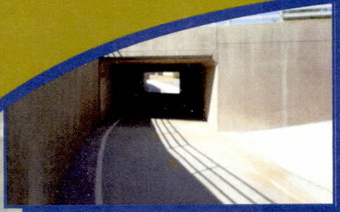
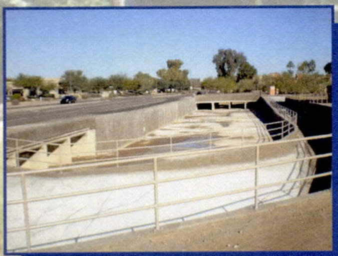


UPPER CAMELBACK WASH

PROJECT No. F0203 and T0203

DRAINAGE IMPROVEMENTS

DESIGN REPORT

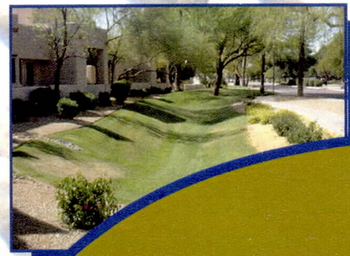


Prepared for:

City of Scottsdale

Flood Control District of Maricopa County

March 2012



Prepared by:

PRIMATECH

ENGINEERS & CONSULTANTS

UPPER CAMELBACK WASH

Project No. F0203 and T0203

DRAINAGE IMPROVEMENTS

March 8, 2012

DESIGN REPORT

FINAL

Registered Professional Engineer (Civil)
CERTIFICATE NO
51562
TAREK
ELTAHAWY
Date Signed 3/7/12
ARIZONA U.S.A.
Expires 12/31/2013

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• EXECUTIVE SUMMARY

Primatech, LLC, also known as Primatech Engineers & Consultants (Primatech), has been contracted by City of Scottsdale (COS) to complete the analysis and design of the Upper Camelback Wash (UCW) Project. This includes Hydrology and Hydraulics Modeling for the Proposed (Post-Project) Conditions, preparation of 30%, 60%, 90%, and 100% plans for the UCW Projects, and other relevant construction/specifications documents.

The existing UCW is an irregular channel that consists of two branches with differently lined segments. The existing UCW is located within an area bounded by Sweetwater Avenue on the north, 96th Place on the east, Shea Boulevard on the south, and 90th Street on the west.

The goal of this project is to provide the *maximum feasible level of flooding protection* using a context-sensitive design approach. This design approach dictates that an appropriate level of protection, i.e. the Design Storm Frequency (DSF), to be determined so that the UCW provides protection for the maximum feasible storm frequency, while maintaining smooth blending into the existing landscaping and aesthetics.

The proposed improvements along the UCW include the design of approximately two miles of channel, six offline detention basins and storm drain improvements and eight minor arterial and collector roadway crossings. The proposed channel types include earthen channel, concrete channel, and re-vegetated earthen channel. In order to maintain a non-erodible velocity throughout the earthen channel reaches, drop structures were provided wherever it is necessary.

In addition to the channel improvements, a new paved Multi-Use Path (MUP) is included in the design. Considerations for the safety of bicycle and pedestrian traffic factored significant into the development of the MUP alignment relative to the proposed channel. The addition of the MUP required a realignment of a major portion of the channel, from the beginning of the project at the Paradise Memorial Gardens (PMG) entrance to Cactus Road. This realignment was designed to ensure that the channel would fall within the existing right of way and drainage easement.

1. INTRODUCTION

The existing Upper camelback Wash (UCW) is an irregular channel that consists of two branches with differently lined segments. The UCW is located within an area bounded by Sweetwater Avenue on the north, 96th Place on the east, Shea Boulevard on the south, and 90th Street on the west.

This report documents the hydrology and hydraulic information and design criteria used for the completion of the 100% design of the UCW project. This report includes discussions of the main issues documented in the previous submittal, as well as the proposed solutions.

1.1 Project Authorization

The UCW Project is under a joint partnership agreement between COS and the FCDMC and is administered by COS. Primatech was authorized to proceed with this project through a Contract with COS with an effective Notice-to-Proceed (NTP) date of August 21, 2009.

1.2 Project Description

The UCW is a main drainage conveyance system in City of Scottsdale. The project is located in Township T03N, Range R05E and crosses through Sections, 17, 18 and 19 in Maricopa County. The vicinity map for this project is shown in Figure 1. The watershed area for this project is approximately 2.8 square miles and is generally bounded by Shea Boulevard on the south, the Central Arizona Project Canal on the north, 90th Street on the west, and 104th Street on the east.

The section of the UCW within the project area has two branches; the Main branch and the 92nd Street branch. The upstream end of the Main branch is located approximately 700 feet north of Sweetwater Avenue and just west of 96th Street, and it extends south to its confluence with the 92nd Street branch, just north of the PMG entrance. The 92nd Street branch begins at Poinsettia Drive to the north and joins the Main branch immediately northwest of PMG, about 1,350 feet south of Cholla Street.

The watershed is within a fully developed area with a mix of land uses, but it is mostly comprised of residential subdivisions of varying densities and some areas of open space. The lining of the existing channels varies greatly, from earthen channels to narrow vertical gabion wall lined channel. The watershed is generally sloped from north to south.

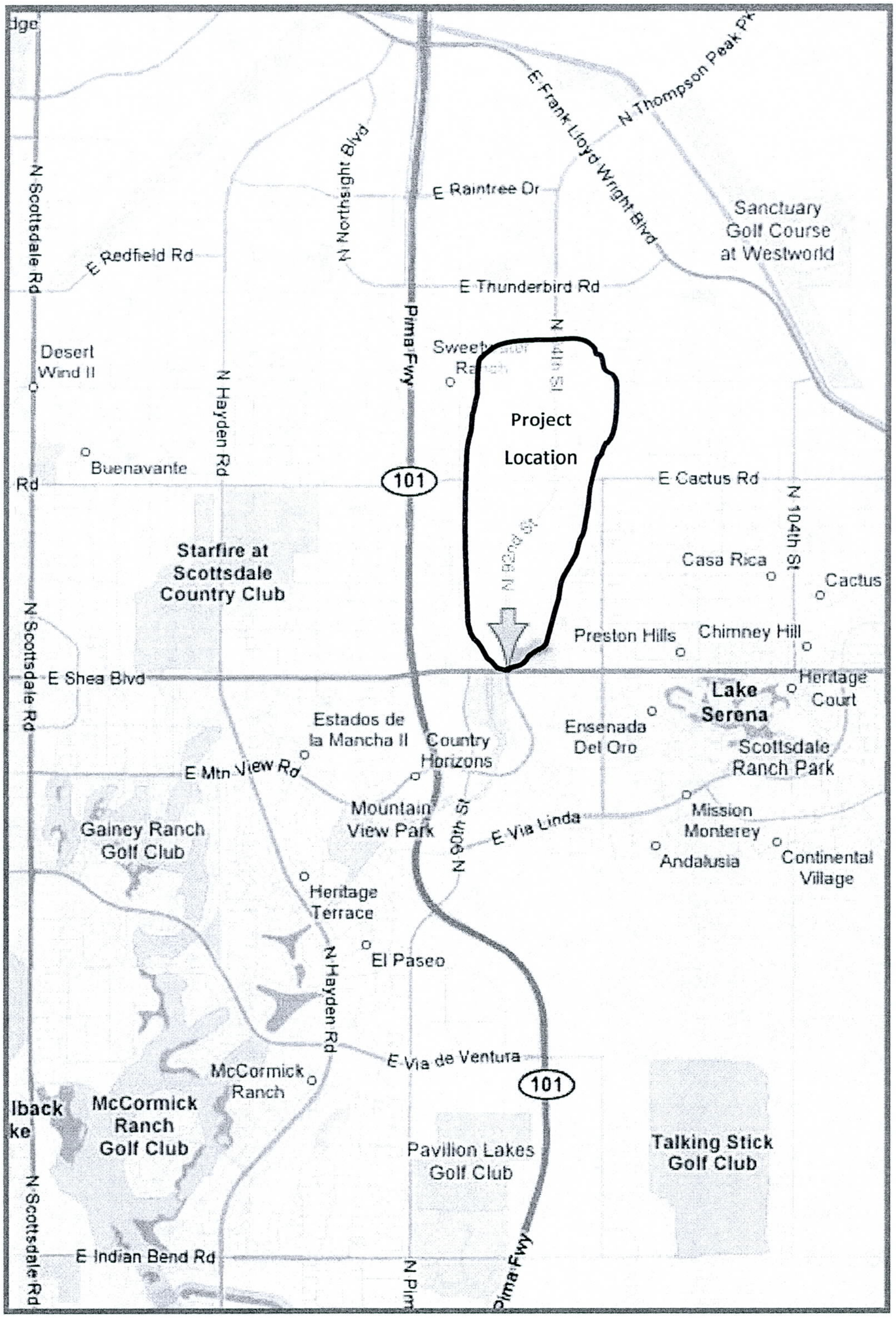


Figure 1: Vicinity Map

1.3 Stakeholders

Ongoing projects and interested stakeholders in the vicinity of the UCW project that will benefit from this project include COS (Project Owner); the FCDMC; existing residential developments such as the Scottsdale Mission Condominiums (SMC); local homeowners; and the Scottsdale public at large.

1.4 Purpose of the Project

The Existing Condition Upper Camelback Wash Floodplain Map enclosed in Appendix B indicates that there are 493 houses within the inundation limits that are exposed to the risk of 100-year flooding damage.

The goal of this project is to provide the *maximum feasible level of flood protection* to the project area. To achieve this goal, locations where the wash does not have sufficient capacity to convey the 100-year floodwaters were identified in the Existing Condition 100-year Floodplain Delineation Map. The first attempt was to provide the 100-year level of flood protection was through flood peak reduction/attenuation by maximizing the existing detention basins and/or the addition of new detention basins on properties owned or purchased by COS. Hydrologic HEC-1 models for various basins scenarios were run, Hydraulic HEC-RAS models for the existing channel were developed, and the areas with insufficient channel capacity were identified. New cross sections were then designed to fully contain the flow and provide the required freeboard per the FCDMC Drainage Design Manual, Volume II, Hydraulics.

1.5 Project Status Summary

This Report and its associated Plan and Profile Sheets furnish the completion of the UCW Project Design. Additionally, the following are the major project stages that have been accomplished throughout the project design period:

- 100% Design – Plan and Profile Sheets (Not for Construction) and Drainage Design Report submitted by Primatech in 2011.
- 90% Design – Plan and Profile Sheets and Drainage Design Report submitted by Primatech in 2011.
- 60% Design – Plan and Profile Sheets and Drainage Design Report followed by two supplements submitted by Primatech in 2010/2011.

- Preliminary Design Report for the entire UCW Project, followed by six supplements, submitted by Primatech in late 2009/early 2010.
- Hydraulics Report for the Existing Conditions of the UCW, submitted by Primatech in August 2008.
- Hydrology Report for the Existing Conditions of the UCW, submitted by Primatech in January 2008.
- 30% Design – Plan and Profile Sheets, prepared by Primatech in 2006
- The 404 Permit for the Cactus Road crossing was acquired.
- Construction of the Cactus Road crossing is complete.
- Construction of the rectangular concrete channel section between 92nd Street and the PMG entrance (Reach 2) is complete.
- Construction of MUP Phase 1 from Shea Blvd to the PMG entrance (Reaches 1 and 2) is complete.
- Construction of the underpass, overflow spillway and storm drain at 92nd Street is complete.

2. SURVEY, MAPPING AND DATA COLLECTION

2.1 Field Survey

Stantec conducted a 50-foot wide cross sectional survey along the existing wash. Primatech subcontracted Steele Engineering, LLC to perform supplementary field survey for selected areas including curb and gutter, sidewalks, curb returns and ramps. All survey data were verified, compiled and integrated to develop the existing CAD surface for the project area.

2.2 Mapping

One-foot contour maps, georeferenced aerial and a GIS TIN surface for the project area were provided by the COS's GIS Department.

2.3 Data Collected

Reference materials gathered from various agencies include the following:

- Previous and existing hydrologic and hydraulic studies, drainage report, ADMP, etc.
- Aerial photography and topographical maps

- Utility as-built drawings
- Drainage easements and Right-of-Way (ROW) information
- Water and sewer quarter section maps

2.3.1 Previous Hydrologic and Hydraulic Studies

In 1993, COS contracted KVL Consultants (KVL) to prepare a comprehensive hydrologic (HEC-1) model for the entire city as part of the COS's Drainage Master Plan. The UCW was included in this comprehensive model.

In 2003, Stantec was contracted by COS to develop a more detailed HEC-1 model for the UCW watershed. Stantec reviewed the existing condition model created by KVL for the 100-year, 6-hour storm event and identified two locations where flow splits needed to be incorporated into the model. In addition, Stantec performed a 1-D hydraulic model for the same study area using HEC-RAS.

Primatech was commissioned by COS to further analyze the UCW watershed and prepare more detailed HEC-1 and HEC-RAS models for the UCW corridor. The FCDMC asked Primatech to correct all error/warnings messages present in the HEC-1 model submitted by Stantec. Subsequently, FCDMC requested an in-depth analysis, re-investigation and adjustment of all parameter values used in the HEC-1 model to create a more realistic and current model of the existing conditions.

In 2008, Primatech completed a new HEC-1 model for the UCW watershed. Primatech started its model from scratch to ensure that the model's parameters, routings, storage basins and networking would be defined in the proper way. The channel cross-sections and Manning's "n" coefficients were chosen to accurately represent the actual field conditions. COS and FCDMC approved this existing condition HEC-1 Model, which was revised in 2008.

Later, Primatech was asked to perform a hydraulic analysis of the UCW channel in order to study its hydraulic properties, determine the extent of flooding along the wash, perform a preliminary damage assessment, and recommend alternatives to mitigate flooding hazards.

Before the end of 2008, Primatech submitted a Hydraulic Report that includes a 100-year Floodplain Delineation Map for the existing condition. In early 2009 the report was accepted following the incorporation of the FCDMC revisions and comments.

In April 2009, the City and the FCDMC signed an IGA to create a cost–sharing partnership for the UCW project. Primatech compiled all of the information into a *Preliminary Design Report* to provide a basic understanding of the project status and proposed drainage improvements. In November 2010 the 60% Drainage Design Report with plans and profile sheets were submitted by Primatech.

3. UTILITIES

3.1 Utility Conflicts/Potholing

Potential utility conflicts were noted based on the received utility as-built maps. All utility conflict locations within the entire project were identified for potholing. *RT Underground LLC* was subcontracted to conduct the potholing work. The spreadsheet results are shown in Appendix A and are integrated in the Plan and Profile sheets.

Table 1 – Utility Contact Information Summary

Company	Utility Type	Contact	Email/Phone
SRP	Irrigation	Dick Aaron	AMDick@SRPnet.com
COX Communications	CATV & Fiber Optics	Linda Markum	(623) 328-3518
APS	Electric & Street Lights	John Rael	John.Rael@APS.com
		Carol Hall	Carol.Hall@APS.com
Qwest	Fiber Optics, Telephone	Ken Thuell	Ken.Thuell@Qwest.com
Southwest Gas	Southwest Gas Print Shop (AOT)	Alisha Pothen	Alisha.Pothen@SWgas.com

4. EXISTING DRAINAGE CONDITIONS AND CHARACTERISTICS

4.1 Watershed and Wash Description

The watershed area for this project, as shown in Figure 2, is approximately 2.8 square miles and generally extends to Shea Boulevard in the south, the Central Arizona Project Canal in the north, 90th street in the west, and 104th street in the east. The general slope of the watershed is form north to south. This area is essentially fully developed and consists of a mix of land uses. It consists primarily of residential areas with various densities and some open spaces, which are used as detention/retention basins. There are also a few commercial locales.

The UCW is a combination of improved channels and natural channels. At the north end of the project, from north of Sweetwater Avenue to south of Larkspur Drive, the channel has been improved with a defined alignment and banks, except for a short section immediately south of Sweetwater Avenue, through the Buffalo Ranch property. From south of the entrance to the LDS church to south of the Gary Street alignment, the channel is in a natural state with irregular banks, meandering alignment and occasional brush in the bed and on the banks. South of Gary Street, the channel is carried west in a gabion lined U-shape section. This section ends adjacent to 92nd Street, where the 92nd Street channel joins the main wash. The combined flows then go south along 92nd Street in a slightly improved natural channel. There are three existing retention/detention basins located along the Main branch of the UCW. In the proposed improvements these basins will be enlarged and used in the design to alleviate flooding.

4.2 Soil Classification and Permissible Velocity

A geotechnical report was prepared by RAM & Associate Inc. in September 2004 for the Cactus Road and UCW improvements. RAM provided information on two sets of soil samples, one from each branch of the UCW. The E-series is for the east or Main branch samples, while the W-series is for the west or the 92nd Street branch samples. The UCW Soil Sample Map showing the test boring locations is provided in Appendix J.

Primatech evaluated and classified these samples based on the sieve analysis and plasticity test results provided in Appendix J. The analysis of the test results indicates that the soils in the project area primarily consist of 1) stiff colloidal sandy clay with fine gravel (CL) and 2) colloidal alluvial silt (SC). The corresponding soil types listed in Table 6.2 of Section 6.5.3 of the 2010 DDM Hydraulics indicate that the *Maximum Permissible Velocity* for both soil types is 5.0 fps. Accordingly, the proposed design for the earthen channel shall maintain a velocity equal to or less than 5.0 feet per second.

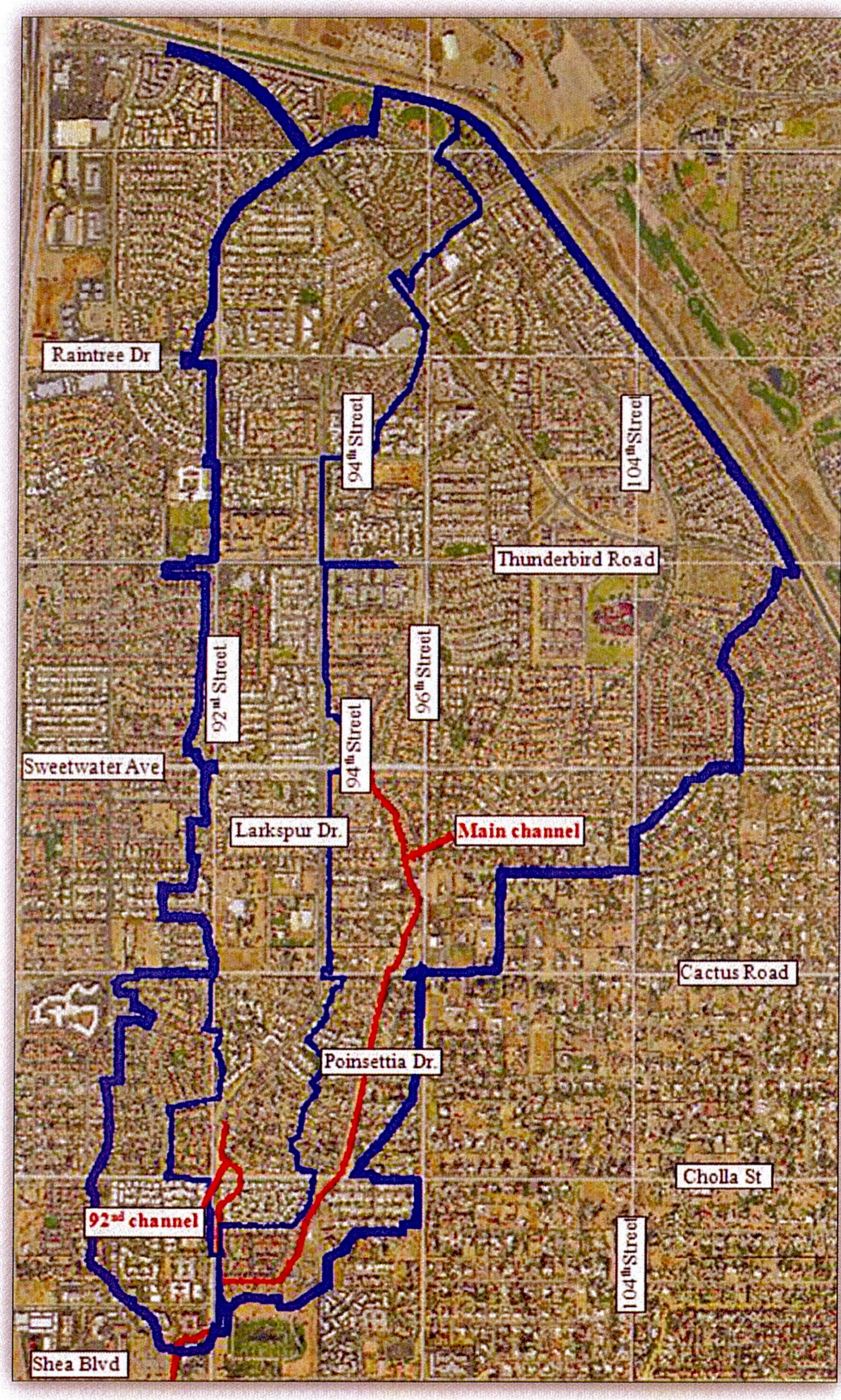


Figure 2: Watershed map showing the Main branch and the 92nd Street branch

4.3 Existing Drainage Facilities

UCW is an urban wash that flows mostly through a highly developed residential area. The UCW Main and 92nd Street branches are defined channels within the study limits. These channels are generally in a natural state. However, at some locations, the channels are lined with gravel or concrete. The 92nd Street Channel runs west of the Main branch and joins it about 1,300 feet north of the intersection of 92nd Street and Shea Boulevard.

At the north end of the project, which runs from north of Sweetwater Avenue to south of Larkspur Drive, the Main branch has been improved using a defined alignment and banks, excluding a short section immediately south of Sweetwater Avenue that runs through the Buffalo Ranch property. From south of the LDS Church entrance to south of Gary Street, the Main branch channel is in a natural state with irregular banks, a meandering alignment, and sporadic brush. South of Gary Street, it turns west and transitions to a gabion-lined U-shape section. This section ends at the confluence of the two branches. The combined flows then proceed south along 92nd Street.

There are three existing retention/detention basins located along the Main branch: Sweetwater Basin, Cholla Basin 1, and Cholla Basin 3. These basins will be enlarged and incorporated into the design to help alleviate flooding.

There are several culvert crossings along the UCW that carry the flow under intersecting streets or driveways. The existing conditions hydraulic report shows that most of these culverts have insufficient capacity to pass the 50-year storm event flow, resulting in overtopping.

4.4 Existing Developments

The Upper Camelback Wash runs through an urbanized area. It is bordered by areas with a mixture of land uses; primarily residential subdivisions of various densities, some sparse areas of open space, and a few commercial locales. The following are some of the features within the 100-year floodplain area.

4.4.1 Scottsdale Mission Condominiums

The Scottsdale Mission Condominiums subdivision, located at the southwest corner of 92nd Street and Cholla Street, has approximately 248 residences that were constructed between 1994 and

1996. The residences have an average living area of approximately 1,351 square feet. This subdivision has repeatedly experienced significant flooding.

4.4.2 Mission De Los Arroyos

Mission De Los Arroyos is located at the southeast corner of 92nd Street and Cholla Street. The 92nd Street branch runs through the center of this apartment complex.

4.4.3 Paradise Memorial Gardens

This cemetery is located on the east side of Reach 2, just north of Shea Boulevard. It occupies an area of about 37.5 acres and has two main entrance roads, one at Shea Boulevard, and the other at 92nd Street.

4.4.4 LDS Church

The Church of Jesus Christ of Latter-Day Saints (LDS) is located just south of Larkspur Drive and west of 96th Street. It occupies an area of 3.6 acres.

4.4.5 Buffalo Ranch

Buffalo Ranch is a small residential development located at the southwest corner of Sweetwater Avenue and the UCW. The developer plans to construct a floodwall along the border separating the development and the UCW.

4.4.6 Sweetwater Ranch II

This subdivision, located south of Sweetwater Avenue and west of 96th Street, occupies an area of about 24 acres. The Main branch passes through this development, and the 100-year floodplain map currently shows this subdivision as being mostly inundated.

4.5 Right-Of-Way (ROW)

The road and drainage ROW and easement maps were provided by COS. The current and proposed ROWs have been compiled and incorporated into the 100% Plans. Although no additional ROWs or drainage easements will be needed for the design provided in this report, a temporary construction easement (TCE) maybe required in certain areas.

4.5.1 Temporary Construction Easements

There are several areas adjacent to the project construction that will require a legal description for a Temporary Construction Easement (TCE) as shown in the Civil Plan Sheets. Each TCE is located in an area where construction of the proposed drainage improvement is limited within an existing Drainage and Flood Control Easement (D&FCE) or Drainage Tract. The additional area required for the TCE is generally limited to 10 feet, unless otherwise requested by the contractor. All areas within the TCE will be restored to essentially the same quality of, if not better than, the previous condition. Any adjacent grading will conform to the requirements set forth in the legal description. Existing drainage patterns will not be adversely affected by the proposed improvements or construction thereof. The City of Scottsdale will manage all required TCE permits.

4.6 Existing Flooding

UCW is the primary drainage conveyance corridor for a moderately dense residential area located in the city of Scottsdale, between Sweetwater Avenue and Shea Boulevard. The possibility of flooding due to urban sprawl became apparent. The project area has a history of flooding incidents during rainfall events lesser than the 100-year storm. To evaluate the existing conditions flooding, Primatech developed a floodplain delineation map as explained below.

4.6.1 Floodplain Delineation

A floodplain or flood hazard map is a map that shows the land area, which would be inundated during a 100-year flood—a flood event that has a 1 percent probability of occurring in any given year.

The floodplain delineation was based on the HEC-RAS model submitted to the City and FCDMC as a part of the 60% submittal package. This model used the flow rates generated from HEC-1 model with the NOAA 14 Precipitation information for the 100-year storm under the existing conditions.

The floodplain map was constructed by two different methods for comparison and verification purposes as follows:

- ***Floodplain mapping using manual delineation***

The floodplain map was constructed by using the water surface elevation data, extracted from the results of the HEC-RAS model, to identify the "wetted part" on each cross-section cut line along the channel. Then it was manually plotted on a contour map by joining the ends of these wetted parts taking into account the contours of the land surface between any two cross sections and extending the water levels to trace the contour lines so as to define the flood hazard zone.

- ***Floodplain mapping using GIS delineation tools***

  This method involves post-processing of the HEC-RAS results of the water surface elevations for flood inundation mapping using ARCGIS V9.2 and HEC-GEORAS V4.0 software. The procedures can be summarized as follows:

  - A water surface TIN (Triangulated Irregular Network) was generated from the water surface elevations imported from HEC-RAS.
  - The water surface TIN was intersected with an underlying terrain TIN model obtained from City of Scottsdale.
  - Both the water surface TIN and the terrain TIN were converted to Water Surface Grid "WSGRID" and Digital Terrain Model Grid "DTMGRID" respectively.
  - The DTMGRID was subtracted from the WSGRID resulting in either positive values (meaning water surface is higher than the terrain), which mark the flood area, or negative values, which mark the dry area.
  - All cells in the water surface grid that result in positive values after subtraction are converted to a polygon, which is the final inundation polygon.

  The refinement of the resulting inundation map to create a representative and hydraulically correct output Floodplain map was an iterative process required several iterations between GIS and HEC-RAS and comparison with the manual delineation.

4.6.2 Preliminary Flood Risk Assessment (Existing Conditions)

Referring to the Floodplain map of the existing conditions attached as Appendix B, it can be seen that the major flooding area under the existing condition is expected to extend along both branches of the UCW channel. Sheet (overland) flows are also shown at some locations. The overtopping happens because the capacities of the current channels, as well as most of the culverts within the project area, are insufficient to handle the 100-year flow. As a result, overtopping occurs at most culvert crossings.

For the Scottsdale Mission Condominiums (SMC), most of the area is under severe flooding as the analysis showed that the water surface elevations for the 100-year storm were higher than the finished floor elevations (FFE) of the buildings at several locations. In addition, there are some locations with potential breakouts within the SMC as shown on the Floodplain map.

The total number of houses that lie in the flood hazard area, and are therefore subject to flooding, is 493. The following table summarizes the number of houses along each branch that are subject to flooding.

Table 2 – Number of structures affected by existing condition flood hazard

Item	**Main Channel**		**92nd Street Channel**	
	* Effective flow area	* Overland flow area	* Effective flow area	* Overland flow area
No. of Houses	93	119	30	251
Total	**493**			

* *Refer to the different color codes as per the legend in the attached Floodplain Map*

5. DESIGN CONCEPT, CRITERIA AND METHODOLOGY

The goal of this project is to provide the *maximum feasible level of flooding protection* using a ***Context-Sensitive Design*** approach. This design approach dictates that an appropriate level of protection, i.e. a Design Storm Frequency (DSF), be determined such that the UCW provides protection for the maximum feasible storm frequency, while maintaining smooth blending into the existing landscaping and aesthetics.

5.1 Design Storm Frequency (DSF)

Primatech established a process for determining the DSF as follows:

(1) Plotting the existing top of bank and WSE profiles for the 10-, 25-, 50-, and 100-year storm frequencies for the existing channel.

(2) A line offset 1.5 feet below the lower bank is shown on the same plot. This line represents the maximum allowable water surface elevation in the existing channels. The distance from this line to the top of bank represents the freeboard.

(3) The minimum level of protection (initial DSF) is estimated by inspecting the resulting graph and interpolating between the 1.5 foot offset WSE line and the WSEs of various frequencies.

(4) The design process is first done based on the designated initial DSF in (3) and the context-sensitive design approach discussed above.

(5) Building a HEC-RAS model for the proposed condition and run it for the various storm frequencies

(6) A final DSF is determined based on the results of the proposed conditions HEC-RAS model and the maximum capacity that the channels reaches can carry.

This process resulted in a DSF of 50 years for all of the channel reaches except Reaches R-13 and R-14, which would have a 10-year DSF. An exhibit for the UCW project's DSF is enclosed as Appendix D.

5.2 Design Criteria

The design of the channels of different reaches, culverts and detention basins follows COS Design Standards & Policies Manual (2008) and the latest FCDMC Drainage Design Manual, Volume II, Hydraulics. The following key criteria have been considered in the design:

5.2.1 Channels

- The drainage channels should be designed to carry the DSF, which has been determined to be 50-year for all reaches, with the exception of reaches 13 and 14, which will be designed for a 10-year DSF.
- Wherever feasible, earthen channels should be designed with a base Manning's "n" value of 0.03.
- The maximum velocity for the earthen channel should not exceed 5.0 feet per second.
- All channel sections should satisfy the freeboard criteria in the FCDMC Drainage Design Manual.
- The freeboard elevation should be contained within the ROW.

- Drop structures and/or extended banks may be required to satisfy the freeboard and velocity criteria.

5.2.2 Culverts

- All culverts should be sized to carry, at a minimum, the DSF peak flows.
- The allowable headwater elevation should not exceed the roadway pavement elevation to prevent overtopping.
- The minimum pipe size of circular culverts, storm drains and basin bleed-off pipes should be 18 inches.
- A minimum cover of 1 foot, measured from the top of subgrade, should be provided for all culverts.
- Culverts should be designed to provide a minimum velocity of 2.5 feet per second to ensure self-cleaning during partial depth flow.
- Culvert outlet protection should be provided where needed.

5.2.3 Detention Basins

- All detention basins should be designed such that the stored water is completely discharged from the basin within 36 hours of the end of the storm event.
- The maximum basin side slope is 3:1
- The maximum depths of the basins should be determined based upon the adjacent channel's bottom elevation to ensure that the draining requirement is met. The depth should not exceed 8 feet.

5.3 Design Methodology

5.3.1 Channel Reaches & Cross Sections

There are two major channels within the project area, referred to here as the UCW *Main branch* and the *92nd Street branch.* Each branch was segmented into different reaches, as shown in Appendix C, and each reach is represented by a typical cross-section as illustrated in the 100% Plans. The geometry of the typical cross section for each reach was designed to convey the designated DSF for that reach while taking into account the available easement width and/or any restrictions that may exist within the reach.

In light of the Context-Sensitive approach and Hydraulic design criteria, channel linings were kept earthen wherever feasible. Reaches 3, 4, 10, 11 and 12 were designed with concrete lining due to ROW restrictions.

5.3.2 Culvert Design

Data from the HEC-RAS model for the existing conditions prepared by Primatech in 2008 shows that most of the culvert crossings along the UCW have insufficient capacity to handle the 50-year storm event, which resulted in flows overtopping the streets at crossing locations. The recently constructed Cactus Road crossing lowered the channel bottom by 4 feet. This resulted in the need to lower most of the channel reaches and crossing culverts to maintain an appropriate drainage slope through the Cactus Road underpass. All cross culverts were sized to accommodate the DSF peak flows with the aid of Culvert Master by Haestad Methods and HY8 by FHWA software.

For culvert outlet protection the USDA method was used to determine the length of the Riprap apron at the culvert outlet as explained in Section 5.3.5.

5.3.3 Detention Basins Design

A total of six sites were identified within the project area as potential detention basin locations (See Appendix C). These sites were selected due to their proximity to the UCW alignment and the undeveloped status of the land. These basins are as follows:

(1) Sweetwater Basin (Main branch) – North of Sweetwater Ave and west of 96th Street

(2) Larkspur Basin (Main branch) – South of Larkspur Dr and east of 96th Street

(3) Cholla Basin #1 (Main branch) – South of Cholla Street and east of the Main branch

(4) Cholla Basin #3 (Main branch) – South of Cholla Street and east of the Main branch

(5) Poinsettia Basin (92nd branch) – South of Poinsettia Drive and west of 92nd Street

(6) Cholla Basin #2 (92nd branch) – North of Cholla Street and east of 92nd Street

In addition to their aesthetics and recreational provisions, the construction of these basins would help to lower the channel's WSE so that adequate freeboard can be obtained.

In order to attenuate the local and overall peak flows, all proposed basins were designed as offline basins with the following modeling approach.

- *Offline Detention Basins*

Offline detention basins receive flow from a channel only after the flow has reached a set target discharge or channel water surface elevation. This limits the use of the entire volume of the detention basins to the storage of hydrographic peaks.

Modeling offline detention basins is performed using diversion cards in HEC-1 such that all flow above a target flow rate is diverted. The target flow rate was developed based on the inflow hydrograph, the proposed channel capacity and the available storage volume of the basin. The diverted flow hydrograph volume was calculated to ensure that the diverted volume does not exceed the basins' storage volume.

5.3.4 Drop Structures

To meet the design criteria of the UCW earthen channel reaches, several drop structures were proposed to control the grades. Total of four drop/drop inlet structures were proposed along the 92nd Street channel while nine drop/drop inlet structures were proposed along the Main Channel of the UCW. The drop structures heights ranged from 1 to 4 feet. The design of drop structure alternatives were according to the following procedures:

1. Hydraulic Engineering Circular No. 14, Third Edition, "Hydraulic Design of Energy Dissipators for Culverts and Channels", Federal Highway Administration, 2006.
2. The Natural Resources Conservation Service, (NRCS) design procedures
3. The Flood Control District of Maricopa County, Hydraulic Manual, DRAFT, 2009.

The NRCS design procedure was elected and the drop structures have been designed as rock chutes as per the example shown in Figure 3 below. Detailed analysis and design is attached as Appendix K.

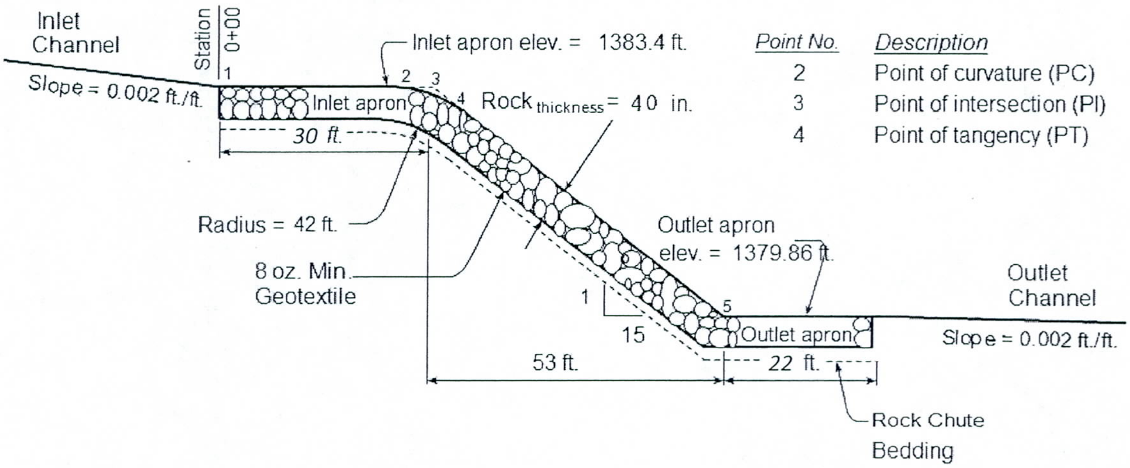


Figure 3: Profile along the centerline of Rock Chute drop structure just DS of Cholla culvert on Main Channel

5.3.5 Outlet Protection and Riprap Sizing

Culverts and stormwater pipes outlets must be adequately protected from scour and deterioration caused by a high exit velocity of the water leaving the outlet. To prevent scour at these outlets, a flow transition structure is needed which will absorb the initial impact of the flow and dissipate its energy. The most commonly used devise for outlet protection is the lined ripraped apron. The USDA method was used, with the aid of CulvertSoft V1.0 by ENSOFTEC, INC, to determine the size (D_{50}) and the length of the Riprap apron at the culvert outlets. This method is basically based on empirical design Monographs/Tables that established relations between culvert diameter/rise, discharge, Riprap size D_{50} and minimum length of apron required. The apron thickness is typically taken as two times the D_{50}. Appendix P presents the results of the outlet protections design.

6. HYDROLOGY

In 2008, Primatech prepared an existing condition hydrologic model for the project area using HEC-1 version 4.1 with NOAA Atlas 2 rainfall data. However, for the current design criteria, this model has been updated using the NOAA Atlas 14 precipitation data. Both the existing and proposed HEC-1 models input data, including time of concentration (T_c) were prepared with the aid of the DDMSW program V.4.5.6, developed by KVL for the FCDMC, in combination with a GIS based project watershed map. The proposed condition HEC-1 model was established based on the existing condition model with the following main changes made to the existing model:

- New/modified detention basins were added to the model at the locations described in section 5.3.3
- All routings along both branches were updated to reflect the proposed cross sections for each reach. Refer to Appendix E for the HEC-1 Routing Map.
- Manning's "n" coefficients were updated to reflect each reach's lining materials.
- The area north of SMC was modified through the addition of new subbasins and boundaries as well as existing detention basins and routings. This was done to provide more representative flow rates and paths. Detailed analysis of the SMC is included in Appendix L.

6.1 Precipitation

The 6-hour NOAA 14 point-rainfall data was used for this project. The rainfall depth, storm distribution and depth-area reduction factors were produced with the aid of the DDMSW program. The rainfall data are included in Appendix M.

6.2 Rainfall Losses

The rainfall loss model utilized for this project was the Green and Ampt infiltration equation. Parameters for the Green-Ampt infiltration loss depend on the soil type and land use. The soil data for the project area was determined from the NRCS (Natural Resources Conservation Services) website. The soil map and table of soil data are provided as Appendix J.

6.3 Land Use

The project area is fully developed with a mix of land uses, but it is mostly comprised of residential subdivisions of varying densities and some areas of open space and commercial locales. The land use input parameters for the hydrology HEC-1 model were prepared for each sub-basin using DDMSW program. To closely represent the different types of land use within the project area, COS land use map, recent aerial photos and field trips were used. A table for the land use data is presented in Appendix M.

6.4 Unit Hydrograph

The unit hydrograph used in this study was the Clark unit hydrograph. The Clark method requires three parameters to calculate a unit hydrograph: T_C, the time of concentration for the basin, R, a storage coefficient, and a time-area curve. A time-area curve defines the cumulative area of the watershed contributing runoff to the sub-basin outlet as a function of time (expressed as a proportion of T_C). The Clark parameters are calculated by MCUHP Program, which is incorporated within the DDMSW software.

6.5 Channel Routing

Muskingum-Cunge method was used for routing the flow. Physical channel parameters such as reach length, slope, Manning's n coefficient and cross section shape were input into HEC-1 to represent the existing/proposed conditions of the routes. Detailed information for the existing conditions can be found in the Hydrology Report prepared by Primatech in 2008.

7. HYDRAULICS

The proposed condition HEC-RAS model was created using HEC-RAS, version 4.1, with the aid of CAD capabilities to export/import geo-referenced stream lines and cross sections. The major procedures used to develop the model are summarized below.

- Proposed cross sections were cut along the construction centerline shown on the 100% plan sheets, through the different reaches, with each reach having its own individual typical cross section.
- Proposed drop structures and road and driveway crossing culverts were modeled at their corresponding locations.
- Major flow change locations were identified using the HEC-1 output and entered in the HEC-RAS "Flow Data" model.

➢ Stage – Storage curves were developed for all basins, as shown in Appendix G.

7.1 Steady State Flow Model

The hydraulic analysis and design for the UCW project was achieved primarily with a steady state flow simulation using HEC-RAS version 4.1. The geometric layout of the proposed HEC-RAS model was divided into two major rivers, referred to as UCWMAIN and UCW92ND in addition to a portion of the tributary river that contributes flow to the UCW Main channel north of the proposed larkspur basin. The UCWMAIN River was split into Upper, Mid and Lower Reaches. The UCW92ND River was split into 92ND_STREET, Lower92ND_STREET and BYPASS CULVERT reaches.

Although the HEC-RAS model is intended for the steady state flow analysis, all proposed six basins were coded in HEC-RAS as storage areas with their corresponding stage-storage information for clarification purpose only.

The diversion structures were modeled in HEC-RAS as lateral broad crested weirs. Hager's Equation was selected for the weir flow computations. The weir coefficients were determined automatically by the program.

The 92nd street Bypass Culvert which is connected to Cholla Basin #2 outlet was modeled in HEC-RAS as an 8-foot by 5-foot concrete rectangular channel with a lid. This option was chosen due to the length of this culvert that is about 465 feet.

Detailed HEC-RAS output is included as Appendix H.

7.2 Unsteady State Flow Model

Two major detention basins, namely, Sweetwater Basin and Larkspur Basin that required unsteady flow analysis to simulate their proper functions and obtain accurate results on the amount of flow diverted over their lateral weirs. Two unsteady flow HEC-RAS models were developed to simulate the basins as offline storage areas. For each model, the basin stage-storage data were entered and the Inflow Hydrograph obtained from the HEC-1 model was introduced at the upstream end of the study reach. The diversion structures were modeled in HEC-RAS as lateral broad crested weirs. The model was run in the mixed flow regime with the flow optimization option engaged to accurately determine the flow rate leaving the channel to the basin through the lateral weir. The weir diversion rating curve (DI-DQ), basin's flow and stage relations and volume were produced.

Detailed analysis of these two basins is included in Appendix N. Appendix N also provides a detailed explanation for determining the DI-DQ curves using the Steady Flow Model approach. This approach was used for all other proposed detention basins given that they are smaller basins and approximate results of their function would be adequate for the design of these basins.

7.3 Roughness Coefficient (Manning's n)

Roughness coefficients represent the resistance to flood flows in channels and floodplains. The use of Manning's formula has been established in the applications of flood-plain management, in flood insurance studies, and in the design of bridges and highways across floodplains.

The overbank entities such as houses, roads, walls and trees may obstruct the flow and increase the resistance to the stream. Although these minute details are difficult to be represented in a 1-D model, such as HEC-RAS model, the *Modified Channel Method* of estimating the value of Manning's coefficient for the floodplains can be adequately used. For the existing channels, Manning's coefficients were estimated based on the aerial photos, field reconnaissance trips and engineering judgment. The following sections presents the methodologies used to determine Manning's coefficient for the existing channels and overbank floodplains.

7.3.1 N-value determination

The determination of the n-values followed the method described in the manual, "Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona". This manual was prepared for the District by the U.S. Geological Survey.

The procedure for determining n-value consists of two steps. The first step is to determine a base value of n for the floodplain's natural bare soil surface. The second step is to quantify adjustment factors to the base number. These factors are: degree of irregularity to the channel side slopes, effects of obstructions in the flow path, vegetation growth in the flow path, variations in the channel cross-section, and the degree of meandering of the channel bed.

The Modified Channel Method as described in the "Guide for Selecting Manning's Roughness Coefficients for Natural Channels and FloodPlains", United States Geological Survey Water-supply Paper 2339 (WSP2339) by G.J. Arcement, Jr. and V.R. Schneider, USGS, is a modified version of Cowan's (1956) procedure that was developed for estimating n values for channels, the following equation can be used to estimate n values for a floodplain:

$$n = (n_0 + n_1 + n_2 + n_3 + n_4).m$$

where:

n_0 = a base value of n for the floodplain's natural bare soil surface

n_1 = a correction factor for the effect of surface irregularities on the floodplain

n_2 = a value for variations in shape and size of the flood-plain cross section

n_3 = a value for obstructions on the floodplain

n_4 = a value for vegetation on the floodplain

m = a correction factor for sinuosity of the floodplain

The n-values have been determined from the following sources of data:

- Detailed topographic mapping (with a contour interval of 1 feet) provided
- Field visits by Primatech staff with photographic documentation.
- Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona.

Intercept of relevant pages from "Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona" as well as the calculation tables for Manning's n-values used for this study are attached in Appendix O.

7.3.2 Base Values

Tables R-1 and R-3 of the District manual, as shown in Appendix O, provide base n-values for the main channels and the over banks. For the main channel, the size of the bed material is used to determine the base n-value. Field investigation of the project site, for which photographic documentation is provided, included a determination of the size of the bed material.

From field investigations, it was found that the Upper Camelback Wash bed consists mainly of firm to loose soil. At some locations, wash consisted of gravel lining. At a location north of the culvert at 92nd Street and Sweetwater Avenue concrete lining was observed. Based on Table R-1 of the Estimated Manning's Roughness Coefficients for Stream Channels and Floodplains in Maricopa County, Arizona, the base value for gravel is 0.024 and firm soil was 0.020.

7.3.3 Adjustment Factors

The sum of the first four adjustment factors is added to base value and the result multiplied by the meandering factor.

- *Degree of Irregularity*

The degree of irregularity is determined by the sloughing or erosion of the side slopes and can be rated as smooth, minor, moderate, or severe.

Upper Camelback wash has a well-established channel beds with prominent side slopes. An adjustment factor of 0.001 was used for the main channels and the over banks to adjust for the minor irregularities.

- *Effects of Obstructions*

Obstructions in a river's flow path, which may include debris deposits, exposed roots, logs, and bridge piers, are calculated as a percent of the flow path area. The effects may be categorized as negligible (less than 5% obstruction) to severe (more than 50%).

The Upper Camelback Wash runs through urban areas, which include houses along the over banks of some cross-sections. These houses are accounted with the increase in the Manning's roughness coefficient assuming that they provide obstruction to the flow. The adjustment factor for obstructions varied from 0.002 to 0.04. A value of 0.002 was used for negligible obstructions where 0.04 was used for severe obstructions in the flood way by houses.

- *Vegetation*

The third adjustment factor accounts for vegetation growth, which may impede flow and is determined as a ratio of flow depth to the vegetation height. The factor may be small, (i.e., flows depth at least 3 times the height of vegetation), to large, (i.e., flows depth about equal to the height of vegetation). Hydraulic radius is also considered when determining this factor.

For Upper camelback wash, values of 0.002 to 0.025 were determined for the channel and up to 0.015 in the over bank areas. At some channel locations, dense grass and weed growth were observed that could potentially impede the flow of water.

- *Cross-section Variations*

This adjustment factor accounts for variations in the channel cross-section. The base values are typically empirical numbers derived utilizing an assumed general cross-section shape such as a trapezoid. Actual channels will vary from this assumed shape and flow may alternate from one side of a channel to the other. This alternating may be gradual, for which no adjustment is made; occasional, in which a small adjustment of 0.001 to 0.005 is made; or frequent, for which an adjustment to 0.015 is made.

The cross-sections for the upper Camelback wash are taken at close intervals (less than 300 feet). Therefore, the variations in the channel geometry are minimal. Longer intervals of cross-sections were taken at locations where the channel was straight and the channel geometry was similar. Shorter intervals were taken where the channel geometry changed frequently, such as along the meanders or culvert sections. To account for minor irregularities in the channel, am adjustment value of 0.001 was chosen for the Upper Camelback wash.

- *Meandering*

Meandering refers to the overall course of the river/wash as affected by the topography of the land. The ratio of the meander length to the straight channel length is used to determine this factor. Minor meandering, less than a 1.2 ratio, has no adjustment. Appreciable meandering, a ratio of 1.2 to 1.5, has an adjustment of 1.15. Severe meandering with a ratio greater than 1.5 has an adjustment ratio of 1.3.

The upper Camelback wash has minor meanders at most locations that do not require any adjustment. However at some locations the degree of channel meander varies from appreciable to severe and the adjustment ratios were chosen accordingly.

Appendix O presents the Manning's n for the UCW existing channels and overbank floodplain

For the proposed channels, and based on several meetings with COS and FCDMC, Table 3 below presents the Manning's coefficients for the different channel linings which were adopted for the design:

Table 3 – Design Manning's Coefficients

Channel Lining	Design Manning's Coefficient
Earthen	0.03
Concrete	0.013
Riprap	0.045*

* *Average value determined from the NRCS Rock chute design calculations and was used for all riprap design in this project, in lieu of the method described in the FCDMC Drainage Design Manual, Volume 2, Hydraulics.*

7.4 Expansion and Contraction Coefficients

Generally, expansion and contraction coefficients of 0.1 and 0.3 are used for the HEC-RAS modeling. At culvert locations, where significant and rapid changes in the flow width occur, 0.3 and 0.5 were used respectively for expansion and contraction coefficients.

8. MAIN CHANNEL DESIGN FEATURES

The two branches were divided into a total of 16 reaches, as shown in Appendix C. This was done to suit varying design requirements as well as for identification purposes. Each of the reaches has a typical cross section and lining material, as shown in the typical cross section sheet included in the Final Plan Sheets. The reaches are named R-1 through R-16, with R-1 at the downstream side of the project at Shea Boulevard. All proposed channels were designed to meet or exceed the design criteria such as the velocity and freeboard requirements. The following sections briefly describe the character and conditions of each reach.

8.1 Reach R-1

Reach R-1 extends from Shea Boulevard north to the 92nd Street culvert. A Multi-Use Path (MUP) has been constructed on the east side of the existing channel, along with a new 14-foot by 8.5-foot concrete box underpass that crosses underneath 92nd Street. Neither the existing earthen channel nor the Shea Boulevard crossing is included in this project.

8.2 Reach R-2

Reach R-2 extends from upstream of the 92nd culvert to the PMG entrance. The construction was completed as part of the UCW Phase one improvement. A Multi-Use Path (MUP) was constructed along the east and south sides of a recently built concrete-lined rectangular channel. The concrete channel and a 4-10-foot by 5-foot box culvert at the PMG entrance are capable of conveying the 100-year flow of 1,720 cfs. The existing 3-8-foot by 4-foot box culvert at 92nd Street can carry approximately 1,200 cfs without overtopping 92nd Street. A side spillway along the east bank of the rectangular channel was constructed to divert flows exceeding the 92nd street culvert's capacity to the new 14-foot by 8.5-foot concrete box underpass. The culvert headwall and the top of banks of the new channel were elevated to ensure the functionality of the design.

8.3 Reach R-3

Reach R-3 extends from the PMG entrance to the confluence of the two UCW branches. The existing channel is earthen with an irregular shape and an average bottom width of around 9 feet. A new rectangular concrete channel with a bottom width of 43 feet and an average depth of 6.25 feet would connect the PMG culvert to the confluence point. At this location, the UCW Main channel turns eastward, while the 92nd Street channel continues north. An MUP is designed along the east side of Reach R-3.

8.4 Reach R-4

Reach R-4 extends from the confluence point along the northern edge of PMG to the southeast corner of La Contessa Subdivision, where the wash turns northeast.

The existing channel has an earthen bottom with vertical walls that are consisted of wire mesh Gabion units. However, a Shotcrete/Gunite layer was applied to the north bank to sustain the Gabions adjacent to the La Contessa walls.

Due to the limited available space of approximately 34.5-foot width along this reach and the need to include a 10-foot MUP along Reach 4, a special design that includes a concrete semi-trapezoidal section with an average bottom width of 6 feet and total depth of 5 feet was proposed. In this design, the channel floor is integrated with a 3 feet vertical concrete wall standing against the existing Gabion baskets along the north side of the channel bank. The south bank slopes at 3:1 to meet a 10-foot wide lower bench (MUP) at 2 feet above the channel bottom. The typical section ends with a 3-foot vertical concrete retaining wall that rises to match the existing grade at the PMG property. The property owner has granted a 10-foot construction easement along the north edge of PMG.

On the other hand and as a part of the improvements in this reach, the COS and PMG owner agreed that a 6-foot high Concrete Masonry Unit (CMU) wall would be constructed along Reach R-4, separating the UCW from PMG. Moreover, openings for wildlife crossings will be provided through the wall. This CMU wall will be designed by the PMG owner's Architect.

8.5 Reach R-5

Reach R-5 extends northeast to just north of Gary Road. This reach is characterized by a natural earthen channel with dense vegetation on the channel bed and banks. Although the area has a 62.5-foot drainage easement available, there are two spots where the easements are only 47.5 feet wide. The MUP runs along the entirety of Reach R-5 and crosses the channel at one location from the east bank to the west bank along the channel bottom. The proposed channel has a trapezoidal cross section with 3:1 side slopes, bottom width of 10 feet, and an approximate depth of 6.2 feet. The channel in this reach has two different lining segments, a ripraped channel segment and a natural earthen channel segment. At the MUP crossing location, the proposed channel begins a transition into a Shotcrete-lined section with 2:1 side slopes on both banks. North of the MUP crossing, the channel has a gradual transition until the east bank is at a 1:1 side slope and the west bank is at a 3:1 side slope.

A small side channel is proposed at the downstream end of the reach to collect the storm water from the local community and drain it to the Main channel.

8.6 Reach R-6

This reach is similar to R-5, except that the existing channel has less vegetation. R-6 extends from the MUP crossing to the Cholla Street culvert. The existing channel is an irregular earthen channel with a bottom width that varies from 6 feet to 50 feet as it approaches Cholla Street. The proposed channel cross section is an earthen trapezoidal channel with a bottom width of 10 feet, a side slope of 3:1 and a depth of about 6.2 feet.

The proposed MUP runs along the west bank and eventually turns east and merges with the existing sidewalk on the south side of Cholla Street.

8.7 Reach R-7 & R-8

Reaches R-7 and R-8 represent the Main branch from north of Cholla Street to the downstream face of the Poinsettia Drive culvert. The existing channel is a natural earthen channel with an irregular shape and vegetative lining. The proposed channel cross section is an earthen trapezoidal channel with a bottom width of 15 feet and side slopes of 3:1. The average depth of reaches R-7 and R-8 are 5.2 feet and 5.7 feet respectively.

Currently, there is a concrete-lined scupper along the west bank, just upstream of the existing Cholla Street culvert. The new channel design dedicates that the existing scupper be removed and replaced by a 17-foot long catch basin along the east side of the 94th Way, north of Cholla Street. This catch basin would intercept the pavement flow and drain it to the proposed Cholla Street culvert via an 18-inch storm drain pipe.

Just upstream of Cholla Basin #1, a small side channel is proposed to convey the storm water from the local community to the Main channel at Reach R-7. The proposed MUP runs along the west bank of Reaches R-7 and R-8.

8.8 Reach R-9

This reach extends from the upstream face of the Poinsettia Drive culvert to the downstream face of the Cactus Road culvert. The existing channel is a well-defined, earthen trapezoidal channel with a bottom width that ranges from 10 to 15 feet and 3:1 side slopes. The design of this reach is similar to Reaches R-7 and R-8, i.e. the typical cross section is an earthen trapezoidal channel with a bottom width of 15 feet, side slopes of 3:1 and an average depth of 5.8 feet.

Under the existing condition, there is a concrete-lined scupper running along the west bank of Reach R-9, just upstream of Poinsettia Drive culvert. The new channel design dedicated that the existing scupper be removed entirely and replaced by a 17-foot curb opening catch basin along the 94th Way, north of Poinsettia Drive. This catch basin would intercept the pavement flow and drain to Poinsettia Drive culvert via an 18-inch storm drain pipe.

The proposed MUP runs along the west bank of the channel and eventually merges with the existing MUP downstream of Cactus Road Bridge. Two 15-foot maintenance access ramps were provided for this reach as per COS request, one is located on the west side of the channel and tied to the proposed MUP just north of Poinsettia Dr., while the second ramp ties to the 94th Way through a proposed Driveway entrance south of Cactus road.

8.9 Reach R-10

Reach R-10 starts just north of Cactus Road and extends approximately 600 feet to Charter Oak Road. The existing channel has dense vegetation. The design of this reach includes a close coordination with the COS Fire Station #8 that has recently been constructed north of Cactus Road on the east side of the wash. Also to avoid a conflict with an existing property that has encroached slightly into the drainage easement, a fine realignment of the channel at this location was performed as well as a new drainage easement was granted by COS. The proposed channel cross section is a rectangular concrete section with a bottom width of 15 feet and varying depths with a maximum of 7.5 feet.

8.10 Reach R-11

This reach extends from the upstream face of the Charter Oak Road culvert to the downstream face of the culvert crossing the LDS Entrance Road. The reach is approximately 340 feet, and the existing channel is an irregular earthen channel with vegetative lining. The proposed channel cross section is a rectangular concrete section with a bottom width of 15 feet and varying depths with a maximum of 9.6 feet.

8.11 Reach R-12

This reach lies between the LDS Entrance Road and Larkspur Drive. The reach length is approximately 300 feet, and the existing channel is an irregular earthen channel with vegetative lining. The proposed channel cross section is a rectangular concrete section with a bottom width of 15 feet and varying depths with a maximum of 6 feet.

An existing reach, which is identified in the HEC-RAS model as "UCW Tributary", joins the channel just upstream of the LDS Entrance Road culvert. At the confluence point, the floor elevation of UCW Tributary is about 2 feet higher than the upstream invert elevation of the LDS Entrance Road culvert. Owing to the restriction of the drainage easement width at this confluence point, a junction structure with a stepped floor joint was designed to connect the Tributary to the Main Channel of UCW just upstream of the LDS Entrance Road culvert. This junction structure would also function as an energy dissipator for the UCW Tributary's merging flow.

8.12 Reach R-13

Reach R-13 extends about 765 feet from north of Larkspur Drive to Sweetwater Avenue. This reach of the Main branch passes through the Sweetwater Ranch II subdivision. The existing drainage way can only convey an approximately 2-year flood. The existing earthen channel is irregular in shape and generally has a very shallow and narrow cross-section with a community trail that crosses the channel and runs along both banks and along the channel bottom. For this particular reach, and due to the relatively shallow existing geometry, limitations of the drainage easement's width, and inputs from the HOA and residents, the channel was designed to provide a 10-year level of flood protection so as to minimize the disturbance to and alteration of the existing landscape.

Although the channel in this reach was designed in compliance with all design criteria, including velocity and freeboard, for a Design Strom Frequency (DSF) of a 10-year, it would still have the capacity to fully contain the flow of the 50-year storm within its banks, though the freeboard and velocity requirements would not be met. The proposed channel is an earthen trapezoidal section with a bottom width of 8 feet, 3:1 side slopes and a total depth of 4.4 feet.

The design also considered the two existing storm drain pipes at the north end of Reach R-13 that discharge runoff from the Buffalo Ranch subdivision into the channel. Outlet protection was designed for these pipes. Additionally, a new drop structure, and community trail crossings were incorporated in the design.

8.13 Reach R-14

Reach R-14 runs along the west side of the proposed Sweetwater Basin, from Sweetwater Avenue to the northern end of Sweetwater Basin which marks the end of the construction work for the UCW Main branch. This reach, similar to reach R-13, was designed for the 10-year storm event. The proposed channel, which will intercept two offsite drainage channels from subdivisions to the west, is designed as an earthen trapezoidal section with a bottom width of 10 feet, 3:1 side slopes and a depth of 4.3 feet. A side spillway on the west side of the channel and north of Sweetwater Avenue would divert excess flows into the channel.

A community trail that leads to the local community center is proposed along both the west and east sides of the proposed Sweetwater Basin and Reach R-14. Additionally, a crossing trail at the north end of the UCW Main branch improvements was proposed to allow local residents to safely cross the channel. A rock chute drop structure was designed at the north end of the project to tie the existing channel to the proposed channel.

8.14 Sweetwater Basin

The existing Sweetwater Basin is located just north of Sweetwater Avenue and was constructed to meet the 2-hour, 100-year storm retention requirements of the neighboring subdivisions. Currently, the basin is located to the west side of the existing wash with an existing 20-foot wide spillway located on the south side of the basin at a height of 2 feet above the basin floor.

For the proposed improvements, the basin was reconfigured and rerouted to the east side of the proposed channel along Reach 14. The proposed basin was designed as an offline basin and linked to the proposed channel through an overflow lateral weir to route the peak flows through the basin and effectively reduce the flow in the proposed channel. The Sweetwater Basin has been designed to accommodate a 50-year storm peak flow with a total storage capacity of about 3.10 acre-feet and a depth of 5 feet. The basin has an 18" outlet bleeding-off pipe that drains back to the Main channel.

8.15 Larkspur Basin

The proposed Larkspur Basin is the largest basin in this project with a total storage volume of 6.95 acre-feet at a depth of 6 feet and was designed to handle the peak flow of the 100-year storm event. The Basin was designed as an offline storage area with a primary diversion structure in the form of a lateral weir located at the end of the tributary channel just upstream of the Larkspur Drive and 96th Street culvert. The weir would discharge via 2-8'x3' concrete box culvert that eventually discharges to the basin. A secondary diversion structure in the form of a trench drain with apron was designed to capture the pavement drainage that runs from east to west along

Larkspur Drive, east of 96th Street. The water intercepted by the trench drain will discharge to the basin through a 36-inch storm drain pipe. The basin has an 18" outlet bleeding-off pipe that drains to the existing 66" storm drain pipe along 96th Street.

8.16 Cholla Basin #1

This proposed basin is located at the northeast corner of 94th Street and Cholla Street. The basin is designed as an offline detention basin with a total capacity of 2.84 acre-feet at maximum depth of 5 feet. This basin was designed to attenuate the 50-year storm peak flow through diversion of the channel flow over a proposed lateral weir to the basin. By reducing the peak flow in the channel, Cholla Basin #1 would have localized benefits on the freeboard along Reach R-6, in addition to minimizing the required culvert size at Cholla Street crossing. The basin has an 18" outlet bleeding-off pipe that is connected to the drop inlet at the upstream face of Cholla Street crossing culvert.

8.17 Cholla Basin #3

This proposed basin is located at the northeast corner of 94th Street and Gary Road. The basin is designed as an offline detention basin with a total capacity of 3.51 acre-feet at maximum depth of 5 feet. This basin was designed to attenuate the 50-year storm peak flow through diversion of the channel flow over a proposed lateral weir to the basin. In addition to its effect on the reduction of the total flow at the downstream end of the project, Cholla Basin #3 would have localized benefits on the freeboard along Reaches R-5 and R-6. The basin has an 18" outlet bleeding-off pipe that drains back to Main channel.

9. 92ND STREET BRANCH FEATURES

9.1 Reach R-15

This reach starts just north of the confluence with the Main branch and extends north to the southern entrance of the Mission De Los Arroyos apartment complex along the east side of 92nd Street. This reach is divided into northern and southern sections, namely, Reach 15(N) and Reach 15(S). The southern section is a riprap lining trapezoidal channel with 12.5 feet bottom width, 5.75 feet depth and 3:1 side slope, while the northern section has a bottom width of 11 feet, a depth of 6 feet and side slopes of 3:1.

According to feedback from the HOA and Residents of Mission De Los Arroyos and La Contessa communities, Reach 15 (N) was further split into two segments based on the lining type; one segment is an earthen channel while the second one has a grass lining as shown in the final Plans.

Also, a request from the abovementioned communities to keep most of the trees along both sides of R-15 intact, a modular concrete block planter was designed around each of those trees.

9.2 Reach R-16

Reach R-16 extends from north of Cholla Street to the upstream end of the project just north of Poinsettia Drive. The proposed channel cross section for this reach has a trapezoidal cross section with a bottom width of 16 feet, side slopes of 3:1, and a total depth of 5.5 feet. R 16 was split into two segments based on the lining type; one segment is an earthen channel while the second one is a concrete lining channel as shown in the final Plans.

According to Mission De Los Arroyos (MDA) HOA comments, the COS requested that no improvements shall be carried out along the 92nd Street channel within MDA community. Given that the existing channel capacity within MDA is not to exceed 400 cfs, an integrated drainage system, including the channel at R-16, Cholla Basin #2 and a bypass concrete box culvert connected to the basin outlet was designed.

The difference in invert elevations of the upstream face of the existing culvert crossing Cholla Street east of 92nd Street, and the proposed channel at R-16 north of culvert, resulted in a lower elevation spot that created an adverse slope towards the upstream of the existing Cholla Street culvert for a distance of approximately 55 feet and a depth of 1.5 feet. As a result, the flow entering Reach 16 will eventually pond at the area just north of Cholla Street culvert. An 18-inch bleed-off pipe, installed at the lowest point, will drain this pool after storm events.

9.3 Cholla Basin #2

This basin is to be constructed on a City-owned, triangular-shaped open space located at the northeast corner of 92nd Street and Cholla Street. The existing 92nd Street branch channel runs along the northern boundary of the open space to the existing Cholla Street culvert and drains through MDA. The proposed basin will function as an offline basin with a total capacity of 3.22 acre-feet at a maximum depth of 7 feet and would provide storage for the 50-year peak flood flow. An 8'x5' bypass culvert was proposed at the basin outlet. The bypass culvert travels about 465 feet downstream (south) along 92nd Street before it combine with the channel at Reach 15. This culvert provides a second flow route to insure that the flow through the existing channel within MDA doesn't exceed 400 cfs. This resulted in Cholla Basin #2 would also function as an inline detention basin, which would further reduce the peak flood elevation.

9.4 Poinsettia Basin

This proposed basin, located at the southwest corner of Poinsettia Drive and 94th Street, is designed to function as an offline basin. Although it has a relatively small volume of about 1.0 acre-feet and a total storage depth of 5 feet, this basin would reduce the peak flow of the incoming hydrograph, thereby reducing the size of the culvert at the 92nd Street crossing, north of Cholla Basin #2. In addition, it would contribute to the stability of the earthen channel in Reach R-16.

9.5 Drainage Improvements at Scottsdale Mission Condominiums (SMC)

During the UCW progress meeting held on March 1st, 2010, the FCDMC and COS requested that the drainage improvements be designed to protect SMC from the 100-year flood, if feasible. If not, the design should provide the maximum level of flood protection that can be achieved without causing any structure damage to the residences or significantly impacting the flow in the 92nd Street branch.

An existing condition HEC-RAS model for SMC was created using HEC-RAS version 4.1 with the aid of CAD and GIS import/export capability for geo-referenced stream lines and cross sections data. This model was used to determine the flow capacity and water surface elevation of the parking area within SMC and the existing channel. The model's results show that the 100-year water surface elevations are 1-2 feet higher than the FFEs of the buildings adjacent to the parking area within SMC. This means that these buildings are prone to flooding during not only the 100-year storm, but also smaller storm events.

Primatech explored several alternatives to mitigate the flooding including a new storm drain system along Cholla Street; a new inlet to SMC at Cholla Street; inverted-crown pavement in the parking area within SMC; a Concrete Box Culvert (CBC) passing under the parking area within SMC; a concrete arch pipe passing under the SMC parking area within SMC; modification of the existing downstream channel south of Gary Road; or some combination of the these alternatives.

Primatech submitted a conceptual design memo for the SMC improvements, attached as Appendix L, to both the COS and FCDMC for their review. The memo included analysis of proposed alternatives and their estimated construction costs and presented a recommended alternative. After careful consideration, the COS and the FCDMC approved the recommended Alternative, which was the installation of an 8-foot by 4-foot CBC along Cholla Street between 91st and 92nd Streets to capture the 100-year flow of 139 cfs and divert it to the east to discharge into the proposed bypass culvert. Hydraulic analysis of the approved alternative is included in Appendix L.

The approved alternative was the most cost-effective solution and required no improvements within SMC, so there would be no disturbance to the residents. It also had the shortest construction time; and would have the least impact on the 92nd Street branch.

10. LANDSCAPING AND AESTHETICS

Logan Simpson Design Inc. (LSD) was subcontracted by Primatech to prepare a native plant survey, inventory plans, landscape replanting plans and underground drip irrigation plans for the UCW improvements, including the six proposed detention basins. Additionally, LSD prepared all documents, exhibits, graphic boards and presentations necessary for meetings with the City's Development Review Board (DRB) and the public.

The landscape design for this project is meant to provide a context-sensitive approach that would improve the conveyance of the storm water drainage flow throughout the project area and blend smoothly with the aesthetics surroundings the wash while maintaining, as much as is feasible, the existing landscape. To achieve this goal, COS has approved limiting the replanting placement to the outside of the channel prism to ensure the conveyance and maintainability of the channel. The landscape planting is a palette of plants from COS approved list and blends with the adjacent properties using similar species whenever possible. The list of proposed plants is included in the landscape plans submittal.

LSD has prepared example landscape design graphics for all of the proposed channel linings as well as for the Sweetwater and Larkspur basins. The graphics show a landscape design for each type of reach in the project area and the typical level of landscape design in the each of the basins. The design is shown in both plan and cross section views.

A permanent irrigation system would be installed in the basins and channel as appropriate. The contractor would be responsible for designing and installing any temporary above- or below-ground watering system (as agreed to by COS) to support the vegetation for the duration of the plant establishment period, which is expected to be one year. The specifications would include language directing the contractor to make any minimal repairs and/or reconnections necessary for all functioning (off-site) private irrigation systems to provide covering matching the existing conditions.

10.1 Native Plant Inventory

The native plant survey and inventory plans, identify each native plant within the project area and its salvageability based on COS's Native Plant Ordinance (NPO) requirements. The survey was conducted in 2006 and 2007, and survey summary and plan sheets were produced in early 2008. Due to the extension of the project design period, the survey data has now expired per NPO time requirements. However, the size and location of most native plant material is not substantially different than it was as the time of the survey. It is therefore still acceptable for use in the developing the replanting design and irrigation plans.

LSD recommends that an updated survey and inventory plans be produced by a City-approved salvage contractor, in accordance with NPO construction requirements, within one year of the construction start date, once the funding has been determined and the construction schedule finalized.

LSD recommends that the native plant salvage be conducted simultaneously with the primary construction activities. It is assumed that all salvaged plants will be replanted within the project area and that the updated survey plans would be used as the basis for the revegetation for the project.

11. SUMMARY AND CONCLUSION

11.1 Hydrology

The DDMSW program V.4.5.6 by KVL for FCDMC and a GIS-based project watershed map was used to develop a hydrologic HEC-1 model, based on the NOAA14 rainfall data. The new NOAA14 rainfall depth for the 50-year, 6-hour storm at the project site was determined to be 2.431 inches, in comparison to the 2.96 inches developed based on the old NOAA2 data. A complete comparison of the results of the model using the NOAA2 and NOAA14 rainfall data is presented below in Table 4.

Table 4 – NOAA2 vs. NOAA 14 Rainfall Data Comparison

Method	Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
NOAA	5 MIN	0.390	0.470	0.520	0.610	0.670	0.740
NOAA	10 MIN	0.580	0.710	0.800	0.930	1.030	1.130
NOAA	15 MIN	0.710	0.880	1.000	1.180	1.310	1.450
NOAA	30 MIN	0.940	1.180	1.350	1.590	1.770	1.960
NOAA	1 HOUR	1.140	1.450	1.670	1.970	2.210	2.450
NOAA	2 HOUR	1.230	1.590	1.840	2.190	2.470	2.740
NOAA	3 HOUR	1.290	1.690	1.960	2.340	2.640	2.930
NOAA	6 HOUR	1.400	1.860	2.180	2.620	2.960	3.300
NOAA	12 HOUR	1.500	2.060	2.430	2.950	3.350	3.750
NOAA	24 HOUR	1.600	2.250	2.680	3.280	3.740	4.200
NOAA14	5 MIN	0.254	0.342	0.411	0.502	0.573	0.645
NOAA14	10 MIN	0.386	0.521	0.625	0.765	0.872	0.982
NOAA14	15 MIN	0.479	0.646	0.775	0.948	1.081	1.217
NOAA14	30 MIN	0.644	0.870	1.044	1.277	1.455	1.639
NOAA14	1 HOUR	0.797	1.077	1.291	1.580	1.801	2.028
NOAA14	2 HOUR	0.924	1.230	1.464	1.784	2.025	2.276
NOAA14	3 HOUR	1.010	1.320	1.565	1.909	2.182	2.465
NOAA14	6 HOUR	1.197	1.528	1.792	2.152	2.431	2.723
NOAA14	12 HOUR	1.343	1.696	1.972	2.346	2.632	2.928
NOAA14	24 HOUR	1.583	2.046	2.414	2.926	3.330	3.753

The flow rates at key project locations are presented below in Table 5. Overall, there is a significant reduction in the flow rates as compared to the flow rates produced by the existing condition model prepared by Primatech in 2008, which used NOAA2 data. A printout of the HEC-1 output file is enclosed as Appendix F.

- *Model Errors and Warnings*

The HEC-1 model ran normally to the end with no errors. The only warning message received was "EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO." This message was disregarded, as it does not indicate any instability issues in the model.

Table 5 – Proposed Condition Flow Rates at Key Project Locations

RIVER	HEC-RAS REACH	LOCATION	HEC-1 ID	HEC-RAS RIVER STATION	Proposed Condition Model (Design Storm*)
UCWMAIN	Upper Reach	*Beginning of the project*; north of Sweetwater Basin (SWB)	Combine 271720	10307.11	259
	Upper Reach	Flow diverted to SWB	SWB	10050	32
	Upper Reach	Flow remaining in the channel after diversion	Hydrograph 271721	10035.78	227
	Upper Reach	Flow just downstream (DS) of Sweetwater Culvert	Route 271730	9639.2	226
	Upper Reach	Flow just upstream (US) of Larkspur Culvert	Combine 271750	8173	378
	Upper Reach	Flow diverted to Larkspur Basin	LBAS	580	60
	Mid Reach	Flow Just US of LDS Culvert	Combine 271760	7812.7	387
	Mid Reach	Flow Just DS of Cactus Bridge	Combine 271780	6648.86	528
	Mid Reach	Flow US of Cholla Basin#1 (CH1)	Combine 271810	4500	541
	Mid Reach	Flow diverted to CH1	CH1	4250	67
	Mid Reach	Flow remaining in the channel after diversion	Hydrograph 271810	4200	474
	Mid Reach	Flow US of Cholla Basin#3 (CH3)	Combine 271830	3581	518
UCWMAIN	Mid Reach	Flow Diverted to CH3	CH3	3450	53
	Mid Reach	Flow remaining in the channel after diversion	Hydrograph 271831	3400	465
	Mid Reach	Flow Just DS of CH3	Combine 271836	3200	473
	Mid Reach	Just south of the confluence with the 92nd St Branch	Combine 270390	1623.84	909
	Lower Reach	Entrance Road to PMG, US of the PMG culvert	Combine 270400	1500	911

RIVER	HEC-RAS REACH	LOCATION	HEC-1 ID	HEC-RAS RIVER STATION	Proposed Condition Model (Design Storm*)
	Lower Reach	Combined Flow about 400 feet north of Shea Blvd culvert	Combine 270440	511.5	943
	Lower Reach	Just US of the Shea Blvd culvert; *"End of Project"*	Route 270440	111.5	933
UCW92ND	92nd_Street	North of Poinsettia Drive at the north corner of Poinsettia Basin	Combine 270280	33760	563
	92nd_Street	Flow Diverted to Poinsettia Basin	POIN	33300	62
	92nd_Street	Flow remaining in the channel	Hydrograph 270281	33339	501
	92nd_Street	Just US of the 92nd Street crossing culvert	Combine 270290	32524	538
	92nd_Street	Flow Diverted to Cholla 2 Basin	CH2	31700	229
	92nd_Street	Flow remaining in the channel	Hydrograph 270295	31660.38	288
	92nd_Street	Combined flow US of Cholla street culvert	Combine 270310	31554.29	312
	Lower 92nd_Street	Flow combined back from the by-pass culvert and Mission De Los Arroyos existing channel	Combine 270324	31060	564
	Lower 92nd_Street	Gary Rd. intersection with 92nd St., US of Gary Rd. culvert	Combine 270370	30500	567
	Bypass Culvert	NE Corner of 92nd Street and Cholla Street	CH2STR	50512.70	223
	Bypass Culvert	Combined flow from CH2 and Cholla Storm Drain	Combine 270319	50404.04	303

** Reach 13 and 14 Design Storm Frequency are 10-Year storm event, other reaches are 50-Year event*

11.2 Hydraulics

The proposed condition steady flow HEC-RAS model was created using HEC-RAS version 4.1, with the aid of the CAD and GIS capabilities to export/import geo-referenced stream lines and cross sections data. All cross sections have been checked manually and adjusted to match the design plan sheets.

The HEC-RAS model was run using mixed flow regime with peak flows corresponding to a DSF of 50 years for all reaches with the exception of Reaches R-13 and R-14, which have peak flows values corresponding to the 10-year DSF. The flow data was obtained from HEC-1 results at the corresponding flow nodes.

The results showed that the flow would be contained within the proposed channels' top banks for all reaches. The freeboard criteria was met or exceeded in all of the reaches within the ROW/drainage easements. The velocity in the earthen reaches is equal to or less than 5 feet/sec, however at some locations, the velocity would increase upstream of a drop structure due to flow acceleration. This issue has been resolved by applying the appropriate lining to the drop structures and the surrounding channel as shown on the Final plans and presented in Appendix K.

The HEC-RAS output for the water surface profile, cross sections and summary tables are provided in Appendix H.

12. COST OF CONSTRUCTION

A construction cost estimate was prepared for the UCW drainage improvements project. The estimate was developed for each branch of the UCW separately in order to allow COS to manage the construction in concert with what funds are available through the budgeting process. Table 6 shows a summary of the construction and the landscape/irrigation costs. A detailed cost estimate is included as Appendix I.

Table 6 – Construction Cost Estimate at the 100% Design Level

CHANNEL SEGMENT	COST
Main Channel – Construction	**$5,030,903.93**
92nd Street Channel – Construction	**$2,892,769.18**
TOTAL	**$7,923,673.11**
Main Channel - Landscape and Irrigation	
Landscape	**$372,392.25**
92nd Street Channel - Landscape and Irrigation	
Landscape	**$129,976.45**
TOTAL	**$502,368.70**
GRAND TOTAL	**$8,426,041.81**

Appendix A

Utility Conflict/Potholing
Summary Table

Station	Location	Utility	Elev	From	Elev	from	Conflict	Quarter Section Map	As Built	Stantec	Primatech/ Steel
	Larkspur Drive	E					Potential conflict			x	
9+91.21	Shea Boulevard	S 21"					N/A	x	x	x	x
10+02.28	Shea Boulevard	W 24"					N/A	x	x	x	x
10+54.61	Shea Boulevard	T					N/A		x		
10+58	Shea Boulevard	CTVT					N/A				x
10+59.56	Shea Boulevard	T					N/A		x		
10+61.97	About 63.62 feet on left align.to Shea Boulevard	Pole	1371.11								x
11+60.26	Right channel	ELVT					N/A				x
17+63.85	Right channel	ELCA					N/A				x
19+65.66	About 63.62 feet on right align.to 92nd Street	Pole	1376.45								x
19+94.93	92nd Street	W 8"	1364				Potential conflict	x	x	x	x
20+34.37	92nd Street	S 10"	1362.88	1/4	1375.58	Stantec	N/A	x	x	x	x
20+80.08	92nd Street	G								x	
20+85.95	92nd Street	E								x	
21+00 to 26+50	Left bank of hannel next to 92nd Street	G									
21+00 to 26+50	Left bank of hannel next to 92nd Street	E									
22+17.98 to 23+82.74	About 45 feet form align. on right bank	E								x	
23+79.39	92nd Street and E Desert Cove Ave	W								x	
23+82.74	92nd Street and E Desert Cove Ave	E								x	
23+96.85	About 38.8 feet form align. on right bank	Pole	1377.1								x
24+52.30	About 41.2 feet form align. on left bank	ELVT									x
26+00 to 34+00	About 9.4 feet form align. on right bank	CATV					Potential conflict			x	
26+06.40	About 39.14 feet form align. on right bank	Pole	check elev								x
36+24.41 to 40+50	Channel	CATV					Potential conflict			x	
42+00 to 46+50	New trail	CATV					Potential conflict			x	
43+00 to 45+00	Cholla Basin 3	CATV					Potential conflict			x	
43+00 to 45+00	Cholla Basin 3	T					Potential conflict			x	
43+00 to 45+00	Cholla Basin 3	W					Potential conflict			x	
45+52.31	Channel	T					Potential conflict			x	
45+82.63	Channel	CATV					Potential conflict			x	
45+98.51	Channel	W					Potential conflict	x		x	

46+00 to 48+80	Next to ROW on the right side of alignment	CATV					N/A			x	
48+80.65	Cholla Street	SD 18"	1385				Potential conflict		x	x	
49+44.38	About 29 feet from align. on left side	Pole	1391.08				Potential conflict				x
49+46.18	Cholla Street	E					Potential conflict			x	
49+50	South of Cholla Basin 1	E					N/A			x	
49+50	South of Cholla Basin 1	W					N/A			x	
49+52.28	Cholla Street	E					Potential conflict			x	
49+52.28	Cholla Street	W 8"					Potential conflict	x	x	x	
50+27.74	Cholla Street and 94th Street	W 8"					Potential conflict	x	x	x	
51+00 to 62+00	New trail next to 94th Way	W 8"						x		x	
61+94.99	Poinsettia	E					Potential conflict			x	
61+96.01	Poinsettia	T					Potential conflict			x	
61+97.05	Poinsettia	E					Potential conflict			x	
61+99.11	Poinsettia	CATV					Potential conflict			x	
62+15.44	Poinsettia	S 8"	1390.4	As Built			Potential conflict	x	x	x	
62+59.43	Poinsettia	W 12"					Potential conflict	x	x	x	
63+00 to 74+50	New trail next to 94th Way	W 8"					Potential conflict	x	x	x	
75+97.83	Cactus Road	W 8"					Potential conflict	x		x	
76+05.30	Cactus Road	E					Potential conflict			x	
76+64.60	Cactus Road	CATV					Potential conflict			x	
76+66.92	Cactus Road	S 8" (As Built), 24" (1/4)					Potential conflict	x	x	x	
76+74.61	Cactus Road	T					Potential conflict		x	x	
76+81.07	Cactus Road	W 16"	1395.2				Potential conflict	x	x	x	
76+83.32	Cactus Road	T					Potential conflict			x	
76+88.48	Cactus Road	CATV					Potential conflict		x	x	
80+33.25 to 82+00	On left bank of channel	CATV					N/A			x	
80+33.25 to 82+00	On left bank of channel	E					N/A			x	
83+60.58	Charter Oak Drive	W 6"					Potential conflict	x	x	x	
83+65+00 to 88+00	29.6 feet from alignment on right channel	T					N/A			x	
90+60 ?	Larkspur Drive	SD 15"	1412.85	1/4							
91+05.26	Larkspur Drive	S 8"	1408.51(140	1/4	1416.29	1/4	Potential conflict	x	x	x	
91+26.44	Larkspur Drive (18.75 feet to align. on right side)	Pole	1418.2								x
91+27.87	Larkspur Drive	G					Potential conflict			x	
91+28.86	Larkspur Drive	W 6"					Potential conflict	x	x	x	
91+32.58	Larkspur Drive	CATV								x	
91+34.65	Larkspur Drive	T								x	
105+07.95	Sweetwater Ave	T					Potential conflict			x	
105+62.74	Sweetwater Ave	S 8"	1414.97	1/4			Potential conflict	x	x	x	
105+92.66	Sweetwater Ave	W? 10"					Potential conflict	x	x	x	
105+98.99	Sweetwater Ave	E					Potential conflict			x	

0+00 & 6+00	Left bank of channel next to 92nd Street	CATV					Potential conflict	x		x	
0+00 & 6+00	Left bank of channel next to 92nd Street	E					Potential conflict	x		x	
0+00 & 6+00	Left bank of channel next to 92nd Street	G					Potential conflict	x		x	
0+50 to 2+11.31	Right bank of channel	CATV									
1+72.36	Cross the Channel	S 10"						x		x	
1+81.22	Cross the Channel	W									
4+19.72	92 nd Street & E Gary Rd	G					Potential conflict				
4+32.27	92 nd Street & E Gary Rd	W 8"					Potential conflict	x		x	
4+46.88	92 nd Street & E Gary Rd	CATV					Potential conflict			x	
7+76.11	La Contessa & Channel	SD	1377.4?						x		
10+50 to 11+ 43.09	Cross the Channel	W 6"					Potential conflict	x		x	
11+00	Culv	SD	1381.63?						x		
13+13.92	South of Cholla	W 6"						x		x	
14+50	Cholla Street	SD									
14+73.33	Cholla Street	S 10"	1380.4?	As Built				x	x	x	
15+13.54	Cholla Street	E									
15+18.55	Cholla Street	W 8"						x	x	x	
15+18.70	Cholla Street	E							x	x	
15+24.13	Cholla Street	E								x	
23+32.16	92 nd Street	W 12"						x		x	
North side of basin	Larkspur Basin & 96 Street	CATV					Potential conflict			x	
North side of basin	Larkspur Basin & 96 Street	E					Potential conflict			x	
North side of basin	Larkspur Basin & 96 Street	G					Potential conflict			x	
North side of basin	Larkspur Basin & 96 Street	S 18"					Potential conflict			x	
North side of basin	Larkspur Basin & 96 Street	T					Potential conflict			x	
North side of basin	Larkspur Basin & 96 Street	W 6"					Potential conflict	x		x	
West side of basin	Larkspur Basin & 96 Street	CATV					Potential conflict			x	
West side of basin	Larkspur Basin & 96 Street	E					Potential conflict			x	
West side of basin	Larkspur Basin & 96 Street	S 18"					Potential conflict	x	x	x	
West side of basin	Larkspur Basin & 96 Street	T					Potential conflict			x	
West side of basin	Larkspur Basin & 96 Street	W 12"					Potential conflict	x		x	
	Cactus Road	SD 60"	1399.15	As Built			Potential conflict		x	x	
	Cactus Road	SD 60"	1399.15	As Built			Potential conflict		x	x	

Utility Potholing Summary Table

No.	Name	Type	Top	Bottom	Northing	Easting	Elev.	No.of Pipes	Composition	Pipe Size	Date/Comments
1	CATV-1	Cable TV	1385.38	1384.72	942108.62	709799.73	1387.88	2	PVC	2"	
2	CATV-11	Cable TV	1374.32	1373.98	941458.09	710421.76	1381.40	1	PVC	3"	
3	CATV-12	Cable TV	1374.54	1374.12	941541.52	710425.80	1380.96	2	PVC	2"	
4	CATV-13	F.O.	1382.25	1381.41	941805.68	710380.78	1386.25	N/A	Slurry	N/A	
5	CATV-15	Cable TV	1415.95	1415.03	946104.34	713077.94	1419.20	3	PVC, Direct Bury Cable	2",1/4"	
6	CATV-16	Cable TV	1423.06	1422.72	947361.00	712301.91	1427.14	2	PVC	2"	
7	CATV-2	Cable TV	1389.89	1389.55	943335.89	712223.23	1392.89	3	PVC	2"	
8	CATV-3	Cable TV	1417.89	1417.64	946104.95	712751.63	1418.56	2	PVC & Direct Bury Cable	2", 1/2"	
9	CATV-4	F.O.	1424.18	1423.84	947370.96	712302.33	1427.01	3	PVC	2"	
10	CATV-5	Cable TV	1423.38	1422.88	947448.06	712297.86	1428.04	2	PVC, Direct Bury Cable	4",1"	
11	CATV-6	F.O.	1391.03	1390.61	942825.34	710464.24	1392.28	N/A	Slurry	N/A	
12	CATV-7	Cable TV	1398.64	1398.39	943845.28	710844.24	1399.47	1	PVC	2"	
13	CATV-8	Cable TV	1372.41	1372.16	940918.52	710422.64	1376.66	1	PVC	3"	
14	CATV-8B	?	1373.83	1373.16	940918.52	710422.64	1376.66	1	PVC	6"	
15	CATV-9	Cable TV	1376.61	1376.36	941170.28	710424.61	1378.61	1	PVC	2"	
16	DRH-5										Dry hole in an attempt to locate private line at crossing 91th north of Cholla
17	DRH-2	DRY HOLE									Dry Hole
18	DRH-3	Electric			947442.66	712299.46	1427.97				Electric line 5' to North of Blue Stake Dry Hole
19	DRH-4	Electric/Telephone									elec line not at b/s marks re called b/s and was marked and located 5ft north of original b/s marks
20	DRH-6	Private Telephone	1387.22	1387.22	942140.55	709693.54	1387.22				center line of 91st north of cholla unable to locate private line running e/w

No.	Name	Type	Top	Bottom	Northing	Easting	Elev.	No.of Pipes	Composition	Pipe Size	Date/Comments
21	E-?	Electric	1415.94	1415.03	946110.03	713079.18	1419.19	3	Direct Bury Cable	1/2"-1/4"	6/2/11--DRH-4 Larkspur & 96th St. Northeast corner
22	E-1	Electric	1382.93	1382.43	942087.72	711843.20	1390.93	2	PVC	4"	
23	E-10	Electric	1377.83	1377.42	941537.92	710425.90	1380.92	1	PVC	5"	
24	E-11	Electric	1385.77	1382.11	941805.64	710379.13	1386.27	N/A	Slurry	N/A	
25	E-12	Electric	1386.40	1385.73	942085.63	710381.11	1388.73	4	PVC	1.25", 2"	
26	E-13	Electric	1380.70	1379.03	942130.92	710398.44	1388.53	2	PVC	5"	Slurry Backfill
27	E-15	Electric									No Blue Stake
28	E-16	Electric	1385.68	1385.02	942797.68	710461.97	1392.68	3	PVC	5" & 2"	
29	E-17	Electric	1393.29	1392.54	943845.28	710894.71	1399.20	3	PVC	2.5"	
30	E-18	Electric	1383.90	1383.65	942156.83	709664.33	1387.98	1	Direct Bury Cable	2"	APS and Private in common
31	E-19	Electric	1382.40	1381.56	942131.95	709697.99	1386.98	2	PVC	5"	
32	E-2	Electric									NO BLUE STAKE MARKINGS N/E
33	E-20	Electric	1382.09	1381.51	942131.53	709739.70	1387.18	2	PVC	5"	
34	E-21	Electric	1386.10	1385.85	942110.45	710168.99	1389.35	1	PVC	2"	
35	E-22	Electric	1385.70	1384.78	942111.00	710296.84	1388.95	2	PVC	2.5"	
36	E-24	Electric	1384.81	1384.06	942144.89	710405.10	1388.72	8	PVC	2"	
37	E-3	Electric	1391.88	1391.63	943349.56	712203.59	1399.05	1	PVC	2"	
38	E-4	Electric	1405.30	1402.55	945088.13	712713.52	1405.80	NA	Slurry	NA	Slurry backfill @ CL of wash
39	E-5	Electric	1409.86	1409.36	946115.83	712752.73	1414.69	2	Direct Bury Cable	1.5"	
40	E-6	Electric	1421.33	1420.50	947445.87	712297.76	1428.00	3	Direct Bury Cable	1",1.5"	
41	E-7	Electric	1372.48	1372.15	940901.66	710423.26	1376.73	1	PVC	4"	
42	E-7B	Electric	1370.84	1367.34	940514.28	710425.81	1370.84	N/A	Slurry	N/A	
43	E-8	Electric	1375.05	1374.71	941186.87	710422.71	1378.88	1	PVC	4"	16' North of BlueStake
44	E-8B	Electric			941175.26	710423.37	1378.77				Dryhole
45	E-9	Electric	1378.36	1378.02	941455.18	710421.85	1381.52	1	PVC	3"	
46	G-1	Gas	1389.78	1389.45	943413.44	712219.22	1398.78	1	Plastic	4"	
47	G-10	Gas	1382.09	1381.84	942095.96	709710.75	1386.84	1	Plastic	2"	
48	G-11	Gas	1411.65	1411.40	945343.89	712779.56	1413.90	1	Plastic	2"	Charton OAK Dr. locate gas line not on plans

No.	Name	Type	Top	Bottom	Northing	Easting	Elev.	No.of Pipes	Composition	Pipe Size	Date/Comments
49	G-2	Gas	1416.58	1416.33	946102.71	712750.42	1418.58	1	Plastic	2"	PLASTIC BLACK GAS MAIN 2" WEST SIDE OF PIPE CROSSING NORTH SIDE OF LARK SPUR
50	G-3	Gas	1380.59	1380.50	941156.35	710408.45	1382.34	1	Plastic	1"	
51	G-4	Gas	1376.64	1376.47	941513.24	710432.23	1381.55	1	Plastic	1"	
52	G-5	Gas	1392.60	1392.26	943851.07	710906.07	1399.51	1	Plastic	2"	
53	G-6	Gas	1384.59	1384.34	942093.81	710030.21	1388.84	1	Steel	2"	
54	G-7	Gas	1415.57	1415.32	946071.23	713085.22	1419.16	1	Plastic	2"	
55	G-8	Gas	-4.33	-4.58				1	Plastic	2"	Gas line running N & S NO SURVEY SHOT
56	G-9	Gas	1381.01	1380.76	942108.65	709720.25	1387.35	1	Plastic	2"	2" Gas not on plans
57	PRV-1	Cable TV	1382.95	1382.70	942156.83	709667.04	1387.70	3	Direct Bury Cable	1/4"	
58	PRV-3	Private Telephone	0.00	0.00							Did not attempt to do this because we could not find the same private line in another location
59	SD-1	Storm Drain	1394.97	1391.97	943553.16	710872.20	1394.97	1	Concrete	30"	
60	SD-2	Storm Drain									No evidence of existing Storm Drain. Location over gas line, not pheasible.
61	SD-3	Storm Drain	1413.48	1409.39	946055.32	713087.28	1418.73	1	Galvanized	66"	Large Diag galv storm drain
62	SL-2	Street Light	-1.58	-1.67				3	Direct Bury	1/2" & 3/4"	
63	SS-08	Sewer	1417.35	1416.52	947410.25	712303.69	1427.35	1	PVC	10"	
64	SS-1	Sewer	1391.92	1390.92	943361.11	712207.46	1398.42	1	Clay	8"	
65	SS-10	Sewer	1379.17	1378.34	942108.06	709976.73	1388.59	1	PVC	8"	
66	SS-11	Sewer	1407.38	1406.63	946072.66	713084.49	1419.22	1	PVC	8"	
67	SS-2	Sewer			941462.16	710422.63	1381.47				Dryhole. After digging 10' looked in MH, no line to the East.
B7	**SS-2B**	**Sewer**	**1374.46**	**1373.71**	**941543.92**	**710425.80**	**1380.96**	**1**	**PVC**	**8"**	Sewer lateral that crosses wash north of SS-2
68	SS-3	Sewer	1376.60	1375.77	941866.00	710374.30	1386.60	1	PVC	10"	

No.	Name	Type	Top	Bottom	Northing	Easting	Elev.	No.of Pipes	Composition	Pipe Size	Date/Comments
69	SS-4	Sewer	1411.14	1410.39	946081.00	712785.65	1417.81	1	PVC	8"	
70	SS-5	Sewer	1393.08	1392.17	943849.30	710847.75	1399.67	1	Clay	8"	
71	SS-6	Sewer	1377.61	1376.61	942099.03	710381.81	1388.94	1	Clay	12"	Elevation from MH @ Intersection
72	SS-7	Sewer	1385.33	1384.50	943004.39	710418.06	1388.16	1	Clay	8"	
73	SS-9	Sewer	1370.13	1369.29	940904.66	710423.30	1376.46	1	PVC	10"	
74	SSMH-1	Sewer	-6.50	-7.25				1	PVC	8"	
75	SSMH-2	Sewer	-10.33	-11.17				1	?	8"	Upstream SS-8 page C17.
76	T-1	Telephone									No Blue Stake
77	T-10	Telephone	1386.11	1385.70	942078.93	710377.03	1388.61	1	PVC	4"	
78	T-11	Telephone	1394.25	1392.75	943853.38	710908.26	1399.42	2	PVC	4"	
79	T-12	Telephone	1383.38	1382.97	942108.39	709726.70	1387.47	1	PVC	4"	
80	T-13	Telephone	1383.37	1382.95	942108.45	709725.22	1387.45	1	PVC	4"	
81	T-14	Telephone	1417.78	1417.62	946103.65	713078.20	1419.28	3	Direct Bury Cable	1/2" 1/4"	
82	T-15	Telephone	1424.49	1424.07	947424.40	712302.78	1427.49	1	PVC	4"	Marked 1800 pair
83	T-16	Telephone	1384.57	1384.32	942156.83	709664.33	1387.98	1	Direct Bury Cable	2"	No Survey and some questions in your description
84	T-17	F.O.	1384.33	1383.16	942146.74	709694.51	1387.33	1	PVC	4"	
85	T-18	Telephone	1383.99	1383.74	942146.14	709692.11	1387.33	1	Cable	2"	
86	T-3	Telephone	1390.42	1389.75	943340.94	712226.20	1392.92	1	PVC	6"	
87	T-4	Telephone	1410.84	1410.59	946112.67	712752.90	1414.59	1	Direct Bury Cable	1.5"	
88	T-5	Telephone	1423.00	1422.83	947355.13	712301.84	1426.83	1	Direct Bury Cable	1.5"	
89	T-6	Telephone	1423.37	1422.87	947446.88	712297.86	1428.04	1	PVC	2"	
90	T-7	NO LINES PER B/S									No Blue Stake
91	T-8	Telephone	1381.01	1380.59	941113.86	710409.99	1381.67	1	PVC	4"	90 degree bend, pipe goes South and East
92	T-9	Telephone	1375.44	1375.10	941535.69	710425.20	1380.94	1	Direct Bury Cable	2"	
93	TS-1	Traffic Signal	1385.51	1385.17	942068.23	710373.17	1388.51	1	PVC	2.5"	
94	W-1	Water	1369.48	1368.98	940528.57	710423.85	1369.48	1	Ductile	6"	Top even with ground (No cover on pipe)
95	W-10	Water	1409.02	1408.27	946103.34	712751.13	1418.60	1	PVC	8"	
96	W-11	Water	1371.30	1370.46	940912.49	710422.93	1376.63	1	AC	8"	
97	W-12	Water	1380.73	1379.90	941858.01	711693.64	1384.90	1	DIP	8"	8' off of Blue Stake
98	W-12B										Dryhole

No.	Name	Type	Top	Bottom	Northing	Easting	Elev.	No.of Pipes	Composition	Pipe Size	Date/Comments
99	W-13	Water	1381.66	1380.91	942146.45	710670.78	1389.25	1	DIP	8"	
A1	W-14	Water	1384.74	1383.91	942806.06	710472.54	1392.74	1	AC	8"	
A2	W-15	Water	1391.74	1390.91	943850.29	710905.19	1399.49	1	AC	8"	
A3	W-16		1420.13	1419.13	947440.71	712299.50	1428.13	1	DIP	10"	
A4	W-17	Water	1405.44	1404.86	945385.33	712808.17	1414.61	1	DIP	6"	
A5	W-18	Water	1415.37	1414.54	946103.03	713078.26	1419.37	1	AC	8"	
A6	W-1B	Water	1369.83	1369.83	940524.43	710422.89	1369.83				Dryhole. Blue Stake off 4'
A7	W-2	Water	1374.65	1373.90	941172.61	710423.42	1378.65	1	AC	8"	BlueStake off 15'. 4 dryholes to locate.
A8	W-2B	Water	1378.44	1377.69	941166.12	710395.18	1382.86	1	AC	8"	Top 45 degree bend to dive pipe under canal
A9	W-3	Water	-	-							no p.h, no water main @ that location. existing watre line runs @ angle (n/s) north of intersection
B1	W-4	Water	1382.88	1382.05	942108.73	709988.99	1388.63	1	Ductile	8"	
B2	W-5	Water	1383.27	1382.52	942111.34	710325.91	1389.19	1	DIP	8"	
B3	W-6	Water	1382.97	1381.97	942148.39	711937.51	1390.97	1	AC	8"	
B4	W-7	Water	1383.35	1382.35	942172.99	711947.43	1391.35	1	AC	8"	
B5	W-8	Water	1392.06	1391.22	943406.51	712214.78	1399.06	1	DIP	8"	
B6	W-9	Water	1383.47	1382.81	942146.44	710406.12	1388.81	1	AC	6"	

Appendix B

Existing Condition Floodplain Delineation for the 100-year storm event

PRIMATECH
ENGINEERS & CONSULTANTS

1295 W. Washington Street, Ste. 115
Tempe, AZ 85281
TEL: (602) 685-9009
FAX: (602) 685 9015
Web: www.primatechengineers.com

UPPER CAMELBACK WASH EXISTING FLOODPLAIN MAP

DATE: 12/09/2008

Appendix C

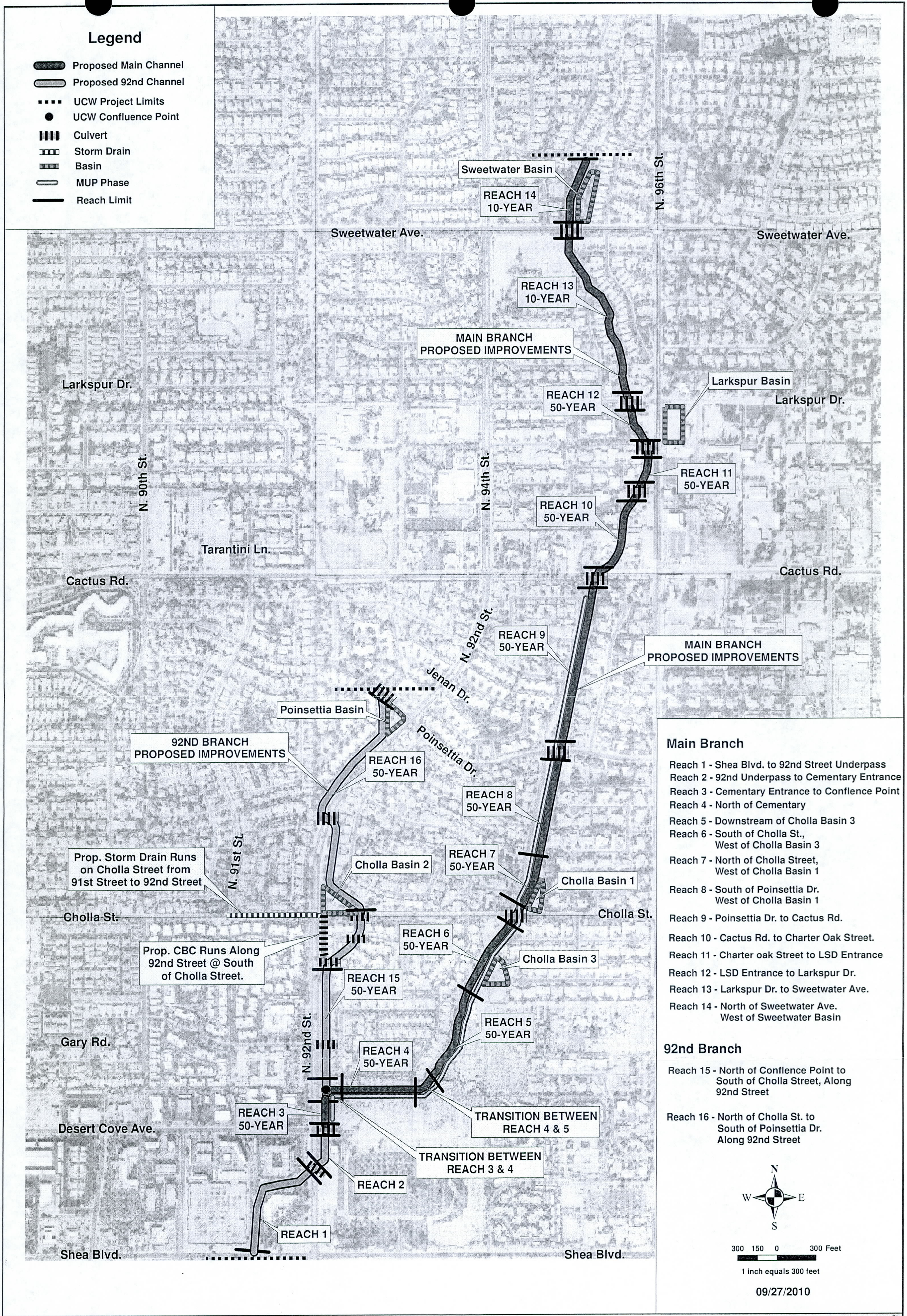
Proposed Channel Reaches and Basins
ID Exhibit

PRIMATECH
ENGINEERS & CONSULTANTS

UPPER CAMELBACK WASH IMPROVEMENTS
PROJECT LOCATION MAP

Appendix D

Designated Design Storm Frequency (DSF)
For the UCW Channel Exhibit



PRIMATECH
ENGINEERS & CONSULTANTS

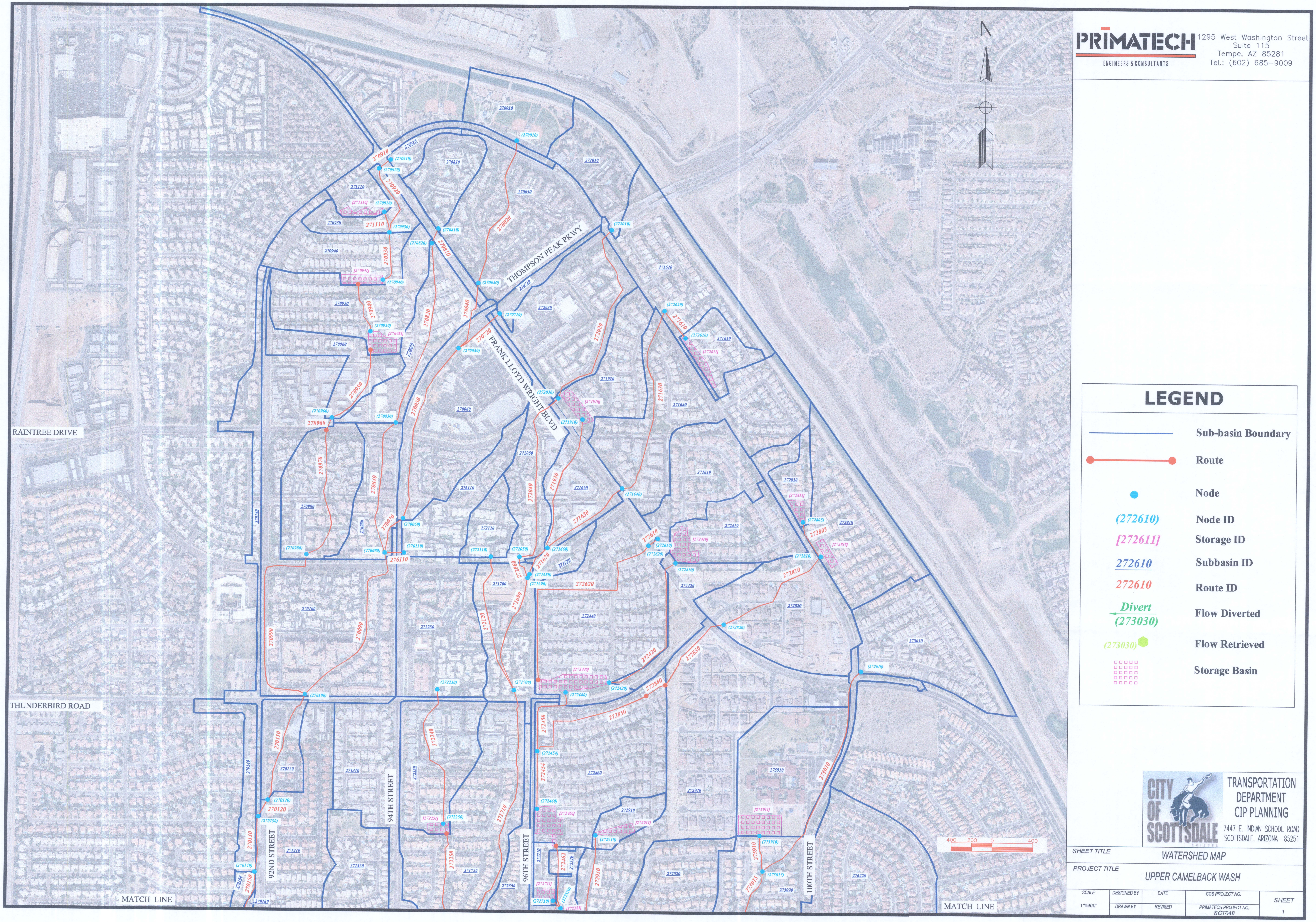
UPPER CAMELBACK WASH IMPROVEMENTS DESIGN STORM FREQUENCY

Flood Control District of Maricopa County

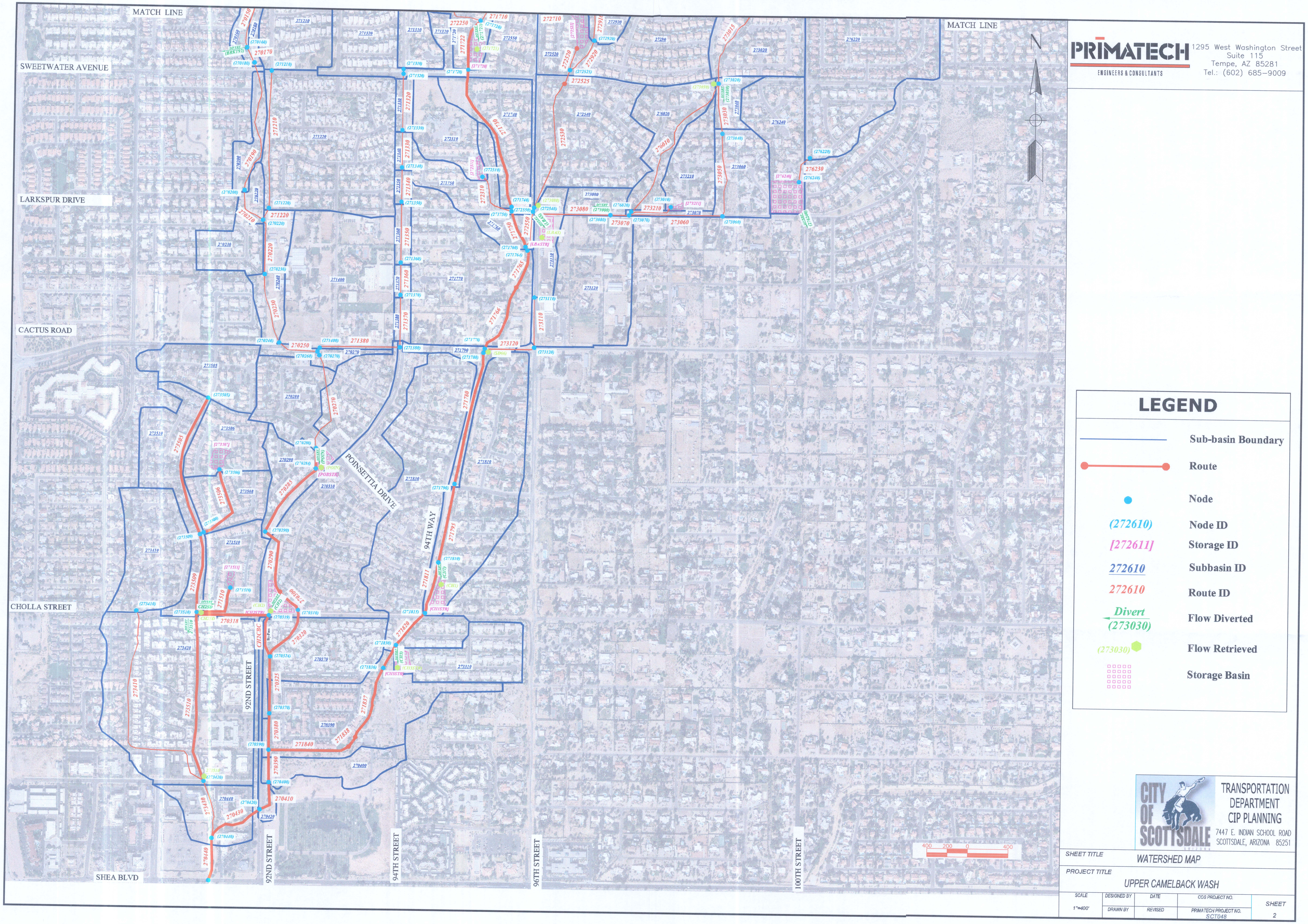
CITY OF SCOTTSDALE

Appendix E

HEC-1 Routing Map



PRIMATECH
ENGINEERS & CONSULTANTS
1295 West Washington Street
Suite 115
Tempe, AZ 85281
Tel.: (602) 685-9009
N
LEGEND
Sub-basin Boundary
Route
Node
(272610) Node ID
[272611] Storage ID
272610 Subbasin ID
272610 Route ID
Divert (273030) Flow Diverted
(273030) Flow Retrieved
Storage Basin
THOMPSON PEAK PKWY
FRANK LLOYD WRIGHT BLVD
RAINTREE DRIVE
THUNDERBIRD ROAD
92ND STREET
94TH STREET
96TH STREET
100TH STREET
MATCH LINE
MATCH LINE
CITY OF SCOTTSDALE
TRANSPORTATION DEPARTMENT
CIP PLANNING
7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251
400 200 0 400
SHEET TITLE
WATERSHED MAP
PROJECT TITLE
UPPER CAMELBACK WASH
SCALE
1"=400'
DESIGNED BY
DRAWN BY
DATE
REVISED
COS PROJECT NO.
PRIMATECH PROJECT NO.
SCT048
SHEET
1



MATCH LINE
SWEETWATER AVENUE
LARKSPUR DRIVE
CACTUS ROAD
POINSETTIA DRIVE
94TH WAY
CHOLLA STREET
92ND STREET
SHEA BLVD
94TH STREET
96TH STREET
100TH STREET
MATCH LINE
PRIMATECH
ENGINEERS & CONSULTANTS
1295 West Washington Street
Suite 115
Tempe, AZ 85281
Tel.: (602) 685-9009
LEGEND
Sub-basin Boundary
Route
Node
(272610)
Node ID
[272611]
Storage ID
272610
Subbasin ID
272610
Route ID
Divert
(273030)
Flow Diverted
(273030)
Flow Retrieved
Storage Basin
CITY OF SCOTTSDALE
TRANSPORTATION DEPARTMENT
CIP PLANNING
7447 E. INDIAN SCHOOL ROAD
SCOTTSDALE, ARIZONA 85251
400 200 0 400
SHEET TITLE
WATERSHED MAP
PROJECT TITLE
UPPER CAMELBACK WASH
SCALE
1"=400'
DESIGNED BY
DRAWN BY
DATE
REVISED
COS PROJECT NO.
PRIMATECH PROJECT NO.
SC7048
SHEET
2

Appendix F

HEC-1 Output File for the UCW
Proposed Condition

```
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   06APR12  TIME  11:24:48   *                *         (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      PROJECT:  Upper Camelback Wash Drainage Improvements
     2        ID      CLIENT:   City of Scottsdale, Municiple Services - CPM
     3        ID                Project #F0203 & T0203
     4        ID      ENGINEER: Primatech Engineers & Consultants
     5        ID      Project #SCT048
     6        ID      Hec-1 Filename:Final UCW2011_PROPOSED_100YR.dat
     7        ID      Date Revised:11/10/2011
     8        ID  -----------------------------------------------------------------------------
     9        ID      Unit Hydrograph: Clark
    10        ID      100 yr-6 hr  return interval using NOAA14 Percipitation
    11        ID      This Hec-1 Model is for the UCW proposed condition and is based on the
    12        ID      existing condition model that was prepared by Primatech in May 2008,
    13        ID      WITH THE FOLLOWING KEY CHANGES:
    14        ID      (1) THE RAINFALL DATA HAS BEEN CHANGED TO NOAA14,
    15        ID      (2) THE BASINS NORTH OF SCOTTSDALE MISSION CONDOS (SMC) HAVE BEEN
    16        ID          REDELINEATED AND SUBDIVIDED TO THREE BASINS, NAMELY, 273505, 273506,
    17        ID          AND 273508 WITH ADJUSTMENTS MADE TO BASINS 273510 AND 271510 AS WELL.
    18        ID      (3) THE PROPOSED SIX BASINS, NAMELY SWEETWATER (SWB), LARKSPUR (LBAS),
    19        ID       CHOLLA #1 (CH1), #2 (CH2)AND #3 (CH3)AND POINSETTIA (POIN)BASINS HAVE
    20        ID       BEEN ADDED TO THEMODEL AS OFFLINE BASINS WITH DIVERSION CARDS &
    21        ID       STORAGE CARDS.
    22        ID      (4) SEVERAL KM CARDS HAVE BEEN ADDED TO THE MODEL FOR CLARIFICATIONS.
    23        ID      (5) CBC BOX CULVERT DS OF CHOLLA BASIN NAMED CH2CBC HAVE BEEN ADDED TO
    24        ID          THE MODEL TO ROUTE THE FLOW OUT OF CH2 BASIN.
    25        ID      (6) SD ALONG BOTH LARKSPUR DR. AND CHOLLA ST HAVE BEEN ADDED TO THE MODEL
    26        ID  -----------------------------------------------------------------------------
              *
    27        IT       1 14NOV11    1200    2000
    28        IN      15
    29        IO       5
              *DIAGRAM
              *
    30        JD   2.723  0.0001
    31        PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
    32        PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
    33        PC   0.962   0.972   0.983   0.991   1.000
    34        JD   2.707  0.5000
    35        PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
    36        PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
    37        PC   0.962   0.972   0.983   0.991   1.000
    38        JD   2.655     2.8
    39        PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.068   0.077
    40        PC   0.088   0.101   0.121   0.164   0.253   0.451   0.694   0.836   0.900   0.938
    41        PC   0.950   0.963   0.975   0.988   1.000
              *

    42        KK  273010   BASIN
    43        KM  This Sub Basin's imprevious value has been updated from 30 to 80, and the
    44        KM  updated value has been verified by field visit and aerial photo.
    45        BA   0.040
    46        LG    0.25    0.29    2.76    1.34      80
    47        UC   0.165   0.097
    48        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
    49        UA     100
              *
1                                             HEC-1 INPUT                                         PAGE  2

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


    50        KK  273010   ROUTE
    51        RD    2261  0.0134   0.016            TRAP   0.100   50.00
              *
```

```
 52     KK  275910    BASIN
 53     BA   0.039
 54     LG    0.18    0.26    3.48    0.92      18
 55     UC   0.225   0.167
 56     UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 57     UA     100
        *

 58     KK  275911 STORAGE
 59     KM   Scottsdale Unified School District No. 48 Aztec Elementary School Detention
 60     KM   Basin at N. 100th St. & N. 102nd St.
 61     RS       1    STOR
 62     SV            0.70    1.40    2.10    2.80    2.81
 63     SQ            1.00    1.00    1.00    1.00  100.00
 64     SE  1452.0 1452.30 1452.50 1452.80 1453.00 1453.10
 65     ST  1453.0   100.0     3.0     1.5
        *

 66     KK  275910   ROUTE
 67     RD     352  0.0057   0.040            TRAP  20.000    4.00
        *

 68     KK  273015 COMBINE
 69     HC       2
        *

 70     KK  273015   ROUTE
 71     RD    1142  0.0142   0.040            TRAP  10.000    3.00
        *

 72     KK  273020   BASIN
 73     BA   0.050
 74     LG    0.25    0.25    3.85    0.62      30
 75     UC   0.266   0.221
 76     UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 77     UA     100
        *

 78     KK  273020 COMBINE
 79     HC       2
        *

 80     KK  273030  DIVERT
 81     KM   This divertion card diverts flow at E. Aster Dr., where is approx. 164'
 82     KM   downstream of E. Sweetwater Ave. & N. 98th Pl. intersection.
 83     DT  273030     0.0     0.0
 84     DI     0.0    50.0    75.0   100.0   125.0   150.0   200.0   250.0     0.0     0.0
 85     DQ     0.0    40.8    57.2    74.4    91.7   108.5   141.0   172.0     0.0     0.0
        *
                                    HEC-1 INPUT                                           PAGE  3

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

 86     KK  273030   ROUTE
 87     RD     437  0.0046   0.030            TRAP  10.000    3.00
        *

 88     KK  273040   BASIN
 89     BA   0.005
 90     LG    0.30    0.25    4.00    0.56      15
 91     UC   0.131   0.136
 92     UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 93     UA     100
        *

 94     KK  273040 COMBINE
 95     HC       2
        *

 96     KK  273050   ROUTE
 97     RD     818  0.0145   0.040            TRAP  10.000    3.00
        *

 98     KK  276220   BASIN
 99     BA   0.084
100     LG    0.25    0.28    3.11    1.04      30
101     UC   0.324   0.250
102     UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
103     UA     100
        *

104     KK  276230   ROUTE
105     RD     281  0.0237   0.035            TRAP   5.000    3.00
        *

106     KK  276240   BASIN
107     BA   0.022
108     LG    0.31    0.27    4.00    0.54      12
109     UC   0.233   0.220
110     UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
111     UA     100
        *

112     KK  276240 COMBINE
113     HC       2
        *

114     KK  276240 STORAGE
115     KM   Ocotillo Estate Community Detention Basin-Coyote Basin
```

```
 116          KM   at N. 99th Pl & E. Larkspur Dr.
 117          RS      1    STOR
 118          SV         1.83    6.48   14.43   22.41
 119          SQ        50.00   75.00  100.00  150.00
 120          SE  1407.0 1410.00 1415.00 1420.00 1425.00
 121          ST  1425.0   300.0     3.0     1.5
              *
                                       HEC-1 INPUT                                              PAGE  4

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


 122          KK  276240  DIVERT
 123          KM   This diversion card diverts the flow that collected by Coyote Basin,
 124          KM   which is located at NW corner of N. 100th St. & E. Larkspur Dr., to the
 125          KM   channel along the east side of N. 100th St., south of E. Larkspur Dr.
 126          DT  276240     0.0     0.0
 127          DI     0.0    10.0    50.0   100.0   200.0   500.0  1000.0  2000.0  5000.0 10000.0
 128          DQ     0.0    10.0    50.0   100.0   200.0   500.0  1000.0  2000.0  5000.0 10000.0
              *

 129          KK  273060   BASIN
 130          BA   0.016
 131          LG    0.31    0.28    4.55    0.40      11
 132          UC   0.227   0.182
 133          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 134          UA     100
              *

 135          KK  273060 COMBINE
 136          HC       3
              *

 137          KK  273060   ROUTE
 138          RD    1428  0.0086   0.013            CIRC   4.000
              *

 139          KK  273210   BASIN
 140          BA   0.014
 141          LG    0.29    0.25    4.65    0.39      18
 142          UC   0.240   0.276
 143          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 144          UA     100
              *

 145          KK  273211 STORAGE
 146          KM   Encata Community Detention Basin at N. 98th Pl. & E. Larkspur Dr.
 147          RS       1    STOR
 148          SV            0.15    0.32    0.51    0.52
 149          SQ            0.01    0.01    0.01    0.01
 150          SE  1422.0 1423.00 1424.00 1425.00 1426.00
 151          ST  1425.0   110.0     3.0     1.5
              *

 152          KK  273210   ROUTE
 153          RD     455  0.0089   0.030            TRAP   5.000    3.00
              *

 154          KK  273030   RETRIEVE
 155          KM   Retrieve the flow at E. Aster Dr., where is approx. 164 feet downstream of
 156          KM   N. 98th Pl. & E. Sweetwater Ave., and the flow runs through the channel
 157          KM   that located at East side of subdivision boundary of Sweetwater Estates.
 158          DR  273030
              *
1                                      HEC-1 INPUT                                              PAGE  5

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


 159          KK  276010   ROUTE
 160          RD    1569  0.0100   0.040            TRAP   8.000    3.00
              *

 161          KK  276020   BASIN
 162          BA   0.019
 163          LG    0.30    0.25    4.30    0.49      15
 164          UC   0.263   0.298
 165          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 166          UA     100
              *

 167          KK  276020 COMBINE
 168          HC       2
              *

 169          KK  273070   BASIN
 170          BA   0.002
 171          LG    0.10    0.25    4.65    0.46      80
 172          UC   0.218   0.572
 173          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 174          UA     100
              *

 175          KK  273070 COMBINE
 176          HC       4
              *

 177          KK  273070   ROUTE
 178          RD     264  0.0041   0.013            CIRC   6.500
              *
```

```
 179            KK  273080    BASIN
 180            BA   0.006
 181            LG    0.30     0.25     4.00     0.56       15
 182            UC   0.340    0.301
 183            UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 184            UA     100
                *

 185            KK  273080 COMBINE
 186            HC       2
                *

 187            KK  273080    ROUTE
 188            RD     742   0.0020    0.013              TRAP    5.000     3.00
                *

 189            KK  273080   DIVERT
 190            KM   this a dummy diversion card to divert the 273080 route and retrieve later to
 191            KM   combine with route 272530 @ combine node 272540
 192            DT  273080
 193            DI     0.0    100.0    500.0    600.0    800.0   1500.0   2000.0      0.0      0.0      0.0
 194            DQ     0.0    100.0    500.0    600.0    800.0   1500.0   2000.0      0.0      0.0      0.0
                *
1                                              HEC-1 INPUT                                              PAGE  6

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


 195            KK  273110    BASIN
 196            BA   0.009
 197            LG    0.30     0.30     4.00     0.51       15
 198            UC   0.295    0.417
 199            UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 200            UA     100
                *

 201            KK  273110 COMBINE
 202            HC       2
                *

 203            KK  273120    BASIN
 204            BA   0.038
 205            LG    0.29     0.30     4.25     0.47       17
 206            UC   0.393    0.323
 207            UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 208            UA     100
                *

 209            KK  273120 COMBINE
 210            HC       2
                *

 211            KK  273120    ROUTE
 212            RD     518   0.0016    0.013              TRAP    5.000     3.00
                *

 213            KK  272910    BASIN
 214            BA   0.008
 215            LG    0.25     0.25     4.00     0.56       30
 216            UC   0.166    0.183
 217            UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 218            UA     100
                *

 219            KK  272911 STORAGE
 220            KM   Camlot Ranch Community Detention Basin at N. 97th Way & E. Presidio Rd.
 221            RS       1     STOR
 222            SV             0.67     1.33     2.00
 223            SQ             0.01     0.01   100.00
 224            SE  1434.0  1435.00  1436.00  1437.00
 225            ST  1436.0    150.0      3.0      1.5
                *

 226            KK  272910    ROUTE
 227            RD    1013   0.0060    0.030              TRAP   10.000     3.00
                *
1                                              HEC-1 INPUT                                              PAGE  7

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


 228            KK  272920    BASIN
 229            BA   0.086
 230            LG    0.26     0.26     3.85     0.61       27
 231            UC   0.346    0.311
 232            UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 233            UA     100
                *

 234            KK  272920 COMBINE
 235            HC       2
                *

 236            KK  272920    ROUTE
 237            RD     399   0.0153    0.030              TRAP    5.000     3.00
                *

 238            KK  272810    BASIN
 239            BA   0.007
 240            LG    0.25     0.29     2.76     1.34       30
 241            UC   0.222    0.312
```

```
 242            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 243            UA     100
                *

 244            KK  272811 STORAGE
 245            KM   Aviara Community Detention Basin at N. 100th St. & E. Redfield Rd.
 246            RS       1    STOR
 247            SV            0.02    0.13    0.30    0.49    0.71    0.92
 248            SQ                            0.50    2.00    4.50    7.50
 249            SE  1489.4 1489.90 1490.40 1490.90 1491.40 1491.90 1492.40
 250            ST  1492.4   100.0     3.0     1.5
                *

 251            KK  272818   BASIN
 252            BA   0.041
 253            LG    0.25    0.29    2.76    1.34      30
 254            UC   0.246   0.174
 255            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 256            UA     100
                *

 257            KK  272818 STORAGE
 258            KM   Aviara Community Detention Basin at N. 100th St. & E. Redfield Dr.
 259            RS       1    STOR
 260            SV            1.13    2.26    3.39    3.40
 261            SQ                                  200.00
 262            SE  1492.0 1493.00 1494.00 1495.00 1495.10
 263            ST  1495.0   100.0     3.0     1.5
                *
1                                        HEC-1 INPUT                                              PAGE  8

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


 264            KK  272810 COMBINE
 265            HC       2
                *

 266            KK  272810   ROUTE
 267            RD    1584  0.0128   0.030            TRAP  10.000    2.00
                *

 268            KK  272820   BASIN
 269            BA   0.050
 270            LG    0.20    0.29    2.76    1.55      10
 271            UC   0.266   0.145
 272            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 273            UA     100
                *

 274            KK  272820 COMBINE
 275            HC       2
                *

 276            KK  272830   ROUTE
 277            RD     863  0.0550   0.025            TRAP   5.000    3.00
                *

 278            KK  272840   ROUTE
 279            RD     218  0.0480   0.030            TRAP  10.000    3.00
                *

 280            KK  272850   ROUTE
 281            RD    1386  0.0079   0.016            TRAP  10.000    3.00
                *

 282            KK  272410   BASIN
 283            BA   0.024
 284            LG    0.23    0.29    2.76    1.40      26
 285            UC   0.193   0.149
 286            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 287            UA     100
                *

 288            KK  272410 STORAGE
 289            KM   Costa Verde Community Detention Basin at N. 98th Way & E. Redfield Rd.
 290            RS       1    STOR
 291            SV            0.01    0.16    0.49    0.96    1.54    2.21
 292            SQ            4.00   12.30   25.50   39.00   50.40   58.50
 293            SE  1472.0 1472.50 1473.00 1473.50 1474.00 1474.50 1475.50
 294            ST  1475.5   100.0     3.0     1.5
                *
1                                        HEC-1 INPUT                                              PAGE  9

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


 295            KK  272420   ROUTE
 296            RD    1545  0.0032   0.035            TRAP   5.000    3.00
                *

 297            KK  272420   BASIN
 298            BA   0.015
 299            LG    0.25    0.31    3.35    0.84      33
 300            UC   0.233   0.213
 301            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 302            UA     100
                *

 303            KK  272420 COMBINE
 304            HC       2
```

```
                         *

     305                 KK  272610   BASIN
     306                 BA   0.026
     307                 LG    0.25    0.27    3.38    0.85      30
     308                 UC   0.185   0.136
     309                 UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
     310                 UA     100
                         *

     311                 KK  272610   ROUTE
     312                 RD     120  0.0052   0.015            TRAP   5.000    3.00
                         *

     313                 KK  272620   ROUTE
     314                 RD    2289  0.0101   0.030            TRAP   5.000    3.00
                         *

     315                 KK  272440   BASIN
     316                 BA   0.067
     317                 LG    0.25    0.25    4.00    0.56      30
     318                 UC   0.287   0.208
     319                 UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
     320                 UA     100
                         *

     321                 KK  272440 COMBINE
     322                 HC       3
                         *

     323                 KK  272440 STORAGE
     324                 KM   Vista Del Rincon Community Detention Basin at N. 98th St.& E. Thunderbird Rd.
     325                 RS       1    STOR
     326                 SV            1.70    3.60    5.55    7.40    9.25   11.10
     327                 SQ            0.01    0.01   18.00   48.00   90.00  120.00
     328                 SE  1448.0 1449.00 1450.00 1451.00 1452.00 1453.00 1454.00
     329                 ST  1454.0   500.0     3.0     1.5
                         *
1                                            HEC-1 INPUT                                                   PAGE 10

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


     330                 KK  272450   ROUTE
     331                 RD     754  0.0092   0.030            TRAP   5.000    3.00
                         *

     332                 KK  272454 COMBINE
     333                 HC       2
                         *

     334                 KK  272454   ROUTE
     335                 RD     617  0.0138   0.030            TRAP   5.000    3.00
                         *

     336                 KK  272460   BASIN
     337                 BA   0.059
     338                 LG    0.25    0.25    4.00    0.56      30
     339                 UC   0.265   0.205
     340                 UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
     341                 UA     100
                         *

     342                 KK  272460 COMBINE
     343                 HC       2
                         *

     344                 KK  272460 STORAGE
     345                 KM   Camelot Ranch Community Detention Basin at N. 96th St. & E. Voltaire Dr.
     346                 RS       1    STOR
     347                 SV            1.33    2.67    4.00
     348                 SQ            0.01    0.01    0.01
     349                 SE  1436.0 1437.00 1438.00 1439.00
     350                 ST  1438.0   243.0     3.0     1.5
                         *

     351                 KK  272462   ROUTE
     352                 RD     626  0.0072   0.030            TRAP   5.000    3.00
                         *

     353                 KK  272710   BASIN
     354                 BA   0.005
     355                 LG    0.30    0.25    4.00    0.56      15
     356                 UC   0.174   0.200
     357                 UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
     358                 UA     100
                         *

     359                 KK  272711 STORAGE
     360                 KM   Sweetwater Ranch Village Community Detention Basin
     361                 KM   at N. 96th St. & E. Pershing Ave.
     362                 RS       1    STOR
     363                 SV            0.29    0.85    1.54    2.31    2.32
     364                 SQ            0.10    0.10    0.10    0.10   50.00
     365                 SE  1428.0 1429.00 1430.00 1431.00 1432.00 1432.10
     366                 ST  1432.0   100.0     3.0     1.5
                         *
1                                            HEC-1 INPUT                                                   PAGE 11

 LINE                    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 367         KK  272710    ROUTE
 368         RD     111   0.0045   0.030            TRAP   5.000    3.00
             *

 369         KK  272520    BASIN
 370         BA   0.065
 371         LG    0.25     0.25    4.00    0.56      30
 372         UC   0.231    0.153
 373         UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 374         UA     100
             *

 375         KK  272520 COMBINE
 376         HC       3
             *

 377         KK  272521 STORAGE
 378         KM   Sweetwater Ranch Village Community Detention Basin
 379         KM   at N. 96th Way & E. Pershing Ave.
 380         RS       1     STOR
 381         SV             0.45    0.95    1.73    2.80    3.50
 382         SQ             2.40    5.00    6.50    7.00    8.00
 383         SE  1426.0 1427.00 1428.00 1429.00 1430.00 1431.00
 384         ST  1431.0    200.0     3.0     1.5
             *

 385         KK  272520    ROUTE
 386         RD     219   0.0231   0.030            TRAP   5.000    3.00
             *

 387         KK  272525    COMBINE
 388         HC       2
             *

 389         KK  272530    ROUTE
 390         RD    1394   0.0056   0.035            TRAP   5.000    3.00
             *

 391         KK  272540    BASIN
 392         BA   0.041
 393         LG    0.30     0.25    4.00    0.56      15
 394         UC   0.390    0.273
 395         UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 396         UA     100
             *

 397         KK  273080    RETRIEVE
 398         KM   Retrieve Route 203080 flow and combine with Hydrograph of sub basin 272540
 399         KM   and route 272530 @ combine node 272540
 400         DR  273080
             *
                                      HEC-1 INPUT                                                  PAGE 12

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

 401         KK  273081   DIVERT
 402         KM   Divert flow of the 66" SD Capacity
 403         KM   This Divert Card inserted here to reflect the real world condition that when
 404         KM   coming, it would fill the 66" SD Capacity, then the remaining flow would run
 405         KM   Larkspur Dr., till it was intercepted by the Proposed Larspur Basin Weir Stru
 406         DT    SD66
 407         DI     0.0    180.0 10000.0
 408         DQ     0.0    180.0   180.0
             *

 409         KK  272540 COMBINE
 410         HC       3
             *

 411         KK  272550    BASIN
 412         BA   0.024
 413         LG    0.30     0.25    4.00    0.56      15
 414         UC   0.456    0.997
 415         UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 416         UA     100
             *

 417         KK  272550 COMBINE
 418         KM   Inflow for Prop. Larkspur Basin
 419         HC       2
             *

 420         KK  272551   DIVERT
 421         KM   Divert the flow into the Larkspur Retention Basin
 422         DT    LBAS
 423         DI     0.0     35.3    89.7   170.2   251.4   281.5   301.8   310.0
 424         DQ     0.0      0.0    18.6    55.3    94.5   108.1   120.4   124.5
 425         KM   DI -DQ values were extracted from LBAS HEC-RAS Unsteady flow model.
             *

 426         KK  272550    ROUTE
 427         RD     423   0.0035   0.030            TRAP   5.000    3.00
             *

 428         KK  271610    BASIN
 429         BA   0.012
 430         LG    0.25     0.25    4.15    0.53      30
 431         UC   0.142    0.077
 432         UA       0      5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
```

```
 433          UA     100
              *

 434          KK  271611 STORAGE
 435          KM   Scottsdale Horizon Community Detention Basin at N. 100th St. & E. Karen Dr.
 436          RS       1     STOR
 437          SV             0.31     0.83     1.31     1.32
 438          SQ             0.01     0.01     0.01     0.01
 439          SE  1488.0 1489.00 1490.00 1491.00 1492.00
 440          ST  1491.0   485.0     3.0      1.5
              *
1                                       HEC-1 INPUT                                              PAGE 13

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

 441          KK  271610   ROUTE
 442          RD     334  0.0030   0.040             TRAP  20.000     4.00
              *

 443          KK  271620   BASIN
 444          BA   0.040
 445          LG    0.25    0.25    4.10     0.55      30
 446          UC   0.269   0.223
 447          UA       0     5.0    16.0     30.0    65.0    77.0     84.0    90.0    94.0    97.0
 448          UA     100
              *

 449          KK  271620 COMBINE
 450          HC       2
              *

 451          KK  271630   ROUTE
 452          RD    1855  0.0081   0.040             TRAP  20.000     2.00
              *

 453          KK  271640   BASIN
 454          BA   0.059
 455          LG    0.27    0.25    4.10     0.55      26
 456          UC   0.240   0.141
 457          UA       0     5.0    16.0     30.0    65.0    77.0     84.0    90.0    94.0    97.0
 458          UA     100
              *

 459          KK  271640 COMBINE
 460          HC       2
              *

 461          KK  271650   ROUTE
 462          RD     934  0.0098   0.030             TRAP   8.000     3.00
              *

 463          KK  271910   BASIN
 464          BA   0.025
 465          LG    0.24    0.25    4.00     0.58      28
 466          UC   0.235   0.225
 467          UA       0     5.0    16.0     30.0    65.0    77.0     84.0    90.0    94.0    97.0
 468          UA     100
              *

 469          KK  271910 STORAGE
 470          KM   Scottsdale Horizon Community Detention Basin
 471          KM   at N. Frank Lloyed Wright Blvd. & E. Raintree Dr.
 472          RS       1     STOR
 473          SV             0.47     7.43     1.92     2.68     2.69
 474          SQ             0.01     0.01     0.01     0.01     0.01
 475          SE  1476.0 1477.00 1478.00 1479.00 1480.00 1481.00
 476          ST  1480.0   260.0     3.0      1.5
              *
1                                       HEC-1 INPUT                                              PAGE 14

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

 477          KK  271930   ROUTE
 478          RD    1309  0.0106   0.030             TRAP  12.000     2.00
              *

 479          KK  271660   BASIN
 480          BA   0.019
 481          LG    0.25    0.25    4.00     0.56      45
 482          UC   0.362   0.403
 483          UA       0     5.0    16.0     30.0    65.0    77.0     84.0    90.0    94.0    97.0
 484          UA     100
              *

 485          KK  271660 COMBINE
 486          HC       3
              *

 487          KK  271670   ROUTE
 488          RD     345  0.0047   0.040             TRAP   8.000     3.00
              *

 489          KK  271680   BASIN
 490          BA   0.005
 491          LG    0.30    0.25    4.00     0.56      15
 492          UC   0.252   0.360
 493          UA       0     5.0    16.0     30.0    65.0    77.0     84.0    90.0    94.0    97.0
 494          UA     100
              *
```

```
 495      KK  271680 COMBINE
 496      HC       2
          *

 497      KK  272010   BASIN
 498      BA   0.021
 499      LG    0.18    0.25    4.00    0.62      55
 500      UC   0.075   0.022
 501      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 502      UA     100
          *

 503      KK  272020   ROUTE
 504      RD    1535  0.0069   0.030            TRAP   5.000    3.00
          *

 505      KK  272030   BASIN
 506      BA   0.039
 507      LG    0.20    0.25    4.00    0.62      48
 508      UC   0.231   0.186
 509      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 510      UA     100
          *
1                                        HEC-1 INPUT                                        PAGE 15

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

 511      KK  272030 COMBINE
 512      HC       2
          *

 513      KK  272040   ROUTE
 514      RD    1794  0.0082   0.035            TRAP   5.000    3.00
          *

 515      KK  272050   BASIN
 516      BA   0.024
 517      LG    0.25    0.25    4.00    0.56      38
 518      UC   0.284   0.330
 519      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 520      UA     100
          *

 521      KK  272050 COMBINE
 522      HC       2
          *

 523      KK  272060   ROUTE
 524      RD     253  0.0268   0.030            TRAP  20.000    2.00
          *

 525      KK  271690 COMBINE
 526      HC       2
          *

 527      KK  271690   ROUTE
 528      RD    1271  0.0081   0.040            TRAP   5.000    3.00
          *

 529      KK  272110   BASIN
 530      BA   0.010
 531      LG    0.25    0.25    4.00    0.56      45
 532      UC   0.170   0.156
 533      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 534      UA     100
          *

 535      KK  272120   ROUTE
 536      RD    1394  0.0104   0.035            TRAP   5.000    3.00
          *

 537      KK  271700   BASIN
 538      BA   0.027
 539      LG    0.31    0.27    4.00    0.54      12
 540      UC   0.295   0.263
 541      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 542      UA     100
          *
1                                        HEC-1 INPUT                                        PAGE 16

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

 543      KK  271700 COMBINE
 544      HC       3
          *

 545      KK  271710   ROUTE
 546      RD    2379  0.0092   0.040            TRAP   8.000    3.00
          *

 547      KK  272230   BASIN
 548      BA   0.041
 549      LG    0.30    0.25    4.00    0.56      15
 550      UC   0.292   0.222
 551      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 552      UA     100
          *
```

```
 553          KK  272240   ROUTE
 554          RD    1445  0.0115   0.030            TRAP   5.000    3.00
              *

 555          KK  272250   BASIN
 556          BA   0.031
 557          LG    0.25    0.25    4.25    0.50      30
 558          UC   0.246   0.192
 559          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 560          UA     100
              *

 561          KK  272250 COMBINE
 562          HC       2
              *

 563          KK  272251 STORAGE
 564          KM   Enclave at Sweetwater Ranch Community Detention Basin
 565          KM   at N. 94th Pl. & E. Presidio Rd.
 566          RS       1    STOR
 567          SV            0.20    0.45    0.75    1.18    1.19
 568          SQ            1.00    1.00    1.00    1.00    1.00
 569          SE  1433.0 1434.00 1435.00 1436.00 1437.00 1438.00
 570          ST  1437.0   210.0     3.0     1.5
              *

 571          KK  272250   ROUTE
 572          RD    1064  0.0052   0.030            TRAP   8.000    3.00
              *

 573          KK  271720   BASIN
 574          BA   0.058
 575          LG    0.25    0.25    4.00    0.56      30
 576          UC   0.339   0.330
 577          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 578          UA     100
              *
1                                    HEC-1 INPUT                                                PAGE 17

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

 579          KK  271720 COMBINE
 580          KM   Inflow for Prop. Sweetwater Basin
 581          HC       3
              *

 582          KK  271721   DIVERT
 583          KM   The flow diverted to the Sweetwater Retention Basin (SWB)
 584          KM   The flow remaining and continuing south is route 271722.
 585          KM   DI&DQ is Beased on Hec-Ras Unsteady Flow Analysis Rating Curve
 586          DT     SWB
 587          DI     0.0   162.1   328.4   459.9   463.8   565.7
 588          DQ     0.0     0.7    54.7   113.1   116.0   122.1
 589          KM   DI -DQ values were extracted from the 50-year SWB HEC-RAS Unsteady flow model
 590          KM   However the last record in DI-DQ was obtained by multplying the inflow hydrog
 591          KM    for the 50-year by a facror = 1.23 to account for the 100-year peak flow and
 592          KM   insure more accurate HEC-1 interpolation process.
              *

 593          KK  271722   ROUTE
 594          KM   Prop. Reach 14 Trap. Earthen Channel
 595          RK     604  0.0033   0.030            TRAP  10.000    3.00
              *

 596          KK  271721   RETRIEVE
 597          KM   Retrieve the diverted flow TO SWB
 598          DR     SWB
              *

 599          KK  SWBSTR STORAGE
 600          KM   Storage Routing for Sweetwater Basin
 601          KM   Bleeding-off pipe was modeled as 18"dia using its Rating curve
 602          KM   assuming that its Flap gate will open at ELEV = 1426
 603          RS       1    STOR
 604          SV            0.35    0.84    1.47    2.22    3.10
 605          SQ            6.82   11.81   15.25   18.04   20.46
 606          SE  1424.0 1425.00 1426.00 1427.00 1428.00 1429.00
 607          ST  1429.0   115.0     3.0     1.5
              *

 608          KK  271728 COMBINE
 609          HC       2
              *

 610          KK  271730   ROUTE
 611          KM   Prop. Reach 13 Trap. Earthen Channel
 612          RD    1384  0.0040   0.030            TRAP  8.0000    3.00
              *

 613          KK  271740   BASIN
 614          BA   0.023
 615          LG    0.26    0.26    4.00    0.55      27
 616          UC   0.266   0.233
 617          UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 618          UA     100
              *
1                                    HEC-1 INPUT                                                PAGE 18

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

```
619        KK  271740 COMBINE
620        HC       2
           *

621        KK  272310   BASIN
622        BA   0.016
623        LG    0.29    0.29    4.20    0.48      18
624        UC   0.307   0.325
625        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
626        UA     100
           *

627        KK  272311 STORAGE
628        KM   Enclave at Sweetwater Ranch Community Detention Basin
629        KM   at N. 94th Pl. & E. Wood Dr.
630        RS       1    STOR
631        SV            0.24    0.52    0.53
632        SQ            0.01    0.01    0.01
633        SE  1417.0 1418.00 1419.00 1420.00
634        ST  1419.0    92.0     3.0     1.5
           *

635        KK  272310   ROUTE
636        RD     603  0.0017   0.030            TRAP   5.000    3.00
           *

637        KK  271750   BASIN
638        BA   0.013
639        LG    0.25    0.25    4.00    0.56      30
640        UC   0.170   0.113
641        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
642        UA     100
           *

643        KK  271750   COMBINE
644        HC       3
           *

645        KK  271750   ROUTE
646        KM   Prop. Reach 12 Rectangular Concrete Lining Channel.
647        RD   298.0  0.0098   0.013            TRAP    15.0     0.0
           *

648        KK  271760   BASIN
649        BA   0.006
650        LG    0.10    0.25    4.00    0.63      80
651        UC   0.142   0.144
652        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
653        UA     100
           *
```

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

654        KK  271760   COMBINE
655        HC       3
           *

656        KK  272551   RETRIEVE
657        KM   Retrieve the diverted flow to LBAS, i.e., Larkspur detention Basin.
658        DR    LBAS
           *

659        KK  LBASTR   STORAGE
660        KM   Larkspur Retention Basin at the southeast corner of Larkspur Drive and
661        KM   96th Street. The combined flow from the northeast corner of Larkspur
662        KM   Drive and 96th Street has been diverted to this basin.
663        KM   Bleeding-off pipe was modeled as 18"dia using its Rating curve
664        KM   assuming that its Flap gate will open at ELEV = 1411
665        RS       1    STOR
666        SV            0.56    1.49    2.64    3.93    5.37    6.95
667        SQ       0    6.82   11.81   15.25   18.04   20.46   22.62
668        SE  1408.0 1409.00 1410.00 1411.00 1412.00 1413.00 1414.00
669        ST  1414.0   200.0     3.0     1.5
           *

670        KK  271764   COMBINE
671        KM   Combine the flow just north of the Church entry road off 96th Street.
672        KM   271760, with the outflow from the Larkspur Retention Basin, 271763.
673        HC       2
           *

674        KK  271765   ROUTE
675        KM   Prop. Reach 11 Rectangular Concrete Lining Channel.
676        RD     334  0.0099   0.013            TRAP    15.0     0.0
           *

677        KK  271766   ROUTE
678        KM   Prop. Reach 10 Rectangular Concrete Lining Channel.
679        RD     577  0.0085   0.013            TRAP    15.0     0.0
           *

680        KK  271770   BASIN
681        BA   0.053
682        LG    0.32    0.28    4.25    0.48      11
683        UC   0.355   0.258
684        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
685        UA     100
           *
```

```
 686            KK  271770   COMBINE
 687            HC       2
                *
1                                      HEC-1 INPUT                                           PAGE 20

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

 688            KK  272540   RETRIEVE
 689            KM   Retrieve the flow that is from 2x66" stormdrain pipes with the outlet at east
 690            KM   side wall of Cactus Bridge on UCW Main Branch.
 691            DR    SD66
                *

 692            KK  271780   COMBINE
 693            HC       3
                *

 694            KK  271780   ROUTE
 695            KM   Prop. Reach 9 Trap. Earthen Channel.
 696            RD    1173  0.0022   0.030            Trap    15.0    3.00
                *

 697            KK  271790   BASIN
 698            BA   0.008
 699            LG    0.10    0.25    4.25    0.60      80
 700            UC   0.318   0.750
 701            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 702            UA     100
                *

 703            KK  271790   COMBINE
 704            HC       2
                *

 705            KK  271795   ROUTE
 706            KM   Prop. Reach 8 Trap. Earthen Channel.
 707            RD     233  0.0020   0.030            TRAP    15.0    3.00
                *

 708            KK  271810   BASIN
 709            BA   0.049
 710            LG    0.30    0.25    4.55    0.42      15
 711            UC   0.402   0.445
 712            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 713            UA     100
                *

 714            KK  271810   COMBINE
 715            HC       2
                *

 716            KK  271810   DIVERT
 717            KM   Offline Cholla Basin #1 Diversion
 718            DT     CH1
 719            DI     0.0      97     194     291     382     485     541     650
 720            DQ     0.0       0       0       7    18.4    47.9    65.8     102
 721            KM   DI-DQ values extracted from the HEC-RAS Steady flow model
 722            KM   "UCW Final_Weirs Rating curves" Plan.
                *
1                                      HEC-1 INPUT                                           PAGE 21

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

 723            KK  271811   ROUTE
 724            KM   Prop. Reach 7 Trap. Earthen Channel.
 725            RD     941  0.0020   0.030            TRAP    15.0    3.00
                *

 726            KK  271812   RETRIEVE
 727            KM   Retrieve flow that diverted into CH1 to have a storage routing
 728            DR     CH1
                *

 729            KK  CH1STR   STORAGE
 730            RS       1    STOR
 731            SV            0.36    0.82    1.39    2.06    2.84
 732            SQ            6.82   11.81   15.25   18.04   20.46
 733            SE  1387.0 1388.00 1389.00 1390.00 1391.00 1392.00
 734            ST  1392.0      50     3.0     1.5
                *

 735            KK  271815   COMBINE
 736            HC       2
                *

 737            KK  271820   ROUTE
 738            KM   Prop. Reach 6 Trap. Earthen Channel.
 739            RD     301  0.0020   0.030            TRAP  10.000    3.00
                *

 740            KK  271830   BASIN
 741            BA   0.063
 742            LG    0.25    0.25    4.60    0.40      30
 743            UC   0.380   0.384
 744            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 745            UA     100
                *
```

```
 746          KK  273310   BASIN
 747          BA   0.020
 748          LG    0.30     0.25     4.70     0.37       15
 749          UC   0.351    0.344
 750          UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 751          UA     100
              *

 752          KK  271830  COMBINE
 753          KM   Inflow of Prop. Cholla Basin #3
 754          HC       3
              *

 755          KK  271831   DIVERT
 756          KM   Offline Cholla Basin #3  Diversion
 757          DT     CH3
 758          DI     0.0       97      194      291      382      485      606      800
 759          DQ     0.0      0.0      0.0      0.0      7.0     38.6     84.5    167.1
 760          KM   DI-DQ values extracted from the HEC-RAS Steady flow model
```

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

 761          KM   "UCW Final_Weirs Rating curves" Plan.
              *

 762          KK  271832   RETRIEVE
 763          KM   Retrieve flow that diverted into CH3
 764          DR     CH3
              *

 765          KK  CH3STR STORAGE
 766          RS       1     STOR
 767          SV             0.53     1.14     1.84     2.63     3.51
 768          SQ             6.82    11.81    15.25    18.04    20.46
 769          SE  1382.0 1383.00 1384.00 1385.00 1386.00 1387.00
 770          ST  1387.0       50      3.0      1.5
              *

 771          KK  271836 COMBINE
 772          KM   Combine the flow that remaining in the main channel and flow
 773          KM   from CH3.
 774          HC       2
              *
              * KK271837   ROUTE
              * KM Prop. Reach 5 Trap. Earthen Channel.
              * RD  1129  0.0020    0.030              TRAP     10.0     3.00
              *

 775          KK  271837   ROUTE
 776          KM   Prop. Reach 5 Trap Earthen Channel Section
 777          RD  921.12  0.0020    0.030              TRAP  10.000     3.00
              *

 778          KK  271838   ROUTE
 779          KM   Prop. Reach 5 Trap. Riprap Channel
 780          RD  193.86  0.0020    0.045              TRAP  10.000     3.00
              *
              * KK271839   ROUTE
              * KM Prop. Reach 5 Trap Concrete Channel
              * RD118.81  0.0050    0.013              TRAP  10.000     3.00
 781          KM   This concrete section was masked out because it is too short
 782          KM   and steep to be modeled and converged by Hec-1.
              *

 783          KK  271840   ROUTE
 784          KM   Prop. Reach 4 Irregular Concrete Lining Channel
 785          RS       1     FLOW
 786          RC   0.013    0.013    0.013      795   0.0050   1382.1
 787          RX   97.00    97.00    98.00   100.00   103.00   109.00   119.00   119.10
 788          RY  1382.1 1377.10 1377.10 1377.10 1377.10 1379.10 1379.10 1382.10
              *
```

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

 789          KK  270010   BASIN
 790          BA   0.021
 791          LG    0.10     0.26     3.50     0.93       80
 792          UC   0.156    0.098
 793          UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 794          UA     100
              *

 795          KK  270020   ROUTE
 796          RD    1498  0.0073    0.035              TRAP   5.000     3.00
              *

 797          KK  270030   BASIN
 798          BA   0.051
 799          LG    0.25     0.25     4.10     0.55       30
 800          UC   0.228    0.137
 801          UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 802          UA     100
              *

 803          KK  270030 COMBINE
 804          HC       2
              *
```

```
 805          KK  270040   ROUTE
 806          RD     698  0.0057    0.016           TRAP  12.000     2.00
              *

 807          KK  270710   BASIN
 808          BA   0.005
 809          LG    0.10    0.25     4.00     0.67      80
 810          UC   0.220   0.465
 811          UA       0     5.0     16.0     30.0    65.0    77.0     84.0     90.0     94.0     97.0
 812          UA     100
              *

 813          KK  270720   ROUTE
 814          RD     410  0.0224    0.030           TRAP   5.000     2.00
              *

 815          KK  270050 COMBINE
 816          HC       2
              *

 817          KK  270050   ROUTE
 818          RD    1793  0.0098    0.040           TRAP  20.000     2.00
              *

 819          KK  270060   BASIN
 820          BA   0.055
 821          LG    0.16    0.25     4.00     0.63      60
 822          UC   0.290   0.249
 823          UA       0     5.0     16.0     30.0    65.0    77.0     84.0     90.0     94.0     97.0
 824          UA     100
              *
1                                        HEC-1 INPUT                                                PAGE 24

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

 825          KK  270060 COMBINE
 826          HC       2
              *

 827          KK  270070   ROUTE
 828          RD     407  0.0156    0.040           TRAP   8.000     2.00
              *

 829          KK  270810   BASIN
 830          BA   0.016
 831          LG    0.25    0.27     3.40     0.84      30
 832          UC   0.198   0.172
 833          UA       0     5.0     16.0     30.0    65.0    77.0     84.0     90.0     94.0     97.0
 834          UA     100
              *

 835          KK  270810   ROUTE
 836          RD     158  0.0007    0.013           TRAP   5.000     3.00
              *

 837          KK  270820   ROUTE
 838          RD    1817  0.0094    0.040           TRAP  10.000     2.00
              *

 839          KK  270830   BASIN
 840          BA   0.026
 841          LG    0.28    0.29     3.55     0.70      20
 842          UC   0.317   0.333
 843          UA       0     5.0     16.0     30.0    65.0    77.0     84.0     90.0     94.0     97.0
 844          UA     100
              *

 845          KK  270830 COMBINE
 846          HC       2
              *

 847          KK  270840   ROUTE
 848          RD    1417  0.0123    0.030           TRAP   8.000     2.00
              *

 849          KK  276110   BASIN
 850          BA   0.020
 851          LG    0.25    0.25     4.00     0.56      38
 852          UC   0.285   0.361
 853          UA       0     5.0     16.0     30.0    65.0    77.0     84.0     90.0     94.0     97.0
 854          UA     100
              *

 855          KK  276110   ROUTE
 856          RD     191  0.0106    0.013           CIRC   1.500
              *
1                                        HEC-1 INPUT                                                PAGE 25

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

 857          KK  270080   BASIN
 858          BA   0.020
 859          LG    0.25    0.25     4.00     0.56      45
 860          UC   0.258   0.252
 861          UA       0     5.0     16.0     30.0    65.0    77.0     84.0     90.0     94.0     97.0
 862          UA     100
              *

 863          KK  270080 COMBINE
```

```
HC      4
*

KK  270090   ROUTE
RD    1691  0.0065    0.040              TRAP   8.000     3.00
*

KK  270910   BASIN
BA   0.004
LG    0.25    0.27     3.40     0.84       30
UC   0.180   0.251
UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
UA     100
*

KK  270910   ROUTE
KM   This route was changed from CIRC 1.5 to TRAP 10x3 for a stability issue
RD     150  0.0349    0.013              TRAP  10.000     3.00
*

KK  270920   ROUTE
RD     715  0.0084    0.040              TRAP   8.000     3.00
*

KK  271110   BASIN
BA   0.022
LG    0.13    0.28     3.01     1.29       70
UC   0.129   0.053
UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
UA     100
*

KK  271111 STORAGE
KM   Desert Sage Two Community Detention Basin
KM   at N. 93rd St. & E. Caribbean Ln.
RS       1    STOR
SV            0.39     0.82     1.29     1.80     2.35     2.94     3.57     3.58
SQ            0.01     0.01     0.01     0.01     0.01     0.01     0.01     0.01
SE  1484.0 1485.00 1486.00 1487.00 1488.00 1489.00 1490.00 1491.00 1492.00
ST  1491.0   325.0      3.0      1.5
*
```

1   HEC-1 INPUT   PAGE 26

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

KK  271110   ROUTE
RD     205  0.0005    0.030              TRAP   8.000     3.00
*

KK  270930   BASIN
BA   0.010
LG    0.25    0.25     3.81     0.63       30
UC   0.208   0.185
UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
UA     100
*

KK  270930 COMBINE
HC       3
*

KK  270930   ROUTE
RD     505  0.0178    0.030              TRAP   8.000     3.00
*

KK  270940   BASIN
BA   0.023
LG    0.25    0.25     3.81     0.63       30
UC   0.204   0.138
UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
UA     100
*

KK  270940 COMBINE
HC       2
*

KK  270941 STORAGE
KM   Desert Shadow I Community Detention Basin at N. 93rd Way & E. Blanche Dr.
RS       1    STOR
SV            0.58     1.25     1.95     1.96
SQ            0.01     0.01     0.01     0.01
SE  1480.0 1481.00 1482.00 1483.00 1484.00
ST  1483.0   360.0      3.0      1.5
*

KK  270940   ROUTE
RD     525  0.0133    0.030              TRAP   8.000     3.00
*

KK  270950   BASIN
BA   0.034
LG    0.25    0.26     3.67     0.69       30
UC   0.210   0.149
UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
UA     100
*
```

1   HEC-1 INPUT   PAGE 27

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

```
 927        KK  270950 COMBINE
 928        HC       2
            *

 929        KK  270951 STORAGE
 930        KM   Montage Community Detention Basin at N. 93rd Way & E. Hillery Way
 931        RS       1    STOR
 932        SV            0.46    1.07    1.80    2.66    3.90    6.81
 933        SQ            0.01    0.01    0.01    0.01    0.01    0.01
 934        SE  1472.0 1473.00 1474.00 1475.00 1476.00 1477.00 1478.00
 935        ST  1478.0   290.0     3.0     1.5
            *

 936        KK  270950   ROUTE
 937        RD     815  0.0012   0.020            TRAP   8.000    3.00
            *

 938        KK  270960   BASIN
 939        BA   0.017
 940        LG    0.25    0.25    3.88    0.60      39
 941        UC   0.256   0.192
 942        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 943        UA     100
            *

 944        KK  270960 COMBINE
 945        HC       2
            *

 946        KK  270960   ROUTE
 947        RD     250  0.0076   0.013            CIRC   1.500
            *

 948        KK  270970   ROUTE
 949        RD    1322  0.0083   0.030            TRAP  10.000    3.00
            *

 950        KK  270980   BASIN
 951        BA   0.031
 952        LG    0.25    0.25    3.95    0.58      45
 953        UC   0.238   0.191
 954        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 955        UA     100
            *

 956        KK  270980 COMBINE
 957        HC       2
            *
                                          HEC-1 INPUT                                        PAGE 28

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

 958        KK  270990   ROUTE
 959        RD    1953  0.0060   0.020            TRAP   8.000    3.00
            *

 960        KK  270100   BASIN
 961        BA   0.095
 962        LG    0.25    0.25    3.92    0.59      45
 963        UC   0.389   0.402
 964        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 965        UA     100
            *

 966        KK  270100 COMBINE
 967        HC       3
            *

 968        KK  270110   ROUTE
 969        RD    1123  0.0076   0.040            TRAP  10.000    3.00
            *

 970        KK  270120   BASIN
 971        BA   0.013
 972        LG    0.25    0.25    4.25    0.50      36
 973        UC   0.226   0.232
 974        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 975        UA     100
            *

 976        KK  270120 COMBINE
 977        HC       2
            *

 978        KK  270120   ROUTE
 979        RD     220  0.0024   0.015            TRAP  10.000    0.00
            *

 980        KK  270130   BASIN
 981        BA   0.020
 982        LG    0.10    0.25    3.92    0.71      80
 983        UC   0.624   2.039
 984        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
 985        UA     100
            *

 986        KK  270130 COMBINE
 987        HC       2
```

```
                   *

  988              KK  270130   ROUTE
  989              RD     538  0.0009    0.040              TRAP  10.000     3.00
                   *
1                                               HEC-1 INPUT                                              PAGE 29

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


  990              KK  270140   BASIN
  991              BA   0.011
  992              LG    0.25    0.25     4.40     0.46       30
  993              UC   0.283   0.467
  994              UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
  995              UA     100
                   *

  996              KK  270140 COMBINE
  997              HC       2
                   *

  998              KK  270150   ROUTE
  999              RD     783  0.0097    0.040              TRAP  10.000     3.00
                   *

 1000              KK  270160   BASIN
 1001              BA   0.004
 1002              LG    0.15    0.25     4.65     0.48        9
 1003              UC   0.376   0.604
 1004              UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1005              UA     100
                   *

 1006              KK  270160 COMBINE
 1007              HC       2
                   *

 1008              KK  270170  DIVERT
 1009              KM  This diversion card diverts flow to the west to simulate the breakout
 1010              KM  flow runs west on E. Wood Dr. & N. 91st Pl.
 1011              DT  BRKT92
 1012              DI     0.0   200.0    350.0    500.0    700.0    800.0      0.0      0.0      0.0      0.0
 1013              DQ     0.0     0.0      1.7    104.1    237.0    265.8      0.0      0.0      0.0      0.0
                   *

 1014              KK  270170   ROUTE
 1015              RD     176  0.0056    0.035              TRAP  10.000     3.00
                   *

 1016              KK  270180   BASIN
 1017              BA   0.003
 1018              LG    0.25    0.25     3.92     0.59       30
 1019              UC   0.215   0.403
 1020              UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1021              UA     100
                   *

 1022              KK  270180 COMBINE
 1023              HC       2
                   *
1                                               HEC-1 INPUT                                              PAGE 30

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


 1024              KK  270190   ROUTE
 1025              RD    1305  0.0069    0.040              TRAP  10.000     3.00
                   *

 1026              KK  270200   BASIN
 1027              BA   0.007
 1028              LG    0.10    0.25     3.92     0.77        5
 1029              UC   0.281   0.455
 1030              UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1031              UA     100
                   *

 1032              KK  270200 COMBINE
 1033              HC       2
                   *

 1034              KK  270210   ROUTE
 1035              RD     305  0.0033    0.040              TRAP   8.000     3.00
                   *

 1036              KK  271210   BASIN
 1037              BA   0.052
 1038              LG    0.25    0.25     4.45     0.45       30
 1039              UC   0.341   0.352
 1040              UA       0     5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1041              UA     100
                   *

 1042              KK  271210   ROUTE
 1043              RD    1358  0.0074    0.040              TRAP   8.000     3.00
                   *

 1044              KK  271220   BASIN
 1045              BA   0.061
 1046              LG    0.25    0.25     4.65     0.39       30
```

```
1047        UC   0.327   0.222
1048        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1049        UA     100
            *

1050        KK  271220 COMBINE
1051        HC       2
            *

1052        KK  271220   ROUTE
1053        RD     173  0.0070   0.030            TRAP  10.000    4.00
            *

1054        KK  270220   BASIN
1055        BA   0.004
1056        LG    0.21    0.25    3.92    0.65      21
1057        UC   0.273   0.348
1058        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1059        UA     100
            *
1                                    HEC-1 INPUT                                            PAGE 31

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

1060        KK  270220 COMBINE
1061        HC       3
            *

1062        KK  270220   ROUTE
1063        RD     517  0.0059   0.040            TRAP  10.000    3.00
            *

1064        KK  270230   BASIN
1065        BA   0.010
1066        LG    0.25    0.25    3.92    0.59      30
1067        UC   0.213   0.179
1068        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1069        UA     100
            *

1070        KK  270230 COMBINE
1071        HC       2
            *

1072        KK  270230   ROUTE
1073        RD     708  0.0114   0.040            TRAP  10.000    3.00
            *

1074        KK  270240   BASIN
1075        BA   0.012
1076        LG    0.10    0.25    4.60    0.53       5
1077        UC   0.403   0.554
1078        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1079        UA     100
            *

1080        KK  270240 COMBINE
1081        HC       2
            *

1082        KK  270250   ROUTE
1083        RD     442  0.0042   0.035            TRAP  10.000    3.00
            *

1084        KK  271310   BASIN
1085        BA   0.039
1086        LG    0.25    0.25    4.45    0.45      30
1087        UC   0.332   0.398
1088        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1089        UA     100
            *

1090        KK  271320   BASIN
1091        BA   0.039
1092        LG    0.25    0.25    4.60    0.40      30
1093        UC   0.278   0.228
1094        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1095        UA     100
            *
1                                    HEC-1 INPUT                                            PAGE 32

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

1096        KK  271320 COMBINE
1097        HC       2
            *

1098        KK  271320   ROUTE
1099        RD     643  0.0064   0.016            TRAP   0.100   50.00
            *

1100        KK  271330   BASIN
1101        BA   0.003
1102        LG    0.18    0.25    4.65    0.43      55
1103        UC   0.156   0.221
1104        UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1105        UA     100
            *
```

```
1106            KK  271330 COMBINE
1107            HC       2
                *

1108            KK  271330   ROUTE
1109            RD     363  0.0067   0.016            TRAP   0.100   50.00
                *

1110            KK  271340   BASIN
1111            BA   0.002
1112            LG    0.18    0.25    4.65    0.43      55
1113            UC   0.210   0.300
1114            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1115            UA     100
                *

1116            KK  271340 COMBINE
1117            HC       2
                *

1118            KK  271340   ROUTE
1119            RD     335  0.0061   0.016            TRAP   0.100   50.00
                *

1120            KK  271350   BASIN
1121            BA   0.002
1122            LG    0.18    0.25    4.65    0.43      55
1123            UC   0.147   0.181
1124            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1125            UA     100
                *

1126            KK  271350 COMBINE
1127            HC       2
                *
```

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

1128            KK  271350   ROUTE
1129            RD     591  0.0070   0.016            TRAP   0.100   50.00
                *

1130            KK  271360   BASIN
1131            BA   0.003
1132            LG    0.18    0.25    4.65    0.43      55
1133            UC   0.201   0.292
1134            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1135            UA     100
                *

1136            KK  271360 COMBINE
1137            HC       2
                *

1138            KK  271360   ROUTE
1139            RD     316  0.0038   0.016            TRAP   0.100   50.00
                *

1140            KK  271370   BASIN
1141            BA   0.002
1142            LG    0.18    0.25    4.65    0.43      55
1143            UC   0.152   0.189
1144            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1145            UA     100
                *

1146            KK  271370 COMBINE
1147            HC       2
                *

1148            KK  271370   ROUTE
1149            RD     511  0.0084   0.016            TRAP   0.100   50.00
                *

1150            KK  271380   BASIN
1151            BA   0.003
1152            LG    0.18    0.25    4.65    0.43      55
1153            UC   0.170   0.189
1154            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1155            UA     100
                *

1156            KK  271380 COMBINE
1157            HC       2
                *

1158            KK  271380   ROUTE
1159            RD     778  0.0032   0.016            TRAP   0.100   50.00
                *
```

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

1160            KK  271400   BASIN
1161            BA   0.049
1162            LG    0.13    0.25    4.65    0.49      10
1163            UC   0.350   0.233
1164            UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
```

```
1165            UA      100
                *

1166            KK   271400 COMBINE
1167            HC        2
                *

1168            KK   270260 COMBINE
1169            HC        2
                *

1170            KK   270270   BASIN
1171            BA    0.005
1172            LG     0.25    0.25    4.65    0.39      30
1173            UC    0.158   0.179
1174            UA        0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1175            UA      100
                *

1176            KK   270270 COMBINE
1177            HC        2
                *

1178            KK   270270   ROUTE
1179            RD      976  0.0035   0.040            TRAP  18.000    3.00
                *

1180            KK   270280   BASIN
1181            BA    0.018
1182            LG     0.25    0.25    4.65    0.39      30
1183            UC    0.224   0.199
1184            UA        0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1185            UA      100
                *

1186            KK   270280 COMBINE
1187            KM    Inflow for Prop.Poinsettia Basin
1188            HC        2
                *

1189            KK   270281  DIVERT
1190            KM    Divert flow to the Poinsettia Retention Basin, named POIN.
1191            DT     POIN
1192            DI      0.0   144.0   287.0   431.0   563.0   718.0   898.0
1193            DQ      0.0     0.0     0.0    16.1    58.1   115.0   184.6
1194            KM    DI-DQ values extracted from the HEC-RAS Steady flow model
1195            KM    "UCW Final_Weirs Rating curves" Plan.
                *
```



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

1196            KK   270282 RETIEVE
1197            KM    Retrieve flow that diverted into Poin Basin to have a storage routing
1198            DR     POIN
                *

1199            KK   POBSTR STORAGE
1200            RS        1    STOR
1201            SV             0.11    0.26    0.45    0.70    1.00
1202            SQ             6.82   11.81   15.25   18.04   20.46
1203            SE   1393.0 1394.00 1395.00 1396.00 1397.00 1398.00
1204            ST   1398.0     120     3.0     1.5
                *

1205            KK   270284 COMBINE
1206            HC        2
                *

1207            KK   270285   ROUTE
1208            KM    Prop. Reach 16N Earthen Channel.
1209            RD     1050  0.0022   0.030            TRAP  16.000    3.00
                *

1210            KK   270290   BASIN
1211            BA    0.031
1212            LG     0.25    0.25    4.65    0.39      30
1213            UC    0.325   0.392
1214            UA        0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1215            UA      100
                *

1216            KK   270290 COMBINE
1217            HC        2
                *

1218            KK   270290   ROUTE
1219            KM    Prop. Reach 16S Trap. Earthen Channel.
1220            KM    Inflow for Prop. Cholla Basin #2
1221            RD      592  0.0006   0.030            TRAP    16.0    3.00
                *

1222            KK   270295  DIVERT
1223            KM    Divert flow to the offline Cholla Detention Basin #2, that located at
1224            KM    NE corner of N. 92nd St. & E. Cholla St.
1225            DT      CH2
1226            DI      0.0   144.0   287.0   431.0   563.0   718.0
1227            DQ      0.0     0.0    72.4   170.6   260.7   364.5
1228            KM    DI-DQ values extracted from the HEC-RAS Steady flow model
1229            KM    "UCW Final_Weirs Rating curves" Plan.
```

```
                                 *
1                                                 HEC-1 INPUT                                                    PAGE 36

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

 1230             KK  270300    ROUTE
 1231             KM   Prop. Reach 16S Trap. Earthen Channel.
 1232             KM   Route the remaining flow downstream to combine with flow from Subbasin 270310
 1233             RD      196  0.0006    0.030              TRAP     16.0     3.00
                   *

 1234             KK  270310    BASIN
 1235             BA   0.063
 1236             LG    0.25     0.25     4.65     0.39       45
 1237             UC   0.298    0.285
 1238             UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1239             UA     100
                   *

 1240             KK  270310 COMBINE
 1241             HC       2
                   *

 1242             KK  270320    ROUTE
 1243             KM   Existing channel within Mission Del Arroyos, no improvements are required.
 1244             RS       1     FLOW
 1245             RC   0.050    0.030    0.050      475   0.0009 1390.00
 1246             RX    0.00     4.20    20.50    25.00    37.90    41.00    49.70    50.70
 1247             RY  1384.4 1383.48 1381.33 1381.01 1381.58 1381.77 1384.31 1384.38
                   *

 1248             KK  270296    RETRIEVE
 1249             KM   Retrieve flow that diverted into Cholla Basin #2 to have a storage routing
 1250             DR     CH2
                   *

 1251             KK  CH2STR STORAGE
 1252             RS       1     STOR
 1253             SV             0.19     0.55     0.97     1.44     1.97     2.56     3.22
 1254             SQ                     52.46   118.63   210.75   324.93   456.63   600.00
 1255             SE  1382.00 1383.0 1384.00 1385.00 1386.00 1387.00 1388.00 1389.00
 1256             ST  1389.0      120      3.0      1.5
                   *

 1257             KK  273505    BASIN
 1258             KM   This Subbasin boundary has been delineated as a part of the hydrology study
 1259             KM   of the Scottsdale Mission Condo, SMC, Sept. 2010
 1260             BA   0.022
 1261             LG    0.25     0.25     4.65     0.39       30
 1262             UC   0.271    0.220
 1263             UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1264             UA     100
                   *
1                                                 HEC-1 INPUT                                                    PAGE 37

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

 1265             KK  273505    ROUTE
 1266             KM   This route has been established as a part of the hydrology study
 1267             KM   of the Scottsdale Mission Condo, SMC, Sept. 2010 to route the flow DS along
 1268             KM   the street
 1269             RD     1380  0.0070    0.016              TRAP   30.000     0.00
                   *

 1270             KK  273506    BASIN
 1271             KM   This Subbasin boundary has been delineated as a part of the hydrology study
 1272             KM   of the Scottsdale Mission Condo, SMC, Sept. 2010
 1273             BA   0.017
 1274             LG    0.25     0.25     4.65     0.39       30
 1275             UC   0.241    0.206
 1276             UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1277             UA     100
                   *

 1278             KK  273507 STORAGE
 1279             KM   This is an exisitng basin within the Berryessa Complex and was added to the
 1280             KM   model as a part of the hydrology study of the SMC, Sept. 2010
 1281             RS       1     STOR
 1282             SV             0.16     0.50
 1283             SQ             1.00     1.00
 1284             SE  1394.0 1395.00 1396.00
 1285             ST  1396.0    100.0      3.0      1.5
                   *

 1286             KK  273506    ROUTE
 1287             RD      819  0.0030    0.016              TRAP   26.000     0.00
                   *

 1288             KK  273508    BASIN
 1289             KM   This Subbasin boundary has been delineated as a part of the  hydrology study
 1290             KM   of the Scottsdale Mission Condo, SMC, Sept. 2010
 1291             BA   0.013
 1292             LG    0.25     0.25     4.65     0.39       30
 1293             UC   0.279    0.247
 1294             UA       0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
 1295             UA     100
                   *

 1296             KK  273508 COMBINE
```

```
1297          KM   Combine flows from Subbasin 273508 and RT 273506
1298          HC        2
              *

1299          KK   273509 COMBINE
1300          KM   Combine flows from the combined 273508 and RT 273505
1301          HC        2
              *
                                      HEC-1 INPUT                                         PAGE 38

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


1302          KK   273509    ROUTE
1303          RD      815  0.0069    0.016             TRAP  30.000    0.0
              *

1304          KK   271510    BASIN
1305          BA    0.018
1306          LG     0.25     0.25    4.70     0.37       30
1307          UC    0.309    0.327
1308          UA        0      5.0    16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
1309          UA      100
              *

1310          KK   271511 STORAGE
1311          KM   This is an exisitng basin within the Manzanita Complex and was added to the
1312          KM   model as a part of the hydrology study of the SMC, Sept. 2010
1313          RS        1     STOR
1314          SV              0.14    0.35
1315          SQ              1.00    1.00
1316          SE   1389.0 1390.00 1391.00
1317          ST   1391.0   100.0     3.0      1.5
              *

1318          KK   271510    ROUTE
1319          KM   Route the flows DS along the Street.
1320          RD      450  0.0053    0.016             TRAP    0.10    50.0
              *

1321          KK   273510    BASIN
1322          KM   This Subbasin boundary has been delineated as a part of the  hydrology study
1323          KM   of the Scottsdale Mission Condo, SMC, Sept. 2010
1324          BA    0.024
1325          LG     0.25     0.25    4.65     0.39       30
1326          UC    0.358    0.551
1327          UA        0      5.0    16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
1328          UA      100
              *

1329          KK   273510 COMBINE
1330          HC        3
              *

1331          KK    CH2SD   DIVERT
1332          DT    CH2SD
1333          DI        0      110     139      400
1334          DQ        0      110     139      200
1335          KM   Max capcity of the SD is 200 cfs
              *

1336          KK   273510    ROUTE
1337          RD     1678  0.0088    0.035             TRAP  10.000    3.00
              *
1                                     HEC-1 INPUT                                         PAGE 39

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


1338          KK   273510   DIVERT
1339          KM   Divert all the remaining flow to be retrieved later and combined at 273420
1340          DT   273510
1341          DI        0     1000
1342          DQ        0     1000
              *

1343          KK   CH2SDR   RETRIEVE
1344          KM   Retrieve the diverted storm drain flow to be added to the culvert
1345          DR   CH2SD
              *

1346          KK   270318    ROUTE
1347          KM   Route the retrieved flow through Cholla Basin2 CBC SD along Cholla St.
1348          RD      670 0.00225    0.013             TRAP     8.0     0.0
              *

1349          KK   270319 COMBINE
1350          KM   Combine flows from storage routing at CH2 basin and the storm drain flow then
1351          KM   route them to cholla 2 CBC SD
1352          HC        3
              *

1353          KK   CH2CBC    ROUTE
1354          KM   The proposed Cholla Bypass culvert
1355          RD      465  0.0023    0.013             TRAP     8.0     0.0
              *

1356          KK   270324 COMBINE
1357          HC        2
              *
```

```
1358      KK  270325   ROUTE
1359      KM   Prop. Reach 15N Trap. Earthen Channel.
1360      RD     604  0.0023   0.030             TRAP    11.0    3.00
          *

1361      KK  270370   BASIN
1362      BA   0.026
1363      LG    0.25    0.25    4.65    0.39      45
1364      UC   0.243   0.203
1365      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1366      UA     100
          *

1367      KK  270370 COMBINE
1368      HC       2
          *
```



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

1369      KK  270380   ROUTE
1370      KM   Prop. Reach 15S Trap. Earthen channel.
1371      RD     293  0.0056   0.045             TRAP  12.500    3.00
          *

1372      KK  270390   BASIN
1373      BA   0.043
1374      LG    0.19    0.25    4.65    0.44      29
1375      UC   0.397   0.391
1376      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1377      UA     100
          *

1378      KK  270390 COMBINE
1379      HC       3
          *

1380      KK  270390   ROUTE
1381      KM   Prop. Reach 3 Rectangular Concrete Lining Channel.
1382      RD     292  0.0110   0.013             TRAP  43.500     0.0
          *

1383      KK  270400   BASIN
1384      BA   0.012
1385      LG    0.10    0.25    4.55    0.55       5
1386      UC   0.276   0.399
1387      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1388      UA     100
          *

1389      KK  270400   COMBINE
1390      HC       2
          *

1391      KK  270410   ROUTE
1392      KM   This is Reach 2 Existing Rectangular Concrete Lining Channel
1393      RD     274  0.0049   0.013             TRAP  43.500     0.0
          *

1394      KK  270420   BASIN
1395      BA   0.004
1396      LG    0.10    0.25    4.70    0.45      80
1397      UC   0.719   3.482
1398      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1399      UA     100
          *

1400      KK  270420   COMBINE
1401      HC       2
          *
```



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

1402      KK  270430   ROUTE
1403      RD     574  0.0400   0.030             TRAP  10.000    3.00
          *

1404      KK  273410   BASIN
1405      BA   0.026
1406      LG    0.25    0.25    4.70    0.37      30
1407      UC   0.246   0.199
1408      UA       0     5.0    16.0    30.0    65.0    77.0    84.0    90.0    94.0    97.0
1409      UA     100
          *

1410      KK  273410   ROUTE
1411      RD    2220  0.0075   0.035             TRAP   5.000    3.00
          *

1412      KK  273510   RETRIEVE
1413      KM   Retrieve the diverted flow along RT 273510
1414      DR  273510
          *

1415      KK  273420   BASIN
1416      BA   0.083
1417      LG    0.25    0.25    4.65    0.39      45
1418      UC   0.245   0.132
```

```
      1419          UA        0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
      1420          UA      100
                    *

      1421          KK   273420 COMBINE
      1422          HC        3
                    *

      1423          KK   273430   ROUTE
      1424          RD      568  0.0040    0.035             TRAP    6.000     3.00
                    *

      1425          KK   270440   BASIN
      1426          BA    0.015
      1427          LG     0.25     0.25     4.70     0.37       45
      1428          UC    0.143    0.080
      1429          UA        0      5.0     16.0     30.0     65.0     77.0     84.0     90.0     94.0     97.0
      1430          UA      100
                    *

      1431          KK   270440 COMBINE
      1432          HC        3
                    *
1                                                 HEC-1 INPUT                                                   PAGE 42

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

      1433          KK   270440   ROUTE
      1434          RD      434  0.0010    0.040             TRAP   30.000     4.00
                    *
      1435          ZZ
1
           SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   42      273010
                V
                V
   50      273010
                .
                .
   52           .     275910
                .          V
                .          V
   58           .     275911
                .          V
                .          V
   66           .     275910
                .          .
                .          .
   68      273015............
                V
                V
   70      273015
                .
                .
   72           .     273020
                .          .
                .          .
   78      273020............
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                .
   83           .------->  273030
   80      273030
                V
                V
   86      273030
                .
                .
   88           .     273040
                .          .
                .          .
   94      273040............
                V
                V
   96      273050
                .
                .
   98           .     276220
                .          V
                .          V
  104           .     276230
                .          .
                .          .
  106           .          .     276240
                .          .          .
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  112           .     276240............
                .          V
                .          V
  114           .     276240
                .          .
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  126           .          .------->  276240
  122           .     276240
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129           .            .      273060
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135      273060.........................
              V
              V
137      273060
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139           .       273210
              .            V
              .            V
145           .       273211
              .            V
              .            V
152           .       273210
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158           .            .           .<-------  273030
154           .            .      273030
              .            .           V
              .            .           V
159           .            .      276010
              .            .           .
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161           .            .           .      276020
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167           .            .      276020............
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169           .            .           .      273070
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175      273070.....................................
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              V
177      273070
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179           .       273080
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185      273080.............
              V
              V
187      273080
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192           .------->   273080
189      273080
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195           .       273110
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201      273110.............
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203           .       273120
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209      273120.............
              V
              V
211      273120
              .
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213           .       272910
              .            V
              .            V
219           .       272911
              .            V
              .            V
226           .       272910
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228           .            .      272920
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234           .       272920............
              .            V
              .            V
236           .       272920
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238           .            .      272810
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              .            .           V
244           .            .      272811
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251           .            .           .      272818
              .            .           .           V
              .            .           .           V
257           .            .           .      272818
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264           .            .      272810............
              .            .           V
              .            .           V
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    266            .           .      272810
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    268            .           .           .      272820
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    274            .           .      272820............
                   .           .           V
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    276            .           .      272830
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    336            .           .           .      272460
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    342            .           .      272460............
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400           .           .           .           .<-------  273080
397           .           .           .      273080
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406           .           .           .           .------->    SD66
 01           .           .           .      273081
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409           .      272540........................
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411           .           .      272550
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417           .      272550............
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422           .           .------->    LBAS
420           .      272551
              .           V
              .           V
426           .      272550
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428           .           .      271610
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              .           .           V
434           .           .      271611
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441           .           .      271610
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443           .           .           .      271620
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449           .           .      271620............
              .           .           V
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451           .           .      271630
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453           .           .           .      271640
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459           .           .      271640............
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461           .           .      271650
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485           .           .      271660........................
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495           .           .      271680............
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497           .           .           .      272010
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523           .           .           .      272060
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525           .           .      271690............
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529            .           .            .      272110
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535            .           .            .      272120
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537            .           .            .           .      271700
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543            .           .       271700.........................
               .           .            V
               .           .            V
545            .           .       271710
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547            .           .            .      272230
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               .           .            .           V
553            .           .            .      272240
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555            .           .            .           .      272250
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561            .           .            .      272250.............
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563            .           .            .      272251
               .           .            .           V
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571            .           .            .      272250
               .           .            .           .
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573            .           .            .           .      271720
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579            .           .       271720.........................
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               .           .            .
586            .           .            .------->     SWB
582            .           .       271721
               .           .            V
               .           .            V
593            .           .       271722
               .           .            .
               .           .            .
598            .           .            .           .<-------     SWB
596            .           .            .      271721
               .           .            .           V
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599            .           .            .      SWBSTR
               .           .            .           .
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608            .           .       271728............
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               .           .            V
610            .           .       271730
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613            .           .            .      271740
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619            .           .       271740............
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627            .           .            .      272311
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               .           .            .           V
635            .           .            .      272310
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637            .           .            .           .      271750
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643            .           .       271750.........................
               .           .            V
               .           .            V
645            .           .       271750
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648            .           .            .      271760
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654            .      271760.........................
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658            .           .            .<-------   LBAS
656            .           .       272551
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659            .           .       LBASTR
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670         .      271764............
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674         .      271765
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677         .      271766
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680         .           .      271770
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686         .      271770............
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691         .           .           .<-------     SD66
688         .           .      272540
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692    271780.......................
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694    271780
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697         .      271790
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703    271790............
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            V
705    271795
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708         .      271810
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714    271810............
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718         .------->      CH1
716    271810
            V
            V
723    271811
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728         .           .<-------      CH1
726         .      271812
            .           V
            .           V
729         .      CH1STR
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735    271815............
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737    271820
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746         .           .      273310
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752    271830.......................
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757         .------->      CH3
755    271831
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764         .           .<-------      CH3
762         .      271832
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765         .      CH3STR
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771    271836............
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775    271837
            V
            V
778    271838
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            V
783    271840
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797         .           .      270030
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813           .           .      270720
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815           .      270050............
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829           .           .      270810
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1191            .           .------->     POIN
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1198            .           .           .<-------     POIN
1196            .           .      270282
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1225            .           .------->      CH2
1222            .      270295
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1250            .           .           .<-------      CH2
1248            .           .      270296
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1251            .           .      CH2STR
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1257            .           .           .      273505
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1329            .           .           .      273510........................
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1332            .           .           .           .------->   CH2SD
1331            .           .           .       CH2SD
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1336            .           .           .      273510
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1340            .           .           .           .------->  273510
1338            .           .           .      273510
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1345            .           .           .           .           .<-------    CH2SD
1343            .           .           .           .      CH2SDR
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1346            .           .           .           .      270318
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1349            .           .      270319........................
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1353            .           .      CH2CBC
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1356            .      270324............
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1389       270400............
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                V
1391       270410
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1400       270420............
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1402       270430
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1423            .      273430
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 1425             .              .          270440
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 1431        270440.........................
                  V
                  V
   33        270440

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *            JUN   1998                 *
 *          VERSION 4.1                  *
 *                                       *
 *  RUN DATE   06APR12  TIME  11:24:48   *
 *                                       *
 *****************************************

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


                        PROJECT:  Upper Camelback Wash Drainage Improvements
                        CLIENT:   City of Scottsdale, Municiple Services - CPM
                                  Project #F0203 & T0203
                        ENGINEER: Primatech Engineers & Consultants
                        Project #SCT048
                        Hec-1 Filename:Final UCW2011_PROPOSED_100YR.dat
                        Date Revised:11/10/2011
                    ------------------------------------------------------------------------
                        Unit Hydrograph: Clark
                        100 yr-6 hr  return interval using NOAA14 Percipitation
                        This Hec-1 Model is for the UCW proposed condition and is based on the
                        existing condition model that was prepared by Primatech in May 2008,
                        WITH THE FOLLOWING KEY CHANGES:
                        (1) THE RAINFALL DATA HAS BEEN CHANGED TO NOAA14,
                        (2) THE BASINS NORTH OF SCOTTSDALE MISSION CONDOS (SMC) HAVE BEEN
                            REDELINEATED AND SUBDIVIDED TO THREE BASINS, NAMELY, 273505, 273506,
                            AND 273508 WITH ADJUSTMENTS MADE TO BASINS 273510 AND 271510 AS WELL.
                        (3) THE PROPOSED SIX BASINS, NAMELY SWEETWATER (SWB), LARKSPUR (LBAS),
                            CHOLLA #1 (CH1), #2 (CH2)AND #3 (CH3)AND POINSETTIA (POIN)BASINS HAVE
                            BEEN ADDED TO THEMODEL AS OFFLINE BASINS WITH DIVERSION CARDS &
                            STORAGE CARDS.
                        (4) SEVERAL KM CARDS HAVE BEEN ADDED TO THE MODEL FOR CLARIFICATIONS.
                        (5) CBC BOX CULVERT DS OF CHOLLA BASIN NAMED CH2CBC HAVE BEEN ADDED TO
                            THE MODEL TO ROUTE THE FLOW OUT OF CH2 BASIN.
                        (6) SD ALONG BOTH LARKSPUR DR. AND CHOLLA ST HAVE BEEN ADDED TO THE MODEL
                    ------------------------------------------------------------------------

    9 IO          OUTPUT CONTROL VARIABLES
                        IPRNT          5  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN          1  MINUTES IN COMPUTATION INTERVAL
                        IDATE    14NOV11  STARTING DATE
                        ITIME       1200  STARTING TIME
                           NQ       2000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE    15NOV11  ENDING DATE
                       NDTIME       2119  ENDING TIME
                        ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL    0.02 HOURS
                        TOTAL TIME BASE   33.32 HOURS

       ENGLISH UNITS
            DRAINAGE AREA           SQUARE MILES
            PRECIPITATION DEPTH     INCHES
            LENGTH, ELEVATION       FEET
            FLOW                    CUBIC FEET PER SECOND
            STORAGE VOLUME          ACRE-FEET
            SURFACE AREA            ACRES
            TEMPERATURE             DEGREES FAHRENHEIT

   30 JD          INDEX STORM NO. 1
                        STRM        2.72  PRECIPITATION DEPTH
                        TRDA        0.00  TRANSPOSITION DRAINAGE AREA

   31 PI            PRECIPITATION PATTERN
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
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                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
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                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
                 0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00     0.00
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0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

34 JD INDEX STORM NO. 2
STRM 2.71 PRECIPITATION DEPTH
TRDA 0.50 TRANSPOSITION DRAINAGE AREA

35 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03
0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

38 JD INDEX STORM NO. 3
STRM 2.65 PRECIPITATION DEPTH
TRDA 2.80 TRANSPOSITION DRAINAGE AREA

39 PI PRECIPITATION PATTERN

0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00
WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

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	273010	105.	4.03	10.	2.	2.	0.04		
+	ROUTED TO	273010	104.	4.12	10.	2.	2.	0.04		
+	HYDROGRAPH AT	275910	64.	4.07	5.	1.	1.	0.04		
+	ROUTED TO	275911	1.	4.00	1.	1.	1.	0.04		
+	ROUTED TO	275910	1.	4.13	1.	1.	1.	0.04		
+	2 COMBINED AT	273015	105.	4.12	10.	3.	3.	0.08		
+	ROUTED TO	273015	105.	4.17	10.	3.	3.	0.08		
+	HYDROGRAPH AT	273020	83.	4.08	8.	2.	1.	0.05		
+	2 COMBINED AT	273020	179.	4.13	18.	5.	4.	0.13		
+	DIVERSION TO	273030	128.	4.13	14.	4.	3.	0.13		
+	HYDROGRAPH AT	273030	52.	4.13	4.	1.	1.	0.13		
+	ROUTED TO	273030	52.	4.15	4.	1.	1.	0.13		
+	HYDROGRAPH AT	273040	10.	4.03	1.	0.	0.	0.00		
	2 COMBINED AT	273040	57.	4.13	5.	1.	1.	0.13		
+	ROUTED TO	273050	57.	4.18	5.	1.	1.	0.13		
+	HYDROGRAPH AT	276220	113.	4.12	12.	3.	2.	0.08		
+	ROUTED TO	276230	113.	4.12	12.	3.	2.	0.08		
+	HYDROGRAPH AT	276240	34.	4.08	3.	1.	0.	0.02		
+	2 COMBINED AT	276240	145.	4.12	15.	4.	3.	0.11		
+	ROUTED TO	276240	57.	4.43	15.	4.	3.	0.11		
+	DIVERSION TO	276240	57.	4.43	15.	4.	3.	0.11		
+	HYDROGRAPH AT	276240	0.	0.00	0.	0.	0.	0.11		
+	HYDROGRAPH AT	273060	29.	4.07	2.	1.	0.	0.02		
+	3 COMBINED AT	273060	79.	4.15	7.	2.	1.	0.26		
+	ROUTED TO	273060	79.	4.17	7.	2.	1.	0.26		
+	HYDROGRAPH AT	273210	22.	4.08	2.	1.	0.	0.01		
+	ROUTED TO	273211	30.	4.17	1.	0.	0.	0.01		
+	ROUTED TO	273210	20.	4.20	1.	0.	0.	0.01		
+	HYDROGRAPH AT	273030	128.	4.13	14.	4.	3.	0.13		
+	ROUTED TO	276010	127.	4.20	14.	4.	3.	0.13		

+	HYDROGRAPH AT	276020	26.	4.10	3.	1.	0.	0.02
+	2 COMBINED AT	276020	150.	4.18	16.	5.	4.	0.02
	HYDROGRAPH AT	273070	3.	4.10	1.	0.	0.	0.00
+	4 COMBINED AT	273070	249.	4.20	25.	7.	5.	0.29
+	ROUTED TO	273070	246.	4.22	25.	7.	5.	0.29
+	HYDROGRAPH AT	273080	8.	4.12	1.	0.	0.	0.01
+	2 COMBINED AT	273080	252.	4.22	26.	7.	5.	0.30
+	ROUTED TO	273080	248.	4.23	26.	7.	5.	0.30
+	DIVERSION TO	273080	248.	4.23	26.	7.	5.	0.30
+	HYDROGRAPH AT	273080	0.	0.00	0.	0.	0.	0.30
+	HYDROGRAPH AT	273110	10.	4.12	1.	0.	0.	0.01
+	2 COMBINED AT	273110	10.	4.12	1.	0.	0.	0.31
+	HYDROGRAPH AT	273120	46.	4.15	5.	1.	1.	0.04
+	2 COMBINED AT	273120	56.	4.15	6.	2.	1.	0.34
+	ROUTED TO	273120	55.	4.17	6.	2.	1.	0.34
+	HYDROGRAPH AT	272910	16.	4.05	1.	0.	0.	0.01
+	ROUTED TO	272911	0.	4.68	0.	0.	0.	0.01
	ROUTED TO	272910	0.	6.33	0.	0.	0.	0.01
+	HYDROGRAPH AT	272920	113.	4.13	13.	3.	2.	0.09
+	2 COMBINED AT	272920	113.	4.13	13.	3.	2.	0.09
+	ROUTED TO	272920	113.	4.13	13.	3.	2.	0.09
+	HYDROGRAPH AT	272810	8.	4.08	1.	0.	0.	0.01
+	ROUTED TO	272811	1.	4.95	0.	0.	0.	0.01
+	HYDROGRAPH AT	272818	62.	4.07	6.	1.	1.	0.04
+	ROUTED TO	272818	0.	0.00	0.	0.	0.	0.04
+	2 COMBINED AT	272810	1.	4.95	0.	0.	0.	0.05
+	ROUTED TO	272810	1.	5.18	0.	0.	0.	0.05
+	HYDROGRAPH AT	272820	61.	4.08	4.	1.	1.	0.05
+	2 COMBINED AT	272820	61.	4.08	4.	1.	1.	0.10
+	ROUTED TO	272830	61.	4.10	4.	1.	1.	0.10
+	ROUTED TO	272840	61.	4.10	4.	1.	1.	0.10
	ROUTED TO	272850	61.	4.15	4.	1.	1.	0.10
+	HYDROGRAPH AT	272410	38.	4.05	3.	1.	1.	0.02
+	ROUTED TO	272410	23.	4.18	3.	1.	1.	0.02

+	ROUTED TO	272420	22.	4.35	3.	1.	1.	0.02
+	HYDROGRAPH AT	272420	24.	4.07	2.	1.	0.	0.01
+	2 COMBINED AT	272420	34.	4.22	5.	1.	1.	0.04
+	HYDROGRAPH AT	272610	51.	4.05	4.	1.	1.	0.03
+	ROUTED TO	272610	51.	4.05	4.	1.	1.	0.03
+	ROUTED TO	272620	50.	4.15	4.	1.	1.	0.03
+	HYDROGRAPH AT	272440	115.	4.10	11.	3.	2.	0.07
+	3 COMBINED AT	272440	194.	4.12	20.	5.	4.	0.13
+	ROUTED TO	272440	46.	4.58	12.	3.	2.	0.13
+	ROUTED TO	272450	46.	4.63	12.	3.	2.	0.13
+	2 COMBINED AT	272454	63.	4.20	17.	4.	3.	0.23
+	ROUTED TO	272454	63.	4.23	17.	4.	3.	0.23
+	HYDROGRAPH AT	272460	103.	4.08	9.	2.	2.	0.06
+	2 COMBINED AT	272460	154.	4.12	26.	7.	5.	0.29
+	ROUTED TO	272460	140.	4.20	21.	5.	4.	0.29
+	ROUTED TO	272462	140.	4.22	21.	5.	4.	0.29
+	HYDROGRAPH AT	272710	9.	4.05	1.	0.	0.	0.00
+	ROUTED TO	272711	0.	4.67	0.	0.	0.	0.00
+	ROUTED TO	272710	0.	4.67	0.	0.	0.	0.00
+	HYDROGRAPH AT	272520	130.	4.07	10.	3.	2.	0.06
+	3 COMBINED AT	272520	216.	4.20	31.	8.	6.	0.36
+	ROUTED TO	272521	205.	4.23	26.	8.	6.	0.36
+	ROUTED TO	272520	203.	4.25	26.	8.	6.	0.36
+	2 COMBINED AT	272525	302.	4.23	38.	11.	8.	0.45
+	ROUTED TO	272530	287.	4.32	38.	11.	8.	0.45
+	HYDROGRAPH AT	272540	54.	4.13	5.	1.	1.	0.04
+	HYDROGRAPH AT	273080	248.	4.23	26.	7.	5.	0.30
+	DIVERSION TO	SD66	180.	4.12	24.	7.	5.	0.30
+	HYDROGRAPH AT	273081	68.	4.23	2.	0.	0.	0.30
+	3 COMBINED AT	272540	295.	4.30	40.	12.	9.	0.79
+	HYDROGRAPH AT	272550	13.	4.25	3.	1.	1.	0.02
+	2 COMBINED AT	272550	301.	4.30	43.	13.	9.	0.81
+	DIVERSION TO	LBAS	121.	4.30	10.	2.	2.	0.81
	HYDROGRAPH AT							

+		272551	180.	4.30	33.	10.	8.	0.81
+	ROUTED TO	272550	176.	4.32	33.	10.	8.	0.81
+	HYDROGRAPH AT	271610	30.	4.02	2.	0.	0.	0.01
+	ROUTED TO	271611	0.	3.90	0.	0.	0.	0.01
+	ROUTED TO	271610	0.	5.23	0.	0.	0.	0.01
+	HYDROGRAPH AT	271620	67.	4.08	6.	2.	1.	0.04
+	2 COMBINED AT	271620	67.	4.08	6.	2.	1.	0.05
+	ROUTED TO	271630	66.	4.20	6.	2.	1.	0.05
+	HYDROGRAPH AT	271640	119.	4.07	9.	2.	2.	0.06
+	2 COMBINED AT	271640	161.	4.10	15.	4.	3.	0.11
+	ROUTED TO	271650	161.	4.13	15.	4.	3.	0.11
+	HYDROGRAPH AT	271910	42.	4.08	4.	1.	1.	0.03
+	ROUTED TO	271910	0.	3.97	0.	0.	0.	0.03
+	ROUTED TO	271930	0.	6.37	0.	0.	0.	0.03
+	HYDROGRAPH AT	271660	24.	4.13	4.	1.	1.	0.02
+	3 COMBINED AT	271660	185.	4.13	19.	5.	3.	0.16
+	ROUTED TO	271670	183.	4.15	19.	5.	3.	0.16
+	HYDROGRAPH AT	271680	6.	4.10	1.	0.	0.	0.00
+	2 COMBINED AT	271680	189.	4.15	20.	5.	4.	0.16
+	HYDROGRAPH AT	272010	60.	4.00	4.	1.	1.	0.02
+	ROUTED TO	272020	59.	4.03	4.	1.	1.	0.02
+	HYDROGRAPH AT	272030	77.	4.07	7.	2.	1.	0.04
+	2 COMBINED AT	272030	136.	4.07	12.	3.	2.	0.06
+	ROUTED TO	272040	134.	4.13	12.	3.	2.	0.06
+	HYDROGRAPH AT	272050	34.	4.10	4.	1.	1.	0.02
+	2 COMBINED AT	272050	168.	4.12	16.	4.	3.	0.08
+	ROUTED TO	272060	168.	4.13	16.	4.	3.	0.08
+	2 COMBINED AT	271690	355.	4.13	35.	9.	6.	0.24
+	ROUTED TO	271690	352.	4.18	35.	9.	6.	0.24
+	HYDROGRAPH AT	272110	22.	4.05	2.	0.	0.	0.01
+	ROUTED TO	272120	21.	4.13	2.	0.	0.	0.01
+	HYDROGRAPH AT	271700	37.	4.10	3.	1.	1.	0.03
+	3 COMBINED AT	271700	404.	4.18	41.	10.	7.	0.28
+	ROUTED TO	271710	400.	4.27	41.	10.	7.	0.28

+	HYDROGRAPH AT	272230	63.	4.10	5.	1.	1.	0.04
+	ROUTED TO	272240	63.	4.15	5.	1.	1.	0.04
	HYDROGRAPH AT	272250	57.	4.07	5.	1.	1.	0.03
+	2 COMBINED AT	272250	113.	4.12	10.	3.	2.	0.07
+	ROUTED TO	272251	119.	4.10	8.	3.	2.	0.07
+	ROUTED TO	272250	112.	4.17	8.	3.	2.	0.07
+	HYDROGRAPH AT	271720	77.	4.12	9.	2.	2.	0.06
+	3 COMBINED AT	271720	564.	4.23	58.	15.	11.	0.41
+	DIVERSION TO	SWB	122.	4.23	8.	2.	1.	0.41
+	HYDROGRAPH AT	271721	442.	4.23	50.	13.	10.	0.41
+	ROUTED TO	271722	442.	4.25	50.	13.	10.	0.41
+	HYDROGRAPH AT	271721	122.	4.23	8.	2.	1.	0.41
+	ROUTED TO	SWBSTR	20.	4.60	8.	2.	1.	0.41
+	2 COMBINED AT	271728	456.	4.27	57.	15.	11.	0.41
+	ROUTED TO	271730	449.	4.32	57.	15.	11.	0.41
+	HYDROGRAPH AT	271740	37.	4.08	4.	1.	1.	0.02
+	2 COMBINED AT	271740	469.	4.30	61.	16.	12.	0.43
	HYDROGRAPH AT	272310	21.	4.12	2.	1.	0.	0.02
+	ROUTED TO	272311	21.	4.22	1.	0.	0.	0.02
+	ROUTED TO	272310	13.	4.37	1.	0.	0.	0.02
+	HYDROGRAPH AT	271750	30.	4.03	2.	1.	0.	0.01
+	3 COMBINED AT	271750	485.	4.32	64.	17.	12.	0.46
+	ROUTED TO	271750	484.	4.32	64.	17.	12.	0.46
+	HYDROGRAPH AT	271760	15.	4.03	2.	0.	0.	0.01
+	3 COMBINED AT	271760	520.	4.32	88.	25.	18.	1.28
+	HYDROGRAPH AT	272551	121.	4.30	10.	2.	2.	0.81
+	ROUTED TO	LBASTR	16.	4.97	9.	2.	2.	0.81
+	2 COMBINED AT	271764	530.	4.32	95.	27.	20.	1.28
+	ROUTED TO	271765	529.	4.32	95.	27.	20.	1.28
+	ROUTED TO	271766	528.	4.33	95.	27.	20.	1.28
+	HYDROGRAPH AT	271770	72.	4.12	7.	2.	1.	0.05
	2 COMBINED AT	271770	557.	4.32	100.	28.	21.	1.34
+	HYDROGRAPH AT	272540	180.	4.12	24.	7.	5.	0.30
+	3 COMBINED AT	271780	682.	4.32	123.	35.	25.	1.68

+	ROUTED TO	271780	670.	4.37	123.	35.	25.	1.68
+	HYDROGRAPH AT	271790	8.	4.15	2.	1.	0.	0.01
+	2 COMBINED AT	271790	676.	4.37	125.	35.	26.	1.69
+	ROUTED TO	271795	672.	4.37	125.	35.	26.	1.69
+	HYDROGRAPH AT	271810	51.	4.17	7.	2.	1.	0.05
+	2 COMBINED AT	271810	697.	4.37	130.	37.	27.	1.74
+	DIVERSION TO	CH1	118.	4.37	9.	2.	2.	1.74
+	HYDROGRAPH AT	271810	579.	4.37	120.	34.	25.	1.74
+	ROUTED TO	271811	572.	4.42	120.	34.	25.	1.74
+	HYDROGRAPH AT	271812	118.	4.37	9.	2.	2.	1.74
+	ROUTED TO	CH1STR	60.	4.47	9.	2.	2.	1.74
+	2 COMBINED AT	271815	626.	4.43	130.	37.	27.	1.74
+	ROUTED TO	271820	622.	4.45	130.	37.	27.	1.74
+	HYDROGRAPH AT	271830	80.	4.15	11.	3.	2.	0.06
+	HYDROGRAPH AT	273310	26.	4.13	3.	1.	1.	0.02
+	3 COMBINED AT	271830	665.	4.45	140.	39.	29.	1.82
+	DIVERSION TO	CH3	111.	4.45	9.	2.	2.	1.82
+	HYDROGRAPH AT	271831	554.	4.43	132.	37.	27.	1.82
+	HYDROGRAPH AT	271832	111.	4.45	9.	2.	2.	1.82
+	ROUTED TO	CH3STR	56.	4.57	9.	2.	2.	1.82
+	2 COMBINED AT	271836	588.	4.52	140.	39.	29.	1.82
+	ROUTED TO	271837	582.	4.53	140.	39.	29.	1.82
+	ROUTED TO	271838	580.	4.55	140.	39.	29.	1.82
+	ROUTED TO	271840	580.	4.57	140.	39.	29.	1.82
+	HYDROGRAPH AT	270010	57.	4.02	5.	1.	1.	0.02
+	ROUTED TO	270020	56.	4.10	5.	1.	1.	0.02
+	HYDROGRAPH AT	270030	106.	4.07	8.	2.	1.	0.05
+	2 COMBINED AT	270030	160.	4.07	13.	3.	2.	0.07
+	ROUTED TO	270040	159.	4.08	13.	3.	2.	0.07
+	HYDROGRAPH AT	270710	7.	4.08	1.	0.	0.	0.00
+	ROUTED TO	270720	7.	4.12	1.	0.	0.	0.00
+	2 COMBINED AT	270050	167.	4.08	15.	4.	3.	0.08
+	ROUTED TO	270050	165.	4.17	15.	4.	3.	0.08
	HYDROGRAPH AT							

+		270060	99.	4.10	12.	3.	2.	0.05
+	2 COMBINED AT	270060	257.	4.15	26.	7.	5.	0.13
+	ROUTED TO	270070	256.	4.15	26.	7.	5.	0.13
+	HYDROGRAPH AT	270810	29.	4.05	2.	1.	0.	0.02
+	ROUTED TO	270810	28.	4.07	2.	1.	0.	0.02
+	ROUTED TO	270820	27.	4.18	2.	1.	0.	0.02
+	HYDROGRAPH AT	270830	31.	4.12	3.	1.	1.	0.03
+	2 COMBINED AT	270830	56.	4.17	6.	1.	1.	0.04
+	ROUTED TO	270840	56.	4.22	6.	1.	1.	0.04
+	HYDROGRAPH AT	276110	27.	4.10	3.	1.	1.	0.02
+	ROUTED TO	276110	27.	4.12	3.	1.	1.	0.02
+	HYDROGRAPH AT	270080	34.	4.08	4.	1.	1.	0.02
+	4 COMBINED AT	270080	363.	4.17	39.	10.	7.	0.21
+	ROUTED TO	270090	359.	4.23	39.	10.	7.	0.21
+	HYDROGRAPH AT	270910	6.	4.07	1.	0.	0.	0.00
+	ROUTED TO	270910	6.	4.07	1.	0.	0.	0.00
+	ROUTED TO	270920	6.	4.15	1.	0.	0.	0.00
	HYDROGRAPH AT	271110	60.	4.00	5.	1.	1.	0.02
+	ROUTED TO	271111	0.	3.45	0.	0.	0.	0.02
+	ROUTED TO	271110	0.	3.85	0.	0.	0.	0.02
+	HYDROGRAPH AT	270930	19.	4.07	2.	0.	0.	0.01
+	3 COMBINED AT	270930	23.	4.07	2.	1.	0.	0.04
+	ROUTED TO	270930	23.	4.10	2.	1.	0.	0.04
+	HYDROGRAPH AT	270940	48.	4.05	4.	1.	1.	0.02
+	2 COMBINED AT	270940	70.	4.07	6.	1.	1.	0.06
+	ROUTED TO	270941	83.	4.20	2.	0.	0.	0.06
+	ROUTED TO	270940	58.	4.23	2.	0.	0.	0.06
+	HYDROGRAPH AT	270950	67.	4.05	5.	1.	1.	0.03
+	2 COMBINED AT	270950	89.	4.23	7.	2.	1.	0.09
+	ROUTED TO	270951	0.	3.83	0.	0.	0.	0.09
+	ROUTED TO	270950	0.	5.48	0.	0.	0.	0.09
+	HYDROGRAPH AT	270960	32.	4.08	3.	1.	1.	0.02
+	2 COMBINED AT	270960	32.	4.08	3.	1.	1.	0.11
+	ROUTED TO	270960	32.	4.08	3.	1.	1.	0.11

+ ROUTED TO	270970	31.	4.17	3.	1.	1.	0.11
+ HYDROGRAPH AT	270980	60.	4.07	6.	1.	1.	0.03
2 COMBINED AT	270980	86.	4.10	9.	2.	2.	0.14
+ ROUTED TO	270990	86.	4.17	9.	2.	2.	0.14
+ HYDROGRAPH AT	270100	119.	4.15	18.	4.	3.	0.09
+ 3 COMBINED AT	270100	554.	4.22	66.	17.	12.	0.45
+ ROUTED TO	270110	551.	4.25	66.	17.	12.	0.45
+ HYDROGRAPH AT	270120	23.	4.07	2.	1.	0.	0.01
+ 2 COMBINED AT	270120	565.	4.25	68.	17.	12.	0.46
+ ROUTED TO	270120	564.	4.25	68.	17.	12.	0.46
+ HYDROGRAPH AT	270130	10.	4.47	4.	1.	1.	0.02
+ 2 COMBINED AT	270130	573.	4.25	72.	18.	13.	0.48
+ ROUTED TO	270130	527.	4.28	71.	18.	13.	0.48
+ HYDROGRAPH AT	270140	13.	4.12	2.	0.	0.	0.01
+ 2 COMBINED AT	270140	537.	4.28	73.	19.	13.	0.49
+ ROUTED TO	270150	536.	4.30	73.	19.	13.	0.49
+ HYDROGRAPH AT	270160	3.	4.17	1.	0.	0.	0.00
2 COMBINED AT	270160	539.	4.30	74.	19.	14.	0.50
+ DIVERSION TO	BRKT92	130.	4.30	6.	1.	1.	0.50
+ HYDROGRAPH AT	270170	409.	4.30	68.	17.	13.	0.50
+ ROUTED TO	270170	409.	4.32	68.	17.	13.	0.50
+ HYDROGRAPH AT	270180	4.	4.08	0.	0.	0.	0.00
+ 2 COMBINED AT	270180	411.	4.32	69.	17.	13.	0.50
+ ROUTED TO	270190	410.	4.37	69.	17.	13.	0.50
+ HYDROGRAPH AT	270200	6.	4.12	1.	0.	0.	0.01
+ 2 COMBINED AT	270200	413.	4.37	69.	18.	13.	0.51
+ ROUTED TO	270210	412.	4.37	69.	18.	13.	0.51
+ HYDROGRAPH AT	271210	69.	4.13	9.	2.	2.	0.05
+ ROUTED TO	271210	68.	4.22	9.	2.	2.	0.05
+ HYDROGRAPH AT	271220	105.	4.10	10.	3.	2.	0.06
+ 2 COMBINED AT	271220	163.	4.13	19.	5.	3.	0.11
ROUTED TO	271220	163.	4.15	19.	5.	3.	0.11
+ HYDROGRAPH AT	270220	5.	4.10	1.	0.	0.	0.00
+ 3 COMBINED AT	270220	515.	4.32	88.	22.	16.	0.63

+	ROUTED TO	270220	514.	4.33	88.	22.	16.	0.63
+	HYDROGRAPH AT	270230	19.	4.07	2.	0.	0.	0.01
+	2 COMBINED AT	270230	519.	4.33	89.	23.	16.	0.64
+	ROUTED TO	270230	518.	4.35	89.	23.	16.	0.64
+	HYDROGRAPH AT	270240	10.	4.17	1.	0.	0.	0.01
+	2 COMBINED AT	270240	525.	4.35	90.	23.	17.	0.65
+	ROUTED TO	270250	524.	4.37	90.	23.	17.	0.65
+	HYDROGRAPH AT	271310	49.	4.13	6.	2.	1.	0.04
+	HYDROGRAPH AT	271320	68.	4.08	7.	2.	1.	0.04
+	2 COMBINED AT	271320	115.	4.10	13.	3.	2.	0.08
+	ROUTED TO	271320	115.	4.13	13.	3.	2.	0.08
+	HYDROGRAPH AT	271330	6.	4.05	1.	0.	0.	0.00
+	2 COMBINED AT	271330	120.	4.13	14.	3.	2.	0.08
+	ROUTED TO	271330	120.	4.15	14.	3.	2.	0.08
+	HYDROGRAPH AT	271340	3.	4.07	0.	0.	0.	0.00
+	2 COMBINED AT	271340	123.	4.15	14.	4.	3.	0.08
+	ROUTED TO	271340	123.	4.17	14.	4.	3.	0.08
+	HYDROGRAPH AT	271350	4.	4.03	0.	0.	0.	0.00
+	2 COMBINED AT	271350	126.	4.17	14.	4.	3.	0.08
+	ROUTED TO	271350	125.	4.20	14.	4.	3.	0.08
+	HYDROGRAPH AT	271360	5.	4.07	1.	0.	0.	0.00
+	2 COMBINED AT	271360	130.	4.20	15.	4.	3.	0.09
+	ROUTED TO	271360	129.	4.22	15.	4.	3.	0.09
+	HYDROGRAPH AT	271370	4.	4.03	0.	0.	0.	0.00
+	2 COMBINED AT	271370	132.	4.22	16.	4.	3.	0.09
+	ROUTED TO	271370	131.	4.23	16.	4.	3.	0.09
+	HYDROGRAPH AT	271380	6.	4.05	1.	0.	0.	0.00
+	2 COMBINED AT	271380	135.	4.23	16.	4.	3.	0.09
+	ROUTED TO	271380	134.	4.28	16.	4.	3.	0.09
+	HYDROGRAPH AT	271400	73.	4.12	6.	2.	1.	0.05
+	2 COMBINED AT	271400	185.	4.25	23.	6.	4.	0.14
	2 COMBINED AT	270260	655.	4.33	111.	28.	20.	0.79
+	HYDROGRAPH AT	270270	10.	4.05	1.	0.	0.	0.00
	2 COMBINED AT							

+		270270	657.	4.33	111.	28.	20.	0.79
+	ROUTED TO	270270	651.	4.38	111.	28.	20.	0.79
+	HYDROGRAPH AT	270280	34.	4.07	3.	1.	1.	0.02
+	2 COMBINED AT	270280	659.	4.38	114.	29.	21.	0.81
+	DIVERSION TO	POIN	94.	4.38	6.	2.	1.	0.81
+	HYDROGRAPH AT	270281	565.	4.38	108.	27.	20.	0.81
+	HYDROGRAPH AT	270282	94.	4.38	6.	2.	1.	0.81
+	ROUTED TO	POBSTR	85.	4.40	6.	2.	1.	0.81
+	2 COMBINED AT	270284	649.	4.40	114.	29.	21.	0.81
+	ROUTED TO	270285	631.	4.47	114.	29.	21.	0.81
+	HYDROGRAPH AT	270290	40.	4.12	5.	1.	1.	0.03
+	2 COMBINED AT	270290	648.	4.45	119.	30.	22.	0.84
+	ROUTED TO	270290	614.	4.48	118.	30.	22.	0.84
+	DIVERSION TO	CH2	295.	4.48	34.	9.	6.	0.84
+	HYDROGRAPH AT	270295	320.	4.48	84.	22.	16.	0.84
+	ROUTED TO	270300	315.	4.50	84.	22.	16.	0.84
+	HYDROGRAPH AT	270310	104.	4.10	12.	3.	2.	0.06
	2 COMBINED AT	270310	354.	4.45	95.	24.	18.	0.91
+	ROUTED TO	270320	352.	4.48	95.	24.	18.	0.91
+	HYDROGRAPH AT	270296	295.	4.48	34.	9.	6.	0.84
+	ROUTED TO	CH2STR	285.	4.55	34.	8.	6.	0.84
+	HYDROGRAPH AT	273505	39.	4.08	4.	1.	1.	0.02
+	ROUTED TO	273505	39.	4.15	4.	1.	1.	0.02
+	HYDROGRAPH AT	273506	32.	4.07	3.	1.	1.	0.02
+	ROUTED TO	273507	29.	4.12	2.	1.	1.	0.02
+	ROUTED TO	273506	29.	4.17	2.	1.	1.	0.02
+	HYDROGRAPH AT	273508	22.	4.10	2.	1.	0.	0.01
+	2 COMBINED AT	273508	49.	4.17	5.	1.	1.	0.03
+	2 COMBINED AT	273509	87.	4.17	8.	2.	2.	0.05
+	ROUTED TO	273509	89.	4.20	8.	2.	2.	0.05
+	HYDROGRAPH AT	271510	26.	4.12	3.	1.	1.	0.02
+	ROUTED TO	271511	26.	4.13	3.	1.	1.	0.02
	ROUTED TO	271510	26.	4.17	3.	1.	1.	0.02
+	HYDROGRAPH AT	273510	25.	4.15	4.	1.	1.	0.02

+	3 COMBINED AT	273510	139.	4.20	15.	4.	3.	0.09
+	DIVERSION TO	CH2SD	139.	4.20	15.	4.	3.	0.09
	HYDROGRAPH AT	CH2SD	0.	4.20	0.	0.	0.	0.09
+	ROUTED TO	273510	0.	4.88	0.	0.	0.	0.09
+	DIVERSION TO	273510	0.	4.88	0.	0.	0.	0.09
+	HYDROGRAPH AT	273510	0.	0.00	0.	0.	0.	0.09
+	HYDROGRAPH AT	CH2SDR	139.	4.20	15.	4.	3.	0.09
+	ROUTED TO	270318	136.	4.22	15.	4.	3.	0.09
+	3 COMBINED AT	270319	385.	4.50	52.	13.	10.	0.09
+	ROUTED TO	CH2CBC	385.	4.52	52.	13.	10.	0.09
+	2 COMBINED AT	270324	680.	4.52	142.	36.	26.	1.00
+	ROUTED TO	270325	676.	4.53	142.	36.	26.	1.00
+	HYDROGRAPH AT	270370	51.	4.07	5.	1.	1.	0.03
+	2 COMBINED AT	270370	684.	4.53	146.	38.	27.	1.03
+	ROUTED TO	270380	683.	4.55	146.	38.	27.	1.03
+	HYDROGRAPH AT	270390	53.	4.15	7.	2.	1.	0.04
+	3 COMBINED AT	270390	1090.	4.53	272.	73.	53.	2.89
	ROUTED TO	270390	1090.	4.55	272.	73.	53.	2.89
+	HYDROGRAPH AT	270400	13.	4.10	1.	0.	0.	0.01
+	2 COMBINED AT	270400	1092.	4.55	273.	73.	53.	2.90
+	ROUTED TO	270410	1092.	4.55	273.	73.	53.	2.90
+	HYDROGRAPH AT	270420	1.	4.57	1.	0.	0.	0.00
+	2 COMBINED AT	270420	1093.	4.55	274.	74.	53.	2.91
+	ROUTED TO	270430	1093.	4.55	274.	74.	53.	2.91
+	HYDROGRAPH AT	273410	49.	4.07	4.	1.	1.	0.03
+	ROUTED TO	273410	48.	4.20	4.	1.	1.	0.03
+	HYDROGRAPH AT	273510	0.	4.88	0.	0.	0.	0.09
+	HYDROGRAPH AT	273420	189.	4.07	16.	4.	3.	0.08
+	3 COMBINED AT	273420	219.	4.08	21.	5.	4.	0.11
+	ROUTED TO	273430	215.	4.10	21.	5.	4.	0.11
+	HYDROGRAPH AT	270440	40.	4.02	3.	1.	1.	0.01
	3 COMBINED AT	270440	1138.	4.52	293.	78.	57.	3.03
+	ROUTED TO	270440	1123.	4.55	292.	78.	57.	3.03

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SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

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                                                                                     INTERPOLATED TO
                                                                                COMPUTATION INTERVAL
   ISTAQ     ELEMENT        DT        PEAK       TIME TO      VOLUME        DT         PEAK     TIME TO       VOLUME
                                                  PEAK                                            PEAK

                           (MIN)      (CFS)       (MIN)        (IN)        (MIN)      (CFS)      (MIN)         (IN)

          FOR STORM = 1  STORM AREA (SQ MI) =      0.00
            273010   MANE         1.00    104.92    247.00       2.30        1.00     104.92     247.00        2.30

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4906E+01 EXCESS=0.0000E+00 OUTFLOW=0.4906E+01 BASIN STORAGE=0.1114E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =      0.50
            273010   MANE         1.00    104.22    247.00       2.29        1.00     104.22     247.00        2.29

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4875E+01 EXCESS=0.0000E+00 OUTFLOW=0.4875E+01 BASIN STORAGE=0.1111E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =      2.80
            273010   MANE         1.00     53.14    248.00       2.13        1.00      53.14     248.00        2.13

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4550E+01 EXCESS=0.0000E+00 OUTFLOW=0.4550E+01 BASIN STORAGE=0.1179E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =      0.00
            275910   MANE         1.00      1.01    248.00       1.00        1.00       1.01     248.00        1.00

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2078E+01 EXCESS=0.0000E+00 OUTFLOW=0.2073E+01 BASIN STORAGE=0.5650E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =      0.50
            275910   MANE         1.00      1.01    248.00       0.99        1.00       1.01     248.00        0.99

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2065E+01 EXCESS=0.0000E+00 OUTFLOW=0.2060E+01 BASIN STORAGE=0.5589E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =      2.80
            275910   MANE         1.00      1.00    254.00       0.66        1.00       1.00     254.00        0.66

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1372E+01 EXCESS=0.0000E+00 OUTFLOW=0.1370E+01 BASIN STORAGE=0.2853E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =      0.00
            273015   MANE         1.00    105.43    250.00       1.66        1.00     105.43     250.00        1.66

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6979E+01 EXCESS=0.0000E+00 OUTFLOW=0.6974E+01 BASIN STORAGE=0.1053E-01 PERCENT ERROR=  -0.1

          FOR STORM = 2  STORM AREA (SQ MI) =      0.50
            273015   MANE         1.00    104.73    250.00       1.64        1.00     104.73     250.00        1.64

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6936E+01 EXCESS=0.0000E+00 OUTFLOW=0.6931E+01 BASIN STORAGE=0.1041E-01 PERCENT ERROR=  -0.1

          FOR STORM = 3  STORM AREA (SQ MI) =      2.80
            273015   MANE         1.00     53.79    252.00       1.40        1.00      53.79     252.00        1.40

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5920E+01 EXCESS=0.0000E+00 OUTFLOW=0.5918E+01 BASIN STORAGE=0.5193E-02 PERCENT ERROR=  -0.1

          FOR STORM = 1  STORM AREA (SQ MI) =      0.00
            273030   MANE         1.00     51.99    249.00       0.36        1.00      51.99     249.00        0.36

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2498E+01 EXCESS=0.0000E+00 OUTFLOW=0.2496E+01 BASIN STORAGE=0.1491E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =      0.50
            273030   MANE         1.00     51.51    249.00       0.36        1.00      51.51     249.00        0.36

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2477E+01 EXCESS=0.0000E+00 OUTFLOW=0.2475E+01 BASIN STORAGE=0.1474E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =      2.80
            273030   MANE         1.00     23.61    250.00       0.28        1.00      23.61     250.00        0.28

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1899E+01 EXCESS=0.0000E+00 OUTFLOW=0.1899E+01 BASIN STORAGE=0.7313E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =      0.00
            273050   MANE         1.00     57.70    251.00       0.39        1.00      57.70     251.00        0.39

    INUITY SUMMARY (AC-FT) - INFLOW=0.2823E+01 EXCESS=0.0000E+00 OUTFLOW=0.2822E+01 BASIN STORAGE=0.2291E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =      0.50
            273050   MANE         1.00     57.18    251.00       0.39        1.00      57.18     251.00        0.39
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2800E+01 EXCESS=0.0000E+00 OUTFLOW=0.2798E+01 BASIN STORAGE=0.2267E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
           273050  MANE          1.00     26.91    251.00       0.30       1.00      26.91     251.00          0.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2141E+01 EXCESS=0.0000E+00 OUTFLOW=0.2140E+01 BASIN STORAGE=0.1118E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
           276230  MANE          0.62    113.97    247.23       1.34       1.00     113.83     247.00          1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6013E+01 EXCESS=0.0000E+00 OUTFLOW=0.6013E+01 BASIN STORAGE=0.1303E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
           276230  MANE          0.62    112.96    247.20       1.33       1.00     112.83     247.00          1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5965E+01 EXCESS=0.0000E+00 OUTFLOW=0.5965E+01 BASIN STORAGE=0.1242E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
           276230  MANE          0.78     49.95    247.31       0.93       1.00      49.90     248.00          0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4153E+01 EXCESS=0.0000E+00 OUTFLOW=0.4153E+01 BASIN STORAGE=0.1278E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
           273060  MANE          1.00     79.52    250.00       0.28       1.00      79.52     250.00          0.28

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3869E+01 EXCESS=0.0000E+00 OUTFLOW=0.3868E+01 BASIN STORAGE=0.7423E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
           273060  MANE          1.00     78.76    250.00       0.28       1.00      78.76     250.00          0.28

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3836E+01 EXCESS=0.0000E+00 OUTFLOW=0.3834E+01 BASIN STORAGE=0.7340E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
           273060  MANE          1.00     39.19    251.00       0.22       1.00      39.19     251.00          0.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2942E+01 EXCESS=0.0000E+00 OUTFLOW=0.2942E+01 BASIN STORAGE=0.3276E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
           273210  MANE          1.00     21.12    252.00       0.74       1.00      21.12     252.00          0.74

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5519E+00 EXCESS=0.0000E+00 OUTFLOW=0.5523E+00 BASIN STORAGE=0.2567E-03 PERCENT ERROR=  -0.1

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
           273210  MANE          1.00     19.69    252.00       0.73       1.00      19.69     252.00          0.73

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5419E+00 EXCESS=0.0000E+00 OUTFLOW=0.5430E+00 BASIN STORAGE=0.2567E-03 PERCENT ERROR=  -0.2

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
           273210  MANE          1.00     11.81    261.00       0.47       1.00      11.81     261.00          0.47

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3534E+00 EXCESS=0.0000E+00 OUTFLOW=0.3536E+00 BASIN STORAGE=0.2567E-03 PERCENT ERROR=  -0.2

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
           276010  MANE          1.00    127.99    252.00       1.22       1.00     127.99     252.00          1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8412E+01 EXCESS=0.0000E+00 OUTFLOW=0.8405E+01 BASIN STORAGE=0.1330E-01 PERCENT ERROR=  -0.1

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
           276010  MANE          1.00    127.11    252.00       1.21       1.00     127.11     252.00          1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8358E+01 EXCESS=0.0000E+00 OUTFLOW=0.8351E+01 BASIN STORAGE=0.1315E-01 PERCENT ERROR=  -0.1

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
           276010  MANE          1.00     70.01    253.00       1.04       1.00      70.01     253.00          1.04

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7186E+01 EXCESS=0.0000E+00 OUTFLOW=0.7183E+01 BASIN STORAGE=0.6455E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
           273070  MANE          0.35    248.84    252.38       0.93       1.00     247.77     252.00          0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1436E+02 EXCESS=0.0000E+00 OUTFLOW=0.1436E+02 BASIN STORAGE=0.6848E-03 PERCENT ERROR=   0.0
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FOR STORM = 2 STORM AREA (SQ MI) = 0.50
273070 MANE 0.35 246.05 252.68 0.92 1.00 245.42 253.00 0.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1425E+02 EXCESS=0.0000E+00 OUTFLOW=0.1425E+02 BASIN STORAGE=0.6767E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
273070 MANE 0.40 123.57 251.85 0.75 1.00 123.56 252.00 0.75

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1170E+02 EXCESS=0.0000E+00 OUTFLOW=0.1170E+02 BASIN STORAGE=0.3147E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
273080 MANE 1.00 250.31 254.00 0.93 1.00 250.31 254.00 0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1475E+02 EXCESS=0.0000E+00 OUTFLOW=0.1474E+02 BASIN STORAGE=0.5265E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
273080 MANE 1.00 247.92 254.00 0.92 1.00 247.92 254.00 0.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1464E+02 EXCESS=0.0000E+00 OUTFLOW=0.1463E+02 BASIN STORAGE=0.5209E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
273080 MANE 1.00 127.00 254.00 0.76 1.00 127.00 254.00 0.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1199E+02 EXCESS=0.0000E+00 OUTFLOW=0.1198E+02 BASIN STORAGE=0.2592E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
273120 MANE 1.00 55.57 250.00 0.17 1.00 55.57 250.00 0.17

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3173E+01 EXCESS=0.0000E+00 OUTFLOW=0.3171E+01 BASIN STORAGE=0.2982E-03 PERCENT ERROR= 0.1

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
273120 MANE 1.00 55.07 250.00 0.17 1.00 55.07 250.00 0.17

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3145E+01 EXCESS=0.0000E+00 OUTFLOW=0.3143E+01 BASIN STORAGE=0.2970E-03 PERCENT ERROR= 0.1

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
273120 MANE 1.00 30.05 252.00 0.13 1.00 30.05 252.00 0.13

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2409E+01 EXCESS=0.0000E+00 OUTFLOW=0.2408E+01 BASIN STORAGE=0.2974E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
272910 MANE 1.00 0.01 518.00 0.05 1.00 0.01 518.00 0.05

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2305E-01 EXCESS=0.0000E+00 OUTFLOW=0.2163E-01 BASIN STORAGE=0.5101E-03 PERCENT ERROR= 3.9

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
272910 MANE 1.00 0.01 519.00 0.05 1.00 0.01 519.00 0.05

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2288E-01 EXCESS=0.0000E+00 OUTFLOW=0.2146E-01 BASIN STORAGE=0.5075E-03 PERCENT ERROR= 4.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
272910 MANE 1.00 0.01 531.00 0.04 1.00 0.01 531.00 0.04

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1884E-01 EXCESS=0.0000E+00 OUTFLOW=0.1761E-01 BASIN STORAGE=0.4425E-03 PERCENT ERROR= 4.2

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
272920 MANE 0.92 113.94 248.73 1.30 1.00 113.82 248.00 1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6530E+01 EXCESS=0.0000E+00 OUTFLOW=0.6530E+01 BASIN STORAGE=0.1863E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
272920 MANE 0.93 113.01 248.37 1.29 1.00 112.69 248.00 1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6476E+01 EXCESS=0.0000E+00 OUTFLOW=0.6476E+01 BASIN STORAGE=0.1900E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
272920 MANE 1.00 61.39 249.00 1.03 1.00 61.39 249.00 1.03

TINUITY SUMMARY (AC-FT) - INFLOW=0.5154E+01 EXCESS=0.0000E+00 OUTFLOW=0.5153E+01 BASIN STORAGE=0.1887E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
272810 MANE 1.00 0.88 311.00 0.12 1.00 0.88 311.00 0.12

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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3173E+00 EXCESS=0.0000E+00 OUTFLOW=0.3168E+00 BASIN STORAGE=0.1472E-02 PERCENT ERROR=  -0.3

              FOR STORM = 2  STORM AREA (SQ MI) =        0.50
                272810  MANE          1.00      0.86    312.00       0.12       1.00       0.86    312.00         0.12

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3137E+00 EXCESS=0.0000E+00 OUTFLOW=0.3132E+00 BASIN STORAGE=0.1472E-02 PERCENT ERROR=  -0.3

              FOR STORM = 3  STORM AREA (SQ MI) =        2.80
                272810  MANE          1.00      0.31    346.00       0.06       1.00       0.31    346.00         0.06

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1609E+00 EXCESS=0.0000E+00 OUTFLOW=0.1601E+00 BASIN STORAGE=0.1472E-02 PERCENT ERROR=  -0.4

              FOR STORM = 1  STORM AREA (SQ MI) =        0.00
                272830  MANE          1.00     61.79    246.00       0.47       1.00      61.79    246.00         0.47

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2436E+01 EXCESS=0.0000E+00 OUTFLOW=0.2436E+01 BASIN STORAGE=0.2972E-03 PERCENT ERROR=   0.0

              FOR STORM = 2  STORM AREA (SQ MI) =        0.50
                272830  MANE          1.00     61.01    246.00       0.46       1.00      61.01    246.00         0.46

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2407E+01 EXCESS=0.0000E+00 OUTFLOW=0.2407E+01 BASIN STORAGE=0.2972E-03 PERCENT ERROR=   0.0

              FOR STORM = 3  STORM AREA (SQ MI) =        2.80
                272830  MANE          1.00     10.00    247.00       0.18       1.00      10.00    247.00         0.18

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9248E+00 EXCESS=0.0000E+00 OUTFLOW=0.9246E+00 BASIN STORAGE=0.2972E-03 PERCENT ERROR=   0.0

              FOR STORM = 1  STORM AREA (SQ MI) =        0.00
                272840  MANE          0.43     61.67    245.73       0.47       1.00      61.67    246.00         0.47

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2436E+01 EXCESS=0.0000E+00 OUTFLOW=0.2436E+01 BASIN STORAGE=0.1194E-03 PERCENT ERROR=   0.0

              FOR STORM = 2  STORM AREA (SQ MI) =        0.50
                272840  MANE          0.43     60.91    245.79       0.46       1.00      60.89    246.00         0.46

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2407E+01 EXCESS=0.0000E+00 OUTFLOW=0.2407E+01 BASIN STORAGE=0.1194E-03 PERCENT ERROR=   0.0

              FOR STORM = 3  STORM AREA (SQ MI) =        2.80
                272840  MANE          0.73      9.98    248.13       0.18       1.00       9.98    248.00         0.18

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9246E+00 EXCESS=0.0000E+00 OUTFLOW=0.9246E+00 BASIN STORAGE=0.1194E-03 PERCENT ERROR=   0.0

              FOR STORM = 1  STORM AREA (SQ MI) =        0.00
                272850  MANE          1.00     61.40    249.00       0.47       1.00      61.40    249.00         0.47

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2436E+01 EXCESS=0.0000E+00 OUTFLOW=0.2435E+01 BASIN STORAGE=0.9203E-03 PERCENT ERROR=   0.0

              FOR STORM = 2  STORM AREA (SQ MI) =        0.50
                272850  MANE          1.00     60.63    249.00       0.46       1.00      60.63    249.00         0.46

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2407E+01 EXCESS=0.0000E+00 OUTFLOW=0.2406E+01 BASIN STORAGE=0.9203E-03 PERCENT ERROR=   0.0

              FOR STORM = 3  STORM AREA (SQ MI) =        2.80
                272850  MANE          1.00      9.93    253.00       0.18       1.00       9.93    253.00         0.18

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9246E+00 EXCESS=0.0000E+00 OUTFLOW=0.9242E+00 BASIN STORAGE=0.9203E-03 PERCENT ERROR=  -0.1

              FOR STORM = 1  STORM AREA (SQ MI) =        0.00
                272420  MANE          1.00     22.12    261.00       1.16       1.00      22.12    261.00         1.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1489E+01 EXCESS=0.0000E+00 OUTFLOW=0.1484E+01 BASIN STORAGE=0.1466E-02 PERCENT ERROR=   0.2

              FOR STORM = 2  STORM AREA (SQ MI) =        0.50
                272420  MANE          1.00     21.90    261.00       1.15       1.00      21.90    261.00         1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1474E+01 EXCESS=0.0000E+00 OUTFLOW=0.1470E+01 BASIN STORAGE=0.1463E-02 PERCENT ERROR=   0.2

              FOR STORM = 3  STORM AREA (SQ MI) =        2.80
                272420  MANE          1.00      9.33    263.00       0.73       1.00       9.33    263.00         0.73

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9377E+00 EXCESS=0.0000E+00 OUTFLOW=0.9361E+00 BASIN STORAGE=0.1726E-02 PERCENT ERROR=   0.0
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         FOR STORM = 1  STORM AREA (SQ MI) =         0.00
           272610  MANE          0.31     51.25    243.01        1.39        1.00       51.25     243.00          1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1932E+01 EXCESS=0.0000E+00 OUTFLOW=0.1932E+01 BASIN STORAGE=0.5142E-04 PERCENT ERROR=    0.0

         FOR STORM = 2  STORM AREA (SQ MI) =         0.50
           272610  MANE          0.31     50.81    242.94        1.38        1.00       50.80     243.00          1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1917E+01 EXCESS=0.0000E+00 OUTFLOW=0.1917E+01 BASIN STORAGE=0.5144E-04 PERCENT ERROR=    0.0

         FOR STORM = 3  STORM AREA (SQ MI) =         2.80
           272610  MANE          0.39     21.98    243.01        1.02        1.00       21.98     243.00          1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1413E+01 EXCESS=0.0000E+00 OUTFLOW=0.1413E+01 BASIN STORAGE=0.5000E-04 PERCENT ERROR=    0.0

         FOR STORM = 1  STORM AREA (SQ MI) =         0.00
           272620  MANE          1.00     50.48    249.00        1.39        1.00       50.48     249.00          1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1932E+01 EXCESS=0.0000E+00 OUTFLOW=0.1930E+01 BASIN STORAGE=0.1419E-02 PERCENT ERROR=    0.0

         FOR STORM = 2  STORM AREA (SQ MI) =         0.50
           272620  MANE          1.00     50.05    249.00        1.38        1.00       50.05     249.00          1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1917E+01 EXCESS=0.0000E+00 OUTFLOW=0.1915E+01 BASIN STORAGE=0.1414E-02 PERCENT ERROR=    0.0

         FOR STORM = 3  STORM AREA (SQ MI) =         2.80
           272620  MANE          1.00     21.75    251.00        1.02        1.00       21.75     251.00          1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1413E+01 EXCESS=0.0000E+00 OUTFLOW=0.1413E+01 BASIN STORAGE=0.1238E-02 PERCENT ERROR=   -0.1

         FOR STORM = 1  STORM AREA (SQ MI) =         0.00
           272450  MANE          1.00     46.70    278.00        0.92        1.00       46.70     278.00          0.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6450E+01 EXCESS=0.0000E+00 OUTFLOW=0.6449E+01 BASIN STORAGE=0.2026E-02 PERCENT ERROR=    0.0

         FOR STORM = 2  STORM AREA (SQ MI) =         0.50
           272450  MANE          1.00     46.02    278.00        0.91        1.00       46.02     278.00          0.91

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6376E+01 EXCESS=0.0000E+00 OUTFLOW=0.6375E+01 BASIN STORAGE=0.2026E-02 PERCENT ERROR=    0.0

         FOR STORM = 3  STORM AREA (SQ MI) =         2.80
           272450  MANE          1.00     23.41    291.00        0.58        1.00       23.41     291.00          0.58

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4116E+01 EXCESS=0.0000E+00 OUTFLOW=0.4115E+01 BASIN STORAGE=0.2026E-02 PERCENT ERROR=    0.0

         FOR STORM = 1  STORM AREA (SQ MI) =         0.00
           272454  MANE          1.00     64.29    254.00        0.72        1.00       64.29     254.00          0.72

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8884E+01 EXCESS=0.0000E+00 OUTFLOW=0.8883E+01 BASIN STORAGE=0.1608E-02 PERCENT ERROR=    0.0

         FOR STORM = 2  STORM AREA (SQ MI) =         0.50
           272454  MANE          1.00     63.20    254.00        0.72        1.00       63.20     254.00          0.72

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8781E+01 EXCESS=0.0000E+00 OUTFLOW=0.8781E+01 BASIN STORAGE=0.1608E-02 PERCENT ERROR=    0.0

         FOR STORM = 3  STORM AREA (SQ MI) =         2.80
           272454  MANE          1.00     25.95    288.00        0.41        1.00       25.95     288.00          0.41

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5039E+01 EXCESS=0.0000E+00 OUTFLOW=0.5038E+01 BASIN STORAGE=0.1608E-02 PERCENT ERROR=    0.0

         FOR STORM = 1  STORM AREA (SQ MI) =         0.00
           272462  MANE          1.00    141.52    253.00        0.72        1.00      141.52     253.00          0.72

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1111E+02 EXCESS=0.0000E+00 OUTFLOW=0.1110E+02 BASIN STORAGE=0.3017E-02 PERCENT ERROR=    0.0

         FOR STORM = 2  STORM AREA (SQ MI) =         0.50
           272462  MANE          1.00    139.44    253.00        0.71        1.00      139.44     253.00          0.71

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1097E+02 EXCESS=0.0000E+00 OUTFLOW=0.1096E+02 BASIN STORAGE=0.3017E-02 PERCENT ERROR=    0.0

         FOR STORM = 3  STORM AREA (SQ MI) =         2.80
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          272462  MANE          1.00     51.02    265.00      0.41      1.00     51.02    265.00          0.41

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6395E+01 EXCESS=0.0000E+00 OUTFLOW=0.6393E+01 BASIN STORAGE=0.3017E-02 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          272710  MANE          1.00      0.10    279.00      0.75      1.00      0.10    279.00          0.75

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2007E+00 EXCESS=0.0000E+00 OUTFLOW=0.2004E+00 BASIN STORAGE=0.3009E-03 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          272710  MANE          1.00      0.10    285.00      0.74      1.00      0.10    285.00          0.74

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1984E+00 EXCESS=0.0000E+00 OUTFLOW=0.1981E+00 BASIN STORAGE=0.2973E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          272710  MANE          1.00      0.07    319.00      0.51      1.00      0.07    319.00          0.51

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1354E+00 EXCESS=0.0000E+00 OUTFLOW=0.1352E+00 BASIN STORAGE=0.2056E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          272520  MANE          0.37    207.81    254.37      0.86      1.00    206.13    254.00          0.86

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1655E+02 EXCESS=0.0000E+00 OUTFLOW=0.1655E+02 BASIN STORAGE=0.9157E-03 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          272520  MANE          0.37    204.35    254.72      0.85      1.00    203.14    255.00          0.85

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1636E+02 EXCESS=0.0000E+00 OUTFLOW=0.1636E+02 BASIN STORAGE=0.9134E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          272520  MANE          0.50     67.85    270.94      0.57      1.00     67.81    271.00          0.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1083E+02 EXCESS=0.0000E+00 OUTFLOW=0.1083E+02 BASIN STORAGE=0.8492E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          272530  MANE          1.00    291.67    259.00      0.95      1.00    291.67    259.00          0.95

    TINUITY SUMMARY (AC-FT) - INFLOW=0.2308E+02 EXCESS=0.0000E+00 OUTFLOW=0.2306E+02 BASIN STORAGE=0.1122E-01 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          272530  MANE          1.00    287.31    259.00      0.94      1.00    287.31    259.00          0.94

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2284E+02 EXCESS=0.0000E+00 OUTFLOW=0.2283E+02 BASIN STORAGE=0.1119E-01 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          272530  MANE          1.00    103.96    276.00      0.66      1.00    103.96    276.00          0.66

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1598E+02 EXCESS=0.0000E+00 OUTFLOW=0.1598E+02 BASIN STORAGE=0.1037E-01 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          272550  MANE          1.00    220.28    259.00      0.51      1.00    220.28    259.00          0.51

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2233E+02 EXCESS=0.0000E+00 OUTFLOW=0.2232E+02 BASIN STORAGE=0.3612E-02 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          272550  MANE          1.00    215.72    259.00      0.51      1.00    215.72    259.00          0.51

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2214E+02 EXCESS=0.0000E+00 OUTFLOW=0.2214E+02 BASIN STORAGE=0.3603E-02 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          272550  MANE          1.00     88.65    277.00      0.39      1.00     88.65    277.00          0.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1716E+02 EXCESS=0.0000E+00 OUTFLOW=0.1716E+02 BASIN STORAGE=0.3339E-02 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271610  MANE          1.00      0.01    347.00      0.04      1.00      0.01    347.00          0.04

    TINUITY SUMMARY (AC-FT) - INFLOW=0.2476E-01 EXCESS=0.0000E+00 OUTFLOW=0.2380E-01 BASIN STORAGE=0.3701E-03 PERCENT ERROR=   2.4

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271610  MANE          1.00      0.01    347.00      0.04      1.00      0.01    347.00          0.04
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2476E-01 EXCESS=0.0000E+00 OUTFLOW=0.2380E-01 BASIN STORAGE=0.3701E-03 PERCENT ERROR= 2.4

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
271610 MANE 1.00 0.01 345.00 0.04 1.00 0.01 345.00 0.04

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2481E-01 EXCESS=0.0000E+00 OUTFLOW=0.2385E-01 BASIN STORAGE=0.3701E-03 PERCENT ERROR= 2.4

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
271630 MANE 1.00 66.73 252.00 1.16 1.00 66.73 252.00 1.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3231E+01 EXCESS=0.0000E+00 OUTFLOW=0.3228E+01 BASIN STORAGE=0.2744E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
271630 MANE 1.00 66.19 252.00 1.15 1.00 66.19 252.00 1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3205E+01 EXCESS=0.0000E+00 OUTFLOW=0.3202E+01 BASIN STORAGE=0.2744E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
271630 MANE 1.00 35.17 254.00 0.96 1.00 35.17 254.00 0.96

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2656E+01 EXCESS=0.0000E+00 OUTFLOW=0.2654E+01 BASIN STORAGE=0.2744E-02 PERCENT ERROR= -0.1

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
271650 MANE 1.00 162.00 248.00 1.30 1.00 162.00 248.00 1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7726E+01 EXCESS=0.0000E+00 OUTFLOW=0.7725E+01 BASIN STORAGE=0.6043E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
271650 MANE 1.00 160.56 248.00 1.29 1.00 160.56 248.00 1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7663E+01 EXCESS=0.0000E+00 OUTFLOW=0.7661E+01 BASIN STORAGE=0.6043E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
271650 MANE 1.00 83.91 248.00 1.06 1.00 83.91 248.00 1.06

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6261E+01 EXCESS=0.0000E+00 OUTFLOW=0.6261E+01 BASIN STORAGE=0.6043E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
271930 MANE 1.00 0.01 426.00 0.02 1.00 0.01 426.00 0.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2479E-01 EXCESS=0.0000E+00 OUTFLOW=0.2296E-01 BASIN STORAGE=0.6703E-03 PERCENT ERROR= 4.7

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
271930 MANE 1.00 0.01 427.00 0.02 1.00 0.01 427.00 0.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2478E-01 EXCESS=0.0000E+00 OUTFLOW=0.2295E-01 BASIN STORAGE=0.6703E-03 PERCENT ERROR= 4.7

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
271930 MANE 1.00 0.01 424.00 0.02 1.00 0.01 424.00 0.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2483E-01 EXCESS=0.0000E+00 OUTFLOW=0.2299E-01 BASIN STORAGE=0.6703E-03 PERCENT ERROR= 4.7

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
271670 MANE 1.00 184.83 249.00 1.15 1.00 184.83 249.00 1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9533E+01 EXCESS=0.0000E+00 OUTFLOW=0.9530E+01 BASIN STORAGE=0.5841E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
271670 MANE 1.00 183.21 249.00 1.14 1.00 183.21 249.00 1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9456E+01 EXCESS=0.0000E+00 OUTFLOW=0.9453E+01 BASIN STORAGE=0.5841E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
271670 MANE 1.00 98.40 250.00 0.95 1.00 98.40 250.00 0.95

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7838E+01 EXCESS=0.0000E+00 OUTFLOW=0.7837E+01 BASIN STORAGE=0.5841E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
272020 MANE 1.00 59.61 242.00 1.92 1.00 59.61 242.00 1.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2153E+01 EXCESS=0.0000E+00 OUTFLOW=0.2148E+01 BASIN STORAGE=0.1319E-02 PERCENT ERROR= 0.2

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   FOR STORM = 2  STORM AREA (SQ MI) =        0.50
     272020  MANE          1.00     59.20    242.00       1.90       1.00      59.20     242.00         1.90

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2138E+01 EXCESS=0.0000E+00 OUTFLOW=0.2133E+01 BASIN STORAGE=0.1315E-02 PERCENT ERROR=   0.2

   FOR STORM = 3  STORM AREA (SQ MI) =        2.80
     272020  MANE          1.00     27.50    243.00       1.71       1.00      27.50     243.00         1.71

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1921E+01 EXCESS=0.0000E+00 OUTFLOW=0.1920E+01 BASIN STORAGE=0.1122E-02 PERCENT ERROR=   0.0

   FOR STORM = 1  STORM AREA (SQ MI) =        0.00
     272040  MANE          1.00    134.69    248.00       1.84       1.00     134.69     248.00         1.84

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5885E+01 EXCESS=0.0000E+00 OUTFLOW=0.5881E+01 BASIN STORAGE=0.1180E-02 PERCENT ERROR=   0.0

   FOR STORM = 2  STORM AREA (SQ MI) =        0.50
     272040  MANE          1.00    133.74    248.00       1.82       1.00     133.74     248.00         1.82

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5843E+01 EXCESS=0.0000E+00 OUTFLOW=0.5839E+01 BASIN STORAGE=0.1400E-02 PERCENT ERROR=   0.0

   FOR STORM = 3  STORM AREA (SQ MI) =        2.80
     272040  MANE          1.00     68.25    249.00       1.62       1.00      68.25     249.00         1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5177E+01 EXCESS=0.0000E+00 OUTFLOW=0.5176E+01 BASIN STORAGE=0.1221E-02 PERCENT ERROR=   0.0

   FOR STORM = 1  STORM AREA (SQ MI) =        0.00
     272060  MANE          0.48    168.61    248.00       1.78       1.00     168.61     248.00         1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7980E+01 EXCESS=0.0000E+00 OUTFLOW=0.7980E+01 BASIN STORAGE=0.2089E-03 PERCENT ERROR=   0.0

   FOR STORM = 2  STORM AREA (SQ MI) =        0.50
     272060  MANE          0.48    167.31    247.64       1.77       1.00     167.27     248.00         1.77

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7922E+01 EXCESS=0.0000E+00 OUTFLOW=0.7922E+01 BASIN STORAGE=0.2124E-03 PERCENT ERROR=   0.0

   FOR STORM = 3  STORM AREA (SQ MI) =        2.80
     272060  MANE          0.60     87.71    249.29       1.55       1.00      87.68     249.00         1.55

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6958E+01 EXCESS=0.0000E+00 OUTFLOW=0.6958E+01 BASIN STORAGE=0.2144E-03 PERCENT ERROR=   0.0

   FOR STORM = 1  STORM AREA (SQ MI) =        0.00
     271690  MANE          1.00    354.98    251.00       1.37       1.00     354.98     251.00         1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1784E+02 EXCESS=0.0000E+00 OUTFLOW=0.1783E+02 BASIN STORAGE=0.1515E-02 PERCENT ERROR=   0.0

   FOR STORM = 2  STORM AREA (SQ MI) =        0.50
     271690  MANE          1.00    351.97    251.00       1.36       1.00     351.97     251.00         1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1770E+02 EXCESS=0.0000E+00 OUTFLOW=0.1769E+02 BASIN STORAGE=0.1515E-02 PERCENT ERROR=   0.0

   FOR STORM = 3  STORM AREA (SQ MI) =        2.80
     271690  MANE          1.00    188.35    253.00       1.16       1.00     188.35     253.00         1.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1504E+02 EXCESS=0.0000E+00 OUTFLOW=0.1503E+02 BASIN STORAGE=0.1515E-02 PERCENT ERROR=   0.0

   FOR STORM = 1  STORM AREA (SQ MI) =        0.00
     272120  MANE          1.00     21.57    248.00       1.76       1.00      21.57     248.00         1.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9392E+00 EXCESS=0.0000E+00 OUTFLOW=0.9387E+00 BASIN STORAGE=0.9029E-03 PERCENT ERROR=   0.0

   FOR STORM = 2  STORM AREA (SQ MI) =        0.50
     272120  MANE          1.00     21.42    248.00       1.75       1.00      21.42     248.00         1.75

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9323E+00 EXCESS=0.0000E+00 OUTFLOW=0.9317E+00 BASIN STORAGE=0.8940E-03 PERCENT ERROR=   0.0

   FOR STORM = 3  STORM AREA (SQ MI) =        2.80
     272120  MANE          1.00     11.07    249.00       1.53       1.00      11.07     249.00         1.53

TINUITY SUMMARY (AC-FT) - INFLOW=0.8178E+00 EXCESS=0.0000E+00 OUTFLOW=0.8176E+00 BASIN STORAGE=0.9608E-03 PERCENT ERROR=  -0.1

   FOR STORM = 1  STORM AREA (SQ MI) =        0.00
     271710  MANE          1.00    402.67    256.00       1.36       1.00     402.67     256.00         1.36
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2045E+02 EXCESS=0.0000E+00 OUTFLOW=0.2044E+02 BASIN STORAGE=0.3170E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            271710  MANE          1.00    399.32    256.00       1.35       1.00    399.32    256.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2029E+02 EXCESS=0.0000E+00 OUTFLOW=0.2028E+02 BASIN STORAGE=0.3170E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            271710  MANE          1.00    214.56    258.00       1.14       1.00    214.56    258.00        1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1706E+02 EXCESS=0.0000E+00 OUTFLOW=0.1705E+02 BASIN STORAGE=0.3170E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            272240  MANE          1.00     63.01    249.00       1.23       1.00     63.01    249.00        1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2685E+01 EXCESS=0.0000E+00 OUTFLOW=0.2684E+01 BASIN STORAGE=0.7464E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            272240  MANE          1.00     62.45    249.00       1.22       1.00     62.45    249.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2661E+01 EXCESS=0.0000E+00 OUTFLOW=0.2660E+01 BASIN STORAGE=0.8187E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            272240  MANE          1.00     30.75    250.00       0.91       1.00     30.75    250.00        0.91

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1984E+01 EXCESS=0.0000E+00 OUTFLOW=0.1984E+01 BASIN STORAGE=0.7804E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            272250  MANE          1.00    113.04    250.00       1.36       1.00    113.04    250.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5233E+01 EXCESS=0.0000E+00 OUTFLOW=0.5225E+01 BASIN STORAGE=0.8733E-03 PERCENT ERROR=   0.1

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            272250  MANE          1.00    112.18    250.00       1.35       1.00    112.18    250.00        1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5192E+01 EXCESS=0.0000E+00 OUTFLOW=0.5182E+01 BASIN STORAGE=0.8733E-03 PERCENT ERROR=   0.2

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            272250  MANE          1.00     57.73    252.00       1.07       1.00     57.73    252.00        1.07

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4108E+01 EXCESS=0.0000E+00 OUTFLOW=0.4097E+01 BASIN STORAGE=0.8733E-03 PERCENT ERROR=   0.3

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            271722  MANE          0.48    446.40    254.97       1.21       1.00    446.39    255.00        1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2652E+02 EXCESS=0.0000E+00 OUTFLOW=0.2653E+02 BASIN STORAGE=0.7981E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            271722  MANE          0.48    441.84    255.14       1.20       1.00    441.43    255.00        1.20

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2632E+02 EXCESS=0.0000E+00 OUTFLOW=0.2633E+02 BASIN STORAGE=0.7981E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            271722  MANE          0.65    260.51    257.40       1.07       1.00    260.50    258.00        1.07

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2338E+02 EXCESS=0.0000E+00 OUTFLOW=0.2338E+02 BASIN STORAGE=0.7981E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            271730  MANE          1.00    453.11    259.00       1.38       1.00    453.11    259.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3036E+02 EXCESS=0.0000E+00 OUTFLOW=0.3035E+02 BASIN STORAGE=0.3576E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            271730  MANE          1.00    448.62    259.00       1.37       1.00    448.62    259.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3012E+02 EXCESS=0.0000E+00 OUTFLOW=0.3010E+02 BASIN STORAGE=0.3576E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            271730  MANE          1.00    268.58    262.00       1.14       1.00    268.58    262.00        1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2499E+02 EXCESS=0.0000E+00 OUTFLOW=0.2499E+02 BASIN STORAGE=0.3576E-02 PERCENT ERROR=   0.0
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      FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        272310  MANE          1.00     13.49    262.00       0.71       1.00      13.49    262.00         0.71

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6195E+00 EXCESS=0.0000E+00 OUTFLOW=0.6078E+00 BASIN STORAGE=0.6212E-03 PERCENT ERROR=   1.8

      FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        272310  MANE          1.00     13.04    263.00       0.69       1.00      13.04    263.00         0.69

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6065E+00 EXCESS=0.0000E+00 OUTFLOW=0.5928E+00 BASIN STORAGE=0.6212E-03 PERCENT ERROR=   2.1

      FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        272310  MANE          1.00      6.80    274.00       0.41       1.00       6.80    274.00         0.41

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3597E+00 EXCESS=0.0000E+00 OUTFLOW=0.3520E+00 BASIN STORAGE=0.6212E-03 PERCENT ERROR=   2.0

      FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        271750  MANE          0.23    490.10    258.55       1.37       1.00     490.00    259.00         1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3377E+02 EXCESS=0.0000E+00 OUTFLOW=0.3377E+02 BASIN STORAGE=0.8211E-03 PERCENT ERROR=   0.0

      FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        271750  MANE          0.23    484.33    258.85       1.36       1.00     484.31    259.00         1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3349E+02 EXCESS=0.0000E+00 OUTFLOW=0.3349E+02 BASIN STORAGE=0.8211E-03 PERCENT ERROR=   0.0

      FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        271750  MANE          0.28    288.28    261.02       1.12       1.00     288.28    261.00         1.12

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2762E+02 EXCESS=0.0000E+00 OUTFLOW=0.2762E+02 BASIN STORAGE=0.8211E-03 PERCENT ERROR=   0.0

      FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        271765  MANE          0.22    727.66    259.13       0.92       1.00     727.28    259.00         0.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6286E+02 EXCESS=0.0000E+00 OUTFLOW=0.6286E+02 BASIN STORAGE=0.2763E-02 PERCENT ERROR=   0.0

      FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        271765  MANE          0.22    717.06    259.11       0.91       1.00     716.49    259.00         0.91

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6225E+02 EXCESS=0.0000E+00 OUTFLOW=0.6225E+02 BASIN STORAGE=0.2758E-02 PERCENT ERROR=   0.0

      FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        271765  MANE          0.28    375.26    260.51       0.69       1.00     375.20    261.00         0.69

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4750E+02 EXCESS=0.0000E+00 OUTFLOW=0.4750E+02 BASIN STORAGE=0.2630E-02 PERCENT ERROR=   0.0

      FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        271766  MANE          0.39    726.24    259.32       0.92       1.00     724.91    259.00         0.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6286E+02 EXCESS=0.0000E+00 OUTFLOW=0.6286E+02 BASIN STORAGE=0.4997E-02 PERCENT ERROR=   0.0

      FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        271766  MANE          0.39    715.49    259.69       0.91       1.00     714.13    260.00         0.91

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6225E+02 EXCESS=0.0000E+00 OUTFLOW=0.6225E+02 BASIN STORAGE=0.4988E-02 PERCENT ERROR=   0.0

      FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        271766  MANE          0.51    375.12    260.84       0.69       1.00     375.11    261.00         0.69

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4750E+02 EXCESS=0.0000E+00 OUTFLOW=0.4750E+02 BASIN STORAGE=0.4757E-02 PERCENT ERROR=   0.0

      FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        271780  MANE          1.00    966.67    261.00       0.93       1.00     966.67    261.00         0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8311E+02 EXCESS=0.0000E+00 OUTFLOW=0.8306E+02 BASIN STORAGE=0.3249E-01 PERCENT ERROR=   0.0

      FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        271780  MANE          1.00    955.63    262.00       0.92       1.00     955.63    262.00         0.92

   TINUITY SUMMARY (AC-FT) - INFLOW=0.8237E+02 EXCESS=0.0000E+00 OUTFLOW=0.8232E+02 BASIN STORAGE=0.3229E-01 PERCENT ERROR=   0.0

      FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        271780  MANE          1.00    550.58    263.00       0.72       1.00     550.58    263.00         0.72
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6430E+02 EXCESS=0.0000E+00 OUTFLOW=0.6426E+02 BASIN STORAGE=0.2395E-01 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            271795  MANE          0.63    968.33    261.75       0.93       1.00     967.86     262.00          0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8407E+02 EXCESS=0.0000E+00 OUTFLOW=0.8406E+02 BASIN STORAGE=0.6678E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            271795  MANE          0.63    957.78    262.07       0.92       1.00     957.56     262.00          0.92

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8332E+02 EXCESS=0.0000E+00 OUTFLOW=0.8331E+02 BASIN STORAGE=0.6637E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            271795  MANE          0.74    555.24    263.72       0.72       1.00     555.18     263.00          0.72

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6522E+02 EXCESS=0.0000E+00 OUTFLOW=0.6521E+02 BASIN STORAGE=0.4918E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            271811  MANE          1.00    771.38    264.00       0.86       1.00     771.38     264.00          0.86

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7943E+02 EXCESS=0.0000E+00 OUTFLOW=0.7938E+02 BASIN STORAGE=0.2701E-01 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            271811  MANE          1.00    764.01    264.00       0.85       1.00     764.01     264.00          0.85

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7880E+02 EXCESS=0.0000E+00 OUTFLOW=0.7875E+02 BASIN STORAGE=0.2684E-01 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            271811  MANE          1.00    499.46    266.00       0.70       1.00     499.46     266.00          0.70

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6447E+02 EXCESS=0.0000E+00 OUTFLOW=0.6444E+02 BASIN STORAGE=0.1986E-01 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            271820  MANE          0.82    919.06    266.86       0.94       1.00     918.48     267.00          0.94

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8746E+02 EXCESS=0.0000E+00 OUTFLOW=0.8745E+02 BASIN STORAGE=0.7708E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            271820  MANE          0.82    905.66    267.22       0.94       1.00     905.14     267.00          0.94

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8669E+02 EXCESS=0.0000E+00 OUTFLOW=0.8667E+02 BASIN STORAGE=0.7661E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            271820  MANE          0.97    513.38    267.13       0.73       1.00     513.34     267.00          0.73

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6791E+02 EXCESS=0.0000E+00 OUTFLOW=0.6790E+02 BASIN STORAGE=0.5668E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            271837  MANE          1.00    844.52    273.00       0.97       1.00     844.52     273.00          0.97

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9426E+02 EXCESS=0.0000E+00 OUTFLOW=0.9422E+02 BASIN STORAGE=0.2416E-01 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            271837  MANE          1.00    829.89    273.00       0.96       1.00     829.89     273.00          0.96

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9343E+02 EXCESS=0.0000E+00 OUTFLOW=0.9339E+02 BASIN STORAGE=0.2401E-01 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            271837  MANE          1.00    504.63    269.00       0.76       1.00     504.63     269.00          0.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7364E+02 EXCESS=0.0000E+00 OUTFLOW=0.7362E+02 BASIN STORAGE=0.1796E-01 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            271838  MANE          0.72    837.40    273.55       0.97       1.00     837.03     274.00          0.97

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9422E+02 EXCESS=0.0000E+00 OUTFLOW=0.9421E+02 BASIN STORAGE=0.6778E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            271838  MANE          0.72    823.78    274.24       0.96       1.00     823.58     274.00          0.96

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9339E+02 EXCESS=0.0000E+00 OUTFLOW=0.9338E+02 BASIN STORAGE=0.6738E-02 PERCENT ERROR=   0.0
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FOR STORM = 3 STORM AREA (SQ MI) = 2.80
271838 MANE 0.84 503.37 269.75 0.76 1.00 503.30 270.00 0.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7362E+02 EXCESS=0.0000E+00 OUTFLOW=0.7361E+02 BASIN STORAGE=0.5031E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270020 MANE 1.00 55.91 246.00 2.33 1.00 55.91 246.00 2.33

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2613E+01 EXCESS=0.0000E+00 OUTFLOW=0.2611E+01 BASIN STORAGE=0.1317E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270020 MANE 1.00 55.55 246.00 2.32 1.00 55.55 246.00 2.32

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2597E+01 EXCESS=0.0000E+00 OUTFLOW=0.2595E+01 BASIN STORAGE=0.1312E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270020 MANE 1.00 29.23 247.00 2.17 1.00 29.23 247.00 2.17

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2435E+01 EXCESS=0.0000E+00 OUTFLOW=0.2434E+01 BASIN STORAGE=0.1110E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270040 MANE 1.00 160.27 245.00 1.74 1.00 160.27 245.00 1.74

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6702E+01 EXCESS=0.0000E+00 OUTFLOW=0.6701E+01 BASIN STORAGE=0.5561E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270040 MANE 1.00 159.08 245.00 1.73 1.00 159.08 245.00 1.73

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6652E+01 EXCESS=0.0000E+00 OUTFLOW=0.6651E+01 BASIN STORAGE=0.5541E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270040 MANE 1.00 80.07 245.00 1.51 1.00 80.07 245.00 1.51

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5791E+01 EXCESS=0.0000E+00 OUTFLOW=0.5790E+01 BASIN STORAGE=0.5761E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270720 MANE 1.00 7.35 247.00 2.36 1.00 7.35 247.00 2.36

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6286E+00 EXCESS=0.0000E+00 OUTFLOW=0.6286E+00 BASIN STORAGE=0.1697E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270720 MANE 1.00 7.30 247.00 2.34 1.00 7.30 247.00 2.34

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6246E+00 EXCESS=0.0000E+00 OUTFLOW=0.6246E+00 BASIN STORAGE=0.1690E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270720 MANE 1.00 4.90 248.00 2.22 1.00 4.90 248.00 2.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5932E+00 EXCESS=0.0000E+00 OUTFLOW=0.5932E+00 BASIN STORAGE=0.1741E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270050 MANE 1.00 165.78 250.00 1.78 1.00 165.78 250.00 1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7329E+01 EXCESS=0.0000E+00 OUTFLOW=0.7325E+01 BASIN STORAGE=0.2490E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270050 MANE 1.00 164.56 250.00 1.77 1.00 164.56 250.00 1.77

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7276E+01 EXCESS=0.0000E+00 OUTFLOW=0.7271E+01 BASIN STORAGE=0.2514E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270050 MANE 1.00 84.48 251.00 1.55 1.00 84.48 251.00 1.55

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6384E+01 EXCESS=0.0000E+00 OUTFLOW=0.6382E+01 BASIN STORAGE=0.2603E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270070 MANE 0.87 257.78 249.12 1.88 1.00 257.53 249.00 1.88

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1322E+02 EXCESS=0.0000E+00 OUTFLOW=0.1322E+02 BASIN STORAGE=0.3005E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50

270070 MANE 0.88 255.85 249.67 1.86 1.00 255.62 249.00 1.86

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1313E+02 EXCESS=0.0000E+00 OUTFLOW=0.1313E+02 BASIN STORAGE=0.3027E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270070 MANE 1.00 139.98 251.00 1.66 1.00 139.98 251.00 1.66

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1171E+02 EXCESS=0.0000E+00 OUTFLOW=0.1171E+02 BASIN STORAGE=0.2947E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270810 MANE 0.89 28.23 243.88 1.39 1.00 28.18 244.00 1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1191E+01 EXCESS=0.0000E+00 OUTFLOW=0.1189E+01 BASIN STORAGE=0.1242E-03 PERCENT ERROR= 0.2

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270810 MANE 0.89 27.93 243.54 1.38 1.00 27.87 244.00 1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1182E+01 EXCESS=0.0000E+00 OUTFLOW=0.1179E+01 BASIN STORAGE=0.1235E-03 PERCENT ERROR= 0.2

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270810 MANE 1.00 12.63 244.00 1.02 1.00 12.63 244.00 1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8744E+00 EXCESS=0.0000E+00 OUTFLOW=0.8737E+00 BASIN STORAGE=0.1273E-03 PERCENT ERROR= 0.1

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270820 MANE 1.00 27.66 251.00 1.39 1.00 27.66 251.00 1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1189E+01 EXCESS=0.0000E+00 OUTFLOW=0.1187E+01 BASIN STORAGE=0.1926E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270820 MANE 1.00 27.38 251.00 1.38 1.00 27.38 251.00 1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1179E+01 EXCESS=0.0000E+00 OUTFLOW=0.1178E+01 BASIN STORAGE=0.1920E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270820 MANE 1.00 12.48 254.00 1.02 1.00 12.48 254.00 1.02

TINUITY SUMMARY (AC-FT) - INFLOW=0.8737E+00 EXCESS=0.0000E+00 OUTFLOW=0.8732E+00 BASIN STORAGE=0.1738E-02 PERCENT ERROR= -0.1

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270840 MANE 1.00 56.56 253.00 1.30 1.00 56.56 253.00 1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2906E+01 EXCESS=0.0000E+00 OUTFLOW=0.2905E+01 BASIN STORAGE=0.9718E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270840 MANE 1.00 56.04 253.00 1.29 1.00 56.04 253.00 1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2882E+01 EXCESS=0.0000E+00 OUTFLOW=0.2881E+01 BASIN STORAGE=0.9680E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270840 MANE 1.00 26.65 257.00 0.93 1.00 26.65 257.00 0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2078E+01 EXCESS=0.0000E+00 OUTFLOW=0.2078E+01 BASIN STORAGE=0.9647E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
276110 MANE 0.33 27.25 246.63 1.64 1.00 27.23 247.00 1.64

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1750E+01 EXCESS=0.0000E+00 OUTFLOW=0.1749E+01 BASIN STORAGE=0.2403E-04 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
276110 MANE 0.33 27.03 246.69 1.63 1.00 27.02 247.00 1.63

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1736E+01 EXCESS=0.0000E+00 OUTFLOW=0.1736E+01 BASIN STORAGE=0.2386E-04 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
276110 MANE 0.36 15.79 247.49 1.39 1.00 15.79 247.00 1.39

TINUITY SUMMARY (AC-FT) - INFLOW=0.1485E+01 EXCESS=0.0000E+00 OUTFLOW=0.1485E+01 BASIN STORAGE=0.2395E-04 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270090 MANE 1.00 361.34 254.00 1.73 1.00 361.34 254.00 1.73

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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1975E+02 EXCESS=0.0000E+00 OUTFLOW=0.1974E+02 BASIN STORAGE=0.1713E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            270090  MANE          1.00    358.42    254.00       1.72       1.00    358.42    254.00         1.72

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1961E+02 EXCESS=0.0000E+00 OUTFLOW=0.1960E+02 BASIN STORAGE=0.1631E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            270090  MANE          1.00    197.22    256.00       1.48       1.00    197.22    256.00         1.48

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1691E+02 EXCESS=0.0000E+00 OUTFLOW=0.1691E+02 BASIN STORAGE=0.1703E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            270910  MANE          0.36      6.13    243.58       1.40       1.00      6.12    244.00         1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2977E+00 EXCESS=0.0000E+00 OUTFLOW=0.2977E+00 BASIN STORAGE=0.3808E-04 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            270910  MANE          0.36      6.08    243.81       1.39       1.00      6.07    244.00         1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2955E+00 EXCESS=0.0000E+00 OUTFLOW=0.2955E+00 BASIN STORAGE=0.3821E-04 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            270910  MANE          0.45      2.85    244.10       1.02       1.00      2.85    244.00         1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2186E+00 EXCESS=0.0000E+00 OUTFLOW=0.2186E+00 BASIN STORAGE=0.3875E-04 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            270920  MANE          1.00      6.06    249.00       1.39       1.00      6.06    249.00         1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2977E+00 EXCESS=0.0000E+00 OUTFLOW=0.2975E+00 BASIN STORAGE=0.6279E-03 PERCENT ERROR=  -0.1

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            270920  MANE          1.00      6.01    249.00       1.38       1.00      6.01    249.00         1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2955E+00 EXCESS=0.0000E+00 OUTFLOW=0.2952E+00 BASIN STORAGE=0.6205E-03 PERCENT ERROR=  -0.1

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            270920  MANE          1.00      2.83    250.00       1.02       1.00      2.83    250.00         1.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2186E+00 EXCESS=0.0000E+00 OUTFLOW=0.2185E+00 BASIN STORAGE=0.6438E-03 PERCENT ERROR=  -0.3

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            271110  MANE          1.00      0.01    260.00       0.02       1.00      0.01    260.00         0.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2564E-01 EXCESS=0.0000E+00 OUTFLOW=0.2531E-01 BASIN STORAGE=0.2338E-03 PERCENT ERROR=   0.4

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            271110  MANE          1.00      0.01    260.00       0.02       1.00      0.01    260.00         0.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2563E-01 EXCESS=0.0000E+00 OUTFLOW=0.2530E-01 BASIN STORAGE=0.2338E-03 PERCENT ERROR=   0.4

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            271110  MANE          1.00      0.01    255.00       0.02       1.00      0.01    255.00         0.02

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2566E-01 EXCESS=0.0000E+00 OUTFLOW=0.2532E-01 BASIN STORAGE=0.2338E-03 PERCENT ERROR=   0.4

          FOR STORM = 1  STORM AREA (SQ MI) =        0.00
            270930  MANE          1.00     23.58    246.00       0.58       1.00     23.58    246.00         0.58

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1108E+01 EXCESS=0.0000E+00 OUTFLOW=0.1108E+01 BASIN STORAGE=0.2641E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =        0.50
            270930  MANE          1.00     23.38    246.00       0.57       1.00     23.38    246.00         0.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1100E+01 EXCESS=0.0000E+00 OUTFLOW=0.1100E+01 BASIN STORAGE=0.2641E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =        2.80
            270930  MANE          1.00     11.51    246.00       0.46       1.00     11.51    246.00         0.46

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8742E+00 EXCESS=0.0000E+00 OUTFLOW=0.8742E+00 BASIN STORAGE=0.2641E-03 PERCENT ERROR=   0.0
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         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270940  MANE          1.00      57.37    254.00       0.32       1.00      57.37     254.00          0.32

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1020E+01 EXCESS=0.0000E+00 OUTFLOW=0.1023E+01 BASIN STORAGE=0.6893E-03 PERCENT ERROR=  -0.3

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270940  MANE          1.00      58.30    254.00       0.32       1.00      58.30     254.00          0.32

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9939E+00 EXCESS=0.0000E+00 OUTFLOW=0.1000E+01 BASIN STORAGE=0.6893E-03 PERCENT ERROR=  -0.7

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270940  MANE          1.00      13.05    276.00       0.14       1.00      13.05     276.00          0.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4300E+00 EXCESS=0.0000E+00 OUTFLOW=0.4309E+00 BASIN STORAGE=0.6893E-03 PERCENT ERROR=  -0.4

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270950  MANE          1.00       0.01    371.00       0.00       1.00       0.01     371.00          0.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2507E-01 EXCESS=0.0000E+00 OUTFLOW=0.2379E-01 BASIN STORAGE=0.5094E-03 PERCENT ERROR=   3.1

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270950  MANE          1.00       0.01    371.00       0.00       1.00       0.01     371.00          0.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2506E-01 EXCESS=0.0000E+00 OUTFLOW=0.2378E-01 BASIN STORAGE=0.5094E-03 PERCENT ERROR=   3.1

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270950  MANE          1.00       0.01    366.00       0.00       1.00       0.01     366.00          0.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2510E-01 EXCESS=0.0000E+00 OUTFLOW=0.2382E-01 BASIN STORAGE=0.5094E-03 PERCENT ERROR=   3.1

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270960  MANE          0.47      31.74    245.27       0.26       1.00      31.74     245.00          0.26

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1513E+01 EXCESS=0.0000E+00 OUTFLOW=0.1513E+01 BASIN STORAGE=0.3548E-04 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270960  MANE          0.47      31.51    245.18       0.26       1.00      31.50     245.00          0.26

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1502E+01 EXCESS=0.0000E+00 OUTFLOW=0.1502E+01 BASIN STORAGE=0.3548E-04 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270960  MANE          0.54      16.60    244.94       0.22       1.00      16.60     245.00          0.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1283E+01 EXCESS=0.0000E+00 OUTFLOW=0.1283E+01 BASIN STORAGE=0.3548E-04 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270970  MANE          1.00      31.44    250.00       0.26       1.00      31.44     250.00          0.26

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1513E+01 EXCESS=0.0000E+00 OUTFLOW=0.1512E+01 BASIN STORAGE=0.1003E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270970  MANE          1.00      31.20    250.00       0.26       1.00      31.20     250.00          0.26

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1502E+01 EXCESS=0.0000E+00 OUTFLOW=0.1501E+01 BASIN STORAGE=0.1003E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270970  MANE          1.00      16.52    251.00       0.22       1.00      16.52     251.00          0.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1283E+01 EXCESS=0.0000E+00 OUTFLOW=0.1282E+01 BASIN STORAGE=0.1003E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270990  MANE          1.00      86.28    250.00       0.59       1.00      86.28     250.00          0.59

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4412E+01 EXCESS=0.0000E+00 OUTFLOW=0.4410E+01 BASIN STORAGE=0.1127E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270990  MANE          1.00      85.60    250.00       0.58       1.00      85.60     250.00          0.58

    INUITY SUMMARY (AC-FT) - INFLOW=0.4379E+01 EXCESS=0.0000E+00 OUTFLOW=0.4377E+01 BASIN STORAGE=0.1127E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270990  MANE          1.00      46.84    251.00       0.50       1.00      46.84     251.00          0.51
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3799E+01 EXCESS=0.0000E+00 OUTFLOW=0.3798E+01 BASIN STORAGE=0.1127E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270110  MANE          1.00    555.10    255.00      1.38      1.00    555.10    255.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3302E+02 EXCESS=0.0000E+00 OUTFLOW=0.3302E+02 BASIN STORAGE=0.1077E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270110  MANE          1.00    550.73    255.00      1.37      1.00    550.73    255.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3278E+02 EXCESS=0.0000E+00 OUTFLOW=0.3277E+02 BASIN STORAGE=0.1077E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270110  MANE          1.00    314.72    257.00      1.18      1.00    314.72    257.00        1.18

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2839E+02 EXCESS=0.0000E+00 OUTFLOW=0.2838E+02 BASIN STORAGE=0.1077E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270120  MANE          0.22    568.59    255.15      1.38      1.00    568.53    255.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3414E+02 EXCESS=0.0000E+00 OUTFLOW=0.3414E+02 BASIN STORAGE=0.3098E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270120  MANE          0.22    564.18    255.07      1.37      1.00    564.06    255.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3389E+02 EXCESS=0.0000E+00 OUTFLOW=0.3389E+02 BASIN STORAGE=0.3098E-03 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270120  MANE          0.28    324.49    257.17      1.19      1.00    324.43    257.00        1.19

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2934E+02 EXCESS=0.0000E+00 OUTFLOW=0.2934E+02 BASIN STORAGE=0.3098E-03 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270130  MANE          1.00    531.24    257.00      1.41      1.00    531.24    257.00        1.41

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3642E+02 EXCESS=0.0000E+00 OUTFLOW=0.3631E+02 BASIN STORAGE=0.1095E-02 PERCENT ERROR=   0.3

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270130  MANE          1.00    526.87    257.00      1.40      1.00    526.87    257.00        1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3615E+02 EXCESS=0.0000E+00 OUTFLOW=0.3604E+02 BASIN STORAGE=0.1095E-02 PERCENT ERROR=   0.3

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270130  MANE          1.00    317.81    260.00      1.22      1.00    317.81    260.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3149E+02 EXCESS=0.0000E+00 OUTFLOW=0.3142E+02 BASIN STORAGE=0.1095E-02 PERCENT ERROR=   0.2

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270150  MANE          1.00    540.71    258.00      1.41      1.00    540.71    258.00        1.41

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3722E+02 EXCESS=0.0000E+00 OUTFLOW=0.3722E+02 BASIN STORAGE=0.6890E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270150  MANE          1.00    536.24    258.00      1.40      1.00    536.24    258.00        1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3695E+02 EXCESS=0.0000E+00 OUTFLOW=0.3694E+02 BASIN STORAGE=0.6890E-03 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270150  MANE          1.00    324.65    261.00      1.22      1.00    324.65    261.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3219E+02 EXCESS=0.0000E+00 OUTFLOW=0.3218E+02 BASIN STORAGE=0.6890E-03 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270170  MANE          0.47    410.29    258.43      1.30      1.00    410.23    259.00        1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3463E+02 EXCESS=0.0000E+00 OUTFLOW=0.3462E+02 BASIN STORAGE=0.1711E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270170  MANE          0.47    408.81    258.71      1.30      1.00    408.72    259.00        1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3444E+02 EXCESS=0.0000E+00 OUTFLOW=0.3444E+02 BASIN STORAGE=0.1711E-03 PERCENT ERROR=   0.0
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         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270170  MANE          0.50    324.99    261.69       1.22       1.00    324.98    262.00          1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3233E+02 EXCESS=0.0000E+00 OUTFLOW=0.3233E+02 BASIN STORAGE=0.1711E-03 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270190  MANE          1.00    411.71    262.00       1.30       1.00    411.71    262.00          1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3486E+02 EXCESS=0.0000E+00 OUTFLOW=0.3485E+02 BASIN STORAGE=0.1295E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270190  MANE          1.00    410.20    262.00       1.30       1.00    410.20    262.00          1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3467E+02 EXCESS=0.0000E+00 OUTFLOW=0.3466E+02 BASIN STORAGE=0.1295E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270190  MANE          1.00    325.97    265.00       1.22       1.00    325.97    265.00          1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3252E+02 EXCESS=0.0000E+00 OUTFLOW=0.3251E+02 BASIN STORAGE=0.1295E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270210  MANE          1.00    414.84    262.00       1.30       1.00    414.84    262.00          1.30

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3522E+02 EXCESS=0.0000E+00 OUTFLOW=0.3521E+02 BASIN STORAGE=0.3573E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270210  MANE          1.00    413.25    262.00       1.29       1.00    413.25    262.00          1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3502E+02 EXCESS=0.0000E+00 OUTFLOW=0.3502E+02 BASIN STORAGE=0.3573E-03 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          270210  MANE          1.00    327.26    266.00       1.21       1.00    327.26    266.00          1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3272E+02 EXCESS=0.0000E+00 OUTFLOW=0.3271E+02 BASIN STORAGE=0.3573E-03 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271210  MANE          1.00     68.78    253.00       1.55       1.00     68.78    253.00          1.55

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4306E+01 EXCESS=0.0000E+00 OUTFLOW=0.4304E+01 BASIN STORAGE=0.1305E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271210  MANE          1.00     68.22    253.00       1.54       1.00     68.22    253.00          1.54

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4271E+01 EXCESS=0.0000E+00 OUTFLOW=0.4269E+01 BASIN STORAGE=0.1293E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271210  MANE          1.00     40.58    255.00       1.31       1.00     40.58    255.00          1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3627E+01 EXCESS=0.0000E+00 OUTFLOW=0.3626E+01 BASIN STORAGE=0.1223E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271220  MANE          0.53    163.79    248.79       1.57       1.00    163.74    249.00          1.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9480E+01 EXCESS=0.0000E+00 OUTFLOW=0.9479E+01 BASIN STORAGE=0.1377E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271220  MANE          0.53    162.45    248.84       1.56       1.00    162.41    249.00          1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9402E+01 EXCESS=0.0000E+00 OUTFLOW=0.9401E+01 BASIN STORAGE=0.1358E-03 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271220  MANE          0.62     95.55    250.63       1.33       1.00     95.51    251.00          1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8044E+01 EXCESS=0.0000E+00 OUTFLOW=0.8043E+01 BASIN STORAGE=0.1442E-03 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          270220  MANE          1.00    534.25    260.00       1.35       1.00    534.25    260.00          1.35

   TINUITY SUMMARY (AC-FT) - INFLOW=0.4497E+02 EXCESS=0.0000E+00 OUTFLOW=0.4496E+02 BASIN STORAGE=0.5422E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          270220  MANE          1.00    531.61    260.00       1.34       1.00    531.61    260.00          1.34
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4469E+02 EXCESS=0.0000E+00 OUTFLOW=0.4469E+02 BASIN STORAGE=0.5422E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =       2.80
           270220  MANE          1.00   407.10   265.00      1.23      1.00   407.10   265.00       1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4097E+02 EXCESS=0.0000E+00 OUTFLOW=0.4096E+02 BASIN STORAGE=0.5422E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =       0.00
           270230  MANE          1.00   540.58   261.00      1.35      1.00   540.58   261.00       1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4576E+02 EXCESS=0.0000E+00 OUTFLOW=0.4576E+02 BASIN STORAGE=0.5885E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =       0.50
           270230  MANE          1.00   537.87   261.00      1.34      1.00   537.87   261.00       1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4548E+02 EXCESS=0.0000E+00 OUTFLOW=0.4548E+02 BASIN STORAGE=0.5885E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =       2.80
           270230  MANE          1.00   411.49   266.00      1.23      1.00   411.49   266.00       1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4161E+02 EXCESS=0.0000E+00 OUTFLOW=0.4161E+02 BASIN STORAGE=0.5885E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =       0.00
           270250  MANE          1.00   547.99   262.00      1.35      1.00   547.99   262.00       1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4647E+02 EXCESS=0.0000E+00 OUTFLOW=0.4647E+02 BASIN STORAGE=0.4756E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =       0.50
           270250  MANE          1.00   545.19   262.00      1.34      1.00   545.19   262.00       1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4618E+02 EXCESS=0.0000E+00 OUTFLOW=0.4618E+02 BASIN STORAGE=0.4756E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =       2.80
           270250  MANE          1.00   415.82   267.00      1.22      1.00   415.82   267.00       1.22

   TINUITY SUMMARY (AC-FT) - INFLOW=0.4211E+02 EXCESS=0.0000E+00 OUTFLOW=0.4210E+02 BASIN STORAGE=0.4756E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =       0.00
           271320  MANE          1.00   115.86   248.00      1.57      1.00   115.86   248.00       1.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6525E+01 EXCESS=0.0000E+00 OUTFLOW=0.6525E+01 BASIN STORAGE=0.3929E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =       0.50
           271320  MANE          1.00   114.94   248.00      1.56      1.00   114.94   248.00       1.56

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6472E+01 EXCESS=0.0000E+00 OUTFLOW=0.6471E+01 BASIN STORAGE=0.3911E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =       2.80
           271320  MANE          1.00    66.13   249.00      1.33      1.00    66.13   249.00       1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5529E+01 EXCESS=0.0000E+00 OUTFLOW=0.5529E+01 BASIN STORAGE=0.4084E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =       0.00
           271330  MANE          1.00   120.65   249.00      1.58      1.00   120.65   249.00       1.58

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6843E+01 EXCESS=0.0000E+00 OUTFLOW=0.6842E+01 BASIN STORAGE=0.2300E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =       0.50
           271330  MANE          1.00   119.70   249.00      1.57      1.00   119.70   249.00       1.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6787E+01 EXCESS=0.0000E+00 OUTFLOW=0.6787E+01 BASIN STORAGE=0.2291E-03 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =       2.80
           271330  MANE          1.00    69.18   250.00      1.35      1.00    69.18   250.00       1.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5817E+01 EXCESS=0.0000E+00 OUTFLOW=0.5817E+01 BASIN STORAGE=0.2250E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =       0.00
           271340  MANE          1.00   123.57   250.00      1.59      1.00   123.57   250.00       1.59

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7054E+01 EXCESS=0.0000E+00 OUTFLOW=0.7054E+01 BASIN STORAGE=0.2163E-03 PERCENT ERROR=   0.0
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        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271340  MANE         1.00    122.60    250.00       1.58       1.00    122.60    250.00         1.58

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6997E+01 EXCESS=0.0000E+00 OUTFLOW=0.6997E+01 BASIN STORAGE=0.2154E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271340  MANE         1.00     71.08    251.00       1.36       1.00     71.08    251.00         1.36

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6010E+01 EXCESS=0.0000E+00 OUTFLOW=0.6010E+01 BASIN STORAGE=0.2133E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271350  MANE         1.00    126.28    252.00       1.60       1.00    126.28    252.00         1.60

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7266E+01 EXCESS=0.0000E+00 OUTFLOW=0.7265E+01 BASIN STORAGE=0.3750E-03 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271350  MANE         1.00    125.29    252.00       1.59       1.00    125.29    252.00         1.59

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7207E+01 EXCESS=0.0000E+00 OUTFLOW=0.7206E+01 BASIN STORAGE=0.3734E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271350  MANE         1.00     73.00    253.00       1.37       1.00     73.00    253.00         1.37

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6202E+01 EXCESS=0.0000E+00 OUTFLOW=0.6202E+01 BASIN STORAGE=0.3663E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271360  MANE         1.00    130.11    253.00       1.62       1.00    130.11    253.00         1.62

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7583E+01 EXCESS=0.0000E+00 OUTFLOW=0.7582E+01 BASIN STORAGE=0.2471E-03 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271360  MANE         1.00    129.09    253.00       1.60       1.00    129.09    253.00         1.60

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7522E+01 EXCESS=0.0000E+00 OUTFLOW=0.7521E+01 BASIN STORAGE=0.2461E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271360  MANE         1.00     75.78    255.00       1.38       1.00     75.78    255.00         1.38

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6491E+01 EXCESS=0.0000E+00 OUTFLOW=0.6490E+01 BASIN STORAGE=0.2458E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271370  MANE         1.00    132.32    254.00       1.62       1.00    132.32    254.00         1.62

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7794E+01 EXCESS=0.0000E+00 OUTFLOW=0.7794E+01 BASIN STORAGE=0.2985E-03 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271370  MANE         1.00    131.27    254.00       1.61       1.00    131.27    254.00         1.61

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7731E+01 EXCESS=0.0000E+00 OUTFLOW=0.7731E+01 BASIN STORAGE=0.2973E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271370  MANE         1.00     77.59    256.00       1.39       1.00     77.59    256.00         1.39

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6683E+01 EXCESS=0.0000E+00 OUTFLOW=0.6683E+01 BASIN STORAGE=0.3029E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
          271380  MANE         1.00    134.80    257.00       1.63       1.00    134.80    257.00         1.63

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8111E+01 EXCESS=0.0000E+00 OUTFLOW=0.8109E+01 BASIN STORAGE=0.6552E-03 PERCENT ERROR=   0.0

        FOR STORM = 2  STORM AREA (SQ MI) =        0.50
          271380  MANE         1.00    133.73    257.00       1.62       1.00    133.73    257.00         1.62

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8046E+01 EXCESS=0.0000E+00 OUTFLOW=0.8044E+01 BASIN STORAGE=0.6525E-03 PERCENT ERROR=   0.0

        FOR STORM = 3  STORM AREA (SQ MI) =        2.80
          271380  MANE         1.00     80.02    260.00       1.41       1.00     80.02    260.00         1.41

 CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6972E+01 EXCESS=0.0000E+00 OUTFLOW=0.6971E+01 BASIN STORAGE=0.6719E-03 PERCENT ERROR=   0.0

        FOR STORM = 1  STORM AREA (SQ MI) =        0.00
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        270270  MANE          1.00    711.89    262.00        1.37       1.00    711.89    262.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5819E+02 EXCESS=0.0000E+00 OUTFLOW=0.5816E+02 BASIN STORAGE=0.1656E-02 PERCENT ERROR=   0.0

       FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        270270  MANE          1.00    707.21    262.00        1.36       1.00    707.21    262.00        1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5780E+02 EXCESS=0.0000E+00 OUTFLOW=0.5778E+02 BASIN STORAGE=0.1656E-02 PERCENT ERROR=   0.0

       FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        270270  MANE          1.00    513.95    268.00        1.22       1.00    513.95    268.00        1.22

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5182E+02 EXCESS=0.0000E+00 OUTFLOW=0.5180E+02 BASIN STORAGE=0.1656E-02 PERCENT ERROR=   0.0

       FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        270285  MANE          1.00    694.72    267.00        1.38       1.00    694.72    267.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5970E+02 EXCESS=0.0000E+00 OUTFLOW=0.5966E+02 BASIN STORAGE=0.2125E-02 PERCENT ERROR=   0.1

       FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        270285  MANE          1.00    688.99    267.00        1.37       1.00    688.99    267.00        1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5930E+02 EXCESS=0.0000E+00 OUTFLOW=0.5926E+02 BASIN STORAGE=0.2125E-02 PERCENT ERROR=   0.1

       FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        270285  MANE          1.00    489.90    271.00        1.23       1.00    489.90    271.00        1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5311E+02 EXCESS=0.0000E+00 OUTFLOW=0.5308E+02 BASIN STORAGE=0.2125E-02 PERCENT ERROR=   0.0

       FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        270290  MANE          1.00    676.94    268.00        1.38       1.00    676.94    268.00        1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6229E+02 EXCESS=0.0000E+00 OUTFLOW=0.6214E+02 BASIN STORAGE=0.1872E-02 PERCENT ERROR=   0.2

       FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        270290  MANE          1.00    671.49    268.00        1.37       1.00    671.49    268.00        1.37

   TINUITY SUMMARY (AC-FT) - INFLOW=0.6187E+02 EXCESS=0.0000E+00 OUTFLOW=0.6172E+02 BASIN STORAGE=0.1872E-02 PERCENT ERROR=   0.2

       FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        270290  MANE          1.00    489.30    273.00        1.23       1.00    489.30    273.00        1.23

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.5533E+02 EXCESS=0.0000E+00 OUTFLOW=0.5521E+02 BASIN STORAGE=0.1872E-02 PERCENT ERROR=   0.2

       FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        270300  MANE          1.00    334.62    269.00        0.96       1.00    334.62    269.00        0.96

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4330E+02 EXCESS=0.0000E+00 OUTFLOW=0.4327E+02 BASIN STORAGE=0.6198E-03 PERCENT ERROR=   0.1

       FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        270300  MANE          1.00    332.93    269.00        0.96       1.00    332.93    269.00        0.96

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4311E+02 EXCESS=0.0000E+00 OUTFLOW=0.4307E+02 BASIN STORAGE=0.6198E-03 PERCENT ERROR=   0.1

       FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        270300  MANE          1.00    276.65    274.00        0.93       1.00    276.65    274.00        0.93

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4183E+02 EXCESS=0.0000E+00 OUTFLOW=0.4180E+02 BASIN STORAGE=0.6198E-03 PERCENT ERROR=   0.1

       FOR STORM = 1  STORM AREA (SQ MI) =        0.00
        273505  MANE          1.00     39.34    249.00        1.59       1.00     39.34    249.00        1.59

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1867E+01 EXCESS=0.0000E+00 OUTFLOW=0.1867E+01 BASIN STORAGE=0.2330E-02 PERCENT ERROR=  -0.1

       FOR STORM = 2  STORM AREA (SQ MI) =        0.50
        273505  MANE          1.00     39.04    249.00        1.58       1.00     39.04    249.00        1.58

   TINUITY SUMMARY (AC-FT) - INFLOW=0.1851E+01 EXCESS=0.0000E+00 OUTFLOW=0.1851E+01 BASIN STORAGE=0.2311E-02 PERCENT ERROR=  -0.1

       FOR STORM = 3  STORM AREA (SQ MI) =        2.80
        273505  MANE          1.00     21.62    250.00        1.36       1.00     21.62    250.00        1.36
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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1593E+01 EXCESS=0.0000E+00 OUTFLOW=0.1593E+01 BASIN STORAGE=0.2280E-02 PERCENT ERROR=  -0.1

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            273506  MANE          1.00     29.50    250.00       1.69       1.00      29.50     250.00         1.69

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1530E+01 EXCESS=0.0000E+00 OUTFLOW=0.1530E+01 BASIN STORAGE=0.1648E-02 PERCENT ERROR=  -0.1

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            273506  MANE          1.00     29.28    250.00       1.67       1.00      29.28     250.00         1.67

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1518E+01 EXCESS=0.0000E+00 OUTFLOW=0.1518E+01 BASIN STORAGE=0.1648E-02 PERCENT ERROR=  -0.1

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            273506  MANE          1.00     15.16    254.00       1.45       1.00      15.16     254.00         1.45

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1312E+01 EXCESS=0.0000E+00 OUTFLOW=0.1312E+01 BASIN STORAGE=0.1666E-02 PERCENT ERROR=  -0.1

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            273509  MANE          1.00     89.85    252.00       1.62       1.00      89.85     252.00         1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4500E+01 EXCESS=0.0000E+00 OUTFLOW=0.4500E+01 BASIN STORAGE=0.1372E-02 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            273509  MANE          1.00     89.29    252.00       1.61       1.00      89.29     252.00         1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4463E+01 EXCESS=0.0000E+00 OUTFLOW=0.4463E+01 BASIN STORAGE=0.1372E-02 PERCENT ERROR=   0.0

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            273509  MANE          1.00     47.57    257.00       1.39       1.00      47.57     257.00         1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.3847E+01 EXCESS=0.0000E+00 OUTFLOW=0.3847E+01 BASIN STORAGE=0.1368E-02 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            271510  MANE          1.00     26.10    250.00       1.68       1.00      26.10     250.00         1.68

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1608E+01 EXCESS=0.0000E+00 OUTFLOW=0.1609E+01 BASIN STORAGE=0.2927E-03 PERCENT ERROR=  -0.1

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            271510  MANE          1.00     25.79    250.00       1.66       1.00      25.79     250.00         1.66

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1595E+01 EXCESS=0.0000E+00 OUTFLOW=0.1595E+01 BASIN STORAGE=0.2927E-03 PERCENT ERROR=  -0.1

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            271510  MANE          1.00     15.35    253.00       1.44       1.00      15.35     253.00         1.44

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1381E+01 EXCESS=0.0000E+00 OUTFLOW=0.1381E+01 BASIN STORAGE=0.2927E-03 PERCENT ERROR=   0.0

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            273510  MANE          0.25      0.07    292.50       0.00       1.00       0.07     293.00         0.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7743E-03 EXCESS=0.0000E+00 OUTFLOW=0.8168E-03 BASIN STORAGE=0.1453E-02 PERCENT ERROR=-193.1

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            273510  MANE          0.30      0.00    347.70       0.00       1.00       0.00     348.00         0.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9481E-08 EXCESS=0.0000E+00 OUTFLOW=0.9481E-08 BASIN STORAGE=0.2026E-05 PERCENT ERROR=******

          FOR STORM = 3  STORM AREA (SQ MI) =         2.80
            273510  MANE          0.30      0.00    328.80       0.00       1.00       0.00     329.00         0.00

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1384E-07 EXCESS=0.0000E+00 OUTFLOW=0.1384E-07 BASIN STORAGE=0.3304E-05 PERCENT ERROR=******

          FOR STORM = 1  STORM AREA (SQ MI) =         0.00
            270318  MANE          1.00    136.35    253.00       1.62       1.00     136.35     253.00         1.62

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8145E+01 EXCESS=0.0000E+00 OUTFLOW=0.8144E+01 BASIN STORAGE=0.9582E-03 PERCENT ERROR=   0.0

          FOR STORM = 2  STORM AREA (SQ MI) =         0.50
            270318  MANE          1.00    135.57    253.00       1.61       1.00     135.57     253.00         1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.8078E+01 EXCESS=0.0000E+00 OUTFLOW=0.8077E+01 BASIN STORAGE=0.9582E-03 PERCENT ERROR=   0.0
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FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270318 MANE 1.00 77.23 258.00 1.39 1.00 77.23 258.00 1.39

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6966E+01 EXCESS=0.0000E+00 OUTFLOW=0.6965E+01 BASIN STORAGE=0.9582E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
CH2CBC MANE 0.47 388.47 270.75 5.35 1.00 388.36 271.00 5.35

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2683E+02 EXCESS=0.0000E+00 OUTFLOW=0.2683E+02 BASIN STORAGE=0.9900E-03 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
CH2CBC MANE 0.47 384.03 271.10 5.29 1.00 384.01 271.00 5.29

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2653E+02 EXCESS=0.0000E+00 OUTFLOW=0.2653E+02 BASIN STORAGE=0.9900E-03 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
CH2CBC MANE 0.55 256.67 273.89 4.03 1.00 256.64 274.00 4.03

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2018E+02 EXCESS=0.0000E+00 OUTFLOW=0.2018E+02 BASIN STORAGE=0.9900E-03 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270325 MANE 1.00 758.64 272.00 1.43 1.00 758.64 272.00 1.43

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7625E+02 EXCESS=0.0000E+00 OUTFLOW=0.7623E+02 BASIN STORAGE=0.2032E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270325 MANE 1.00 752.09 272.00 1.42 1.00 752.09 272.00 1.42

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7571E+02 EXCESS=0.0000E+00 OUTFLOW=0.7569E+02 BASIN STORAGE=0.2032E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270325 MANE 1.00 566.62 275.00 1.26 1.00 566.62 275.00 1.26

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6748E+02 EXCESS=0.0000E+00 OUTFLOW=0.6746E+02 BASIN STORAGE=0.2032E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270380 MANE 0.78 767.94 271.77 1.44 1.00 767.82 272.00 1.44

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7877E+02 EXCESS=0.0000E+00 OUTFLOW=0.7877E+02 BASIN STORAGE=0.1013E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270380 MANE 0.78 760.90 271.75 1.43 1.00 760.89 272.00 1.43

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.7821E+02 EXCESS=0.0000E+00 OUTFLOW=0.7821E+02 BASIN STORAGE=0.1013E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270380 MANE 0.85 576.85 275.12 1.27 1.00 576.85 275.00 1.27

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.6973E+02 EXCESS=0.0000E+00 OUTFLOW=0.6973E+02 BASIN STORAGE=0.1013E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270390 MANE 0.20 1624.33 273.95 1.15 1.00 1624.27 274.00 1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1765E+03 EXCESS=0.0000E+00 OUTFLOW=0.1765E+03 BASIN STORAGE=0.5916E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270390 MANE 0.20 1603.50 274.12 1.14 1.00 1603.40 274.00 1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1751E+03 EXCESS=0.0000E+00 OUTFLOW=0.1751E+03 BASIN STORAGE=0.5888E-02 PERCENT ERROR= 0.0

FOR STORM = 3 STORM AREA (SQ MI) = 2.80
270390 MANE 0.24 1099.09 272.90 0.95 1.00 1099.08 273.00 0.95

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1463E+03 EXCESS=0.0000E+00 OUTFLOW=0.1463E+03 BASIN STORAGE=0.4659E-02 PERCENT ERROR= 0.0

FOR STORM = 1 STORM AREA (SQ MI) = 0.00
270410 MANE 0.24 1628.79 273.97 1.15 1.00 1628.76 274.00 1.15

INUITY SUMMARY (AC-FT) - INFLOW=0.1772E+03 EXCESS=0.0000E+00 OUTFLOW=0.1772E+03 BASIN STORAGE=0.7076E-02 PERCENT ERROR= 0.0

FOR STORM = 2 STORM AREA (SQ MI) = 0.50
270410 MANE 0.24 1607.63 274.17 1.14 1.00 1607.45 274.00 1.14

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CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1758E+03 EXCESS=0.0000E+00 OUTFLOW=0.1758E+03 BASIN STORAGE=0.7043E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270410  MANE          0.28   1102.68    273.05        0.95        1.00   1102.67    273.00          0.95

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1468E+03 EXCESS=0.0000E+00 OUTFLOW=0.1468E+03 BASIN STORAGE=0.5572E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270430  MANE          0.46   1629.19    274.21        1.15        1.00   1628.90    274.00          1.15

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1776E+03 EXCESS=0.0000E+00 OUTFLOW=0.1776E+03 BASIN STORAGE=0.5456E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270430  MANE          0.46   1607.99    274.82        1.14        1.00   1607.25    274.00          1.14

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1762E+03 EXCESS=0.0000E+00 OUTFLOW=0.1762E+03 BASIN STORAGE=0.5427E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270430  MANE          0.51   1103.71    273.11        0.95        1.00   1103.60    273.00          0.95

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1472E+03 EXCESS=0.0000E+00 OUTFLOW=0.1472E+03 BASIN STORAGE=0.4118E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          273410  MANE          1.00     48.56    252.00        1.61        1.00     48.56    252.00          1.61

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2230E+01 EXCESS=0.0000E+00 OUTFLOW=0.2228E+01 BASIN STORAGE=0.1745E-02 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          273410  MANE          1.00     48.19    252.00        1.59        1.00     48.19    252.00          1.59

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2212E+01 EXCESS=0.0000E+00 OUTFLOW=0.2209E+01 BASIN STORAGE=0.1728E-02 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          273410  MANE          1.00     26.55    254.00        1.38        1.00     26.55    254.00          1.38

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1909E+01 EXCESS=0.0000E+00 OUTFLOW=0.1908E+01 BASIN STORAGE=0.1527E-02 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          273430  MANE          1.00    216.76    246.00        1.78        1.00    216.76    246.00          1.78

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1034E+02 EXCESS=0.0000E+00 OUTFLOW=0.1033E+02 BASIN STORAGE=0.5898E-03 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          273430  MANE          1.00    215.09    246.00        1.76        1.00    215.09    246.00          1.76

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1025E+02 EXCESS=0.0000E+00 OUTFLOW=0.1025E+02 BASIN STORAGE=0.5851E-03 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          273430  MANE          1.00    119.86    246.00        1.57        1.00    119.86    246.00          1.57

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.9139E+01 EXCESS=0.0000E+00 OUTFLOW=0.9137E+01 BASIN STORAGE=0.5112E-03 PERCENT ERROR=   0.0

         FOR STORM = 1  STORM AREA (SQ MI) =          0.00
          270440  MANE          1.00   1640.78    275.00        1.17        1.00   1640.78    275.00          1.17

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1894E+03 EXCESS=0.0000E+00 OUTFLOW=0.1893E+03 BASIN STORAGE=0.2658E-01 PERCENT ERROR=   0.0

         FOR STORM = 2  STORM AREA (SQ MI) =          0.50
          270440  MANE          1.00   1620.26    275.00        1.16        1.00   1620.26    275.00          1.16

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1879E+03 EXCESS=0.0000E+00 OUTFLOW=0.1878E+03 BASIN STORAGE=0.2644E-01 PERCENT ERROR=   0.0

         FOR STORM = 3  STORM AREA (SQ MI) =          2.80
          270440  MANE          1.00   1144.68    273.00        0.97        1.00   1144.68    273.00          0.97

CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1576E+03 EXCESS=0.0000E+00 OUTFLOW=0.1576E+03 BASIN STORAGE=0.2031E-01 PERCENT ERROR=   0.0


                                          SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION    275911
                                    (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

     PLAN  1 ...............                     INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                                      ELEVATION      1452.00             1453.00           1453.00
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	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
STORAGE	0.	3.	3.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1452.83	0.00	2.	1.	0.00	4.00	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1452.00	1453.00	1453.00
STORAGE	0.	3.	3.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1452.82	0.00	2.	1.	0.00	4.00	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1452.00	1453.00	1453.00
STORAGE	0.	3.	3.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1452.46	0.00	1.	1.	0.00	4.10	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 276240
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1407.00	1425.00	1425.00
STORAGE	0.	22.	22.
OUTFLOW	0.	150.	150.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1411.47	0.00	3.	57.	0.00	4.43	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1407.00	1425.00	1425.00
STORAGE	0.	22.	22.
OUTFLOW	0.	150.	150.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1411.44	0.00	3.	57.	0.00	4.43	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1407.00	1425.00	1425.00
STORAGE	0.	22.	22.
OUTFLOW	0.	150.	150.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1409.56	0.00	2.	43.	0.00	4.40	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 273211
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1422.00	1425.00	1425.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1425.19	0.19	1.	27.	3.00	4.17	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1422.00	1425.00	1425.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO	MAXIMUM	MAXIMUM	MAXIMUM	MAXIMUM	DURATION	TIME OF	TIME OF
OF	RESERVOIR	DEPTH	STORAGE	OUTFLOW	OVER TOP	MAX OUTFLOW	FAILURE

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                PMF       W.S.ELEV     OVER DAM      AC-FT        CFS        HOURS         HOURS          HOURS

                1.00       1425.21        0.21          1.         32.        3.00          4.17           0.00

   PLAN  3 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1422.00             1425.00           1425.00
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  0.                0.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1425.13        0.13          1.         15.        2.93          4.30           0.00
1                         SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION    272911
                       (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

   PLAN  1 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1434.00             1436.00           1436.00
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  0.                0.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1434.95        0.00          1.          0.        0.00          6.32           0.00

   PLAN  2 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1434.00             1436.00           1436.00
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  0.                0.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1434.94        0.00          1.          0.        0.00          6.32           0.00

   PLAN  3 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1434.00             1436.00           1436.00
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  0.                0.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1434.78        0.00          1.          0.        0.00          6.37           0.00
1                         SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION    272811
                       (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)

   PLAN  1 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1489.40             1492.40           1492.40
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  8.                8.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1491.03        0.00          0.          1.        0.00          4.95           0.00

   PLAN  2 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1489.40             1492.40           1492.40
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  8.                8.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1491.02        0.00          0.          1.        0.00          4.95           0.00

   PLAN  3 ...............                    INITIAL VALUE      SPILLWAY CREST      TOP OF DAM
                          ELEVATION              1489.40             1492.40           1492.40
                          STORAGE                     0.                  1.                1.
                          OUTFLOW                     0.                  8.                8.

               RATIO       MAXIMUM      MAXIMUM      MAXIMUM      MAXIMUM     DURATION      TIME OF        TIME OF
                OF        RESERVOIR      DEPTH       STORAGE      OUTFLOW     OVER TOP    MAX OUTFLOW      FAILURE
                PMF       W.S.ELEV     OVER DAM       AC-FT         CFS        HOURS         HOURS          HOURS

                1.00       1490.71        0.00          0.          0.        0.00          5.40           0.00
1                         SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION    272818
                       (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)
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PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1492.00	1495.00	1495.00
	STORAGE	0.	3.	3.
	OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1494.45	0.00	3.	0.	0.00	0.00	0.00

PLAN 2		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1492.00	1495.00	1495.00
	STORAGE	0.	3.	3.
	OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1494.44	0.00	3.	0.	0.00	0.00	0.00

PLAN 3		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1492.00	1495.00	1495.00
	STORAGE	0.	3.	3.
	OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1493.65	0.00	2.	0.	0.00	0.00	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272410
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1472.00	1475.50	1475.50
	STORAGE	0.	2.	2.
	OUTFLOW	0.	59.	59.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1473.40	0.00	0.	23.	0.00	4.18	0.00

PLAN 2		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1472.00	1475.50	1475.50
	STORAGE	0.	2.	2.
	OUTFLOW	0.	59.	59.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1473.39	0.00	0.	22.	0.00	4.18	0.00

PLAN 3		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1472.00	1475.50	1475.50
	STORAGE	0.	2.	2.
	OUTFLOW	0.	59.	59.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1472.83	0.00	0.	9.	0.00	4.18	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272440
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1448.00	1454.00	1454.00
	STORAGE	0.	11.	11.
	OUTFLOW	0.	120.	120.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1451.96	0.00	7.	47.	0.00	4.58	0.00

PLAN 2		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1448.00	1454.00	1454.00
	STORAGE	0.	11.	11.
	OUTFLOW	0.	120.	120.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1451.93	0.00	7.	46.	0.00	4.58	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1448.00	1454.00	1454.00
STORAGE	0.	11.	11.
OUTFLOW	0.	120.	120.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1451.18	0.00	6.	23.	0.00	4.80	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272460
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1436.00	1438.00	1438.00
STORAGE	0.	3.	3.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1438.34	0.34	3.	142.	29.23	4.20	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1436.00	1438.00	1438.00
STORAGE	0.	3.	3.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1438.33	0.33	3.	140.	29.23	4.20	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1436.00	1438.00	1438.00
STORAGE	0.	3.	3.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1438.17	0.17	3.	51.	29.12	4.38	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272711
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1428.00	1432.00	1432.00
STORAGE	0.	2.	2.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1429.02	0.00	0.	0.	0.00	4.60	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1428.00	1432.00	1432.00
STORAGE	0.	2.	2.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1429.01	0.00	0.	0.	0.00	4.70	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1428.00	1432.00	1432.00
STORAGE	0.	2.	2.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1428.74	0.00	0.	0.	0.00	5.25	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272521
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1426.00	1431.00	1431.00
STORAGE	0.	4.	4.
OUTFLOW	0.	8.	8.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1431.48	0.48	4.	208.	3.18	4.23	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1426.00	1431.00	1431.00
STORAGE	0.	4.	4.
OUTFLOW	0.	8.	8.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1431.48	0.48	4.	205.	3.17	4.23	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1426.00	1431.00	1431.00
STORAGE	0.	4.	4.
OUTFLOW	0.	8.	8.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1431.21	0.21	4.	68.	2.70	4.52	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 271611
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1488.00	1491.00	1491.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1490.28	0.00	1.	0.	0.00	3.90	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1488.00	1491.00	1491.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1490.26	0.00	1.	0.	0.00	3.90	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1488.00	1491.00	1491.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1489.95	0.00	1.	0.	0.00	3.88	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 271910
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1476.00	1480.00	1480.00
STORAGE	0.	3.	3.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1477.21	0.00	2.	0.	0.00	3.97	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1476.00	1480.00	1480.00

STORAGE	0.	3.	3.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1477.21	0.00	2.	0.	0.00	3.97	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1476.00	1480.00	1480.00
STORAGE	0.	3.	3.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1477.16	0.00	2.	0.	0.00	3.95	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272251
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1433.00	1437.00	1437.00
STORAGE	0.	1.	1.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1437.35	0.35	1.	132.	2.03	4.10	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1433.00	1437.00	1437.00
STORAGE	0.	1.	1.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1437.32	0.32	1.	115.	2.02	4.10	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1433.00	1437.00	1437.00
STORAGE	0.	1.	1.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1437.26	0.26	1.	85.	2.25	4.05	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION SWBSTR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1424.00	1429.00	1429.00
STORAGE	0.	3.	3.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1428.91	0.00	3.	20.	0.00	4.60	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1424.00	1429.00	1429.00
STORAGE	0.	3.	3.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1428.88	0.00	3.	20.	0.00	4.60	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1424.00	1429.00	1429.00
STORAGE	0.	3.	3.
OUTFLOW	0.	20.	20.

RATIO OF	MAXIMUM RESERVOIR	MAXIMUM DEPTH	MAXIMUM STORAGE	MAXIMUM OUTFLOW	DURATION OVER TOP	TIME OF MAX OUTFLOW	TIME OF FAILURE

PMF	W.S.ELEV	OVER DAM	AC-FT	CFS	HOURS	HOURS	HOURS
1.00	1426.41	0.00	1.	13.	0.00	4.60	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 272311
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1417.00	1419.00	1419.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1419.16	0.16	1.	18.	3.12	4.20	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1417.00	1419.00	1419.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1419.19	0.19	1.	23.	3.12	4.22	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1417.00	1419.00	1419.00
STORAGE	0.	1.	1.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1419.12	0.12	1.	11.	3.03	4.37	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION LBASTR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1408.00	1414.00	1414.00
STORAGE	0.	7.	7.
OUTFLOW	0.	23.	23.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1412.32	0.00	4.	19.	0.00	4.95	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1408.00	1414.00	1414.00
STORAGE	0.	7.	7.
OUTFLOW	0.	23.	23.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1412.24	0.00	4.	19.	0.00	4.95	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1408.00	1414.00	1414.00
STORAGE	0.	7.	7.
OUTFLOW	0.	23.	23.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1409.68	0.00	1.	10.	0.00	5.00	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION CH1STR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1387.00	1392.00	1392.00
STORAGE	0.	3.	3.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1393.03	1.03	4.	179.	0.67	4.47	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1387.00	1392.00	1392.00
STORAGE	0.	3.	3.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1393.01	1.01	4.	175.	0.65	4.47	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1387.00	1392.00	1392.00
STORAGE	0.	3.	3.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1391.43	0.00	2.	19.	0.00	4.82	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION CH3STR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1382.00	1387.00	1387.00
STORAGE	0.	4.	4.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1388.06	1.06	4.	187.	0.60	4.57	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1382.00	1387.00	1387.00
STORAGE	0.	4.	4.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1388.03	1.03	4.	181.	0.60	4.57	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1382.00	1387.00	1387.00
STORAGE	0.	4.	4.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1385.32	0.00	2.	16.	0.00	4.85	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 271111
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1484.00	1491.00	1491.00
STORAGE	0.	4.	4.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1489.17	0.00	2.	0.	0.00	3.48	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1484.00	1491.00	1491.00
STORAGE	0.	4.	4.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1489.14	0.00	2.	0.	0.00	3.48	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1484.00	1491.00	1491.00
STORAGE	0.	4.	4.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1488.72	0.00	2.	0.	0.00	3.42	0.00

SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 270941
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1480.00	1483.00	1483.00
STORAGE	0.	2.	2.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1483.16	0.16	2.	69.	29.15	4.20	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1480.00	1483.00	1483.00
STORAGE	0.	2.	2.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1483.19	0.19	2.	87.	29.12	4.20	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1480.00	1483.00	1483.00
STORAGE	0.	2.	2.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1483.05	0.05	2.	13.	28.80	4.55	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 270951
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1472.00	1478.00	1478.00
STORAGE	0.	7.	7.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1476.69	0.00	4.	0.	0.00	3.85	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1472.00	1478.00	1478.00
STORAGE	0.	7.	7.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1476.66	0.00	3.	0.	0.00	3.85	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1472.00	1478.00	1478.00
STORAGE	0.	7.	7.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1475.68	0.00	2.	0.	0.00	3.78	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION POBSTR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1393.00	1398.00	1398.00
STORAGE	0.	1.	1.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS

1.00	1398.41	0.41	1.	115.	0.47	4.40	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1393.00	1398.00	1398.00
STORAGE	0.	1.	1.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1398.40	0.40	1.	113.	0.45	4.40	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1393.00	1398.00	1398.00
STORAGE	0.	1.	1.
OUTFLOW	0.	20.	20.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1397.34	0.00	1.	19.	0.00	4.68	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION CH2STR
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1382.00	1389.00	1389.00
STORAGE	0.	3.	3.
OUTFLOW	0.	600.	600.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1387.00	0.00	2.	325.	0.00	4.53	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1382.00	1389.00	1389.00
STORAGE	0.	3.	3.
OUTFLOW	0.	600.	600.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1386.97	0.00	2.	322.	0.00	4.53	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1382.00	1389.00	1389.00
STORAGE	0.	3.	3.
OUTFLOW	0.	600.	600.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1385.95	0.00	1.	206.	0.00	4.62	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 273507
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1394.00	1396.00	1396.00
STORAGE	0.	1.	1.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1396.21	0.21	1.	29.	1.12	4.12	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1394.00	1396.00	1396.00
STORAGE	0.	1.	1.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1396.21	0.21	1.	29.	1.12	4.12	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1394.00	1396.00	1396.00

STORAGE	0.	1.	1.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1396.13	0.13	1.	15.	1.18	4.20	0.00

1 SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION 271511
(PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED DURING BREACH FORMATION)

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1389.00	1391.00	1391.00
STORAGE	0.	0.	0.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1391.19	0.19	0.	26.	1.57	4.13	0.00

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1389.00	1391.00	1391.00
STORAGE	0.	0.	0.
OUTFLOW	0.	1.	1.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1391.19	0.19	0.	26.	1.57	4.13	0.00

PLAN 3 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1389.00	1391.00	1391.00
STORAGE	0.	0.	0.
OUTFLOW	0.	1.	1.

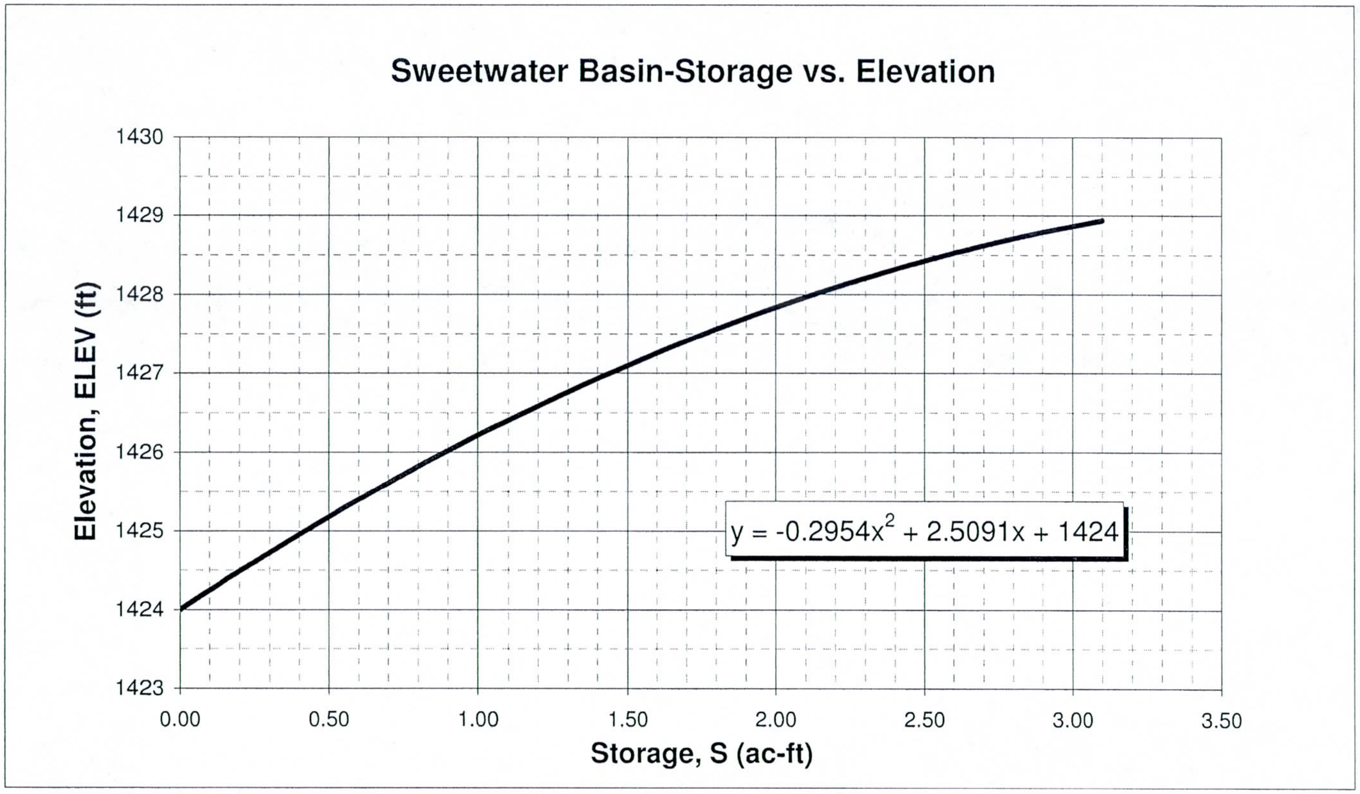
RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1391.13	0.13	0.	15.	1.60	4.17	0.00

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

Appendix G

Stage-Storage, Diversion Curves
and Outlet pipes for all Proposed Basins

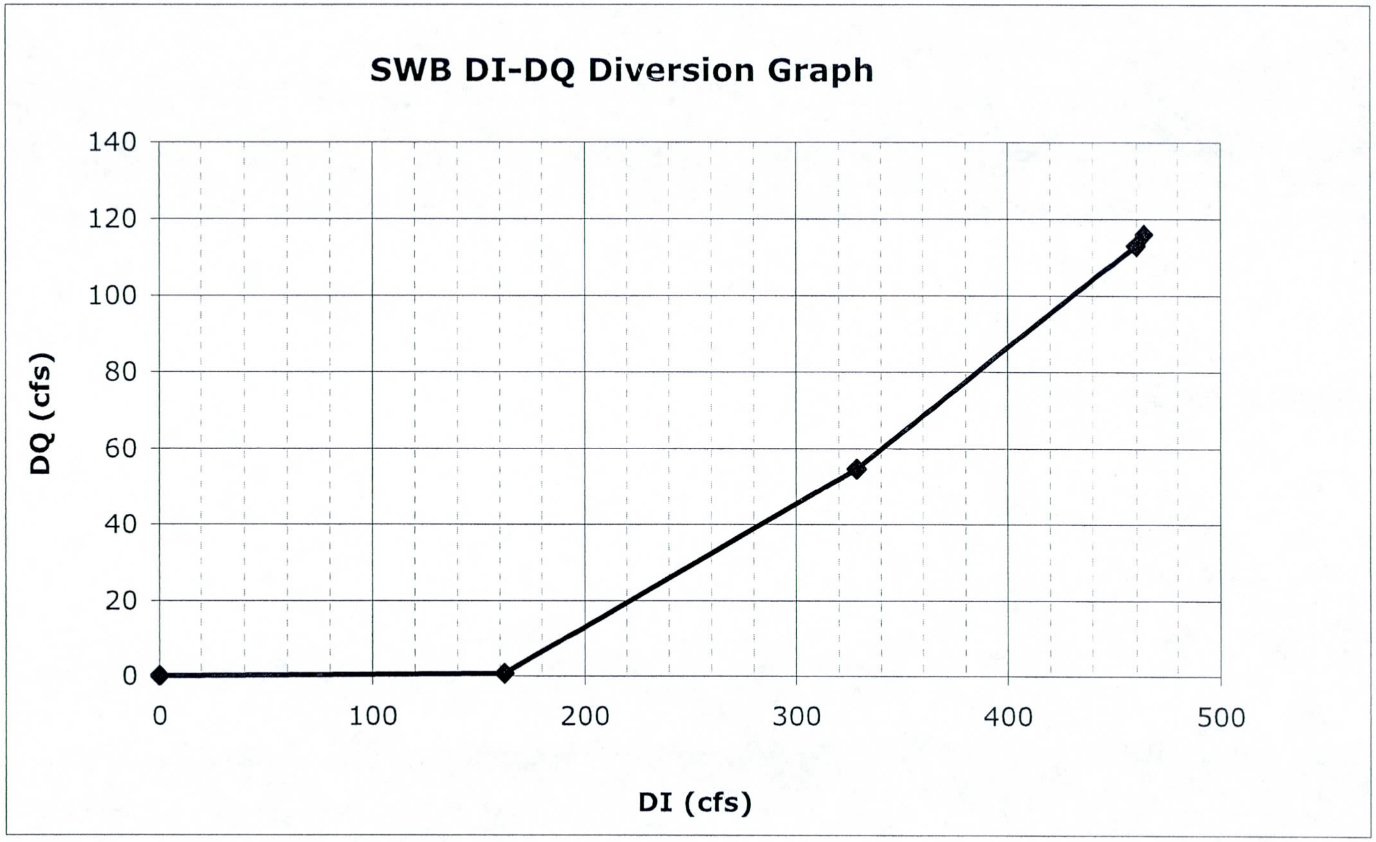
Sweetwater Basin: Stage-Storage Curve



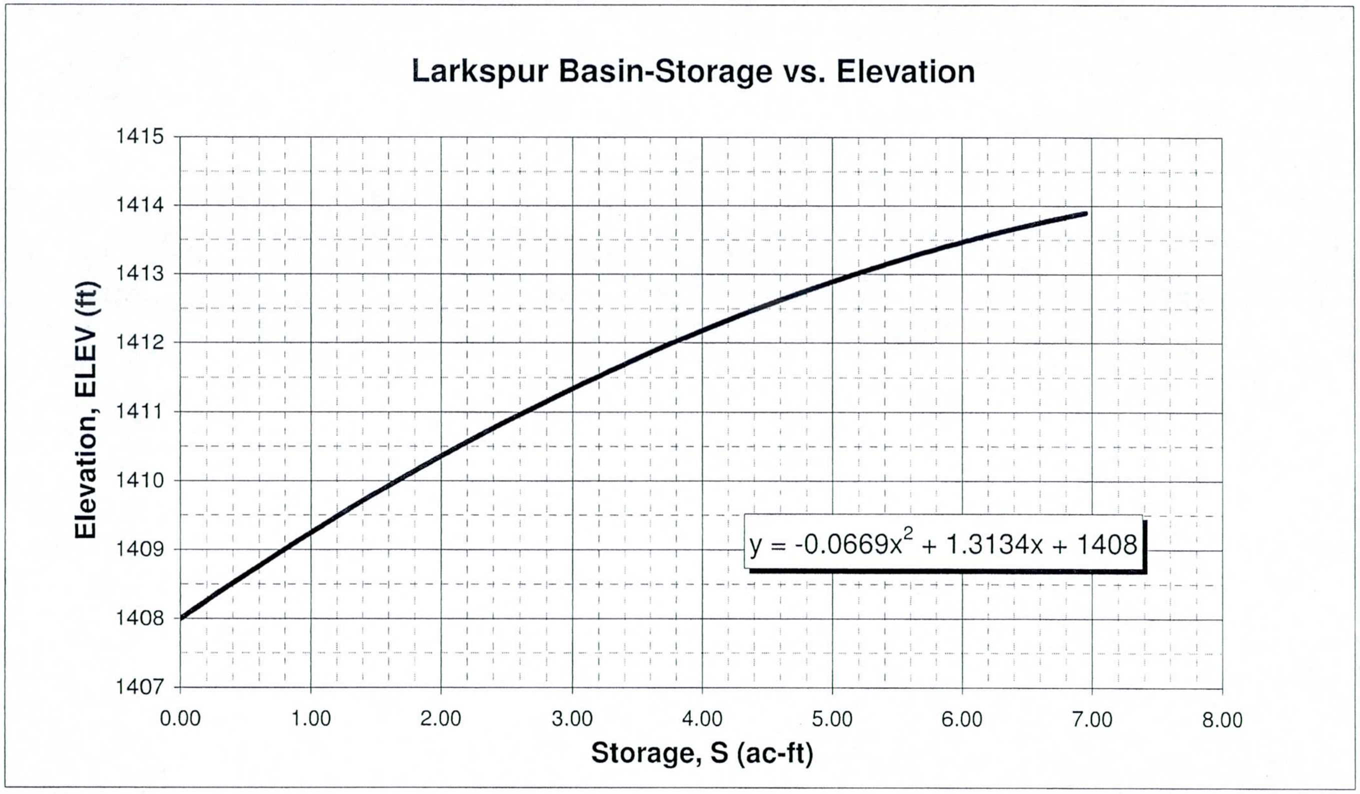
Elevation	Storage	depth
1424	0.00	0
1425	0.35	1
1426	0.84	2
1427	1.47	3
1428	2.22	4
1429	3.10	5

Sweetwater Basin Diversion Rating Curve

DI	0	162.1	328.4	459.9	463.8
DQ	0	0.7	54.7	113.1	116



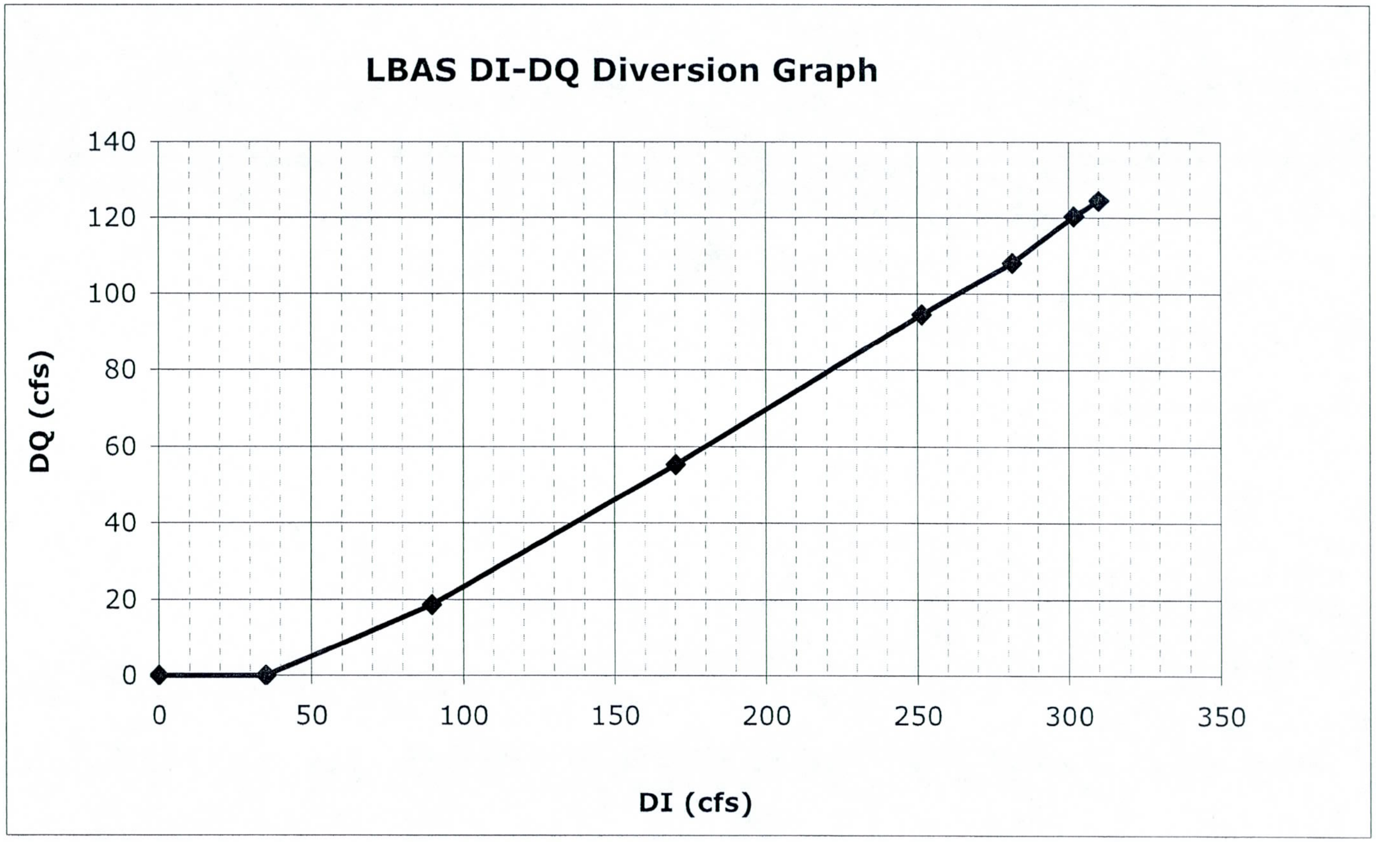
Larkspur Basin: Stage-Storage Curve



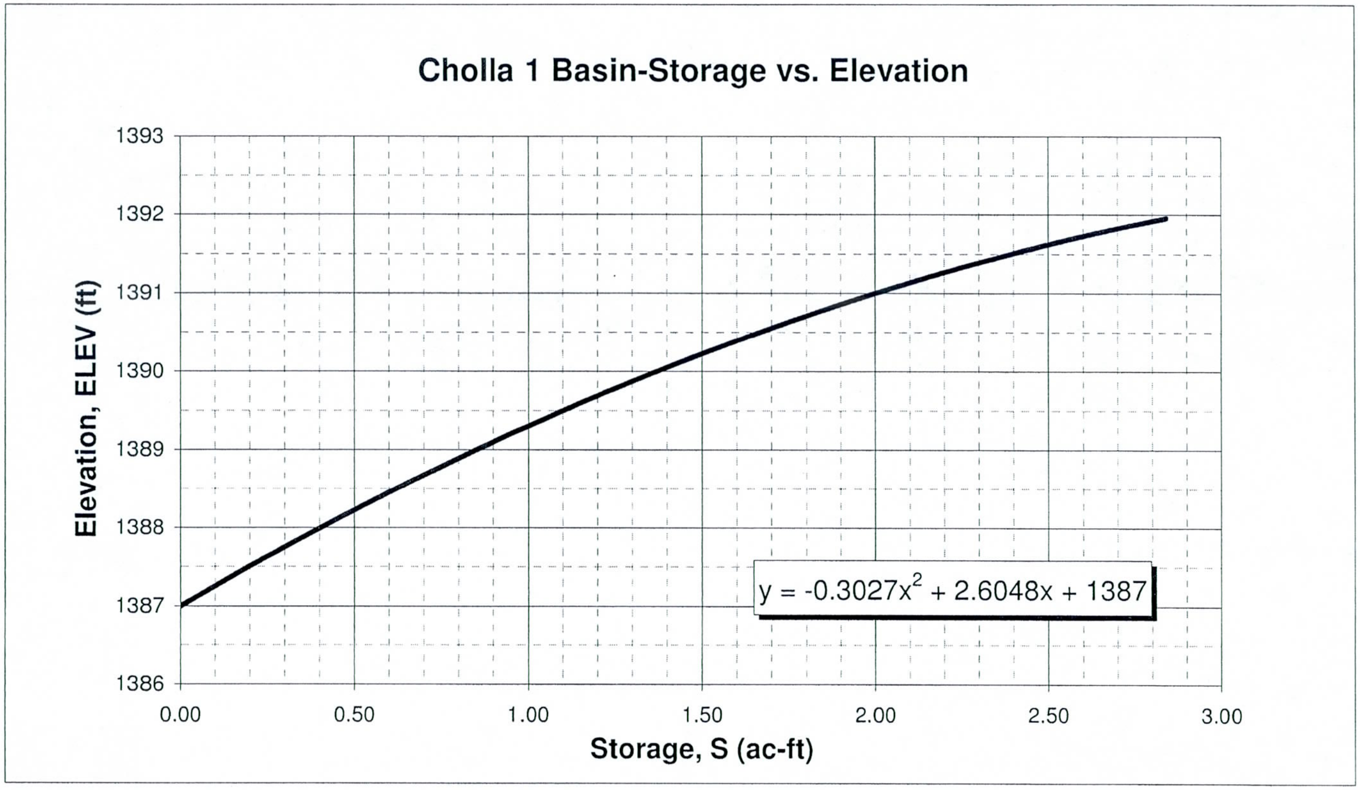
Elevation	Storage	Depth
1408	0.00	0
1409	0.56	1
1410	1.49	2
1411	2.64	3
1412	3.93	4
1413	5.37	5
1414	6.95	6

Larkspur Basin Diversion Rating Curve

DI	0	35.3	89.7	170.2	251.4	281.5	301.8	310
DQ	0	0	18.6	55.3	94.5	108.1	120.4	124.5



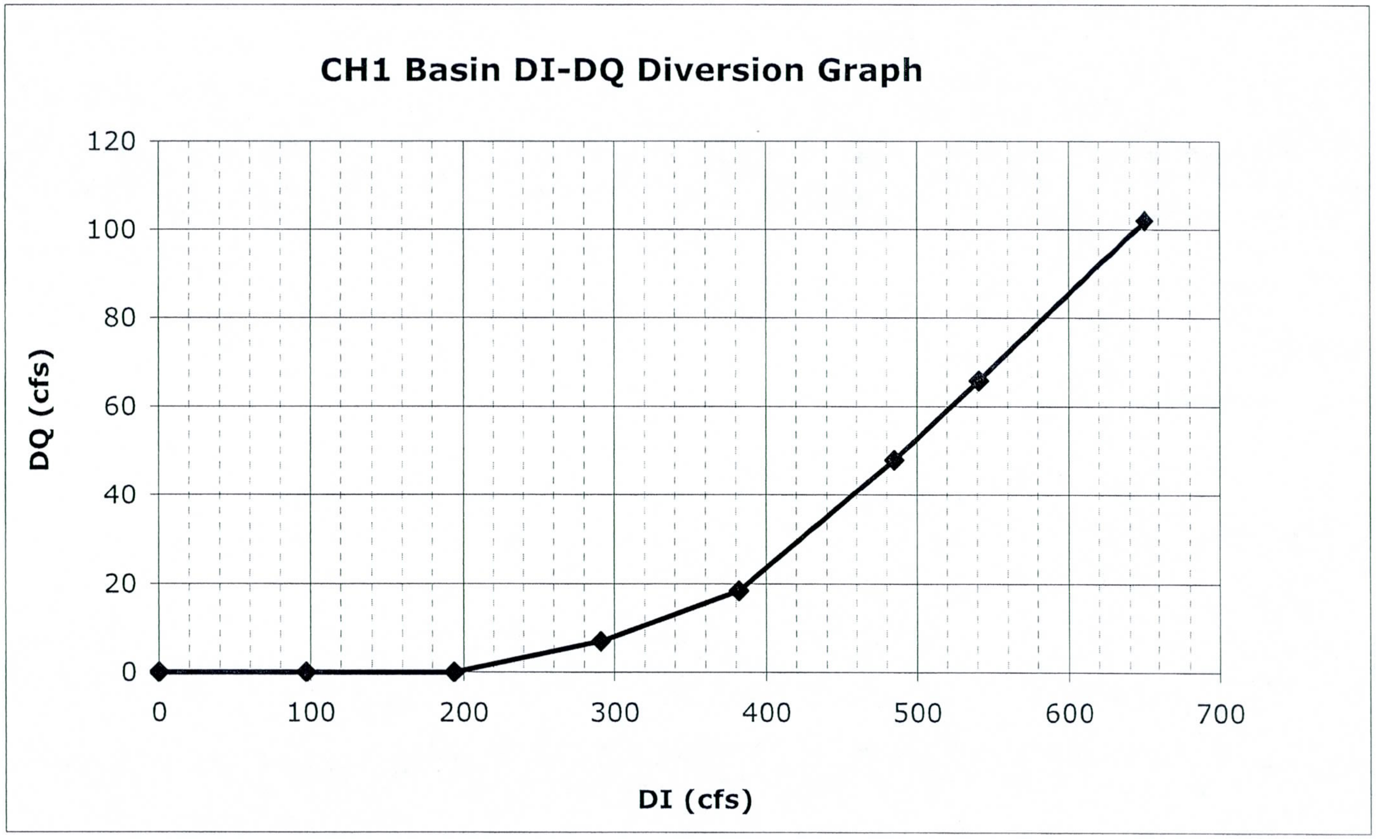
Cholla 1 Basin: Stage-Storage Curve



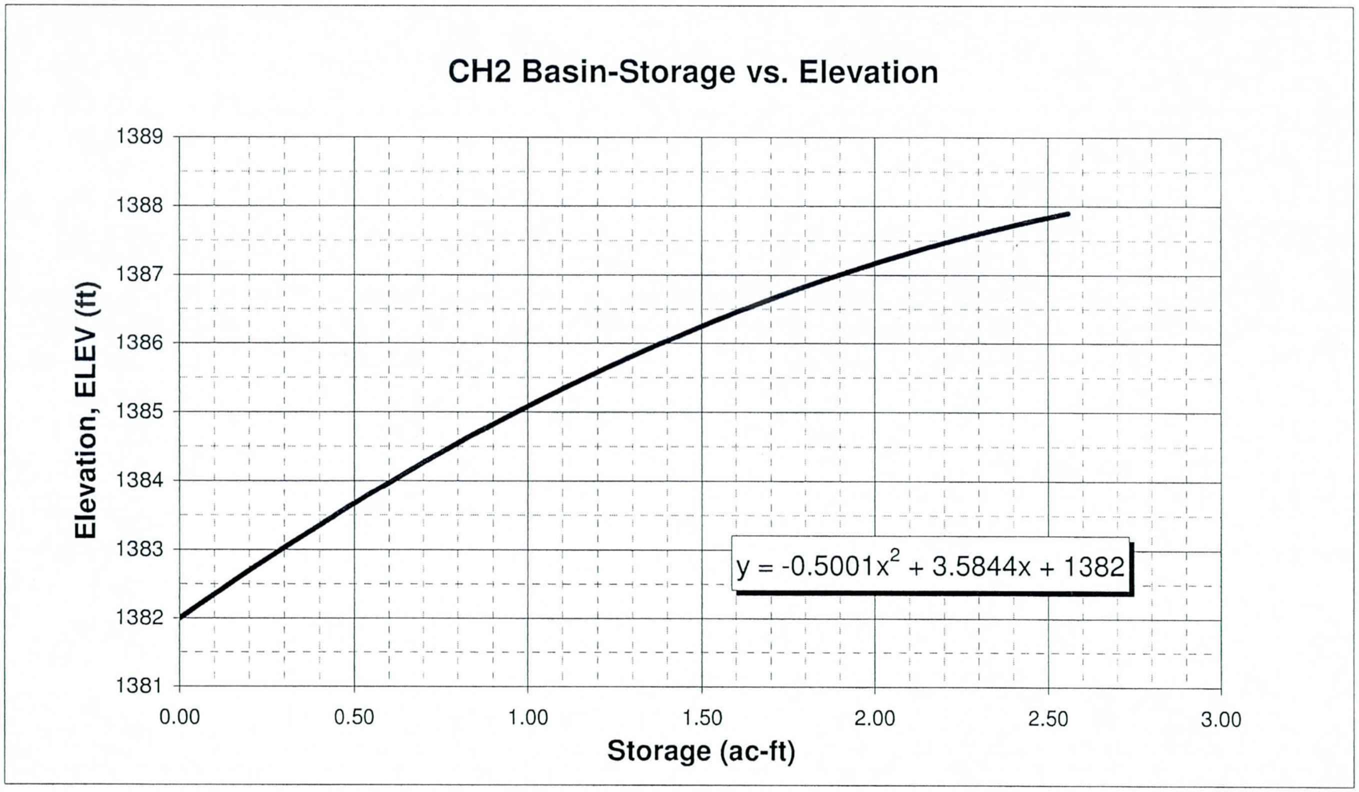
Elevation	Storage	Depth
1387	0.00	0
1388	0.36	1
1389	0.82	2
1390	1.39	3
1391	2.06	4
1392	2.84	5

Cholla 1 Basin Diversion Rating Curve

DI	0	97	194	291	382	485	541	650
DQ	0	0	0	7	18.4	47.9	65.8	102



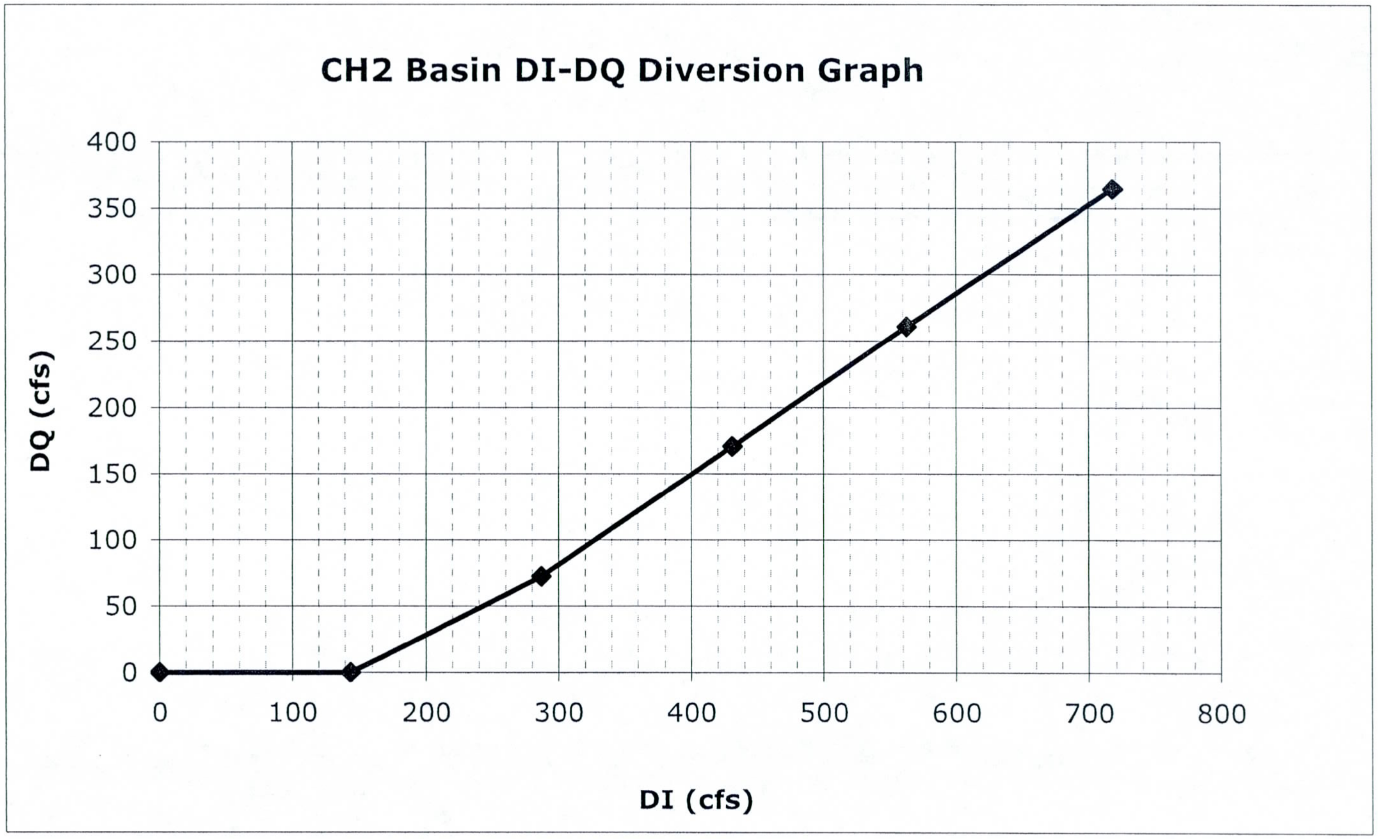
CH2 Basin: Stage-Storage Curve



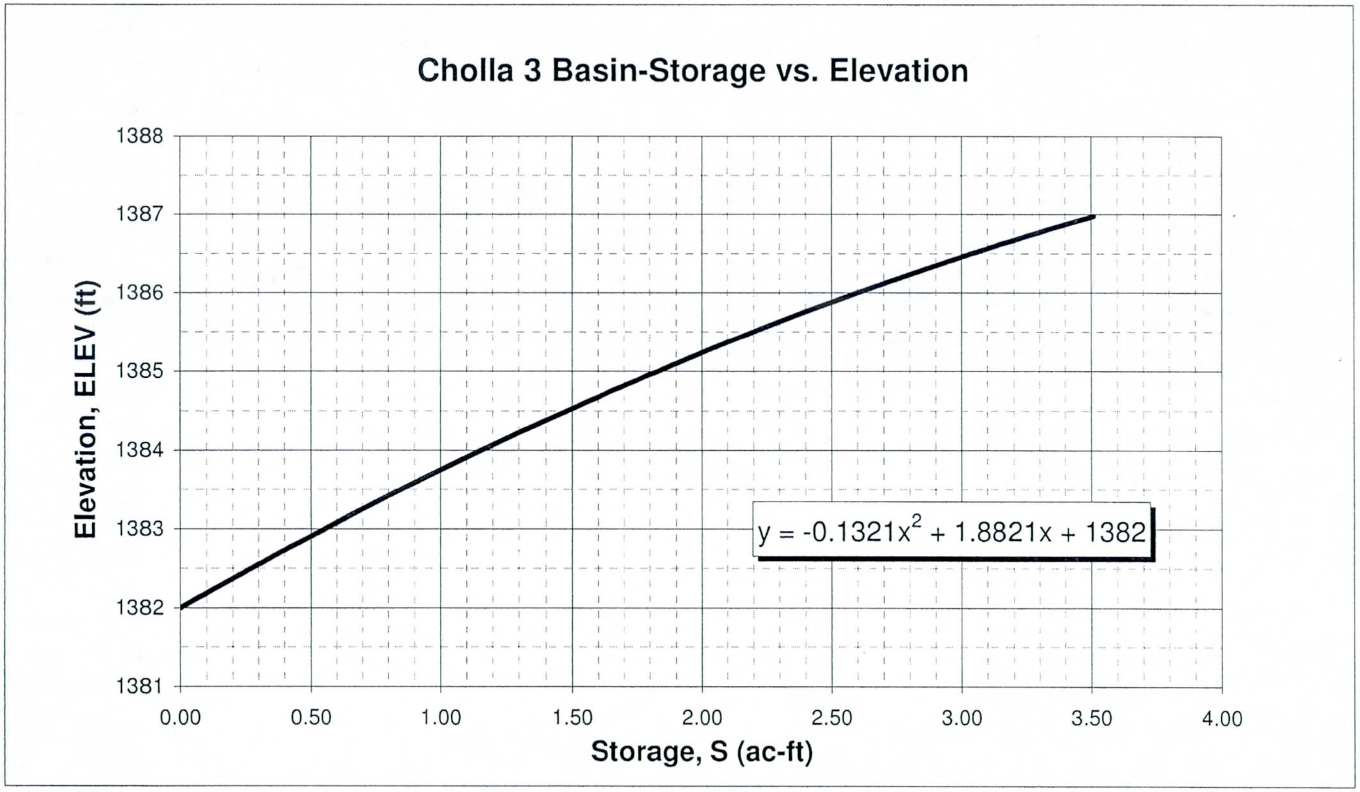
Elevation	Storage	Depth
1382	0.00	0
1383	0.19	1
1384	0.55	2
1385	0.97	3
1386	1.44	4
1387	1.97	5
1388	2.56	6
1389	3.22	7

CH2Basin Diversion Rating Curve

DI	0	144	287	431	563	718
DQ	0	0	72.4	170.6	260.7	364.5



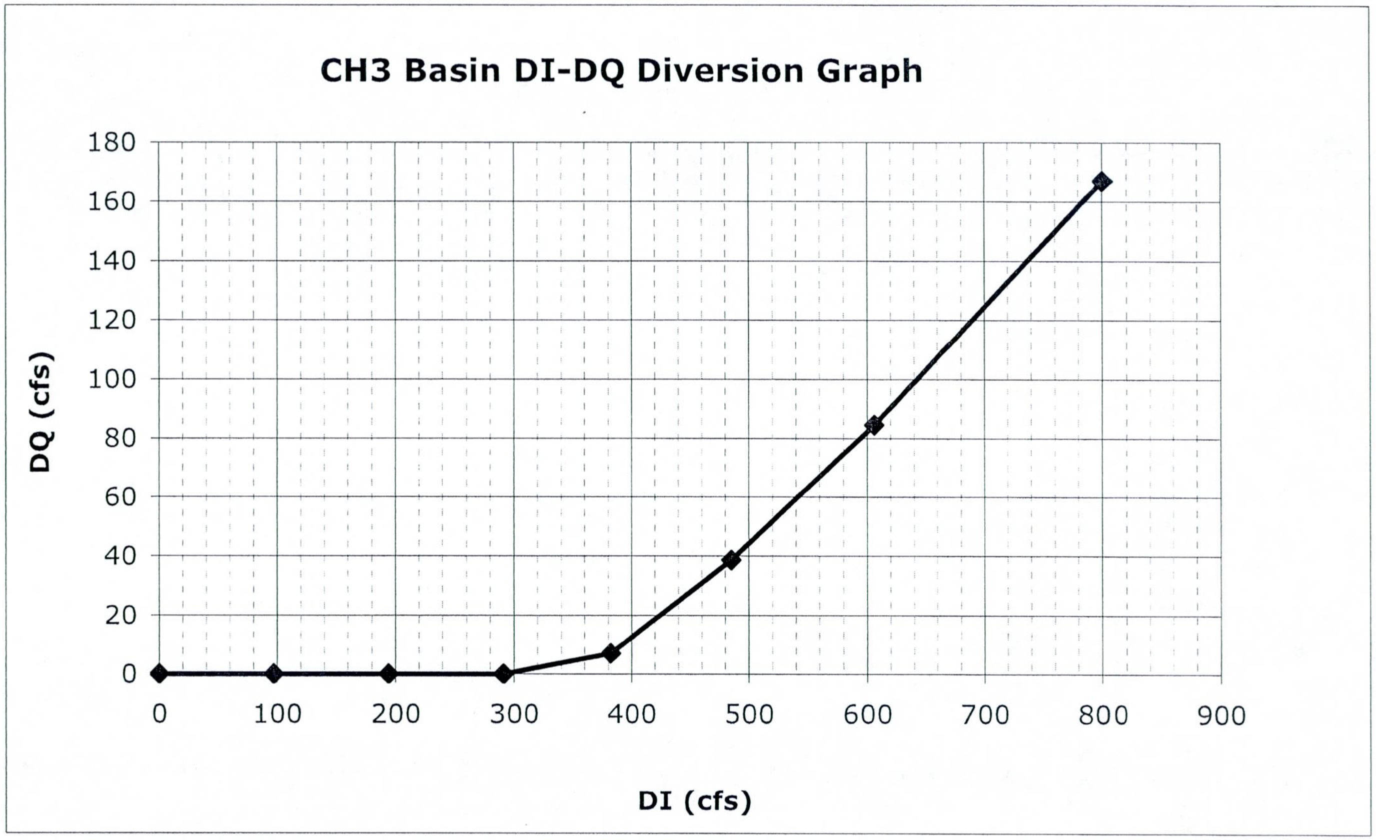
Cholla 3 Basin: Stage-Storage Curve



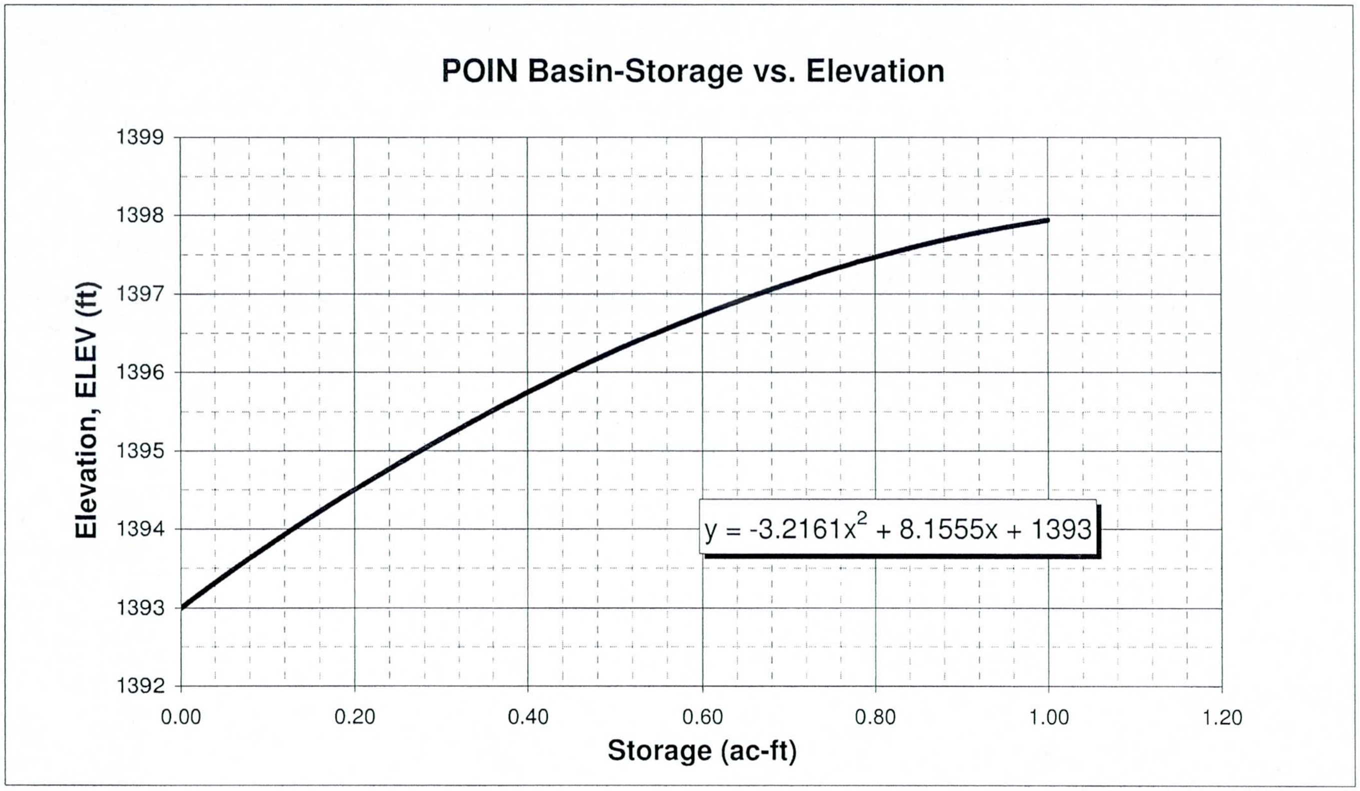
Elevation	Storage	Depth
1382	0.00	0
1383	0.53	1
1384	1.14	2
1385	1.84	3
1386	2.63	4
1387	3.51	5

Cholla 3Basin Diversion Rating Curve

DI	0	97	194	291	382	485	606	800
DQ	0	0	0	0	7	38.6	84.5	167.1



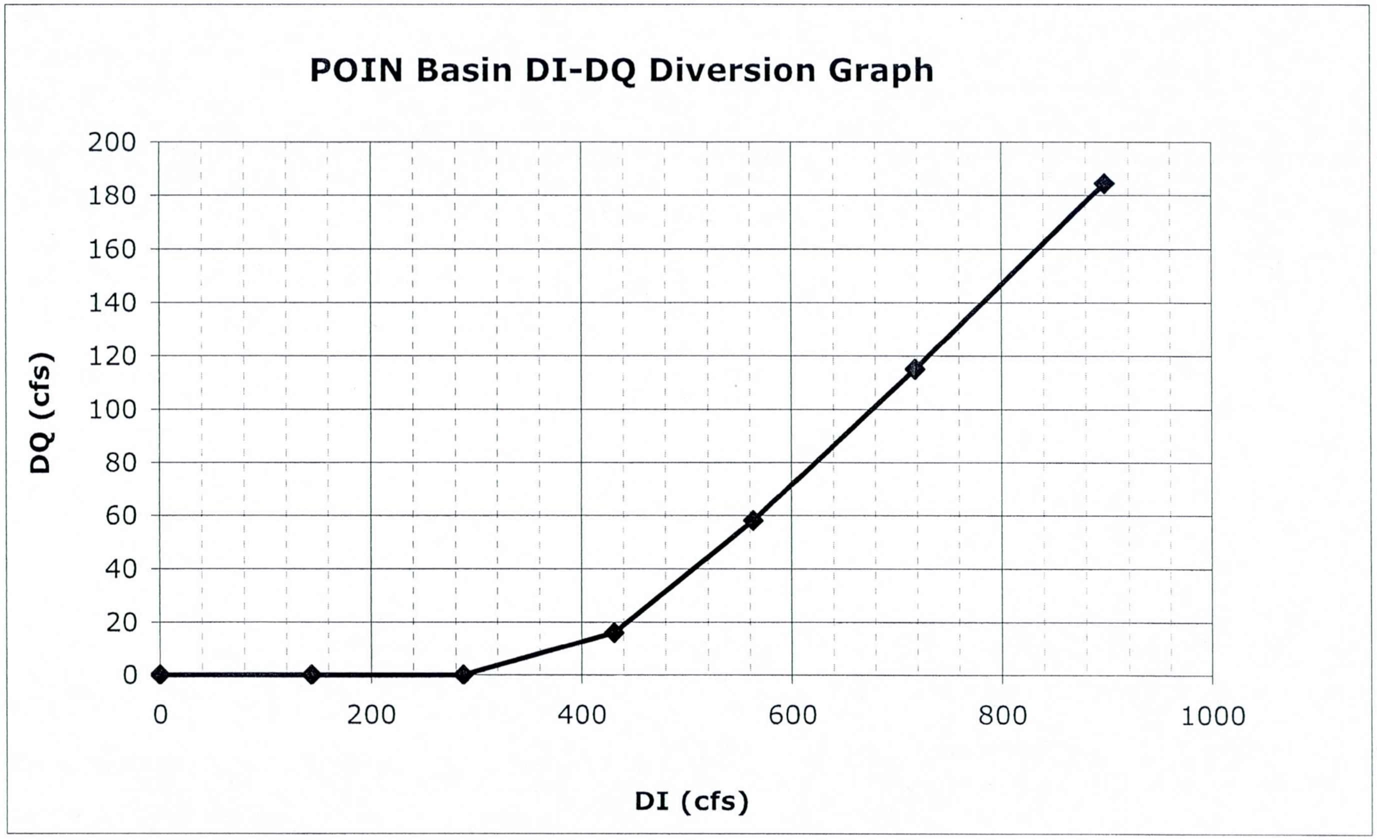
POIN Basin: Stage-Storage Curve



Elevation	Storage	Depth
1393	0.00	0
1394	0.11	1
1395	0.26	2
1396	0.45	3
1397	0.70	4
1398	1.00	5

POINBasin Diversion Rating Curve

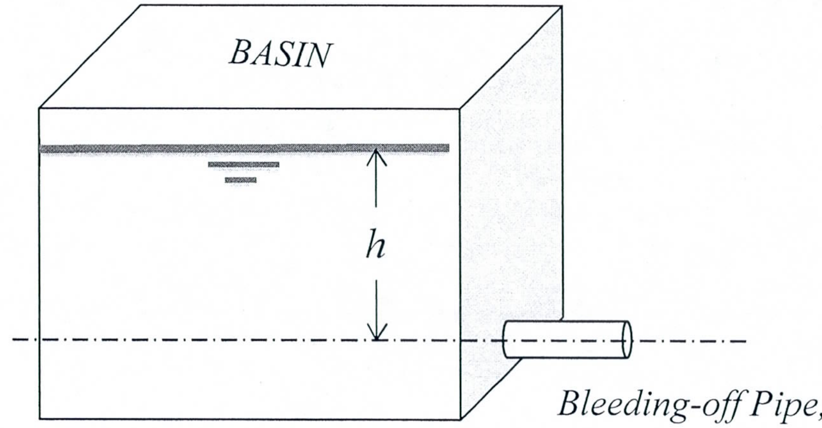
DI	0	144	287	431	563	718	898
DQ	0	0	0	16.1	58.1	115	184.6



Sweetwater Basin Outlet (Bleeding-off) Pipe

Use a 18" outlet pipe at the bottom of the Basin,
Orifice Equation:

$Q = C_d A(2gh)^{0.5}$

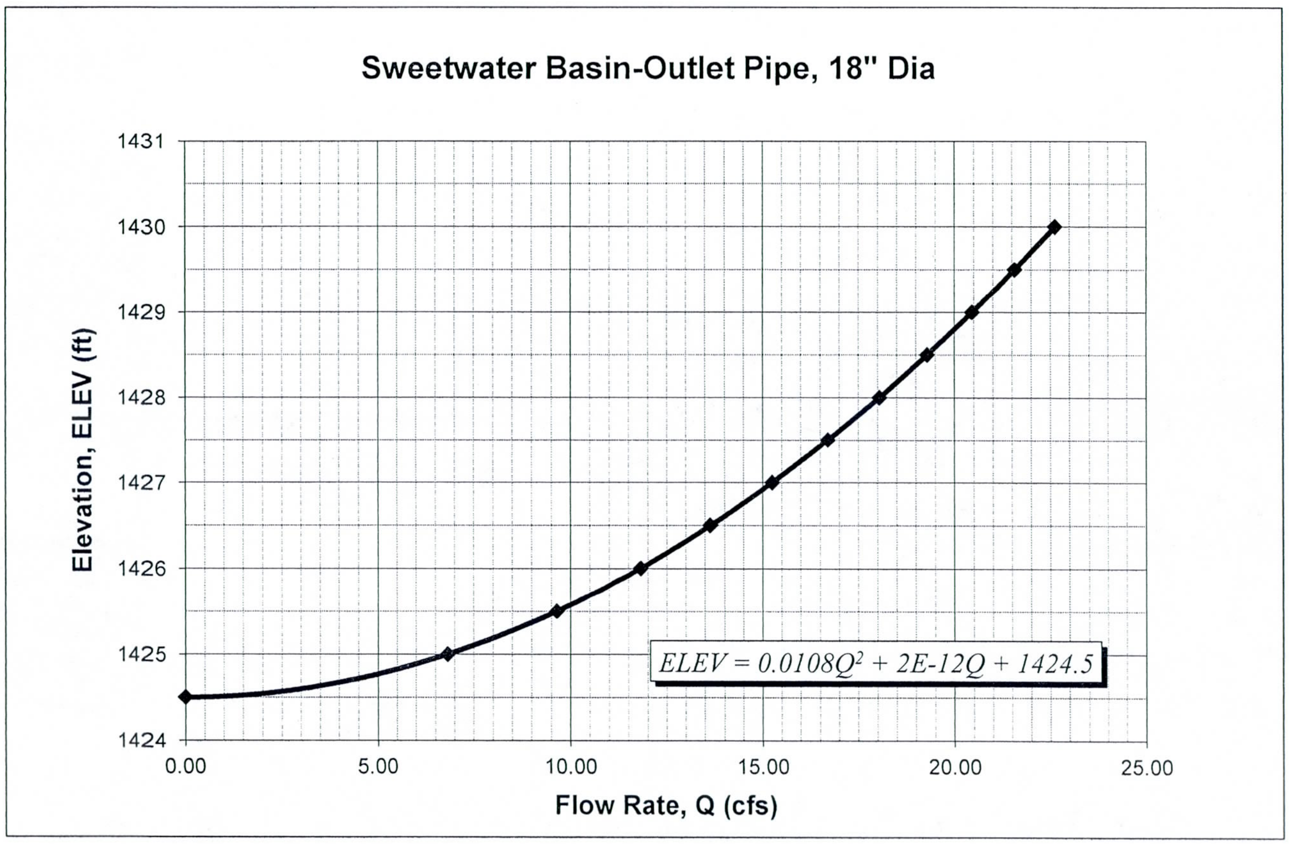


Orifice C_d = 0.68

Orifice Dia = 1.5 ft

Orifice Area = 1.767 sq.ft

Centreline Elevation of the Orifice = 1424.5

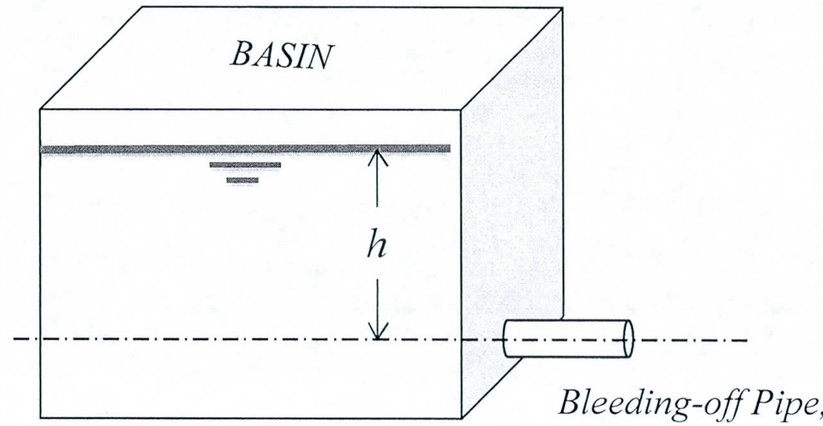


h (ft)	*ELEV (ft)*	*Q (cfs)*
0	1424.5	0.00
0.5	1425	6.82
1	1425.5	9.64
1.5	1426	11.81
2	1426.5	13.64
2.5	1427	15.25
3	1427.5	16.70
3.5	1428	18.04
4	1428.5	19.29
4.5	1429	20.46
5	1429.5	21.56
5.5	1430	22.62
6	1430.5	23.62
6.5	1431	24.59
7	1431.5	25.51

Larkspur Basin Outlet (Bleeding-off) Pipe

Use a 18" outlet pipe at the bottom of the Basin,
Orifice Equation:

$$Q = C_d A(2gh)^{0.5}$$

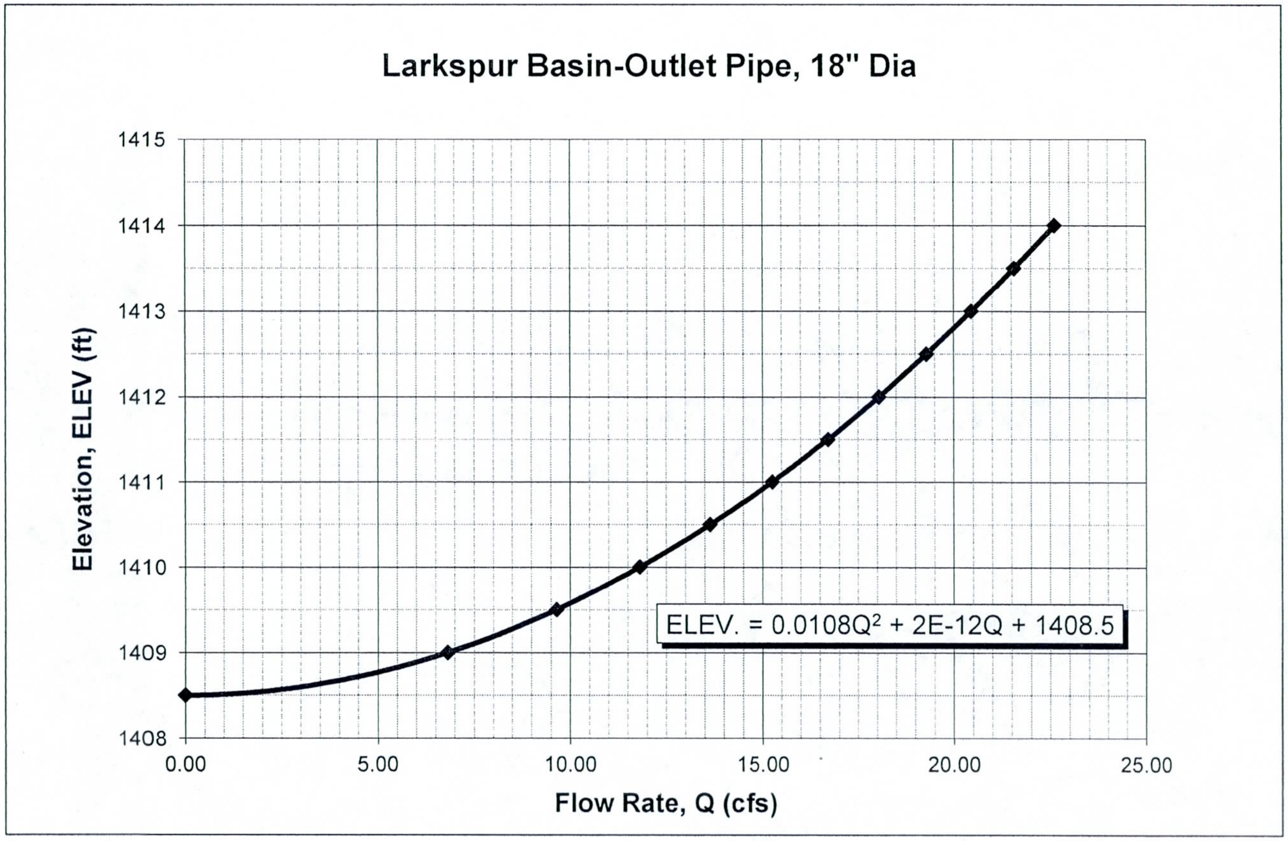


Orifice C_d = 0.68

Orifice Dia = 1.5 ft

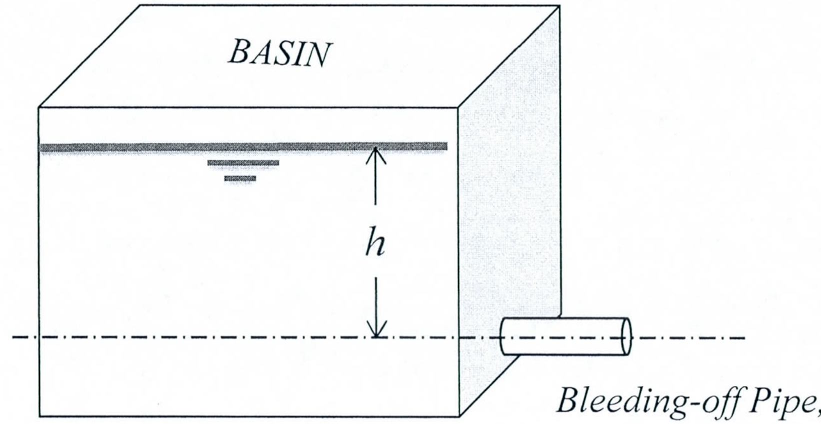
Orifice Area = 1.767 sq.ft

Centreline Elevation of the Orifice = 1408.5



h (ft)	*ELEV (ft)*	*Q (cfs)*
0	1408.5	0.00
0.5	1409	6.82
1	1409.5	9.64
1.5	1410	11.81
2	1410.5	13.64
2.5	1411	15.25
3	1411.5	16.70
3.5	1412	18.04
4	1412.5	19.29
4.5	1413	20.46
5	1413.5	21.56
5.5	1414	22.62

Cholla 1 Basin Outlet (Bleeding-off) Pipe



Use a 18" outlet pipe at the bottom of the Basin,
Orifice Equation:

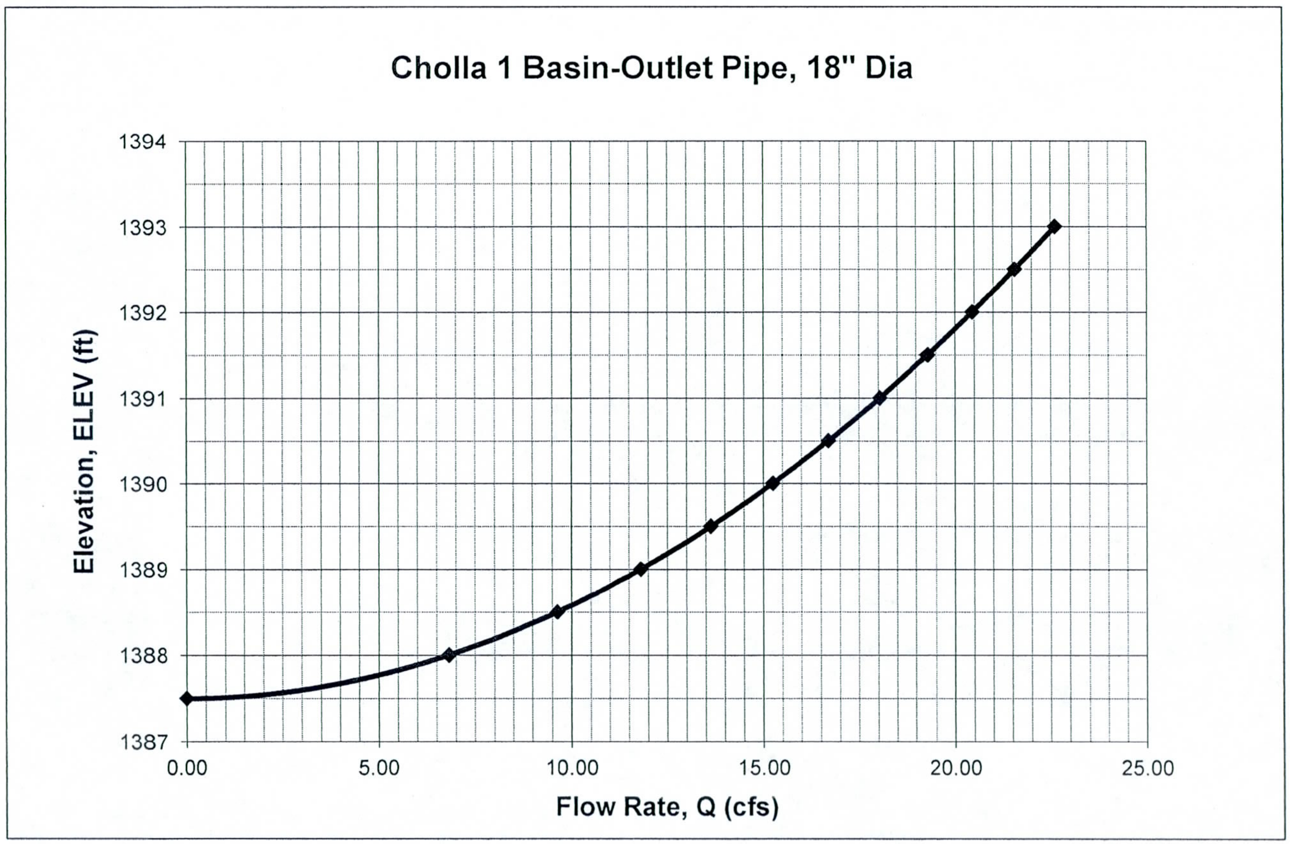
$$Q = C_d A(2gh)^{0.5}$$

Orifice C_d = 0.68

Orifice Dia = 1.5 ft

Orifice Area = 1.767 sq.ft

Centreline Elevation of the Orifice = 1387.5



h (ft)	*ELEV (ft)*	*Q (cfs)*
0	1387.5	0.00
0.5	1388	6.82
1	1388.5	9.64
1.5	1389	11.81
2	1389.5	13.64
2.5	1390	15.25
3	1390.5	16.70
3.5	1391	18.04
4	1391.5	19.29
4.5	1392	20.46
5	1392.5	21.56
5.5	1393	22.62
6	1393.5	23.62
6.5	1394	24.59
7	1394.5	25.51

Cholla 3 Basin Outlet (Bleeding-off) Pipe

Use a 18" outlet pipe at the bottom of the Basin,
Orifice Equation:

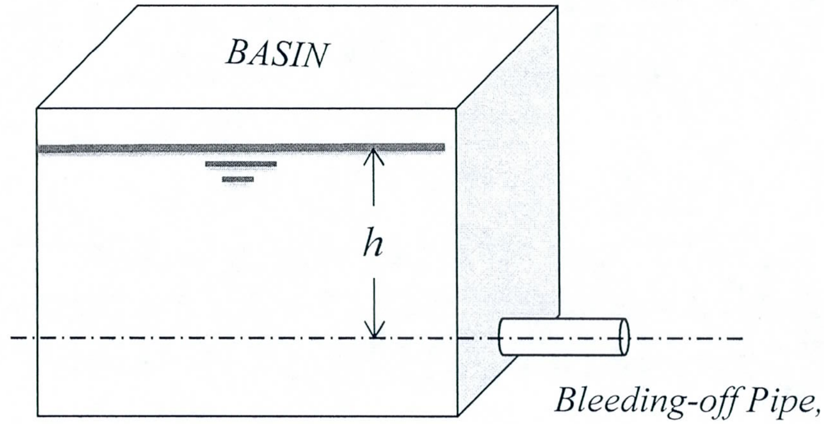
$$Q = C_d A (2gh)^{0.5}$$

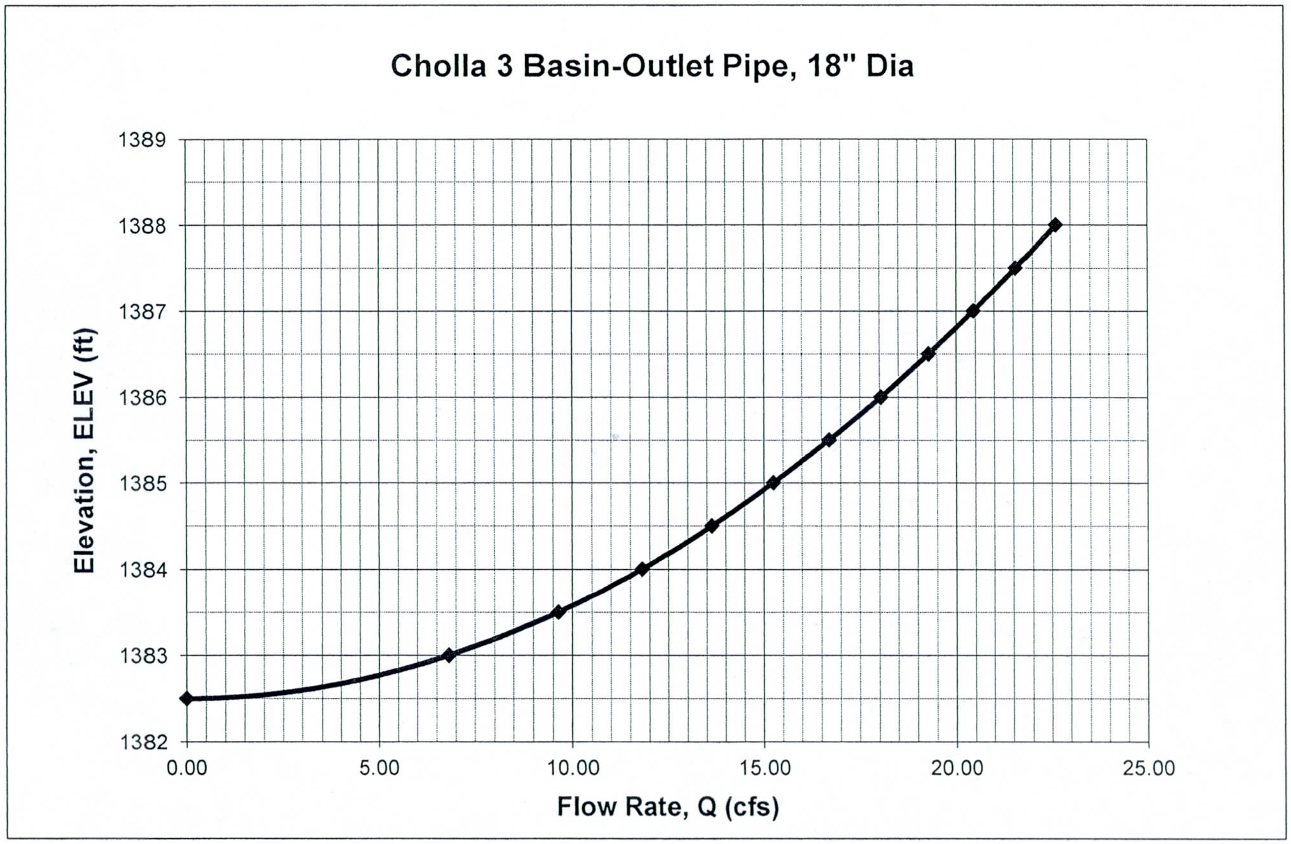
Orifice C_d = 0.68

Orifice Dia = 1.5 ft

Orifice Area = 1.767 sq.ft

Centreline Elevation of the Orifice = 1382.5

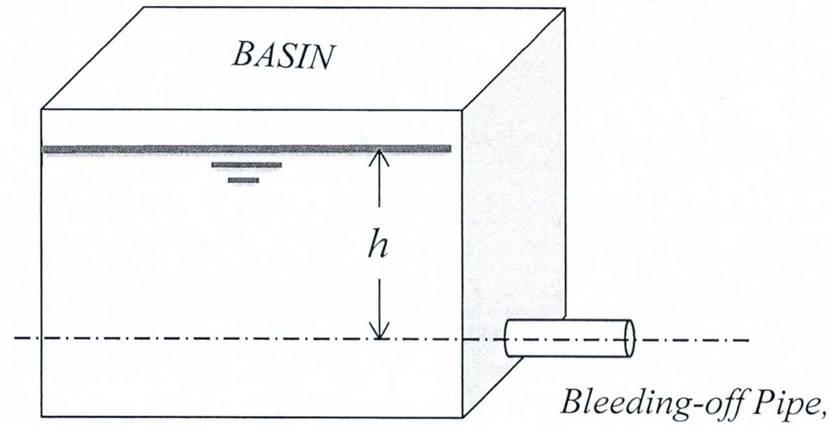




h (ft)	*ELEV (ft)*	*Q (cfs)*
0	1382.5	0.00
0.5	1383	6.82
1	1383.5	9.64
1.5	1384	11.81
2	1384.5	13.64
2.5	1385	15.25
3	1385.5	16.70
3.5	1386	18.04
4	1386.5	19.29
4.5	1387	20.46
5	1387.5	21.56
5.5	1388	22.62
6	1388.5	23.62
6.5	1389	24.59
7	1389.5	25.51

POINDETTIA Basin Outlet (Bleeding-off) Pipe

Use a 18" outlet pipe at the bottom of the Basin,
Orifice Equation:



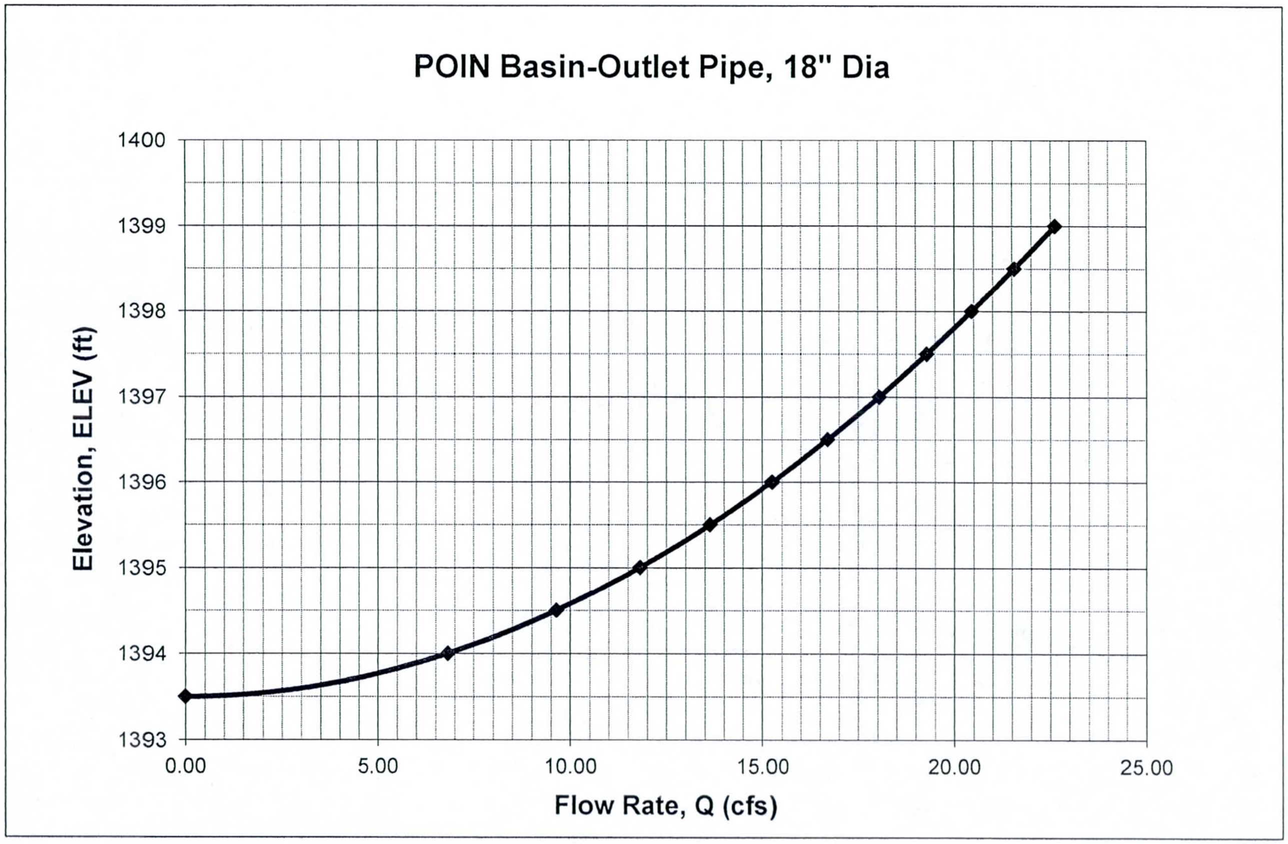
$Q = C_d A(2gh)^{0.5}$

Orifice C_d = 0.68

Orifice Dia = 1.5 ft

Orifice Area = 1.767 sq.ft

Centreline Elevation of the Orifice = 1393.5



h (ft)	*ELEV (ft)*	*Q (cfs)*
0	1393.5	0.00
0.5	1394	6.82
1	1394.5	9.64
1.5	1395	11.81
2	1395.5	13.64
2.5	1396	15.25
3	1396.5	16.70
3.5	1397	18.04
4	1397.5	19.29
4.5	1398	20.46
5	1398.5	21.56
5.5	1399	22.62
6	1399.5	23.62
6.5	1400	24.59
7	1400.5	25.51

Appendix H

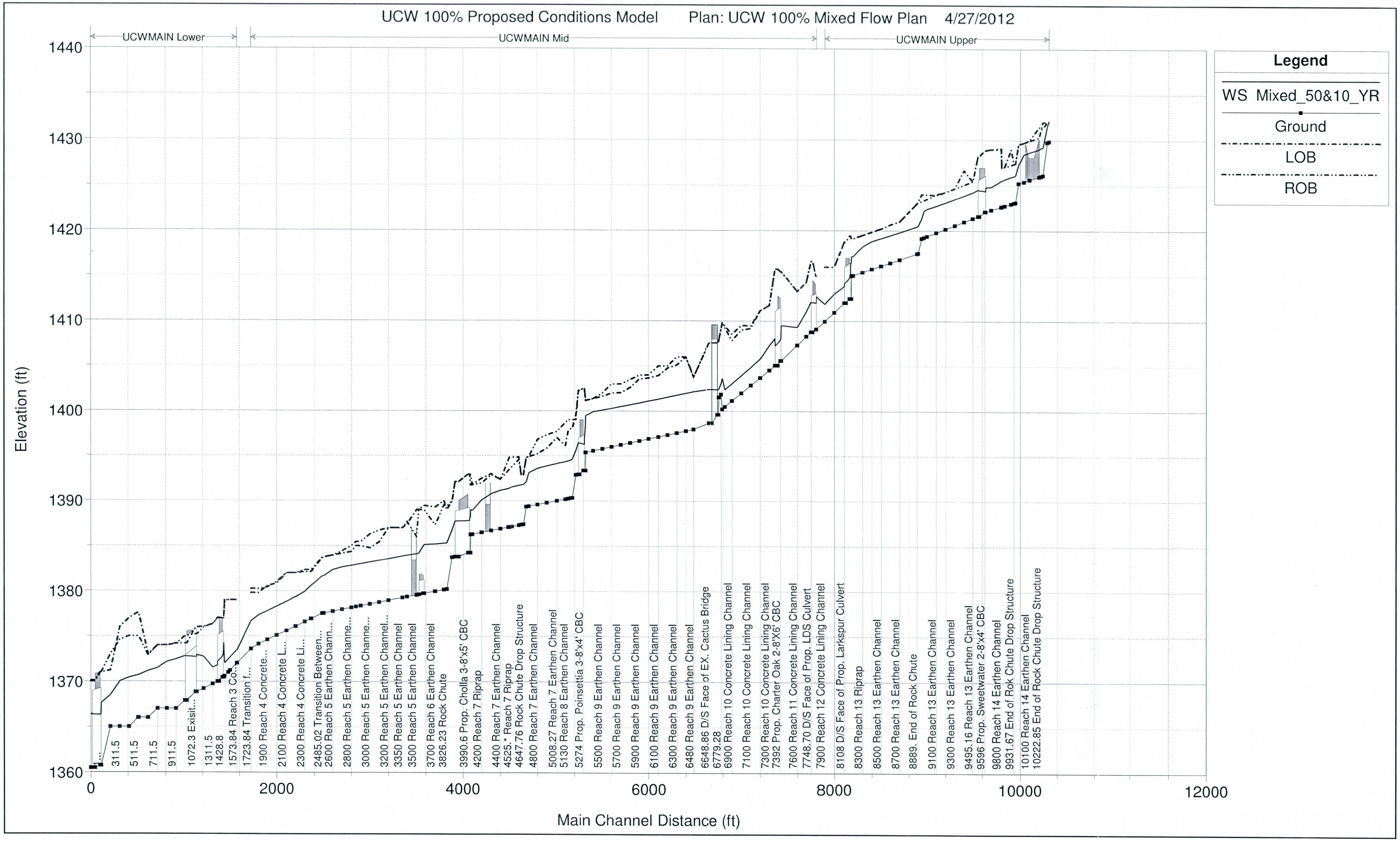
HEC-RAS Output Files for the Proposed Condition Run

PRIMATECH
ENGINEERS & CONSULTANTS

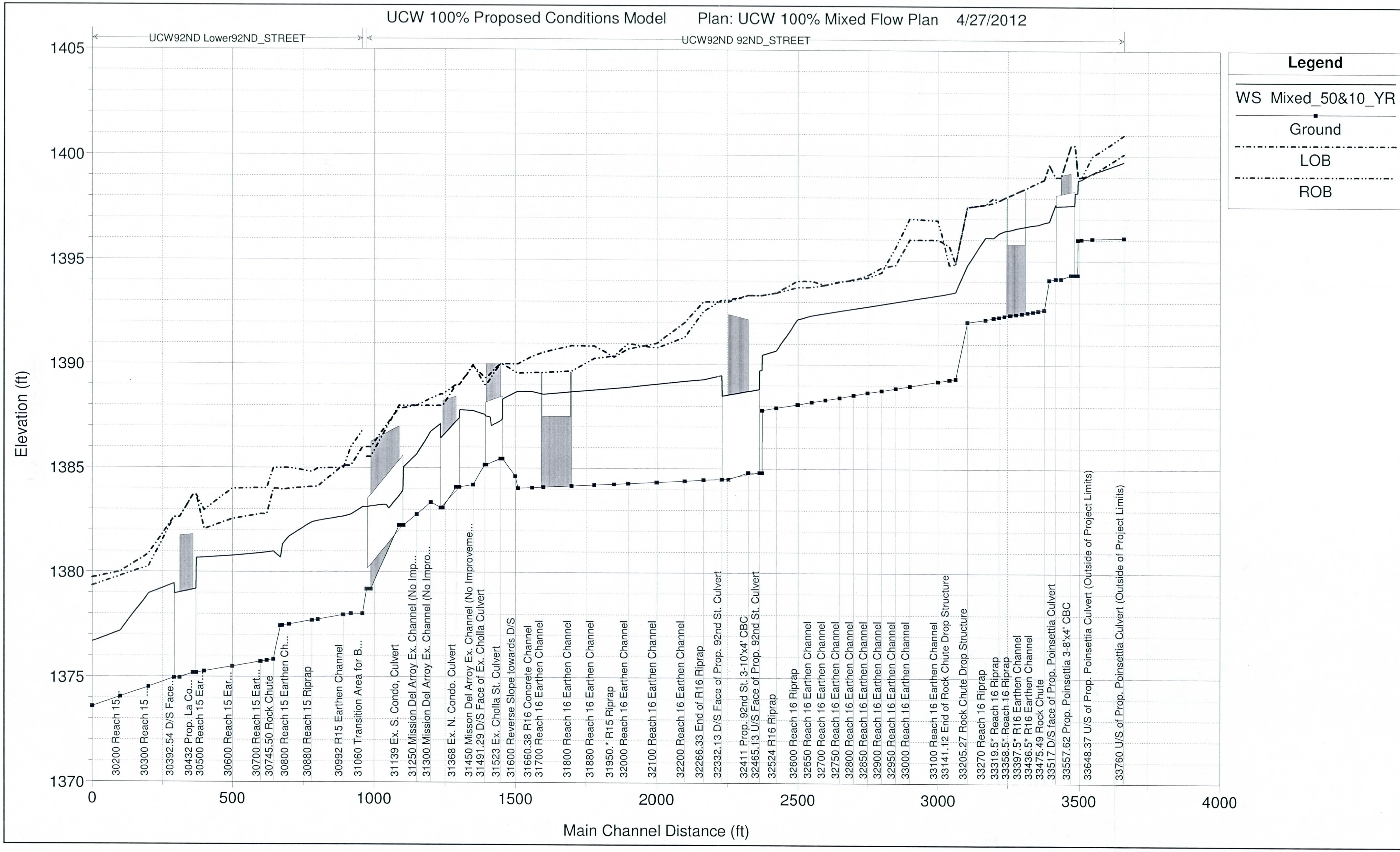
UPPER CAMELBACK WASH IMPROVEMENTS
HEC-RAS CROSS SECTION LOCATIONS MAP

Flood Control District of Maricopa County

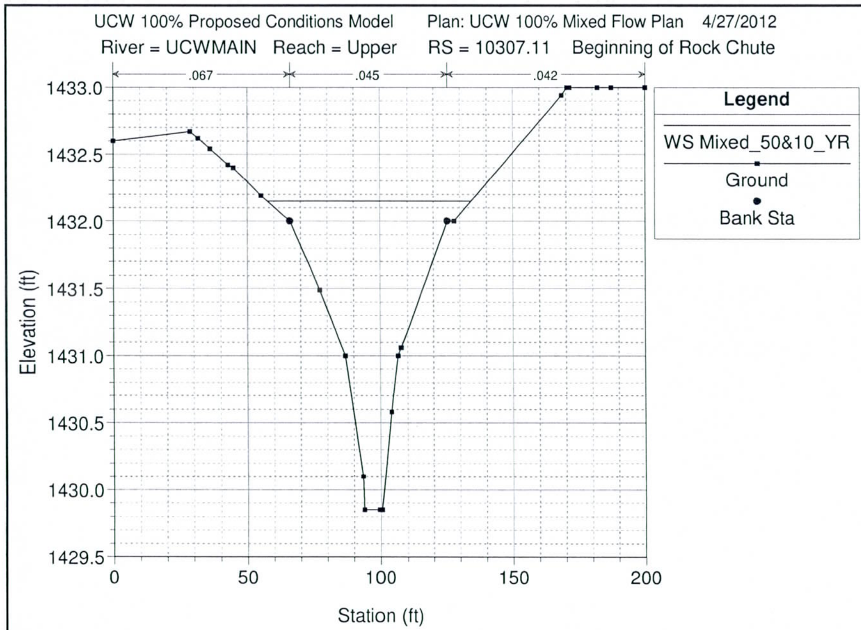
CITY OF SCOTTSDALE ARIZONA

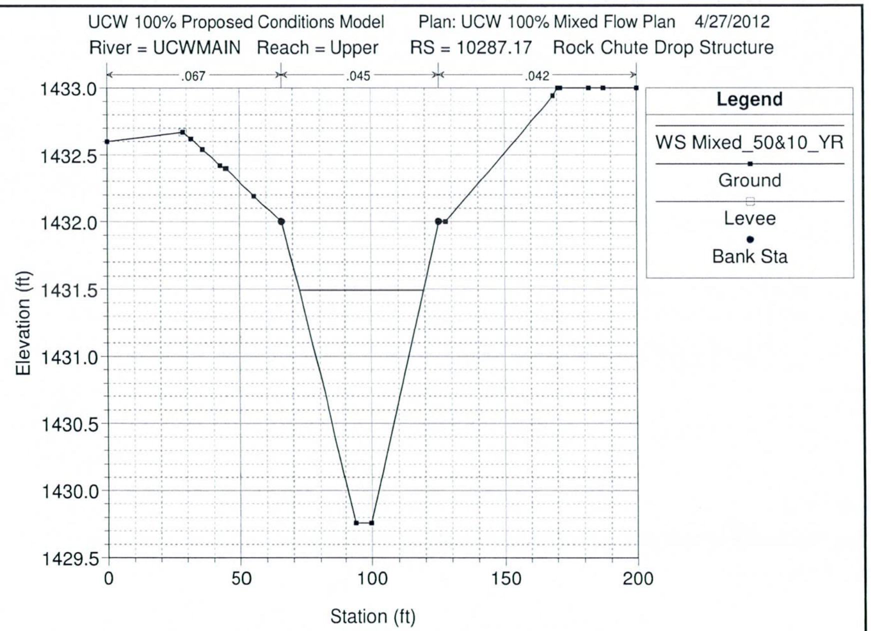


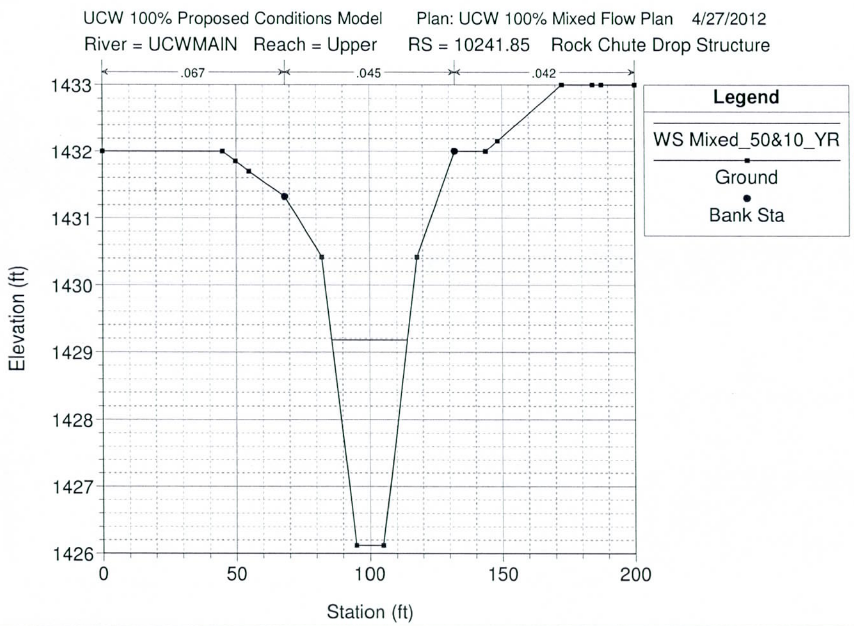
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
UCWMAIN Lower
UCWMAIN Mid
UCWMAIN Upper
Legend
WS Mixed_50&10_YR
Ground
LOB
ROB
Elevation (ft)
Main Channel Distance (ft)
1360
1370
1380
1390
1400
1410
1420
1430
1440
0
2000
4000
6000
8000
10000
12000
311.5
511.5
711.5
911.5
1072.3 Exisit...
1311.5
1428.8
1573.84 Reach 3 Co...
1723.84 Transition f...
1900 Reach 4 Concrete...
2100 Reach 4 Concrete L...
2300 Reach 4 Concrete Li...
2485.02 Transition Between...
2600 Reach 5 Earthen Chann...
2800 Reach 5 Earthen Channe...
3000 Reach 5 Earthen Channe...
3200 Reach 5 Earthen Channel...
3350 Reach 5 Earthen Channel
3500 Reach 5 Earthen Channel
3700 Reach 6 Earthen Channel
3826.23 Rock Chute
3990.6 Prop. Cholla 3-8'x5' CBC
4200 Reach 7 Riprap
4400 Reach 7 Earthen Channel
4525.* Reach 7 Riprap
4647.76 Rock Chute Drop Structure
4800 Reach 7 Earthen Channel
5008.27 Reach 7 Earthen Channel
5130 Reach 8 Earthen Channel
5274 Prop. Poinsettia 3-8'x4' CBC
5500 Reach 9 Earthen Channel
5700 Reach 9 Earthen Channel
5900 Reach 9 Earthen Channel
6100 Reach 9 Earthen Channel
6300 Reach 9 Earthen Channel
6480 Reach 9 Earthen Channel
6648.86 D/S Face of EX. Cactus Bridge
6779.28
6900 Reach 10 Concrete Lining Channel
7100 Reach 10 Concrete Lining Channel
7300 Reach 10 Concrete Lining Channel
7392 Prop. Charter Oak 2-8'X6' CBC
7600 Reach 11 Concrete Lining Channel
7748.70 D/S Face of Prop. LDS Culvert
7900 Reach 12 Concrete Lining Channel
8108 D/S Face of Prop. Larkspur Culvert
8300 Reach 13 Riprap
8500 Reach 13 Earthen Channel
8700 Reach 13 Earthen Channel
8889. End of Rock Chute
9100 Reach 13 Earthen Channel
9300 Reach 13 Earthen Channel
9495.16 Reach 13 Earthen Channel
9596 Prop. Sweetwater 2-8'x4' CBC
9800 Reach 14 Earthen Channel
9931.67 End of Rok Chute Drop Structure
10100 Reach 14 Earthen Channel
10222.85 End of Rock Chute Drop Structure

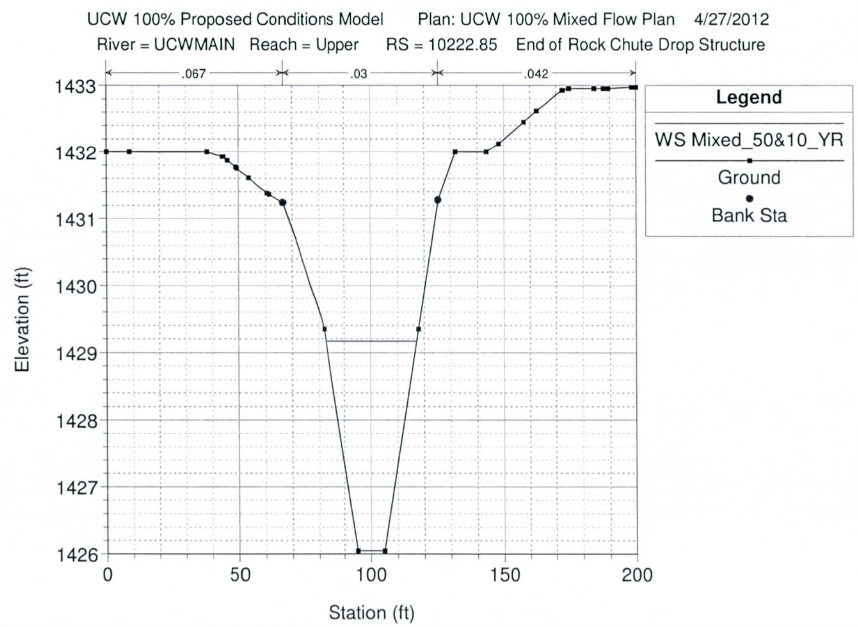


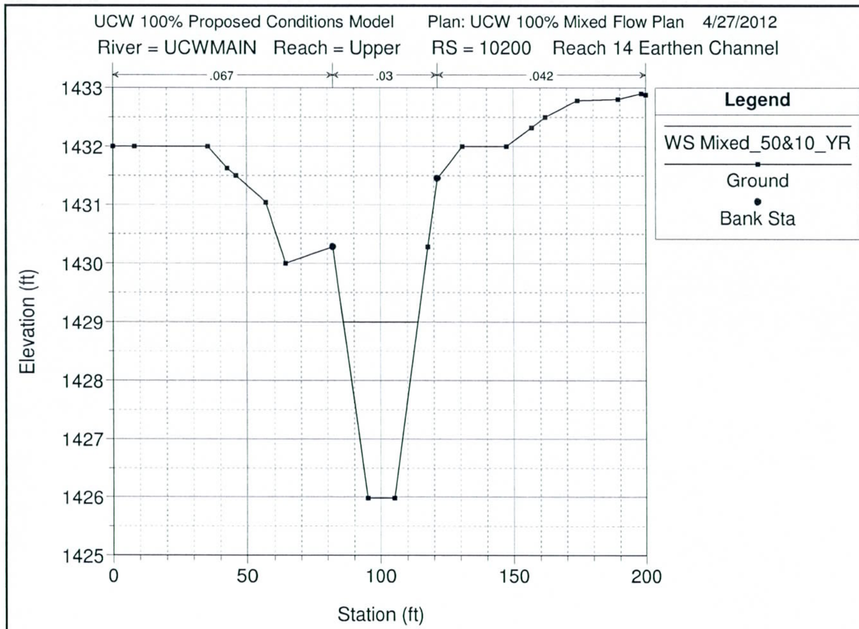
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
UCW92ND Lower92ND_STREET
UCW92ND 92ND_STREET
Legend
WS Mixed_50&10_YR
Ground
LOB
ROB
Elevation (ft)
1405
1400
1395
1390
1385
1380
1375
1370
Main Channel Distance (ft)
0
500
1000
1500
2000
2500
3000
3500
4000
30200 Reach 15
30300 Reach 15 ...
30392.54 D/S Face...
30432 Prop. La Co...
30500 Reach 15 Ear...
30600 Reach 15 Ear...
30700 Reach 15 Eart...
30745.50 Rock Chute
30800 Reach 15 Earthen Ch...
30880 Reach 15 Riprap
30992 R15 Earthen Channel
31060 Transition Area for B...
31139 Ex. S. Condo, Culvert
31250 Mission Del Arroy Ex. Channel (No Imp...
31300 Mission Del Arroy Ex. Channel (No Impro...
31368 Ex. N. Condo. Culvert
31450 Misson Del Arroy Ex. Channel (No Improveme...
31491.29 D/S Face of Ex. Cholla Culvert
31523 Ex. Cholla St. Culvert
31600 Reverse Slope towards D/S
31660.38 R16 Concrete Channel
31700 Reach 16 Earthen Channel
31800 Reach 16 Earthen Channel
31880 Reach 16 Earthen Channel
31950.* R15 Riprap
32000 Reach 16 Earthen Channel
32100 Reach 16 Earthen Channel
32200 Reach 16 Earthen Channel
32266.33 End of R16 Riprap
32332.13 D/S Face of Prop. 92nd St. Culvert
32411 Prop. 92nd St. 3-10'x4' CBC
32465.13 U/S Face of Prop. 92nd St. Culvert
32524 R16 Riprap
32600 Reach 16 Riprap
32650 Reach 16 Earthen Channel
32700 Reach 16 Earthen Channel
32750 Reach 16 Earthen Channel
32800 Reach 16 Earthen Channel
32850 Reach 16 Earthen Channel
32900 Reach 16 Earthen Channel
32950 Reach 16 Earthen Channel
33000 Reach 16 Earthen Channel
33100 Reach 16 Earthen Channel
33141.12 End of Rock Chute Drop Structure
33205.27 Rock Chute Drop Structure
33270 Reach 16 Riprap
33319.5* Reach 16 Riprap
33358.5* Reach 16 Riprap
33397.5* R16 Earthen Channel
33436.5* R16 Earthen Channel
33475.49 Rock Chute
33517 D/S face of Prop. Poinsettia Culvert
33557.62 Prop. Poinsettia 3-8'x4' CBC
33648.37 U/S of Prop. Poinsettia Culvert (Outside of Project Limits)
33760 U/S of Prop. Poinsettia Culvert (Outside of Project Limits)

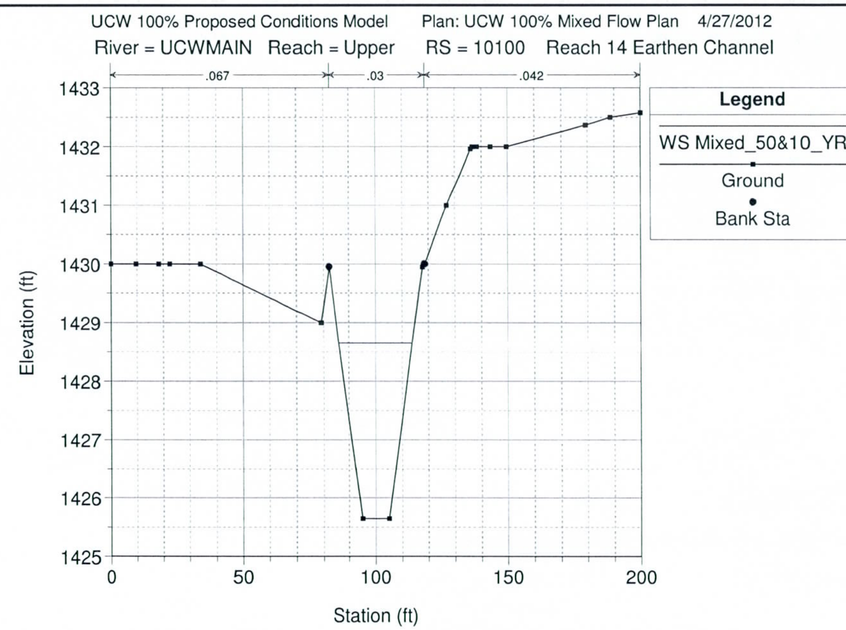

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10307.11 Beginning of Rock Chute
.067
.045
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

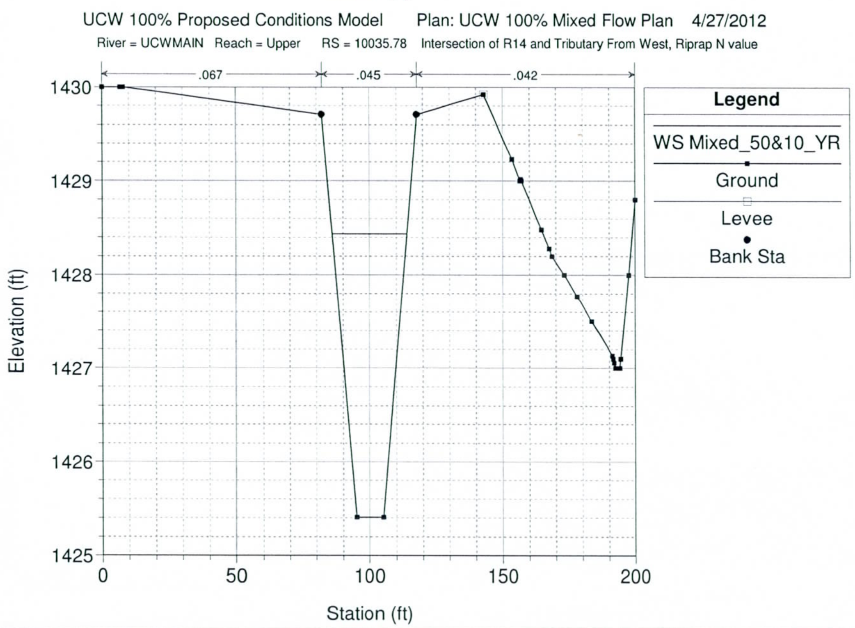

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10287.17 Rock Chute Drop Structure
.067
.045
.042
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

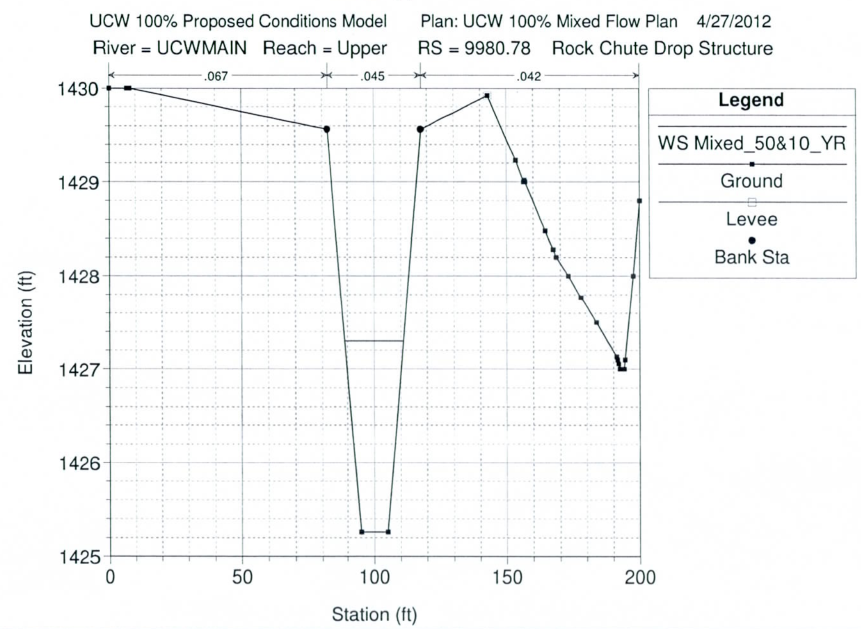

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10241.85 Rock Chute Drop Structure
.067
.045
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

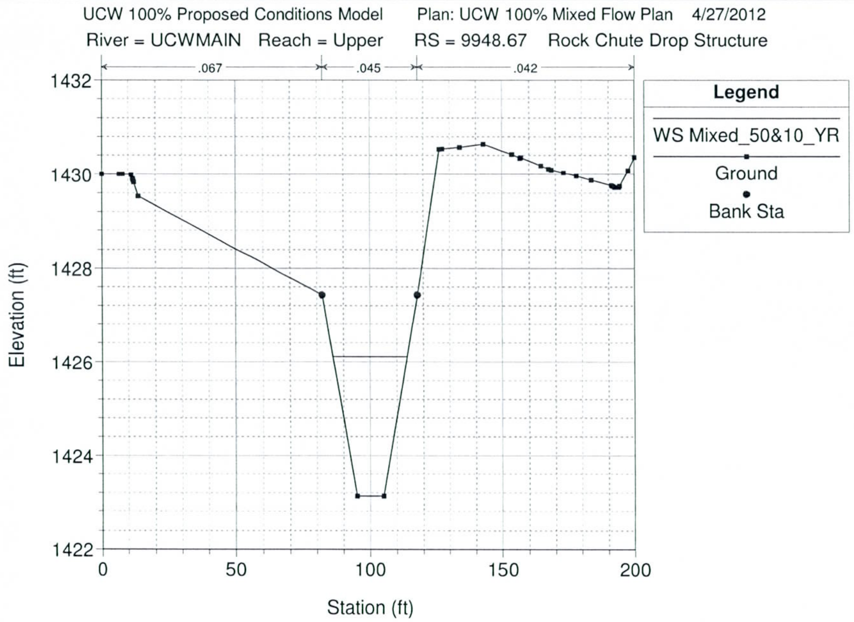

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10222.85 End of Rock Chute Drop Structure
.067
.03
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

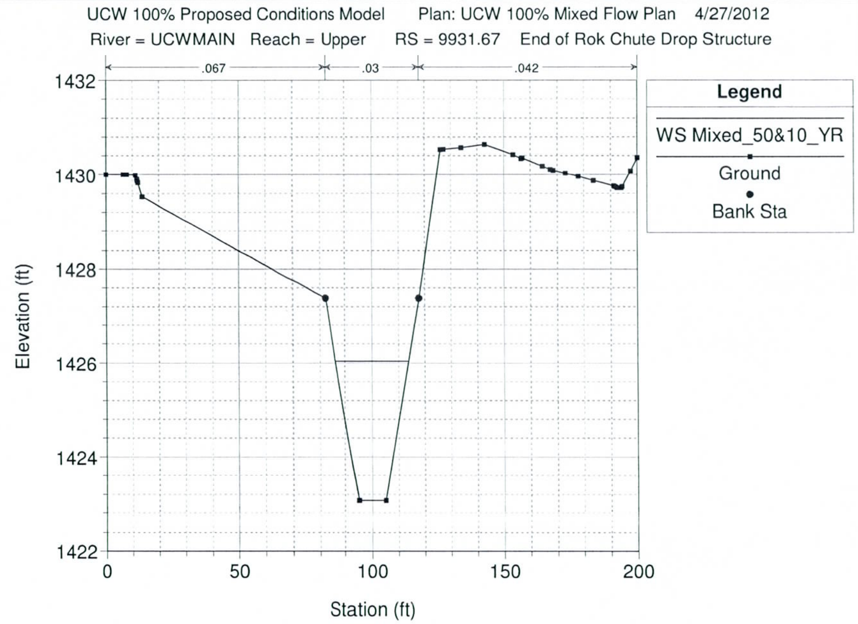

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10200 Reach 14 Earthen Channel
.067
.03
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1433
1432
1431
1430
1429
1428
1427
1426
1425
0
50
100
150
200

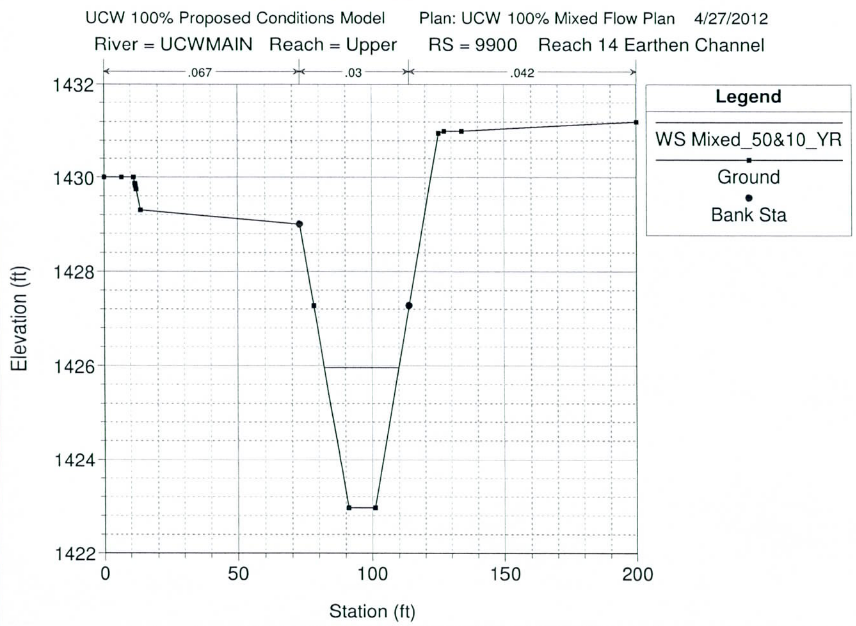

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10100 Reach 14 Earthen Channel
.067
.03
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1433
1432
1431
1430
1429
1428
1427
1426
1425
0
50
100
150
200

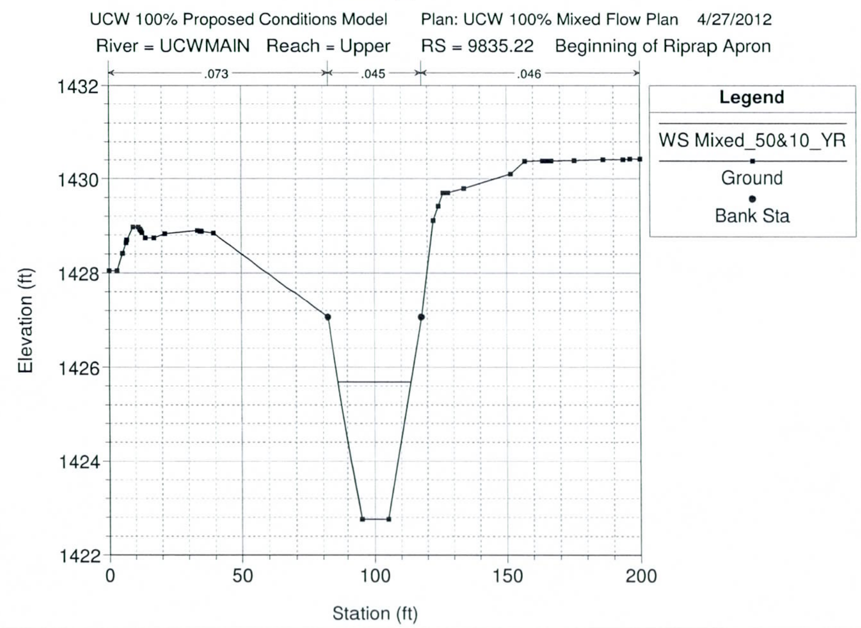

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 10035.78 Intersection of R14 and Tributary From West, Riprap N value
.067
.045
.042
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1430
1429
1428
1427
1426
1425
0
50
100
150
200

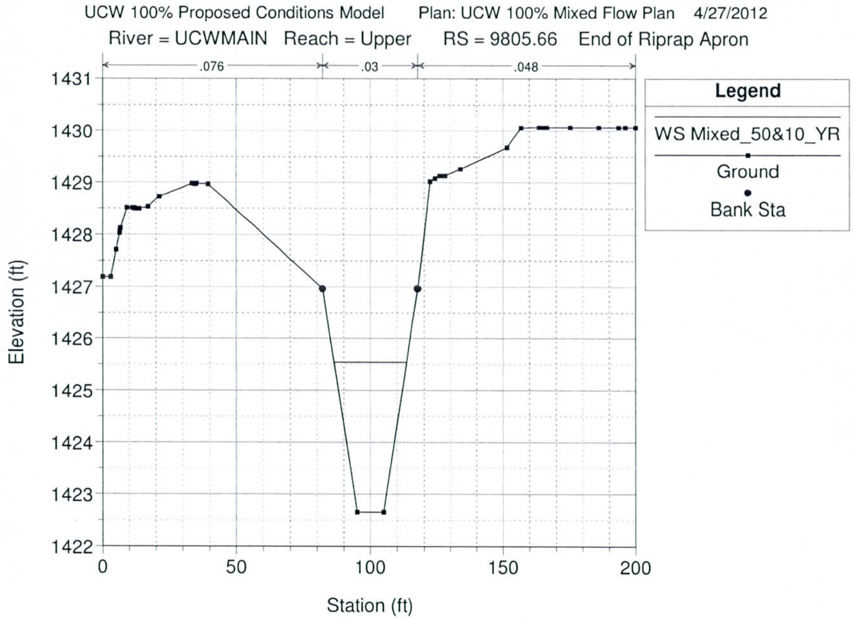

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9980.78 Rock Chute Drop Structure
.067
.045
.042
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1430
1429
1428
1427
1426
1425
0
50
100
150
200


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9948.67 Rock Chute Drop Structure
.067
.045
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1432
1430
1428
1426
1424
1422
0
50
100
150
200

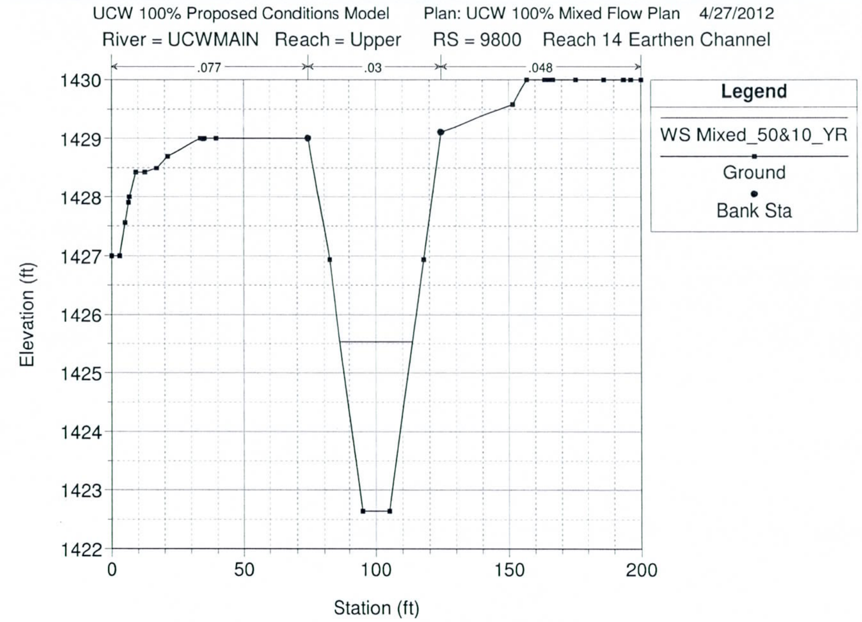

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9931.67 End of Rok Chute Drop Structure
.067
.03
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1432
1430
1428
1426
1424
1422
0
50
100
150
200


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9900 Reach 14 Earthen Channel
.067
.03
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1432
1430
1428
1426
1424
1422
0
50
100
150
200

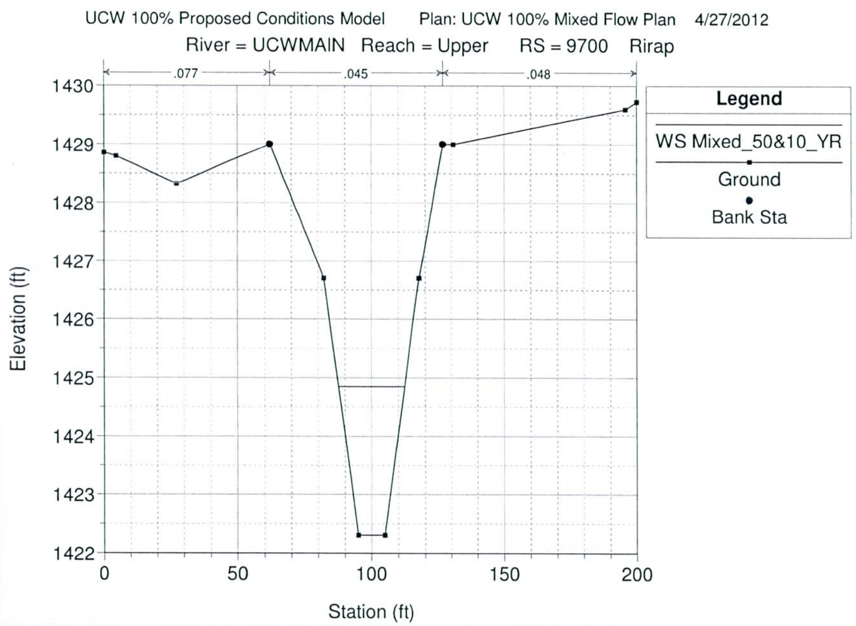

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9835.22 Beginning of Riprap Apron
.073
.045
.046
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1432
1430
1428
1426
1424
1422
0
50
100
150
200



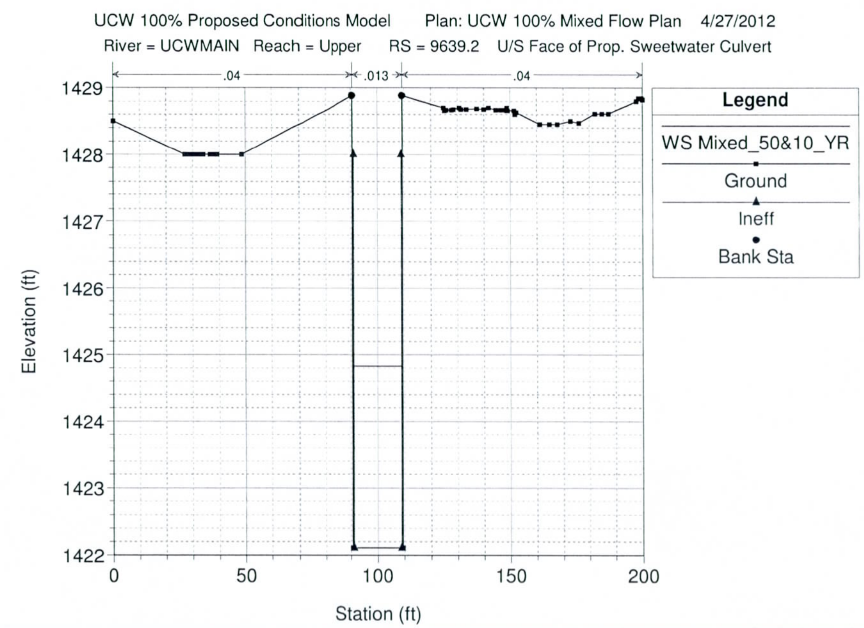
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9805.66 End of Riprap Apron
.076
.03
.048
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)



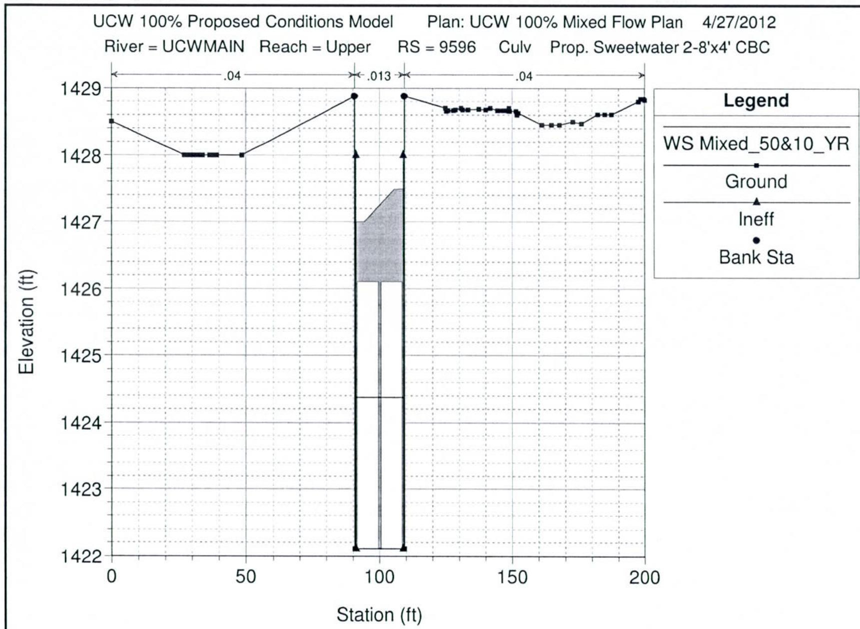
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9800 Reach 14 Earthen Channel
.077
.03
.048
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

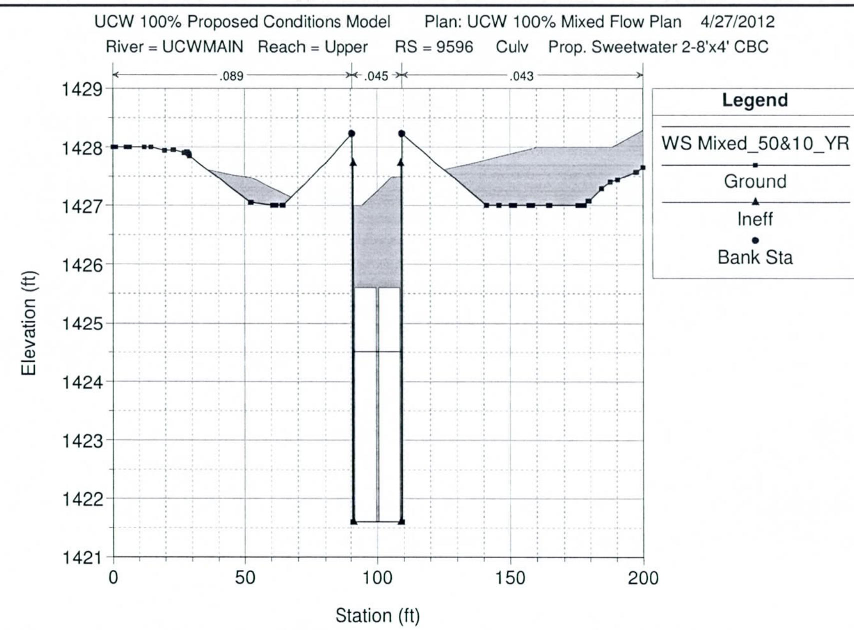


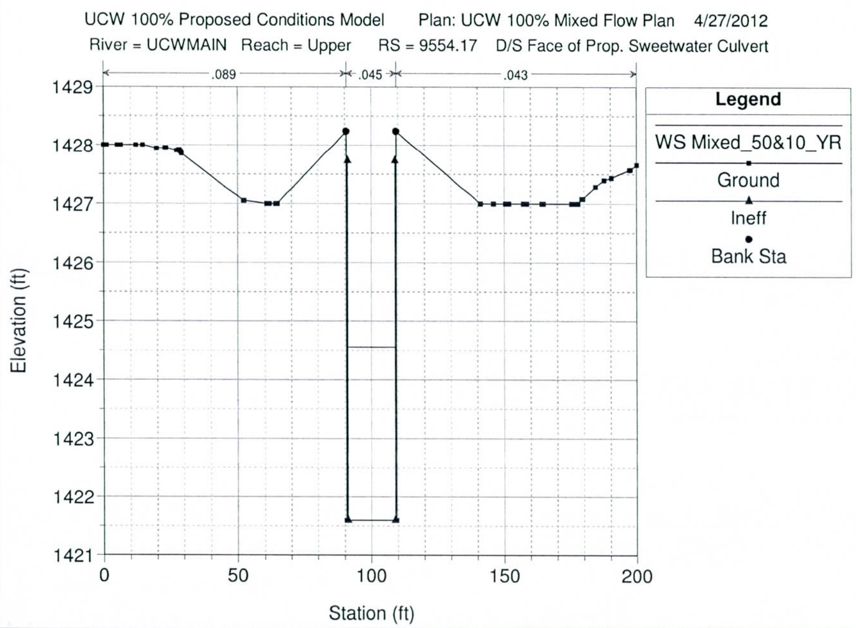
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9700 Rirap
.077
.045
.048
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

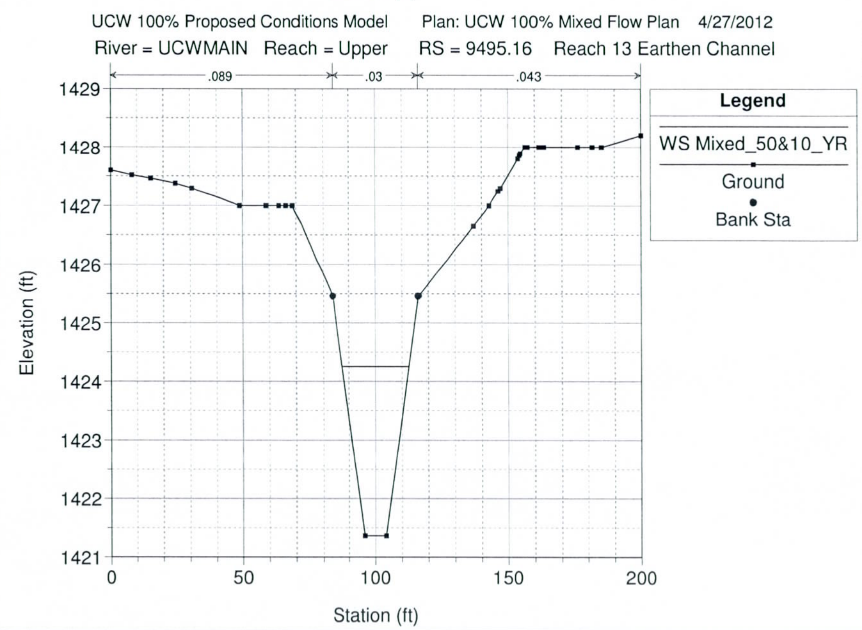


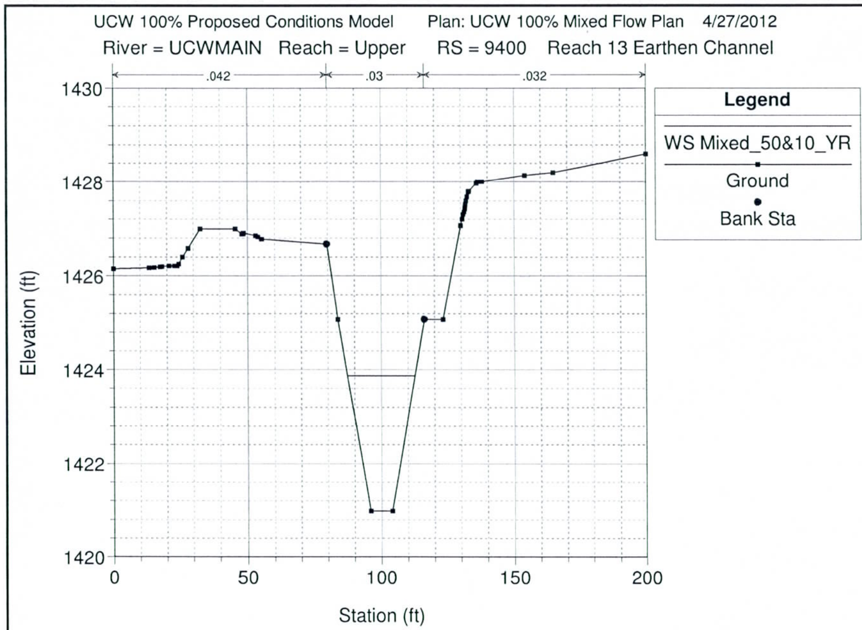
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9639.2 U/S Face of Prop. Sweetwater Culvert
.04
.013
.04
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

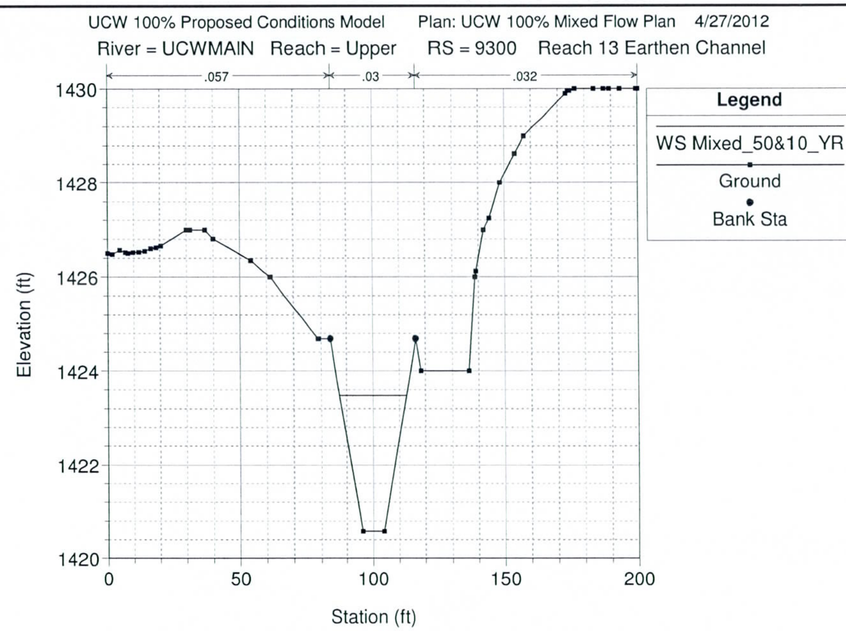

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9596 Culv Prop. Sweetwater 2-8'x4' CBC
.04
.013
.04
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

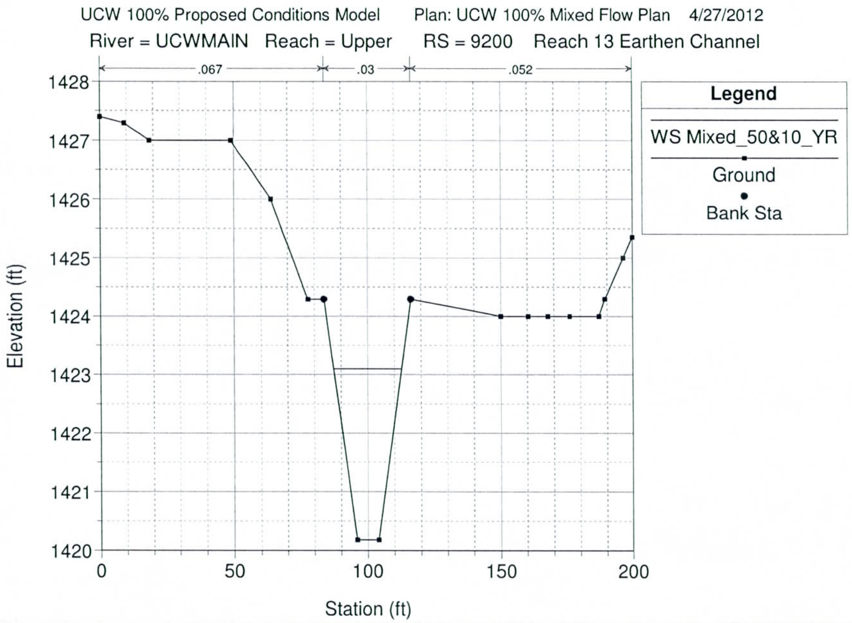

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9596 Culv Prop. Sweetwater 2-8'x4' CBC
.089
.045
.043
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

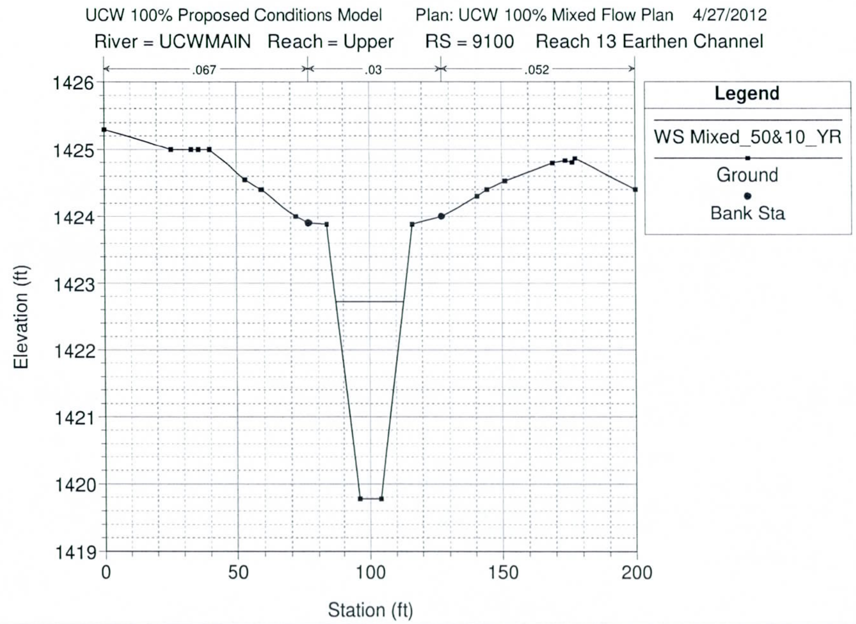

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9554.17 D/S Face of Prop. Sweetwater Culvert
.089
.045
.043
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

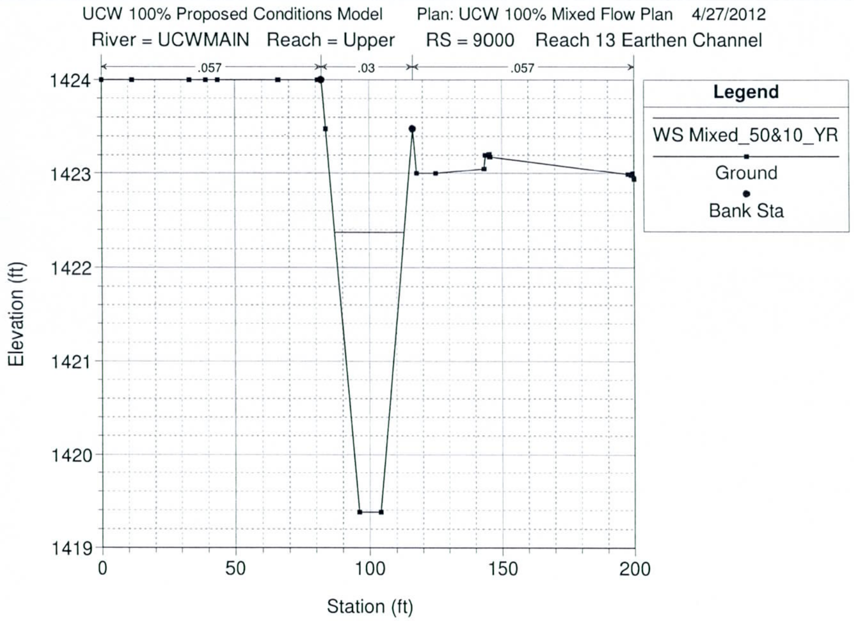

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9495.16 Reach 13 Earthen Channel
.089
.03
.043
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

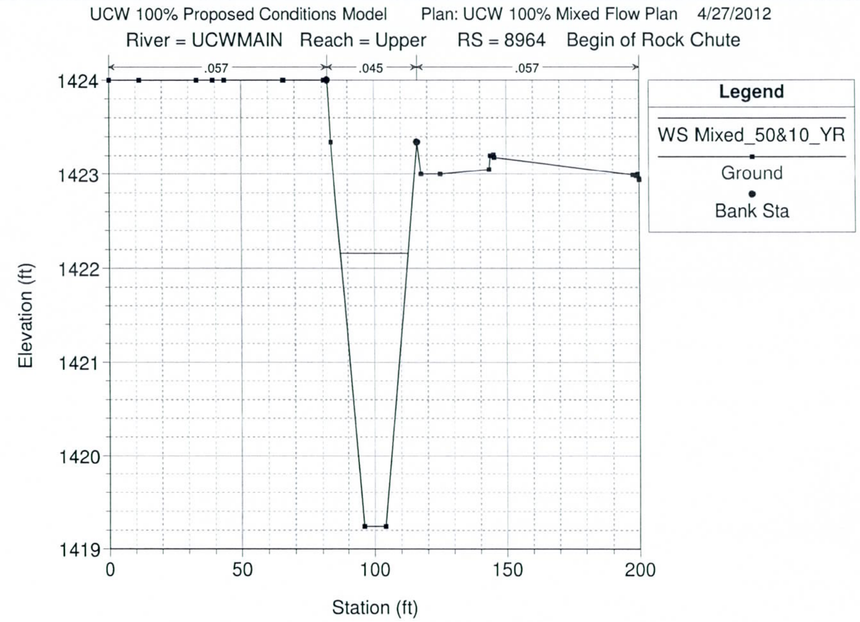

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9400 Reach 13 Earthen Channel
.042
.03
.032
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

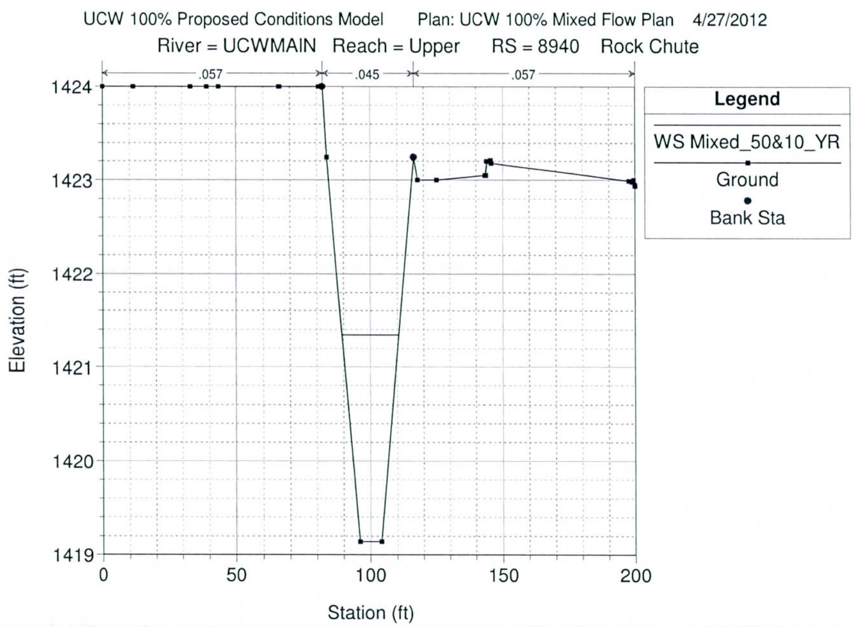

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9300 Reach 13 Earthen Channel
.057
.03
.032
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

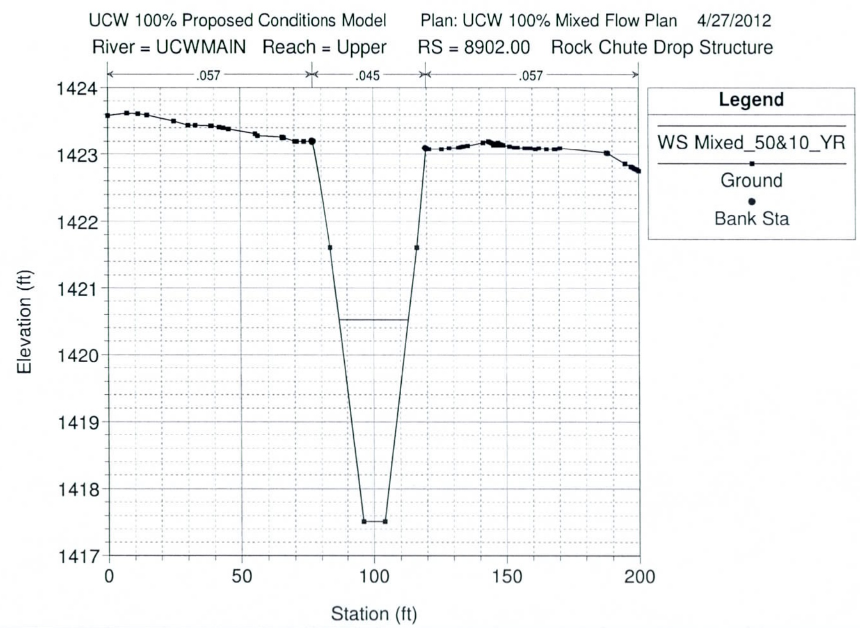

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9200 Reach 13 Earthen Channel
.067
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

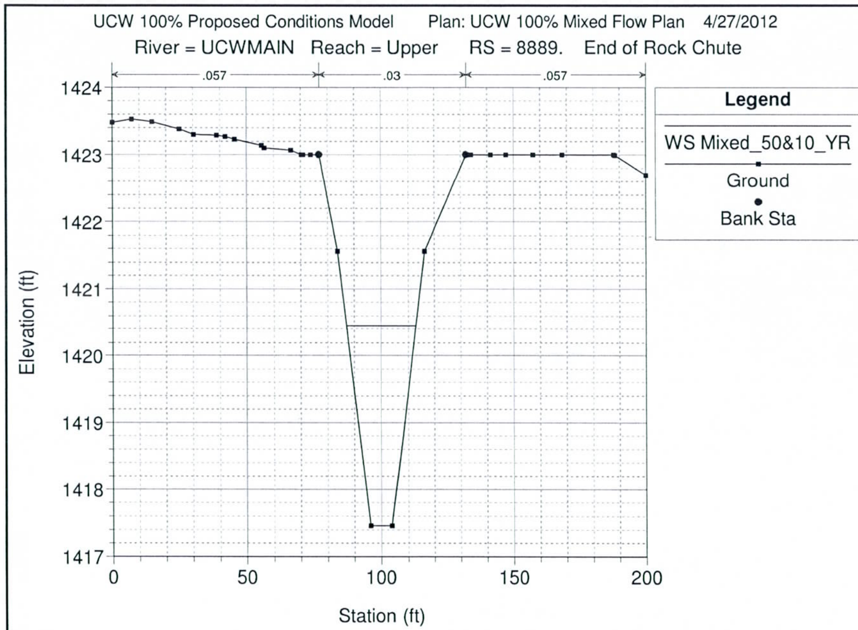

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9100 Reach 13 Earthen Channel
.067
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

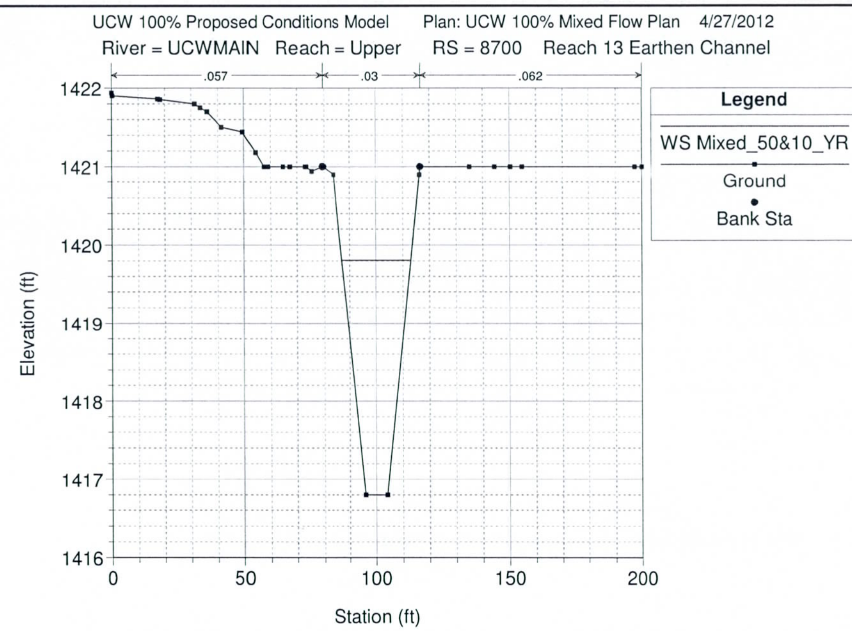

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 9000 Reach 13 Earthen Channel
.057
.03
.057
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1424
1423
1422
1421
1420
1419
0
50
100
150
200

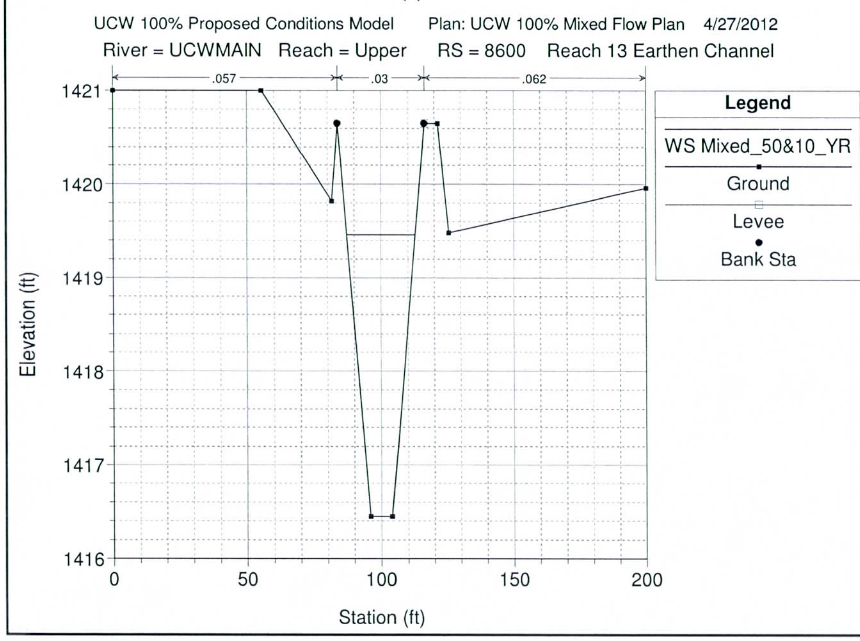

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8964 Begin of Rock Chute
.057
.045
.057
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1424
1423
1422
1421
1420
1419
0
50
100
150
200

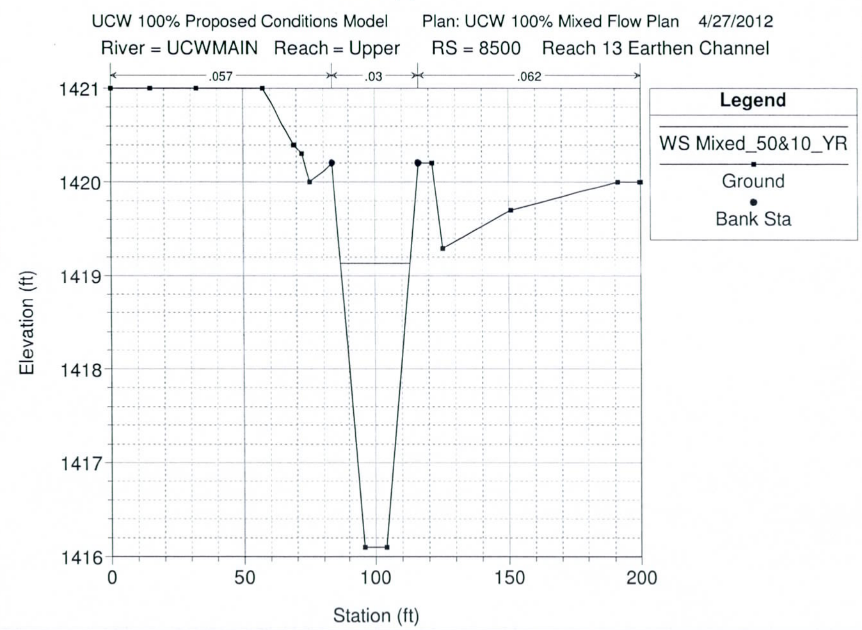

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8940 Rock Chute
.057
.045
.057
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1424
1423
1422
1421
1420
1419
0
50
100
150
200

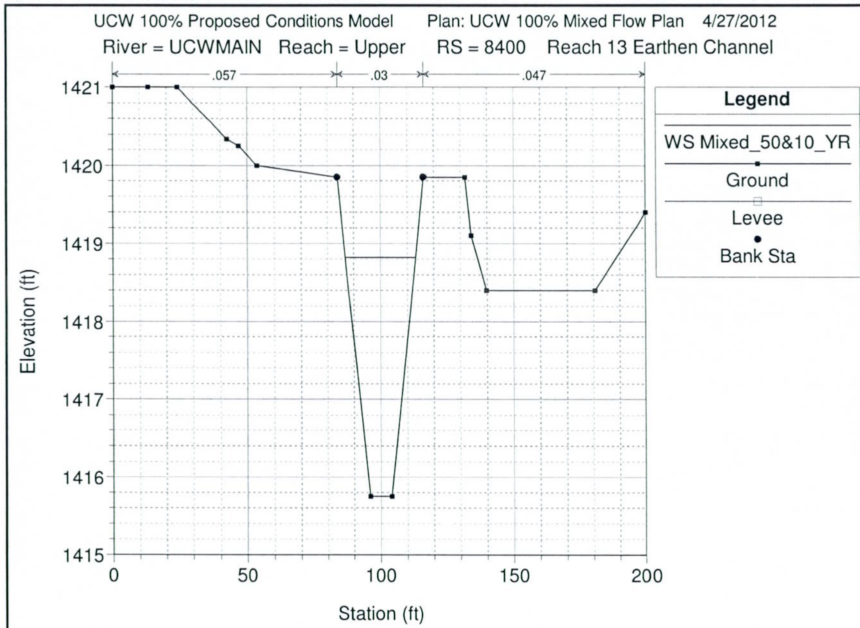

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8902.00 Rock Chute Drop Structure
.057
.045
.057
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1424
1423
1422
1421
1420
1419
1418
1417
0
50
100
150
200

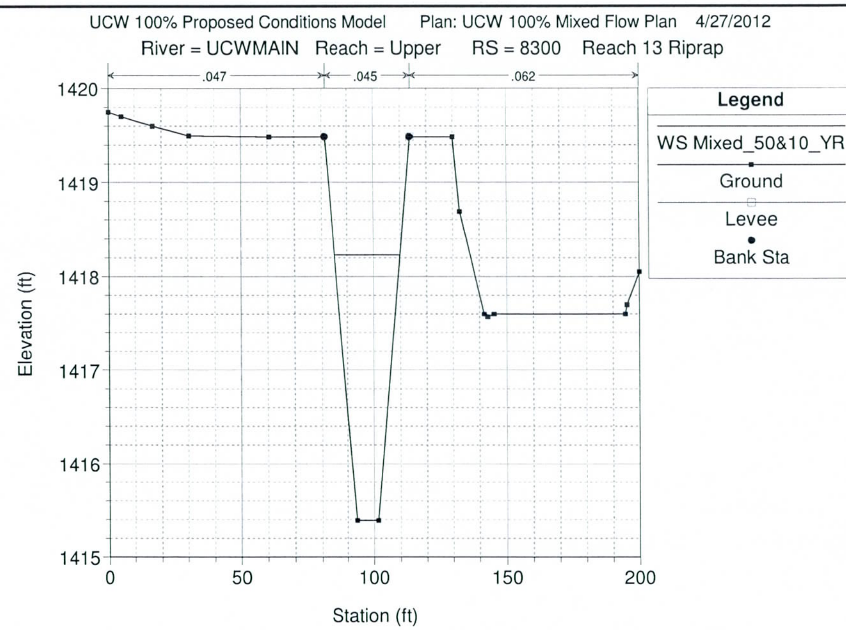

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8889. End of Rock Chute
.057
.03
.057
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1424
1423
1422
1421
1420
1419
1418
1417
0
50
100
150
200
Station (ft)

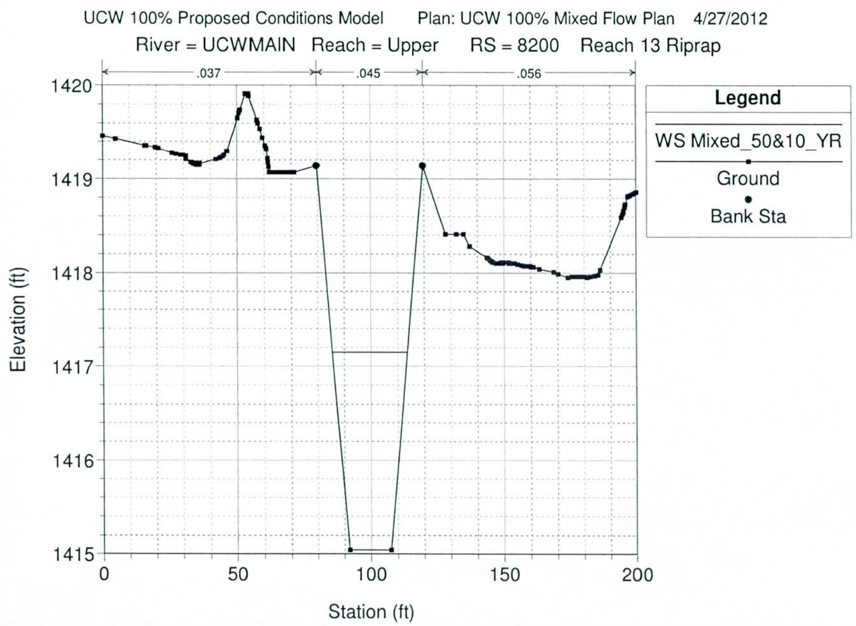

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8700 Reach 13 Earthen Channel
.057
.03
.062
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1422
1421
1420
1419
1418
1417
1416
0
50
100
150
200
Station (ft)

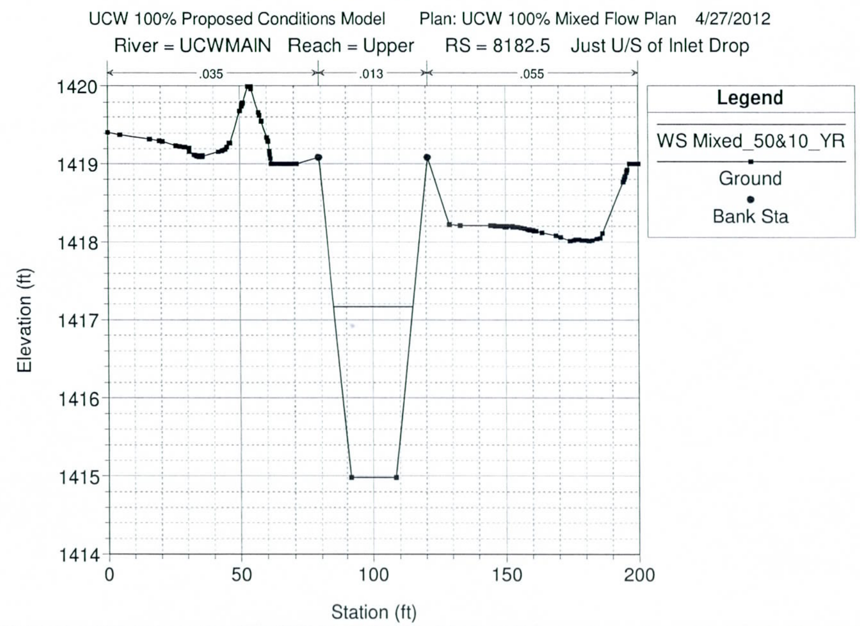

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8600 Reach 13 Earthen Channel
.057
.03
.062
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
1421
1420
1419
1418
1417
1416
0
50
100
150
200
Station (ft)

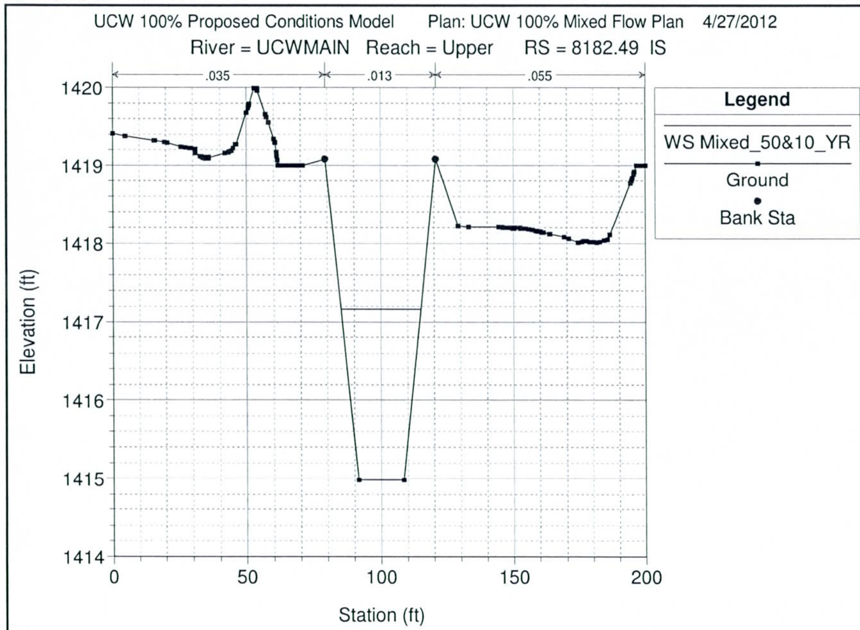

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8500 Reach 13 Earthen Channel
.057
.03
.062
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1421
1420
1419
1418
1417
1416
0
50
100
150
200
Station (ft)

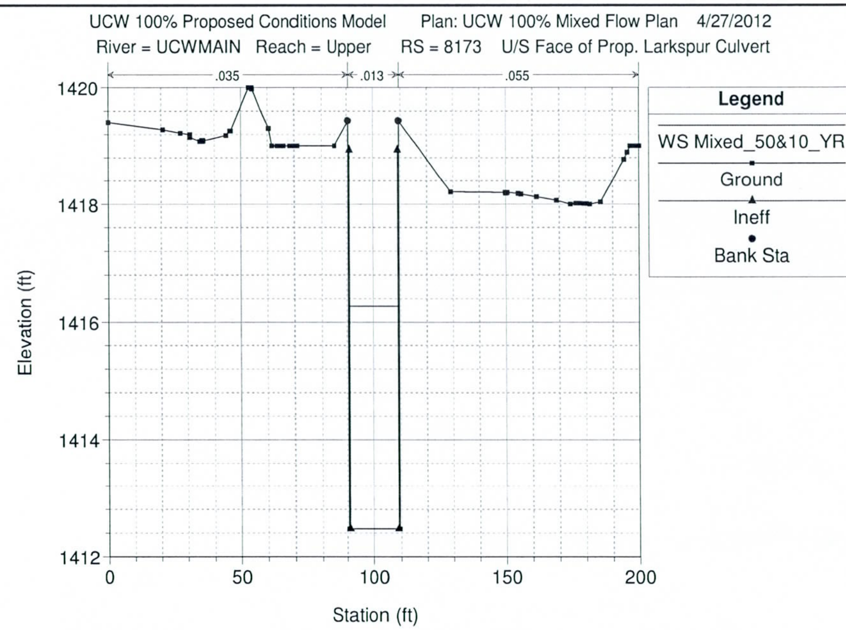

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8400 Reach 13 Earthen Channel
.057
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

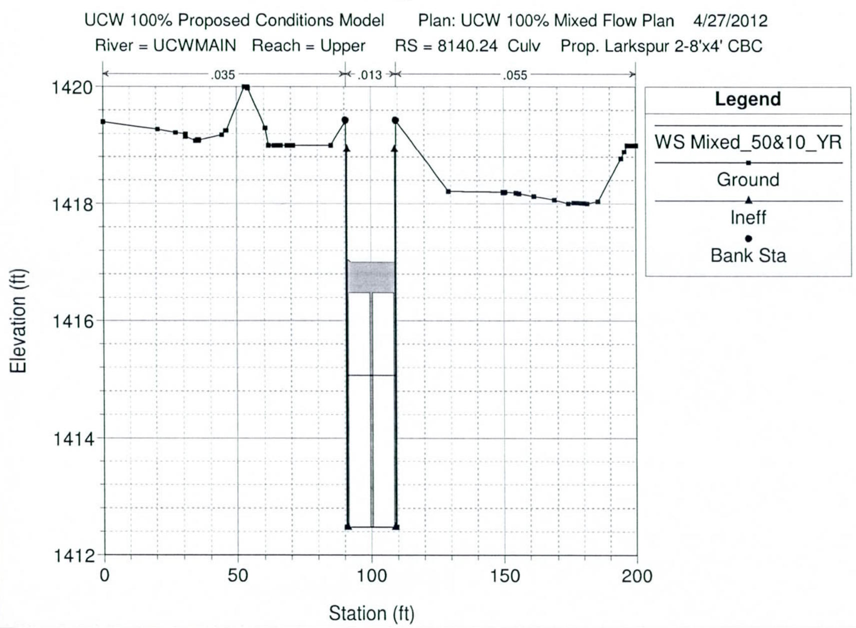

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8300 Reach 13 Riprap
.047
.045
.062
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

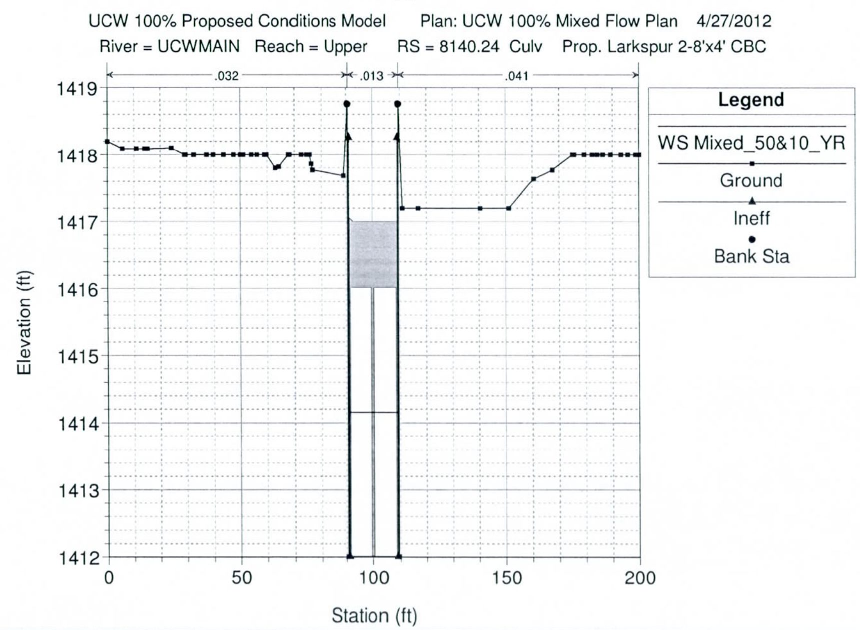

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8200 Reach 13 Riprap
.037
.045
.056
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

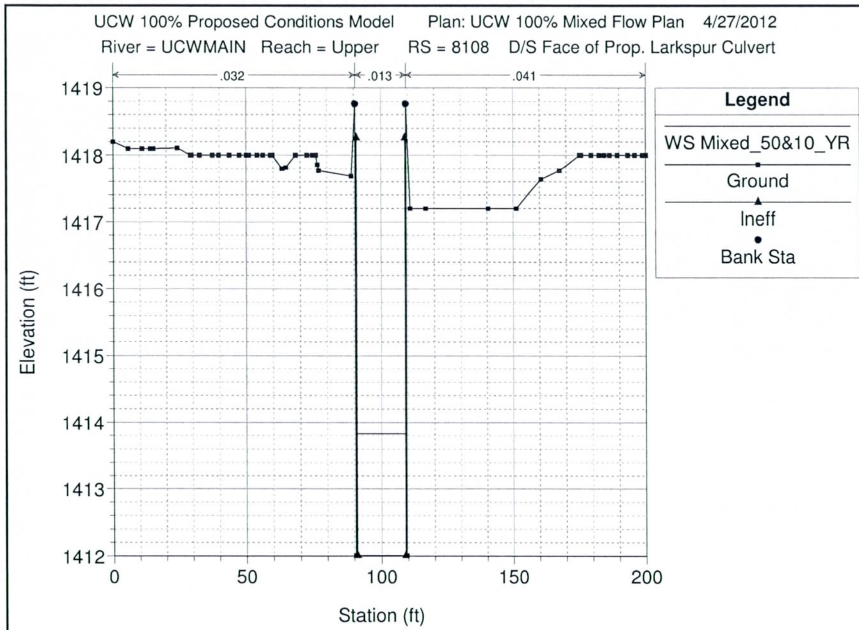

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8182.5 Just U/S of Inlet Drop
.035
.013
.055
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

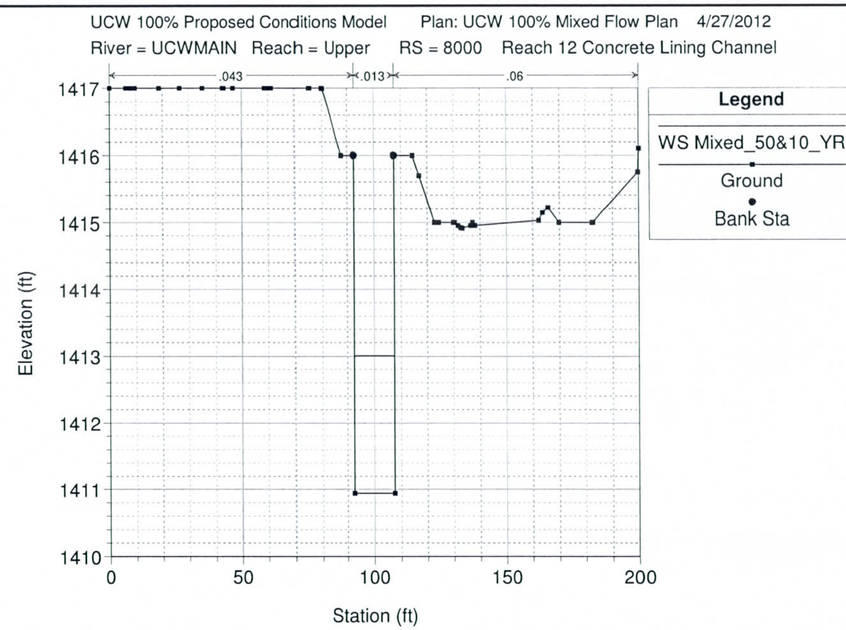

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8182.49 IS
.035 .013 .055
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

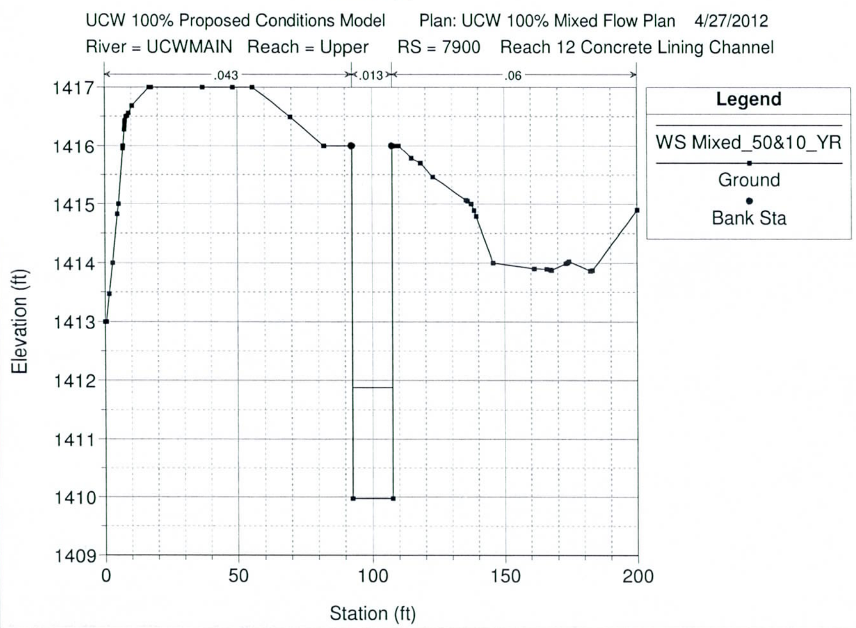

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8173 U/S Face of Prop. Larkspur Culvert
.035 .013 .055
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

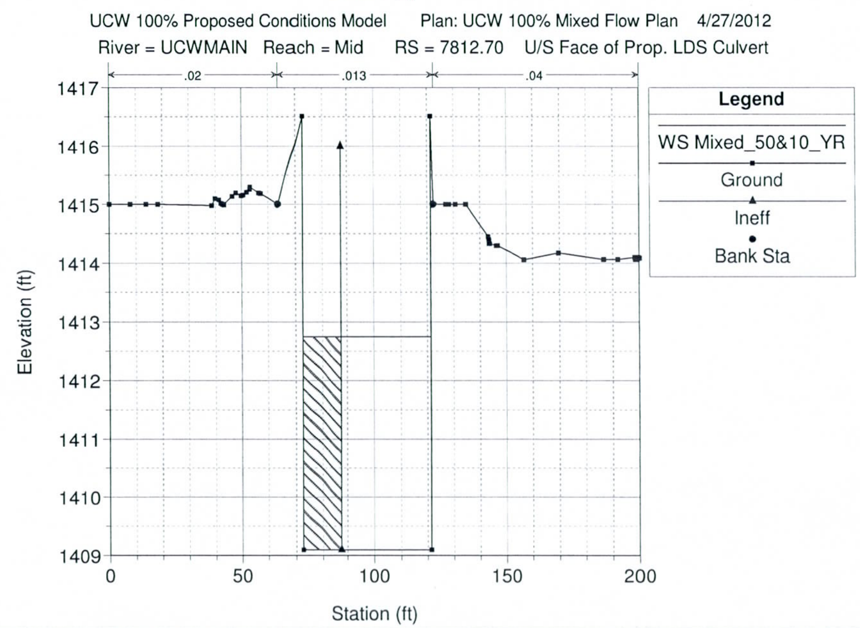

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8140.24 Culv Prop. Larkspur 2-8'x4' CBC
.035 .013 .055
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

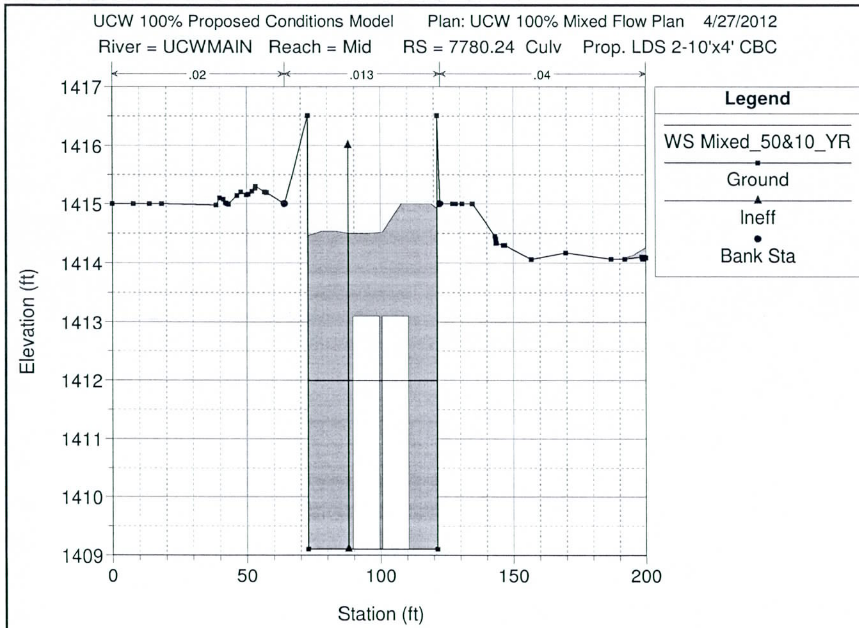

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8140.24 Culv Prop. Larkspur 2-8'x4' CBC
.032 .013 .041
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

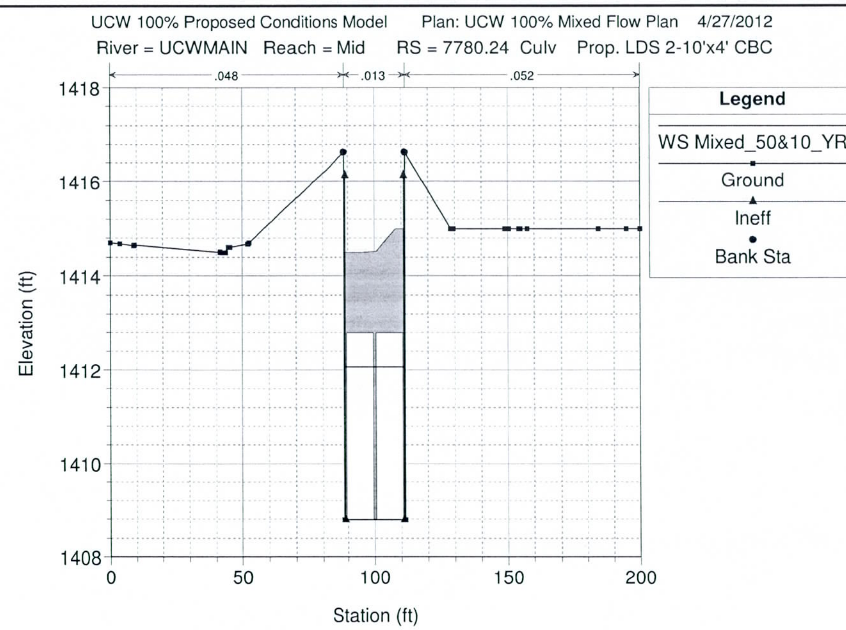

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8108 D/S Face of Prop. Larkspur Culvert
.032
.013
.041
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

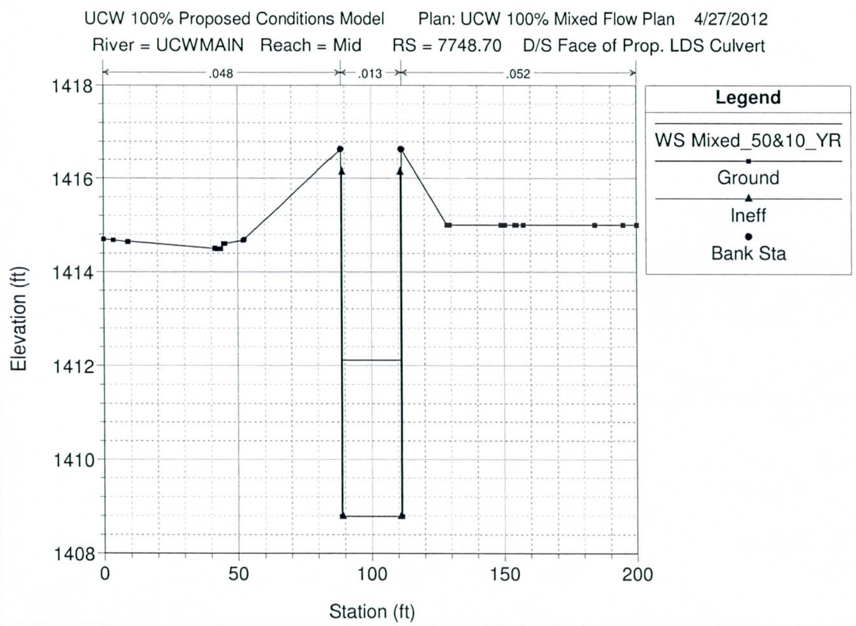

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 8000 Reach 12 Concrete Lining Channel
.043
.013
.06
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

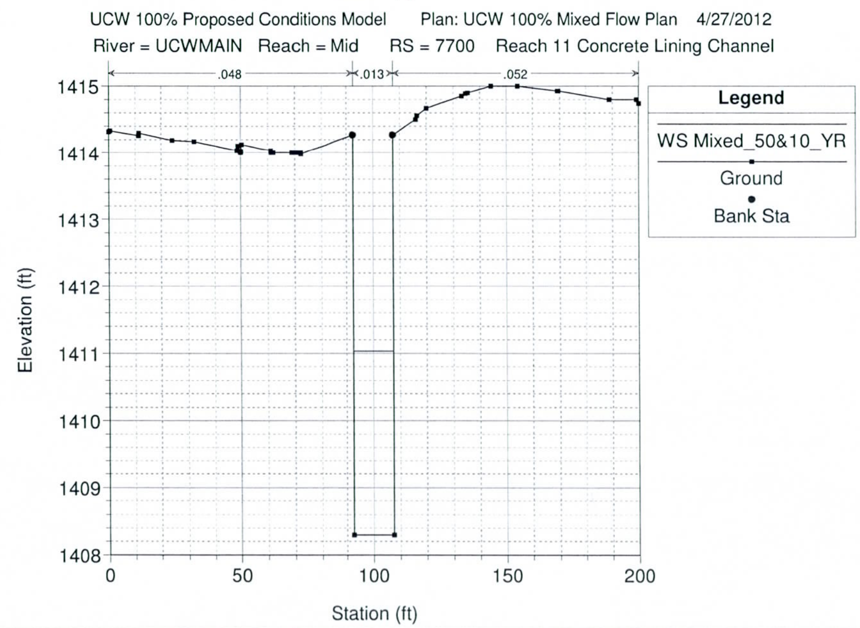

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Upper RS = 7900 Reach 12 Concrete Lining Channel
.043
.013
.06
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

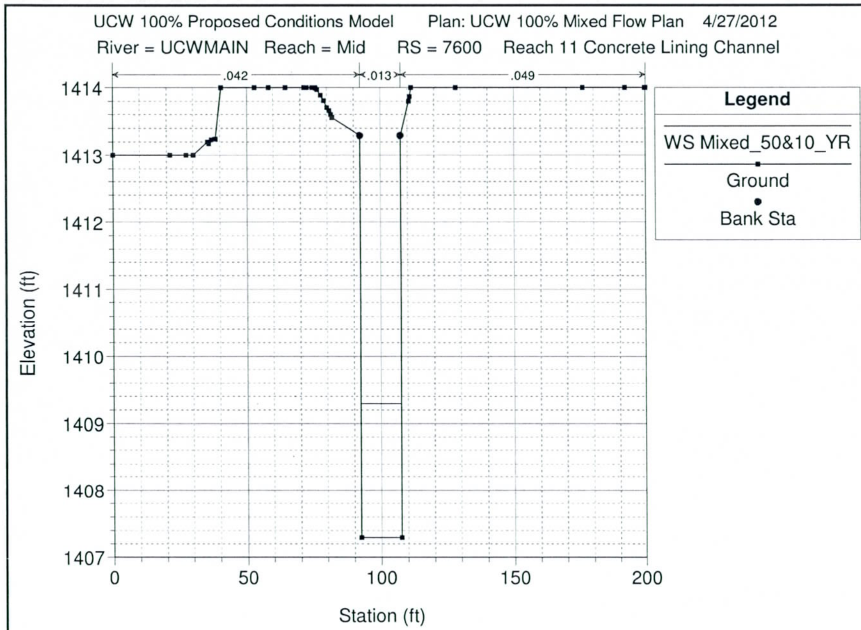

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7812.70 U/S Face of Prop. LDS Culvert
.02
.013
.04
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

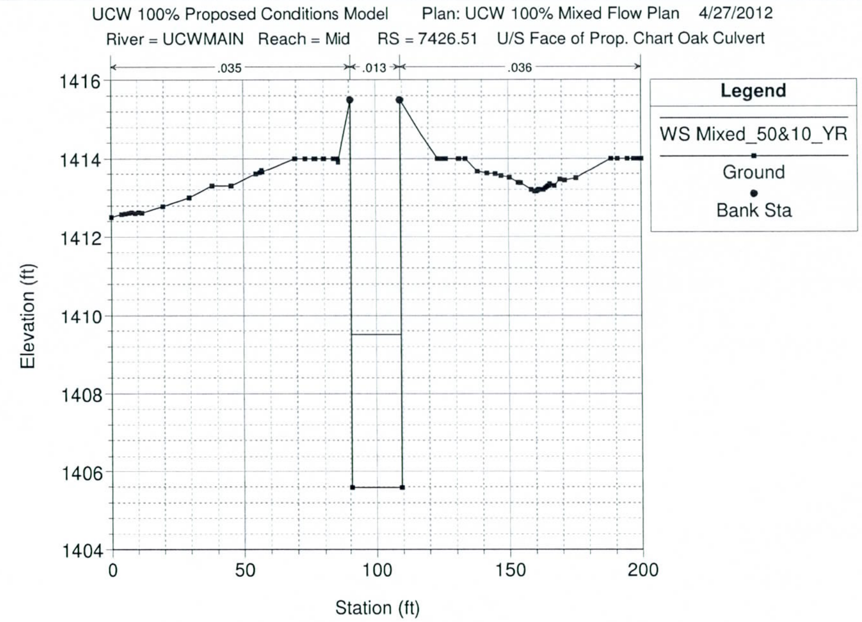

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7780.24 Culv Prop. LDS 2-10'x4' CBC
.02
.013
.04
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

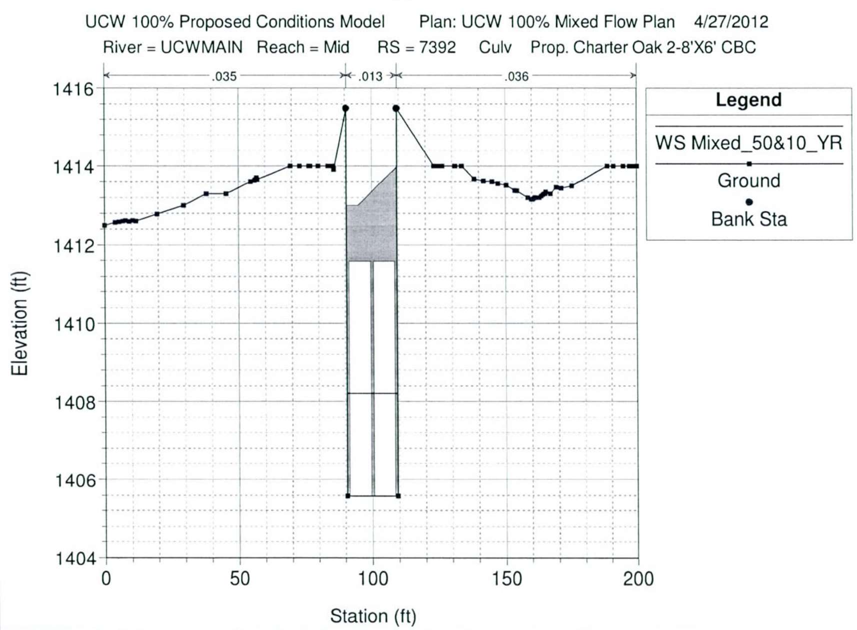

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7780.24 Culv Prop. LDS 2-10'x4' CBC
.048
.013
.052
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

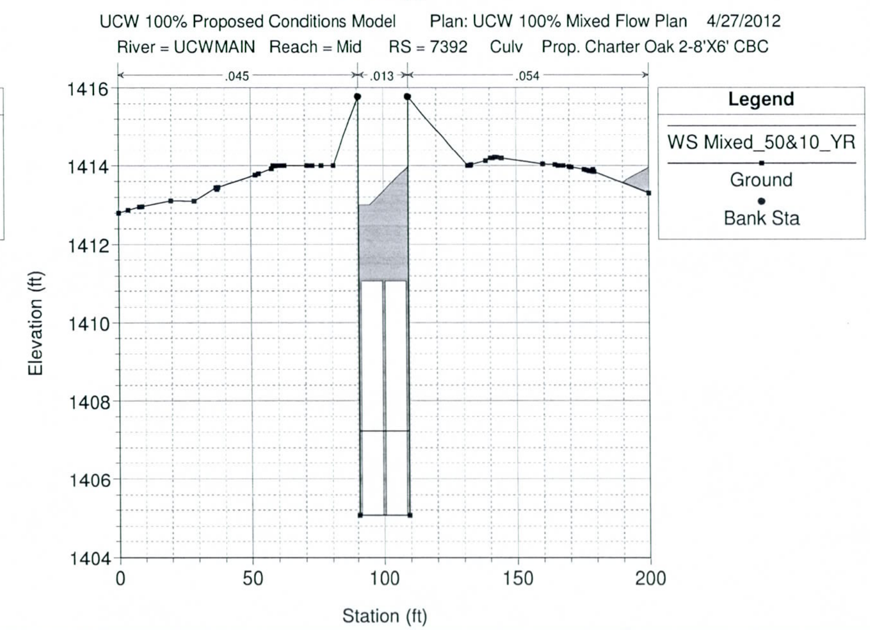

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7748.70 D/S Face of Prop. LDS Culvert
.048
.013
.052
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

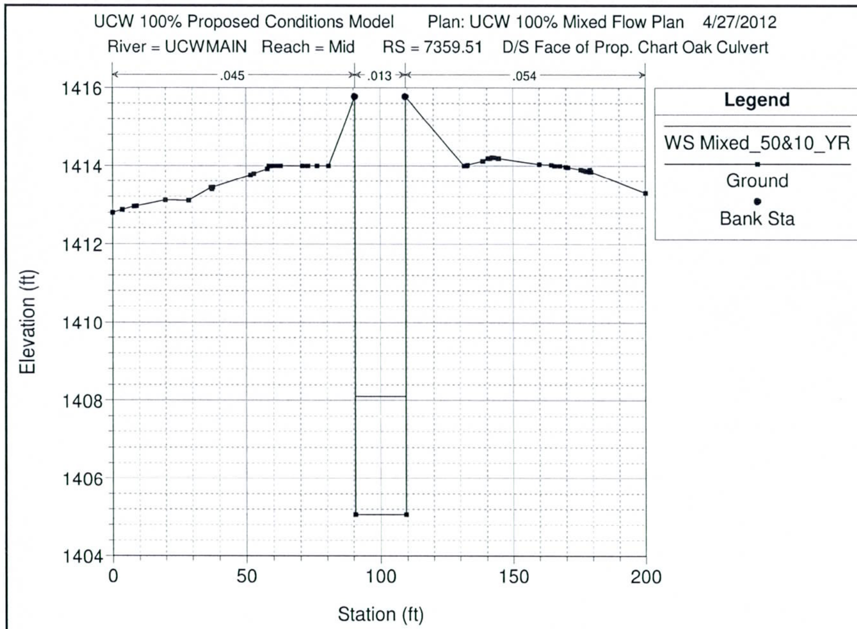

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7700 Reach 11 Concrete Lining Channel
.048
.013
.052
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

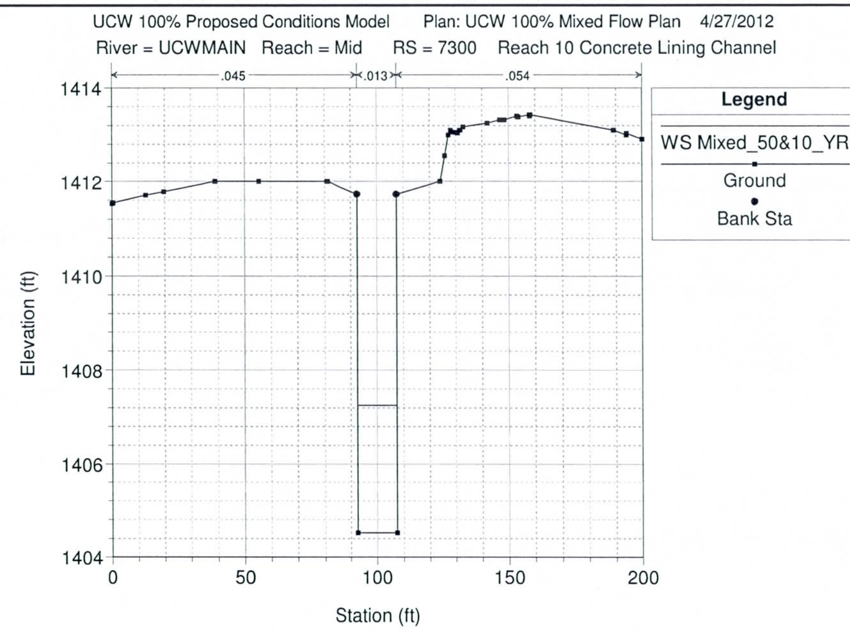

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7600 Reach 11 Concrete Lining Channel
.042
.013
.049
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

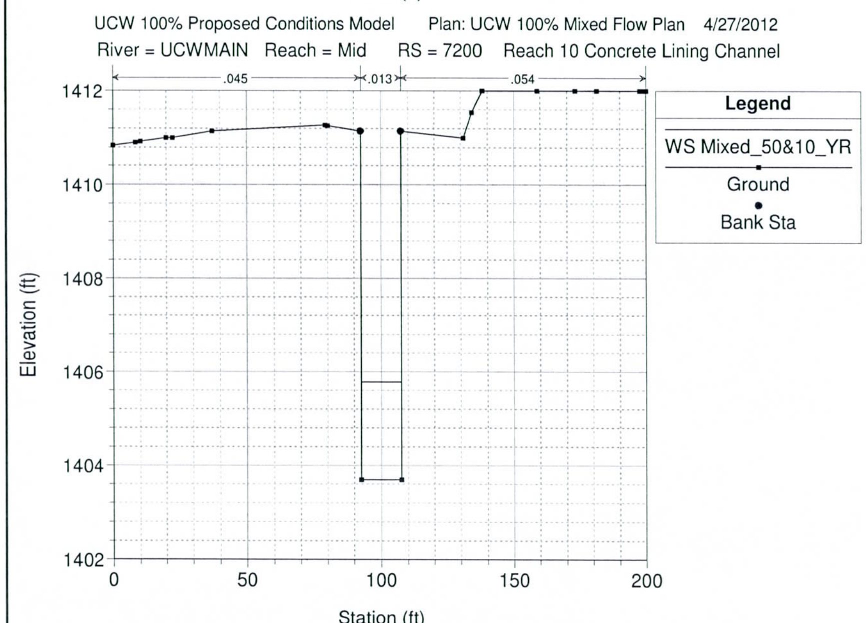

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7426.51 U/S Face of Prop. Chart Oak Culvert
.035
.013
.036
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

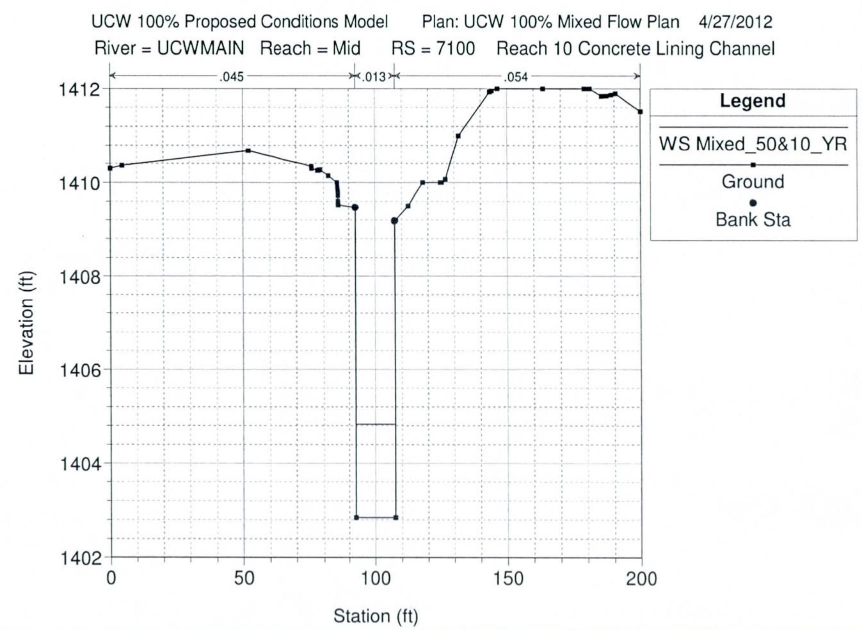

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7392 Culv Prop. Charter Oak 2-8'X6' CBC
.035
.013
.036
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

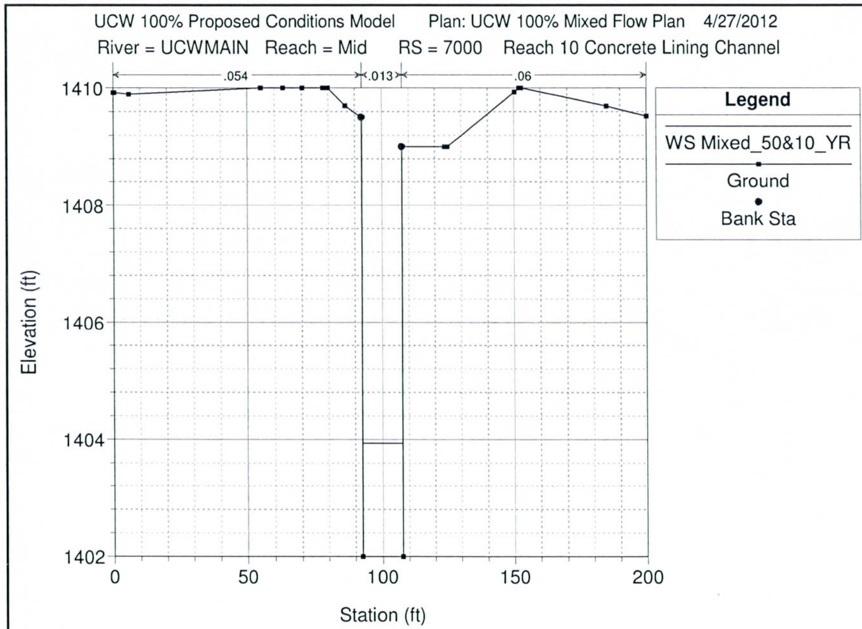

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7392 Culv Prop. Charter Oak 2-8'X6' CBC
.045
.013
.054
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

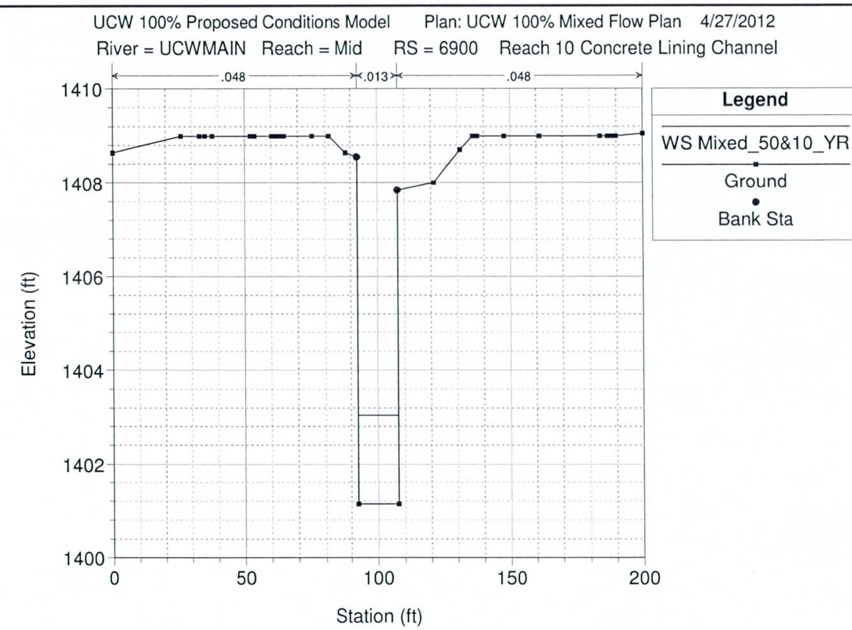

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7359.51 D/S Face of Prop. Chart Oak Culvert
.045
.013
.054
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

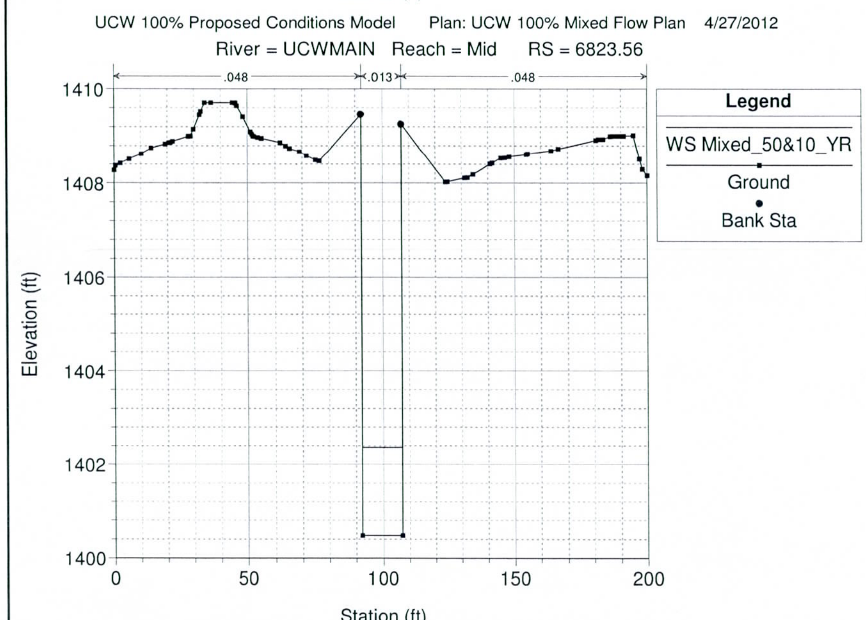

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7300 Reach 10 Concrete Lining Channel
.045
.013
.054
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

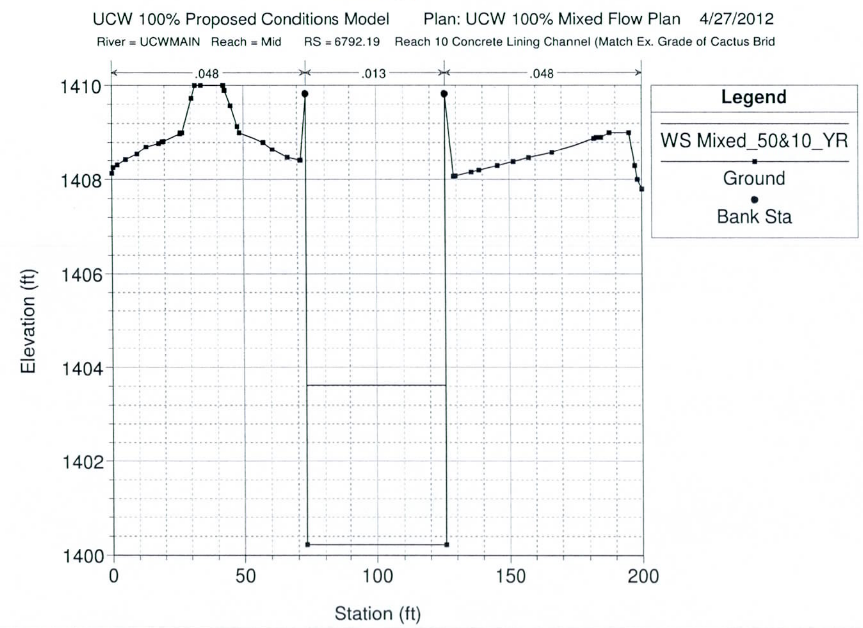

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7200 Reach 10 Concrete Lining Channel
.045
.013
.054
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7100 Reach 10 Concrete Lining Channel
.045
.013
.054
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

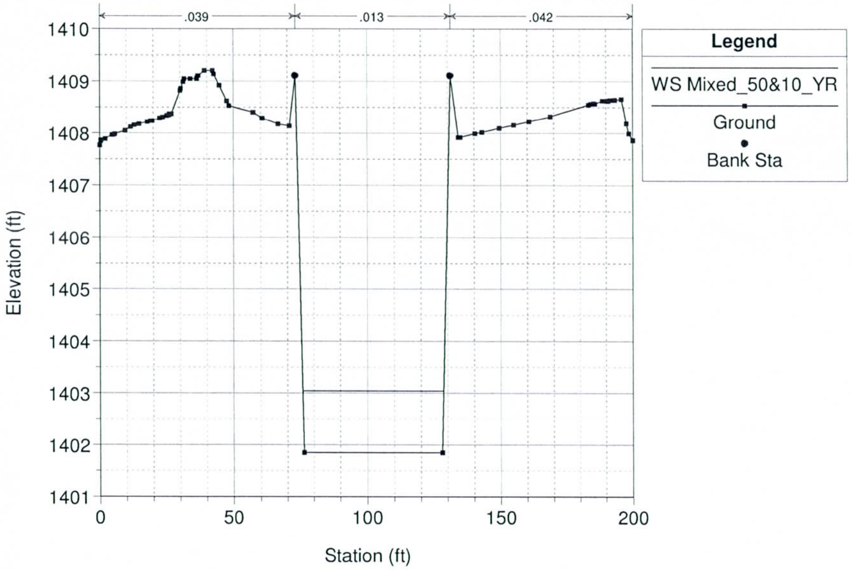

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 7000 Reach 10 Concrete Lining Channel
.054
.013
.06
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1410
1408
1406
1404
1402
0
50
100
150
200


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6900 Reach 10 Concrete Lining Channel
.048
.013
.048
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1410
1408
1406
1404
1402
1400
0
50
100
150
200

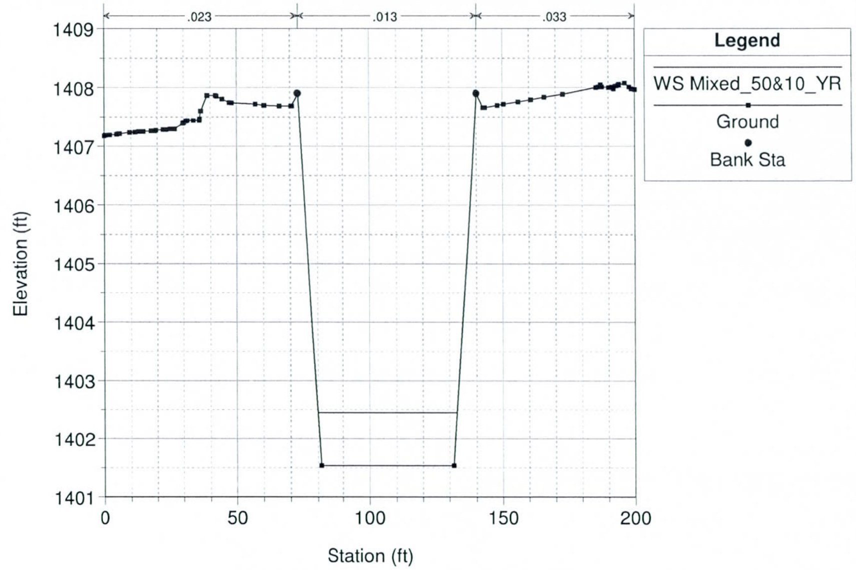

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6823.56
.048
.013
.048
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1410
1408
1406
1404
1402
1400
0
50
100
150
200


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6792.19 Reach 10 Concrete Lining Channel (Match Ex. Grade of Cactus Brid
.048
.013
.048
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1410
1408
1406
1404
1402
1400
0
50
100
150
200

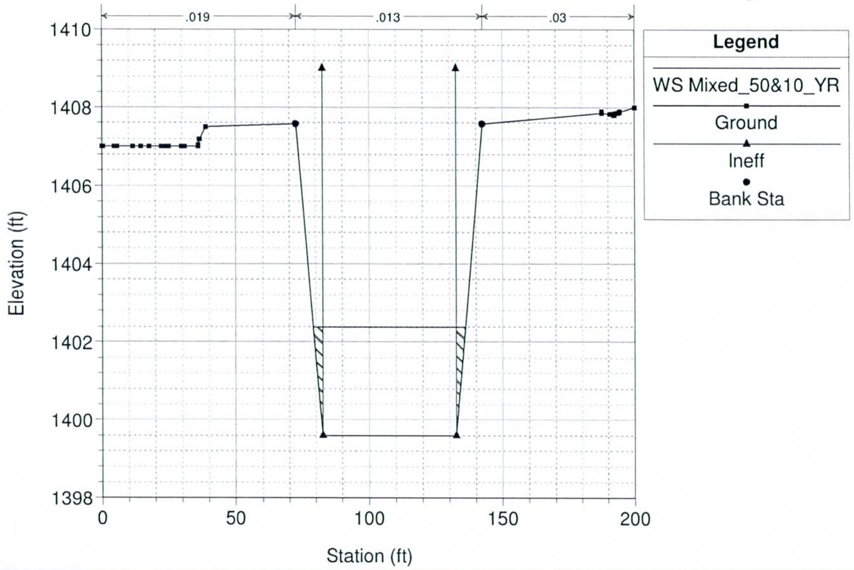
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6779.28



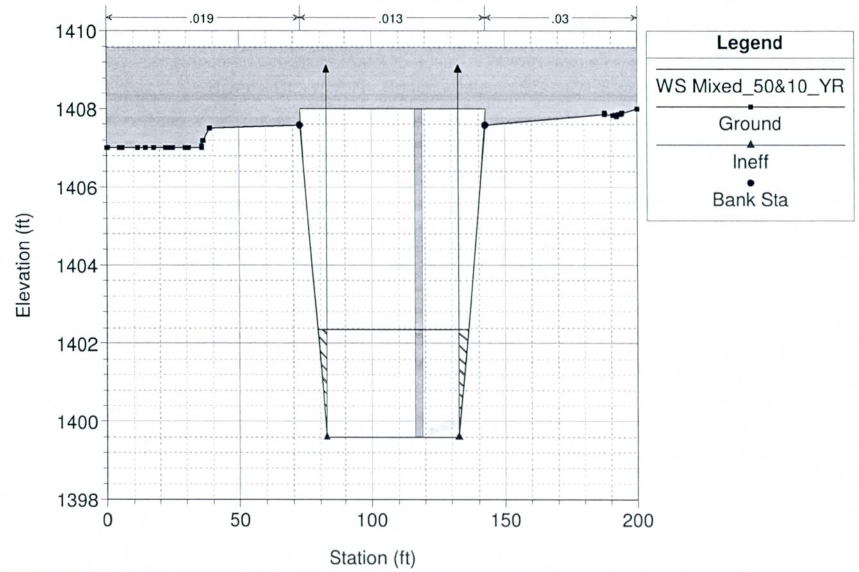
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6757.14

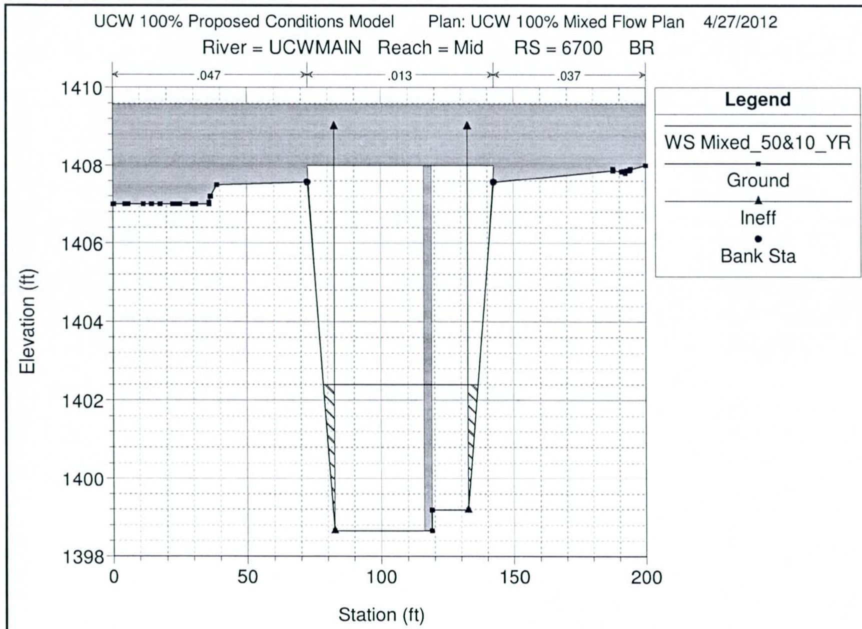


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6751.66 U/S Face of EX. Cactus Bridge

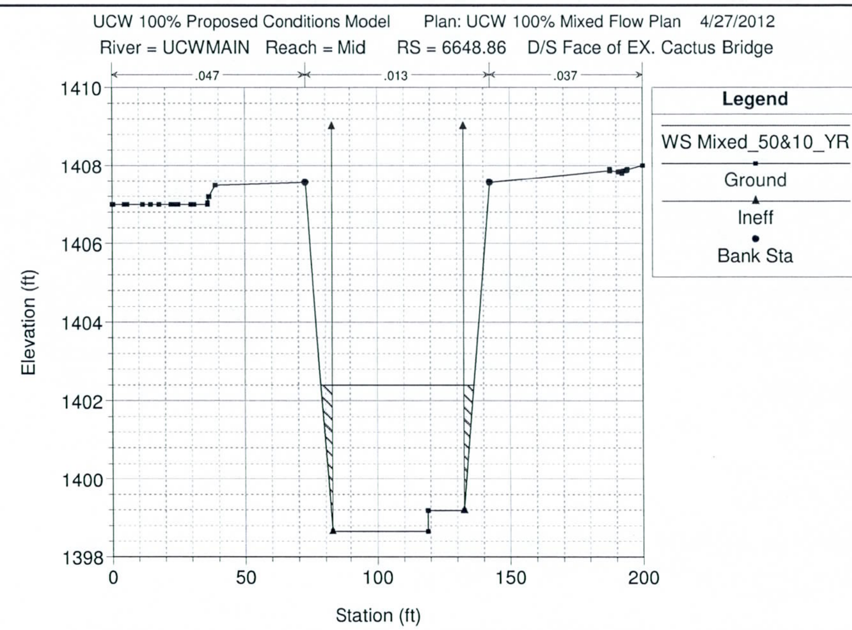


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6700 BR

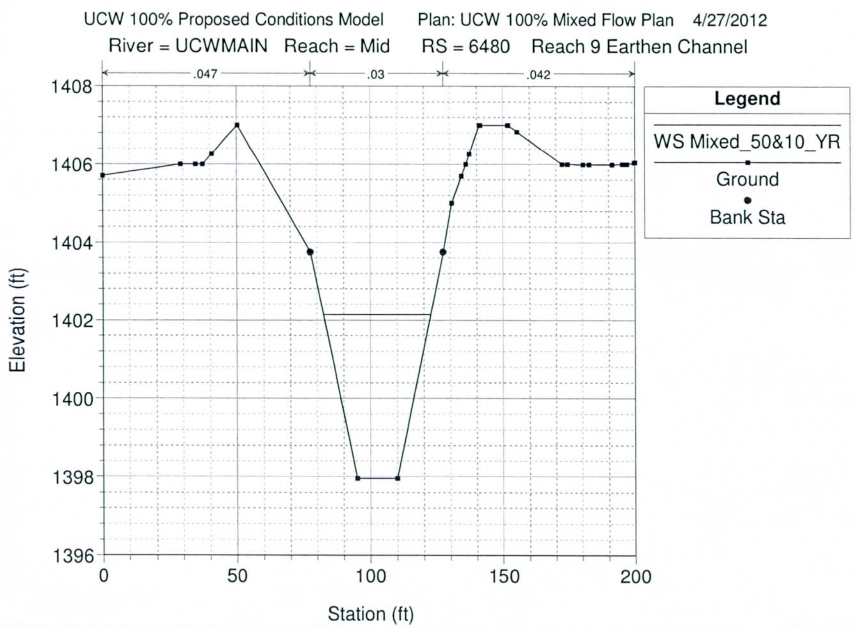




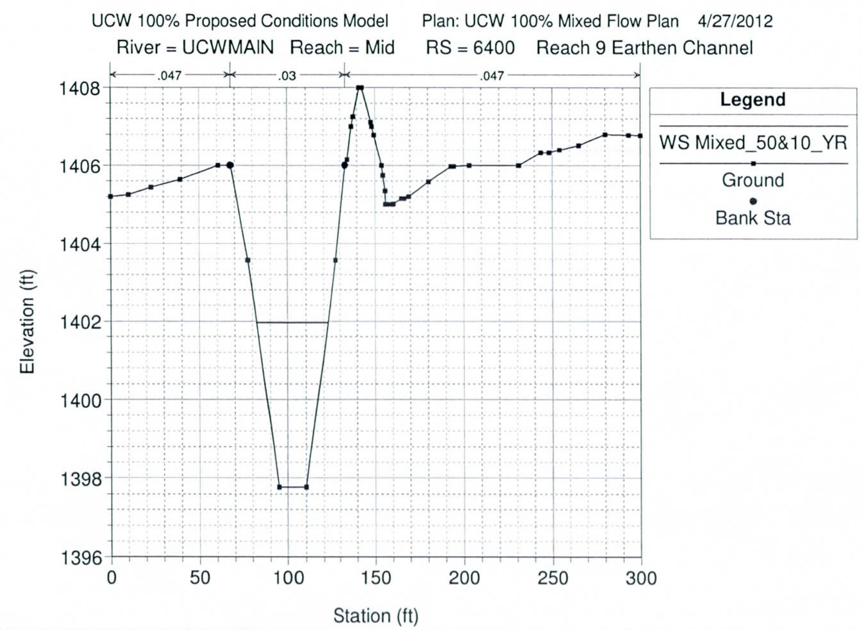
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6700 BR
.047
.013
.037
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)



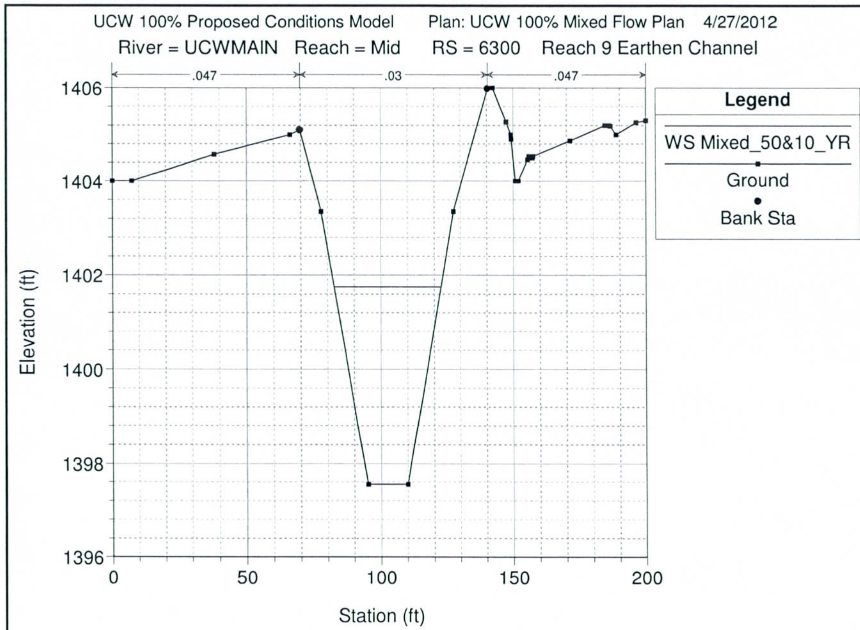
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6648.86 D/S Face of EX. Cactus Bridge
.047
.013
.037
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

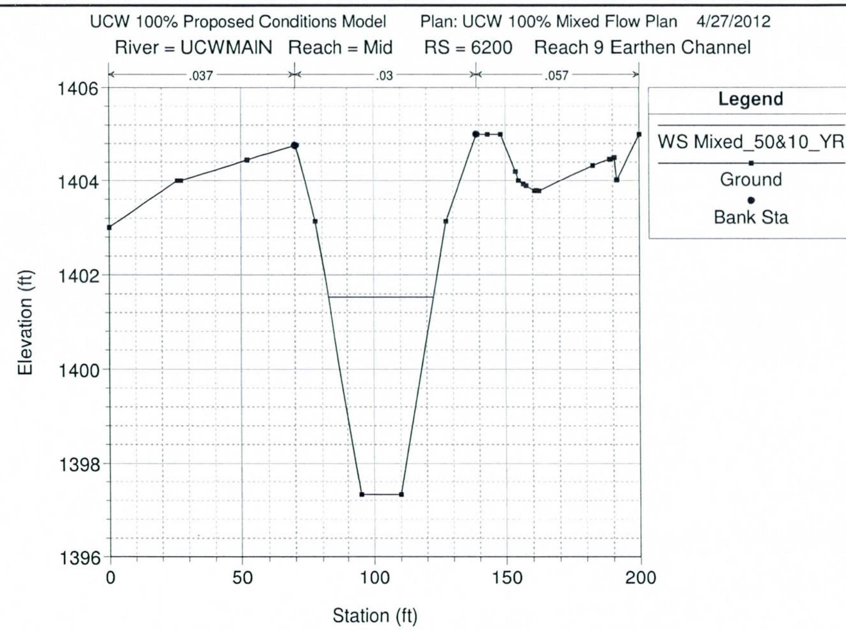


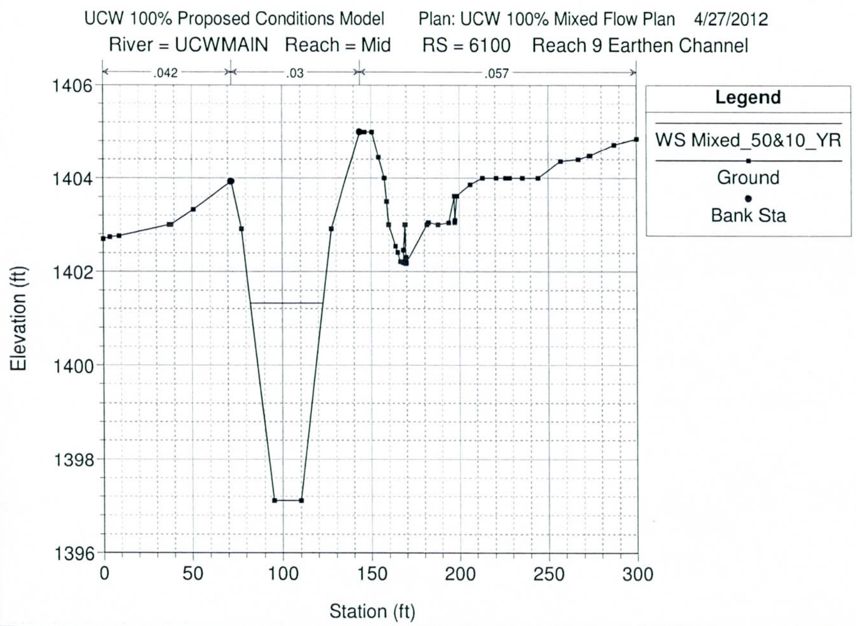
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6480 Reach 9 Earthen Channel
.047
.03
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

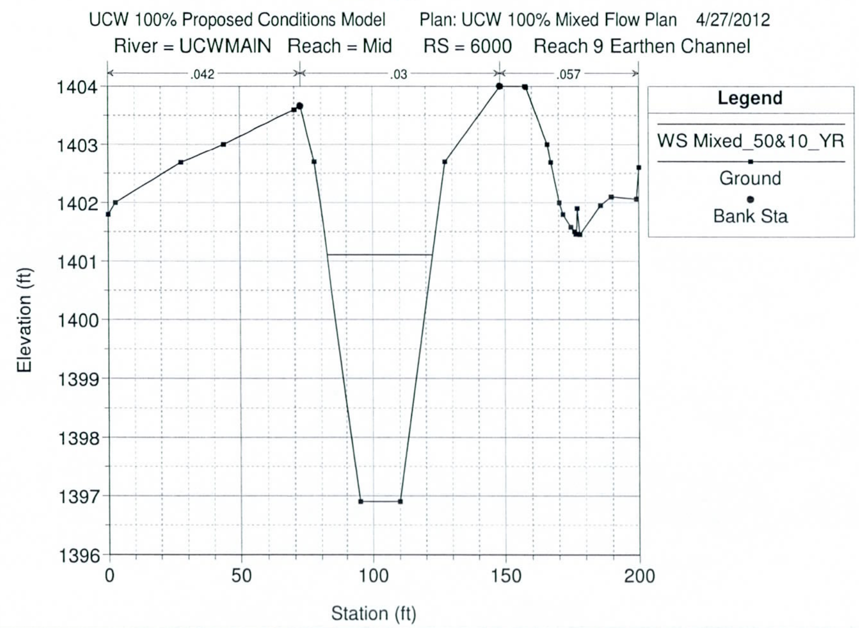


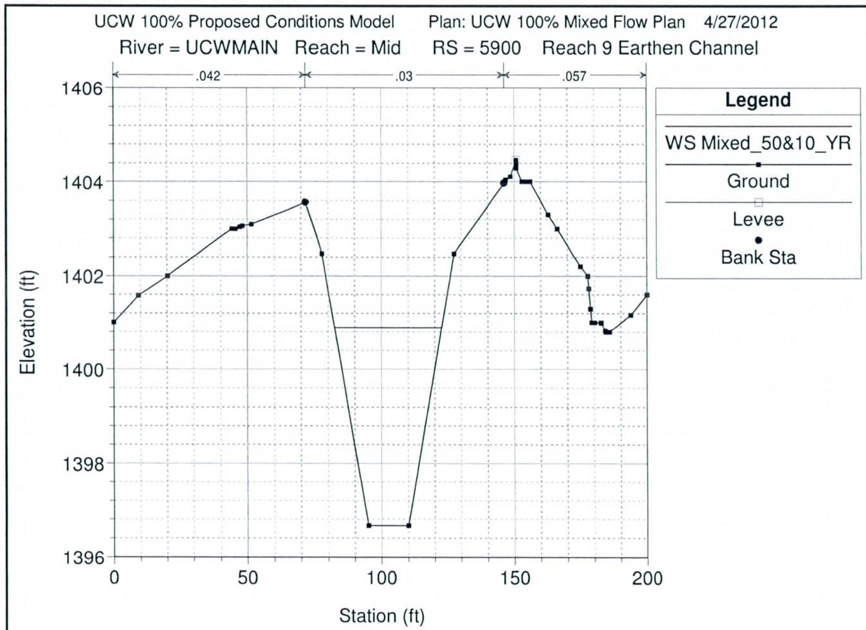
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6400 Reach 9 Earthen Channel
.047
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

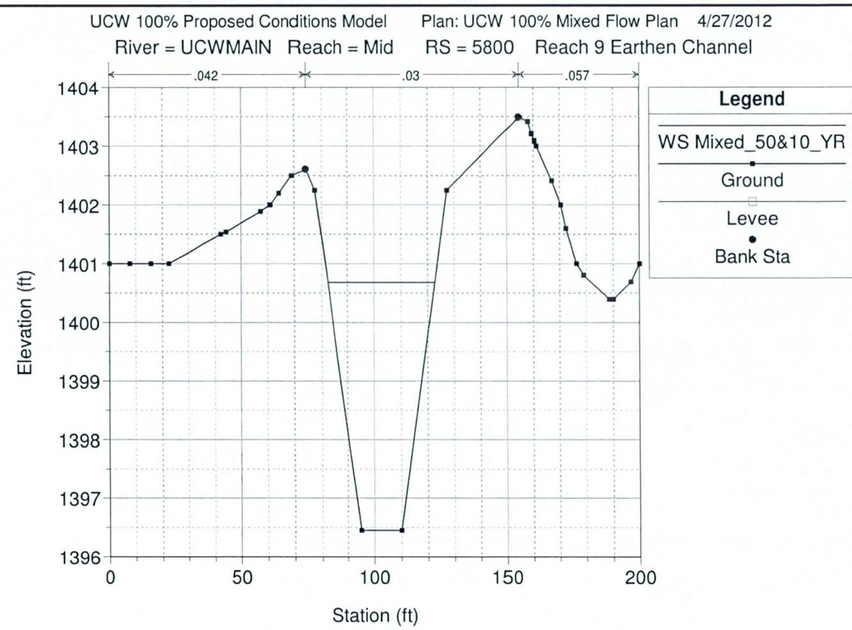

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6300 Reach 9 Earthen Channel
.047 .03 .047
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

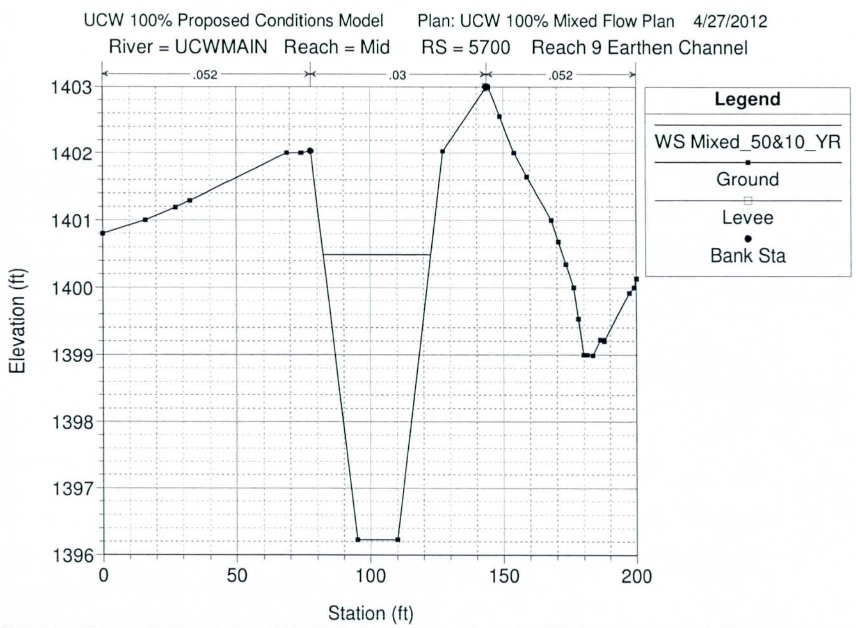

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6200 Reach 9 Earthen Channel
.037 .03 .057
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

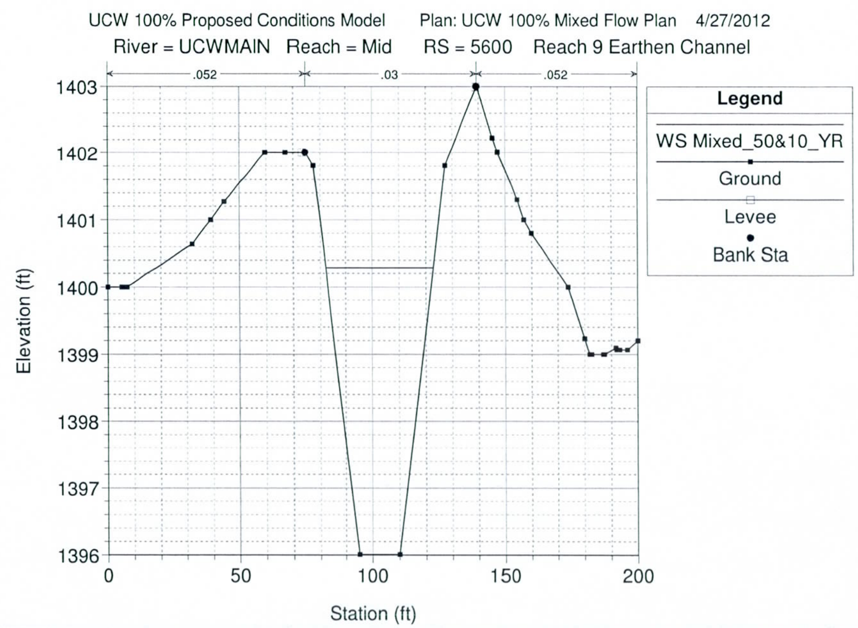

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6100 Reach 9 Earthen Channel
.042 .03 .057
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

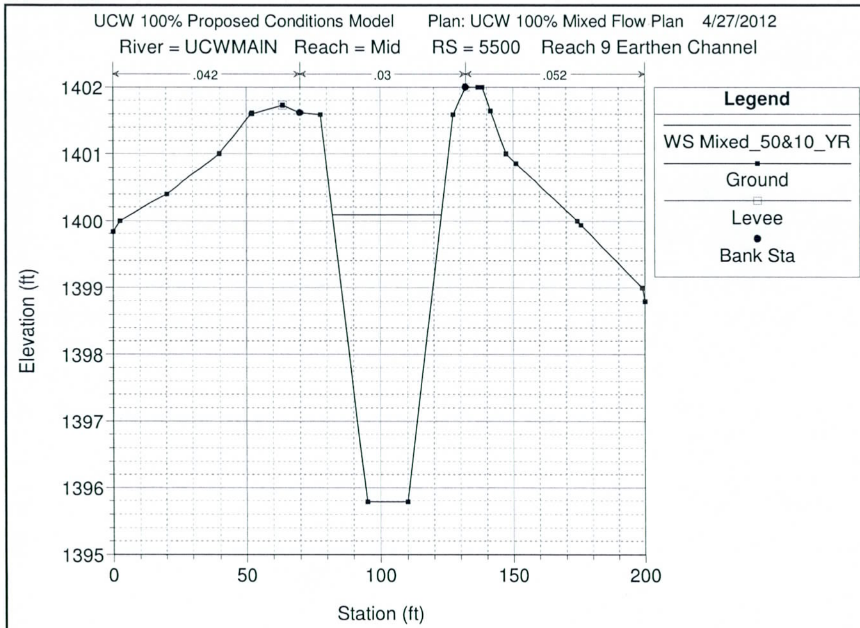

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 6000 Reach 9 Earthen Channel
.042 .03 .057
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

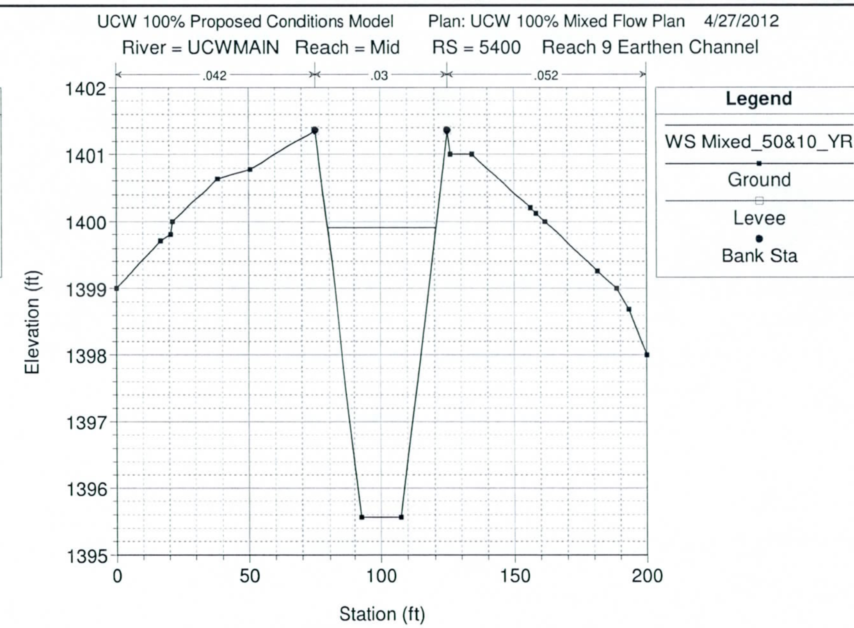

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5900 Reach 9 Earthen Channel
.042
.03
.057
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

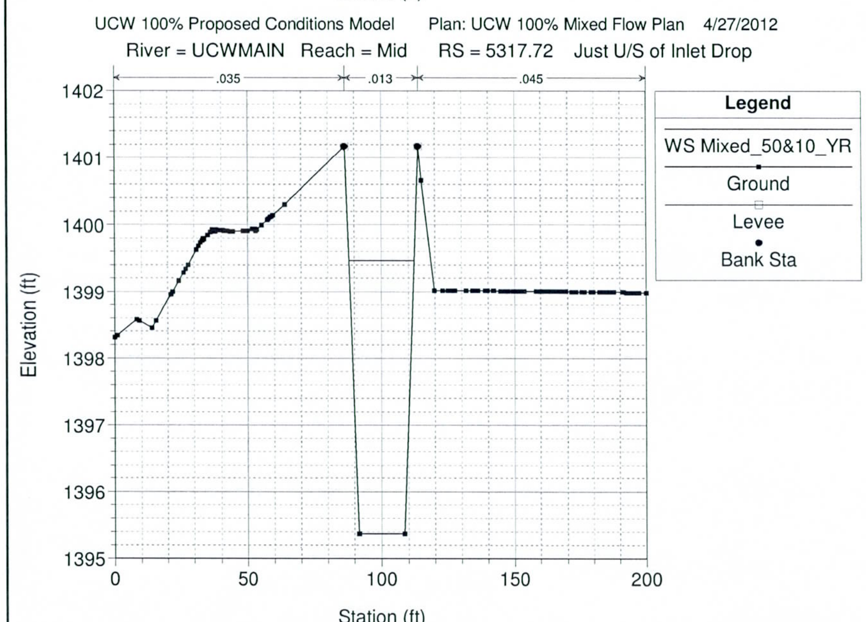

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5800 Reach 9 Earthen Channel
.042
.03
.057
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

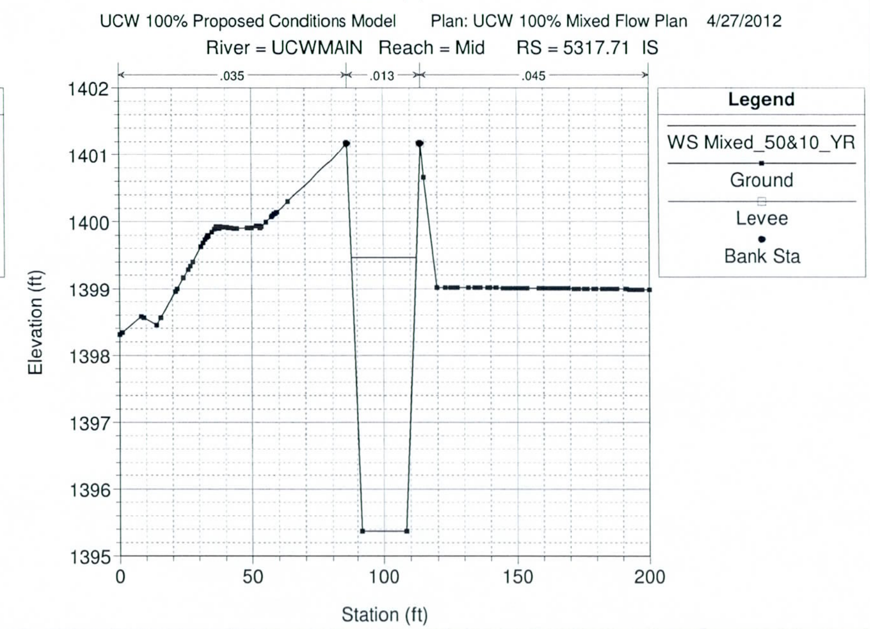

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5700 Reach 9 Earthen Channel
.052
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

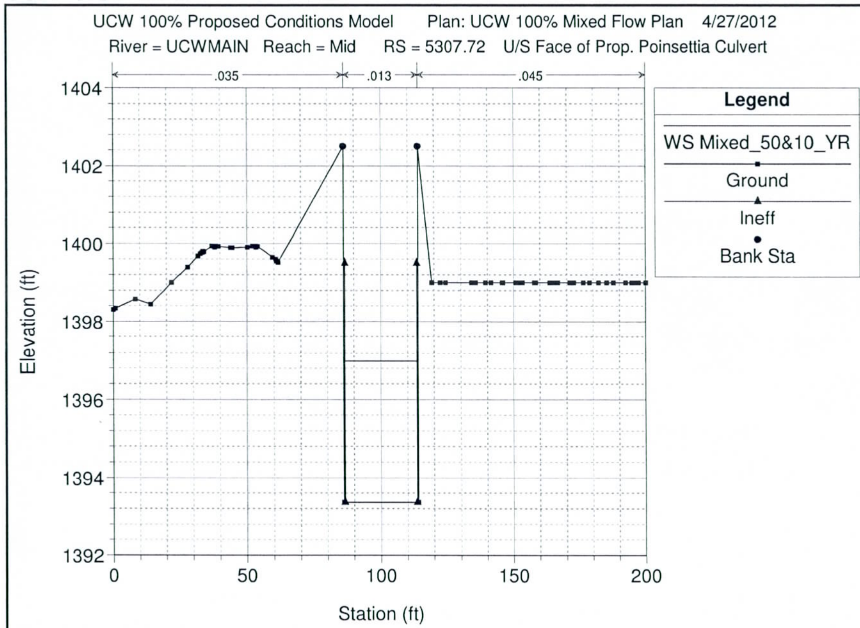

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5600 Reach 9 Earthen Channel
.052
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

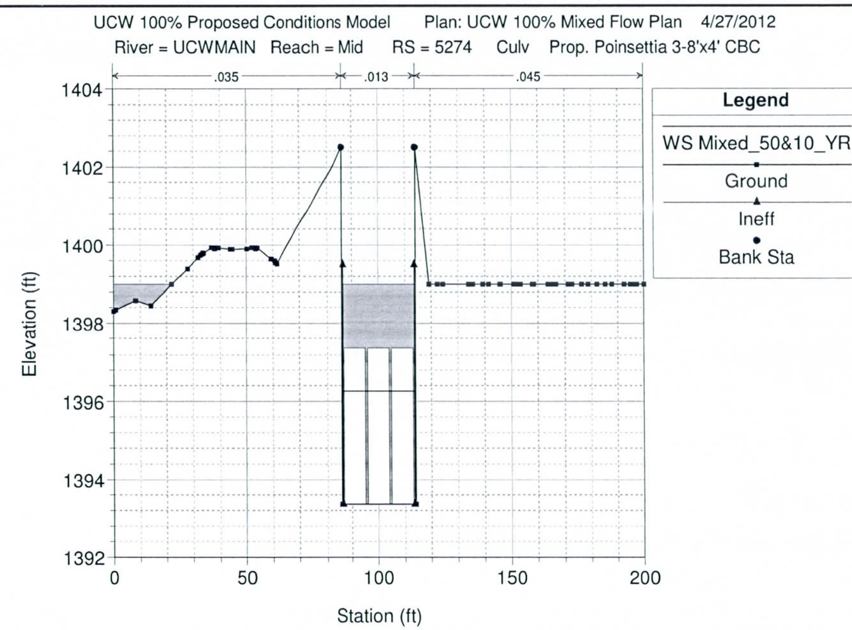

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5500 Reach 9 Earthen Channel
.042
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1395
1396
1397
1398
1399
1400
1401
1402
0
50
100
150
200

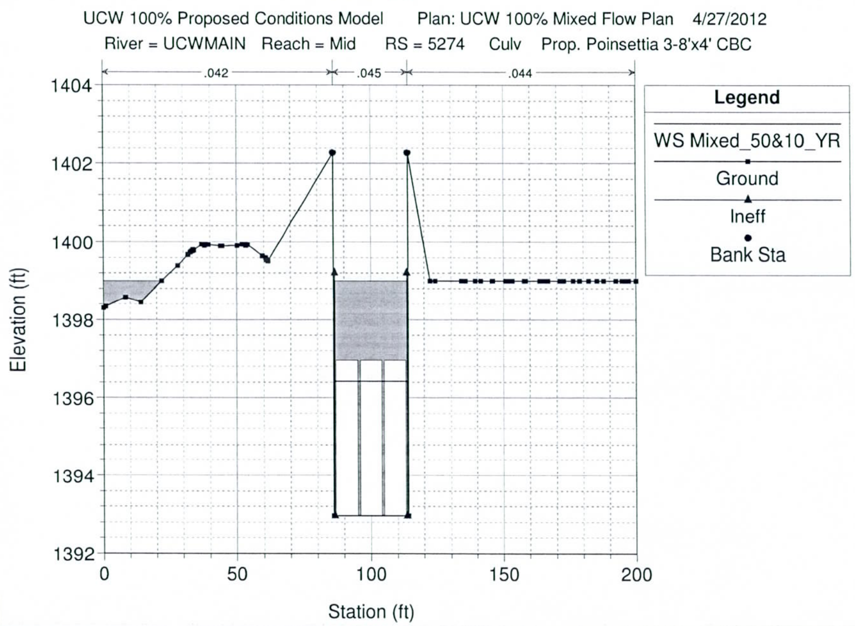

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5400 Reach 9 Earthen Channel
.042
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1395
1396
1397
1398
1399
1400
1401
1402
0
50
100
150
200

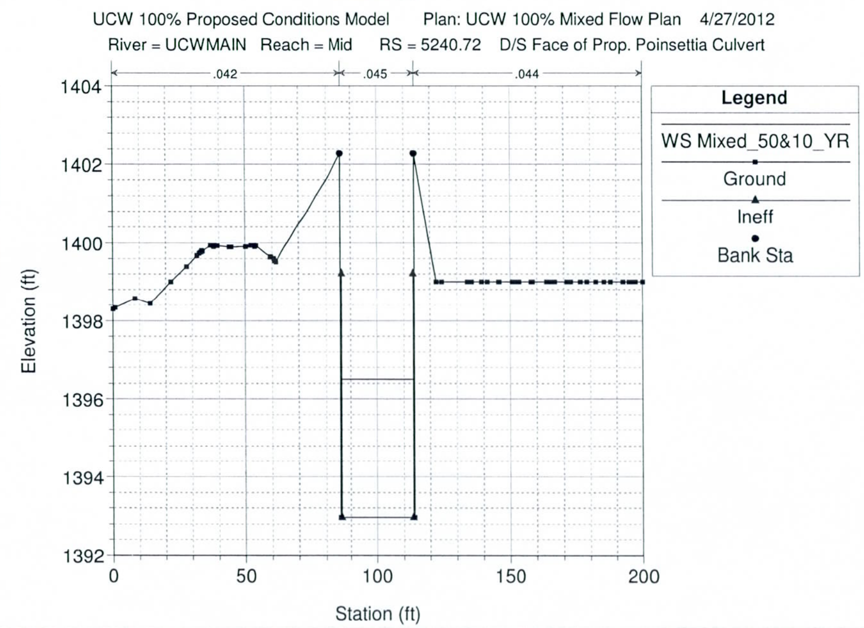

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5317.72 Just U/S of Inlet Drop
.035
.013
.045
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1395
1396
1397
1398
1399
1400
1401
1402
0
50
100
150
200

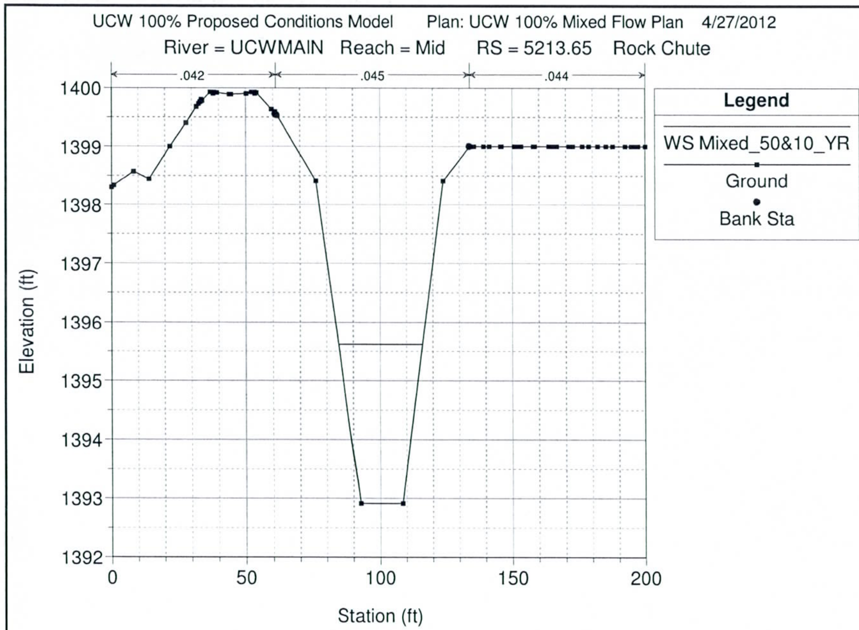

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5317.71 IS
.035
.013
.045
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1395
1396
1397
1398
1399
1400
1401
1402
0
50
100
150
200

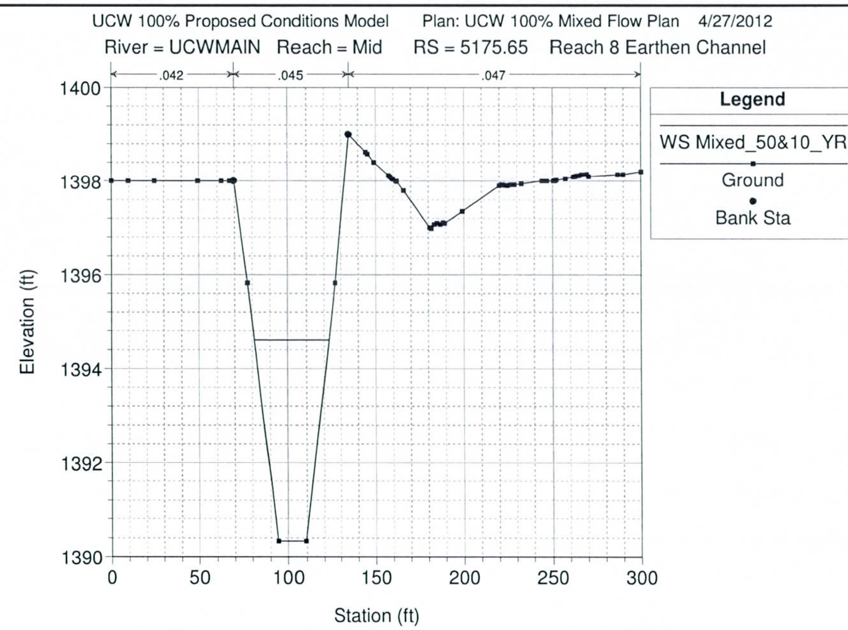

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5307.72 U/S Face of Prop. Poinsettia Culvert
.035
.013
.045
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

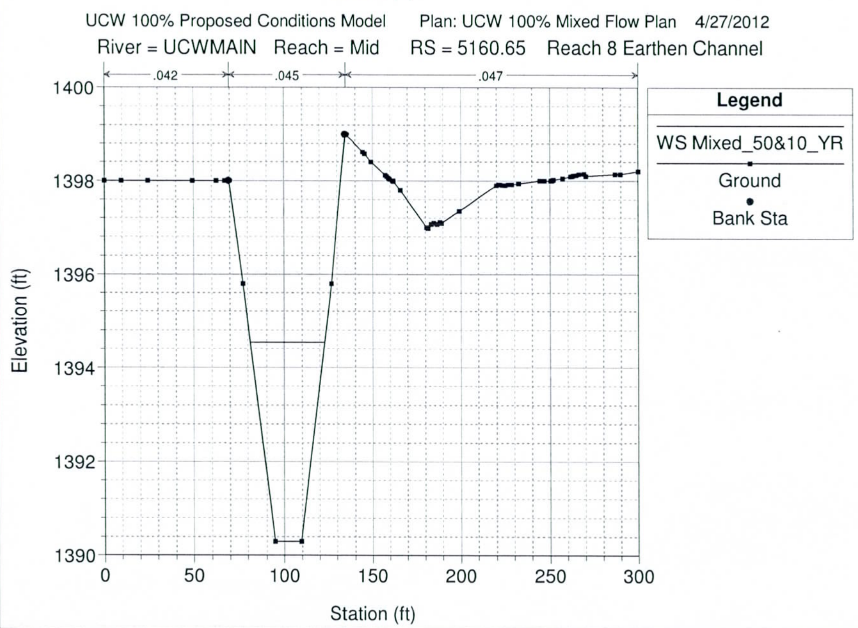

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5274 Culv Prop. Poinsettia 3-8'x4' CBC
.035
.013
.045
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

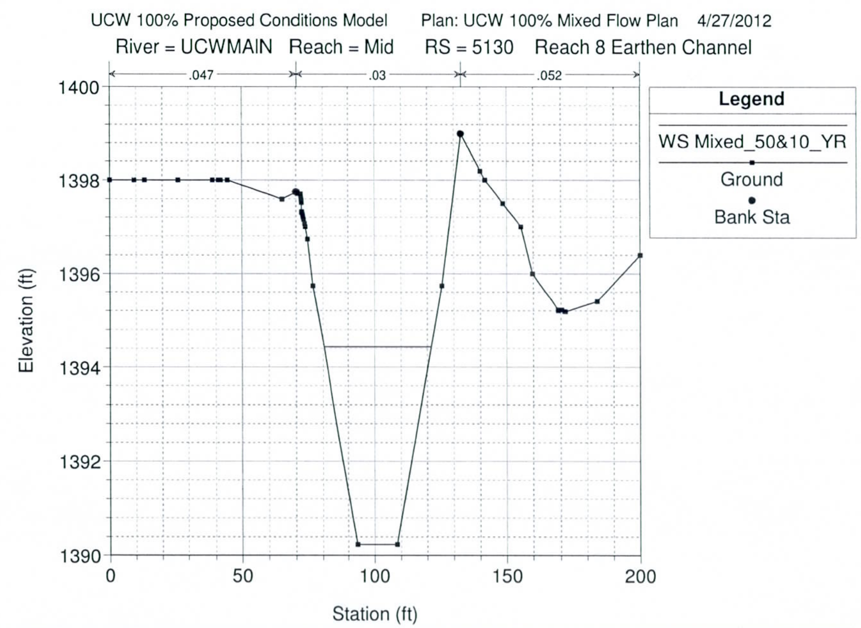

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5274 Culv Prop. Poinsettia 3-8'x4' CBC
.042
.045
.044
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

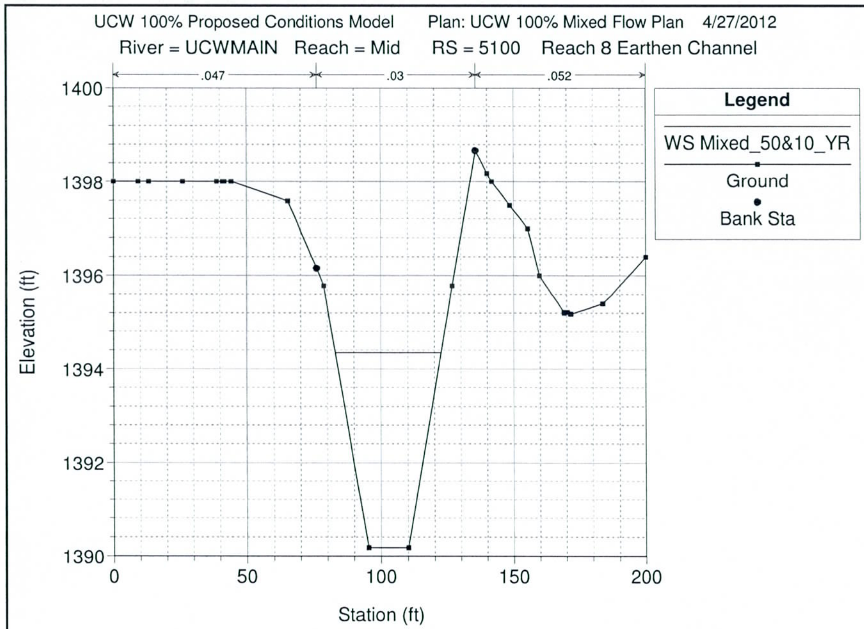

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5240.72 D/S Face of Prop. Poinsettia Culvert
.042
.045
.044
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

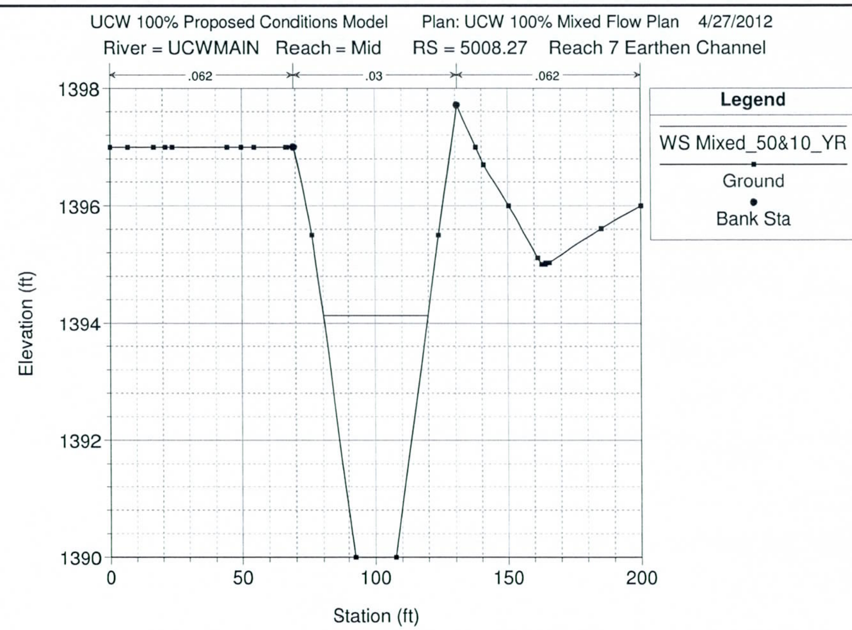

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5213.65 Rock Chute
.042
.045
.044
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

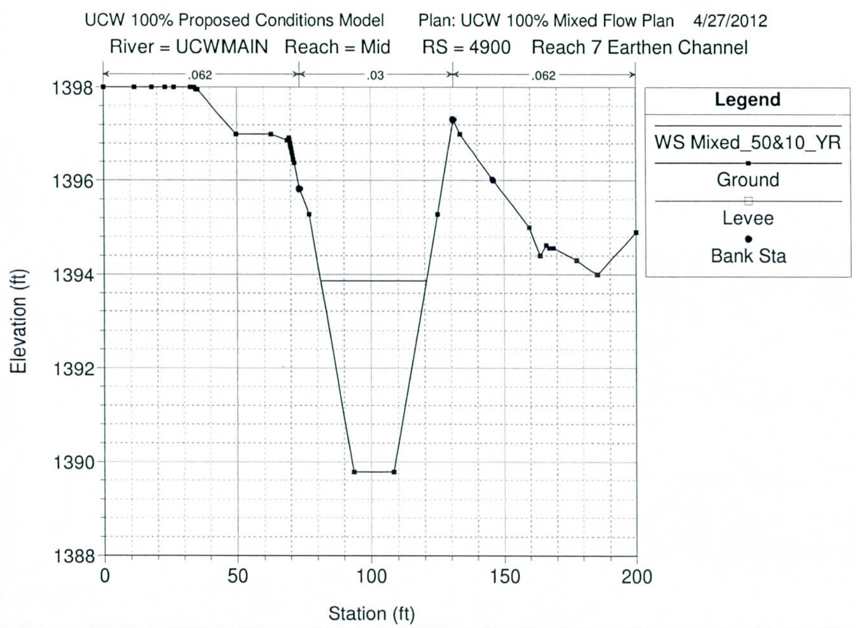

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5175.65 Reach 8 Earthen Channel
.042
.045
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

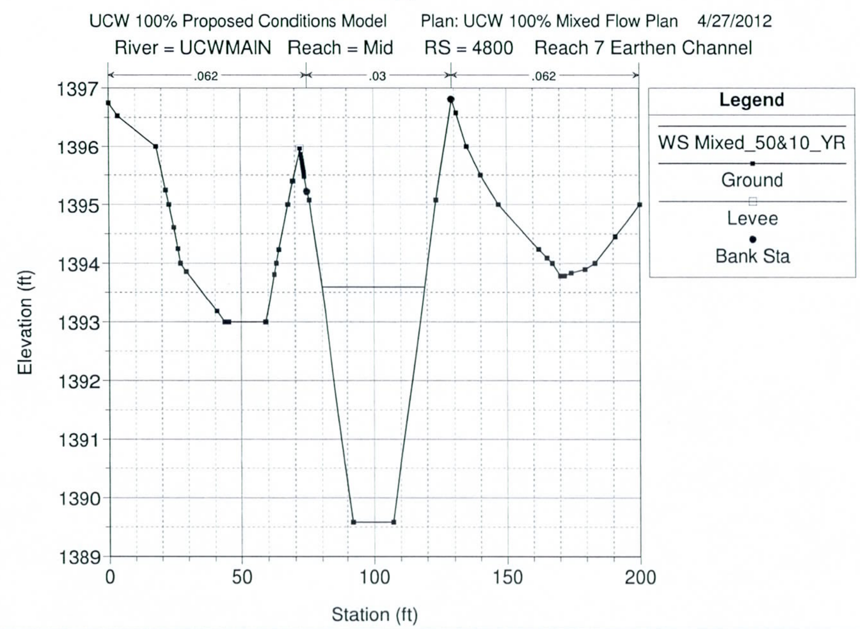

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5160.65 Reach 8 Earthen Channel
.042
.045
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

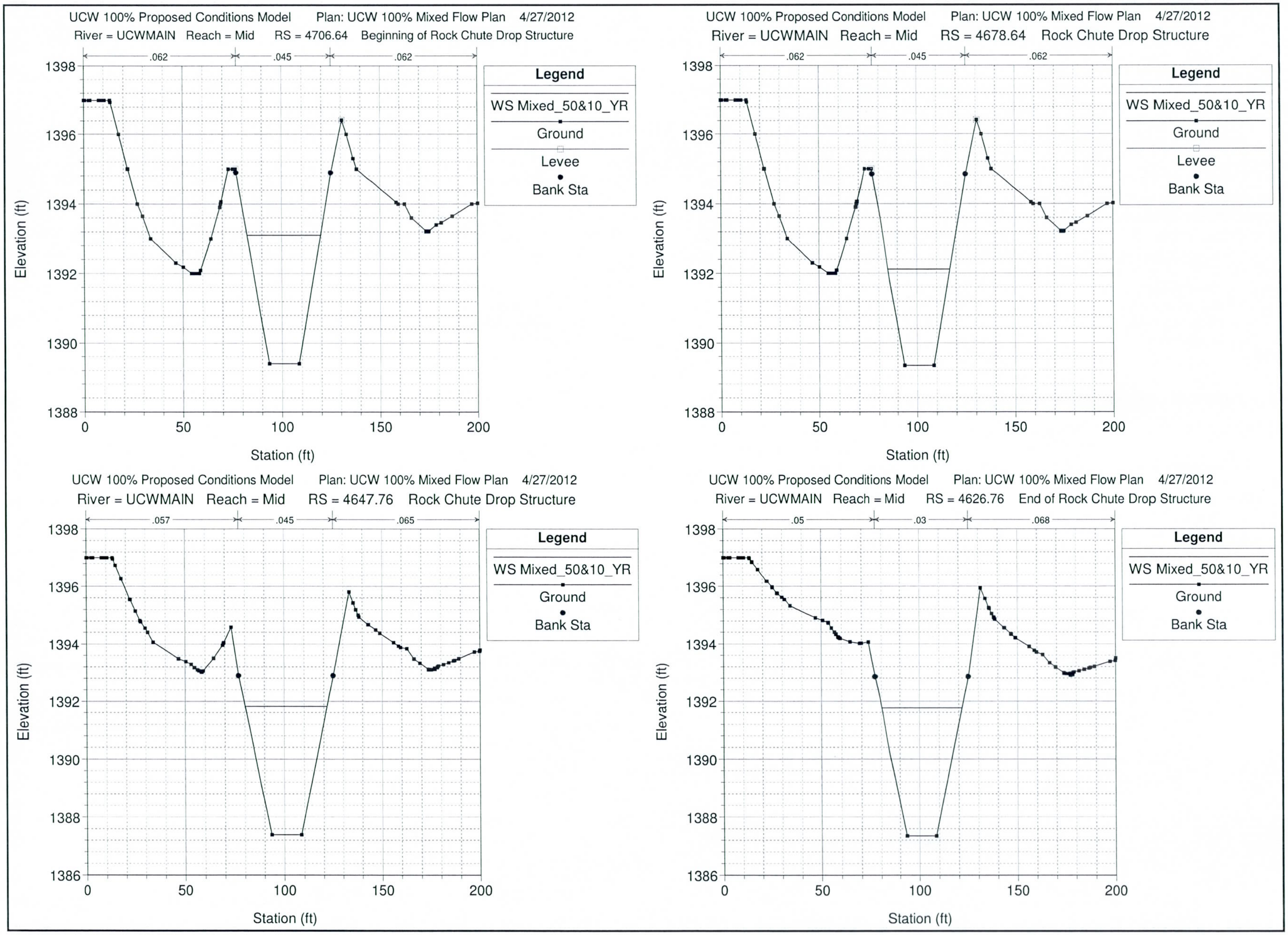

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5130 Reach 8 Earthen Channel
.047
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

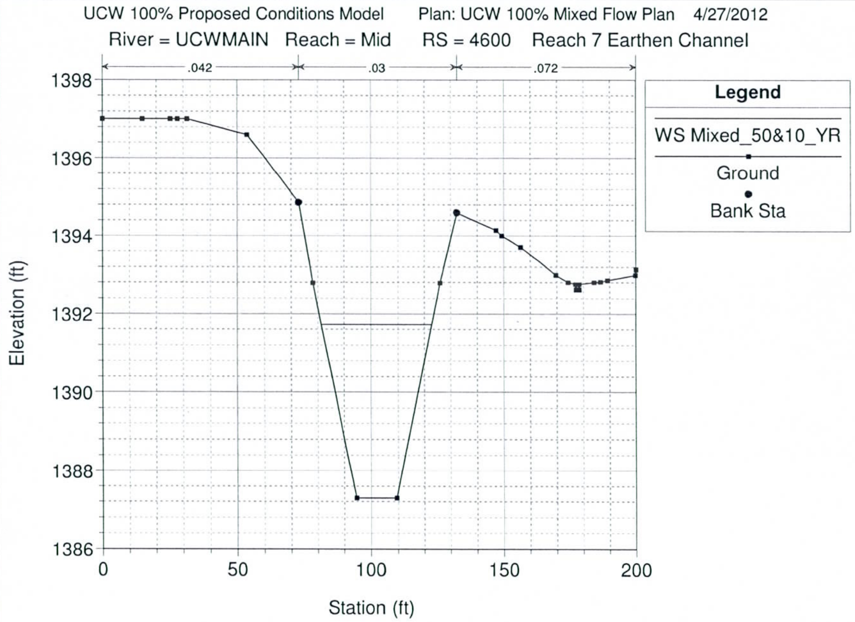

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5100 Reach 8 Earthen Channel
.047
.03
.052
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

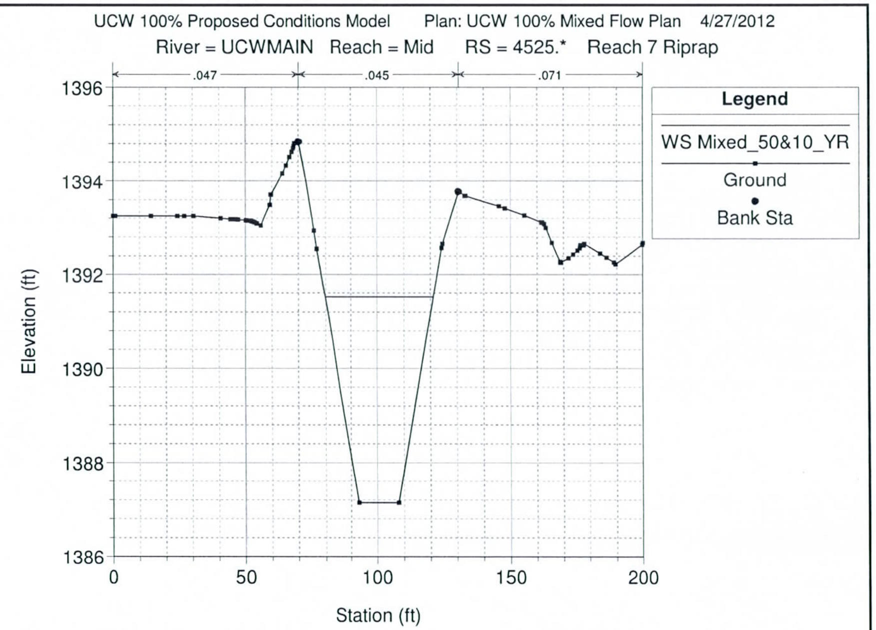

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 5008.27 Reach 7 Earthen Channel
.062
.03
.062
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

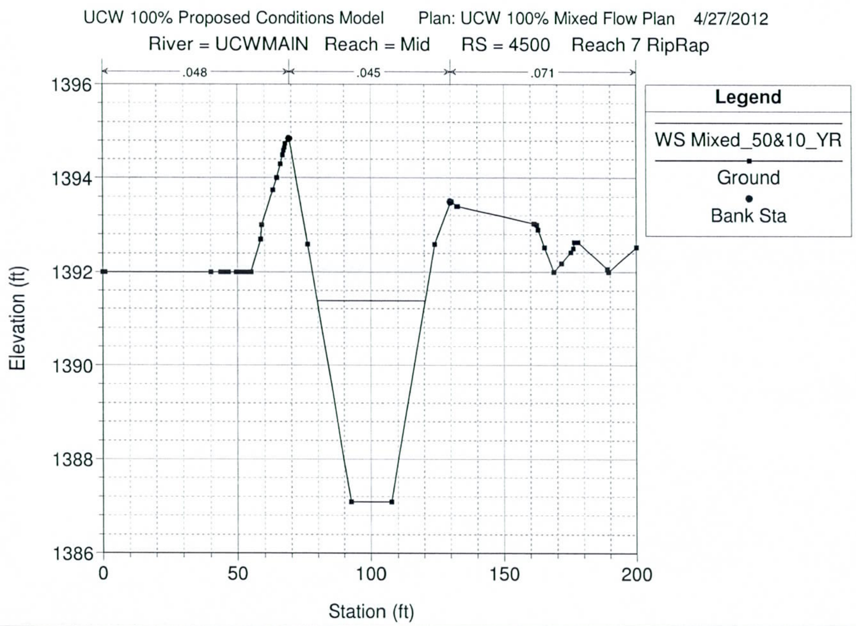

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4900 Reach 7 Earthen Channel
.062
.03
.062
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

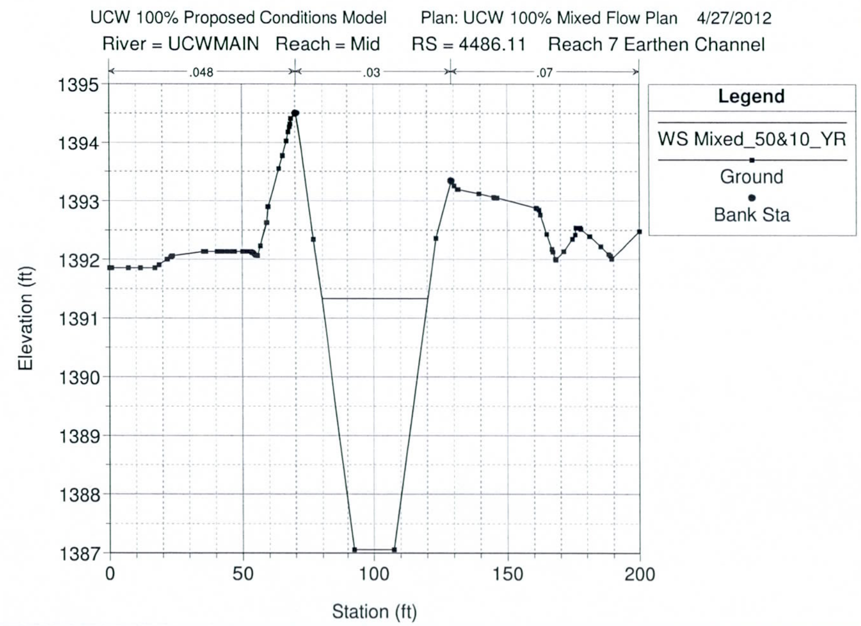

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4800 Reach 7 Earthen Channel
.062
.03
.062
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

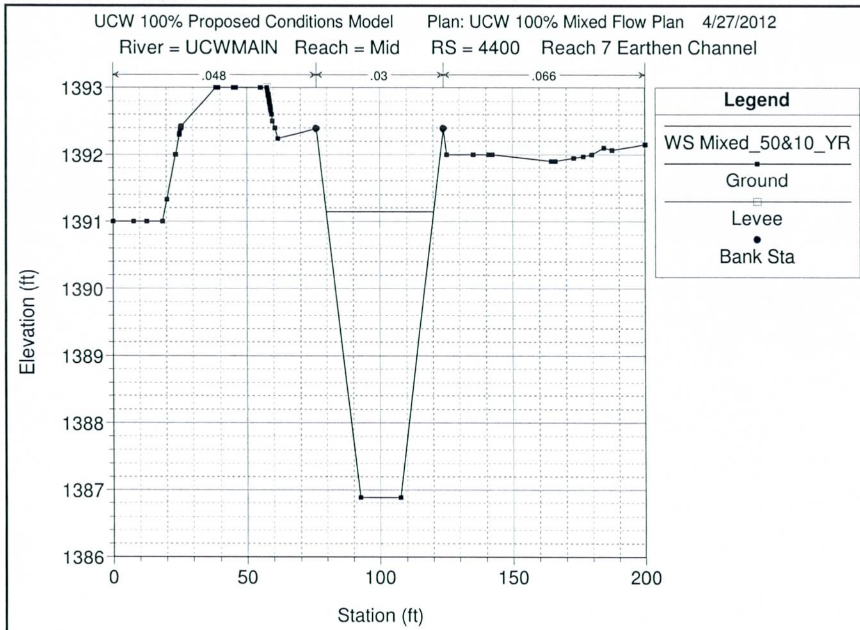

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4706.64 Beginning of Rock Chute Drop Structure
.062
.045
.062
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4678.64 Rock Chute Drop Structure
.062
.045
.062
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4647.76 Rock Chute Drop Structure
.057
.045
.065
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4626.76 End of Rock Chute Drop Structure
.05
.03
.068
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

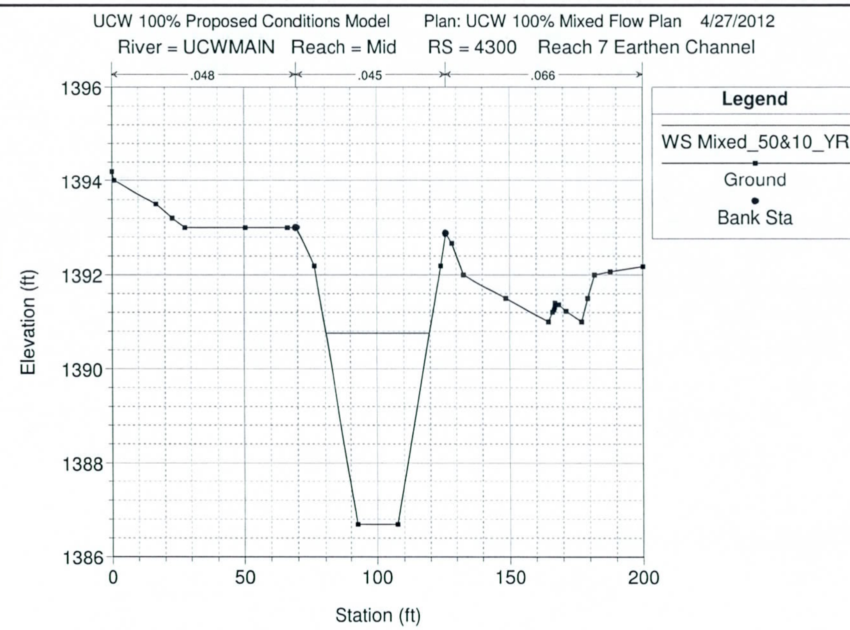

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4600 Reach 7 Earthen Channel
.042
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

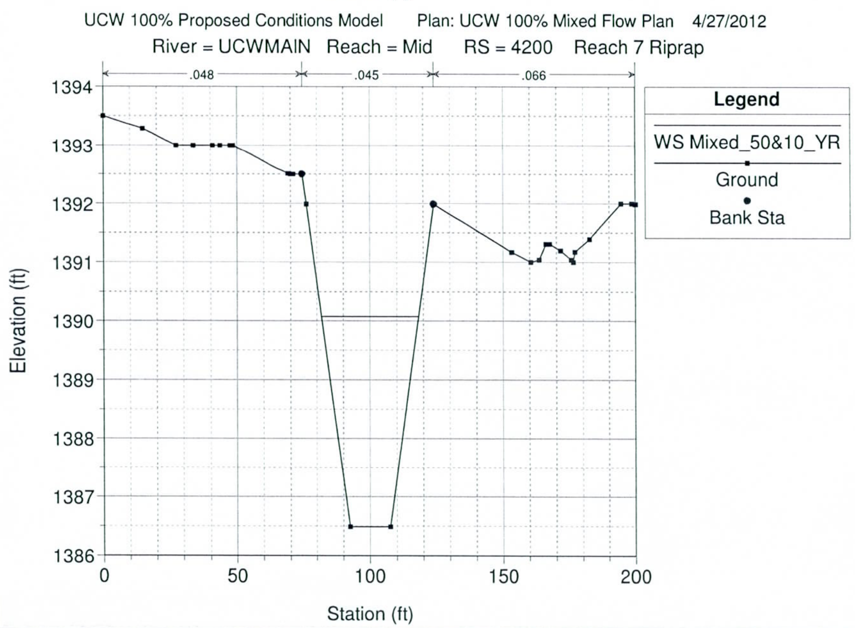

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4525.* Reach 7 Riprap
.047
.045
.071
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

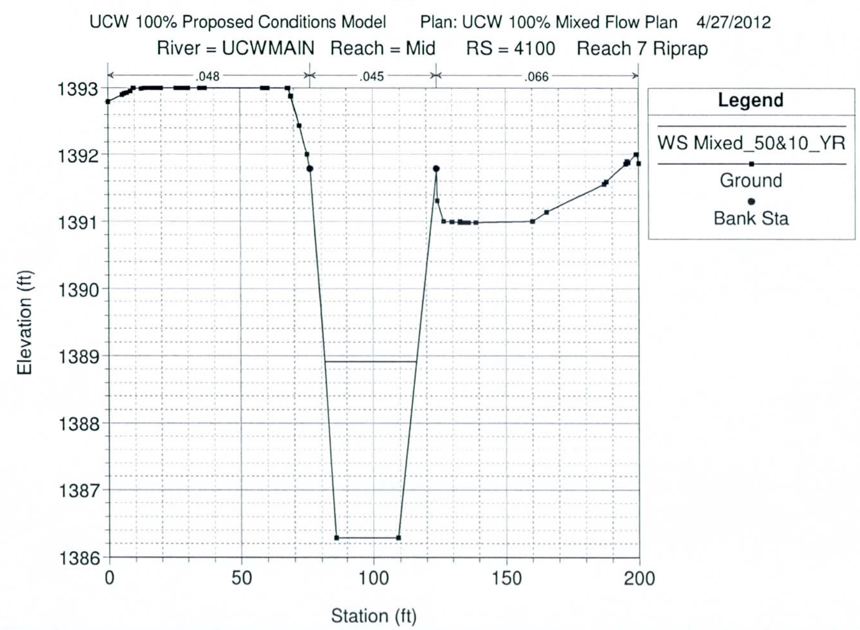

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4500 Reach 7 RipRap
.048
.045
.071
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

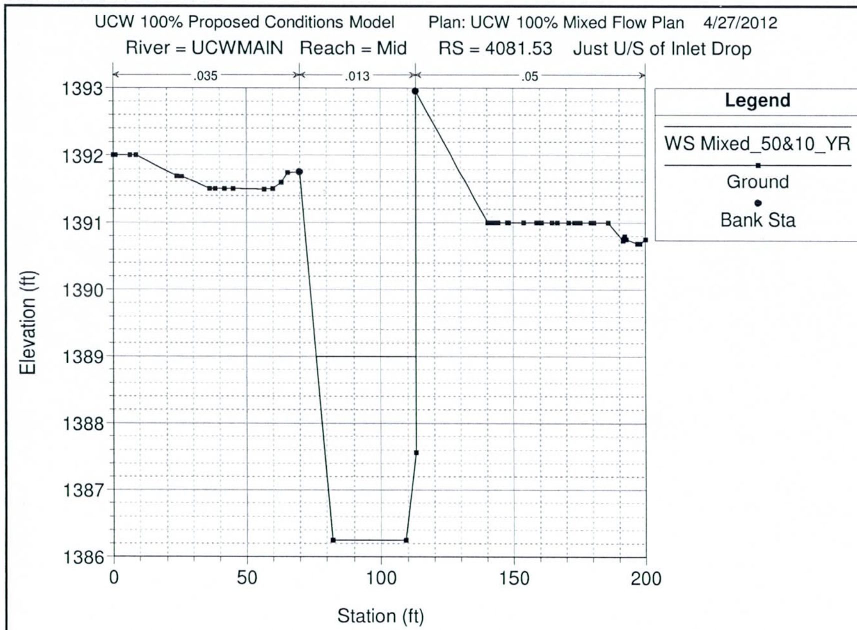

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4486.11 Reach 7 Earthen Channel
.048
.03
.07
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

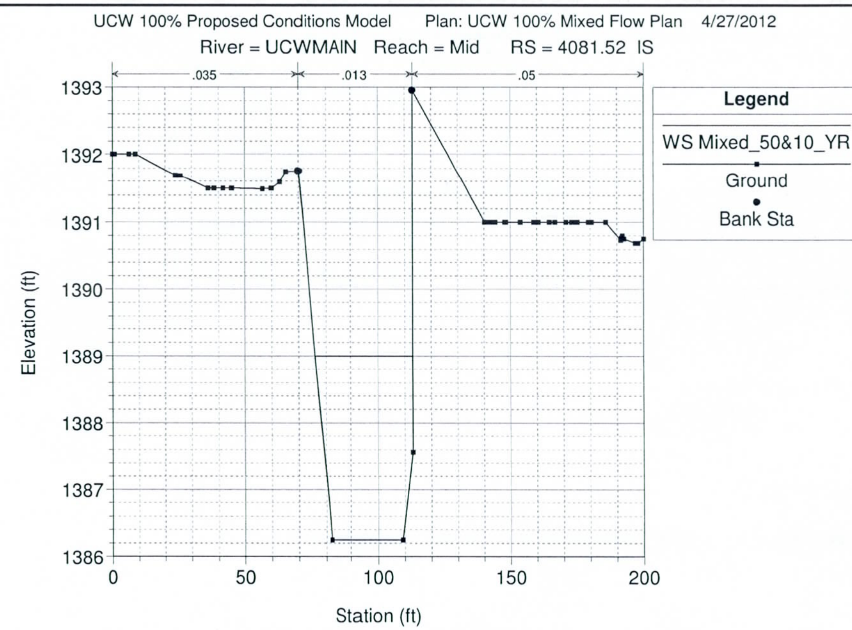

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4400 Reach 7 Earthen Channel
.048
.03
.066
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

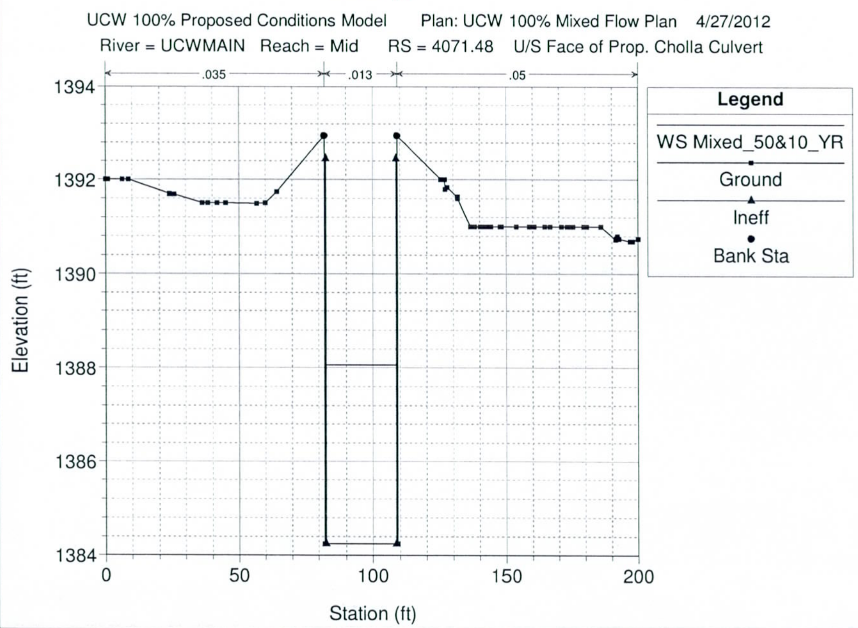

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4300 Reach 7 Earthen Channel
.048
.045
.066
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

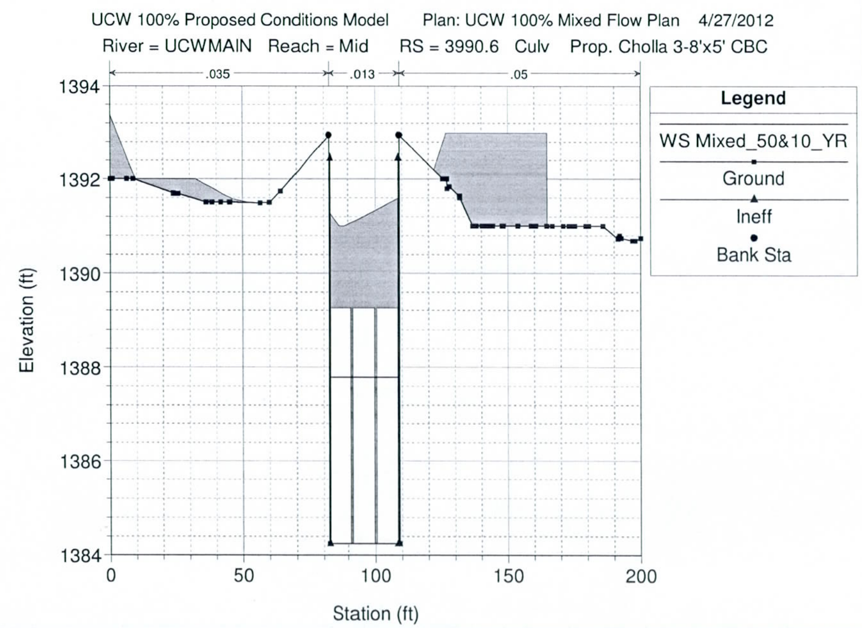

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4200 Reach 7 Riprap
.048
.045
.066
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

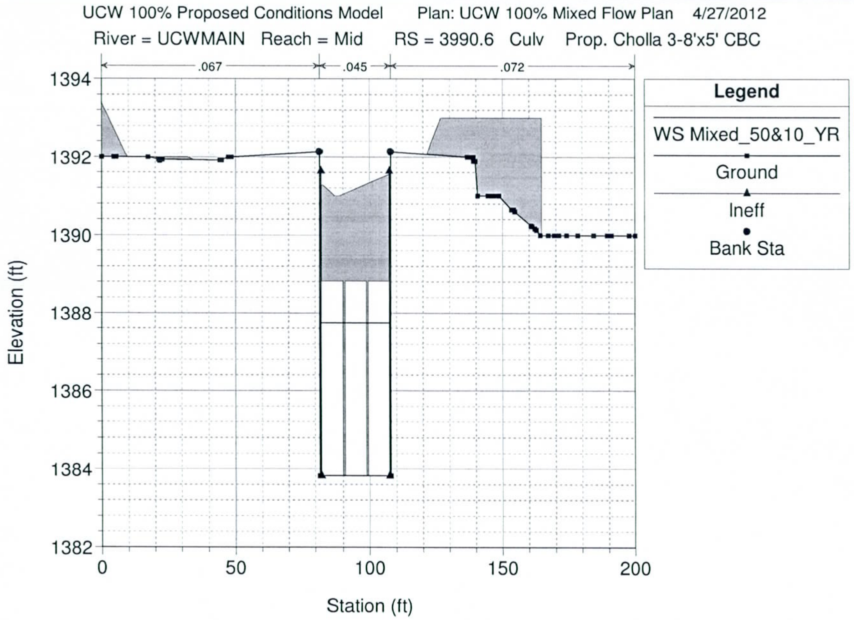

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4100 Reach 7 Riprap
.048
.045
.066
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

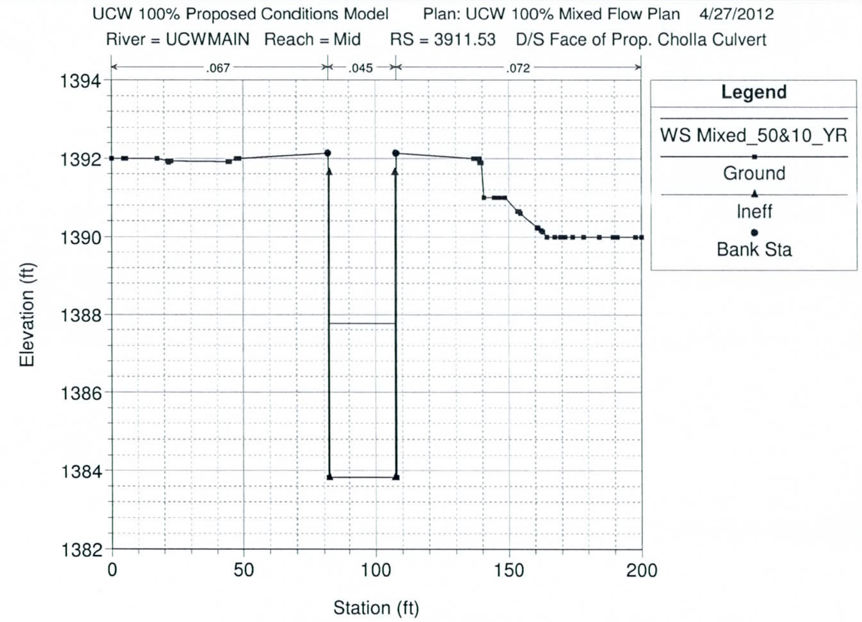

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4081.53 Just U/S of Inlet Drop
.035
.013
.05
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1393
1392
1391
1390
1389
1388
1387
1386
0
50
100
150
200

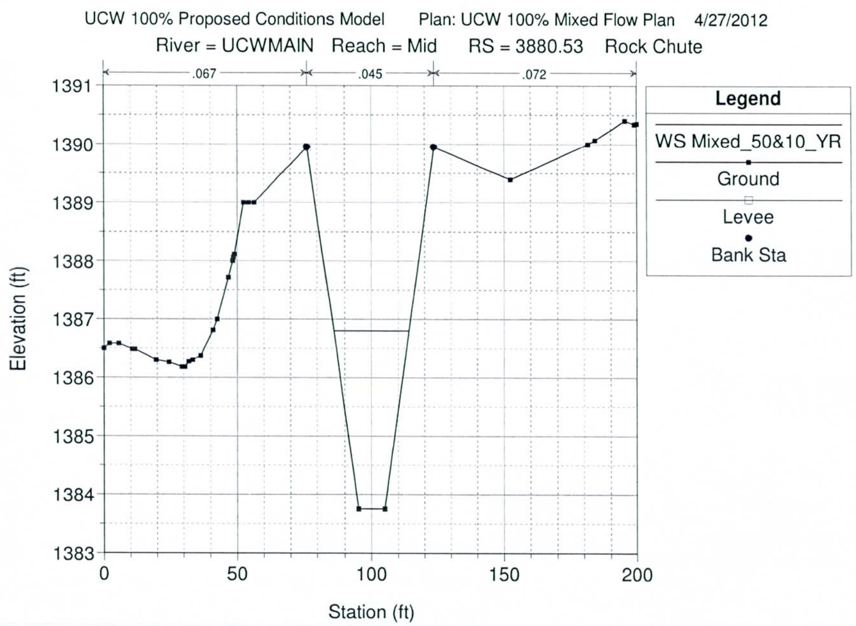

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4081.52 IS
.035
.013
.05
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1393
1392
1391
1390
1389
1388
1387
1386
0
50
100
150
200

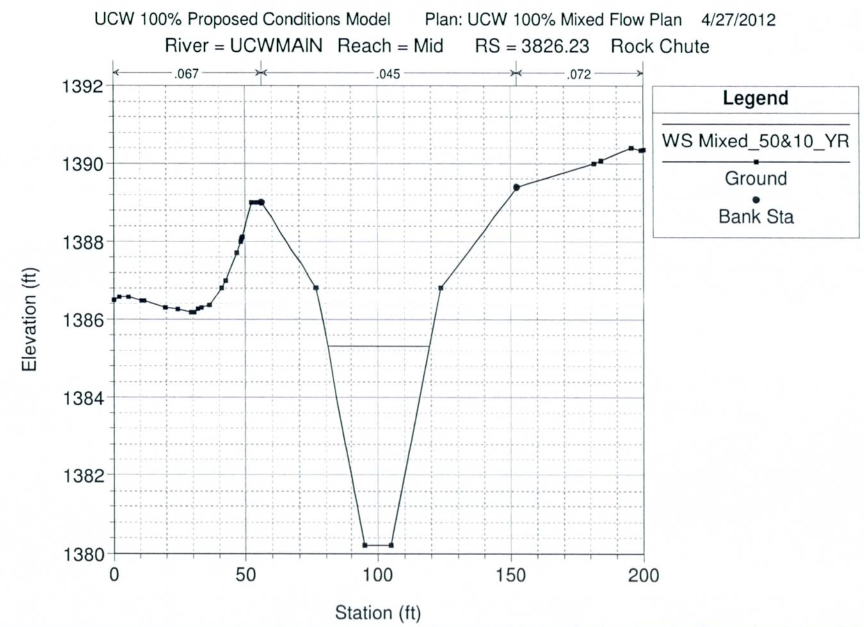

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 4071.48 U/S Face of Prop. Cholla Culvert
.035
.013
.05
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1394
1392
1390
1388
1386
1384
0
50
100
150
200

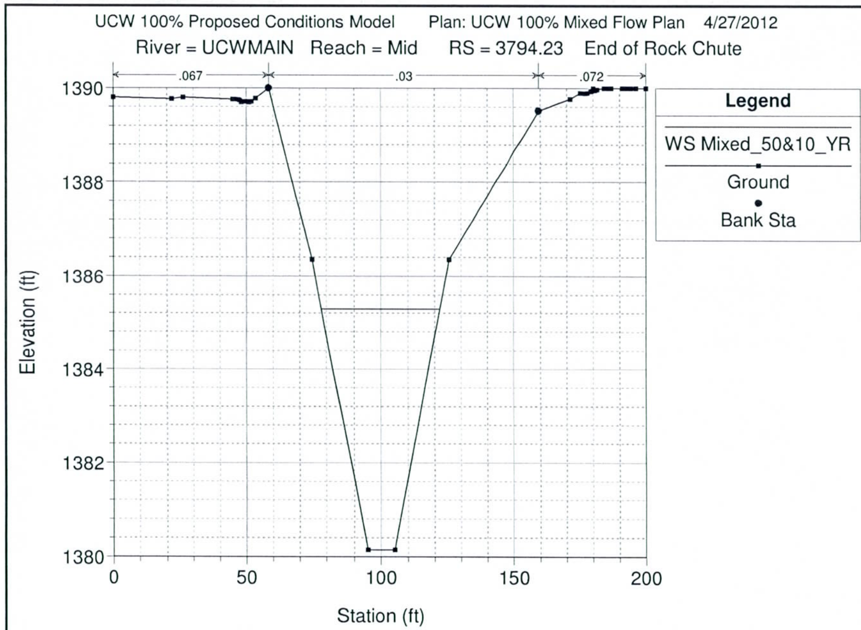

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3990.6 Culv Prop. Cholla 3-8'x5' CBC
.035
.013
.05
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1394
1392
1390
1388
1386
1384
0
50
100
150
200

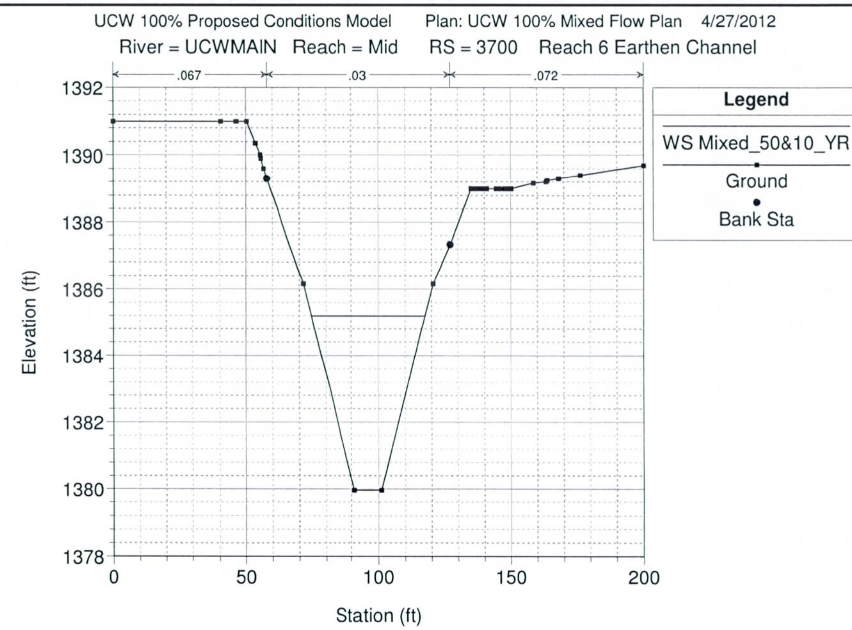

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3990.6 Culv Prop. Cholla 3-8'x5' CBC
.067 .045 .072
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

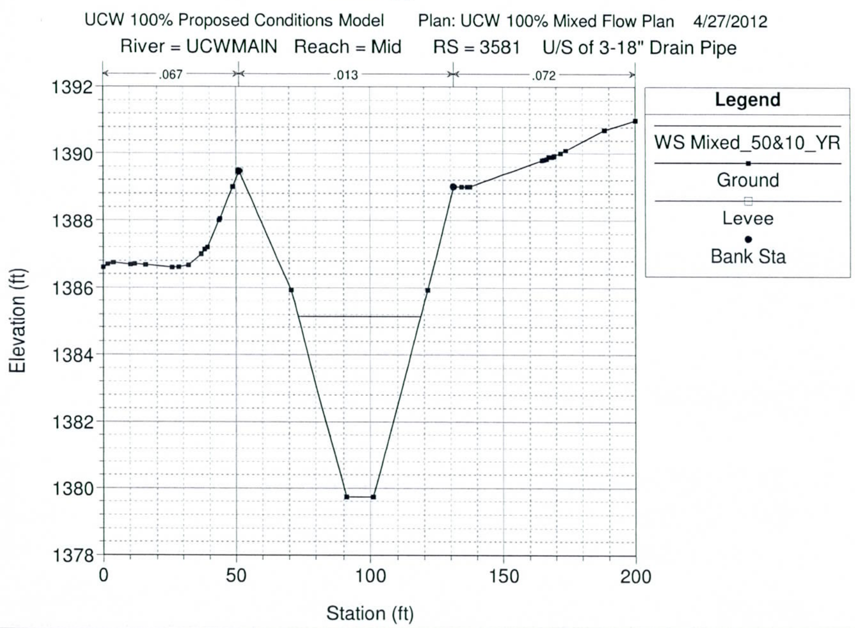

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3911.53 D/S Face of Prop. Cholla Culvert
.067 .045 .072
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

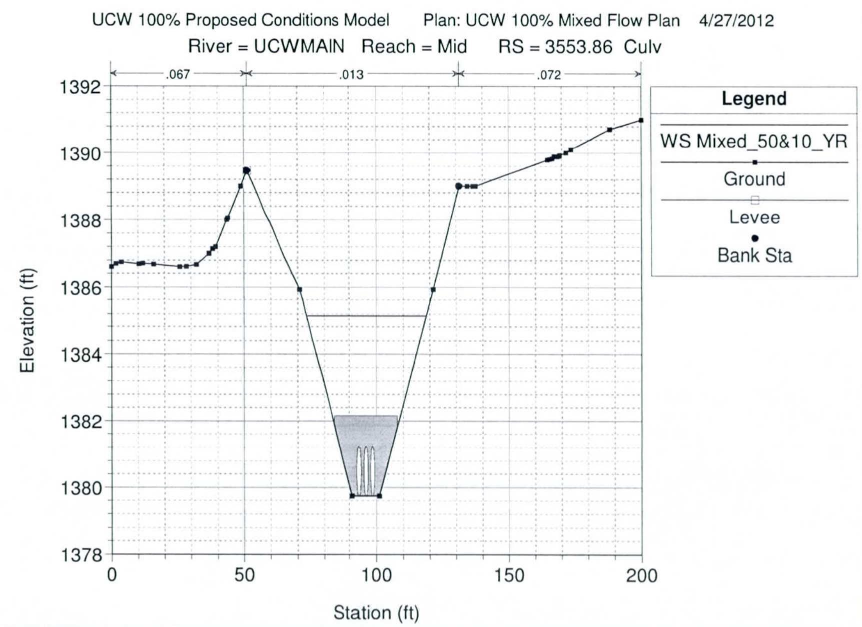

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3880.53 Rock Chute
.067 .045 .072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

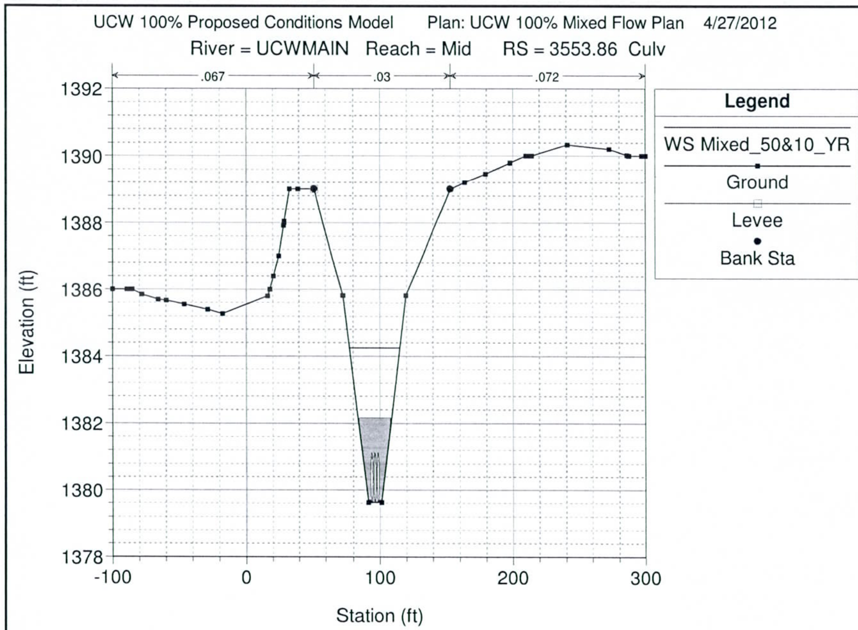

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3826.23 Rock Chute
.067 .045 .072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

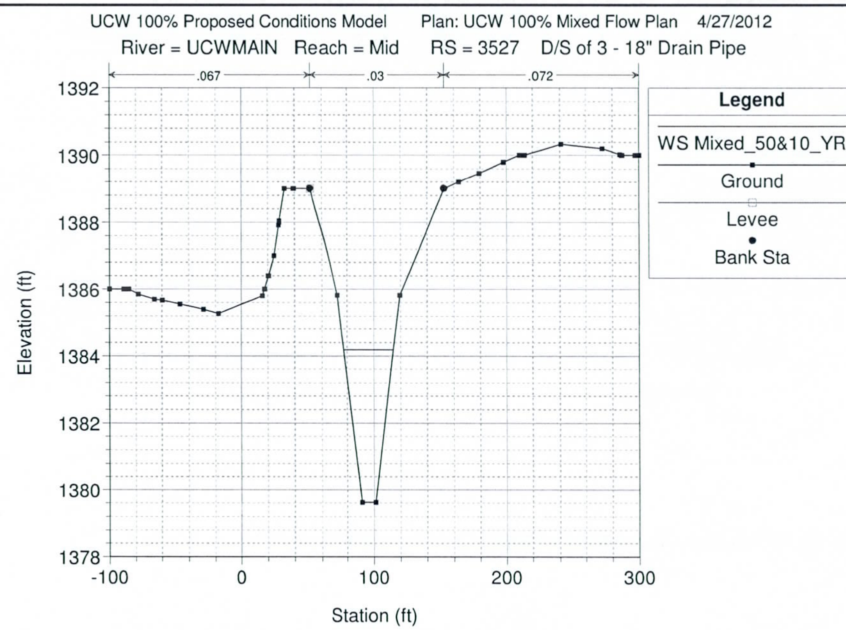

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3794.23 End of Rock Chute
.067
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1390
1388
1386
1384
1382
1380
0
50
100
150
200
Station (ft)

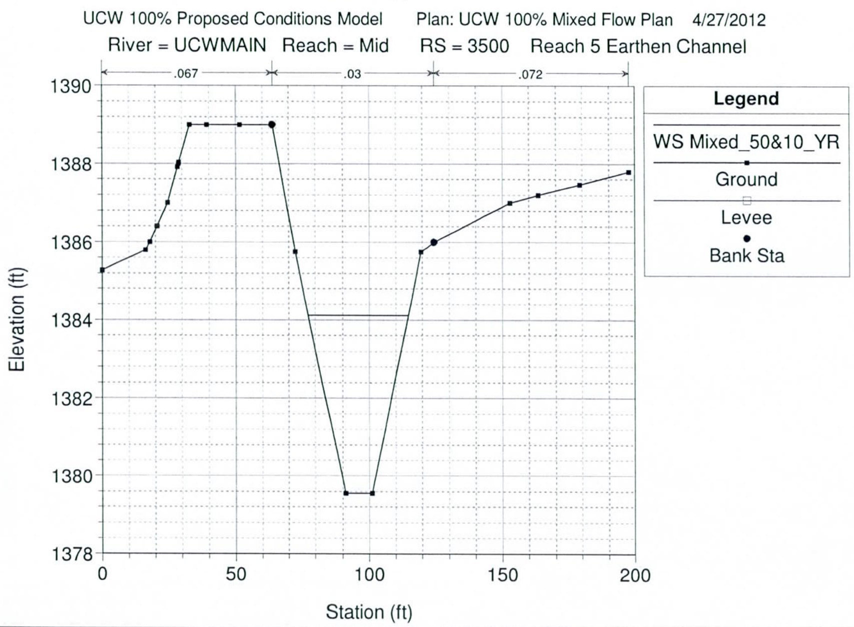

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3700 Reach 6 Earthen Channel
.067
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1392
1390
1388
1386
1384
1382
1380
1378
0
50
100
150
200
Station (ft)

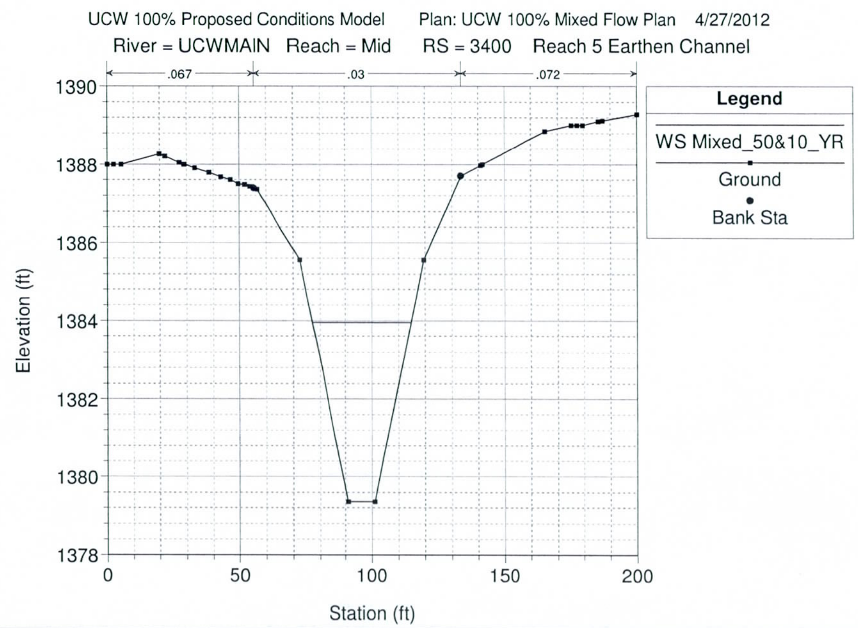

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3581 U/S of 3-18" Drain Pipe
.067
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
1392
1390
1388
1386
1384
1382
1380
1378
0
50
100
150
200
Station (ft)

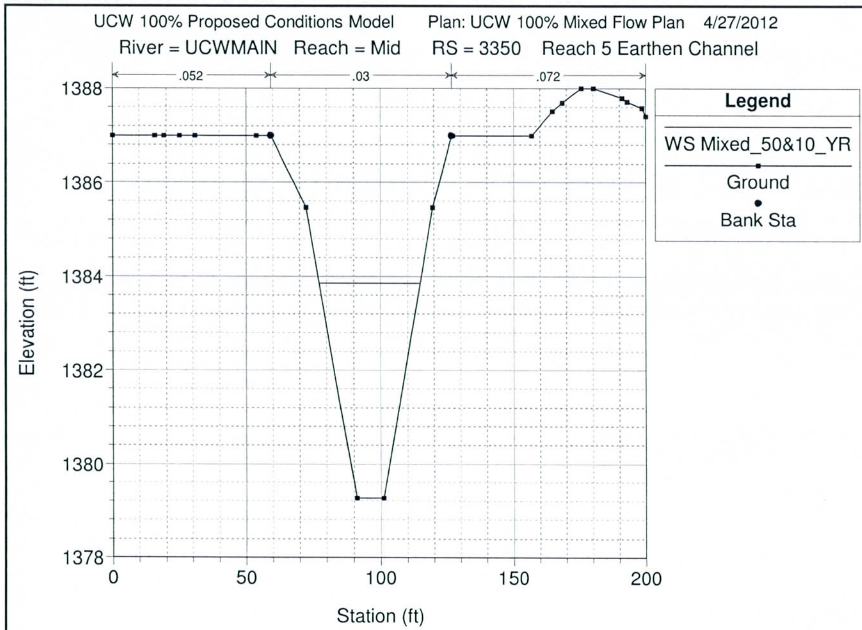

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3553.86 Culv
.067
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
1392
1390
1388
1386
1384
1382
1380
1378
0
50
100
150
200
Station (ft)

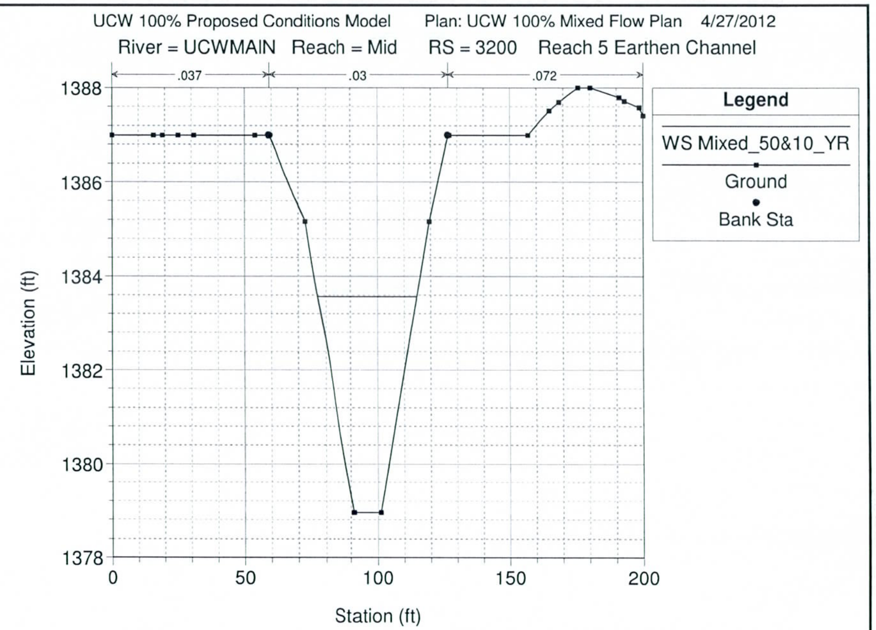

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3553.86 Culv
.067
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1392
1390
1388
1386
1384
1382
1380
1378
-100
0
100
200
300

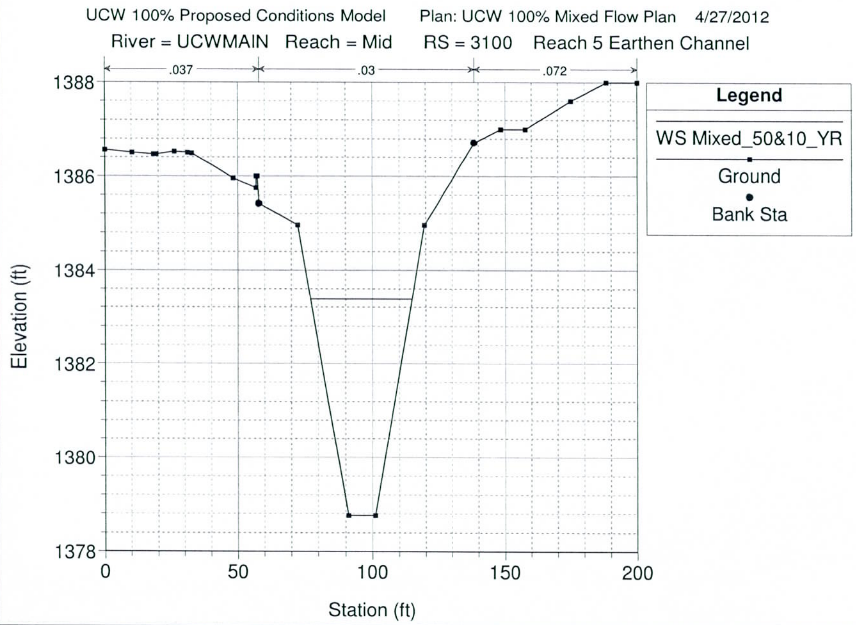

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3527 D/S of 3 - 18" Drain Pipe
.067
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1392
1390
1388
1386
1384
1382
1380
1378
-100
0
100
200
300

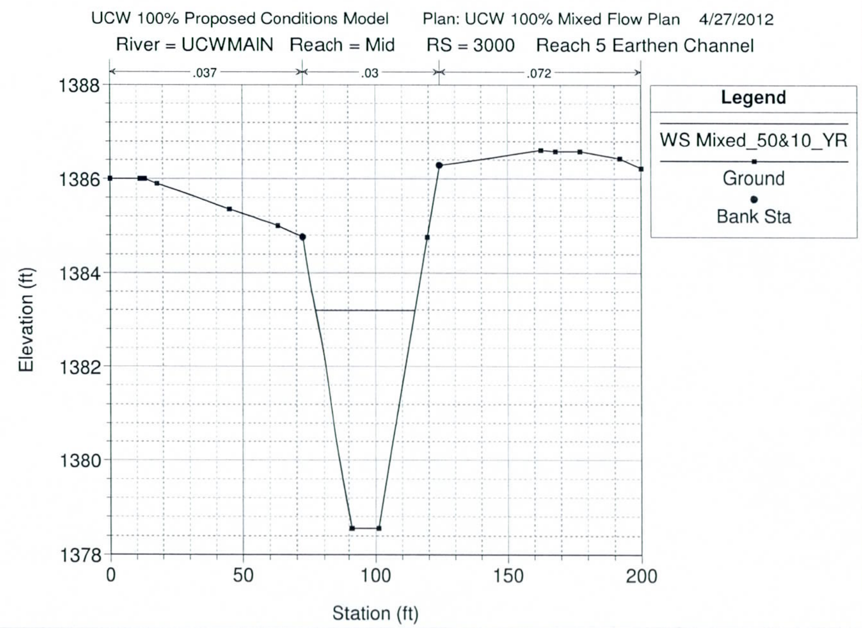

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3500 Reach 5 Earthen Channel
.067
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1390
1388
1386
1384
1382
1380
1378
0
50
100
150
200

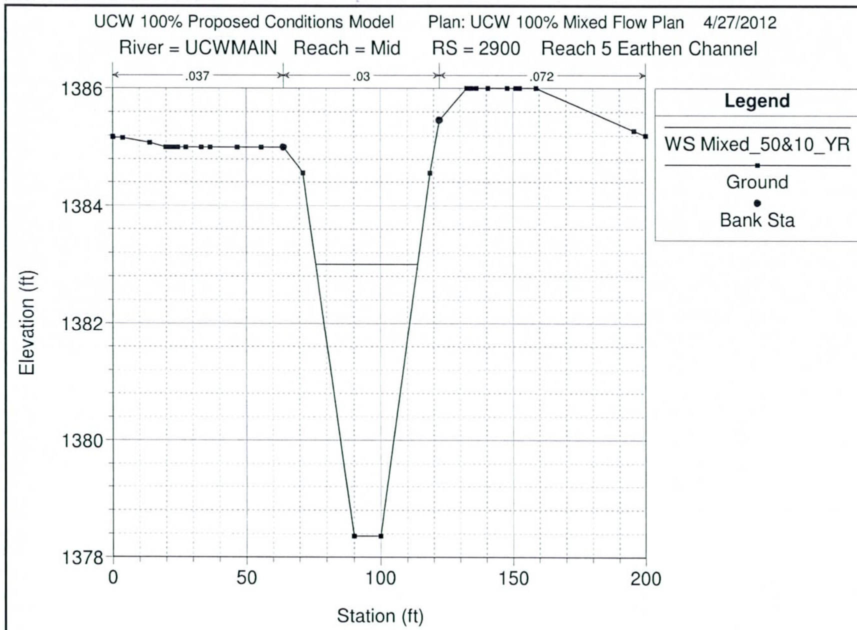

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3400 Reach 5 Earthen Channel
.067
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1390
1388
1386
1384
1382
1380
1378
0
50
100
150
200

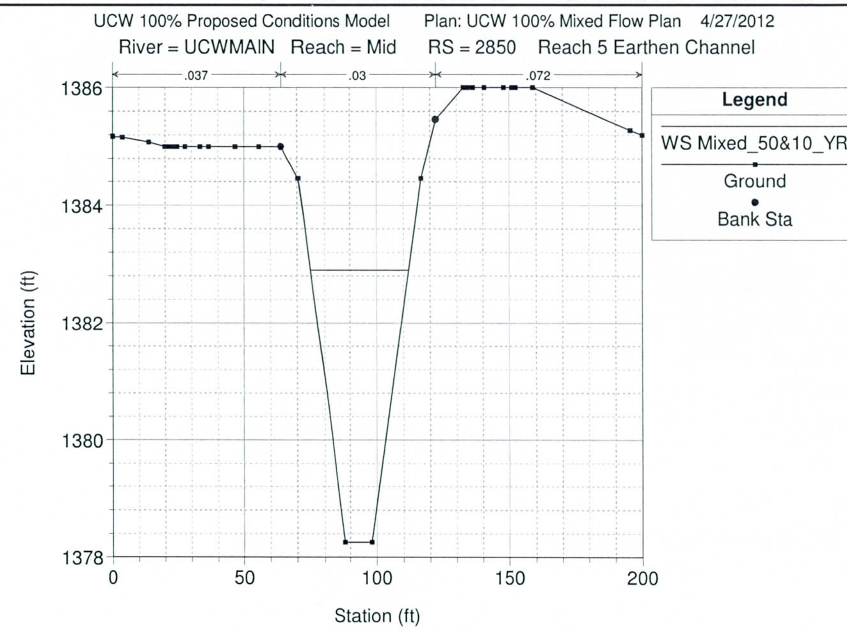

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3350 Reach 5 Earthen Channel
.052
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

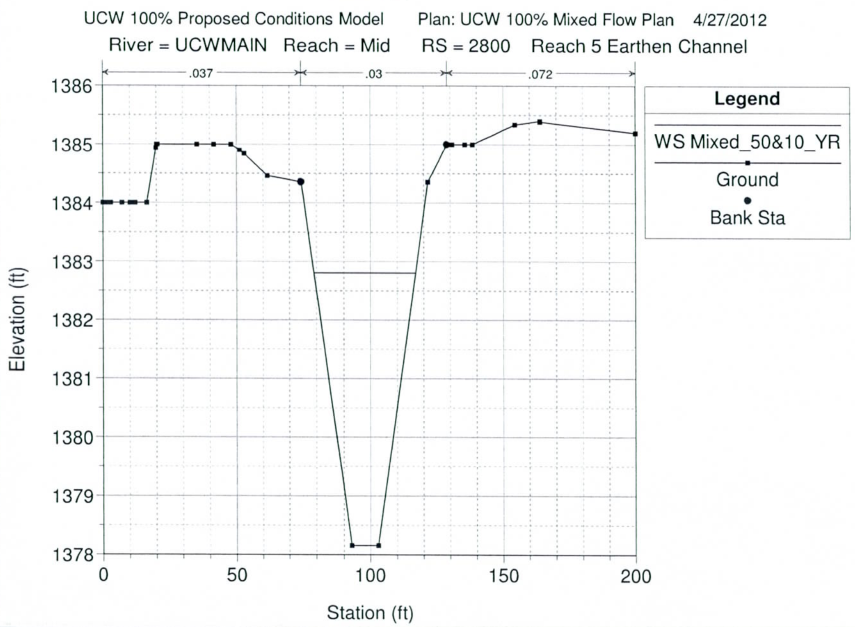

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3200 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

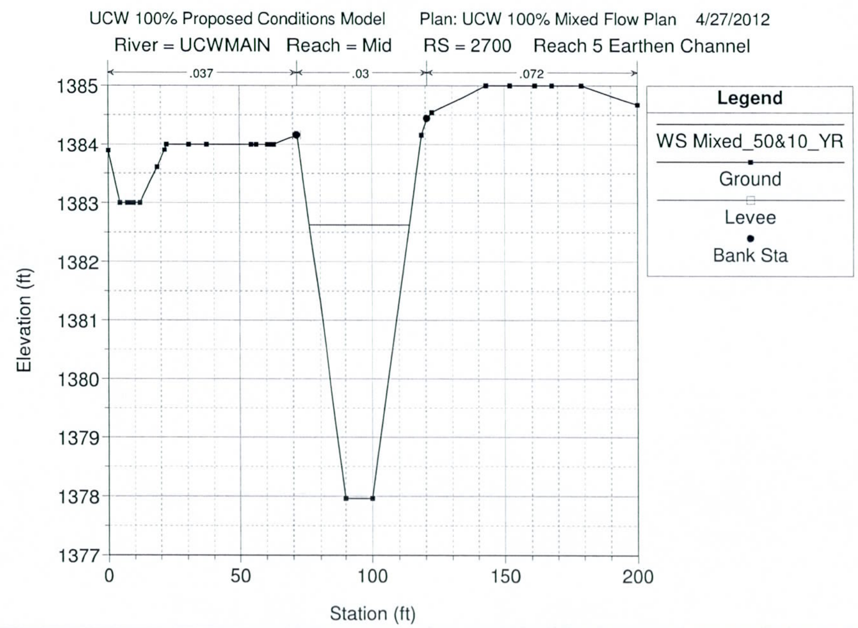

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3100 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

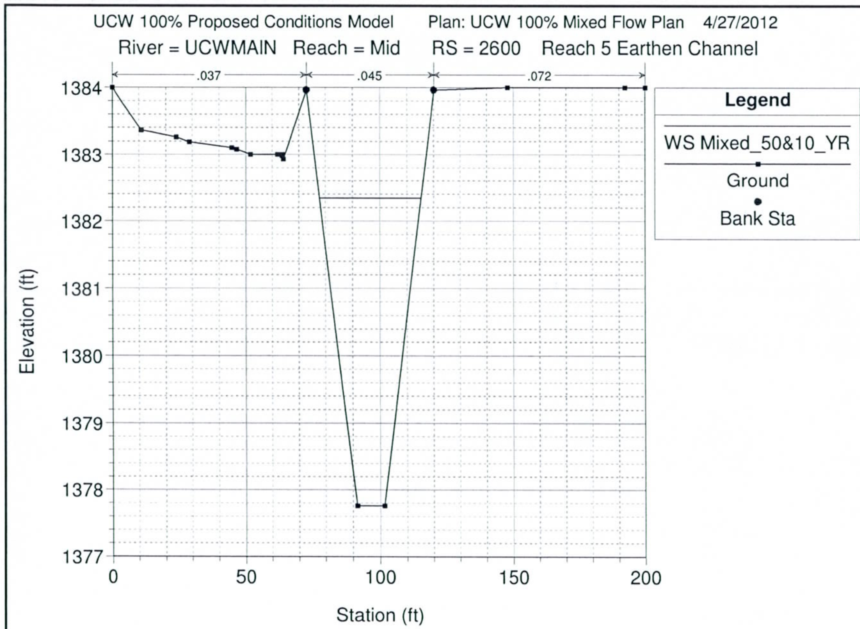

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 3000 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

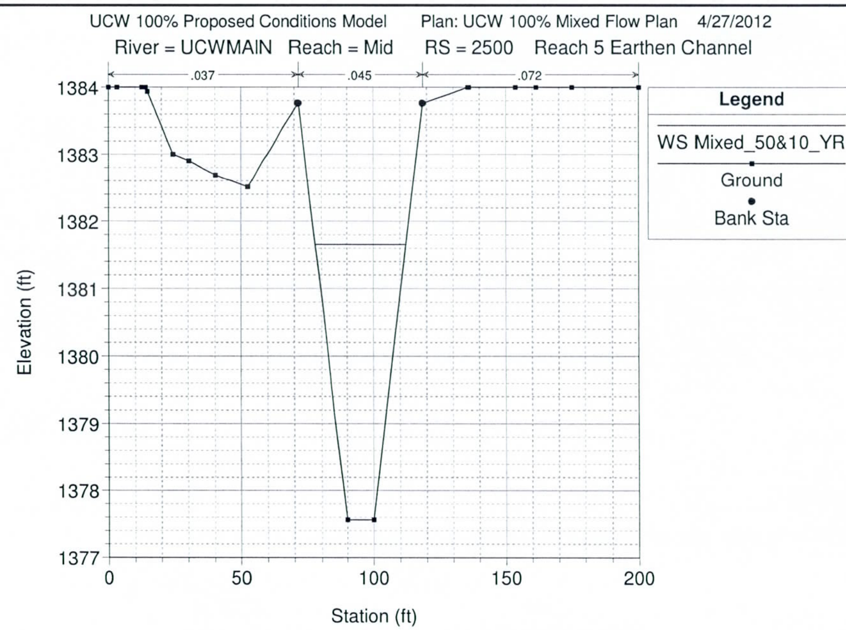

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2900 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1378
1380
1382
1384
1386
Station (ft)
0
50
100
150
200

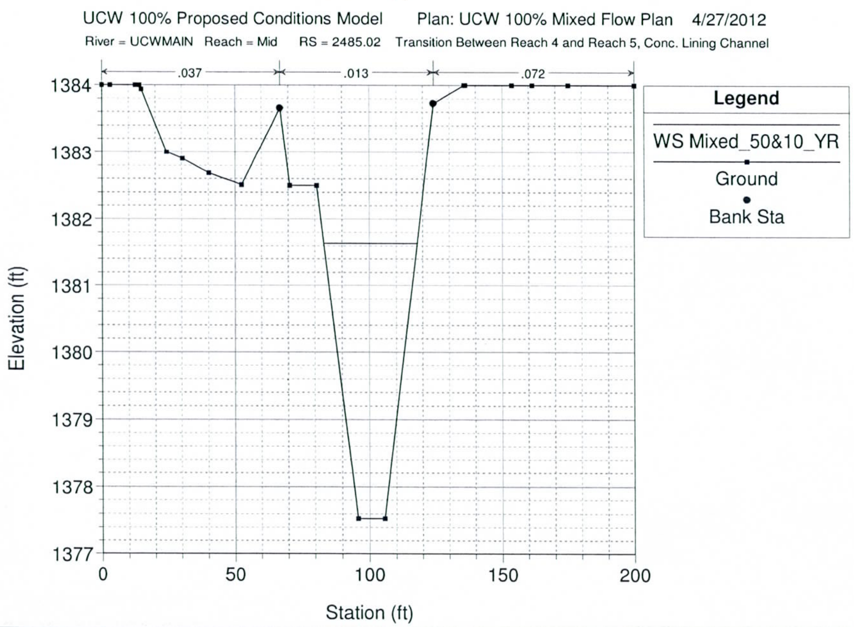

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2850 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1378
1380
1382
1384
1386
Station (ft)
0
50
100
150
200

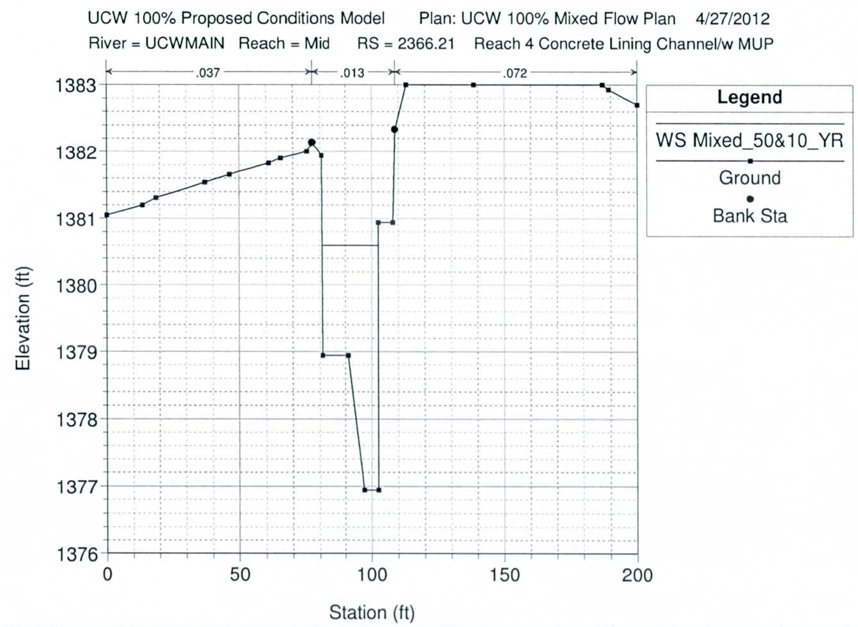

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2800 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1378
1379
1380
1381
1382
1383
1384
1385
1386
Station (ft)
0
50
100
150
200

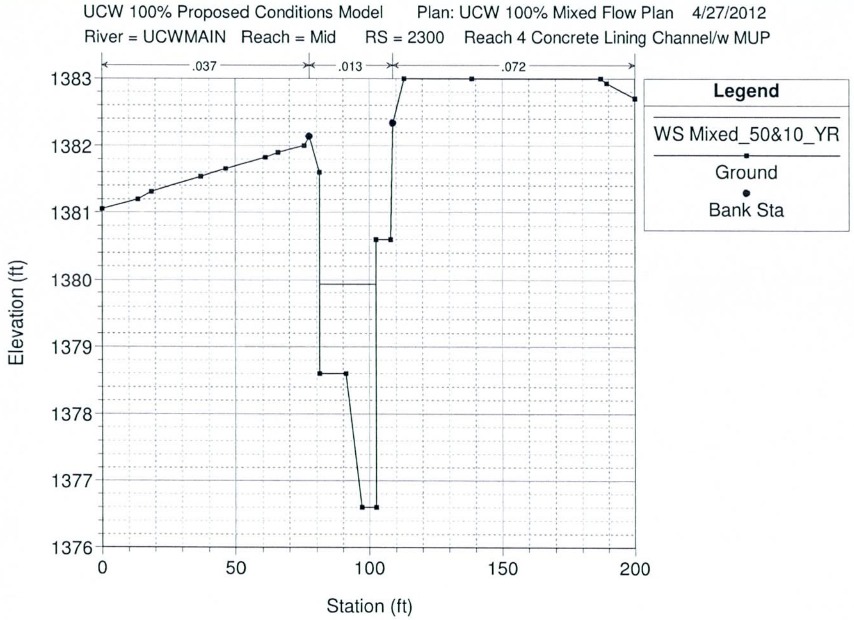

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2700 Reach 5 Earthen Channel
.037
.03
.072
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
1377
1378
1379
1380
1381
1382
1383
1384
1385
Station (ft)
0
50
100
150
200

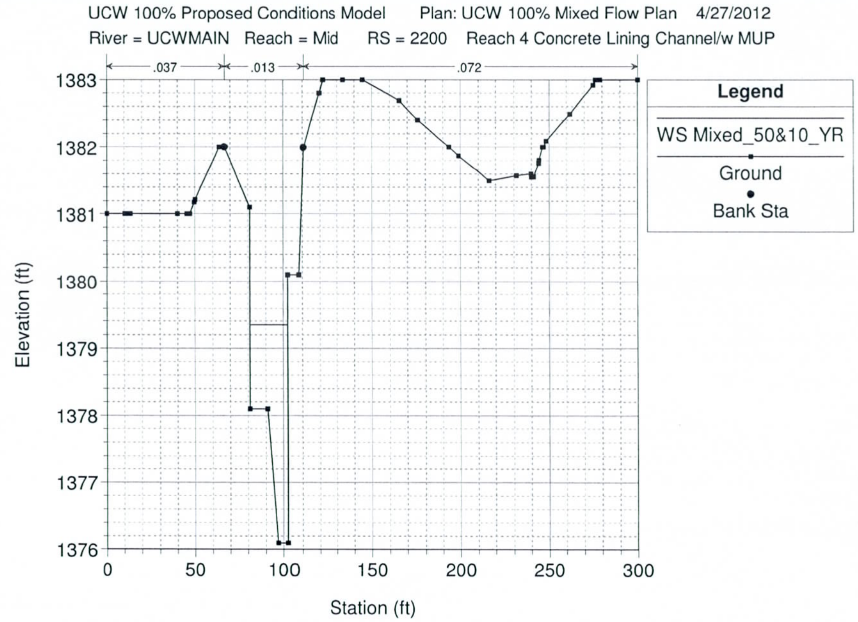

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2600 Reach 5 Earthen Channel
.037
.045
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

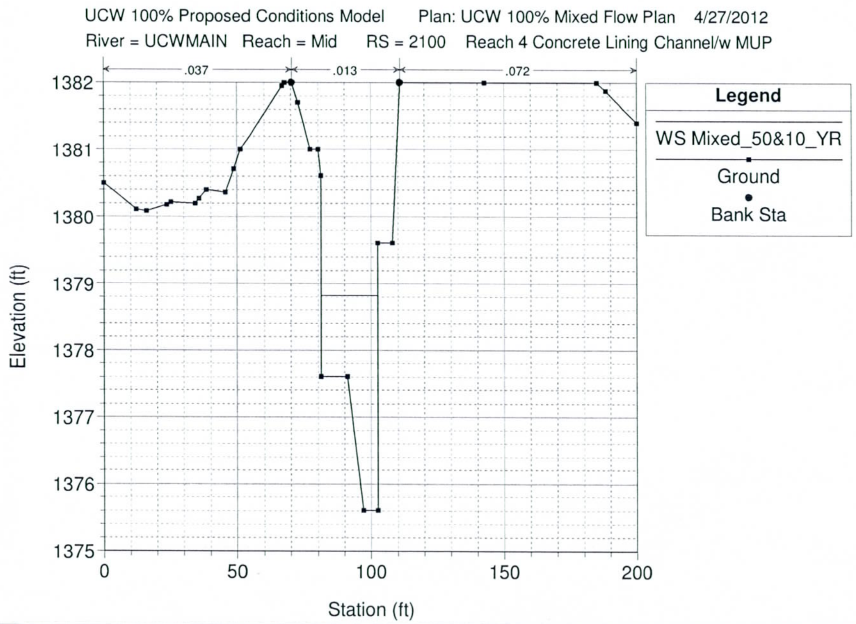

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2500 Reach 5 Earthen Channel
.037
.045
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

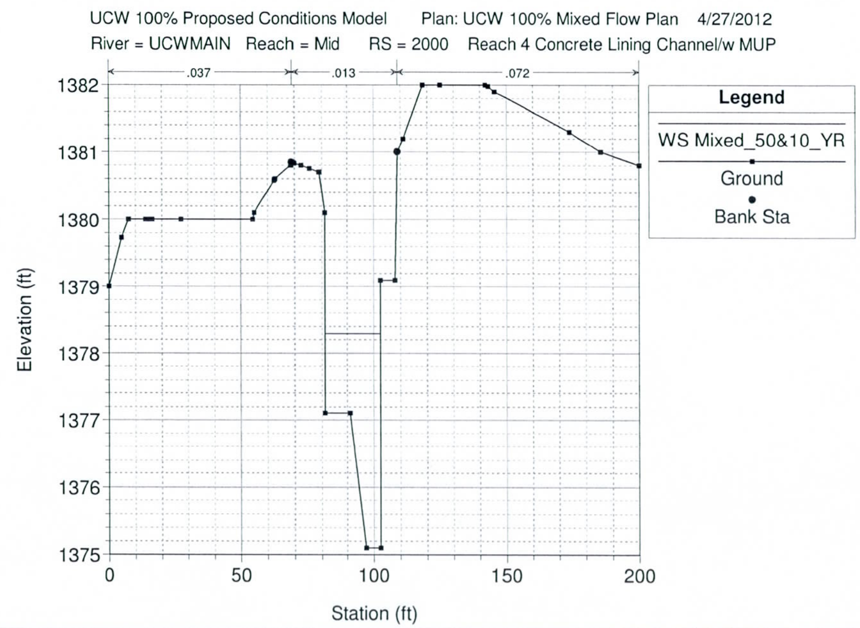

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2485.02 Transition Between Reach 4 and Reach 5, Conc. Lining Channel
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

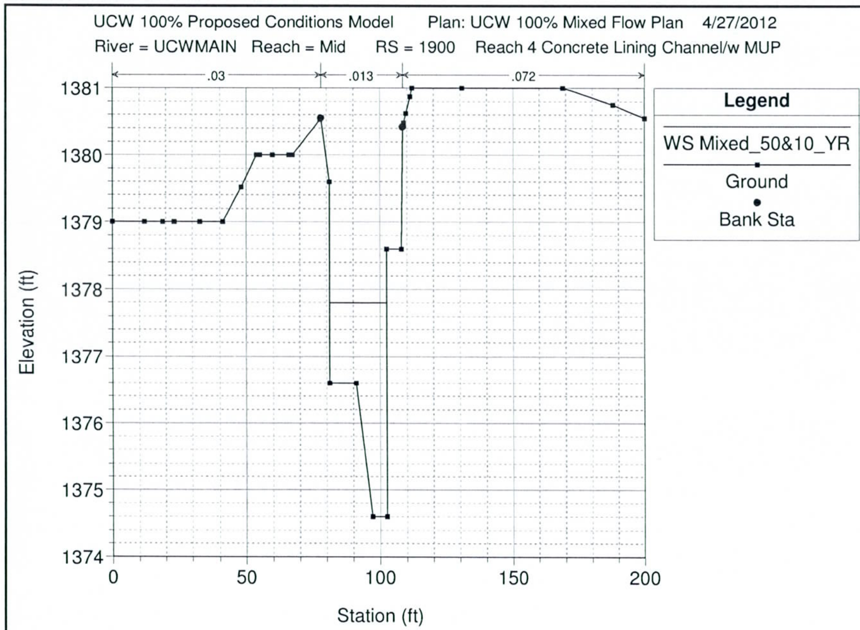

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2366.21 Reach 4 Concrete Lining Channel/w MUP
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

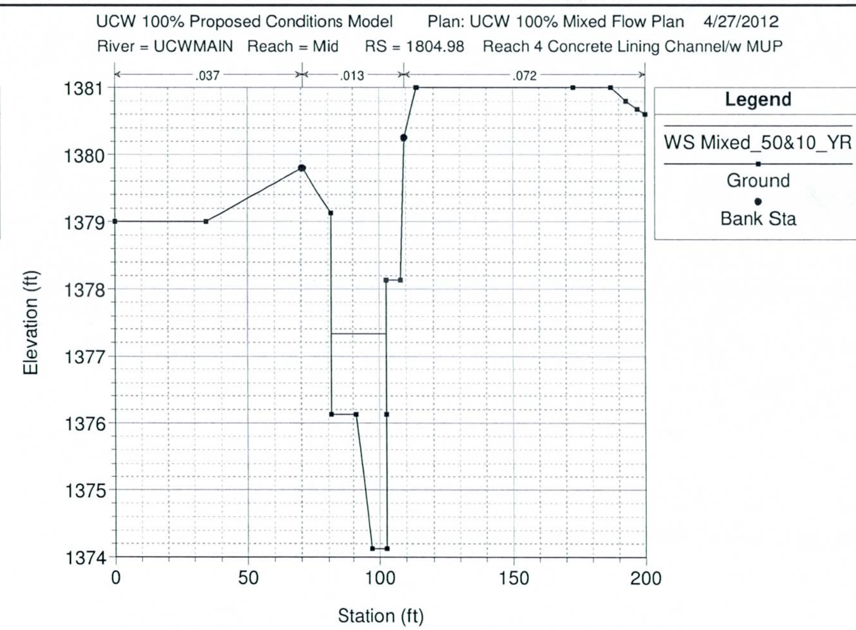

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2300 Reach 4 Concrete Lining Channel/w MUP
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

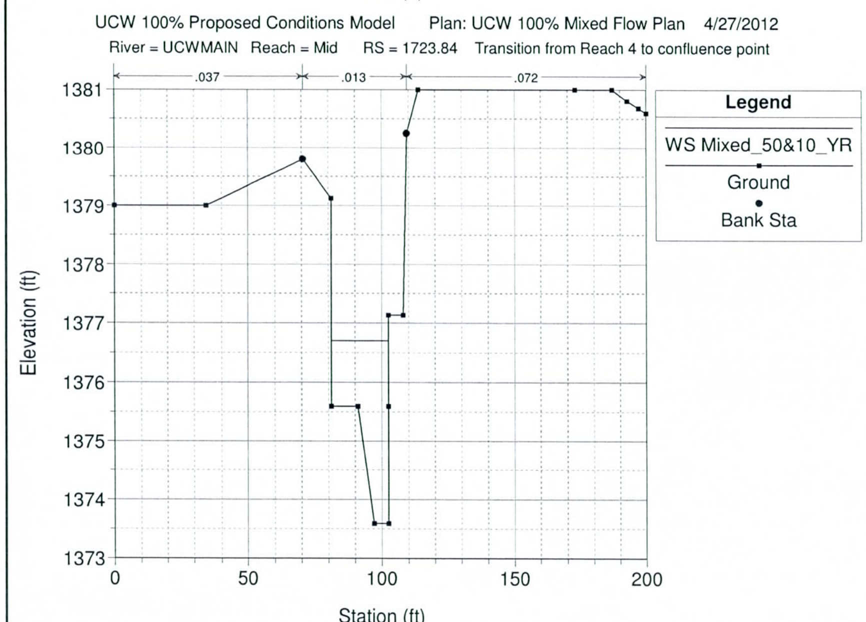

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2200 Reach 4 Concrete Lining Channel/w MUP
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

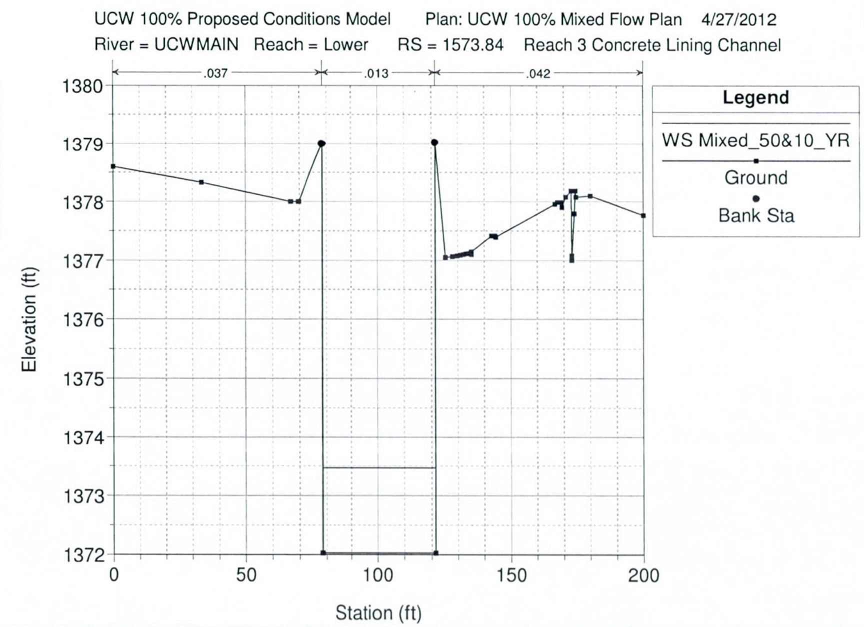

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2100 Reach 4 Concrete Lining Channel/w MUP
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 2000 Reach 4 Concrete Lining Channel/w MUP
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

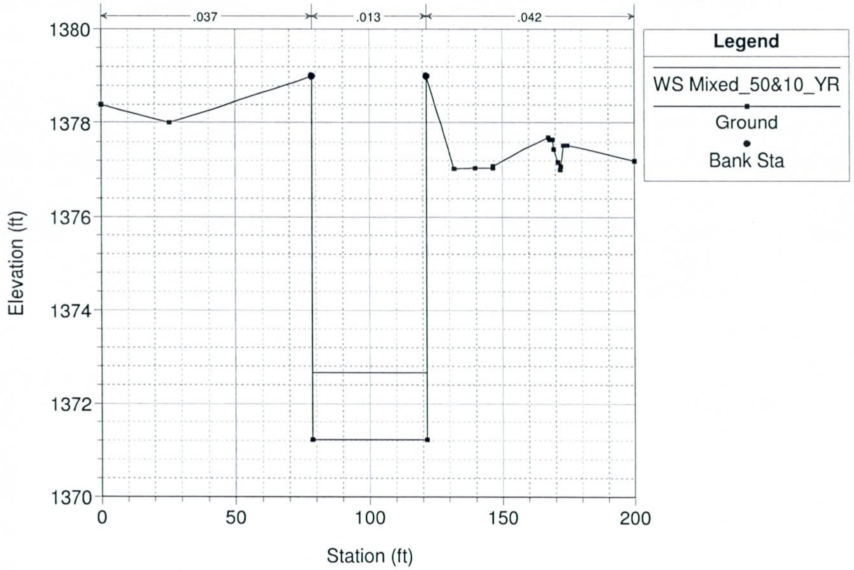

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 1900 Reach 4 Concrete Lining Channel/w MUP
.03
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 1804.98 Reach 4 Concrete Lining Channel/w MUP
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

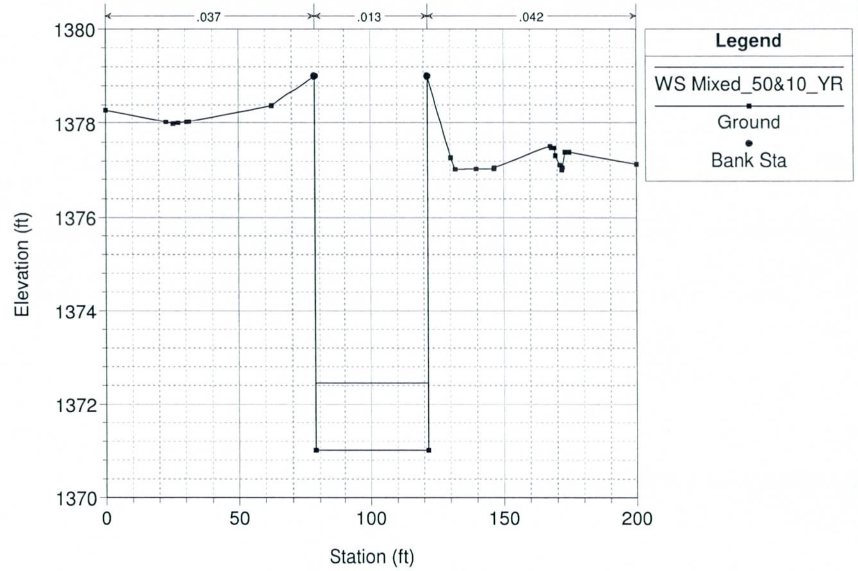

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Mid RS = 1723.84 Transition from Reach 4 to confluence point
.037
.013
.072
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1573.84 Reach 3 Concrete Lining Channel
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

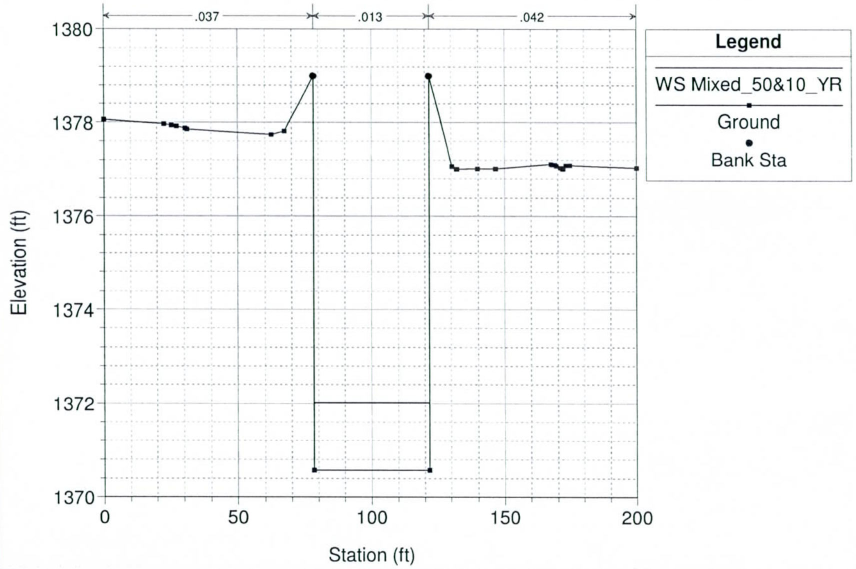
UCW 100% Proposed Conditions Model   Plan: UCW 100% Mixed Flow Plan   4/27/2012
River = UCWMAIN   Reach = Lower   RS = 1500   Reach 3 Concrete Lining Channel



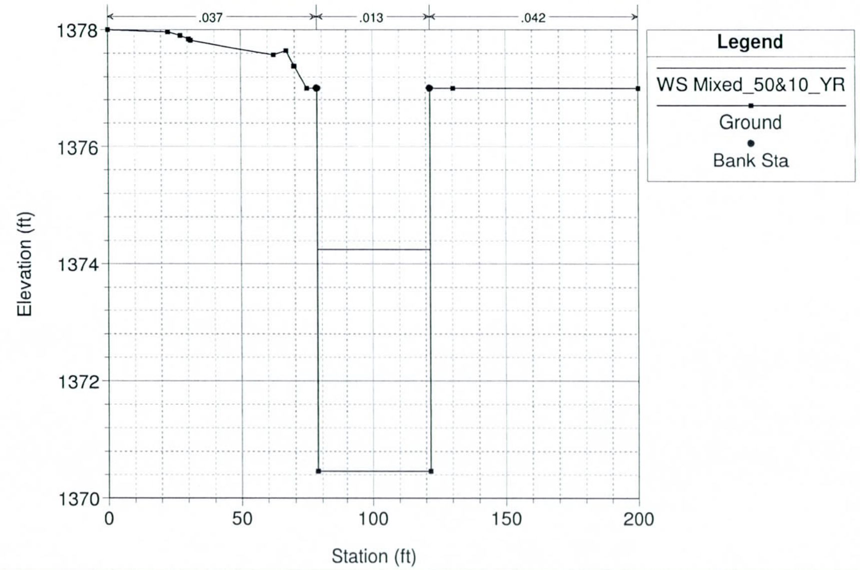
UCW 100% Proposed Conditions Model   Plan: UCW 100% Mixed Flow Plan   4/27/2012
River = UCWMAIN   Reach = Lower   RS = 1480   Reach 3 Concrete Channel

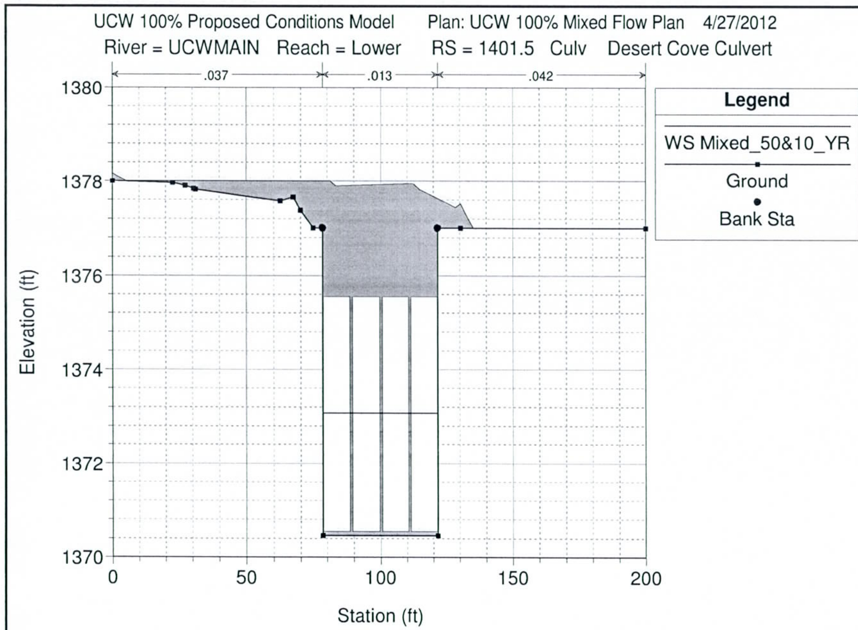


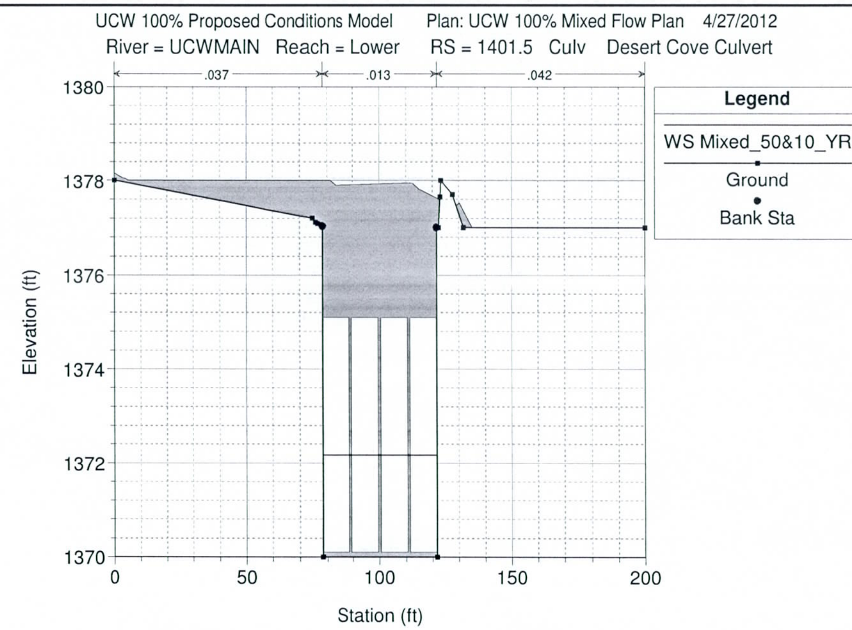
UCW 100% Proposed Conditions Model   Plan: UCW 100% Mixed Flow Plan   4/27/2012
River = UCWMAIN   Reach = Lower   RS = 1440   Reach 3 Concrete Channel

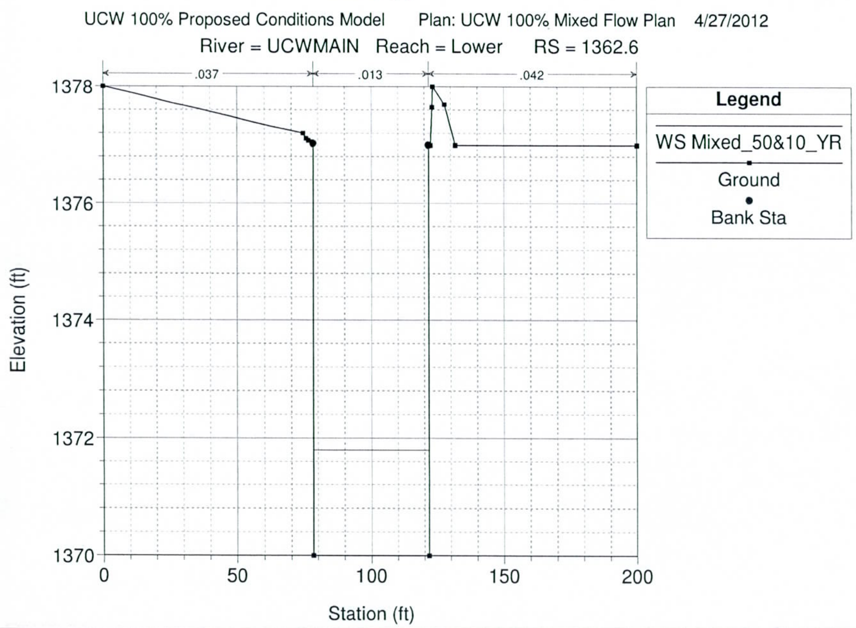


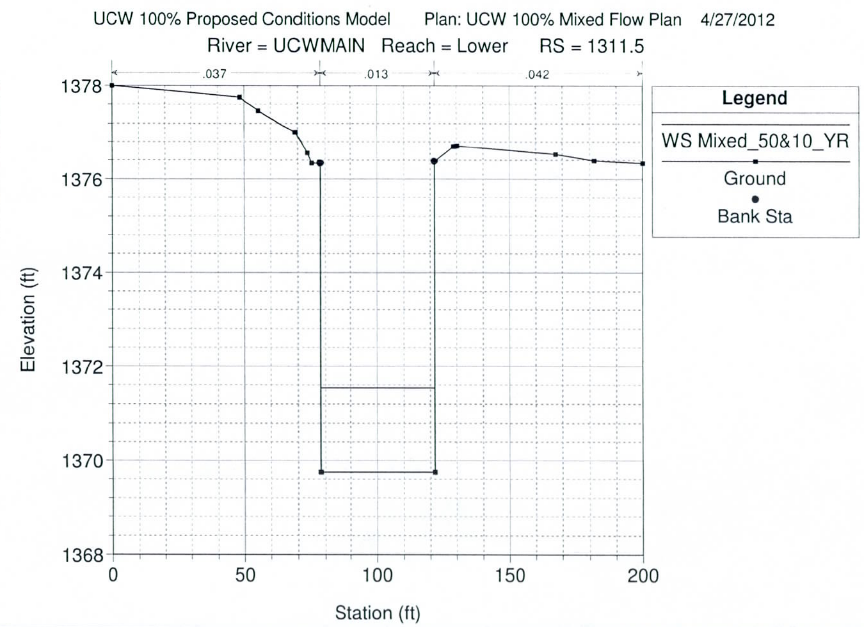
UCW 100% Proposed Conditions Model   Plan: UCW 100% Mixed Flow Plan   4/27/2012
River = UCWMAIN   Reach = Lower   RS = 1428.8

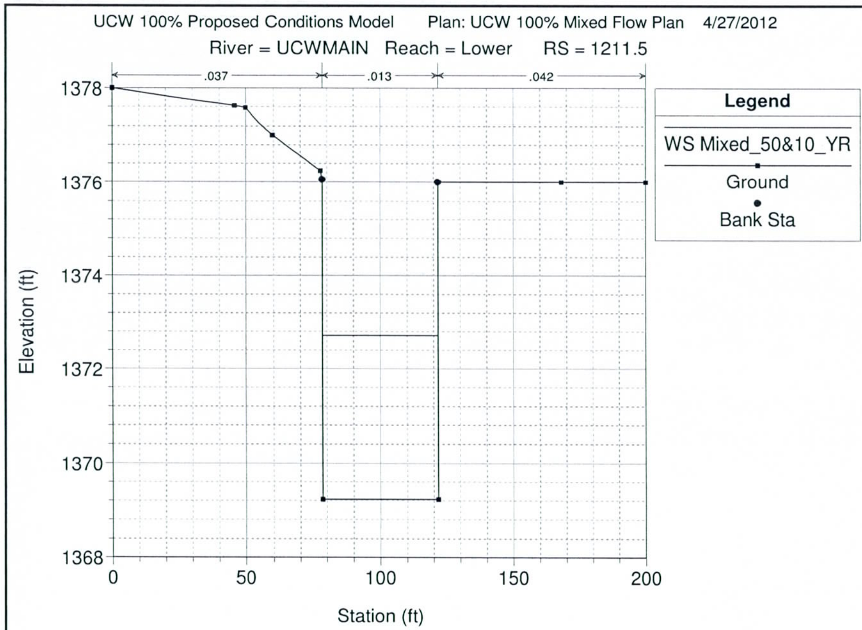


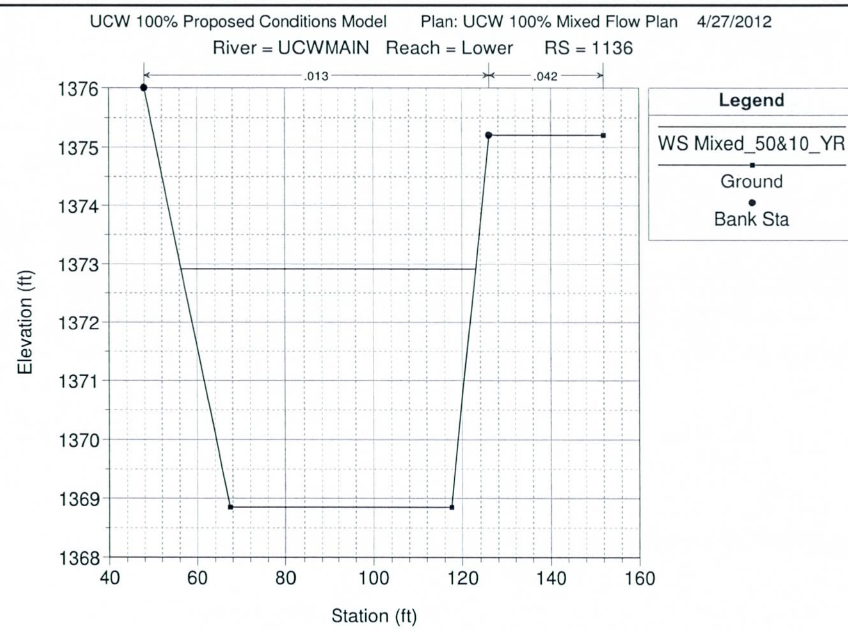

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1401.5 Culv Desert Cove Culvert
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1370
1372
1374
1376
1378
1380
0
50
100
150
200

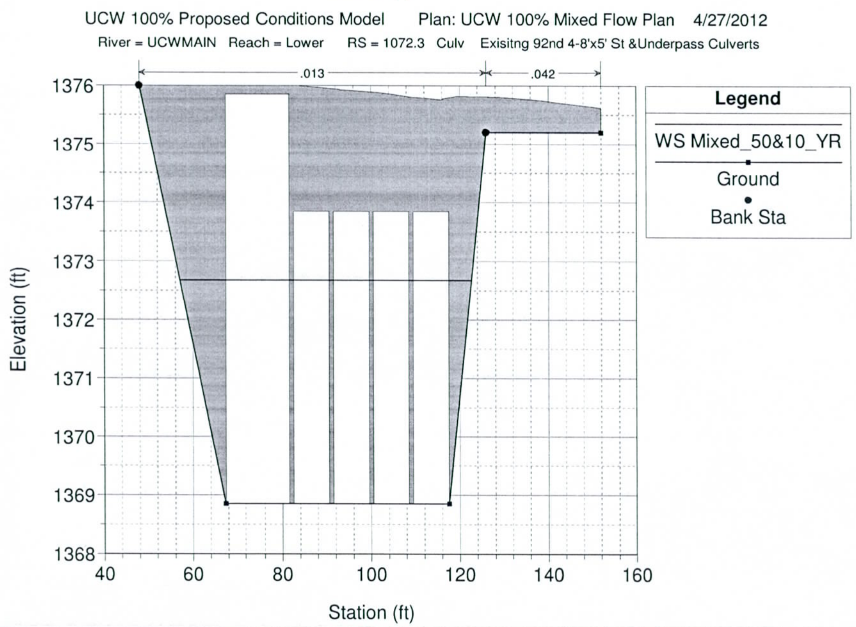

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1401.5 Culv Desert Cove Culvert
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1370
1372
1374
1376
1378
1380
0
50
100
150
200

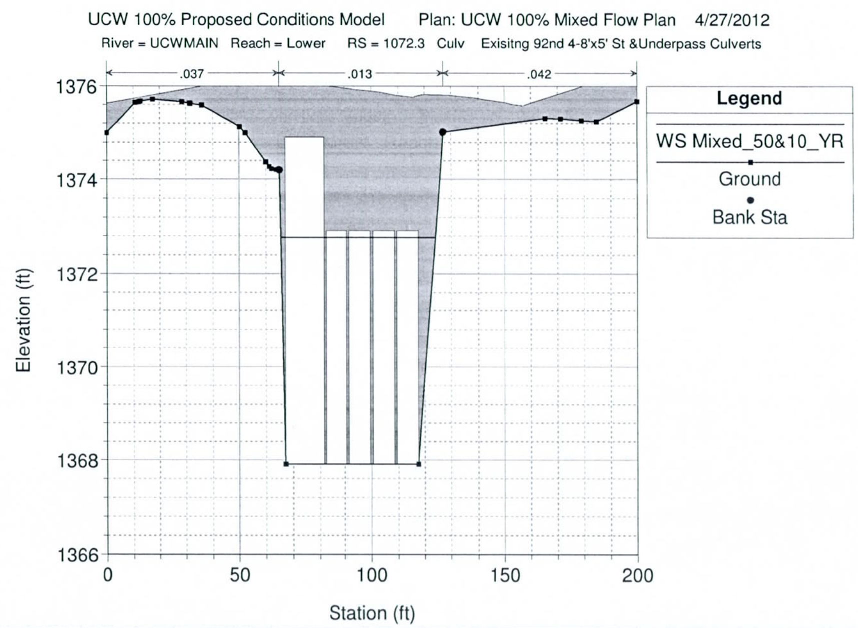

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1362.6
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1370
1372
1374
1376
1378
0
50
100
150
200

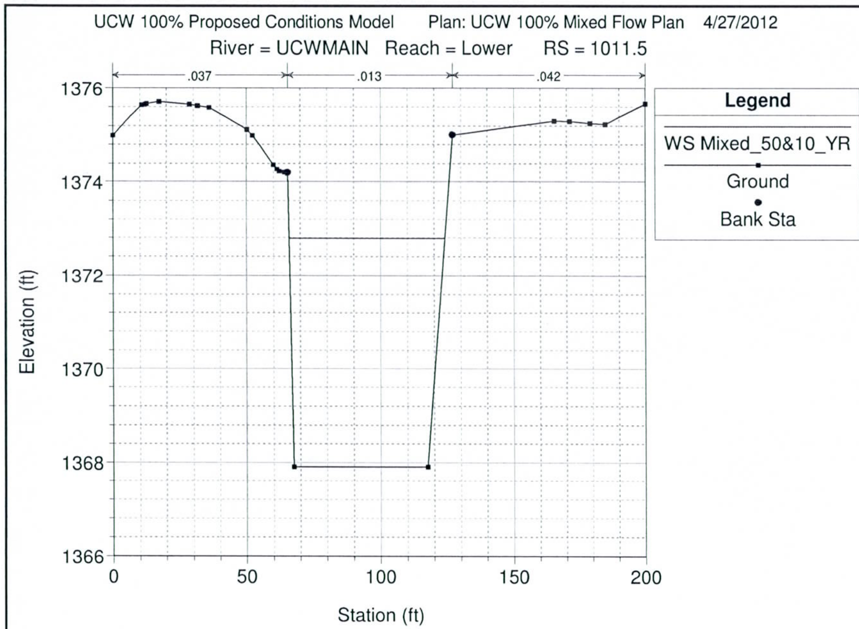

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1311.5
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1368
1370
1372
1374
1376
1378
0
50
100
150
200

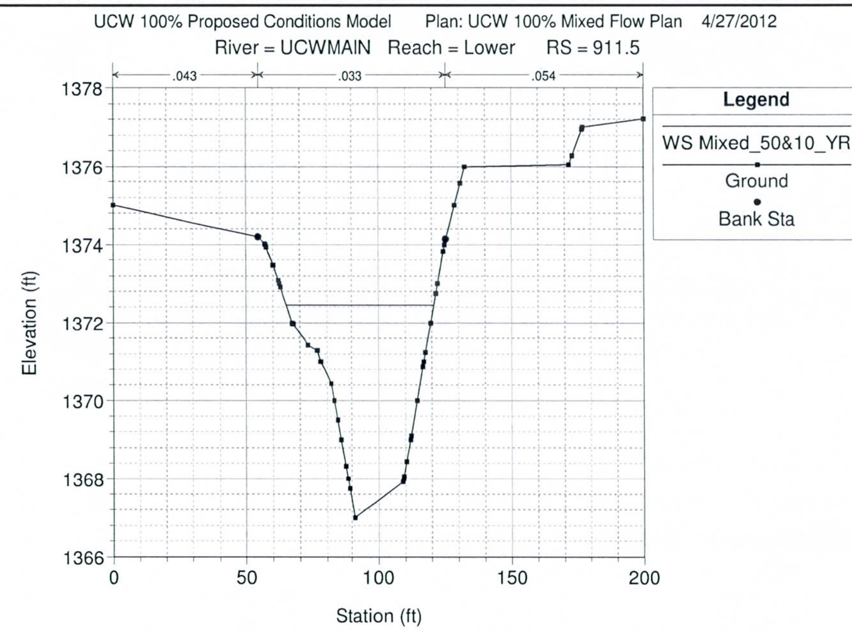

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1211.5
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1378
1376
1374
1372
1370
1368
0
50
100
150
200

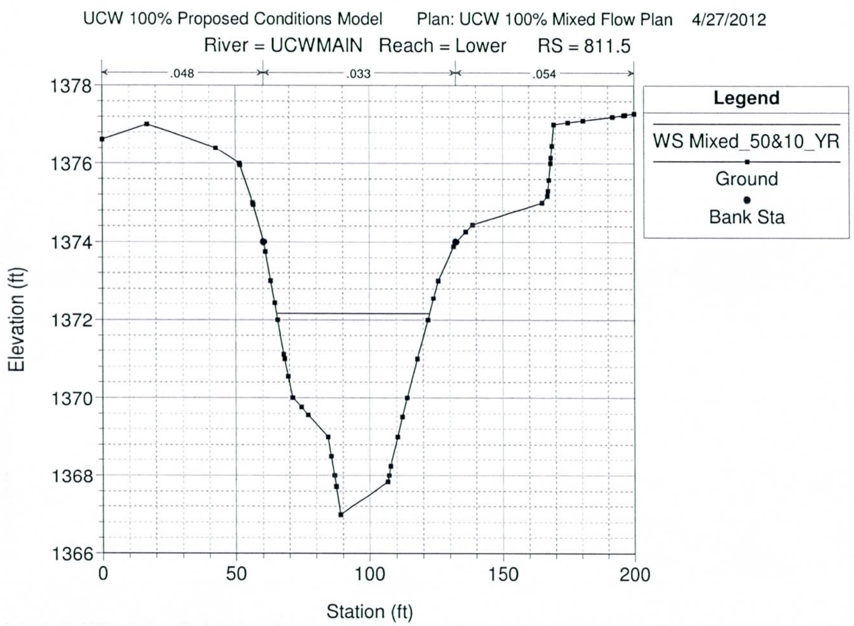

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1136
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1376
1375
1374
1373
1372
1371
1370
1369
1368
40
60
80
100
120
140
160

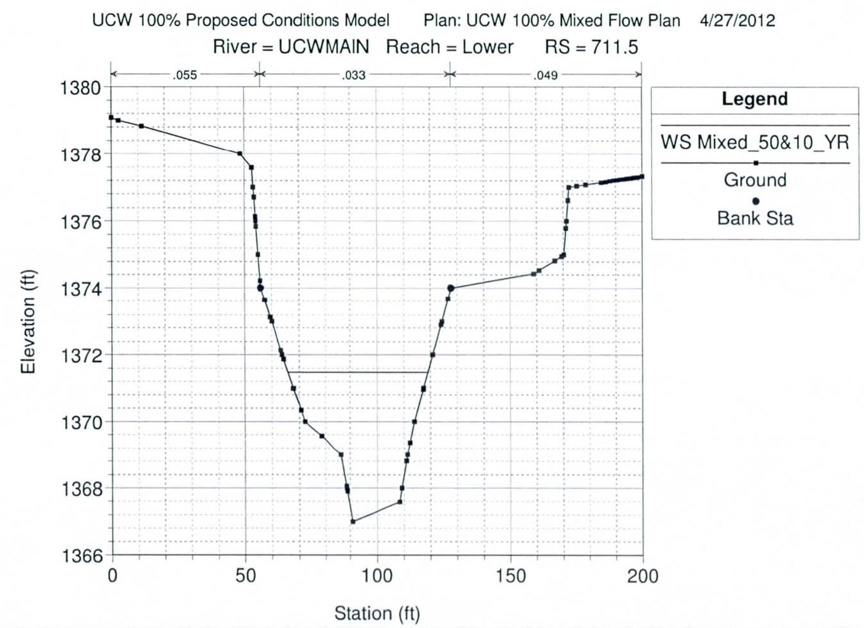

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1072.3 Culv Exisitng 92nd 4-8'x5' St &Underpass Culverts
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1376
1375
1374
1373
1372
1371
1370
1369
1368
40
60
80
100
120
140
160

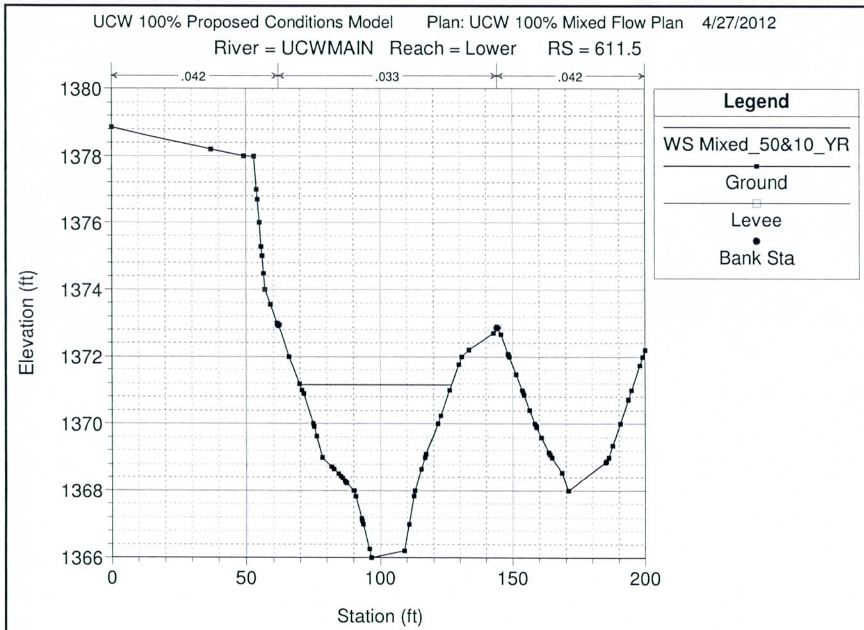

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1072.3 Culv Exisitng 92nd 4-8'x5' St &Underpass Culverts
.037
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1376
1374
1372
1370
1368
1366
0
50
100
150
200

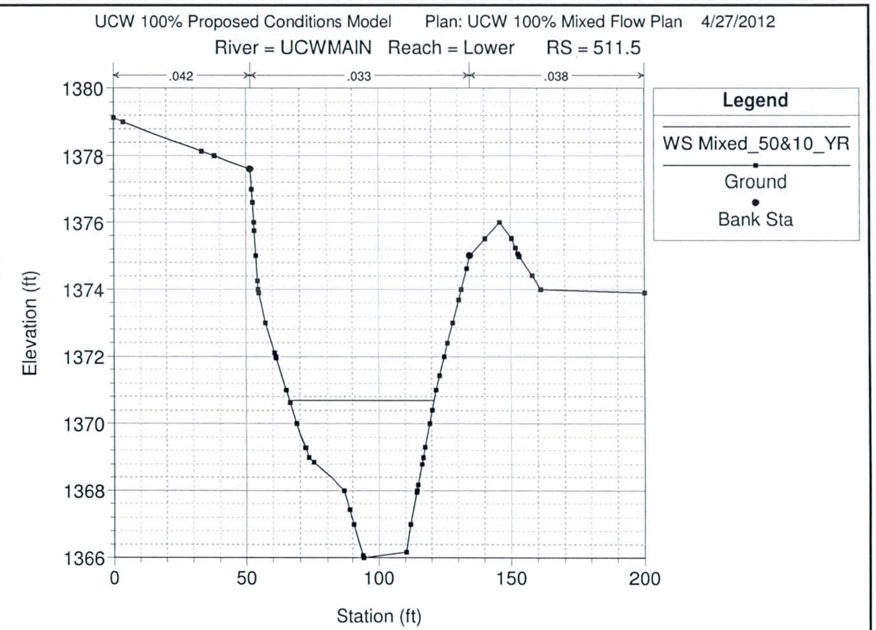

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 1011.5
.037
.013
.042
Elevation (ft)
1376
1374
1372
1370
1368
1366
0
50
100
150
200
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

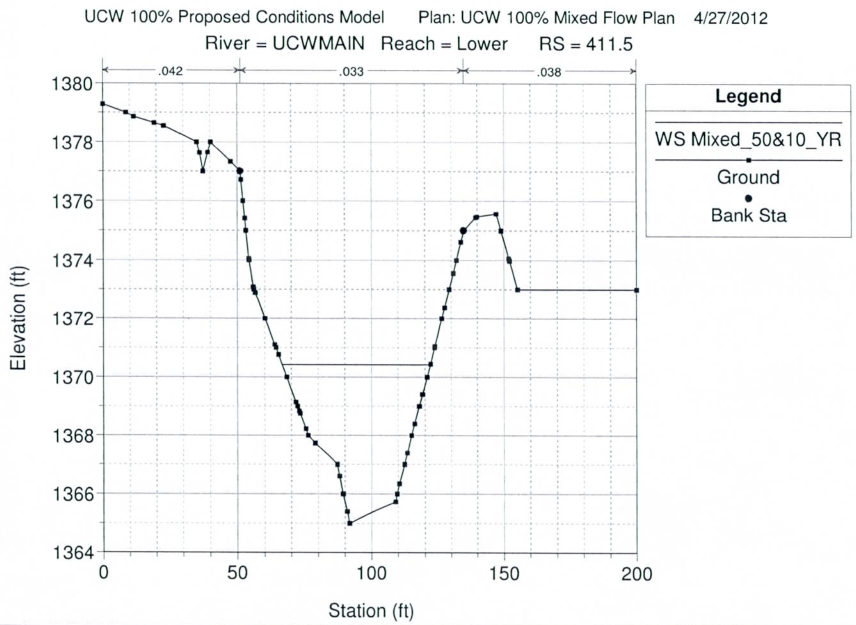

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 911.5
.043
.033
.054
Elevation (ft)
1378
1376
1374
1372
1370
1368
1366
0
50
100
150
200
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

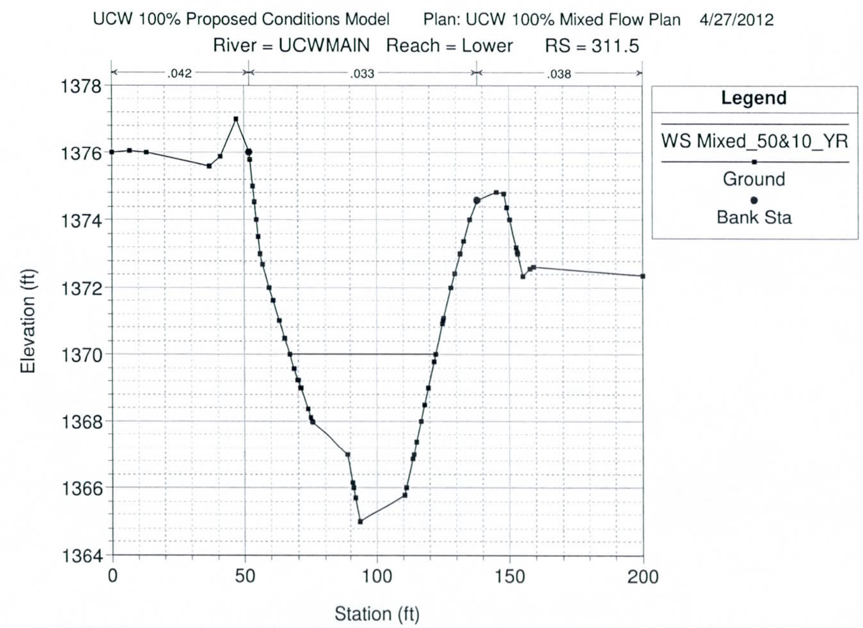

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 811.5
.048
.033
.054
Elevation (ft)
1378
1376
1374
1372
1370
1368
1366
0
50
100
150
200
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

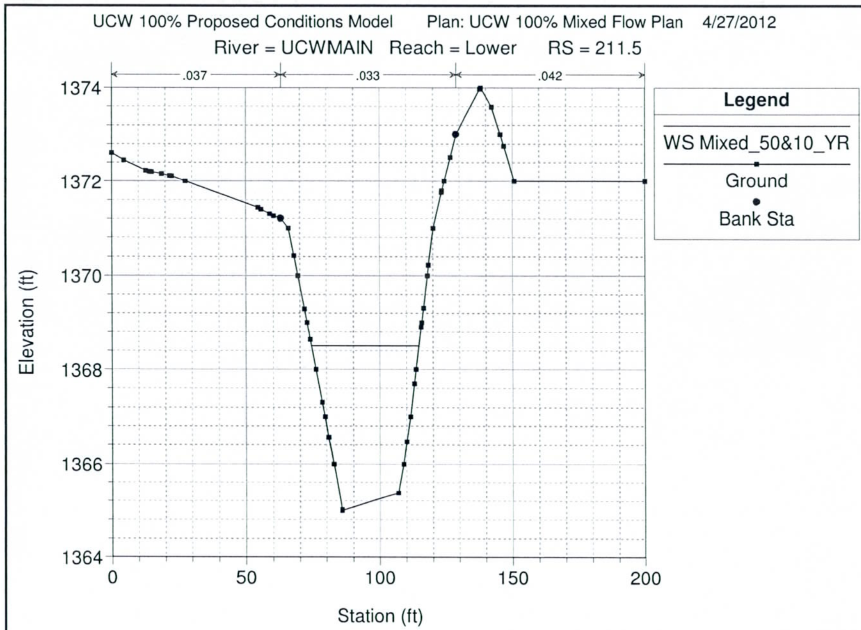

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 711.5
.055
.033
.049
Elevation (ft)
1380
1378
1376
1374
1372
1370
1368
1366
0
50
100
150
200
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

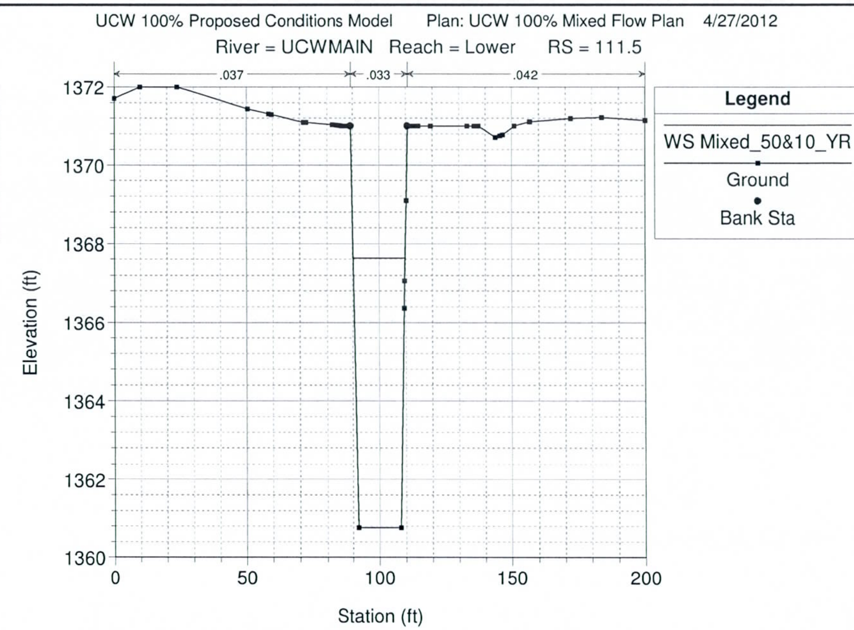

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 611.5
.042
.033
.042
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta

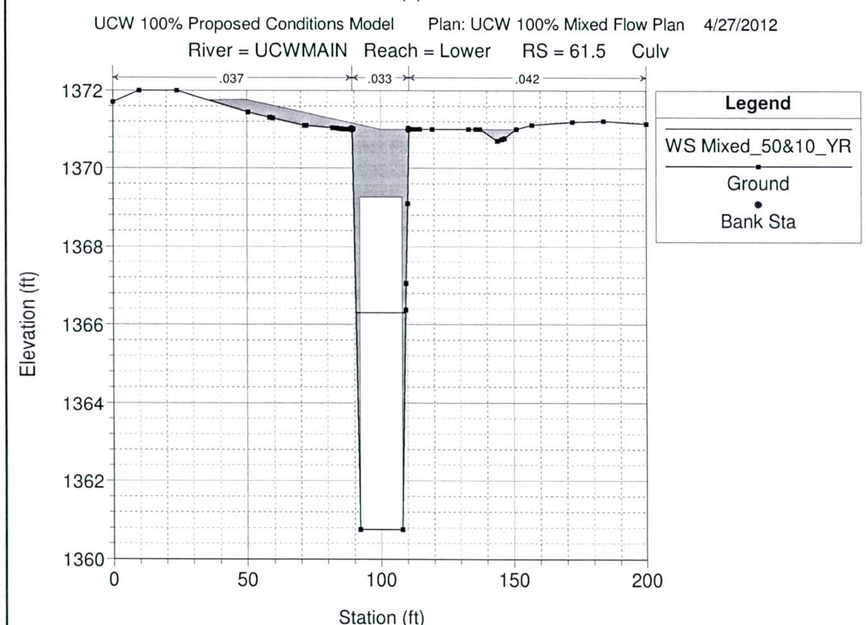

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 511.5
.042
.033
.038
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

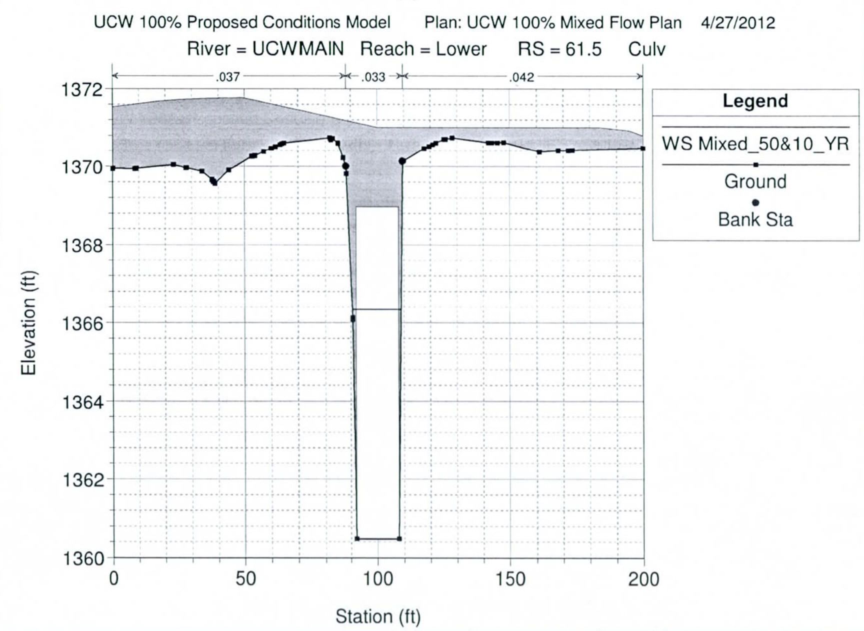

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 411.5
.042
.033
.038
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

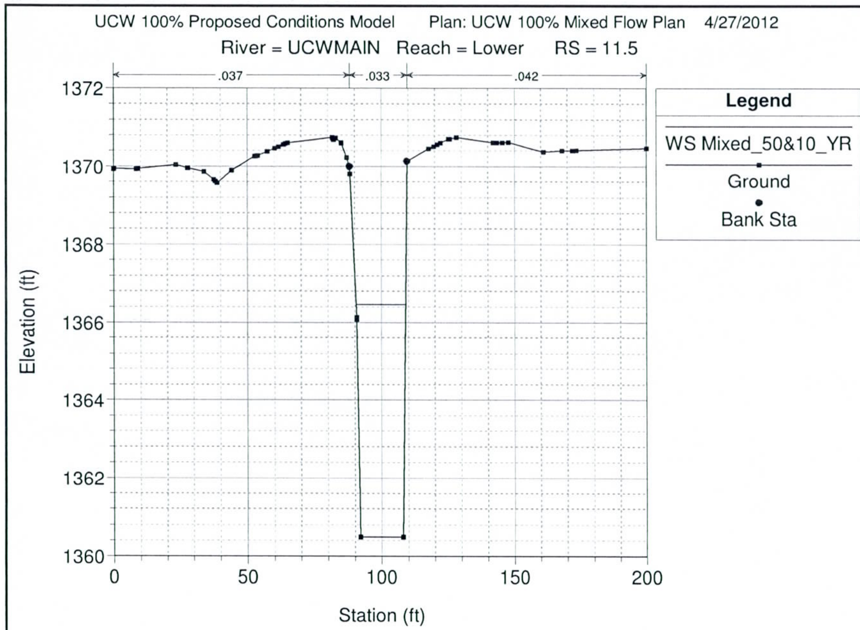

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 311.5
.042
.033
.038
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

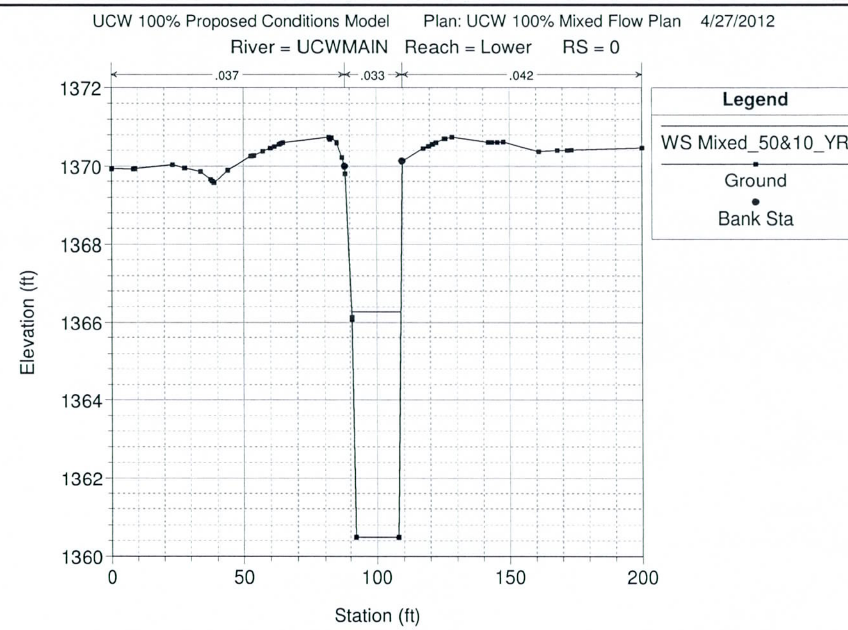

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 211.5
.037
.033
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1374
1372
1370
1368
1366
1364
0
50
100
150
200
Station (ft)

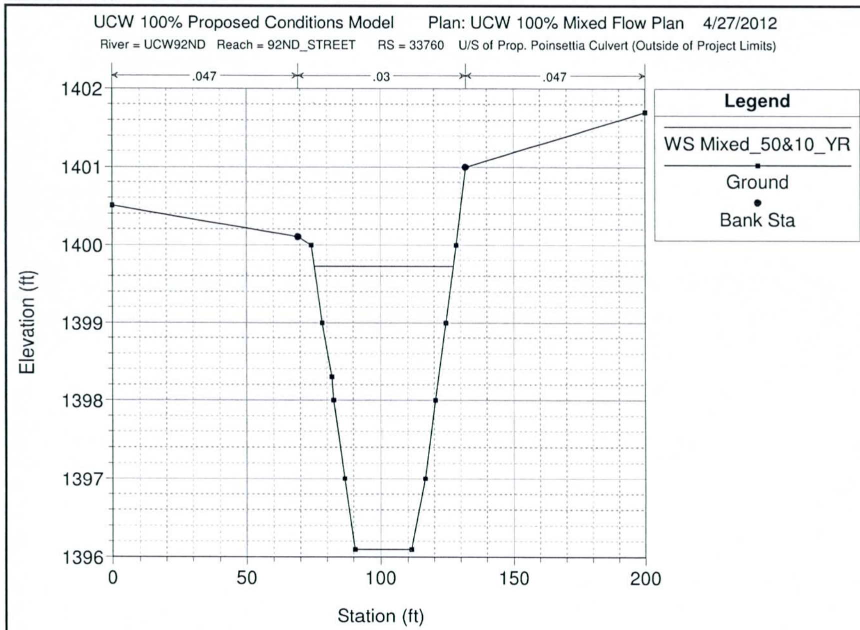

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 111.5
.037
.033
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1372
1370
1368
1366
1364
1362
1360
0
50
100
150
200
Station (ft)

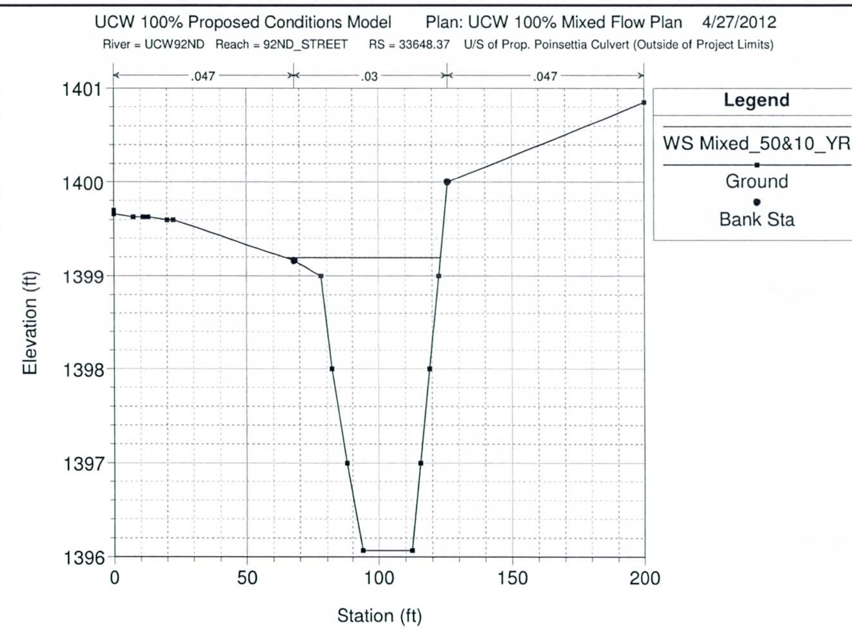

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 61.5 Culv
.037
.033
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1372
1370
1368
1366
1364
1362
1360
0
50
100
150
200
Station (ft)

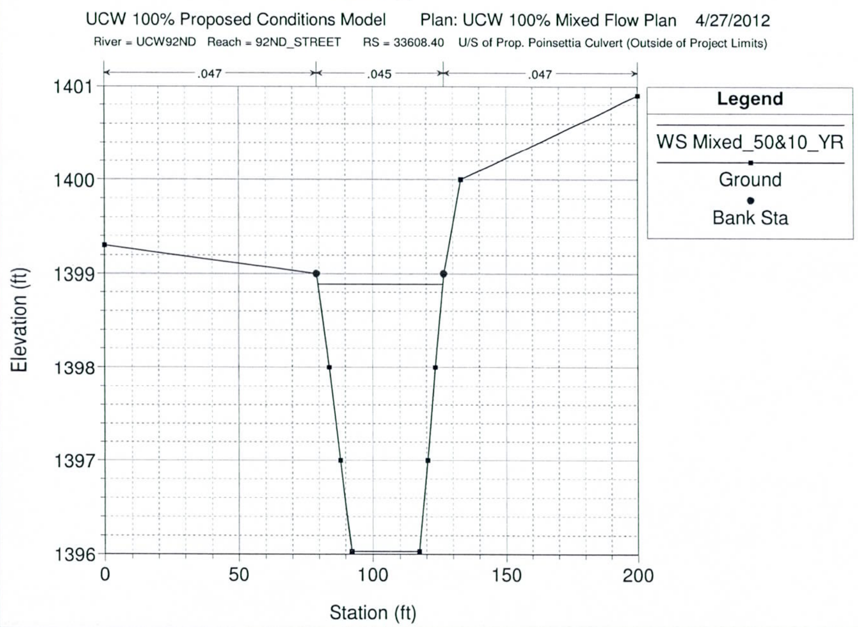

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 61.5 Culv
.037
.033
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1372
1370
1368
1366
1364
1362
1360
0
50
100
150
200
Station (ft)

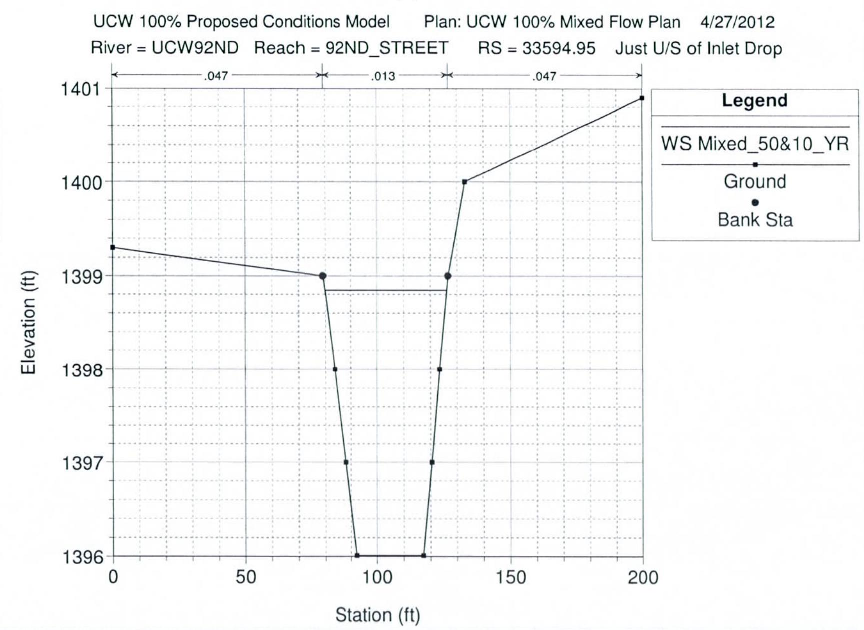

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 11.5
.037
.033
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1372
1370
1368
1366
1364
1362
1360
0
50
100
150
200
Station (ft)

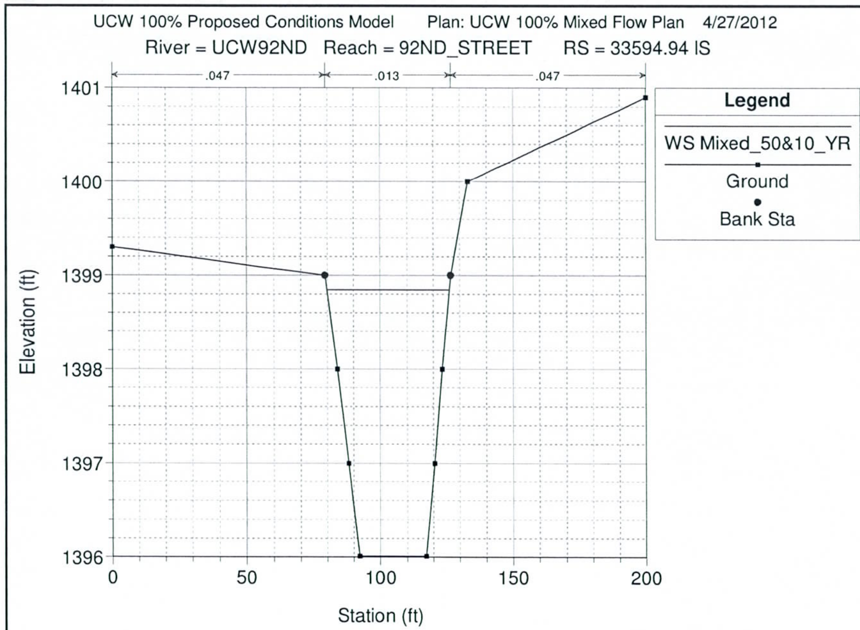

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCWMAIN Reach = Lower RS = 0
.037
.033
.042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1372
1370
1368
1366
1364
1362
1360
0
50
100
150
200
Station (ft)

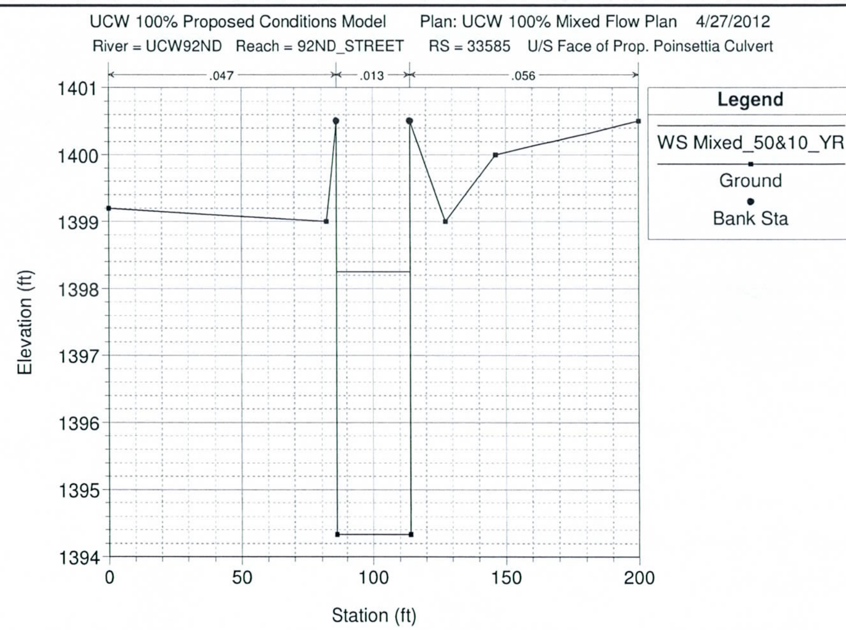

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33760 U/S of Prop. Poinsettia Culvert (Outside of Project Limits)
.047
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

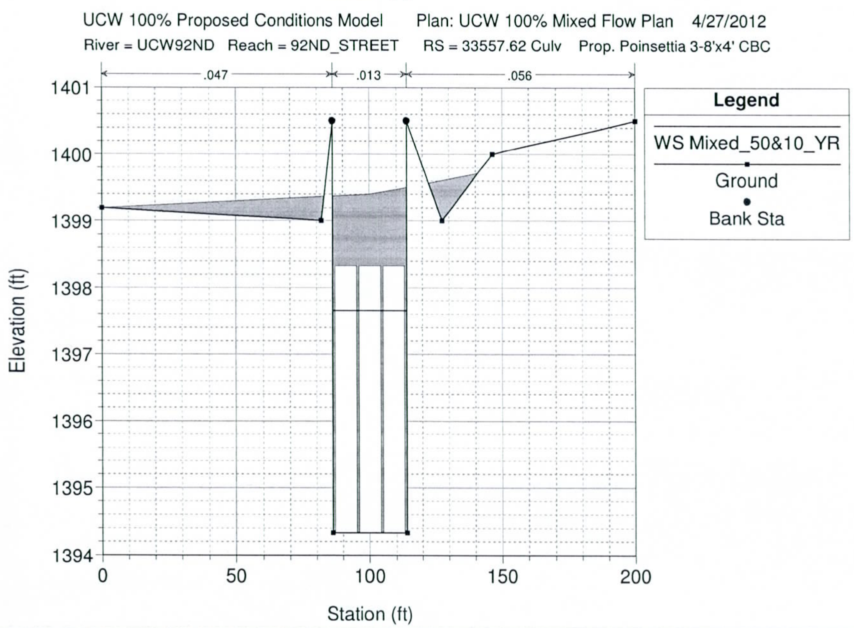

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33648.37 U/S of Prop. Poinsettia Culvert (Outside of Project Limits)
.047
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

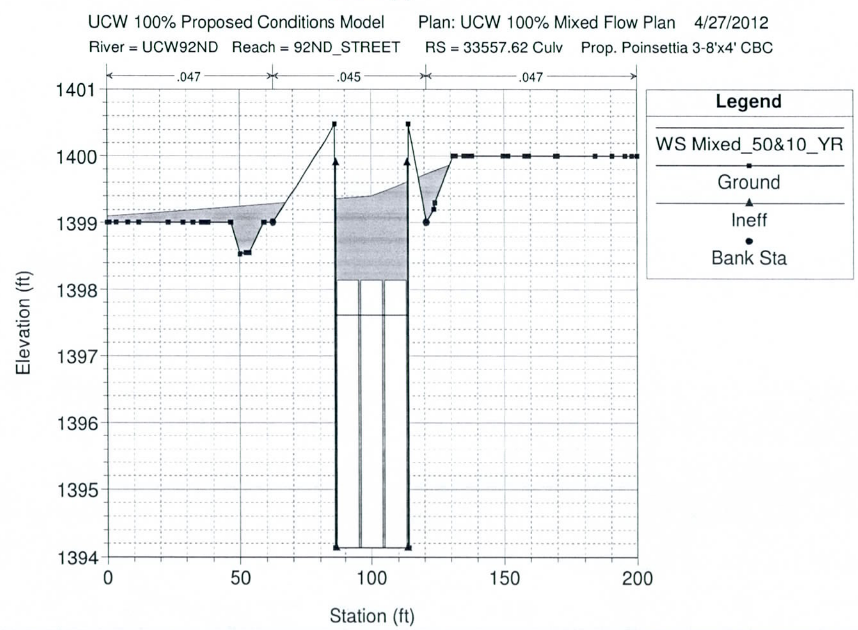

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33608.40 U/S of Prop. Poinsettia Culvert (Outside of Project Limits)
.047
.045
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33594.95 Just U/S of Inlet Drop
.047
.013
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

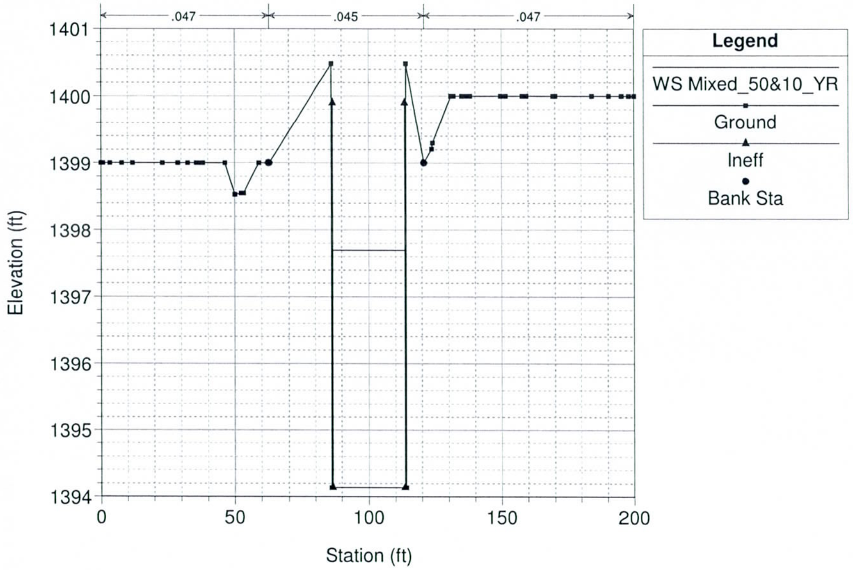

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33594.94 IS
.047
.013
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1401
1400
1399
1398
1397
1396
0
50
100
150
200
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33585 U/S Face of Prop. Poinsettia Culvert
.047
.013
.056
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1401
1400
1399
1398
1397
1396
1395
1394
0
50
100
150
200
Station (ft)

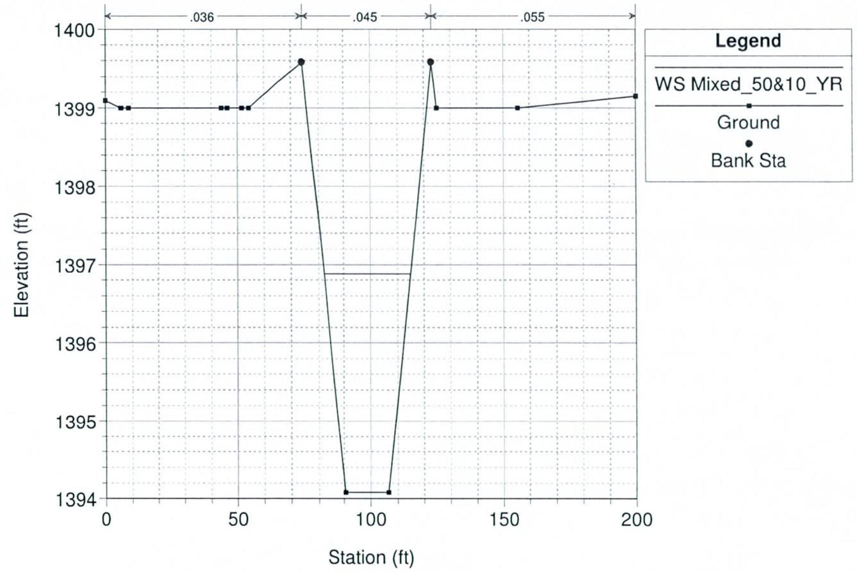

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33557.62 Culv Prop. Poinsettia 3-8'x4' CBC
.047
.013
.056
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1401
1400
1399
1398
1397
1396
1395
1394
0
50
100
150
200
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33557.62 Culv Prop. Poinsettia 3-8'x4' CBC
.047
.045
.047
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
1401
1400
1399
1398
1397
1396
1395
1394
0
50
100
150
200
Station (ft)

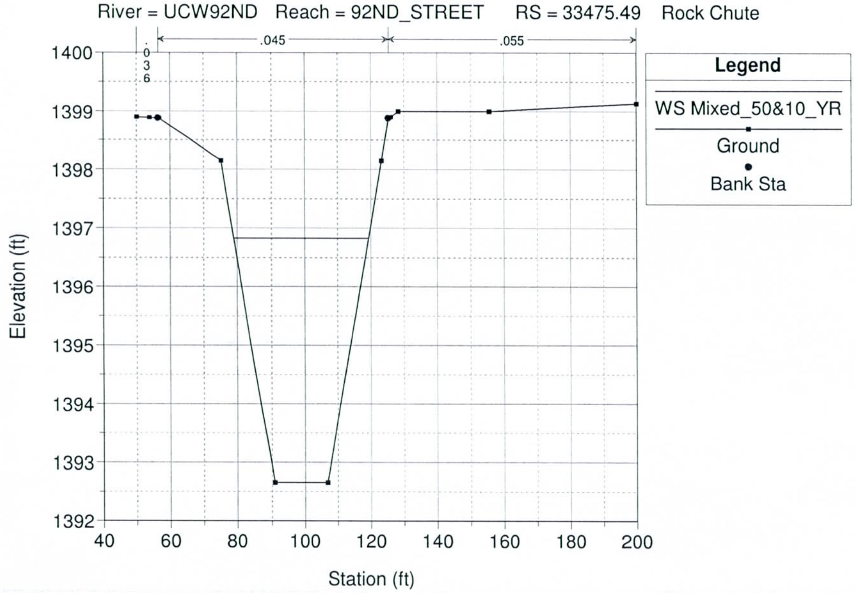
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33517 D/S face of Prop. Poinsettia Culvert



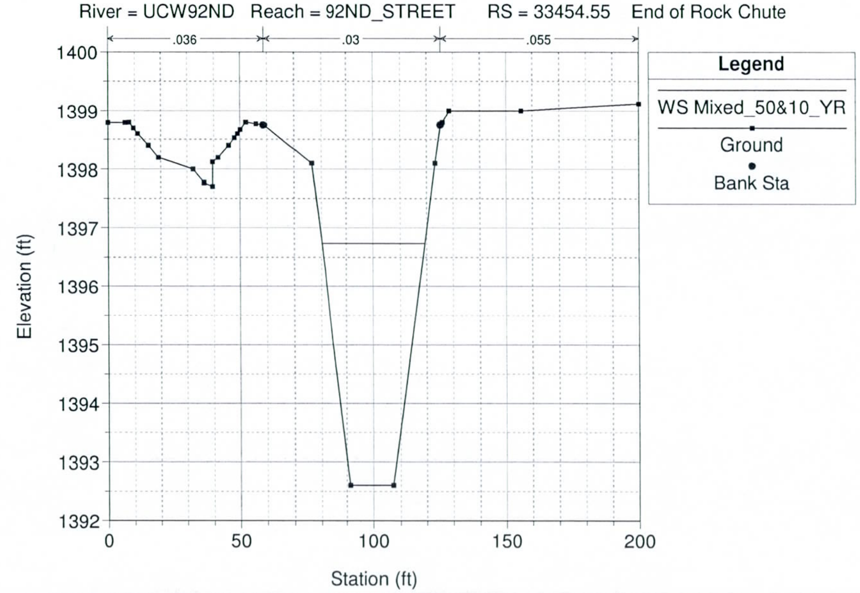
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33493.59 Rock Chute

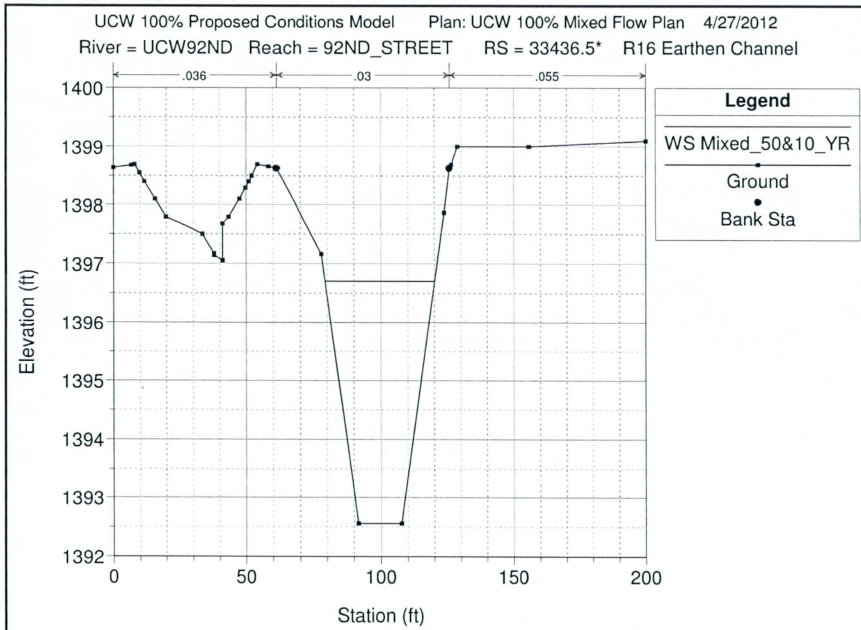


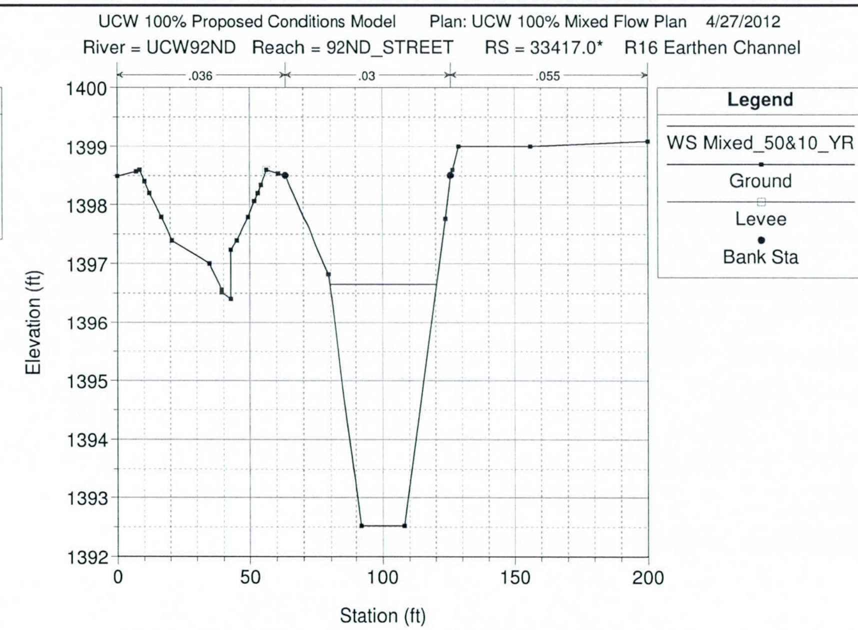
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33475.49 Rock Chute

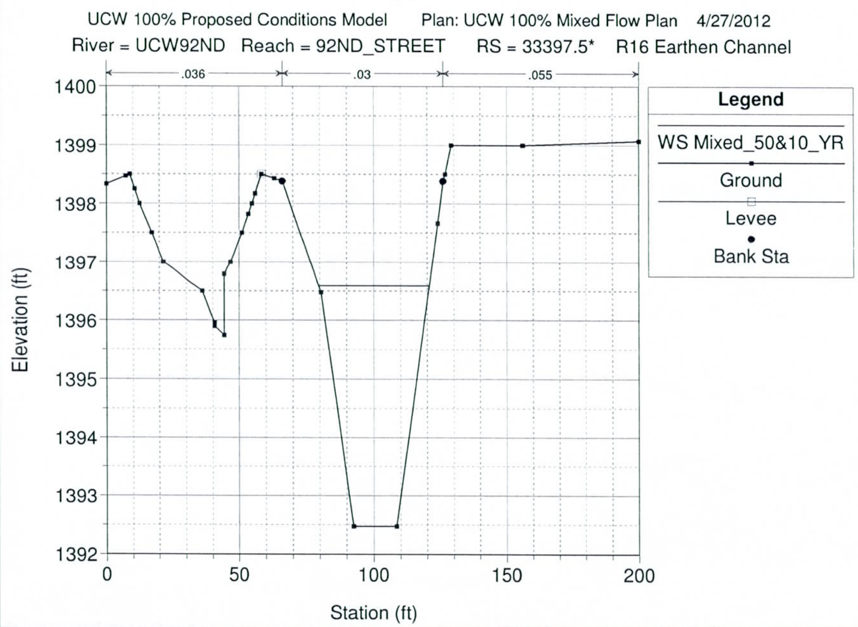


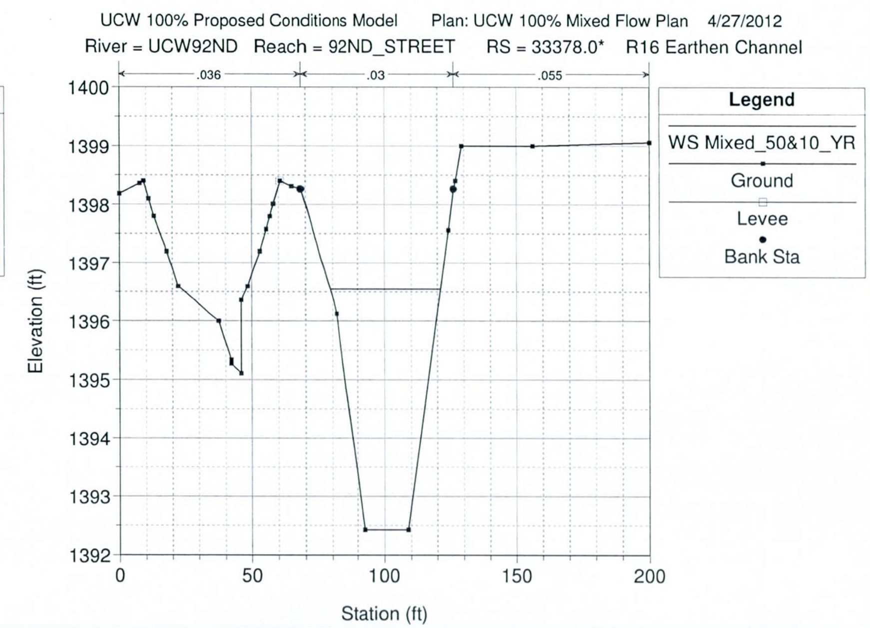
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33454.55 End of Rock Chute

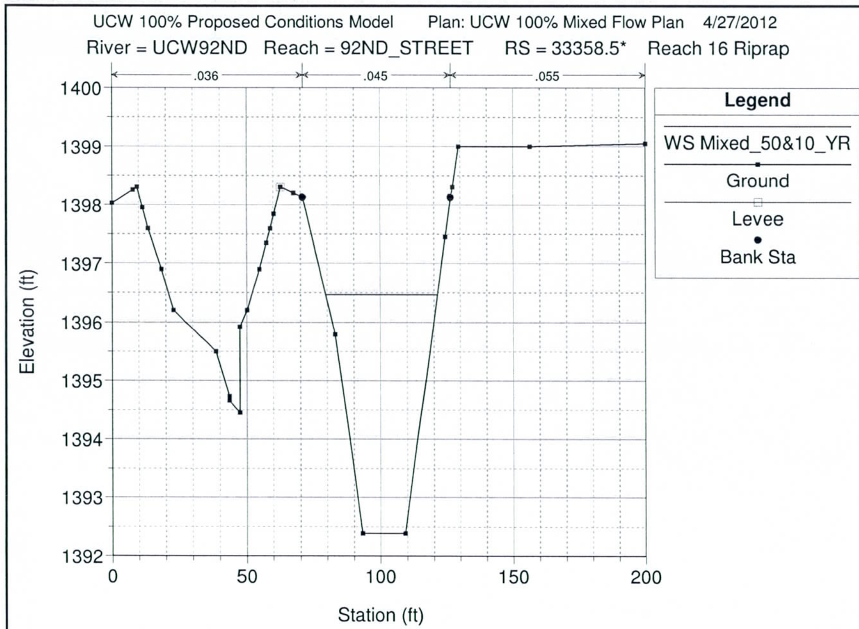


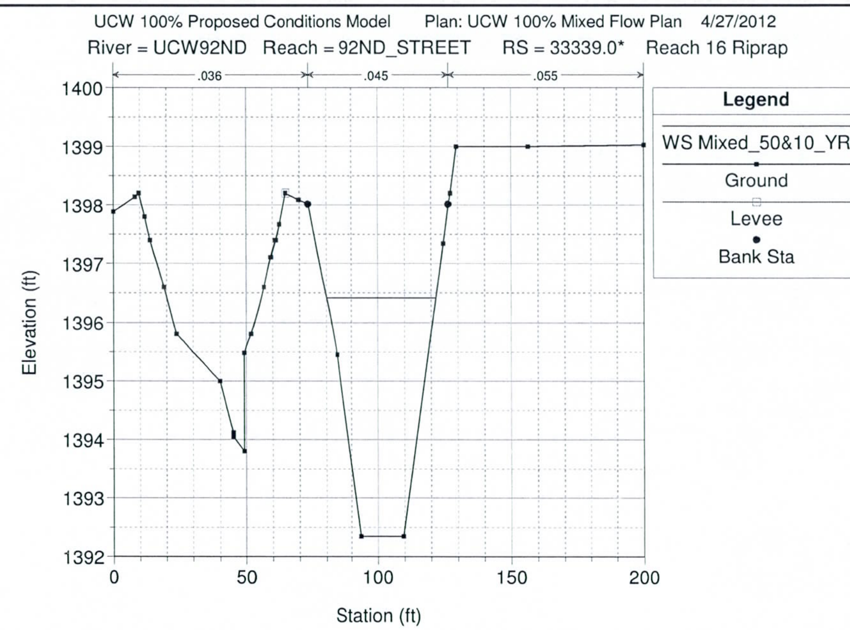

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33436.5* R16 Earthen Channel
.036
.03
.055
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

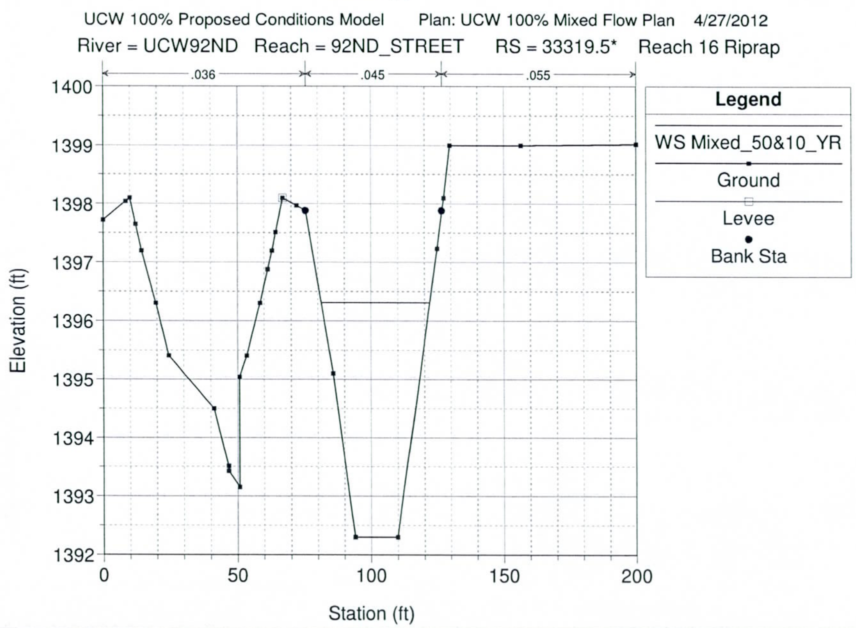

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33417.0* R16 Earthen Channel
.036
.03
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

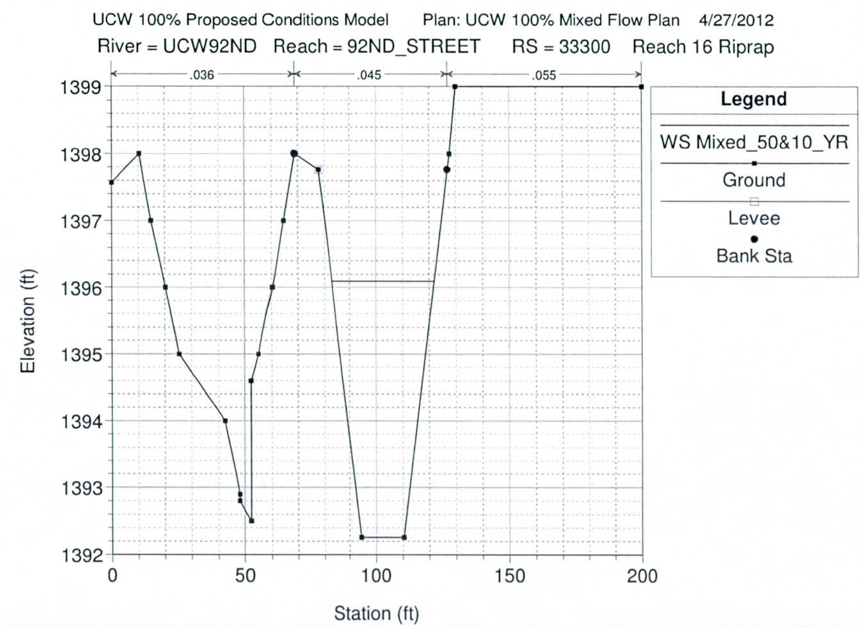

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33397.5* R16 Earthen Channel
.036
.03
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

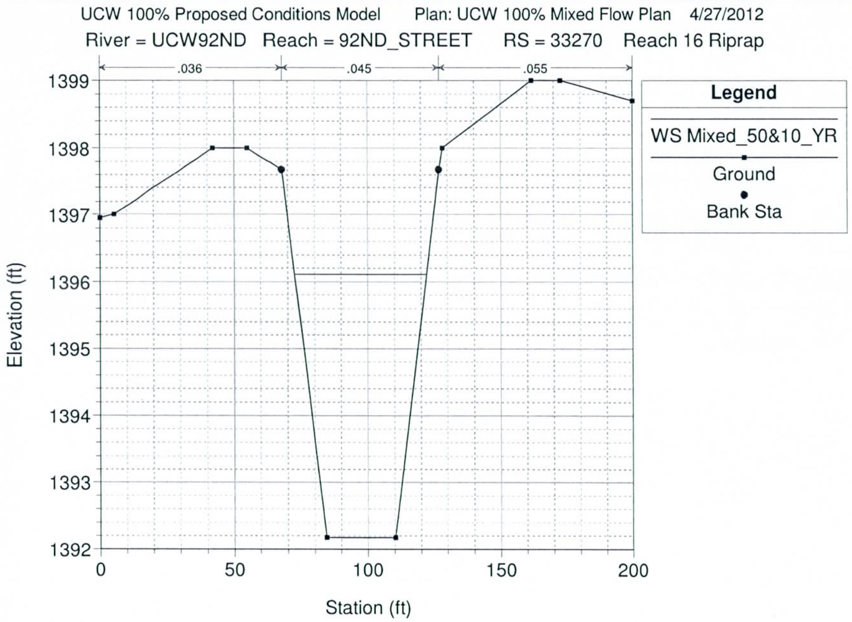

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33378.0* R16 Earthen Channel
.036
.03
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

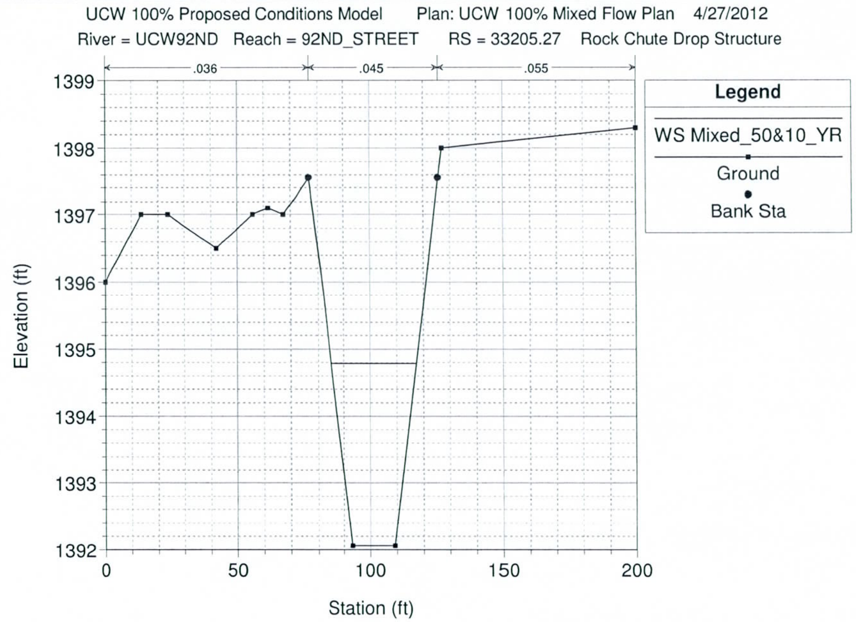

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33358.5* Reach 16 Riprap
.036
.045
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

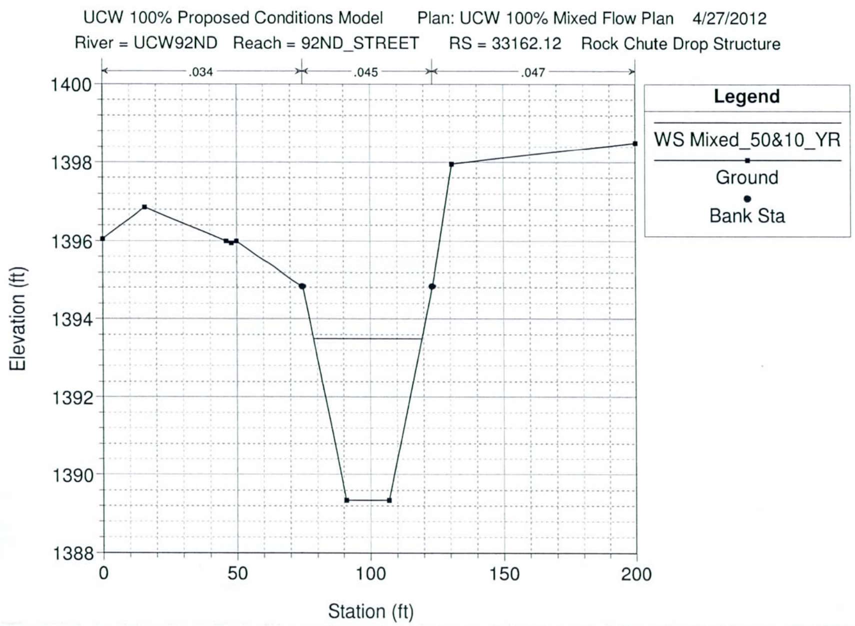

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33339.0* Reach 16 Riprap
.036
.045
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

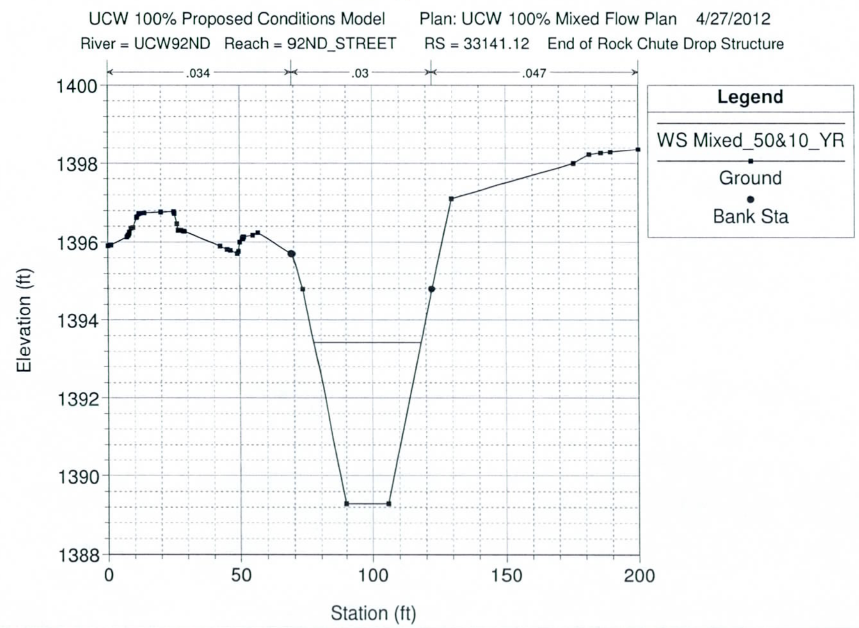

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33319.5* Reach 16 Riprap
.036
.045
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

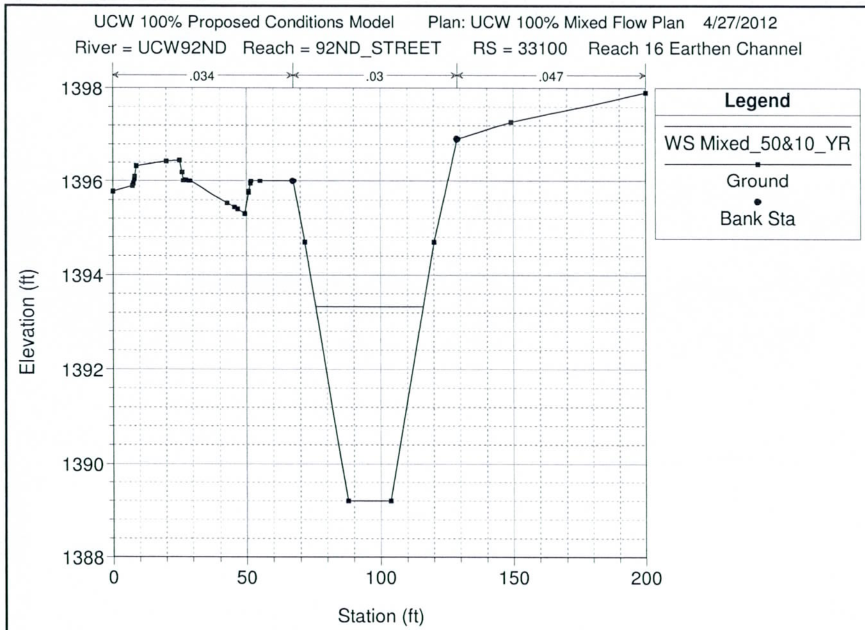

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33300 Reach 16 Riprap
.036
.045
.055
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

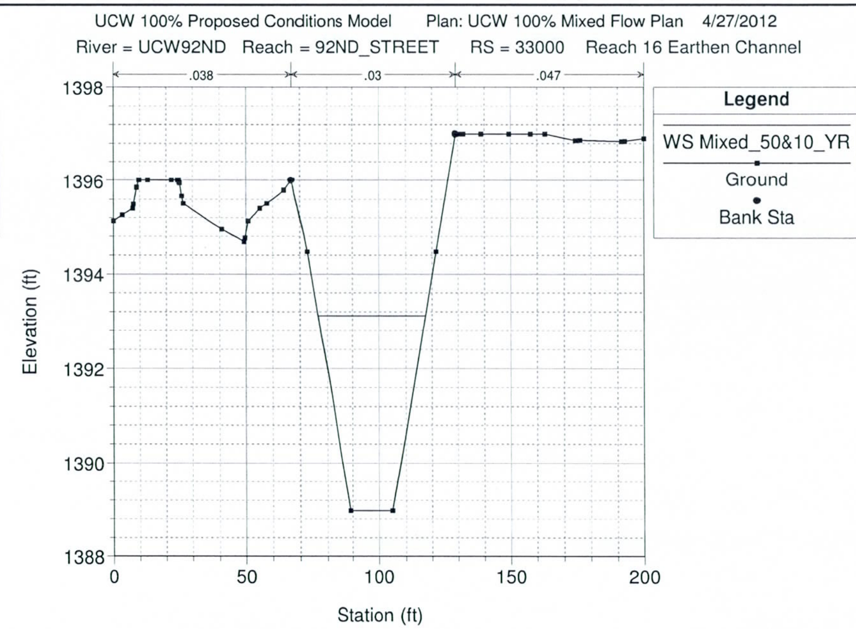

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33270 Reach 16 Riprap
.036
.045
.055
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

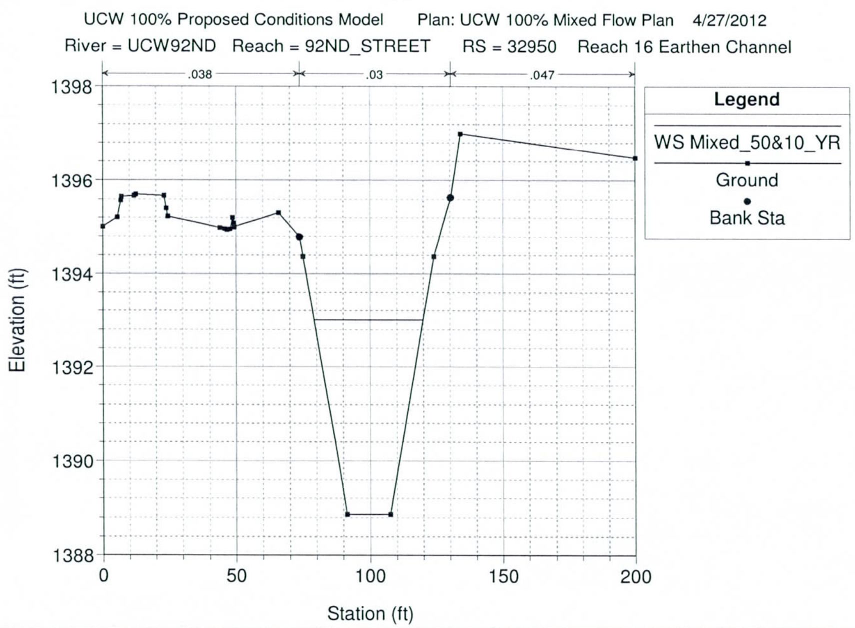

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33205.27 Rock Chute Drop Structure
.036
.045
.055
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

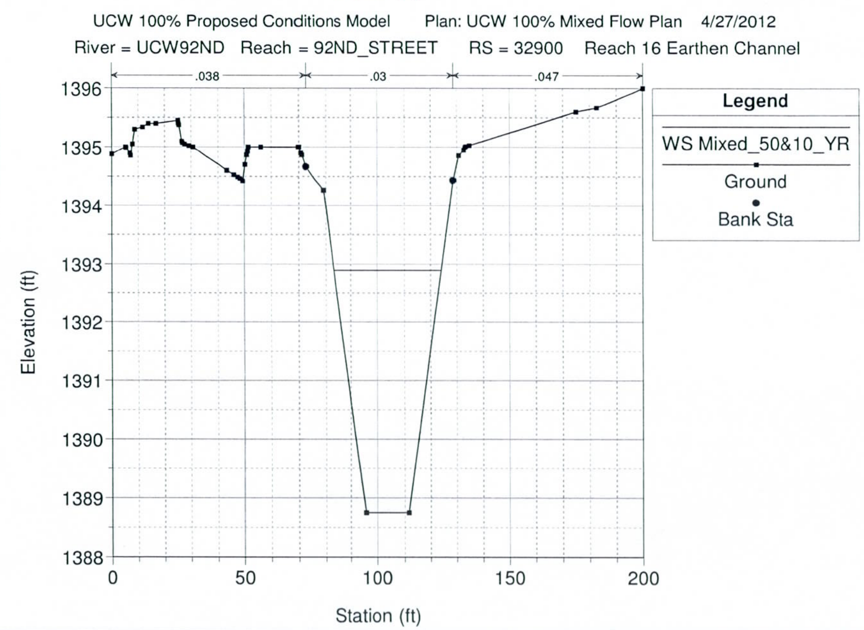

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33162.12 Rock Chute Drop Structure
.034
.045
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

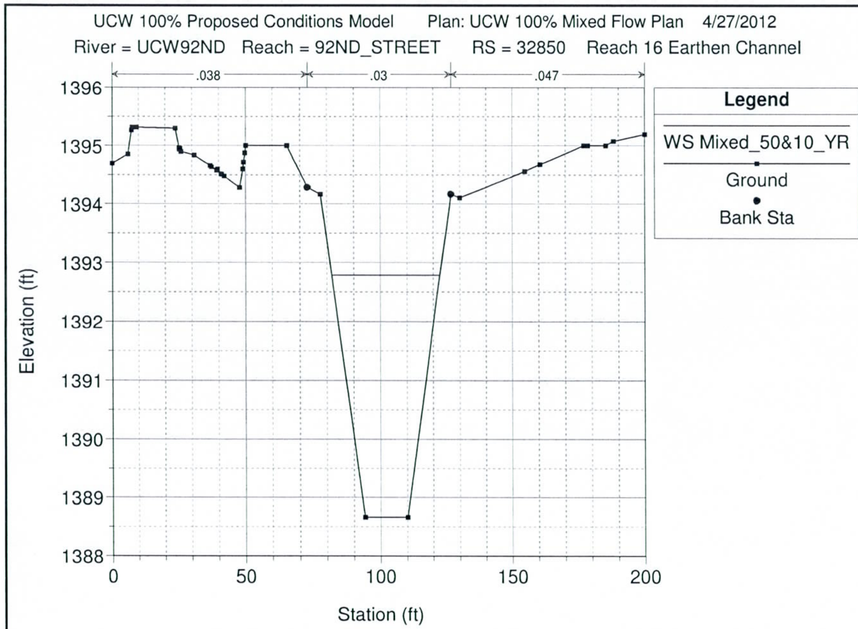

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33141.12 End of Rock Chute Drop Structure
.034
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

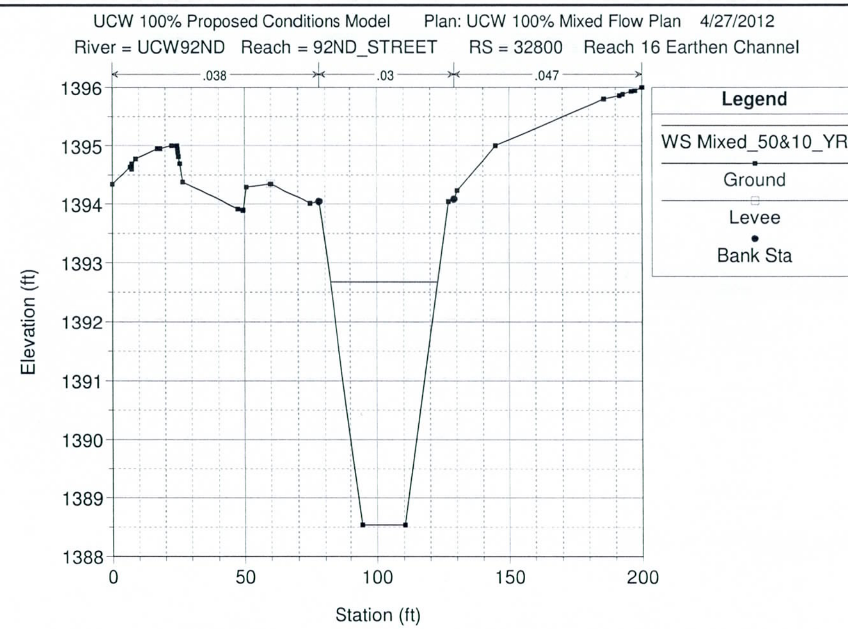

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33100 Reach 16 Earthen Channel
.034
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

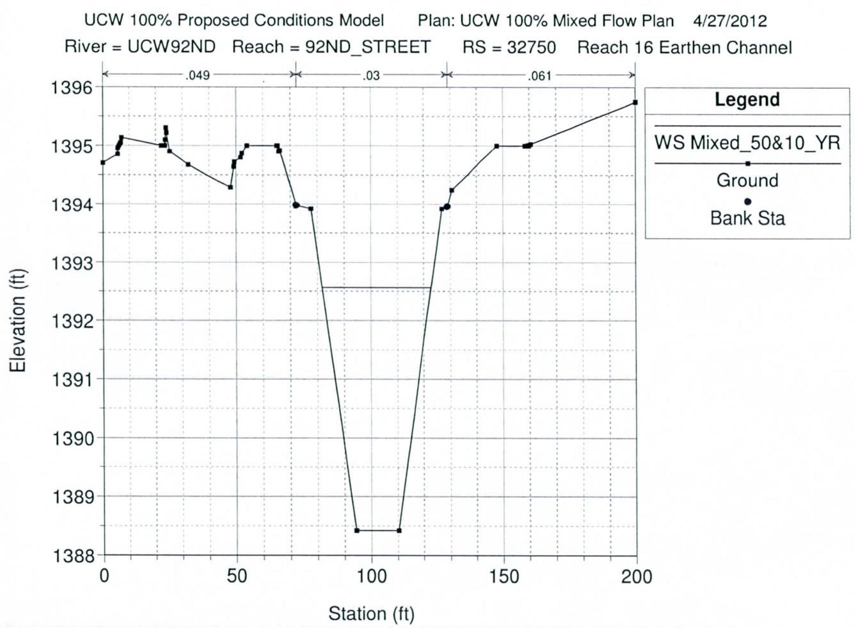

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 33000 Reach 16 Earthen Channel
.038
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

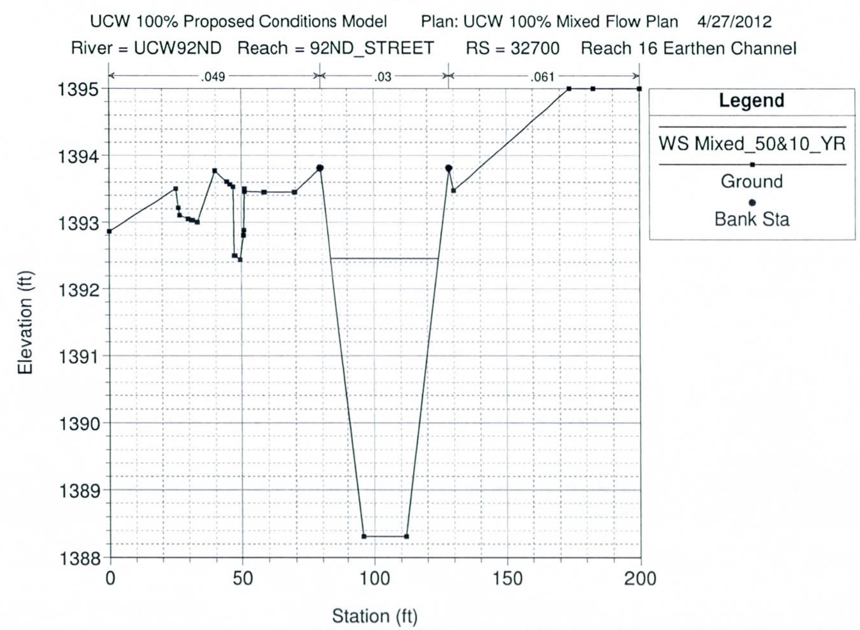

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32950 Reach 16 Earthen Channel
.038
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32900 Reach 16 Earthen Channel
.038
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

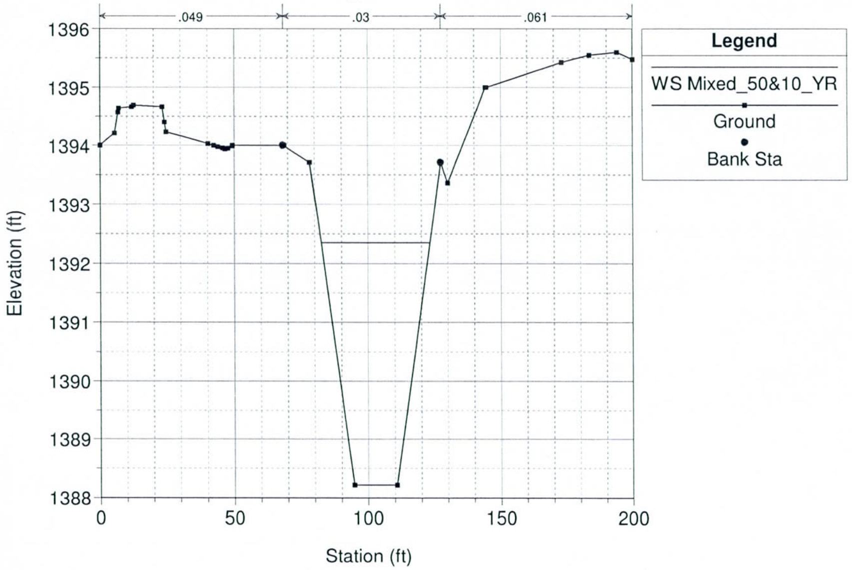

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32850 Reach 16 Earthen Channel
.038
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1388
1389
1390
1391
1392
1393
1394
1395
1396
0
50
100
150
200


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32800 Reach 16 Earthen Channel
.038
.03
.047
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
1388
1389
1390
1391
1392
1393
1394
1395
1396
0
50
100
150
200

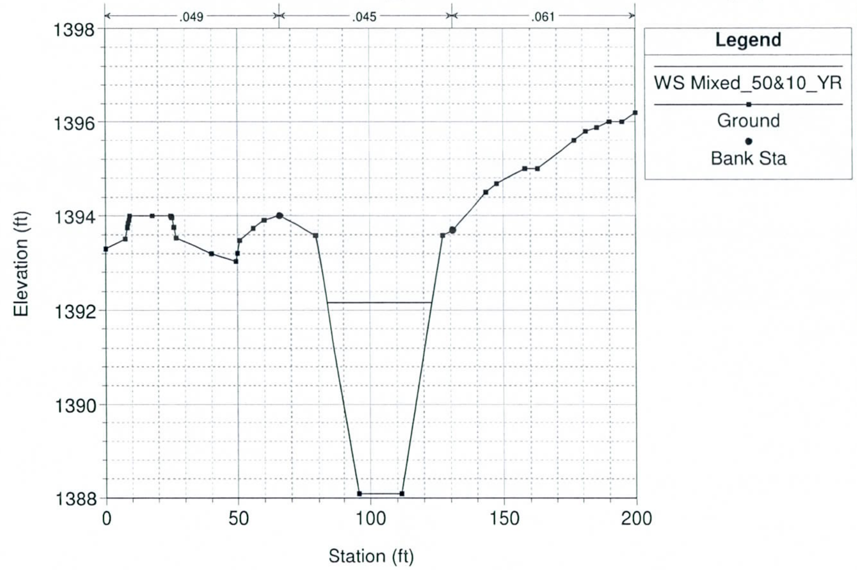

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32750 Reach 16 Earthen Channel
.049
.03
.061
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1388
1389
1390
1391
1392
1393
1394
1395
1396
0
50
100
150
200


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32700 Reach 16 Earthen Channel
.049
.03
.061
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1388
1389
1390
1391
1392
1393
1394
1395
0
50
100
150
200

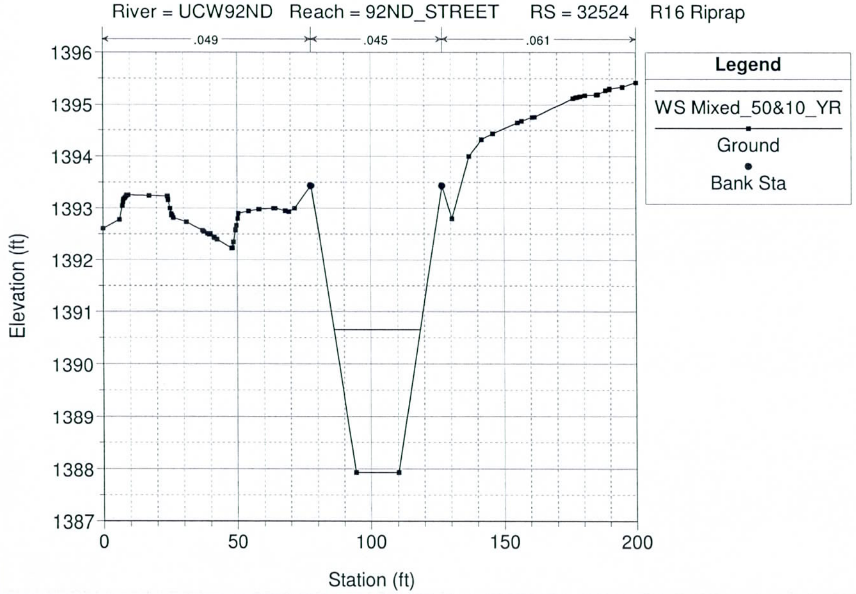
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32650 Reach 16 Earthen Channel



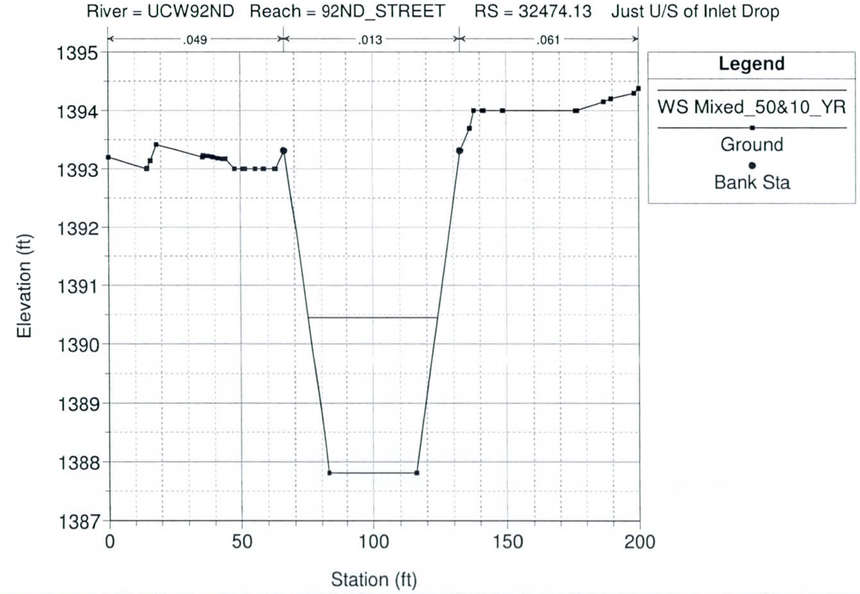
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32600 Reach 16 Riprap

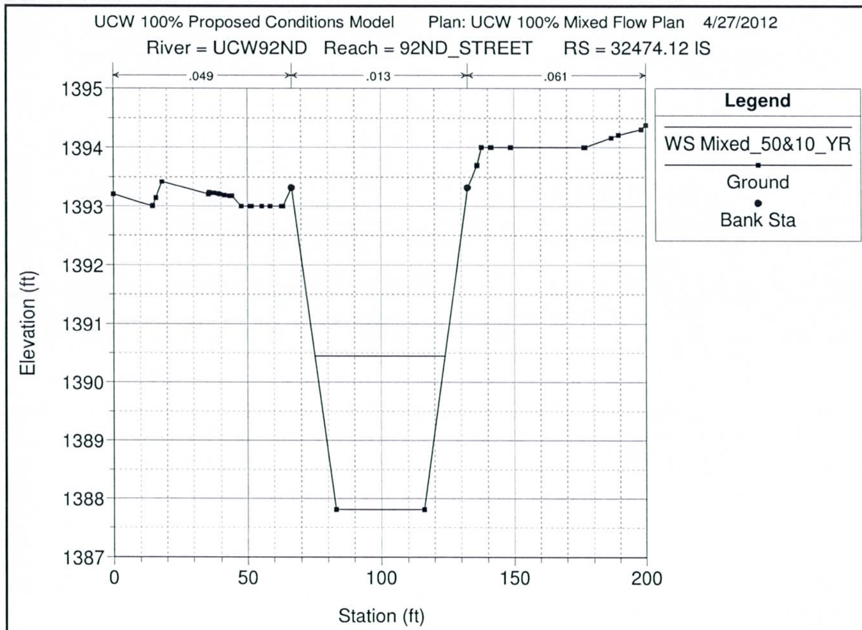


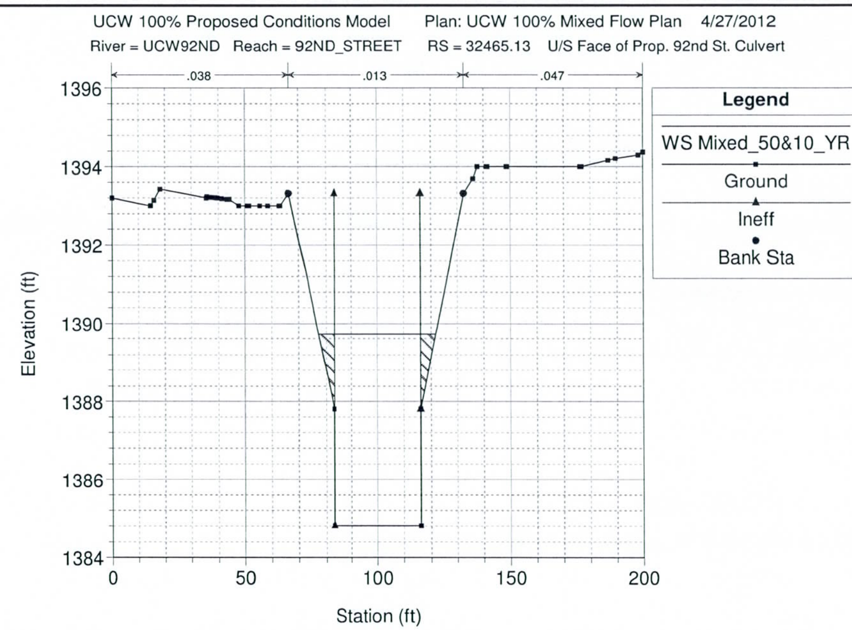
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32524 R16 Riprap

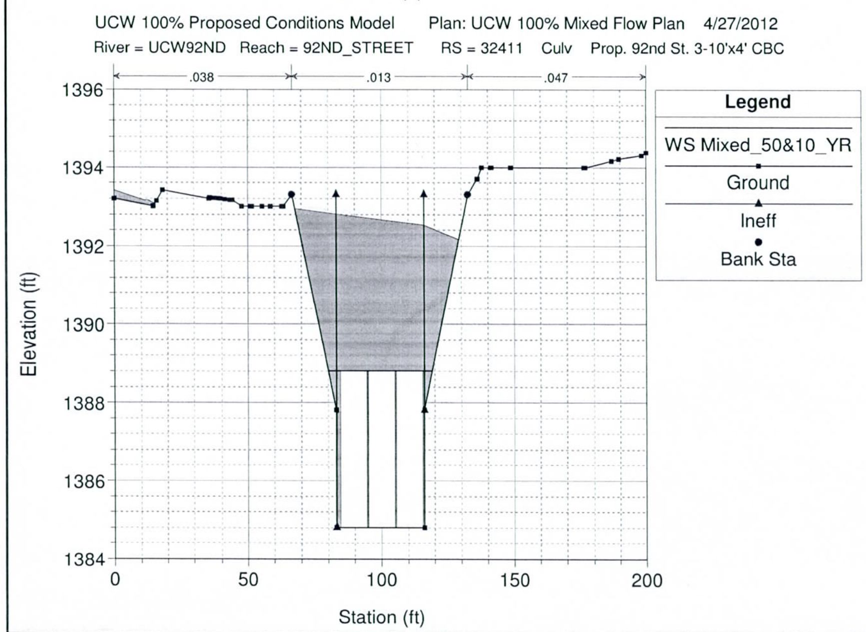


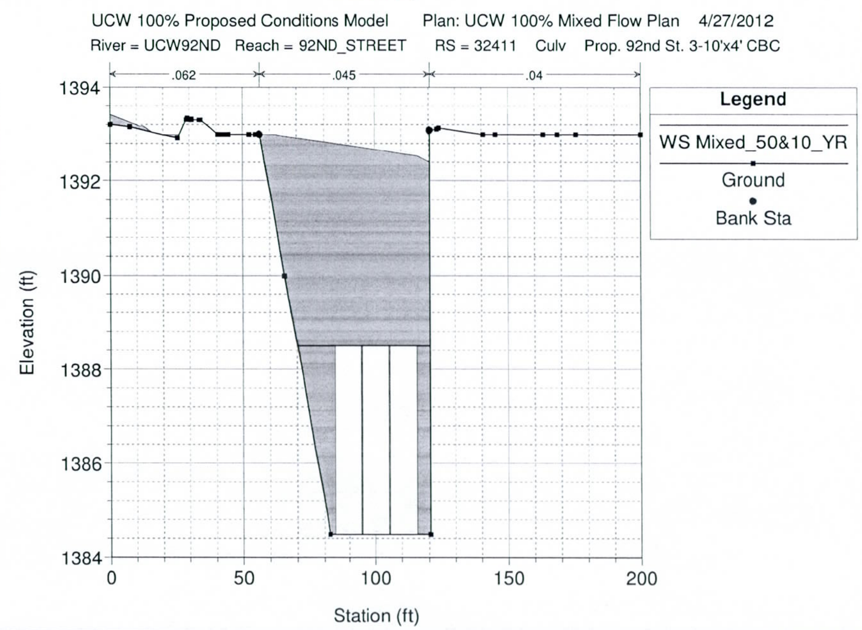
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32474.13 Just U/S of Inlet Drop

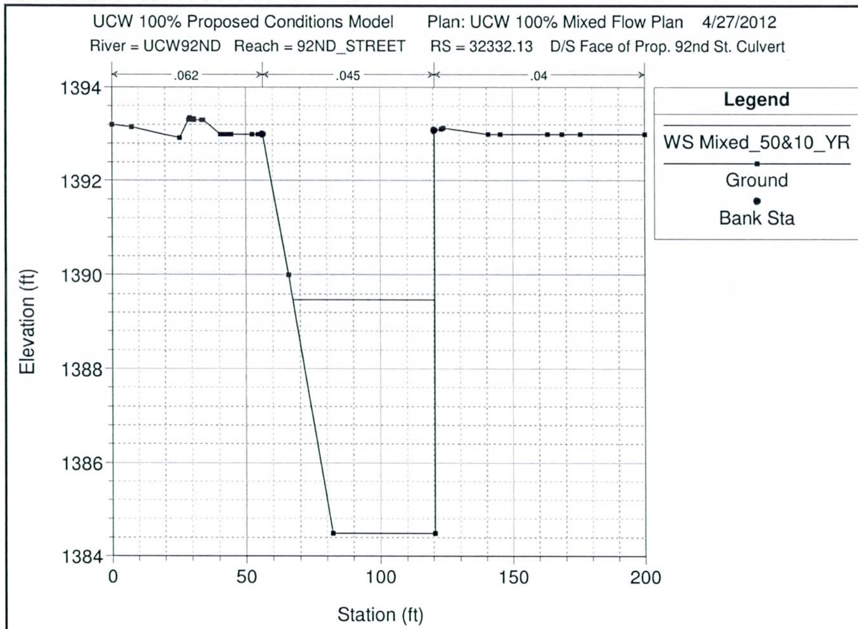


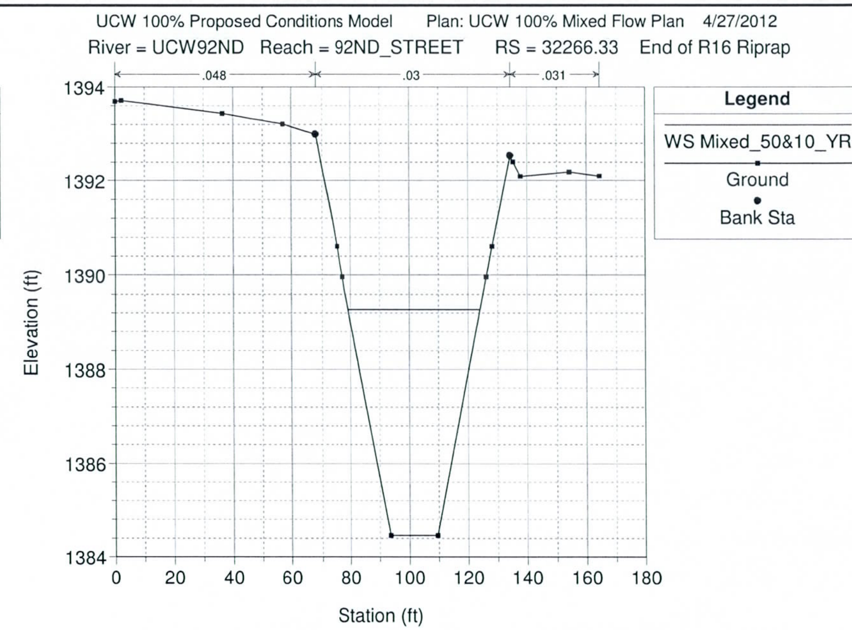

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32474.12 IS
.049
.013
.061
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

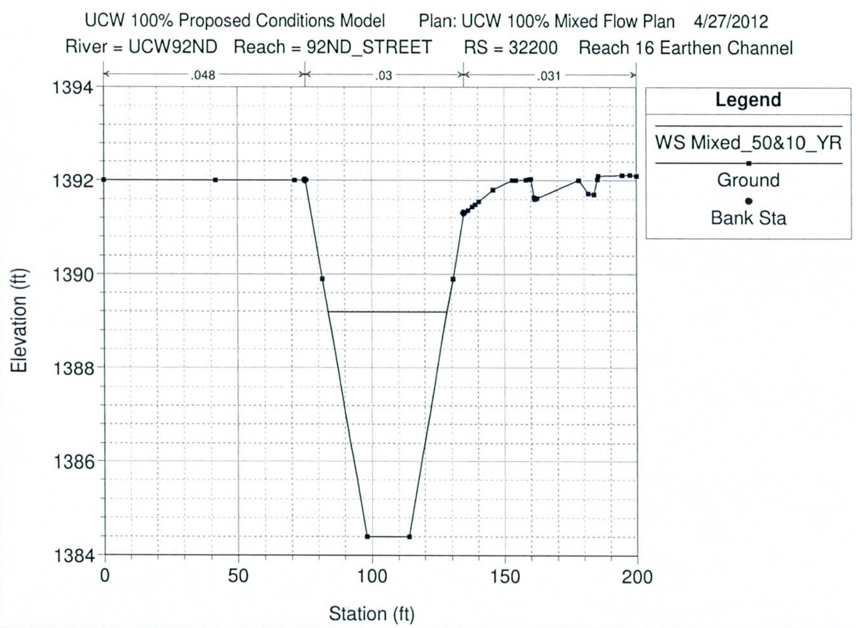

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32465.13 U/S Face of Prop. 92nd St. Culvert
.038
.013
.047
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

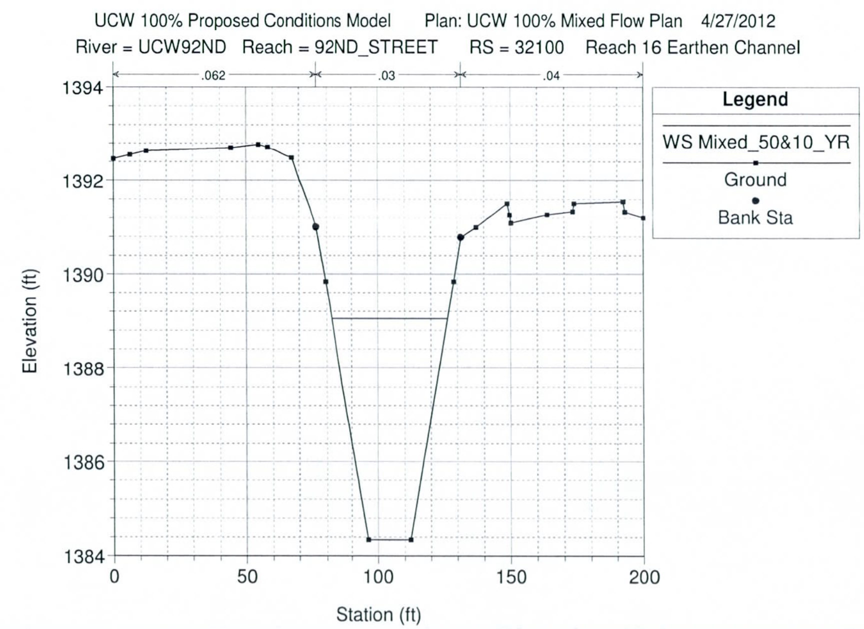

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32411 Culv Prop. 92nd St. 3-10'x4' CBC
.038
.013
.047
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

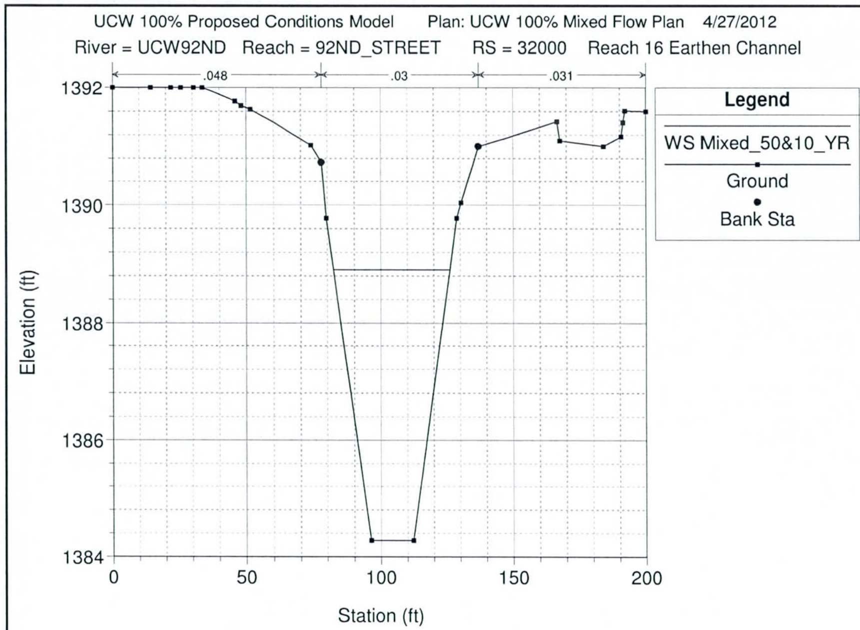

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32411 Culv Prop. 92nd St. 3-10'x4' CBC
.062
.045
.04
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

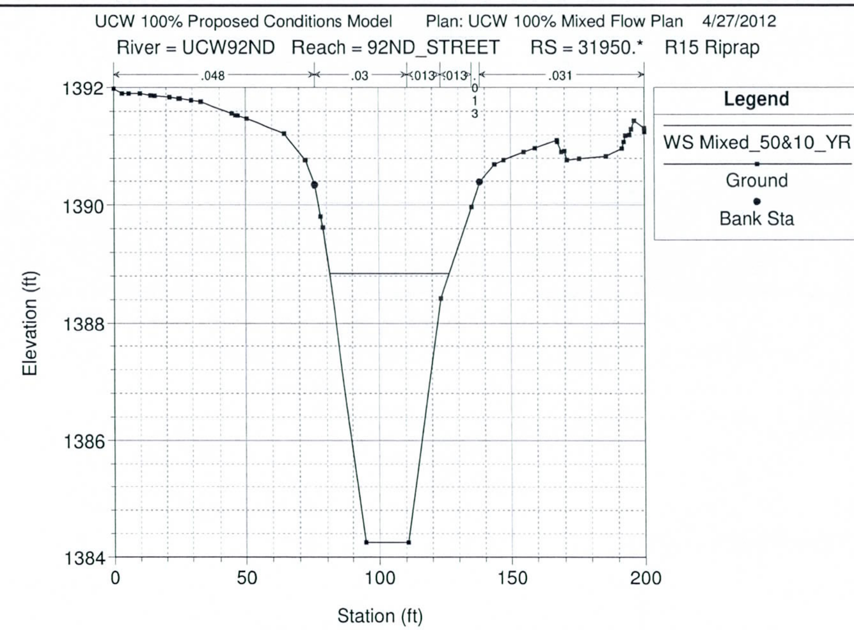

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32332.13 D/S Face of Prop. 92nd St. Culvert
.062
.045
.04
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

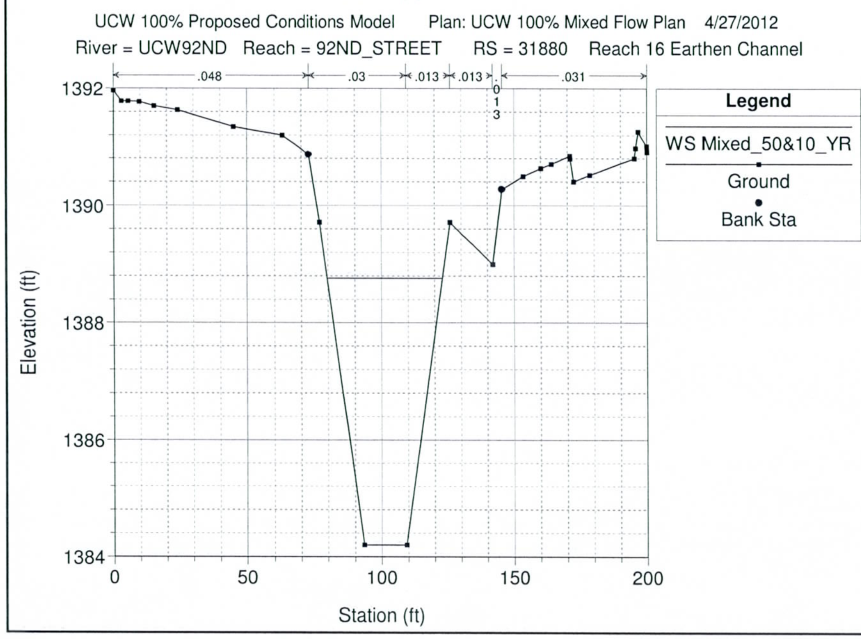

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32266.33 End of R16 Riprap
.048
.03
.031
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

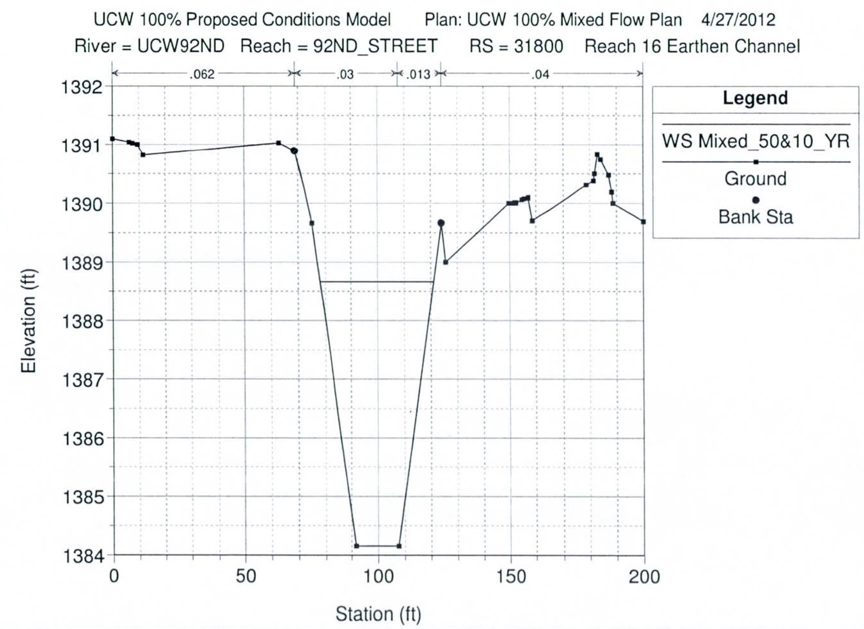

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32200 Reach 16 Earthen Channel
.048
.03
.031
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32100 Reach 16 Earthen Channel
.062
.03
.04
Elevation (ft)
Station (ft)
Legend
WS Mixed_50&10_YR
Ground
Bank Sta

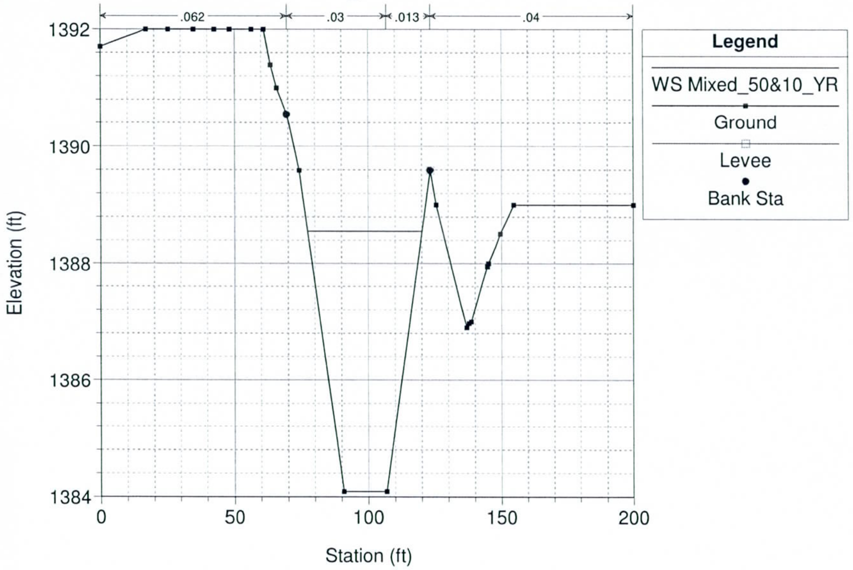

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 32000 Reach 16 Earthen Channel
.048 .03 .031
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31950.* R15 Riprap
.048 .03 .013 .013 .031
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

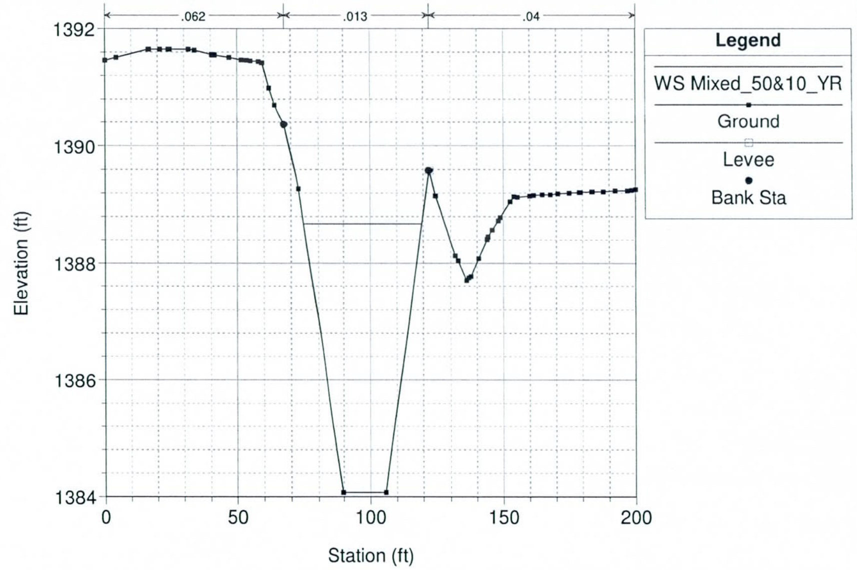

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31880 Reach 16 Earthen Channel
.048 .03 .013 .013 .031
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31800 Reach 16 Earthen Channel
.062 .03 .013 .04
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

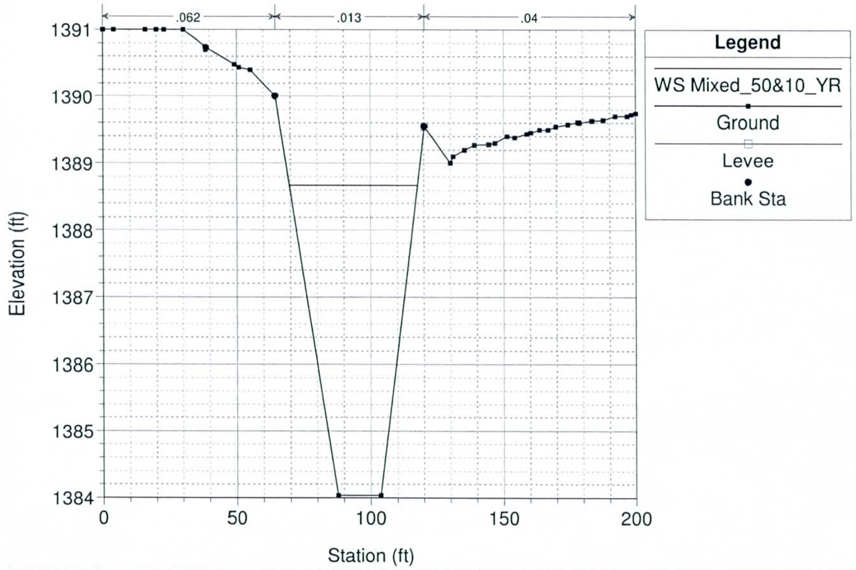
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31700 Reach 16 Earthen Channel



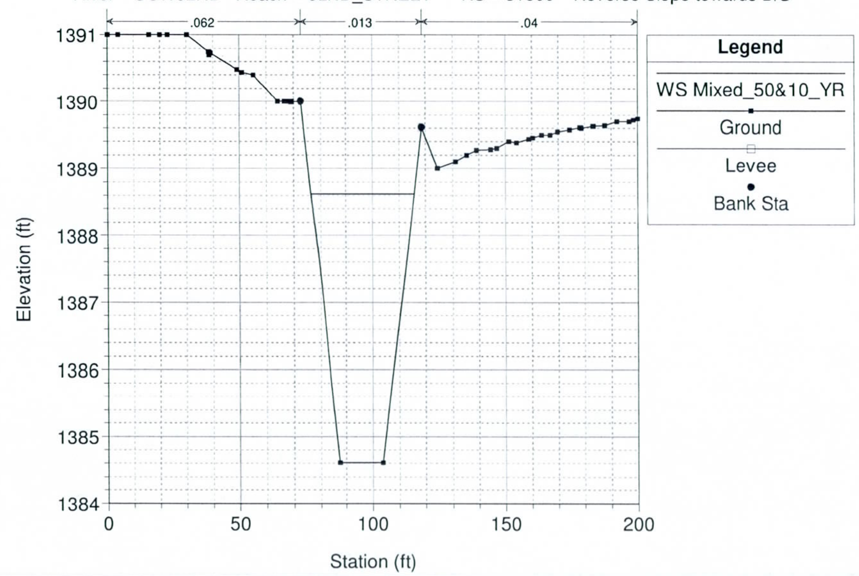
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31660.38 R16 Concrete Channel

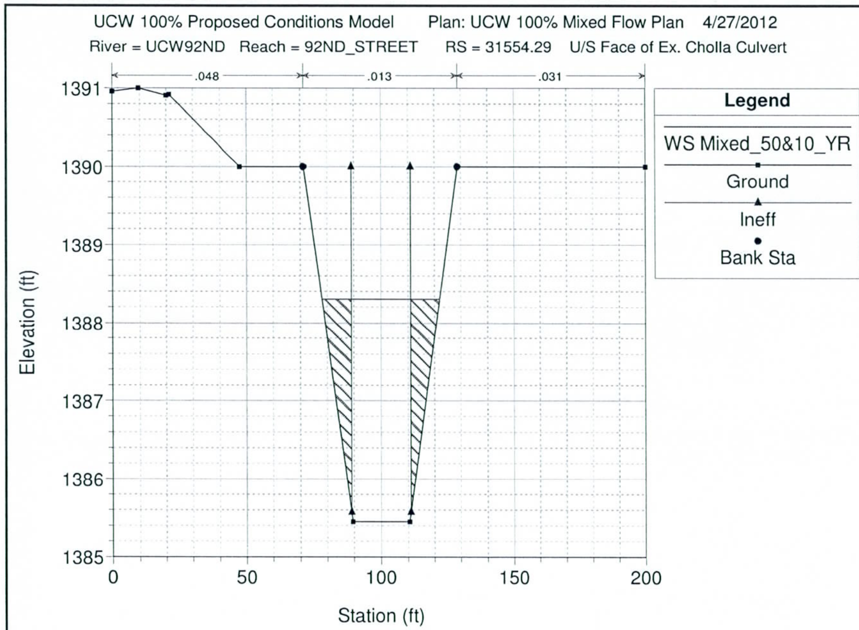


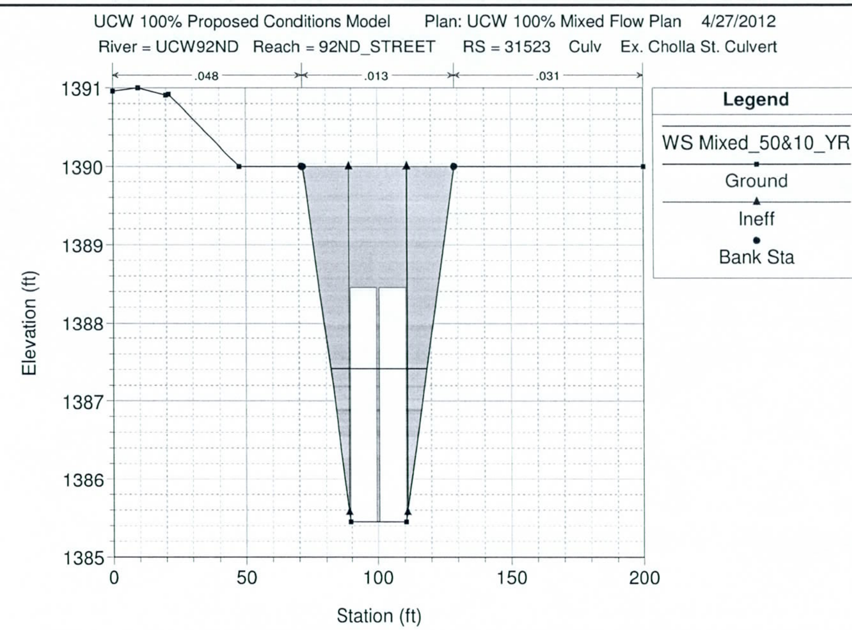
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31609.97 Reverse Slope Start Point towards D/S

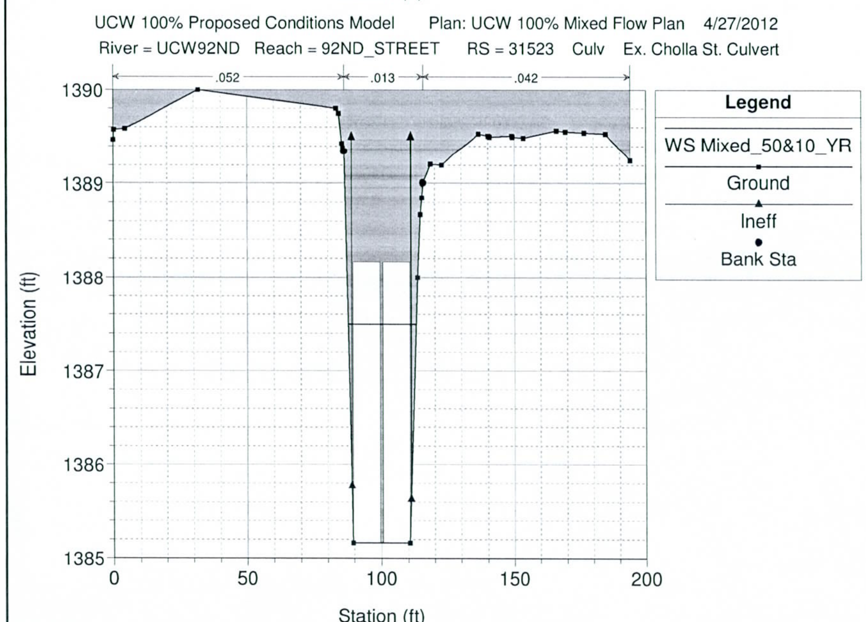


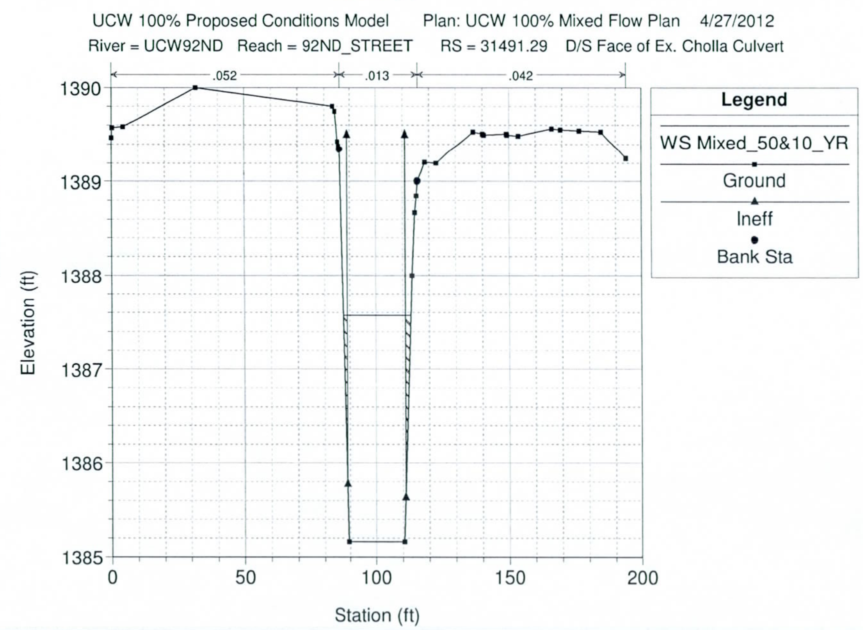
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31600 Reverse Slope towards D/S

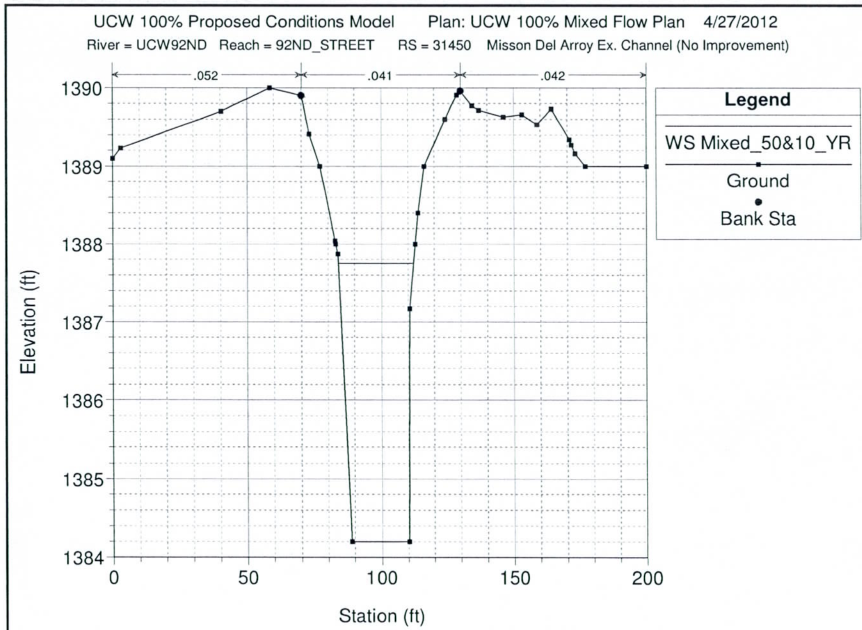


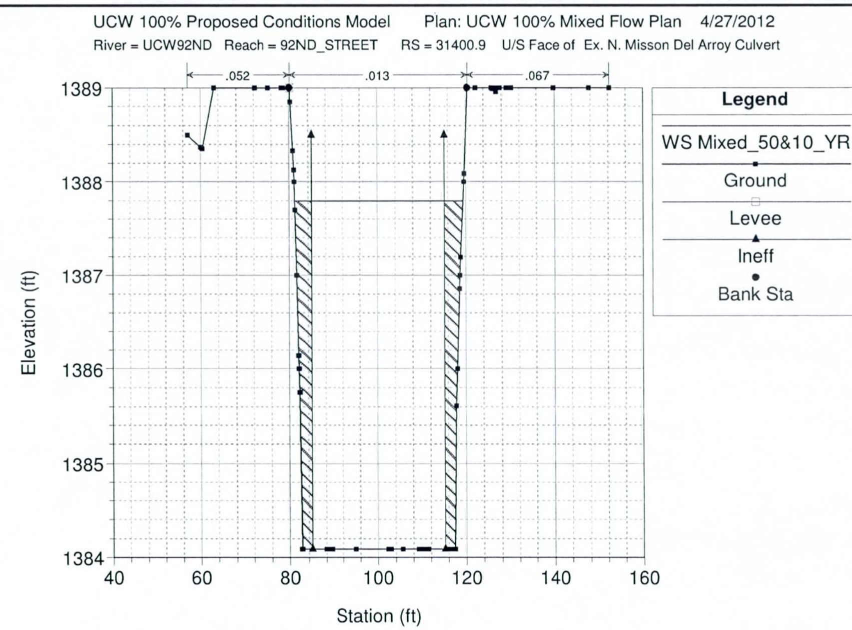

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31554.29 U/S Face of Ex. Cholla Culvert
.048
.013
.031
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
1391
1390
1389
1388
1387
1386
1385
0
50
100
150
200
Station (ft)

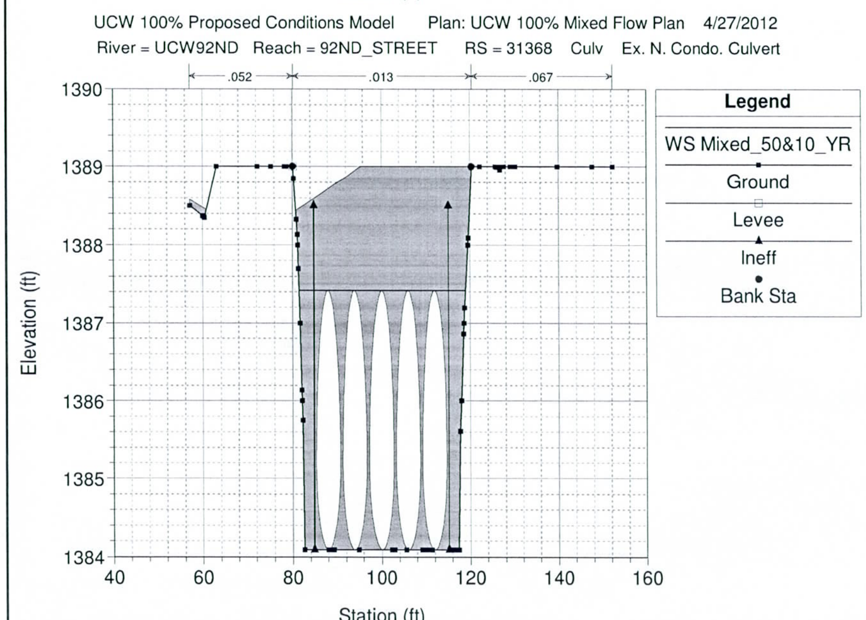

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31523 Culv Ex. Cholla St. Culvert
.048
.013
.031
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
1391
1390
1389
1388
1387
1386
1385
0
50
100
150
200
Station (ft)

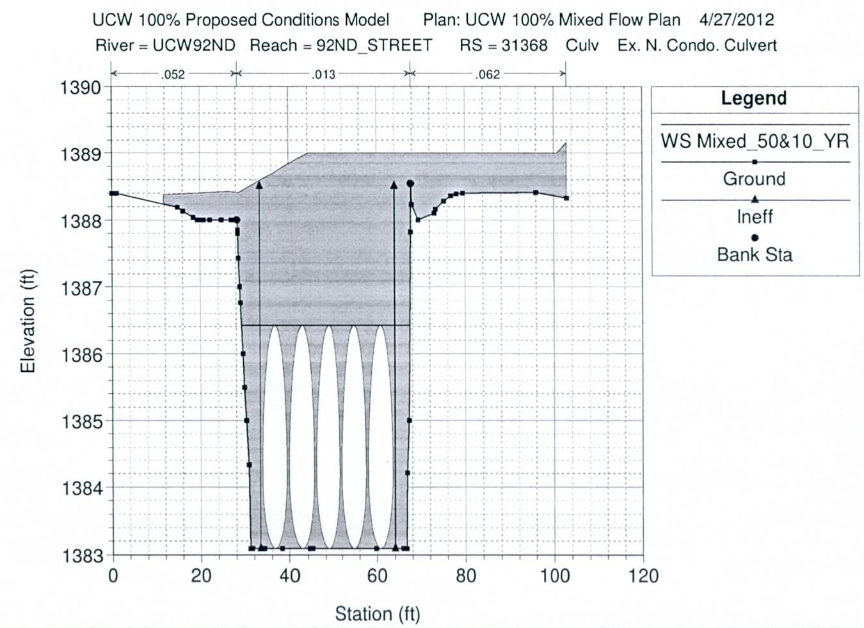

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31523 Culv Ex. Cholla St. Culvert
.052
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
1390
1389
1388
1387
1386
1385
0
50
100
150
200
Station (ft)

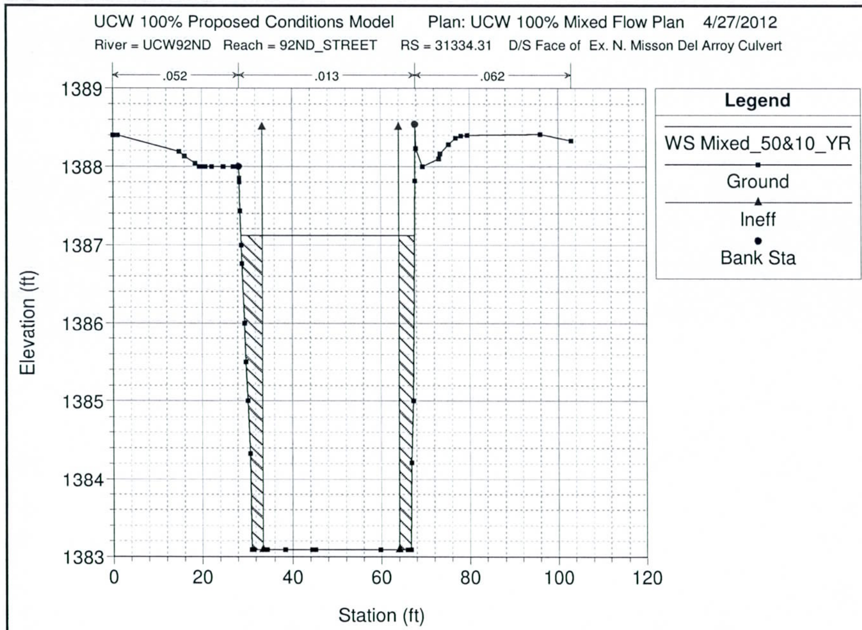

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31491.29 D/S Face of Ex. Cholla Culvert
.052
.013
.042
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
1390
1389
1388
1387
1386
1385
0
50
100
150
200
Station (ft)

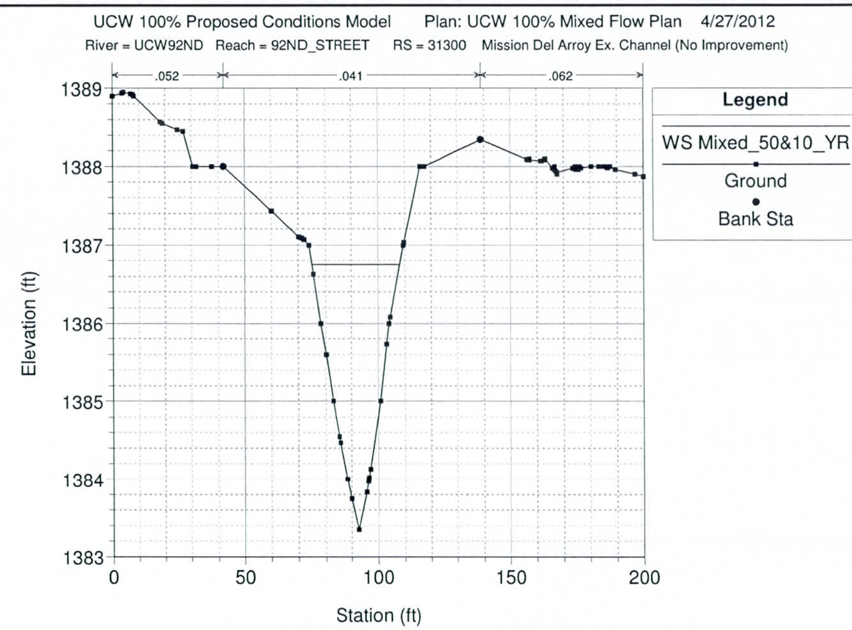

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31450 Misson Del Arroy Ex. Channel (No Improvement)
.052 .041 .042
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

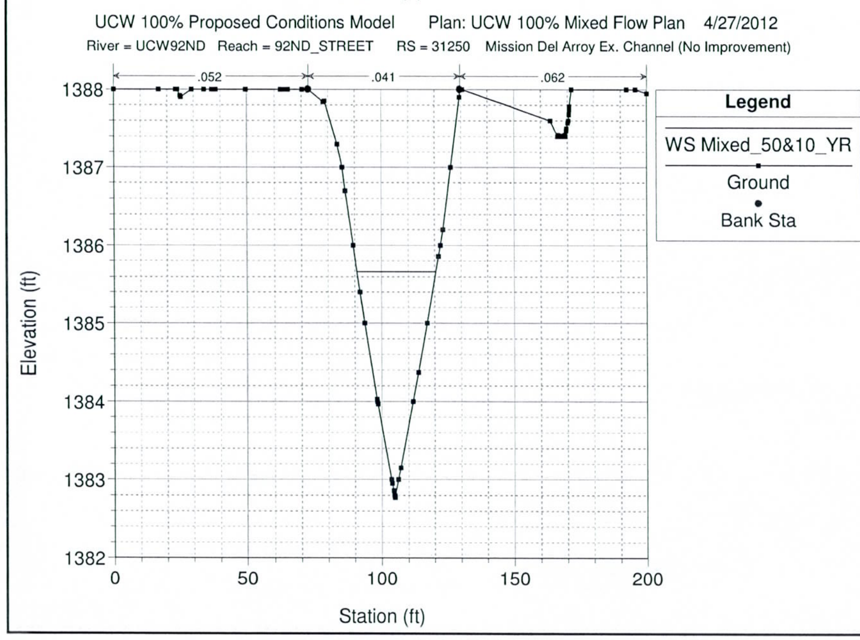

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31400.9 U/S Face of Ex. N. Misson Del Arroy Culvert
.052 .013 .067
Legend
WS Mixed_50&10_YR
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

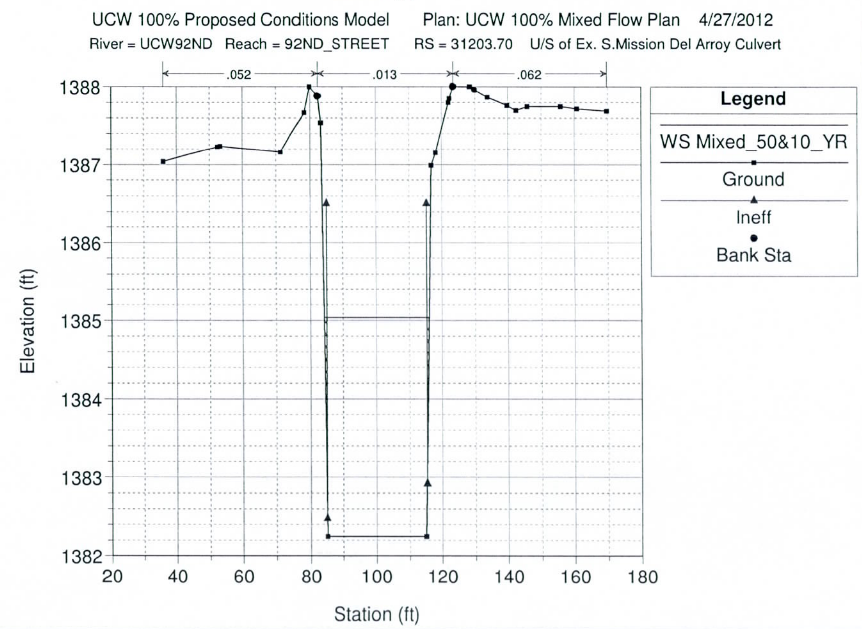

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31368 Culv Ex. N. Condo. Culvert
.052 .013 .067
Legend
WS Mixed_50&10_YR
Ground
Levee
Ineff
Bank Sta
Elevation (ft)
Station (ft)

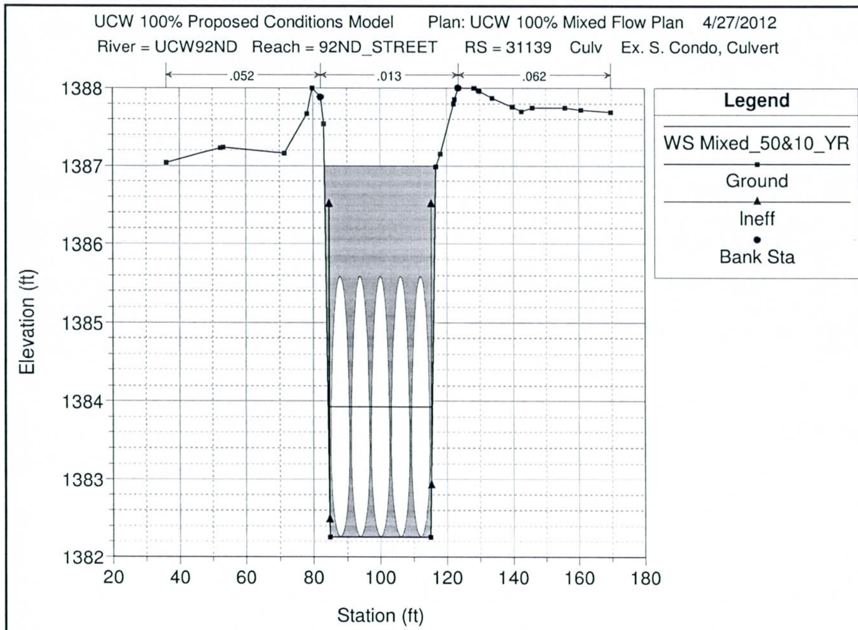

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31368 Culv Ex. N. Condo. Culvert
.052 .013 .062
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

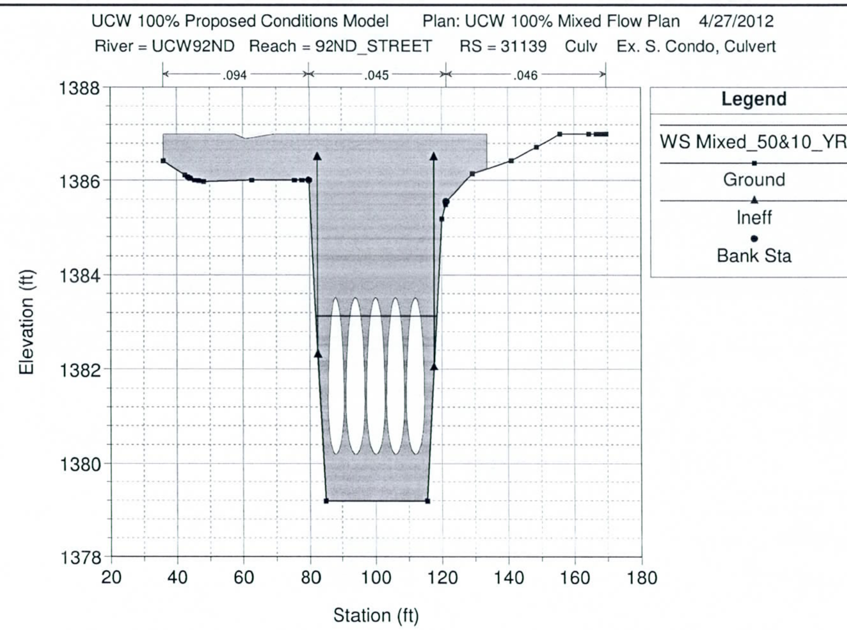

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31334.31 D/S Face of Ex. N. Misson Del Arroy Culvert
.052
.013
.062
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

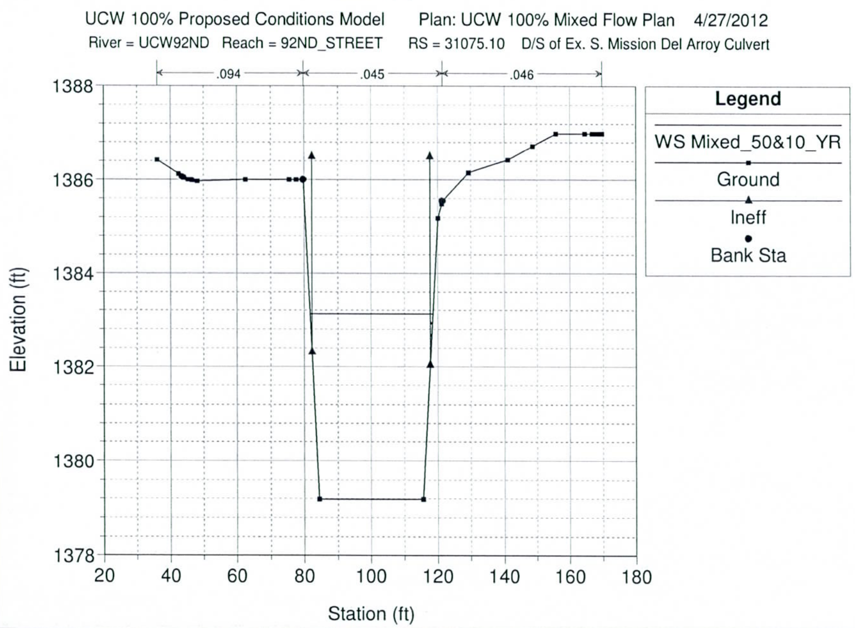

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31300 Mission Del Arroy Ex. Channel (No Improvement)
.052
.041
.062
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

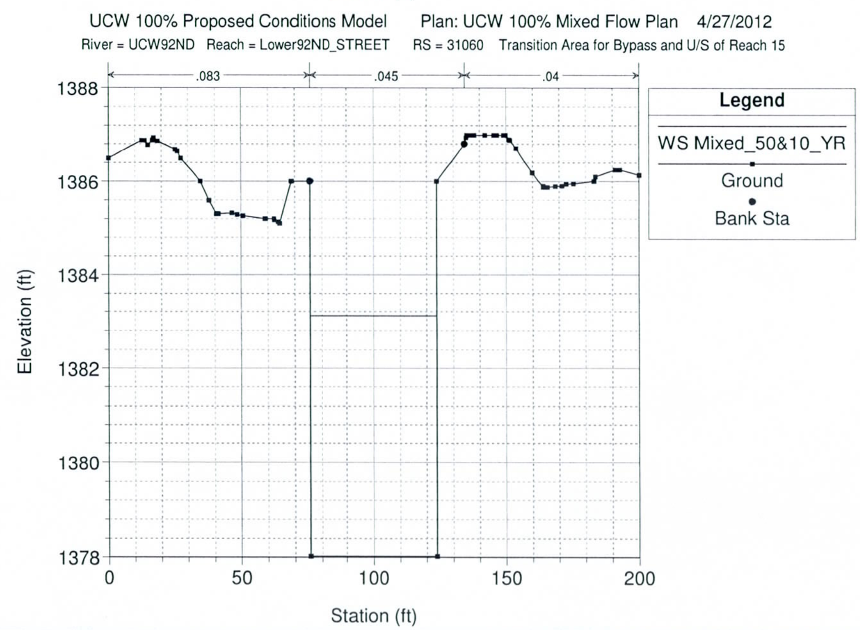

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31250 Mission Del Arroy Ex. Channel (No Improvement)
.052
.041
.062
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

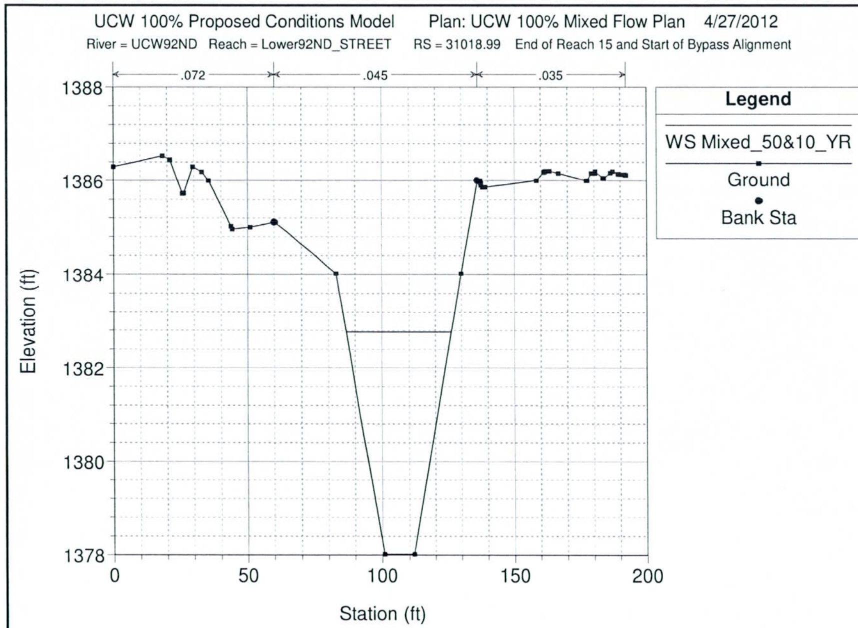

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31203.70 U/S of Ex. S.Mission Del Arroy Culvert
.052
.013
.062
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

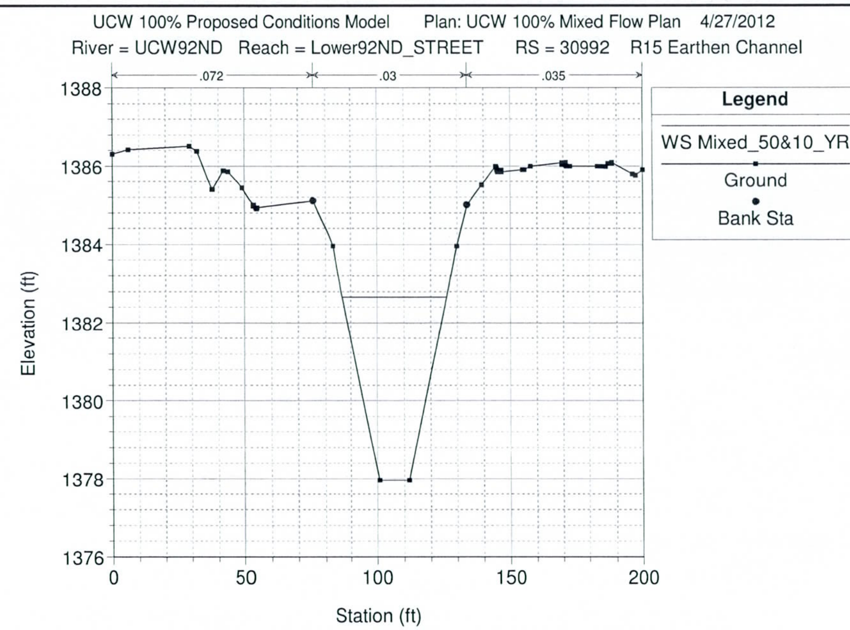

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31139 Culv Ex. S. Condo, Culvert
.052
.013
.062
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

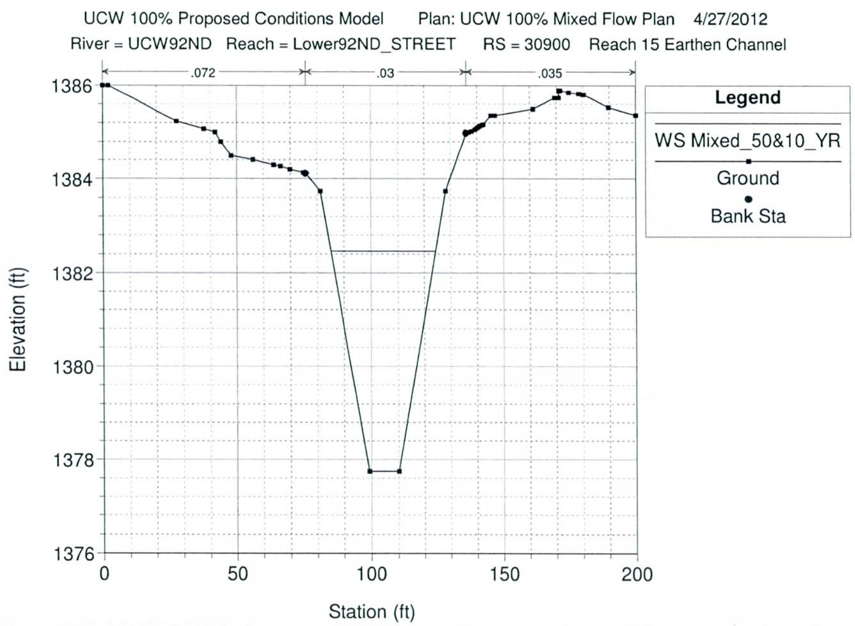

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31139 Culv Ex. S. Condo, Culvert
.094
.045
.046
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

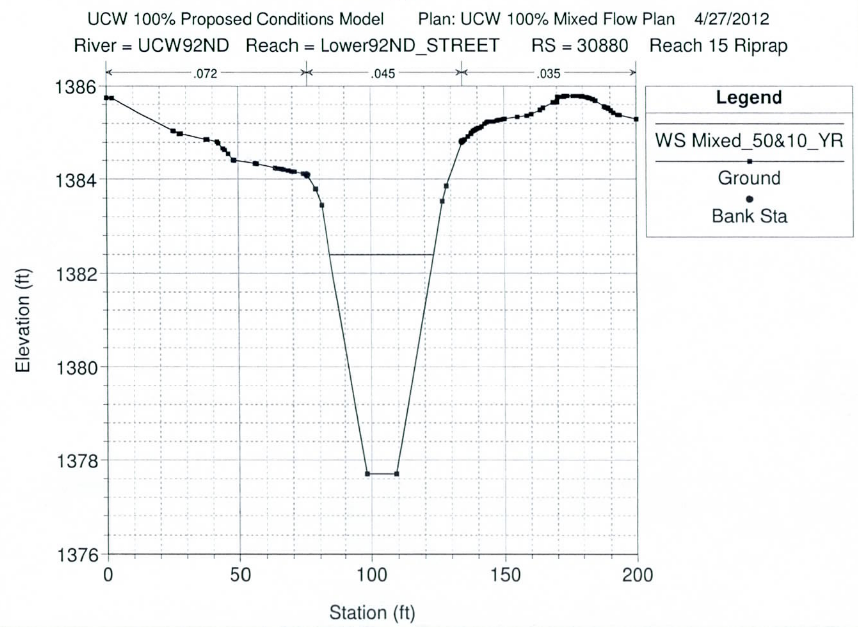

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = 92ND_STREET RS = 31075.10 D/S of Ex. S. Mission Del Arroy Culvert
.094
.045
.046
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

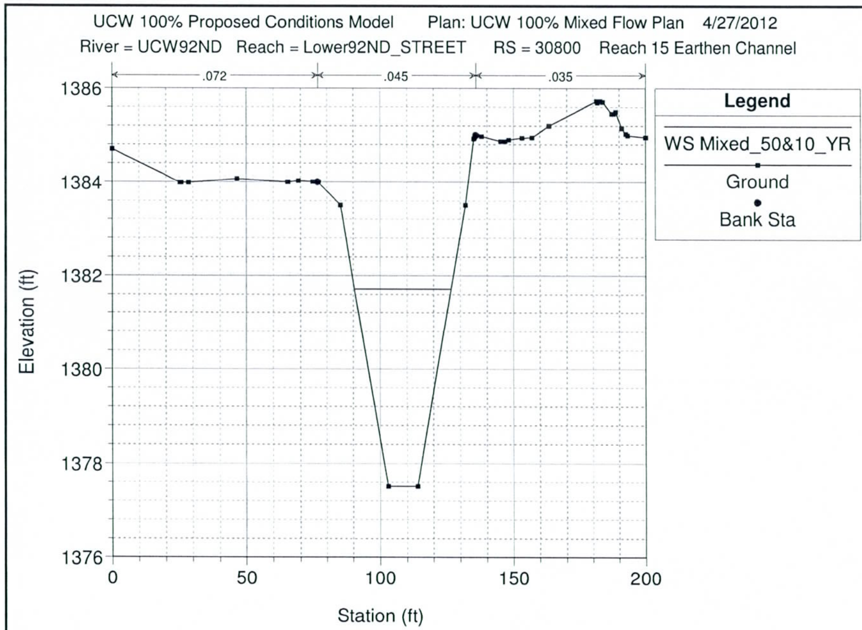

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 31060 Transition Area for Bypass and U/S of Reach 15
.083
.045
.04
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

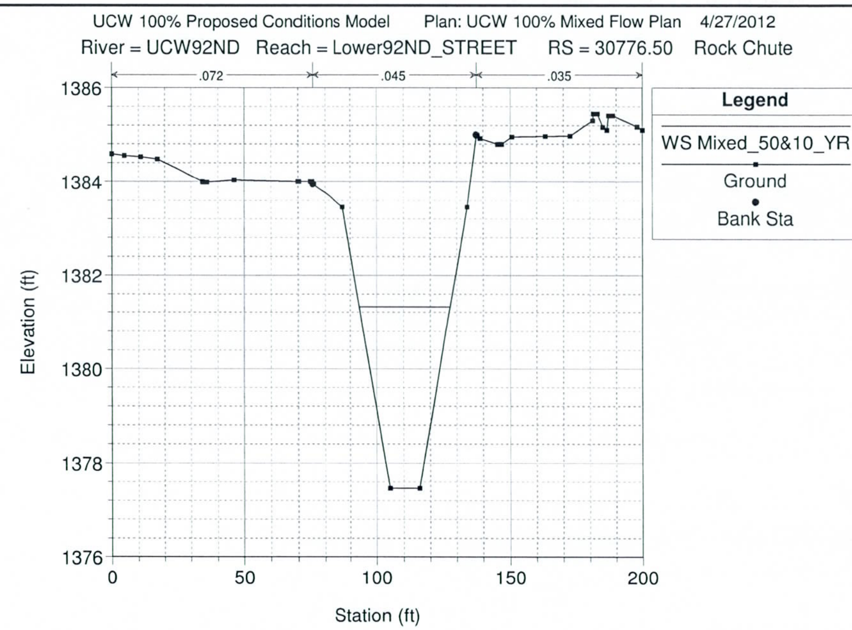

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 31018.99 End of Reach 15 and Start of Bypass Alignment
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1388
1386
1384
1382
1380
1378
0
50
100
150
200

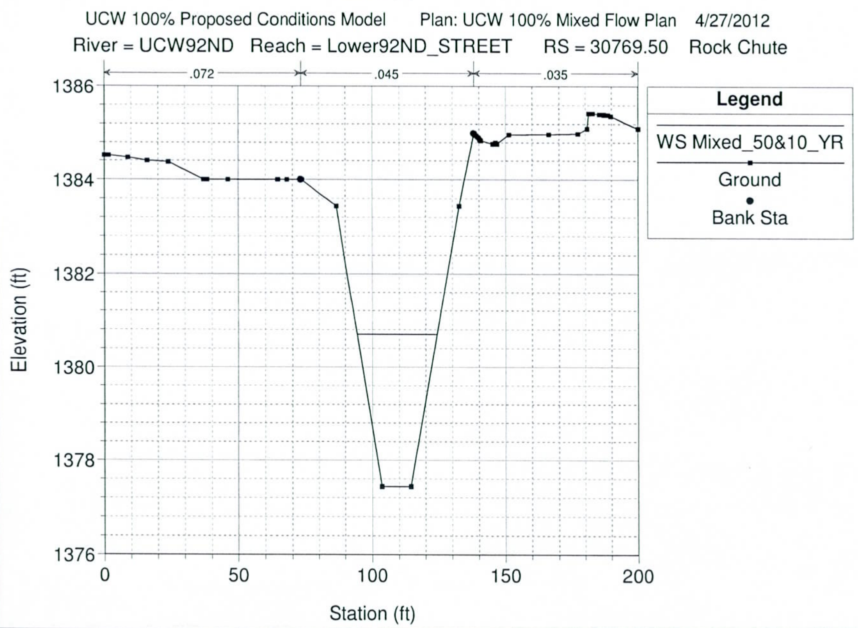

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30992 R15 Earthen Channel
.072
.03
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1388
1386
1384
1382
1380
1378
1376
0
50
100
150
200

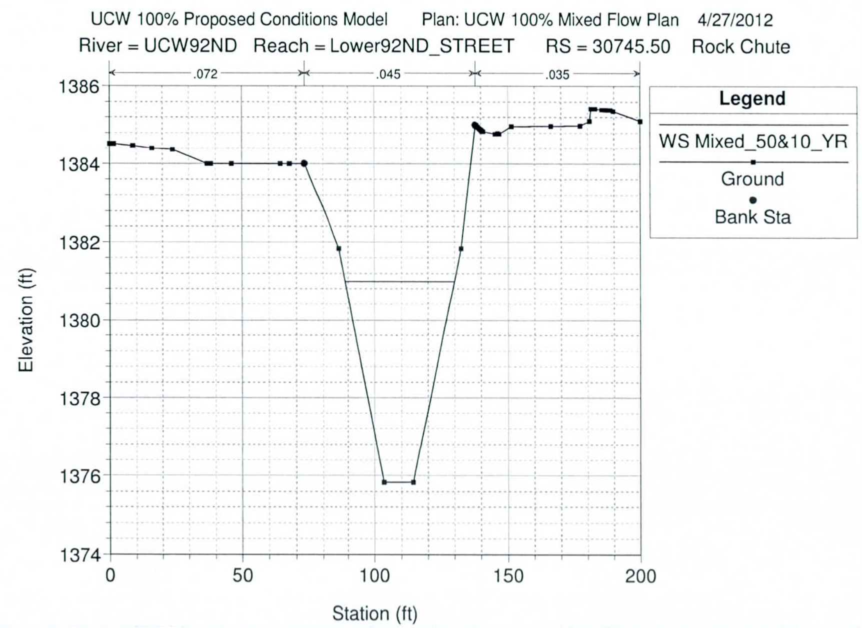

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30900 Reach 15 Earthen Channel
.072
.03
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1386
1384
1382
1380
1378
1376
0
50
100
150
200

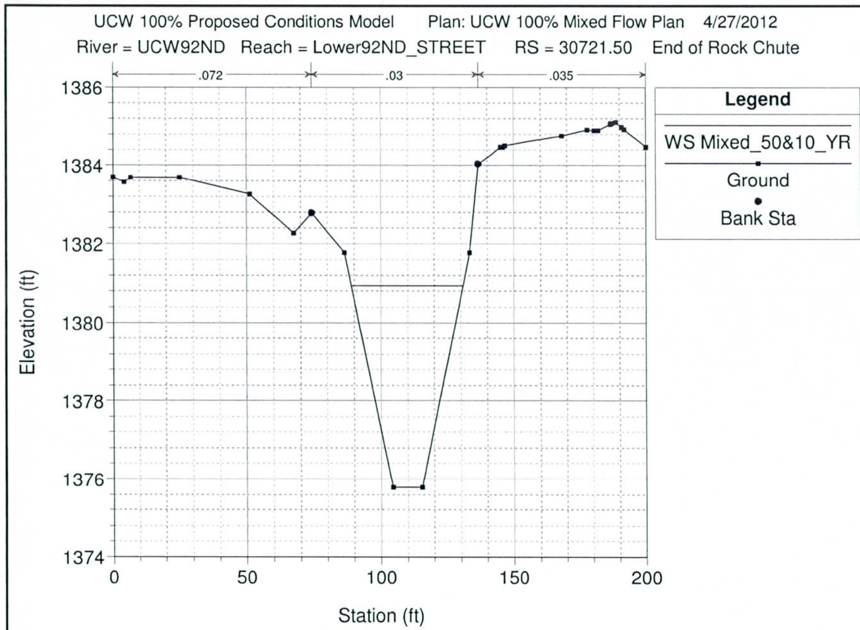

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30880 Reach 15 Riprap
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)
1386
1384
1382
1380
1378
1376
0
50
100
150
200

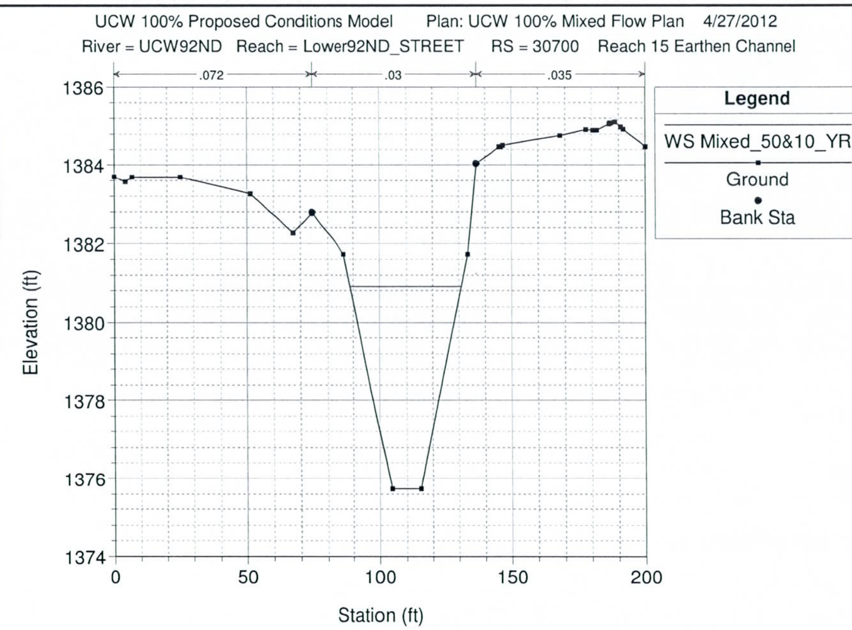

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30800 Reach 15 Earthen Channel
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
0
50
100
150
200
Station (ft)

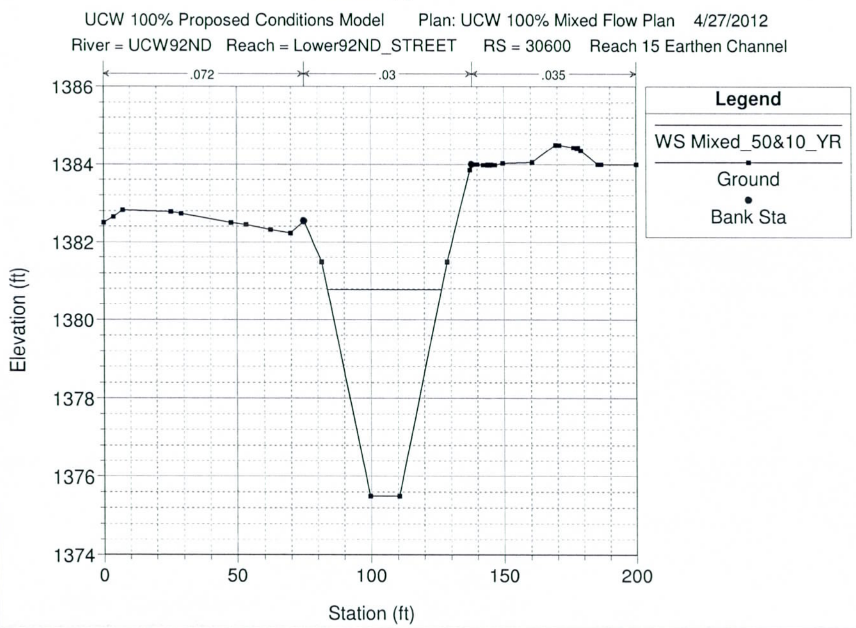

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30776.50 Rock Chute
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
0
50
100
150
200
Station (ft)

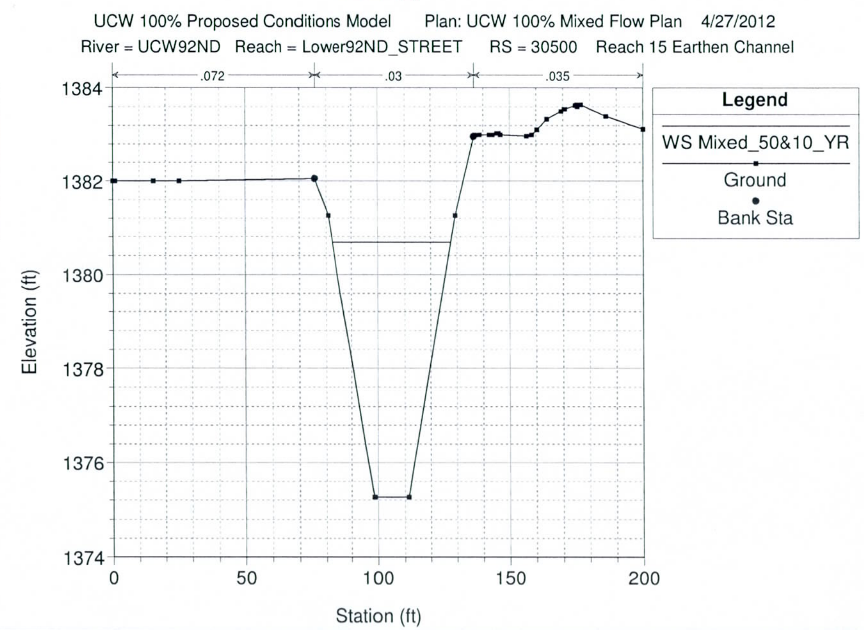

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30769.50 Rock Chute
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
0
50
100
150
200
Station (ft)

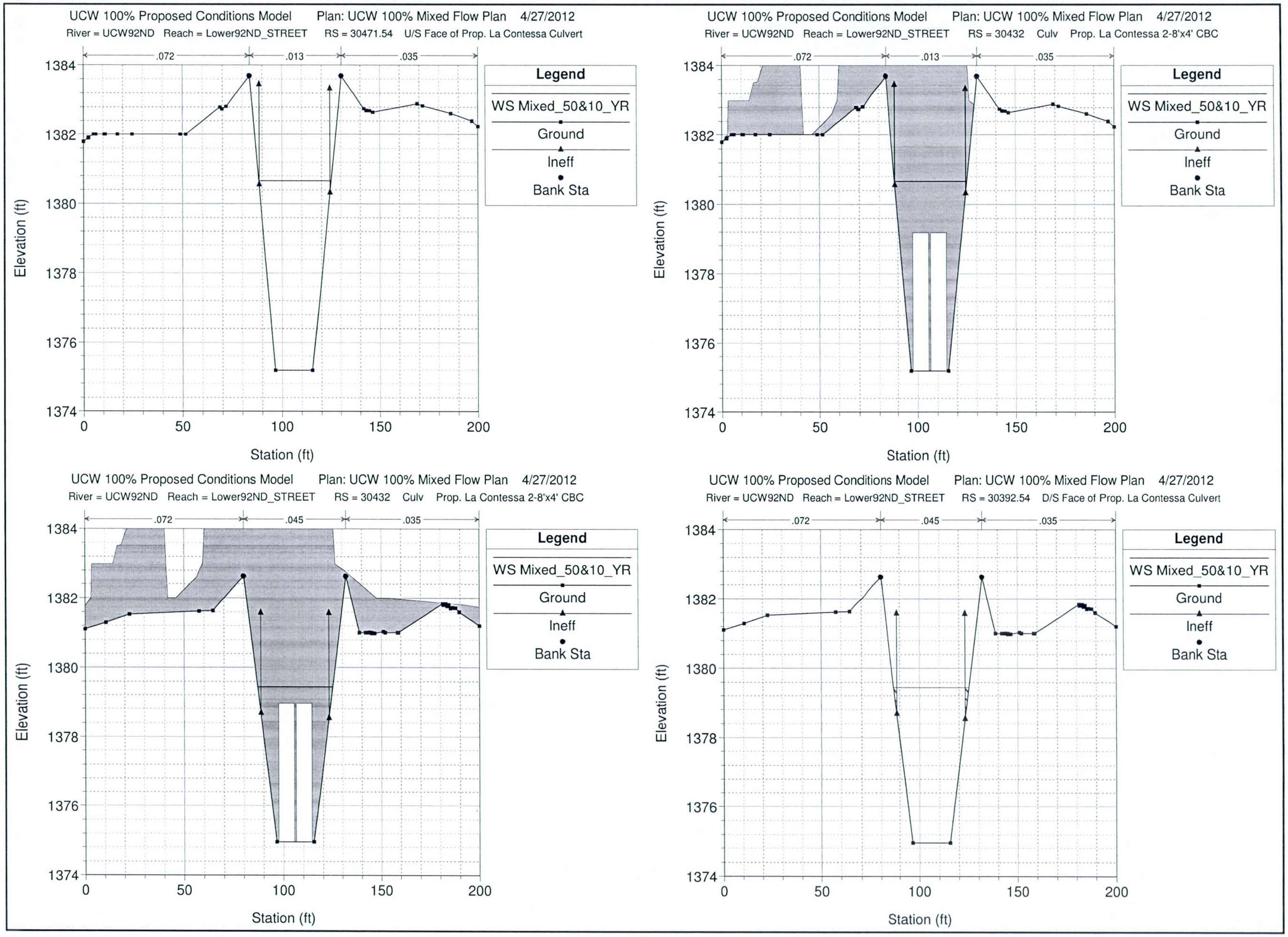

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30745.50 Rock Chute
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
1374
0
50
100
150
200
Station (ft)

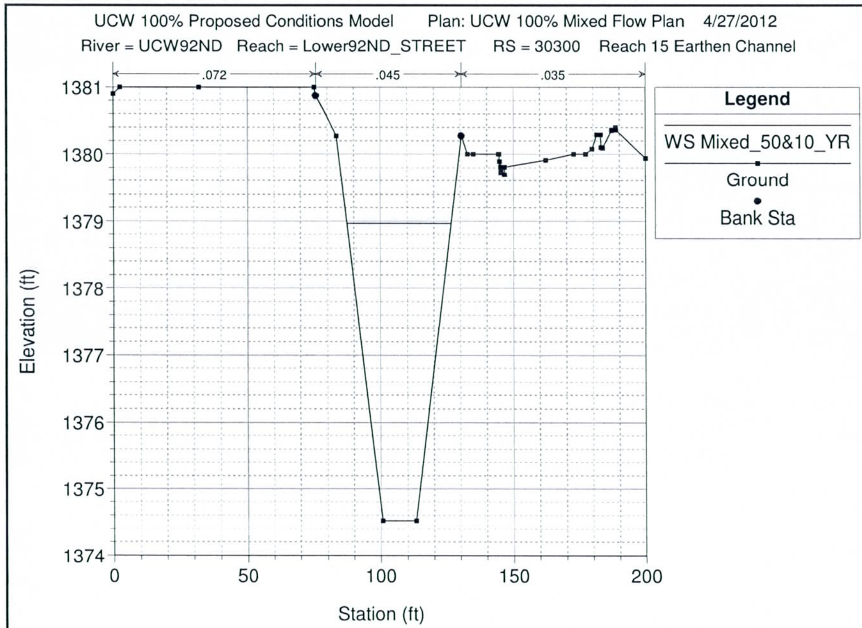

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30721.50 End of Rock Chute
.072
.03
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
1374
0
50
100
150
200
Station (ft)

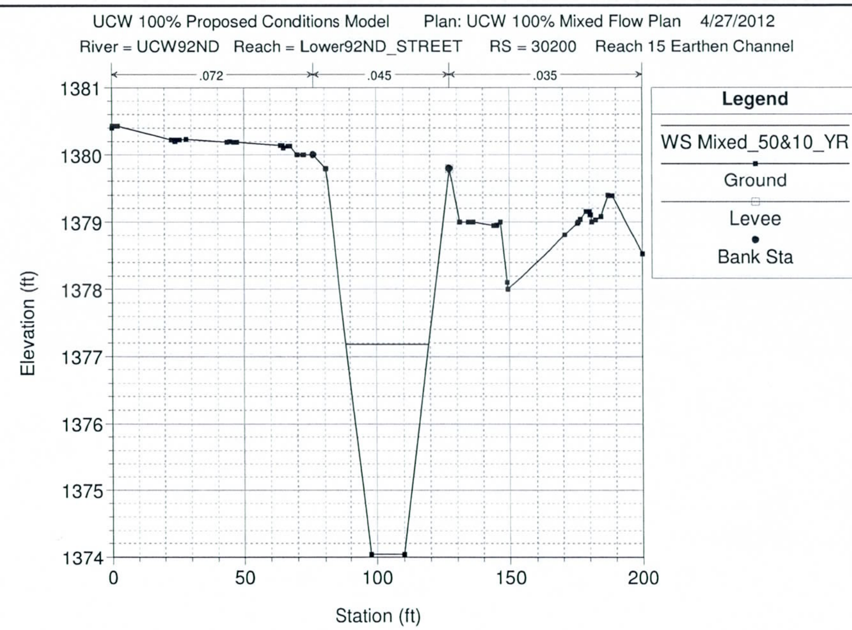

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30700 Reach 15 Earthen Channel
.072
.03
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
1374
0
50
100
150
200
Station (ft)

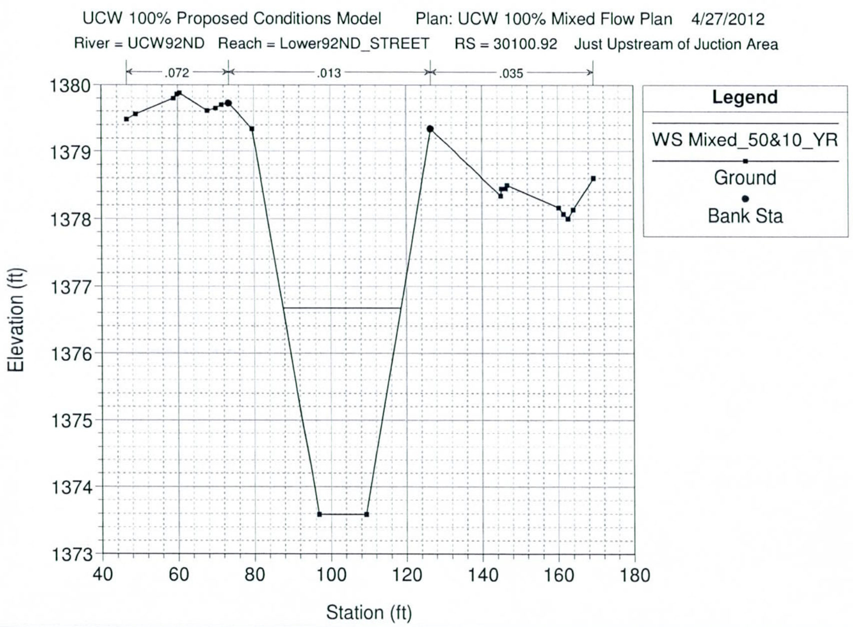

UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30600 Reach 15 Earthen Channel
.072
.03
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1386
1384
1382
1380
1378
1376
1374
0
50
100
150
200
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30500 Reach 15 Earthen Channel
.072
.03
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
1384
1382
1380
1378
1376
1374
0
50
100
150
200
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30471.54 U/S Face of Prop. La Contessa Culvert
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30432 Culv Prop. La Contessa 2-8'x4' CBC
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30432 Culv Prop. La Contessa 2-8'x4' CBC
UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30392.54 D/S Face of Prop. La Contessa Culvert
Legend
WS Mixed_50&10_YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
.072
.013
.045
.035


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30300 Reach 15 Earthen Channel
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30200 Reach 15 Earthen Channel
.072
.045
.035
Legend
WS Mixed_50&10_YR
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)


UCW 100% Proposed Conditions Model Plan: UCW 100% Mixed Flow Plan 4/27/2012
River = UCW92ND Reach = Lower92ND_STREET RS = 30100.92 Just Upstream of Juction Area
.072
.013
.035
Legend
WS Mixed_50&10_YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

HEC-RAS Plan: UCW 100% Mix Profile: Mixed_50&10_YR

River	Reach	River Sta	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)	
UCWMAIN	Upper	10307.11	259.00	1429.85	1432.15	1431.91	1432.41	0.014560	4.12	64.14	76.89	0.71
UCWMAIN	Upper	10287.17	259.00	1429.76	1431.49	1431.49	1431.99	0.030256	5.63	45.98	47.20	1.01
UCWMAIN	Upper	10241.85	259.00	1426.12	1429.18	1428.31	1429.48	0.007108	4.42	58.64	28.35	0.54
UCWMAIN	Upper	10222.85	259.00	1426.05	1429.17		1429.38	0.002324	3.75	69.11	34.36	0.47
UCWMAIN	Upper	10200	259.00	1425.98	1429.00		1429.31	0.003346	4.51	57.42	28.09	0.56
UCWMAIN	Upper	10199	Lat Struct									
UCWMAIN	Upper	10100	259.00	1425.65	1428.65		1428.97	0.003396	4.53	57.11	28.02	0.56
UCWMAIN	Upper	10035.78	227.00	1425.41	1428.44	1427.46	1428.68	0.005696	3.93	57.74	28.16	0.48
UCWMAIN	Upper	9980.78	227.00	1425.26	1427.30	1427.30	1428.04	0.026759	6.88	32.98	22.27	1.00
UCWMAIN	Upper	9948.67	227.00	1423.13	1426.11	1425.16	1426.36	0.006041	4.02	56.52	27.90	0.50
UCWMAIN	Upper	9931.67	227.00	1423.08	1426.04		1426.30	0.002761	4.06	55.94	27.77	0.50
UCWMAIN	Upper	9900	227.00	1422.97	1425.96		1426.21	0.002652	4.00	56.77	27.95	0.49
UCWMAIN	Upper	9835.22	227.00	1422.76	1425.69		1425.95	0.006516	4.13	54.98	27.56	0.52
UCWMAIN	Upper	9805.66	227.00	1422.66	1425.55		1425.82	0.003057	4.21	53.90	27.33	0.53
UCWMAIN	Upper	9800	227.00	1422.64	1425.53		1425.81	0.003049	4.21	53.95	27.34	0.53
UCWMAIN	Upper	9700	227.00	1422.31	1424.85		1425.26	0.011671	5.12	44.30	24.89	0.68
UCWMAIN	Upper	9639.2	226.00	1422.11	1424.83	1423.81	1425.16	0.000430	4.62	48.94	19.00	0.49
UCWMAIN	Upper	9596	Culvert									
UCWMAIN	Upper	9554.17	226.00	1421.60	1424.55	1423.30	1424.83	0.003921	4.25	53.12	19.00	0.44
UCWMAIN	Upper	9495.16	226.00	1421.36	1424.25		1424.59	0.003984	4.69	48.24	25.35	0.60
UCWMAIN	Upper	9400	226.00	1420.98	1423.87		1424.21	0.003974	4.68	48.28	25.37	0.60
UCWMAIN	Upper	9300	226.00	1420.58	1423.48		1423.82	0.003940	4.67	48.44	25.40	0.60
UCWMAIN	Upper	9200	226.00	1420.18	1423.09		1423.43	0.003869	4.63	48.76	25.48	0.59
UCWMAIN	Upper	9100	226.00	1419.78	1422.72		1423.05	0.003722	4.57	49.46	25.64	0.58
UCWMAIN	Upper	9000	226.00	1419.38	1422.37		1422.68	0.003451	4.44	50.85	25.97	0.56
UCWMAIN	Upper	8964	226.00	1419.24	1422.16		1422.49	0.008612	4.62	48.95	25.52	0.59
UCWMAIN	Upper	8940	226.00	1419.14	1421.34	1421.34	1422.11	0.027291	7.04	32.11	21.20	1.01
UCWMAIN	Upper	8902.00	226.00	1417.51	1420.52	1419.71	1420.82	0.007602	4.41	51.25	26.06	0.55
UCWMAIN	Upper	8889.	226.00	1417.46	1420.45		1420.76	0.003465	4.45	50.78	25.95	0.56
UCWMAIN	Upper	8700	226.00	1416.80	1419.81		1420.11	0.003382	4.41	51.23	26.05	0.55
UCWMAIN	Upper	8600	226.00	1416.45	1419.46	1418.67	1419.77	0.003463	4.47	50.56	25.62	0.56
UCWMAIN	Upper	8500	226.00	1416.10	1419.13		1419.43	0.003278	4.36	51.82	26.19	0.55
UCWMAIN	Upper	8400	226.00	1415.75	1418.82	1417.96	1419.10	0.003109	4.28	52.84	26.42	0.53
UCWMAIN	Upper	8300	226.00	1415.39	1418.23	1417.60	1418.59	0.009682	4.82	46.89	25.03	0.62
UCWMAIN	Upper	8200	226.00	1415.04	1417.15		1417.52	0.011862	4.91	46.02	28.16	0.68
UCWMAIN	Upper	8182.5	226.00	1414.98	1417.16	1416.58	1417.47	0.000757	4.42	51.12	29.96	0.60
UCWMAIN	Upper	8182.49	Inl Struct									
UCWMAIN	Upper	8173	378.00	1412.48	1416.27	1414.88	1416.75	0.000396	5.54	68.29	19.00	0.50
UCWMAIN	Upper	8140.24	Culvert									
UCWMAIN	Upper	8108	378.00	1412.01	1413.83	1414.40	1415.89	0.004566	11.52	32.80	19.00	1.50
UCWMAIN	Upper	8000	378.00	1410.94	1413.01	1413.63	1415.32	0.005986	12.20	30.99	15.00	1.50

HEC-RAS Plan: UCW 100% Mix Profile: Mixed_50&10_YR (Continued)

River	Reach	River Sta	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)	
UCWMAIN	Upper	7900	378.00	1409.97	1411.87	1412.66	1414.60	0.007707	13.25	28.53	15.00	1.69
UCWMAIN	Mid	7812.70	387.00	1409.10	1412.74	1410.70	1412.89	0.000157	3.17	122.27	48.50	0.29
UCWMAIN	Mid	7780.24	Culvert									
UCWMAIN	Mid	7748.70	387.00	1408.79	1412.12	1410.92	1412.55	0.000429	5.28	73.28	23.00	0.51
UCWMAIN	Mid	7700	387.00	1408.30	1411.03	1411.03	1412.42	0.002700	9.44	41.00	15.00	1.01
UCWMAIN	Mid	7600	387.00	1407.30	1409.30	1410.04	1411.89	0.006935	12.90	29.99	15.00	1.61
UCWMAIN	Mid	7426.51	387.00	1405.58	1409.50	1407.92	1409.92	0.000531	5.20	74.44	19.00	0.46
UCWMAIN	Mid	7392	Culvert									
UCWMAIN	Mid	7359.51	387.00	1405.07	1408.10		1408.80	0.001137	6.71	57.64	19.00	0.68
UCWMAIN	Mid	7300	387.00	1404.52	1407.26	1407.26	1408.64	0.002697	9.43	41.02	15.00	1.01
UCWMAIN	Mid	7200	387.00	1403.69	1405.78	1406.43	1408.15	0.006078	12.36	31.32	15.00	1.51
UCWMAIN	Mid	7100	387.00	1402.85	1404.84	1405.59	1407.46	0.007093	13.00	29.77	15.00	1.63
UCWMAIN	Mid	7000	387.00	1402.00	1403.93	1404.74	1406.70	0.007722	13.37	28.95	15.00	1.70
UCWMAIN	Mid	6900	387.00	1401.14	1403.04	1403.88	1405.90	0.008104	13.58	28.50	15.00	1.74
UCWMAIN	Mid	6823.56	387.00	1400.48	1402.37	1403.22	1405.27	0.008262	13.66	28.32	15.00	1.75
UCWMAIN	Mid	6792.19	387.00	1400.22	1403.62	1401.41	1403.70	0.000082	2.16	179.12	52.63	0.21
UCWMAIN	Mid	6779.28	387.00	1401.85	1403.04	1403.04	1403.64	0.002451	6.20	62.40	52.83	1.01
UCWMAIN	Mid	6757.14	387.00	1401.54	1402.45	1402.75	1403.51	0.006222	8.26	46.85	52.82	1.55
UCWMAIN	Mid	6751.66	387.00	1399.60	1402.39	1400.83	1402.51	0.000150	2.78	139.38	57.00	0.29
UCWMAIN	Mid	6700	Bridge									
UCWMAIN	Mid	6648.86	528.00	1398.65	1402.40	1400.31	1402.54	0.000120	2.93	180.30	58.04	0.27
UCWMAIN	Mid	6480	528.00	1397.95	1402.14		1402.46	0.002180	4.57	115.42	40.12	0.48
UCWMAIN	Mid	6400	528.00	1397.77	1401.96		1402.29	0.002166	4.56	115.68	40.16	0.47
UCWMAIN	Mid	6300	528.00	1397.55	1401.75		1402.07	0.002157	4.56	115.85	40.19	0.47
UCWMAIN	Mid	6200	528.00	1397.33	1401.53		1401.86	0.002146	4.55	116.07	40.22	0.47
UCWMAIN	Mid	6100	528.00	1397.11	1401.32		1401.64	0.002133	4.54	116.34	40.26	0.47
UCWMAIN	Mid	6000	528.00	1396.90	1401.11		1401.43	0.002142	4.55	116.16	40.24	0.47
UCWMAIN	Mid	5900	528.00	1396.67	1400.90	1399.44	1401.21	0.002100	4.51	117.00	40.36	0.47
UCWMAIN	Mid	5800	528.00	1396.45	1400.69	1399.22	1401.00	0.002074	4.49	117.53	40.44	0.46
UCWMAIN	Mid	5700	528.00	1396.23	1400.49	1399.01	1400.80	0.002042	4.47	118.19	40.54	0.46
UCWMAIN	Mid	5600	528.00	1396.01	1400.29	1398.80	1400.59	0.002003	4.44	119.02	40.66	0.46
UCWMAIN	Mid	5500	528.00	1395.79	1400.09	1398.58	1400.39	0.001957	4.40	120.05	40.81	0.45
UCWMAIN	Mid	5400	528.00	1395.56	1399.91	1398.35	1400.20	0.001877	4.33	121.88	41.08	0.44
UCWMAIN	Mid	5317.72	528.00	1395.37	1399.47	1398.32	1400.08	0.000686	6.26	84.37	24.27	0.59
UCWMAIN	Mid	5317.71	Inl Struct									
UCWMAIN	Mid	5307.72	528.00	1393.37	1396.97	1395.65	1397.43	0.000409	5.43	97.24	28.00	0.50
UCWMAIN	Mid	5274	Culvert									
UCWMAIN	Mid	5240.72	528.00	1392.96	1396.50	1395.25	1396.97	0.005195	5.53	95.54	28.00	0.52
UCWMAIN	Mid	5213.65	528.00	1392.91	1395.62	1395.62	1396.65	0.024488	8.15	64.77	31.77	1.01
UCWMAIN	Mid	5175.65	528.00	1390.33	1394.61	1393.09	1394.91	0.004363	4.35	121.24	41.63	0.45
UCWMAIN	Mid	5160.65	528.00	1390.30	1394.53		1394.84	0.004565	4.43	119.25	41.33	0.46

HEC-RAS Plan: UCW 100% Mix Profile: Mixed_50&10_YR (Continued)

River	Reach	River Sta	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)	
UCWMAIN	Mid	5130	528.00	1390.24	1394.43		1394.75	0.002111	4.49	117.54	41.07	0.47
UCWMAIN	Mid	5100	528.00	1390.18	1394.34		1394.68	0.002260	4.65	113.55	39.54	0.48
UCWMAIN	Mid	5008.27	528.00	1390.00	1394.13		1394.47	0.002300	4.66	113.20	39.79	0.49
UCWMAIN	Mid	4900	528.00	1389.78	1393.86	1392.54	1394.21	0.002409	4.74	111.30	39.50	0.50
UCWMAIN	Mid	4800	528.00	1389.58	1393.60	1392.36	1393.96	0.002577	4.86	108.61	39.09	0.51
UCWMAIN	Mid	4706.64	528.00	1389.39	1393.10	1392.18	1393.56	0.007895	5.44	97.11	37.29	0.59
UCWMAIN	Mid	4678.64	528.00	1389.34	1392.12	1392.12	1393.15	0.024324	8.15	64.80	31.66	1.00
UCWMAIN	Mid	4647.76	528.00	1387.39	1391.82	1390.17	1392.10	0.003901	4.21	125.46	41.60	0.43
UCWMAIN	Mid	4626.76	528.00	1387.35	1391.77		1392.05	0.001757	4.23	124.85	41.51	0.43
UCWMAIN	Mid	4600	528.00	1387.29	1391.72		1392.00	0.001735	4.21	125.43	41.60	0.43
UCWMAIN	Mid	4525.*	528.00	1387.14	1391.52		1391.81	0.004094	4.28	123.25	41.27	0.44
UCWMAIN	Mid	4500	541.00	1387.09	1391.37		1391.69	0.004704	4.54	119.29	40.70	0.47
UCWMAIN	Mid	4486.11	541.00	1387.06	1391.33		1391.65	0.002120	4.56	118.66	40.60	0.47
UCWMAIN	Mid	4400	541.00	1386.89	1391.14	1389.69	1391.47	0.002157	4.59	117.94	40.50	0.47
UCWMAIN	Mid	4300	541.00	1386.69	1390.76		1391.13	0.005774	4.89	110.71	39.41	0.51
UCWMAIN	Mid	4250	Lat Struct									
UCWMAIN	Mid	4200	474.00	1386.49	1390.07	1389.10	1390.48	0.007333	5.14	92.25	36.50	0.57
UCWMAIN	Mid	4100	474.00	1386.29	1388.91		1389.51	0.012959	6.19	76.57	35.08	0.74
UCWMAIN	Mid	4081.53	474.00	1386.25	1389.00	1388.21	1389.42	0.000682	5.22	90.76	36.97	0.59
UCWMAIN	Mid	4081.52	Inl Struct									
UCWMAIN	Mid	4071.48	474.00	1384.25	1388.06	1386.44	1388.42	0.000293	4.78	99.22	27.02	0.43
UCWMAIN	Mid	3990.6	Culvert									
UCWMAIN	Mid	3911.53	474.00	1383.82	1387.76	1386.05	1388.11	0.003354	4.77	99.41	26.25	0.42
UCWMAIN	Mid	3880.53	474.00	1383.75	1386.80	1386.80	1387.82	0.024079	8.12	58.40	28.30	1.00
UCWMAIN	Mid	3826.23	474.00	1380.22	1385.31	1383.29	1385.54	0.003013	3.82	123.95	38.69	0.38
UCWMAIN	Mid	3794.23	474.00	1380.15	1385.29		1385.47	0.001078	3.42	138.66	43.97	0.34
UCWMAIN	Mid	3700	474.00	1379.96	1385.19		1385.37	0.001051	3.42	138.66	43.04	0.34
UCWMAIN	Mid	3581	518.00	1379.74	1385.14	1382.88	1385.33	0.000196	3.46	149.53	45.39	0.34
UCWMAIN	Mid	3553.86	Culvert									
UCWMAIN	Mid	3527	518.00	1379.62	1384.18	1382.81	1384.53	0.002408	4.80	107.83	37.34	0.50
UCWMAIN	Mid	3500	518.00	1379.56	1384.11	1382.75	1384.47	0.002421	4.81	107.63	37.30	0.50
UCWMAIN	Mid	3450	Lat Struct									
UCWMAIN	Mid	3400	465.00	1379.36	1383.95		1384.23	0.001878	4.26	109.15	37.55	0.44
UCWMAIN	Mid	3350	465.00	1379.26	1383.86		1384.14	0.001866	4.25	109.40	37.59	0.44
UCWMAIN	Mid	3200	473.00	1378.96	1383.56		1383.85	0.001920	4.31	109.63	37.62	0.45
UCWMAIN	Mid	3100	473.00	1378.76	1383.37		1383.66	0.001903	4.30	109.99	37.68	0.44
UCWMAIN	Mid	3000	473.00	1378.56	1383.19		1383.47	0.001882	4.28	110.45	37.76	0.44
UCWMAIN	Mid	2900	473.00	1378.36	1383.00		1383.28	0.001856	4.26	111.02	37.84	0.44
UCWMAIN	Mid	2850	473.00	1378.26	1382.90		1383.19	0.001917	4.33	109.12	37.07	0.45
UCWMAIN	Mid	2800	473.00	1378.16	1382.81		1383.09	0.001840	4.25	111.37	37.90	0.44
UCWMAIN	Mid	2700	473.00	1377.96	1382.63	1381.00	1382.91	0.001806	4.22	112.16	38.02	0.43

HEC-RAS Plan: UCW 100% Mix Profile: Mixed_50&10_YR (Continued)

River	Reach	River Sta	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)	
UCWMAIN	Mid	2600	473.00	1377.76	1382.34		1382.64	0.004403	4.34	108.87	37.50	0.45
UCWMAIN	Mid	2500	473.00	1377.56	1381.66		1382.07	0.007083	5.18	91.35	34.59	0.56
UCWMAIN	Mid	2485.02	473.00	1377.53	1381.64		1382.05	0.000586	5.16	91.65	34.64	0.56
UCWMAIN	Mid	2366.21	473.00	1376.94	1380.60	1380.60	1381.84	0.002514	8.94	52.91	21.77	1.01
UCWMAIN	Mid	2300	473.00	1376.60	1379.93	1380.25	1381.60	0.003972	10.36	45.67	21.50	1.25
UCWMAIN	Mid	2200	473.00	1376.10	1379.35	1379.75	1381.16	0.004525	10.80	43.80	21.50	1.33
UCWMAIN	Mid	2100	473.00	1375.61	1378.82	1379.26	1380.70	0.004770	10.98	43.07	21.50	1.37
UCWMAIN	Mid	2000	473.00	1375.10	1378.29	1378.76	1380.20	0.004918	11.09	42.65	21.50	1.39
UCWMAIN	Mid	1900	473.00	1374.60	1377.80	1378.26	1379.70	0.004902	11.08	42.70	21.50	1.39
UCWMAIN	Mid	1804.98	473.00	1374.13	1377.33	1377.79	1379.23	0.004876	11.06	42.77	21.50	1.38
UCWMAIN	Mid	1723.84	473.00	1373.59	1376.69	1377.40	1378.79	0.005682	11.61	40.73	21.50	1.49
UCWMAIN	Lower	1573.84	909.00	1372.03	1373.47	1374.42	1376.83	0.011119	14.70	61.82	43.00	2.16
UCWMAIN	Lower	1500	911.00	1371.22	1372.67	1373.62	1376.00	0.010995	14.67	62.12	43.00	2.15
UCWMAIN	Lower	1480	911.00	1371.01	1372.46	1373.40	1375.77	0.010920	14.62	62.32	43.14	2.14
UCWMAIN	Lower	1440	911.00	1370.58	1372.02	1372.96	1375.34	0.011020	14.63	62.29	43.42	2.15
UCWMAIN	Lower	1428.8	911.00	1370.46	1374.24	1372.84	1374.72	0.000494	5.54	164.44	43.50	0.50
UCWMAIN	Lower	1401.5	Culvert									
UCWMAIN	Lower	1362.6	911.00	1370.00	1371.79	1372.38	1373.91	0.005315	11.67	78.05	43.50	1.54
UCWMAIN	Lower	1311.5	911.00	1369.74	1371.54	1372.12	1373.64	0.005256	11.63	78.32	43.50	1.53
UCWMAIN	Lower	1211.5	911.00	1369.23	1372.71	1371.61	1373.27	0.000640	6.01	151.46	43.50	0.57
UCWMAIN	Lower	1136	911.00	1368.85	1372.92	1370.95	1373.15	0.000216	3.84	237.22	66.57	0.36
UCWMAIN	Lower	1072.3	Culvert									
UCWMAIN	Lower	1011.5	911.00	1367.91	1372.79		1372.97	0.000136	3.45	264.25	58.29	0.29
UCWMAIN	Lower	911.5	911.00	1367.00	1372.45		1372.91	0.003470	5.43	167.72	55.61	0.55
UCWMAIN	Lower	811.5	911.00	1367.00	1372.16		1372.57	0.002994	5.14	177.07	57.26	0.52
UCWMAIN	Lower	711.5	911.00	1367.00	1371.47		1372.13	0.005949	6.52	139.71	52.97	0.71
UCWMAIN	Lower	611.5	911.00	1366.00	1371.16	1369.98	1371.62	0.003610	5.46	166.96	56.91	0.56
UCWMAIN	Lower	511.5	944.00	1366.00	1370.69		1371.23	0.004146	5.85	161.38	54.87	0.60
UCWMAIN	Lower	411.5	944.00	1365.00	1370.44		1370.85	0.002825	5.18	182.23	55.62	0.50
UCWMAIN	Lower	311.5	944.00	1365.00	1370.01		1370.51	0.003891	5.72	165.08	55.39	0.58
UCWMAIN	Lower	211.5	944.00	1365.00	1368.51	1368.51	1369.80	0.012211	9.13	103.42	40.48	1.01
UCWMAIN	Lower	111.5	933.00	1360.76	1367.63	1365.35	1368.54	0.004479	7.64	122.05	19.63	0.54
UCWMAIN	Lower	61.5	Culvert									
UCWMAIN	Lower	11.5	933.00	1360.49	1366.46		1367.74	0.007253	9.07	102.83	18.58	0.68
UCWMAIN	Lower	0	933.00	1360.49	1366.28	1365.11	1367.65	0.007981	9.39	99.33	18.42	0.71
UCW92ND	92ND_STREET	33760	563.00	1396.10	1399.73	1398.42	1400.00	0.002056	4.18	134.67	52.17	0.46
UCW92ND	92ND_STREET	33648.37	563.00	1396.07	1399.19		1399.64	0.005045	5.36	105.06	58.46	0.68
UCW92ND	92ND_STREET	33608.40	563.00	1396.03	1398.89		1399.36	0.009929	5.50	102.40	46.64	0.65
UCW92ND	92ND_STREET	33594.95	563.00	1396.01	1398.85	1398.23	1399.33	0.000860	5.57	100.99	46.31	0.67
UCW92ND	92ND_STREET	33594.94	Inl Struct									
UCW92ND	92ND_STREET	33585	563.00	1394.33	1398.25	1396.65	1398.66	0.000453	5.13	109.76	28.00	0.46

HEC-RAS Plan: UCW 100% Mix Profile: Mixed_50&10_YR (Continued)

River	Reach	River Sta	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)	
UCW92ND	92ND_STREET	33557.62	Culvert									
UCW92ND	92ND_STREET	33517	563.00	1394.14	1397.70	1396.52	1398.23	0.005793	5.86	96.10	28.00	0.55
UCW92ND	92ND_STREET	33493.59	563.00	1394.08	1396.88	1396.88	1397.93	0.024393	8.25	68.21	32.78	1.01
UCW92ND	92ND_STREET	33475.49	563.00	1392.65	1396.83	1395.47	1397.18	0.005289	4.79	117.44	40.23	0.49
UCW92ND	92ND_STREET	33454.55	563.00	1392.60	1396.73		1397.11	0.002524	4.95	113.77	39.13	0.51
UCW92ND	92ND_STREET	33436.5*	563.00	1392.56	1396.70		1397.06	0.002379	4.79	117.64	40.84	0.50
UCW92ND	92ND_STREET	33417.0*	563.00	1392.52	1396.65	1395.34	1397.01	0.002399	4.80	117.27	40.78	0.50
UCW92ND	92ND_STREET	33411.16	Lat Struct									
UCW92ND	92ND_STREET	33397.5*	563.00	1392.47	1396.60	1395.28	1396.96	0.002434	4.80	117.36	41.33	0.50
UCW92ND	92ND_STREET	33378.0*	563.00	1392.43	1396.55	1395.23	1396.91	0.002503	4.81	117.16	42.08	0.51
UCW92ND	92ND_STREET	33358.5*	563.00	1392.39	1396.47	1395.20	1396.84	0.005856	4.87	115.66	41.98	0.52
UCW92ND	92ND_STREET	33339.0*	501.00	1392.35	1396.42	1394.97	1396.71	0.004628	4.34	115.48	41.76	0.46
UCW92ND	92ND_STREET	33319.5*	501.00	1392.30	1396.31	1394.94	1396.62	0.004845	4.44	112.90	40.81	0.47
UCW92ND	92ND_STREET	33300	537.00	1392.26	1396.10	1394.99	1396.50	0.006578	5.09	105.49	39.01	0.55
UCW92ND	92ND_STREET	33270	537.00	1392.18	1396.11		1396.31	0.002874	3.62	148.49	49.58	0.37
UCW92ND	92ND_STREET	33205.27	537.00	1392.06	1394.79	1394.79	1395.82	0.024492	8.15	65.86	32.35	1.01
UCW92ND	92ND_STREET	33162.12	537.00	1389.34	1393.49	1392.07	1393.81	0.004813	4.55	118.12	40.91	0.47
UCW92ND	92ND_STREET	33141.12	537.00	1389.29	1393.42		1393.75	0.002177	4.58	117.37	40.80	0.48
UCW92ND	92ND_STREET	33100	537.00	1389.20	1393.33		1393.66	0.002212	4.61	116.38	40.39	0.48
UCW92ND	92ND_STREET	33000	537.00	1388.98	1393.11		1393.44	0.002180	4.58	117.32	40.79	0.48
UCW92ND	92ND_STREET	32950	537.00	1388.87	1393.00		1393.33	0.002178	4.58	117.36	40.80	0.48
UCW92ND	92ND_STREET	32900	537.00	1388.76	1392.89		1393.22	0.002174	4.57	117.45	40.82	0.48
UCW92ND	92ND_STREET	32850	537.00	1388.66	1392.78		1393.11	0.002200	4.59	116.93	40.73	0.48
UCW92ND	92ND_STREET	32800	537.00	1388.54	1392.67	1391.28	1393.00	0.002175	4.57	117.42	40.80	0.48
UCW92ND	92ND_STREET	32750	537.00	1388.42	1392.57		1392.89	0.002146	4.55	117.98	40.89	0.47
UCW92ND	92ND_STREET	32700	537.00	1388.31	1392.46		1392.78	0.002140	4.55	118.11	41.62	0.47
UCW92ND	92ND_STREET	32650	537.00	1388.21	1392.35		1392.67	0.002161	4.56	117.69	40.85	0.47
UCW92ND	92ND_STREET	32600	537.00	1388.09	1392.16	1390.83	1392.51	0.005309	4.74	113.38	39.69	0.49
UCW92ND	92ND_STREET	32524	538.00	1387.93	1390.66	1390.66	1391.69	0.024435	8.15	66.00	32.37	1.01
UCW92ND	92ND_STREET	32474.13	538.00	1387.81	1390.45	1389.71	1390.83	0.000678	4.99	107.84	48.82	0.59
UCW92ND	92ND_STREET	32474.12	Inl Struct									
UCW92ND	92ND_STREET	32465.13	538.00	1384.81	1389.71	1386.84	1389.89	0.000115	3.33	161.40	44.42	0.27
UCW92ND	92ND_STREET	32411	Culvert									
UCW92ND	92ND_STREET	32332.13	538.00	1384.49	1389.47		1389.56	0.000842	2.36	228.11	53.27	0.20
UCW92ND	92ND_STREET	32266.33	538.00	1384.46	1389.27		1389.48	0.001192	3.68	146.34	44.86	0.36
UCW92ND	92ND_STREET	32200	538.00	1384.40	1389.19		1389.40	0.001215	3.70	145.30	44.72	0.36
UCW92ND	92ND_STREET	32100	538.00	1384.34	1389.05		1389.27	0.001297	3.79	141.89	44.26	0.37
UCW92ND	92ND_STREET	32000	538.00	1384.28	1388.90		1389.14	0.001399	3.90	138.03	43.73	0.39
UCW92ND	92ND_STREET	31950.*	538.00	1384.25	1388.84		1389.08	0.001025	3.93	137.05	45.45	0.40
UCW92ND	92ND_STREET	31880	538.00	1384.21	1388.76		1389.01	0.001052	3.99	134.89	43.30	0.40
UCW92ND	92ND_STREET	31800	538.00	1384.16	1388.67		1388.92	0.001095	4.04	133.03	43.04	0.41

HEC-RAS Plan: UCW 100% Mix Profile: Mixed_50&10_YR (Continued)

River	Reach	River Sta	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)	
UCW92ND	92ND_STREET	31750	Lat Struct									
UCW92ND	92ND_STREET	31700	538.00	1384.09	1388.55	1386.83	1388.81	0.001148	4.11	130.82	42.73	0.41
UCW92ND	92ND_STREET	31660.38	288.00	1384.07	1388.67	1385.95	1388.74	0.000074	2.06	140.05	44.87	0.21
UCW92ND	92ND_STREET	31609.97	288.00	1384.04	1388.67	1385.92	1388.73	0.000067	1.94	148.21	47.98	0.19
UCW92ND	92ND_STREET	31600	288.00	1384.61	1388.62	1386.52	1388.73	0.000136	2.60	110.70	39.20	0.27
UCW92ND	92ND_STREET	31554.29	312.00	1385.45	1388.30	1387.30	1388.69	0.000470	4.98	62.70	44.02	0.52
UCW92ND	92ND_STREET	31523	Culvert									
UCW92ND	92ND_STREET	31491.29	312.00	1385.16	1387.57	1387.02	1388.11	0.000857	5.91	52.78	25.53	0.67
UCW92ND	92ND_STREET	31450	312.00	1384.20	1387.75		1387.95	0.002662	3.62	86.24	28.16	0.36
UCW92ND	92ND_STREET	31400.9	312.00	1384.09	1387.80	1385.58	1387.91	0.000102	2.77	112.72	38.14	0.25
UCW92ND	92ND_STREET	31368	Culvert									
UCW92ND	92ND_STREET	31334.31	312.00	1383.09	1387.12	1384.57	1387.22	0.000077	2.54	122.97	38.82	0.22
UCW92ND	92ND_STREET	31300	312.00	1383.35	1386.75	1386.24	1387.18	0.009839	5.23	59.63	33.23	0.69
UCW92ND	92ND_STREET	31250	312.00	1382.77	1385.66	1385.66	1386.43	0.022549	7.03	44.39	29.67	1.01
UCW92ND	92ND_STREET	31203.70	312.00	1382.25	1385.04	1383.74	1385.25	0.000273	3.68	84.72	32.02	0.39
UCW92ND	92ND_STREET	31139	Culvert									
UCW92ND	92ND_STREET	31075.10	312.00	1379.19	1383.13	1380.64	1383.21	0.000973	2.35	132.52	36.67	0.21
UCW92ND	Lower92ND_STREET	31060	567.00	1378.02	1383.12	1379.65	1383.20	0.000729	2.32	244.26	47.93	0.18
UCW92ND	Lower92ND_STREET	31018.99	567.00	1378.02	1382.76		1383.11	0.004941	4.74	119.62	39.45	0.48
UCW92ND	Lower92ND_STREET	30992	567.00	1377.96	1382.67		1383.02	0.002268	4.80	118.20	39.23	0.49
UCW92ND	Lower92ND_STREET	30900	567.00	1377.74	1382.46		1382.82	0.002238	4.77	118.80	39.33	0.48
UCW92ND	Lower92ND_STREET	30880	567.00	1377.70	1382.39		1382.75	0.005180	4.82	117.58	39.17	0.49
UCW92ND	Lower92ND_STREET	30800	567.00	1377.51	1381.71		1382.22	0.008219	5.72	99.17	36.21	0.61
UCW92ND	Lower92ND_STREET	30776.50	567.00	1377.46	1381.32	1380.71	1381.98	0.011647	6.50	87.25	34.18	0.72
UCW92ND	Lower92ND_STREET	30769.50	567.00	1377.44	1380.69	1380.69	1381.82	0.024038	8.51	66.59	29.97	1.01
UCW92ND	Lower92ND_STREET	30745.50	567.00	1375.83	1380.99	1379.08	1381.27	0.003554	4.22	134.37	41.09	0.41
UCW92ND	Lower92ND_STREET	30721.50	567.00	1375.78	1380.94		1381.21	0.001530	4.15	136.70	41.97	0.41
UCW92ND	Lower92ND_STREET	30700	567.00	1375.73	1380.91		1381.17	0.001506	4.12	137.49	42.08	0.40
UCW92ND	Lower92ND_STREET	30600	567.00	1375.49	1380.78		1381.03	0.001379	3.99	142.06	42.73	0.39
UCW92ND	Lower92ND_STREET	30500	567.00	1375.26	1380.69		1380.89	0.001058	3.60	157.35	45.27	0.34
UCW92ND	Lower92ND_STREET	30471.54	567.00	1375.19	1380.67	1377.95	1380.88	0.000171	3.71	152.85	36.86	0.32
UCW92ND	Lower92ND_STREET	30432	Culvert									
UCW92ND	Lower92ND_STREET	30392.54	567.00	1374.96	1379.44	1377.67	1379.75	0.003456	4.47	126.90	38.28	0.41
UCW92ND	Lower92ND_STREET	30300	567.00	1374.52	1378.97	1377.62	1379.35	0.005583	4.93	114.91	39.18	0.51
UCW92ND	Lower92ND_STREET	30200	567.00	1374.05	1377.18	1377.18	1378.26	0.023586	8.36	67.86	31.07	1.00
UCW92ND	Lower92ND_STREET	30100.92	567.00	1373.59	1376.67	1376.68	1377.78	0.002046	8.46	67.00	30.99	1.01

Appendix I

Construction Cost Estimate

ENGINEER'S DISCLAIMER ON THE ENGINEER ESTIMATE OF PROBABLE COST

This **ENGINEER'S** opinion of probable construction cost is made on the basis of **ENGINEER'S** experience and qualifications and represents the **ENGINEER'S** best judgment as an experienced and qualified professional generally familiar with the industry to be reasonably accurate in providing estimated costs of a project. However, since the **ENGINEER** has no control over the cost of labor, materials, equipment, or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, **ENGINEER** cannot and does not guarantee that proposals, bids, or actual construction cost will not vary from opinions of probable construction cost as prepared by **ENGINEER**. Prices for the utility relocations (i.e. electrical, gas, phone, cable TV, etc.) and native plant preservation are not included in this estimate. The **Owner** hereby acknowledges that estimates of probable construction costs cannot be guaranteed, and such estimates are not to be constructed as a promise to design facilities within a cost limitation."

NOTES:

1. Quantities are estimates based off design drawings. Actual quantities may varies due to shrinkage, expansion, underground conditions and/or contractor's mean of construction.
2. Unit costs are our best estimates based on similar projects. These costs are not guarantees. A number of factors may affect these costs when ultimately priced by a contractor.
3. This "Engineer Estimate of Probable Cost" does not include fees that maybe charged by other government agencies, and/or taxes that may be required.
4. "Admin., legal and overhead" is totally at the discretion of the owner.
6. All cost requested by the owner outside the scope of the contracts negotiated during the course of this project will be additional services and are not included in the "Total Engineer Estimate of Probable Cost" as listed above.

Estimate Analysis of Probable Cost
Main Channel

GENERAL -100

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
1	104150	PROJECT SIGNS	2	EA	$500.00	$1,000.00
2	104250	PROJECT HOTLINE	1	LS	$1,000.00	$1,000.00
3	105801	CONSTRUCTION SURVEYING	1	LS	$18,000.00	$18,000.00
4	105820	AS-BUILTS	1	LS	$11,000.00	$11,000.00
5	105905	STORMWATER POLLUTION PREVENTION PLAN	1	LS	$10,000.00	$10,000.00
6	800001	MOBILIZATION / DE-MOBILIZATION/CLEANUP	1	LS	$25,000.00	$25,000.00
					General Subtotal =	**$66,000.00**

EARTH WORK -200

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
7	201001	CLEARING AND GRUBBING	1	LS	$5,000.00	$5,000.00
8	215001	CHANNEL CUT	37,979	CY	$8.00	$303,832.00
9	215002	CHANNEL FILL	4,092	CY	$7.00	$28,644.00
10	215004	DETENTION BASIN CUT	27,227	CY	$8.00	$217,816.00
11	215005	DETENTION BASIN FILL	330	CY	$7.00	$2,310.00
12	220402	NRCS DROP STRUCTURE RIPRAP WITH GEOSYNTHETIC FABRIC	2,803	CY	$45.00	$126,135.00

EARTH WORK -200 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
13	220403	RIPRAP WITH GEOSYNTHETIC FABRIC	3,668	CY	$45.00	$165,060.00
14	220404	DUMP RIPRAP WITH GEOSYNTHETIC FABRIC	513	CY	$45.00	$23,085.00
15	220701	SHOTCRETE COVERED GABION	1	LS	$1,000.00	$1,000.00
					Earth Work Subtotal =	**$872,882.00**

STREETS RELATED WORK - 300

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
16	321001	ASPHALT PAVEMENT COS 2200	1,638	SY	$25.00	$40,950.00
17	324108	CONCRETE PAVEMENT	6,258	SF	$11.35	$71,028.30
18	331202	MICROSEAL MAG 331	1,533	SY	$3.00	$4,599.00
19	337202	APPLY NON-SKID SURFACE TREATMENT	2,332	SF	$2.00	$4,664.00
20	340001	TYPE A CURB AND GUTTER MAG 220-1	1,073	LF	$15.00	$16,095.00
21	340005	VERTICAL CURB MAG 222 , TYPE B	509	LF	$11.00	$5,599.00
22	340006	CURB AND GUTTER TRANSITION TYPE A TO TYPE C MAG 221	5	LF	$15.00	$75.00
23	340007	TYPE C CURB AND GUTTER MAG 220-1	3	LF	$14.20	$42.60
24	340205	CONCRETE SIDEWALK MAG 230	15,139	SF	$2.89	$43,751.71
25	340215	CONCRETE MUP COS 2283	33,390	SF	$3.36	$112,190.40
26	340217	NON-SKID CONCRETE MUP COS 2283	6,650	SF	$5.83	$38,769.50

STREETS RELATED WORK - 300 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
27	340220	RAISED MEDIAN ISLAND COS 2290-1, L=60'	1	EA	$2,500.00	$2,500.00
28	340265	DIRECTIONAL SIDEWALK RAMP COS 2232	2	EA	$2,000.00	$4,000.00
29	340268	SHARED CURB SIDEWALK RAMP COS 2234	4	EA	$2,000.00	$8,000.00
30	340269	MID-BLOCK SIDEWALK RAMP COS 2235-1	1	EA	$2,000.00	$2,000.00
31	340406	DRIVEWAY ENTRANCES COS 250-1	1	EA	$600.00	$600.00
32	340601	CONCRETE SIDEWALK SCUPPER MAG 206	2	EA	$2,500.00	$5,000.00
33	345002	ADJUST VALVE COS 2270	1	EA	$250.00	$250.00
					Streets Related Work Subtotal =	**$360,114.51**

REMOVAL OF EXISTING IMPROVEMENT - 350

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
34	350001	REMOVE ASPHALT PAVEMENT	1,675	SY	$3.50	$5,862.50
35	350041	REMOVE CURB AND GUTTER	1,335	LF	$3.50	$4,672.50
36	350050	REMOVE CONCRETE LINING	9,544	SF	$3.00	$28,632.00
37	350060	REMOVE CONCRETE EMBANKMENT	752	SF	$5.00	$3,760.00
38	350061	REMOVE CONCRETE SIDEWALK, DRIVEWAYS AND SLABS	34,688	SF	$2.20	$76,313.60
39	350065	REMOVE SIDEWALK RAMP	3	EA	$360.00	$1,080.00
40	350082	REMOVE WINGWALL	24	EA	$1,600.00	$38,400.00

REMOVAL OF EXISTING IMPROVEMENT - 350 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
41	350120	REMOVE FENCE	216	LF	$1.50	$324.00
42	350121	REMOVE CMU WALL	60	LF	$15.00	$900.00
43	350201	REMOVE STORM DRAIN PIPE	6	LF	$15.00	$90.00
44	350210	REMOVE RCP	410	LF	$15.00	$6,150.00
45	350220	REMOVE PVC STORM DRAIN	26	LF	$10.00	$260.00
46	350241	REMOVE 66" RCP	33	LF	$50.00	$1,650.00
47	350259	REMOVE SEWER LINE	90	LF	$15.00	$1,350.00
48	350260	REMOVE WATERLINE	1,648	LF	$15.00	$24,720.00
49	350264	REMOVE CMP	811	LF	$10.00	$8,110.00
50	350266	PLUG AND ABANDON EXCMP PIPE IN PLACE	1	EA	$1,000.00	$1,000.00
51	350280	REMOVE CATCH BASIN	2	EA	$1,200.00	$2,400.00
52	350282	REMOVE STORM WATER INLET	1	EA	$500.00	$500.00
53	350290	REMOVE CONCRETE BOX	1	EA	$500.00	$500.00
54	350322	REMOVE GABION	1,043	CY	$15.00	$15,645.00
55	350324	REMOVE BOX CULVERT	663	LF	$100.00	$66,300.00
56	350325	REMOVE GUARDRAIL	1,494	LF	$1.00	$1,494.00
57	350716	REMOVE VALVE	10	EA	$400.00	$4,000.00
58	350801	MISCELLANEOUS REMOVALS AND OTHER WORK	1	LS	$4,000.00	$4,000.00

REMOVAL OF EXISTING IMPROVEMENT - 350 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
59	351281	ABANDON DRYWELL	1	EA	$700.00	$700.00
					Removal of Existing Improvement Subtotal =	**$298,813.60**

RIGHT-OF-WAY AND TRAFFIC CONTROL - 400

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
60	401001	TRAFFIC CONTROL	1	LS	$25,000.00	$25,000.00
61	401101	UNIFORMED LAW ENFORCEMENT OFFICER	1,400	HR	$25.00	$35,000.00
62	402006	SIX-FOOT HIGH CHAIN LINK CONSTRUCTION FENCE	1,940	LF	$9.00	$17,460.00
63	402008	FOUR-FOOT HIGH PLASTIC CONSTRUCTION FENCE	3,890	LF	$5.00	$19,450.00
64	416510	TYPE 2 REMOVAL BOLLARD MAG 140	36	EA	$200.00	$7,200.00
					Right-of-Way and Traffic Control Subtotal =	**$104,110.00**

LANDSCAPE - 430

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
65	430001	DECOMPOSED GRANITE, 2" DEPTH (SWEETWATER BASIN)	277	SY	$3.75	$1,038.75
66	430003	STABILIZED DECOMPOSED GRANITE, 3" DEPTH (LARKSPUR BASIN)	1,093	SY	$5.50	$6,011.50
67	430010	BOULDERS (MONUMENT MARKER, 3FT X 3FT X 3FT, SURFACE SELECT WEATHERED)	5	EA	$350.00	$1,750.00
68	430101	GROUNDCOVER, 1 GALLON	543	EA	$9.00	$4,887.00
69	430201	SHRUB, 1 GALLON	726	EA	$9.00	$6,534.00

LANDSCAPE - 430 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
70	430202	SHRUB, 5 GALLON	904	EA	$30.00	$27,120.00
71	430303	TREE, 24" BOX	227	EA	$225.00	$51,075.00
72	430304	TREE, 36" BOX	219	EA	$350.00	$76,650.00
73	430501	SAGUARO, (6' SPEARS)	15	EA	$600.00	$9,000.00
74	430602	SALVAGE & RELOCATE NATIVE CACTI, SAGUARO, AVG. 12' HT.	4	EA	$750.00	$3,000.00
75	430604	SALVAGE & RELOCATE NATIVE CACTI, PRICKLY PEAR, AVG. 3' HT.	10	EA	$200.00	$2,000.00
76	430621	SALVAGE & RELOCATE NATIVE TREE, AVG 14' HT X 14' WT.	52	EA	$750.00	$39,000.00
77	430701	NATIVE PLANT SALVAGE/STORAGE	10	MO	$1,200.00	$12,000.00
					Landscape Subtotal =	**$240,066.25**

IRRIGATION - 440

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
78	440002	BACKFLOW PREVENTER WITH CAGE (1")	3	EA	$2,500.00	$7,500.00
79	440007	BALL VALVE (3/4")	14	EA	$125.00	$1,750.00
80	440015	BALL VALVE (1-1/2")	2	EA	$225.00	$450.00
81	440102	SOLAR CONTROLLER WITH ENCLOSURE	3	EA	$1,200.00	$3,600.00
82	440207	IRRIGATION PIPING LATERAL DRIP	19,420	LF	$1.55	$30,101.00
83	440210	IRRIGATION PIPING MAINLINE (1")	300	LF	$2.15	$645.00

IRRIGATION - 440 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
84	440215	IRRIGATION PIPING MAINLINE (1-1/2")	3,260	LF	$3.50	$11,410.00
85	440227	IRRIGATION PIPING LATERAL (3/4" SOFT COPPER) THIS IS AN EITHER/OR SELECTION: EITHER 660LF OF PIPE UNDER THE CHANNELS WILL BE SOFT COPPER AND REDUCE 660LF OF ITEM 440263 OR 660LF OF 2" SCHEDULE 80 SLEEVES WILL BE USED AND THIS ITEM WILL BE DELETED FROM THE SCOPE. THE CONTACTOR TO DECIDE BASED ON THEIR SKILLS AND FIELD CONDITIONS.	460	LF	$15.00	$6,900.00
86	440261	IRRIGATION SLEEVING (4")(DUCTILE IRON)	90	LF	$30.00	$2,700.00
87	440262	IRRIGATION SLEEVING (4")(SCHEDULE 40)	90	LF	$20.00	$1,800.00
88	440263	IRRIGATION SLEEVING (2")(SCHEDULE 80)	960	LF	$15.00	$14,400.00
89	440264	IRRIGATION SLEEVING (3")(SCHEDULE 40)	90	LF	$14.00	$1,260.00
90	440265	IRRIGATION SLEEVING (1-1/2")(SCHEDULE 40)	1,090	LF	$12.00	$13,080.00
91	440301	IRRIGATION CONTROL VALVES WITH ID TAG	17	EA	$125.00	$2,125.00
92	440305	IRRIGATION CONTROL VALVES WITH TBOS	2	EA	$500.00	$1,000.00
93	440315	MASTER VALVE	3	EA	$250.00	$750.00
94	440320	DRIP FILTER & PRESSURE REGULATOR	17	EA	$150.00	$2,550.00
95	440501	IRRIGATION EMITTERS MULTI	1,186	EA	$20.00	$23,720.00
96	440502	IRRIGATION EMITTERS SINGLE	439	EA	$15.00	$6,585.00
					Irrigation Subtotal =	**$132,326.00**

STRUCTURES - 500

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
97	505011	CATCH BASIN MAG 531	2	EA	$2,000.00	$4,000.00
98	505026	CONCRETE FLOOR (7")	4,798	SF	$8.75	$41,982.50
99	505029	MODIFY SLAB FOR SEWER PROTECTION	47	LF	$40.00	$1,880.00
100	505039	CATCH BASIN MAG 533-2 TYPE D, L=17'	2	EA	$6,000.00	$12,000.00
101	505103	TRENCH DRAIN WITH APRON	1	EA	$19,000.00	$19,000.00
102	505126	CONCRETE HEADWALL ADOT B-11.11	212	SF	$44.00	$9,328.00
103	505127	OUTLET AND INLET WINGWALL ADOT B-11.12	1	EA	$4,500.00	$4,500.00
104	505131	RAISED HEADWALL	760	SF	$18.00	$13,680.00
105	505132	CONCRETE HEADWALL MAG 501 - 4	5	EA	$1,000.00	$5,000.00
106	505133	CONCRETE HEADWALL MAG 501 - U TYPE	6	EA	$1,000.00	$6,000.00
107	505138	INLET DROP STRUCTURE	3	EA	$12,500.00	$37,500.00
108	505140	MAG 502-2 TRASH RACK	4	EA	$300.00	$1,200.00
109	505141	CATCH BASIN AND APRON ADOT C-15.81	4	EA	$1,100.00	$4,400.00
110	505142	CONCRETE BASIN LATERAL WEIR	9,448	SF	$11.61	$109,691.28
111	505303	CAP/CUTOFF WALL LOW WATER CROSSING	416	SF	$11.00	$4,576.00
112	505304	PLAIN CONCRETE CUTOFF WALL	669	LF	$37.00	$24,753.00
113	505403	CBC ADOT B-02.20 DOUBLE 8'X3'	97	LF	$792.00	$76,824.00
114	505404	CBC ADOT B-02.20 DOUBLE 8'X4'	146	LF	$842.00	$122,932.00

STRUCTURES - 500 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
115	505405	CBC ADOT B-02.20 DOUBLE 8'X6'	65	LF	$942.00	$61,230.00
116	505406	CBC ADOT B-02.20 DOUBLE 10'X4'	62	LF	$1,129.00	$69,998.00
117	505407	CBC ADOT B-02.30 TRIPLE 8'X4'	65	LF	$1,217.00	$79,105.00
118	505408	CBC ADOT B-02.30 TRIPLE 8'X5'	150	LF	$1,283.00	$192,450.00
119	505410	CONSTRUCT 66" RCP EQUIVALENT CBC	33	LF	$431.00	$14,223.00
120	505411	CBC CONCRETE CUTOFF WALL PER ADOT WINGWALL SECTION C-C	544	SF	$22.00	$11,968.00
121	505412	3-18" RCP ENCASEMENT	1	LS	$9,000.00	$9,000.00
122	505461	INLET WINGS ADOT B-08.10/B-08.20	1,958	SF	$32.00	$62,656.00
123	505462	OUTLET WINGS ADOT B-08.10/B-08.20	759	SF	$32.00	$24,288.00
124	505603	TRAPEZOIDAL CONCRETE CHANNEL LINING (7")	5,907	SF	$11.28	$66,630.96
125	505604	RECTANGULAR CONCRETE CHANNEL LINING (7")	18,325	SF	$12.36	$226,497.00
126	505605	COMPOSITE SHAPES CONCRETE CHANNEL LINING (7")	24,458	SF	$12.36	$302,300.88
127	505824	COMBINED TRAFFIC AND PEDESTRIAN BARRIER	150	LF	$50.00	$7,500.00
128	505825	CONCRETE RETAINING WALL ADOT B-10.10 (REACH 4)	3,475	SF	$40.00	$139,000.00
129	505826	CONCRETE RETAINING WALL ADOT B-10.10 (CURVED)	371	SF	$40.00	$14,840.00
130	505829	CONCRETE RETAINING WALL ADOT B-10.10 (RECTANGULAR CHANNEL)	20,253	SF	$40.00	$810,120.00
131	505830	WILDLIFE ACCESS	4	EA	$2,500.00	$10,000.00
132	505833	DIVERSION STRUCTURE PER DETAILS ON DWG GD-18	1	EA	$5,500.00	$5,500.00

STRUCTURES - 500 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
133	505834	DIVERSION WEIR PER DETAILS ON DWG GD-13	101	LF	$65.00	$6,565.00
134	505835	FLOOR INTEGRATED CONCRETE WALL	2,013	SF	$25.00	$50,325.00
135	505907	CONCRETE CUTOFF WALL	742	LF	$50.00	$37,100.00
136	510050	CMU WALL PER DETAIL ON DWG GD-5	865	LF	$150.00	$129,750.00
137	510051	MATCHING ADJACENT CMU FENCE	270	LF	$125.00	$33,750.00
138	520001	STEEL HANDRAIL COS 2508	3,101	LF	$45.00	$139,545.00
					Structure Subtotal =	**$3,003,588.62**

WATER, SEWER AND DRAINAGE PIPE- 600

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
139	610306	6" DIP CLASS 150, RESTRAINED	11	LF	$70.00	$770.00
140	610713	WATERLINE THRUST COLLAR	1	EA	$200.00	$200.00
141	610721	6" CLASS 350 DIP RESTRAINED VERT. REALIGN, COS 2370	358	LF	$70.00	$25,060.00
142	610722	8" CLASS 350 DIP RESTRAINED VERT. REALIGN, COS 2370	961	LF	$75.00	$72,075.00
143	610723	10" CLASS 350 DIP RESTRAINED VERT. REALIGN, COS 2370	175	LF	$80.00	$14,000.00
144	610724	12" CLASS 350 DIP RESTRAINED VERT. REALIGN, COS 2370	205	LF	$85.00	$17,425.00
145	610843	CUT AND PLUG EXISTING 8" WATERLINE PER PHX STD DTL P1343	1	EA	$600.00	$600.00

WATER, SEWER AND DRAINAGE PIPE- 600 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
146	615208	8" PVC C900 (DR18) SEWER PIPE	90	LF	$40.00	$3,600.00
147	618018	18" CLASS III RGRCP	622	LF	$138.00	$85,836.00
148	618020	24" CLASS III RGRCP	27	LF	$150.00	$4,050.00
149	618024	36" CLASS III RGRCP	24	LF	$185.00	$4,440.00
150	618168	CONNECT 18" RCP TO 66" RCP MAG 524	1	EA	$1,000.00	$1,000.00
151	618518	18" PIPE COLLAR, MAG 505	1	EA	$500.00	$500.00
152	619852	FLAP GATE	3	EA	$400.00	$1,200.00
153	621097	CMP/CMS TREE WELL	8	EA	$600.00	$4,800.00
154	630306	6" GATE VALVE	6	EA	$600.00	$3,600.00
155	630308	8" GATE VALVE	2	EA	$800.00	$1,600.00
156	630310	10" GATE VALVE	2	EA	$1,000.00	$2,000.00
157	630312	12" GATE VALVE	2	EA	$1,200.00	$2,400.00
158	630602	2" AIR RELEASE VALVE COS 2348	14	EA	$3,000.00	$42,000.00
					Water and Sewer Subtotal =	**$287,156.00**

MATERIALS - 700

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
159	724828	INTEGRATED CONCRETE COLORING	11,899	SF	$0.65	$7,734.35
160	724829	STAIN CONCRETE COLORING	8,469	SF	$0.65	$5,504.85
					Materials Subtotal =	**$13,239.20**

SPECIALTY CONSTRUCTION - 800

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
161	800013	MISCELLANEOUS CONSTRUCTION AT EL PASEO ESTATE	1	LS	$25,000.00	$25,000.00
					Specialty Construction Subtotal =	**$25,000.00**

SUMMARY OF COST ESTIMATE

GENERAL SUBTOTAL	$66,000.00
EARTH WORK SUBTOTAL	$872,882.00
STREET RELATED WORK SUBTOTAL	$360,114.51
REMOVAL OF EXISTING IMPROVEMENT SUBTOTAL	$298,813.60
RIGHT-OF-WAY AND TRAFFIC CONTROL SUBTOTAL	$104,110.00
LANDSCAPE SUBTOTAL	$240,066.25
IRRIGATION SUBTOTAL	$132,326.00
STRUCTURES SUBTOTAL	$3,003,588.62
WATER AND SEWER SUBTOTAL	$287,156.00
MATERIALS SUBTOTAL	$13,239.20
SPECIAL CONSTRUCTION SUBTOTAL	$25,000.00
GRAND TOTAL IN WRITING:	**$5,403,296.18**

Estimate Analysis of Probable Cost
92ND Street Channel

GENERAL -100

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
1	104150	PROJECT SIGNS	2	EA	$500.00	$1,000.00
2	104250	PROJECT HOTLINE	1	LS	$600.00	$600.00
3	105801	CONSTRUCTION SURVEYING	1	LS	$10,000.00	$10,000.00
4	105820	AS-BUILTS	1	LS	$6,000.00	$6,000.00
5	105905	STORMWATER POLLUTION PREVENTION PLAN	1	LS	$10,000.00	$10,000.00
6	800001	MOBILIZATION / DE-MOBILIZATION/CLEANUP	1	LS	$15,000.00	$15,000.00
					General Subtotal =	**$42,600.00**

EARTH WORK -200

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
7	201001	CLEARING AND GRUBBING	1	LS	$2,000.00	$2,000.00
8	215001	CHANNEL CUT	13,396	CY	$8.00	$107,168.00
9	215002	CHANNEL FILL	852	CY	$7.00	$5,964.00
10	215004	DETENTION BASIN CUT	6,799	CY	$8.00	$54,392.00
11	215005	DETENTION BASIN FILL	67	CY	$7.00	$469.00

EARTH WORK -200 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
12	220402	NRCS DROP STRUCTURE RIPRAP WITH GEOSYNTHETIC FABRIC	1,306	CY	$45.00	$58,770.00
13	220403	RIPRAP WITH GEOSYNTHETIC FABRIC	3,418	CY	$45.00	$153,810.00
14	220404	DUMP RIPRAP WITH GEOSYNTHETIC FABRIC	83	CY	$45.00	$3,735.00
					Earth Work Subtotal =	**$386,308.00**

STREETS RELATED WORK - 300

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
15	321001	ASPHALT PAVEMENT COS 2200	2,166	SY	$25.00	$54,150.00
16	324121	EXPOSED AGGREGATE CONCRETE PAVEMENT	772	SF	$7.75	$5,983.00
17	331202	MICROSEAL MAG 331	6,455	SY	$3.00	$19,365.00
18	336301	REPLACE AND MATCH PAVEMENT	1,352	SY	$25.00	$33,800.00
19	340001	TYPE A CURB AND GUTTER MAG 220-1	1,134	LF	$15.00	$17,010.00
20	340005	VERTICAL CURB MAG 222 , TYPE B	199	LF	$11.00	$2,189.00
21	340205	CONCRETE SIDEWALK MAG 230	4,217	SF	$2.89	$12,187.13
22	340215	CONCRETE MUP COS 2283	1,660	SF	$3.36	$5,577.60
23	340268	SHARED CURB SIDEWALK RAMP COS 2234	4	EA	$2,000.00	$8,000.00
24	340302	CONCRETE VALLEY GUTTER COS 2240	1,443	SF	$11.00	$15,873.00

STREETS RELATED WORK - 300 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
25	340601	CONCRETE SIDEWALK SCUPPER MAG 206	3	EA	$2,500.00	$7,500.00
26	342092	CAST-IN-PLACE CONCRETE HEADER	163	LF	$12.00	$1,956.00
					Streets Related Work Subtotal =	**$183,590.73**

REMOVAL OF EXISTING IMPROVEMENT - 350

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
27	350001	REMOVE ASPHALT PAVEMENT	3,650	SY	$3.50	$12,775.00
28	350031	REMOVE VALLEY GUTTER	1,017	SF	$2.00	$2,034.00
29	350041	REMOVE CURB AND GUTTER	1,263	LF	$3.50	$4,420.50
30	350050	REMOVE CONCRETE LINING	5,943	SF	$3.00	$17,829.00
31	350061	REMOVE CONCRETE SIDEWALK, DRIVEWAYS AND SLABS	7,870	SF	$2.20	$17,314.00
32	350065	REMOVE SIDEWALK RAMP	4	EA	$360.00	$1,440.00
33	350082	REMOVE WINGWALL	15	EA	$1,600.00	$24,000.00
34	350201	REMOVE STORM DRAIN PIPE	15	LF	$15.00	$225.00
35	350259	REMOVE SEWER LINE	71	LF	$15.00	$1,065.00
36	350260	REMOVE WATERLINE	1,017	LF	$15.00	$15,255.00
37	350264	REMOVE CMP	1,065	LF	$10.00	$10,650.00

REMOVAL OF EXISTING IMPROVEMENT - 350 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
38	350280	REMOVE CATCH BASIN	2	EA	$1,200.00	$2,400.00
39	350322	REMOVE GABION	88	CY	$15.00	$1,320.00
40	350324	REMOVE BOX CULVERT	128	LF	$100.00	$12,800.00
41	350325	REMOVE GUARDRAIL	285	LF	$1.00	$285.00
42	350608	REMOVE TEMPORARY BARRICADE	1	EA	$200.00	$200.00
43	350716	REMOVE VALVE	2	EA	$400.00	$800.00
44	350801	MISCELLANEOUS REMOVALS AND OTHER WORK	1	LS	$2,000.00	$2,000.00
					Removal of Existing Improvement Subtotal =	**$126,812.50**

RIGHT-OF-WAY AND TRAFFIC CONTROL - 400

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
45	401001	TRAFFIC CONTROL	1	LS	$30,000.00	$30,000.00
46	401101	UNIFORMED LAW ENFORCEMENT OFFICER	1,000	HR	$25.00	$25,000.00
47	402006	SIX-FOOT HIGH CHAIN LINK CONSTRUCTION FENCE	260	LF	$9.00	$2,340.00
48	405012	SURVEY MARKER COS 2120	1	EA	$250.00	$250.00
49	416510	TYPE 2 REMOVAL BOLLARD MAG 140	12	EA	$200.00	$2,400.00
					Right-of-Way and Traffic Control Subtotal =	**$59,990.00**

LANDSCAPE - 430

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
50	430006	RESODDING	670	SY	$9.00	$6,030.00
51	430101	GROUNDCOVER, 1 GALLON	170	EA	$9.00	$1,530.00
52	430201	SHRUB, 1 GALLON	113	EA	$9.00	$1,017.00
53	430202	SHRUB, 5 GALLON	347	EA	$30.00	$10,410.00
54	430303	TREE, 24" BOX	54	EA	$225.00	$12,150.00
55	430304	TREE, 36" BOX	40	EA	$350.00	$14,000.00
56	430501	SAGUARO, (6' SPEARS)	7	EA	$600.00	$4,200.00
57	430603	SALVAGE & RELOCATE NATIVE CACTI, BARREL, AVG. 2' HT.	1	EA	$120.00	$120.00
58	430621	SALVAGE & RELOCATE NATIVE TREE, AVG. 14' HT X 14' WT.	16	EA	$750.00	$12,000.00
59	430701	NATIVE PLANT SALVAGE/STORAGE	8	MO	$1,200.00	$9,600.00
					Landscape Subtotal =	**$71,057.00**

IRRIGATION - 440

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
60	440002	BACKFLOW PREVENTER WITH CAGE (1")	1	EA	$2,500.00	$2,500.00
61	440007	BALL VALVE (3/4")	4	EA	$125.00	$500.00
62	440015	BALL VALVE (1-1/2")	2	EA	$225.00	$450.00

IRRIGATION - 440 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
63	440102	SOLAR CONTROLLER WITH ENCLOSURE	1	EA	$1,200.00	$1,200.00
64	440207	IRRIGATION PIPING LATERAL DRIP	11,599	LF	$1.55	$17,978.45
65	440208	IRRIGATION PIPING LATERAL TURF	600	LF	$1.95	$1,170.00
66	440210	IRRIGATION PIPING MAINLINE (1")	20	LF	$2.15	$43.00
67	440215	IRRIGATION PIPING MAINLINE (1-1/2")	1,528	LF	$3.50	$5,348.00
68	440227	IRRIGATION PIPING LATERAL (3/4" SOFT COPPER) THIS IS AN EITHER/OR SELECTION: EITHER 660LF OF PIPE UNDER THE CHANNELS WILL BE SOFT COPPER AND REDUCE 660LF OF ITEM 440263 OR 660LF OF 2" SCHEDULE 80 SLEEVES WILL BE USED AND THIS ITEM WILL BE DELETED FROM THE SCOPE. THE CONTACTOR TO DECIDE BASED ON THEIR SKILLS AND FIELD CONDITIONS.	200	LF	$15.00	$3,000.00
69	440261	IRRIGATION SLEEVING (4")(DUCTILE IRON)	170	LF	$30.00	$5,100.00
70	440262	IRRIGATION SLEEVING (4")(SCHEDULE 40)	170	LF	$20.00	$3,400.00
71	440263	IRRIGATION SLEEVING (2")(SCHEDULE 80)	300	LF	$15.00	$4,500.00
72	440265	IRRIGATION SLEEVING (1-1/2")(SCHEDULE 40)	115	LF	$12.00	$1,380.00
73	440301	IRRIGATION CONTROL VALVES WITH ID TAG	11	EA	$125.00	$1,375.00
74	440315	MASTER VALVE	1	EA	$250.00	$250.00
75	440320	DRIP FILTER & PRESSURE REGULATOR	8	EA	$150.00	$1,200.00
76	440501	IRRIGATION EMITTERS MULTI	304	EA	$20.00	$6,080.00

IRRIGATION - 440 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
77	440502	IRRIGATION EMITTERS SINGLE	128	EA	$15.00	$1,920.00
78	440541	IRRIGATION SPRAY HEADS	10	EA	$15.00	$150.00
79	440542	IRRIGATION ROTOR HEADS	15	EA	$25.00	$375.00
80	440832	RESTORE LANDSCAPE AND IRRIGATION	1	LS	$1,000.00	$1,000.00
					Irrigation Subtotal =	**$58,919.45**

STRUCTURES - 500

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
81	505029	MODIFY SLAB FOR SEWER PROTECTION	27	LF	$40.00	$1,080.00
82	505039	CATCH BASIN MAG 533-2 TYPE D, L=17'	2	EA	$6,000.00	$12,000.00
83	505074	CATCH BASIN, COP 1569 TYPE M-1, L=10'	1	EA	$3,600.00	$3,600.00
84	505101	TRENCH DRAIN	1	EA	$18,000.00	$18,000.00
85	505102	CURB TRENCH DRAIN	1	EA	$20,000.00	$20,000.00
86	505126	CONCRETE HEADWALL ADOT B-11.11	45	SF	$44.00	$1,980.00
87	505131	RAISED HEADWALL	597	SF	$18.00	$10,746.00
88	505132	CONCRETE HEADWALL MAG 501 - 4	3	EA	$1,000.00	$3,000.00
89	505133	CONCRETE HEADWALL MAG 501 - U TYPE	1	EA	$1,000.00	$1,000.00

STRUCTURES - 500 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
90	505138	INLET DROP STRUCTURE	2	EA	$12,500.00	$25,000.00
91	505139	MAG 502-1 DROP INLET HEADWALL AND TRASH RACK	1	EA	$1,500.00	$1,500.00
92	505141	CATCH BASIN AND APRON ADOT C-15.81	1	EA	$1,100.00	$1,100.00
93	505142	CONCRETE BASIN LATERAL WEIR	6,509	SF	$11.61	$75,569.49
94	505301	CAP/CUTOFF WALL (SEWER PROTECTION)	371	LF	$11.00	$4,081.00
95	505304	PLAIN CONCRETE CUTOFF WALL	294	LF	$37.00	$10,878.00
96	505401	CBC ADOT B-02.10 SINGLE 8'X4'	732	LF	$527.00	$385,764.00
97	505402	CBC ADOT B-02.10 SINGLE 8'X5'	465	LF	$568.00	$264,120.00
98	505404	CBC ADOT B-02.20 DOUBLE 8'X4'	77	LF	$842.00	$64,834.00
99	505407	CBC ADOT B-02.30 TRIPLE 8'X4'	66	LF	$1,217.00	$80,322.00
100	505409	CBC ADOT B-02.30 TRIPLE 10'X4'	131	LF	$1,635.00	$214,185.00
101	505411	CBC CONCRETE CUTOFF WALL PER ADOT WINGWALL SECTION C-C	495	SF	$22.00	$10,890.00
102	505461	INLET WINGS ADOT B-08.10/B-08.20	1,090	SF	$32.00	$34,880.00
103	505462	OUTLET WINGS ADOT B-08.10/B-08.20	2,210	SF	$32.00	$70,720.00
104	505603	TRAPEZOIDAL CONCRETE CHANNEL LINING (7")	5,255	SF	$12.28	$64,531.40
105	505604	RECTANGULAR CONCRETE CHANNEL LINING (7")	12,244	SF	$12.36	$151,335.84
106	505606	CONCRETE BANK PROTECTION	3,599	SF	$12.28	$44,195.72
107	505824	COMBINED TRAFFIC AND PEDESTRIAN BARRIER	281	LF	$50.00	$14,050.00

STRUCTURES - 500 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
108	505829	CONCRETE RETAINING WALL ADOT B-10.10 (RECTANGULAR CHANNEL)	4,519	SF	$40.00	$180,760.00
109	505907	CONCRETE CUTOFF WALL	46	LF	$50.00	$2,300.00
110	510011	CMU RETAINING WALL ADOT B-18.50	6	LF	$115.00	$690.00
111	510050	CMU WALL PER DETAIL ON DWG GD-5	174	LF	$150.00	$26,100.00
112	512107	MODULAR BLOCK PLANTER	378	LF	$90.00	$34,020.00
113	515902	SAFETY RACK	2	EA	$5,000.00	$10,000.00
114	520001	STEEL HANDRAIL COS 2508	685	LF	$45.00	$30,825.00
					Structures Subtotal =	**$1,874,057.45**

WATER, SEWER AND DRAINAGE PIPE - 600

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
115	610308	NEW WATERLINE DIP CLASS 350- COS- 2370 (NON-RESTRAINED)	448	LF	$75.00	$33,600.00
116	610713	WATERLINE THRUST COLLAR	4	EA	$200.00	$800.00
117	610721	6"- CLASS 350 DIP RESTRAINED VERT.- REALIGN,- COS- 2370	121	LF	$70.00	$8,470.00
118	610722	8"- CLASS 350 DIP RESTRAINED VERT.- REALIGN,- COS- 2370	504	LF	$75.00	$37,800.00
119	610724	12"- CLASS 350 DIP RESTRAINED VERT.- REALIGN,- COS 2370	209	LF	$85.00	$17,765.00
120	610843	CUT AND PLUG EXISTING 8" WATERLINE PER PHX STD DTL P1343	1	EA	$600.00	$600.00
121	615208	8" PVC C900 (DR18) SEWER PIPE	71	LF	$40.00	$2,840.00

WATER, SEWER AND DRAINAGE PIPE - 600 Cont.

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
122	618018	18" CLASS III RGRCP	170	LF	$138.00	$23,460.00
123	618022	30" CLASS III RGRCP	18	LF	$170.00	$3,060.00
124	619852	FLAP GATE	1	EA	$400.00	$400.00
125	621050	58"x36" CMPA	20	LF	$140.00	$2,800.00
126	625021	STORM DRAIN MANHOLE MAG 521 & 522	1	EA	$6,000.00	$6,000.00
127	625023	STORM DRAIN MANHOLE RISER MAG 522	2	EA	$1,440.00	$2,880.00
128	630306	6" GATE VALVE	1	EA	$600.00	$600.00
129	630308	8" GATE VALVE	7	EA	$800.00	$5,600.00
130	630312	12" GATE VALVE	2	EA	$1,200.00	$2,400.00
131	630602	2" AIR RELEASE VALVE COS 2348	11	EA	$3,000.00	$33,000.00
					Water and Sewer Subtotal =	**$182,075.00**

MATERIALS - 700

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
132	724829	STAIN CONCRETE COLORING	6,670	SF	$0.65	$4,335.50
					Materials Subtotal =	**$4,335.50**

SPECIALTY CONSTRUCTION - 800

Line Item No.	COS Item No.	Item Description	Estimated Quantity	Unit	Unit Price	Price
133	800011	MISCELLANEOUS CONSTRUCTION AT LA CONTESSA ENTRANCE	1	LS	$25,000.00	$25,000.00
134	800012	MISCELLANEOUS CONSTRUCTION AT MISSION DEL LOS ARROYOS ENTRANCE	1	LS	$8,000.00	$8,000.00
					SPECIALTY Subtotal =	**$33,000.00**

SUMMARY OF COST ESTIMATE

GENERAL SUBTOTAL	$42,600.00
EARTH WORK SUBTOTAL	$386,308.00
STREET RELATED WORK SUBTOTAL	$183,590.73
REMOVAL OF EXISTING IMPROVEMENT SUBTOTAL	$126,812.50
RIGHT-OF-WAY AND TRAFFIC CONTROL SUBTOTAL	$59,990.00
LANDSCAPE SUBTOTAL	$71,057.00
IRRIGATION SUBTOTAL	$58,919.45
STRUCTURES SUBTOTAL	$1,874,057.45
WATER AND SEWER SUBTOTAL	$182,075.00
MATERIALS SUBTOTAL	$4,335.50
SPECIAL CONSTRUCTION SUBTOTAL	$33,000.00
GRAND TOTAL IN WRITING:	**$3,022,745.63**

Appendix J

Soil Data

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features

Municipalities
- Cities
- Urban Areas

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 12N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties
Survey Area Data: Version 5, Mar 1, 2007

Date(s) aerial images were photographed: 9/17/1992; 4/30/1997

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Aguila-Carefree Area, Arizona, Parts of Maricopa and Pinal Counties (AZ645)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1	Antho sandy loams	408.3	10.7%
2	Antho gravelly sandy loams	30.0	0.8%
3	Antho-Carrizo-Maripo complex	35.7	0.9%
50	Estrella loams	156.4	4.1%
55	Gilman loams	1,781.8	46.8%
90	Momoli gravelly sandy loam, 1 to 5 percent slopes	984.3	25.9%
91	Momoli-Carrizo complex	381.5	10.0%
98	Pinamt-Tremant complex, 1 to 10 percent slopes	29.6	0.8%
Totals for Area of Interest (AOI)		3,807.7	100.0%


416800
417600
418400
419200
420000
420800
421600
3716800
3716000
E BELL RD
E SHEA BLVD
N
Meters
0 50 100 200 300
Feet
0 250 500 1,000 1,500

Appendix K

Drop Structures Design

Design Values

Angular D_{50} dia. = 17.9 in.
$Rock_{chute}$ thickness = 35.8 in.
Inlet apron length = 30 ft.
Outlet apron length = 22 ft.
Radius = 40 ft.
Will bedding be used? No

Rock Gradation Envelope

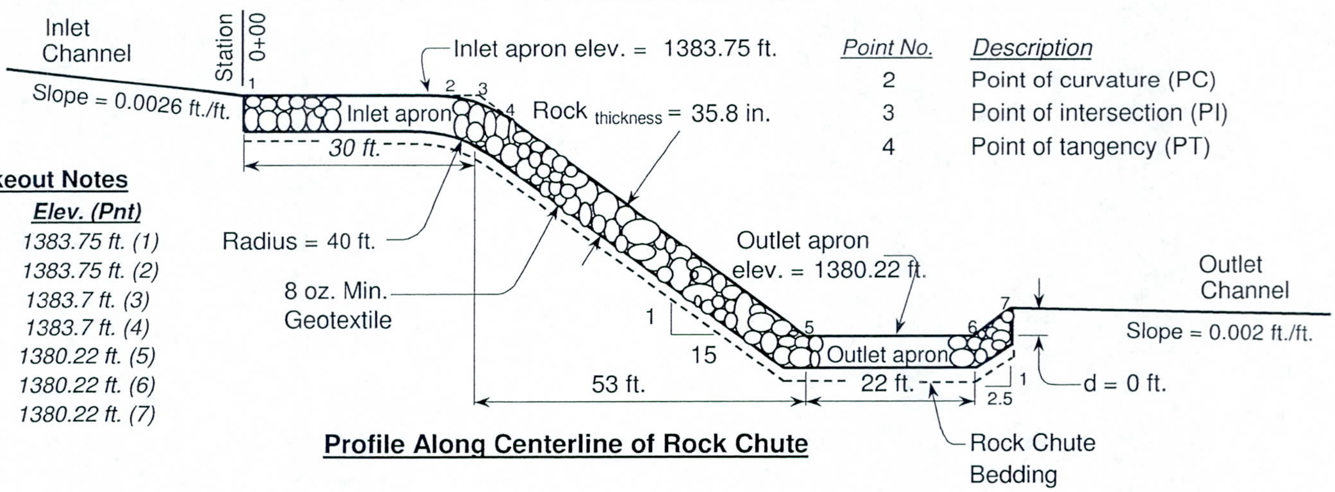
% Passing	*Diameter, in. (weight, lbs.)*
D_{100} ---------	27 - 36 (1411 - 3344)
D_{85} ---------	23 - 32 (918 - 2438)
D_{50} ---------	18 - 27 (418 - 1411)
D_{10} ---------	14 - 23 (214 - 918)

Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$

Quantities [a]

Angular Rock = 533 yd^3
Geotextile (8 oz.)[b] = 652 yd^2
Bedding = 0 yd^3
Excavation = 0 yd^3
Earthfill = 0 yd^3
Seeding = 0.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

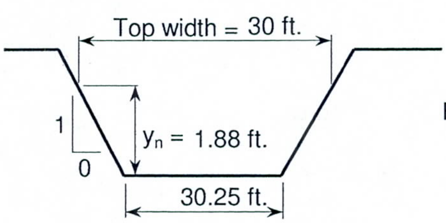


Point No.	*Description*
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

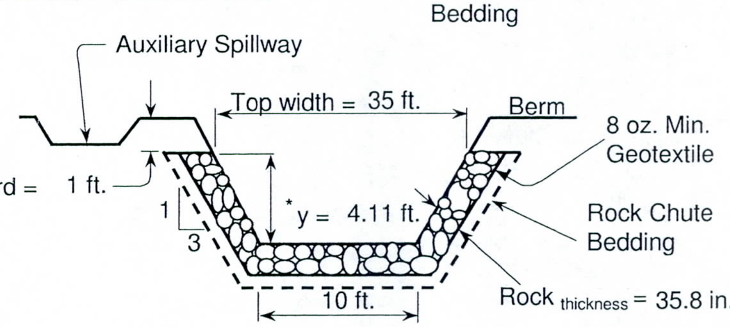
Stakeout Notes

Sta.	*Elev. (Pnt)*
0+00	1383.75 ft. (1)
0+28.7	1383.75 ft. (2)
0+30	1383.7 ft. (3)
0+31.3	1383.7 ft. (4)
0+83	1380.22 ft. (5)
1+5	1380.22 ft. (6)
1+5	1380.22 ft. (7)

Profile Along Centerline of Rock Chute

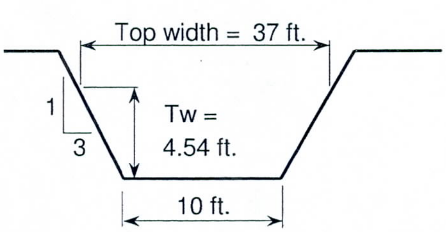


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

Project: SCT048 UCW - Main 39+12.53
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ	Approved by:	
Drawn: NRCS Standard Dwg.	Title:	
Traced:	Sheet No.	Drawing No.
Checked: TT	of	

Design Values

Angular D_{50} dia. = 16.5 in.
$Rock_{chute}$ thickness = 33.0 in.
Inlet apron length = 27 ft.
Outlet apron length = 21 ft.
Radius = 37 ft.
Will bedding be used? No

Rock Gradation Envelope

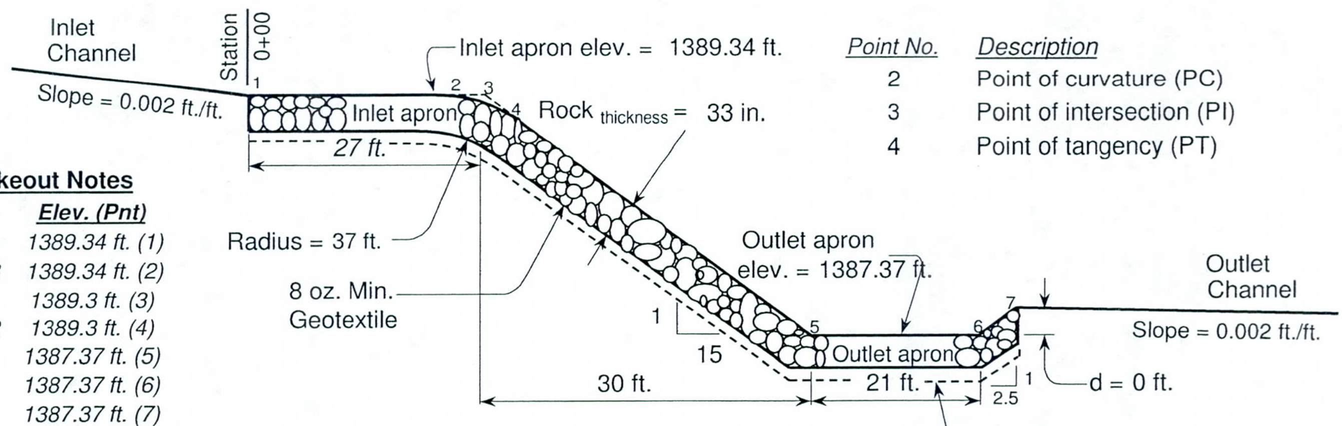
% Passing	Diameter, in. (weight, lbs.)
D_{100} ---------	25 - 33 (1105 - 2619)
D_{85} ---------	21 - 30 (719 - 1909)
D_{50} ---------	17 - 25 (327 - 1105)
D_{10} ---------	13 - 21 (168 - 719)

Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$

Quantities [a]

Angular Rock = 389 yd^3
Geotextile (8 oz.)[b] = 503 yd^2
Bedding = 0 yd^3
Excavation = 0 yd^3
Earthfill = 0 yd^3
Seeding = 0.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

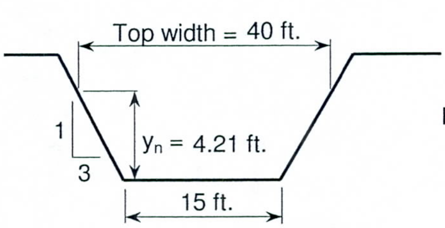


Point No.	Description
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

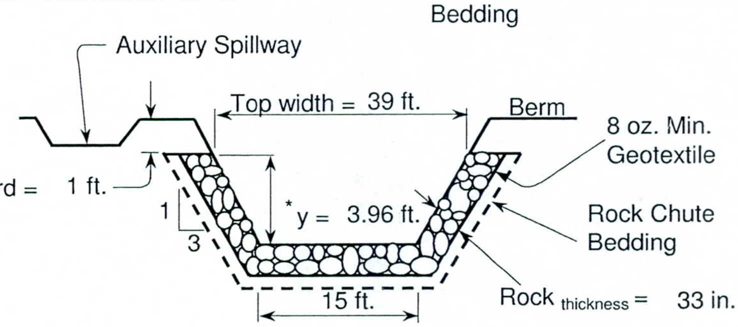
Stakeout Notes

Sta.	*Elev. (Pnt)*
0+00	1389.34 ft. (1)
0+25.8	1389.34 ft. (2)
0+27	1389.3 ft. (3)
0+28.2	1389.3 ft. (4)
0+57	1387.37 ft. (5)
0+78	1387.37 ft. (6)
0+78	1387.37 ft. (7)

Profile Along Centerline of Rock Chute

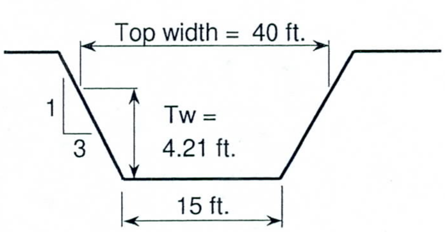


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

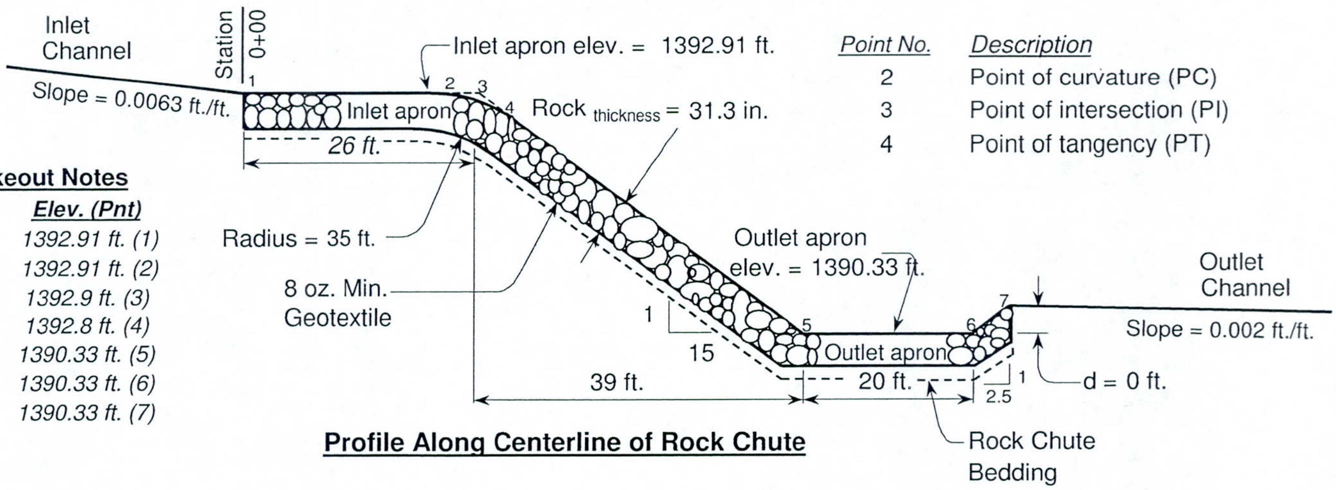
Project: SCT048 UCW - Main Sta 46+06.64
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ	Approved by:
Drawn: NRCS Standard Dwg.	Title:
Traced:	Sheet No. of / Drawing No.
Checked: TT	

Design Values	Rock Gradation Envelope		Quantities[a]
	% Passing	Diameter, in. (weight, lbs.)	
Angular D_{50} dia. = 15.7 in.	D_{100}	24 - 31 (952 - 2256)	Angular Rock = 394 yd^3
$Rock_{chute}$ thickness = 31.3 in.	D_{85}	20 - 28 (620 - 1645)	Geotextile (8 oz.)[b] = 535 yd^2
Inlet apron length = 26 ft.	D_{50}	16 - 24 (282 - 952)	Bedding = 0 yd^3
Outlet apron length = 20 ft.	D_{10}	13 - 20 (144 - 620)	Excavation = 0 yd^3
Radius = 35 ft.			Earthfill = 0 yd^3
Will bedding be used? No	*Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$*		Seeding = 0.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

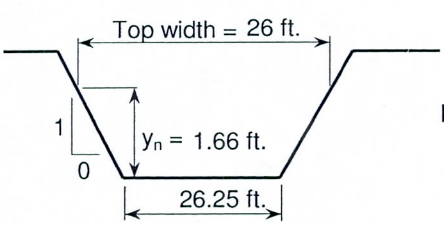


Point No.	Description
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

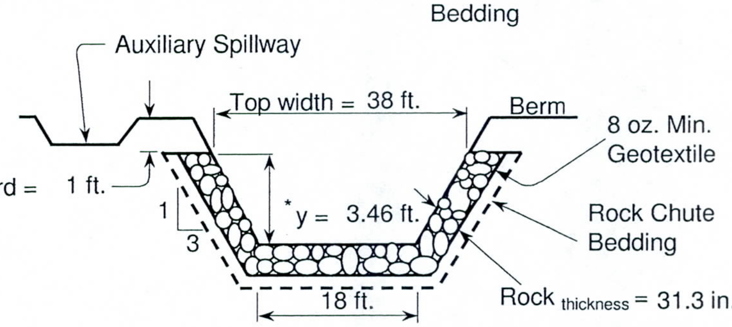
Stakeout Notes

Sta.	Elev. (Pnt)
0+00	1392.91 ft. (1)
0+24.8	1392.91 ft. (2)
0+26	1392.9 ft. (3)
0+27.2	1392.8 ft. (4)
0+65	1390.33 ft. (5)
0+85	1390.33 ft. (6)
0+85	1390.33 ft. (7)

Profile Along Centerline of Rock Chute

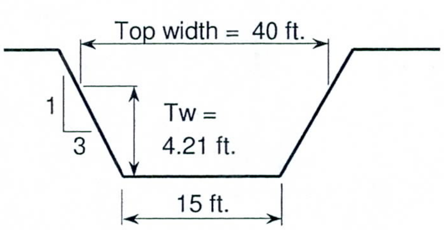


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

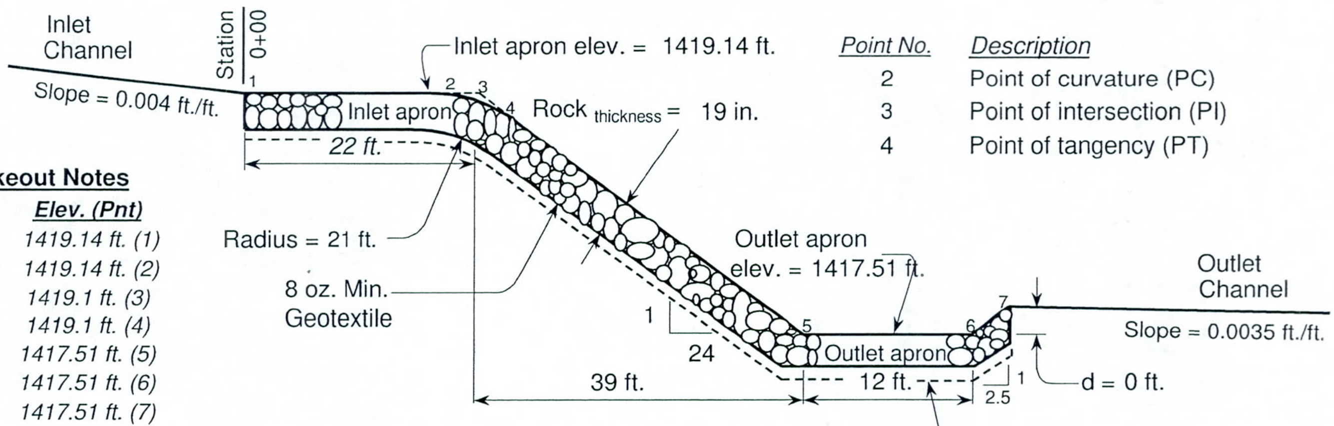
Project: SCT048 UCW Main STA 52+41.72
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ	Approved by:	
Drawn: NRCS Standard Dwg.	Title:	
Traced:	Sheet No.	Drawing No.
Checked: TT	of	

Design Values		Rock Gradation Envelope		Quantities [a]	
Angular D_{50} dia. =	9.5 in.	*% Passing*	*Diameter, in. (weight, lbs.)*	**Angular** Rock =	133 yd^3
$Rock_{chute}$ thickness =	19.0 in.	D_{100} ---------	14 - 19 (211 - 500)	Geotextile (8 oz.)[b] =	294 yd^2
Inlet apron length =	22 ft.	D_{85} ---------	12 - 17 (137 - 364)	Bedding =	0 yd^3
Outlet apron length =	12 ft.	D_{50} ---------	10 - 14 (62 - 211)	Excavation =	0 yd^3
Radius =	21 ft.	D_{10} ---------	8 - 12 (32 - 137)	Earthfill =	0 yd^3
Will bedding be used?	No	*Coefficient of Uniformity,* $(D_{60})/(D_{10}) \leq 2.0$		Seeding =	0.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

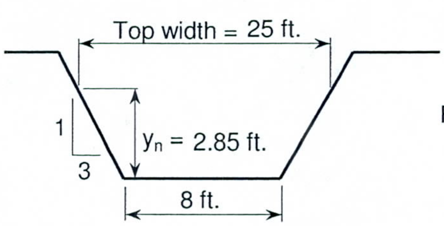


Point No.	*Description*
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

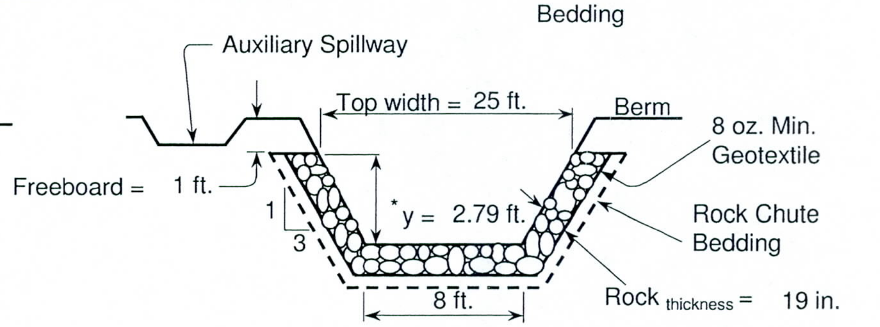
Stakeout Notes

Sta.	*Elev. (Pnt)*
0+00	*1419.14 ft. (1)*
0+21.6	*1419.14 ft. (2)*
0+22	*1419.1 ft. (3)*
0+22.4	*1419.1 ft. (4)*
0+61	*1417.51 ft. (5)*
0+73	*1417.51 ft. (6)*
0+73	*1417.51 ft. (7)*

Profile Along Centerline of Rock Chute

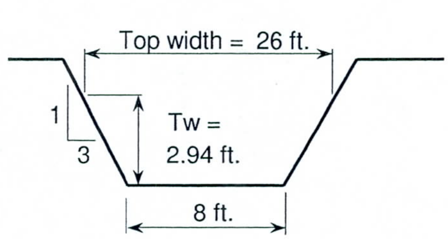


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

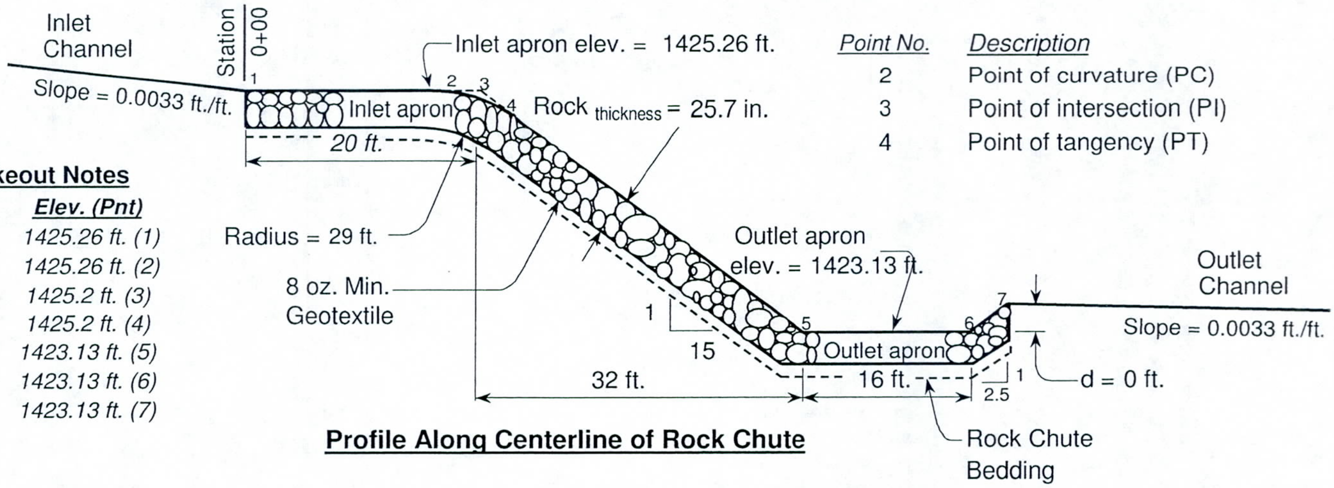
Project: SCT048 UCW - Main sta 89+64
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ	Approved by:
Drawn: NRCS Standard Dwg.	Title:
Traced:	Sheet No. of
Checked: TT	Drawing No.

Design Values	***Rock Gradation Envelope***		***Quantities***[a]
Angular D_{50} dia. = 12.9 in.	*% Passing*	*Diameter, in. (weight, lbs.)*	***Angular*** Rock = 184 yd^3
$Rock_{chute}$ thickness = 25.7 in.	D_{100} ---------	19 - 26 (528 - 1252)	Geotextile (8 oz.)[b] = 312 yd^2
Inlet apron length = 20 ft.	D_{85} ---------	17 - 23 (344 - 912)	Bedding = 0 yd^3
Outlet apron length = 16 ft.	D_{50} ---------	13 - 19 (156 - 528)	Excavation = 0 yd^3
Radius = 29 ft.	D_{10} ---------	10 - 17 (80 - 344)	Earthfill = 0 yd^3
Will bedding be used? No	*Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$*		Seeding = 0.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

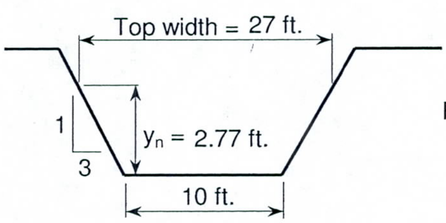


Point No.	*Description*
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

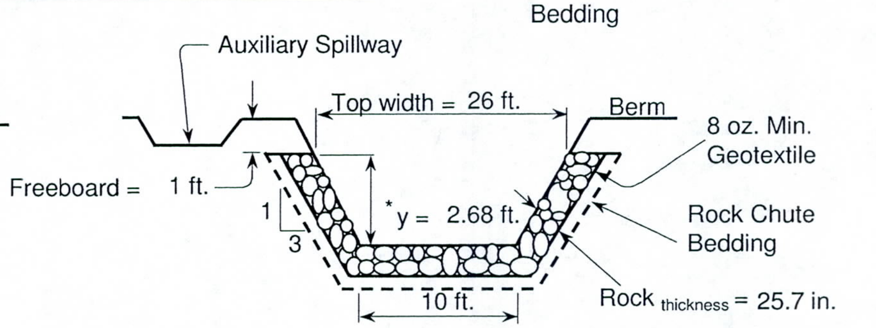
Stakeout Notes

Sta.	***Elev. (Pnt)***
0+00	*1425.26 ft. (1)*
0+19	*1425.26 ft. (2)*
0+20	*1425.2 ft. (3)*
0+21	*1425.2 ft. (4)*
0+52	*1423.13 ft. (5)*
0+68	*1423.13 ft. (6)*
0+68	*1423.13 ft. (7)*

Profile Along Centerline of Rock Chute



Inlet Channel Cross Section



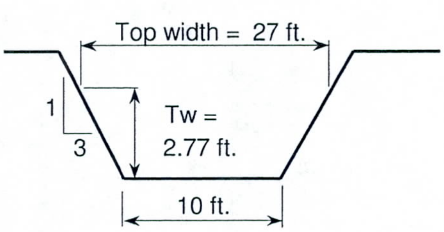
Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.

Profile, Cross Sections, and Quantities

Project: SCT048 UCW - Main sta 99+79.67
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

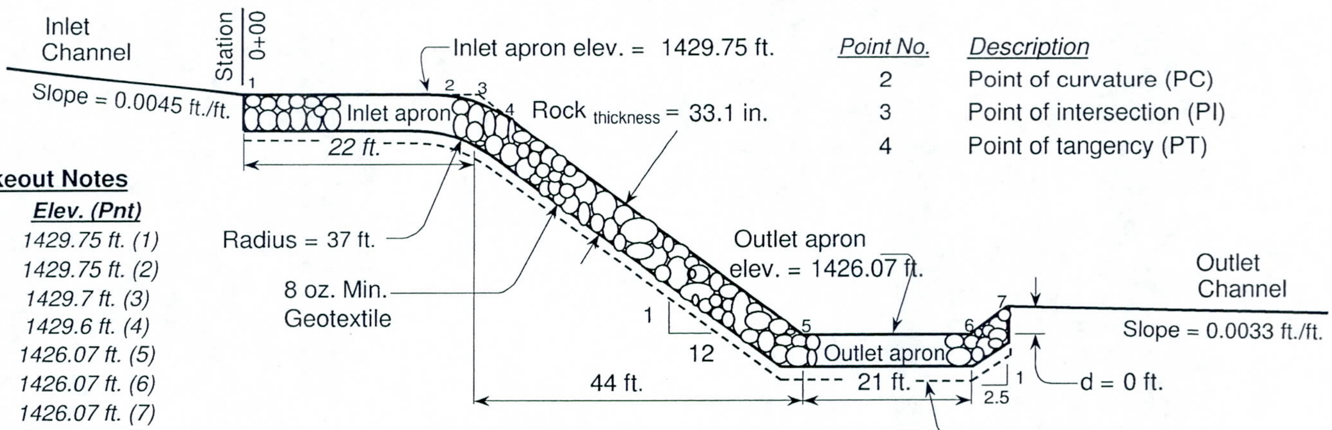


Outlet Channel Cross Section

Designed: XZ	Approved by:
Drawn: NRCS Standard Dwg.	Title:
Traced:	Sheet No. of
Checked: TT	Drawing No.

Design Values		Rock Gradation Envelope		Quantities[a]	
		% Passing	Diameter, in. (weight, lbs.)		
Angular D_{50} dia. =	16.6 in.	D_{100} ---------	25 - 33 (1125 - 2667)	**Angular** Rock =	342 yd^3
$Rock_{chute}$ thickness =	33.1 in.	D_{85} ---------	22 - 30 (732 - 1944)	Geotextile (8 oz.)[b] =	461 yd^2
Inlet apron length =	22 ft.	D_{50} ---------	17 - 25 (333 - 1125)	Bedding =	0 yd^3
Outlet apron length =	21 ft.	D_{10} ---------	13 - 22 (171 - 732)	Excavation =	0 yd^3
Radius =	37 ft.			Earthfill =	0 yd^3
Will bedding be used?	No	*Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$*		Seeding =	0.0 acres

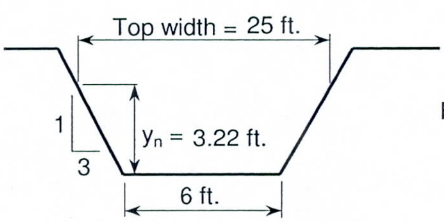
Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*



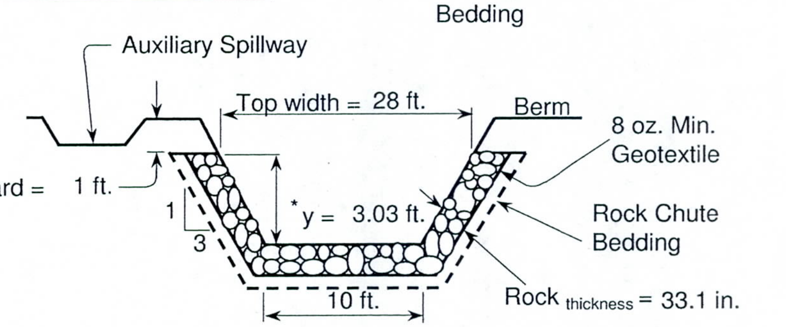
Stakeout Notes

Sta.	*Elev. (Pnt)*
0+00	*1429.75 ft. (1)*
0+20.5	*1429.75 ft. (2)*
0+22	*1429.7 ft. (3)*
0+23.5	*1429.6 ft. (4)*
0+66	*1426.07 ft. (5)*
0+87	*1426.07 ft. (6)*
0+87	*1426.07 ft. (7)*

Profile Along Centerline of Rock Chute

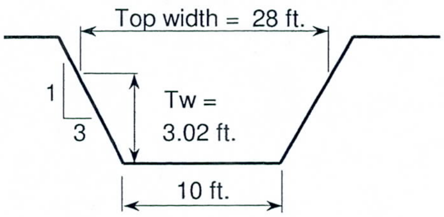


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

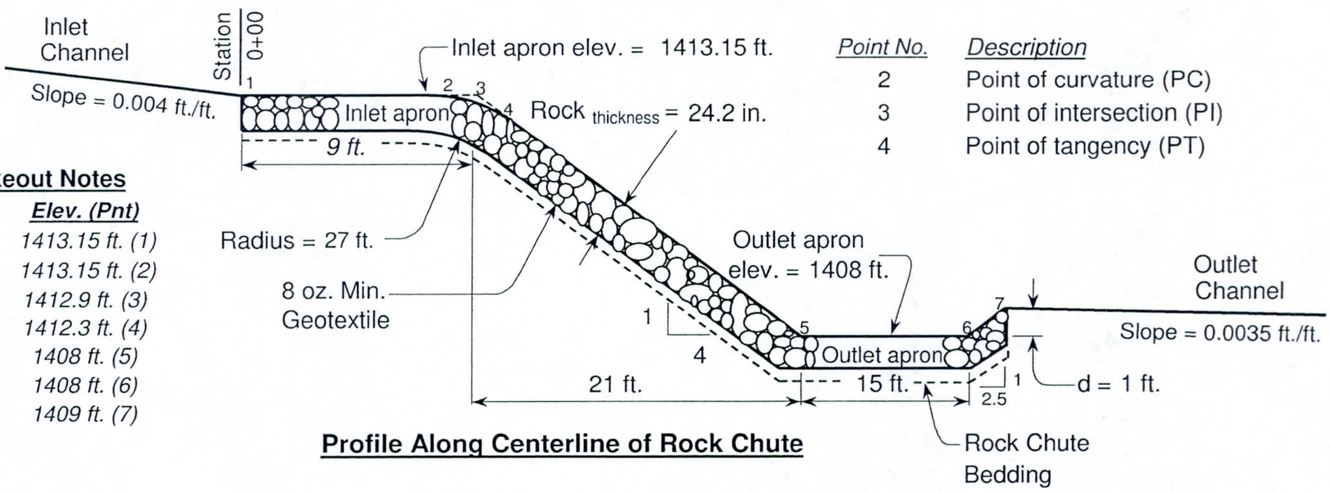
Project: SCT048 UCW - Main sta 103+07.11
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ	Approved by:	
Drawn: NRCS Standard Dwg.	Title:	
Traced:	Sheet No.	Drawing No.
Checked: TT	of	

Design Values	***Rock Gradation Envelope***		***Quantities*** [a]
Angular D_{50} dia. = 12.1 in.	*% Passing*	*Diameter, in. (weight, lbs.)*	***Angular*** Rock = 145 yd^3
$Rock_{chute}$ thickness = 24.2 in.	D_{100} ---------	18 - 24 (436 - 1033)	Geotextile (8 oz.)[b] = 250 yd^2
Inlet apron length = 9 ft.	D_{85} ---------	16 - 22 (284 - 753)	Bedding = 0 yd^3
Outlet apron length = 15 ft.	D_{50} ---------	12 - 18 (129 - 436)	Excavation = 0 yd^3
Radius = 27 ft.	D_{10} ---------	10 - 16 (66 - 284)	Earthfill = 0 yd^3
Will bedding be used? No	*Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$*		Seeding = 0.0 acres

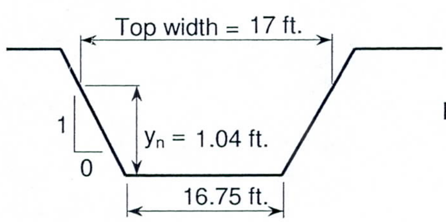
Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*



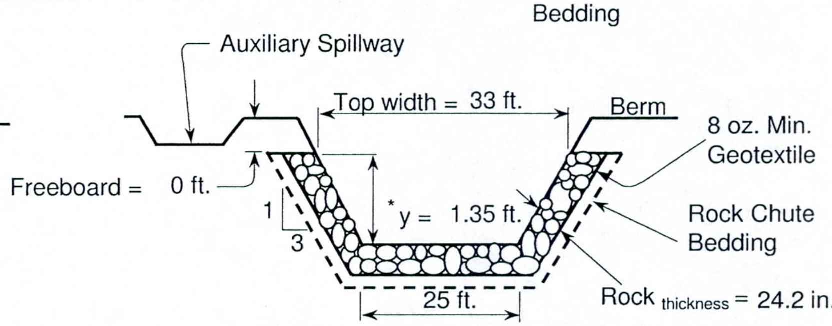
Stakeout Notes

Sta.	*Elev. (Pnt)*
0+00	*1413.15 ft. (1)*
0+5.7	*1413.15 ft. (2)*
0+9	*1412.9 ft. (3)*
0+12.2	*1412.3 ft. (4)*
0+30	*1408 ft. (5)*
0+45	*1408 ft. (6)*
0+47.5	*1409 ft. (7)*

Profile Along Centerline of Rock Chute

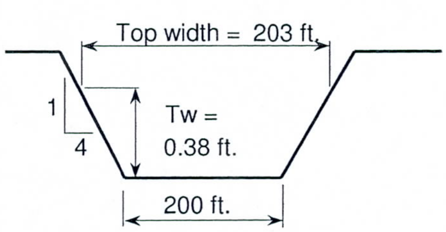


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

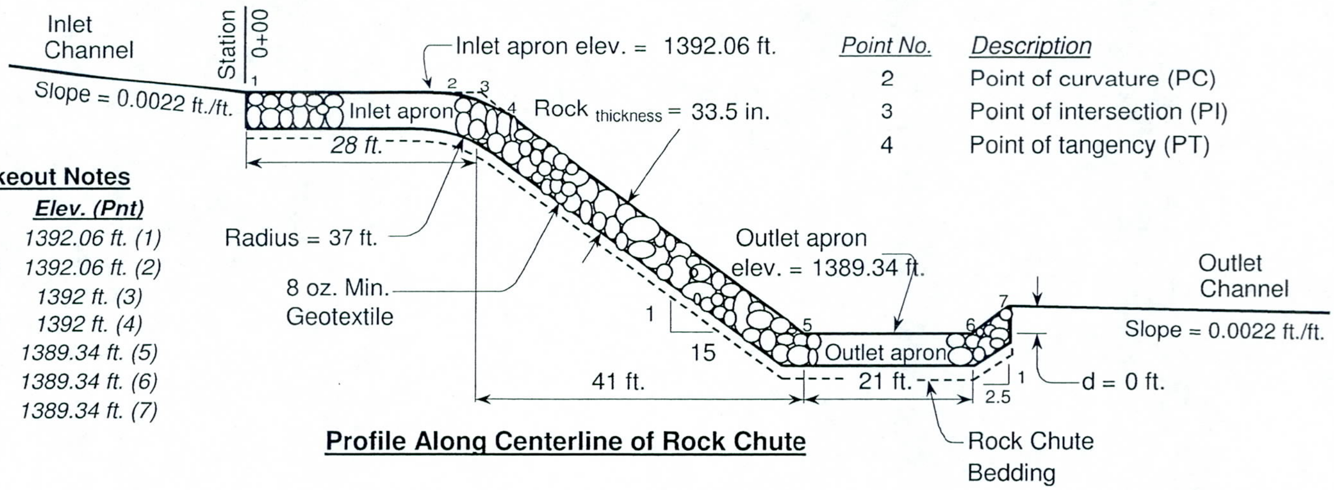
Project: SCT048 UCW - Main LBAS 2-8'x3' Outlet
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ	Approved by:
Drawn: NRCS Standard Dwg.	Title:
Traced:	Sheet No. ___ of ___ / Drawing No.
Checked: TT	

Design Values		***Rock Gradation Envelope***		***Quantities***[a]	
Angular D_{50} dia. =	16.7 in.	*% Passing*	*Diameter, in. (weight, lbs.)*	**Angular** Rock =	456 yd^3
$Rock_{chute}$ thickness =	33.5 in.	D_{100} ---------	25 - 33 (1146 - 2715)	Geotextile (8 oz.)[b] =	583 yd^2
Inlet apron length =	28 ft.	D_{85} ---------	22 - 30 (746 - 1979)	Bedding =	0 yd^3
Outlet apron length =	21 ft.	D_{50} ---------	17 - 25 (339 - 1146)	Excavation =	0 yd^3
Radius =	37 ft.	D_{10} ---------	13 - 22 (174 - 746)	Earthfill =	0 yd^3
Will bedding be used?	No	*Coefficient of Uniformity,* $(D_{60})/(D_{10}) \leq 2.0$		Seeding =	0.0 acres

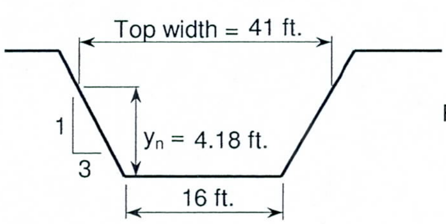
Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*
[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*



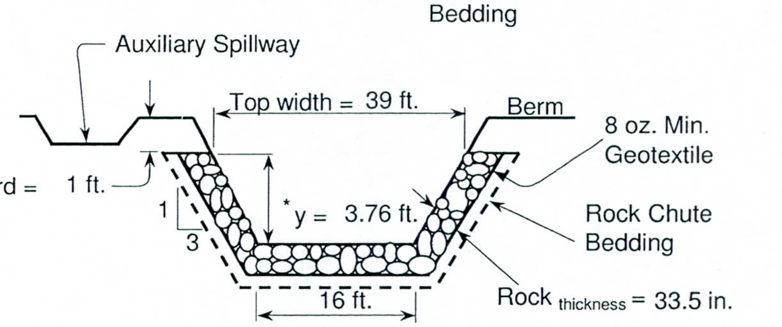
Stakeout Notes

Sta.	*Elev. (Pnt)*
0+00	1392.06 ft. (1)
0+26.8	1392.06 ft. (2)
0+28	1392 ft. (3)
0+29.2	1392 ft. (4)
0+69	1389.34 ft. (5)
0+90	1389.34 ft. (6)
0+90	1389.34 ft. (7)

Profile Along Centerline of Rock Chute

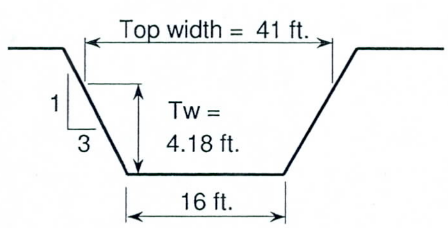


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

Project: SCT048 UCW - STA 332+05.27
Location: Maricopa County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: XZ		Approved by:	
Drawn: NRCS Standard Dwg.		Title:	
Traced:		Sheet No. of	Drawing No.
Checked: TT			

Appendix L

Scottsdale Mission Condominiums (SMC)
Conceptual Design Memo
&
Recommended Alternative Analysis
(*Alternative 4*)

CONCEPTUAL DESIGN MEMO

To: City of Scottsdale

From: Tarek Tahawy, Ph.D., P.E. – Primatech Engineers & Consultants

Date: 23-DEC-2010

Re: Investigation of Scottsdale Mission Condominiums for Flood Mitigation Alternatives

Primatech is pleased to submit for your review a conceptual design Memo for the Scottsdale Mission Condominiums (SMC) flood mitigation alternatives.

1. INTRODUCTION

During the UCW progress meeting held on March 1st, 2010, the Flood Control District of Maricopa County (FCDMC) and City of Scottsdale (City) requested that the drainage improvements proposed for this project to be designed to ensure that SMC is protected from the 100-year flood, if feasible. If not, the design should provide the maximum level of flood relief that can be achieved without any structural damage to the properties and without significantly impacting the flow in the 92nd Street Branch channel downstream.

2. PURPOSE

The purpose of this memo is to evaluate various alternatives for the mitigation of SMC flooding and provide a 10% conceptual design with a cost estimate for each alternative to facilitate the decision making process for the City and/or the FCDMC regarding this part of the UCW project. The goals can be summarized as follows:

(1) Establish a reliable Design Peak Flow Rate for the designated DSF and evaluate the 100-year storm event at the concentration point located south of the intersection of 91st Street and Cholla Street

(2) Determine the maximum allowable flow through SMC that will not cause any structural flooding, and

(3) Propose, evaluate, and recommend cost-effective solutions for routing the water through SMC to the existing channel south of Gary Road.

The SMC investigation for flood mitigation alternatives calls for hydrologic and hydraulic analysis and design of these alternatives for a proposed storm drainage system within the SMC area, developed to the 10% conceptual design level. Once a recommended alternative has been established the design will proceed to the 30%, 60%, 90%, and 100% design levels.

3. EXISTING CONDITIONS

The Scottsdale Mission Condominiums subdivision, located at the southwest corner of 92nd Street and Cholla Street, has approximately 248 residences that were constructed between 1994 and 1996. They are all single-story residences with an average living area of approximately 1,351 square feet. This subdivision has repeatedly experienced significant flooding due to the overflow of the small basin which receives the water collected at the south of the intersection of 91st and Cholla Streets through a scupper inlet. The water then flows south through the parking corridor (alley) and spread laterally causing flooding to the residences. The flow eventually will cross over Gary Road, and merge into an existing downstream channel which in turn combines with the Main branch of the UCW channel north of Shea BLVD.

4. SURVEY

The analysis and design of the drainage system passing through SMC required a ground survey in order to build a representative DTM surface for all modeling purposes. The survey was performed by Steele Engineering LLC, and included the following areas:

- Cholla Street from 91st Street to 92nd Street including elevations for the top of curb, gutter and pavement
- The alley within SMC and several spot-checks for finished floor elevations adjacent to the proposed conveyance through the paved drive area. Additionally, the Elevation Certificates of the structures within the complex were obtained from the City of Scottsdale.

5. HYDROLOGY

The proposed condition HEC-1 model for the Upper Camelback Wash project prepared by Primatech in November 2010 was used. In this model, the new NOAA14 precipitation data replaced the old NOAA2 data. Additionally, the area north of SMC was modified through the addition of new subbasins and boundaries as well as existing detention basins and routings. This was done to provide more representative flow rates and paths. The runoff from this area flows downstream and concentrates at the intersection of 91st Street and Cholla Street and then enters the SMC. The HEC-1 model results show that this flow is equal to ***139 cfs*** for the 100-year storm frequency. Figures 1 and 2 show the HEC-1 Routing Map for the area north of SMC before and after the modifications, respectively.

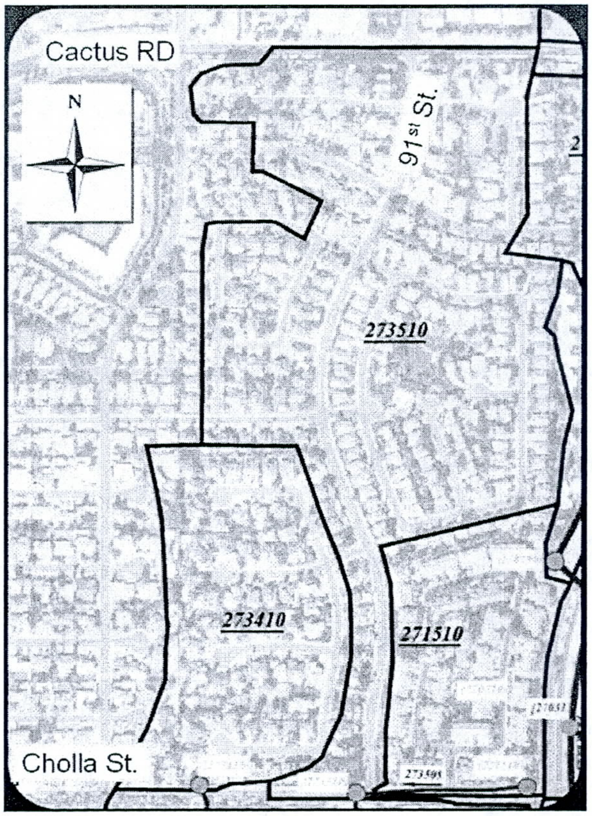


Figure 1. HEC-1 Map for the Area North of SMC *before* Modifications

March 18, 2011

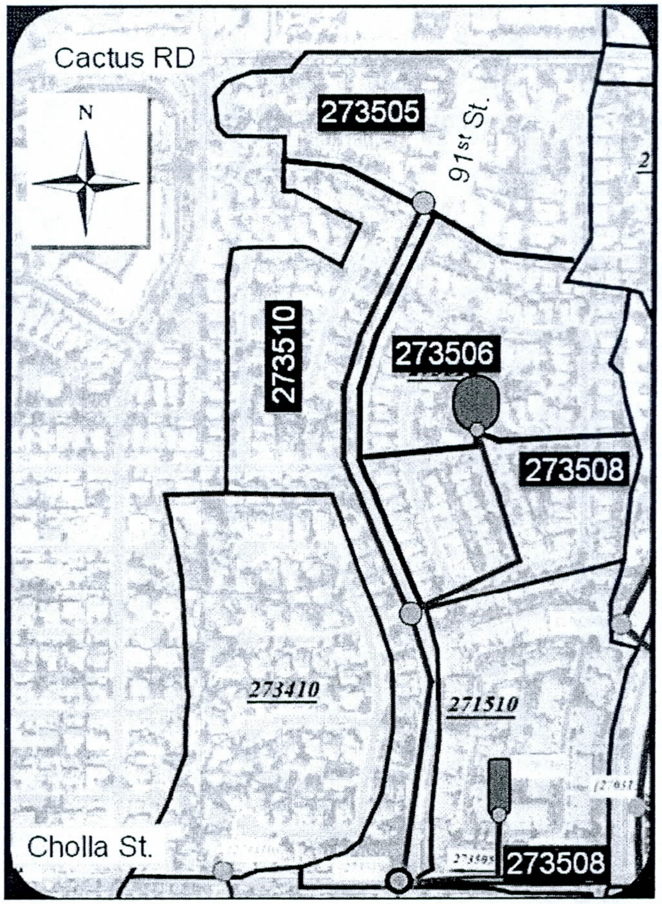


Figure 2. HEC-1 Map for the Area North of SMC *after* Modifications

6. HYDRAULICS

To determine the flow capacity and the water surface elevation of the parking alley (alley) and the existing channel along the same alignment south of Gary Road, an existing condition HEC-RAS model was created using HEC-RAS, version 4.1, with the aid of CAD capabilities to export/import geo-referenced stream lines and cross sections. The general procedures used to develop the model are summarized below:

- Cross-sections were cut from the DTM surface built from the integration between the survey data and the City's 1-foot contours data.
- A new HEC-RAS model that considers the parking alley to be the main conveyance channel was developed.
- The existing structures in the left overbank and right overbank for each cross section

were coded in the model as areas with higher Manning's coefficient *n*.

- The model was run for the 100-year storm event and the water surface elevations was determined at several locations along the parking alley

From HEC-RAS model results it appears that the 100-year water surface elevations are generally higher than the finished floor elevations of the adjacent buildings by 1-2 feet. In other words, the buildings surrounding the parking alley are prone to flooding hazards from the 100-year (or even smaller) storm events.

6.1 Assessment of the potential breakout north of Cactus Road

To account for a possible breakout north of cactus road along the 92nd street channel as was shown in the Floodplain map for the UCW existing/proposed condition prepared by Primatech in 2011, a detailed study for the area north of poinsettia drive crossing culvert on the 92nd street (north project limit) was performed. This study included modification of the existing HEC-RAS model as follows:

- The cross section cut lines along the 92nd channel north of Cactus Road were extended so that longer lengths of the floodplain were covered.
- The recently constructed Cactus Road culvert was added to the model
- Flow obstructions such as walls were added to the model

The model was run in the subcritical flow regime. A floodplain map was created for the area just north of Cactus Road and east of 91st street by delineating the resulted water surface elevations manually on the contour map. The results showed that no breakout is expected to take place north of Cactus Road. This is mainly because the upgraded 3-8' X 3' concrete box culvert at Cactus Road crossing as shown in

7. PROPOSED CONDITIONS

The goal of any proposed alternative is to either reduce the amount of flow entering the SMC from the south of the intersection of 91st Street and Cholla Street and/or transfer it safely through a surface or an underground conveyance facility. To achieve this goal

Primatech has investigated several alternatives to mitigate the flooding within the SMC including:

- New storm drain system along Cholla Street
- New Inlet at Cholla Street to SMC
- Inverted-crown pavement in the SMC parking alley
- Concrete Box Culvert, CBC under the parking alley within SMC
- Concrete arch pipe under the parking alley within SMC
- Existing downstream channel modification south of Gary Road
- Combination of the above

Some of the abovementioned options were not feasible and were disregarded. Below is a summary of the alternatives that were found feasible. Further study will be required to assess the impact to the 92nd Channel if any improvements were to be made along Cholla Street.

7.1 Alternative 1: 48" RCP along Cholla St. & 4'X3' CBC + 36"X58" Arch Pipe in SMC

Alternative 1 features a combination of proposed improvements along Cholla Street and SMC. This includes a 48" trunk line along Cholla Street from 91st Street to 92nd Street of about 650' to mitigate the flooding problems of the Scottsdale Mission Condominiums development (SMC). This system would be able to divert about 66 cfs of the surface runoff that concentrates in a depressed area located south of the intersection of 91st Street and Cholla Street, adjacent to SMC. This ponded storm water would then be rerouted to the east, where it would drain into the 92nd Street Branch of Upper Camelback Wash (UCW). The remaining flow would enter SMC through an improved grate type inlet. To meet the minimum cover requirement, the flow has to pass through a concrete box conduit for the first 320' and then through a Pipe arch conduit till it discharges into the existing downstream channel south of Gary Road. Below is a highlight of this alternative.

1. Proposed improvement along Cholla Street

- A 48" RCP stormdrain runs along Cholla St. between 91st Street and 92nd Street of (650 L.F.)
- The 100-year flow from north of Cholla Street = 139 cfs
- Flow intercepted by the proposed storm drain in Cholla Street = 66 cfs
- Remaining flow entering SMC = 139 cfs – 66 cfs = 73 cfs

2. Proposed inlet at Cholla Street to SMC

- 2'X18' Grate inlet (serves as trench drain), d = 0.482 ft

3. Proposed improvement within SMC

- 4'X3' Concrete Box Culvert from Cholla Street to SMC (320 L.F.)
- 36"X58" Arch Pipe through SMC and up to the existing downstream channel (980 L.F.)

4. Estimated Cost for Alternative 1

Item	Cost
Improvement along Cholla Street	$258,700
Improvement within SMC	$522,800
Total Cost	**$780,500**

7.2 Alternative 2: 5'X4' CBC along Cholla St. & 3'X3' CBC + 31"X51" Arch Pipe in SMC

Alternative 2 is very similar to Alternative 1 with the replacement of the Stormdrain pipe along Cholla Street with a 5'x4' concrete box conduit which would have a bigger capacity to divert more flow to the east and minimize the amount of flow entering SMC. Below is a highlight of this alternative.

1. Proposed improvement along Cholla Street

- 5'X4' Concrete Box Conduit runs along Cholla St. between 91st Street and 92nd Street (650 L.F.)
- The 100-year flow from north of Cholla Street = 139 cfs

- Flow intercepted by the proposed conduit in Cholla Street = 96 cfs
- Remaining flow entering SMC = 139 cfs – 96 cfs = 43 cfs
- Proposed inlet at Cholla Street to SMC
- 2'X12' Grate inlet (serve as trench drain), d = 0.394 ft

2. Proposed improvement within SMC

- 3'X3' Concrete Box Culvert from Cholla Street to SMC (320 L.F.)
- 31"X51" Arch Pipe through SMC and up to the existing downstream channel (980 L.F.)

3. Estimated Cost for Alternative 2

Item	Cost
Improvement along Cholla Street	$432,700
Improvement within SMC	$488,800
Total Cost	**$920,700**

7.3 Alternative 3: 5'X4' CBC along Cholla St. & 23"X36" Arch Pipe + Inverted-crown pavement in SMC + Existing Channel Modification S. of Gary Rd.

Alternative 3 features an Inverted-crown pavement section in the SMC parking lot alley. A width of 22 feet with a maximum cross slope of 6% was considered. It was estimated that inverting the parking alley would hold up to 25 cfs with 7 inches of flow depth. However, even with much less flow of 9 cfs, as proposed in this alternative, it was not possible to maintain water surface elevation at one foot below the Finished Floor Elevations (FFEs) of the existing buildings adjacent to the inverted-crown parking alley. In some cases, the FFEs were lower than the water surface elevation in the inverted section of the parking alley. Despite this fact, Alternative 3 was kept as a potential alternative, as the storm water would be contained in the inverted crown pavement section with no impact on the surrounding structures. Below is a highlight of this alternative.

1. Proposed improvement along Cholla Street

- 5'X4' Concrete Box Conduit runs along Cholla St. between 91st Street and 92nd Street (650 L.F.)
- The 100-year flow from north of Cholla Street = 139 cfs
- Flow intercepted by the proposed conduit in Cholla Street = 96 cfs
- Remaining flow entering SMC = 139 cfs – 96 cfs = 43 cfs

2. <u>Proposed inlet at Cholla Street to SMC</u>

- 2'X12' Grate inlet (serve as trench drain), d = 0.394 ft

3. <u>Proposed improvement in SMC</u>

- 23"X36" Arch Pipe to convey 34 cfs under ground (900 L.F.)
- Inverted-crown pavement in the SMC parking alley to convey 9 cfs on the surface (800 L.F.). This 9 cfs will cross over Gary Road and continue to the existing channel.
- Existing channel modification south of Gary Road (4-foot bottom with 3:1 side slope, 2 feet deep) (400 L.F.)

4. <u>Estimated Cost for Alternative 3</u>

Item	Cost
Improvement along Cholla Street	$432,700
Improvement within SMC	$331,800
Total Cost	**$764,500**

7.4 Alternative 4: 8'X4' CBC along Cholla Street

This Alternative will eliminate the need to make any improvements within the SMC by capturing all the 100-year flow in the amount of 139 cfs that arrives at the south of the intersection between Cholla Street and 91st Street and divert it to the east along Cholla Street through an 8' X 4' concrete box conduit. Below is a highlight of this alternative.

1. <u>Proposed improvement in Cholla Street</u>

- 8'X4' Concrete Box Conduit runs along Cholla St. between 91st Street and 92nd Street (650 L.F.)
- The 100-year flow from north of Cholla Street = 139 cfs
- Flow intercepted by the proposed conduit in Cholla Street = 139 cfs
- Remaining flow entering SMC = 0 cfs

2. No improvements is required in SMC
3. Estimated Cost for Alternative 4:

Item	Cost
Improvement along Cholla Street	$657,100
Improvement within SMC	0.0
Total Cost	**$657,100**

7.5 Recommended Alternative

Our recommended alternative **is Alternative 4** for the following reasons:

- Alternative 4 is the most cost-effective solution among other proposed alternatives.
- No improvements is required within the Scottsdale Mission Condominiums and hence no disturbance to the residents.
- Least construction time in comparisons with other proposed alternatives.

Since the flow will be diverted to the east and eventually it will combine with the 92nd street branch of the UCW, further study is presented below in section 7.5.1 to assess the impact of diverting this flow to the 92nd channel of the UCW.

7.5.1 Impact of the recommended alternative on the downstream channel

The recommended Alternative 4 will cause all the flow concentrated south of the intersection between 91st Street and Cholla Street to be routed to the east through a 8'X4' Concrete Box Culvert and eventually it will combine with the 92nd street branch of the UCW as shown in Figure 3.

To evaluate the impact that this alternative might cause on the downstream reach of the 92nd street channel, the proposed condition HEC-1 model by Primatech 2011 was updated such that the recommended alternative is reflected in the model. This was achieved by inserting a Diversion, Retrieve and Route Records at KKCH2SD, KKCH2SDR, and KK270318 in the HEC-1 model respectively to represent either the current design of 48" Stormdrain pipe or the proposed 8'X4'Concrete Box Conduit CBC along Cholla Street between 91st and 92nd Streets.

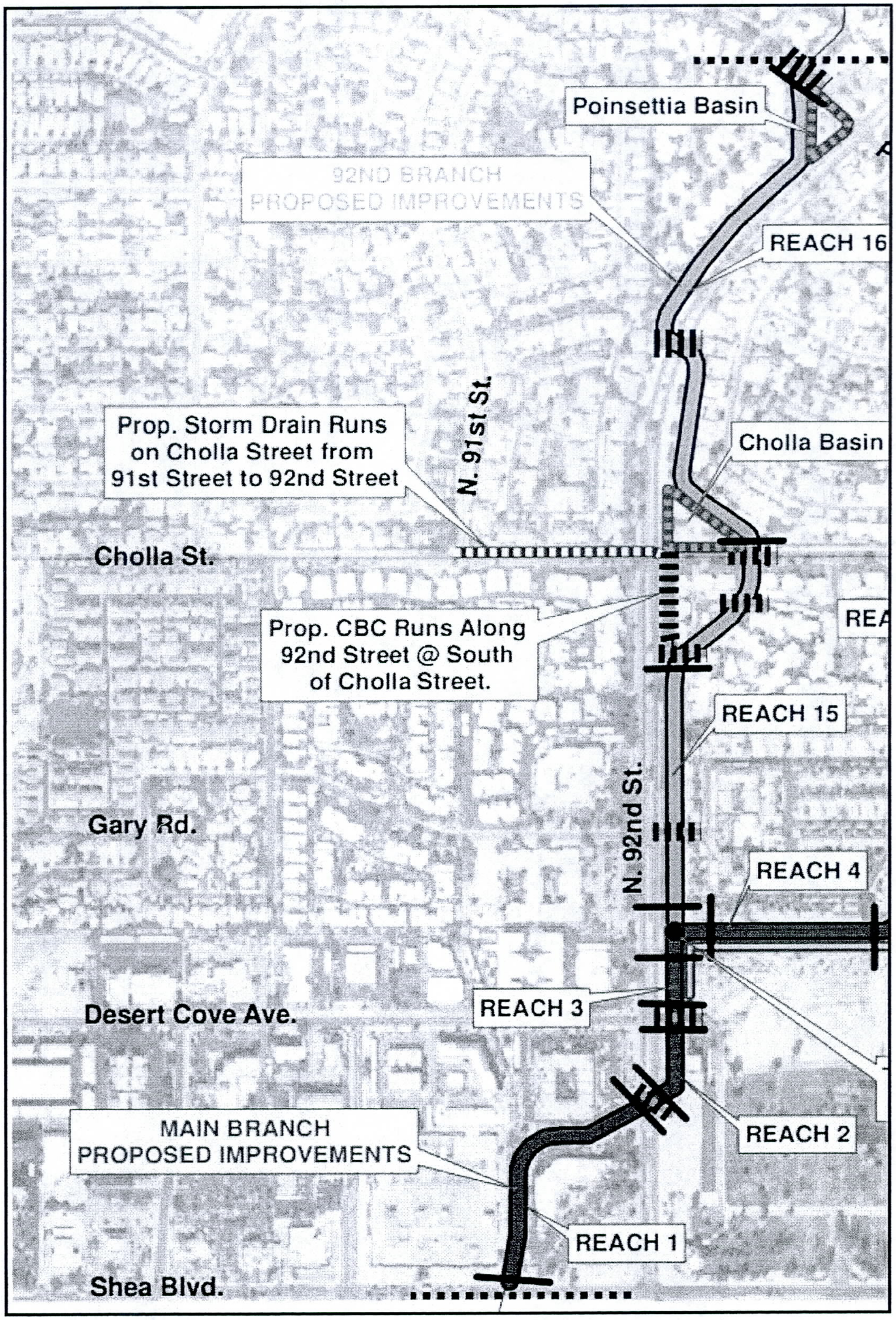


Figure 3. Proposed Stormdrain conduit along Cholla St between 91st and 92nd streets

The HEC-1 model was run for both the 50- and 100-year storm frequencies. The results were checked at the downstream Nodes 270324, 270370, 270400, 270420, 270440, and the downstream (south) end of the project at the end of Route 270440 at Shea Blvd. as shown in Figure 4.

Table 1 presents the results of the HEC-1 model in terms of the peak flow rates at the above mentioned locations for both the current design of 48" storm drain pipe and the recommended alternative of the 8'X4' CBC for both 50- and 100-year storm frequencies.

Table1. Peak flows at key locations

NODE	Q 50-year		Q 100-year	
	Current Design (48" Pipe)	Alternative 4 (8' X 4' CBC)	Current Design (48" Pipe)	Alternative 4 (8' X 4' CBC)
Flow Diverted	66	109	66	139
270324	590	590	679	679
270370	595	594	685	686
270400	948	948	1129	1130
270440	985	986	1184	1179

From Table 1 it can be seen that for the 50-year storm event, the peak flows for both the pipe and the CBC are almost identical at all downstream nodes. The same behavior is shown for the 100-year storm with a maximum difference of 5 cfs at Node 270440 just north of Shea Blvd. In other words, no significant impact is expected to occur on the downstream channel as a result of constructing the recommended alternative 4. Digital copies of HEC-1 Model input and output files are enclosed with this memo

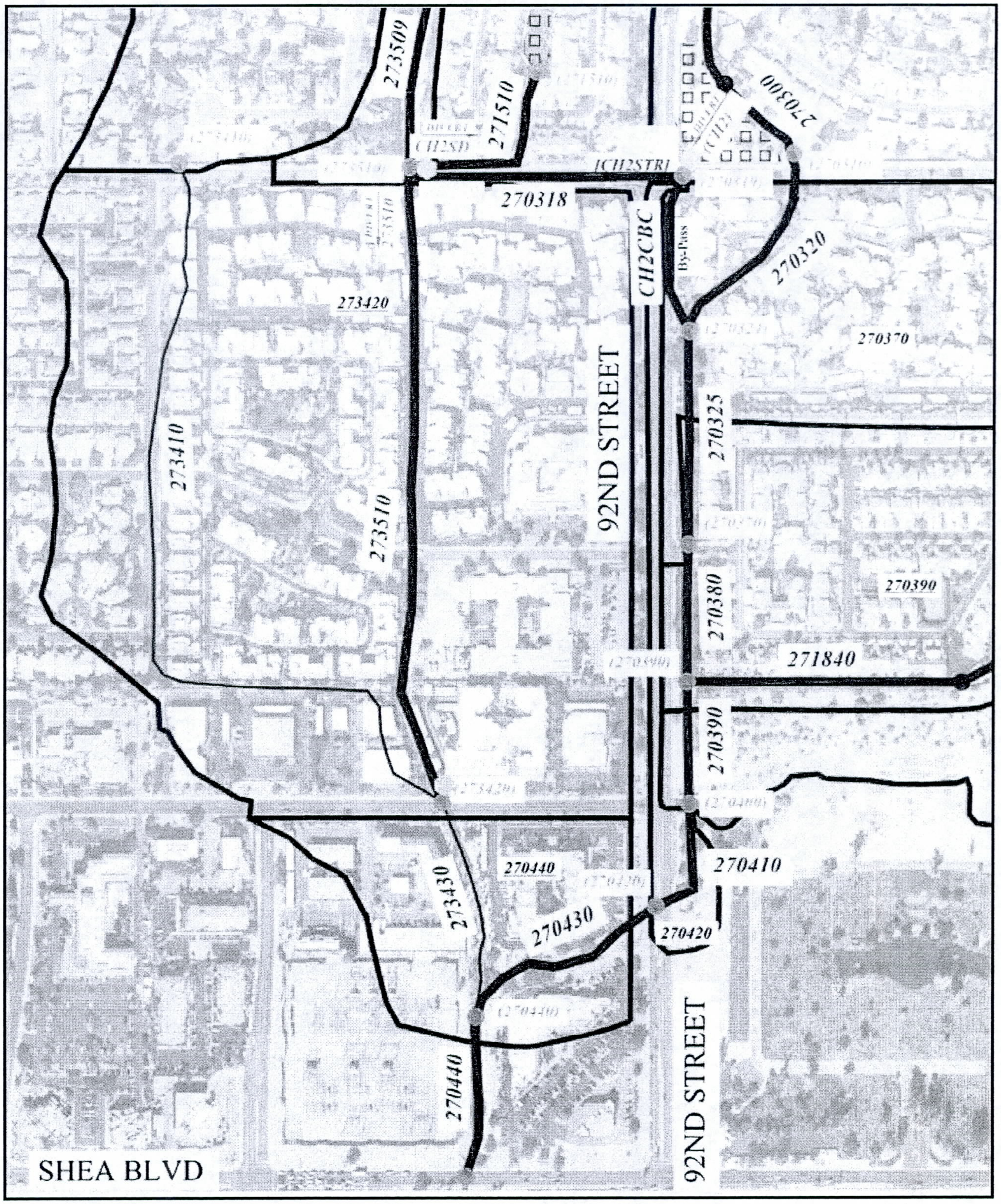
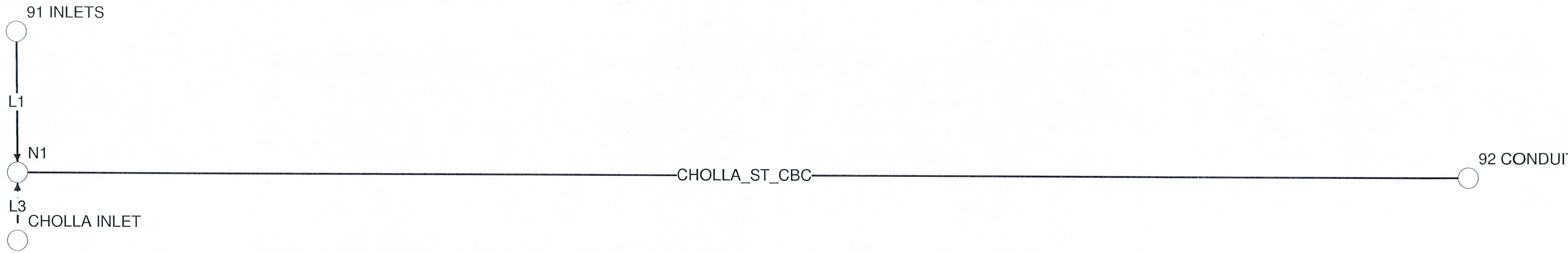


Figure 4. HEC-1 Routing Map for SMC and the downstream channel



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FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 02/28/2012

Project No. : UCW048
Project Name.:Upper Camel back Wash (UCW)
91st ST - Curb Openning Catch Basin Design
Computed by : T.T

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0069
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	1.50
a	Gutter Depression (inch)	1.50
Q	Discharge (cfs)	89.000
T	Width of Spread (ft)	41.64

Gutter Flow

Eo	Gutter Flow Ratio	0.093
d	Depth of Flow (ft)	0.83
V	Average Velocity (ft/sec)	5.13

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	91.19
L	Curb-Opening Length (ft)	17.00
e	Inlet Efficiency	0.310
Qi	Intercepted Flow (cfs)	27.608
Qb	By-pass Flow (cfs)	61.392

Note: The 17' curb-opening CB, on one side, would intercept 27.6 cfs. This flow rate will be doubled by installing two CBs on either side of the 91st street just north of the trench drain. Accordingly, a bypass flow in the amount of 89 - 2x27.6 = 33.8 cfs will be intecepted by the Trench drain

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 02/28/2012

Project No. : UCW048
Project Name.:Upper Camel back Wash (UCW)
91st ST - Trench Drain Design
Computed by : T.T

Inlets on Grade: Slotted Drain Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0069
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.50
Q	Discharge (cfs)	35.000
T	Width of Spread (ft)	29.41

Gutter Flow

Eo	Gutter Flow Ratio	0.171
d	Depth of Flow (ft)	0.59
V	Average Velocity (ft/sec)	4.05

Inlet Interception

	Inlet Type	Slotted Drain
LT	Length for 100% Inteception (ft)	58.02
L	Slotted Drain Length (ft)	38.00
e	Inlet Efficiency	0.853
Qi	Intercepted Flow (cfs)	29.845
Qb	By-pass Flow (cfs)	5.155

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 03/1/2012

Project No. : UCW048
Project Name.: Upper Camel back Wash (UCW)
Cholla St - Curb Trench Drain Design
Computed by : T.T

Inlets on Sag: Slotted Drain Inlet

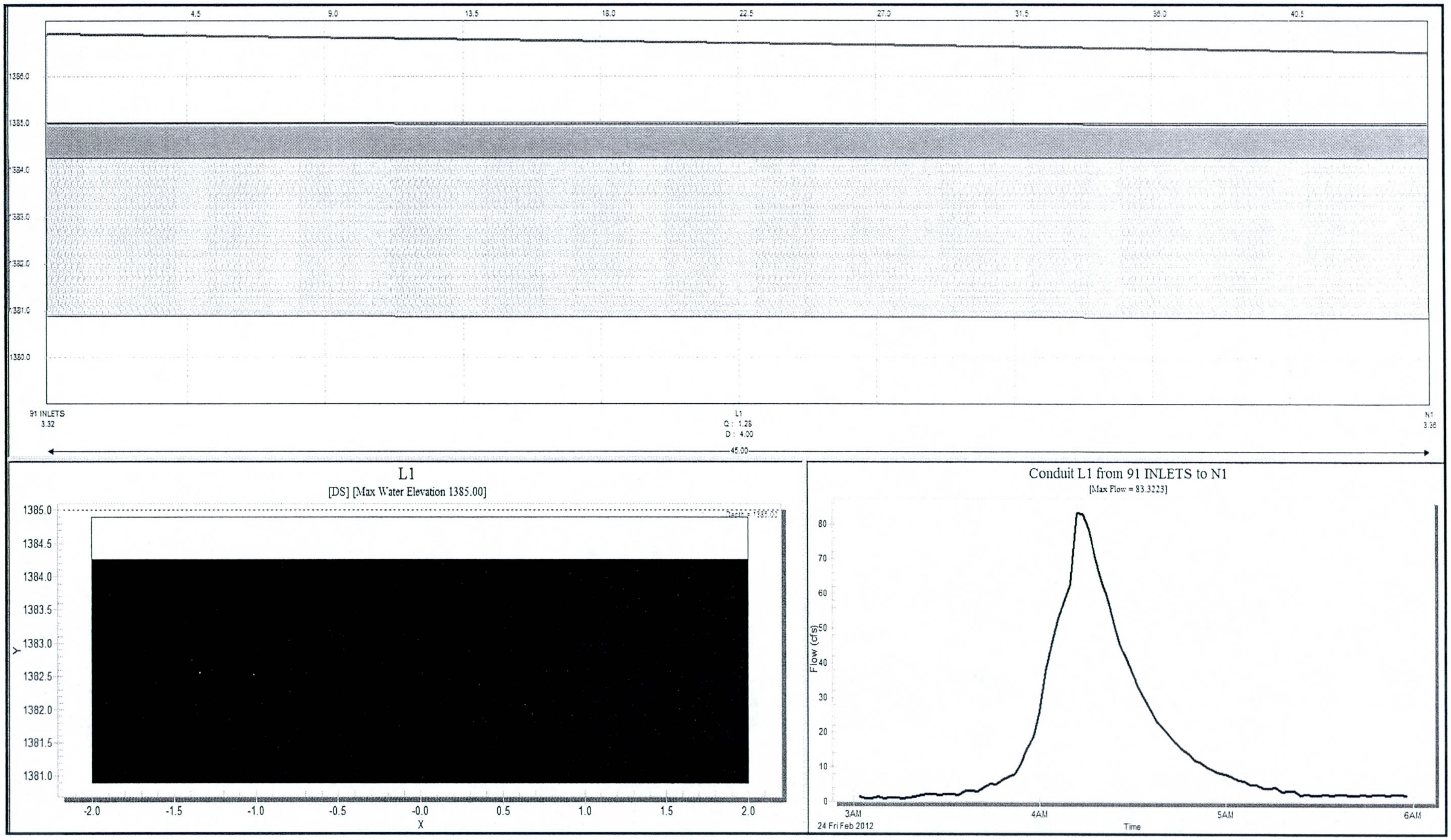
Roadway and Discharge Data

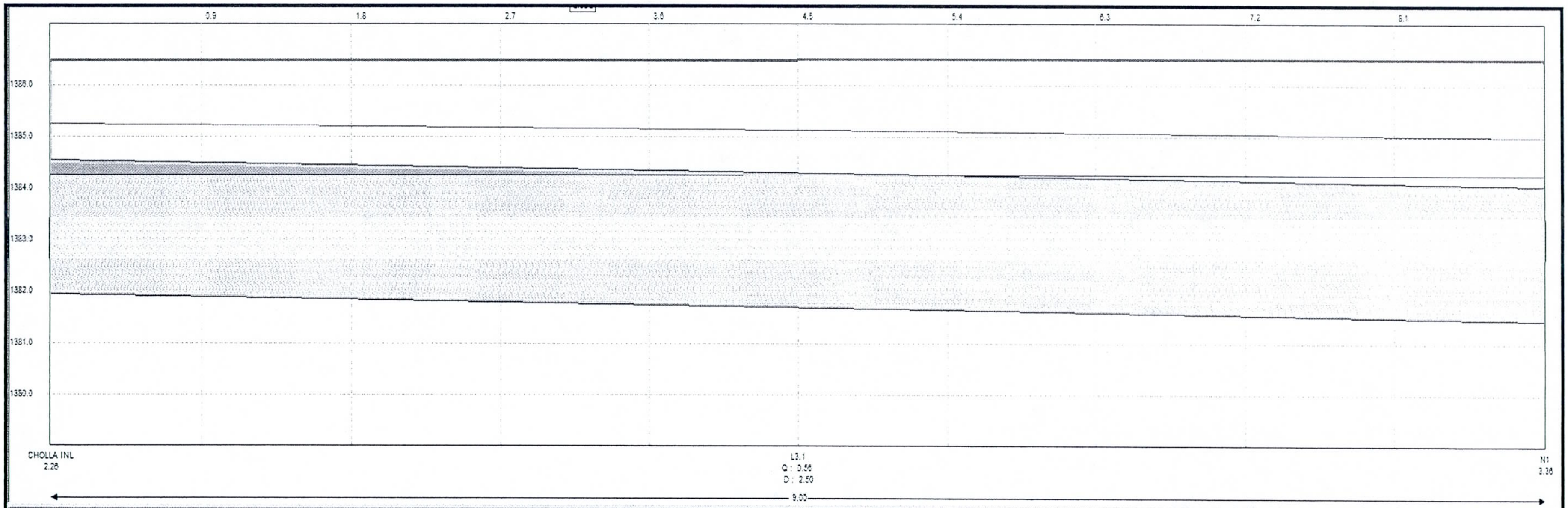
	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.50

Inlet Interception

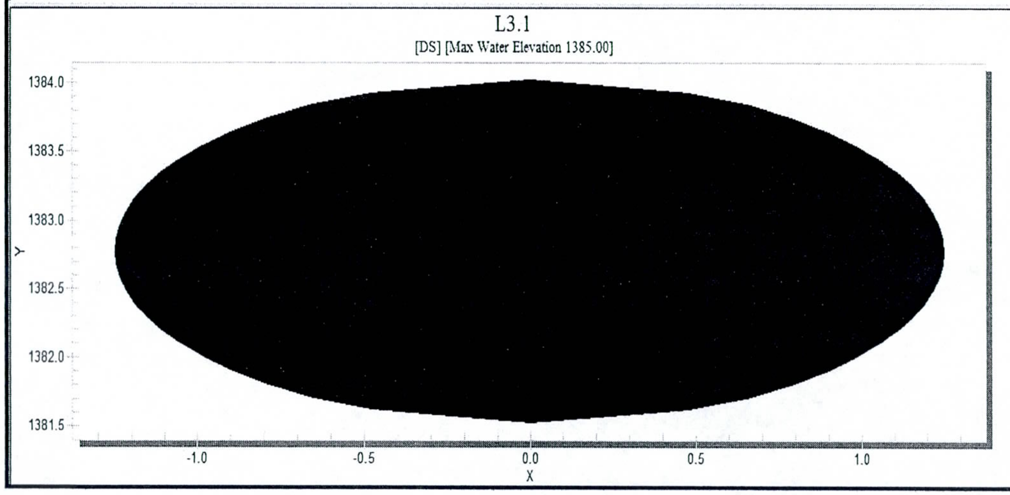
	Inlet Type *Sag*	Slotted Drain
T	Width of Spread (ft)	8.11
L	Length of Inlet (ft)	38.00
W1	Slotted Drain Opening (in)	24.00
CLF	Clogging Factor (%)	75.00
d_slot	Depth over Slotted Drain (ft)	0.205
d_curb	Depth at Curb (ft)	0.287
Qi	Intercepted Flow (cfs)	55.200

Note: Flow rate accounted for the 50 cfs coming from the east along Cholla Street plus 5.2 cfs by-pass flow from the 91st street Trench drain

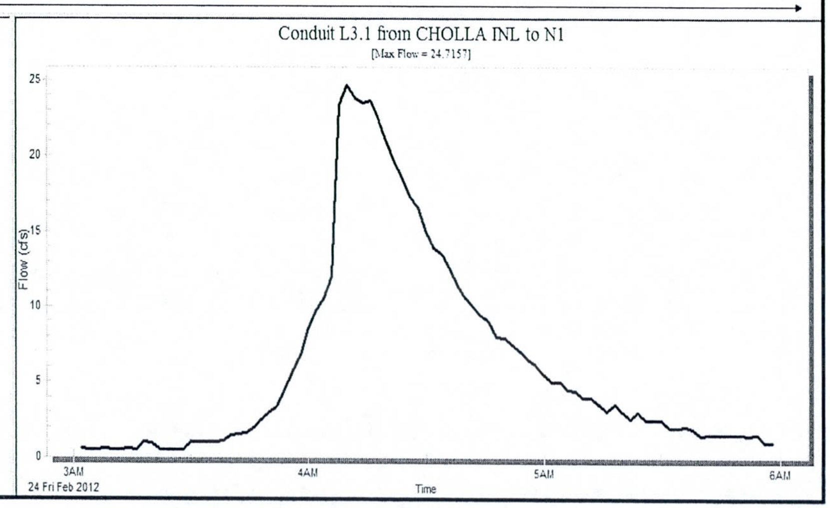

4.5
9.0
13.5
18.0
22.5
27.0
31.5
36.0
40.5
1386.0
1385.0
1384.0
1383.0
1382.0
1381.0
1380.0
91 INLETS
3.32
L1
Q: 1.28
D: 4.00
N1
3.36
45.00
L1
[DS] [Max Water Elevation 1385.00]
1385.0
1384.5
1384.0
1383.5
1383.0
1382.5
1382.0
1381.5
1381.0
Y
-2.0
-1.5
-1.0
-0.5
-0.0
0.5
1.0
1.5
2.0
X
Conduit L1 from 91 INLETS to N1
[Max Flow = 83.3223]
Flow (cfs)
80
70
60
50
40
30
20
10
0
3AM
4AM
5AM
6AM
24 Fri Feb 2012
Time



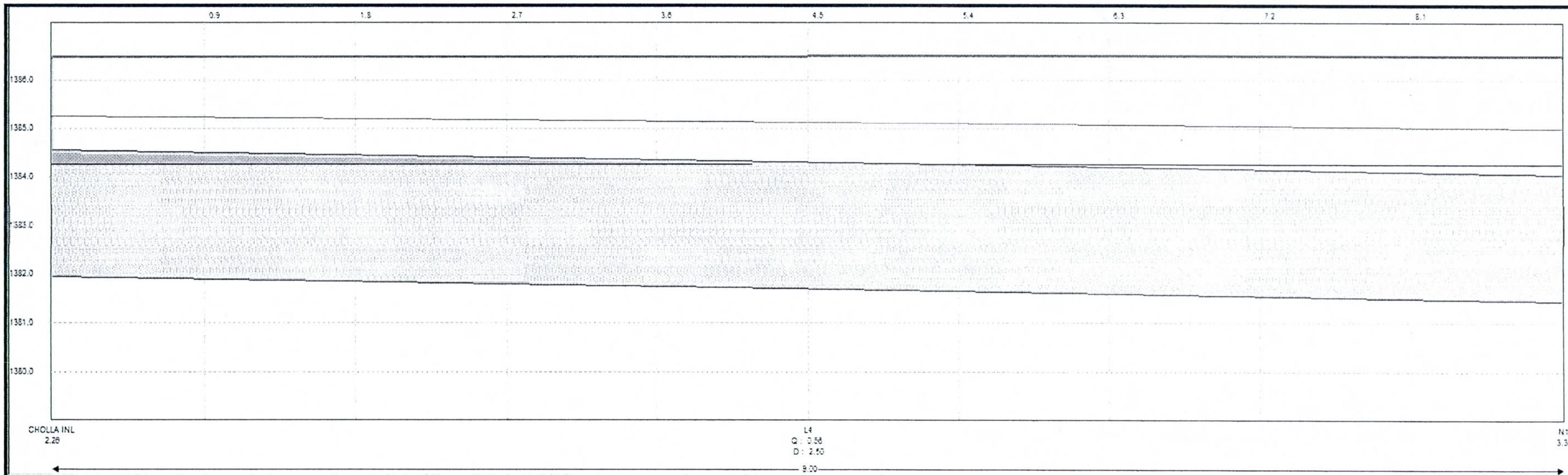
0.9
1.8
2.7
3.6
4.5
5.4
6.3
7.2
8.1
1386.0
1385.0
1384.0
1383.0
1382.0
1381.0
1380.0
CHOLLA INL
2.26
L3.1
Q : 3.56
D : 2.50
N1
3.36
9.00



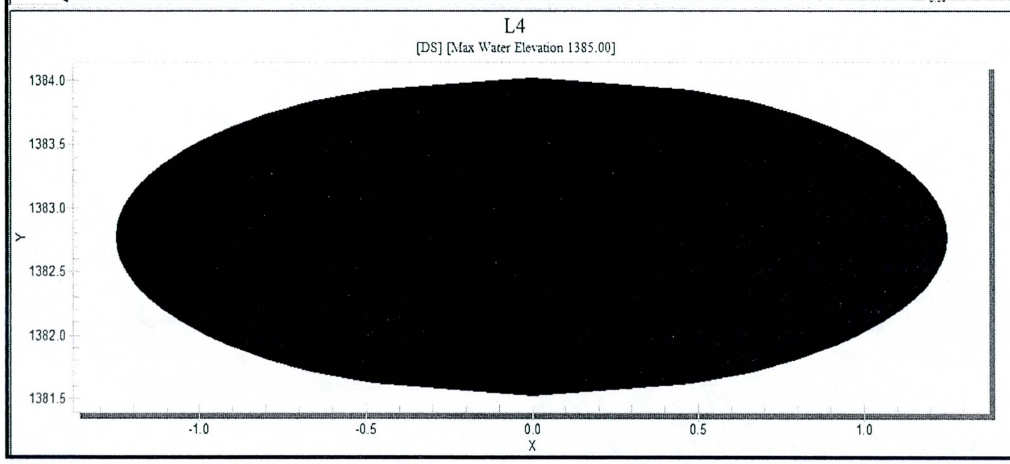
L3.1
[DS] [Max Water Elevation 1385.00]
1384.0
1383.5
1383.0
1382.5
1382.0
1381.5
Y
-1.0
-0.5
0.0
0.5
1.0
X



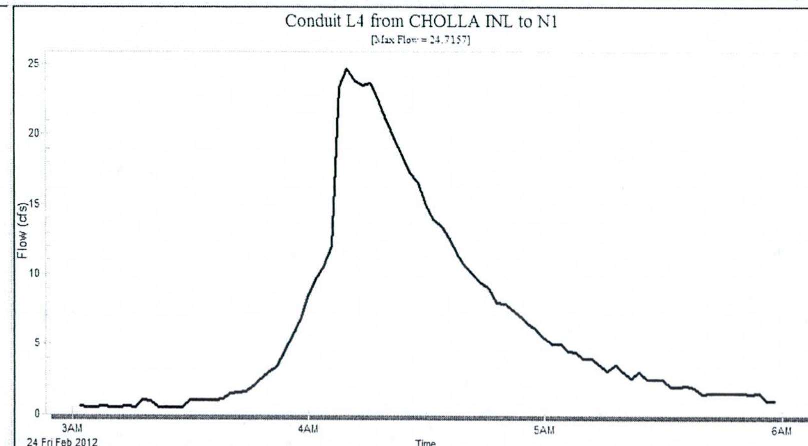
Conduit L3.1 from CHOLLA INL to N1
[Max Flow = 24.7157]
Flow (cfs)
25
20
15
10
5
0
3AM
24 Fri Feb 2012
4AM
5AM
6AM
Time



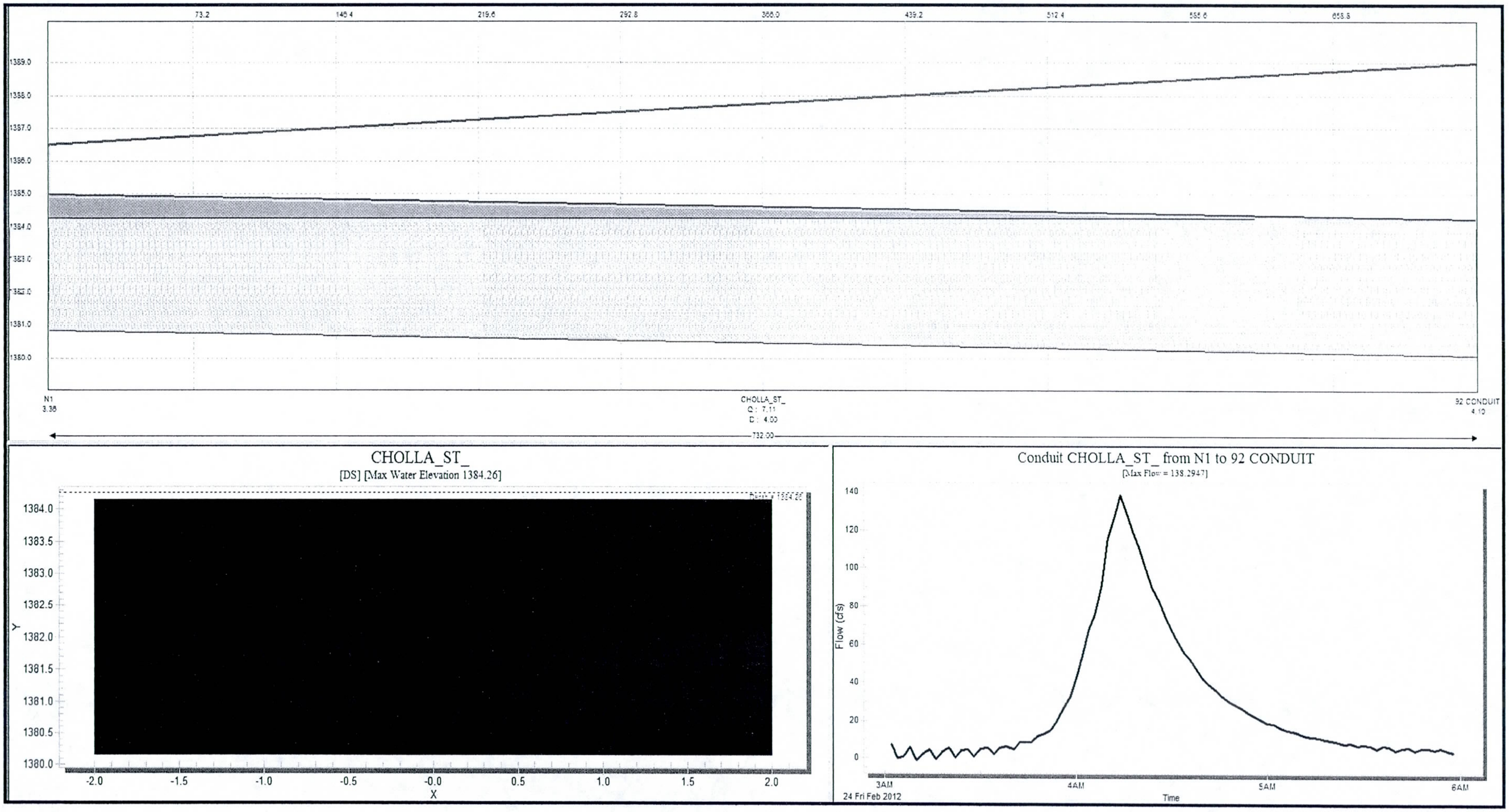
0.9
1.8
2.7
3.6
4.5
5.4
6.3
7.2
8.1
1386.0
1385.0
1384.0
1383.0
1382.0
1381.0
1380.0
CHOLLA INL
2.26
L4
Q : 0.56
D : 2.50
N1
3.36
9.00



L4
[DS] [Max Water Elevation 1385.00]
1384.0
1383.5
1383.0
1382.5
1382.0
1381.5
Y
-1.0
-0.5
0.0
0.5
1.0
X



Conduit L4 from CHOLLA INL to N1
[Max Flow = 24.7157]
25
20
15
10
5
0
Flow (cfs)
3AM
4AM
5AM
6AM
24 Fri Feb 2012
Time



N1
CHOLLA_ST_
92 CONDUIT
CHOLLA_ST_
[DS] [Max Water Elevation 1384.26]
Y
X
Conduit CHOLLA_ST_ from N1 to 92 CONDUIT
Flow (cfs)
3AM
4AM
5AM
6AM
24 Fri Feb 2012
Time

```
*==================================================*
|                    XP-SWMM                       |
|    Storm and Wastewater Management Model         |
|                 Version 9.24                     |
|==================================================|
|                 Developed by                     |
|==================================================|
|                                                  |
|                  XP Software                     |
|                                                  |
|              Based on the U.S. EPA               |
|  Storm Water Management Model Version 4.30       |
|                                                  |
|            Originally Developed by               |
|             Metcalf & Eddy, Inc.                 |
|            University of Florida                 |
|          Camp Dresser & McKee Inc.               |
|              September 1970                      |
|                                                  |
|            EPA-SWMM is maintained by             |
|            Oregon State University               |
|            Camp Dresser & McKee Inc.             |
|==================================================|
|     XP Software      October, 2003               |
|      Data File Version --->    11.7              |
*==================================================*


*==========================================================*
|       Input and Output file names by SWMM Layer          |
*==========================================================*

 Input File  to Layer #     1 JOT.US
 Output File to Layer #     1 JOT.US

*============================================================*
|  Special command line arguments in XP-SWMM2000. This       |
|  now includes program defaults. $Keywords are the program|
|  defaults.  Other Keywords are from the SWMMCOM.CFG file.|
|  or the command line or any cfg file on the command line.|
|  Examples include these in the file xpswm.bat under the  |
|  section :solve or in the windows version XPSWMM32 in the|
|  file solve.bat                                           |
|                                                           |
|  Note: the cfg file should be in the subdirectory swmxp  |
|        or defined by the set variable in the xpswm.bat   |
|        file.  Some examples of the command lines possible|
|        are shown below:                                   |
|                                                           |
|  swmmd swmmcom.cfg                                        |
|  swmmd my.cfg                                             |
|  swmmd nokeys nconv5 perv extranwq                        |
*============================================================*
```

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$powerstation                           0.0000        1       2
$perv                                   0.0000        0       4
$oldegg                                 0.0000        0       7
$as                                     0.0000        0      11
$noflat                                 0.0000        0      21
$oldomega                               0.0000        0      24
$oldvol                                 0.0000        1      28
$implicit                               0.0000        1      29
$oldhot                                 0.0000        1      31
$oldscs                                 0.0000        0      33
$flood                                  0.0000        1      40
$nokeys                                 0.0000        0      42
$pzero                                  0.0000        0      55
$oldvol2                                0.0000        2      59
$storage2                               0.0000        3      62
$oldhot1                                0.0000        1      63
$pumpwt                                 0.0000        1      70
$ecloss                                 0.0000        1      77
$exout                                  0.0000        0      97
$spatial = 0.90                         0.9000        5     124
$djref = -1.0                          -0.1000        3     143
$weirlen = 50                          50.0000        1     153
$oldbnd                                 0.0000        1     154
$nogrelev                               0.0000        1     161
$ncmid                                  0.0000        0     164
$new_nl_97                              0.0000        2     290
$best97                                 0.0000        1     294
$newbound                               0.0000        1     295
$q_tol = 0.1                            0.0010        1     316
$new_storage                            0.0000        1     322
$old_iteration                          0.0000        1     333
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$review_elevation                       0.0000        1     383
$use_half_volume                        0.0000        1     385
$min_ts = 0.5                           0.5000        1     407
$design_restart = on                    0.0000        1     412
$zero_value=1.e-05                      0.0000        1     414

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#    Entry made to the HYDRAULIC Layer(Block) of SWMM #
#    Last Updated October,2000 by XP Software         #

    UCW-CHOLLA ST SD


*============================================================*
|        HYDRAULICS TABLES IN THE OUTPUT FILE                |
|  These are the more important tables in the output file.   |
|  You can use your editor to find the table numbers,        |
|  for example: search for Table E20 to check continuity.    |
|  This output file can be imported into a Word Processor    |
|  and printed on US letter or A4 paper using portrait       |
|  mode, courier font, a size of 8 pt. and margins of 0.75   |
```

```
|                                                                  |
| Table E1    - Basic Conduit Data                                 |
| Table E2    - Conduit Factor Data                                |
| Table E3a   - Junction Data                                      |
| Table E3b   - Junction Data                                      |
| Table E4    - Conduit Connectivity Data                          |
| Table E4a   - Dry Weather Flow Data                              |
| Table E4b   - Real Time Control Data                             |
| Table E5    - Junction Time Step Limitation Summary              |
| Table E5a   - Conduit Explicit Condition Summary                 |
| Table E6    - Final Model Condition                              |
| Table E7    - Iteration Summary                                  |
| Table E8    - Junction Time Step Limitation Summary              |
| Table E9    - Junction  Summary  Statistics                      |
| Table E10   - Conduit   Summary  Statistics                      |
| Table E11   - Area assumptions used in the analysis              |
| Table E12   - Mean conduit information                           |
| Table E13   - Channel losses(H) and culvert info                 |
| Table E13a  - Culvert Analysis Classification                    |
| Table E14   - Natural Channel Overbank Flow Information          |
| Table E14a  - Natural Channel Encroachment Information           |
| Table E14b  - Floodplain Mapping                                 |
| Table E15   - Spreadsheet Info List                              |
| Table E15a  - Spreadsheet Reach List                             |
| Table E16   - New Conduit Output Section                         |
| Table E17   - Pump Operation                                     |
| Table E18   - Junction Continuity Error                          |
| Table E19   - Junction Inflow Sources                            |
| Table E20   - Junction Flooding and Volume List                  |
| Table E21   - Continuity balance at simulation end               |
| Table E22   - Model Judgement Section                            |
*============================================================*

Time Control from Hydraulics Job Control
Year.........    2012 Month.......       2
Day..........      24 Hour........       3
Minute.......       0 Second......       0


Control information for simulation
----------------------------------

Integration cycles.................       180
Length of integration step is......     60.00 seconds
Simulation length..................      3.00 hours
Do not create equiv. pipes(NEQUAL).         0
Use U.S. customary units for I/O...         0
Printing starts in cycle...........         1
Intermediate printout intervals of.       500 cycles
Intermediate printout intervals of.    500.00 minutes
Summary printout intervals of......       500 cycles
Summary printout time interval of..    500.00 minutes
Hot start file parameter (REDO)....         0
Initial time.......................      3.00 hours
```

```
Iteration variables: Flow Tolerance.   0.00010
                     Head Tolerance.   0.00005
    Minimum depth (m or ft).........   0.00001
    Underrelaxation parameter.......   0.85000
    Time weighting parameter........   0.85000
    Conduit roughness factor........   1.00000
    Flow adjustment factor..........   1.00000
    Initial Condition Smoothing.....         0
    Courant Time Step Factor........   1.00000
    Default Expansion/Contraction K.   0.00000
    Default Entrance/Exit K.........   0.00000
    Routing Method..................   Dynamic Wave
Default surface area of junctions...     13.00 square feet.
Minimum Junction/Conduit Depth......   0.00001 feet.
Ponding Area Coefficient............   5000.00
Ponding Area Exponent...............    1.0000
Minimum Orifice Length..............   1000.00 feet.
NJSW input hydrograph junctions.....     2
     or user defined hydrographs....
```

Water surface elevations will be plotted for the following 1 Junctions

91 INLETS

```
*=====================================================*
|           Table E1 - Conduit Data                   |
*=====================================================*
```

Inp Num	Conduit Name	Length (ft)	Conduit Class	Area (ft^2)	Manning Coef.	Max Width (ft)	Depth (ft)	Trapezoid Side Slopes
1	CHOLLA_ST_	732.0000	Rectangle	32.0000	0.0130	8.0000	4.0000	
2	L1	45.0000	Rectangle	32.0000	0.0130	8.0000	4.0000	
3	L3a	9.0000	Circular	4.9087	0.0130	2.5000	2.5000	
4	L3b	9.0000	Circular	4.9087	0.0130	2.5000	2.5000	

Total length of all conduits .... 795.0000 feet

```
*=====================================================*
| If there are messages about (sqrt(g*d)*dt/dx), or  |
| the sqrt(wave celerity)*time step/conduit length   |
| in the output file all it means is that the        |
| program will lower the internal time step to       |
| satisfy this condition (explicit condition).       |
```

```
| You control the actual internal time step by         |
| using the minimum courant time step factor in the |
| HYDRAULICS job control.  The message put in words |
| states that the smallest conduit with the fastest |
| velocity will control the time step selection.      |
| You have further control by using the modify         |
| conduit option in the HYDRAULICS Job Control.       |
*===================================================*


         Conduit     Courant
            Name       Ratio
 ---------------   ---------
      CHOLLA_ST_        0.93
              L1       15.13    ===> Warning ! (sqrt(wave celerity)*time
step/conduit length)
             L3a       17.94    ===> Warning ! (sqrt(wave celerity)*time
step/conduit length)
             L3b       17.94    ===> Warning ! (sqrt(wave celerity)*time
step/conduit length)

 *==================*
 |  Conduit Volume  |
 *==================*

 Full pipe or full open conduit volume
 Input full depth volume...........    2.5159E+04 cubic feet


 *===================================================*
 |            Table E3a - Junction Data              |
 *===================================================*

 Inp          Junction     Ground      Crown    Invert     Qinst  Initial
Interface
 Num              Name  Elevation Elevation Elevation       cfs Depth-ft
Flow (%)
 ---  ---------------  --------- --------- --------- -------- --------
---------
   1                N1  1386.5000 1384.9000 1380.9000   0.0000   0.0000
100.0000
   2        92 CONDUIT  1389.0000 1384.1600 1380.1600   0.0000   0.0000
100.0000
   3         91 INLETS  1386.9000 1384.9400 1380.9400   0.0000   0.0000
100.0000
   4        CHOLLA INL  1386.4800 1384.5000 1382.0000   0.0000   0.0000
100.0000


 *===================================================*
 |            Table E3b - Junction Data              |
 *===================================================*
```

Inp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet
1	N1	143.0254	355.5423	Sealed	Normal
2	92 CONDUIT	398.7719	355.7326	No Ponding	Normal
3	91 INLETS	142.8580	380.5278	No Ponding	Normal
4	CHOLLA INL	143.0386	343.5457	No Ponding	Normal

===
| Table E4 - Conduit Connectivity |
===

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation
1	CHOLLA_ST_	N1	92 CONDUIT	1380.9000	1380.1600
2	L1	91 INLETS	N1	1380.9400	1380.9000
3	L3a	CHOLLA INL	N1	1382.0000	1381.5000
4	L3b	CHOLLA INL	N1	1382.0000	1381.5000

===
| FREE OUTFALL DATA (DATA GROUP I1) |
| BOUNDARY CONDITION ON DATA GROUP J1 |
===

Outfall at Junction....92 CONDUIT has boundary condition number... 1

===
| INTERNAL CONNECTIVITY INFORMATION |
===

CONDUIT	JUNCTION	JUNCTION
FREE # 1	92 CONDUIT	BOUNDARY

===

```
 |        Boundary Condition Information              |
 |                 Data Groups J1-J4                   |
 *====================================================*


 BC NUMBER..         1 Control water surface elevation is..   1384.26
feet.

 *====================================================*
 |             XP Note Field Summary                   |
 *====================================================*



 *=================================*
 |   Conduit Convergence Criteria  |
 *=================================*

         Conduit         Full     Conduit
            Name         Flow       Slope
-----------------  ----------  ----------
       CHOLLA_ST_    140.8894      0.0010
               L1    132.1118      0.0009
              L3a     52.9529      0.0167
              L3b     52.9529      0.0167

 *=================================*
 |    Initial Model Condition      |
 | Initial Time =       3.02 hours |
 *=================================*

       Junction / Depth   / Elevation    ===>  "*" Junction is
Surcharged.
              N1/   3.36 /  1384.26       92 CONDUIT/   4.10 /
1384.26         91 INLETS/   3.32 /  1384.26
      CHOLLA INL/   2.26 /  1384.26

         Conduit/       FLOW    ===> "*" Conduit uses the normal flow
option.
      CHOLLA_ST_/       0.00               L1/       0.00
L3a/       0.00
             L3b/       0.00         FREE # 1/       0.00

         Conduit/   Velocity
      CHOLLA_ST_/       0.00               L1/       0.00
L3a/       0.00
             L3b/       0.00

         Conduit/ Cross Sectional Area
      CHOLLA_ST_/      27.47               L1/      26.59
L3a/       4.71
             L3b/       4.71
```

```
        Conduit/ Hydraulic Radius
     CHOLLA_ST_/       1.78                L1/       1.82
L3a/       0.73
             L3b/      0.73

        Conduit/ Upstream/ Downstream Elevation
     CHOLLA_ST_/  1384.26/  1384.26           L1/  1384.26/
1384.26            L3a/  1384.26/  1384.26
             L3b/  1384.26/  1384.26


 91 INLETS / 2.00E+00 CHOLLA INL/ 2.00E+00
 # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
# # # # #


 *====================================================*
 | Table E5 - Junction Time Limitation Summary         |
 |            (0.10 or 0.25)* Depth * Area              |
 | Time step = ------------------------------           |
 |                 Sum of Flow                          |
 *====================================================*
 |  The time this junction was the limiting junction    |
 |              is listed in the third column.          |
 *====================================================*

        Junction      Time(.10)  Time(.25)  Time(sec)
-----------------     ---------  ---------  ---------
               N1       24.1706    60.4265   180.0000
       92 CONDUIT      600.0000   600.0000     0.0000
        91 INLETS        6.5773    16.4434     0.0000
       CHOLLA INL        1.2117     3.0293 10620.0000
The junction requiring the smallest time step was...CHOLLA INL


 *===========================================================*
 |       Table E5a - Conduit Explicit Condition Summary        |
 |       Courant    =          Conduit Length                  |
 |       Time step = --------------------------------          |
 |                      Velocity + sqrt(g*depth)               |
 |                                                             |
 |                 Conduit Implicit Condition Summary          |
 |       Courant    =          Conduit Length                  |
 |       Time step = --------------------------------          |
 |                             Velocity                        |
 *===========================================================*
 |  The 3rd column is the Explicit time step times the         |
 |      minimum courant time step factor                       |
 |                                                             |
 |  Minimum Conduit Time Step in seconds in the 4th column     |
 |  in the list. Maximum possible is 10 * maximum time step    |
 |                                                             |
 |  The 5th column is the maximum change at any time step      |
 |  during the simulation. The 6th column is the wobble        |
```

```
 |  value which is an indicator of the flow stability.        |
 |                                                            |
 |  You should use this section to find those conduits that  |
 |  are slowing your model down.  Use modify conduits to      |
 |  alter the length of the slow conduits to make your        |
 |  simulation faster, or change the conduit name to          |
 |  "CHME?????" where ????? are any characters, this will     |
 |  lengthen the conduit based on the model time step,        |
 |  not the value listed in modify conduits.                  |
 *============================================================*

           Conduit   Time(exp)  Expl*Cmin  Time(imp)  Time(min)  Max
Qchange    Wobble   Type of Soln
    --------------  ---------  ---------  ---------  ---------  -------
----  -------  ------------
      CHOLLA_ST_     46.4560    46.4560   171.5551     1.0000
1.2123    2.7123  Normal Soln
              L1      3.1721     3.1721    16.6881     0.0000
1.5685    1.7646  Normal Soln
             L3a      1.9053     1.9053     5.8477   179.0000      -
1.4199    3.7463  Normal Soln
             L3b      1.9053     1.9053     5.8477     0.0000      -
1.4199    3.7463  Normal Soln
The conduit with the smallest time step limitation was..L3a
The conduit with the largest wobble was.................L3a
The conduit with the largest flow change in any
consecutive time step...................................L1

 *==================================================*
 |  Table E6. Final Model Condition                 |
 |            This table is used for steady state   |
 |            flow comparison and is the information|
 |            saved to the hot-restart file.        |
 |            Final Time =     6.017 hours          |
 *==================================================*

 Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
              N1/   3.37 /  1384.27/      92 CONDUIT/   4.10 /
1384.26/      91 INLETS/    3.33 /  1384.27/
      CHOLLA INL/   2.27 /  1384.27/

   Conduit/       Flow     ===> "*" Conduit uses the normal flow option.
      CHOLLA_ST_/        5.10 /                L1/        2.08 /
L3a/        1.01 /
             L3b/        1.01 /          FREE # 1/        5.10 /

         Conduit/   Velocity
      CHOLLA_ST_/        0.19 /                L1/        0.08 /
L3a/        0.21 /
             L3b/        0.21 /

         Conduit/      Width
      CHOLLA_ST_/        7.99 /                L1/        8.00 /
L3a/        1.38 /
```

```
             L3b/       1.38 /

        Junction/        EGL
             N1/        3.37 /       92 CONDUIT/        4.10 /       91
INLETS/       3.33 /
      CHOLLA INL/       2.27 /

        Junction/  Freeboard
             N1/        2.23 /       92 CONDUIT/        4.74 /       91
INLETS/       2.63 /
      CHOLLA INL/       2.21 /

        Junction/ Max Volume
             N1/       53.36 /       92 CONDUIT/       53.30 /       91
INLETS/      53.02 /
      CHOLLA INL/      42.30 /

        Junction/Total Fldng
             N1/        0.00 /       92 CONDUIT/        0.00 /       91
INLETS/       0.00 /
      CHOLLA INL/       0.00 /

         Conduit/ Cross Sectional Area
      CHOLLA_ST_/      27.53 /             L1/       26.66 /
L3a/        4.72 /
             L3b/       4.72 /

         Conduit/  Final Volume
      CHOLLA_ST_/   20151.47 /             L1/     1199.51 /
L3a/      141.65 /
             L3b/     141.65 /

         Conduit/ Hydraulic Radius
      CHOLLA_ST_/       1.78 /             L1/        1.82 /
L3a/        0.73 /
             L3b/       0.73 /

         Conduit/ Upstream/ Downstream Elevation
      CHOLLA_ST_/  1384.27/  1384.26             L1/  1384.27/
1384.27                L3a/  1384.27/  1384.27/
             L3b/  1384.27/  1384.27


 *=========================================================*
 |         Table E7 -  Iteration Summary                   |
 *=========================================================*

 Total number of time steps simulated...........          180
 Total number of passes in the simulation........        9170
 Total number of time steps during simulation....        3984
 Ratio of actual # of time steps / NTCYC.........      22.133
 Average number of iterations per time step......       2.302
 Average  time step size(seconds)................       2.711
 Smallest time step size(seconds)................       1.200
```

Largest time step size(seconds)............... 15.000
Average minimum Conduit Courant time step (sec). 3.141
Average minimum implicit time step (sec)........ 2.761
Average minimum junction time step (sec)........ 2.761
Average Courant Factor Tf....................... 2.761
Number of times omega reduced................... 0

==
| Table E8 - Junction Time Step Limitation Summary |
==
| Not Convr = Number of times this junction did not |
| converge during the simulation. |
| Avg Convr = Average junction iterations. |
| Conv err = Mean convergence error. |
| Omega Cng = Change of omega during iterations |
| Max Itern = Maximum number of iterations |
==

Junction	Not Convr	Avg Convr	Total Itt	Omega Cng	Max Itern	Ittrn >10	Ittrn >25	Ittrn >40
N1	0	3.00	11936	0	35	13	3	0
92 CONDUIT	0	2.61	10396	0	22	3	0	0
91 INLETS	0	2.86	11376	0	481	2	1	1
CHOLLA INL	0	2.65	10552	0	49	6	2	1

Total number of iterations for all junctions.. 44260
Minimum number of possible iterations......... 15936
Efficiency of the simulation.................. 2.78
Good Efficiency

==
| Extran Efficiency is an indicator of the efficiency of |
| the simulation. Ideal efficiency is one iteration per |
| time step. Altering the underrelaxation parameter, |
| lowering the time step, increasing the flow and head |
| tolerance are good ways of improving the efficiency, |
| another is lowering the internal time step. The lower the|
| efficiency generally the faster your model will run. |
| If your efficiency is less than 1.5 then you may try |
| increasing your time step so that your overall simulation|
| is faster. Ideal efficiency would be around 2.0 |
| |
| Good Efficiency < 1.5 mean iterations |
| Excellent Efficiency < 2.5 and > 1.5 mean iterations |
| Good Efficiency < 4.0 and > 2.5 mean iterations |
| Fair Efficiency < 7.5 and > 4.0 mean iterations |
| Poor Efficiency > 7.5 mean iterations |
==

```
*=====================================================*
|      Table E9 - JUNCTION SUMMARY STATISTICS          |
| The Maximum area is only the area of the node, it    |
| does not include the area of the surrounding conduits|
*=====================================================*
```

Junction Name	Ground Elevation feet	Uppermost PipeCrown Elevation feet	Maximum Junction Elevation feet	Time of Occurence Hr.	Time of Occurence Min.	Feet of Surcharge at Max Elevation	Freeboard of node feet	Maximum Junction Area ft^2	Maximum Gutter Depth feet	Maximum Gutter Width feet	Maximum Gutter Velocity ft/s
N1	1386.5000	1384.9000	1385.0045	4	13	0.1045	1.4955	13.0000	0.0000	0.0000	0.0000
92 CONDUIT	1389.0000	1384.1600	1384.2600	3	0	0.1000	4.7400	13.0000	0.0000	0.0000	0.0000
91 INLETS	1386.9000	1384.9400	1385.0195	4	13	0.0795	1.8805	13.0000	0.0000	0.0000	0.0000
CHOLLA INL	1386.4800	1384.5000	1385.2541	4	13	0.7541	1.2259	13.0000	0.0000	0.0000	0.0000

```
*=====================================================*
|      Table E10 - CONDUIT SUMMARY STATISTICS          |
| Note: The peak flow may be less than the design flow |
| and the conduit may still surcharge because of the   |
| downstream boundary conditions.                      |
|                                                      |
| * denotes an open conduit that has been overtopped   |
|   this is a potential source of severe errors        |
*=====================================================*
```

Conduit Name	Conduit Design Flow (cfs)	Maximum Design Velocity (ft/s)	Maximum Vertical Depth (in)	Maximum Computed Flow (cfs)	Time of Occurence Hr.	Time of Occurence Min.	Maximum Computed Velocity (ft/s)	Time of Occurence Hr.	Time of Occurence Min.	Ratio of Max. to Design Flow	Maximum Depth at Pipe Ends Upstream (ft)	Maximum Depth at Pipe Ends Dwnstrm (ft)	Ratio d/D US	Ratio d/D DS
CHOLLA_ST_	140.8894	4.4028	48.0000	138.7865	4	13	4.2681	4	14	0.9851	1385.005	1384.260	1.026	1.025
L1	132.1118	4.1285	48.0000	88.0425	4	13	2.6977	4	13	0.6664	1385.019	1385.005	1.019	1.026
L3a	52.9529	10.7875	30.0000	26.3735	4	11	5.3649	4	11	0.4981	1385.254	1385.005	1.301	1.401
L3b	52.9529	10.7875	30.0000	26.3735	4	11	5.3649	4	11	0.4981	1385.254	1385.005	1.301	1.401

FREE # 1	Undefnd	Undefnd	Undefn	138.7525	4	13

```
*===============================================*
| Table E11.  Area assumptions used in the analysis|
| Subcritical and Critical flow assumptions from   |
|    Subroutine Head.  See Figure 17-1 in the      |
|        manual for further information.           |
*===============================================*
```

Conduit Name	Duration of Dry Flow(min)	Duration of Sub-Critical Flow(min)	Durat. of Upstream Critical Flow(min)	Durat. of Downstream Critical Flow(min)	Maximum Hydraulic Radius-m	Maximum X-Sect Area(ft^2)	Maximum Vel*D (ft^2/s)
CHOLLA_ST_	0.0000	180.0000	0.0000	0.0000	1.8386	32.8235	17.3789
L1	0.0000	180.0000	0.0000	0.0000	1.8879	32.6465	11.0265
L3a	0.0000	180.0000	0.0000	0.0000	0.7431	5.1351	17.2014
L3b	0.0000	180.0000	0.0000	0.0000	0.7431	5.1351	17.2014

```
*=========================================*
| Table E12. Mean Conduit Flow Information |
*=========================================*
```

Conduit Name	Mean Flow (cfs)	Total Flow (ft^3)	Mean Percent Change	Low Flow Weightng	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Area	Mean Conduit Roughness
CHOLLA_ST_	27.2912	294744.89	0.0071	1.0000	0.1045	1.7388	28.2043	0.0130
L1	15.0593	162640.81	0.0040	1.0000	0.0596	1.7893	27.2840	0.0130
L3a	6.1133	66023.636	0.0028	1.0000	0.1638	0.7099	4.7823	0.0130
L3b	6.1133	66023.636	0.0028	1.0000	0.1638	0.7099	4.7823	0.0130
FREE # 1	27.2921	294754.47						

1

LOCATION NO. : 91 INLETS   Clock time in hours.

Plot of Junction Elevation

Invert Elev - 1380.94 feet
Crown Elev - 1384.94 feet
Ground Elev - 1386.90 feet

```
*===================================================================*
| Table E13. Channel losses(H), headwater depth (HW), tailwater    |
| depth (TW), critical and normal depth (Yc and Yn).               |
| Use this section for culvert comparisons                         |
*===================================================================*
```

Conduit Name	Maximum Flow	Head Loss	Friction Loss	Critical Depth	Normal Depth	HW Elevat	TW Elevat	
CHOLLA_ST_	138.2947	0.0000	0.6951	2.1011	3.1948	1384.9460	1384.2600	Max Flow
L1	88.0135	0.0000	0.0171	1.5540	2.4157	1385.0185	1384.9997	Max Flow
L3a	25.2321	0.0000	0.1131	1.7112	1.2153	1385.2062	1384.9997	Max Flow
L3b	25.2321	0.0000	0.1131	1.7112	1.2153	1385.2062	1384.9997	Max Flow

```
*==============================================================*
| Table E13a. CULVERT ANALYSIS CLASSIFICATION,                 |
| and the time the culvert was in a particular                 |
| classification during the simulation.  The time is           |
| in minutes.  The Dynamic Wave Equation is used for           |
| all conduit analysis but the culvert flow classification     |
| condition is based on the HW and TW depths.                  |
*==============================================================*
```

Conduit Name	Mild Slope Critical D Outlet Control	Mild Slope TW Control Outlet Control	Steep Slope TW Insignf Entrance Control	Slug Flow Outlet/ Entrance Control	Mild Slope TW > D Outlet Control	Mild Slope TW <= D Outlet Control	Outlet Control	Inlet Control	Inlet Configuration
CHOLLA_ST_	0.0000	0.0000	0.0000	0.0000	180.0000	0.0000	0.0000	0.0000	None
L1	0.0000	177.0000	0.0000	0.0000	3.0000	0.0000	0.0000	0.0000	None
L3a	0.0000	0.0000	0.0000	165.0000	0.0000	15.0000	0.0000	0.0000	None

L3b 0.0000 0.0000 0.0000 165.0000 0.0000
15.0000 0.0000 0.0000 None

```
*====================================*
|   Kinematic Wave Approximations    |
| Time in Minutes for Each Condition |
*====================================*
```

Conduit Name	Duration of Normal Flow	Slope Criteria	Super-Critical	Roll Waves
CHOLLA_ST_	0.0000	169.0362	0.0000	0.0000
L1	0.0000	176.6936	0.0000	0.0000
L3a	0.0000	25.0421	0.0000	0.0000
L3b	0.0000	25.0421	0.0000	0.0000

```
*=========================================================*
|     Table E15 - SPREADSHEET INFO LIST                   |
| Conduit Flow and Junction Depth Information for use in  |
| spreadsheets.  The maximum values in this table are the |
| true maximum values because they sample every time step.|
| The values in the review results may only be the        |
| maximum of a subset of all the time steps in the run.   |
| Note: These flows are only the flows in a single barrel.|
*=========================================================*
```

##	Conduit Name / Junction Name	Maximum Flow (cfs) / Invert Elevation (ft)	Total Flow (ft^3) / Maximum Elevation (ft)	Maximum Velocity (ft/s)	Maximum Volume (ft^3)
	CHOLLA_ST_	138.7865	294744.8868	4.2681	24003.0528
##	N1	1380.9000	1385.0045		
	L1	88.0425	162640.8078	2.6977	1475.5350
##	92 CONDUIT	1380.1600	1384.2600		
	L3a	26.3735	66023.6362	5.3649	153.6426
##	91 INLETS	1380.9400	1385.0195		
	L3b	26.3735	66023.6362	5.3649	153.6426
##	CHOLLA INL	1382.0000	1385.2541		
	FREE # 1	138.7525	294754.4738	0.0000	0.0000
##					

```
*===================================================*
|     Table E15a - SPREADSHEET REACH LIST           |
| Peak flow and Total Flow listed by Reach or those |
|     conduits or diversions having the same        |
|     upstream and downstream nodes.                |
*===================================================*
```

Upstream Node	Downstream Node	Maximum Flow	Total Flow

		(cfs)	(ft^3)
N1	92 CONDUIT	138.7865	294744.887
91 INLETS	N1	88.0425	162640.808
CHOLLA INL	N1	52.7471	132047.272

```
#####################################################
# Table E16. New Conduit Information Section        #
#            Conduit Invert (IE) Elevation and Conduit  #
#            Maximum Water Surface (WS) Elevations     #
#####################################################
```

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
CHOLLA_ST_	N1	92 CONDUIT	1380.9000	1380.1600	1385.0045	1384.2600	Rectangle
L1	91 INLETS	N1	1380.9400	1380.9000	1385.0185	1385.0045	Rectangle
L3a	CHOLLA INL	N1	1382.0000	1381.5000	1385.2541	1385.0045	Circular
L3b	CHOLLA INL	N1	1382.0000	1381.5000	1385.2541	1385.0045	Circular

```
*==========================================================================*
 |    Table E18 - Junction Continuity Error.   Division by Volume added 11/96  |
 |                                                                            |
 |  Continuity Error = Net Flow + Beginning Volume - Ending Volume            |
 |                     ------------------------------------------------       |
 |                     Total Flow + (Beginning Volume + Ending Volume)/2      |
 |                                                                            |
 |  Net Flow    = Node Inflow - Node Outflow                                  |
 |  Total Flow = absolute (Inflow + Outflow                                   |
 |  Intermediate column is a judgement on the node continuity error.         |
 |                                                                            |
 |  Excellent  < 1 percent    Great  1 to  2 percent  Good  2 to  5 percent  |
 |  Fair  5 to 10  percent    Poor  10 to 25 percent  Bad  25 to 50 percent  |
 |  Terrible > 50  percent                                                    |
```

==

Junction Name	Continuity Error Volume	% of Node	% of Inflow	Remaining Volume	Beginning Volume	Net Flow Thru Node	Total Flow Thru Node	Failed to Converge
N1	1.7084	0.0003	0.0006	11707.6880	11693.6731	15.7233	589432.9670	0
92 CONDUIT	-26.5410	-0.0044	0.0090	10967.6032	10955.3742	-14.3120	589864.1122	0
91 INLETS	-23.6740	-0.0073	0.0080	645.9016	644.3564	-22.1288	325143.8188	0
CHOLLA INL	-2.3847	-0.0009	0.0008	176.4461	176.1024	-2.0410	263988.3366	0

The total continuity error was -50.891 cubic feet
The remaining total volume was 23498. cubic feet
Your mean node continuity error was Excellent
Your worst node continuity error was Excellent

===
| Table E19 - Junction Inflow Sources |
| Units are either ft^3 or m^3 |
| depending on the units in your model. |
===

Junction Name	Constant Inflow to Node	User Inflow to Node	Interface Inflow to Node	DWF Inlow to Node	Inflow through Outfall	RNF Layer Inflow to Node	Outflow from Node	Evaporation from Node
92 CONDUIT	0.0000	0.0000	0.0000	0.0000	364.7517	0.0000	295119.2255	0.0000
91 INLETS	0.0000	162550.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
CHOLLA INL	0.0000	131990.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

===
| Table E20 - Junction Flooding and Volume Listing. |
| The maximum volume is the total volume |
| in the node including the volume in the |
| flooded storage area. This is the max |
| volume at any time. The volume in the |
| flooded storage area is the total volume |
| above the ground elevation, where the |
| flooded pond storage area starts. |
| The fourth column is instantaneous, the fifth is the |

| sum of the flooded volume over the entire simulation|
| Units are either ft^3 or m^3 depending on the units.|
==

Junction Name	Surcharged Time (min)	Flooded Time(min)	Out of System Flooded Volume	Maximum Volume	Stored in System Ponding Allowed Flood Pond Volume
N1	2.4235	0.0000	0.0000	53.3584	0.0000
92 CONDUIT	180.0000	0.0000	0.0000	53.3000	0.0000
91 INLETS	2.0338	0.0000	0.0000	53.0210	0.0000
CHOLLA INL	17.1571	0.0000	0.0000	42.3035	0.0000

==================================
| Simulation Specific Information |
==================================

Number of Input Conduits.......... 4
Number of Simulated Conduits...... 5
Number of Natural Channels........ 0
Number of Junctions............... 4
Number of Storage Junctions....... 0
Number of Weirs................... 0
Number of Orifices................ 0
Number of Pumps................... 0
Number of Free Outfalls........... 1
Number of Tide Gate Outfalls...... 0

===
| Average % Change in Junction or Conduit is defined as: |
| Conduit % Change ==> 100.0 (Q(n+1) - Q(n)) / Qfull |
| Junction % Change ==> 100.0 (Y(n+1) - Y(n)) / Yfull |
===

The Conduit with the largest average change was..FREE # 1 with 0.007 percent
The Junction with the largest average change was.CHOLLA INL with 0.432 percent
The Conduit with the largest sinuosity was.......L3a with 3.746

==
| Table E21. Continuity balance at the end of the simulation |
| Junction Inflow, Outflow or Street Flooding |

```
| Error = Inflow  + Initial Volume - Outflow - Final   Volume         |
*====================================================================*

       Inflow          Inflow       Average
       Junction    Volume,ft^3    Inflow, cfs
---------------  ------------  -------------
     92 CONDUIT       364.7517         0.0338
      91 INLETS    162503.0110        15.0466
     CHOLLA INL    131941.0642        12.2168
     92 CONDUIT   -295119.2255       -27.3259

       Outflow       Outflow         Average
       Junction  Volume,ft^3    Outflow, cfs
---------------  ------------   ------------
     92 CONDUIT    295119.2255        27.3259


*=====================================================*
| Initial system volume         =     23469.5061 Cu Ft |
| Total system inflow volume    =    294904.7517 Cu Ft |
| Inflow + Initial volume       =    318374.2578 Cu Ft |
*=====================================================*
| Total system outflow          =    295119.2255 Cu Ft |
| Volume left in system         =     23497.6389 Cu Ft |
| Evaporation                   =         0.0000 Cu Ft |
| Outflow + Final Volume        =    318616.8644 Cu Ft |
*=====================================================*

*==============================================*
| Total Model Continuity Error                 |
| Error in Continuity, Percent =       -0.0160 |
| Error in Continuity, ft^3    =       -50.891 |
| + Error means a continuity loss, - a gain    |
*==============================================*

###################################################
# Table E22. Numerical Model judgement section    #
###################################################

 Your overall error was                                         -0.0160
percent
 Worst nodal error was in node 92 CONDUIT       with            -0.0045
percent
 Of the total inflow this loss was                               0.0090
percent
 Your overall continuity error was                   Excellent
                                                    Good Efficiency
 Efficiency of the simulation                        2.78
 Most Number of Non Convergences at one Node         0.
 Total Number Non Convergences at all Nodes          0.
 Total Number of Nodes with Non Convergences         0.

 ===> Hydraulic model simulation ended normally.
 ===> XP-SWMM Simulation ended normally.
```

```
*===================================================================*
|            SWMM Simulation Date and Time Summary                  |
*===================================================================*
| Starting Date... March        5, 2012  Time...   13:38:58:81  |
|   Ending Date... March        5, 2012  Time...   13:38:59:70  |
|  Elapsed Time...    0.01483 minutes or      0.89000 seconds  |
*===================================================================*
```

Appendix M

DDMSW Printout

- Rainfall data
- Soil data
- Land use data
- Sub basins data

Primatech Engineers & Consultants
Drainage Design Management System
RAINFALL DATA
Project Reference: UCW2011_PROPOSED

ID	Method	Duration	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
DEFAULT	CUSTOM	5 MIN	0.298	0.402	0.480	0.585	0.665	0.746
	CUSTOM	10 MIN	0.453	0.611	0.731	0.891	1.013	1.136
	CUSTOM	15 MIN	0.562	0.758	0.907	1.105	1.256	1.408
	CUSTOM	30 MIN	0.756	1.021	1.221	1.488	1.691	1.897
	CUSTOM	1 HOUR	0.936	1.263	1.511	1.841	2.093	2.347
	CUSTOM	2 HOUR	1.073	1.424	1.695	2.061	2.340	2.629
	CUSTOM	3 HOUR	1.142	1.489	1.765	2.150	2.455	2.771
	CUSTOM	6 HOUR	1.356	1.721	2.014	2.416	2.732	3.060
	CUSTOM	12 HOUR	1.607	2.018	2.345	2.787	3.128	3.478
	CUSTOM	24 HOUR	1.935	2.520	2.994	3.669	4.216	4.799
RAINID	NOAA14	5 MIN	0.254	0.342	0.411	0.502	0.573	0.645
	NOAA14	10 MIN	0.386	0.521	0.625	0.765	0.872	0.982
	NOAA14	15 MIN	0.479	0.646	0.775	0.948	1.081	1.217
	NOAA14	30 MIN	0.644	0.870	1.044	1.277	1.455	1.639
	NOAA14	1 HOUR	0.797	1.077	1.291	1.580	1.801	2.028
	NOAA14	2 HOUR	0.924	1.230	1.464	1.784	2.025	2.276
	NOAA14	3 HOUR	1.010	1.320	1.565	1.909	2.182	2.465
	NOAA14	6 HOUR	1.197	1.528	1.792	2.152	2.431	2.723
	NOAA14	12 HOUR	1.343	1.696	1.972	2.346	2.632	2.928
	NOAA14	24 HOUR	1.583	2.046	2.414	2.926	3.330	3.753

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
270010	645	3	6453	0.017	80.00	0.58	-	100
	645	90	64590	0.004	20.00	0.39	-	100
270030	645	90	64590	0.026	50.00	0.39	-	100
	645	98	64598	0.026	50.00	0.37	-	100
270060	645	90	64590	0.055	100.00	0.39	-	100
270080	645	90	64590	0.020	100.00	0.39	-	100
270100	645	1	6451	0.076	80.00	0.41	-	100
	645	90	64590	0.019	20.00	0.39	-	100
270120	645	55	64555	0.005	40.00	0.27	-	100
	645	1	6451	0.008	60.00	0.41	-	100
270130	645	1	6451	0.020	100.00	0.41	-	100
270140	645	55	64555	0.007	60.00	0.27	-	100
	645	1	6451	0.004	40.00	0.41	-	100
270160	645	55	64555	0.004	100.00	0.27	-	100
270180	645	2	6452	0.003	100.00	0.41	-	100
270200	645	1	6451	0.005	70.00	0.41	-	100
	645	2	6452	0.002	30.00	0.41	-	100
270220	645	1	6451	0.004	100.00	0.41	-	100
270230	645	1	6451	0.010	100.00	0.41	-	100
270240	645	55	64555	0.011	90.00	0.27	-	100
	645	1	6451	0.001	10.00	0.41	-	100
270270	645	55	64555	0.005	100.00	0.27	-	100
270280	645	55	64555	0.018	100.00	0.27	-	100
270290	645	55	64555	0.031	100.00	0.27	-	100
270310	645	55	64555	0.057	90.00	0.27	-	100
	645	50	64550	0.006	10.00	0.26	-	100
270370	645	55	64555	0.018	70.00	0.27	-	100
	645	50	64550	0.008	30.00	0.26	-	100
270390	645	55	64555	0.030	70.00	0.27	-	100
	645	50	64550	0.013	30.00	0.26	-	100
270400	645	55	64555	0.006	50.00	0.27	-	100
	645	50	64550	0.004	30.00	0.26	-	100
	645	1	6451	0.002	20.00	0.41	-	100
270420	645	50	64550	0.004	100.00	0.26	-	100
270440	645	50	64550	0.015	100.00	0.26	-	100
270710	645	90	64590	0.005	100.00	0.39	-	100
270810	645	3	6453	0.016	100.00	0.58	-	100
270830	645	3	6453	0.018	70.00	0.58	-	100
	645	90	64590	0.008	30.00	0.39	-	100
270910	645	3	6453	0.004	100.00	0.58	-	100
270930	645	90	64590	0.007	70.00	0.39	-	100
	645	3	6453	0.003	30.00	0.58	-	100
270940	645	90	64590	0.016	70.00	0.39	-	100
	645	3	6453	0.007	30.00	0.58	-	100
270950	645	3	6453	0.017	50.00	0.58	-	100
	645	90	64590	0.009	25.00	0.39	-	100
	645	1	6451	0.009	25.00	0.41	-	100
270960	645	1	6451	0.008	45.00	0.41	-	100
	645	90	64590	0.008	45.00	0.39	-	100
	645	3	6453	0.002	9.90	0.58	-	100
270980	645	1	6451	0.020	65.00	0.41	-	100
	645	90	64590	0.011	35.00	0.39	-	100
271110	645	91	64591	0.013	60.00	0.93	-	100

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
271110	645	3	6453	0.009	40.00	0.58	-	100
271210	645	55	64555	0.036	70.00	0.27	-	100
	645	2	6452	0.016	30.00	0.41	-	100
271220	645	55	64555	0.055	90.00	0.27	-	100
	645	50	64550	0.006	10.00	0.26	-	100
271310	645	55	64555	0.025	65.00	0.27	-	100
	645	90	64590	0.014	35.00	0.39	-	100
271320	645	90	64590	0.006	15.10	0.39	-	100
	645	50	64550	0.012	29.90	0.26	-	100
	645	55	64555	0.022	55.00	0.27	-	100
271330	645	55	64555	0.003	100.00	0.27	-	100
271340	645	55	64555	0.002	100.00	0.27	-	100
271350	645	55	64555	0.002	100.00	0.27	-	100
271360	645	55	64555	0.003	100.00	0.27	-	100
271370	645	55	64555	0.002	100.00	0.27	-	100
271380	645	55	64555	0.003	100.00	0.27	-	100
271400	645	55	64555	0.049	100.00	0.27	-	100
271510	645	50	64550	0.013	70.00	0.26	-	100
	645	55	64555	0.006	30.00	0.27	-	100
271610	645	98	64598	0.012	100.00	0.37	-	100
271620	645	98	64598	0.016	40.00	0.37	-	100
	645	90	64590	0.024	60.00	0.39	-	100
271640	645	90	64590	0.035	60.00	0.39	-	100
	645	98	64598	0.024	40.00	0.37	-	100
271660	645	90	64590	0.019	100.00	0.39	-	100
271680	645	90	64590	0.005	100.00	0.39	-	100
271700	645	90	64590	0.027	100.00	0.39	-	100
271720	645	90	64590	0.058	100.00	0.39	-	100
271740	645	90	64590	0.023	100.00	0.39	-	100
271750	645	90	64590	0.013	100.00	0.39	-	100
271760	645	90	64590	0.006	100.00	0.39	-	100
271770	645	90	64590	0.037	70.00	0.39	-	100
	645	55	64555	0.016	30.00	0.27	-	100
271790	645	55	64555	0.002	30.00	0.27	-	100
	645	90	64590	0.006	70.00	0.39	-	100
271810	645	55	64555	0.042	84.90	0.27	-	100
	645	90	64590	0.007	15.10	0.39	-	100
271830	645	55	64555	0.038	59.90	0.27	-	100
	645	50	64550	0.016	25.00	0.26	-	100
	645	90	64590	0.010	15.10	0.39	-	100
271910	645	90	64590	0.025	100.00	0.39	-	100
272010	645	90	64590	0.021	100.00	0.39	-	100
272030	645	90	64590	0.039	100.00	0.39	-	100
272050	645	90	64590	0.024	100.00	0.39	-	100
272110	645	90	64590	0.010	100.00	0.39	-	100
272230	645	90	64590	0.041	100.00	0.39	-	100
272250	645	55	64555	0.009	30.00	0.27	-	100
	645	90	64590	0.022	70.00	0.39	-	100
272310	645	55	64555	0.003	20.00	0.27	-	100
	645	90	64590	0.013	80.00	0.39	-	100
272410	645	91	64591	0.024	100.00	0.93	-	100

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)

Major Basin ID: 01

Area ID	Book Number	Map Unit	Soil ID	Area (sq mi)	Area (%)	XKSAT	Rock Percent (%)	Effective Rock (%)
272420	645	90	64590	0.008	50.00	0.39	-	100
	645	91	64591	0.008	50.00	0.93	-	100
272440	645	90	64590	0.067	100.00	0.39	-	100
272460	645	90	64590	0.059	100.00	0.39	-	100
272520	645	90	64590	0.065	100.00	0.39	-	100
272540	645	90	64590	0.041	100.00	0.39	-	100
272550	645	90	64590	0.024	100.00	0.39	-	100
272610	645	98	64598	0.013	50.00	0.37	-	100
	645	91	64591	0.013	50.00	0.93	-	100
272710	645	90	64590	0.005	100.00	0.39	-	100
272810	645	91	64591	0.007	100.00	0.93	-	100
272818	645	91	64591	0.041	100.00	0.93	-	100
272820	645	91	64591	0.050	100.00	0.93	-	100
272910	645	90	64590	0.008	100.00	0.39	-	100
272920	645	90	64590	0.077	90.00	0.39	-	100
	645	91	64591	0.009	10.00	0.93	-	100
273010	645	91	64591	0.040	100.00	0.93	-	100
273020	645	90	64590	0.045	90.00	0.39	-	100
	645	91	64591	0.005	10.00	0.93	-	100
273040	645	90	64590	0.005	100.00	0.39	-	100
273060	645	55	64555	0.013	80.00	0.27	-	100
	645	90	64590	0.003	20.00	0.39	-	100
273070	645	55	64555	0.002	100.00	0.27	-	100
273080	645	90	64590	0.006	100.00	0.39	-	100
273110	645	90	64590	0.009	100.00	0.39	-	100
273120	645	90	64590	0.027	70.00	0.39	-	100
	645	55	64555	0.011	30.00	0.27	-	100
273210	645	55	64555	0.014	100.00	0.27	-	100
273310	645	50	64550	0.020	100.00	0.26	-	100
273410	645	50	64550	0.026	100.00	0.26	-	100
273420	645	50	64550	0.042	50.00	0.26	-	100
	645	55	64555	0.042	50.00	0.27	-	100
273505	645	55	64555	0.022	100.00	0.27	-	100
273506	645	55	64555	0.017	100.00	0.27	-	100
273508	645	55	64555	0.013	100.00	0.27	-	100
273510	645	55	64555	0.024	100.00	0.27	-	100
275910	645	90	64590	0.023	60.00	0.39	-	100
	645	91	64591	0.016	40.00	0.93	-	100
276020	645	90	64590	0.011	60.00	0.39	-	100
	645	55	64555	0.008	40.00	0.27	-	100
276110	645	90	64590	0.020	100.00	0.39	-	100
276220	645	91	64591	0.059	70.00	0.93	-	100
	645	90	64590	0.025	30.00	0.39	-	100
276240	645	90	64590	0.022	100.00	0.39	-	100

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
270010	560	0.021	100.0	0.10	80	75.0	NORMAL	0.033
		0.021	**100.0**					
270030	150	0.051	100.0	0.25	30	50.0	NORMAL	0.031
		0.051	**100.0**					
270060	150	0.022	40.0	0.25	30	50.0	NORMAL	0.030
	230	0.033	60.0	0.10	80	75.0	NORMAL	0.030
		0.055	**100.0**					
270080	180	0.020	100.0	0.25	45	50.0	NORMAL	0.033
		0.020	**100.0**					
270100	180	0.095	100.0	0.25	45	50.0	NORMAL	0.029
		0.095	**100.0**					
270120	140	0.008	60.0	0.25	30	50.0	NORMAL	0.034
	180	0.005	40.0	0.25	45	50.0	NORMAL	0.034
		0.013	**100.0**					
270130	600	0.020	100.0	0.10	80	75.0	NORMAL	0.033
		0.020	**100.0**					
270140	150	0.011	100.0	0.25	30	50.0	NORMAL	0.035
		0.011	**100.0**					
270160	150	0.001	30.0	0.25	30	50.0	NORMAL	0.037
	730	0.003	70.0	0.10	0	90.0	NORMAL	0.140
		0.004	**100.0**					
270180	150	0.003	100.0	0.25	30	50.0	NORMAL	0.038
		0.003	**100.0**					
270200	710	0.007	100.0	0.10	5	90.0	NORMAL	0.036
		0.007	**100.0**					
270220	150	0.003	70.0	0.25	30	50.0	NORMAL	0.037
	730	0.001	30.0	0.10	0	90.0	NORMAL	0.140
		0.004	**100.0**					
270230	140	0.010	100.0	0.25	30	50.0	NORMAL	0.035
		0.010	**100.0**					
270240	700	0.012	100.0	0.10	5	90.0	NORMAL	0.068
		0.012	**100.0**					
270270	150	0.005	100.0	0.25	30	50.0	NORMAL	0.037
		0.005	**100.0**					
270280	140	0.018	100.0	0.25	30	50.0	NORMAL	0.033
		0.018	**100.0**					
270290	150	0.031	100.0	0.25	30	50.0	NORMAL	0.032
		0.031	**100.0**					
270310	190	0.063	100.0	0.25	45	50.0	NORMAL	0.030
		0.063	**100.0**					
270370	190	0.026	100.0	0.25	45	50.0	NORMAL	0.032
		0.026	**100.0**					

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
270390	180	0.026	60.0	0.25	45	50.0	NORMAL	0.031
	700	0.017	40.0	0.10	5	90.0	NORMAL	0.060
		0.043	**100.0**					
270400	710	0.012	100.0	0.10	5	90.0	NORMAL	0.034
		0.012	**100.0**					
270420	600	0.004	100.0	0.10	80	75.0	NORMAL	0.037
		0.004	**100.0**					
270440	190	0.015	100.0	0.25	45	50.0	NORMAL	0.034
		0.015	**100.0**					
270710	230	0.001	20.0	0.10	80	75.0	NORMAL	0.037
	600	0.004	80.0	0.10	80	75.0	NORMAL	0.037
		0.005	**100.0**					
270810	150	0.016	100.0	0.25	30	50.0	NORMAL	0.034
		0.016	**100.0**					
270830	150	0.018	66.7	0.25	30	50.0	NORMAL	0.032
	900	0.009	33.3	0.35	0	25.0	DRY	0.063
		0.026	**100.0**					
270910	150	0.004	100.0	0.25	30	50.0	NORMAL	0.037
		0.004	**100.0**					
270930	150	0.010	100.0	0.25	30	50.0	NORMAL	0.035
		0.010	**100.0**					
270940	150	0.023	100.0	0.25	30	50.0	NORMAL	0.033
		0.023	**100.0**					
270950	150	0.034	100.0	0.25	30	50.0	NORMAL	0.032
		0.034	**100.0**					
270960	150	0.007	40.0	0.25	30	50.0	NORMAL	0.034
	180	0.010	60.0	0.25	45	50.0	NORMAL	0.034
		0.017	**100.0**					
270980	180	0.031	100.0	0.25	45	50.0	NORMAL	0.032
		0.031	**100.0**					
271110	140	0.004	20.0	0.25	30	50.0	NORMAL	0.033
	600	0.018	80.0	0.10	80	75.0	NORMAL	0.033
		0.022	**100.0**					
271210	150	0.052	100.0	0.25	30	50.0	NORMAL	0.030
		0.052	**100.0**					
271220	150	0.061	100.0	0.25	30	50.0	NORMAL	0.030
		0.061	**100.0**					
271310	140	0.039	100.0	0.25	30	50.0	NORMAL	0.031
		0.039	**100.0**					
271320	150	0.039	100.0	0.25	30	50.0	NORMAL	0.031
		0.039	**100.0**					
271330	140	0.002	50.0	0.25	30	50.0	NORMAL	0.038
	600	0.002	50.0	0.10	80	75.0	NORMAL	0.038

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb

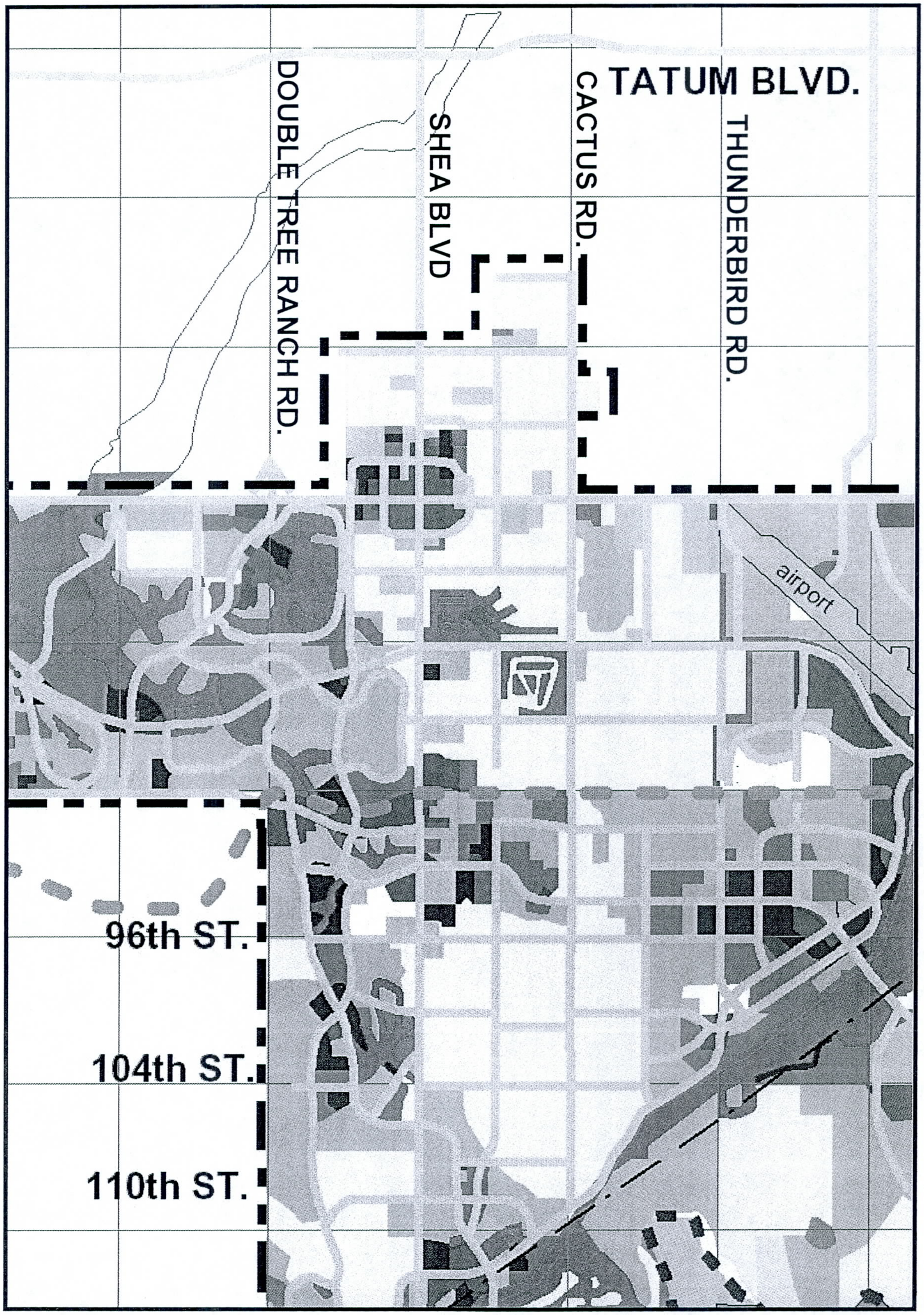
Major Basin ID: 01

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
		0.003	**100.0**					
271340	140	0.001	50.0	0.25	30	50.0	NORMAL	0.039
	600	0.001	50.0	0.10	80	75.0	NORMAL	0.039
		0.002	**100.0**					
271350	140	0.001	50.0	0.25	30	50.0	NORMAL	0.039
	600	0.001	50.0	0.10	80	75.0	NORMAL	0.039
		0.002	**100.0**					
271360	140	0.002	50.0	0.25	30	50.0	NORMAL	0.038
	600	0.002	50.0	0.10	80	75.0	NORMAL	0.038
		0.003	**100.0**					
271370	140	0.001	50.0	0.25	30	50.0	NORMAL	0.039
	600	0.001	50.0	0.10	80	75.0	NORMAL	0.039
		0.002	**100.0**					
271380	140	0.002	50.0	0.25	30	50.0	NORMAL	0.038
	600	0.002	50.0	0.10	80	75.0	NORMAL	0.038
		0.003	**100.0**					
271400	140	0.010	20.0	0.25	30	50.0	NORMAL	0.031
	700	0.039	80.0	0.10	5	90.0	NORMAL	0.059
		0.049	**100.0**					
271510	150	0.019	100.0	0.25	30	50.0	NORMAL	0.033
		0.019	**100.0**					
271610	150	0.012	100.0	0.25	30	50.0	NORMAL	0.034
		0.012	**100.0**					
271620	150	0.040	100.0	0.25	30	50.0	NORMAL	0.031
		0.040	**100.0**					
271640	130	0.018	30.0	0.30	15	50.0	NORMAL	0.030
	150	0.041	70.0	0.25	30	50.0	NORMAL	0.030
		0.059	**100.0**					
271660	190	0.019	100.0	0.25	45	50.0	NORMAL	0.033
		0.019	**100.0**					
271680	130	0.005	100.0	0.30	15	50.0	NORMAL	0.037
		0.005	**100.0**					
271700	130	0.022	80.0	0.30	15	50.0	NORMAL	0.032
	900	0.005	20.0	0.35	0	25.0	DRY	0.063
		0.027	**100.0**					
271720	150	0.058	100.0	0.25	30	50.0	NORMAL	0.030
		0.058	**100.0**					
271740	150	0.021	90.0	0.25	30	50.0	NORMAL	0.033
	900	0.002	10.0	0.35	0	25.0	DRY	0.064
		0.023	**100.0**					
271750	150	0.013	100.0	0.25	30	50.0	NORMAL	0.034
		0.013	**100.0**					
271760	210	0.006	100.0	0.10	80	65.0	NORMAL	0.036

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
		0.006	**100.0**					
271770	130	0.037	70.0	0.30	15	50.0	NORMAL	0.030
	900	0.016	30.0	0.35	0	25.0	DRY	0.059
		0.053	**100.0**					
271790	600	0.008	100.0	0.10	80	75.0	NORMAL	0.036
		0.008	**100.0**					
271810	130	0.049	100.0	0.30	15	50.0	NORMAL	0.031
		0.049	**100.0**					
271830	140	0.063	100.0	0.25	30	50.0	NORMAL	0.030
		0.063	**100.0**					
271910	150	0.023	90.0	0.25	30	50.0	NORMAL	0.032
	710	0.003	10.0	0.10	5	90.0	NORMAL	0.032
		0.025	**100.0**					
272010	150	0.011	50.0	0.25	30	50.0	NORMAL	0.033
	560	0.006	30.0	0.10	80	75.0	NORMAL	0.033
	600	0.004	20.0	0.10	80	75.0	NORMAL	0.033
		0.021	**100.0**					
272030	130	0.020	50.0	0.30	15	50.0	NORMAL	0.031
	230	0.020	50.0	0.10	80	75.0	NORMAL	0.031
		0.039	**100.0**					
272050	150	0.012	50.0	0.25	30	50.0	NORMAL	0.033
	190	0.012	50.0	0.25	45	50.0	NORMAL	0.033
		0.024	**100.0**					
272110	180	0.010	100.0	0.25	45	50.0	NORMAL	0.035
		0.010	**100.0**					
272230	130	0.041	100.0	0.30	15	50.0	NORMAL	0.031
		0.041	**100.0**					
272250	140	0.016	50.0	0.25	30	50.0	NORMAL	0.032
	150	0.016	50.0	0.25	30	50.0	NORMAL	0.032
		0.031	**100.0**					
272310	150	0.010	60.0	0.25	30	50.0	NORMAL	0.034
	900	0.006	40.0	0.35	0	25.0	DRY	0.066
		0.016	**100.0**					
272410	150	0.020	85.0	0.25	30	50.0	NORMAL	0.033
	710	0.004	15.0	0.10	5	90.0	NORMAL	0.033
		0.024	**100.0**					
272420	140	0.002	15.2	0.25	30	50.0	NORMAL	0.034
	600	0.005	35.1	0.10	80	75.0	NORMAL	0.034
	900	0.008	49.7	0.35	0	25.0	DRY	0.066
		0.015	**100.0**					
272440	150	0.067	100.0	0.25	30	50.0	NORMAL	0.030
		0.067	**100.0**					
272460	150	0.059	100.0	0.25	30	50.0	NORMAL	0.030
		0.059	**100.0**					

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
272520	140	0.065	100.0	0.25	30	50.0	NORMAL	0.030
		0.065	**100.0**					
272540	130	0.041	100.0	0.30	15	50.0	NORMAL	0.031
		0.041	**100.0**					
272550	130	0.024	100.0	0.30	15	50.0	NORMAL	0.033
		0.024	**100.0**					
272610	150	0.026	100.0	0.25	30	50.0	NORMAL	0.032
		0.026	**100.0**					
272710	130	0.005	100.0	0.30	15	50.0	NORMAL	0.037
		0.005	**100.0**					
272810	150	0.007	100.0	0.25	30	50.0	NORMAL	0.036
		0.007	**100.0**					
272818	150	0.041	100.0	0.25	30	50.0	NORMAL	0.031
		0.041	**100.0**					
272820	130	0.025	50.0	0.30	15	50.0	NORMAL	0.031
	700	0.025	50.0	0.10	5	90.0	NORMAL	0.059
		0.050	**100.0**					
272910	150	0.008	100.0	0.25	30	50.0	NORMAL	0.036
		0.008	**100.0**					
272920	140	0.077	90.0	0.25	30	50.0	NORMAL	0.029
	900	0.009	10.0	0.35	0	25.0	DRY	0.056
		0.086	**100.0**					
273010	150	0.040	100.0	0.25	30	50.0	NORMAL	0.031
		0.040	**100.0**					
273020	140	0.050	100.0	0.25	30	50.0	NORMAL	0.031
		0.050	**100.0**					
273040	130	0.005	100.0	0.30	15	50.0	NORMAL	0.037
		0.005	**100.0**					
273060	130	0.012	75.0	0.30	15	50.0	NORMAL	0.034
	900	0.004	25.0	0.35	0	25.0	DRY	0.066
		0.016	**100.0**					
273070	600	0.002	100.0	0.10	80	75.0	NORMAL	0.039
		0.002	**100.0**					
273080	130	0.006	100.0	0.30	15	50.0	NORMAL	0.036
		0.006	**100.0**					
273110	140	0.005	50.0	0.25	30	50.0	NORMAL	0.035
	900	0.005	50.0	0.35	0	25.0	DRY	0.070
		0.009	**100.0**					
273120	130	0.015	39.3	0.30	15	50.0	NORMAL	0.031
	210	0.006	14.2	0.10	80	65.0	NORMAL	0.031
	900	0.018	46.5	0.35	0	25.0	DRY	0.061
		0.039	**100.0**					
273210	130	0.011	80.0	0.30	15	50.0	NORMAL	0.034

Sub Basin	Land Use Code	Area (sq mi)	Area (%)	Initial Loss (IA)	Percent Impervious (RTIMP)	Vegetation Cover (%)	DTHETA	Kb
Major Basin ID: 01								
273210	140	0.003	20.0	0.25	30	50.0	NORMAL	0.034
		0.014	**100.0**					
273310	130	0.020	100.0	0.30	15	50.0	NORMAL	0.033
		0.020	**100.0**					
273410	140	0.026	100.0	0.25	30	50.0	NORMAL	0.032
		0.026	**100.0**					
273420	190	0.083	100.0	0.25	45	50.0	NORMAL	0.029
		0.083	**100.0**					
273505	150	0.022	100.0	0.25	30	50.0	NORMAL	0.033
		0.022	**100.0**					
273506	150	0.016	100.0	0.25	30	50.0	NORMAL	0.034
		0.016	**100.0**					
273508	150	0.013	100.0	0.25	30	50.0	NORMAL	0.034
		0.013	**100.0**					
273510	150	0.024	100.0	0.25	30	50.0	NORMAL	0.033
		0.024	**100.0**					
275910	150	0.020	50.0	0.25	30	50.0	NORMAL	0.031
	710	0.020	50.0	0.10	5	90.0	NORMAL	0.031
		0.039	**100.0**					
276020	130	0.019	100.0	0.30	15	50.0	NORMAL	0.033
		0.019	**100.0**					
276110	150	0.010	50.0	0.25	30	50.0	NORMAL	0.033
	180	0.010	50.0	0.25	45	50.0	NORMAL	0.033
		0.020	**100.0**					
276210	150	0.036	70.0	0.25	30	50.0	NORMAL	0.031
	900	0.015	30.0	0.35	0	25.0	DRY	0.059
		0.051	**100.0**					
276220	150	0.084	100.0	0.25	30	50.0	NORMAL	0.029
		0.084	**100.0**					
276240	130	0.018	80.0	0.30	15	50.0	NORMAL	0.033
	900	0.004	20.0	0.35	0	25.0	DRY	0.064
		0.022	**100.0**					



TATUM BLVD.
DOUBLE TREE RANCH RD.
SHEA BLVD
CACTUS RD.
THUNDERBIRD RD.
airport
96th ST.
104th ST.
110th ST.

• Existing Land Uses

Residential

- 1/5 - 1/2 Dwelling Unit/Acre
- 1/2 - 2 Dwelling Unit/Acre
- 2 - 4 Dwelling Unit/Acre
- 4 - 12 Dwelling Unit/Acre
- 12 - 22 Dwelling Unit/Acre

Non-Residential

- Tourist Accommodations & Resorts
- Neighborhood & General Commercial
- Office
- Employment
- Natural Open Space
- Limited Use Area
- Developed Open Space
- Cultural/Institutional
- Utilities

McDowell Sonoran Preserve (as of 4/2002)

State Trust Lands Reclassified for Conservation

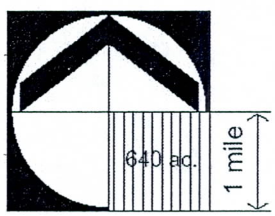
State Trust Lands Reclassified, but not limited to Conservation

Recommended Study Boundary of the McDowell Sonoran Preserve

City Boundary

October 29, 2001

revised to show McDowell Sonoran Preserve as of April 2, 2002



REFERENCE MAP

Locations depicted on this map are generalized

general plan

scottsdale, arizona

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
273010	0.040	0.23	99.1	99.1	URBAN	0.031	0.25	0.29	2.76	1.34	80*	**Tc (Hrs)**	0.204	0.204	0.197	0.182	0.173	0.165
												Vel (f/s)	1.65	1.65	1.71	1.85	1.95	2.04
												R (Hrs)	0.123	0.123	0.118	0.108	0.102	0.097
275910	0.039	0.29	98.0	98.0	URBAN	0.031	0.18	0.26	3.48	0.92	18	**Tc (Hrs)**	0.323*	0.323*	0.300*	0.261*	0.241	0.225
												Vel (f/s)	1.32	1.32	1.42	1.63	1.76	1.89
												R (Hrs)	0.249	0.249	0.229	0.196	0.180	0.167
273020	0.050	0.39	71.5	71.5	URBAN	0.031	0.25	0.25	3.85	0.62	30	**Tc (Hrs)**	0.355*	0.355*	0.336*	0.302*	0.283*	0.266*
												Vel (f/s)	1.61	1.61	1.70	1.89	2.02	2.15
												R (Hrs)	0.304	0.304	0.287	0.255	0.237	0.221
273040	0.005	0.11	140.2	140.2	URBAN	0.037	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.183	0.183	0.171	0.151	0.141	0.131
												Vel (f/s)	0.88	0.88	0.94	1.07	1.14	1.23
												R (Hrs)	0.197	0.197	0.183	0.160	0.147	0.136
276220	0.084	0.50	58.6	58.6	URBAN	0.029	0.25	0.28	3.11	1.04	30	**Tc (Hrs)**	0.453*	0.453*	0.424*	0.372*	0.345*	0.324*
												Vel (f/s)	1.62	1.62	1.73	1.97	2.13	2.26
												R (Hrs)	0.362	0.362	0.337	0.291	0.268	0.250
276240	0.022	0.26	100.0	100.0	URBAN	0.039	0.31	0.27	4.00	0.54	12	**Tc (Hrs)**	0.330*	0.330*	0.308*	0.270*	0.250*	0.233
												Vel (f/s)	1.16	1.16	1.24	1.41	1.53	1.64
												R (Hrs)	0.324	0.324	0.300	0.259	0.238	0.220
273060	0.016	0.17	58.5	58.5	URBAN	0.042	0.31	0.28	4.55	0.40	11	**Tc (Hrs)**	0.316*	0.316*	0.297*	0.263*	0.243	0.227
												Vel (f/s)	0.79	0.79	0.84	0.95	1.03	1.10
												R (Hrs)	0.264	0.264	0.246	0.215	0.197	0.182
273210	0.014	0.24	53.8	53.8	URBAN	0.034	0.29	0.25	4.65	0.39	18	**Tc (Hrs)**	0.325*	0.325*	0.308*	0.275*	0.256*	0.240
												Vel (f/s)	1.08	1.08	1.14	1.28	1.38	1.47
												R (Hrs)	0.387	0.387	0.364	0.322	0.297	0.276
276020	0.019	0.29	57.0	57.0	URBAN	0.033	0.30	0.25	4.30	0.49	15	**Tc (Hrs)**	0.363*	0.363*	0.342*	0.303*	0.281*	0.263*
												Vel (f/s)	1.17	1.17	1.24	1.40	1.51	1.62
												R (Hrs)	0.428	0.428	0.399	0.350	0.322	0.298

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
273070	0.002	0.17	33.9	33.9	URBAN	0.039	0.10	0.25	4.65	0.46	80	**Tc (Hrs)**	0.268*	0.268*	0.259*	0.240	0.229	0.218
												Vel (f/s)	0.93	0.93	0.96	1.04	1.09	1.14
												R (Hrs)	0.719	0.719	0.692	0.637	0.602	0.572
273080	0.006	0.09	4.5	4.5	URBAN	0.036	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.474*	0.474*	0.444*	0.392*	0.364*	0.340*
												Vel (f/s)	0.28	0.28	0.30	0.34	0.36	0.39
												R (Hrs)	0.435	0.435	0.404	0.352	0.324	0.301
273110	0.009	0.22	55.8	55.8	URBAN	0.052	0.30	0.30	4.00	0.51	15	**Tc (Hrs)**	0.414*	0.414*	0.387*	0.341*	0.316*	0.295*
												Vel (f/s)	0.78	0.78	0.83	0.95	1.02	1.09
												R (Hrs)	0.606	0.606	0.563	0.489	0.450	0.417
273120	0.038	0.30	27.7	27.7	URBAN	0.045	0.29	0.30	4.25	0.47	17	**Tc (Hrs)**	0.543*	0.543*	0.510*	0.452*	0.420*	0.393*
												Vel (f/s)	0.81	0.81	0.86	0.97	1.05	1.12
												R (Hrs)	0.463	0.463	0.431	0.377	0.348	0.323
272910	0.008	0.16	96.8	96.8	URBAN	0.036	0.25	0.25	4.00	0.56	30	**Tc (Hrs)**	0.221	0.221	0.210	0.189	0.177	0.166
												Vel (f/s)	1.06	1.06	1.12	1.24	1.33	1.41
												R (Hrs)	0.250	0.250	0.237	0.211	0.196	0.183
272920	0.086	0.61	68.9	68.9	URBAN	0.032	0.26	0.26	3.85	0.61	27	**Tc (Hrs)**	0.465*	0.465*	0.440*	0.394*	0.368*	0.346*
												Vel (f/s)	1.92	1.92	2.03	2.27	2.43	2.59
												R (Hrs)	0.432	0.432	0.406	0.359	0.333	0.311
272810	0.007	0.19	65.1	65.1	URBAN	0.036	0.25	0.29	2.76	1.34	30	**Tc (Hrs)**	0.319*	0.319*	0.299*	0.258*	0.238	0.222
												Vel (f/s)	0.87	0.87	0.93	1.08	1.17	1.26
												R (Hrs)	0.466	0.466	0.433	0.369	0.336	0.312
272818	0.041	0.28	68.2	68.2	URBAN	0.031	0.25	0.29	2.76	1.34	30	**Tc (Hrs)**	0.353*	0.353*	0.331*	0.286*	0.263*	0.246
												Vel (f/s)	1.16	1.16	1.24	1.44	1.56	1.67
												R (Hrs)	0.260	0.260	0.242	0.206	0.188	0.174
272820	0.050	0.23	113.1	113.1	URBAN	0.045	0.20	0.29	2.76	1.55	10	**Tc (Hrs)**	0.495*	0.495*	0.437*	0.335*	0.294*	0.266*
												Vel (f/s)	0.68	0.68	0.77	1.01	1.15	1.27
												R (Hrs)	0.289	0.289	0.251	0.187	0.162	0.145

* Non default value or value out of range

	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
272410	0.024	0.22	120.1	120.1	URBAN	0.033	0.23	0.29	2.76	1.40	26	**Tc (Hrs)**	0.287*	0.287*	0.267*	0.228	0.208	0.193
												Vel (f/s)	1.12	1.12	1.21	1.42	1.55	1.67
												R (Hrs)	0.231	0.231	0.213	0.179	0.162	0.149
272420	0.015	0.19	82.2	82.2	URBAN	0.050	0.25	0.31	3.35	0.84	33	**Tc (Hrs)**	0.318*	0.318*	0.299*	0.266*	0.247	0.233
												Vel (f/s)	0.88	0.88	0.93	1.05	1.13	1.20
												R (Hrs)	0.301	0.301	0.281	0.246	0.228	0.213
272610	0.026	0.22	105.9	105.9	URBAN	0.032	0.25	0.27	3.38	0.85	30	**Tc (Hrs)**	0.253*	0.253*	0.238	0.211	0.196	0.185
												Vel (f/s)	1.28	1.28	1.36	1.53	1.65	1.74
												R (Hrs)	0.192	0.192	0.179	0.157	0.145	0.136
272440	0.067	0.40	53.9	53.9	URBAN	0.030	0.25	0.25	4.00	0.56	30	**Tc (Hrs)**	0.381*	0.381*	0.362*	0.326*	0.305*	0.287*
												Vel (f/s)	1.54	1.54	1.62	1.80	1.92	2.04
												R (Hrs)	0.284	0.284	0.269	0.239	0.222	0.208
272460	0.059	0.40	69.6	69.6	URBAN	0.030	0.25	0.25	4.00	0.56	30	**Tc (Hrs)**	0.352*	0.352*	0.334*	0.301*	0.282*	0.265*
												Vel (f/s)	1.67	1.67	1.76	1.95	2.08	2.21
												R (Hrs)	0.280	0.280	0.264	0.236	0.219	0.205
272710	0.005	0.12	65.0	65.0	URBAN	0.037	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.243	0.243	0.227	0.201	0.186	0.174
												Vel (f/s)	0.72	0.72	0.78	0.88	0.95	1.01
												R (Hrs)	0.289	0.289	0.269	0.234	0.215	0.200
272520	0.065	0.36	91.6	91.6	URBAN	0.030	0.25	0.25	4.00	0.56	30	**Tc (Hrs)**	0.307*	0.307*	0.291*	0.262*	0.246	0.231
												Vel (f/s)	1.72	1.72	1.81	2.02	2.15	2.29
												R (Hrs)	0.209	0.209	0.197	0.176	0.163	0.153
272540	0.041	0.26	12.5	12.5	URBAN	0.031	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.543*	0.543*	0.509*	0.449*	0.417*	0.390*
												Vel (f/s)	0.70	0.70	0.75	0.85	0.91	0.98
												R (Hrs)	0.395	0.395	0.368	0.320	0.295	0.273
272550	0.024	0.72	43.2	43.2	URBAN	0.033	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.636*	0.636*	0.596*	0.526*	0.488*	0.456*
												Vel (f/s)	1.66	1.66	1.77	2.01	2.16	2.32
												R (Hrs)	1.442	1.442	1.341	1.168	1.075	0.997

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
271610	0.012	0.09	57.5	57.5	URBAN	0.034	0.25	0.25	4.15	0.53	30	**Tc (Hrs)**	0.188	0.188	0.179	0.161	0.151	0.142
												Vel (f/s)	0.70	0.70	0.74	0.82	0.87	0.93
												R (Hrs)	0.105	0.105	0.099	0.088	0.082	0.077
271620	0.040	0.33	51.2	51.2	URBAN	0.031	0.25	0.25	4.10	0.55	30	**Tc (Hrs)**	0.357*	0.357*	0.340*	0.306*	0.286*	0.269*
												Vel (f/s)	1.36	1.36	1.42	1.58	1.69	1.80
												R (Hrs)	0.305	0.305	0.288	0.256	0.238	0.223
271640	0.059	0.29	59.7	59.7	URBAN	0.030	0.27	0.25	4.10	0.55	26	**Tc (Hrs)**	0.322*	0.322*	0.305*	0.273*	0.255*	0.240
												Vel (f/s)	1.32	1.32	1.39	1.56	1.67	1.77
												R (Hrs)	0.196	0.196	0.185	0.164	0.152	0.141
271910	0.025	0.29	70.4	70.4	URBAN	0.032	0.24	0.25	4.00	0.58	28	**Tc (Hrs)**	0.313*	0.313*	0.297*	0.267*	0.250*	0.235
												Vel (f/s)	1.36	1.36	1.43	1.59	1.70	1.81
												R (Hrs)	0.310	0.310	0.292	0.260	0.241	0.225
271660	0.019	0.27	13.9	13.9	URBAN	0.033	0.25	0.25	4.00	0.56	45	**Tc (Hrs)**	0.466*	0.466*	0.446*	0.407*	0.383*	0.362*
												Vel (f/s)	0.85	0.85	0.89	0.97	1.03	1.09
												R (Hrs)	0.533	0.533	0.507	0.458	0.428	0.403
271680	0.005	0.15	28.3	28.3	URBAN	0.037	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.351*	0.351*	0.329*	0.290*	0.269*	0.252*
												Vel (f/s)	0.63	0.63	0.67	0.76	0.82	0.87
												R (Hrs)	0.520	0.520	0.484	0.421	0.388	0.360
272010	0.021	0.07	245.1	236.8	URBAN	0.033	0.18	0.25	4.00	0.62	55	**Tc (Hrs)**	0.095	0.095	0.091	0.083	0.079	0.075
												Vel (f/s)	1.08	1.08	1.13	1.24	1.30	1.37
												R (Hrs)	0.029	0.029	0.028	0.025	0.024	0.022
272030	0.039	0.32	69.6	69.6	URBAN	0.031	0.20	0.25	4.00	0.62	48	**Tc (Hrs)**	0.296*	0.296*	0.283*	0.258*	0.244	0.231
												Vel (f/s)	1.59	1.59	1.66	1.82	1.92	2.03
												R (Hrs)	0.244	0.244	0.233	0.210	0.197	0.186
272050	0.024	0.35	49.4	49.4	URBAN	0.033	0.25	0.25	4.00	0.56	38	**Tc (Hrs)**	0.370*	0.370*	0.353*	0.320*	0.300*	0.284*
												Vel (f/s)	1.39	1.39	1.45	1.60	1.71	1.81
												R (Hrs)	0.444	0.444	0.421	0.378	0.352	0.330

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
272110	0.010	0.15	68.8	68.8	URBAN	0.035	0.25	0.25	4.00	0.56	45	**Tc (Hrs)**	0.218	0.218	0.209	0.190	0.179	0.170
												Vel (f/s)	1.01	1.01	1.05	1.16	1.23	1.29
												R (Hrs)	0.207	0.207	0.197	0.178	0.166	0.156
271700	0.027	0.27	47.5	47.5	URBAN	0.038	0.31	0.27	4.00	0.54	12	**Tc (Hrs)**	0.418*	0.418*	0.390*	0.342*	0.317*	0.295*
												Vel (f/s)	0.95	0.95	1.02	1.16	1.25	1.34
												R (Hrs)	0.387	0.387	0.358	0.309	0.284	0.263
272230	0.041	0.30	40.1	40.1	URBAN	0.031	0.30	0.25	4.00	0.56	15	**Tc (Hrs)**	0.407*	0.407*	0.381*	0.336*	0.312*	0.292*
												Vel (f/s)	1.08	1.08	1.15	1.31	1.41	1.51
												R (Hrs)	0.321	0.321	0.299	0.260	0.239	0.222
272250	0.031	0.26	48.4	48.4	URBAN	0.032	0.25	0.25	4.25	0.50	30	**Tc (Hrs)**	0.325*	0.325*	0.309*	0.279*	0.261*	0.246
												Vel (f/s)	1.17	1.17	1.23	1.37	1.46	1.55
												R (Hrs)	0.262	0.262	0.248	0.221	0.205	0.192
271720	0.058	0.51	46.5	46.5	URBAN	0.030	0.25	0.25	4.00	0.56	30	**Tc (Hrs)**	0.450*	0.450*	0.428*	0.385*	0.361*	0.339*
												Vel (f/s)	1.66	1.66	1.75	1.94	2.07	2.21
												R (Hrs)	0.451	0.451	0.426	0.380	0.353	0.330
271740	0.023	0.24	42.6	42.6	URBAN	0.036	0.26	0.26	4.00	0.55	27	**Tc (Hrs)**	0.355*	0.355*	0.337*	0.302*	0.283*	0.266*
												Vel (f/s)	0.99	0.99	1.04	1.17	1.24	1.32
												R (Hrs)	0.322	0.322	0.303	0.269	0.249	0.233
272310	0.016	0.23	42.5	42.5	URBAN	0.047	0.29	0.29	4.20	0.48	18	**Tc (Hrs)**	0.422*	0.422*	0.397*	0.353*	0.328*	0.307*
												Vel (f/s)	0.80	0.80	0.85	0.96	1.03	1.10
												R (Hrs)	0.463	0.463	0.433	0.379	0.349	0.325
271750	0.013	0.12	51.3	51.3	URBAN	0.034	0.25	0.25	4.00	0.56	30	**Tc (Hrs)**	0.226	0.226	0.215	0.194	0.181	0.170
												Vel (f/s)	0.78	0.78	0.82	0.91	0.97	1.04
												R (Hrs)	0.155	0.155	0.146	0.130	0.121	0.113
271760	0.006	0.12	68.4	68.4	URBAN	0.036	0.10	0.25	4.00	0.63	80	**Tc (Hrs)**	0.175	0.175	0.169	0.157	0.149	0.142
												Vel (f/s)	1.01	1.01	1.04	1.12	1.18	1.24
												R (Hrs)	0.181	0.181	0.174	0.160	0.151	0.144

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
271770	0.053	0.33	37.5	37.5	URBAN	0.039	0.32	0.28	4.25	0.48	11	**Tc (Hrs)**	0.504*	0.504*	0.470*	0.412*	0.381*	0.355*
												Vel (f/s)	0.96	0.96	1.03	1.17	1.27	1.36
												R (Hrs)	0.380	0.380	0.351	0.304	0.279	0.258
271790	0.008	0.38	32.6	32.6	URBAN	0.036	0.10	0.25	4.25	0.60	80	**Tc (Hrs)**	0.391*	0.391*	0.378*	0.351*	0.333*	0.318*
												Vel (f/s)	1.43	1.43	1.47	1.59	1.67	1.75
												R (Hrs)	0.943	0.943	0.908	0.836	0.790	0.750
271810	0.049	0.52	31.9	31.9	URBAN	0.031	0.30	0.25	4.55	0.42	15	**Tc (Hrs)**	0.552*	0.552*	0.521*	0.464*	0.430*	0.402*
												Vel (f/s)	1.38	1.38	1.46	1.64	1.77	1.90
												R (Hrs)	0.632	0.632	0.593	0.521	0.480	0.445
271830	0.063	0.56	35.1	35.1	URBAN	0.030	0.25	0.25	4.60	0.40	30	**Tc (Hrs)**	0.499*	0.499*	0.476*	0.431*	0.403*	0.380*
												Vel (f/s)	1.65	1.65	1.73	1.91	2.04	2.16
												R (Hrs)	0.521	0.521	0.494	0.442	0.411	0.384
273310	0.020	0.24	15.1	15.1	URBAN	0.033	0.30	0.25	4.70	0.37	15	**Tc (Hrs)**	0.480*	0.480*	0.454*	0.405*	0.376*	0.351*
												Vel (f/s)	0.73	0.73	0.78	0.87	0.94	1.00
												R (Hrs)	0.486	0.486	0.457	0.403	0.371	0.344
270010	0.021	0.16	71.8	71.8	URBAN	0.033	0.10	0.26	3.50	0.93	80	**Tc (Hrs)**	0.192	0.192	0.185	0.171	0.163	0.156
												Vel (f/s)	1.22	1.22	1.27	1.37	1.44	1.50
												R (Hrs)	0.124	0.124	0.119	0.109	0.103	0.098
270030	0.051	0.27	63.4	63.4	URBAN	0.031	0.25	0.25	4.10	0.55	30	**Tc (Hrs)**	0.303*	0.303*	0.287*	0.259*	0.242	0.228
												Vel (f/s)	1.31	1.31	1.38	1.53	1.64	1.74
												R (Hrs)	0.188	0.188	0.177	0.158	0.147	0.137
270710	0.005	0.25	57.6	57.6	URBAN	0.037	0.10	0.25	4.00	0.67	80	**Tc (Hrs)**	0.270*	0.270*	0.261*	0.242	0.230	0.220
												Vel (f/s)	1.36	1.36	1.40	1.52	1.59	1.67
												R (Hrs)	0.585	0.585	0.563	0.518	0.490	0.465
270060	0.055	0.43	46.1	46.1	URBAN	0.030	0.16	0.25	4.00	0.63	60	**Tc (Hrs)**	0.364*	0.364*	0.351*	0.322*	0.305*	0.290*
												Vel (f/s)	1.73	1.73	1.80	1.96	2.07	2.17
												R (Hrs)	0.321	0.321	0.307	0.280	0.263	0.249

	Sub Basin Parameters						Rainfall Losses					Return Period Parameters						
Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr

Major Basin ID: 01

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
270810	0.016	0.19	73.5	73.5	URBAN	0.034	0.25	0.27	3.40	0.84	30	**Tc (Hrs)**	0.271*	0.271*	0.255*	0.226	0.211	0.198
												Vel (f/s)	1.03	1.03	1.09	1.23	1.32	1.41
												R (Hrs)	0.243	0.243	0.227	0.199	0.184	0.172
270830	0.026	0.32	60.3	60.3	URBAN	0.043	0.28	0.29	3.55	0.70	20	**Tc (Hrs)**	0.446*	0.446*	0.416*	0.365*	0.339*	0.317*
												Vel (f/s)	1.05	1.05	1.13	1.29	1.38	1.48
												R (Hrs)	0.486	0.486	0.450	0.389	0.358	0.333
276110	0.020	0.34	46.2	46.2	URBAN	0.033	0.25	0.25	4.00	0.56	38	**Tc (Hrs)**	0.372*	0.372*	0.355*	0.322*	0.302*	0.285*
												Vel (f/s)	1.34	1.34	1.40	1.55	1.65	1.75
												R (Hrs)	0.484	0.484	0.460	0.412	0.384	0.361
270080	0.020	0.25	36.6	36.6	URBAN	0.033	0.25	0.25	4.00	0.56	45	**Tc (Hrs)**	0.332*	0.332*	0.318*	0.290*	0.273*	0.258*
												Vel (f/s)	1.10	1.10	1.15	1.26	1.34	1.42
												R (Hrs)	0.334	0.334	0.318	0.287	0.268	0.252
270910	0.004	0.13	62.9	62.9	URBAN	0.037	0.25	0.27	3.40	0.84	30	**Tc (Hrs)**	0.246	0.246	0.231	0.205	0.191	0.180
												Vel (f/s)	0.78	0.78	0.83	0.93	1.00	1.06
												R (Hrs)	0.354	0.354	0.331	0.290	0.268	0.251
271110	0.022	0.10	68.9	68.9	URBAN	0.033	0.13	0.28	3.01	1.29	70	**Tc (Hrs)**	0.163	0.163	0.156	0.143	0.136	0.129
												Vel (f/s)	0.90	0.90	0.94	1.03	1.08	1.14
												R (Hrs)	0.069	0.069	0.066	0.060	0.056	0.053
270930	0.010	0.14	37.4	37.4	URBAN	0.035	0.25	0.25	3.81	0.63	30	**Tc (Hrs)**	0.277*	0.277*	0.263*	0.236	0.221	0.208
												Vel (f/s)	0.74	0.74	0.78	0.87	0.93	0.99
												R (Hrs)	0.255	0.255	0.240	0.213	0.198	0.185
270940	0.023	0.18	54.3	54.3	URBAN	0.033	0.25	0.25	3.81	0.63	30	**Tc (Hrs)**	0.271*	0.271*	0.257*	0.231	0.216	0.204
												Vel (f/s)	0.97	0.97	1.03	1.14	1.22	1.29
												R (Hrs)	0.189	0.189	0.179	0.159	0.147	0.138
270950	0.034	0.25	80.8	80.8	URBAN	0.032	0.25	0.26	3.67	0.69	30	**Tc (Hrs)**	0.282*	0.282*	0.267*	0.239	0.224	0.210
												Vel (f/s)	1.30	1.30	1.37	1.53	1.64	1.75
												R (Hrs)	0.206	0.206	0.194	0.171	0.159	0.149

* Non default value or value out of range

Major Basin ID: 01

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
270960	0.017	0.16	20.6	20.6	URBAN	0.034	0.25	0.25	3.88	0.60	39	**Tc (Hrs)**	0.333*	0.333*	0.318*	0.288*	0.271*	0.256*
												Vel (f/s)	0.70	0.70	0.74	0.81	0.87	0.92
												R (Hrs)	0.257	0.257	0.244	0.219	0.204	0.192
270980	0.031	0.27	51.3	51.3	URBAN	0.032	0.25	0.25	3.95	0.58	45	**Tc (Hrs)**	0.307*	0.307*	0.294*	0.267*	0.252*	0.238
												Vel (f/s)	1.29	1.29	1.35	1.48	1.57	1.66
												R (Hrs)	0.253	0.253	0.241	0.217	0.203	0.191
270100	0.095	0.77	48.8	48.8	URBAN	0.029	0.25	0.25	3.92	0.59	45	**Tc (Hrs)**	0.501*	0.501*	0.479*	0.436*	0.411*	0.389*
												Vel (f/s)	2.25	2.25	2.36	2.59	2.75	2.90
												R (Hrs)	0.533	0.533	0.507	0.457	0.428	0.402
270120	0.013	0.20	43.9	43.9	URBAN	0.034	0.25	0.25	4.25	0.50	36	**Tc (Hrs)**	0.295*	0.295*	0.281*	0.255*	0.239	0.226
												Vel (f/s)	0.99	0.99	1.04	1.15	1.23	1.30
												R (Hrs)	0.313	0.313	0.297	0.266	0.248	0.232
270130	0.020	1.00	15.4	15.4	URBAN	0.033	0.10	0.25	3.92	0.71	80	**Tc (Hrs)**	0.768*	0.768*	0.742*	0.687*	0.654*	0.624*
												Vel (f/s)	1.91	1.91	1.98	2.13	2.24	2.35
												R (Hrs)	2.565	2.565	2.469	2.269	2.146	2.039
270140	0.011	0.31	46.6	46.6	URBAN	0.035	0.25	0.25	4.40	0.46	30	**Tc (Hrs)**	0.373*	0.373*	0.355*	0.321*	0.301*	0.283*
												Vel (f/s)	1.22	1.22	1.28	1.42	1.51	1.61
												R (Hrs)	0.635	0.635	0.601	0.537	0.499	0.467
270160	0.004	0.14	41.7	41.7	URBAN	0.109	0.15	0.25	4.65	0.48	9	**Tc (Hrs)**	0.521*	0.521*	0.492*	0.436*	0.404*	0.376*
												Vel (f/s)	0.39	0.39	0.42	0.47	0.51	0.55
												R (Hrs)	0.867	0.867	0.812	0.711	0.653	0.604
270180	0.003	0.15	42.5	42.5	URBAN	0.038	0.25	0.25	3.92	0.59	30	**Tc (Hrs)**	0.285*	0.285*	0.271*	0.244	0.228	0.215
												Vel (f/s)	0.77	0.77	0.81	0.90	0.96	1.02
												R (Hrs)	0.553	0.553	0.522	0.464	0.431	0.403
270200	0.007	0.22	43.4	43.4	URBAN	0.036	0.10	0.25	3.92	0.77	5	**Tc (Hrs)**	0.411*	0.411*	0.380*	0.328*	0.303*	0.281*
												Vel (f/s)	0.79	0.79	0.85	0.98	1.06	1.15
												R (Hrs)	0.695	0.695	0.637	0.542	0.494	0.455

Column groups: Sub Basin Parameters (Area, Length, Slope, Adj Slope, Time-Area, Kb); Rainfall Losses (IA, DTHETA, PSIF, XKSAT, RTIMP); Return Period Parameters (2 Yr – 100 Yr).

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
271210	0.052	0.51	44.0	44.0	URBAN	0.030	0.25	0.25	4.45	0.45	30	**Tc (Hrs)**	0.449*	0.449*	0.428*	0.387*	0.362*	0.341*
												Vel (f/s)	1.67	1.67	1.75	1.93	2.07	2.19
												R (Hrs)	0.479	0.479	0.454	0.406	0.377	0.352
271220	0.061	0.34	25.3	25.3	URBAN	0.030	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.430*	0.430*	0.410*	0.371*	0.347*	0.327*
												Vel (f/s)	1.16	1.16	1.22	1.34	1.44	1.52
												R (Hrs)	0.301	0.301	0.286	0.256	0.238	0.222
270220	0.004	0.11	35.4	35.4	URBAN	0.068	0.21	0.25	3.92	0.65	21	**Tc (Hrs)**	0.372*	0.372*	0.351*	0.313*	0.291*	0.273*
												Vel (f/s)	0.43	0.43	0.46	0.52	0.55	0.59
												R (Hrs)	0.492	0.492	0.461	0.405	0.374	0.348
270230	0.010	0.13	30.2	30.2	URBAN	0.035	0.25	0.25	3.92	0.59	30	**Tc (Hrs)**	0.283*	0.283*	0.269*	0.242	0.226	0.213
												Vel (f/s)	0.67	0.67	0.71	0.79	0.84	0.90
												R (Hrs)	0.246	0.246	0.232	0.207	0.192	0.179
270240	0.012	0.25	41.4	41.4	URBAN	0.068	0.10	0.25	4.60	0.53	5	**Tc (Hrs)**	0.566*	0.566*	0.532*	0.470*	0.433*	0.403*
												Vel (f/s)	0.65	0.65	0.69	0.78	0.85	0.91
												R (Hrs)	0.808	0.808	0.754	0.656	0.600	0.554
271310	0.039	0.50	48.7	48.7	URBAN	0.031	0.25	0.25	4.45	0.45	30	**Tc (Hrs)**	0.438*	0.438*	0.418*	0.377*	0.353*	0.332*
												Vel (f/s)	1.67	1.67	1.75	1.95	2.08	2.21
												R (Hrs)	0.541	0.541	0.512	0.458	0.425	0.398
271320	0.039	0.32	41.1	41.1	URBAN	0.031	0.25	0.25	4.60	0.40	30	**Tc (Hrs)**	0.366*	0.366*	0.349*	0.315*	0.295*	0.278*
												Vel (f/s)	1.28	1.28	1.34	1.49	1.59	1.69
												R (Hrs)	0.309	0.309	0.294	0.263	0.244	0.228
271330	0.003	0.11	55.7	55.7	URBAN	0.038	0.18	0.25	4.65	0.43	55	**Tc (Hrs)**	0.197	0.197	0.190	0.174	0.164	0.156
												Vel (f/s)	0.82	0.82	0.85	0.93	0.98	1.03
												R (Hrs)	0.286	0.286	0.274	0.249	0.234	0.221
271340	0.002	0.08	13.3	13.3	URBAN	0.039	0.18	0.25	4.65	0.43	55	**Tc (Hrs)**	0.265*	0.265*	0.255*	0.234	0.222	0.210
												Vel (f/s)	0.44	0.44	0.46	0.50	0.53	0.56
												R (Hrs)	0.389	0.389	0.372	0.339	0.318	0.300

* Non default value or value out of range

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
Major Basin ID: 01																		
271350	0.002	0.07	34.3	34.3	URBAN	0.039	0.18	0.25	4.65	0.43	55	**Tc (Hrs)**	0.185	0.185	0.178	0.164	0.154	0.147
												Vel (f/s)	0.55	0.55	0.58	0.63	0.67	0.70
												R (Hrs)	0.234	0.234	0.224	0.204	0.192	0.181
271360	0.003	0.11	24.6	24.6	URBAN	0.038	0.18	0.25	4.65	0.43	55	**Tc (Hrs)**	0.254*	0.254*	0.244	0.224	0.212	0.201
												Vel (f/s)	0.64	0.64	0.66	0.72	0.76	0.80
												R (Hrs)	0.379	0.379	0.363	0.330	0.310	0.292
271370	0.002	0.07	30.3	30.3	URBAN	0.039	0.18	0.25	4.65	0.43	55	**Tc (Hrs)**	0.192	0.192	0.185	0.170	0.161	0.152
												Vel (f/s)	0.53	0.53	0.55	0.60	0.64	0.68
												R (Hrs)	0.244	0.244	0.234	0.213	0.200	0.189
271380	0.003	0.08	25.0	25.0	URBAN	0.038	0.18	0.25	4.65	0.43	55	**Tc (Hrs)**	0.215	0.215	0.207	0.190	0.180	0.170
												Vel (f/s)	0.55	0.55	0.57	0.62	0.65	0.69
												R (Hrs)	0.245	0.245	0.234	0.213	0.200	0.189
271400	0.049	0.28	49.3	49.3	URBAN	0.054	0.13	0.25	4.65	0.49	10	**Tc (Hrs)**	0.483*	0.483*	0.456*	0.405*	0.375*	0.350*
												Vel (f/s)	0.85	0.85	0.90	1.01	1.10	1.17
												R (Hrs)	0.333	0.333	0.312	0.274	0.251	0.233
270270	0.005	0.12	69.6	69.6	URBAN	0.037	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.208	0.208	0.199	0.180	0.168	0.158
												Vel (f/s)	0.85	0.85	0.88	0.98	1.05	1.11
												R (Hrs)	0.243	0.243	0.231	0.207	0.192	0.179
270280	0.018	0.21	46.2	46.2	URBAN	0.033	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.294*	0.294*	0.281*	0.254*	0.238	0.224
												Vel (f/s)	1.05	1.05	1.10	1.21	1.29	1.38
												R (Hrs)	0.270	0.270	0.256	0.229	0.213	0.199
270290	0.031	0.43	41.9	41.9	URBAN	0.032	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.428*	0.428*	0.408*	0.369*	0.345*	0.325*
												Vel (f/s)	1.47	1.47	1.55	1.71	1.83	1.94
												R (Hrs)	0.531	0.531	0.504	0.451	0.419	0.392
270310	0.063	0.54	64.1	64.1	URBAN	0.030	0.25	0.25	4.65	0.39	45	**Tc (Hrs)**	0.383*	0.383*	0.367*	0.335*	0.316*	0.298*
												Vel (f/s)	2.07	2.07	2.16	2.36	2.51	2.66
												R (Hrs)	0.376	0.376	0.359	0.325	0.304	0.285

* Non default value or value out of range

Major Basin ID: 01

Area ID	Sub Basin Parameters: Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	Rainfall Losses: IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		Return Period Parameters: 2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
273505	0.022	0.21	24.8	24.8	URBAN	0.033	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.357*	0.357*	0.341*	0.308*	0.289*	0.271*
												Vel (f/s)	0.86	0.86	0.90	1.00	1.07	1.14
												R (Hrs)	0.298	0.298	0.283	0.253	0.235	0.220
273506	0.017	0.19	32.5	32.5	URBAN	0.034	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.317*	0.317*	0.303*	0.274*	0.256*	0.241
												Vel (f/s)	0.88	0.88	0.92	1.02	1.09	1.16
												R (Hrs)	0.280	0.280	0.265	0.237	0.221	0.206
273508	0.013	0.16	15.3	15.3	URBAN	0.034	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.368*	0.368*	0.351*	0.317*	0.297*	0.279*
												Vel (f/s)	0.64	0.64	0.67	0.74	0.79	0.84
												R (Hrs)	0.334	0.334	0.317	0.284	0.264	0.247
271510	0.018	0.25	21.3	21.3	URBAN	0.033	0.25	0.25	4.70	0.37	30	**Tc (Hrs)**	0.407*	0.407*	0.388*	0.351*	0.329*	0.309*
												Vel (f/s)	0.90	0.90	0.95	1.04	1.11	1.19
												R (Hrs)	0.444	0.444	0.422	0.377	0.351	0.327
273510	0.024	0.48	38.6	38.6	URBAN	0.033	0.25	0.25	4.65	0.39	30	**Tc (Hrs)**	0.471*	0.471*	0.449*	0.406*	0.380*	0.358*
												Vel (f/s)	1.49	1.49	1.57	1.73	1.85	1.97
												R (Hrs)	0.747	0.747	0.709	0.634	0.590	0.551
270370	0.026	0.25	39.9	39.9	URBAN	0.032	0.25	0.25	4.65	0.39	45	**Tc (Hrs)**	0.312*	0.312*	0.299*	0.273*	0.257*	0.243
												Vel (f/s)	1.18	1.18	1.23	1.34	1.43	1.51
												R (Hrs)	0.268	0.268	0.256	0.231	0.216	0.203
270390	0.043	0.41	34.3	34.3	URBAN	0.043	0.19	0.25	4.65	0.44	29	**Tc (Hrs)**	0.523*	0.523*	0.499*	0.451*	0.422*	0.397*
												Vel (f/s)	1.15	1.15	1.21	1.33	1.42	1.51
												R (Hrs)	0.531	0.531	0.504	0.450	0.418	0.391
270400	0.012	0.28	53.2	53.2	URBAN	0.034	0.10	0.25	4.55	0.55	5	**Tc (Hrs)**	0.390*	0.390*	0.366*	0.322*	0.297*	0.276*
												Vel (f/s)	1.05	1.05	1.12	1.28	1.38	1.49
												R (Hrs)	0.584	0.584	0.544	0.473	0.433	0.399
270420	0.004	0.51	3.9	3.9	URBAN	0.037	0.10	0.25	4.70	0.45	80	**Tc (Hrs)**	0.883*	0.883*	0.854*	0.792*	0.753*	0.719*
												Vel (f/s)	0.85	0.85	0.88	0.94	0.99	1.04
												R (Hrs)	4.378	4.378	4.218	3.879	3.668	3.482

Area ID	Area (sq mi)	Length (mi)	Slope (ft/mi)	Adj Slope	Time-Area	Kb	IA (in)	DTHETA	PSIF (in)	XKSAT (in/hr)	RTIMP (%)		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
	Sub Basin Parameters						Rainfall Losses						Return Period Parameters					
Major Basin ID: 01																		
273410	0.026	0.24	39.5	39.5	URBAN	0.032	0.25	0.25	4.70	0.37	30	**Tc (Hrs)**	0.324 *	0.324 *	0.309*	0.280*	0.262*	0.246
												Vel (f/s)	1.09	1.09	1.14	1.26	1.34	1.43
												R (Hrs)	0.271	0.271	0.257	0.230	0.214	0.199
273420	0.083	0.33	51.5	51.5	URBAN	0.029	0.25	0.25	4.65	0.39	45	**Tc (Hrs)**	0.315 *	0.315 *	0.302*	0.276*	0.259*	0.245
												Vel (f/s)	1.54	1.54	1.60	1.75	1.87	1.98
												R (Hrs)	0.174	0.174	0.167	0.151	0.141	0.132
270440	0.015	0.11	63.7	63.7	URBAN	0.034	0.25	0.25	4.70	0.37	45	**Tc (Hrs)**	0.184	0.184	0.177	0.161	0.152	0.143
												Vel (f/s)	0.88	0.88	0.91	1.00	1.06	1.13
												R (Hrs)	0.106	0.106	0.101	0.091	0.086	0.080

* Non default value or value out of range

Appendix N

Unsteady Flow HEC-RAS Models

UPPER CAMELBACK WASH

100% DESIGN

DIVERSION STRUCTURE DESIGN FOR SWEETWATER DETENTION BASIN

Prepared for

City of Scottsdale (COS)

&

Flood Control District of Maricopa County (FCDMC)

Prepared by

PRIMATECH
ENGINEERS & CONSULTANTS

4640 E. McDowell Road, Suite 100,
Phoenix, AZ 85008

March 7, 2012

1. INTRODUCTION

This supplement is to document the approaches followed by Primatech to design a functioning diversion structure for Sweetwater Detention Basin. According to the HEC-1 Model for the 50-year proposed conditions prepared by Primatech in March 2012, an inflow hydrograph, at HEC-1 Combined Node 271720, with a peak flow of 462 CFS would be introduced into the channel upstream of the diversion structure. A lateral (side) weir diversion structure was proposed. Two approaches were conducted to design this system. A brief discussion of them is presented below*.

2. METHODOLOGY

A HEC-RAS model was developed for both Steady and Unsteady flow analyses. This model was developed from Primatech's steady-state proposed condition model for the 50-year storm frequency completed by Primatech in March 2012. The model has two "HEC-RAS Plans", namely, ***SWB- Steady Flow Model*** and ***SWB-Unsteady Flow Model*** for the steady and unsteady flow analysis respectively. The model was created using HEC-RAS ver. 4.1.0 and was run in the mixed flow regime for both plans.

To simplify the model, the study reach was shortened to contain only the section of the channel with the lateral weir, Sweetwater Basin, Sweetwater crossing culvert, and a channel segment downstream of the culvert that is long enough for the setup of the downstream boundary conditions. Moreover, a segment of the existing channel of length 350 ft was appended to the upstream end to give the model an enough length before the drop structure to establish the water surface profile and facilitate the solution convergence for the unsteady model. This section of the Main channel reach ranged from RS 10635.85 to RS 8500.

2.1 Steady Flow Analysis

In the steady flow plan, the flow data included several profiles with different flow rates in the range from 100 to 650 CFS, as shown in Figure 1. The "Flow Optimization" option in HEC-RAS was used so that HEC-RAS would run the Split Flow Optimization Engine and perform multiple iterations until the energy elevations or discharge values were balanced and the proper split ratio was obtained.

The flow rates at the upstream and downstream sections of the lateral weir and flow rate leaving the channel (over the weir) from the HEC-RAS model results were documented for each profile.

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* The reader is expected to be familiar with the HEC-RAS model for proposed conditions submitted by Primatech in March 2012.

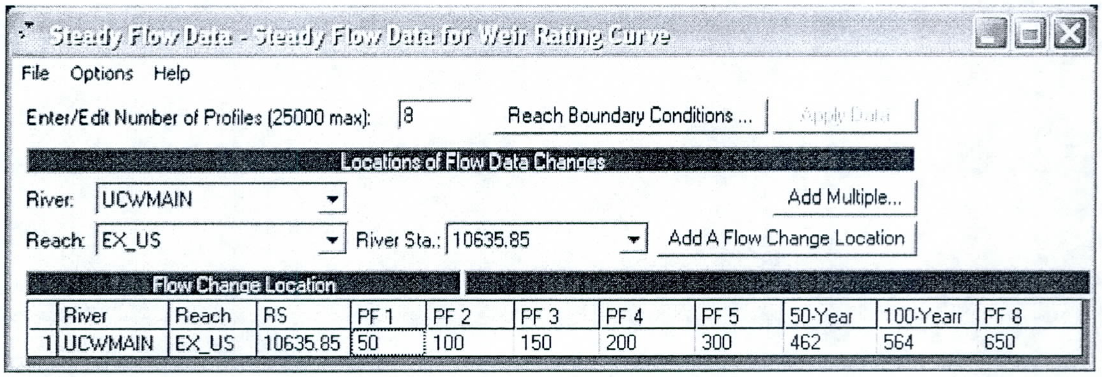


Figure 1: Steady State Model Multiple Flow Profiles

A diversion rating curve between the total incoming flows and leaving flows was then established. This rating curve was entered into the HEC-1 Model using the "*DI*" and "*DQ*" records, under CARD ID "KK271721 DIVERT", along with the HEC-1 Reservoir Routing "*RS*" record to produce the final hydrographs.

Table 1 shows the results of the diversion split flows of the HEC-RAS model. Figure 2 shows a graphical representation of Table 1.

Table 1: Total and Diverted Flows Obtained from the HEC-RAS Steady Flow Model

DI (CFS)	50	100	150	200	300	462	564	650
DQ (CFS)	0	0	1.5	18.6	65.8	151.4	211.6	262.7

The weir design is a trapezoidal broad-crested weir with a horizontal crest of approximately 65ft along the channel and 20:1 side slopes. The weir crest elevation was set at 1428.1. Hager's Equation for the lateral weir coefficient (Hager 1987) was used and a value of C = 1.86 was determined by the program at the corresponding 50-year peak flow of 462 cfs. The HEC-RAS water surface profile and weir table are presented in Appendix A.

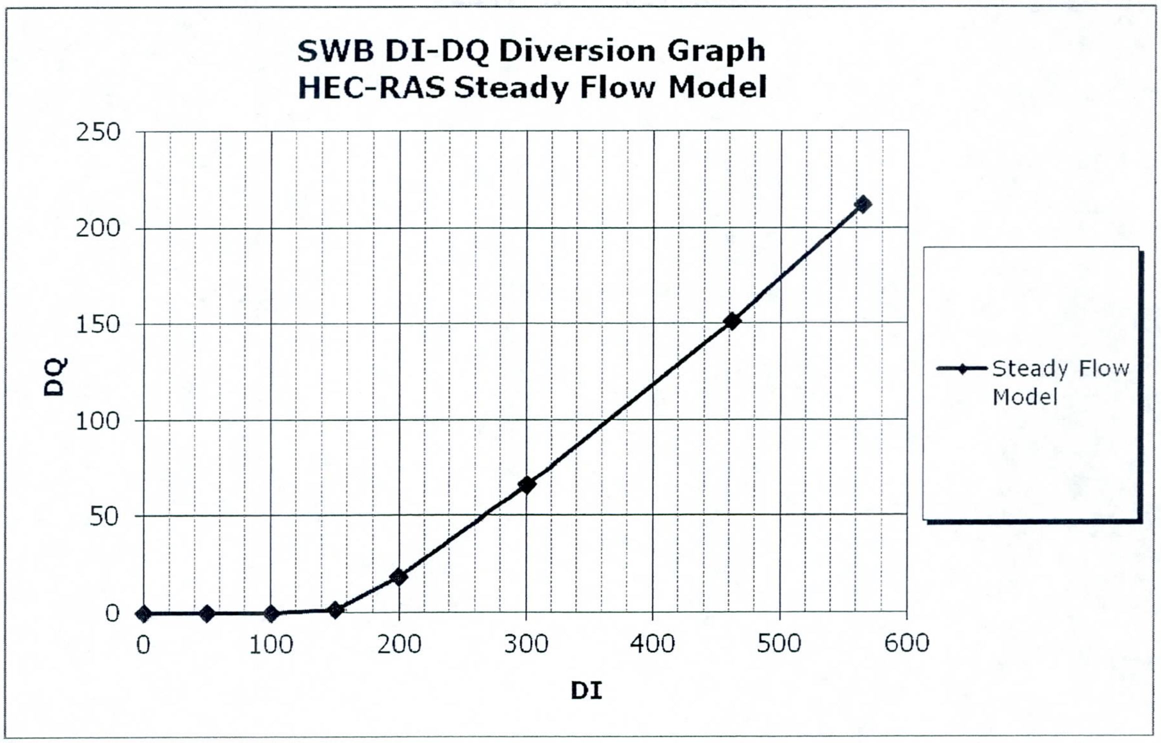


Figure 2: Sweetwater Basin Diversion Rating Curve - Steady State Model

2.2 Unsteady Flow Analysis

In the unsteady flow plan of the HEC-RAS model, the Boundary Conditions (BC) were set such that the Inflow Hydrograph obtained from the HEC-1 model was introduced at the upstream end of the study reach, while the Normal Depth BC was used for the downstream end of the reach, which is about a mile downstream of the Sweetwater culvert crossing. This reach length was chosen so that any instability in the solution at the BCs would not have a significant effect on the results upstream, at the weir location.

Sweetwater Basin was modeled as an off-line storage area in HEC-RAS, and the stage-storage relation for the basin was entered in the HEC-RAS Storage Area Editor and the bottom elevation of 1424 was set as an initial boundary condition (i.e. the basin is empty).

Hager's Equation for the lateral weir coefficient (Hager 1987) was used. The iterations converged to a weir coefficient $C = 1.7$ for the 50 year peak flow of 462 CFS. The weir configuration was the same as for the steady state model, i.e., trapezoidal broad-crested weir with a horizontal crest of approximately 65ft along the channel and 20:1 side slopes. The weir crest elevation was set at

1428.1. The configuration and hydraulic parameters of the proposed weir, HEC-RAS output profile and tables, and Sweetwater Detention Basin flow and stage hydrographs are presented in Appendix A.

The model was run in the mixed flow regime using 12 seconds as the computational interval. Interpolated cross sections were added every 15 feet to smooth out the results. After several iterations and adjusting the minimum Hydrograph inflow rates to be computed by the model to 30 cfs, the model finished the run normally and converged to a solution with no errors or warnings.

The flow rates at the upstream and downstream sections of the lateral weir and the flow rate leaving the channel (over the weir) shown in the HEC-RAS model results were documented for each profile.

A diversion rating curve showing the relationship between the total incoming flows and leaving flows was then established. This rating curve was entered into HEC-1 Model using the *"DI"* and *"DQ"* records, under CARD ID "KK271721 DIVERT", along with the HEC-1 Reservoir Routing *"RS"* records to produce the final hydrographs as shown in Appendix B.

Table 2 shows the results of the diversion split flows from the HEC-RAS model. Figure 3 shows a graphical representation of Table 2. Furthermore, the Steady state model diversion rating curve obtained earlier was added to Figure 3 for comparison.

Table 2 Total and Diverted Flows Obtained from the HEC-RAS Unsteady Flow Model

DI (CFS)	0.0	162.1	200.5	328.4	411.5	435.2	459.9	463.8	451.7
DQ (CFS)	0.0	0.7	9.0	54.7	90.4	101.2	113.1	116.0	112.4
DI (CFS)	440.4	412.1	379.7	347.7	315.2	273.3	247.1	224.8	214.0
DQ (CFS)	108.4	97.6	85.1	72.5	59.9	41.7	24.9	6.4	0.0

3. SUMMARY AND CONCLUSION

A HEC-RAS model was developed for both Steady and Unsteady flow analysis. Sweetwater basin was modeled as an offline storage area while the diversion structure was modeled as a lateral weir in HEC-RAS. The model was run in the mixed flow regime for both steady and unsteady analyses.

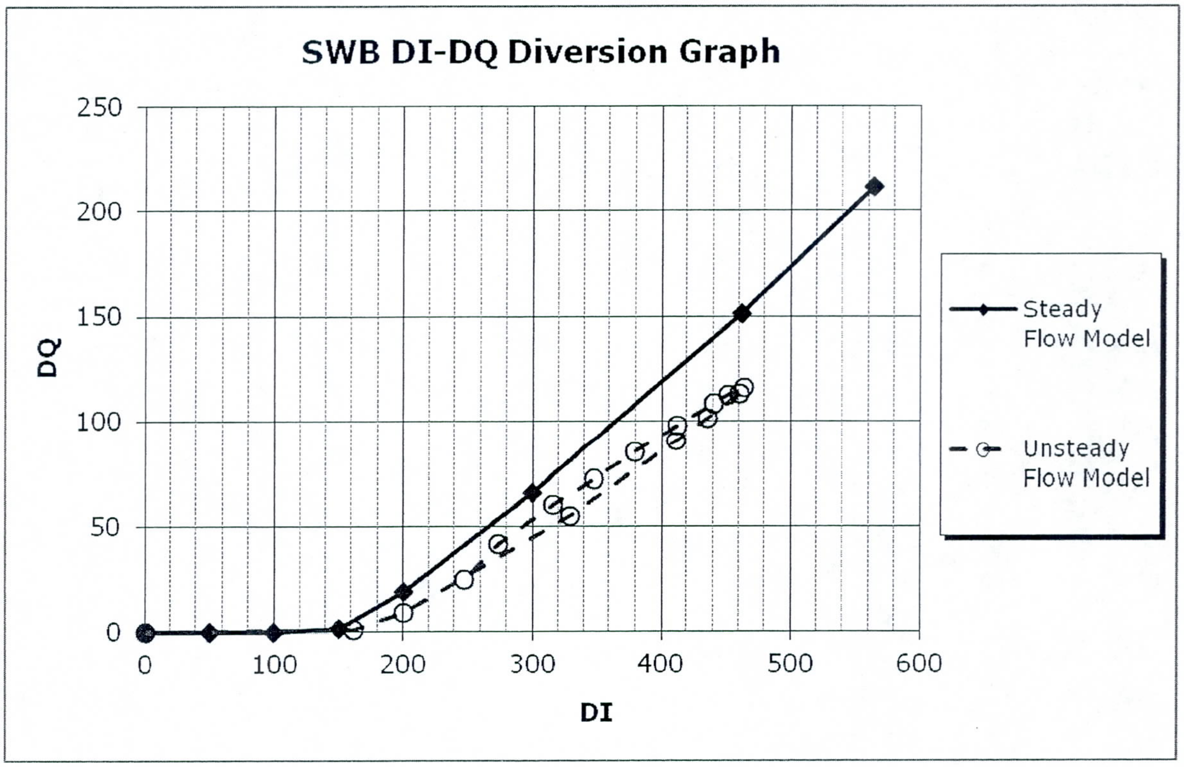


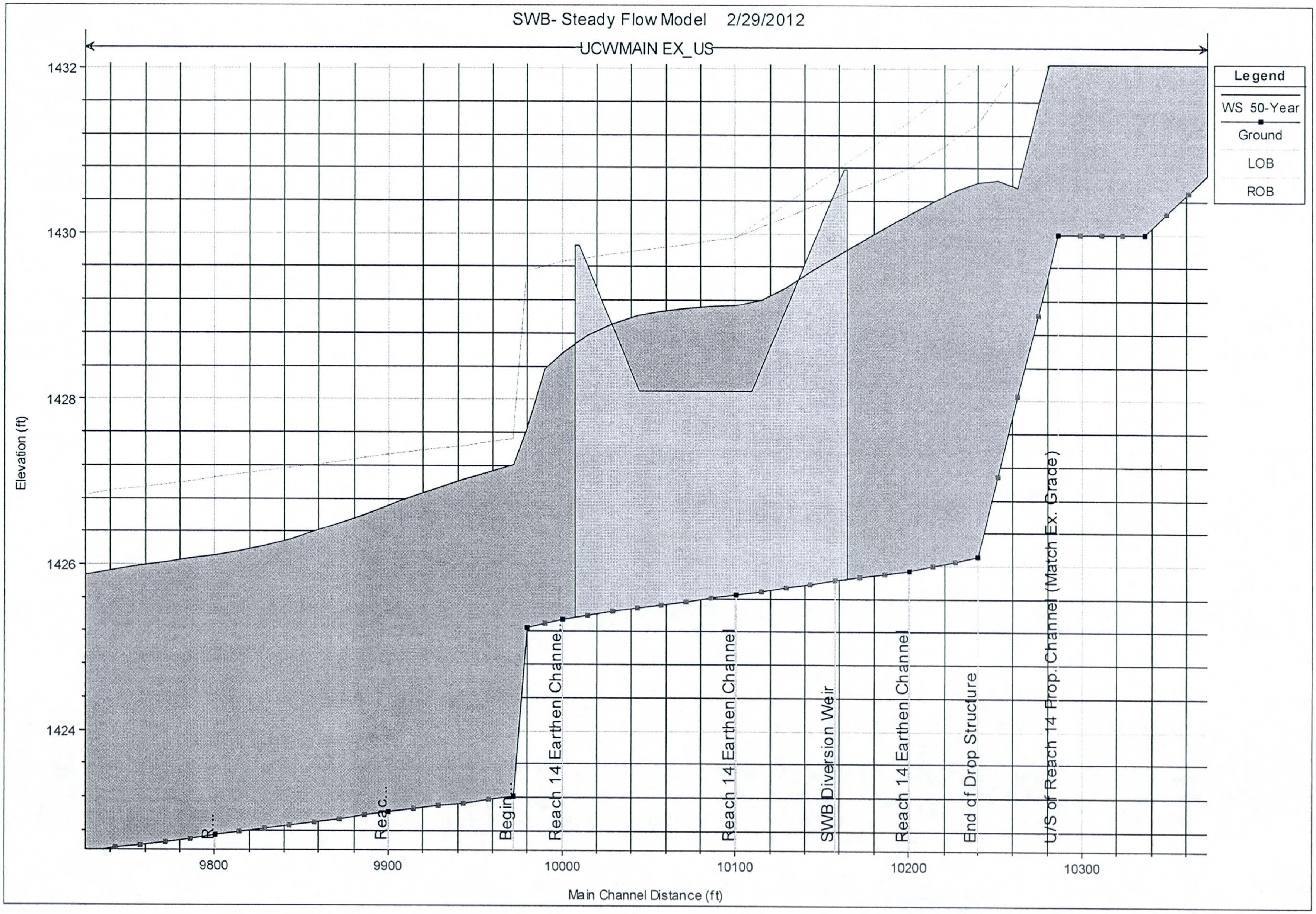
Figure 3: Steady vs. Unsteady State Model for Sweetwater Basin Diversion Rating Curve

Figure 3 shows a comparison between the results obtained from the model for both steady and unsteady flow plans for the diversion rating curve of the lateral weir. It can be seen that, the DI-DQ relationship can be fairly represented by a linear trend. Also the figure shows that, for the same inflow rate (DI), the unsteady flow model would give more diverted flow (DQ) over the weir than the steady flow model. This behavior is more pronounced as the inflow rate increases.

The diversion rating curves DI-DQ that resulted from both steady and unsteady HEC-RAS models were entered back in HEC-1 model to produce the diverted and the remaining–in-channel hydrographs. Generally, it can be concluded that for the steady flow model, about 150 cfs would be diverted to Sweetwater basin while about 115 cfs would be diverted in the case of unsteady flow model; these values represents 32% and 25% of the incoming hydrograph peak flow of 462 cfs respectively. The diverted hydrograph, resulted from the unsteady flow model, with the peak flow of 115 cfs was established as the final diversion for Sweetwater Basin, as shown in Appendix C.

Appendix A

HEC-RAS Steady State Model Output

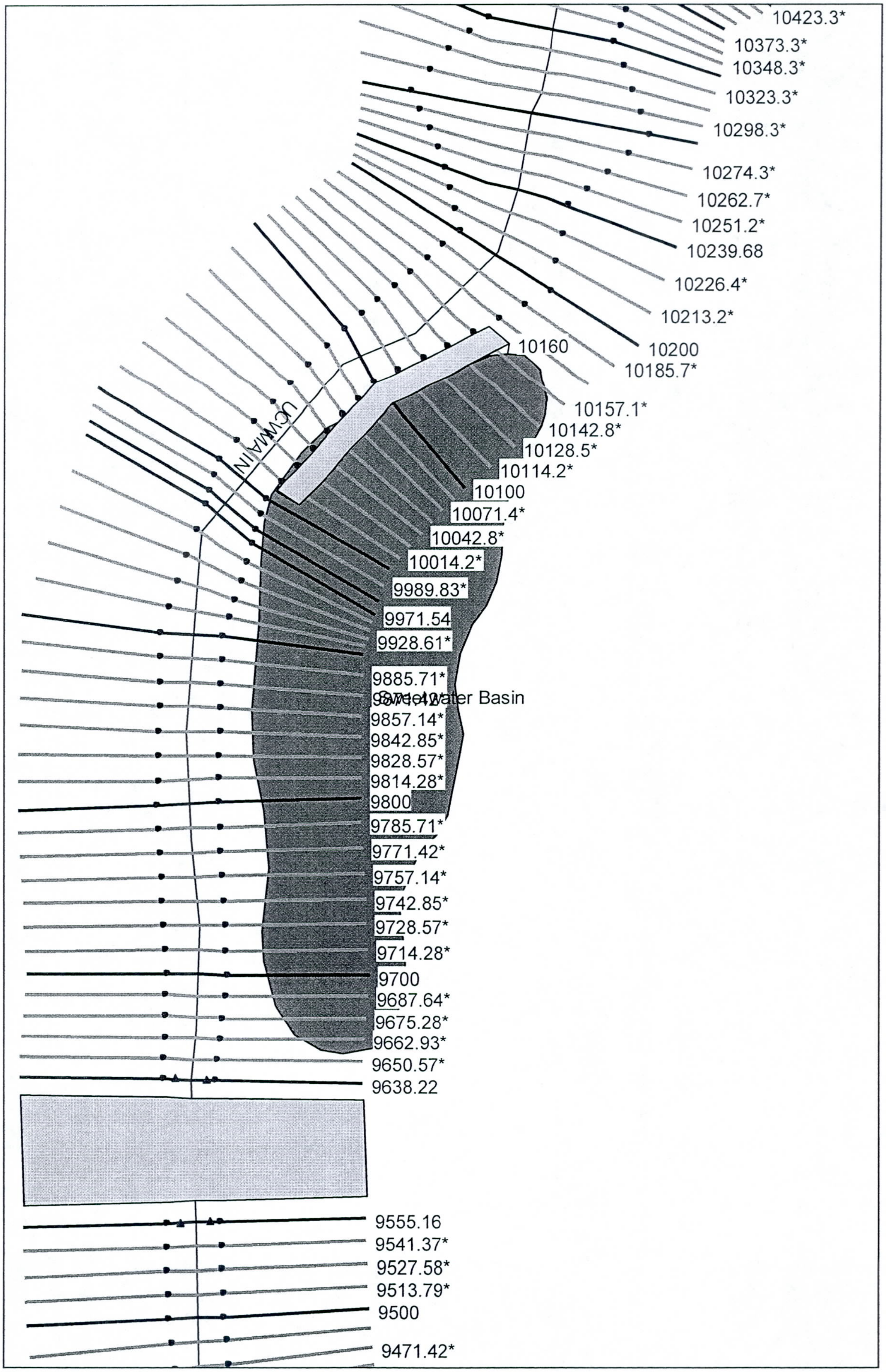

SWB- Steady Flow Model 2/29/2012
UCWMAIN EX_US
Legend
WS 50-Year
Ground
LOB
ROB
Elevation (ft)
1432
1430
1428
1426
1424
Main Channel Distance (ft)
9800
9900
10000
10100
10200
10300
R...
Reac...
Begin...
Reach 14 Earthen Channel...
Reach 14 Earthen Channel
SWB Diversion Weir
Reach 14 Earthen Channel
End of Drop Structure
U/S of Reach 14 Prop. Channel (Match Ex. Grade)

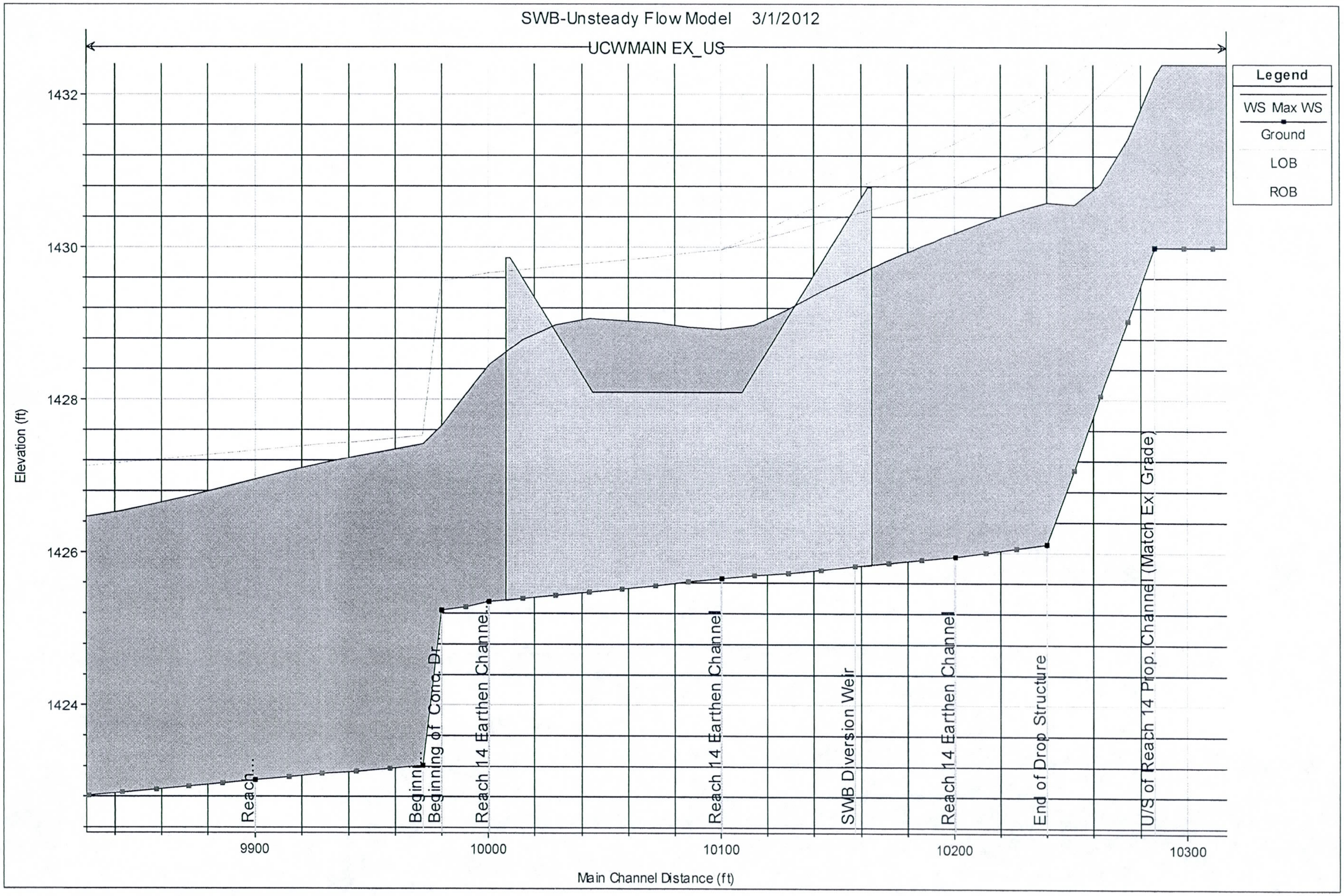
Lateral Weir HEC-RAS Table- Steady State Model

River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Weir Top Width	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
		(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10160	PF 1	50.00	0.00	50.00	0.00				1428.10	1427.43	1427.35	1426.86	1426.75
10160	PF 2	100.00	0.00	100.00	0.00				1428.10	1428.11	1427.99	1427.47	1427.31
10160	PF 3	150.00	1.53	148.47	1.53	50.44	0.13	0.07	1428.10	1428.61	1428.45	1427.93	1427.71
10160	PF 4	200.00	18.59	181.46	18.59	75.45	0.38	0.27	1428.10	1428.95	1428.74	1428.19	1427.95
10160	PF 5	300.00	65.83	233.57	65.83	89.05	0.70	0.53	1428.10	1429.51	1429.20	1428.56	1428.27
10160	50-Year	462.00	151.40	308.86	151.40	107.58	1.08	0.80	1428.10	1430.23	1429.81	1429.02	1428.67
10160	100-Year	564.00	211.58	354.53	211.58	119.27	1.28	0.93	1428.10	1430.61	1430.15	1429.26	1428.89
10160	PF8	650.00	262.68	390.61	262.68	128.86	1.43	1.01	1428.10	1430.90	1430.42	1429.45	1429.05

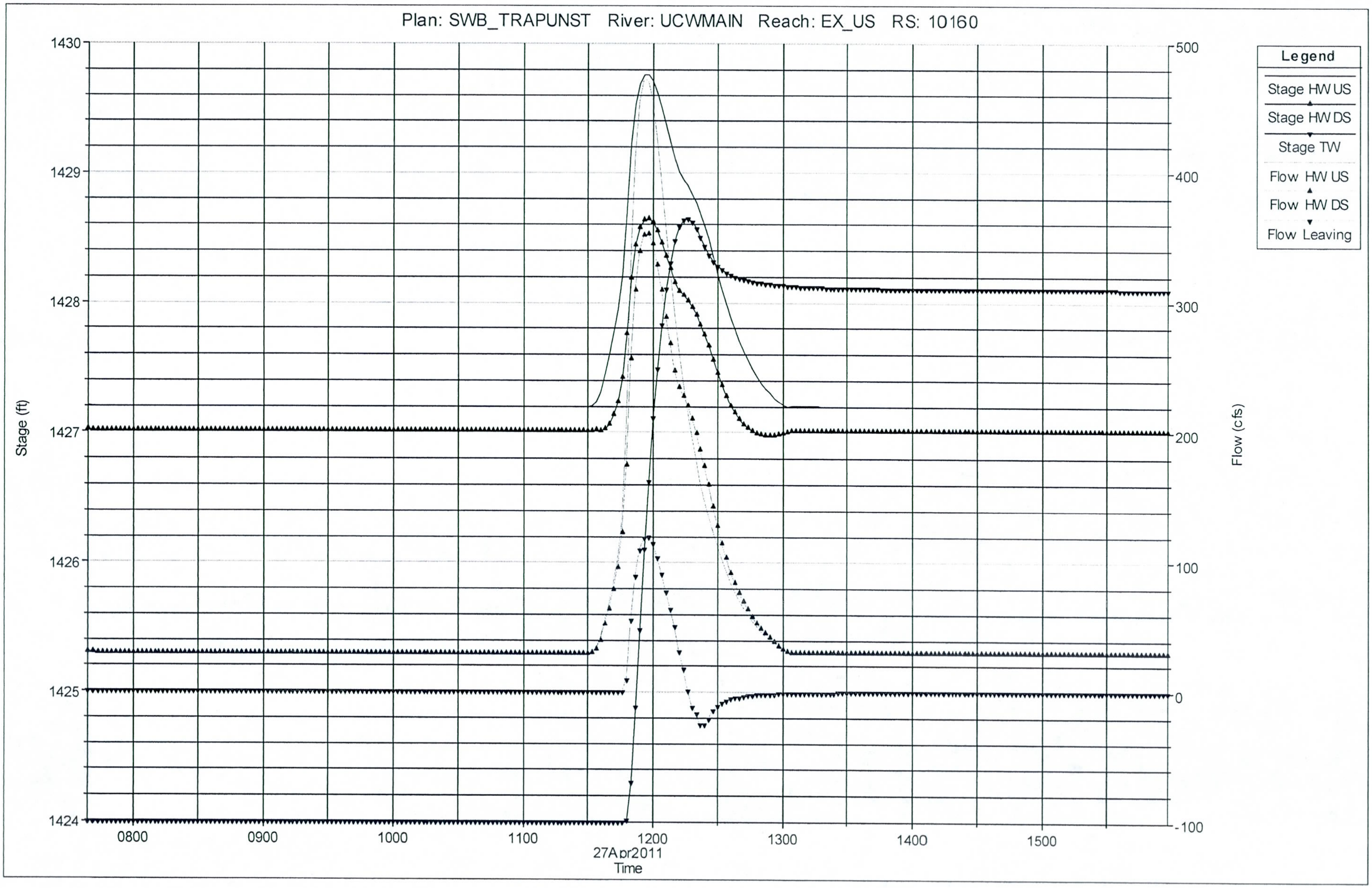
Appendix B

HEC-RAS Unsteady State Model Output


10423.3*
10373.3*
10348.3*
10323.3*
10298.3*
10274.3*
10262.7*
10251.2*
10239.68
10226.4*
10213.2*
10160
10200
10185.7*
UCMAIN
10157.1*
10142.8*
10128.5*
10114.2*
10100
10071.4*
10042.8*
10014.2*
9989.83*
9971.54
9928.61*
9885.71*
Sweetwater Basin
9857.14*
9842.85*
9828.57*
9814.28*
9800
9785.71*
9771.42*
9757.14*
9742.85*
9728.57*
9714.28*
9700
9687.64*
9675.28*
9662.93*
9650.57*
9638.22
9555.16
9541.37*
9527.58*
9513.79*
9500
9471.42*

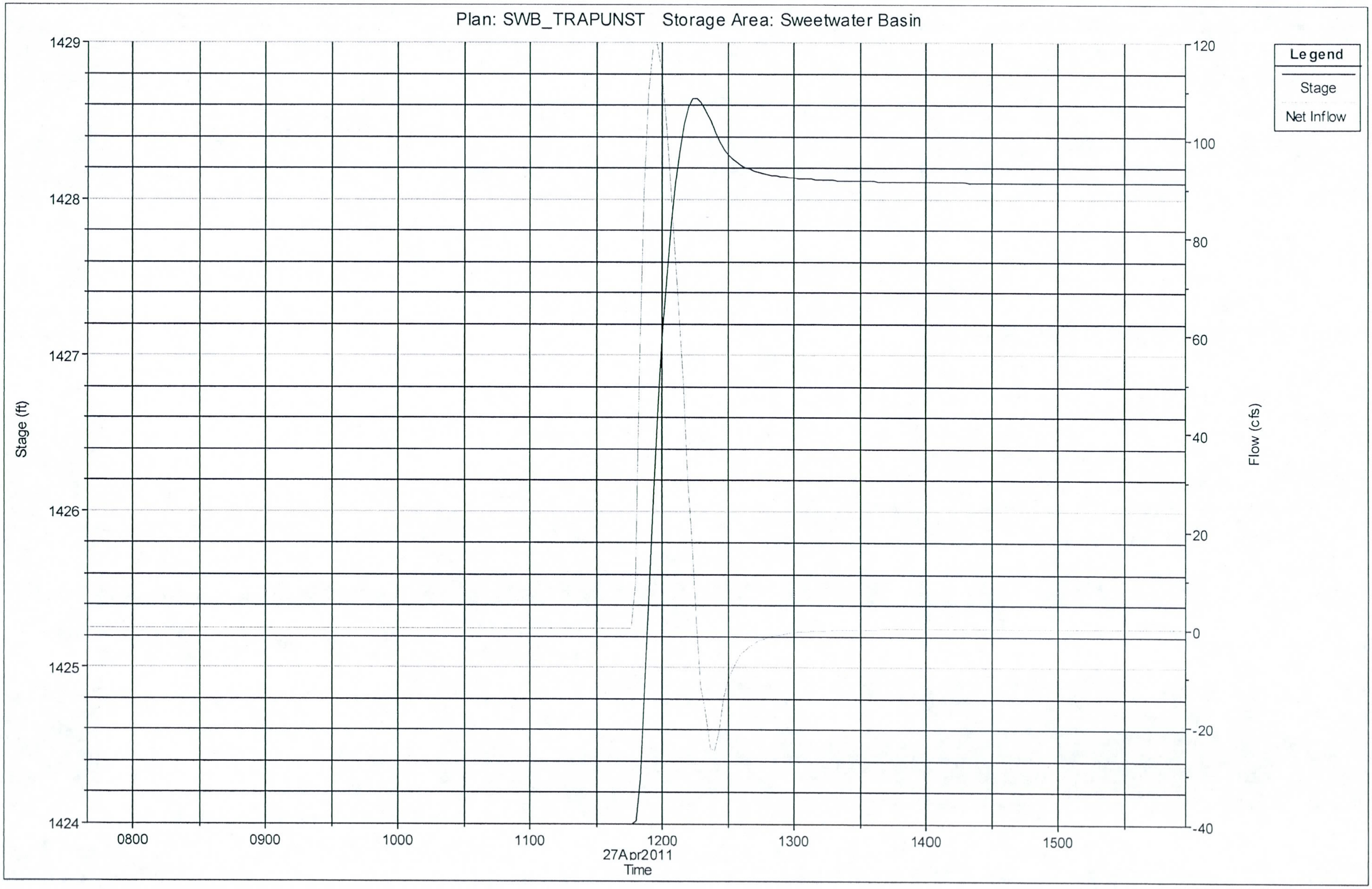

SWB-Unsteady Flow Model 3/1/2012
UCWMAIN EX_US
Legend
WS Max WS
Ground
LOB
ROB
Elevation (ft)
1432
1430
1428
1426
1424
Reach...
Beginni...
Beginning of Conc. Dr...
Reach 14 Earthen Channe...
Reach 14 Earthen Channel
SWB Diversion Weir
Reach 14 Earthen Channel
End of Drop Structure
U/S of Reach 14 Prop. Channel (Match Ex. Grade)
9900
10000
10100
10200
10300
Main Channel Distance (ft)

Lateral Weir Stage and Flow Hydrographs

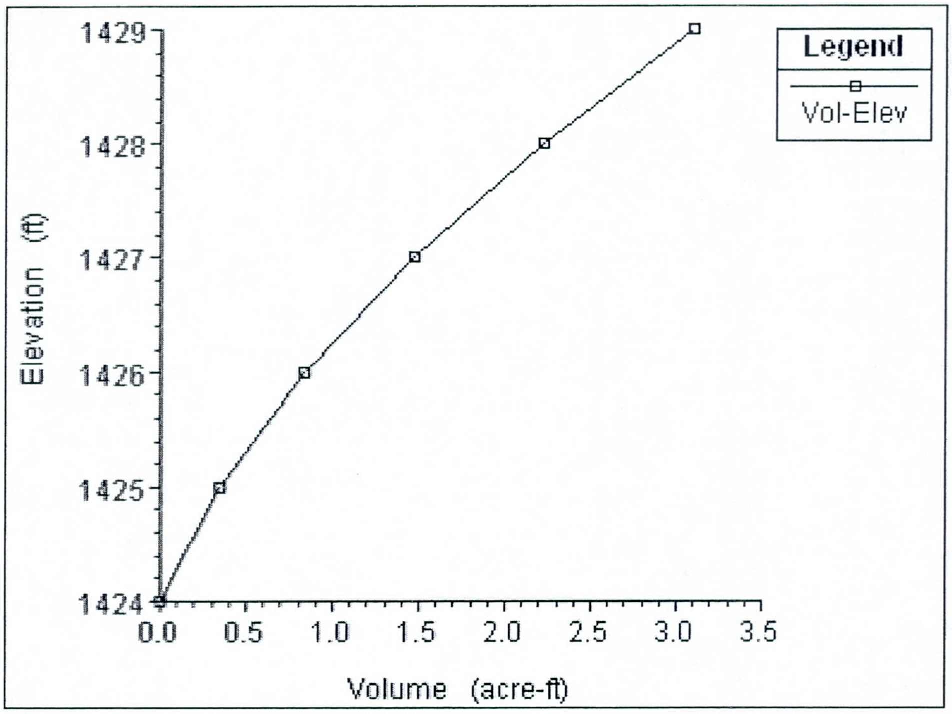


Lateral Weir HEC-RAS Table- Unsteady State Model

River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Weir Top Width	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
		(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
10160	Max WS	464.41	116.04	347.94	116.04	104.25	0.96	0.72	1428.10	1430.19	1429.73	1429.09	1428.63
10160	27APR2011 0746	29.97	0.00	30.01	0.00				1428.10	1427.24	1427.20	1427.04	1427.02
10160	27APR2011 1148	162.11	0.73	148.89	0.73	39.89	0.11	0.06	1428.10	1428.64	1428.46	1427.85	1427.60
10160	27APR2011 1152	374.67	74.55	286.73	74.55	93.04	0.70	0.58	1428.10	1429.80	1429.40	1428.75	1428.33
10160	27APR2011 1156	459.92	113.14	344.33	113.14	103.56	0.94	0.71	1428.10	1430.17	1429.71	1429.06	1428.60
10160	27APR2011 1200	451.65	112.39	342.27	112.39	103.13	0.94	0.71	1428.10	1430.14	1429.69	1429.06	1428.60
10160	27APR2011 1204	396.15	91.50	310.76	91.50	97.23	0.81	0.64	1428.10	1429.91	1429.50	1428.89	1428.46
10160	27APR2011 1208	332.27	66.52	272.18	66.52	90.11	0.65	0.55	1428.10	1429.62	1429.26	1428.67	1428.28
10160	27APR2011 1212	273.31	41.74	235.86	41.74	83.81	0.53	0.43	1428.10	1429.33	1429.03	1428.45	1428.10
10160	27APR2011 1216	224.78	6.41	221.04	6.41	86.17	0.55	0.46	1428.10	1429.13	1428.90	1428.36	1428.02



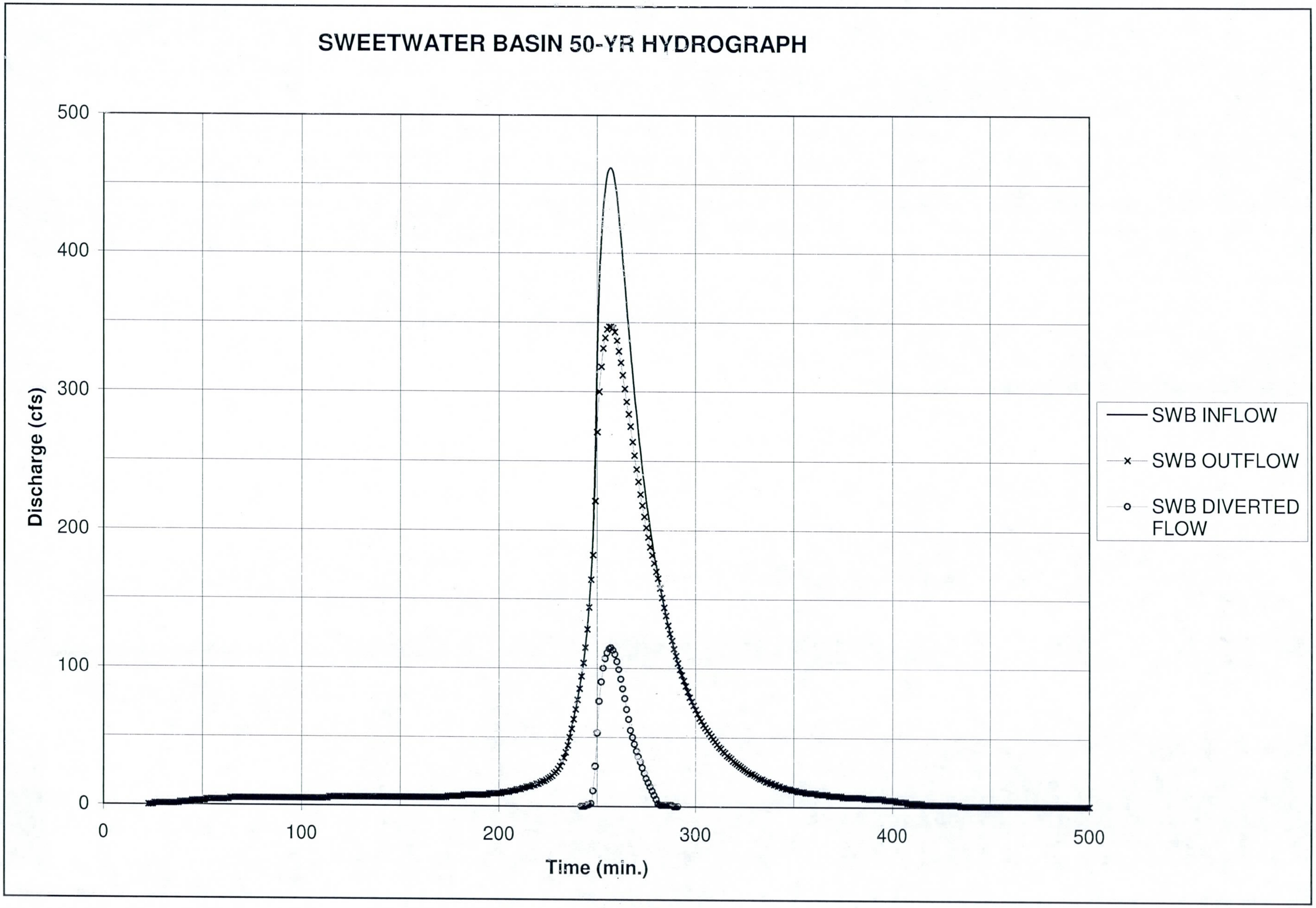
Plan: SWB_TRAPUNST Storage Area: Sweetwater Basin
Stage (ft)
1429
1428
1427
1426
1425
1424
Flow (cfs)
120
100
80
60
40
20
0
-20
-40
0800
0900
1000
1100
1200
1300
1400
1500
27Apr2011
Time
Legend
Stage
Net Inflow



Stage-Storage Graph for Sweetwater Basin

Appendix C

HEC-1 Inflow, Outflow and Diverted Flow Hydrographs



SWEETWATER BASIN 50-YR HYDROGRAPH
500
400
300
200
100
0
Discharge (cfs)
0
100
200
300
400
500
Time (min.)
SWB INFLOW
SWB OUTFLOW
SWB DIVERTED FLOW

UPPER CAMELBACK WASH

100% DESIGN

DIVERSION STRUCTURE DESIGN FOR LARKSPUR DETENTION BASIN

Prepared for

City of Scottsdale (COS)

&

Flood Control District of Maricopa County (FCDMC)

Prepared by

PRIMATECH
ENGINEERS & CONSULTANTS

4640 E. McDowell Road, Suite 100
Phoenix, AZ 85008

March 7, 2012

1. INTRODUCTION

This supplement is to document the approaches followed by Primatech to design a functioning diversion structure for Larkspur Detention Basin. Figure 1 shows a schematic of the basin and diversion structure. There are two main flows which will be routed to Larkspur Detention Basin as follows:

(1) Flow diverted from the Tributary 1 channel through a lateral weir installed on the left side bank of the channel which discharges to a Concrete Box Culvert[1] (CBC) running under Larkspur drive and outlet at the basin north side,

(2) Flow running along Larkspur Dr. and coming from the east that is not captured by the existing 66" storm drain system. This flow will be captured by a proposed trench drain with apron[1] connected to a 36" pipe that drain into the Basin

Based on the HEC-1 model for the 100-year storm completed by Primatech in 2012, and as shown in the Routings Map in Figure 2, an inflow hydrograph with a peak flow of 302 cfs is introduced into the "Tributary 1" channel at the upstream Node 272525; this hydrograph is routed south along Route 272530 and combine with flows from the surrounding subbasins, and then diverted to the basin through the lateral weir and the concrete box culvert.

On the other hand, a hydrograph with peak flow of 248 cfs (HEC-1 Node 273080) would be flowing west along Larkspur Drive towards Combination Node 272550. Based on the computed capacity of the existing 66" storm drain system along Larkspur Drive, as shown in Appendix D, about 180 cfs out of the 248 will be intercepted by the storm drain system, leaving a hydrograph with peak flow of 68 cfs to be collected by the proposed trench drain (grate) with apron and diverted to Larkspur Basin.

Since the main purpose of the HEC-RAS unsteady flow model is to check the storage routing and capacity of Larkspur basin and its diversion structure including the box culvert, the model was simplified by assuming that all flows diverted to the basin are to be combined first and then diverted to Larkspur basin. From the results of the HEC-1 model for the 100-year storm, the combined hydrograph at Node 272550 has peak flow of 301 Cfs.

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[1] For a detailed construction drawings, please refer to the 100% submittal plan and profile sheets, by Primatech, 2012.

Figure 3 shows a layout and profile of the proposed diversion structure. Detailed design for the box culvert, the trench drain inlet, and outlet pipe is beyond the scope of this memo and will be performed in a separate analysis.

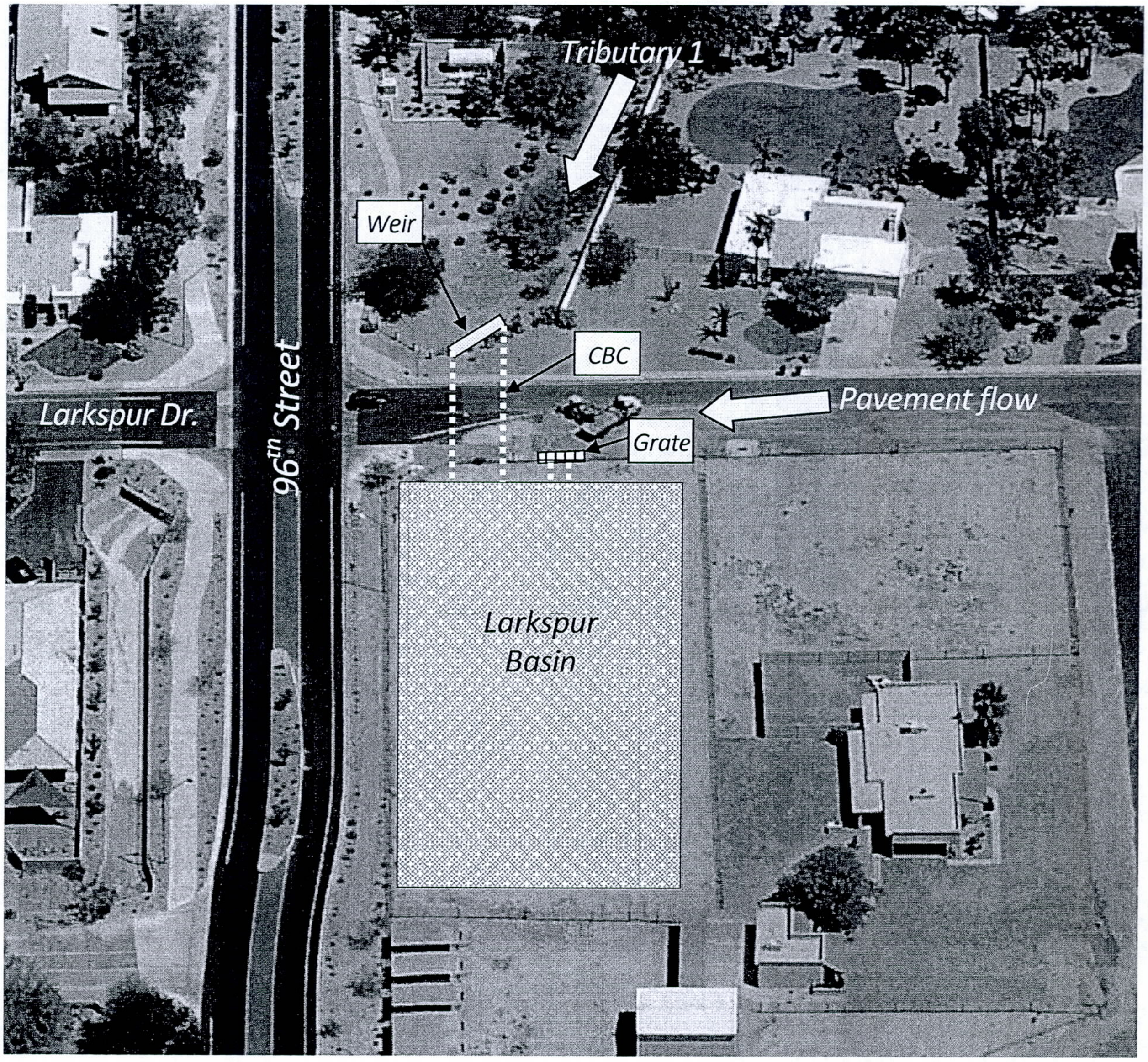


Figure 1: Larkspur Basin Diversion Structure Schematic

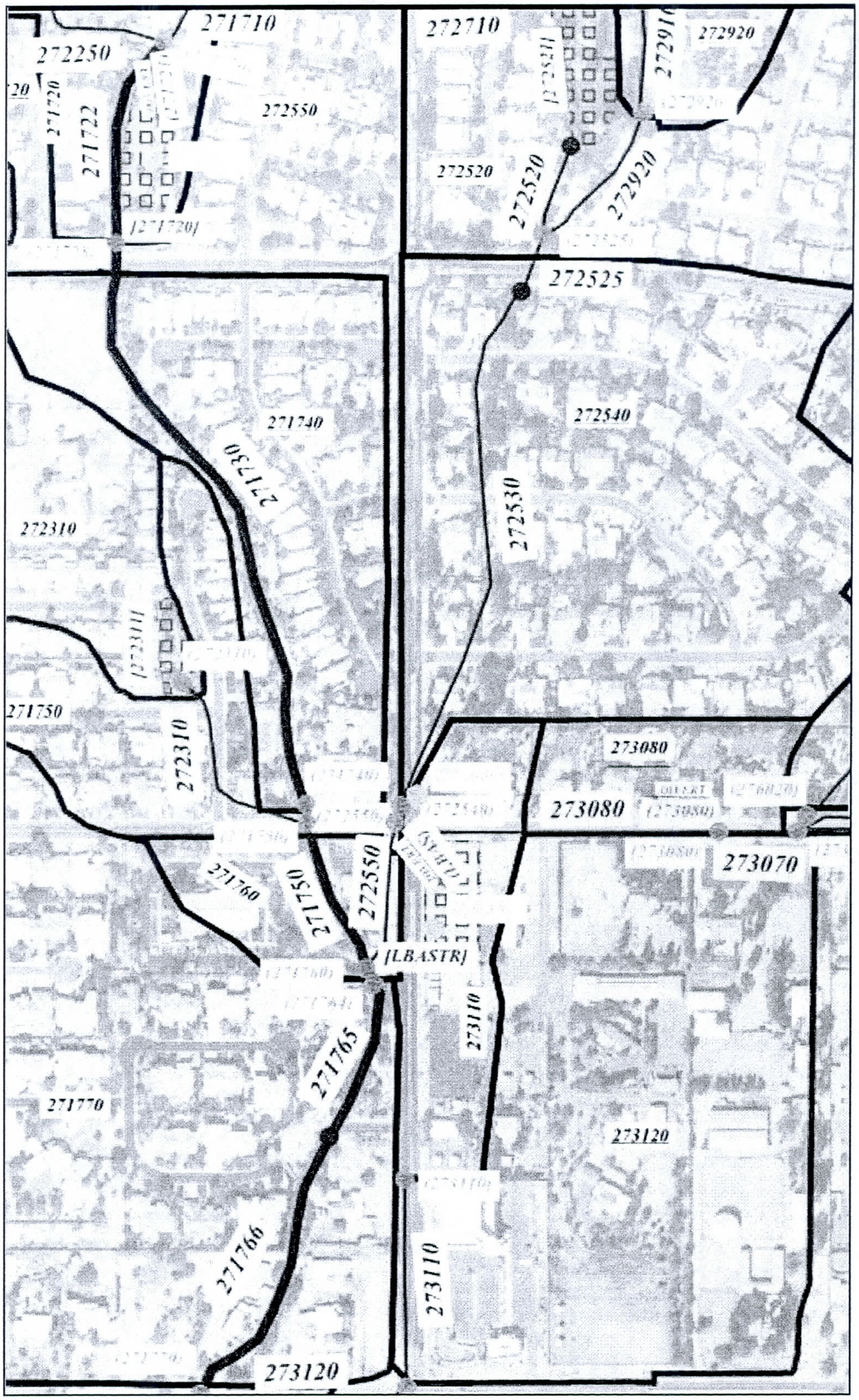


Figure2: HEC-1 Routing Map for Larkspur Dr. Area

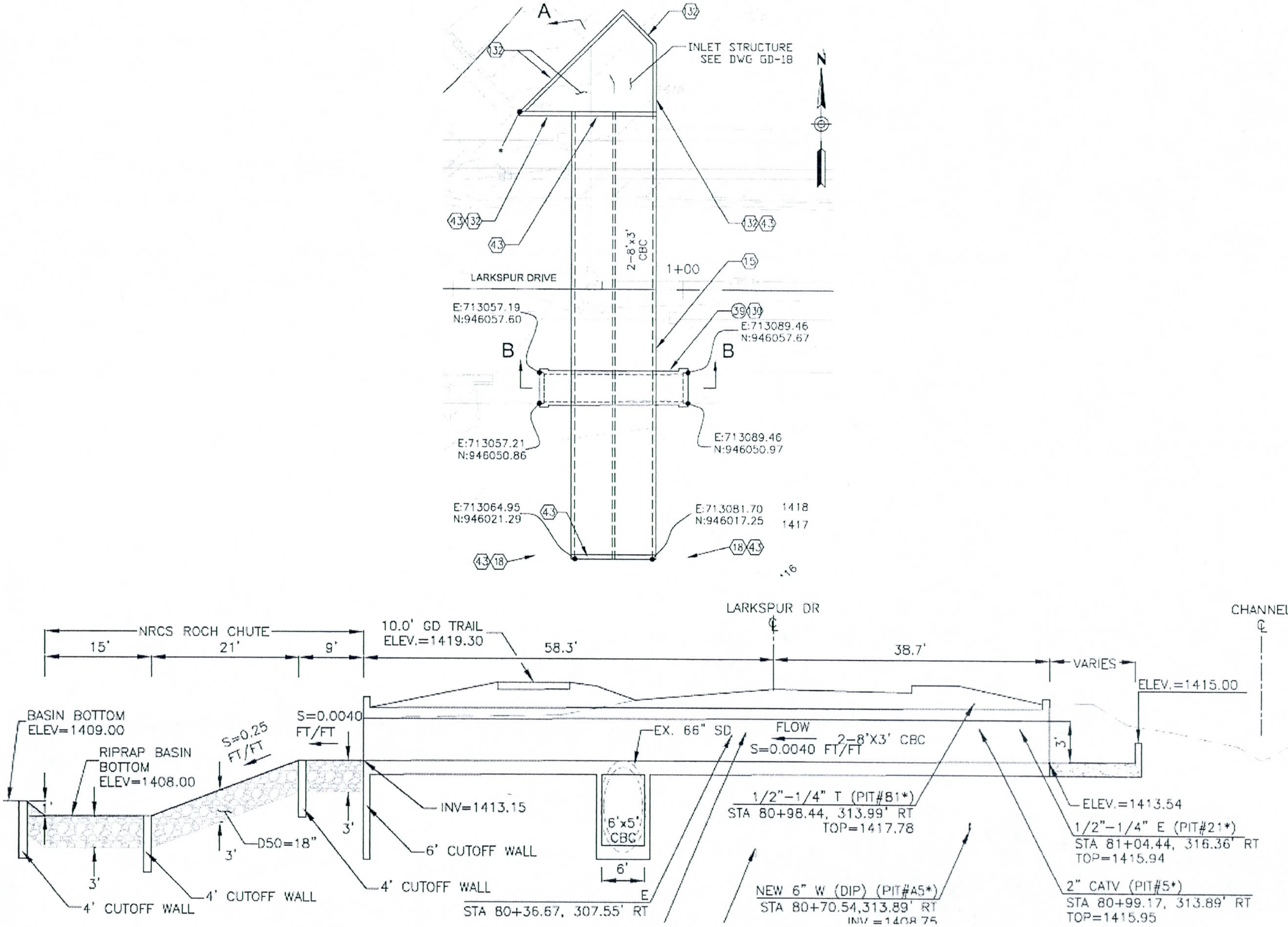


Figure 3: Larkspur Basin Diversion Structure Layout

2. METHODOLOGY

A HEC-RAS model was developed for both Steady and Unsteady flow analyses. This model was developed from Primatech's steady-state proposed condition model for the 100-year storm frequency submitted with the 60% submittal package in November 2010 and has been updated with the 100% Final Design of the UCW project submittal in March 2012. The model has two "HEC-RAS Plans", namely, ***Larkspur Steady Flow Model*** and ***Larkspur Unsteady Flow Model*** for the steady and unsteady flow analysis respectively. The model was created using HEC-RAS ver. 4.1.0 and was run in the mixed flow regime for both plans.

To simplify the model, the study reach was shortened to contain only the section of the "Tributary 1" channel with the lateral weir, Larkspur Basin, Larkspur crossing culvert, and a channel segment downstream of the culvert that is long enough for the setup of the downstream boundary conditions. This section of Tributary 1 reach ranged from RS 1984.609 to RS 182.0. Additionally the Concrete Box Culvert (2-8'x3') that conveys the flow from the Tributary side weir to the Basin was modeled as a rectangular channel cross section with lid. At the end of this culvert an inline weir was installed at the same elevation as the CBC outlet invert for stability purpose of the unsteady flow model.

2.1 Steady Flow Analysis

In the steady flow plan, the flow data included several profiles with different flow rates in the range from 20 to 400 cfs as shown in Figure 4. The "Flow Optimization" option in HEC-RAS was used so that HEC-RAS would run the Split Flow Optimization Engine and perform multiple iterations until the energy elevations or discharge values were balanced and the proper split ratio was obtained.

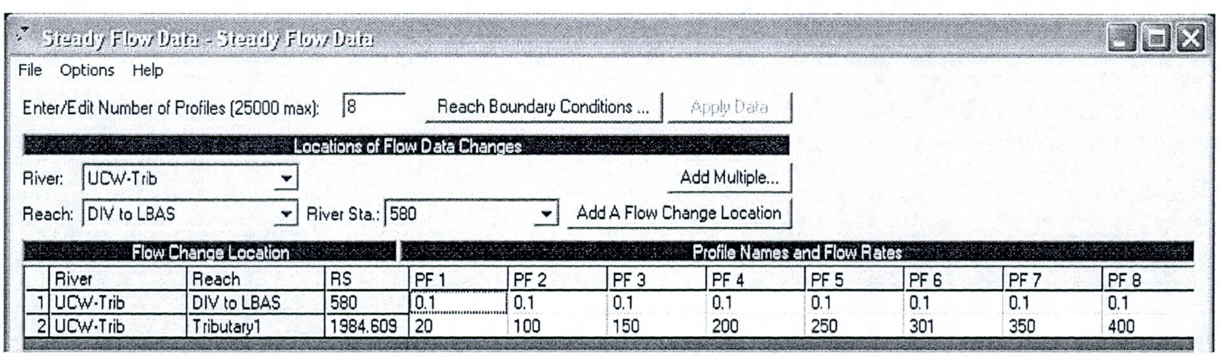


Figure 4: Steady State Model Multiple Flow Profiles

The flow rates at the upstream and downstream sections of the lateral weir and flow rate leaving the channel (over the weir) from the HEC-RAS model results were documented for each profile.

A diversion rating curve between the total incoming flows and leaving flows was then established. This rating curve was entered into the HEC-1 Model using the *"DI"* and *"DQ"* records, under CARD ID "KK27255 DIVERT", along with the HEC-1 Reservoir Routing *"RS"* record to produce the final hydrographs. Table 1 shows the results of the diversion split flows of the HEC-RAS model and Figure 5 shows a graphical representation of Table 1.

Table 1: Total and Diverted Flows Obtained from HEC-RAS Steady Flow Model

DI (cfs)	20	100	150	200	250	301	350	400
DQ (cfs)	0	25.2	49.4	74.6	100.2	129.2	156.5	185.5

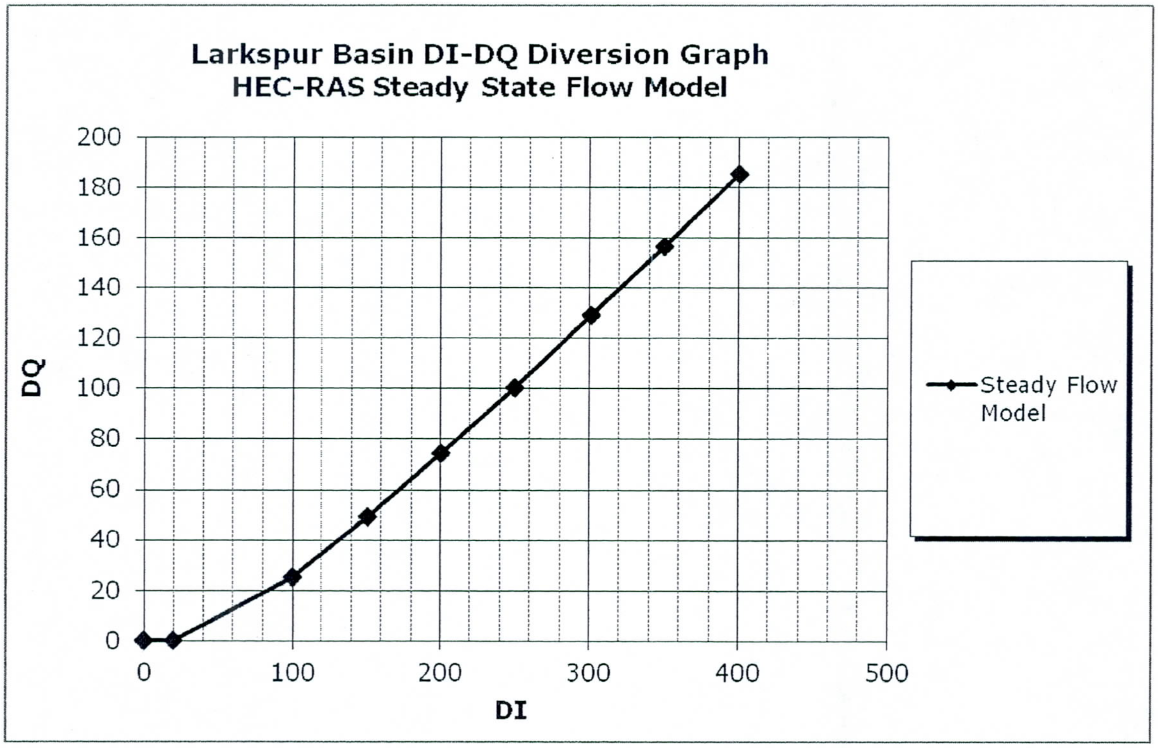


Figure 5: Larkspur Basin Diversion Rating Curve - Steady State Model

The weir design is a rectangular broad-crested weir with a horizontal crest and a length of 30 feet along the channel. The weir elevation was set at 1415.00. Hager's Equation for the lateral weir coefficient (Hager 1987) was used and the value of C = 2.4 was determined by the program at the corresponding 100-year peak flow of about 301 cfs. HEC-RAS water surface profile and weir table are presented in Appendix A.

2.2 Unsteady Flow Analysis

In the unsteady flow plan of the HEC-RAS model, the Boundary Conditions (BC) were set such that the Inflow Hydrograph obtained from the HEC-1 model was introduced at the upstream end of the study reach, while the Normal Depth BC was used for the downstream end of the reach.

Larkspur Basin was modeled as an off-line storage area in HEC-RAS, and the stage-storage relation for the basin was entered in the HEC-RAS Storage Area Editor and the bottom elevation of 1408 was set as an initial boundary condition (i.e. the basin is empty).

Hager's Equation for the lateral weir coefficient (Hager 1987) was used. The iterations converged to a weir coefficient $C = 2.4$ for the peak flow of 301 cfs. The weir configuration was the same as for the steady state model, i.e, a rectangular broad-crested weir with a horizontal crest and a total top width of 30 feet along the channel and the weir crest elevation was set at 1415.00. The configuration and hydraulic parameters of the proposed weir, HEC-RAS output profile and tables, and Larkspur Detention Basin flow and stage hydrographs are presented in Appendix B.

2.2.1 Model Stability

The model represents a natural channel reach (Tributary 1) with irregular cross sections and has insufficient capacity at some locations, as well as a mixed flow regime (sub-critical and supercritical flows) due to the sudden change in slopes. Initially, there were some difficulties in converging to a solution. The following measures were taken to resolve the possible causes of the model's instabilities:

- The computational interval was selected such that it is equal to or less than $T_{peak}/20$, where T_{peak} is the time to the peak of the inflow hydrograph. After several iterations, 10 seconds was found to be the optimal value for the computational interval.
- Cross sections were interpolated at a span of 15 feet between successive cross sections.
- The very small flow values at the beginning of the inflow hydrograph (< 5 CFS) create instabilities in the model. Consequently, flow values less than 5 CFS were trimmed out of the hydrograph by setting up a min flow rate limit.

- A Hydrograph with ordinates equal to 1 (instead of zeros) cfs was entered as a boundary condition for "DIVtoLBAS" Reach to stabilize the model.
- To accommodate for the attenuation of the peak flow of the "Tributary 1" hydrograph, a multiplier factor of 1.07 was established to bring the peak flow upstream of the lateral weir to 301 Cfs (as per HEC-1 model)

After the incorporation of the necessary modifications listed above, the model ran smoothly without the need to a *Restart File* and without errors or warnings with the exception of three cross sections that have reached maximum iterations of 20, however it was converged within an acceptable error tolerance of 0.032' or less in the water surface elevation and the warning was ignored.

The flow rates at the upstream and downstream sections of the lateral weir and the flow rate leaving the channel (over the weir) shown in the HEC-RAS model results were documented for each profile.

A diversion rating curve showing the relationship between the total incoming flows and leaving flows was then established. This rating curve was entered into HEC-1 Model using the "*DI*" and "*DQ*" records, under CARD ID "KK27255 DIVERT", along with the HEC-1 Reservoir Routing "*RS*" records to produce the final hydrographs as shown in Appendix C.

Table 2 shows the results of the diversion split flows from the HEC-RAS model. Figure 6 shows a graphical representation of Table 2. Furthermore, the Steady state model diversion rating curve obtained earlier was added to Figure 6 for comparison.

Table 2 Total and Diverted Flows Obtained from the HEC-RAS Unsteady Flow Model

DI (cfs)	0	35.3	89.7	170.2	251.4	281.5	301.8	290.3	267.4
DQ (cfs)	0	0	18.6	55.3	94.5	108.1	120.4	115.3	104.8
DI (cfs)	247.8	224.2	197.7	179.2	142.2	112.6	87.3	66.7	35.0
DQ (cfs)	95.6	85.3	70.9	61.9	44.5	30.8	19.2	10.4	0

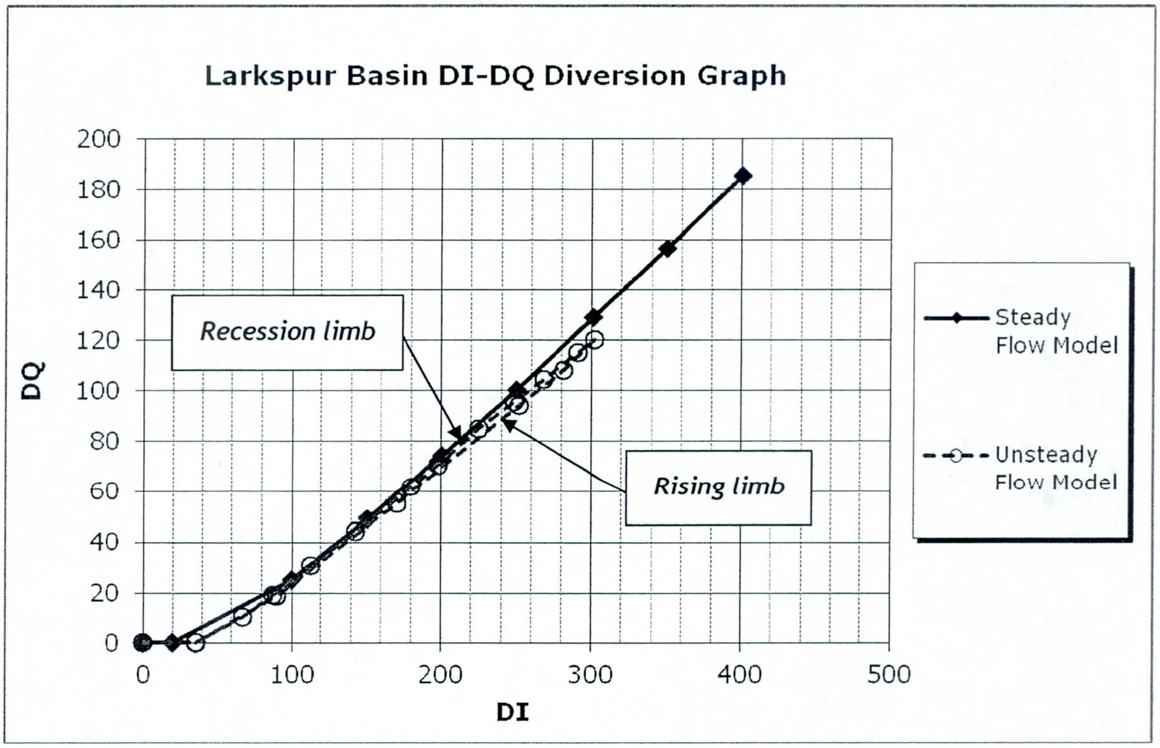


Figure 6: Larkspur Basin Diversion Rating Curve - Steady vs. Unsteady Models

3. SUMMARY AND CONCLUSION

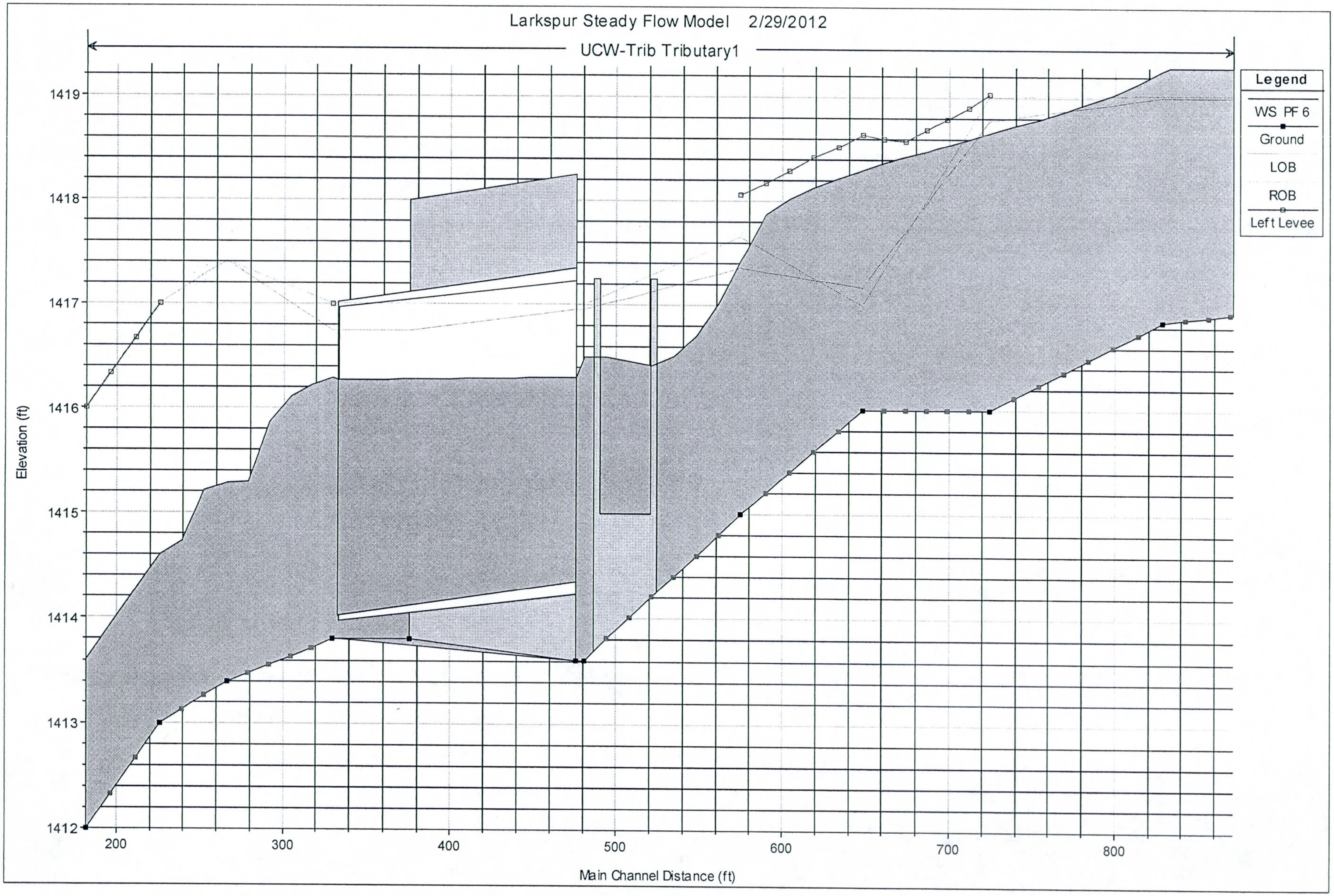
A HEC-RAS model was developed for both Steady and Unsteady flow analysis. Larkspur basin was modeled as an offline storage area while the diversion structure was modeled as a lateral weir in HEC-RAS. The Concrete Box Culvert CBC that conveys the flow from the Tributary lateral weir to the Basin was modeled as a rectangular channel cross section with lid. The model was run in the mixed flow regime for both steady and unsteady analyses.

Figure 6 shows a comparison between the results obtained from the model for both steady and unsteady flow plans for the diversion rating curve of the lateral weir. It can be seen that, the DI-DQ relationship can be fairly represented by a linear trend. Also the figure shows that, very close results for the DI-DQ were obtained from the steady and unsteady models.

The diversion rating curves DI-DQ that resulted from both steady and unsteady HEC-RAS models were entered back in HEC-1 model to produce the diverted and the remaining–in-channel hydrographs. The diverted hydrograph, resulted from the unsteady flow model, with a peak flow of 121 cfs was established as the final diversion for Larkspur Basin, as shown in Appendix C.

Appendix A

HEC-RAS Steady State Model Output



Larkspur Steady Flow Model 2/29/2012
UCW-Trib Tributary1
Legend
WS PF 6
Ground
LOB
ROB
Left Levee
Elevation (ft)
1419
1418
1417
1416
1415
1414
1413
1412
200
300
400
500
600
700
800
Main Channel Distance (ft)

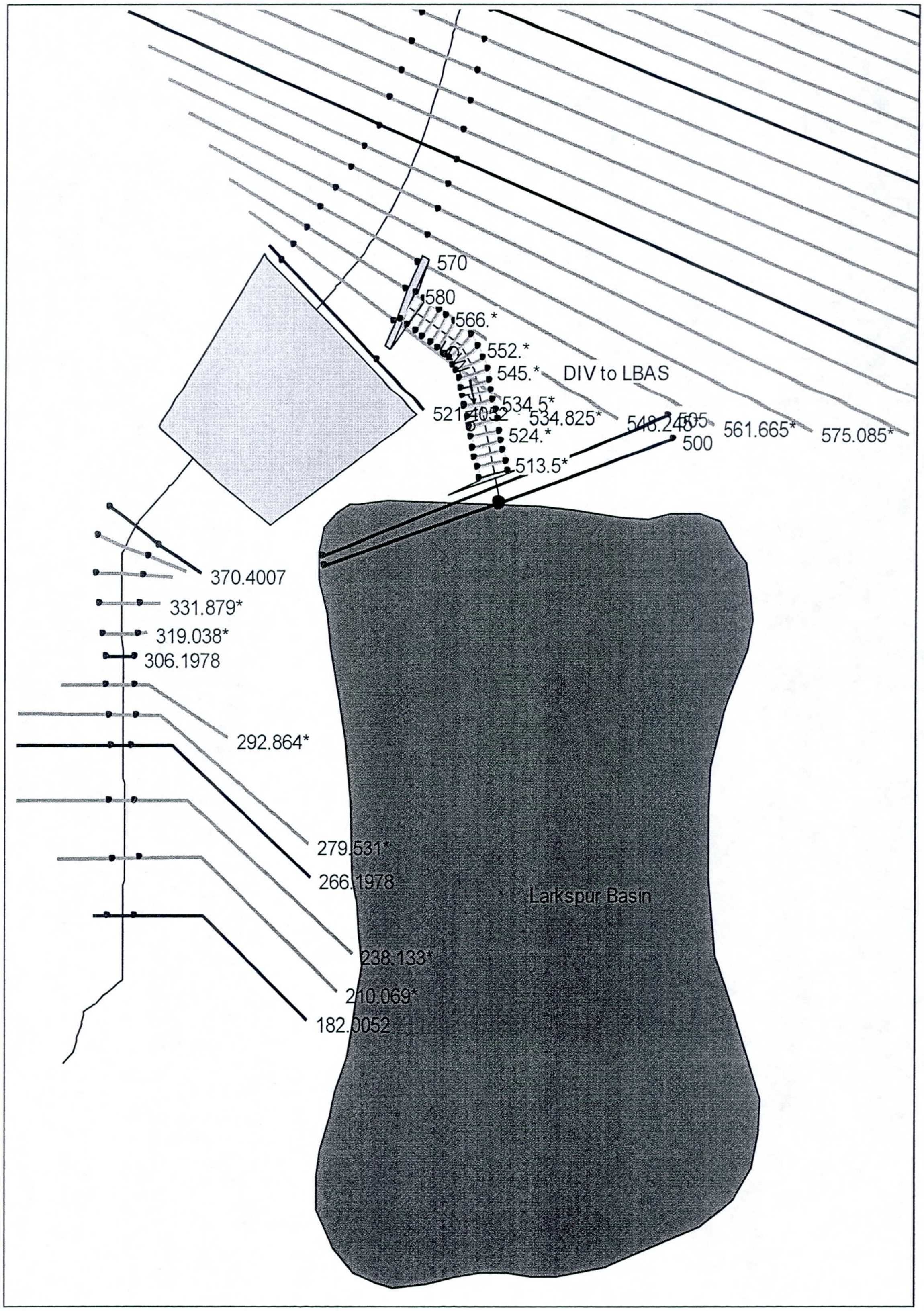
Lateral Weir HEC-RAS Table- Steady State Model

River Sta	Profile	Q US (cfs)	Q Leaving Total (cfs)	Q DS (cfs)	Q Weir (cfs)	Weir Top Width (ft)	Weir Max Depth (ft)	Weir Avg Depth (ft)	Min El Weir Flow (ft)	E.G. US. (ft)	W.S. US. (ft)	E.G. DS (ft)	W.S. DS (ft)
570	PF 1	20.00	0.00	20.00	0.00				1415.00	1414.88	1414.81	1414.74	1414.74
570	PF 2	100.00	25.23	74.77	25.23	30	0.51	0.51	1415.00	1415.72	1415.54	1415.53	1415.51
570	PF 3	150.00	49.42	100.49	49.42	30	0.80	0.79	1415.00	1416.04	1415.81	1415.83	1415.80
570	PF 4	200.00	74.64	124.74	74.64	30	1.05	1.03	1415.00	1416.32	1416.03	1416.08	1416.05
570	PF 5	250.00	100.20	147.81	100.20	30	1.27	1.25	1415.00	1416.56	1416.23	1416.31	1416.27
570	PF 6*	301.00	129.24	172.45	129.24	30	1.50	1.47	1415.00	1416.79	1416.44	1416.54	1416.50
570	PF 7	350.00	156.47	194.77	156.47	30	1.70	1.66	1415.00	1417.00	1416.62	1416.74	1416.70
570	PF 8	400.00	185.54	217.46	185.54	30	1.89	1.85	1415.00	1417.19	1416.80	1416.93	1416.89

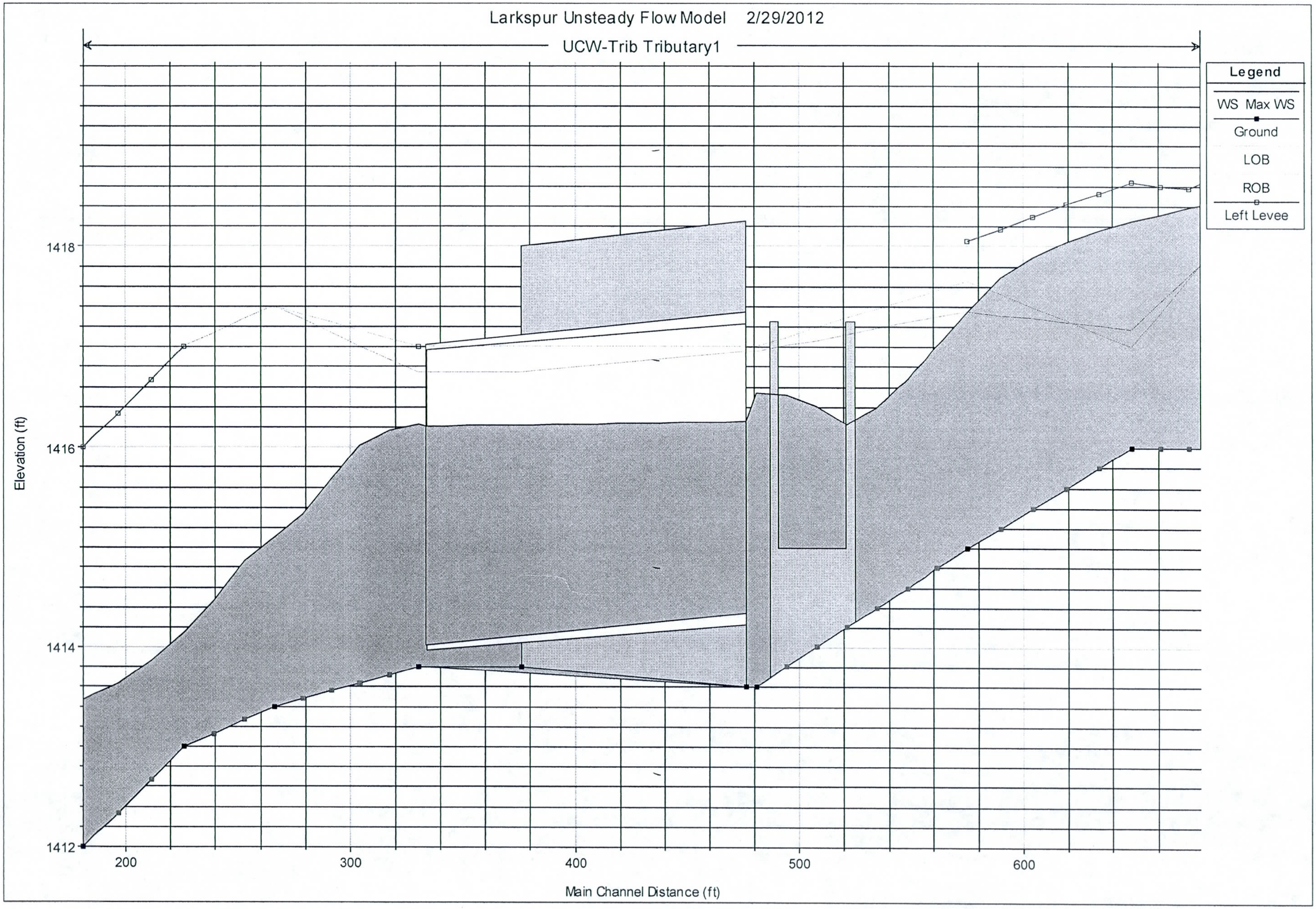
* *100-year peak flow*

Appendix B

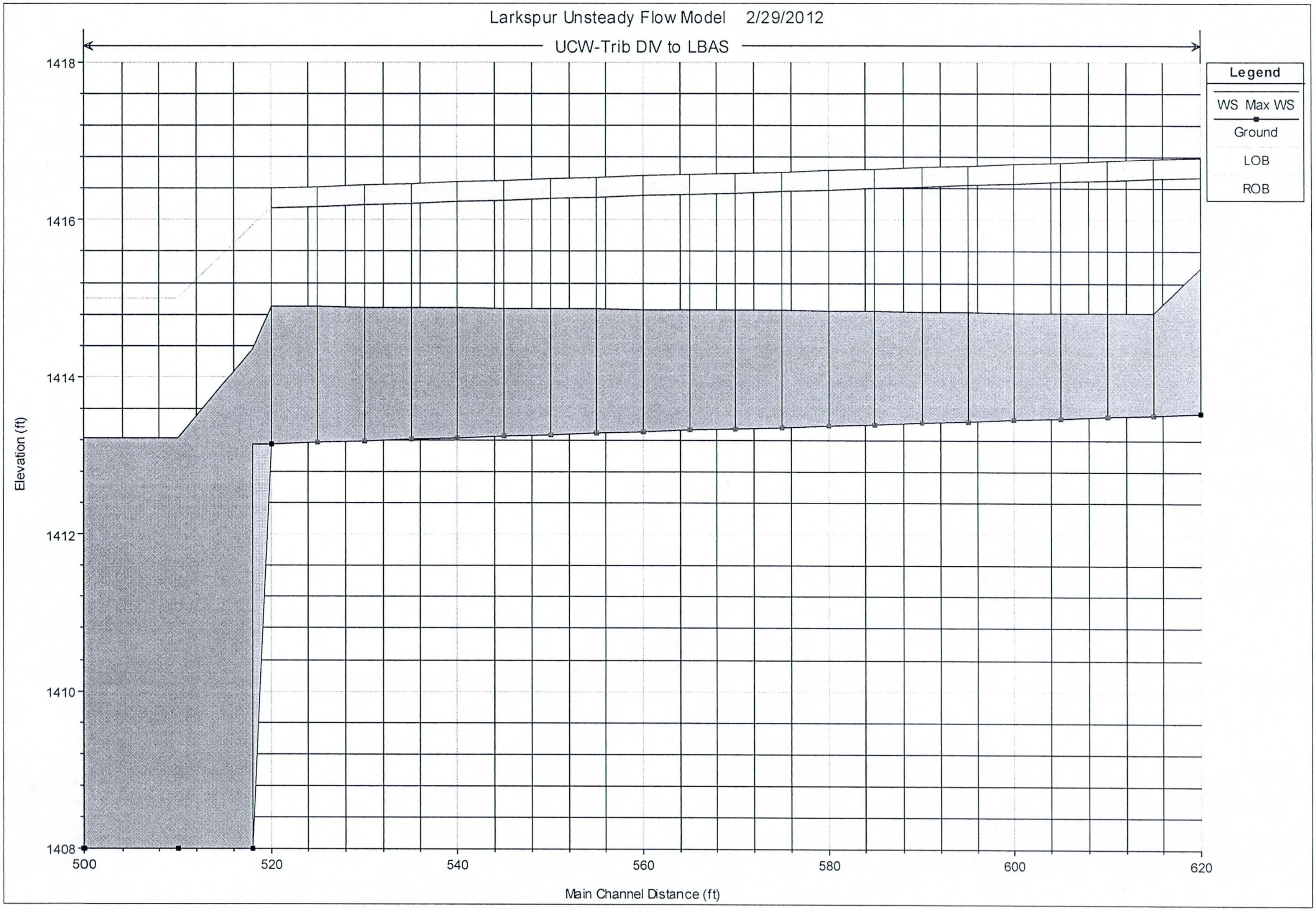
HEC-RAS Unsteady State Model Output



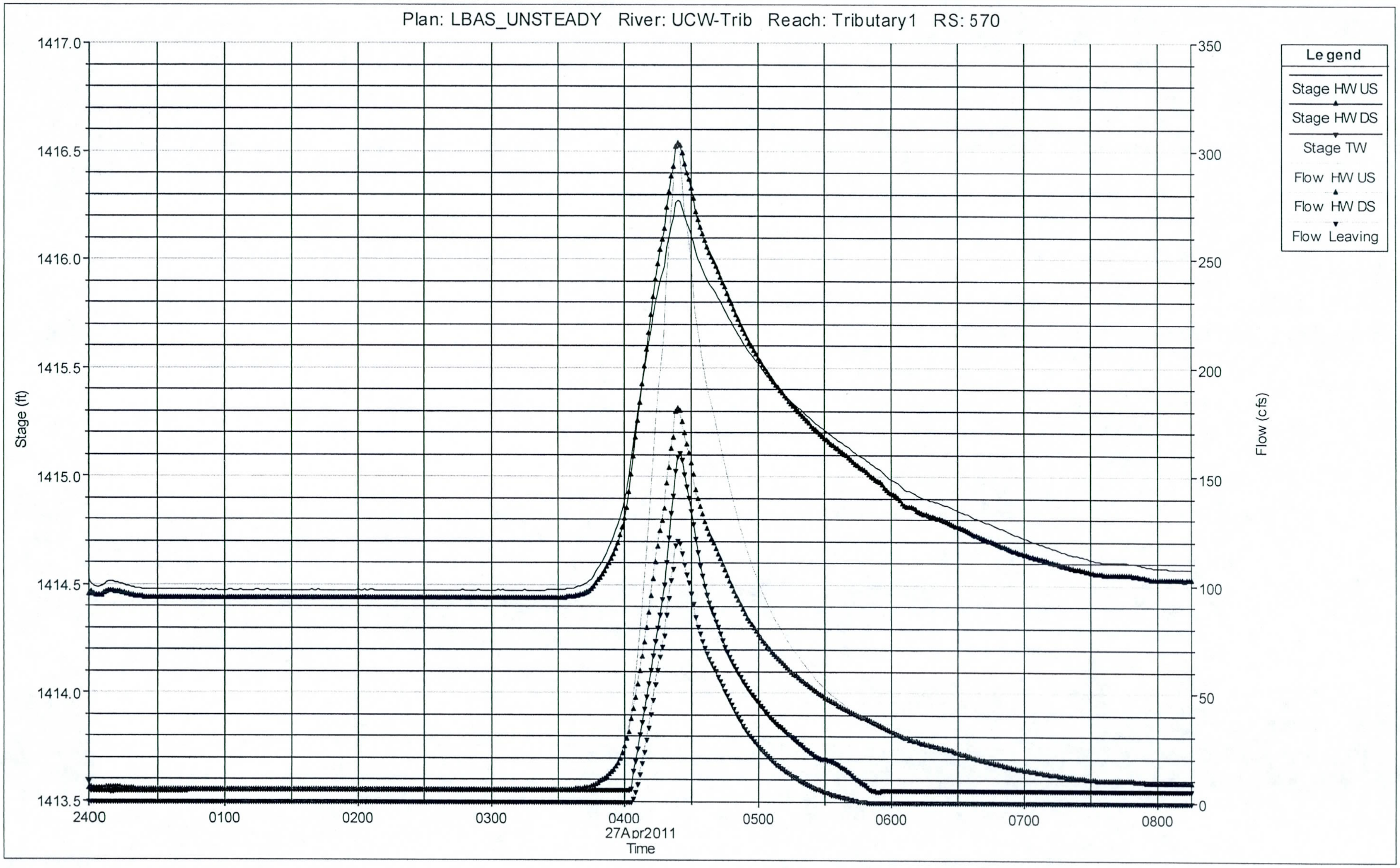
Larkspur Basin HEC-RAS Layout



Larkspur Unsteady Flow Model 2/29/2012
UCW-Trib Tributary1
Legend
WS Max WS
Ground
LOB
ROB
Left Levee
Elevation (ft)
1412
1414
1416
1418
200
300
400
500
600
Main Channel Distance (ft)

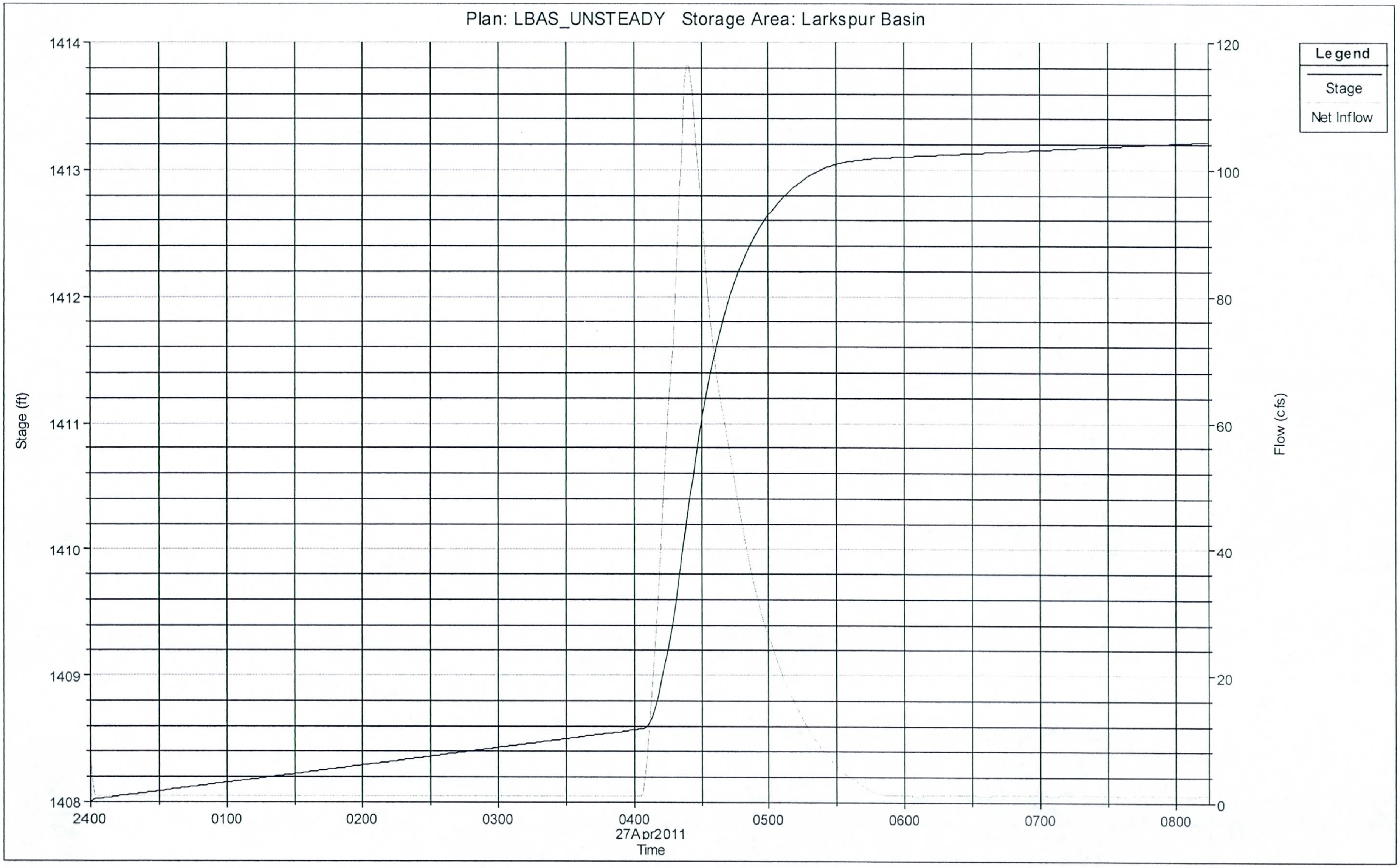

Larkspur Unsteady Flow Model 2/29/2012
UCW-Trib DIV to LBAS
Legend
WS Max WS
Ground
LOB
ROB
Elevation (ft)
1418
1416
1414
1412
1410
1408
500
520
540
560
580
600
620
Main Channel Distance (ft)

Lateral Weir Stage and Flow Hydrographs

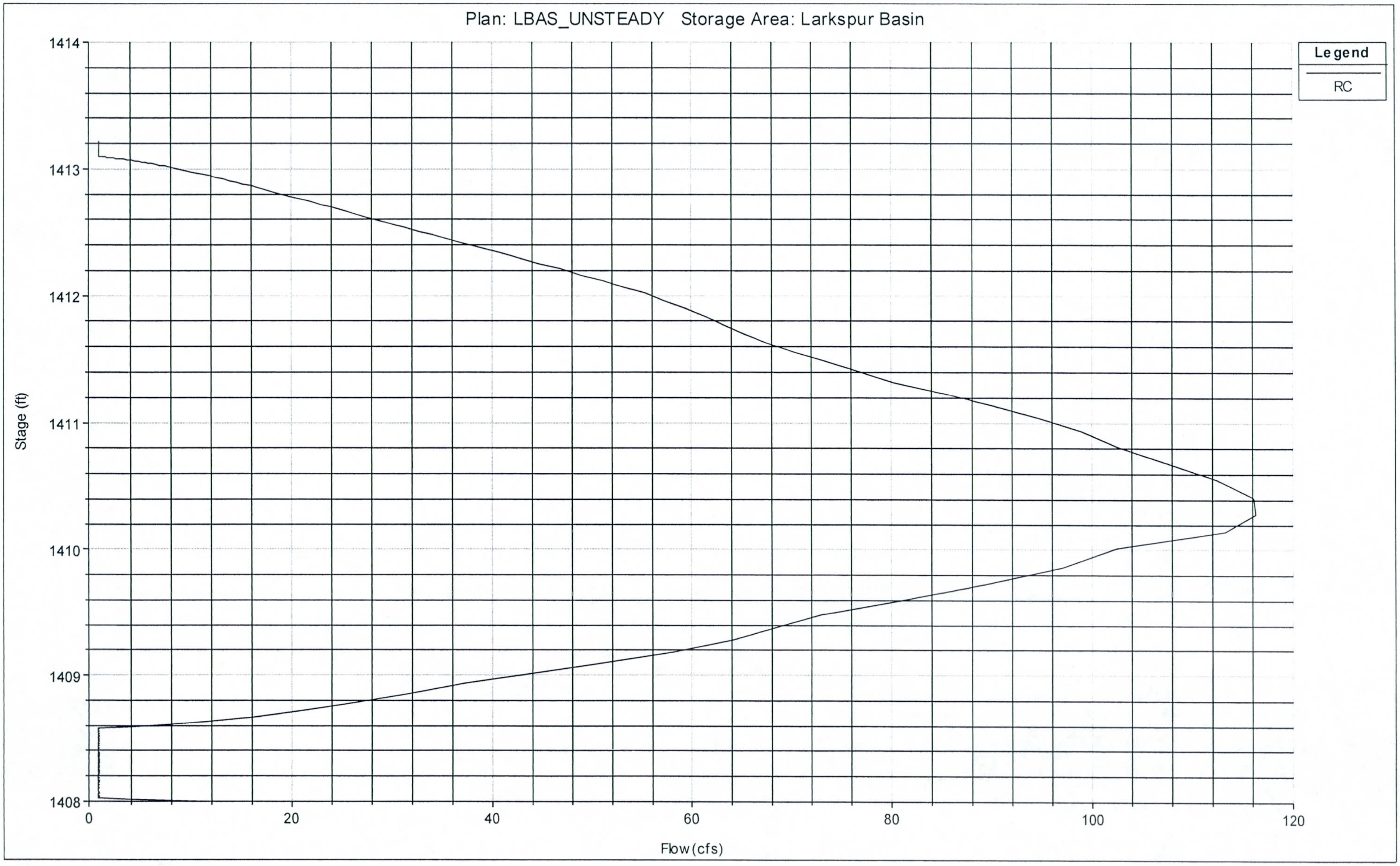


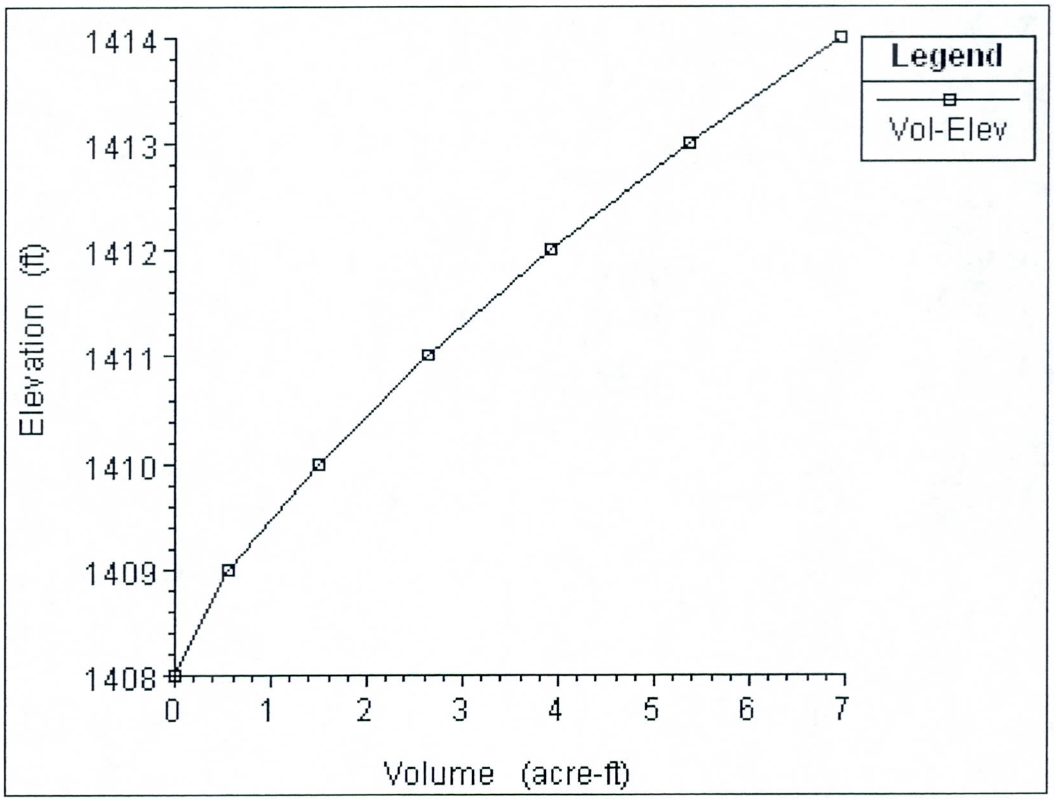
Lateral Weir HEC-RAS Table- Unsteady State Model

River Sta	Profile	Q US	Q Leaving Total	Q DS	Q Weir	Weir Top Width	Weir Max Depth	Weir Avg Depth	Min El Weir Flow	E.G. US.	W.S. US.	E.G. DS	W.S. DS
		(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
570	Max WS	301.80	120.49	181.10	120.49	30	1.53	1.41	1415.0	1416.72	1416.27	1416.58	1416.53
570	27APR2011 0404	48.23	2.23	42.99	2.23	30	0.13	0.11	1415.0	1415.27	1415.16	1415.12	1415.10
570	27APR2011 0408	89.68	18.55	67.88	18.55	30	0.43	0.42	1415.0	1415.62	1415.43	1415.46	1415.43
570	27APR2011 0412	141.16	41.58	95.86	41.58	30	0.75	0.71	1415.0	1415.95	1415.68	1415.78	1415.75
570	27APR2011 0416	194.41	67.31	124.87	67.31	30	1.04	0.97	1415.0	1416.23	1415.90	1416.08	1416.04
570	27APR2011 0420	251.43	94.48	154.23	94.48	30	1.30	1.21	1415.0	1416.50	1416.10	1416.35	1416.31
570	27APR2011 0424	301.80	120.43	181.07	120.43	30	1.53	1.41	1415.0	1416.72	1416.27	1416.58	1416.53
570	27APR2011 0428	267.41	104.77	164.19	104.77	30	1.39	1.29	1415.0	1416.58	1416.17	1416.44	1416.40
570	27APR2011 0432	224.17	85.26	142.89	85.26	30	1.21	1.13	1415.0	1416.39	1416.03	1416.25	1416.22
570	27APR2011 0436	197.68	70.90	128.25	70.90	30	1.07	1.00	1415.0	1416.26	1415.93	1416.11	1416.08
570	27APR2011 0440	179.15	61.90	118.28	61.90	30	0.98	0.92	1415.0	1416.16	1415.85	1416.02	1415.98



Plan: LBAS_UNSTEADY Storage Area: Larkspur Basin
Legend
Stage
Net Inflow
Stage (ft)
Flow (cfs)
1414
1413
1412
1411
1410
1409
1408
120
100
80
60
40
20
0
2400
0100
0200
0300
0400
27Apr2011
0500
0600
0700
0800
Time


Plan: LBAS_UNSTEADY Storage Area: Larkspur Basin
Legend
RC
Stage (ft)
1408
1409
1410
1411
1412
1413
1414
Flow (cfs)
0
20
40
60
80
100
120

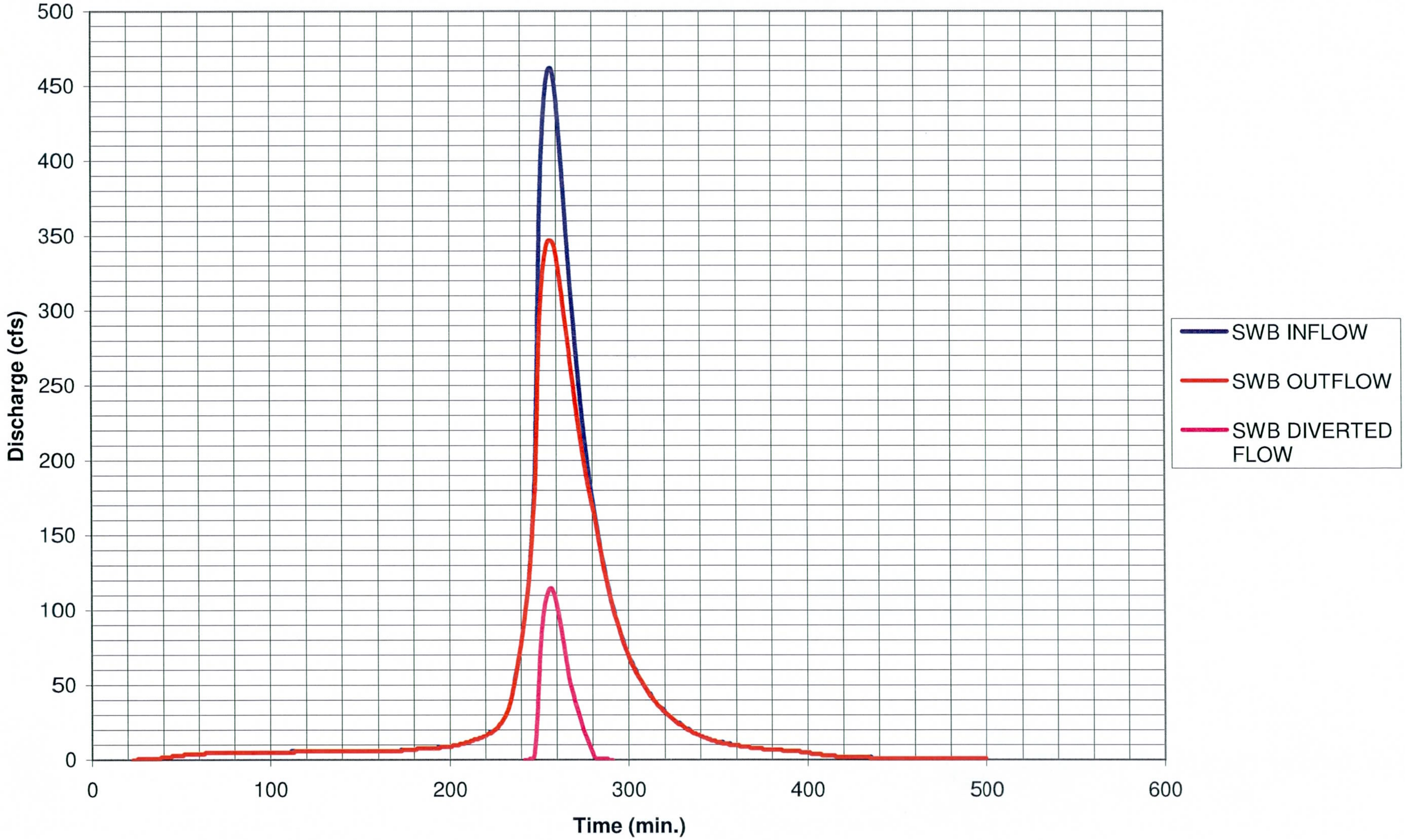


Stage-Storage Graph for Larkspur Basin

Appendix C

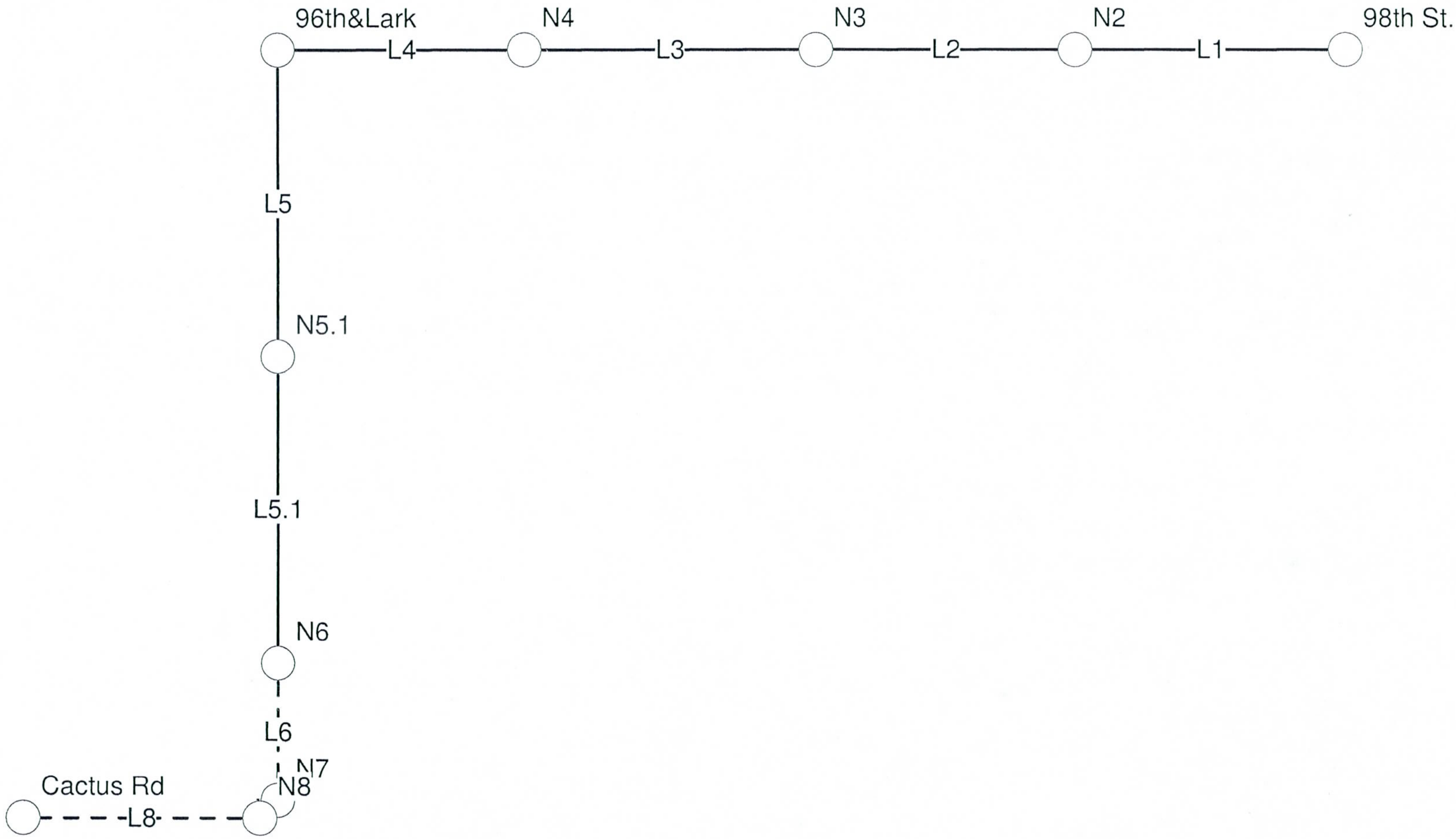
HEC-1 Inflow, Outflow and Diverted Flow Hydrographs

SWEETWATER BASIN 50-YR HYDROGRAPH

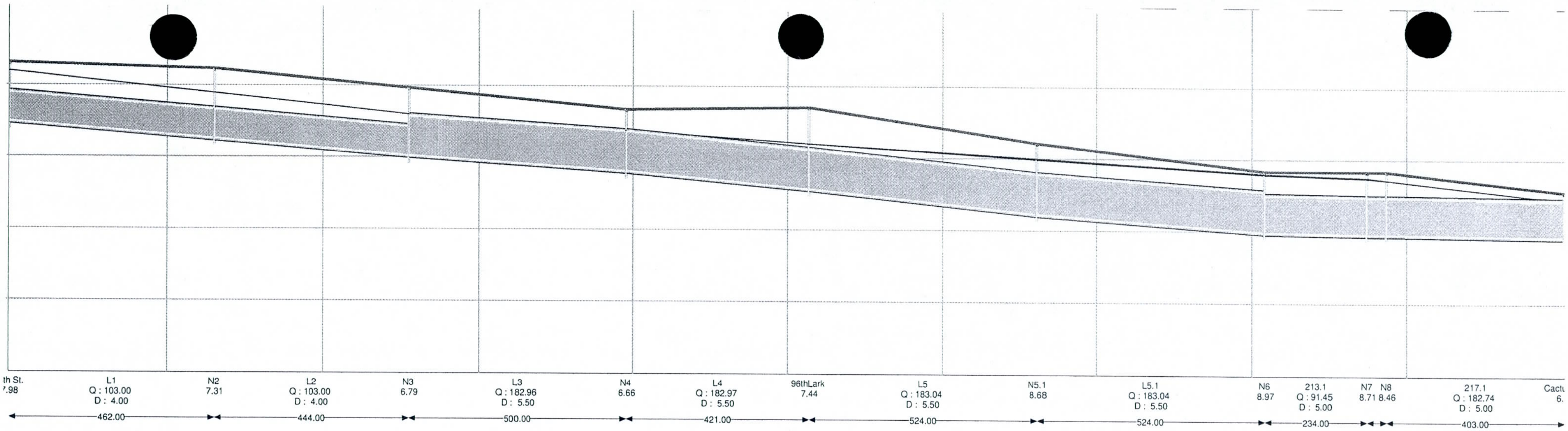


Appendix D

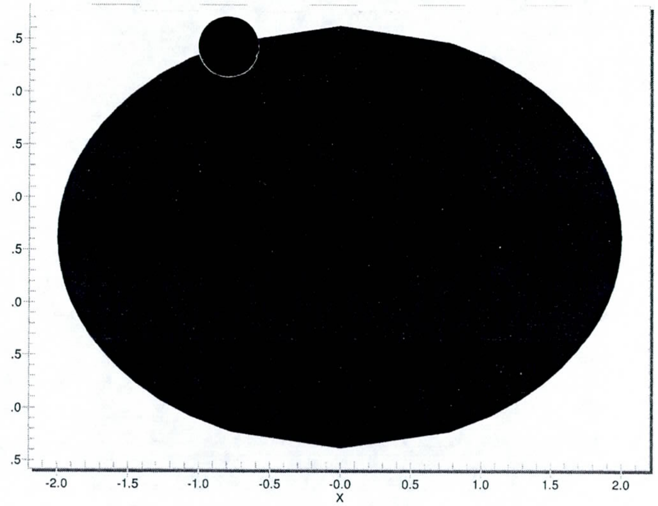
Larkspur Dr. 66" Stormdrain Analysis

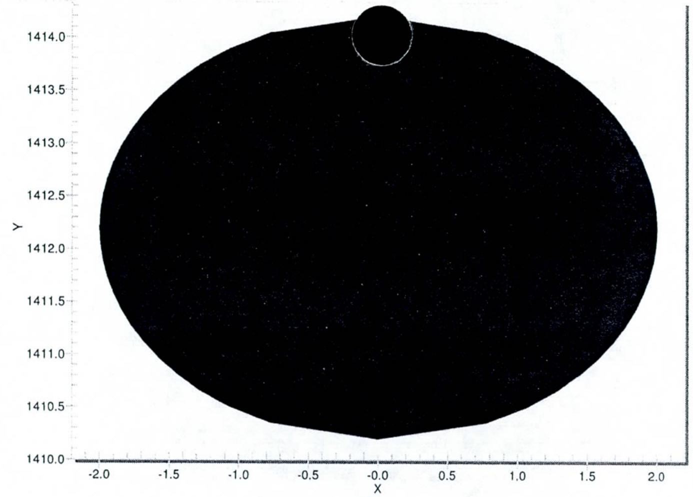


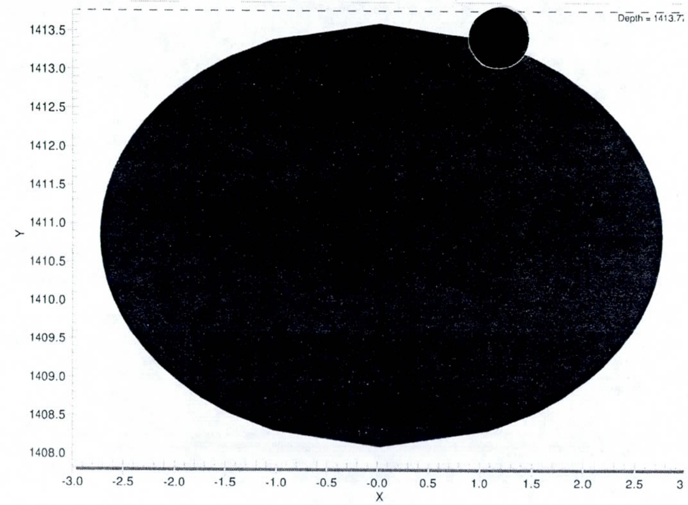
SWMM Version 9.14 Copyright (c) XP Software	**SCT048 UCW Larkspur Dr Ex. 48-66-60 SD** Licenced To: Primatech [42-910-0945]	12/01/09 Page 1/1



th St.
7.98
L1
Q : 103.00
D : 4.00
N2
7.31
L2
Q : 103.00
D : 4.00
N3
6.79
L3
Q : 182.96
D : 5.50
N4
6.66
L4
Q : 182.97
D : 5.50
96thLark
7.44
L5
Q : 183.04
D : 5.50
N5.1
8.68
L5.1
Q : 183.04
D : 5.50
N6
8.97
213.1
Q : 91.45
D : 5.00
N7
8.71
N8
8.46
217.1
Q : 182.74
D : 5.00
Cactu
6.
462.00
444.00
500.00
421.00
524.00
524.00
234.00
403.00



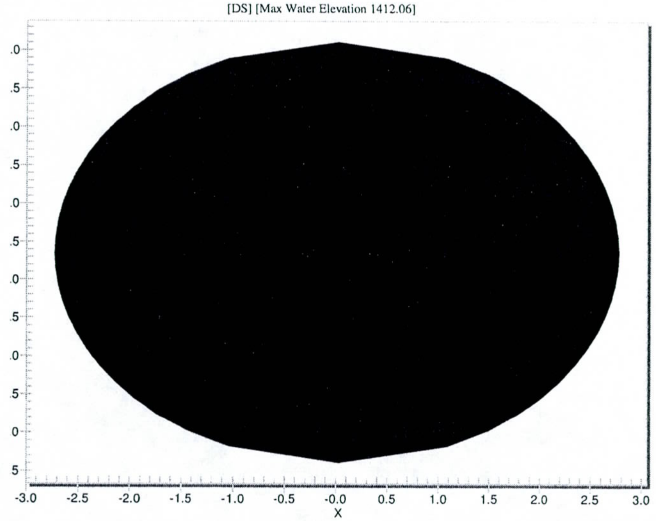


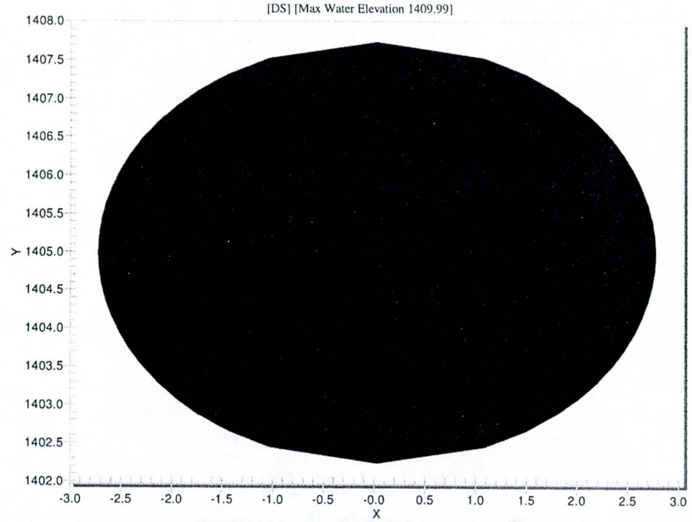


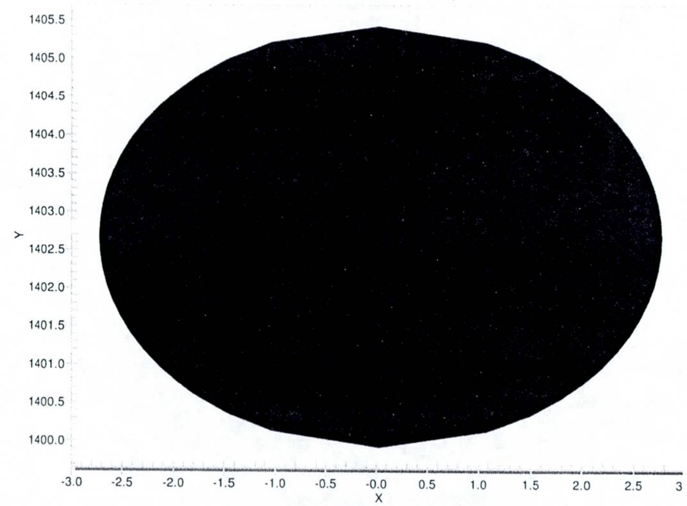
L4
[DS] [Max Water Elevation 1412.06]

L5
[DS] [Max Water Elevation 1409.99]

L5.1
[DS] [Max Water Elevation 1407.99]



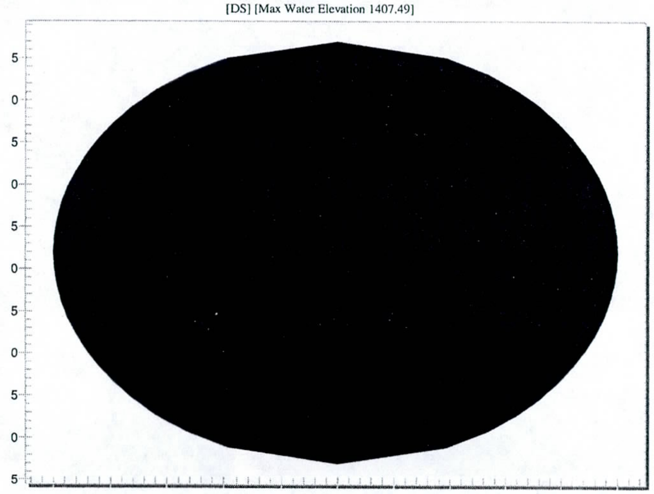


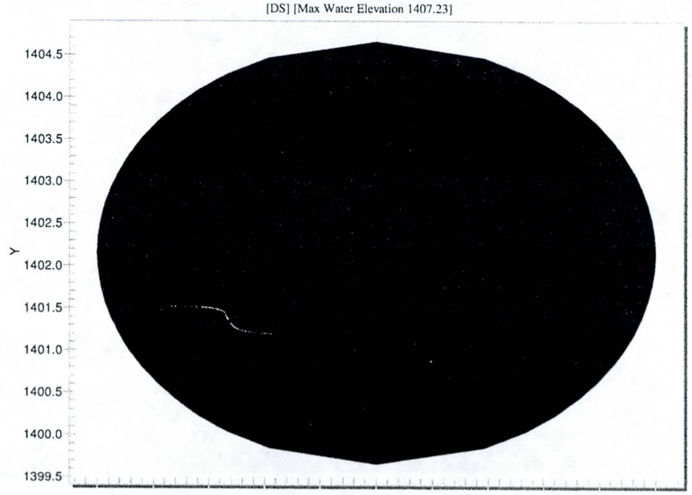


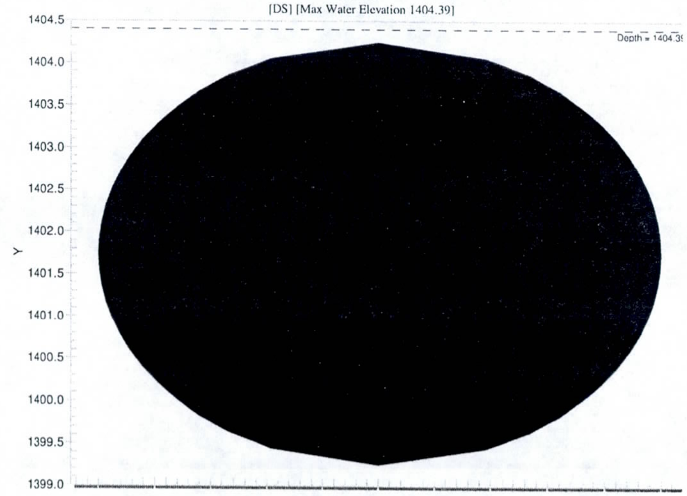
213.1
[DS] [Max Water Elevation 1407.49]

215.1
[DS] [Max Water Elevation 1407.23]

217.1
[DS] [Max Water Elevation 1404.39]







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Current Directory:   C:\XPS\XP-SWMM
Engine Name: C:\XPS\XP-SWMM\swmmengw.exe
Read      0 line(s) and found    0 items(s) from your cfg file.
Input File : C:\SCT048 Larkspur SD\SCT048_Larkspur.XP
         *================================================*
         |                    XP-SWMM                     |
         |      Storm and Wastewater Management Model     |
         |                  Version 9.24                  |
         |================================================|
         |                  Developed by                  |
         |================================================|
         |                                                |
         |                                                |
         |                  XP Software                   |
         |                                                |
         |                                                |
         |              Based on the U.S. EPA             |
         |    Storm Water Management Model Version 4.30   |
         |                                                |
         |            Originally Developed by             |
         |              Metcalf & Eddy, Inc.              |
         |             University of Florida              |
         |           Camp Dresser & McKee Inc.            |
         |                September 1970                  |
         |                                                |
         |            EPA-SWMM is maintained by           |
         |            Oregon State University             |
         |            Camp Dresser & McKee Inc.           |
         |================================================|
         |     XP Software       October, 2003            |
         |       Data File Version --->    11.7           |
         *================================================*


*==========================================================*
|       Input and Output file names by SWMM Layer          |
*==========================================================*

Input File  to Layer #     1 JOT.US

Output File to Layer #     1 JOT.US



    SCT048 UCW Larkspur Dr Ex. 48-66-60 SD



 *============================================================*
 |      HYDRAULICS TABLES IN THE OUTPUT FILE                  |
 |  These are the more important tables in the output file.  |
 |  You can use your editor to find the table numbers,        |
 |  for example: search for Table E20 to check continuity.    |
 |  This output file can be imported into a Word Processor    |
 |  and printed on US letter or A4 paper using portrait       |
 |  mode, courier font, a size of 8 pt. and margins of 0.75   |
 |                                                            |
 | Table E1   - Basic Conduit Data                            |
 | Table E2   - Conduit Factor Data                           |
 | Table E3a  - Junction Data                                 |
 | Table E3b  - Junction Data                                 |
 | Table E4   - Conduit Connectivity Data                     |
```

```
| Table E4a   - Dry Weather Flow Data                          |
| Table E4b   - Real Time Control Data                         |
| Table E5    - Junction Time Step Limitation Summary          |
| Table E5a   - Conduit Explicit Condition Summary            |
| Table E6    - Final Model Condition                          |
| Table E7    - Iteration Summary                              |
| Table E8    - Junction Time Step Limitation Summary          |
| Table E9    - Junction  Summary  Statistics                  |
| Table E10   - Conduit   Summary  Statistics                  |
| Table E11   - Area assumptions used in the analysis          |
| Table E12   - Mean conduit information                       |
| Table E13   - Channel losses(H) and culvert info             |
| Table E13a  - Culvert Analysis Classification                |
| Table E14   - Natural Channel Overbank Flow Information      |
| Table E14a  - Natural Channel Encroachment Information       |
| Table E14b  - Floodplain Mapping                             |
| Table E15   - Spreadsheet Info List                          |
| Table E15a  - Spreadsheet Reach List                         |
| Table E16   - New Conduit Output Section                     |
| Table E17   - Pump Operation                                 |
| Table E18   - Junction Continuity Error                      |
| Table E19   - Junction Inflow Sources                        |
| Table E20   - Junction Flooding and Volume List              |
| Table E21   - Continuity balance at simulation end           |
| Table E22   - Model Judgement Section                        |
*==============================================================*

Time Control from Hydraulics Job Control
Year.........    2009 Month.......      1
Day..........       1 Hour........      0
Minute.......       0 Second......      0


Control information for simulation
----------------------------------

Integration cycles.................       360
Length of integration step is......     60.00 seconds
Simulation length..................      6.00 hours
Do not create equiv. pipes(NEQUAL).         0
Use U.S. customary units for I/O...         0
Printing starts in cycle...........         1
Intermediate printout intervals of.       500 cycles
Intermediate printout intervals of.    500.00 minutes
Summary printout intervals of......       500 cycles
Summary printout time interval of..    500.00 minutes
Hot start file parameter (REDO)....         0
Initial time.......................      0.00 hours

Iteration variables: Flow Tolerance.   0.00010
                     Head Tolerance.   0.00050
    Minimum depth (m or ft).........   0.00001
    Underrelaxation parameter.......   0.85000
    Time weighting parameter........   0.85000
    Conduit roughness factor........   1.00000
    Flow adjustment factor..........   1.00000
    Initial Condition Smoothing.....         0
    Courant Time Step Factor........   1.00000
    Default Expansion/Contraction K.   0.00000
    Default Entrance/Exit K.........   0.00000
```

```
    Routing Method..................   Dynamic Wave
Default surface area of junctions...      12.57 square feet.
Minimum Junction/Conduit Depth......    0.00001 feet.
Ponding Area Coefficient...........   50000.00
Ponding Area Exponent..............      5.0000
Minimum Orifice Length.............     300.00 feet.
NJSW input hydrograph junctions.....      0
     or user defined hydrographs....
```

```
*====================================================*
|          Table E1 - Conduit Data                   |
*====================================================*
```

Trapezoid Inp Side Num Slopes	Conduit Name	Length (ft)	Conduit Class	Area (ft^2)	Manning Coef.	Max Width (ft)	Depth (ft)
1	L1	462.0000	Circular	12.5664	0.0130	4.0000	4.0000
2	L2	444.0000	Circular	12.5664	0.0130	4.0000	4.0000
3	L3	500.0000	Circular	23.7583	0.0140	5.5000	5.5000
4	L4	421.0000	Circular	23.7583	0.0130	5.5000	5.5000
5	L5	524.0000	Circular	23.7583	0.0130	5.5000	5.5000
6	L5.1	524.0000	Circular	23.7583	0.0130	5.5000	5.5000
7	213.1	234.0000	Circular	19.6350	0.0130	5.0000	5.0000
8	213.2	234.0000	Circular	19.6350	0.0130	5.0000	5.0000
9	215.1	44.0000	Circular	19.6350	0.0130	5.0000	5.0000
10	215.2	44.0000	Circular	19.6350	0.0130	5.0000	5.0000
11	217.1	403.0000	Circular	19.6350	0.0130	5.0000	5.0000
12	217.2	403.0000	Circular	0.0201	0.0130	0.1600	0.1600

Total length of all conduits .... 4237.0000 feet

```
*====================================================*
|      Table E2 -  Conduit Factor Data               |
*====================================================*
```

Conduit Name	Number of Barrels	Entrance Loss Coef	Exit Loss Coef	Exp/Contc Coefficnt	Time Weighting Parameter	Low Flow Roughness Factor n	Depth at Which Changes	Flow Routing
L1	1.0000	0.3000	0.3000	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave
L2	1.0000	0.2500	0.4000	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave
L3	1.0000	0.4000	0.2500	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave
L4	1.0000	0.2500	0.4000	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave
L5	1.0000	0.4000	0.2500	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave
L5.1	1.0000	0.2500	0.2500	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave
213.1	1.0000	0.2500	0.4000	0.0000	0.8500	1.0000	0.0000	Standard - Dynamic Wave

```
            213.2      1.0000     0.2500     0.4000     0.0000     0.8500     1.0000     0.0000
Standard - Dynamic Wave
            215.1      1.0000     0.3000     0.3000     0.0000     0.8500     1.0000     0.0000
Standard - Dynamic Wave
            215.2      1.0000     0.3000     0.3000     0.0000     0.8500     1.0000     0.0000
Standard - Dynamic Wave
            217.1      1.0000     0.3000     0.3000     0.0000     0.8500     1.0000     0.0000
Standard - Dynamic Wave
            217.2      1.0000     0.3000     0.3000     0.0000     0.8500     1.0000     0.0000
Standard - Dynamic Wave

 *=====================================================*
 | If there are messages about (sqrt(g*d)*dt/dx), or   |
 | the sqrt(wave celerity)*time step/conduit length    |
 | in the output file all it means is that the         |
 | program will lower the internal time step to        |
 | satisfy this condition (explicit condition).        |
 | You control the actual internal time step by        |
 | using the minimum courant time step factor in the   |
 | HYDRAULICS job control.  The message put in words   |
 | states that the smallest conduit with the fastest   |
 | velocity will control the time step selection.      |
 | You have further control by using the modify        |
 | conduit option in the HYDRAULICS Job Control.       |
 *=====================================================*


         Conduit      Courant
            Name        Ratio
 ---------------    ---------
              L1         1.47  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
              L2         1.53  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
              L3         1.60  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
              L4         1.90  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
              L5         1.52  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
            L5.1         1.52  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
           213.1         3.25  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
           213.2         3.25  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
           215.1        17.30  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
           215.2        17.30  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
           217.1         1.89  ===> Warning ! (sqrt(wave celerity)*time step/conduit
length)
           217.2         0.34

 *==================*
 |  Conduit Volume  |
 *==================*

 Full pipe or full open conduit volume
 Input full depth volume............    7.7003E+04 cubic feet
```

===
| Table E3a - Junction Data |
===

Inp Num	Junction Name	Ground Elevation	Crown Elevation	Invert Elevation	Qinst cfs	Initial Depth-ft	Interface Flow (%)
1	98th St.	1423.0000	1418.9300	1413.9300	103.0000	0.0000	100.0000
2	N2	1422.2000	1416.6200	1411.6200	0.0000	0.0000	100.0000
3	N3	1419.6000	1415.7000	1409.2000	80.0000	0.0000	100.0000
4	N4	1416.7000	1413.6000	1407.1000	0.0000	0.0000	100.0000
5	96th&Lark	1417.0000	1411.1100	1404.6100	0.0000	0.0000	100.0000
6	N6	1408.3000	1405.4300	1398.9300	0.0000	0.0000	100.0000
7	N7	1408.3000	1404.7000	1398.7000	0.0000	0.0000	100.0000
8	N8	1408.3000	1404.6600	1398.6600	0.0000	0.0000	100.0000
9	Cactus Rd	1405.5500	1404.2400	1398.2400	0.0000	0.0000	100.0000
10	N5.1	1412.1000	1407.7400	1401.2400	0.0000	0.0000	100.0000

===
| Table E3b - Junction Data |
===

Inp Num	Junction Name	X Coord.	Y Coord.	Type of Manhole	Type of Inlet	Maximum Capacity	Pavement Shape	Slope
1	98th St.	714822.1070	946060.8500	No Ponding	Normal		0	0.0000
2	N2	714360.2835	946058.6500	No Ponding	Normal		0	0.0000
3	N3	713916.1170	946057.2000	No Ponding	Normal		0	0.0000
4	N4	713416.2050	946055.1500	No Ponding	Normal		0	0.0000
5	96th&Lark	712995.5945	946053.7000	No Ponding	Normal		0	0.0000
6	N6	712997.8030	945005.7500	No Ponding	Normal		0	0.0000
7	N7	712997.4340	944771.1500	No Ponding	Normal		0	0.0000
8	N8	712966.8875	944740.5500	No Ponding	Normal		0	0.0000
9	Cactus Rd	712563.2055	944740.9500	No Ponding	Normal		0	0.0000
10	N5.1	712996.6965	945529.7500	No Ponding	Normal		0	0.0000

```
*=====================================================*
|        Table E4 - Conduit Connectivity              |
*=====================================================*
```

Input Number	Conduit Name	Upstream Node	Downstream Node	Upstream Elevation	Downstream Elevation	
1	L1	98th St.	N2	1414.9300	1412.6200	No Design
2	L2	N2	N3	1412.6200	1410.2000	No Design
3	L3	N3	N4	1410.2000	1408.1000	No Design
4	L4	N4	96th&Lark	1408.1000	1405.6100	No Design
5	L5	96th&Lark	N5.1	1405.6100	1402.2400	No Design
6	L5.1	N5.1	N6	1402.2400	1399.9300	No Design
7	213.1	N6	N7	1399.9300	1399.7000	No Design
8	213.2	N6	N7	1399.9300	1399.7000	No Design
9	215.1	N7	N8	1399.7000	1399.6600	No Design
10	215.2	N7	N8	1399.7000	1399.6600	No Design
11	217.1	N8	Cactus Rd	1399.6600	1399.2400	No Design
12	217.2	N8	Cactus Rd	1399.6600	1399.2400	No Design

```
*==================================================*
|      FREE OUTFALL DATA (DATA GROUP I1)           |
|     BOUNDARY CONDITION ON DATA GROUP J1          |
*==================================================*
```

Outfall at Junction....Cactus Rd has boundary condition number... 1

===> Warning !! Outfall Junction Cactus Rd has two or more connecting conduits.

```
*==================================================*
|     INTERNAL CONNECTIVITY INFORMATION            |
*==================================================*
```

CONDUIT	JUNCTION	JUNCTION
FREE # 1	Cactus Rd	BOUNDARY

```
*=====================================================*
|     Boundary Condition Information                  |
|            Data Groups J1-J4                        |
*=====================================================*
```

BC NUMBER.. 1 Control water surface elevation is.. 1404.39 feet.

```
*=======================================================*
|              XP Note Field Summary                    |
*=======================================================*



*=================================*
|   Conduit Convergence Criteria  |
*=================================*

          Conduit        Full     Conduit
             Name        Flow       Slope
-----------------  ----------  ----------
               L1    101.5711      0.0050

               L2    106.0478      0.0055

               L3    202.0843      0.0042

               L4    258.2564      0.0059

               L5    269.3034      0.0064

             L5.1    222.9630      0.0044

            213.1     81.6522      0.0010

            213.2     81.6522      0.0010

            215.1     78.5264      0.0009

            215.2     78.5264      0.0009

            217.1     84.0783      0.0010

            217.2      0.0087      0.0010


*=================================*
|    Initial Model Condition      |
| Initial Time =       0.02 hours |
*=================================*

      Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
       98th St./   0.00 /  1413.93                N2/   0.00 /  1411.62                N3/
 0.00 /  1409.20
             N4/   0.00 /  1407.10        96th&Lark/   0.00 /  1404.61                N6/
 5.46 /  1404.39
             N7/   5.69 /  1404.39                N8/   5.73 /  1404.39         Cactus Rd/
 6.15 /  1404.39
           N5.1/   3.15 /  1404.39

        Conduit/        FLOW    ===> "*" Conduit uses the normal flow option.
             L1/        0.00                L2/        0.00                L3/        0.00
             L4/        0.00                L5/        0.00              L5.1/        0.00
          213.1/        0.00             213.2/        0.00             215.1/        0.00
          215.2/        0.00             217.1/        0.00             217.2/        0.00
       FREE # 1/        0.00
```

```
        Conduit/  Velocity
             L1/      0.00                 L2/      0.00                 L3/      0.00
             L4/      0.00                 L5/      0.00               L5.1/      0.00
          213.1/      0.00              213.2/      0.00              215.1/      0.00
          215.2/      0.00              217.1/      0.00              217.2/      0.00

        Conduit/ Cross Sectional Area
             L1/      0.00                 L2/      0.00                 L3/      0.00
             L4/      0.00                 L5/      7.75               L5.1/      9.81
          213.1/     18.54              213.2/     18.54              215.1/     19.12
          215.2/     19.12              217.1/     19.28              217.2/      0.02

        Conduit/ Hydraulic Radius
             L1/      0.00                 L2/      0.00                 L3/      0.00
             L4/      0.00                 L5/      1.04               L5.1/      1.21
          213.1/      1.49              213.2/      1.49              215.1/      1.45
          215.2/      1.45              217.1/      1.42              217.2/      0.04

        Conduit/ Upstream/ Downstream Elevation
             L1/ 1411.62/  1411.62            L2/ 1409.20/  1409.20              L3/
1407.10/  1407.10
             L4/ 1404.61/  1404.61            L5/ 1404.61/  1404.39            L5.1/
1404.39/  1404.39
          213.1/ 1404.39/  1404.39         213.2/ 1404.39/  1404.39           215.1/
1404.39/  1404.39
          215.2/ 1404.39/  1404.39         217.1/ 1404.39/  1404.39           217.2/
1404.39/  1404.39


*===================================================*
| Table E5 - Junction Time Limitation Summary       |
|            (0.10 or 0.25)* Depth * Area           |
| Time step = ----------------------------          |
|                  Sum of Flow                      |
*===================================================*
|  The time this junction was the limiting junction |
|              is listed in the third column.       |
*===================================================*

        Junction      Time(.10)  Time(.25)  Time(sec)
-----------------     ---------  ---------  ---------
        98th St.        0.0122     0.0305   240.0000

              N2        4.2174    10.5435    60.0000

              N3        0.0157     0.0393     0.0000

              N4       22.6525    56.6312     0.0000

      96th&Lark         7.5998    18.9996    60.0000

              N6        2.2421     5.6052  4920.0000

              N7        3.4201     8.5502 10980.0000

              N8        5.0817    12.7042  4140.0000

       Cactus Rd      600.0000   600.0000     0.0000
```

```
              N5.1          7.6466    19.1166  1200.0000

The junction requiring the smallest time step was...N7


  *===========================================================*
  |       Table E5a - Conduit Explicit Condition Summary       |
  |       Courant   =          Conduit Length                  |
  |       Time step = --------------------------------         |
  |                       Velocity + sqrt(g*depth)             |
  |                                                            |
  |                  Conduit Implicit Condition Summary        |
  |       Courant   =          Conduit Length                  |
  |       Time step = --------------------------------         |
  |                              Velocity                      |
  *===========================================================*
  |  The 3rd column is the Explicit time step times the        |
  |      minimum courant time step factor                      |
  |                                                            |
  |  Minimum Conduit Time Step in seconds in the 4th column    |
  |  in the list. Maximum possible is 10 * maximum time step   |
  |                                                            |
  |  The 5th column is the maximum change at any time step     |
  |  during the simulation. The 6th column is the wobble       |
  |  value which is an indicator of the flow stability.        |
  |                                                            |
  |  You should use this section to find those conduits that   |
  |  are slowing your model down.  Use modify conduits to      |
  |  alter the length of the slow conduits to make your        |
  |  simulation faster, or change the conduit name to          |
  |  "CHME?????" where ????? are any characters, this will     |
  |  lengthen the conduit based on the model time step,        |
  |  not the value listed in modify conduits.                  |
  *===========================================================*

          Conduit  Time(exp)  Expl*Cmin  Time(imp)  Time(min)  Max Qchange   Wobble  Type
of Soln
   -------------  ---------  ---------  ---------  ---------  -----------  -------  -----
-------
              L1    19.9516    19.9516    56.5241     4.0000       3.2737   1.1356
Normal Soln
              L2    19.7939    19.7939    54.3325     0.0000       6.6806   1.0806
Normal Soln
              L3    23.6066    23.6066    57.9323     0.0000       7.3374   1.0077
Normal Soln
              L4    19.1593    19.1593    44.1481     0.0000       8.3275   0.9051
Normal Soln
              L5    22.6200    22.6200    60.9502     0.0000      10.0566   1.6234
Normal Soln
            L5.1    22.0444    22.0444    68.1098     0.0000       4.6427   2.1207
Normal Soln
           213.1    11.2818    11.2818    50.2943     0.0000       1.4489   6.7832
Normal Soln
           213.2    11.2818    11.2818    50.2943     0.0000       1.4489   6.7832
Normal Soln
           215.1     2.1490     2.1490     9.4504   356.0000       8.2022  14.6684
Normal Soln
           215.2     2.1490     2.1490     9.4504     0.0000       8.2022  14.6684
Normal Soln
           217.1    16.1869    16.1869    43.3075     0.0000       5.9019   6.2041
Normal Soln
```

```
          217.2    24.1466    24.1466   366.8245     0.0000        0.0007  35.5644
Normal Soln
The conduit with the smallest time step limitation was..215.1
The conduit with the largest wobble was.................217.2
The conduit with the largest flow change in any
consecutive time step..................................L5

 *====================================================*
 |  Table E6. Final Model Condition                   |
 |           This table is used for steady state      |
 |           flow comparison and is the information   |
 |           saved to the hot-restart file.           |
 |           Final Time =     6.017 hours             |
 *====================================================*

 Junction / Depth  / Elevation    ===>  "*" Junction is Surcharged.
       98th St./   7.98*/  1421.91/              N2/   7.31*/  1418.93/             N3/
  6.79*/  1415.99/
             N4/   6.66*/  1413.76/       96th&Lark/   7.44*/  1412.05/             N6/
  8.97*/  1407.90/
             N7/   8.71*/  1407.41/              N8/   8.46*/  1407.12/      Cactus Rd/
  6.15 /  1404.39/
           N5.1/   8.68*/  1409.92/

  Conduit/       Flow   ===> "*" Conduit uses the normal flow option.
             L1/     103.00 /             L2/     103.00 /             L3/     182.96 /
             L4/     182.97 /             L5/     183.04 /           L5.1/     183.04 /
          213.1/      91.45 /          213.2/      91.45 /          215.1/      91.36 /
          215.2/      91.36 /          217.1/     182.74 /          217.2/       0.03 /
      FREE # 1/     182.88 /

        Conduit/  Velocity
             L1/       8.16 /             L2/       8.17 /             L3/       7.52 /
             L4/       7.57 /             L5/       7.40 /           L5.1/       7.68 /
          213.1/       4.64 /          213.2/       4.64 /          215.1/       4.64 /
          215.2/       4.64 /          217.1/       9.27 /          217.2/       1.08 /

        Conduit/      Width
             L1/       0.02 /             L2/       0.02 /             L3/       2.07 /
             L4/       2.03 /             L5/       1.05 /           L5.1/       0.03 /
          213.1/       0.03 /          213.2/       0.03 /          215.1/       0.03 /
          215.2/       0.03 /          217.1/       0.22 /          217.2/       0.00 /

      Junction/       EGL
      98th St./       7.98 /             N2/       8.35 /             N3/       7.83 /
             N4/       7.54 /      96th&Lark/       8.33 /             N6/       9.89 /
             N7/       9.04 /             N8/       8.80 /      Cactus Rd/       7.48 /
           N5.1/       9.53 /

      Junction/  Freeboard
      98th St./       1.09 /             N2/       3.27 /             N3/       3.61 /
             N4/       2.94 /      96th&Lark/       4.95 /             N6/       0.40 /
             N7/       0.89 /             N8/       1.18 /      Cactus Rd/       1.16 /
           N5.1/       2.18 /

      Junction/ Max Volume
      98th St./     100.34 /             N2/      91.97 /             N3/      85.41 /
             N4/      83.76 /      96th&Lark/      93.58 /             N6/     113.74 /
             N7/     110.46 /             N8/     107.73 /      Cactus Rd/      77.28 /
           N5.1/     109.90 /
```

```
Junction/Total Fldng
98th St./        0.00 /            N2/        0.00 /           N3/        0.00 /
      N4/        0.00 /     96th&Lark/        0.00 /           N6/        0.00 /
      N7/        0.00 /            N8/        0.00 /    Cactus Rd/        0.00 /
    N5.1/        0.00 /

 Conduit/ Cross Sectional Area
      L1/      12.62 /             L2/      12.61 /            L3/      24.33 /
      L4/      24.17 /             L5/      24.75 /          L5.1/      23.82 /
   213.1/      19.71 /          213.2/      19.71 /         215.1/      19.70 /
   215.2/      19.70 /          217.1/      19.72 /         217.2/       0.03 /

 Conduit/  Final Volume
      L1/    5832.58 /             L2/    5599.55 /            L3/   12166.77 /
      L4/   10177.01 /             L5/   12968.33 /          L5.1/   12481.20 /
   213.1/    4611.82 /          213.2/    4611.82 /         215.1/     866.89 /
   215.2/     866.89 /          217.1/    7946.90 /         217.2/      10.38 /

 Conduit/ Hydraulic Radius
      L1/       1.00 /             L2/       1.00 /            L3/       1.38 /
      L4/       1.38 /             L5/       1.38 /          L5.1/       1.38 /
   213.1/       1.25 /          213.2/       1.25 /         215.1/       1.25 /
   215.2/       1.25 /          217.1/       1.25 /         217.2/       0.04 /

 Conduit/ Upstream/ Downstream Elevation
      L1/  1421.91/  1418.93             L2/  1418.93/  1415.99             L3/
1415.99/  1413.76/
      L4/  1413.76/  1412.05             L5/  1412.05/  1409.92           L5.1/
1409.92/  1407.90/
   213.1/  1407.90/  1407.41          213.2/  1407.90/  1407.41          215.1/
1407.41/  1407.12/
   215.2/  1407.41/  1407.12          217.1/  1407.12/  1404.39          217.2/
1407.12/  1404.39/


*=========================================================*
|        Table E7 -  Iteration Summary                    |
*=========================================================*

Total number of time steps simulated...........      360
Total number of passes in the simulation........    10248
Total number of time steps during simulation....    10093
Ratio of actual # of time steps / NTCYC.........   28.036
Average number of iterations per time step......    1.015
Average  time step size(seconds)................    2.140
Smallest time step size(seconds)................    0.500
Largest  time step size(seconds)................   15.000
Average minimum Conduit Courant time step (sec).    2.350
Average minimum implicit time step (sec)........    2.143
Average minimum junction time step (sec)........    2.143
Average Courant Factor Tf.......................    2.143
Number of times omega reduced...................     8827


*=========================================================*
|    Table E8 - Junction Time Step Limitation Summary     |
*=========================================================*
|  Not Convr = Number of times this junction did not      |
|              converge during the simulation.            |
```

```
|   Avg Convr = Average junction iterations.             |
|   Conv err  = Mean convergence error.                  |
|   Omega Cng = Change of omega during iterations        |
|   Max Itern = Maximum number of iterations             |
*========================================================*
```

Junction	Not Convr	Avg Convr	Total Itt	Omega Cng	Max Itern	Ittrn >10	Ittrn >25	Ittrn >40
98th St.	0	1.03	10442	1	26	2	1	0
N2	0	1.05	10602	8	14	6	0	0
N3	0	1.04	10542	2	26	1	1	0
N4	0	1.06	10732	3	20	1	0	0
96th&Lark	0	1.05	10563	10	22	5	0	0
N6	0	1.10	11122	1	9	0	0	0
N7	0	23.09	233044	4756	101	4699	4695	4695
N8	0	17.55	177092	4045	44	4018	4013	3995
Cactus Rd	0	1.08	10855	0	6	0	0	0
N5.1	0	1.03	10360	1	9	0	0	0

```
Total number of iterations for all junctions..    495354
Minimum number of possible iterations.........    100930
Efficiency of the simulation..................      4.91
                                                  Fair Efficiency
```

```
*==========================================================*
| Extran Efficiency is an indicator of the efficiency of   |
| the simulation.  Ideal efficiency is one iteration per   |
| time step.  Altering the underrelaxation parameter,      |
| lowering the time step, increasing the flow and head     |
| tolerance are good ways of improving the efficiency,     |
| another is lowering the internal time step. The lower the|
| efficiency generally the faster your model will run.     |
| If your efficiency is less than 1.5 then you may try     |
| increasing your time step so that your overall simulation|
| is faster.  Ideal efficiency would be around 2.0         |
|                                                          |
| Good Efficiency      < 1.5           mean iterations     |
| Excellent Efficiency < 2.5 and > 1.5 mean iterations     |
| Good      Efficiency < 4.0 and > 2.5 mean iterations     |
| Fair      Efficiency < 7.5 and > 4.0 mean iterations     |
| Poor Efficiency      > 7.5           mean iterations     |
*==========================================================*
```

```
*======================================================*
|       Table E9 - JUNCTION SUMMARY STATISTICS         |
| The Maximum area is only the area of the node, it    |
| does not include the area of the surrounding conduits|
*======================================================*
```

Junction Name	Uppermost Ground Elevation feet	Maximum PipeCrown Elevation feet	Maximum Junction Elevation feet	Time of Occurence Hr.	Min.	Feet of Surcharge at Max Elevation	Freeboard of node feet	Maximum Junction Area ft^2	Maximum Gutter Depth feet	Maximum Gutter Width feet	Maximum Gutter Velocity ft/s
98th St.	1423.0000	1418.9300	1421.9152	0	51	2.9852	1.0848	12.5660	0.0000	0.0000	0.0000
N2	1422.2000	1416.6200	1418.9388	0	50	2.3188	3.2612	12.5660	0.0000	0.0000	0.0000
N3	1419.6000	1415.7000	1415.9967	0	50	0.2967	3.6033	12.5660	0.0000	0.0000	0.0000
N4	1416.7000	1413.6000	1413.7653	0	50	0.1653	2.9347	12.5660	0.0000	0.0000	0.0000
96th&Lark	1417.0000	1411.1100	1412.0574	0	49	0.9474	4.9426	12.5660	0.0000	0.0000	0.0000
N6	1408.3000	1405.4300	1407.9878	1	26	2.5578	0.3122	12.5660	0.0000	0.0000	0.0000
N7	1408.3000	1404.7000	1407.4908	1	26	2.7908	0.8092	12.5660	0.0000	0.0000	0.0000
N8	1408.3000	1404.6600	1407.2333	1	26	2.5733	1.0667	12.5660	0.0000	0.0000	0.0000
Cactus Rd	1405.5500	1404.2400	1404.3900	0	0	0.1500	1.1600	12.5660	0.0000	0.0000	0.0000
N5.1	1412.1000	1407.7400	1409.9860	2	40	2.2460	2.1140	12.5660	0.0000	0.0000	0.0000

```
*=====================================================*
|         Table E10 - CONDUIT SUMMARY STATISTICS      |
| Note: The peak flow may be less than the design flow |
| and the conduit may still surcharge because of the  |
| downstream boundary conditions.                     |
|                                                     |
| * denotes an open conduit that has been overtopped  |
|   this is a potential source of severe errors       |
*=====================================================*
```

Conduit Name	Maximum Design Flow (cfs)	Maximum Design Velocity (ft/s)	Conduit Vertical Depth (in)	Maximum Computed Flow (cfs)	Time of Occurence Hr.	Min.	Maximum Computed Velocity (ft/s)	Time of Occurence Hr.	Min.	Ratio of Max. to Design Flow	Maximum Depth at Pipe Ends Upstream (ft)	Maximum Depth at Pipe Ends Dwnstrm (ft)	Ratio d/D US	Ratio d/D DS
L1	101.5711	8.0828	48.0000	103.7012	0	6	8.2258	0	6	1.0210	1421.915	1418.939	1.746	1.579
L2	106.0478	8.4390	48.0000	104.3940	0	6	8.2540	0	6	0.9844	1418.939	1415.997	1.579	1.449
L3	202.0843	8.5058	66.0000	183.1191	0	7	8.6414	0	7	0.9062	1415.997	1413.765	1.053	1.030
L4	258.2564	10.8702	66.0000	183.2253	5	58	9.5777	0	6	0.7095	1413.765	1412.057	1.030	1.172
L5	269.3034	11.3351	66.0000	183.5350	5	58	8.6080	0	5	0.6815	1412.057	1409.986	1.172	1.408

```
         L5.1 222.9630   9.3846  66.0000 183.4098     2    39   7.7004     4    57
0.8226 1409.986 1407.988 1.408 1.465
        213.1  81.6522   4.1585  60.0000  91.8855     2    39   4.6624     2    39
1.1253 1407.988 1407.491 1.611 1.558
        213.2  81.6522   4.1585  60.0000  91.8855     2    39   4.6624     2    39
1.1253 1407.988 1407.491 1.611 1.558
        215.1  78.5264   3.9993  60.0000  91.8777     2    39   4.6653     2    39
1.1700 1407.491 1407.233 1.558 1.514
        215.2  78.5264   3.9993  60.0000  91.8777     2    39   4.6653     2    39
1.1700 1407.491 1407.233 1.558 1.514
        217.1  84.0783   4.2821  60.0000 183.6967     1    26   9.3142     1    26
2.1848 1407.233 1404.390 1.514 1.030
        217.2   0.0087   0.4316   1.9200   0.0284     1    26   1.1004     3    49
3.2762 1407.233 1404.390 47.33 32.19
     FREE # 1 Undefnd  Undefnd  Undefn  183.6431     1    26
```

```
*==================================================*
| Table E11.  Area assumptions used in the analysis|
| Subcritical and Critical flow assumptions from   |
|    Subroutine Head.  See Figure 17-1 in the      |
|         manual for further information.          |
*==================================================*
```

Conduit Name	Duration of Dry Flow(min)	Duration of Sub-Critical Flow(min)	Durat. of Upstream Critical Flow(min)	Durat. of Downstream Critical Flow(min)	Maximum Hydraulic Radius-m	Maximum X-Sect Area(ft^2)	Maximum Vel*D (ft^2/s)
L1	1.0583	357.3750	0.0000	1.5667	1.2090	13.1586	54.2709
L2	1.8250	358.1750	0.0000	0.0000	1.2153	13.1722	49.4736
L3	1.0583	355.3529	0.0000	3.5887	1.6682	24.3422	43.0797
L4	1.3000	355.6471	0.0000	3.0529	1.6648	24.1838	45.8194
L5	3.1250	356.8750	0.0000	0.0000	1.6434	24.7974	52.3558
L5.1	0.0000	360.0000	0.0000	0.0000	1.6522	24.8687	60.5063
213.1	0.0000	360.0000	0.0000	0.0000	1.4896	20.5823	36.7176
213.2	0.0000	360.0000	0.0000	0.0000	1.4896	20.5823	36.7176
215.1	0.0000	360.0000	0.0000	0.0000	1.4455	20.5794	35.6601
215.2	0.0000	360.0000	0.0000	0.0000	1.4455	20.5794	35.6601
217.1	0.0000	360.0000	0.0000	0.0000	1.4166	20.5173	59.0863
217.2	0.0000	360.0000	0.0000	0.0000	0.0400	0.0258	6.9758

```
*==========================================*
| Table E12. Mean Conduit Flow Information  |
*==========================================*
```

Conduit Name	Mean Flow (cfs)	Total Flow (ft^3)	Mean Percent Change	Low Flow Weightng	Mean Froude Number	Mean Hydraulic Radius	Mean Cross Area	Mean Conduit Roughness
L1	102.3979	2211793.6	0.0009	0.9989	0.5731	0.9973	12.5264	0.0130
L2	102.1609	2206675.1	0.0014	0.9897	0.5928	0.9891	12.4565	0.0130
L3	181.2642	3915307.5	0.0027	0.9989	0.5602	1.3743	23.9651	0.0140

```
            L4  180.7481 3904158.2    0.0031    0.9959    0.5663    1.3672   23.7329
0.0130

            L5  180.1996 3892311.2    0.0041    0.9867    0.5093    1.3610   24.3322
0.0130

          L5.1  179.7555 3882718.1    0.0030    1.0000    0.4797    1.3735   23.6068
0.0130

         213.1   89.8204 1940121.3    0.0036    1.0000    0.2889    1.2537   19.6919
0.0130

         213.2   89.8204 1940121.3    0.0036    1.0000    0.2889    1.2537   19.6919
0.0130

         215.1   89.7989 1939656.0    0.0075    1.0000    0.2930    1.2530   19.6941
0.0130

         215.2   89.7989 1939656.0    0.0075    1.0000    0.2930    1.2530   19.6941
0.0130

         217.1  179.5217 3877669.0    0.0032    1.0000    0.7060    1.2525   19.7141
0.0130

         217.2    0.0276  596.6716    0.0000    1.0000    0.0831    0.0400    0.0258
0.0130

      FREE # 1  179.5480 3878237.2


 *=============================================================*
 | Table E13. Channel losses(H), headwater depth (HW), tailwater |
 | depth (TW), critical and normal depth (Yc and Yn).            |
 | Use this section for culvert comparisons                      |
 *=============================================================*

       Conduit   Maximum      Head  Friction  Critical    Normal        HW        TW
          Name      Flow      Loss      Loss     Depth     Depth    Elevat    Elevat
 -------------- --------- --------- --------- --------- --------- --------- ---------
            L1  103.0020    0.6197    2.3537    3.0721    3.3345 1421.9111 1418.9343
Max Flow
            L2  103.0040    0.6730    2.2667    3.0721    3.1806 1418.9345 1415.9922
Max Flow
            L3  183.0562    0.5646    1.6424    3.7844    4.1044 1415.9935 1413.7563
Max Flow
            L4  183.1413    0.5898    1.2094    3.7853    3.4223 1413.7602 1412.0428
Max Flow
            L5  183.3924    0.5309    1.4401    3.7879    3.3307 1412.0458 1409.9151
Max Flow
          L5.1  183.2482    0.4596    1.5524    3.7864    3.7972 1409.9221 1407.8790
Max Flow
         213.1   91.6931    0.2185    0.2879    2.7179    5.0000 1407.9179 1407.3983
Max Flow
         213.2   91.6931    0.2185    0.2879    2.7179    5.0000 1407.9179 1407.3983
Max Flow
         215.1   91.7027    0.2021    0.0542    2.7181    5.0000 1407.4711 1407.2072
Max Flow
         215.2   91.7027    0.2021    0.0542    2.7181    5.0000 1407.4711 1407.2072
Max Flow
```

217.1	183.5268	0.8141	1.9837	3.8757	5.0000	1407.2092	1404.3900	Max Flow
217.2	0.0284	0.0106	2.7212	0.1141	0.1600	1407.2092	1404.3900	Max Flow

```
*=========================================================*
| Table E13a. CULVERT ANALYSIS CLASSIFICATION,            |
| and the time the culvert was in a particular            |
| classification during the simulation.  The time is      |
| in minutes.  The Dynamic Wave Equation is used for      |
| all conduit analysis but the culvert flow classification |
| condition is based on the HW and TW depths.             |
*=========================================================*
```

Conduit Name	Mild Slope Critical D Outlet Control	Mild Slope TW Control Outlet Control	Steep Slope TW Insignf Entrance Control	Slug Flow Outlet/ Entrance Control	Mild Slope TW > D Outlet Control	Mild Slope TW <= D Outlet Control	Outlet Control	Inlet Control	Inlet Configuration
L1	0.0000	2.0000	2.0000	0.0000	356.0000	0.0000	0.0000	0.0000	None
L2	0.0000	0.0000	2.0000	0.0000	355.0000	0.0000	3.0000	0.0000	None
L3	1.0000	16.0000	2.0000	0.0000	340.0000	0.0000	1.0000	0.0000	None
L4	0.0000	0.0000	4.0000	341.0000	0.0000	0.0000	15.0000	0.0000	None
L5	0.0000	0.0000	4.0000	350.0000	0.0000	0.0000	6.0000	0.0000	None
L5.1	0.0000	0.0000	0.0000	14.0000	340.0000	6.0000	0.0000	0.0000	None
213.1	0.0000	2.0000	0.0000	3.0000	355.0000	0.0000	0.0000	0.0000	None
213.2	0.0000	2.0000	0.0000	3.0000	355.0000	0.0000	0.0000	0.0000	None
215.1	0.0000	2.0000	0.0000	3.0000	355.0000	0.0000	0.0000	0.0000	None
215.2	0.0000	2.0000	0.0000	3.0000	355.0000	0.0000	0.0000	0.0000	None
217.1	0.0000	0.0000	0.0000	3.0000	357.0000	0.0000	0.0000	0.0000	None
217.2	0.0000	0.0000	0.0000	0.0000	357.0000	3.0000	0.0000	0.0000	None

```
*====================================*
|   Kinematic Wave Approximations    |
|  Time in Minutes for Each Condition |
*====================================*
```

Conduit Name	Duration of Normal Flow	Slope Criteria	Super-Critical	Roll Waves
L1	0.0000	0.0000	0.0000	0.0000
L2	0.0083	1.2191	0.0000	0.0000
L3	0.0000	0.0000	0.0000	0.0000

L4	0.0000	353.0000	0.1500	0.0000
L5	0.0000	4.3750	0.0000	0.0000
L5.1	0.0000	2.6528	0.0000	0.0000
213.1	0.0000	1.8056	0.0000	0.0000
213.2	0.0000	1.8056	0.0000	0.0000
215.1	0.0000	1.2500	0.0000	0.0000
215.2	0.0000	1.2500	0.0000	0.0000
217.1	0.0000	1.3309	0.0000	0.0000
217.2	0.0000	0.0000	0.0000	0.0000

```
*=====================================================*
|     Table E15 - SPREADSHEET INFO LIST               |
| Conduit Flow and Junction Depth Information for use in |
| spreadsheets.  The maximum values in this table are the |
| true maximum values because they sample every time step.|
| The values in the review results may only be the     |
| maximum of a subset of all the time steps in the run. |
| Note: These flows are only the flows in a single barrel.|
*=====================================================*
```

Conduit Name	Maximum Flow (cfs)	Total Flow (ft^3)	Maximum Velocity (ft/s)	Maximum Volume (ft^3)	##	Junction Name	Invert Elevation (ft)	Maximum Elevation (ft)
L1	103.7012	2211793.603	8.2258	6047.2917	##	98th St.	1413.9300	1421.9152
L2	104.3940	2206675.066	8.2540	5795.7518	##	N2	1411.6200	1418.9388
L3	183.1191	3915307.506	8.6414	12113.5958	##	N3	1409.2000	1415.9967
L4	183.2253	3904158.246	9.5777	10364.7243	##	N4	1407.1000	1413.7653
L5	183.5350	3892311.174	8.6080	12591.1456	##	96th&Lark	1404.6100	1412.0574
L5.1	183.4098	3882718.060	7.7004	12573.6978	##	N6	1398.9300	1407.9878
213.1	91.8855	1940121.262	4.6624	4610.8294	##	N7	1398.7000	1407.4908
213.2	91.8855	1940121.262	4.6624	4610.8294	##	N8	1398.6600	1407.2333
215.1	91.8777	1939655.950	4.6653	866.7686	##	Cactus Rd	1398.2400	1404.3900
215.2	91.8777	1939655.950	4.6653	866.7686	##	N5.1	1401.2400	1409.9860
217.1	183.6967	3877669.031	9.3142	8000.3490	##			

```
          217.2       0.0284    596.6716          1.1004          9.7116     ##


       FREE # 1     183.6431 3878237.189          0.0000          0.0000     ##


 *=====================================================*
 |     Table E15a - SPREADSHEET REACH LIST              |
 | Peak flow and Total Flow listed by Reach or those    |
 |      conduits or diversions having the same          |
 |      upstream and downstream nodes.                  |
 *=====================================================*
```

Upstream Node	Downstream Node	Maximum Flow (cfs)	Total Flow (ft^3)
98th St.	N2	103.7012	2211793.60
N2	N3	104.3940	2206675.07
N3	N4	183.1191	3915307.51
N4	96th&Lark	183.2253	3904158.25
96th&Lark	N5.1	183.5350	3892311.17
N5.1	N6	183.4098	3882718.06
N6	N7	183.7711	3880242.52
N7	N8	183.7554	3879311.90
N8	Cactus Rd	183.7251	3878265.70

```
 #########################################################
 # Table E16. New Conduit Information Section            #
 #            Conduit Invert (IE) Elevation and Conduit  #
 #            Maximum Water Surface (WS) Elevations      #
 #########################################################
```

Conduit Name	Upstream Node	Downstream Node	IE Up	IE Dn	WS Up	WS Dn	Conduit Type
L1	98th St.	N2	1414.9300	1412.6200	1421.9152	1418.9388	Circular
L2	N2	N3	1412.6200	1410.2000	1418.9388	1415.9967	Circular

```
                L3               N3                  N4 1410.2000 1408.1000 1415.9967
1413.7653 Circular

                L4               N4          96th&Lark 1408.1000 1405.6100 1413.7653
1412.0574 Circular

                L5        96th&Lark               N5.1 1405.6100 1402.2400 1412.0573
1409.9860 Circular

              L5.1             N5.1                  N6 1402.2400 1399.9300 1409.9860
1407.9878 Circular

             213.1               N6                  N7 1399.9300 1399.7000 1407.9878
1407.4906 Circular

             213.2               N6                  N7 1399.9300 1399.7000 1407.9878
1407.4906 Circular

             215.1               N7                  N8 1399.7000 1399.6600 1407.4908
1407.2333 Circular

             215.2               N7                  N8 1399.7000 1399.6600 1407.4908
1407.2333 Circular

             217.1               N8          Cactus Rd 1399.6600 1399.2400 1407.2332
1404.3900 Circular

             217.2               N8          Cactus Rd 1399.6600 1399.2400 1407.2332
1404.3900 Circular


 *=============================================================================*
 |   Table E18 - Junction Continuity Error.   Division by Volume added 11/96   |
 |                                                                             |
 |  Continuity Error = Net Flow + Beginning Volume - Ending Volume            |
 |                     -------------------------------------------------      |
 |                     Total Flow + (Beginning Volume + Ending Volume)/2      |
 |                                                                             |
 |  Net Flow   = Node Inflow - Node Outflow                                   |
 |  Total Flow = absolute (Inflow + Outflow                                   |
 |  Intermediate column is a judgement on the node continuity error.         |
 |                                                                             |
 |  Excellent  < 1 percent    Great  1 to  2 percent  Good  2 to  5 percent   |
 |  Fair  5 to 10  percent    Poor  10 to 25 percent  Bad  25 to 50 percent   |
 |  Terrible > 50  percent                                                    |
 *=============================================================================*

        Junction    <------Continuity Error -------> Remaining   Beginning     Net Flow
Total Flow Failed to
            Name     Volume  % of Node  % of Inflow     Volume      Volume    Thru Node
 Thru Node  Converge
 ---------------    --------  ----------  ----------    --------  ----------  ----------
---------- ---------
       98th St.   9615.3544      0.2167      0.2433   3015.3380      0.0000  12630.6923
4436593.603       0

            N2    -906.0130     -0.0205      0.0229   5805.8140      0.0000   4899.8010
4418468.669       0

            N3    9873.8278      0.1257      0.2498   8941.3831      0.0000  18815.2109
7849982.572       0
```

```
                 N4    -425.1290      -0.0054       0.0108  11292.6684       0.0000  10867.5394
7819465.752           0

          96th&Lark      -3.9643      -0.0001       0.0001  11620.5898       0.0000  11616.6254
7796469.420           0

                 N6    -367.1303      -0.0047       0.0093  10965.4081   8184.0387   2414.2390
7762960.584           0

                 N7     328.9298       0.0042       0.0083   5587.4179   5312.6674    603.6802
7759554.425           0

                 N8     520.7231       0.0067       0.0132   4969.9948   4862.1437    628.5742
7757577.604           0

          Cactus Rd     -29.6686      -0.0004       0.0008   4074.1401   4024.3916     20.0799
7756502.892           0

              N5.1     486.3918       0.0062       0.0123  12725.8737   3756.8742   9455.3913
7775029.234           0

 The total continuity error was      19093.      cubic feet
 The remaining total volume was      78999.      cubic feet
 Your mean node continuity error was    Excellent
 Your worst node continuity error was   Excellent

   *====================================================*
   |  Table E19 - Junction Inflow Sources               |
   |              Units are either ft^3 or m^3          |
   |              depending on the units in your model.|
   *====================================================*

                         Constant        User       Interface       DWF          Inflow     RNF
Layer
          Junction      Inflow      Inflow         Inflow        Inlow        through
Inflow       Outflow     Evaporation
              Name     to Node     to Node        to Node       to Node       Outfall        to
Node     from Node     from Node
 ---------------  ----------  -----------  -----------  -----------  -----------  --------
---  -----------  -----------
          98th St. 2224800.000       0.0000       0.0000       0.0000       0.0000
0.0000       0.0000       0.0000

                N3 1728000.000       0.0000       0.0000       0.0000       0.0000
0.0000       0.0000       0.0000

         Cactus Rd      0.0000       0.0000       0.0000       0.0000       0.0000
0.0000    3.8782E+06       0.0000


   *=====================================================*
   | Table E20 - Junction Flooding and Volume Listing.   |
   |             The maximum volume is the total volume  |
   |             in the node including the volume in the |
   |             flooded storage area. This is the max   |
   |             volume at any time. The volume in the   |
   |             flooded storage area is the total volume|
   |             above the ground elevation, where the   |
   |             flooded pond storage area starts.       |
   | The fourth column is instantaneous, the fifth is the|
```

```
| sum of the flooded volume over the entire simulation|
| Units are either ft^3 or m^3 depending on the units.|
*=====================================================*
```

Junction Name	Surcharged Time (min)	Flooded Time(min)	Out of System Flooded Volume	Maximum Volume	Stored in System Ponding Allowed Flood Pond Volume
98th St.	356.7500	0.0000	0.0000	100.3425	0.0000
N2	355.5882	0.0000	0.0000	91.9677	0.0000
N3	342.0000	0.0000	0.0000	85.4076	0.0000
N4	339.7500	0.0000	0.0000	83.7568	0.0000
96th&Lark	349.3333	0.0000	0.0000	93.5846	0.0000
N6	354.5556	0.0000	0.0000	113.7425	0.0000
N7	355.0000	0.0000	0.0000	110.4650	0.0000
N8	355.0000	0.0000	0.0000	107.7306	0.0000
Cactus Rd	360.0000	0.0000	0.0000	77.2809	0.0000
N5.1	353.7317	0.0000	0.0000	109.9017	0.0000

```
*==================================*
| Simulation Specific Information  |
*==================================*
Number of Input Conduits..........       12 Number of Simulated Conduits......        13
Number of Natural Channels........        0 Number of Junctions...............        10
Number of Storage Junctions.......        0 Number of Weirs...................         0
Number of Orifices................        0 Number of Pumps...................         0
Number of Free Outfalls...........        1 Number of Tide Gate Outfalls......         0

*=======================================================*
| Average % Change in Junction or Conduit is defined as: |
| Conduit  % Change ==> 100.0 ( Q(n+1) - Q(n) ) / Qfull  |
| Junction % Change ==> 100.0 ( Y(n+1) - Y(n) ) / Yfull  |
*=======================================================*

The Conduit with the largest average change was..215.1      with     0.008 percent
The Junction with the largest average change was.N7         with     1.372 percent
The Conduit with the largest sinuosity was.......217.2      with    35.564
```

```
*==========================================================================*
| Table E21. Continuity balance at the end of the simulation               |
|            Junction Inflow, Outflow or Street Flooding                   |
| Error = Inflow  + Initial Volume - Outflow - Final   Volume              |
*==========================================================================*

       Inflow          Inflow       Average
       Junction    Volume,ft^3   Inflow, cfs
---------------  ------------  -------------
       98th St.    2.22480E+06      103.0000


             N3    1.72800E+06       80.0000


      Cactus Rd     -3.878E+06     -179.5480


       Outflow       Outflow         Average
       Junction   Volume,ft^3   Outflow, cfs
---------------  ------------  ------------
      Cactus Rd   3.87824E+06      179.5480


*=====================================================*

| Initial system volume       =      26140.1156 Cu Ft |

| Total system inflow volume  =    3.952800E+06 Cu Ft |

| Inflow + Initial volume     =    3.978940E+06 Cu Ft |

*=====================================================*

| Total system outflow        =    3.878237E+06 Cu Ft |

| Volume left in system       =      78998.6276 Cu Ft |

| Evaporation                 =          0.0000 Cu Ft |

| Outflow + Final Volume      =    3.957236E+06 Cu Ft |

*=====================================================*


*===============================================*
```

```
| Total Model Continuity Error                       |
| Error in Continuity, Percent =           0.4799   |
| Error in Continuity, ft^3    =        19093.322   |
| + Error means a continuity loss, - a gain         |
*===================================================*

###################################################
# Table E22. Numerical Model judgement section    #
###################################################

Your overall error was                                        0.4799 percent
Worst nodal error was in node N3                with          0.1258 percent
Of the total inflow this loss was                             0.2498 percent
Your overall continuity error was                  Excellent
                                                  Fair Efficiency
Efficiency of the simulation                       4.91
Most Number of Non Convergences at one Node        0.
Total Number Non Convergences at all Nodes         0.
Total Number of Nodes with Non Convergences        0.

===> Hydraulic model simulation ended normally.
===> XP-SWMM Simulation ended normally.
===> Your input file was named  : C:\SCT048 Larkspur SD\SCT048_Larkspur.DAT

===> Your output file was named : C:\SCT048 Larkspur SD\SCT048_Larkspur.out


*================================================================*
|              SWMM Simulation Date and Time Summary             |
*================================================================*
| Starting Date... November   20, 2009  Time...   16:42:39: 9   |
|   Ending Date... November   20, 2009  Time...   16:42:55:70   |
|  Elapsed Time...    0.27683 minutes or     16.61000 seconds   |
*================================================================*
```

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 03/01/2012

Project No. : UCW048
Project Name.:Upper Camel back Wash (UCW)
Larkspur Dr. - Trench Drain with Apron Design
Computed by : T.T

Inlets on Sag: Slotted Drain Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	2.00

Inlet Interception

	Inlet Type *Sag*	Slotted Drain
T	Width of Spread (ft)	11.59
L	Length of Inlet (ft)	39.00
W1	Slotted Drain Opening (in)	24.00
CLF	Clogging Factor (%)	75.00
d_slot	Depth over Slotted Drain (ft)	0.295
d_curb	Depth at Curb (ft)	0.398
Qi	Intercepted Flow (cfs)	68.000

Note: This Trench drain would capture the pavement drainage coming along Larkspur Drive from east and drain it to Larkspur Basin

Appendix O

Manning's Roughness Coefficient

N-value determination for Upper Camelback wash

River station ID	Main Channel							Left Overbank							Right Overbank						
	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n
Reach name : Upper Camelback																					
83+15.54	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.030	0.015	1.000	0.067	0.020	0.001	0.001	0.010	0.010	1.000	0.042
82+22.23	0.024	0.001	0.001	0.001	0.025	1.150	0.060	0.020	0.001	0.001	0.030	0.015	1.150	0.077	0.020	0.001	0.001	0.010	0.010	1.150	0.048
81+80.00	0.024	0.001	0.001	0.001	0.025	1.150	0.060	0.020	0.001	0.001	0.030	0.015	1.150	0.077	0.020	0.001	0.001	0.010	0.010	1.150	0.048
81+60.22	0.024	0.001	0.001	0.001	0.025	1.150	0.060	0.020	0.001	0.001	0.030	0.015	1.150	0.077	0.020	0.001	0.001	0.010	0.010	1.150	0.048
80+35.34	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.001	0.001	0.005	0.015	1.150	0.040	0.013	0.001	0.001	0.010	0.010	1.150	0.040
8023 Sweetwater																					
79+59.30	0.024	0.001	0.005	0.001	0.025	1.150	0.064	0.020	0.001	0.001	0.040	0.015	1.150	0.089	0.020	0.001	0.001	0.010	0.005	1.150	0.043
77+49.79	0.024	0.001	0.005	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.005	0.015	1.000	0.042	0.020	0.001	0.001	0.005	0.005	1.000	0.032
76+00.02	0.024	0.001	0.001	0.001	0.020	1.000	0.047	0.020	0.001	0.001	0.020	0.015	1.000	0.057	0.020	0.001	0.001	0.005	0.005	1.000	0.032
74+03.18	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.030	0.015	1.000	0.067	0.020	0.001	0.001	0.015	0.015	1.000	0.052
71+24.75	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.020	0.015	1.000	0.057	0.020	0.001	0.001	0.020	0.015	1.000	0.057
69+73.17	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.020	0.015	1.000	0.057	0.020	0.001	0.001	0.025	0.015	1.000	0.062
68+51.75	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.010	0.015	1.000	0.047	0.020	0.001	0.001	0.025	0.015	1.000	0.062
67+66.61	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.030	0.015	1.000	0.067	0.020	0.001	0.001	0.025	0.015	1.000	0.062
65+56.75	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.001	0.001	0.020		1.000	0.035	0.013	0.001	0.001	0.025	0.015	1.000	0.055
6556 Larkspur																					
64+94.01	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.005	0.005	1.000	0.032	0.020	0.001	0.001	0.004	0.015	1.000	0.041
63+53.90	0.024	0.001	0.001	0.001	0.015	1.150	0.048	0.020	0.001	0.001	0.010	0.005	1.150	0.043	0.020	0.001	0.001	0.015	0.015	1.150	0.060
62+34.38	0.024	0.001	0.001	0.001	0.015	1.150	0.048	0.020	0.001	0.001	0.005	0.005	1.150	0.037	0.020	0.001	0.001	0.005	0.015	1.150	0.048
61+87.65	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.001	0.001	0.005		1.000	0.020	0.013	0.001	0.001	0.005	0.015	1.150	0.040
6187 LDS Church Ent.																					
61+33.02	0.024	0.001	0.001	0.001	0.015	1.150	0.048	0.020	0.001	0.001	0.005	0.015	1.150	0.048	0.020	0.001	0.001	0.008	0.015	1.150	0.052
59+70.41	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.005	0.015	1.000	0.042	0.020	0.001	0.001	0.012	0.015	1.000	0.049
57+91.07	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.001	0.001	0.005	0.015	1.000	0.035	0.013	0.001	0.001	0.006	0.015	1.000	0.036
5791 Charter Oak																					
57+33.28	0.024	0.001	0.001	0.001	0.015	1.150	0.048	0.020	0.001	0.001	0.002	0.015	1.150	0.045	0.020	0.001	0.001	0.015	0.010	1.150	0.054
56+67.87	0.024	0.001	0.001	0.001	0.015	1.150	0.048	0.020	0.001	0.001	0.002	0.015	1.150	0.045	0.020	0.001	0.001	0.015	0.010	1.150	0.054
54+49.47	0.024	0.001	0.001	0.001	0.015	1.150	0.048	0.020	0.001	0.001	0.010	0.015	1.150	0.054	0.020	0.001	0.001	0.020	0.010	1.150	0.060
52+76.44	0.024	0.001	0.005	0.001	0.010	1.150	0.047	0.020	0.001	0.001	0.005	0.015	1.150	0.048	0.020	0.001	0.001	0.010	0.010	1.150	0.048
51+68.38	0.024	0.001	0.005	0.001	0.025	1.150	0.064	0.020	0.001	0.001	0.005	0.015	1.150	0.048	0.020	0.001	0.001	0.010	0.010	1.150	0.048
50+70.71	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.000	0.001	0.005	0.000	1.000	0.019	0.013	0.001	0.001	0.005	0.010	1.000	0.030
5055 Cactus																					
49+96.70	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.010	0.015	1.000	0.047	0.020	0.001	0.001	0.005	0.010	1.000	0.037
48+04.15	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.010	0.015	1.000	0.047	0.020	0.001	0.001	0.010	0.010	1.000	0.042
45+82.79	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.010	0.015	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
44+46.73	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.005	0.010	1.000	0.037	0.020	0.001	0.001	0.025	0.010	1.000	0.057
42+86.68	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.025	0.010	1.000	0.057
41+03.23	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.025	0.010	1.000	0.057
38+42.38	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.020	0.010	1.000	0.052
37+23.57	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.020	0.010	1.000	0.052
36+69.07	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.001	0.001	0.010	0.010	1.000	0.035	0.013	0.001	0.001	0.020	0.010	1.000	0.045
3666 Poinsetta																					
36+04.13	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.012	0.010	1.000	0.044
35+40.62	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.015	0.010	1.000	0.047
35+08.92	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.020	0.010	1.000	0.052
33+58.30	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.030	0.010	1.000	0.062
31+80.39	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.030	0.010	1.000	0.062
30+27.46	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.030	0.010	1.000	0.062
28+85.39	0.024	0.001	0.001	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.040	0.010	1.000	0.072
27+82.90	0.024	0.001	0.005	0.001	0.015	1.000	0.046	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.030	0.010	1.000	0.062
26+79.20	0.024	0.001	0.005	0.001	0.015	1.150	0.053	0.020	0.001	0.001	0.010	0.010	1.150	0.048	0.020	0.001	0.001	0.030	0.010	1.150	0.071
25+88.82	0.024	0.001	0.005	0.001	0.015	1.150	0.053	0.020	0.001	0.001	0.010	0.010	1.150	0.048	0.020	0.001	0.001	0.025	0.010	1.150	0.066
25+19.87	0.024	0.001	0.005	0.001	0.015	1.150	0.053	0.020	0.001	0.001	0.010	0.010	1.150	0.048	0.020	0.001	0.001	0.025	0.010	1.150	0.066
24+91.86	0.024	0.001	0.005	0.001	0.015	1.150	0.053	0.020	0.001	0.001	0.010	0.010	1.150	0.048	0.020	0.001	0.001	0.025	0.010	1.150	0.066
24+36.54	0.013	0.001	0.001	0.001	0.000	1.000	0.016	0.013	0.001	0.001	0.010	0.010	1.000	0.035	0.013	0.001	0.001	0.025	0.010	1.000	0.050
2436 Cholla																					
22+79.06	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.040	0.005	1.000	0.067	0.020	0.001	0.001	0.040	0.010	1.000	0.072
21+89.10	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.040	0.005	1.000	0.067	0.020	0.001	0.001	0.040	0.010	1.000	0.072
20+68.64	0.020	0.001	0.005	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.040	0.005	1.000	0.067	0.020	0.001	0.001	0.040	0.010	1.000	0.072
19+15.92	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.040	0.010	1.000	0.072
18+21.30	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
15+71.73	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
14+34.25	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
12+29.92	0.020	0.001	0.005	0.001	0.015	1.000	0.042	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072

N-value determination for Upper Camelback wash

River station ID	Main Channel							Left Overbank							Right Overbank						
	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n
10+52.13	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
08+96.64	0.020	0.001	0.001	0.001	0.015	1.300	0.049	0.020	0.001	0.001	0.015	0.005	1.300	0.055	0.020	0.001	0.001	0.040	0.010	1.300	0.094
07+25.15	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
05+86.03	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
04+46.22	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
02+78.91	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
00+55.76	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072
Reach name: After Confluence																					
18+72.00	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
17+56.22	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
16+65.88	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
1639 Cemetery Ent.																					
15+75.60	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
14+80.69	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.010	0.010	1.000	0.042
13+74.22	0.020	0.001	0.001	0.001	0.015	1.150	0.044	0.020	0.001	0.001	0.010	0.005	1.150	0.043	0.020	0.001	0.001	0.010	0.010	1.150	0.048
13+40.09	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010		1.000	0.032	0.020	0.001	0.001	0.010	0.010	1.000	0.042
1340 92nd Street																					
12+19.11	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
11+15.12	0.020	0.001	0.001	0.001	0.015	1.150	0.044	0.020	0.001	0.001	0.010	0.005	1.150	0.043	0.020	0.001	0.001	0.015	0.010	1.150	0.054
09+32.76	0.020	0.001	0.001	0.001	0.015	1.150	0.044	0.020	0.001	0.001	0.010	0.010	1.150	0.048	0.020	0.001	0.001	0.015	0.010	1.150	0.054
08+11.57	0.020	0.001	0.001	0.001	0.015	1.300	0.049	0.020	0.001	0.001	0.010	0.010	1.300	0.055	0.020	0.001	0.001	0.010	0.010	1.300	0.055
07+07.31	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.010	0.010	1.000	0.042
05+43.15	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.010	1.000	0.042	0.020	0.001	0.001	0.010	0.010	1.000	0.042
03+70.30	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
03+16.43	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
316 Culvert																					
01+97.79	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
01+20.20	0.020	0.001	0.001	0.001	0.015	1.000	0.038	0.020	0.001	0.001	0.010	0.005	1.000	0.037	0.020	0.001	0.001	0.010	0.010	1.000	0.042
Reach name: 92nd Street Channel																					
93+05.94	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.010	0.005	1.000	0.037
92+29.86	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
91+22.47	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
90+22.56	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
89+24.12	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
88+06.98	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
8775 culvert																					
87+40.41	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
86+25.49	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
84+35.97	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.025	0.005	1.000	0.052	0.020	0.001	0.001	0.025	0.005	1.000	0.052
80+21.29	0.013	0.000	0.000	0.000	0.000	1.000	0.013	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.040	0.010	1.000	0.072
8000 culvert	0.013	0.000	0.000	0.000	0.000	1.000	0.013	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.040	0.010	1.000	0.072
79+43.82	0.013	0.000	0.000	0.000	0.000	1.000	0.013	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.040	0.010	1.000	0.072
79+22.34	0.013	0.000	0.000	0.000	0.000	1.000	0.013	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.040	0.010	1.000	0.072
78+89.01	0.013	0.000	0.000	0.000	0.000	1.000	0.013	0.020	0.001	0.001	0.030	0.010	1.000	0.062	0.020	0.001	0.001	0.015	0.010	1.000	0.047
78+52.00	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
7800 culvert	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
77+37.06	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
77+01.68	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
76+22.72	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
75+22.90	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
74+22.94	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
73+22.94	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
72+22.94	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
71+22.94	0.024	0.001	0.001	0.002	0.005	1.150	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
70+22.95	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
69+09.90	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
68+22.93	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
67+24.00	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
66+46.72	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
65+83.41	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
6525 culvert																					
64+84.59	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
64+22.93	0.024	0.001	0.001	0.002	0.005	1.150	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
63+21.15	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047

N-value determination for Upper Camelback wash

River station ID	Main Channel							Left Overbank							Right Overbank						
	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n
62+23.43	0.024	0.001	0.001	0.002	0.005	1.150	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
60+78.23	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
59+23.43	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
56+33.91	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
55+23.43	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
54+08.07	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
53+24.09	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
52+30.22	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
51+63.65	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
50+37.32	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
49+61.81	0.024	0.001	0.001	0.002	0.025	1.000	0.053	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
4900 culvert																				1.000	0.000
48+51.04	0.024	0.001	0.001	0.002	0.005	1.150	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
48+23.47	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
47+30.90	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
45+23.47	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
44+21.51	0.024	0.001	0.001	0.002	0.005	1.300	0.043	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
43+73.95	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
4325 culvert																					
42+78.23	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
42+52.71	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
42+23.46	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
41+23.46	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
40+23.48	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
39+23.48	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
38+23.48	0.024	0.001	0.001	0.002	0.005	1.150	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
37+23.48	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
36+23.48	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
36+03.25	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
3560 culvert																					
35+29.10	0.024	0.001	0.001	0.002	0.005	1.150	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
34+23.46	0.024	0.001	0.001	0.002	0.005	1.000	0.033	0.020	0.001	0.001	0.015	0.010	1.000	0.047	0.020	0.001	0.001	0.015	0.010	1.000	0.047
33+47.42	0.024	0.001	0.001	0.001	0.015	1.300	0.055	0.020	0.001	0.001	0.002	0.004	1.300	0.036	0.020	0.001	0.001	0.010	0.010	1.300	0.055
32+82.70	0.024	0.001	0.001	0.001	0.005	1.300	0.042	0.020	0.001	0.001	0.002	0.004	1.300	0.036	0.020	0.001	0.001	0.010	0.010	1.300	0.055
32+31.22	0.024	0.001	0.001	0.001	0.005	1.300	0.042	0.020	0.001	0.001	0.002	0.004	1.300	0.036	0.020	0.001	0.001	0.010	0.010	1.300	0.055
30+95.96	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.006	0.006	1.000	0.034	0.020	0.001	0.001	0.015	0.010	1.000	0.047
30+34.05	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.006	0.006	1.000	0.034	0.020	0.001	0.001	0.015	0.010	1.000	0.047
29+33.98	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.006	0.006	1.000	0.034	0.020	0.001	0.001	0.015	0.010	1.000	0.047
28+34.65	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.010	0.006	1.000	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047
27+31.71	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.010	0.006	1.000	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047
26+32.73	0.024	0.001	0.001	0.001	0.005	1.300	0.042	0.020	0.001	0.001	0.010	0.006	1.300	0.049	0.020	0.001	0.001	0.015	0.010	1.300	0.061
25+25.52	0.024	0.001	0.001	0.001	0.005	1.300	0.042	0.020	0.001	0.001	0.010	0.006	1.300	0.049	0.020	0.001	0.001	0.015	0.010	1.300	0.061
24+80.78	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.010	0.006	1.000	0.038	0.020	0.001	0.001	0.015	0.010	1.000	0.047
2400 culvert																					
23+24.99	0.024	0.001	0.001	0.001	0.005	1.300	0.042	0.020	0.001	0.001	0.020	0.006	1.300	0.062	0.020	0.001	0.001	0.004	0.005	1.300	0.040
22+77.70	0.024	0.001	0.001	0.001	0.005	1.000	0.032	0.020	0.001	0.001	0.020	0.006	1.000	0.048	0.020	0.001	0.001	0.004	0.005	1.000	0.031
22+40.74	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.020	0.006	1.000	0.048	0.020	0.001	0.001	0.004	0.005	1.000	0.031
21+30.52	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.020	0.006	1.000	0.048	0.020	0.001	0.001	0.004	0.005	1.000	0.031
19+28.31	0.024	0.001	0.001	0.001	0.010	1.300	0.048	0.020	0.001	0.001	0.020	0.006	1.300	0.062	0.020	0.001	0.001	0.004	0.005	1.300	0.040
18+20.05	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.020	0.006	1.000	0.048	0.020	0.001	0.001	0.004	0.005	1.000	0.031
16+64.38	0.024	0.001	0.001	0.001	0.010	1.300	0.048	0.020	0.001	0.001	0.020	0.006	1.300	0.062	0.020	0.001	0.001	0.004	0.005	1.300	0.040
15+40.16	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.020	0.006	1.000	0.048	0.020	0.001	0.001	0.004	0.005	1.000	0.031
15+27.33	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.020	0.006	1.000	0.048	0.020	0.001	0.001	0.004	0.005	1.000	0.031
1527 Cholla																					
14+65.16	0.028	0.001	0.001	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.005	0.015	1.000	0.042
13+99.83	0.028	0.001	0.001	0.001	0.010	1.150	0.047	0.020	0.001	0.001	0.020	0.010	1.150	0.060	0.020	0.001	0.001	0.030	0.015	1.150	0.077
13+77.13	0.028	0.001	0.001	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.030	0.015	1.000	0.067
1377 Condo Culv no 1																					
13+09.77	0.028	0.001	0.001	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.030	0.010	1.000	0.062
12+66.74	0.028	0.001	0.001	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.030	0.010	1.000	0.062
12+36.74	0.028	0.001	0.001	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.030	0.010	1.000	0.062
11+72.17	0.028	0.001	0.001	0.001	0.010	1.000	0.041	0.020	0.001	0.001	0.020	0.010	1.000	0.052	0.020	0.001	0.001	0.030	0.010	1.000	0.062
1172 Condo Culv no 2																					
10+43.45	0.024	0.001	0.001	0.001	0.010	1.300	0.048	0.020	0.001	0.001	0.040	0.010	1.300	0.094	0.020	0.001	0.001	0.008	0.005	1.300	0.046
08+30.56	0.024	0.001	0.001	0.001	0.010	1.150	0.043	0.020	0.001	0.001	0.040	0.010	1.150	0.083	0.020	0.001	0.001	0.008	0.005	1.150	0.040

N-value determination for Upper Camelback wash

River station ID	Main Channel							Left Overbank							Right Overbank						
	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n	n0	n1	n2	n3	n4	m5	n
07+84.21	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035
06+35.81	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035
04+95.05	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035
04+59.28	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035
04+40.13	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035
440 LaContessa Ent.																					
03+62.13	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035
02+11.03	0.024	0.001	0.001	0.001	0.010	1.000	0.037	0.020	0.001	0.001	0.040	0.010	1.000	0.072	0.020	0.001	0.001	0.008	0.005	1.000	0.035

n0= basic n value
n1=value added to correct for surface irregularities
n2=value for variations in channel cross-section
n3= value for obstrutcions
n4=value for vegetations and flow conditions
m5=correction factor for meandering channel

Appendix P

Outlet Protection Design

PROJECT: Upper Camelback Wash
LOCATION: City of Scottsdale

Designed: T.T

OUTLET PROTECTION

UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**92ND_92nd**		Culvert End Treatment Type:	Wingwall	
Culvert Dia. / Rise	4.00	Ft.	Depth of Flow in Tailwater Channel:	4.68	Ft.
Design Discharge	538.0	CFS.	Tailwater Channel Velocity	3.83	Ft/Sec.
Depth of Flow @ Outlet:	2.33	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	7.69	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	0.89		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	4.74	Ft.
Width	17.05	Ft.
Length	32.45	Ft.
Location of Max. Scour:	12.98	Ft.

USDA METHOD

Check Discharge per Barrel	179.33	CFS.
Length of Rock Outlet Protection	62.6	Ft.
Width of Rock Outlet Protection	41	Ft.
D50 Riprap Size	0.7	Ft.
Thickness of Apron	1.4	Ft.

PROJECT: Upper Camelback Wash

LOCATION: City of Scottsdale

Designed: T.T

OUTLET PROTECTION

UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**92NDByPass**		Culvert End Treatment Type:	End Section	
Culvert Dia. / Rise	5.00	Ft.	Depth of Flow in Tailwater Channel:	4.37	Ft.
Design Discharge	303.0	CFS.	Tailwater Channel Velocity	2.88	Ft/Sec.
Depth of Flow @ Outlet:	3.16	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	11.97	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	1.19		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	2.71	Ft.
Width	12.42	Ft.
Length	21.63	Ft.
Location of Max. Scour:	8.65	Ft.

USDA METHOD

Check Discharge per Barrel	303	CFS.
Length of Rock Outlet Protection	75.1	Ft.
Width of Rock Outlet Protection	41	Ft.
D50 Riprap Size	0.7	Ft.
Thickness of Apron	1.5	Ft.

PROJECT: Upper Camelback Wash
LOCATION: City of Scottsdale

OUTLET PROTECTION

Designed: T.T

UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**LaContessa**		Culvert End Treatment Type:	End Section	
Culvert Dia. / Rise	4.00	Ft.	Depth of Flow in Tailwater Channel:	4.37	Ft.
Design Discharge	567.0	CFS.	Tailwater Channel Velocity	5.07	Ft/Sec.
Depth of Flow @ Outlet:	3.68	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	9.64	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	0.89		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	4.86	Ft.
Width	18.54	Ft.
Length	34.54	Ft.
Location of Max. Scour:	13.81	Ft.

USDA METHOD

ROCK OUTLET PROTECTION SECTION

Check Discharge per Barrel	283.5	CFS.
Length of Rock Outlet Protection	109.6	Ft.
Width of Rock Outlet Protection	51.8	Ft.
D50 Riprap Size	1.4	Ft.
Thickness of Apron	2.9	Ft.

PROJECT:	Upper Camelback Wash		Designed: T.T
LOCATION:	City of Scottsdale	**OUTLET PROTECTION**	
			UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**92NDPoin**		Culvert End Treatment Type:	Wingwall	
Culvert Dia. / Rise	4.00	Ft.	Depth of Flow in Tailwater Channel:	5.29	Ft.
Design Discharge	563.0	CFS.	Tailwater Channel Velocity	3.34	Ft/Sec.
Depth of Flow @ Outlet:	2.76	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	8.50	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	0.90		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	4.74	Ft.
Width	19.24	Ft.
Length	35.06	Ft.
Location of Max. Scour:	14.02	Ft.

USDA METHOD

Check Discharge per Barrel	187.67	CFS.
Length of Rock Outlet Protection	67.2	Ft.
Width of Rock Outlet Protection	42.9	Ft.
D50 Riprap Size	0.7	Ft.
Thickness of Apron	1.5	Ft.

PROJECT: Upper Camelback Wash | Designed: T.T
LOCATION: City of Scottsdale

OUTLET PROTECTION

UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**Main_CH**		Culvert End Treatment Type:	Wingwall	
Culvert Dia. / Rise	5.00	Ft.	Depth of Flow in Tailwater Channel:	5.51	Ft.
Design Discharge	474.0	CFS.	Tailwater Channel Velocity	3.25	Ft/Sec.
Depth of Flow @ Outlet:	2.49	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	7.93	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	0.89		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	4.51	Ft.
Width	17.17	Ft.
Length	32.01	Ft.
Location of Max. Scour:	12.81	Ft.

USDA METHOD

Check Discharge per Barrel	158	CFS.
Length of Rock Outlet Protection	30	Ft.
Width of Rock Outlet Protection	22	Ft.
D50 Riprap Size	0.5	Ft.
Thickness of Apron	1	Ft.

PROJECT:	Upper Camelback Wash		Designed: T.T
LOCATION:	City of Scottsdale	**OUTLET PROTECTION**	
			UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**Poinsettia**		Culvert End Treatment Type:	Wingwall	
Culvert Dia. / Rise	4.00	Ft.	Depth of Flow in Tailwater Channel:	5.22	Ft.
Design Discharge	528.0	CFS.	Tailwater Channel Velocity	3.3	Ft/Sec.
Depth of Flow @ Outlet:	2.00	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	11.00	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	1.37		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	4.92	Ft.
Width	17.15	Ft.
Length	33.01	Ft.
Location of Max. Scour:	13.20	Ft.

USDA METHOD

ROCK OUTLET PROTECTION SECTION

Check Discharge per Barrel	176	CFS.
Length of Rock Outlet Protection	60.6	Ft.
Width of Rock Outlet Protection	39.2	Ft.
D50 Riprap Size	0.7	Ft.
Thickness of Apron	1.3	Ft.

PROJECT: Upper Camelback Wash
LOCATION: City of Scottsdale

Designed: T.T

OUTLET PROTECTION

UNITS **ENGLISH**

CULVERT & TAILWATER DATA

Culvert No:	**SWCulvert**		Culvert End Treatment Type:	End Section	
Culvert Dia. / Rise	4.00	Ft.	Depth of Flow in Tailwater Channel:	4.35	Ft.
Design Discharge	360.0	CFS.	Tailwater Channel Velocity	3.93	Ft/Sec.
Depth of Flow @ Outlet:	2.05	Ft.	Natural Channel Bed Material:	Sandy Clay (Sand 60%)	
Brink Velocity:	10.97	Ft/Sec.	Mean Particle size of Bed Material	0.15	Ft.
Froude No.	1.35		Non-scour Velocity for Soil Type:	5	Ft/Sec.

OUTLET PROTECTION REQUIRED!

SCOUR HOLE

Size of Scour Hole

Depth	3.96	Ft.
Width	15.14	Ft.
Length	28.19	Ft.
Location of Max. Scour:	11.28	Ft.

USDA METHOD

Check Discharge per Barrel	180	CFS.
Length of Rock Outlet Protection	62.9	Ft.
Width of Rock Outlet Protection	33.2	Ft.
D50 Riprap Size	0.7	Ft.
Thickness of Apron	1.4	Ft.