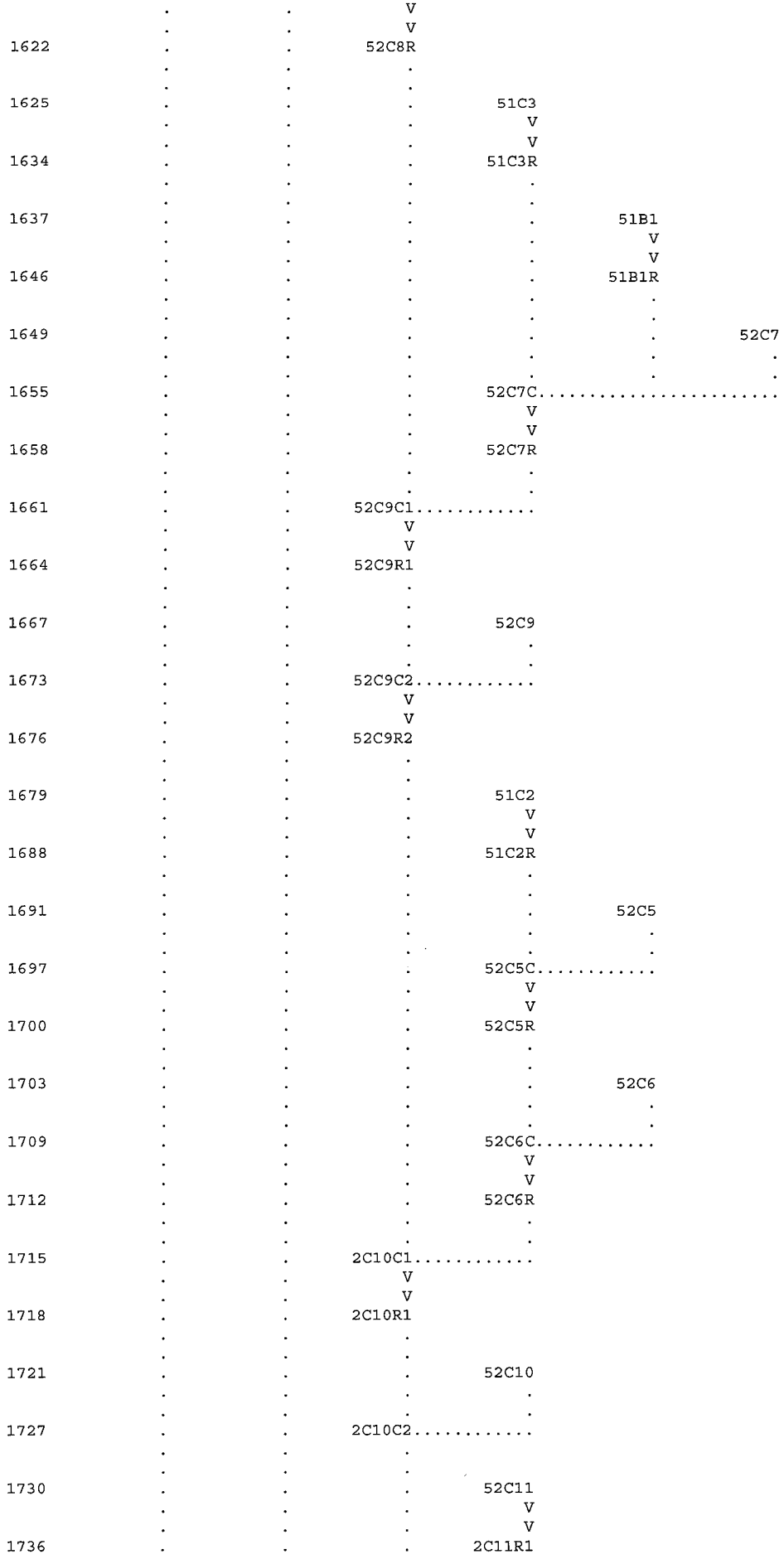
52C8C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1664 52C9R1
1667 52C9
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1676 52C9R2
1679 51C2
1688 51C2R
1691 52C5
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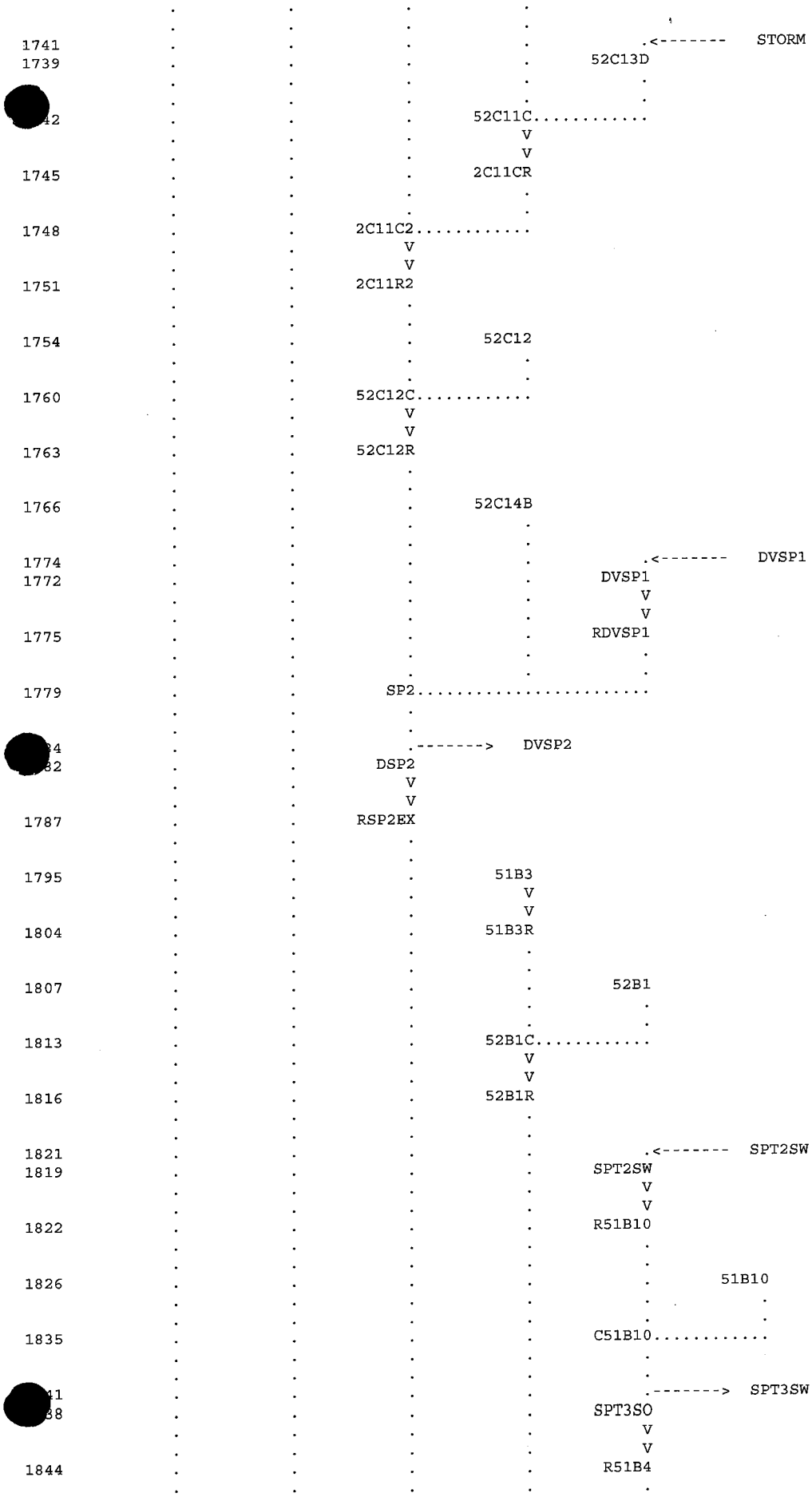
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1760
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DVSP1
DVSP1
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RDVSP1
1779
SP2
DVSP2
DSP2
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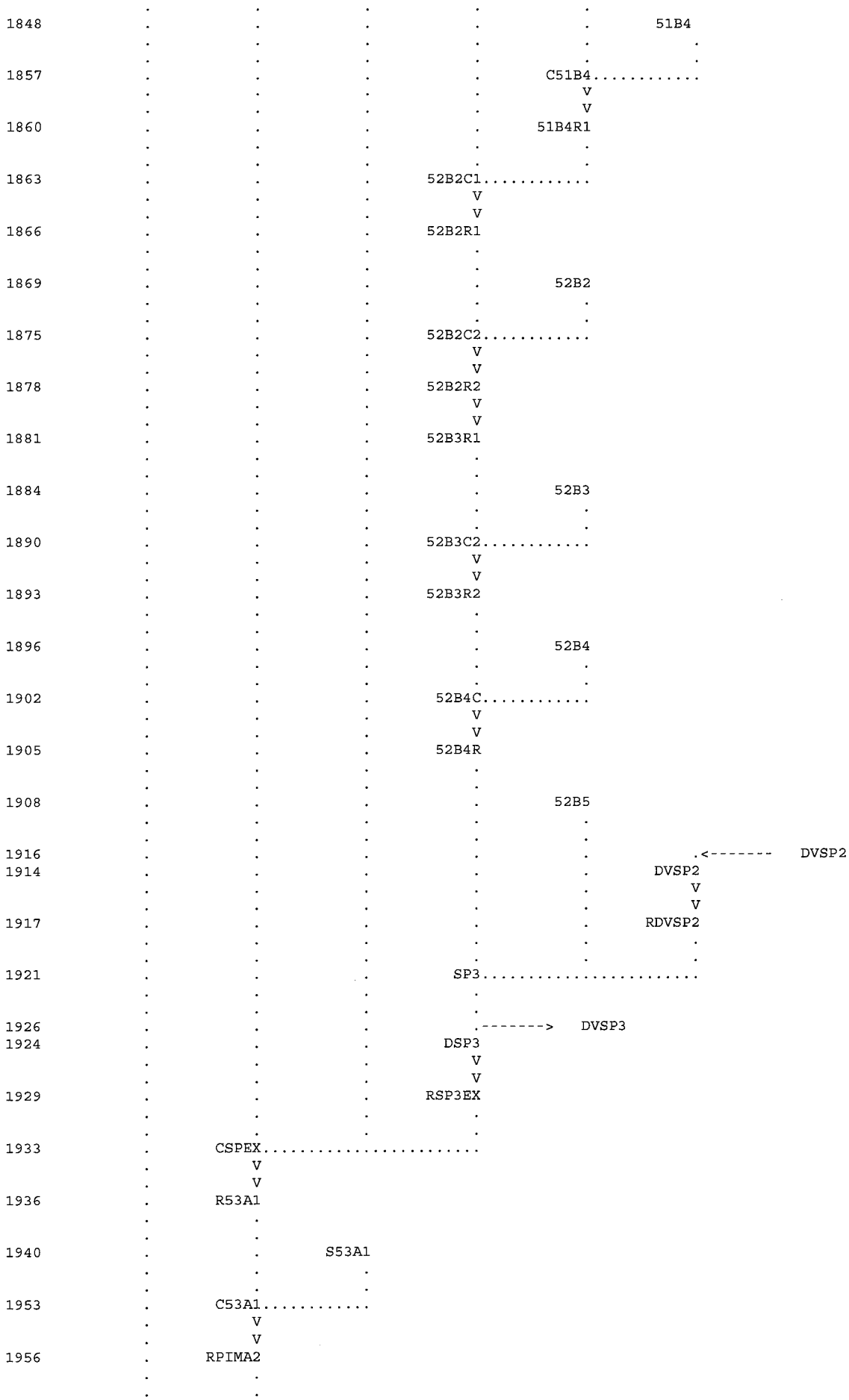
R51B10
1826
51B10
1835
C51B10
SPT3SW
SPT3SO
1844
R51B4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1875
52B2C2
1878
52B2R2
1881
52B3R1
1884
52B3
1890
52B3C2
1893
52B3R2
1896
52B4
1902
52B4C
1905
52B4R
1908
52B5
1916
<-------
DVSP2
1914
DVSP2
1917
RDVSP2
1921
SP3
1926
-------> DVSP3
1924
DSP3
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RSP3EX
1933
CSPEX
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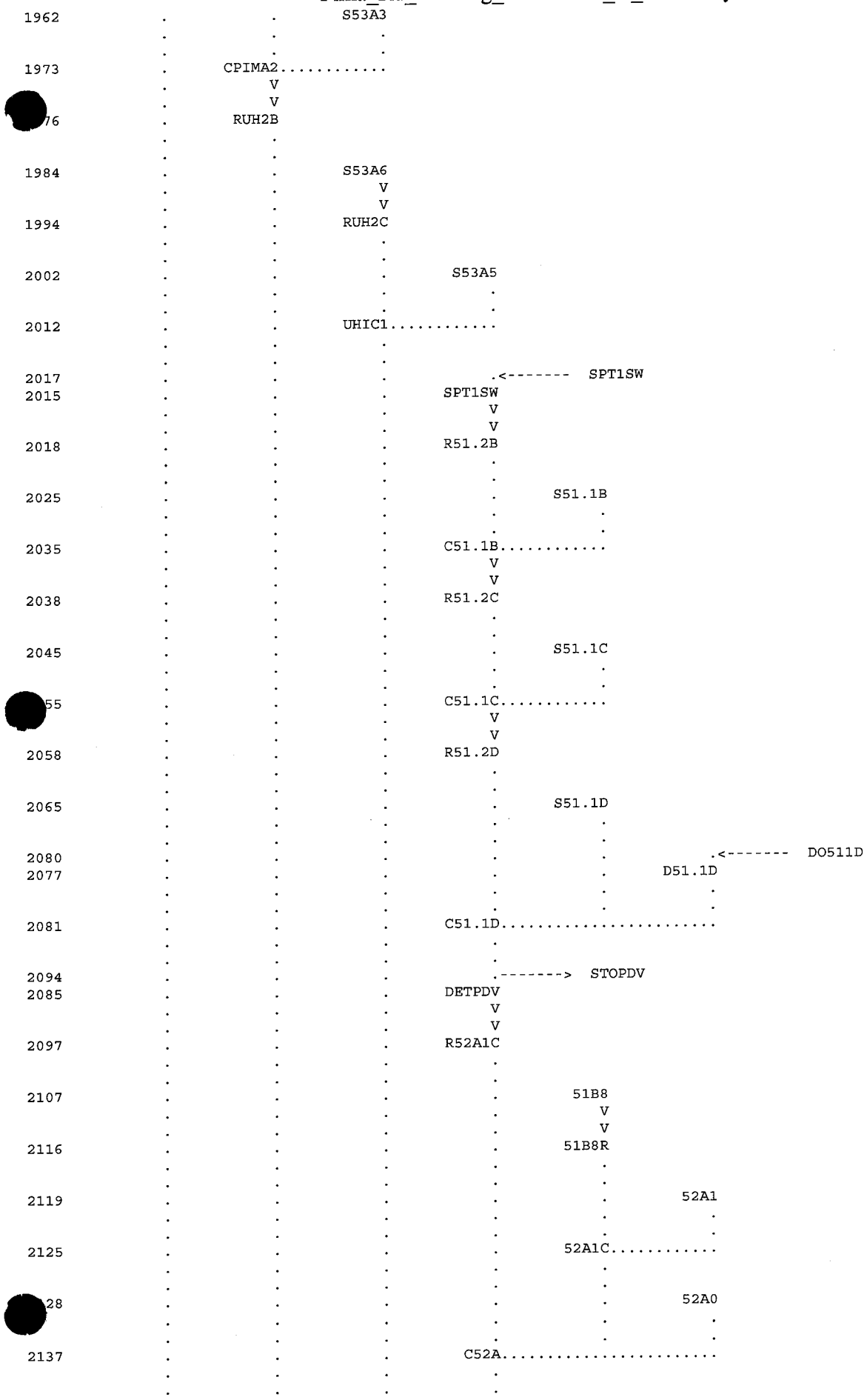
R53A1
1940
S53A1
1953
C53A1
1956
RPIMA2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CPIMA2
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1984
S53A6
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2002
S53A5
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2017
SPT1SW
2015
SPT1SW
2018
R51.2B
2025
S51.1B
2035
C51.1B
2038
R51.2C
2045
S51.1C
2055
C51.1C
2058
R51.2D
2065
S51.1D
2080
DO511D
2077
D51.1D
2081
C51.1D
2094
STOPDV
2085
DETPDV
2097
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52A1C
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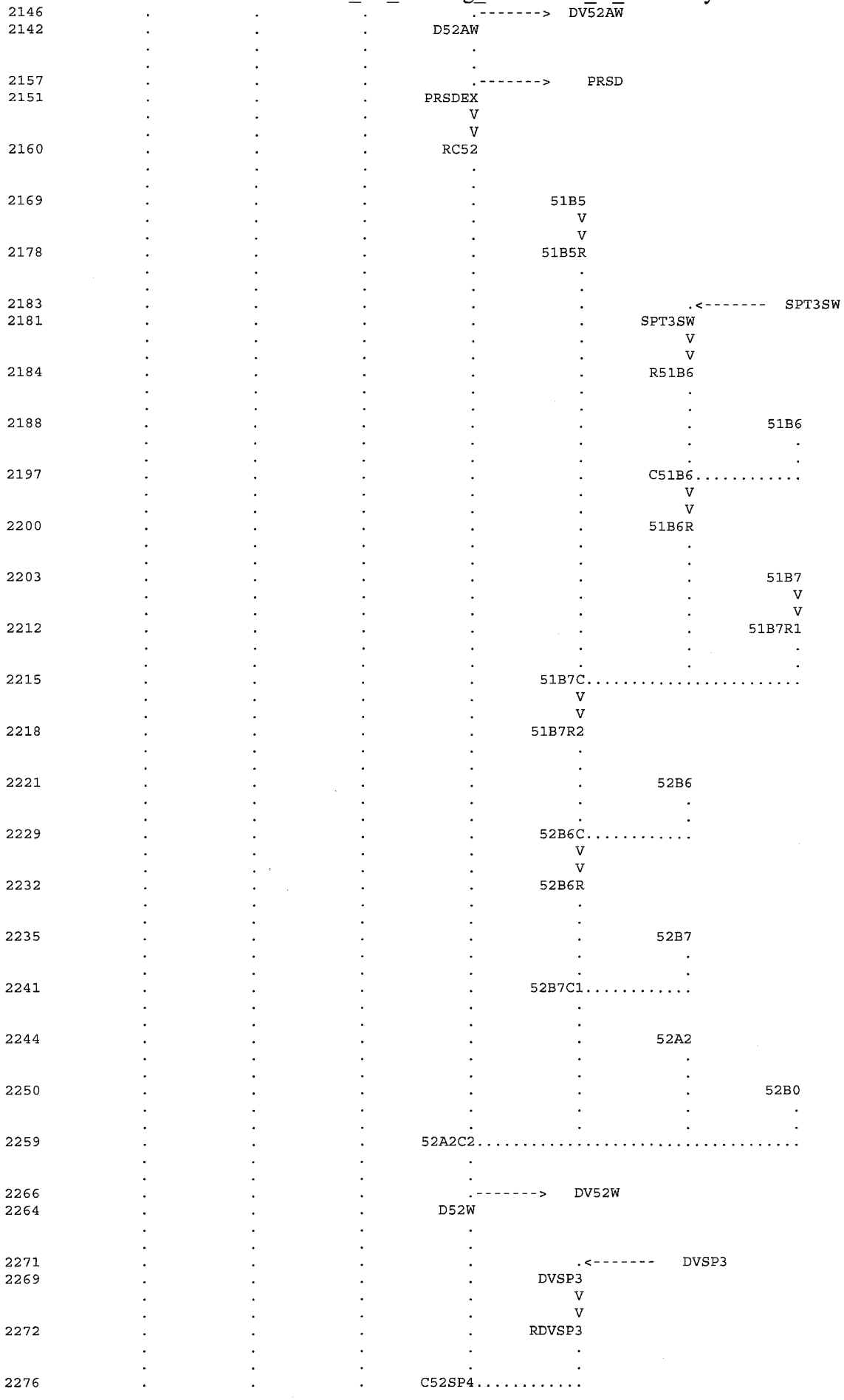
C52A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SPT3SW
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SPT3SW
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R51B6
2188
51B6
2197
C51B6
2200
51B6R
2203
51B7
2212
51B7R1
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51B7C
2218
51B7R2
2221
52B6
2229
52B6C
2232
52B6R
2235
52B7
2241
52B7C1
2244
52A2
2250
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2259
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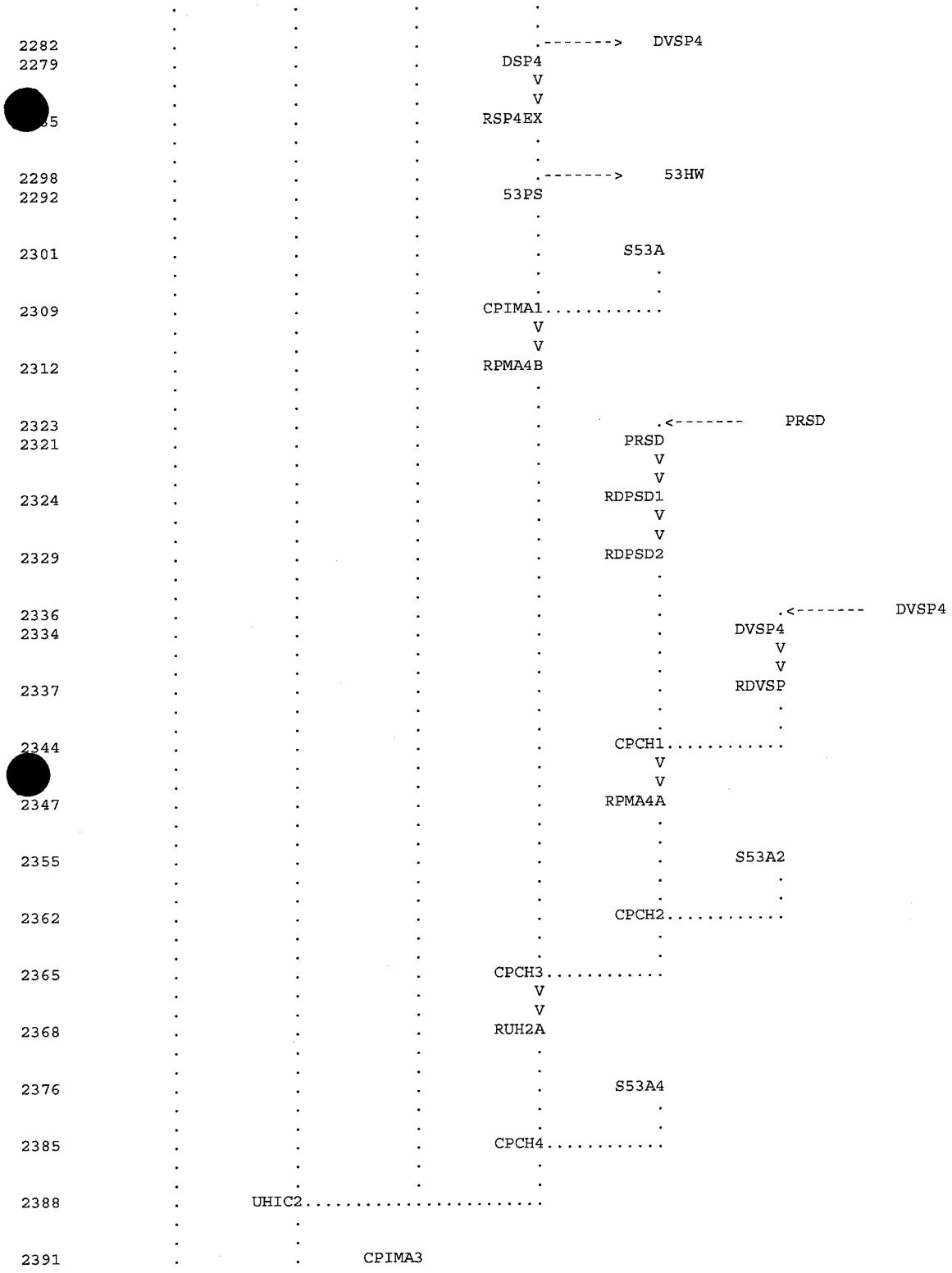

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

		PEAK	TIME OF	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN	MAXIMUM	
OPERATION	STATION	FLOW	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA	STAGE	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
+								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	1304.	3.58	129.	32.	23.	4.64
+								103.48
+								
3.58								
+	HYDROGRAPH AT	S1A2F	19.	3.08	1.	0.	0.	.01
+	2 COMBINED AT	C1A2F	1306.	3.58	130.	33.	24.	4.65
+	DIVERSION TO	DO1A2F	1306.	.00	130.	33.	24.	4.65

```
          HYDROGRAPH AT
+                         D1A2F        0.     .00          0.          0.          0.        4.65
          ROUTED TO
+                         R1A2F        0.     .00          0.          0.          0.        4.65
+                                                                                                    100.00
.00
          HYDROGRAPH AT
+                         S1A2E       65.    3.08          5.          1.          1.         .03
          DIVERSION TO
+                         DOSA2E      65.     .00          5.          1.          1.         .03
          HYDROGRAPH AT
+                         DS-A2E       0.     .00          0.          0.          0.         .03
          2 COMBINED AT
+                         C1A2E        0.     .00          0.          0.          0.        4.68
          DIVERSION TO
+                         DO1A2E       0.     .00          0.          0.          0.        4.68
          HYDROGRAPH AT
+                         D1A2E        0.     .00          0.          0.          0.        4.68
          ROUTED TO
+                         R1A2E        0.     .00          0.          0.          0.        4.68
+                                                                                                    100.00
.00
          HYDROGRAPH AT
+                         S1A2D       33.    3.10          2.          1.          0.         .02
          2 COMBINED AT
+                         C1A2D       33.    3.10          2.          1.          0.        4.70
          DIVERSION TO
+                         DO1A2D      33.     .00          2.          1.          0.        4.70
          HYDROGRAPH AT
+                         D1A2D        0.     .00          0.          0.          0.        4.70
          ROUTED TO
+                         R1A2D        0.     .00          0.          0.          0.        4.70
+                                                                                                    100.00
.00
          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      169.    3.10         11.          3.          2.        4.78
          ROUTED TO
+                         R1A2C      166.    3.10         11.          3.          2.        4.78
+                                                                                                    101.29
3.10
          HYDROGRAPH AT
+                         S1A2G        8.    3.08          1.          0.          0.         .00
          2 COMBINED AT
+                         C1A2G      174.    3.10         11.          3.          2.        4.78
```

+	DIVERSION TO	DO1A2G	151.	3.10	10.	2.	2.	4.78	
+	HYDROGRAPH AT	D1A2G	23.	3.10	1.	0.	0.	4.78	
+	ROUTED TO	R1A2G	21.	3.13	1.	0.	0.	4.78	
+									100.42
3.13									
+	HYDROGRAPH AT	S1B4	47.	3.08	3.	1.	1.	.02	
+	DIVERSION TO	DOSR1D	47.	.00	3.	1.	1.	.02	
+	HYDROGRAPH AT	DS-1B4	0.	.00	0.	0.	0.	.02	
+	2 COMBINED AT	C1B4	21.	3.13	1.	0.	0.	4.80	
+	DIVERSION TO	DO1B4	0.	3.13	0.	0.	0.	4.80	
+	HYDROGRAPH AT	D1B4	21.	3.13	1.	0.	0.	4.80	
+	ROUTED TO	R1B4	20.	3.17	1.	0.	0.	4.80	
+									100.40
3.17									
+	HYDROGRAPH AT	S1B3	239.	3.13	19.	5.	4.	.14	
+	2 COMBINED AT	C1B3	256.	3.15	21.	5.	4.	4.95	
+	ROUTED TO	R1B3	254.	3.15	21.	5.	4.	4.95	
+									101.67
3.15									
+	DIVERSION TO	DO1B3	254.	.00	21.	5.	4.	4.95	
+	HYDROGRAPH AT	D1B3	0.	.00	0.	0.	0.	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	115.	3.12	9.	2.	2.	5.02	
+	DIVERSION TO	DO1B2	115.	.00	9.	2.	2.	5.02	
+	HYDROGRAPH AT	D1B2	0.	.00	0.	0.	0.	5.02	
+	HYDROGRAPH AT	DO1B3	254.	3.15	21.	5.	4.	.00	
+	2 COMBINED AT	CD1A2G	254.	3.15	21.	5.	4.	5.02	
+	ROUTED TO	RD1B2	247.	3.20	21.	5.	4.	5.02	
+									96.34
3.20									

	HYDROGRAPH AT							
+		D1B2	115.	3.12	9.	2.	2.	.00
	ROUTED TO							
+		R1B2	113.	3.13	9.	2.	2.	.00
+								101.00
3.13								
	DIVERSION TO							
+		DO511D	113.	.00	9.	2.	2.	.00
	HYDROGRAPH AT							
+		D51.1D	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		R51.1D	0.	.00	0.	0.	0.	.00
+								.00
3.18								
	HYDROGRAPH AT							
+		SEEC13	22.	3.10	2.	0.	0.	.01
	2 COMBINED AT							
+		CEEC13	22.	3.10	2.	0.	0.	.01
	ROUTED TO							
+		REEC13	22.	3.10	2.	0.	0.	.01
+								.39
3.10								
	HYDROGRAPH AT							
+		SEEC12	3.	3.07	0.	0.	0.	.00
	2 COMBINED AT							
+		CEEC12	25.	3.10	2.	0.	0.	.01
	ROUTED TO							
+		REEC12	25.	3.10	2.	0.	0.	.01
+								.42
3.10								
	HYDROGRAPH AT							
+		SEEC11	15.	3.13	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC11	39.	3.12	3.	1.	1.	.02
	ROUTED TO							
+		REEC11	39.	3.12	3.	1.	1.	.02
+								.55
3.12								
	HYDROGRAPH AT							
+		SEEC10	33.	3.13	3.	1.	1.	.02
	3 COMBINED AT							
+		CEEC10	303.	3.20	27.	7.	5.	5.05
	ROUTED TO							
+		REEC10	303.	3.20	27.	7.	5.	5.05
+								1.89
3.20								
	HYDROGRAPH AT							
+		SEEC09	44.	3.17	4.	1.	1.	.02
	HYDROGRAPH AT							
+		DO1B4	0.	.00	0.	0.	0.	.00
	3 COMBINED AT							
+		CEEC09	345.	3.20	31.	8.	6.	5.07
	ROUTED TO							
+		REEC09	340.	3.22	31.	8.	6.	5.07
+								2.00
3.22								
	HYDROGRAPH AT							
+		SEEC08	34.	3.37	5.	1.	1.	.03

	2 COMBINED AT							
+		CEEC08	370.	3.22	36.	9.	7.	5.10
	ROUTED TO							
+		REEC08	368.	3.22	36.	9.	7.	5.10
+								2.08
3								
	HYDROGRAPH AT							
+		SEEC07	13.	3.08	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC07	374.	3.22	37.	9.	7.	5.11
	ROUTED TO							
+		REEC07	373.	3.23	37.	9.	7.	5.11
+								2.09
3.23								
	HYDROGRAPH AT							
+		SEEC06	6.	3.08	0.	0.	0.	.00
	2 COMBINED AT							
+		CEEC06	375.	3.23	37.	9.	7.	5.11
	ROUTED TO							
+		REEC06	371.	3.23	37.	9.	7.	5.11
+								2.09
3.23								
	HYDROGRAPH AT							
+		SEEC05	114.	3.22	13.	3.	2.	.07
	HYDROGRAPH AT							
+		DO1A2D	33.	3.10	2.	1.	0.	.00
	ROUTED TO							
+		RD1A2D	30.	3.15	2.	1.	0.	.00
+								95.38
3.15								
	HYDROGRAPH AT							
+		DO1A2G	151.	3.10	10.	2.	2.	.00
	2 COMBINED AT							
+		CD1A2G	169.	3.12	12.	3.	2.	.00
	ROUTED TO							
+		RD1A2G	149.	3.25	12.	3.	2.	.00
+								96.02
3.25								
	3 COMBINED AT							
+		CEEC05	632.	3.25	62.	16.	11.	5.18
	DIVERSION TO							
+		37AW	632.	.00	62.	16.	11.	5.18
	HYDROGRAPH AT							
+		37AE	0.	.00	0.	0.	0.	5.18
	ROUTED TO							
+		REEC05	0.	.00	0.	0.	0.	5.18
+								.00
3.37								
	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
.								
	3 COMBINED AT							
+		CEEC04	184.	3.27	22.	6.	4.	5.31
	ROUTED TO							

+		REEC04	184.	3.27	22.	6.	4.	5.31
+								1.41
3.27								
	HYDROGRAPH AT							
+		SEEC03	9.	3.20	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC03	192.	3.27	23.	6.	4.	5.32
	ROUTED TO							
+		REEC03	192.	3.27	23.	6.	4.	5.32
+								1.45
3.27								
	HYDROGRAPH AT							
+		SEEC02	26.	3.10	2.	0.	0.	.01
	2 COMBINED AT							
+		CEEC02	202.	3.27	25.	6.	5.	5.33
	ROUTED TO							
+		REEC02	202.	3.27	25.	6.	5.	5.33
+								1.49
3.27								
	HYDROGRAPH AT							
+		SEEC01	254.	3.28	33.	8.	6.	.19
	HYDROGRAPH AT							
+		DO1A2F	1306.	3.58	130.	33.	24.	.00
	ROUTED TO							
+		RD1A2F	1273.	3.70	130.	33.	24.	.00
+								98.41
3.70								
	3 COMBINED AT							
+		CEEC01	1421.	3.68	186.	47.	34.	5.51
	ROUTED TO							
+		REEC01	1415.	3.72	186.	47.	34.	5.51
+								3.81
3.72								
	HYDROGRAPH AT							
+		S37A3	204.	3.20	21.	5.	4.	.12
	2 COMBINED AT							
+		C37A3	1457.	3.70	206.	52.	38.	5.63
	ROUTED TO							
+		R37A3	1456.	3.72	206.	52.	38.	5.63
+								3.85
3.72								
	HYDROGRAPH AT							
+		S37A2	89.	3.43	15.	4.	3.	.08
	2 COMBINED AT							
+		C37A2	1504.	3.72	221.	56.	41.	5.72
	ROUTED TO							
+		D37A2	1504.	3.72	216.	54.	39.	5.72
+								1791.00
3.67								
	ROUTED TO							
+		R37A2	1502.	3.73	216.	54.	39.	5.72
+								3.90
3.73								
	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
3.73							
	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	2126.	3.75	503.	209.	165.	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	0.	3.10	0.	0.	0.	.11
	HYDROGRAPH AT						
+	SP1EX	294.	3.10	24.	6.	4.	.11
	ROUTED TO						
+	RSP1EX	280.	3.17	24.	6.	4.	.11
+							3.46
3.17							
	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	
+									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	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						
+		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	0.	.00	0.	0.	0.	.00
	ROUTED TO						
+		RDVSP1	0.	.00	0.	0.	0.	.00
	3 COMBINED AT						
+		SP2	3617.	3.53	465.	118.	85.	8.33
	DIVERSION TO						
+		DVSP2	0.	3.53	0.	0.	0.	8.33
	HYDROGRAPH AT						
+		DSP2	3617.	3.53	465.	118.	85.	8.33
	ROUTED TO						
+		RSP2EX	3610.	3.55	465.	118.	85.	8.33
+								6.41
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
+	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	0.	3.43	0.	0.	0.	.00
+	ROUTED TO	RDVSP2	0.	4.62	0.	0.	0.	.00

	3 COMBINED AT							
+		SP3	1067.	3.58	150.	38.	28.	.22
	DIVERSION TO							
+		DVSP3	0.	3.58	0.	0.	0.	.22
	HYDROGRAPH AT							
+		DSP3	1067.	3.58	150.	38.	28.	.22
	ROUTED TO							
+		RSP3EX	1064.	3.63	150.	38.	28.	.22
	3 COMBINED AT							
+		CSPEX	4652.	3.58	637.	163.	117.	8.65
	ROUTED TO							
+		R53A1	4642.	3.60	637.	163.	118.	8.65
	HYDROGRAPH AT							
+		S53A1	317.	3.28	36.	9.	6.	.18
	2 COMBINED AT							
+		C53A1	4775.	3.60	673.	172.	124.	8.84
	ROUTED TO							
+		RPIMA2	4768.	3.62	673.	172.	124.	8.84
	HYDROGRAPH AT							
+		S53A3	159.	3.18	14.	4.	3.	.07
	2 COMBINED AT							
+		CPIMA2	4808.	3.62	687.	176.	127.	8.91
	ROUTED TO							
+		RUH2B	4791.	3.63	687.	176.	127.	8.91
+								6.66
3.63								
	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	113.	3.13	9.	2.	2.	.00
+	3 COMBINED AT	C51.1D	3261.	3.50	433.	110.	79.	1.05
+	DIVERSION TO	STOPDV	265.	3.50	9.	2.	2.	1.05
+	HYDROGRAPH AT	DETPDV	3261.	3.50	427.	108.	78.	1.05
+	ROUTED TO	R52A1C	3248.	3.53	427.	108.	78.	1.05
+								5.50
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
+	HYDROGRAPH AT	52A0	118.	3.08	7.	2.	1.	.04
+	3 COMBINED AT	C52A	3388.	3.53	465.	118.	85.	1.25
+	DIVERSION TO	DV52AW	274.	3.53	29.	7.	5.	1.25
+	HYDROGRAPH AT	D52AW	3114.	3.53	435.	110.	80.	1.25
+	DIVERSION TO	PRSD	600.	3.53	256.	66.	47.	1.25
+	HYDROGRAPH AT	PRSDEX	2514.	3.53	179.	45.	32.	1.25
+	ROUTED TO	RC52	2500.	3.58	179.	45.	32.	1.25
+								2.95
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	3296.	3.60	332.	84.	61.	1.59
	DIVERSION TO							
+		DV52W	0.	3.60	0.	0.	0.	1.59
	HYDROGRAPH AT							
+		D52W	3296.	3.60	332.	84.	61.	1.59
	HYDROGRAPH AT							
+		DVSP3	0.	3.53	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP3	0.	.00	0.	0.	0.	.00
	2 COMBINED AT							
+		C52SP4	3296.	3.60	332.	84.	61.	1.59
	DIVERSION TO							
+		DVSP4	0.	3.60	0.	0.	0.	1.59
	HYDROGRAPH AT							
+		DSP4	3296.	3.60	332.	84.	61.	1.59
	ROUTED TO							
+		RSP4EX	3294.	3.63	331.	84.	61.	1.59
+								3.19
3.63								
	DIVERSION TO							
+		53HW	0.	3.63	0.	0.	0.	1.59
	HYDROGRAPH AT							
+		53PS	3294.	3.63	331.	84.	61.	1.59
	HYDROGRAPH AT							
+		S53A	225.	3.25	24.	6.	4.	.13
	2 COMBINED AT							
+		CPIMA1	3371.	3.63	356.	90.	65.	1.71
	ROUTED TO							
+		RPMA4B	3374.	3.65	356.	90.	65.	1.71
+								3.19
3.65								
	HYDROGRAPH AT							
+		PRSD	600.	3.23	256.	66.	47.	.00
	ROUTED TO							
+		RDPSD1	600.	3.25	256.	66.	47.	.00

	ROUTED TO							
+		RDPSD2	600.	3.27	256.	66.	47.	.00	
	HYDROGRAPH AT							
+		DVSP4	0.	3.55	0.	0.	0.	.00	
	ROUTED TO							
+		RDVSP	0.	3.62	0.	0.	0.	.00	
+									.00
3.72									
	2 COMBINED AT								
+		CPCH1	600.	3.67	256.	66.	47.	.00	
	ROUTED TO								
+		RPMA4A	600.	3.37	256.	66.	47.	.00	
+									1.69
3.75									
	HYDROGRAPH AT								
+		S53A2	131.	3.12	11.	3.	2.	.05	
	2 COMBINED AT								
+		CPCH2	650.	3.33	266.	68.	49.	.05	
	2 COMBINED AT								
+		CPCH3	3995.	3.65	620.	158.	114.	1.77	
	ROUTED TO								
+		RUH2A	3971.	3.67	620.	158.	114.	1.77	
+									4.56
3.67									
	HYDROGRAPH AT								
+		S53A4	128.	3.13	11.	3.	2.	.05	
	2 COMBINED AT								
+		CPCH4	3992.	3.67	630.	161.	116.	1.82	
	3 COMBINED AT								
+		UHIC2	8732.	3.67	1326.	339.	245.	10.78	
	HYDROGRAPH AT								
+		CPIMA3	192.	3.15	18.	5.	3.	.07	

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*                                   *
*   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

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	MAX TIME OF STAGE
+	HYDROGRAPH AT	S30N	437.	3.45	64.	16.	12.	.65		
+	ROUTED TO	R30N	434.	3.50	64.	16.	12.	.65	102.47	3.50
+	HYDROGRAPH AT	S31.1	128.	3.48	20.	5.	4.	.27		
+	2 COMBINED AT	C31.1	562.	3.50	85.	21.	15.	.92		
+	HYDROGRAPH AT	S34.2	222.	3.45	34.	9.	6.	.44		
+	2 COMBINED AT	C34.2	779.	3.48	119.	30.	22.	1.36		
+	HYDROGRAPH AT	S35N	485.	3.28	54.	14.	10.	.55		
+	DIVERSION TO	D35NL	218.	3.28	24.	6.	4.	.55		
+	HYDROGRAPH AT	D35NR	267.	3.28	31.	8.	6.	.55		
+	ROUTED TO	R35NR	262.	3.38	31.	8.	6.	.55	101.14	3.38
+	HYDROGRAPH AT	S36.2	126.	3.33	16.	4.	3.	.21		
+	2 COMBINED AT	C36.2	382.	3.37	47.	12.	8.	.76		
+	DIVERSION TO	D36.2L	6.	3.37	0.	0.	0.	.76		
+	HYDROGRAPH AT	D36.2R	376.	3.37	47.	12.	8.	.76		

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                ROUTED TO
+                               R36.2R      322.    3.78      47.      12.       8.      .76
+                                                                                          101.02
3.78

                HYDROGRAPH AT
+                               S34.1       611.    3.42      91.      23.      17.     1.17

                2 COMBINED AT
+                               C34.1       633.    3.75     137.      35.      25.     1.93

                2 COMBINED AT
+                               HVDB-I     1367.    3.45     256.      65.      47.     3.29

                ROUTED TO
+                               HVDB-O      107.    6.42     104.      65.      47.     3.29
+                                                                                          2080.21
6.40

                DIVERSION TO
+                               DO34.1      107.     .00     104.      65.      47.     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        48.    3.58       9.       2.       2.      .14

                2 COMBINED AT
+                               C36.1        48.    3.58       9.       2.       2.     3.43

                DIVERSION TO
+                               DO36.1       48.     .00       9.       2.       2.     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       218.    3.28      24.       6.       4.      .00

                ROUTED TO
+                               R35NL       199.    3.67      24.       6.       4.      .00
+                                                                                          102.37
3.67

                HYDROGRAPH AT
+                               B36.2L        6.    3.37       0.       0.       0.      .00

                ROUTED TO
+                               R36.2L        1.    4.77       0.       0.       0.      .00
+                                                                                          100.02
4.78

                HYDROGRAPH AT
+                               S36R1A      201.    3.68      40.      10.       7.      .63

                4 COMBINED AT
+                               C36R1A      400.    3.67      63.      16.      12.     4.06

                ROUTED TO
+                               R36R1A      399.    3.68      63.      16.      12.     4.06
+                                                                                          102.17
3.68

                HYDROGRAPH AT
+                               S36R1C       27.    3.52       5.       1.       1.      .08

                DIVERSION TO
+                               DOSR1C       27.     .00       5.       1.       1.      .08
```

+	HYDROGRAPH AT	DS-R1C	0.	.00	0.	0.	0.	.08	
+	2 COMBINED AT	C36R1C	399.	3.68	63.	16.	12.	4.14	
+	DIVERSION TO	DO361C	234.	3.68	57.	15.	11.	4.14	
+	HYDROGRAPH AT	D36R1C	165.	3.68	6.	1.	1.	4.14	
+	HYDROGRAPH AT	S36R1D	153.	3.65	32.	8.	6.	.50	
+	DIVERSION TO	DOSR1D	97.	3.65	3.	1.	1.	.50	
+	HYDROGRAPH AT	DS-R1D	153.	3.65	29.	7.	5.	.50	
+	2 COMBINED AT	C36R1D	317.	3.68	35.	9.	6.	4.64	
+	ROUTED TO	R36R1D	317.	3.68	35.	9.	6.	4.64	
+									101.88
3.68									
+	HYDROGRAPH AT	S1A2F	7.	3.12	1.	0.	0.	.01	
+	2 COMBINED AT	C1A2F	318.	3.68	35.	9.	7.	4.65	
+	DIVERSION TO	DO1A2F	318.	.00	35.	9.	7.	4.65	
+	HYDROGRAPH AT	D1A2F	0.	.00	0.	0.	0.	4.65	
+	ROUTED TO	R1A2F	0.	.00	0.	0.	0.	4.65	
+									100.00
.00									
+	HYDROGRAPH AT	S1A2E	25.	3.12	2.	1.	0.	.03	
+	DIVERSION TO	DOSA2E	25.	.00	2.	1.	0.	.03	
+	HYDROGRAPH AT	DS-A2E	0.	.00	0.	0.	0.	.03	
+	2 COMBINED AT	C1A2E	0.	.00	0.	0.	0.	4.68	
+	DIVERSION TO	DO1A2E	0.	.00	0.	0.	0.	4.68	
+	HYDROGRAPH AT	D1A2E	0.	.00	0.	0.	0.	4.68	
+	ROUTED TO	R1A2E	0.	.00	0.	0.	0.	4.68	
+									100.00
.00									
+	HYDROGRAPH AT	S1A2D	13.	3.13	1.	0.	0.	.02	
+	2 COMBINED AT	C1A2D	13.	3.13	1.	0.	0.	4.70	
+	DIVERSION TO	DO1A2D	13.	.00	1.	0.	0.	4.70	
+	HYDROGRAPH AT	D1A2D	0.	.00	0.	0.	0.	4.70	

```
          ROUTED TO
+                        R1A2D      0.    .00        0.        0.        0.      4.70
+                                                                                        100.00
.00

          HYDROGRAPH AT
+                        S1A2A     39.   3.13        4.        1.        1.       .05

          DIVERSION TO
+                       DOSA2A     39.   3.25        2.        0.        0.       .05

          HYDROGRAPH AT
+                       DS-A2A     23.   3.25        2.        1.        0.       .05

          HYDROGRAPH AT
+                        S1A2B     19.   3.13        2.        0.        0.       .02

          2 COMBINED AT
+                        C1A2B     34.   3.25        4.        1.        1.       .07

          HYDROGRAPH AT
+                        S1A2C      8.   3.12        1.        0.        0.       .01

          3 COMBINED AT
+                        C1A2C     38.   3.25        4.        1.        1.      4.78

          ROUTED TO
+                        R1A2C     34.   3.27        4.        1.        1.      4.78
+                                                                                        100.53
3.27

          HYDROGRAPH AT
+                        S1A2G      3.   3.10        0.        0.        0.       .00

          2 COMBINED AT
+                        C1A2G     36.   3.27        5.        1.        1.      4.78

          DIVERSION TO
+                       DO1A2G     31.   3.27        4.        1.        1.      4.78

          HYDROGRAPH AT
+                        D1A2G      5.   3.27        1.        0.        0.      4.78

          ROUTED TO
+                        R1A2G      4.   3.32        1.        0.        0.      4.78
+                                                                                        100.10
3.32

          HYDROGRAPH AT
+                         S1B4     16.   3.12        1.        0.        0.       .02

          DIVERSION TO
+                       DOSR1D     16.    .00        1.        0.        0.       .02

          HYDROGRAPH AT
+                       DS-1B4      0.    .00        0.        0.        0.       .02

          2 COMBINED AT
+                         C1B4      4.   3.32        1.        0.        0.      4.80

          DIVERSION TO
+                       DO1B4       0.   3.32        0.        0.        0.      4.80

          HYDROGRAPH AT
+                         D1B4      4.   3.32        1.        0.        0.      4.80

          ROUTED TO
+                         R1B4      4.   3.35        1.        0.        0.      4.80
+                                                                                        100.09
3.35

          HYDROGRAPH AT
+                         S1B3     79.   3.20        9.        2.        2.       .14

          2 COMBINED AT
+                         C1B3     82.   3.20        9.        2.        2.      4.95

          ROUTED TO
+                         R1B3     82.   3.22        9.        2.        2.      4.95
+                                                                                        100.92
3.22
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+	DIVERSION TO	DO1B3	82.	.00	9.	2.	2.	4.95	
+	HYDROGRAPH AT	D1B3	0.	.00	0.	0.	0.	4.95	
+	HYDROGRAPH AT	S1B1	21.	3.13	2.	0.	0.	.03	
+	ROUTED TO	R1B1	21.	3.15	2.	0.	0.	.03	
+									100.40
3.15									
+	HYDROGRAPH AT	S1B2	17.	3.22	2.	1.	0.	.04	
+	3 COMBINED AT	C1B2	36.	3.17	4.	1.	1.	5.02	
+	DIVERSION TO	DO1B2	36.	.00	4.	1.	1.	5.02	
+	HYDROGRAPH AT	D1B2	0.	.00	0.	0.	0.	5.02	
+	HYDROGRAPH AT	DO1B3	82.	3.22	9.	2.	2.	.00	
+	2 COMBINED AT	CD1A2G	82.	3.22	9.	2.	2.	5.02	
+	ROUTED TO	RD1B2	79.	3.28	9.	2.	2.	5.02	
+									95.69
3.28									
+	HYDROGRAPH AT	D1B2	36.	3.17	4.	1.	1.	.00	
+	ROUTED TO	R1B2	36.	3.20	4.	1.	1.	.00	
+									100.51
3.20									
+	DIVERSION TO	DO511D	36.	.00	4.	1.	1.	.00	
+	HYDROGRAPH AT	D51.1D	0.	.00	0.	0.	0.	.00	
+	ROUTED TO	R51.1D	0.	.00	0.	0.	0.	.00	
+									.00
3.47									
+	HYDROGRAPH AT	SEEC13	10.	3.12	1.	0.	0.	.01	
+	2 COMBINED AT	CEEC13	10.	3.12	1.	0.	0.	.01	
+	ROUTED TO	REEC13	9.	3.13	1.	0.	0.	.01	
+									.20
3.13									
+	HYDROGRAPH AT	SEEC12	2.	3.08	0.	0.	0.	.00	
+	2 COMBINED AT	CEEC12	11.	3.13	1.	0.	0.	.01	
+	ROUTED TO	REEC12	10.	3.15	1.	0.	0.	.01	
+									.22
3.15									
+	HYDROGRAPH AT	SEEC11	6.	3.18	1.	0.	0.	.01	

	2 COMBINED AT							
+		CEEC11	16.	3.17	2.	0.	0.	.02	
	ROUTED TO							
+		REEC11	16.	3.17	2.	0.	0.	.02	
+									.33
3.17									
	HYDROGRAPH AT							
+		SEEC10	14.	3.18	1.	0.	0.	.02	
	3 COMBINED AT							
+		CEEC10	100.	3.27	12.	3.	2.	5.05	
	ROUTED TO							
+		REEC10	100.	3.28	12.	3.	2.	5.05	
+									.99
3.28									
	HYDROGRAPH AT							
+		SEEC09	18.	3.22	2.	1.	0.	.02	
	HYDROGRAPH AT							
+		DO1B4	0.	.00	0.	0.	0.	.00	
	3 COMBINED AT							
+		CEEC09	116.	3.28	15.	4.	3.	5.07	
	ROUTED TO							
+		REEC09	115.	3.28	15.	4.	3.	5.07	
+									1.07
3.28									
	HYDROGRAPH AT							
+		SEEC08	14.	3.47	3.	1.	0.	.03	
	2 COMBINED AT							
+		CEEC08	128.	3.28	17.	4.	3.	5.10	
	ROUTED TO							
+		REEC08	127.	3.30	17.	4.	3.	5.10	
+									1.13
3.30									
	HYDROGRAPH AT							
+		SEEC07	6.	3.12	0.	0.	0.	.01	
	2 COMBINED AT							
+		CEEC07	129.	3.30	18.	4.	3.	5.11	
	ROUTED TO							
+		REEC07	129.	3.32	18.	4.	3.	5.11	
+									1.14
3.32									
	HYDROGRAPH AT							
+		SEEC06	3.	3.12	0.	0.	0.	.00	
	2 COMBINED AT							
+		CEEC06	130.	3.32	18.	5.	3.	5.11	
	ROUTED TO							
+		REEC06	129.	3.33	18.	5.	3.	5.11	
+									1.14
3.33									
	HYDROGRAPH AT							
+		SEEC05	46.	3.30	7.	2.	1.	.07	
	HYDROGRAPH AT							
+		DO1A2D	13.	3.13	1.	0.	0.	.00	
	ROUTED TO							
+		RD1A2D	11.	3.23	1.	0.	0.	.00	
+									95.17
3.23									
	HYDROGRAPH AT							
+		DO1A2G	31.	3.27	4.	1.	1.	.00	

	2 COMBINED AT							
+		CD1A2G	42.	3.27	5.	1.	1.	.00
	ROUTED TO							
+		RD1A2G	36.	3.45	5.	1.	1.	.00
+								95.43
3								
	3 COMBINED AT							
+		CEEC05	196.	3.37	30.	8.	5.	5.18
	DIVERSION TO							
+		37AW	196.	.00	30.	8.	5.	5.18
	HYDROGRAPH AT							
+		37AE	0.	.00	0.	0.	0.	5.18
	ROUTED TO							
+		REEC05	0.	.00	0.	0.	0.	5.18
+								.00
3.28								
	HYDROGRAPH AT							
+		SEEC04	75.	3.33	11.	3.	2.	.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	75.	3.33	11.	3.	2.	5.31
	ROUTED TO							
+		REEC04	75.	3.33	11.	3.	2.	5.31
+								.83
3.33								
	HYDROGRAPH AT							
+		SEEC03	4.	3.27	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC03	79.	3.33	12.	3.	2.	5.32
	ROUTED TO							
+		REEC03	79.	3.35	12.	3.	2.	5.32
+								.85
3.35								
	HYDROGRAPH AT							
+		SEEC02	11.	3.12	1.	0.	0.	.01
	2 COMBINED AT							
+		CEEC02	82.	3.33	13.	3.	2.	5.33
	ROUTED TO							
+		REEC02	82.	3.35	13.	3.	2.	5.33
+								.88
3.35								
	HYDROGRAPH AT							
+		SEEC01	103.	3.38	17.	4.	3.	.19
	HYDROGRAPH AT							
+		DO1A2F	318.	3.68	35.	9.	7.	.00
	ROUTED TO							
+		RD1A2F	301.	3.88	35.	9.	7.	.00
+								96.60
3.88								
	3 COMBINED AT							
+		CEEC01	357.	3.88	64.	17.	12.	5.51
	ROUTED TO							
+		REEC01	350.	3.93	64.	17.	12.	5.51
+								2.03
3.93								

	HYDROGRAPH AT							
+		S37A3	84.	3.27	11.	3.	2.	.12	
	2 COMBINED AT							
+		C37A3	365.	3.93	74.	19.	14.	5.63	
	ROUTED TO							
+		R37A3	363.	3.95	74.	19.	14.	5.63	
+									2.07
3.95									
	HYDROGRAPH AT							
+		S37A2	37.	3.53	8.	2.	1.	.08	
	2 COMBINED AT							
+		C37A2	381.	3.95	82.	21.	15.	5.72	
	ROUTED TO							
+		D37A2	381.	3.95	76.	19.	14.	5.72	
+									1791.00
3.93									
	ROUTED TO							
+		R37A2	378.	3.97	76.	19.	14.	5.72	
+									2.11
3.97									
	HYDROGRAPH AT							
+		S37A1	170.	3.55	35.	9.	7.	.40	
	HYDROGRAPH AT							
+		DO361C	234.	3.62	57.	15.	11.	.00	
	ROUTED TO							
+		RD-R1C	234.	4.05	57.	15.	11.	.00	
+									96.39
4.03									
	HYDROGRAPH AT							
+		D036.1	48.	3.58	9.	2.	2.	.00	
	ROUTED TO							
+		RD36.1	43.	4.17	9.	2.	2.	.00	
+									95.50
4.17									
	HYDROGRAPH AT							
+		DO34.1	107.	6.42	104.	65.	47.	.00	
	ROUTED TO							
+		RD34.1	107.	6.87	104.	65.	47.	.00	
+									95.88
6.88									
	5 COMBINED AT							
+		C37A1	774.	3.97	265.	110.	79.	6.11	
	HYDROGRAPH AT							
+		52C13	28.	3.12	2.	1.	0.	.02	
	DIVERSION TO							
+		STORM	28.	.00	2.	1.	0.	.02	
	HYDROGRAPH AT							
+		2C13DV	0.	.00	0.	0.	0.	.02	
	HYDROGRAPH AT							
+		52C15	85.	3.12	8.	2.	1.	.05	
	HYDROGRAPH AT							
+		52C14A	77.	3.13	7.	2.	1.	.04	
	3 COMBINED AT							
+		SP1	161.	3.12	15.	4.	3.	.11	
	DIVERSION TO							
+		DVSP1	0.	3.12	0.	0.	0.	.11	
	HYDROGRAPH AT							
+		SP1EX	161.	3.12	15.	4.	3.	.11	

	ROUTED TO							
+		RSP1EX	154.	3.20	15.	4.	3.	.11
+								2.78
3.20								
+	HYDROGRAPH AT	39	1587.	3.35	213.	54.	39.	1.88
+	HYDROGRAPH AT	40	601.	3.23	60.	15.	11.	.58
+	2 COMBINED AT	C40	2007.	3.33	273.	69.	50.	2.47
	ROUTED TO							
+		R41	1975.	3.48	272.	69.	50.	2.47
+								2.95
3.48								
+	HYDROGRAPH AT	41	296.	3.50	49.	12.	9.	.83
+	2 COMBINED AT	C41	2270.	3.48	321.	81.	59.	3.29
+	HYDROGRAPH AT	42	368.	3.30	44.	11.	8.	.58
+	HYDROGRAPH AT	43	1087.	3.27	121.	30.	22.	1.07
+	HYDROGRAPH AT	44	837.	3.28	95.	24.	17.	.84
+	2 COMBINED AT	C44	1922.	3.27	216.	54.	39.	1.91
	ROUTED TO							
+		R45	1901.	3.33	216.	54.	39.	1.91
+								3.48
3								
+	HYDROGRAPH AT	45	218.	3.17	19.	5.	3.	.20
+	2 COMBINED AT	C45	2015.	3.32	235.	59.	43.	2.11
+	HYDROGRAPH AT	45A	222.	3.20	21.	5.	4.	.17
+	HYDROGRAPH AT	46	1360.	3.18	111.	28.	20.	.93
+	3 COMBINED AT	C46	2957.	3.28	366.	92.	66.	3.21
	ROUTED TO							
+		R47	2942.	3.38	366.	92.	66.	3.21
+								3.79
3.38								
+	HYDROGRAPH AT	47	138.	3.62	26.	7.	5.	.38
+	2 COMBINED AT	C47.1	3020.	3.38	392.	99.	71.	3.58
+	3 COMBINED AT	C47.2	5327.	3.45	756.	191.	138.	7.46
	ROUTED TO							
+		R50	5313.	3.47	756.	191.	138.	7.46
+								3.97
3								
+	HYDROGRAPH AT	50	438.	3.22	42.	10.	8.	.41
	2 COMBINED AT							

+	C50	5504.	3.47	797.	201.	145.	7.87
	DIVERSION TO						
+	APEXSO	2752.	3.47	399.	101.	73.	7.87
	HYDROGRAPH AT						
+	APEXSW	2752.	3.47	399.	101.	73.	7.87
	ROUTED TO						
+	R51.2A	2743.	3.50	399.	101.	73.	7.87
+							4.25
3.50							
	HYDROGRAPH AT						
+	S51.1A	46.	3.38	7.	2.	1.	.07
	2 COMBINED AT						
+	C51.1A	2782.	3.50	405.	102.	74.	7.93
	DIVERSION TO						
+	SPT1SW	807.	3.50	117.	30.	21.	7.93
	HYDROGRAPH AT						
+	SPT1SO	1975.	3.50	288.	73.	52.	7.93
	ROUTED TO						
+	R51B9	1973.	3.52	288.	73.	52.	7.93
	HYDROGRAPH AT						
+	51B9	25.	3.13	2.	1.	0.	.02
	2 COMBINED AT						
+	C51B9	1980.	3.52	289.	73.	53.	7.96
	DIVERSION TO						
+	SPT2SW	634.	3.52	93.	23.	17.	7.96
	HYDROGRAPH AT						
+	SPT2SO	1346.	3.52	197.	50.	36.	7.96
	ROUTED TO						
+	R51B2	1339.	3.60	197.	50.	36.	7.96
	HYDROGRAPH AT						
+	51B2	46.	3.28	6.	2.	1.	.06
	2 COMBINED AT						
+	C51B2	1358.	3.60	202.	51.	37.	8.02
	ROUTED TO						
+	51B2R	1355.	3.62	202.	51.	37.	8.02
	HYDROGRAPH AT						
+	52C8	9.	3.13	1.	0.	0.	.01
	2 COMBINED AT						
+	52C8C	1357.	3.62	203.	52.	37.	8.03
	ROUTED TO						
+	52C8R	1354.	3.63	203.	52.	37.	8.03
	HYDROGRAPH AT						
+	51C3	13.	3.20	1.	0.	0.	.02
	ROUTED TO						
+	51C3R	13.	3.23	1.	0.	0.	.02
	HYDROGRAPH AT						
+	51B1	14.	3.17	1.	0.	0.	.01
	ROUTED TO						
+	51B1R	14.	3.18	1.	0.	0.	.01
	HYDROGRAPH AT						
+	52C7	7.	3.12	1.	0.	0.	.01
	3 COMBINED AT						
+	52C7C	32.	3.20	3.	1.	1.	.04
	ROUTED TO						
+	52C7R	31.	3.27	3.	1.	1.	.04

+	2 COMBINED AT	52C9C1	1365.	3.63	206.	52.	38.	8.06
+	ROUTED TO	52C9R1	1364.	3.65	206.	52.	38.	8.06
+	HYDROGRAPH AT	52C9	66.	3.20	7.	2.	1.	.07
+	2 COMBINED AT	52C9C2	1381.	3.65	212.	54.	39.	8.13
+	ROUTED TO	52C9R2	1380.	3.65	212.	54.	39.	8.13
+	HYDROGRAPH AT	51C2	34.	3.25	4.	1.	1.	.04
+	ROUTED TO	51C2R	33.	3.27	4.	1.	1.	.04
+	HYDROGRAPH AT	52C5	16.	3.15	2.	0.	0.	.02
+	2 COMBINED AT	52C5C	44.	3.23	6.	1.	1.	.06
+	ROUTED TO	52C5R	44.	3.38	6.	1.	1.	.06
+	HYDROGRAPH AT	52C6	31.	3.23	4.	1.	1.	.04
+	2 COMBINED AT	52C6C	67.	3.33	9.	2.	2.	.09
+	ROUTED TO	52C6R	67.	3.35	9.	2.	2.	.09
+	2 COMBINED AT	2C10C1	1415.	3.65	221.	57.	41.	8.23
+	ROUTED TO	2C10R1	1412.	3.65	221.	57.	41.	8.23
+	HYDROGRAPH AT	52C10	9.	3.17	1.	0.	0.	.01
+	2 COMBINED AT	2C10C2	1414.	3.65	222.	57.	41.	8.24
+	HYDROGRAPH AT	52C11	35.	3.22	4.	1.	1.	.04
+	ROUTED TO	2C11R1	35.	3.25	4.	1.	1.	.04
+	HYDROGRAPH AT	52C13D	28.	3.12	2.	1.	0.	.00
+	2 COMBINED AT	52C11C	53.	3.17	7.	2.	1.	.04
+	ROUTED TO	2C11CR	53.	3.20	7.	2.	1.	.04
+	2 COMBINED AT	2C11C2	1430.	3.65	228.	59.	42.	8.28
+	ROUTED TO	2C11R2	1429.	3.67	228.	59.	42.	8.28
+	HYDROGRAPH AT	52C12	61.	3.08	5.	1.	1.	.02
+	2 COMBINED AT	52C12C	1435.	3.67	232.	60.	43.	8.31
+	ROUTED TO	52C12R	1431.	3.68	232.	60.	43.	8.31

	HYDROGRAPH AT							
+		52C14B	38.	3.12	3.	1.	1.	.02
	HYDROGRAPH AT							
+		DVSP1	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP1	0.	.00	0.	0.	0.	.00
	3 COMBINED AT							
+		SP2	1436.	3.68	235.	61.	44.	8.33
	DIVERSION TO							
+		DVSP2	0.	3.68	0.	0.	0.	8.33
	HYDROGRAPH AT							
+		DSP2	1436.	3.68	235.	61.	44.	8.33
	ROUTED TO							
+		RSP2EX	1429.	3.72	235.	61.	44.	8.33
+								4.16
3.72								
	HYDROGRAPH AT							
+		51B3	16.	3.33	2.	1.	0.	.02
	ROUTED TO							
+		51B3R	16.	3.37	2.	1.	0.	.02
	HYDROGRAPH AT							
+		52B1	3.	3.13	0.	0.	0.	.00
	2 COMBINED AT							
+		52B1C	17.	3.35	3.	1.	0.	.03
	ROUTED TO							
+		52B1R	17.	3.40	3.	1.	0.	.03
	HYDROGRAPH AT							
+		SPT2SW	634.	3.52	93.	23.	17.	.00
	ROUTED TO							
+		R51B10	632.	3.57	93.	23.	17.	.00
	HYDROGRAPH AT							
+		51B10	22.	3.18	2.	1.	0.	.02
	2 COMBINED AT							
+		C51B10	638.	3.57	95.	24.	17.	.02
	DIVERSION TO							
+		SPT3SW	255.	3.57	38.	10.	7.	.02
	HYDROGRAPH AT							
+		SPT3SO	383.	3.57	57.	14.	10.	.02
	ROUTED TO							
+		R51B4	381.	3.63	57.	14.	10.	.02
	HYDROGRAPH AT							
+		51B4	20.	3.23	2.	1.	0.	.02
	2 COMBINED AT							
+		C51B4	388.	3.63	59.	15.	11.	.05
	ROUTED TO							
+		51B4R1	386.	3.67	59.	15.	11.	.05
	2 COMBINED AT							
+		52B2C1	395.	3.67	61.	16.	11.	.08
	ROUTED TO							
+		52B2R1	395.	3.68	61.	16.	11.	.08
	HYDROGRAPH AT							
+		52B2	22.	3.23	3.	1.	0.	.03
	2 COMBINED AT							
+		52B2C2	401.	3.68	64.	16.	12.	.11

+	ROUTED TO	52B2R2	400.	3.70	64.	16.	12.	.11
+	ROUTED TO	52B3R1	400.	3.72	64.	16.	12.	.11
+	HYDROGRAPH AT	52B3	54.	3.23	7.	2.	1.	.06
+	2 COMBINED AT	52B3C2	414.	3.72	70.	18.	13.	.17
+	ROUTED TO	52B3R2	413.	3.77	70.	18.	13.	.17
+	HYDROGRAPH AT	52B4	45.	3.13	4.	1.	1.	.03
+	2 COMBINED AT	52B4C	418.	3.77	74.	19.	14.	.20
+	ROUTED TO	52B4R	418.	3.77	74.	19.	14.	.20
+	HYDROGRAPH AT	52B5	36.	3.12	3.	1.	1.	.02
+	HYDROGRAPH AT	DVSP2	0.	3.60	0.	0.	0.	.00
+	ROUTED TO	RDVSP2	0.	5.32	0.	0.	0.	.00
+	3 COMBINED AT	SP3	422.	3.77	76.	20.	14.	.22
+	DIVERSION TO	DVSP3	0.	3.77	0.	0.	0.	.22
+	HYDROGRAPH AT	DSP3	422.	3.77	76.	20.	14.	.22
+	ROUTED TO	RSP3EX	420.	3.83	76.	20.	14.	.22
+	3 COMBINED AT	CSPEX	1767.	3.78	325.	84.	61.	8.65
+	ROUTED TO	R53A1	1764.	3.80	325.	84.	61.	8.65
+	HYDROGRAPH AT	S53A1	129.	3.38	19.	5.	3.	.18
+	2 COMBINED AT	C53A1	1817.	3.80	343.	89.	64.	8.84
+	ROUTED TO	RPIMA2	1812.	3.82	343.	89.	64.	8.84
+	HYDROGRAPH AT	S53A3	69.	3.25	8.	2.	1.	.07
+	2 COMBINED AT	CPIMA2	1827.	3.82	351.	91.	66.	8.91
+	ROUTED TO	RUH2B	1814.	3.87	351.	91.	66.	8.91
+								4.36
3.87								
+	HYDROGRAPH AT	S53A6	30.	3.13	3.	1.	1.	.03
+	ROUTED TO	RUH2C	29.	3.17	3.	1.	1.	.03
+								.46
3.17								
+	HYDROGRAPH AT	S53A5	25.	3.13	2.	1.	0.	.02

	2 COMBINED AT							
+		UHIC1	54.	3.15	5.	1.	1.	.05	
	HYDROGRAPH AT							
+		SPT1SW	807.	3.50	117.	30.	21.	.00	
	ROUTED TO							
+		R51.2B	805.	3.52	117.	30.	21.	.00	
+									2.21
3.52									
	HYDROGRAPH AT							
+		S51.1B	32.	3.42	5.	1.	1.	.05	
	2 COMBINED AT							
+		C51.1B	833.	3.52	122.	31.	22.	.05	
	ROUTED TO							
+		R51.2C	831.	3.55	122.	31.	22.	.05	
+									2.25
3.55									
	HYDROGRAPH AT							
+		S51.1C	53.	3.53	9.	2.	2.	.10	
	2 COMBINED AT							
+		C51.1C	884.	3.55	131.	33.	24.	.15	
	ROUTED TO							
+		R51.2D	877.	3.62	131.	33.	24.	.15	
+									2.32
3.62									
	HYDROGRAPH AT							
+		S51.1D	427.	3.65	86.	22.	16.	.90	
	HYDROGRAPH AT							
+		D51.1D	36.	3.20	4.	1.	1.	.00	
	3 COMBINED AT							
+		C51.1D	1313.	3.62	220.	56.	41.	1.05	
	DIVERSION TO							
+		STOPDV	242.	3.62	9.	2.	2.	1.05	
	HYDROGRAPH AT							
+		DETPDV	1313.	3.62	214.	54.	39.	1.05	
	ROUTED TO							
+		R52A1C	1296.	3.70	214.	54.	39.	1.05	
+									4.03
3.70									
	HYDROGRAPH AT							
+		51B8	24.	3.38	4.	1.	1.	.04	
	ROUTED TO							
+		51B8R	24.	3.58	4.	1.	1.	.04	
	HYDROGRAPH AT							
+		52A1	131.	3.18	14.	3.	3.	.13	
	2 COMBINED AT							
+		52A1C	132.	3.18	18.	4.	3.	.17	
	HYDROGRAPH AT							
+		52A0	53.	3.10	4.	1.	1.	.04	
	3 COMBINED AT							
+		C52A	1351.	3.68	233.	59.	43.	1.25	
	DIVERSION TO							
+		DV52AW	121.	3.68	10.	3.	2.	1.25	
	HYDROGRAPH AT							
+		D52AW	1230.	3.68	223.	57.	41.	1.25	
	DIVERSION TO							
+		PRSD	600.	3.68	188.	48.	35.	1.25	

+	HYDROGRAPH AT	PRSDEX	630.	3.68	35.	9.	6.	1.25
+	ROUTED TO	RC52	614.	3.78	35.	9.	6.	1.25
								2.29
+	HYDROGRAPH AT	51B5	4.	3.15	0.	0.	0.	.00
+	ROUTED TO	51B5R	4.	3.27	0.	0.	0.	.00
+	HYDROGRAPH AT	SPT3SW	255.	3.57	38.	10.	7.	.00
+	ROUTED TO	R51B6	254.	3.67	38.	10.	7.	.00
+	HYDROGRAPH AT	51B6	36.	3.23	4.	1.	1.	.04
+	2 COMBINED AT	C51B6	265.	3.67	42.	11.	8.	.04
+	ROUTED TO	51B6R	265.	3.68	42.	11.	8.	.04
+	HYDROGRAPH AT	51B7	20.	3.27	3.	1.	0.	.03
+	ROUTED TO	51B7R1	20.	3.28	3.	1.	0.	.03
+	3 COMBINED AT	51B7C	273.	3.68	45.	11.	8.	.08
+	ROUTED TO	51B7R2	271.	3.75	45.	11.	8.	.08
+	HYDROGRAPH AT	52B6	85.	3.20	9.	2.	2.	.10
+	2 COMBINED AT	52B6C	289.	3.75	53.	14.	10.	.17
+	ROUTED TO	52B6R	287.	3.83	54.	14.	10.	.17
+	HYDROGRAPH AT	52B7	163.	3.13	15.	4.	3.	.08
+	2 COMBINED AT	52B7C1	303.	3.83	67.	18.	13.	.25
+	HYDROGRAPH AT	52A2	137.	3.15	14.	3.	2.	.06
+	HYDROGRAPH AT	52B0	22.	3.12	2.	0.	0.	.02
+	4 COMBINED AT	52A2C2	922.	3.80	117.	30.	22.	1.59
+	DIVERSION TO	DV52W	0.	3.80	0.	0.	0.	1.59
+	HYDROGRAPH AT	D52W	922.	3.80	117.	30.	22.	1.59
+	HYDROGRAPH AT	DVSP3	0.	.00	0.	0.	0.	.00
+	ROUTED TO	RDVSP3	0.	.00	0.	0.	0.	.00
+	2 COMBINED AT	C52SP4	922.	3.80	117.	30.	22.	1.59
	DIVERSION TO							

+		DVSP4	0.	3.80	0.	0.	0.	1.59	
	HYDROGRAPH AT							
+		DSP4	922.	3.80	117.	30.	22.	1.59	
	ROUTED TO							
+		RSP4EX	884.	3.92	117.	30.	22.	1.59	
+									2.44
3.92									
	DIVERSION TO							
+		53HW	0.	3.92	0.	0.	0.	1.59	
	HYDROGRAPH AT							
+		53PS	884.	3.92	117.	30.	22.	1.59	
	HYDROGRAPH AT							
+		S53A	91.	3.33	13.	3.	2.	.13	
	2 COMBINED AT							
+		CPIMA1	910.	3.92	130.	33.	24.	1.71	
	ROUTED TO							
+		RPMA4B	904.	3.95	130.	33.	24.	1.71	
+									2.43
3.95									
	HYDROGRAPH AT							
+		PRSD	600.	3.53	188.	48.	35.	.00	
	ROUTED TO							
+		RDPSD1	600.	3.55	188.	48.	35.	.00	
	ROUTED TO							
+		RDPSD2	600.	3.57	188.	48.	35.	.00	
	HYDROGRAPH AT							
+		DVSP4	0.	.00	0.	0.	0.	.00	
	ROUTED TO							
+		RDVSP	0.	.00	0.	0.	0.	.00	
+									.00
3.93									
	2 COMBINED AT							
+		CPCH1	600.	3.57	188.	48.	35.	.00	
	ROUTED TO							
+		RPMA4A	600.	3.67	188.	48.	35.	.00	
+									1.69
3.67									
	HYDROGRAPH AT							
+		S53A2	57.	3.17	6.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH2	612.	3.65	193.	50.	36.	.05	
	2 COMBINED AT							
+		CPCH3	1511.	3.95	321.	83.	60.	1.77	
	ROUTED TO							
+		RUH2A	1507.	3.97	321.	83.	60.	1.77	
+									2.66
3.97									
	HYDROGRAPH AT							
+		S53A4	56.	3.17	6.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH4	1514.	3.97	326.	84.	61.	1.82	
	3 COMBINED AT							
+		UHIC2	3170.	3.93	682.	177.	127.	10.78	
	HYDROGRAPH AT							
+		CPIMA3	101.	3.18	11.	3.	2.	.07	

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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

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	MAX TIME OF 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		

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                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	36.	4.03	9.	2.	2.	4.64	100.58
+									
4.03									
+	HYDROGRAPH AT	S1A2F	2.	3.13	0.	0.	0.	.01	
+	2 COMBINED AT	C1A2F	36.	4.03	9.	2.	2.	4.65	
+	DIVERSION TO	DO1A2F	36.	.00	9.	2.	2.	4.65	
+	HYDROGRAPH AT	D1A2F	0.	.00	0.	0.	0.	4.65	
+	ROUTED TO	R1A2F	0.	.00	0.	0.	0.	4.65	100.00
+									
.00									
+	HYDROGRAPH AT	S1A2E	8.	3.15	1.	0.	0.	.03	
+	DIVERSION TO	DOSA2E	8.	.00	1.	0.	0.	.03	
+	HYDROGRAPH AT	DS-A2E	0.	.00	0.	0.	0.	.03	
+	2 COMBINED AT	C1A2E	0.	.00	0.	0.	0.	4.68	
+	DIVERSION TO	DO1A2E	0.	.00	0.	0.	0.	4.68	
+	HYDROGRAPH AT	D1A2E	0.	.00	0.	0.	0.	4.68	
+	ROUTED TO	R1A2E	0.	.00	0.	0.	0.	4.68	100.00
+									
.00									
+	HYDROGRAPH AT	S1A2D	4.	3.17	1.	0.	0.	.02	
+	2 COMBINED AT	C1A2D	4.	3.17	1.	0.	0.	4.70	
+	DIVERSION TO	DO1A2D	4.	.00	1.	0.	0.	4.70	
+	HYDROGRAPH AT	D1A2D	0.	.00	0.	0.	0.	4.70	

	ROUTED TO							
+		R1A2D	0.	.00	0.	0.	0.	4.70
+								100.00
.00								
	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	9.	3.17	1.	0.	0.	4.78
	ROUTED TO							
+		R1A2C	9.	3.18	1.	0.	0.	4.78
+								100.19
3.18								
	HYDROGRAPH AT							
+		S1A2G	1.	3.13	0.	0.	0.	.00
	2 COMBINED AT							
+		C1A2G	10.	3.18	1.	0.	0.	4.78
	DIVERSION TO							
+		DO1A2G	8.	3.18	1.	0.	0.	4.78
	HYDROGRAPH AT							
+		D1A2G	1.	3.18	0.	0.	0.	4.78
	ROUTED TO							
+		R1A2G	1.	3.22	0.	0.	0.	4.78
+								100.03
3.22								
	HYDROGRAPH AT							
+		S1B4	4.	3.17	1.	0.	0.	.02
	DIVERSION TO							
+		DOSR1D	4.	.00	1.	0.	0.	.02
	HYDROGRAPH AT							
+		DS-1B4	0.	.00	0.	0.	0.	.02
	2 COMBINED AT							
+		C1B4	1.	3.22	0.	0.	0.	4.80
	DIVERSION TO							
+		DO1B4	0.	3.22	0.	0.	0.	4.80
	HYDROGRAPH AT							
+		D1B4	1.	3.22	0.	0.	0.	4.80
	ROUTED TO							
+		R1B4	1.	3.25	0.	0.	0.	4.80
+								100.03
3.25								
	HYDROGRAPH AT							
+		S1B3	20.	3.28	3.	1.	1.	.14
	2 COMBINED AT							
+		C1B3	22.	3.28	4.	1.	1.	4.95
	ROUTED TO							
+		R1B3	21.	3.30	4.	1.	1.	4.95
+								100.43
3.30								

+	DIVERSION TO	DO1B3	21.	.00	4.	1.	1.	4.95	
+	HYDROGRAPH AT	D1B3	0.	.00	0.	0.	0.	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	9.	3.22	2.	0.	0.	5.02	
+	DIVERSION TO	DO1B2	9.	.00	2.	0.	0.	5.02	
+	HYDROGRAPH AT	D1B2	0.	.00	0.	0.	0.	5.02	
+	HYDROGRAPH AT	DO1B3	21.	3.30	4.	1.	1.	.00	
+	2 COMBINED AT	CD1A2G	21.	3.30	4.	1.	1.	5.02	
+	ROUTED TO	RD1B2	20.	3.47	4.	1.	1.	5.02	
+									95.30
3.47									
+	HYDROGRAPH AT	D1B2	9.	3.22	2.	0.	0.	.00	
+	ROUTED TO	R1B2	9.	3.28	2.	0.	0.	.00	
+									100.18
3.28									
+	DIVERSION TO	DO511D	9.	.00	2.	0.	0.	.00	
+	HYDROGRAPH AT	D51.1D	0.	.00	0.	0.	0.	.00	
+	ROUTED TO	R51.1D	0.	.00	0.	0.	0.	.00	
+									.00
3.85									
+	HYDROGRAPH AT	SEEC13	4.	3.15	0.	0.	0.	.01	
+	2 COMBINED AT	CEEC13	4.	3.15	0.	0.	0.	.01	
+	ROUTED TO	REEC13	4.	3.17	0.	0.	0.	.01	
+									.08
3.17									
+	HYDROGRAPH AT	SEEC12	1.	3.10	0.	0.	0.	.00	
+	2 COMBINED AT	CEEC12	4.	3.17	0.	0.	0.	.01	
+	ROUTED TO	REEC12	4.	3.18	0.	0.	0.	.01	
+									.08
3.18									
+	HYDROGRAPH AT	SEEC11	2.	3.23	0.	0.	0.	.01	

	2 COMBINED AT							
+		CEEC11	6.	3.18	1.	0.	0.	.02	
	ROUTED TO							
+		REEC11	6.	3.20	1.	0.	0.	.02	
+									.13
3.20									
	HYDROGRAPH AT							
+		SEEC10	5.	3.23	1.	0.	0.	.02	
	3 COMBINED AT							
+		CEEC10	25.	3.43	5.	1.	1.	5.05	
	ROUTED TO							
+		REEC10	25.	3.45	5.	1.	1.	5.05	
+									.41
3.45									
	HYDROGRAPH AT							
+		SEEC09	7.	3.27	1.	0.	0.	.02	
	HYDROGRAPH AT							
+		DO1B4	0.	.00	0.	0.	0.	.00	
	3 COMBINED AT							
+		CEEC09	29.	3.42	6.	2.	1.	5.07	
	ROUTED TO							
+		REEC09	29.	3.43	6.	2.	1.	5.07	
+									.46
3.43									
	HYDROGRAPH AT							
+		SEEC08	5.	3.55	1.	0.	0.	.03	
	2 COMBINED AT							
+		CEEC08	34.	3.43	7.	2.	1.	5.10	
	ROUTED TO							
+		REEC08	34.	3.45	7.	2.	1.	5.10	
+									.51
3.45									
	HYDROGRAPH AT							
+		SEEC07	2.	3.15	0.	0.	0.	.01	
	2 COMBINED AT							
+		CEEC07	35.	3.45	8.	2.	1.	5.11	
	ROUTED TO							
+		REEC07	35.	3.47	8.	2.	1.	5.11	
+									.51
3.47									
	HYDROGRAPH AT							
+		SEEC06	1.	3.15	0.	0.	0.	.00	
	2 COMBINED AT							
+		CEEC06	35.	3.47	8.	2.	1.	5.11	
	ROUTED TO							
+		REEC06	35.	3.48	8.	2.	1.	5.11	
+									.51
3.48									
	HYDROGRAPH AT							
+		SEEC05	17.	3.37	3.	1.	1.	.07	
	HYDROGRAPH AT							
+		DO1A2D	4.	3.17	1.	0.	0.	.00	
	ROUTED TO							
+		RD1A2D	4.	3.27	1.	0.	0.	.00	
+									95.06
3.27									
	HYDROGRAPH AT							
+		DO1A2G	8.	3.18	1.	0.	0.	.00	

+	2 COMBINED AT	CD1A2G	12.	3.20	2.	0.	0.	.00	
+	ROUTED TO	RD1A2G	10.	3.55	2.	0.	0.	.00	
+									95.15
3									
+	3 COMBINED AT	CEEC05	59.	3.47	13.	3.	2.	5.18	
+	DIVERSION TO	37AW	59.	.00	13.	3.	2.	5.18	
+	HYDROGRAPH AT	37AE	0.	.00	0.	0.	0.	5.18	
+	ROUTED TO	REEC05	0.	.00	0.	0.	0.	5.18	
+									.00
3.65									
+	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	27.	3.40	5.	1.	1.	5.31	
+	ROUTED TO	REEC04	27.	3.42	5.	1.	1.	5.31	
+									.44
3.42									
+	HYDROGRAPH AT	SEEC03	1.	3.33	0.	0.	0.	.01	
+	2 COMBINED AT	CEEC03	28.	3.40	6.	1.	1.	5.32	
+	ROUTED TO	REEC03	28.	3.42	6.	1.	1.	5.32	
+									.45
3.42									
+	HYDROGRAPH AT	SEEC02	4.	3.15	0.	0.	0.	.01	
+	2 COMBINED AT	CEEC02	30.	3.40	6.	2.	1.	5.33	
+	ROUTED TO	REEC02	30.	3.42	6.	2.	1.	5.33	
+									.46
3.42									
+	HYDROGRAPH AT	SEEC01	37.	3.45	8.	2.	1.	.19	
+	HYDROGRAPH AT	DO1A2F	36.	4.03	9.	2.	2.	.00	
+	ROUTED TO	RD1A2F	31.	4.60	9.	2.	2.	.00	
+									95.41
4.60									
+	3 COMBINED AT	CEEC01	67.	3.43	22.	6.	4.	5.51	
+	ROUTED TO	REEC01	67.	3.50	22.	6.	4.	5.51	
+									.77
3.50									

	HYDROGRAPH AT							
+		S37A3	31.	3.32	5.	1.	1.	.12	
	2 COMBINED AT							
+		C37A3	94.	3.38	28.	7.	5.	5.63	
	ROUTED TO							
+		R37A3	94.	3.40	28.	7.	5.	5.63	
+									.95
3.40									
	HYDROGRAPH AT							
+		S37A2	13.	3.63	4.	1.	1.	.08	
	2 COMBINED AT							
+		C37A2	106.	3.42	31.	8.	6.	5.72	
	ROUTED TO							
+		D37A2	103.	3.50	24.	6.	5.	5.72	
+									1791.00
3.50									
	ROUTED TO							
+		R37A2	98.	3.58	24.	6.	5.	5.72	
+									.98
3.58									
	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	228.	4.33	136.	46.	33.	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	0.	3.15	0.	0.	0.	.11	
	HYDROGRAPH AT							
+		SP1EX	82.	3.15	9.	2.	2.	.11	

	ROUTED TO							
+		RSP1EX	78.	3.25	9.	2.	2.	.11
+								2.20
3.25								
	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								
	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								
	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	0.	.00	0.	0.	0.	.00
	ROUTED TO							
+		RDVSP1	0.	.00	0.	0.	0.	.00
	3 COMBINED AT							
+		SP2	372.	4.07	100.	26.	19.	8.33
	DIVERSION TO							
+		DVSP2	0.	4.07	0.	0.	0.	8.33
	HYDROGRAPH AT							
+		DSP2	372.	4.07	100.	26.	19.	8.33
	ROUTED TO							
+		RSP2EX	370.	4.12	100.	26.	19.	8.33
+								2.34
4.12								
	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	0.	.00	0.	0.	0.	.00
+	ROUTED TO	RDVSP2	0.	.00	0.	0.	0.	.00
+	3 COMBINED AT	SP3	110.	4.20	33.	9.	6.	.22
+	DIVERSION TO	DVSP3	0.	4.20	0.	0.	0.	.22
+	HYDROGRAPH AT	DSP3	110.	4.20	33.	9.	6.	.22
+	ROUTED TO	RSP3EX	110.	4.30	33.	9.	6.	.22
+	3 COMBINED AT	CSPEX	458.	4.22	141.	38.	27.	8.65
+	ROUTED TO	R53A1	458.	4.25	141.	38.	27.	8.65
+	HYDROGRAPH AT	S53A1	44.	3.52	9.	2.	2.	.18
+	2 COMBINED AT	C53A1	473.	4.25	150.	40.	29.	8.84
+	ROUTED TO	RPIMA2	473.	4.30	150.	40.	29.	8.84
+	HYDROGRAPH AT	S53A3	25.	3.35	4.	1.	1.	.07
+	2 COMBINED AT	CPIMA2	477.	4.30	153.	41.	30.	8.91
+	ROUTED TO	RUH2B	473.	4.37	153.	41.	30.	8.91
+								2.65
4.37								
+	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	9.	3.28	2.	0.	0.	.00
	3 COMBINED AT							
+		C51.1D	371.	3.97	98.	26.	18.	1.05
	DIVERSION TO							
+		STOPDV	149.	3.97	9.	2.	2.	1.05
	HYDROGRAPH AT							
+		DETPDV	371.	3.97	91.	23.	17.	1.05
	ROUTED TO							
+		R52A1C	368.	4.07	91.	23.	17.	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
	HYDROGRAPH AT							
+		52A0	15.	3.17	1.	0.	0.	.04
	3 COMBINED AT							
+		C52A	384.	4.07	100.	26.	19.	1.25
	DIVERSION TO							
+		DV52AW	6.	4.07	1.	0.	0.	1.25
	HYDROGRAPH AT							
+		D52AW	377.	4.07	98.	26.	18.	1.25
	DIVERSION TO							
+		PRSD	377.	.00	98.	26.	18.	1.25

+	HYDROGRAPH AT PRSDEX	0.	.00	0.	0.	0.	1.25
+	ROUTED TO RC52	0.	.00	0.	0.	0.	1.25
+							.00
+	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	0.	.00	0.	0.	0.	.00
+	ROUTED TO RDVSP3	0.	.00	0.	0.	0.	.00
+	2 COMBINED AT C52SP4	171.	3.18	40.	11.	8.	1.59
	DIVERSION TO						

+		DVSP4	0.	3.18	0.	0.	0.	1.59	
	HYDROGRAPH AT							
+		DSP4	171.	3.18	40.	11.	8.	1.59	
	ROUTED TO							
+		RSP4EX	148.	3.42	40.	11.	8.	1.59	
+									1.83
3.42									
	DIVERSION TO							
+		53HW	0.	3.42	0.	0.	0.	1.59	
	HYDROGRAPH AT							
+		53PS	148.	3.42	40.	11.	8.	1.59	
	HYDROGRAPH AT							
+		S53A	31.	3.47	6.	2.	1.	.13	
	2 COMBINED AT							
+		CPIMA1	178.	3.43	46.	12.	9.	1.71	
	ROUTED TO							
+		RPMA4B	176.	3.47	46.	12.	9.	1.71	
+									1.88
3.47									
	HYDROGRAPH AT							
+		PRSD	377.	4.07	98.	26.	18.	.00	
	ROUTED TO							
+		RDPSD1	377.	4.07	98.	26.	18.	.00	
	ROUTED TO							
+		RDPSD2	377.	4.08	98.	26.	18.	.00	
	HYDROGRAPH AT							
+		DVSP4	0.	.00	0.	0.	0.	.00	
	ROUTED TO							
+		RDVSP	0.	.00	0.	0.	0.	.00	
+									.00
3.28									
	2 COMBINED AT							
+		CPCH1	377.	4.08	98.	26.	18.	.00	
	ROUTED TO							
+		RPMA4A	376.	4.13	98.	26.	18.	.00	
+									1.29
4.13									
	HYDROGRAPH AT							
+		S53A2	20.	3.23	3.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH2	379.	4.13	100.	26.	19.	.05	
	2 COMBINED AT							
+		CPCH3	437.	4.12	146.	39.	28.	1.77	
	ROUTED TO							
+		RUH2A	435.	4.17	146.	39.	28.	1.77	
+									1.29
4.17									
	HYDROGRAPH AT							
+		S53A4	20.	3.23	3.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH4	439.	4.17	148.	39.	28.	1.82	
	3 COMBINED AT							
+		UHIC2	861.	4.33	304.	81.	58.	10.78	
	HYDROGRAPH AT							
+		CPIMA3	47.	3.22	7.	2.	1.	.07	

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1*****************************************                         ***************************************
 *                                       *                         *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                         *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998               *                         *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1                *                         *         609 SECOND STREET           *
 *                                       *                         *      DAVIS, CALIFORNIA 95616        *
 * RUN DATE   28AUG09  TIME   12:20:33   *                         *         (916) 756-1104              *
 *                                       *                         *                                     *
*****************************************                         ***************************************


                    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                                          HEC-1 INPUT                                                     PAGE  1

 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       *-*
```

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

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

166	ID	*-*	-REEC12	*-*
167	ID	*-*	-REEC11	*-*
168	ID	*-*	-REEC10	*-*
169	ID	*-*	-REEC09	*-*
170	ID	*-*	-REEC08	*-*
171	ID	*-*	-REEC07	*-*
172	ID	*-*	-REEC06	*-*
173	ID	*-*		*-*
174	ID	*-*	Channel Assumptions:	*-*
175	ID	*-*	-Right Side Slope = 4:1	*-*
176	ID	*-*	-Left Side Slope = 4:1	*-*
177	ID	*-*	-Bottom Width = 30'	*-*
178	ID	*-*	-Channel Depth = 5'	*-*
179	ID	*-*		*-*
180	ID	*-*	ii) -REEC05	*-*
181	ID	*-*	-REEC04	*-*
182	ID	*-*	-REEC03	*-*
183	ID	*-*	-REEC02	*-*
184	ID	*-*	-REEC01	*-*
185	ID	*-*	-R37A3	*-*
186	ID	*-*		*-*
187	ID	*-*	Channel Assumptions:	*-*
188	ID	*-*	-Right Side Slope = 4:1	*-*
189	ID	*-*	-Left Side Slope = 4:1	*-*
190	ID	*-*	-Bottom Width = 44'	*-*
191	ID	*-*	-Channel Depth = 5'	*-*
192	ID	*-*		*-*
193	ID	*-*	12) Modified Diversions DV52AW representing the split at	*-*
194	ID	*-*	Pima Rd. and Thompson Peak Parkway. This diversion	*-*
195	ID	*-*	represent the existing conditions and the rating curve	*-*
196	ID	*-*	is based on the FLO-2D results.	*-*
197	ID	*-*		*-*
198	ID	*-*	Total Q West Q South Q	*-*
199	ID	*-*	0.0 0.0 0.0	*-*
200	ID	*-*	100.0 1.0 99.0	*-*
201	ID	*-*	250.0 4.0 246.0	*-*
202	ID	*-*	375.0 6.0 369.0	*-*

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 203          ID   *-*                    500.0      13.0      487.0                    *-*
 204          ID   *-*                    625.0      22.0      603.0                    *-*
 205          ID   *-*                    750.0      41.0      709.0                    *-*
 206          ID   *-*                    875.0      63.0      812.0                    *-*
 207          ID   *-*                   1000.0      82.0      918.0                    *-*
 208          ID   *-*                   1125.0      96.0     1029.0                    *-*
 209          ID   *-*                   1250.0     109.0     1141.0                    *-*
 210          ID   *-*                   1375.0     124.0     1251.0                    *-*
 211          ID   *-*                   1500.0     137.0     1363.0                    *-*
 212          ID   *-*                   1750.0     161.0     1589.0                    *-*
 213          ID   *-*                   2000.0     186.0     1814.0                    *-*
 214          ID   *-*                   2500.0     238.0     2262.0                    *-*
 215          ID   *-*                   2750.0     256.0     2494.0                    *-*
 216          ID   *-*                   2875.0     259.0     2616.0                    *-*
 217          ID   *-*                   3000.0     255.0     2745.0                    *-*
 218          ID   *-*                   3500.0     280.0     3220.0                    *-*
 219          ID   *-*                                                                  *-*
 220          ID   *-* -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
1                                        HEC-1 INPUT                                    PAGE  5

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

 221          ID   *-* *-*-*-*-*-*-*-*- DEER VALLEY CHANNEL IMPROVEMENTS *-*-*-*-*-*-*-*-* *-*
 222          ID   *-* -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
 223          ID   *-*                                                                  *-*
 224          ID   ******************************************************************************
 225          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
 226          ID   ******************************************************************************
 227          ID   ***                                                                    ***
 228          ID   ***  Modified:   July 2009                                            ***
 229          ID   ***  Project:    PIMA ROAD                                            ***
 230          ID   ***  Client:     City of Scottsdale                                   ***
 231          ID   ***  File Name:  2009-07_Pima_Rd_DV_PA_EX_w-los_gatos-wall-100-yr.hc1  ***
 232          ID   ***                                                                    ***
 233          ID   ***  Client Project#:                                                  ***
 234          ID   ***  Entellus Prj#:    410.061                                        ***
 235          ID   ***  Modelers:         RAS                                            ***
 236          ID   ***  Storm:            100-year, 6-hour                               ***
 237          ID   ***  Development Cond: Existing Conditions With Los Gatos Wall In Place  ***
 238          ID   ***                                                                    ***
 239          ID   ***                                                                    ***
 240          ID   ***  It was decided that various flow conditions needed to be modeled.  ***
 241          ID   ***    This was to enable the best decision making in regards to the    ***
 242          ID   ***    Pima Road Channel, Deer Valley channel and Sierra Pinta Outlet.  ***
 243          ID   ***    Three scenarios will be modeled and they are as follows:         ***
 244          ID   ***                                                                    ***
 245          ID   ***      1) Existing conditions assuming the Los Gatos wall is in place.***
 246          ID   ***           This scenario will model the Los Gatos wall as though it ***
 247          ID   ***           does not allow flow to cross it.  The Los Gatos entrance ***
 248          ID   ***           will, however allow flow in, and this diversion into the ***
 249          ID   ***           subdivision will be modeled.                             ***
 250          ID   ***                                                                    ***
 251          ID   ***      2) Existing Conditions assuming the Los Gatos Wall is not in place.***
 252          ID   ***           This scenario will model the Los Gatos wall as though it ***
 253          ID   ***           does not exist and all flow will be allowed to cross Pima***
 254          ID   ***           Rd. unimpeded along the Los Gatos subdivision boundary.  ***
 255          ID   ***                                                                    ***
 256          ID   ***      3) Proposed Conditions:                                       ***
 257          ID   ***           The proposed conditions for the design of the Pima Rd    ***
 258          ID   ***           Channel, Deer Valley Channel and the Sierra Pinta Outfall.***
 259          ID   ***                                                                    ***
 260          ID   ***                                                                    ***
 261          ID   ***  PIMA ROAD DIVERSION ASSUMPTIONS                                   ***
 262          ID   ***     The following assumptions were made for this model             ***
 263          ID   ***     regarding the diversion along Pima Rd:                         ***
 264          ID   ***       1) DO36R1c - Northeast side of Pinnacle Peak and Pima Rd.    ***
 265          ID   ***            This diversion to the west was assumed to be equal to the***
 266          ID   ***            capacity of the existing 2-3x4.5' box culverts.        ***
 267          ID   ***            The capacity was estimated as being 234 cfs.           ***
 268          ID   ***            Flow was diverted to the west up to the capacity of    ***
 269          ID   ***            the culvert before flow was allowed to continue        ***
 270          ID   ***            south along Pima Rd.                                   ***
 271          ID   ***                                                                   ***
 272          ID   ***       2) DO1A2F - Flow crossing Pima Rd. 1000' S. of Pinnacle Peak***
 273          ID   ***            Based on field observations any flow that does not     ***
 274          ID   ***            cross through the existing 2-36" culverts will         ***
 275          ID   ***            cross Pima Rd prior to the following driveway.         ***
1                                        HEC-1 INPUT                                    PAGE  6

LINE         ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
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276          ID   ***          Thus it was assumed that all flow crosses Pima Rd.          ***
277          ID   ***          and heads to the west through subbasin SEEC01 at            ***
278          ID   ***          this location.                                              ***
279          ID   ***                                                                      ***
280          ID   ***       3) DO1A2E - Flow Crossing Pima Rd. at/near E. Paraiso Dr.      ***
281          ID   ***          Based on field observations it was determined               ***
282          ID   ***          that all flow crosses Pima Rd. at or near                  ***
283          ID   ***          E. Paraiso / E. Calle Buena Vista and flows                ***
284          ID   ***          to the west through subbasin SEEC04.                       ***
285          ID   ***                                                                      ***
286          ID   ***       4) DO1A2D - Flow Crossing Pima Rd. north of N 91st St.        ***
287          ID   ***          Based on field observations, it was determined that         ***
288          ID   ***          flow from subbasin S1A2D crosses Pima Rd. and does         ***
289          ID   ***          not continue south along Pima Rd.                          ***
290          ID   ***                                                                      ***
291          ID   ***       5) DO1A2G - Flow crossing Pima Rd. 250' S. of E. Paraiso Dr.  ***
292          ID   ***          This diversion accounts for the flow that crosses          ***
293          ID   ***          Pima Rd. just south of the intersection of Pima Rd.        ***
294          ID   ***          and E. Paraiso Dr.  based on the FLO-2D Results,           ***
295          ID   ***          it was determined that a flow split in which               ***
296          ID   ***          approximately 87% of the flow crosses Pima Rd.             ***
297          ID   ***          to the west and through the Pinnacle Peak Country          ***
298          ID   ***          Club subdivision.  The diversion occurs just north         ***
299          ID   ***          of the concentration point C1A2G, but flow from            ***
300          ID   ***          subbasin S1A2G would be contributing to the diversion,     ***
301          ID   ***          therefore the diversion was taken out after the            ***
302          ID   ***          concentration point.  The remaining 13% of the flow        ***
303          ID   ***          continues south along Pima Rd.                             ***
304          ID   ***                                                                      ***
305          ID   ***       6) DO1B4 - Flow crossing Pima Rd. 1000' N. of Los Gatos Dr.    ***
306          ID   ***          It was decided for this model that the Los Gatos            ***
307          ID   ***          wall would be modeled as though it were in place           ***
308          ID   ***          and no flow would cross it.  Therefore no flow             ***
309          ID   ***          crosses Pima Rd and enters the Los Gatos subdivision       ***
310          ID   ***          at this point, instead flow travels south along Pima Rd.   ***
311          ID   ***                                                                      ***
312          ID   ***       7) DO1B3 - Flow along Pima Rd. north of Los Gatos Dr.         ***
313          ID   ***          This diversion occurs along the east side of the           ***
314          ID   ***          Los Gatos subdivision and Pima Rd. north of Los            ***
315          ID   ***          Gatos Dr.  This diversion accounts for the flow            ***
316          ID   ***          that enters through the Los Gatos entrance.  Based         ***
317          ID   ***          on the FLO-2D model it was determined that all flow        ***
318          ID   ***          from concentration point C1B3 flows along Pima Rd.         ***
319          ID   ***          and enters through the Los Gatos entrance.  However,       ***
320          ID   ***          the flow coming from the east (subbasins S1B1 and S1B2)    ***
321          ID   ***          does not contribute to flow entering the subdivision       ***
322          ID   ***          at this location.  Thus this diversion occurs after        ***
323          ID   ***          the flow has been routed from C1B3 to the Los Gatos        ***
324          ID   ***          entrance but before the combine with flows from the        ***
325          ID   ***          east (C1B2).                                               ***
326          ID   ***                                                                      ***
327          ID   ***       8) DO1B2 - Flow arriving at the intersection of Los Gatos Dr. & ***
328          ID   ***                  Pima Rd. from the subbasins to the east: S1B2 & S1B1.***
329          ID   ***          This diversion only considers flow arriving at the         ***
330          ID   ***          intersection of Pima Rd. and Los Gatos Dr. from the        ***
1                                      HEC-1 INPUT                                    PAGE  7

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

331          ID   ***          east via subbasins S1B2 and S1B1.  It was assumed          ***
332          ID   ***          that all flow arriving at this intersection from the       ***
333          ID   ***          north (route R1B3) had already crossed Pima Rd. and        ***
334          ID   ***          enters the Los Gatos subdivision at Los Gatos Dr.          ***
335          ID   ***          Based on the results of the Flo-2D analysis flow from      ***
336          ID   ***          the east does not cross Pima Rd at this intersection,      ***
337          ID   ***          instead, this flow crosses Los Gatos Dr. and continues     ***
338          ID   ***          south along Pima Rd. beyond Deer Valley.  This continues   ***
339          ID   ***          the assumption that the wall along the east side of        ***
340          ID   ***          the Los Gatos subdivision is in place and withstands       ***
341          ID   ***          the forces of the flood event.                             ***
342          ID   ***                                                                      ***
343          ID   ***       9) D51.1D - Diversion at Pima Rd. and Deer Valley             ***
344          ID   ***          Based on field observations it was assumed that            ***
345          ID   ***          flow along Pima Rd. at Deer Valley would not get           ***
346          ID   ***          into the Deer Valley channel.  Therefore it was            ***
347          ID   ***          assumed that all flow continues south along Pima Rd.       ***
348          ID   ***                                                                      ***
349          ID   ***      10) D52AW - Diversion at Pima Rd and Thompson Peak Parkway
350          ID   ***
351          ID   ***                                                                      ***
352          ID   ***     Modifications made to model:                                     ***
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353          ID   ***       1) Diversion added after C1A2G:                                    ***
354          ID   ***           This diversion was added to account for additional flow        ***
355          ID   ***           that crosses Pima Road prior to the Los Gatos subdivision.     ***
356          ID   ***           Previous assumptions were that the flow crosses Pima Rd.       ***
357          ID   ***           and is taken out at the next diversion.  This assumption       ***
358          ID   ***           was made due to the assumption that the Los Gatos Wall         ***
359          ID   ***           would not act as a flood wall and would not be modeled,        ***
360          ID   ***           thus allowing all flow to cross. Based on FLO-2D               ***
361          ID   ***           modeling results, flow crosses Pima Rd prior to the            ***
362          ID   ***           Los Gatos subdivision, and approximately 90% of the            ***
363          ID   ***           flow crosses to the west and 10% stays along Pima Rd.          ***
364          ID   ***           to the south.                                                  ***
365          ID   ***                                                                          ***
366          ID   ***       2) Added Concentration Point CD1A2G:                               ***
367          ID   ***           This concentration point was added to account for the          ***
368          ID   ***           combine of route RD1A2D and the newly added diversion D1A2G.   ***
369          ID   ***                                                                          ***
370          ID   ***       3) Added Route RD1A2G and Modified Route RD1A2D:                   ***
371          ID   ***           Route RD1A2D was modified to account for the added             ***
372          ID   ***           concentration point.  It essentially has been truncated        ***
373          ID   ***           at E. Country Club Trail.  Route RD1A2G picks up after         ***
374          ID   ***           the combine of the diversion recovery of DO1A2G and routes     ***
375          ID   ***           the combined routes to Deer Valley.                            ***
376          ID   ***                                                                          ***
377          ID   ***       4) Added Diversion D1B3:                                           ***
378          ID   ***           Added a diversion D1B3 following route R1B3.  This             ***
379          ID   ***           diversion represents the flow into the Los Gatos               ***
380          ID   ***           Subdivision entrance from the north.  Through a FLO-2D         ***
381          ID   ***           analysis it was determined that the majority of the flow       ***
382          ID   ***           from C1B3crosses Pima Rd. to the west and enters the Los       ***
383          ID   ***           Gatos subdivision entrance.  The analysis also determined      ***
384          ID   ***           that minimal flow from the east at the intersection of E.      ***
385          ID   ***           Los Gatos Dr. crosses Pima Rd at this location, thus all       ***
1                                        HEC-1 INPUT                                                PAGE   8

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

386          ID   ***           flow from here was routed south along Pima Rd.                 ***
387          ID   ***                                                                          ***
388          ID   ***       5) Added Concentration Point CD1B2:                                ***
389          ID   ***           Added a concentration Point CD1B2 that combines                ***
390          ID   ***           the diversion recovery Do1B3 and the diversion                 ***
391          ID   ***           recovery of DO1B2.  This concentration point                   ***
392          ID   ***           represents the total flow entering the Los Gatos               ***
393          ID   ***           Subdivision entrance and passing through the                   ***
394          ID   ***           wall south of the entrance (if allowed):                       ***
395          ID   ***           DO1B3 (flow from the north along Pima Rd through entrance)     ***
396          ID   ***           and DO1B2 (flow from the east of E. Los Gatos Dr.              ***
397          ID   ***           and crossing the wall to the west).                            ***
398          ID   ***                                                                          ***
399          ID   ***                                                                          ***
400          ID   ******************************************************************************
401          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
402          ID   ******************************************************************************
403          ID   ***                                                                          ***
404          ID   ***  Modified:          December 2008                                       ***
405          ID   ***  Project:           PIMA ROAD                                           ***
406          ID   ***  Client:            City of Scottsdale                                  ***
407          ID   ***  File Name:         2008-12_Pima_Rd_Combined_100-yr.hc1                 ***
408          ID   ***                                                                          ***
409          ID   ***  Client Project#:                                                       ***
410          ID   ***  Entellus Prj#:     410.061                                             ***
411          ID   ***  Modelers:          RAS                                                 ***
412          ID   ***  Storm:             100-year, 6-hour                                    ***
413          ID   ***  Development Cond:  Existing Conditions                                 ***
414          ID   ***                                                                          ***
415          ID   ***                                                                          ***
416          ID   ***                                                                          ***
417          ID   ***     Reasons for Modifications to model:                                  ***
418          ID   ***                                                                          ***
419          ID   ***       1) It was determined that the wall along Pima Rd. at             ***
420          ID   ***          Los Gatos subdivision should be considered.  Doing             ***
421          ID   ***          this requires routing flow south along Pima Rd.  This          ***
422          ID   ***          flow will cross Deer Valley Rd and not flow into the           ***
423          ID   ***          Deer Valley Channel.  To accomplish this the two (2)           ***
424          ID   ***          HEC-1 models (1. North of Deer Valley and 2. South of          ***
425          ID   ***          Deer Valley) were combined.  This model combines the           ***
426          ID   ***          two models.                                                    ***
427          ID   ***                                                                          ***
428          ID   ***                                                                          ***
429          ID   ***     Modifications made to model:                                         ***
```

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430          ID   ***       1) The Deer Valley North and Deer Valley South models were      ***
431          ID   ***          combined.                                                    ***
432          ID   ***                                                                       ***
433          ID   ***       2) Modified Diversions D1B4 and D1B2.  It was decided that      ***
434          ID   ***          no flow will pass through the wall of Los Gatos.  This       ***
435          ID   ***          diversion has been modified to have all flow continue        ***
436          ID   ***          south along Pima Rd.                                         ***
437          ID   ***                                                                       ***
438          ID   ***       3) Removed subbasins S51.1H, S51.1G and S51.1F.               ***
439          ID   ***          These subbasins were replaced by S51.1D which was           ***
440          ID   ***          modified slightly to include the area all the way           ***
1                                        HEC-1 INPUT                                      PAGE  9

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

441          ID   ***          to E. Los Gatos Dr.                                         ***
442          ID   ***                                                                       ***
443          ID   ***       4) Combined routes R1B2, R51.1H, R51.1G and extended to C51.1D. ***
444          ID   ***          This combined/extended route is called R1B2.                 ***
445          ID   ***                                                                       ***
446          ID   ***       5) Removed concentration point C51.1H, C51.1G, C51.1F,       ***
447          ID   ***          and CEEC13.                                                 ***
448          ID   ***                                                                       ***
449          ID   ***       6) Modified NSTPS for all necessary routes.                  ***
450          ID   ***          Some of the modified NSTPS were for routes taken directly    ***
451          ID   ***          from other models.  The routes taken from other models      ***
452          ID   ***          that were updated include: R41, R45, R47, R50.              ***
453          ID   ***          Other modified NSTPS routes that were nodified are:         ***
454          ID   ***          RD-R1C, RD36.1, RD34.1, RSP1EX, R51.2A, RSP2EX, RUH2B,      ***
455          ID   ***          RUH2C, R51.2B, R51.2C, R51.2D, R1B2, R52A1C, RC52, RSP4EX,  ***
456          ID   ***          RPMA4B, RDVSP, RPMA4A, RUH2A                                ***
457          ID   ***                                                                       ***
458          ID   *******************************************************************************
459          ID   ***  PIMA RD COMBINATION *** PIMA RD COMBINATION *** PIMA RD COMBINATION  ***
460          ID   *******************************************************************************
461          ID
462          ID
463          ID   --------------------------------------------------------------------------
464          ID   |////////////////////////////////////////////////////////////////////////|
465          ID   |============== BEGIN DEER VALLEY NORTH IDENTIFICATION CARDS ==============|
466          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
467          ID   |------------------------------------------------------------------------|
468          ID   |PROJECT:                PIMA ROAD DRAINAGE IMPROVEMENTS:                |
469          ID   |                         (DEER VALLEY TO PINNACLE PEAK)                 |
470          ID   |                                                                        |
471          ID   |CLIENT:                 City of Scottsdale                              |
472          ID   |PREPARED BY:            Entellus, Inc.                                  |
473          ID   |PROJECT No:                                        Entellus 410.061A    |
474          ID   |FILE NAME: PIMA_II-100y6h-ex.hc1       CREATED DATE: SEP 14, 2005       |
475          ID   |                                      MODIFIED DATE: OCT 18, 2005       |
476          ID   |                                                                        |
477          ID   |STORM:                                                                  |
478          ID   |                    100-year 6-hour Storm                               |
479          ID   |                                                                        |
480          ID   |DEVELOPMENT CONDITIONS:                                                 |
481          ID   |                    Existing Conditions                                 |
482          ID   |                                                                        |
483          ID   |MODELING ASSUMPTIONS:                                                   |
484          ID   |                    The Model base was taken directly from the "Pima    |
485          ID   |                    Road Three Basins" project as performed by Stantec  |
486          ID   |                    for the City of Scottsdale: file name FU1100-6.IH1, |
487          ID   |                    revised on 01-20-99 by MCG.                         |
488          ID   |                                                                        |
489          ID   |                    To reflect existing developed conditions, percent   |
490          ID   |                    impervious was increased.                           |
491          ID   |                                                                        |
492          ID   |                    It was assumed that for all basins that were not    |
493          ID   |                    subdivided, that the UK and RK records, as used by  |
494          ID   |                    Stantec were correct.                               |
495          ID   |                                                                        |
1                                        HEC-1 INPUT                                      PAGE 10

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

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

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503          ID   |                    Field verification was conducted to determine the     |
504          ID   |                    existing path of flow routes through the study area.  |
505          ID   |                    This field verification occured on 10-14-2005         |
506          ID   |                    and included all portions of the study area along     |
507          ID   |                    Pima Rd south of Happy Valley Rd.                     |
508          ID   |                                                                          |
509          ID   |                    Normal Depth Routing was utilized for all new routes. |
510          ID   |                                                                          |
511          ID   |                    Kinematic wave was utilized for all subdivided basins.|
512          ID   |                                                                          |
513          ID   |--------------------------------------------------------------------------|
514          ID   |//////////////////////////////////////////////////////////////////////////|
515          ID   |=============== END DEER VALLEY NORTH IDENTIFICATION CARDS ===============|
516          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
517          ID   ----------------------------------------------------------------------------
518          ID
519          ID
520          ID
521          ID   ----------------------------------------------------------------------------
522          ID   |//////////////////////////////////////////////////////////////////////////|
523          ID   |============== BEGIN DEER VALLEY SOUTH IDENTIFICATION CARDS ==============|
524          ID   |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
525          ID   |--------------------------------------------------------------------------|
526          ID   ****************************************************************************
527          ID   ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS ** PIMA RD MODIFICATIONS **
528          ID   ****************************************************************************
529          ID   ***                                                                      ***
530          ID   ***  Modified:         NOVEMBER 2008                                    ***
531          ID   ***  Project:          PIMA ROAD                                        ***
532          ID   ***  Client:           City of Scottsdale                               ***
533          ID   ***  File Name:        2008-11_Deer_Valley_to_Thompson_                 ***
534          ID   ***                     Peak-Modifications_100-yr.hc1                   ***
535          ID   ***  Client Project#:                                                   ***
536          ID   ***  Entellus Prj#:    410.061                                          ***
537          ID   ***  Modelers:         RAS                                              ***
538          ID   ***  Storm:            100-year, 6-hour                                 ***
539          ID   ***  Development Cond: Existing Conditions                              ***
540          ID   ***                                                                      ***
541          ID   ***                                                                      ***
542          ID   ***     Reasons for Modifications to model:                             ***
543          ID   ***                                                                      ***
544          ID   ***       1) A small portion of the Pima Road corridor is not included   ***
545          ID   ***          in either this HEC-1 model or the model for the area        ***
546          ID   ***          between Pinnacle Peak and Deer Valley Rd.  The area in      ***
547          ID   ***          question is between Deer Valley and Sierra Pinta and is     ***
548          ID   ***          along the west side of Pima Rd.                             ***
549          ID   ***                                                                      ***
550          ID   ***                                                                      ***
```



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

551          ID   ***     Modifications made to model:                                   ***
552          ID   ***                                                                    ***
553          ID   ***        1) Added subbasin 52A0 (west side of Pima Rd between        ***
554          ID   ***           Deer Valley and Thompson Peak Parkway).  The subbasin    ***
555          ID   ***           cards utilized are as follows:                           ***
556          ID   ***             KK 52A0     SUB                                      ***
557          ID   ***             KM      RUNOFF FROM SUB-BASIN 52A0                   ***
558          ID   ***             BA0.0369                                             ***
559          ID   ***             LS            85                                     ***
560          ID   ***             UK   100   .2300     .20     100                    ***
561          ID   ***             RK  2500   .2300    .045           TRAP      20       8 ***
562          ID   ***                                                                  ***
563          ID   ***        2) Added subbasin 52B0 (west side of Pima Rd between        ***
564          ID   ***           Thompson Peak Parkway and Sierra Pinta ).  The subbasin  ***
565          ID   ***           cards utilized are as follows:                           ***
566          ID   ***             KK 52B0     SUB                                      ***
567          ID   ***             KM      RUNOFF FROM SUB-BASIN 52B0                   ***
568          ID   ***             BA0.0188                                             ***
569          ID   ***             LS            83                                     ***
570          ID   ***             UK   100   .2300     .20     100                    ***
571          ID   ***             RK  2500   .2300    .045           TRAP      20       8 ***
572          ID   ***                                                                  ***
573          ID   ***        3) Modified concentration point C52A to include the       ***
574          ID   ***           newly added subbasin 52A0.  changed HC=2 to HC=3       ***
575          ID   ***                                                                  ***
576          ID   ***        4) Modified concentration point 52A2C2 to include the     ***
577          ID   ***           newly added subbasin 52B0.  changed HC=3 to HC=4       ***
578          ID   ***                                                                  ***
579          ID   ***        5) Corrected roughness coefficient for subbasins S53A5    ***
```

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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   ***                                                                      ***
1                                        HEC-1 INPUT                                          PAGE 12

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
```

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 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 **********
            * ***************************************************************************
            * ***                          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
1                                  HEC-1 INPUT                                    PAGE 15

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
```

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

 770          KK   C34.2
 771          KM     COMBINE ROUTED HYDROGRAPH FROM C31.1 WITH RUNOFF FROM SUBBASIN 34.2
 772          HC       2
              *
1                                        HEC-1 INPUT                                        PAGE 16

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


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

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

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

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

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

 806          KK  D36.2R
 807          KM     DIVERSION AT DESERT HIGHLANDS DRIVE
 808          KM        RIGHT BRANCH, AT GOLF CART CROSSING IS ROUTED TO C34.1
 809          KM        LEFT BRANCH (CODED ON DQ RECORD) IS ROUTED TO C36R1
 810          DT  D36.2L
 811          DI       0      36     166     288     360     430     538     681     859    1074
 812          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


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

```
                *
      820       KK   S34.1
      821       KM  ****************************************************************************
      822       KM  * ENTELLUS COMMENT: THE BASIN AREA FOR SUBBASIN S34.1 WAS CORRECTED TO       *
      823       KM  * ENTELLUS COMMENT: REFLECT GEOMETRY.  AREA CHANGED FROM 1.635 TO 1.170 SQMI *
      824       KM  ****************************************************************************
      825       KM     RUNOFF FROM SUBBASIN 34.1
      826       KM        RAINFALL LOSSES FOR GREINER SUBBASINS 31.2 AND 34.1 ARE WEIGHTED BY AREA
      827       BA  1.1700
      828       LS            77.3      12            77.3      12
      829       UK     300   0.590    0.13      25
      830       UK     300   0.040    0.13      75
      831       RK    2570   0.085   0.045  0.0214    TRAP       0      10
      832       RK    8800  0.0325   0.040            TRAP      20      10
                *
      833       KK   C34.1
      834       KM     COMBINE ROUTED HYDROGRAPH FROM C36.2 W/RUNOFF FROM SUBBASIN 34.1
      835       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.  *
                * ****************************************************************************
                *
      836       KK  HVDB-I
      837       KM     COMBINE HYDROGRAPH FROM C34.2 W/ C34.1
      838       HC       2  2.9029
                *
      839       KK  HVDB-O
      840       KM     DETENTION BASIN AT HAPPY VALLEY ROAD - NONREGULATORY STRUCTURE
      841       KM        PRINCIPAL SPILLWAY:  42" x 800' RCP WITH A SLOPE OF 0.5%
      842       KM        11 ACRE-FEET OF STORAGE FOR SEDIMENTAION
      843       RS       1    STOR      -1
      844       SV       0     0.2      0.7      1.8      3.4      5.4     36.3     89.1    151.2    225.3
      845       SV   241.0
      846       SE    2065    2066     2067     2068     2069     2070     2075     2080     2085     2090
      847       SE    2091
      848       SQ       0      10       20       30       40       50       60       70       80       90
      849       SQ     100     110      120      130      140
      850       SE  2065.0 2066.47 2067.13 2067.67 2068.14 2068.58 2069.04 2071.26 2073.33 2075.68
      851       SE  2078.3 2081.19 2084.37 2087.82 2091.54
                *
1                                          HEC-1 INPUT                                          PAGE 18

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

      852       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.      *
                *  ****************************************************************************
      853       DT  DO34.1
      854       DI       0    5000
      855       DQ       0    5000
                *
      856       KK   R34.1
      857       KM     NORMAL DEPTH CHANNEL ROUTE FROM C34.1 TO C36.1 THROUGH PIMA CHANNEL
      858       RS       8    FLOW      -1
      859       RC   0.022   0.022   0.022    2200    0.01
      860       RX    1000    1012    1020    1028    1036    1044    1052    1064
      861       RY     107     104     102     100     100     102     104     107
                *
                *
      862       KK   S36.1
      863       KM     RUNOFF FROM SUBBASIN 36.1
      864       BA  0.1394
      865       LS            73.4      11
      866       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
             *
1                                        HEC-1 INPUT                                    PAGE 19

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:                                 *
```

```
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**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
          *
```



```
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 *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*
              *  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
              *
1                                         HEC-1 INPUT                                            PAGE 22

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
*
```



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



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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 *-*-*-*-*-*-*-*-*-*-*-*-*-*-
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*

KK   D1A2D
KM   MODIFIED: REMOVED DIVERSION CROSSING PIMA RD
KM
KM   BASED ON A FIELD VISIT IT WAS DETERMINED THAT THE FLOW FROM BASIN S1A2D
KM   CROSSES PIMA ROAD, AND DOES NOT FLOW SOUTH ALONG PIMA ROAD.
DT  DO1A2D
DI       0    5000
DQ       0       0
* DQ     0    5000
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*  *-*-*-*-*-*-*-*-*-*- END DEER VALLEY CHANNEL IMPROVEMENTS -*-*-*-*-*-*-*-*-*-*-*-*-*-*-
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*
*
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*  *-*-*-*-*-*-*-*-*-*-* BEGIN PIMA ROAD CHANNEL -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


KK   R1A2D
RS       1    FLOW      -1
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'
RX       0       5      23      45      54      76      94      99
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 *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-
*  -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*- *-*
*
*

KK   S1A2A
BA  0.0474
LS              72      20
UK     100   0.045   0.130     100
RK    2200   0.029   0.017             TRAP      14       7
*

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



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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
              *
              *
```



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



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



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

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               *   -*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-*-  *-*
               *

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 ============|
              *  |\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\|
              *  ------------------------------------------------------------------------
1                                        HEC-1 INPUT                                    PAGE 38

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


1337          KK  CEEC10
1338          HC       3
              *
```

```
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'
1                                          HEC-1 INPUT                                          PAGE 40

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 ********** *
              * ***************************************************** *
1                                    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
*
*
```

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```
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

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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
```



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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
              *
              *
1                                      HEC-1 INPUT                                    PAGE 52

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
              *
```



```
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
* ************************************************************************
*
```



```
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
          *
          *
```



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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
```

```
2192          KM   ROUTE FROM PROJECT STRUCTURE #1 TO PROPOSED PIMA RD DRAINAGE CHANNEL
2193          KM   THE ROUTE GEOMETRY WAS FOUND USING MAPPING AND AERIALS FROM THE
2194          KM   CITY OF SCOTTSDALE.
2195          RK    1831    .018    0.04            TRAP      57       4
              *
              *

2196          KK   S53A3
2197          KM   RUNOFF FROM SUBBASIN S53A3
2198          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2199          KM   ENTELLLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
2200          KM   ENTELLLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT,
2201          KM   (IT REPRESENTED PIMA ACRES WHICH IS NOT A PART OF THIS BASIN)
2202          BA   .0720
2203          LS             77      30
2204          UK     150   0.027    0.13     100
2205          RK    1250   0.023   0.045  0.0087    TRAP       4       5
2206          RK    1831    .018    0.04            TRAP      57       4
              *
              *  *************************
              *  PROJECT STRUCTURE #2
              *
              *  *************************
              *

2207          KK  CPIMA2      CP
2208          KM   COMBINE SUB S53A3 AND RPIMA2 (EXISTING BRIDGE ADJACENT TO IRONWOOD VILLAGE)
2209          HC       2
              *
              *

2210          KK   RUH2B
2211          KM   ROUTE CPIMA2 TO CUH2
2212          KM   ENTELLUS CREATED THIS ROUTE
2213          KM   Modified x-section 12/2008
2214          RS       4    FLOW      -1
2215          RC   0.055    0.04   0.055    1453   .0096
1                                    HEC-1 INPUT                                    PAGE 66

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

2216          RX       0      14      21      32      80      94     100     107
2217          RY       7       3       2       1       1       3       4       7
              * RY     5       3       2       1       1       3       4       5
              *
              *

2218          KK   S53A6
2219          KM   RUNOFF FROM SUBBASIN S53A6, ORIGINAL BASIN S53A1
2220          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2221          KM   ENTELLUS MODIFIED THE MAIN CHANNEL GEOMETRY ACCORDING TO TOPO
2222          KM   ENTELLUS REMOVED THE SECOND OVERLAND FLOW CATACHMENT
2223          KM   (IT REPRSENTED PIMA ACRES WHICH IS NOT PART OF THIS BASIN)
2224          BA   .0261
2225          LS             77      30
2226          UK     150   0.027    0.13     100
2227          RK     669   .0179    0.04            TRAP      10    5.25
              *

2228          KK   RUH2C
2229          KM   ROUTE S53A6 TO CUH2
2230          KM   EAST SEGMENT OF PROPOSED UNION HILLS INTERCEPTOR CHANNEL BETWEEN PIMA RD
2231          KM   ALIGNMENT AND PROPOSED PIMA RD DRAINAGE CHANNEL
2232          RS       3    FLOW      -1
2233          RC    .055     .04    .055     993    .088
2234          RX       0      10      22      32      33      34      35      36
2235          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 ***************
              * ********************************************************************************

2236          KK   S53A5
2237          KM   RUNOFF FROM SUBBASIN S53A5, ORIGINAL BASIN S53A1
2238          KM   ENTELLUS CREATED THIS BASIN BY SUBDIVIDING BASIN S53A1
2239          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
              *
              *
```

```
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
              *
```

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```
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
```

```
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 71

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

```
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
              *
              *
1                                        HEC-1 INPUT                                                    PAGE 73

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
              *
```

```
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
```

```
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
*
*
```



```
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

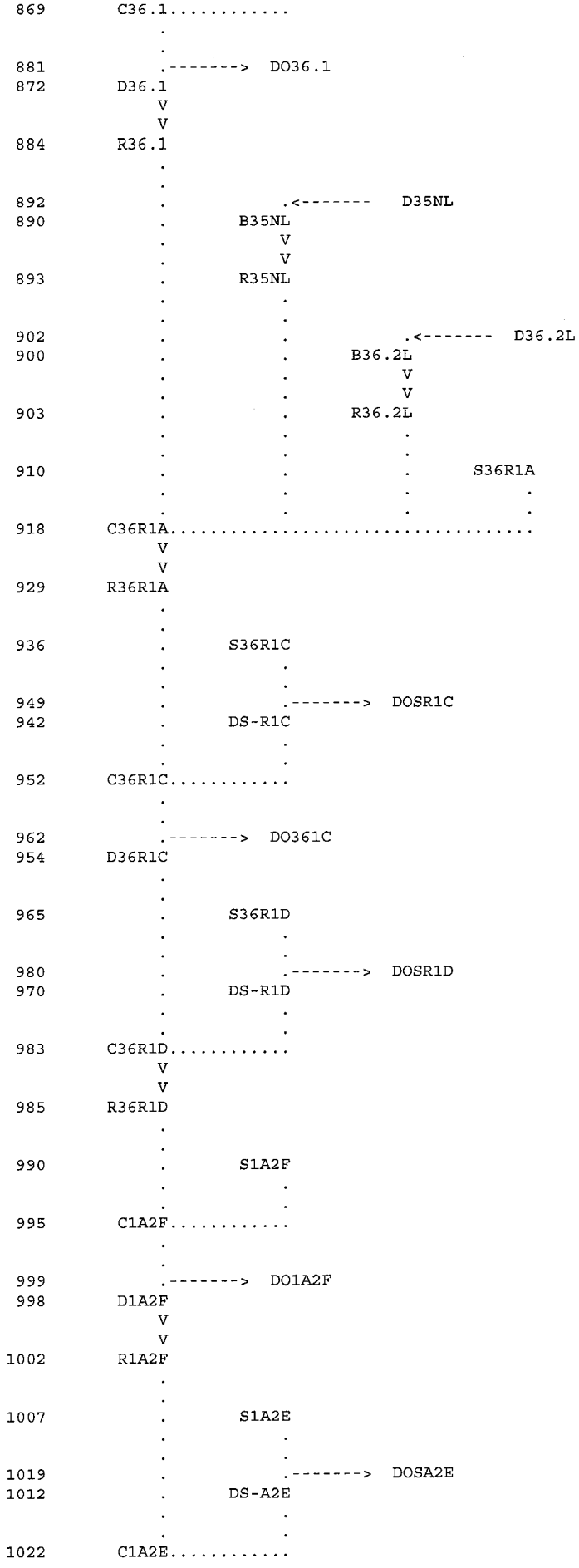
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


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
   791        .       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
   846       R34.1
              .
              .
   862        .       S36.1
              .           .
              .           .
```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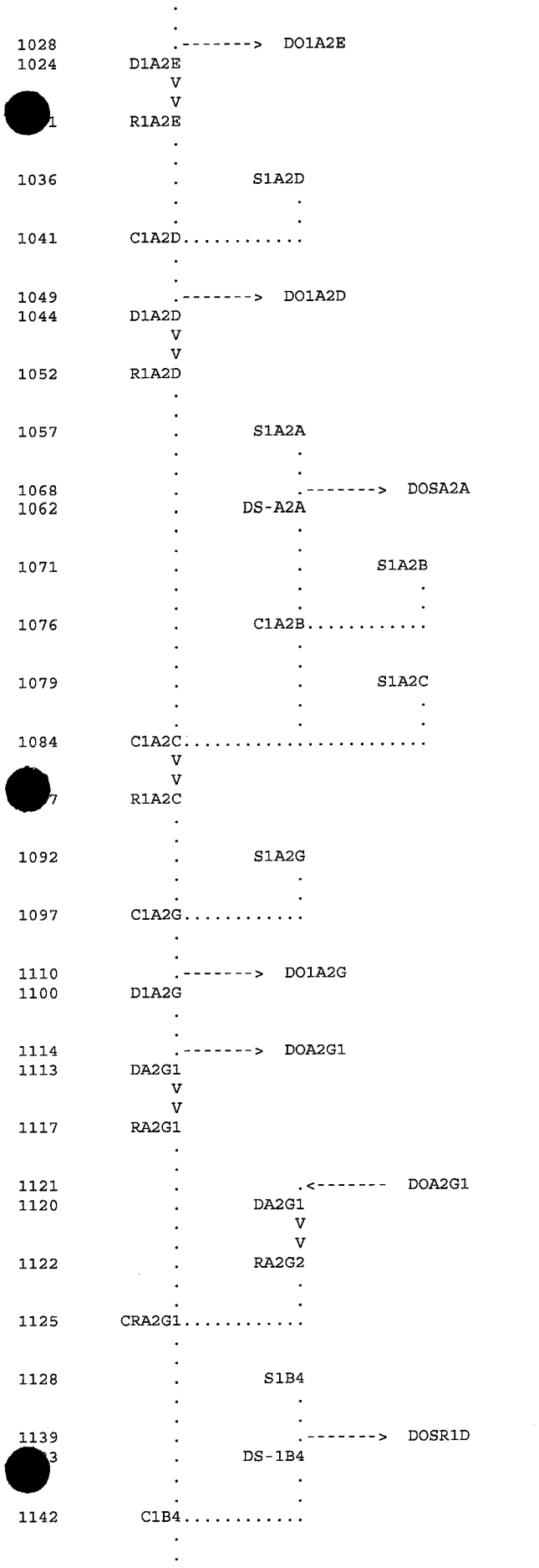
D36.1
R36.1
D35NL
B35NL
R35NL
D36.2L
B36.2L
R36.2L
S36R1A
C36R1A
R36R1A
S36R1C
DOSR1C
DS-R1C
C36R1C
DO361C
D36R1C
S36R1D
DOSR1D
DS-R1D
C36R1D
R36R1D
S1A2F
C1A2F
DO1A2F
D1A2F
R1A2F
S1A2E
DOSA2E
DS-A2E
C1A2E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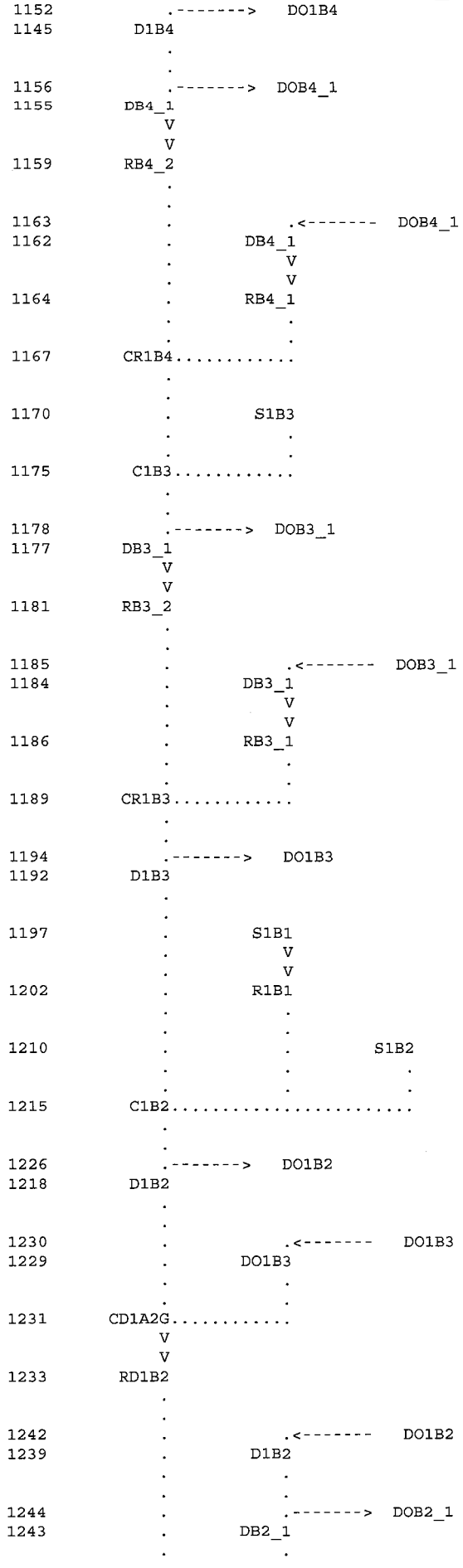
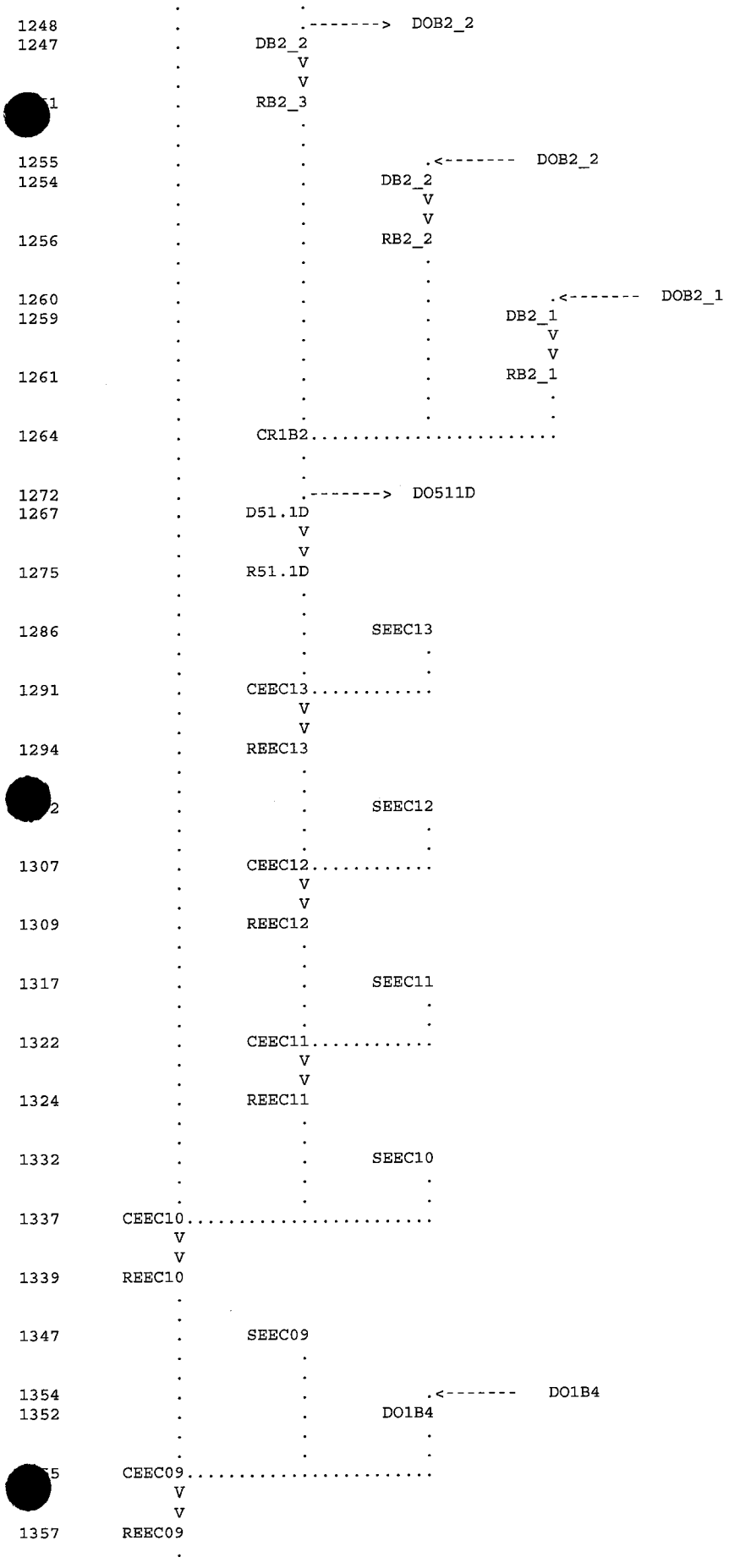
DO1A2E
1024
D1A2E
R1A2E
1036
S1A2D
1041
C1A2D
1049
DO1A2D
1044
D1A2D
1052
R1A2D
1057
S1A2A
1068
DOSA2A
1062
DS-A2A
1071
S1A2B
1076
C1A2B
1079
S1A2C
1084
C1A2C
R1A2C
1092
S1A2G
1097
C1A2G
1110
DO1A2G
1100
D1A2G
1114
DOA2G1
1113
DA2G1
1117
RA2G1
1121
DOA2G1
1120
DA2G1
1122
RA2G2
1125
CRA2G1
1128
S1B4
1139
DOSR1D
DS-1B4
1142
C1B4


1152
.-------> DO1B4
1145
D1B4
1156
.-------> DOB4_1
1155
DB4_1
1159
RB4_2
1163
.<------- DOB4_1
1162
DB4_1
1164
RB4_1
1167
CR1B4
1170
S1B3
1175
C1B3
1178
.-------> DOB3_1
1177
DB3_1
1181
RB3_2
1185
.<------- DOB3_1
1184
DB3_1
1186
RB3_1
1189
CR1B3
1194
.-------> DO1B3
1192
D1B3
1197
S1B1
1202
R1B1
1210
S1B2
1215
C1B2
1226
.-------> DO1B2
1218
D1B2
1230
.<------- DO1B3
1229
DO1B3
1231
CD1A2G
1233
RD1B2
1242
.<------- DO1B2
1239
D1B2
1244
.-------> DOB2_1
1243
DB2_1


1248
DOB2_2
1247
DB2_2
RB2_3
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DOB2_2
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DB2_2
1256
RB2_2
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DOB2_1
1259
DB2_1
1261
RB2_1
1264
CR1B2
1272
DO511D
1267
D51.1D
1275
R51.1D
1286
SEEC13
1291
CEEC13
1294
REEC13
SEEC12
1307
CEEC12
1309
REEC12
1317
SEEC11
1322
CEEC11
1324
REEC11
1332
SEEC10
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REEC10
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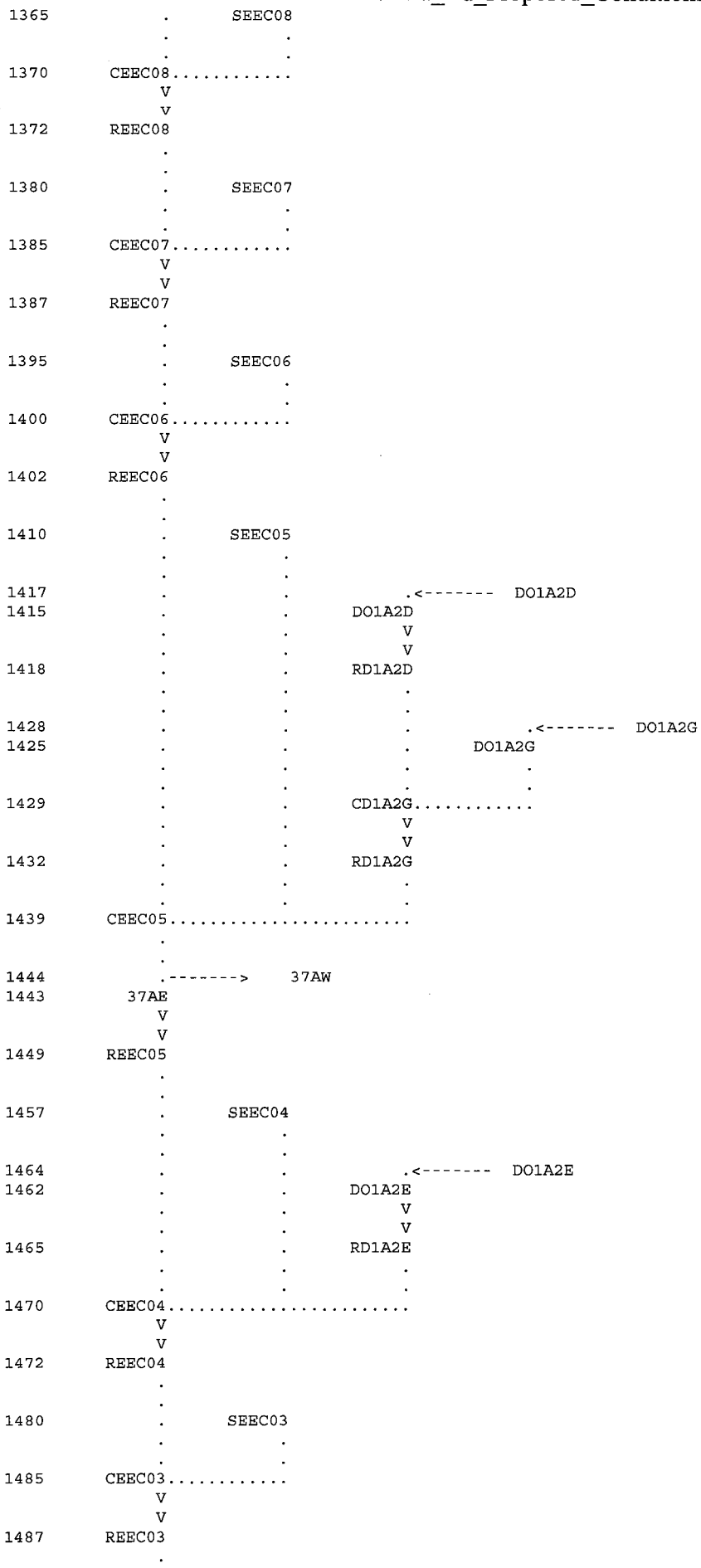
SEEC09
1354
DO1B4
1352
DO1B4
CEEC09
1357
REEC09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SEEC08
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CEEC08
1372
REEC08
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SEEC07
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CEEC07
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REEC07
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1402
REEC06
1410
SEEC05
1417
DO1A2D
1415
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RD1A2D
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DO1A2G
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37AE
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1462
DO1A2E
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1472
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SEEC03
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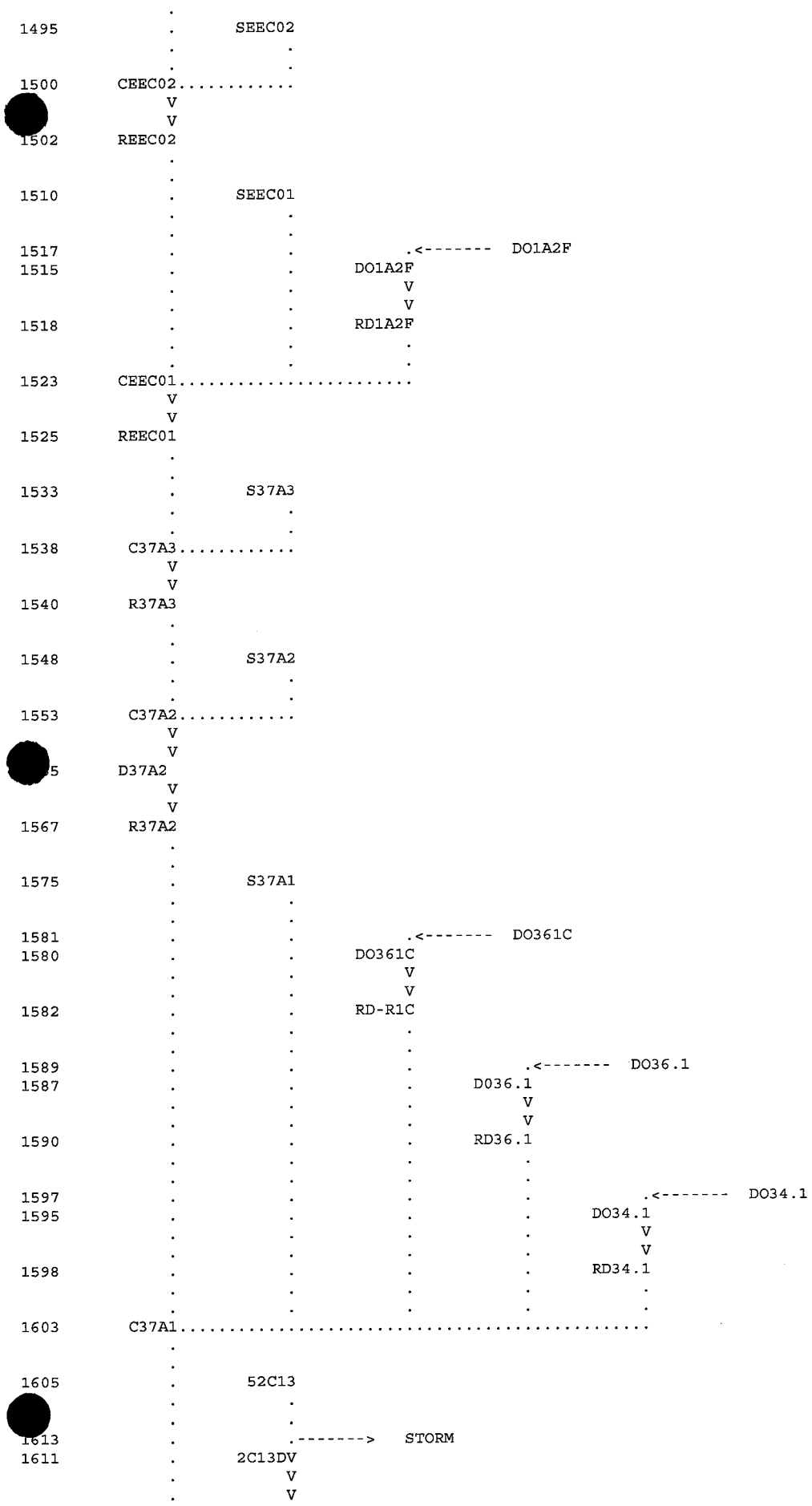
CEEC03
1487
REEC03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1502 REEC02
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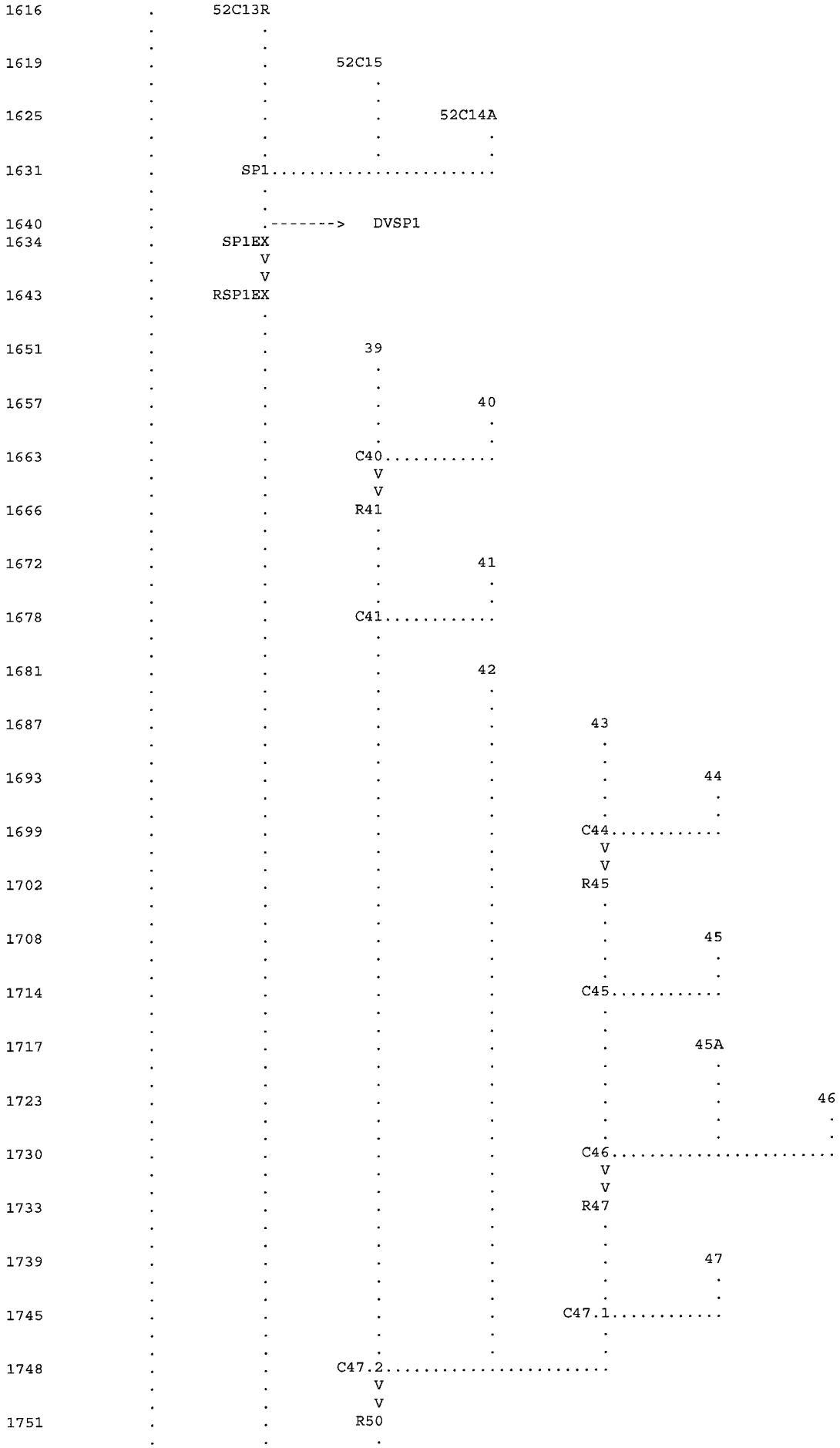
1515 DO1A2F
1518 RD1A2F
1523 CEEC01
1525 REEC01
1533 S37A3
1538 C37A3
1540 R37A3
1548 S37A2
1553 C37A2
D37A2
1567 R37A2
1575 S37A1
1581 DO361C
1580 DO361C
1582 RD-R1C
1589 DO36.1
1587 D036.1
1590 RD36.1
1597 DO34.1
1595 DO34.1
1598 RD34.1
1603 C37A1
1605 52C13
1613 STORM
1611 2C13DV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1619
52C15
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52C14A
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SP1
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DVSP1
1634
SP1EX
1643
RSP1EX
1651
39
1657
40
1663
C40
1666
R41
1672
41
1678
C41
1681
42
1687
43
1693
44
1699
C44
1702
R45
1708
45
1714
C45
1717
45A
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C46
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R47
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1745
C47.1
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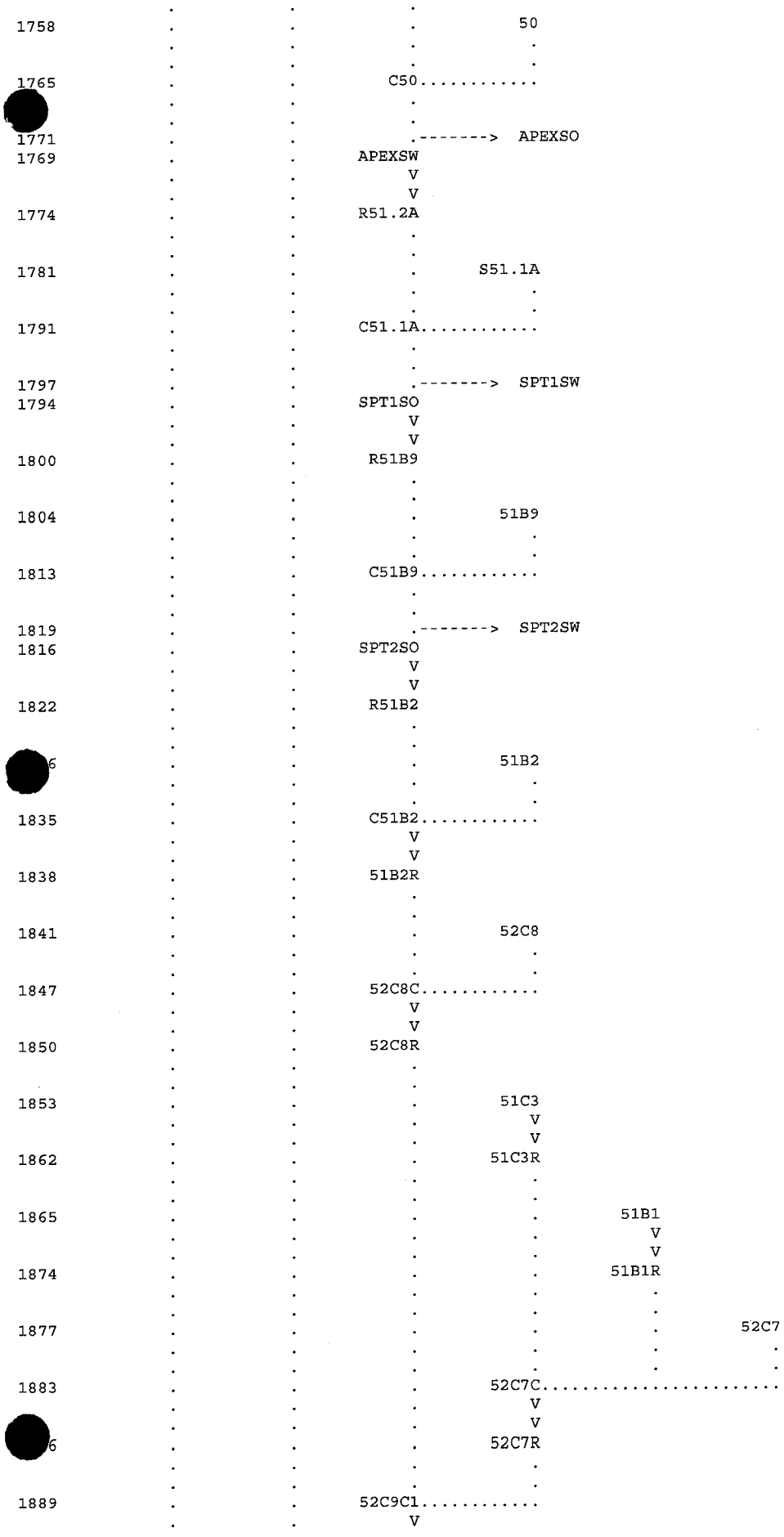
C47.2
1751
R50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C50
1771
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S51.1A
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C51.1A
1797
SPT1SW
1794
SPT1SO
1800
R51B9
1804
51B9
1813
C51B9
1819
SPT2SW
1816
SPT2SO
1822
R51B2
51B2
1835
C51B2
1838
51B2R
1841
52C8
1847
52C8C
1850
52C8R
1853
51C3
1862
51C3R
1865
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1874
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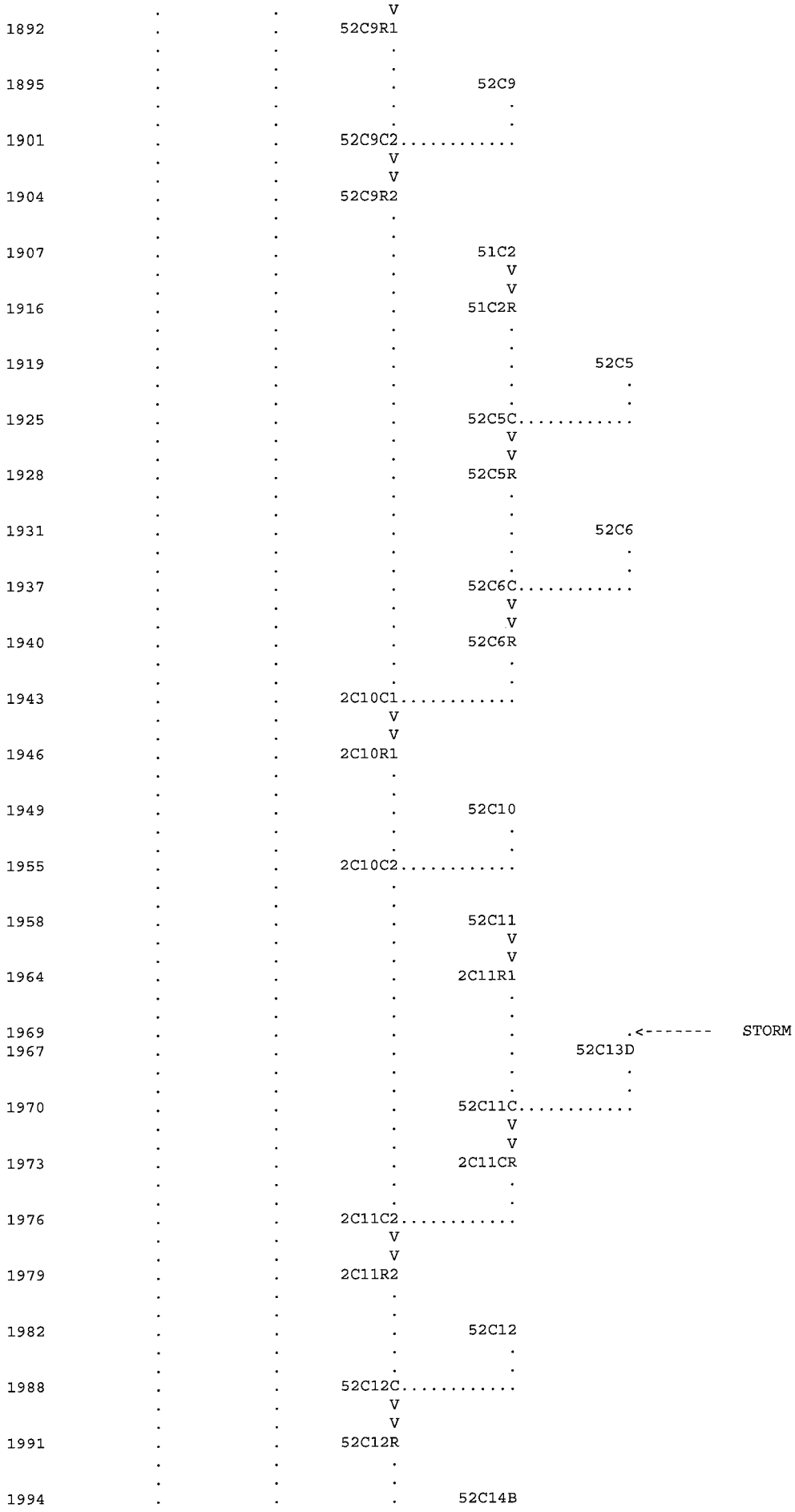
1877
52C7
1883
52C7C
52C7R
1889
52C9C1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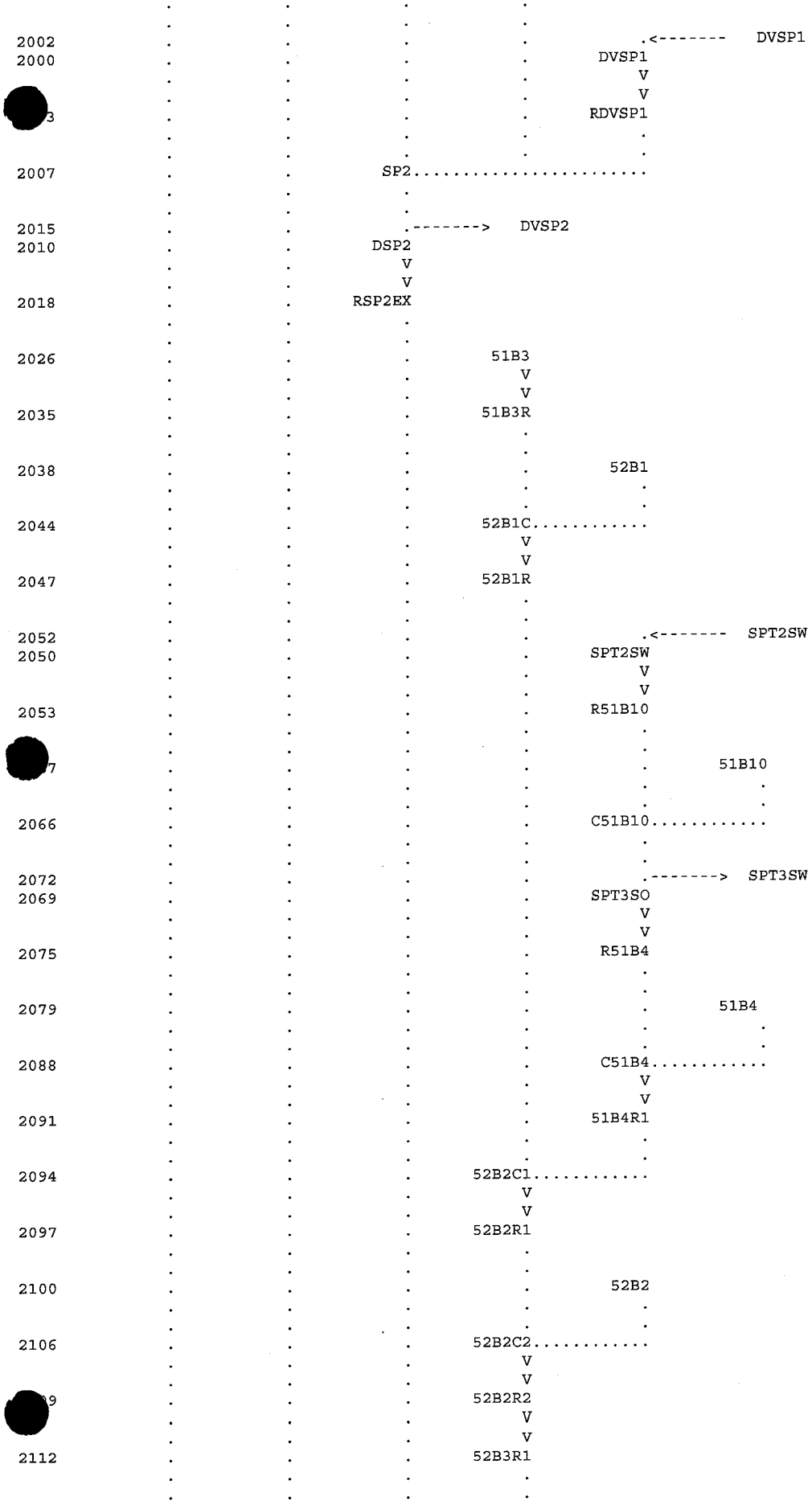
1895 52C9
1901 52C9C2
1904 52C9R2
1907 51C2
1916 51C2R
1919 52C5
1925 52C5C
1928 52C5R
1931 52C6
1937 52C6C
1940 52C6R
1943 2C10C1
1946 2C10R1
1949 52C10
1955 2C10C2
1958 52C11
1964 2C11R1
1969 <------- STORM
1967 52C13D
1970 52C11C
1973 2C11CR
1976 2C11C2
1979 2C11R2
1982 52C12
1988 52C12C
1991 52C12R
1994 52C14B


2002
2000
DVSP1
<-------
DVSP1
RDVSP1
2007
SP2
2015
2010
DVSP2
DSP2
2018
RSP2EX
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51B3
2035
51B3R
2038
52B1
2044
52B1C
2047
52B1R
2052
2050
SPT2SW
<-------
SPT2SW
2053
R51B10
51B10
2066
C51B10
2072
2069
SPT3SO
<-------
SPT3SW
2075
R51B4
2079
51B4
2088
C51B4
2091
51B4R1
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2097
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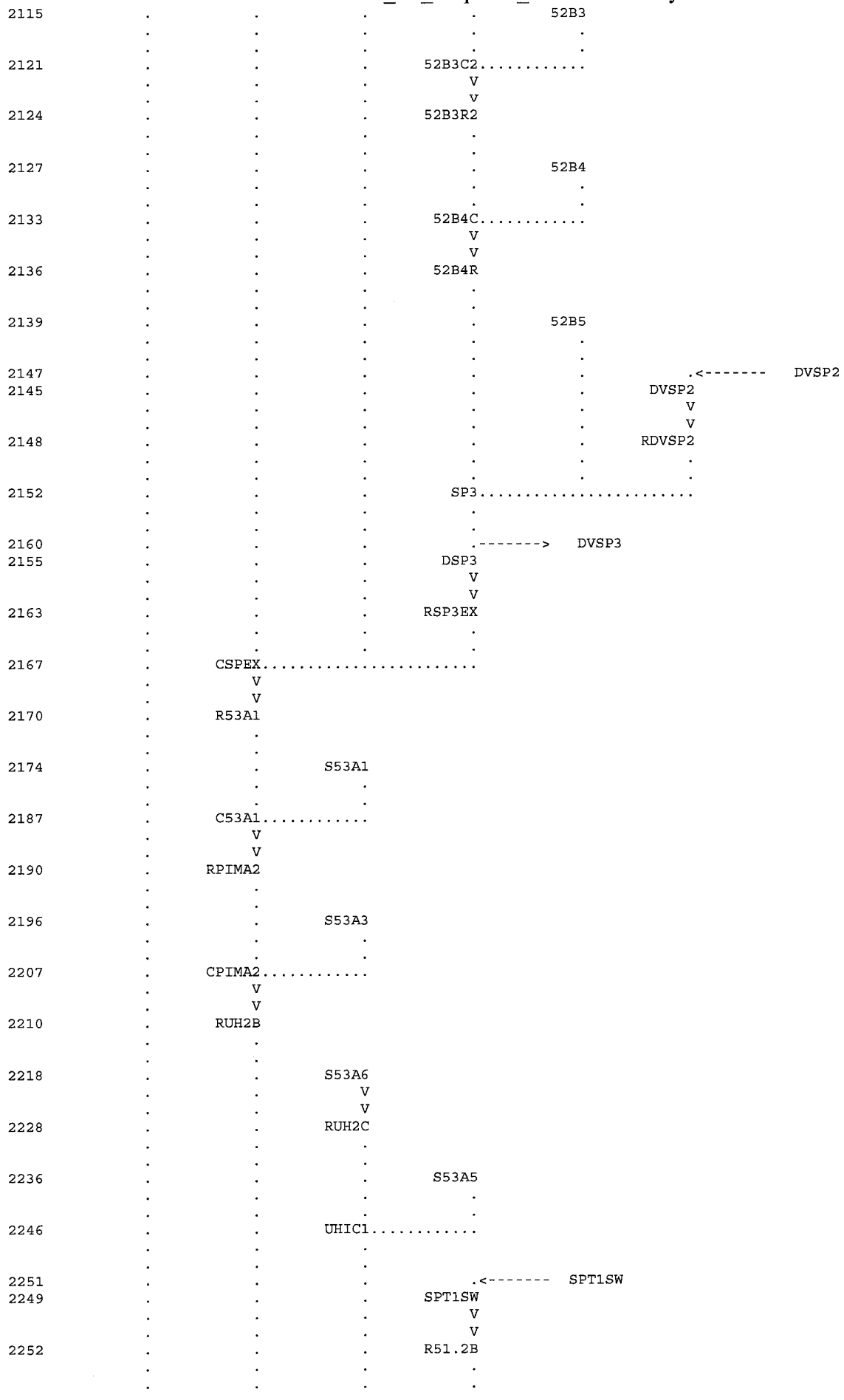
2112
52B3R1


2115
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52B3C2
2124
52B3R2
2127
52B4
2133
52B4C
2136
52B4R
2139
52B5
2147
.<-------
DVSP2
2145
DVSP2
2148
RDVSP2
2152
SP3
2160
.------->
DVSP3
2155
DSP3
2163
RSP3EX
2167
CSPEX
2170
R53A1
2174
S53A1
2187
C53A1
2190
RPIMA2
2196
S53A3
2207
CPIMA2
2210
RUH2B
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S53A6
2228
RUH2C
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UHIC1
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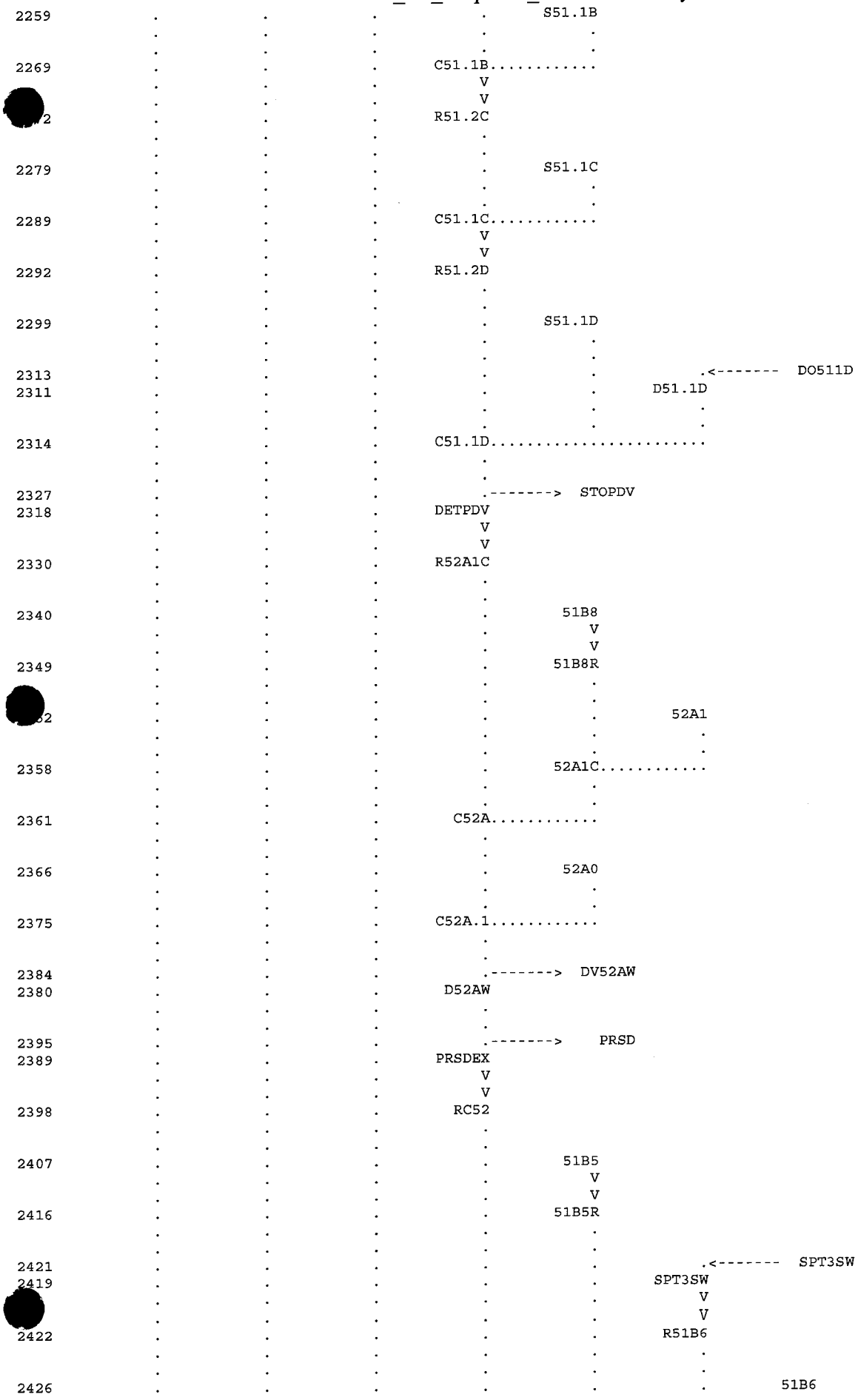
SPT1SW
2249
SPT1SW
2252
R51.2B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R51.2C
S51.1C
C51.1C
R51.2D
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D51.1D
C51.1D
STOPDV
DETPDV
R52A1C
51B8
51B8R
52A1
52A1C
C52A
52A0
C52A.1
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51B5R
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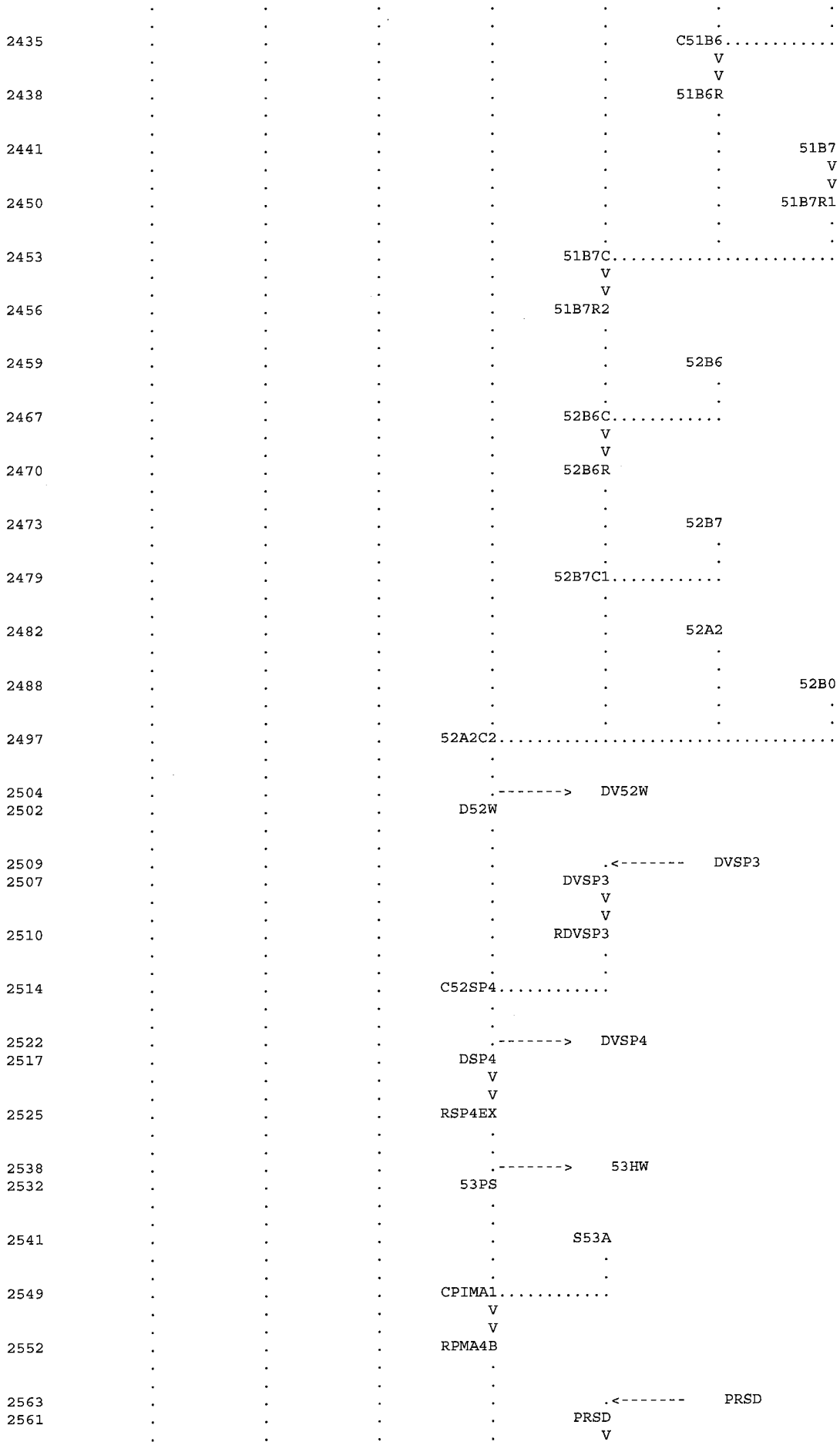
SPT3SW
R51B6
51B6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2441
51B7
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51B7R1
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51B7C
2456
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52B6
2467
52B6C
2470
52B6R
2473
52B7
2479
52B7C1
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52A2
2488
52B0
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52A2C2
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DV52W
2502
D52W
2509
DVSP3
2507
DVSP3
2510
RDVSP3
2514
C52SP4
2522
DVSP4
2517
DSP4
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RSP4EX
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PRSD
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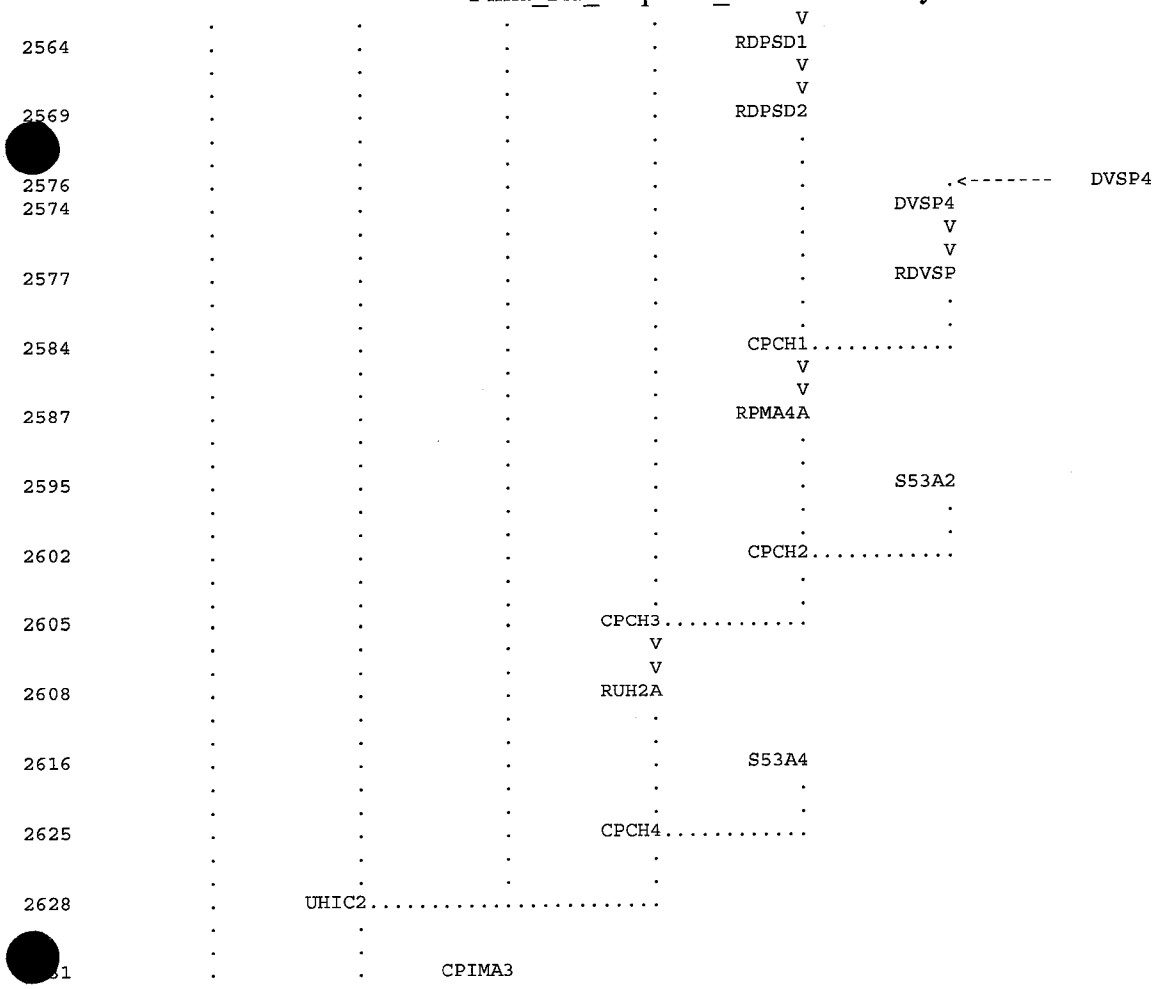
PRSD



(***) 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
```

+								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

	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

+	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									

	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

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							

+		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							

+	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

	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

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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

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	MAX STAGE
+	HYDROGRAPH AT	S30N	437.	3.45	64.	16.	12.	.65		
+	ROUTED TO	R30N	434.	3.50	64.	16.	12.	.65	102.47	
+ 3.50										
+	HYDROGRAPH AT	S31.1	128.	3.48	20.	5.	4.	.27		
+	2 COMBINED AT	C31.1	562.	3.50	85.	21.	15.	.92		
+	HYDROGRAPH AT	S34.2	222.	3.45	34.	9.	6.	.44		
+	2 COMBINED AT	C34.2	779.	3.48	119.	30.	22.	1.36		
+	HYDROGRAPH AT	S35N	485.	3.28	54.	14.	10.	.55		
+	DIVERSION TO	D35NL	218.	3.28	24.	6.	4.	.55		
+	HYDROGRAPH AT	D35NR	267.	3.28	31.	8.	6.	.55		
+	ROUTED TO	R35NR	262.	3.38	31.	8.	6.	.55	101.14	
+ 3.38										
+	HYDROGRAPH AT	S36.2	126.	3.33	16.	4.	3.	.21		
+	2 COMBINED AT	C36.2	382.	3.37	47.	12.	8.	.76		
+	DIVERSION TO	D36.2L	6.	3.37	0.	0.	0.	.76		
+	HYDROGRAPH AT	D36.2R	376.	3.37	47.	12.	8.	.76		

	ROUTED TO							
+		R36.2R	322.	3.78	47.	12.	8.	.76
+								101.02
3.78								
	HYDROGRAPH AT							
+		S34.1	611.	3.42	91.	23.	17.	1.17
	2 COMBINED AT							
+		C34.1	633.	3.75	137.	35.	25.	1.93
	2 COMBINED AT							
+		HVDB-I	1367.	3.45	256.	65.	47.	3.29
	ROUTED TO							
+		HVDB-O	107.	6.42	104.	65.	47.	3.29
+								2080.21
6.40								
	DIVERSION TO							
+		DO34.1	107.	.00	104.	65.	47.	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	48.	3.58	9.	2.	2.	.14
	2 COMBINED AT							
+		C36.1	48.	3.58	9.	2.	2.	3.43
	DIVERSION TO							
+		DO36.1	48.	.00	9.	2.	2.	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	218.	3.28	24.	6.	4.	.00
	ROUTED TO							
+		R35NL	199.	3.67	24.	6.	4.	.00
+								102.37
3.67								
	HYDROGRAPH AT							
+		B36.2L	6.	3.37	0.	0.	0.	.00
	ROUTED TO							
+		R36.2L	1.	4.77	0.	0.	0.	.00
+								100.02
4.78								
	HYDROGRAPH AT							
+		S36R1A	201.	3.68	40.	10.	7.	.63
	4 COMBINED AT							
+		C36R1A	400.	3.67	63.	16.	12.	4.06
	ROUTED TO							
+		R36R1A	399.	3.68	63.	16.	12.	4.06
+								102.17
3.68								
	HYDROGRAPH AT							
+		S36R1C	27.	3.52	5.	1.	1.	.08
	DIVERSION TO							
+		DOSR1C	27.	.00	5.	1.	1.	.08

+	HYDROGRAPH AT	DS-R1C	0.	.00	0.	0.	0.	.08	
+	2 COMBINED AT	C36R1C	399.	3.68	63.	16.	12.	4.14	
+	DIVERSION TO	DO361C	234.	3.68	57.	15.	11.	4.14	
+	HYDROGRAPH AT	D36R1C	165.	3.68	6.	1.	1.	4.14	
+	HYDROGRAPH AT	S36R1D	153.	3.65	32.	8.	6.	.50	
+	DIVERSION TO	DOSR1D	97.	3.65	3.	1.	1.	.50	
+	HYDROGRAPH AT	DS-R1D	153.	3.65	29.	7.	5.	.50	
+	2 COMBINED AT	C36R1D	317.	3.68	35.	9.	6.	4.64	
+	ROUTED TO	R36R1D	309.	3.72	35.	9.	6.	4.64	1.91
+									
3.72									
+	HYDROGRAPH AT	S1A2F	7.	3.12	1.	0.	0.	.01	
+	2 COMBINED AT	C1A2F	310.	3.72	35.	9.	7.	4.65	
+	DIVERSION TO	DO1A2F	31.	3.72	4.	1.	1.	4.65	
+	HYDROGRAPH AT	D1A2F	279.	3.72	31.	8.	6.	4.65	
+	ROUTED TO	R1A2F	267.	3.78	31.	8.	6.	4.65	1.77
+									
3.78									
+	HYDROGRAPH AT	S1A2E	25.	3.12	2.	1.	0.	.03	
+	DIVERSION TO	DOSA2E	0.	3.12	0.	0.	0.	.03	
+	HYDROGRAPH AT	DS-A2E	25.	3.12	2.	1.	0.	.03	
+	2 COMBINED AT	C1A2E	270.	3.78	33.	9.	6.	4.68	
+	DIVERSION TO	DO1A2E	0.	3.78	0.	0.	0.	4.68	
+	HYDROGRAPH AT	D1A2E	270.	3.78	33.	9.	6.	4.68	
+	ROUTED TO	R1A2E	264.	3.82	33.	9.	6.	4.68	1.82
+									
3.82									
+	HYDROGRAPH AT	S1A2D	13.	3.13	1.	0.	0.	.02	
+	2 COMBINED AT	C1A2D	266.	3.82	34.	9.	6.	4.70	
+	DIVERSION TO	DO1A2D	0.	3.82	0.	0.	0.	4.70	
+	HYDROGRAPH AT	D1A2D	266.	3.82	34.	9.	6.	4.70	

	ROUTED TO							
+		R1A2D	264.	3.83	34.	9.	6.	4.70
+								1.82
3.83								
	HYDROGRAPH AT							
+		S1A2A	39.	3.13	4.	1.	1.	.05
	DIVERSION TO							
+		DOSA2A	39.	3.25	2.	0.	0.	.05
	HYDROGRAPH AT							
+		DS-A2A	23.	3.25	2.	1.	0.	.05
	HYDROGRAPH AT							
+		S1A2B	19.	3.13	2.	0.	0.	.02
	2 COMBINED AT							
+		C1A2B	34.	3.25	4.	1.	1.	.07
	HYDROGRAPH AT							
+		S1A2C	8.	3.12	1.	0.	0.	.01
	3 COMBINED AT							
+		C1A2C	271.	3.83	39.	10.	7.	4.78
	ROUTED TO							
+		R1A2C	263.	3.87	39.	10.	7.	4.78
+								1.81
3.87								
	HYDROGRAPH AT							
+		S1A2G	3.	3.10	0.	0.	0.	.00
	2 COMBINED AT							
+		C1A2G	264.	3.87	39.	10.	7.	4.78
	DIVERSION TO							
+		DO1A2G	0.	3.87	0.	0.	0.	4.78
	HYDROGRAPH AT							
+		D1A2G	264.	3.87	39.	10.	7.	4.78
	DIVERSION TO							
+		DOA2G1	132.	3.87	19.	5.	4.	4.78
	HYDROGRAPH AT							
+		DA2G1	132.	3.87	19.	5.	4.	4.78
	ROUTED TO							
+		RA2G1	132.	3.87	19.	5.	4.	4.78
	HYDROGRAPH AT							
+		DA2G1	132.	3.87	19.	5.	4.	.00
	ROUTED TO							
+		RA2G2	132.	3.87	19.	5.	4.	.00
	2 COMBINED AT							
+		CRA2G1	263.	3.87	39.	10.	7.	4.78
	HYDROGRAPH AT							
+		S1B4	16.	3.12	1.	0.	0.	.02
	DIVERSION TO							
+		DOSR1D	0.	3.12	0.	0.	0.	.02
	HYDROGRAPH AT							
+		DS-1B4	16.	3.12	1.	0.	0.	.02
	2 COMBINED AT							
+		C1B4	265.	3.87	40.	10.	8.	4.80
	DIVERSION TO							
+		DO1B4	0.	3.87	0.	0.	0.	4.80
	HYDROGRAPH AT							
+		D1B4	265.	3.87	40.	10.	8.	4.80
	DIVERSION TO							
+		DOB4_1	133.	3.87	20.	5.	4.	4.80

+	HYDROGRAPH AT	DB4_1	133.	3.87	20.	5.	4.	4.80
+	ROUTED TO	RB4_2	132.	3.87	20.	5.	4.	4.80
+	HYDROGRAPH AT	DB4_1	133.	3.87	20.	5.	4.	.00
+	ROUTED TO	RB4_1	132.	3.87	20.	5.	4.	.00
+	2 COMBINED AT	CR1B4	265.	3.87	40.	10.	8.	4.80
+	HYDROGRAPH AT	S1B3	79.	3.20	9.	2.	2.	.14
+	2 COMBINED AT	C1B3	278.	3.87	49.	13.	9.	4.95
+	DIVERSION TO	DOB3_1	139.	3.87	24.	6.	5.	4.95
+	HYDROGRAPH AT	DB3_1	139.	3.87	24.	6.	5.	4.95
+	ROUTED TO	RB3_2	139.	3.87	24.	6.	5.	4.95
+	HYDROGRAPH AT	DB3_1	139.	3.87	24.	6.	5.	.00
+	ROUTED TO	RB3_1	139.	3.87	24.	6.	5.	.00
+	2 COMBINED AT	CR1B3	278.	3.87	49.	13.	9.	4.95
+	DIVERSION TO	DO1B3	0.	3.87	0.	0.	0.	4.95
+	HYDROGRAPH AT	D1B3	278.	3.87	49.	13.	9.	4.95
+	HYDROGRAPH AT	S1B1	21.	3.13	2.	0.	0.	.03
+	ROUTED TO	R1B1	21.	3.15	2.	0.	0.	.03
+								100.40
3.15								
+	HYDROGRAPH AT	S1B2	17.	3.22	2.	1.	0.	.04
+	3 COMBINED AT	C1B2	284.	3.87	53.	14.	10.	5.02
+	DIVERSION TO	DO1B2	284.	.00	53.	14.	10.	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
+	HYDROGRAPH AT	D1B2	284.	3.87	53.	14.	10.	.00
	DIVERSION TO							

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+                    DOB2_1      95.   3.87     18.     5.      3.      .00
          HYDROGRAPH AT
+                    DB2_1      189.   3.87     35.     9.      7.      .00
          DIVERSION TO
+                    DOB2_2      95.   3.87     18.     5.      3.      .00
          HYDROGRAPH AT
+                    DB2_2       95.   3.87     18.     5.      3.      .00
          ROUTED TO
+                    RB2_3       95.   3.88     18.     5.      3.      .00
          HYDROGRAPH AT
+                    DB2_2       95.   3.87     18.     5.      3.      .00
          ROUTED TO
+                    RB2_2       95.   3.88     18.     5.      3.      .00
          HYDROGRAPH AT
+                    DB2_1       95.   3.87     18.     5.      3.      .00
          ROUTED TO
+                    RB2_1       95.   3.88     18.     5.      3.      .00
          3 COMBINED AT
+                    CR1B2      284.   3.88     53.    14.     10.      .00
          DIVERSION TO
+                    DO511D       0.   3.88      0.     0.      0.      .00
          HYDROGRAPH AT
+                    D51.1D     284.   3.88     53.    14.     10.      .00
          ROUTED TO
+                    R51.1D     281.   3.92     53.    14.     10.      .00
+                                                                              96.55
3.92
          HYDROGRAPH AT
+                    SEEC13      10.   3.12      1.     0.      0.      .01
          2 COMBINED AT
+                    CEEC13     282.   3.92     53.    14.     10.      .01
          ROUTED TO
+                    REEC13     282.   3.92     53.    14.     10.      .01
+                                                                              96.56
3.92
          HYDROGRAPH AT
+                    SEEC12       2.   3.08      0.     0.      0.      .00
          2 COMBINED AT
+                    CEEC12     282.   3.92     54.    14.     10.      .01
          ROUTED TO
+                    REEC12     282.   3.92     54.    14.     10.      .01
+                                                                              96.56
3.92
          HYDROGRAPH AT
+                    SEEC11       6.   3.18      1.     0.      0.      .01
          2 COMBINED AT
+                    CEEC11     282.   3.92     54.    14.     10.      .02
          ROUTED TO
+                    REEC11     282.   3.93     54.    14.     10.      .02
+                                                                              96.56
3.93
          HYDROGRAPH AT
+                    SEEC10      14.   3.18      1.     0.      0.      .02
          3 COMBINED AT
+                    CEEC10     284.   3.93     56.    14.     10.     5.05
          ROUTED TO
+                    REEC10     284.   3.93     56.    14.     10.     5.05
```

+								96.56
3.93								
+	HYDROGRAPH AT	SEEC09	18.	3.22	2.	1.	0.	.02
+	HYDROGRAPH AT	DO1B4	0.	.00	0.	0.	0.	.00
+	3 COMBINED AT	CEEC09	287.	3.93	58.	15.	11.	5.07
+	ROUTED TO	REEC09	285.	3.95	58.	15.	11.	5.07
+								96.57
3.95								
+	HYDROGRAPH AT	SEEC08	14.	3.47	3.	1.	0.	.03
+	2 COMBINED AT	CEEC08	291.	3.95	60.	16.	11.	5.10
+	ROUTED TO	REEC08	289.	3.97	60.	16.	11.	5.10
+								96.58
3.97								
+	HYDROGRAPH AT	SEEC07	6.	3.12	0.	0.	0.	.01
+	2 COMBINED AT	CEEC07	290.	3.97	61.	16.	11.	5.11
+	ROUTED TO	REEC07	290.	3.97	61.	16.	11.	5.11
+								96.58
3.97								
+	HYDROGRAPH AT	SEEC06	3.	3.12	0.	0.	0.	.00
+	2 COMBINED AT	CEEC06	290.	3.97	61.	16.	11.	5.11
+	ROUTED TO	REEC06	288.	3.98	61.	16.	11.	5.11
+								96.58
3.98								
+	HYDROGRAPH AT	SEEC05	46.	3.30	7.	2.	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	297.	3.98	67.	17.	13.	5.18
+	DIVERSION TO	37AW	147.	3.98	34.	9.	6.	5.18
+	HYDROGRAPH AT	37AE	150.	3.98	34.	9.	6.	5.18

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          ROUTED TO
+                      REEC05     148.   4.02      34.      9.      6.      5.18
+                                                                                    95.95
4.02

          HYDROGRAPH AT
+                      SEEC04      75.   3.33      11.      3.      2.       .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     205.   3.35      45.     12.      8.      5.31

          ROUTED TO
+                      REEC04     205.   3.35      45.     12.      8.      5.31
+                                                                                    96.15
3.35

          HYDROGRAPH AT
+                      SEEC03       4.   3.27       1.      0.      0.       .01

          2 COMBINED AT
+                      CEEC03     208.   3.35      45.     12.      8.      5.32

          ROUTED TO
+                      REEC03     207.   3.37      45.     12.      8.      5.32
+                                                                                    96.16
3.37

          HYDROGRAPH AT
+                      SEEC02      11.   3.12       1.      0.      0.       .01

          2 COMBINED AT
+                      CEEC02     211.   3.37      46.     12.      9.      5.33

          ROUTED TO
+                      REEC02     211.   3.37      46.     12.      9.      5.33
+                                                                                    96.17
3.37

          HYDROGRAPH AT
+                      SEEC01     103.   3.38      17.      4.      3.       .19

          HYDROGRAPH AT
+                      DO1A2F      31.   3.72       4.      1.      1.       .00

          ROUTED TO
+                      RD1A2F      22.   4.20       4.      1.      1.       .00
+                                                                                    95.34
4.20

          3 COMBINED AT
+                      CEEC01     314.   3.37      67.     17.     12.      5.51

          ROUTED TO
+                      REEC01     310.   3.43      67.     17.     12.      5.51
+                                                                                    96.47
3.43

          HYDROGRAPH AT
+                       S37A3      84.   3.27      11.      3.      2.       .12

          2 COMBINED AT
+                       C37A3     365.   3.40      77.     20.     14.      5.63

          ROUTED TO
+                       R37A3     364.   3.43      77.     20.     14.      5.63
+                                                                                    96.62
3.43

          HYDROGRAPH AT
+                       S37A2      37.   3.53       8.      2.      1.       .08

          2 COMBINED AT
+                       C37A2     400.   3.43      85.     22.     16.      5.72
```

+	ROUTED TO	D37A2	400.	3.43	79.	20.	14.	5.72
+								1791.00
+								
3.75								
+	ROUTED TO	R37A2	398.	3.45	79.	20.	14.	5.72
+								2.17
+								
3.45								
+	HYDROGRAPH AT	S37A1	170.	3.55	35.	9.	7.	.40
+	HYDROGRAPH AT	DO361C	234.	3.62	57.	15.	11.	.00
+	ROUTED TO	RD-R1C	234.	4.05	57.	15.	11.	.00
+								96.39
+								
4.03								
+	HYDROGRAPH AT	D036.1	48.	3.58	9.	2.	2.	.00
+	ROUTED TO	RD36.1	43.	4.17	9.	2.	2.	.00
+								95.50
+								
4.17								
+	HYDROGRAPH AT	DO34.1	107.	6.42	104.	65.	47.	.00
+	ROUTED TO	RD34.1	107.	6.87	104.	65.	47.	.00
+								95.88
+								
6.88								
+	5 COMBINED AT	C37A1	634.	4.15	268.	111.	80.	6.11
+	HYDROGRAPH AT	52C13	28.	3.12	2.	1.	0.	.02
+	DIVERSION TO	STORM	28.	.00	2.	1.	0.	.02
+	HYDROGRAPH AT	2C13DV	0.	.00	0.	0.	0.	.02
+	HYDROGRAPH AT	52C15	85.	3.12	8.	2.	1.	.05
+	HYDROGRAPH AT	52C14A	77.	3.13	7.	2.	1.	.04
+	3 COMBINED AT	SP1	161.	3.12	15.	4.	3.	.11
+	DIVERSION TO	DVSP1	161.	3.23	15.	4.	3.	.11
+	HYDROGRAPH AT	SP1EX	0.	3.23	0.	0.	0.	.11
+	ROUTED TO	RSP1EX	0.	3.52	0.	0.	0.	.11
+								.50
+								
3.67								
+	HYDROGRAPH AT	39	1587.	3.35	213.	54.	39.	1.88
+	HYDROGRAPH AT	40	601.	3.23	60.	15.	11.	.58
+	2 COMBINED AT	C40	2007.	3.33	273.	69.	50.	2.47
+	ROUTED TO	R41	1975.	3.48	272.	69.	50.	2.47

+ 2.95
3.48

HYDROGRAPH AT
+ 41 296. 3.50 49. 12. 9. .83

2 COMBINED AT
+ C41 2270. 3.48 321. 81. 59. 3.29

HYDROGRAPH AT
+ 42 368. 3.30 44. 11. 8. .58

HYDROGRAPH AT
+ 43 1087. 3.27 121. 30. 22. 1.07

HYDROGRAPH AT
+ 44 837. 3.28 95. 24. 17. .84

2 COMBINED AT
+ C44 1922. 3.27 216. 54. 39. 1.91

ROUTED TO
+ R45 1901. 3.33 216. 54. 39. 1.91
+ 3.48
3.33

HYDROGRAPH AT
+ 45 218. 3.17 19. 5. 3. .20

2 COMBINED AT
+ C45 2015. 3.32 235. 59. 43. 2.11

HYDROGRAPH AT
+ 45A 222. 3.20 21. 5. 4. .17

HYDROGRAPH AT
+ 46 1360. 3.18 111. 28. 20. .93

3 COMBINED AT
+ C46 2957. 3.28 366. 92. 66. 3.21

ROUTED TO
+ R47 2942. 3.38 366. 92. 66. 3.21
+ 3.79
3.38

HYDROGRAPH AT
+ 47 138. 3.62 26. 7. 5. .38

2 COMBINED AT
+ C47.1 3020. 3.38 392. 99. 71. 3.58

3 COMBINED AT
+ C47.2 5327. 3.45 756. 191. 138. 7.46

ROUTED TO
+ R50 5313. 3.47 756. 191. 138. 7.46
+ 3.97
3.47

HYDROGRAPH AT
+ 50 438. 3.22 42. 10. 8. .41

2 COMBINED AT
+ C50 5504. 3.47 797. 201. 145. 7.87

DIVERSION TO
+ APEXSO 2752. 3.47 399. 101. 73. 7.87

HYDROGRAPH AT
+ APEXSW 2752. 3.47 399. 101. 73. 7.87

ROUTED TO
+ R51.2A 2743. 3.50 399. 101. 73. 7.87
+ 4.25
3.50

HYDROGRAPH AT
+ S51.1A 46. 3.38 7. 2. 1. .07

2 COMBINED AT

	C51.1A	2782.	3.50	405.	102.	74.	7.93
DIVERSION TO	SPT1SW	807.	3.50	117.	30.	21.	7.93
HYDROGRAPH AT	SPT1SO	1975.	3.50	288.	73.	52.	7.93
ROUTED TO	R51B9	1973.	3.52	288.	73.	52.	7.93
HYDROGRAPH AT	51B9	25.	3.13	2.	1.	0.	.02
2 COMBINED AT	C51B9	1980.	3.52	289.	73.	53.	7.96
DIVERSION TO	SPT2SW	634.	3.52	93.	23.	17.	7.96
HYDROGRAPH AT	SPT2SO	1346.	3.52	197.	50.	36.	7.96
ROUTED TO	R51B2	1339.	3.60	197.	50.	36.	7.96
HYDROGRAPH AT	51B2	46.	3.28	6.	2.	1.	.06
2 COMBINED AT	C51B2	1358.	3.60	202.	51.	37.	8.02
ROUTED TO	51B2R	1355.	3.62	202.	51.	37.	8.02
HYDROGRAPH AT	52C8	9.	3.13	1.	0.	0.	.01
2 COMBINED AT	52C8C	1357.	3.62	203.	52.	37.	8.03
ROUTED TO	52C8R	1354.	3.63	203.	52.	37.	8.03
HYDROGRAPH AT	51C3	13.	3.20	1.	0.	0.	.02
ROUTED TO	51C3R	13.	3.23	1.	0.	0.	.02
HYDROGRAPH AT	51B1	14.	3.17	1.	0.	0.	.01
ROUTED TO	51B1R	14.	3.18	1.	0.	0.	.01
HYDROGRAPH AT	52C7	7.	3.12	1.	0.	0.	.01
3 COMBINED AT	52C7C	32.	3.20	3.	1.	1.	.04
ROUTED TO	52C7R	31.	3.27	3.	1.	1.	.04
2 COMBINED AT	52C9C1	1365.	3.63	206.	52.	38.	8.06
ROUTED TO	52C9R1	1364.	3.65	206.	52.	38.	8.06
HYDROGRAPH AT	52C9	66.	3.20	7.	2.	1.	.07
2 COMBINED AT	52C9C2	1381.	3.65	212.	54.	39.	8.13
ROUTED TO	52C9R2	1380.	3.65	212.	54.	39.	8.13
HYDROGRAPH AT							

+	51C2	34.	3.25	4.	1.	1.	.04
ROUTED TO							
+	51C2R	33.	3.27	4.	1.	1.	.04
HYDROGRAPH AT							
+	52C5	16.	3.15	2.	0.	0.	.02
2 COMBINED AT							
+	52C5C	44.	3.23	6.	1.	1.	.06
ROUTED TO							
+	52C5R	44.	3.38	6.	1.	1.	.06
HYDROGRAPH AT							
+	52C6	31.	3.23	4.	1.	1.	.04
2 COMBINED AT							
+	52C6C	67.	3.33	9.	2.	2.	.09
ROUTED TO							
+	52C6R	67.	3.35	9.	2.	2.	.09
2 COMBINED AT							
+	2C10C1	1415.	3.65	221.	57.	41.	8.23
ROUTED TO							
+	2C10R1	1412.	3.65	221.	57.	41.	8.23
HYDROGRAPH AT							
+	52C10	9.	3.17	1.	0.	0.	.01
2 COMBINED AT							
+	2C10C2	1414.	3.65	222.	57.	41.	8.24
HYDROGRAPH AT							
+	52C11	35.	3.22	4.	1.	1.	.04
ROUTED TO							
+	2C11R1	35.	3.25	4.	1.	1.	.04
HYDROGRAPH AT							
+	52C13D	28.	3.12	2.	1.	0.	.00
2 COMBINED AT							
+	52C11C	53.	3.17	7.	2.	1.	.04
ROUTED TO							
+	2C11CR	53.	3.20	7.	2.	1.	.04
2 COMBINED AT							
+	2C11C2	1430.	3.65	228.	59.	42.	8.28
ROUTED TO							
+	2C11R2	1429.	3.67	228.	59.	42.	8.28
HYDROGRAPH AT							
+	52C12	61.	3.08	5.	1.	1.	.02
2 COMBINED AT							
+	52C12C	1435.	3.67	232.	60.	43.	8.31
ROUTED TO							
+	52C12R	1431.	3.68	232.	60.	43.	8.31
HYDROGRAPH AT							
+	52C14B	38.	3.12	3.	1.	1.	.02
HYDROGRAPH AT							
+	DVSP1	161.	3.12	15.	4.	3.	.00
ROUTED TO							
+	RDVSP1	160.	3.15	15.	4.	3.	.00
3 COMBINED AT							
+	SP2	1461.	3.68	248.	64.	46.	8.33
DIVERSION TO							
+	DVSP2	1328.	3.68	246.	64.	46.	8.33
HYDROGRAPH AT							

	DSP2	133.	3.68	2.	0.	0.	8.33
ROUTED TO	RSP2EX	90.	3.78	2.	0.	0.	8.33

1.43

HYDROGRAPH AT	51B3	16.	3.33	2.	1.	0.	.02
ROUTED TO	51B3R	16.	3.37	2.	1.	0.	.02
HYDROGRAPH AT	52B1	3.	3.13	0.	0.	0.	.00
2 COMBINED AT	52B1C	17.	3.35	3.	1.	0.	.03
ROUTED TO	52B1R	17.	3.40	3.	1.	0.	.03
HYDROGRAPH AT	SPT2SW	634.	3.52	93.	23.	17.	.00
ROUTED TO	R51B10	632.	3.57	93.	23.	17.	.00
HYDROGRAPH AT	51B10	22.	3.18	2.	1.	0.	.02
2 COMBINED AT	C51B10	638.	3.57	95.	24.	17.	.02
DIVERSION TO	SPT3SW	255.	3.57	38.	10.	7.	.02
HYDROGRAPH AT	SPT3SO	383.	3.57	57.	14.	10.	.02
ROUTED TO	R51B4	381.	3.63	57.	14.	10.	.02
HYDROGRAPH AT	51B4	20.	3.23	2.	1.	0.	.02
2 COMBINED AT	C51B4	388.	3.63	59.	15.	11.	.05
ROUTED TO	51B4R1	386.	3.67	59.	15.	11.	.05
2 COMBINED AT	52B2C1	395.	3.67	61.	16.	11.	.08
ROUTED TO	52B2R1	395.	3.68	61.	16.	11.	.08
HYDROGRAPH AT	52B2	22.	3.23	3.	1.	0.	.03
2 COMBINED AT	52B2C2	401.	3.68	64.	16.	12.	.11
ROUTED TO	52B2R2	400.	3.70	64.	16.	12.	.11
ROUTED TO	52B3R1	400.	3.72	64.	16.	12.	.11
HYDROGRAPH AT	52B3	54.	3.23	7.	2.	1.	.06
2 COMBINED AT	52B3C2	414.	3.72	70.	18.	13.	.17
ROUTED TO	52B3R2	413.	3.77	70.	18.	13.	.17
HYDROGRAPH AT	52B4	45.	3.13	4.	1.	1.	.03

	2 COMBINED AT							
+		52B4C	418.	3.77	74.	19.	14.	.20
	ROUTED TO							
+		52B4R	418.	3.77	74.	19.	14.	.20
	HYDROGRAPH AT							
+		52B5	36.	3.12	3.	1.	1.	.02
	HYDROGRAPH AT							
+		DVSP2	1328.	3.63	246.	64.	46.	.00
	ROUTED TO							
+		RDVSP2	1328.	3.65	247.	64.	46.	.00
	3 COMBINED AT							
+		SP3	1750.	3.77	323.	84.	60.	.22
	DIVERSION TO							
+		DVSP3	1328.	3.77	310.	80.	58.	.22
	HYDROGRAPH AT							
+		DSP3	422.	3.77	13.	3.	2.	.22
	ROUTED TO							
+		RSP3EX	416.	3.82	14.	3.	2.	.22
	3 COMBINED AT							
+		CSPEX	491.	3.80	15.	4.	3.	8.65
	ROUTED TO							
+		R53A1	488.	3.83	16.	4.	3.	8.65
	HYDROGRAPH AT							
+		S53A1	129.	3.38	19.	5.	3.	.18
	2 COMBINED AT							
+		C53A1	538.	3.83	34.	9.	6.	8.84
	ROUTED TO							
+		RPIMA2	530.	3.87	35.	9.	6.	8.84
	HYDROGRAPH AT							
+		S53A3	69.	3.25	8.	2.	1.	.07
	2 COMBINED AT							
+		CPIMA2	544.	3.87	43.	11.	8.	8.91
	ROUTED TO							
+		RUH2B	500.	3.95	43.	11.	8.	8.91
+								2.70
3.95								
	HYDROGRAPH AT							
+		S53A6	30.	3.13	3.	1.	1.	.03
	ROUTED TO							
+		RUH2C	29.	3.17	3.	1.	1.	.03
+								.46
3.17								
	HYDROGRAPH AT							
+		S53A5	25.	3.13	2.	1.	0.	.02
	2 COMBINED AT							
+		UHIC1	54.	3.15	5.	1.	1.	.05
	HYDROGRAPH AT							
+		SPT1SW	807.	3.50	117.	30.	21.	.00
	ROUTED TO							
+		R51.2B	805.	3.52	117.	30.	21.	.00
+								2.21
3.52								
	HYDROGRAPH AT							
+		S51.1B	32.	3.42	5.	1.	1.	.05
	2 COMBINED AT							
+		C51.1B	833.	3.52	122.	31.	22.	.05

+	ROUTED TO	R51.2C	831.	3.55	122.	31.	22.	.05
+								2.25
3.55								
+	HYDROGRAPH AT	S51.1C	53.	3.53	9.	2.	2.	.10
+	2 COMBINED AT	C51.1C	884.	3.55	131.	33.	24.	.15
+	ROUTED TO	R51.2D	877.	3.62	131.	33.	24.	.15
+								2.32
3.62								
+	HYDROGRAPH AT	S51.1D	427.	3.65	86.	22.	16.	.90
+	HYDROGRAPH AT	D51.1D	0.	.00	0.	0.	0.	.00
+	3 COMBINED AT	C51.1D	1299.	3.62	216.	55.	40.	1.05
+	DIVERSION TO	STOPDV	248.	3.62	9.	2.	2.	1.05
+	HYDROGRAPH AT	DETPDV	1299.	3.62	210.	53.	38.	1.05
+	ROUTED TO	R52A1C	1283.	3.70	210.	53.	38.	1.05
+								4.01
3.70								
+	HYDROGRAPH AT	51B8	24.	3.38	4.	1.	1.	.04
+	ROUTED TO	51B8R	24.	3.58	4.	1.	1.	.04
+	HYDROGRAPH AT	52A1	131.	3.18	14.	3.	3.	.13
+	2 COMBINED AT	52A1C	132.	3.18	18.	4.	3.	.17
+	2 COMBINED AT	C52A	1331.	3.68	225.	58.	41.	1.22
+	HYDROGRAPH AT	52A0	53.	3.10	4.	1.	1.	.04
+	2 COMBINED AT	C52A.1	1338.	3.68	229.	58.	42.	1.25
+	DIVERSION TO	DV52AW	401.	3.68	69.	18.	13.	1.25
+	HYDROGRAPH AT	D52AW	936.	3.68	160.	41.	29.	1.25
+	DIVERSION TO	PRSD	600.	3.68	146.	37.	27.	1.25
+	HYDROGRAPH AT	PRSDEX	336.	3.68	14.	3.	2.	1.25
+	ROUTED TO	RC52	307.	3.82	14.	3.	2.	1.25
+								2.14
3.82								
+	HYDROGRAPH AT	51B5	4.	3.15	0.	0.	0.	.00
+	ROUTED TO	51B5R	4.	3.27	0.	0.	0.	.00

	HYDROGRAPH AT						
+		SPT3SW	255.	3.57	38.	10.	7.	.00
	ROUTED TO						
+		R51B6	254.	3.67	38.	10.	7.	.00
	HYDROGRAPH AT						
+		51B6	36.	3.23	4.	1.	1.	.04
	2 COMBINED AT						
+		C51B6	265.	3.67	42.	11.	8.	.04
	ROUTED TO						
+		51B6R	265.	3.68	42.	11.	8.	.04
	HYDROGRAPH AT						
+		51B7	20.	3.27	3.	1.	0.	.03
	ROUTED TO						
+		51B7R1	20.	3.28	3.	1.	0.	.03
	3 COMBINED AT						
+		51B7C	273.	3.68	45.	11.	8.	.08
	ROUTED TO						
+		51B7R2	271.	3.75	45.	11.	8.	.08
	HYDROGRAPH AT						
+		52B6	85.	3.20	9.	2.	2.	.10
	2 COMBINED AT						
+		52B6C	289.	3.75	53.	14.	10.	.17
	ROUTED TO						
+		52B6R	287.	3.83	54.	14.	10.	.17
	HYDROGRAPH AT						
+		52B7	163.	3.13	15.	4.	3.	.08
	2 COMBINED AT						
+		52B7C1	303.	3.83	67.	18.	13.	.25
	HYDROGRAPH AT						
+		52A2	137.	3.15	14.	3.	2.	.06
	HYDROGRAPH AT						
+		52B0	22.	3.12	2.	0.	0.	.02
	4 COMBINED AT						
+		52A2C2	625.	3.82	96.	25.	18.	1.59
	DIVERSION TO						
+		DV52W	0.	3.82	0.	0.	0.	1.59
	HYDROGRAPH AT						
+		D52W	625.	3.82	96.	25.	18.	1.59
	HYDROGRAPH AT						
+		DVSP3	1328.	3.63	310.	80.	58.	.00
	ROUTED TO						
+		RDVSP3	1328.	3.68	310.	80.	58.	.00
	2 COMBINED AT						
+		C52SP4	1953.	3.82	405.	105.	76.	1.59
	DIVERSION TO						
+		DVSP4	1328.	3.82	377.	98.	71.	1.59
	HYDROGRAPH AT						
+		DSP4	625.	3.82	27.	7.	5.	1.59
	ROUTED TO						
+		RSP4EX	579.	3.95	27.	7.	5.	1.59
+								2.28
3.95								
	DIVERSION TO						
+		53HW	0.	3.95	0.	0.	0.	1.59
	HYDROGRAPH AT						

+		53PS	579.	3.95	27.	7.	5.	1.59	
	HYDROGRAPH AT							
+		S53A	91.	3.33	13.	3.	2.	.13	
	2 COMBINED AT							
+		CPIMA1	603.	3.95	40.	10.	7.	1.71	
	ROUTED TO							
+		RPMA4B	597.	3.97	40.	10.	7.	1.71	
+									2.28
3.97									
	HYDROGRAPH AT							
+		PRSD	600.	3.57	146.	37.	27.	.00	
	ROUTED TO							
+		RDPSD1	600.	3.60	146.	37.	27.	.00	
	ROUTED TO							
+		RDPSD2	600.	3.62	146.	37.	27.	.00	
	HYDROGRAPH AT							
+		DVSP4	1328.	3.63	377.	98.	71.	.00	
	ROUTED TO							
+		RDVSP	1332.	3.68	377.	98.	71.	.00	
+									2.67
3.68									
	2 COMBINED AT							
+		CPCH1	1932.	3.68	523.	136.	98.	.00	
	ROUTED TO							
+		RPMA4A	1931.	3.73	523.	136.	98.	.00	
+									3.27
3.73									
	HYDROGRAPH AT							
+		S53A2	57.	3.17	6.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH2	1941.	3.73	529.	137.	99.	.05	
	2 COMBINED AT							
+		CPCH3	2531.	3.97	568.	147.	106.	1.77	
	ROUTED TO							
+		RUH2A	2529.	4.00	568.	147.	106.	1.77	
+									3.56
4.00									
	HYDROGRAPH AT							
+		S53A4	56.	3.17	6.	1.	1.	.05	
	2 COMBINED AT							
+		CPCH4	2536.	4.00	574.	149.	107.	1.82	
	3 COMBINED AT							
+		UHIC2	2994.	3.98	621.	161.	116.	10.78	
	HYDROGRAPH AT							
+		CPIMA3	101.	3.18	11.	3.	2.	.07	

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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
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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

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

			PEAK	TIME OF	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN	MAXIMUM	
	OPERATION	STATION	FLOW	PEAK	6-HOUR	24-HOUR	72-HOUR	AREA	STAGE	MAX
+	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		

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          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
+	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

	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

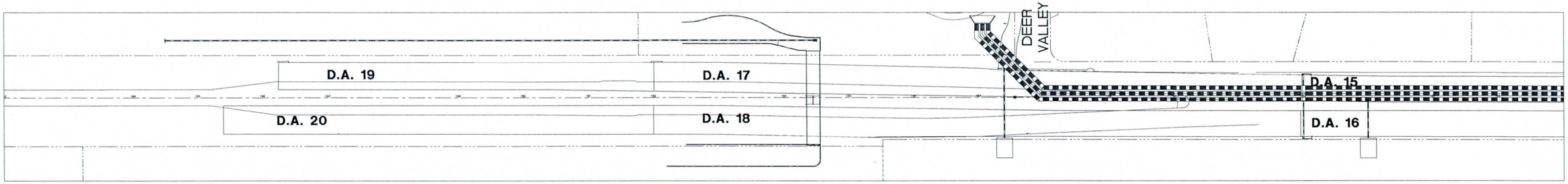
	ROUTED TO							
+		R51.2C	211.	3.90	51.	13.	9.	.05
+								1.00
3.90								
	HYDROGRAPH AT							
+		S51.1C	19.	3.70	5.	1.	1.	.10
	2 COMBINED AT							
+		C51.1C	227.	3.90	55.	14.	10.	.15
	ROUTED TO							
+		R51.2D	225.	4.00	55.	14.	10.	.15
+								1.04
4.00								
	HYDROGRAPH AT							
+		S51.1D	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

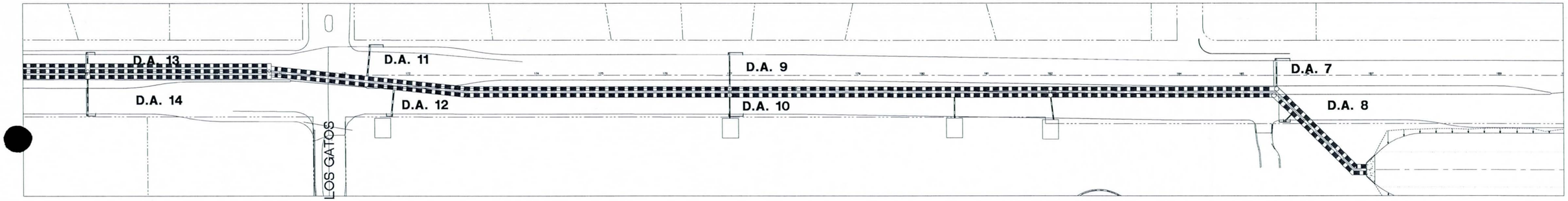
	HYDROGRAPH AT						
+		SPT3SW	65.	3.88	16.	4.	3.	.00
	ROUTED TO						
+		R51B6	65.	4.05	16.	4.	3.	.00
	HYDROGRAPH AT						
+		51B6	13.	3.30	2.	1.	0.	.04
	2 COMBINED AT						
+		C51B6	68.	4.05	17.	5.	3.	.04
	ROUTED TO						
+		51B6R	68.	4.07	17.	5.	3.	.04
	HYDROGRAPH AT						
+		51B7	7.	3.33	1.	0.	0.	.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						

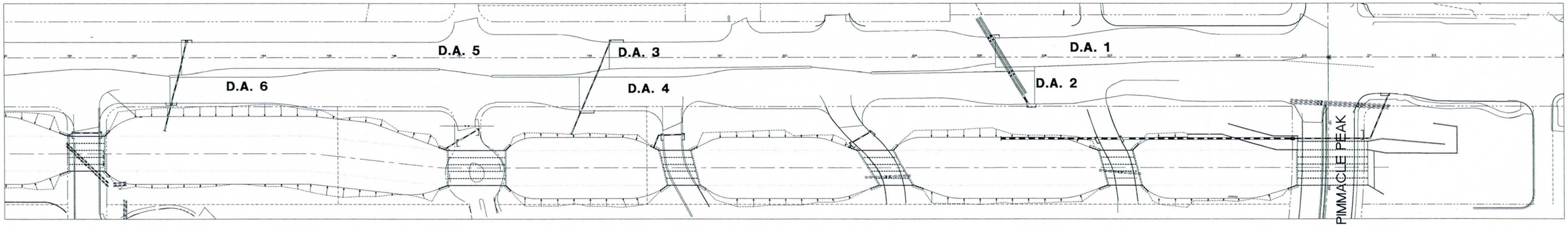
+		53PS	0.	7.23	0.	0.	0.	1.59	
+	HYDROGRAPH AT	S53A	31.	3.47	6.	2.	1.	.13	
+	2 COMBINED AT	CPIMA1	31.	3.47	6.	2.	1.	1.71	
+	ROUTED TO	RPMA4B	31.	3.52	6.	2.	1.	1.71	
+									1.06
3.52									
+	HYDROGRAPH AT	PRSD	267.	4.07	69.	18.	13.	.00	
+	ROUTED TO	RDPSD1	267.	4.07	69.	18.	13.	.00	
+	ROUTED TO	RDPSD2	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	

n-value	0.016
Hydr Radius	0.244
c-value	0.95

Location	Drainage Area	Contributory Area [ft^2]	Roadway Slope	Vel [ft/s]	Length [ft]	Tc [min]	intensity for 10 year	intensity for 100 year	Q-10 year [cfs]	Q-100 year [cfs]		K_b	T_c	Roadway Cross Slope	Length of Opening	By-Pass Flow	
205+25	1	24,000	0.020	5.14	520	1.7	6	9	3.1	4.7	32.3	0.0014	1.1	0.026	14.5	0.2	catch basin
199+30	3	32,000	0.019	5.01	471	1.6	6	9	4.2	6.3	32.5	0.0007	0.6	0.030	22.5	0.0	catch basin
196+40	5	17,100	0.019	5.01	290	1.0	6	9	2.2	3.4	30.0	0.0023	1.2	0.022	12	0.1	scupper
185+57	7	46,000	0.022	5.39	1083	3.3	6	9	6.0	9.0	44.7	-0.0002	#NUM!	0.025	22.5	0.5	catch basin
177+00	9	34,000	0.023	5.51	857	2.6	6	9	4.4	6.7	39.4	0.0005	0.7	0.025	14.5	1.0	catch basin
171+60	11	29,800	0.012	3.98	540	2.3	6	9	3.9	5.8	31.4	0.0009	0.9	0.024	22.5	0.0	catch basin
167+00	13	15,700	0.028	6.08	460	1.3	6	9	2.1	3.1	29.7	0.0025	1.4	0.026	14.5	0.0	catch basin
162+00	15	20,000	0.026	5.86	500	1.4	6	9	2.6	3.9	30.5	0.0019	1.2	0.028	14.5	0.1	catch basin
152+00	17	42,300	0.024	5.63	1000	3.0	6	9	5.5	8.3	40.6	0.0000	#NUM!	0.029	16	0.9	scupper
146+34	19	24,300	0.025	5.75	566	1.6	6	9	3.2	4.8	37.8	0.0014	1.0	0.022	16	0.5	scupper
205+74	2	28,000	0.022	5.39	450	1.4	6	9	3.7	5.5	36.2	0.0010	0.8	0.025	14.5	0.4	catch basin
198+84	4	37,900	0.0210	5.27	690	2.2	6	9	5.0	7.4	44.5	0.0003	0.4	0.021	22.5	0.2	catch basin
192+55	6	32,400	0.0210	5.27	630	2.0	6	9	4.2	6.4	43.5	0.0007	0.7	0.020	14.5	0.8	catch basin
185+57	8	35,500	0.0210	5.27	630	2.0	6	9	4.6	7.0	44.2	0.0004	0.5	0.021	22.5	0.2	catch basin
177+00	10	34,800	0.0250	5.75	857	2.5	6	9	4.6	6.8	44.2	0.0005	0.6	0.022	22.5	0.1	catch basin
171+60	12	26,200	0.0250	5.75	540	1.6	6	9	3.4	5.1	34.0	0.0012	0.9	0.028	10.5*	0.0	catch basin
167+00	14	21,200	0.0250	5.75	460	1.3	6	9	2.8	4.2	39.0	0.0017	1.1	0.019	14.5	0.3	catch basin
162+00	16	20,100	0.0250	5.75	500	1.4	6	9	2.6	3.9	34.6	0.0019	1.2	0.023	14.5	0.2	catch basin
152+10	18	42,000	0.0240	5.63	990	2.9	6	9	5.5	8.2	46.3	0.0000	#NUM!	0.023	16	1.2	scupper
145+50	20	29,000	0.0230	5.51	760	2.3	6	9	3.8	5.7	36.9	0.0009	0.9	0.025	16	0.8	scupper







PIMA ROAD DRAINAGE AREAS

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Entellus

FLO-2D - Pinnacle Peak to Deer Valley
Existing Conditions Cross Section Summary

Existing Conditions												
X-Section ID	2yr-Peak [cfs]	Time to Peak [Hrs]	5yr-Peak [cfs]	Time to Peak [Hrs]	10yr-Peak [cfs]	Time to Peak [Hrs]	25yr-Peak [cfs]	Time to Peak [Hrs]	50yr-Peak [cfs]	Time to Peak [Hrs]	100yr-Peak [cfs]	Time to Peak [Hrs]
X-Sec 1	0.16	4.39	5.57	3.83	20.70	3.71	116.81	3.61	162.89	3.56	259.53	3.53
X-Sec 2	0.00	0.00	0.31	3.99	16.81	3.77	58.27	3.60	98.16	3.60	141.24	3.52
X-Sec 3	0.00	0.00	0.00	0.00	0.00	0.00	0.72	3.85	1.03	3.63	1.61	3.58
X-Sec 4	0.00	0.00	1.29	3.99	6.68	3.90	43.02	3.62	66.07	3.56	101.43	3.52
X-Sec 5	0.00	0.00	3.09	4.02	38.29	3.74	48.12	3.64	50.28	3.58	50.51	3.54
X-Sec 6	0.00	0.00	1.80	4.11	36.61	3.81	48.75	3.63	51.74	3.58	52.34	3.64
X-Sec 7	0.00	0.00	0.00	0.00	14.59	3.87	26.38	3.69	28.64	3.62	29.69	3.63
X-Sec 8	0.42	3.56	1.59	3.30	3.08	3.80	5.49	3.64	6.16	3.60	7.11	3.55
X-Sec 9	2.39	3.52	4.56	3.35	18.78	3.82	18.71	4.02	19.82	3.13	21.33	3.10
X-Sec 10	0.00	0.00	0.18	4.50	1.26	3.90	1.59	3.81	2.08	3.68	3.53	3.60
X-Sec 11	2.58	3.51	5.41	3.28	14.40	3.80	18.77	3.62	20.91	3.61	22.22	3.56
X-Sec 12	0.00	0.00	11.49	3.96	84.64	3.74	83.75	3.92	85.87	3.57	87.38	3.53
X-Sec 13	0.00	0.00	1.18	4.99	2.61	3.80	3.88	3.47	5.95	3.58	9.96	3.56
X-Sec 14	0.00	0.00	0.34	3.79	0.95	3.46	2.60	3.36	4.45	3.56	9.29	3.68
X-Sec 15	5.17	3.18	14.21	3.56	35.32	3.32	53.23	3.34	56.41	3.35	89.58	3.21
X-Sec 16	0.00	0.00	0.54	3.73	1.73	3.34	4.86	3.31	5.89	3.34	9.65	3.22
X-Sec 17	3.30	3.38	10.47	3.59	23.00	3.34	39.21	3.31	42.58	3.61	69.67	3.21
X-Sec 18	2.59	3.67	11.31	3.63	22.97	3.36	38.56	3.40	46.50	3.50	69.50	3.23
X-Sec 19	1.60	8.54	1.69	3.85	3.46	3.48	5.84	3.38	6.58	3.32	10.41	3.26
X-Sec 20	0.00	0.00	1.35	5.92	2.62	3.83	7.83	3.61	18.15	3.27	27.06	3.19
X-Sec 21	0.00	0.00	0.00	0.00	0.00	0.00	0.67	6.16	0.87	4.11	1.16	3.90
X-Sec 22	18.45	3.34	42.38	3.26	67.18	3.23	117.80	3.17	170.30	3.16	206.40	3.14
X-Sec 23	16.34	3.35	37.83	3.26	55.64	3.23	99.19	3.19	145.12	3.16	178.07	3.14
X-Sec 24	7.04	3.38	14.97	3.32	25.45	3.27	52.37	3.21	74.00	3.22	101.23	3.18
X-Sec 25	11.60	3.42	29.00	3.30	47.68	3.27	72.43	3.20	98.26	3.19	125.18	3.16
X-Sec 26	2.61	3.60	9.07	3.42	14.89	3.30	26.71	3.23	38.40	3.20	54.19	3.15
X-Sec 27	2.40	4.51	5.37	3.63	9.97	3.44	22.14	3.33	33.49	3.25	56.90	3.19
X-Sec 28	0.00	0.00	2.35	8.69	3.02	4.73	7.69	3.39	12.25	3.29	17.18	3.29
X-Sec 29	0.00	0.00	2.21	4.69	3.52	4.25	7.92	3.58	16.56	3.40	23.00	3.33
X-Sec 30	0.08	4.23	2.42	4.40	3.23	3.68	5.23	3.44	8.91	3.38	12.20	3.32
X-Sec 31	0.00	0.00	1.33	5.38	1.74	4.15	4.94	3.53	8.72	3.42	11.90	3.33
X-Sec 32	0.76	4.32	2.32	3.55	4.92	3.39	7.34	3.37	11.00	3.35	19.38	3.28
X-Sec 33	1.76	6.36	4.42	3.78	9.92	3.68	24.59	3.39	37.40	3.26	51.14	3.21
X-Sec 34	0.00	0.00	6.04	5.22	19.00	4.39	48.91	3.94	85.88	3.79	125.50	3.65
X-Sec 35	1.56	4.11	4.78	3.44	9.29	3.33	18.02	3.25	26.27	3.22	38.73	3.17
X-Sec 36	0.00	0.00	0.77	4.07	15.08	3.74	19.77	3.65	20.85	3.58	21.05	3.60
X-Sec 37	2.37	4.06	5.18	3.96	51.42	3.78	102.42	3.62	150.08	3.55	175.99	3.55
X-Sec 38	46.36	4.15	112.84	3.85	135.26	3.77	186.57	3.65	270.62	3.64	333.76	3.51
X-Sec 39	7.70	4.27	20.43	3.95	60.24	3.80	81.72	3.62	108.33	3.54	116.62	3.58
X-Sec 40	0.00	0.00	26.17	3.82	125.12	3.72	197.78	3.60	246.60	3.56	268.27	3.52
X-Sec 41	46.00	4.12	138.74	3.83	271.79	3.71	387.80	3.59	484.39	3.56	563.49	3.50
X-Sec 42	119.20	4.19	198.27	4.01	141.60	4.48	164.67	4.46	214.38	3.60	289.74	3.47
X-Sec 43	0.05	7.23	0.08	7.34	12.47	3.68	45.95	3.59	69.04	3.62	100.97	3.58

STRUCTURE OUTFLOW DISCHARGE

FLOODPLAIN GRID ELEMENTS TIME (HRS) DISCHARGE (CFS OR CMS)

THE MAXIMUM DISCHARGE FOR STRUCTURE 1 IS: 196.48 AT TIME: 3.59

INFLOW NODE:	1584	AND OUTFLOW NODE:	2446
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	0.00		0.00
3.00	0.00		0.00
3.25	0.00		0.00
3.50	165.43		-165.43
3.75	131.95		-131.95
4.00	42.62		-42.62
4.25	18.65		-18.65
4.50	0.00		0.00
4.75	0.00		0.00
5.00	0.00		0.00
5.25	0.00		0.00
5.50	0.00		0.00
5.75	0.00		0.00
6.00	0.00		0.00
6.25	0.00		0.00
6.50	0.00		0.00
6.75	0.00		0.00
7.00	0.00		0.00
7.25	0.00		0.00
7.50	0.00		0.00
7.75	0.00		0.00
8.00	0.00		0.00
8.25	0.00		0.00
8.50	0.00		0.00
8.75	0.00		0.00
9.00	0.00		0.00
9.25	0.00		0.00
9.50	0.00		0.00
9.75	0.00		0.00
10.00	0.00		0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 2 IS: 1520.00 AT TIME: 3.55

INFLOW NODE:	1672	AND OUTFLOW NODE:	2097
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	0.00		0.00
3.00	0.00		0.00
3.25	210.72		-210.72
3.50	655.67		-655.67
3.75	540.80		-540.80
4.00	363.33		-363.33
4.25	280.13		-280.13
4.50	0.00		0.00
4.75	183.22		-183.22
5.00	145.63		-145.63
5.25	0.00		0.00

5.50	0.00	0.00
5.75	111.79	-111.79
6.00	0.00	0.00
6.25	101.39	-101.39
6.50	90.97	-90.97
6.75	88.66	-88.66
7.00	88.70	-88.70
7.25	80.28	-80.28
7.50	0.00	0.00
7.75	58.32	-58.32
8.00	51.26	-51.26
8.25	0.00	0.00
8.50	0.00	0.00
8.75	0.00	0.00
9.00	0.00	0.00
9.25	0.00	0.00
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 3 IS: 1334.08 AT TIME: 3.59

INFLOW NODE: 3670 AND OUTFLOW NODE: 4660

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	378.95	-378.95
3.50	1081.73	-1081.73
3.75	1001.57	-1001.57
4.00	526.60	-526.60
4.25	333.03	-333.03
4.50	251.21	-251.21
4,75	184.79	-184.79
5.00	169.67	-169.67
5.25	136.79	-136.79
5.50	120.35	-120.35
5.75	109.93	-109.93
6.00	101.57	-101.57
6.25	91.48	-91.48
6.50	77.16	-77.16
6.75	61.40	-61.40
7.00	51.32	-51.32
7.25	38.34	-38.34
7.50	37.95	-37.95
7.75	20.01	-20.01
8.00	16.30	-16.30
8.25	14.47	-14.47
8.50	15.06	-15.06
8.75	15.53	-15.53
9.00	14.89	-14.89
9.25	14.60	-14.60
9.50	14.51	-14.51
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 4 IS: 1300.37 AT TIME: 3.60

INFLOW NODE: 6310 AND OUTFLOW NODE: 6860

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00

1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	364.34	-364.34
3.50	1025.59	-1025.59
3.75	1029.33	-1029.33
4.00	540.27	-540.27
4.25	350.59	-350.59
4.50	253.33	-253.33
4.75	196.27	-196.27
5.00	166.18	-166.18
5.25	140.02	-140.02
5.50	124.19	-124.19
5.75	110.72	-110.72
6.00	100.50	-100.50
6.25	91.04	-91.04
6.50	77.75	-77.75
6.75	64.30	-64.30
7.00	51.52	-51.52
7.25	39.94	-39.94
7.50	31.83	-31.83
7.75	25.10	-25.10
8.00	16.13	-16.13
8.25	14.10	-14.10
8.50	15.51	-15.51
8.75	14.09	-14.09
9.00	14.50	-14.50
9.25	14.93	-14.93
9.50	14.10	-14.10
9.75	0.00	0.00
10.00	0.00	0.00

E MAXIMUM DISCHARGE FOR STRUCTURE 5 IS: 102.28 AT TIME: 3.61

INFLOW NODE: 7518 AND OUTFLOW NODE: 8167

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	36.51	-36.51
3.50	85.71	-85.71
3.75	90.78	-90.78
4.00	54.93	-54.93
4.25	38.18	-38.18
4.50	31.77	-31.77
4.75	27.69	-27.69
5.00	25.07	-25.07
5.25	23.32	-23.32
5.50	22.09	-22.09
5.75	20.75	-20.75
6.00	19.52	-19.52
6.25	18.40	-18.40
6.50	16.84	-16.84
6.75	14.84	-14.84
7.00	12.70	-12.70
7.25	10.61	-10.61
7.50	8.11	-8.11
7.75	7.53	-7.53
8.00	6.90	-6.90
8.25	5.99	-5.99
8.50	5.13	-5.13

8.75	4.33	-4.33
9.00	3.63	-3.63
9.25	3.01	-3.01
9.50	2.01	-2.01
9.75	2.02	-2.02
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 6 IS: 985.66 AT TIME: 3.61
INFLOW NODE: 8950 AND OUTFLOW NODE: 10182

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	271.90	-271.90
3.50	820.89	-820.89
3.75	879.04	-879.04
4.00	510.56	-510.56
4.25	325.96	-325.96
4.50	225.60	-225.60
4.75	172.40	-172.40
5.00	138.64	-138.64
5.25	118.41	-118.41
5.50	103.03	-103.03
5.75	91.77	-91.77
6.00	81.65	-81.65
6.25	73.93	-73.93
6.50	63.61	-63.61
6.75	51.54	-51.54
7.00	27.17	-27.17
7.25	26.48	-26.48
7.50	22.16	-22.16
7.75	14.32	-14.32
8.00	0.00	0.00
8.25	0.00	0.00
8.50	0.00	0.00
8.75	0.00	0.00
9.00	14.37	-14.37
9.25	14.13	-14.13
9.50	0.00	0.00
9.75	14.37	-14.37
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 7 IS: 1169.02 AT TIME: 3.63
INFLOW NODE: 12338 AND OUTFLOW NODE: 13064

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	238.89	-238.89
3.50	870.81	-870.81
3.75	1008.57	-1008.57
4.00	525.70	-525.70
4.25	332.21	-332.21
4.50	229.78	-229.78
4.75	175.53	-175.53

5.00	141.51	-141.51
5.25	120.35	-120.35
5.50	104.19	-104.19
5.75	93.51	-93.51
6.00	82.78	-82.78
6.25	74.30	-74.30
6.50	64.65	-64.65
6.75	52.64	-52.64
7.00	39.78	-39.78
7.25	30.88	-30.88
7.50	25.24	-25.24
7.75	0.00	0.00
8.00	0.00	0.00
8.25	15.17	-15.17
8.50	14.62	-14.62
8.75	0.00	0.00
9.00	0.00	0.00
9.25	14.51	-14.51
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 8 IS: 29.00 AT TIME: 3.53

INFLOW NODE: 16197 AND OUTFLOW NODE: 17660

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.70	-0.70
2.50	0.00	0.00
2.75	0.77	-0.77
3.00	2.49	-2.49
3.25	13.48	-13.48
3.50	28.60	-28.60
3.75	29.00	-29.00
4.00	23.85	-23.85
4.25	18.80	-18.80
4.50	14.63	-14.63
4.75	11.88	-11.88
5.00	10.30	-10.30
5.25	8.91	-8.91
5.50	7.85	-7.85
5.75	7.23	-7.23
6.00	6.75	-6.75
6.25	6.37	-6.37
6.50	5.93	-5.93
6.75	5.40	-5.40
7.00	5.23	-5.23
7.25	5.55	-5.55
7.50	4.72	-4.72
7.75	3.69	-3.69
8.00	3.35	-3.35
8.25	2.94	-2.94
8.50	2.65	-2.65
8.75	2.40	-2.40
9.00	2.27	-2.27
9.25	2.18	-2.18
9.50	2.09	-2.09
9.75	2.00	-2.00
10.00	1.92	-1.92

THE MAXIMUM DISCHARGE FOR STRUCTURE 9 IS: 1139.53 AT TIME: 3.64

INFLOW NODE: 16199 AND OUTFLOW NODE: 17453

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00

1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	14.08	-14.08
3.00	15.34	-15.34
3.25	199.50	-199.50
3.50	834.35	-834.35
3.75	1016.54	-1016.54
4.00	529.79	-529.79
4.25	326.33	-326.33
4.50	224.61	-224.61
4.75	167.96	-167.96
5.00	136.68	-136.68
5.25	114.70	-114.70
5.50	97.92	-97.92
5.75	88.13	-88.13
6.00	78.57	-78.57
6.25	69.71	-69.71
6.50	59.72	-59.72
6.75	48.74	-48.74
7.00	40.77	-40.77
7.25	23.96	-23.96
7.50	16.15	-16.15
7.75	0.00	0.00
8.00	15.20	-15.20
8.25	0.00	0.00
8.50	0.00	0.00
8.75	0.00	0.00
9.00	14.30	-14.30
9.25	0.00	0.00
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 10 IS: 28.39 AT TIME: 3.65
INFLOW NODE: 19333 AND OUTFLOW NODE: 20378

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.71	-0.71
2.50	0.98	-0.98
2.75	1.06	-1.06
3.00	3.55	-3.55
3.25	11.29	-11.29
3.50	25.98	-25.98
3.75	28.03	-28.03
4.00	22.39	-22.39
4.25	18.80	-18.80
4.50	15.53	-15.53
4.75	13.06	-13.06
5.00	11.42	-11.42
5.25	10.25	-10.25
5.50	9.34	-9.34
5.75	8.70	-8.70
6.00	8.03	-8.03
6.25	7.35	-7.35
6.50	6.71	-6.71
6.75	6.13	-6.13
7.00	5.26	-5.26
7.25	4.59	-4.59
7.50	3.73	-3.73
7.75	3.38	-3.38
8.00	3.38	-3.38

8.25	3.01	-3.01
8.50	2.71	-2.71
8.75	2.45	-2.45
9.00	2.21	-2.21
9.25	1.95	-1.95
9.50	1.74	-1.74
9.75	1.53	-1.53
10.00	1.43	-1.43

THE MAXIMUM DISCHARGE FOR STRUCTURE 11 IS: 1190.35 AT TIME: 3.66

INFLOW NODE: 24559 AND OUTFLOW NODE: 25813

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	21.15	-21.15
3.25	127.47	-127.47
3.50	873.89	-873.89
3.75	1099.16	-1099.16
4.00	607.08	-607.08
4.25	372.16	-372.16
4.50	259.08	-259.08
4.75	195.81	-195.81
5.00	155.79	-155.79
5.25	134.75	-134.75
5.50	114.95	-114.95
5.75	103.06	-103.06
6.00	91.21	-91.21
6.25	80.43	-80.43
6.50	69.15	-69.15
6.75	58.18	-58.18
7.00	63.89	-63.89
7.25	33.74	-33.74
7.50	25.23	-25.23
7.75	16.14	-16.14
8.00	0.00	0.00
8.25	0.00	0.00
8.50	14.05	-14.05
8.75	14.91	-14.91
9.00	0.00	0.00
9.25	14.40	-14.40
9.50	0.00	0.00
9.75	0.00	0.00
10.00	14.62	-14.62

THE MAXIMUM DISCHARGE FOR STRUCTURE 12 IS: 1029.31 AT TIME: 3.69

INFLOW NODE: 37935 AND OUTFLOW NODE: 72391

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	202.65	-229.25
3.50	788.94	-677.69
3.75	1011.21	-1024.11
4.00	668.02	-711.26
4.25	405.78	-435.04

4.50	282.92	-307.70
4.75	211.35	-224.77
5.00	169.17	-177.50
5.25	143.47	-147.89
5.50	122.28	-129.16
5.75	108.09	-112.35
6.00	96.48	-100.34
6.25	86.09	-89.92
6.50	74.30	-78.53
6.75	63.54	-67.77
7.00	51.04	-55.88
7.25	39.60	-43.29
7.50	26.66	-36.43
7.75	26.13	-15.98
8.00	14.34	-15.33
8.25	0.00	0.00
8.50	14.85	-14.62
8.75	15.42	-14.54
9.00	14.74	-15.18
9.25	14.81	-14.82
9.50	14.84	-14.38
9.75	14.06	-14.90
10.00	14.73	-14.39

```
S C36R1C 0 1 1584 2446 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 29.00
    T 2.00 77.00
    T 3.00 135.00
    T 4.00 196.00
    T 5.00 234.00
    T 6.00 235.00
S CXXX1 0 1 1672 2097 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
S C36R1D 0 1 3670 4660 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
S CXXX2 0 1 6310 6860 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
S C1A2F 0 1 7518 8167 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S CXXX3 0 1 8950 10182 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
S CXXX4 0 1 12338 13064 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
S C1A2E 0 1 16197 17660 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
S CXXX5 0 1 16199 17453 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
```

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S S1A2D 0 1 19333 20378 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
S C1A2C 0 1 24559 25813 0 0.00 0.00 40.00
    T 0.00 0.00
    T 1.00 140.00
    T 2.00 360.00
    T 3.00 640.00
    T 4.00 960.00
    T 5.00 1320.00
    T 5.50 1520.00
S CBOX 0 1 37935 72391 0 0.00 2800.00 40.00
    T 0.00 0.00 0.0
    T 1.00 140.00 40.0
    T 2.00 360.00 80.0
    T 3.00 640.00 120.0
    T 4.00 960.00 160.0
    T 5.00 1320.00 200.0
    T 5.50 1520.00 200.0
```

SUMMARY.OUT FILE

NEGATIVE VOLUME CONSERVATION (ACRE FEET)
INDICATES EXCESS VOLUME (OUTFLOW + STORAGE > INFLOW)

SIMULATION TIME (HOURS)	AVERAGE TIMESTEP (SECONDS)	VOLUME CONSERVATION (ACRE FEET)	PERCENT OF INFLOW
0.250	18.028	0.000000	0.000000
0.500	30.000	0.000000	0.000000
0.750	30.000	0.000000	0.000000
1.000	7.437	0.000000	0.000003
1.251	4.373	0.000000	0.000004
1.500	3.667	0.000000	0.000002
1.750	2.798	0.000000	0.000000
2.000	1.141	0.000000	0.000001
2.250	0.927	0.000000	0.000005
2.500	0.814	0.000000	0.000005
2.750	0.712	0.000000	0.000005
3.000	0.520	0.000000	0.000001
3.250	0.139	-0.000002	0.000009
3.500	0.046	0.000002	0.000005
3.750	0.033	0.000018	0.000025
4.000	0.049	0.000007	0.000008
4.250	0.059	0.000010	0.000010
4.500	0.087	0.000015	0.000014
4.750	0.099	0.000019	0.000017
5.000	0.110	0.000008	0.000007
5.250	0.116	0.000007	0.000006
5.500	0.126	0.000009	0.000007
5.750	0.122	0.000011	0.000009
6.000	0.125	0.000013	0.000010
6.250	0.129	0.000011	0.000009
6.500	0.127	0.000009	0.000007
6.750	0.117	0.000016	0.000012
7.000	0.105	0.000009	0.000006
7.250	0.096	0.000006	0.000004
7.500	0.102	0.000016	0.000012
7.750	0.119	0.000010	0.000008
8.000	0.142	0.000006	0.000004
8.250	0.159	0.000007	0.000005
8.500	0.178	0.000007	0.000005
8.750	0.200	0.000006	0.000004
9.000	0.230	0.000010	0.000007
9.250	0.242	0.000005	0.000004
9.500	0.258	0.000010	0.000007
9.750	0.274	0.000011	0.000008
10.000	0.294	0.000003	0.000003

MASS BALANCE INFLOW - OUTFLOW VOLUME

*** INFLOW (ACRE-FEET) ***

	WATER
INFLOW HYDROGRAPH	136.61

*** OUTFLOW (ACRE-FT) ***

OVERLAND FLOW	WATER
FLOODPLAIN STORAGE	11.80
FLOODPLAIN OUTFLOW HYDROGRAPH	125.46
FLOODPLAIN OUTFLOW AND STORAGE	137.26

*** TOTALS ***

TOTAL OUTFLOW FROM GRID SYSTEM 125.46

TOTAL VOLUME OF OUTFLOW AND STORAGE 137.26

THE MAXIMUM INUNDATED AREA IS: 38.40 ACRES

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COMPUTER RUN TIME IS : 15.38020 HRS

THIS OUTPUT FILE WAS TERMINATED ON: 2/13/2008 AT: 8: 7:34

```
S C36R1C 0 1 1581 2446 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 29.00
    T 2.00 77.00
    T 3.00 135.00
    T 4.00 196.00
    T 5.00 234.00
    T 6.00 235.00
S C36R1D 0 1 3560 4656 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S S1A2F 0 1 6525 6965 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S C1A2F 0 1 7515 8167 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S C1A2E 0 1 16197 17660 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
S S1A2D 0 1 19333 20378 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
S C1A2C 0 1 24772 25812 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 8.00
    T 2.00 26.00
    T 3.00 40.00
    T 4.00 52.00
    T 5.00 53.00
S C1B2 0 1 53189 54442 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
```

STRUCTURE OUTFLOW DISCHARGE

FLOODPLAIN GRID ELEMENTS TIME (HRS) DISCHARGE (CFS OR CMS)

THE MAXIMUM DISCHARGE FOR STRUCTURE 1 IS: 234.01 AT TIME: 3.57

INFLOW NODE:	1581 AND OUTFLOW NODE:	2446
0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	0.00	0.00
2.80	0.00	0.00
2.90	0.00	0.00
3.00	0.00	0.00
3.10	0.00	0.00
3.20	1.01	-1.01
3.30	199.84	-199.84
3.40	218.36	-218.36
3.50	229.64	-229.64
3.60	233.73	-233.73
3.70	230.81	-230.81
3.80	218.10	-218.10
3.90	214.00	-214.00
4.00	210.38	-210.38
4.10	206.31	-206.31
4.20	197.52	-197.52
4.30	188.93	-188.93
4.40	166.63	-166.63
4.50	151.16	-151.16
4.60	129.12	-129.12
4.70	123.06	-123.06
4.80	110.53	-110.53
4.90	100.51	-100.51
5.00	95.12	-95.12
5.10	87.02	-87.02
5.20	84.03	-84.03
5.30	80.03	-80.03
5.40	68.37	-68.37
5.50	72.35	-72.35
5.60	75.56	-75.56
5.70	61.87	-61.87
5.80	63.07	-63.07
5.90	59.88	-59.88
6.00	58.99	-58.99
6.10	56.87	-56.87
6.20	54.75	-54.75
6.30	50.53	-50.53
6.40	49.95	-49.95

6.50	45.27	-45.27
6.60	44.36	-44.36
6.70	40.02	-40.02
6.80	36.98	-36.98
6.90	33.13	-33.13
7.00	30.37	-30.37
7.10	25.69	-25.69
7.20	24.92	-24.92
7.30	22.07	-22.07
7.40	20.10	-20.10
7.50	15.52	-15.52
7.60	15.46	-15.46
7.70	12.93	-12.93
7.80	11.61	-11.61
7.90	12.58	-12.58
8.00	10.17	-10.17
8.10	9.69	-9.69
8.20	7.92	-7.92
8.30	7.90	-7.90
8.40	6.85	-6.85
8.50	7.02	-7.02
8.60	7.07	-7.07
8.70	5.74	-5.74
8.80	6.10	-6.10
8.90	4.79	-4.79
9.00	4.94	-4.94
9.10	4.60	-4.60
9.20	3.26	-3.26
9.30	3.23	-3.23
9.40	3.13	-3.13
9.50	2.87	-2.87
9.60	2.85	-2.85
9.70	2.68	-2.68
9.80	2.43	-2.43
9.90	2.05	-2.05
10.00	2.11	-2.11

THE MAXIMUM DISCHARGE FOR STRUCTURE 2 IS: 92.15 AT TIME: 3.49

INFLOW NODE:	3560 AND OUTFLOW NODE:	4656
0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	1.34	-1.34
2.80	3.61	-3.61
2.90	5.98	-5.98
3.00	13.38	-13.38
3.10	32.90	-32.90
3.20	54.56	-54.56

3.30	71.37	-71.37
3.40	85.35	-85.35
3.50	91.83	-91.83
3.60	90.29	-90.29
3.70	85.23	-85.23
3.80	77.25	-77.25
3.90	70.07	-70.07
4.00	65.59	-65.59
4.10	59.80	-59.80
4.20	52.65	-52.65
4.30	51.63	-51.63
4.40	45.57	-45.57
4.50	45.77	-45.77
4.60	41.44	-41.44
4.70	40.34	-40.34
4.80	38.66	-38.66
4.90	39.53	-39.53
5.00	37.35	-37.35
5.10	37.00	-37.00
5.20	37.04	-37.04
5.30	36.56	-36.56
5.40	35.00	-35.00
5.50	35.06	-35.06
5.60	34.27	-34.27
5.70	33.96	-33.96
5.80	33.69	-33.69
5.90	33.45	-33.45
6.00	33.09	-33.09
6.10	32.74	-32.74
6.20	31.97	-31.97
6.30	31.37	-31.37
6.40	29.75	-29.75
6.50	28.86	-28.86
6.60	28.19	-28.19
6.70	26.80	-26.80
6.80	24.95	-24.95
6.90	23.12	-23.12
7.00	21.19	-21.19
7.10	18.61	-18.61
7.20	16.42	-16.42
7.30	14.79	-14.79
7.40	13.39	-13.39
7.50	11.76	-11.76
7.60	10.39	-10.39
7.70	9.29	-9.29
7.80	6.96	-6.96
7.90	6.98	-6.98
8.00	6.18	-6.18
8.10	5.77	-5.77
8.20	5.42	-5.42
8.30	4.78	-4.78
8.40	4.43	-4.43
8.50	4.23	-4.23
8.60	3.97	-3.97
8.70	3.48	-3.48
8.80	3.21	-3.21
8.90	3.03	-3.03
9.00	2.95	-2.95
9.10	2.82	-2.82
9.20	2.68	-2.68
9.30	2.09	-2.09
9.40	1.81	-1.81
9.50	1.62	-1.62
9.60	0.85	-0.85
9.70	1.46	-1.46
9.80	1.59	-1.59
9.90	0.78	-0.78
10.00	1.61	-1.61

THE MAXIMUM DISCHARGE FOR STRUCTURE 3 IS: 120.59 AT TIME: 3.51
INFLOW NODE: 6525 AND OUTFLOW NODE: 6965

0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	0.00	0.00
2.80	0.00	0.00
2.90	2.12	-2.12
3.00	-79.32	79.32
3.10	70.94	-70.94
3.20	118.41	-118.41
3.30	120.32	-120.32
3.40	120.52	-120.52
3.50	120.59	-120.59
3.60	120.58	-120.58
3.70	120.52	-120.52
3.80	120.44	-120.44
3.90	120.37	-120.37
4.00	120.26	-120.26
4.10	120.14	-120.14
4.20	118.95	-118.95
4.30	115.11	-115.11
4.40	111.68	-111.68
4.50	99.69	-99.69
4.60	88.60	-88.60
4.70	84.72	-84.72
4.80	83.31	-83.31
4.90	80.72	-80.72
5.00	79.80	-79.80
5.10	79.61	-79.61
5.20	-107.46	107.46
5.30	80.44	-80.44
5.40	83.53	-83.53
5.50	87.15	-87.15
5.60	84.02	-84.02
5.70	80.62	-80.62
5.80	-104.33	104.33
5.90	74.19	-74.19
6.00	73.50	-73.50
6.10	72.86	-72.86
6.20	-102.47	102.47
6.30	71.74	-71.74
6.40	71.22	-71.22
6.50	70.23	-70.23
6.60	69.78	-69.78
6.70	-101.08	101.08
6.80	69.77	-69.77
6.90	-99.46	99.46
7.00	67.25	-67.25
7.10	-97.87	97.87

7.20	65.49	-65.49
7.30	-95.19	95.19
7.40	63.40	-63.40
7.50	-96.59	96.59
7.60	69.52	-69.52
7.70	-93.69	93.69
7.80	61.72	-61.72
7.90	-91.29	91.29
8.00	59.03	-59.03
8.10	57.47	-57.47
8.20	-91.95	91.95
8.30	56.77	-56.77
8.40	56.59	-56.59
8.50	56.68	-56.68
8.60	56.66	-56.66
8.70	59.99	-59.99
8.80	-87.23	87.23
8.90	-86.88	86.88
9.00	55.63	-55.63
9.10	57.45	-57.45
9.20	58.80	-58.80
9.30	-88.08	88.08
9.40	51.88	-51.88
9.50	55.99	-55.99
9.60	49.07	-49.07
9.70	48.23	-48.23
9.80	-84.48	84.48
9.90	55.01	-55.01
10.00	47.81	-47.81

THE MAXIMUM DISCHARGE FOR STRUCTURE 4 IS: 120.66 AT TIME: 3.50

INFLOW NODE: 7515 AND OUTFLOW NODE: 8167

0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	0.00	0.00
2.80	0.00	0.00
2.90	0.00	0.00
3.00	0.00	0.00
3.10	22.72	-22.72
3.20	114.71	-114.71
3.30	120.36	-120.36
3.40	120.61	-120.61
3.50	120.66	-120.66
3.60	120.66	-120.66
3.70	120.61	-120.61
3.80	120.53	-120.53
3.90	120.46	-120.46

4.00	120.34	-120.34
4.10	120.23	-120.23
4.20	119.98	-119.98
4.30	115.23	-115.23
4.40	110.30	-110.30
4.50	101.89	-101.89
4.60	91.03	-91.03
4.70	81.87	-81.87
4.80	74.52	-74.52
4.90	69.61	-69.61
5.00	65.88	-65.88
5.10	63.59	-63.59
5.20	59.98	-59.98
5.30	58.58	-58.58
5.40	47.70	-47.70
5.50	50.38	-50.38
5.60	55.66	-55.66
5.70	46.01	-46.01
5.80	46.10	-46.10
5.90	44.04	-44.04
6.00	42.26	-42.26
6.10	40.35	-40.35
6.20	38.96	-38.96
6.30	37.26	-37.26
6.40	35.35	-35.35
6.50	33.09	-33.09
6.60	31.23	-31.23
6.70	28.57	-28.57
6.80	26.83	-26.83
6.90	24.63	-24.63
7.00	22.24	-22.24
7.10	19.76	-19.76
7.20	17.84	-17.84
7.30	15.13	-15.13
7.40	14.39	-14.39
7.50	12.67	-12.67
7.60	11.29	-11.29
7.70	10.31	-10.31
7.80	7.31	-7.31
7.90	7.30	-7.30
8.00	6.86	-6.86
8.10	6.49	-6.49
8.20	6.53	-6.53
8.30	6.77	-6.77
8.40	6.22	-6.22
8.50	5.78	-5.78
8.60	5.60	-5.60
8.70	5.40	-5.40
8.80	5.03	-5.03
8.90	4.80	-4.80
9.00	4.34	-4.34
9.10	4.08	-4.08
9.20	4.32	-4.32
9.30	3.94	-3.94
9.40	3.19	-3.19
9.50	2.52	-2.52
9.60	-5.24	5.24
9.70	2.12	-2.12
9.80	1.60	-1.60
9.90	1.95	-1.95
10.00	1.53	-1.53

THE MAXIMUM DISCHARGE FOR STRUCTURE 5 IS: 24.96 AT TIME: 3.57

INFLOW NODE: 16197 AND OUTFLOW NODE: 17660

0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00

0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	0.00	0.00
2.80	0.00	0.00
2.90	-0.13	0.13
3.00	-1.73	1.73
3.10	-9.78	9.78
3.20	21.87	-21.87
3.30	-19.20	19.20
3.40	-19.97	19.97
3.50	-20.25	20.25
3.60	24.86	-24.86
3.70	-19.97	19.97
3.80	-19.53	19.53
3.90	-19.08	19.08
4.00	23.25	-23.25
4.10	22.78	-22.78
4.20	22.41	-22.41
4.30	-17.01	17.01
4.40	-16.44	16.44
4.50	21.30	-21.30
4.60	20.90	-20.90
4.70	-14.76	14.76
4.80	-14.22	14.22
4.90	19.91	-19.91
5.00	-13.29	13.29
5.10	19.35	-19.35
5.20	19.13	-19.13
5.30	18.94	-18.94
5.40	-12.16	12.16
5.50	-11.96	11.96
5.60	-11.90	11.90
5.70	-11.27	11.27
5.80	-11.08	11.08
5.90	18.13	-18.13
6.00	-10.78	10.78
6.10	-10.65	10.65
6.20	-10.54	10.54
6.30	17.55	-17.55
6.40	-10.03	10.03
6.50	-9.77	9.77
6.60	-9.55	9.55
6.70	16.65	-16.65
6.80	16.50	-16.50
6.90	-9.14	9.14
7.00	-9.03	9.03
7.10	16.21	-16.21
7.20	16.12	-16.12
7.30	16.08	-16.08
7.40	-8.78	8.78
7.50	-8.66	8.66
7.60	-9.01	9.01
7.70	-8.73	8.73
7.80	-8.61	8.61

7.90	15.72	-15.72
8.00	-8.53	8.53
8.10	-8.51	8.51
8.20	15.68	-15.68
8.30	-8.32	8.32
8.40	-8.28	8.28
8.50	15.45	-15.45
8.60	15.57	-15.57
8.70	-8.29	8.29
8.80	15.41	-15.41
8.90	-8.24	8.24
9.00	15.37	-15.37
9.10	15.50	-15.50
9.20	15.47	-15.47
9.30	15.44	-15.44
9.40	-7.99	7.99
9.50	15.25	-15.25
9.60	15.32	-15.32
9.70	15.25	-15.25
9.80	15.33	-15.33
9.90	-8.22	8.22
10.00	-8.23	8.23

THE MAXIMUM DISCHARGE FOR STRUCTURE 6 IS: 10.39 AT TIME: 3.58

INFLOW NODE: 19333 AND OUTFLOW NODE: 20378

0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	0.00	0.00
2.80	0.00	0.00
2.90	0.00	0.00
3.00	0.00	0.00
3.10	0.52	-0.52
3.20	5.92	-5.92
3.30	8.38	-8.38
3.40	9.49	-9.49
3.50	10.29	-10.29
3.60	10.29	-10.29
3.70	9.60	-9.60
3.80	9.16	-9.16
3.90	8.49	-8.49
4.00	7.72	-7.72
4.10	7.04	-7.04
4.20	6.65	-6.65
4.30	6.29	-6.29
4.40	5.95	-5.95
4.50	5.61	-5.61
4.60	5.21	-5.21

4.70	4.86	-4.86
4.80	4.53	-4.53
4.90	4.20	-4.20
5.00	3.93	-3.93
5.10	3.66	-3.66
5.20	3.36	-3.36
5.30	3.14	-3.14
5.40	2.96	-2.96
5.50	2.82	-2.82
5.60	2.67	-2.67
5.70	2.52	-2.52
5.80	2.41	-2.41
5.90	2.30	-2.30
6.00	2.20	-2.20
6.10	2.11	-2.11
6.20	2.03	-2.03
6.30	1.84	-1.84
6.40	1.67	-1.67
6.50	1.49	-1.49
6.60	1.31	-1.31
6.70	0.70	-0.70
6.80	0.63	-0.63
6.90	0.57	-0.57
7.00	0.51	-0.51
7.10	0.47	-0.47
7.20	0.43	-0.43
7.30	0.40	-0.40
7.40	0.36	-0.36
7.50	0.35	-0.35
7.60	0.33	-0.33
7.70	0.31	-0.31
7.80	0.27	-0.27
7.90	0.26	-0.26
8.00	0.23	-0.23
8.10	0.22	-0.22
8.20	0.22	-0.22
8.30	0.21	-0.21
8.40	0.21	-0.21
8.50	0.21	-0.21
8.60	0.21	-0.21
8.70	0.21	-0.21
8.80	0.00	0.00
8.90	0.21	-0.21
9.00	0.21	-0.21
9.10	0.21	-0.21
9.20	0.21	-0.21
9.30	0.21	-0.21
9.40	0.21	-0.21
9.50	0.00	0.00
9.60	0.21	-0.21
9.70	0.21	-0.21
9.80	0.21	-0.21
9.90	0.21	-0.21
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 7 IS: 53.00 AT TIME: 3.09
INFLOW NODE: 24772 AND OUTFLOW NODE: 25812

0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00

1.50	0.00	0.00
1.60	0.00	0.00
1.70	2.84	-2.84
1.80	-1.67	1.67
1.90	3.55	-3.55
2.00	-3.61	3.61
2.10	-5.20	5.20
2.20	-6.02	6.02
2.30	-6.24	6.24
2.40	7.25	-7.25
2.50	-6.08	6.08
2.60	-6.23	6.23
2.70	-6.90	6.90
2.80	10.09	-10.09
2.90	-10.42	10.42
3.00	20.48	-20.48
3.10	53.00	-53.00
3.20	53.00	-53.00
3.30	53.00	-53.00
3.40	53.00	-53.00
3.50	53.00	-53.00
3.60	52.80	-52.80
3.70	49.38	-49.38
3.80	32.52	-32.52
3.90	-22.97	22.97
4.00	22.90	-22.90
4.10	21.16	-21.16
4.20	19.74	-19.74
4.30	-16.42	16.42
4.40	-15.25	15.25
4.50	18.13	-18.13
4.60	17.38	-17.38
4.70	-13.80	13.80
4.80	16.85	-16.85
4.90	15.74	-15.74
5.00	15.51	-15.51
5.10	15.32	-15.32
5.20	15.10	-15.10
5.30	-12.15	12.15
5.40	15.33	-15.33
5.50	15.80	-15.80
5.60	15.77	-15.77
5.70	14.84	-14.84
5.80	-11.63	11.63
5.90	14.22	-14.22
6.00	13.76	-13.76
6.10	13.25	-13.25
6.20	-9.39	9.39
6.30	-8.95	8.95
6.40	11.87	-11.87
6.50	11.24	-11.24
6.60	10.59	-10.59
6.70	10.39	-10.39
6.80	9.08	-9.08
6.90	-6.61	6.61
7.00	7.81	-7.81
7.10	-6.17	6.17
7.20	7.46	-7.46
7.30	-5.93	5.93
7.40	-5.86	5.86
7.50	-5.66	5.66
7.60	-5.57	5.57
7.70	-5.64	5.64
7.80	7.06	-7.06
7.90	-5.71	5.71
8.00	-5.67	5.67
8.10	-5.67	5.67
8.20	7.10	-7.10
8.30	7.04	-7.04
8.40	7.12	-7.12
8.50	7.06	-7.06

8.60	-5.61	5.61
8.70	6.96	-6.96
8.80	-5.59	5.59
8.90	7.01	-7.01
9.00	-5.47	5.47
9.10	-5.43	5.43
9.20	6.87	-6.87
9.30	6.87	-6.87
9.40	-5.41	5.41
9.50	-5.37	5.37
9.60	-5.41	5.41
9.70	6.82	-6.82
9.80	-5.36	5.36
9.90	6.73	-6.73
10.00	-5.29	5.29

THE MAXIMUM DISCHARGE FOR STRUCTURE 8 IS: 21.92 AT TIME: 3.18
INFLOW NODE: 53189 AND OUTFLOW NODE: 54442

0.10	0.00	0.00
0.20	0.00	0.00
0.30	0.00	0.00
0.41	0.00	0.00
0.50	0.00	0.00
0.61	0.00	0.00
0.70	0.00	0.00
0.80	0.00	0.00
0.90	0.00	0.00
1.00	0.00	0.00
1.10	0.00	0.00
1.20	0.00	0.00
1.30	0.00	0.00
1.40	0.00	0.00
1.50	0.00	0.00
1.60	0.00	0.00
1.70	0.00	0.00
1.80	0.00	0.00
1.90	0.00	0.00
2.00	0.00	0.00
2.10	0.00	0.00
2.20	0.00	0.00
2.30	0.00	0.00
2.40	0.00	0.00
2.50	0.00	0.00
2.60	0.00	0.00
2.70	0.00	0.00
2.80	0.00	0.00
2.90	0.00	0.00
3.00	0.00	0.00
3.10	13.11	-13.11
3.20	21.29	-21.29
3.30	13.29	-13.29
3.40	8.22	-8.22
3.50	5.63	-5.63
3.60	3.94	-3.94
3.70	2.79	-2.79
3.80	2.18	-2.18
3.90	1.77	-1.77
4.00	1.28	-1.28
4.10	1.05	-1.05
4.20	0.95	-0.95
4.30	0.86	-0.86
4.40	0.75	-0.75
4.50	0.70	-0.70
4.60	0.69	-0.69
4.70	0.60	-0.60
4.80	0.50	-0.50
4.90	0.45	-0.45
5.00	0.46	-0.46
5.10	0.46	-0.46
5.20	0.47	-0.47
5.30	0.44	-0.44

5.40	0.36	-0.36
5.50	0.29	-0.29
5.60	0.25	-0.25
5.70	0.23	-0.23
5.80	0.24	-0.24
5.90	0.27	-0.27
6.00	0.29	-0.29
6.10	0.30	-0.30
6.20	0.30	-0.30
6.30	0.29	-0.29
6.40	0.22	-0.22
6.50	0.21	-0.21
6.60	0.00	0.00
6.70	0.00	0.00
6.80	0.21	-0.21
6.90	0.00	0.00
7.00	0.00	0.00
7.10	0.00	0.00
7.20	0.00	0.00
7.30	0.00	0.00
7.40	0.00	0.00
7.50	0.00	0.00
7.60	0.00	0.00
7.70	0.00	0.00
7.80	0.00	0.00
7.90	0.00	0.00
8.00	0.00	0.00
8.10	0.00	0.00
8.20	0.00	0.00
8.30	0.00	0.00
8.40	0.00	0.00
8.50	0.00	0.00
8.60	0.00	0.00
8.70	0.00	0.00
8.80	0.00	0.00
8.90	0.00	0.00
9.00	0.00	0.00
9.10	0.00	0.00
9.20	0.00	0.00
9.30	0.00	0.00
9.40	0.00	0.00
9.50	0.00	0.00
9.60	0.00	0.00
9.70	0.00	0.00
9.80	0.00	0.00
9.90	0.00	0.00
10.00	0.00	0.00

SUMMARY.OUT FILE

NEGATIVE VOLUME CONSERVATION (ACRE FEET)
INDICATES EXCESS VOLUME (OUTFLOW + STORAGE > INFLOW)

SIMULATION TIME (HOURS)	AVERAGE TIMESTEP (SECONDS)	VOLUME CONSERVATION (ACRE FEET)	VOLUME CONSERVATION PERCENT OF INFLOW
0.102	11.800	0.000000	0.000000
0.201	27.640	0.000000	0.000000
0.301	35.920	0.000000	0.000000
0.408	42.760	0.000000	0.000000
0.502	48.520	0.000000	0.000000
0.607	53.560	0.000000	0.000000
0.704	58.233	0.000000	0.000000
0.804	60.000	0.000000	0.000000
0.901	15.195	0.000000	0.000001
1.001	7.702	0.000000	0.000003
1.101	7.006	0.000000	0.000004
1.202	6.300	0.000000	0.000001
1.301	6.967	0.000000	0.000003
1.401	6.327	0.000000	0.000003
1.501	5.613	0.000000	0.000002
1.600	5.976	0.000000	0.000001
1.700	3.779	0.000000	0.000002
1.801	3.020	0.000000	0.000015
1.900	3.044	0.000000	0.000048
2.001	3.246	0.000000	0.000035
2.100	3.156	0.000000	0.000040
2.200	2.993	0.000000	0.000042
2.301	2.938	0.000000	0.000039
2.400	2.674	0.000000	0.000030
2.500	2.572	0.000000	0.000028
2.600	2.300	0.000000	0.000026
2.700	2.220	0.000000	0.000034
2.800	2.123	0.000000	0.000027
2.900	1.645	0.000000	0.000025
3.000	0.649	0.000000	0.000015
3.100	0.240	-0.000001	0.000007
3.200	0.055	0.000000	0.000002
3.300	0.053	-0.000001	0.000005
3.400	0.086	0.000000	0.000000
3.500	0.044	0.000001	0.000002
3.600	0.019	0.000000	0.000000
3.700	0.021	0.000000	0.000001
3.800	0.032	0.000001	0.000001
3.900	0.037	0.000000	0.000000
4.000	0.043	-0.000003	0.000004
4.100	0.050	0.000002	0.000003
4.200	0.038	-0.000001	0.000001
4.300	0.018	0.000002	0.000002
4.400	0.020	0.000002	0.000002
4.500	0.025	-0.000001	0.000001
4.600	0.027	0.000004	0.000004
4.700	0.030	0.000004	0.000004
4.800	0.032	0.000000	0.000000
4.900	0.034	0.000004	0.000004
5.000	0.032	0.000000	0.000000
5.100	0.030	-0.000006	0.000005
5.200	0.030	0.000004	0.000004
5.300	0.048	-0.000002	0.000001
5.400	0.058	-0.000005	0.000004
5.500	0.291	-0.000001	0.000001
5.600	0.177	0.000002	0.000002
5.700	0.100	0.000001	0.000001
5.800	0.049	0.000002	0.000002
5.900	0.051	0.000003	0.000002
6.000	0.054	-0.000003	0.000002
6.100	0.054	0.000003	0.000002
6.200	0.057	0.000004	0.000003
6.300	0.059	0.000000	0.000000

6.400	0.063	-0.000001	0.000000
6.500	0.067	0.000000	0.000000
6.600	0.071	0.000005	0.000004
6.700	0.077	-0.000003	0.000002
6.800	0.082	0.000001	0.000001
6.900	0.090	-0.000001	0.000001
7.000	0.099	-0.000003	0.000002
7.100	0.111	-0.000005	0.000004
7.200	0.125	0.000006	0.000005
7.300	0.142	-0.000001	0.000001
7.400	0.158	-0.000008	0.000006
7.500	0.312	0.000004	0.000003
7.600	0.367	-0.000003	0.000002
7.700	0.527	-0.000003	0.000002
7.800	0.494	-0.000006	0.000004
7.900	0.322	0.000000	0.000000
8.000	0.232	-0.000001	0.000000
8.100	0.320	0.000001	0.000001
8.200	0.445	-0.000002	0.000001
8.300	0.541	0.000001	0.000000
8.400	0.574	-0.000002	0.000001
8.500	0.503	0.000002	0.000001
8.600	0.343	0.000002	0.000001
8.700	0.472	0.000006	0.000005
8.800	0.416	-0.000003	0.000002
8.900	0.464	-0.000001	0.000000
9.000	0.491	0.000006	0.000004
9.100	0.504	-0.000002	0.000001
9.200	0.567	0.000001	0.000001
9.300	0.613	-0.000007	0.000005
9.400	0.646	-0.000002	0.000002
9.500	0.622	0.000001	0.000000
9.600	0.680	0.000001	0.000001
9.700	0.655	0.000002	0.000002
9.800	0.630	-0.000003	0.000002
9.900	0.657	-0.000001	0.000001
10.000	0.673	0.000004	0.000003

MASS BALANCE INFLOW - OUTFLOW VOLUME

*** INFLOW (ACRE-FEET) ***

	WATER
INFLOW HYDROGRAPH	136.61

*** OUTFLOW (ACRE-FT) ***

OVERLAND FLOW	WATER
FLOODPLAIN STORAGE	14.00
FLOODPLAIN OUTFLOW HYDROGRAPH	122.61
FLOODPLAIN OUTFLOW AND STORAGE	136.61

*** TOTALS ***

TOTAL OUTFLOW FROM GRID SYSTEM	122.61
TOTAL VOLUME OF OUTFLOW AND STORAGE	136.61

SURFACE AREA OF INUNDATION REGARDLESS OF THE TIME OF OCCURRENCE:
(FOR FLOW DEPTHS GREATER THAN THE "TOL" VALUE TYPICALLY 0.1 FT OR 0.03 M)

THE MAXIMUM INUNDATED AREA IS: 213.92 ACRES

COMPUTER RUN TIME IS : 17.48947 HRS

THIS OUTPUT FILE WAS TERMINATED ON: 7/21/2009 AT: 2: 2:43

STRUCTURE OUTFLOW DISCHARGE

FLOODPLAIN GRID ELEMENTS TIME (HRS) DISCHARGE (CFS OR CMS)

THE MAXIMUM DISCHARGE FOR STRUCTURE 1 IS: 234.03 AT TIME: 3.58

INFLOW NODE:	1581	AND OUTFLOW NODE:	2446
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	0.00		0.00
3.00	0.00		0.00
3.25	147.55		-147.55
3.50	231.06		-231.06
3.75	224.57		-224.57
4.00	210.04		-210.04
4.25	196.52		-196.52
4.50	155.01		-155.01
4.75	115.61		-115.61
5.00	94.91		-94.91
5.25	78.80		-78.80
5.50	70.59		-70.59
5.75	62.90		-62.90
6.00	58.72		-58.72
6.25	54.17		-54.17
6.50	46.80		-46.80
6.75	37.70		-37.70
7.00	28.29		-28.29
7.25	23.39		-23.39
7.50	17.31		-17.31
7.75	12.46		-12.46
8.00	9.71		-9.71
8.25	8.10		-8.10
8.50	6.81		-6.81
8.75	5.38		-5.38
9.00	4.42		-4.42
9.25	3.63		-3.63
9.50	2.98		-2.98
9.75	2.91		-2.91
10.00	2.95		-2.95

THE MAXIMUM DISCHARGE FOR STRUCTURE 2 IS: 93.08 AT TIME: 3.49

INFLOW NODE:	3560	AND OUTFLOW NODE:	4656
0.25	0.00		0.00
0.50	0.00		0.00
0.75	0.00		0.00
1.00	0.00		0.00
1.25	0.00		0.00
1.50	0.00		0.00
1.75	0.00		0.00
2.00	0.00		0.00
2.25	0.00		0.00
2.50	0.00		0.00
2.75	2.56		-2.56
3.00	13.00		-13.00
3.25	66.51		-66.51
3.50	87.04		-87.04
3.75	77.23		-77.23
4.00	62.60		-62.60
4.25	52.60		-52.60
4.50	44.43		-44.43
4.75	39.76		-39.76
5.00	37.81		-37.81
5.25	35.66		-35.66

5.50	35.24	-35.24
5.75	33.71	-33.71
6.00	33.19	-33.19
6.25	31.34	-31.34
6.50	29.12	-29.12
6.75	25.52	-25.52
7.00	21.03	-21.03
7.25	15.82	-15.82
7.50	11.52	-11.52
7.75	6.81	-6.81
8.00	6.06	-6.06
8.25	5.05	-5.05
8.50	4.33	-4.33
8.75	3.32	-3.32
9.00	2.92	-2.92
9.25	2.47	-2.47
9.50	2.02	-2.02
9.75	2.00	-2.00
10.00	2.02	-2.02

THE MAXIMUM DISCHARGE FOR STRUCTURE 3 IS: 120.52 AT TIME: 3.50

INFLOW NODE: 6525 AND OUTFLOW NODE: 6965

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	10.98	-10.98
3.25	120.14	-120.14
3.50	120.52	-120.52
3.75	120.43	-120.43
4.00	120.22	-120.22
4.25	117.06	-117.06
4.50	96.70	-96.70
4.75	75.59	-75.59
5.00	63.47	-63.47
5.25	56.37	-56.37
5.50	50.32	-50.32
5.75	46.02	-46.02
6.00	40.97	-40.97
6.25	37.41	-37.41
6.50	32.40	-32.40
6.75	27.23	-27.23
7.00	21.75	-21.75
7.25	16.36	-16.36
7.50	12.35	-12.35
7.75	8.89	-8.89
8.00	6.01	-6.01
8.25	6.14	-6.14
8.50	3.96	-3.96
8.75	3.46	-3.46
9.00	3.00	-3.00
9.25	2.78	-2.78
9.50	2.03	-2.03
9.75	2.03	-2.03
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 4 IS: 120.65 AT TIME: 3.57

INFLOW NODE: 7515 AND OUTFLOW NODE: 8167

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00

1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	120.16	-120.16
3.50	120.64	-120.64
3.75	120.56	-120.56
4.00	120.33	-120.33
4.25	118.41	-118.41
4.50	100.20	-100.20
4.75	76.54	-76.54
5.00	64.34	-64.34
5.25	56.97	-56.97
5.50	51.17	-51.17
5.75	48.11	-48.11
6.00	41.43	-41.43
6.25	37.84	-37.84
6.50	32.90	-32.90
6.75	27.74	-27.74
7.00	22.10	-22.10
7.25	16.77	-16.77
7.50	12.58	-12.58
7.75	9.01	-9.01
8.00	5.84	-5.84
8.25	5.16	-5.16
8.50	4.49	-4.49
8.75	3.55	-3.55
9.00	3.03	-3.03
9.25	2.78	-2.78
9.50	2.05	-2.05
9.75	0.00	0.00
10.00	2.01	-2.01

E MAXIMUM DISCHARGE FOR STRUCTURE 5 IS: 14.39 AT TIME: 3.21
INFLOW NODE: 16197 AND OUTFLOW NODE: 17660

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.72	-0.72
3.00	2.80	-2.80
3.25	14.13	-14.13
3.50	9.50	-9.50
3.75	5.48	-5.48
4.00	1.94	-1.94
4.25	1.04	-1.04
4.50	0.97	-0.97
4.75	0.70	-0.70
5.00	0.70	-0.70
5.25	0.70	-0.70
5.50	0.70	-0.70
5.75	0.70	-0.70
6.00	0.70	-0.70
6.25	0.70	-0.70
6.50	0.00	0.00
6.75	0.00	0.00
7.00	0.00	0.00
7.25	0.00	0.00
7.50	0.00	0.00
7.75	0.00	0.00
8.00	0.00	0.00
8.25	0.00	0.00
8.50	0.00	0.00

8.75	0.00	0.00
9.00	0.00	0.00
9.25	0.00	0.00
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 6 IS: 13.69 AT TIME: 3.29

INFLOW NODE: 19333 AND OUTFLOW NODE: 20378

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	13.18	-13.18
3.50	12.79	-12.79
3.75	10.83	-10.83
4.00	8.08	-8.08
4.25	6.13	-6.13
4.50	4.79	-4.79
4.75	3.77	-3.77
5.00	2.91	-2.91
5.25	2.38	-2.38
5.50	2.07	-2.07
5.75	1.89	-1.89
6.00	1.80	-1.80
6.25	1.64	-1.64
6.50	0.00	0.00
6.75	0.70	-0.70
7.00	0.00	0.00
7.25	0.00	0.00
7.50	0.00	0.00
7.75	0.00	0.00
8.00	0.70	-0.70
8.25	0.00	0.00
8.50	0.00	0.00
8.75	0.00	0.00
9.00	0.00	0.00
9.25	0.00	0.00
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 7 IS: 53.00 AT TIME: 3.09

INFLOW NODE: 24772 AND OUTFLOW NODE: 25812

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.87	-0.87
2.00	0.86	-0.86
2.25	0.83	-0.83
2.50	0.82	-0.82
2.75	1.38	-1.38
3.00	12.98	-12.98
3.25	53.00	-53.00
3.50	53.00	-53.00
3.75	44.42	-44.42
4.00	16.97	-16.97
4.25	13.61	-13.61
4.50	11.21	-11.21
4.75	9.00	-9.00

5.00	8.02	-8.02
5.25	7.87	-7.87
5.50	6.75	-6.75
5.75	6.48	-6.48
6.00	5.64	-5.64
6.25	3.68	-3.68
6.50	2.23	-2.23
6.75	0.97	-0.97
7.00	0.00	0.00
7.25	0.80	-0.80
7.50	0.00	0.00
7.75	0.00	0.00
8.00	0.00	0.00
8.25	0.00	0.00
8.50	0.00	0.00
8.75	0.00	0.00
9.00	0.00	0.00
9.25	0.00	0.00
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

THE MAXIMUM DISCHARGE FOR STRUCTURE 8 IS: 21.45 AT TIME: 3.17
INFLOW NODE: 53189 AND OUTFLOW NODE: 54442

0.25	0.00	0.00
0.50	0.00	0.00
0.75	0.00	0.00
1.00	0.00	0.00
1.25	0.00	0.00
1.50	0.00	0.00
1.75	0.00	0.00
2.00	0.00	0.00
2.25	0.00	0.00
2.50	0.00	0.00
2.75	0.00	0.00
3.00	0.00	0.00
3.25	16.63	-16.63
3.50	5.18	-5.18
3.75	2.18	-2.18
4.00	0.91	-0.91
4.25	0.70	-0.70
4.50	0.70	-0.70
4.75	0.00	0.00
5.00	0.70	-0.70
5.25	0.70	-0.70
5.50	0.70	-0.70
5.75	0.00	0.00
6.00	0.00	0.00
6.25	0.00	0.00
6.50	0.00	0.00
6.75	0.00	0.00
7.00	0.00	0.00
7.25	0.00	0.00
7.50	0.00	0.00
7.75	0.00	0.00
8.00	0.00	0.00
8.25	0.00	0.00
8.50	0.00	0.00
8.75	0.00	0.00
9.00	0.00	0.00
9.25	0.00	0.00
9.50	0.00	0.00
9.75	0.00	0.00
10.00	0.00	0.00

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S C36R1C 0 1 1581 2446 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 29.00
    T 2.00 77.00
    T 3.00 135.00
    T 4.00 196.00
    T 5.00 234.00
    T 6.00 235.00
S C36R1D 0 1 3560 4656 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S S1A2F 0 1 6525 6965 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S C1A2F 0 1 7515 8167 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 20.00
    T 2.00 38.00
    T 3.00 70.00
    T 4.00 100.00
    T 5.00 120.00
    T 6.00 121.00
S C1A2E 0 1 16197 17660 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
S S1A2D 0 1 19333 20378 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
S C1A2C 0 1 24772 25812 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 8.00
    T 2.00 26.00
    T 3.00 40.00
    T 4.00 52.00
    T 5.00 53.00
S C1B2 0 1 53189 54442 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 7.00
    T 2.00 18.00
    T 3.00 25.00
    T 3.50 28.00
    T 4.00 29.00
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SUMMARY.OUT FILE

NEGATIVE VOLUME CONSERVATION (ACRE FEET)
INDICATES EXCESS VOLUME (OUTFLOW + STORAGE > INFLOW)

SIMULATION TIME (HOURS)	AVERAGE TIMESTEP (SECONDS)	VOLUME CONSERVATION (ACRE FEET)	PERCENT OF INFLOW
0.250	18.028	0.000000	0.000000
0.500	30.000	0.000000	0.000000
0.750	30.000	0.000000	0.000000
1.000	7.498	0.000000	0.000002
1.251	4.512	0.000000	0.000004
1.500	4.151	0.000000	0.000002
1.750	3.255	0.000000	0.000002
2.000	2.542	0.000000	0.000036
2.250	2.012	0.000000	0.000044
2.500	1.978	0.000000	0.000026
2.750	1.696	0.000000	0.000022
3.000	1.177	0.000000	0.000008
3.250	0.176	-0.000001	0.000004
3.500	0.150	0.000000	0.000001
3.750	0.141	-0.000003	0.000004
4.000	0.173	0.000001	0.000001
4.250	0.185	0.000000	0.000000
4.500	0.192	0.000002	0.000002
4.750	0.196	-0.000005	0.000005
5.000	0.195	-0.000004	0.000004
5.250	0.193	0.000001	0.000001
5.500	0.199	0.000001	0.000001
5.750	0.206	-0.000001	0.000001
6.000	0.210	0.000001	0.000000
6.250	0.212	0.000003	0.000003
6.500	0.220	-0.000005	0.000004
6.750	0.230	-0.000005	0.000003
7.000	0.237	-0.000003	0.000002
7.250	0.243	0.000003	0.000002
7.500	0.248	-0.000005	0.000004
7.750	0.252	0.000001	0.000001
8.000	0.256	0.000005	0.000004
8.250	0.259	0.000005	0.000004
8.500	0.262	-0.000001	0.000001
8.750	0.265	-0.000002	0.000001
9.000	0.267	0.000002	0.000001
9.250	0.270	0.000002	0.000001
9.500	0.272	-0.000002	0.000001
9.750	0.272	0.000001	0.000001
10.000	0.272	0.000001	0.000001

MASS BALANCE INFLOW - OUTFLOW VOLUME

*** INFLOW (ACRE-FEET) ***

	WATER
INFLOW HYDROGRAPH	136.61

*** OUTFLOW (ACRE-FT) ***

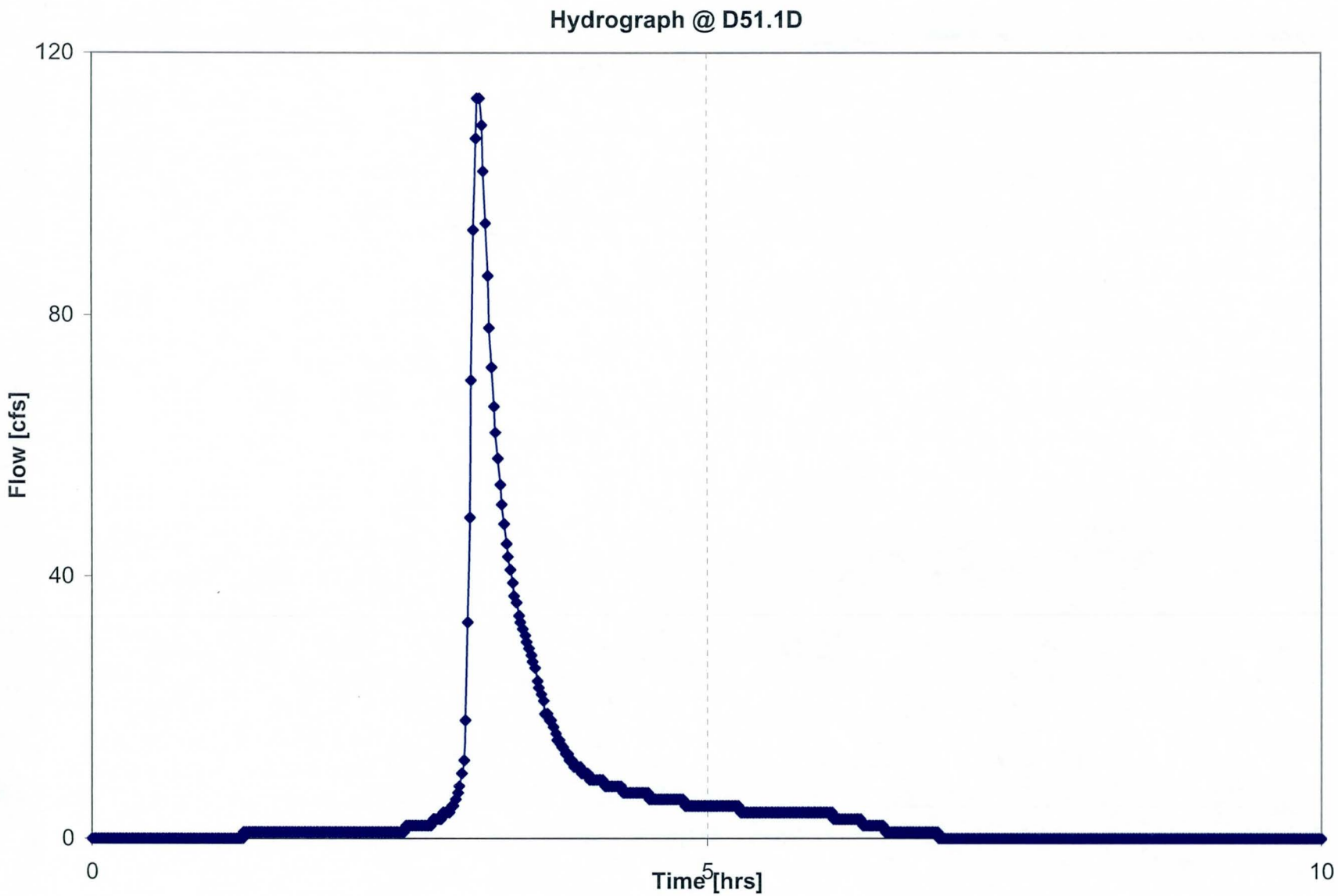
OVERLAND FLOW	WATER
FLOODPLAIN STORAGE	26.58
FLOODPLAIN OUTFLOW HYDROGRAPH	110.03
FLOODPLAIN OUTFLOW AND STORAGE	136.61

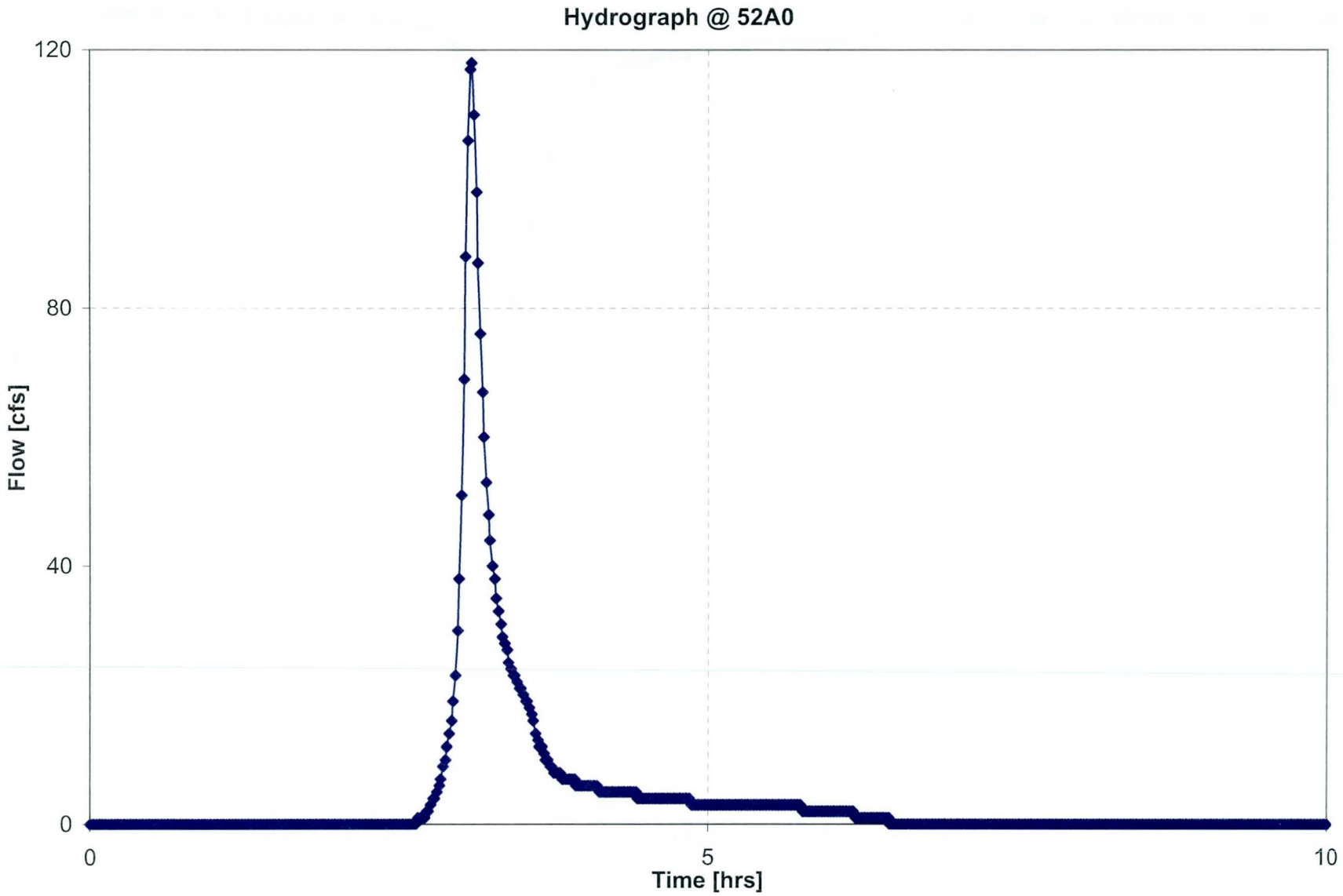
*** TOTALS ***

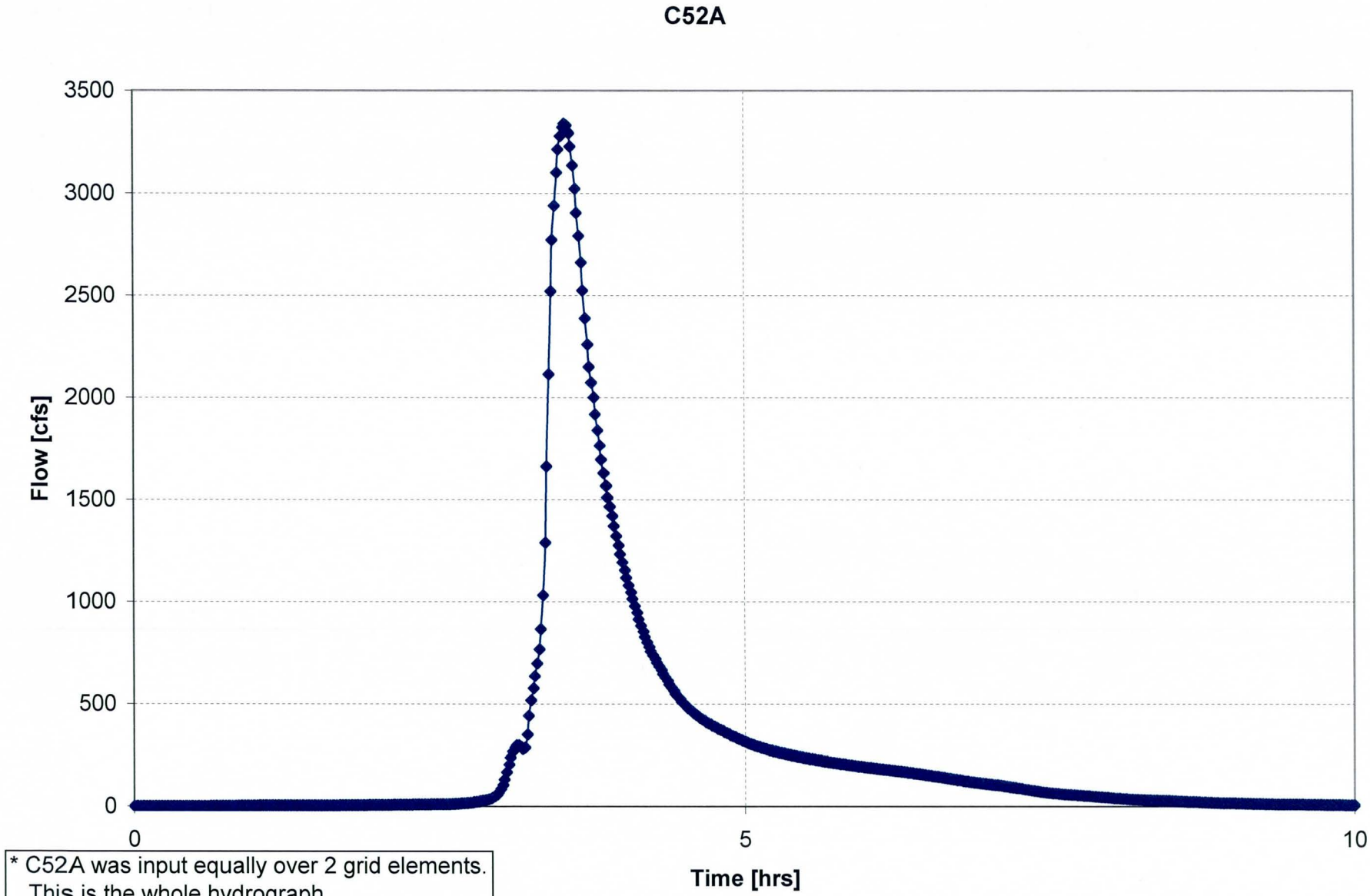
TOTAL OUTFLOW FROM GRID SYSTEM	110.03
TOTAL VOLUME OF OUTFLOW AND STORAGE	136.61
THE MAXIMUM INUNDATED AREA IS:	134.19 ACRES

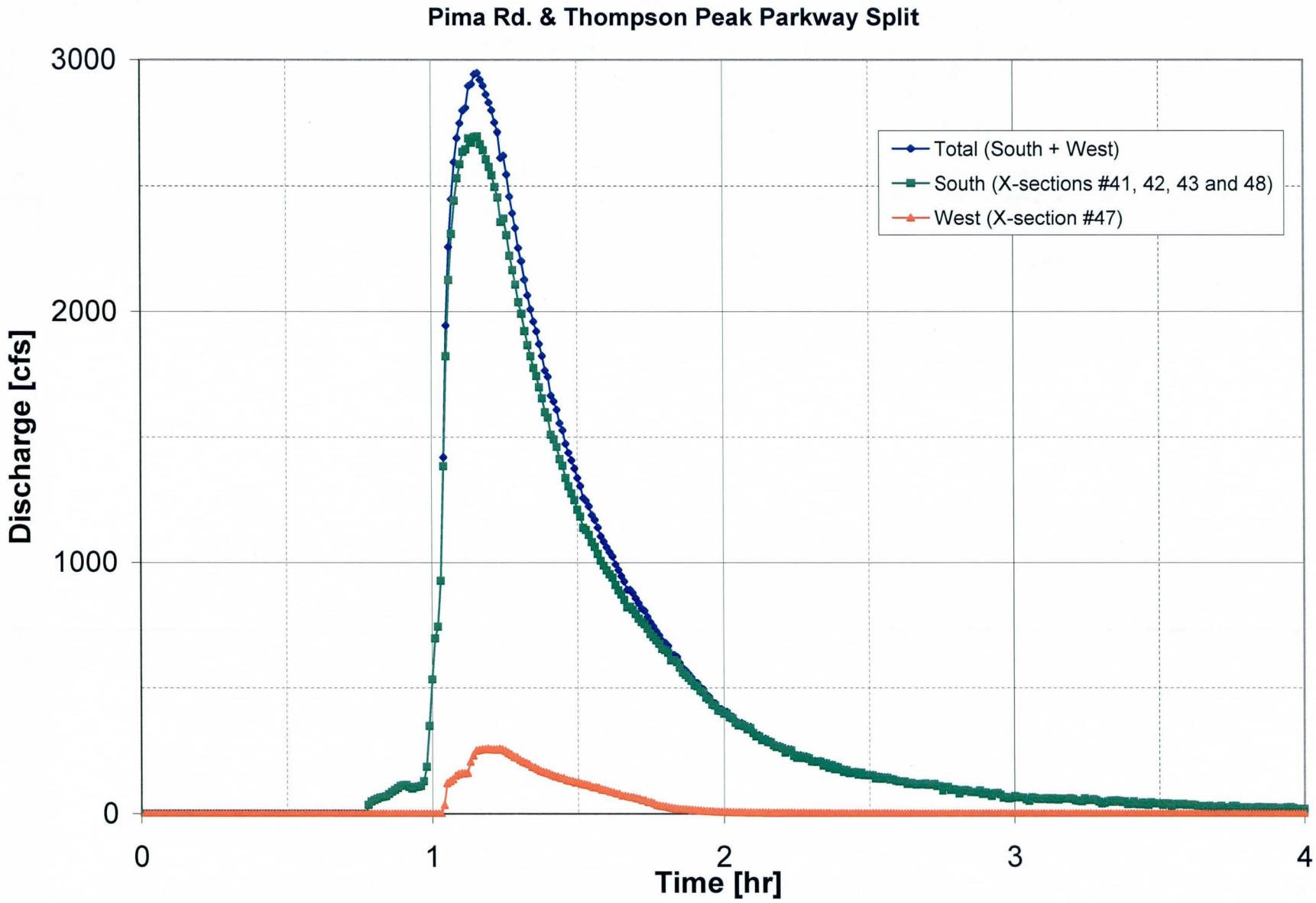
COMPUTER RUN TIME IS : 6.14949 HRS

THIS OUTPUT FILE WAS TERMINATED ON: 6/29/2007 AT: 23:30:20


Hydrograph @ D51.1D
120
80
40
0
Flow [cfs]
0
5
10
Time [hrs]


Hydrograph @ 52A0
120
80
40
0
Flow [cfs]
0
5
10
Time [hrs]


C52A
3500
3000
2500
2000
1500
1000
500
0
Flow [cfs]
0
5
10
Time [hrs]
* C52A was input equally over 2 grid elements.
This is the whole hydrograph


Pima Rd. & Thompson Peak Parkway Split
Discharge [cfs]
3000
2000
1000
0
0
1
2
3
4
Time [hr]
Total (South + West)
South (X-sections #41, 42, 43 and 48)
West (X-section #47)

STRUCTURE OUTFLOW DISCHARGE

FLOODPLAIN GRID ELEMENTS TIME (HRS) DISCHARGE (CFS OR CMS)

THE MAXIMUM DISCHARGE FOR STRUCTURE 1 IS: 179.24 AT TIME: 1.12
INFLOW NODE: 24283 AND OUTFLOW NODE: 32458

0.01	0.00	0.00
0.02	0.00	0.00
0.03	0.00	0.00
0.04	0.00	0.00
0.05	0.00	0.00
0.06	0.00	0.00
0.07	0.00	0.00
0.08	0.00	0.00
0.09	0.00	0.00
0.10	0.00	0.00
0.11	0.00	0.00
0.12	0.00	0.00
0.13	0.00	0.00
0.14	0.00	0.00
0.15	0.00	0.00
0.16	0.00	0.00
0.17	0.00	0.00
0.18	0.00	0.00
0.19	0.00	0.00
0.20	0.00	0.00
0.21	0.00	0.00
0.22	0.00	0.00
0.23	0.00	0.00
0.24	0.00	0.00
0.25	0.00	0.00
0.26	0.00	0.00
0.27	0.00	0.00
0.28	0.00	0.00
0.29	0.00	0.00
0.30	0.00	0.00
0.31	0.00	0.00
0.32	0.00	0.00
0.33	0.00	0.00
0.34	0.00	0.00
0.35	0.00	0.00
0.36	0.00	0.00
0.37	0.00	0.00
0.38	0.00	0.00
0.39	0.00	0.00
0.40	0.00	0.00
0.41	0.00	0.00
0.42	0.00	0.00
0.43	0.00	0.00
0.44	0.00	0.00
0.45	0.00	0.00
0.46	0.00	0.00
0.47	0.00	0.00
0.48	0.00	0.00
0.49	0.00	0.00
0.50	0.00	0.00
0.51	0.00	0.00
0.52	0.00	0.00
0.53	0.00	0.00
0.54	0.00	0.00
0.55	0.00	0.00
0.56	0.00	0.00
0.57	0.00	0.00
0.58	0.00	0.00
0.59	0.00	0.00
0.60	0.00	0.00
0.61	0.00	0.00
0.62	0.00	0.00
0.63	0.00	0.00
0.64	0.00	0.00

0.65	0.00	0.00
0.66	0.00	0.00
0.67	0.00	0.00
0.68	0.00	0.00
0.69	0.00	0.00
0.70	0.00	0.00
0.71	0.00	0.00
0.72	0.00	0.00
0.73	0.00	0.00
0.74	0.00	0.00
0.75	0.00	0.00
0.76	0.00	0.00
0.77	0.00	0.00
0.78	0.00	0.00
0.79	0.00	0.00
0.80	0.00	0.00
0.81	0.00	0.00
0.82	0.00	0.00
0.83	0.00	0.00
0.84	0.00	0.00
0.85	0.00	0.00
0.86	0.00	0.00
0.87	0.00	0.00
0.88	0.00	0.00
0.89	0.00	0.00
0.90	87.34	-2.11
0.91	132.80	-39.87
0.92	149.41	-83.10
0.93	158.82	-118.17
0.94	162.16	-139.64
0.95	162.22	-152.04
0.96	164.80	-157.73
0.97	165.72	-161.14
0.98	167.47	-162.88
0.99	166.59	-167.08
1.00	167.21	-167.72
1.01	169.89	-167.08
1.02	166.95	-170.08
1.03	173.18	-166.50
1.04	171.99	-170.68
1.05	170.47	-173.83
1.06	172.60	-173.64
1.07	174.11	-174.05
1.08	176.65	-172.98
1.09	173.95	-176.53
1.10	176.15	-173.80
1.11	175.43	-175.87
1.12	176.50	-176.59
1.13	178.00	-174.29
1.14	174.99	-175.93
1.15	175.88	-175.49
1.16	176.99	-173.51
1.17	170.72	-178.99
1.18	175.95	-173.50
1.19	176.12	-174.01
1.20	173.05	-175.88
1.21	173.99	-174.32
1.22	172.16	-175.20
1.23	172.55	-174.45
1.24	173.30	-173.14
1.25	171.68	-173.51
1.26	171.69	-172.50
1.27	169.32	-173.69
1.28	169.60	-171.92
1.29	170.48	-170.15
1.30	163.45	-176.63
1.31	170.58	-168.91
1.32	169.64	-169.61
1.33	169.34	-169.01
1.34	166.92	-171.15
1.35	168.73	-169.22

1.36	168.25	-168.69
1.37	168.20	-168.46
1.38	167.72	-168.31
1.39	167.98	-167.02
1.40	168.80	-165.83
1.41	165.69	-168.38
1.42	167.33	-166.85
1.43	164.26	-169.68
1.44	167.75	-165.05
1.45	165.19	-167.04
1.46	164.95	-166.29
1.47	165.86	-164.90
1.48	165.64	-165.06
1.49	163.97	-166.10
1.50	166.13	-163.62
1.51	167.89	-161.75
1.52	162.51	-167.21
1.53	162.65	-166.98
1.54	163.72	-166.07
1.55	160.29	-168.73
1.56	163.18	-164.30
1.57	163.25	-163.40
1.58	165.15	-161.92
1.59	162.13	-164.31
1.60	162.95	-163.54
1.61	163.31	-162.64
1.62	159.73	-166.92
1.63	164.73	-160.33
1.64	162.15	-162.60
1.65	162.71	-160.88
1.66	162.25	-161.43
1.67	158.34	-164.67
1.68	163.62	-159.56
1.69	162.03	-160.44
1.70	160.93	-161.37
1.71	159.16	-161.48
1.72	161.42	-159.13
1.73	161.62	-159.19
1.74	158.08	-161.63
1.75	162.06	-156.59
1.76	155.65	-162.94
1.77	159.00	-158.12
1.78	160.59	-155.80
1.79	156.19	-159.39
1.80	158.40	-156.89
1.81	154.48	-160.68
1.82	155.39	-158.93
1.83	158.18	-155.89
1.84	156.47	-156.57
1.85	150.55	-161.54
1.86	154.15	-158.64
1.87	153.82	-157.42
1.88	152.78	-157.46
1.89	156.87	-152.87
1.90	152.17	-155.75
1.91	155.44	-152.72
1.92	155.72	-152.03
1.93	152.73	-154.24
1.94	152.91	-152.86
1.95	156.64	-149.10
1.96	150.05	-154.98
1.97	153.30	-150.21
1.98	155.01	-148.26
1.99	148.16	-152.50
2.00	149.34	-150.86
2.01	148.60	-150.02
2.02	147.21	-150.99
2.03	150.94	-146.48
2.04	148.79	-146.80
2.05	147.37	-147.51
2.06	145.87	-148.27

2.07	146.70	-146.90
2.08	146.20	-146.81
2.09	146.09	-145.88
2.10	144.79	-146.09
2.11	141.37	-148.58
2.12	144.16	-145.97
2.13	141.69	-148.26
2.14	144.45	-144.49
2.15	142.43	-145.65
2.16	145.48	-141.96
2.17	143.87	-143.06
2.18	140.29	-145.70
2.19	140.72	-144.97
2.20	137.80	-146.20
2.21	140.65	-142.76
2.22	139.39	-143.49
2.23	141.50	-140.96
2.24	137.01	-144.49
2.25	132.49	-148.44
2.26	140.70	-140.32
2.27	140.64	-140.50
2.28	138.49	-142.03
2.29	139.05	-140.90
2.30	139.92	-139.95
2.31	138.34	-139.43
2.32	138.59	-138.75
2.33	138.70	-138.46
2.34	137.37	-138.91
2.35	136.52	-138.80
2.36	139.54	-136.54
2.37	139.76	-135.66
2.38	136.89	-138.11
2.39	133.33	-141.12
2.40	131.21	-142.35
2.41	137.64	-135.24
2.42	134.34	-138.66
2.43	136.28	-136.10
2.44	136.03	-136.32
2.45	134.16	-137.69
2.46	141.01	-131.21
2.47	134.90	-136.61
2.48	133.09	-137.96
2.49	130.57	-139.47
2.50	128.57	-140.95
2.51	136.33	-133.23
2.52	135.49	-134.36
2.53	134.01	-135.57
2.54	135.28	-134.61
2.55	136.04	-133.69
2.56	125.72	-142.44
2.57	128.87	-138.69
2.58	134.80	-133.43
2.59	130.38	-136.75
2.60	131.85	-135.20
2.61	129.40	-136.76
2.62	132.66	-133.98
2.63	131.00	-134.66
2.64	136.91	-128.96
2.65	133.80	-131.37
2.66	127.86	-136.12
2.67	128.68	-134.23
2.68	133.30	-129.41
2.69	129.91	-132.70
2.70	135.08	-128.54
2.71	131.38	-131.71
2.72	132.38	-130.00
2.73	131.70	-130.45
2.74	129.35	-132.07
2.75	128.20	-132.88
2.76	129.30	-130.71
2.77	123.57	-136.00

2.78	127.45	-132.37
2.79	134.32	-125.39
2.80	129.59	-129.24
2.81	131.15	-127.47
2.82	131.10	-126.78
2.83	129.03	-129.02
2.84	125.95	-131.51
2.85	121.84	-134.27
2.86	125.49	-130.48
2.87	126.71	-129.89
2.88	128.88	-128.12
2.89	131.04	-124.85
2.90	132.39	-122.66
2.91	124.83	-129.35
2.92	126.05	-128.01
2.93	126.89	-126.92
2.94	125.52	-128.13
2.95	125.40	-126.91
2.96	127.08	-124.59
2.97	124.78	-126.88
2.98	117.61	-133.09
2.99	126.19	-125.70
3.00	129.10	-123.30
3.01	124.98	-126.00
3.02	107.77	-142.25
3.03	126.29	-123.10
3.04	123.56	-126.32
3.05	125.25	-124.64
3.06	123.57	-125.19
3.07	121.16	-126.74
3.08	125.77	-123.33
3.09	126.61	-122.27
3.10	119.71	-128.60
3.11	122.89	-124.38
3.12	117.88	-128.72
3.13	115.56	-130.58
3.14	126.57	-119.45
3.15	123.65	-120.74
3.16	120.24	-123.46
3.17	122.43	-121.69
3.18	122.09	-121.17
3.19	122.81	-119.84
3.20	120.49	-122.80
3.21	119.67	-123.81
3.22	116.17	-126.39
3.23	119.19	-121.83
3.24	119.91	-121.63
3.25	116.88	-123.03
3.26	117.56	-122.39
3.27	118.21	-120.87
3.28	122.98	-116.80
3.29	118.81	-119.36
3.30	112.46	-125.82
3.31	117.50	-120.28
3.32	117.48	-120.03
3.33	118.80	-119.97
3.34	120.88	-117.28
3.35	120.84	-116.78
3.36	116.25	-120.74
3.37	115.12	-120.37
3.38	117.86	-117.97
3.39	117.57	-117.35
3.40	118.53	-115.30
3.41	113.96	-120.59
3.42	118.48	-115.84
3.43	112.05	-121.10
3.44	117.96	-114.83
3.45	117.03	-115.76
3.46	115.90	-117.00
3.47	113.78	-120.26
3.48	114.57	-119.16

3.49	112.78	-120.39
3.50	116.75	-115.35
3.51	112.78	-119.55
3.52	119.04	-113.12
3.53	112.55	-117.55
3.54	119.11	-111.55
3.55	108.66	-121.41
3.56	109.11	-120.72
3.57	114.18	-114.47
3.58	115.51	-113.01
3.59	119.69	-109.37
3.60	109.86	-118.92
3.61	113.45	-115.04
3.62	117.42	-108.75
3.63	116.02	-111.74
3.64	114.98	-110.19
3.65	107.35	-116.90
3.66	112.24	-111.42
3.67	118.37	-106.13
3.68	112.41	-112.18
3.69	111.66	-112.87
3.70	116.69	-108.24
3.71	114.91	-110.27
3.72	111.94	-112.01
3.73	116.29	-106.94
3.74	105.42	-117.98
3.75	113.15	-110.59
3.76	113.54	-109.26
3.77	108.71	-113.90
3.78	109.89	-112.71
3.79	104.05	-117.17
3.80	111.50	-109.10
3.81	105.85	-114.44
3.82	114.50	-106.21
3.83	112.46	-108.88
3.84	111.88	-108.30
3.85	106.88	-113.43
3.86	107.75	-112.69
3.87	107.99	-111.60
3.88	108.93	-109.26
3.89	107.86	-110.78
3.90	99.26	-118.30
3.91	102.57	-114.93
3.92	111.01	-106.30
3.93	105.27	-111.05
3.94	103.86	-111.56
3.95	114.18	-101.12
3.96	113.33	-101.82
3.97	107.26	-106.73
3.98	108.19	-105.36
3.99	110.36	-101.98
4.00	108.73	-104.66
4.01	97.86	-114.83
4.02	105.97	-105.25
4.03	101.15	-109.30
4.04	105.60	-105.20
4.05	106.63	-103.45
4.06	104.52	-104.66
4.07	103.43	-106.14
4.08	105.57	-103.23
4.09	101.26	-107.09
4.10	98.36	-108.62
4.11	106.21	-100.44
4.12	105.76	-99.89
4.13	100.38	-103.85
4.14	108.81	-97.02
4.15	106.19	-99.61
4.16	105.19	-100.67
4.17	97.78	-106.41
4.18	101.93	-103.42
4.19	97.31	-106.63

4.20	102.87	-102.45
4.21	101.58	-104.16
4.22	102.29	-100.69
4.23	98.41	-104.36
4.24	95.30	-106.30
4.25	102.25	-98.25
4.26	93.18	-105.87
4.27	99.45	-99.40
4.28	103.88	-95.21
4.29	96.81	-101.48
4.30	98.06	-99.93
4.31	98.23	-99.53
4.32	99.77	-97.58
4.33	99.78	-97.50
4.34	96.68	-100.47
4.35	98.12	-98.61
4.36	101.03	-96.34
4.37	90.29	-105.38
4.38	101.51	-94.42
4.39	99.19	-95.88
4.40	97.16	-97.09
4.41	100.94	-91.57
4.42	95.89	-96.70
4.43	94.36	-95.99
4.44	90.60	-98.40
4.45	93.26	-93.63
4.46	94.08	-92.80
4.47	88.99	-96.22
4.48	90.22	-92.82
4.49	93.02	-89.26
4.50	87.78	-92.19
4.51	87.85	-90.42
4.52	89.17	-87.20
4.53	86.66	-89.20
4.54	87.09	-87.92
4.55	86.86	-87.16
4.56	85.43	-86.56
4.57	84.45	-87.06
4.58	85.24	-84.67
4.59	86.10	-82.03
4.60	77.98	-89.54
4.61	81.17	-86.04
4.62	83.73	-83.00
4.63	83.69	-82.07
4.64	81.67	-82.45
4.65	77.39	-84.80
4.66	81.32	-80.36
4.67	74.52	-85.27
4.68	80.59	-78.38
4.69	79.71	-78.56
4.70	78.28	-78.64
4.71	80.22	-75.11
4.72	77.93	-76.37
4.73	76.23	-76.71
4.74	76.04	-75.74
4.75	74.23	-76.11
4.76	75.23	-73.25
4.77	74.44	-73.28
4.78	73.50	-73.48
4.79	69.92	-74.96
4.80	74.73	-70.41
4.81	71.46	-72.22
4.82	69.25	-73.01
4.83	70.44	-70.41
4.84	69.40	-70.35
4.85	69.02	-68.78
4.86	67.46	-69.39
4.87	67.56	-68.81
4.88	65.83	-68.73
4.89	64.76	-68.87
4.90	64.98	-67.62

4.91	67.63	-63.69
4.92	65.06	-65.58
4.93	63.38	-64.90
4.94	60.68	-67.28
4.95	64.57	-62.27
4.96	62.88	-62.82
4.97	64.63	-58.96
4.98	60.70	-62.36
4.99	59.66	-61.88
5.00	56.08	-65.40
5.01	58.67	-61.72
5.02	53.81	-66.01
5.03	59.12	-59.17
5.04	55.45	-60.41
5.05	53.01	-61.58
5.06	57.43	-57.01
5.07	55.39	-57.22
5.08	54.04	-57.86
5.09	55.92	-55.54
5.10	55.57	-55.50
5.11	54.06	-56.48
5.12	54.17	-55.33
5.13	53.49	-54.92
5.14	53.33	-54.02
5.15	52.45	-53.89
5.16	51.46	-53.95
5.17	51.77	-52.80
5.18	50.05	-53.65
5.19	51.80	-51.38
5.20	51.35	-51.48
5.21	50.73	-51.59
5.22	50.99	-50.40
5.23	49.59	-51.08
5.24	45.25	-54.70
5.25	48.64	-50.86
5.26	49.97	-49.28
5.27	49.79	-49.16
5.28	48.09	-50.07
5.29	47.05	-50.40
5.30	47.85	-49.35
5.31	47.83	-48.56
5.32	47.23	-48.32
5.33	45.86	-48.74
5.34	46.23	-48.16
5.35	46.44	-47.35
5.36	46.59	-46.68
5.37	46.08	-46.89
5.38	46.46	-46.11
5.39	46.16	-46.10
5.40	44.60	-47.19
5.41	44.60	-46.54
5.42	45.04	-45.39
5.43	44.30	-45.72
5.44	44.41	-44.90
5.45	44.04	-44.75
5.46	43.92	-44.47
5.47	42.86	-44.93
5.48	43.04	-44.23
5.49	42.10	-44.89
5.50	41.80	-44.60

THE MAXIMUM DISCHARGE FOR STRUCTURE 2 IS: 139.97 AT TIME: 1.12

INFLOW NODE: 24284 AND OUTFLOW NODE: 32459

0.01	0.00	0.00
0.02	0.00	0.00
0.03	0.00	0.00
0.04	0.00	0.00
0.05	0.00	0.00
0.06	0.00	0.00
0.07	0.00	0.00
0.08	0.00	0.00

0.09	0.00	0.00
0.10	0.00	0.00
0.11	0.00	0.00
0.12	0.00	0.00
0.13	0.00	0.00
0.14	0.00	0.00
0.15	0.00	0.00
0.16	0.00	0.00
0.17	0.00	0.00
0.18	0.00	0.00
0.19	0.00	0.00
0.20	0.00	0.00
0.21	0.00	0.00
0.22	0.00	0.00
0.23	0.00	0.00
0.24	0.00	0.00
0.25	0.00	0.00
0.26	0.00	0.00
0.27	0.00	0.00
0.28	0.00	0.00
0.29	0.00	0.00
0.30	0.00	0.00
0.31	0.00	0.00
0.32	0.00	0.00
0.33	0.00	0.00
0.34	0.00	0.00
0.35	0.00	0.00
0.36	0.00	0.00
0.37	0.00	0.00
0.38	0.00	0.00
0.39	0.00	0.00
0.40	0.00	0.00
0.41	0.00	0.00
0.42	0.00	0.00
0.43	0.00	0.00
0.44	0.00	0.00
0.45	0.00	0.00
0.46	0.00	0.00
0.47	0.00	0.00
0.48	0.00	0.00
0.49	0.00	0.00
0.50	0.00	0.00
0.51	0.00	0.00
0.52	0.00	0.00
0.53	0.00	0.00
0.54	0.00	0.00
0.55	0.00	0.00
0.56	0.00	0.00
0.57	0.00	0.00
0.58	0.00	0.00
0.59	0.00	0.00
0.60	0.00	0.00
0.61	0.00	0.00
0.62	0.00	0.00
0.63	0.00	0.00
0.64	0.00	0.00
0.65	0.00	0.00
0.66	0.00	0.00
0.67	0.00	0.00
0.68	0.00	0.00
0.69	0.00	0.00
0.70	0.00	0.00
0.71	0.00	0.00
0.72	0.00	0.00
0.73	0.00	0.00
0.74	0.00	0.00
0.75	0.00	0.00
0.76	0.00	0.00
0.77	0.00	0.00
0.78	0.00	0.00
0.79	0.00	0.00

0.80	0.00	0.00
0.81	0.00	0.00
0.82	0.00	0.00
0.83	0.00	0.00
0.84	0.00	0.00
0.85	0.00	0.00
0.86	0.00	0.00
0.87	0.00	0.00
0.88	0.00	0.00
0.89	0.00	0.00
0.90	47.57	-0.02
0.91	90.53	-11.41
0.92	111.10	-56.99
0.93	122.60	-86.82
0.94	126.22	-105.75
0.95	125.42	-116.61
0.96	128.31	-120.44
0.97	128.13	-124.23
0.98	130.36	-125.21
0.99	128.26	-130.51
1.00	129.43	-130.27
1.01	132.32	-129.17
1.02	129.92	-132.05
1.03	135.66	-128.54
1.04	134.02	-132.54
1.05	133.35	-134.43
1.06	134.73	-134.54
1.07	135.33	-135.20
1.08	138.55	-133.76
1.09	136.15	-136.95
1.10	136.69	-135.92
1.11	137.86	-136.02
1.12	137.96	-137.58
1.13	137.84	-136.44
1.14	135.53	-137.73
1.15	137.44	-135.89
1.16	138.76	-134.45
1.17	131.80	-141.03
1.18	137.59	-134.72
1.19	137.18	-135.51
1.20	135.25	-136.33
1.21	136.34	-134.92
1.22	134.27	-136.50
1.23	134.94	-135.51
1.24	135.09	-135.14
1.25	132.48	-136.27
1.26	133.06	-134.77
1.27	130.70	-136.57
1.28	130.73	-135.12
1.29	132.63	-132.94
1.30	128.79	-136.24
1.31	132.35	-132.04
1.32	132.09	-131.95
1.33	131.65	-131.62
1.34	130.20	-132.40
1.35	131.53	-130.77
1.36	130.07	-131.60
1.37	130.56	-130.89
1.38	130.80	-130.14
1.39	130.57	-129.63
1.40	131.50	-128.48
1.41	128.40	-130.82
1.42	131.02	-128.61
1.43	127.76	-131.29
1.44	130.19	-128.14
1.45	128.38	-129.74
1.46	128.28	-129.06
1.47	129.27	-127.58
1.48	129.38	-127.11
1.49	127.24	-128.62
1.50	128.34	-127.22

1.51	130.23	-125.25
1.52	125.99	-129.64
1.53	126.72	-128.81
1.54	126.73	-128.72
1.55	125.19	-129.71
1.56	127.22	-126.53
1.57	124.70	-128.27
1.58	127.76	-125.38
1.59	124.46	-128.25
1.60	125.74	-126.93
1.61	127.38	-124.92
1.62	124.83	-128.45
1.63	126.33	-124.65
1.64	126.29	-124.97
1.65	126.05	-124.04
1.66	126.50	-123.87
1.67	119.19	-130.25
1.68	127.64	-121.54
1.69	125.42	-123.19
1.70	125.74	-122.94
1.71	123.38	-124.08
1.72	124.50	-122.50
1.73	125.79	-121.47
1.74	116.03	-129.60
1.75	122.40	-121.90
1.76	119.98	-124.39
1.77	122.66	-120.14
1.78	124.43	-118.00
1.79	119.38	-121.70
1.80	121.04	-120.29
1.81	120.72	-120.59
1.82	118.29	-121.94
1.83	119.46	-120.40
1.84	120.74	-117.87
1.85	114.68	-122.96
1.86	116.18	-121.86
1.87	116.75	-118.96
1.88	117.74	-117.02
1.89	118.85	-115.53
1.90	112.88	-119.92
1.91	117.06	-115.96
1.92	117.40	-114.96
1.93	114.47	-117.06
1.94	116.02	-114.56
1.95	115.23	-114.54
1.96	112.63	-116.42
1.97	114.19	-112.72
1.98	115.99	-110.56
1.99	108.15	-115.48
2.00	112.53	-110.45
2.01	111.56	-109.12
2.02	111.12	-109.64
2.03	107.12	-111.86
2.04	102.65	-113.32
2.05	106.46	-108.46
2.06	106.02	-109.09
2.07	106.42	-107.95
2.08	105.10	-108.10
2.09	105.94	-105.22
2.10	101.55	-108.02
2.11	101.61	-107.33
2.12	102.82	-106.44
2.13	102.52	-106.36
2.14	103.53	-103.55
2.15	104.77	-101.01
2.16	102.80	-101.97
2.17	98.50	-105.71
2.18	101.18	-102.12
2.19	102.12	-100.04
2.20	93.43	-106.23
2.21	100.21	-98.46

2.22	98.60	-99.77
2.23	99.27	-98.51
2.24	98.03	-98.66
2.25	95.01	-101.36
2.26	97.07	-98.89
2.27	101.38	-94.99
2.28	101.02	-94.77
2.29	97.84	-96.91
2.30	92.66	-100.96
2.31	91.62	-98.89
2.32	95.80	-94.76
2.33	94.60	-95.76
2.34	97.40	-92.00
2.35	97.22	-90.84
2.36	92.07	-96.54
2.37	98.23	-89.69
2.38	91.43	-96.57
2.39	87.44	-100.18
2.40	91.52	-94.83
2.41	93.00	-91.95
2.42	94.52	-90.61
2.43	93.05	-90.36
2.44	89.67	-94.24
2.45	93.65	-90.42
2.46	92.77	-90.40
2.47	90.32	-92.79
2.48	88.35	-94.06
2.49	85.65	-94.90
2.50	86.46	-93.72
2.51	92.31	-88.28
2.52	86.48	-93.96
2.53	92.24	-87.98
2.54	91.28	-89.65
2.55	93.05	-88.09
2.56	89.33	-89.75
2.57	87.40	-90.64
2.58	89.61	-89.57
2.59	89.51	-87.99
2.60	87.18	-90.37
2.61	84.95	-90.52
2.62	86.64	-89.61
2.63	87.88	-86.74
2.64	93.28	-81.26
2.65	85.18	-88.14
2.66	82.87	-89.62
2.67	89.60	-81.97
2.68	85.97	-84.58
2.69	82.70	-88.34
2.70	91.63	-80.31
2.71	87.80	-83.18
2.72	83.92	-85.99
2.73	87.64	-82.62
2.74	84.56	-83.79
2.75	82.67	-85.55
2.76	82.60	-83.88
2.77	78.90	-86.66
2.78	83.86	-82.71
2.79	87.76	-79.03
2.80	81.06	-84.45
2.81	84.10	-81.29
2.82	79.11	-84.45
2.83	85.46	-78.95
2.84	81.61	-82.16
2.85	78.37	-83.64
2.86	79.88	-81.82
2.87	82.92	-78.49
2.88	77.21	-85.55
2.89	79.36	-81.95
2.90	84.39	-75.44
2.91	80.28	-79.55
2.92	77.45	-82.39

2.93	79.28	-79.63
2.94	78.45	-80.07
2.95	76.36	-80.26
2.96	79.59	-75.89
2.97	78.09	-78.00
2.98	72.47	-83.31
2.99	77.99	-78.36
3.00	75.20	-81.44
3.01	77.19	-78.10
3.02	73.14	-81.66
3.03	77.33	-76.30
3.04	74.84	-79.37
3.05	78.26	-75.62
3.06	77.88	-75.14
3.07	73.67	-78.62
3.08	76.95	-76.54
3.09	78.22	-75.50
3.10	76.28	-76.83
3.11	73.63	-78.22
3.12	73.92	-76.68
3.13	77.83	-72.79
3.14	79.08	-70.77
3.15	73.60	-75.39
3.16	73.51	-74.87
3.17	75.14	-73.92
3.18	76.23	-71.63
3.19	71.12	-76.64
3.20	75.84	-72.63
3.21	71.46	-76.50
3.22	69.44	-77.85
3.23	73.86	-72.66
3.24	72.63	-74.14
3.25	70.83	-74.31
3.26	72.29	-72.66
3.27	73.24	-71.20
3.28	72.91	-71.61
3.29	69.76	-73.70
3.30	72.73	-70.74
3.31	70.96	-72.09
3.32	71.45	-70.83
3.33	70.46	-72.77
3.34	73.70	-69.45
3.35	75.25	-68.07
3.36	71.25	-71.04
3.37	68.49	-72.18
3.38	72.82	-68.38
3.39	70.52	-69.87
3.40	69.75	-69.98
3.41	72.00	-68.70
3.42	68.81	-71.29
3.43	64.92	-73.96
3.44	71.09	-67.56
3.45	70.70	-67.99
3.46	69.97	-68.40
3.47	65.15	-74.26
3.48	62.28	-76.60
3.49	66.90	-71.71
3.50	65.57	-72.03
3.51	63.18	-74.76
3.52	67.49	-69.71
3.53	63.84	-71.72
3.54	72.38	-63.66
3.55	66.65	-69.63
3.56	65.50	-70.59
3.57	70.02	-64.48
3.58	68.17	-66.15
3.59	72.91	-61.52
3.60	61.91	-72.39
3.61	69.76	-64.13
3.62	72.96	-58.88
3.63	69.08	-63.76

3.64	67.32	-63.29
3.65	55.31	-74.47
3.66	63.08	-66.29
3.67	70.78	-58.52
3.68	63.73	-66.58
3.69	64.58	-65.45
3.70	66.42	-63.81
3.71	65.33	-65.33
3.72	61.93	-67.79
3.73	66.58	-62.23
3.74	64.88	-64.32
3.75	66.68	-62.77
3.76	65.19	-63.26
3.77	59.94	-68.60
3.78	63.22	-65.45
3.79	63.17	-64.92
3.80	65.77	-60.87
3.81	59.51	-66.98
3.82	63.07	-63.88
3.83	64.93	-62.76
3.84	66.45	-59.77
3.85	60.10	-65.84
3.86	61.76	-64.29
3.87	62.55	-62.76
3.88	62.74	-61.27
3.89	65.02	-59.71
3.90	58.25	-65.22
3.91	55.36	-67.49
3.92	63.78	-59.21
3.93	58.83	-63.54
3.94	62.57	-59.38
3.95	59.86	-61.92
3.96	64.55	-56.75
3.97	60.83	-58.89
3.98	56.88	-62.18
3.99	63.73	-54.81
4.00	61.93	-57.35
4.01	55.79	-63.56
4.02	57.24	-60.47
4.03	54.96	-62.72
4.04	57.74	-59.48
4.05	57.78	-59.02
4.06	57.77	-58.23
4.07	57.38	-58.65
4.08	57.73	-57.48
4.09	53.72	-61.69
4.10	55.76	-58.31
4.11	57.62	-55.72
4.12	59.26	-53.83
4.13	55.34	-56.86
4.14	59.54	-53.83
4.15	55.95	-56.85
4.16	56.90	-56.13
4.17	54.30	-57.62
4.18	53.62	-58.90
4.19	53.39	-58.56
4.20	56.32	-56.78
4.21	54.60	-58.51
4.22	54.64	-56.81
4.23	52.55	-58.41
4.24	51.55	-58.61
4.25	54.67	-54.75
4.26	51.62	-57.11
4.27	52.51	-55.71
4.28	55.20	-52.97
4.29	53.24	-54.67
4.30	52.43	-55.18
4.31	53.22	-54.31
4.32	53.76	-53.44
4.33	53.93	-53.02
4.34	51.22	-55.72

4.35	53.93	-52.80
4.36	54.25	-52.56
4.37	48.68	-57.46
4.38	53.55	-52.50
4.39	53.90	-51.80
4.40	51.74	-53.47
4.41	54.18	-50.36
4.42	52.19	-52.20
4.43	50.81	-52.79
4.44	49.00	-54.07
4.45	49.30	-52.78
4.46	51.05	-50.77
4.47	47.92	-52.99
4.48	48.97	-50.96
4.49	50.31	-49.14
4.50	48.29	-50.13
4.51	47.99	-49.53
4.52	48.50	-48.02
4.53	47.52	-48.69
4.54	48.31	-47.46
4.55	47.93	-47.32
4.56	46.35	-48.00
4.57	46.58	-47.41
4.58	46.43	-46.65
4.59	46.90	-45.30
4.60	43.05	-48.67
4.61	43.80	-47.49
4.62	45.72	-45.10
4.63	45.44	-44.98
4.64	44.68	-45.10
4.65	41.84	-47.05
4.66	44.82	-43.64
4.67	41.18	-46.35
4.68	43.36	-43.66
4.69	43.21	-43.46
4.70	40.36	-45.51
4.71	43.25	-41.94
4.72	41.84	-42.83
4.73	41.51	-42.69
4.74	41.74	-41.80
4.75	40.99	-41.80
4.76	40.61	-41.23
4.77	40.90	-40.29
4.78	40.50	-40.15
4.79	38.01	-41.68
4.80	40.34	-39.19
4.81	39.18	-39.70
4.82	38.38	-39.95
4.83	38.71	-38.78
4.84	38.12	-38.68
4.85	38.07	-37.76
4.86	37.48	-37.87
4.87	36.39	-38.51
4.88	35.40	-38.72
4.89	34.93	-38.66
4.90	35.35	-37.27
4.91	35.91	-36.13
4.92	35.85	-35.94
4.93	34.63	-35.93
4.94	32.02	-38.19
4.95	35.09	-34.49
4.96	34.45	-34.51
4.97	35.64	-32.43
4.98	32.56	-35.12
4.99	32.86	-34.12
5.00	31.80	-34.99
5.01	32.45	-33.79
5.02	29.44	-36.28
5.03	32.17	-32.74
5.04	30.15	-33.60
5.05	27.31	-35.60

5.06	31.27	-31.30
5.07	29.60	-32.03
5.08	25.47	-35.48
5.09	30.06	-30.31
5.10	30.19	-30.05
5.11	29.40	-30.31
5.12	29.48	-29.33
5.13	28.32	-29.44
5.14	27.33	-29.38
5.15	27.22	-28.58
5.16	26.68	-28.20
5.17	26.90	-27.19
5.18	24.81	-28.63
5.19	26.41	-26.39
5.20	26.11	-26.26
5.21	25.62	-26.22
5.22	25.94	-24.88
5.23	25.21	-24.86
5.24	21.55	-28.02
5.25	23.20	-25.75
5.26	24.55	-24.07
5.27	24.31	-23.96
5.28	23.19	-24.36
5.29	21.82	-25.03
5.30	22.57	-24.14
5.31	23.17	-22.72
5.32	22.32	-22.72
5.33	20.56	-23.50
5.34	21.25	-22.56
5.35	20.62	-22.48
5.36	21.42	-21.22
5.37	20.88	-21.50
5.38	21.34	-20.55
5.39	20.22	-21.44
5.40	19.66	-21.61
5.41	19.89	-20.68
5.42	19.74	-20.06
5.43	18.38	-20.95
5.44	19.11	-19.46
5.45	18.81	-19.25
5.46	18.29	-19.46
5.47	18.17	-18.92
5.48	17.71	-18.84
5.49	16.87	-19.47
5.50	17.04	-18.71

THE MAXIMUM DISCHARGE FOR STRUCTURE 3 IS: 318.01 AT TIME: 1.12

INFLOW NODE: 19245	AND OUTFLOW NODE: 19856
0.01	0.00	0.00
0.02	0.00	0.00
0.03	0.00	0.00
0.04	0.00	0.00
0.05	0.00	0.00
0.06	0.00	0.00
0.07	0.00	0.00
0.08	0.00	0.00
0.09	0.00	0.00
0.10	0.00	0.00
0.11	0.00	0.00
0.12	0.00	0.00
0.13	0.00	0.00
0.14	0.00	0.00
0.15	0.00	0.00
0.16	0.00	0.00
0.17	0.00	0.00
0.18	0.00	0.00
0.19	0.00	0.00
0.20	0.00	0.00
0.21	0.00	0.00
0.22	0.00	0.00
0.23	0.00	0.00

0.24	0.00	0.00
0.25	0.00	0.00
0.26	0.00	0.00
0.27	0.00	0.00
0.28	0.00	0.00
0.29	0.00	0.00
0.30	0.00	0.00
0.31	0.00	0.00
0.32	0.00	0.00
0.33	0.00	0.00
0.34	0.00	0.00
0.35	0.00	0.00
0.36	0.00	0.00
0.37	0.00	0.00
0.38	0.00	0.00
0.39	0.00	0.00
0.40	0.00	0.00
0.41	0.00	0.00
0.42	0.00	0.00
0.43	0.00	0.00
0.44	0.00	0.00
0.45	0.00	0.00
0.46	0.00	0.00
0.47	0.00	0.00
0.48	0.00	0.00
0.49	0.00	0.00
0.50	0.00	0.00
0.51	0.00	0.00
0.52	0.00	0.00
0.53	0.00	0.00
0.54	0.00	0.00
0.55	0.00	0.00
0.56	0.00	0.00
0.57	0.00	0.00
0.58	0.00	0.00
0.59	0.00	0.00
0.60	0.00	0.00
0.61	0.00	0.00
0.62	24.53	-24.53
0.63	68.13	-68.13
0.64	80.83	-80.83
0.65	87.21	-87.21
0.66	119.64	-119.64
0.67	134.73	-134.73
0.68	131.32	-131.32
0.69	133.82	-133.82
0.70	144.56	-144.56
0.71	-189.20	189.20
0.72	108.55	-108.55
0.73	84.43	-84.43
0.74	-167.19	167.19
0.75	101.63	-101.63
0.76	90.23	-90.23
0.77	96.08	-96.08
0.78	99.69	-99.69
0.79	139.46	-139.46
0.80	151.91	-151.91
0.81	155.27	-155.27
0.82	150.82	-150.82
0.83	165.70	-165.70
0.84	162.74	-162.74
0.85	150.72	-150.72
0.86	153.64	-153.64
0.87	166.62	-166.62
0.88	156.79	-156.79
0.89	157.62	-157.62
0.90	142.11	-142.11
0.91	143.40	-143.40
0.92	155.05	-155.05
0.93	194.72	-194.72
0.94	220.40	-220.40

0.95	250.63	-250.63
0.96	261.64	-261.64
0.97	269.08	-269.08
0.98	275.95	-275.95
0.99	280.59	-280.59
1.00	286.40	-286.40
1.01	294.50	-294.50
1.02	301.58	-301.58
1.03	306.34	-306.34
1.04	306.57	-306.57
1.05	309.26	-309.26
1.06	312.50	-312.50
1.07	314.40	-314.40
1.08	314.64	-314.64
1.09	314.77	-314.77
1.10	316.36	-316.36
1.11	315.52	-315.52
1.12	315.50	-315.50
1.13	315.39	-315.39
1.14	312.56	-312.56
1.15	313.71	-313.71
1.16	312.28	-312.28
1.17	309.17	-309.17
1.18	307.78	-307.78
1.19	309.18	-309.18
1.20	306.74	-306.74
1.21	306.58	-306.58
1.22	302.66	-302.66
1.23	300.35	-300.35
1.24	298.81	-298.81
1.25	297.83	-297.83
1.26	296.78	-296.78
1.27	295.02	-295.02
1.28	291.77	-291.77
1.29	291.03	-291.03
1.30	288.75	-288.75
1.31	285.85	-285.85
1.32	284.17	-284.17
1.33	283.26	-283.26
1.34	282.07	-282.07
1.35	281.15	-281.15
1.36	279.38	-279.38
1.37	276.76	-276.76
1.38	275.55	-275.55
1.39	274.19	-274.19
1.40	273.37	-273.37
1.41	268.51	-268.51
1.42	269.94	-269.94
1.43	269.28	-269.28
1.44	268.62	-268.62
1.45	266.23	-266.23
1.46	265.14	-265.14
1.47	263.89	-263.89
1.48	263.32	-263.32
1.49	261.81	-261.81
1.50	260.70	-260.70
1.51	259.91	-259.91
1.52	257.85	-257.85
1.53	255.45	-255.45
1.54	254.01	-254.01
1.55	250.43	-250.43
1.56	249.05	-249.05
1.57	248.57	-248.57
1.58	245.79	-245.79
1.59	245.45	-245.45
1.60	243.30	-243.30
1.61	239.96	-239.96
1.62	240.86	-240.86
1.63	237.01	-237.01
1.64	236.25	-236.25
1.65	232.11	-232.11

1.66	231.85	-231.85
1.67	224.15	-224.15
1.68	223.71	-223.71
1.69	222.05	-222.05
1.70	218.11	-218.11
1.71	214.17	-214.17
1.72	211.04	-211.04
1.73	208.12	-208.12
1.74	203.88	-203.88
1.75	199.65	-199.65
1.76	194.57	-194.57
1.77	191.08	-191.08
1.78	185.07	-185.07
1.79	180.55	-180.55
1.80	174.81	-174.81
1.81	167.66	-167.66
1.82	159.42	-159.42
1.83	161.10	-161.10
1.84	163.23	-163.23
1.85	165.92	-165.92
1.86	183.42	-183.42
1.87	161.26	-161.26
1.88	150.87	-150.87
1.89	159.91	-159.91
1.90	150.55	-150.55
1.91	149.84	-149.84
1.92	176.03	-176.03
1.93	143.83	-143.83
1.94	141.64	-141.64
1.95	151.69	-151.69
1.96	-193.99	193.99
1.97	136.34	-136.34
1.98	-205.26	205.26
1.99	118.29	-118.29
2.00	101.10	-101.10
2.01	74.95	-74.95
2.02	95.89	-95.89
2.03	67.23	-67.23
2.04	68.20	-68.20
2.05	59.34	-59.34
2.06	83.20	-83.20
2.07	58.83	-58.83
2.08	49.66	-49.66
2.09	46.94	-46.94
2.10	44.54	-44.54
2.11	42.14	-42.14
2.12	39.54	-39.54
2.13	38.48	-38.48
2.14	37.37	-37.37
2.15	36.28	-36.28
2.16	35.32	-35.32
2.17	34.10	-34.10
2.18	32.35	-32.35
2.19	31.44	-31.44
2.20	30.94	-30.94
2.21	30.18	-30.18
2.22	29.01	-29.01
2.23	28.21	-28.21
2.24	27.49	-27.49
2.25	26.71	-26.71
2.26	25.87	-25.87
2.27	26.26	-26.26
2.28	24.78	-24.78
2.29	24.81	-24.81
2.30	24.30	-24.30
2.31	24.03	-24.03
2.32	23.75	-23.75
2.33	22.96	-22.96
2.34	22.54	-22.54
2.35	21.66	-21.66
2.36	21.85	-21.85

2.37	21.86	-21.86
2.38	21.55	-21.55
2.39	21.10	-21.10
2.40	20.53	-20.53
2.41	20.42	-20.42
2.42	20.01	-20.01
2.43	19.62	-19.62
2.44	19.16	-19.16
2.45	18.87	-18.87
2.46	18.90	-18.90
2.47	18.33	-18.33
2.48	18.50	-18.50
2.49	18.19	-18.19
2.50	18.17	-18.17
2.51	17.51	-17.51
2.52	16.56	-16.56
2.53	17.04	-17.04
2.54	16.70	-16.70
2.55	16.11	-16.11
2.56	16.05	-16.05
2.57	15.72	-15.72
2.58	15.25	-15.25
2.59	15.36	-15.36
2.60	15.02	-15.02
2.61	14.35	-14.35
2.62	14.44	-14.44
2.63	14.12	-14.12
2.64	14.24	-14.24
2.65	13.78	-13.78
2.66	13.68	-13.68
2.67	13.49	-13.49
2.68	13.26	-13.26
2.69	13.01	-13.01
2.70	12.73	-12.73
2.71	13.06	-13.06
2.72	12.60	-12.60
2.73	12.31	-12.31
2.74	12.44	-12.44
2.75	12.08	-12.08
2.76	11.91	-11.91
2.77	11.99	-11.99
2.78	11.91	-11.91
2.79	11.61	-11.61
2.80	11.25	-11.25
2.81	11.06	-11.06
2.82	10.25	-10.25
2.83	10.53	-10.53
2.84	10.41	-10.41
2.85	10.59	-10.59
2.86	10.15	-10.15
2.87	10.11	-10.11
2.88	10.12	-10.12
2.89	9.98	-9.98
2.90	10.00	-10.00
2.91	9.85	-9.85
2.92	9.72	-9.72
2.93	9.37	-9.37
2.94	9.61	-9.61
2.95	9.68	-9.68
2.96	9.56	-9.56
2.97	9.43	-9.43
2.98	9.48	-9.48
2.99	9.59	-9.59
3.00	9.38	-9.38
3.01	9.61	-9.61
3.02	9.17	-9.17
3.03	9.63	-9.63
3.04	9.31	-9.31
3.05	9.27	-9.27
3.06	8.87	-8.87
3.07	8.97	-8.97

3.08	9.07	-9.07
3.09	8.30	-8.30
3.10	8.90	-8.90
3.11	8.87	-8.87
3.12	8.75	-8.75
3.13	8.69	-8.69
3.14	8.71	-8.71
3.15	8.76	-8.76
3.16	8.86	-8.86
3.17	8.73	-8.73
3.18	8.59	-8.59
3.19	8.13	-8.13
3.20	8.57	-8.57
3.21	8.55	-8.55
3.22	8.66	-8.66
3.23	7.92	-7.92
3.24	8.14	-8.14
3.25	8.13	-8.13
3.26	8.12	-8.12
3.27	8.00	-8.00
3.28	7.94	-7.94
3.29	7.83	-7.83
3.30	7.85	-7.85
3.31	7.83	-7.83
3.32	7.96	-7.96
3.33	7.79	-7.79
3.34	7.75	-7.75
3.35	7.37	-7.37
3.36	7.68	-7.68
3.37	7.86	-7.86
3.38	7.65	-7.65
3.39	7.75	-7.75
3.40	7.55	-7.55
3.41	7.84	-7.84
3.42	7.49	-7.49
3.43	7.56	-7.56
3.44	7.41	-7.41
3.45	7.37	-7.37
3.46	7.25	-7.25
3.47	7.16	-7.16
3.48	7.20	-7.20
3.49	7.28	-7.28
3.50	7.17	-7.17
3.51	7.31	-7.31
3.52	7.09	-7.09
3.53	6.93	-6.93
3.54	6.82	-6.82
3.55	6.85	-6.85
3.56	6.88	-6.88
3.57	6.62	-6.62
3.58	6.52	-6.52
3.59	6.70	-6.70
3.60	6.51	-6.51
3.61	6.64	-6.64
3.62	6.45	-6.45
3.63	5.34	-5.34
3.64	6.53	-6.53
3.65	6.29	-6.29
3.66	6.48	-6.48
3.67	6.10	-6.10
3.68	6.44	-6.44
3.69	6.43	-6.43
3.70	6.15	-6.15
3.71	6.38	-6.38
3.72	6.48	-6.48
3.73	6.36	-6.36
3.74	6.39	-6.39
3.75	6.22	-6.22
3.76	6.39	-6.39
3.77	6.22	-6.22
3.78	6.03	-6.03

3.79	6.20	-6.20
3.80	6.47	-6.47
3.81	6.02	-6.02
3.82	6.25	-6.25
3.83	6.10	-6.10
3.84	6.25	-6.25
3.85	6.14	-6.14
3.86	6.42	-6.42
3.87	6.01	-6.01
3.88	6.20	-6.20
3.89	6.04	-6.04
3.90	6.26	-6.26
3.91	6.02	-6.02
3.92	5.65	-5.65
3.93	6.00	-6.00
3.94	5.89	-5.89
3.95	5.58	-5.58
3.96	5.46	-5.46
3.97	5.66	-5.66
3.98	5.27	-5.27
3.99	5.16	-5.16
4.00	5.38	-5.38
4.01	5.39	-5.39
4.02	5.20	-5.20
4.03	4.95	-4.95
4.04	4.89	-4.89
4.05	4.50	-4.50
4.06	4.79	-4.79
4.07	4.64	-4.64
4.08	4.56	-4.56
4.09	4.49	-4.49
4.10	4.48	-4.48
4.11	4.47	-4.47
4.12	4.43	-4.43
4.13	4.44	-4.44
4.14	4.41	-4.41
4.15	4.35	-4.35
4.16	4.33	-4.33
4.17	4.28	-4.28
4.18	4.23	-4.23
4.19	4.20	-4.20
4.20	4.07	-4.07
4.21	4.10	-4.10
4.22	4.05	-4.05
4.23	4.01	-4.01
4.24	3.95	-3.95
4.25	3.89	-3.89
4.26	3.81	-3.81
4.27	3.77	-3.77
4.28	3.71	-3.71
4.29	3.68	-3.68
4.30	3.63	-3.63
4.31	3.57	-3.57
4.32	3.53	-3.53
4.33	3.47	-3.47
4.34	3.42	-3.42
4.35	3.35	-3.35
4.36	3.28	-3.28
4.37	3.21	-3.21
4.38	3.12	-3.12
4.39	3.07	-3.07
4.40	2.98	-2.98
4.41	2.92	-2.92
4.42	2.85	-2.85
4.43	2.79	-2.79
4.44	2.72	-2.72
4.45	2.67	-2.67
4.46	2.62	-2.62
4.47	2.57	-2.57
4.48	2.51	-2.51
4.49	2.46	-2.46

4.50	2.42	-2.42
4.51	2.38	-2.38
4.52	2.30	-2.30
4.53	2.30	-2.30
4.54	2.25	-2.25
4.55	2.21	-2.21
4.56	2.18	-2.18
4.57	2.14	-2.14
4.58	2.11	-2.11
4.59	2.07	-2.07
4.60	2.02	-2.02
4.61	2.00	-2.00
4.62	1.96	-1.96
4.63	1.94	-1.94
4.64	1.91	-1.91
4.65	1.87	-1.87
4.66	1.83	-1.83
4.67	1.80	-1.80
4.68	1.75	-1.75
4.69	1.71	-1.71
4.70	1.68	-1.68
4.71	1.64	-1.64
4.72	1.60	-1.60
4.73	1.57	-1.57
4.74	1.54	-1.54
4.75	1.51	-1.51
4.76	1.48	-1.48
4.77	1.45	-1.45
4.78	1.42	-1.42
4.79	1.41	-1.41
4.80	1.39	-1.39
4.81	1.37	-1.37
4.82	1.36	-1.36
4.83	1.34	-1.34
4.84	1.32	-1.32
4.85	1.29	-1.29
4.86	1.27	-1.27
4.87	1.25	-1.25
4.88	1.23	-1.23
4.89	1.22	-1.22
4.90	1.21	-1.21
4.91	1.20	-1.20
4.92	1.18	-1.18
4.93	1.17	-1.17
4.94	1.16	-1.16
4.95	1.15	-1.15
4.96	1.14	-1.14
4.97	1.12	-1.12
4.98	1.11	-1.11
4.99	1.10	-1.10
5.00	1.08	-1.08
5.01	1.08	-1.08
5.02	1.07	-1.07
5.03	1.05	-1.05
5.04	1.04	-1.04
5.05	1.03	-1.03
5.06	1.02	-1.02
5.07	1.01	-1.01
5.08	1.00	-1.00
5.09	0.98	-0.98
5.10	0.97	-0.97
5.11	0.96	-0.96
5.12	0.95	-0.95
5.13	0.94	-0.94
5.14	0.93	-0.93
5.15	0.92	-0.92
5.16	0.90	-0.90
5.17	0.89	-0.89
5.18	0.87	-0.87
5.19	0.85	-0.85
5.20	0.84	-0.84

5.21	0.79	-0.79
5.22	0.79	-0.79
5.23	0.77	-0.77
5.24	0.77	-0.77
5.25	0.76	-0.76
5.26	0.75	-0.75
5.27	0.73	-0.73
5.28	0.72	-0.72
5.29	0.71	-0.71
5.30	0.70	-0.70
5.31	0.68	-0.68
5.32	0.67	-0.67
5.33	0.65	-0.65
5.34	0.62	-0.62
5.35	0.61	-0.61
5.36	0.61	-0.61
5.37	0.61	-0.61
5.38	0.60	-0.60
5.39	0.58	-0.58
5.40	0.55	-0.55
5.41	0.53	-0.53
5.42	0.53	-0.53
5.43	0.51	-0.51
5.44	0.47	-0.47
5.45	0.45	-0.45
5.46	0.00	0.00
5.47	0.46	-0.46
5.48	0.45	-0.45
5.49	0.46	-0.46
5.50	0.45	-0.45

THE MAXIMUM DISCHARGE FOR STRUCTURE 4 IS: 787.63 AT TIME: 1.13
INFLOW NODE: 26480 AND OUTFLOW NODE: 29601

0.01	0.00	0.00
0.02	0.00	0.00
0.03	0.00	0.00
0.04	0.00	0.00
0.05	0.00	0.00
0.06	0.00	0.00
0.07	0.00	0.00
0.08	0.00	0.00
0.09	0.00	0.00
0.10	0.00	0.00
0.11	0.00	0.00
0.12	0.00	0.00
0.13	0.00	0.00
0.14	0.00	0.00
0.15	0.00	0.00
0.16	0.00	0.00
0.17	0.00	0.00
0.18	0.00	0.00
0.19	0.00	0.00
0.20	0.00	0.00
0.21	0.00	0.00
0.22	0.00	0.00
0.23	0.00	0.00
0.24	0.00	0.00
0.25	0.00	0.00
0.26	0.00	0.00
0.27	0.00	0.00
0.28	0.00	0.00
0.29	0.00	0.00
0.30	0.00	0.00
0.31	0.00	0.00
0.32	0.00	0.00
0.33	0.00	0.00
0.34	0.00	0.00
0.35	0.00	0.00
0.36	0.00	0.00
0.37	0.00	0.00
0.38	0.00	0.00

0.39	0.00	0.00
0.40	0.00	0.00
0.41	0.00	0.00
0.42	0.00	0.00
0.43	0.00	0.00
0.44	0.00	0.00
0.45	0.00	0.00
0.46	0.00	0.00
0.47	0.00	0.00
0.48	0.00	0.00
0.49	0.00	0.00
0.50	0.00	0.00
0.51	0.00	0.00
0.52	0.00	0.00
0.53	0.00	0.00
0.54	0.00	0.00
0.55	0.00	0.00
0.56	0.00	0.00
0.57	0.00	0.00
0.58	0.00	0.00
0.59	0.00	0.00
0.60	0.00	0.00
0.61	0.00	0.00
0.62	0.00	0.00
0.63	0.00	0.00
0.64	0.00	0.00
0.65	0.00	0.00
0.66	0.00	0.00
0.67	0.00	0.00
0.68	0.00	0.00
0.69	0.00	0.00
0.70	0.00	0.00
0.71	0.00	0.00
0.72	11.34	-11.34
0.73	35.61	-35.61
0.74	47.63	-47.63
0.75	59.72	-59.72
0.76	65.67	-65.67
0.77	69.21	-69.21
0.78	70.33	-70.33
0.79	69.51	-69.51
0.80	66.60	-66.60
0.81	72.45	-72.45
0.82	72.92	-72.92
0.83	85.54	-85.54
0.84	94.78	-94.78
0.85	100.11	-100.11
0.86	113.28	-113.28
0.87	117.93	-117.93
0.88	117.77	-117.77
0.89	117.36	-117.36
0.90	117.42	-117.42
0.91	117.82	-117.82
0.92	109.06	-109.06
0.93	109.69	-109.69
0.94	112.91	-112.91
0.95	129.30	-129.30
0.96	162.26	-162.26
0.97	297.16	-297.16
0.98	485.11	-485.11
0.99	592.43	-592.43
1.00	631.71	-631.71
1.01	664.57	-664.57
1.02	684.60	-684.60
1.03	726.39	-726.39
1.04	748.34	-748.34
1.05	759.81	-759.81
1.06	765.37	-765.37
1.07	763.34	-763.34
1.08	761.34	-761.34
1.09	775.18	-775.18

1.10	780.88	-780.88
1.11	785.74	-785.74
1.12	777.75	-777.75
1.13	784.61	-784.61
1.14	774.30	-774.30
1.15	777.10	-777.10
1.16	769.62	-769.62
1.17	772.16	-772.16
1.18	775.35	-775.35
1.19	761.00	-761.00
1.20	758.13	-758.13
1.21	759.68	-759.68
1.22	749.49	-749.49
1.23	760.10	-760.10
1.24	750.06	-750.06
1.25	745.17	-745.17
1.26	725.36	-725.36
1.27	737.21	-737.21
1.28	710.14	-710.14
1.29	721.29	-721.29
1.30	702.39	-702.39
1.31	712.37	-712.37
1.32	691.24	-691.24
1.33	704.80	-704.80
1.34	676.43	-676.43
1.35	678.72	-678.72
1.36	670.66	-670.66
1.37	679.83	-679.83
1.38	672.93	-672.93
1.39	675.22	-675.22
1.40	654.92	-654.92
1.41	629.99	-629.99
1.42	647.31	-647.31
1.43	640.57	-640.57
1.44	622.44	-622.44
1.45	645.51	-645.51
1.46	629.05	-629.05
1.47	613.67	-613.67
1.48	615.41	-615.41
1.49	603.11	-603.11
1.50	611.18	-611.18
1.51	598.97	-598.97
1.52	578.32	-578.32
1.53	574.52	-574.52
1.54	568.43	-568.43
1.55	574.46	-574.46
1.56	550.57	-550.57
1.57	559.47	-559.47
1.58	543.41	-543.41
1.59	535.65	-535.65
1.60	551.81	-551.81
1.61	538.64	-538.64
1.62	533.60	-533.60
1.63	510.88	-510.88
1.64	520.64	-520.64
1.65	513.15	-513.15
1.66	522.15	-522.15
1.67	495.38	-495.38
1.68	489.96	-489.96
1.69	492.98	-492.98
1.70	485.71	-485.71
1.71	484.80	-484.80
1.72	493.16	-493.16
1.73	479.62	-479.62
1.74	454.01	-454.01
1.75	446.37	-446.37
1.76	445.69	-445.69
1.77	439.95	-439.95
1.78	440.52	-440.52
1.79	442.42	-442.42
1.80	415.13	-415.13

1.81	422.06	-422.06
1.82	408.50	-408.50
1.83	403.30	-403.30
1.84	396.24	-396.24
1.85	355.71	-355.71
1.86	372.41	-372.41
1.87	353.78	-353.78
1.88	341.26	-341.26
1.89	343.98	-343.98
1.90	314.02	-314.02
1.91	326.42	-326.42
1.92	318.30	-318.30
1.93	305.82	-305.82
1.94	289.00	-289.00
1.95	282.82	-282.82
1.96	274.92	-274.92
1.97	263.21	-263.21
1.98	255.56	-255.56
1.99	249.55	-249.55
2.00	230.06	-230.06
2.01	235.55	-235.55
2.02	216.80	-216.80
2.03	206.48	-206.48
2.04	216.56	-216.56
2.05	206.81	-206.81
2.06	203.87	-203.87
2.07	198.24	-198.24
2.08	188.35	-188.35
2.09	187.62	-187.62
2.10	180.75	-180.75
2.11	170.03	-170.03
2.12	166.77	-166.77
2.13	162.21	-162.21
2.14	156.64	-156.64
2.15	143.97	-143.97
2.16	143.15	-143.15
2.17	137.73	-137.73
2.18	131.48	-131.48
2.19	125.90	-125.90
2.20	123.73	-123.73
2.21	125.54	-125.54
2.22	118.16	-118.16
2.23	120.70	-120.70
2.24	115.89	-115.89
2.25	108.42	-108.42
2.26	104.54	-104.54
2.27	104.72	-104.72
2.28	104.61	-104.61
2.29	101.19	-101.19
2.30	90.76	-90.76
2.31	95.47	-95.47
2.32	93.35	-93.35
2.33	91.69	-91.69
2.34	89.73	-89.73
2.35	89.32	-89.32
2.36	86.14	-86.14
2.37	83.80	-83.80
2.38	78.87	-78.87
2.39	80.73	-80.73
2.40	73.87	-73.87
2.41	77.84	-77.84
2.42	74.53	-74.53
2.43	73.34	-73.34
2.44	72.09	-72.09
2.45	70.05	-70.05
2.46	67.22	-67.22
2.47	66.18	-66.18
2.48	64.36	-64.36
2.49	61.87	-61.87
2.50	60.02	-60.02
2.51	60.70	-60.70

2.52	59.32	-59.32
2.53	57.05	-57.05
2.54	55.72	-55.72
2.55	55.77	-55.77
2.56	51.96	-51.96
2.57	54.67	-54.67
2.58	50.13	-50.13
2.59	51.13	-51.13
2.60	50.27	-50.27
2.61	47.92	-47.92
2.62	45.67	-45.67
2.63	45.81	-45.81
2.64	46.58	-46.58
2.65	44.52	-44.52
2.66	45.19	-45.19
2.67	44.01	-44.01
2.68	41.90	-41.90
2.69	40.80	-40.80
2.70	40.78	-40.78
2.71	38.91	-38.91
2.72	38.40	-38.40
2.73	36.53	-36.53
2.74	36.45	-36.45
2.75	35.37	-35.37
2.76	34.56	-34.56
2.77	33.30	-33.30
2.78	34.00	-34.00
2.79	18.93	-18.93
2.80	34.94	-34.94
2.81	36.33	-36.33
2.82	34.39	-34.39
2.83	18.63	-18.63
2.84	20.79	-20.79
2.85	35.69	-35.69
2.86	33.09	-33.09
2.87	32.73	-32.73
2.88	17.41	-17.41
2.89	18.86	-18.86
2.90	19.77	-19.77
2.91	34.77	-34.77
2.92	30.25	-30.25
2.93	18.11	-18.11
2.94	17.67	-17.67
2.95	19.16	-19.16
2.96	19.83	-19.83
2.97	33.63	-33.63
2.98	18.01	-18.01
2.99	18.29	-18.29
3.00	18.40	-18.40
3.01	18.47	-18.47
3.02	19.38	-19.38
3.03	19.65	-19.65
3.04	20.05	-20.05
3.05	19.99	-19.99
3.06	20.03	-20.03
3.07	33.54	-33.54
3.08	17.86	-17.86
3.09	17.63	-17.63
3.10	17.69	-17.69
3.11	17.94	-17.94
3.12	18.29	-18.29
3.13	18.09	-18.09
3.14	18.13	-18.13
3.15	17.83	-17.83
3.16	17.92	-17.92
3.17	18.00	-18.00
3.18	18.16	-18.16
3.19	17.92	-17.92
3.20	17.83	-17.83
3.21	17.59	-17.59
3.22	17.22	-17.22

3.23	17.37	-17.37
3.24	17.02	-17.02
3.25	16.63	-16.63
3.26	16.62	-16.62
3.27	16.43	-16.43
3.28	16.39	-16.39
3.29	16.02	-16.02
3.30	15.75	-15.75
3.31	15.51	-15.51
3.32	15.38	-15.38
3.33	15.10	-15.10
3.34	14.87	-14.87
3.35	15.13	-15.13
3.36	14.72	-14.72
3.37	14.68	-14.68
3.38	14.38	-14.38
3.39	13.99	-13.99
3.40	14.01	-14.01
3.41	14.24	-14.24
3.42	13.99	-13.99
3.43	13.79	-13.79
3.44	12.86	-12.86
3.45	13.30	-13.30
3.46	13.45	-13.45
3.47	13.42	-13.42
3.48	12.94	-12.94
3.49	12.47	-12.47
3.50	12.79	-12.79
3.51	12.60	-12.60
3.52	12.53	-12.53
3.53	12.22	-12.22
3.54	12.38	-12.38
3.55	11.92	-11.92
3.56	11.99	-11.99
3.57	11.63	-11.63
3.58	11.34	-11.34
3.59	11.45	-11.45
3.60	11.32	-11.32
3.61	11.18	-11.18
3.62	11.12	-11.12
3.63	11.13	-11.13
3.64	11.98	-11.98
3.65	11.46	-11.46
3.66	10.85	-10.85
3.67	15.18	-15.18
3.68	0.00	0.00
3.69	15.44	-15.44
3.70	10.95	-10.95
3.71	14.76	-14.76
3.72	0.00	0.00
3.73	0.00	0.00
3.74	12.97	-12.97
3.75	14.03	-14.03
3.76	11.74	-11.74
3.77	14.45	-14.45
3.78	11.41	-11.41
3.79	13.55	-13.55
3.80	12.23	-12.23
3.81	13.98	-13.98
3.82	11.65	-11.65
3.83	14.13	-14.13
3.84	13.18	-13.18
3.85	11.58	-11.58
3.86	13.75	-13.75
3.87	0.00	0.00
3.88	12.36	-12.36
3.89	10.82	-10.82
3.90	0.00	0.00
3.91	0.00	0.00
3.92	0.00	0.00
3.93	12.76	-12.76

3.94	0.00	0.00
3.95	0.00	0.00
3.96	11.05	-11.05
3.97	11.82	-11.82
3.98	12.27	-12.27
3.99	12.22	-12.22
4.00	11.99	-11.99
4.01	0.00	0.00
4.02	0.00	0.00
4.03	14.21	-14.21
4.04	0.00	0.00
4.05	11.14	-11.14
4.06	0.00	0.00
4.07	11.70	-11.70
4.08	10.97	-10.97
4.09	0.00	0.00
4.10	12.29	-12.29
4.11	11.33	-11.33
4.12	10.87	-10.87
4.13	11.08	-11.08
4.14	13.35	-13.35
4.15	10.85	-10.85
4.16	0.00	0.00
4.17	13.38	-13.38
4.18	12.93	-12.93
4.19	0.00	0.00
4.20	0.00	0.00
4.21	0.00	0.00
4.22	0.00	0.00
4.23	12.44	-12.44
4.24	12.91	-12.91
4.25	0.00	0.00
4.26	11.51	-11.51
4.27	12.65	-12.65
4.28	0.00	0.00
4.29	11.35	-11.35
4.30	12.41	-12.41
4.31	0.00	0.00
4.32	12.19	-12.19
4.33	0.00	0.00
4.34	0.00	0.00
4.35	11.84	-11.84
4.36	11.42	-11.42
4.37	11.45	-11.45
4.38	0.00	0.00
4.39	0.00	0.00
4.40	0.00	0.00
4.41	0.00	0.00
4.42	0.00	0.00
4.43	0.00	0.00
4.44	0.00	0.00
4.45	0.00	0.00
4.46	12.69	-12.69
4.47	0.00	0.00
4.48	0.00	0.00
4.49	0.00	0.00
4.50	13.17	-13.17
4.51	0.00	0.00
4.52	0.00	0.00
4.53	0.00	0.00
4.54	12.15	-12.15
4.55	0.00	0.00
4.56	0.00	0.00
4.57	0.00	0.00
4.58	10.92	-10.92
4.59	0.00	0.00
4.60	11.35	-11.35
4.61	0.00	0.00
4.62	10.82	-10.82
4.63	0.00	0.00
4.64	0.00	0.00

4.65	0.00	0.00
4.66	0.00	0.00
4.67	0.00	0.00
4.68	0.00	0.00
4.69	0.00	0.00
4.70	0.00	0.00
4.71	0.00	0.00
4.72	11.70	-11.70
4.73	0.00	0.00
4.74	0.00	0.00
4.75	0.00	0.00
4.76	0.00	0.00
4.77	0.00	0.00
4.78	0.00	0.00
4.79	0.00	0.00
4.80	0.00	0.00
4.81	0.00	0.00
4.82	10.81	-10.81
4.83	0.00	0.00
4.84	0.00	0.00
4.85	0.00	0.00
4.86	11.03	-11.03
4.87	0.00	0.00
4.88	0.00	0.00
4.89	0.00	0.00
4.90	0.00	0.00
4.91	11.75	-11.75
4.92	0.00	0.00
4.93	0.00	0.00
4.94	0.00	0.00
4.95	0.00	0.00
4.96	0.00	0.00
4.97	10.98	-10.98
4.98	0.00	0.00
4.99	0.00	0.00
5.00	0.00	0.00
5.01	0.00	0.00
5.02	0.00	0.00
5.03	0.00	0.00
5.04	10.89	-10.89
5.05	0.00	0.00
5.06	0.00	0.00
5.07	0.00	0.00
5.08	0.00	0.00
5.09	0.00	0.00
5.10	0.00	0.00
5.11	0.00	0.00
5.12	0.00	0.00
5.13	0.00	0.00
5.14	0.00	0.00
5.15	11.27	-11.27
5.16	0.00	0.00
5.17	0.00	0.00
5.18	0.00	0.00
5.19	0.00	0.00
5.20	0.00	0.00
5.21	0.00	0.00
5.22	10.84	-10.84
5.23	11.57	-11.57
5.24	0.00	0.00
5.25	0.00	0.00
5.26	11.52	-11.52
5.27	0.00	0.00
5.28	0.00	0.00
5.29	0.00	0.00
5.30	0.00	0.00
5.31	0.00	0.00
5.32	0.00	0.00
5.33	0.00	0.00
5.34	0.00	0.00
5.35	0.00	0.00

5.36	0.00	0.00
5.37	0.00	0.00
5.38	0.00	0.00
5.39	0.00	0.00
5.40	0.00	0.00
5.41	0.00	0.00
5.42	0.00	0.00
5.43	11.37	-11.37
5.44	0.00	0.00
5.45	0.00	0.00
5.46	10.84	-10.84
5.47	0.00	0.00
5.48	0.00	0.00
5.49	0.00	0.00
5.50	0.00	0.00

```
S 1-60inch 0 1 24283 32458 0 0.00 750.00 60.00
    T 0.00 0.00 0.00
    T 3.00 55.00 12.00
    T 4.00 90.00 16.00
    T 5.00 125.00 19.50
    T 6.00 150.00 19.50
    T 7.00 180.00 19.50
S 1-60inch 0 1 24284 32459 0 0.00 750.00 60.00
    T 0.00 0.00 0.00
    T 3.00 55.00 12.00
    T 4.00 90.00 16.00
    T 5.00 125.00 19.50
    T 6.00 150.00 19.50
    T 7.00 180.00 19.50
S 10-24inch 0 1 19245 19856 0 0.00 0.00 0.00
    T 0.00 0.00
    T 1.00 4.50
    T 2.00 130.00
    T 3.00 200.00
    T 4.00 260.00
    T 5.00 300.00
    T 6.00 340.00
    T 6.50 360.00
S 3-48x96box 0 1 26480 29601 0 0.00 0.00 0.00
    T 0.00 0.00
    T 2.00 216.00
    T 3.00 384.00
    T 4.00 552.00
    T 5.00 744.00
    T 6.00 888.00
    T 7.00 1056.00
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SUMMARY.OUT FILE

NEGATIVE VOLUME CONSERVATION (ACRE FEET)
INDICATES EXCESS VOLUME (OUTFLOW + STORAGE > INFLOW)

SIMULATION TIME (HOURS)	AVERAGE TIMESTEP (SECONDS)	VOLUME CONSERVATION (ACRE FEET)	PERCENT OF INFLOW
0.010	1.352	0.000000	0.000001
0.020	0.985	0.000000	0.000005
0.030	0.745	0.000000	0.000005
0.040	0.682	0.000000	0.000001
0.050	0.746	0.000000	0.000002
0.060	0.692	0.000000	0.000003
0.070	0.697	0.000000	0.000001
0.080	0.758	0.000000	0.000004
0.090	1.632	0.000000	0.000003
0.100	0.946	0.000000	0.000003
0.110	0.857	0.000000	0.000002
0.120	0.940	0.000000	0.000004
0.130	0.961	0.000000	0.000002
0.140	0.691	0.000000	0.000002
0.150	0.647	0.000000	0.000001
0.160	0.853	0.000000	0.000004
0.170	0.886	0.000000	0.000002
0.180	0.742	0.000000	0.000006
0.190	1.182	0.000000	0.000001
0.200	1.044	0.000000	0.000004
0.210	1.396	0.000000	0.000004
0.220	1.427	0.000000	0.000000
0.230	1.427	0.000000	0.000001
0.240	1.293	0.000000	0.000002
0.250	1.137	0.000000	0.000002
0.260	1.161	0.000000	0.000001
0.270	1.086	0.000000	0.000002
0.280	1.092	0.000000	0.000002
0.290	1.106	0.000000	0.000001
0.300	1.164	0.000000	0.000004
0.310	1.079	0.000000	0.000003
0.320	1.132	0.000000	0.000005
0.330	1.093	0.000000	0.000006
0.340	1.126	0.000000	0.000003
0.350	1.184	0.000000	0.000007
0.360	1.175	0.000000	0.000010
0.370	1.172	0.000000	0.000004
0.380	1.083	0.000000	0.000008
0.390	1.020	0.000000	0.000005
0.400	1.160	0.000000	0.000009
0.410	1.104	0.000000	0.000005
0.420	1.078	0.000000	0.000009
0.430	1.064	0.000000	0.000012
0.440	1.081	0.000000	0.000012
0.450	1.051	0.000000	0.000006
0.460	1.004	0.000000	0.000010
0.470	1.004	0.000000	0.000011
0.480	0.950	0.000000	0.000013
0.490	0.939	0.000000	0.000009
0.500	0.927	0.000000	0.000008
0.510	0.833	0.000000	0.000012
0.520	0.845	0.000000	0.000009
0.530	0.861	0.000000	0.000005
0.540	0.781	0.000000	0.000006
0.550	0.589	0.000000	0.000002
0.560	0.492	0.000000	0.000001
0.570	0.498	0.000000	0.000003
0.580	0.381	0.000000	0.000003
0.590	0.394	0.000000	0.000006
0.600	0.305	0.000000	0.000004
0.610	0.384	0.000000	0.000006
0.620	0.370	0.000000	0.000001
0.630	0.373	0.000000	0.000001

0.640	0.334	0.000000	0.000000
0.650	0.231	0.000000	0.000002
0.660	0.207	0.000000	0.000005
0.670	0.186	0.000000	0.000003
0.680	0.198	0.000000	0.000005
0.690	0.177	0.000000	0.000004
0.700	0.182	0.000000	0.000001
0.710	0.174	0.000000	0.000003
0.720	0.180	0.000000	0.000001
0.730	0.200	0.000000	0.000002
0.740	0.201	0.000000	0.000000
0.750	0.208	0.000000	0.000002
0.760	0.202	0.000000	0.000001
0.770	0.207	0.000000	0.000003
0.780	0.186	0.000000	0.000000
0.790	0.174	0.000000	0.000003
0.800	0.172	0.000000	0.000004
0.810	0.167	0.000000	0.000001
0.820	0.176	0.000000	0.000001
0.830	0.165	0.000000	0.000000
0.840	0.156	0.000000	0.000003
0.850	0.141	-0.000001	0.000003
0.860	0.130	0.000000	0.000000
0.870	0.119	0.000000	0.000001
0.880	0.107	0.000000	0.000002
0.890	0.093	-0.000001	0.000003
0.900	0.086	-0.000001	0.000002
0.910	0.082	0.000000	0.000001
0.920	0.078	0.000001	0.000004
0.930	0.077	0.000000	0.000001
0.940	0.075	0.000001	0.000003
0.950	0.071	0.000001	0.000004
0.960	0.069	0.000000	0.000000
0.970	0.068	0.000000	0.000001
0.980	0.068	0.000001	0.000002
0.990	0.066	0.000000	0.000000
1.000	0.066	0.000001	0.000003
1.010	0.065	-0.000002	0.000005
1.020	0.064	-0.000002	0.000004
1.030	0.065	0.000001	0.000001
1.040	0.064	0.000000	0.000000
1.050	0.064	0.000000	0.000000
1.060	0.065	0.000002	0.000003
1.070	0.065	0.000001	0.000001
1.080	0.065	0.000000	0.000001
1.090	0.066	0.000001	0.000001
1.100	0.066	0.000001	0.000001
1.110	0.068	-0.000002	0.000003
1.120	0.067	0.000000	0.000000
1.130	0.071	-0.000002	0.000003
1.140	0.072	-0.000002	0.000002
1.150	0.070	0.000001	0.000001
1.160	0.072	0.000001	0.000001
1.170	0.074	-0.000005	0.000006
1.180	0.076	0.000000	0.000000
1.190	0.076	-0.000003	0.000003
1.200	0.077	0.000004	0.000004
1.210	0.078	0.000000	0.000000
1.220	0.075	-0.000003	0.000003
1.230	0.078	-0.000001	0.000001
1.240	0.079	-0.000003	0.000002
1.250	0.078	0.000001	0.000001
1.260	0.082	0.000005	0.000005
1.270	0.083	0.000002	0.000002
1.280	0.084	0.000002	0.000002
1.290	0.084	0.000002	0.000002
1.300	0.081	-0.000003	0.000003
1.310	0.085	-0.000001	0.000001
1.320	0.086	0.000000	0.000000
1.330	0.088	-0.000008	0.000007
1.340	0.088	-0.000001	0.000001

1.350	0.085	0.000005	0.000004
1.360	0.088	-0.000002	0.000001
1.370	0.090	-0.000001	0.000001
1.380	0.093	0.000001	0.000001
1.390	0.089	0.000006	0.000005
1.400	0.096	-0.000009	0.000007
1.410	0.090	0.000003	0.000002
1.420	0.098	-0.000002	0.000001
1.430	0.097	-0.000005	0.000004
1.440	0.095	0.000005	0.000004
1.450	0.097	-0.000001	0.000001
1.460	0.101	0.000001	0.000000
1.470	0.104	-0.000002	0.000001
1.480	0.100	0.000004	0.000003
1.490	0.098	0.000003	0.000002
1.500	0.105	-0.000003	0.000002
1.510	0.101	-0.000001	0.000001
1.520	0.106	-0.000009	0.000006
1.530	0.107	-0.000003	0.000002
1.540	0.108	-0.000004	0.000003
1.550	0.104	-0.000004	0.000002
1.560	0.109	0.000005	0.000004
1.570	0.108	0.000003	0.000002
1.580	0.111	0.000002	0.000001
1.590	0.111	-0.000009	0.000006
1.600	0.109	-0.000004	0.000003
1.610	0.115	0.000003	0.000002
1.620	0.114	0.000001	0.000001
1.630	0.121	0.000003	0.000002
1.640	0.120	0.000005	0.000003
1.650	0.117	0.000000	0.000000
1.660	0.122	-0.000003	0.000002
1.670	0.123	-0.000004	0.000003
1.680	0.119	0.000007	0.000004
1.690	0.124	-0.000001	0.000000
1.700	0.126	-0.000004	0.000003
1.710	0.132	0.000000	0.000000
1.720	0.123	-0.000003	0.000002
1.730	0.129	0.000001	0.000001
1.740	0.139	0.000000	0.000000
1.750	0.140	0.000003	0.000002
1.760	0.133	0.000000	0.000000
1.770	0.146	0.000000	0.000000
1.780	0.142	-0.000004	0.000002
1.790	0.139	-0.000005	0.000003
1.800	0.150	0.000002	0.000001
1.810	0.141	0.000008	0.000005
1.820	0.154	-0.000006	0.000003
1.830	0.146	-0.000005	0.000003
1.840	0.154	0.000005	0.000003
1.850	0.156	-0.000002	0.000001
1.860	0.156	-0.000005	0.000003
1.870	0.161	0.000009	0.000005
1.880	0.160	-0.000007	0.000004
1.890	0.162	-0.000002	0.000001
1.900	0.173	-0.000005	0.000003
1.910	0.167	0.000006	0.000003
1.920	0.167	-0.000004	0.000002
1.930	0.166	-0.000004	0.000002
1.940	0.176	-0.000001	0.000001
1.950	0.174	-0.000002	0.000001
1.960	0.175	0.000003	0.000002
1.970	0.181	0.000000	0.000000
1.980	0.180	0.000000	0.000000
1.990	0.184	-0.000002	0.000001
2.000	0.189	-0.000003	0.000002
2.010	0.202	0.000004	0.000002
2.020	0.202	0.000003	0.000002
2.030	0.208	0.000000	0.000000
2.040	0.217	-0.000002	0.000001
2.050	0.218	0.000002	0.000001

2.060	0.218	0.000001	0.000001
2.070	0.230	0.000006	0.000003
2.080	0.235	0.000008	0.000005
2.090	0.239	0.000002	0.000001
2.100	0.240	-0.000005	0.000003
2.110	0.243	0.000000	0.000000
2.120	0.245	-0.000005	0.000003
2.130	0.249	0.000001	0.000001
2.140	0.250	-0.000002	0.000001
2.150	0.257	-0.000001	0.000000
2.160	0.258	-0.000001	0.000000
2.170	0.259	-0.000006	0.000004
2.180	0.261	0.000003	0.000002
2.190	0.267	-0.000010	0.000006
2.200	0.268	-0.000008	0.000004
2.210	0.268	0.000004	0.000002
2.220	0.268	-0.000006	0.000003
2.230	0.268	0.000005	0.000003
2.240	0.280	-0.000004	0.000002
2.250	0.275	-0.000001	0.000000
2.260	0.277	0.000004	0.000002
2.270	0.275	-0.000009	0.000005
2.280	0.279	-0.000001	0.000000
2.290	0.284	-0.000003	0.000002
2.300	0.289	0.000007	0.000004
2.310	0.300	0.000003	0.000002
2.320	0.297	0.000004	0.000002
2.330	0.297	-0.000001	0.000000
2.340	0.298	-0.000006	0.000003
2.350	0.303	0.000010	0.000005
2.360	0.294	0.000001	0.000001
2.370	0.294	-0.000009	0.000005
2.380	0.298	0.000003	0.000001
2.390	0.297	-0.000004	0.000002
2.400	0.307	-0.000003	0.000002
2.410	0.299	-0.000001	0.000001
2.420	0.299	0.000001	0.000001
2.430	0.292	0.000012	0.000006
2.440	0.302	-0.000001	0.000001
2.450	0.296	0.000004	0.000002
2.460	0.302	0.000005	0.000003
2.470	0.301	-0.000003	0.000001
2.480	0.306	0.000006	0.000003
2.490	0.307	0.000003	0.000002
2.500	0.300	0.000004	0.000002
2.510	0.312	0.000001	0.000000
2.520	0.295	0.000007	0.000004
2.530	0.306	0.000008	0.000004
2.540	0.310	-0.000003	0.000001
2.550	0.308	-0.000001	0.000000
2.560	0.317	0.000002	0.000001
2.570	0.312	-0.000004	0.000002
2.580	0.306	0.000007	0.000004
2.590	0.308	0.000012	0.000006
2.600	0.315	0.000002	0.000001
2.610	0.314	-0.000005	0.000003
2.620	0.304	0.000005	0.000003
2.630	0.309	0.000008	0.000004
2.640	0.314	0.000009	0.000005
2.650	0.313	0.000005	0.000002
2.660	0.313	-0.000006	0.000003
2.670	0.322	0.000009	0.000005
2.680	0.315	0.000009	0.000005
2.690	0.322	-0.000008	0.000004
2.700	0.318	0.000006	0.000003
2.710	0.311	0.000002	0.000001
2.720	0.313	0.000002	0.000001
2.730	0.319	0.000011	0.000006
2.740	0.323	0.000007	0.000004
2.750	0.326	-0.000001	0.000001
2.760	0.324	0.000012	0.000006

2.770	0.324	-0.000004	0.000002
2.780	0.329	-0.000002	0.000001
2.790	0.327	0.000017	0.000009
2.800	0.335	-0.000006	0.000003
2.810	0.323	-0.000016	0.000008
2.820	0.329	-0.000004	0.000002
2.830	0.327	0.000004	0.000002
2.840	0.330	0.000008	0.000004
2.850	0.331	0.000003	0.000001
2.860	0.331	-0.000003	0.000001
2.870	0.335	0.000011	0.000005
2.880	0.333	-0.000004	0.000002
2.890	0.324	0.000006	0.000003
2.900	0.330	0.000009	0.000005
2.910	0.333	-0.000004	0.000002
2.920	0.335	-0.000008	0.000004
2.930	0.329	-0.000002	0.000001
2.940	0.328	0.000001	0.000000
2.950	0.333	-0.000005	0.000002
2.960	0.336	-0.000014	0.000007
2.970	0.339	0.000005	0.000002
2.980	0.340	0.000014	0.000007
2.990	0.332	0.000010	0.000005
3.000	0.334	0.000001	0.000001
3.010	0.341	-0.000007	0.000003
3.020	0.337	0.000008	0.000004
3.030	0.339	0.000002	0.000001
3.040	0.341	0.000012	0.000006
3.050	0.337	-0.000006	0.000003
3.060	0.332	-0.000007	0.000003
3.070	0.343	-0.000003	0.000001
3.080	0.335	-0.000015	0.000007
3.090	0.331	0.000001	0.000001
3.100	0.345	-0.000004	0.000002
3.110	0.340	-0.000006	0.000003
3.120	0.345	0.000006	0.000003
3.130	0.346	0.000016	0.000008
3.140	0.343	-0.000003	0.000002
3.150	0.341	-0.000008	0.000004
3.160	0.345	-0.000003	0.000001
3.170	0.346	0.000002	0.000001
3.180	0.345	0.000014	0.000007
3.190	0.349	-0.000002	0.000001
3.200	0.347	0.000003	0.000002
3.210	0.337	0.000019	0.000009
3.220	0.349	0.000004	0.000002
3.230	0.357	0.000005	0.000003
3.240	0.350	0.000010	0.000005
3.250	0.353	-0.000011	0.000005
3.260	0.355	-0.000006	0.000003
3.270	0.353	-0.000001	0.000000
3.280	0.345	0.000001	0.000000
3.290	0.354	-0.000001	0.000001
3.300	0.363	-0.000005	0.000003
3.310	0.357	0.000008	0.000004
3.320	0.357	-0.000008	0.000004
3.330	0.356	0.000015	0.000007
3.340	0.356	-0.000002	0.000001
3.350	0.358	0.000007	0.000003
3.360	0.368	-0.000004	0.000002
3.370	0.357	-0.000008	0.000004
3.380	0.356	-0.000006	0.000003
3.390	0.361	-0.000005	0.000002
3.400	0.352	0.000003	0.000001
3.410	0.357	-0.000002	0.000001
3.420	0.361	0.000011	0.000005
3.430	0.360	0.000001	0.000000
3.440	0.373	0.000007	0.000004
3.450	0.357	0.000003	0.000002
3.460	0.369	0.000013	0.000006
3.470	0.366	0.000000	0.000000

3.480	0.357	0.000015	0.000007
3.490	0.377	0.000010	0.000005
3.500	0.368	-0.000010	0.000005
3.510	0.365	-0.000009	0.000004
3.520	0.374	-0.000004	0.000002
3.530	0.379	0.000012	0.000006
3.540	0.365	0.000011	0.000005
3.550	0.374	-0.000006	0.000003
3.560	0.366	0.000005	0.000002
3.570	0.364	-0.000004	0.000002
3.580	0.364	-0.000004	0.000002
3.590	0.364	0.000004	0.000002
3.600	0.362	0.000000	0.000000
3.610	0.374	-0.000003	0.000001
3.620	0.367	0.000005	0.000003
3.630	0.378	0.000003	0.000001
3.640	0.378	0.000001	0.000001
3.650	0.374	0.000005	0.000002
3.660	0.373	0.000005	0.000002
3.670	0.382	-0.000001	0.000000
3.680	0.379	-0.000004	0.000002
3.690	0.381	0.000014	0.000007
3.700	0.369	0.000003	0.000001
3.710	0.371	0.000001	0.000000
3.720	0.368	-0.000010	0.000004
3.730	0.379	0.000005	0.000002
3.740	0.377	-0.000007	0.000003
3.750	0.373	0.000010	0.000005
3.760	0.384	0.000003	0.000001
3.770	0.389	-0.000015	0.000007
3.780	0.378	0.000010	0.000004
3.790	0.375	-0.000002	0.000001
3.800	0.391	-0.000013	0.000006
3.810	0.378	0.000001	0.000001
3.820	0.381	0.000005	0.000002
3.830	0.379	-0.000007	0.000003
3.840	0.385	0.000004	0.000002
3.850	0.382	0.000009	0.000004
3.860	0.391	-0.000002	0.000001
3.870	0.395	-0.000009	0.000004
3.880	0.389	-0.000002	0.000001
3.890	0.400	0.000004	0.000002
3.900	0.386	0.000006	0.000003
3.910	0.388	-0.000001	0.000001
3.920	0.396	-0.000004	0.000002
3.930	0.393	0.000008	0.000004
3.940	0.402	0.000002	0.000001
3.950	0.394	0.000004	0.000002
3.960	0.403	0.000013	0.000006
3.970	0.388	0.000005	0.000002
3.980	0.399	-0.000002	0.000001
3.990	0.403	0.000003	0.000001
4.000	0.393	0.000000	0.000000
4.010	0.390	-0.000002	0.000001
4.020	0.397	-0.000003	0.000002
4.030	0.398	0.000001	0.000000
4.040	0.398	-0.000007	0.000003
4.050	0.406	0.000007	0.000003
4.060	0.408	0.000009	0.000004
4.070	0.405	-0.000010	0.000005
4.080	0.397	0.000015	0.000007
4.090	0.406	-0.000013	0.000006
4.100	0.407	0.000010	0.000004
4.110	0.397	-0.000016	0.000008
4.120	0.404	-0.000002	0.000001
4.130	0.403	0.000013	0.000006
4.140	0.387	-0.000003	0.000002
4.150	0.401	0.000004	0.000002
4.160	0.395	0.000016	0.000007
4.170	0.387	0.000000	0.000000
4.180	0.390	-0.000008	0.000004

4.190	0.383	-0.000004	0.000002
4.200	0.370	0.000011	0.000005
4.210	0.362	0.000002	0.000001
4.220	0.356	0.000002	0.000001
4.230	0.354	-0.000006	0.000003
4.240	0.357	0.000011	0.000005
4.250	0.357	-0.000006	0.000003
4.260	0.354	0.000003	0.000001
4.270	0.359	0.000000	0.000000
4.280	0.358	0.000008	0.000004
4.290	0.357	0.000006	0.000003
4.300	0.358	0.000006	0.000003
4.310	0.349	0.000013	0.000006
4.320	0.349	0.000002	0.000001
4.330	0.349	0.000011	0.000005
4.340	0.348	-0.000006	0.000003
4.350	0.350	0.000016	0.000007
4.360	0.351	-0.000004	0.000002
4.370	0.347	0.000003	0.000001
4.380	0.345	-0.000001	0.000001
4.390	0.347	-0.000006	0.000003
4.400	0.351	0.000004	0.000002
4.410	0.341	-0.000002	0.000001
4.420	0.328	-0.000001	0.000000
4.430	0.320	0.000004	0.000002
4.440	0.313	-0.000002	0.000001
4.450	0.308	-0.000002	0.000001
4.460	0.307	0.000002	0.000001
4.470	0.314	0.000006	0.000003
4.480	0.315	0.000010	0.000005
4.490	0.296	-0.000001	0.000000
4.500	0.303	0.000002	0.000001
4.510	0.306	0.000005	0.000002
4.520	0.298	-0.000017	0.000008
4.530	0.282	0.000002	0.000001
4.540	0.284	0.000007	0.000003
4.550	0.288	-0.000011	0.000005
4.560	0.286	0.000008	0.000004
4.570	0.287	0.000001	0.000000
4.580	0.289	-0.000001	0.000001
4.590	0.292	0.000005	0.000002
4.600	0.292	-0.000011	0.000005
4.610	0.295	0.000004	0.000002
4.620	0.293	-0.000010	0.000004
4.630	0.297	-0.000005	0.000002
4.640	0.297	-0.000008	0.000003
4.650	0.296	0.000006	0.000003
4.660	0.301	0.000004	0.000002
4.670	0.301	0.000008	0.000004
4.680	0.304	0.000007	0.000003
4.690	0.304	0.000007	0.000003
4.700	0.304	0.000011	0.000005
4.710	0.311	-0.000004	0.000002
4.720	0.314	0.000014	0.000006
4.730	0.315	-0.000006	0.000002
4.740	0.326	0.000009	0.000004
4.750	0.320	-0.000002	0.000001
4.760	0.329	-0.000001	0.000000
4.770	0.335	-0.000004	0.000002
4.780	0.335	0.000012	0.000005
4.790	0.330	-0.000001	0.000000
4.800	0.341	0.000011	0.000005
4.810	0.329	-0.000006	0.000003
4.820	0.330	0.000010	0.000004
4.830	0.331	0.000009	0.000004
4.840	0.330	0.000004	0.000002
4.850	0.324	0.000003	0.000001
4.860	0.329	0.000013	0.000006
4.870	0.323	-0.000007	0.000003
4.880	0.321	0.000002	0.000001
4.890	0.323	0.000014	0.000006

4.900	0.334	-0.000001	0.000000
4.910	0.314	-0.000015	0.000007
4.920	0.324	0.000014	0.000006
4.930	0.342	0.000014	0.000006
4.940	0.331	0.000008	0.000003
4.950	0.344	-0.000003	0.000001
4.960	0.350	0.000007	0.000003
4.970	0.343	0.000014	0.000006
4.980	0.350	-0.000007	0.000003
4.990	0.348	-0.000003	0.000001
5.000	0.353	-0.000014	0.000006
5.010	0.346	0.000003	0.000001
5.020	0.356	0.000009	0.000004
5.030	0.333	-0.000011	0.000005
5.040	0.346	0.000000	0.000000
5.050	0.333	0.000003	0.000001
5.060	0.337	0.000003	0.000002
5.070	0.354	0.000002	0.000001
5.080	0.336	-0.000003	0.000001
5.090	0.345	0.000013	0.000006
5.100	0.334	-0.000002	0.000001
5.110	0.338	0.000007	0.000003
5.120	0.333	-0.000015	0.000007
5.130	0.343	0.000007	0.000003
5.140	0.333	-0.000007	0.000003
5.150	0.341	0.000013	0.000006
5.160	0.341	0.000000	0.000000
5.170	0.344	0.000004	0.000002
5.180	0.331	0.000008	0.000004
5.190	0.343	0.000006	0.000003
5.200	0.333	-0.000008	0.000004
5.210	0.340	-0.000002	0.000001
5.220	0.327	-0.000010	0.000004
5.230	0.340	0.000001	0.000001
5.240	0.332	0.000011	0.000005
5.250	0.328	0.000000	0.000000
5.260	0.331	-0.000013	0.000006
5.270	0.326	-0.000011	0.000005
5.280	0.328	-0.000005	0.000002
5.290	0.325	0.000010	0.000004
5.300	0.327	0.000013	0.000006
5.310	0.337	-0.000003	0.000001
5.320	0.334	-0.000014	0.000006
5.330	0.344	-0.000007	0.000003
5.340	0.334	0.000003	0.000001
5.350	0.341	0.000000	0.000000
5.360	0.341	-0.000006	0.000003
5.370	0.336	-0.000005	0.000002
5.380	0.347	-0.000008	0.000003
5.390	0.353	0.000010	0.000004
5.400	0.348	-0.000005	0.000002
5.410	0.348	0.000009	0.000004
5.420	0.371	-0.000005	0.000002
5.430	0.347	-0.000011	0.000005
5.440	0.350	0.000015	0.000006
5.450	0.358	-0.000006	0.000003
5.460	0.343	0.000012	0.000005
5.470	0.351	0.000008	0.000004
5.480	0.344	-0.000007	0.000003
5.490	0.345	-0.000006	0.000003
5.500	0.358	0.000017	0.000008

MASS BALANCE INFLOW - OUTFLOW VOLUME

*** INFLOW (ACRE-FEET) ***

	WATER
INFLOW HYDROGRAPH	228.73

*** OUTFLOW (ACRE-FT) ***

OVERLAND FLOW	WATER
FLOODPLAIN STORAGE	9.69
FLOODPLAIN OUTFLOW HYDROGRAPH	219.23
FLOODPLAIN OUTFLOW AND STORAGE	228.92

*** TOTALS ***

TOTAL OUTFLOW FROM GRID SYSTEM	219.23
TOTAL VOLUME OF OUTFLOW AND STORAGE	228.92

SURFACE AREA OF INUNDATION REGARDLESS OF THE TIME OF OCCURRENCE:
(FOR FLOW DEPTHS GREATER THAN THE "TOL" VALUE TYPICALLY 0.1 FT OR 0.03 M)

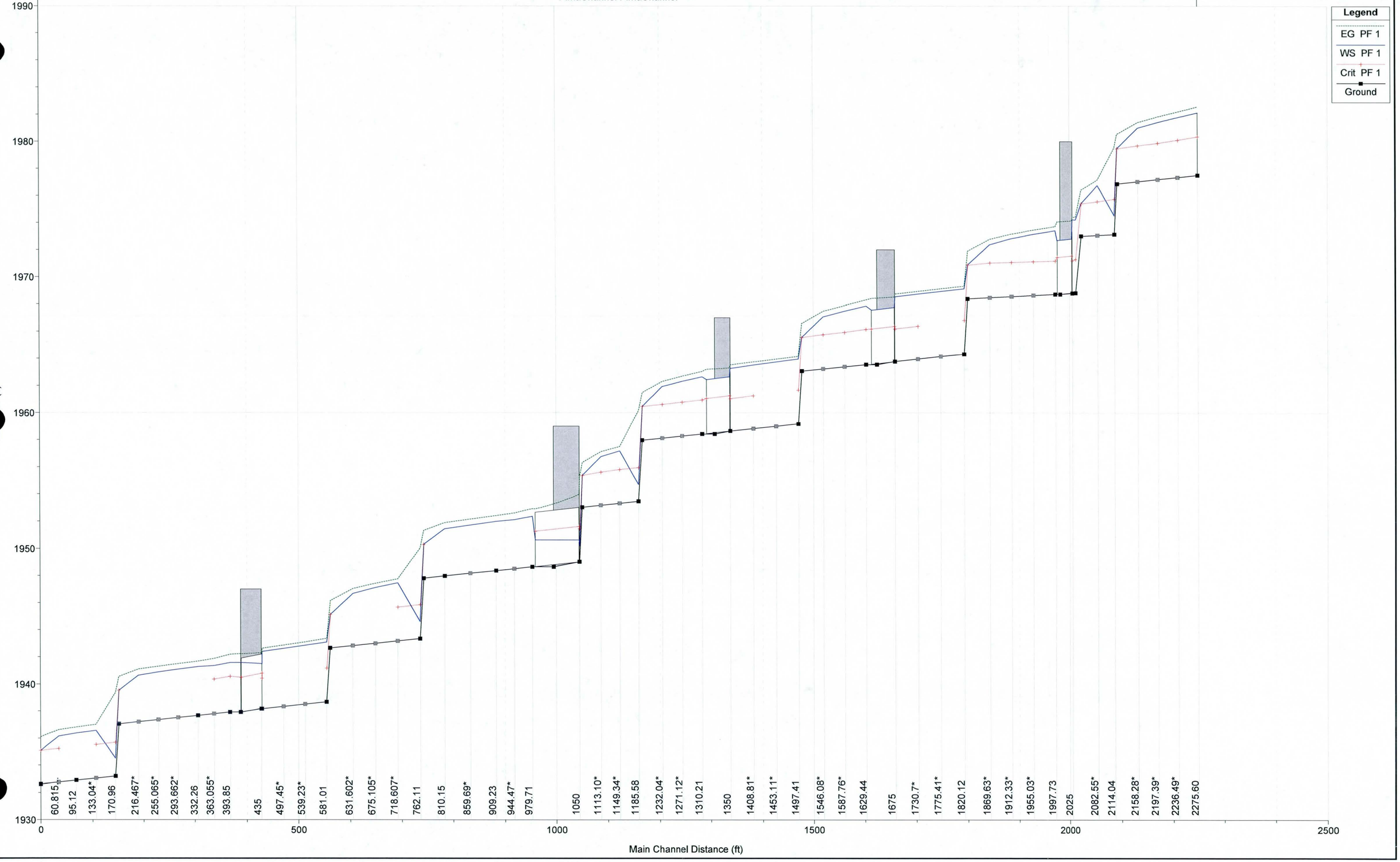
THE MAXIMUM INUNDATED AREA IS: 53.70 ACRES

COMPUTER RUN TIME IS : 2.67447 HRS

THIS OUTPUT FILE WAS TERMINATED ON: 8/26/2009 AT: 18:41:48

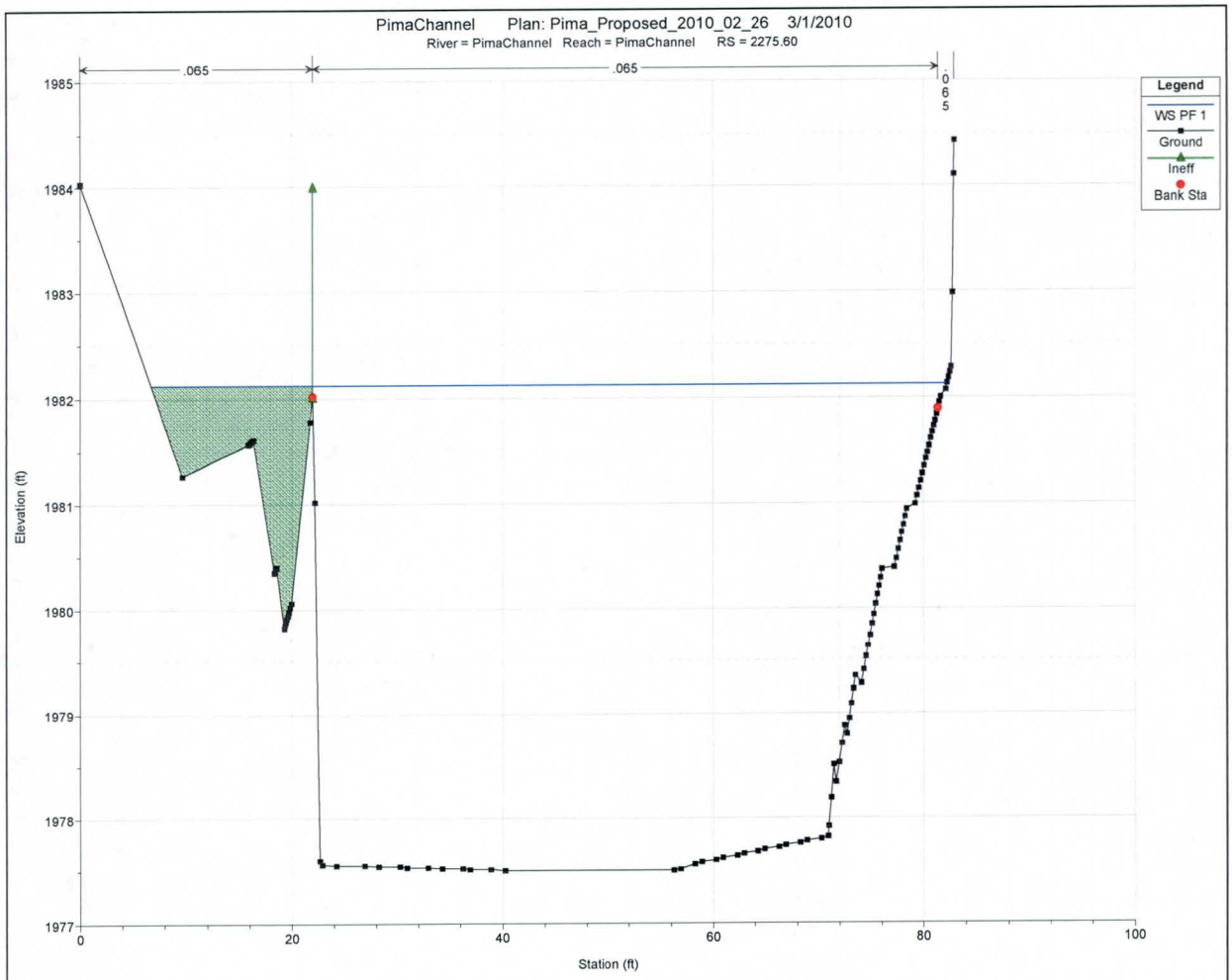
PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010

PimaChannel PimaChannel



HEC-RAS Plan: 100% Plans River: PimaChannel Reach: PimaChannel Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Vel Right	Max Chl Dpth
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft/s)	(ft)
PimaChannel	26.51	PF 1	1200.00	1932.61	1935.11	1935.11	1936.14	0.049713	8.14	147.39	72.49	1.01		2.50
PimaChannel	60.815*	PF 1	1200.00	1932.75	1936.17	1935.25	1936.64	0.005880	5.52	217.38	79.83	0.59		3.42
PimaChannel	95.12	PF 1	1200.00	1932.89	1936.40		1936.84	0.005369	5.35	224.17	80.52	0.57		3.50
PimaChannel	133.04*	PF 1	1200.00	1933.04	1936.59	1935.55	1937.04	0.005240	5.40	222.29	77.22	0.56		3.55
PimaChannel	170.96	PF 1	1200.00	1933.19	1934.53	1935.71	1939.39	0.532459	17.70	67.80	61.73	2.98		1.34
PimaChannel	177.87	PF 1	1200.00	1937.05	1939.56	1939.56	1940.59	0.049704	8.14	147.40	72.49	1.01		2.51
PimaChannel	216.467*	PF 1	1200.00	1937.21	1940.67		1941.13	0.005603	5.43	220.87	80.12	0.58		3.46
PimaChannel	255.065*	PF 1	1200.00	1937.36	1940.91		1941.34	0.005094	5.26	228.08	80.81	0.55		3.55
PimaChannel	293.662*	PF 1	1200.00	1937.52	1941.12		1941.53	0.004785	5.15	232.93	81.25	0.54		3.60
PimaChannel	332.26	PF 1	1200.00	1937.67	1941.31		1941.71	0.004567	5.07	236.59	81.56	0.52		3.64
PimaChannel	363.055*	PF 1	1200.00	1937.80	1941.38	1940.38	1941.90	0.005620	5.80	206.90	67.32	0.58		3.58
PimaChannel	393.85	PF 1	1200.00	1937.92	1941.61	1940.58	1942.22	0.016081	6.29	190.72	62.80	0.60		3.69
PimaChannel	435		Culvert											
PimaChannel	455.67	PF 1	1200.00	1938.16	1942.42	1940.45	1942.66	0.005464	3.91	306.69	84.79	0.36		4.26
PimaChannel	497.45*	PF 1	1200.00	1938.33	1942.64		1942.89	0.005504	3.97	302.32	82.62	0.37		4.31
PimaChannel	539.23*	PF 1	1200.00	1938.50	1942.87		1943.13	0.005790	4.07	295.14	80.98	0.38		4.37
PimaChannel	581.01	PF 1	1200.00	1938.67	1943.11	1941.20	1943.38	0.006282	4.20	285.51	79.29	0.39		4.44
PimaChannel	588.10	PF 1	1200.00	1942.65	1945.15	1945.15	1946.18	0.049614	8.14	147.48	72.50	1.01		2.50
PimaChannel	631.602*	PF 1	1200.00	1942.82	1946.71		1947.07	0.009835	4.81	249.46	79.70	0.48		3.89
PimaChannel	675.105*	PF 1	1200.00	1942.99	1947.14		1947.45	0.007889	4.51	266.36	79.37	0.43		4.15
PimaChannel	718.607*	PF 1	1200.00	1943.17	1947.49	1945.70	1947.78	0.006913	4.33	277.28	79.31	0.41		4.32
PimaChannel	762.11	PF 1	1200.00	1943.34	1944.63	1945.88	1950.05	0.626782	18.68	64.25	60.96	3.21		1.29
PimaChannel	769.16	PF 1	1200.00	1947.80	1950.31	1950.31	1951.34	0.049690	8.14	147.41	72.50	1.01		2.51
PimaChannel	810.15	PF 1	1200.00	1947.97	1951.45		1951.90	0.005510	5.40	222.24	80.36	0.57		3.48
PimaChannel	859.69*	PF 1	1200.00	1948.17	1951.73		1952.17	0.005178	5.33	225.33	79.33	0.56		3.56
PimaChannel	909.23	PF 1	1200.00	1948.36	1951.99		1952.42	0.004924	5.27	227.79	78.43	0.54		3.63
PimaChannel	944.47*	PF 1	1200.00	1948.50	1952.12		1952.62	0.005211	5.70	210.38	66.10	0.56		3.62
PimaChannel	979.71	PF 1	1200.00	1948.64	1952.37		1952.94	0.014075	6.04	198.73	54.97	0.56		3.73
PimaChannel	1050		Culvert											
PimaChannel	1071.550	PF 1	1200.00	1949.01	1950.21	1951.46	1955.30	0.517851	18.11	66.25	55.85	2.93		1.20
PimaChannel	1076.87	PF 1	1200.00	1953.01	1955.38	1955.38	1956.34	0.050446	7.86	152.61	105.05	1.00		2.69
PimaChannel	1113.10*	PF 1	1200.00	1953.16	1956.78	1955.63	1957.14	0.011024	4.87	246.44	106.14	0.50	0.97	3.62
PimaChannel	1149.34*	PF 1	1200.00	1953.30	1957.19	1955.82	1957.52	0.009361	4.59	261.18	100.13	0.47		3.89
PimaChannel	1185.58	PF 1	1200.00	1953.45	1954.72	1955.97	1960.16	0.653740	18.72	64.09	62.64	3.26		1.27
PimaChannel	1192.96	PF 1	1200.00	1957.96	1960.48	1960.48	1961.49	0.048623	8.08	148.49	83.13	1.00		2.52
PimaChannel	1232.04*	PF 1	1200.00	1958.11	1961.93	1960.63	1962.32	0.010483	4.99	240.57	90.90	0.49		3.82
PimaChannel	1271.12*	PF 1	1200.00	1958.27	1962.32	1960.79	1962.69	0.008805	4.89	245.21	89.10	0.46		4.05
PimaChannel	1310.21	PF 1	1200.00	1958.42	1962.65	1960.96	1963.04	0.008502	5.00	239.86	86.35	0.44		4.23
PimaChannel	1350		Culvert											
PimaChannel	1364.51	PF 1	1200.00	1958.64	1963.27	1961.05	1963.54	0.005231	4.13	290.85	95.47	0.35		4.63
PimaChannel	1408.81*	PF 1	1200.00	1958.82	1963.52	1961.26	1963.76	0.004646	3.89	308.18	90.14	0.34		4.70
PimaChannel	1453.11*	PF 1	1200.00	1958.99	1963.75		1963.96	0.004459	3.72	322.33	82.99	0.33		4.76
PimaChannel	1497.41	PF 1	1200.00	1959.17	1963.96	1961.68	1964.16	0.004426	3.60	333.77	90.76	0.33		4.79
PimaChannel	1504.40	PF 1	1200.00	1963.06	1965.56	1965.56	1966.59	0.049747	8.14	147.37	72.50	1.01		2.50
PimaChannel	1546.08*	PF 1	1200.00	1963.22	1967.08	1965.76	1967.48	0.010699	5.13	233.95	71.84	0.50		3.86
PimaChannel	1587.76*	PF 1	1200.00	1963.38	1967.49	1965.94	1967.91	0.009513	5.19	231.22	82.93	0.48		4.11
PimaChannel	1629.44	PF 1	1200.00	1963.54	1967.87	1966.16	1968.33	0.009626	5.42	221.46	90.81	0.47		4.33
PimaChannel	1675		Culvert											
PimaChannel	1685.99	PF 1	1200.00	1963.77	1968.55	1966.19	1968.75	0.004329	3.62	331.70	91.41	0.32		4.77
PimaChannel	1730.7*	PF 1	1200.00	1963.95	1968.74	1966.39	1968.94	0.004272	3.60	333.60	90.50	0.32		4.79
PimaChannel	1775.41*	PF 1	1200.00	1964.14	1968.93		1969.13	0.004307	3.59	334.70	89.32	0.33		4.79
PimaChannel	1820.12	PF 1	1200.00	1964.32	1969.13	1966.83	1969.33	0.004361	3.58	335.48	90.90	0.33		4.81
PimaChannel	1826.93	PF 1	1200.00	1968.38	1970.90	1970.90	1971.91	0.048741	8.09	148.36	74.51	1.00		2.52
PimaChannel	1869.63*	PF 1	1300.00	1968.46	1972.39	1971.05	1972.79	0.010538	5.08	256.08	82.93	0.50		3.93
PimaChannel	1912.33*	PF 1	1300.00	1968.54	1972.84	1971.09	1973.17	0.007502	4.64	279.92	77.18	0.43		4.30
PimaChannel	1955.03*	PF 1	1300.00	1968.63	1973.16	1971.14	1973.47	0.006295	4.49	289.55	76.24	0.39		4.52
PimaChannel	1997.73	PF 1	1300.00	1968.71	1973.42	1971.19	1973.73	0.005812	4.45	291.93	75.07	0.37		4.71
PimaChannel	2025		Culvert											
PimaChannel	2032.79	PF 1	1300.00	1968.78	1974.22	1971.21	1974.42	0.003140	3.51	370.30	77.99	0.28		5.44
PimaChannel	2039.86	PF 1	1300.00	1968.80	1974.22	1971.31	1974.45	0.003746	3.92	331.83	76.09	0.31	0.86	5.41
PimaChannel	2051.07	PF 1	1300.00	1973.00	1975.43	1975.43	1976.44	0.050426	8.07	161.09	80.76	1.01		2.43
PimaChannel	2082.55*	PF 1	1300.00	1973.06	1976.77	1975.58	1977.17	0.011844	5.12	253.78	84.88	0.52		3.71
PimaChannel	2114.04	PF 1	1300.00	1973.13	1974.53	1975.75	1979.57	0.528069	18.02	72.16	63.66	2.98		1.40
PimaChannel	2119.18	PF 1	1300.00	1976.87	1979.49	1979.49	1980.56	0.049123	8.29	156.79	74.38	1.01		2.62
PimaChannel	2158.28*	PF 1	1300.00	1977.03	1981.01	1979.70	1981.42	0.011076	5.17	251.46	79.21	0.51		3.98
PimaChannel	2197.39*	PF 1	1300.00	1977.19	1981.43	1979.89	1981.83	0.009656	5.09	255.42	76.53	0.48		4.23
PimaChannel	2236.49*	PF 1	1300.00	1977.34	1981.78	1980.11	1982.20	0.009185	5.17	251.51	78.10	0.47	0.26	4.44
PimaChannel	2275.60	PF 1	1300.00	1977.50	1982.13	1980.36	1982.57	0.009375	5.36	242.83	75.52	0.47	0.49	4.63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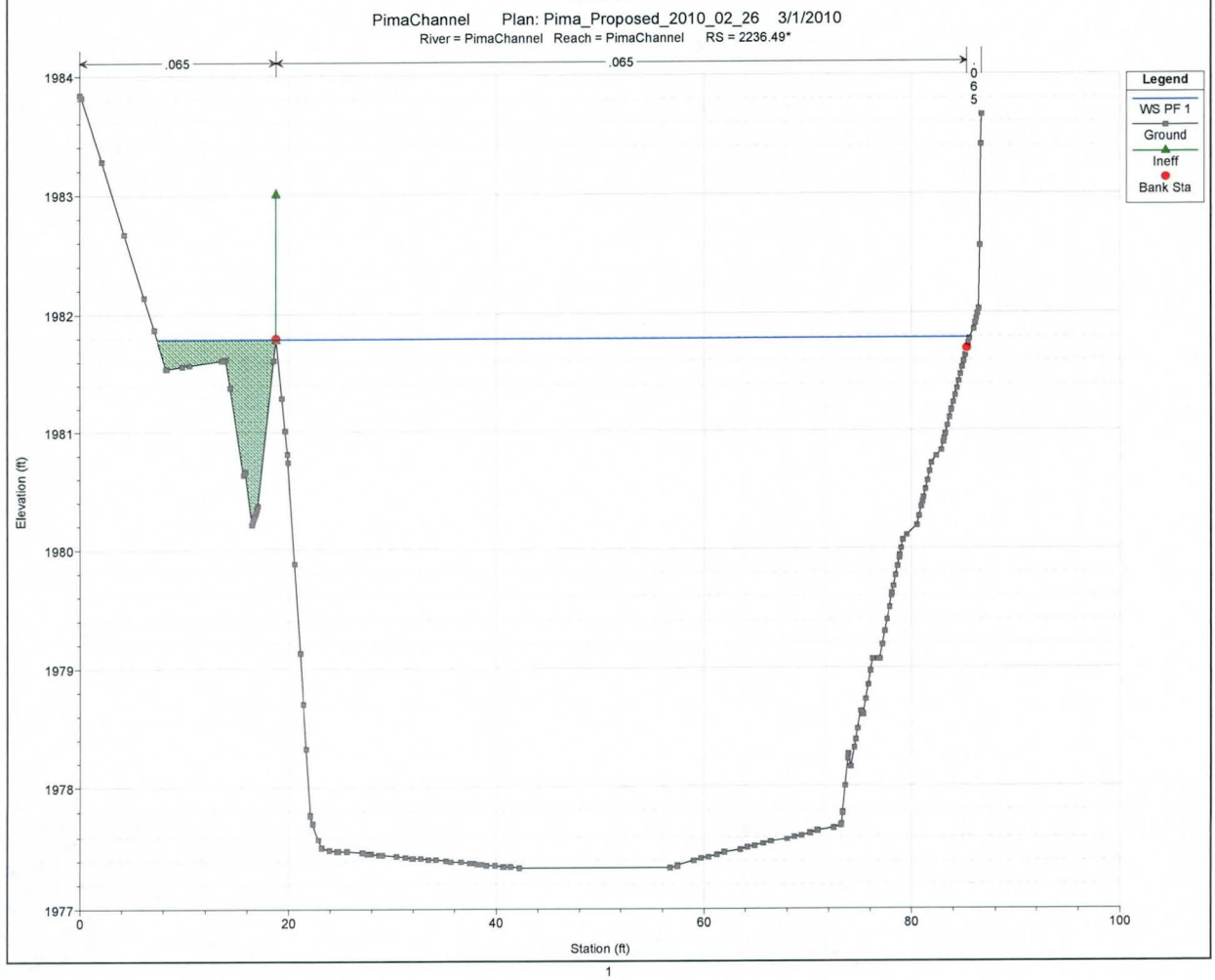
River = PimaChannel Reach = PimaChannel RS = 2275.60
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1985
1984
1983
1982
1981
1980
1979
1978
1977
0
20
40
60
80
100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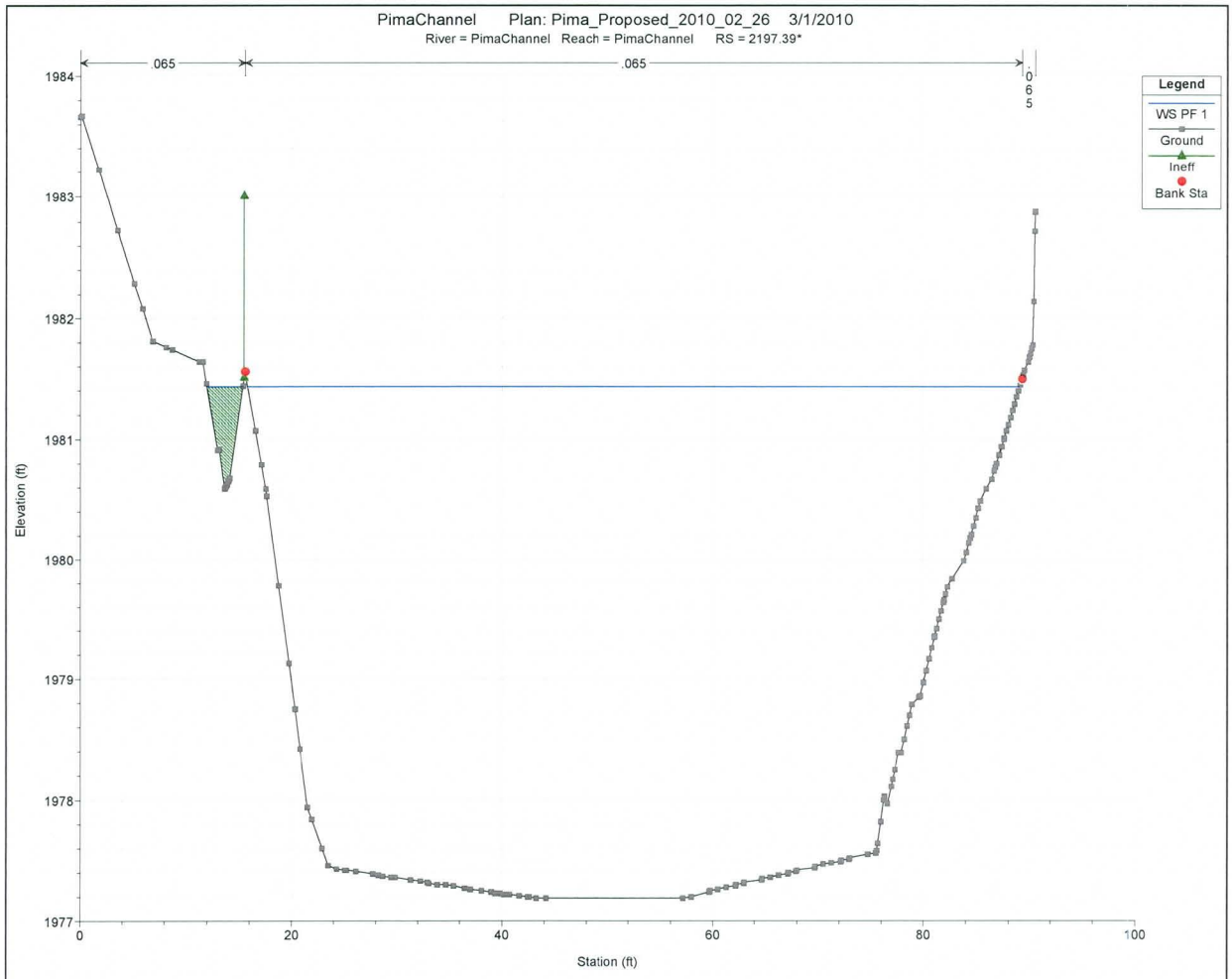
River = PimaChannel Reach = PimaChannel RS = 2236.49*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1984
1983
1982
1981
1980
1979
1978
1977
0
20
40
60
80
100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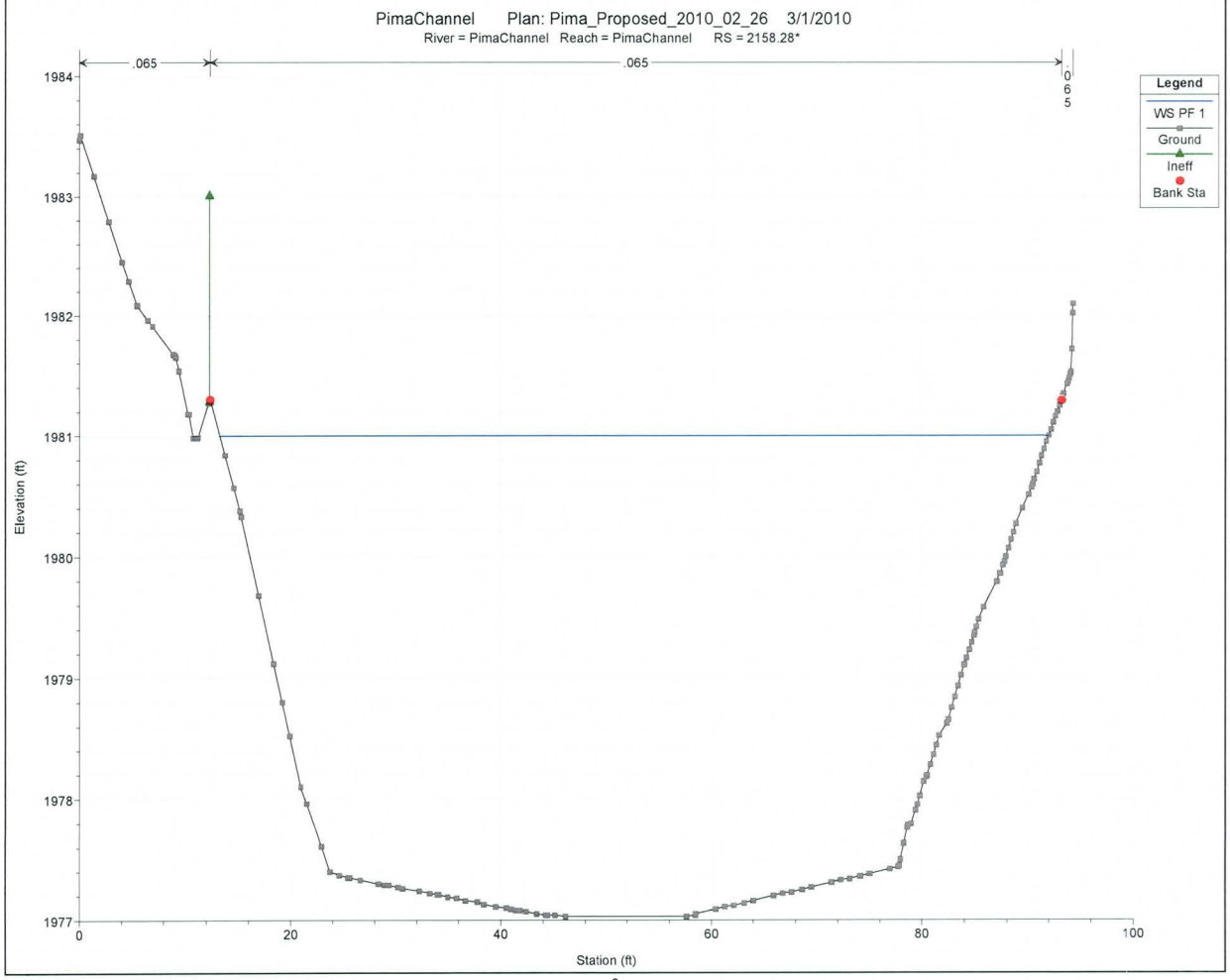
River = PimaChannel Reach = PimaChannel RS = 2197.39*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1984
1983
1982
1981
1980
1979
1978
1977
0
20
40
60
80
100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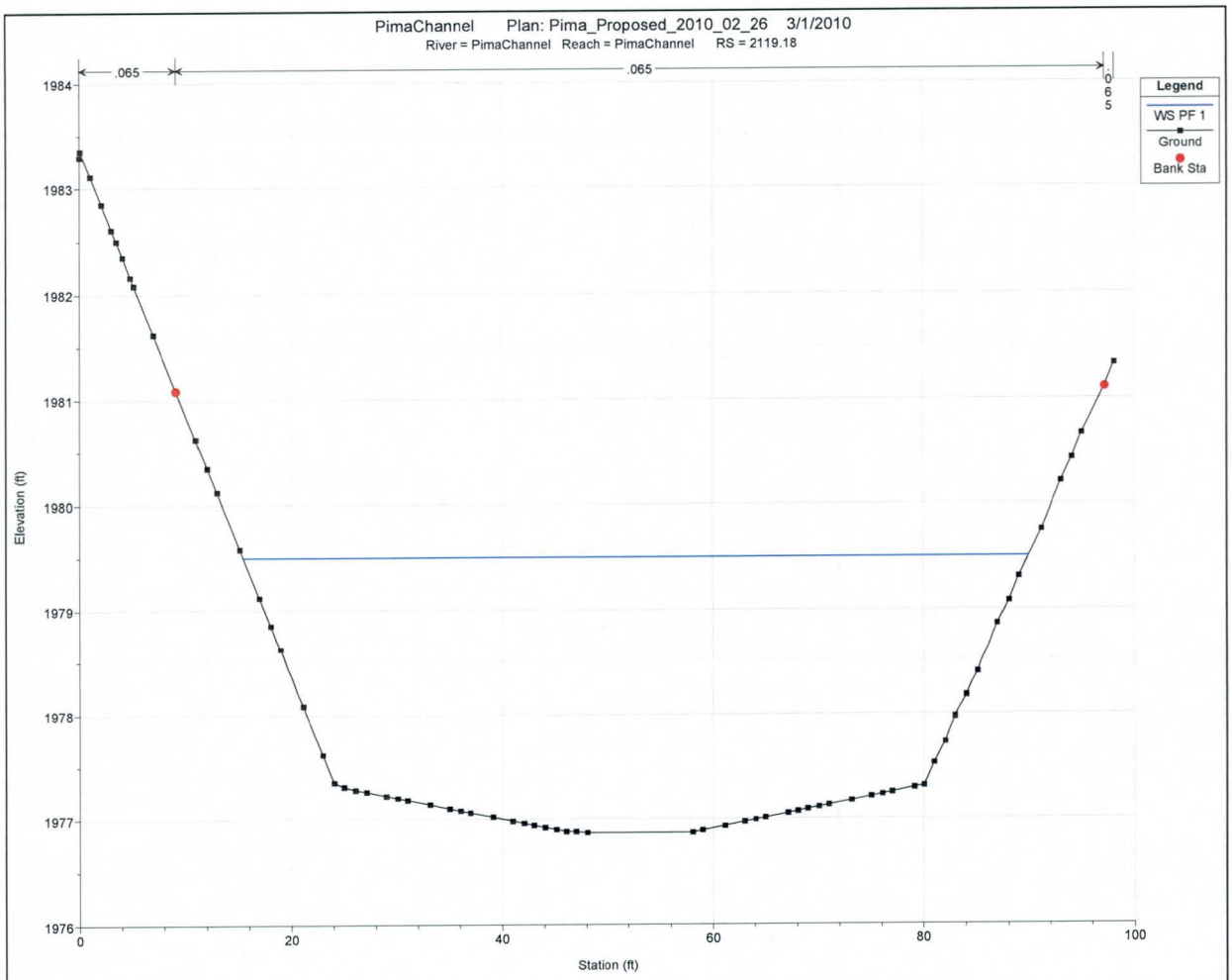
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1984
1983
1982
1981
1980
1979
1978
1977
0
20
40
60
80
100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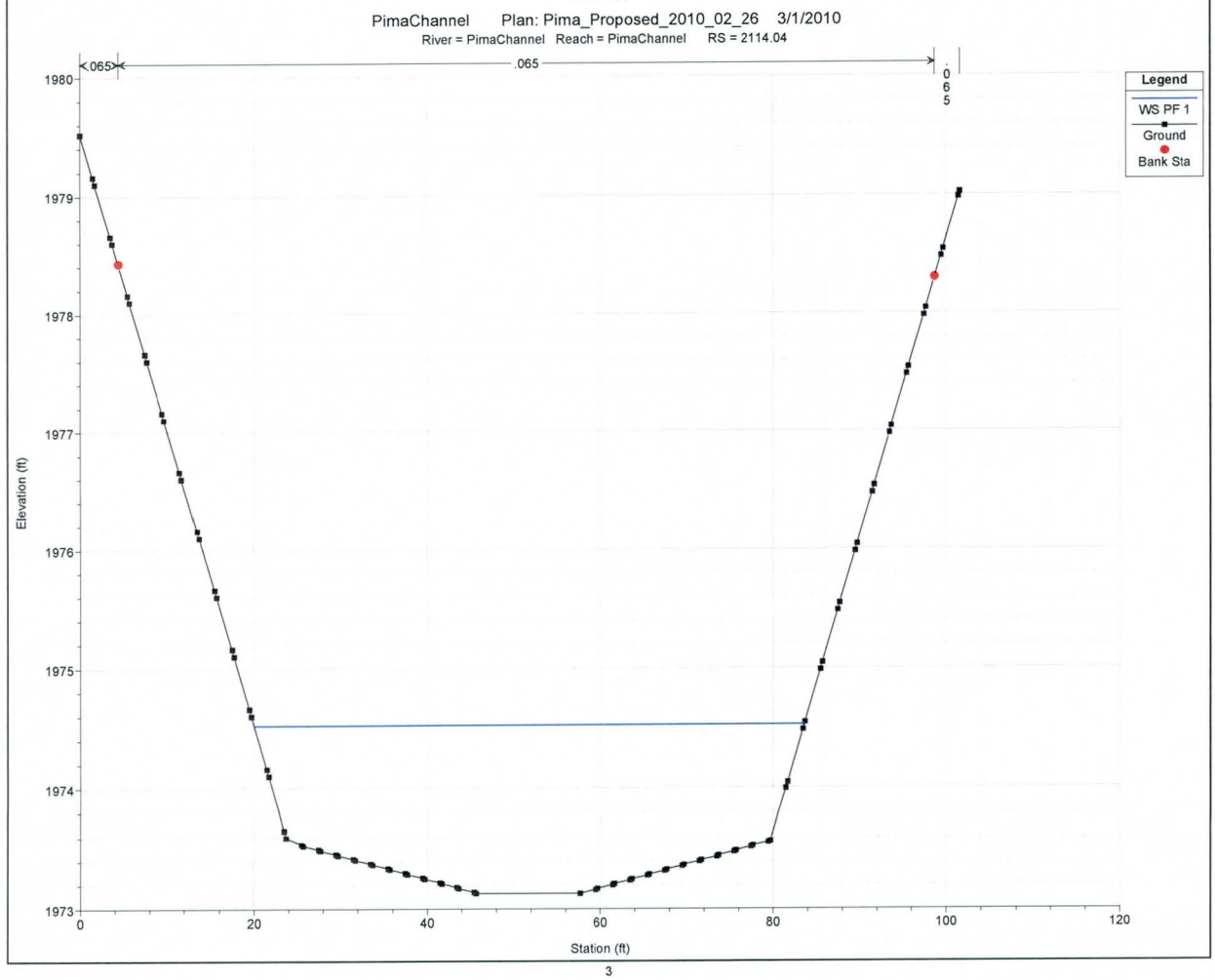
River = PimaChannel Reach = PimaChannel RS = 2119.18
.065
.065
0
6
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1984
1983
1982
1981
1980
1979
1978
1977
1976
0
20
40
60
80
100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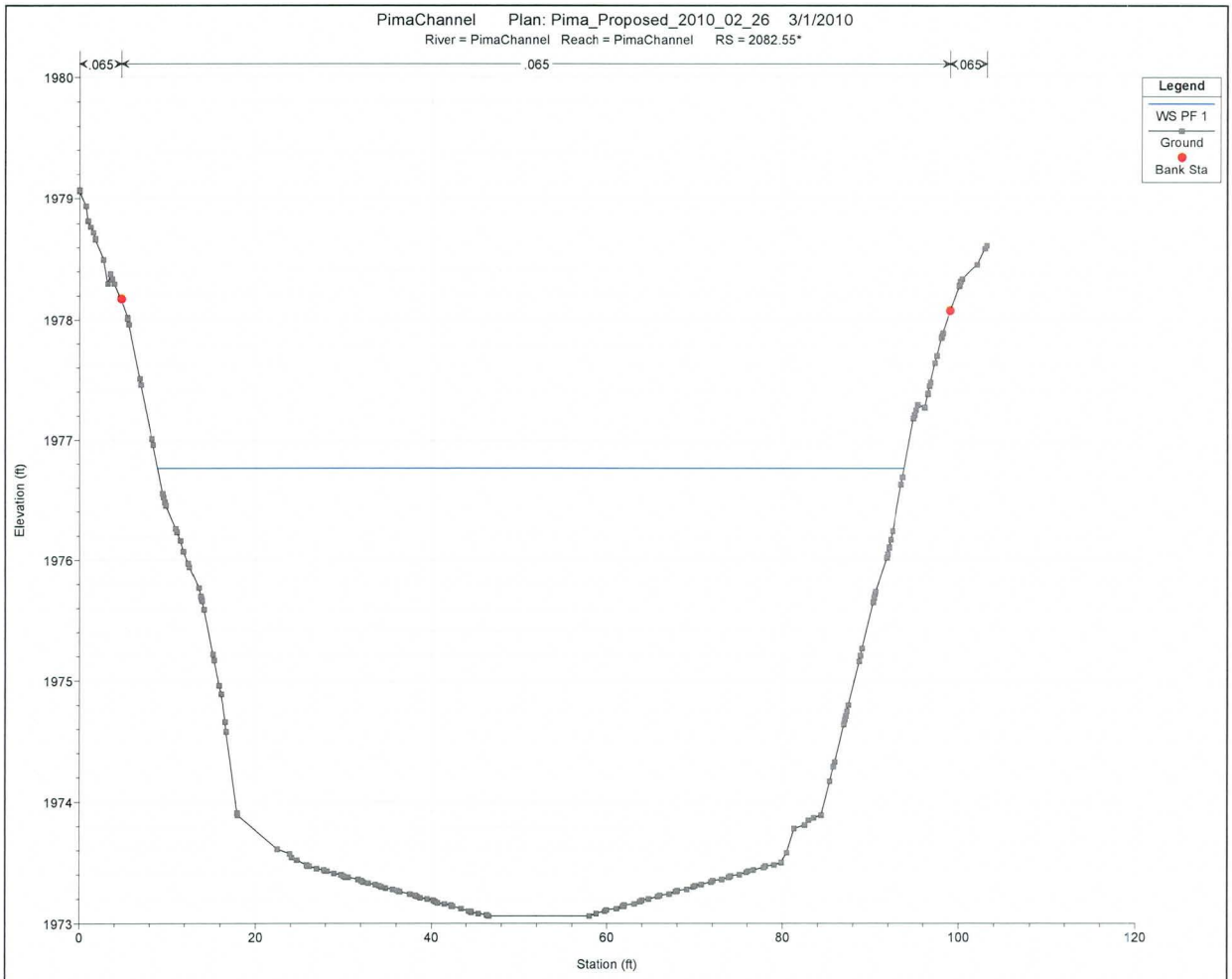
River = PimaChannel Reach = PimaChannel RS = 2114.04
.065
.065
0
6
5
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1980
1979
1978
1977
1976
1975
1974
1973
0
20
40
60
80
100
120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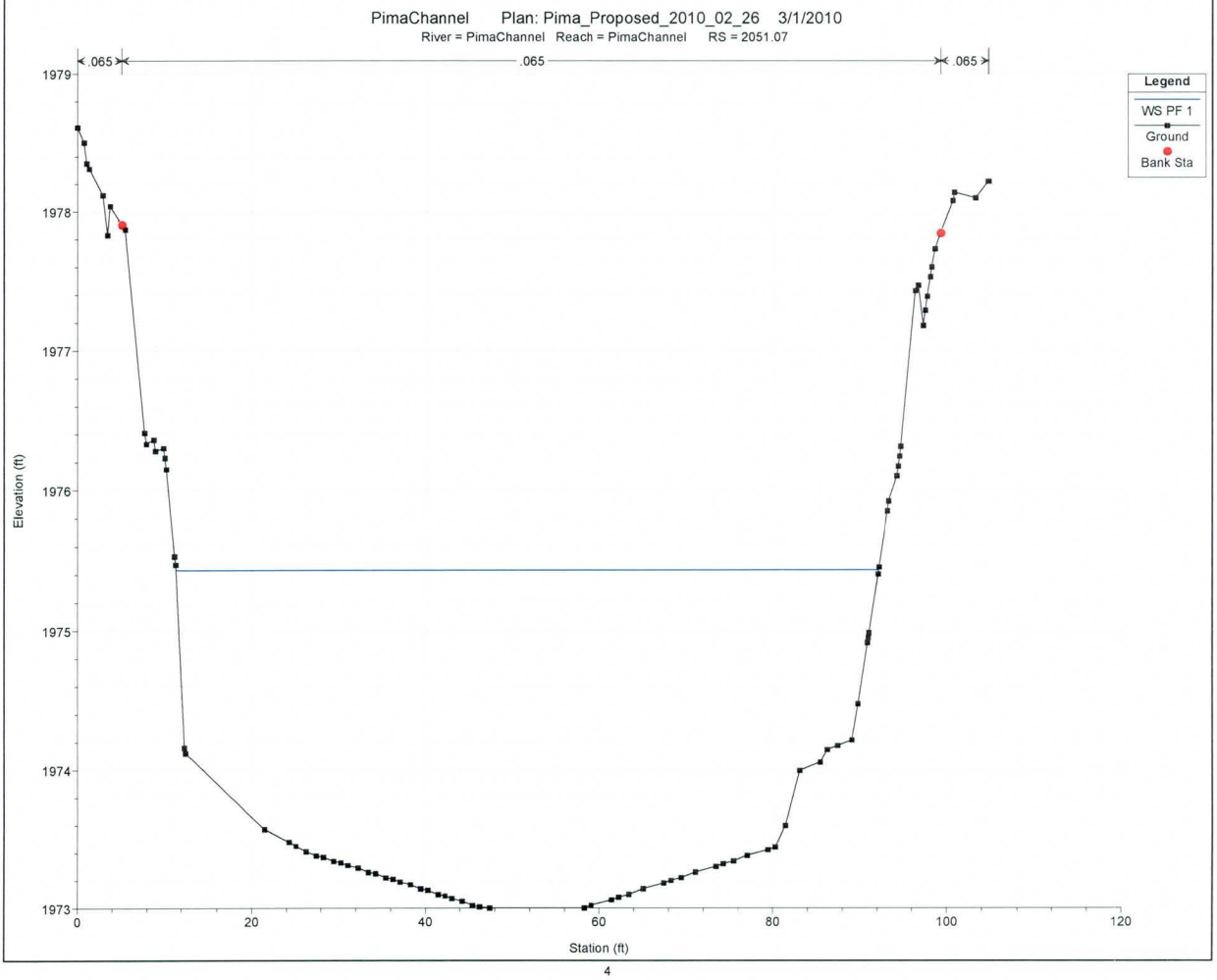
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1980
1979
1978
1977
1976
1975
1974
1973
0
20
40
60
80
100
120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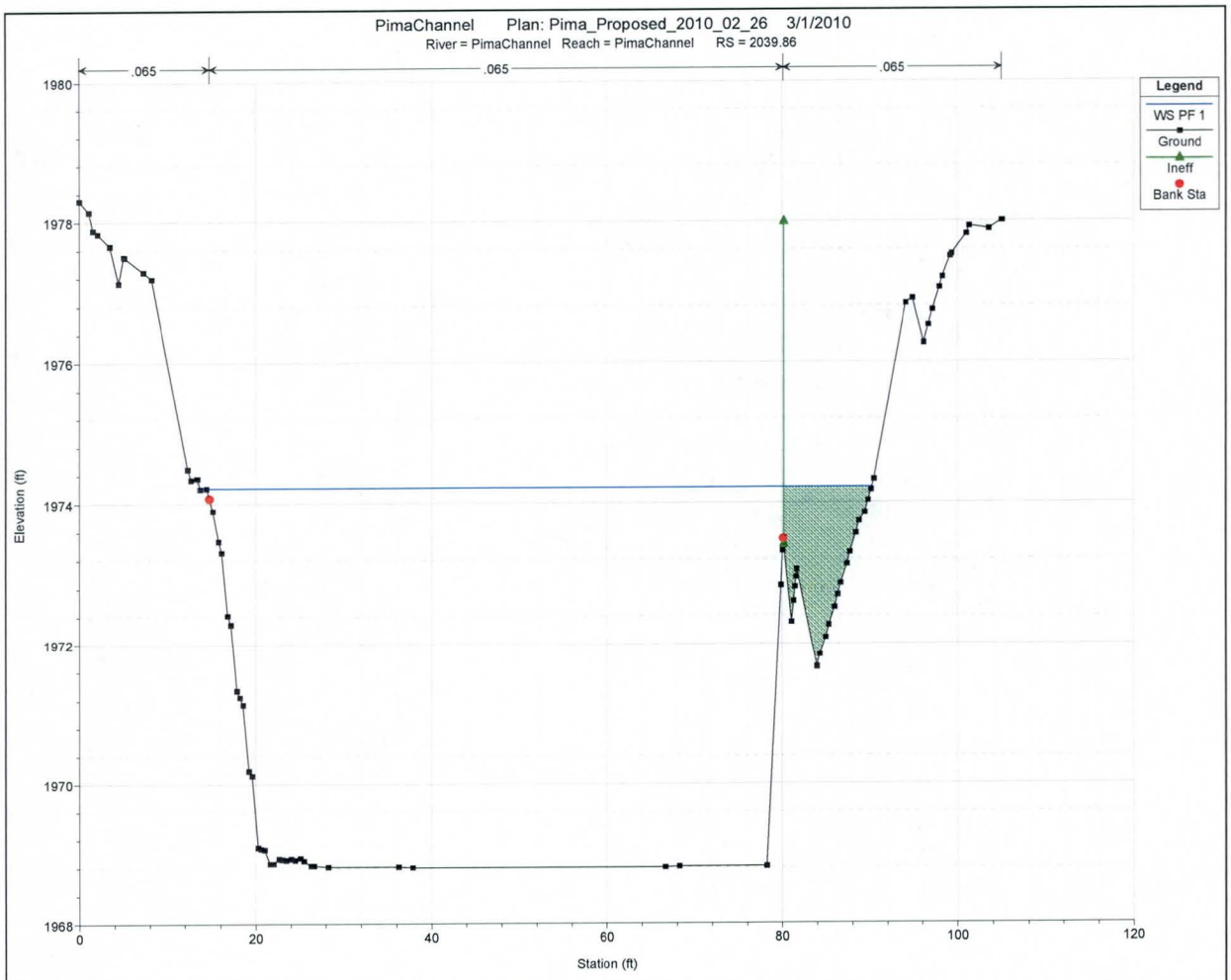
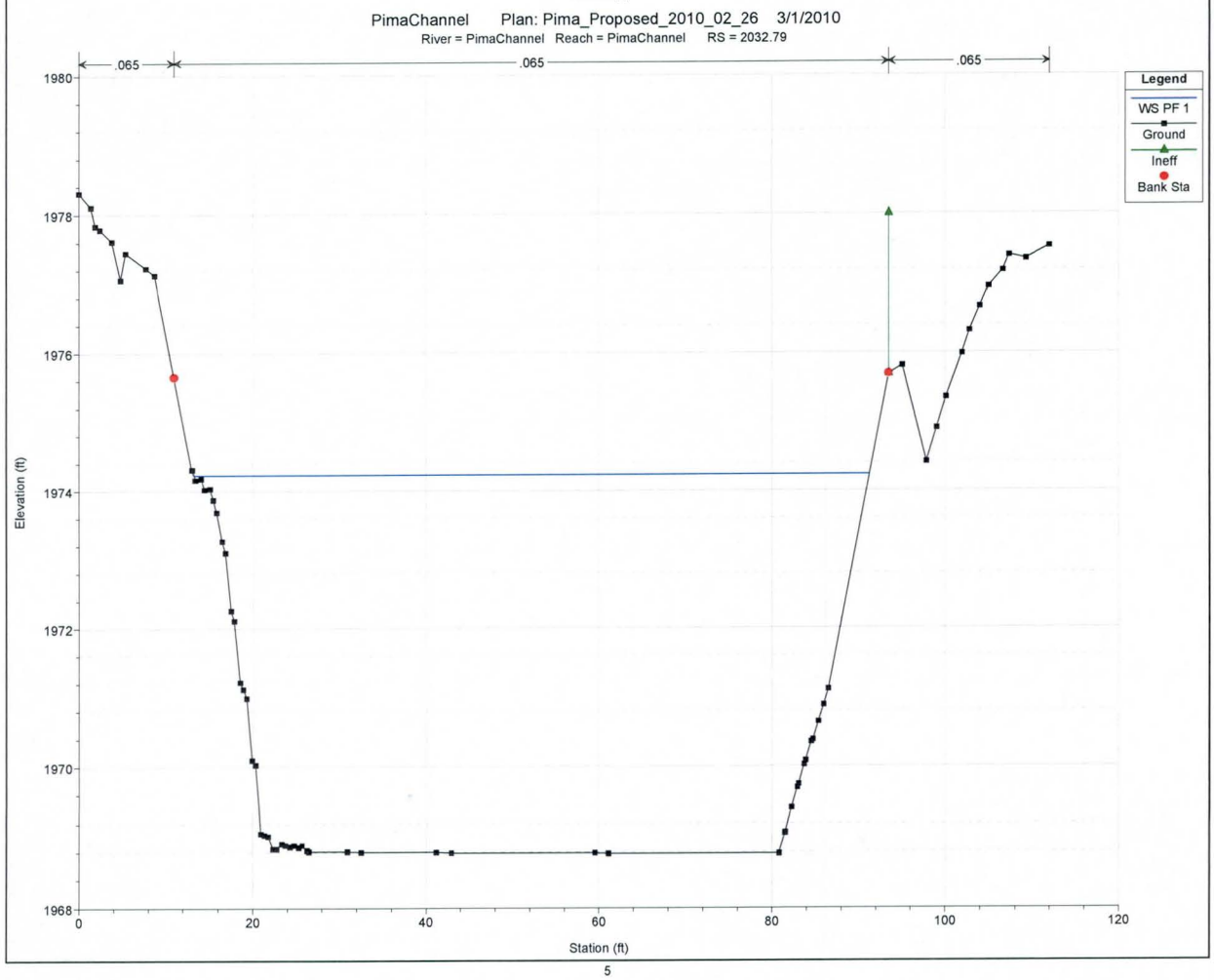
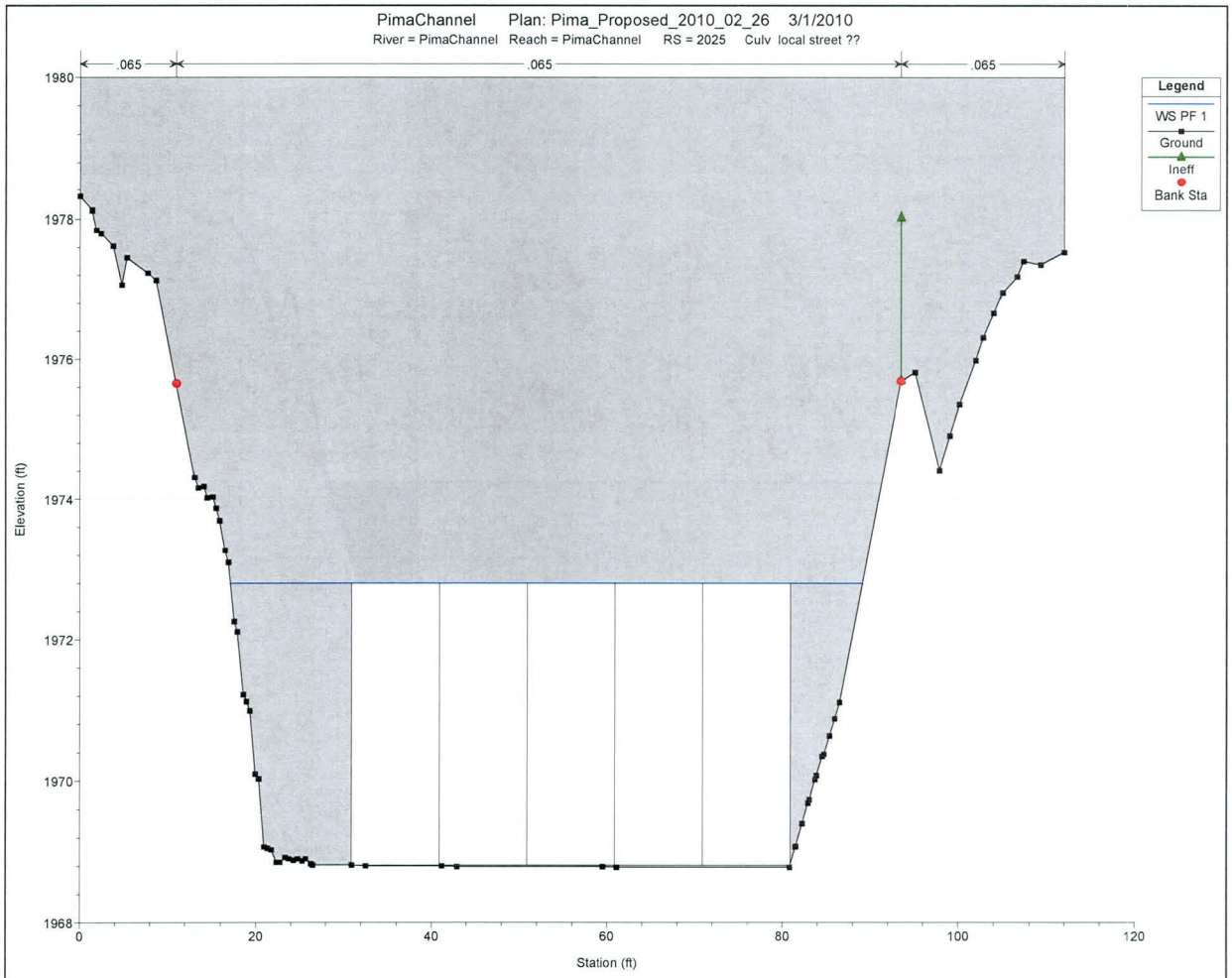
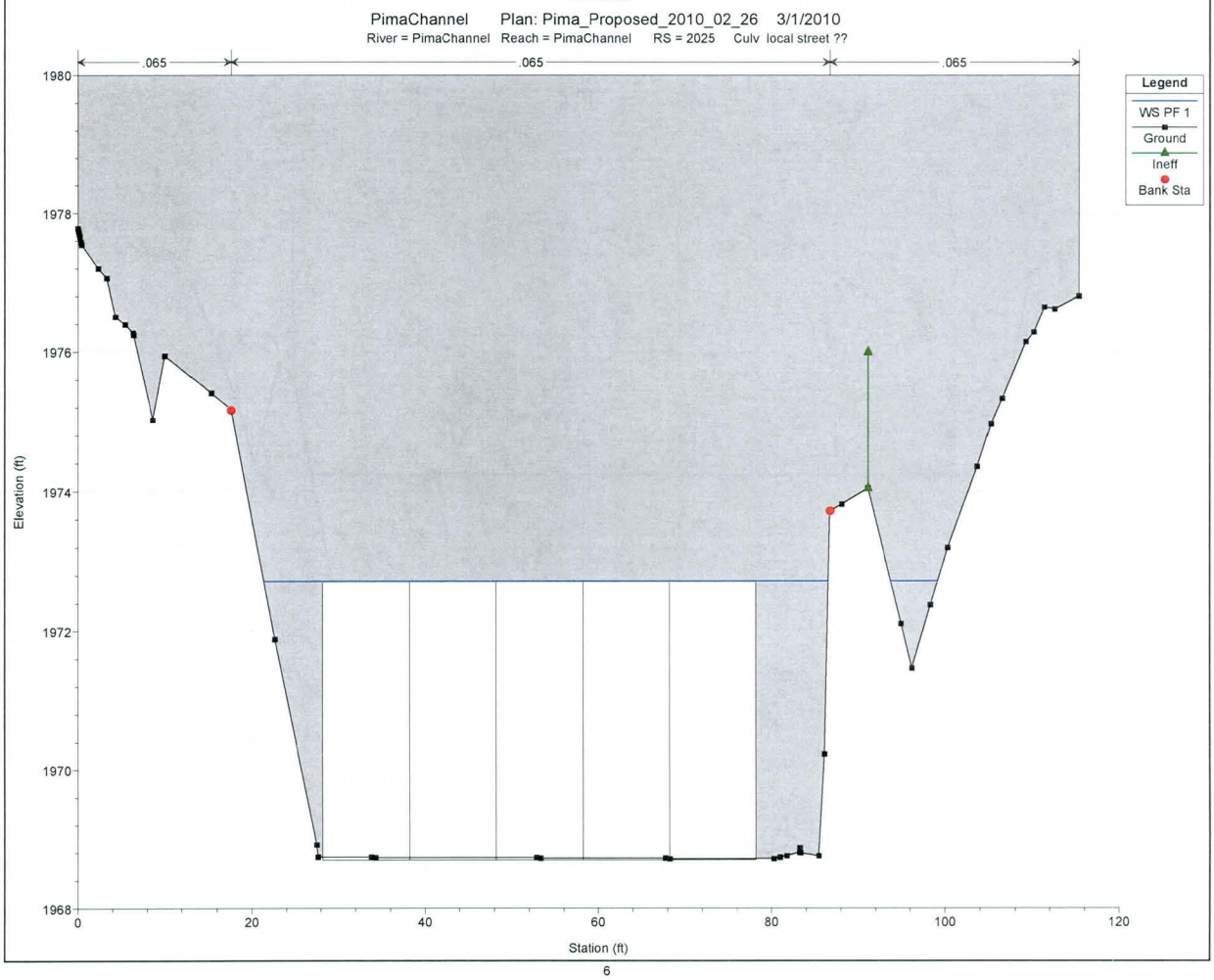
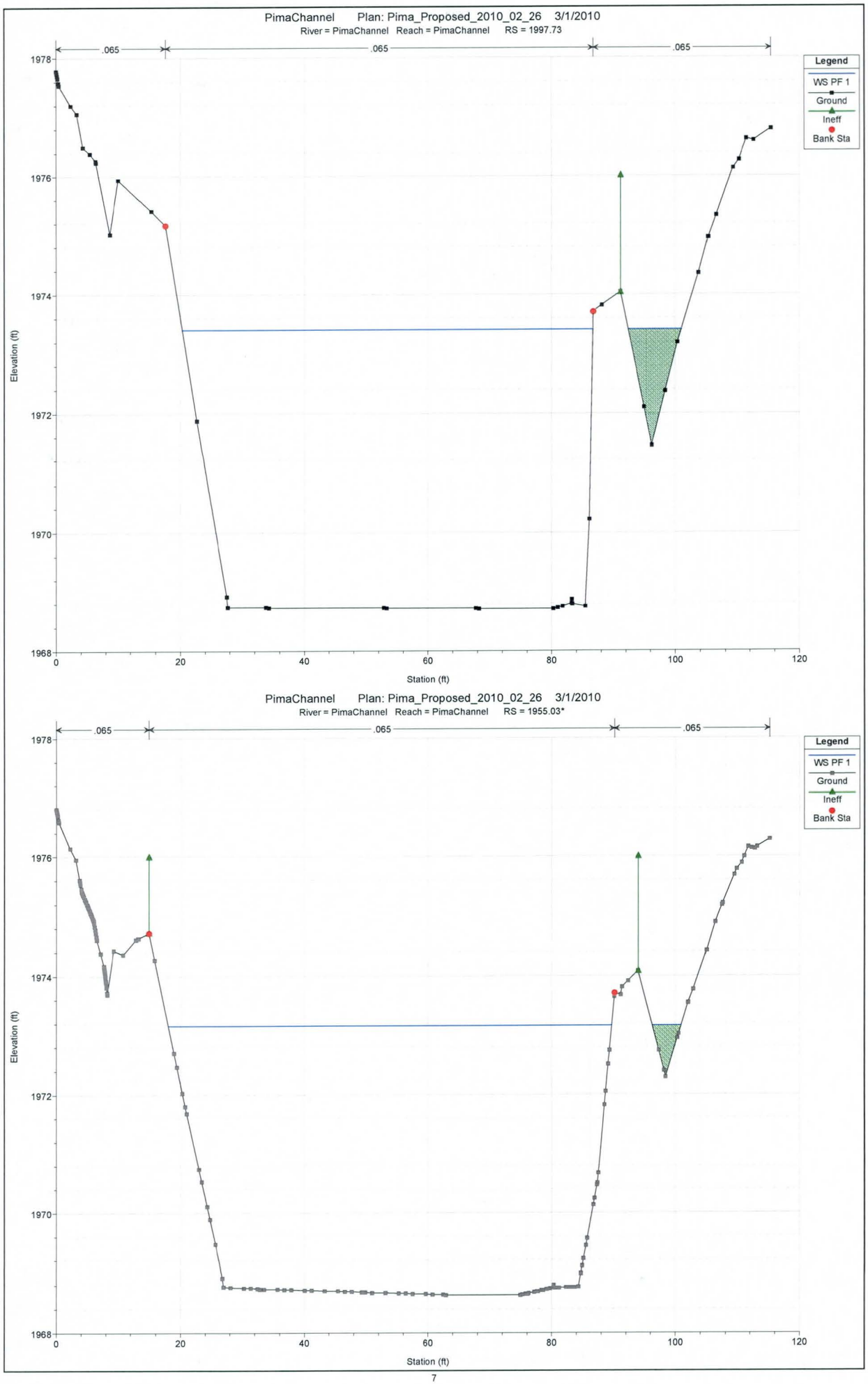
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1979
1978
1977
1976
1975
1974
1973
0
20
40
60
80
100
120


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 2039.86
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1980
1978
1976
1974
1972
1970
1968
0
20
40
60
80
100
120


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 2032.79
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1980
1978
1976
1974
1972
1970
1968
0
20
40
60
80
100
120


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 2025 Culv local street ??
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1980
1978
1976
1974
1972
1970
1968
0
20
40
60
80
100
120


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 2025 Culv local street ??
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1980
1978
1976
1974
1972
1970
1968
0
20
40
60
80
100
120


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1997.73
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.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1978
1976
1974
1972
1970
1968
0
20
40
60
80
100
120
Station (ft)
PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1955.03*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1978
1976
1974
1972
1970
1968
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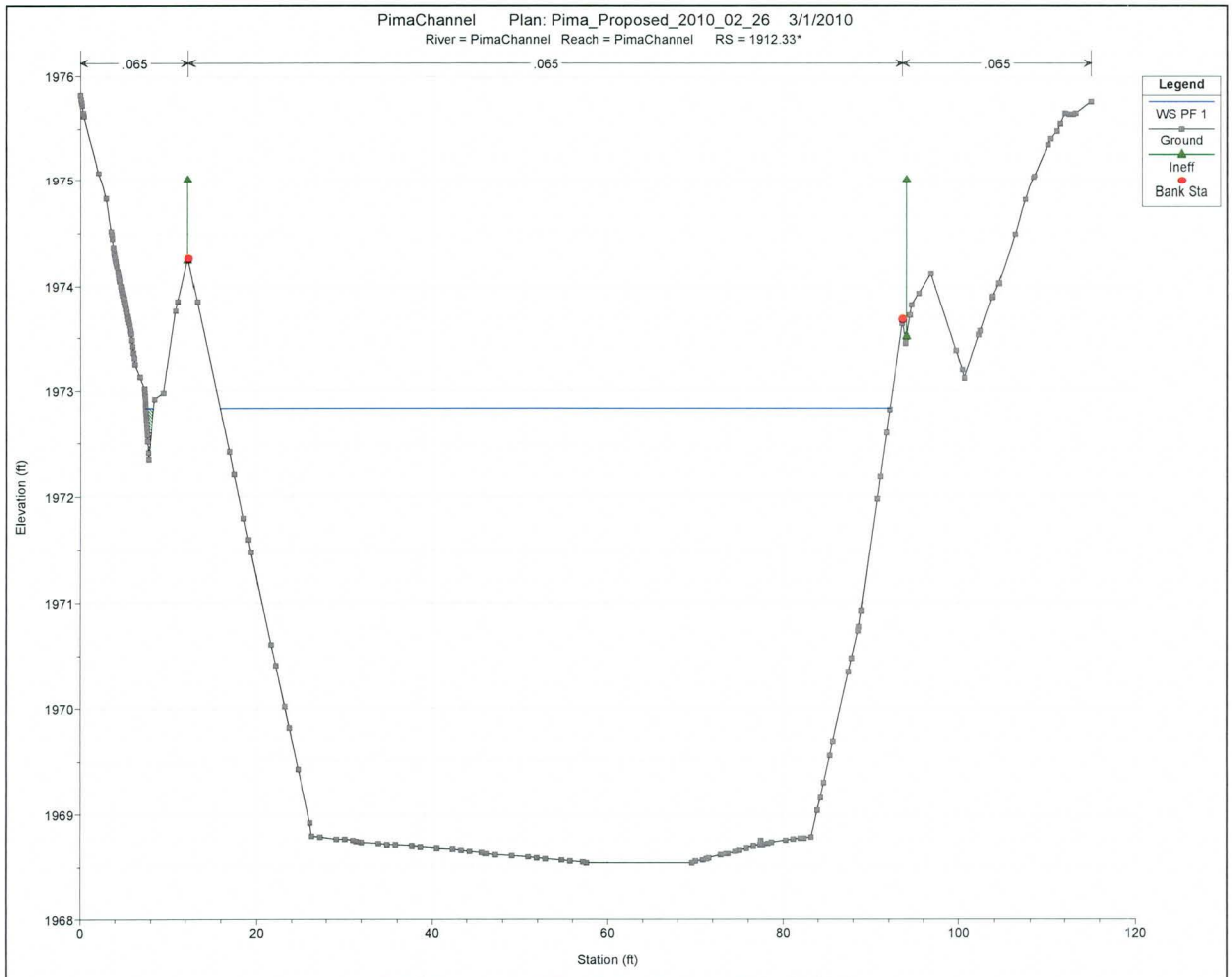
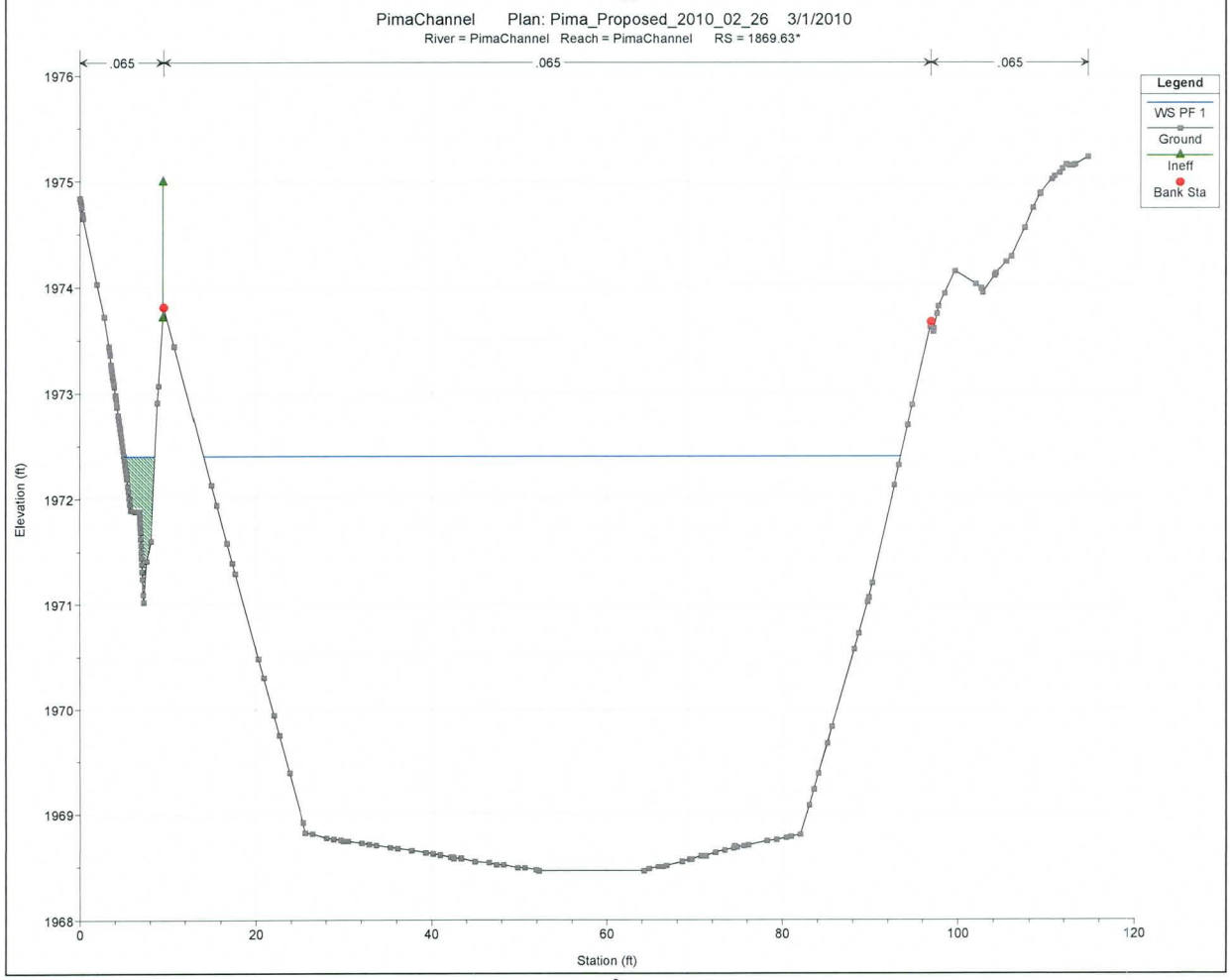
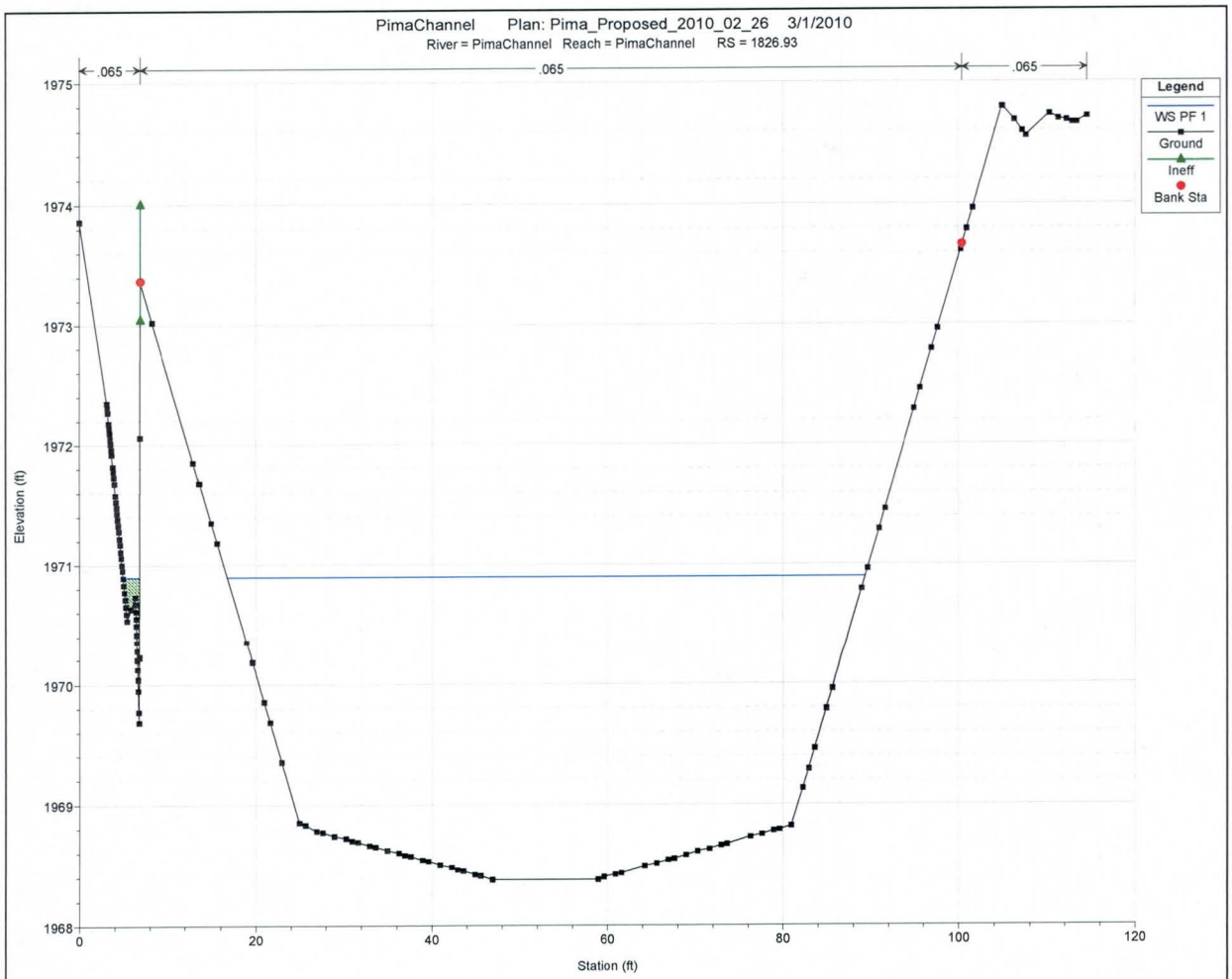
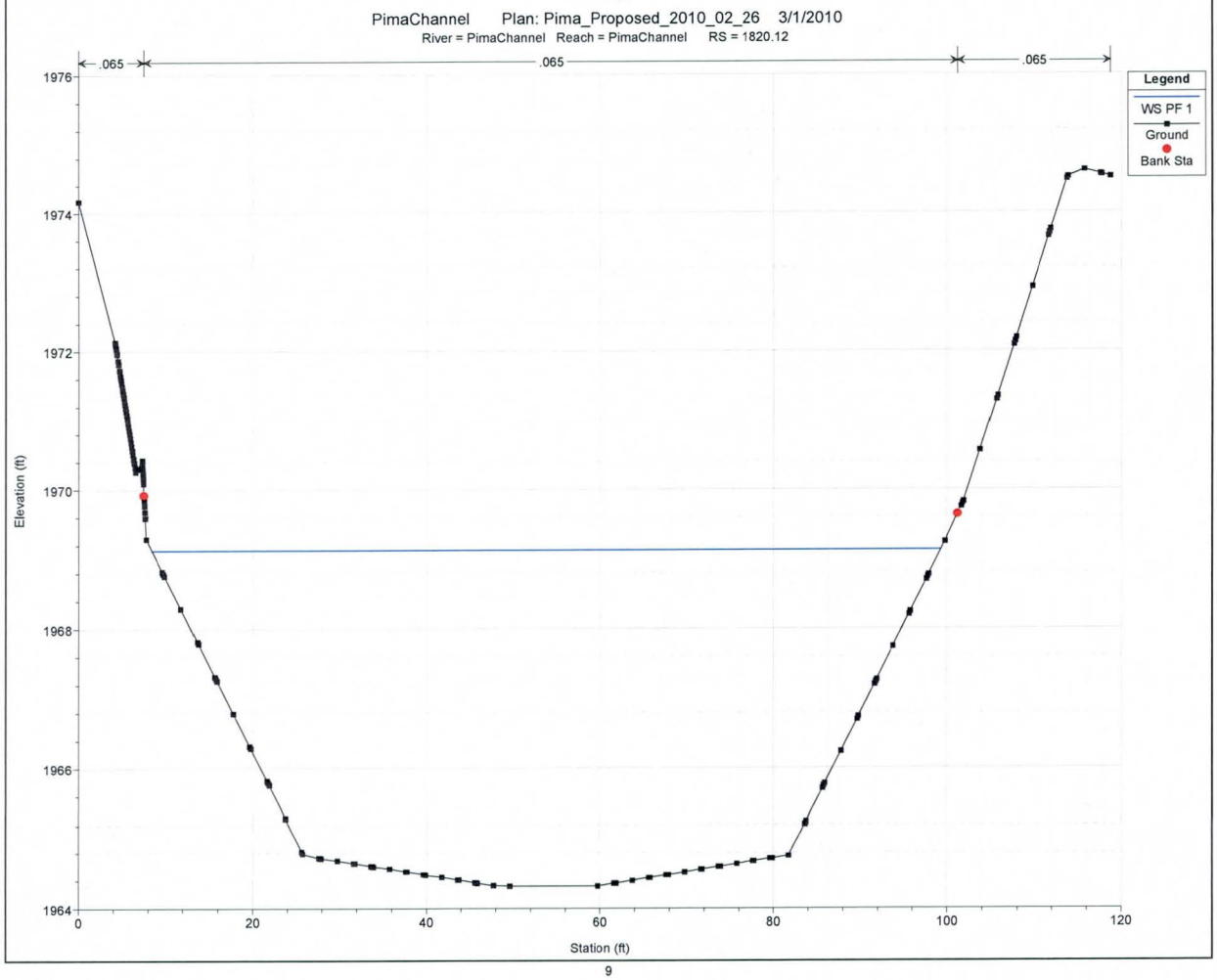
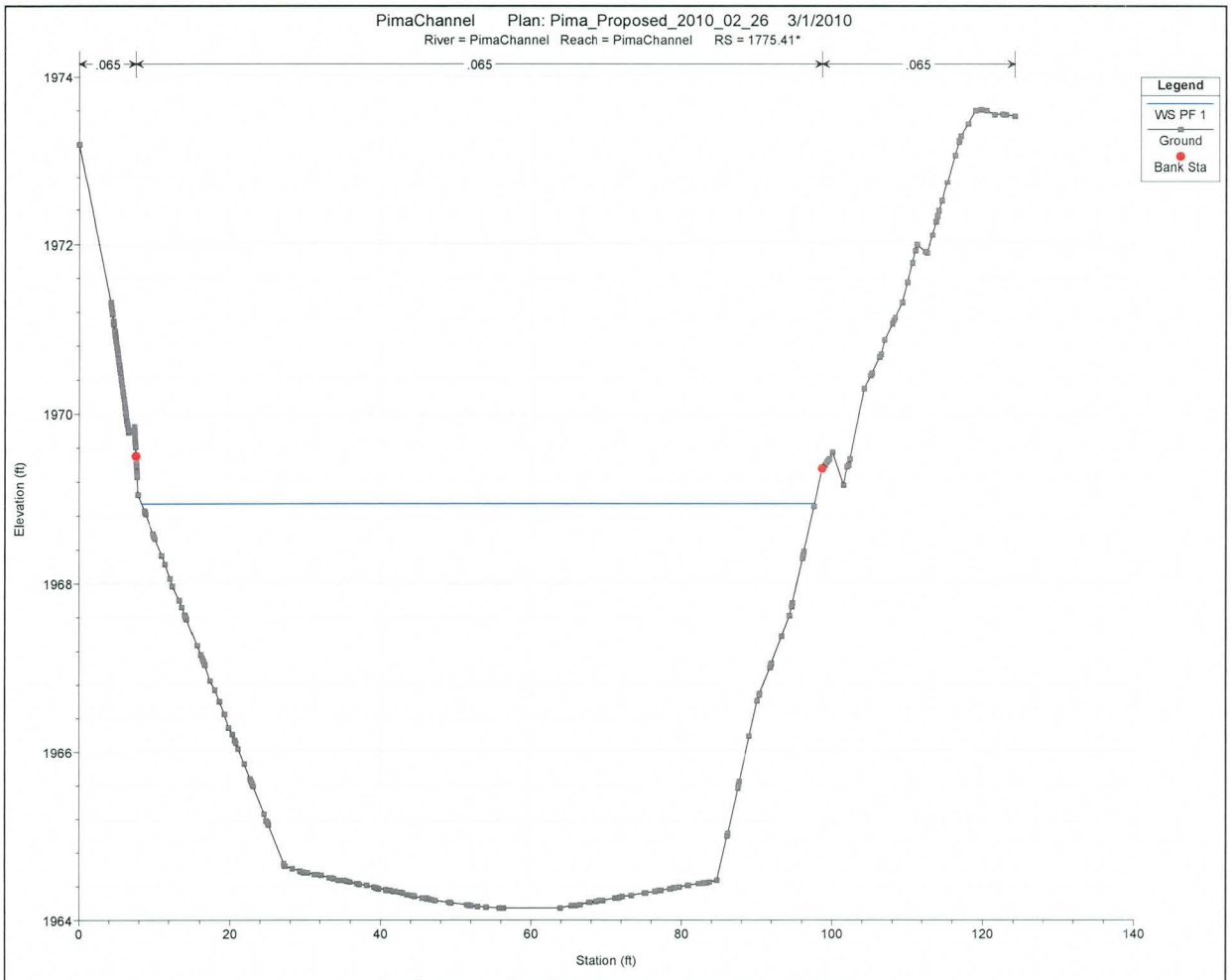
20
40
60
80
100
120
Station (ft)

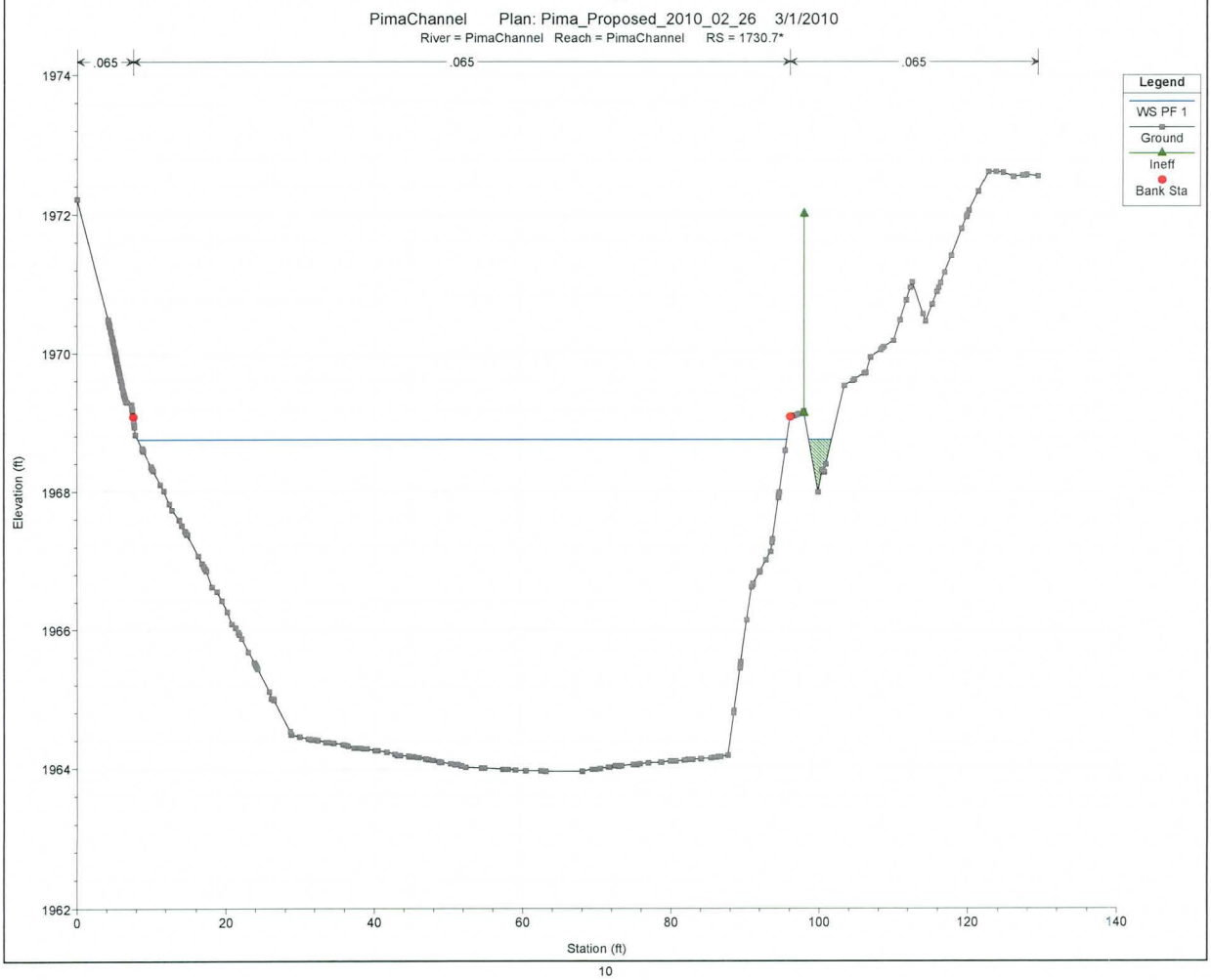

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1912.33*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1976
1975
1974
1973
1972
1971
1970
1969
1968
0
20
40
60
80
100
120

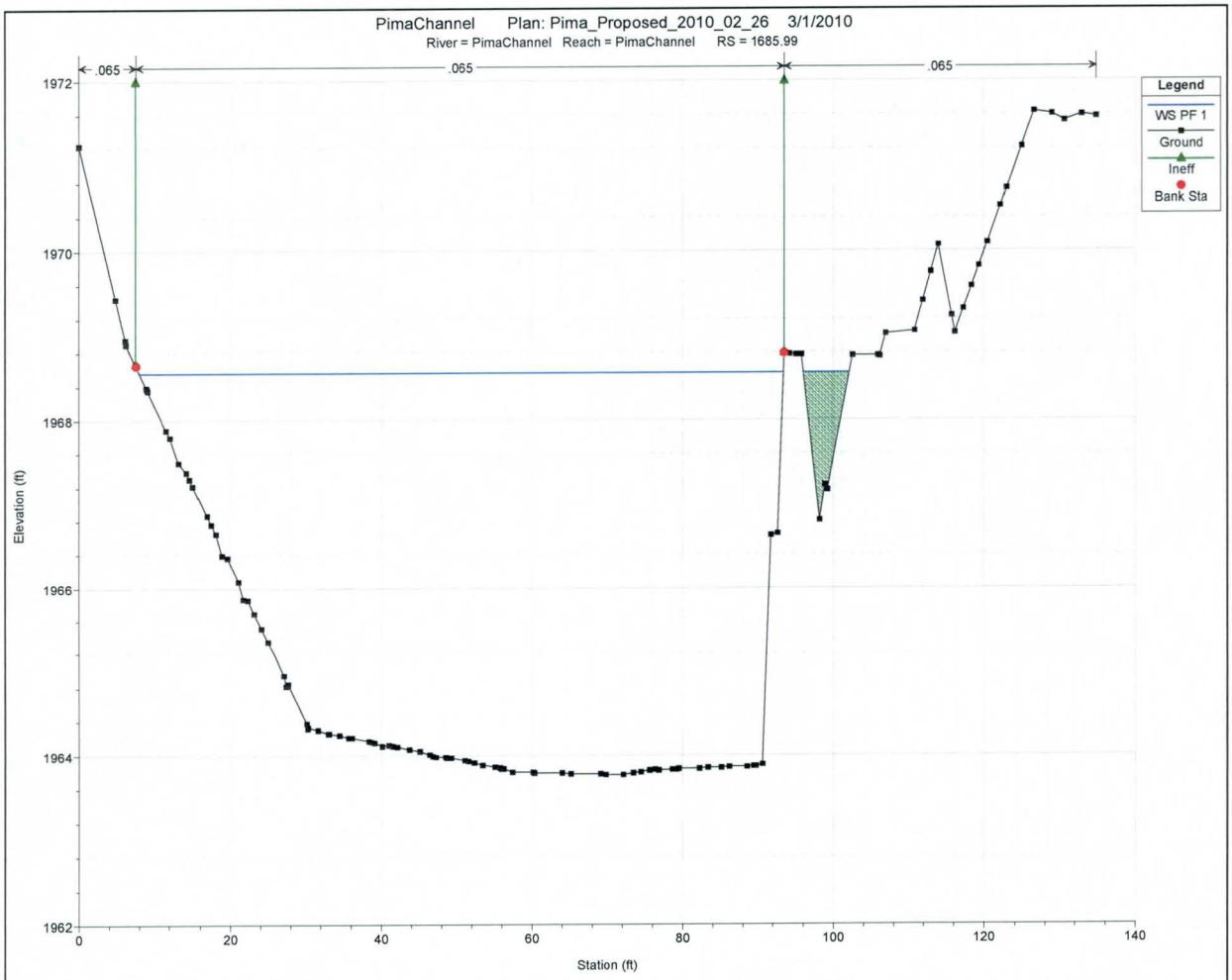

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1869.63*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1976
1975
1974
1973
1972
1971
1970
1969
1968
0
20
40
60
80
100
120

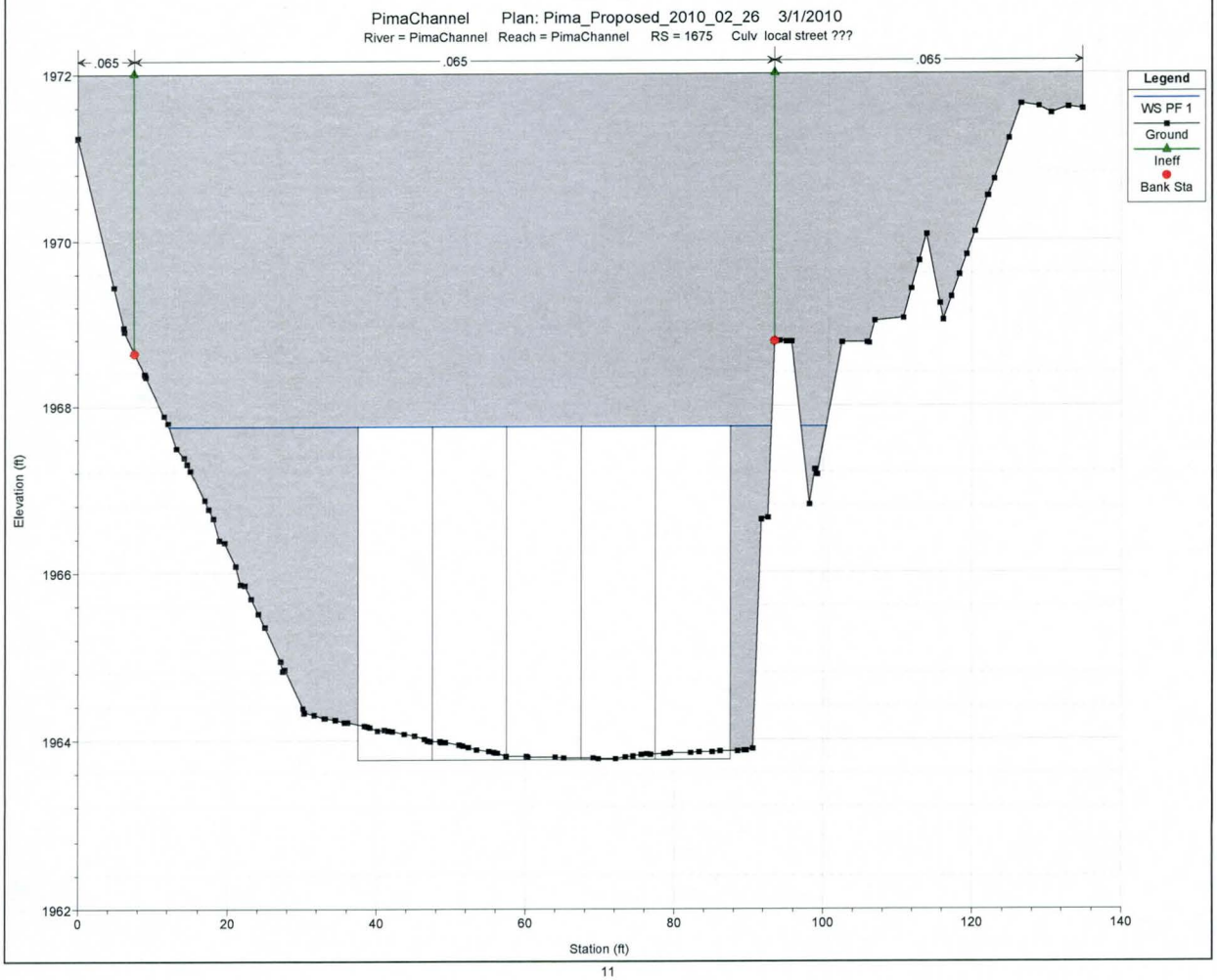

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1826.93
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

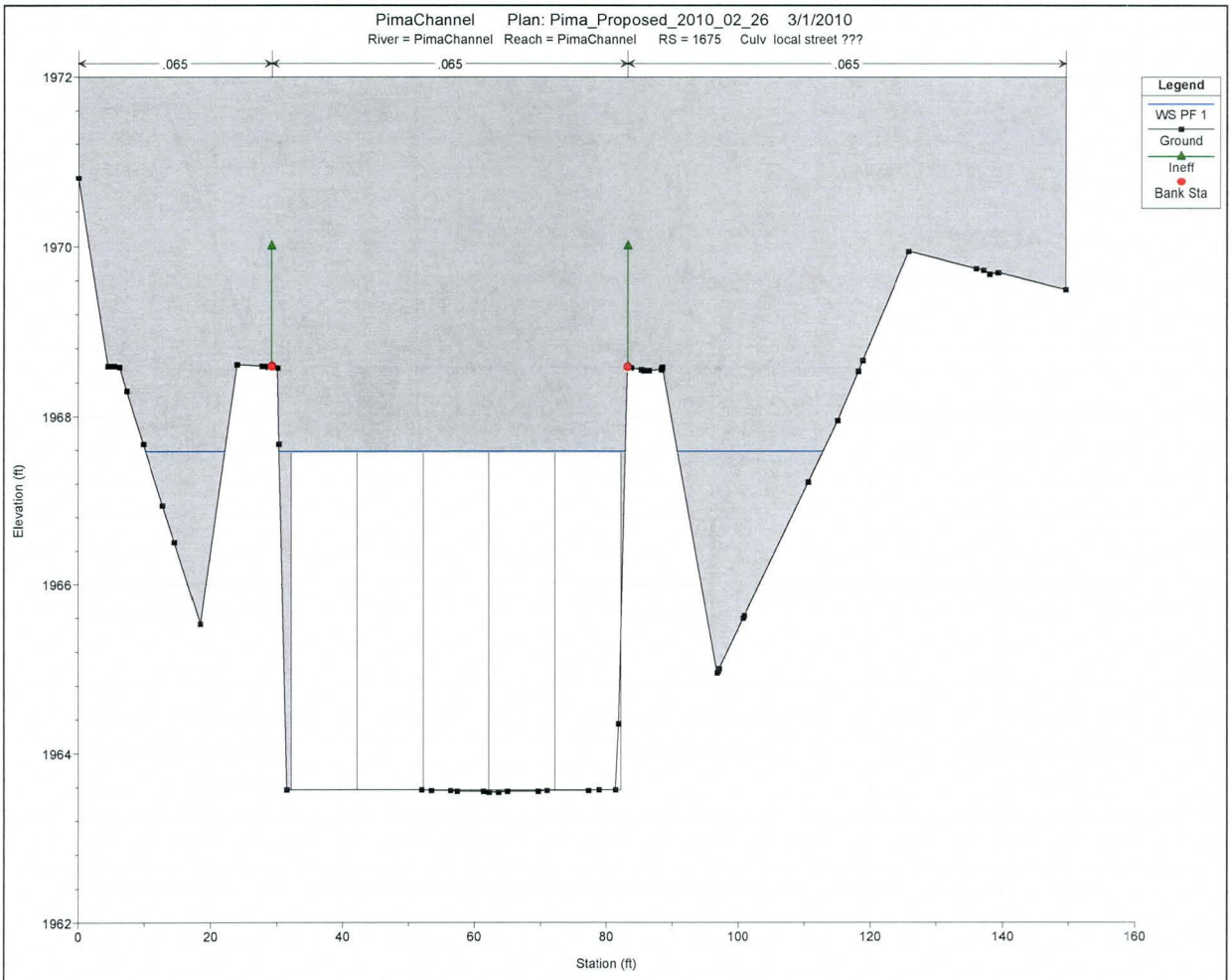

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1820.12
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

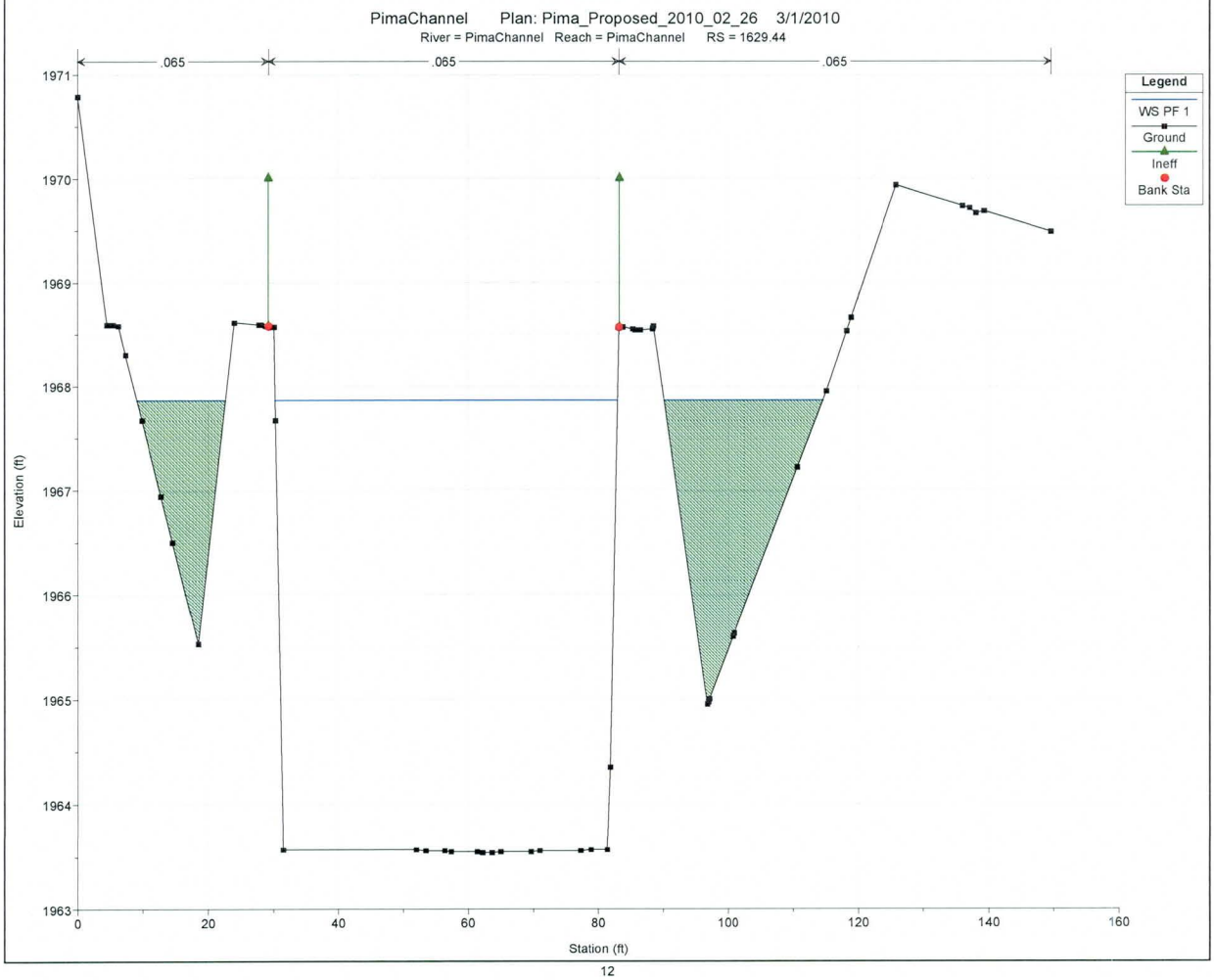

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1775.41*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

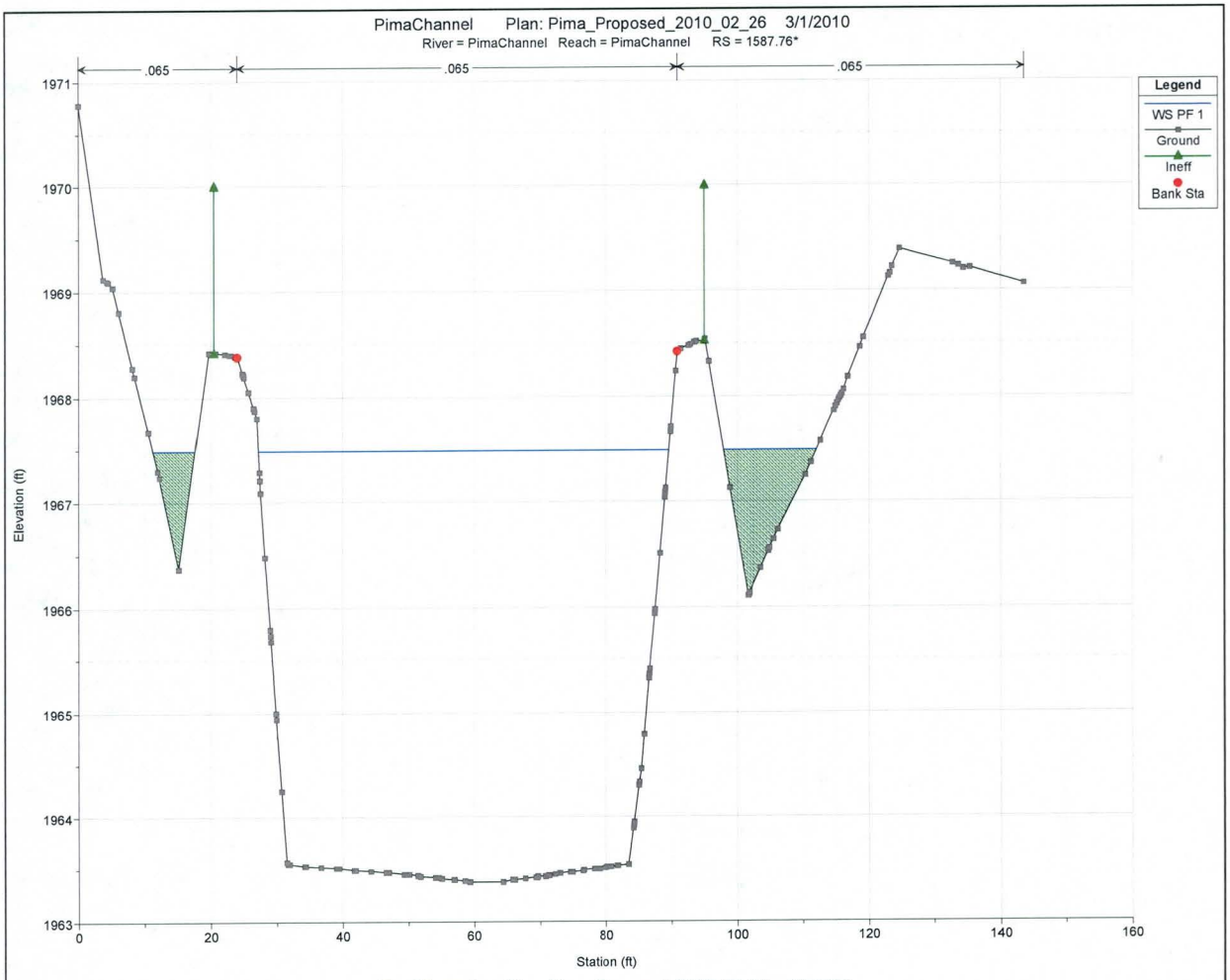

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1730.7*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

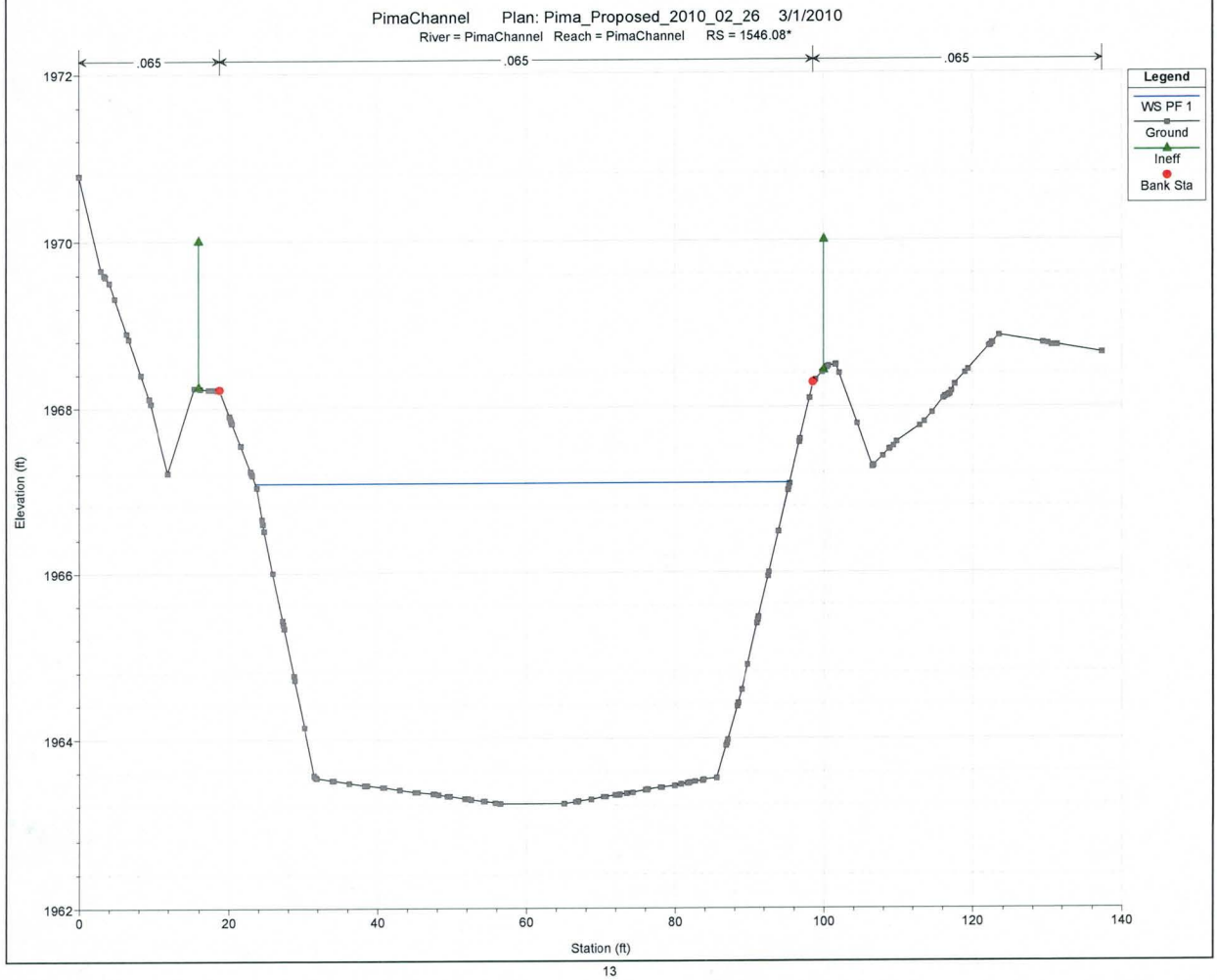

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1685.99
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

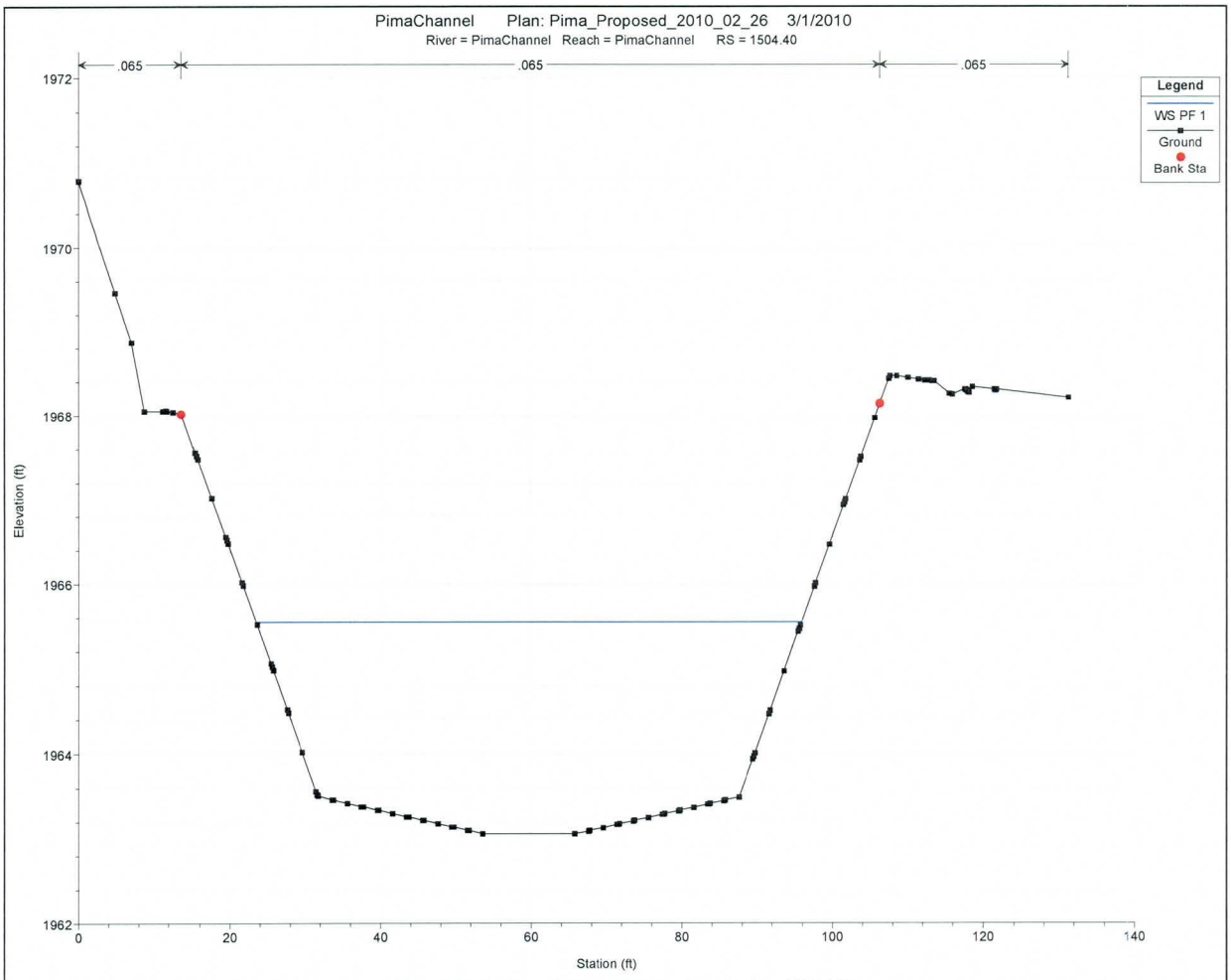

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1675 Culv local street ???
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

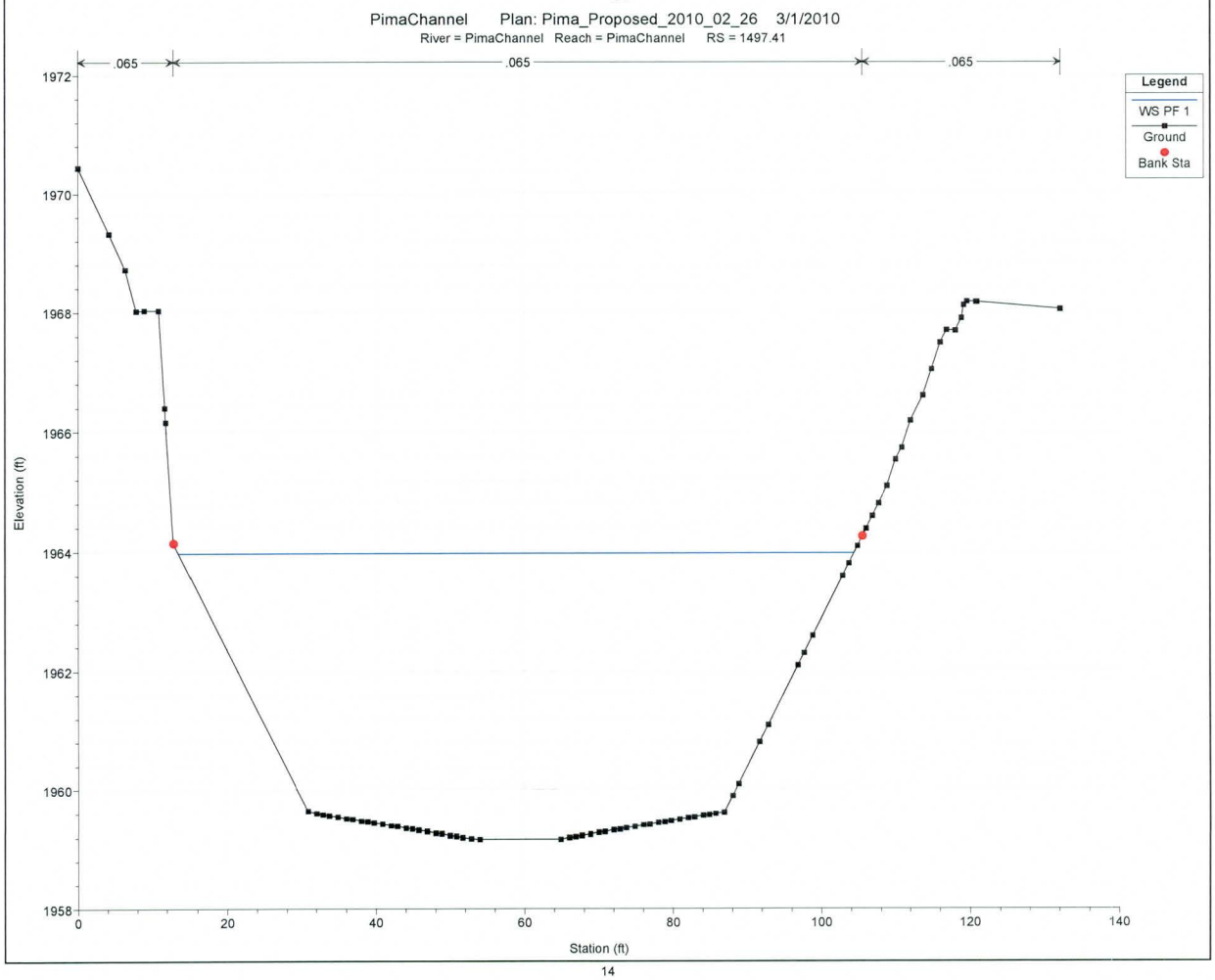

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1675 Culv local street ???
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1962
1964
1966
1968
1970
1972
0
20
40
60
80
100
120
140
160

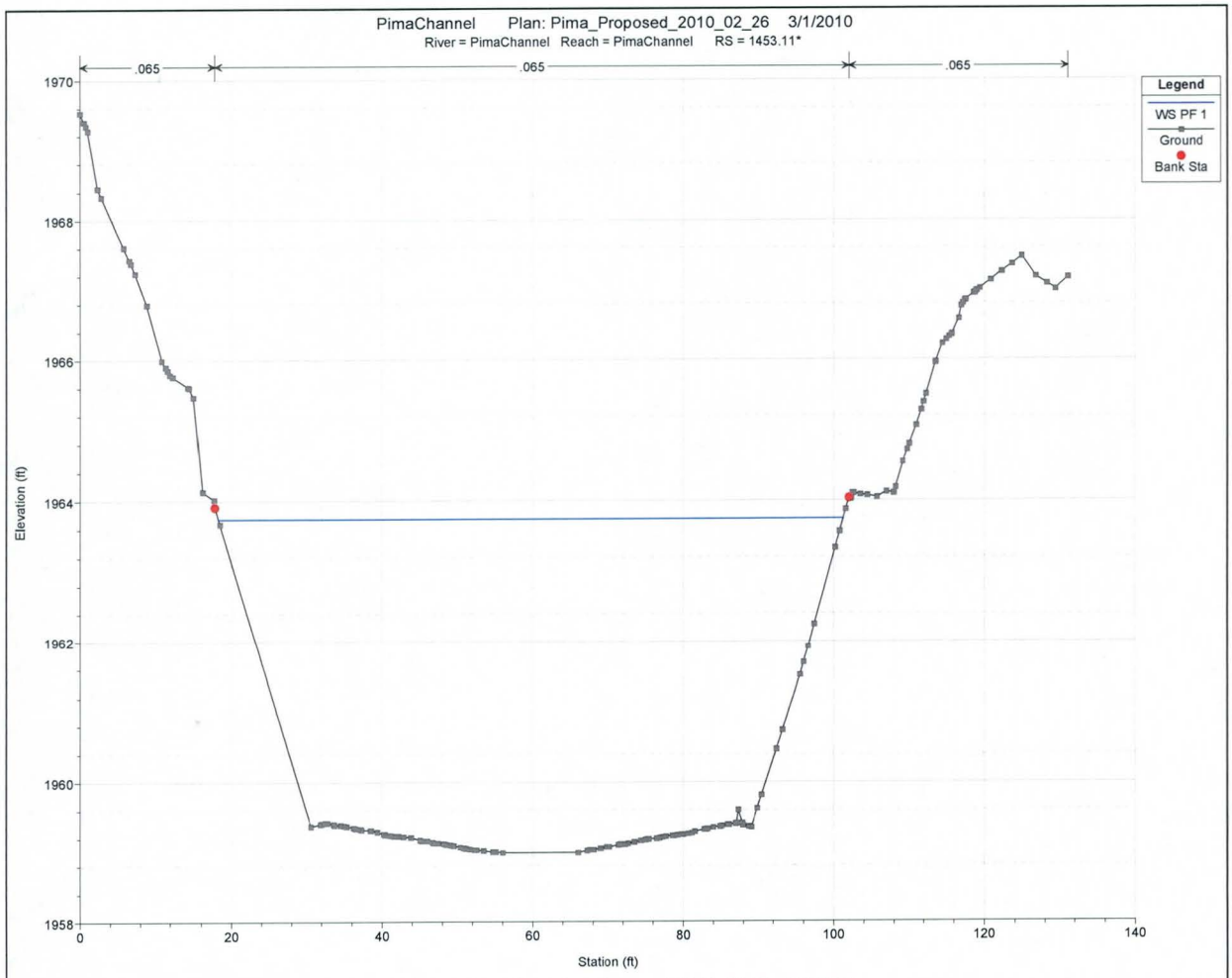

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1629.44
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1963
1964
1965
1966
1967
1968
1969
1970
1971
0
20
40
60
80
100
120
140
160

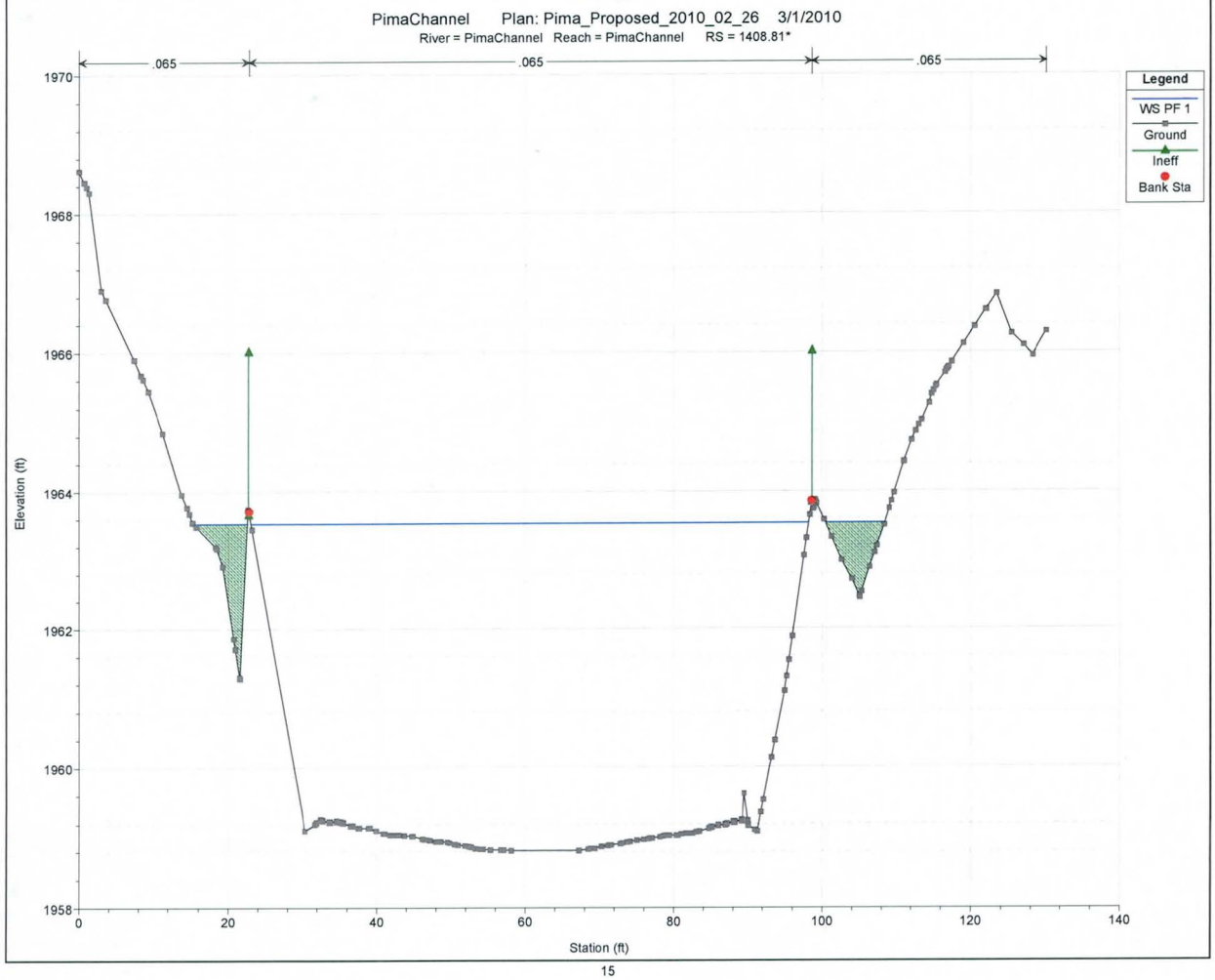

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1587.76*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

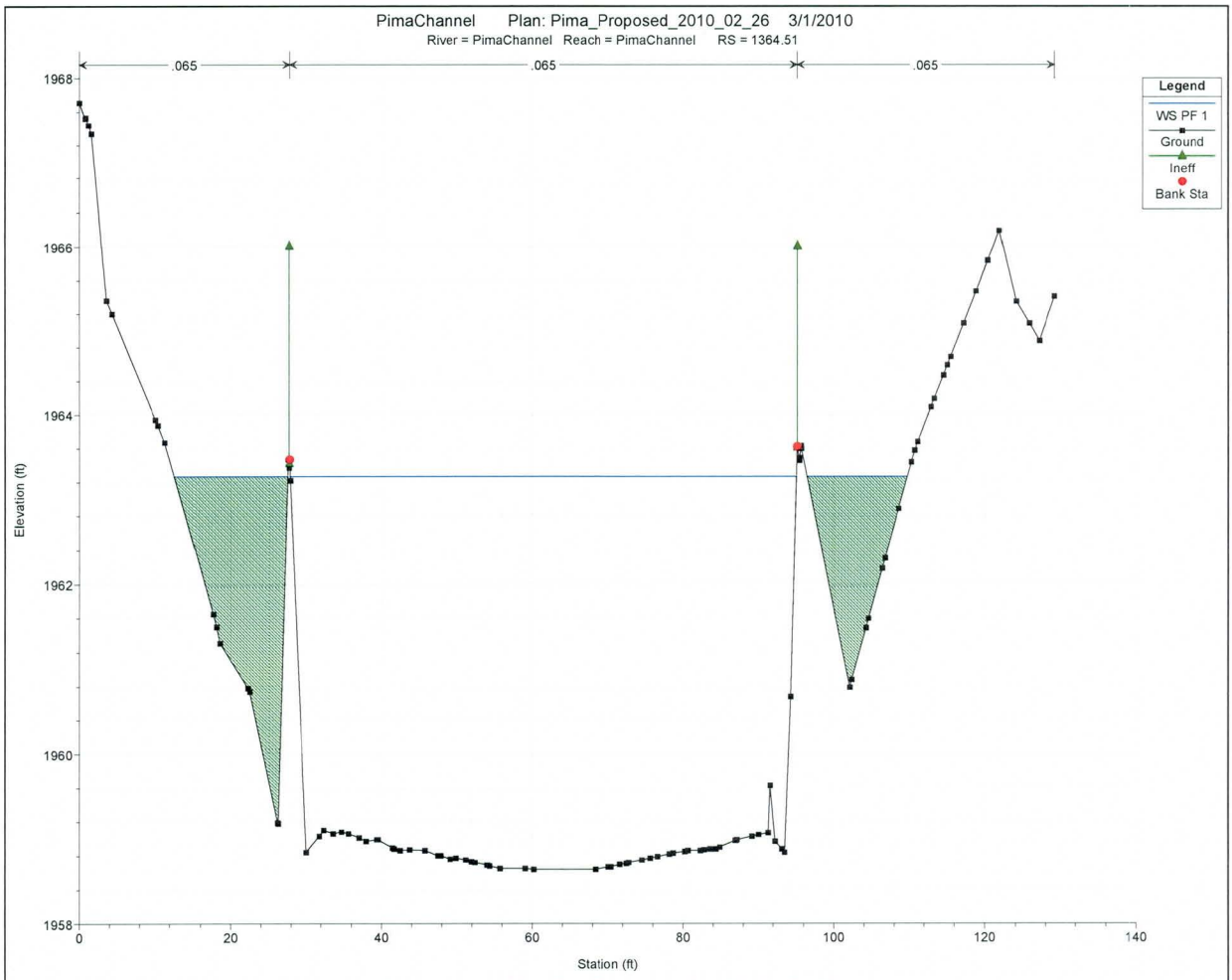

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1546.08*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

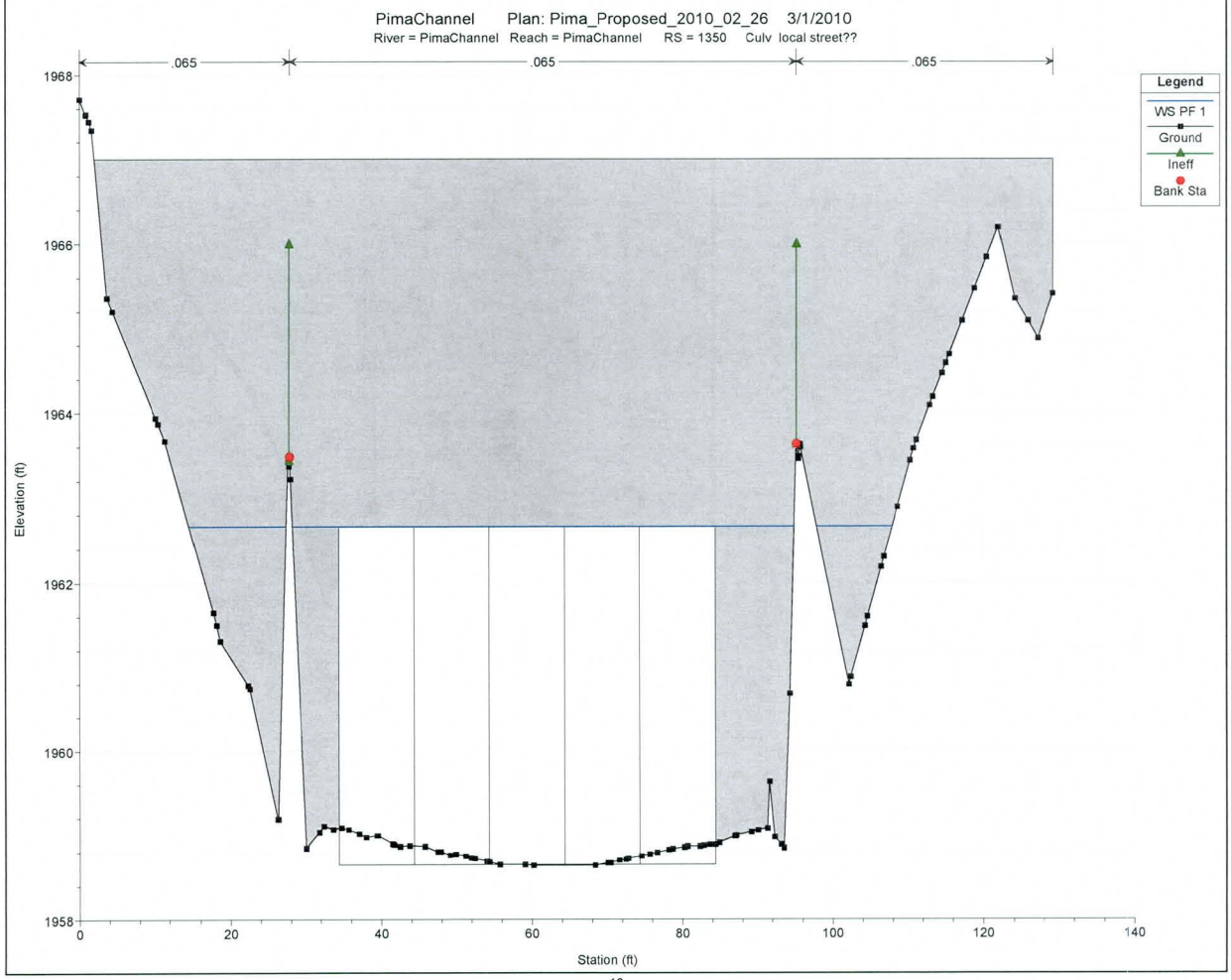

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1504.40
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1962
1964
1966
1968
1970
1972
0
20
40
60
80
100
120
140

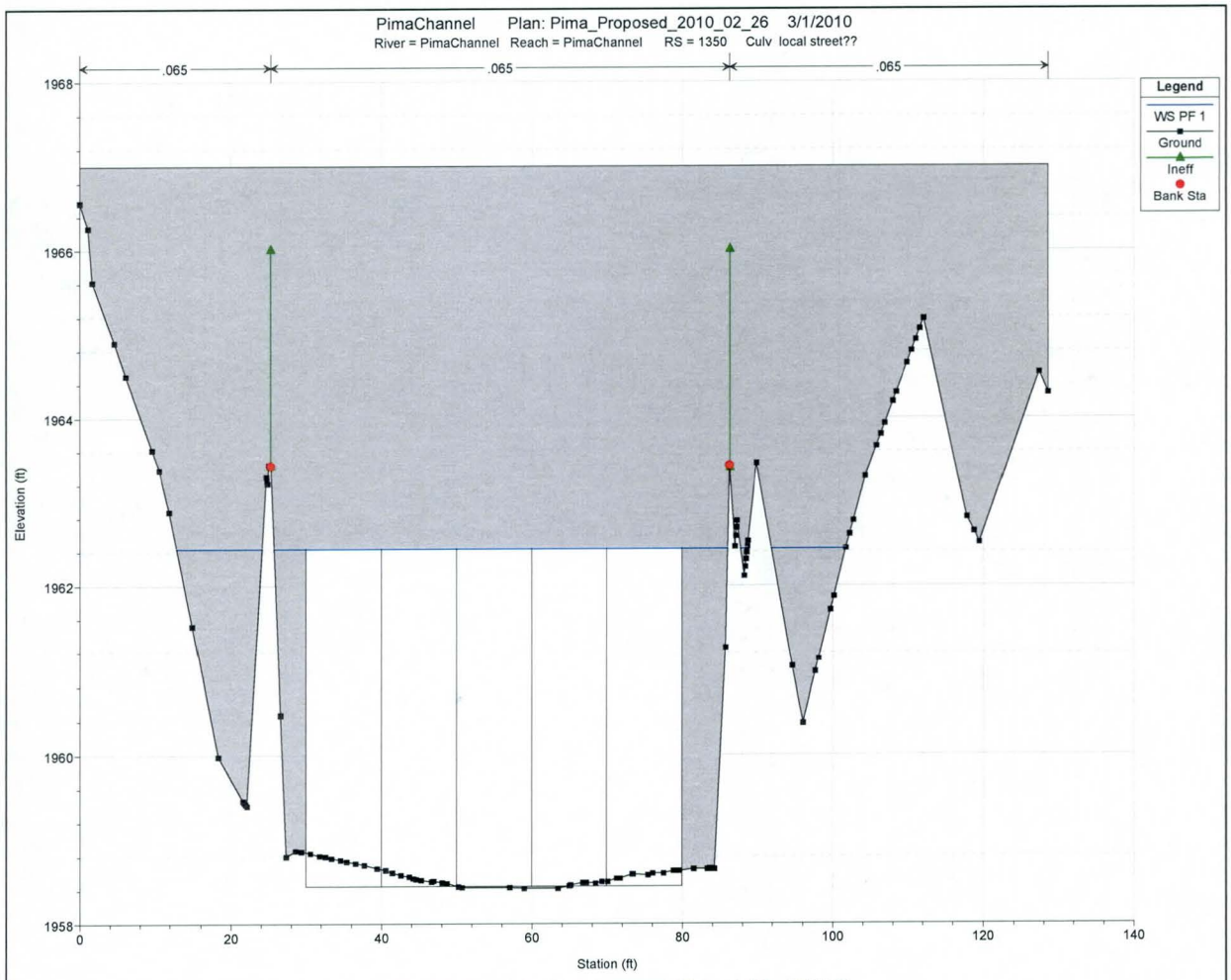

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1497.41
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1958
1960
1962
1964
1966
1968
1970
1972
0
20
40
60
80
100
120
140

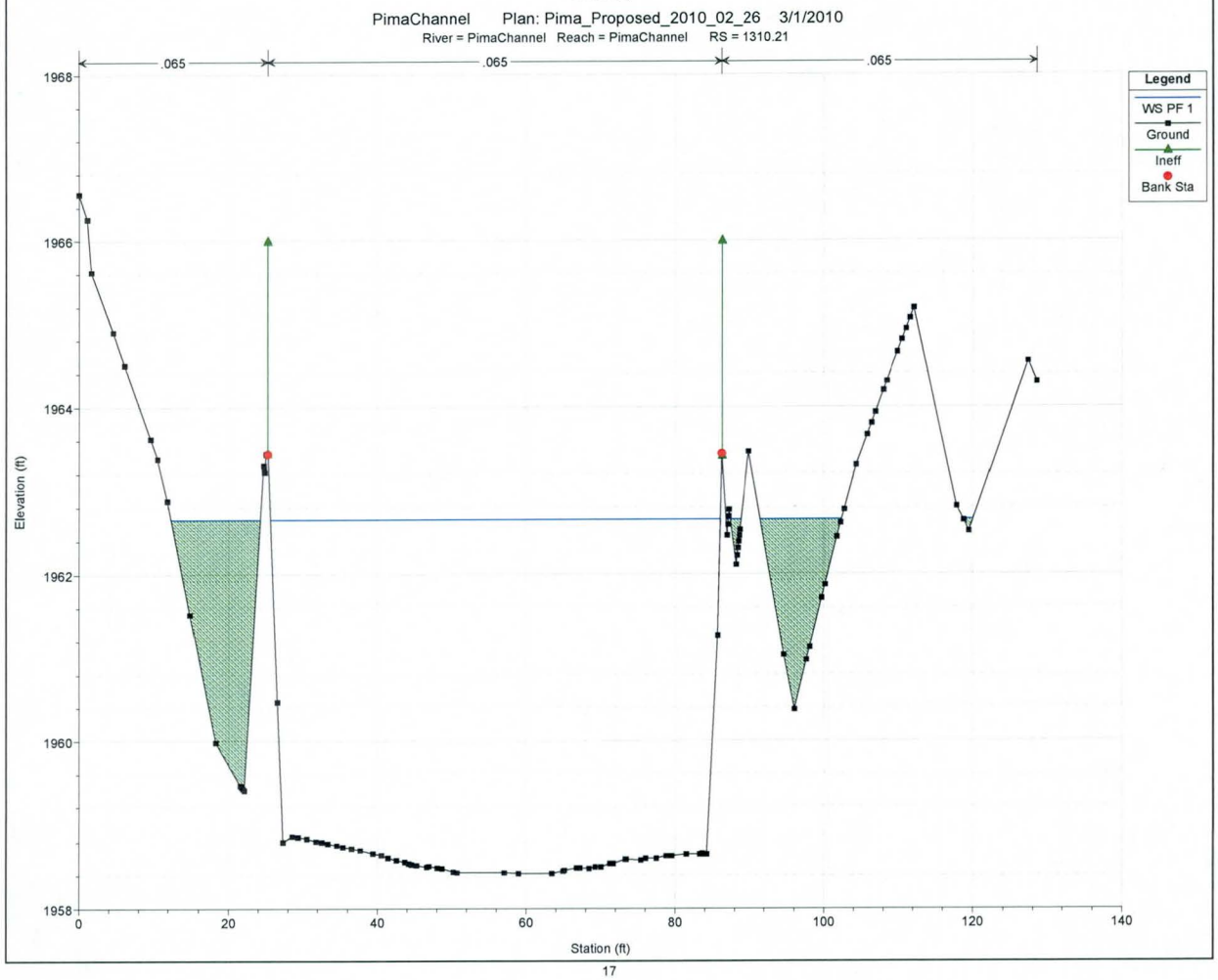

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1453.11*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

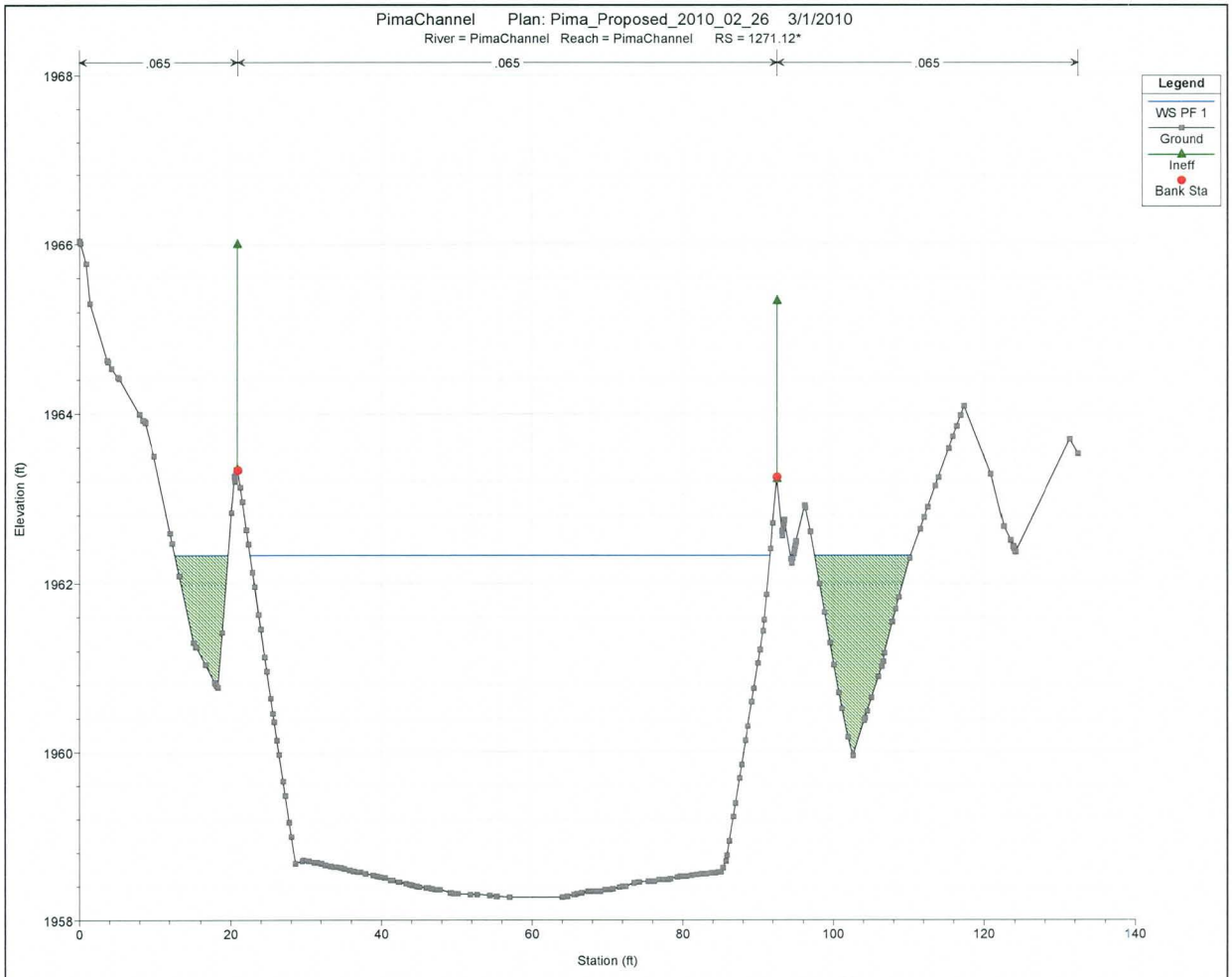

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1408.81*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

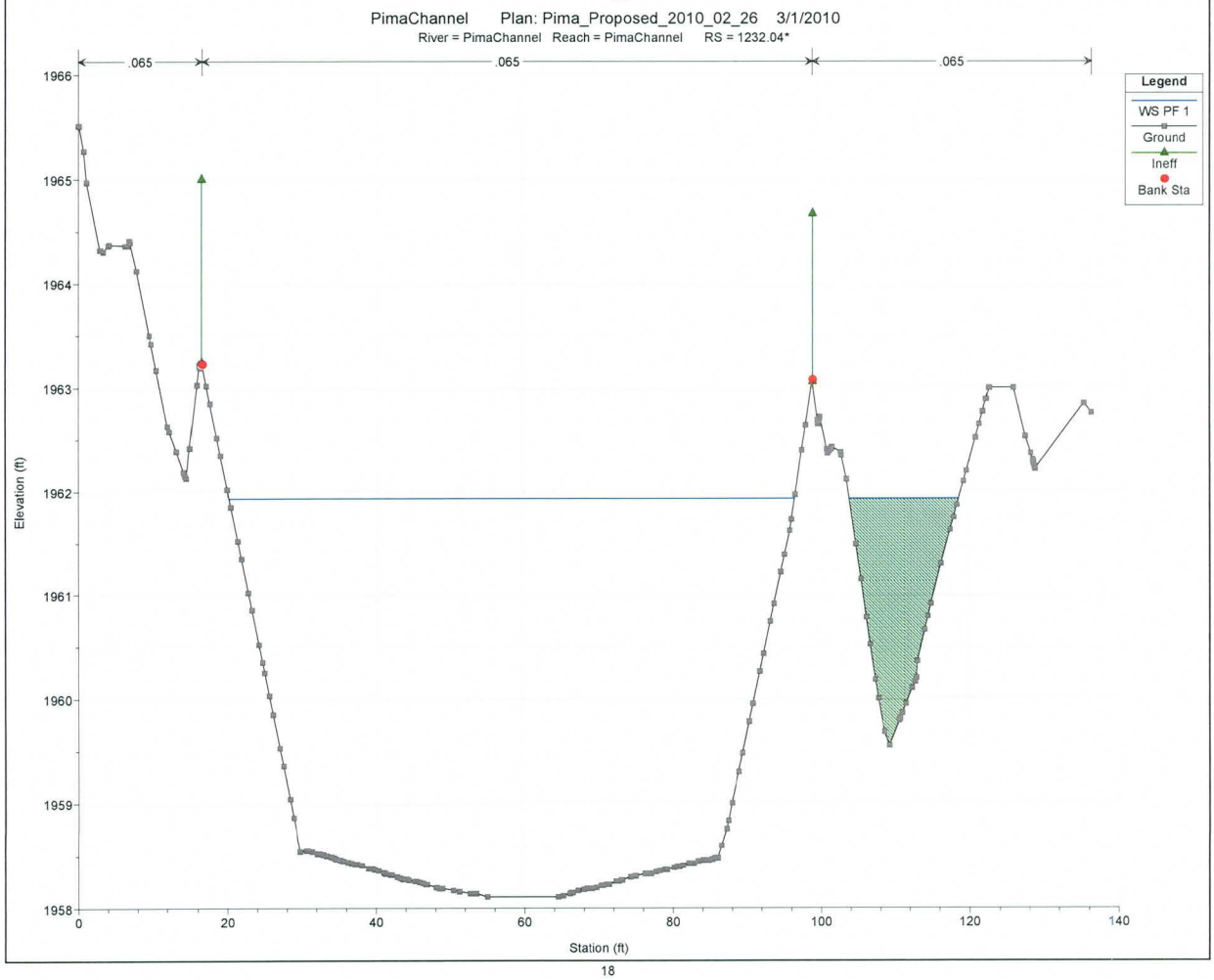

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1364.51
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1958
1960
1962
1964
1966
1968
0
20
40
60
80
100
120
140

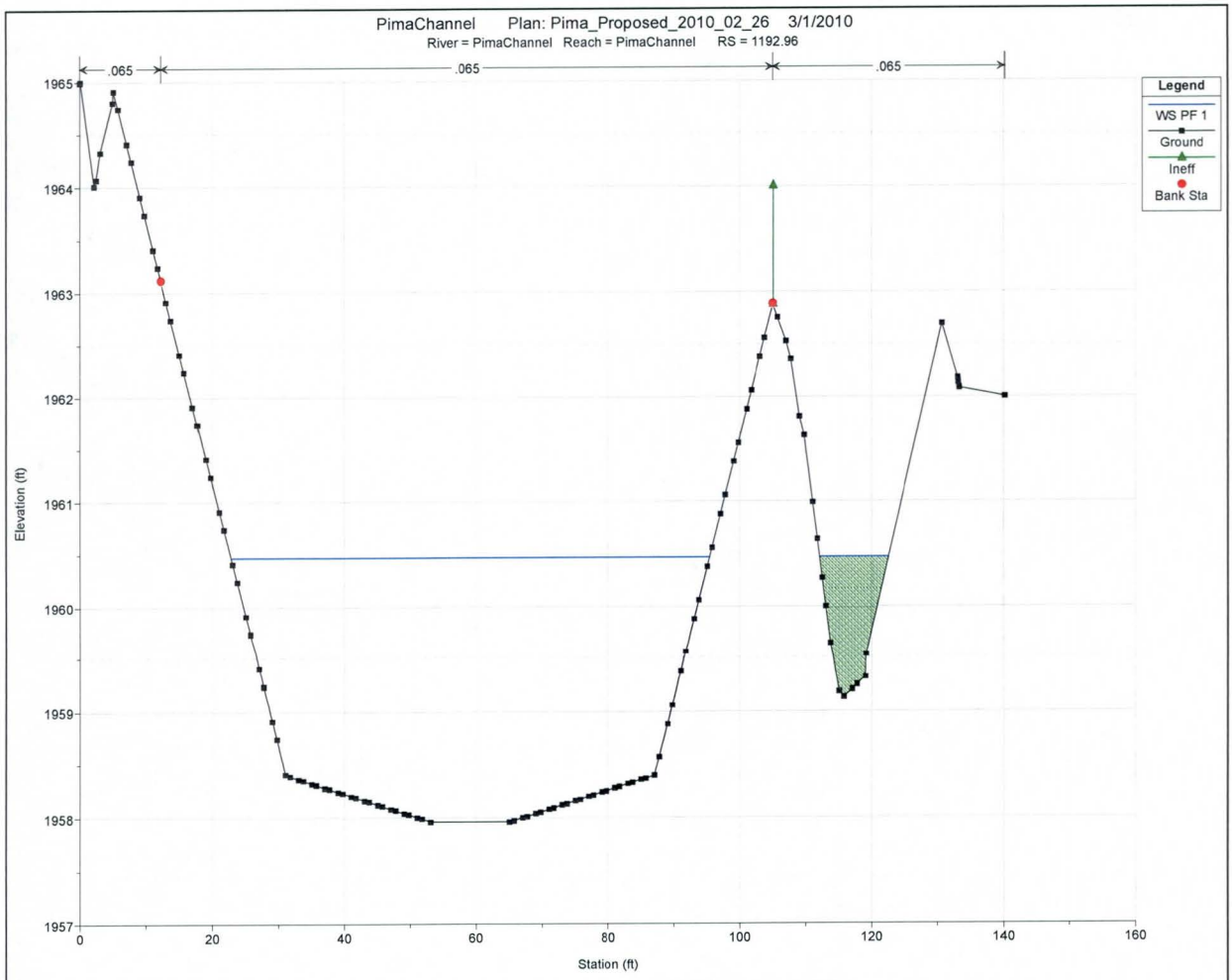

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1350 Culv local street??
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1958
1960
1962
1964
1966
1968
0
20
40
60
80
100
120
140

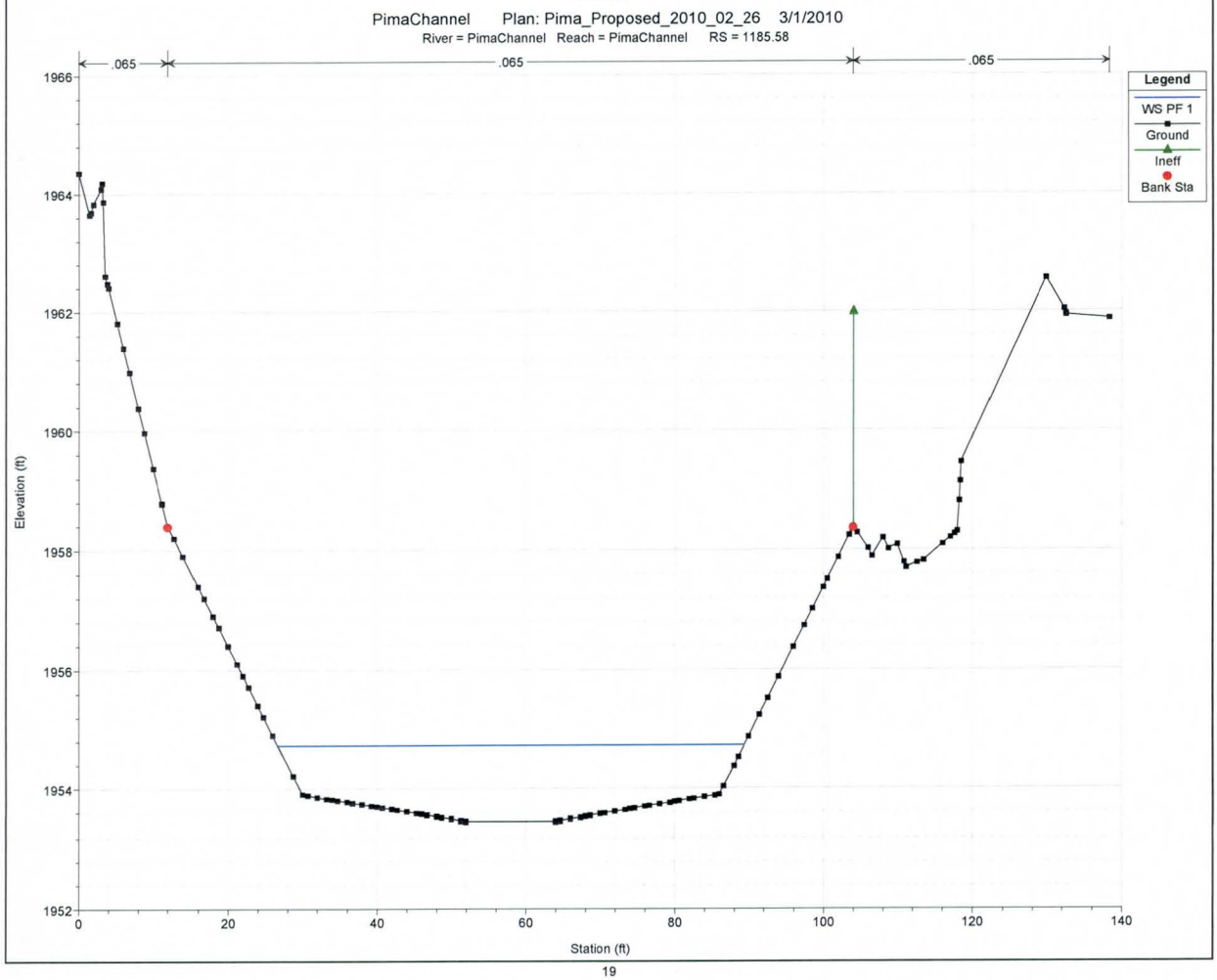

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1350 Culv local street??
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

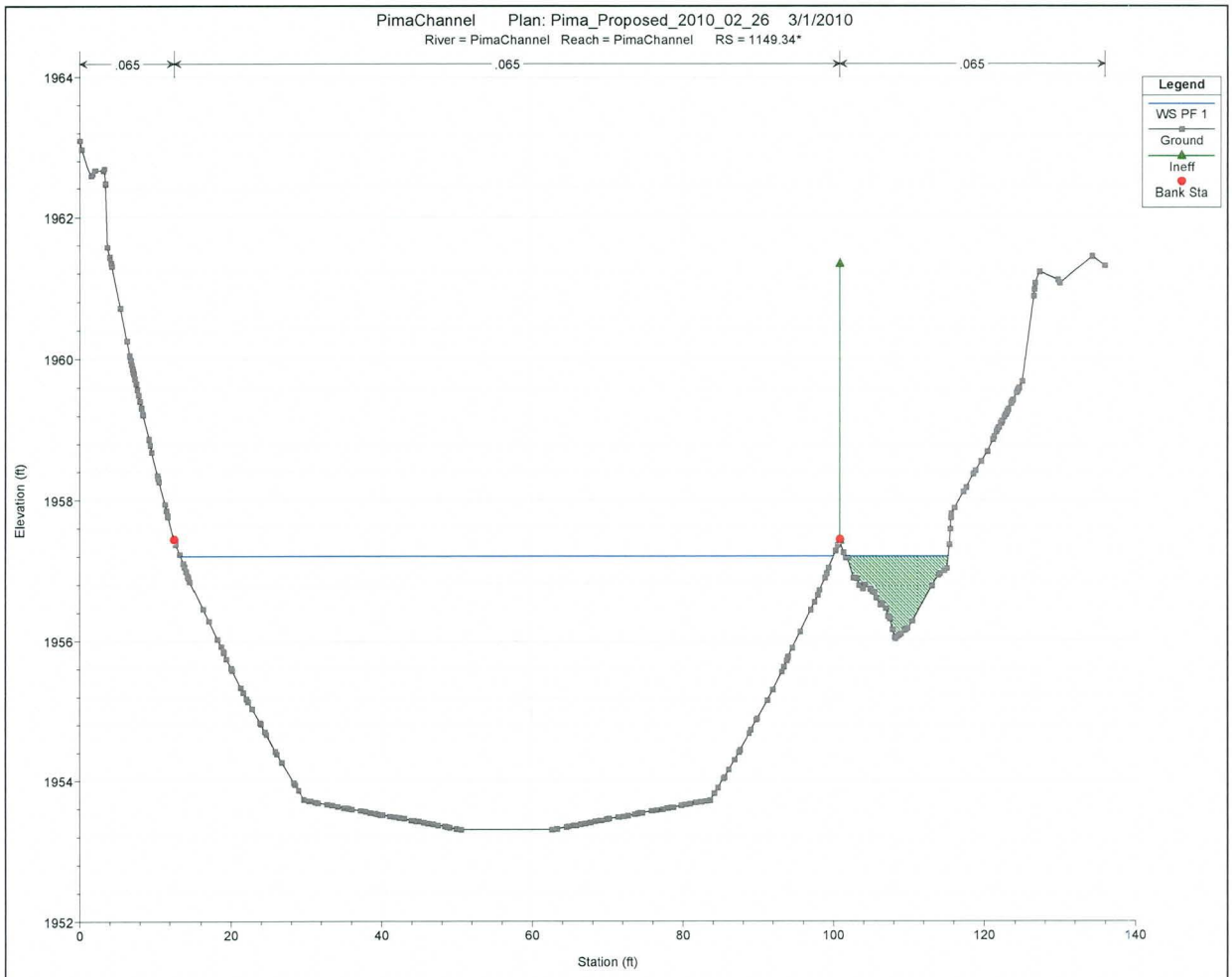

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1310.21
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

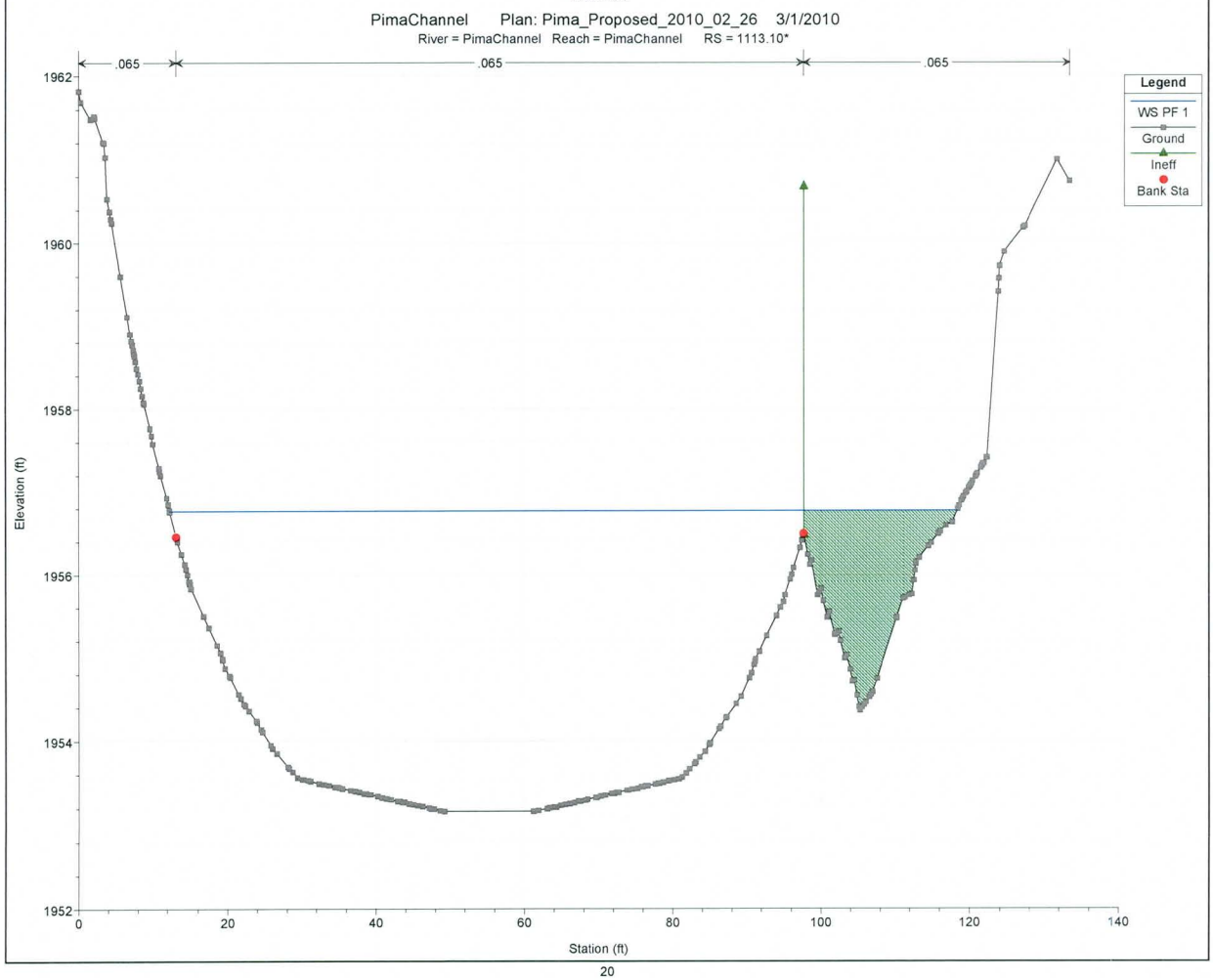

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1271.12*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1958
1960
1962
1964
1966
0
20
40
60
80
100
120
140

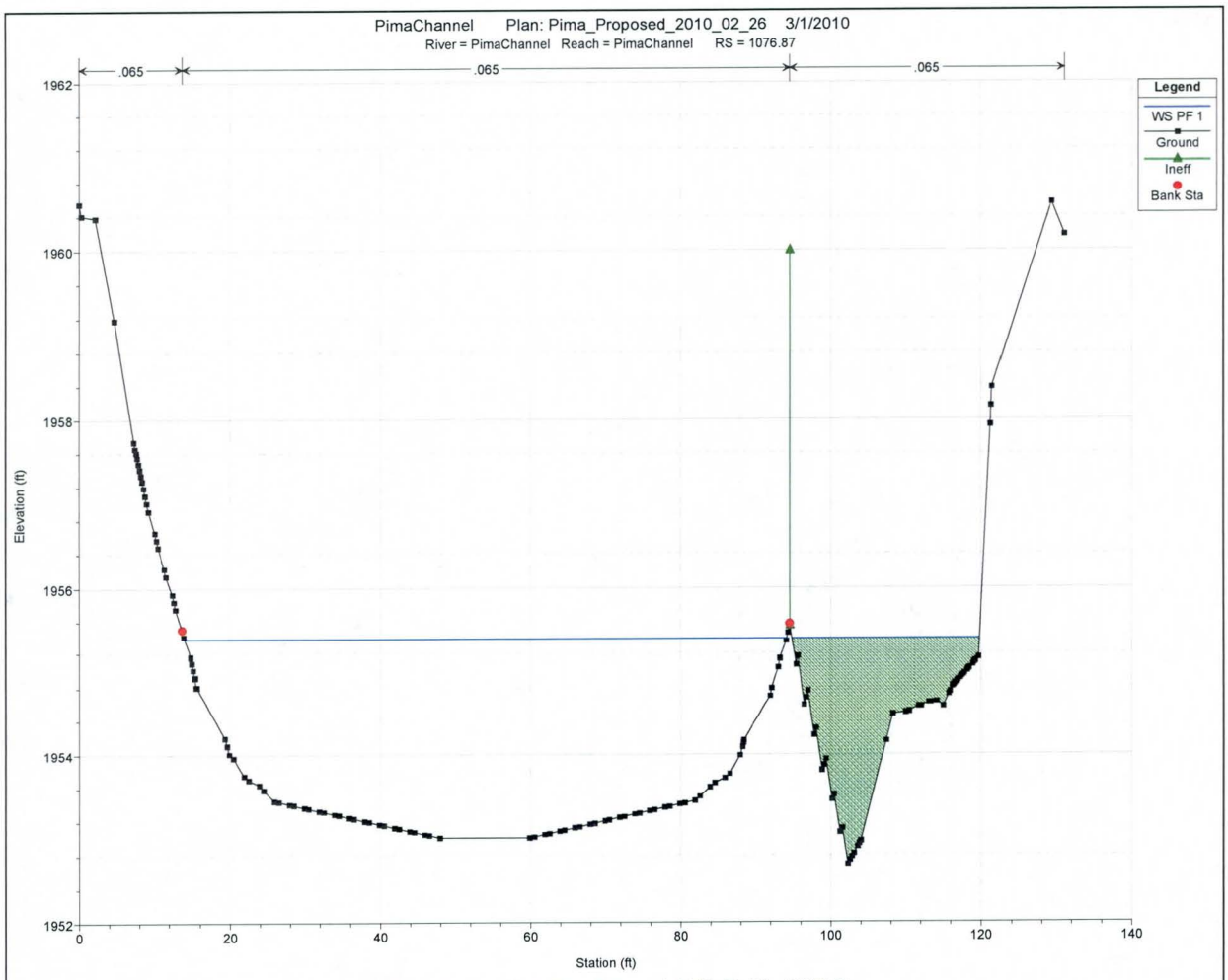

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1232.04*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1958
1959
1960
1961
1962
1963
1964
1965
1966
0
20
40
60
80
100
120
140

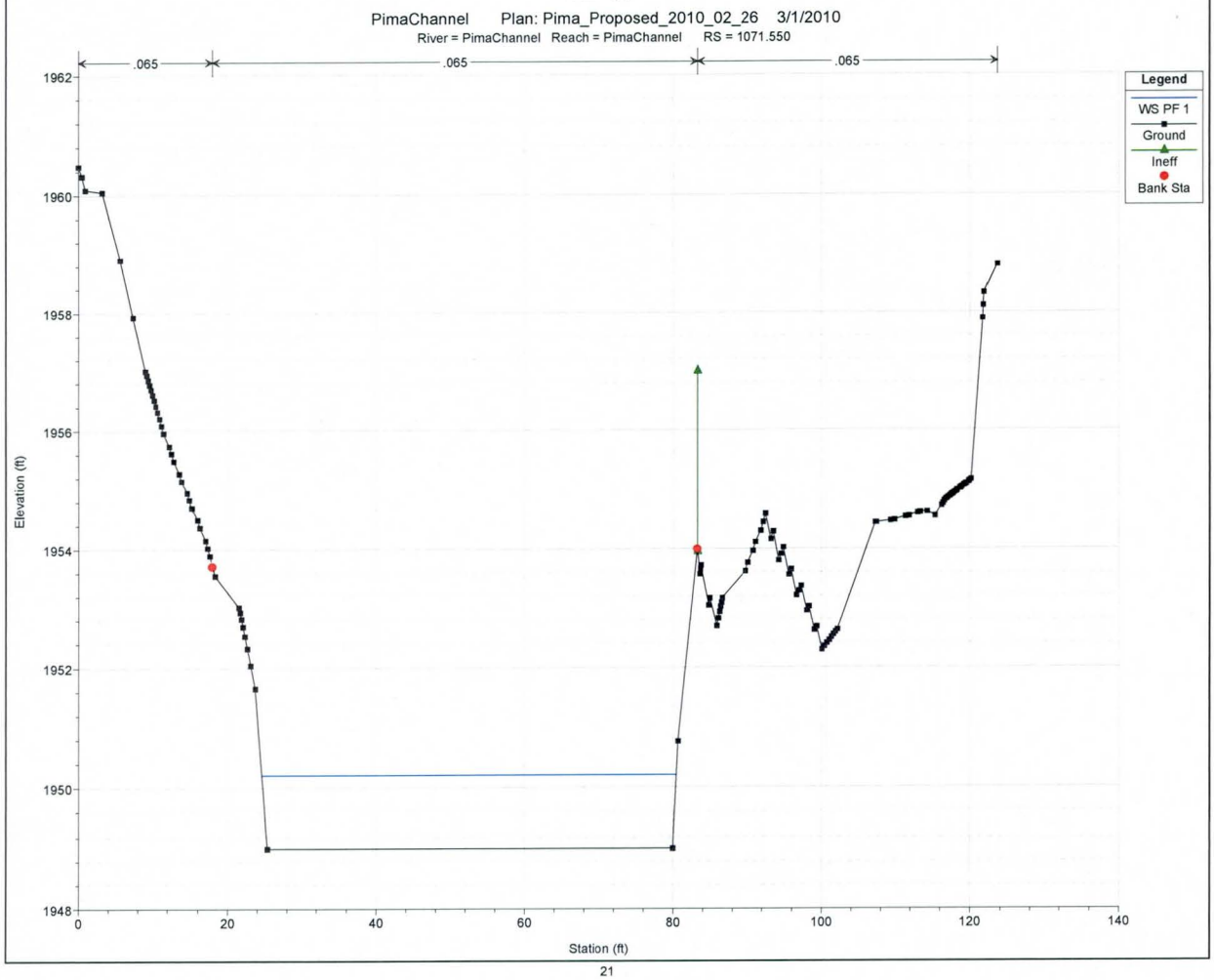

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1192.96
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

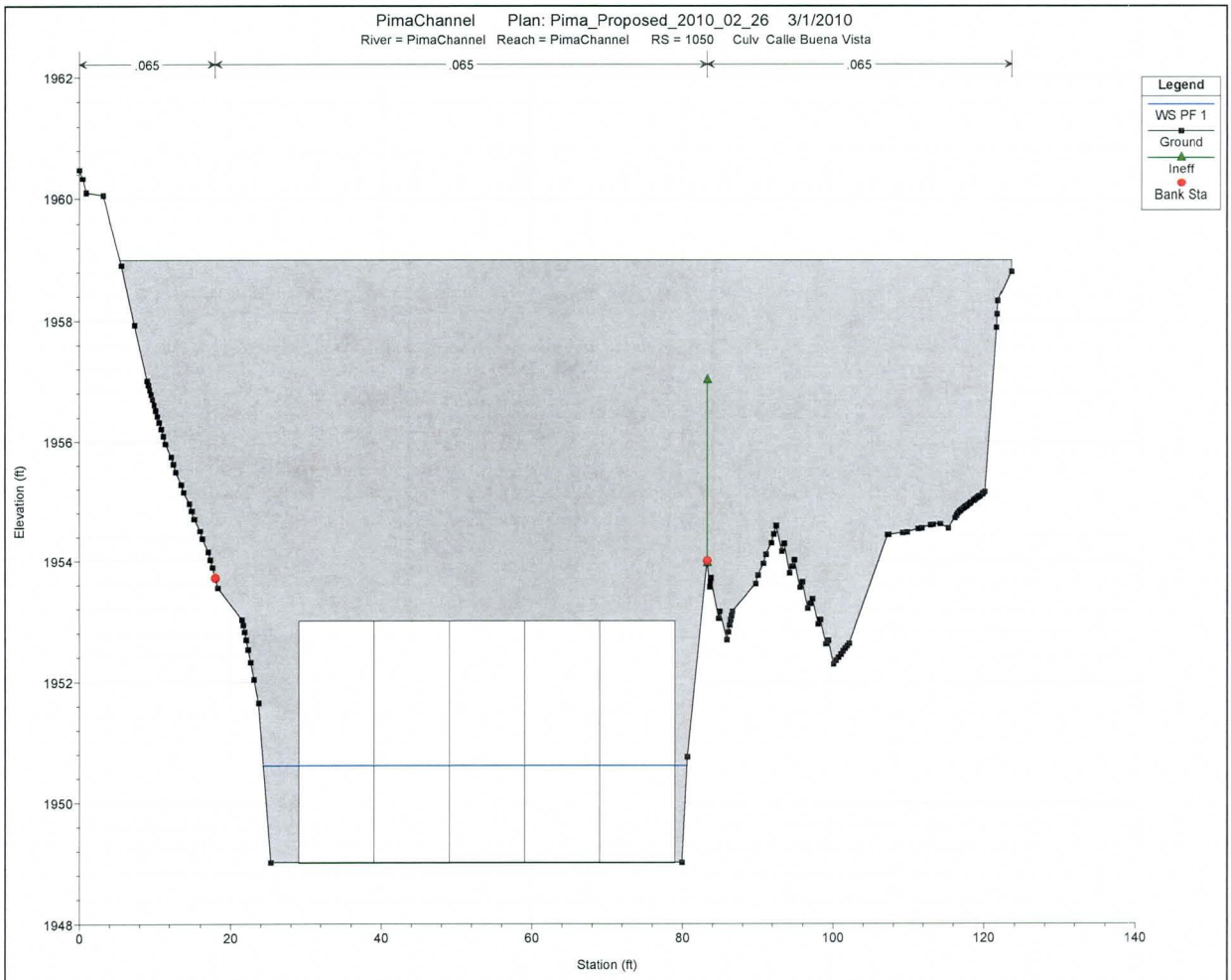

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1185.58
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

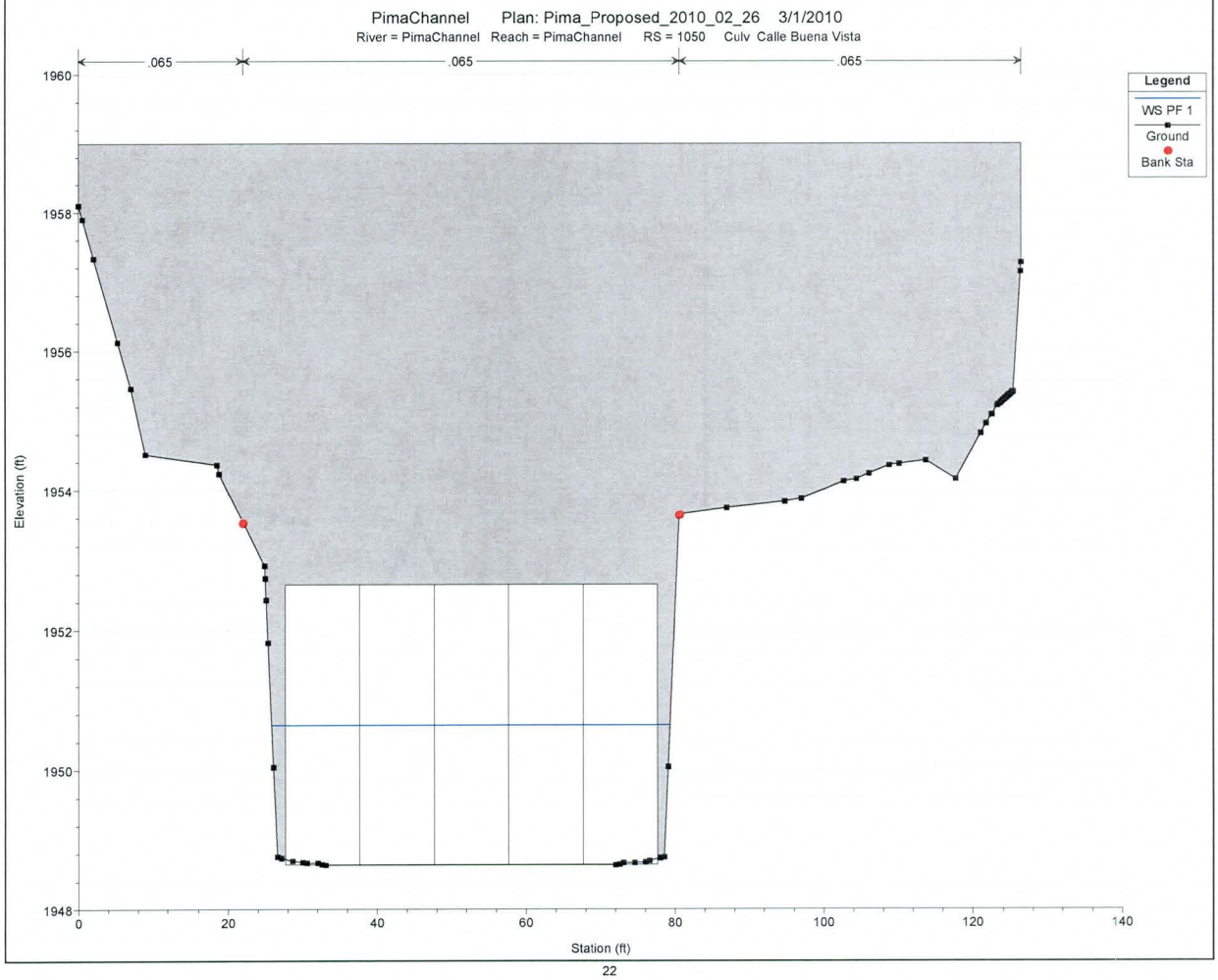

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1149.34*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1964
1962
1960
1958
1956
1954
1952
0
20
40
60
80
100
120
140

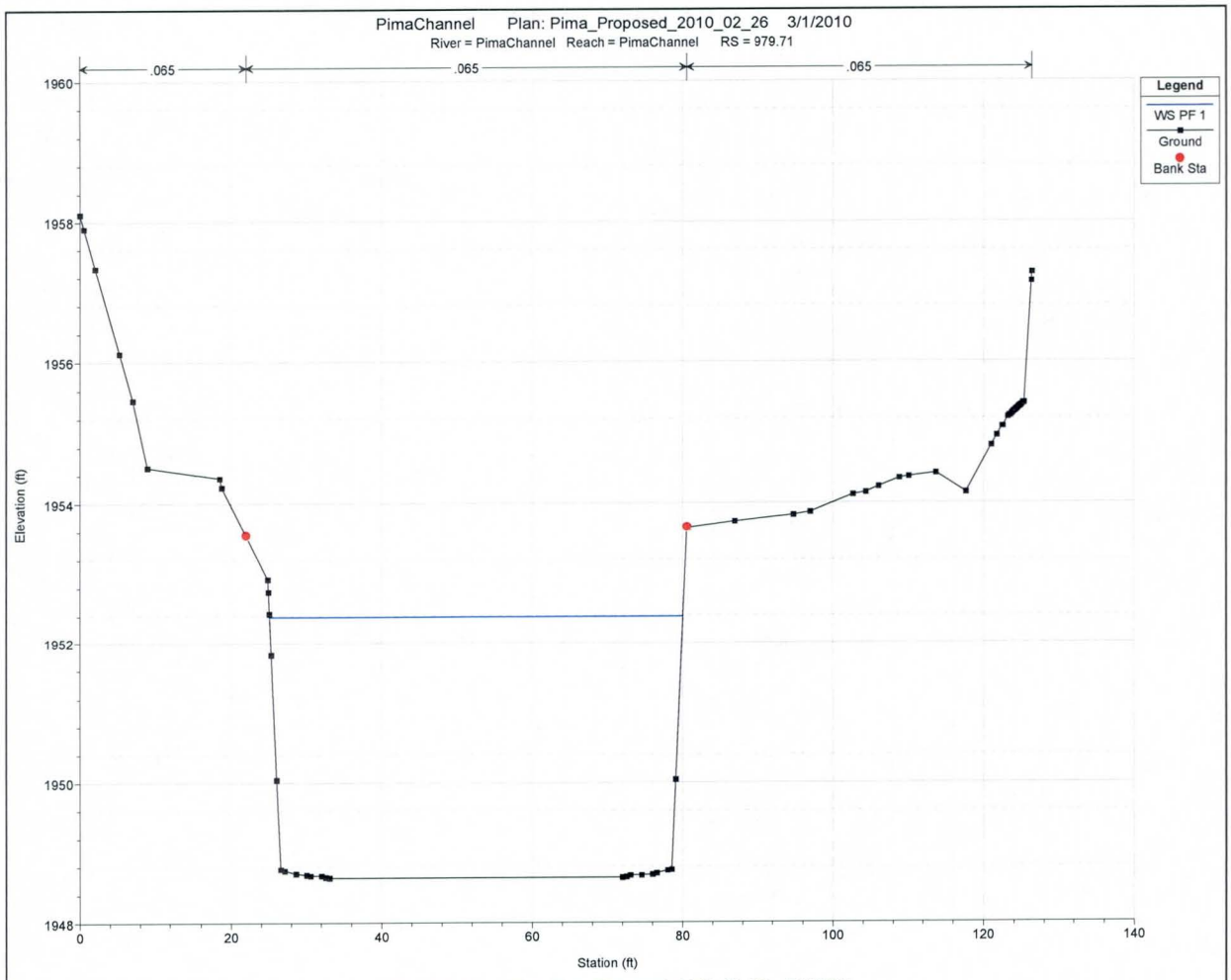

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1113.10*
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1962
1960
1958
1956
1954
1952
0
20
40
60
80
100
120
140

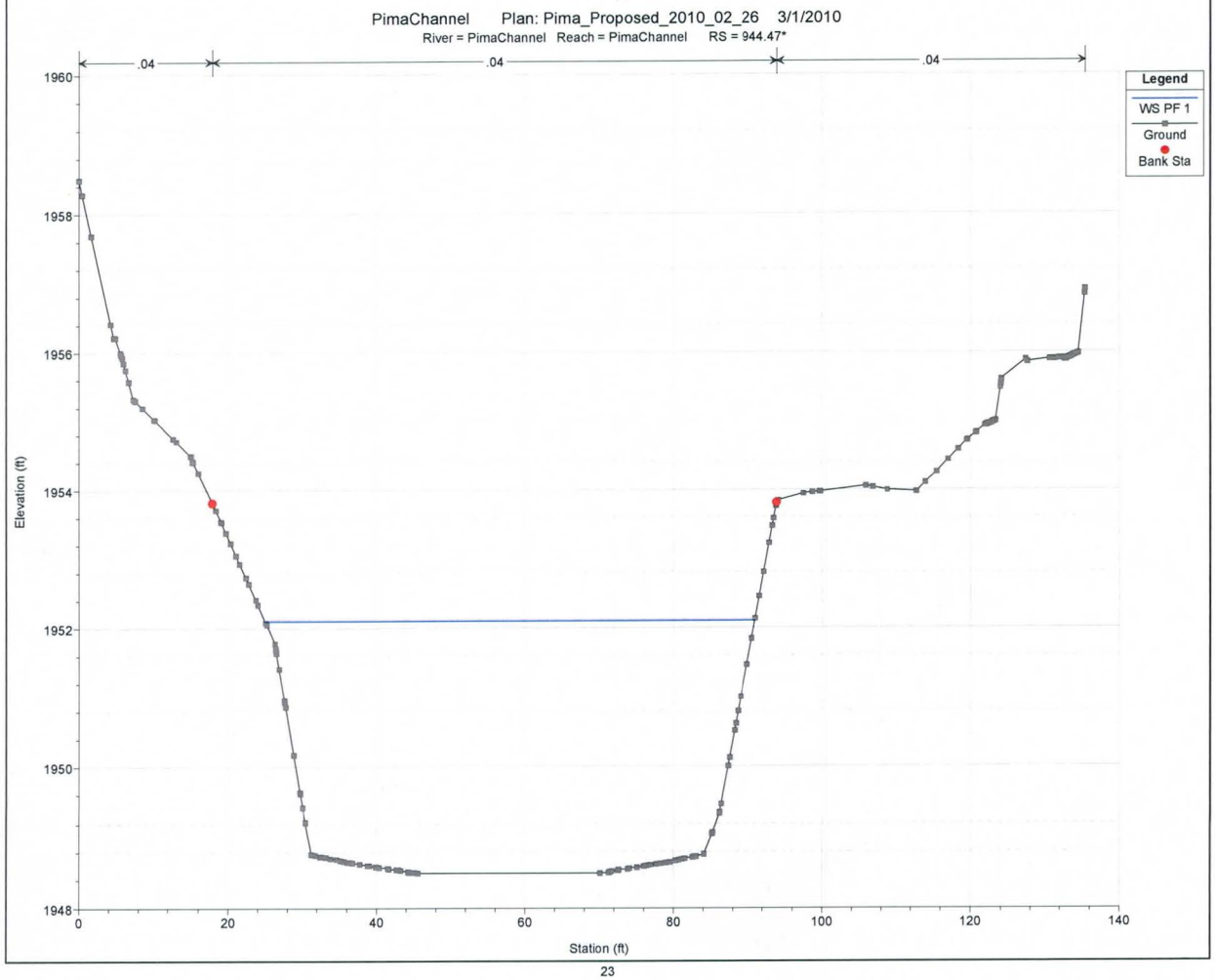

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1076.87
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

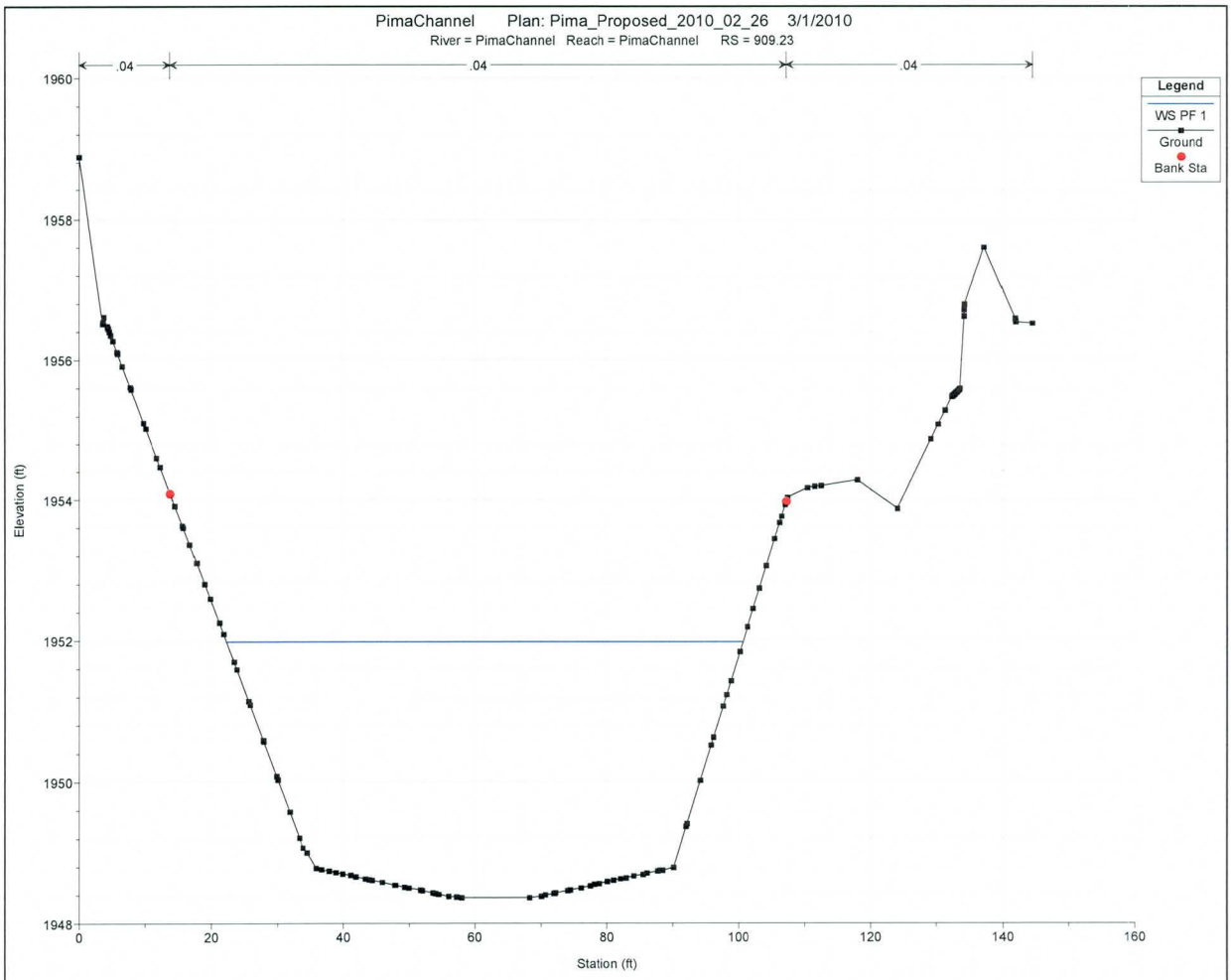

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1071.550
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

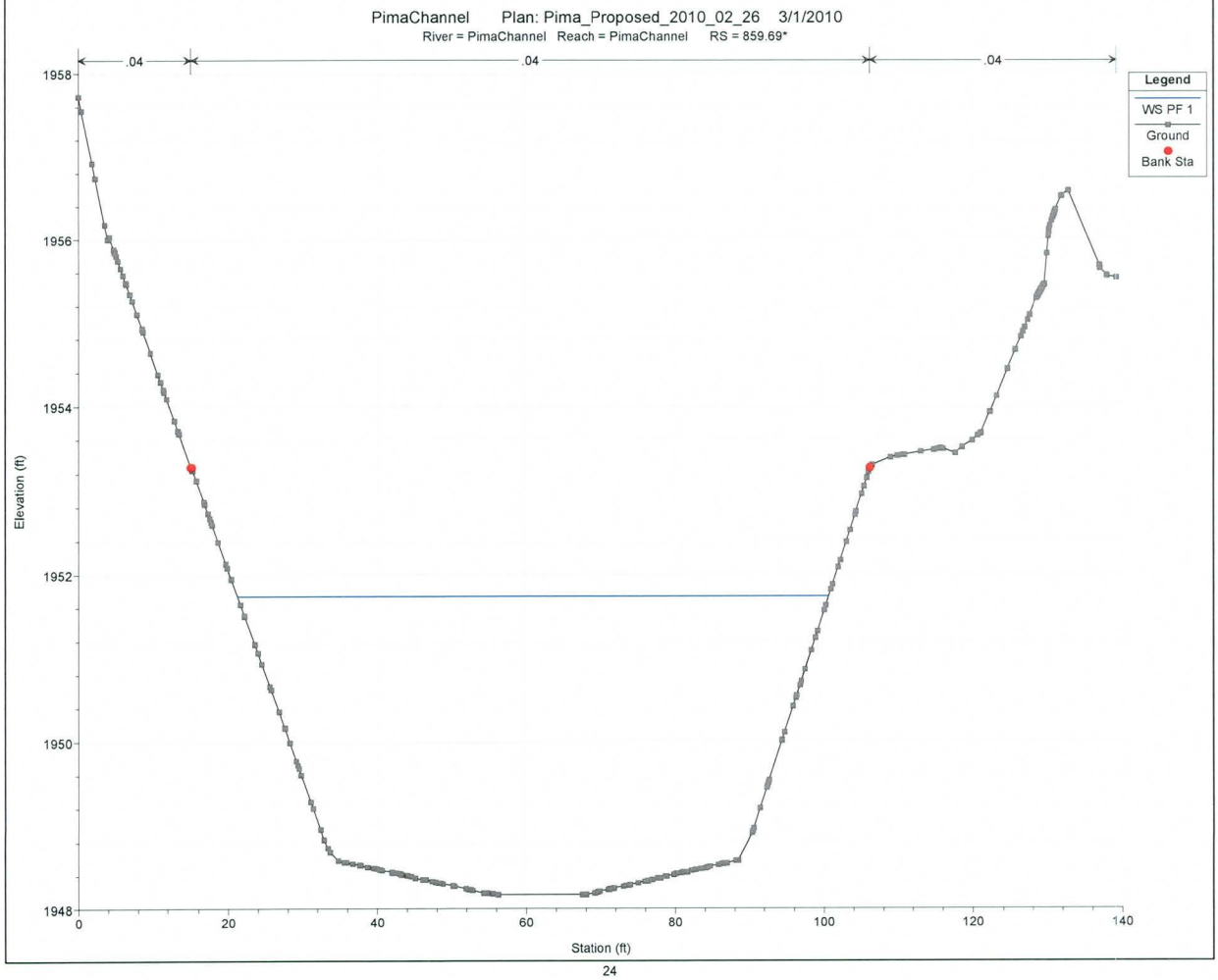

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1050 Culv Calle Buena Vista
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

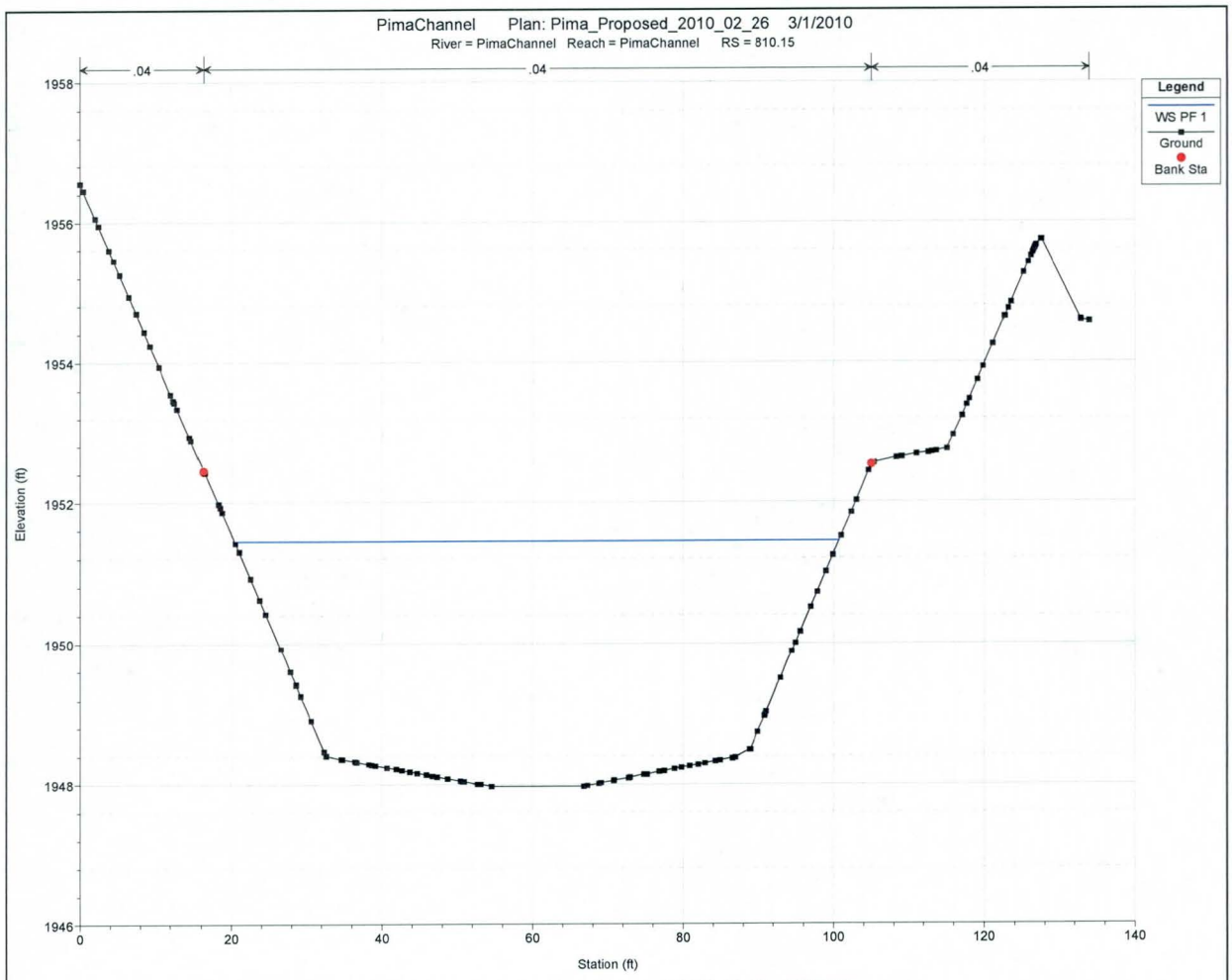

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 1050 Culv Calle Buena Vista
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

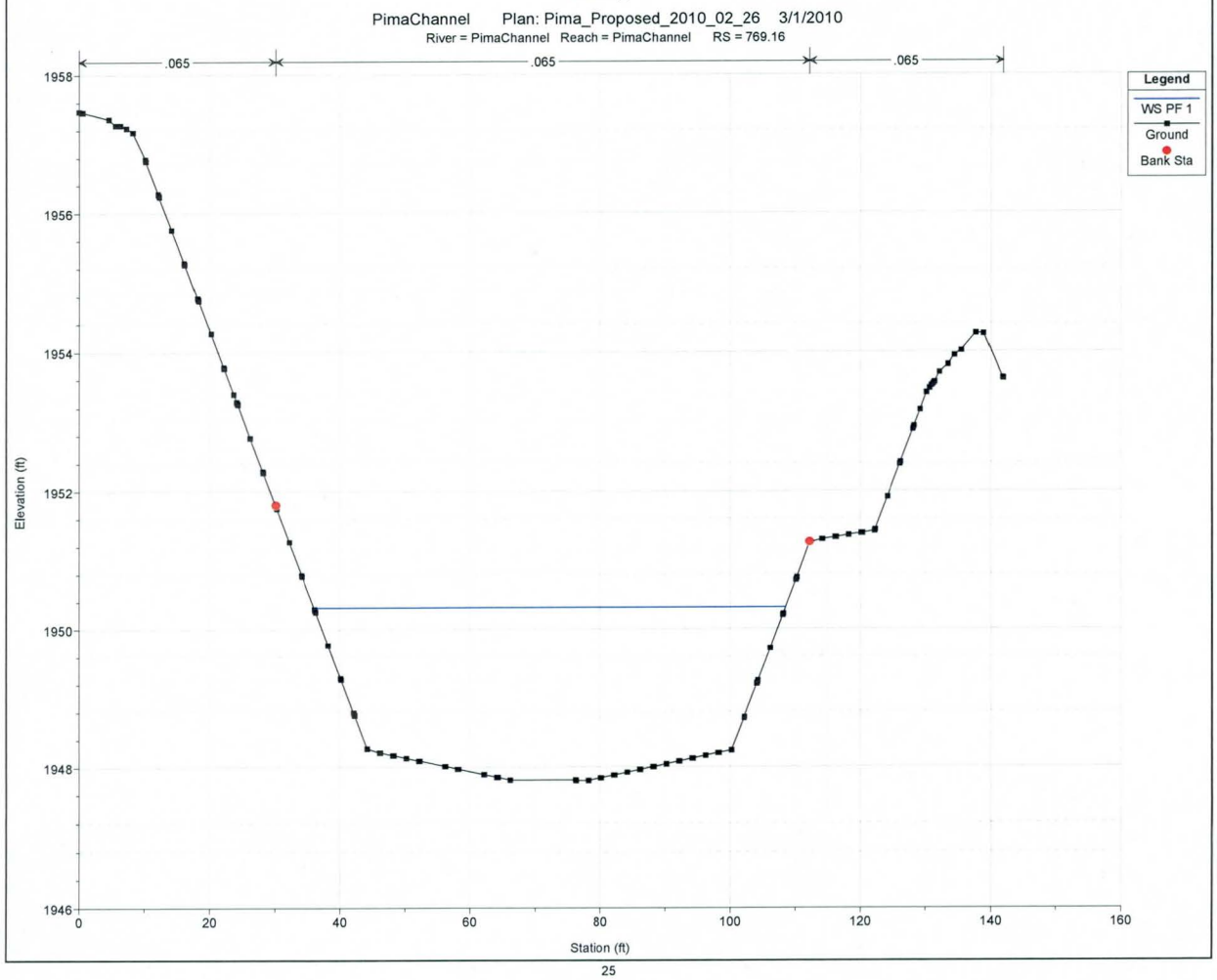

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 979.71
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

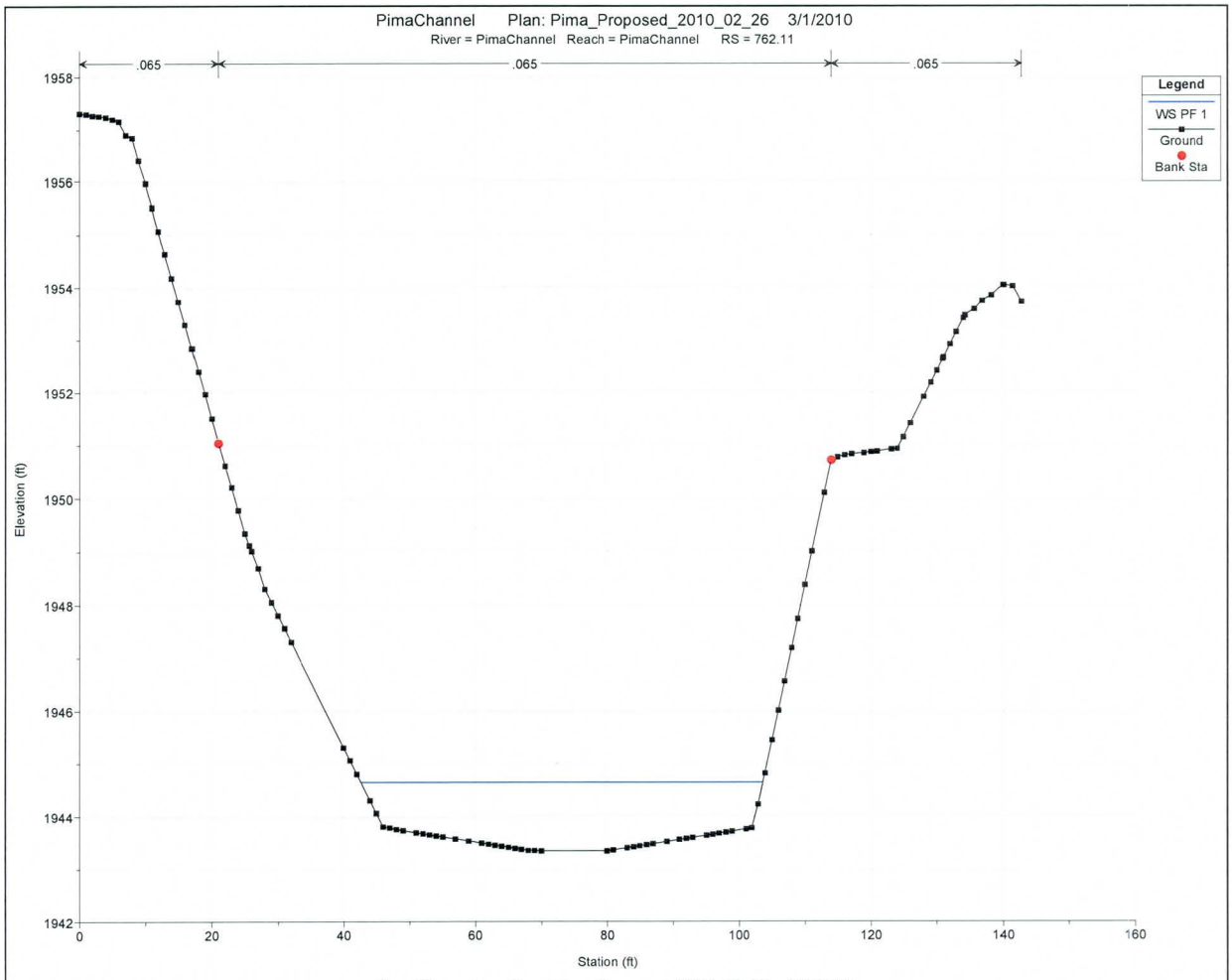

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 944.47*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

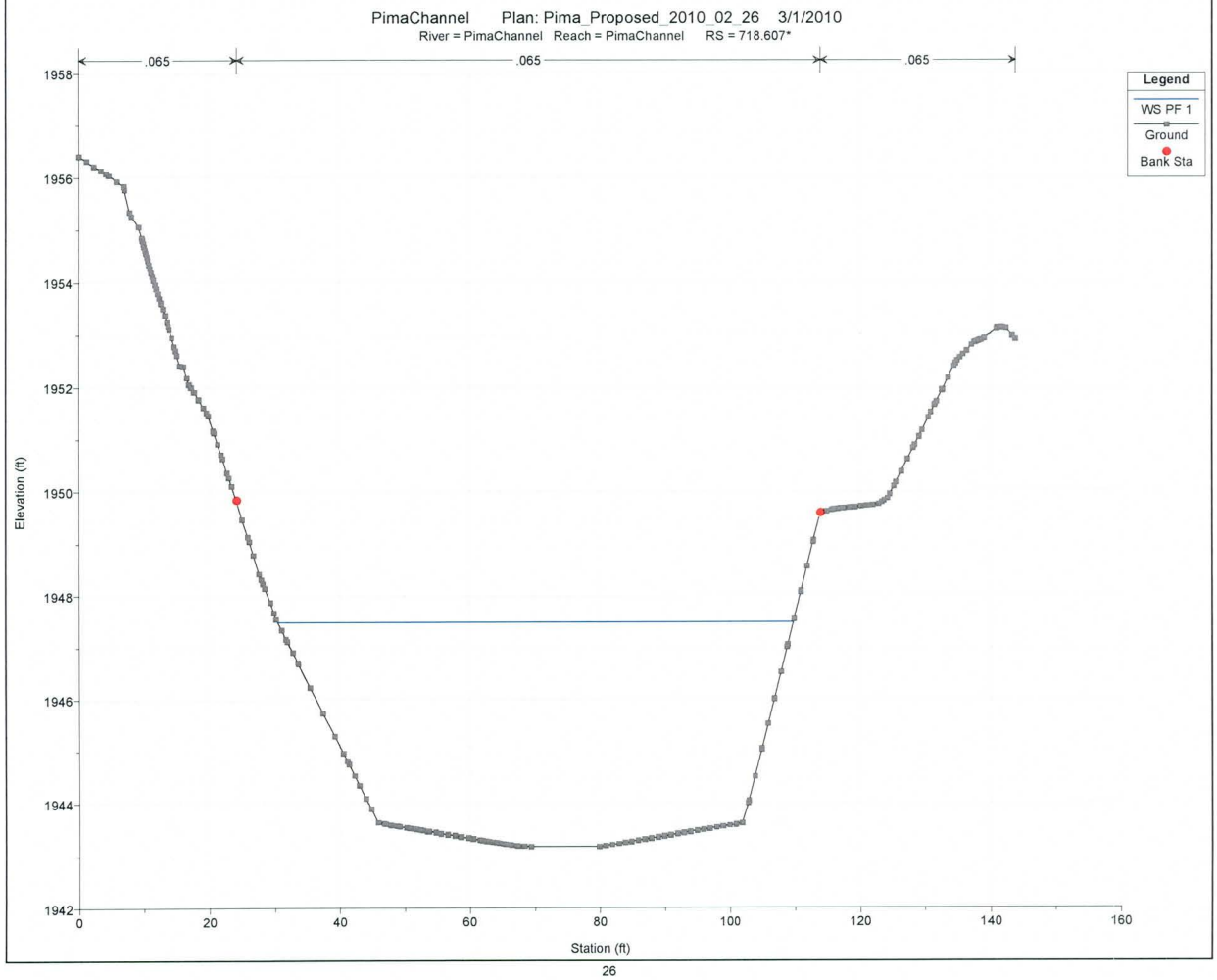

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 909.23
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1960
1958
1956
1954
1952
1950
1948
0
20
40
60
80
100
120
140
160
Station (ft)

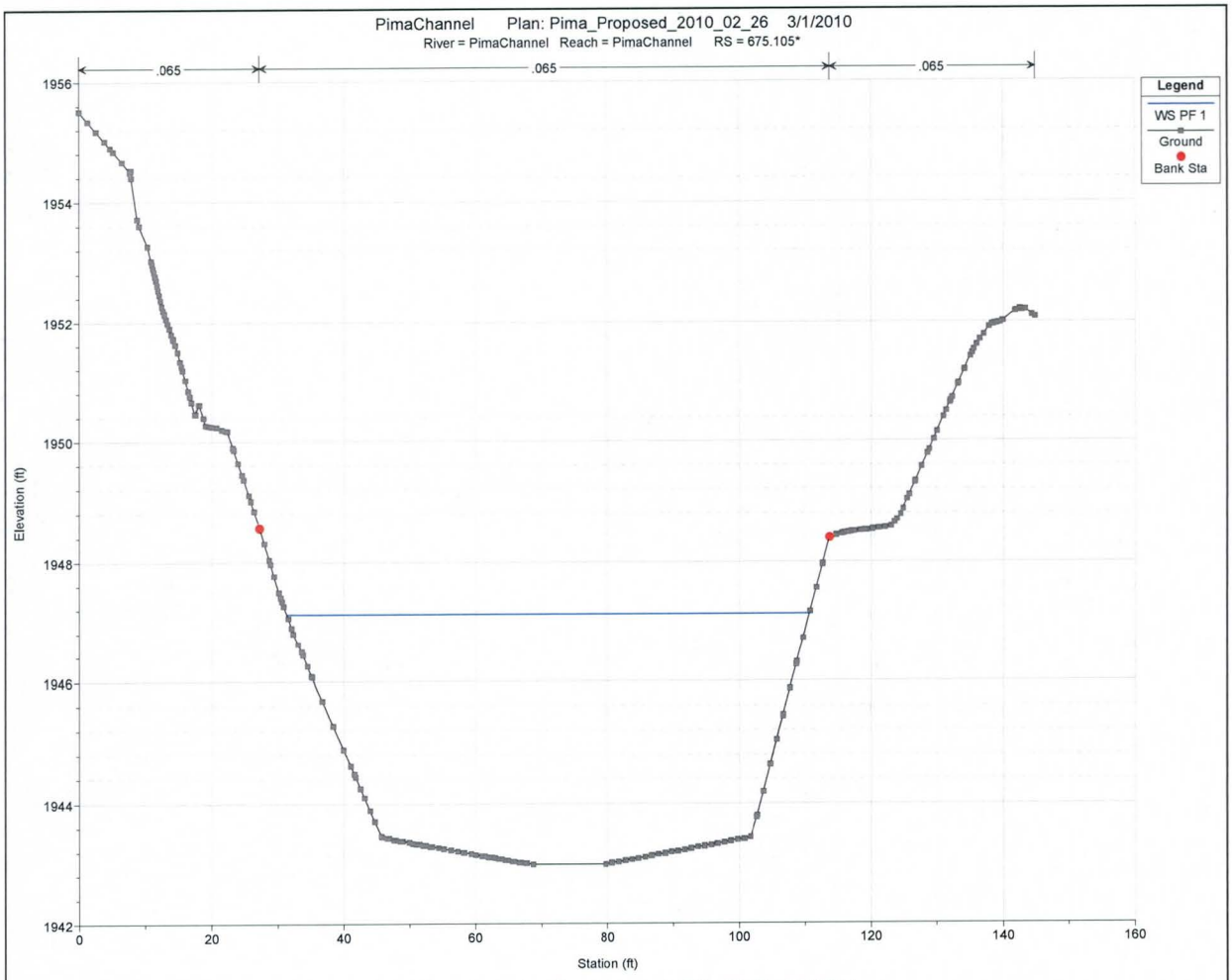

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 859.69*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1958
1956
1954
1952
1950
1948
0
20
40
60
80
100
120
140
Station (ft)

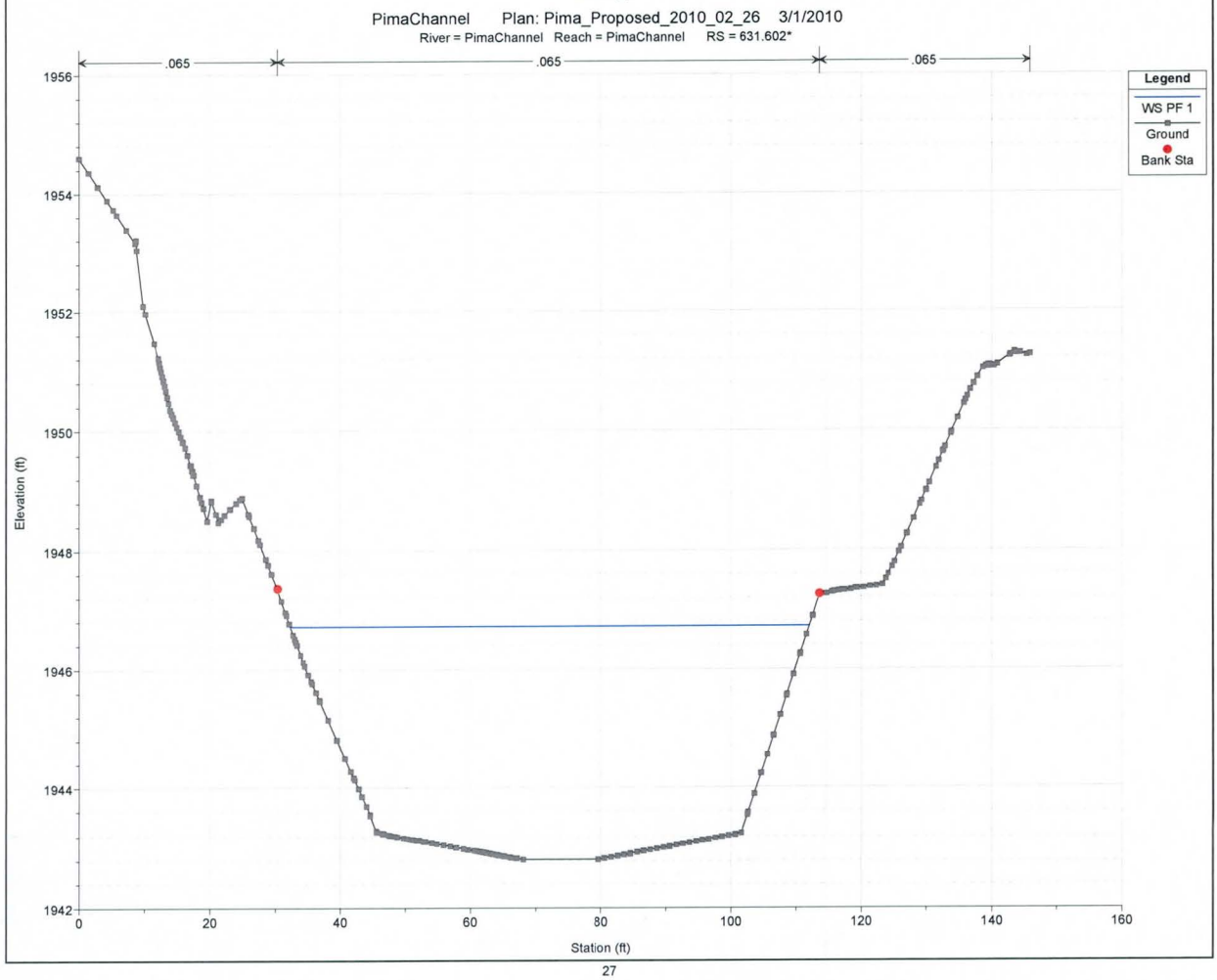

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 810.15
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1946
1948
1950
1952
1954
1956
1958
0
20
40
60
80
100
120
140

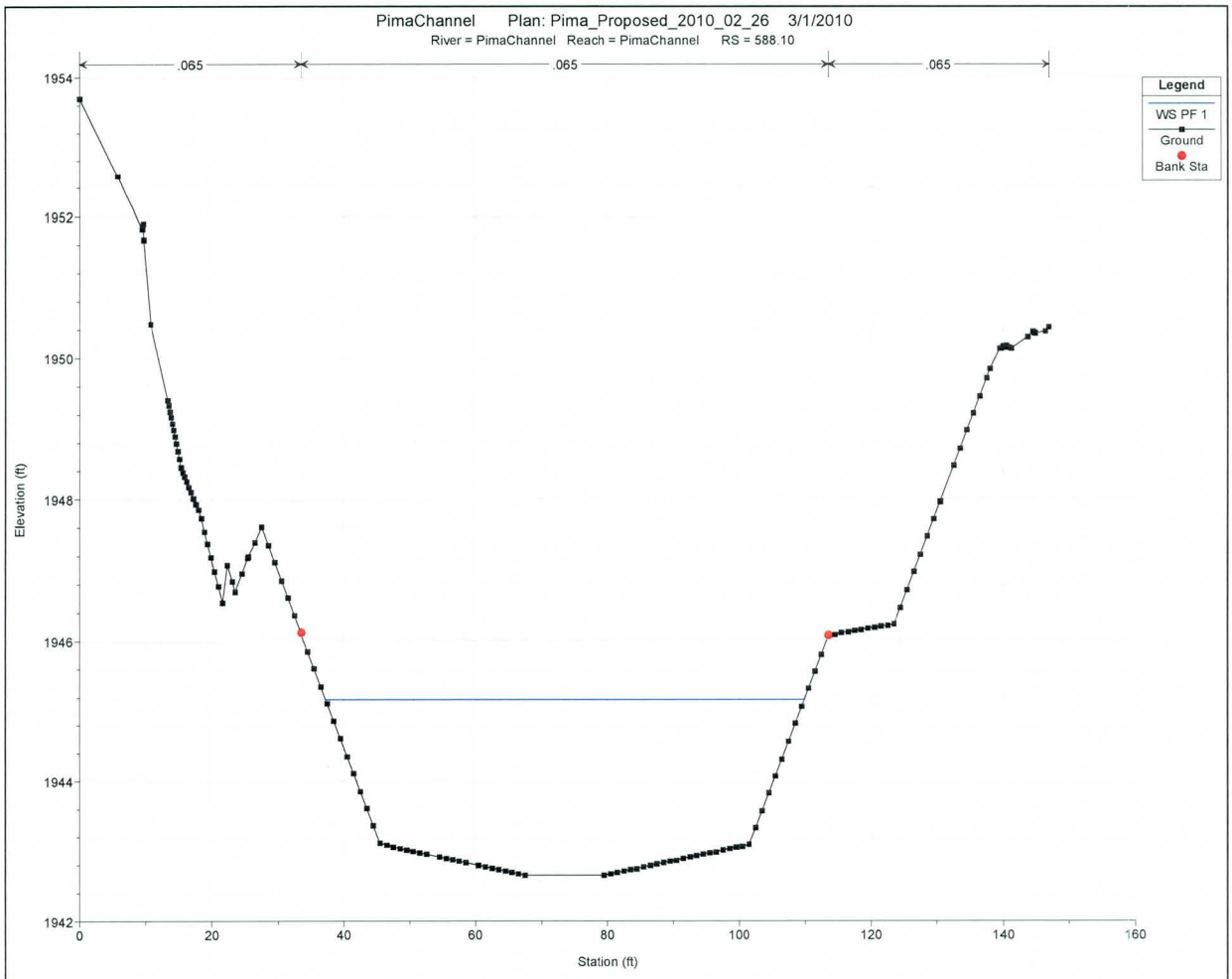

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 769.16
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1946
1948
1950
1952
1954
1956
1958
0
20
40
60
80
100
120
140
160

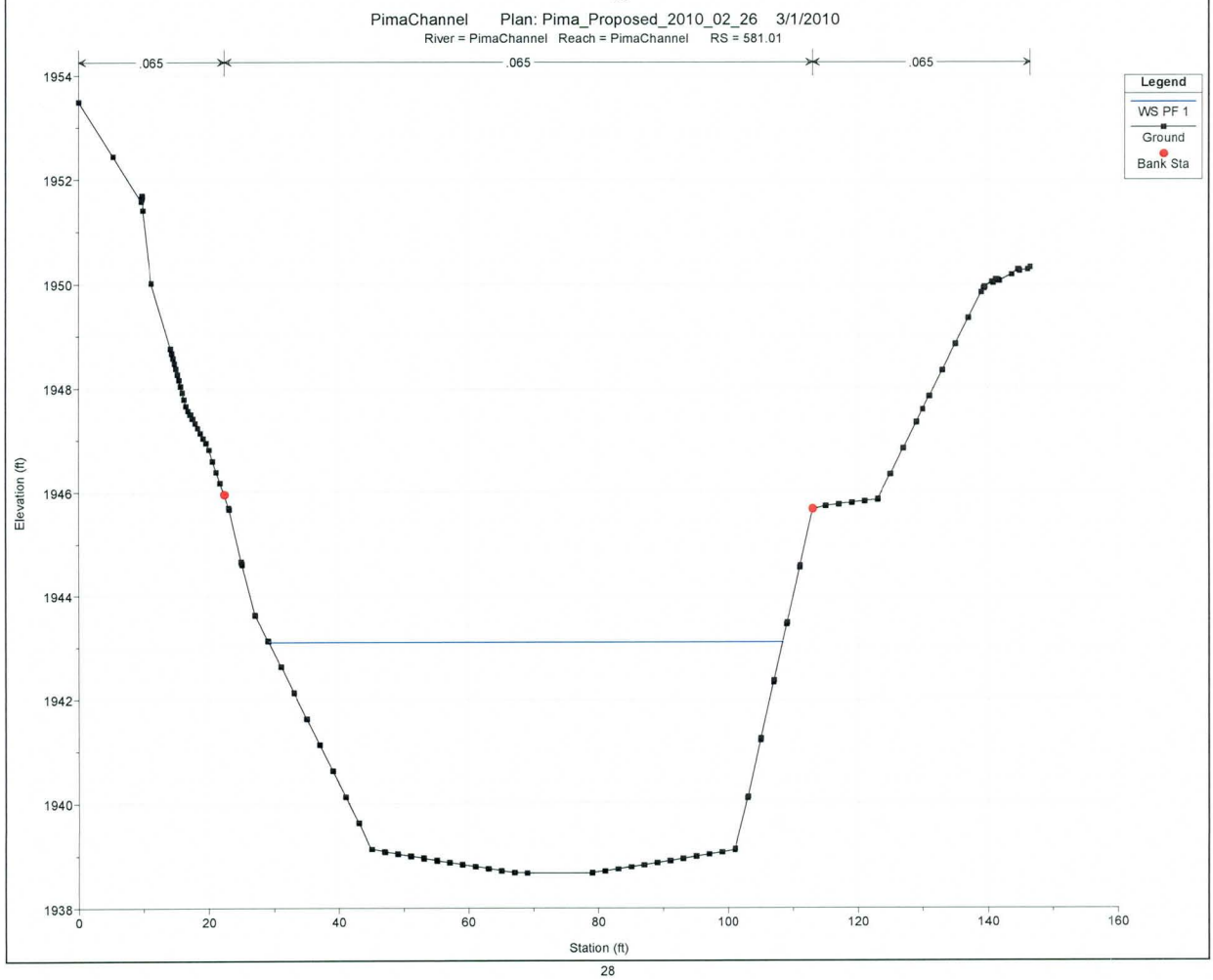

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 762.11
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

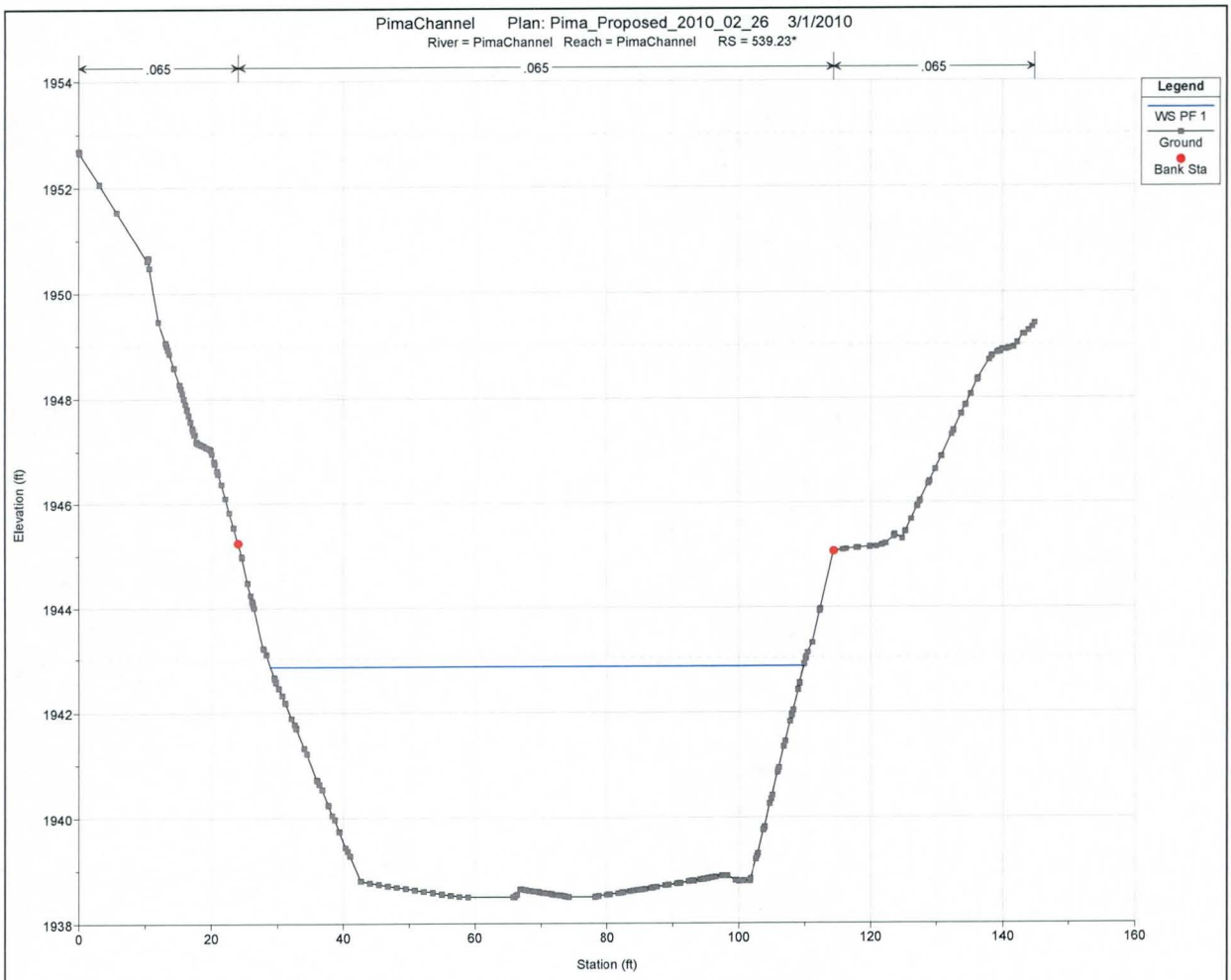

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 718.607*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

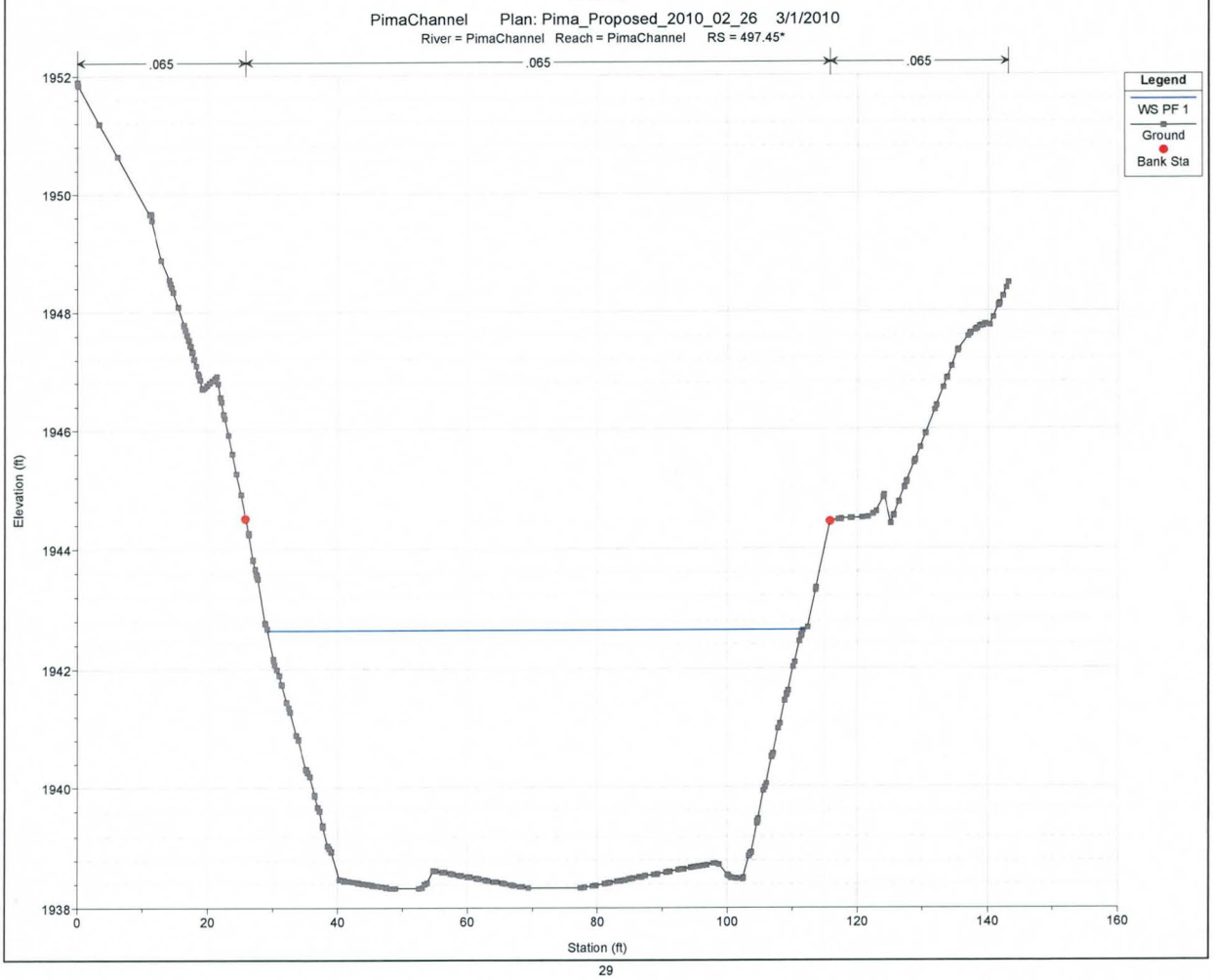

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 675.105*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1956
1954
1952
1950
1948
1946
1944
1942
0
20
40
60
80
100
120
140
160

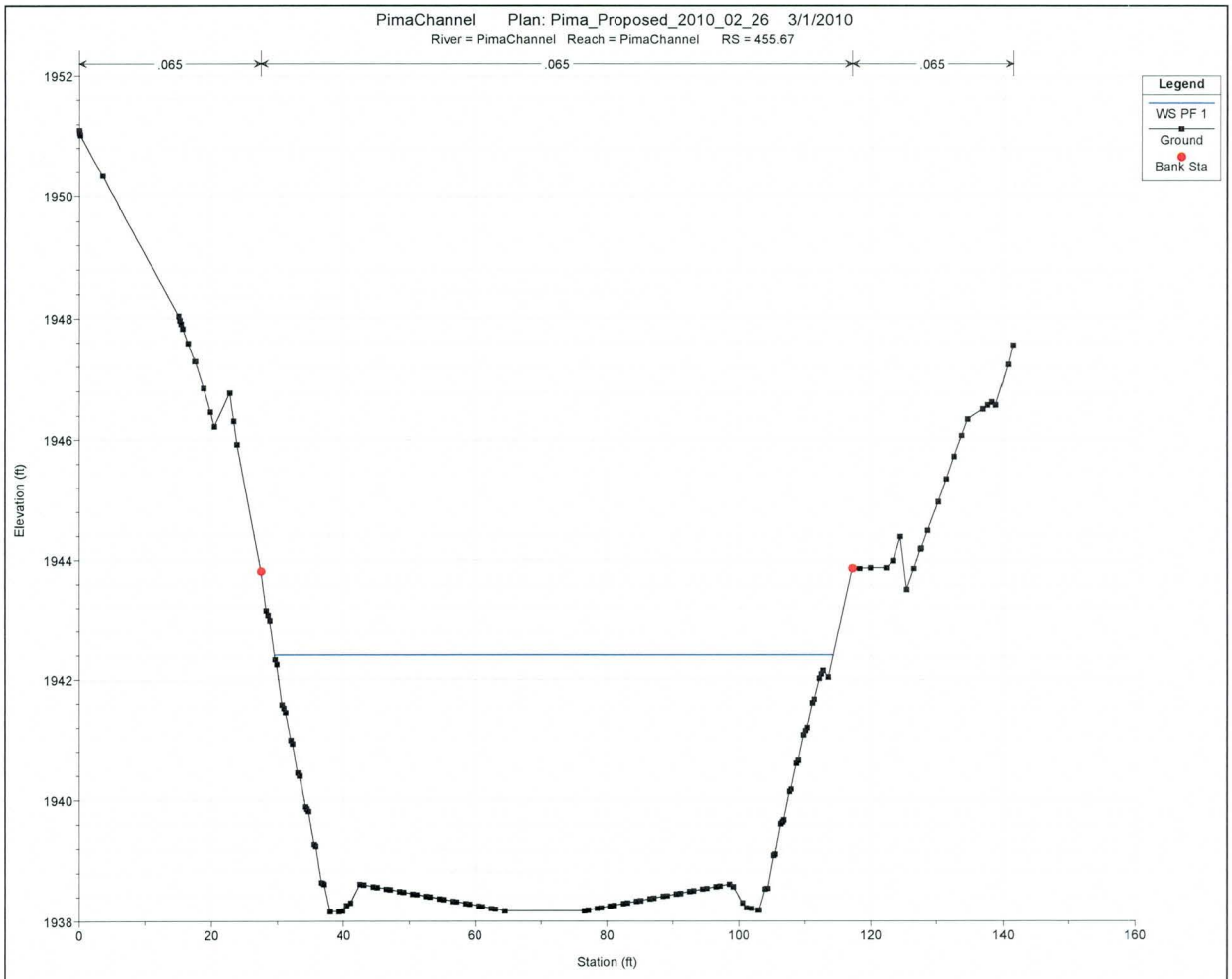

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 631.602*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1956
1954
1952
1950
1948
1946
1944
1942
0
20
40
60
80
100
120
140
160

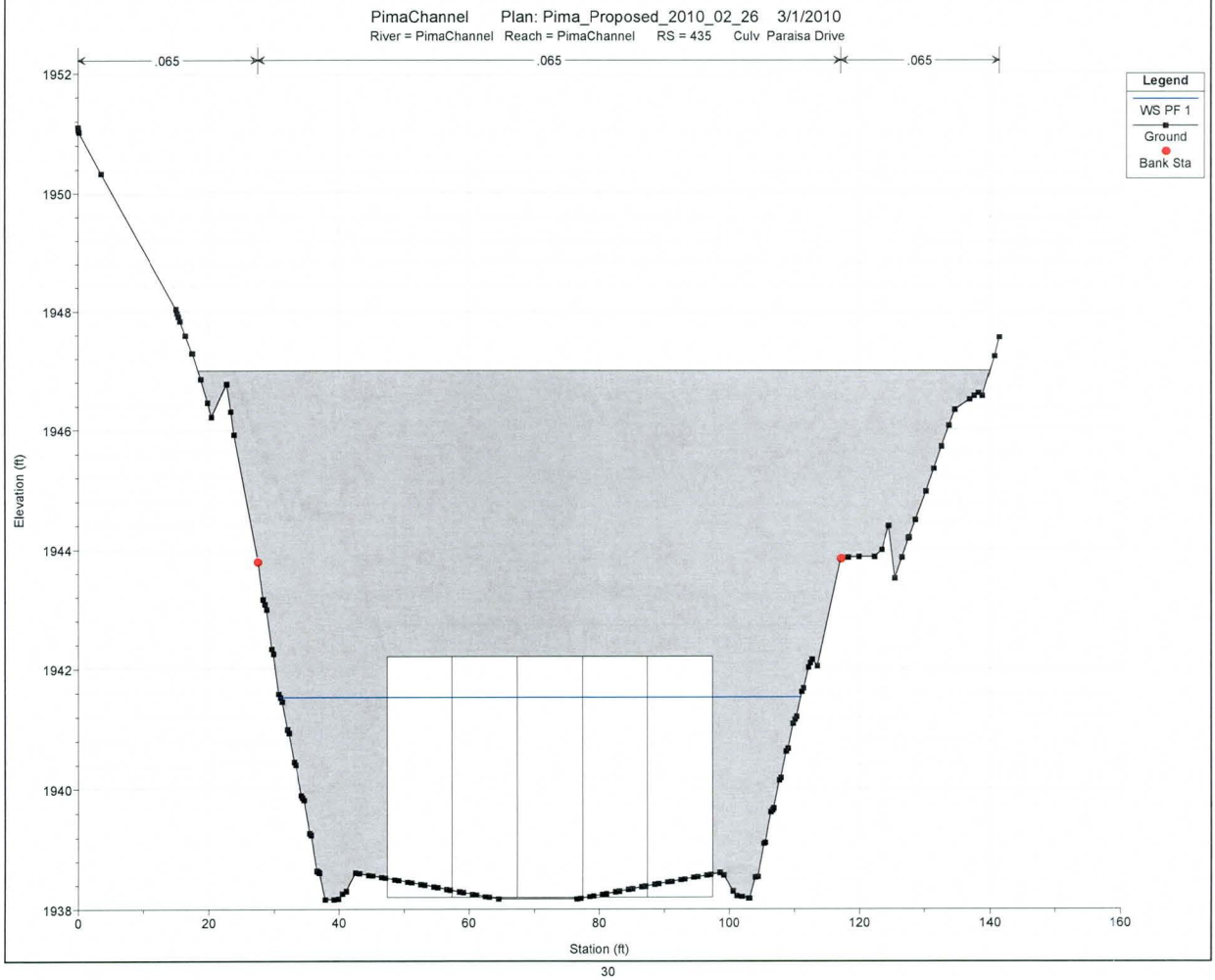

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 588.10
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1954
1952
1950
1948
1946
1944
1942
0
20
40
60
80
100
120
140
160

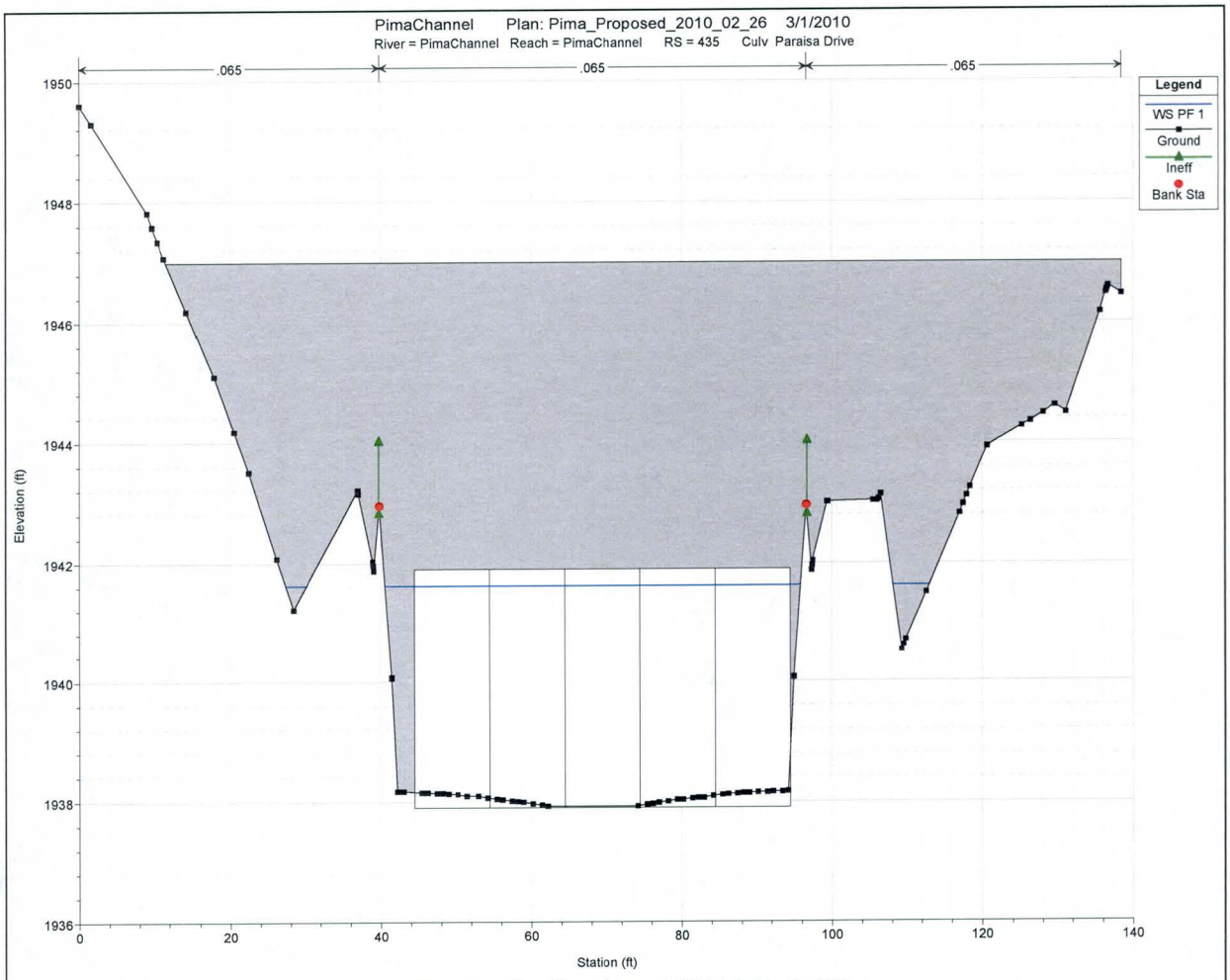

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 581.01
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1954
1952
1950
1948
1946
1944
1942
1940
1938
0
20
40
60
80
100
120
140
160

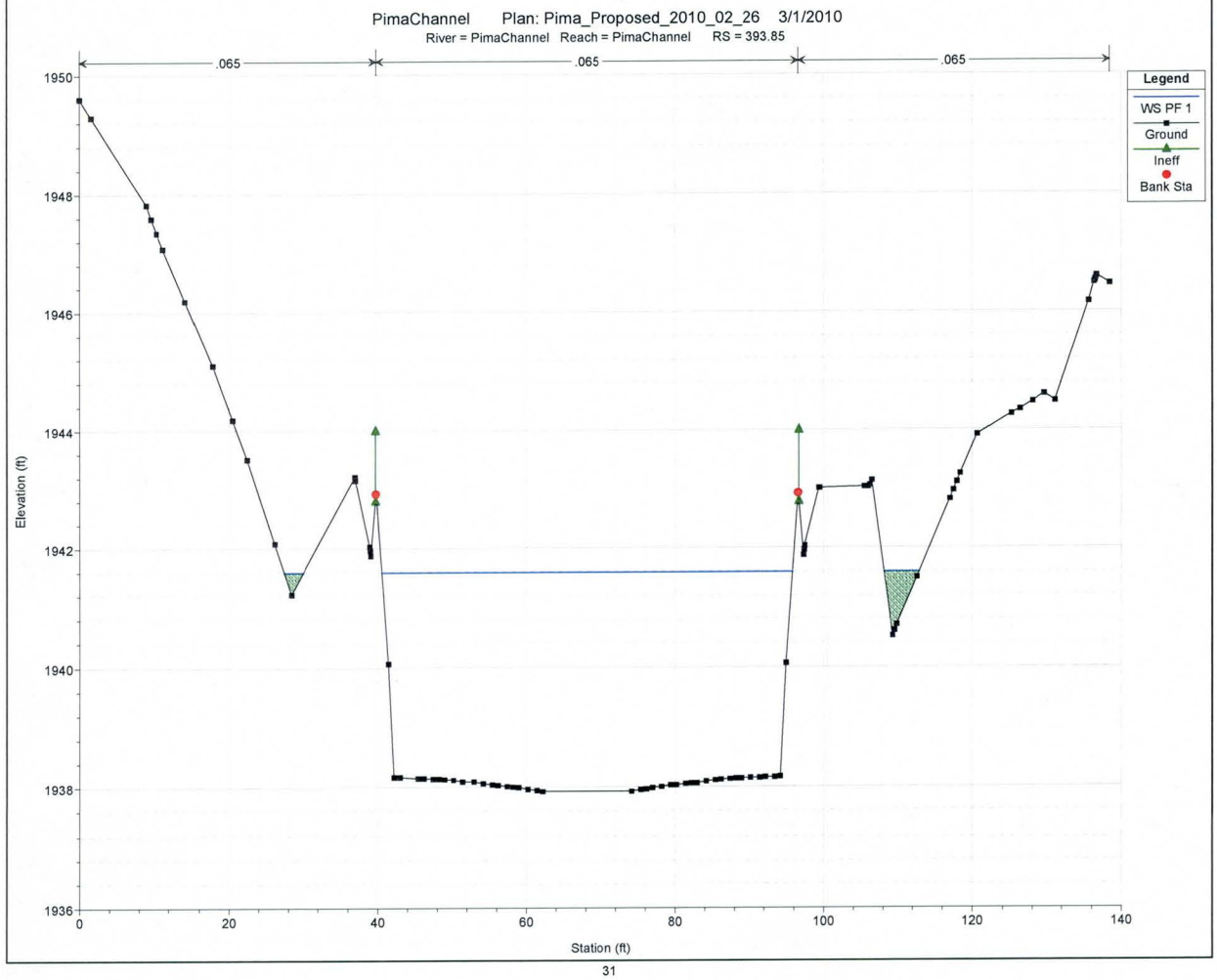

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 539.23*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

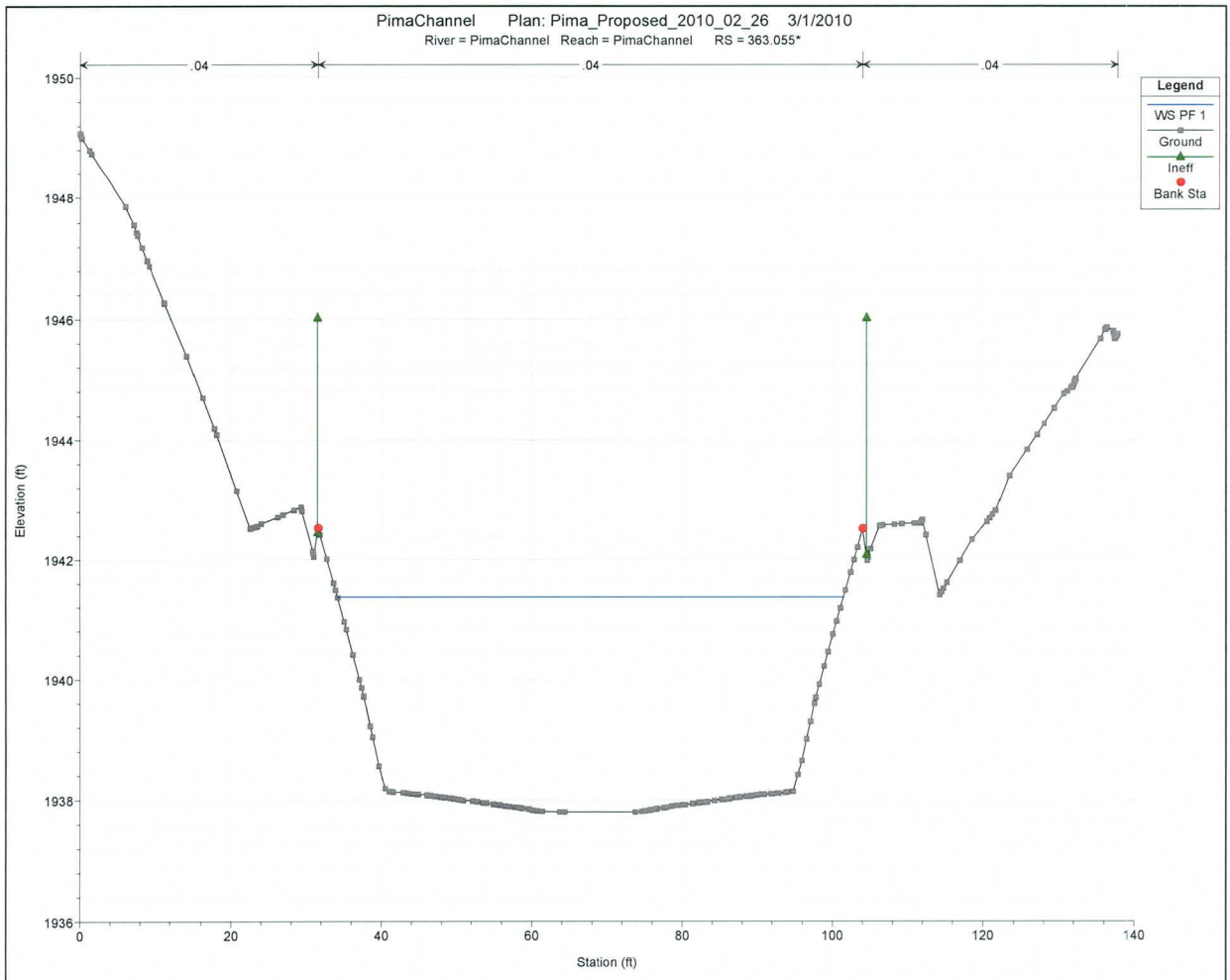

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 497.45*
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

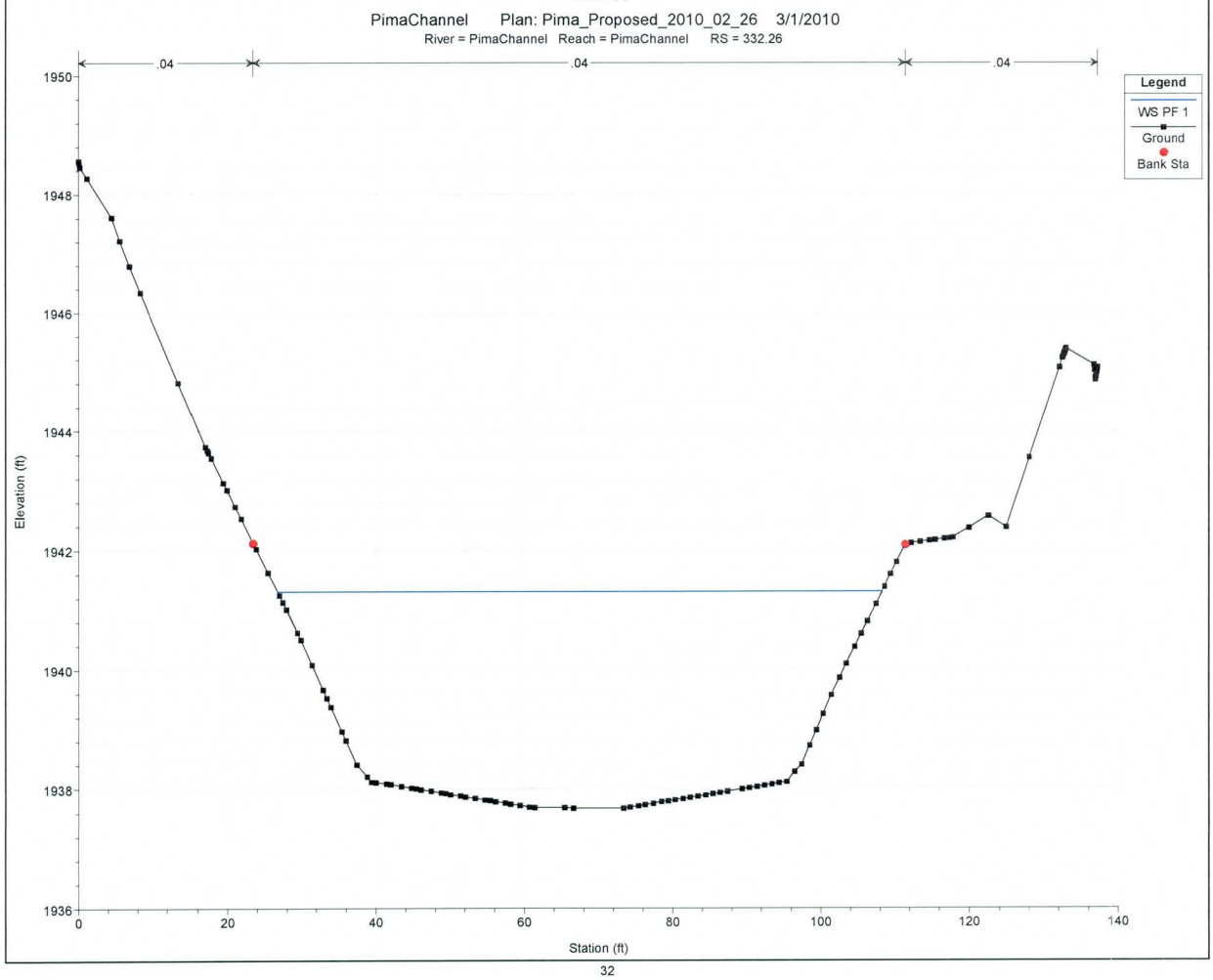

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 455.67
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

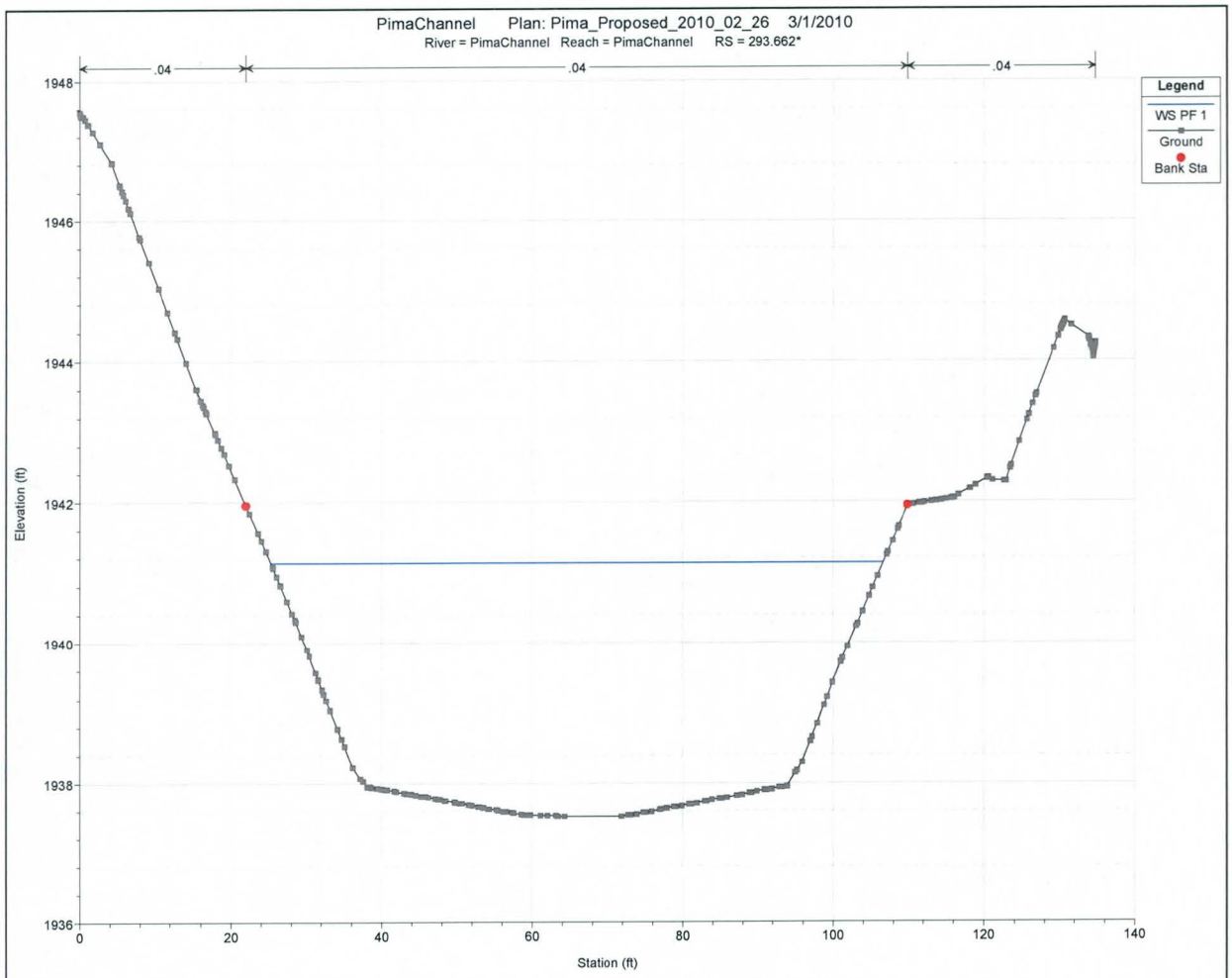

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 435 Culv Paraisa Drive
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

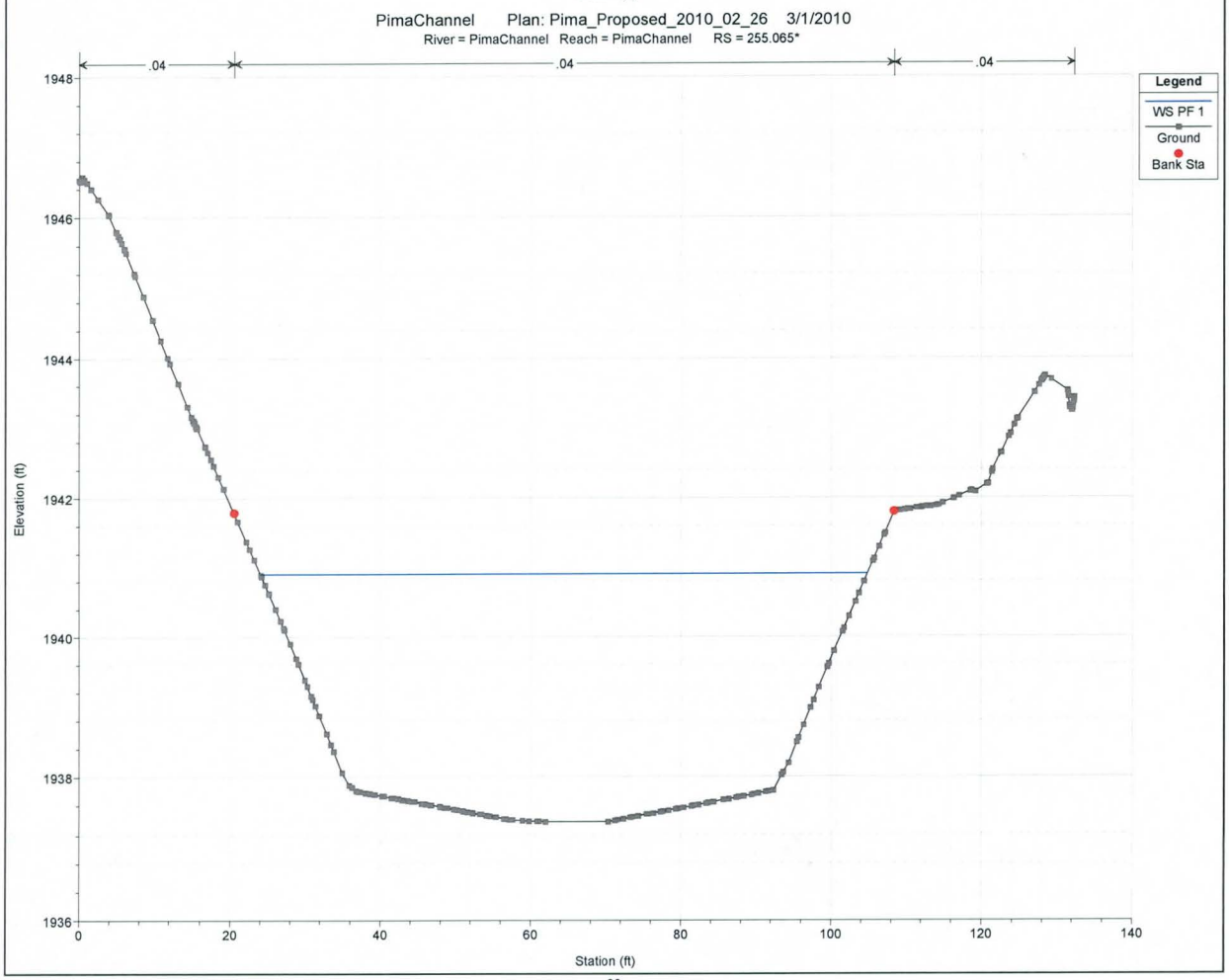

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 435 Culv Paraisa Drive
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1950
1948
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140

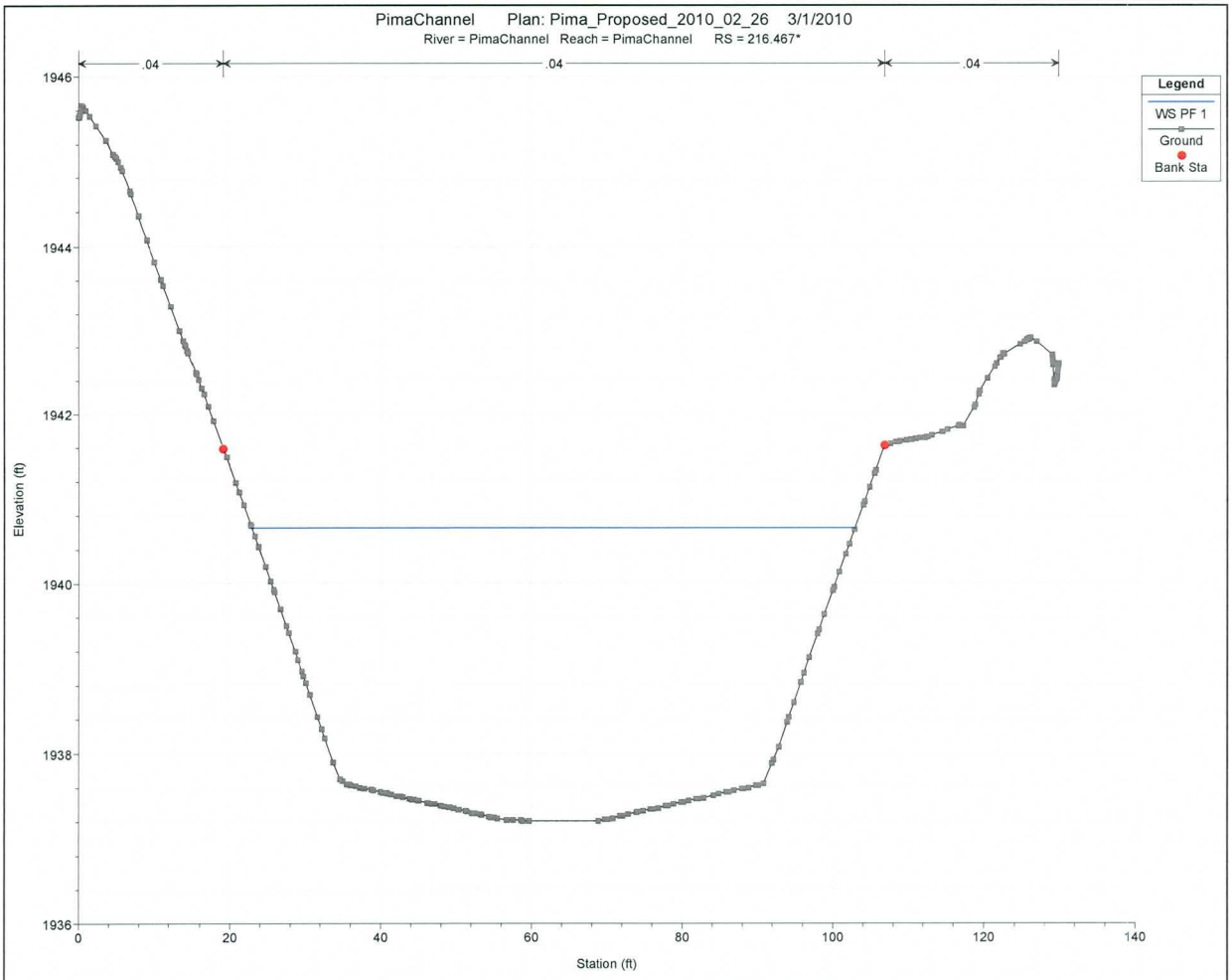

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 393.85
.065
.065
.065
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1950
1948
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140

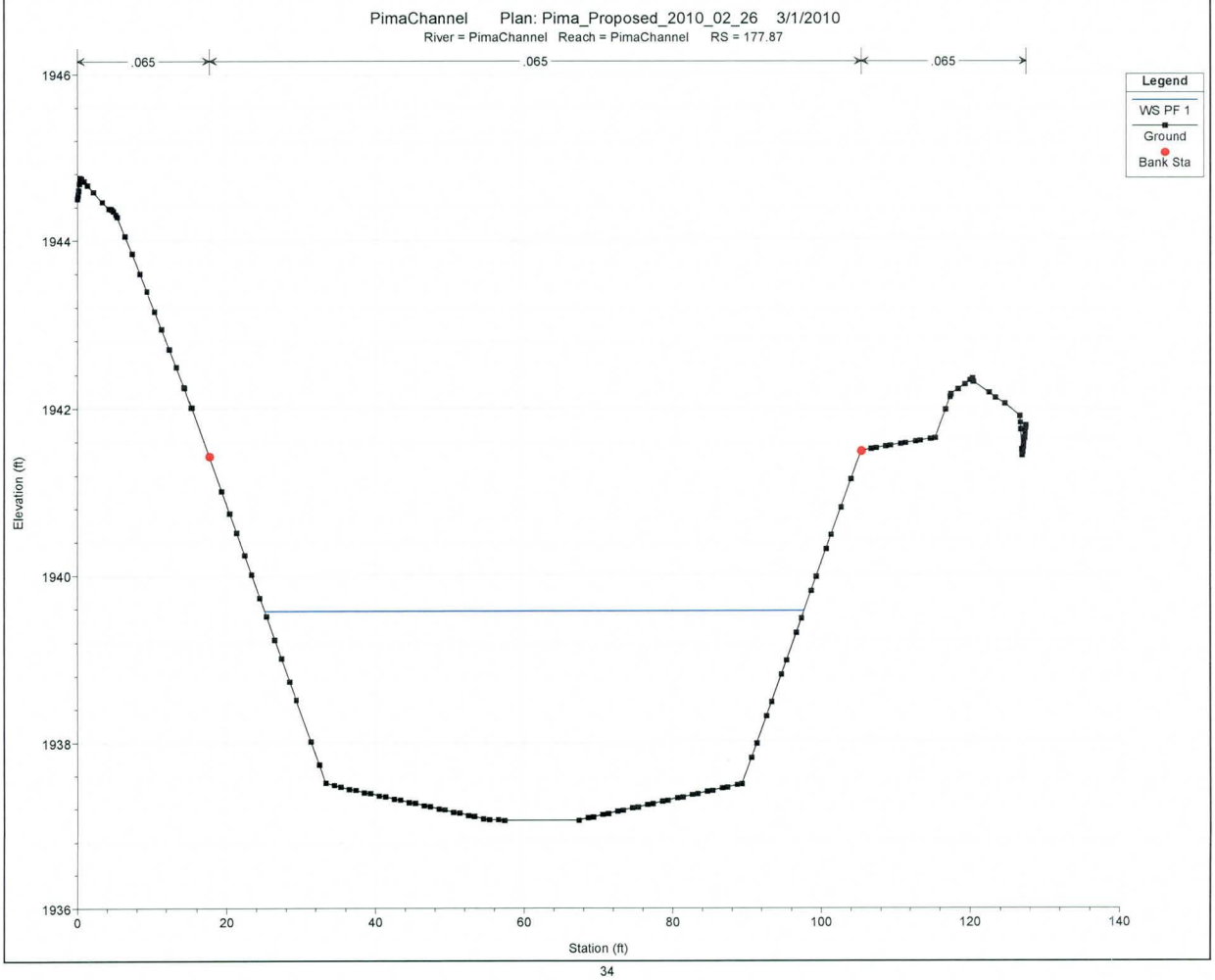

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 363.055*
.04
.04
.04
Legend
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
1950
1948
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140
Station (ft)

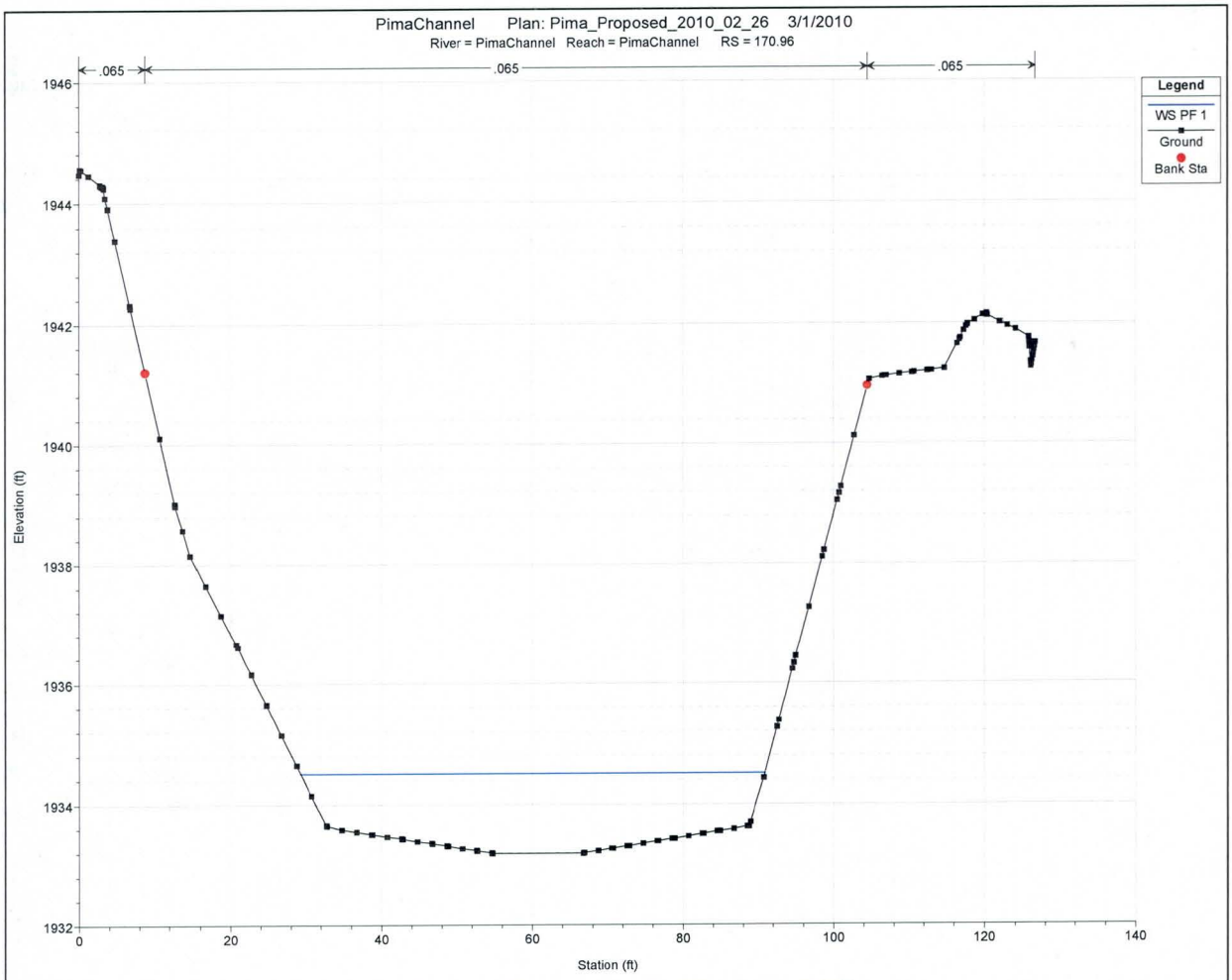

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 332.26
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1950
1948
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140
Station (ft)

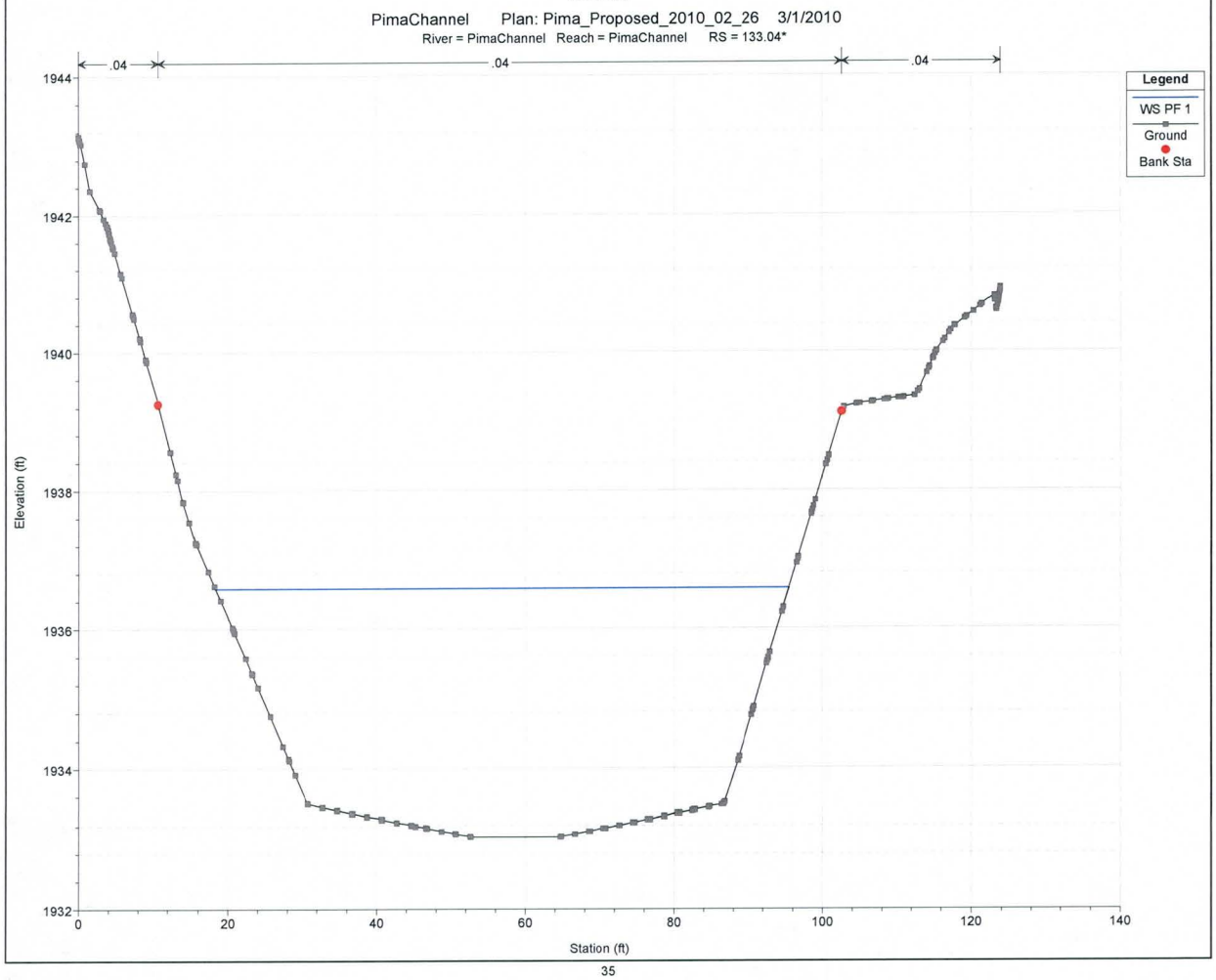

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 293.662*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1948
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140
Station (ft)

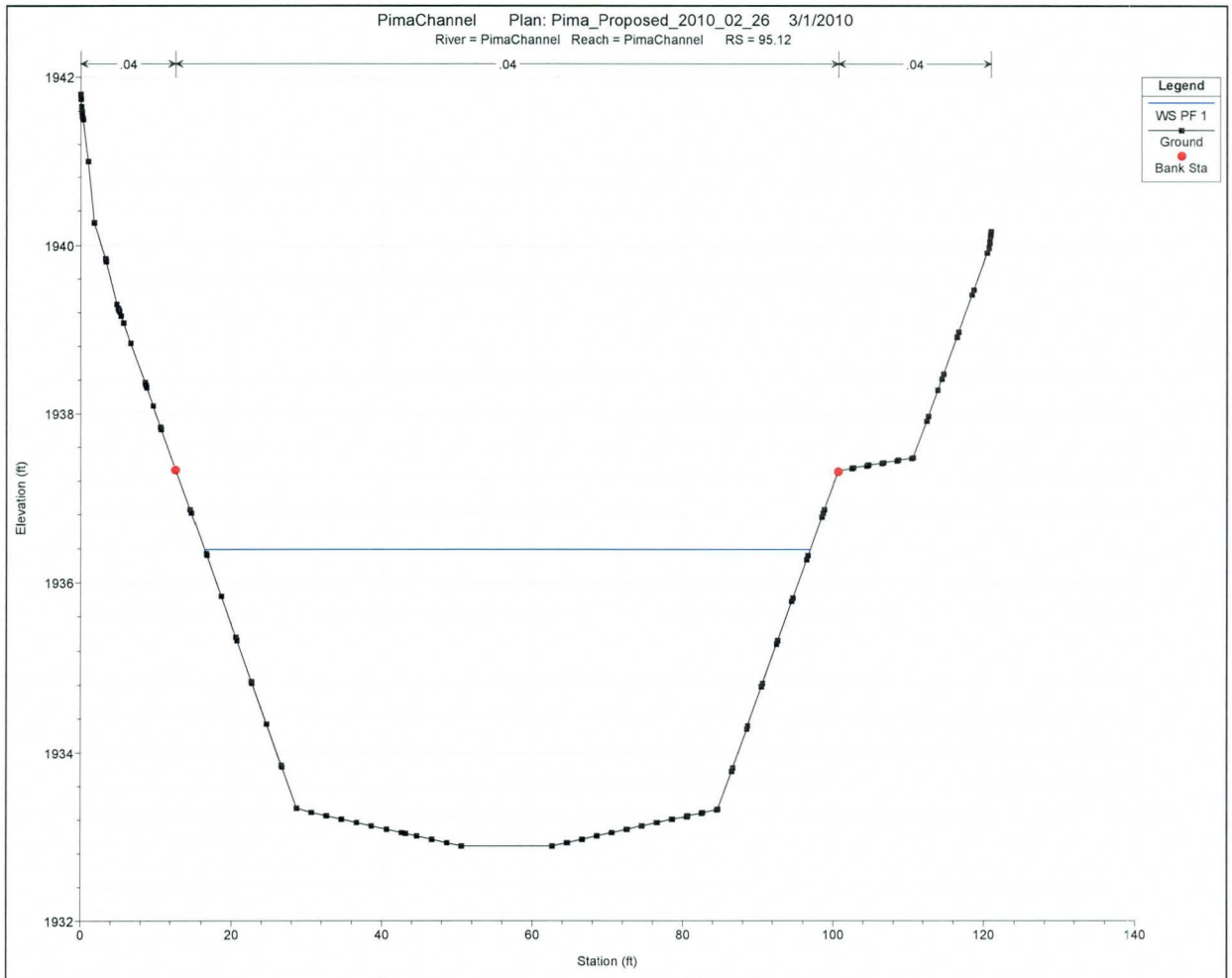

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 255.065*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1948
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140
Station (ft)

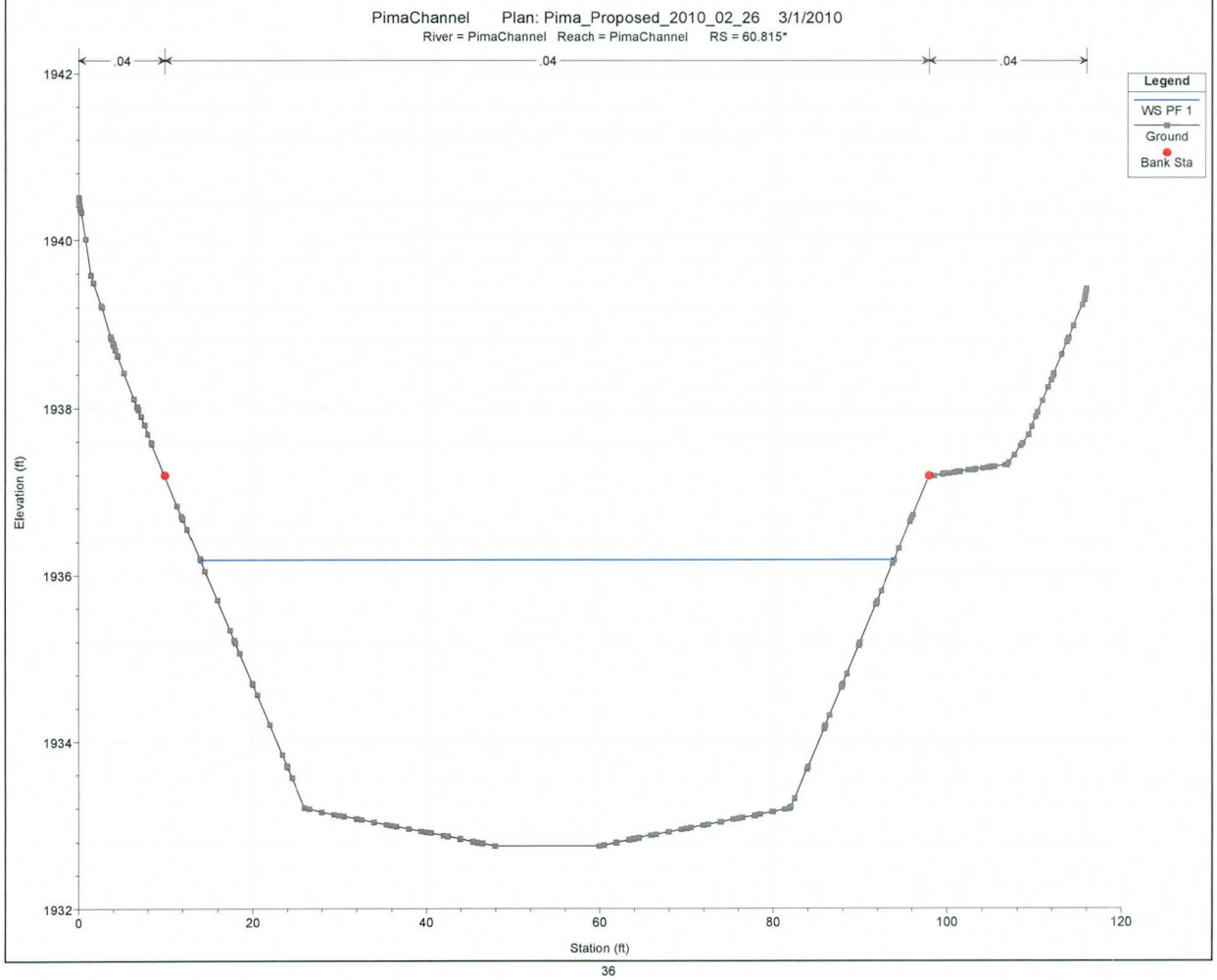

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 216.467*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140
Station (ft)

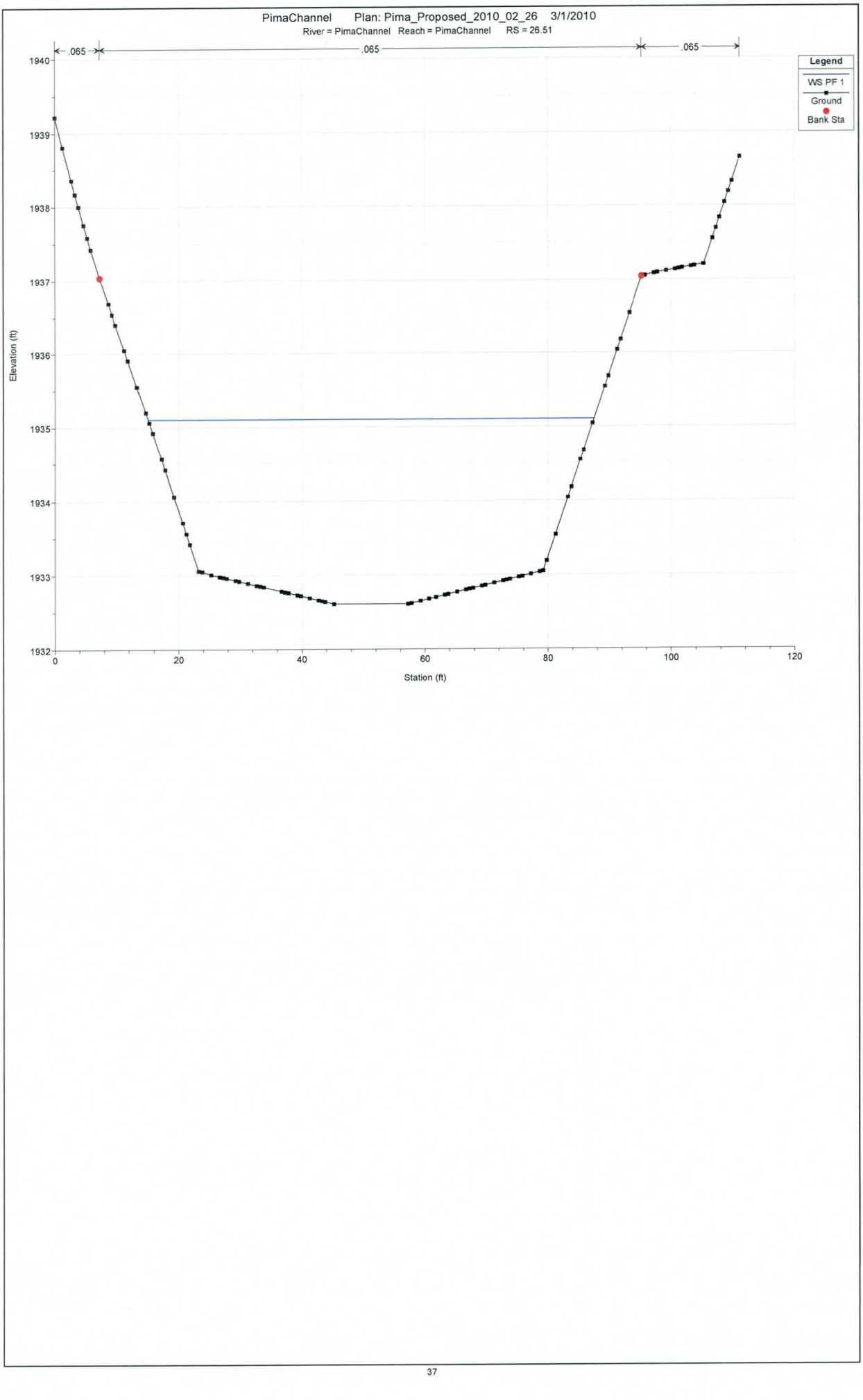

PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 177.87
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1946
1944
1942
1940
1938
1936
0
20
40
60
80
100
120
140
Station (ft)


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 170.96
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1946
1944
1942
1940
1938
1936
1934
1932
0
20
40
60
80
100
120
140


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 133.04*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1944
1942
1940
1938
1936
1934
1932
0
20
40
60
80
100
120
140


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 95.12
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1942
1940
1938
1936
1934
1932
0
20
40
60
80
100
120
140


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 60.815*
.04
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1942
1940
1938
1936
1934
1932
0
20
40
60
80
100
120


PimaChannel Plan: Pima_Proposed_2010_02_26 3/1/2010
River = PimaChannel Reach = PimaChannel RS = 26.51
.065
.065
.065
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
1940
1939
1938
1937
1936
1935
1934
1933
1932
0
20
40
60
80
100
120
Station (ft)

FlexTable: Conduit Table (Final - Pima Rd. Storm Drain - Via De Luna to Deer Valley Rd..stc)

Label	Section Size	Velocity (In) (ft/s)	Velocity (Out) (ft/s)	Length (Unified) (ft)	Slope (ft/ft)	Invert (Downstream) (ft)	Invert (Upstream) (ft)
CO-1	78 inch	18.53	18.53	171.0	0.001	1,912.00	1,912.17
CO-3	78 inch	18.53	18.53	351.0	0.001	1,911.50	1,911.95
CO-43	78 inch	13.93	12.94	516.0	0.011	1,859.30	1,865.00
CO-47	78 inch	18.53	18.53	411.0	0.021	1,894.41	1,903.00
CO-49	78 inch	18.92	22.81	306.0	0.021	1,888.00	1,894.41
CO-55	78 inch	18.53	18.53	501.0	0.015	1,904.00	1,911.50
CO-56	78 inch	13.93	18.16	284.0	0.014	1,883.00	1,887.00
CO-57	78 inch	13.93	17.65	501.0	0.012	1,871.00	1,877.00
CO-58	78 inch	18.53	18.53	20.0	0.716	1,912.17	1,926.50

Number of Barrels	Manning's n	Flow (ft^3/s)	Froude Number	Headloss (ft)
2	0.014	1,230.00	1.282	2.73
2	0.014	1,230.00	1.282	5.60
3	0.014	1,230.00	0.854	5.18
2	0.014	1,230.00	1.282	6.56
2	0.014	1,230.00	1.282	7.64
2	0.014	1,230.00	1.282	8.00
3	0.014	1,230.00	0.854	5.21
3	0.014	1,230.00	0.854	7.11
2	0.014	1,230.00	12.072	0.32

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FlexTable: Manhole Table (Final - Pima Rd. Storm Drain - Via De Luna to Deer Valley Rd..stc)

Label	Station (Calculated) (ft)	Elevation (Ground) (ft)	Set Rim to Ground Elevation?	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Method	Headloss Coefficient (Standard)	Structure Type	Length (ft)	Width (ft)
MH-1	28+70.000	1,934.15	True	1,934.15	1,911.95	Standard	0.500	Box Structure	7.00	200.00
MH-3	13+01.000	1,902.00	True	1,902.00	1,887.00	Standard	0.500	Box Structure	7.00	250.00
MH-4	10+17.000	1,893.10	True	1,893.10	1,877.00	Standard	0.500	Box Structure	7.00	250.00
MH-5	5+16.000	1,880.20	True	1,880.20	1,865.00	Standard	0.500	Box Structure	7.00	250.00
MH-12	25+19.000	1,926.00	True	1,926.00	1,911.50	Standard	0.500	Box Structure	7.00	200.00
MH-13	20+18.000	1,914.60	True	1,914.60	1,903.00	Standard	0.500	Box Structure	7.00	200.00
MH-29	16+07.000	1,906.00	True	1,906.00	1,894.41	Standard	0.500	Box Structure	7.00	200.00
MH-33	30+41.000	1,942.00	True	1,942.00	1,912.17	Standard	0.500	Box Structure	7.00	200.00

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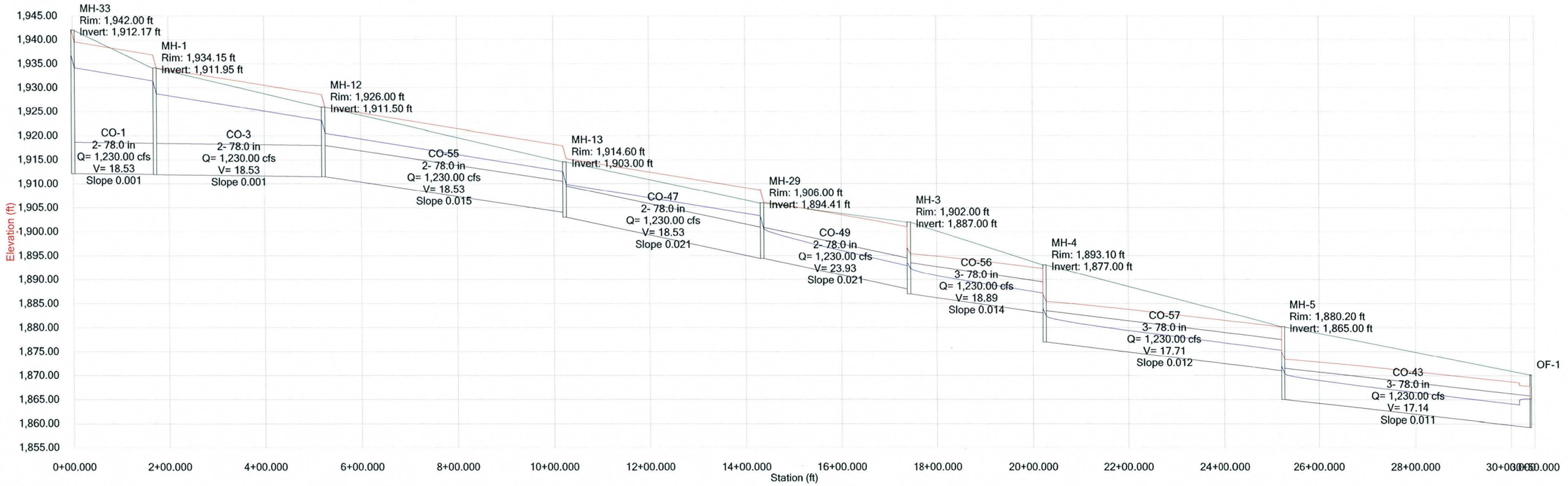
Profile Report

Engineering Profile - Pima Rd. Storm Drain - Via De Luna to Deer Valley Rd. (Final - Pima Rd. Storm Drain - Via De Luna to Deer Valley Rd..stc)



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	Pima Rd Channel	865.5	50	8.20	24.24	0.18	0.621	0.17	1	0.95	0.156	0.461	822.4	134.8	398.7
2	Storm Drain	92.0	50	8.20	24.24	0.19	0.621	0.17	1	1.00	0.164	0.486	92.3	15.1	44.8
3	Storm Drain	43.5	50	8.20	24.24	0.20	0.621	0.17	1	1.06	0.173	0.512	45.9	7.5	22.3
4	Storm Drain	8.0	50	8.20	24.24	0.16	0.621	0.17	1	0.84	0.138	0.409	6.8	1.1	3.3
5	Storm Drain	2.0	50	8.20	24.24	0.15	0.621	0.17	1	0.79	0.130	0.384	1.6	0.3	0.8
6	Storm Drain	7.2	50	8.20	24.24	0.15	0.621	0.17	1	0.79	0.130	0.384	5.7	0.9	2.8
7	Storm Drain	15.2	50	8.20	24.24	0.18	0.400	0.17	1	0.61	0.100	0.297	9.3	1.5	4.5

[1)] R – Rainfall and Runoff factor (**Figure-1**, or **$R = 0.01*\Sigma[EI]$,** where $E = 916 + 331 \text{ Log}_{10}[I]$, and I = rainfall intensity [in/hr])

K – Soil erodibility factor (**SCS Soil Survey**)

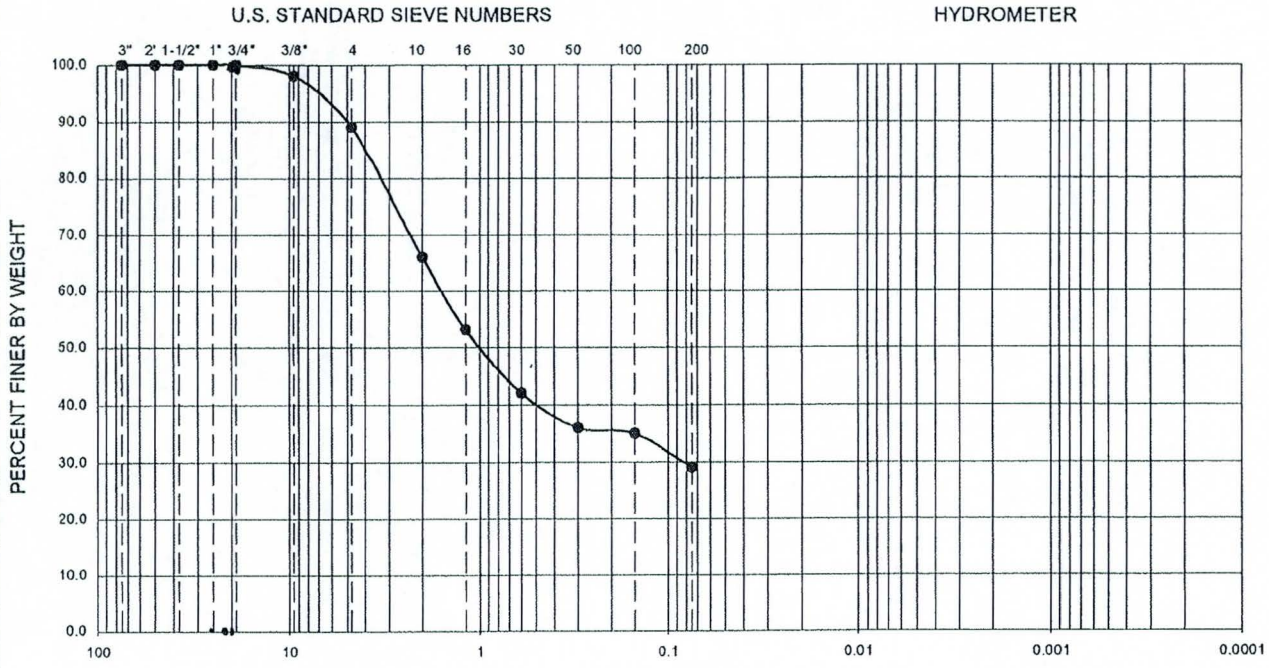
LS – Topographic factor (**Table-3**)

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

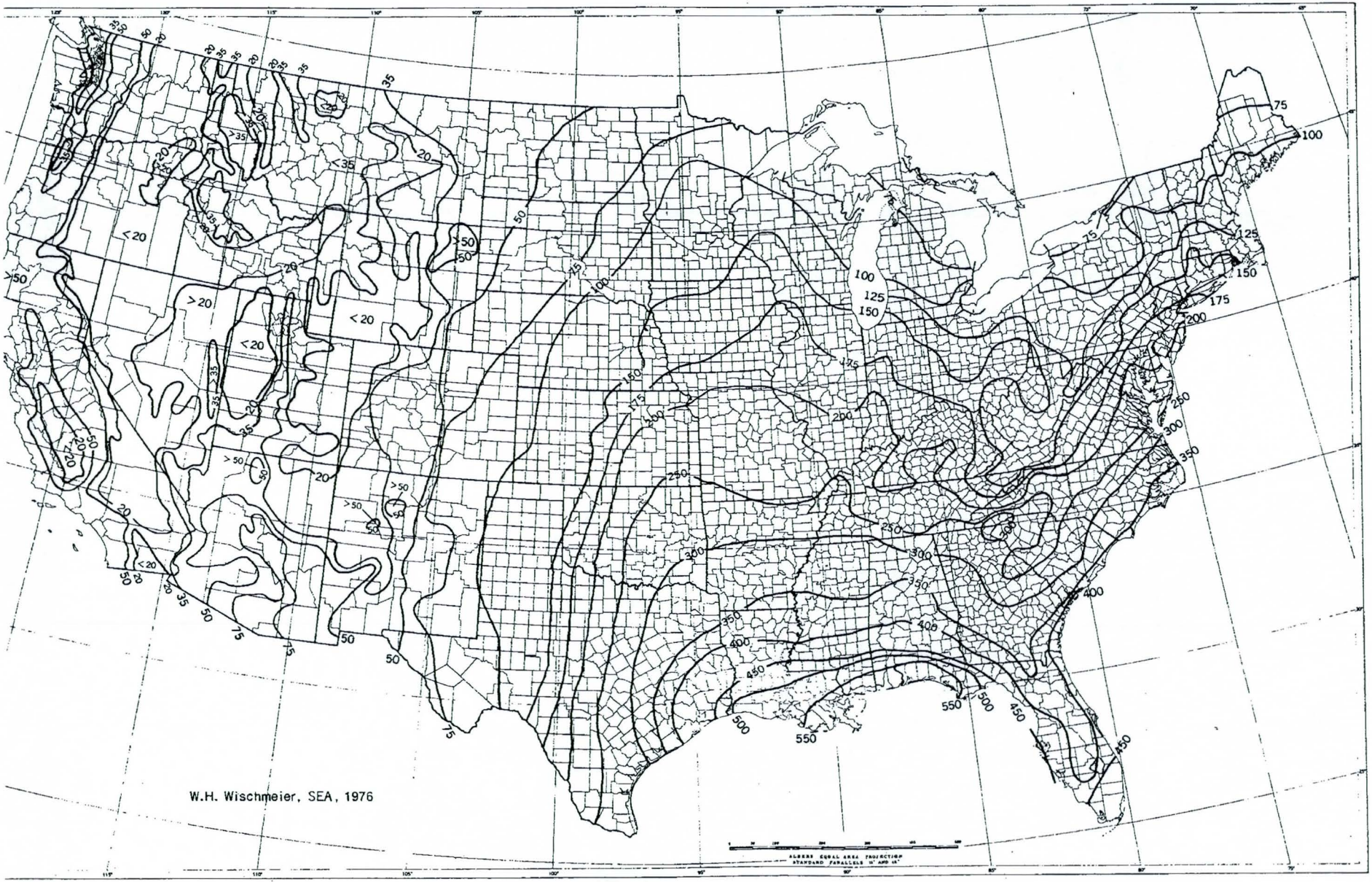


FIGURE 1.—Average annual values of the rainfall erosion index.

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						
Type and height[2]	Percent cover[3]		Percent ground cover					
		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.

Typical Cross for Deer Valley to Thompson Peak Parkway

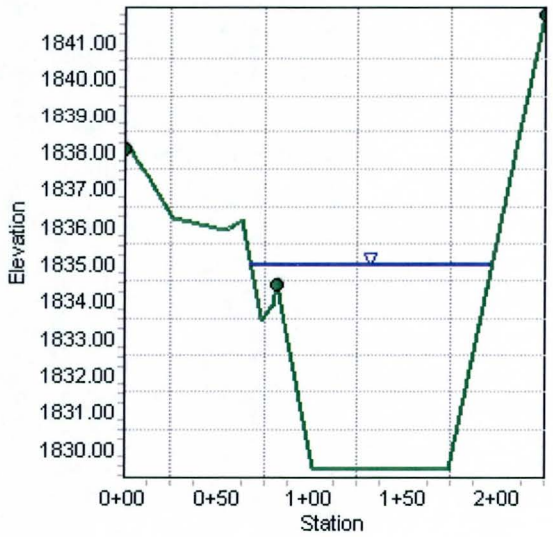
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	5.51	ft
Discharge	3375.60	ft³/s

Cross Section Image



Typical Cross Section from Deer Valley Road to Thompson Peak Parkway

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	5.51	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00	1838.08
0+00	1838.07
0+04	1837.94
0+06	1837.87
0+12	1837.33
0+26	1836.22
0+50	1835.94
0+54	1835.89
0+56	1835.96
0+63	1836.12
0+70	1834.28
0+72	1833.79
0+73	1833.47
0+76	1833.65
0+78	1833.82
0+79	1833.87
0+81	1834.44
1+01	1829.44
1+73	1829.44
2+25	1841.71

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1838.08)	(0+81, 1834.44)	0.015
(0+81, 1834.44)	(2+25, 1841.71)	0.040

Options

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

Typical Cross Section from Deer Valley Road to Thompson Peak Parkway

Options

Closed Channel Weighting Method	Pavlovskii's Method

Results

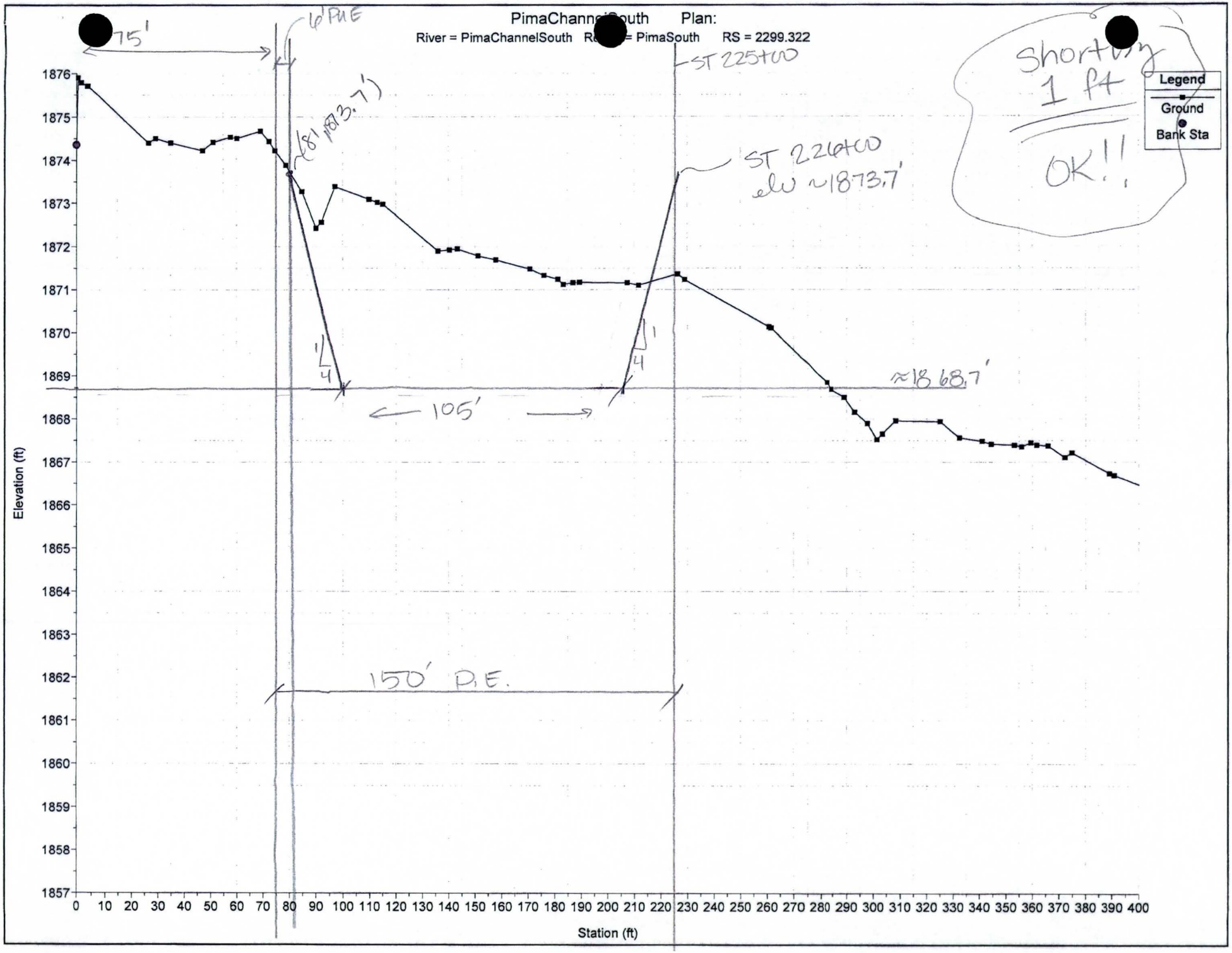
Discharge		3375.60	ft³/s
Elevation Range	1829.44 to 1841.71 ft		
Flow Area		534.91	ft²
Wetted Perimeter		130.71	ft
Hydraulic Radius		4.09	ft
Top Width		129.17	ft
Normal Depth		5.51	ft
Critical Depth		3.79	ft
Critical Slope		0.01450	ft/ft
Velocity		6.31	ft/s
Velocity Head		0.62	ft
Specific Energy		6.13	ft
Froude Number		0.55	
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	5.51	ft
Critical Depth	3.79	ft
Channel Slope	0.00400	ft/ft
Critical Slope	0.01450	ft/ft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River = PimaChannelSouth Reach = PimaSouth RS = 2299.322
75'
6' PUE
ST 225+00
ST 226+00
elv ≈1873.7'
≈1873.7'
≈1868.7'
1/4
1/4
105'
150' P.E.
Shorting 1 ft
OK!!
Legend
Ground
Bank Sta
Elevation (ft)
Station (ft)
1857
1858
1859
1860
1861
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1863
1864
1865
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1867
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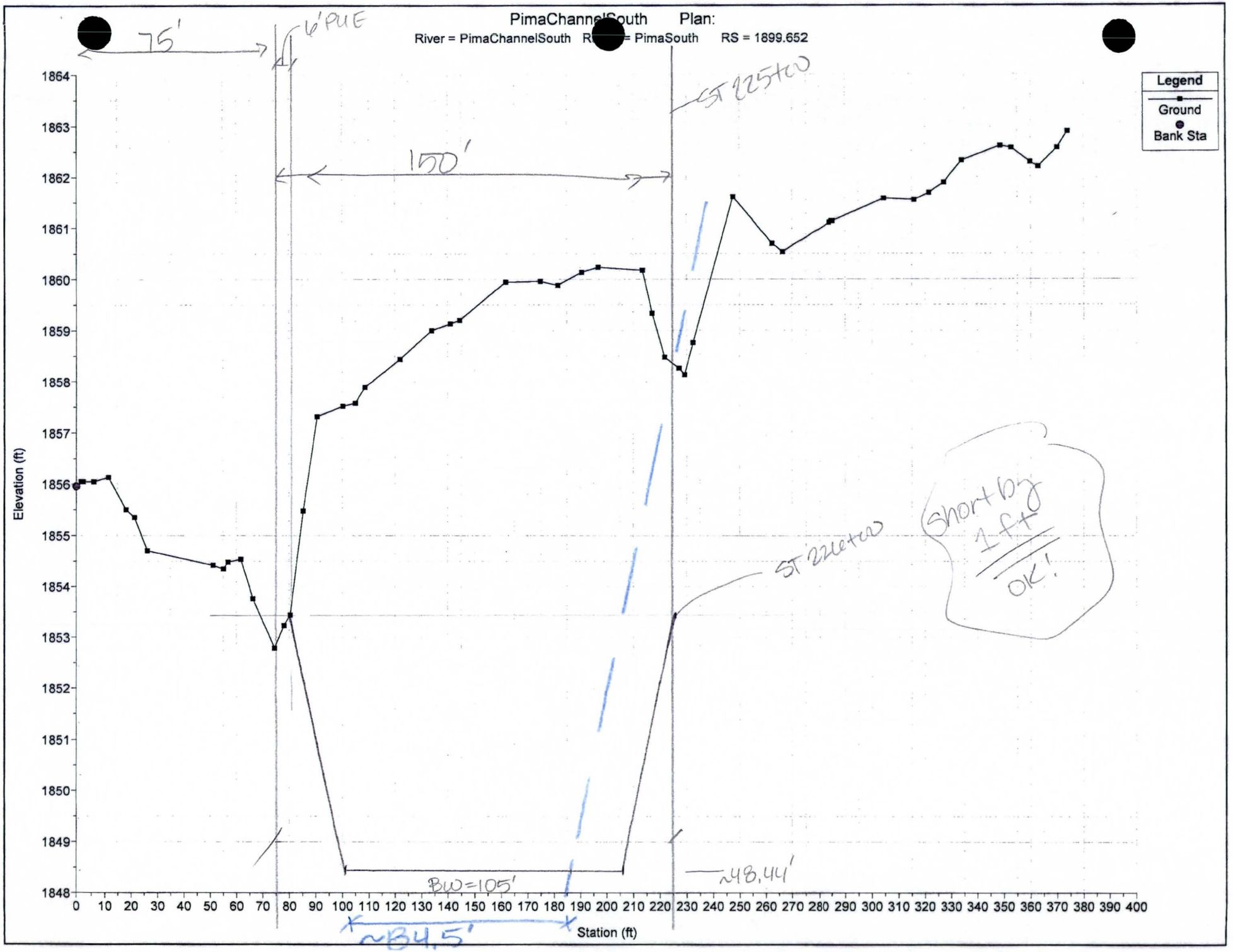
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400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75'
6' PUE
150'
ST 225 tw
ST 226 tw
Short by 1 ft
OK!
BW=105'
~84.5'
~48.44'
Legend
Ground
Bank Sta
Elevation (ft)
Station (ft)
1864
1863
1862
1861
1860
1859
1858
1857
1856
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1853
1852
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1850
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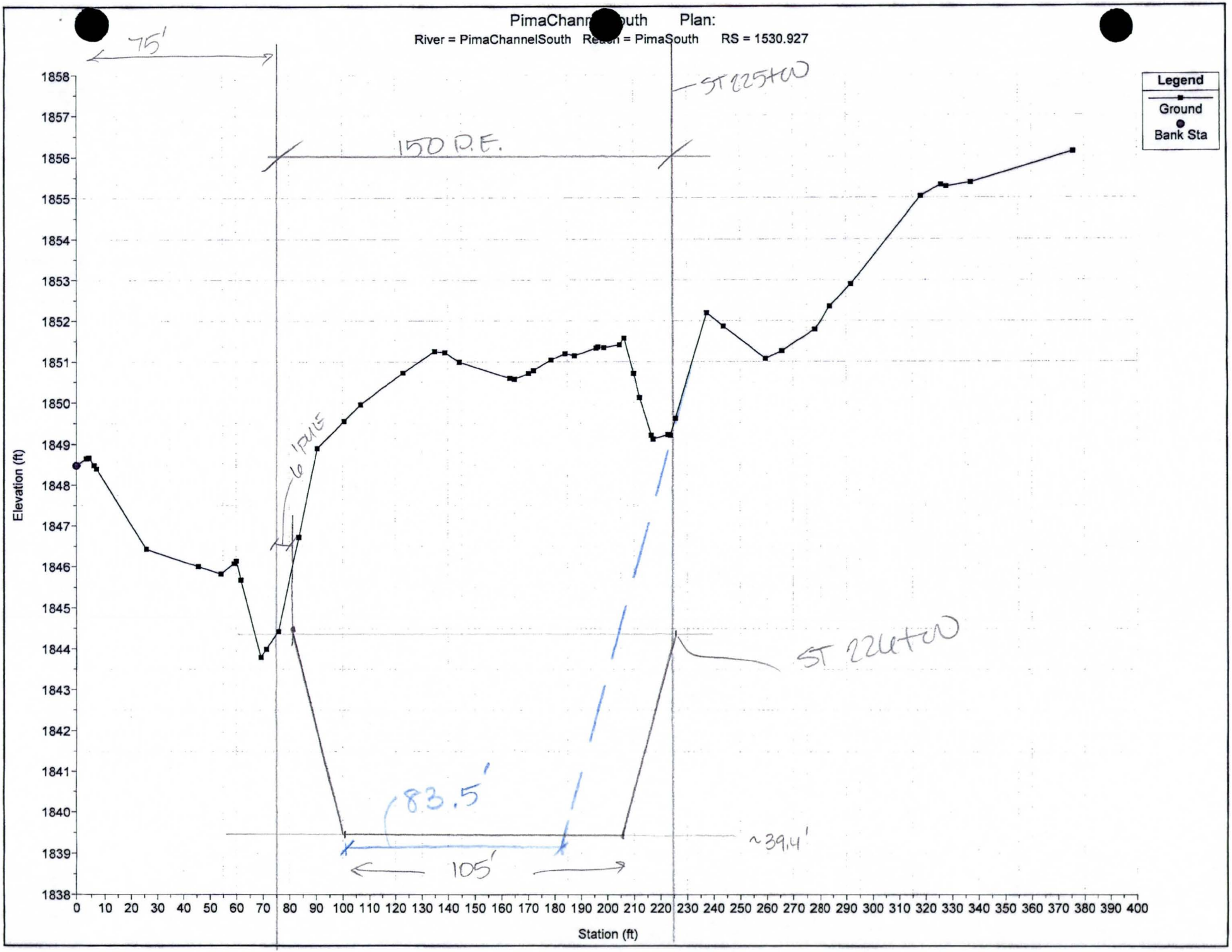
1848
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400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75'
150 R.E.
ST 225+00
ST 224+00
6' PIPE
83.5'
105'
~39.4'
Legend
Ground
Bank Sta
Elevation (ft)
Station (ft)
1858
1857
1856
1855
1854
1853
1852
1851
1850
1849
1848
1847
1846
1845
1844
1843
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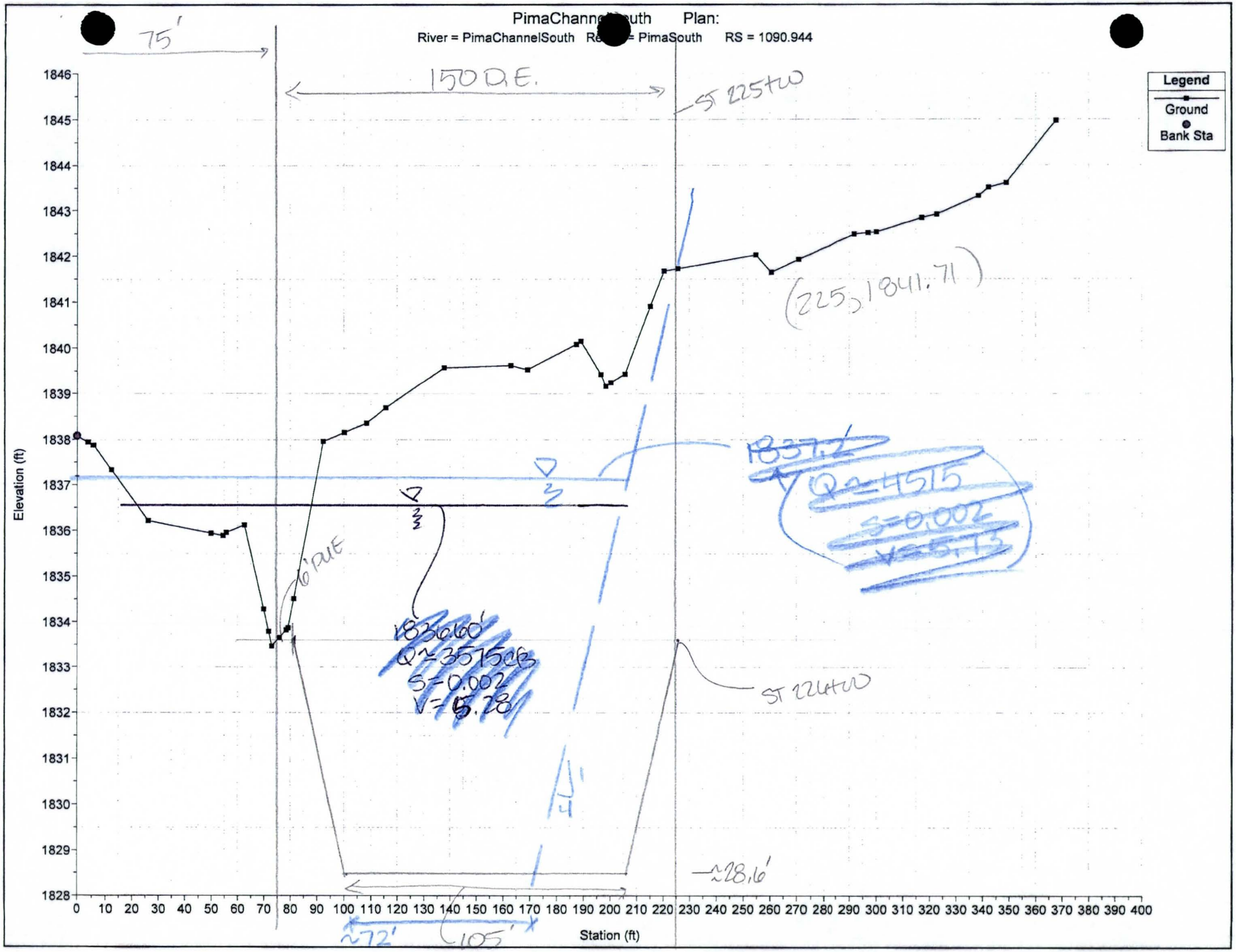
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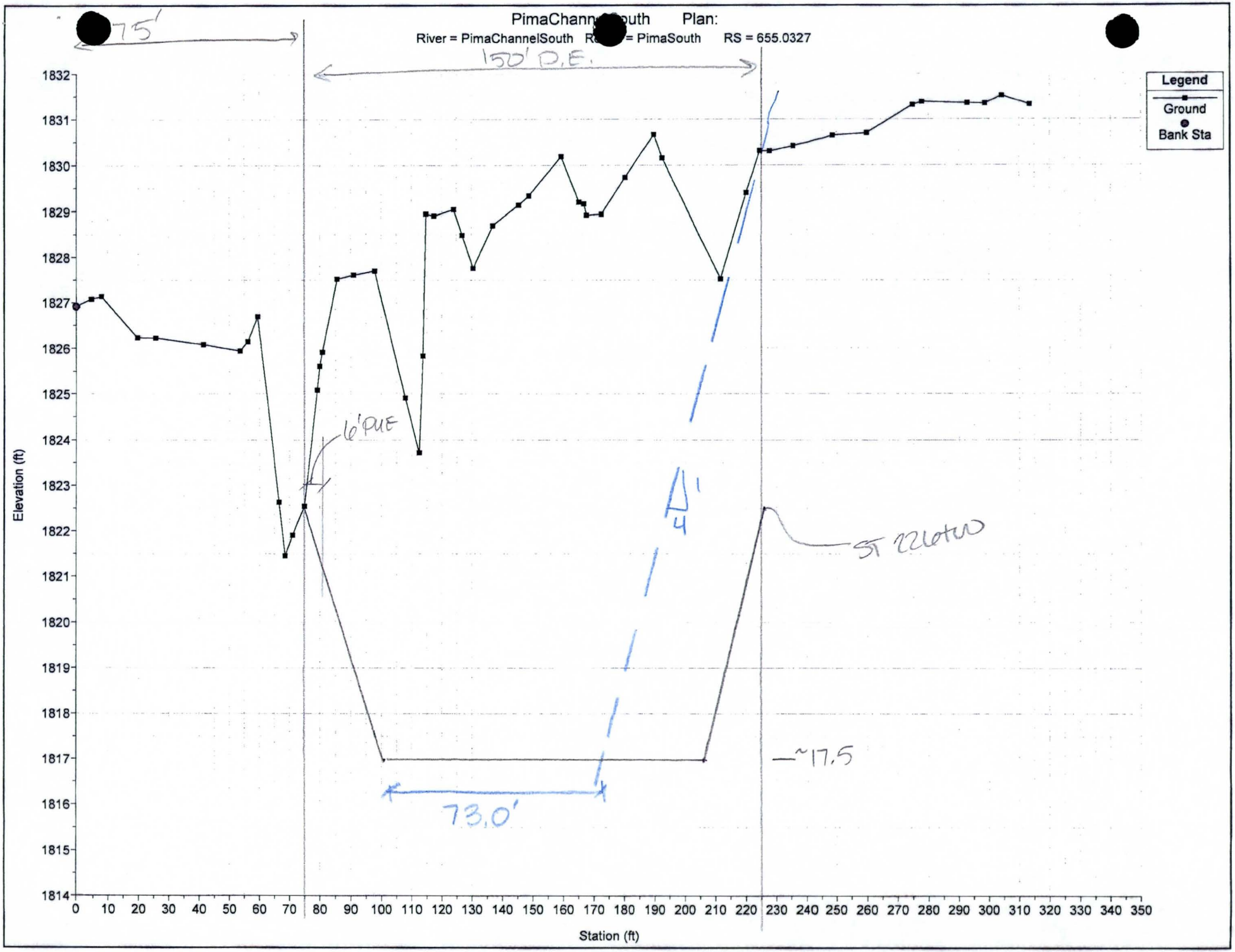
75'
150 L.E.
ST 225+00
Legend
Ground
Bank Sta
(225, 1841.71)
1837.2
Q=4515
S=0.002
V=5.73
6' ALE
1836.60'
Q=3515cfs
S=0.002
V=5.28
ST 224+00
~28.16'
~72'
105'
Elevation (ft)
Station (ft)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75'
150' P.E.
Legend
Ground
Bank Sta
6' PUE
1
4
5' 22 btw
~17.5
73.0'
Elevation (ft)
Station (ft)
1832
1831
1830
1829
1828
1827
1826
1825
1824
1823
1822
1821
1820
1819
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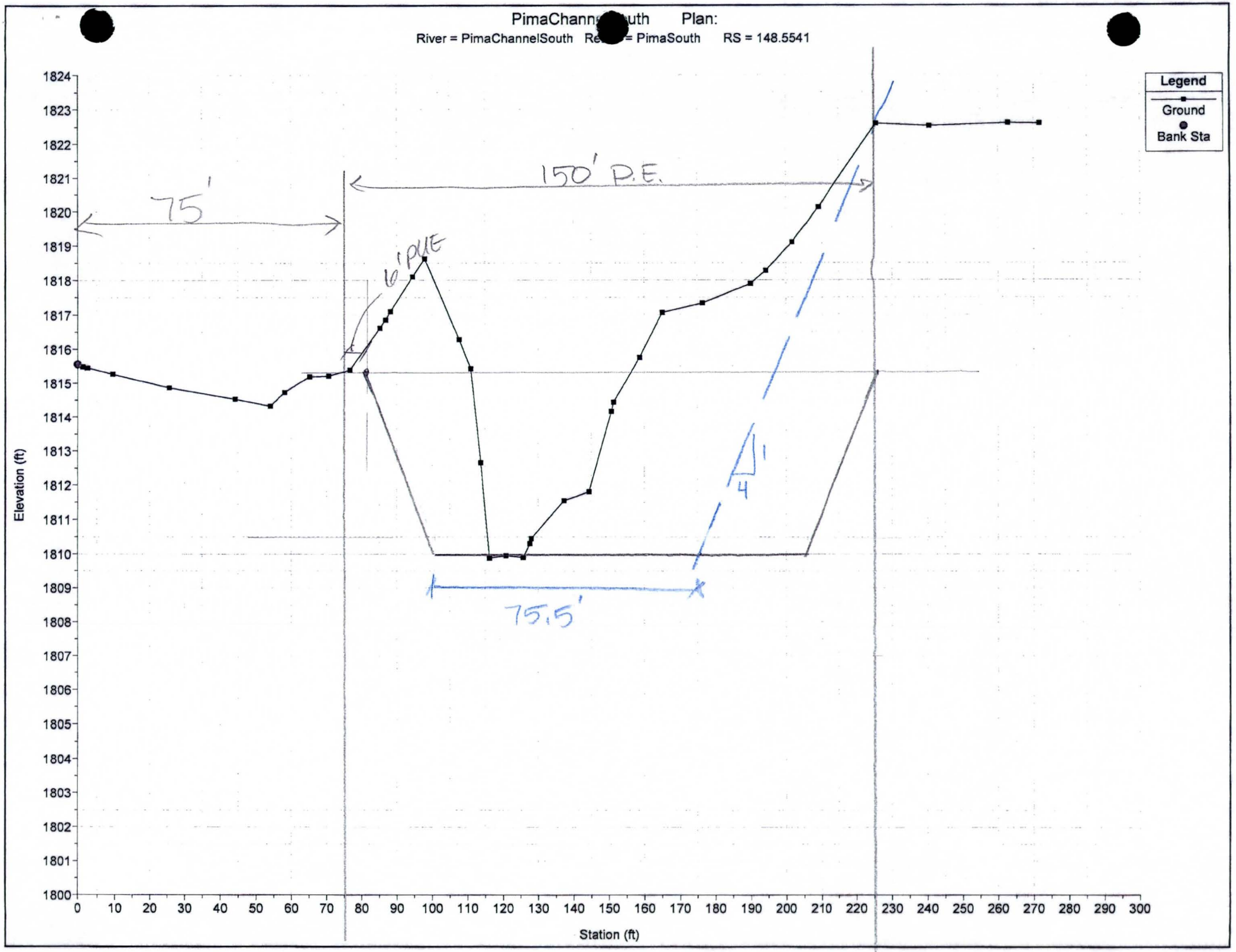
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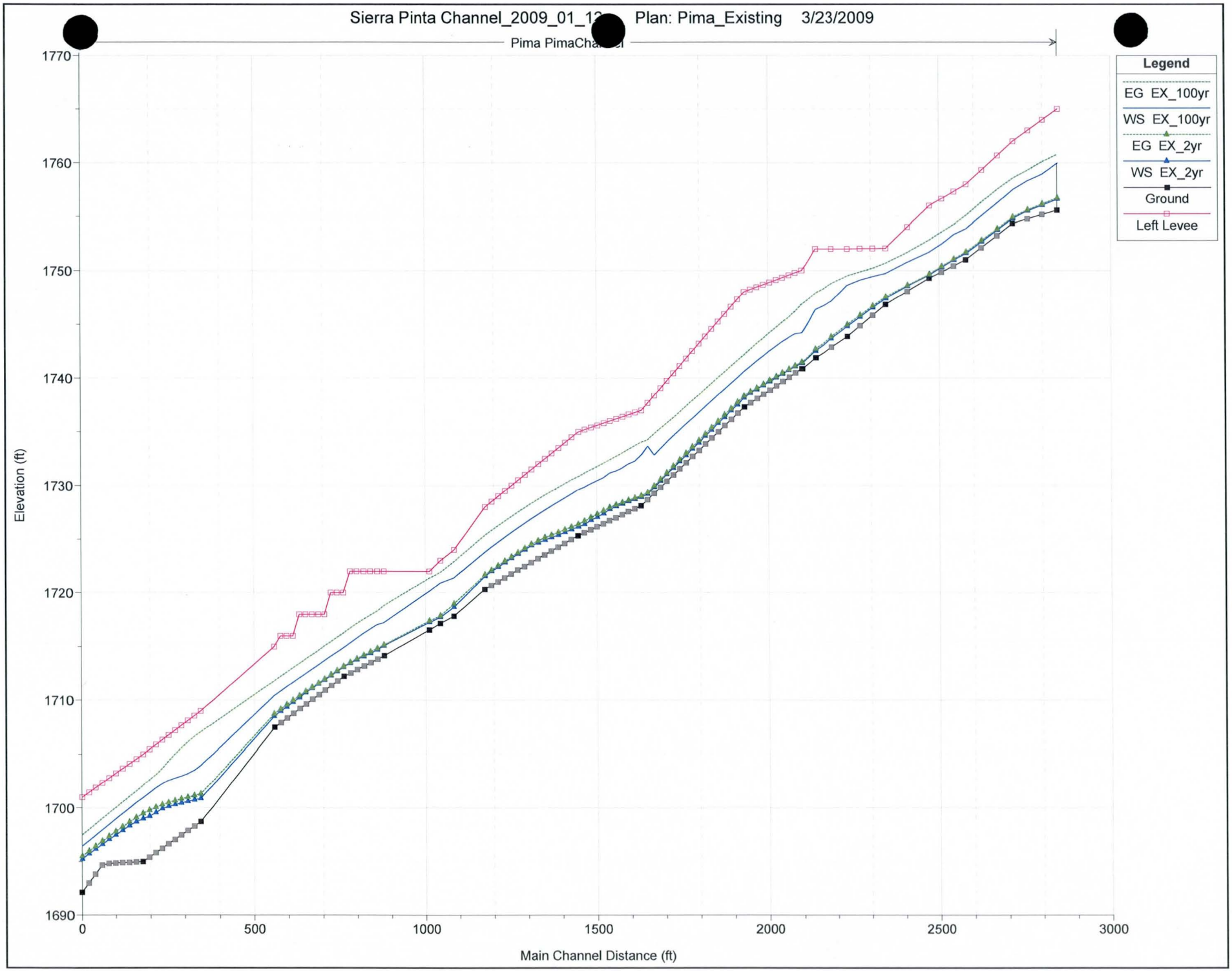
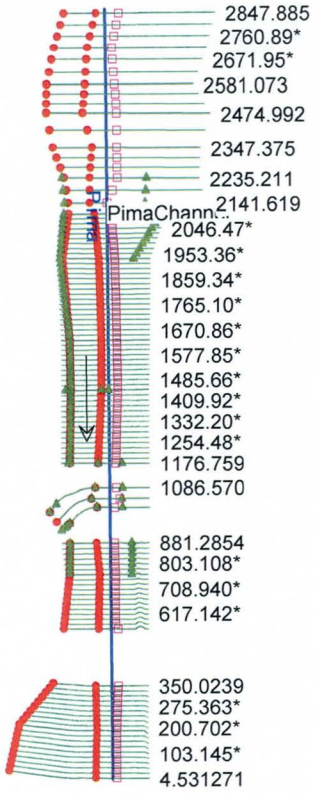
Legend
Ground
Bank Sta
150' P.E.
75'
16' PUE
1
4
75.5'
Elevation (ft)
Station (ft)
1824
1823
1822
1821
1820
1819
1818
1817
1816
1815
1814
1813
1812
1811
1810
1809
1808
1807
1806
1805
1804
1803
1802
1801
1800
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
Pima PimaChannel
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Left Levee
Elevation (ft)
1770
1760
1750
1740
1730
1720
1710
1700
1690
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)


2847.885
2760.89*
2671.95*
2581.073
2474.992
2347.375
2235.211
2141.619
PimaChann...
2046.47*
1953.36*
1859.34*
1765.10*
1670.86*
1577.85*
1485.66*
1409.92*
1332.20*
1254.48*
1176.759
1086.570
881.2854
803.108*
708.940*
617.142*
350.0239
275.363*
200.702*
103.145*
4.531271

HEC-RAS Plan: EX River: Pima Reach: PimaChannel

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	4.531271	EX_100yr	3310.00	1692.12	1696.45	1696.69	1697.50	0.025499	8.20	403.89	300.53	1.25
PimaChannel	4.531271	EX_2yr	365.00	1692.12	1695.24	1695.26	1695.51	0.025622	4.15	87.92	182.16	1.05
imaChannel	24.2541*	EX_100yr	3310.00	1692.97	1696.96	1697.20	1698.01	0.025553	8.23	402.23	298.23	1.25
PimaChannel	24.2541*	EX_2yr	365.00	1692.97	1695.74	1695.74	1695.98	0.022811	3.95	92.42	189.60	1.00
PimaChannel	43.9770*	EX_100yr	3310.00	1693.82	1697.46	1697.71	1698.52	0.025555	8.26	400.88	295.97	1.25
PimaChannel	43.9770*	EX_2yr	365.00	1693.82	1696.17	1696.19	1696.44	0.023746	4.16	87.76	171.85	1.03
PimaChannel	63.6999*	EX_100yr	3310.00	1694.67	1697.97	1698.21	1699.03	0.025532	8.26	400.74	295.65	1.25
PimaChannel	63.6999*	EX_2yr	365.00	1694.67	1696.61	1696.63	1696.90	0.024516	4.31	84.69	161.16	1.05
PimaChannel	83.4228*	EX_100yr	3310.00	1694.83	1698.49	1698.71	1699.54	0.025982	8.24	401.94	301.92	1.26
PimaChannel	83.4228*	EX_2yr	365.00	1694.83	1697.07	1697.07	1697.36	0.021391	4.27	85.55	149.26	0.99
PimaChannel	103.145*	EX_100yr	3310.00	1694.87	1699.00	1699.21	1700.04	0.025142	8.18	404.86	299.93	1.24
PimaChannel	103.145*	EX_2yr	365.00	1694.87	1697.48	1697.50	1697.81	0.023741	4.56	80.11	136.95	1.05
PimaChannel	122.868*	EX_100yr	3310.00	1694.90	1699.50	1699.71	1700.55	0.025540	8.24	401.52	297.13	1.25
PimaChannel	122.868*	EX_2yr	365.00	1694.90	1697.91	1697.94	1698.25	0.024367	4.70	77.66	129.08	1.07
PimaChannel	142.591*	EX_100yr	3310.00	1694.93	1700.00	1700.24	1701.07	0.025910	8.30	398.73	294.93	1.26
PimaChannel	142.591*	EX_2yr	365.00	1694.93	1698.36	1698.36	1698.69	0.020431	4.61	79.25	118.71	0.99
PimaChannel	162.314*	EX_100yr	3310.00	1694.96	1700.51	1700.76	1701.57	0.024992	8.28	400.53	301.81	1.24
PimaChannel	162.314*	EX_2yr	365.00	1694.96	1698.72	1698.71	1699.11	0.019443	5.00	73.03	92.76	0.99
PimaChannel	182.0372	EX_100yr	3310.00	1694.99	1700.96	1701.26	1702.10	0.026487	8.59	387.59	303.51	1.28
PimaChannel	182.0372	EX_2yr	365.00	1694.99	1699.01	1698.93	1699.49	0.015754	5.54	65.84	60.46	0.94
PimaChannel	200.702*	EX_100yr	3310.00	1695.40	1701.42	1701.74	1702.60	0.025999	8.73	382.74	293.92	1.28
PimaChannel	200.702*	EX_2yr	365.00	1695.40	1699.24	1699.17	1699.79	0.014758	5.98	61.01	47.54	0.93
PimaChannel	219.367*	EX_100yr	3310.00	1695.82	1701.88	1702.21	1703.09	0.025910	8.88	377.37	284.68	1.28
PimaChannel	219.367*	EX_2yr	365.00	1695.82	1699.58	1699.42	1700.07	0.013674	5.64	64.76	52.40	0.89
imaChannel	238.032*	EX_100yr	3310.00	1696.23	1702.26	1702.68	1703.66	0.029103	9.52	352.22	264.27	1.36
PimaChannel	238.032*	EX_2yr	365.00	1696.23	1699.95	1699.73	1700.31	0.010550	4.83	75.64	64.03	0.78
PimaChannel	256.698*	EX_100yr	3310.00	1696.65	1702.56	1703.15	1704.35	0.031915	10.75	310.35	212.54	1.45
PimaChannel	256.698*	EX_2yr	365.00	1696.65	1700.15	1699.89	1700.50	0.009371	4.73	77.15	61.66	0.75
PimaChannel	275.363*	EX_100yr	3310.00	1697.06	1702.77	1703.60	1705.00	0.025087	11.98	276.37	117.87	1.36
PimaChannel	275.363*	EX_2yr	365.00	1697.06	1700.32	1700.01	1700.68	0.008831	4.77	76.51	57.85	0.73
PimaChannel	294.028*	EX_100yr	3310.00	1697.48	1702.98	1704.02	1705.57	0.024209	12.92	256.26	92.83	1.37
PimaChannel	294.028*	EX_2yr	365.00	1697.48	1700.48	1700.16	1700.84	0.008459	4.85	75.21	53.71	0.72
PimaChannel	312.693*	EX_100yr	3310.00	1697.89	1703.20	1704.45	1706.12	0.024673	13.71	241.48	81.02	1.40
PimaChannel	312.693*	EX_2yr	365.00	1697.89	1700.62	1700.28	1701.01	0.008170	4.96	73.59	49.59	0.72
PimaChannel	331.358*	EX_100yr	3310.00	1698.31	1703.50	1704.93	1706.64	0.023963	14.24	232.51	71.89	1.40
PimaChannel	331.358*	EX_2yr	365.00	1698.31	1700.76	1700.40	1701.16	0.007942	5.09	71.72	45.51	0.71
PimaChannel	350.0239	EX_100yr	3310.00	1698.72	1703.96	1705.42	1707.07	0.020681	14.15	233.89	64.97	1.31
PimaChannel	350.0239	EX_2yr	365.00	1698.72	1700.89	1700.50	1701.32	0.007646	5.21	70.06	41.63	0.71
PimaChannel	562.0628	EX_100yr	2300.00	1707.48	1710.42	1710.75	1711.80	0.022467	8.94	246.08	163.31	1.19
PimaChannel	562.0628	EX_2yr	40.00	1707.48	1708.51	1708.51	1708.74	0.026729	3.80	10.52	24.73	1.03
PimaChannel	580.422*	EX_100yr	2300.00	1707.91	1710.84	1711.16	1712.22	0.022216	8.95	246.50	163.47	1.19
PimaChannel	580.422*	EX_2yr	40.00	1707.91	1708.98	1708.95	1709.17	0.020393	3.45	11.59	26.28	0.92
PimaChannel	598.782*	EX_100yr	2300.00	1708.34	1711.26	1711.57	1712.63	0.022063	8.98	246.81	163.58	1.19
PimaChannel	598.782*	EX_2yr	40.00	1708.34	1709.38	1709.38	1709.59	0.023437	3.68	10.86	25.19	0.99
PimaChannel	617.142*	EX_100yr	2300.00	1708.77	1711.68	1711.98	1713.04	0.021913	9.01	247.21	164.01	1.19
PimaChannel	617.142*	EX_2yr	40.00	1708.77	1709.82	1709.80	1710.00	0.021447	3.44	11.64	28.20	0.94
imaChannel	635.501*	EX_100yr	2300.00	1709.20	1712.09	1712.39	1713.44	0.021765	9.03	247.67	164.56	1.19
PimaChannel	635.501*	EX_2yr	40.00	1709.20	1710.24	1710.22	1710.41	0.022771	3.29	12.16	32.94	0.95
PimaChannel	653.861*	EX_100yr	2300.00	1709.64	1712.50	1712.81	1713.85	0.021699	9.07	247.77	165.10	1.19
PimaChannel	653.861*	EX_2yr	40.00	1709.64	1710.71	1710.63	1710.82	0.020778	2.60	15.37	55.35	0.87
PimaChannel	672.221*	EX_100yr	2300.00	1710.07	1712.90	1713.21	1714.25	0.021852	9.14	247.15	165.53	1.20
PimaChannel	672.221*	EX_2yr	40.00	1710.07	1711.10	1711.08	1711.21	0.022708	2.61	15.31	58.51	0.90

HEC-RAS Plan: EX River: Pima Reach: PimaChannel (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
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	690.581*	EX_100yr	2300.00	1710.50	1713.30	1713.62	1714.66	0.021917	9.20	246.65	165.54	1.21
PimaChannel	690.581*	EX_2yr	40.00	1710.50	1711.51	1711.48	1711.60	0.019779	2.41	16.57	64.37	[illegible]
PimaChannel	708.940*	EX_100yr	2300.00	1710.93	1713.71	1714.03	1715.06	0.021869	9.25	246.59	165.41	1.21
PimaChannel	708.940*	EX_2yr	40.00	1710.93	1711.89	1711.87	1711.99	0.022567	2.51	15.95	64.59	0.89
PimaChannel	727.300*	EX_100yr	2300.00	1711.36	1714.10	1714.44	1715.46	0.022050	9.33	245.64	165.18	1.22
PimaChannel	727.300*	EX_2yr	40.00	1711.36	1712.29	1712.27	1712.38	0.020448	2.40	16.68	67.00	0.85
PimaChannel	745.660*	EX_100yr	2300.00	1711.79	1714.51	1714.82	1715.86	0.021720	9.32	246.74	165.07	1.21
PimaChannel	745.660*	EX_2yr	40.00	1711.79	1712.68	1712.67	1712.78	0.022437	2.46	16.25	67.30	0.88
PimaChannel	764.0201	EX_100yr	2300.00	1712.22	1714.89	1715.23	1716.27	0.022902	9.48	243.81	165.19	1.24
PimaChannel	764.0201	EX_2yr	40.00	1712.22	1713.09	1713.05	1713.17	0.020788	2.38	16.79	68.79	0.85
PimaChannel	783.564*	EX_100yr	2300.00	1712.54	1715.34	1715.69	1716.71	0.022151	9.55	245.01	162.88	1.23
PimaChannel	783.564*	EX_2yr	40.00	1712.54	1713.46	1713.41	1713.54	0.017285	2.39	16.73	59.53	0.79
PimaChannel	803.108*	EX_100yr	2300.00	1712.86	1715.81	1716.13	1717.14	0.020863	9.49	250.19	162.55	1.20
PimaChannel	803.108*	EX_2yr	40.00	1712.86	1713.77	1713.71	1713.88	0.016174	2.61	15.34	45.57	0.79
PimaChannel	822.652*	EX_100yr	2300.00	1713.18	1716.25	1716.56	1717.54	0.020295	9.41	254.11	165.07	1.19
PimaChannel	822.652*	EX_2yr	40.00	1713.18	1714.08	1714.01	1714.19	0.015727	2.77	14.46	38.51	0.80
PimaChannel	842.197*	EX_100yr	2300.00	1713.50	1716.66	1716.93	1717.94	0.019423	9.40	257.74	164.88	1.16
PimaChannel	842.197*	EX_2yr	40.00	1713.50	1714.38	1714.32	1714.51	0.016694	2.89	13.86	36.25	0.82
PimaChannel	861.741*	EX_100yr	2300.00	1713.82	1717.05	1717.33	1718.30	0.018058	9.31	262.44	163.80	1.13
PimaChannel	861.741*	EX_2yr	40.00	1713.82	1714.71	1714.66	1714.84	0.016974	2.87	13.94	37.26	0.83
PimaChannel	881.2854	EX_100yr	2300.00	1714.14	1717.23	1717.67	1718.79	0.023444	10.31	235.73	158.46	1.27
PimaChannel	881.2854	EX_2yr	40.00	1714.14	1715.06	1714.95	1715.16	0.015639	2.44	16.38	52.25	0.77
PimaChannel	1013.720	EX_100yr	2300.00	1716.53	1720.15	1720.41	1721.37	0.016091	8.90	265.05	196.99	1.07
PimaChannel	1013.720	EX_2yr	40.00	1716.53	1717.25	1717.20	1717.38	0.018088	2.90	13.79	38.09	[illegible]
PimaChannel	1046.424	EX_100yr	2300.00	1717.15	1720.93	1721.07	1721.91	0.015927	7.95	289.36	232.56	1.04
PimaChannel	1046.424	EX_2yr	40.00	1717.15	1717.73	1717.63	1717.86	0.012205	2.81	14.25	29.98	0.72
PimaChannel	1086.570	EX_100yr	2300.00	1717.82	1721.41	1721.93	1722.92	0.032657	9.85	233.54	220.67	1.44
PimaChannel	1086.570	EX_2yr	40.00	1717.82	1718.67	1718.73	1718.96	0.033192	4.36	9.17	21.58	1.18
PimaChannel	1176.759	EX_100yr	2300.00	1720.32	1723.79	1724.26	1725.38	0.022819	10.21	231.10	154.11	1.25
PimaChannel	1176.759	EX_2yr	40.00	1720.32	1721.56	1721.56	1721.69	0.027358	2.91	13.73	49.85	0.98
PimaChannel	1196.18*	EX_100yr	2300.00	1720.68	1724.26	1724.72	1725.82	0.022396	10.12	233.52	157.12	1.24
PimaChannel	1196.18*	EX_2yr	40.00	1720.68	1722.01	1721.97	1722.12	0.018185	2.59	15.43	49.51	0.82
PimaChannel	1215.62*	EX_100yr	2300.00	1721.03	1724.73	1725.17	1726.25	0.021866	10.02	236.00	157.47	1.23
PimaChannel	1215.62*	EX_2yr	40.00	1721.03	1722.40	1722.39	1722.53	0.024771	2.90	13.81	47.47	0.95
PimaChannel	1235.05*	EX_100yr	2300.00	1721.39	1725.18	1725.60	1726.68	0.021692	9.97	237.16	157.61	1.23
PimaChannel	1235.05*	EX_2yr	40.00	1721.39	1722.83	1722.80	1722.95	0.019093	2.69	14.87	47.18	0.84
PimaChannel	1254.48*	EX_100yr	2300.00	1721.75	1725.63	1726.02	1727.10	0.021211	9.88	239.31	157.71	1.22
PimaChannel	1254.48*	EX_2yr	40.00	1721.75	1723.22	1723.21	1723.35	0.022606	2.86	13.96	45.86	0.91
PimaChannel	1273.91*	EX_100yr	2300.00	1722.11	1726.05	1726.45	1727.52	0.021177	9.86	239.78	157.69	1.21
PimaChannel	1273.91*	EX_2yr	40.00	1722.11	1723.64	1723.60	1723.75	0.019066	2.74	14.61	45.20	0.85
PimaChannel	1293.34*	EX_100yr	2300.00	1722.46	1726.49	1726.87	1727.92	0.020497	9.74	242.62	157.58	1.20
PimaChannel	1293.34*	EX_2yr	40.00	1722.46	1724.02	1723.99	1724.14	0.021060	2.86	13.97	43.58	0.89
PimaChannel	1312.77*	EX_100yr	2300.00	1722.82	1726.90	1727.31	1728.32	0.020136	9.67	243.97	155.99	1.19
PimaChannel	1312.77*	EX_2yr	40.00	1722.82	1724.41	1724.27	1724.53	0.018314	2.78	14.40	42.36	0.84
PimaChannel	1332.20*	EX_100yr	2300.00	1723.18	1727.31	1727.68	1728.71	0.019645	9.60	245.53	153.70	1.17
PimaChannel	1332.20*	EX_2yr	40.00	1723.18	1724.68	1724.58	1724.85	0.013380	3.29	12.16	21.77	[illegible]
PimaChannel	1351.63*	EX_100yr	2300.00	1723.53	1727.71	1728.07	1729.09	0.019170	9.51	247.26	151.40	[illegible]
PimaChannel	1351.63*	EX_2yr	40.00	1723.53	1724.93	1724.76	1725.13	0.014651	3.58	11.17	18.81	0.82
PimaChannel	1371.06*	EX_100yr	2300.00	1723.89	1728.09	1728.45	1729.46	0.018997	9.49	247.49	148.54	1.15
PimaChannel	1371.06*	EX_2yr	40.00	1723.89	1725.17	1725.02	1725.39	0.011609	3.75	10.67	14.04	0.76
PimaChannel	1390.49*	EX_100yr	2300.00	1724.25	1728.48	1728.80	1729.82	0.018301	9.38	249.88	145.94	1.13

HEC-RAS Plan: EX River: Pima Reach: PimaChannel (Continued)

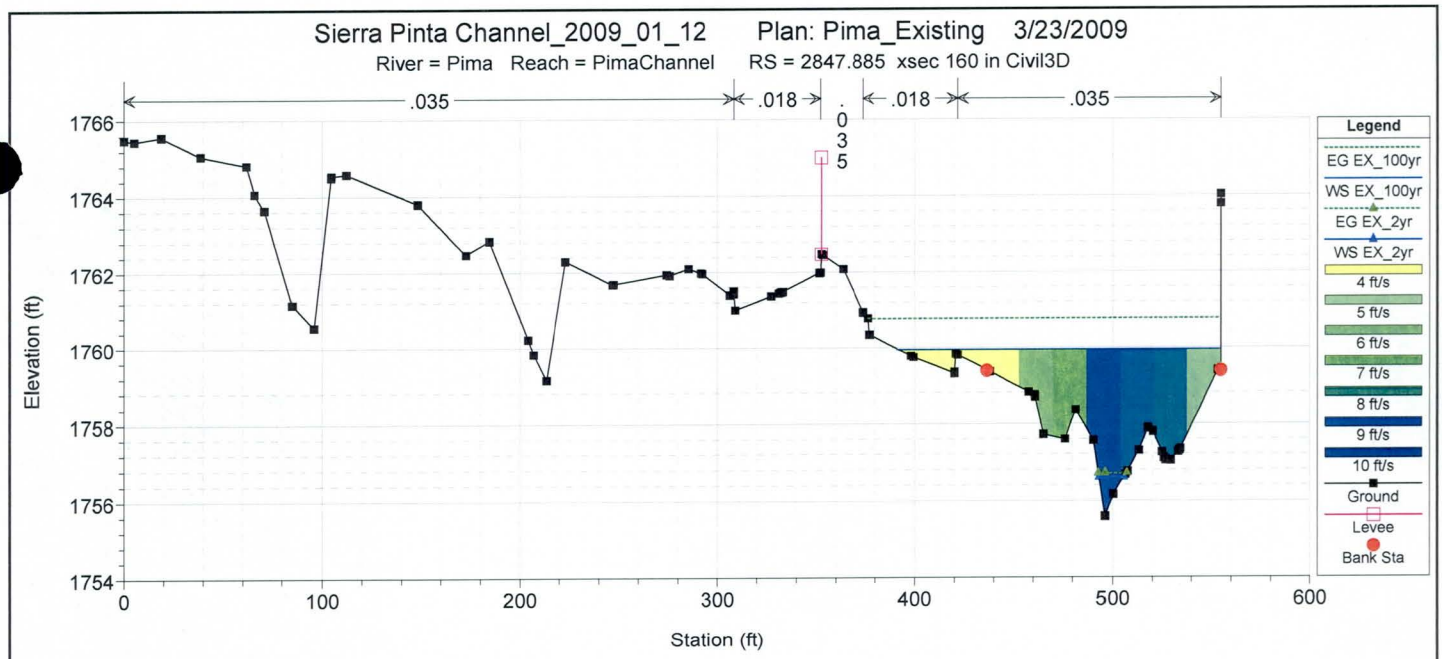
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	1390.49*	EX_2yr	40.00	1724.25	1725.39	1725.28	1725.63	0.012865	3.87	10.33	14.01	0.79
PimaChannel	1409.92*	EX_100yr	2300.00	1724.60	1728.85	1729.20	1730.17	0.017754	9.28	251.78	143.28	1.12
PimaChannel	1409.92*	EX_2yr	40.00	1724.60	1725.65	1725.53	1725.88	0.012853	3.84	10.42	14.31	0.79
PimaChannel	1429.35*	EX_100yr	2300.00	1724.96	1729.22	1729.49	1730.51	0.016936	9.15	254.90	140.39	1.10
PimaChannel	1429.35*	EX_2yr	40.00	1724.96	1725.90	1725.79	1726.13	0.012801	3.80	10.54	14.72	0.79
PimaChannel	1448.784	EX_100yr	2300.00	1725.32	1729.61	1729.81	1730.83	0.015510	8.90	261.66	138.75	1.05
PimaChannel	1448.784	EX_2yr	40.00	1725.32	1726.16	1726.04	1726.38	0.013138	3.78	10.58	15.17	0.80
PimaChannel	1467.22*	EX_100yr	2300.00	1725.60	1729.86	1730.08	1731.15	0.016852	9.15	252.63	128.97	1.09
PimaChannel	1467.22*	EX_2yr	40.00	1725.60	1726.40	1726.36	1726.69	0.019122	4.30	9.30	14.60	0.95
PimaChannel	1485.66*	EX_100yr	2300.00	1725.87	1730.18	1730.35	1731.45	0.016024	9.06	254.53	122.33	1.07
PimaChannel	1485.66*	EX_2yr	40.00	1725.87	1726.76	1726.69	1727.01	0.015936	4.04	9.89	14.85	0.87
PimaChannel	1504.09*	EX_100yr	2300.00	1726.15	1730.46	1730.61	1731.76	0.016353	9.15	251.37	113.28	1.08
PimaChannel	1504.09*	EX_2yr	40.00	1726.15	1727.05	1727.01	1727.32	0.017828	4.19	9.56	14.85	0.92
PimaChannel	1522.53*	EX_100yr	2300.00	1726.43	1730.74	1730.90	1732.07	0.016859	9.26	248.31	112.24	1.10
PimaChannel	1522.53*	EX_2yr	40.00	1726.43	1727.39	1727.32	1727.64	0.016369	4.01	9.97	15.50	0.88
PimaChannel	1540.97*	EX_100yr	2300.00	1726.71	1731.16	1731.19	1732.37	0.014435	8.83	260.54	112.42	1.02
PimaChannel	1540.97*	EX_2yr	40.00	1726.71	1727.79	1727.70	1727.93	0.015043	3.07	13.04	28.67	0.80
PimaChannel	1559.41*	EX_100yr	2300.00	1726.99	1731.37	1731.52	1732.71	0.016725	9.27	248.16	110.96	1.09
PimaChannel	1559.41*	EX_2yr	40.00	1726.99	1728.06	1727.95	1728.18	0.012139	2.81	14.21	30.30	0.72
PimaChannel	1577.85*	EX_100yr	2300.00	1727.27	1731.65	1731.81	1733.04	0.017748	9.45	243.45	110.35	1.12
PimaChannel	1577.85*	EX_2yr	40.00	1727.27	1728.28	1728.17	1728.41	0.012158	2.80	14.29	30.78	0.72
PimaChannel	1596.29*	EX_100yr	2300.00	1727.55	1732.02	1732.17	1733.36	0.016895	9.30	247.42	110.43	1.09
PimaChannel	1596.29*	EX_2yr	40.00	1727.55	1728.51	1728.40	1728.62	0.011603	2.75	14.56	31.17	0.71
PimaChannel	1614.72*	EX_100yr	2300.00	1727.83	1732.30	1732.51	1733.71	0.018344	9.54	241.09	109.87	1.13
PimaChannel	1614.72*	EX_2yr	40.00	1727.83	1728.72	1728.61	1728.84	0.011379	2.72	14.69	31.39	0.70
PimaChannel	1633.167	EX_100yr	2300.00	1728.10	1732.84	1732.84	1734.02	0.013809	8.70	264.38	111.35	0.99
PimaChannel	1633.167	EX_2yr	40.00	1728.10	1728.93	1728.81	1729.04	0.010677	2.67	15.00	31.52	0.68
PimaChannel	1652.01*	EX_100yr	1850.00	1728.68	1733.65	1732.99	1734.25	0.006211	6.22	297.55	114.07	0.68
PimaChannel	1652.01*	EX_2yr	15.00	1728.68	1729.22	1729.22	1729.34	0.031903	2.79	5.38	24.02	1.04
PimaChannel	1670.86*	EX_100yr	1850.00	1729.25	1732.82	1733.54	1734.82	0.026399	11.33	163.34	75.84	1.36
PimaChannel	1670.86*	EX_2yr	15.00	1729.25	1729.83	1729.84	1729.96	0.032969	2.88	5.21	22.76	1.06
PimaChannel	1689.71*	EX_100yr	1850.00	1729.83	1733.45	1734.06	1735.32	0.025449	10.97	168.65	80.24	1.33
PimaChannel	1689.71*	EX_2yr	15.00	1729.83	1730.44	1730.46	1730.58	0.033183	2.95	5.09	21.52	1.07
PimaChannel	1708.56*	EX_100yr	1850.00	1730.40	1734.05	1734.60	1735.81	0.026073	10.64	173.88	88.54	1.34
PimaChannel	1708.56*	EX_2yr	15.00	1730.40	1731.05	1731.06	1731.19	0.032384	3.03	4.95	19.73	1.07
PimaChannel	1727.40*	EX_100yr	1850.00	1730.98	1734.62	1735.12	1736.33	0.026862	10.47	176.67	94.54	1.35
PimaChannel	1727.40*	EX_2yr	15.00	1730.98	1731.63	1731.66	1731.81	0.037149	3.44	4.37	15.97	1.16
PimaChannel	1746.25*	EX_100yr	1850.00	1731.55	1735.18	1735.63	1736.84	0.027655	10.32	179.25	100.48	1.36
PimaChannel	1746.25*	EX_2yr	15.00	1731.55	1732.23	1732.24	1732.40	0.027703	3.30	4.55	14.18	1.03
PimaChannel	1765.10*	EX_100yr	1850.00	1732.12	1735.72	1736.19	1737.37	0.027993	10.31	179.40	101.86	1.37
PimaChannel	1765.10*	EX_2yr	15.00	1732.12	1732.79	1732.83	1733.00	0.035591	3.67	4.09	13.12	1.16
PimaChannel	1783.95*	EX_100yr	1850.00	1732.70	1736.26	1736.72	1737.91	0.027869	10.29	179.83	102.35	1.37
PimaChannel	1783.95*	EX_2yr	15.00	1732.70	1733.42	1733.43	1733.59	0.027628	3.35	4.48	13.62	1.03
PimaChannel	1802.80*	EX_100yr	1850.00	1733.27	1736.80	1737.27	1738.44	0.028015	10.28	179.88	102.82	1.37
PimaChannel	1802.80*	EX_2yr	15.00	1733.27	1733.98	1734.02	1734.19	0.036355	3.76	3.99	12.50	1.17
PimaChannel	1821.64*	EX_100yr	1850.00	1733.85	1737.34	1737.79	1738.97	0.027847	10.23	180.76	103.62	1.37
PimaChannel	1821.64*	EX_2yr	15.00	1733.85	1734.61	1734.61	1734.78	0.026723	3.36	4.47	13.19	1.02
PimaChannel	1840.49*	EX_100yr	1850.00	1734.42	1737.88	1738.33	1739.51	0.028019	10.23	180.79	104.14	1.37
PimaChannel	1840.49*	EX_2yr	15.00	1734.42	1735.15	1735.20	1735.38	0.036957	3.84	3.90	11.98	1.19
PimaChannel	1859.34*	EX_100yr	1850.00	1735.00	1738.43	1738.86	1740.03	0.027840	10.18	181.82	105.10	1.36
PimaChannel	1859.34*	EX_2yr	15.00	1735.00	1735.79	1735.80	1735.97	0.026784	3.40	4.41	12.75	1.02

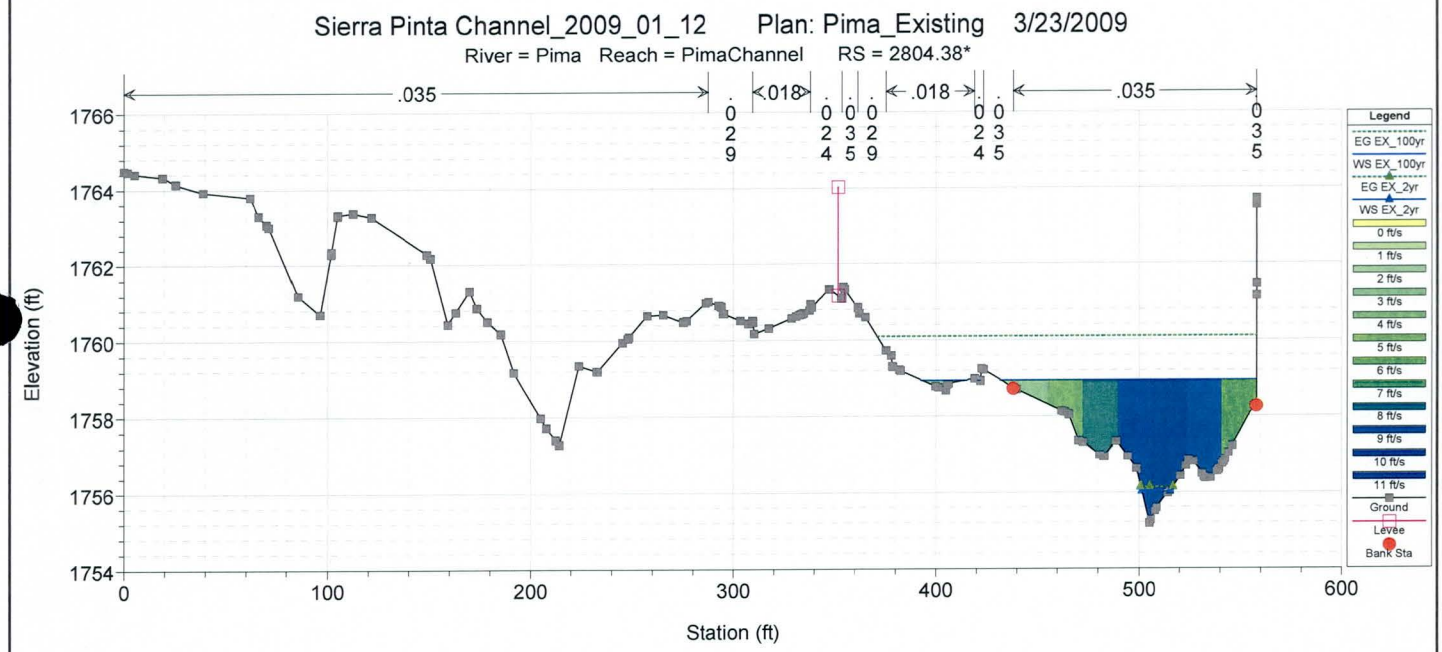
HEC-RAS Plan: EX River: Pima Reach: PimaChannel (Continued)

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
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	1878.19*	EX_100yr	1850.00	1735.57	1738.96	1739.39	1740.57	0.028174	10.19	181.60	105.73	1.37
PimaChannel	1878.19*	EX_2yr	15.00	1735.57	1736.33	1736.38	1736.57	0.036614	3.88	3.86	11.57	1.18
PimaChannel	1897.04*	EX_100yr	1850.00	1736.14	1739.51	1739.92	1741.10	0.027978	10.14	182.47	106.43	[illegible]
PimaChannel	1897.04*	EX_2yr	15.00	1736.14	1736.97	1736.97	1737.15	0.026735	3.46	4.33	12.17	1.02
PimaChannel	1915.89*	EX_100yr	1850.00	1736.72	1740.04	1740.47	1741.64	0.028170	10.14	182.47	106.94	1.37
PimaChannel	1915.89*	EX_2yr	15.00	1736.72	1737.51	1737.57	1737.76	0.038081	4.01	3.74	10.99	1.21
PimaChannel	1934.738	EX_100yr	1850.00	1737.29	1740.60	1741.00	1742.17	0.027654	10.06	183.90	107.52	1.36
PimaChannel	1934.738	EX_2yr	15.00	1737.29	1738.16	1738.16	1738.34	0.025204	3.42	4.39	11.99	1.00
PimaChannel	1953.36*	EX_100yr	1850.00	1737.69	1741.08	1741.52	1742.70	0.027478	10.19	181.54	103.63	1.36
PimaChannel	1953.36*	EX_2yr	15.00	1737.69	1738.60	1738.53	1738.72	0.015920	2.79	5.38	14.19	0.80
PimaChannel	1971.98*	EX_100yr	1850.00	1738.09	1741.57	1742.01	1743.22	0.027033	10.30	179.69	99.78	1.35
PimaChannel	1971.98*	EX_2yr	15.00	1738.09	1738.92	1738.91	1739.07	0.021651	3.07	4.88	14.01	0.92
PimaChannel	1990.60*	EX_100yr	1850.00	1738.49	1742.06	1742.51	1743.73	0.026272	10.37	178.33	95.86	1.34
PimaChannel	1990.60*	EX_2yr	15.00	1738.49	1739.32	1739.27	1739.44	0.018397	2.81	5.33	15.52	0.85
PimaChannel	2009.22*	EX_100yr	1850.00	1738.88	1742.52	1743.00	1744.24	0.025989	10.53	175.77	91.69	1.34
PimaChannel	2009.22*	EX_2yr	15.00	1738.88	1739.67	1739.63	1739.79	0.019241	2.79	5.37	16.38	0.86
PimaChannel	2027.84*	EX_100yr	1850.00	1739.28	1742.99	1743.43	1744.72	0.024876	10.57	175.10	87.90	1.32
PimaChannel	2027.84*	EX_2yr	15.00	1739.28	1740.04	1739.98	1740.14	0.018229	2.64	5.68	18.10	0.83
PimaChannel	2046.47*	EX_100yr	1850.00	1739.68	1743.39	1743.88	1745.22	0.024936	10.87	170.14	81.61	1.33
PimaChannel	2046.47*	EX_2yr	15.00	1739.68	1740.39	1740.34	1740.49	0.018681	2.57	5.84	19.76	0.83
PimaChannel	2065.09*	EX_100yr	1850.00	1740.08	1743.79	1744.29	1745.71	0.024599	11.12	166.44	76.05	1.32
PimaChannel	2065.09*	EX_2yr	15.00	1740.08	1740.74	1740.69	1740.83	0.017748	2.44	6.16	21.75	0.81
PimaChannel	2083.71*	EX_100yr	1850.00	1740.48	1744.12	1744.69	1746.21	0.024080	11.60	159.52	66.84	1.32
PimaChannel	2083.71*	EX_2yr	15.00	1740.48	1741.07	1741.03	1741.16	0.018164	2.37	6.32	23.59	0.81
PimaChannel	2102.336	EX_100yr	1850.00	1740.87	1744.22	1745.05	1746.90	0.032152	13.13	140.85	60.58	[illegible]
PimaChannel	2102.336	EX_2yr	15.00	1740.87	1741.39	1741.35	1741.48	0.017246	2.33	6.45	23.90	0.79
PimaChannel	2141.619	EX_100yr	1850.00	1741.89	1746.37	1746.74	1747.89	0.016416	9.92	187.97	88.30	1.09
PimaChannel	2141.619	EX_2yr	15.00	1741.89	1742.52	1742.52	1742.71	0.024516	3.46	4.33	11.40	0.99
PimaChannel	2188.41*	EX_100yr	1850.00	1742.88	1747.14	1747.68	1748.79	0.021335	10.31	179.58	85.59	1.23
PimaChannel	2188.41*	EX_2yr	15.00	1742.88	1743.67	1743.67	1743.86	0.024994	3.48	4.32	11.42	1.00
PimaChannel	2235.211	EX_100yr	1850.00	1743.87	1748.64	1748.64	1749.50	0.009462	7.60	258.94	158.65	0.84
PimaChannel	2235.211	EX_2yr	15.00	1743.87	1744.81	1744.79	1744.97	0.022409	3.25	4.61	12.40	0.94
PimaChannel	2272.59*	EX_100yr	1850.00	1744.86	1749.11	1748.80	1749.85	0.008348	6.97	274.62	162.57	0.79
PimaChannel	2272.59*	EX_2yr	15.00	1744.86	1745.68	1745.67	1745.84	0.024442	3.17	4.74	14.24	0.97
PimaChannel	2309.98*	EX_100yr	1850.00	1745.85	1749.43	1749.24	1750.22	0.010600	7.13	261.23	139.76	0.87
PimaChannel	2309.98*	EX_2yr	15.00	1745.85	1746.56	1746.54	1746.70	0.021833	3.02	4.97	14.80	0.92
PimaChannel	2347.375	EX_100yr	1850.00	1746.84	1749.74	1749.81	1750.68	0.016862	7.81	236.93	142.06	1.06
PimaChannel	2347.375	EX_2yr	15.00	1746.84	1747.40	1747.38	1747.54	0.022776	3.08	4.87	14.49	0.94
PimaChannel	2411.18*	EX_100yr	1850.00	1748.06	1750.79	1750.79	1751.69	0.014627	7.60	244.01	142.58	1.00
PimaChannel	2411.18*	EX_2yr	15.00	1748.06	1748.55	1748.48	1748.62	0.012717	1.98	7.57	28.41	0.68
PimaChannel	2474.992	EX_100yr	1850.00	1749.29	1751.72	1751.94	1752.84	0.020378	8.50	220.65	151.05	1.16
PimaChannel	2474.992	EX_2yr	15.00	1749.29	1749.59	1749.55	1749.65	0.021290	2.12	7.09	35.53	0.83
PimaChannel	2510.35*	EX_100yr	1850.00	1749.85	1752.45	1752.69	1753.58	0.021594	8.55	221.00	153.66	1.19
PimaChannel	2510.35*	EX_2yr	15.00	1749.85	1750.30	1750.27	1750.38	0.020081	2.25	6.66	29.10	0.83
PimaChannel	2545.71*	EX_100yr	1850.00	1750.42	1753.34	1753.43	1754.27	0.016721	7.80	243.71	158.14	1.06
PimaChannel	2545.71*	EX_2yr	15.00	1750.42	1750.97	1750.93	1751.06	0.018677	2.43	6.17	22.68	0.82
PimaChannel	2581.073	EX_100yr	1850.00	1750.99	1753.87	1754.18	1755.10	0.027752	8.99	210.70	158.00	[illegible]
PimaChannel	2581.073	EX_2yr	15.00	1750.99	1751.60	1751.56	1751.71	0.017759	2.57	5.84	19.03	[illegible]
PimaChannel	2626.51*	EX_100yr	1850.00	1752.11	1755.08	1755.45	1756.36	0.027142	9.13	206.24	148.43	1.32
PimaChannel	2626.51*	EX_2yr	15.00	1752.11	1752.65	1752.65	1752.78	0.026880	2.90	5.18	19.24	0.98
PimaChannel	2671.95*	EX_100yr	1850.00	1753.23	1756.28	1756.68	1757.55	0.024984	9.09	207.29	163.09	1.28
PimaChannel	2671.95*	EX_2yr	15.00	1753.23	1753.76	1753.73	1753.86	0.021107	2.53	5.93	22.58	0.87

HEC-RAS Plan: EX River: Pima Reach: PimaChannel (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
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	2717.397	EX_100yr	1850.00	1754.36	1757.50	1757.77	1758.55	0.018706	8.32	226.74	163.98	1.12
PimaChannel	2717.397	EX_2yr	15.00	1754.36	1754.82	1754.81	1754.93	0.026535	2.59	5.80	25.37	0.95
PimaChannel	2760.89*	EX_100yr	1850.00	1754.77	1758.33	1758.51	1759.31	0.015666	8.02	235.93	161.51	1.04
PimaChannel	2760.89*	EX_2yr	15.00	1754.77	1755.53	1755.41	1755.61	0.010400	2.19	6.84	18.91	0.64
PimaChannel	2804.38*	EX_100yr	1850.00	1755.18	1758.95	1759.25	1760.11	0.019237	8.64	216.41	150.13	1.14
PimaChannel	2804.38*	EX_2yr	15.00	1755.18	1756.04	1755.96	1756.16	0.014783	2.74	5.48	14.05	0.77
PimaChannel	2847.885	EX_100yr	1850.00	1755.59	1759.96	1759.96	1760.77	0.011270	7.31	261.21	163.55	0.89
PimaChannel	2847.885	EX_2yr	15.00	1755.59	1756.61	1756.48	1756.72	0.011514	2.66	5.65	12.45	0.70


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2847.885 xsec 160 in Civil3D
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta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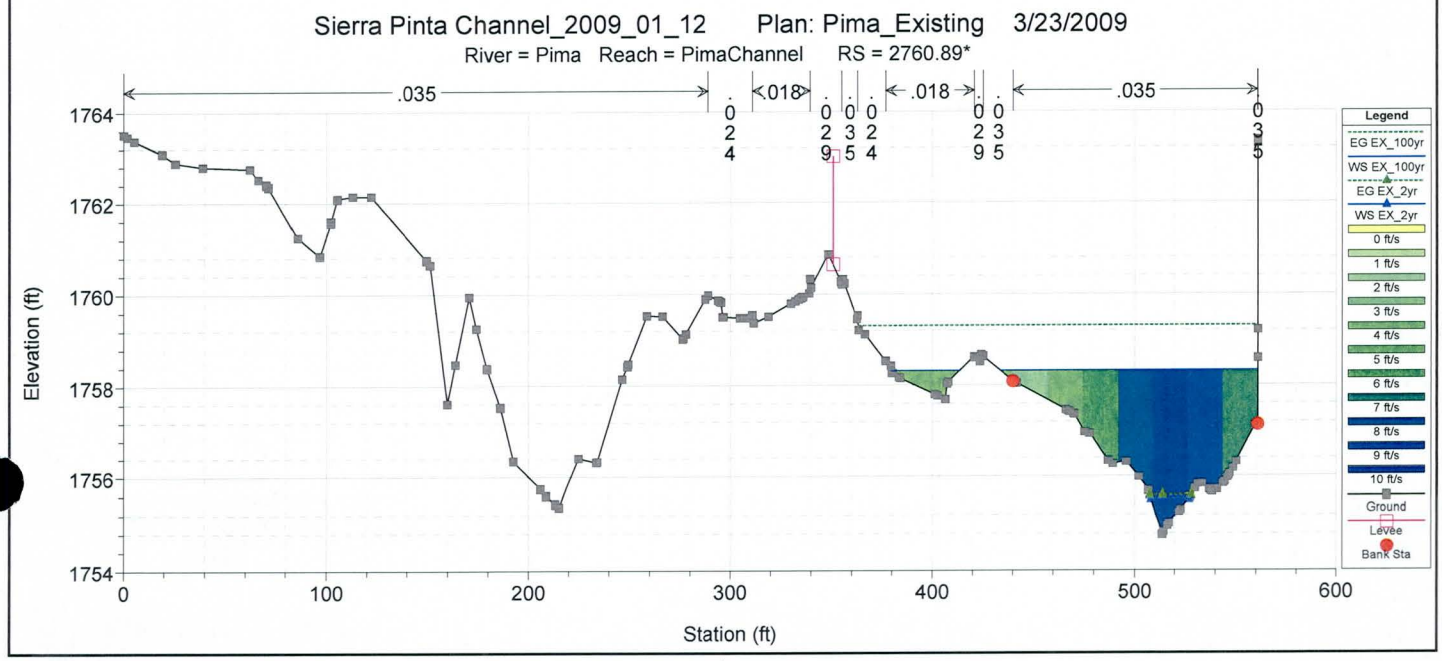
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2760.89*
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
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
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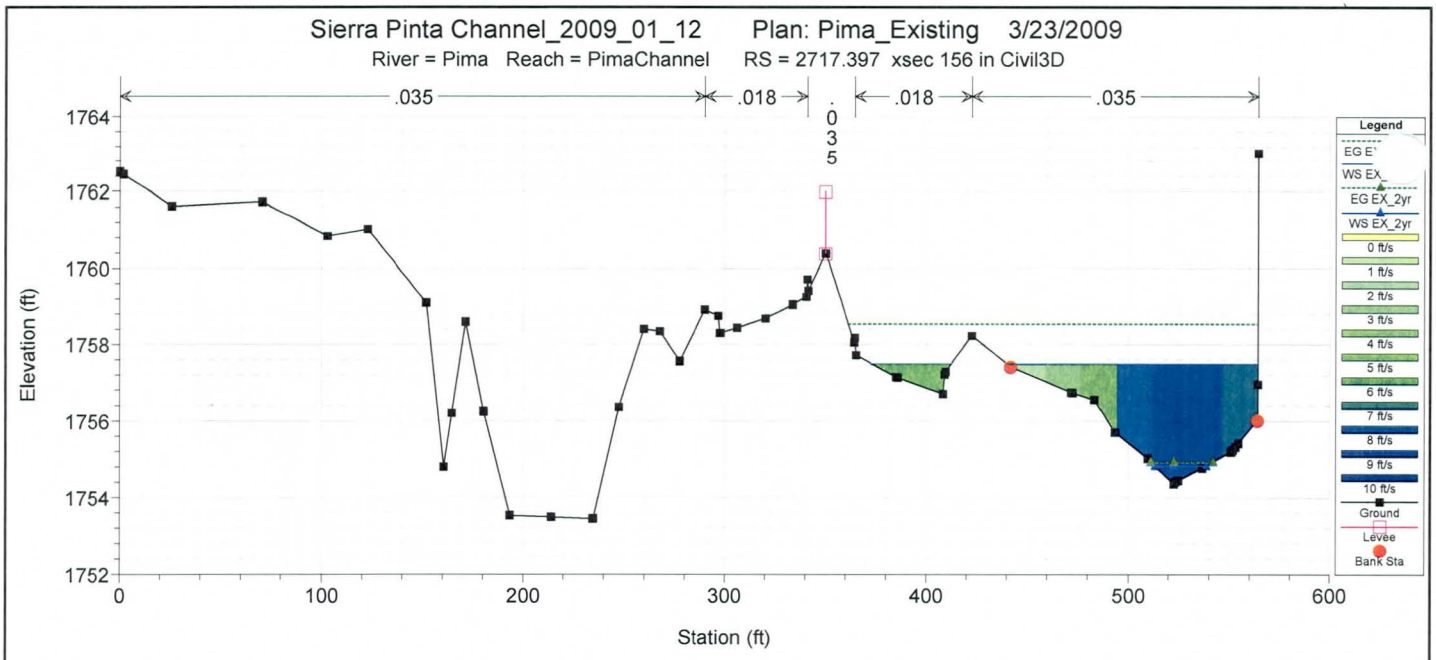
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2717.397 xsec 156 in Civil3D
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG E
WS EX
EG EX_2yr
WS EX_2yr
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
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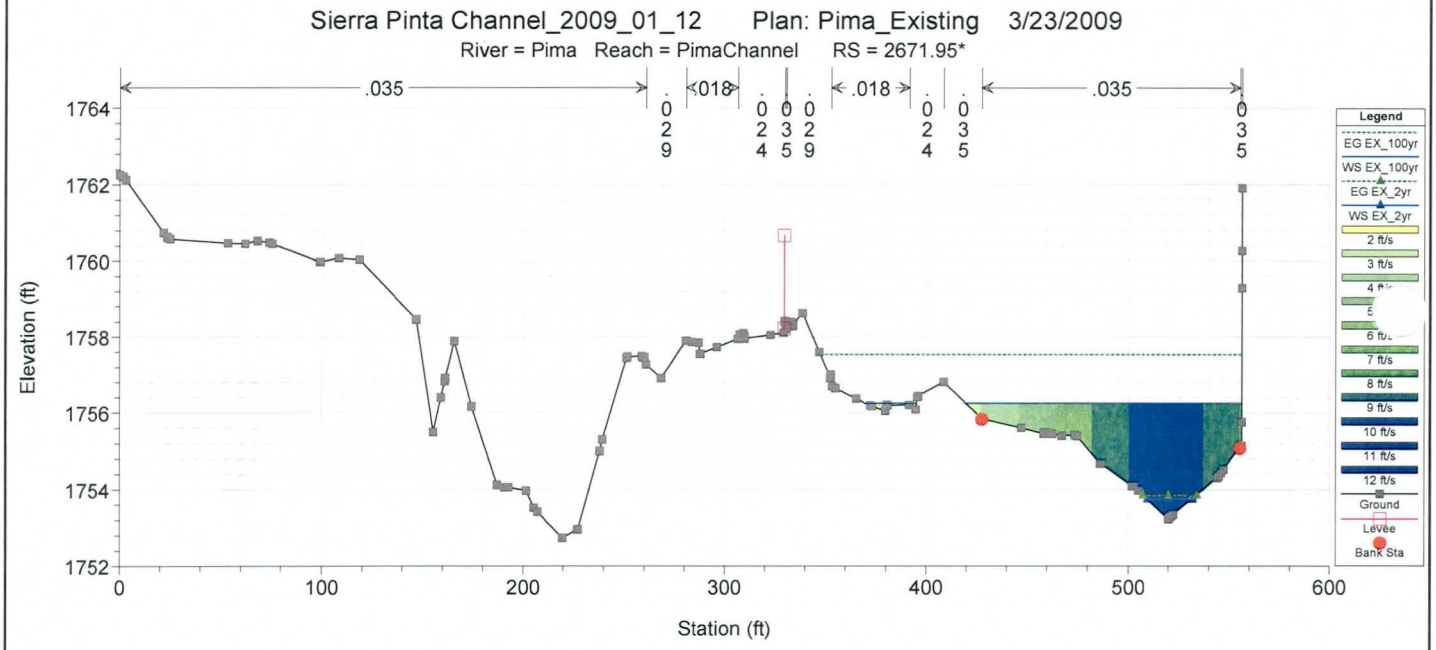
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
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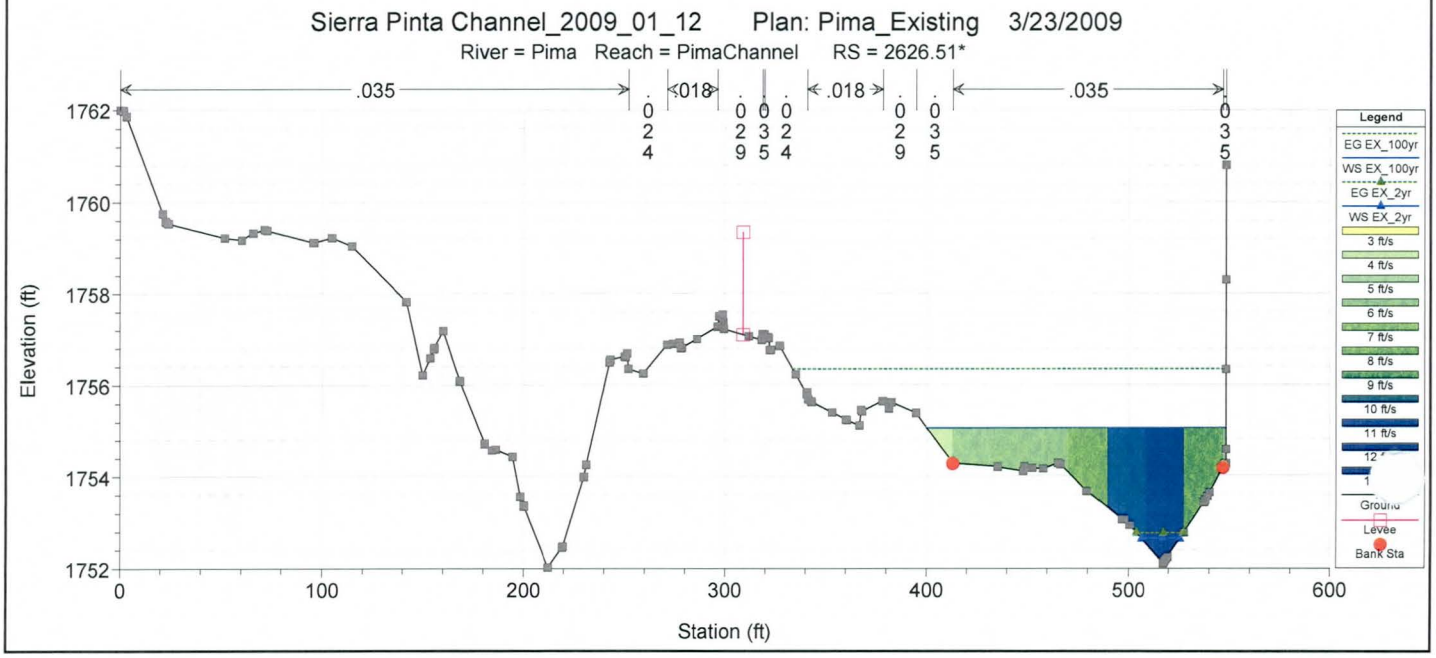
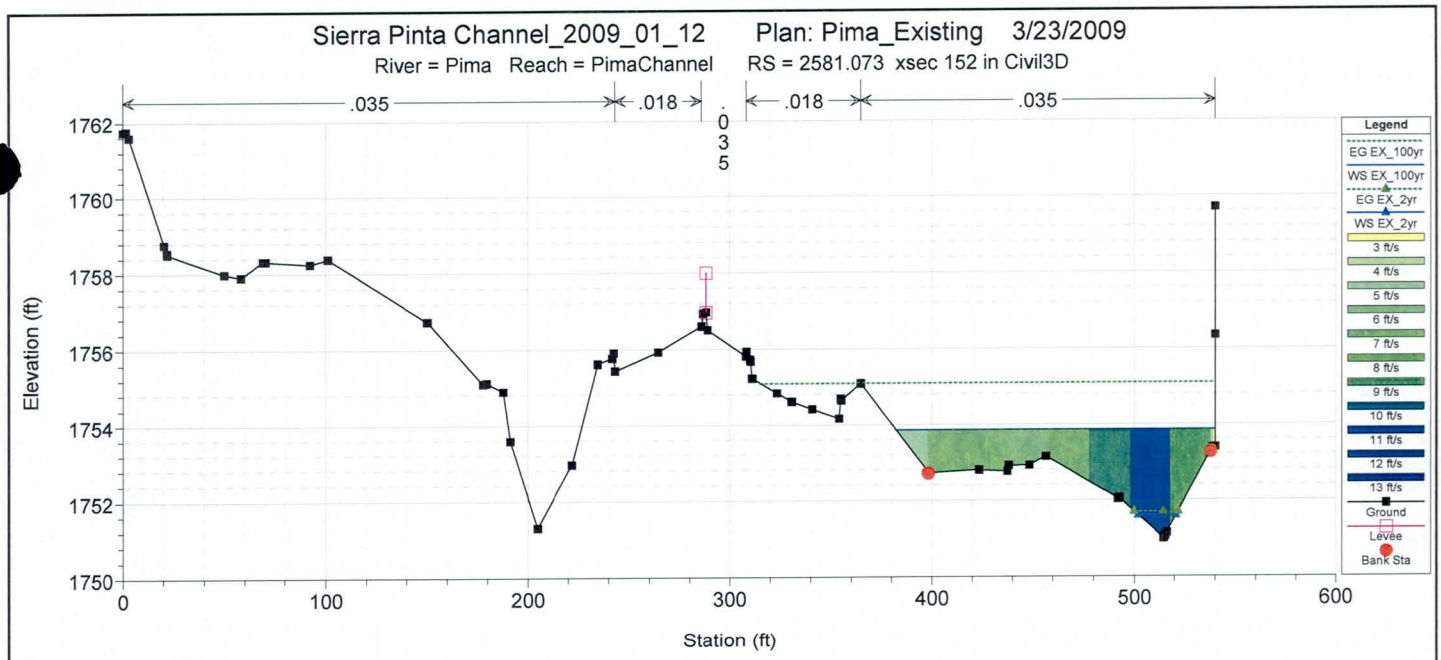
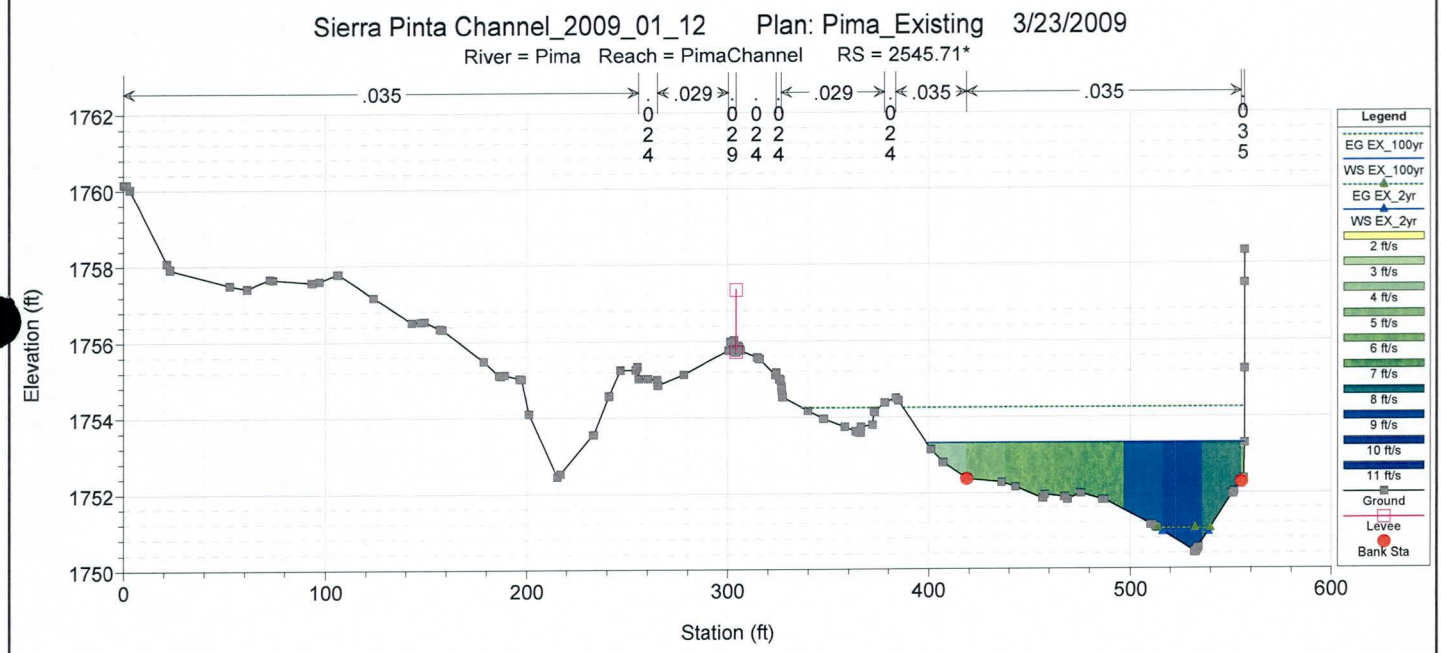
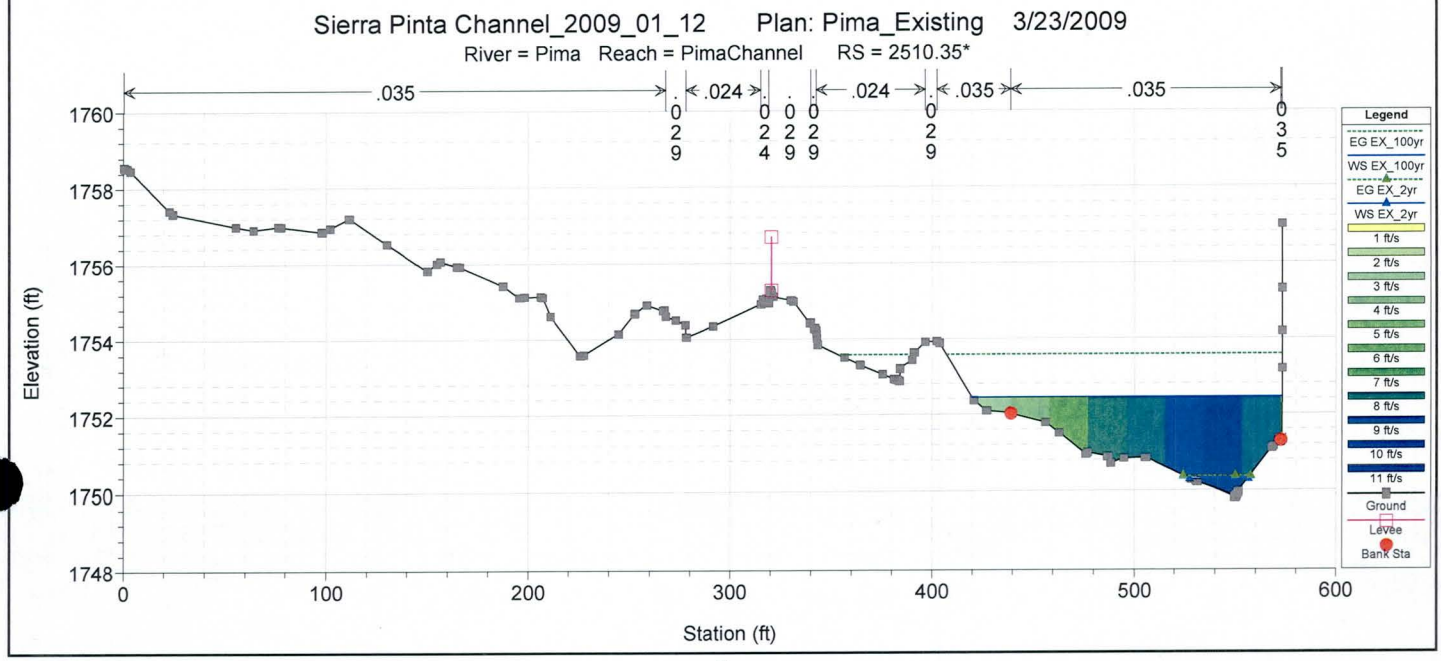
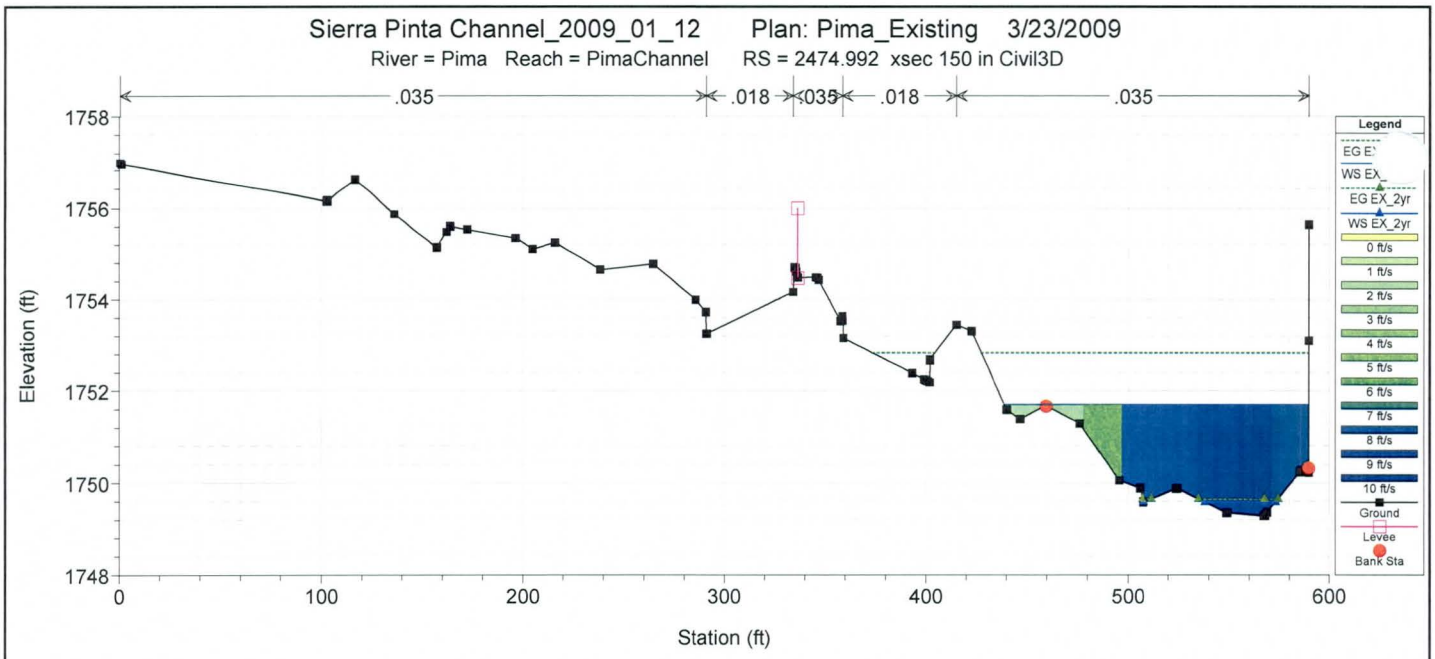
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Bank Sta

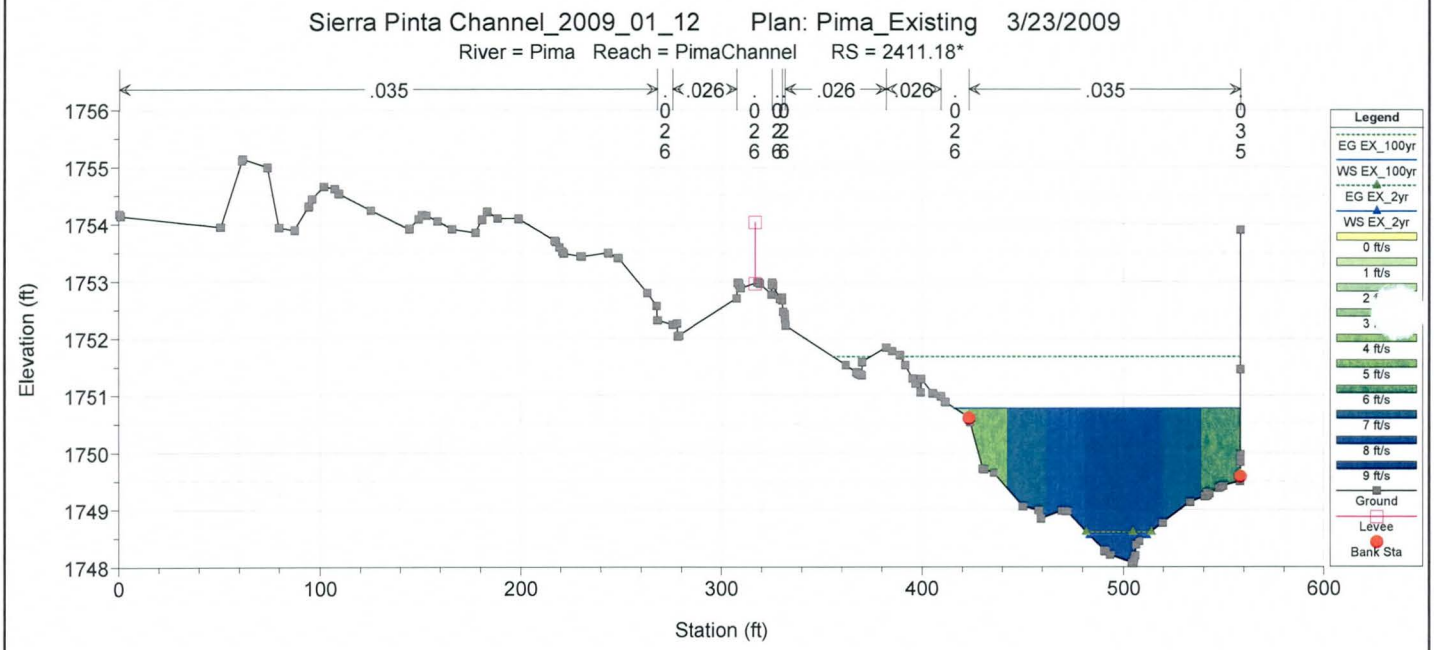

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2626.51*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Levee
Bank Sta

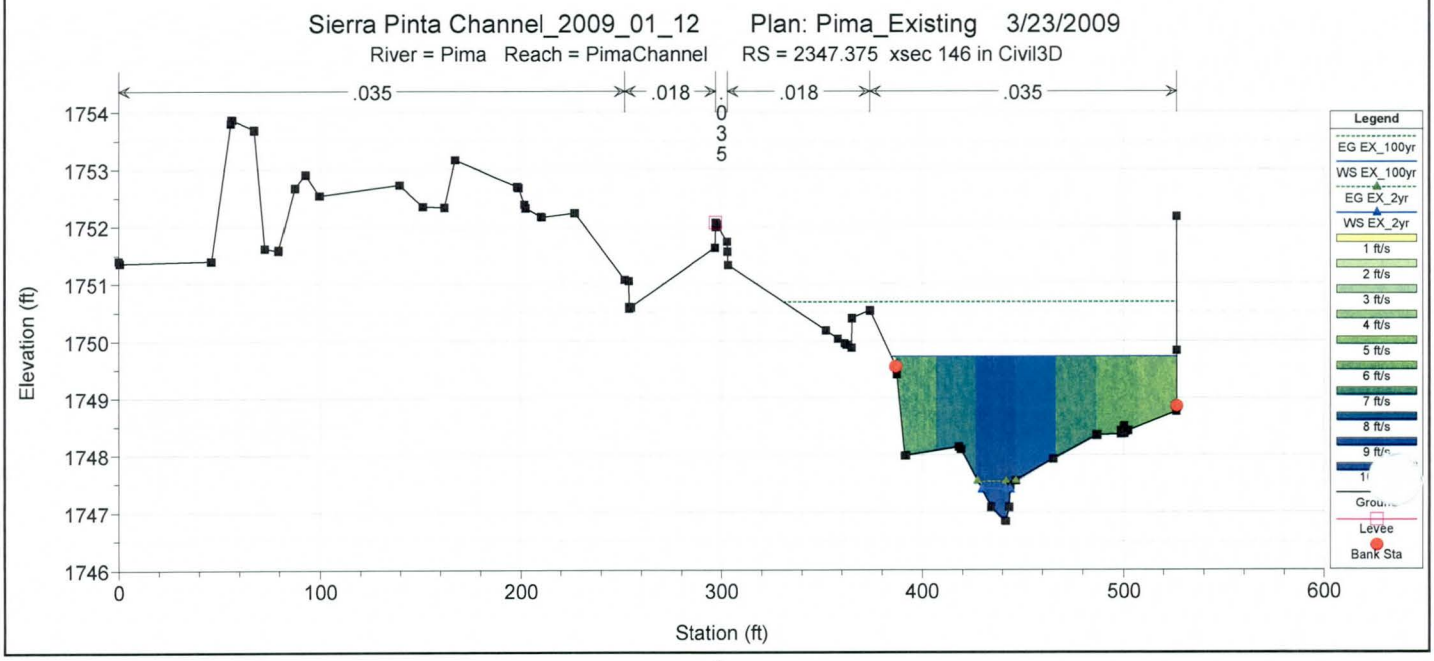

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2581.073 xsec 152 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

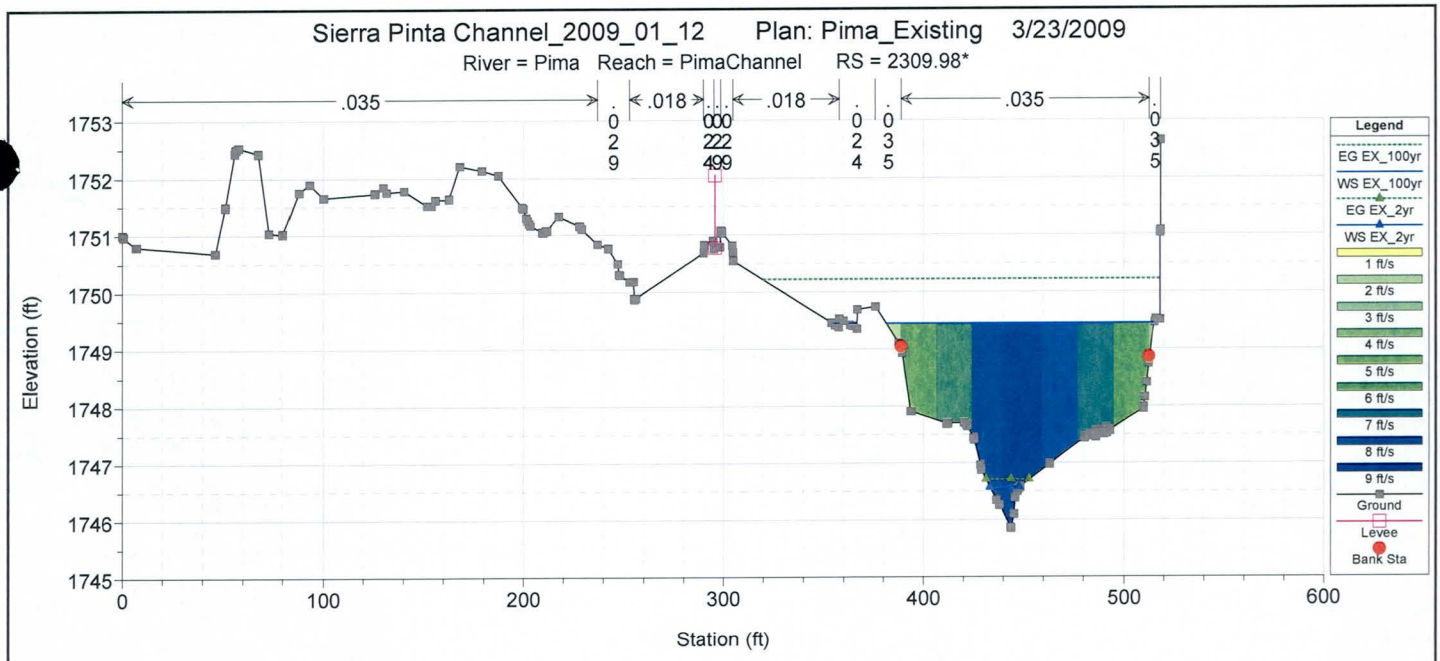

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2545.71*
.035
.029
.029
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

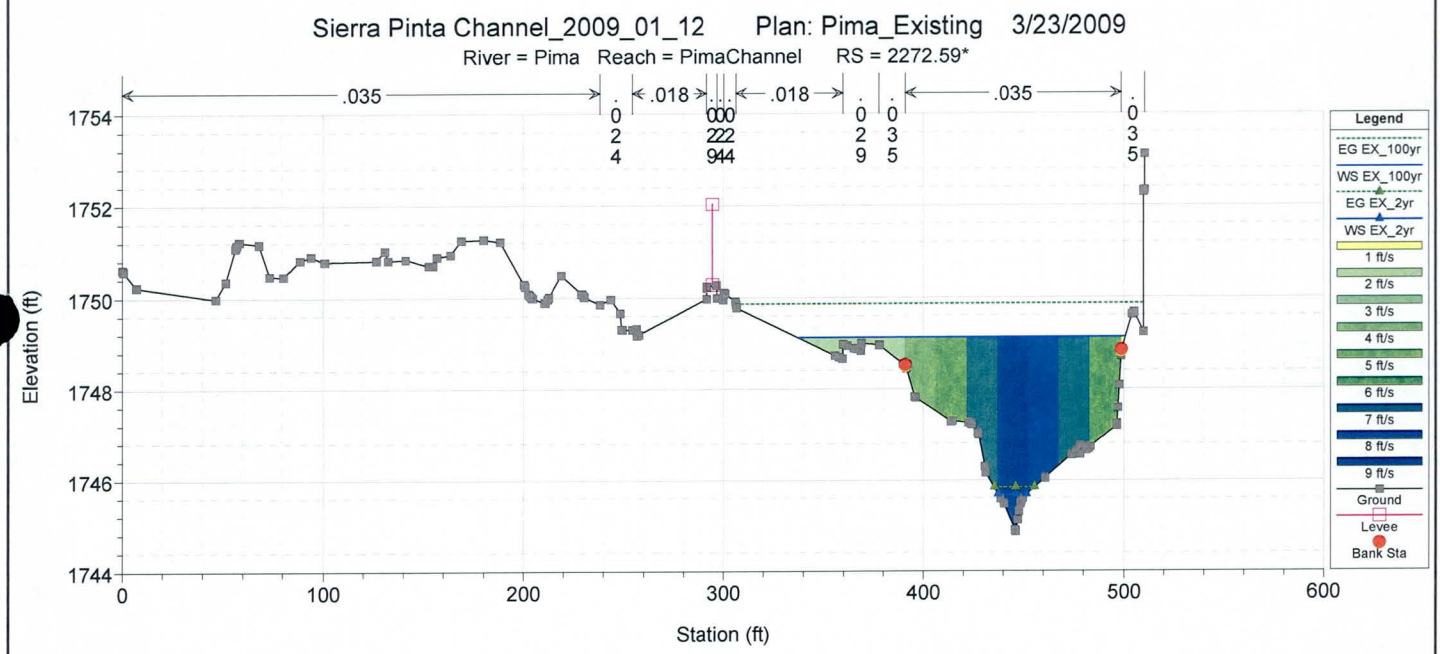

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2510.35*
.035
.024
.024
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

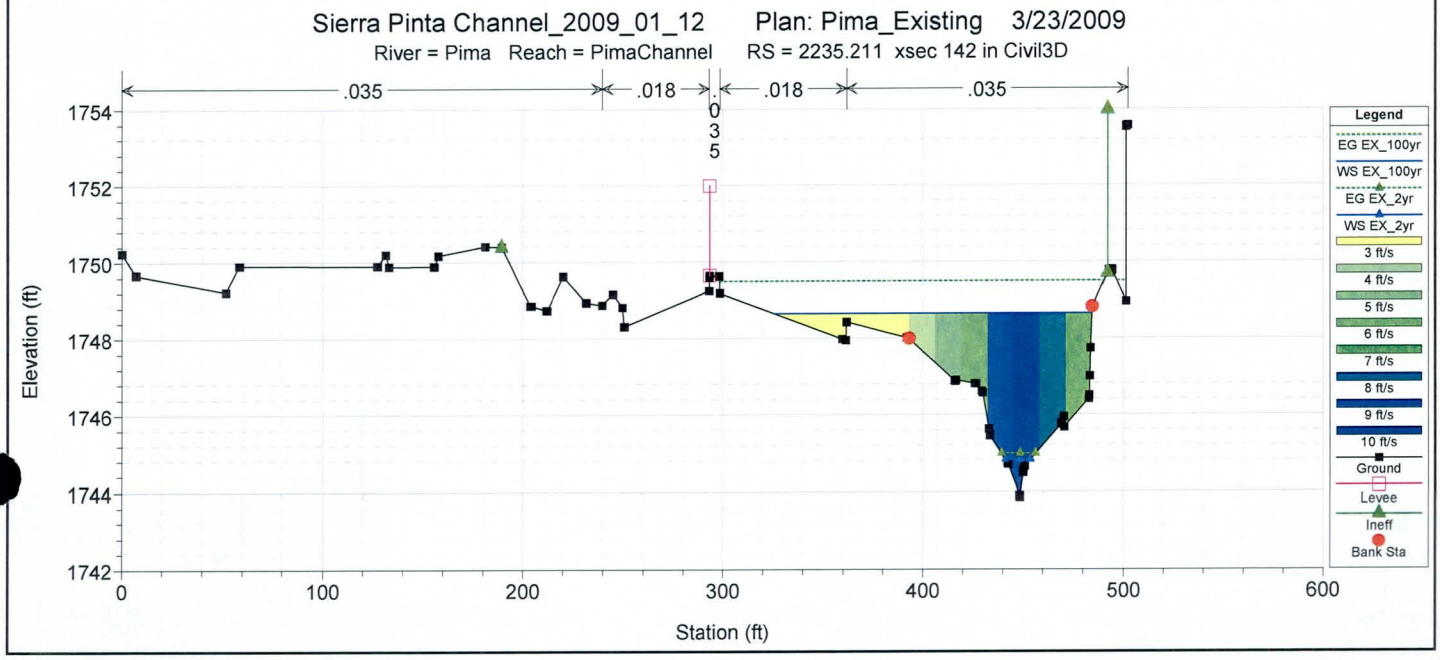

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2474.992 xsec 150 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta

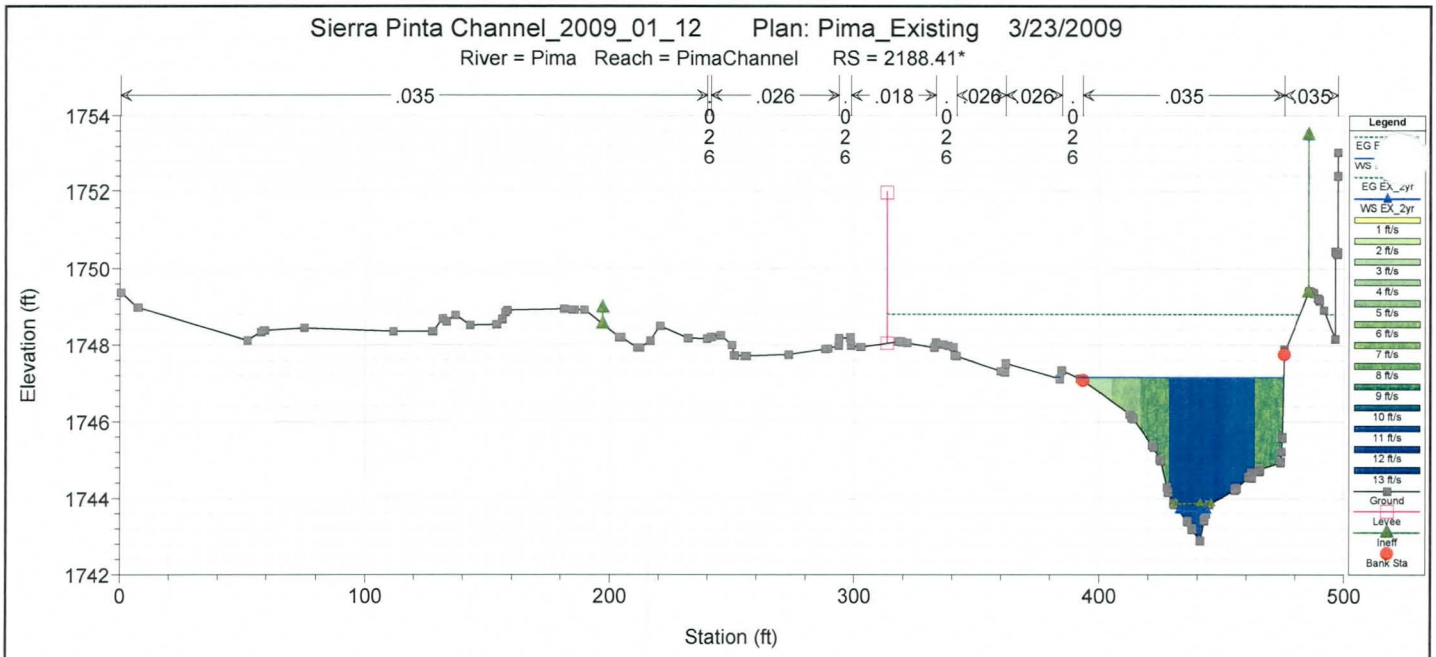

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2411.18*
.035
.026
.026
.026
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

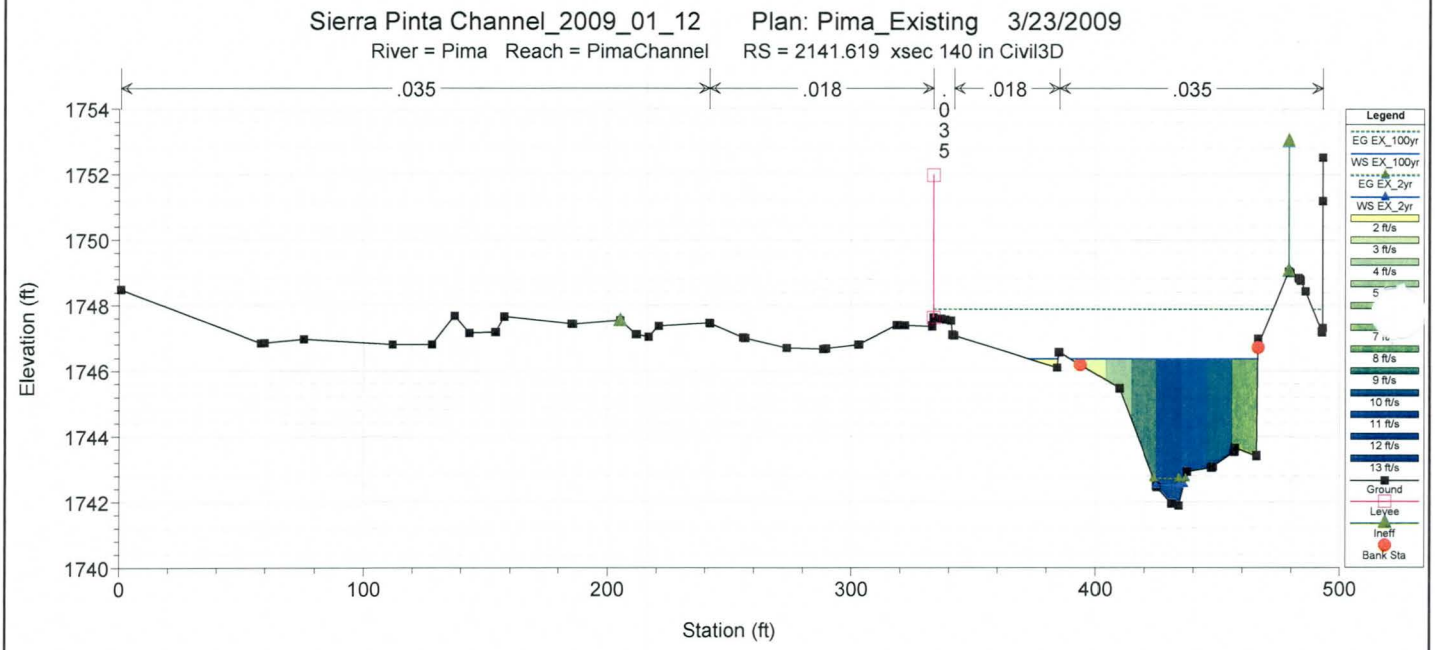

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2347.375 xsec 146 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Levee
Bank Sta

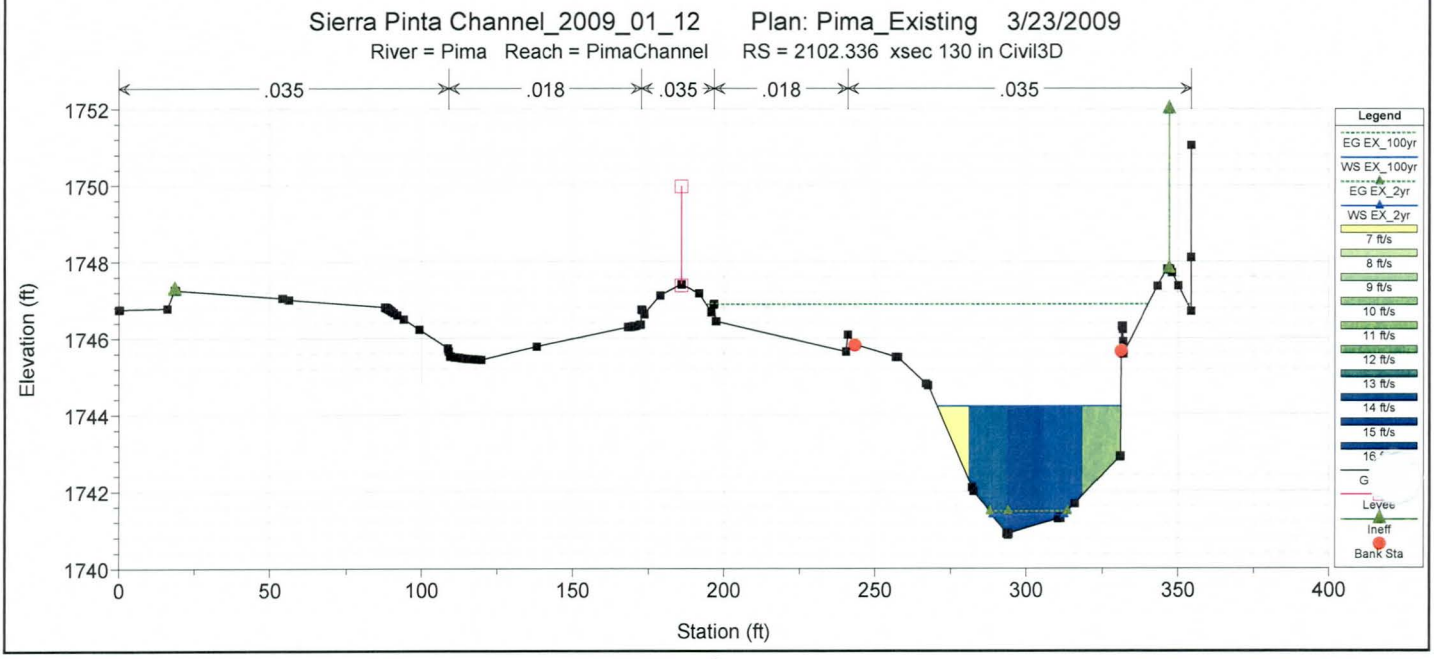

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2309.98*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

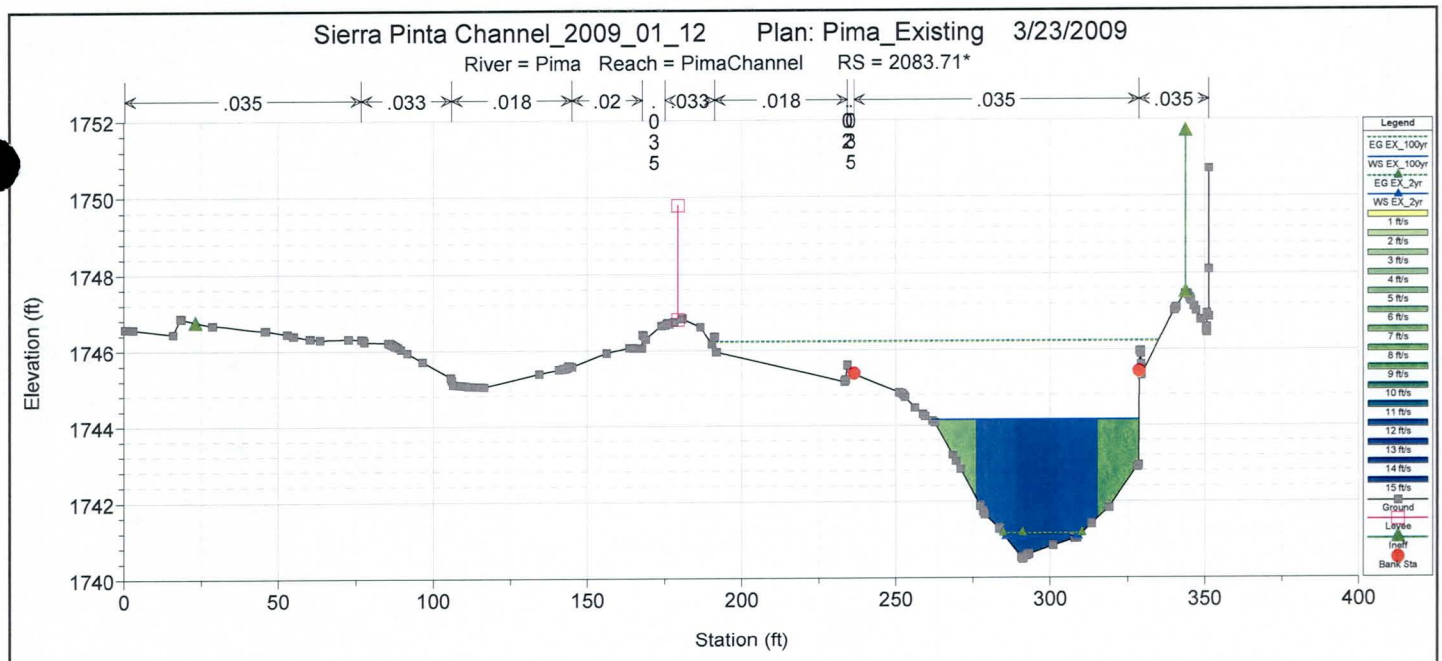

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2272.59*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

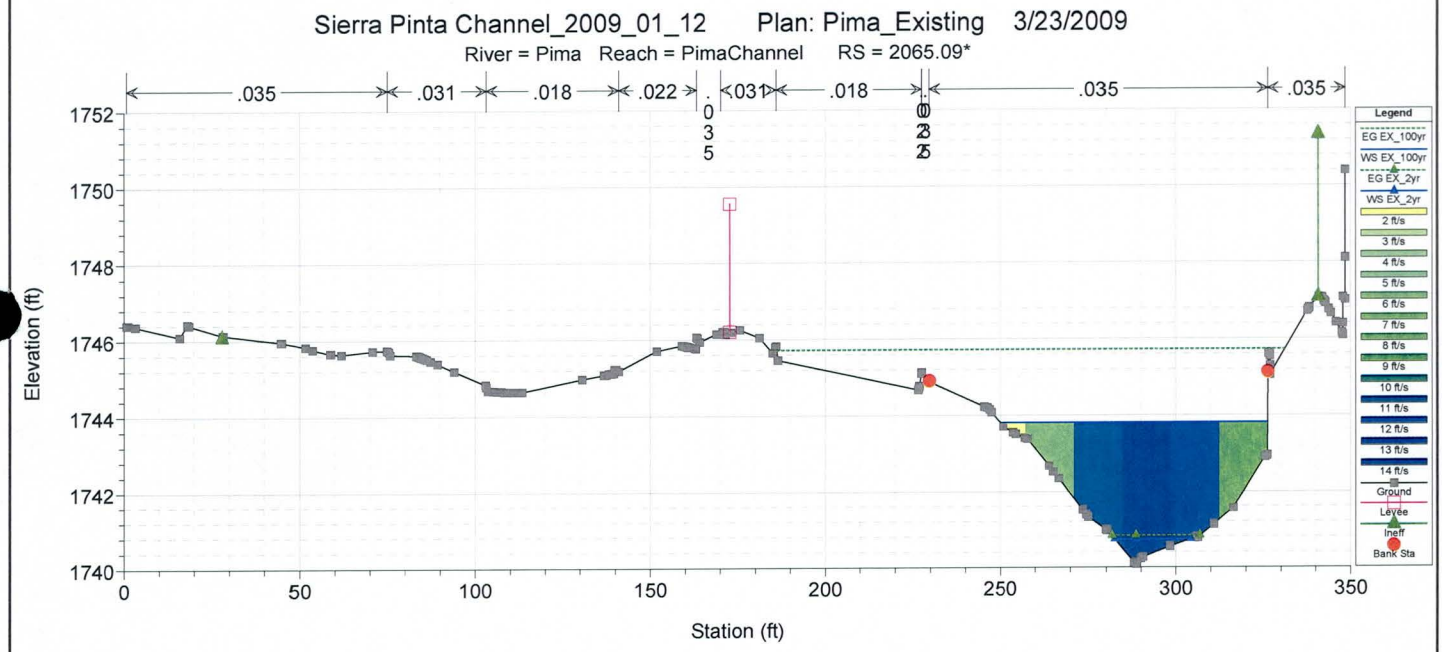

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2235.211 xsec 142 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Ineff
Bank Sta

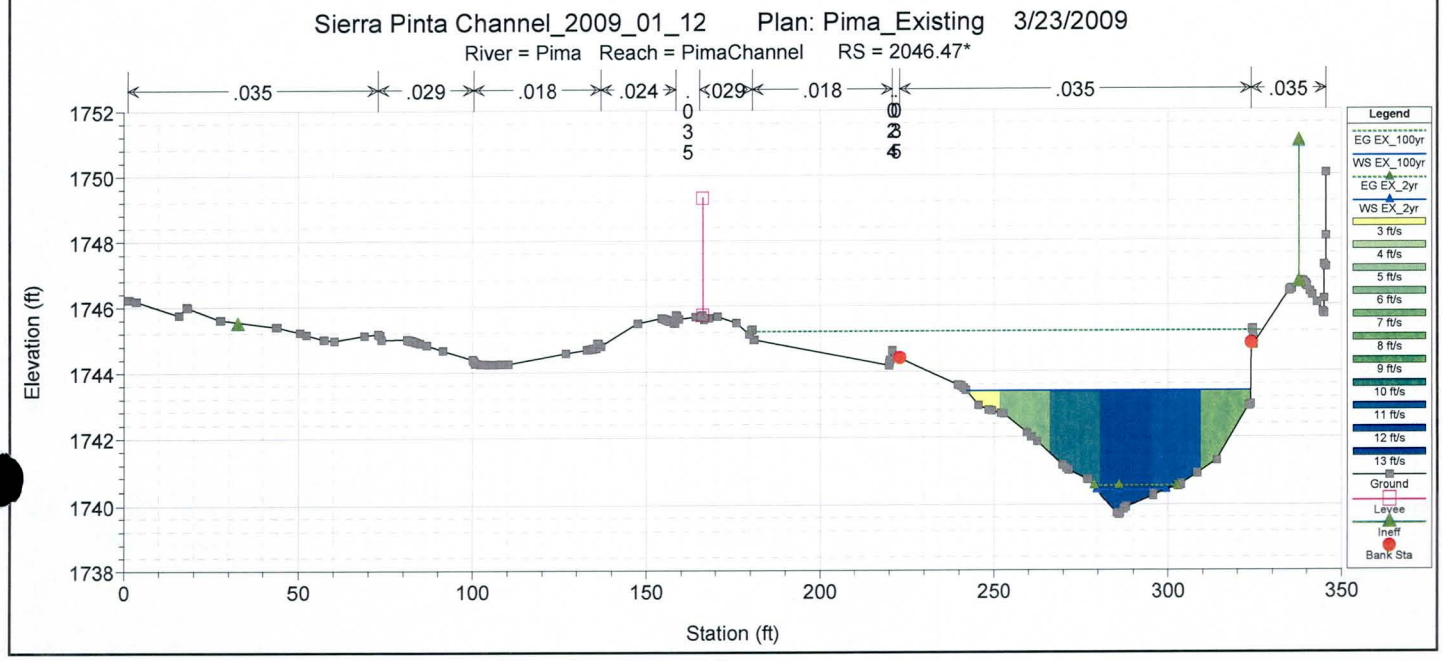

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2188.41*
.035
.026
.018
.026
.026
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

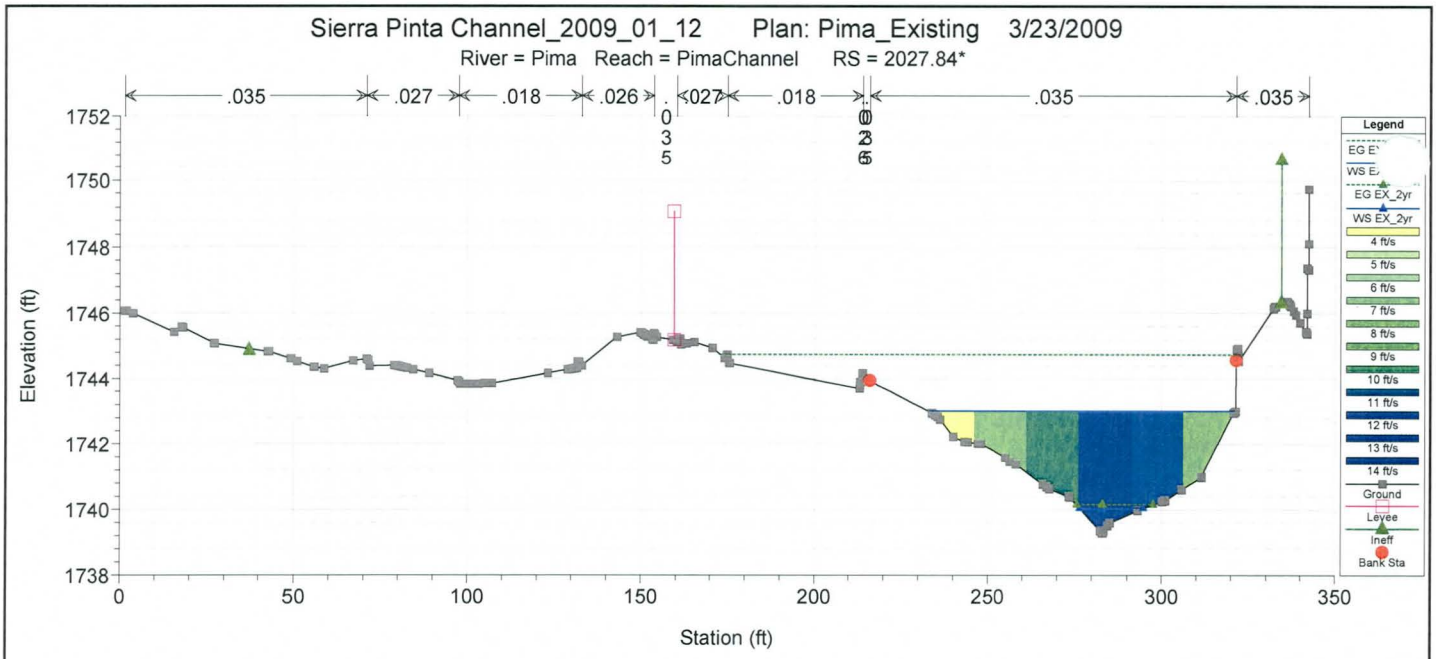

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2141.619 xsec 140 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

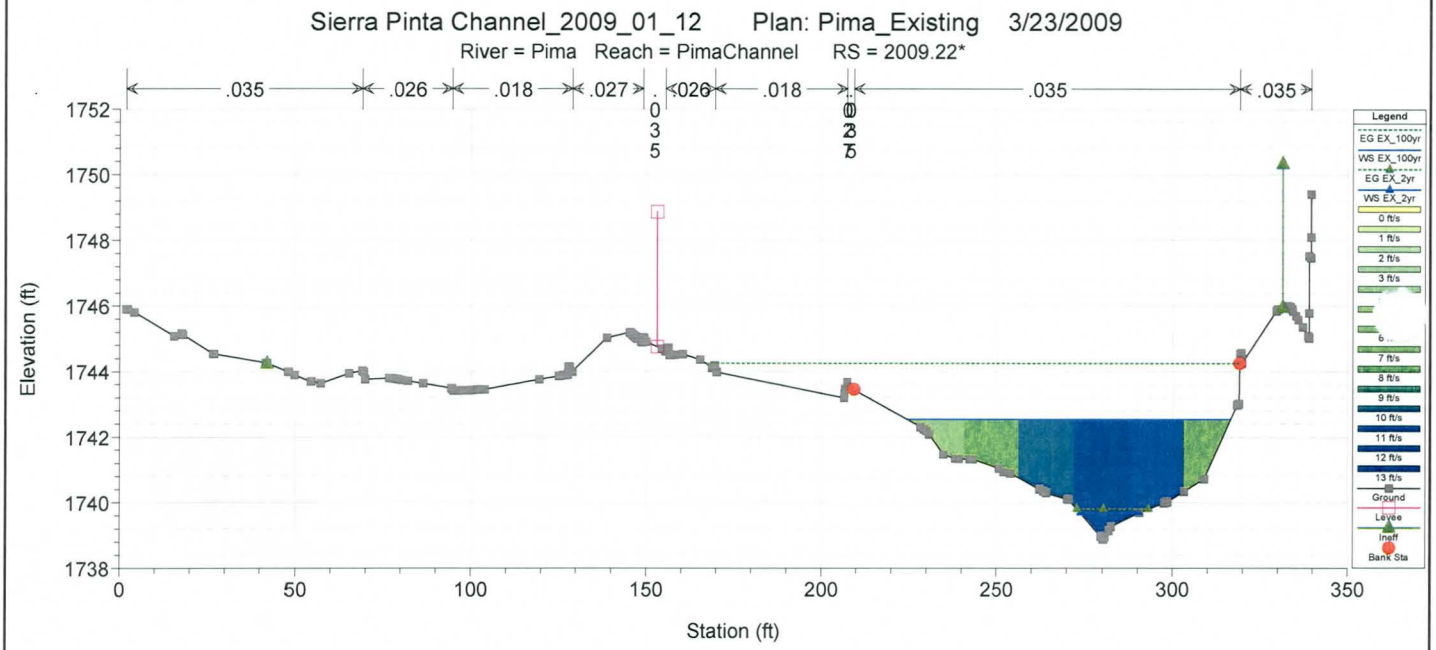

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2102.336 xsec 130 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Levee
Ineff
Bank Sta

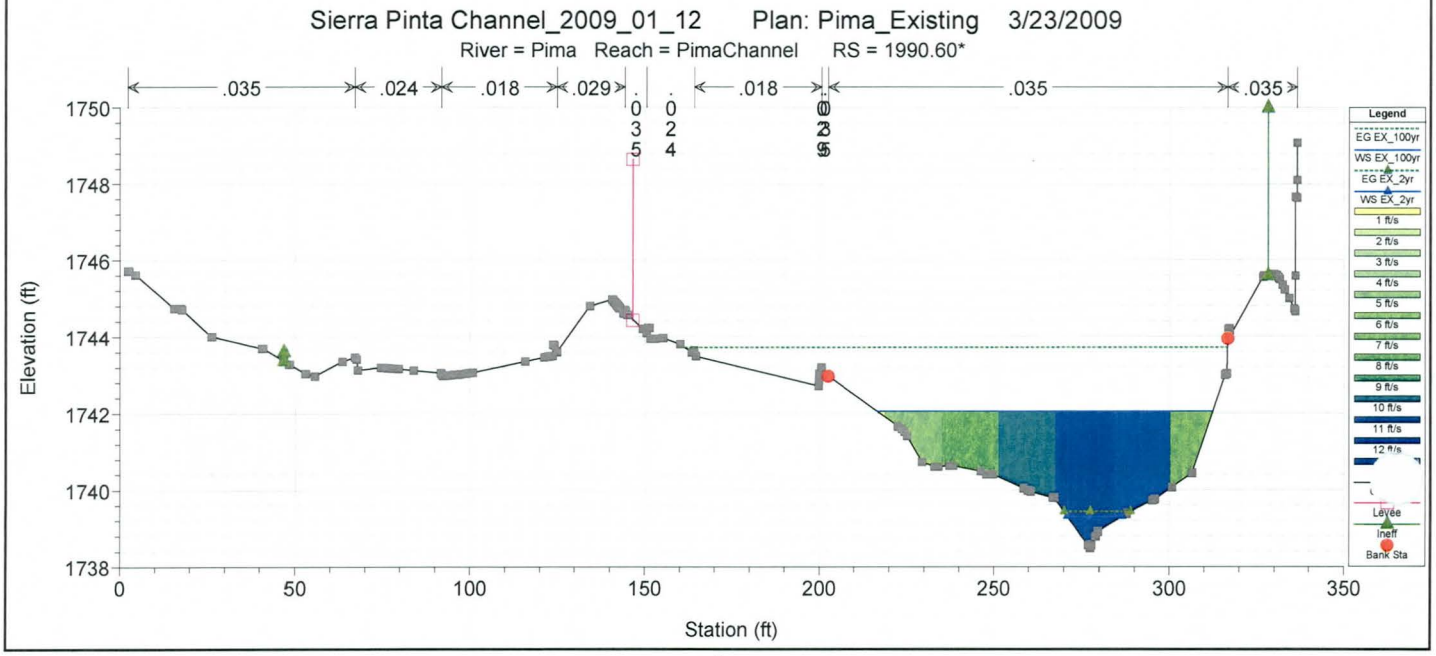

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2083.71*
.035
.033
.018
.02
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

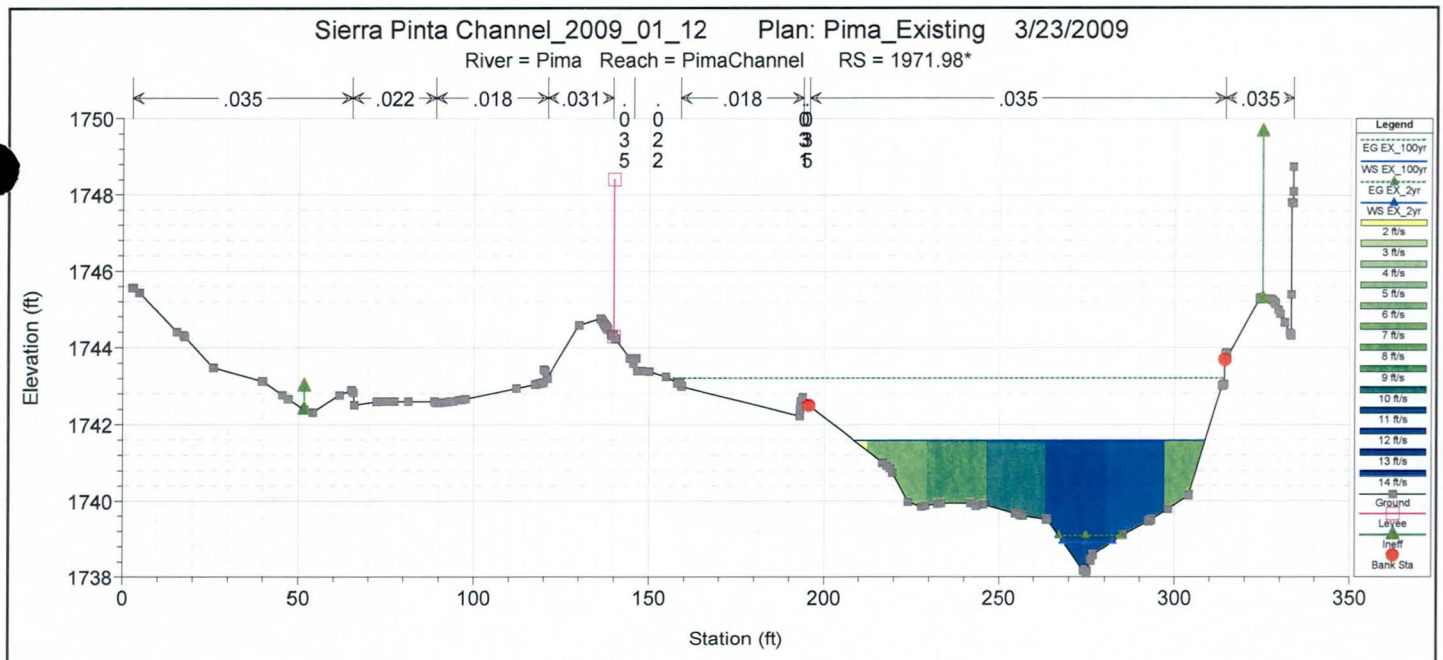

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2065.09*
.035
.031
.018
.022
.031
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

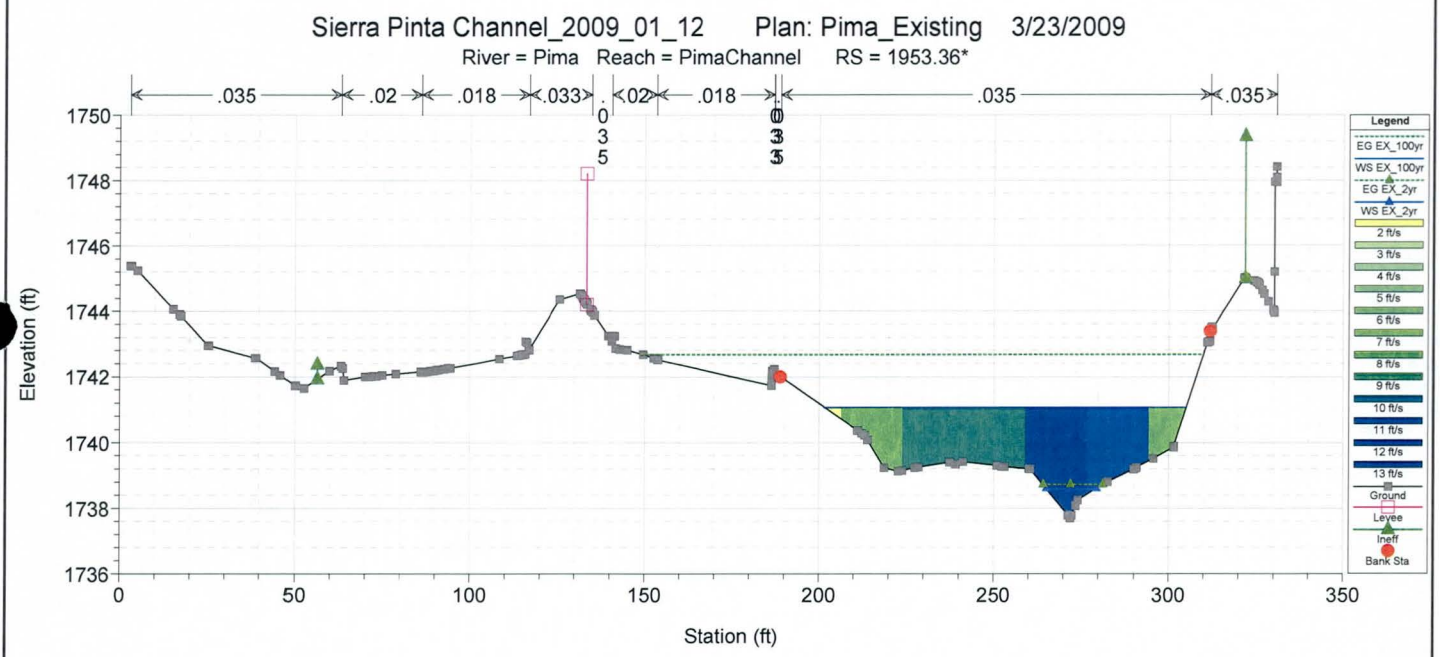

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2046.47*
.035
.029
.018
.024
.029
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

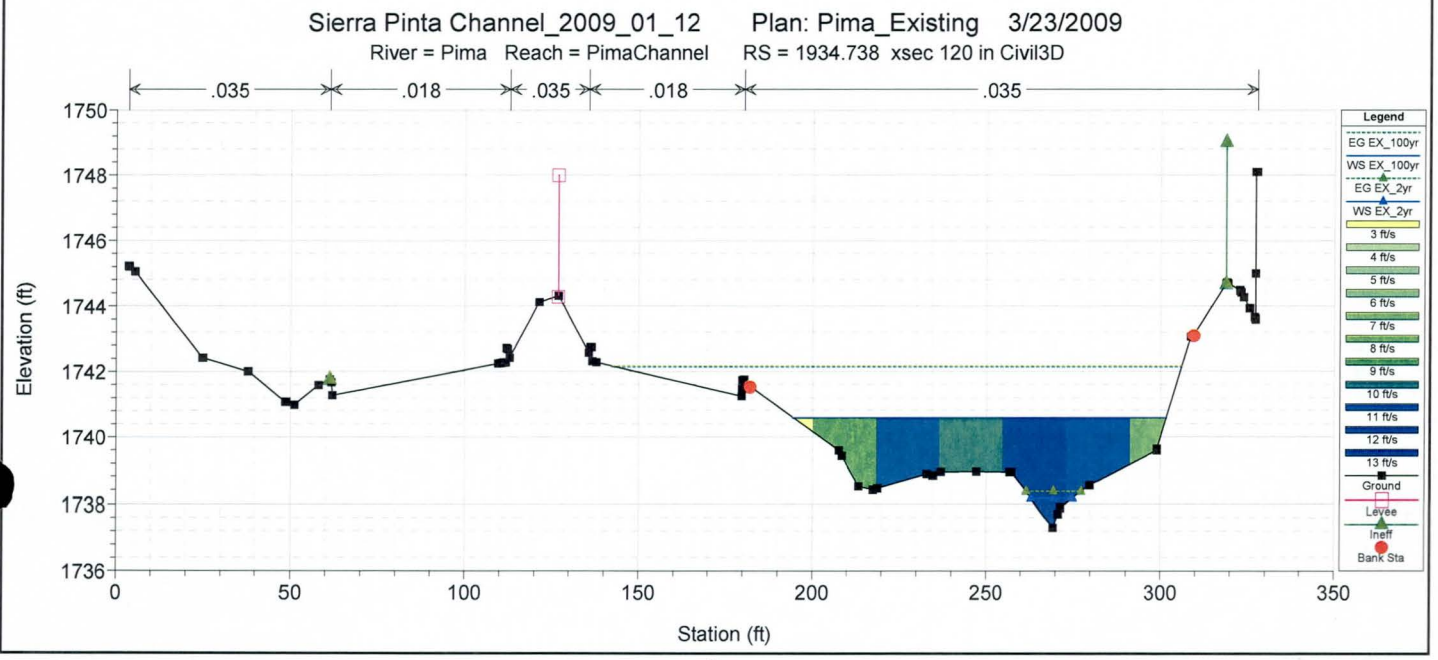

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2027.84*
.035
.027
.018
.026
.027
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

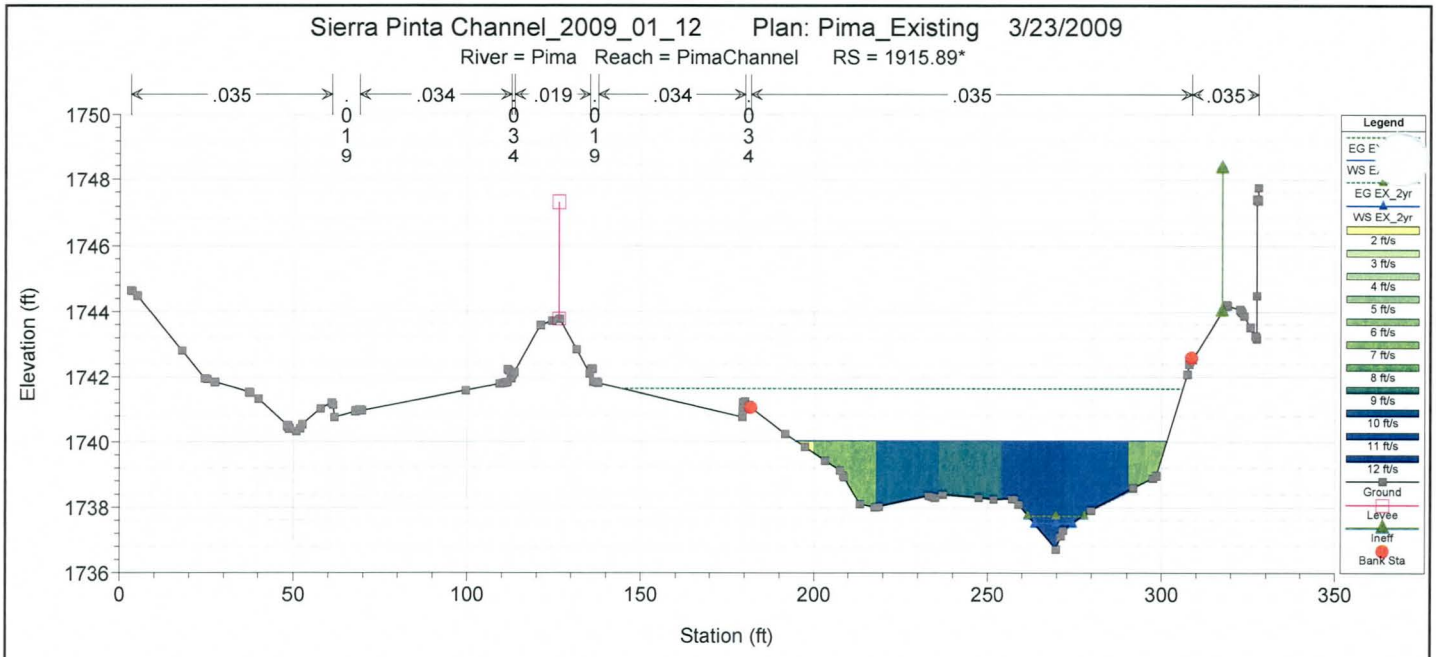

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 2009.22*
.035
.026
.018
.027
.026
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

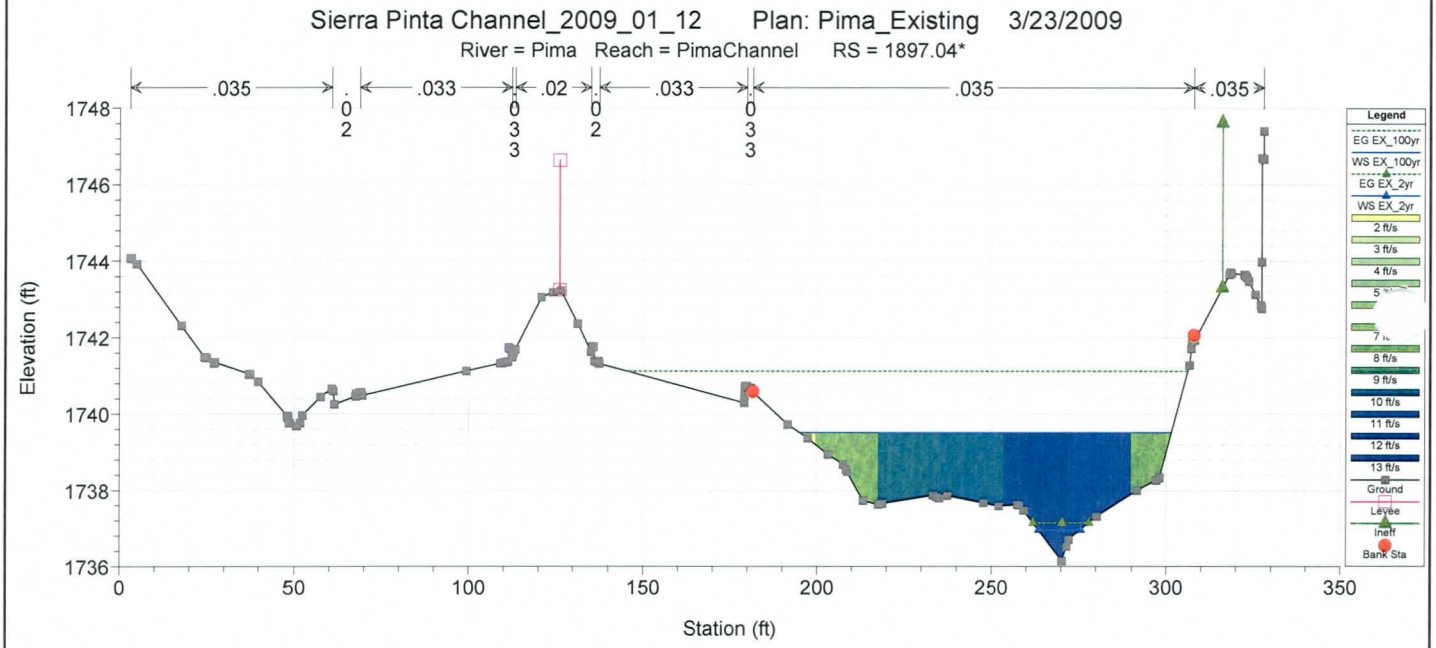

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1990.60*
.035
.024
.018
.029
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Levee
Ineff
Bank Sta

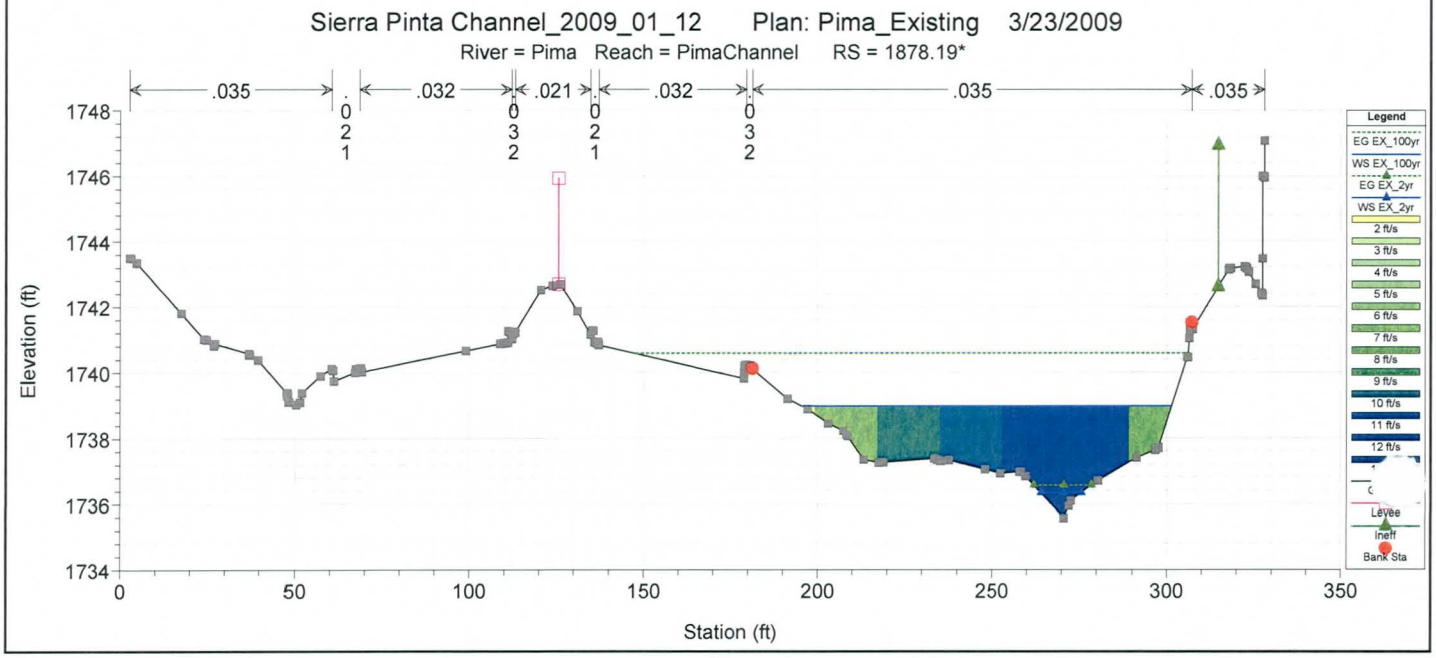

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1971.98*
.035
.022
.018
.031
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

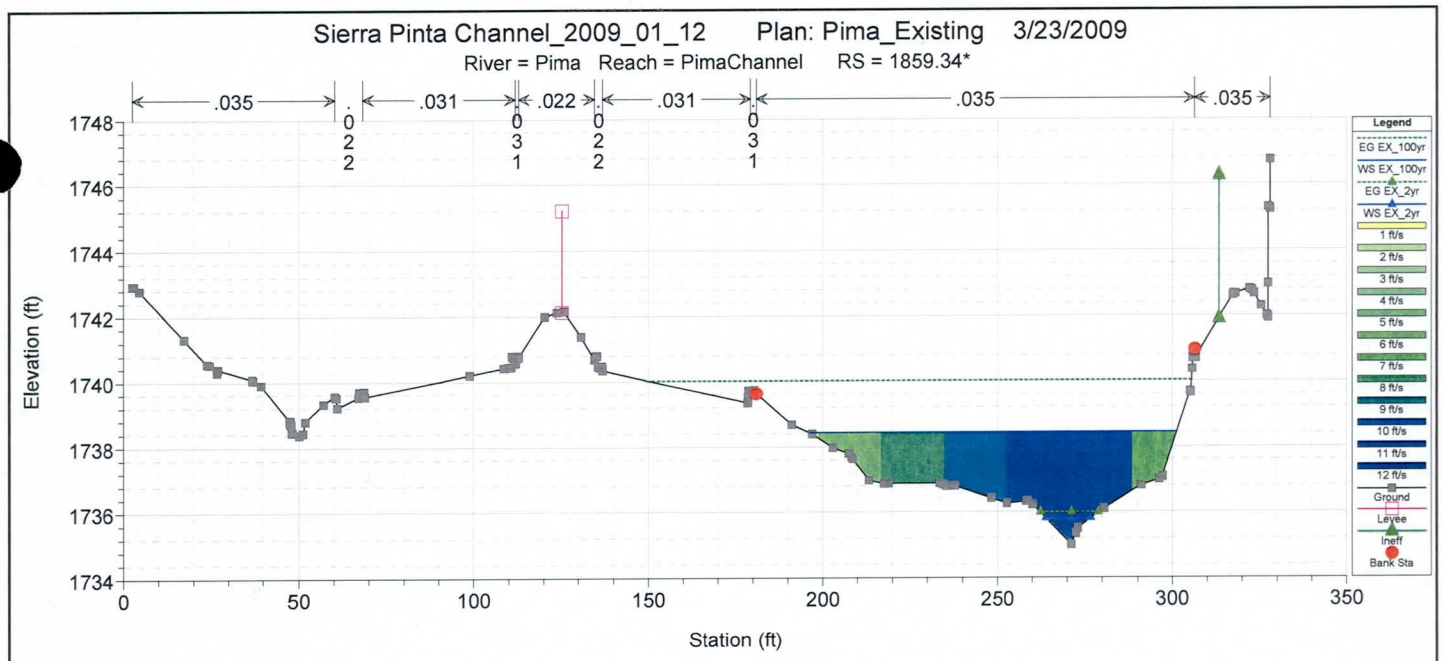

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1953.36*
.035
.02
.018
.033
.02
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

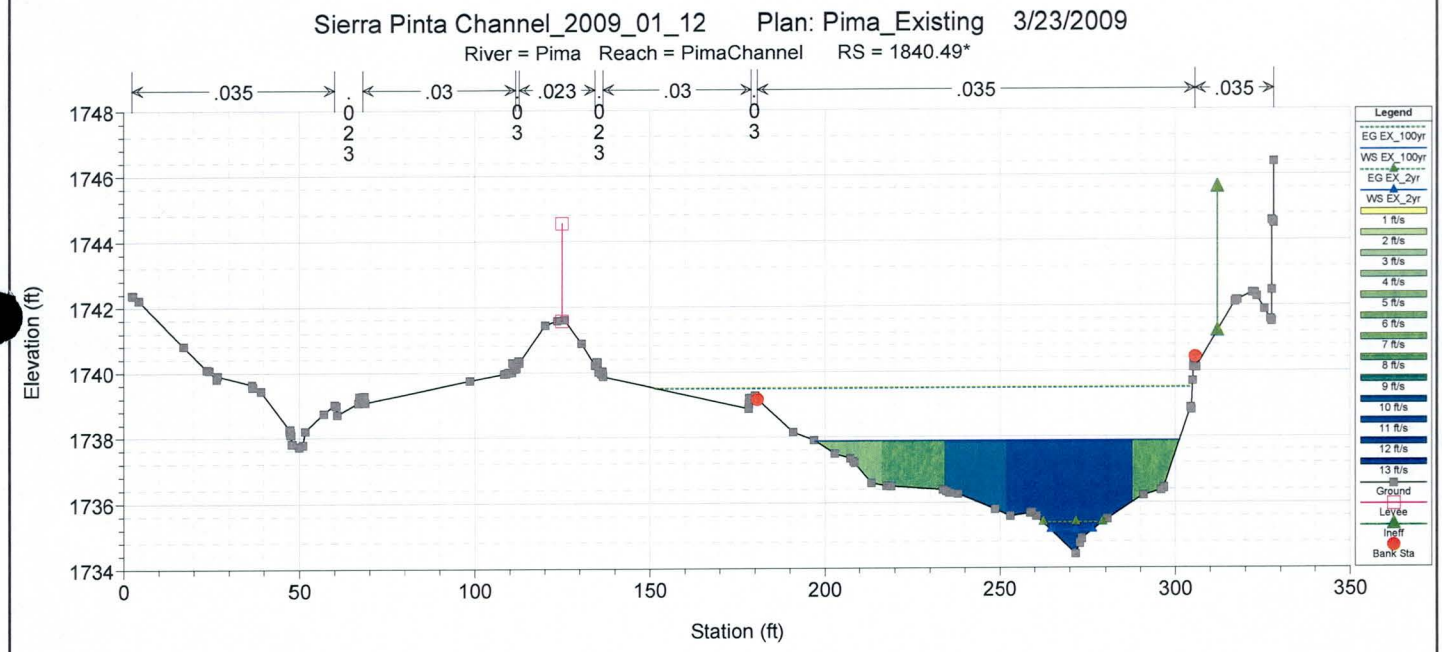

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1934.738 xsec 120 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

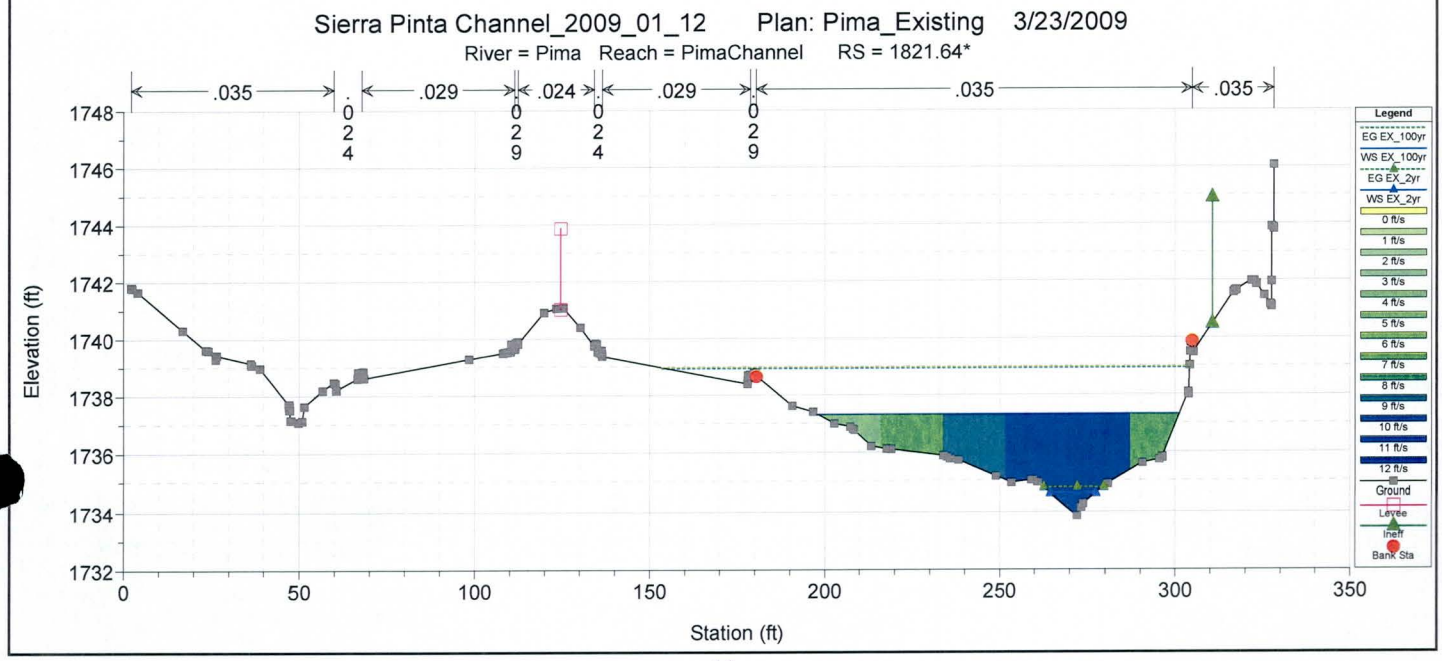

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1915.89*
.035
.019
.034
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

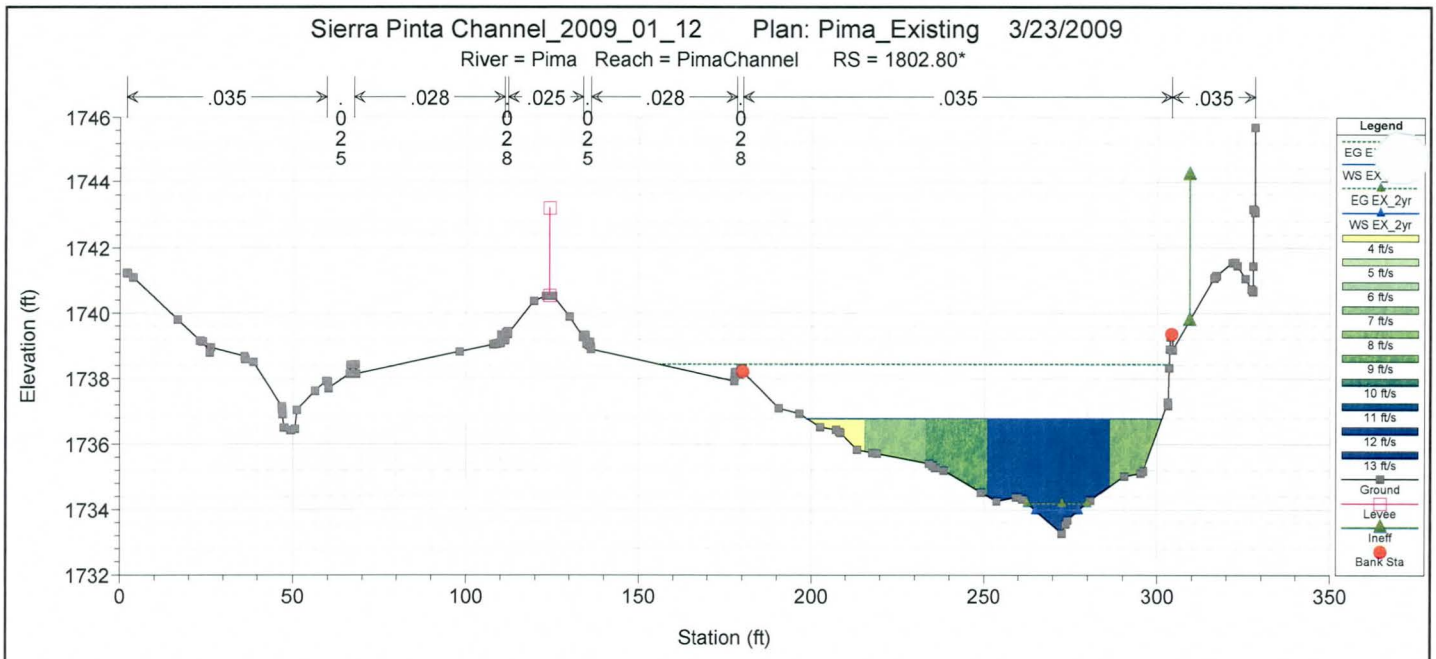

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1897.04*
.035
.033
.02
.033
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

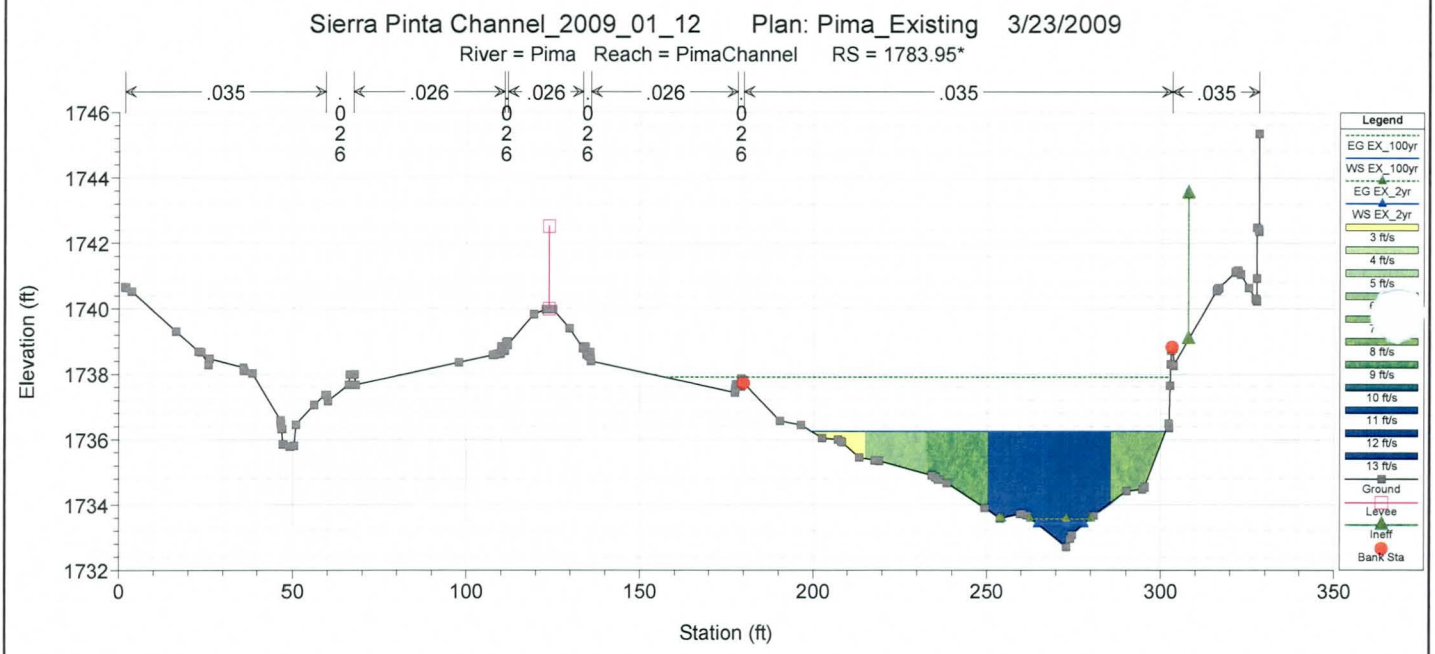

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1878.19*
.035
.032
.021
.032
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Levee
Ineff
Bank Sta

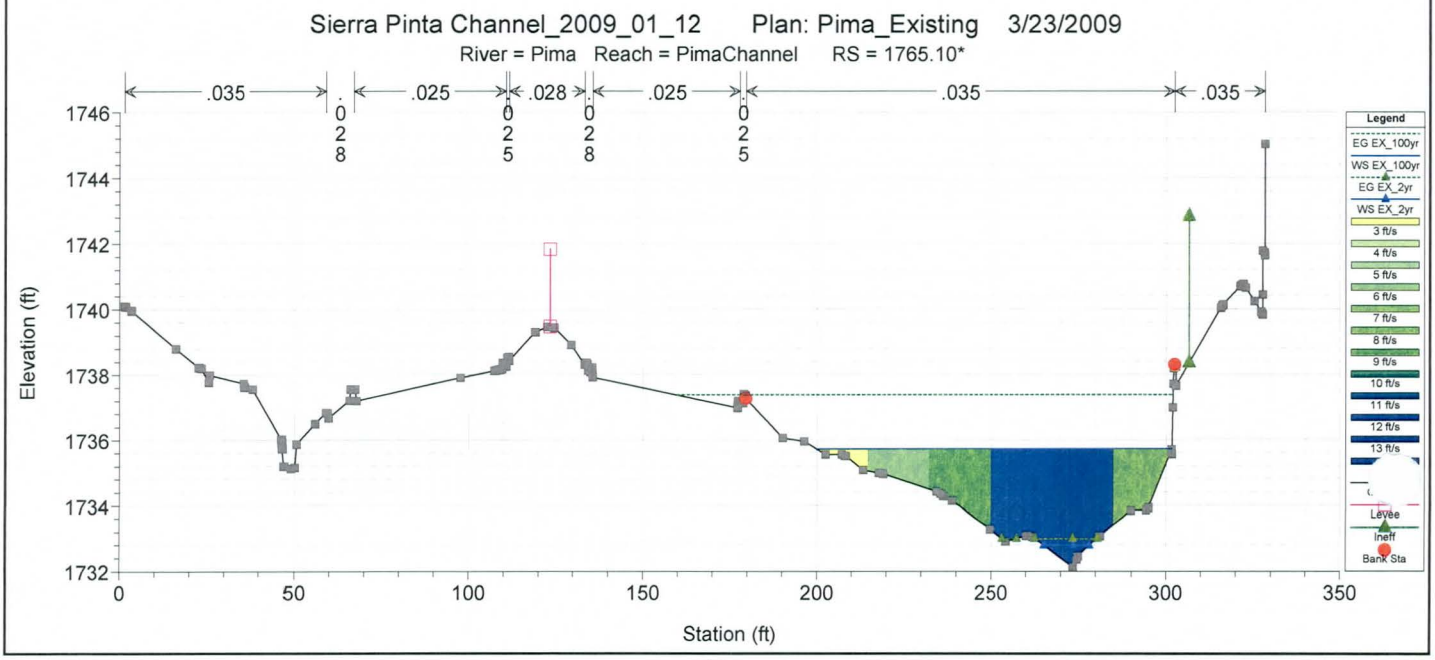

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1859.34*
.035
.022
.031
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

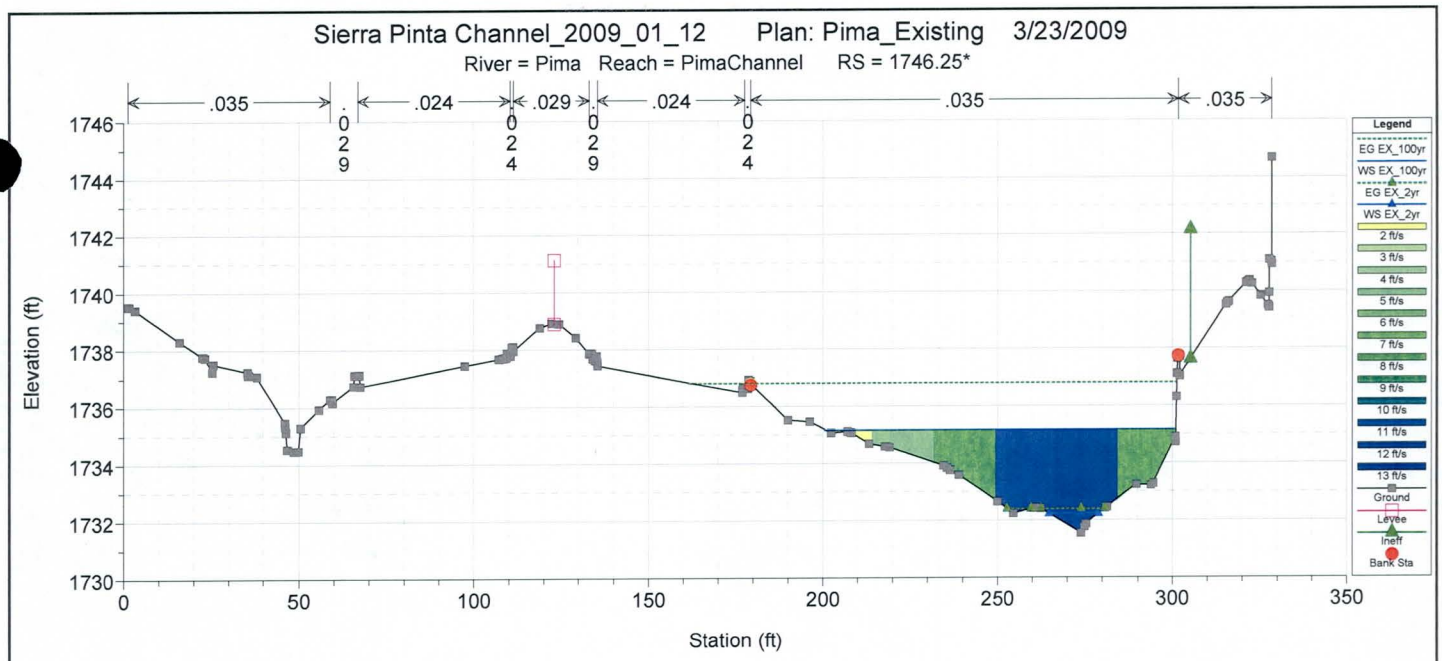

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1840.49*
.035
.03
.023
.03
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

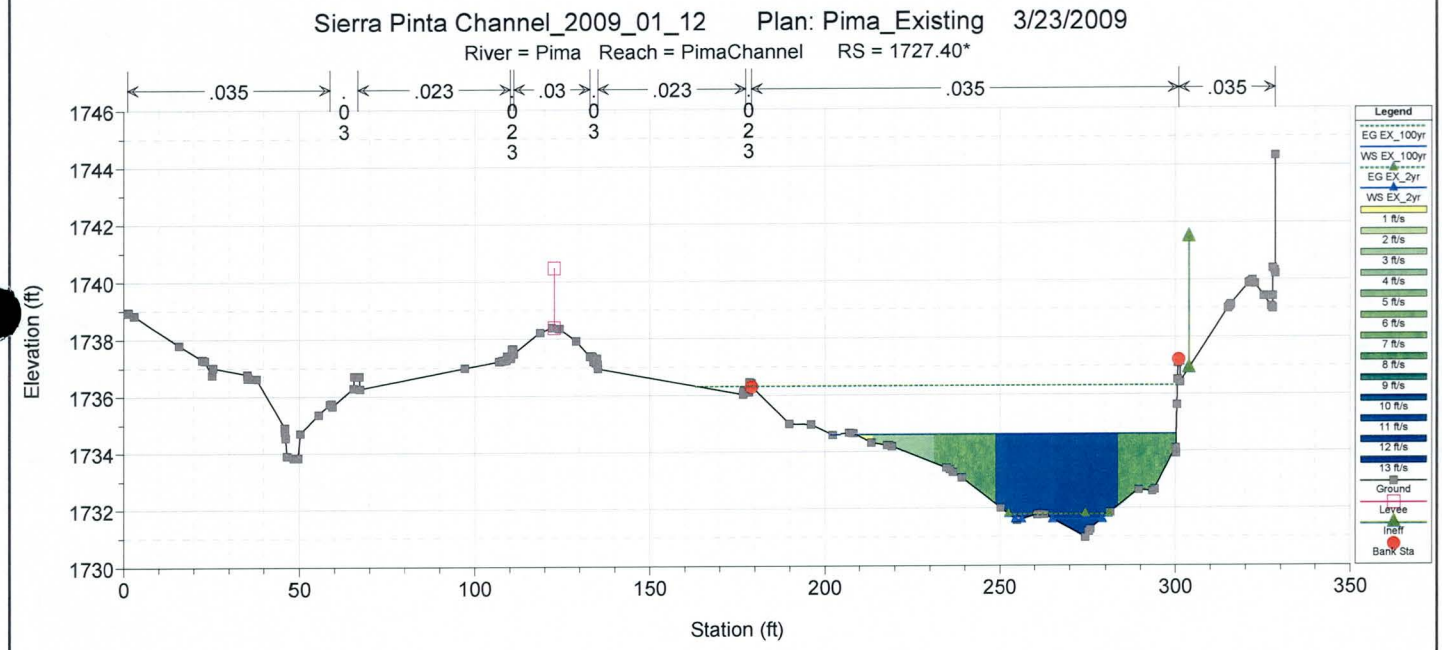

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1821.64*
.035
.029
.024
.029
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

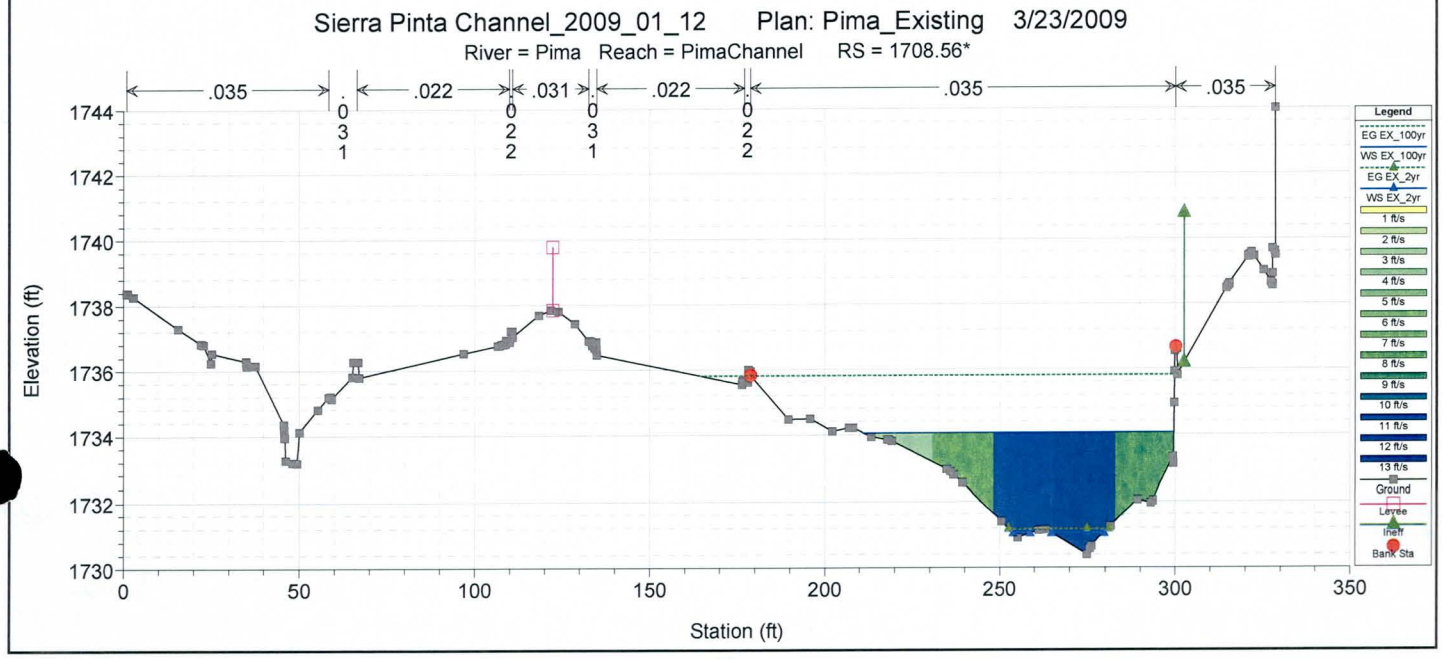

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1802.80*
.035
.028
.025
.028
.035
.035
Elevation (ft)
Station (ft)
Legend
EG E
WS EX
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Levee
Ineff
Bank Sta

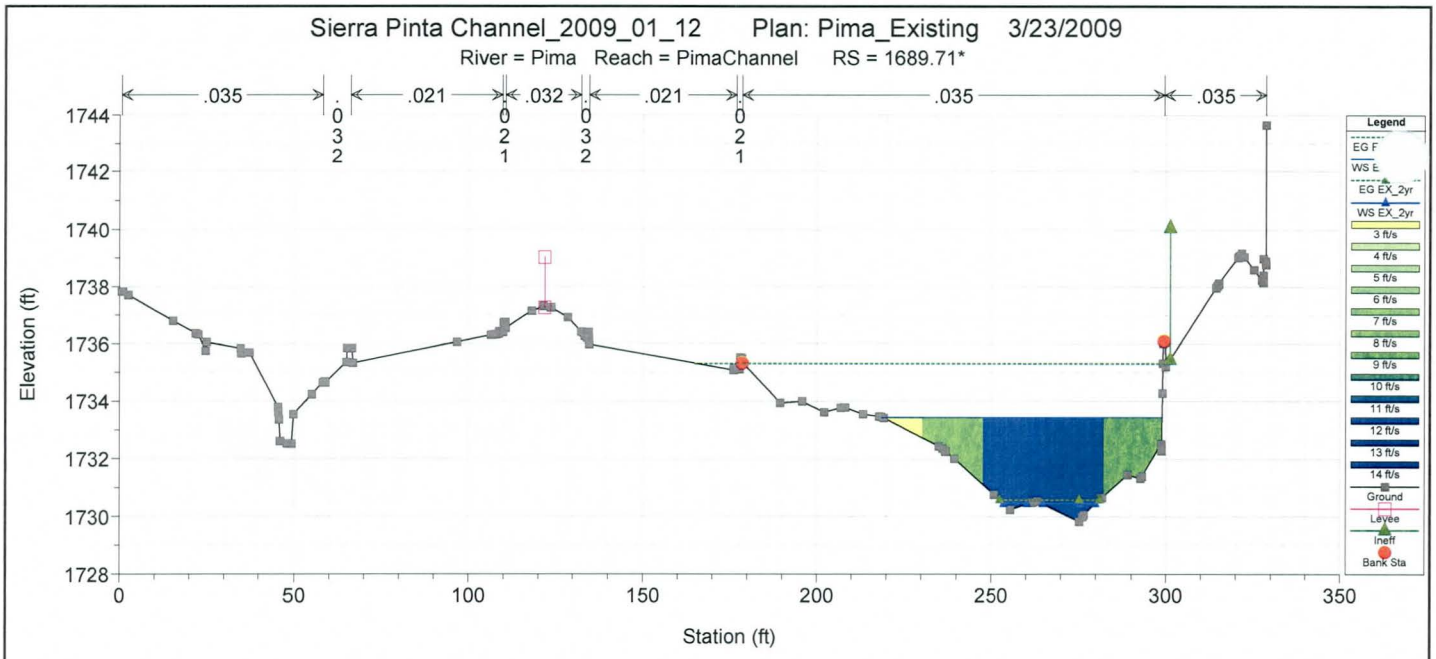

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1783.95*
.035
.026
.026
.026
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Levee
Ineff
Bank Sta

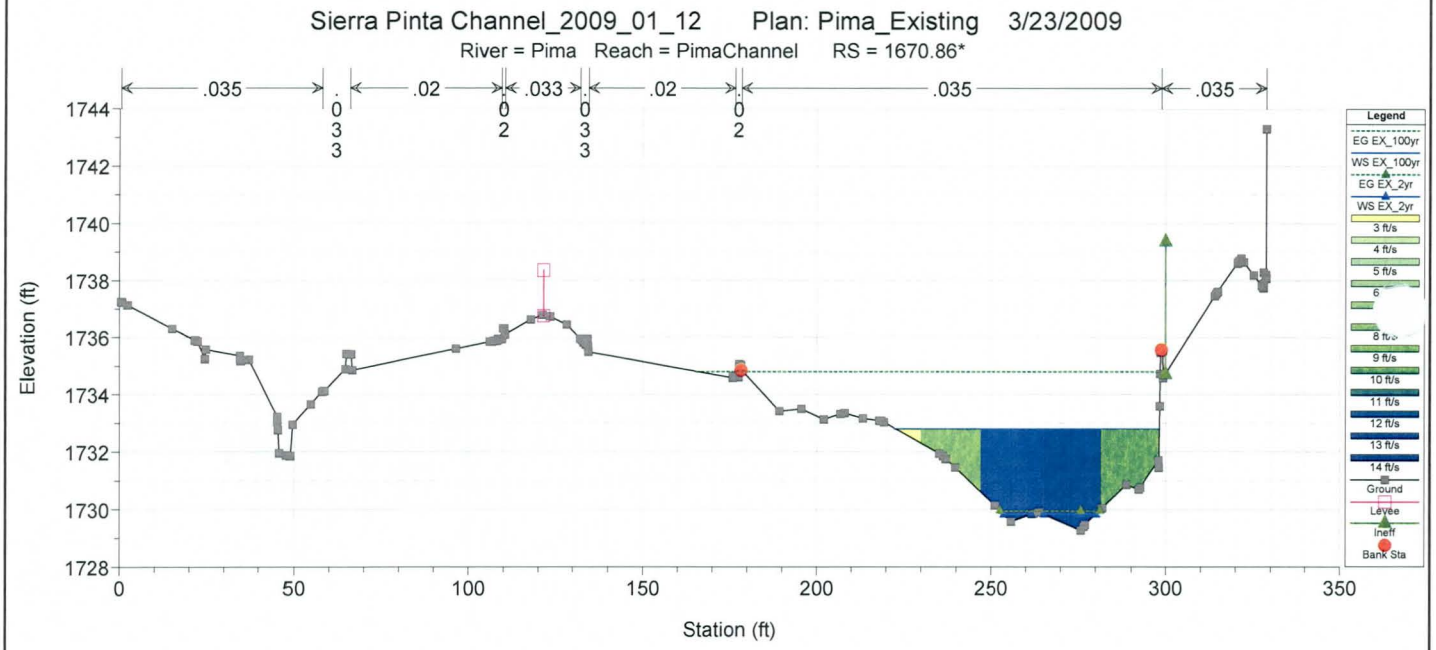

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1765.10*
.035
.025
.028
.025
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Levee
Ineff
Bank Sta

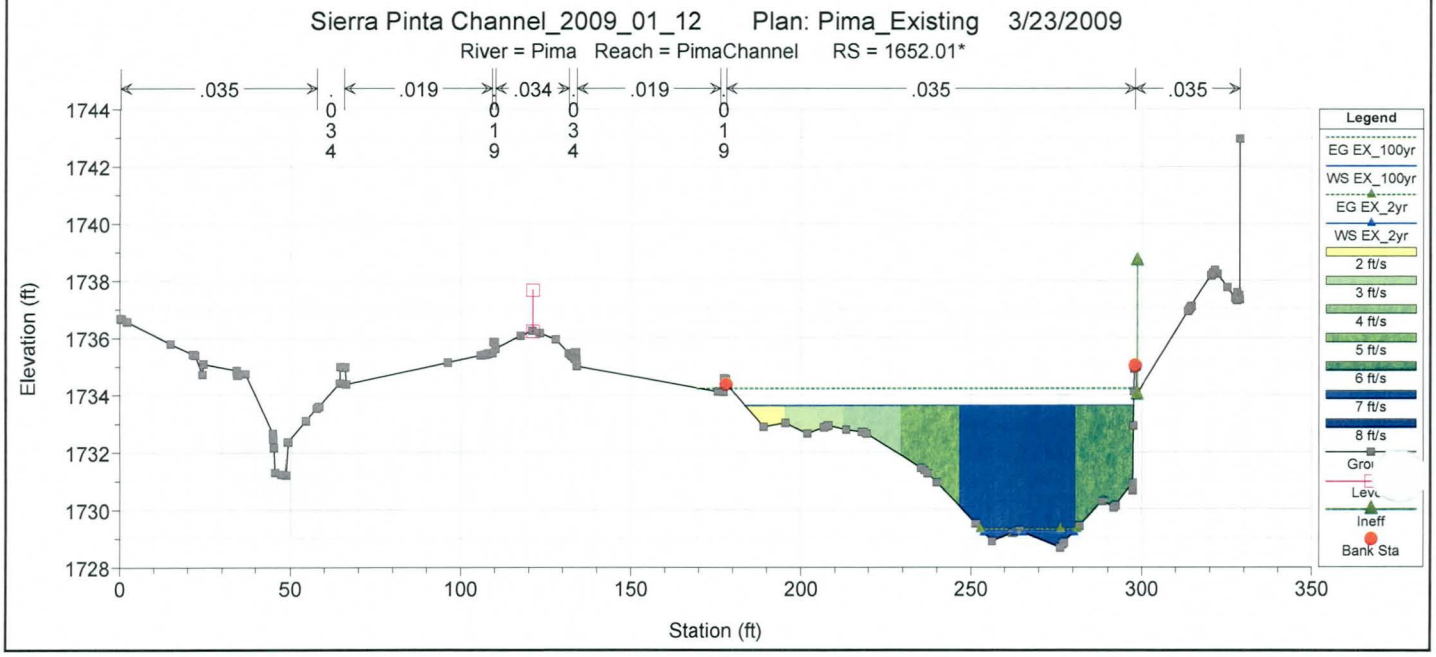

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1746.25*
.035
.029
.024
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

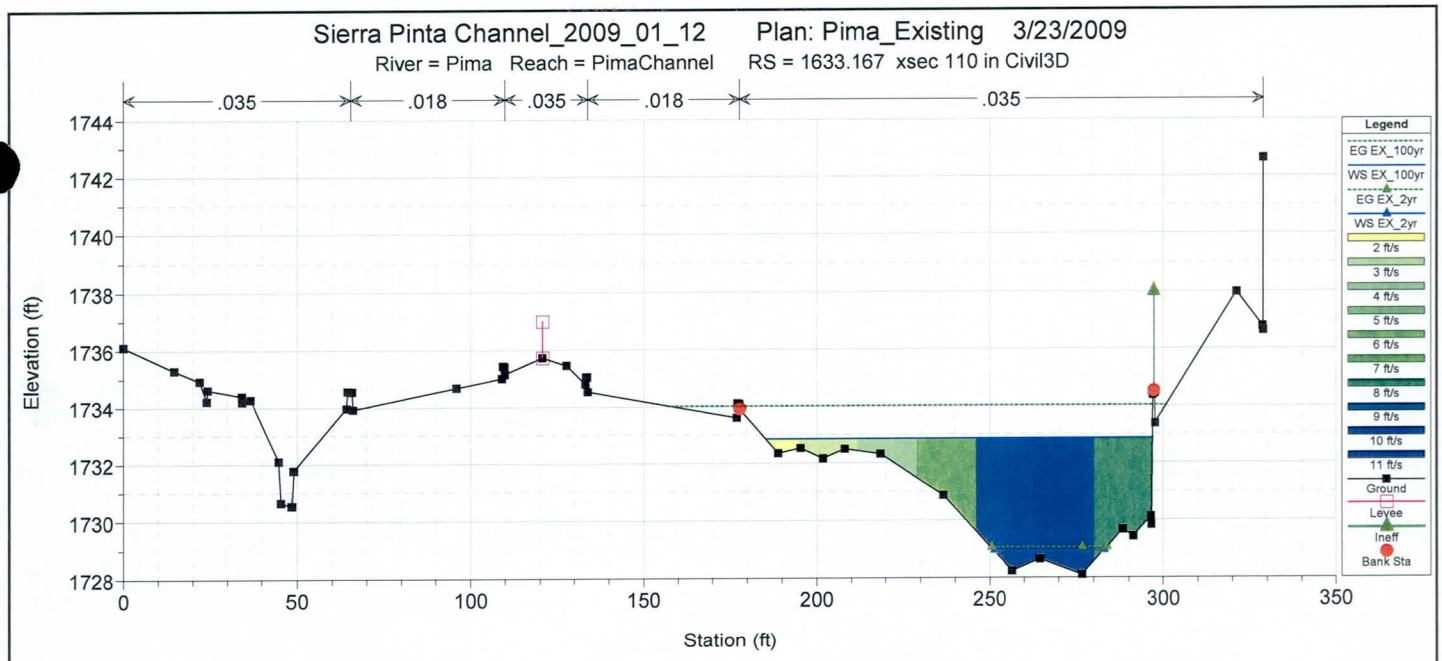

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1727.40*
.035
.023
.03
.023
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

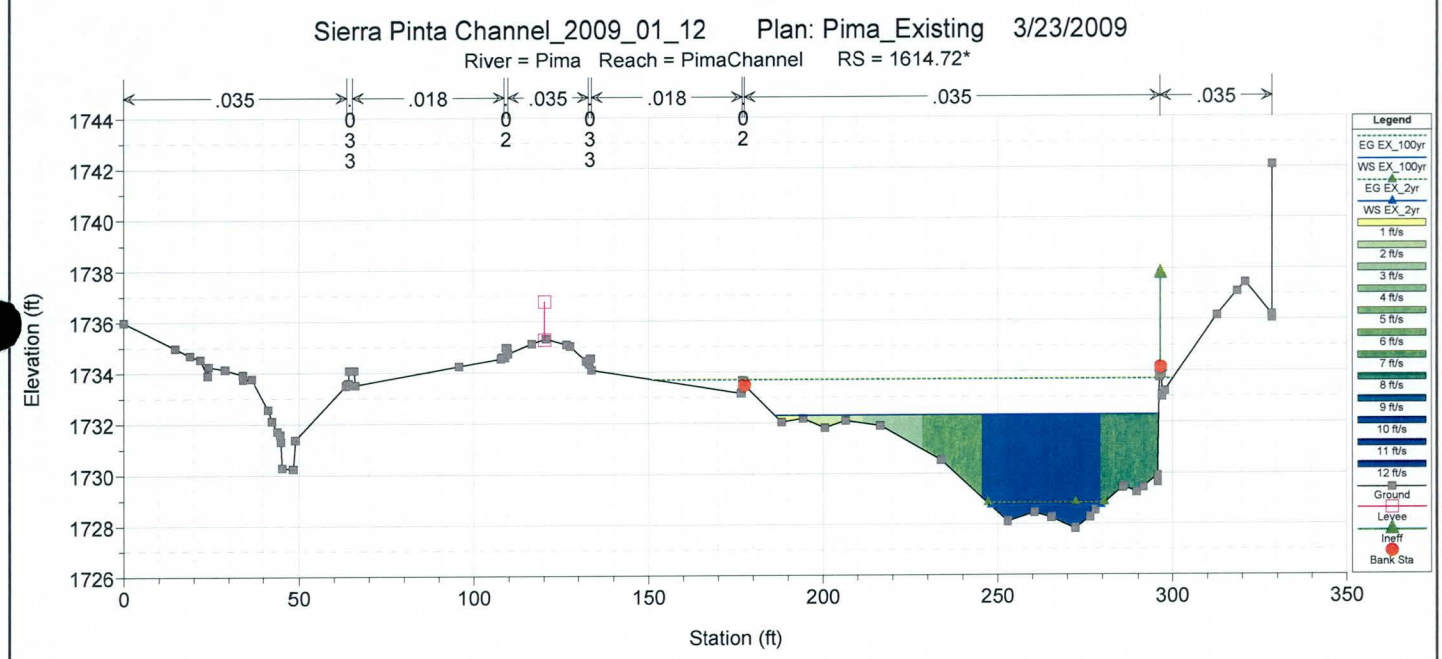

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1708.56*
.035
.022
.031
.022
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

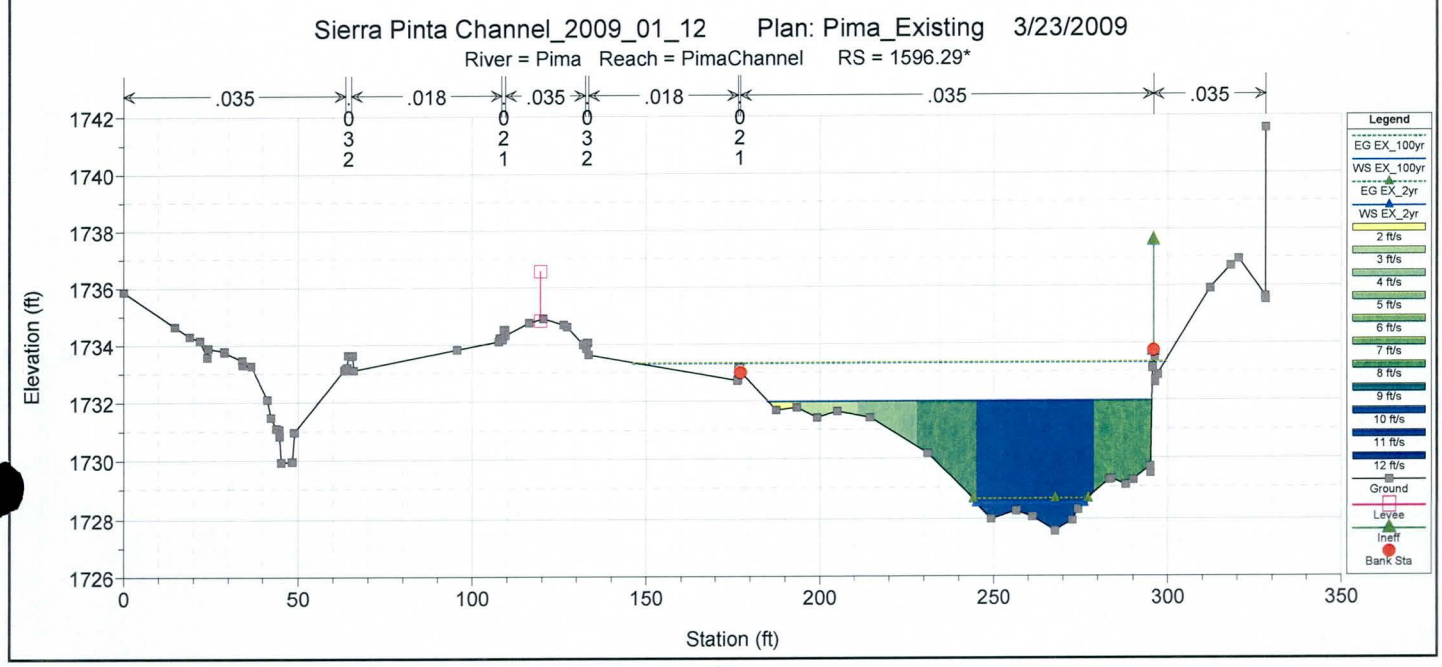

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1689.71*
.035
.032
.021
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

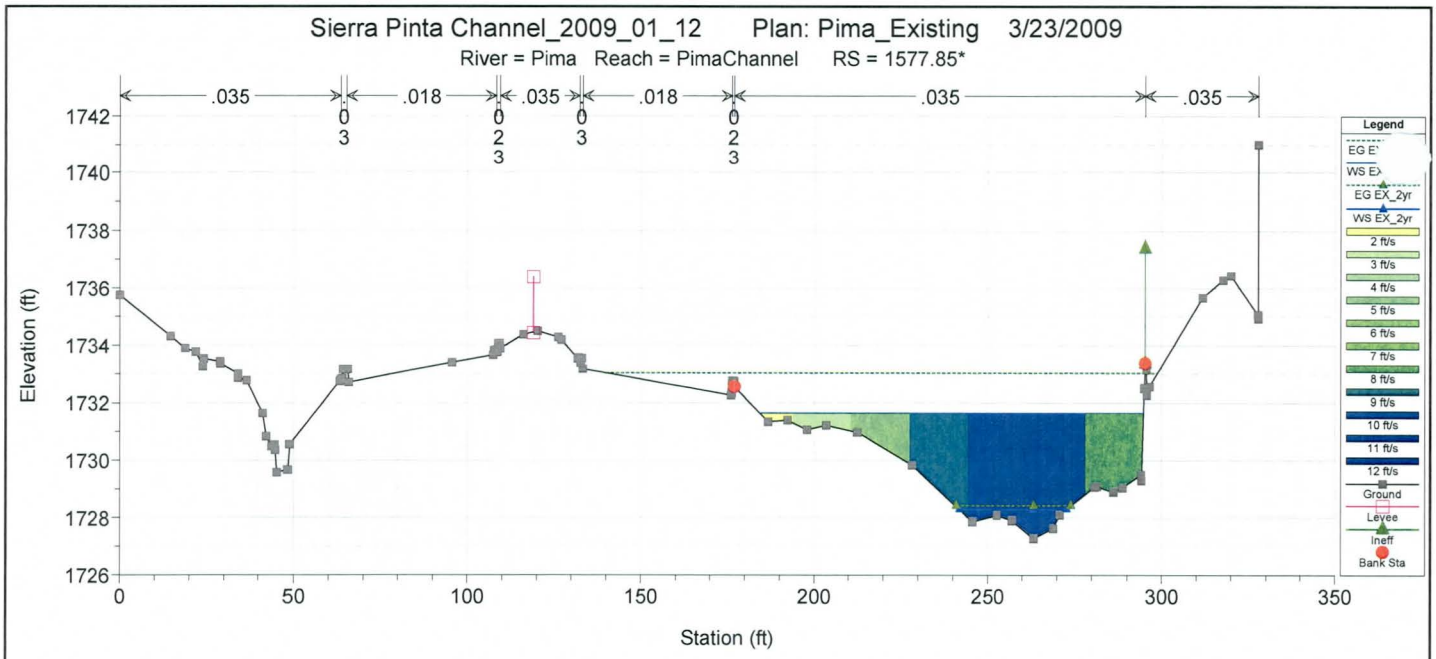

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1670.86*
.035
.033
.02
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

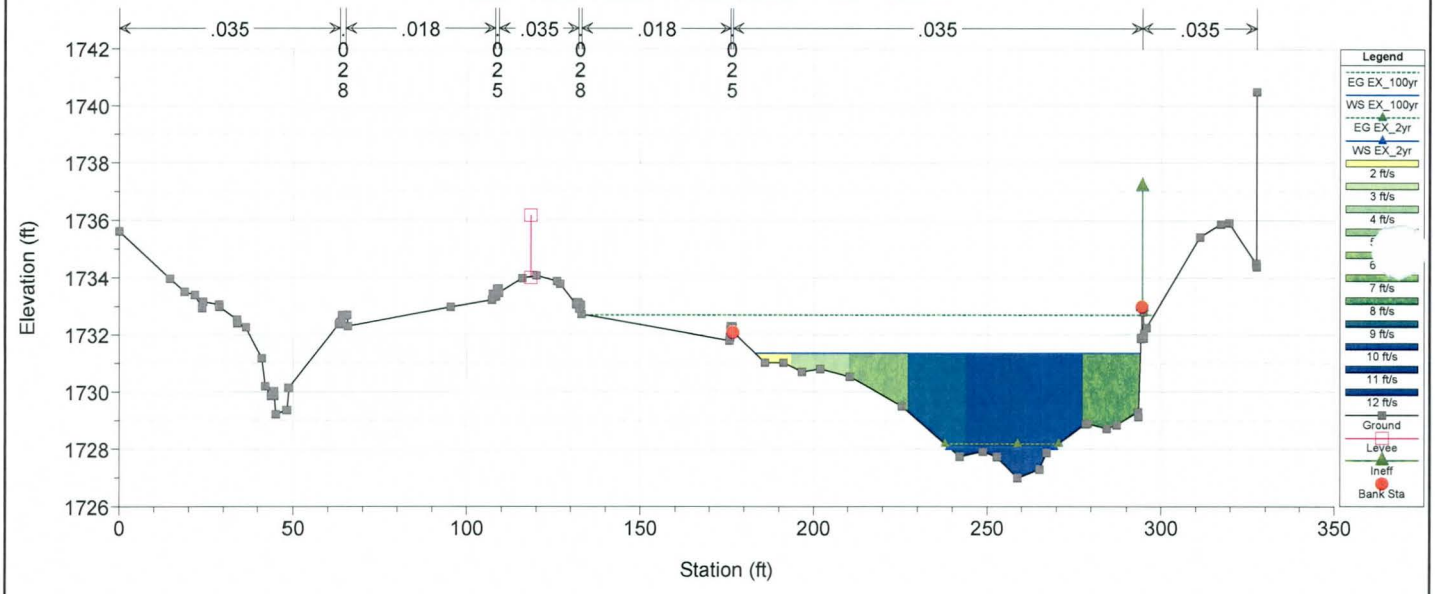

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1652.01*
.035
.034
.019
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ineff
Bank Sta

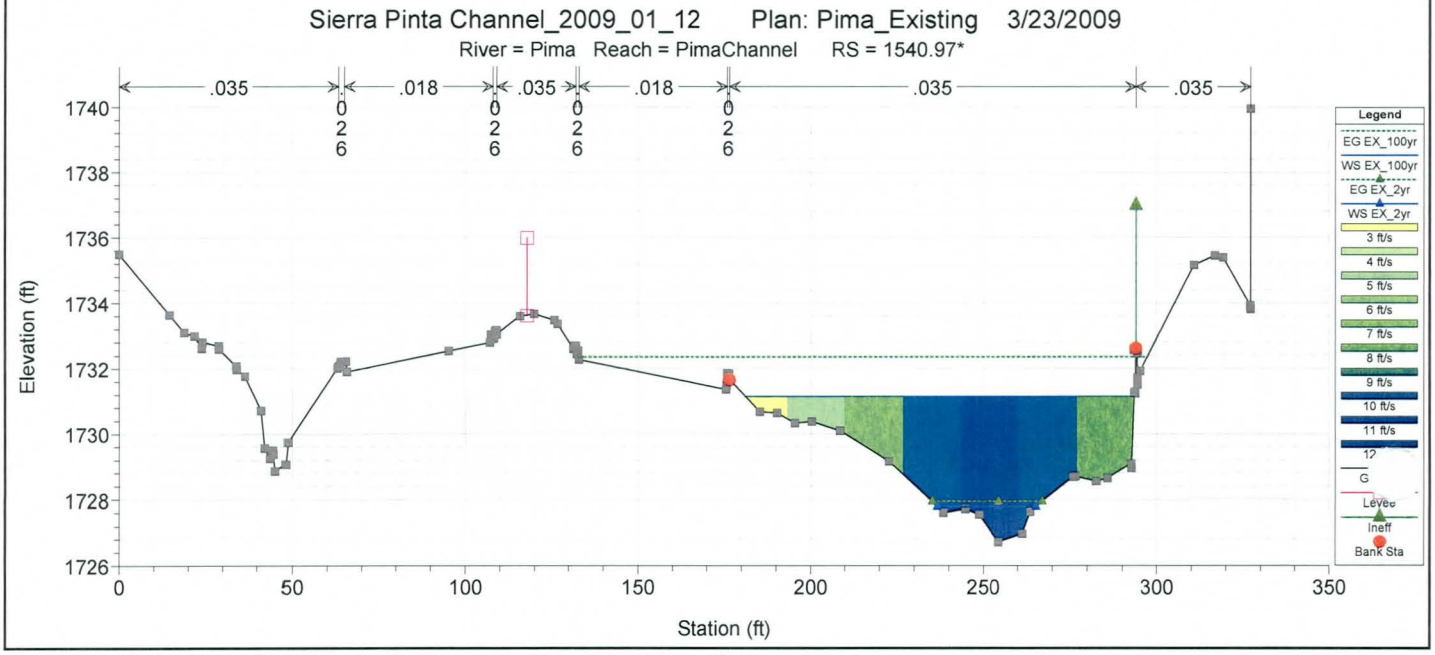

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1633.167 xsec 110 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta

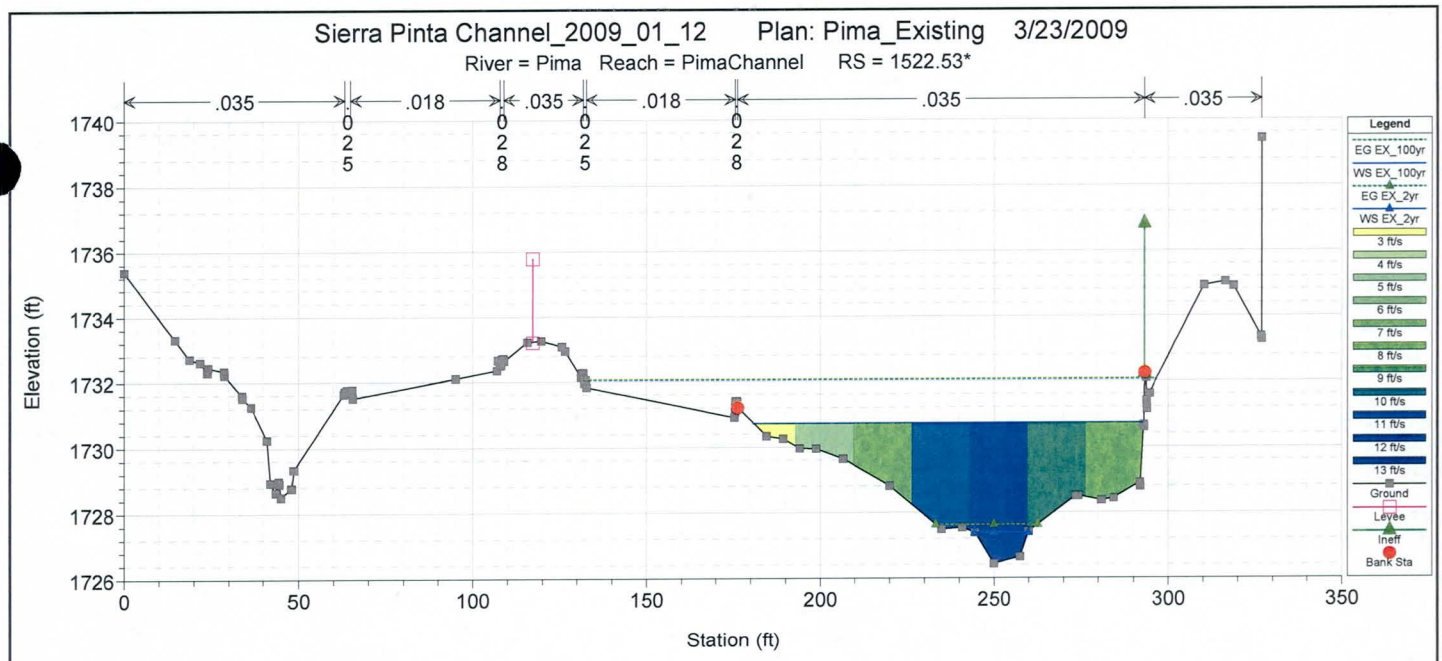

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1614.72*
.035
.018
.035
.018
.035
.035
0.3
3
0.2
0.3
3
0.2
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

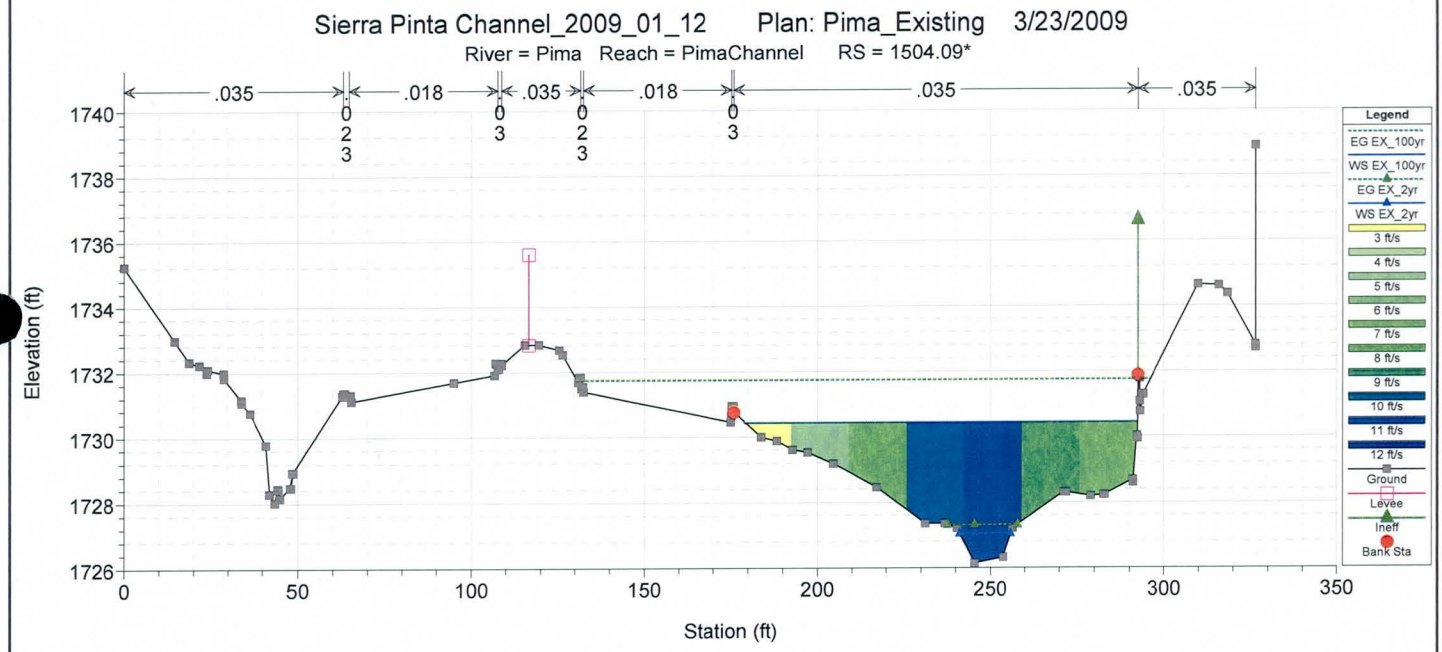

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1596.29*
.035
.018
.035
.018
.035
.035
0.3
2
0.2
1
0.3
2
0.2
1
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

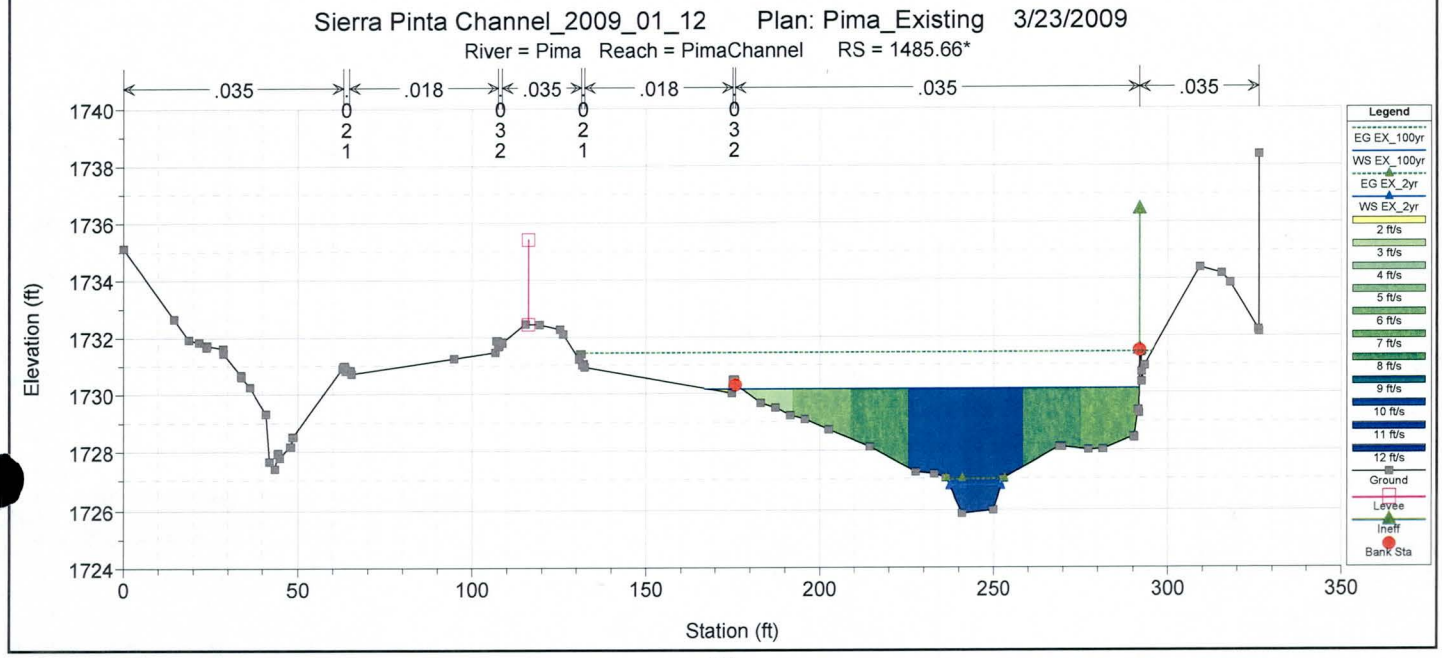

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1577.85*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

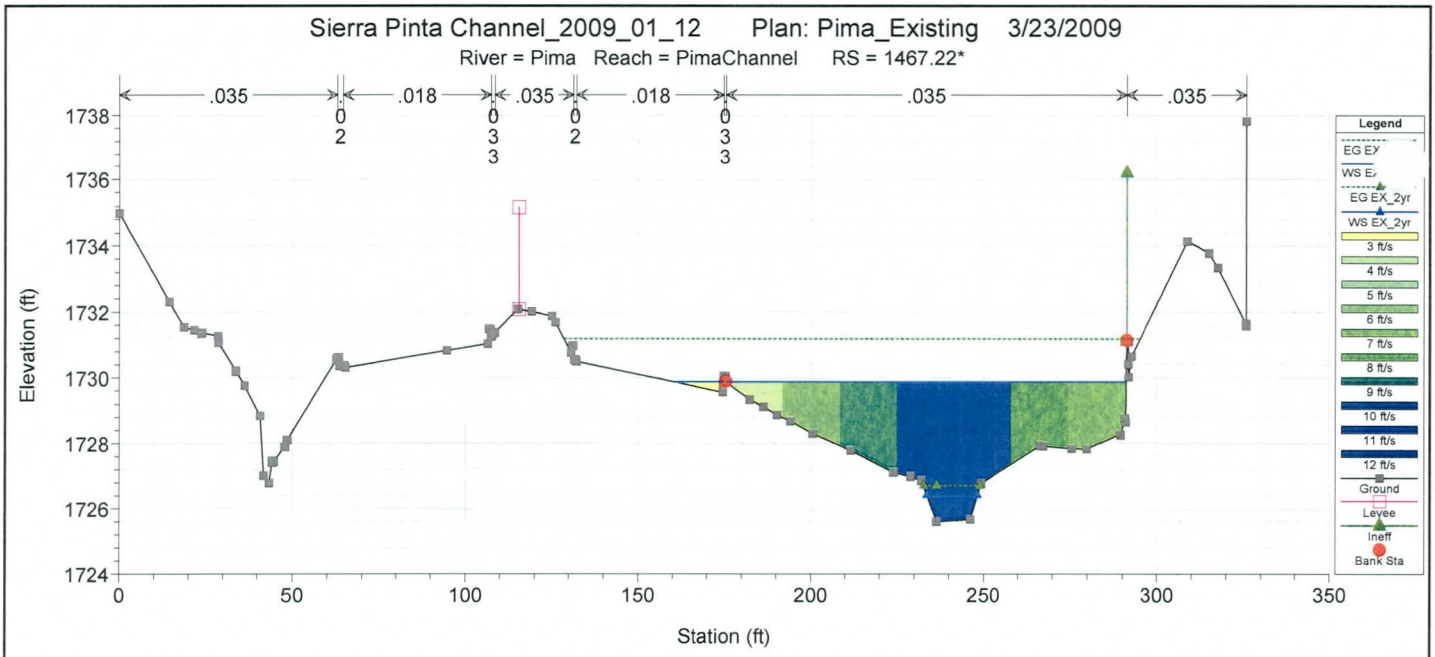

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1559.41*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

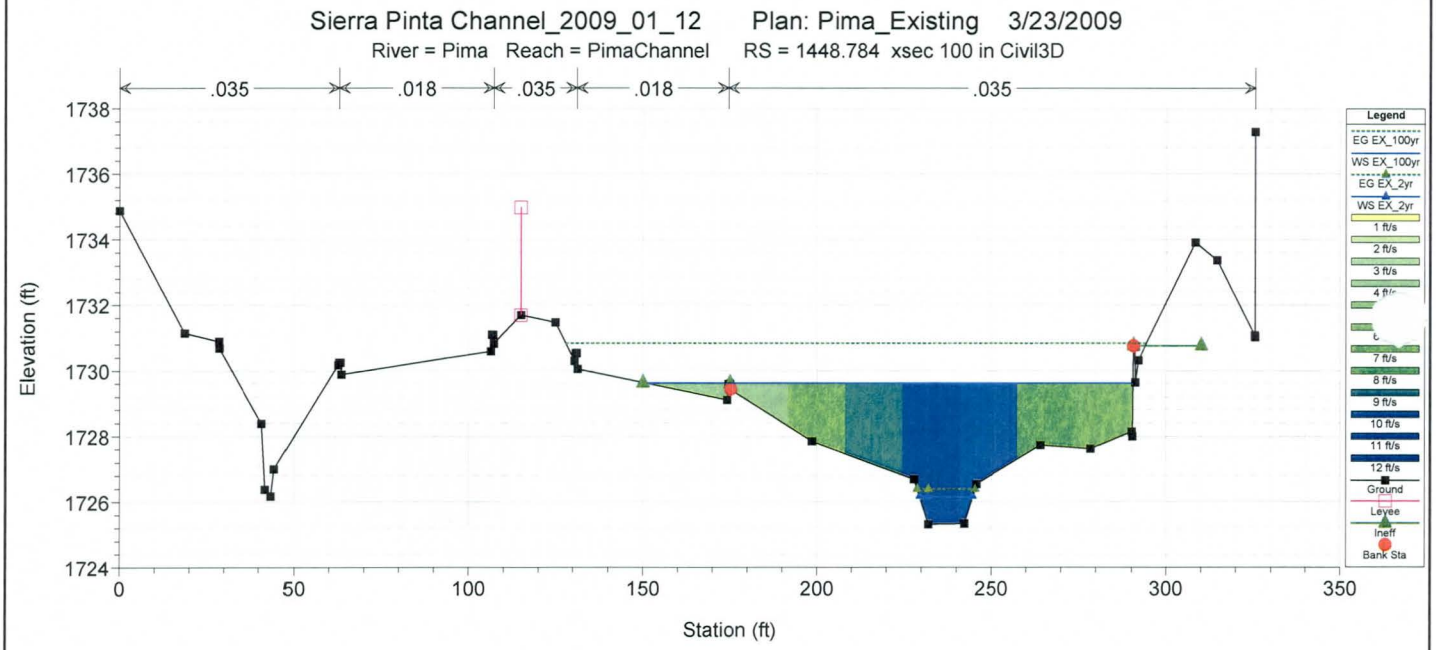

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1540.97*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Levee
Ineff
Bank Sta

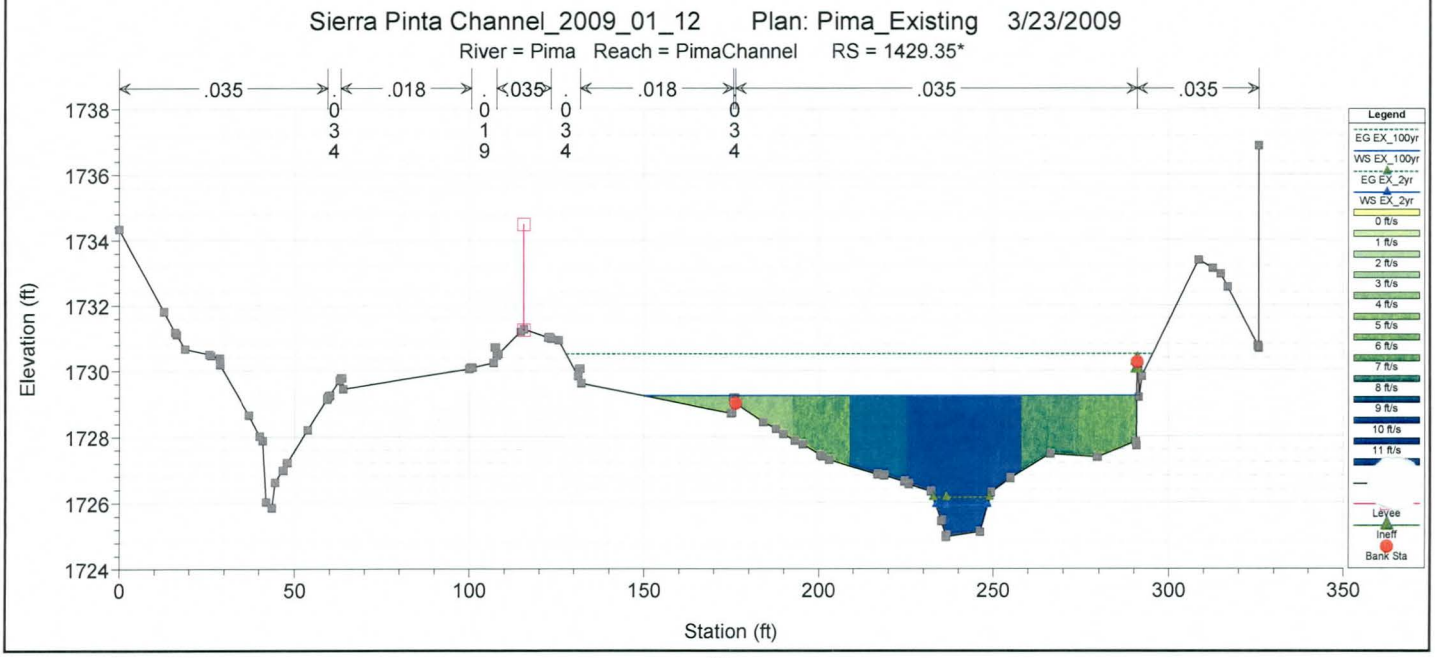

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1522.53*
.035
.018
.035
.018
.035
.035
0.025
0.028
0.025
0.028
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Levee
Ineff
Bank Sta

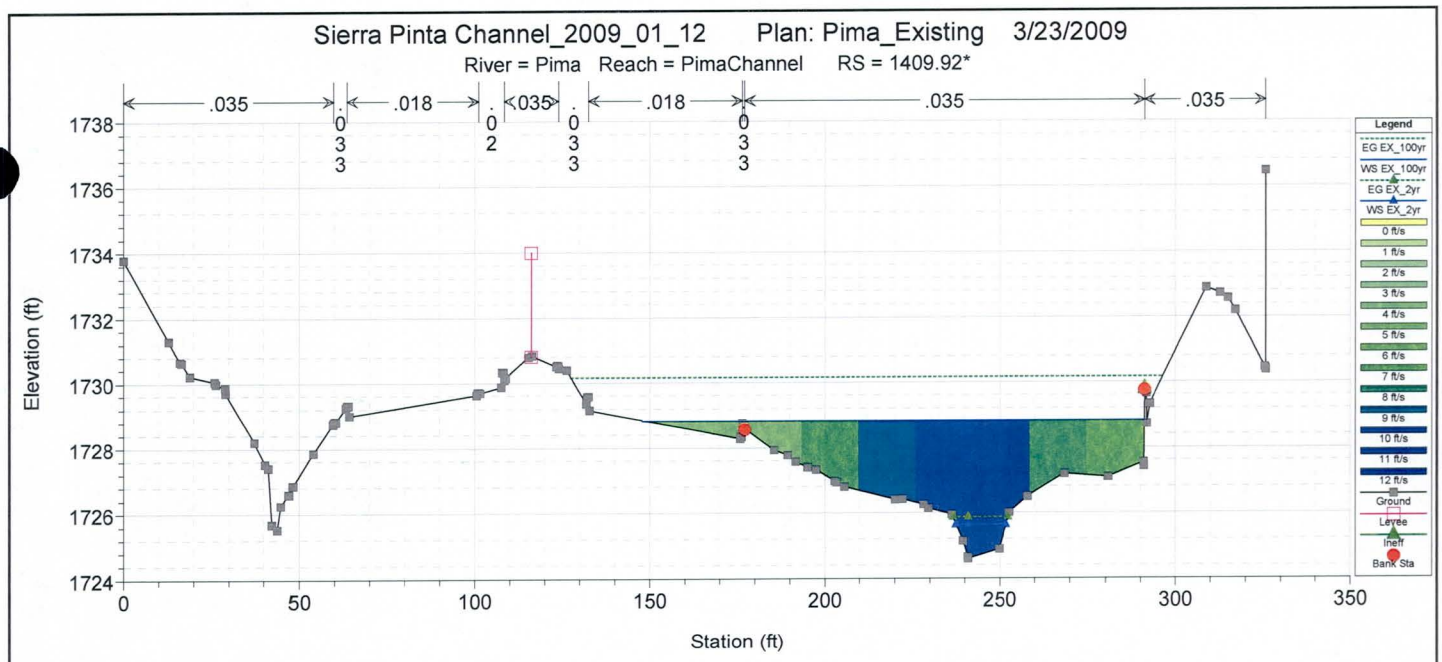

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1504.09*
.035
.018
.035
.018
.035
.035
0.023
0.03
0.023
0.03
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

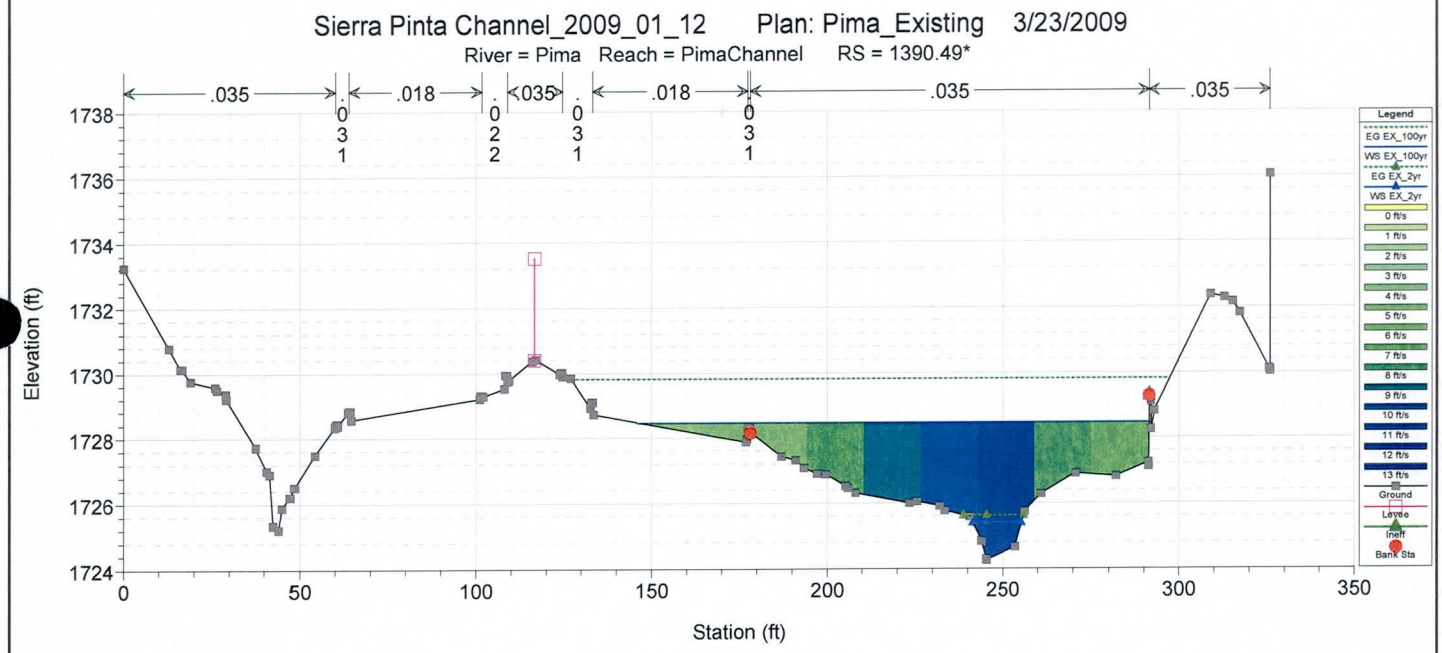

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1485.66*
.035
.018
.035
.018
.035
.035
0.021
0.032
0.021
0.032
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

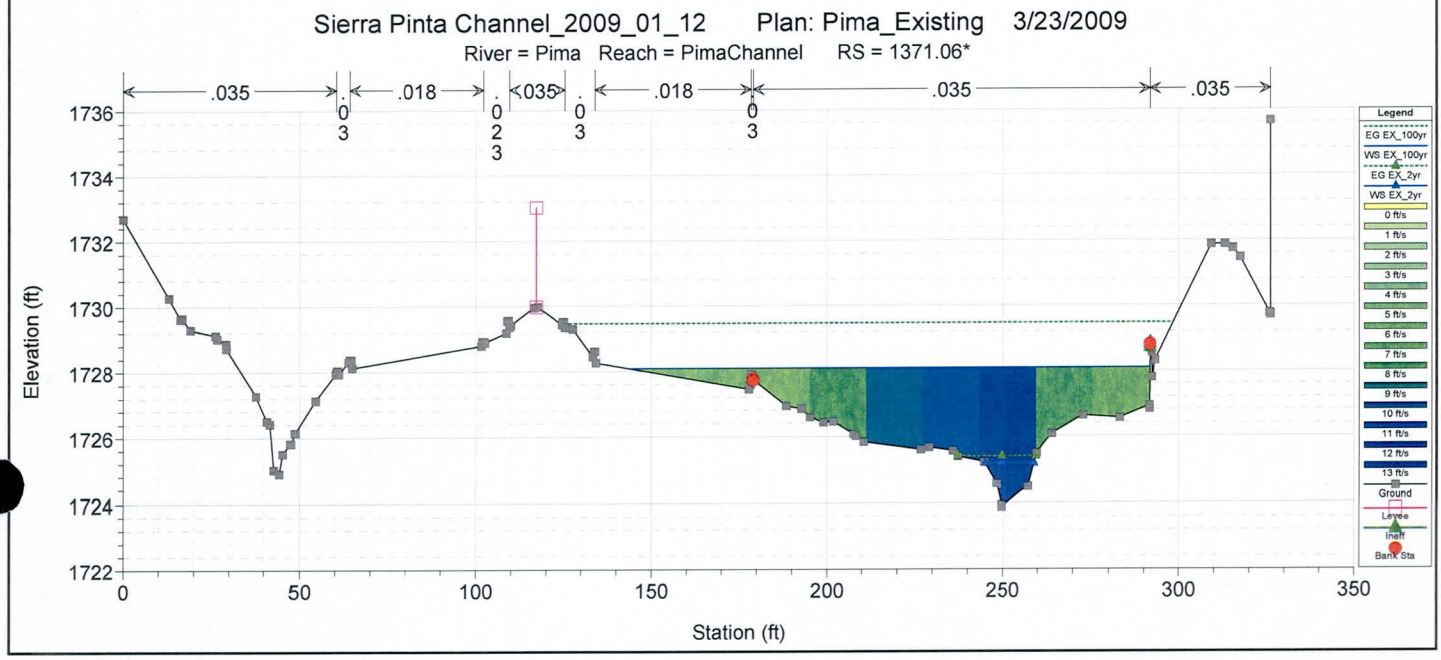

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1467.22*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

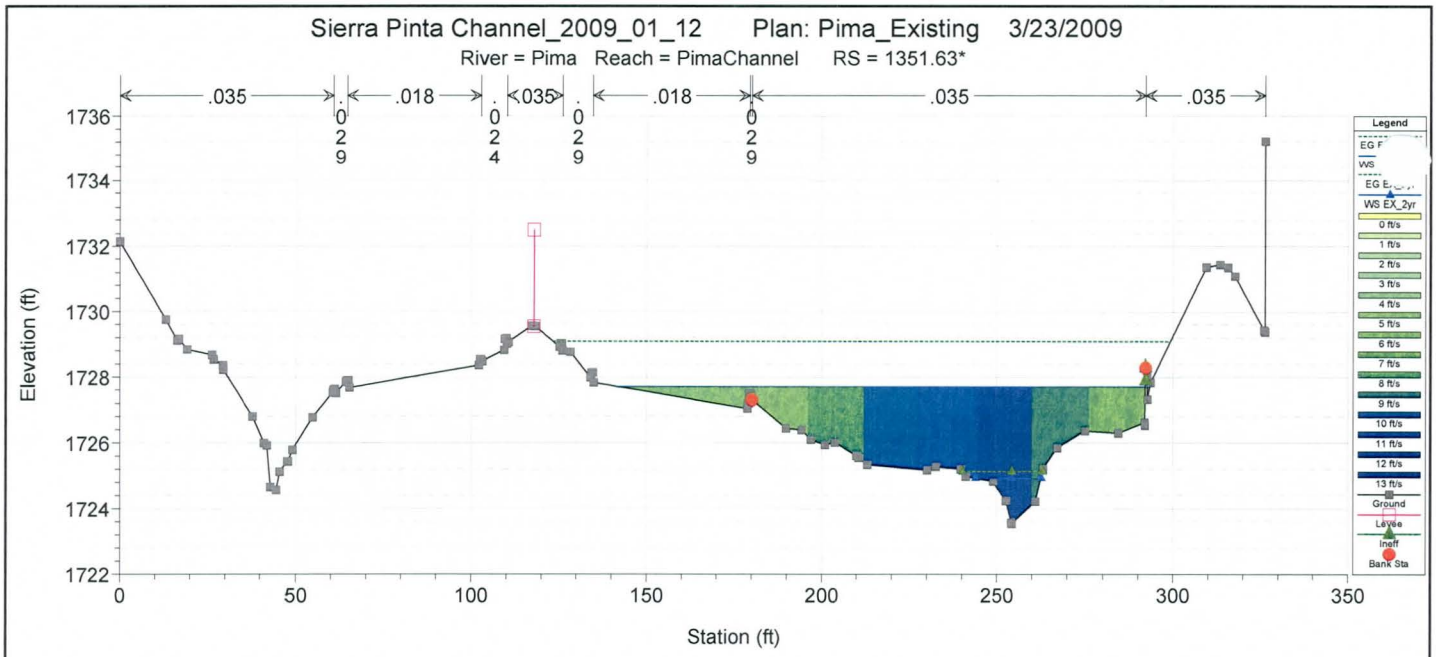

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1448.784 xsec 100 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

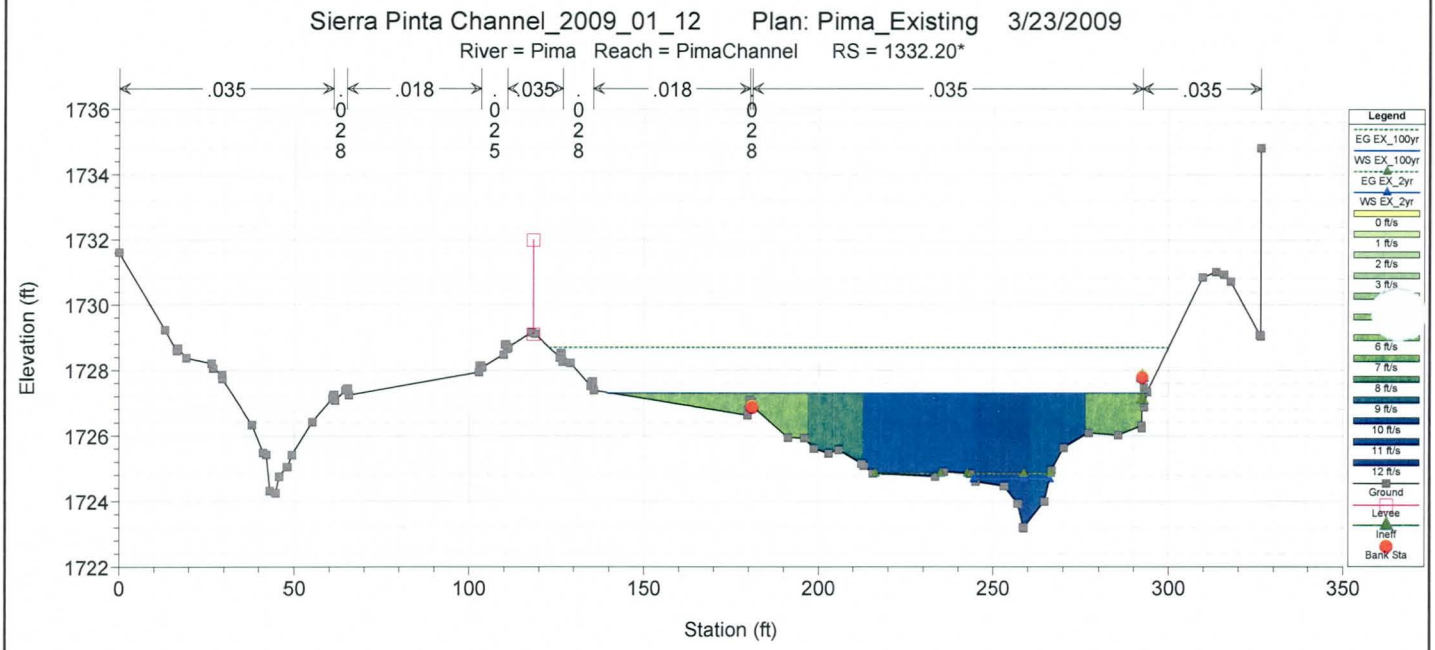

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1429.35*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Levee
Ineff
Bank Sta

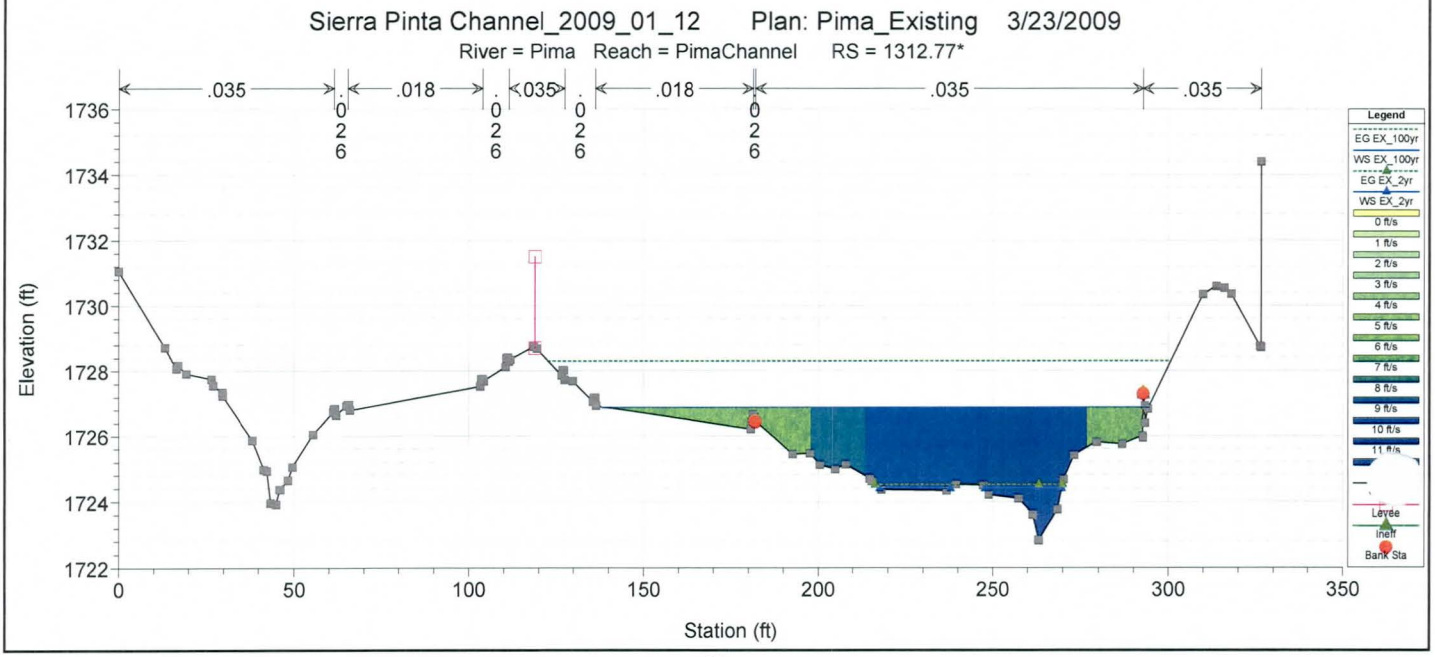

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1409.92*
.035
.033
.018
.02
.035
.033
.018
.033
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1390.49*
.035
.031
.018
.022
.035
.031
.018
.031
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1371.06*
.035
.03
.018
.023
.035
.03
.018
.03
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1351.63*
.035
.029
.018
.024
.035
.029
.018
.029
.035
.035
Elevation (ft)
Station (ft)
Legend
EG F
WS
EG E
WS EX_2yr
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
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Levee
Ineff
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1332.20*
.035
.028
.018
.025
.035
.028
.018
.028
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1312.77*
.035
.026
.018
.026
.035
.026
.018
.026
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
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
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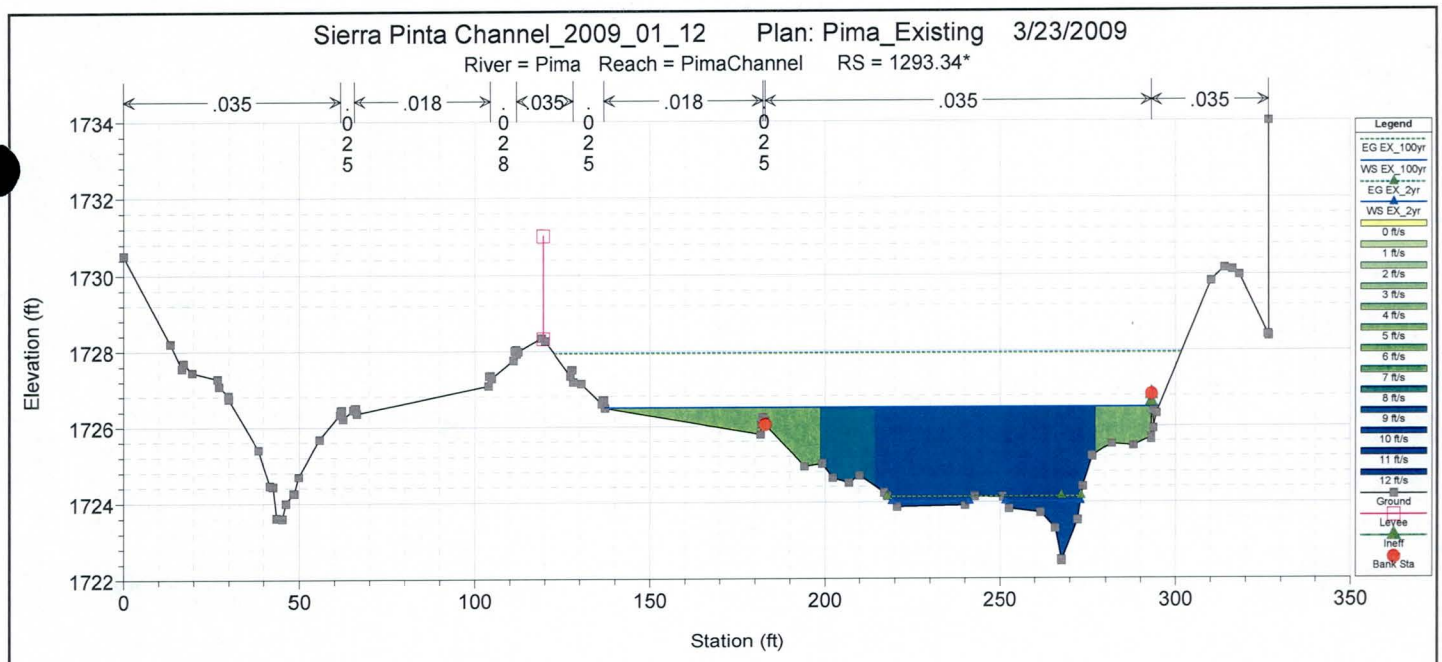
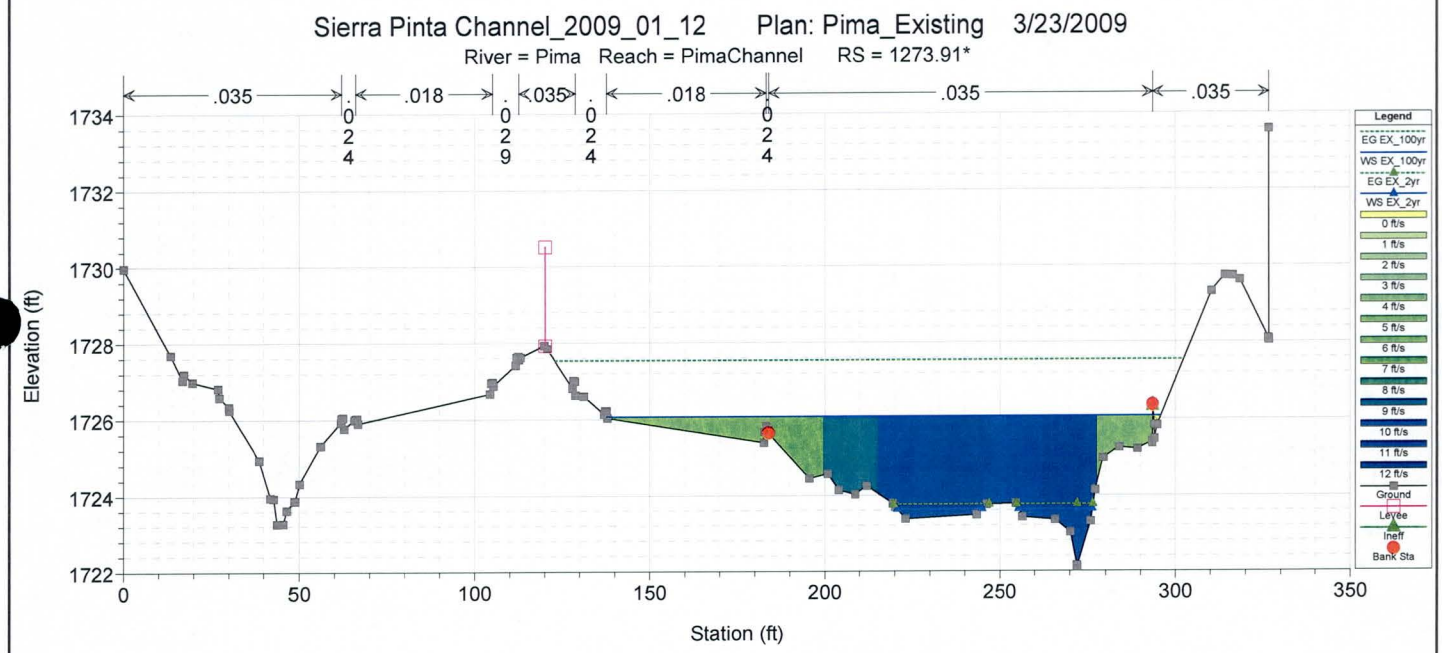
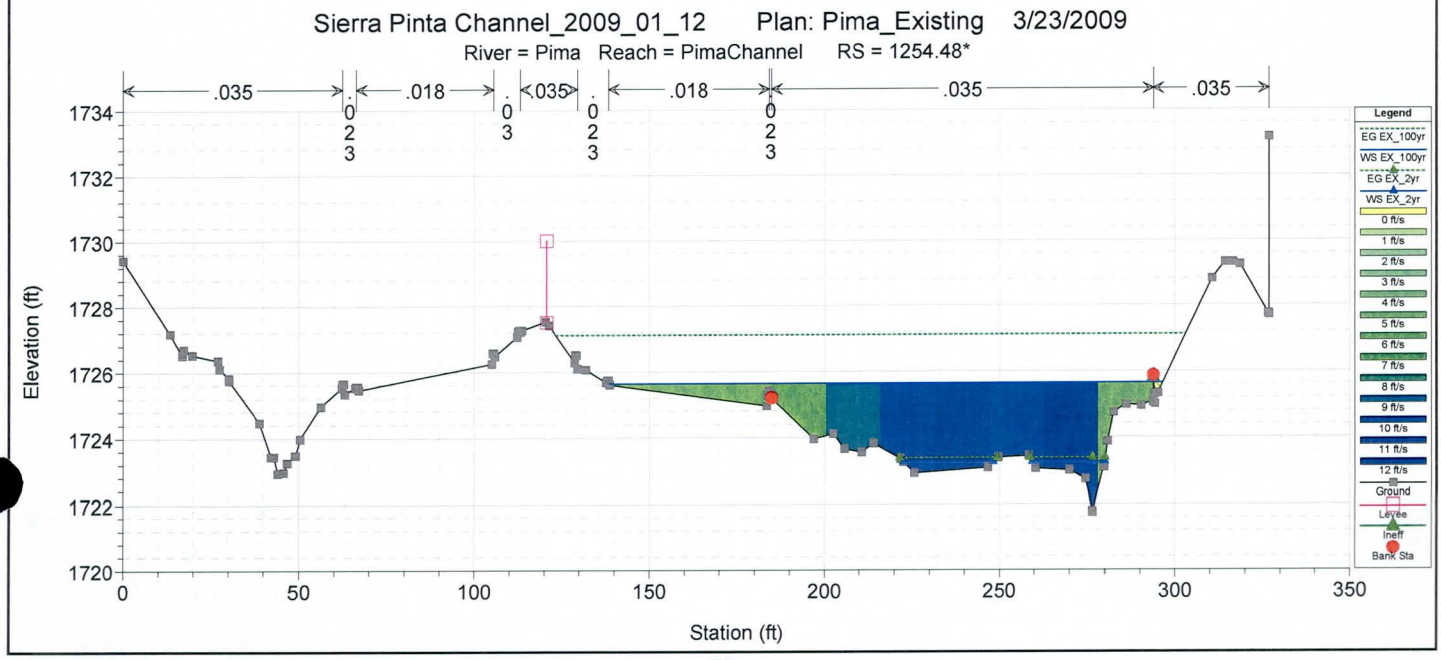
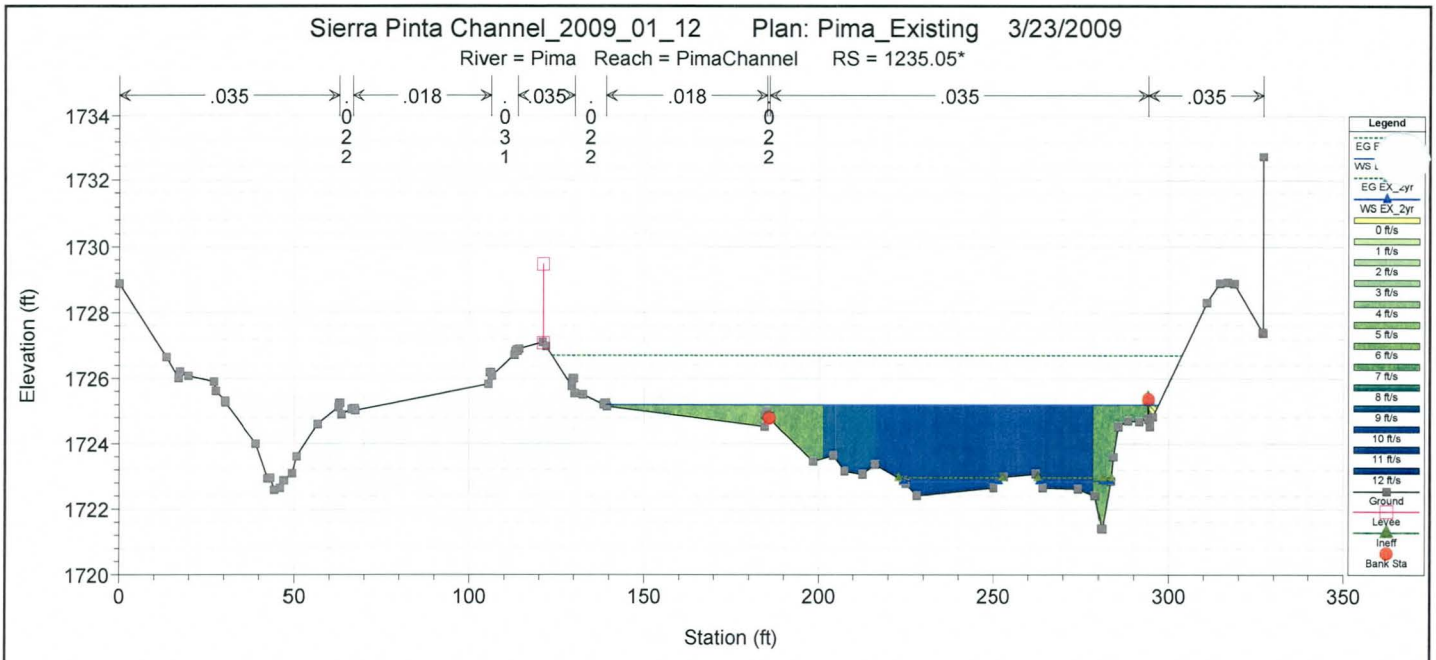
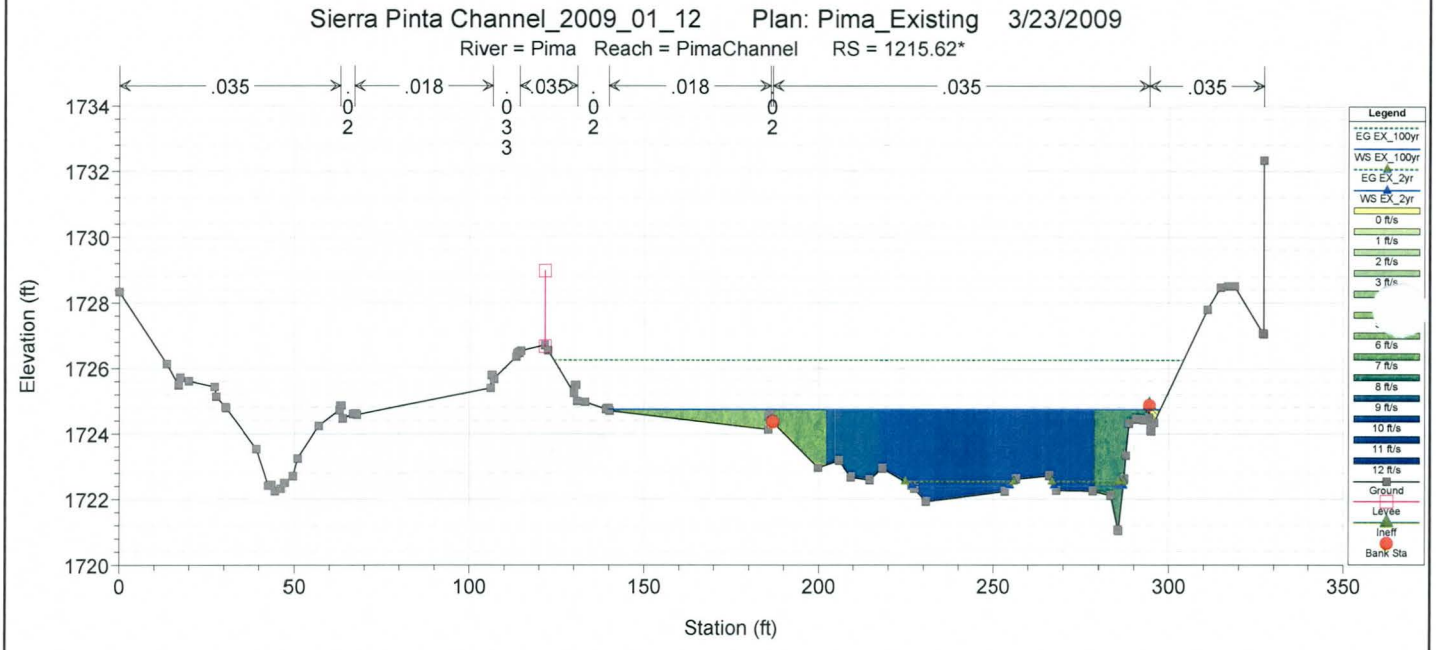
10 ft/s
11 ft/s
Levee
Ineff
Bank Sta

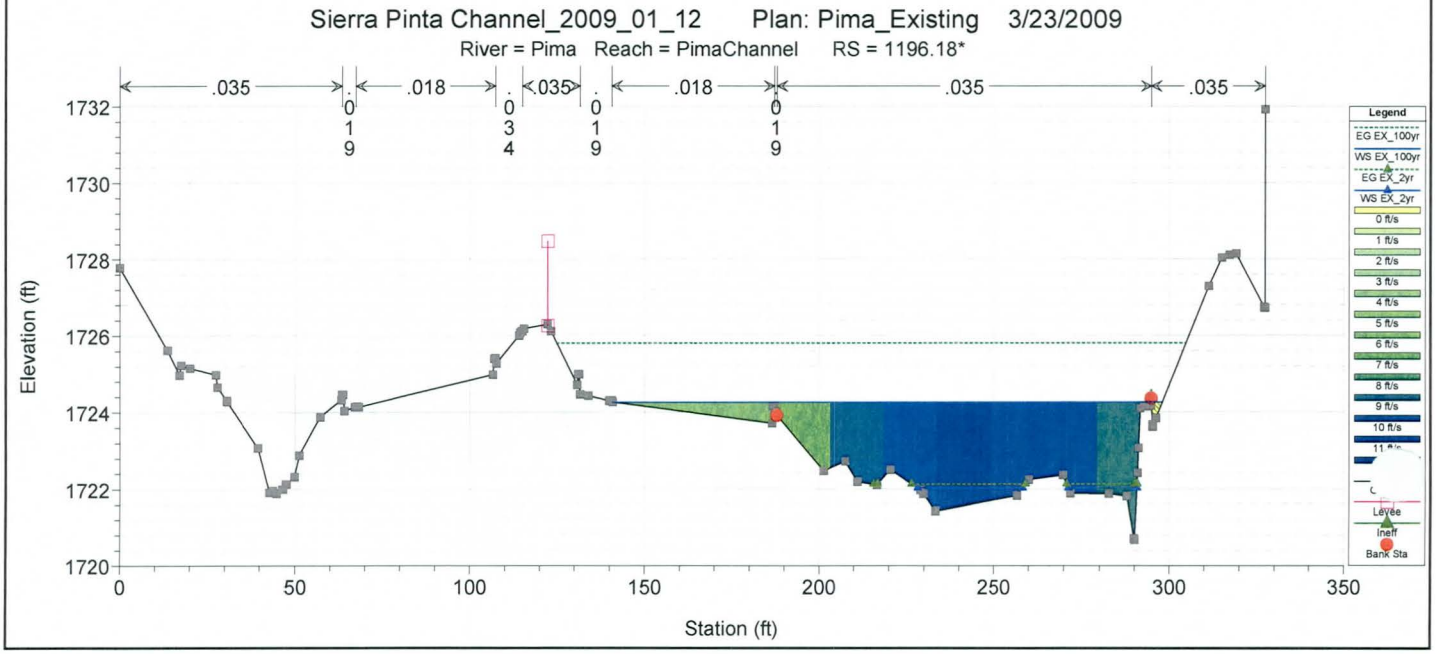

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1293.34*
.035
.025
.018
.028
.035
.025
.018
.025
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

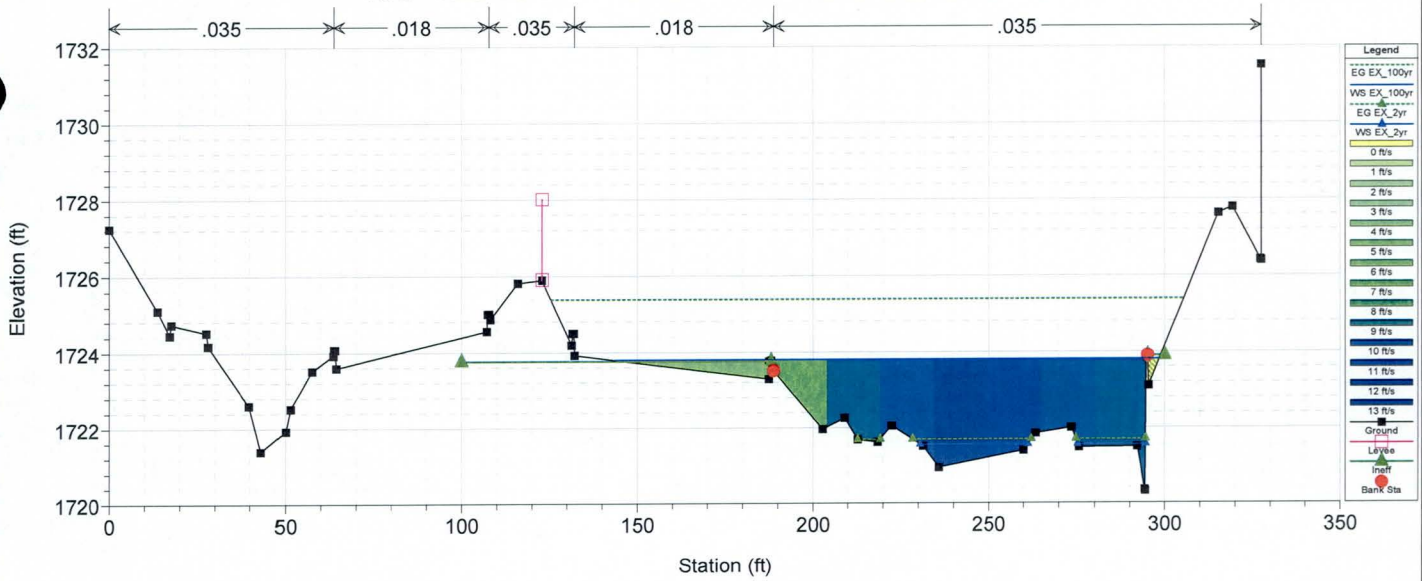

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1273.91*
.035
.024
.018
.029
.035
.024
.018
.024
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

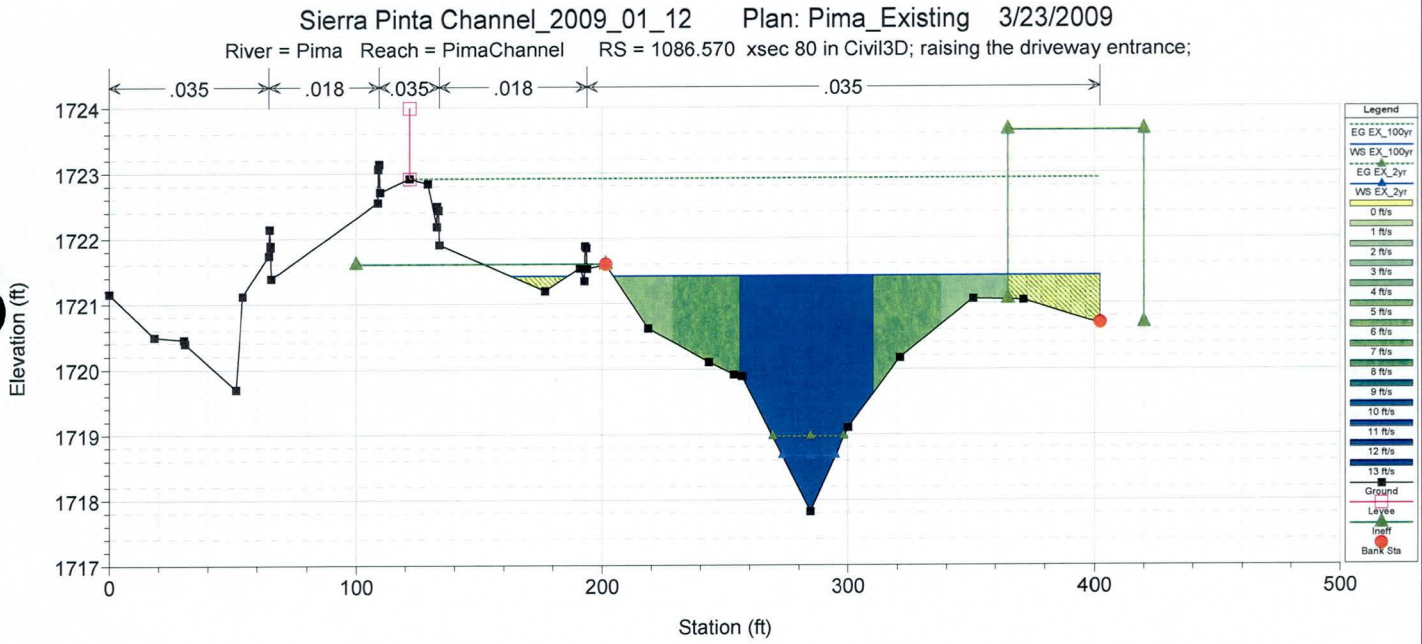

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1254.48*
.035
.023
.018
.03
.035
.023
.018
.023
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

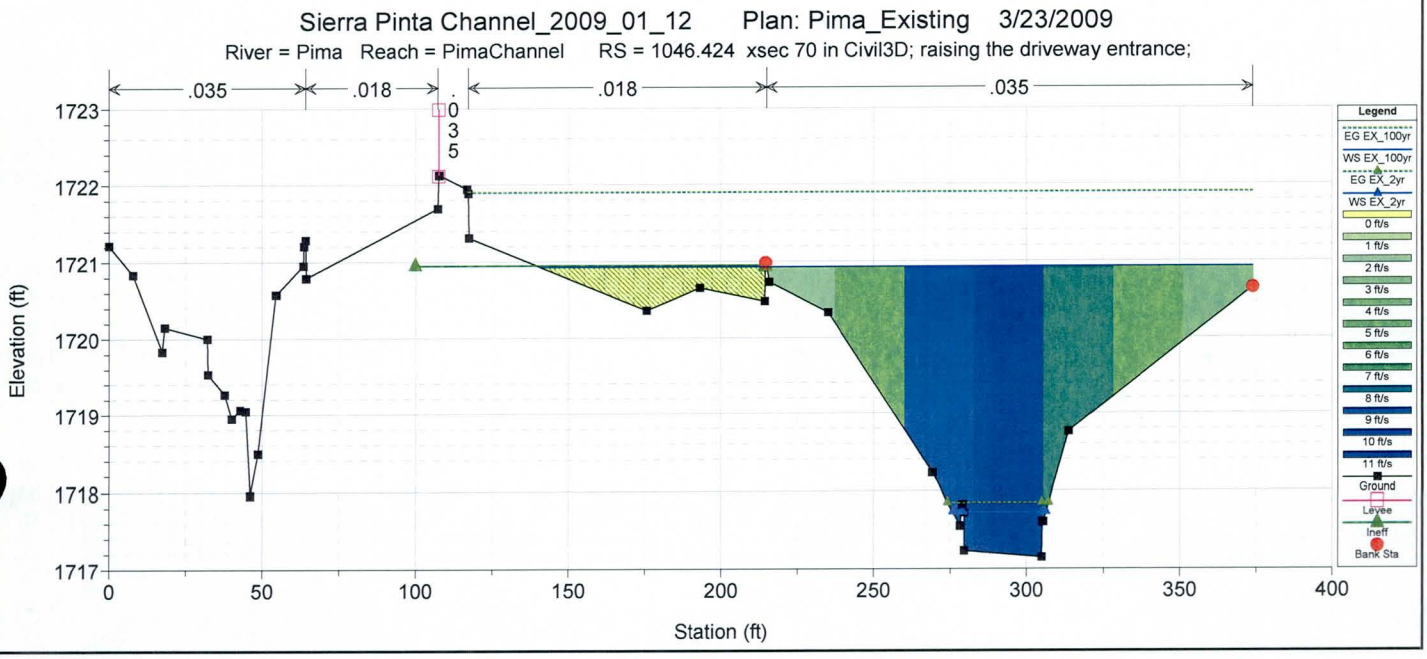

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1235.05*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

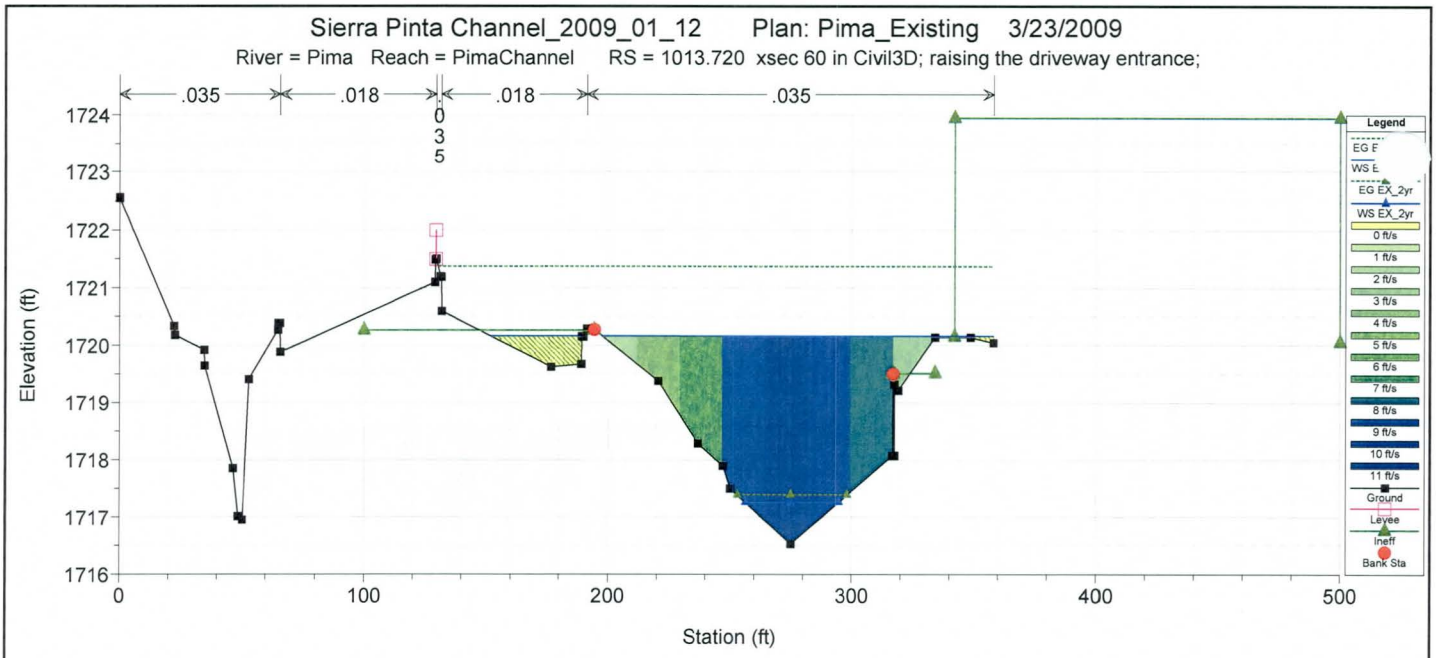

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1215.62*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

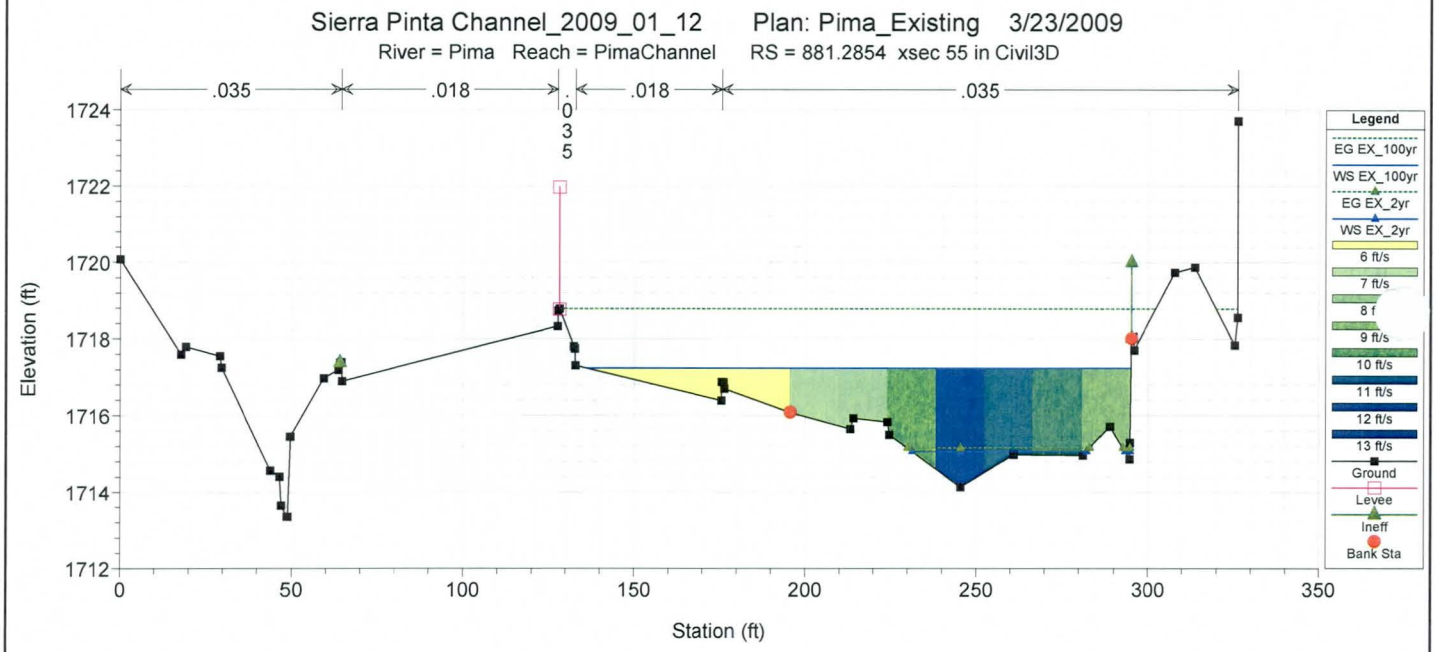

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1196.18*
.035
.018
.035
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Levee
Ineff
Bank Sta

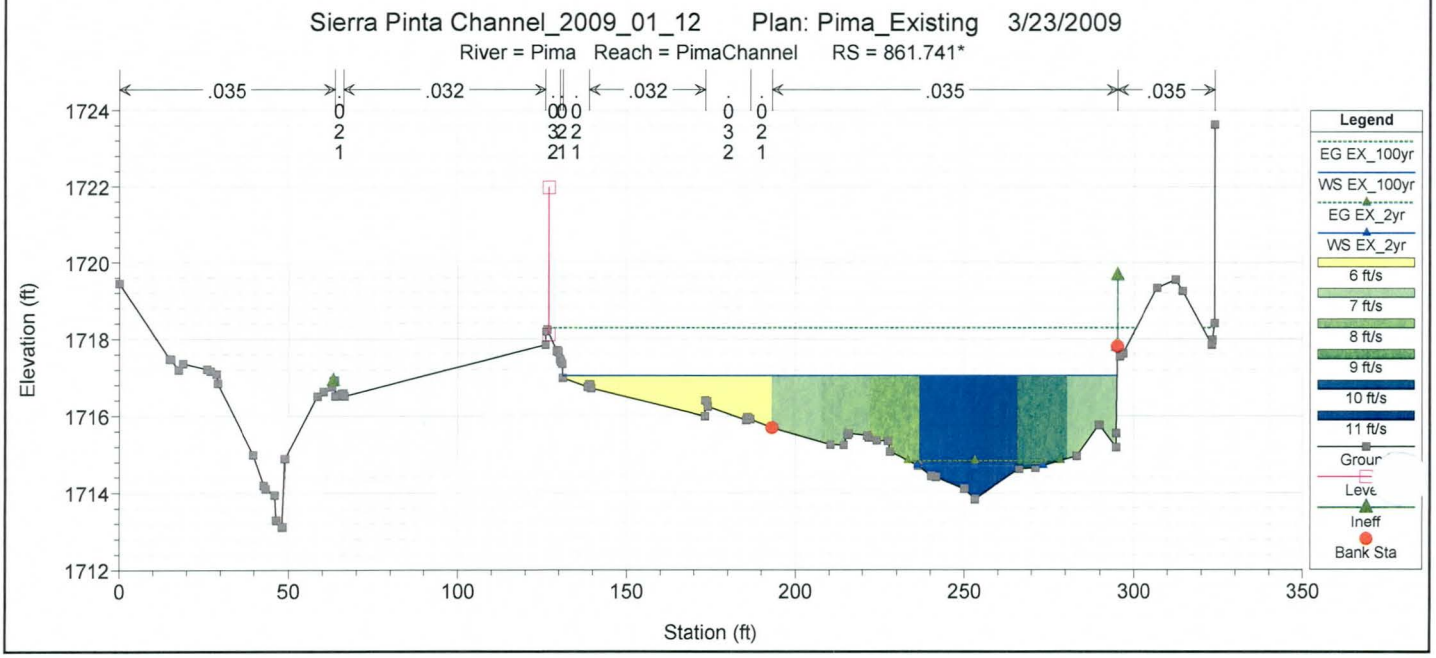

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1176.759 xsec 90 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

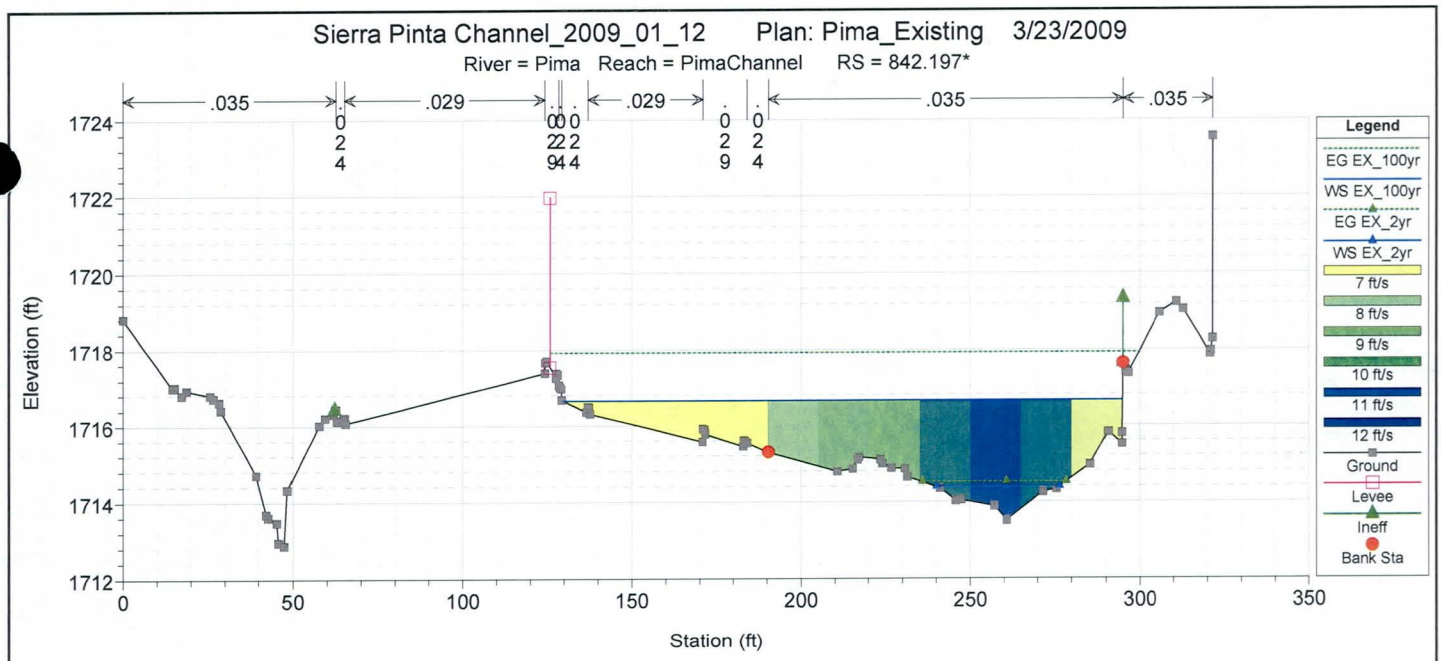

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1086.570 xsec 80 in Civil3D; raising the driveway entrance;
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

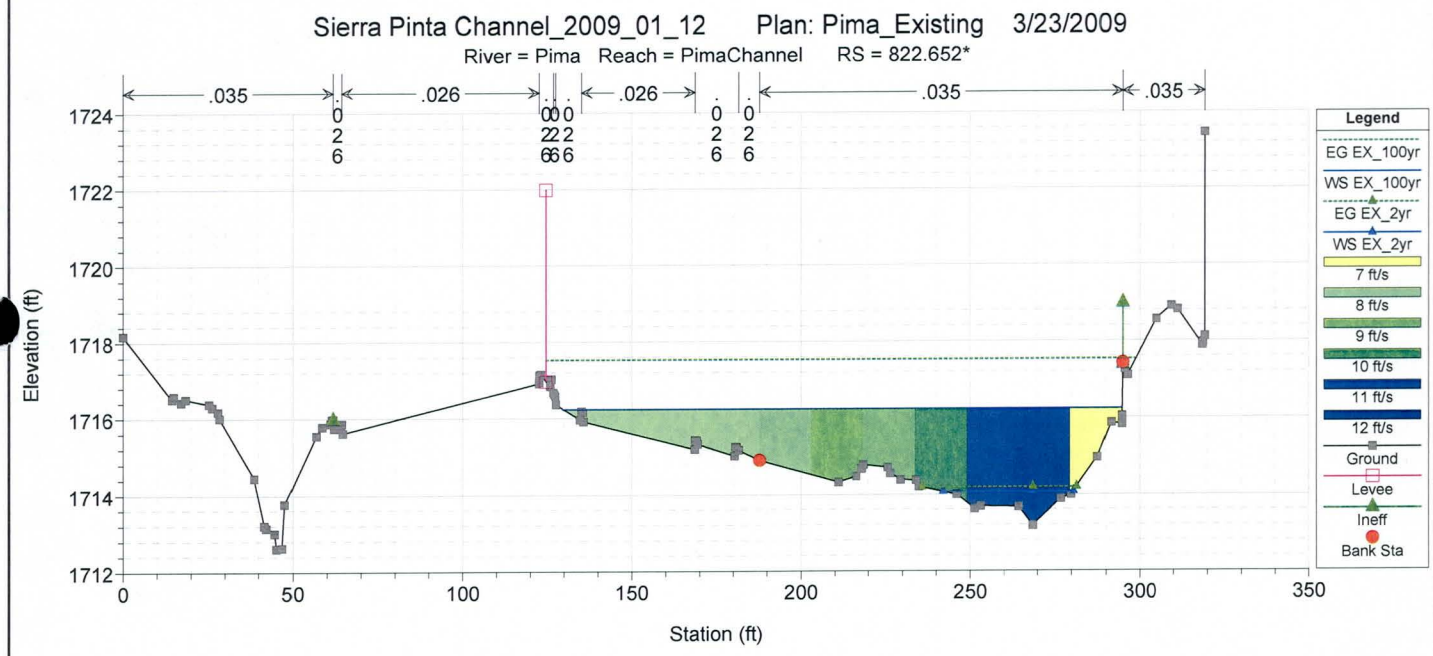

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1046.424 xsec 70 in Civil3D; raising the driveway entrance;
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

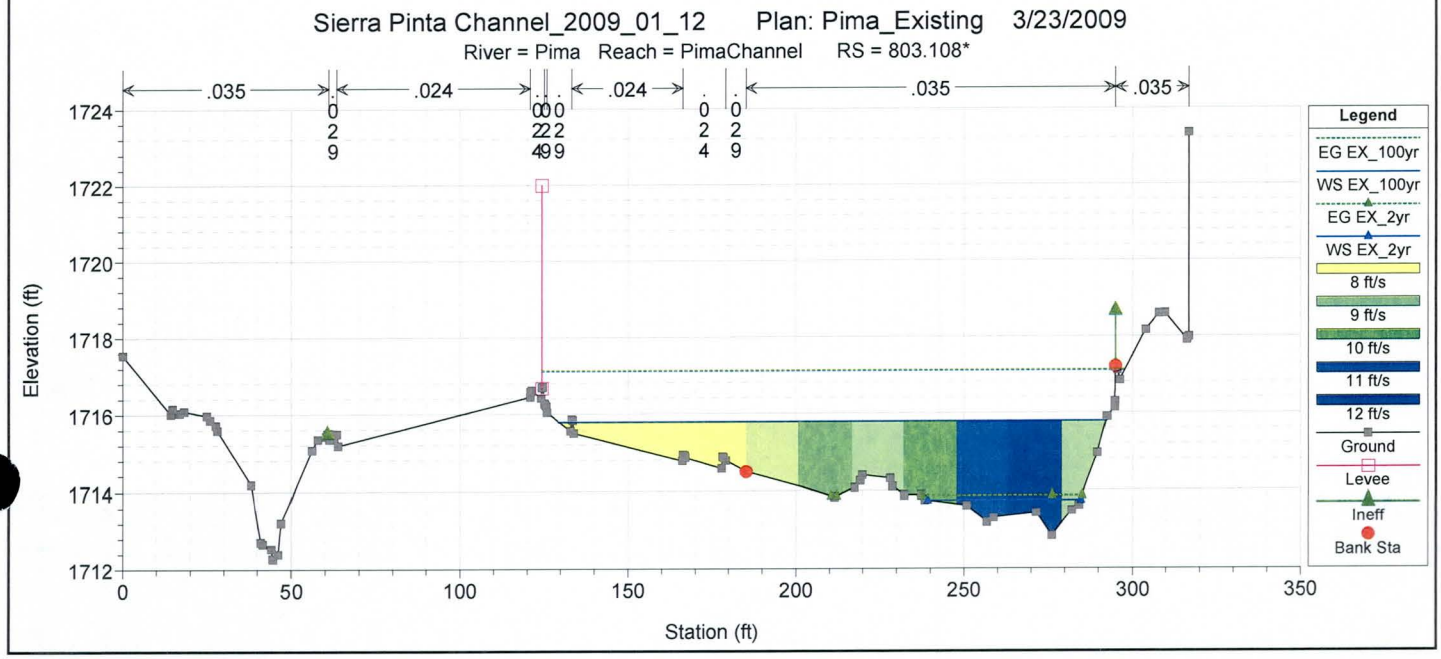

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 1013.720 xsec 60 in Civil3D; raising the driveway entrance;
.035
.018
.018
.035
0
3
5
Elevation (ft)
Station (ft)
Legend
EG F
WS E
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta

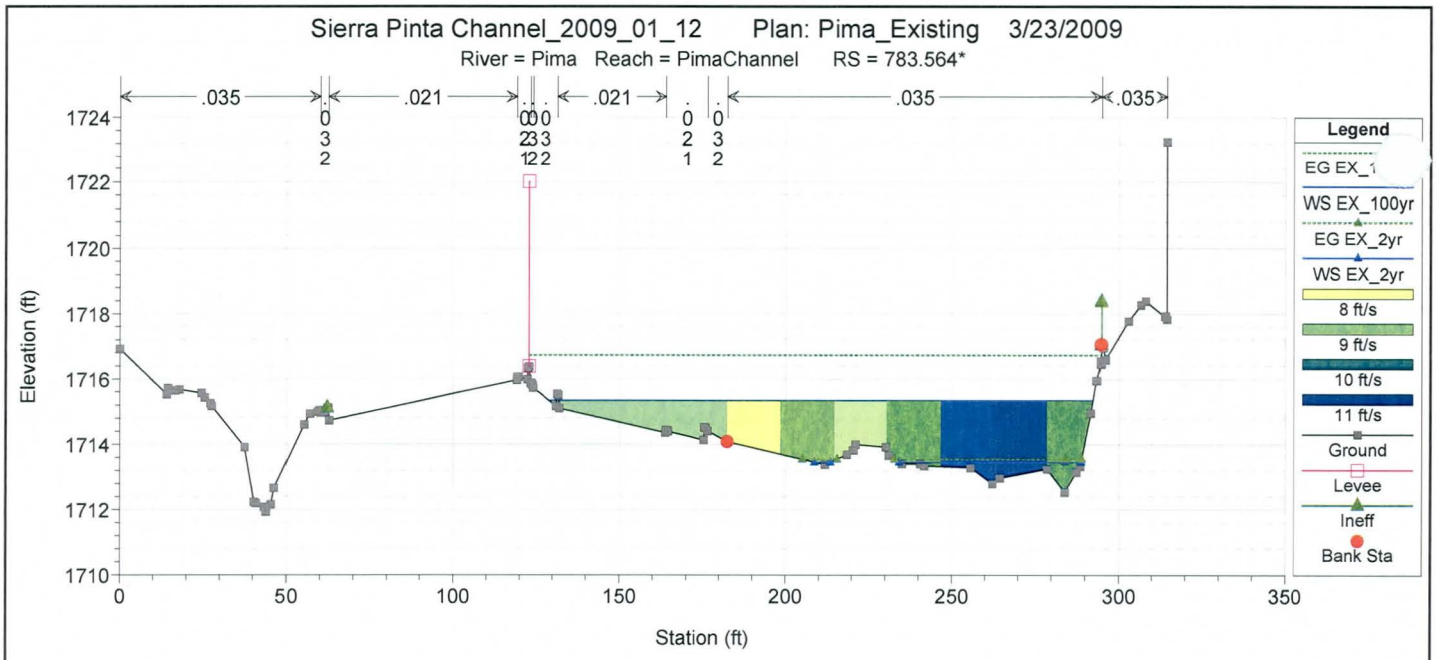

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 881.2854 xsec 55 in Civil3D
.035
.018
.018
.035
0
3
5
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
6 ft/s
7 ft/s
8 f
9 ft/s
10 ft/s
11 ft/s
12 ft/s
13 ft/s
Ground
Levee
Ineff
Bank Sta

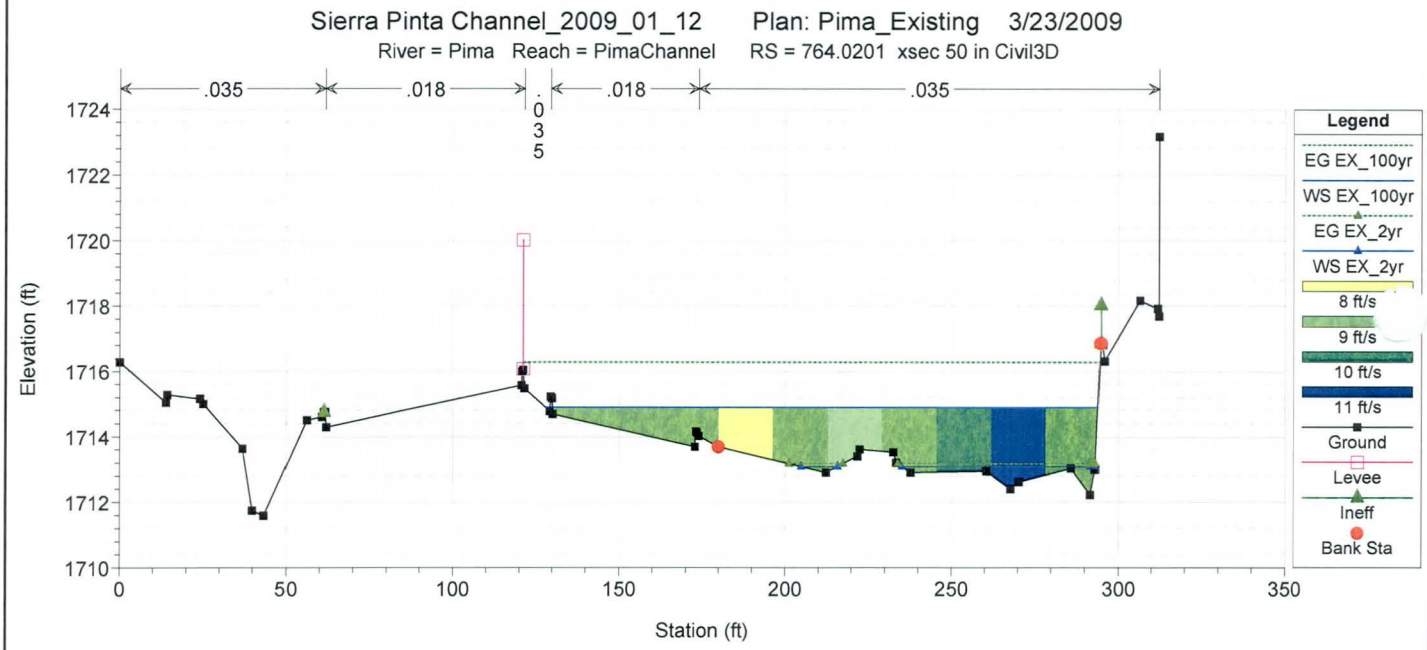

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 861.741*
.035
.032
.032
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ineff
Bank Sta

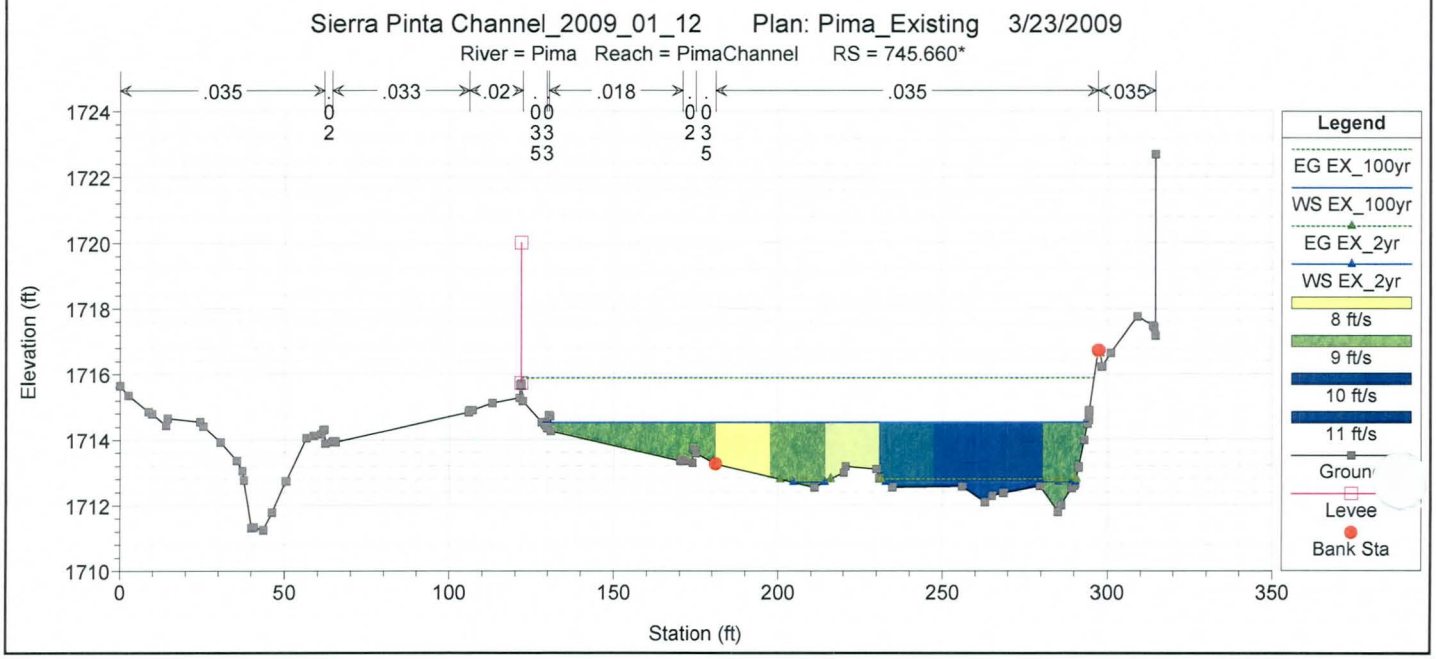

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 842.197*
.035
.029
.029
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

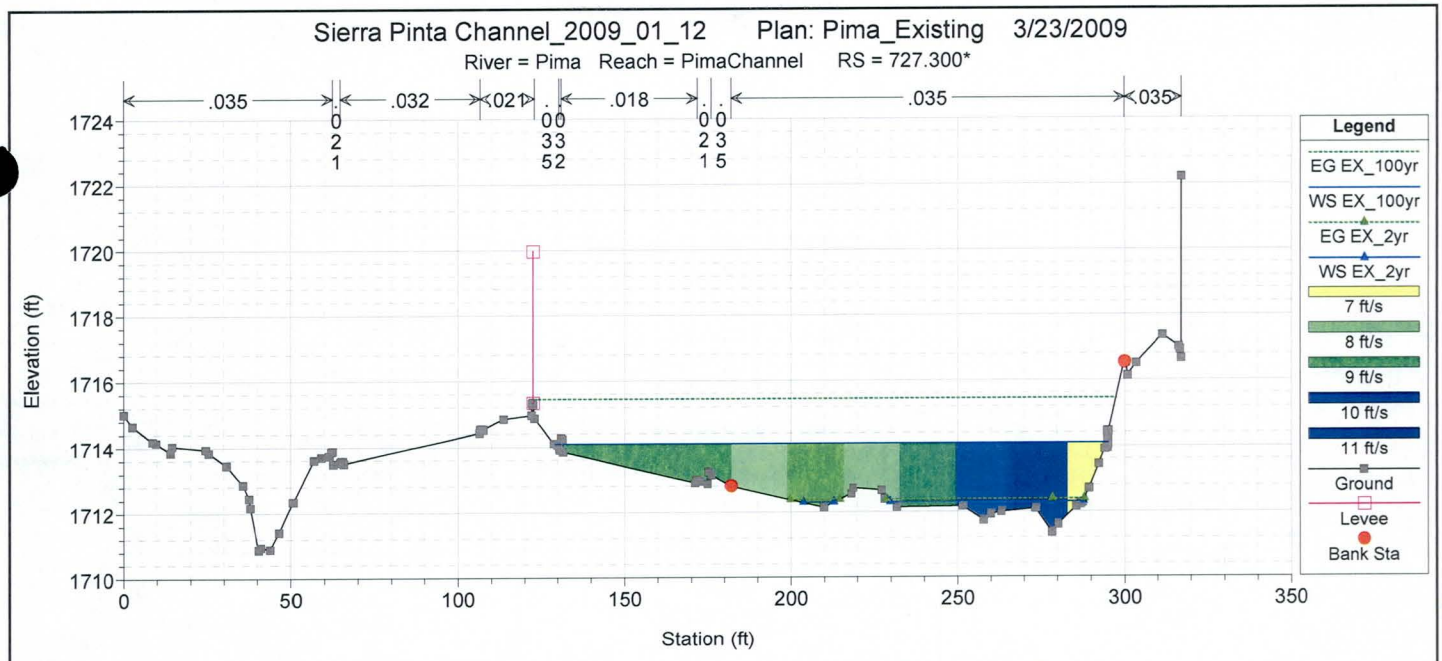

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 822.652*
.035
.026
.026
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

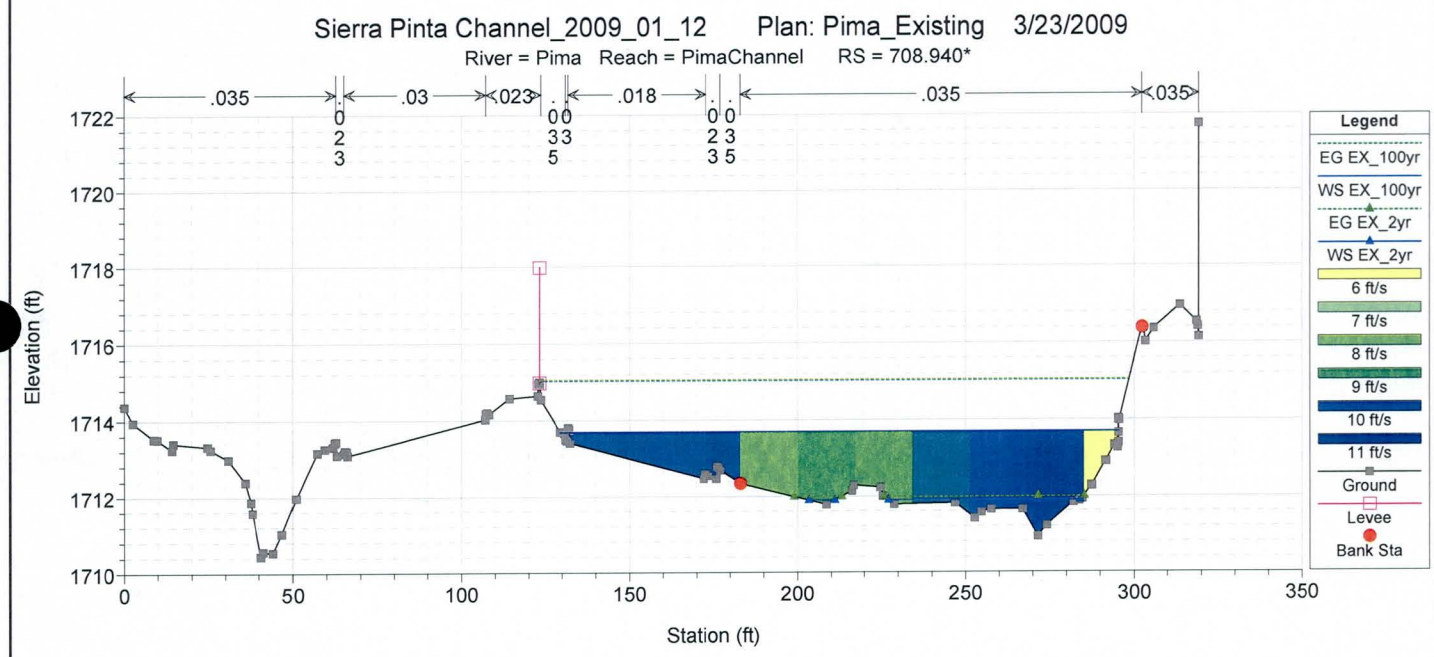

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 803.108*
.035
.024
.024
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

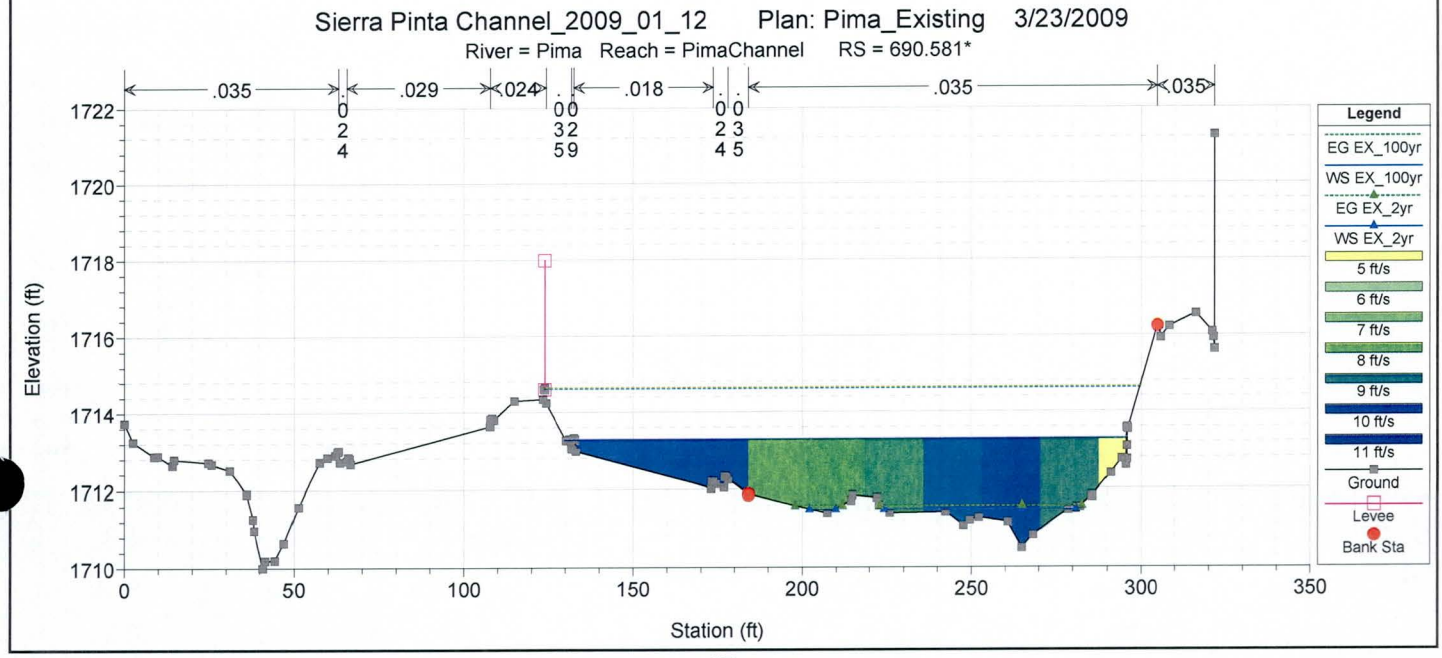

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 783.564*
.035
.021
.021
.035
.035
Legend
EG EX_1
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

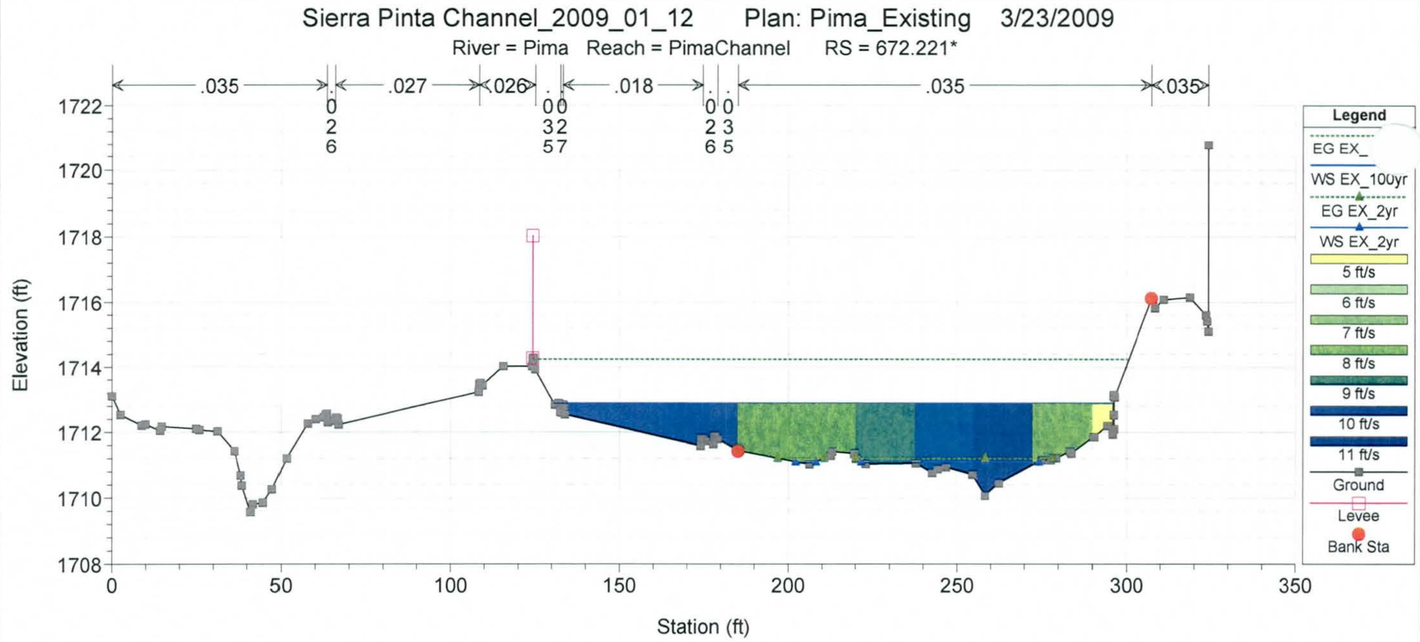

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 764.0201 xsec 50 in Civil3D
.035
.018
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

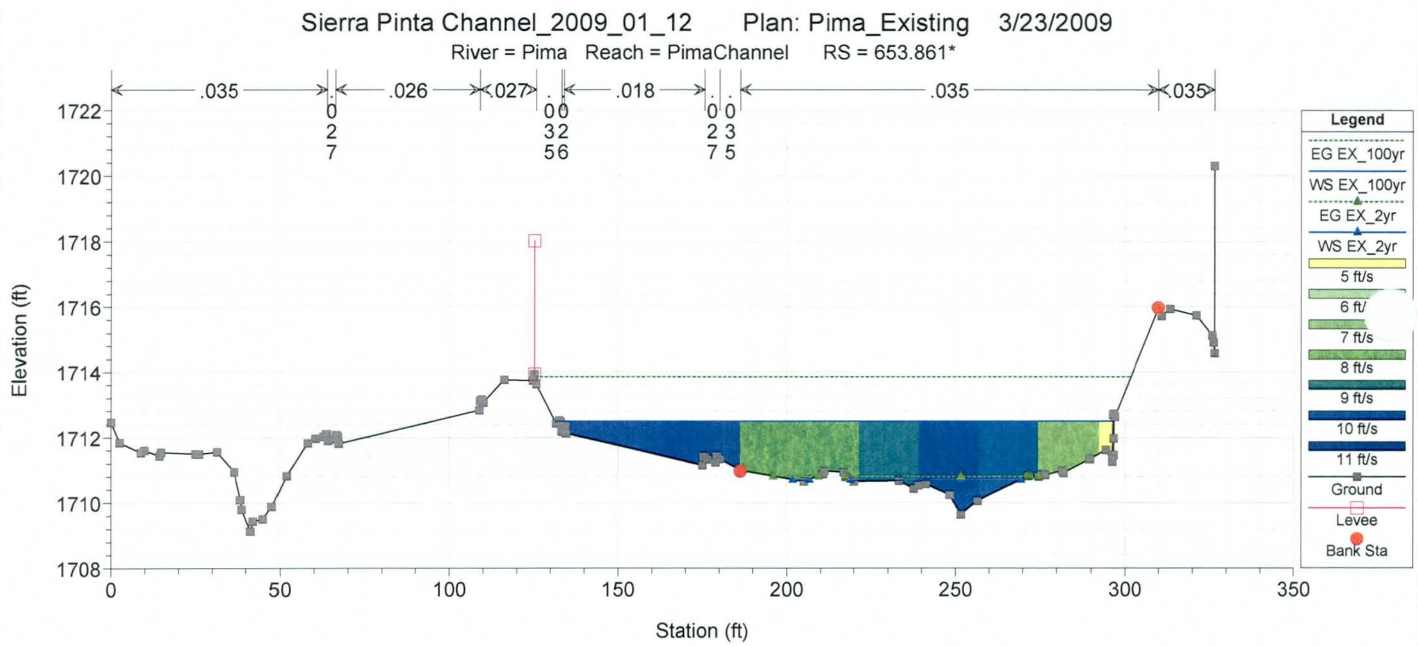

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 745.660*
.035
.033
.02
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Levee
Bank Sta
Elevation (ft)
Station (ft)

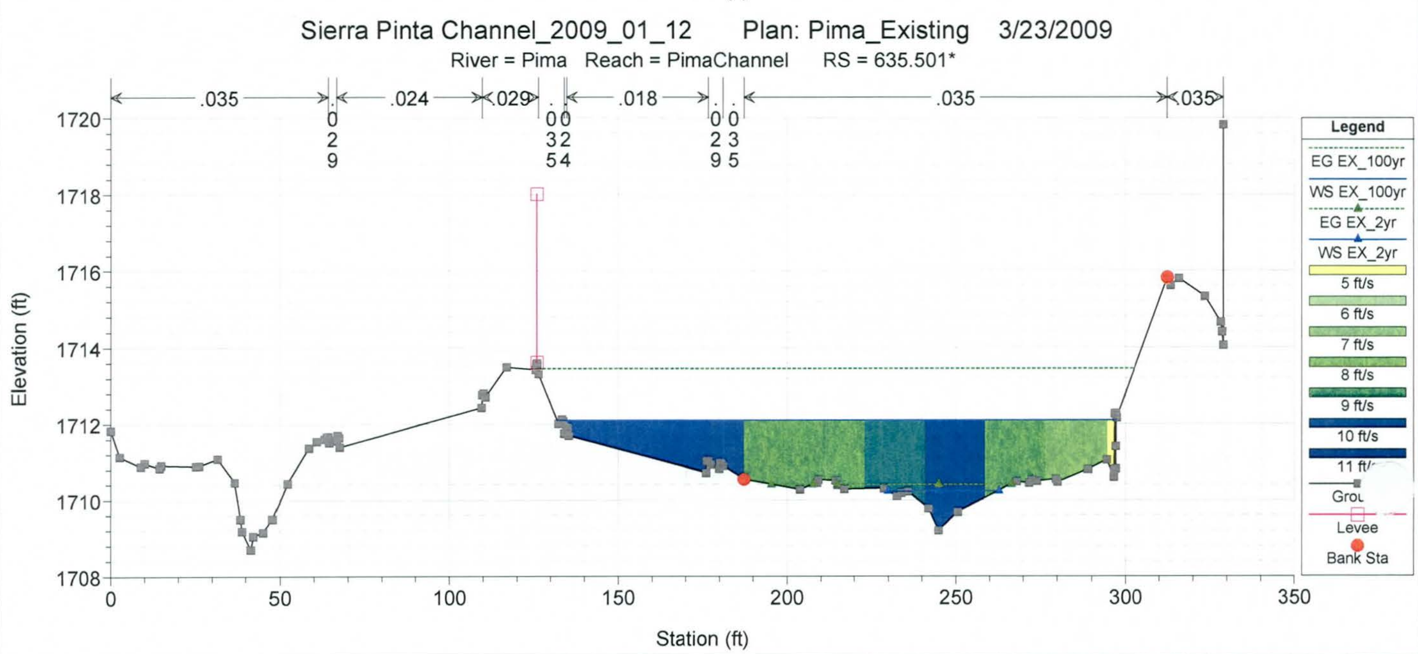

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 727.300*
.035
.032
.021
.018
.035
.035
0 0 0 0 0 0
2 3 3 3 1 5
2 3 3 2 1 5
1 1 2 2
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
1710
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

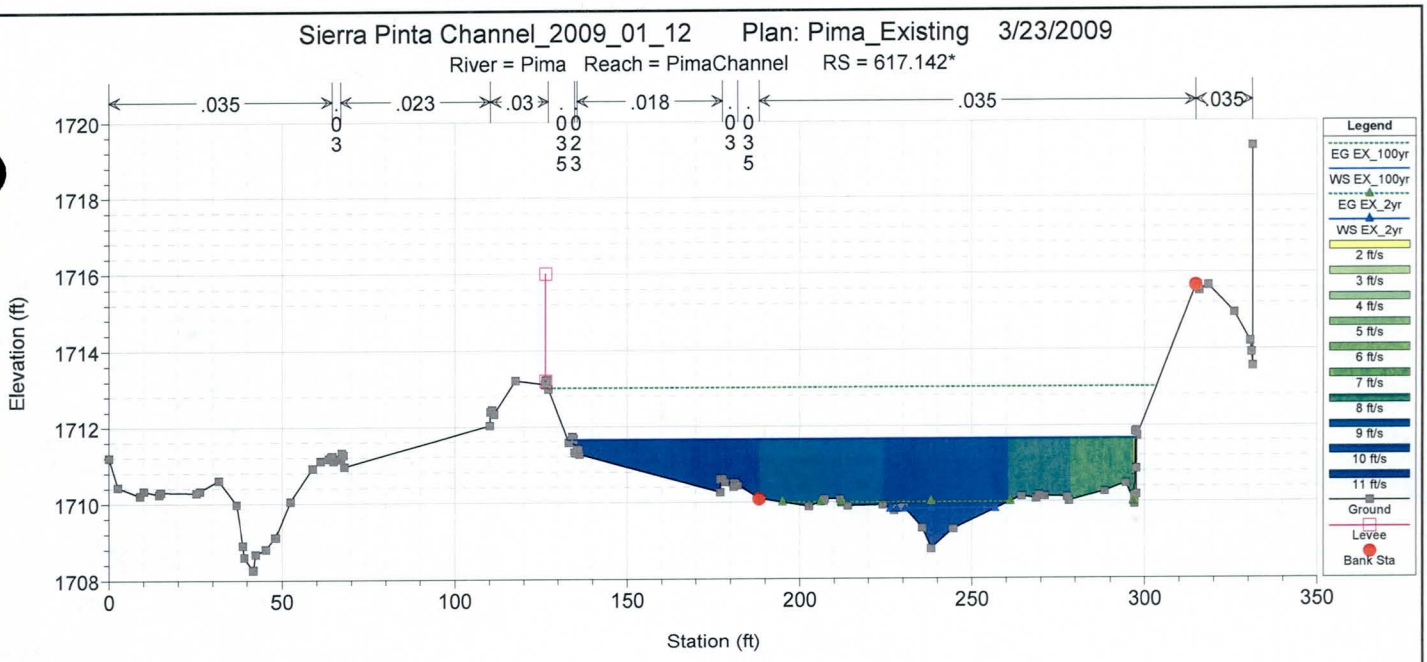

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 708.940*
.035
.03
.023
.018
.035
.035
0 0 0 0 0 0
2 3 3 3 2 5
2 3 3 2 3 5
2 3 3 3
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

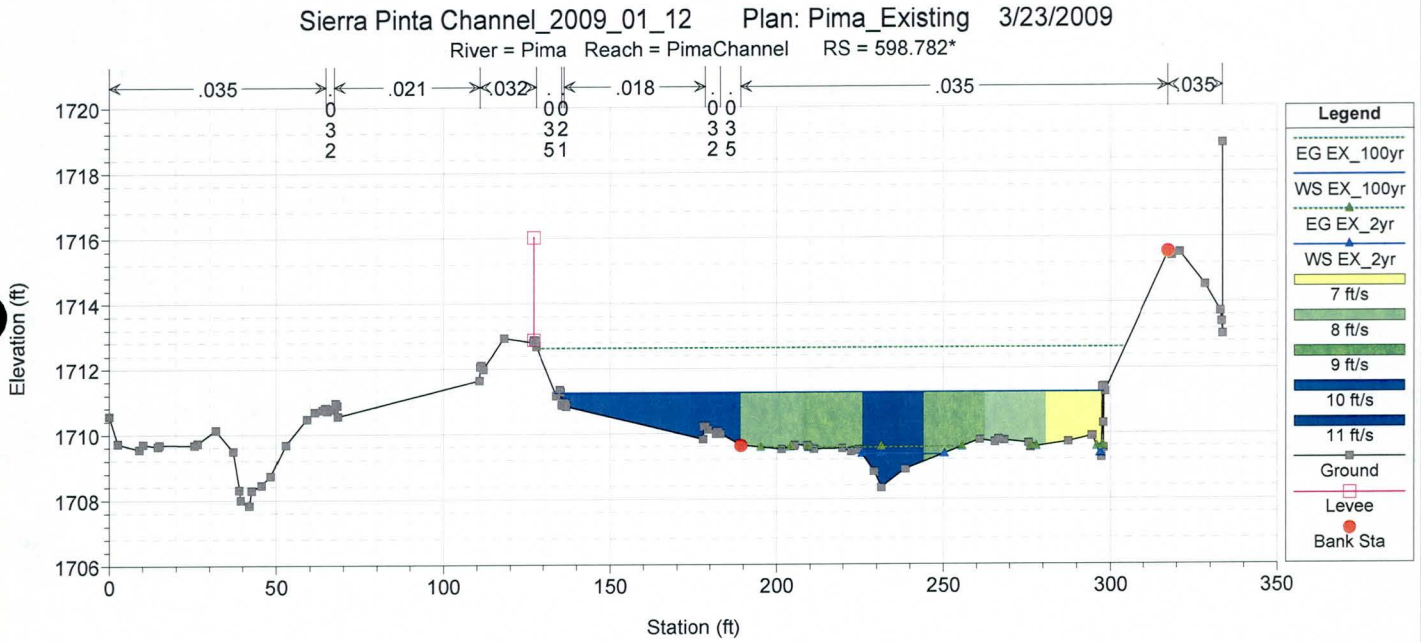

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 690.581*
.035
.029
.024
.018
.035
.035
0 0 0 0 0 0
2 3 3 2 4 5
2 3 3 2 5 9
2 4 4 4
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

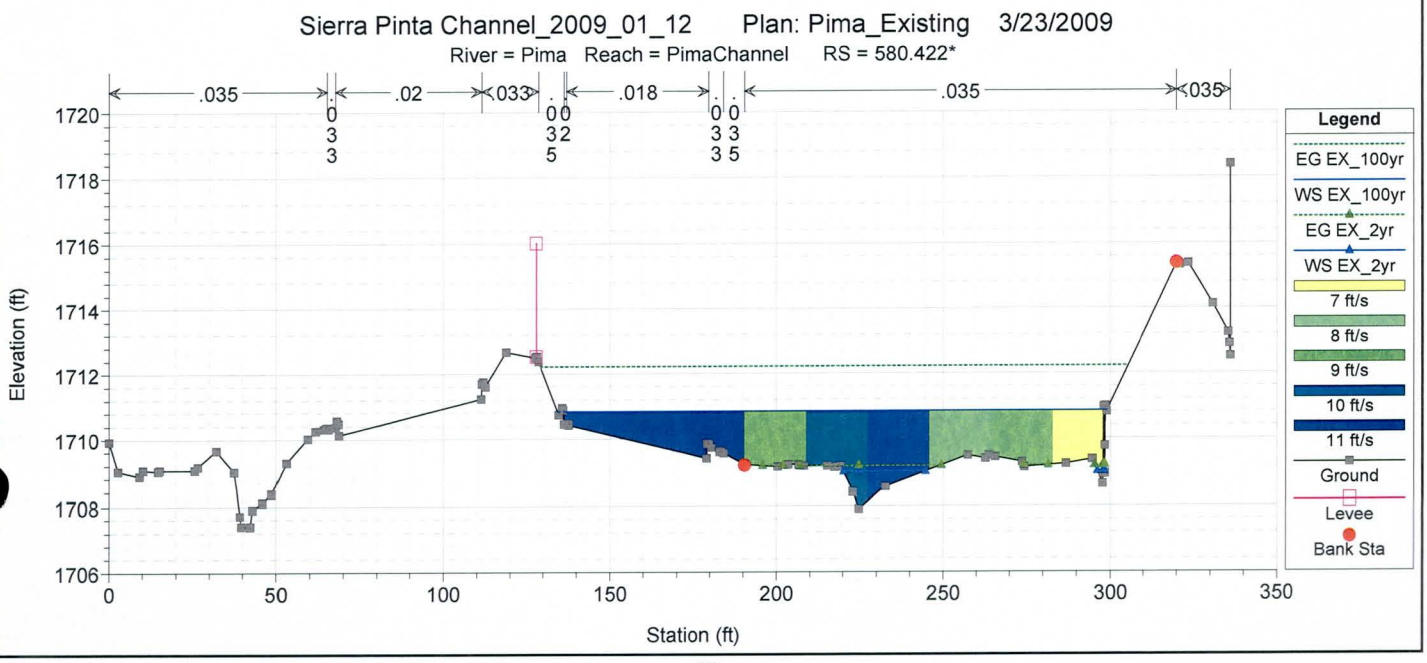

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 672.221*
.035
.027
.026
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

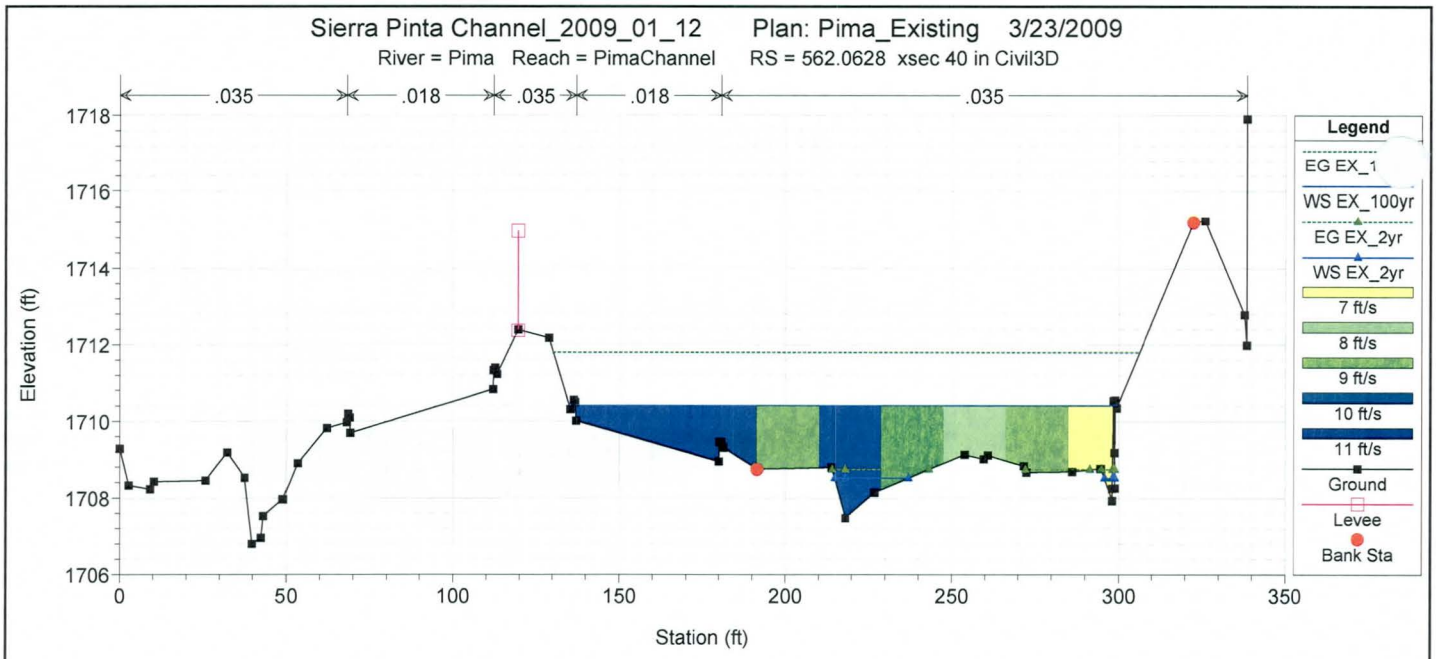

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 653.861*
.035
.026
.027
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

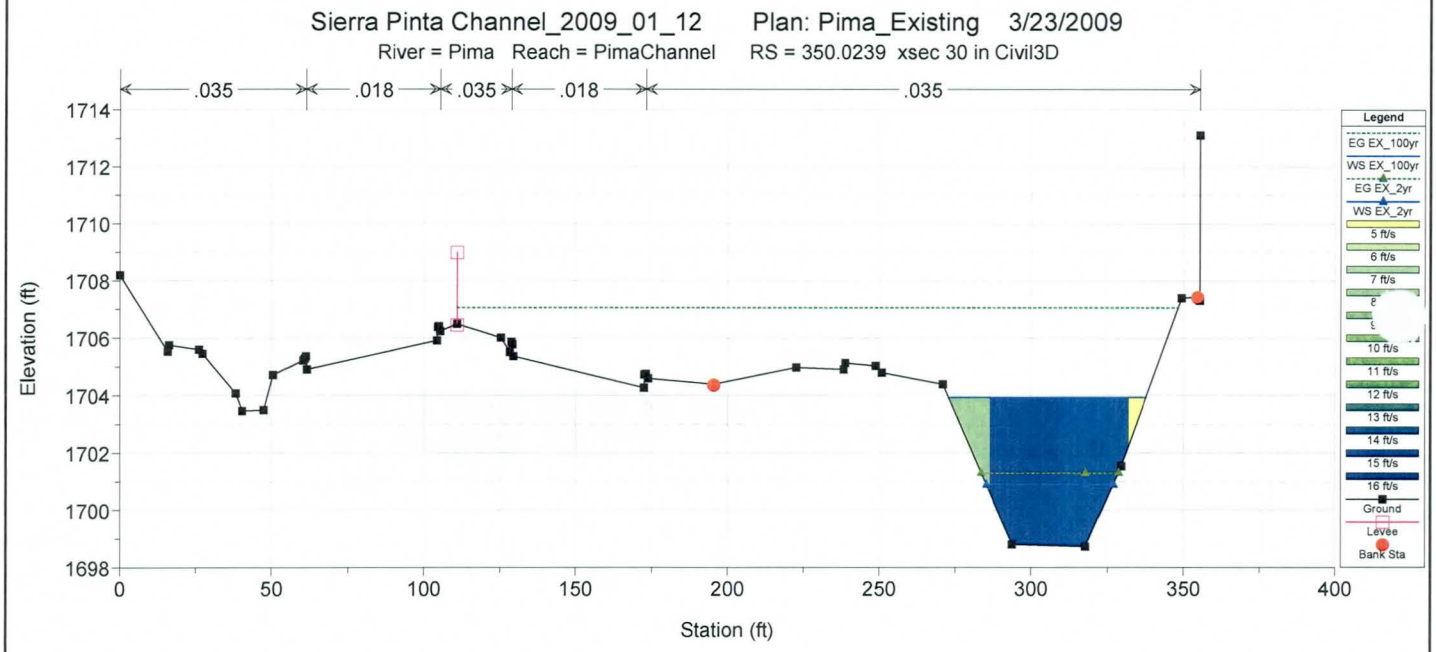

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 635.501*
.035
.024
.029
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Levee
Bank Sta

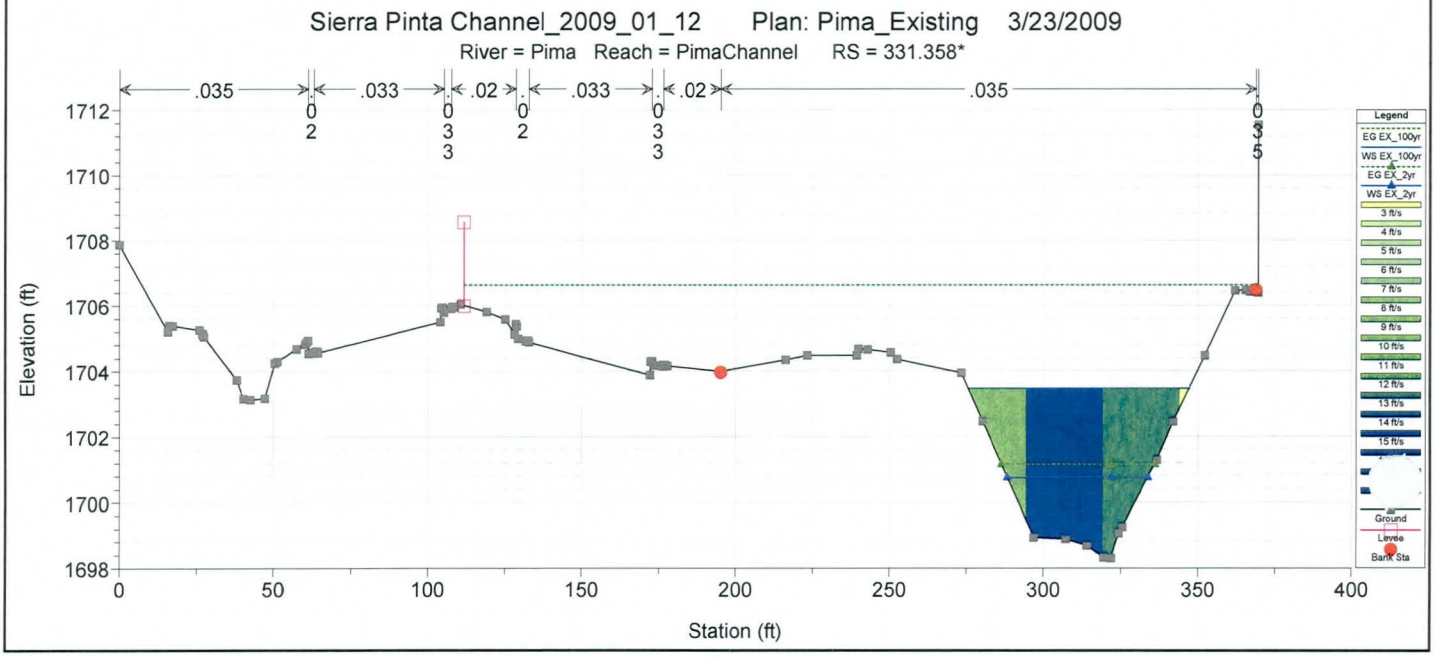

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 617.142*
.035
.023
.03
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

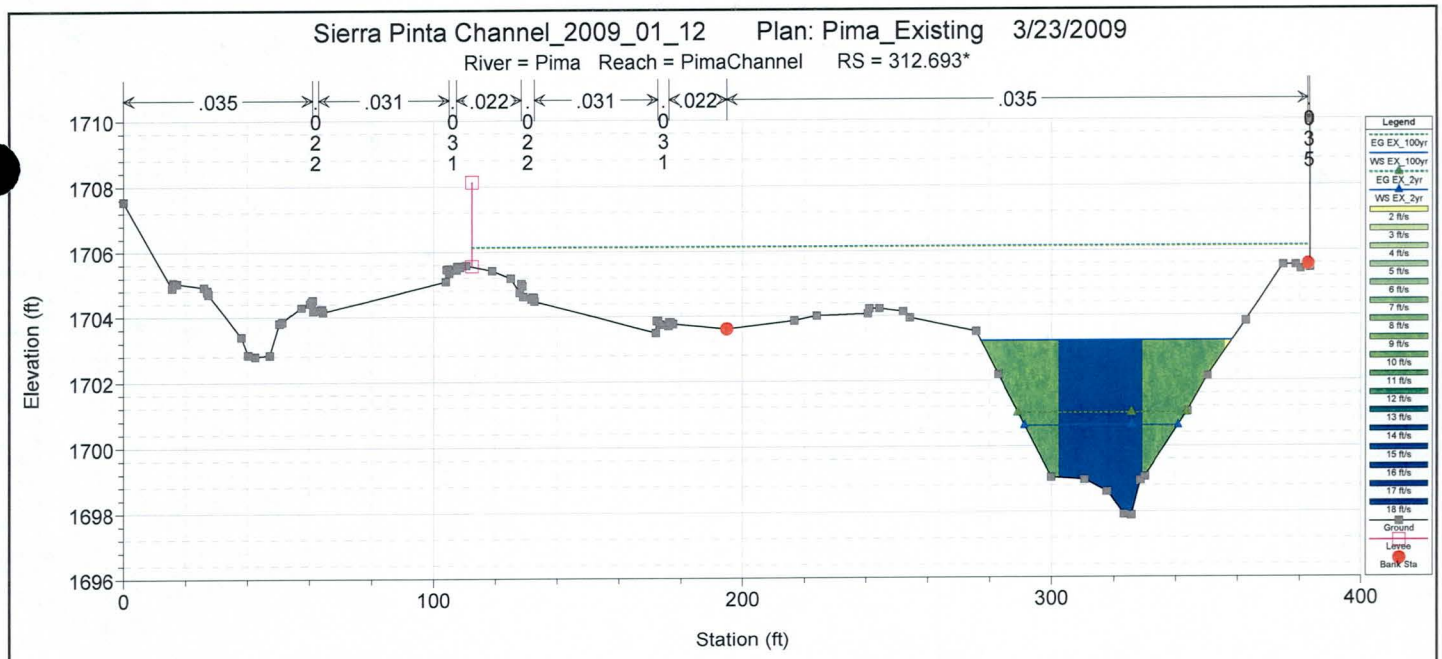

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 598.782*
.035
.021
.032
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

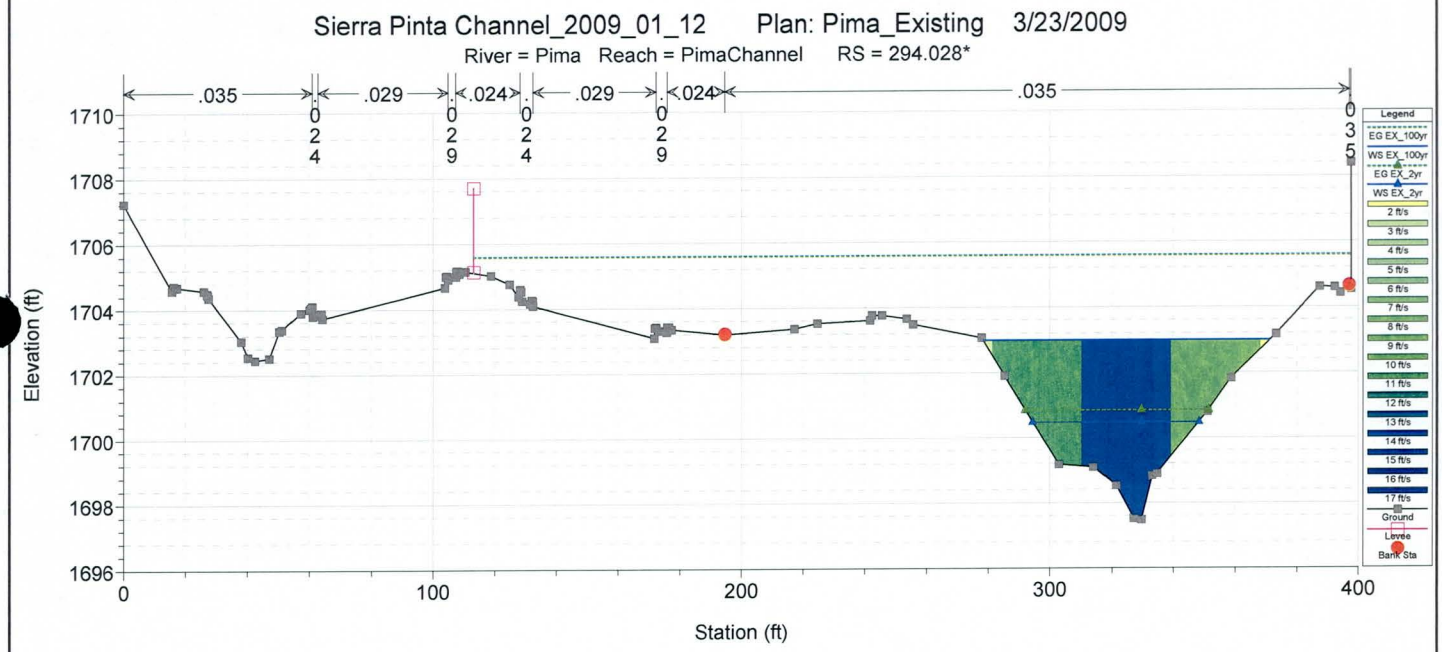

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 580.422*
.035
.02
.033
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

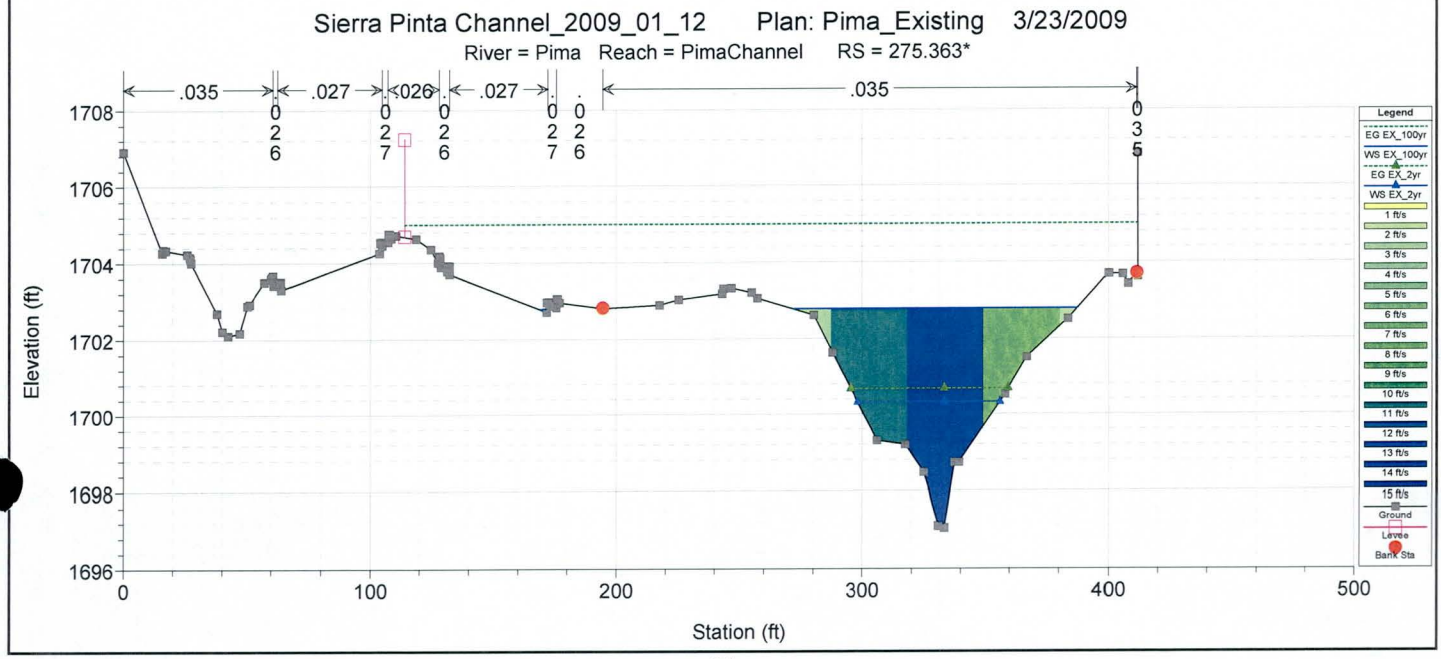

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 562.0628 xsec 40 in Civil3D
.035
.018
.035
.018
.035
Legend
EG EX_1
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

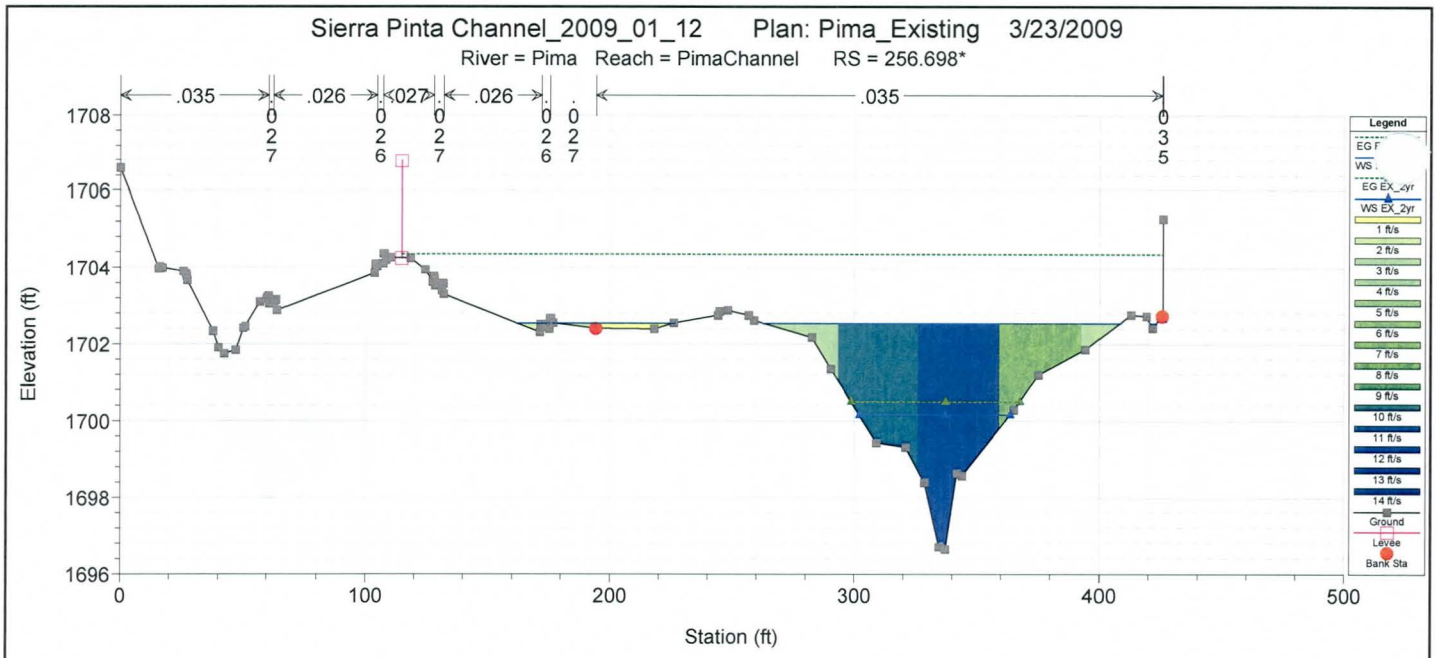

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 350.0239 xsec 30 in Civil3D
.035
.018
.035
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

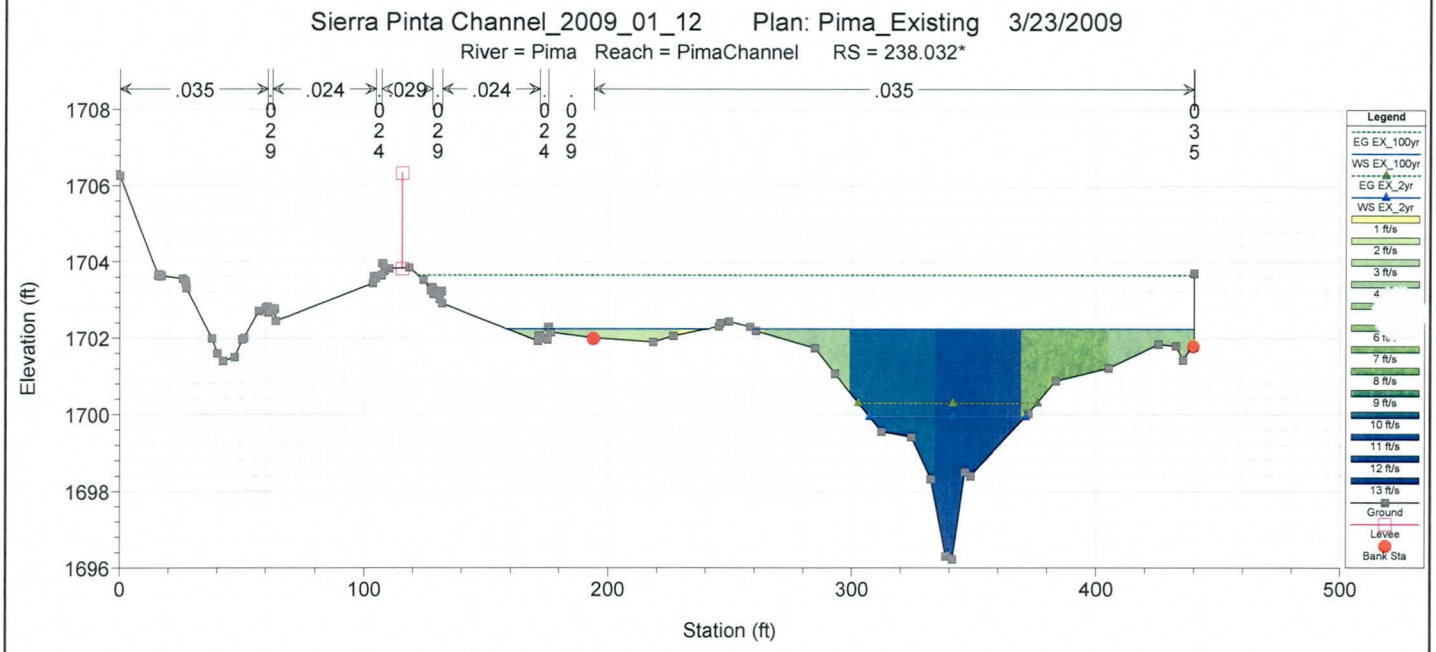

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 331.358*
.035
.033
.02
.033
.02
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

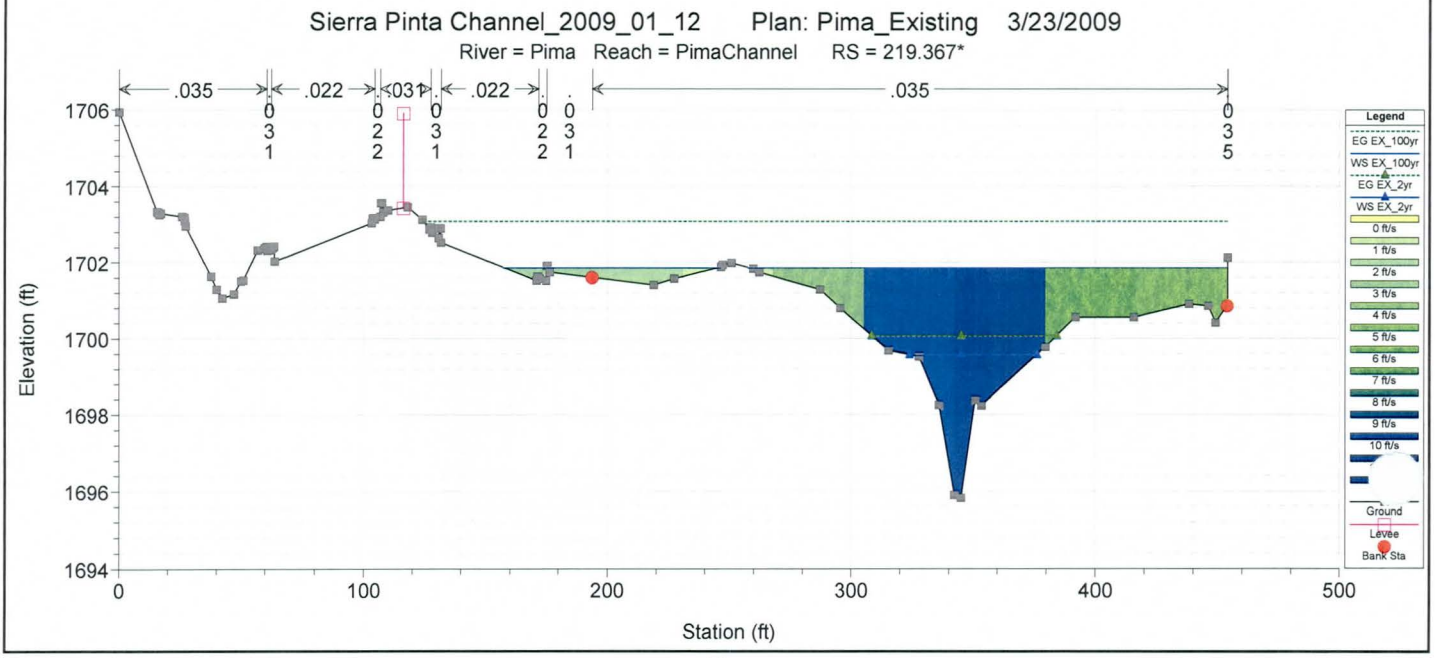

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 312.693*
.035
.031
.022
.031
.022
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

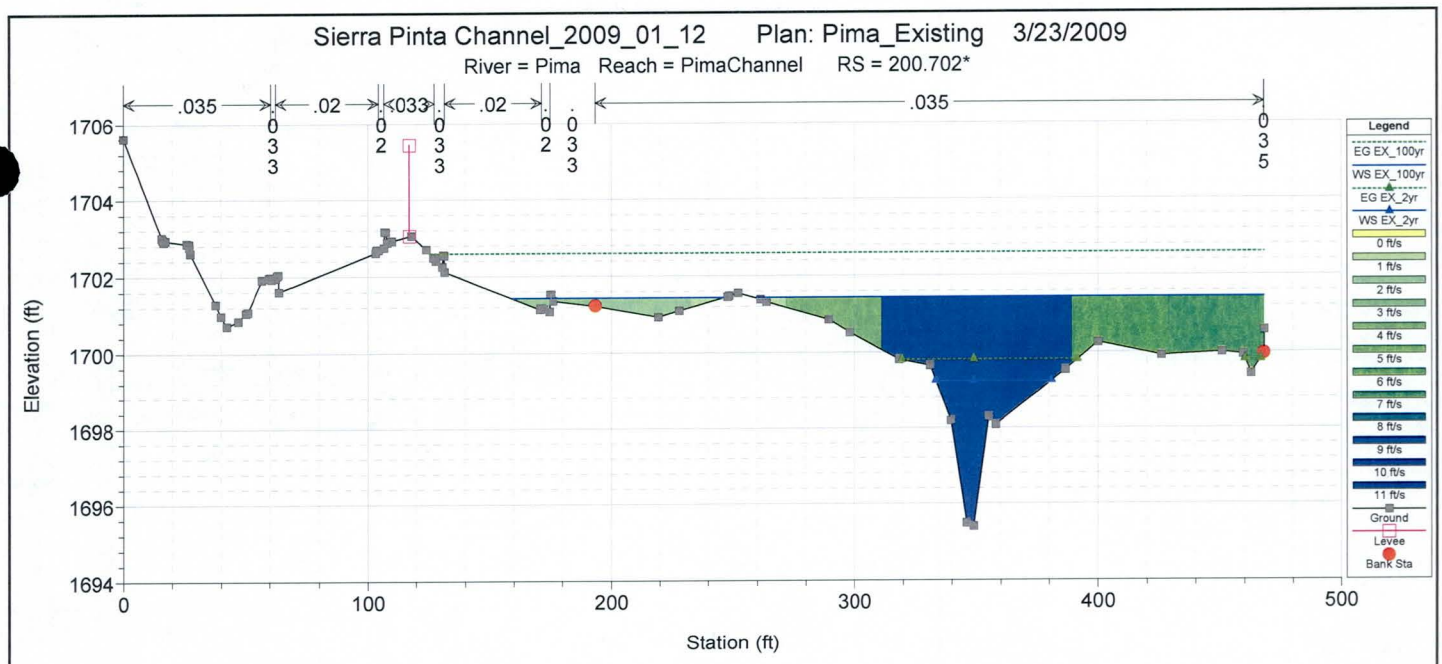

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 294.028*
.035
.029
.024
.029
.024
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

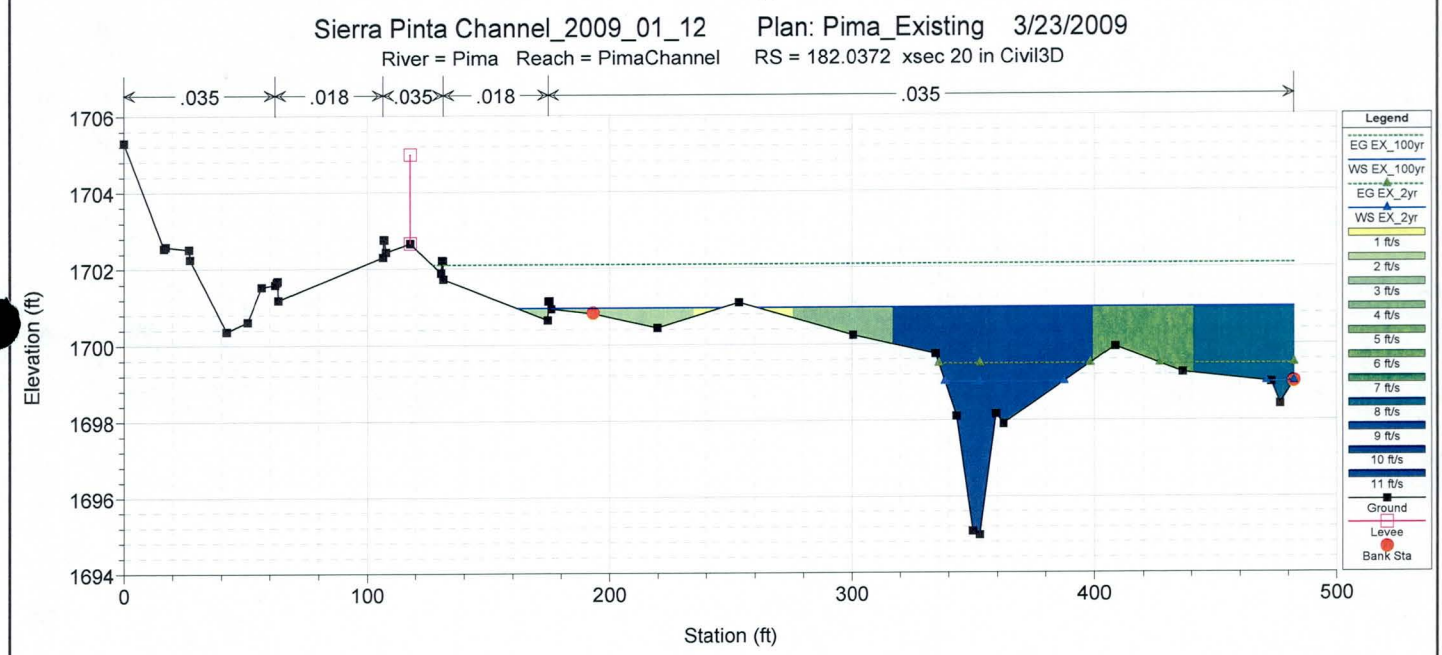

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 275.363*
.035
.027
.026
.027
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

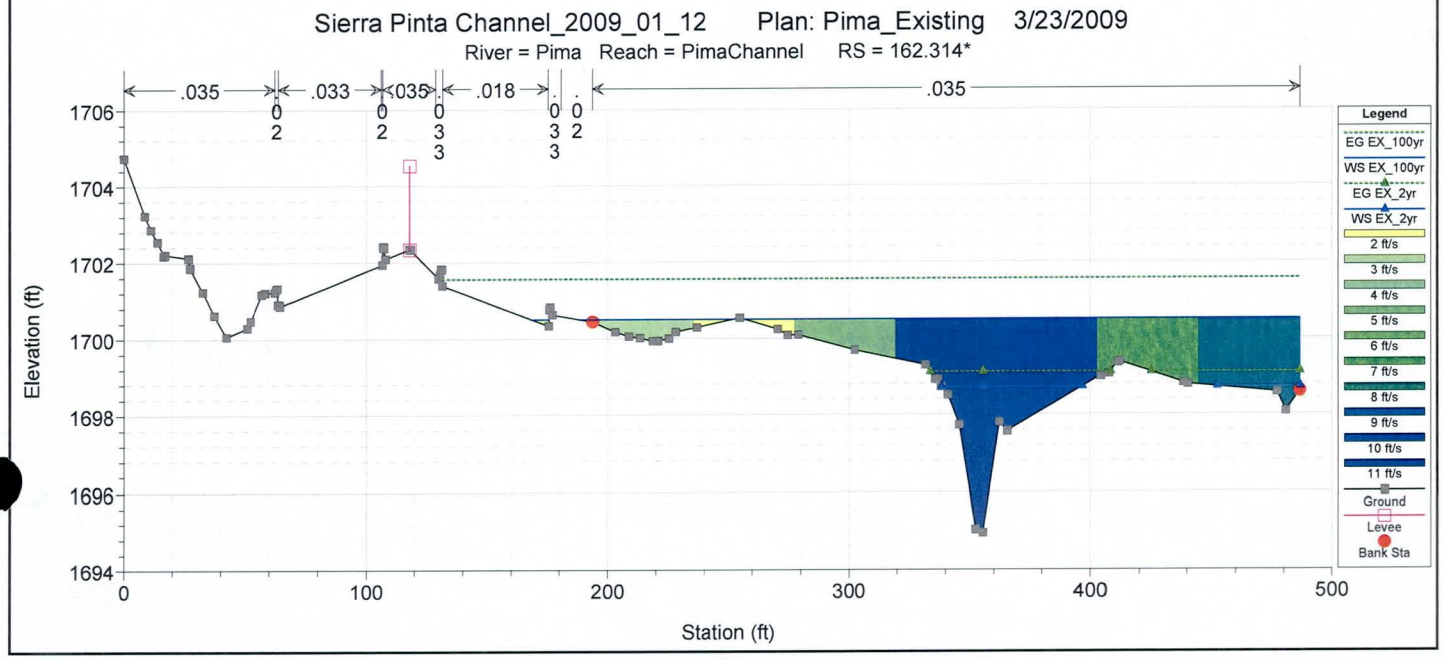

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 256.698*
.035
.026
.027
.026
.035
Elevation (ft)
Station (ft)
Legend
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

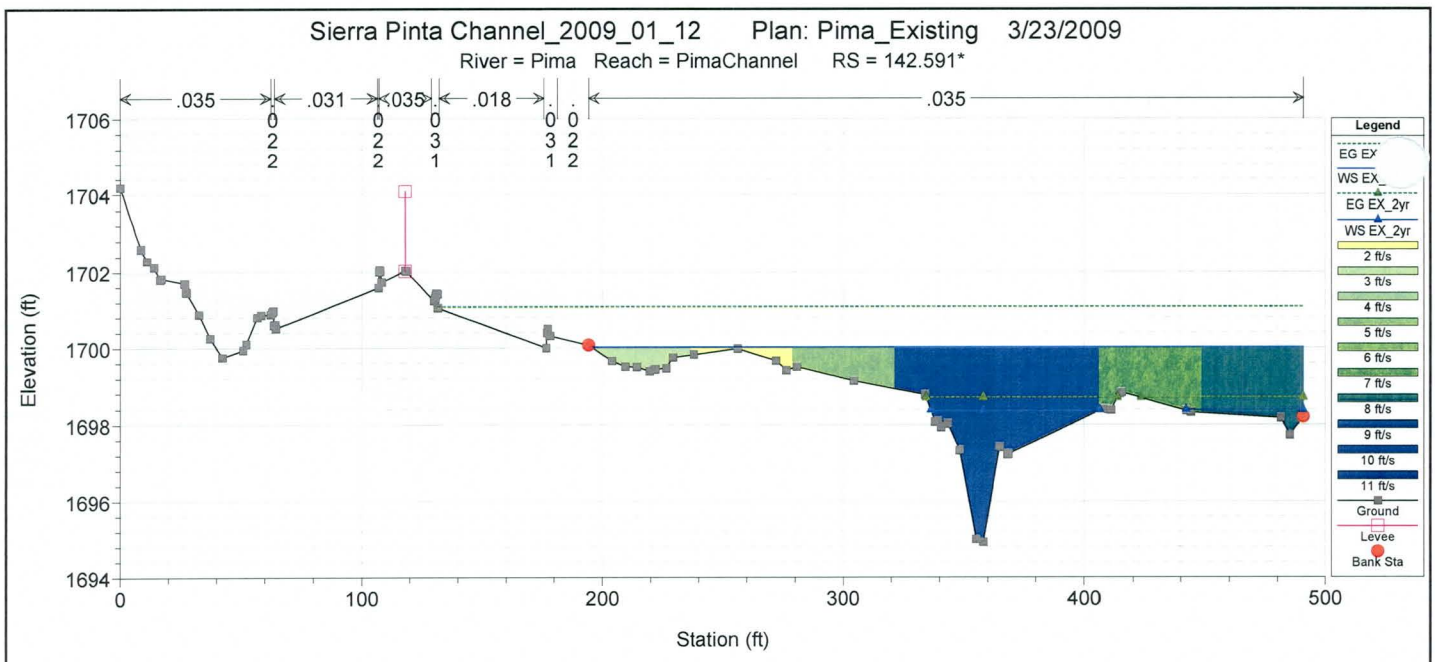

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 238.032*
.035
.024
.029
.024
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

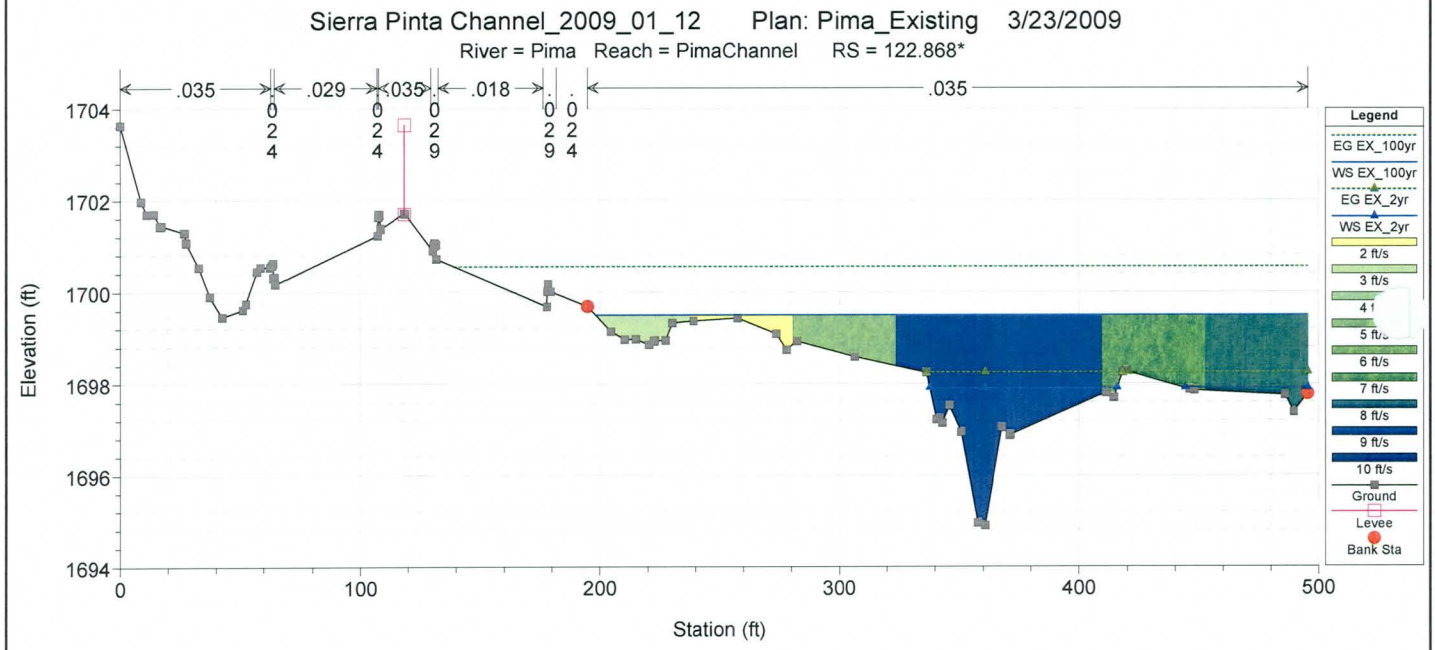

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 219.367*
.035
.022
.031
.022
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

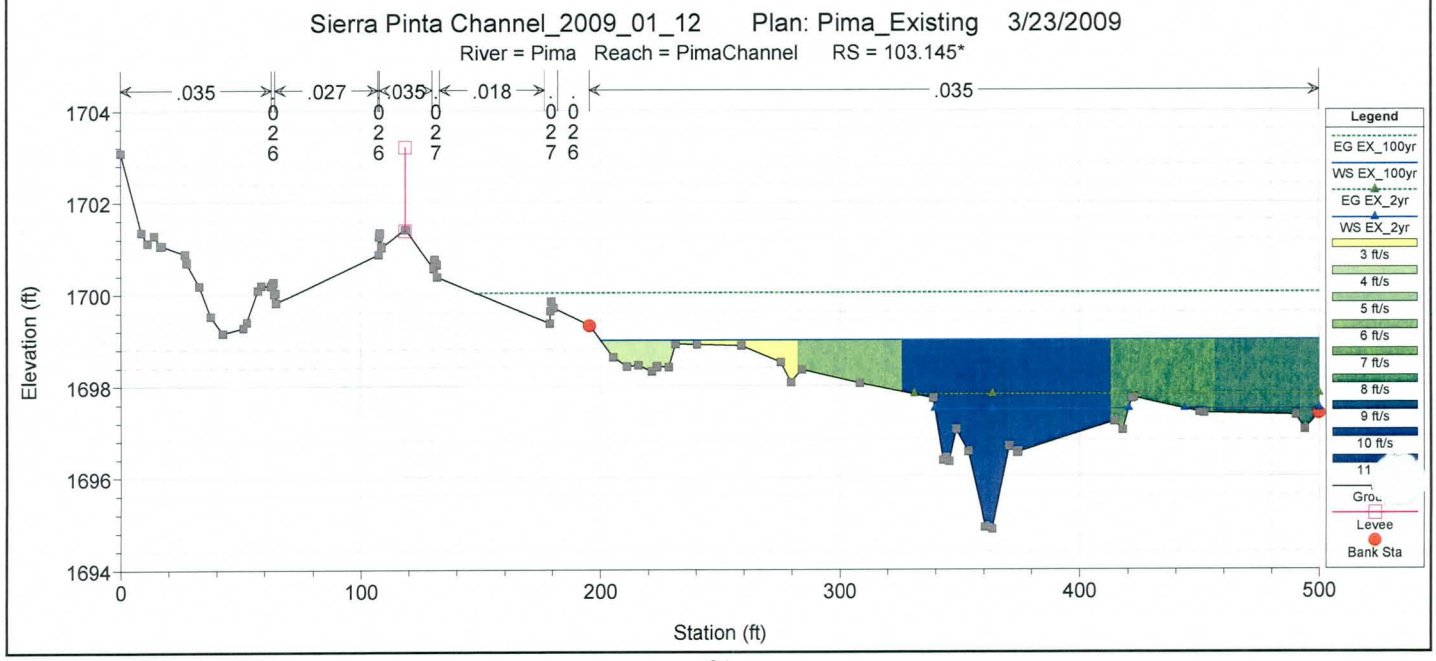

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 200.702*
.035
.02
.033
.02
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

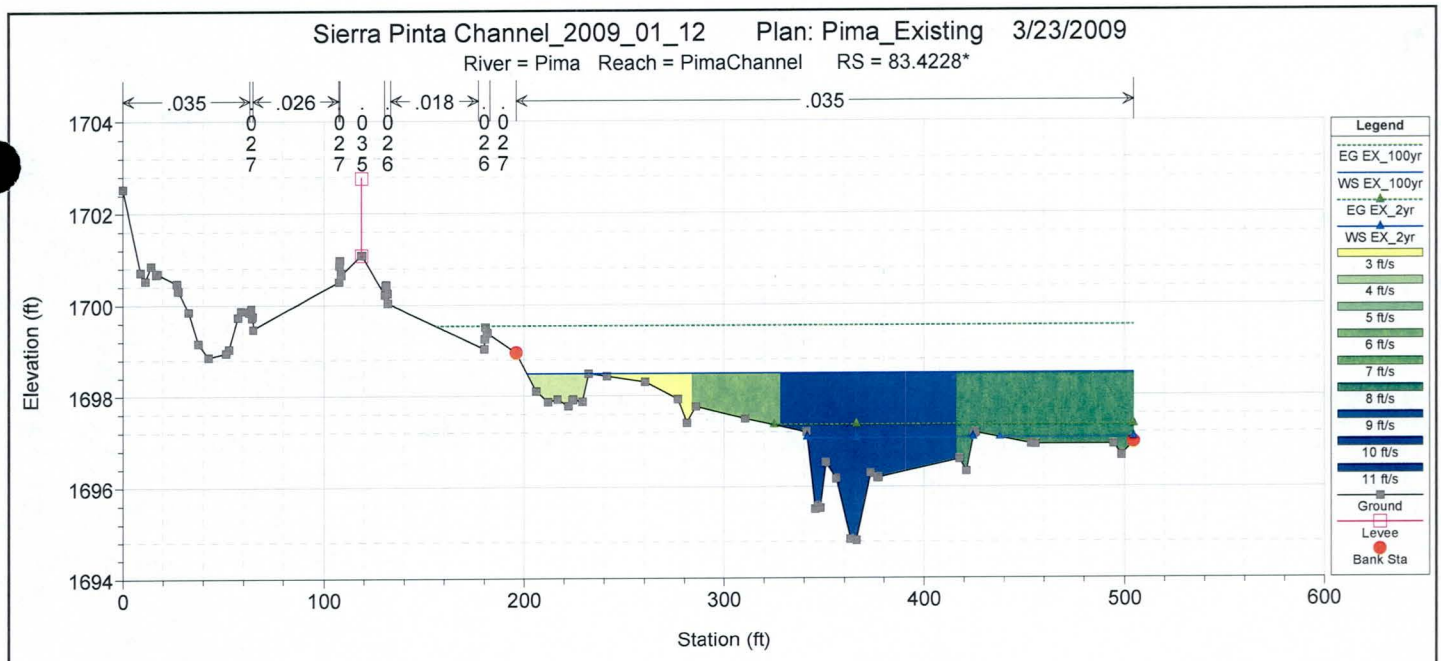

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 182.0372 xsec 20 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

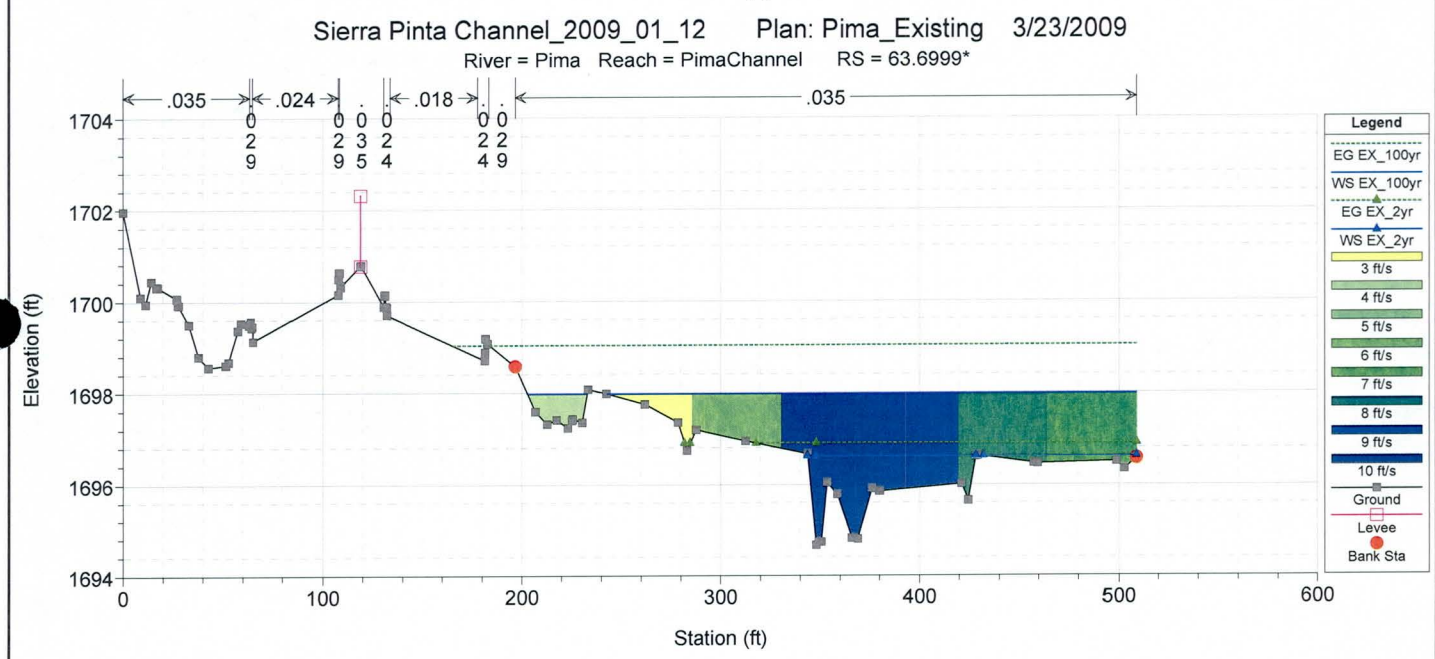

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 162.314*
.035
.033
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

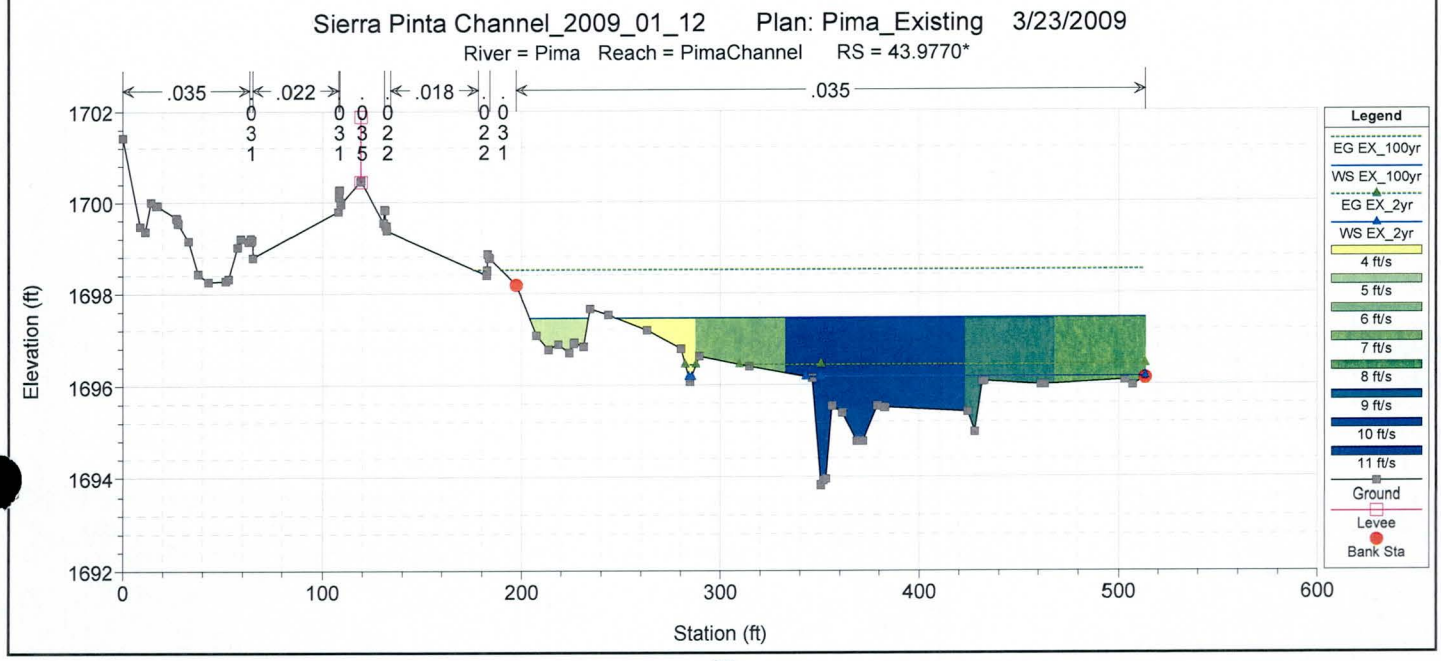

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 142.591*
.035
.031
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX
WS EX_
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

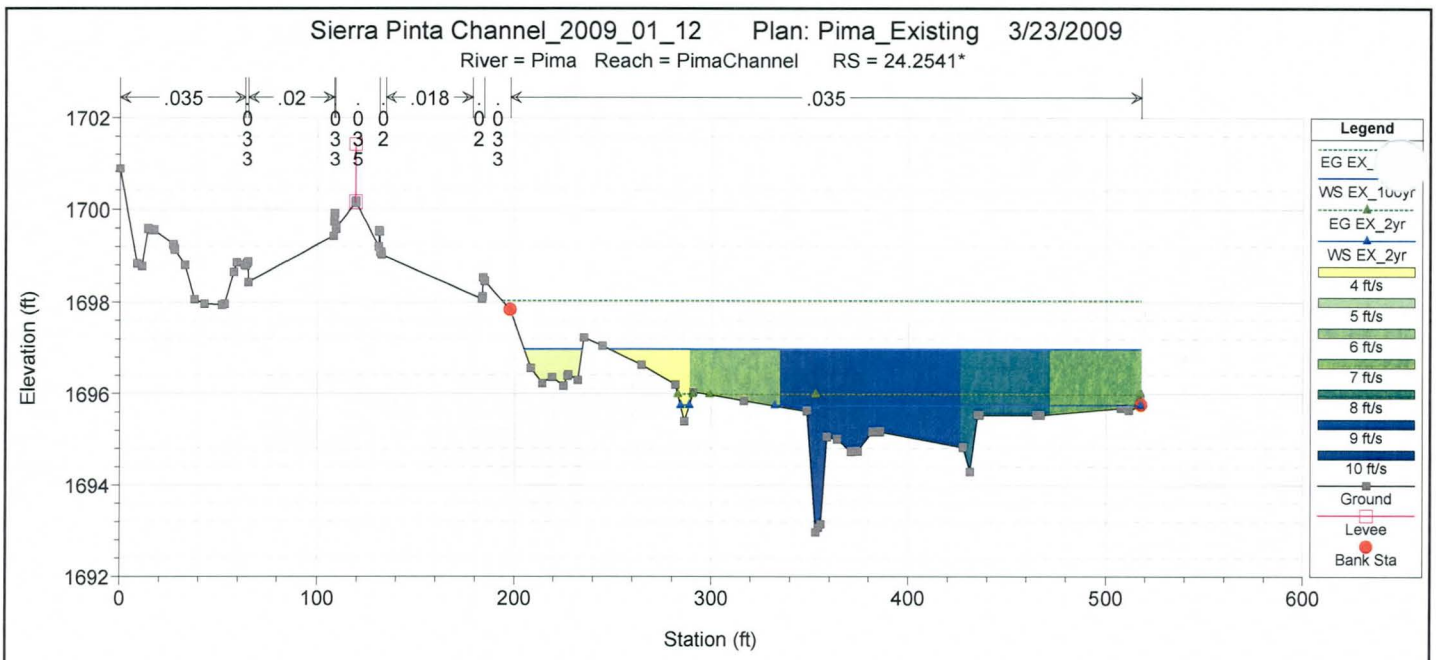

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 122.868*
.035
.029
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta

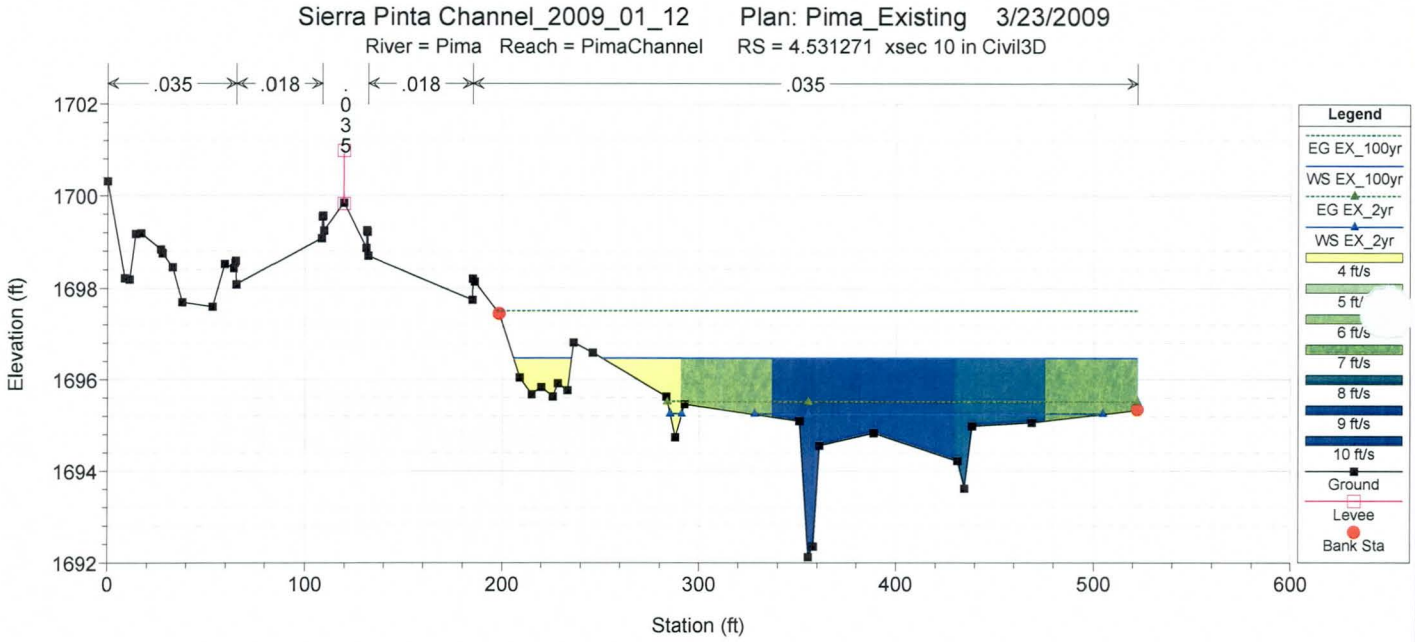

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 103.145*
.035
.027
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Levee
Bank Sta

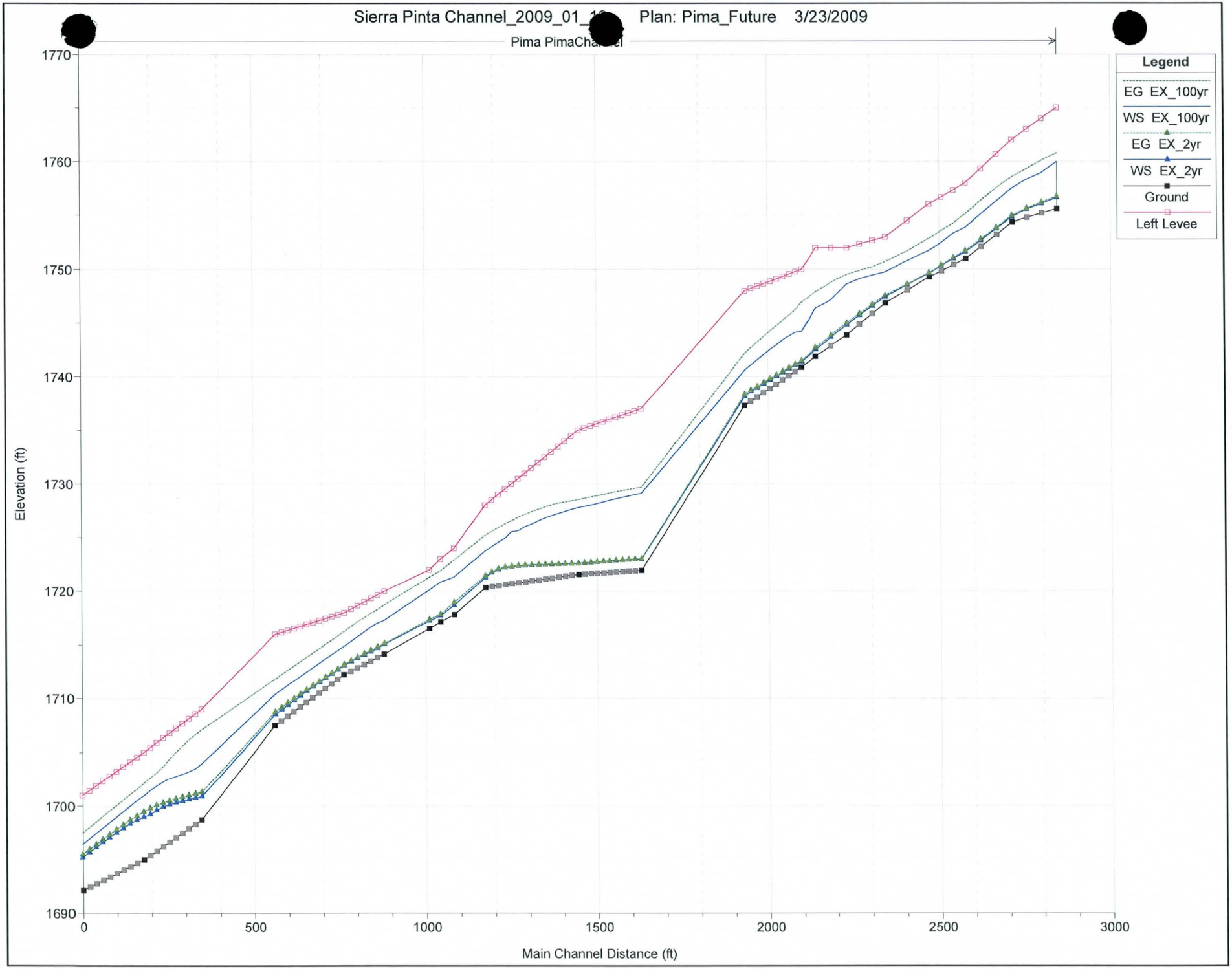

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 83.4228*
.035
.026
.018
.035
0.027
0.0356
0.0226
0.027
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

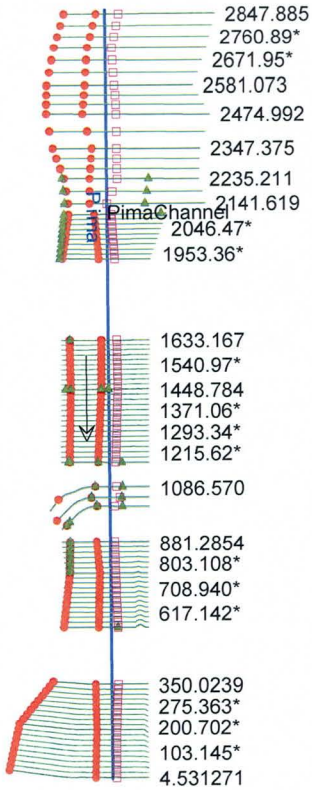

Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 63.6999*
.035
.024
.018
.035
0.029
0.0354
0.0249
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 43.9770*
.035
.022
.018
.035
0.031
0.0332
0.0231
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 24.2541*
.035
.02
.018
.035
Elevation (ft)
1702
1700
1698
1696
1694
1692
0
100
200
300
400
500
600
Station (ft)
Legend
EG EX_
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Existing 3/23/2009
River = Pima Reach = PimaChannel RS = 4.531271 xsec 10 in Civil3D
.035
.018
.018
.035
Elevation (ft)
1702
1700
1698
1696
1694
1692
0
100
200
300
400
500
600
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_1[redacted] Plan: Pima_Future 3/23/2009
Pima PimaCha[redacted]el
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Left Levee
Elevation (ft)
1770
1760
1750
1740
1730
1720
1710
1700
1690
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)


2847.885
2760.89*
2671.95*
2581.073
2474.992
2347.375
2235.211
2141.619
PimaChannel
2046.47*
1953.36*
1633.167
1540.97*
1448.784
1371.06*
1293.34*
1215.62*
1086.570
881.2854
803.108*
708.940*
617.142*
350.0239
275.363*
200.702*
103.145*
4.531271

HEC-RAS Plan: FU River: Pima Reach: PimaChannel

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	4.531271	EX_100yr	3310.00	1692.12	1696.45	1696.69	1697.50	0.025570	8.20	403.52	300.47	1.25
PimaChannel	4.531271	EX_2yr	365.00	1692.12	1695.24	1695.26	1695.51	0.024987	4.10	88.99	184.29	1.04
PimaChannel	24.2541*	EX_100yr	3310.00	1692.44	1696.96	1697.20	1698.01	0.025392	8.23	402.31	296.81	1.25
PimaChannel	24.2541*	EX_2yr	365.00	1692.44	1695.71	1695.72	1695.98	0.026080	4.15	87.96	185.07	1.06
PimaChannel	43.9770*	EX_100yr	3310.00	1692.76	1697.46	1697.69	1698.51	0.025152	8.24	401.64	293.55	1.24
PimaChannel	43.9770*	EX_2yr	365.00	1692.76	1696.18	1696.18	1696.44	0.023858	4.10	88.99	178.34	1.02
PimaChannel	63.6999*	EX_100yr	3310.00	1693.08	1697.95	1698.20	1699.03	0.025656	8.35	396.60	288.74	1.25
PimaChannel	63.6999*	EX_2yr	365.00	1693.08	1696.64	1696.64	1696.90	0.021938	4.06	89.83	171.49	0.99
PimaChannel	83.4228*	EX_100yr	3310.00	1693.40	1698.44	1698.70	1699.55	0.025826	8.43	392.50	282.71	1.26
PimaChannel	83.4228*	EX_2yr	365.00	1693.40	1697.08	1697.09	1697.35	0.023986	4.23	86.37	166.23	1.03
PimaChannel	103.145*	EX_100yr	3310.00	1693.72	1698.96	1699.21	1700.05	0.024907	8.40	393.87	277.45	1.24
PimaChannel	103.145*	EX_2yr	365.00	1693.72	1697.51	1697.53	1697.81	0.023927	4.37	83.57	152.69	1.04
PimaChannel	122.868*	EX_100yr	3310.00	1694.03	1699.49	1699.71	1700.55	0.025231	8.23	402.24	295.34	1.24
PimaChannel	122.868*	EX_2yr	365.00	1694.03	1697.93	1697.96	1698.26	0.023154	4.58	79.65	131.91	1.04
PimaChannel	142.591*	EX_100yr	3310.00	1694.35	1699.98	1700.24	1701.07	0.025643	8.37	395.66	286.65	1.25
PimaChannel	142.591*	EX_2yr	365.00	1694.35	1698.35	1698.35	1698.69	0.020774	4.70	77.64	113.82	1.00
PimaChannel	162.314*	EX_100yr	3310.00	1694.67	1700.50	1700.76	1701.57	0.024771	8.30	399.30	295.70	1.24
PimaChannel	162.314*	EX_2yr	365.00	1694.67	1698.70	1698.68	1699.10	0.019070	5.06	72.07	88.23	0.99
PimaChannel	182.0372	EX_100yr	3310.00	1694.99	1700.96	1701.26	1702.10	0.026593	8.60	386.96	303.20	1.28
PimaChannel	182.0372	EX_2yr	365.00	1694.99	1698.98	1698.93	1699.48	0.016168	5.70	63.99	57.37	0.95
PimaChannel	200.702*	EX_100yr	3310.00	1695.40	1701.42	1701.74	1702.60	0.025874	8.71	383.53	294.35	1.28
PimaChannel	200.702*	EX_2yr	365.00	1695.40	1699.23	1699.17	1699.79	0.015087	6.04	60.46	47.24	0.94
PimaChannel	219.367*	EX_100yr	3310.00	1695.82	1701.87	1702.21	1703.09	0.026052	8.90	376.44	284.12	1.29
PimaChannel	219.367*	EX_2yr	365.00	1695.82	1699.60	1699.42	1700.08	0.013596	5.57	65.54	53.80	0.89
PimaChannel	238.032*	EX_100yr	3310.00	1696.23	1702.26	1702.68	1703.66	0.029085	9.52	352.32	264.32	1.36
PimaChannel	238.032*	EX_2yr	365.00	1696.23	1699.95	1699.73	1700.31	0.010492	4.82	75.80	64.10	0.78
PimaChannel	256.698*	EX_100yr	3310.00	1696.65	1702.56	1703.15	1704.35	0.031907	10.75	310.43	212.62	1.45
PimaChannel	256.698*	EX_2yr	365.00	1696.65	1700.16	1699.89	1700.50	0.009358	4.73	77.18	61.67	0.74
PimaChannel	275.363*	EX_100yr	3310.00	1697.06	1702.77	1703.60	1705.00	0.025081	11.98	276.42	117.91	1.36
PimaChannel	275.363*	EX_2yr	365.00	1697.06	1700.32	1700.01	1700.68	0.008826	4.77	76.53	57.86	0.73
PimaChannel	294.028*	EX_100yr	3310.00	1697.48	1702.98	1704.02	1705.57	0.024212	12.92	256.25	92.83	1.37
PimaChannel	294.028*	EX_2yr	365.00	1697.48	1700.48	1700.16	1700.84	0.008457	4.85	75.21	53.72	0.72
PimaChannel	312.693*	EX_100yr	3310.00	1697.89	1703.20	1704.45	1706.12	0.024693	13.71	241.41	81.01	1.40
PimaChannel	312.693*	EX_2yr	365.00	1697.89	1700.62	1700.28	1701.01	0.008170	4.96	73.59	49.59	0.72
PimaChannel	331.358*	EX_100yr	3310.00	1698.31	1703.49	1704.93	1706.65	0.024017	14.25	232.32	71.87	1.40
PimaChannel	331.358*	EX_2yr	365.00	1698.31	1700.76	1700.40	1701.16	0.007942	5.09	71.72	45.51	0.71
PimaChannel	350.0239	EX_100yr	3310.00	1698.72	1703.95	1705.42	1707.07	0.020753	14.17	233.60	64.94	1.32
PimaChannel	350.0239	EX_2yr	365.00	1698.72	1700.89	1700.50	1701.32	0.007646	5.21	70.06	41.63	0.71
PimaChannel	562.0628	EX_100yr	2300.00	1707.48	1710.41	1710.74	1711.81	0.022423	9.11	243.35	162.61	1.21
PimaChannel	562.0628	EX_2yr	40.00	1707.48	1708.52	1708.52	1708.74	0.024750	3.73	10.74	25.00	1.00
PimaChannel	580.422*	EX_100yr	2300.00	1707.91	1710.83	1711.16	1712.23	0.022236	9.11	243.82	162.80	1.21
PimaChannel	580.422*	EX_2yr	40.00	1707.91	1708.97	1708.95	1709.17	0.022088	3.57	11.19	25.75	0.96
PimaChannel	598.782*	EX_100yr	2300.00	1708.34	1711.25	1711.58	1712.64	0.022019	9.12	244.66	163.07	1.21
PimaChannel	598.782*	EX_2yr	40.00	1708.34	1709.38	1709.38	1709.59	0.023092	3.66	10.92	25.29	0.98
PimaChannel	617.142*	EX_100yr	2300.00	1708.77	1711.67	1712.00	1713.04	0.021909	9.13	245.21	163.55	1.21
PimaChannel	617.142*	EX_2yr	40.00	1708.77	1709.82	1709.80	1710.00	0.021800	3.47	11.54	27.94	0.95
PimaChannel	635.501*	EX_100yr	2300.00	1709.20	1712.08	1712.40	1713.45	0.021847	9.14	245.66	164.05	1.21
PimaChannel	635.501*	EX_2yr	40.00	1709.20	1710.24	1710.23	1710.41	0.022405	3.27	12.23	33.03	0.95
PimaChannel	653.861*	EX_100yr	2300.00	1709.64	1712.49	1712.82	1713.85	0.021587	9.14	246.71	164.72	1.20
PimaChannel	653.861*	EX_2yr	40.00	1709.64	1710.71	1710.63	1710.82	0.021058	2.62	15.29	55.17	0.88
PimaChannel	672.221*	EX_100yr	2300.00	1710.07	1712.90	1713.22	1714.25	0.021414	9.15	247.52	165.37	1.20
PimaChannel	672.221*	EX_2yr	40.00	1710.07	1711.10	1711.08	1711.21	0.022203	2.59	15.43	58.75	0.89

HEC-RAS Plan: FU River: Pima Reach: PimaChannel (Continued)

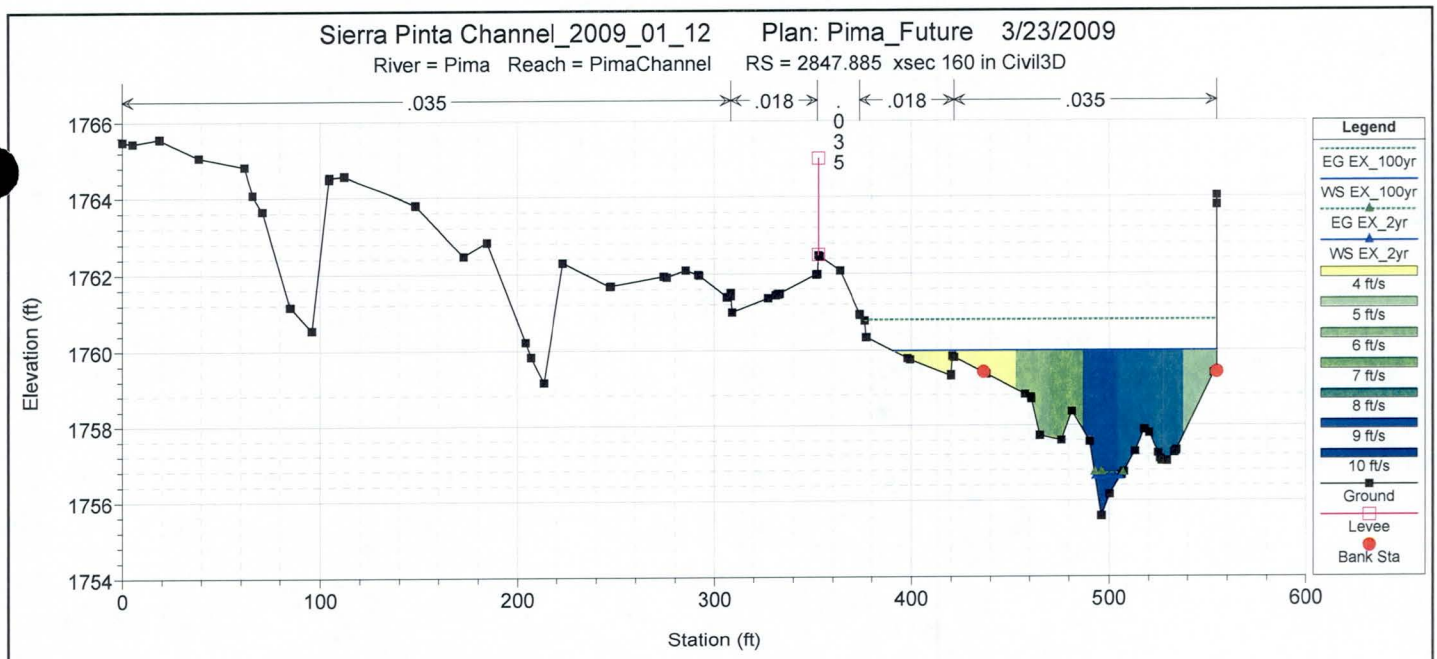
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	690.581*	EX_100yr	2300.00	1710.50	1713.30	1713.63	1714.66	0.021694	9.22	246.60	165.43	1.21
PimaChannel	690.581*	EX_2yr	40.00	1710.50	1711.51	1711.47	1711.60	0.020222	2.43	16.44	64.14	0.85
PimaChannel	708.940*	EX_100yr	2300.00	1710.93	1713.71	1714.02	1715.06	0.021789	9.26	246.40	165.35	1.21
PimaChannel	708.940*	EX_2yr	40.00	1710.93	1711.90	1711.87	1711.99	0.022281	2.50	16.02	64.69	0.88
PimaChannel	727.300*	EX_100yr	2300.00	1711.36	1714.10	1714.43	1715.46	0.022025	9.33	245.62	165.16	1.22
PimaChannel	727.300*	EX_2yr	40.00	1711.36	1712.29	1712.27	1712.38	0.020744	2.41	16.59	66.90	0.85
PimaChannel	745.660*	EX_100yr	2300.00	1711.79	1714.51	1714.84	1715.86	0.021743	9.32	246.66	165.06	1.21
PimaChannel	745.660*	EX_2yr	40.00	1711.79	1712.68	1712.65	1712.78	0.022336	2.46	16.27	67.33	0.88
PimaChannel	764.0201	EX_100yr	2300.00	1712.22	1714.89	1715.24	1716.27	0.022896	9.48	243.83	165.19	1.24
PimaChannel	764.0201	EX_2yr	40.00	1712.22	1713.09	1713.05	1713.17	0.020788	2.38	16.79	68.79	0.85
PimaChannel	783.564*	EX_100yr	2300.00	1712.54	1715.34	1715.69	1716.71	0.022145	9.55	245.03	162.88	1.23
PimaChannel	783.564*	EX_2yr	40.00	1712.54	1713.46	1713.41	1713.54	0.017285	2.39	16.73	59.53	0.79
PimaChannel	803.108*	EX_100yr	2300.00	1712.86	1715.81	1716.14	1717.14	0.020848	9.49	250.25	162.56	1.20
PimaChannel	803.108*	EX_2yr	40.00	1712.86	1713.77	1713.71	1713.88	0.016174	2.61	15.34	45.57	0.79
PimaChannel	822.652*	EX_100yr	2300.00	1713.18	1716.25	1716.54	1717.54	0.020250	9.40	254.29	165.09	1.19
PimaChannel	822.652*	EX_2yr	40.00	1713.18	1714.08	1714.01	1714.19	0.015727	2.77	14.46	38.51	0.80
PimaChannel	842.197*	EX_100yr	2300.00	1713.50	1716.66	1716.95	1717.94	0.019354	9.39	258.04	164.92	1.16
PimaChannel	842.197*	EX_2yr	40.00	1713.50	1714.38	1714.33	1714.51	0.016694	2.89	13.86	36.25	0.82
PimaChannel	861.741*	EX_100yr	2300.00	1713.82	1717.06	1717.33	1718.30	0.017891	9.28	263.26	163.81	1.12
PimaChannel	861.741*	EX_2yr	40.00	1713.82	1714.71	1714.65	1714.84	0.016974	2.87	13.94	37.26	0.83
PimaChannel	881.2854	EX_100yr	2300.00	1714.14	1717.29	1717.68	1718.72	0.020792	9.90	245.65	161.35	1.20
PimaChannel	881.2854	EX_2yr	40.00	1714.14	1715.06	1715.01	1715.16	0.015639	2.44	16.38	52.25	0.77
PimaChannel	1013.720	EX_100yr	2300.00	1716.53	1720.13	1720.40	1721.32	0.018239	8.76	263.02	180.29	1.11
PimaChannel	1013.720	EX_2yr	40.00	1716.53	1717.25	1717.20	1717.38	0.018088	2.90	13.79	38.09	0.85
PimaChannel	1046.424	EX_100yr	2300.00	1717.15	1720.88	1721.07	1721.92	0.017343	8.16	281.90	229.49	1.08
PimaChannel	1046.424	EX_2yr	40.00	1717.15	1717.73	1717.63	1717.86	0.012205	2.81	14.25	29.98	0.72
PimaChannel	1086.570	EX_100yr	2300.00	1717.82	1721.33	1721.86	1722.91	0.034211	10.25	236.20	209.89	1.48
PimaChannel	1086.570	EX_2yr	40.00	1717.82	1718.69	1718.73	1718.96	0.029338	4.17	9.60	22.08	1.11
PimaChannel	1176.759	EX_100yr	2300.00	1720.36	1723.76	1724.18	1725.21	0.019479	9.76	241.05	150.85	1.16
PimaChannel	1176.759	EX_2yr	40.00	1720.36	1721.27	1721.27	1721.44	0.025737	3.30	12.11	34.75	0.99
PimaChannel	1196.18*	EX_100yr	2300.00	1720.45	1724.17	1724.58	1725.58	0.018276	9.62	244.72	147.52	1.14
PimaChannel	1196.18*	EX_2yr	40.00	1720.45	1721.74	1721.68	1721.82	0.015003	2.38	16.81	53.23	0.75
PimaChannel	1215.62*	EX_100yr	2300.00	1720.53	1724.56	1724.94	1725.94	0.017481	9.46	248.12	145.39	1.12
PimaChannel	1215.62*	EX_2yr	40.00	1720.53	1722.02	1721.91	1722.10	0.013757	2.28	17.56	55.89	0.72
PimaChannel	1235.05*	EX_100yr	2300.00	1720.62	1724.94	1725.29	1726.27	0.016455	9.29	251.67	140.52	1.09
PimaChannel	1235.05*	EX_2yr	40.00	1720.62	1722.20	1721.86	1722.28	0.006182	2.15	18.58	35.20	0.52
PimaChannel	1254.48*	EX_100yr	2300.00	1720.71	1725.57	1725.57	1726.55	0.010443	8.04	293.69	155.12	0.88
PimaChannel	1254.48*	EX_2yr	40.00	1720.71	1722.30	1721.76	1722.36	0.003046	1.93	20.69	27.04	0.39
PimaChannel	1273.91*	EX_100yr	2300.00	1720.79	1725.63	1725.82	1726.88	0.014795	8.99	257.58	127.18	1.04
PimaChannel	1273.91*	EX_2yr	40.00	1720.79	1722.36	1721.68	1722.41	0.002223	1.74	22.92	27.70	0.34
PimaChannel	1293.34*	EX_100yr	2300.00	1720.88	1726.02	1726.02	1727.16	0.012650	8.56	269.92	124.79	0.97
PimaChannel	1293.34*	EX_2yr	40.00	1720.88	1722.41	1721.67	1722.45	0.001712	1.61	24.90	28.05	0.30
PimaChannel	1312.77*	EX_100yr	2300.00	1720.97	1726.25	1726.19	1727.41	0.012661	8.62	266.94	111.03	0.97
PimaChannel	1312.77*	EX_2yr	40.00	1720.97	1722.44	1721.69	1722.48	0.001379	1.50	26.68	28.41	0.27
PimaChannel	1332.20*	EX_100yr	2300.00	1721.05	1726.55	1726.40	1727.64	0.011309	8.36	275.12	107.35	0.92
PimaChannel	1332.20*	EX_2yr	40.00	1721.05	1722.47	1721.70	1722.50	0.001148	1.40	28.51	29.24	0.25
PimaChannel	1351.63*	EX_100yr	2300.00	1721.14	1726.79	1726.43	1727.85	0.010441	8.23	279.42	105.16	0.89
PimaChannel	1351.63*	EX_2yr	40.00	1721.14	1722.50	1721.75	1722.53	0.001011	1.33	30.06	30.40	0.24
PimaChannel	1371.06*	EX_100yr	2300.00	1721.23	1727.03	1726.42	1728.03	0.008838	8.03	286.48	98.73	0.83
PimaChannel	1371.06*	EX_2yr	40.00	1721.23	1722.52	1721.78	1722.54	0.000921	1.27	31.47	31.79	0.23
PimaChannel	1390.49*	EX_100yr	2300.00	1721.31	1727.24	1726.32	1728.19	0.007289	7.80	294.84	91.76	0.77

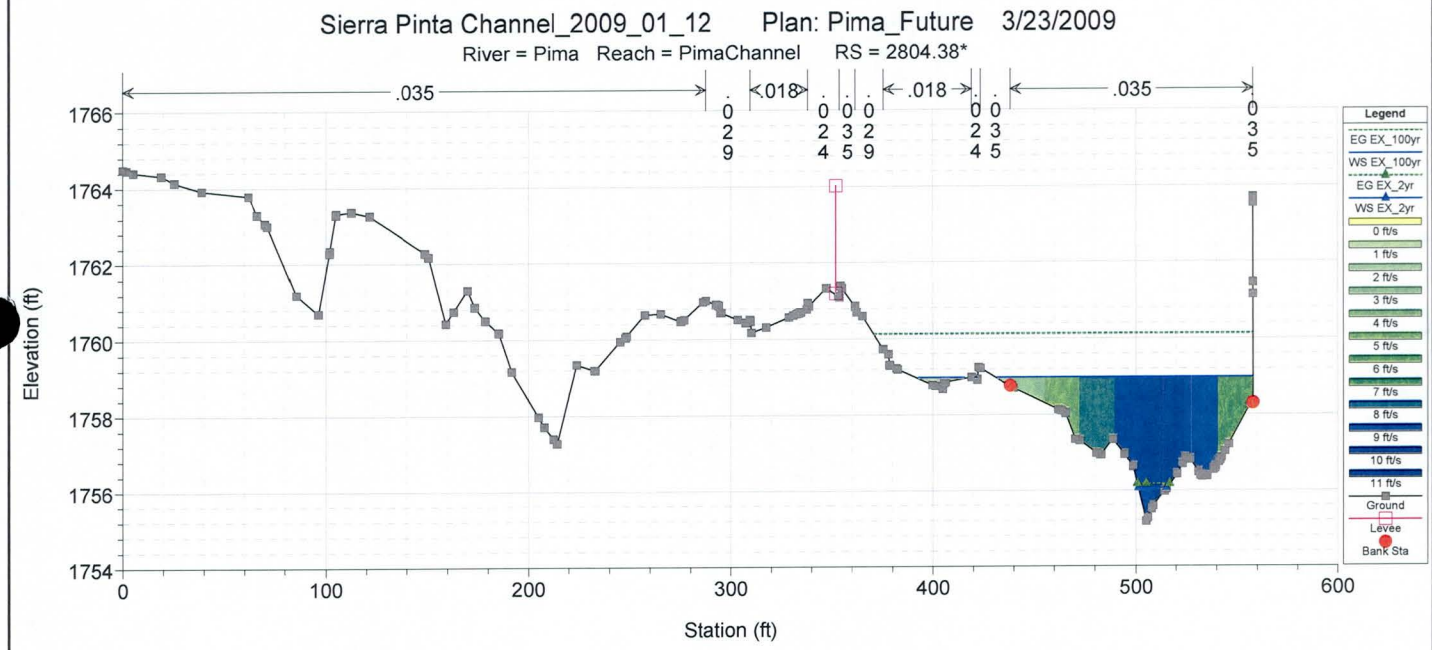
HEC-RAS Plan: FU River: Pima Reach: PimaChannel (Continued)

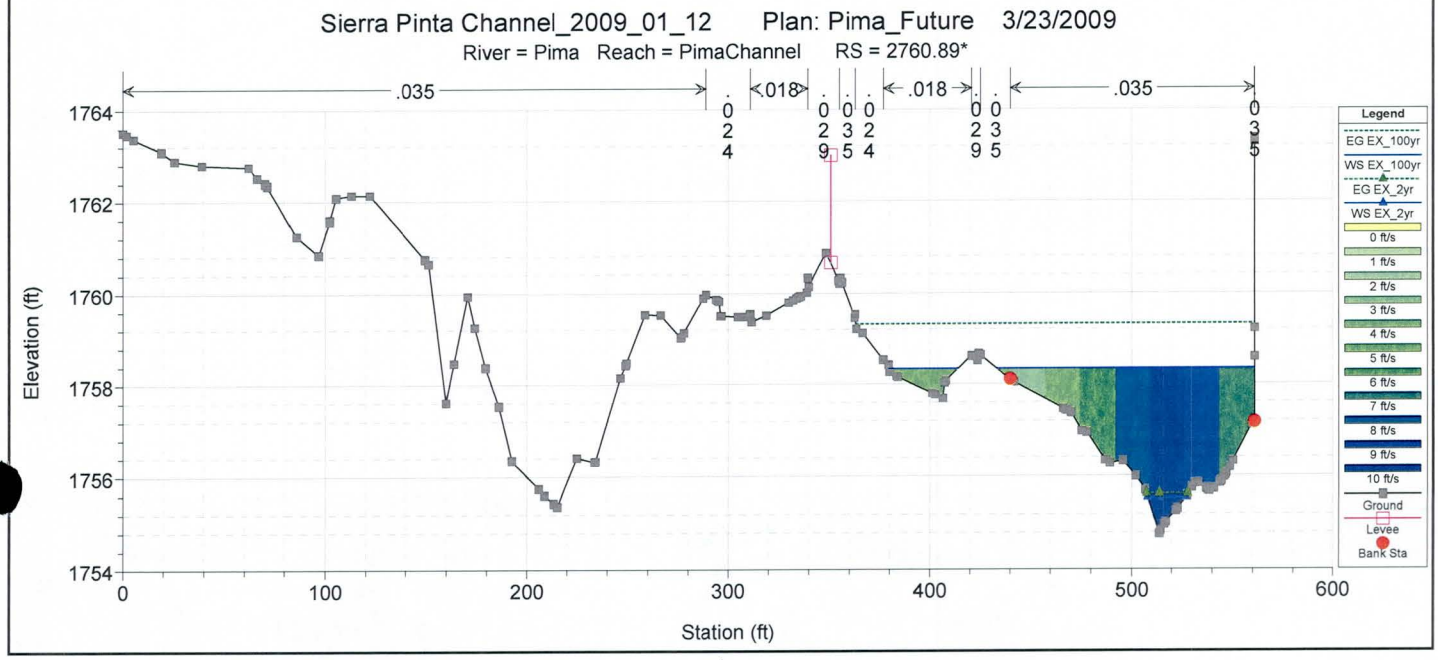
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	1390.49*	EX_2yr	40.00	1721.31	1722.54	1721.81	1722.56	0.000843	1.21	32.94	33.41	0.22
PimaChannel	1409.92*	EX_100yr	2300.00	1721.40	1727.42	1726.28	1728.31	0.005350	7.58	303.57	78.12	0.68
PimaChannel	1409.92*	EX_2yr	40.00	1721.40	1722.56	1721.85	1722.58	0.000807	1.18	34.04	35.10	0.21
PimaChannel	1429.35*	EX_100yr	2300.00	1721.49	1727.59	1726.21	1728.41	0.004444	7.26	316.85	75.50	0.62
PimaChannel	1429.35*	EX_2yr	40.00	1721.49	1722.57	1721.89	1722.59	0.000789	1.14	34.99	36.99	0.21
PimaChannel	1448.784	EX_100yr	2300.00	1721.57	1727.79	1726.15	1728.53	0.007215	6.90	333.32	75.49	0.58
PimaChannel	1448.784	EX_2yr	40.00	1721.57	1722.60	1721.93	1722.62	0.002206	1.10	36.24	39.00	0.20
PimaChannel	1467.22*	EX_100yr	2300.00	1721.61	1727.91	1726.26	1728.65	0.006352	6.93	332.02	75.03	0.58
PimaChannel	1467.22*	EX_2yr	40.00	1721.61	1722.64	1722.03	1722.66	0.002231	1.18	33.96	38.61	0.22
PimaChannel	1485.66*	EX_100yr	2300.00	1721.65	1728.02	1726.38	1728.77	0.006279	6.93	331.82	74.45	0.58
PimaChannel	1485.66*	EX_2yr	40.00	1721.65	1722.68	1722.08	1722.70	0.002550	1.23	32.48	38.41	0.24
PimaChannel	1504.09*	EX_100yr	2300.00	1721.69	1728.16	1726.46	1728.89	0.006817	6.87	334.61	81.56	0.60
PimaChannel	1504.09*	EX_2yr	40.00	1721.69	1722.73	1722.11	1722.75	0.002691	1.25	32.12	36.83	0.24
PimaChannel	1522.53*	EX_100yr	2300.00	1721.73	1728.30	1726.53	1729.01	0.006695	6.77	339.82	82.04	0.59
PimaChannel	1522.53*	EX_2yr	40.00	1721.73	1722.78	1722.14	1722.80	0.002562	1.22	32.91	36.08	0.22
PimaChannel	1540.97*	EX_100yr	2300.00	1721.76	1728.45	1726.56	1729.13	0.006475	6.64	346.32	82.22	0.57
PimaChannel	1540.97*	EX_2yr	40.00	1721.76	1722.82	1722.15	1722.84	0.002322	1.16	34.36	36.21	0.21
PimaChannel	1559.41*	EX_100yr	2300.00	1721.80	1728.59	1726.61	1729.25	0.006268	6.52	352.74	82.30	0.56
PimaChannel	1559.41*	EX_2yr	40.00	1721.80	1722.87	1722.17	1722.89	0.002167	1.12	35.62	36.77	0.20
PimaChannel	1577.85*	EX_100yr	2300.00	1721.84	1728.73	1726.56	1729.36	0.006038	6.39	359.80	82.41	0.54
PimaChannel	1577.85*	EX_2yr	40.00	1721.84	1722.91	1722.21	1722.92	0.002025	1.08	36.94	37.58	0.19
PimaChannel	1596.29*	EX_100yr	2300.00	1721.88	1728.86	1726.56	1729.47	0.005805	6.26	367.12	82.46	0.52
PimaChannel	1596.29*	EX_2yr	40.00	1721.88	1722.94	1722.23	1722.96	0.001901	1.05	38.26	38.59	0.19
PimaChannel	1614.72*	EX_100yr	2300.00	1721.91	1728.99	1726.54	1729.58	0.005699	6.13	375.22	82.55	0.51
PimaChannel	1614.72*	EX_2yr	40.00	1721.91	1722.98	1722.24	1722.99	0.001818	1.00	39.85	39.72	0.18
PimaChannel	1633.167	EX_100yr	2300.00	1721.95	1729.12	1726.49	1729.68	0.005323	6.00	383.28	82.66	0.49
PimaChannel	1633.167	EX_2yr	40.00	1721.95	1723.01	1722.28	1723.03	0.001666	0.97	41.08	40.91	0.17
PimaChannel	1934.738	EX_100yr	1850.00	1737.29	1740.60	1741.02	1742.17	0.027654	10.06	183.90	107.52	1.36
PimaChannel	1934.738	EX_2yr	15.00	1737.29	1738.16	1738.16	1738.34	0.025079	3.41	4.40	12.00	0.99
PimaChannel	1953.36*	EX_100yr	1850.00	1737.69	1741.08	1741.52	1742.70	0.027478	10.19	181.54	103.63	1.36
PimaChannel	1953.36*	EX_2yr	15.00	1737.69	1738.59	1738.53	1738.72	0.016385	2.82	5.32	14.10	0.81
PimaChannel	1971.98*	EX_100yr	1850.00	1738.09	1741.57	1742.02	1743.22	0.027033	10.30	179.69	99.78	1.35
PimaChannel	1971.98*	EX_2yr	15.00	1738.09	1738.93	1738.90	1739.07	0.021305	3.06	4.91	14.06	0.91
PimaChannel	1990.60*	EX_100yr	1850.00	1738.49	1742.06	1742.51	1743.73	0.026272	10.37	178.33	95.86	1.34
PimaChannel	1990.60*	EX_2yr	15.00	1738.49	1739.32	1739.27	1739.44	0.018062	2.79	5.37	15.58	0.84
PimaChannel	2009.22*	EX_100yr	1850.00	1738.88	1742.52	1742.97	1744.24	0.025989	10.53	175.77	91.69	1.34
PimaChannel	2009.22*	EX_2yr	15.00	1738.88	1739.67	1739.63	1739.79	0.019353	2.80	5.36	16.36	0.86
PimaChannel	2027.84*	EX_100yr	1850.00	1739.28	1742.99	1743.44	1744.72	0.024876	10.57	175.10	87.90	1.32
PimaChannel	2027.84*	EX_2yr	15.00	1739.28	1740.04	1739.98	1740.14	0.018139	2.64	5.69	18.12	0.83
PimaChannel	2046.47*	EX_100yr	1850.00	1739.68	1743.39	1743.89	1745.22	0.024936	10.87	170.14	81.61	1.33
PimaChannel	2046.47*	EX_2yr	15.00	1739.68	1740.38	1740.34	1740.49	0.018781	2.57	5.83	19.74	0.83
PimaChannel	2065.09*	EX_100yr	1850.00	1740.08	1743.79	1744.29	1745.71	0.024599	11.12	166.44	76.05	1.32
PimaChannel	2065.09*	EX_2yr	15.00	1740.08	1740.74	1740.69	1740.83	0.017688	2.43	6.17	21.76	0.81
PimaChannel	2083.71*	EX_100yr	1850.00	1740.48	1744.12	1744.68	1746.21	0.024080	11.60	159.52	66.84	1.32
PimaChannel	2083.71*	EX_2yr	15.00	1740.48	1741.07	1741.03	1741.16	0.018234	2.38	6.31	23.58	0.81
PimaChannel	2102.336	EX_100yr	1850.00	1740.87	1744.22	1745.01	1746.90	0.032152	13.13	140.85	60.58	1.52
PimaChannel	2102.336	EX_2yr	15.00	1740.87	1741.40	1741.35	1741.48	0.017176	2.32	6.46	23.91	0.79
PimaChannel	2141.619	EX_100yr	1850.00	1741.89	1746.37	1746.74	1747.89	0.016416	9.92	187.97	88.30	1.09
PimaChannel	2141.619	EX_2yr	15.00	1741.89	1742.52	1742.52	1742.71	0.024516	3.46	4.33	11.40	0.99
PimaChannel	2188.41*	EX_100yr	1850.00	1742.88	1747.14	1747.68	1748.79	0.021335	10.31	179.58	85.59	1.23
PimaChannel	2188.41*	EX_2yr	15.00	1742.88	1743.67	1743.67	1743.86	0.024994	3.48	4.32	11.42	1.00

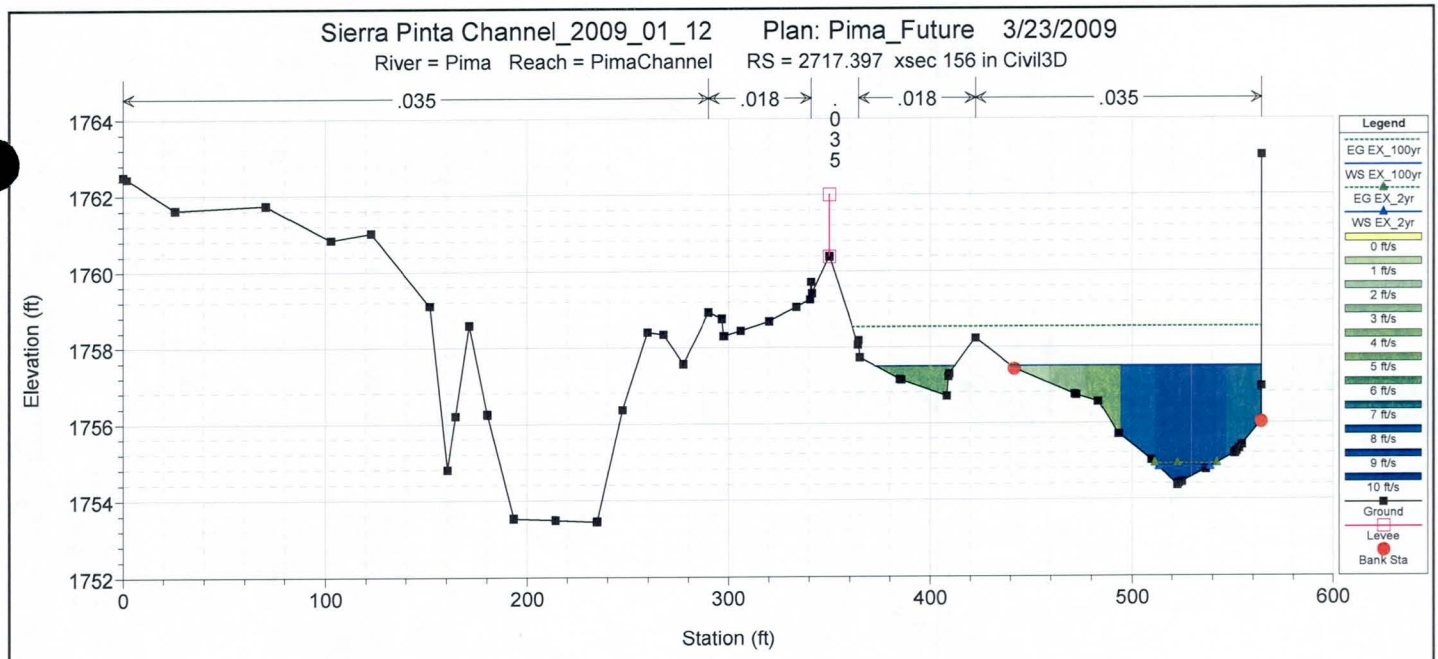
HEC-RAS Plan: FU River: Pima Reach: PimaChannel (Continued)

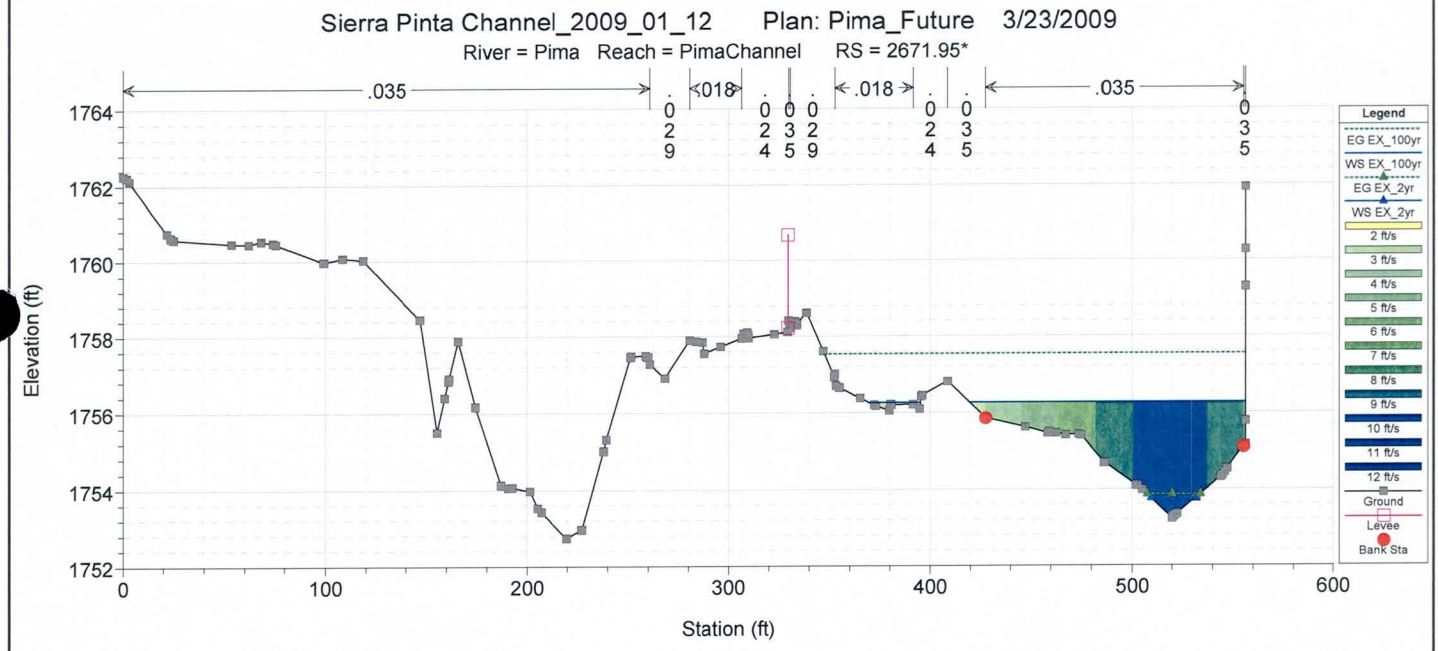
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
PimaChannel	2235.211	EX_100yr	1850.00	1743.87	1748.64	1748.64	1749.50	0.009462	7.60	258.94	158.65	0.84
PimaChannel	2235.211	EX_2yr	15.00	1743.87	1744.81	1744.79	1744.97	0.022409	3.25	4.61	12.40	0.94
PimaChannel	2272.59*	EX_100yr	1850.00	1744.86	1749.11	1748.80	1749.85	0.008348	6.97	274.62	162.57	0.79
PimaChannel	2272.59*	EX_2yr	15.00	1744.86	1745.68	1745.67	1745.84	0.024442	3.17	4.74	14.24	0.97
PimaChannel	2309.98*	EX_100yr	1850.00	1745.85	1749.43	1749.24	1750.22	0.010600	7.13	261.23	139.76	0.87
PimaChannel	2309.98*	EX_2yr	15.00	1745.85	1746.56	1746.54	1746.70	0.021833	3.02	4.97	14.80	0.92
PimaChannel	2347.375	EX_100yr	1850.00	1746.84	1749.74	1749.81	1750.68	0.016862	7.81	236.93	142.06	1.06
PimaChannel	2347.375	EX_2yr	15.00	1746.84	1747.40	1747.38	1747.54	0.022776	3.08	4.87	14.49	0.94
PimaChannel	2411.18*	EX_100yr	1850.00	1748.06	1750.79	1750.79	1751.69	0.014627	7.60	244.01	142.58	1.00
PimaChannel	2411.18*	EX_2yr	15.00	1748.06	1748.55	1748.48	1748.62	0.012717	1.98	7.57	28.41	0.68
PimaChannel	2474.992	EX_100yr	1850.00	1749.29	1751.72	1751.94	1752.84	0.020378	8.50	220.65	151.05	1.16
PimaChannel	2474.992	EX_2yr	15.00	1749.29	1749.59	1749.55	1749.65	0.021290	2.12	7.09	35.53	0.83
PimaChannel	2510.35*	EX_100yr	1850.00	1749.85	1752.45	1752.69	1753.58	0.021594	8.55	221.00	153.66	1.19
PimaChannel	2510.35*	EX_2yr	15.00	1749.85	1750.30	1750.27	1750.38	0.020081	2.25	6.66	29.10	0.83
PimaChannel	2545.71*	EX_100yr	1850.00	1750.42	1753.34	1753.43	1754.27	0.016721	7.80	243.71	158.14	1.06
PimaChannel	2545.71*	EX_2yr	15.00	1750.42	1750.97	1750.93	1751.06	0.018677	2.43	6.17	22.68	0.82
PimaChannel	2581.073	EX_100yr	1850.00	1750.99	1753.87	1754.18	1755.10	0.027752	8.99	210.70	158.00	1.32
PimaChannel	2581.073	EX_2yr	15.00	1750.99	1751.60	1751.56	1751.71	0.017759	2.57	5.84	19.03	0.82
PimaChannel	2626.51*	EX_100yr	1850.00	1752.11	1755.08	1755.45	1756.36	0.027142	9.13	206.24	148.43	1.32
PimaChannel	2626.51*	EX_2yr	15.00	1752.11	1752.65	1752.65	1752.78	0.026880	2.90	5.18	19.24	0.98
PimaChannel	2671.95*	EX_100yr	1850.00	1753.23	1756.28	1756.68	1757.55	0.024984	9.09	207.29	163.09	1.28
PimaChannel	2671.95*	EX_2yr	15.00	1753.23	1753.76	1753.73	1753.86	0.021107	2.53	5.93	22.58	0.87
PimaChannel	2717.397	EX_100yr	1850.00	1754.36	1757.50	1757.77	1758.55	0.018706	8.32	226.74	163.98	1.12
PimaChannel	2717.397	EX_2yr	15.00	1754.36	1754.82	1754.81	1754.93	0.026535	2.59	5.80	25.37	0.95
PimaChannel	2760.89*	EX_100yr	1850.00	1754.77	1758.33	1758.51	1759.31	0.015666	8.02	235.93	161.51	1.04
PimaChannel	2760.89*	EX_2yr	15.00	1754.77	1755.53	1755.41	1755.61	0.010400	2.19	6.84	18.91	0.64
PimaChannel	2804.38*	EX_100yr	1850.00	1755.18	1758.95	1759.25	1760.11	0.019237	8.64	216.41	150.13	1.14
PimaChannel	2804.38*	EX_2yr	15.00	1755.18	1756.04	1755.96	1756.16	0.014783	2.74	5.48	14.05	0.77
PimaChannel	2847.885	EX_100yr	1850.00	1755.59	1759.96	1759.96	1760.77	0.011270	7.31	261.21	163.55	0.89
PimaChannel	2847.885	EX_2yr	15.00	1755.59	1756.61	1756.48	1756.72	0.011514	2.66	5.65	12.45	0.70

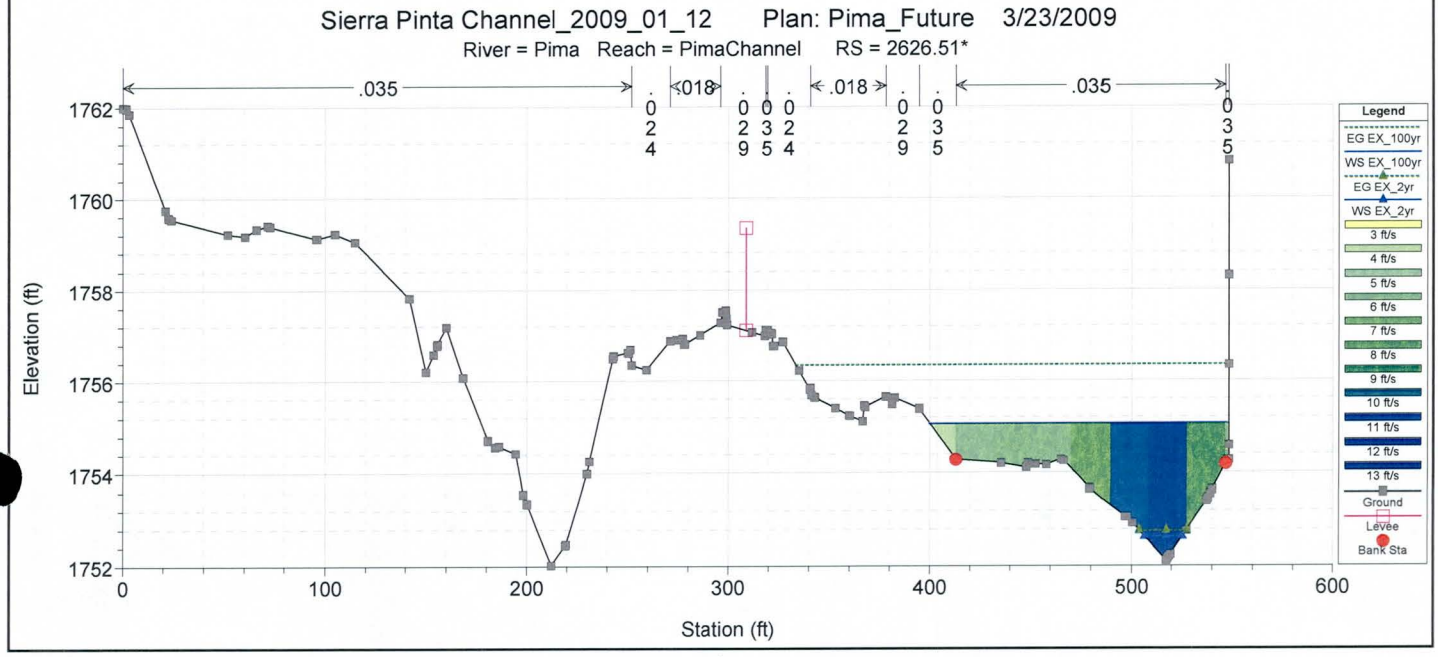

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2847.885 xsec 160 in Civil3D
.035
.018
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

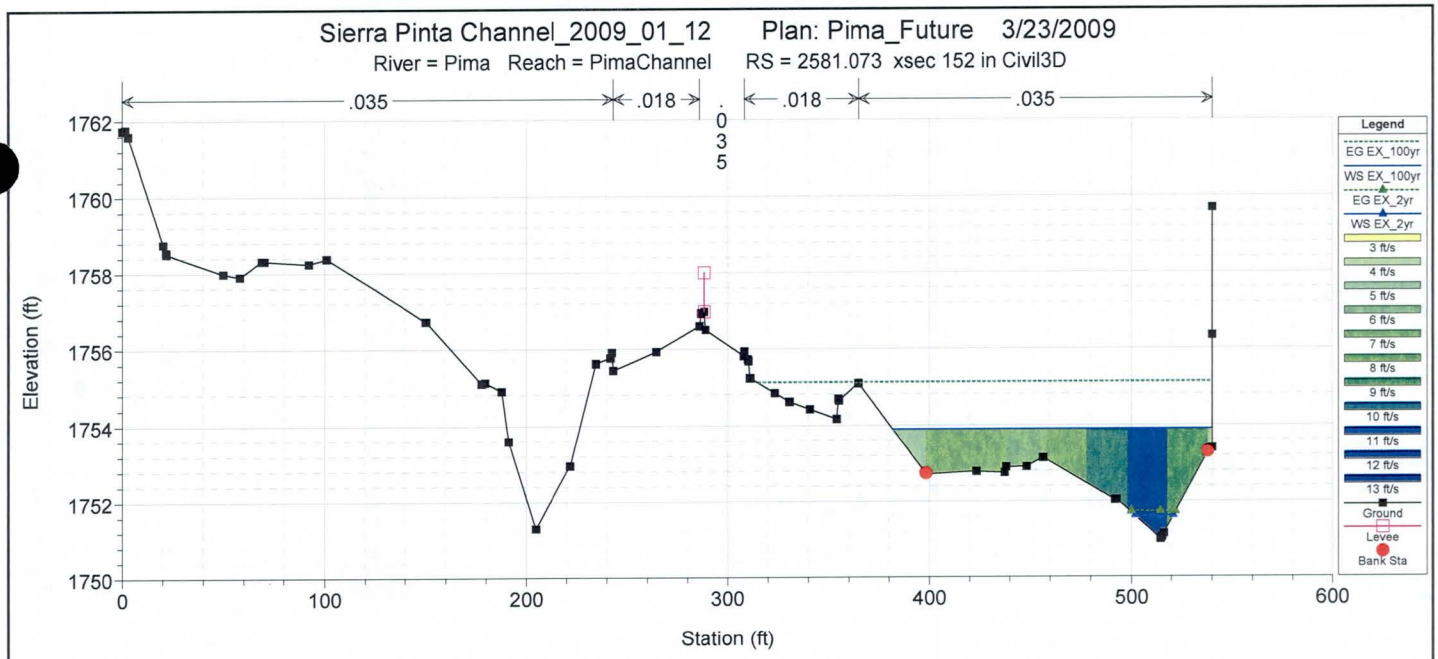

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2804.38*
.035
.018
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

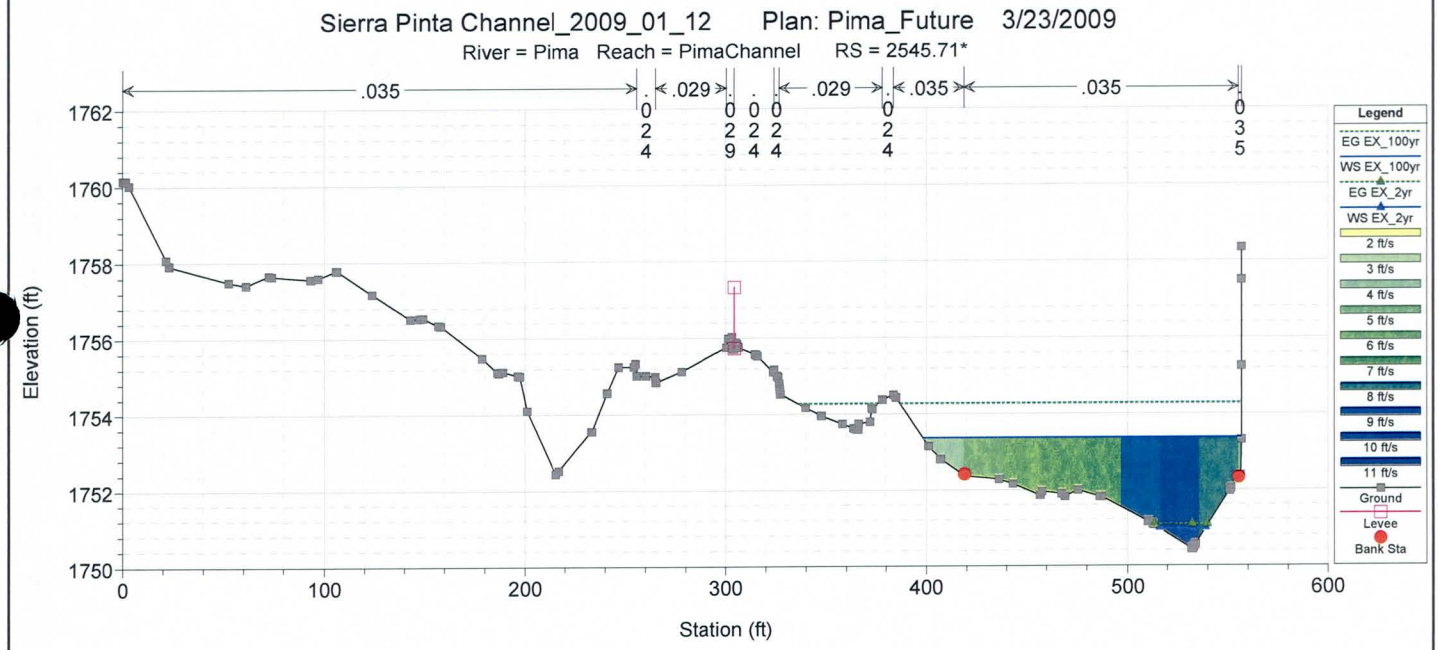

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2760.89*
.035
.018
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

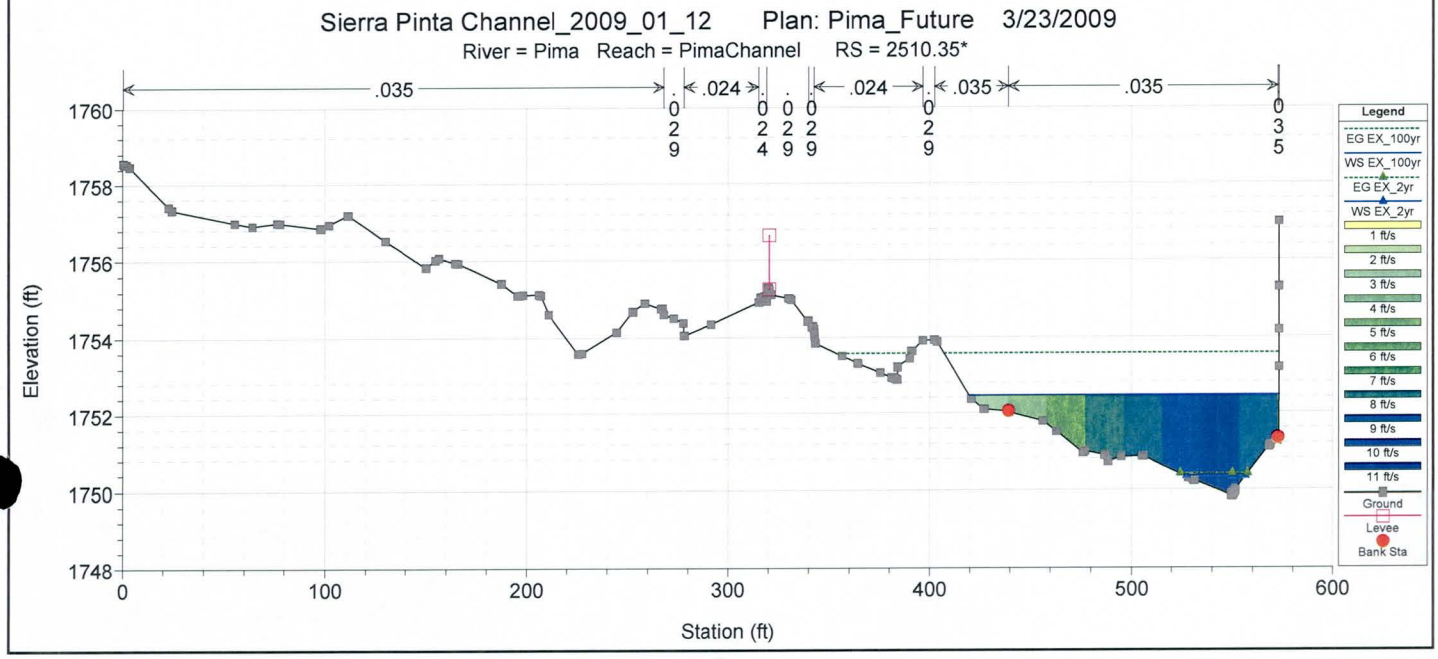

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2717.397 xsec 156 in Civil3D
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

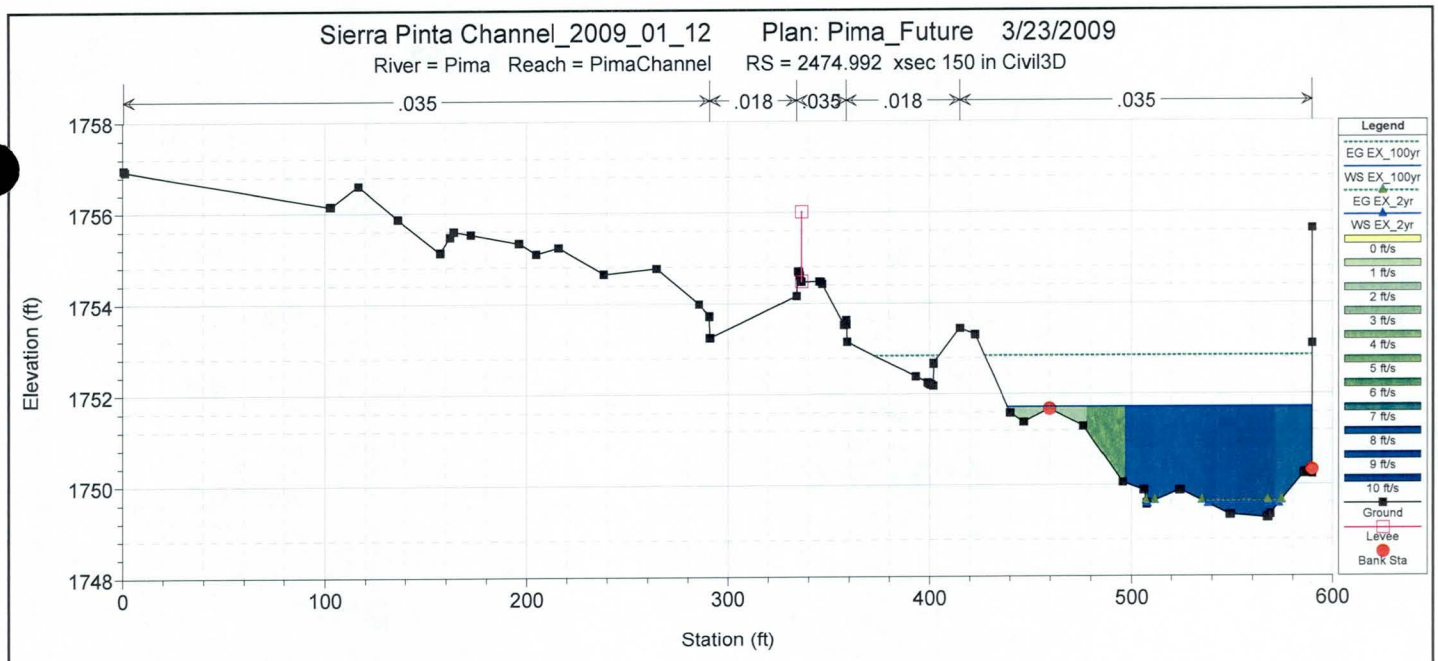

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2671.95*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

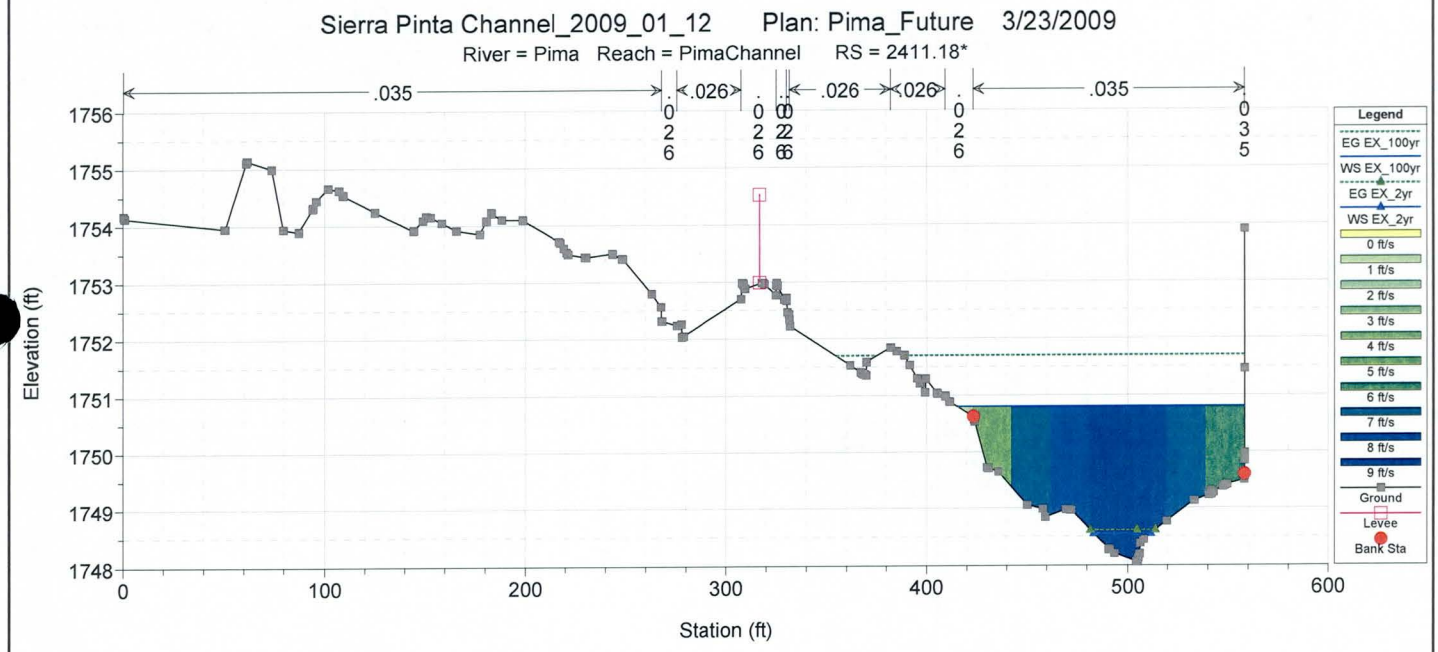

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2626.51*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

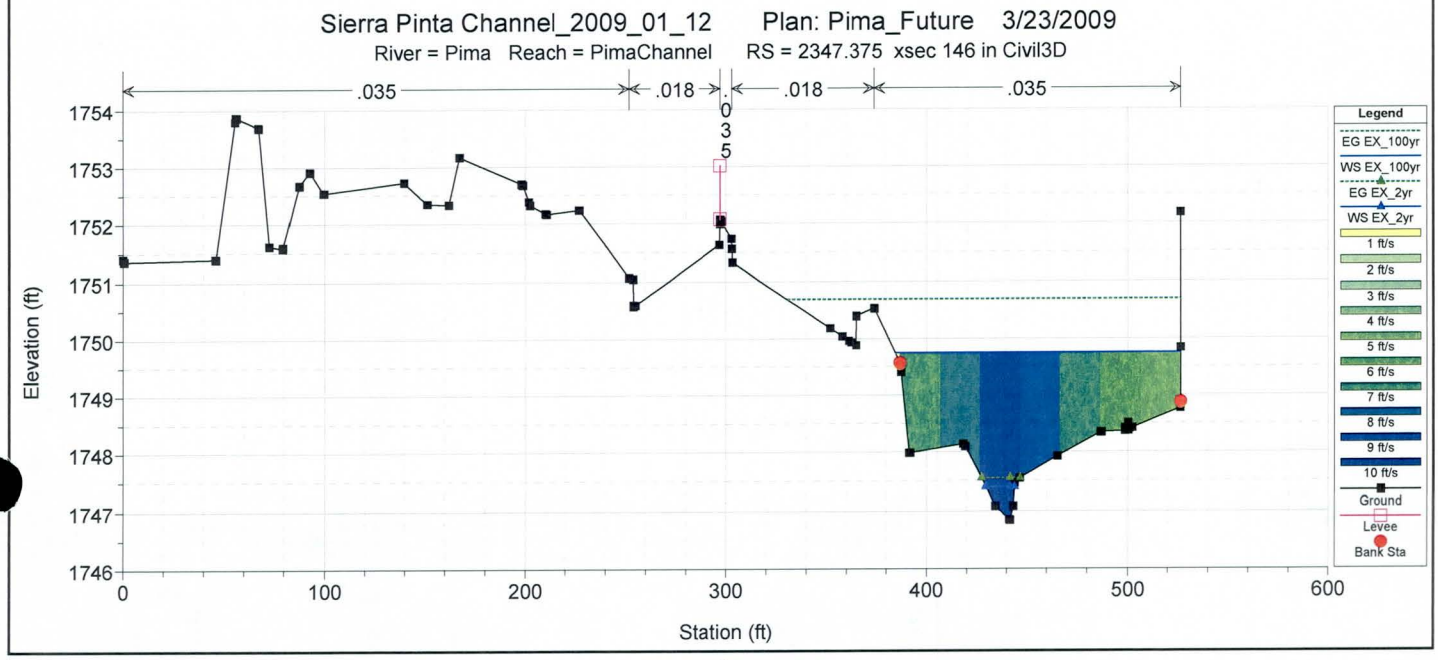

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2581.073 xsec 152 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

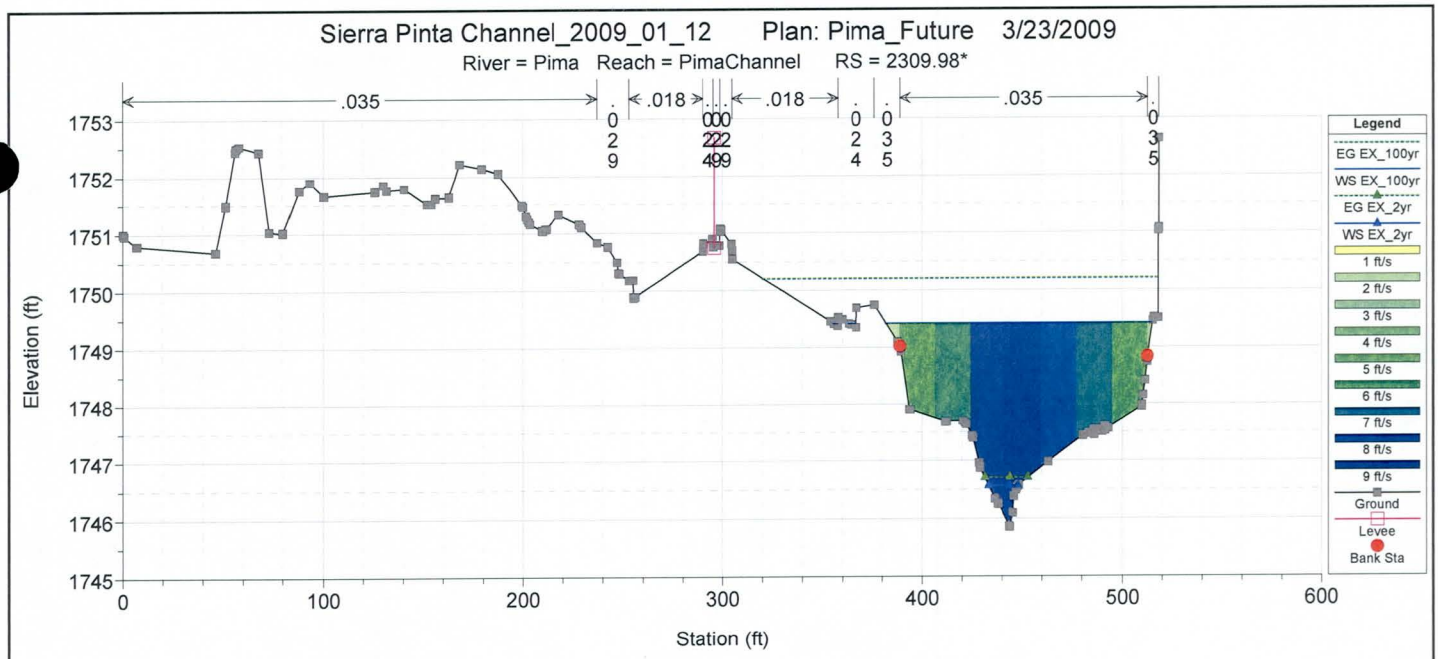

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2545.71*
.035
.029
.029
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

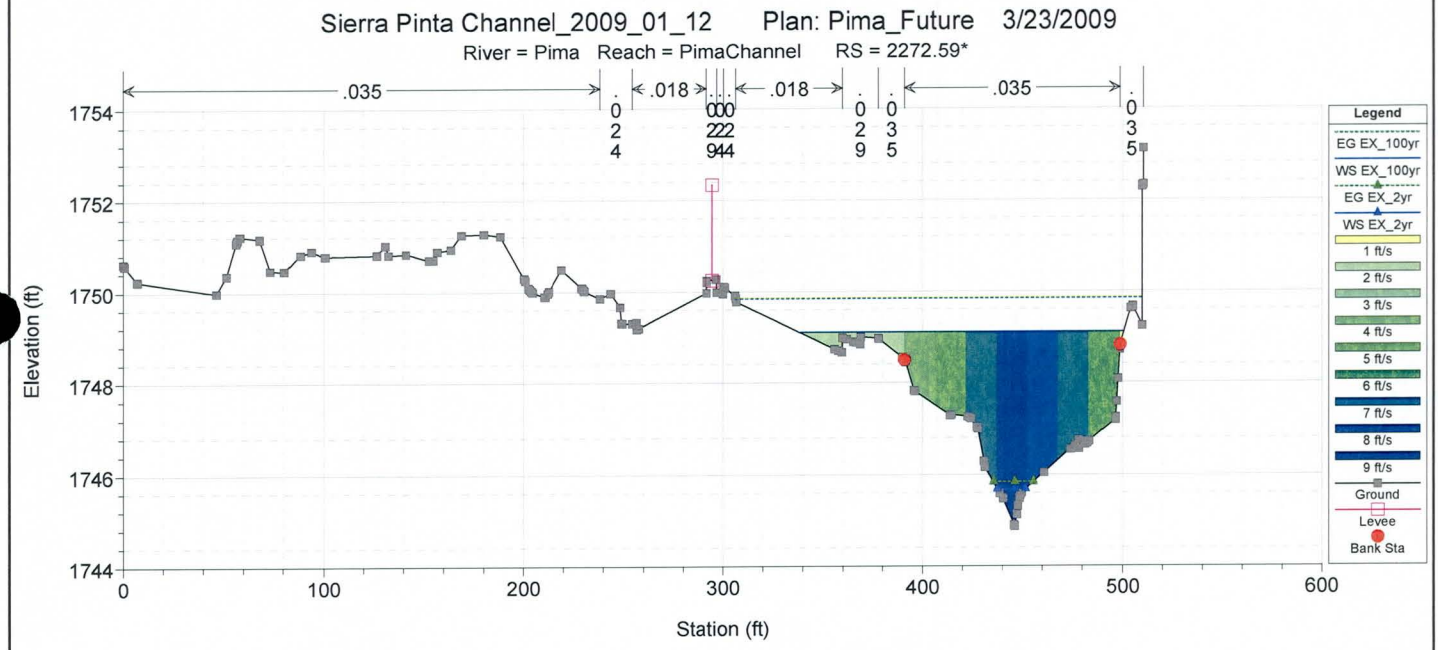

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2510.35*
.035
.024
.024
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

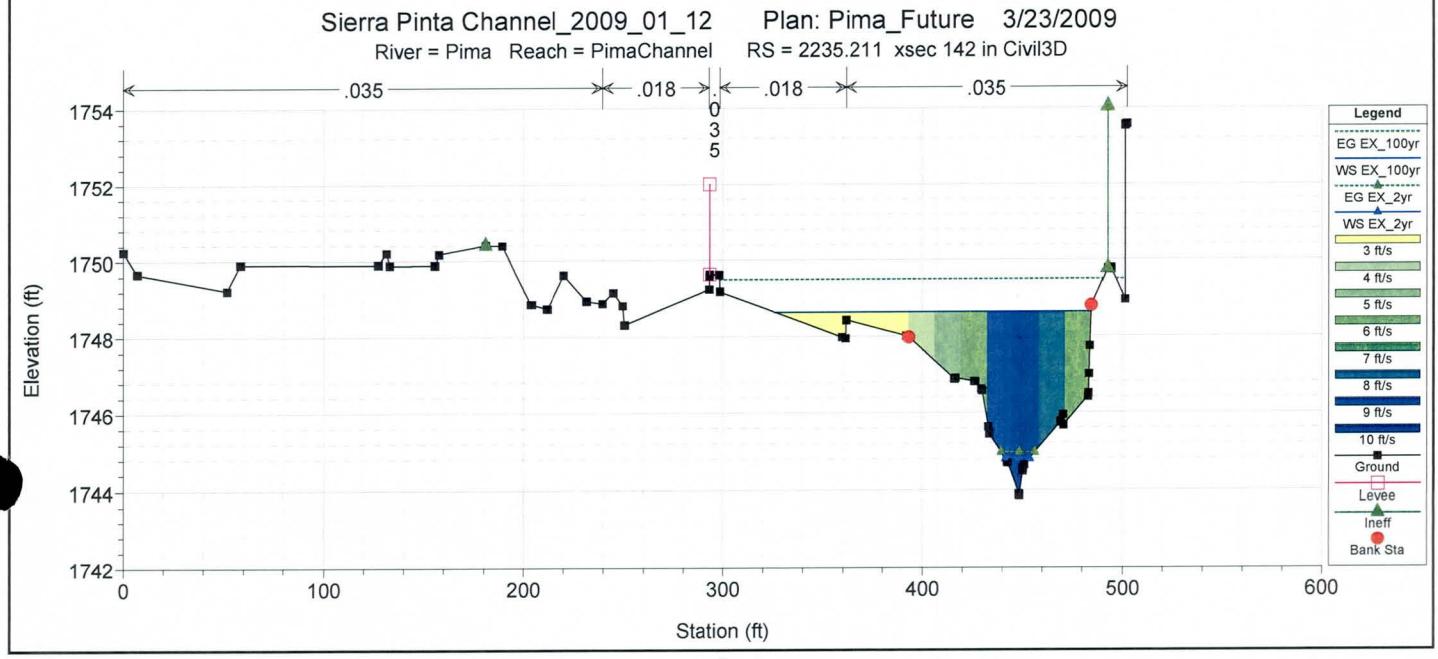

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2474.992 xsec 150 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta

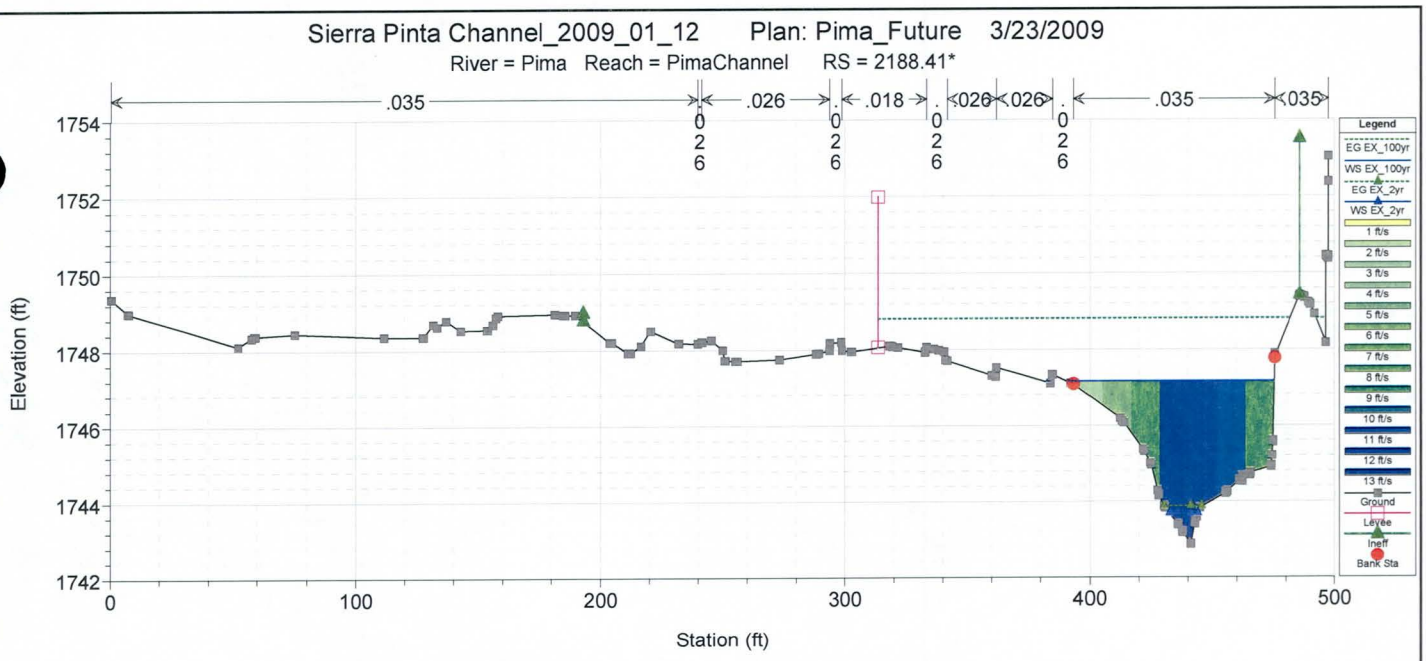

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2411.18*
.035
.026
.026
.026
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

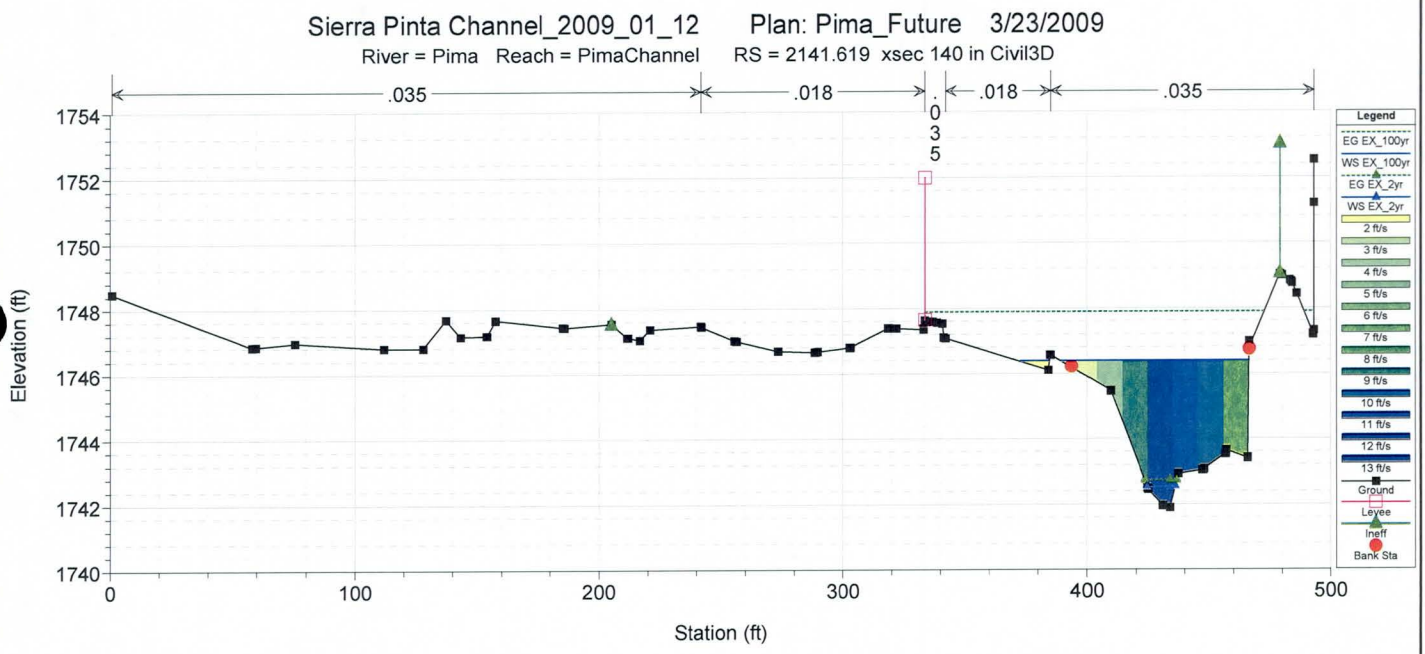

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2347.375 xsec 146 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta

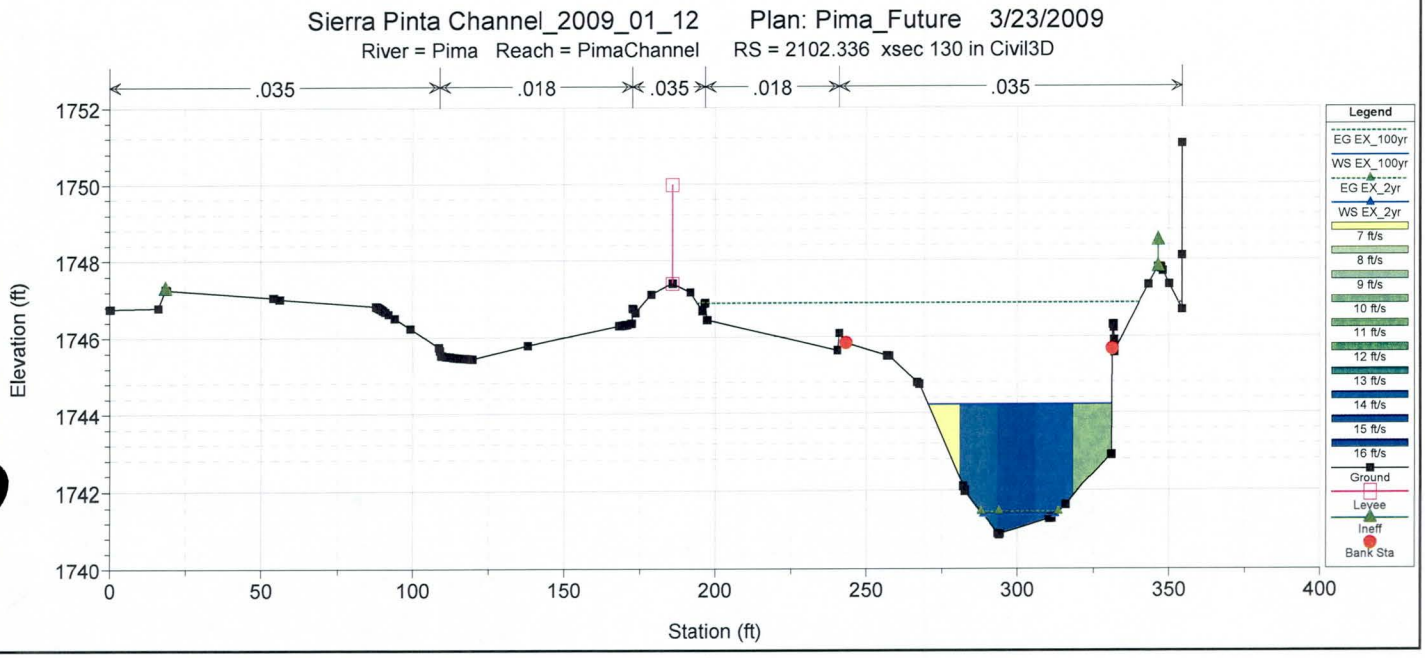

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2309.98*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

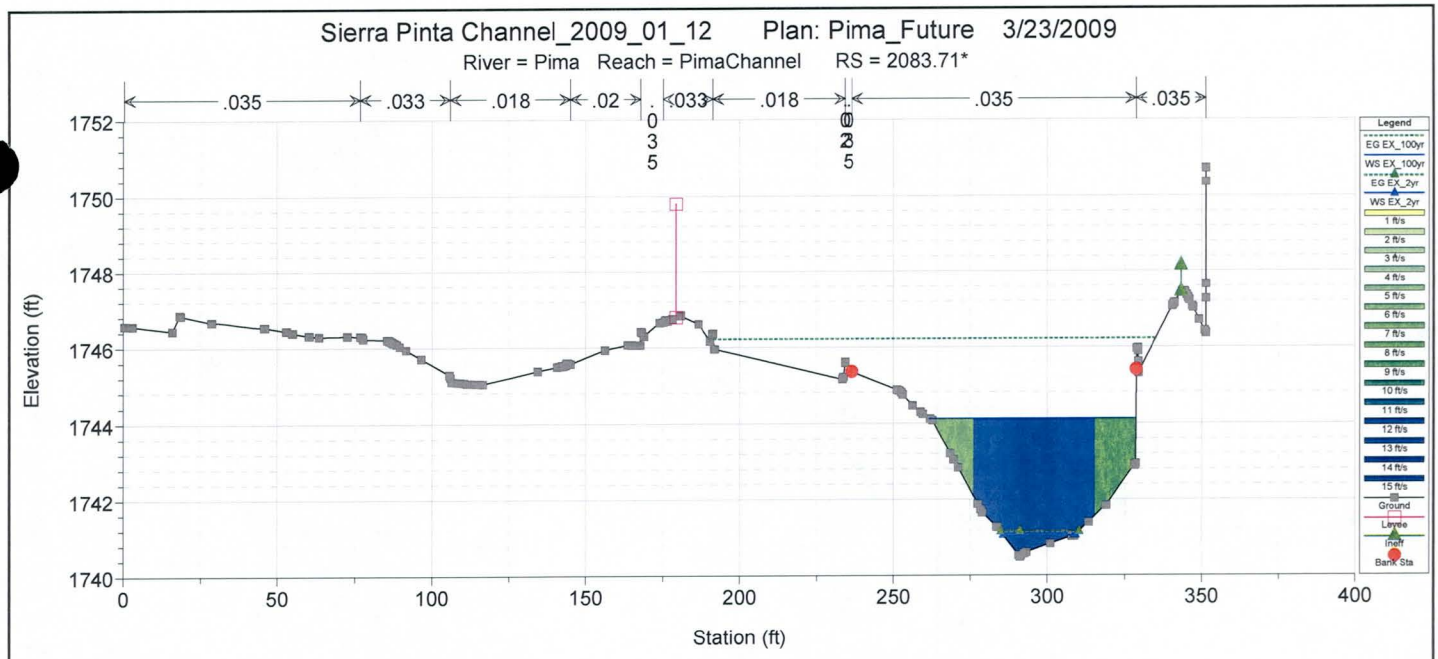

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2272.59*
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

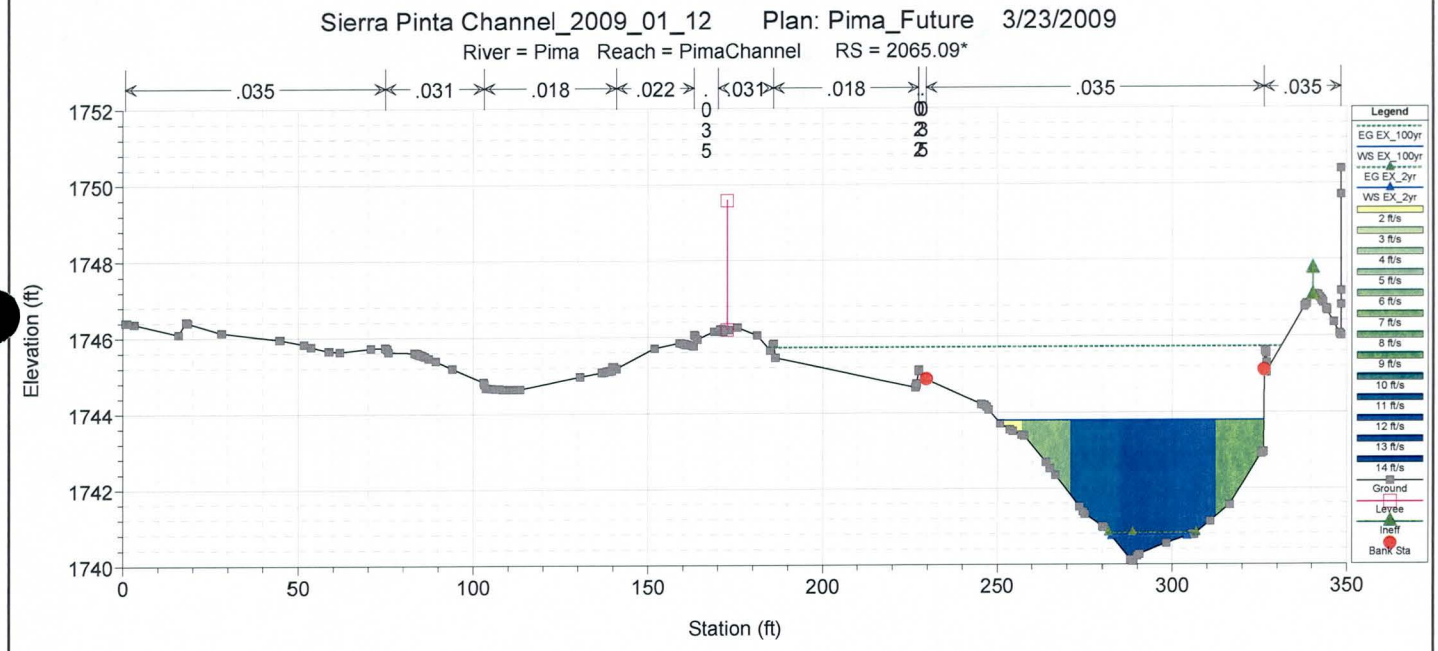

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2235.211 xsec 142 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Ineff
Bank Sta

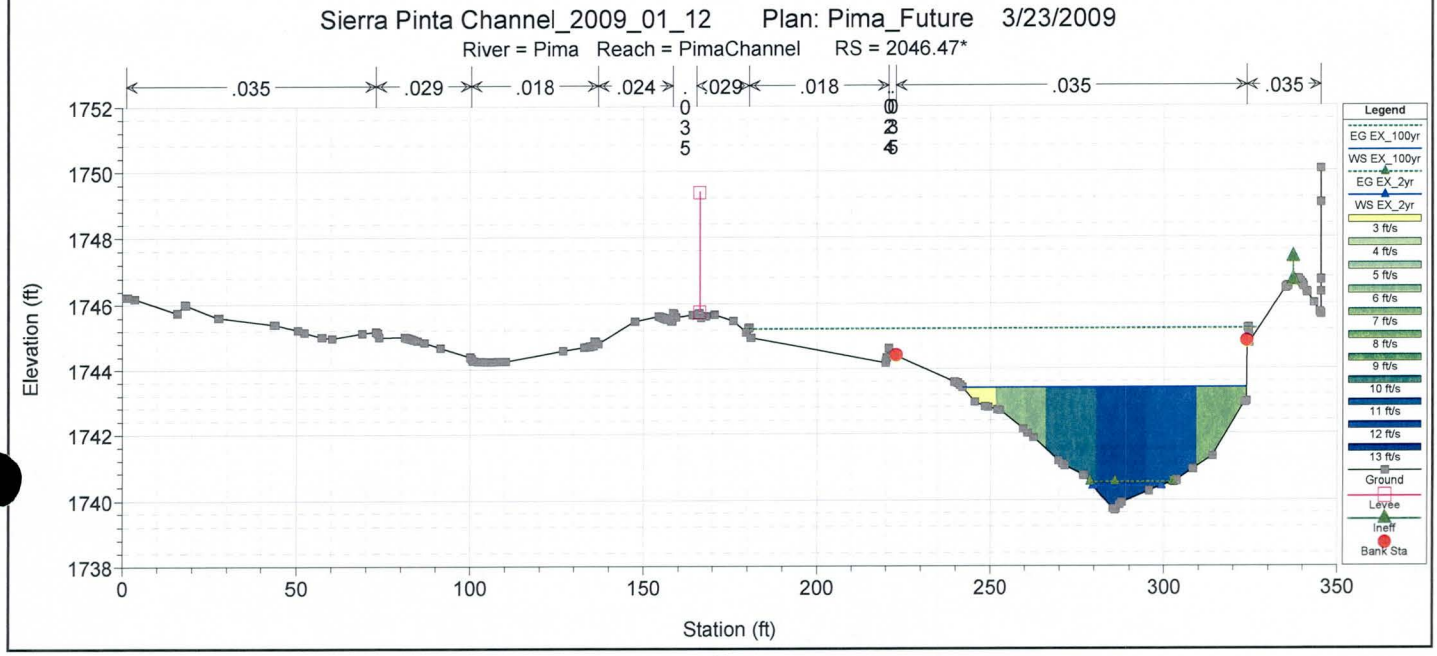

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2188.41*
.035
.026
.018
.026
.026
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

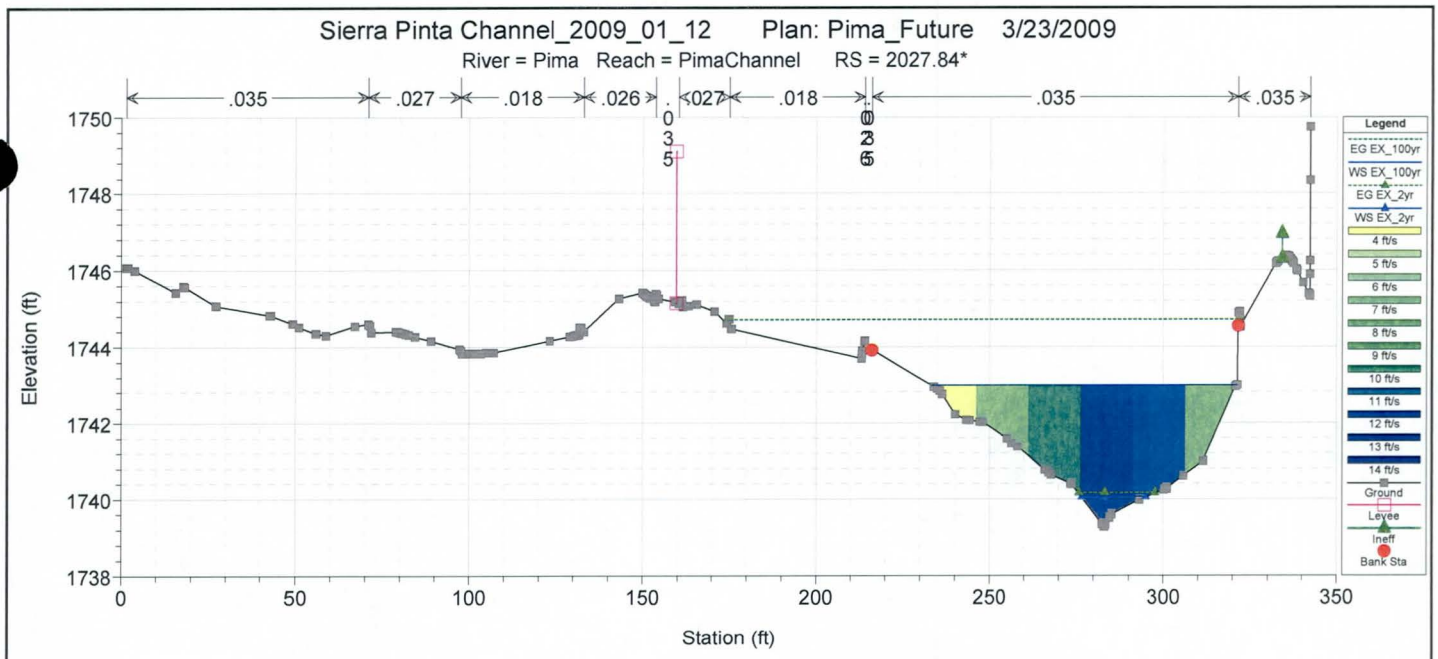

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2141.619 xsec 140 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

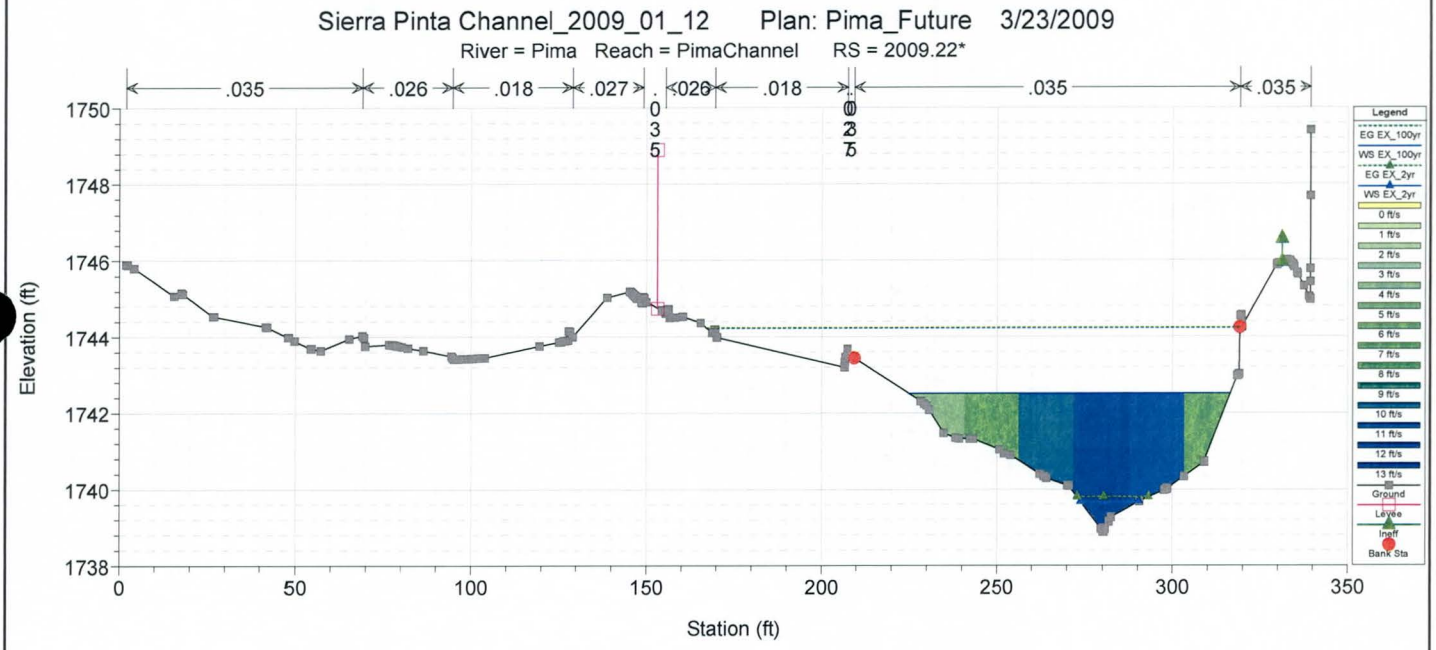

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2102.336 xsec 130 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

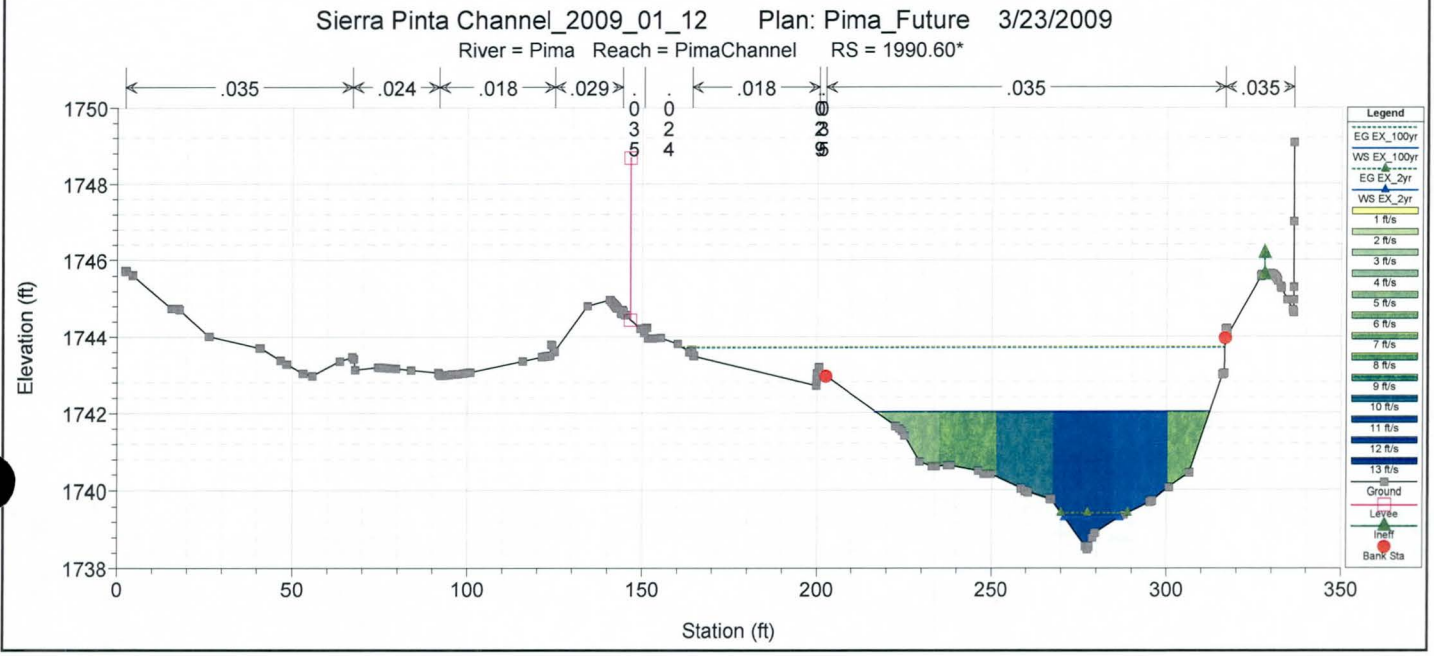

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2083.71*
.035
.033
.018
.02
.033
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

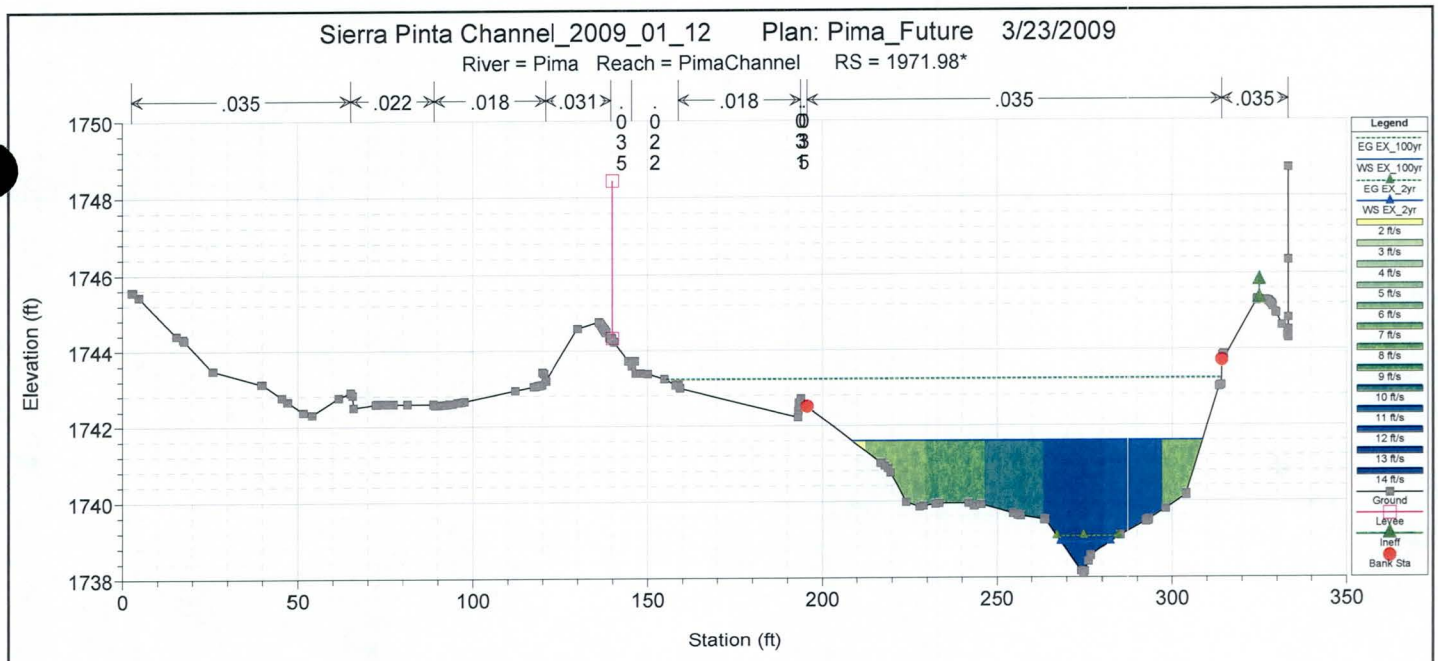

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2065.09*
.035
.031
.018
.022
.031
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

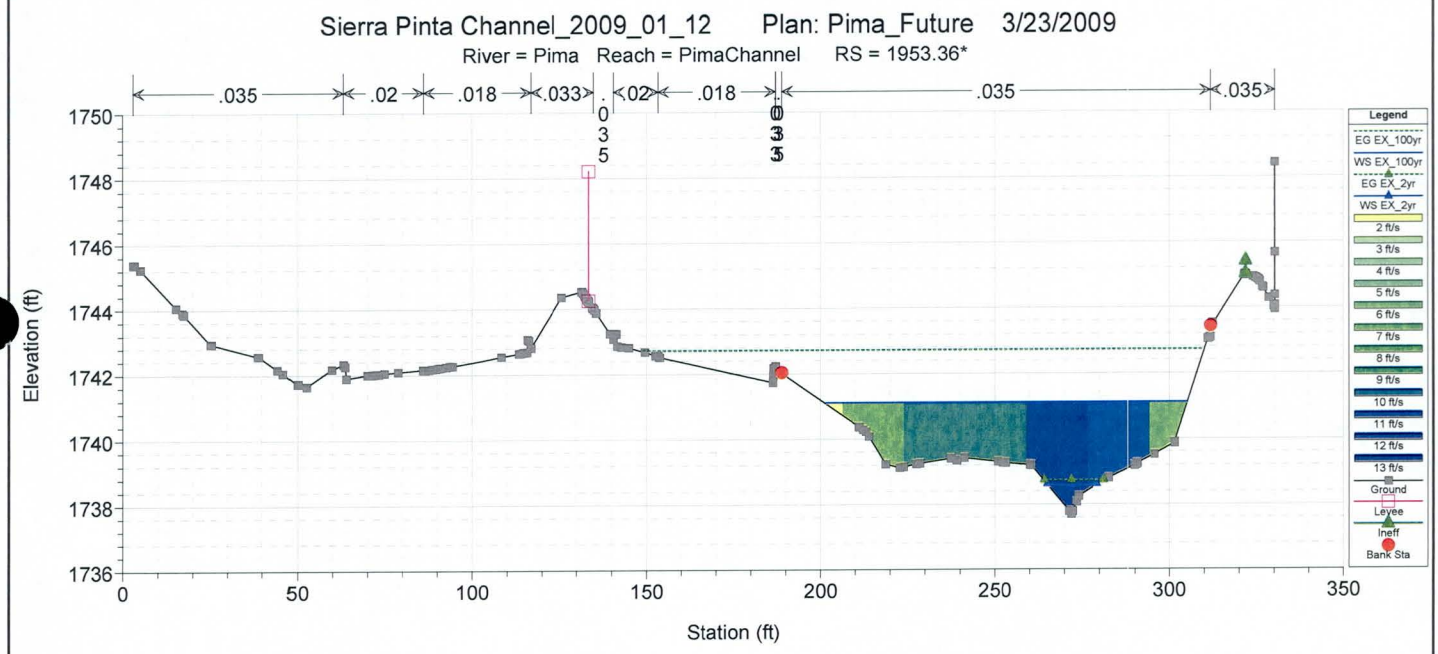

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2046.47*
.035
.029
.018
.024
.029
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

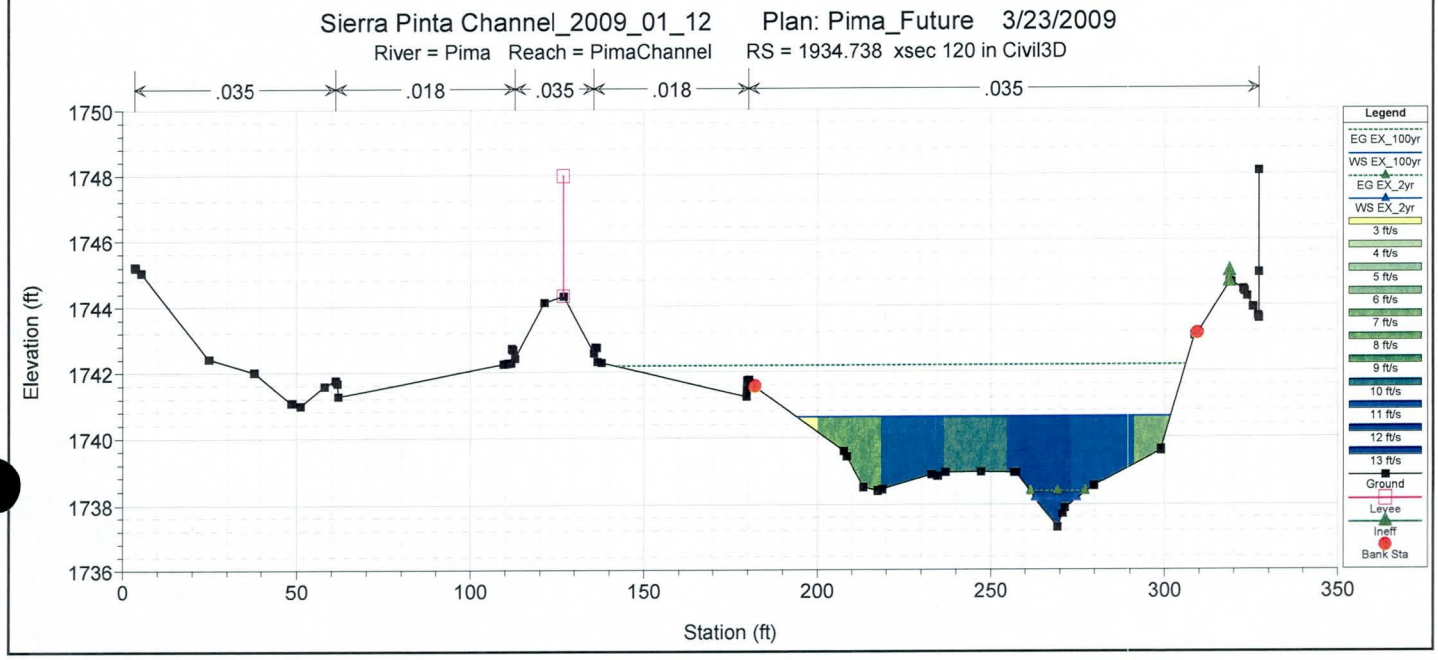

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2027.84*
.035
.027
.018
.026
.027
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

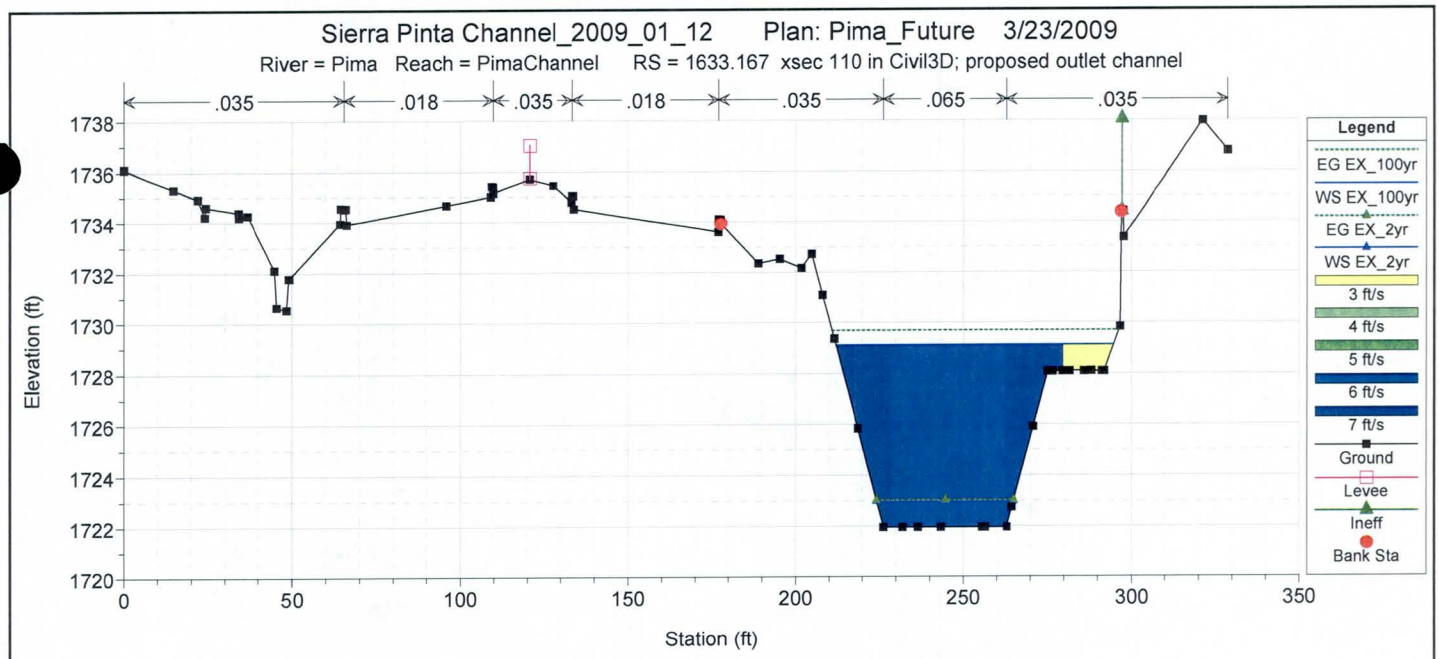

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 2009.22*
.035
.026
.018
.027
.026
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

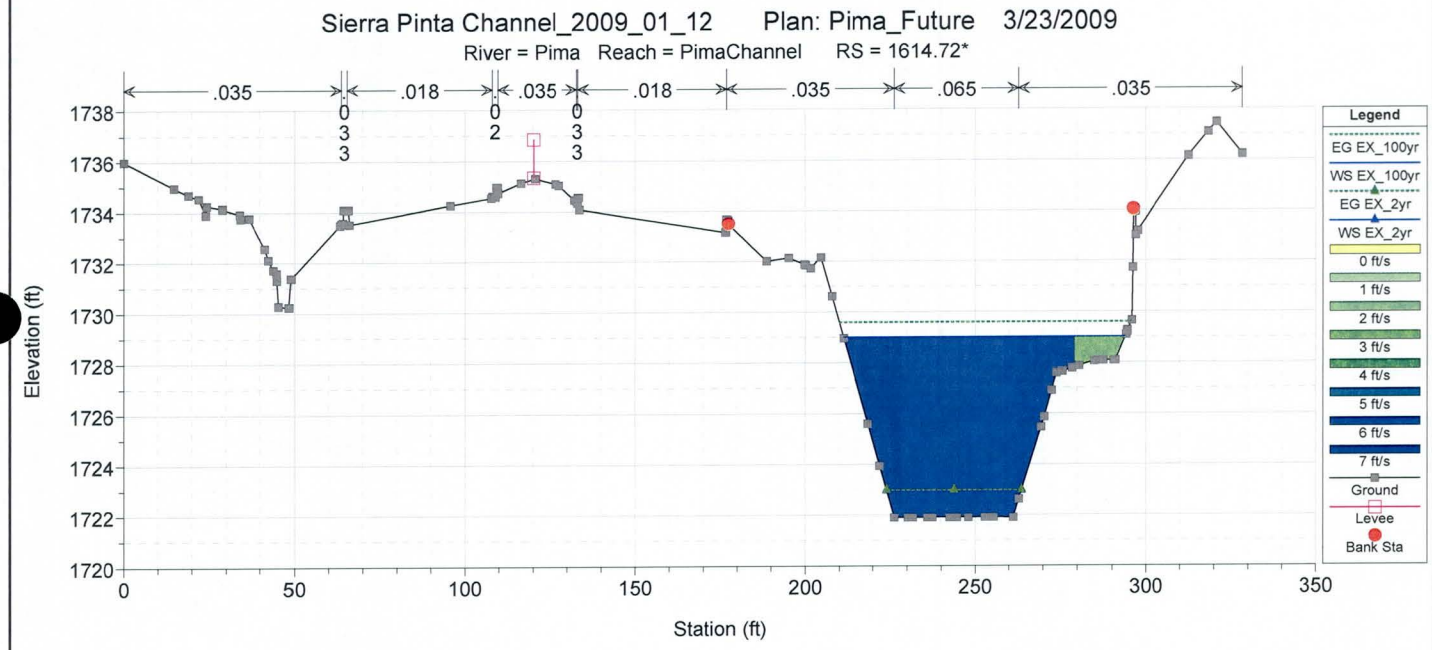

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1990.60*
.035
.024
.018
.029
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

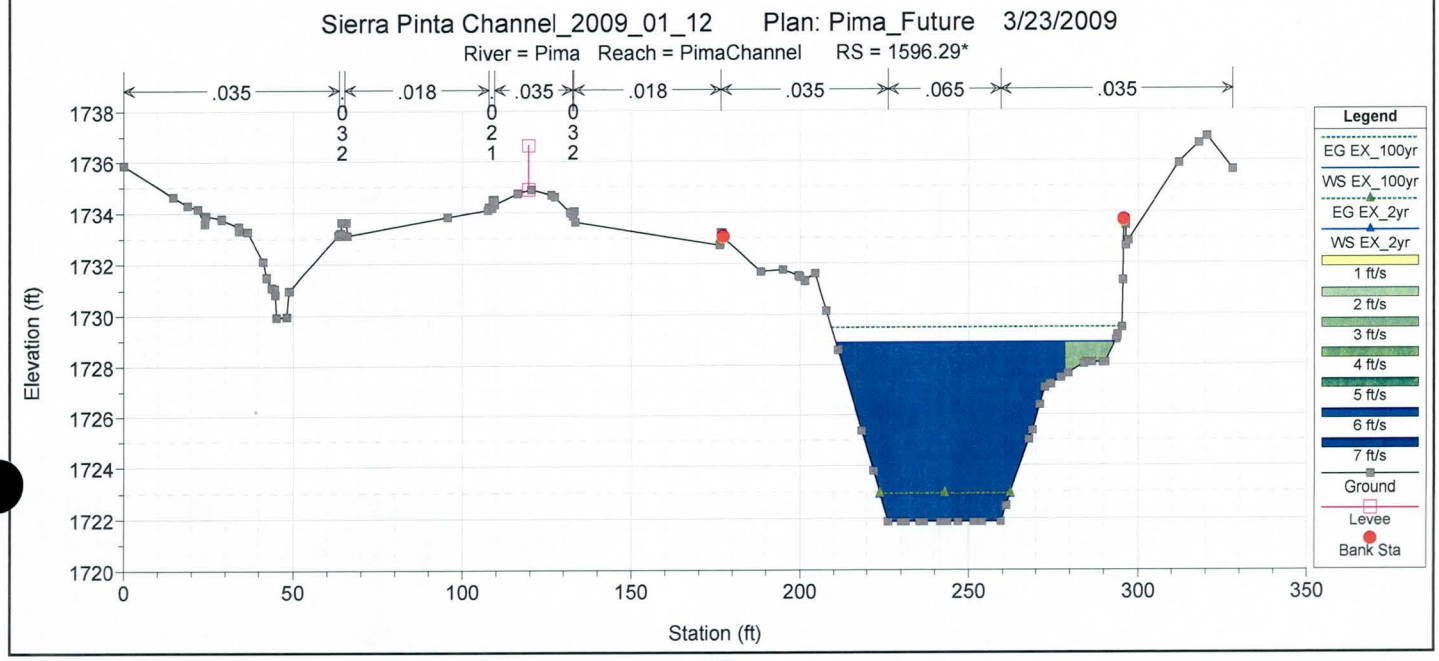

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1971.98*
.035
.022
.018
.031
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

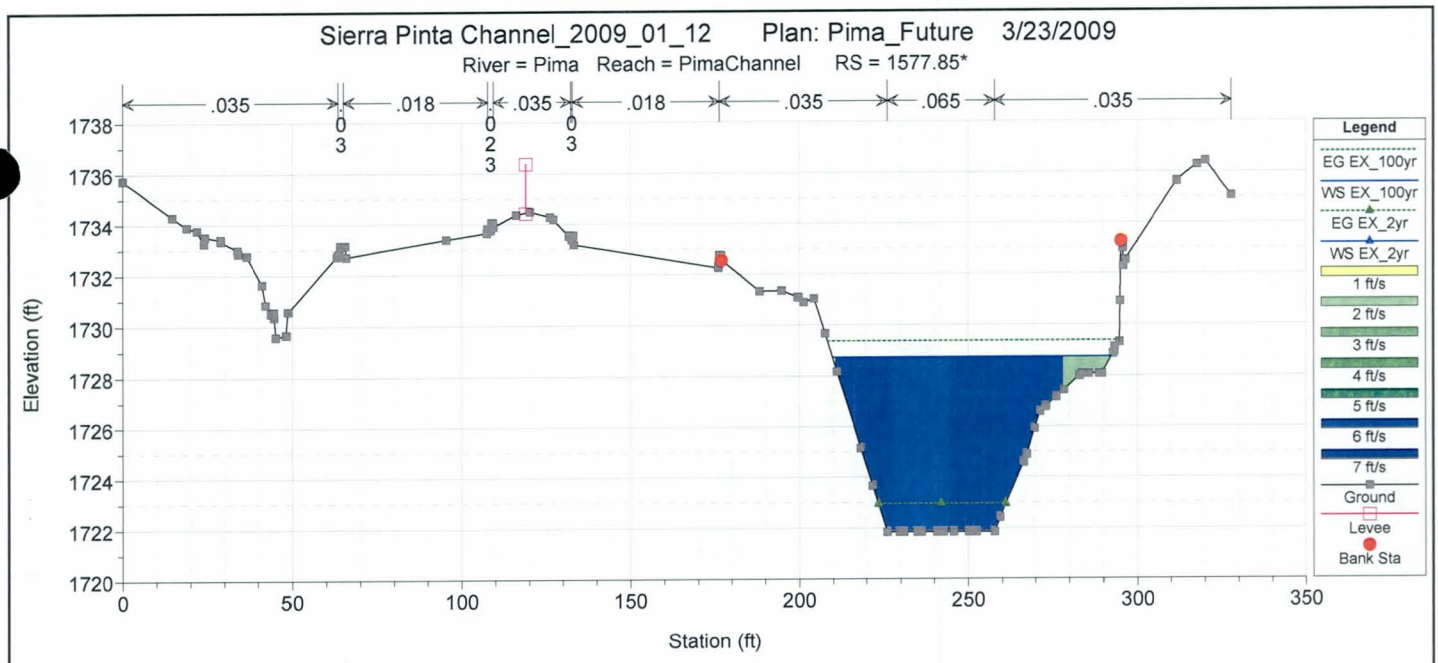

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1953.36*
.035
.02
.018
.033
.02
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

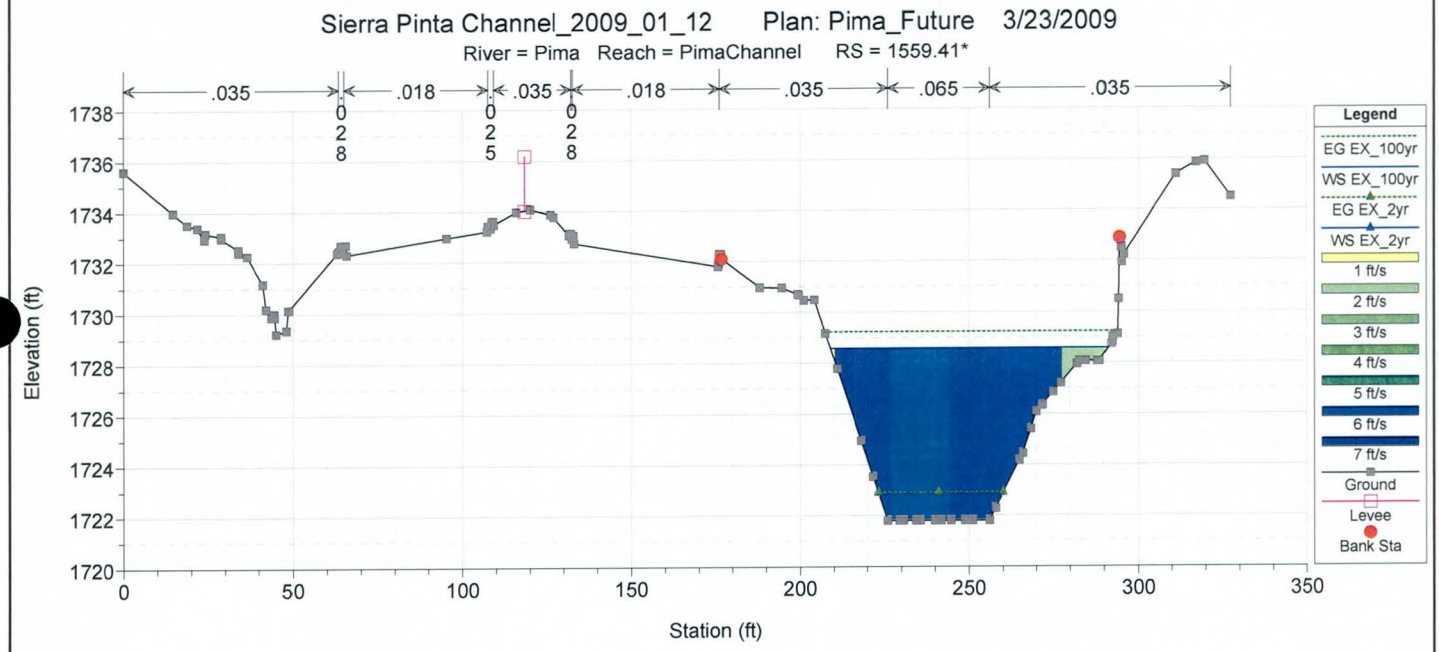

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1934.738 xsec 120 in Civil3D
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

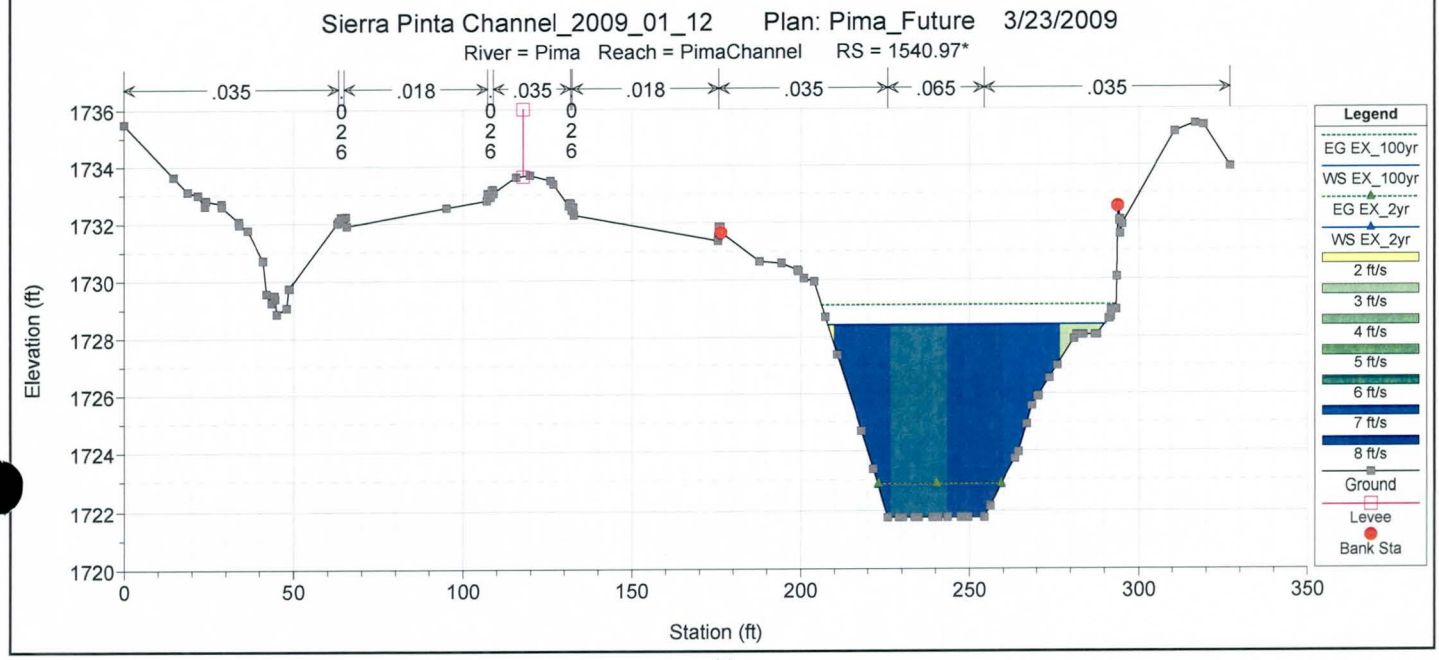

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1633.167 xsec 110 in Civil3D; proposed outlet channel
.035 .018 .035 .018 .035 .065 .035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Levee
Ineff
Bank Sta

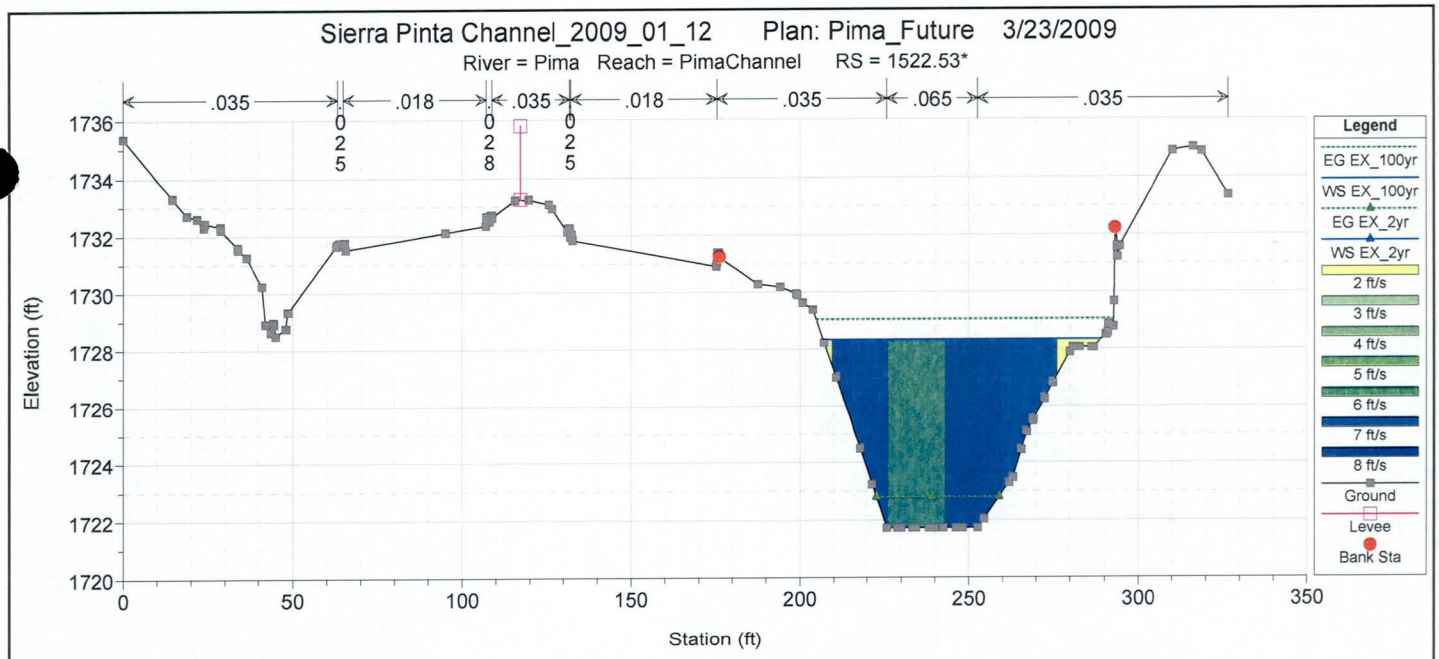

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1614.72*
.035 .018 .035 .018 .035 .065 .035
0 3 3
0 2
0 3 3
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Levee
Bank Sta

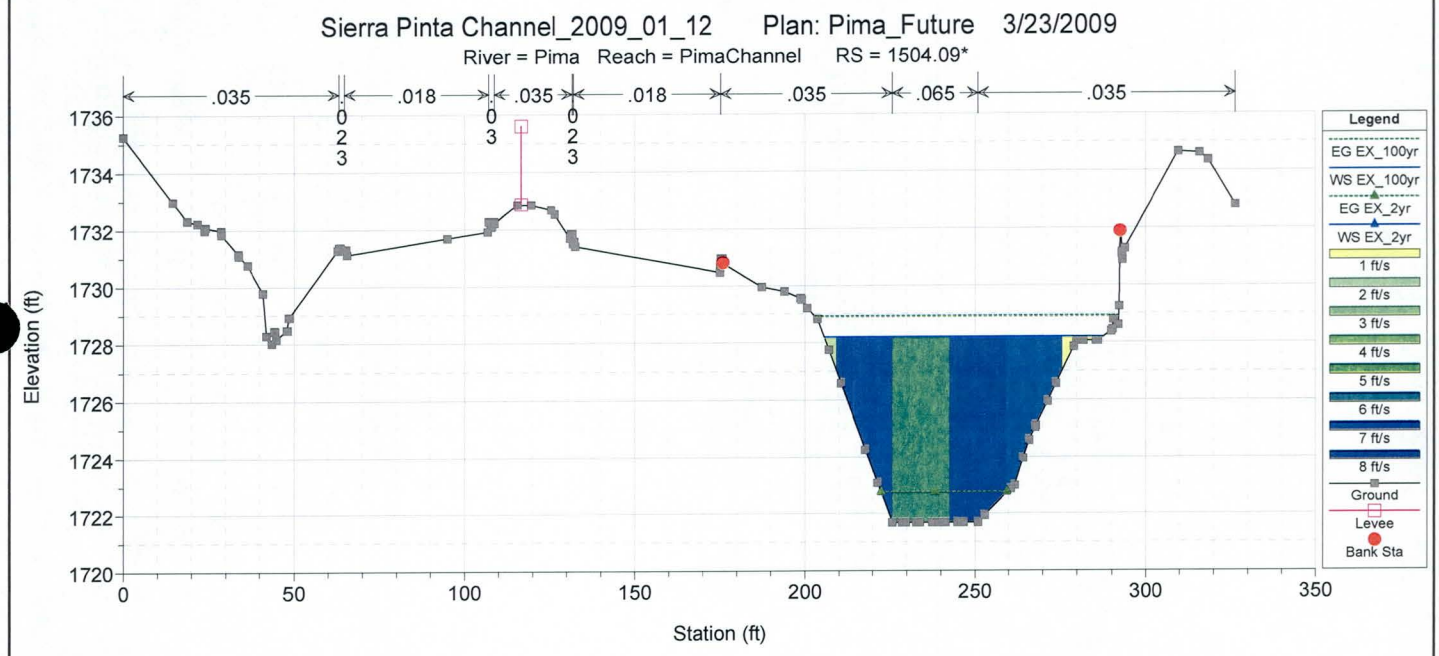

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1596.29*
.035 .018 .035 .018 .035 .065 .035
0 3 2
0 2 1
0 3 2
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Levee
Bank Sta

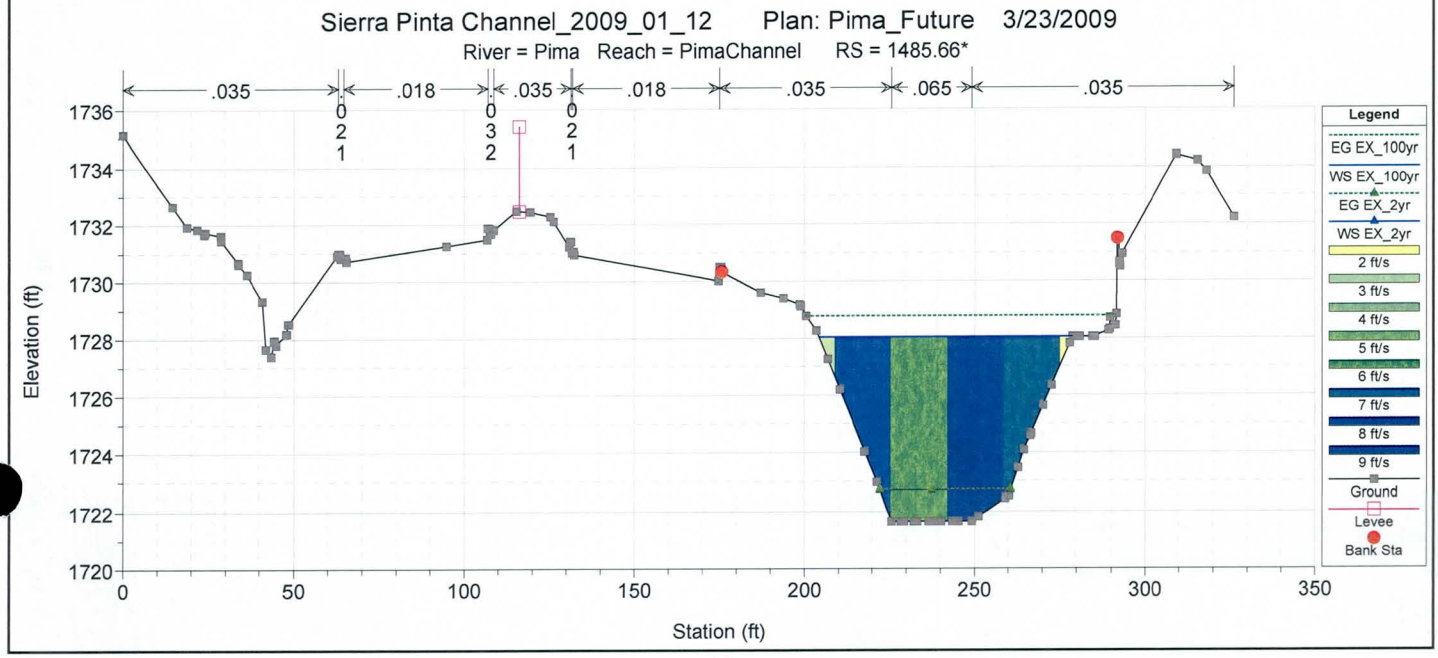

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1577.85*
.035 .018 .035 .018 .035 .065 .035
0.03 0.023 0.03
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Levee
Bank Sta

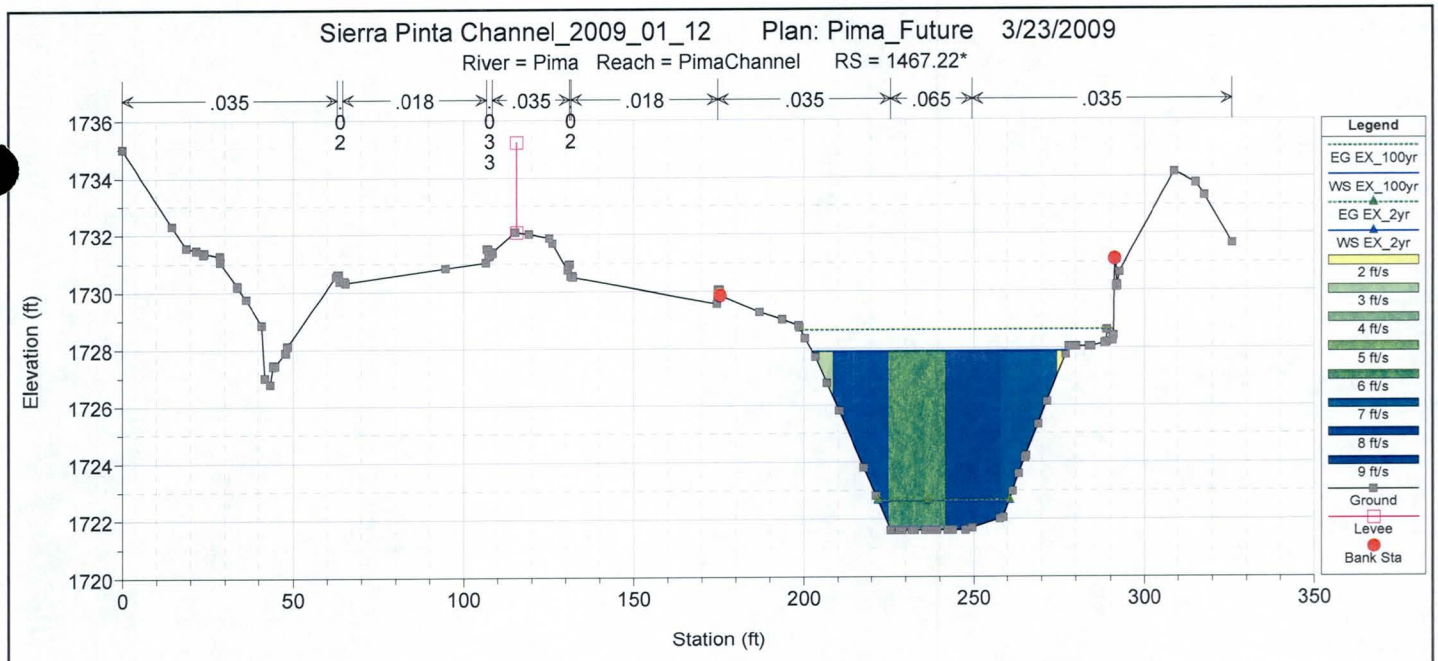

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1559.41*
.035 .018 .035 .018 .035 .065 .035
0.028 0.025 0.028
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
Ground
Levee
Bank Sta

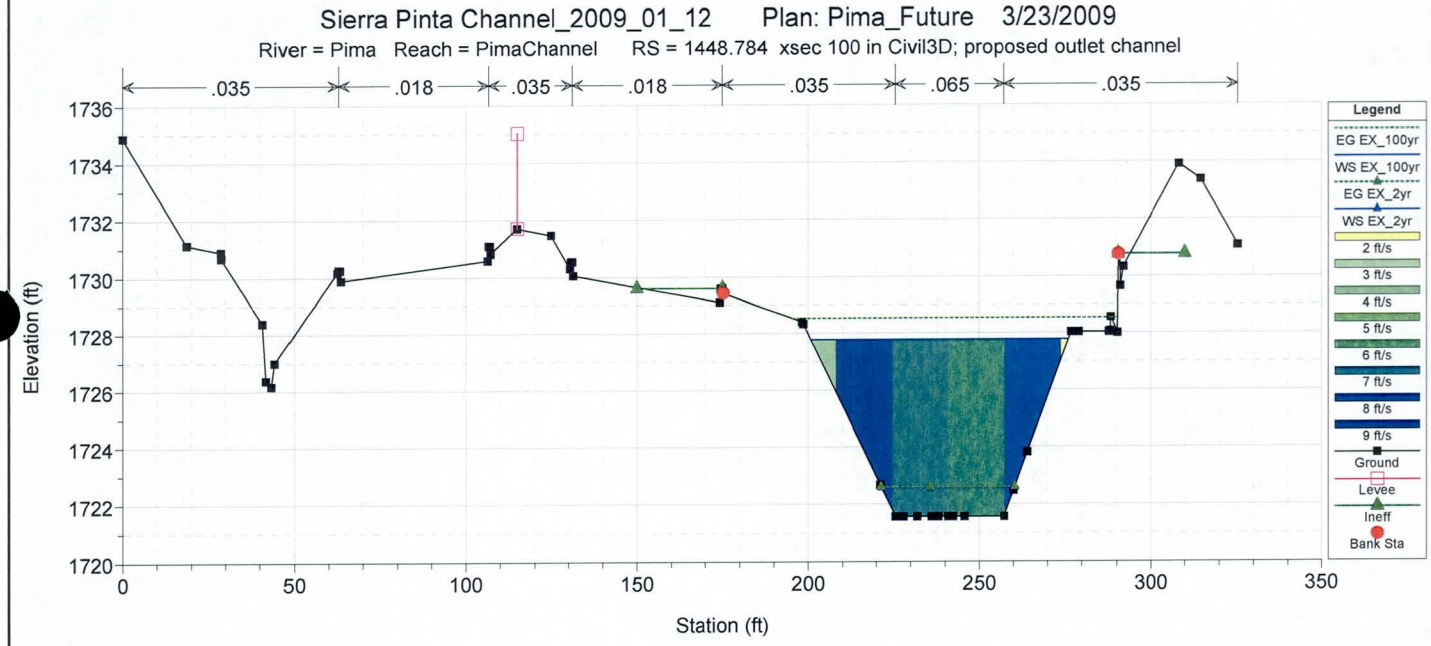

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1540.97*
.035 .018 .035 .018 .035 .065 .035
0.026 0.026 0.026
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Levee
Bank Sta

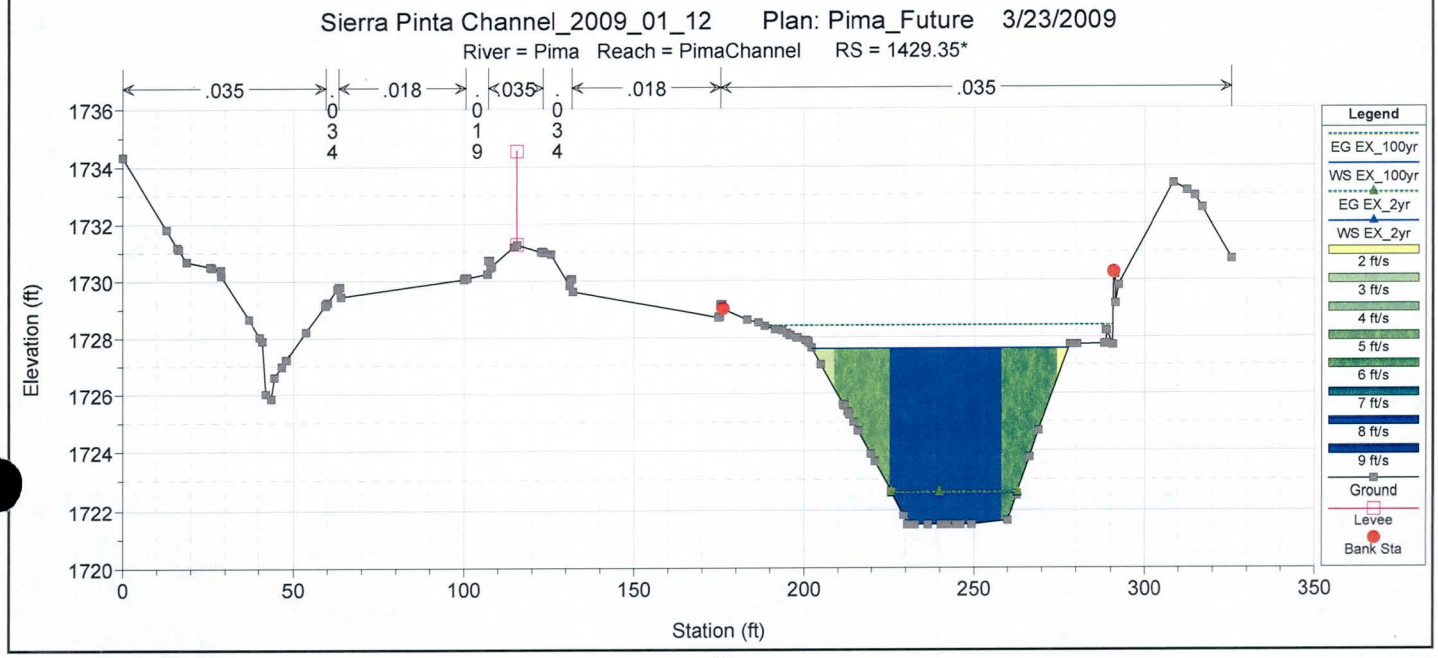

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1522.53*
.035 .018 .035 .018 .035 .065 .035
0 2 5
0 2 8
0 2 5
Elevation (ft)
1736
1734
1732
1730
1728
1726
1724
1722
1720
0 50 100 150 200 250 300 350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
Ground
Levee
Bank Sta

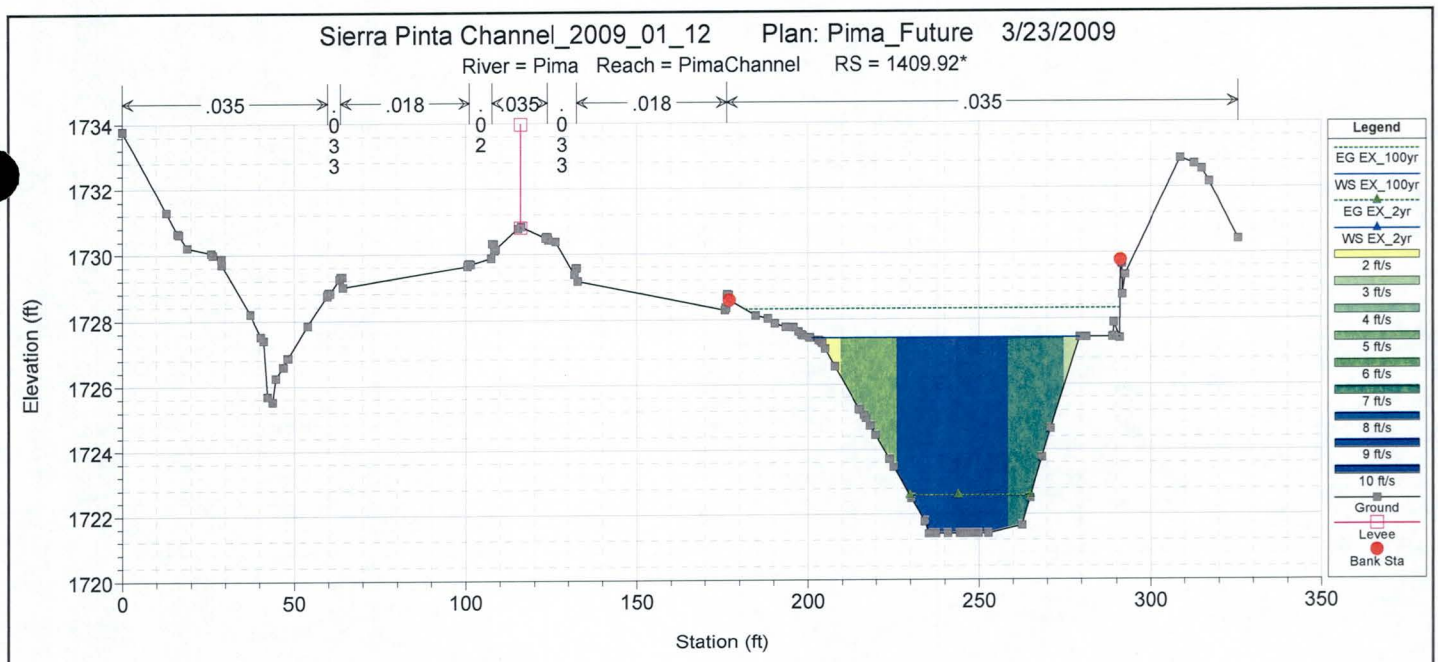

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1504.09*
.035 .018 .035 .018 .035 .065 .035
0 2 3
0 3
0 2 3
Elevation (ft)
1736
1734
1732
1730
1728
1726
1724
1722
1720
0 50 100 150 200 250 300 350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
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
Levee
Bank Sta

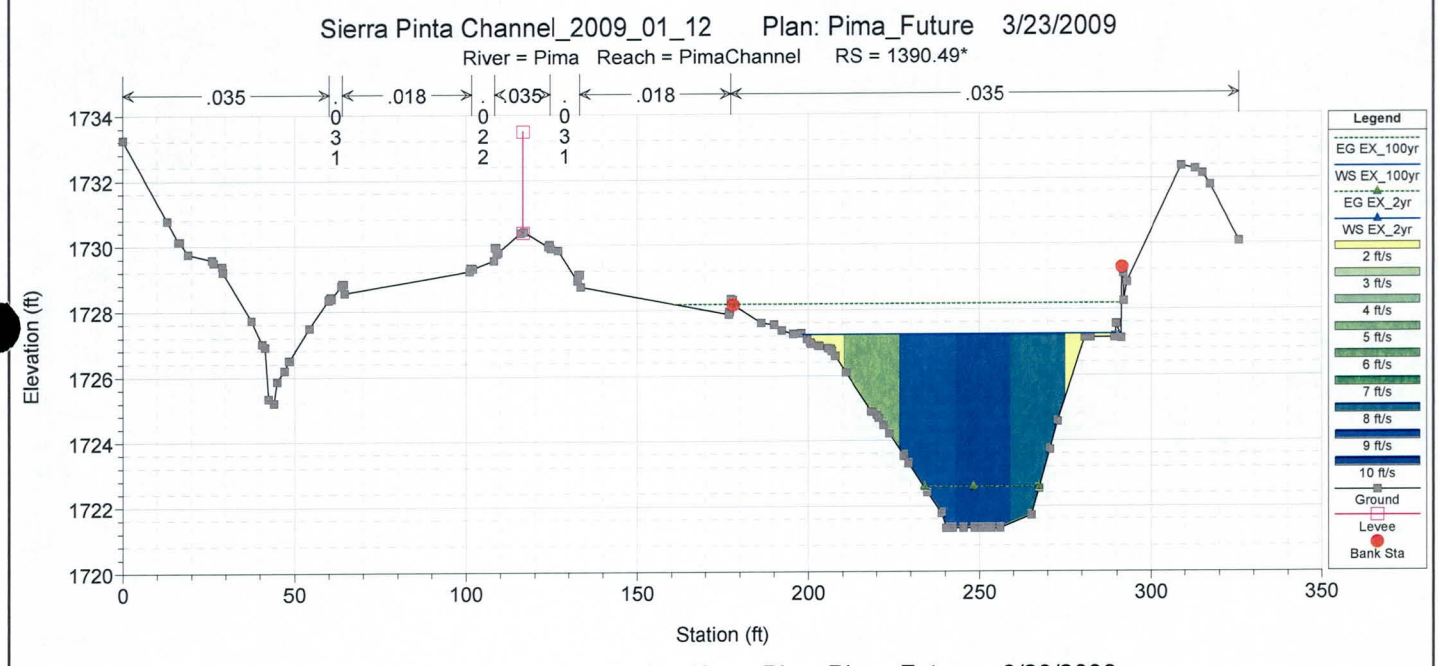

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1485.66*
.035 .018 .035 .018 .035 .065 .035
0 2 1
0 3 2
0 2 1
Elevation (ft)
1736
1734
1732
1730
1728
1726
1724
1722
1720
0 50 100 150 200 250 300 350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
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
Levee
Bank Sta

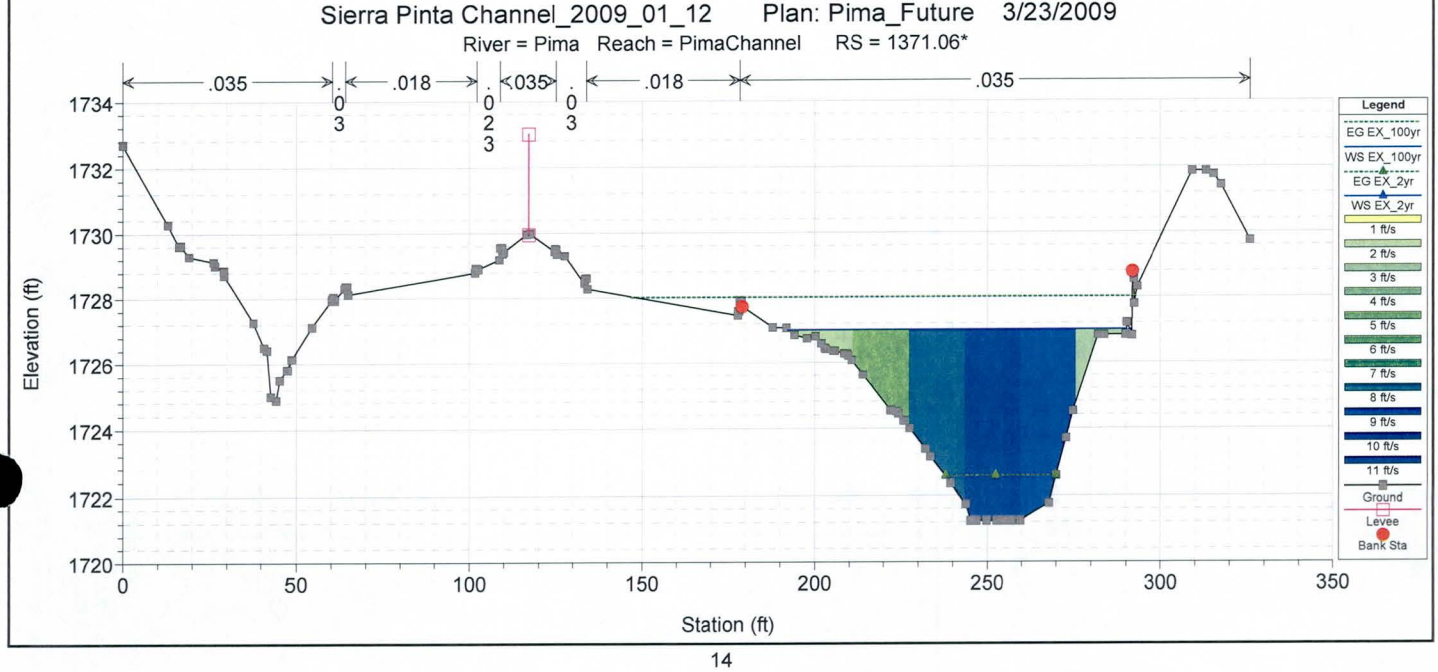

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1467.22*
.035
.018
.035
.018
.035
.065
.035
0.02
0.033
0.02
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

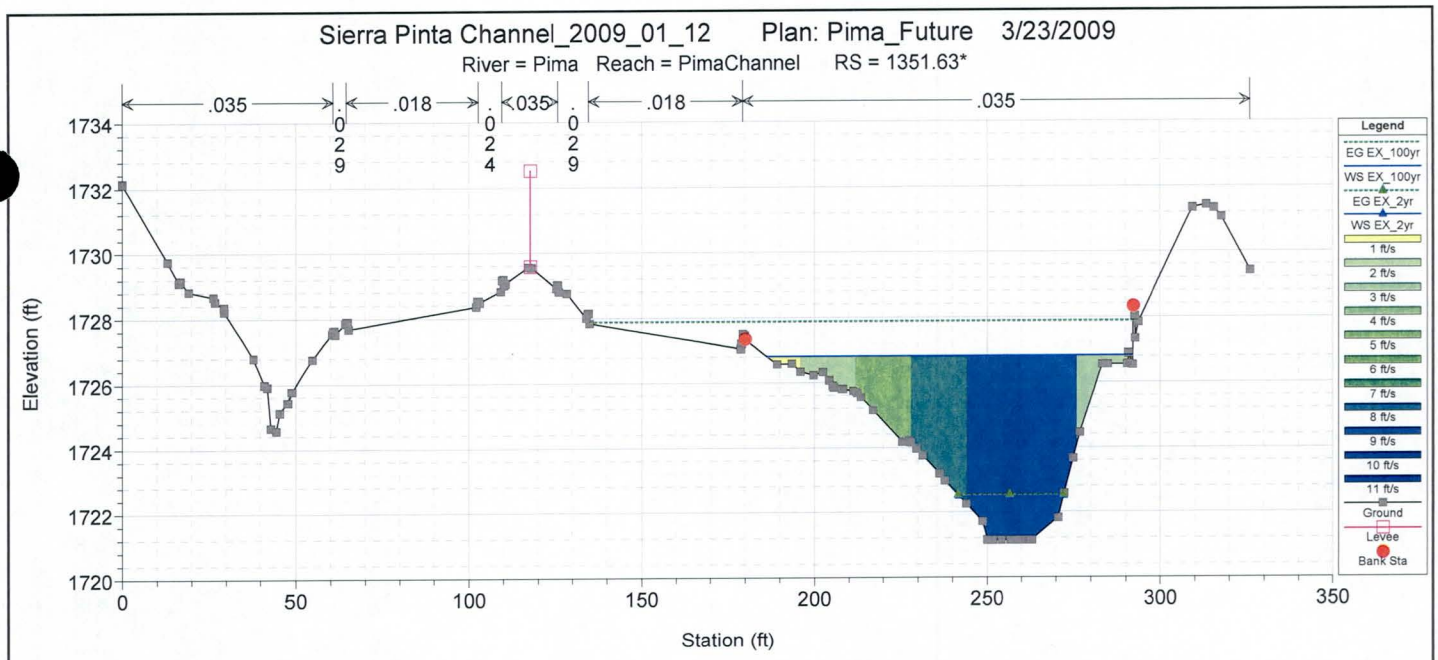

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1448.784 xsec 100 in Civil3D; proposed outlet channel
.035
.018
.035
.018
.035
.065
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Ineff
Bank Sta

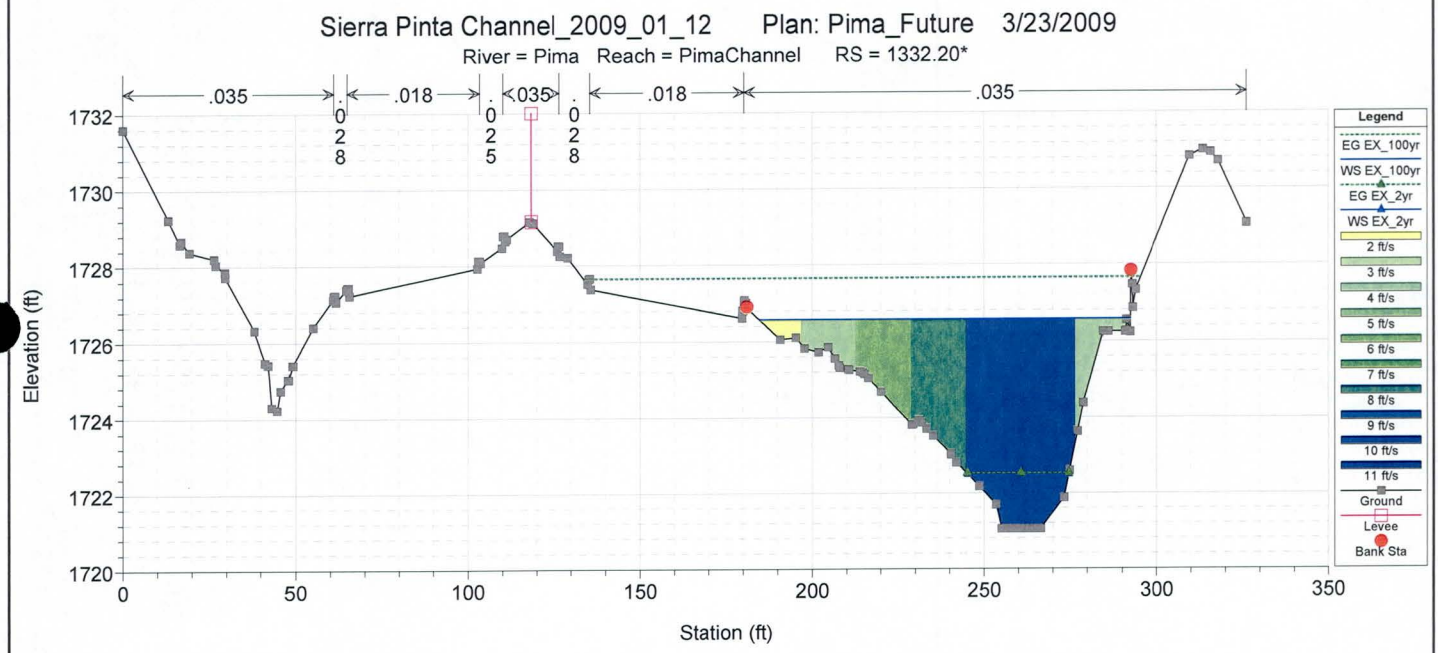

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1429.35*
.035
.018
.035
.018
.035
0.034
0.019
0.034
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
Ground
Levee
Bank Sta

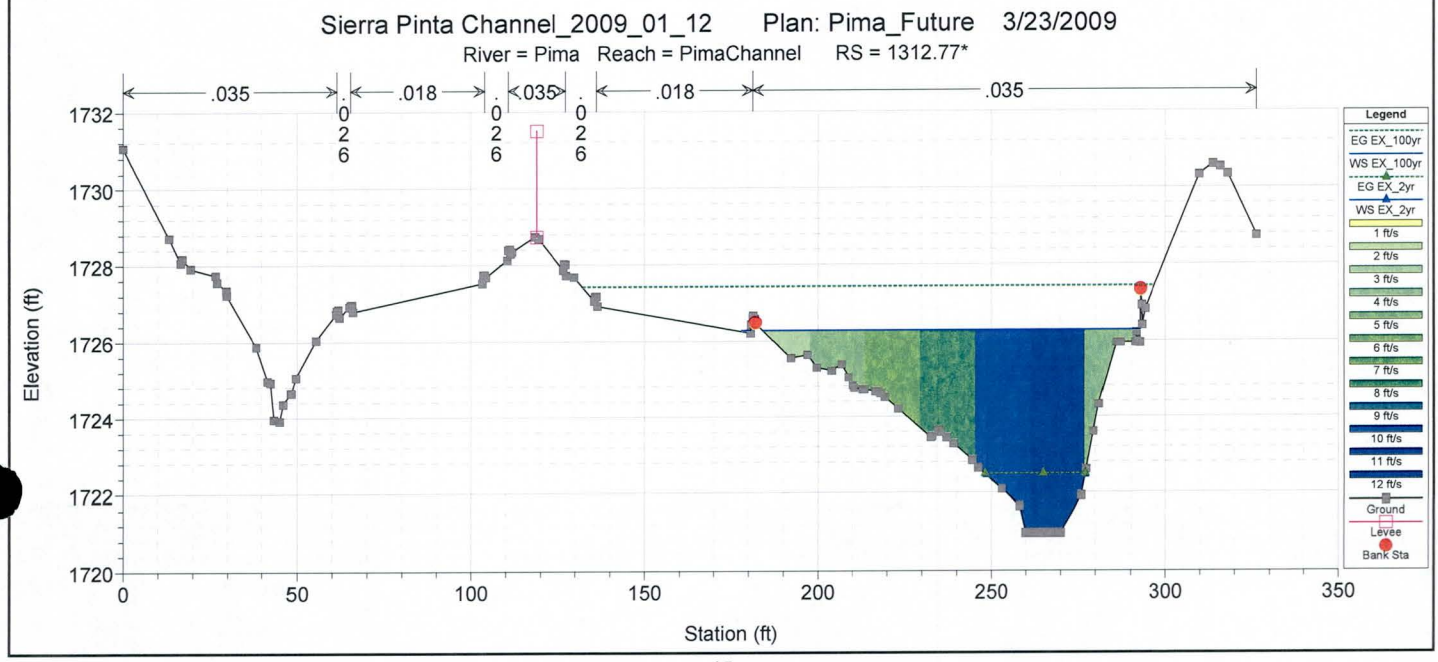

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1409.92*
.035
.033
.018
.022
.035
.033
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

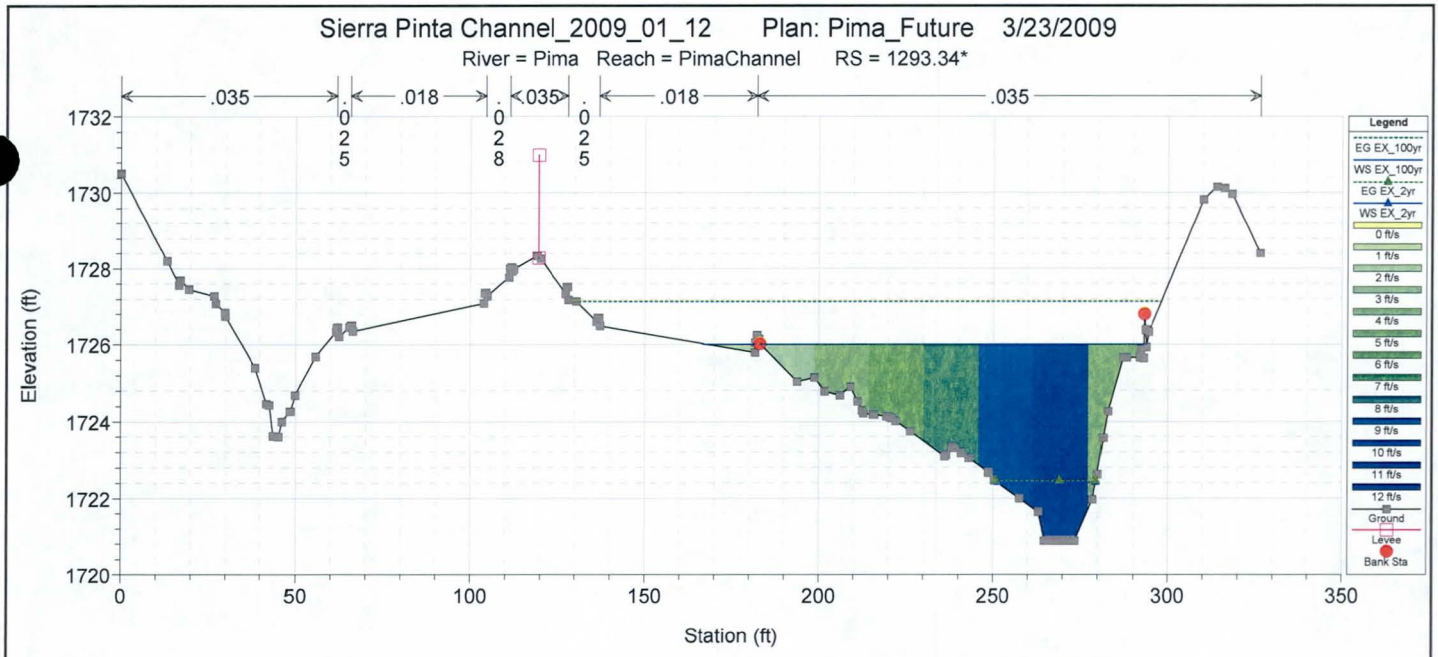

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1390.49*
.035
.031
.018
.022
.035
.031
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

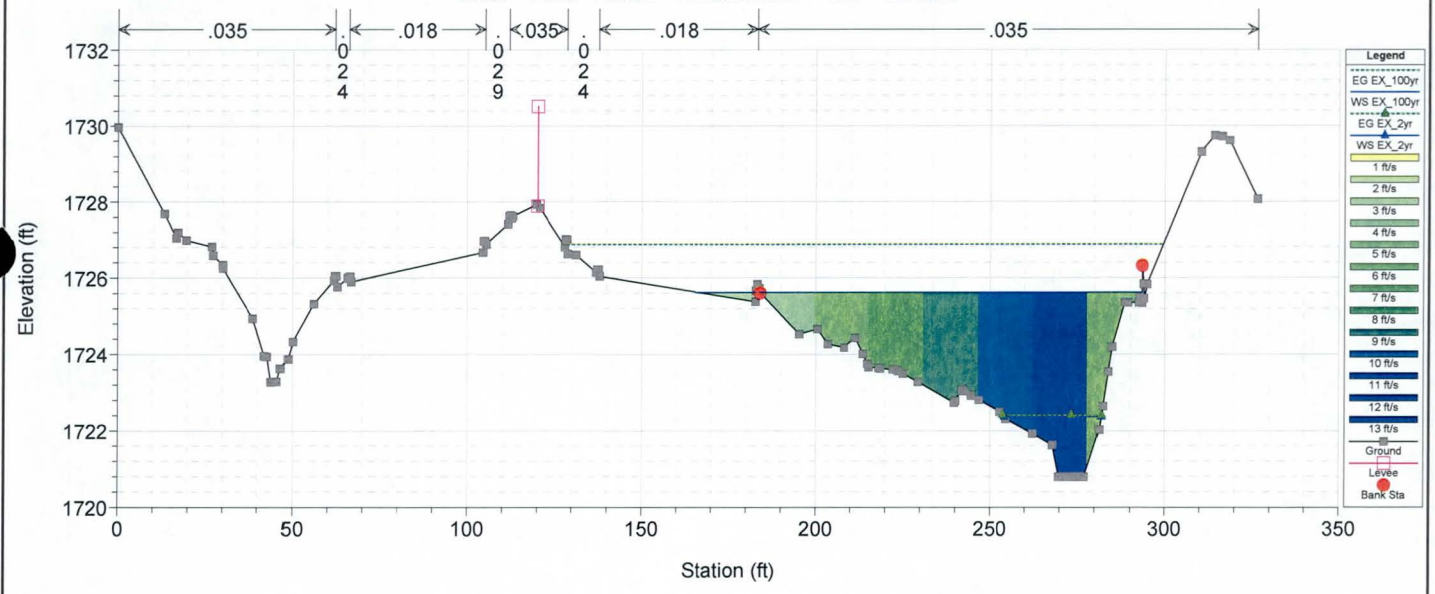

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1371.06*
.035
.03
.018
.023
.035
.03
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

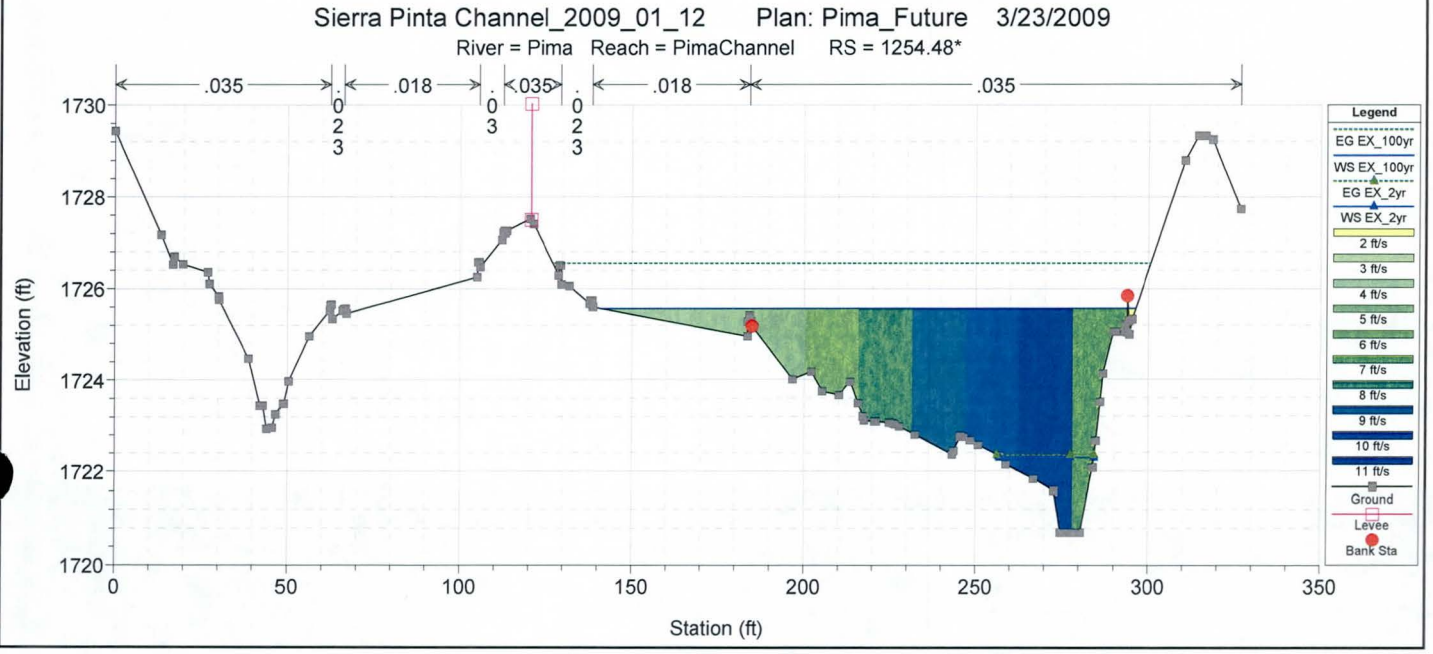

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1351.63*
.035
.029
.018
.024
.035
.029
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

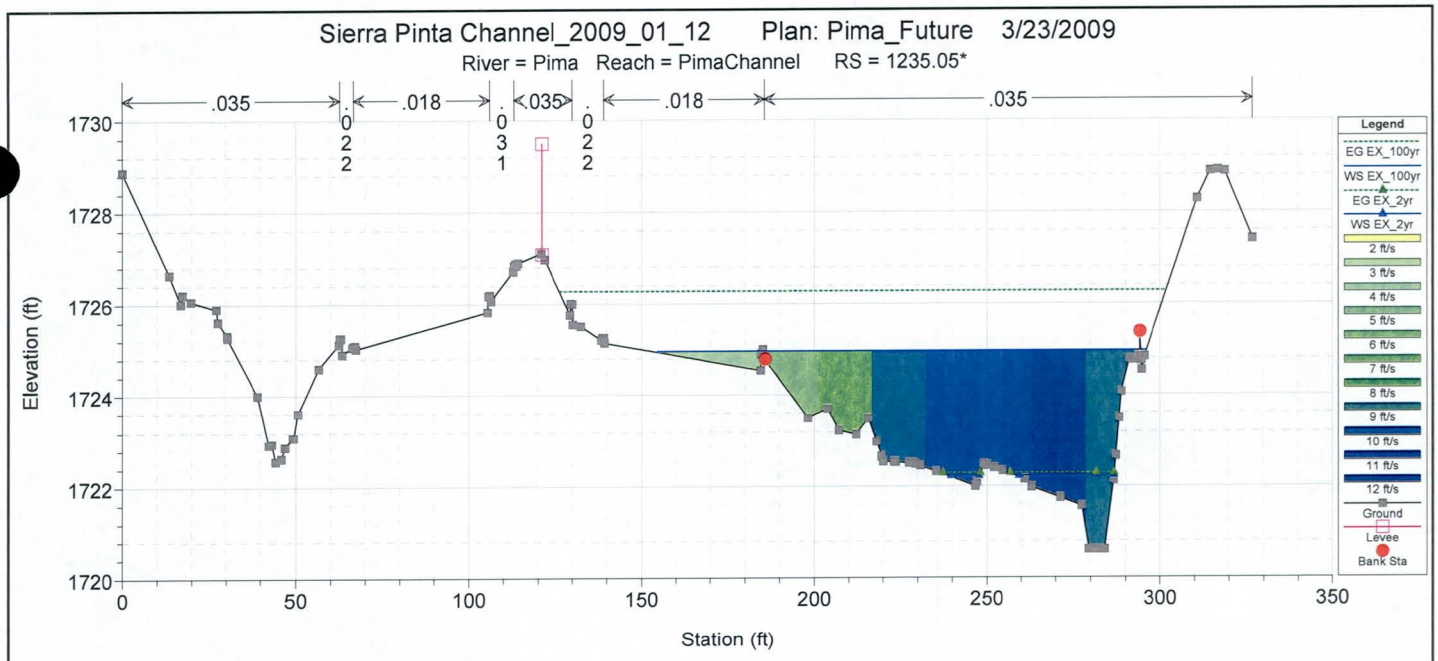

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1332.20*
.035
.028
.018
.025
.035
.028
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

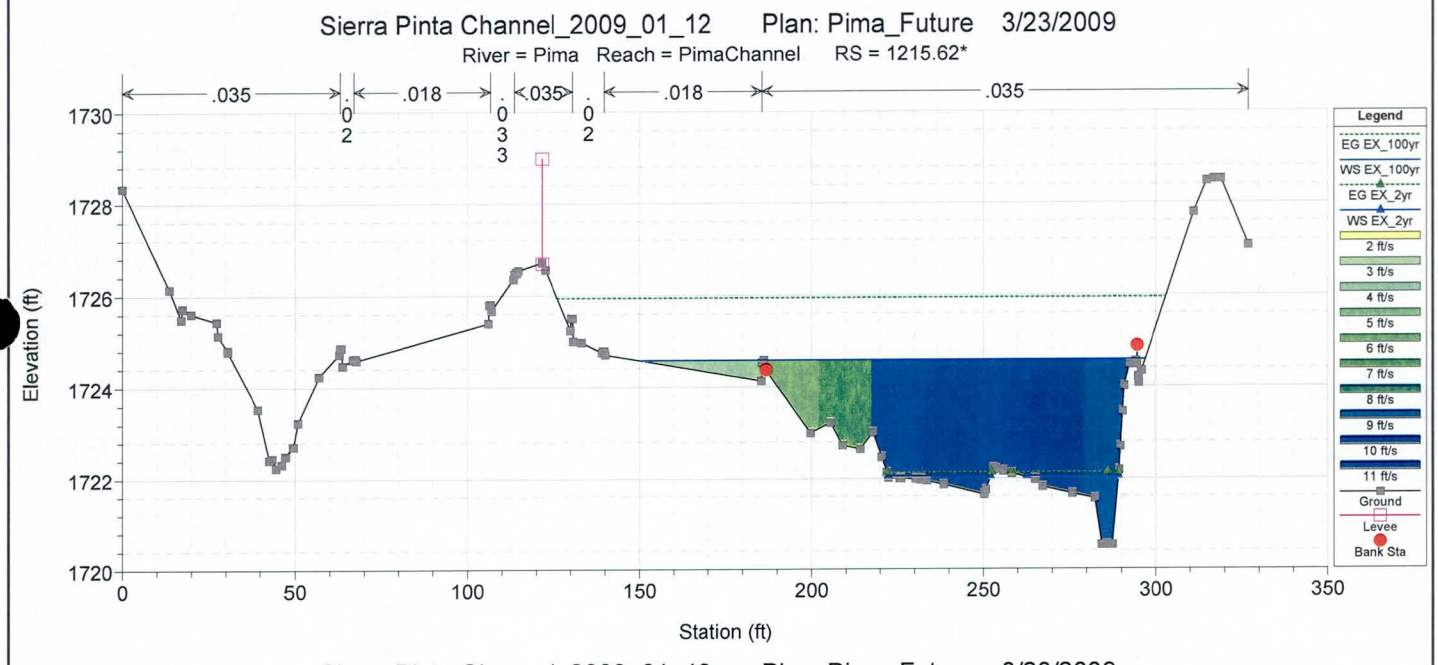

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1312.77*
.035
.026
.018
.026
.035
.026
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

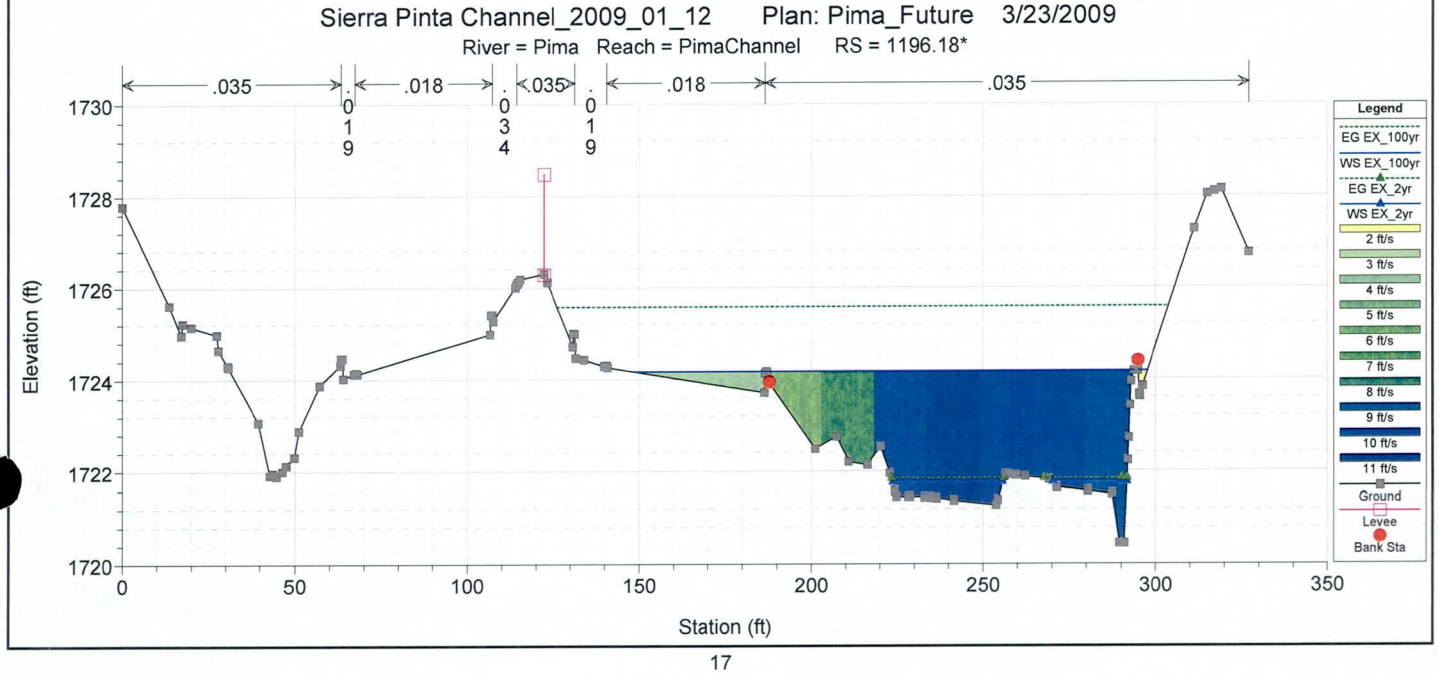

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1293.34*
.035
.025
.018
.028
.035
.025
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

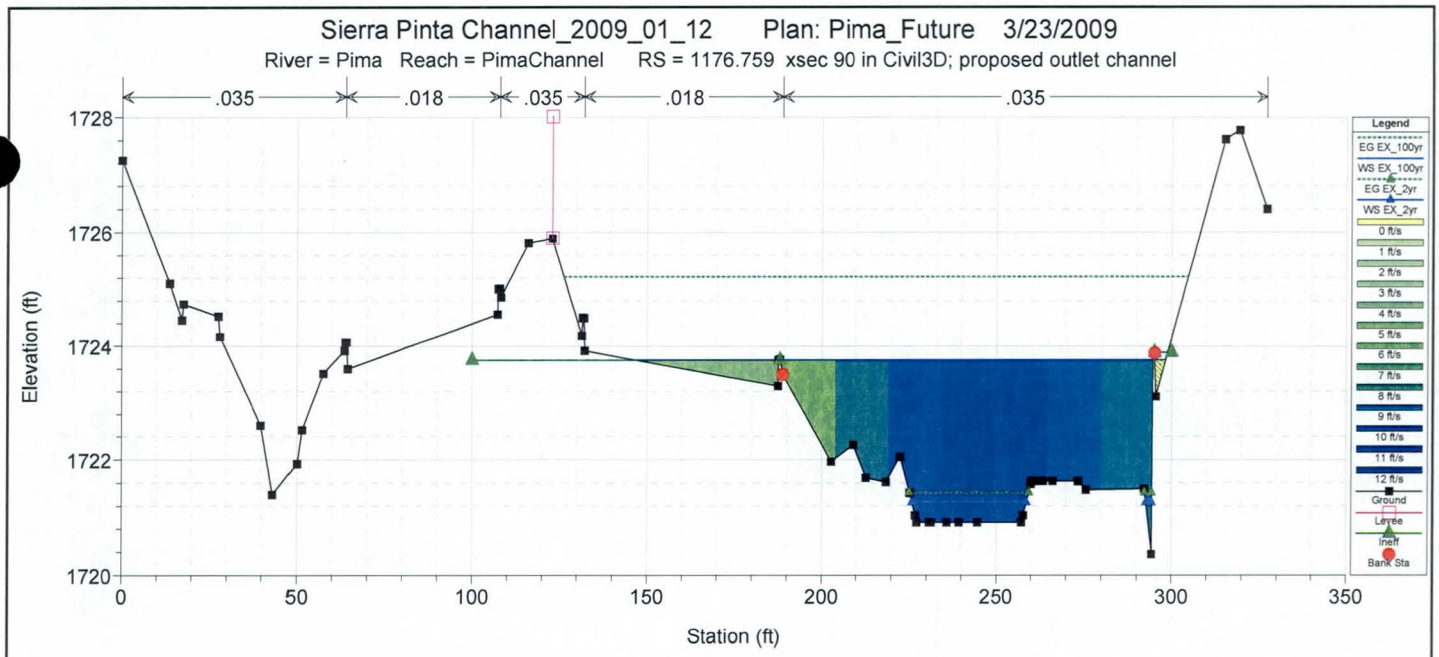

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1273.91*
.035
.024
.018
.029
.035
.024
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

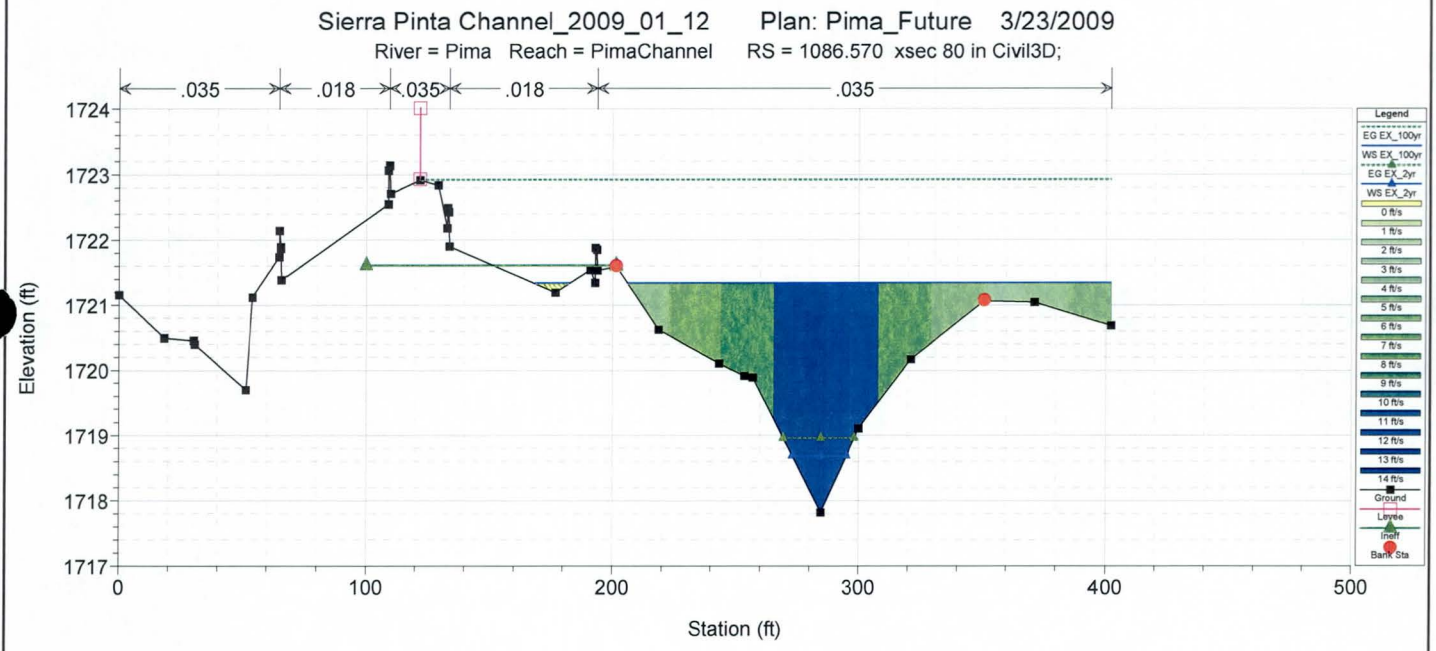

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1254.48*
.035
.023
.018
.03
.035
.023
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta

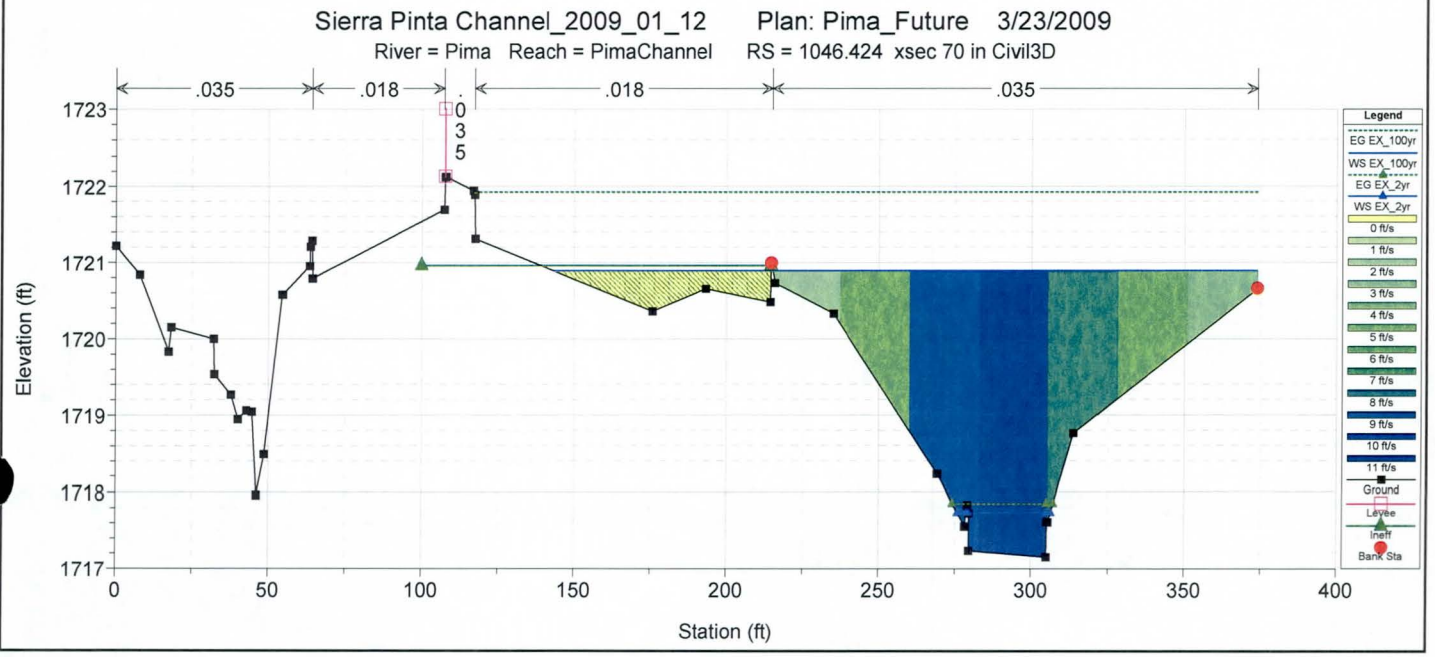

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1235.05*
.035
.022
.018
.031
.035
.022
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Bank Sta

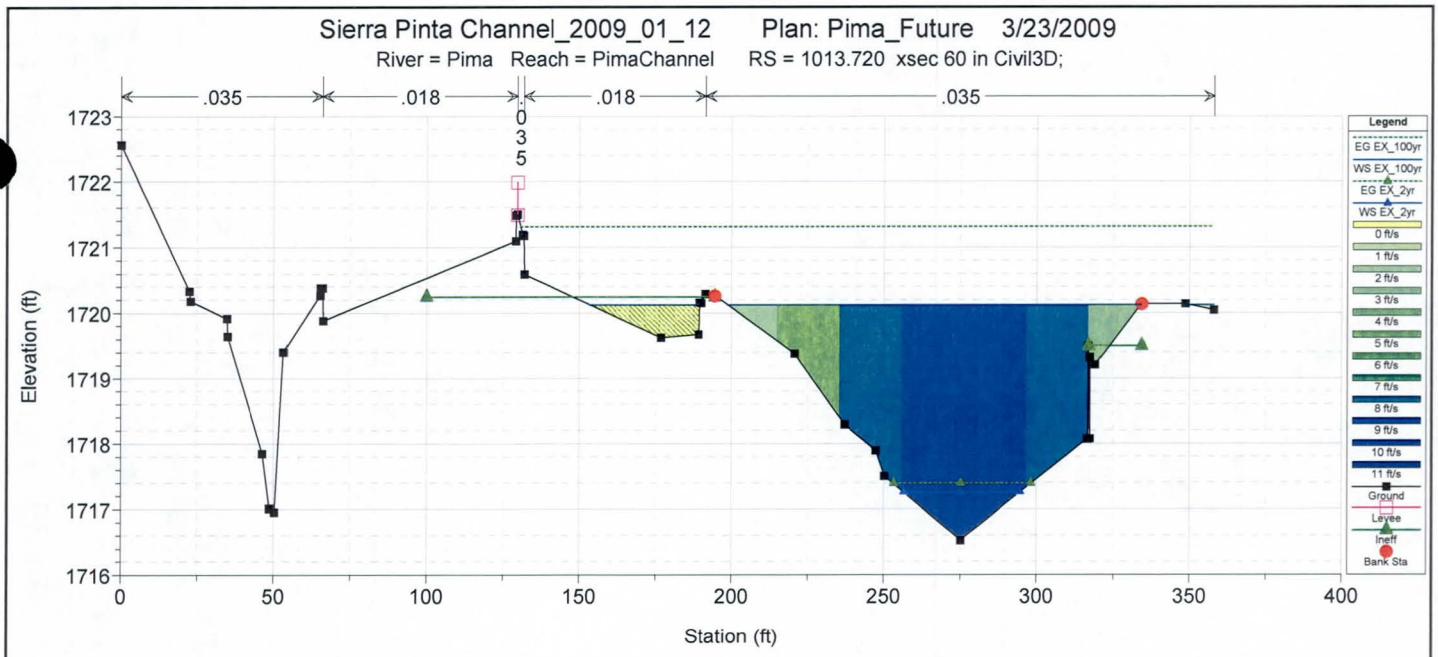

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1215.62*
.035
.02
.018
.033
.035
.02
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

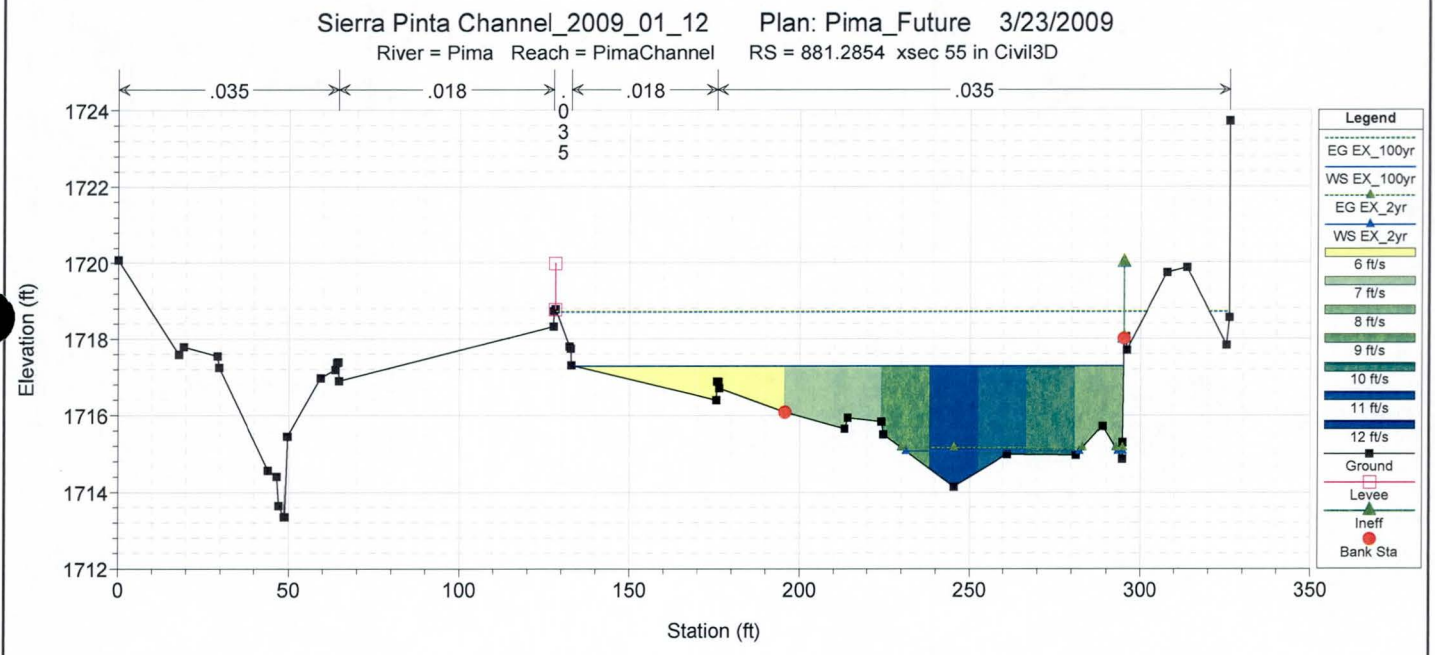

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1196.18*
.035
.019
.018
.034
.035
.019
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

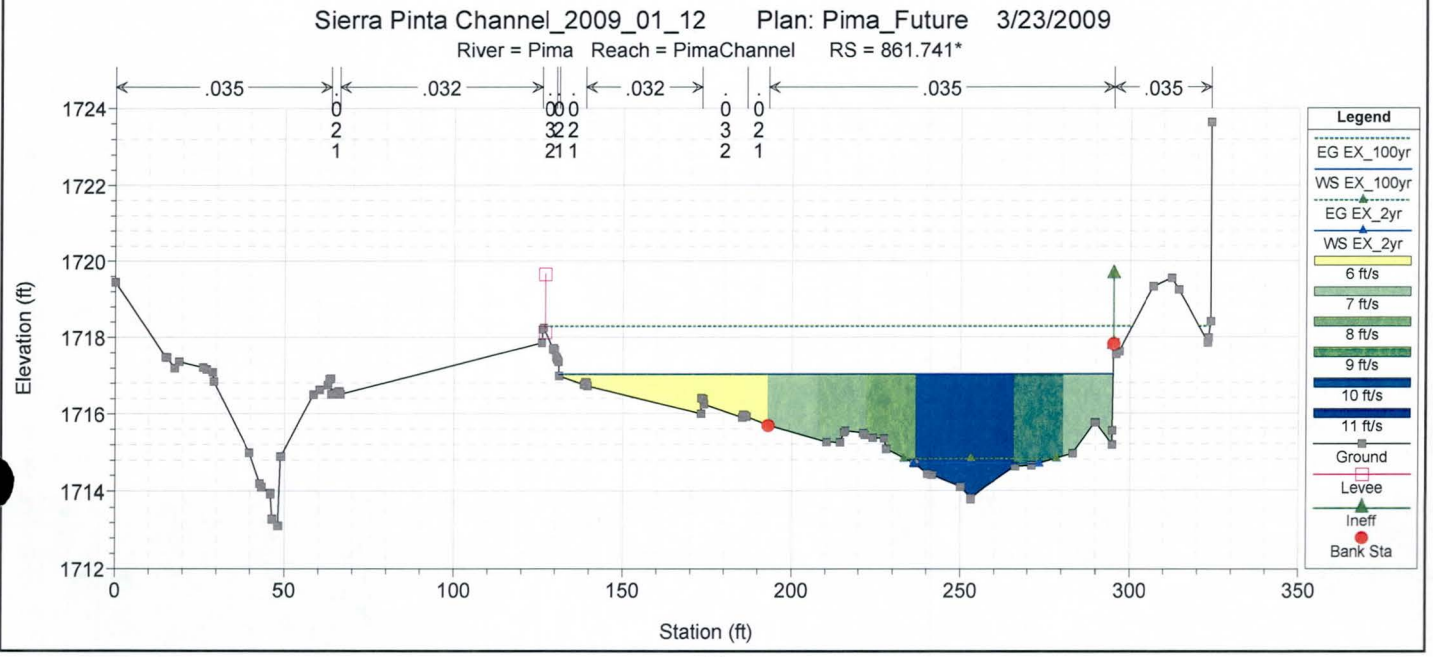

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1176.759 xsec 90 in Civil3D; proposed outlet channel
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

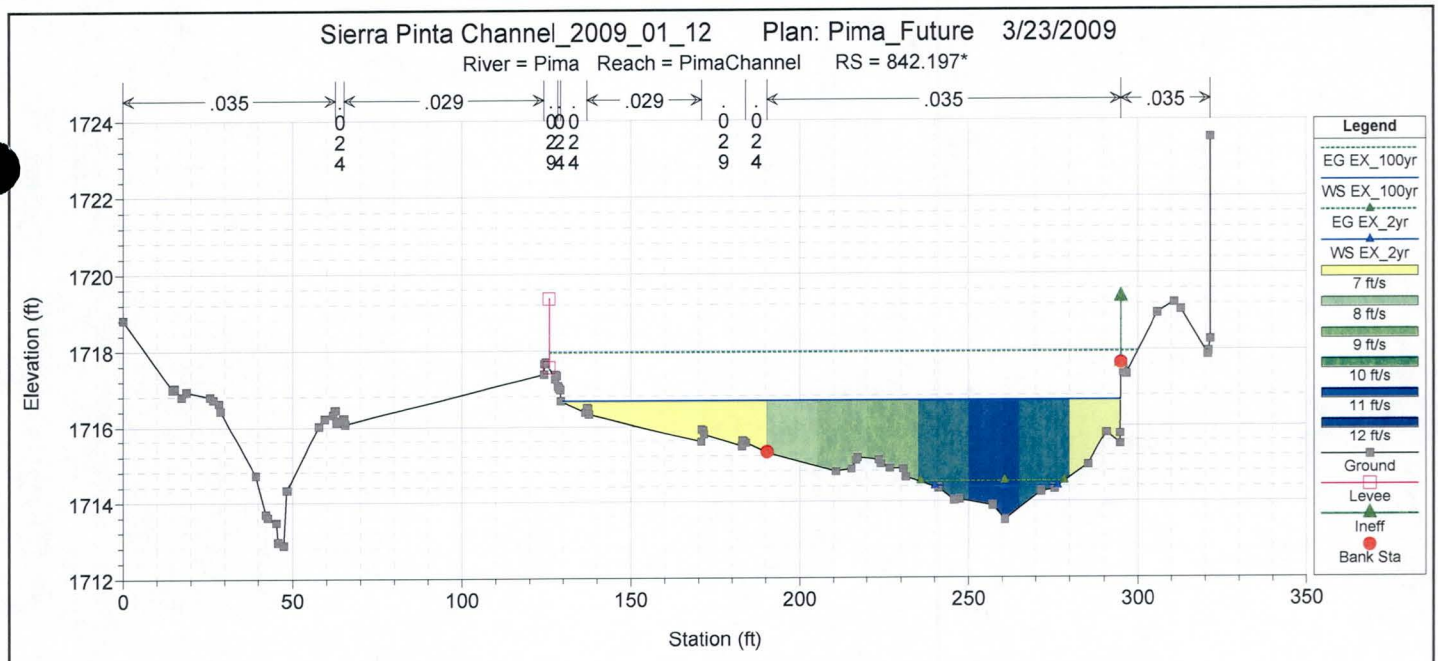

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1086.570 xsec 80 in Civil3D;
.035
.018
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

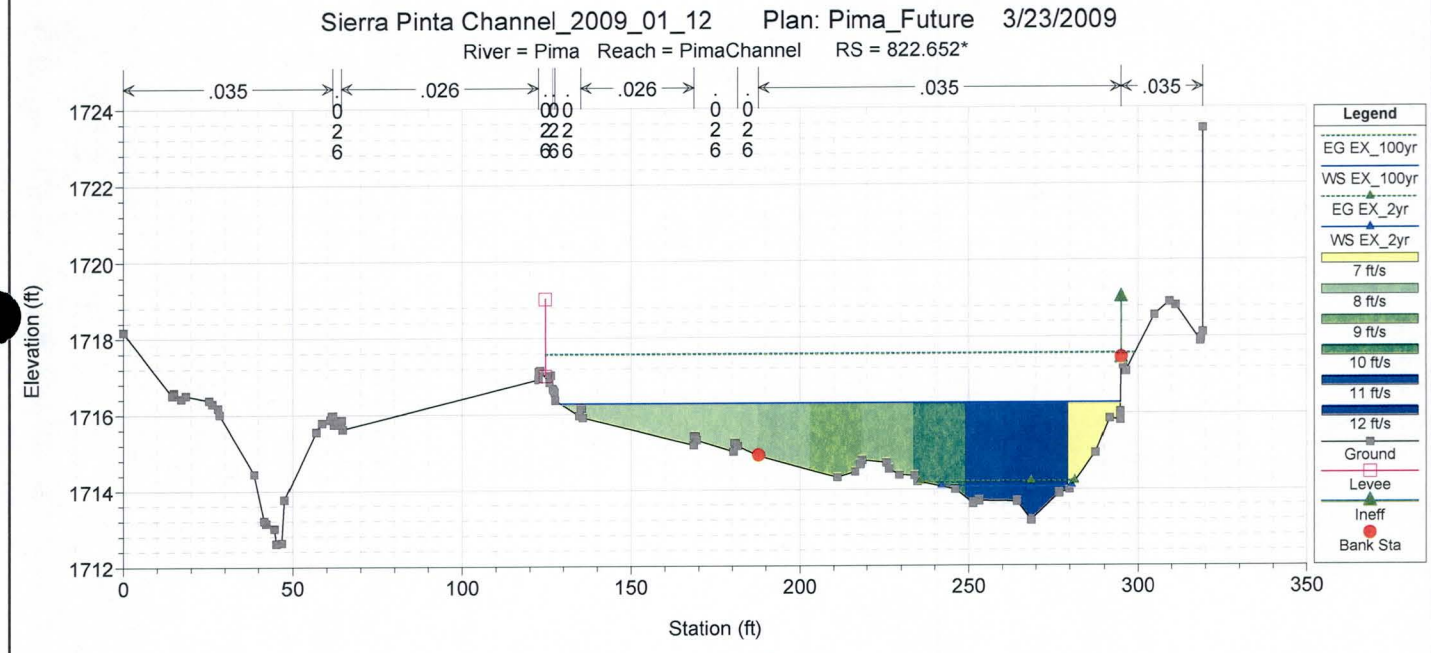

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1046.424 xsec 70 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Ineff
Bank Sta

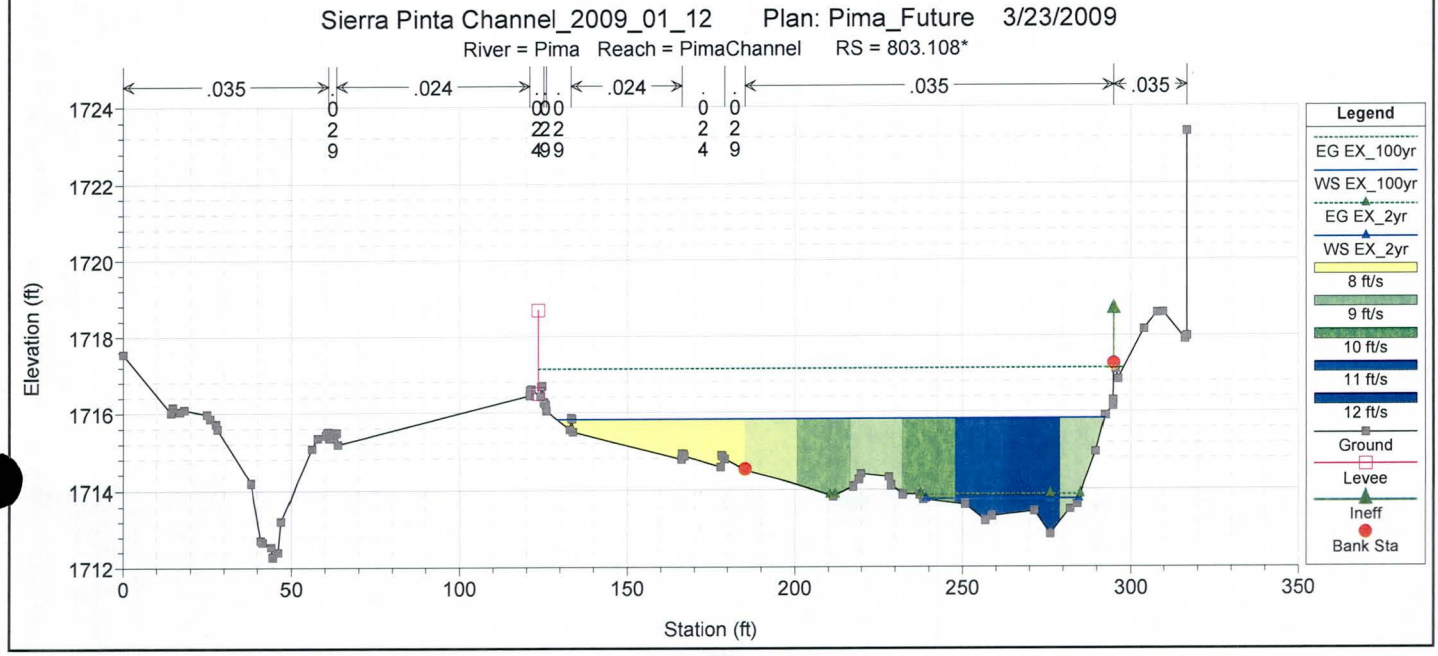

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 1013.720 xsec 60 in Civil3D;
.035
.018
.018
.035
0.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
0 ft/s
1 ft/s
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta

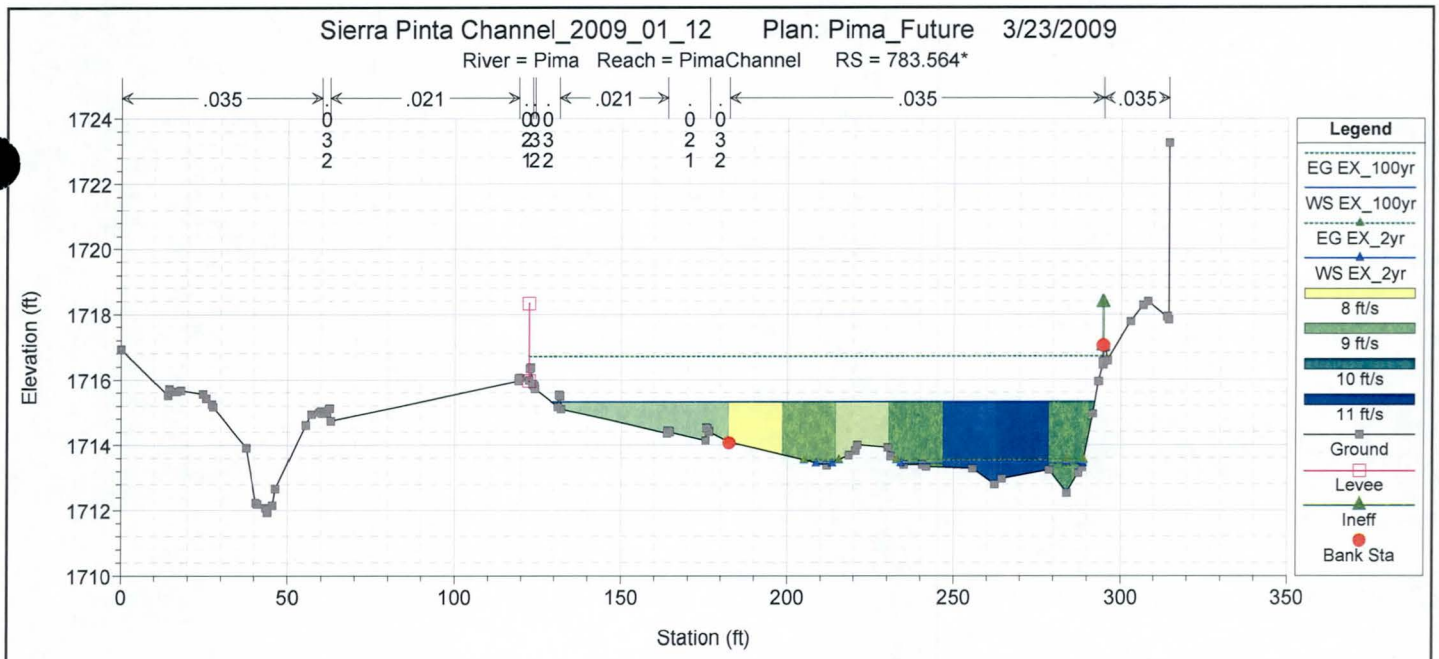

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 881.2854 xsec 55 in Civil3D
.035
.018
.018
.035
0.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta

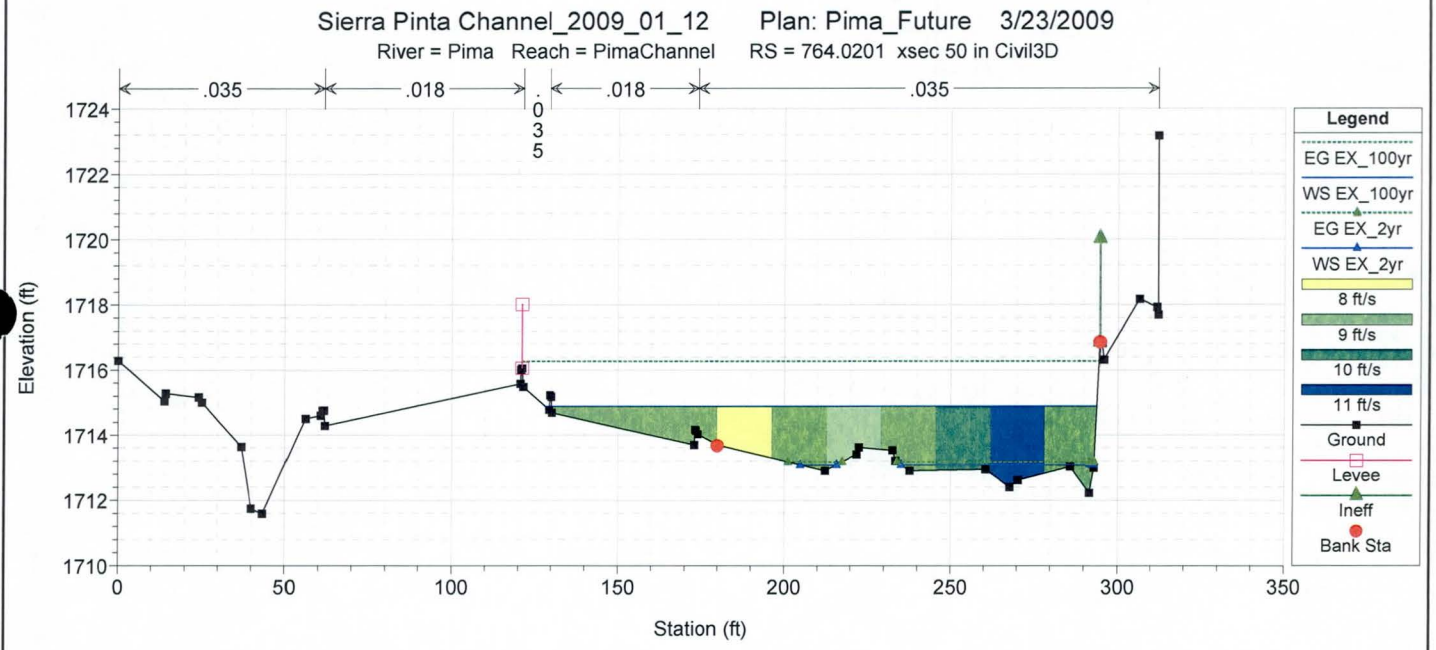

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 861.741*
.035
.032
.032
.035
.035
0.021
0.032211
0.032
0.021
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta

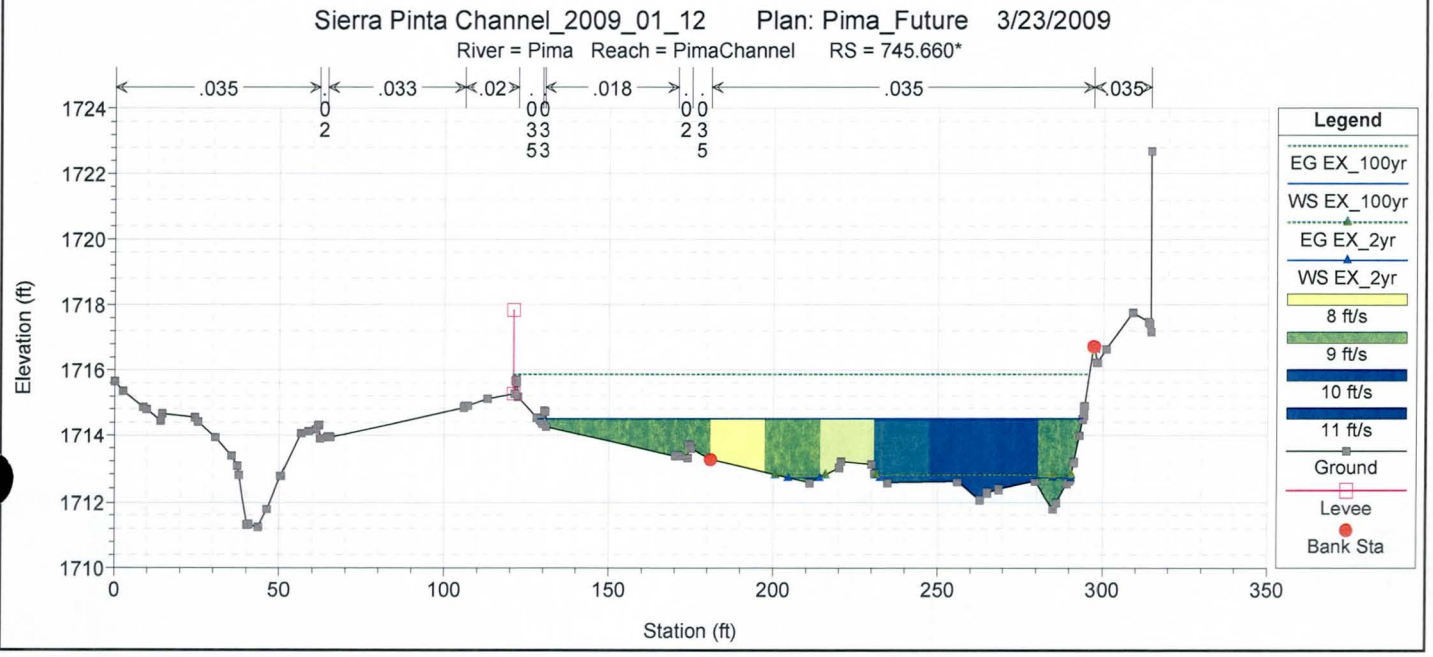

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 842.197*
.035
.029
.029
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

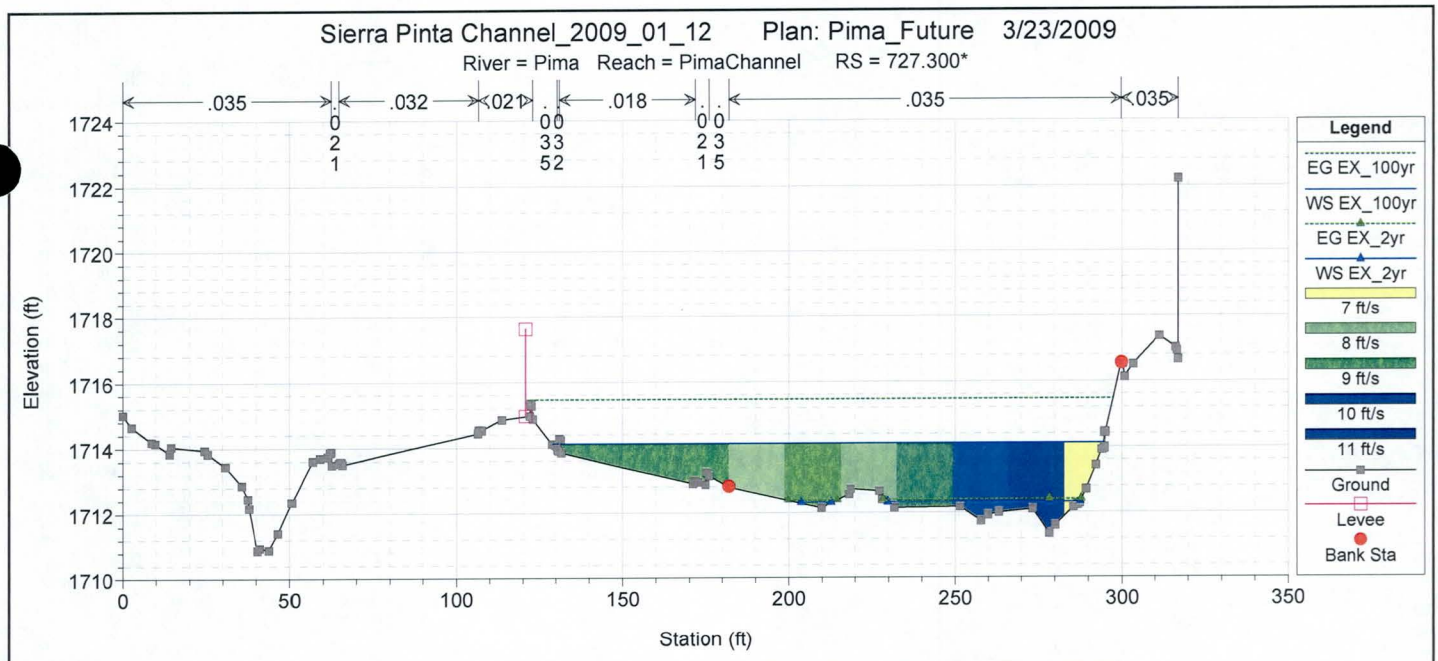

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 822.652*
.035
.026
.026
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

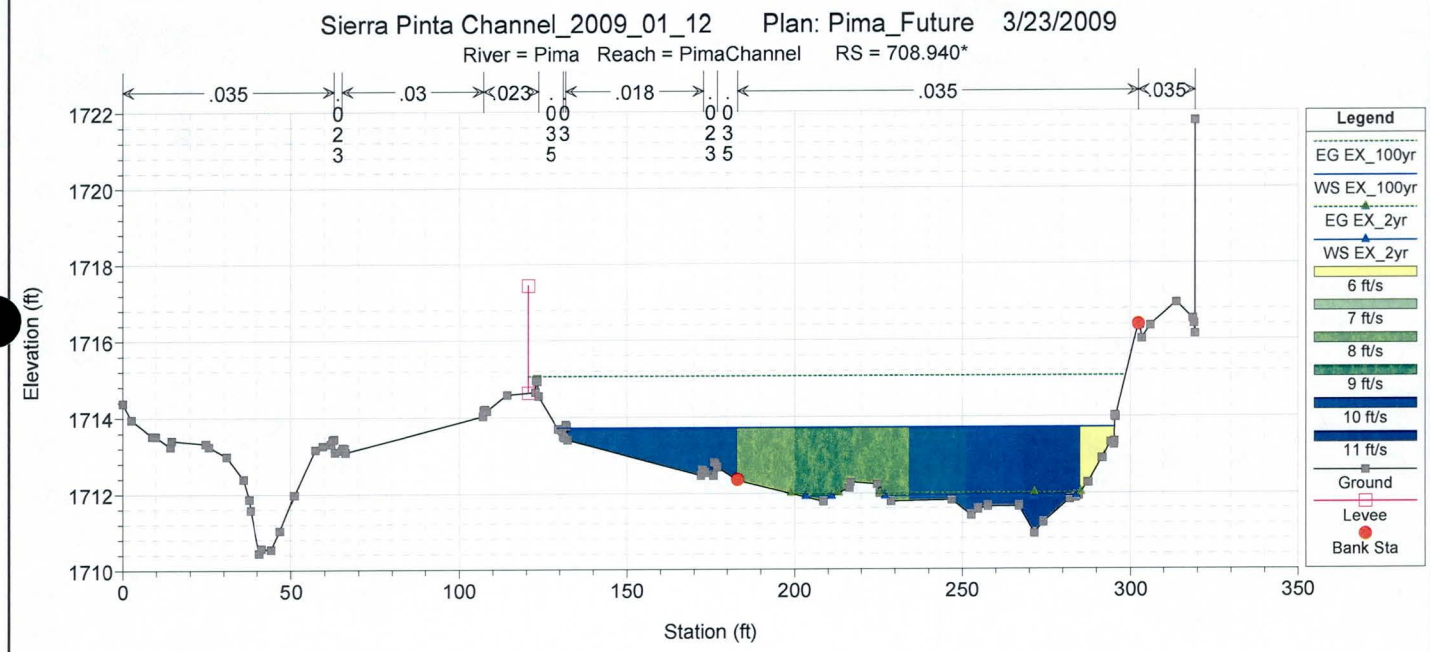

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 803.108*
.035
.024
.024
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

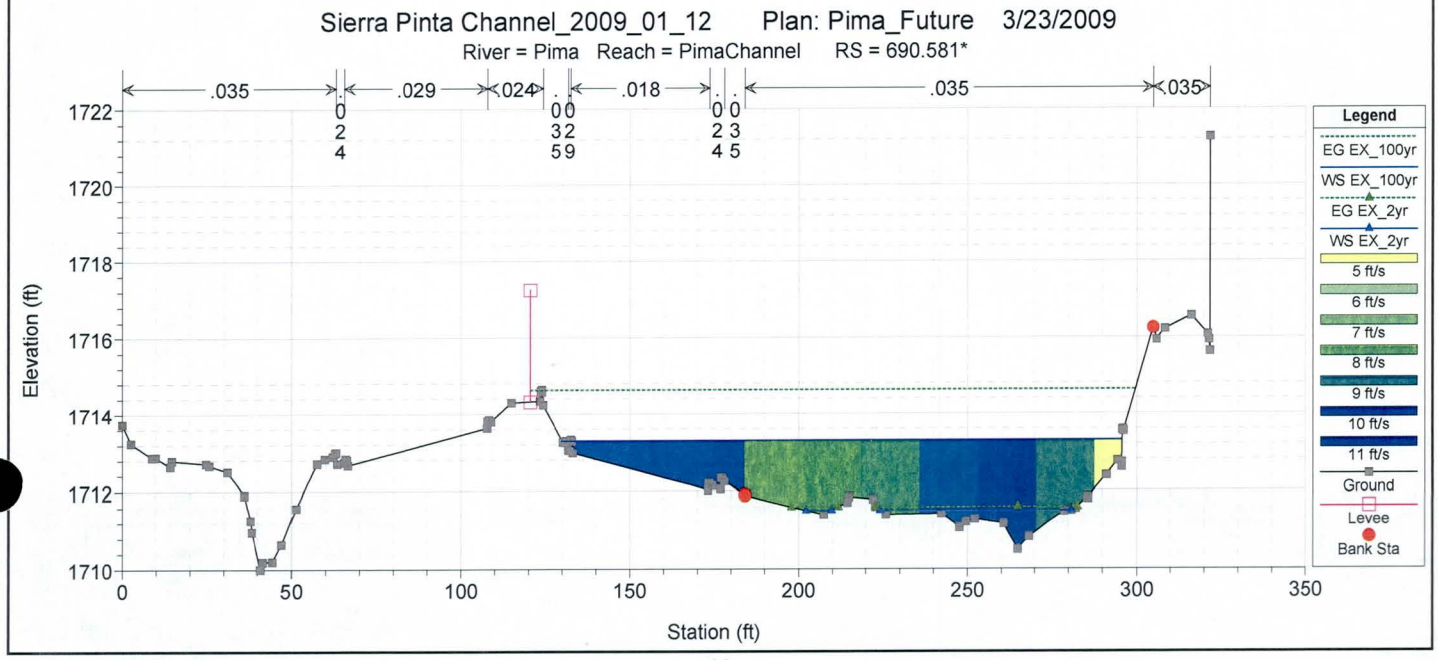

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 783.564*
.035
.021
.021
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta

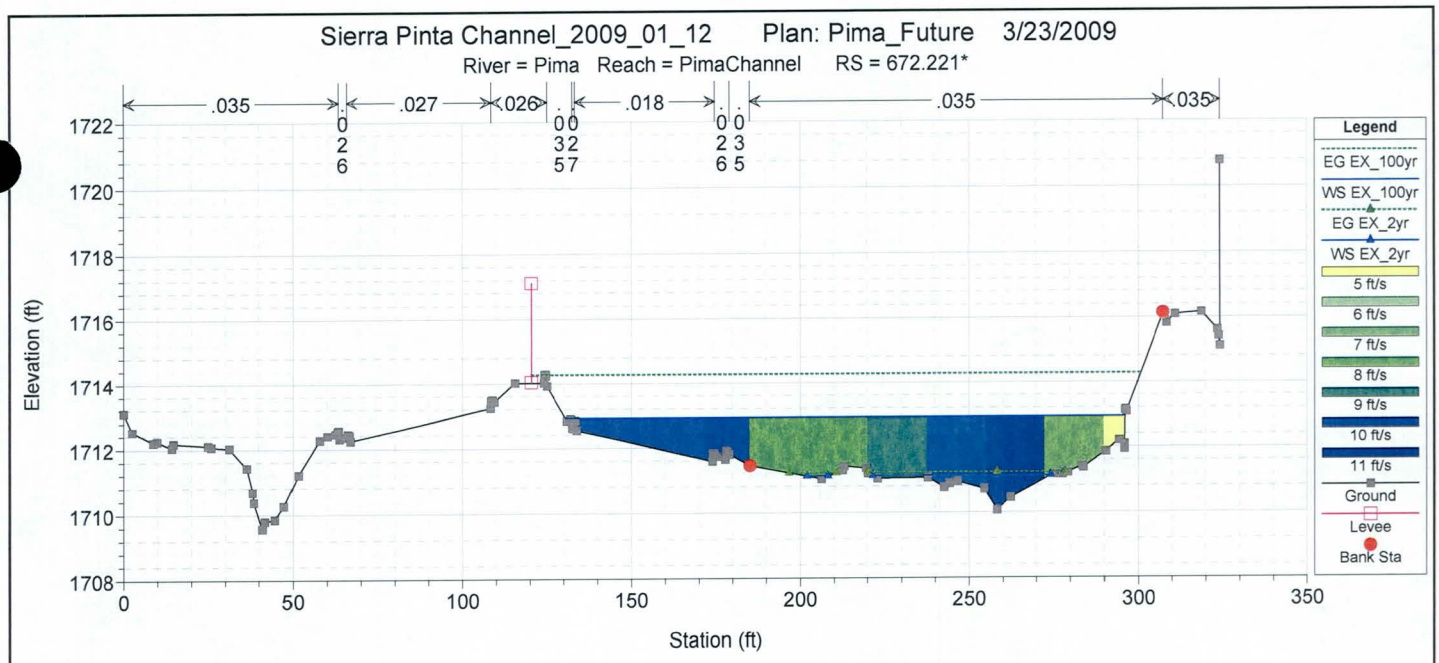

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 764.0201 xsec 50 in Civil3D
.035
.018
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Ineff
Bank Sta

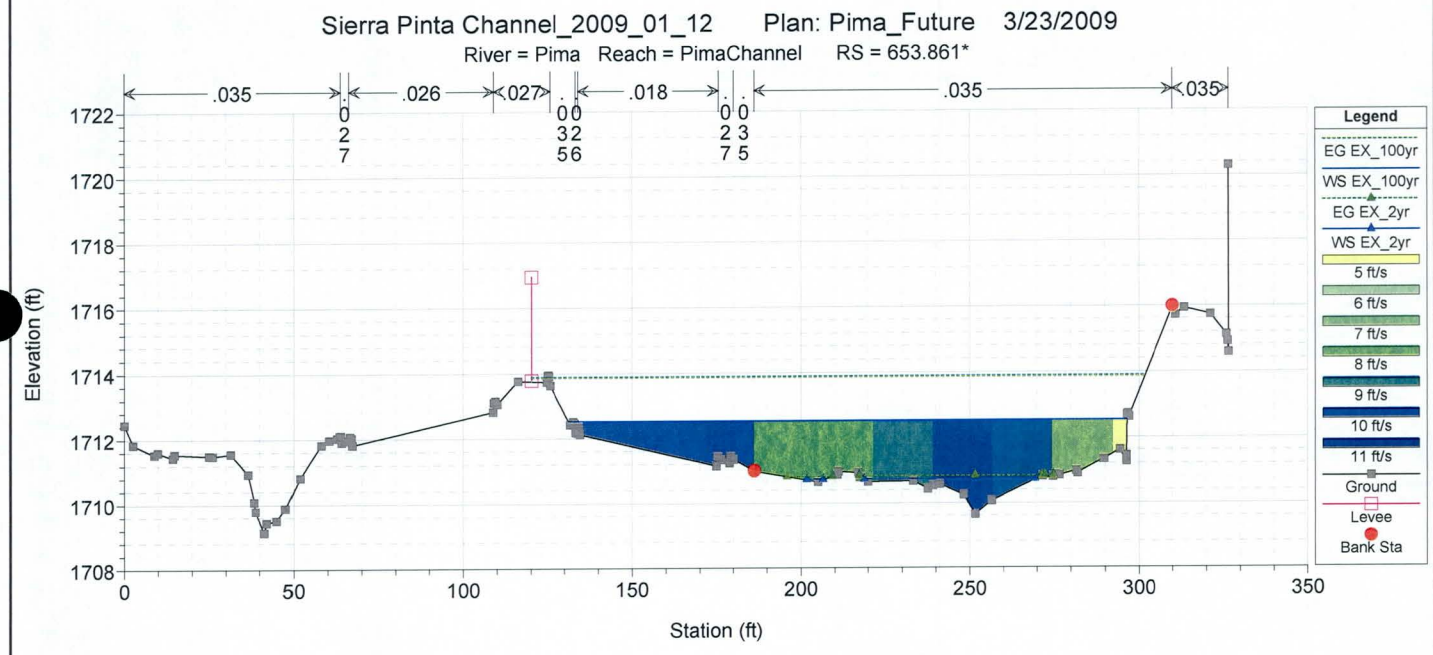

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 745.660*
.035
.033
.02
.018
.035
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

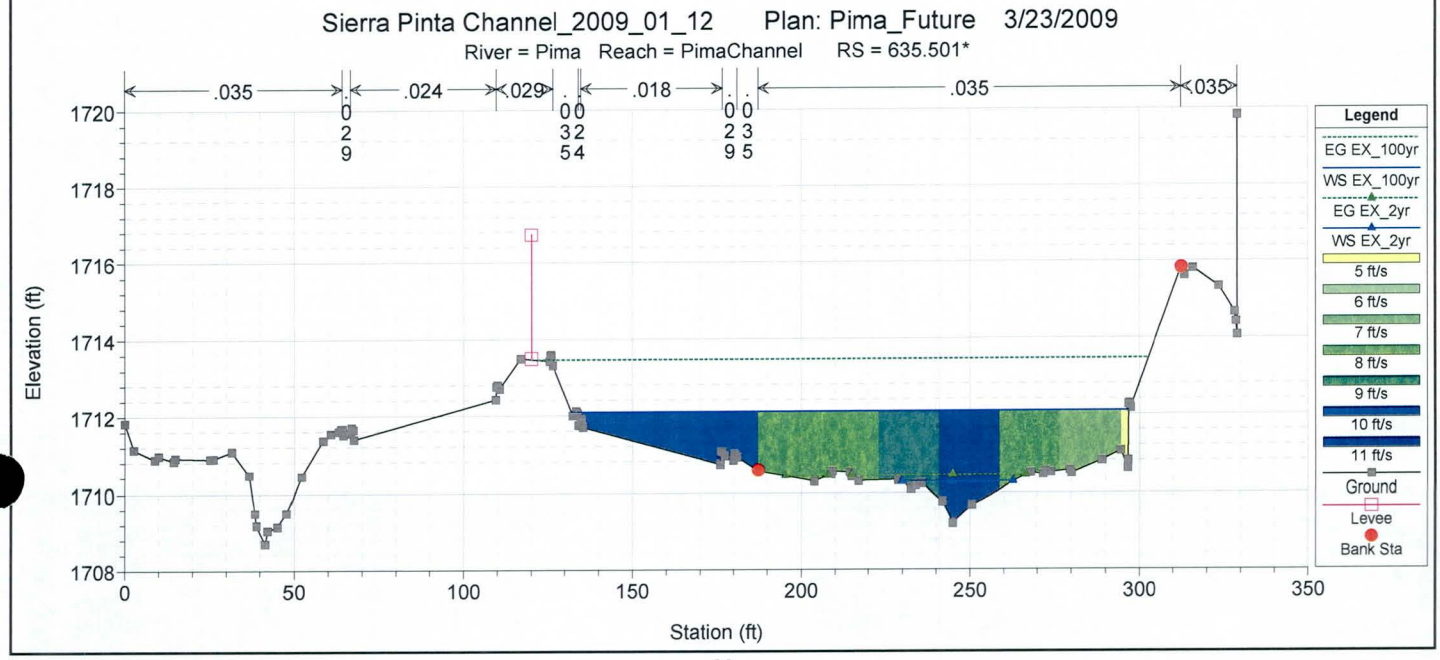

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 727.300*
.035
.032
.021
.018
.035
.035
0 0 0 0 0 2 3
2 3 3 3 5 1 5
1 2
Elevation (ft)
1724
1722
1720
1718
1716
1714
1712
1710
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

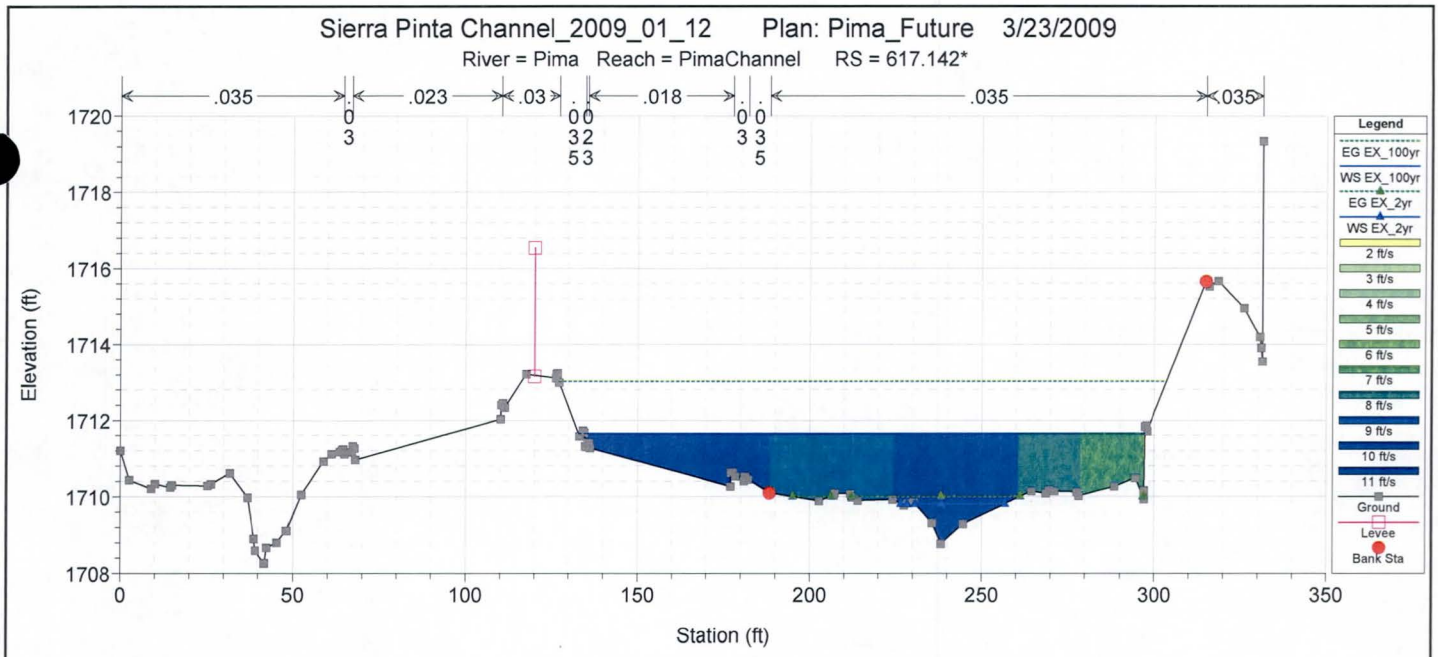

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 708.940*
.035
.03
.023
.018
.035
.035
0 0 0 0 0 2 3
2 3 3 3 5 3 5
3
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

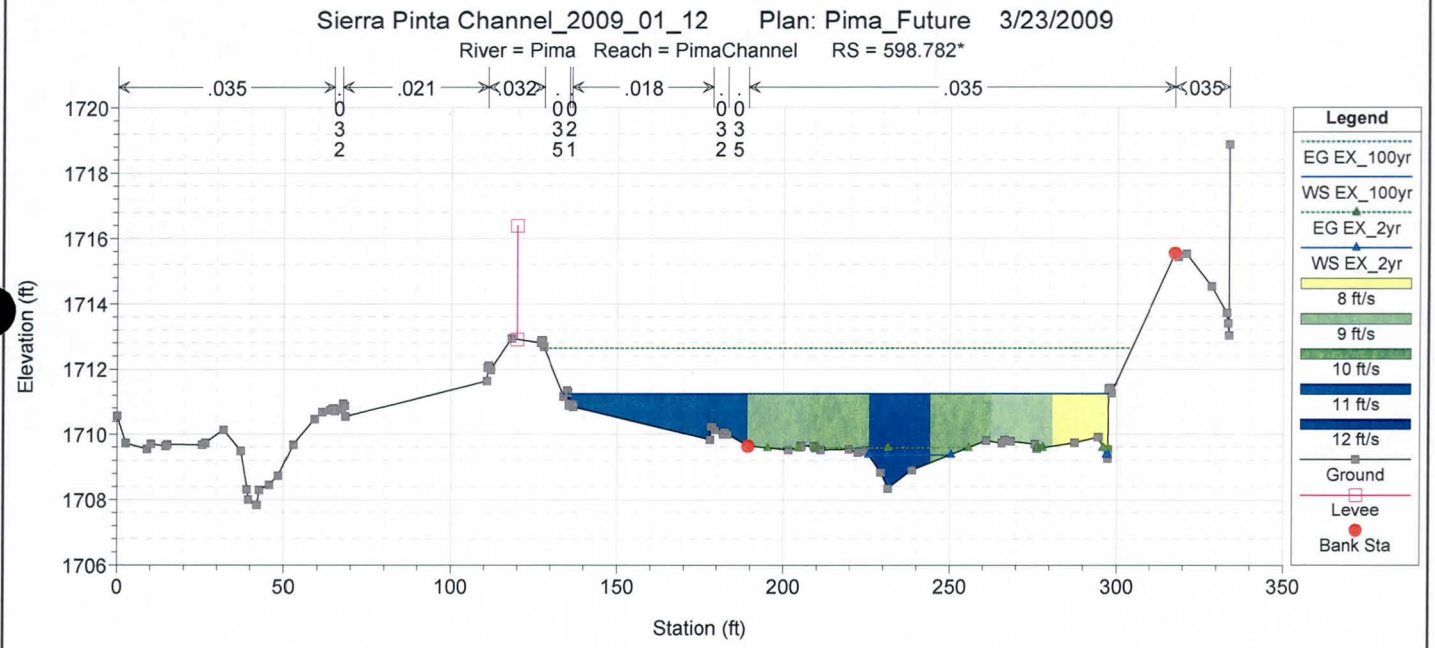

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 690.581*
.035
.029
.024
.018
.035
.035
0 0 0 0 0 2 3
2 3 3 2 4 5 9
4
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

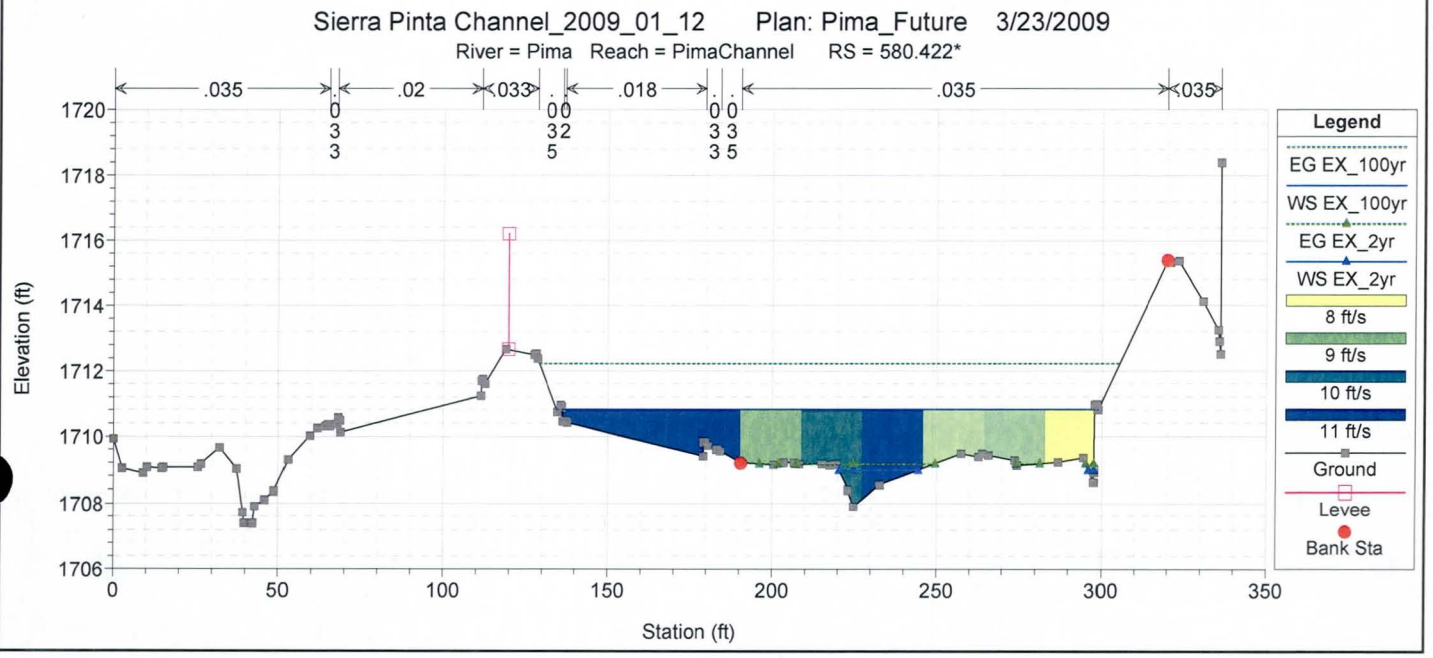

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 672.221*
.035
.027
.026
.018
.035
.035
0 0 0 0 0 0
2 3 2 3 6 5
6 7 5 7
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
1708
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

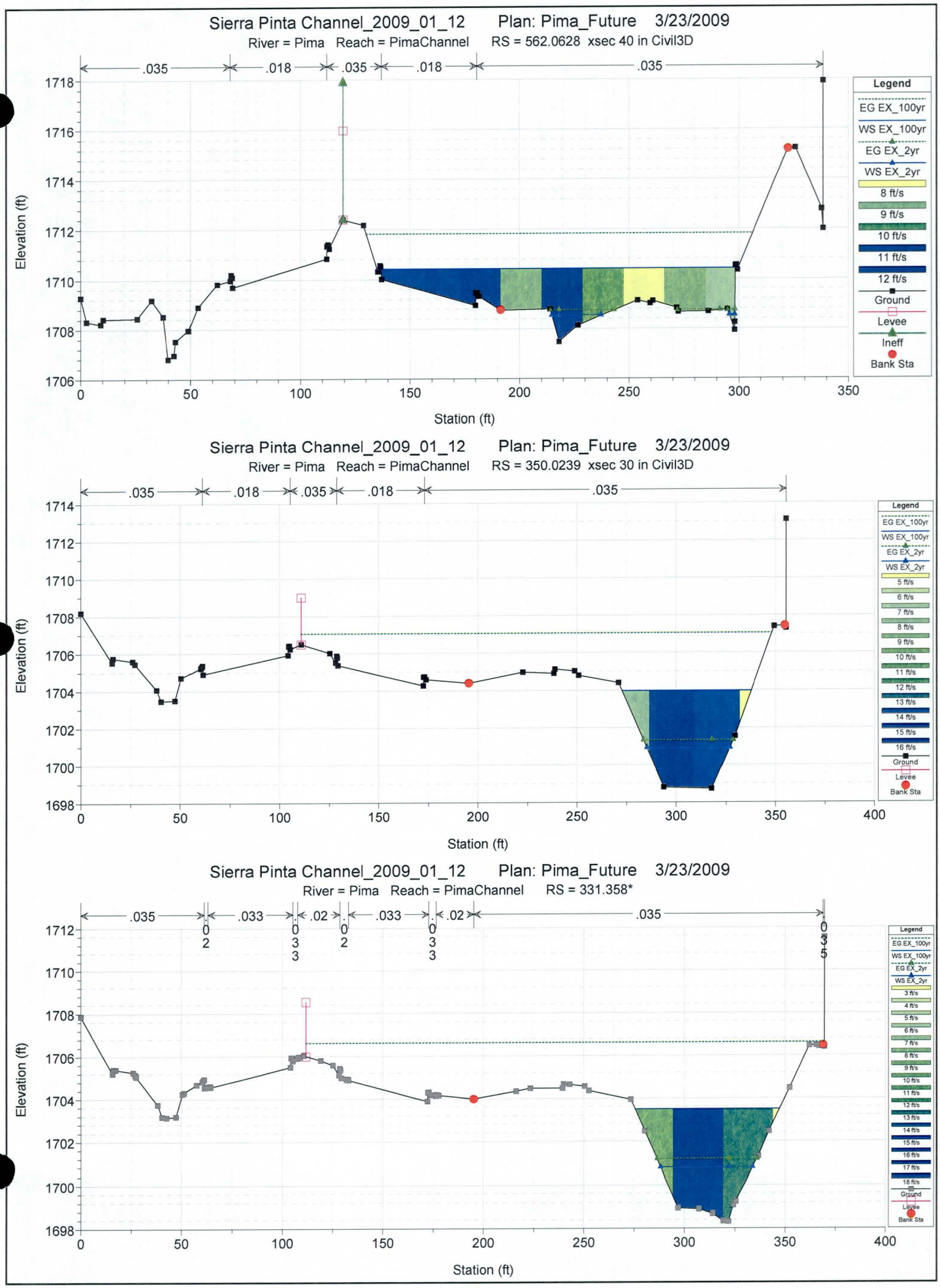

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 653.861*
.035
.026
.027
.018
.035
.035
0 0 0 0 0 0
2 3 2 3 7 5
7 6 5 6
Elevation (ft)
1722
1720
1718
1716
1714
1712
1710
1708
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

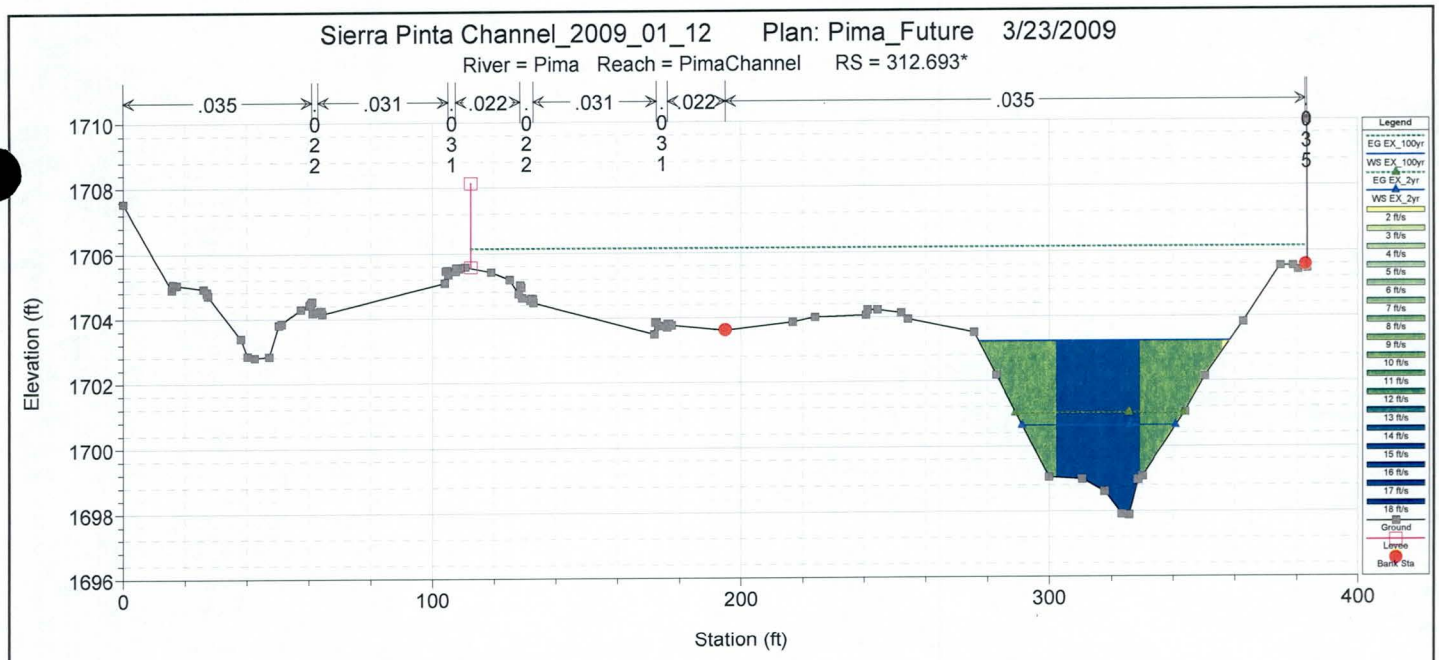

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 635.501*
.035
.024
.029
.018
.035
.035
0 0 0 0 0 0
2 3 2 3 9 5
9 4 5 4
Elevation (ft)
1720
1718
1716
1714
1712
1710
1708
0
50
100
150
200
250
300
350
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

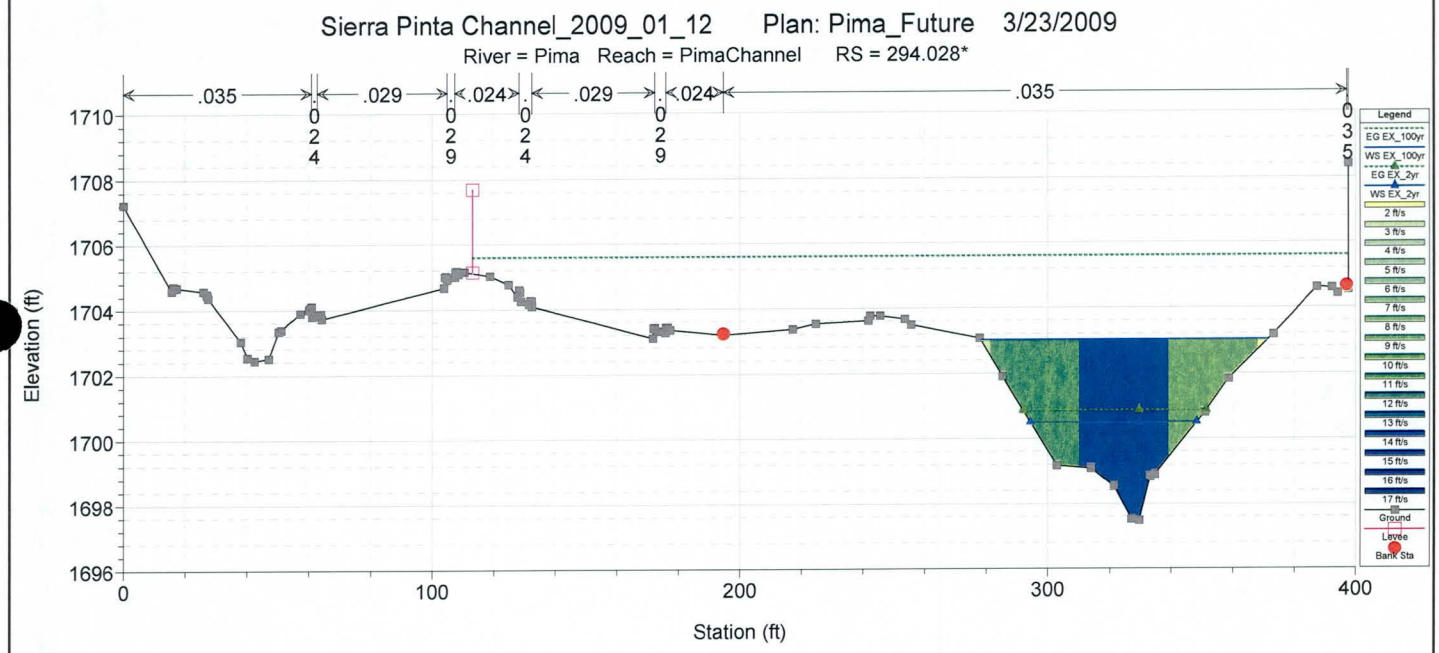

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 617.142*
.035
.023
.03
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

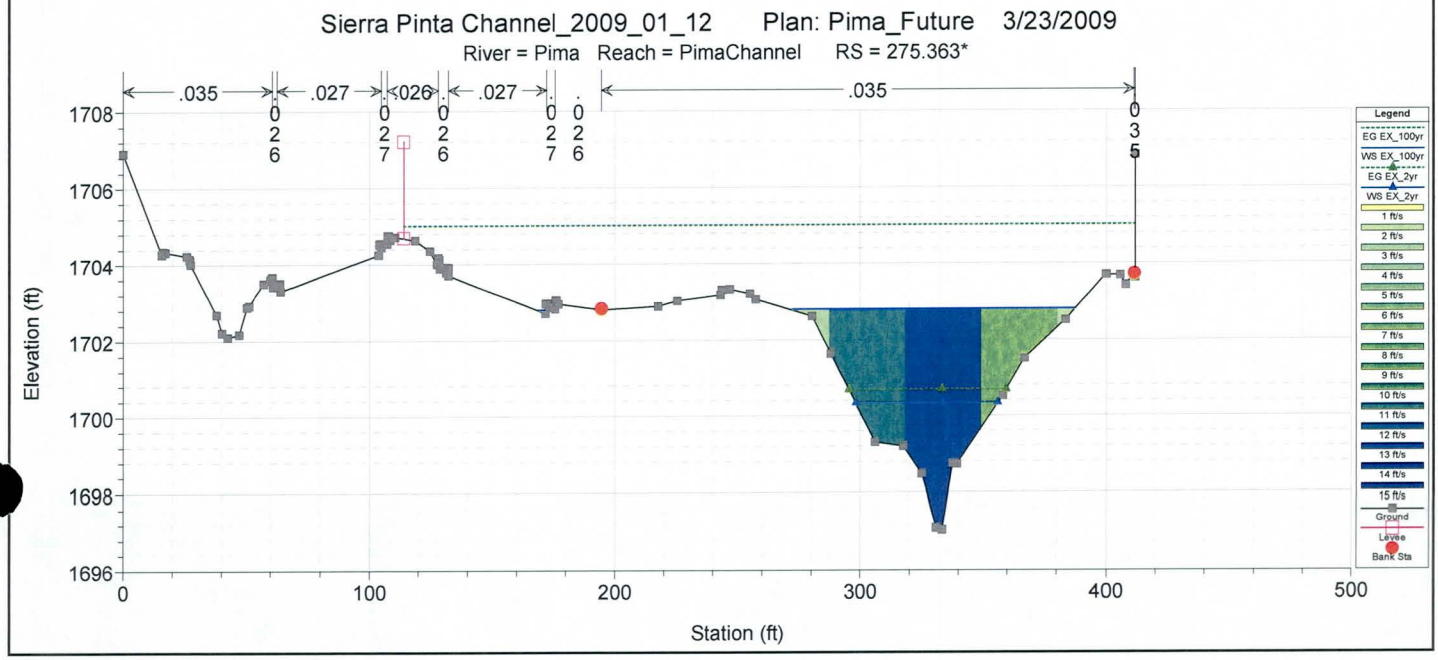

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 598.782*
.035
.021
.032
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

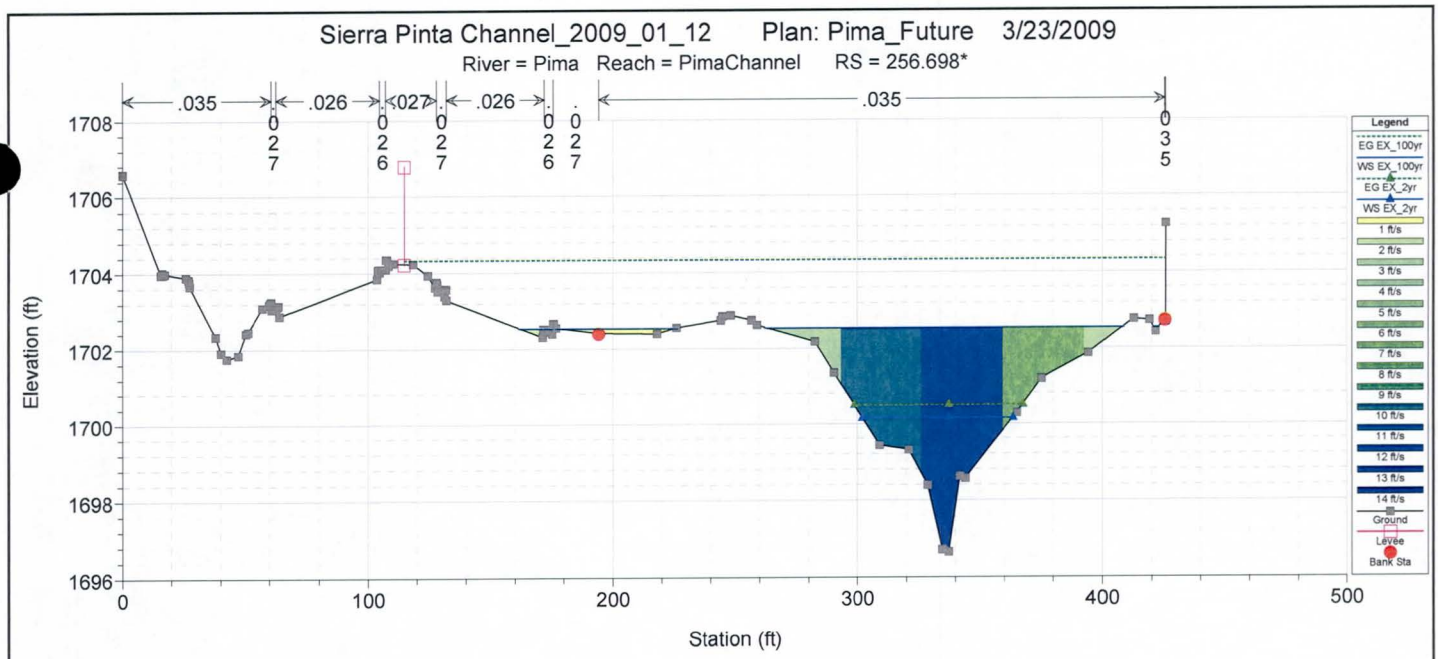

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 580.422*
.035
.02
.033
.018
.035
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 562.0628 xsec 40 in Civil3D
.035
.018
.035
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 350.0239 xsec 30 in Civil3D
.035
.018
.035
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
5 ft/s
6 ft/s
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
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 331.358*
.035
.033
.02
.033
.02
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
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
Levee
Bank Sta
Elevation (ft)
Station (ft)


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 312.693*
.035
.031
.022
.031
.022
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 294.028*
.035
.029
.024
.029
.024
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 275.363*
.035
.027
.026
.027
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
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.026
.027
.026
.035
Legend
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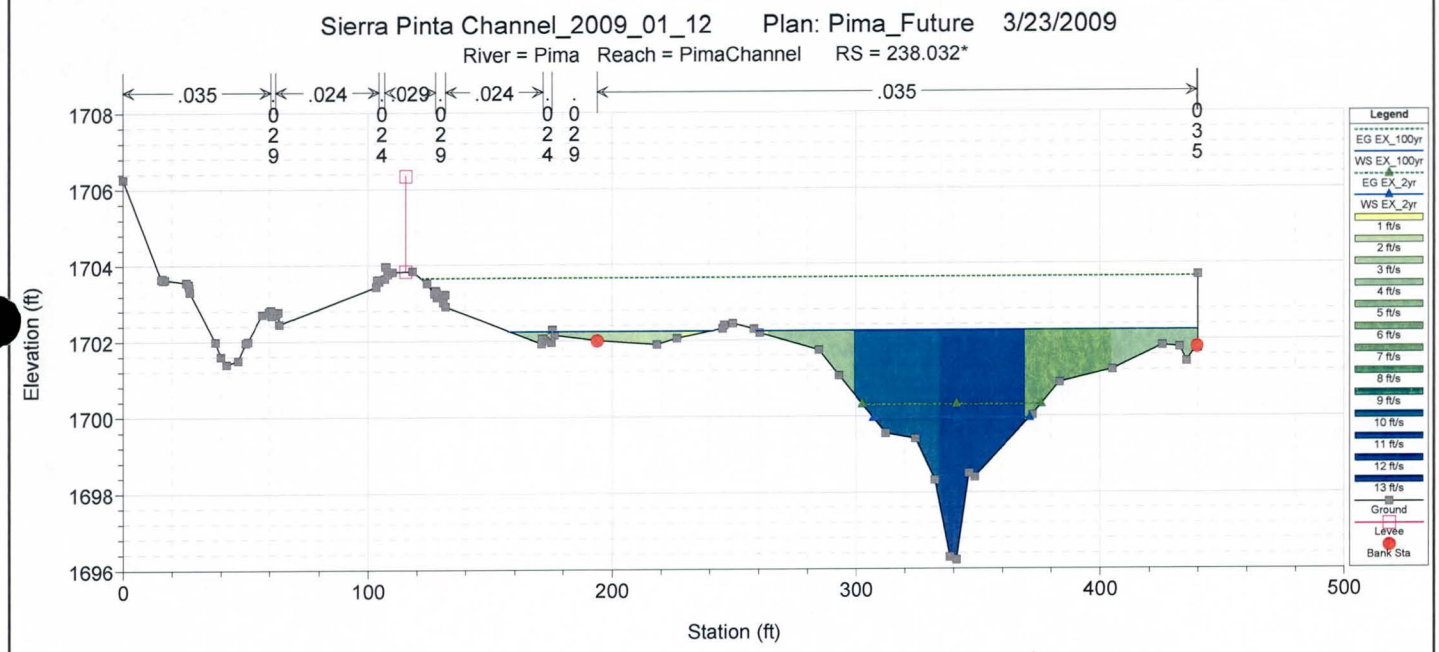
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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River = Pima Reach = PimaChannel RS = 238.032*
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.024
.029
.024
.035
Legend
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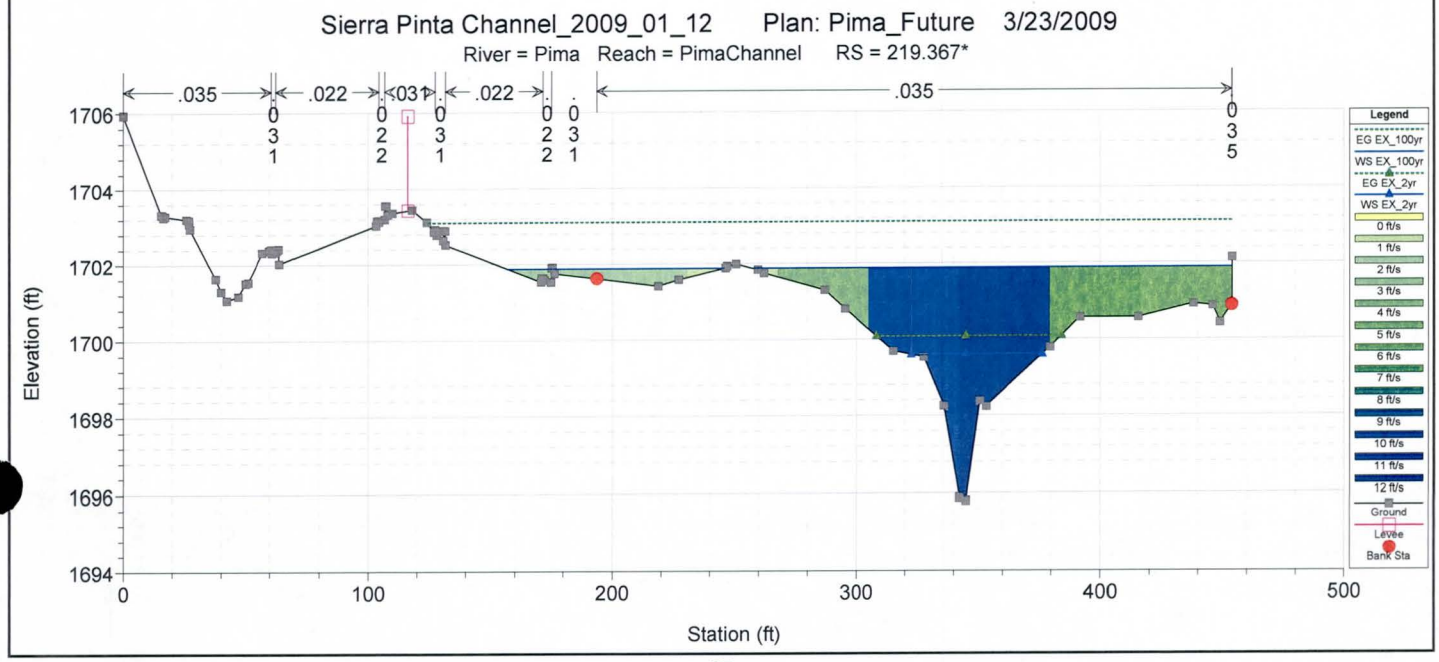
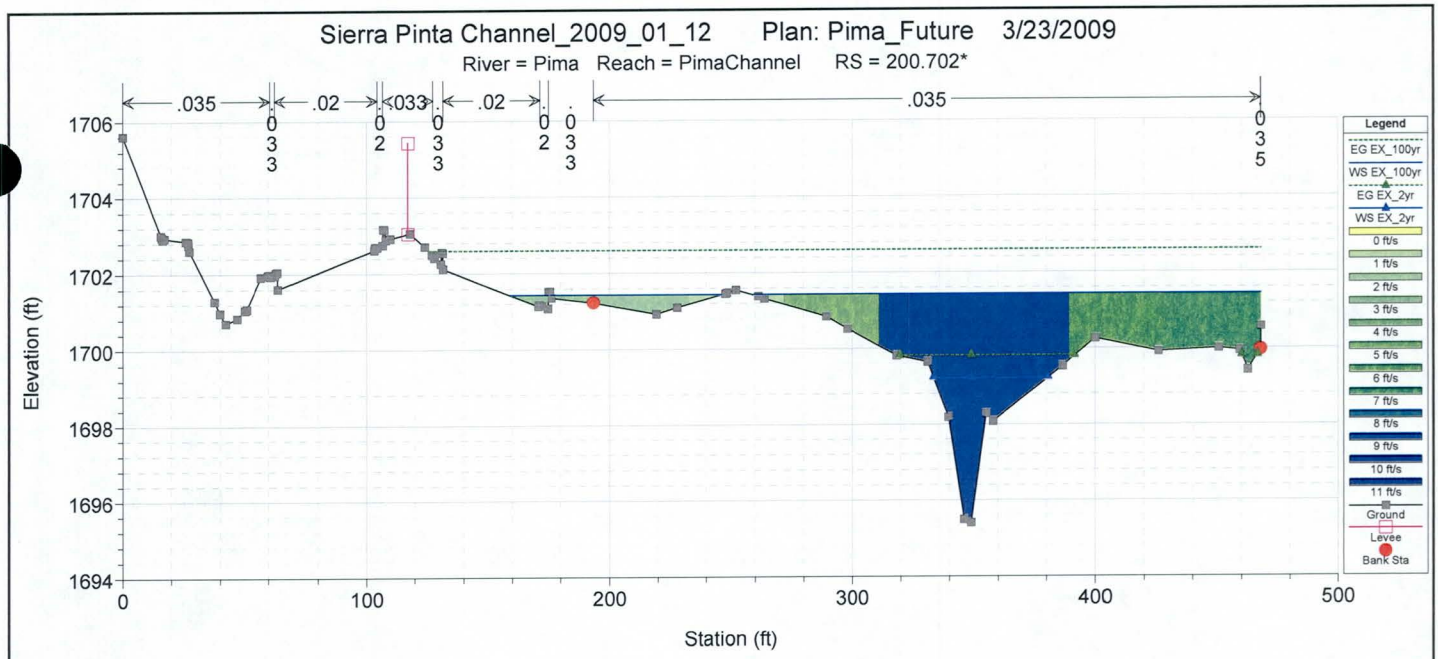
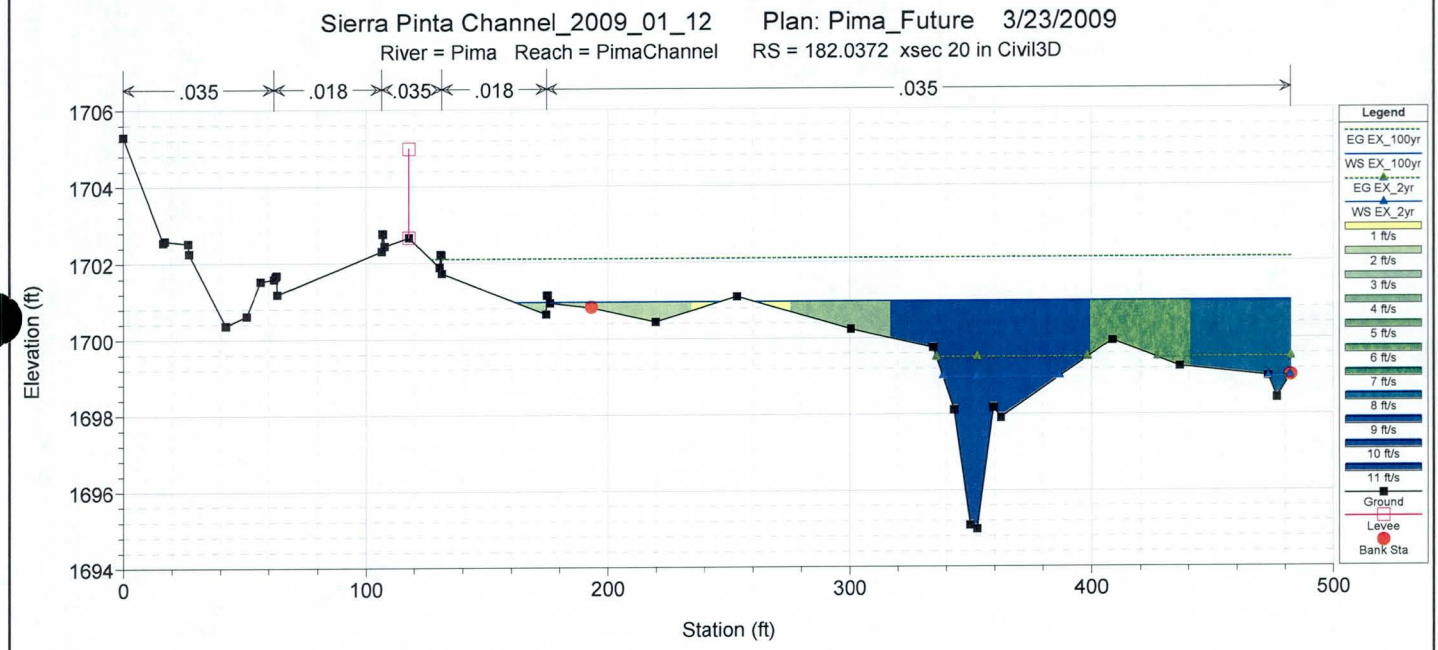
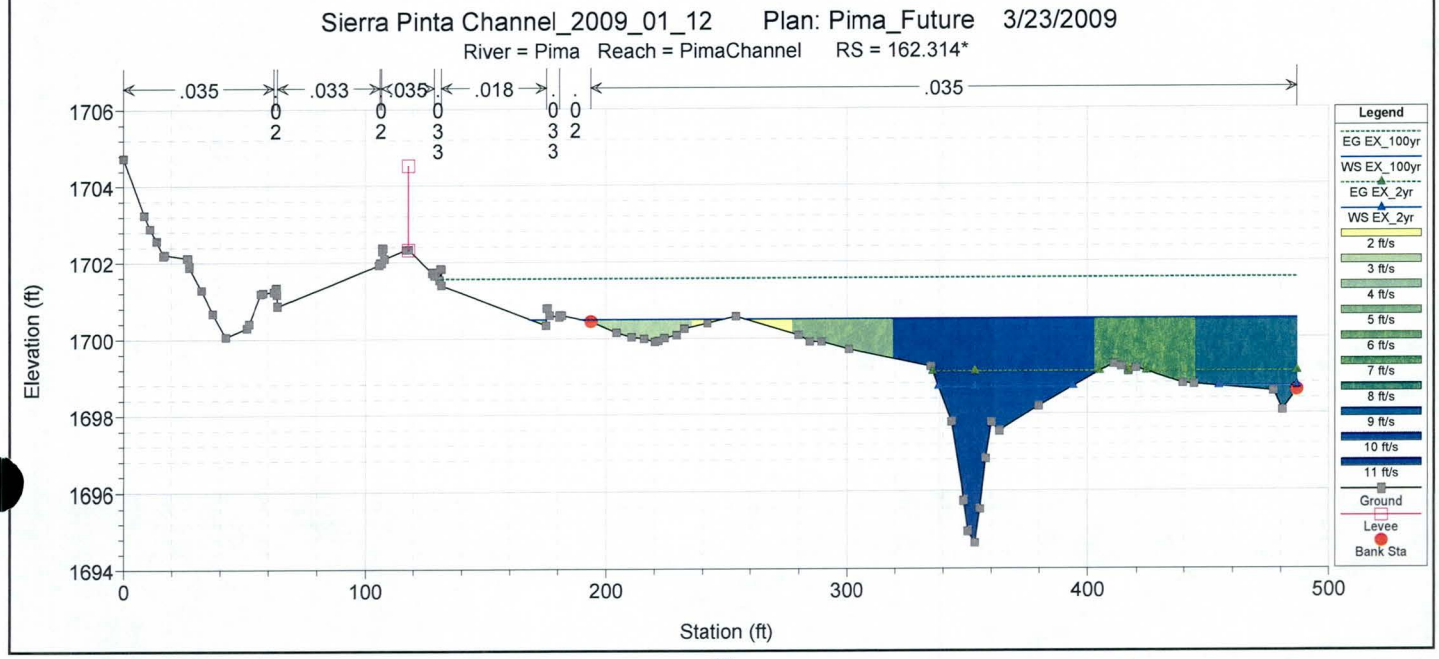
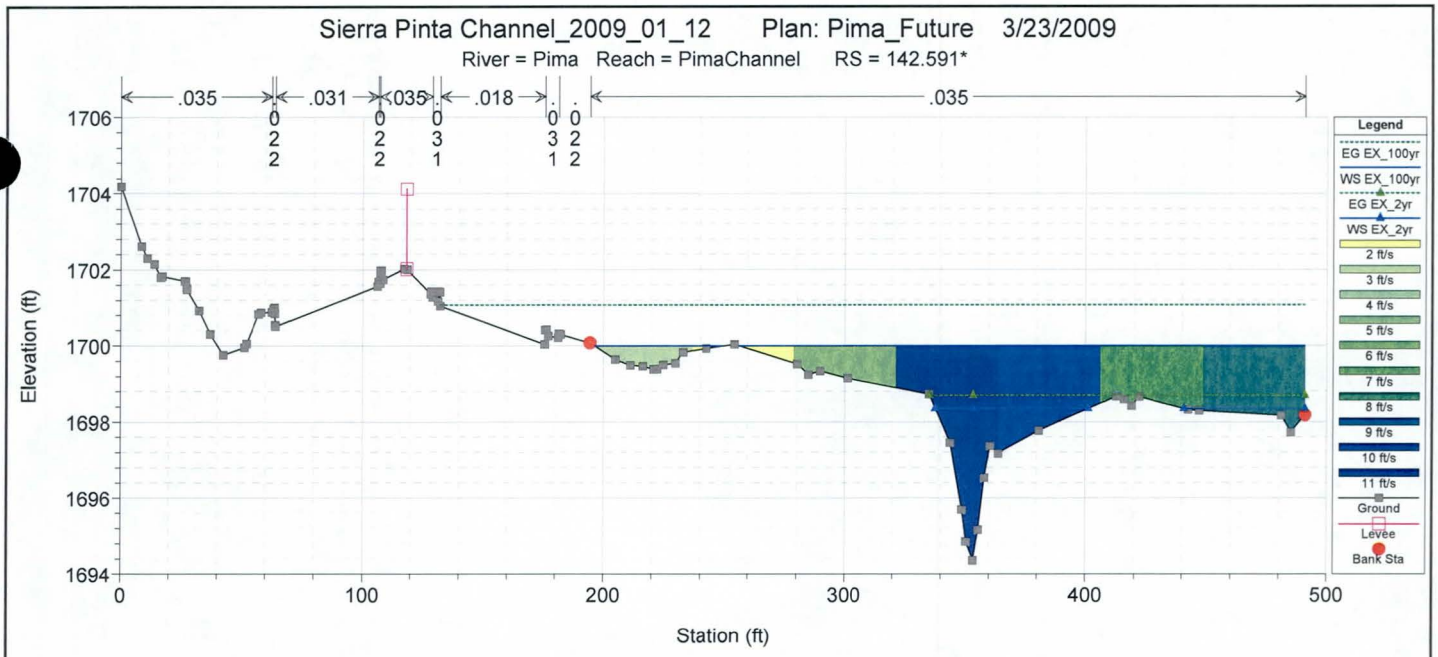
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

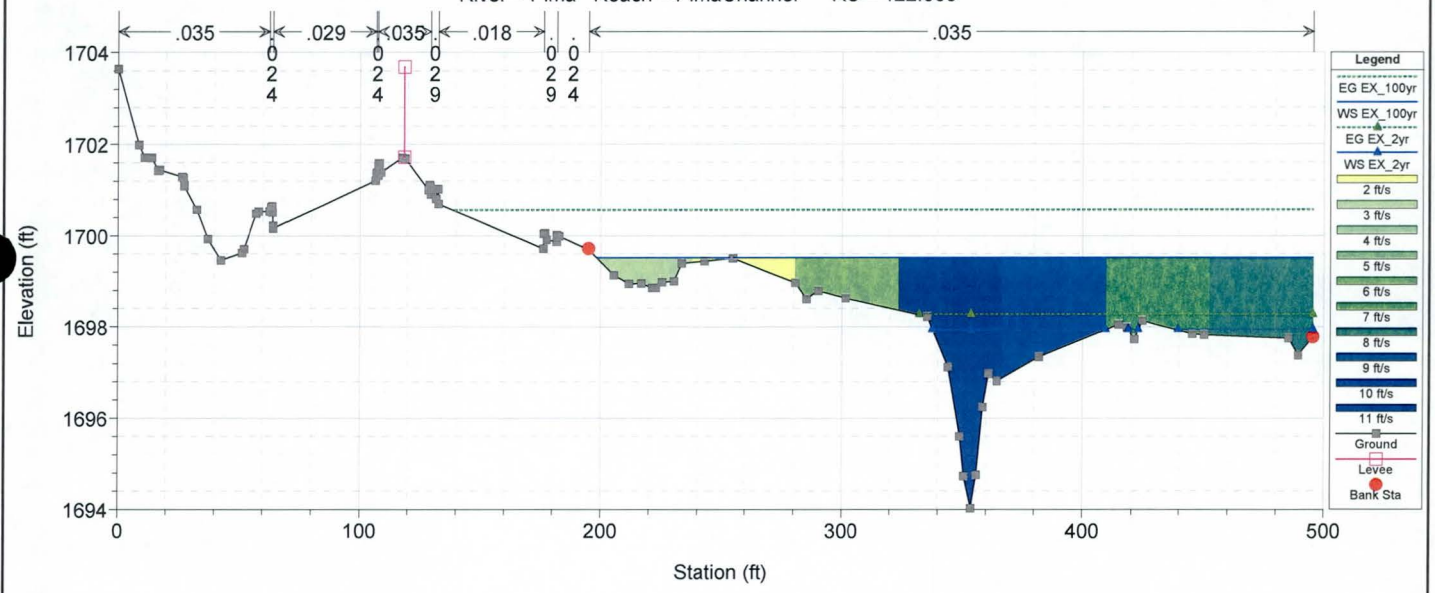

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 219.367*
.035
.022
.031
.022
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

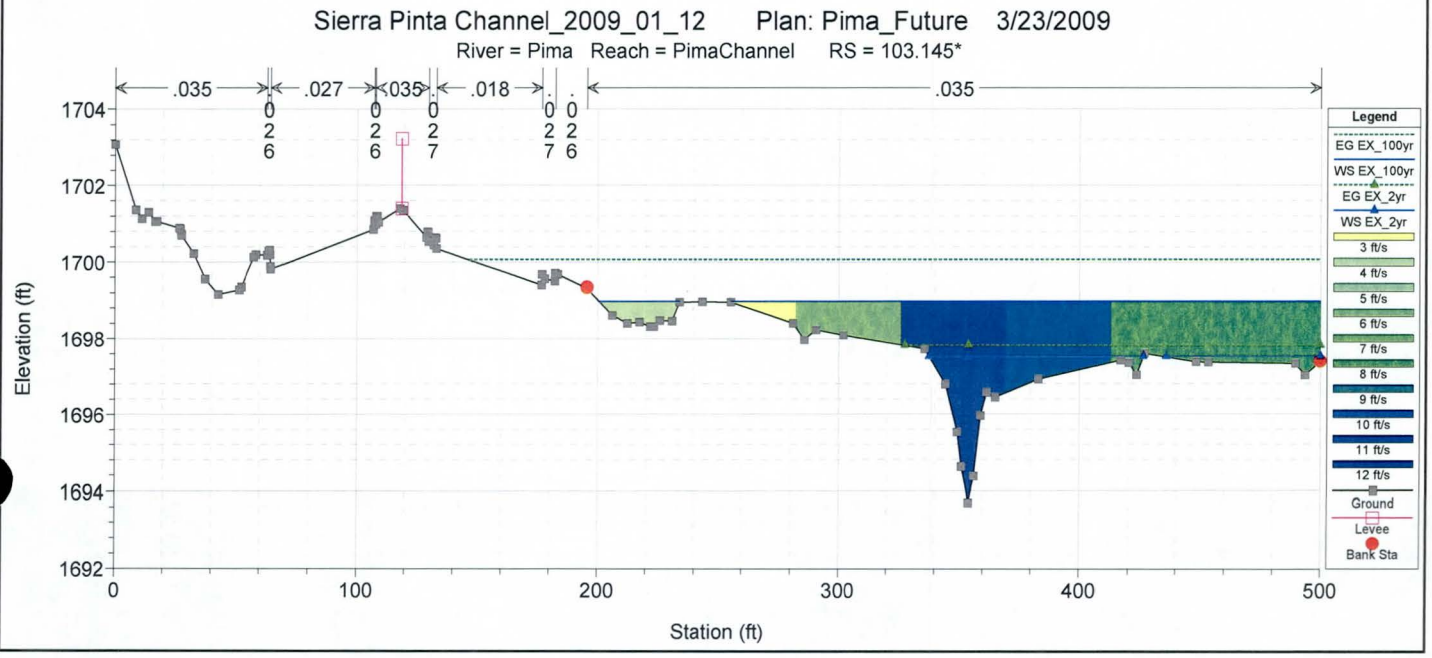

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 200.702*
.035
.02
.033
.02
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

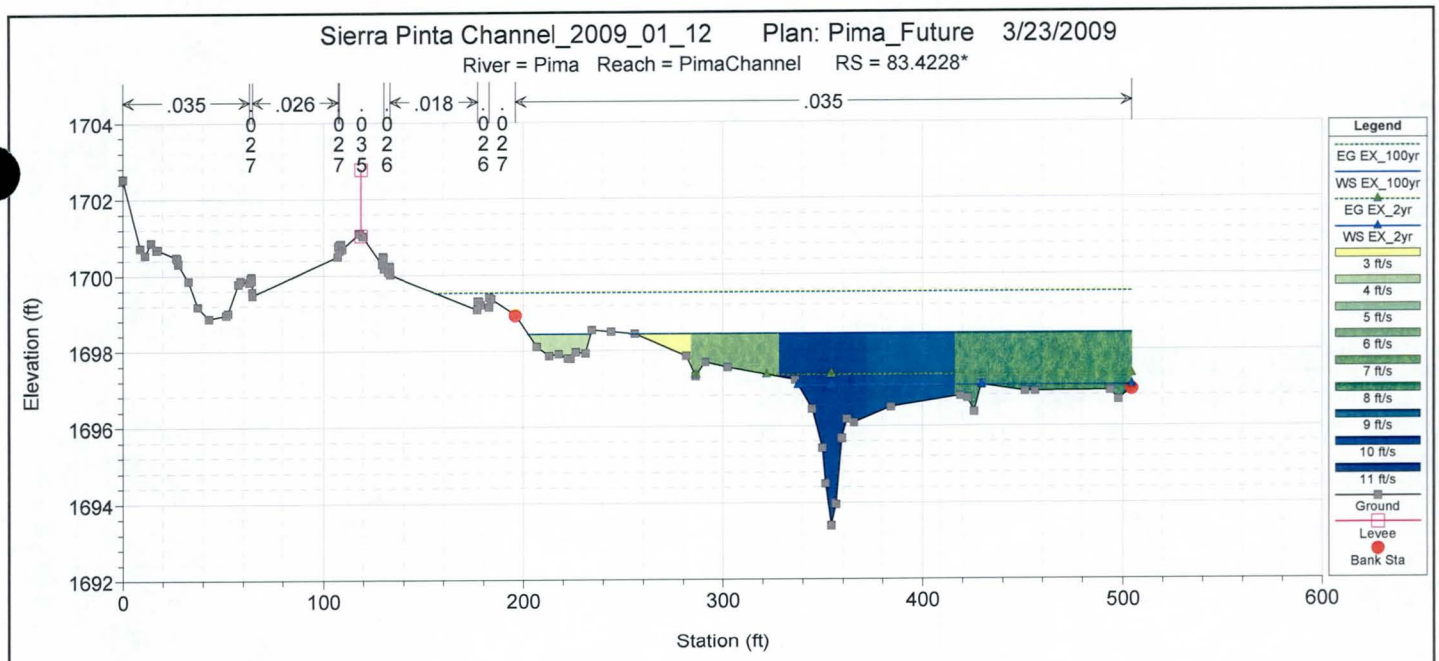

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 182.0372 xsec 20 in Civil3D
.035
.018
.035
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

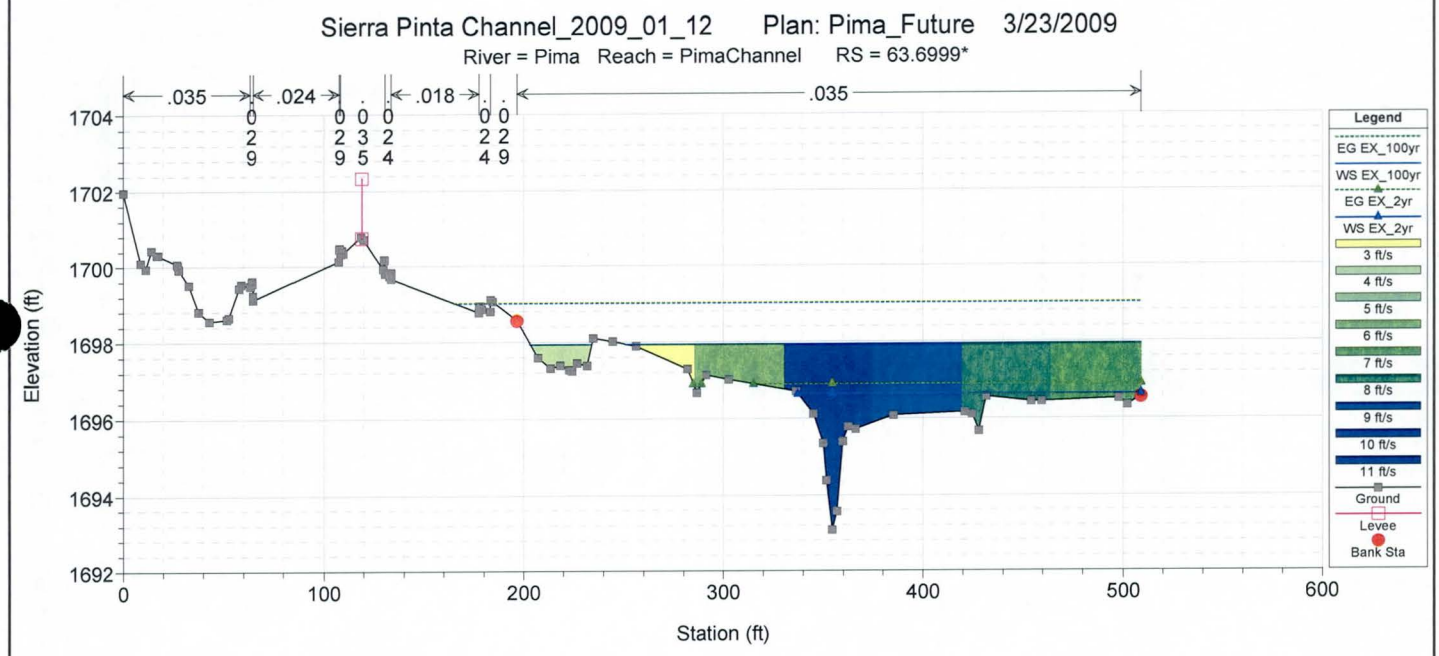

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 162.314*
.035
.033
.035
.018
.035
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

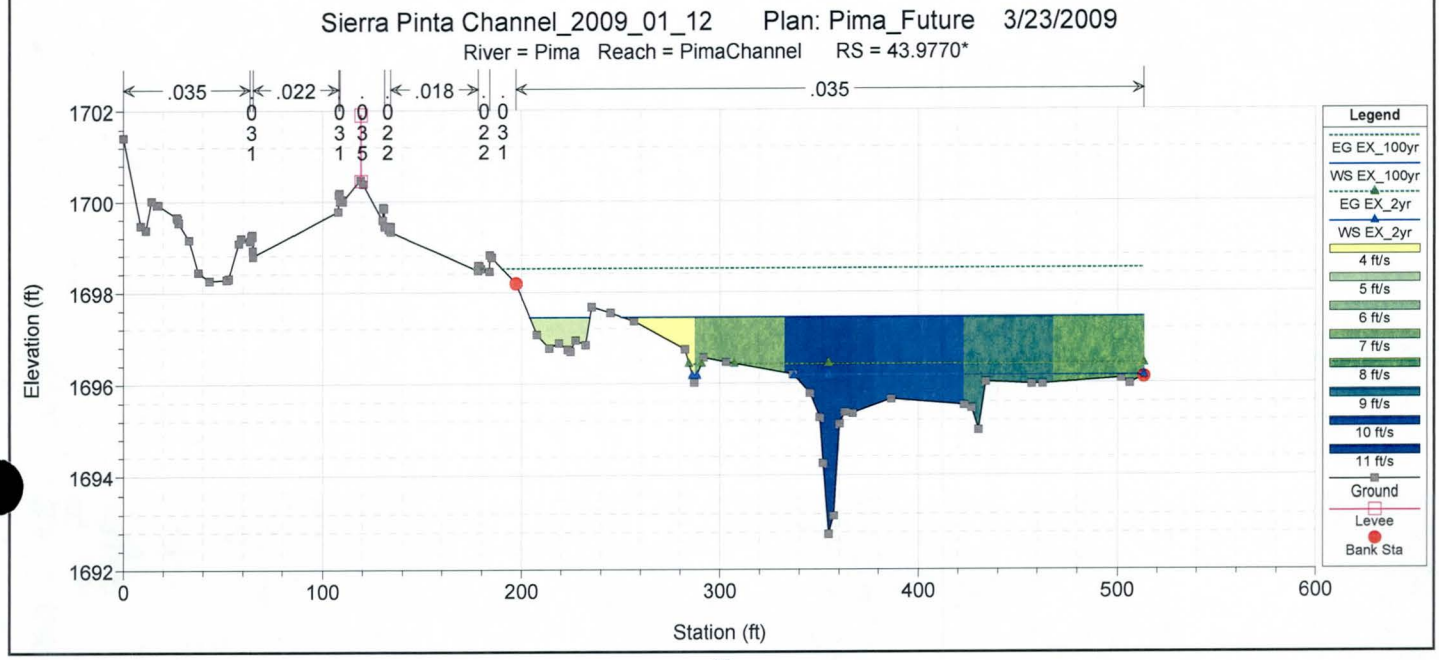

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 142.591*
.035
.031
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta

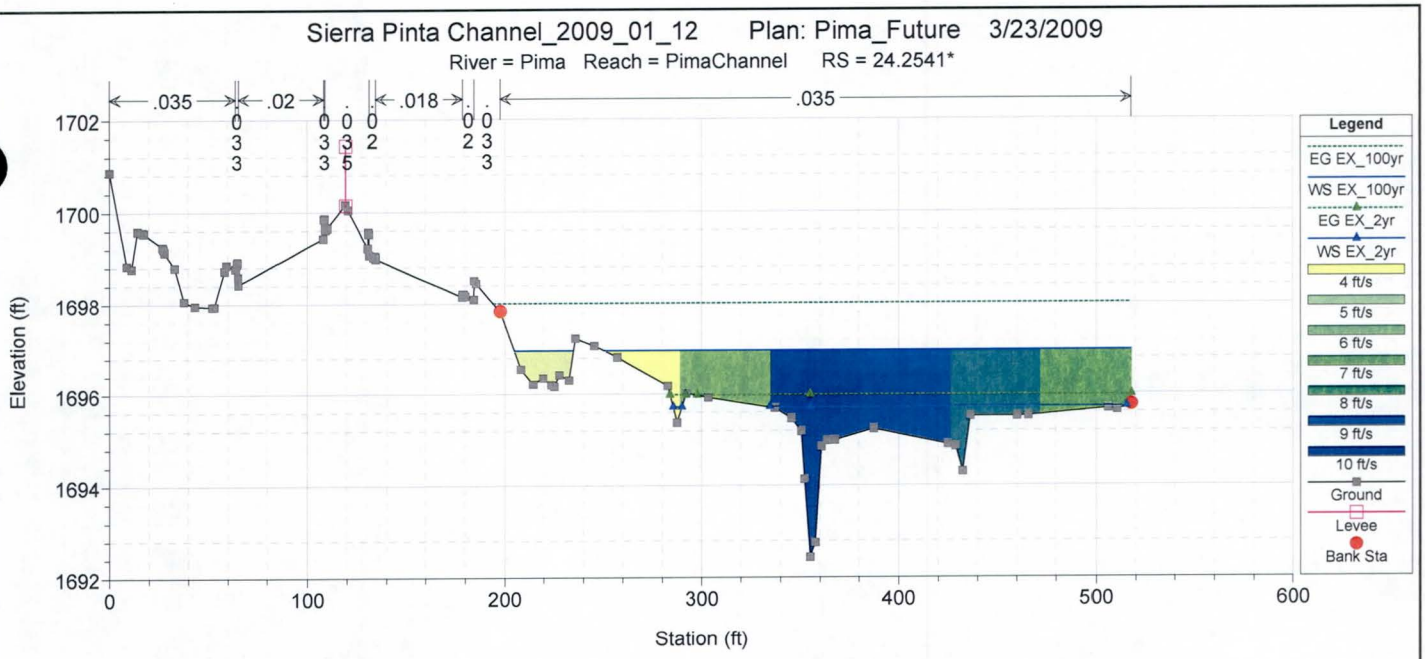

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 122.868*
.035
.029
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
2 ft/s
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 103.145*
.035
.027
.035
.018
.035
Elevation (ft)
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
12 ft/s
Ground
Levee
Bank Sta


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 83.4228*
.035
.026
.018
.035
0.027
0.023.756
0.022.667
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 63.6999*
.035
.024
.018
.035
0.029
0.023.954
0.022.449
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
3 ft/s
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 43.9770*
.035
.022
.018
.035
0.031
0.033.152
0.023.221
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
11 ft/s
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)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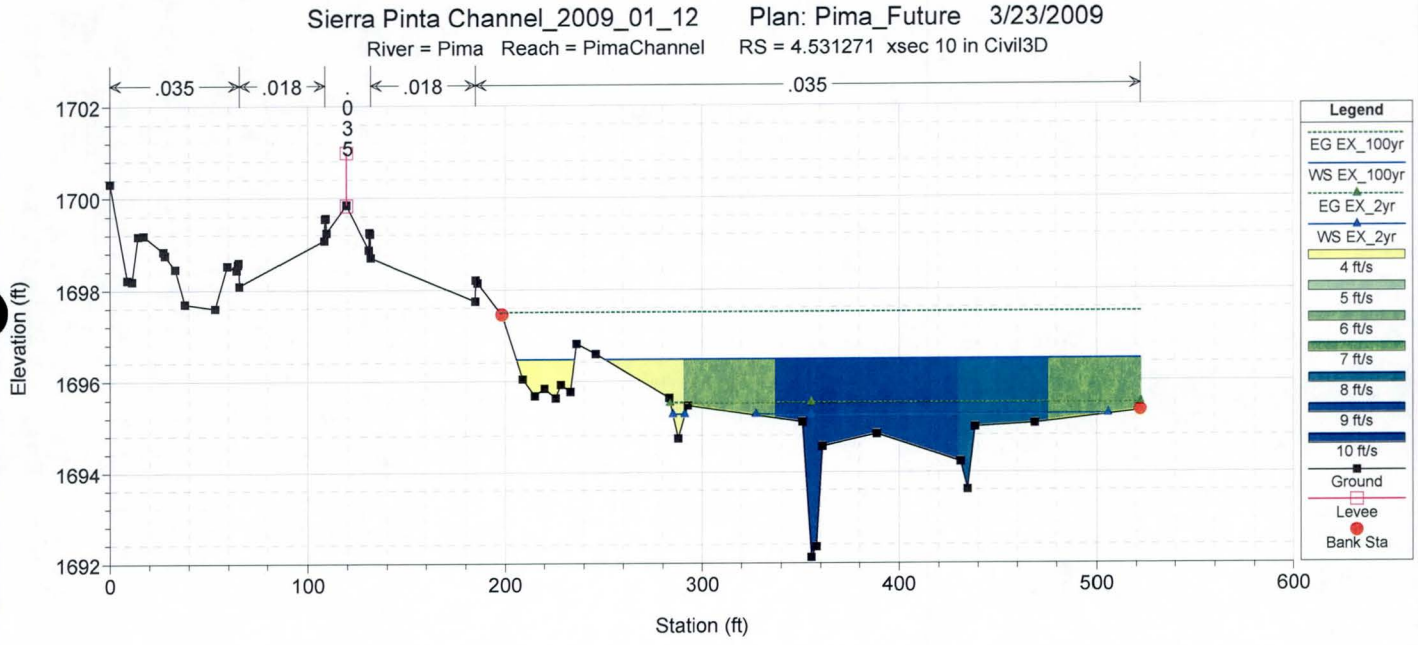
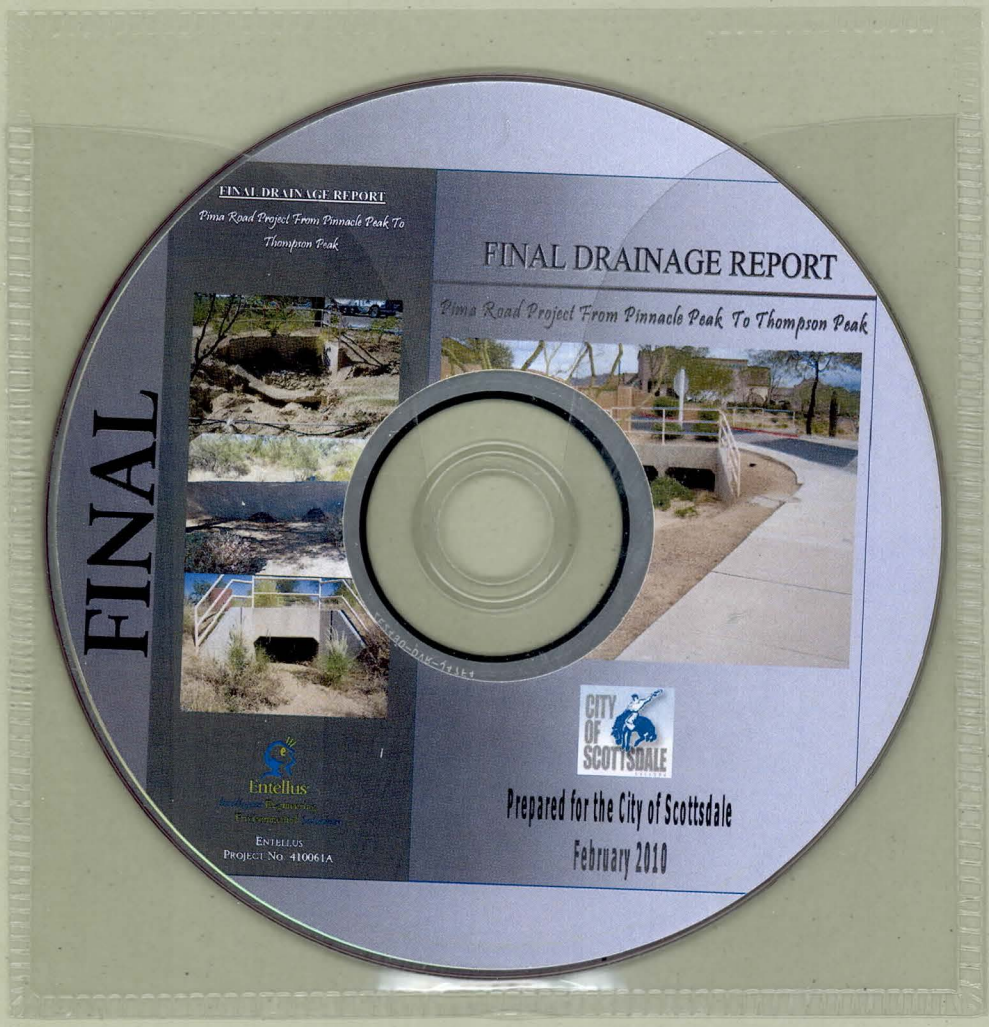
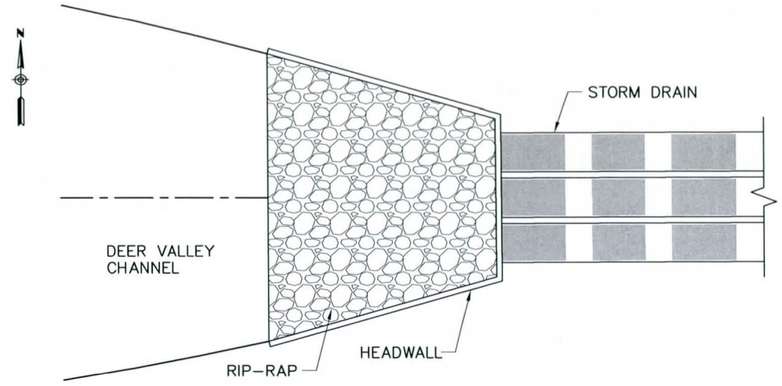
River = Pima Reach = PimaChannel RS = 24.2541*
.035
.02
.018
.035
1702
1700
1698
1696
1694
1692
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta

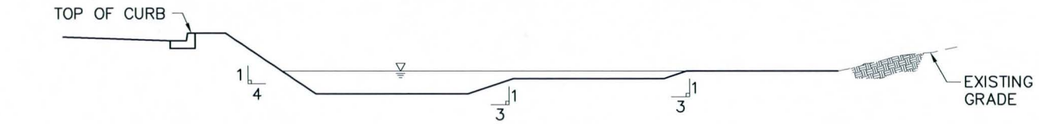

Sierra Pinta Channel_2009_01_12 Plan: Pima_Future 3/23/2009
River = Pima Reach = PimaChannel RS = 4.531271 xsec 10 in Civil3D
.035
.018
.018
.035
1702
1700
1698
1696
1694
1692
Elevation (ft)
0
100
200
300
400
500
600
Station (ft)
Legend
EG EX_100yr
WS EX_100yr
EG EX_2yr
WS EX_2yr
4 ft/s
5 ft/s
6 ft/s
7 ft/s
8 ft/s
9 ft/s
10 ft/s
Ground
Levee
Bank Sta

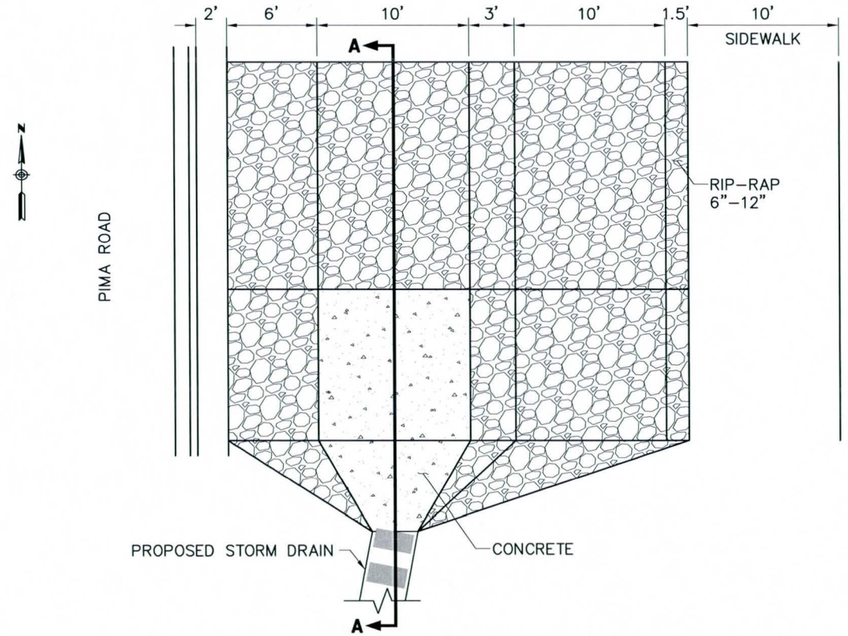

FINAL
FINAL DRAINAGE REPORT
Pima Road Project From Pinnacle Peak To Thompson Peak
Entellus
ENTELLUS
PROJECT NO. 410061A
FINAL DRAINAGE REPORT
Pima Road Project From Pinnacle Peak To Thompson Peak
CITY OF SCOTTSDALE
Prepared for the City of Scottsdale
February 2010

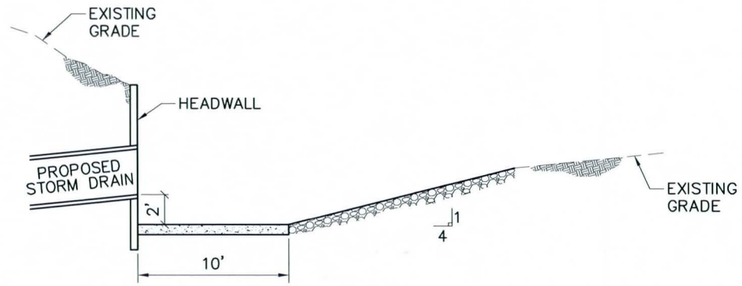


DETAIL NO. 1
STORM DRAIN OUTFALL @ DEER VALLEY ROAD AND PIMA ROAD

DETAIL NO. 2
TYPICAL SEDIMENT BASIN ALONG PIMA RD. BETWEEN PINNACLE PEAK RD. & DEER VALLEY RD.







SECTION A-A

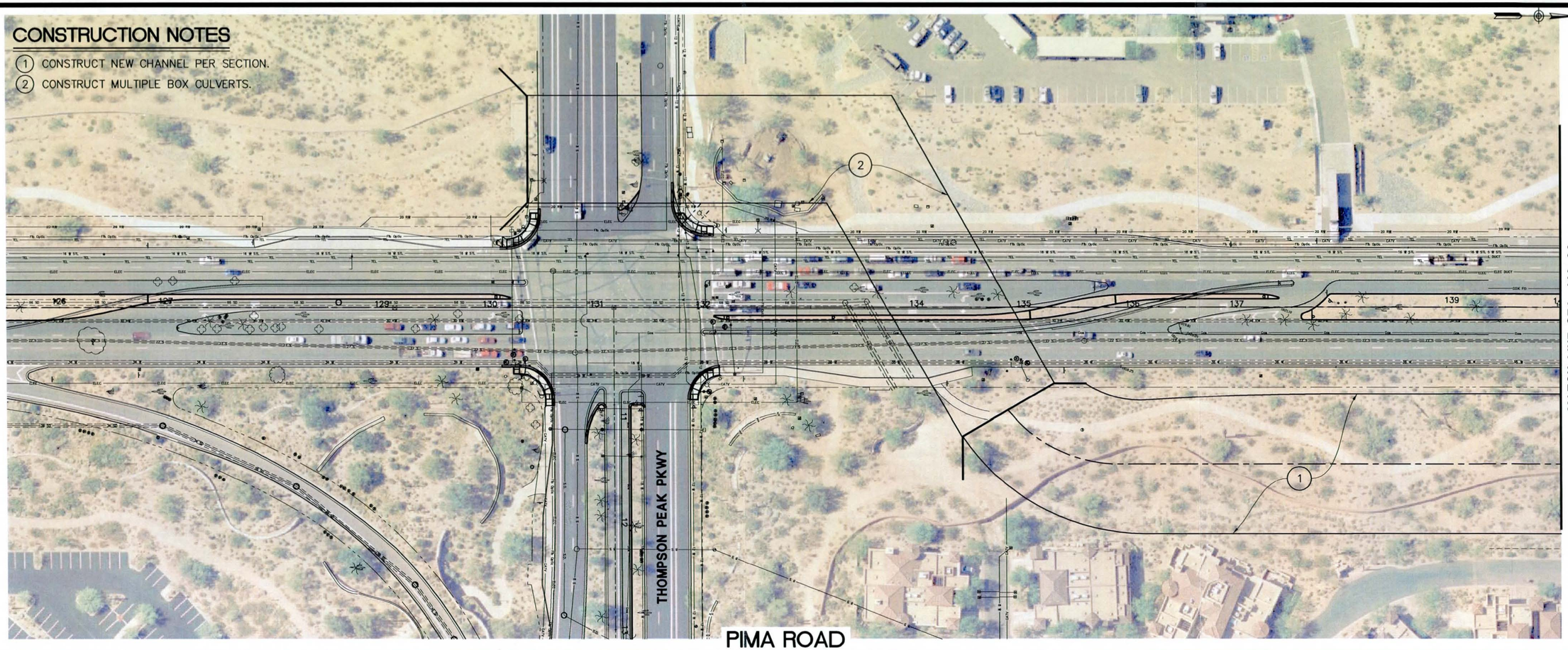
STATION	Q	PIPE SIZE
157+40	20 cfs	24"
163+00	25 cfs	24"
171+60	120 cfs	54"
177+00	80 cfs	48"
180+50	160 cfs	60"
182+00	50 cfs	36"

SHT. of
SCALE NTS
Details
Exhibit A

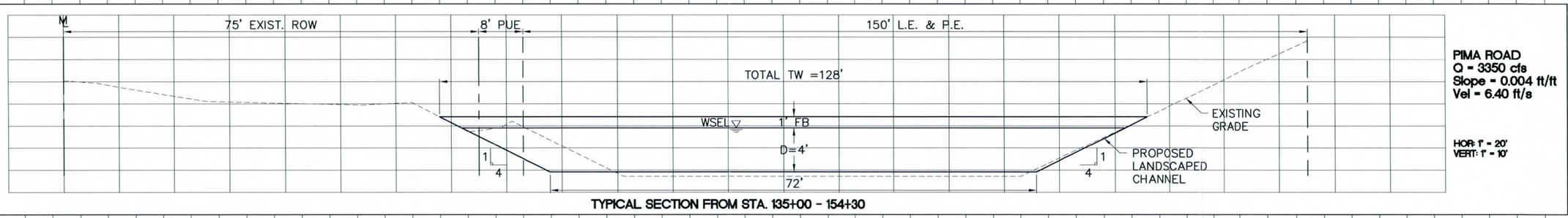
FILE: P:\400\410061a\drainage\DV_PA\DWG\Pima_Detail_Sheet.dwg DATE: Mar 09, 2010

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION.
2. CONSTRUCT MULTIPLE BOX CULVERTS.



PIMA ROAD



TYPICAL SECTION FROM STA. 135+00 - 154+30

126+00 127+00 128+00 129+00 130+00 131+00 132+00 133+00 134+00 135+00 136+00 137+00 138+00 139+00

Pima Road Channel And Pima Road Storm Drain

CONCEPTUAL PLANS

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

SHT. 1 of 6

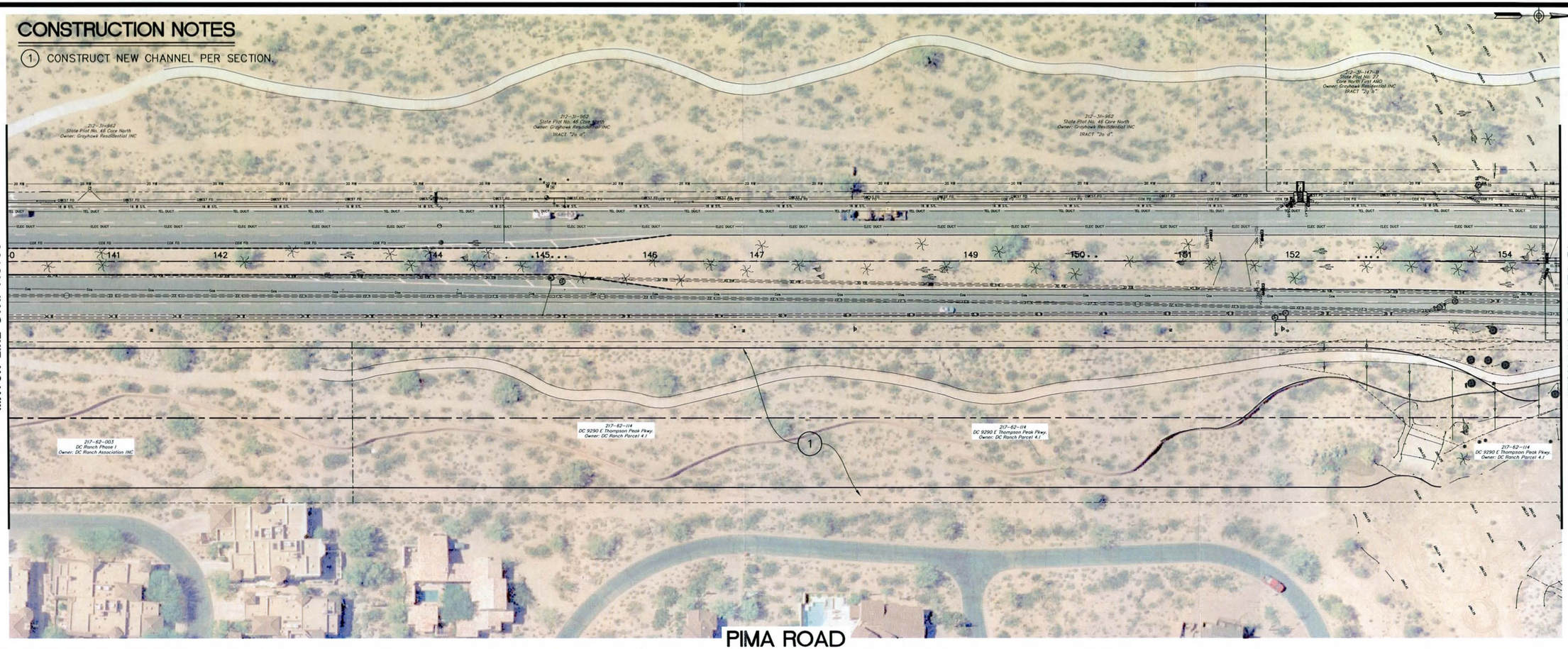
FILE: P:\400\410061a\drainage\DV_PA\DWG\PP01_Pima.dwg DATE: Mar 03, 2010

CONSTRUCTION NOTES

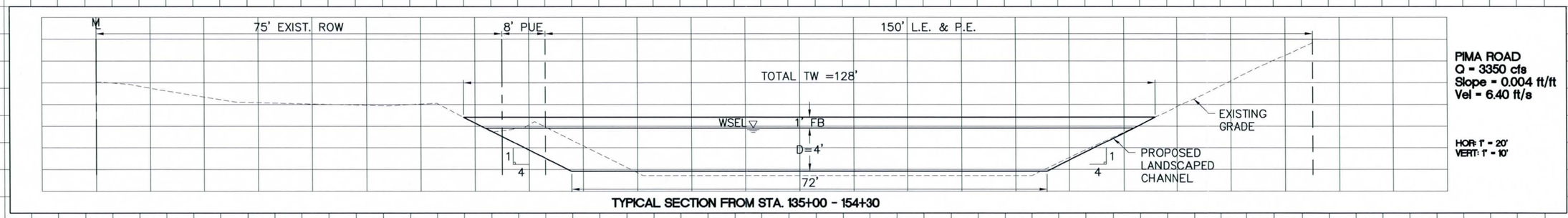
(1) CONSTRUCT NEW CHANNEL PER SECTION.

MATCH LINE STA. 140+00

MATCH LINE STA. 154+50



PIMA ROAD



TYPICAL SECTION FROM STA. 135+00 - 154+30

141+00 142+00 143+00 144+00 145+00 146+00 147+00 148+00 149+00 150+00 151+00 152+00 153+00 154+00

FILE: P:\400\410061a\drainage\DV_PA\DWG\PP02_Pima.dwg DATE: Mar 03, 2010

Pima Road Channel And
Pima Road Storm Drain

CONCEPTUAL PLANS

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

SHT. 2 of 6

MATCH LINE STA. 154+50

MATCH LINE STA. 169+00

DEER VALLEY RD

NW COR. SEC 19
T4N R1E
ELEV. E OF RANGE LINE

CONSTRUCTION NOTES

(3) CONSTRUCT STORM DRAIN OUTLET (HEADWALL AND WINGWALLS).
(4) CONSTRUCT RIP-RAP.
(5) INSTALL STORM DRAIN.
(6) CONSTRUCT SEDIMENTATION BASIN.
(7) CONSTRUCT COLLECTOR CHANNEL.

PIMA ROAD

EXISTING GRADE @ PIPE

PROPOSED HGL

PROPOSED STORM DRAIN

1895
1890
1885
1880
1875
1870
1865
1860
1855

155+00 156+00 157+00 158+00 159+00 160+00 161+00 162+00 163+00 164+00 165+00 166+00 167+00 168+00 169+00

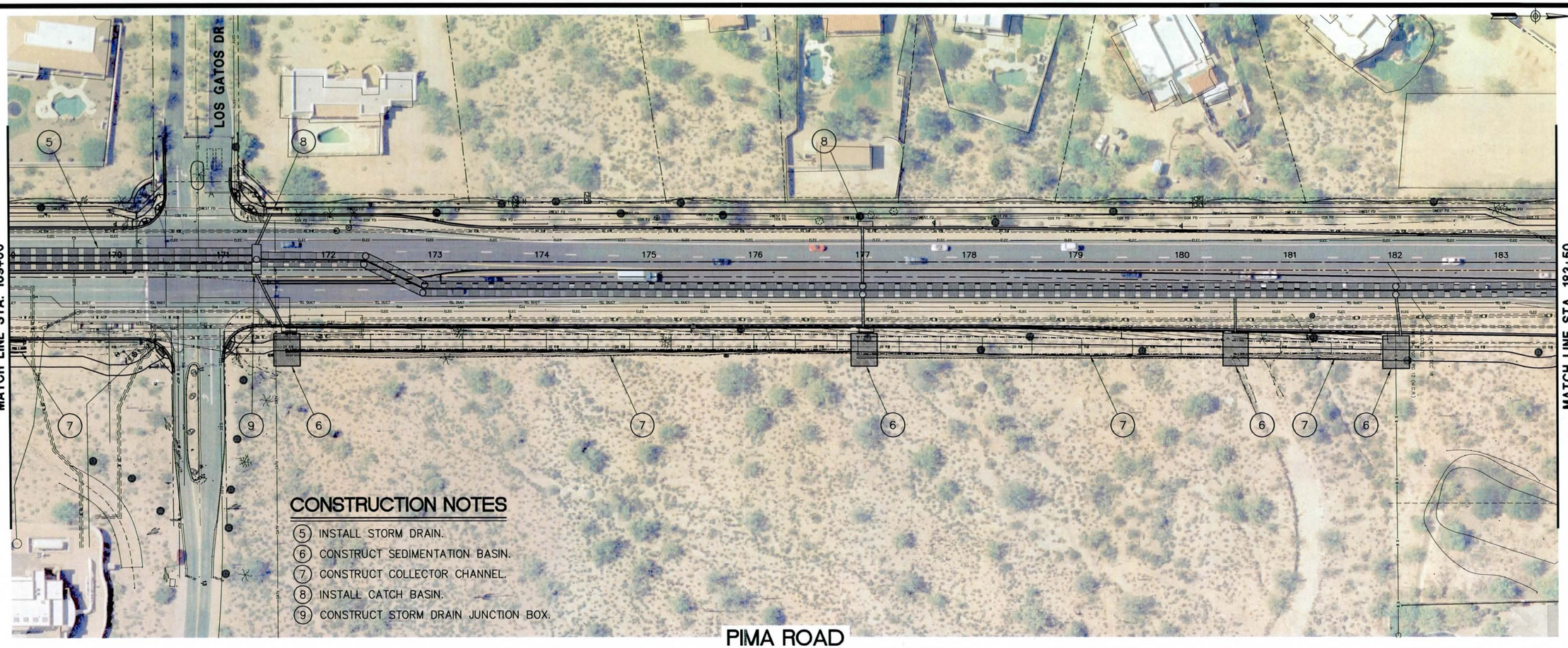
Pima Road Channel And
Pima Road Storm Drain

CONCEPTUAL PLANS

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

Sht.
3 of 6

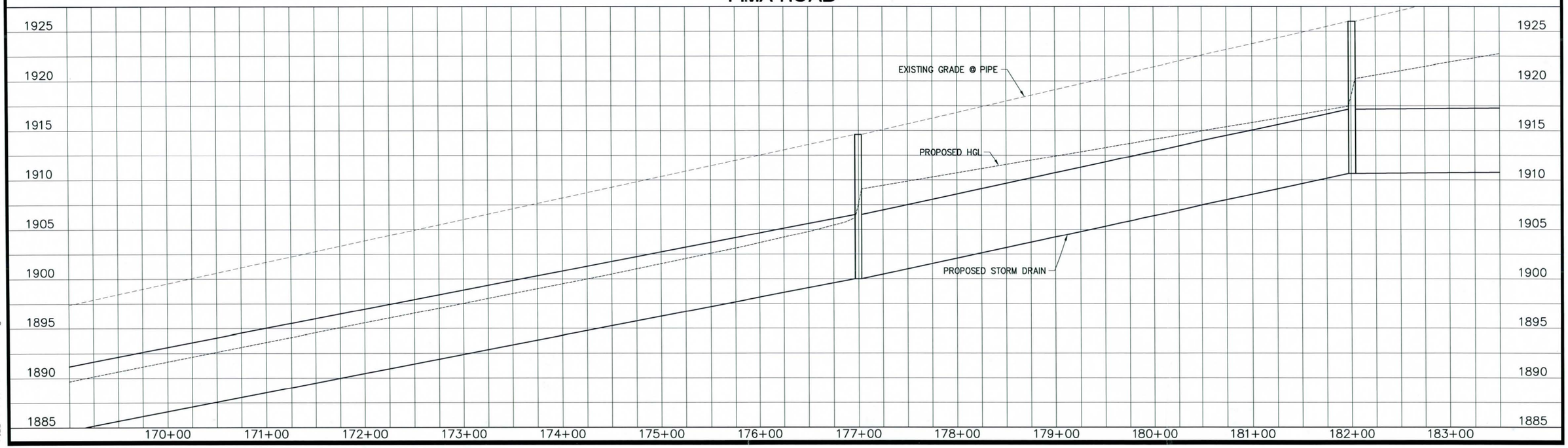
FILE: P:\400\410061a\drainage\DV_PA\DWG\PP03_Pima.dwg DATE: Mar 03, 2010



CONSTRUCTION NOTES

(5) INSTALL STORM DRAIN.
(6) CONSTRUCT SEDIMENTATION BASIN.
(7) CONSTRUCT COLLECTOR CHANNEL.
(8) INSTALL CATCH BASIN.
(9) CONSTRUCT STORM DRAIN JUNCTION BOX.

PIMA ROAD



Pima Road Channel And Pima Road Storm Drain

CONCEPTUAL PLANS

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

SHT. 4 of 6

FILE: P:\400\410061a\drainage\DV_PA\DWG\PP04_Pima.dwg DATE: Mar 03, 2010

CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION.
2. CONSTRUCT MULTIPLE BOX CULVERTS.
3. CONSTRUCT STORM DRAIN OUTLET (HEADWALL AND WINGWALLS).
4. CONSTRUCT RIP-RAP.
5. INSTALL STORM DRAIN.
8. INSTALL CATCH BASIN.
10. CONSTRUCT STORM DRAIN INLET (HEADWALL AND WINGWALLS).
11. CONSTRUCT CONCRETE DROP INLET.

MATCH LINE STA. 183+50

MATCH LINE STA. 198+00

COUNTRY CLUB TR

PARAISO DR

CALLE BUENA VISTA

N.A.O.S. SCENIC CORRIDOR & PUBLIC TRAIL EASEM.

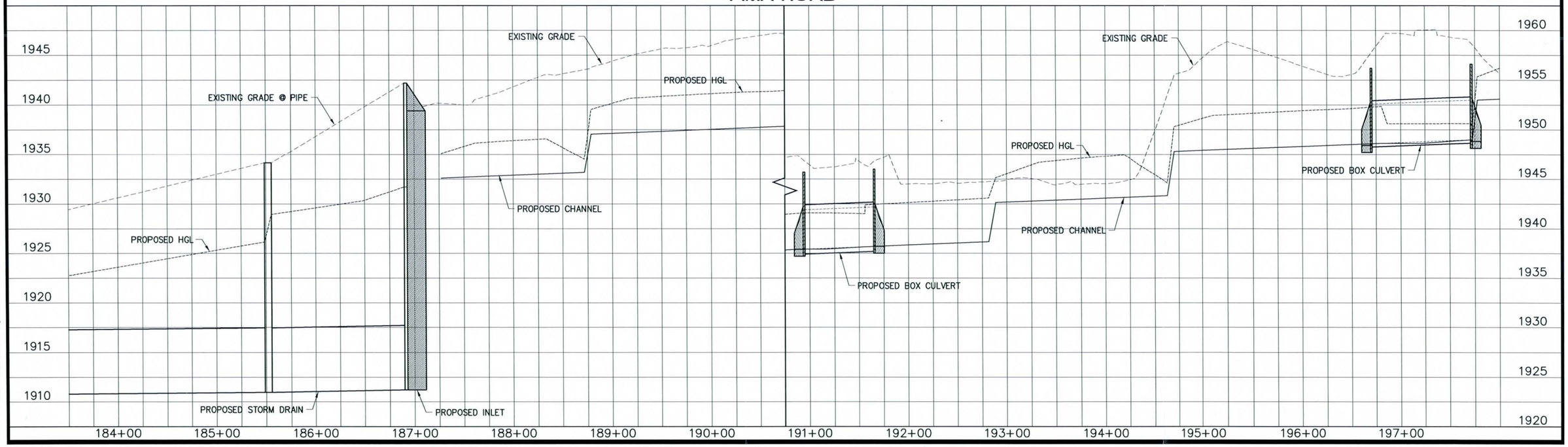
217-07-833 O E Paraiso Dr. Owner: Calada Vistas Community Assn.

217-07-903 Desert Village Owner: Desert Village Assn.

425-18 Mirage Village

212-01-690-18Los Pinnacle Peak Country Club Owner: Pinnacle Peak Country Club Inc.

PIMA ROAD



Pima Road Channel And Pima Road Storm Drain

CONCEPTUAL PLANS

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

SHT. 5 of 6

FILE: P:\400\410061a\drainage\DV_PA\DWG\PP05_Pima.dwg DATE: Mar 03, 2010

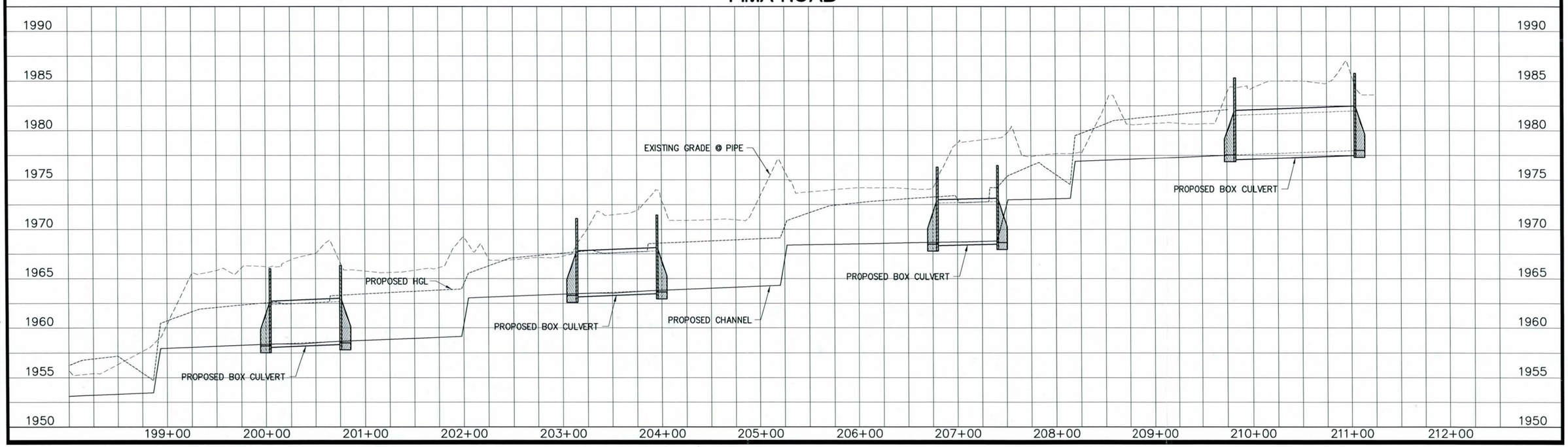
CONSTRUCTION NOTES

1. CONSTRUCT NEW CHANNEL PER SECTION.
2. CONSTRUCT MULTIPLE BOX CULVERTS.
3. CONSTRUCT STORM DRAIN OUTLET (HEADWALL AND WINGWALLS).
4. CONSTRUCT RIP-RAP.
5. INSTALL STORM DRAIN.
8. INSTALL CATCH BASIN.

MATCH LINE STA. 198+00

PINNACLE PEAK RD

PIMA ROAD



CONCEPTUAL PLANS

Pima Road Channel And
Pima Road Storm Drain

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

SHT. 6 of 6

FILE: P:\400\410061a\drainage\DV_PA\DWG\PP06_Pima.dwg DATE: Mar 03, 2010

TO:	Elaine Mercado
FROM:	Entellus, Inc.
JOB NO:	410.061
DATE:	02/22/2010

PROJECT NAME: Pima Road Drainage Report

Response To Comments

This is Entellus' response to comments received from the City of Scottsdale for the Pima Rd Drainage Report. The original comment is shown below in red text with Entellus' response below the original comments in blue text.

1. Section 3.2.4 describes a proposed channel along the east side of Pima Road from Deer Valley to Thompson Peak along with 10 – 10'x5' RCB outlet pipes. Is this proposed design part of the original scope of work?

   Entellus Response: What was provided in the drainage report regarding the channel along Pima Road between Deer Valley and Thompson Peak is a conceptual design only. This was not part of the original scope of work, however Entellus was asked to briefly, and on a very conceptual level look at this area and include it in the drainage report.

2. The velocity in the proposed channel is listed at 6.3 ft/s. This velocity can be erosive. Please describe any proposed erosion protection measures.

   Entellus Response: As aforementioned this is a conceptual design only. Further refinement of the concept will occur with the actual design of the channel. Potential ways of mitigating the higher calculated velocities may include the addition of drop structures, or channel protection. As the report only includes a brief conceptual representation of the channel, additional text was added/modified to the report in section 3.2.4 stating the following: *"As the design presented herein is a conceptual design only, additional analysis of these proposed box culverts, the proposed drainage channel, and the drainage area of the commercial development would need to be completed prior to final design."*

3. This section states that the 10'x5' RCBs will conflict with the existing 3 – 8'x4' RCB culverts on the west side of Pima Road and these culverts will need to be removed. Will the channel on the east side of Pima collect 100% of the flow?

What will happen to any flow that makes it to the west side of Pima Road to the northwest commercial property?

Entellus Response: The text was modified to state that *"The entire flow would be conveyed in a proposed trapezoidal channel..."*. As this is a conceptual design, no details regarding local Pima Road flows, such as those that might get to the west side of Pima Road, were analyzed. This level of effort is reserved for final design.

4. Section 5.1.8 – Please document if the precipitation is NOAA 2 or NOAA 14 value.

Entellus Response: A reference to NOAA 2 was added to Section5.1.8.

5. Figure 5.3.12 – Correct the figure title.

Entellus Response: The figure title was corrected for 5.3.12.

6. Figures 5.3.13 through 5.3.15 – Existing conditions or proposed? With wall or without? Please check the title.

Entellus Response: The figure title for Figures 5.3.13 and 5.3.14 were corrected. Figure 5.3.15 is correct – "With wall" is accurately stated in the legend.

7. The FLO-2D model uses ARF numbers of 0.5 and 0.2 for commercial and residential. Please provide a discussion on the choosing of these parameters. Also, justify why ARF factors were used instead of just completely blocking the grid element for flow where it is fully obstructed by a building. I would expect to see in the figures flow passing around the existing buildings; however the FLO-2D model seems to allow minimal flow through the buildings.

Entellus Response: Modified the write-up on the ARFs in section 5.4.5. Added explanation as to why cells were not blocked out of the model: *"Area reduction factors (ARF) were utilized for residential and commercial areas to properly model the building obstructions in the existing conditions. The ARFs are used to model areas where flow is blocked due to the existence of structures such as commercial or residential buildings by limiting the grid elements area available for volume storage. An ARF of 0.5 and 0.2 (50% and 20% reductions) were used for commercial and residential areas respectively and can be seen in Figure 5.4.3. A high reduction value was utilized for the commercial areas due to the increased flow and volume restriction that might occur due to the large building. A complete removal of the commercial and residential grid elements from the model was not appropriate as flooding will likely occur in these structures, thus allowing for some storage within the buildings grid element. The FLO-2D user's manual states that for the simulation of large flood events such as this model, the utilization of ARFs*

will generally have only a minor impact on the inundated area (Reference 38)."

8. Table 5.11 needs clarification. It is not clear where the location is where these flow measurements were calculated. What is the time interval between measurements? The total flow does not match the total flow shown on Figure 5.4.7. Please document more fully what numbers where used to calculate the 91.5% / 9.5% split. (Note: 91.5% + 9.5% = 101%)

   Entellus Response: Added text clarifying how the rating curve was determined, which X-sections were utilized, etc. Also added a graph of the FLO-2D output hydrographs for what was assumed to flow south and to the west in Appendix D. Add/modified the following text to section 5.4.9: *"Figure 5.4.8 shows the output flow data retrieved from the FLO-2D model run and the rating curve that was created from the FLO-2D output and subsequently utilized in the HEC-1 model. Both the rising and falling limbs of the hydrographs (which can be seen in APPENDIX D) were utilized for the determination of the rating curve. As stated above it was assumed that all flow to the southwest would end up in the Pima Road channel downstream (consisting of X-Sections #41, 42, 43 and 48). X-section #47 was utilized to represent the flow to the west along Thompson Peak Parkway. Table 5.11 shows the rating curve found in Figure 5.4.8 in tabular format. Thus, as shown in Figure 5.4.8 as well as Table 5.11 below, about 8 to 9.5% of the high flows entering the Pima Road and Thompson Peak intersection continues west along Thompson Peak Parkway and the remaining 90.5 to 92% continues south along the Pima Road corridor. The precise percentage varies based on the flow."*

9. The FLO-2D model appears to use only inflow hydrographs and no rainfall values. Please explain why rainfall was not part of this model. The addition of rainfall would appear to have an effect on the downstream flow numbers.

   Entellus Response: The 100-year discharge hydrographs from HEC-1 for the area in question were utilized. To utilize FLO-2D as the hydrologic and hydraulic model for the area would require significant effort and computing time. It would require the modeling of the entire contributing watershed area (including upstream of Reata Pass) and the determining of various parameters. Since the analysis was focused on the intersection, only the flow hydrographs directly arriving at the intersection were necessary, and they were already computed by HEC-1.

10. Please show how the flows of 260-cfs, 971-cfs, and 1746-cfs were calculated based on the cross-sections shown on Figure 5.4.5.

Entellus Response: These are output from FLO-2D. Added statement that they were determined by FLO-2D.

11. Further investigation of the 1746-cfs that flows to the southwest needs to be performed. It cannot be assumed that all of the flow goes back to Pima Road.

Entellus Response: Further investigation into the ultimate outfall of this flow is beyond the scope of work of this project. A statement was added to the Warnings and Disclaimer of Liability section regarding the need for further analysis to determine the ultimate outfall of this flow. Additionally the following was added to Section 4: Special Conditions: "*The FLO-2D analysis between Deer Valley and Thompson Peak Parkway (see Section 5.4) shows that there is a considerable amount of flow that does not travel south along the Pima Road alignment or west along the Thompson Peak alignment. Instead this flow leaves the intersection in a southwesterly direction which is the historical flow direction. It is unclear as to the ultimate outfall of this flow but through aerial photography it appears the southwesterly flow may either continue through the existing subdivision or be redirected towards Pima Road or a combination of the two may occur. Additionally, a wall exists along the Pima Road channel south of Thompson Peak Parkway that may restrict flow from entering the Pima Road channel from the subdivision. It is recommended that an analysis be conducted regarding the ultimate outfall of this southwesterly flow and any downstream impacts caused by its redirection.*"

12. Side note: please change the color scheme for FLO-2D figures so that the lighter blue color is the shallow flow areas and the darker blue color is the deeper flow areas.

Entellus Response: Using a color ramp consisting of only blue was not adequate for the representation of the results. The color ramp was modified so that light blue is shallow flow, dark blue deeper flow and dark red deeper still. This allowed for adequate contrast in the color ramp.

13. Figures 5.4.5 through 5.4.7 indicate 2-60" RGRCP culverts near the intersection of Pima Road and Thompson Peak. Field measurement shows these culverts to be 2 – 56" RGRCP's. Please revise the figures and revise the Max Storm Drain Flow number if necessary.

Entellus Response: The culverts are 2 – 60".

14. Section 5.4.9 lists the culverts under Thompson Peak at Pima to be 3 – 5'x8' RCBC. However, as noted above, the culverts are listed in section 3.2.4 as 3 – 8'x4' RCB. Please correct.

Entellus Response: This was corrected to read as 3 – 4'x8' RCBCs.

15. Section 5.6.3 states that one section of the storm drain has a velocity of 24 fps. Per Table 6.9 of the Maricopa County Drainage Policies and Standards manual, the maximum velocity in a storm drain is 15 fps.

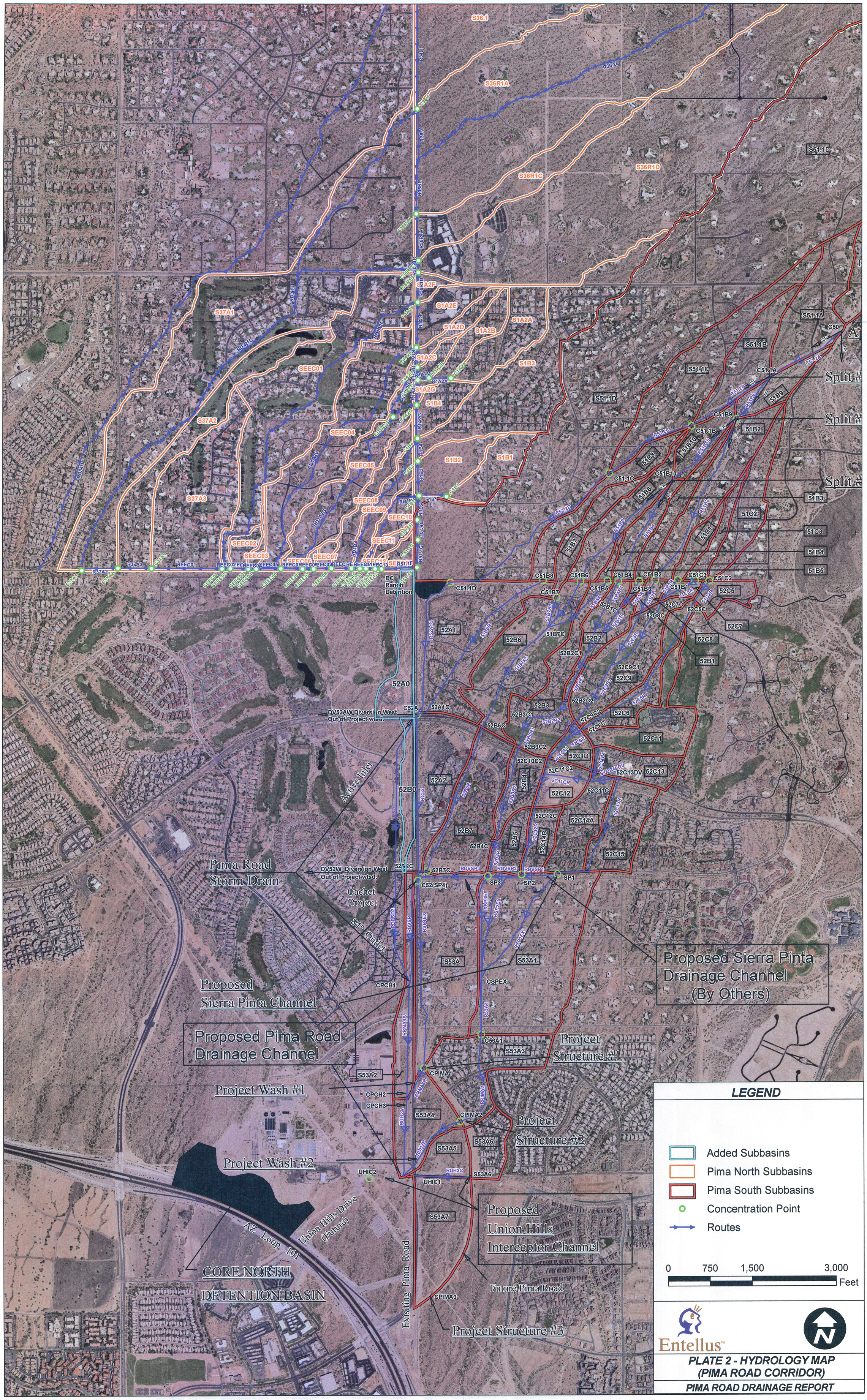
Entellus Response: Additional coordination regarding this issue has occurred between Entellus and the City. The pipe manufacturer was contacted and verified that velocities up to 40fps was adequate for concrete pipe. Additional storm frequencies were examined (outside of the drainage report) and found that for higher frequency storms velocities were generally less than 15 fps. The final design of the storm drain will finalize all design issues. No modifications were made to the drainage report for this item.

16. Provide the Warning and Disclaimer of Liability

Entellus Response: This section has been completed.

17. Show HGL and EGL in Pima Road on conceptual plans in Appendix K. Sheets 1 and 2 do not have a profile view.

Entellus Response: The WSE and HGL have been placed on the channel north of Deer Valley and storm drain sheets. The EGL is not typically placed on these sheets. Sheets 1 and 2 are only a very conceptual design so there is no profile for those sheets.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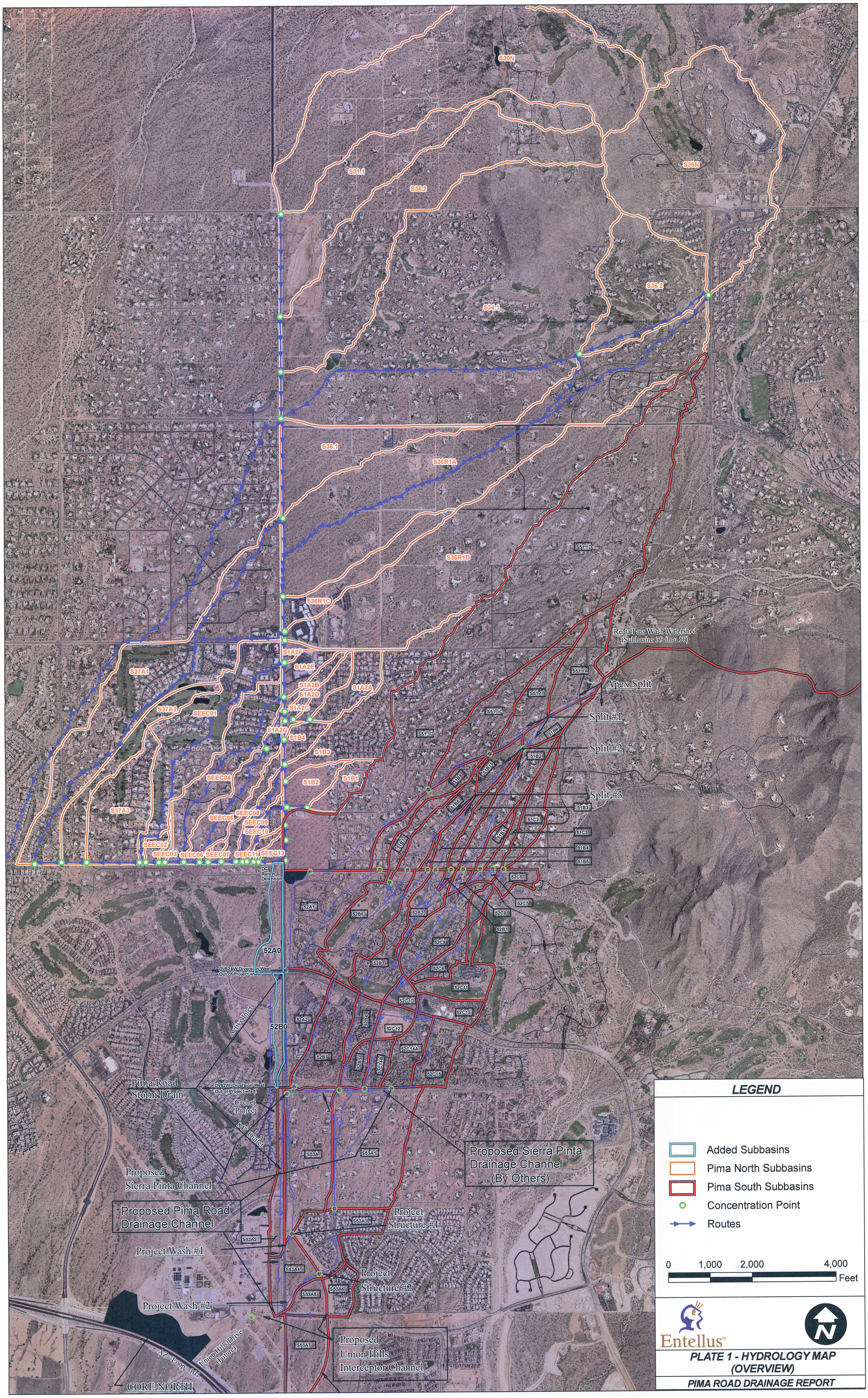
52C14B
52B4C
52C15
52A0
52B0
52B7C
C52(SP4)
SP3
SP2
SP1
S53A
S53A1
CPCH1
CSPEX
C53A1
S53A3
CPIMA1
S53A2
CPCH2
CPCH3
S53A4
CPIMA2
S53A6
S53A5
UHIC2
UHIC1
S53A7
CPIMA3
C37A1
C37A2
C37A3
R37A2
R37A3
REEC01
C52A
DV52AW Diversion West
Out of Project wtsd.
DV52W Diversion West
Out of Project wtsd.
DC
Ranch
Detention
Active Inlet
Pima Road
Storm Drain
Cachet
Project
84" Outlet
Proposed
Sierra Pinta Channel
Proposed Pima Road
Drainage Channel
Project Wash #1
Project Wash #2
CORE NORTH
DETENTION BASIN
AZ Loop 101
Union Hills Drive
(Future)
Existing Pima Road
Proposed
Union Hills
Interceptor Channel
Future Pima Road
Project
Structure #1
Project
Structure #2
Project Structure #3
Proposed Sierra Pinta
Drainage Channel
(By Others)
Split #1
Split #2
Split #3
LEGEND
Added Subbasins
Pima North Subbasins
Pima South Subbasins
Concentration Point
Routes
0
750
1,500
3,000
Feet
Entellus™
PLATE 2 - HYDROLOGY MAP
(PIMA ROAD CORRIDOR)
PIMA ROAD DRAINAGE REPORT



LEGEND

- Added Subbasins
- Pima North Subbasins
- Pima South Subbasins
- Concentration Point
- Routes

0 1,000 2,000 4,000 Feet

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PLATE 1 - HYDROLOGY MAP (OVERVIEW)

PIMA ROAD DRAINAGE REPORT