IMPORTANT: PLEASE READ

US 60/SR202L TI, Phase II

Portions of this project's *Final Drainage Report* (dated February 2005) have been superseded by revised calculations submitted by Bailang Gary Sun of Parsons Brinckerhoff (PB) on May 2, 2005. The revised calculations were sealed by Jeff B. Blau, PE of PB on 4/28/05 and, are, therefore, referred to as the "*4/28/05 Revisions*".

Brief History

The February 2005 *Final Drainage Report* was submitted to the District for review on March 2, 2005. On March 16, 2005, the District responded with 3 comments (see memo from Catherine W. Regester to Shelby Brown, dated March 16, 2005). On May 2, 2005, PB submitted a response to those comments along with revised and additional calculations.

All revised and additional calculations have been inserted into this *Final Drainage Report* with "*4/28/05 Revisions*" noted on each sheet (except for the revised HEC-RAS report (.rpt) files where the notation only appears on the first page of the revised print-out). The superseded data in the February 2005 *Final Drainage Report* has been stamped "SUPERSEDED" but has been left in the report.

A CD containing the revised HEC-1 and HEC-RAS files was also submitted by PB on May 2, 2005. This CD is titled *SRT Phase II, Final Drainage Report* and is dated May 02, 2005. A hard copy print-out of the revised HEC-1 model was not provided by PB. Therefore, the reader should see the CD for the final HEC-1 model used in this design.

A copy of the PB May 2, 2005 transmittal follows this sheet as does the 4/28/05 response memo to the District's review comments of May 16, 2005. A separate notebook containing only the "*4/28/05 Revisions*" has also been prepared and is filed in the Engineering Division Library under the name *US 60 / SR 202L TI – Phase II, Final Drainage Report, 4/28/05 Revisions*.

Prepared by: Catherine W. Regester, FCDMC
June 8, 2005

Parsons Brinckerhoff
1501 W. Fountainhead Parkway, #400
Tempe, Arizona 85282
(480) 966-8295
Fax: 480-966-9234

TRANSMITTAL

DATE	JOB NO.
May 02, 2005	11194P
ATTENTION:	
RE: SR 202L / US 60 System TI, Phase II	
Project No. STP-202-B(008)B	
TRACS No. 202 MA 029 H5686 04C	

TO Curt Slagell
Project Manager
Aztec Engineering
4561 East McDowell Road
Phoenix, Arizona 85008
(602) 659-9301

WE ARE SENDING YOU X Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications

☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
2	4/28/05		Responses to FCDMC's Comments Dated March 16, 2005
1	5/02/05		Compact Disc of Final HEC-1 and HEC-RAS Files (April 2005)

THESE ARE TRANSMITTED as checked below:

☐ For Approval ☐ No Exception Taken ☐ Submit Specified Item

X For Your Use ☐ Make Corrections Noted ☐ Submit ___ copies for distribution

X As Requested ☐ Revise and Resubmit ☐ Return ___ corrected prints

☐ For Review & Comment ☐ Rejected ☐ _____

☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Let me know if you need additional copies.

COPY TO File, Catherine Regester (FCDMC) - Delivered **SIGNED** Bailang Gary Sun

If enclosures are not as noted, kindly notify us at once

L:\PROJECTS\11242 District Minor\Letter - Memos\Trans 102504.doc

Memorandum

177 North Church Avenue, Suite 500
Tucson, Arizona 85701
520-882-6424
Fax: 520-882-8830

Registered Professional Engineer (Civil)
CERTIFICATE NO. 24387
JEFF B. BLAU
DATE SIGNED 4-28-05
ARIZONA U.S.A.

To: Catherine W. Regester, Flood Control District of Maricopa County

From: Jeff Blau, Parsons Brinckerhoff

Date: April 28, 2005

Subject: Response to Review Comments dated March 16, 2005 on the Loop 202/US 60 TI, Phase II – Final Plans and Drainage Report

Thank-you for your review comments. Following are our responses that address your comments.

1. All of the HEC-RAS models *Lateral Weir Rating Curve, Southern Ave System and Hawes Road Channel*, have been revised to reflect the channel and culvert revisions that are in the Final Plans. The revisions resulted in slight changes to the lateral weir rating. The revised lateral weir rating was incorporated into the final HEC-1 model. The revised lateral weir rating resulted in a slight increase in the proposed conditions 100-year peak flows above what was presented in the Final Drainage Report, in the Hawes Channel (increase from 385 to 389 cfs), in the concrete channel along the north side of US 60 (increase from 652 to 654 cfs) and in the Sossoman Channel at the US 60 culvert (1,350 to 1,356 cfs). Table 2 – Summary of 100-Year Peak Flows from the Final Drainage Report has been updated and is included below. Also included in this submittal are the updated digital files of the HEC-RAS models as well as hard copy print outs of the updated HEC-RAS output.

2. The watershed boundary map/HEC-1 schematic that was submitted with the Draft Final Drainage Report at the 60% plan stage has not changed and is valid for the Final HEC-1 model. A digital copy of the watershed boundary map/HEC-1 schematic as well as of the updated final HEC-1 model and output (*NE200255.dat and NE200255.out*) have been included with this submittal.

3. We went to the project site and measured the geometry of the Hawes Channel at the driveway crossing, and computed the normal flow depth using the computer program Flowmaster (v6.1). The slope of the channel at the crossing was determined from the project topography. The flow depth was computed for the Q in the Hawes Channel (221 cfs) at the time of the Q100 at the lateral weir in the Southern Avenue System, as well as for the Q100 in the Hawes Channel (389 cfs). The Flowmaster output shows a flow depth of 2.34 feet and 3.19 feet for 221 cfs and 389 cfs respectively. The driveway low chord is 3.33 feet above the channel bottom. This shows that the driveway will not impact the hydraulics of the basin outfall system design. The Flowmaster output is included with this submittal.

If you should have any questions please contact me at 520-838-3412.

Table 2 – Summary of 100-Year Peak Flows
(Taken from the Final Drainage Report Report dated 2/18/05 and updated with the results of the updated HEC-1 Model NE200255.dat)

Concentration Point	Location	Baseline Conditions (cfs)	Proposed Conditions (cfs)
C31B	Southern Avenue and Hawes Road - Structure at Northwest Corner	1,790	1,148
D31W	Southern Avenue box culvert system - west of Hawes Road	1,058	939
D31S	Hawes Road Channel south of Southern Avenue	732	208
C31S	Hawes Road Channel south of confluence with Southern Avenue system	752	389
C38C	Existing concrete channel along north side of US 60, just downstream of confluence with Hawes Channel	1,503	654
38T39	Existing concrete channel along north side of US 60, just upstream of confluence with Sossoman Channel	633	654
SOSS	Sossoman Channel at US 60 culvert crossing	1,764	1,356

Flood Control District
of Maricopa County

INTEROFFICE MEMORANDUM

Date: March 16, 2005

To: Shelby Brown, Permits Branch

From: Catherine W. Regester, Engineering Division, Hydrology/Hydraulics Branch

Subject: Loop 202/60, Phase II – Final Plans and Drainage Report
Permit No. 2004P038

I have reviewed the subject plans and report and have the following comments:

1. The HEC-RAS model for the *Southern Ave System* has been revised since the 95% submittal. The channel invert elevations have been revised (lowered) at several cross sections. Most notably, the invert was lowered by 0.48 ft at cross section 1170. This same section is present in both the *Hawes Road Channel* and the *Lateral Weir Rating Curve* HEC-RAS models. However, per the summary print-outs in the report, there has been no change to the invert elevations in these two models; and, the downstream cross sections in these models show higher invert elevations than the revised elevation at section 1170. The consultant should provide an explanation for the disparity between the models and make any necessary changes to the models and/or design drawings. A digital copy of the final HEC-RAS models should be submitted (on diskette or CD) for inclusion in the final report. A revised hard copy print-out of any modified HEC-RAS models should also be submitted.

2. A watershed boundary map/HEC-1 schematic and digital copy of the HEC-1 model (on diskette or CD) should be submitted for inclusion in the final report as documentation for the final hydrology.

3. My September 28, 2004 comments noted the presence of an existing driveway crossing the Hawes Road Channel downstream of the location where the submitted HEC-RAS models begin. It appears that this driveway may be restricting the flows in the channel. The consultant may want to verify that this driveway is not impacting the hydraulics of their basin outfall system design.

If you have any questions, please feel free to call me at (602) 506-4001.

cc: Bing Zhao
Felicia Terry
Afshin Ahouraiyan
Warren Rosebraugh

2801 West Durango Street Phoenix, Arizona 85009 Phone: 602-506-1501 Fax: 602-506-4601

US 60 / SR 202L

SYSTEM TRAFFIC INTERCHANGE – PHASE 2
TRACS NO. H5686 04C

FINAL
DRAINAGE REPORT

Registered Professional Engineer (Civil)
CERTIFICATE NO.
20957
BAILANG
SUN
DATE SIGNED 2/17/05
ARIZONA U.S.A.

February 2005

Registered Professional Engineer (Civil)
CERTIFICATE NO
23993
DENNIS N.
JERMELAND
Date Signed 02/15/05
ARIZONA, U.S.A.

Submitted to:

ADOT

Submitted by:

PB PARSONS BRINCKERHOFF
100 YEARS

AZTEC

TABLE OF CONTENTS

1 INTRODUCTION **1**
1.1 PROJECT LOCATION **1**
1.2 PROJECT DESCRIPTION **1**
1.3 PURPOSE OF DRAINAGE REPORT **4**

2 OFF-SITE DRAINAGE **5**
2.1 HYDROLOGY **5**
2.2 DESCRIPTION OF NEW IMPROVEMENTS **5**
2.3 MODIFICATIONS TO THE STAGE II CONCEPT **6**
2.4 MODIFICATIONS TO THE STAGE II HEC-1 AND HEC-RAS MODELS **6**

3 ON-SITE DRAINAGE **9**
3.1 GENERAL DISCUSSION **9**
3.1.1 ROADWAY DESIGN CONDITIONS AND IMPACT TO ON-SITE DRAINAGE 9
3.1.2 ON-SITE DRAINAGE SYSTEMS 9
3.1.3 EXISTING US60 DRAINAGE SYSTEMS BETWEEN POWER ROAD AND SOSSAMAN ROAD 10
3.1.4 EXISTING US60 DRAINAGE SYSTEMS FROM WEST OF ELLSWORTH ROAD EAST TO CRISMON ROAD 11
3.2 DESIGN CRITERIA **12**
3.2.1 RUNOFF COMPUTATIONS 13
3.2.2 TIME OF CONCENTRATION PROCEDURE 13
3.2.3 CATCH BASIN DESIGN CRITERIA AND ASSUMPTIONS 14
3.3 ON-SITE DRAINAGE DESIGN APPROACH **17**
3.3.1 GENERAL DESIGN APPROACH 17
3.3.2 US60 WEST DRAINAGE SYSTEM NO. 1 19
3.3.3 US60 WEST DRAINAGE SYSTEM NO. 2 21
3.3.4 US60 EAST DRAINAGE SYSTEMS 22
3.3.5 202L FREEWAY DRAINAGE SYSTEMS 28
3.3.6 DIRECTIONAL RAMPS 31
3.3.7 ELLSWORTH ROAD RAMP A 35
3.3.8 ELLSWORTH ROAD RAMP B 35
3.4 SUMMARY **36**

4 REFERENCES **38**

LIST OF TABLES

2-1 DETENTION BASIN DATA 7

2-2 SUMMARY OF 100-YEAR PEAK FLOWS 7

3-1 DESIGN SPREAD CRITERIA 14

3-2 NEW US60 DRAINAGE SYSTEM BOUNDARIES FROM WEST OF ELLSWORTH ROAD EAST TO CRISMON ROAD 22

LIST OF FIGURESS

1-1 VINCINITY MAP 2

2-1 OFF-SITE DRAINAGE PLAN 8

LIST OF APPENDICES

A OFF-SITE DRAINAGE CALCULATIONS

- RATING CURVE CALCULATIONS FOR SOUTHERN AVENUE DETENTION BASIN OUTLET STRUCTURE
- RATING CURVE CALCULATIONS FOR CULVERTS AT NW CORNER OF SOUTHERN AND HAWES
- HEC-1 OUTPUT
- HEC-RAS Output for Drainage Channel (100-Year Event)
- HEC-RAS Output for Hawes Road Channel (100-Year Event)
- HEC-RAS Output for Lateral Weir Rating Curve

B ON-SITE DRAINAGE CALCULATIONS

- HYDROLOGIC CALCULATIONS
- RIPRAP CALCULATIONS
- STORM CAD ANALYSES

C STAGE IV (95%) PLANS

Registered Professional Engineer (Civil) CERTIFICATE NO. 20957 BAILANG SUN DATE SIGNED 2/17/05 ARIZONA U.S.A.

Registered Professional Engineer (Civil) CERTIFICATE NO 23993 DENNIS N. JERMELAND Date Signed 02/15/05 ARIZONA, U.S.A.

1 INTRODUCTION

1.1 PROJECT LOCATION

The US 60/SR 202L System Traffic Interchange, also called the SuperRedTan TI (SRT TI), is a freeway-to-freeway, fully directional facility located in the eastern part of the City of Mesa, Maricopa County, Arizona. The project limits along US60 are Sossaman Road to the west and Ellsworth Road to the east, while Southern Road to the north and Baseline Road to the south are the limits along the SR 202L alignment. A project location map is shown in Figure 1-1.

1.2 PROJECT DESCRIPTION

The proposed US 60/SR 202L System Traffic Interchange is a part of the Maricopa Association of Governments (MAG) Regional Freeway System and will connect the 202L to the Superstition Freeway (US60) in the eastern portion of the Phoenix metropolitan area. The completed 202L freeway will serve the cities of Phoenix (COP), Tempe (COT), Chandler (COC), and Mesa (COM), the Town of Gilbert, the Gila River Indian Community (GRIC), the Salt River Pima-Maricopa Indian Community (SRPMIC), and unincorporated portions of Maricopa County.

This element of the Regional Freeway System will be a four-level freeway-to-freeway system interchange with directional ramp connections between the 202L and US60. US60 will be the first level of the TI. Existing US60 will be widened for a sufficient distance to accommodate the additional entrance and exit ramp lanes as required to support the new interchange. In the vicinity of the 202L, US60 will be reconstructed to provide a widened median for a future High Occupancy Vehicle (HOV) lane in each direction and a possible future HOV directional ramp connection between US60 (east of 202L) and the 202L (south of US60).

The 202L will be the second level of the TI. The 202L freeway mainline will consist of six basic through lanes, three in each direction of travel, separated by an open median. Additional lanes will be provided to accommodate the entrance and exit ramp lanes as required to support the interchange. The open median is designed to allow the addition of a future HOV lane in each direction of travel and a possible future HOV directional ramp as previously described.

The third level of the TI will consist of directional Ramps W-S and E-N. The possible future HOV directional ramp will also be included with the third level of the interchange. The fourth level consists of directional Ramps N-W and S-E.

The existing Power Road TI eastern ramps will be realigned to match the widened US60 roadway.

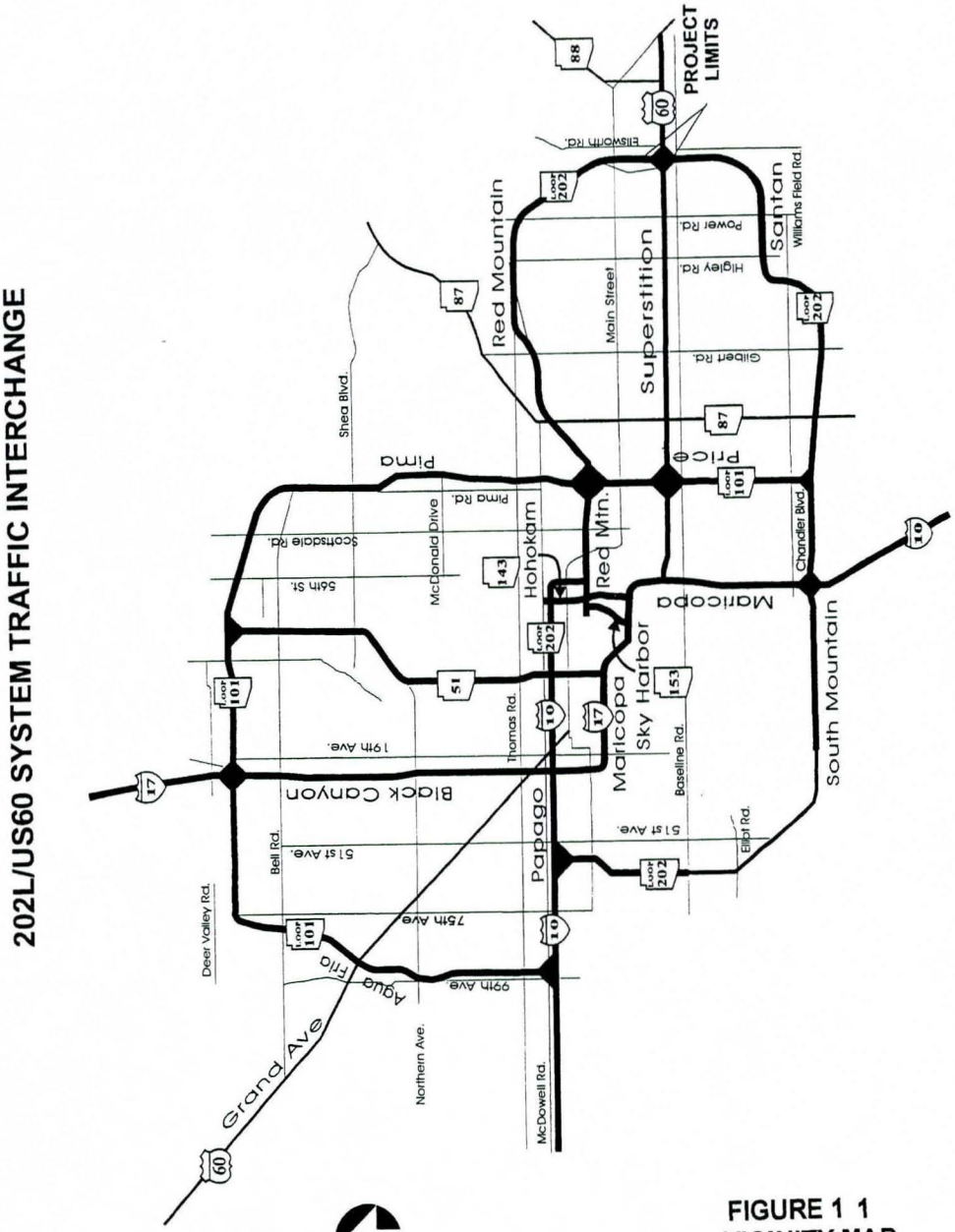


FIGURE 1 1
VICINITY MAP

The existing Sossaman Road Traffic Interchange (TI) will be reconstructed as a half-diamond interchange, with ramp connections to US60 to and from the west. The existing western ramps will be realigned to match the widened US60 roadway. The existing eastern ramps will be removed. The crossroad median will be reconfigured to provide dual left-turn lanes for the northbound to westbound traffic movement. The existing Sossaman Road TI Underpass will remain and retaining walls will be constructed at each bridge abutment to accommodate the widened US60 roadway.

The Ellsworth Road TI western ramps will be reconstructed to provide braided ramp connections to US60. The eastern ramps will be realigned to match the widened US60 roadway. The existing Ellsworth Road TI Underpass will remain and retaining walls will be constructed at each bridge abutment to accommodate the widened US60 roadway.

The existing Crismon Road TI western ramps will be realigned to match the widened US60 roadway.

The Baseline Road Overpasses and crossroad improvements will be constructed with the Santan Freeway, Elliot Road to Baseline Road project. The Southern Avenue Overpasses will be constructed with the US 60/SR 202L TI project and will serve as the northern project limit. The 202L Overpasses, the Ellsworth Road Ramp A over Ramp W-S structure, the four major directional ramp structures and the Ramp N-E over Ellsworth Road Ramp B structure are also included with this project. Retaining walls and sound walls are required at numerous locations within the project limits.

The US 60/SR 202L TI Phase I embankments eliminate a number of existing US60 drainage detention basins located adjacent to the channel north of US60. The lost storage volume is replaced with a number of new detention basins located within the new ADOT right-of-way. Off-site drainage will be directed to this existing drainage channel and the proposed detention basins. On-site drainage along US60 utilizes the existing storm drain trunk line. New catch basins and storm drain laterals are provided to collect and convey the US60 on-site drainage flows to the existing trunk lines. South of US60, the on-site and off-site drainage flows are collected and conveyed to discharge into a proposed off-site drainage channel located adjacent to the eastern 202L right-of-way.

The interchange, as currently programmed, will be built through at least two construction packages. The first construction package is the US 60/SR 202L System Traffic Interchange, Phase I. Phase I includes the permanent US60 roadway improvements between Sossaman Road and Ellsworth Road, the directional ramp connections E-S and N-W between the 202L and the US60, and the northbound and southbound 202L structures over US60. Phase I of the US 60/SR 202L TI, as currently programmed, is scheduled to be completed and open to traffic in December 2005.

Phase II of this project will interconnect the northern and eastern quadrants of the US 60/SR 202L TI. Phase II of the US 60/SR 202L TI, as currently programmed, is scheduled to be completed and open to traffic in September 2007.

1.3 PURPOSE OF DRAINAGE REPORT

This report addresses the drainage facilities included in Phase 2 of the project. This report documents the procedures, methodologies, criteria, and computations utilized in the hydrologic and hydraulic analyses and design of the proposed off-site and on-site drainage facilities for the project. Supporting tables, calculation sheets and drawings are included in the Appendices of this report.

2 OFF-SITE DRAINAGE

2.1 HYDROLOGY

The analysis of the existing off-site drainage characteristics and the development of the proposed hydrologic model were completed by the ADOT General Consultant as part of the Stage II design of the project. Chapter 2.0-Offsite Hydrology of the "202L/US 60 Traffic Interchange, Phase II Initial Drainage Report" developed by DMJM+Harris and dated August 2002, documents the project off-site hydrology and is included in this report in Appendix A.

2.2 DESCRIPTION OF NEW IMPROVEMENTS

The downstream end of the Red Mountain Freeway's off-site drainage system is a detention basin in the northeast corner of the intersection with Southern Avenue. This Southern Avenue Detention Basin and the conduits that carry the discharge from the basin to the Phase I constructed NW-1 Detention Basin and to the existing Hawes Road Channel, are the main elements of the Phase II offsite drainage construction. The new improvements that are a part of the Phase I construction were documented in the Phase I Final Drainage Report dated April 2003. The new improvements that are a part of the Phase II construction are described below:

- The proposed Southern Avenue Detention Basin will have a proposed 10' X 6' RCBC under Southern Avenue to carry the 100-year discharge from the basin, and a proposed emergency spillway to allow for the controlled discharge of the 100-year peak flow out of the basin into Southern Avenue should the culvert become blocked.
- The discharge from the Southern Avenue Detention Basin box culvert outlet will be carried in a proposed channel along the south side of Southern Avenue (Southern Avenue Channel) to Hawes Road, where a proposed 10' X 4' RCBC will carry the 100-year peak flow under Hawes Road into the existing Hawes Road Channel. The proposed Southern Avenue Channel will have a 237' long lateral spillway located along its south bank to allow for a portion of the peak flows to enter the Phase I constructed NW-1 Detention Basin.
- Two barrels of the existing 3 - 8' X 4' RCBC under Southern Avenue at the Hawes Road intersection will be blocked off to reduce the proposed conditions discharges through the culvert.
- The Phase I trapezoidal open channel emergency spillway for Detention Basin NE-1 will be replaced with a 10' X 6' RCBC emergency spillway to allow for the Phase II construction of Ramp W-N.

2.3 MODIFICATIONS TO THE STAGE II CONCEPT

The final design of the off-site drainage facilities follows the Stage II concept. Figure 2-1 shows the elements of the off-site system included in the Phase II construction. The only modification to the Stage II design is that the proposed blockage to the existing 3 – 8' X 4' RCBC under Southern Avenue at the Hawes Road intersection is designed to reduce the discharge through the culvert by 2/3 at the 100-year peak flow level, rather than by 3/4 as was recommended in the Stage II design.

As recommended in the Phase II Stage II drainage report, a culvert analysis was performed on the box culvert outlet for the Southern Avenue Detention Basin to see if the 10' X 6' size could be reduced by the use of an improved inlet. The analysis showed that for the final basin geometry, the culvert cannot be reduced in size without it resulting in the basin overtopping during a 100-year storm event. The HY-8 culvert analysis is located in Appendix A.

2.4 MODIFICATIONS TO THE STAGE II HEC-1 AND HEC-RAS MODELS

The HEC-1 model from the Phase II Stage II drainage report (NE200235.dat) was updated by DMJM+Harris in August 2003 (NE2002US.dat), and again in December 2003 (NE202USR.dat), to reflect their refinements to the Red Mountain Freeway Design. In conjunction with discussions with the Flood Control District of Maricopa County (FCDMC), PB further refined the model to represent future conditions land use for Sub-basin 31B. PB also revised the model using the following: the updated Phase I detention basin storage volumes; the revisions to the NW-1 and NW-2 Detention Basin outlet structures from the Phase 1 final plans; the updated Southern Avenue Detention Basin storage volumes that are based on the final Phase II basin configuration; the updated weir rating for the lateral weir located along the Southern Avenue Channel; the updated diversion rating for the box culvert system at Southern Avenue and Hawes Road to simulate blockage of 2 barrels of the existing 3 barrel box culvert under Southern Avenue. The output from the final updated HEC-1 model for the Phase II design (NE200250.dat) is included in Appendix A.

The HEC-RAS models from the Phase II Stage II drainage report were updated. The lateral weir rating analysis was updated (LWR.prj) to reflect the final weir geometry, and to use the updated coincidental peak flows (from the updated HEC-1 model) in the Hawes Road Channel and Southern Avenue Channel (just upstream of the proposed lateral weir). The results from the updated lateral weir rating analysis were used to further update the final HEC-1 model. The results from the final HEC-1 model (NE200250.dat) were then used in the final HEC-RAS models to analyze the channel hydraulics. The final HEC-RAS results show that the proposed Southern Avenue Channel (WSP100SC.prj) has sufficient capacity to handle the 100-year peak flow and maintain the required freeboard. The existing Hawes Road Channel (WSP100HC.prj)

has sufficient capacity to handle the proposed conditions 100-year peak flow of 208 cfs and maintain a freeboard of 0.80 ft. This is 0.20 ft. lower than the desired freeboard, however the proposed conditions 100-year peak flow for the Hawes Road Channel is 524 cfs less than the baseline conditions 100-year peak flow of 732 cfs. The outputs from the updated HEC-RAS models for the Phase II design are included in Appendix A.

Table 2-1 presents data for the Southern Avenue Detention Basin. Table 2-2 presents the 100-year peak flows at the locations of interest.

Table 2-1: DETENTION BASIN DATA

Basin	Q100 In (cfs)	Q100 Out (cfs)	Design 100-yr WSEL	100-yr Storage Volume (ac-ft)
Southern Avenue	1,775	712	1,453.4	66.0

NE2002250
NE2002252

Table 2-2: SUMMARY OF 100-YEAR PEAK FLOWS

TABLE 2 SUPERSEDED BY 4/28/05 REVISIONS BY PB

Concentration Point	Location	Baseline Conditions (cfs)	Proposed Conditions (cfs)	
C31B	Southern Avenue and Hawes Road - Structure at Northwest Corner	1,790	1,148	
D31W	Southern Avenue box culvert system - west of Hawes Road	1,058	939	
D31S	Hawes Road Channel south of Southern Avenue	732	208	
C31S	Hawes Road Channel south of confluence with Southern Avenue system	752	385	383
C38C	Existing concrete channel along north side of US60, just downstream of confluence with Hawes Channel	1,503	652	628
38T39	Existing concrete channel along north side of US60, just upstream of confluence with Sossoman Channel	633	652	628
SOSS	Sossoman Channel at US60 culvert crossing	1,764	1,350	1345

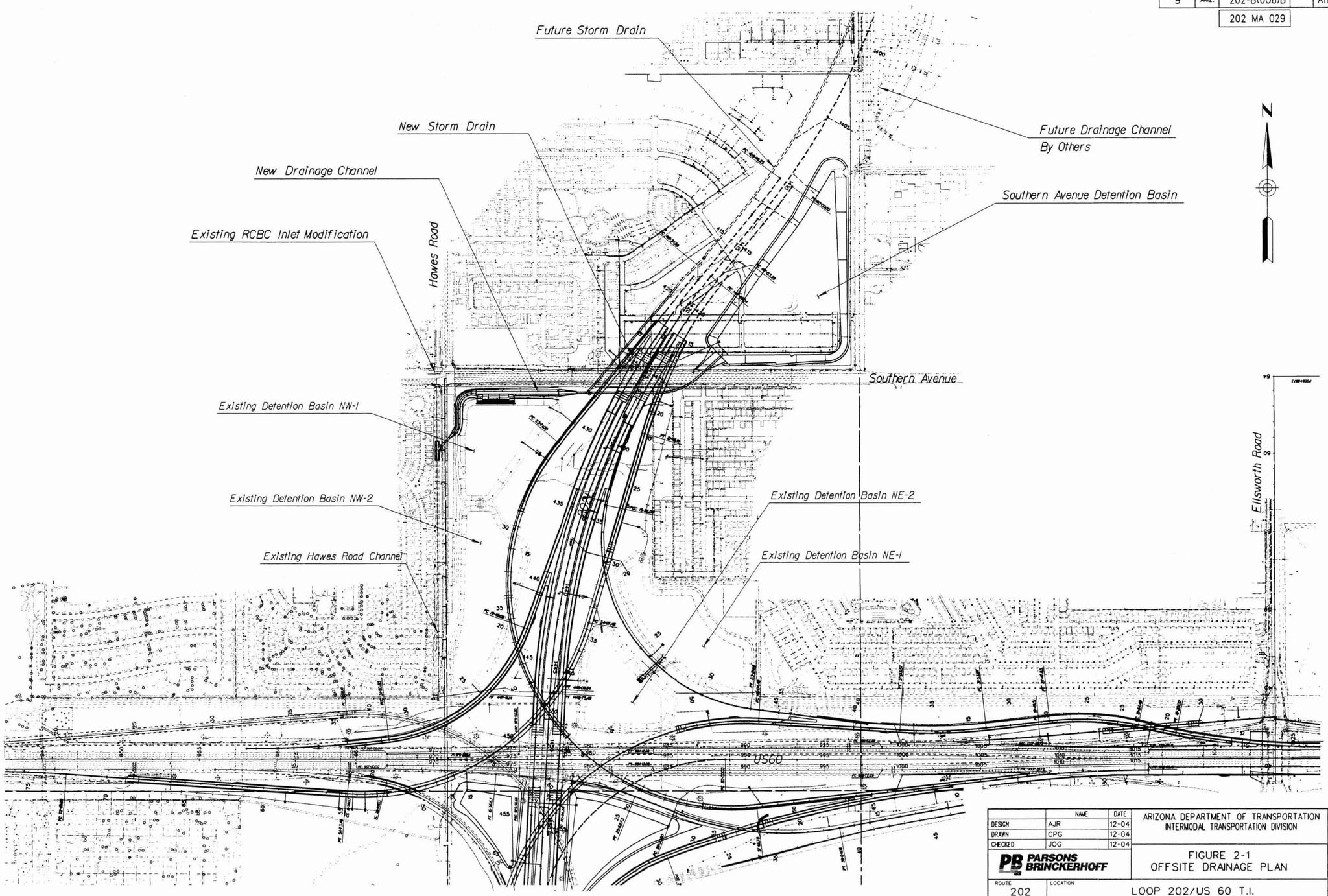
SUPERSEDED

If you should have any questions please contact me at 520-838-3412.

Table 2 – Summary of 100-Year Peak Flows
(Taken from the Final Drainage Report Report dated 2/18/05 and updated with the results of the updated HEC-1 Model NE200255.dat)

Concentration Point	Location	Baseline Conditions (cfs)	Proposed Conditions (cfs)
C31B	Southern Avenue and Hawes Road - Structure at Northwest Corner	1,790	1,148
D31W	Southern Avenue box culvert system - west of Hawes Road	1,058	939
D31S	Hawes Road Channel south of Southern Avenue	732	208
C31S	Hawes Road Channel south of confluence with Southern Avenue system	752	389
C38C	Existing concrete channel along north side of US 60, just downstream of confluence with Hawes Channel	1,503	654
38T39	Existing concrete channel along north side of US 60, just upstream of confluence with Sossoman Channel	633	654
SOSS	Sossoman Channel at US 60 culvert crossing	1,764	1,356

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B		A1124	
		202 MA 029			



	NAME	DATE
DESIGN	AJR	12-04
DRAWN	CPG	12-04
CHECKED	JOG	12-04

PB PARSONS BRINCKERHOFF

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

FIGURE 2-1
OFFSITE DRAINAGE PLAN

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 28178 ANTHONY J. REGIS ARIZONA U.S.A.

DWG NO. ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Thu Feb 10 09:32:49 2005 H:\60_Ti\phase_2\Drng\DrngReport\Fig_2-2.dgn

3 ON-SITE DRAINAGE

3.1 GENERAL DISCUSSION

3.1.1 Roadway Design Conditions and Impact to On-Site Drainage

The following items identify roadway design features specific to Phase II and describes their impact on the design of the proposed on-site drainage systems:

- The proposed on-site drainage systems for Phase II of the 202L/US 60 TI are continuations of the on-site and off-site drainage systems implemented in Phase I.
- The addition of outside lanes (eastbound and westbound) for the segments of US60 from Power Road east to Sossaman Road and from Ellsworth Road east to Crismon Road, while retaining the existing roadway pavement section, will prohibit new lateral crossings of US60. Consequently, this restriction will require integrating the existing laterals into the design of the Phase II on-site drainage systems.
- The Phase II widening of US60 will require realigning and reconstructing the service ramps at Power Road, Sossaman Road, Ellsworth Road and Crismon Road. As a result, new drainage systems to service these ramps will be required.
- The future HOV lanes in the median of the 202L freeway from Southern Avenue south to US60 will require that the design of the on-site drainage systems be compatible for both Phase II and the future HOV lanes. As a result, the laterals will be designed with sufficient flexibility to allow partial reconstruction to remove the infield catch basins and construct roadway catch basins when the HOV lanes are constructed. The collection and conveyance systems for this segment of the 202L have been positioned and sized to accommodate future runoff.
- Portions of the directional and service ramps between the US 60/SR 202L TI and Ellsworth Road will be constructed below existing grade (depressed) and will be unable to gravity drain to outlets. The design will investigate all options prior to connecting the on-site drainage systems to the Phase I US60 drainage system.

3.1.2 On-Site Drainage Systems

Existing on-site drainage systems impacted by Phase II have been divided into five main drainage regions. These five regions are as follows:

- The segment of US60 between Power Road and Sossaman Road which includes Power Road Ramps C and D and Sossaman Road Ramps A and B. There are two existing drainage systems within this segment of US60 and which are referred to

in this report as the *"US60 West Drainage Systems No. 1 and 2"*. These designations apply to both the existing and proposed on-site drainage systems.

- The segment of US60 from east of the 202L overpass at US60 Med. Sta. 1000+00 eastward to east of Ellsworth Road at US60 Med. Sta.1037+70. Drainage improvements represent a continuation of the US60 drainage system improvements implemented in Phase I.
- The segment of US60 from east of Ellsworth Road (US60 Med. Sta. 1036+00) east to Crismon Road, including Ellsworth Road Ramps C and D and Crismon Road Ramps A and B. The drainage systems are referred to in this report as *"US60 East Drainage Systems No. 1 through 8"*. These designations apply to both the existing and the proposed on-site drainage systems.
- The segment of 202L Freeway from the project limits to the north of Southern Avenue south to Baseline Road. The proposed drainage systems are referred to as *"202L Freeway Drainage Systems No. 1 through 8"*.
- Directional Ramps W-N, W-S, N-E, S-E, S-W, E-N and Ellsworth Road Service Ramps A and B.

3.1.3 Existing US60 Drainage Systems Between Power Road and Sossaman Road

The following section briefly describes the two existing on-site drainage systems for the segment of US60 between Power Road and Sossaman Road.

US60 West Drainage System No. 1

The existing drainage system is a closed conduit collection and conveyance system running along the north right-of-way of existing US60 from the Sossaman channel (US60 Median Sta. 930+00) west to Clearview Avenue (US60 Median Sta. 883+00). Immediately west of Clearview Avenue, the trunk line veers to the northwest for a short distance, before turning back to the west and continuing within the right-of-way until it gravity drains to the North Channel at approximately US60 Median Sta. 848+00. The trunk line ranges in size from a 24-inch conduit at the upstream end to a 66-inch diameter conduit at the North Channel outfall.

The existing on-site collection system consists of a series of catch basins and 24-inch diameter laterals crossing north beneath US60 to the trunk line. Several of the laterals extend to catch basins servicing Sossaman Road Ramps A and B.

US60 West Drainage System No. 2

The existing drainage system is a closed conduit collection and conveyance system running along the north right-of-way of US60 from Clearview Avenue westward to Power Road. The trunk line continues westward beyond the project limits within the US60 north right-of-way to its outfall to the North Channel at US60 Median Sta. 842+00. Within the project limits, the trunk line ranges in size from a 24-inch conduit at Clearview Avenue to a 42-inch conduit at Power Road, eventually increasing to a 60-inch diameter conduit at its outfall.

The existing on-site collection system consists of a series of catch basins and 24-inch diameter laterals crossing north beneath US60 to the trunk line. Several of the laterals extend to catch basins servicing Power Road Ramps C and D.

3.1.4 Existing US60 Drainage Systems from West of Ellsworth Road East to Crismon Road

The segment of US60 from west of Ellsworth Road (US60 Median eastward to Crismon Road has eight on-site drainage systems. In addition, there are several individual catch basins and outlet pipes, which are discussed at the end of this section. The eight drainage systems have been designated US60 East drainage systems No. 1 through 8 and are shown on the drainage plans in Appendix C. A brief description of the eight drainage systems follows.

US60 East Drainage System No. 1

The on-site drainage system is a continuation of the Phase I US60 drainage system. The portion of the drainage system to be evaluated in Phase II begins at US60 Median Sta. 1000+00, approximately 2,400 feet west of Ellsworth Road and extends east to approximately US60 Median Sta. 1037+70. Several laterals extend from the trunk line along this segment of US60 to service US60, Ellsworth Road Ramps A, C and D, both ends of the Ellsworth Road bridge, and off-site runoff to the north of US60 and to the east of Ellsworth Road. This segment of the US60 trunk line ranges from a 24-inch to a 54-inch diameter conduit.

US60 East Drainage System No. 2

The on-site drainage system is a closed conduit collection and conveyance system handling the segment of US60 from approximately Sta. 1037+70 east to Sta. 1049+50. The on-site drainage system discharges south to an existing drainage ditch at approximately Sta. 1037+70. Several laterals extend north beneath US60 to catch basins from the main line running within the south right-of-way. The conveyance system ranges from a 24-inch to a 36-inch diameter conduit at its outfall. An open area adjacent to the

drainage ditch provides temporary detention to attenuate the peak flow prior to continuing south and discharging into an off-site storm drain system.

US60 East Drainage System No. 3

The on-site drainage system is a closed conduit collection and conveyance system for the segment of US60 from Sta. 1049+50 east to Sta. 1055+30. The conveyance system is 24-inch diameter conduits with its outlet to the North Channel.

US60 East Drainage System No. 4

The on-site drainage system is a closed conduit collection and conveyance system for the segment of US60 from Sta. 1055+30 east to Sta. 1062+50. The conveyance system is 24-inch diameter closed conduits with its outlet to the North Channel.

US60 East Drainage System No. 5

The on-site drainage system is a closed conduit collection and conveyance system for the segment of US60 from Sta. 1062+50 east to Sta. 1065+60 for the westbound lanes and east to Sta. 1075+00 for the eastbound lanes. The on-site drainage system includes runoff from the west ends of Crismon Road Ramps A and B. The conveyance system is a 24-inch diameter system with its outlet to the North Channel.

US60 East Drainage System No. 6

The on-site drainage system is a closed conduit collection and conveyance system for the segment of US60 westbound lanes from Sta. 1065+60 east to Crismon Road. The conveyance system is a 24-inch diameter system with its outlet to the North Channel.

US60 East Drainage Systems Nos. 7 and 8

Separate on-site drainage systems collect and convey runoff for the east ends of Crismon Road Ramps A and B. Runoff from the service ramps is conveyed through 24-inch diameter conduit with discharge into the Crismon Road drainage system. The Crismon Road conveyance system ranges from 30-inches to 36-inches in diameter. The combined flows are conveyed north to the North Channel. The Crismon Road drainage system also collects and conveys runoff from Ramps A and B infield catch areas.

3.2 DESIGN CRITERIA

This section addresses the design procedures, criteria, and assumptions used to evaluate and design the on-site drainage systems for Phase II. Included in this section are brief overviews of the Rational Equation and the time of concentration methodology (used to determine the appropriate rainfall intensity).

Also presented are the procedures used to size, locate, and analyze the catch basins and the assumptions used in the design. The hydrologic/hydraulic approach used to evaluate the existing conveyance systems and size the new conveyance systems is also included. The approach and assumptions used in selecting and sizing the drainage ditches and channels are identified.

3.2.1 Runoff Computations

The procedures presented in the ADOT Highway Drainage Design Manual, Hydrology, (HDDM), March 1993 were used to compute peak flows based on the Rational Equation. Phase II uses site-specific Intensity-Duration Frequency (I-D-F) Graphs for the 10-, 25-, and 50-year design storms. A description of the Rational Equation follows (Equation 2-1 of the HDDM):

$$Q = C\,IA$$

Where:
- Q = the peak discharge, cubic feet per second
- C = runoff coefficient, dimensionless
- I = the average rainfall intensity, inches/hour (based on the selected rainfall return period)
- A = the contributing drainage area, acres

The following land use runoff coefficient values were used for the 10-year, 25-year and 50-year storm events:

- Paved surfaces - 0.95
- Highway slopes - 0.70
- Right-of-way – 0.60

3.2.2 Time of Concentration Procedure

Rainfall intensity is estimated based on a specific time of concentration at the point of analysis. A series of site-specific intensity-duration-frequency curves were developed for the three recurrence intervals based on the procedures presented in the Hydrologic Drainage Design Manual (HDDM). These I-D-F curves were used to estimate the appropriate rainfall intensities for the contributing areas. The procedure begins by computing an initial time of concentration based on an assumed time of concentration using Equation 2-2 of the HDDM as follows:

$$T_c = 11.4\ L^{0.5}\ K_b^{0.52}\ S^{-0.31}\ I^{-0.38}$$

Where: T_c = time of concentration, hours

(the minimum T_c has been established at ten minutes.)

L = the length of the longest flow path, miles

K_b = the watershed resistance coefficient (Table 2-1 of the HDDM)

S = the slope of the longest flow path, ft/mile

I = the average rainfall intensity, in/hr (the same 'I' as used in Equation 2-1 of the HDDM)

The computed time of concentration is then compared with the assumed time of concentration. If the two values differ significantly, a new time of concentration is selected and a new time of concentration is computed until an acceptable convergence is achieved. This time of concentration is then used in selecting the appropriate rainfall intensity for input into the Rational Equation.

3.2.3 Catch Basin Design Criteria and Assumptions

Design Criteria

The following drainage design criteria applies to the design of the on-site drainage systems for Phase II and can be found in Chapter 600, HIGHWAY DRAINAGE DESIGN (ENGLISH UNIT EQUIVALENCIES) of the ADOT Roadway Design Guidelines (RDG), May 1996:

- The 10-year design storm is applicable for the 202L mainline, flyover ramps and crossroad ramps, as applied in Phase I.
- The 25-year design storm is appropriate for the US60 mainline, as applied in Phase I.
- The allowable ponding spread at the catch basins was established for US60 and 202L, the directional ramps and the service ramps with guidance from ADOT:

Table 3-1: DESIGN SPREAD CRITERIA

Inlet Location	Max. Spread 10-Year Storm	Max. Spread 25-Year Storm
Mainline Outside	16 ft	22 ft
Mainline Inside	14 ft	20 ft
1-Lane Ramps	10 ft	10 ft
2-Lane Ramps	16 ft	22 ft

Note: Some segments have wider than standard shoulders that allow spreads to exceed the values presented in this table.

- The allowable ponding depth at the catch basins is dependent upon the type of curb. For a Type B curb (C-5.10), the allowable ponding depth is 6 inches. For a Type C curb, the allowable ponding depth is 3 inches. For Half-barrier applications, the allowable ponding depth is 6 inches. When a barrier or retaining wall is present, the spread criteria generally control the placement of the catch basin.
- Inlet capture ratios shall comply with Table 606.2 of ADOT's Roadway Design Guidelines manual (RDG).
- Specific restrictions for the various types of inlets as presented in subsection 606.2.B of the RDG shall apply.
- The minimum pipe size for storm drains shall be a 24-inch conduit except that those pipes connecting individual catch basins to trunk lines may be 18 inches.
- The desirable "self cleaning" velocity is 3 feet per second (fps) based on a pipe flowing full. The minimum "self cleaning" velocity based on a pipe flowing full is 2 fps.
- The following pipe design criteria as presented in the ADOT Pipe Selection Guidelines and Procedures document dated February 1, 1996 with March 21, 1996 Revisions shall apply:
  - Pipe roughness values of 0.012 shall be used for all pipes except for non-reinforced cast-in-place concrete pipe (NRCIPCP) that has a pipe roughness value of 0.014.
  - Approved pipe types are reinforced concrete pipe (RCP), non-reinforced concrete pipe (NRCP), non-reinforced cast-in-place concrete pipe (NRCIPCP) and corrugated high-density polyethylene plastic pipe (CHDPEPP) Class "S" up to 42 inches in diameter in fills less than 10 feet.

Catch Basin Selection

The following criteria shall be used in the selection and placement of catch basins within and outside roadways.

- Acceptable types of catch basin for US60, 202L, and the directional and service ramps are ADOT's Standard Drawings C-15.91 and C-15.92. Slotted drains may be required to optimize the systems. Standard locations of inlets, storm drain manholes, and trunk lines are shown in ADOT's Standard Drawing C-13.65.
- In unpaved medians and other locations outside roadways, the ADOT Standard Drawing C-15.80 and C-15.81 - Median flush catch basins shall be used. Modified C-15.80 and C-15.81 (double-grate) catch basins are also utilized in areas where bypass flows are to be minimized. When dikes are required for median and off-road catch basins placed on grade, ADOT Standard Drawing C-13.10 applies.

The criteria presented in the Urban Drainage Design Manual, Hydraulic Engineering Circular No. 22, FHWA, November 1996 (HY-22) shall apply to Phase II.

Placement of Catch Basins

There are several key locations (i.e., back of gore, at sumps, and at super-elevation transitions) where placement catch basins are required to maintain safe driving conditions. The following criteria shall apply:

- The placement of catch basins at the back of gores, sumps, and super-elevation transitions where cross over flow is to be limited to 0.3 cubic foot per second (cfs).
- Limit flow interception at the catch basins to 80% - 85% of the runoff, with the remainder of the flow bypassing to the downstream catch basin. This approach reduces the number of inlets and length of slotted drains required, and subsequently, reduces the cost of the system.

Storm Drain Design Criteria and Assumptions

The following criteria and assumptions were applied in evaluating and modifying existing storm drainage systems and sizing new drainage systems:

- The hydraulic evaluations of the existing and proposed collection systems were performed using the Visual Urban in accordance with the criteria presented in the FHWA HY-22 Manual.
- Sizing the new storm drain laterals and trunk lines was performed using the StormCad hydraulic model.
- Due to uncertainties regarding obtaining reliable water surface elevations at the storm drain outfalls, the tailwater elevations were set at the soffits of the outlet pipes for hydraulic evaluation.
- The computed HGL generated from the StormCad models for each drainage system will be used to determine compliance with ADOT design criteria.

Drainage Ditches and Channels Criteria and Assumptions

The design of the drainage ditches and channels for Phase II are in accordance with the criteria presented in ADOT Roadway Engineering Group Roadway Design Guidelines, Section 608.

The following ADOT criteria have been applied:

- The ditches/channels shall be designed to maintain a stable flow regime.

- The sideslopes shall not be steeper than 3:1 (H/V). Adjacent to roadways without barriers, the sideslopes cannot be steeper that 4:1 (H/V). There shall be a rounded bottom of approximately 4 feet.
- The maximum allowable grade in unpaved channels is based on tolerable velocity for type of vegetation and soil types. The minimum grade is based on achieving velocities to avoid sedimentation. Minimum grade of 0.2 percent is required for earth and grass channels.
- The depth of flows is based on a steady flow in the uniform ditches and channels. The depth of flow is computed based on normal depth criteria using Haested's Flow Master Program.
- The Manning's Equation roughness coefficient 'n-value' has been selected based on channel material.
- Freeboard requirements for the channels are based on the size and locations of the channels, the inflow characteristics, water surface fluctuations, overall soil conditions, and the consequences of overtopping.

Riprap Criteria and Assumptions

The design of riprap protection at the storm drain outlets was based on the following equation:

$$D_{50} = (0.02/TW)(Q/D_o)^{4/3}$$

Where:
- TW = Tailwater depth above the invert of the pipe, feet
- Q = Pipe discharge in cfs for design storm or 25 year, whichever is greater
- D_o = Maximum inside pipe width, feet.

3.3 ON-SITE DRAINAGE DESIGN APPROACH

This section describes the general approach used to design the on-site drainage systems for Phase II. It begins with an overview of the general design approach for Phase II, followed by a discussion of each of the proposed on-site drainage systems. The discussion includes an overview of the proposed drainage system, the approach selected for design, and the results. Only when additions, differences, or exceptions exist will documentation be provided a system.

3.3.1 General Design Approach

The following discussion identifies the pertinent background information, site limitations, and the general criteria and assumptions used to evaluate the existing drainage systems

and design the proposed systems. Any ramifications to the Phase I design caused by the proposed on-site and off-site drainage systems have also been identified.

- The proposed on-site drainage systems as presented in Phase I are the basis upon which the design of the on-site drainage systems for Phase II proceeded.
- An initial evaluation of the existing US60 drainage systems was performed for Phase I using the StormCad hydrologic-hydraulic model, to establish an appropriate storm frequency for the design of the US60 on-site drainage systems. From this earlier evaluation, ADOT determined the 25-year recurrence interval as appropriate for the design of the US60 drainage system including those elements of the directional and service ramp drainage systems that connect to the US60 drainage system. This criterion was applied to the design of the Phase II US60 on-site drainage systems along with those segments of the service and directional ramps that connect to the US60 drainage system.
- The sizes of the existing on-site drainage systems were obtained from as-built drawings while the invert elevations were obtained from field surveys. Several existing drainage structures could not be field verified. As result, these elevations were interpolated from the nearest available information and a note was added to the design drawings at these locations requiring the contractor to field verify prior to construction.
- In anticipation of the future HOV lanes for the segment of the 202L from Southern Avenue south to the US 60/SR 202L TI, the catch basins and laterals crossing the 202L were designed to include flows from the future HOV lanes in establishing their sizes and locations. In addition, the laterals were placed at sufficient depths to allow for repositioning the catch basins to service the future HOV lanes.
- The contributing drainage area for each catch basin has been delineated based on an examination of the roadway plans, profiles, and cross sections. The contributing drainage areas are presented in Appendix B.
- Several segments of the service and directional ramps whose flows were identified in Phase I as contributing to the US60 drainage systems have been finalized in the Phase II. The pipe stub-outs provided in Phase I have been used where applicable.
- A combination of ADOT standard catch basins C-15.91 and C-15.92 supplemented with slotted drains, has been used to capture surface runoff. Off-site catch basins ADOT Standard C-15.80 and C-15.81 and Modified C-15.80 and C-15.81 catch basins have been used for the adjacent drainage areas outside the roadways and within the 202L median.
- The spread calculations performed for the bridge decks and criteria established in Phase I to place catch basins outside the bridge anchors remain applicable. Catch basins have been positioned at the ends of the bridges outside the anchor and approach slabs to control flows onto and off the ramps and the bridges. An

exception is Ramp E-N bridge crossing Southern Avenue where the roadway profile requires placement of a catch basin within the anchor/approach slab. A special detail for the placement of the catch basin within the slab has been prepared.

- Where feasible, on-site flows have been redirected to alternate outfalls to lessen the impact on the Phase I US60 drainage system. Alternate outfalls include redirecting flows to the North Channel, the Phase I Southeast Channel by mean of the trunk line to the south of US60, the Phase I detention basins to the north of US60 and Phase II SE and SW Basins.
- The two infield areas (Basins SE and SW) to the south of the US 60/SR 202L TI have been over excavated to provide borrow material for the project. Lowering the basins' floor elevations prevents gravity discharge to the Southeast Channel. Consequently, these flows have been redirected to the US60 storm drain. Evaluation of the Phase I US60 drainage system determined that a maximum flow of 8 cfs from each basin can be discharged into the US60 storm drain without adversely impacting the system. To control discharge, an 8-inch circular opening orifice plate has been installed at each basin's outlet structure.
- At the west end of Ramp E-N bridge, a MSE retaining wall will be installed preventing the use of catch basins with slotted drains. To collect the flow from this section of the bridge while minimizing the impact on the MSE wall, a series of four catch basins have been positioned with separate outlet pipes directed south away from the MSE wall to a drainage ditch.
- Existing and proposed drainage systems along US60 have been modified and designed to provide safe convenient, access for periodic maintenance. The modifications include "Wye" connections at key locations and installing maintenance manholes along with oversized pipes to provide access to the main trunk line (the existing trunk line will be under the roadway once US60 is widened), abandoning portions of the existing drainage systems and relocating them outside the roadway for safer maintenance access.

3.3.2 US60 West Drainage System No. 1

The existing conveyance system for this segment of US60 serves as the infrastructure for the Phase II on-site drainage system's modifications associated with the roadway widening. The existing collection and conveyance system has been modified to service the segment of US60 from the Sossaman Channel (Sta. 930+00) west to the Clearview Avenue (Sta. 884+00) and the reconstructed Sossaman Road Ramps A and B. The segment of US60 from the Sossaman Channel west to Sossaman Road (Sta. 917+00) was designed in Phase I, while the remaining segment has been designed in Phase II.

Design Approach

The design approach used for the proposed on-site drainage system to serve this segment of US60 is as follows:

- This segment of the US60 on-site drainage system was designed for the 25-year storm event.
- The approach for this segment assumes the removal of the existing catch basins and the extending the existing laterals to the new roadway edges. Also, several existing laterals paralleling US60 will continue to be used, once the existing catch basins have been removed and replaced with new pipe sections as detailed on the design plans. New laterals and catch basins have been provided to service reconstructed Sossaman Road Ramps A and B.
- A StormCad model was used to evaluate the adequacy of the existing conveyance system to service the new flows and to size the new conveyance system's components. The contributing areas and runoff coefficients were taken from the catch basins calculations. The StormCad model is included in Appendix B.

Results

The previous WinStorm analysis performed during the 30% stage indicated all but two segments of the existing trunk line had sufficient capacity to handle the new flows. Review of the WinStorm output did not indicate any violations of vertical clearance requirement between the water surface elevations and the bottoms of the catch basin grates. The laterals had sufficient capacity, but operate under temporary surcharge conditions.

The hydraulic analysis for final design was performed using the StormCad program with updated runoff input. The cumulative CA-value and time of concentration for the Phase I design of the upper end of the US60 drainage system to the east of Sossaman Road were input into the StormCad model. As with the earlier analysis, the starting water surface elevation was the soffit of the outlet pipe. The StormCad analysis indicated that the existing trunk line had sufficient capacity to handle the design flows with most of the trunkline operating under gravity flow conditions. Review of the hydraulics of the laterals did not indicate any violations of vertical clearance between the water surface elevation and the bottoms of the catch basin grate of 6-inches.

The 30% WinStorm model used an overly cautious approach of inputting the catch basin's intercepted flows into the model, then routing the flows through the conveyance system. The final design approach used the CA-values from the contributing areas and their time of concentration values that generates more realistic flows through the system along with improved representation of the system's hydraulics.

3.3.3 US60 West Drainage System No. 2

The existing conveyance system for this segment of US60 serves as the infrastructure for the Phase II on-site drainage system modifications associated with the roadway's widening. This system has been modified to serve the segment of the proposed US60 roadway improvements from Clearview Avenue (Sta. 884+00) west to the project limits at Power Road (Sta. 865+00) and includes the reconstructed Power Road Ramps C and D.

This drainage system continues west as a closed conduit system serving US60 until it outfalls into the North Channel at approximately Sta. 843+09.

Design Approach

The following approach was used in developing the proposed on-site drainage system for this segment of US60:

- This segment of the US60 on-site drainage system has been designed for the 25-year storm event.
- The approach for this segment of US60 assumes the removal of the existing catch basins and extension of the existing laterals to the new roadway edges. Several sections of the existing laterals paralleling this segment of US60 will continue to be utilized for conveyance once the existing catch basins have been removed and replaced with new pipe sections as detailed on the design plans. Existing laterals include new catch basins and outlet pipes at specific locations connecting to the laterals using "Wyes" to allow access for periodic maintenance. New laterals have been extended to serve the reconstructed Power Road Ramps C and D.
- A StormCad model was used to evaluate the adequacy of the existing conveyance system to handle the new flows and to size the new conveyance system's components. The contributing areas and runoff coefficients were taken from catch basin calculations. The StormCad analysis is included in Appendix B.

Results

The WinStorm analysis performed during the 30% stage indicated that most of the existing trunk line lacked the capacity to handle the 25-year storm event. A review of the WinStorm results indicates that the laterals are adequately sized, but like the trunk line operate under temporary surcharge conditions due to the undersized trunk line and the assumed tailwater elevation.

The hydraulic analysis for the final design was performed using the StormCad program with updated runoff input.. As with the earlier analysis, the starting water surface elevation was the soffit of the outlet pipe.

The StormCad analysis indicated that the existing trunk line had sufficient capacity to handle the design flows with the trunkline operating under gravity flow conditions. Review of the hydraulics of the laterals did not indicate any violations of vertical clearance between the water surface elevations and the bottoms of the catch basin grates of 6-inches.

The 30% WinStorm model used an overly cautious approach of inputting the catch basin's intercepted flows into the model, then routing the flows through the conveyance system. The final design approach uses the CA-values from the contributing areas and their time of concentration values that generates more realistic flows through the system along with an improved representation of the system's hydraulics.

3.3.4 US60 East Drainage Systems

The existing conveyance systems serve as the infrastructure for the proposed on-site drainage systems for the segment of US60 from west of Ellsworth Road (Sta. 1000+00) east to Crismon Road. Several of the proposed on-site drainage systems include new laterals to serve the reconstructed Ellsworth Road Ramps A, C, and D and the Crismon Road Ramps A and B. Several laterals paralleling US60 have been abandoned and plugged; new laterals have been placed outside the new roadway to provide maintenance access.

Eight on-site drainage systems have been identified to handle pavement runoff for this segment of US60. The designations assigned to the new on-site drainage systems correlate with the existing drainage system designations presented earlier in the report. The following table identifies the eight proposed on-site drainage systems, their boundaries, and the locations of the outfalls. Both the US60 westbound and eastbound drainage boundaries have been specified to accurately identify the contributing areas for each system. The remaining individual catch basins are discussed at the end of this section.

Table 3-2
NEW US60 DRAINAGE SYSTEM BOUNDARIES FROM WEST OF ELLSWORTH ROAD EAST TO CRISMON ROAD

Drainage System Designation	Upstream Boundary[1] (Sta.)	Downstream Boundary[1] (Sta.)	Outfall Location
1	1035+80 EB 1037+70 WB	1000+00 EB 1000+00 WB	Continuation of Phase I US60 drainage system.
2	1049+50 EB 1049+50 WB	1037+70 EB 1037+70 WB	Drains south to existing drainage ditch.
3	1055+25 EB 1055+25 WB	1049+50 EB 1049+50 WB	North to the North Channel.
4	1062+77 EB 1062+52 WB	1055+25 EB 1055+25 WB	North to the North Channel.
5	1070+50 EB 1065+19 WB	1062+77 EB 1062+52 WB	North to the North Channel.
6	1068+50 WB 19+65[2]	1065+19 WB 16+64[2]	North to the North Channel.
7	19+65[2]	25+65[2]	North to the North Channel.
8	29+70[3]	21+68[3]	Connects to existing drainage system along Crismon Road.

[1] Stationing refers to US60 Median Centerline.
[2] Stationing refers to Crismon Road Service Ramp A.
[3] Stationing refers to Crismon Road Service Ramp B.

Several individual catch basins have been relocated to the new pavement edges and are not addressed in this section. These individual catch basins represent the gaps in the above table drainage boundaries stationing. The layout of the new on-site drainage systems and the individual catch basins are presented on the drainage plans in Appendix C.

Design Approach

The following approach applies to the eight drainage systems and the individual catch basins for this segment of US60:

- This segment of the US60 on-site drainage system has been designed for either the 10-year or the 25-year storm event depending on ADOT design criteria.

- The approach for this segment of US60 assumes the removal of the existing catch basins and the extension of the existing laterals to the new roadway edges. Several of the laterals paralleling US60 will continue to be utilized as conveyance systems, with the existing catch basins removed and replaced with pipe sections as detailed on the design plans.
- New laterals have been provided to handle runoff from the reconstructed Ellsworth Road Ramps A, C, and D, Crismon Road Ramps A and B, as well as where existing laterals have been abandoned to improve maintenance access.
- StormCad evaluations have been performed for the eight drainage systems. The models have been used to assess the adequacy of the existing conveyance systems to handle the new flows and to size the new conveyance components. The contributing areas and associated runoff coefficients from the catch basins computations have been input into the StormCad models. The catch basin computations are presented in Appendix B.

Results

The following discussion summarizes the modifications to the eight existing on-site drainage systems for this segment of US60. The results of the StormCad analyses are included in Appendix B.

US60 East Drainage System No. 1

The modification to the existing drainage system for this segment of US60 is the upstream end of the Phase I US60 drainage system. The starting water surface elevation for the StormCad model was provided by consultants Parsons Brinckerhoff for Phase I.

The WinStorm analysis completed during the 30% stage indicated that the existing conveyance system has adequate capacity. The final StormCad analysis supports this conclusion. This section of the trunk line operates under gravity flow conditions. Review of the connecting laterals indicates compliance with ADOT's criteria of a 6-inch clearance between the hydraulic profiles and the bottoms of the catch basins grates.

The initial design called for the Ellsworth Road storm drain running south to north along the west right-of-way to be redirected to the proposed drainage ditch to be extended from the Phase I Southeast Channel. However, field investigations indicated that the invert elevation of the trunk line is below the proposed drainage ditch flow line. As a result, the drainage system was reconnected to the US60 drainage system. Flow from this system was included in the StormCad analysis and does not adversely impact this segment of the US60 trunk line.

Drainage from this segment of US60's westbound lanes including the east end of Ramp W-S, is directed to the US60 drainage system. Drainage from the US60 eastbound lanes

is directed south to the new trunk line implemented in Phase I, which outlets into the Southeast Channel.

The US60 trunk line has been extended to the east to Sta. 1034+00 to service Ellsworth Road Ramp C. The lateral at Sta. 1028+50 has been extended south to service Ramp D.

New laterals reconnect to the existing catch basins serving both ends of the Ellsworth Road bridge. A lateral to the south of US60 required placement within US60 eastbound lanes to avoid interfering1 with the Ellsworth Road south bridge abutment wall, which is positioned immediately behind the roadway barrier.

A maintenance manhole has been installed at Sta. 1020+60 on the US60 trunk line at the request of ADOT maintenance. The manhole is located adjacent to the Ramp W-S gore area to allow a vehicle to park outside the travel lanes.

An existing off-site catch basin to the north of Ellsworth Road Ramp C has been removed and the runoff redirected to the existing drainage system to the north. This system continues west beneath Ellsworth Road with discharge into the North Channel. Any excess runoff will pond temporarily within the right-of-way until the conveyance system can accommodate it.

US60 East Drainage System No. 2

The drainage system primarily continues to use the existing conveyance system's infrastructure. The existing lateral paralleling the eastbound lanes will continue to be utilized along with new catch basins located at the roadway edge and reconnected to the lateral. The existing catch basins on this lateral are to be removed and replaced with new pipes. The existing lateral crossing US60 at approximately Sta. 1037+70 will continue to be utilized to handle runoff for this segment of the westbound lanes. The two remaining laterals to the east are to be abandoned in-place and plugged. A new lateral will be installed at the east end of Ellsworth Road Ramp D. The conveyance system outlet has been extended south outside the new roadway embankment.

The StormCad analysis indicates the existing conveyance system is adequate and operates in gravity flow conditions.

US60 East Drainage Systems No. 3

The on-site drainage system will continue to utilize primarily the existing conveyance system infrastructure. Two existing laterals crossing US60 has been extended to the new pavement edges and new catch basins installed. The lateral parallel to the US60 westbound lanes has been removed and a new lateral provided at the new roadway edge. This decision was based on providing access to the system for periodic maintenance at the request of ADOT Maintenance. The existing off-road catch basin has been relocated

outside the new roadway embankment. The existing outfall line to the North Channel will continue to be utilized.

The StormCad analysis indicates that the downstream end of the existing drainage system will operate under temporary surcharge conditions while the upstream end will operate under gravity flow conditions. Review of the hydraulic profile does not indicate any violations between elevations of the catch basins grates and the water surface elevations.

US60 East Drainage Systems No. 4

The on-site drainage system will use primarily the existing conveyance system's infrastructure. Two existing laterals have been extended to the new roadway edges with catch basins installed. The lateral parallel to the US60 westbound lanes has been removed and a new lateral provided at the new roadway edge. Again, this decision was based on providing access to the drainage system for periodic maintenance at the request of ADOT Maintenance. The existing off-road catch basin has been relocated outside the new roadway embankment. The existing outfall line to the North Channel continues to be utilized.

The StormCad analysis indicates the existing drainage system is adequate and will operate under gravity flow conditions. Review of the hydraulic profile does not indicate any violations between elevations of the catch basins' grates and the water surface elevations.

US60 East Drainage System No. 5

The on-site drainage system will continue to utilize the existing conveyance system's infrastructure. The existing lateral at approximately Sta. 1063+00 has been extended south to the new pavement edge to install a catch basin to collect runoff from the west end of Crismon Road Ramp B. Another catch basin has been installed upstream from US60 eastbound lanes gore to intercept flows before it can cross onto Crismon Road Ramp B. The existing outfall line to the North Channel continues to be utilized.

The StormCad analysis indicates the existing drainage system is adequate and will operate under gravity flow conditions. Review of the hydraulic profile does not indicate any violations between elevations of the catch basins' grates and water surface elevations.

US60 East Drainage System No. 6

The on-site drainage system will continue to use the existing outfall line at approximately Sta. 1065+55. A new catch basin has been provided upstream from the US60 westbound gore to intercept flow before it can cross onto Crismon Road Ramp A. A new catch basin

has been positioned over the existing lateral to collect runoff from the west end of Ramp A.

The StormCad analysis indicates the new upstream section of the drainage system will operate under gravity flow conditions.

US60 East Drainage System No. 7

A catch basin has been provided at the east end of the Crismon Road Ramp A to minimize bypass flows onto Crismon Road. The catch basin is positioned over the existing Crismon Road drainage system outfall line. A new drainage system has been provided to collect runoff for the segment of US60's westbound lanes east to Crismon Road and the infield area between US60 and Ramp A. The drainage system connects to the existing Crismon Road drainage system. Flows from this drainage system and System No. 8 combine with the Crismon Road drainage system to discharge into the North Channel.

The StormCad analyses for this drainage system and the existing Crismon Road drainage system are included with the East Drainage System No. 8. The analysis indicates this segment of the conveyance system is operating under gravity flow conditions.

US60 East Drainage System No. 8

A new drainage system has been provided to collect runoff from this segment of the US60 eastbound lanes and the east end of Crismon Road Ramp B. The drainage system connects to the existing Crismon Road drainage system at an existing inlet structure in the infield area.

The StormCad analysis for this drainage system includes East Drainage System No. 7 and the existing Crismon Road drainage system. The analysis indicates the section along Crismon Road is operating under temporary surcharge conditions. The remaining system is operating under gravity flow conditions.

Individual Catch Basins

Two catch basins are located at US60 Med. Sta. 1045+00 and Sta. 1047+25 and discharge to a drainage ditch that conveys the flows west to an existing drainage swale. The flows continue overland to an existing drainage system to the east of Ellsworth Road that conveys flows west to the North Channel.

3.3.5 202L Freeway Drainage Systems

The seven drainage systems for the segment of the 202L Freeway begin north of the Southern Avenue bridge and extend south to the Baseline Road bridge.

In addition to this segment of the 202L, the drainage systems include sections of directional Ramps S-W, E-S, W-N, W-S, and N-E at the transitions to and from the 202L freeway. There are no existing drainage systems along this segment of the 202L freeway.

All stationing presented in this section refer to the 202L Freeway median stationing unless otherwise noted.

StormCad analysis was not performed for the smaller drainage systems (single and double catch basin systems); a check of flows along with the minimum pipe sizes required by ADOT indicate that the pipes are oversized for the projected flows.

Design Approach

The following approach was used in the design of the drainage systems for this segment of the 202L Freeway:

- The drainage systems for this segment of the 202L freeway have been designed for the 10-year storm event.
- Runoff entering the US 60/SR 202L TI southeast and southwest infield areas is collected and regulated by vertical circular orifice plates attached to the outlet structures. A maximum allowable discharge from each infield area into the US60 drainage system has been set at 8 cfs based on the Phase I US60 drainage system StormCad analysis.
- The median catch basins along the super elevated section of the freeway will handle both median and roadway runoff from the 202L eastbound lanes during the interim.
- The median catch basins and laterals have been designed to provide sufficient flexibility to allow repositioning once the HOV lanes are implemented. The conveyance systems have been checked to insure that adequate capacity will be available to accommodate the additional runoff from the HOV lanes. Dependent on flows, double catch basins have been utilized at several locations. A special detail has been included in the design drawings. Dikes have been provided to improve interception and minimize bypass flows.
- Runoff from the drainage systems to the north of US60 will go either to the Phase I upper and lower northeast detention basins (NE-1 and NE-2), to the Phase I

Northwest basins (NW-1 and NW-2), or to a proposed drainage ditch running from Southern Avenue south to the upper northeast detention basin (NE-1).

- The on-site drainage systems to the south of US60 will convey flows to the US 60/SR 202L TI southeast and southwest infield areas (Basins SW and SE).
- Because of the high velocities at the outlets, riprap splash pads have been provided.

Results

The designs of the drainage systems for this segment of the 202L Freeway are discussed in the following sections. The catch basins computations and StormCad analyses are included in Appendix B. The design of the drainage ditches and the riprap energy dissipaters are included in Appendix B.

202L Freeway Drainage System No. 1

The drainage system handles the segment of the 202L Freeway and Ramp E-N from the roadway high point north of Southern Avenue to the south end of the Southern Avenue bridges. The drainage system outlets eastward to a drainage ditch that conveys flows south to Basin NE-1.

A catch basin and an outlet pipe have been placed at the north end of the Ramp E-N bridge over Southern Avenue. Because it is within the approach and anchor slab sections, a special detail has been provided. The catch basin discharges into the Southern Avenue detention basin.

202L Freeway Drainage System No. 2

The on-site drainage system handles the segment of the 202L Freeway as shown in the above table and includes the north portion of Ramp W-N. The system includes two laterals beginning at the median and crossing beneath 202L westbound lanes. The two laterals connect to another lateral running south along the east pavement edges of the freeway and Ramp W-N. The lateral turns east and outlets into the northwest corner of Basin NE-1.

To accommodate the vertical grade separation from the super elevation through this section of the 202L eastbound and westbound lanes, the median catch basins have been shifted to the west of the median centerline. This condition also applies to Systems 3 and 4. The median drainage system includes both single and double catch basins.

The StormCad analysis determined that a 24-inch diameter conveyance can handle the 10-year flows with some temporary surcharging at the upstream end.

202L Freeway Drainage System No. 3

The drainage system is located at 202L Median Sta. 1436+70 and handles runoff from the eastbound lanes and the median. The drainage system outlets to the east and is conveyed overland to Basin NE-2.

The StormCad analysis indicates that a 24-inch diameter conveyance system is needed.

202L Freeway Drainage System No. 4

The drainage system is located at 202L Median Sta. 1440+25 and handles runoff from the eastbound and westbound lanes for this segment of the freeway, including the median. The drainage system outlets to the drainage ditch which enters the north end of the upper northeast basin NE-2.

The StormCad analysis indicates that a 24-inch diameter conveyance system is needed.

202L Freeway Drainage System No. 5

The drainage system is located in a low point at 202L Med. Sta. 1445+83 and handles the 202L eastbound and westbound lanes and the median. Discharge is eastward into the lower northeast basin NE-2. The drainage system is positioned to capture roadway and median runoff before the bridges. Some minor grading in the median is required to redirect flows away from the bridge abutment north to the catch basin.

The StormCad analysis indicates that a 24-inch diameter conveyance system is needed.

202L Freeway Drainage System No. 6

This drainage system is located at 202L Median Sta. 1457+72 collects and conveys runoff from the median and the eastbound lanes. The conveyance system discharges west to Basin SW.

The StormCad analysis indicates that a 24-inch diameter conveyance system is needed.

202L Freeway Drainage System No. 7

The drainage system is located at the low points (sumps) for the eastbound and westbound lanes and the median. As a result, the conveyance system is aligned at a skew as it crosses the 202L to match the low points. The conveyance system discharges into the south corner of Basin SE.

The StormCad analysis indicates that a 24-inch diameter conveyance system is needed.

Catch basins and outlet pipes are located at 202L Median Sta. 1453+80, Sta. 1459+38 and Sta. 1460+22 and discharge into Basins SE and SW.

3.3.6 Directional Ramps

This section summarizes the on-site drainage systems for the Phase II directional Ramps E-N, S-E, S-W, N-E, W-N, W-S and Ellsworth Road Ramps A and B.

Approach

The following approach was used in the design of the on-site drainage systems for these ramps:

- Spread computations are in compliance to the criteria presented in Table 3-1.
- Spread calculations indicate the catch basins can be located outside the ramps' bridges approach/anchors slabs.
- Those drainage systems connecting to the Phase I US60 drainage system have utilized the stub-outs provided in Phase I when ever possible.

The catch basins computations are presented in Appendix B. The designs of the drainage ditches and the riprap splash pads are included in Appendix B.

Ramp E-N

The drainage system for Ramp E-N is a series of individual catch basins and outlet pipes located on the embankment sections of the ramp. As discussed earlier, a catch basin is located within the north approach/anchor slabs of the bridge crossing Southern Avenue because of a sump condition. A special detail has been provided to integrate this catch basin with the approach/anchor slabs.

The following discussion summarizes the placement of the catch basins along Ramp E-N.

- A series of six catch basins are provided for the section of the ramp from the US60 transition east to the west end of the ramp bridge. Four catch basins are located immediately west of the bridge to intercept runoff from the bridge. Because of the impact slotted drains would have on the structural integrity of the MSE retaining wall, four single closely spaced catch basins are required to intercept the flow prior to the roadway's super-transition. Each catch basin

required a separate outlet pipe leading away from the MSE wall. Two remaining catch basins to the west are positioned to intercept the ramp's remaining runoff. The runoff is collected in a v-shaped drainage ditch and conveyed west to an off-road catch basin. A conduit extends north under the existing soundwall and connects to a 36-inch diameter storm drain installed in Phase I. The crossing will require dismantling a section of the soundwall and constructing a bond beam in the foundation to protect the pipe. A special detail has been provided. The existing 36-inch storm drain continues west along the US60 south right-of-way to the Sossaman Channel. Review of the storm drain hydraulics indicates sufficient capacity to accept the additional runoff.

- Two catch basins are located along the ramp from the north end of the ramp's bridge to the south end of the Southern Avenue bridge. Both catch basins discharge eastwardly to a drainage ditch that conveys flows south to Basin NE-1. Riprap splash pads have been provided at the outlets. The drainage ditch is v-shaped with 3:1 (H:V) side slopes.

Ramp S-E

The drainage system for Ramp S-E includes both individual catch basins and several small drainage systems.

The following discussion summarizes the drainage systems for Ramp S-E:

- The small drainage system at the low point at Sta. 22+12 is conveyed west to Basins NW-1. The catch basin at Sta. 25+00 also discharges west into Basin NW-1. Both systems include splash pads at their outlets. The systems handle runoff for the north end of the ramp.
- A single catch basin at Sta. 57+90 collects runoff from the southeast elevated section of the ramp and directs it north into a drainage ditch. The flows are conveyed west to a culvert that outlets into Basin SE.
- A combination roadway and off-road drainage system is located upstream from the ramp's gore transition to Ramp N-E at Sta. 63+65. The drainage system outlets south to the Phase I storm drain, which connects to the Southeast Channel.
- A series of catch basins and outlet pipes are positioned along the ramp transition to US60's eastbound lanes to collect and convey flows south to the Phase I storm drain.

Ramp S-W

Ramp S-W has three catch basins positioned along the ramp. Two catch basins outlet into Basin NW-1, while the third basin connects to the existing US60 trunk line. An off-

road catch basin is placed at the west end of the ramp to collect runoff between the soundwall and the ramp.

At the north end, as the ramp transitions from the 202L eastbound lanes, there is a super elevation transition as the ramp rolls over. A catch basin has been provided at this location to limit the crossover flow to 0.3 cfs. A riprap splash pad has been provided at the outlet.

Ramp N-E

Three catch basins are positioned along Ramp N-E. Roadway and off-road catch basins at Sta. 40+66 connect to the Phase I drainage system's Southeast Channel.

The catch basin at Sta. 37+00 outlets at the toe of the ramp's embankment then flows overland to the Phase I Southeast Channel. A riprap splash pad has been provided at the outlet.

At the east end of the ramp, the catch basin at Sta. 16+35 intercepts runoff upstream of the ramp's transition with Ramp S-E. The system outlets south to the Phase I storm drain.

Ramp W-N

Three catch basins are positioned along the transition of Ramp W-N onto the 202L westbound lanes. These catch basins are included in 202L Drainage System No. 3. The combined flows are directed to Basin NE-1.

On-road and off-road catch basins are located at Sta. 25+81 to collect runoff from the north end of the ramp and the area between the ramp and the soundwall. The flows discharge northeast into Basin NE-2. A riprap splash pad has been provided at the outlet.

The drainage system at Sta. 35+80 includes two catch basins serving Ramp W-S, upstream of the ramp's transition. The drainage system connects to a pipe stub-out from the North Channel provided in Phase I.

Ramp W-S

Ramp W-S transitions from the US60 westbound lanes to the west of Ellsworth Road and continues west towards 202L before it turns southwest and crosses over US60 converging into 202L Freeway at Baseline Road.

The drainage systems are positioned along Ramp W-S at low points, super elevation transitions, and as needed to comply with spread criteria. The drainage systems were designed based on the 10-year or 25-year storm events depending on applicable ADOT criteria. If the outfall goes into the US60 drainage system, the system has been designed for the 25-year event. Otherwise, the 10-year event applies.

The drainage systems for Ramp W-S are summarized below:

- The drainage system at Sta. 20+87 is located at a low point. The system connects to the US60 storm drain. The drainage system also handles runoff from adjacent off-road areas on both sides of the ramp. Drainage swales have been provided to direct the runoff into the off-site catch basins, thereby minimizing flow onto the roadway.
- To the east at Sta. 18+90, roadway and off-site catch basins have been provided to intercept runoff from the US60 westbound lanes' transition to Ramp W-S and runoff from the infield area between US60 and Ellsworth Road Ramp A. The conveyance system connects to the US60 storm drain.
- The catch basins at Sta. 36+16 and Sta. 37+40 will collect runoff entering the low point and convey it to the US60 storm drain. Although the drainage systems are located in a sump, the flows will overtop the roadway and flow onto US60 before reaching the threshold ponding depth of 29-inches, which would require design for the larger event. As a result, the catch basins have been positioned and sized for the 10-year event. Off-road catch basins are provided in the sump on both sides of the road to collect runoff from the cut banks on both sides of the ramp.
- The catch basins at Sta. 44+20 and Sta. 45+50 intercept runoff prior to the super elevation's transition as well as upstream from the gore area of Ramp W-N. The drainage system connects into the Ramp N-W system and discharges into the North Channel.
- Three catch basins are positioned at Sta. 75+04, Sta. 79+16 and Sta. 82+00 to intercept runoff at the south end of Ramp W-S. The catch basins connect to the Phase I 202L drainage systems. In accordance with the Phase I concept, two off-road catch basins to collect runoff from the infield area between 202L eastbound lanes and Ramp W-S.

3.3.7 Ellsworth Road Ramp A

Ellsworth Road Ramp A has five catch basins that either connect to the existing storm drain to the north that discharges into the North Channel or into the US60 storm drain.

Approach

Those catch basins connecting into US60 storm drain have been designed for the 25-year event. Those catch basins that outlet into the North Channel have been designed for the 10-year event.

Results

The conveyance systems for the catch basins at Sta. 32+28 and Sta. 29+80 connect to an existing closed conduit drainage system to the north. The remaining catch basins at Sta. 23+40, Sta. 20+00 and Sta. 16+26 either connect into the US60 storm drain by means of stub-outs provided in Phase I or directly into the storm drain by means of pipe collars or tees.

3.3.8 Ellsworth Road Ramp B

Approach

The following approach was used for the design of the drainage systems for Ellsworth Road Ramp B.

- The drainage systems have been designed for either the 10-year or 25-year events, depending on whether the systems connect to the US60 storm drain. If the drainage system connects to the Phase I US60 drainage system, the conveyance system has been sized for the 25-year storm; otherwise, the 10-year event applies.
- The "*twelve foot dry lane corridor*" and "*one lane continuity*" spread criteria apply to this ramp, as defined in Section 3.2.3.
- A proposed culvert, designated Pipe 606, has been located beneath the ramp at Sta. 28+30. The culvert conveys runoff from the infield area from the Ramp S-E embankment by means of a drainage ditch before discharging into Basin SE. The culvert also collects roadway and off-road runoff for a section of Ellsworth Road Ramp B.

Results

The section of Ramp B as it transitions from the US60 eastbound lanes to Sta. 28+80 connects to the US60 storm drain by means of a stub-out provided in Phase I. The drainage system includes both roadway and off-road catch basins. This system also handles a regulated flow of 8 cfs from Basin SE. The conveyance system has been sized for the 25-year storm.

The drainage system for this section of the ramp from Sta. 28+80 east to Sta. 33+80, including the infield area between Ramp S-E and this ramp, connects to the culvert at Sta. 28+80. Off-site catch basins have been provided on both sides of the ramp to service the infield areas. Riprap bank protection is provided to the north for runoff between Ramps S-E and N-E.

Three catch basins service the remaining eastern section of Ramp B and connect to the storm drain trunk line to the south.

3.4 SUMMARY

The following summarizes the proposed on-site drainage systems for Phase II of the US 60/SR 202L System TI:

- US60 West Drainage System No. 1 utilizes the existing US60 storm drain with modifications and realignment of the laterals to accommodate the roadway widening and the realignment of Powers Ramps C and D. Several "wye" connections have been installed at strategic locations for maintenance access.
- US60 West Drainage System No. 2 utilizes the existing US60 storm drain with modifications and realignment of the laterals to accommodate the roadway widening and the realignment of the ramps at Sossaman Road. Several "wye" connections have been installed to provide maintenance access. Two larger diameter pipe connections to the trunk line along with access manholes outside the roadway have been included for maintenance access at the request of ADOT Maintenance.
- US60 East Drainage Systems No. 1 to 8 for the segment of US60 from west of Ellsworth Road eastward to Crismon Road continues to utilize primarily the US60 storm drain and lateral infrastructures. The collection and conveyance systems have been extended to the new roadway edges.
- New on-site drainage systems have been provided for the segment of 202L from Southern Avenue south to Baseline Road. North of US60, the drainage systems discharge either east into Basins NE-1 and NE-2 or west into Basins NW-1 and

NW-2. South of US60, drainage systems discharge either into the Southeast Channel or into Basins SE and SW.

- The drainage systems for the section of Ramp W-S to the east of the 202L outlet either into the North Channel or into the US60 storm drain.
- The drainage systems at the west end of Ramp E-N discharge into the Phase I trunk line that outlets to the Sossaman Channel. The trunk line has adequate capacity to accept the additional flows.
- Directional Ramps S-W, N-E, E-N, W-N, and S-E and Ellsworth Road Ramps A and B have new drainage systems. Wherever possible, flows from these ramps have been directed away from the US60 storm drain.

4 REFERENCES

Arizona Department of Transportation, *Highway Drainage Design Manual, Volume I -Hydrology,* March 1993.

Arizona Department of Transportation, Roadway Engineering Group *Roadway Design Guidelines, May 1996.*

Arizona Department of Transportation, Intermodal Transportation Division, Pipe *Selection Guidelines and Procedures,* February 1, 1996, with March 21, 1996 revisions.

DMJM+Harris, *202L/US60 System Traffic Interchange, Phase II, Initial Drainage Report (Stage II Design),* August 2002.

Federal Highway Administration, *Hydraulic Design Series No. 5, Hydraulic Design of Highway Culverts*, September 1985.

Federal Highway Administration, *Hydraulic Engineering Circular No. 12, Drainage of Highway Pavements*, March 1984.

Federal Highway Administration, *Hydraulic Engineering Circular No. 14, Hydraulic Design of Energy Dissipaters for Culverts and Channels*, September 1983.

Federal Highway Administration, *Urban Drainage Design Manual Hydraulic Engineering Circular* No. 22, August 2001 (HY-22).

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona, Volume I Hydrology,* June 1992, revised January 1995.

Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Arizona, Volume // Hydraulics,* November 1991, revised September 1992.

Parsons Brinckerhoff/Aztec, 202L/US60 *Traffic Interchange, Phase I Final Drainage Report (Stage Design),* April 4, 2003.

U. S. Army Corps of Engineers, *HEC-1 Flood Hydrograph Package User's Manual,* Hydrologic Engineering Center, September 1990.

U. S. Army Corps of Engineers, HEC-RAS Computer Program, Version 3.1.1, May 2003.

Rating Curve Calculations for Southern Avenue Detention Basin Outlet Structure

APPENDIX A

OFF-SITE DRAINAGE CALCULATIONS

Southern Avenue
Detention Basin

CURRENT DATE: 11-26-2003
CURRENT TIME: 11:55:56

FILE DATE: 11-26-2003
FILE NAME: SRTSOUT2

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS	SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1444.00	1437.85	984.02	1	RCB	10.00	6.00	.013	CONVENTIONAL
2									
3									
4									
5									
6									

SUMMARY OF CULVERT FLOWS (cfs) FILE: SRTSOUT2 DATE: 11-26-2003

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1444.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1446.17	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1447.47	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1448.64	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1449.73	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1450.81	500.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1451.95	600.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1453.18	700.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1453.84	750.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1456.06	900.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1458.02	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SRTSOUT2 DATE: 11-26-2003

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1444.00	0.000	0.00	0.00	0.00
1446.17	0.000	100.00	0.00	0.00
1447.47	0.000	200.00	0.00	0.00
1448.64	0.000	300.00	0.00	0.00
1449.73	0.000	400.00	0.00	0.00
1450.81	0.000	500.00	0.00	0.00
1451.95	0.000	600.00	0.00	0.00
1453.18	0.000	700.00	0.00	0.00
1453.84	0.000	750.00	0.00	0.00
1456.06	0.000	900.00	0.00	0.00
1458.02	0.000	1000.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

NT DATE: 11-26-2003 FILE DATE: 11-26-2003
NT TIME: 11:55:56 FILE NAME: SRTSOUT2

PERFORMANCE CURVE FOR CULVERT 1 - 1(10.00 (ft) BY 6.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1444.00	0.00	-6.11	0-NF	0.00	0.00	0.00	0.04	0.00	0.00
100.00	1446.17	2.17	-2.28	1-S2n	1.14	1.46	1.06	1.56	9.42	3.45
200.00	1447.47	3.47	-1.42	1-S2n	1.82	2.32	1.72	2.30	11.62	4.31
300.00	1448.64	4.64	-0.35	1-S2n	2.39	3.04	2.34	2.88	12.81	4.88
400.00	1449.73	5.73	0.96	1-S2n	2.92	3.68	2.93	3.36	13.66	5.32
500.00	1450.81	6.81	2.53	1-S2n	3.42	4.28	3.38	3.79	14.81	5.68
600.00	1451.95	7.95	4.37	1-S2n	3.91	4.83	3.83	4.17	15.68	5.99
700.00	1453.18	9.18	6.47	5-S2n	4.37	5.35	4.38	4.52	15.97	6.25
750.00	1453.84	9.84	7.62	5-S2n	4.60	5.60	4.50	4.69	16.66	6.38
900.00	1456.06	12.06	11.33	6-FFc	5.28	6.00	5.28	5.16	17.05	6.71
1000.00	1458.02	13.74	14.02	6-FFc	6.00	6.00	6.00	5.44	16.67	6.91

El. inlet face invert 1444.00 ft El. outlet invert 1437.85 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

* SITE DATA ***** CULVERT INVERT **********

INLET STATION	984.00 ft
INLET ELEVATION	1444.00 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1437.85 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0063
CULVERT LENGTH ALONG SLOPE	984.02 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	6.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	1:1 BEVEL (45 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 11-26-2003 FILE DATE: 11-26-2003
CURRENT TIME: 11:55:56 FILE NAME: SRTSOUT2

TAILWATER

******* REGULAR CHANNEL CROSS SECTION ****************

BOTTOM WIDTH	16.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.001
MANNING'S n (.01-0.1)	0.016
CHANNEL INVERT ELEVATION	1437.89 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1437.85 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1437.89	0.000	0.00	0.00	0.00
100.00	1439.41	0.492	1.52	3.45	0.09
200.00	1440.15	0.505	2.26	4.31	0.14
300.00	1440.72	0.511	2.83	4.88	0.18
400.00	1441.21	0.515	3.32	5.32	0.21
500.00	1441.64	0.517	3.75	5.68	0.23
600.00	1442.02	0.519	4.13	5.99	0.26
700.00	1442.37	0.520	4.48	6.25	0.28
750.00	1442.54	0.521	4.65	6.38	0.29
900.00	1443.01	0.523	5.11	6.71	0.32
1000.00	1443.29	0.524	5.40	6.91	0.34

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	0.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1333.00 ft

PARSONS BRINCKERHOFF
COMPUTATION SHEET

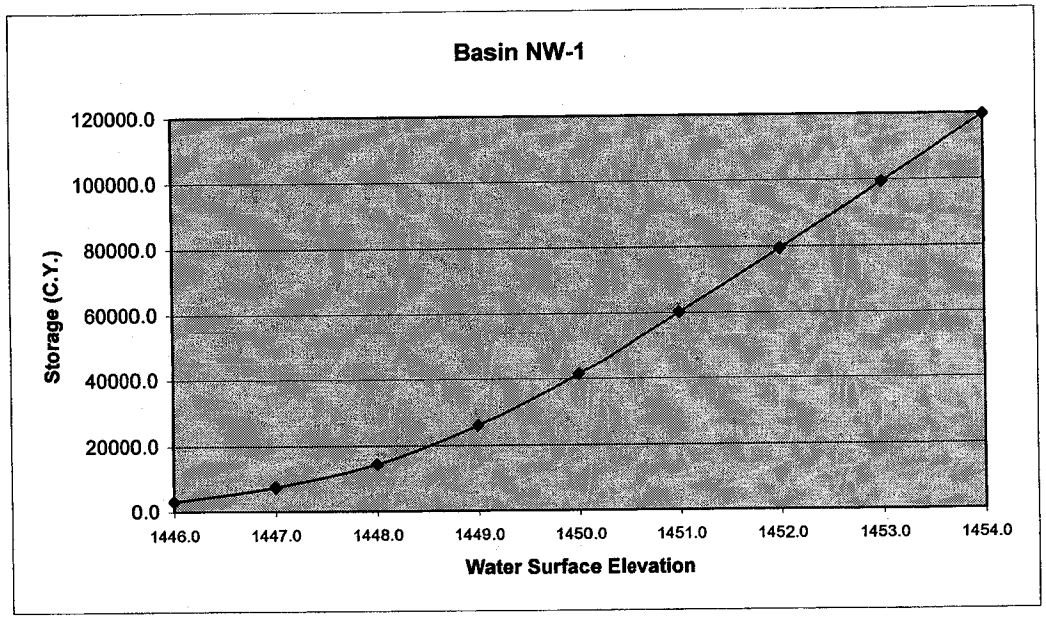
Made By: P.Vineyard
Date: 11/21/2003
Checked By: J. Blau
Date: 11/21/2003

Subject: Basin NW-1

Earthwork:

Cut = 262892 **C.Y.**

Water Surface Elevation	Storage Volume (C.Y)	Storage Volume (Ac-Ft)
1446.0	3226.7	2.0
1447.0	7500.4	4.6
1448.0	14422.0	8.9
1449.0	26058.9	16.2
1450.0	41415.0	25.7
1451.0	60108.6	37.3
1452.0	79440.7	49.2
1453.0	99338.8	61.6
1454.0	119719.3	74.2



CURRENT DATE: 11-26-2003
CURRENT TIME: 11:47:44

FILE DATE: 11-26-2003
FILE NAME: SRTSOUT1

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS / SHAPE / MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1444.00	1437.85	978.02	1 RCB	8.00	6.00	.013	IMPR SDT REC
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: SRTSOUT1 DATE: 11-26-2003

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1444.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1446.60	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1448.13	200.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
[illegible].41	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
[illegible]1.02	400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1452.14	500.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1453.50	600.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1455.53	700.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1457.26	750.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1463.16	900.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1467.68	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: SRTSOUT1 DATE: 11-26-2003

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1444.00	0.000	0.00	0.00	0.00
1446.60	0.000	100.00	0.00	0.00
1448.13	0.000	200.00	0.00	0.00
1449.41	0.000	300.00	0.00	0.00
1451.02	0.000	400.00	0.00	0.00
1452.14	0.000	500.00	0.00	0.00
1453.50	0.000	600.00	0.00	0.00
1455.53	0.000	700.00	0.00	0.00
1457.26	0.000	750.00	0.00	0.00
1463.16	0.000	900.00	0.00	0.00
1467.68	0.000	1000.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

Southern Avenue Detention Basin

This 8'X6' culvert with a tapered inlet will not perform adequately. The basin outflow begins overtopping the emergency spillway (crest elev = 1454.20) well before the 100-year peak discharge out of the basin of 726 cfs. Therefore a 10'X6' culvert is required.

CURRENT DATE: 11-26-2003 FILE DATE: 11-26-2003
CURRENT TIME: 11:47:44 FILE NAME: SRTSOUT1

PERFORMANCE CURVE FOR CULVERT 1 - 1(8.00 (ft) BY 6.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1444.00	0.00	-6.15	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
100.00	1446.60	2.60	-2.06	1-S2n	1.35	1.70	1.30	1.52	9.64	3.45
200.00	1448.13	4.13	-0.85	1-S2n	2.18	2.69	2.09	2.26	11.94	4.31
300.00	1449.41	5.41	0.76	1-S2n	2.91	3.53	2.83	2.84	13.26	4.88
400.00	1451.02	7.02	2.80	1-S2n	3.59	4.28	3.48	3.32	14.39	5.32
500.00	1452.14	8.14	5.29	1-S2n	4.25	4.96	4.16	3.75	15.02	5.68
600.00	1453.50	9.50	8.23	5-S2n	4.88	5.60	4.80	4.13	15.62	5.99
700.00	1455.53	11.11	11.53	6-FFc	6.00	6.00	6.00	4.48	14.58	6.25
750.00	1457.26	12.01	13.26	6-FFc	6.00	6.00	6.00	4.65	15.63	6.38
900.00	1463.15	15.07	19.15	6-FFc	6.00	6.00	6.00	5.11	18.75	6.71
1000.00	1467.68	17.43	23.68	6-FFc	6.00	6.00	6.00	5.40	20.83	6.91

El. inlet face invert 1444.00 ft El. outlet invert 1437.85 ft
El. inlet throat invert 1443.96 ft El. inlet crest 0.00 ft

SITE DATA ***** CULVERT INVERT **********

INLET STATION	984.00 ft
INLET ELEVATION	1444.00 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1437.85 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0063
CULVERT LENGTH ALONG SLOPE	978.02 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	8.00 ft
BARREL RISE	6.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	IMPR SDT RECT
INLET EDGE AND WALL	SQUARE EDGE TOP (26-90 DEG WINGWALL)
INLET DEPRESSION	NONE

***** SIDE-TAPERED RECTANGULAR IMPROVED INLET ***

FACE WIDTH	10.00 ft
SIDE TAPER (4:1 TO 6:1) (X:1)	6.00

CURRENT DATE: 11-26-2003
CURRENT TIME: 11:47:44

FILE DATE: 11-26-2003
FILE NAME: SRTSOUT1

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	16.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.001
MANNING'S n (.01-0.1)	0.016
CHANNEL INVERT ELEVATION	1437.85 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1437.85 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1437.85	0.000	0.00	0.00	0.00
100.00	1439.37	0.492	1.52	3.45	0.09
200.00	1440.11	0.505	2.26	4.31	0.14
300.00	1440.69	0.511	2.84	4.88	0.18
400.00	1441.17	0.515	3.32	5.32	0.21
500.00	1441.60	0.517	3.75	5.68	0.23
600.00	1441.98	0.519	4.13	5.99	0.26
700.00	1442.33	0.520	4.48	6.25	0.28
750.00	1442.50	0.521	4.65	6.38	0.29
900.00	1442.96	0.523	5.11	6.71	0.32
1000.00	1443.25	0.524	5.40	6.91	0.34

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	0.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1462.00 ft

Rating Curve Calculations for Culverts at Northwest Corner of Southern Avenue and Hawes Road

Hawes Road Southern Avenue

Interpolated Rating Table Flows Directed West		HY8 Rating Table Flows Directed West	
Elev. (ft)	Q (cfs)	Elev. (ft)	Q (cfs)
1436.70	0	1436.70	0
1437.50	62	1438.37	130
1438.12	111	1439.35	260
1439.00	214	1440.18	390
1439.50	283	1440.93	520
1440.00	362	1441.61	650
1440.50	445	1442.24	780
1441.00	533	1442.81	900
1441.50	629	1443.46	1,040
1442.00	730	1444.07	1,170
1442.50	835		
1443.00	941		
1443.50	1,049		

Note:

1 Double 10'x6' RCBC extending west from the intersection along the north side of Southern Avenue.

2 Tailwater based on downstream box section b=20', z=0, S=0.00677, n=0.013

Combined Rating Table Total Flows Before Split	
Elev. (ft)	Q (cfs)
1436.70	0
1437.50	62
1438.12	111
1439.00	229
1439.50	306
1440.00	401
1440.50	521
1441.00	636
1441.50	759
1442.00	887
1442.50	1,019
1443.00	1,150
1443.50	1,281

Note: Combined Rating includes partially blocked/controlled Southern Ave. Culvert (2 barrels plugged) addressed on the following sheet of this workbook.

Proposed Southern Avenue Culvert

Interpolated Rating Table Flows Directed South		HY8 Rating Table Flows Directed South	
Elev. (ft)	Q (cfs)	Elev. (ft)	Q (cfs)
1436.70	0	1436.70	0
1437.50	0	1437.50	0
1438.12	0	1438.12	0
1439.00	15	1439.91	30
1439.50	23	1440.21	60
1440.00	39	1440.75	90
1440.50	76	1441.31	120
1441.00	103	1441.88	150
1441.50	130	1442.42	180
1442.00	157	1443.02	210
1442.50	184	1443.67	240
1443.00	209		
1443.50	232		

Note:

1 Triple 8'x4' RCBC with 2 cells plugged, extending south across the intersection along the west side of Hawes Road.

2 Tailwater based on downstream channel b=10', z=2, S=0.0022, n=0.016

3/8

Hawes + Southern
Flows going west

CURRENT DATE: 12-22-2003
CURRENT TIME: 09:49:45

FILE DATE: 12-22-2003
FILE NAME: HAWSOUTW

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1436.70	1429.70	1035.02	2 RCB	10.00	6.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: HAWSOUTW DATE: 12-22-2003

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1436.70	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1438.37	130.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1439.35	260.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1440.18	390.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1440.93	520.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1441.61	650.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1442.24	780.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1442.81	900.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1443.46	1040.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1444.07	1170.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1444.70	1300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: HAWSOUTW DATE: 12-22-2003

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1436.70	0.000	0.00	0.00	0.00
1438.37	0.000	130.00	0.00	0.00
1439.35	0.000	260.00	0.00	0.00
1440.18	0.000	390.00	0.00	0.00
1440.93	0.000	520.00	0.00	0.00
1441.61	0.000	650.00	0.00	0.00
1442.24	0.000	780.00	0.00	0.00
1442.81	0.000	900.00	0.00	0.00
1443.46	0.000	1040.00	0.00	0.00
1444.07	0.000	1170.00	0.00	0.00
1444.70	0.000	1300.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

CURRENT DATE: 12-22-2003 FILE DATE: 12-22-2003
CURRENT TIME: 09:49:45 FILE NAME: HAWSOUTW

PERFORMANCE CURVE FOR CULVERT 1 - 2(10.00 (ft) BY 6.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1436.70	0.00	-7.00	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
130.00	1438.37	1.67	-3.39	1-S2n	0.83	1.10	0.80	0.80	8.15	7.77
260.00	1439.35	2.65	-2.88	1-S2n	1.32	1.74	1.24	1.22	10.47	10.05
390.00	1440.18	3.48	-2.30	1-S2n	1.74	2.28	1.68	1.56	11.59	11.63
520.00	1440.93	4.23	-1.63	1-S2n	2.11	2.76	2.06	1.85	12.59	12.87
650.00	1441.61	4.91	-0.85	1-S2n	2.46	3.21	2.41	2.11	13.50	13.91
780.00	1442.25	5.55	0.04	1-S2n	2.79	3.62	2.72	2.36	14.32	14.81
900.00	1442.81	6.11	0.96	1-S2n	3.09	3.99	2.99	2.57	15.07	15.55
1040.00	1443.46	6.76	2.15	1-S2n	3.43	4.39	3.43	2.80	15.14	16.32
1170.00	1444.07	7.37	3.38	1-S2n	3.73	4.75	3.65	3.00	16.04	16.97
1300.00	1444.70	8.00	4.73	1-S2n	4.03	5.09	4.04	3.19	16.10	17.56

El. inlet face invert 1436.70 ft El. outlet invert 1429.70 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

***** SITE DATA ***** CULVERT INVERT **********

INLET STATION	9935.00 ft
INLET ELEVATION	1436.70 ft
OUTLET STATION	8900.00 ft
OUTLET ELEVATION	1429.70 ft
NUMBER OF BARRELS	2
SLOPE (V/H)	0.0068
CULVERT LENGTH ALONG SLOPE	1035.02 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	10.00 ft
BARREL RISE	6.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	1.5:1 BEVEL (90 DEG.)
INLET DEPRESSION	NONE

5/8

CURRENT DATE: 12-22-2003
CURRENT TIME: 09:49:45

FILE DATE: 12-22-2003
FILE NAME: HAWSOUTW

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	20.00 ft
SIDE SLOPE H/V (X:1)	1.0
CHANNEL SLOPE V/H (ft/ft)	0.007
MANNING'S n (.01-0.1)	0.013
CHANNEL INVERT ELEVATION	1429.70 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1429.70 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1429.70	0.000	0.00	0.00	0.00
130.00	1430.50	1.527	0.80	7.77	0.34
260.00	1430.92	1.603	1.22	10.05	0.51
390.00	1431.26	1.643	1.56	11.63	0.66
520.00	1431.55	1.669	1.85	12.87	0.78
650.00	1431.81	1.687	2.11	13.91	0.89
780.00	1432.06	1.700	2.36	14.81	1.00
900.00	1432.27	1.710	2.57	15.55	1.08
1040.00	1432.50	1.719	2.80	16.32	1.18
1170.00	1432.70	1.726	3.00	16.97	1.27
1300.00	1432.89	1.732	3.19	17.56	1.35

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	70.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1333.00 ft

6/8

Hawes + Southern
Flows going south
with 2 barrels plugged
and only 1 barrel open

CURRENT DATE: 12-22-2003
CURRENT TIME: 09:47:06

FILE DATE: 12-22-2003
FILE NAME: HAWSOUTS

FHWA CULVERT ANALYSIS
HY-8, VERSION 6.0

CULV NO.	SITE DATA: INLET ELEV. (ft)	OUTLET ELEV. (ft)	CULVERT LENGTH (ft)	CULVERT SHAPE, MATERIAL, INLET: BARRELS SHAPE MATERIAL	SPAN (ft)	RISE (ft)	MANNING n	INLET TYPE
1	1438.12	1437.50	83.00	1 RCB	8.00	4.00	.013	CONVENTIONAL
2								
3								
4								
5								
6								

SUMMARY OF CULVERT FLOWS (cfs) FILE: HAWSOUTS DATE: 12-22-2003

ELEV (ft)	TOTAL	1	2	3	4	5	6	ROADWAY	ITR
1438.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1439.91	30.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1440.21	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1440.75	90.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1441.31	120.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1441.86	150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1442.42	180.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1443.02	210.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1443.67	240.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1444.38	270.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
1445.16	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0
0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	OVERTOPPING	

SUMMARY OF ITERATIVE SOLUTION ERRORS FILE: HAWSOUTS DATE: 12-22-2003

HEAD ELEV (ft)	HEAD ERROR (ft)	TOTAL FLOW (cfs)	FLOW ERROR (cfs)	% FLOW ERROR
1438.12	0.000	0.00	0.00	0.00
1439.91	0.000	30.00	0.00	0.00
1440.21	0.000	60.00	0.00	0.00
1440.75	0.000	90.00	0.00	0.00
1441.31	0.000	120.00	0.00	0.00
1441.86	0.000	150.00	0.00	0.00
1442.42	0.000	180.00	0.00	0.00
1443.02	0.000	210.00	0.00	0.00
1443.67	0.000	240.00	0.00	0.00
1444.38	0.000	270.00	0.00	0.00
1445.16	0.000	300.00	0.00	0.00

<1> TOLERANCE (ft) = 0.010 <2> TOLERANCE (%) = 1.000

7/8

NT DATE: 12-22-2003 FILE DATE: 12-22-2003
ENT TIME: 09:47:06 FILE NAME: HAWSOUTS

PERFORMANCE CURVE FOR CULVERT 1 - 1(8.00 (ft) BY 4.00 (ft)) RCB

DIS-CHARGE FLOW (cfs)	HEAD-WATER ELEV. (ft)	INLET CONTROL DEPTH (ft)	OUTLET CONTROL DEPTH (ft)	FLOW TYPE <F4>	NORMAL DEPTH (ft)	CRIT. DEPTH (ft)	OUTLET DEPTH (ft)	TW DEPTH (ft)	OUTLET VEL. (fps)	TW VEL. (fps)
0.00	1438.12	0.00	-0.62	0-NF	0.00	0.00	0.00	0.00	0.00	0.00
30.00	1439.91	1.28	1.79	1-S2n	0.57	0.76	0.59	0.78	6.32	3.33
60.00	1440.21	2.03	2.09	1-S2n	0.91	1.21	0.94	1.16	7.99	4.19
90.00	1440.75	2.63	2.41	1-S2n	1.20	1.58	1.24	1.46	9.06	4.76
120.00	1441.31	3.19	2.77	1-S2n	1.45	1.92	1.52	1.72	9.90	5.20
150.00	1441.86	3.74	3.17	1-S2n	1.68	2.22	1.78	1.94	10.51	5.56
180.00	1442.42	4.30	3.61	1-S2n	1.91	2.51	2.04	2.15	11.03	5.87
210.00	1443.02	4.90	4.09	5-S2n	2.12	2.78	2.27	2.33	11.55	6.14
240.00	1443.66	5.54	4.63	5-S2n	2.33	3.04	2.51	2.51	11.95	6.38
270.00	1444.38	6.26	5.21	5-S2n	2.54	3.29	2.73	2.67	12.36	6.60
300.00	1445.16	7.04	5.84	5-S2n	2.73	3.53	2.95	2.82	12.72	6.80

El. inlet face invert 1438.12 ft El. outlet invert 1437.50 ft
El. inlet throat invert 0.00 ft El. inlet crest 0.00 ft

* SITE DATA ***** CULVERT INVERT **********

INLET STATION	83.00 ft
INLET ELEVATION	1438.12 ft
OUTLET STATION	0.00 ft
OUTLET ELEVATION	1437.50 ft
NUMBER OF BARRELS	1
SLOPE (V/H)	0.0075
CULVERT LENGTH ALONG SLOPE	83.00 ft

***** CULVERT DATA SUMMARY **********

BARREL SHAPE	BOX
BARREL SPAN	8.00 ft
BARREL RISE	4.00 ft
BARREL MATERIAL	CONCRETE
BARREL MANNING'S n	0.013
INLET TYPE	CONVENTIONAL
INLET EDGE AND WALL	SQUARE EDGE (0 DEG. FLARE)
INLET DEPRESSION	NONE

CURRENT DATE: 12-22-2003 FILE DATE: 12-22-2003
CURRENT TIME: 09:47:06 FILE NAME: HAWSOUTS

TAILWATER

******* REGULAR CHANNEL CROSS SECTION **********

BOTTOM WIDTH	10.00 ft
SIDE SLOPE H/V (X:1)	2.0
CHANNEL SLOPE V/H (ft/ft)	0.002
MANNING'S n (.01-0.1)	0.016
CHANNEL INVERT ELEVATION	1437.50 ft
CULVERT NO.1 OUTLET INVERT ELEVATION	1437.50 ft

******* UNIFORM FLOW RATING CURVE FOR DOWNSTREAM CHANNEL

FLOW (cfs)	W.S.E. (ft)	FROUDE NUMBER	DEPTH (ft)	VEL. (f/s)	SHEAR (psf)
0.00	1437.50	0.000	0.00	0.00	0.00
30.00	1438.28	0.664	0.78	3.33	0.11
60.00	1438.66	0.685	1.16	4.19	0.16
90.00	1438.96	0.694	1.46	4.76	0.20
120.00	1439.22	0.700	1.72	5.20	0.24
150.00	1439.44	0.704	1.94	5.56	0.27
180.00	1439.65	0.706	2.15	5.87	0.29
210.00	1439.83	0.709	2.33	6.14	0.32
240.00	1440.01	0.711	2.51	6.38	0.34
270.00	1440.17	0.712	2.67	6.60	0.37
300.00	1440.32	0.714	2.82	6.80	0.39

ROADWAY OVERTOPPING DATA

ROADWAY SURFACE	PAVED
EMBANKMENT TOP WIDTH	70.00 ft
CREST LENGTH	100.00 ft
OVERTOPPING CREST ELEVATION	1333.00 ft

Hawes Channel at Driveway Crossing - Q in Hawes Channel at time of Q100 peak at Lateral Weir in Southern Avenue System
Worksheet for Irregular Channel

Project Description	
Worksheet	Hawes Channel at Driveway
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	0.002600 ft/ft
Discharge	221.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.016
Water Surface Elevation	2.34 ft
Elevation Range	0.00 to 3.33
Flow Area	32.5 ft²
Wetted Perimeter	18.85 ft
Top Width	17.31 ft
Actual Depth	2.34 ft
Critical Elevation	2.16 ft
Critical Slope	0.003448 ft/ft
Velocity	6.81 ft/s
Velocity Head	0.72 ft
Specific Energy	3.06 ft
Froude Number	0.88
Flow Type	Subcritical

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+20	0.016

Natural Channel Points

Station (ft)	Elevation (ft)
0+00	3.33
0+06	0.00
0+17	0.00
0+20	3.33

4/28/05
REVISION

Hawes Channel at Driveway Crossing - Q100
Worksheet for Irregular Channel

Project Description	
Worksheet	Hawes Channel at Driveway
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data	
Slope	0.002600 ft/ft
Discharge	389.00 cfs

Options	
Current Roughness Method	Improved Lotter's Method
Open Channel Weighting Method	Improved Lotter's Method
Closed Channel Weighting Method	Horton's Method

Results	
Mannings Coefficient	0.016
Water Surface Elevation	3.19 ft
Elevation Range	0.00 to 3.33
Flow Area	48.4 ft²
Wetted Perimeter	21.92 ft
Top Width	19.82 ft
Actual Depth	3.19 ft
Critical Elevation	3.02 ft
Critical Slope	0.003208 ft/ft
Velocity	8.03 ft/s
Velocity Head	1.00 ft
Specific Energy	4.20 ft
Froude Number	0.91
Flow Type	Subcritical

Roughness Segments

Start Station	End Station	Mannings Coefficient
0+00	0+20	0.016

Natural Channel Points

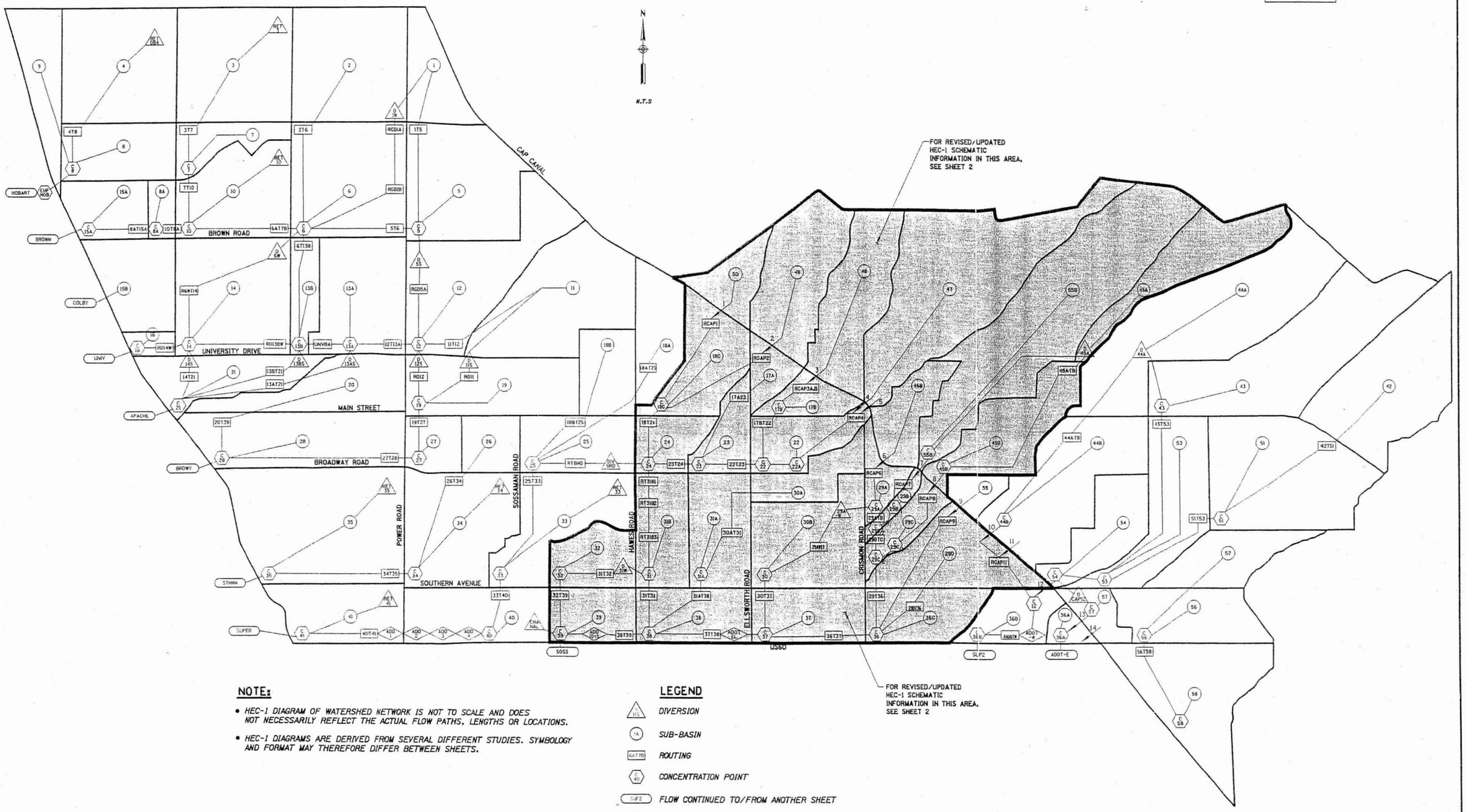
Station (ft)	Elevation (ft)
0+00	3.33
0+06	0.00
0+17	0.00
0+20	3.33

4/28/05
REVISION

HEC-1 Output

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

202L MA



NOTE:

- HEC-1 DIAGRAM OF WATERSHED NETWORK IS NOT TO SCALE AND DOES NOT NECESSARILY REFLECT THE ACTUAL FLOW PATHS, LENGTHS OR LOCATIONS.
- HEC-1 DIAGRAMS ARE DERIVED FROM SEVERAL DIFFERENT STUDIES. SYMBOLOGY AND FORMAT MAY THEREFORE DIFFER BETWEEN SHEETS.

LEGEND

- DIVERSION
- SUB-BASIN
- ROUTING
- CONCENTRATION POINT
- FLOW CONTINUED TO/FROM ANOTHER SHEET
- DETENTION BASIN
- CAP OVERCHUTE

	NAME	DATE
DESIGN	ABM	8/02
DRAWN	KJM	8/02
CHECKED	JRM	8/02

DMJM HARRIS — 2777 E. CAMELBACK ROAD, SUITE 200, PHOENIX, AZ. 85016-4302, (602) 337-2777

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

HEC-I SCHEMATIC
NORTHERN REGION

PRELIMINARY
STAGE II
Review
NOT FOR CONSTRUCTION OR RECORD INC

ROUTE: 202L
LOCATION: 202L/US60 T.I. PHASE II
SHEET: 1 OF 2

TRACS NO. H 5686 03C

07/31/02 J:\RMSA2\Prod\Exhibit\hec_1.dgn

4/28/05
REVISION

F.A.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.				

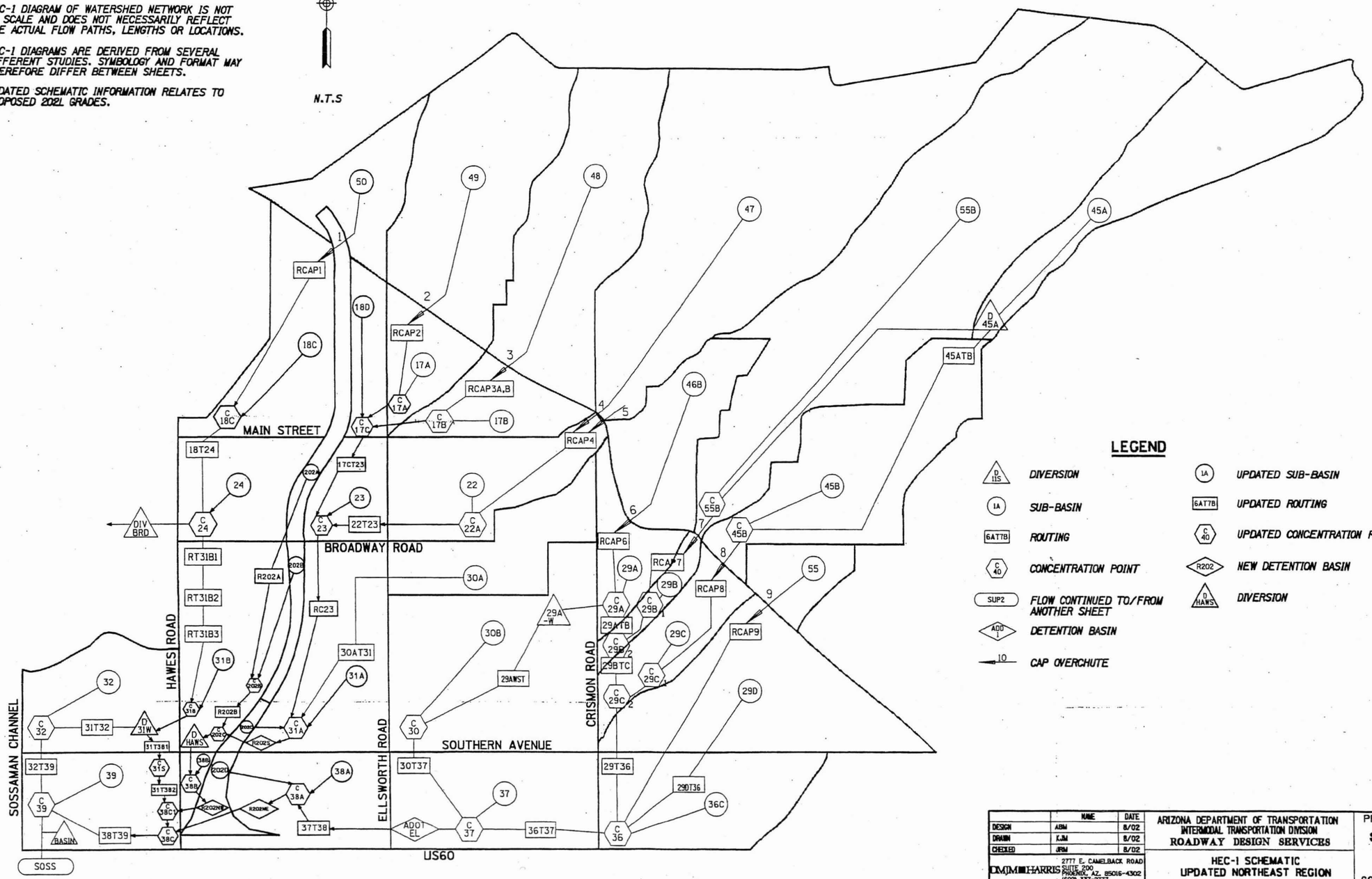
202L MA

NOTE:

- HEC-1 DIAGRAM OF WATERSHED NETWORK IS NOT TO SCALE AND DOES NOT NECESSARILY REFLECT THE ACTUAL FLOW PATHS, LENGTHS OR LOCATIONS.
- HEC-1 DIAGRAMS ARE DERIVED FROM SEVERAL DIFFERENT STUDIES. SYMBOLOGY AND FORMAT MAY THEREFORE DIFFER BETWEEN SHEETS.
- UPDATED SCHEMATIC INFORMATION RELATES TO PROPOSED 202L GRADES.

N

N.T.S



LEGEND

D 115	DIVERSION	1A	UPDATED SUB-BASIN
1A	SUB-BASIN	6AT7B	UPDATED ROUTING
6AT7B	ROUTING	C 40	UPDATED CONCENTRATION POINT
C 40	CONCENTRATION POINT	R202	NEW DETENTION BASIN
SUP2	FLOW CONTINUED TO/FROM ANOTHER SHEET	D HAWS	DIVERSION
ADD	DETENTION BASIN		
10	CAP OVERCHUTE		

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES	PRELIMINARY STAGE II Review NOT FOR CONSTRUCTION OR RECORDING
DESIGN	ABM	8/02		
DRAWN	KJM	8/02		
CHECKED	JRM	8/02		
DMJMHARRIS 2777 E. CAMELBACK ROAD SUITE 200 PHOENIX, AZ. 85016-4302 (602) 337-2777			HEC-1 SCHEMATIC UPDATED NORTHEAST REGION	
ROUTE 202L	LOCATION 202L/US60 T.I. PHASE II			SHEET 2 OF 2
TRACS NO. H 5686 03C				

07/31/02 J:\RMSAZ\Prod\Exhibit\hec1_3.dgn

4/28/05 REVISION

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   23APR04  TIME  17:29:48   *
 *                                       *
*****************************************
```

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

SUPERSEDED

SEE 4/28/05 REVISIONS & CD DATED 5/2/05 FOR FINAL HEC-1 MODEL

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X       XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

1 HEC-1 INPUT PAGE 1

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

  1           ID
  2           ID  ******************************************************************************
  3           ID  ******************************************************************************
  4           ID  ******************************************************************************
  5           ID   MODEL NAME: NE200250.DAT   Revised by PARSONS BRINCKERHOFF - April 2004
  6           ID
  7           ID   This model includes the following revisions to DMJM+HARRIS model
  8           ID   NE202USR.DAT dated December 2003.
  9           ID
 10           ID    1. The storage volumes for the NE-1, NE-2, NW-1, NW-2 and Southern Avenue
 11           ID       detention basins have been updated per the final basin geometry.
 12           ID
 13           ID    2. The discharge rates for detention basins NW-1 and NW-2 have been revised
 14           ID       to reflect the revisions to the outlet structures and emergency
 15           ID       spillways.
 16           ID
 17           ID    3. The diversion at the box culvert system at Southern Avenue and Hawes
 18           ID       Road was revised to simulate blockage of 2 barrels of the existing 3
 19           ID       barrel box culvert under Southern.
 20           ID
 21           ID    4. The diversion at the lateral weir in the Southern Avenue Channel was
 22           ID       revised to reflect the final weir geometry and rating analysis.
```

```
23          ID
24          ID    5. The data for Subbasin 31B was revised to reflect future conditions
25          ID       land use.
26          ID
27          ID  ******************************************************************************
28          ID  ******************************************************************************
29          ID  ******************************************************************************
30          ID
31          ID   MODEL NAME: Ne2002us.DAT           Revised by DMJM+HARRIS - August 2003
32          ID
33          ID   This model includes various revisions to incorporate the Red Mountain Freeway
34          ID   in association with the University Drive to Southern Avenue.
35          ID
36          ID   CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:
37          ID
38          ID   1. In order to reflect the proposed 202 Freeway Loopand to facilitate design,
39          ID      drainage basins 18D, 18C and 24 were further subdivided.  Additional
40          ID      concentration points were added to provide discharges at more locations.
41          ID
42          ID   2. Drainage basin areas for 50 and 202A were modified to reflect design
43          ID      refinements to the Power to University segment of the Red Mountain Freeway
44          ID
45          ID  ******************************************************************************
46          ID  ******************************************************************************
47          ID
48          ID   MODEL NAME: Ne200235.DAT           Revised by DMJM+HARRIS - July 2002
49          ID
50          ID   This model includes various revisions to incorporate the Red Mountain Freeway
51          ID   in association with the 202L/US60 Traffic Interchange Design Concept Report.
52          ID
53          ID   CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:
54          ID
55          ID    1. In order to reflect the proposed 202 Freeway Loop, basin areas for 18C,
```



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

56          ID       23, 24, 31A and 31B were revised.  Drainage basins 18D, 202A, 202B, and
57          ID       202D were added.      Basin 38 was split into 38A and 38B due to the 202 Loop
58          ID
59          ID    2. Several concentration points have been added and basins have been routed
60          ID       to reflect the proposed Red Mountain Freeway alignment.
61          ID
62          ID    3. Existing detention basins (ADOT) have been removed and new detention
63          ID       basins are proposed as part of the freeway construction.
64          ID
65          ID    4. Modifications were made to the previous (Ne20030) model per the City of
66          ID       Mesa to remove the connection of the Southern Ave. Channel from the
67          ID       structure at Hawes Rd. and instead connect to the Hawes Channel south of
68          ID       the intersection.
69          ID
70          ID  ******************************************************************************
71          ID  ******************************************************************************
72          ID   ** Previous ** MODEL NAME: NE2002.DAT
73          ID
74          ID   THIS MODEL COVERS THE AREA EAST OF HAWES ROAD AND THE SOSSAMAN CHANNEL
75          ID   MAJOR CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:
76          ID
77          ID    1. OLD SUBBASIN 18A HAS BEEN SPLIT INTO TWO SUBBASINS. SUBBASIN 18C REMAINS
78          ID       IN THIS MODEL AS PART OF THE HAWES CHANNEL INFRASTRUCTURE
```

```
 79          ID    2. OLD SUBBASIN 30 HAS BEEN SPLIT INTO SUBBASIN 30A AND SUBBASIN 30B.
 80          ID       SUBBASIN 30 GETS INTERCEPTED BY A CHANNEL ON THE NORTH SIDE OF CORALBELL
 81          ID       AND GETS ROUTED TO SUBBASIN 31A. SUBBASIN 30B STILL GOES SOUTH ALONG
 82          ID       ELLSWORTH ROAD
 83          ID    3. FOR THE 2002 YEAR CONDITION, ALL CAP DETENTION BASINS HAVE BEEN PLACED IN
 84          ID       THE MODEL. THEIR OUTLET CHANNELS HAVE FOR THE MOST PART NOT BEEN INCLUDED
 85          ID       IN THIS MODEL. THE OUTLET CHANNELS WILL BE IN THE FUTURE MODEL
 86          ID  ******************************************************************************
 87          ID
 88          ID   SOUTHEAST MESA AREA DRAINAGE MASTER PLAN
 89          ID   AREA NORTH OF SUPERSTITION FREEWAY
 90          ID
 91          ID
 92          ID   REVISED BY VALERIE SWICK, OCTOBER-NOVEMBER 1996
 93          ID   TO INCORPORATE THE SUPERSITION STRUCTURES AND COMBINE MODELS
 94          ID
 95          ID   FILENAME:  MESANE.DAT
 96          ID
 97          ID   THIS MODEL REPRESENTS THE EXISTING CONDITION OF THE WATERSHED.
 98          ID   TOTAL DRAINAGE AREA IS APPROXIMATELY 17 SQ. MI.
 99          ID
100          ID   100-YEAR 24-HOUR FREQUENCY
101          ID
102          ID
103          ID   METHODOLOGY
104          ID   THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
105          ID   SCS TYPE II RAINFALL DISTRIBUTION
106          ID   S-GRAPH HYDROGRAPH
107          ID   GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
108          ID   NORMAL DEPTH STORAGE CHANNEL ROUTING
109          ID   APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN
110          ID   EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS
```



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

111          ID   DATED 1994
112          ID   THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS
113          ID
114          ID   INITIAL STUDY PERFORMED BY LISA C. YOUNG
115          ID   REVIEWED BY VALERIE A. SWICK
116          ID   HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
117          ID   DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.
118          ID
119          ID   ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2 FT/SEC FOR WASH/NATURAL
120          ID   CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL
121          ID
122          ID
123          ID    LAST UPDATED ON  3/13/98
124          ID
125          ID    UPDATE WAS BASED UPON NEW MAG LAND USE DEFINITIONS FOR SINGLE FAMILY HOUSING
126          ID
127          ID   DDM MCUHP2 MESA AREA DRAINAGE MASTER PLAN
             *DIAGRAM
128          IT       5  1APR97    0000    1000
129          IO       5
130          IN      15
131          JD   3.600     .01
132          PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
133          PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
```

```
134        PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
135        PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
136        PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
137        PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
138        PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
139        PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
140        PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
141        PC    .983    .986    .989    .992    .995    .998   1.000
142        JD   3.58     1.0
143        JD   3.49     5.0
144        JD   3.38    10.0
145        JD   3.24    30.0
146        JD   3.10    60.0
147        JD   3.05    90.0
148        JD   3.00   120.0
149        JD   2.97   150.0
           *
           * DDM   ***** Updated *****

150        KK      42
151        KM   BASIN 42
152        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
153        KM    L=      3.1  Lca=      1.5   S=   60.9  Kn= .043  LAG=  51.6
154        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
155        BA    1.75
156        LG     .32     .29    5.00     .31   10.00
157        UI    114.    114.    248.    441.    618.    773.    923.   1018.   1086.   1092.
158        UI   1041.    954.    806.    673.    573.    485.    415.    340.    290.    242.
159        UI    212.    175.    147.    121.    109.     78.     78.     78.     38.     28.
160        UI     28.     28.     28.     28.     28.     28.     28.      0.      0.      0.
161        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****
```



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

162        KK   42T51
163        RS      10    FLOW      -1
164        RC    0.08   0.055    0.08    7000   0.011
165        RX       0     600     700     710     720     730     830    1630
166        RY      10       5       3       0       0       3       5      10
           *
           * DDM   ***** Updated *****

167        KK      51
168        KM   BASIN 51
169        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
170        KM    L=      1.5  Lca=       .8   S=   54.4  Kn= .039  LAG=  27.3
171        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
172        BA    1.24
173        LG     .29     .30    4.60     .37   18.00
174        UI    153.    416.    885.   1248.   1446.   1410.   1128.    817.    598.    428.
175        UI    311.    232.    163.    110.     99.     37.     37.     37.     37.     37.
176        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
177        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****
```

```
178        KK     C51
179        KM   COMBINE FLOWS FROM 42 AND 51
180        HC       2
           *
           * DDM   ***** Preserved *****

181        KK   51T53
182        KM    ROUTE 51 TO 53
183        RS       9    FLOW      -1
184        RC    0.08   0.055    0.08    8000    0.01
185        RX       0     100     200     210     220     230     330     430
186        RY       7       6       5       0       0       5       6       7
           *
           * DDM   ***** Updated *****

187        KK     44A
188        KM   BASIN 44A
189        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
190        KM    L=      2.8  Lca=      1.4   S=   54.5  Kn= .039  LAG=  43.6
191        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
192        BA    1.59
193        LG     .20     .25    4.50     .45   45.00
194        UI    123.    123.    390.    597.    813.    994.   1114.   1180.   1153.   1063.
195        UI    881.    716.    588.    484.    397.    320.    259.    219.    189.    131.
196        UI    126.     84.     84.     75.     30.     30.     30.     30.     30.     30.
197        UI     30.     30.      0.      0.      0.      0.      0.      0.      0.      0.
198        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****
```



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

199        KK  DIV44A
200        KM   DIVERT 80% OF THE LOW FLOWS WEST AND SOUTH TO 44B, 70% OF HIGH FLOWS
201        DT    D44A
202        DI       0     500    1000    3000
203        DQ       0     400     750    2100
           * DDM   ***** Updated *****

204        KK      43
205        KM   BASIN 43
206        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
207        KM    L=      1.9  Lca=       .9   S=   58.2  Kn= .036  LAG=  29.8
208        KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
209        BA    1.42
210        LG     .29     .30    4.70     .35   18.00
211        UI    161.    376.    827.   1212.   1470.   1531.   1375.   1047.    783.    584.
212        UI    434.    324.    251.    171.    127.    110.     59.     39.     39.     39.
213        UI     39.      0.      0.      0.      0.      0.      0.      0.      0.      0.
214        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

215        KK     C43
216        KM     COMBINE 43 WITH DIVERTED FLOWS FROM 45A
217        HC       2
           *
           * DDM   ***** Preserved *****
```

```
218        KK   43T53
219        RS      12    FLOW      -1
220        RC    0.08   0.055    0.08   11250   0.009
221        RX       0     200     300     310     315     325     335     535
222        RY       6       3       2       0       0       2       3       6
           *
           * DDM   ***** Updated *****

223        KK      53
224        KM   BASIN 53
225        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
226        KM    L=      1.9  Lca=       .9   S=   63.5  Kn= .039  LAG=  31.8
227        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
228        BA     .78
229        LG     .29     .30    5.20     .28   20.00
230        UI     83.    189.    377.    486.    616.    903.    943.    707.    555.    428.
231        UI    291.    149.    123.     83.     38.     25.     25.     25.      0.      0.
232        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

233        KK     C53
234        KM     COMBINE 53, 43 AND 51
235        HC       3
           *
           * DDM   ***** Updated *****
```



```
1                                   HEC-1 INPUT

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

236        KK      54
237        KM   BASIN 54
238        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
239        KM    L=      1.5  Lca=       .8   S=   42.8  Kn= .044  LAG=  32.8
240        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
241        BA     .49
242        LG     .30     .29    5.40     .26   17.00
243        UI     50.    107.    221.    287.    359.    502.    603.    449.    358.    278.
244        UI    206.    110.     84.     55.     39.     15.     15.     15.     15.      0.
245        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
246        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

247        KK     C54
248        KM   COMBINE 53 AND 54
249        HC       2
           *
           * DDM   ***** Preserved *****

250        KK  DCAP12
251        KM   FLOWS SPLIT AT CAP AND SOUTHERN AVE, RATING CURVES BASED ON THREE 5X7 CBCs
252        KM   PART OF THE FLOW GOES SOUTH ACRSS SOUTHERN TO CAP 13 +14
253        DT   SOUTH
254        DI       0     450    1000    2500
255        DQ       0       0     275    1025
           *
           * DDM   ***** Preserved *****
```

```
256        KK   CAP12
257        RS       1    FLOW      -1
258        SV       0   0.238    2.72   13.37   36.82
259        SE  1563.6    1564    1566    1568    1570
260        SQ       0      30     188     574    1098
           *
           * DDM   ***** Preserved *****

261        KK   DR44A
262        KM   RETRIEVE DIVERTED FLOWS FROM 44A
263        DR    D44A
           *
           * DDM   ***** Preserved *****

264        KK   44ATB
265        KM   ROUTE 44A TO 44B, STREET AND SHEET FLOW THROUGH NEIGHBORHOODS
266        KM   NO CURB AND GUTTER
267        RS      15    FLOW      -1
268        RC   0.055   0.045   0.055    9000   0.008
269        RX       0     500    1010  1012.5  1022.5  1027.5  1532.5  2037.5
270        RY       6     5.5       3       0       0       3     5.5       6
           *
           * DDM   ***** Updated *****
```



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

271        KK     44B
272        KM   BASIN 44B
273        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
274        KM    L=      1.1  Lca=       .9   S=   64.8  Kn= .041  LAG=  26.2
275        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
276        BA    1.06
277        LG     .26     .24    6.60     .17   30.00
278        UI    136.    426.    715.    947.   1453.   1456.   1057.    775.    520.    251.
279        UI    180.    109.     42.     42.     42.      0.      0.      0.      0.      0.
280        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

281        KK    C44B
282        KM   COMBINE 44A WITH 44B
283        HC       2
           *
           * DDM   ***** Preserved *****

284        KK  CAP10+
285        KM   COMBINED CAP 10 AND 11, SAME CONTRIBUTING AREA AND HYDRAULICALLY CONNECTED
286        KM   STORAGE AND DISCHARGES WERE ADDED AT THE APPROPRIATE ELEVATIONS
287        RS       1    FLOW      -1
288        SV       0    0.43   3.397  11.626   66.53
289        SE  1562.4    1564    1566    1568    1570
290        SQ       0     180     736    1684    2754
           *
           * DDM   ***** Preserved *****

291        KK  RCAP11
292        KM   ROUTE FLOWS FROM CAP OVERCHUTE #10 AND 11 TO ADOT WEST BASIN
```

```
293        RK    2400  0.0003   0.013            TRAP      20       3
           *
           * DDM   ***** Preserved *****

294        KK     C12
295        KM   COMBINE ROUTED FLOWS FROM CAP #10 AND 11 WITH CAP #12
296        HC       2
           *
           * DDM   ***** Preserved *****

297        KK  ADOT-W
298        KM   WEST ADOT DETENTION BASIN 4189, WEST OF CAP AND NORTH OF SUPERSITION FREEWAY
299        KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
300        KM        COUNTY
301        KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
302        KM            A-N WEST, INC., FEBRUARY, 1987.
303        RS       1    ELEV      36
304        SV       0   12.35    63.5   210.3   367.5   535.1  667.85  713.55
305        SE      36      38      40      44      48      52      55      56
306        SL    36.0   28.27      .6      .5
307        SS      55     200     2.6     1.5
           *
           * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                                    PAGE  8

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


308        KK  RADOTW
309        KM   ROUTE FLOWS IN CONCRETE CHANNEL TO CULVERTS UNDER SUPERSTITION FREEWAY
310        RS    1.75    FLOW      -1
311        RC    .035   0.012    .035    4500   .0033
312        RX       0     500    1000    1012    1020    1032    1532    2032
313        RY      13    12.5      12       0       0      12    12.5      13
           *
           * DDM   ***** Updated *****

314        KK     36B
315        KM   BASIN 36B
316        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
317        KM    L=      1.0  Lca=       .5   S=   45.0  Kn= .028  LAG=  15.0
318        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
319        BA     .32
320        LG     .30     .29    7.30     .11   16.00
321        UI    125.    387.    715.    627.    361.    139.     58.     22.      0.      0.
322        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

323        KK    C36B
324        KM   COMBINE FLOWS FROM ADOT BASIN W WITH SUB36
325        HC       2
326        ZW     A=ADOT WEST BASIN  B=AT SUPERSTITION  C=FLOW  E=5MIN F=100YR
           *
           * DDM   ***** Preserved *****

327        KK  RSOUTH
328        KM   RETRIEVE FLOWS CROSSING SOUTHERN AT CAP
329        DR   SOUTH
           *
```

```
* DDM   ***** Updated *****

KK      57
KM   BASIN 57
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=       .3  Lca=       .1   S=   35.7  Kn= .044  LAG=   9.4
KM    DESERT/RANGELAND S-GRAPH WAS USED FOR THE BASIN
BA     .18
LG     .37     .35    5.40     .25    2.00
UI    193.    566.    378.    149.     59.     19.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK     C57
KM   COMBINE FLOWS CROSSING SOUTHERN AT CAP WITH THOSE OF SUBBASIN 57
HC       2
*
* DDM   ***** Preserved *****
```



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

KK  CAP13+
KM    CAP OVERCHUTES 13 AND 14 WERE COMBINED SINCE THY HAVE COMMON DRAINAGE
KM    STORAGE AND DISCHARGES WERE ADDED AT SPECIFIED ELEVATIONS
RS       1    FLOW      -1
SV       0   1.198   2.601   5.746
SE    1564    1567    1568    1570
SQ       0     180     500    1143
*
* DDM   ***** Updated *****

KK     36A
KM   BASIN 36A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=       .3  Lca=       .2   S=   44.1  Kn= .028  LAG=   6.6
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .10
LG     .27     .34    6.00     .21   28.00
UI    201.    435.    101.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK    C36A
KM   COMBINE FLOWS FROM CAP OVERCHUTES INTO ADOT EAST DETENTION BASIN
HC       2
*
* DDM   ***** Preserved *****

KK  ADOT-E
KM   EAST ADOT DETENTION BASIN 4105, WEST OF CAP AND NORTH OF SUPERSTITION
KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
KM        COUNTY
KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
KM            A-N WEST, INC., FEBRUARY, 1987.
RS       1    ELEV    49.5
SV       0     300     340
```

```
369          SE    49.5      60      61
370          SL    49.5   28.27      .6      .5
371          SS      60     200     2.6     1.5
372          ZW    A=ADOT EAST BASIN B=AT SUPERSTITION  C=FLOW  E=5MIN F=100YR
             *
             * DDM   ***** Preserved *****

373          KK   CFAKE
374          KM   THIS IS JUST A FAKE CONCENTRATION POINT TO ELIMINATE THE ERROR THAT SAYS TO
375          KM   "COMBINE HYDROGRAPHS MORE OFTEN".
376          HC       2
             *
             * DDM   ***** Updated *****
1                                    HEC-1 INPUT                                          PAGE 10

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


377          KK      52
378          KM   BASIN 52
379          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
380          KM    L=      1.6  Lca=       .7   S=   54.9  Kn= .035  LAG=  25.3
381          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
382          BA     .43
383          LG     .31     .31    6.60     .15   12.00
384          UI     58.    191.    311.    418.    657.    573.    419.    304.    176.     98.
385          UI     63.     30.     18.     18.     18.      0.      0.      0.      0.      0.
386          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Updated *****

387          KK      56
388          KM   BASIN 56
389          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
390          KM    L=       .9  Lca=       .5   S=   57.9  Kn= .040  LAG=  20.2
391          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
392          BA     .55
393          LG     .31     .24    7.30     .13   20.00
394          UI    106.    393.    593.    982.    870.    588.    362.    157.     97.     30.
395          UI     28.     28.      0.      0.      0.      0.      0.      0.      0.      0.
396          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****

397          KK     C56
398          KM     COMBINE 52 AND 56 BEHIND THE STOCK POND
399          KM     ASSUMING STOCK POND IS EFFECTIVE, DIVERTS FLOWS SOUTH ACROSS SUPERSTITION
400          KM     STORAGE ROUTING WAS NOT PERFORMED, CHANNEL/PIPE CROSSING
401          HC       2
             *
             * DDM   ***** Preserved *****

402          KK   56T58
403          RS       3    FLOW      -1
404          RC    0.08   0.055    0.08    2500   0.004
405          RX       0     200     300     310     320     330     430     530
406          RY       6       4       3       0       0       3       4       6
             *
             * DDM   ***** Updated *****

407          KK      58
```

```
408          KM   BASIN 58
409          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
410          KM    L=      1.1  Lca=       .5   S=   50.4  Kn= .033  LAG=  18.3
411          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
412          BA     .95
413          LG     .34     .36    5.60     .22    4.00
414          UI    238.    813.   1261.   1998.   1385.    886.    384.    213.     76.     54.
415          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
416          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
             * DDM   ***** Preserved *****
```



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


417          KK     C58
418          KM   COMBINE 58 WITH 56
419          KM   THE VOLUME AT THIS CONCENTRATION POINT WILL BE SPLIT BETWEEN THE OVERCHUTES
420          KM   CAP1A AND CAP1B. THIS WILL BE MODELED AS FLAT TOP HYDROGRAPHS WITH 217 CFS
421          KM   VALUES FOR UI CARDS AT THESE OVERCHUTES
422          KM   NO DATA AVAILABLE ON CAP OVERCHUTE SIZING
423          ZW     A=CONCENTRATION POINT C58  B=FLOW TO OVERCHUTES  C=FLOW  F=OBSERVED
424          HC       2
             *

425          KK     46B
426          KM   BASIN 46B
427          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
428          KM    L=      1.4  Lca=       .7   S=   42.9  Kn= .073  LAG=  51.1
429          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
430          BA     .36
431          LG     .21     .24    4.00     .56   51.00
432          UI     24.     24.     59.     95.    118.    135.    156.    182.    232.    298.
433          UI    262.    217.    189.    161.    138.    117.     94.     61.     42.     39.
434          UI     31.     24.     21.      7.      7.      7.      7.      7.      7.      7.
435          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
436          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

437          KK    D46B
438          KM    RETAIN 100 YEAR 2 HOUR, (16% FOR FUTURE DEVELOPMENT)
439          DT     D46       5
440          DI       0   10000
441          DQ       0   10000
             *

442          KK    CAP6
443          RS       1    FLOW      -1
444          SV       0   0.236   1.627   8.021
445          SE  1556.2    1558    1560    1562
446          SQ       0      52     180     350
             *

447          KK  RCAP6B
448          KM   CHANNEL PARAMETERS TAKEN FROM PLANS BY AMERICAN ENGINEERING
449          KM   FOR THE SUPERSTITION SKYLINE HIGH SCHOOL
450          KM   FLOW IS ROUTED ALONG THE TRANSMISSION LINE CORRIDOR
451          KM   ROUTE CONCENTRATION POINT CAP#6 TO SUBBASIN 29A (CRISMON CHANNEL)
452          RS       2    FLOW      -1
```

```
453          RC    .013    .013    .013    2300    .002
454          RX       0      39      40    45.5    53.5      59      60      99
455          RY     6.5     5.5     5.5       0       0     6.5     6.5     6.5
             *

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

456          KK     29A
457          KM   BASIN 29A
458          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
459          KM    L=       .9  Lca=       .4   S=   41.2  Kn= .107  LAG=  49.5
460          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
461          BA     .18
462          LG     .21     .24    4.00     .58   29.00
463          UI     12.     12.     33.     51.     63.     72.     84.     99.    131.    157.
464          UI    127.    107.     93.     78.     66.     56.     40.     24.     21.     19.
465          UI     12.     12.      5.      4.      4.      4.      4.      4.      4.      0.
466          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
467          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

468          KK    D29A
469          KM    RETAIN 100 YEAR 2 HOUR, (73% FOR FUTURE DEVELOPMENT)
470          DT    D29A       9
471          DI       0   10000
472          DQ       0   10000
             *

473          KK    C29A
474          HC       2
             *
             * OVERTOPPING OF CRISMON ROAD CHANNEL REMOVED TO REFLECT FUTURE CHANNEL

475          KK     45A
476          KM   BASIN 45A
477          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
478          KM    L=      2.0  Lca=      1.0   S=   70.4  Kn= .079  LAG=  66.1
479          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
480          BA     .62
481          LG     .21     .25    4.00     .60   19.00
482          UI     31.     31.     31.    101.    126.    150.    171.    187.    210.    238.
483          UI    273.    346.    409.    353.    303.    269.    243.    213.    190.    166.
484          UI    149.    120.     89.     56.     54.     52.     42.     31.     31.     22.
485          UI     10.     10.     10.     10.     10.     10.     10.     10.     10.      0.
486          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
487          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

488          KK    D45A
489          KM    RETAIN 100 YEAR 2 HOUR, (66% FOR FUTURE DEVELOPMENT)
490          DT    D29A      24
491          DI       0   10000
492          DQ       0   10000
             *

493          KK    D45A
494          KM    DIVERT 75% OF THE FLOW SOUTH,THE REMAINDER ALONG UNIVERSITY TO NEXT SUBBASIN
495          KM    CHANNEL ALONG UNIVERSITY, SOME SHEET FLOW IS DIVERTED
```

```
496          DT   45ATB
497          DI       0    5000
498          DQ       0    4750
             *
```



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

499          KK     55B
500          KM   BASIN 55B
501          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
502          KM    L=      3.5  Lca=      1.8   S=   48.6  Kn= .058  LAG=  79.5
503          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
504          BA    1.86
505          LG     .23     .25    4.10     .57   31.00
506          UI     79.     79.     79.    141.    269.    319.    374.    413.    451.    490.
507          UI    542.    600.    670.    821.    973.    999.    852.    753.    682.    628.
508          UI    569.    510.    465.    413.    376.    325.    252.    192.    139.    136.
509          UI    129.    124.     79.     79.     79.     54.     24.     24.     24.     24.
510          UI     24.     24.     24.     24.     24.     24.     24.      0.      0.      0.
511          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

512          KK    D55B
513          KM    RETAIN 100 YEAR 2 HOUR, (73% FUTURE DEVELOPMENT)
514          DT    D55B      92
515          DI       0   10000
516          DQ       0   10000
             *

517          KK    C55B
518          KM   COMBINE 55B WITH DIVERTED FLOWS FROM 45A
519          HC       2
             *

520          KK    CAP7
521          KM   ROUTE THROUGH CAP#7
522          RS       1    FLOW      -1
523          SV       0   0.167   0.309   0.539   24.52   85.75
524          SE  1560.5    1563 1564.27    1566    1568    1570
525          SQ       0       0     225     460     756    1017
             *
             *  FOLLOWING ROUTING CHANGED TO REFLECT FUTURE LAND USE CHANGES FOR
             *  PARKWOOD RANCH

526          KK   RD45A
527          KM   RETURN DIVERTED FLOWS FROM 45A
528          DR   45ATB
             *

529          KK   45ATB
530          KM   ROUTE REMAINDER OF FLOWS TO 45B
531          KM   STREET FLOW AND SHEET FLOW, NO DEFINED CHANNEL
532          RS      17    FLOW      -1
533          RC   0.055   0.035   0.055   10000   0.001
534          RX       0     500    1010  1012.5  1022.5  1027.5  1532.5  2037.5
535          RY       6     5.5       5       0       0       5     5.5       6
             *
```

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

536           KK     45B
537           KM   BASIN 45B
538           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
539           KM    L=      1.9  Lca=       .9   S=   45.0  Kn= .052  LAG=  45.2
540           KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
541           BA     .66
542           LG     .22     .25    6.00     .22   50.00
543           UI     49.     49.    159.    219.    266.    309.    368.    482.    614.    516.
544           UI    425.    363.    302.    252.    202.    124.     86.     80.     53.     49.
545           UI     22.     15.     15.     15.     15.     15.      0.      0.      0.      0.
546           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

547           KK    D45B
548           KM    RETAIN 100 YEAR 2 HOUR, (42% FOR FUTURE DEVELOPMENT)
549           DT    D45B      24
550           DI       0   10000
551           DQ       0   10000
              *

552           KK    C45B
553           KM   COMBINE FLOWS FROM 45A AND 45B
554           HC       2
              *

555           KK    CAP8
556           KM   ROUTE THROUGH CAP OVERCHUTE #8
557           RS       1    FLOW      -1
558           SV       0   1.449   9.494   43.04
559           SE  1562.1    1564    1566    1568
560           SQ       0     120     436     935
              *

561           KK    C7+8
562           KM   COMBINE FLOW FROM OVERCHUTES #7 & #8
563           KM   ROUTE FLOW FROM HERE THROUGH PARKWOOD RANCH
564           HC       2
              *

565           KK  RCAP78
566           KM   ROUTE CAP OVERCHUTE #7 & #8 TO SUBBASIN 29B, A ROUTING OF ABOUT 4000 FT
567           KM   CHANNEL DIMENSIONS FROM PARKWOOD RANCH
568           KM  (ADMP CHANNEL ID CN4)
569           RS       3    FLOW      -1
570           RC    .035    .035    .035    4000   .0033
571           RX       0      12      27      45     125     143     158     170
572           RY     6.5     4.5       3       0       0       3     4.5     6.5
              *
```



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

573           KK     29B
574           KM   BASIN 29B
575           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
576        KM    L=       .8  Lca=       .5   S=   52.6  Kn= .092  LAG=  42.2
577        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
578        BA     .08
579        LG     .18     .25    4.00     .66   17.00
580        UI      6.      7.     23.     31.     36.     43.     53.     74.     75.     59.
581        UI     50.     41.     34.     27.     16.     11.     10.      6.      6.      2.
582        UI      2.      2.      2.      2.      2.      0.      0.      0.      0.      0.
583        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

584        KK    D29B
585        KM    RETAIN 100 YEAR 2 HOUR, (98% FOR FUTURE DEVELOPMENT)
586        DT    D29B      5
587        DI       0   10000
588        DQ       0   10000
           *

589        KK   C29B1
590        KM   COMBINE FLOWS FROM CAP #7 OVERCHUTE AND SUBBASIN 29B
591        HC       2
           *

592        KK   C29B2
593        KM   COMBINE ROUTED FLOW FROM 29A WITH SUBBASIN 29B
594        HC       2
           *

595        KK   TRANS
596        KM   ROUTE FLOW ALONG THE TRANSMISSION CORRIDOR
597        KM   ADJACENT TO SCHOOL SITE AND PARKWOOD RANCH
598        KM  (ADMP CHANNEL ID CN3)
599        RS       1    FLOW      -1
600        RC    .013    .013    .013    2600   .0015
601        RX       0      39      40      51      78      89      90     129
602        RY     6.5     5.5     5.5       0       0     5.5     5.5     6.5
           *

603        KK     29C
604        KM   BASIN 29C
605        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
606        KM    L=       .9  Lca=       .5   S=   58.8  Kn= .074  LAG=  34.7
607        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
608        BA     .23
609        LG     .24     .25    5.70     .27   32.00
610        UI     23.     43.     95.    124.    153.    199.    280.    226.    180.    143.
611        UI    113.     77.     41.     36.     23.     15.      7.      7.      7.      7.
612        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
613        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
```



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

614        KK    D29C
615        KM    RETAIN 100 YEAR 2 HOUR, (98% FOR FUTURE DEVELOPMENT)
616        DT     D29      17
617        DI       0   10000
618        DQ       0   10000
           *
```

```
619          KK   C29C2
620          KM   COMBINE ROUTED FLOWS FROM C29B2 AND C29C1
621          HC       2
             *

622          KK  29CTD1
623          KM   REACH PR-2, PR-3
624          KM   ROUTE FLOW ALONG SOUTH OF SCHOOL AND SOUTH ALONG CRISMON TO SOUTHERN
625          KM   GRASS LINED CHANNEL
626          RS       1    FLOW      -1
627          RC    .045    .045    .045    2500   .0025
628          RX       0      20      40      69     109     139     147     155
629          RY     6.5     5.5     4.9       0       0     4.9     5.5     6.5
             *

630          KK      55
631          KM   BASIN 55
632          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
633          KM    L=       .5  Lca=       .2   S=   72.3  Kn= .081  LAG=  22.2
634          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
635          BA     .14
636          LG     .24     .24    4.60     .40   29.00
637          UI     21.     85.    128.    192.    243.    167.    116.     63.     35.     20.
638          UI      7.      7.      7.      0.      0.      0.      0.      0.      0.      0.
639          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

640          KK     D55
641          KM    RETAIN 100 YEAR 2 HOUR, (90% FOR FUTURE DEVELOPMENT)
642          DT     D55       9
643          DI       0   10000
644          DQ       0   10000
             *

645          KK    CAP9
646          RS       1    FLOW      -1
647          SV       0    2.03  10.075  43.569
648          SE  1562.1    1564    1566    1568
649          SQ       0     120     436     935
             *

650          KK   RCAP9
651          KM   ROUTE CAP OVERCHUTE #9 TO SUBBASIN 29D
652          KM   UNLINED CHANNEL THROUGH PARKWOOD RANCH
653          KM   DESIGN PLANS BY STANDAGE & TRUITT
654          KM   CHANNEL REVISED BY HOSKIN ENG.
655          KM   CHANNEL ID FOR THAT PART OF THE CHANNEL THAT CUT ACROSS 29D)
```



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

656          RS       3    FLOW      -1
657          RC    .035    .035    .035    4700   .0050
658          RX       0      16      30      40      50      60      74      90
659          RY     7.4     3.4     2.0       0       0     2.0     3.4     7.4
             *

660          KK     29D
661          KM   BASIN 29D
```

```
662        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
663        KM    L=      1.2  Lca=       .9   S=   40.7  Kn= .066  LAG=  47.8
664        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
665        BA     .65
666        LG     .21     .25    4.90     .35   43.00
667        UI     46.     46.    133.    196.    239.    275.    325.    390.    532.    552.
668        UI    439.    375.    319.    270.    225.    177.    111.     80.     75.     51.
669        UI     46.     26.     14.     14.     14.     14.     14.     14.      0.      0.
670        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *

671        KK    D29D
672        KM    RETAIN 100 YEAR 2 HOUR, (53% FOR FUTURE DEVELOPMENT)
673        DT    D29D      27
674        DI       0   10000
675        DQ       0   10000
           *

676        KK   D29D2
677        KM   DIVERT APPROXIMATLY 2/3 OF SUBBASIN 29D'S FLOW TO THE EAST. THIS HAPPENS
678        KM   BECAUSE CHANNEL CN5 CUTS ACROSS SUBBASIN 29D. ONLY THOSE FLOWS TO THE EAST OF
679        KM   THE CHANNEL GET INTO THE CHANNEL
680        DT   D29DE   10000
681        DI       0     100     200     500     800
682        DQ       0      66     132     330     528
           *
           *       *****KVM*****

683        KK   C29C3
684        KM  COMBINE FLOWS FROM C29C2, D29D2, AND RCAP9
685        HC       3
           *
           * RETENTION BASIN 5, OPTION 2

686        KK  BASIN5
687        KM  WITH 36-INCH OUTFALL
688        RS       1    STOR      -1
689        SA       0     3.9      11    13.7      14      14
690        SE    1518    1521    1523    1524    1528    1531
691        SL    1518   18.00     0.6     0.5
692        SS    1528     200     2.5     1.5
           *
```



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

693        KK   RBAS5
694        KM   REACH PR-1
695        KM   ROUTE FLOWS FORM 29D (WESTERN 1/3) TO SUBBASIN 36.  CRISMON AND SOUTHERN TO
696        KM  THE SUPERSTITION FWY. (PREVIOUSLY CALLED 29DT36)
697        RS       1    FLOW      -1
698        RC   0.025   0.025   0.025    2150  0.0017
699        RX       0      20      25      32      44      60      68      76
700        RY     3.8     3.9       4       0       0       4     3.9     3.8
           *

701        KK   G29DE
702        KM   RECALL THE EASTERN 2/3 OF SUBBASIN 29D. THIS IS RECALLED 2600 FT EAST OF
703        KM   CRISMON RD.
```

```
704         DR   D29DE
            *
            *  FOLLOWING ROUTE ADDED BY HOSKIN ENG.*

705         KK   29T36
706         KM   ROUTE FLOW FROM PARKWOOD RANCH THROUGH NEW UNLINED CHANNEL
707         KM   CROSS-SECTION MATCHES PARKWOOD RANCH CHANNEL
708         KM  (ADMP CHANNEL ID CN5)
709         RS       3    FLOW      -1
710         RC    .035    .035    .035    3000   .0050
711         RX       0      16      30      40      50      60      74      90
712         RY     7.4     3.4     2.0       0       0     2.0     3.4     7.4
            *

713         KK     36C
714         KM   BASIN 36C
715         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
716         KM    L=      1.2  Lca=       .6   S=   44.2  Kn= .020  LAG=  12.4
717         KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
718         BA     .44
719         LG     .10     .25    4.65     .47   80.00
720         UI    266.    780.   1282.    724.    259.     83.     37.      0.      0.      0.
721         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

722         KK    D36C
723         KM    RETAIN 100 YEAR 2 HOUR, (87% FOR FUTURE DEVELOPMENT)
724         DT    D36C      38
725         DI       0   10000
726         DQ       0   10000
            *

727         KK     C36
728         KM   COMBINE FLOWS IN CHANNEL ACROSS PARKWOOD RANCH (SUBBASIN 29D) WITH SUBBASIN 3
729         HC       3
            *
            * DDM   ***** Preserved *****
```



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

730         KK   36T37
731         KM   ROUTE C36 TO C37 VIA ADOT CONCRETE CHANNEL
732         RS    1.76    FLOW      -1
733         RC   0.035   0.013   0.035    5280  0.0033
734         RX       0     500    1000    1012    1020    1032    1532    2032
735         RY      13    12.5      12       0       0      12    12.5      13
            *
            * DDM   ***** Updated *****

736         KK     30b
737         KM   BASIN 30b
738         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
739         KM    L=      1.5  Lca=       .9   S=   43.3  Kn= .060  LAG=  48.3
740         KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
741         BA     .81
742         LG     .27     .27    4.00     .52   25.00
743         UI     57.     57.    161.    241.    296.    339.    400.    475.    645.    703.
744         UI    558.    475.    407.    344.    288.    236.    149.    101.     94.     71.
```

```
745        UI     57.     41.     17.     17.     17.     17.     17.     17.      0.      0.
746        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           *
           * DDM   ***** Preserved *****

747        KK   30bT37
748        KM   ROUTE FLOWS FROM S30b TO C37 VIA NATURAL CHANNEL
749        RS     4.4    FLOW      -1
750        RC   0.040   0.035   0.040    2640   0.053
751        RX       0       2       3       4       7       8      28     528
752        RY       6       5       5       0       0       4     4.5       5
           * DDM   ***** Updated *****

753        KK      37
754        KM   BASIN 37
755        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
756        KM    L=      1.0  Lca=       .5   S=   45.0  Kn= .028  LAG=  15.0
757        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
758        BA     .47
759        LG     .31     .33    4.00     .49   14.00
760        UI    184.    569.   1051.    922.    531.    204.     85.     32.      0.      0.
761        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
           * DDM   ***** Preserved *****

762        KK     C37
763        KM   COMBINE FLOWS FROM S37, S30, AND C36 AT C37
764        HC       3
           *
           * DDM   ***** Preserved *****

765        KK  ADOTEL
766        KM   ADOT DETENTION BASIN 4313 AT ELLSWORTH RD. AND SUPERSTITION
767        KM   FROM EASTERN MARICOPA COUNTY AREA DRAINAGE MASTER STUDY, FCD OF MARICOPA
768        KM        COUNTY
769        KM        AND SUPERSTITION FREEWAY COMPREHENSIVE OFFSITE DRAINAGE PLAN,
770        KM            A-N WEST, INC., FEBRUARY, 1987.
```



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

771        RS       1    ELEV      56
772        SV       0     617     650
773        SE      56      74      75
774        SL      56    3.14     0.6     .05
775        SS      74     200     2.6     1.5
           *
           * DDM   ***** Preserved *****
           *
           * ******************************************************************************
           * Revised by DMJM to reflect Red Mountain Freeway Design Concepts
           * ******************************************************************************
           *

776        KK  37T38A
777        KM   ROUTE FLOWS FROM C37 TO C38A VIA ADOT CONCRETE CHANNEL
778        RS    1.76    FLOW      -1
           *
779        RC   0.035   0.012   0.035    3620  0.0045
780        RX       0     500    1000    1012    1020    1032    1532    2032
781        RY      13    12.5      12       0       0      12    12.5      13
```

```
*
* Revised by DMJM to reflect Red Mountain Freeway Design Concepts
*
* DDM   ***** Inserted *****

KK     38A
KM   BASIN 38A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
*     KM  L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  50.8
KM    L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  43.8
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .3275
LG     .25     .29    4.25     .44   31.00
UI     25.     25.     87.    116.    141.    164.    198.    266.    316.    249.
UI    209.    175.    145.    121.     85.     50.     43.     34.     25.     18.
UI      8.      8.      8.      8.      8.      8.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
*    Old Parameters from the Previous Subbbasin 38
*    BA   .47
*    LG   .25     .29    4.25     .44   31.00
*    UI   31.     31.     78.    127.    156.    179.    207.    242.    313.
*    UI  340.    282.    247.    209.    179.    152.    119.     77.     55.
*    UI   39.     31.     25.     10.     10.     10.     10.     10.     10.
*    UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*    UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* ******************************************************************************
*    ***** Revisions by DMJM to document original design *****
*
*  ***** Original ADOT On-line Detention Basin per URS Final Drainage Report ***
*
*  KKHDET12
*  KM ONLINE DETENTION POND #12 - UPSTREAM FROM HAWES RD. (STA. 992+00 - 997+00)
*  RS    1.   ELEV  1439.8
*  SV    0.    0.11    1.81    5.73    8.84    9.92   10.78
*  SE1439.8  1441.8  1443.8  1445.8  1447.3  1447.8  1448.2
*  SQ   0.    52.0   100.0   132.0   152.0   209.0   285.0
*
* ***** Original ADOT On-line Detention Basin per URS Final Drainage Report ****
*
*  KKHDET11
*  KM ONLINE DETENTION POND #11 - UPSTREAM FROM HAWES RD. (STA. 977+00 - 972+00)
*  RS    1.   ELEV  1427.8
*  SV    0.    0.11    1.87    5.88    7.10    7.96   10.09
*  SE1427.8  1429.8  1431.8  1433.8  1434.4  1434.8  1435.8
*  SQ   0.    52.0   100.0   132.0   140.0   162.0   279.0
*
* ******************************************************************************
*
*  Revise interval to read hydrograph more accurately
*
```



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

IN       5
*

KK    202D
```

```
KM   BASIN 202D
KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
KM     A = 15.93 acres, C = 0.80, Tc = 15.33 min.
BA   .0249
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      2      2      2      2      2      2      2
QI      2      2      2      2      2      2      2      2      3      3
QI      3      3      3      3      4      4      4      6     10     15
QI     19     26     40     71    100     94     69     48     35     25
QI     17     11      8      6      5      4      4      3      3      3
QI      3      3      3      2      2      2      2      2      2      2
QI      2      2      2      2      2      2      2      2      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1      1      1      1      1      1      1      1      1      1
QI      1
*

KK    C38A
KM    COMBINE FLOWS FROM BASIN 38A WITH ADOT DETENTION OUTLET AND FREEWAY'S 202D
HC       3
*
* **** Revised by DMJM to reflect Red Mountain Freeway 30% Design Concepts ****
*

KK  202NE1
KM   On-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
KM   Basin is located Northeast of the 202L/US60 Traffic Interchange - Upper Basin
RS       1    ELEV  1436.2
*
* SV   0     0.2     2.3     6.4    14.9    29.2    36.7    44.4    52.3    60.4
*
* *** Revised by PB to reflect final basin geometry ****
*
SV       0     0.4     2.8     6.4    14.3    28.8    36.4    44.1    52.0    60.7
SE  1436.2  1437.0  1438.0 1438.73  1440.0  1442.0  1443.0  1444.0  1445.0  1446.0
*   ***** Double 30 inch dia. RCP Outlet Pipe *****
SQ       0       0       0       0      43      69      79      88      96     103
*
*
```



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

KK  202NE2
KM   On-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
KM   Basin is located Northeast of the 202L/US60 Traffic Interchange - Lower Basin
RS       1    ELEV  1433.9
*
```

```
* SV   0     0.7     4.2     8.9    13.9    19.0    24.3    29.7    35.4    41.3
*
* *** Revised by PB to reflect final basin geometry ****
*
SV       0     0.9     3.7     8.1    12.8    17.8    22.8    28.2    33.5    40.1
SE  1433.9  1435.0  1436.0  1437.0  1438.0  1439.0  1440.0  1441.0  1442.0  1443.0
*   ***** Single 24 inch dia. RCP Outlet Pipe *****
SQ       0     5.0    12.8    20.7    25.1    29.1    32.7    36.0    39.1    42.0
*
*
* DDM   ***** Updated *****

KK     17A
KM   BASIN 17A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=       .7  Lca=       .5   S=   60.6  Kn= .042  LAG=  18.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .18
LG     .26     .28    4.00     .55   33.00
UI     44.    151.    233.    375.    265.    171.     77.     42.     16.     10.
UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****
* Revised by DMJM to reflect Red Mountain Freeway Design Concepts
*    KK17AT23
*    KM ROUTE FLOWS FROM 17 TO 23 VIA DIRT CHANNEL, THEN NATURAL WASH
*    RS     3    FLOW      -1
*    RC 0.045   0.032   0.045    2600   0.015
*    RX     0     100     133     137     142     147     200     300
*    RY     5       4     3.5       0       0     3.5       4       5
*
* **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
*
* DDM   ***** Updated *****

KK      49
KM   BASIN 49
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.6  Lca=       .8   S=   73.6  Kn= .040  LAG=  28.4
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .79
LG     .30     .30    4.15     .48   14.00
UI     94.    257.    467.    603.    836.   1129.    839.    643.    482.    296.
UI    161.    117.     74.     29.     29.     29.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****
```



```
1                                   HEC-1 INPUT

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


KK    CAP2
RS       1    FLOW      -1
SV       0    0.02   0.538   2.545  13.729
SE  1565.1    1566    1568    1570    1572
SQ       0      60     340     807    1395
*
```

```
863         KK  BASIN2
            * KO     1
864         KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP2
865         KM        WITH 24-INCH OUTFALL      (EH1B)
866         RS       1    STOR      -1
867         SA       0     .54    1.81    4.10    5.14     6.3     6.3     6.3
868         SE      49      51      52      53      54      55      64      67
869         SL      50    3.14     .62      .5
870         SS    56.5     100     2.5     1.5
            *

871         KK  RCAP2A
872         KM   ROUTE BASIN 2 OUTFLOW THROUGH 36-INCH PIPE
873         RK    1370  0.0088   0.012            CIRC       3
            *
            * DDM   ***** Preserved *****

874         KK   RCAP2
            *
875         KM   ROUTE CAP OVERCHUTE #2 South to Broadway Road at C17A
            *
876         RS      10    FLOW      -1
            *
877         RC    .045    .040    .045    1100    .012
            *
878         RX     100     200     300     316     321     329     429     529
879         RY       6       5       3       0       0       3       5       6
            *
            *

880         KK    C17A
881         KM    COMBINE FLOWS FROM CAP OVERCHUTE #2 AND S17A
882         HC       2
            *
            * DDM   ***** Updated *****

883         KK      48
884         KM   BASIN 48
885         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
886         KM    L=      1.6  Lca=       .8   S=   80.2  Kn= .038  LAG=  26.4
887         KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
888         BA     .77
889         LG     .31     .31    4.10     .49   12.00
890         UI     98.    305.    517.    682.   1035.   1076.    777.    573.    390.    190.
891         UI    136.     85.     30.     30.     30.      0.      0.      0.      0.      0.
892         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****
```



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

893         KK    CAP3
894         RS       1    FLOW      -1
895         SV       0   0.934   1.222   4.303   13.13
896         SE  1564.6  1567.5    1568    1570    1572
897         SQ       0       0     143     750    1530
            *
```

```
898         KK  BASIN3
            * KO     1       2
899         KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP3
900         KM        WITH 30-INCH OUTFALL    BASIN AE2B (BASIN 3)
901         RS       1    STOR      -1
902         SA       0      .5       1     1.8     3.4       4       6       6
903         SE      55      56      57      58      59      60      62      65
904         SL   56.25    4.91     .62      .5
905         SS      62     100     2.5     1.5
            *
            * DDM   ***** Preserved *****

906         KK  RCAP3A
907         KM   ROUTE CAP OVERCHUTE #3 TO APACHE TRAIL (ALONG NATURAL CHANNEL)
908         RS     3.3    FLOW      -1
909         RC    .055    .045    .055    2000    .020
910         RX     100     200     300     305     310     315     415     515
911         RY       7       6       5       0       0       5       6       7
            *
            * DDM   ***** Preserved *****

912         KK  RCAP3B
913         KM   ROUTE CAP OVERCHUTE #3 FROM APACHE TRAIL TO 17B
914         RS       1    FLOW      -1
915         RC    .045    .035    .045    2300     .01
916         RX     100     200     300     301     311     312     412     512
917         RY       3       2       1       0       0       1       2       3
            *
            * DDM   ***** Updated *****

918         KK     17B
919         KM   BASIN 17B
920         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
921         KM    L=       .8  Lca=       .6   S=   50.0  Kn= .042  LAG=  21.2
922         KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
923         BA     .22
924         LG     .26     .28    4.00     .54   30.00
925         UI     37.    146.    220.    348.    372.    252.    169.     77.     47.     23.
926         UI     11.     11.      0.      0.      0.      0.      0.      0.      0.      0.
927         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * DDM   ***** Preserved *****
```



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

928         KK    C17B
929         KM    COMBINE FLOWS FROM CAP OVERCHUTE #3 AND S17B
930         HC       2
            *
            *     * DDM   ***** Preserved *****
            *     KK17BT22
            *     KM ROUTE FLOWS FROM S17 TO C22 VIA LINED CHANNEL
            *     RS     3    FLOW      -1
            *     RC 0.035   0.015   0.035    2700  0.0114
            *     RX     0       1       3       6      18      21      36      70
            *     RY  6.25    6.10       6       0       0       3    3.25     3.5
            *
```

```
931        KK    C17C
932        KM    COMBINE FLOWS FROM C17A AND C17B
933        HC       2
           *

934        KK  17CT23
935        KM   ROUTE FLOWS FROM C17C TO C23A
           *
936        RS       2    FLOW      -1
937        RC   0.035   0.025   0.035    3000  0.0083
938        RX       0       9      24      54      66      96     111     120
939        RY       8     5.3       5       0       0       5     5.3       8
           *
           * **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
           *

940        KK     18F   BASIN
941        KM   BASIN 18F
942        KM    THIS IS THE FUTURE SUBBASIN CREATED BY 202L BISECTING 18C
943        BA   0.048
944        LG    0.14    0.32    4.00    0.43       5
945        UI     119     217      31       0       0       0       0       0       0       0
946        UI       0       0       0       0       0       0       0       0       0       0
           *

947        KK  R18FTE
948        KM   ROUTE FLOWS FROM 18F TO C18E VIA CHANNEL ON EAST SIDE OF FREEWAY
949        RS       2    FLOW      -1
950        RC   0.035   0.016   0.035    2570  0.0123
951        RX       0       9      24      36      44      56      71      80
952        RY       9     6.3       6       0       0       6     6.3       9
           *
           *

953        KK     18E   BASIN
954        KM   BASIN 18E
955        KM    THIS IS THE FUTURE SUBBASIN CREATED BY 202L BISECTING 18C
956        BA   0.082
957        LG    0.11    0.31    4.00    0.49      28
958        UI     203     371      53       0       0       0       0       0       0       0
959        UI       0       0       0       0       0       0       0       0       0       0
           *
```



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

960        KK  RET18E
961        KM    RETAIN THE 100 YEAR 2 HOUR VOLUME (27% OF BASIN HAS RETENTION)
962        DT    D18E    2.32
963        DI       0   10000
964        DQ       0    2700
           *

965        KK    C18E
966        KM    COMBINE FLOWS FROM BASIN 18E AND 18F
967        HC       2
           *
           *
```

```
968          KK  18ET23
969          KM   ROUTE FLOWS FROM C18E TO C23 VIA CONCRETE CHANNEL ON EAST SIDE OF FREEWAY
970          RS       1    FLOW      -1
971          RC   0.035   0.016   0.035    1860  0.0107
972          RX       0       9      24      36      44      56      71      80
973          RY       9     6.3       6       0       0       6     6.3       9
             *

974          KK    C23A
975          KM    COMBINE FLOWS FROM C17C AND C18E
976          HC       2
             *

977          KK  R23ATB
978          KM   ROUTE FLOWS FROM C23A TO C23B VIA CONCRETE CHANNEL ON EAST SIDE OF FREEWAY
979          RS       1    FLOW      -1
980          RC   0.035   0.016   0.035    1120  0.0086
981          RX       0       9      24      36      44      56      71      80
982          RY       9     6.3       6       0       0       6     6.3       9
             *

983          KK      23   BASIN
984          KM   BASIN 23
985          BA   0.169
986          LG    0.22    0.26    4.10    0.54      30
987          UI      38     137     206     337     257     168      82      43      20       9
988          UI       9       0       0       0       0       0       0       0       0       0
989          UI       0       0       0       0       0       0       0       0       0       0
             *   KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
             *   *     KM  L=      1.0  Lca=       .3   S=   65.0  Kn= .038  LAG=  16.2
             *   KM  L=       .6  Lca=       .2   S=   58.6  Kn= .068  LAG=  19.9
             *
             *   KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
             *   BA .1750
             *   LG   .28     .30    4.00     .47   20.00
             *   UI   35.    129.    195.    325.    274.    184.    108.     50.     28.
             *   UI    9.      0.      0.      0.      0.      0.      0.      0.      0.
             *   UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
             *     BA   .28
             *     LG   .28     .30    4.00     .53   20.00
             *     UI   92.    296.    509.    595.    357.    170.     77.     28.     18.
             *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
             *     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
```



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

990          KK   RET23
991          KM    RETAIN THE 100 YEAR 2 HOUR VOLUME (18% OF BASIN HAS RETENTION)
992          DT     D23    2.79
993          DI       0   10000
994          DQ       0    1800
             *

995          KK    C23B
996          KM   COMBINE FLOWS FROM C23A AND BASIN 23
997          HC       2
             *
```

```
* DDM   ***** Updated *****

KK      47
KM   BASIN 47
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      3.0  Lca=      1.5   S=   51.2  Kn= .037  LAG=  44.8
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA    1.67
LG     .32     .32    4.00     .49    8.00
UI    126.    126.    418.    569.    691.    804.    959.   1272.   1579.   1302.
UI   1079.    920.    765.    631.    492.    300.    218.    205.    126.    126.
UI     42.     39.     39.     39.     39.     39.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****
* KKCAP4+5
* KM ROUTE THROUGH OVERCHUTES 4 AND 5, HUYDRAULICALLY CONNECTED
* KM STORAGE AND DISCHARGE WERE ADDED AT APPROPRIATE ELEVATIONS
* RS      1    FLOW      -1
* SV      0   0.081   0.483   4.779   39.02  121.88
* SE1568.3    1570    1572    1574    1576    1578
* SQ      0     170     575    1085    1245    1410
*

KK  BASIN4
KM   ROUTE THROUGH OVERCHUTES 4 AND 5, HYDRAULICALLY CONNECTED
KM   STORAGE AND DISCHARGE WERE ADDED AT APPROPRIATE ELEVATIONS
KM  OUTFLOW THROUGH ONE 30-INCH PIPE
KM        BASIN4 (BY4B)
RS       1    STOR      -1
SA       0    0.64     2.3    5.28    6.88    9.41
SE      68      69      70      71      72      76
SL   69.75    4.91     .62      .5
SS      74     200     2.5     1.5
*
* DDM   ***** Preserved *****

KK   RCAP4
KM   ROUTE CAP OVERCHUTE #4 AND #5 TO SUBBASIN 22
RS      10    FLOW      -1
RC     .05    .045     .05    6000    .005
RX     100     200     300     304     310     314     414     514
RY       6       5       4       0       0       4       5       6
*
* DDM   ***** Updated *****
```



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

KK      22
KM   BASIN 22
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .3   S=   51.3  Kn= .041  LAG=  19.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .41
LG     .27     .28    4.00     .54   29.00
UI     86.    310.    470.    782.    624.    415.    227.    109.     56.     21.
UI     21.      0.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
          * DDM   ***** Preserved *****

1035      KK    C22A
1036      KM   COMBINE FLOWS FROM CAP OVERCHUTES 4 & 5 AND SUBBASIN 22
1037      HC       2
          *
          * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
          *
          *    * DDM   ***** Preserved *****
          *    KK   C22
          *    KM COMBINE S17B AND S22
          *    HC     2
          *    * DDM   ***** Preserved *****

1038      KK  22AT23
1039      KM   ROUTE C22A TO C23 VIA CONCRETE CHANNEL
1040      KM   VELOCITY = 5FT/S
1041      RS       2    FLOW      -1
          *
1042      RC   0.045   0.022   0.042    1600   0.001
          *
1043      RX       0     102     103     106    1021     124     128     270
1044      RY       7     6.5       6       0       0       3       5       7
          *
          * DDM   ***** Preserved *****
          *
          * **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
          *

1045      KK    C23C
          *
1046      KM   COMBINE FLOWS FROM C22A AND C23C
1047      HC       2
          *
          *    * DDM   ***** Preserved *****
          *    KK 23T24
          *    KM ROUTE FLOWS FROM C23 TO C24 VIA CONCRETE LINED CHANNEL
          *    RS     2    FLOW      -1
          *    RC 0.045   0.022   0.045    2640  0.0117
          *    RX     0       2       3       6      21      24      26      70
          *    RY     6       6       6       0       0       3       5       6
          *
          * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
          *
```



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

1048      KK   RC23
1049      KM   ROUTE FLOWS FROM C23 TO C31a VIA CONCRETE LINED CHANNEL
1050      RS       3    FLOW      -1
1051      RC   0.035   0.016   0.035    4120  0.0054
1052      RX       0       7      19      33      47      61      73      80
1053      RY       9     7.3       7       0       0       7     7.3       9
          *
          *
          * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
          *
          *
```

```
* DDM   ***** Updated *****

KK     30a
KM   BASIN 30a
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.2  Lca=       .7   S=   48.8  Kn= .060  LAG=  38.1
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .30
LG     .27     .28    3.91     .53   28.00
UI     27.     42.    104.    138.    166.    204.    281.    329.    251.    208.
UI    167.    135.     96.     54.     45.     32.     27.      9.      8.      8.
UI      8.      8.      0.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* DDM   ***** Preserved *****

KK  30at31
KM   ROUTE SUBBASIN 30A IN VARIOUS CHANNELS UNTIL IT COMBINES WITH SUBBASIN 31A
KM   AT THE CORNER OF 88TH ST AND SOUTHERN.  IN REALITY THIS ROUTING COULD BE
KM   BROKEN UP INTO POSSIBLY 3 DIFFERENT ROUTINGS DUE TO CHANGES IN HOW THE
KM   ROUTING IS ACCOMPLISHED, IE. CEMENT CHANNEL, EARTH LINED CHANNEL AND OPEN
KM   WASH. THE PARAMETERS WILL TRY TO BE AN AVERAGE FOR THE ENTIRE REACH
RS       4    FLOW      -1
RC    .038    .030    .038    5000    .005
RX       0      15      25      40      60      75      85     100
RY       8       6       3       2       2       3       6       8
*
*
* **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
*   ** Additional Refinements were made with the University to Southern Segment
*
* DDM   ***** Preserved *****

KK   C31A1
KM    COMBINE FLOWS FROM SUBBASIN 30A, AND C23
HC       2
*
* DDM   ***** Updated *****
```



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

KK     31A
KM   BASIN 31A
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=      1.0  Lca=       .5   S=   43.3  Kn= .064  LAG=  22.5
KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   .5127
LG     .29     .29    4.15     .46   18.00
UI     77.    299.    454.    675.    882.    614.    430.    249.    130.     78.
UI     27.     24.     24.      0.      0.      0.      0.      0.      0.      0.
UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
*    BA   .53
*    LG   .29     .29    4.15     .46   18.00
*    UI   80.    312.    472.    702.    919.    639.    448.    259.    135.
*    UI   28.     25.     25.      0.      0.      0.      0.      0.      0.
*    UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
```

```
1088    KK    202C
1089    KM   BASIN 202C
1090    KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
1091    KM     A = 6.66 acres, C = 0.95, Tc = 13.33 min.
1092    BA   .0104
1093    QI       1       1       1       1       1       1       1       1       1       1
1094    QI       1       1       1       1       1       1       1       1       1       1
1095    QI       1       1       1       2       4       5       7       9      14      26
1096    QI      34      30      20      14      10       7       5       3       2       2
1097    QI       1       1       1       1       1       1       1       1       1       1
1098    QI       1       1       1       1       1       1       1       1       1       1
1099    QI       1       1
        *
        *
        * **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
        *   ** Additional Refinements were made with the University to Southern Segment
        *
        * DDM   ***** Preserved *****

1100    KK   C31A2
1101    KM    COMBINE FLOWS FROM SUBBASIN 30A, SUBBASIN 31A, C23, AND SUBBASIN 202C
1102    HC       3
        *
        *
        * **** Revised by DMJM to reflect Red Mountain Freeway 30% Design Concepts ****
        *

1103    KK   R202S
1104    KM   On-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
1105    KM    Basin located on the east side of the 202L Freeway north of Southern Ave.
1106    KM    Principal Outlet Structure consists of 1 - 10'x6' RCB.
        *   RS     1    ELEV  1446.0
        *   SV     0     0.2     1.4     4.3     9.5    17.5    28.6    52.9    78.4
        *   SE1446.0  1447.0  1448.0  1449.0  1450.0  1451.0  1452.0  1454.0  1456.0  14
        *   SQ     0    46.3    92.6   164.1   245.7   333.9   425.9   604.9   804.7   8
        *
        * **** Revised by DMJM to reflect 202L/US60 - Phase 2 - 30% Design Concepts ****
        *
```



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

1107    RS       1    ELEV  1444.0
        * SV   0     0.2     1.4     4.3     9.5    17.5    28.6    52.9    78.4    91.3
        * SE1444.01445.0  1446.0  1447.0  1448.0  1449.0  1450.0  1452.0  1454.0  1455.0
        * SQ   0    46.1    92.2   163.8   245.3   333.3   425.7   604.8   803.6   826.1
        *
        * *** Revised by PB to reflect final culvert geometry and basin geometry ***
        *
1108    SV       0     1.0     2.0     4.6     8.9    16.2    25.7    37.3    49.2    61.6
1109    SV    74.2
1110    SE  1444.0  1445.0  1446.0  1447.0  1448.0  1449.0  1450.0  1451.0  1452.0  1453.0
1111    SE  1454.0
1112    SQ       0    46.1    92.2   163.8   245.0   333.3   425.7   516.7   604.1   685.4
1113    SQ   760.8
        *
        * ***** Onsite 202L Runoff *****
        *

1114    KK    202A
```

```
1115        KM   BASIN 202A
1116        KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
1117        KM     A = 56.9 acres, C = 0.76, Tc = 22.9 min.
1118        BA   .0889
1119        QI      0      0      1      1      2      2      2      3      3      3
1120        QI      3      3      3      3      4      4      4      4      4      4
1121        QI      4      4      5      5      5      5      6      6      6      7
1122        QI      8      9     14     20     28     38     55     90    137    163
1123        QI    155    127     96     73     54     39     27     20     15     12
1124        QI     10      8      7      6      6      5      5      5      5      5
1125        QI      4      4      4      4      4      4      4      3      3      3
1126        QI      3      3      3      3      2      2      1      1
            *

1127        KK   R202A
1128        KM   ROUTE FLOWS FROM Broadway Road to C202B
1129        RK   6000.  0.0016   0.013            CIRC     6.0
            *

1130        KK    202B
1131        KM   BASIN 202B
1132        KM    Hydrograph created from onsite Rational Calulations and SCS Distribution
1133        KM     A = 35.73 acres, C = 0.84, Tc = 17.67 min.
1134        BA   .0558
1135        QI      0      0      1      1      2      2      2      2      2      2
1136        QI      2      2      2      2      2      3      3      3      3      3
1137        QI      3      3      3      3      4      4      4      4      5      5
1138        QI      6      7     12     17     24     32     48     82    121    125
1139        QI    101     73     53     39     27     18     13      9      7      6
1140        QI      5      5      4      4      4      3      3      3      3      3
1141        QI      3      3      3      3      3      2      2      2      2      2
1142        QI      2      2      2      2      1      1
            *
```



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

1143        KK   C202B
1144        KM    COMBINE FLOWS FROM SUBBASIN 202A WITH SUBBASIN 202B
1145        HC       2
            *
            *

1146        KK   R202B
1147        KM   ROUTE FLOWS FROM C202B TO C202C
1148        RK   3200.  0.0010   0.013            CIRC     5.0
            *
            *

1149        KK   C202C
1150        KM    COMBINE FLOWS FROM C202B WITH C31A
            * KO   1
1151        HC       2
            *

1152        KK  RT202C
1153        KM   ROUTE FLOWS ALONG SOUTHERN AVE FROM 202L TO HAWES ROAD.
            * KO   1
1154        RS       1    FLOW      -1
```

```
1155        RC    .025    .015    .025     683  0.0010
1156        RX       0       4      16      28      44      56      68      72
1157        RY     7.3     6.3     6.0       0       0     6.0     6.3     7.3
            *
            *   *** REVISED BY DMJM+HARRIS PER CITY OF MESA COMMENTS ***
            *

1158        KK  DSPILL
1159        KM   DIVERT FLOW SW TOWARD HAWES CHANNEL VIA 10x4 RCB
1160        KM   REMAINDER FLOWS SOUTH VIA SIDE CHANNEL WEIR (L=165') TO NW BASINS
1161        DT   DHAWS
            *
            * *** Flow Split rating from HEC-RAS model and channel w/ weir (L=165') ***
            * DI   0     104     185     461     527     579     618     674     719
            * DQ   0     104     140     162     189     208     217     224     225
            *
            * *** Revised by PB to reflect final lateral weir goemetry and lateral ***
            * *** weir rating analysis ***
            *
1162        DI       0      96     185     248     324     480     644     712
1163        DQ       0      96     136     148     160     169     199     230
            *
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            * DDM   ***** Inserted *****
            *
```



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


1164        KK     38B
1165        KM   BASIN 38B
1166        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
            *     KM  L=      1.1  Lca=       .8   S=   37.0  Kn= .063  LAG=  50.8
1167        KM    L=       .5  Lca=       .4   S=   28.0  Kn= .063  LAG=  25.6
1168        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1169        BA   .0528
1170        LG     .25     .29    4.25     .44   31.00
1171        UI      7.     23.     37.     50.     78.     71.     52.     38.     23.     12.
1172        UI      8.      4.      2.      2.      2.      0.      0.      0.      0.      0.
1173        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            *     LG   .25     .29    4.25     .44   31.00
            *     UI   31.     31.     78.    127.    156.    179.    207.    242.    313.
            *     UI  340.    282.    247.    209.    179.    152.    119.     77.     55.
            *     UI   39.     31.     25.     10.     10.     10.     10.     10.     10.
            *     UI    0.
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *

1174        KK    C38B
1175        KM   COMBINE FLOWS FROM D31S with SUBBASIN 38B AT C38B
            *
1176        HC       2
            *
            *

1177        KK  202NW1
```

```
1178        KM   Off-line Detention Basin estimated for 202L/US60 Traffic Interchange DCR
1179        KM    Upper Basin of Two in Series
1180        RS       1    ELEV  1433.0
            *  *   ***** Triple 48 Inch dia. RCP Outlet Pipes *****
            *  SV     0     0.4     3.1    11.5    12.6    17.7    23.0    28.4    33.8
            *  SE1433.0  1434.0  1435.0 1436.66  1437.0  1438.0  1439.0  1440.0  1441.0
            *  SQ     0       0       0       0     125     246     343     395     438
            *  **** Triple 48 Inch dia. RCP Outlet Pipes and Emergency Spillway ****
            * SV   0     0.4     3.1    11.5    12.6    17.7    23.0   23.70   32.34
            * SE1433  1434.0  1435.0 1436.66  1437.0  1438.0  1439.0 1439.13 1440.73
            * SQ   0       0       0       0     125     246     343     352    1192
            *
            * *** Revised by PB to reflect final basin geomerty and 2-8'X4" RCBC outlet ****
            *
1181        SV       0     0.7     3.5    10.5    12.9    18.1    20.8    23.4    24.5    25.6
1182        SV    26.7    28.9
1183        SE  1433.0  1434.0  1435.0  1436.5  1437.0  1438.0  1438.5 1439.00 1439.20  1439.4
1184        SE  1439.6  1440.0
1185        SQ       0       0       0       0     266     451     502     551     570     595
1186        SQ     615     650
            *
            *
```



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

1187        KK  202NW2
1188        KM   Off-line Detention Basin for 202L/US60 Traffic Interchange 30% Design
1189        KM    Lower Basin of Two in Series
1190        RS       1    ELEV  1430.4
            *  *   ***** Double 48 inch dia. RCP Outlet Pipe *****
            *  SV     0     0.1     1.4     5.2    10.7    16.6    22.7    29.0    35.3
            *  SE1430.4  1431.0  1432.0  1433.0  1434.0  1435.0  1436.0  1437.0  1438.0
            *  SQ     0      12      35      74     109     160     216     250     280
            *   **** Double 48 inch dia. RCP Outlet Pipe and Emergency Spillway ****
            * SV   0     0.1     1.4     5.2    10.7    16.6    22.7   27.42    47.9
            * SE1430.4 1431.0  1432.0  1433.0  1434.0  1435.0  1436.0 1436.75  1440.0
            * SQ   0      12      35      74     109     160     216     246    1265
            *
            * *** Revised by PB to reflect final basin geometry and 2-36" RCP outlet ****
            *
1191        SV       0     0.2     1.9     6.1    12.5    19.8    23.6    27.3    31.2    35.2
1192        SV    39.2
1193        SE  1430.3  1431.0  1432.0  1433.0  1434.0  1435.0  1435.5  1436.0  1436.5  1437.0
1194        SE  1437.5
1195        SQ       0       5      27      61      96     122     186     304     469     683
1196        SQ     946
            *
            * DDM   ***** Updated *****

1197        KK      50
1198        KM   BASIN 50
1199        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1200        KM    L=       .9  Lca=       .4   S=   81.4  Kn= .037  LAG=  15.8
1201        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1202        BA     .28
1203        LG     .33     .31    4.00     .49    5.00
1204        UI     97.    306.    543.    575.    342.    149.     71.     21.     18.      0.
1205        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

```
1206    UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
        *
        * DDM   ***** Preserved *****

1207    KK    CAP1
1208    RS       1    FLOW      -1
1209    SV       0   0.091   0.575   3.319  13.256
1210    SE    1566    1568    1570    1572    1574
1211    SQ       5      90     275     470     610
        *

1212    KK  BASIN1
        * KO     1       2
1213    KM        NEW DETENTION BASIN LOCATED DOWNSTREAM FROM CAP1
1214    KM        WITH 24-INCH OUTFALL
1215    RS       1    STOR      -1
1216    SA    0.01    1.94    3.10    3.49    3.94    4.40    4.85
1217    SE      60      61      62      63      64      65      66
1218    SL    60.2    3.14     .62      .5
1219    SS      64      50     2.5     1.5
        *
        *
        * DDM   ***** Preserved *****
```



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


1220    KK   RCAP1
1221    KM   ROUTE CAP OVERCHUTE #1 TO SUBBASIN 18A
1222    RS      11    FLOW      -1
1223    RC     .05    .045     .05    7000     .02
1224    RX     100     200     300     301     303     304     404     505
1225    RY       6       5       2       0       0       2       5       6
        *
        * **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
        *   ** Additional Refinements were made with the University to Southern Segment
        *
        * DDM   ***** Updated *****

1226    KK     18C   BASIN
1227    KM   BASIN 18c
        *
1228    KM    THIS IS THE FUTURE SUBBASIN     WITH LESS AREA DUE TO 202L FREEWAY
        *
1229    BA   0.386
1230    LG    0.21    0.27    4.10    0.50      31
1231    UI      50     159     265     349     552     522     383     282     184      88
1232    UI      64      37      15      16      15       0       0       0       0       0
1233    UI       0       0       0       0       0       0       0       0       0       0
        *
        *   KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
        *   KM  L=      1.0  Lca=       .5   S=   60.6  Kn= .071  LAG=  24.1
        *     KM  L=      1.2  Lca=       .7   S=   66.1  Kn= .061  LAG=  37.2
        *
        * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
        *
1234    KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
        *   BA .4172
        *   LG   .28     .29    4.10     .48   19.00
```

```
*   UI   58.    207.    326.    450.    691.    528.    384.    266.    127.
*   UI   49.     18.     18.     18.      0.      0.      0.      0.      0.
*   UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*     BA   .50
*     LG   .22     .25    4.00     .57   44.00
*     UI   45.     75.    180.    237.    287.    355.    507.    531.    407.
*     UI  268.    214.    140.     80.     72.     45.     34.     14.     14.
*     UI   14.     14.      0.      0.      0.      0.      0.      0.      0.
*     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
*   KK  D18c
*   KM  RETAIN THE 100 YEAR 2 HOUR VOLUME (53% OF BASIN HAS RETENTION)
*   DT  D18c      20
*   DI     0   10000
*   DQ     0   10000
*
```



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

1235          KK  RET18C
1236          KM    RETAIN THE 100 YEAR 2 HOUR VOLUME (16% OF BASIN HAS RETENTION)
1237          DT    D18C    5.00
1238          DI       0   10000
1239          DQ       0    1600
              *
              * DDM   ***** Preserved *****

1240          KK    C18C
1241          KM    COMBINE FLOWS FROM ROUTED FLOW OF SUBBASIN 50 WITH FLOW FROM 18c
1242          KM    BEFORE CROSSING UNDERNEATH APACHE BLVD AND GOING INTO THE HAWES CHANNEL
1243          HC       2
              *
              * DDM   ***** Preserved *****

1244          KK   18T24
1245          KM   REACH HS-6, HS-7, HS-8
1246          KM   ROUTE FLOWS FROM SUBBASIN 18A TO SUBBASIN 24.
1247          RS       1    FLOW      -1
1248          RC    .025    .015    .025    2730  0.0017
1249          RX       0       8      16      26      46      58      65      73
1250          RY     5.0     5.1     5.2       0       0     5.2     5.1     5.0
              *  THE ABOVE CHANNEL DIMS ARE BASED ON THE NARROWEST DESIGN REACH.
              *
              *

1251          KK     18D   BASIN
1252          KM   BASIN 18D
1253          BA   0.044
1254          LG    0.20    0.27    4.00    0.54      34
1255          UI      33     103     128      53      17       5       0       0       0       0
1256          UI       0       0       0       0       0       0       0       0       0       0
              *   KM  THIS IS THE FUTURE SUBBASIN CREATED BY 202L BISECTING 18C
              *   KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              *     KM  L=      1.2  Lca=       .7   S=   66.1  Kn= .061  LAG=  37.2
              *   KM  L=       .7  Lca=       .4   S=   50.0  Kn= .071  LAG=  29.7
              *   KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              *   BA .1367
              *   LG   .28     .29    4.10     .48   19.00
```

```
*  UI   16.    40.    75.    96.   127.   188.   152.   117.    89.
*  UI   33.    25.    16.     8.     5.     5.     5.     0.     0.
*  UI    0.     0.     0.     0.     0.     0.     0.     0.     0.
*
KK  18DT24
KM   ROUTE FLOWS FROM SUBBASIN 18D TO C24A
RS      2    FLOW     -1
RC   .035    .025   .035   2820  0.0071
RX      0       5     20     36     44     60     75     80
RY    4.4     4.3    4.0      0      0    4.0    4.3    4.4
*
```



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

KK     24A   BASIN
KM   BASIN 24A
BA   0.044
LG    0.11    0.30    4.00    0.52      36
UI      62     179      79      16       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*

KK    C24A
KM   COMBINE FLOWS FROM 18D AND 24A
HC       2
*

KK   24ATB
KM   ROUTE C24A TO C24B VIA CONCRETE CHANNEL
*   KM VELOCITY = 5FT/S
RS       2    FLOW     -1
*
RC   0.045   0.022   0.042    2630  0.0095
*
RX       0     102     103     106     121     124     128     270
RY       7     6.5       6       0       0       3       5       7
*
*
* **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
*   ** Additional Refinements were made with the University to Southern Segment
*
* DDM   ***** Updated *****
* DDM   ***** Inserted *****
*

KK     24B   BASIN
KM   BASIN 24B
BA   0.258
LG    0.24    0.26    4.00    0.54      31
UI      67     230     353     549     372     232      97      56      16      15
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*   KK    24
*   KM BASIN 24
*   KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
*     KM  L=       .9  Lca=       .5   S=   43.5  Kn= .047  LAG=  24.6
*   KM  L=       .9  Lca=       .5   S=   43.5  Kn= .052  LAG=  30.4
```

```
*   KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
*   BA .4272
*   BA .4272
*   LG   .23     .26    4.00     .56   38.00
*   UI   47.    117.    223.    286.    373.    562.    484.    372.    285.
*   UI  116.     80.     53.     34.     15.     15.     15.     15.      0.
*   UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*     BA   .29
*     LG   .23     .26    4.00     .58   38.00
*     UI   40.    138.    220.    300.    469.    376.    275.    195.    100.
*     UI   40.     12.     12.     12.      0.      0.      0.      0.      0.
*     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
```



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

1285        KK  RET24B
1286        KM    RETAIN THE 100 YEAR 2 HOUR VOLUME (18% OF BASIN HAS RETENTION)
1287        DT    D24B    3.35
1288        DI       0   10000
1289        DQ       0    1800
            *
            * **** Revised by DMJM+HARRIS to reflect Red Mountain Freeway Design Concepts **
            *   ** Additional Refinements were made with the University to Southern Segment
            *

1290        KK    C24B
1291        KM   COMBINE FLOWS FROM C24A AND BASIN 24B
            *   KK   C24
            *   KM COMBINE FLOWS FROM S18C AND S24
            *   ZW   A=HAWES RD @ BROADWAY RD   B=HAWES CHANNEL PROJECT  C=FLOW   F=HYDROGRA
1292        HC       2
            *

1293        KK    C24C
1294        KM   COMBINE FLOWS FROM C24B AND C18C
            *   KK   C24
            *   KM COMBINE FLOWS FROM S18C AND S24
1295        ZW     A=HAWES RD @ BROADWAY RD   B=HAWES CHANNEL PROJECT  C=FLOW   F=HYDROGRAPH
1296        HC       2
            *
            *
            * DDM   ***** Preserved *****

1297        KK  BRDHAW
1298        KM    DIVERT FLOW OF 360 CFS TO THE WEST PER THE CITY OF MESA FUTURE DRAINAGE
1299        KM    SYSTEM
1300        DT  DIVBRD
1301        DI       0     200     400     500     700    1000
1302        DQ       0       0       0       0       0       0
            * DI     0     200     400     500     700    1000
            * DQ     0     200     360     360     360     360
            *

1303        KK  RT31B1
1304        KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
1305        KM   REACH HS-5 plus culvert HSC-4
1306        KM   ROUTE FLOWS FROM HAWES ROAD AND BROADWAY ROAD (C24) TO CORAL BELL AVENUE.
```

```
1307        KO                                    21                    10
1308        ZW   A=FLOW AFTER 360 CFS DIVERT TO WEST B=HAWES CHANNEL PROJECT C=FLOW  F=HYDRO
1309        RS       1    FLOW      -1
1310        RC    .025    .015    .025    1312  0.0015
1311        RX       0       8      15      28      68      81      89      97
1312        RY     6.2     6.4     6.5       0       0     6.5     6.4     6.2
            *
1                                   HEC-1 INPUT                                          PAGE 39

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


1313        KK  RT31B2
1314        KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
1315        KM   REACH HS-4A AND HS4-B plus culvert HSC-3
1316        KM   ROUTE FLOWS FROM CORAL BELL AVENUE TO EMELITA AVENUE.
1317        RS       1    FLOW      -1
1318        RC    .025    .015    .025    2080  0.0018
1319        RX       0       8    15.9      16      66    66.1      74      82
1320        RY     5.8     5.9     6.1       0       0     6.1     5.9     5.8
            *

1321        KK  RT31B3
1322        KM   THIS ROUTING STEP HAS BEEN BROKEN OUT OF A LARGER SEQUENCE FOR SIMPLICITY
1323        KM   REACH HS-3
1324        KM    THIS REACH IS AN EXISTING CHANNEL FOR THE CRESCENT RUN MOBILE HOME PARK.
1325        KM    The existing channel 5.6 ft deep has no freeboard.  Overbank flows in street
1326        KM    Routing values per channel design plans,
1327        KM    Sheet 2 of 19, City of Mesa Project 97-69.
1328        KM   ROUTE FLOWS FROM EMELITA AVENUE TO SOUTHERN AVENUE (C31) WITHIN SUBBASIN 31B.
1329        RS       1    FLOW      -1
1330        RC    .025    .015    .025    1935  0.0033
1331        RX       0    35.6    41.6      50    66.7    75.1    81.1    92.0
1332        RY     5.4     4.7     5.6       0       0     5.6     7.6     7.7
            *
            * DDM   ***** Updated *****
            *

1333        KK     31B
1334        KM   BASIN  31B
1335        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
            *     KM  L=      1.2  Lca=       .5   S=   29.7  Kn= .049  LAG=  30.8
1336        KM    L=      1.2  Lca=       .5   S=   29.7  Kn= .077  LAG=  23.2
1337        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
            *
1338        BA     .44
            * LG .31    0.32    4.45    0.35      11
            * UI  31      31      88     132     162     184     218     263     356     375
            * UI 302     254     217     187     152     124      77      54      51      36
            * UI  31      19      10       9       9      10       9      10       0       0
            * UI   0       0       0       0       0       0       0       0       0       0
            *
            * *** Revised by PB to reflect future conditions land use ***
            *
1339        LG    0.24    0.25    4.45    0.46      37
1340        UI      52     125     240     309     399     601     544     416     321     243
1341        UI     141      88      63      44      16      16      16      16       0       0
1342        UI       0       0       0       0       0       0       0       0       0       0
1343        UI       0       0       0       0       0       0       0       0       0       0
            *
```

```
*   BA  .720
*   LG   .31     .32    4.45     .35   11.00
*   UI  104.    391.    602.    859.   1236.    884.    629.    407.    187.
*   UI   59.     32.     32.      0.      0.      0.      0.      0.      0.
*   UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
*     BA   .47
*     LG   .24     .25    4.45     .46   37.00
*     UI   52.    125.    240.    309.    399.    601.    544.    416.    321.
*     UI  141.     88.     63.     44.     16.     16.     16.     16.      0.
*     UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
```



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

1344        KK   D31BS
1345        KM    RETAIN 100 YEAR 2 HOUR, (66% FOR FUTURE DEVELOPMENT)
1346        DT   D31BS      23
1347        DI       0   10000
1348        DQ       0   10000
            *
            * DDM   ***** Preserved *****
            *
            *
            * ***** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *

1349        KK   C31B
1350        KM   COMBINE FLOWS FROM C24 AND 31B
1351        ZW   A=FLOW SOUTHERN AND HAWES BEFORE SPLIT BOX B=HAWES CHANNEL PROJ C=FLOW F=HYDR
1352        HC       2
            *
            *
            * DDM   ***** Preserved *****
            *     KK  D31W
            *

1353        KK    D31S
            *
1354        KM    THIS DIVERT RECORD IS FOR THE BOX CULVERT SYSTEM AT SOUTHERN AVE AND HAWES
1355        KM    IT IS BASED UPON A HEC-RAS ANALYSIS OF THE FOLLOWING STRUCTURES:
1356        KM    3-8'X4' CBC SOUTH,  2-10'X6' CBC TO THE WEST
1357        KM    THE CULVERT TO THE SOUTH HAS THE TWO THAT ARE THERE NOW WITH AN ADDITIONAL
1358        KM    ONE CONSTRUCTED
            * KO   1
1359        DT    D31W
            *
            * **** Revised by DMJM to reflect Red Mountain Freeway Design Concepts *****
            *
            *   *  THESE NEW CARDS BASED UPON HEC-RAS ANALYSIS
            *   DI     0     144     182     252     380     454     544     671     758
            *   DI   976    1098    1184    1280    1412    1544    1646    1738    1830
            *   DQ     0       0       0     220     316     358     400     460     520
            *   DQ   640     690     740     800     860     920     980    1030    1080
            *
            *  THESE CARDS BASED UPON HEC-RAS ANALYSIS *** As Intended ***
            *
            *  DI     0     144     182     252     380     454     544     671     758
```

```
* DI   976    1098    1184    1280    1412    1544    1646    1738    1830
* DQ     0     144     182     220     316     358     400     460     520
* DQ   640     690     740     800     860     920     980    1030    1080
*
*  ** Revised to help allow proper function of NW Detention Basins (Off-line Typ
*  *** Simulating 75% blockage of the Southern Avenue culverts ***
*
* DI   0      62     111     230     309     403     504     611     727     847
* DI 971    1098    1223    1346
* DQ   0      62     111     214     283     362     445     533     629     729
* DQ 834     941    1049    1155
*
* *** Revised by PB to simulate blockage of 2 barrels leaving 1 barrel open ***
* *** of the Southern Avenue Culverts                                        ***
*
```



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

1360        DI       0      62     111     229     306     401     521     636     759     887
1361        DI    1019    1150    1281
1362        DQ       0      62     111     214     283     362     445     533     629     730
1363        DQ     835     941    1049
            *
            *

1364        KK  31T381  ROUTED IN TWO STEPS DUE TO CHANNEL DISSIMILARITY.
1365        KM   REACH HS-2 plus culvert HSC-2
1366        KM     ROUTE FLOWS FROM SOUTHERN AVENUE (C31) IN THE HAWES CHANNEL.
1367        KM   REACH HS-2 IS A PROPOSED CHANNEL SOON-TO-BE-CONSTRUCTED.  IT IS 4.5 FEET
1368        KM     DEEP, WITH FREEBOARD. CHANNEL CROSS-SECTION FROM DESIGN PLANS FOR
1369        KM     SOUTHERN AVENUE DRAINAGE IMPROVEMENTS.  SHEET 28 OF 43
1370        KM     CITY OF MESA PROJECT NO. 97-56.1 DESIGN PLANS BY ENTELLUS
1371        KM     DATED 8/8/97 REV. 12/19/97
            * KO   1
1372        RS       1    FLOW      -1
1373        RC   0.025   0.015   0.025    1248   .0022
1374        RX       0      32      37      46      56      65      73      75
1375        RY       5     7.0     4.5       0       0     4.5     9.0     9.5
            *
            *
            * **** Revised by DMJM+HARRIS at request of City of Mesa *****
            *
            *

1376        KK   RHAWS
1377        KM   RETRIEVE DIVERTED HYDROGRAPH FROM CHANNEL ALONG SOUTHERN AVE.
1378        DR   DHAWS
            *
            *

1379        KK  RTHAWS
1380        KM   ROUTE FLOWS FROM SOUTHERN AVENUE TO HAWES CHANNEL.
1381        RS       1    FLOW      -1
1382        RC    .025    .015    .025     513  0.0010
1383        RX       0       4      16      28      38      50      62      66
1384        RY     7.3     6.3     6.0       0       0     6.0     6.3     7.3
            *
            *
```

```
1385        KK   C31S
1386        KM   COMBINE FLOWS FROM D31S AND RHAWS
            * KO   1
1387        HC       2
            *

1388        KK  31T382
1389        KM   REACH HS-1 plus culvert HSC-1
1390        KM   ROUTE FLOWS TO SUPERSTITION FREEWAY (C38)
1391        KM   IN THE HAWES CHANNEL.
1392        RS       1    FLOW      -1
1393        RC   0.025   0.015   0.025      810   .0017
1394        RX       0      10      16       26      51      61      77      81
1395        RY     5.3     4.8     4.9        0       0     4.9     4.6     3.6
            *
            *    * DDM   ***** Preserved *****
            *    KK31AT38
            *    KM ROUTE S31A TO 38
            *    RS      6    FLOW      -1
            *    RC    .04     .03     .04    3500    .012
            *    RX    100     200     300     302     307     309     409     509
            *    RY      4       3       2       0       0       2       3       4
            *
            *
```



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

1396        KK   C38C1
1397        KM   COMBINE FLOWS FROM HAWES CHANNEL WITH NW DETENTION BASINS FLOW
1398        HC       2
            *
            *

1399        KK    C38C
1400        KM   COMBINE FLOWS FROM R202NE with R202NW AT C38
1401        HC       2
            *
            * DDM   ***** Preserved *****

1402        KK   38T39
1403        KM   ROUTE FLOWS FROM C38C TO C39 VIA CONCRETE CHANNEL
1404        RS    1.32    FLOW      -1
1405        RC   0.035   0.012   0.035    3960  0.0066
1406        RX       0     500    1000    1012    1020    1032    1532    2032
1407        RY      13    12.5      12       0              12    12.5      13
            *     * ADOT DETENTION BASINS FROM URS REPORT SEPT 1988
            *     * DDM   ***** Preserved *****
            *     KK ADD10
            *     KM  BASIN #10 - OFF-LINE DETENTION POND TO ATTENUATE PEAK FLOWS
            *     KM   BUT DO NOT DELAY THE PEAK
            *     DT  DB10
            *     DI   807     879     961    1070    1190    1320
            *     DQ     0      29      61     120     190     270
            *     * DDM   ***** Preserved *****
            *     KK  ADD9
            *     KM BASIN #9 - OFF-LINE DETENTION POND
            *     DT   DB9
            *     DI   626     660     751     861     987    1128
```

```
*     DQ     0      10      51     110     189     278
*     * DDM   ***** Preserved *****
*     KK  ADD8
*     KM BASIN #8 - OFF-LINE DETENTION POND
*     DT   DB8
*      * ORIGINAL DESIGN PER URS FINAL DRAINAGE REPORT
*     *     DI   464     521     627     752     898
*     DI   464     521     627     752     898          1059    1236
*     *     DQ     0      21      77     152     248
*     DQ     0      21      77     152     248     359          486
*
*  ***** Per Original Design and URS Final Drainage Report *****
*  ***** These Detention Basins occurred West of Sossaman Channel *****
*
*     * DDM   ***** Preserved *****
*     KK  ADD7
*     KM BASIN #7 - OFF-LINE DETENTION POND
*     DT   DB7
*     DI   770     810     892     988    1093    1207    1331    1462
*     DQ     0      10      42      88     143     207     281     362
*     * DDM   ***** Preserved *****
*     KK  ADD6
*     KM BASIN #6 - OFF-LINE DETENTION POND
*     DT   DB6
*     DI   685     703     781     875     978    1092    1215
*     DQ     0       3      31      75     128     192     265
*     * DDM   ***** Preserved *****
*     KK  ADD5
*     KM BASIN #5 - OFF-LINE DETENTION POND
*     DT   DB5
*     DI  1005    1063    1141    1227    1320    1421    1527
*     DQ     0      13      41      77     120     171     227
*
*
* ******************************************************************************
* End of Revisions by DMJM to reflect Red Mountain Freeway Design Concepts
* ******************************************************************************
*
*
```



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


1408          KK    R31W
1409          KM   RETURN DIVERTED FLOW AT CORNER OF SOUTHERN AND HAWES
1410          DR    D31W
              *
              * DDM   ***** Preserved *****

1411          KK  31WT32
1412          KM   ROUTE FLOWS FROM D31A TO C32
1413          RS    1.76    FLOW      -1
1414          RC    .035    .022    .035    5280   .0027
1415          RX       0    2005    2012    2012    2106    2106    2113    3122
1416          RY     4.5     4.5     3.5       0       0     3.5     4.5     4.5
              *
              * DDM   ***** Updated *****

1417          KK      32
```

```
1418        KM   BASIN 32
1419        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1420        KM    L=       .9  Lca=       .5   S=   38.9  Kn= .055  LAG=  29.1
1421        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1422        BA     .38
1423        LG     .23     .25    4.55     .44   27.00
1424        UI     43.    115.    212.    273.    368.    529.    407.    314.    237.    161.
1425        UI     81.     62.     43.     14.     13.     13.     13.      0.      0.      0.
1426        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *
            * KK   D32
            * KM  RETAIN 100 YEAR 2 HOUR, (FULLY DEVELOPED - NO RETENTION)
            * DT   D32       0
            * DI     0   10000
            * DQ     0   10000
            *
            * DDM   ***** Preserved *****

1427        KK     C32
1428        KM    COMBINE SOSSAMAN CHANNEL FLOWS WITH FLOWS FROM 32
1429        HC       2
            *
            * DDM   ***** Preserved *****

1430        KK   32T39
1431        KM   ROUTE FLOWS FROM C32 TO C39
1432        RS    0.88    FLOW      -1
1433        RC   0.012   0.012   0.012    2640   0.004
1434        RX       0       5      10      28      38      60      65      70
1435        RY      14      14      14       0       0      14      14      14
            * DDM   ***** Updated *****

1436        KK      39
1437        KM   BASIN 39
1438        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1439        KM    L=       .9  Lca=       .7   S=   38.0  Kn= .060  LAG=  32.4
1440        KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1441        BA     .36
```



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

1442        LG     .22     .25    4.60     .41   44.00
1443        UI      37      81     165     213     269     383     437     325     258     200
1444        UI     142      76      61      37      24      11      11      11      11       0
1445        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *

1446        KK     D39
1447        KM    RETAIN 100 YEAR 2 HOUR, (13% FOR FUTURE DEVELOPMENT)
1448        DT     D39       4
1449        DI       0   10000
1450        DQ       0   10000
            *
            * DDM   ***** Preserved *****

1451        KK    C39A
1452        KM   COMBINE FLOWS FROM C32, C38 AND S39 AT C39
1453        HC       2
            *
```

```
                 * DDM   ***** Preserved *****

1454             KK    C39B
1455             KM   COMBINE FLOWS FROM C39A AND ADOT BASINS
1456             HC       2
                 *
                 * DDM   ***** Preserved *****

1457             KK    SOSS
1458             KM   THIS WAS FORMERLY CALLED CHANNEL
1459             KM   DIVERT FLOWS IN EXCESS OF 1800 CFS TO SOSSAMAN DET. BASIN
1460             KM   IN REALITY, BACKWATER FROM THE ADOT CROSSING DETERMINES THE AMOUNT OF SPILL
1461             KM   SUPERSTITION FREEWAY
1462             ZW    A=SOSSAMAN DRAIN  B=AT SUPERSTITION C=FLOW E=5MIN F=100YR
1463             DT   BASIN
1464             DI       0    1800    2000   10000
1465             DQ       0       0     200    8200
1466             ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

 150         42
              V
              V
 162       42T51
              .
              .
 167          .          51
              .           .
              .           .
 178         C51............
              V
              V
 181       51T53
              .
              .
 187          .         44A
              .           .
              .           .
 201          .           .-------->    D44A
 199          .      DIV44A
              .           .
              .           .
 204          .           .          43
              .           .           .
              .           .           .
 215          .         C43............
              .           V
              .           V
 218          .       43T53
              .           .
              .           .
 223          .           .          53
              .           .           .
              .           .           .
 233         C53........................
```

```
          .
          .
236       .          54
          .           .
          .           .
247     C54............
          .
          .
253       .-------->  SOUTH
250   DCAP12
          V
          V
256    CAP12
          .
          .
263       .           .<-------    D44A
261       .       DR44A
          .           V
          .           V
264       .       44ATB
          .           .
          .           .
271       .           .         44B
          .           .           .
          .           .           .
281       .        C44B............
          .           V
          .           V
284       .      CAP10+
          .           V
          .           V
291       .      RCAP11
          .           .
          .           .
294     C12............
          V
          V
297   ADOT-W
          V
          V
308   RADOTW
          .
          .
314       .         36B
          .           .
          .           .
323     C36B............
          .
          .
329       .           .<-------   SOUTH
327       .      RSOUTH
          .           .
          .           .
330       .           .          57
          .           .           .
          .           .           .
339       .         C57............
          .           V
          .           V
342       .      CAP13+
```

```
                .          .
                .          .
349             .          .        36A
                .          .          .
                .          .          .
358             .      C36A.............
                .        V
                .        V
361             .    ADOT-E
                .          .
                .          .
373         CFAKE............
                .
                .
377             .        52
                .          .
                .          .
387             .          .         56
                .          .          .
                .          .          .
397             .      C56.............
                .        V
                .        V
402             .     56T58
                .          .
                .          .
407             .          .         58
                .          .          .
                .          .          .
7               .      C58.............
                .          .
                .          .
425             .          .        46B
                .          .          .
                .          .          .
439             .          .          .-------->     D46
437             .          .       D46B
                .          .          V
                .          .          V
442             .          .       CAP6
                .          .          V
                .          .          V
447             .          .     RCAP6B
                .          .          .
                .          .          .
456             .          .          .        29A
                .          .          .          .
                .          .          .          .
470             .          .          .          .-------->    D29A
468             .          .          .       D29A
                .          .          .          .
                .          .          .          .
473             .          .       C29A.............
                .          .          .
                .          .          .
5               .          .          .        45A
                .          .          .          .
                .          .          .          .
490             .          .          .          .-------->    D29A
488             .          .          .       D45A
```

```
                .         .         .         .
                .         .         .         .
496             .         .         .         .-------->  45ATB
493             .         .         .      D45A
                .         .         .         .
                .         .         .         .
499             .         .         .         .        55B
                .         .         .         .         .
                .         .         .         .         .
514             .         .         .         .         .-------->   D55B
512             .         .         .         .      D55B
                .         .         .         .         .
                .         .         .         .         .
517             .         .         .      C55B............
                .         .         .         V
                .         .         .         V
520             .         .         .      CAP7
                .         .         .         .
                .         .         .         .
528             .         .         .         .         .<--------   45ATB
526             .         .         .         .     RD45A
                .         .         .         .         V
                .         .         .         .         V
529             .         .         .         .     45ATB
                .         .         .         .         .
                .         .         .         .         .
536             .         .         .         .         .        45B
                .         .         .         .         .         .
                .         .         .         .         .         .
                .         .         .         .         .         .-------->   D45B
                .         .         .         .         .      D45B
                .         .         .         .         .         .
                .         .         .         .         .         .
552             .         .         .         .      C45B............
                .         .         .         .         V
                .         .         .         .         V
555             .         .         .         .      CAP8
                .         .         .         .         .
                .         .         .         .         .
561             .         .         .      C7+8............
                .         .         .         V
                .         .         .         V
565             .         .         .    RCAP78
                .         .         .         .
                .         .         .         .
573             .         .         .         .        29B
                .         .         .         .         .
                .         .         .         .         .
586             .         .         .         .         .-------->   D29B
584             .         .         .         .      D29B
                .         .         .         .         .
                .         .         .         .         .
589             .         .         .      C29B1...........
                .         .         .         .
                .         .         .         .
                .         .      C29B2............
                .         .         V
                .         .         V
595             .         .      TRANS
                .         .         .
```

```
                .         .         .
603             .         .         .        29C
                .         .         .         .
                .         .         .         .
                .         .         .         .-------->     D29
614             .         .         .       D29C
                .         .         .         .
                .         .         .         .
619             .         .     C29C2............
                .         .         V
                .         .         V
622             .         .    29CTD1
                .         .         .
                .         .         .
630             .         .         .        55
                .         .         .         .
                .         .         .         .
642             .         .         .         .-------->     D55
640             .         .         .       D55
                .         .         .         V
                .         .         .         V
645             .         .         .       CAP9
                .         .         .         V
                .         .         .         V
650             .         .         .      RCAP9
                .         .         .         .
                .         .         .         .
660             .         .         .         .         29D
                .         .         .         .          .
                .         .         .         .          .
                .         .         .         .          .-------->    D29D
671             .         .         .         .       D29D
                .         .         .         .          .
                .         .         .         .          .
680             .         .         .         .          .-------->   D29DE
676             .         .         .         .      D29D2
                .         .         .         .          .
                .         .         .         .          .
683             .         .     C29C3........................
                .         .         V
                .         .         V
686             .         .    BASIN5
                .         .         V
                .         .         V
693             .         .     RBAS5
                .         .         .
                .         .         .
704             .         .         .         .<-------   D29DE
701             .         .         .      G29DE
                .         .         .         V
                .         .         .         V
705             .         .         .      29T36
                .         .         .         .
                .         .         .         .
713             .         .         .         .         36C
                .         .         .         .          .
                .         .         .         .          .
724             .         .         .         .          .-------->    D36C
722             .         .         .         .       D36C
                .         .         .         .          .
```

```
727          C36.......................
               V
               V
           36T37
               .
               .
736            .        30b
               .         V
               .         V
747            .      30bT3
               .         .
               .         .
753            .         .          37
               .         .           .
               .         .           .
762          C37.......................
               V
               V
765        ADOTEL
               V
               V
776        37T38A
               .
               .
782            .        38A
               .         .
               .         .
794            .         .        202D
               .         .           .
               .         .           .
821          C38A.......................
               V
               V
824        202NE1
               V
               V
831        202NE2
               .
               .
838            .        17A
               .         .
               .         .
848            .         .          49
               .         .           V
               .         .           V
858            .         .         CAP2
               .         .           V
               .         .           V
863            .         .       BASIN2
               .         .           V
               .         .           V
871            .         .       RCAP2A
               .         .           V
               .         .           V
               .         .        RCAP2
               .         .           .
               .         .           .
880            .        C17A..........
               .         .
```

```
883                 48
                     V
                     V
                  CAP3
                     V
                     V
898            BASIN3
                     V
                     V
906            RCAP3A
                     V
                     V
912            RCAP3B
                     .
                     .
918                  .        17B
                     .          .
                     .          .
928               C17B...........
                     .
                     .
931         C17C...........
               V
               V
934         17CT23
                     .
                     .
940                 18F
                     V
                     V
947            R18FTE
                     .
                     .
953                  .        18E
                     .          .
                     .          .
962                  .          .-------->   D18E
960                  .     RET18E
                     .          .
                     .          .
965               C18E...........
                     V
                     V
968            18ET23
                     .
                     .
974         C23A...........
               V
               V
977         R23ATB
                     .
                     .
983                 23
                     .
                     .
992                  .-------->   D23
990            RET23
                     .
                     .
```

```
995                 C23B............
                      .
                      .
998                   .        47
                      .         V
                      .         V
1009                  .     BASIN4
                      .         V
                      .         V
1019                  .      RCAP4
                      .         .
                      .         .
1025                  .         .          22
                      .         .           .
                      .         .           .
1035                  .      C22A............
                      .         V
                      .         V
1038                  .     22AT23
                      .         .
                      .         .
1045                C23C............
                      V
                      V
1048                RC23
                      .
                      .
1054                  .        30a
                      .         V
                      .         V
                      .     30at31
                      .         .
                      .         .
1075                C31A1...........
                      .
                      .
1078                  .        31A
                      .         .
                      .         .
1088                  .         .         202C
                      .         .           .
                      .         .           .
1100                C31A2......................
                      V
                      V
1103                R202S
                      .
                      .
1114                  .       202A
                      .         V
                      .         V
1127                  .      R202A
                      .         .
                      .         .
1130                  .         .         202B
                      .         .           .
                      .         .           .
1143                  .      C202B...........
                      .         V
                      .         V
```

```
1146                                  R202B
                                        .
                                        .
1149                            C202C............
                                  V
                                  V
1152                            RT202C
                                  .
                                  .
1161                              .-------->  DHAWS
1158                            DSPILL
                                  .
                                  .
1164                                  .      38B
                                        .
                                        .
1174                              C38B............
                                  V
                                  V
1177                            202NW1
                                  V
                                  V
1187                            202NW2
                                  .
                                  .
1197                                  .       50
                                        .       V
                                        .       V
1207                                  .     CAP1
                                        .       V
                                        .       V
1212                                  .   BASIN1
                                        .       V
                                        .       V
1220                                  .    RCAP1
                                        .       .
                                        .       .
1226                                  .       .       18C
                                        .       .        .
                                        .       .        .
1237                                  .       .        .-------->  D18C
1235                                  .       .    RET18C
                                        .       .        .
                                        .       .        .
1240                                  .     C18C............
                                        .       V
                                        .       V
1244                                  .    18T24
                                        .       .
                                        .       .
1251                                  .       .       18D
                                        .       .        V
                                        .       .        V
1257                                  .       .    18DT24
                                        .       .        .
                                        .       .        .
1263                                  .       .        .        24A
                                        .       .        .         .
                                        .       .        .         .
1269                                  .       .      C24A............
```

```
                                    V
                                    V
1272                            24ATB
                                    .
                                    .
1278                                .        24B
                                    .          .
                                    .          .
1287                                .          .-------->   D24B
1285                                .     RET24B
                                    .          .
                                    .          .
1290                            C24B............
                                    .
                                    .
1293                        C24C............
                                    .
                                    .
1300                                .-------> DIVBRD
1297                        BRDHAW
                                    V
                                    V
1303                        RT31B1
                                    V
                                    V
1313                        RT31B2
                                    V
                                    V
1321                        RT31B3
                                    .
                                    .
1333                                .        31B
                                    .          .
                                    .          .
1346                                .          .-------->  D31BS
1344                                .      D31BS
                                    .          .
                                    .          .
1349                        C31B ............
                                    .
                                    .
1359                                .-------->   D31W
1353                        D31S
                                    V
                                    V
1364                        31T381
                                    .
                                    .
1378                                .          .<--------  DHAWS
1376                                .      RHAWS
                                    .          V
                                    .          V
1379                                .      RTHAWS
                                    .          .
                                    .          .
                            C31S ............
                                    V
                                    V
1388                        31T382
                                    .
```

```
                .         .         .         .         .
1396            .         .         .      C38C1............
                .         .         .         .
                .         .         .         .
                .         .      C38C............
                .         .         V
                .         .         V
1402            .         .      38T39
                .         .         .
                .         .         .
1410            .         .         .         .<-------    D31W
1408            .         .         .      R31W
                .         .         .         V
                .         .         .         V
1411            .         .         .     31WT32
                .         .         .         .
                .         .         .         .
1417            .         .         .         .         32
                .         .         .         .          .
                .         .         .         .          .
1427            .         .         .       C32............
                .         .         .         V
                .         .         .         V
1430            .         .         .      32T39
                .         .         .         .
                .         .         .         .
1436            .         .         .         .         39
                .         .         .         .          .
                .         .         .         .          .
                .         .         .         .          .-------->     D39
                .         .         .         .        D39
                .         .         .         .          .
                .         .         .         .          .
1451            .         .         .      C39A............
                .         .         .         .
                .         .         .         .
1454            .         .      C39B............
                .         .         .
                .         .         .
1463            .         .         .-------->   BASIN
1457            .         .      SOSS
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*           VERSION 4.1                 *
*                                       *
*  RUN DATE   23APR04  TIME  17:29:48   *
*                                       *
*****************************************
```

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

```
*******************************************************************************
*******************************************************************************
```

****

MODEL NAME: NE200250.DAT Revised by PARSONS BRINCKERHOFF - April 2004

This model includes the following revisions to DMJM+HARRIS model NE202USR.DAT dated December 2003.

1. The storage volumes for the NE-1, NE-2, NW-1, NW-2 and Southern Avenue detention basins have been updated per the final basin geometry.

2. The discharge rates for detention basins NW-1 and NW-2 have been revised to reflect the revisions to the outlet structures and emergency spillways.

3. The diversion at the box culvert system at Southern Avenue and Hawes Road was revised to simulate blockage of 2 barrels of the existing 3 barrel box culvert under Southern.

4. The diversion at the lateral weir in the Southern Avenue Channel was revised to reflect the final weir geometry and rating analysis.

5. The data for Subbasin 31B was revised to reflect future conditions land use.

****
****
****

MODEL NAME: Ne2002us.DAT Revised by DMJM+HARRIS - August 2003

This model includes various revisions to incorporate the Red Mountain Freeway in association with the University Drive to Southern Avenue.

CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:

1. In order to reflect the proposed 202 Freeway Loopand to facilitate design, drainage basins 18D, 18C and 24 were further subdivided. Additional concentration points were added to provide discharges at more locations.

2. Drainage basin areas for 50 and 202A were modified to reflect design refinements to the Power to University segment of the Red Mountain Freeway

****
****

MODEL NAME: Ne200235.DAT Revised by DMJM+HARRIS - July 2002

This model includes various revisions to incorporate the Red Mountain Freeway in association with the 202L/US60 Traffic Interchange Design Concept Report.

CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:

1. In order to reflect the proposed 202 Freeway Loop, basin areas for 18C, 23, 24, 31A and 31B were revised. Drainage basins 18D, 202A, 202B, and 202D were added. Basin 38 was split into 38A and 38B due to the 202 Loop

2. Several concentration points have been added and basins have been routed to reflect the proposed Red Mountain Freeway alignment.

3. Existing detention basins (ADOT) have been removed and new detention basins are proposed as part of the freeway construction.

4. Modifications were made to the previous (Ne20030) model per the City of Mesa to remove the connection of the Southern Ave. Channel from the structure at Hawes Rd. and instead connect to the Hawes Channel south of the intersection.

****
****

** Previous ** MODEL NAME: NE2002.DAT

THIS MODEL COVERS THE AREA EAST OF HAWES ROAD AND THE SOSSAMAN CHANNEL
MAJOR CHANGES TO THIS MODEL INCLUDE THE FOLLOWING:

1. OLD SUBBASIN 18A HAS BEEN SPLIT INTO TWO SUBBASINS. SUBBASIN 18C REMAINS IN THIS MODEL AS PART OF THE HAWES CHANNEL INFRASTRUCTURE
2. OLD SUBBASIN 30 HAS BEEN SPLIT INTO SUBBASIN 30A AND SUBBASIN 30B. SUBBASIN 30 GETS INTERCEPTED BY A CHANNEL ON THE NORTH SIDE OF CORALBELL AND GETS ROUTED TO SUBBASIN 31A. SUBBASIN 30B STILL GOES SOUTH ALONG ELLSWORTH ROAD
3. FOR THE 2002 YEAR CONDITION, ALL CAP DETENTION BASINS HAVE BEEN PLACED IN THE MODEL. THEIR OUTLET CHANNELS HAVE FOR THE MOST PART NOT BEEN INCLUDED IN THIS MODEL. THE OUTLET CHANNELS WILL BE IN THE FUTURE MODEL

****

SOUTHEAST MESA AREA DRAINAGE MASTER PLAN
AREA NORTH OF SUPERSTITION FREEWAY

REVISED BY VALERIE SWICK, OCTOBER-NOVEMBER 1996
TO INCORPORATE THE SUPERSITION STRUCTURES AND COMBINE MODELS

FILENAME: MESANE.DAT

THIS MODEL REPRESENTS THE EXISTING CONDITION OF THE WATERSHED.
TOTAL DRAINAGE AREA IS APPROXIMATELY 17 SQ. MI.

100-YEAR 24-HOUR FREQUENCY

METHODOLOGY
THE US CORPS OF ENGINEERS FLOOD HYDROLOGY MODEL HEC-1 DATED SEP1990 VER 4.0
SCS TYPE II RAINFALL DISTRIBUTION
S-GRAPH HYDROGRAPH
GREEN AND AMPT INFILTRATION EQUATION USED FOR CALCULATING LOSSES
NORMAL DEPTH STORAGE CHANNEL ROUTING
APPROXIMATE DIRECTION, LOCATION, AND LENGTH OF THE WASHES HAVE BEEN EVALUATED BASED ON FIELD INVESTIGATION, USGS MAPS, LANDIS AERIAL SURVEYS DATED 1994
THE NOAA TECHNICAL MEMORANDUM NOAA ATLAS 2 DEPTH AREA RATIOS

INITIAL STUDY PERFORMED BY LISA C. YOUNG
REVIEWED BY VALERIE A. SWICK
HYDROLOGY BRANCH ENGINEERING DIVISION, FLOOD CONTROL
DISTRICT OF MARICOPA COUNTY, DECEMBER - JULY 1995.

ASSUMED VELOCITY OF 1 FT/SEC FOR SHEET FLOW, 2 FT/SEC FOR WASH/NATURAL CHANNEL, 3 FT/SEC FOR ROAD AND GRASS CHANNEL, 10FT/SEC FOR CONCRETE CHANNEL

LAST UPDATED ON 3/13/98

UPDATE WAS BASED UPON NEW MAG LAND USE DEFINITIONS FOR SINGLE FAMILY HOUSING

DDM MCUHP2 MESA AREA DRAINAGE MASTER PLAN

IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	5	MINUTES IN COMPUTATION INTERVAL
IDATE	1APR97	STARTING DATE
ITIME	0000	STARTING TIME
NQ	1000	NUMBER OF HYDROGRAPH ORDINATES
NDDATE	4APR97	ENDING DATE
NDTIME	1115	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .08 HOURS
TOTAL TIME BASE 83.25 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

131 JD INDEX STORM NO. 1

STRM	3.60	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

132 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

142 JD INDEX STORM NO. 2

STRM 3.58 PRECIPITATION DEPTH

TRDA 1.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

143 JD INDEX STORM NO. 3

STRM 3.49 PRECIPITATION DEPTH

TRDA 5.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03

.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

144 JD INDEX STORM NO. 4

STRM 3.38 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

145 JD INDEX STORM NO. 5

STRM 3.24 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

146 JD INDEX STORM NO. 6

STRM 3.10 PRECIPITATION DEPTH

TRDA 60.00 TRANSPOSITION DRAINAGE AREA

PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

147 JD INDEX STORM NO. 7

STRM 3.05 PRECIPITATION DEPTH

TRDA 90.00 TRANSPOSITION DRAINAGE AREA

PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

148 JD INDEX STORM NO. 8

STRM 3.00 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

149 JD INDEX STORM NO. 9

STRM 2.97 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.01	.00	.01
.01	.01	.01	.01	.01	.01	.01	.01	.03	.03
.03	.09	.09	.09	.01	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00		

WARNING --- ROUTED OUTFLOW (1120.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1159.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1192.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1215.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1230.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1235.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (1233.) IS GREATER THAN MAXIMUM OUTFLOW (1098.) IN STORAGE-OUTFLOW TABLE

```
WARNING --- ROUTED OUTFLOW (   1223.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1207.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1185.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1155.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1115.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1113.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1152.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1184.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1207.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1222.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1227.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1225.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1216.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1200.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1177.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1148.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1108.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1117.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1148.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1171.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1185.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1191.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1189.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1180.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1165.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1143.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1114.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1104.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1126.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   1140.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
```

```
WARNING --- ROUTED OUTFLOW (   1146.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1145.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE

NG --- ROUTED OUTFLOW (   1137.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1122.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1101.) IS GREATER THAN MAXIMUM OUTFLOW (   1098.) IN STORAGE-OUTFLOW TABLE
   -----DSS---ZOPEN:  Existing File Opened,  File: NE200250.DSS
                      Unit:  71;  DSS Version: 6-JG
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT WEST BASIN/AT SUPERSTITION/FLOW/04APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /ADOT EAST BASIN/AT SUPERSTITION/FLOW/04APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /CONCENTRATION POINT C58/FLOW TO OVERCHUTES/FLOW/31MAR1997/5MIN/OBSERVED/
-----DSS---ZWRITE Unit  71; Vers.   17:  /CONCENTRATION POINT C58/FLOW TO OVERCHUTES/FLOW/01APR1997/5MIN/OBSERVED/
-----DSS---ZWRITE Unit  71; Vers.   17:  /CONCENTRATION POINT C58/FLOW TO OVERCHUTES/FLOW/02APR1997/5MIN/OBSERVED/
-----DSS---ZWRITE Unit  71; Vers.   17:  /CONCENTRATION POINT C58/FLOW TO OVERCHUTES/FLOW/03APR1997/5MIN/OBSERVED/
-----DSS---ZWRITE Unit  71; Vers.   17:  /CONCENTRATION POINT C58/FLOW TO OVERCHUTES/FLOW/04APR1997/5MIN/OBSERVED/
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO


        *** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION=  1


        *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


        *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


        *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


        *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


        *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


WARNING --- ROUTED OUTFLOW (    761.) IS GREATER THAN MAXIMUM OUTFLOW (    761.) IN STORAGE-OUTFLOW TABLE

ING --- ROUTED OUTFLOW (    761.) IS GREATER THAN MAXIMUM OUTFLOW (    761.) IN STORAGE-OUTFLOW TABLE
-----DSS---ZWRITE Unit  71; Vers.   17:  /HAWES RD @ BROADWAY RD/HAWES CHANNEL PROJECT/FLOW/31MAR1997/5MIN/HYDROGRAPH/
-----DSS---ZWRITE Unit  71; Vers.   17:  /HAWES RD @ BROADWAY RD/HAWES CHANNEL PROJECT/FLOW/01APR1997/5MIN/HYDROGRAPH/
-----DSS---ZWRITE Unit  71; Vers.   17:  /HAWES RD @ BROADWAY RD/HAWES CHANNEL PROJECT/FLOW/02APR1997/5MIN/HYDROGRAPH/
-----DSS---ZWRITE Unit  71; Vers.   17:  /HAWES RD @ BROADWAY RD/HAWES CHANNEL PROJECT/FLOW/03APR1997/5MIN/HYDROGRAPH/
```

```
-----DSS---ZWRITE Unit  71; Vers.   17:  /HAWES RD @ BROADWAY RD/HAWES CHANNEL PROJECT/FLOW/04APR1997/5MIN/HYDROGRAPH/


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
1303 KK   *    RT31B1  *
          *            *
          **************


1307 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          5  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE
                       IPNCH          0  PUNCH COMPUTED HYDROGRAPH
                        IOUT         21  SAVE HYDROGRAPH ON THIS UNIT
                       ISAV1          1  FIRST ORDINATE PUNCHED OR SAVED
                       ISAV2       1000  LAST ORDINATE PUNCHED OR SAVED
                      TIMINT      1.000  TIME INTERVAL IN HOURS

-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW AFTER 360 CFS DIVERT TO WES/HAWES CHANNEL PROJECT/FLOW/31MAR1997/5MIN/HYD/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW AFTER 360 CFS DIVERT TO WES/HAWES CHANNEL PROJECT/FLOW/01APR1997/5MIN/HYD/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW AFTER 360 CFS DIVERT TO WES/HAWES CHANNEL PROJECT/FLOW/02APR1997/5MIN/HYD/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW AFTER 360 CFS DIVERT TO WES/HAWES CHANNEL PROJECT/FLOW/03APR1997/5MIN/HYD/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW AFTER 360 CFS DIVERT TO WES/HAWES CHANNEL PROJECT/FLOW/04APR1997/5MIN/HYD/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW SOUTHERN AND HAWES BEFORE S/HAWES CHANNEL PROJ/FLOW/31MAR1997/5MIN/HYDR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW SOUTHERN AND HAWES BEFORE S/HAWES CHANNEL PROJ/FLOW/01APR1997/5MIN/HYDR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW SOUTHERN AND HAWES BEFORE S/HAWES CHANNEL PROJ/FLOW/02APR1997/5MIN/HYDR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW SOUTHERN AND HAWES BEFORE S/HAWES CHANNEL PROJ/FLOW/03APR1997/5MIN/HYDR/
-----DSS---ZWRITE Unit  71; Vers.   17:  /FLOW SOUTHERN AND HAWES BEFORE S/HAWES CHANNEL PROJ/FLOW/04APR1997/5MIN/HYDR/
-----DSS---ZWRITE Unit  71; Vers.   33:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   33:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   33:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   33:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   33:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.  113:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  113:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  113:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  113:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  113:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  114:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  114:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  114:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  114:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  114:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  115:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  115:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  115:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  115:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  115:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  116:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  116:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  116:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  116:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  116:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  117:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  117:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
```

```
-----DSS---ZWRITE Unit  71; Vers.  117:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  117:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  117:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  118:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  118:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  118:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  118:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  118:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  119:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  119:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  119:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  119:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.  119:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN//
-----DSS---ZWRITE Unit  71; Vers.   17:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/????????????????????????????/
-----DSS---ZWRITE Unit  71; Vers.   17:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/????????????????????????????/
-----DSS---ZWRITE Unit  71; Vers.   17:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/????????????????????????????/
-----DSS---ZWRITE Unit  71; Vers.   17:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/????????????????????????????/
-----DSS---ZWRITE Unit  71; Vers.   17:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN/????????????????????????????/
-----DSS---ZWRITE Unit  71; Vers.   34:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/31MAR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   34:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/01APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   34:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/02APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   34:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/03APR1997/5MIN/100YR/
-----DSS---ZWRITE Unit  71; Vers.   34:  /SOSSAMAN DRAIN/AT SUPERSTITION/FLOW/04APR1997/5MIN/100YR/
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									
+		42	1048.	12.58	206.	56.	19.	1.75		
	ROUTED TO									
+		42T51	962.	13.17	206.	56.	19.	1.75		
	HYDROGRAPH AT									
+		51	1277.	12.25	159.	46.	15.	1.24		
	2 COMBINED AT									
+		C51	1420.	12.33	359.	100.	34.	2.99		
	ROUTED TO									
+		51T53	1129.	13.08	359.	100.	34.	2.99		
	HYDROGRAPH AT									
+		44A	1297.	12.50	277.	89.	30.	1.59		
	DIVERSION TO									
+		D44A	951.	12.50	213.	69.	23.	1.59		
	HYDROGRAPH AT									
+		DIV44A	347.	12.50	64.	20.	7.	1.59		
	HYDROGRAPH AT									
+		43	1365.	12.33	184.	53.	18.	1.42		
	2 COMBINED AT									

SUPERSEDED

+	C43	1646.	12.33	244.	72.	24.	3.01
ROUTED TO							
+	43T53	1104.	13.42	244.	72.	24.	3.01
HYDROGRAPH AT							
+	53	831.	12.42	108.	31.	11.	.78
3 COMBINED AT							
+	C53	2157.	13.33	684.	196.	66.	6.78
HYDROGRAPH AT							
+	54	512.	12.42	66.	19.	6.	.49
2 COMBINED AT							
+	C54	2173.	13.33	743.	213.	71.	7.27
DIVERSION TO							
+	SOUTH	862.	13.33	235.	59.	20.	7.27
HYDROGRAPH AT							
+	DCAP12	1312.	13.33	508.	154.	52.	7.27
ROUTED TO							
+	CAP12	1166.	13.67	508.	154.	52.	7.27
HYDROGRAPH AT							
+	DR44A	951.	12.50	213.	69.	23.	1.59
ROUTED TO							
+	44ATB	769.	13.58	213.	69.	23.	1.59
HYDROGRAPH AT							
+	44B	1430.	12.25	179.	54.	18.	1.06
2 COMBINED AT							
+	C44B	1606.	12.25	393.	123.	41.	1.06
ROUTED TO							
+	CAP10+	1490.	12.33	393.	123.	41.	1.06
ROUTED TO							
+	RCAP11	1490.	12.42	393.	123.	41.	1.06
2 COMBINED AT							
+	C12	2146.	12.50	874.	269.	90.	8.33
ROUTED TO							
+	ADOT-W	439.	15.17	414.	263.	90.	8.33
ROUTED TO							
+	RADOTW	438.	15.25	414.	263.	90.	8.33
HYDROGRAPH AT							
+	36B	581.	12.08	49.	14.	5.	.32
2 COMBINED AT							
+	C36B	745.	12.08	421.	275.	94.	8.65
HYDROGRAPH AT							

SUPERSEDED

	RSOUTH	862.	13.33	235.	59.	20.	7.27
HYDROGRAPH AT	57	318.	12.00	19.	5.	2.	.18
2 COMBINED AT	C57	941.	13.33	277.	69.	23.	.18
ROUTED TO	CAP13+	931.	13.33	277.	69.	23.	.18
HYDROGRAPH AT	36A	215.	12.00	15.	4.	1.	.10
2 COMBINED AT	C36A	934.	13.33	292.	74.	25.	.28
ROUTED TO	ADOT-E	267.	14.25	200.	73.	25.	.28
2 COMBINED AT	CFAKE	771.	12.08	594.	339.	116.	8.93
HYDROGRAPH AT	52	572.	12.25	61.	17.	6.	.43
HYDROGRAPH AT	56	862.	12.17	88.	25.	8.	.55
2 COMBINED AT	C56	1400.	12.25	149.	42.	14.	.98
ROUTED TO	56T58	1068.	12.50	149.	42.	14.	.98
HYDROGRAPH AT	58	1370.	12.17	107.	28.	9.	.95
2 COMBINED AT	C58	1813.	12.25	252.	68.	23.	1.93
HYDROGRAPH AT	46B	300.	12.67	65.	21.	7.	.36
DIVERSION TO	D46	12.	9.67	8.	3.	1.	.36
HYDROGRAPH AT	D46B	300.	12.67	65.	19.	6.	.36
ROUTED TO	CAP6	239.	12.92	65.	19.	6.	.36
ROUTED TO	RCAP6B	239.	12.92	65.	19.	6.	.36
HYDROGRAPH AT	29A	135.	12.67	26.	8.	3.	.18
DIVERSION TO							

SUPERSEDED

+	D29A	135.	12.67	17.	5.	2.	.18
HYDROGRAPH AT +	D29A	95.	12.92	12.	3.	1.	.18
2 COMBINED AT +	C29A	333.	12.92	76.	22.	7.	.54
HYDROGRAPH AT +	45A	336.	12.92	74.	22.	7.	.62
DIVERSION TO +	D29A	336.	12.92	45.	12.	4.	.62
HYDROGRAPH AT +	D45A	256.	13.17	35.	10.	3.	.62
DIVERSION TO +	45ATB	243.	13.17	33.	9.	3.	.62
HYDROGRAPH AT +	D45A	13.	13.17	2.	0.	0.	.62
HYDROGRAPH AT +	55B	955.	13.17	263.	82.	27.	1.86
DIVERSION TO +	D55B	955.	13.17	168.	46.	15.	1.86
HYDROGRAPH AT +	D55B	740.	13.42	124.	36.	12.	1.86
2 COMBINED AT +	C55B	743.	13.42	124.	36.	12.	2.48
ROUTED TO +	CAP7	517.	13.75	124.	36.	12.	2.48
HYDROGRAPH AT +	RD45A	243.	13.17	33.	9.	3.	.62
ROUTED TO +	45ATB	167.	14.17	31.	9.	3.	.62
HYDROGRAPH AT +	45B	653.	12.58	128.	41.	14.	.66
DIVERSION TO +	D45B	358.	12.17	39.	12.	4.	.66
HYDROGRAPH AT +	D45B	653.	12.58	105.	29.	10.	.66
2 COMBINED AT +	C45B	653.	12.58	135.	38.	13.	.66
ROUTED TO +	CAP8	464.	12.83	134.	38.	13.	.66
2 COMBINED AT							

SUPERSEDED

+	C7+8	727.	13.42	247.	72.	24.	3.14
ROUTED TO +	RCAP78	674.	13.83	243.	72.	24.	3.14
HYDROGRAPH AT +	29B	58.	12.58	9.	3.	1.	.08
DIVERSION TO +	D29B	58.	12.58	9.	3.	1.	.08
HYDROGRAPH AT +	D29B	1.	18.58	0.	0.	0.	.08
2 COMBINED AT +	C29B1	674.	13.83	243.	72.	24.	3.22
2 COMBINED AT +	C29B2	757.	13.75	307.	93.	31.	3.76
ROUTED TO +	TRANS	749.	13.83	307.	93.	31.	3.76
HYDROGRAPH AT +	29C	253.	12.42	38.	12.	4.	.23
DIVERSION TO +	D29	253.	12.42	32.	9.	3.	.23
HYDROGRAPH AT +	D29C	94.	12.83	10.	3.	1.	.23
2 COMBINED AT +	C29C2	765.	13.08	315.	95.	32.	3.99
ROUTED TO +	29CTD1	734.	14.00	313.	95.	32.	3.99
HYDROGRAPH AT +	55	190.	12.25	21.	6.	2.	.14
DIVERSION TO +	D55	190.	12.25	17.	5.	2.	.14
HYDROGRAPH AT +	D55	75.	12.50	6.	2.	1.	.14
ROUTED TO +	CAP9	39.	12.58	6.	2.	1.	.14
ROUTED TO +	RCAP9	23.	13.17	6.	2.	1.	.14
HYDROGRAPH AT +	29D	573.	12.67	114.	36.	12.	.65
DIVERSION TO +	D29D	415.	12.42	46.	14.	5.	.65
HYDROGRAPH AT							

SUPERSEDED

+	D29D	573.	12.67	82.	23.	8.	.65
DIVERSION TO							
+	D29DE	378.	12.67	54.	15.	5.	.65
HYDROGRAPH AT							
+	D29D2	195.	12.67	28.	8.	3.	.65
3 COMBINED AT							
+	C29C3	771.	13.25	343.	104.	35.	4.78
ROUTED TO							
+	BASIN5	273.	15.33	251.	104.	35.	4.78
ROUTED TO							
+	RBAS5	272.	15.42	251.	104.	35.	4.78
HYDROGRAPH AT							
+	G29DE	378.	12.67	54.	15.	5.	.65
ROUTED TO							
+	29T36	357.	12.75	54.	15.	5.	.65
HYDROGRAPH AT							
+	36C	929.	12.08	105.	36.	12.	.44
DIVERSION TO							
+	D36C	848.	12.00	66.	19.	6.	.44
HYDROGRAPH AT							
+	D36C	770.	12.17	57.	17.	6.	.44
3 COMBINED AT							
+	C36	763.	12.17	323.	133.	44.	5.22
ROUTED TO							
+	36T37	519.	12.92	320.	133.	44.	5.22
HYDROGRAPH AT							
+	30b	603.	12.67	109.	33.	11.	.81
ROUTED TO							
+	30bT3	574.	12.83	109.	33.	11.	.81
HYDROGRAPH AT							
+	37	678.	12.08	51.	15.	5.	.47
3 COMBINED AT							
+	C37	1096.	12.25	447.	173.	58.	6.50
ROUTED TO							
+	ADOTEL	17.	27.00	17.	17.	17.	6.50
ROUTED TO							
+	37T38A	17.	27.17	17.	17.	16.	6.50
HYDROGRAPH AT							
+	38A	279.	12.58	49.	15.	5.	.33
HYDROGRAPH AT							

SUPERSEDED

+	202D	100.	8.67	10.	3.	2.	.02
3 COMBINED AT +	C38A	279.	12.58	62.	31.	22.	6.85
ROUTED TO +	202NE1	60.	13.42	51.	29.	21.	6.85
ROUTED TO +	202NE2	29.	20.33	28.	26.	21.	6.85
HYDROGRAPH AT +	17A	257.	12.17	26.	8.	3.	.18
HYDROGRAPH AT +	49	792.	12.33	89.	25.	8.	.79
ROUTED TO +	CAP2	760.	12.42	89.	25.	8.	.79
ROUTED TO +	BASIN2	280.	12.75	59.	25.	8.	.79
ROUTED TO +	RCAP2A	279.	12.75	59.	25.	8.	.79
ROUTED TO +	RCAP2	288.	12.75	59.	25.	8.	.79
2 COMBINED AT +	C17A	308.	12.75	83.	34.	11.	.97
HYDROGRAPH AT +	48	786.	12.33	83.	23.	8.	.77
ROUTED TO +	CAP3	757.	12.33	83.	23.	8.	.77
ROUTED TO +	BASIN3	366.	12.67	75.	23.	8.	.77
ROUTED TO +	RCAP3A	376.	12.67	75.	23.	8.	.77
ROUTED TO +	RCAP3B	267.	12.92	75.	23.	8.	.77
HYDROGRAPH AT +	17B	284.	12.25	31.	10.	3.	.22
2 COMBINED AT +	C17B	321.	12.25	103.	33.	11.	.99
2 COMBINED AT +	C17C	589.	12.17	182.	65.	22.	1.96
ROUTED TO +	17CT23	569.	12.25	182.	65.	22.	1.96
HYDROGRAPH AT							

SUPERSEDED

+	18F	96.	12.00	5.	1.	0.	.05
ROUTED TO							
+	R18FTE	88.	12.00	5.	1.	0.	.05
HYDROGRAPH AT							
+	18E	171.	12.00	12.	4.	1.	.08
DIVERSION TO							
+	D18E	46.	12.00	3.	1.	0.	.08
HYDROGRAPH AT							
+	RET18E	125.	12.00	8.	3.	1.	.08
2 COMBINED AT							
+	C18E	213.	12.00	13.	4.	1.	.13
ROUTED TO							
+	18ET23	195.	12.00	13.	4.	1.	.13
2 COMBINED AT							
+	C23A	616.	12.25	194.	69.	23.	2.09
ROUTED TO							
+	R23ATB	615.	12.25	194.	69.	23.	2.09
HYDROGRAPH AT							
+	23	237.	12.17	24.	7.	2.	.17
DIVERSION TO							
+	D23	43.	12.17	4.	1.	0.	.17
HYDROGRAPH AT							
+	RET23	194.	12.17	20.	6.	2.	.17
2 COMBINED AT							
+	C23B	792.	12.25	212.	75.	25.	2.26
HYDROGRAPH AT							
+	47	1121.	12.58	165.	45.	15.	1.67
ROUTED TO							
+	BASIN4	871.	12.75	136.	45.	15.	1.67
ROUTED TO							
+	RCAP4	642.	13.50	136.	45.	15.	1.67
HYDROGRAPH AT							
+	22	549.	12.17	56.	17.	6.	.41
2 COMBINED AT							
+	C22A	650.	13.50	183.	61.	21.	2.08
ROUTED TO							
+	22AT23	622.	13.67	182.	61.	21.	2.08
2 COMBINED AT							
+	C23C	1187.	12.25	385.	133.	45.	4.34
ROUTED TO							

SUPERSEDED

+	RC23	1178.	12.33	385.	133.	45.	4.34
HYDROGRAPH AT +	30a	270.	12.50	42.	13.	4.	.30
ROUTED TO +	30at31	244.	12.67	42.	13.	4.	.30
2 COMBINED AT +	C31A1	1253.	12.33	424.	146.	49.	4.64
HYDROGRAPH AT +	31A	624.	12.25	63.	18.	6.	.51
HYDROGRAPH AT +	202C	34.	2.50	3.	2.	1.	.01
3 COMBINED AT +	C31A2	1775.	12.33	481.	164.	56.	5.16
ROUTED TO +	R202S	712.	14.00	476.	164.	56.	5.16
HYDROGRAPH AT +	202A	163.	3.25	19.	6.	3.	.09
ROUTED TO +	R202A	159.	3.42	19.	6.	3.	.09
HYDROGRAPH AT +	202B	125.	3.25	13.	4.	2.	.06
2 COMBINED AT +	C202B	249.	3.33	33.	10.	5.	.14
ROUTED TO +	R202B	245.	3.42	33.	10.	5.	.14
2 COMBINED AT +	C202C	712.	14.00	477.	173.	60.	5.31
ROUTED TO +	RT202C	712.	14.00	477.	173.	60.	5.31
DIVERSION TO +	DHAWS	230.	14.00	180.	95.	34.	5.31
HYDROGRAPH AT +	DSPILL	482.	14.00	297.	78.	26.	5.31
HYDROGRAPH AT +	38B	64.	12.25	8.	2.	1.	.05
2 COMBINED AT +	C38B	483.	14.00	303.	81.	27.	5.36
ROUTED TO +	202NW1	474.	14.33	294.	75.	25.	5.36
ROUTED TO							

SUPERSEDED

+	202NW2	468.	14.67	267.	75.	25.	5.36
HYDROGRAPH AT +	50	371.	12.17	26.	7.	2.	.28
ROUTED TO +	CAP1	325.	12.17	29.	11.	7.	.28
ROUTED TO +	BASIN1	38.	12.50	25.	11.	7.	.28
ROUTED TO +	RCAP1	34.	13.08	25.	11.	7.	.28
HYDROGRAPH AT +	18C	453.	12.25	57.	18.	6.	.39
DIVERSION TO +	D18C	72.	12.25	9.	3.	1.	.39
HYDROGRAPH AT +	RET18C	380.	12.25	48.	15.	5.	.39
2 COMBINED AT +	C18C	393.	12.33	70.	26.	12.	.67
ROUTED TO +	18T24	371.	12.33	70.	26.	12.	.67
HYDROGRAPH AT +	18D	80.	12.08	7.	2.	1.	.04
ROUTED TO +	18DT24	69.	12.17	7.	2.	1.	.04
HYDROGRAPH AT +	24A	90.	12.00	7.	2.	1.	.04
2 COMBINED AT +	C24A	135.	12.08	13.	4.	1.	.09
ROUTED TO +	24ATB	124.	12.17	13.	4.	1.	.09
HYDROGRAPH AT +	24B	374.	12.17	37.	12.	4.	.26
DIVERSION TO +	D24B	67.	12.17	6.	2.	1.	.26
HYDROGRAPH AT +	RET24B	307.	12.17	31.	10.	3.	.26
2 COMBINED AT +	C24B	430.	12.17	45.	14.	5.	.35
2 COMBINED AT +	C24C	699.	12.25	113.	40.	17.	1.01
DIVERSION TO							

SUPERSEDED

+	DIVBRD	0.	.00	0.	0.	0.	1.01
HYDROGRAPH AT +	BRDHAW	699.	12.25	113.	40.	17.	1.01
ROUTED TO +	RT31B1	693.	12.25	113.	40.	17.	1.01
ROUTED TO +	RT31B2	670.	12.33	113.	40.	17.	1.01
ROUTED TO +	RT31B3	659.	12.33	113.	40.	17.	1.01
HYDROGRAPH AT +	31B	523.	12.33	76.	24.	8.	.44
DIVERSION TO +	D31BS	474.	12.25	41.	12.	4.	.44
HYDROGRAPH AT +	D31BS	514.	12.42	43.	12.	4.	.44
2 COMBINED AT +	C31B	1148.	12.42	153.	51.	20.	1.45
DIVERSION TO +	D31W	939.	12.42	138.	48.	19.	1.45
HYDROGRAPH AT +	D31S	208.	12.42	15.	4.	1.	1.45
ROUTED TO +	31T381	195.	12.50	15.	4.	1.	1.45
HYDROGRAPH AT +	RHAWS	230.	14.00	180.	95.	34.	5.31
ROUTED TO +	RTHAWS	230.	14.00	180.	95.	34.	5.31
2 COMBINED AT +	C31S	385.	12.50	202.	101.	36.	1.45
ROUTED TO +	31T382	385.	12.50	202.	101.	36.	1.45
2 COMBINED AT +	C38C1	669.	14.33	445.	171.	59.	6.81
2 COMBINED AT +	C38C	652.	14.42	441.	178.	75.	13.66
ROUTED TO +	38T39	652.	14.50	440.	178.	75.	13.66
HYDROGRAPH AT +	R31W	939.	12.42	138.	48.	19.	1.45
ROUTED TO							

SUPERSEDED

+	31WT32	614.	12.58	137.	47.	19.	1.45
HYDROGRAPH AT +	32	417.	12.33	54.	16.	5.	.38
2 COMBINED AT +	C32	865.	12.50	189.	64.	25.	.38
ROUTED TO +	32T39	864.	12.58	189.	64.	25.	.38
HYDROGRAPH AT +	39	402.	12.42	62.	20.	7.	.36
DIVERSION TO +	D39	10.	9.00	6.	2.	1.	.36
HYDROGRAPH AT +	D39	402.	12.42	62.	18.	6.	.36
2 COMBINED AT +	C39A	1192.	12.50	249.	82.	31.	.74
2 COMBINED AT +	C39B	1350.	12.58	651.	251.	103.	14.40
DIVERSION TO +	BASIN	0.	.00	0.	0.	0.	14.40
HYDROGRAPH AT +	SOSS	1350.	12.58	651.	251.	103.	14.40

1

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

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
FOR STORM = 1	STORM AREA (SQ MI) =			.01					
RCAP11	MANE	1.73	1501.14	745.00	4.36	5.00	1501.13	745.00	4.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2464E+03 EXCESS= .0000E+00 OUTFLOW= .2466E+03 BASIN STORAGE= .1048E-04 PERCENT ERROR= -.1

FOR STORM = 2	STORM AREA (SQ MI) =			1.00					
RCAP11	MANE	1.70	1491.68	743.53	4.33	5.00	1491.61	745.00	4.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2448E+03 EXCESS= .0000E+00 OUTFLOW= .2450E+03 BASIN STORAGE= .1177E-04 PERCENT ERROR= -.1

FOR STORM = 3	STORM AREA (SQ MI) =			5.00					
RCAP11	MANE	1.66	1448.77	747.19	4.21	5.00	1448.30	745.00	4.20

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2376E+03 EXCESS= .0000E+00 OUTFLOW= .2379E+03 BASIN STORAGE= .9588E-05 PERCENT ERROR= -.1

SUPERSEDED

```
FOR STORM = 4  STORM AREA (SQ MI) =      10.00
  RCAP11  MANE        1.79   1395.53    746.52      4.05      5.00   1395.02    745.00        4.05

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2289E+03 EXCESS= .0000E+00 OUTFLOW= .2290E+03 BASIN STORAGE= .1252E-04 PERCENT ERROR=   -.1

FOR STORM = 5  STORM AREA (SQ MI) =      30.00
  RCAP11  MANE        1.76   1327.22    747.52      3.85      5.00   1326.40    745.00        3.85

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2176E+03 EXCESS= .0000E+00 OUTFLOW= .2178E+03 BASIN STORAGE= .1368E-04 PERCENT ERROR=   -.1

FOR STORM = 6  STORM AREA (SQ MI) =      60.00
  RCAP11  MANE        1.77   1259.23    748.20      3.65      5.00   1256.52    745.00        3.65

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2064E+03 EXCESS= .0000E+00 OUTFLOW= .2065E+03 BASIN STORAGE= .1165E-04 PERCENT ERROR=   -.1

FOR STORM = 7  STORM AREA (SQ MI) =      90.00
  RCAP11  MANE        1.86   1232.86    746.17      3.58      5.00   1231.24    745.00        3.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2023E+03 EXCESS= .0000E+00 OUTFLOW= .2025E+03 BASIN STORAGE= .1310E-04 PERCENT ERROR=   -.1

FOR STORM = 8  STORM AREA (SQ MI) =     120.00
  RCAP11  MANE        1.83   1208.64    747.50      3.51      5.00   1205.83    745.00        3.51

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1983E+03 EXCESS= .0000E+00 OUTFLOW= .1984E+03 BASIN STORAGE= .1212E-04 PERCENT ERROR=   -.1

FOR STORM = 9  STORM AREA (SQ MI) =     150.00
  RCAP11  MANE        1.88   1193.21    746.56      3.47      5.00   1190.66    745.00        3.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1958E+03 EXCESS= .0000E+00 OUTFLOW= .1960E+03 BASIN STORAGE= .1309E-04 PERCENT ERROR=   -.1

FOR STORM = 1  STORM AREA (SQ MI) =        .01
  RCAP2A  MANE         .48    288.75    761.36      1.21      5.00    287.78    765.00        1.21

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5079E+02 EXCESS= .0000E+00 OUTFLOW= .5079E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

FOR STORM = 2  STORM AREA (SQ MI) =       1.00
  RCAP2A  MANE         .48    279.04    765.07      1.19      5.00    279.01    765.00        1.20

NUITY SUMMARY (AC-FT) - INFLOW= .5034E+02 EXCESS= .0000E+00 OUTFLOW= .5034E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

FOR STORM = 3  STORM AREA (SQ MI) =       5.00
  RCAP2A  MANE         .51    245.69    765.42      1.15      5.00    244.99    765.00        1.15
```

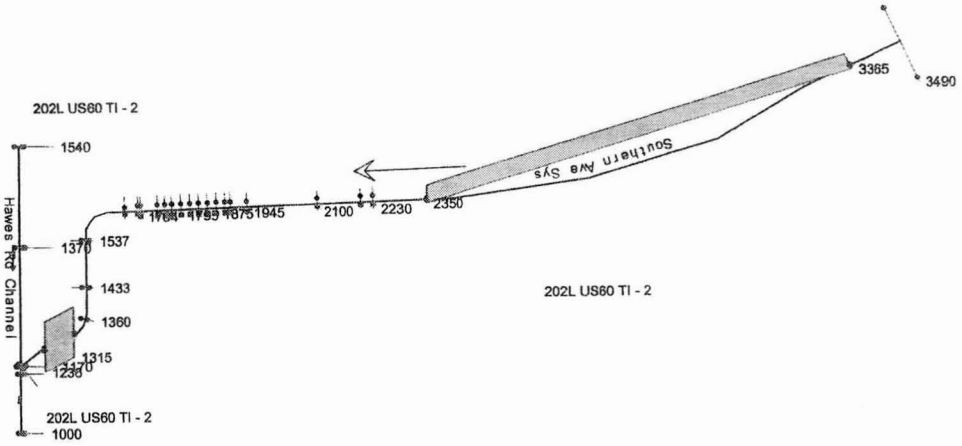
```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .4832E+02 EXCESS= .0000E+00 OUTFLOW= .4832E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

        FOR STORM = 4  STORM AREA (SQ MI) =      10.00
          RCAP2A  MANE          .49    199.90    765.88      1.09      5.00    196.87    765.00        1.09

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4584E+02 EXCESS= .0000E+00 OUTFLOW= .4584E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

        FOR STORM = 5  STORM AREA (SQ MI) =      30.00
          RCAP2A  MANE          .50    136.81    771.03      1.01      5.00    136.38    770.00        1.01

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4272E+02 EXCESS= .0000E+00 OUTFLOW= .4272E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

        FOR STORM = 6  STORM AREA (SQ MI) =      60.00
          RCAP2A  MANE          .62     86.48    775.95       .94      5.00     86.25    775.00         .94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3976E+02 EXCESS= .0000E+00 OUTFLOW= .3976E+02 BASIN STORAGE= .1230E-07 PERCENT ERROR=    .0

        FOR STORM = 7  STORM AREA (SQ MI) =      90.00
          RCAP2A  MANE          .54     71.89    776.37       .92      5.00     70.97    775.00         .92

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3875E+02 EXCESS= .0000E+00 OUTFLOW= .3875E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

        FOR STORM = 8  STORM AREA (SQ MI) =     120.00
          RCAP2A  MANE          .55     56.76    780.94       .90      5.00     56.52    780.00         .90

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3778E+02 EXCESS= .0000E+00 OUTFLOW= .3777E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

        FOR STORM = 9  STORM AREA (SQ MI) =     150.00
          RCAP2A  MANE          .72     47.95    781.16       .88      5.00     47.72    780.00         .88

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3720E+02 EXCESS= .0000E+00 OUTFLOW= .3720E+02 BASIN STORAGE= .1231E-07 PERCENT ERROR=    .0

        FOR STORM = 1  STORM AREA (SQ MI) =        .01
           R202A  MANE         3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

        FOR STORM = 2  STORM AREA (SQ MI) =       1.00
           R202A  MANE         3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1
```

```
FOR STORM = 3  STORM AREA (SQ MI) =      5.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 4  STORM AREA (SQ MI) =     10.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 5  STORM AREA (SQ MI) =     30.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 6  STORM AREA (SQ MI) =     60.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 7  STORM AREA (SQ MI) =     90.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 8  STORM AREA (SQ MI) =    120.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 9  STORM AREA (SQ MI) =    150.00
  R202A  MANE        3.67    161.55    203.09      3.37      5.00    158.67    205.00        3.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1601E+02 EXCESS= .0000E+00 OUTFLOW= .1599E+02 BASIN STORAGE= .3164E-01 PERCENT ERROR=   -.1

FOR STORM = 1  STORM AREA (SQ MI) =       .01
  R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

FOR STORM = 2  STORM AREA (SQ MI) =      1.00
  R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76
```

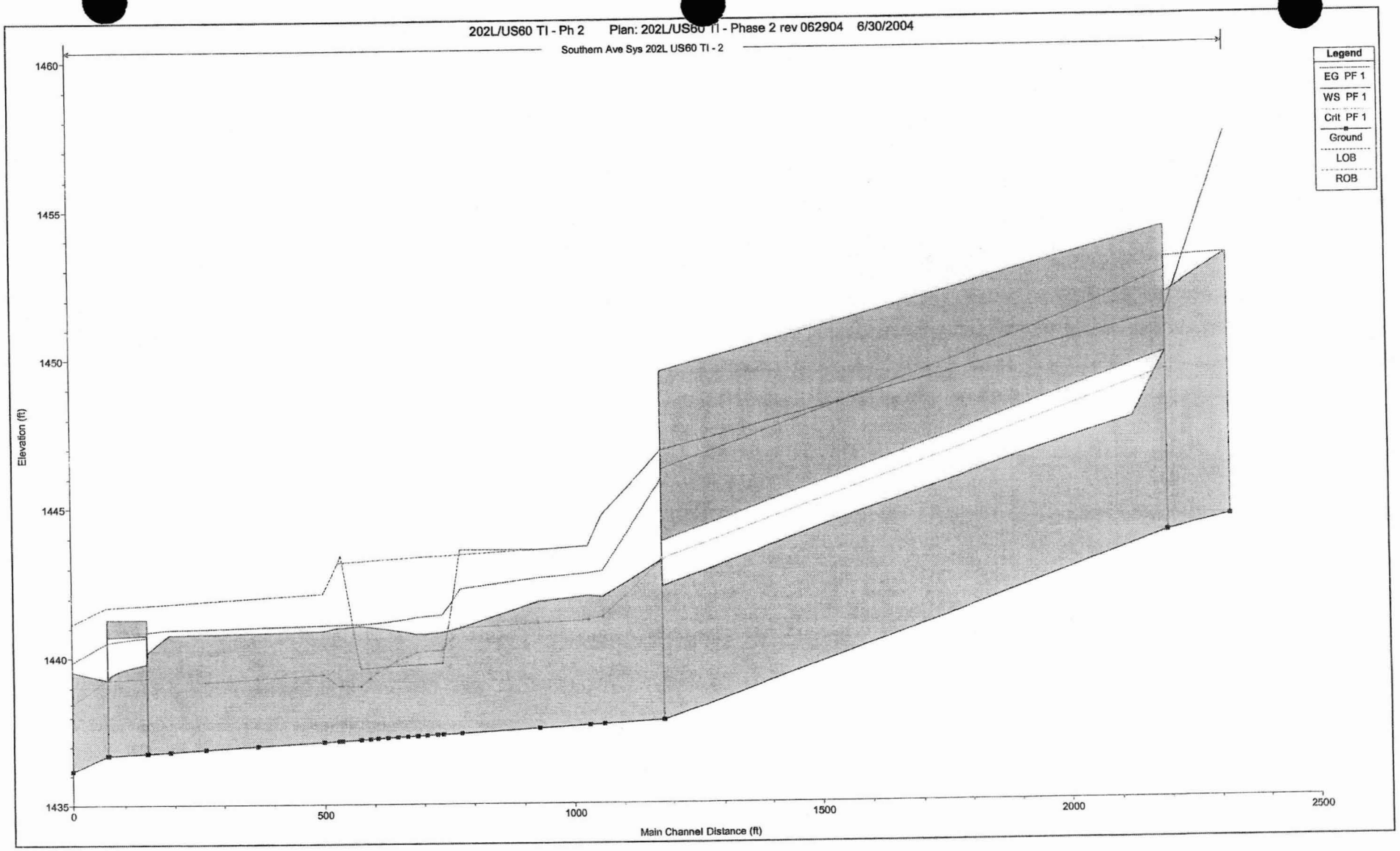
```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 3  STORM AREA (SQ MI) =       5.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 4  STORM AREA (SQ MI) =      10.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 5  STORM AREA (SQ MI) =      30.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 6  STORM AREA (SQ MI) =      60.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

NUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 7  STORM AREA (SQ MI) =      90.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 8  STORM AREA (SQ MI) =     120.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

     FOR STORM = 9  STORM AREA (SQ MI) =     150.00
        R202B  MANE        2.27    245.65    203.50      3.76      5.00    244.89    205.00        3.76

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2902E+02 EXCESS= .0000E+00 OUTFLOW= .2902E+02 BASIN STORAGE= .3634E-01 PERCENT ERROR=   -.1

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

```
-----DSS---ZCLOSE Unit:  71,   File: NE200250.DSS
          Pointer Utilization:   .30
          Number of Records:     45
          File Size:     89.4  Kbytes
          Percent Inactive:    .0
```

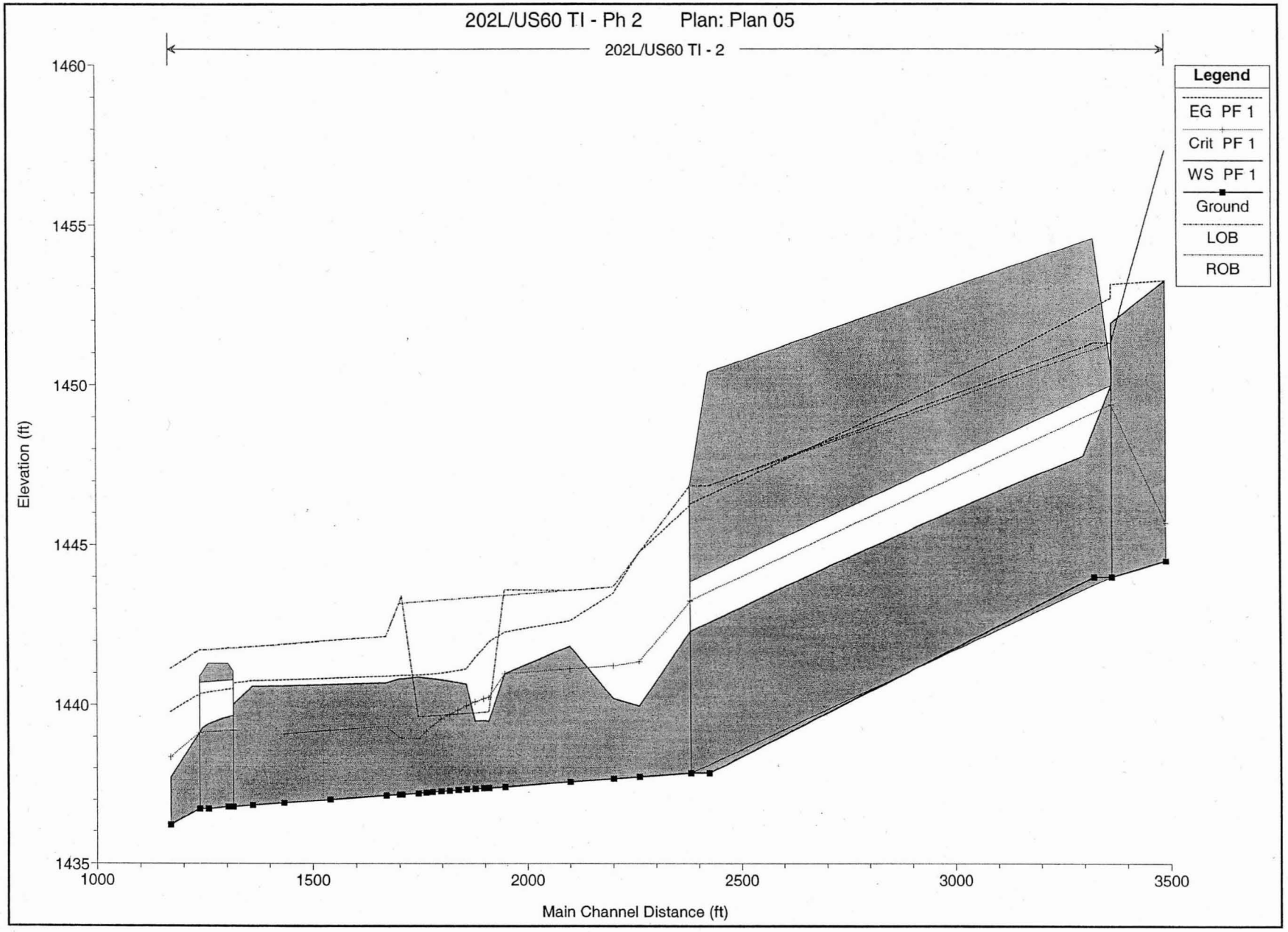
HEC-RAS Output for Drainage Channel (100-Year Event)



artial GIS data


202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Southern Ave Sys 202L US60 TI - 2
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
LOB
ROB
Elevation (ft)
1460
1455
1450
1445
1440
1435
0
500
1000
1500
2000
2500
Main Channel Distance (ft)

SUPERSEDED



4/28/05
REVISIONS

HEC-RAS Plan: 202L/US60 TI River: Southern Ave Sys Reach: 202L US60 TI - 2 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
202L US60 TI - 2	3490	PF 1	712.00	1444.50	1453.27	1445.68	1453.27	0.000002	0.31	2293.30	312.07	0.02
202L US60 TI - 2	3365	PF 1	712.00	1444.00	1451.95	1449.37	1453.15	0.001646	8.83	84.47	23.75	0.55
202L US60 TI - 2	2857.5		Culvert									
202L US60 TI - 2	2350	PF 1	712.00	1437.82	1442.27	1443.19	1446.21	0.008192	15.92	44.72	10.10	0.55
202L US60 TI - 2	2230	PF 1	712.00	1437.70	1439.93	1441.33	1444.72	0.017946	17.55	40.57	23.08	2.33
202L US60 TI - 2	2201	PF 1	712.00	1437.67	1440.00	1441.23	1444.02	0.014535	16.08	44.28	24.69	2.12
202L US60 TI - 2	2100	PF 1	712.00	1437.57	1441.84	1441.12	1442.63	0.001433	7.15	99.64	32.45	0.72
202L US60 TI - 2	1945	PF 1	712.00	1437.41	1440.98	1440.98	1442.28	0.002879	9.15	77.78	29.63	1.00
202L US60 TI - 2	1907	PF 1	712.00	1437.38	1439.48	1440.24	1441.97	0.012191	12.65	56.30	40.57	1.89
202L US60 TI - 2	1895	PF 1	712.00	1437.37	1439.57	1440.21	1441.74	0.010128	11.83	60.18	41.71	1.74
202L US60 TI - 2	1875	PF 1	712.00	1437.35	1440.77	1440.21	1441.37	0.001392	6.23	114.24	45.40	0.69
202L US60 TI - 2	1855	PF 1	692.00	1437.33	1440.77	1440.15	1441.33	0.001278	6.00	115.29	45.45	0.66
202L US60 TI - 2	1835	PF 1	635.00	1437.31	1440.83	1440.00	1441.28	0.000979	5.34	118.88	45.61	0.58
202L US60 TI - 2	1815	PF 1	570.00	1437.29	1440.89	1439.86	1441.23	0.000720	4.66	122.42	45.76	0.50
202L US60 TI - 2	1795	PF 1	498.00	1437.27	1440.94	1439.67	1441.19	0.000506	3.96	125.77	45.91	0.42
202L US60 TI - 2	1775	PF 1	421.00	1437.25	1440.99	1439.46	1441.16	0.000336	3.27	128.81	46.04	0.34
202L US60 TI - 2	1760	PF 1	359.00	1437.23	1441.02	1439.27	1441.14	0.000231	2.74	131.13	46.14	0.29
202L US60 TI - 2	1742	PF 1	281.00	1437.21	1441.05	1439.02	1441.12	0.000134	2.11	133.44	46.24	0.22
202L US60 TI - 2	1704	PF 1	230.00	1437.17	1441.00	1439.04	1441.11	0.000229	2.69	85.58	30.66	0.28
202L US60 TI - 2	1698	PF 1	230.00	1437.17	1440.99	1439.04	1441.11	0.000230	2.69	85.54	30.66	0.28
202L US60 TI - 2	1668	PF 1	230.00	1437.14	1440.88	1439.42	1441.09	0.000484	3.66	62.92	24.56	0.40
202L US60 TI - 2	1537	PF 1	230.00	1437.01	1440.83	1439.29	1441.02	0.000445	3.55	64.84	24.87	0.39
202L US60 TI - 2	1433	PF 1	230.00	1436.90	1440.79	1439.18	1440.98	0.000413	3.45	66.66	25.16	0.37
202L US60 TI - 2	1360	PF 1	230.00	1436.82	1440.77		1440.95	0.000255	3.37	68.24	25.41	0.36
202L US60 TI - 2	1315	PF 1	230.00	1436.78	1440.17	1439.33	1440.87	0.001351	6.74	34.11	10.14	0.65
202L US60 TI - 2	1270		Culvert									
202L US60 TI - 2	1236	PF 1	230.00	1436.71	1439.26	1439.26	1440.51	0.004056	8.98	25.62	10.10	0.99
202L US60 TI - 2	1170	PF 1	245.00	1436.16	1439.53	1438.45	1439.85	0.000795	4.52	54.22	22.18	0.51

SUPERSEDED

HEC-RAS Plan: Final Plans Profile: PF 1

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)	
South Hawes Chan	202L/US60 TI - 2	1170	221.00	1436.21	1438.56	1438.36	1439.23	0.002495	6.59	33.51	18.57	0.87
South Hawes Chan	202L/US60 TI - 2	1150	221.00	1436.06	1438.55	1438.27	1439.17	0.002200	6.32	34.99	18.79	0.82
South Hawes Chan	202L/US60 TI - 2	1000	221.00	1435.73	1438.22	1437.94	1438.84	0.002201	6.32	34.99	18.78	0.82
Southern Ave Sys	202L/US60 TI - 2	3490	712.00	1444.50	1453.27	1445.68	1453.27	0.000002	0.31	2293.30	312.07	0.02
Southern Ave Sys	202L/US60 TI - 2	3365	712.00	1444.00	1451.95	1449.37	1453.15	0.001646	8.83	84.47	23.75	0.55
Southern Ave Sys	202L/US60 TI - 2	3000	Culvert									
Southern Ave Sys	202L/US60 TI - 2	2381	712.00	1437.85	1442.31	1443.23	1446.23	0.008150	15.89	44.81	10.10	0.55
Southern Ave Sys	202L/US60 TI - 2	2261	712.00	1437.73	1439.96	1441.35	1444.74	0.017927	17.54	40.58	23.09	2.33
Southern Ave Sys	202L/US60 TI - 2	2201	712.00	1437.67	1440.19	1441.22	1443.47	0.010828	14.53	48.99	25.45	1.85
Southern Ave Sys	202L/US60 TI - 2	2100	712.00	1437.57	1441.84	1441.12	1442.63	0.001442	7.16	99.42	32.42	0.72
Southern Ave Sys	202L/US60 TI - 2	1947	712.00	1437.41	1440.98	1440.98	1442.28	0.002875	9.15	77.82	29.63	0.99
Southern Ave Sys	202L/US60 TI - 2	1909	712.00	1437.38	1439.48	1440.23	1441.96	0.012155	12.63	56.36	40.59	1.89
Southern Ave Sys	202L/US60 TI - 2	1897	694.00	1437.37	1439.50	1440.18	1441.76	0.010853	12.04	57.63	40.96	1.79
Southern Ave Sys	202L/US60 TI - 2	1877	653.00	1437.35	1439.49	1440.08	1441.47	0.009540	11.30	57.78	41.01	1.68
Southern Ave Sys	202L/US60 TI - 2	1857	607.00	1437.33	1440.65	1439.97	1441.13	0.001143	5.53	109.83	45.21	0.62
Southern Ave Sys	202L/US60 TI - 2	1837	556.00	1437.31	1440.70	1439.84	1441.08	0.000882	4.93	112.83	45.34	0.55
Southern Ave Sys	202L/US60 TI - 2	1817	500.00	1437.29	1440.74	1439.70	1441.03	0.000660	4.32	115.71	45.47	0.48
Southern Ave Sys	202L/US60 TI - 2	1797	439.00	1437.27	1440.78	1439.54	1441.00	0.000473	3.71	118.45	45.59	0.41
Southern Ave Sys	202L/US60 TI - 2	1777	374.00	1437.25	1440.82	1439.34	1440.97	0.000321	3.09	121.02	45.70	0.33
Southern Ave Sys	202L/US60 TI - 2	1762	322.00	1437.23	1440.85	1439.16	1440.95	0.000226	2.62	123.11	45.79	0.28
Southern Ave Sys	202L/US60 TI - 2	1744	256.00	1437.21	1440.87	1438.93	1440.94	0.000135	2.04	125.21	45.88	0.22
Southern Ave Sys	202L/US60 TI - 2	1706	214.00	1437.17	1440.81	1438.97	1440.93	0.000240	2.67	80.07	29.94	0.29
Southern Ave Sys	202L/US60 TI - 2	1700	214.00	1437.17	1440.81	1438.98	1440.92	0.000240	2.67	80.02	29.93	0.29
Southern Ave Sys	202L/US60 TI - 2	1670	214.00	1437.14	1440.70	1439.33	1440.90	0.000513	3.66	58.44	23.82	0.41
Southern Ave Sys	202L/US60 TI - 2	1540	214.00	1437.01	1440.64	1439.20	1440.84	0.000471	3.55	60.28	24.13	0.40
Southern Ave Sys	202L/US60 TI - 2	1433	214.00	1436.90	1440.60	1439.08	1440.79	0.000437	3.45	61.95	24.40	0.38
Southern Ave Sys	202L/US60 TI - 2	1360	214.00	1436.83	1440.58		1440.76	0.000273	3.39	63.21	24.62	0.37
Southern Ave Sys	202L/US60 TI - 2	1315	214.00	1436.78	1440.01	1439.19	1440.68	0.001337	6.58	32.52	10.13	0.65
Southern Ave Sys	202L/US60 TI - 2	1270	Culvert									
Southern Ave Sys	202L/US60 TI - 2	1237	214.00	1436.71	1439.14	1439.14	1440.33	0.004060	8.78	24.37	10.10	1.00
Southern Ave Sys	202L/US60 TI - 2	1170	221.00	1436.21	1437.71	1438.36	1439.79	0.012575	11.59	19.06	15.47	1.84
Hawes Rd Channel	202L/US60 TI - 2	1540	7.00	1437.47	1439.43	1437.71	1439.43	0.000005	0.26	27.23	17.83	0.04
Hawes Rd Channel	202L/US60 TI - 2	1370	7.00	1437.08	1439.43	1437.32	1439.43	0.000002	0.20	34.49	19.39	0.03
Hawes Rd Channel	202L/US60 TI - 2	1170	221.00	1436.21	1438.56	1438.36	1439.23	0.002495	6.59	33.51	18.57	0.87

4/28/05
REVISIONS

Loop 202 / US 60 T.I., Phase 2
(Southern Avenue) Drainage Channel
Water Surface Superelevation Check

6/30/2004

River Sta	W.S. Elev plus Freeboard	Top Width (ft)	Channel Velocity (fps)	Channel Radius (ft)	W.S. Super-elevation (ft)	W.S. + FB + Super	Channel Lining Elev	Superelevation Check	Froude # Chl
3490	1455.02	312.07	0.31				N/A	N/A	0.02
3365	1453.78	23.75	8.83				N/A	N/A	0.55
3000									
2350	1443.95	10.10	15.92				1449.50	OK	0.55
2230	1441.33	23.08	17.55				1443.70	OK	2.33
2201	1441.27	24.69	16.08				1443.67	OK	2.12
2100	1442.85	32.44	7.15				1443.57	OK	0.72
1945	1441.98	29.63	9.15				1443.41	OK	1.00
1907	1440.48	40.59	12.63				1443.38	OK	1.89
1895	1440.57	41.73	11.81				1443.37	OK	1.73
1875	1441.77	45.40	6.23				1443.35	OK	0.69
1855	1441.77	45.45	6.00				1443.33	OK	0.66
1835	1441.83	45.61	5.34				1443.31	OK	0.58
1815	1441.89	45.76	4.66				1443.29	OK	0.50
1795	1441.94	45.91	3.96				1443.27	OK	0.42
1775	1441.99	46.04	3.27				1443.25	OK	0.34
1760	1442.02	46.14	2.74				1443.23	OK	0.29
1742	1442.05	46.24	2.11				1443.21	OK	0.22
1704	1442.00	30.66	2.69				1443.17	OK	0.28
1698	1442.00	30.66	2.69				1443.17	OK	0.28
1668	1441.88	24.56	3.66	85.53	0.06	1441.94	1442.14	OK	0.40
1537	1441.83	24.87	3.55	85.53	0.05	1441.88	1442.01	OK	0.39
1433	1441.79	25.16	3.45	95.00	0.05	1441.84	1441.90	OK	0.37
1360	1441.77	25.41	3.37	95.00	0.04	1441.81	1441.82	OK	0.36
1315	1441.17	10.14	6.74				1441.78	OK	0.65
1270									
1237	1440.26	10.10	8.98				1441.71	OK	0.99
1170	1440.53	22.18	4.52				1441.00	OK	0.51

Note: W.S. Superelevation per ADOT Roadway Design Guidelines, May 1996:

$$y = C v^2 W / g r_c$$

where
C = 0.5 for subcritical flow
v = velocity, fps
W = channel width at water surface, ft
g = acceleration of gravity, 32.2 ft/s^2
r_c = radius of curvature at channel centerline, ft

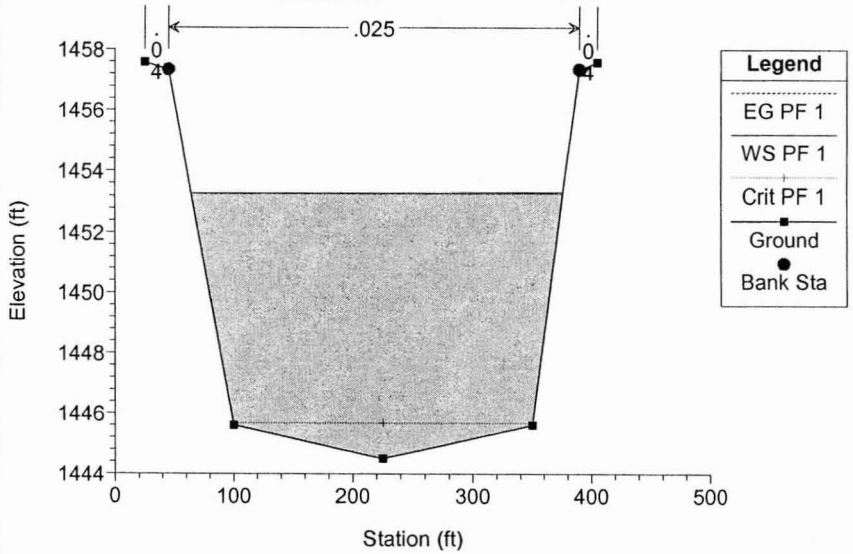
Loop 202 / US 60 T.I., Phase 2
(Southern Avenue) Drainage Channel
Freeboard Check

6/30/2004

River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	E.G. Elev (ft)	0.2 * (y + V²/2g) (ft)	Req. Freeboard (ft)	W.S. Elev plus Freeboard	Channel Lining Elev	Freeboard Check	Top Width (ft)	Froude # Chl
3490	712	1444.50	1453.27	1453.27	1.75	1.75	1455.02	N/A	N/A	312.07	0.02
3365	712	1444.00	1451.95	1453.15	1.83	1.83	1453.78	N/A	N/A	23.75	0.55
3000	Culvert										
2350	712	1437.82	1442.27	1446.21	1.68	1.68	1443.95	1449.50	OK	10.10	0.55
2230	712	1437.70	1439.93	1444.72	1.40	1.40	1441.33	1443.70	OK	23.08	2.33
2201	712	1437.67	1440.00	1444.02	1.27	1.27	1441.27	1443.67	OK	24.69	2.12
2100	712	1437.57	1441.84	1442.63	1.01	1.01	1442.85	1443.57	OK	32.44	0.72
1945	712	1437.41	1440.98	1442.28	0.97	1.00	1441.98	1443.41	OK	29.63	1.00
1907	712	1437.38	1439.48	1441.96	0.92	1.00	1440.48	1443.38	OK	40.59	1.89
1895	712	1437.37	1439.57	1441.74	0.87	1.00	1440.57	1443.37	OK	41.73	1.73
1875	712	1437.35	1440.77	1441.37	0.80	1.00	1441.77	1443.35	OK	45.40	0.69
1855	692	1437.33	1440.77	1441.33	0.80	1.00	1441.77	1443.33	OK	45.45	0.66
1835	635	1437.31	1440.83	1441.28	0.79	1.00	1441.83	1443.31	OK	45.61	0.58
1815	570	1437.29	1440.89	1441.23	0.79	1.00	1441.89	1443.29	OK	45.76	0.50
1795	498	1437.27	1440.94	1441.19	0.78	1.00	1441.94	1443.27	OK	45.91	0.42
1775	421	1437.25	1440.99	1441.16	0.78	1.00	1441.99	1443.25	OK	46.04	0.34
1760	359	1437.23	1441.02	1441.14	0.78	1.00	1442.02	1443.23	OK	46.14	0.29
1742	281	1437.21	1441.05	1441.12	0.78	1.00	1442.05	1443.21	OK	46.24	0.22
1704	230	1437.17	1441.00	1441.11	0.79	1.00	1442.00	1443.17	OK	30.66	0.28
1698	230	1437.17	1441.00	1441.11	0.79	1.00	1442.00	1443.17	OK	30.66	0.28
1668	230	1437.14	1440.88	1441.09	0.79	1.00	1441.88	1442.14	OK	24.56	0.40
1537	230	1437.01	1440.83	1441.02	0.80	1.00	1441.83	1442.01	OK	24.87	0.39
1433	230	1436.90	1440.79	1440.98	0.82	1.00	1441.79	1441.90	OK	25.16	0.37
1360	230	1436.82	1440.77	1440.95	0.83	1.00	1441.77	1441.82	OK	25.41	0.36
1315	230	1436.78	1440.17	1440.87	0.82	1.00	1441.17	1441.78	OK	10.14	0.65
1270	Culvert										
1237	230	1436.71	1439.26	1440.51	0.76	1.00	1440.26	1441.71	OK	10.10	0.99
1170	245	1436.16	1439.53	1439.85	0.74	1.00	1440.53	1441.00	OK	22.18	0.51

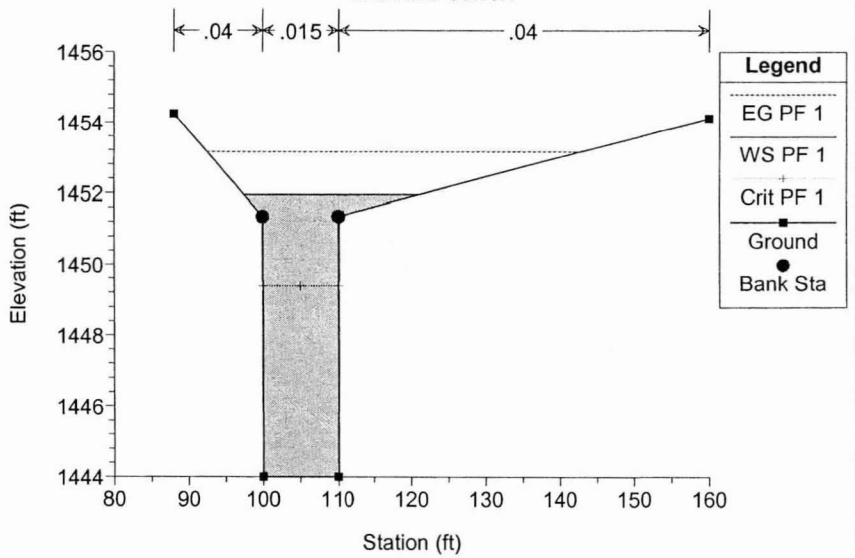
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

Southern Avenue Detention Basin



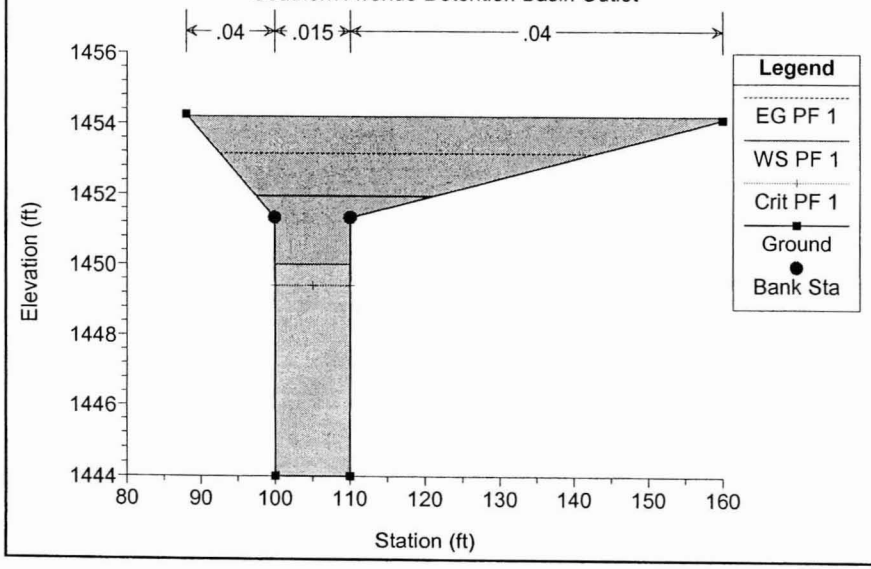
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

End RCB Culvert



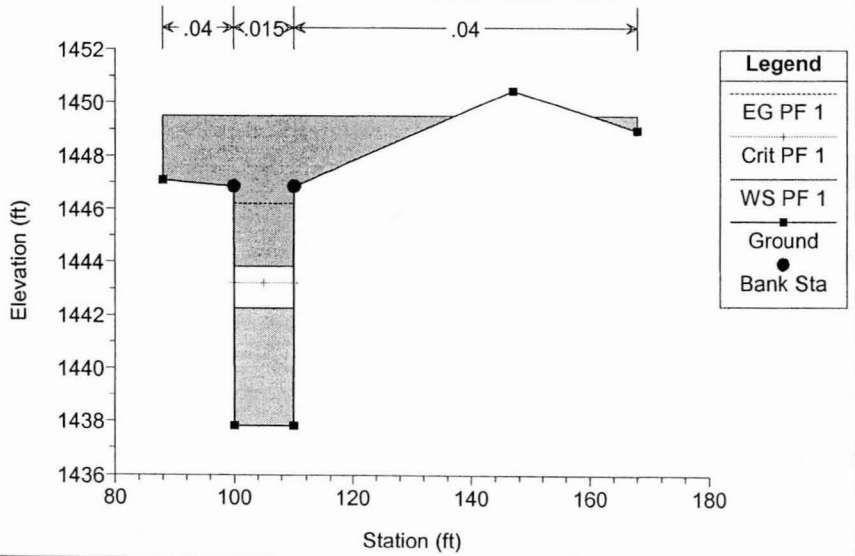
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

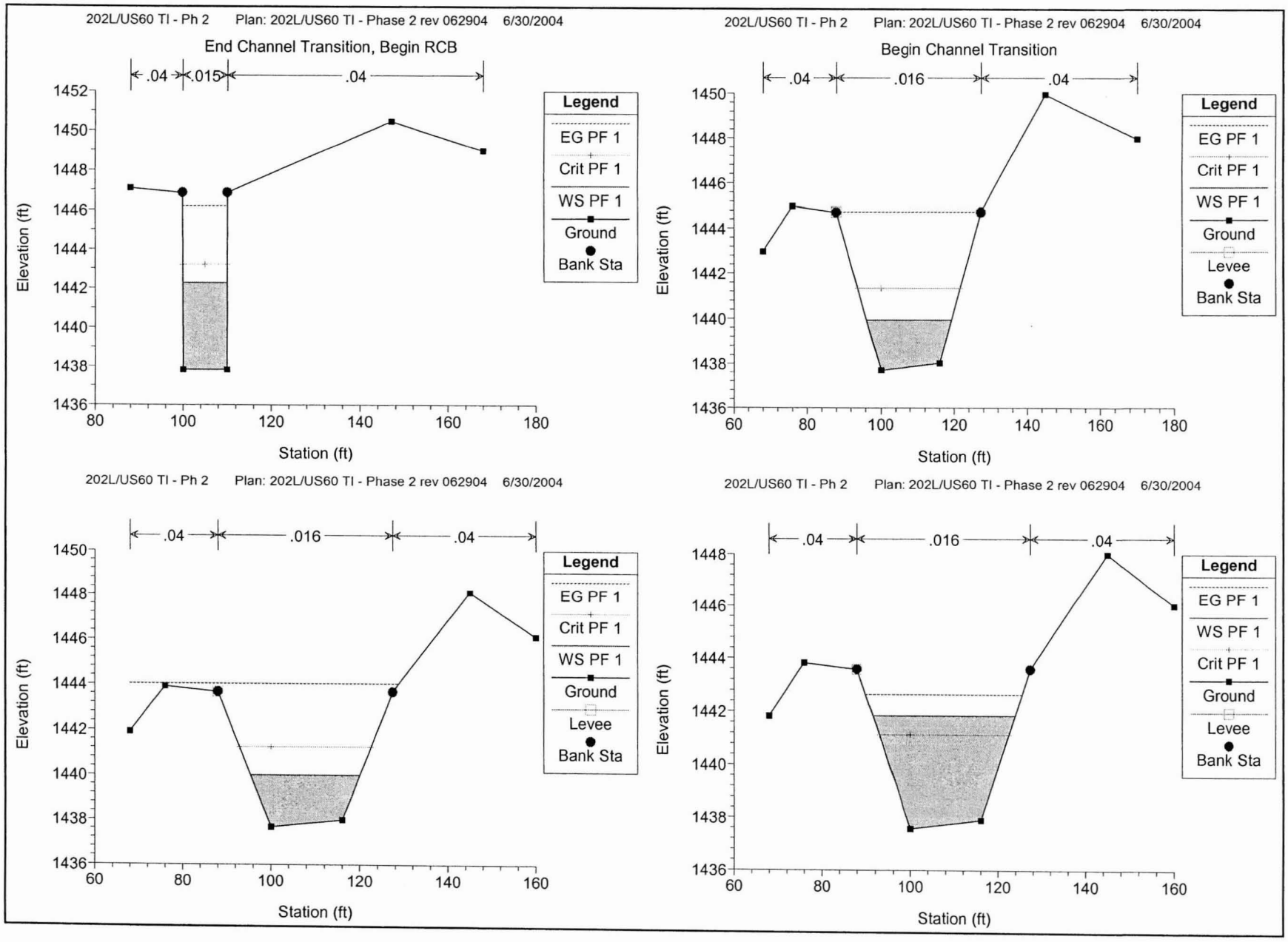
Southern Avenue Detention Basin Outlet

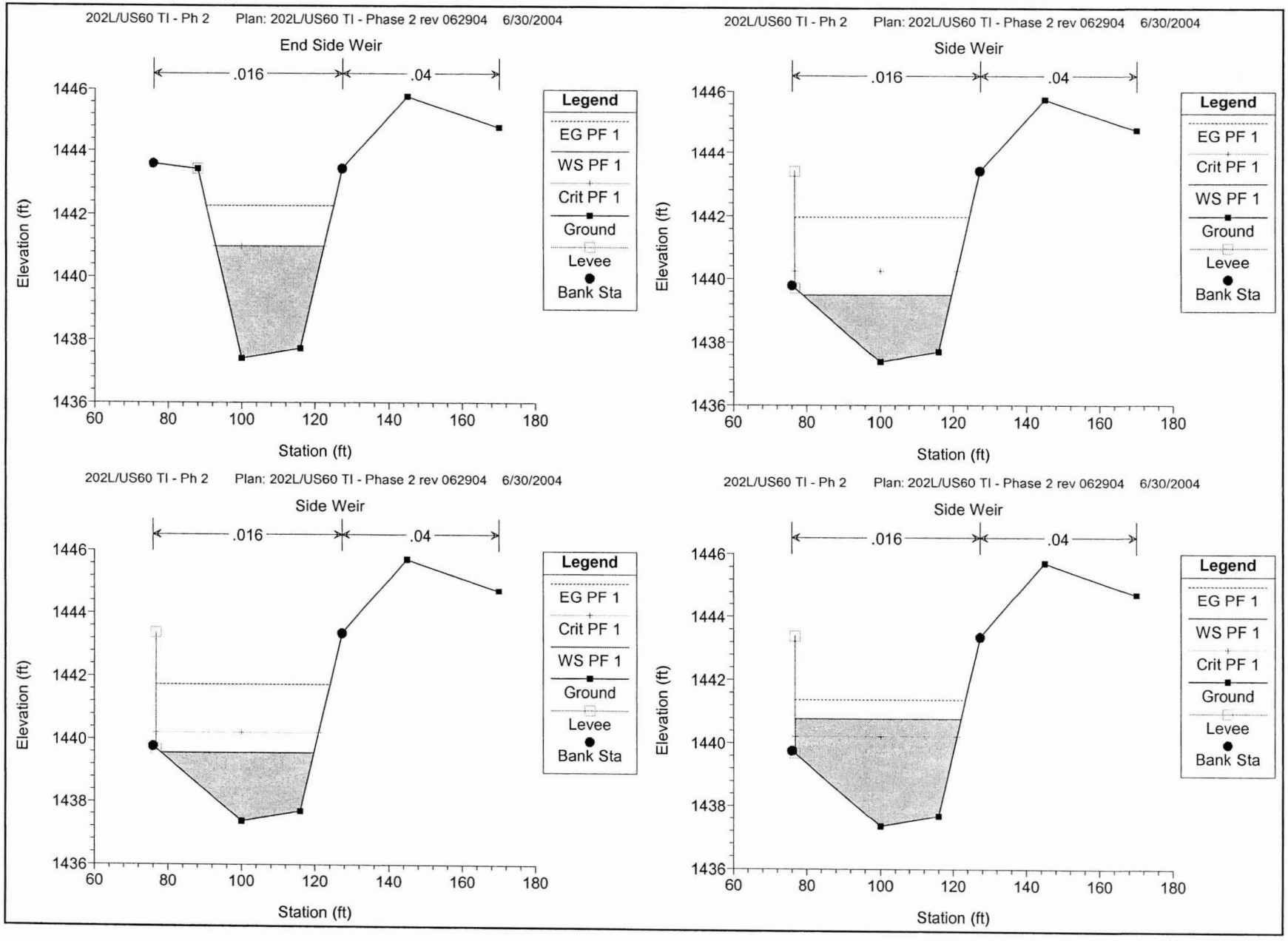


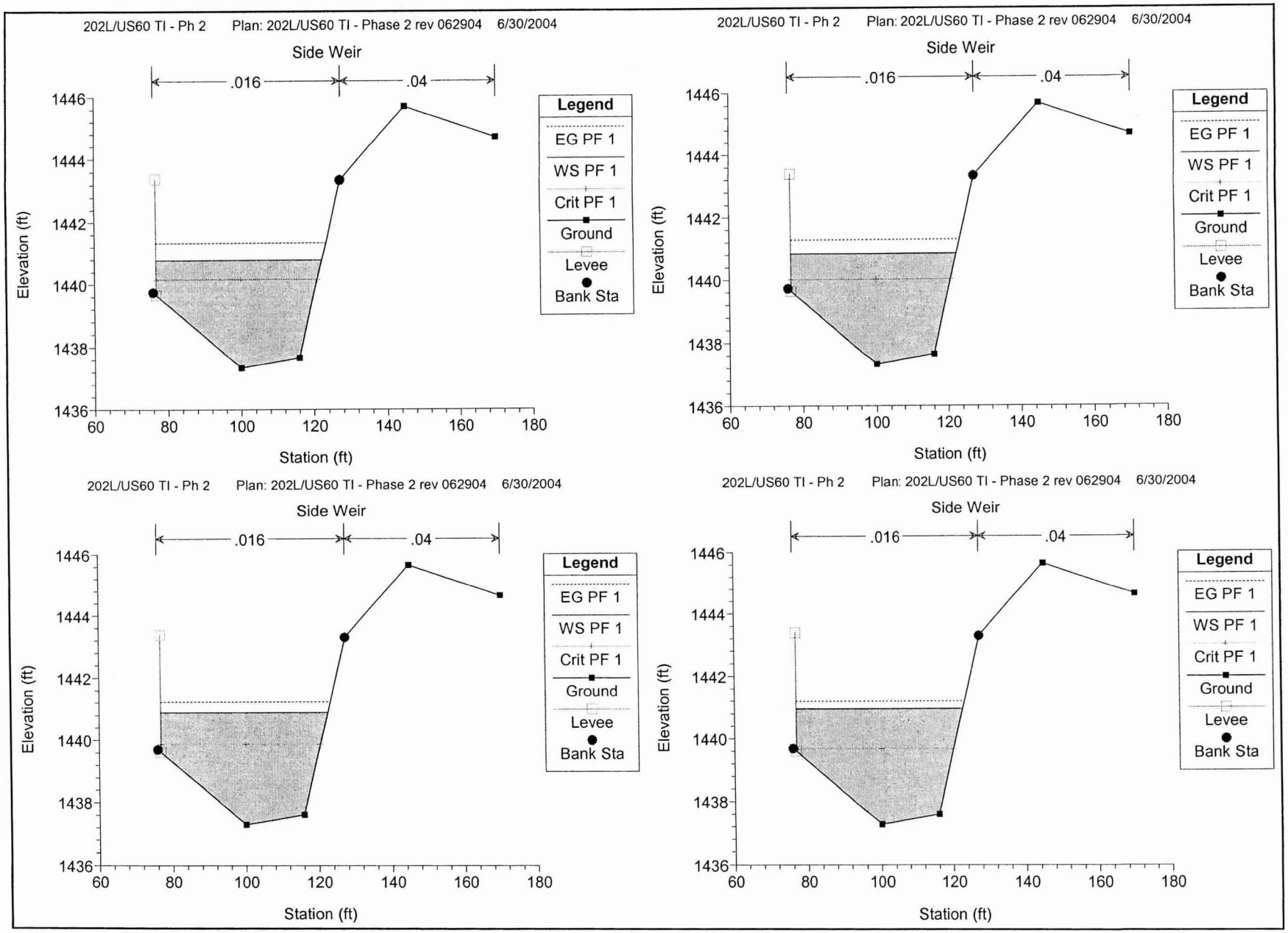
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

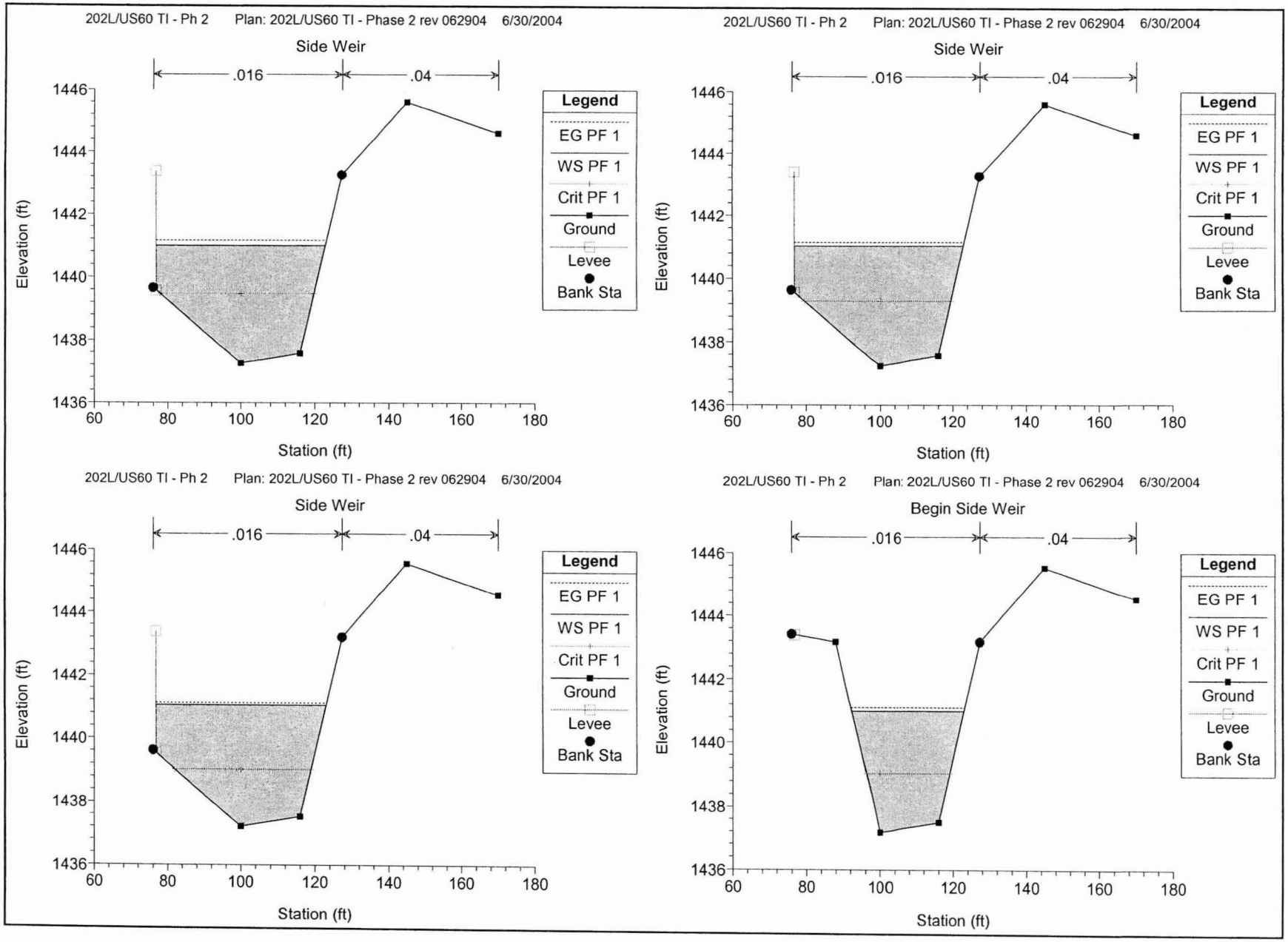
Southern Avenue Detention Basin Outlet




202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
End Channel Transition, Begin RCB
.04
.015
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Begin Channel Transition
.04
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
.04
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
.04
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

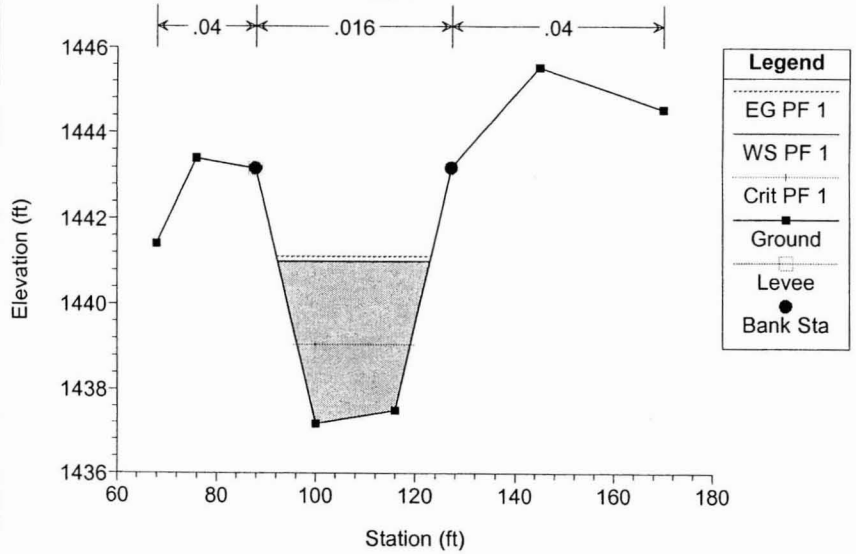

202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
End Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
Crit PF 1
WS PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta


202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Begin Side Weir
.016
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

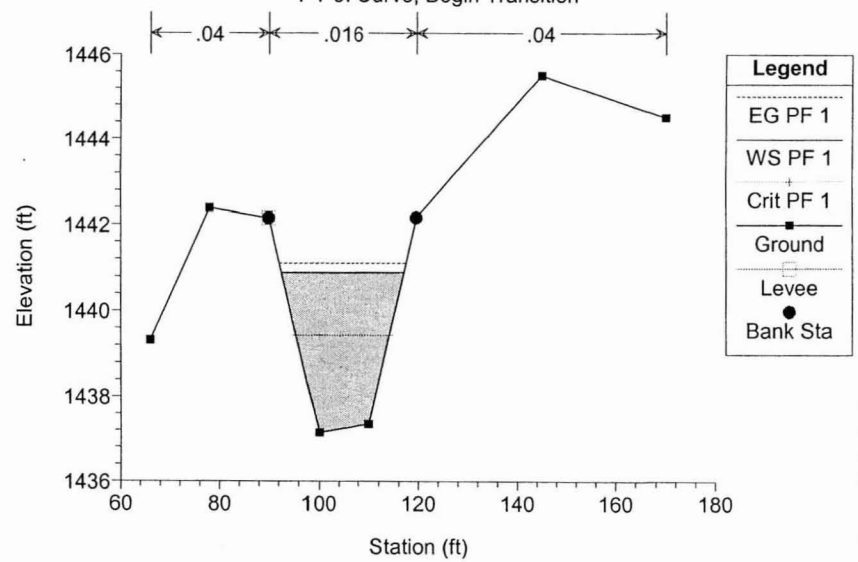
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

End Transistion



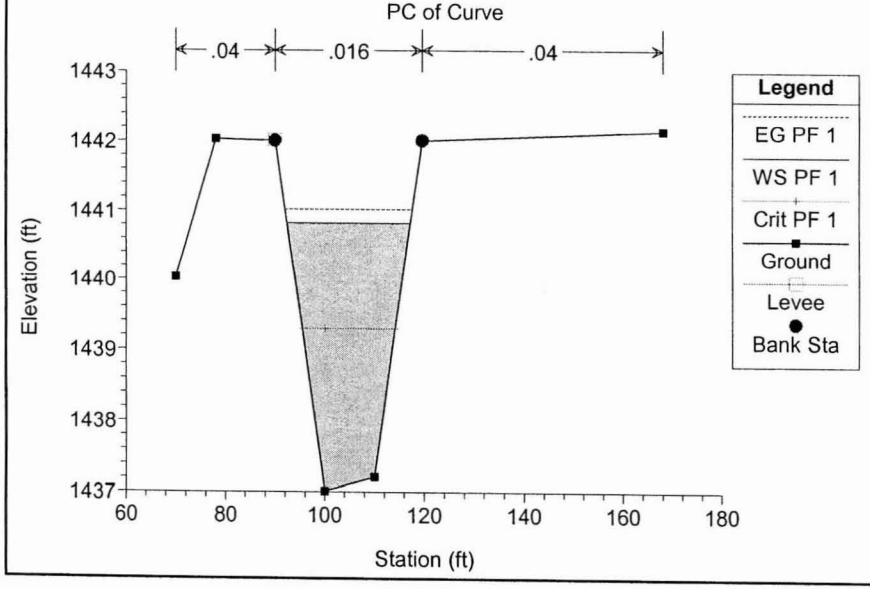
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

PT of Curve, Begin Transition



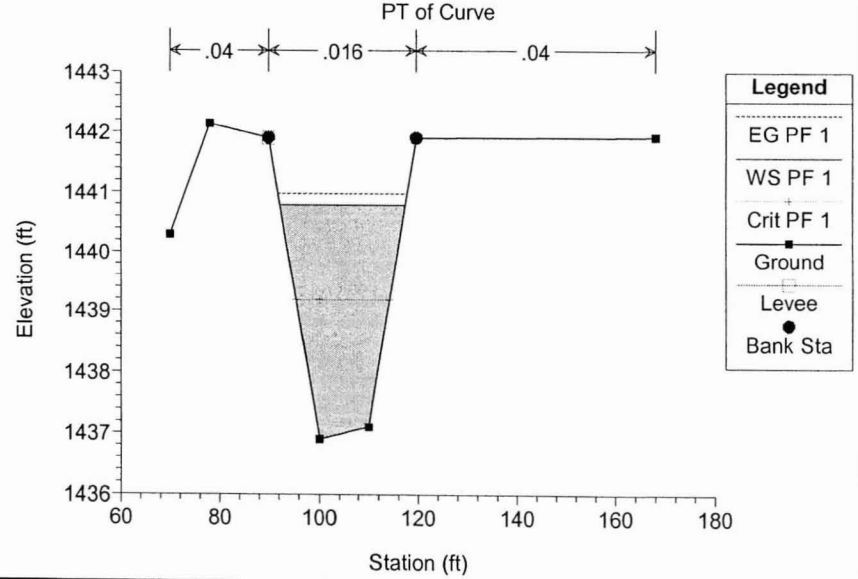
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

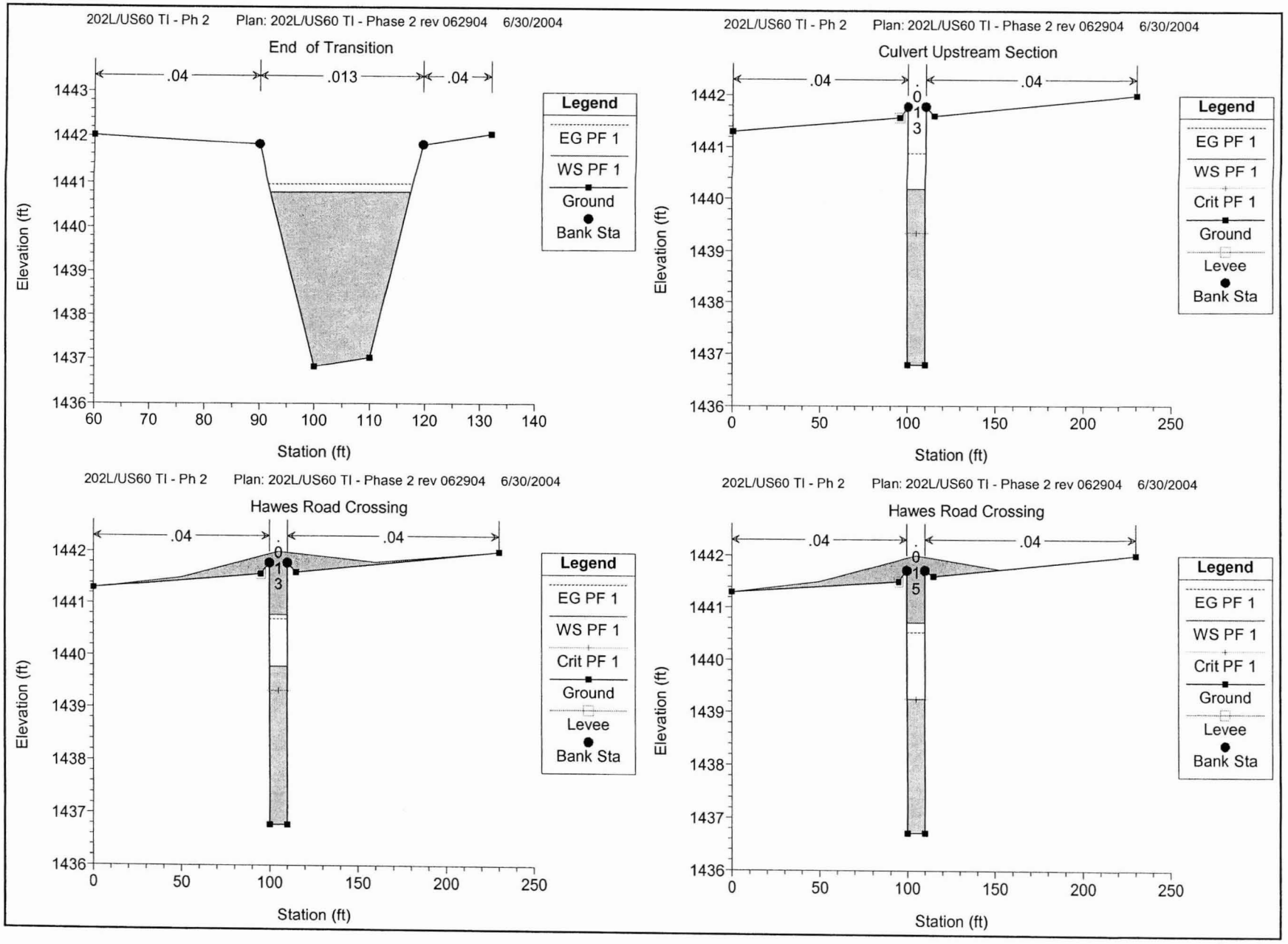
PC of Curve



202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

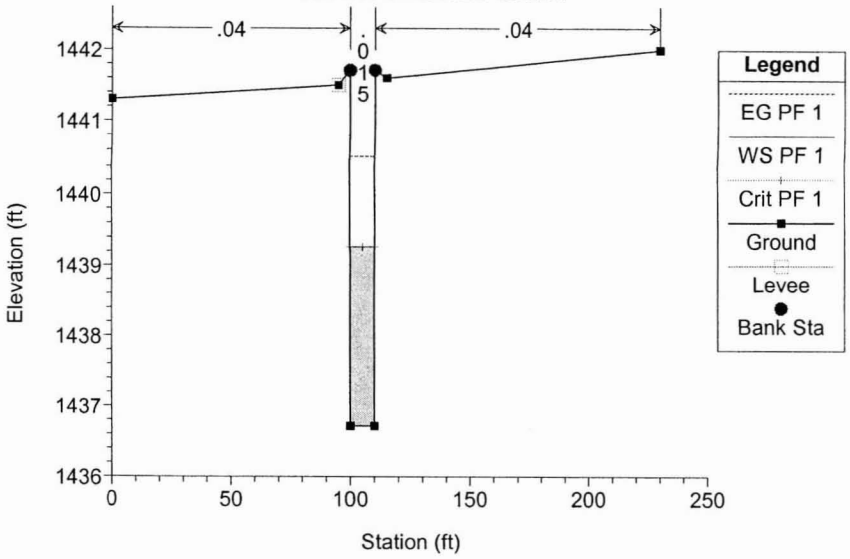
PT of Curve




202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
End of Transition
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Culvert Upstream Section
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Hawes Road Crossing
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004
Hawes Road Crossing
.04
.04
Elevation (ft)
Station (ft)
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta

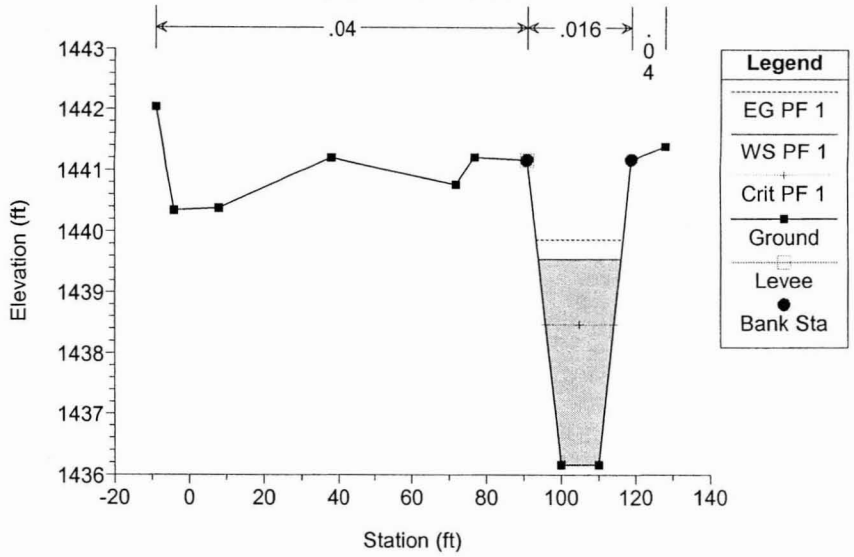
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

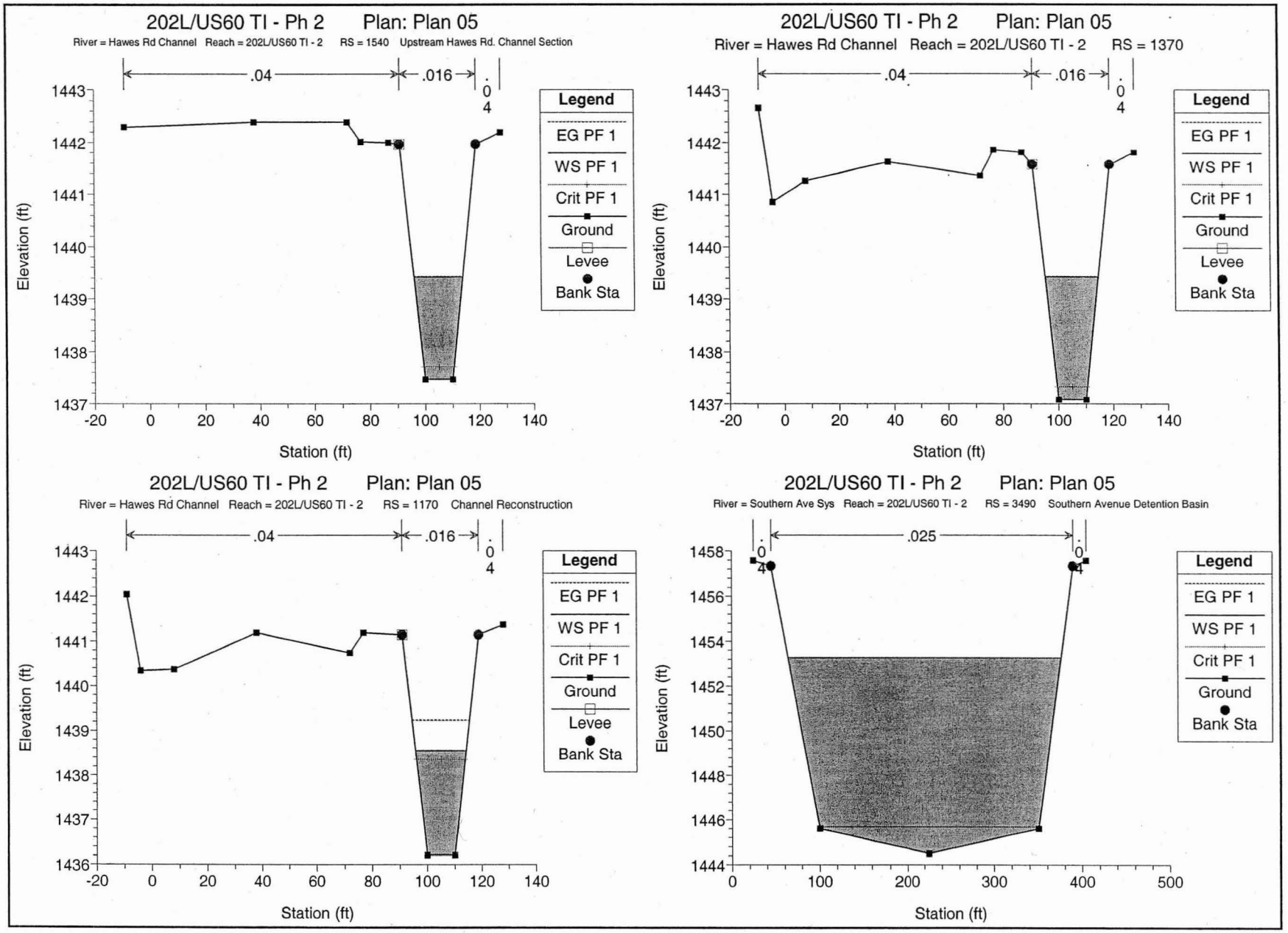
Culvert Downstream Section



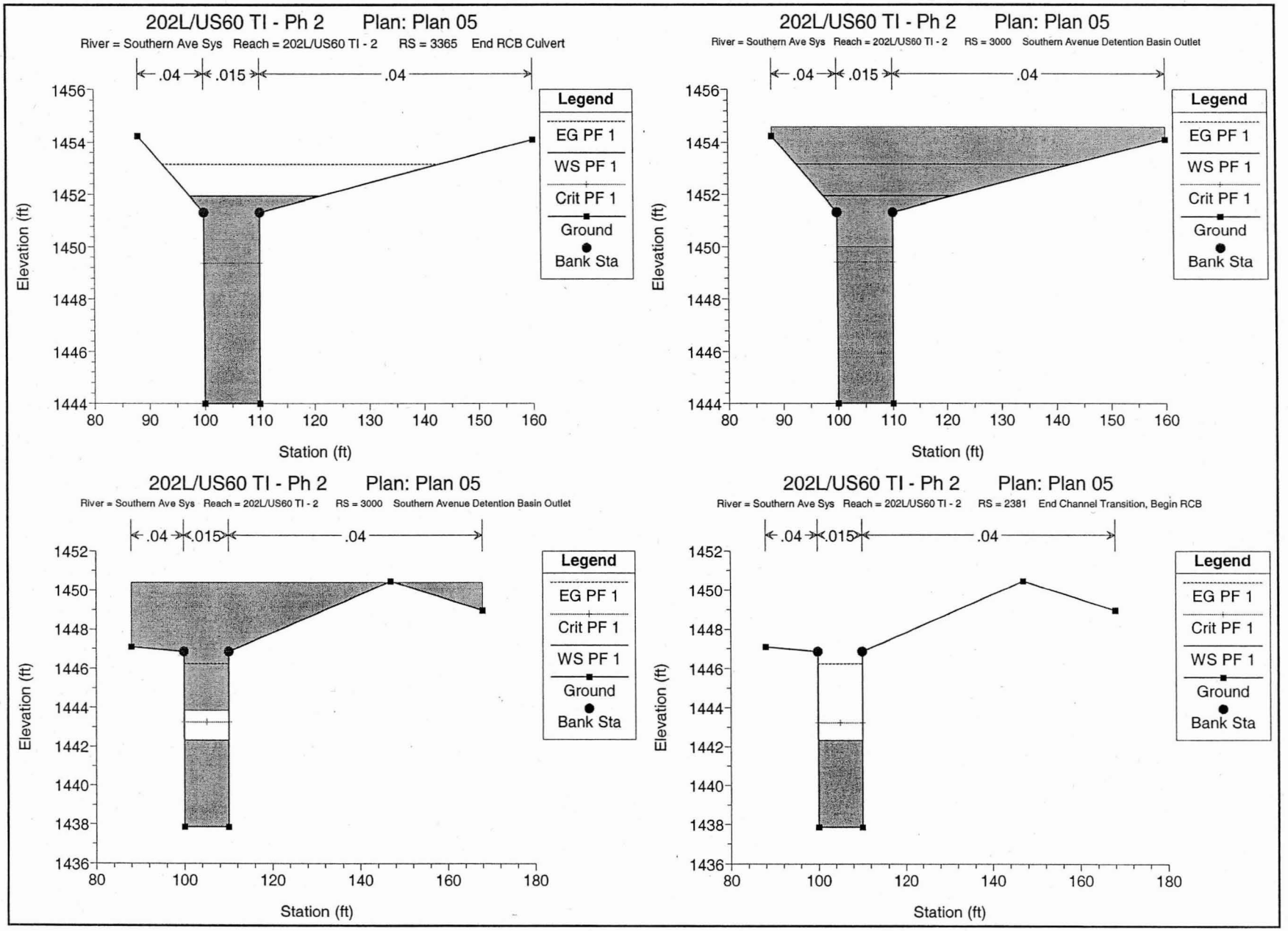
202L/US60 TI - Ph 2 Plan: 202L/US60 TI - Phase 2 rev 062904 6/30/2004

Channel Reconstruction

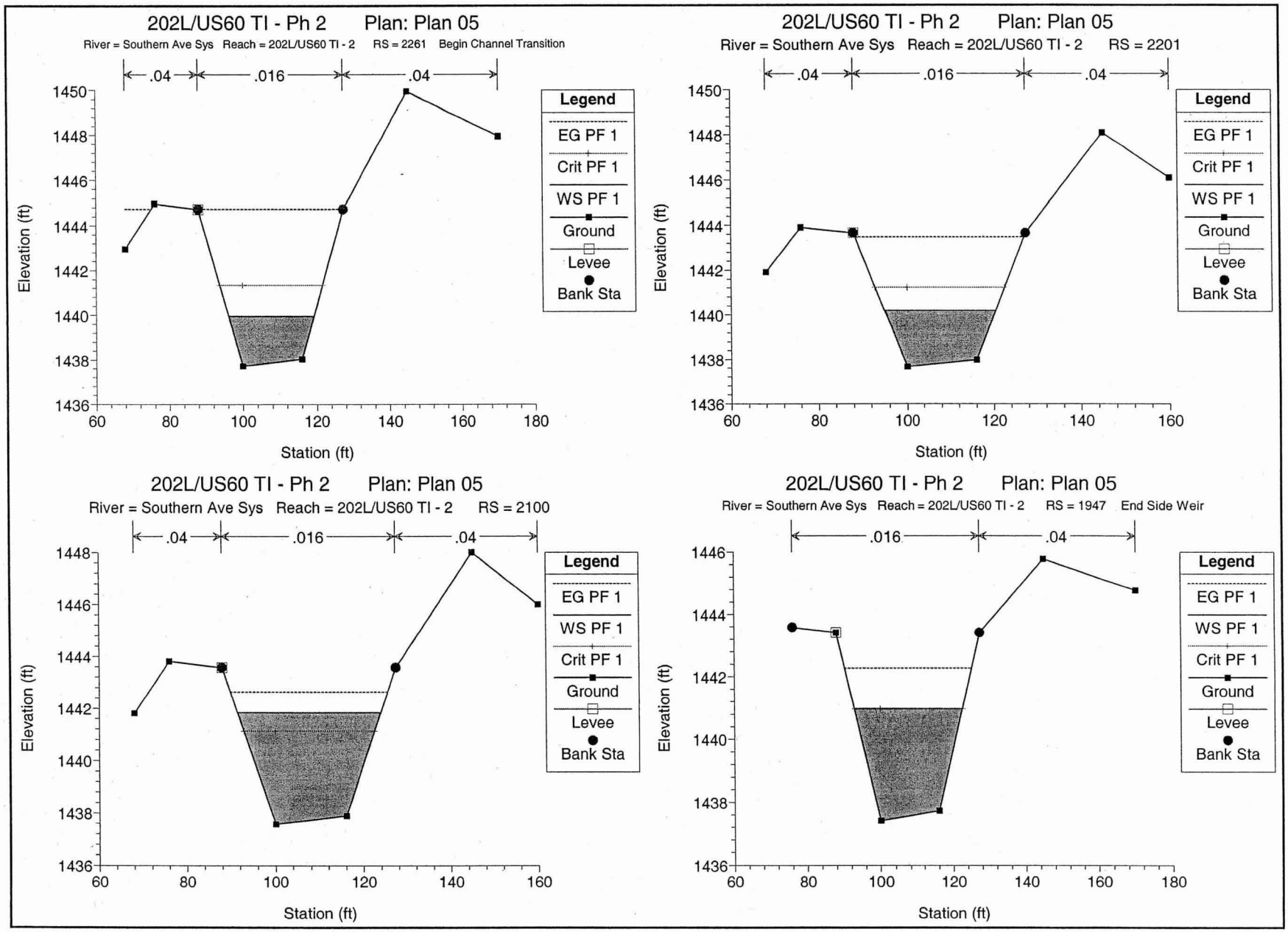




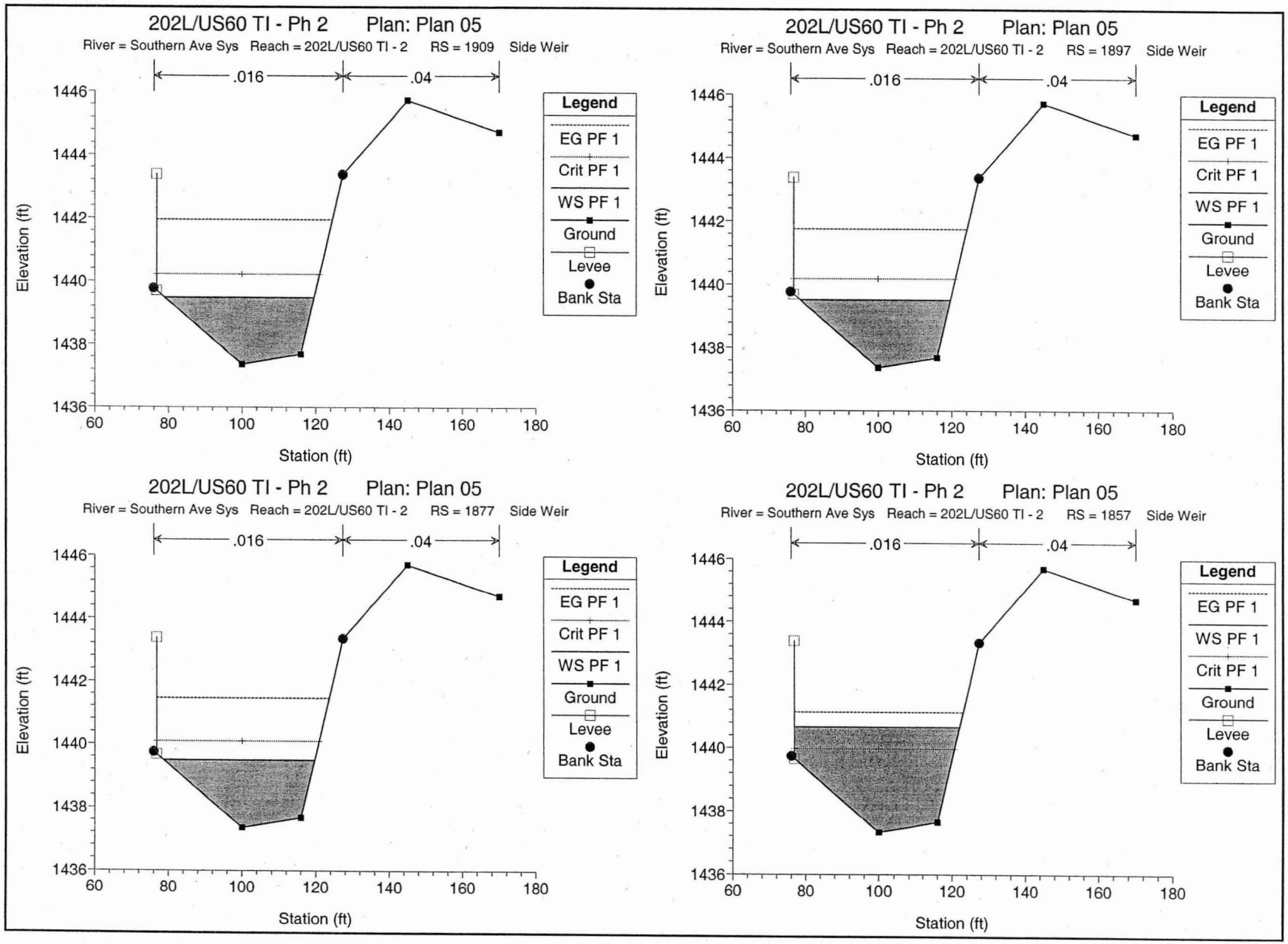
4/28/05
REVISIONS



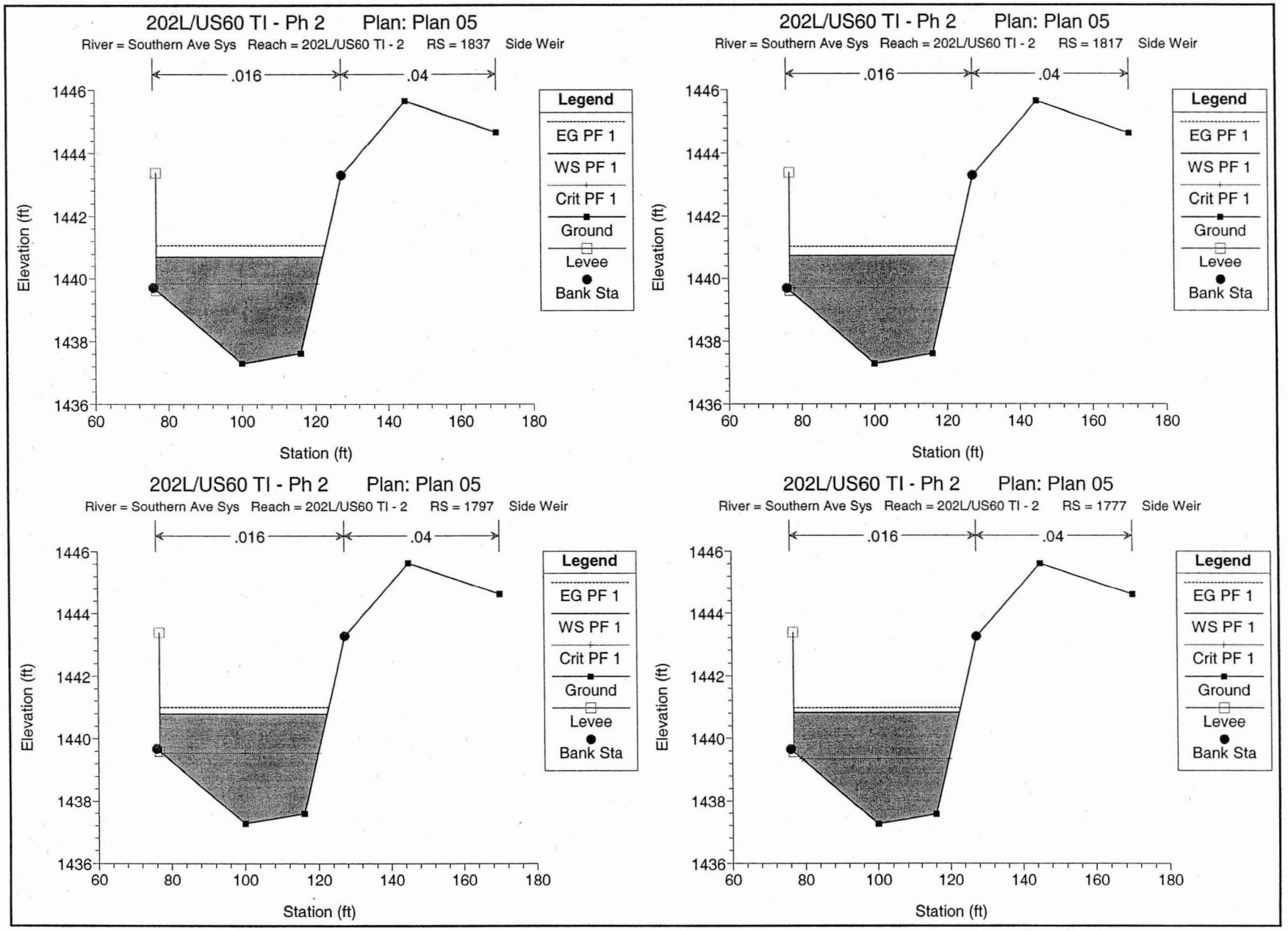
4/28/05
REVISIONS



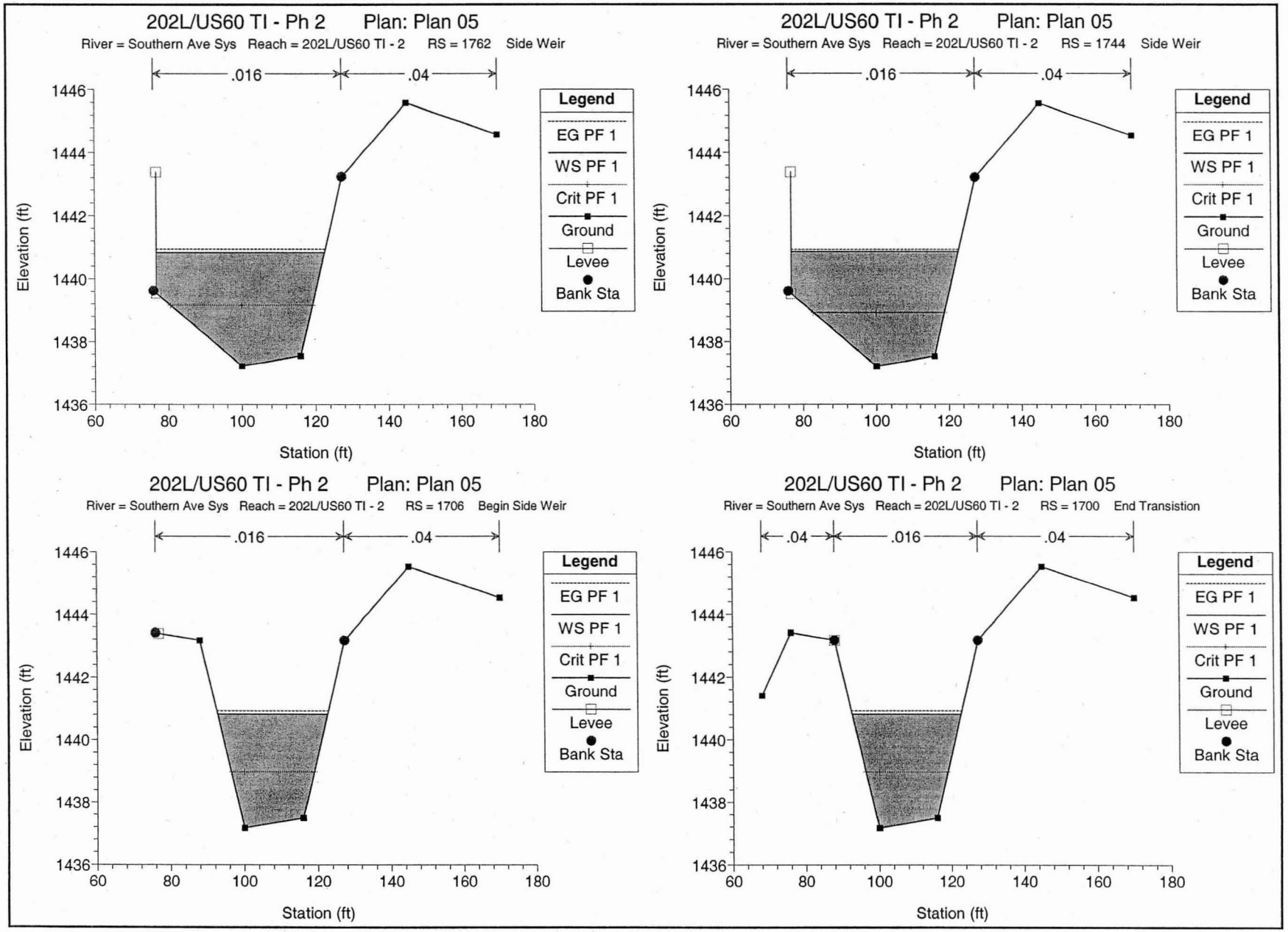
4/28/05
REVISIONS



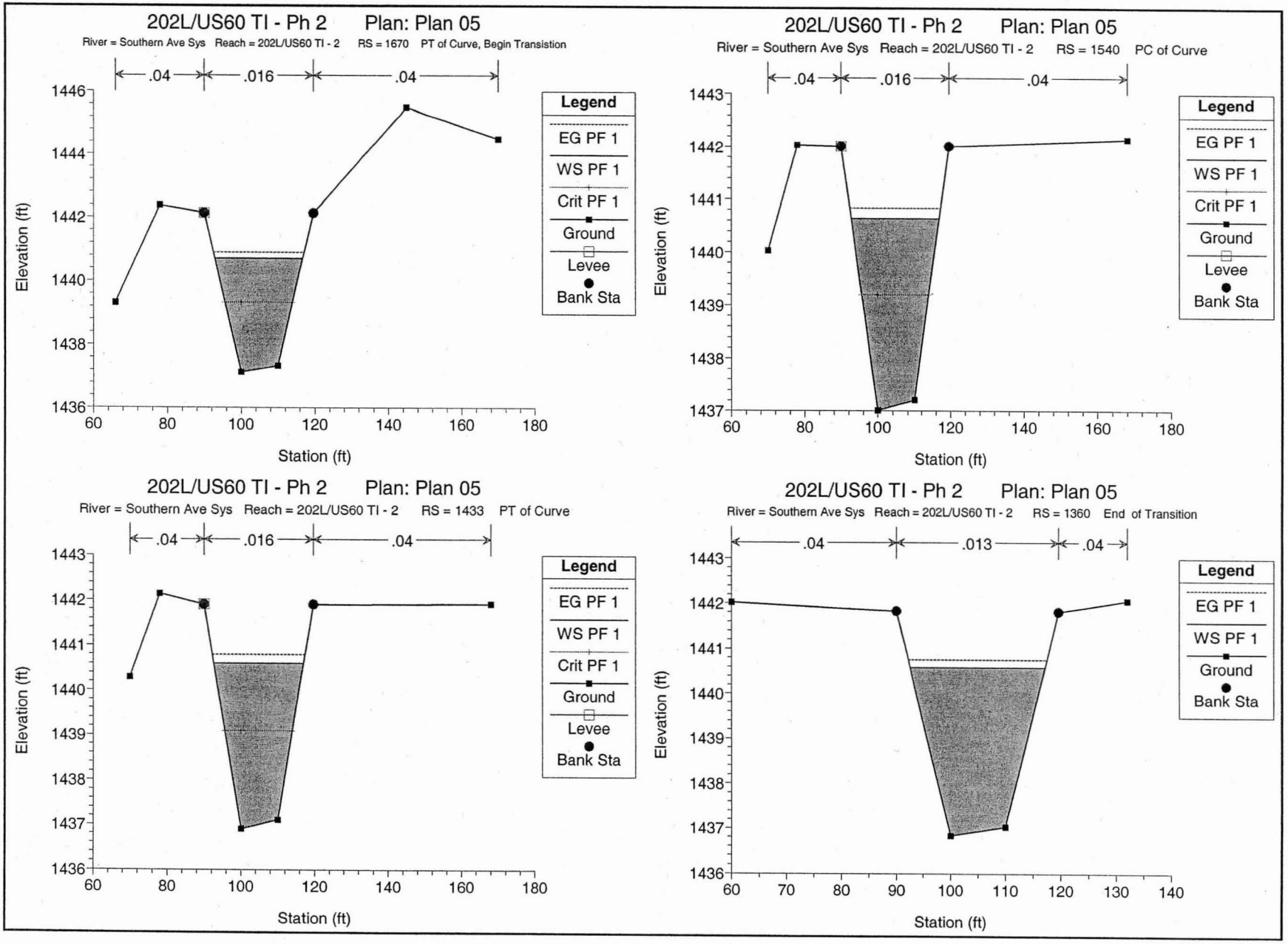
4/28/05
REV 151045



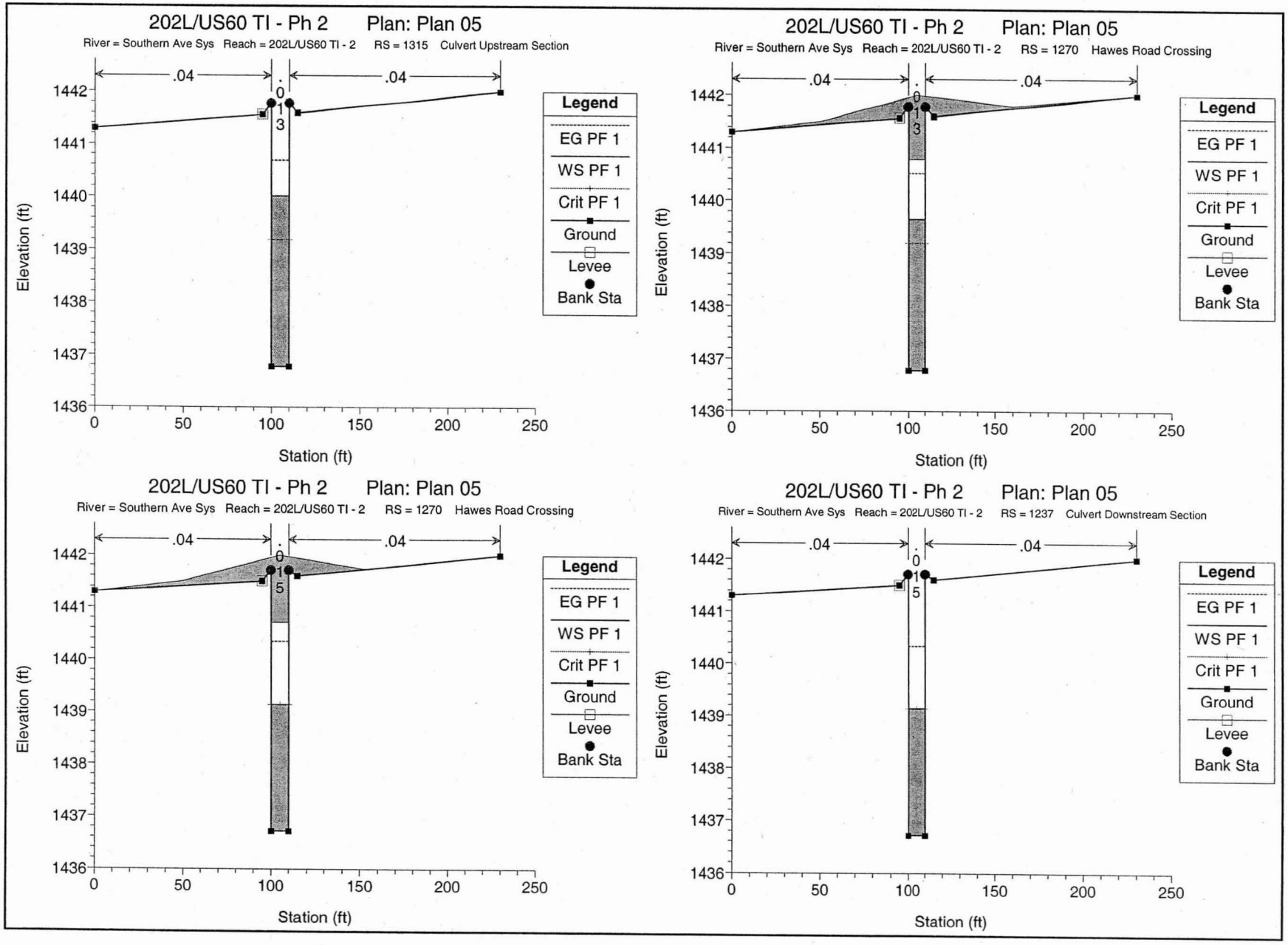
4/28/05
REVISIONS



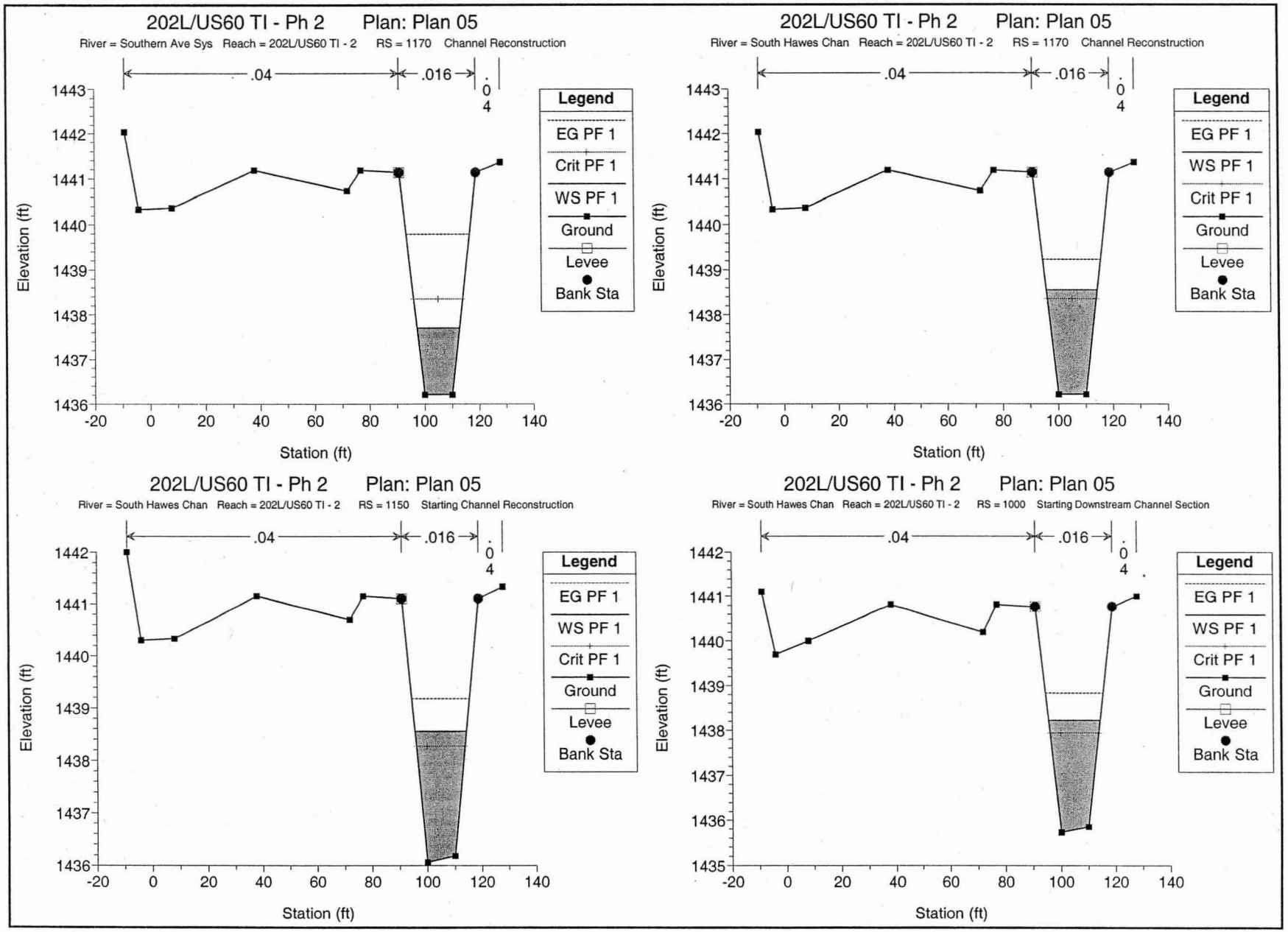
4/28/05
REVISIONS



4/28/05
REVISIONS



4/28/05
REVISIONS



4/28/05
REVISIONS

SUPERSEDED

ENTIRE REPORT FILE SUPERSEDED BY 4/28/05 REVISIONS. THE 4/28/05 REVISION CAN BE FOUND AT THE END OF THIS SECTION.


```
HEC-RAS Version 3.1.1 May 2003
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X       X
X     X  X        X    X       X   X    X    X       X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 202L/US60 TI - Ph 2
Project File : WSP100SC.prj
Run Date and Time: 6/30/2004 3:13:40 PM

Project in English units

Project Description:
202L/US60 Traffic Interchange - Phase 2
This model is to determine the
channel hydraulics for the 100-year peak flow in the Southern Avenue Channel.
The coincident peak flows in the Hawes Road Channel are taken from the
hydrographs generated by the HEC-1 model NE200250.

PLAN DATA

Plan Title: 202L/US60 TI - Phase 2 rev 062904
Plan File : I:\PROJECTS\11194 SuperRedTan\Reports\Drainage\Phase 2\Final Drainage Report\WSP100SC.p01

Geometry Title: 202L/US60 TI - Phase 2 rev 062904
Geometry File : I:\PROJECTS\11194 SuperRedTan\Reports\Drainage\Phase 2\Final Drainage Report\WSP100SC.g02

Flow Title : 202L/US60 TI - Phase 2
Flow File : I:\PROJECTS\11194 SuperRedTan\Reports\Drainage\Phase 2\Final Drainage Report\WSP100SC.f01

Plan Summary Information:

Number of:	Cross Sections	= 32	Mulitple Openings	=	0
	Culverts	= 2	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: 202L/US60 TI - Phase 2
Flow File : I:\PROJECTS\11194 SuperRedTan\Reports\Drainage\Phase 2\Final Drainage Report\WSP100SC.f01

Flow Data (cfs)

River	Reach	RS	PF 1
Hawes Rd Channel	202L US60 TI -	21540	1
Hawes Rd Channel	202L US60 TI -	21170	245
Southern Ave Sys	202L US60 TI -	23490	712
Southern Ave Sys	202L US60 TI -	21855	692
Southern Ave Sys	202L US60 TI -	21835	635
Southern Ave Sys	202L US60 TI -	21815	570
Southern Ave Sys	202L US60 TI -	21795	498
Southern Ave Sys	202L US60 TI -	21775	421
Southern Ave Sys	202L US60 TI -	21760	359
Southern Ave Sys	202L US60 TI -	21742	281
Southern Ave Sys	202L US60 TI -	21704	230
Southern Ave Sys	202L US60 TI -	21170	245
South Hawes Chan	202L US60 TI -	21170	245
South Hawes Chan	202L US60 TI -	21000	245

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hawes Rd Channel	202L US60 TI -	2PF 1	Normal S = 0.0022	
Southern Ave Sys	202L US60 TI -	2PF 1	Normal S = 1E-11	
South Hawes Chan	202L US60 TI -	2PF 1		Normal S = 0.0022

GEOMETRY DATA

SUPERSEDED

Geometry Title: 202L/US60 TI - Phase 2 rev 062904
Geometry File : I:\PROJECTS\11194 SuperRedTan\Reports\Drainage\Phase 2\Final Drainage Report\WSP100SC.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Hawes Rd Channel	202L US60 TI - 2		Confluence
Southern Ave Sys	202L US60 TI - 2		Confluence
South Hawes Chan	202L US60 TI - 2	Confluence	

JUNCTION INFORMATION

Name: Confluence
Description: Junction of Southern Ave Syst. w/ Hawes Rd Channel
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Hawes Rd Channel	202L US60 TI - 2 to	South Hawes Chan	202L US60 TI - 2	0	
Southern Ave Sys	202L US60 TI - 2 to	South Hawes Chan	202L US60 TI - 2	0	

CROSS SECTION

RIVER: Hawes Rd Channel
REACH: 202L US60 TI - 2 RS: 1540

INPUT
Description: Upstream Hawes Rd. Channel Section
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.3	38	1442.4	72	1442.4	77	1442.02	87	1442
91	1441.97	100	1437.47	110	1437.47	119	1441.97	128	1442.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	170	170	170	.1	.3

Left Levee Station= 91 Elevation= 1441.97

CROSS SECTION

RIVER: Hawes Rd Channel
REACH: 202L US60 TI - 2 RS: 1370

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.66	-4	1440.86	8	1441.26	38	1441.63	72	1441.36
77	1441.86	87	1441.81	91	1441.58	100	1437.08	110	1437.08
119	1441.58	128	1441.81						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	200	200	200	.1	.3

Left Levee Station= 91 Elevation= 1441.58

CROSS SECTION

RIVER: Hawes Rd Channel
REACH: 202L US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION

RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2 RS: 3490

INPUT
Description: Southern Avenue Detention Basin
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
25	1457.58	45	1457.34	100	1445.6	225	1444.5	350	1445.6
390	1457.34	405	1457.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
25	.04	45	.025	390	.04

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

SUPERSEDED


```
          45     390          125.02  125.02  125.02            .1       .3

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 3365

INPUT
Description: End RCB Culvert
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1454.24    99.9 1451.33     100    1444     110    1444   110.1 1451.33
     160 1454.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1             1015    1015    1015            .1       .3

CULVERT


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 2857.5

INPUT
Description: Southern Avenue Detention Basin Outlet
Distance from Upstream XS =          1
Deck/Roadway Width        =       1013
Weir Coefficient          =        2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1454.2             700  1454.2

Upstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1454.24    99.9 1451.33     100    1444     110    1444   110.1 1451.33
     160 1454.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1            .1       .3

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1449.5             200  1449.5

Downstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1447.09    99.9 1446.85     100 1437.82     110 1437.82   110.1 1446.85
     147 1450.46     168 1448.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1            .1       .3

Upstream Embankment side slope              =      10 horiz. to 1.0 vertical
Downstream Embankment side slope            =      12 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1          Box         6      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - Wingwall flared 45 deg.; inlet top edge bevel=0.43D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
              0    1015     .013     .013        0                  .2                  .2
Upstream   Elevation =  1444
           Centerline Station =  105
Downstream Elevation =  1437.82
           Centerline Station =  105

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 2350

INPUT
Description: End Channel Transition, Begin RCB
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1447.09    99.9 1446.85     100 1437.82     110 1437.82   110.1 1446.85
     147 1450.46     168 1448.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
```

SUPERSEDED


```
     88      .04     99.9     .015    110.1      .04

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
          99.9   110.1             120.33  120.33  120.33          .1          .3

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 2230

INPUT
Description: Begin Channel Transition
Station Elevation Data    num=       8
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
      68 1442.97      76 1444.97      88  1444.7     100  1437.7     116 1438.02
  127.36  1444.7     145 1449.96     170 1447.96

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      68     .04      88    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
           88  127.36              29      29      29          .1          .3
Left Levee      Station=      88      Elevation= 1444.73

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 2201

INPUT
Description:
Station Elevation Data    num=       8
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
      68 1441.91      76 1443.91      88 1443.67     100 1437.67     116 1437.99
  127.36 1443.67     145  1448.1     160  1446.1

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      68     .04      88    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
           88  127.36             100.98  100.98  100.98          .1          .3
Left Levee      Station=      88      Elevation= 1443.67

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 2100

INPUT
Description:
Station Elevation Data    num=       8
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
      68 1441.81      76 1443.81      88 1443.57     100 1437.57     116 1437.89
  127.36 1443.57     145    1448     160    1446

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      68     .04      88    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
           88  127.36             155.04  155.04  155.04          .1          .3
Left Levee      Station=      88      Elevation= 1443.57

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1945

INPUT
Description: End Side Weir
Station Elevation Data    num=       7
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
      76 1443.58      88 1443.41     100 1437.41     116 1437.73  127.36 1443.41
     145 1445.77     170 1444.77

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
           76  127.36              38      38      38          .1          .3
Left Levee      Station=      88      Elevation= 1443.42

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1907

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
      76 1439.78     100 1437.38     116  1437.7  127.36 1443.38     145 1445.74
     170 1444.74

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04
```

SUPERSEDED


```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           76  127.36              12      12      12            .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1895

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.77     100 1437.37     116 1437.69  127.36 1443.37     145 1445.73
     170 1444.73

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           76  127.36              20      20      20            .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1875

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.75     100 1437.35     116 1437.67  127.36 1443.35     145 1445.71
     170 1444.71

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           76  127.36              20      20      20            .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1855

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.73     100 1437.33     116 1437.65  127.36 1443.33     145 1445.69
     170 1444.69

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           76  127.36              20      20      20            .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1835

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.71     100 1437.31     116 1437.63  127.36 1443.31     145 1445.67
     170 1444.67

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           76  127.36              20      20      20            .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1815

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.69     100 1437.29     116 1437.61  127.36 1443.29     145 1445.65
     170 1444.65

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

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

SUPERSEDED


```
            76  127.36                20      20      20              .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1795

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.67     100 1437.27     116 1437.59  127.36 1443.27     145 1445.63
     170 1444.63

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36                20      20      20              .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1775

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.65     100 1437.25     116 1437.57  127.36 1443.25     145 1445.61
     170 1444.61

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36                15      15      15              .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1760

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.63     100 1437.23     116 1437.55  127.36 1443.23     145 1445.59
     170 1444.59

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36                18      18      18              .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1742

INPUT
Description: Side Weir
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.61     100 1437.21     116 1437.53  127.36 1443.21     145 1445.57
     170 1444.57

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36                38      38      38              .1       .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1704

INPUT
Description: Begin Side Weir
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1443.41      88 1443.17     100 1437.17     116 1437.49  127.36 1443.17
     145 1445.53     170 1444.53

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36                 6       6       6              .1       .3
```

SUPERSEDED


```
CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1315

INPUT
Description: Culvert Upstream Section
Station Elevation Data     num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95 1441.57    99.9 1441.78     100 1436.78     110 1436.78
   110.1 1441.78     115  1441.6 230.001    1442

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .013   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1               79       79      79            .1       .3
Left Levee      Station=      95      Elevation= 1441.57

CULVERT


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1270

INPUT
Description: Hawes Road Crossing
Distance from Upstream XS =       1
Deck/Roadway Width        =      77
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =      45
Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1441.3              50  1441.5             105    1442
     160  1441.8             230    1442

Upstream Bridge Cross Section Data
Station Elevation Data     num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95 1441.57    99.9 1441.78     100 1436.78     110 1436.78
   110.1 1441.78     115  1441.6 230.001    1442

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .013   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1          .1       .3
Left Levee      Station=      95      Elevation= 1441.57

Downstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1441.3              50  1441.5             105    1442
     160  1441.7             230    1442

Downstream Bridge Cross Section Data
Station Elevation Data     num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
   110.1 1441.71     115  1441.6 230.001    1442

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1          .1       .3
Left Levee      Station=      95      Elevation=  1441.5

Upstream Embankment side slope              =      50 horiz. to 1.0 vertical
Downstream Embankment side slope            =      50 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =  1441.5
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1          Box        4      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 2 - Wingwall flared 18 to 33.7 deg.; inlet top edge bevel=0.083D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                .5      78     .013     .013         0                .2                 .1
Upstream   Elevation =  1436.78
           Centerline Station =  105
Downstream Elevation =  1436.71
           Centerline Station =  105

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1236

INPUT
Description: Culvert Downstream Section
Station Elevation Data     num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
```

SUPERSEDED


```
   110.1 1441.71     115  1441.6 230.001    1442

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1            67.32   67.32   67.32          .1          .3
Left Levee      Station=      95      Elevation=  1441.5

CROSS SECTION


RIVER: Southern Ave Sys
REACH: 202L US60 TI - 2   RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9 1442.04      -4 1440.34      8 1440.37     38 1441.19     72 1440.74
      77 1441.19      91 1441.14    100 1436.16    110 1436.16    119 1441.14
     128 1441.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04     91    .016    119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91    119               20      20      20          .1          .3
Left Levee      Station=      91      Elevation= 1441.14

CROSS SECTION


RIVER: South Hawes Chan
REACH: 202L US60 TI - 2   RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9 1442.04      -4 1440.34      8 1440.37     38 1441.19     72 1440.74
      77 1441.19      91 1441.14    100 1436.64    110 1436.64    119 1441.14
     128 1441.37

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04     91    .016    119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91    119               20      20      20          .1          .3
Left Levee      Station=      91      Elevation= 1441.14

CROSS SECTION


RIVER: South Hawes Chan
REACH: 202L US60 TI - 2   RS: 1150

INPUT
Description: Starting Channel Reconstruction
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9    1442      -4  1440.3      8 1440.33     38 1441.15     72  1440.7
      77 1441.15      91  1441.1    100  1436.6    110  1436.6    119  1441.1
     128 1441.33

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04     91    .016    119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91    119              150     150     150          .1          .3
Left Levee      Station=      91      Elevation=  1441.1

CROSS SECTION


RIVER: South Hawes Chan
REACH: 202L US60 TI - 2   RS: 1000

INPUT
Description: Starting Downstream Channel Section
Station Elevation Data    num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9  1441.1      -4  1439.7      8    1440     38 1440.82     72  1440.2
      77 1440.82      91 1440.77    100 1436.27    110 1436.27    119 1440.77
     128    1441

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04     91    .016    119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91    119                0       0       0          .1          .3
Left Levee      Station=      91      Elevation= 1440.77


SUMMARY OF MANNING'S N VALUES

River:Hawes Rd Channel

     Reach          River Sta.       n1        n2        n3
```

SUPERSEDED

202L US60 TI - 2	1540	.04	.016	.04
202L US60 TI - 2	1370	.04	.016	.04
202L US60 TI - 2	1170	.04	.016	.04

River:Southern Ave Sys

Reach	River Sta.	n1	n2	n3
202L US60 TI - 2	3490	.04	.025	.04
202L US60 TI - 2	3365	.04	.015	.04
202L US60 TI - 2	2857.5	Culvert		
202L US60 TI - 2	2350	.04	.015	.04
202L US60 TI - 2	2230	.04	.016	.04
202L US60 TI - 2	2201	.04	.016	.04
202L US60 TI - 2	2100	.04	.016	.04
202L US60 TI - 2	1945	.04	.016	.04
202L US60 TI - 2	1907	.04	.016	.04
202L US60 TI - 2	1895	.04	.016	.04
202L US60 TI - 2	1875	.04	.016	.04
202L US60 TI - 2	1855	.04	.016	.04
202L US60 TI - 2	1835	.04	.016	.04
202L US60 TI - 2	1815	.04	.016	.04
202L US60 TI - 2	1795	.04	.016	.04
202L US60 TI - 2	1775	.04	.016	.04
202L US60 TI - 2	1760	.04	.016	.04
202L US60 TI - 2	1742	.04	.016	.04
202L US60 TI - 2	1704	.04	.016	.04
202L US60 TI - 2	1698	.04	.016	.04
202L US60 TI - 2	1668	.04	.016	.04
202L US60 TI - 2	1537	.04	.016	.04
202L US60 TI - 2	1433	.04	.016	.04
202L US60 TI - 2	1360	.04	.013	.04
202L US60 TI - 2	1315	.04	.013	.04
202L US60 TI - 2	1270	Culvert		
202L US60 TI - 2	1236	.04	.015	.04
202L US60 TI - 2	1170	.04	.016	.04

River:South Hawes Chan

Reach	River Sta.	n1	n2	n3
202L US60 TI - 2	1170	.04	.016	.04
202L US60 TI - 2	1150	.04	.016	.04
202L US60 TI - 2	1000	.04	.016	.04

SUMMARY OF REACH LENGTHS

River: Hawes Rd Channel

Reach	River Sta.	Left	Channel	Right
202L US60 TI - 2	1540	170	170	170
202L US60 TI - 2	1370	200	200	200
202L US60 TI - 2	1170	20	20	20

River: Southern Ave Sys

Reach	River Sta.	Left	Channel	Right
202L US60 TI - 2	3490	125.02	125.02	125.02
202L US60 TI - 2	3365	1015	1015	1015
202L US60 TI - 2	2857.5	Culvert		
202L US60 TI - 2	2350	120.33	120.33	120.33
202L US60 TI - 2	2230	29	29	29
202L US60 TI - 2	2201	100.98	100.98	100.98
202L US60 TI - 2	2100	155.04	155.04	155.04
202L US60 TI - 2	1945	38	38	38
202L US60 TI - 2	1907	12	12	12
202L US60 TI - 2	1895	20	20	20
202L US60 TI - 2	1875	20	20	20
202L US60 TI - 2	1855	20	20	20
202L US60 TI - 2	1835	20	20	20
202L US60 TI - 2	1815	20	20	20
202L US60 TI - 2	1795	20	20	20
202L US60 TI - 2	1775	15	15	15
202L US60 TI - 2	1760	18	18	18
202L US60 TI - 2	1742	38	38	38
202L US60 TI - 2	1704	6	6	6
202L US60 TI - 2	1698	30.3	30.3	30.3
202L US60 TI - 2	1668	130.97	130.97	130.97
202L US60 TI - 2	1537	103.8	103.8	103.8
202L US60 TI - 2	1433	73	73	73
202L US60 TI - 2	1360	45.39	45.39	45.39
202L US60 TI - 2	1315	79	79	79
202L US60 TI - 2	1270	Culvert		
202L US60 TI - 2	1236	67.32	67.32	67.32
202L US60 TI - 2	1170	20	20	20

River: South Hawes Chan

Reach	River Sta.	Left	Channel	Right
202L US60 TI - 2	1170	20	20	20
202L US60 TI - 2	1150	150	150	150
202L US60 TI - 2	1000	0	0	0

SUPERSEDED

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hawes Rd Channel

Reach	River Sta.	Contr.	Expan.
202L US60 TI - 2	1540	.1	.3
202L US60 TI - 2	1370	.1	.3
202L US60 TI - 2	1170	.1	.3

River: Southern Ave Sys

Reach	River Sta.	Contr.	Expan.
202L US60 TI - 2	3490	.1	.3
202L US60 TI - 2	3365	.1	.3
202L US60 TI - 2	2857.5	Culvert	
202L US60 TI - 2	2350	.1	.3
202L US60 TI - 2	2230	.1	.3
202L US60 TI - 2	2201	.1	.3
202L US60 TI - 2	2100	.1	.3
202L US60 TI - 2	1945	.1	.3
202L US60 TI - 2	1907	.1	.3
202L US60 TI - 2	1895	.1	.3
202L US60 TI - 2	1875	.1	.3
202L US60 TI - 2	1855	.1	.3
202L US60 TI - 2	1835	.1	.3
202L US60 TI - 2	1815	.1	.3
202L US60 TI - 2	1795	.1	.3
202L US60 TI - 2	1775	.1	.3
202L US60 TI - 2	1760	.1	.3
202L US60 TI - 2	1742	.1	.3
202L US60 TI - 2	1704	.1	.3
202L US60 TI - 2	1698	.1	.3
202L US60 TI - 2	1668	.1	.3
202L US60 TI - 2	1537	.1	.3
202L US60 TI - 2	1433	.1	.3
202L US60 TI - 2	1360	.1	.3
202L US60 TI - 2	1315	.1	.3
202L US60 TI - 2	1270	Culvert	
202L US60 TI - 2	1236	.1	.3
202L US60 TI - 2	1170	.1	.3

River: South Hawes Chan

Reach	River Sta.	Contr.	Expan.
202L US60 TI - 2	1170	.1	.3
202L US60 TI - 2	1150	.1	.3
202L US60 TI - 2	1000	.1	.3

4/28/05
REVISION
BY PB
(THIS ENTIRE
REPORT FILE
IS REVISED.)

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX   XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 202L/US60 TI - Ph 2
Project File : WSP100SC.prj
Run Date and Time: 4/26/2005 9:40:13 AM

Project in English units

Project Description:
202L/US60 Traffic Interchange - Phase 2
This model is to determine the
channel hydraulics for the 100-year peak flow in the Southern Avenue Channel.
The coincident peak flows in the Hawes Road Channel are taken from the
hydrographs generated by the HEC-1 model NE200250.

PLAN DATA

Plan Title: Plan 05
Plan File : 1:\11194\Phase2\HEC-RAS\V301\WSP100SC.p05

Geometry Title: 202L/US60 TI - Phase 2 FP
Geometry File : 1:\11194\Phase2\HEC-RAS\V301\WSP100SC.g02

Flow Title : 202L/US60 TI - Phase 2 FP
Flow File : 1:\11194\Phase2\HEC-RAS\V301\WSP100SC.f02

Plan Summary Information:

Number of:	Cross Sections	= 32	Mulitple Openings	=	0
	Culverts	= 2	Inline Weirs	=	0
	Bridges	= 0			

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: 202L/US60 TI - Phase 2 FP
Flow File : 1:\11194\Phase2\HEC-RAS\V301\WSP100SC.f02

Flow Data (cfs)

River	Reach	RS	PF 1
Hawes Rd Channel	202L/US60 TI -	21540	7
Hawes Rd Channel	202L/US60 TI -	21170	221
Southern Ave Sys	202L/US60 TI -	23490	712
Southern Ave Sys	202L/US60 TI -	21897	694
Southern Ave Sys	202L/US60 TI -	21877	653
Southern Ave Sys	202L/US60 TI -	21857	607
Southern Ave Sys	202L/US60 TI -	21837	556
Southern Ave Sys	202L/US60 TI -	21817	500
Southern Ave Sys	202L/US60 TI -	21797	439
Southern Ave Sys	202L/US60 TI -	21777	374
Southern Ave Sys	202L/US60 TI -	21762	322
Southern Ave Sys	202L/US60 TI -	21744	256

Southern Ave Sys202L/US60 TI - 21706	214
Southern Ave Sys202L/US60 TI - 21170	221
South Hawes Chan202L/US60 TI - 21170	221
South Hawes Chan202L/US60 TI - 21000	221

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hawes Rd Channel	202L/US60 TI - 2	PF 1	Normal S = .0022	
Southern Ave Sys	202L/US60 TI - 2	PF 1	Normal S = 1E-11	
South Hawes Chan	202L/US60 TI - 2	PF 1		Normal S = .0022

GEOMETRY DATA

Geometry Title: 202L/US60 TI - Phase 2 FP
Geometry File : 1:\11194\Phase2\HEC-RAS\V301\WSP100SC.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Hawes Rd Channel	202L/US60 TI - 2		Confluence
Southern Ave Sys	202L/US60 TI - 2		Confluence
South Hawes Chan	202L/US60 TI - 2	Confluence	

JUNCTION INFORMATION

Name: Confluence
Description: Junction of Southern Ave Syst. w/ Hawes Rd Channel
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Hawes Rd Channel	202L/US60 TI - 2 to	South Hawes Chan	202L/US60 TI - 2	0	
Southern Ave Sys	202L/US60 TI - 2 to	South Hawes Chan	202L/US60 TI - 2	0	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1540

INPUT
Description: Upstream Hawes Rd. Channel Section
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.3	38	1442.4	72	1442.4	77	1442.02	87	1442
91	1441.97	100	1437.47	110	1437.47	119	1441.97	128	1442.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	170	170	170	.1	.3

Left Levee Station= 91 Elevation= 1441.97

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.84	Element			
Vel Head (ft)	0.20	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.64	Reach Len. (ft)	106.90	106.90	106.90
Crit W.S. (ft)	1439.20	Flow Area (sq ft)		60.28	
E.G. Slope (ft/ft)	0.000471	Area (sq ft)		60.28	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	24.13	Top Width (ft)		24.13	
Vel Total (ft/s)	3.55	Avg. Vel. (ft/s)		3.55	
Max Chl Dpth (ft)	3.63	Hydr. Depth (ft)		2.50	
Conv. Total (cfs)	9857.7	Conv. (cfs)		9857.7	
Length Wtd. (ft)	106.90	Wetted Per. (ft)		25.80	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		0.39	
C & E Loss (ft)	0.00	Cum SA (acres)		0.16	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1370

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.66	-4	1440.86	8	1441.26	38	1441.63	72	1441.36
77	1441.86	87	1441.81	91	1441.58	100	1437.08	110	1437.08
119	1441.58	128	1441.81						

```
Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04      91    .016     119     .04

Bank Sta: Left   Right    Lengths: Left Channel  Right     Coeff Contr.   Expan.
           91     119              200     200     200          .1          .3
Left Levee      Station=      91      Elevation= 1441.58

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1439.43    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.00    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1439.43    Reach Len. (ft)            200.00     200.00     200.00
  Crit W.S. (ft)           1437.32    Flow Area (sq ft)                      34.49
  E.G. Slope (ft/ft)      0.000002    Area (sq ft)                           34.49
  Q Total (cfs)               7.00    Flow (cfs)                              7.00
  Top Width (ft)             19.39    Top Width (ft)                         19.39
  Vel Total (ft/s)            0.20    Avg. Vel. (ft/s)                        0.20
  Max Chl Dpth (ft)           2.35    Hydr. Depth (ft)                        1.78
  Conv. Total (cfs)         4531.0    Conv. (cfs)                           4531.0
  Length Wtd. (ft)           200.00   Wetted Per. (ft)                       20.50
  Min Ch El (ft)           1437.08    Shear (lb/sq ft)                        0.00
  Alpha                       1.00    Stream Power (lb/ft s)                  0.00
  Frctn Loss (ft)             0.13    Cum Volume (acre-ft)                    0.16
  C & E Loss (ft)             0.07    Cum SA (acres)                          0.09

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.

CROSS SECTION          RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2   RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data     num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9 1442.04      -4 1440.34      8 1440.37     38 1441.19     72 1440.74
      77 1441.19      91 1441.14    100 1436.21    110 1436.21    119 1441.14
     128 1441.37

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04      91    .016     119     .04

Bank Sta: Left   Right    Lengths: Left Channel  Right     Coeff Contr.   Expan.
           91     119               20      20      20          .1          .3
Left Levee      Station=      91      Elevation= 1441.14

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1439.23    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.68    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1438.56    Reach Len. (ft)              0.00      0.00       0.00
  Crit W.S. (ft)           1438.36    Flow Area (sq ft)                      33.51
  E.G. Slope (ft/ft)      0.002495    Area (sq ft)                           33.51
  Q Total (cfs)             221.00    Flow (cfs)                            221.00
  Top Width (ft)             18.57    Top Width (ft)                         18.57
  Vel Total (ft/s)            6.59    Avg. Vel. (ft/s)                        6.59
  Max Chl Dpth (ft)           2.35    Hydr. Depth (ft)                        1.80
  Conv. Total (cfs)         4424.7    Conv. (cfs)                           4424.7
  Length Wtd. (ft)            0.00    Wetted Per. (ft)                       19.77
  Min Ch El (ft)           1436.21    Shear (lb/sq ft)                        0.26
  Alpha                       1.00    Stream Power (lb/ft s)                  1.74
  Frctn Loss (ft)             0.00    Cum Volume (acre-ft)
  C & E Loss (ft)             0.00    Cum SA (acres)

CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 3490

INPUT
Description: Southern Avenue Detention Basin
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      25 1457.58      45 1457.34    100  1445.6    225  1444.5    350  1445.6
     390 1457.34     405 1457.58

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      25     .04      45    .025     390     .04

Bank Sta: Left   Right    Lengths: Left Channel  Right     Coeff Contr.   Expan.
           45     390              125     125     125          .1          .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1453.27    Element                    Left OB    Channel   Right OB
```

Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1453.27	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.68	Flow Area (sq ft)		2293.30	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		2293.30	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	312.07	Top Width (ft)		312.07	
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)		0.31	
Max Chl Dpth (ft)	8.77	Hydr. Depth (ft)		7.35	
Conv. Total (cfs)	513107.3	Conv. (cfs)		513107.3	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		313.99	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01	6.64	0.04
C & E Loss (ft)	0.12	Cum SA (acres)	0.03	1.43	0.14

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3365

INPUT
Description: End RCB Culvert
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	983.8	983.8	983.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1453.15	Element			
Vel Head (ft)	1.21	Wt. n-Val.	0.040	0.015	0.040
W.S. Elev (ft)	1451.95	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1449.37	Flow Area (sq ft)	0.77	80.31	3.39
E.G. Slope (ft/ft)	0.001646	Area (sq ft)	0.77	80.31	3.39
Q Total (cfs)	712.00	Flow (cfs)	0.52	709.15	2.33
Top Width (ft)	23.75	Top Width (ft)	2.51	10.20	11.04
Vel Total (ft/s)	8.43	Avg. Vel. (ft/s)	0.67	8.83	0.69
Max Chl Dpth (ft)	7.94	Hydr. Depth (ft)	0.31	7.87	0.31
Conv. Total (cfs)	17547.3	Conv. (cfs)	12.8	17477.1	57.4
Length Wtd. (ft)	983.80	Wetted Per. (ft)	2.59	24.66	11.06
Min Ch El (ft)	1444.00	Shear (lb/sq ft)	0.03	0.33	0.03
Alpha	1.09	Stream Power (lb/ft s)	0.02	2.96	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	3.24	0.04
C & E Loss (ft)		Cum SA (acres)	0.03	0.97	0.12

CULVERT RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3000

INPUT
Description: Southern Avenue Detention Basin Outlet
Distance from Upstream XS = 41
Deck/Roadway Width = 900
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1454.6		700	1454.6	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
99.9	110.1	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1450.4		200	1450.4	

Downstream Bridge Cross Section Data

```
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1447.09    99.9 1446.85    100 1437.85    110 1437.85   110.1 1446.85
     147 1450.46     168 1448.96

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1            .1        .3

Upstream Embankment side slope              =      10 horiz. to 1.0 vertical
Downstream Embankment side slope            =      12 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape     Rise    Span
Culvert #1         Box       6      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - Wingwall flared 45 deg.; inlet top edge bevel=0.43D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                 0   983.8       .013                   .2               .2
Upstream   Elevation =  1444
           Centerline Station =  105
Downstream Elevation =  1437.85
           Centerline Station =  105

CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 2381

INPUT
Description: End Channel Transition, Begin RCB
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1447.09    99.9 1446.85    100 1437.85    110 1437.85   110.1 1446.85
     147 1450.46     168 1448.96

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1             120.3   120.3   120.3             .1        .3

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1446.23   Element                    Left OB   Channel   Right OB
  Vel Head (ft)              3.92   Wt. n-Val.                           0.015
  W.S. Elev (ft)          1442.31   Reach Len. (ft)            120.30    120.30     120.30
  Crit W.S. (ft)          1443.23   Flow Area (sq ft)                     44.81
  E.G. Slope (ft/ft)     0.008150   Area (sq ft)                          44.81
  Q Total (cfs)            712.00   Flow (cfs)                           712.00
  Top Width (ft)            10.10   Top Width (ft)                        10.10
  Vel Total (ft/s)          15.89   Avg. Vel. (ft/s)                      15.89
  Max Chl Dpth (ft)          4.46   Hydr. Depth (ft)                       4.44
  Conv. Total (cfs)         7886.9  Conv. (cfs)                          7886.9
  Length Wtd. (ft)          120.30  Wetted Per. (ft)                      18.92
  Min Ch El (ft)          1437.85   Shear (lb/sq ft)                       1.21
  Alpha                      1.00   Stream Power (lb/ft s)                19.15
  Frctn Loss (ft)                   Cum Volume (acre-ft)                   1.82
  C & E Loss (ft)                   Cum SA (acres)                         0.74

CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 2261

INPUT
Description: Begin Channel Transition
Station Elevation Data     num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      68 1442.97     76 1444.97     88 1444.73    100 1437.73    116 1438.05
  127.36 1444.73    145 1449.96    170 1447.96

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      68     .04     88    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           88  127.36              60      60      60             .1        .3
Left Levee      Station=      88      Elevation= 1444.73

CROSS SECTION OUTPUT    Profile #PF 1
```

E.G. Elev (ft)	1444.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.78	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.96	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1441.35	Flow Area (sq ft)		40.58	
E.G. Slope (ft/ft)	0.017927	Area (sq ft)		40.58	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	23.09	Top Width (ft)		23.09	
Vel Total (ft/s)	17.54	Avg. Vel. (ft/s)		17.54	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	5317.7	Conv. (cfs)		5317.7	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		24.21	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		1.88	
Alpha	1.00	Stream Power (lb/ft s)		32.91	
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)		1.70	
C & E Loss (ft)	0.09	Cum SA (acres)		0.69	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2201

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.91	76	1443.91	88	1443.67	100	1437.67	116	1437.99
127.36	1443.67	145	1448.1	160	1446.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	101	101	101	.1	.3

Left Levee Station= 88 Elevation= 1443.67

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1443.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.19	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1441.22	Flow Area (sq ft)		48.99	
E.G. Slope (ft/ft)	0.010828	Area (sq ft)		48.99	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	25.45	Top Width (ft)		25.45	
Vel Total (ft/s)	14.53	Avg. Vel. (ft/s)		14.53	
Max Chl Dpth (ft)	2.52	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	6842.5	Conv. (cfs)		6842.5	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		26.56	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		1.25	
Alpha	1.00	Stream Power (lb/ft s)		18.12	
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)		1.64	
C & E Loss (ft)	0.45	Cum SA (acres)		0.66	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2100

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.81	76	1443.81	88	1443.57	100	1437.57	116	1437.89
127.36	1443.57	145	1448	160	1446				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	153	153	153	.1	.3

Left Levee Station= 88 Elevation= 1443.57

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1442.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.84	Reach Len. (ft)	153.00	153.00	153.00
Crit W.S. (ft)	1441.12	Flow Area (sq ft)		99.42	
E.G. Slope (ft/ft)	0.001442	Area (sq ft)		99.42	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	32.42	Top Width (ft)		32.42	
Vel Total (ft/s)	7.16	Avg. Vel. (ft/s)		7.16	
Max Chl Dpth (ft)	4.26	Hydr. Depth (ft)		3.07	
Conv. Total (cfs)	18748.8	Conv. (cfs)		18748.8	
Length Wtd. (ft)	153.00	Wetted Per. (ft)		34.36	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.87	
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)		1.47	
C & E Loss (ft)	0.05	Cum SA (acres)		0.59	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1947

INPUT
Description: End Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.58	88	1443.41	100	1437.41	116	1437.73	127.36	1443.41
145	1445.77	170	1444.77						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 88 Elevation= 1443.42

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1442.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1440.98	Flow Area (sq ft)		77.82	
E.G. Slope (ft/ft)	0.002875	Area (sq ft)		77.82	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	29.63	Top Width (ft)		29.63	
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		9.15	
Max Chl Dpth (ft)	3.57	Hydr. Depth (ft)		2.63	
Conv. Total (cfs)	13278.8	Conv. (cfs)		13278.8	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		31.25	
Min Ch El (ft)	1437.41	Shear (lb/sq ft)		0.45	
Alpha	1.00	Stream Power (lb/ft s)		4.09	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		1.16	
C & E Loss (ft)	0.17	Cum SA (acres)		0.48	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1909

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.78	100	1437.38	116	1437.7	127.36	1443.38	145	1445.74
170	1444.74								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	12	12	12	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.48	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.48	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)	1440.23	Flow Area (sq ft)		56.36	
E.G. Slope (ft/ft)	0.012155	Area (sq ft)		56.36	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	40.59	Top Width (ft)		40.59	
Vel Total (ft/s)	12.63	Avg. Vel. (ft/s)		12.63	
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	6458.0	Conv. (cfs)		6458.0	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		41.12	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		1.04	
Alpha	1.00	Stream Power (lb/ft s)		13.14	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)		1.10	
C & E Loss (ft)	0.12	Cum SA (acres)		0.45	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1897

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.77	100	1437.37	116	1437.69	127.36	1443.37	145	1445.73
170	1444.73								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.25	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.50	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.18	Flow Area (sq ft)		57.63	
E.G. Slope (ft/ft)	0.010853	Area (sq ft)		57.63	
Q Total (cfs)	694.00	Flow (cfs)		694.00	
Top Width (ft)	40.96	Top Width (ft)		40.96	
Vel Total (ft/s)	12.04	Avg. Vel. (ft/s)		12.04	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	6661.8	Conv. (cfs)		6661.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.50	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.94	
Alpha	1.00	Stream Power (lb/ft s)		11.33	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		1.09	
C & E Loss (ft)	0.07	Cum SA (acres)		0.44	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1877

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.75	100	1437.35	116	1437.67	127.36	1443.35	145	1445.71
170	1444.71								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.98	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.49	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.08	Flow Area (sq ft)		57.78	
E.G. Slope (ft/ft)	0.009540	Area (sq ft)		57.78	
Q Total (cfs)	653.00	Flow (cfs)		653.00	
Top Width (ft)	41.01	Top Width (ft)		41.01	
Vel Total (ft/s)	11.30	Avg. Vel. (ft/s)		11.30	
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)		1.41	

Conv. Total (cfs)	6685.7	Conv. (cfs)	6685.7
Length Wtd. (ft)	20.00	Wetted Per. (ft)	41.55
Min Ch El (ft)	1437.35	Shear (lb/sq ft)	0.83
Alpha	1.00	Stream Power (lb/ft s)	9.36
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	1.06
C & E Loss (ft)	0.08	Cum SA (acres)	0.42

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1857

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.73	100	1437.33	116	1437.65	127.36	1443.33	145	1445.69
170	1444.69								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.13	Element			
Vel Head (ft)	0.47	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.65	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.97	Flow Area (sq ft)		109.83	
E.G. Slope (ft/ft)	0.001143	Area (sq ft)		109.83	
Q Total (cfs)	607.00	Flow (cfs)		607.00	
Top Width (ft)	45.21	Top Width (ft)		45.21	
Vel Total (ft/s)	5.53	Avg. Vel. (ft/s)		5.53	
Max Chl Dpth (ft)	3.32	Hydr. Depth (ft)		2.43	
Conv. Total (cfs)	17952.7	Conv. (cfs)		17952.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		47.04	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		0.92	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		1.02	
C & E Loss (ft)	0.03	Cum SA (acres)		0.40	

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1837

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.71	100	1437.31	116	1437.63	127.36	1443.31	145	1445.67
170	1444.67								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.08	Element			
Vel Head (ft)	0.38	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.70	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.84	Flow Area (sq ft)		112.83	
E.G. Slope (ft/ft)	0.000882	Area (sq ft)		112.83	
Q Total (cfs)	556.00	Flow (cfs)		556.00	
Top Width (ft)	45.34	Top Width (ft)		45.34	
Vel Total (ft/s)	4.93	Avg. Vel. (ft/s)		4.93	
Max Chl Dpth (ft)	3.39	Hydr. Depth (ft)		2.49	
Conv. Total (cfs)	18718.7	Conv. (cfs)		18718.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		47.25	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.65	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.97	
C & E Loss (ft)	0.03	Cum SA (acres)		0.38	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1817

INPUT
Description: Side Weir

```
Station Elevation Data     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.69    100 1437.29     116 1437.61  127.36 1443.29     145 1445.65
     170 1444.65

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36              20      20      20            .1        .3
Left Levee       Station=    76.8      Elevation= 1443.38

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1441.03    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.29    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1440.74    Reach Len. (ft)            20.00      20.00      20.00
  Crit W.S. (ft)           1439.70    Flow Area (sq ft)                    115.71
  E.G. Slope (ft/ft)      0.000660    Area (sq ft)                         115.71
  Q Total (cfs)             500.00    Flow (cfs)                           500.00
  Top Width (ft)             45.47    Top Width (ft)                        45.47
  Vel Total (ft/s)            4.32    Avg. Vel. (ft/s)                       4.32
  Max Chl Dpth (ft)           3.45    Hydr. Depth (ft)                       2.55
  Conv. Total (cfs)        19467.4    Conv. (cfs)                         19467.4
  Length Wtd. (ft)           20.00    Wetted Per. (ft)                      47.46
  Min Ch El (ft)           1437.29    Shear (lb/sq ft)                       0.10
  Alpha                       1.00    Stream Power (lb/ft s)                 0.43
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)                   0.92
  C & E Loss (ft)             0.02    Cum SA (acres)                         0.36


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1797

INPUT
Description: Side Weir
Station Elevation Data     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.67    100 1437.27     116 1437.59  127.36 1443.27     145 1445.63
     170 1444.63

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36              20      20      20            .1        .3
Left Levee       Station=    76.8      Elevation= 1443.38

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1441.00    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.21    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1440.78    Reach Len. (ft)            20.00      20.00      20.00
  Crit W.S. (ft)           1439.54    Flow Area (sq ft)                    118.45
  E.G. Slope (ft/ft)      0.000473    Area (sq ft)                         118.45
  Q Total (cfs)             439.00    Flow (cfs)                           439.00
  Top Width (ft)             45.59    Top Width (ft)                        45.59
  Vel Total (ft/s)            3.71    Avg. Vel. (ft/s)                       3.71
  Max Chl Dpth (ft)           3.51    Hydr. Depth (ft)                       2.60
  Conv. Total (cfs)        20186.1    Conv. (cfs)                         20186.1
  Length Wtd. (ft)           20.00    Wetted Per. (ft)                      47.65
  Min Ch El (ft)           1437.27    Shear (lb/sq ft)                       0.07
  Alpha                       1.00    Stream Power (lb/ft s)                 0.27
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)                   0.86
  C & E Loss (ft)             0.02    Cum SA (acres)                         0.34


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1777

INPUT
Description: Side Weir
Station Elevation Data     num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      76 1439.65    100 1437.25     116 1437.57  127.36 1443.25     145 1445.61
     170 1444.61

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      76     .04      76    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36              15      15      15            .1        .3
Left Levee       Station=    76.8      Elevation= 1443.38

CROSS SECTION OUTPUT    Profile #PF 1
```

E.G. Elev (ft)	1440.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.82	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)	1439.34	Flow Area (sq ft)		121.02	
E.G. Slope (ft/ft)	0.000321	Area (sq ft)		121.02	
Q Total (cfs)	374.00	Flow (cfs)		374.00	
Top Width (ft)	45.70	Top Width (ft)		45.70	
Vel Total (ft/s)	3.09	Avg. Vel. (ft/s)		3.09	
Max Chl Dpth (ft)	3.57	Hydr. Depth (ft)		2.65	
Conv. Total (cfs)	20866.3	Conv. (cfs)		20866.3	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		47.83	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.81	
C & E Loss (ft)	0.01	Cum SA (acres)		0.32	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1762

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.63	100	1437.23	116	1437.55	127.36	1443.23	145	1445.59
170	1444.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	18	18	18	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.85	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)	1439.16	Flow Area (sq ft)		123.11	
E.G. Slope (ft/ft)	0.000226	Area (sq ft)		123.11	
Q Total (cfs)	322.00	Flow (cfs)		322.00	
Top Width (ft)	45.79	Top Width (ft)		45.79	
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)		2.62	
Max Chl Dpth (ft)	3.62	Hydr. Depth (ft)		2.69	
Conv. Total (cfs)	21426.9	Conv. (cfs)		21426.9	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		47.98	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.01	Cum SA (acres)		0.30	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1744

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.61	100	1437.21	116	1437.53	127.36	1443.21	145	1445.57
170	1444.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.87	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1438.93	Flow Area (sq ft)		125.21	
E.G. Slope (ft/ft)	0.000135	Area (sq ft)		125.21	
Q Total (cfs)	256.00	Flow (cfs)		256.00	
Top Width (ft)	45.88	Top Width (ft)		45.88	
Vel Total (ft/s)	2.04	Avg. Vel. (ft/s)		2.04	
Max Chl Dpth (ft)	3.66	Hydr. Depth (ft)		2.73	
Conv. Total (cfs)	21993.8	Conv. (cfs)		21993.8	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		48.13	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.71	
C & E Loss (ft)	0.00	Cum SA (acres)		0.28	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1706

INPUT
Description: Begin Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.41	88	1443.17	100	1437.17	116	1437.49	127.36	1443.17
145	1445.53	170	1444.53						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	6	6	6	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.81	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)	1438.97	Flow Area (sq ft)		80.07	
E.G. Slope (ft/ft)	0.000240	Area (sq ft)		80.07	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	29.94	Top Width (ft)		29.94	
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)		2.67	
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)		2.67	
Conv. Total (cfs)	13824.6	Conv. (cfs)		13824.6	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		31.58	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.62	
C & E Loss (ft)	0.00	Cum SA (acres)		0.25	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1700

INPUT
Description: End Transistion
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.41	76	1443.41	88	1443.17	100	1437.17	116	1437.49
127.36	1443.17	145	1445.53	170	1444.53				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	30.3	30.3	30.3	.1	.3

Left Levee Station= 88 Elevation= 1443.17

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.81	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.98	Flow Area (sq ft)		80.02	
E.G. Slope (ft/ft)	0.000240	Area (sq ft)		80.02	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	29.93	Top Width (ft)		29.93	
Vel Total (ft/s)	2.67	Avg. Vel. (ft/s)		2.67	
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)		2.67	
Conv. Total (cfs)	13812.2	Conv. (cfs)		13812.2	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		31.58	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.61	
C & E Loss (ft)	0.01	Cum SA (acres)		0.25	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1670

INPUT
Description: PT of Curve, Begin Transistion
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
     66 1439.31      78 1442.38      90 1442.14     100 1437.14     110 1437.34
  119.6 1442.14     145  1445.5     170  1444.5

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
      66     .04      90    .016    119.6     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6             124   129.8     145            .1          .3
Left Levee       Station=      90      Elevation= 1442.14

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1440.90    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.21    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1440.70    Reach Len. (ft)            124.00     129.80     145.00
  Crit W.S. (ft)           1439.33    Flow Area (sq ft)                     58.44
  E.G. Slope (ft/ft)      0.000513    Area (sq ft)                          58.44
  Q Total (cfs)             214.00    Flow (cfs)                           214.00
  Top Width (ft)             23.82    Top Width (ft)                        23.82
  Vel Total (ft/s)            3.66    Avg. Vel. (ft/s)                       3.66
  Max Chl Dpth (ft)           3.55    Hydr. Depth (ft)                       2.45
  Conv. Total (cfs)          9446.5   Conv. (cfs)                          9446.5
  Length Wtd. (ft)          129.80    Wetted Per. (ft)                      25.45
  Min Ch El (ft)           1437.14    Shear (lb/sq ft)                       0.07
  Alpha                       1.00    Stream Power (lb/ft s)                 0.27
  Frctn Loss (ft)             0.06    Cum Volume (acre-ft)                   0.57
  C & E Loss (ft)             0.00    Cum SA (acres)                         0.23


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1540

INPUT
Description: PC of Curve
Station Elevation Data      num=        7
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
      70 1440.03      78 1442.03      90 1442.01     100 1437.01     110 1437.21
  119.6 1442.01     168 1442.15

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
      70     .04      90    .016    119.6     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6             106.9   106.9   106.9            .1          .3
Left Levee       Station=      90      Elevation= 1442.01

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1440.84    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.20    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1440.64    Reach Len. (ft)            106.90     106.90     106.90
  Crit W.S. (ft)           1439.20    Flow Area (sq ft)                     60.28
  E.G. Slope (ft/ft)      0.000471    Area (sq ft)                          60.28
  Q Total (cfs)             214.00    Flow (cfs)                           214.00
  Top Width (ft)             24.13    Top Width (ft)                        24.13
  Vel Total (ft/s)            3.55    Avg. Vel. (ft/s)                       3.55
  Max Chl Dpth (ft)           3.63    Hydr. Depth (ft)                       2.50
  Conv. Total (cfs)          9857.7   Conv. (cfs)                          9857.7
  Length Wtd. (ft)          106.90    Wetted Per. (ft)                      25.80
  Min Ch El (ft)           1437.01    Shear (lb/sq ft)                       0.07
  Alpha                       1.00    Stream Power (lb/ft s)                 0.24
  Frctn Loss (ft)             0.05    Cum Volume (acre-ft)                   0.39
  C & E Loss (ft)             0.00    Cum SA (acres)                         0.16


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1433

INPUT
Description: PT of Curve
Station Elevation Data      num=        7
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
      70 1440.29      78 1442.14      90  1441.9     100  1436.9     110  1437.1
  119.6  1441.9     168 1441.92

Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
      70     .04      90    .016    119.6     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6              88    72.8     45            .1          .3
Left Levee       Station=      90      Elevation=  1441.9

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1440.79    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.19    Wt. n-Val.                            0.016
```

W.S. Elev (ft)	1440.60	Reach Len. (ft)	88.00	72.80	45.00
Crit W.S. (ft)	1439.08	Flow Area (sq ft)		61.95	
E.G. Slope (ft/ft)	0.000437	Area (sq ft)		61.95	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	24.40	Top Width (ft)		24.40	
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)		3.45	
Max Chl Dpth (ft)	3.70	Hydr. Depth (ft)		2.54	
Conv. Total (cfs)	10235.9	Conv. (cfs)		10235.9	
Length Wtd. (ft)	72.80	Wetted Per. (ft)		26.10	
Min Ch El (ft)	1436.90	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.22	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.00	Cum SA (acres)		0.10	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1360

INPUT
Description: End of Transition
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
60	1442.02	90	1441.83	100	1436.83	110	1437.03	119.6	1441.82
132	1442.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
60	.04	90	.013	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	45.3	45.3	45.3	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.76	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.58	Reach Len. (ft)	45.30	45.30	45.30
Crit W.S. (ft)		Flow Area (sq ft)		63.21	
E.G. Slope (ft/ft)	0.000273	Area (sq ft)		63.21	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	24.62	Top Width (ft)		24.62	
Vel Total (ft/s)	3.39	Avg. Vel. (ft/s)		3.39	
Max Chl Dpth (ft)	3.75	Hydr. Depth (ft)		2.57	
Conv. Total (cfs)	12950.2	Conv. (cfs)		12950.2	
Length Wtd. (ft)	45.30	Wetted Per. (ft)		26.34	
Min Ch El (ft)	1436.83	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.13	
C & E Loss (ft)	0.05	Cum SA (acres)		0.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1315

INPUT
Description: Culvert Upstream Section
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.57	99.9	1441.78	100	1436.78	110	1436.78
110.1	1441.78	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.013	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	78	78	78	.1	.3

Left Levee Station= 95 Elevation= 1441.57

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.68	Element			
Vel Head (ft)	0.67	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.01	Reach Len. (ft)	78.00	78.00	78.00
Crit W.S. (ft)	1439.19	Flow Area (sq ft)		32.52	
E.G. Slope (ft/ft)	0.001337	Area (sq ft)		32.52	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	10.13	Top Width (ft)		10.13	
Vel Total (ft/s)	6.58	Avg. Vel. (ft/s)		6.58	
Max Chl Dpth (ft)	3.23	Hydr. Depth (ft)		3.21	
Conv. Total (cfs)	5851.7	Conv. (cfs)		5851.7	
Length Wtd. (ft)	78.00	Wetted Per. (ft)		16.46	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		1.09	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.08	
C & E Loss (ft)		Cum SA (acres)		0.04	

```
CULVERT                    RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2    RS: 1270

INPUT
Description: Hawes Road Crossing
Distance from Upstream XS =       12
Deck/Roadway Width        =       46
Weir Coefficient          =      2.6
Bridge Deck/Roadway Skew  =       45
Upstream  Deck/Roadway Coordinates
    num=        5
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
       0  1441.3               50  1441.5              105    1442
     160  1441.8              230    1442

Upstream Bridge Cross Section Data
Station Elevation Data    num=        8
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  1441.3       95 1441.57    99.9 1441.78     100 1436.78     110 1436.78
   110.1 1441.78      115  1441.6 230.001    1442

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .013   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3
Left Levee      Station=      95      Elevation= 1441.57

Downstream  Deck/Roadway Coordinates
    num=        5
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
       0  1441.3               50  1441.5              105    1442
     160  1441.7              230    1442

Downstream Bridge Cross Section Data
Station Elevation Data    num=        8
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  1441.3       95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
   110.1 1441.71      115  1441.6 230.001    1442

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3
Left Levee      Station=      95      Elevation=  1441.5

Upstream Embankment side slope              =      50 horiz. to 1.0 vertical
Downstream Embankment side slope            =      50 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =  1441.5
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1          Box       4      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 2 - Wingwall flared 18 to 33.7 deg.; inlet top edge bevel=0.083D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                  0      78      .013                .2               .1
Upstream   Elevation =  1436.78
           Centerline Station =  105
Downstream Elevation =  1436.71
           Centerline Station =  105

CROSS SECTION              RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2    RS: 1237

INPUT
Description: Culvert Downstream Section
Station Elevation Data    num=        8
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0  1441.3       95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
   110.1 1441.71      115  1441.6 230.001    1442

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1             67.3    67.3    67.3             .1       .3
```

Left Levee Station= 95 Elevation= 1441.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.20	Wt. n-Val.		0.015	
W.S. Elev (ft)	1439.14	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1439.14	Flow Area (sq ft)		24.37	
E.G. Slope (ft/ft)	0.004060	Area (sq ft)		24.37	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	10.10	Top Width (ft)		10.10	
Vel Total (ft/s)	8.78	Avg. Vel. (ft/s)		8.78	
Max Chl Dpth (ft)	2.43	Hydr. Depth (ft)		2.41	
Conv. Total (cfs)	3358.4	Conv. (cfs)		3358.4	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		14.85	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		3.65	
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)		0.03	
C & E Loss (ft)	0.16	Cum SA (acres)		0.02	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.21	110	1436.21	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1437.71	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1438.36	Flow Area (sq ft)		19.06	
E.G. Slope (ft/ft)	0.012575	Area (sq ft)		19.06	
Q Total (cfs)	221.00	Flow (cfs)		221.00	
Top Width (ft)	15.47	Top Width (ft)		15.47	
Vel Total (ft/s)	11.59	Avg. Vel. (ft/s)		11.59	
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)		1.23	
Conv. Total (cfs)	1970.8	Conv. (cfs)		1970.8	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		16.23	
Min Ch El (ft)	1436.21	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)		10.69	
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)			
C & E Loss (ft)	0.09	Cum SA (acres)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.21	110	1436.21	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
     -9     .04      91    .016     119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91     119               20      20      20            .1        .3
Left Levee      Station=      91      Elevation= 1441.14

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1439.79    Element                    Left OB    Channel   Right OB
  Vel Head (ft)              2.09    Wt. n-Val.                            0.016
  W.S. Elev (ft)          1437.71    Reach Len. (ft)              0.00      0.00       0.00
  Crit W.S. (ft)          1438.36    Flow Area (sq ft)                     19.06
  E.G. Slope (ft/ft)     0.012575    Area (sq ft)                          19.06
  Q Total (cfs)            221.00    Flow (cfs)                           221.00
  Top Width (ft)            15.47    Top Width (ft)                        15.47
  Vel Total (ft/s)          11.59    Avg. Vel. (ft/s)                      11.59
  Max Chl Dpth (ft)          1.50    Hydr. Depth (ft)                       1.23
  Conv. Total (cfs)        1970.8    Conv. (cfs)                          1970.8
  Length Wtd. (ft)           0.00    Wetted Per. (ft)                      16.23
  Min Ch El (ft)          1436.21    Shear (lb/sq ft)                       0.92
  Alpha                      1.00    Stream Power (lb/ft s)                10.69
  Frctn Loss (ft)            0.45    Cum Volume (acre-ft)
  C & E Loss (ft)            0.09    Cum SA (acres)


Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
         than 0.7 or greater than 1.4.  This may indicate the need for additional cross sections.

CROSS SECTION          RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2   RS: 1150

INPUT
Description: Starting Channel Reconstruction
Station Elevation Data     num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9    1442      -4  1440.3      8 1440.33     38 1441.15     72  1440.7
      77 1441.15      91  1441.1    100 1436.06    110 1436.18    119  1441.1
     128 1441.33

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04      91    .016     119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91     119              150     150     150            .1        .3
Left Levee      Station=      91      Elevation=  1441.1

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1439.17    Element                    Left OB    Channel   Right OB
  Vel Head (ft)              0.62    Wt. n-Val.                            0.016
  W.S. Elev (ft)          1438.55    Reach Len. (ft)            150.00    150.00     150.00
  Crit W.S. (ft)          1438.27    Flow Area (sq ft)                     34.99
  E.G. Slope (ft/ft)     0.002200    Area (sq ft)                          34.99
  Q Total (cfs)            221.00    Flow (cfs)                           221.00
  Top Width (ft)            18.79    Top Width (ft)                        18.79
  Vel Total (ft/s)           6.32    Avg. Vel. (ft/s)                       6.32
  Max Chl Dpth (ft)          2.49    Hydr. Depth (ft)                       1.86
  Conv. Total (cfs)        4711.8    Conv. (cfs)                          4711.8
  Length Wtd. (ft)         150.00    Wetted Per. (ft)                      20.04
  Min Ch El (ft)          1436.06    Shear (lb/sq ft)                       0.24
  Alpha                      1.00    Stream Power (lb/ft s)                 1.51
  Frctn Loss (ft)            0.33    Cum Volume (acre-ft)                   0.12
  C & E Loss (ft)            0.00    Cum SA (acres)                         0.06


CROSS SECTION          RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2   RS: 1000

INPUT
Description: Starting Downstream Channel Section
Station Elevation Data     num=      11
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      -9  1441.1      -4  1439.7      8    1440     38 1440.82     72  1440.2
      77 1440.82      91 1440.77    100 1435.73    110 1435.85    119 1440.77
     128    1441

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      -9     .04      91    .016     119     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           91     119                0       0       0            .1        .3
Left Levee      Station=      91      Elevation= 1440.77

CROSS SECTION OUTPUT    Profile #PF 1
```

E.G. Elev (ft)	1438.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.22	Reach Len. (ft)			
Crit W.S. (ft)	1437.94	Flow Area (sq ft)		34.99	
E.G. Slope (ft/ft)	0.002201	Area (sq ft)		34.99	
Q Total (cfs)	221.00	Flow (cfs)		221.00	
Top Width (ft)	18.78	Top Width (ft)		18.78	
Vel Total (ft/s)	6.32	Avg. Vel. (ft/s)		6.32	
Max Chl Dpth (ft)	2.49	Hydr. Depth (ft)		1.86	
Conv. Total (cfs)	4710.9	Conv. (cfs)		4710.9	
Length Wtd. (ft)		Wetted Per. (ft)		20.04	
Min Ch El (ft)	1435.73	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		1.52	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Hawes Rd Channel

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1540	.04	.016	.04
202L/US60 TI - 2	1370	.04	.016	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:Southern Ave Sys

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	3490	.04	.025	.04
202L/US60 TI - 2	3365	.04	.015	.04
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	.04	.015	.04
202L/US60 TI - 2	2261	.04	.016	.04
202L/US60 TI - 2	2201	.04	.016	.04
202L/US60 TI - 2	2100	.04	.016	.04
202L/US60 TI - 2	1947	.04	.016	.04
202L/US60 TI - 2	1909	.04	.016	.04
202L/US60 TI - 2	1897	.04	.016	.04
202L/US60 TI - 2	1877	.04	.016	.04
202L/US60 TI - 2	1857	.04	.016	.04
202L/US60 TI - 2	1837	.04	.016	.04
202L/US60 TI - 2	1817	.04	.016	.04
202L/US60 TI - 2	1797	.04	.016	.04
202L/US60 TI - 2	1777	.04	.016	.04
202L/US60 TI - 2	1762	.04	.016	.04
202L/US60 TI - 2	1744	.04	.016	.04
202L/US60 TI - 2	1706	.04	.016	.04
202L/US60 TI - 2	1700	.04	.016	.04
202L/US60 TI - 2	1670	.04	.016	.04
202L/US60 TI - 2	1540	.04	.016	.04
202L/US60 TI - 2	1433	.04	.016	.04
202L/US60 TI - 2	1360	.04	.013	.04
202L/US60 TI - 2	1315	.04	.013	.04
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	.04	.015	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:South Hawes Chan

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1170	.04	.016	.04
202L/US60 TI - 2	1150	.04	.016	.04
202L/US60 TI - 2	1000	.04	.016	.04

SUMMARY OF REACH LENGTHS

River: Hawes Rd Channel

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1540	170	170	170
202L/US60 TI - 2	1370	200	200	200
202L/US60 TI - 2	1170	20	20	20

River: Southern Ave Sys

Reach	River Sta.	Left	Channel	Right

202L/US60 TI - 2	3490	125	125	125
202L/US60 TI - 2	3365	983.8	983.8	983.8
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	120.3	120.3	120.3
202L/US60 TI - 2	2261	60	60	60
202L/US60 TI - 2	2201	101	101	101
202L/US60 TI - 2	2100	153	153	153
202L/US60 TI - 2	1947	38	38	38
202L/US60 TI - 2	1909	12	12	12
202L/US60 TI - 2	1897	20	20	20
202L/US60 TI - 2	1877	20	20	20
202L/US60 TI - 2	1857	20	20	20
202L/US60 TI - 2	1837	20	20	20
202L/US60 TI - 2	1817	20	20	20
202L/US60 TI - 2	1797	20	20	20
202L/US60 TI - 2	1777	15	15	15
202L/US60 TI - 2	1762	18	18	18
202L/US60 TI - 2	1744	38	38	38
202L/US60 TI - 2	1706	6	6	6
202L/US60 TI - 2	1700	30.3	30.3	30.3
202L/US60 TI - 2	1670	124	129.8	145
202L/US60 TI - 2	1540	106.9	106.9	106.9
202L/US60 TI - 2	1433	88	72.8	45
202L/US60 TI - 2	1360	45.3	45.3	45.3
202L/US60 TI - 2	1315	78	78	78
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	67.3	67.3	67.3
202L/US60 TI - 2	1170	20	20	20

River: South Hawes Chan

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1170	20	20	20
202L/US60 TI - 2	1150	150	150	150
202L/US60 TI - 2	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hawes Rd Channel

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1540	.1	.3
202L/US60 TI - 2	1370	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: Southern Ave Sys

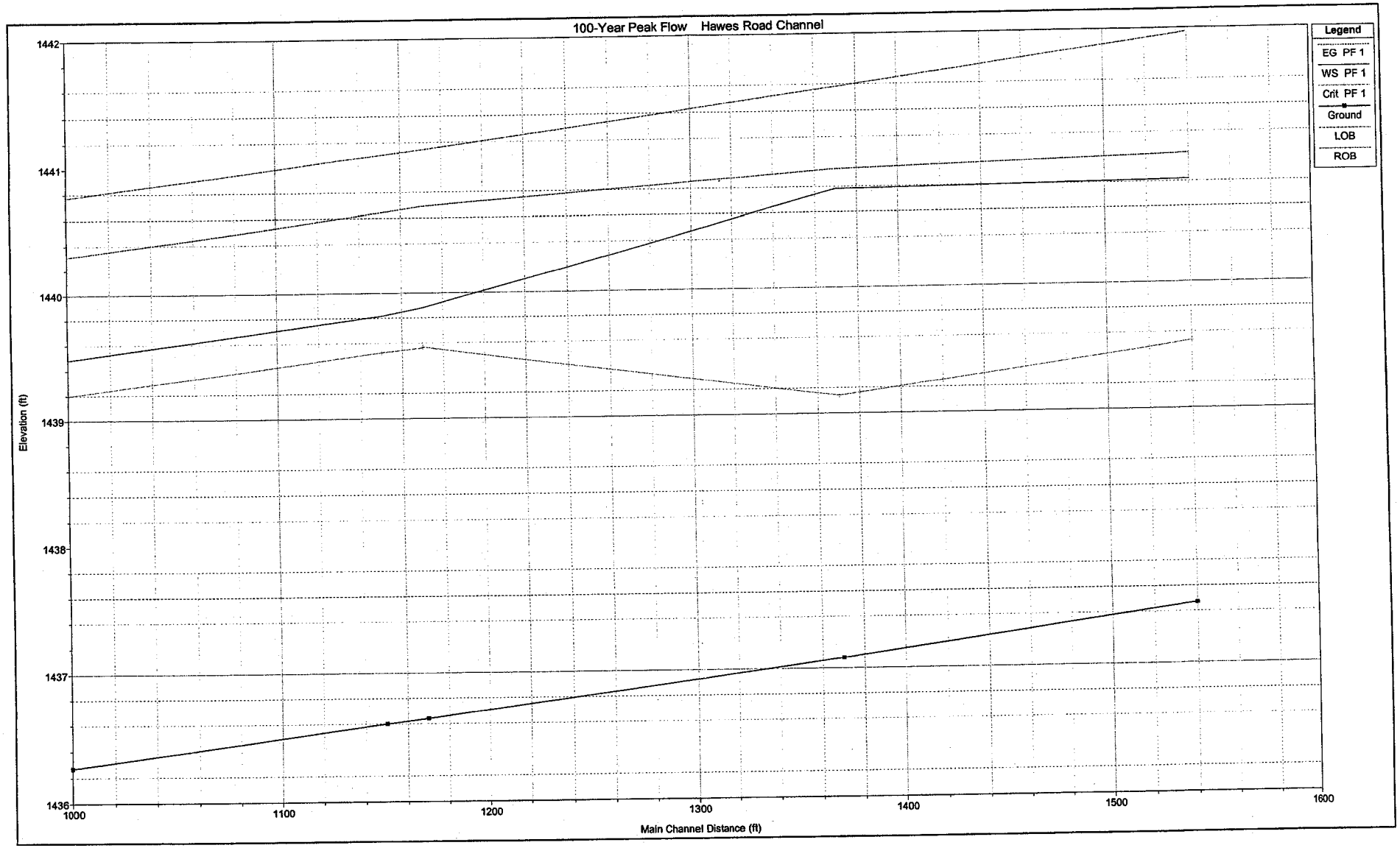
Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	3490	.1	.3
202L/US60 TI - 2	3365	.1	.3
202L/US60 TI - 2	3000	Culvert	
202L/US60 TI - 2	2381	.1	.3
202L/US60 TI - 2	2261	.1	.3
202L/US60 TI - 2	2201	.1	.3
202L/US60 TI - 2	2100	.1	.3
202L/US60 TI - 2	1947	.1	.3
202L/US60 TI - 2	1909	.1	.3
202L/US60 TI - 2	1897	.1	.3
202L/US60 TI - 2	1877	.1	.3
202L/US60 TI - 2	1857	.1	.3
202L/US60 TI - 2	1837	.1	.3
202L/US60 TI - 2	1817	.1	.3
202L/US60 TI - 2	1797	.1	.3
202L/US60 TI - 2	1777	.1	.3
202L/US60 TI - 2	1762	.1	.3
202L/US60 TI - 2	1744	.1	.3
202L/US60 TI - 2	1706	.1	.3
202L/US60 TI - 2	1700	.1	.3
202L/US60 TI - 2	1670	.1	.3
202L/US60 TI - 2	1540	.1	.3
202L/US60 TI - 2	1433	.1	.3
202L/US60 TI - 2	1360	.1	.3
202L/US60 TI - 2	1315	.1	.3
202L/US60 TI - 2	1270	Culvert	
202L/US60 TI - 2	1237	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: South Hawes Chan

4/28/05
REVISIONS

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1170	.1	.3
202L/US60 TI - 2	1150	.1	.3
202L/US60 TI - 2	1000	.1	.3

HEC-RAS Output for Hawes Road Channel (100-Year Event)



THIS SECTION

SUPERSEDED BY 4/28/05 REVISIONS BY PB.

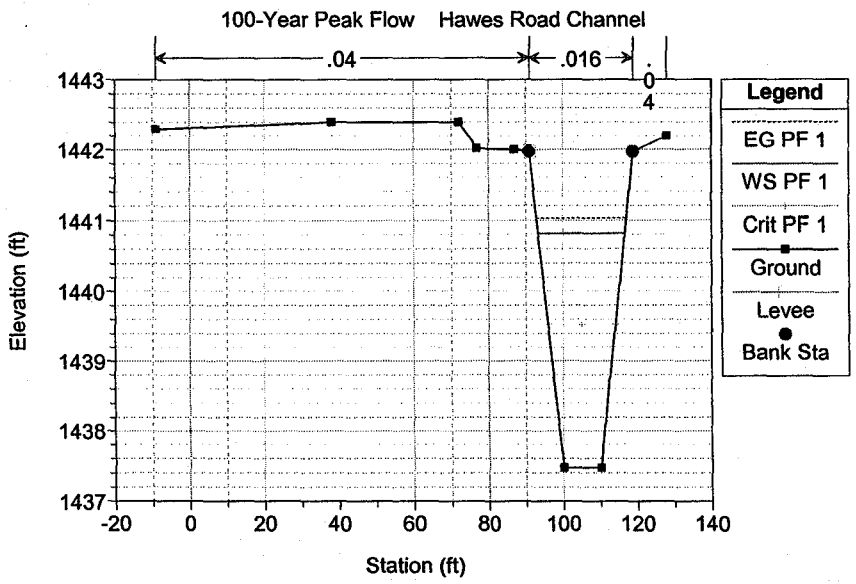
(4/28/05 REVISIONS INSERTED AT END OF THIS SECTION.)

HEC-RAS Plan: RMSA3 Profile: PF 1

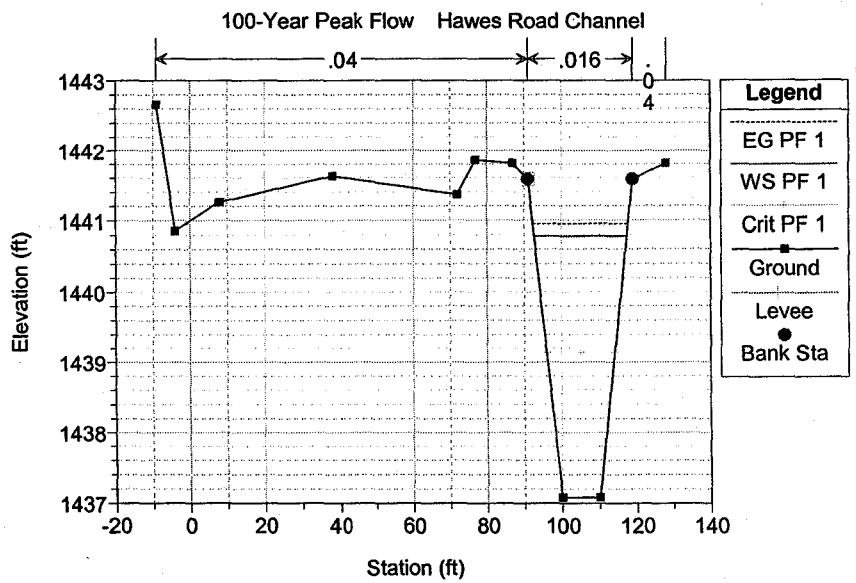
River	Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South Hawes Chan	202L/US60 TI - 2	1170	385.00	1436.64	1439.88	1439.56	1440.69	0.002132	7.21	53.40	22.96	0.83
South Hawes Chan	202L/US60 TI - 2	1150	385.00	1436.60	1439.81	1439.53	1440.64	0.002199	7.29	52.80	22.86	0.85
South Hawes Chan	202L/US60 TI - 2	1000	385.00	1436.27	1439.48	1439.20	1440.31	0.002201	7.29	52.79	22.85	0.85
Hawes Rd Channel	202L/US60 TI - 2	1540	208.00	1437.47	1440.82	1439.53	1441.03	0.000548	3.72	55.91	23.39	0.42
Hawes Rd Channel	202L/US60 TI - 2	1370	208.00	1437.08	1440.78	1439.14	1440.94	0.000371	3.23	64.42	24.81	0.35
Hawes Rd Channel	202L/US60 TI - 2	1170	385.00	1436.64	1439.88	1439.57	1440.69	0.002132	7.21	53.40	22.96	0.83

SUPERSEDED

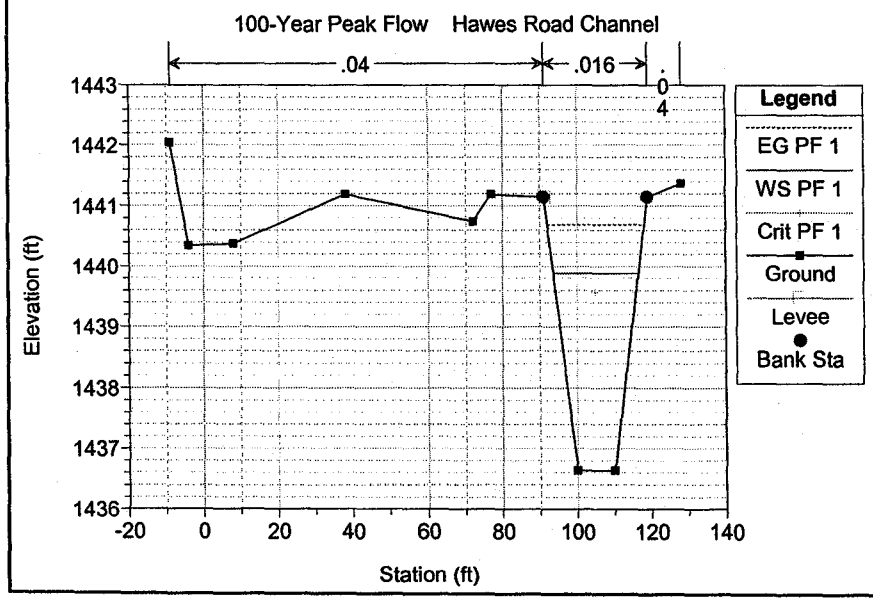
River = Hawes Rd Channel Reach = 202L/US60 TI - 2 RS = 1540 Upstream Hawes Rd. Channel Section



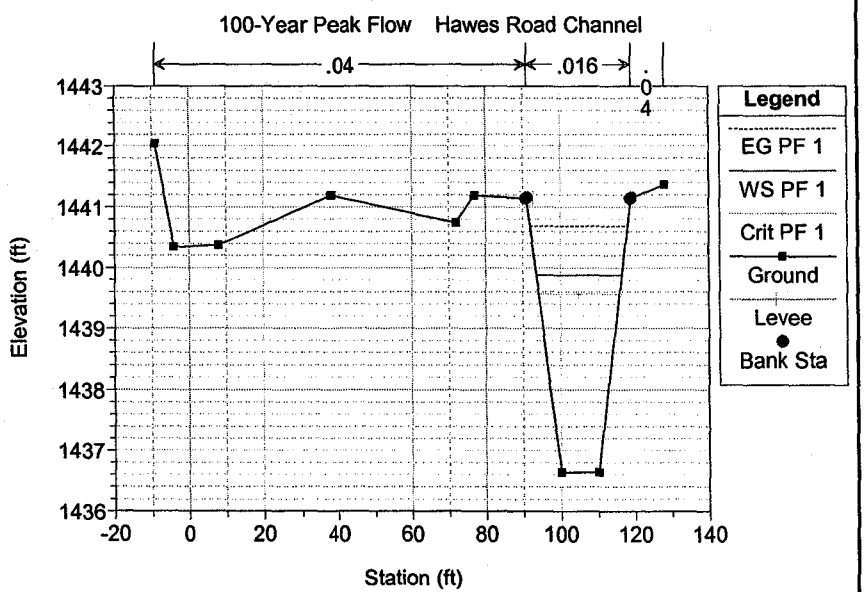
River = Hawes Rd Channel Reach = 202L/US60 TI - 2 RS = 1370



River = Hawes Rd Channel Reach = 202L/US60 TI - 2 RS = 1170 Channel Reconstruction

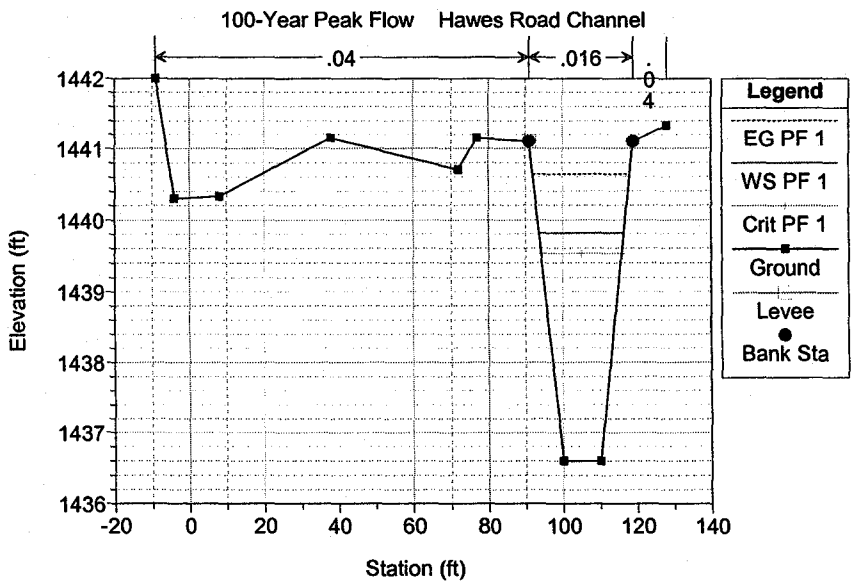


River = South Hawes Chan Reach = 202L/US60 TI - 2 RS = 1170 Channel Reconstruction

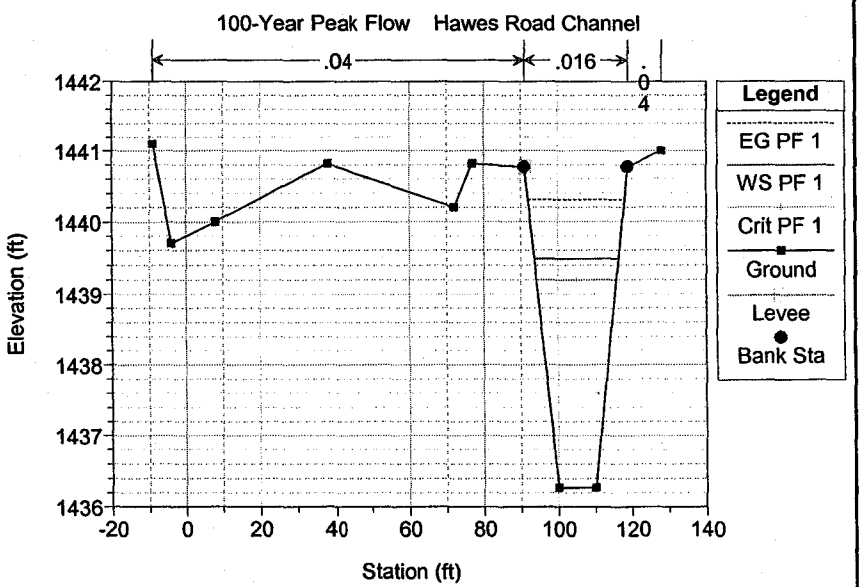


SUPERSEDED

River = South Hawes Chan Reach = 202L/US60 TI - 2 RS = 1150 Starting Channel Reconstruction



River = South Hawes Chan Reach = 202L/US60 TI - 2 RS = 1000 Starting Downstream Channel Section



SUPERSEDED

SUPERSEDED

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 202L/US60 TI - Ph 2
Project File : WSP100HC.prj
Run Date and Time: 4/23/2004 1:31:29 PM

Project in English units

Project Description:
202L/US60 Traffic Interchange - Phase 2
This model is to determine the
channel hydraulics for the 100-year peak flow in the Hawes Road Channel.

PLAN DATA

Plan Title: 202L/US60 TI - Phase 2
Plan File : l:\11194\Phase2\HEC-RAS\V301\WSP100HC.p02

Geometry Title: 202L/US60 TI - Phase 2
Geometry File : l:\11194\Phase2\HEC-RAS\V301\WSP100HC.g01

Flow Title : 202L/US60 TI - Phase 2
Flow File : l:\11194\Phase2\HEC-RAS\V301\WSP100HC.f01

Plan Summary Information:

Number of:	Cross Sections	= 32	Mulitple Openings	=	0
	Culverts	= 2	Inline Weirs	=	0
	Bridges	= 0			

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

SUPERSEDED

FLOW DATA

Flow Title: 202L/US60 TI - Phase 2
Flow File : l:\11194\Phase2\HEC-RAS\V301\WSP100HC.f01

Flow Data (cfs)

River	Reach	RS	PF 1
Hawes Rd Channel	202L/US60 TI -	21540	208
Hawes Rd Channel	202L/US60 TI -	21170	385
Southern Ave Sys	202L/US60 TI -	23490	712
Southern Ave Sys	202L/US60 TI -	21855	692
Southern Ave Sys	202L/US60 TI -	21835	635
Southern Ave Sys	202L/US60 TI -	21815	570
Southern Ave Sys	202L/US60 TI -	21795	498
Southern Ave Sys	202L/US60 TI -	21775	421
Southern Ave Sys	202L/US60 TI -	21760	359
Southern Ave Sys	202L/US60 TI -	21742	281
Southern Ave Sys	202L/US60 TI -	21704	230
Southern Ave Sys	202L/US60 TI -	21170	385
South Hawes Chan	202L/US60 TI -	21170	385
South Hawes Chan	202L/US60 TI -	21000	385

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hawes Rd Channel	202L/US60 TI -	2PF 1	Normal S = .0022	
Southern Ave Sys	202L/US60 TI -	2PF 1	Normal S = 1E-11	
South Hawes Chan	202L/US60 TI -	2PF 1		Normal S = .0022

GEOMETRY DATA

Geometry Title: 202L/US60 TI - Phase 2
Geometry File : l:\11194\Phase2\HEC-RAS\V301\WSP100HC.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Hawes Rd Channel	202L/US60 TI - 2		Confluence
Southern Ave Sys	202L/US60 TI - 2		Confluence
South Hawes Chan	202L/US60 TI - 2	Confluence	

JUNCTION INFORMATION

Name: Confluence
Description: Junction of Southern Ave Syst. w/ Hawes Rd Channel
Energy computation Method

Length across Junction Tributary

SUPERSEDED

River	Reach	River	Reach	Length	Angle
Hawes Rd Channel	202L/US60 TI - 2 to	South Hawes Chan	202L/US60 TI - 2	0	
Southern Ave Sys	202L/US60 TI - 2 to	South Hawes Chan	202L/US60 TI - 2	0	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1540

INPUT
Description: Upstream Hawes Rd. Channel Section
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.3	38	1442.4	72	1442.4	77	1442.02	87	1442
91	1441.97	100	1437.47	110	1437.47	119	1441.97	128	1442.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	170	170	170	.1	.3

Left Levee Station= 91 Elevation= 1441.97

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.03	Element			
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.82	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1439.53	Flow Area (sq ft)		55.91	
E.G. Slope (ft/ft)	0.000548	Area (sq ft)		55.91	
Q Total (cfs)	208.00	Flow (cfs)		208.00	
Top Width (ft)	23.39	Top Width (ft)		23.39	
Vel Total (ft/s)	3.72	Avg. Vel. (ft/s)		3.72	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		2.39	
Conv. Total (cfs)	8885.7	Conv. (cfs)		8885.7	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		24.97	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		0.51	
C & E Loss (ft)	0.02	Cum SA (acres)		0.20	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1370

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

SUPERSEDED

-9	1442.66	-4	1440.86	8	1441.26	38	1441.63	72	1441.36
77	1441.86	87	1441.81	91	1441.58	100	1437.08	110	1437.08
119	1441.58	128	1441.81						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	200	200	200	.1	.3

Left Levee Station= 91 Elevation= 1441.58

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.94	Element			
Vel Head (ft)	0.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.78	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)	1439.14	Flow Area (sq ft)		64.42	
E.G. Slope (ft/ft)	0.000371	Area (sq ft)		64.42	
Q Total (cfs)	208.00	Flow (cfs)		208.00	
Top Width (ft)	24.81	Top Width (ft)		24.81	
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)		3.23	
Max Chl Dpth (ft)	3.70	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	10801.9	Conv. (cfs)		10801.9	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		26.55	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)		0.27	
C & E Loss (ft)	0.06	Cum SA (acres)		0.11	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

SUPERSEDED

-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.69	Element			
Vel Head (ft)	0.81	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.88	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1439.57	Flow Area (sq ft)		53.40	
E.G. Slope (ft/ft)	0.002132	Area (sq ft)		53.40	
Q Total (cfs)	385.00	Flow (cfs)		385.00	
Top Width (ft)	22.96	Top Width (ft)		22.96	
Vel Total (ft/s)	7.21	Avg. Vel. (ft/s)		7.21	
Max Chl Dpth (ft)	3.24	Hydr. Depth (ft)		2.33	
Conv. Total (cfs)	8338.5	Conv. (cfs)		8338.5	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		24.49	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.29	
Alpha	1.00	Stream Power (lb/ft s)		2.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)			
C & E Loss (ft)	0.00	Cum SA (acres)			

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3490

INPUT
Description: Southern Avenue Detention Basin
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
25	1457.58	45	1457.34	100	1445.6	225	1444.5	350	1445.6
390	1457.34	405	1457.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
25	.04	45	.025	390	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45	390	125	125	125	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1453.27	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.025	

SUPERSEDED

W.S. Elev (ft)	1453.27	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.68	Flow Area (sq ft)		2293.30	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		2293.30	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	312.07	Top Width (ft)		312.07	
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)		0.31	
Max Chl Dpth (ft)	8.77	Hydr. Depth (ft)		7.35	
Conv. Total (cfs)	513107.3	Conv. (cfs)		513107.3	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		313.99	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01	6.87	0.04
C & E Loss (ft)	0.12	Cum SA (acres)	0.03	1.46	0.14

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3365

INPUT
Description: End RCB Culvert
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	983.8	983.8	983.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1453.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.	0.040	0.015	0.040
W.S. Elev (ft)	1451.95	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1449.37	Flow Area (sq ft)	0.77	80.31	3.39

SUPERSEDED

E.G. Slope (ft/ft)	0.001646	Area (sq ft)	0.77	80.31	3.39
Q Total (cfs)	712.00	Flow (cfs)	0.52	709.15	2.33
Top Width (ft)	23.75	Top Width (ft)	2.51	10.20	11.04
Vel Total (ft/s)	8.43	Avg. Vel. (ft/s)	0.67	8.83	0.69
Max Chl Dpth (ft)	7.94	Hydr. Depth (ft)	0.31	7.87	0.31
Conv. Total (cfs)	17547.3	Conv. (cfs)	12.8	17477.1	57.4
Length Wtd. (ft)	983.80	Wetted Per. (ft)	2.59	24.66	11.06
Min Ch El (ft)	1444.00	Shear (lb/sq ft)	0.03	0.33	0.03
Alpha	1.09	Stream Power (lb/ft s)	0.02	2.96	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	3.46	0.04
C & E Loss (ft)		Cum SA (acres)	0.03	0.99	0.12

CULVERT RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3000

INPUT
Description: Southern Avenue Detention Basin Outlet
Distance from Upstream XS = 41
Deck/Roadway Width = 900
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1454.6		700	1454.6	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
99.9	110.1	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1450.4		200	1450.4	

Downstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1447.09	99.9	1446.85	100	1437.85	110	1437.85	110.1	1446.85
147	1450.46	168	1448.96						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

SUPERSEDED

Bank Sta: Left	Right	Coeff Contr.	Expan.
99.9	110.1	.1	.3

Upstream Embankment side slope = 10 horiz. to 1.0 vertical
Downstream Embankment side slope = 12 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	6	10

FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - Wingwall flared 45 deg.; inlet top edge bevel=0.43D
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	n Value	Entrance Loss Coef	Exit Loss Coef
	0	983.8	.013	.2	.2

Upstream Elevation = 1444
Centerline Station = 105
Downstream Elevation = 1437.85
Centerline Station = 105

CULVERT OUTPUT Profile #PF 1
Culvert ID : Culvert #1

Culv Q (cfs)	712.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	11.87
Q Barrel (cfs)	712.00	Culv Vel DS (ft/s)	16.00
E.G. US. (ft)	1453.15	Culv Inv El Up (ft)	1444.00
W.S. US. (ft)	1451.95	Culv Inv El Dn (ft)	1437.85
E.G. DS (ft)	1445.92	Culv Frctn Ls (ft)	6.44
W.S. DS (ft)	1443.23	Culv Ext Lss (ft)	0.36
Delta EG (ft)	7.23	Culv Ent Lss (ft)	0.44
Delta WS (ft)	8.71	Q Weir (cfs)	
E.G. IC (ft)	1453.15	Weir Sta Lft (ft)	
E.G. OC (ft)	1452.64	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1450.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1442.30	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.45	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	5.40	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2381

INPUT
Description: End Channel Transition, Begin RCB
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1447.09	99.9	1446.85	100	1437.85	110	1437.85	110.1	1446.85
147	1450.46	168	1448.96						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

SUPERSEDED

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	120.3	120.3	120.3	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1446.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.92	Wt. n-Val.		0.015	
W.S. Elev (ft)	1442.31	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1443.23	Flow Area (sq ft)		44.81	
E.G. Slope (ft/ft)	0.008150	Area (sq ft)		44.81	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	10.10	Top Width (ft)		10.10	
Vel Total (ft/s)	15.89	Avg. Vel. (ft/s)		15.89	
Max Chl Dpth (ft)	4.46	Hydr. Depth (ft)		4.44	
Conv. Total (cfs)	7886.9	Conv. (cfs)		7886.9	
Length Wtd. (ft)	120.30	Wetted Per. (ft)		18.92	
Min Ch El (ft)	1437.85	Shear (lb/sq ft)		1.21	
Alpha	1.00	Stream Power (lb/ft s)		19.15	
Frctn Loss (ft)		Cum Volume (acre-ft)		2.05	
C & E Loss (ft)		Cum SA (acres)		0.77	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2261

INPUT
Description: Begin Channel Transition
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1442.97	76	1444.97	88	1444.73	100	1437.73	116	1438.05
127.36	1444.73	145	1449.96	170	1447.96				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	60	60	60	.1	.3

Left Levee Station= 88 Elevation= 1444.73

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1444.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.78	Wt. n-Val.		0.016	

SUPERSEDED

W.S. Elev (ft)	1439.96	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1441.35	Flow Area (sq ft)		40.58	
E.G. Slope (ft/ft)	0.017927	Area (sq ft)		40.58	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	23.09	Top Width (ft)		23.09	
Vel Total (ft/s)	17.54	Avg. Vel. (ft/s)		17.54	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	5317.7	Conv. (cfs)		5317.7	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		24.21	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		1.88	
Alpha	1.00	Stream Power (lb/ft s)		32.91	
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)		1.93	
C & E Loss (ft)	0.09	Cum SA (acres)		0.72	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2201

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.91	76	1443.91	88	1443.67	100	1437.67	116	1437.99
127.36	1443.67	145	1448.1	160	1446.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	101	101	101	.1	.3

Left Levee Station= 88 Elevation= 1443.67

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1443.47	Element	Left OB	Channel	Right OB

SUPERSEDED

Vel Head (ft)	3.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.19	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1441.22	Flow Area (sq ft)		48.99	
E.G. Slope (ft/ft)	0.010828	Area (sq ft)		48.99	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	25.45	Top Width (ft)		25.45	
Vel Total (ft/s)	14.53	Avg. Vel. (ft/s)		14.53	
Max Chl Dpth (ft)	2.52	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	6842.5	Conv. (cfs)		6842.5	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		26.56	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		1.25	
Alpha	1.00	Stream Power (lb/ft s)		18.12	
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)		1.87	
C & E Loss (ft)	0.45	Cum SA (acres)		0.69	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2100

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.81	76	1443.81	88	1443.57	100	1437.57	116	1437.89
127.36	1443.57	145	1448	160	1446				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	155	155	155	.1	.3

Left Levee Station= 88 Elevation= 1443.57

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1442.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.84	Reach Len. (ft)	155.00	155.00	155.00

SUPERSEDED

Crit W.S. (ft)	1441.12	Flow Area (sq ft)	99.63
E.G. Slope (ft/ft)	0.001434	Area (sq ft)	99.63
Q Total (cfs)	712.00	Flow (cfs)	712.00
Top Width (ft)	32.44	Top Width (ft)	32.44
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)	7.15
Max Chl Dpth (ft)	4.27	Hydr. Depth (ft)	3.07
Conv. Total (cfs)	18805.2	Conv. (cfs)	18805.2
Length Wtd. (ft)	155.00	Wetted Per. (ft)	34.39
Min Ch El (ft)	1437.57	Shear (lb/sq ft)	0.26
Alpha	1.00	Stream Power (lb/ft s)	1.85
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	1.69
C & E Loss (ft)	0.05	Cum SA (acres)	0.62

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1945

INPUT
Description: End Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.58	88	1443.41	100	1437.41	116	1437.73	127.36	1443.41
145	1445.77	170	1444.77						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 88 Elevation= 1443.42

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1442.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1440.98	Flow Area (sq ft)		77.82	

SUPERSEDED

E.G. Slope (ft/ft)	0.002875	Area (sq ft)	77.82
Q Total (cfs)	712.00	Flow (cfs)	712.00
Top Width (ft)	29.63	Top Width (ft)	29.63
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)	9.15
Max Chl Dpth (ft)	3.57	Hydr. Depth (ft)	2.63
Conv. Total (cfs)	13278.8	Conv. (cfs)	13278.8
Length Wtd. (ft)	38.00	Wetted Per. (ft)	31.25
Min Ch El (ft)	1437.41	Shear (lb/sq ft)	0.45
Alpha	1.00	Stream Power (lb/ft s)	4.09
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	1.38
C & E Loss (ft)	0.24	Cum SA (acres)	0.51

Warning: The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1907

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.78	100	1437.38	116	1437.7	127.36	1443.38	145	1445.74
170	1444.74								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	12	12	12	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

SUPERSEDED

E.G. Elev (ft)	1441.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.48	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.48	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)	1440.23	Flow Area (sq ft)		56.36	
E.G. Slope (ft/ft)	0.012155	Area (sq ft)		56.36	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	40.59	Top Width (ft)		40.59	
Vel Total (ft/s)	12.63	Avg. Vel. (ft/s)		12.63	
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	6458.0	Conv. (cfs)		6458.0	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		41.12	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		1.04	
Alpha	1.00	Stream Power (lb/ft s)		13.14	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)		1.32	
C & E Loss (ft)	0.12	Cum SA (acres)		0.48	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1895

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.77	100	1437.37	116	1437.69	127.36	1443.37	145	1445.73
170	1444.73								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.17	Wt. n-Val.		0.016	

SUPERSEDED

W.S. Elev (ft)	1439.57	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.22	Flow Area (sq ft)		60.26	
E.G. Slope (ft/ft)	0.010095	Area (sq ft)		60.26	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	41.73	Top Width (ft)		41.73	
Vel Total (ft/s)	11.82	Avg. Vel. (ft/s)		11.82	
Max Chl Dpth (ft)	2.20	Hydr. Depth (ft)		1.44	
Conv. Total (cfs)	7086.6	Conv. (cfs)		7086.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		42.28	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.90	
Alpha	1.00	Stream Power (lb/ft s)		10.61	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)		1.30	
C & E Loss (ft)	0.09	Cum SA (acres)		0.47	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1875

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.75	100	1437.35	116	1437.67	127.36	1443.35	145	1445.71
170	1444.71								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.97	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.20	Flow Area (sq ft)		123.18	
E.G. Slope (ft/ft)	0.001102	Area (sq ft)		123.18	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	45.79	Top Width (ft)		45.79	

SUPERSEDED

Vel Total (ft/s)	5.78	Avg. Vel. (ft/s)	5.78
Max Chl Dpth (ft)	3.62	Hydr. Depth (ft)	2.69
Conv. Total (cfs)	21446.5	Conv. (cfs)	21446.5
Length Wtd. (ft)	20.00	Wetted Per. (ft)	47.99
Min Ch El (ft)	1437.35	Shear (lb/sq ft)	0.18
Alpha	1.00	Stream Power (lb/ft s)	1.02
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1.26
C & E Loss (ft)	0.01	Cum SA (acres)	0.45

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1855

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.73	100	1437.33	116	1437.65	127.36	1443.33	145	1445.69
170	1444.69								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.97	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.14	Flow Area (sq ft)		124.33	
E.G. Slope (ft/ft)	0.001012	Area (sq ft)		124.33	
Q Total (cfs)	692.00	Flow (cfs)		692.00	
Top Width (ft)	45.84	Top Width (ft)		45.84	
Vel Total (ft/s)	5.57	Avg. Vel. (ft/s)		5.57	
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)		2.71	
Conv. Total (cfs)	21757.3	Conv. (cfs)		21757.3	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.07	

SUPERSEDED

Min Ch El (ft)	1437.33	Shear (lb/sq ft)	0.16
Alpha	1.00	Stream Power (lb/ft s)	0.91
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1.21
C & E Loss (ft)	0.03	Cum SA (acres)	0.43

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1835

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.71	100	1437.31	116	1437.63	127.36	1443.31	145	1445.67
170	1444.67								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.41	Element			
Vel Head (ft)	0.39	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.02	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.01	Flow Area (sq ft)		127.40	
E.G. Slope (ft/ft)	0.000790	Area (sq ft)		127.40	
Q Total (cfs)	635.00	Flow (cfs)		635.00	
Top Width (ft)	45.98	Top Width (ft)		45.98	
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)		4.98	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)		2.77	
Conv. Total (cfs)	22590.3	Conv. (cfs)		22590.3	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.29	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.65	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.03	Cum SA (acres)		0.40	

SUPERSEDED

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1815

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.69	100	1437.29	116	1437.61	127.36	1443.29	145	1445.65
170	1444.65								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.36	Element			
Vel Head (ft)	0.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.07	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.85	Flow Area (sq ft)		130.47	
E.G. Slope (ft/ft)	0.000592	Area (sq ft)		130.47	
Q Total (cfs)	570.00	Flow (cfs)		570.00	
Top Width (ft)	46.11	Top Width (ft)		46.11	
Vel Total (ft/s)	4.37	Avg. Vel. (ft/s)		4.37	
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)		2.83	
Conv. Total (cfs)	23436.4	Conv. (cfs)		23436.4	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.50	
Min Ch El (ft)	1437.29	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.43	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.09	
C & E Loss (ft)	0.02	Cum SA (acres)		0.38	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1795

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.67	100	1437.27	116	1437.59	127.36	1443.27	145	1445.63
170	1444.63								

Manning's n Values num= 3

SUPERSEDED

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.33	Element			
Vel Head (ft)	0.22	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.11	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.67	Flow Area (sq ft)		133.39	
E.G. Slope (ft/ft)	0.000422	Area (sq ft)		133.39	
Q Total (cfs)	498.00	Flow (cfs)		498.00	
Top Width (ft)	46.24	Top Width (ft)		46.24	
Vel Total (ft/s)	3.73	Avg. Vel. (ft/s)		3.73	
Max Chl Dpth (ft)	3.84	Hydr. Depth (ft)		2.88	
Conv. Total (cfs)	24250.0	Conv. (cfs)		24250.0	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.71	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.27	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.03	
C & E Loss (ft)	0.02	Cum SA (acres)		0.36	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1775

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.65	100	1437.25	116	1437.57	127.36	1443.25	145	1445.61
170	1444.61								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	15	15	15	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.30	Element			

SUPERSEDED

Vel Head (ft)	0.15	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.15	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)	1439.47	Flow Area (sq ft)		136.12	
E.G. Slope (ft/ft)	0.000283	Area (sq ft)		136.12	
Q Total (cfs)	421.00	Flow (cfs)		421.00	
Top Width (ft)	46.36	Top Width (ft)		46.36	
Vel Total (ft/s)	3.09	Avg. Vel. (ft/s)		3.09	
Max Chl Dpth (ft)	3.90	Hydr. Depth (ft)		2.94	
Conv. Total (cfs)	25017.4	Conv. (cfs)		25017.4	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		48.90	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.97	
C & E Loss (ft)	0.01	Cum SA (acres)		0.34	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1760

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.63	100	1437.23	116	1437.55	127.36	1443.23	145	1445.59
170	1444.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	18	18	18	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.18	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)	1439.27	Flow Area (sq ft)		138.30	
E.G. Slope (ft/ft)	0.000196	Area (sq ft)		138.30	
Q Total (cfs)	359.00	Flow (cfs)		359.00	

SUPERSEDED

Top Width (ft)	46.45	Top Width (ft)	46.45
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)	2.60
Max Chl Dpth (ft)	3.94	Hydr. Depth (ft)	2.98
Conv. Total (cfs)	25635.4	Conv. (cfs)	25635.4
Length Wtd. (ft)	18.00	Wetted Per. (ft)	49.05
Min Ch El (ft)	1437.23	Shear (lb/sq ft)	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.09
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.92
C & E Loss (ft)	0.01	Cum SA (acres)	0.33

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1742

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.61	100	1437.21	116	1437.53	127.36	1443.21	145	1445.57
170	1444.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.20	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1439.01	Flow Area (sq ft)		140.49	
E.G. Slope (ft/ft)	0.000115	Area (sq ft)		140.49	
Q Total (cfs)	281.00	Flow (cfs)		281.00	
Top Width (ft)	46.54	Top Width (ft)		46.54	
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)		2.00	
Max Chl Dpth (ft)	3.99	Hydr. Depth (ft)		3.02	
Conv. Total (cfs)	26259.8	Conv. (cfs)		26259.8	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		49.20	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	

SUPERSEDED

Alpha	1.00	Stream Power (lb/ft s)	0.04
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.86
C & E Loss (ft)	0.00	Cum SA (acres)	0.31

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1704

INPUT
Description: Begin Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.41	88	1443.17	100	1437.17	116	1437.49	127.36	1443.17
145	1445.53	170	1444.53						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	6	6	6	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.26	Element			
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.15	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)	1439.05	Flow Area (sq ft)		90.49	
E.G. Slope (ft/ft)	0.000196	Area (sq ft)		90.49	
Q Total (cfs)	230.00	Flow (cfs)		230.00	
Top Width (ft)	31.30	Top Width (ft)		31.30	
Vel Total (ft/s)	2.54	Avg. Vel. (ft/s)		2.54	
Max Chl Dpth (ft)	3.98	Hydr. Depth (ft)		2.89	
Conv. Total (cfs)	16428.8	Conv. (cfs)		16428.8	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		33.11	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.76	
C & E Loss (ft)	0.00	Cum SA (acres)		0.27	

SUPERSEDED

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1698

INPUT
Description: End Transistion
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.41	76	1443.41	88	1443.17	100	1437.17	116	1437.49
127.36	1443.17	145	1445.53	170	1444.53				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	30.3	30.3	30.3	.1	.3

Left Levee Station= 88 Elevation= 1443.17

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.25	Element			
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.15	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1439.05	Flow Area (sq ft)		90.45	
E.G. Slope (ft/ft)	0.000196	Area (sq ft)		90.45	
Q Total (cfs)	230.00	Flow (cfs)		230.00	
Top Width (ft)	31.29	Top Width (ft)		31.29	
Vel Total (ft/s)	2.54	Avg. Vel. (ft/s)		2.54	
Max Chl Dpth (ft)	3.98	Hydr. Depth (ft)		2.89	
Conv. Total (cfs)	16418.0	Conv. (cfs)		16418.0	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		33.10	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.75	
C & E Loss (ft)	0.01	Cum SA (acres)		0.27	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1668

INPUT

SUPERSEDED

Description: PT of Curve, Begin Transistion
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
66	1439.31	78	1442.38	90	1442.14	100	1437.14	110	1437.34
119.6	1442.14	145	1445.5	170	1444.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
66	.04	90	.016	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	124	131.3	145	.1	.3

Left Levee Station= 90 Elevation= 1442.14

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.24	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.06	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1439.42	Flow Area (sq ft)		67.30	
E.G. Slope (ft/ft)	0.000402	Area (sq ft)		67.30	
Q Total (cfs)	230.00	Flow (cfs)		230.00	
Top Width (ft)	25.26	Top Width (ft)		25.26	
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)		3.42	
Max Chl Dpth (ft)	3.92	Hydr. Depth (ft)		2.66	
Conv. Total (cfs)	11470.1	Conv. (cfs)		11470.1	
Length Wtd. (ft)	131.30	Wetted Per. (ft)		27.07	
Min Ch El (ft)	1437.14	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.21	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		0.69	
C & E Loss (ft)	0.00	Cum SA (acres)		0.25	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1537

INPUT
Description: PC of Curve
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
70	1440.03	78	1442.03	90	1442.01	100	1437.01	110	1437.21
119.6	1442.01	168	1442.15						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
70	.04	90	.016	119.6	.04

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

SUPERSEDED

90 119.6 103.8 103.8 103.8 .1 .3
Left Levee Station= 90 Elevation= 1442.01

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.02	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1439.28	Flow Area (sq ft)		69.57	
E.G. Slope (ft/ft)	0.000367	Area (sq ft)		69.57	
Q Total (cfs)	230.00	Flow (cfs)		230.00	
Top Width (ft)	25.62	Top Width (ft)		25.62	
Vel Total (ft/s)	3.31	Avg. Vel. (ft/s)		3.31	
Max Chl Dpth (ft)	4.01	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	12005.2	Conv. (cfs)		12005.2	
Length Wtd. (ft)	103.80	Wetted Per. (ft)		27.47	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.19	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.49	
C & E Loss (ft)	0.00	Cum SA (acres)		0.17	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1433

INPUT
Description: PT of Curve
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
70	1440.29	78	1442.14	90	1441.9	100	1436.9	110	1437.1
119.6	1441.9	168	1441.92						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
70	.04	90	.016	119.6	.04

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
90 119.6 88 82.7 45 .1 .3
Left Levee Station= 90 Elevation= 1441.9

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.99	Reach Len. (ft)	88.00	82.70	45.00

SUPERSEDED

Crit W.S. (ft)	1439.18	Flow Area (sq ft)	71.67
E.G. Slope (ft/ft)	0.000338	Area (sq ft)	71.67
Q Total (cfs)	230.00	Flow (cfs)	230.00
Top Width (ft)	25.95	Top Width (ft)	25.95
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	3.21
Max Chl Dpth (ft)	4.09	Hydr. Depth (ft)	2.76
Conv. Total (cfs)	12506.3	Conv. (cfs)	12506.3
Length Wtd. (ft)	82.70	Wetted Per. (ft)	27.83
Min Ch El (ft)	1436.90	Shear (lb/sq ft)	0.05
Alpha	1.00	Stream Power (lb/ft s)	0.17
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.32
C & E Loss (ft)	0.00	Cum SA (acres)	0.11

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1350

INPUT
Description: End of Transition
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
60	1442.02	90	1441.82	100	1436.82	110	1437.02	119.6	1441.82
132	1442.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
60	.04	90	.013	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	45.4	45.4	45.4	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.97	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		73.29	
E.G. Slope (ft/ft)	0.000210	Area (sq ft)		73.29	
Q Total (cfs)	230.00	Flow (cfs)		230.00	
Top Width (ft)	26.20	Top Width (ft)		26.20	
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)		3.14	
Max Chl Dpth (ft)	4.15	Hydr. Depth (ft)		2.80	

SUPERSEDED

Conv. Total (cfs)	15870.6	Conv. (cfs)	15870.6
Length Wtd. (ft)	45.40	Wetted Per. (ft)	28.11
Min Ch El (ft)	1436.82	Shear (lb/sq ft)	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.11
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.18
C & E Loss (ft)	0.04	Cum SA (acres)	0.06

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1305

INPUT
Description: Culvert Upstream Section
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.57	99.9	1441.78	100	1436.78	110	1436.78
110.1	1441.78	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.013	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	67.4	67.4	67.4	.1	.3

Left Levee Station= 95 Elevation= 1441.57

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.06	Element			
Vel Head (ft)	0.60	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.46	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1439.31	Flow Area (sq ft)		37.07	
E.G. Slope (ft/ft)	0.001072	Area (sq ft)		37.07	
Q Total (cfs)	230.00	Flow (cfs)		230.00	
Top Width (ft)	10.15	Top Width (ft)		10.15	
Vel Total (ft/s)	6.21	Avg. Vel. (ft/s)		6.21	
Max Chl Dpth (ft)	3.68	Hydr. Depth (ft)		3.65	
Conv. Total (cfs)	7024.9	Conv. (cfs)		7024.9	
Length Wtd. (ft)	67.40	Wetted Per. (ft)		17.36	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.14	

SUPERSEDED

Alpha	1.00	Stream Power (lb/ft s)	0.89
Frctn Loss (ft)		Cum Volume (acre-ft)	0.12
C & E Loss (ft)		Cum SA (acres)	0.04

CULVERT RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1270

INPUT
Description: Hawes Road Crossing
Distance from Upstream XS = 12
Deck/Roadway Width = 46
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 45
Upstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1441.3		50	1441.5		105	1442	
160	1441.8		230	1442				

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.57	99.9	1441.78	100	1436.78	110	1436.78
110.1	1441.78	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.013	110.1	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
99.9	110.1	.1	.3

Left Levee Station= 95 Elevation= 1441.57

Downstream Deck/Roadway Coordinates
num= 5

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1441.3		50	1441.5		105	1442	
160	1441.7		230	1442				

Downstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.5	99.9	1441.71	100	1436.71	110	1436.71
110.1	1441.71	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
99.9	110.1	.1	.3

Left Levee Station= 95 Elevation= 1441.5

Upstream Embankment side slope = 50 horiz. to 1.0 vertical
Downstream Embankment side slope = 50 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 1441.5
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

SUPERSEDED

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Box	4	10

FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 2 - Wingwall flared 18 to 33.7 deg.; inlet top edge bevel=0.083D
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	n Value	Entrance Loss Coef	Exit Loss Coef
	.4	66	.013	.2	.1

Upstream Elevation = 1436.78
Centerline Station = 105
Downstream Elevation = 1436.71
Centerline Station = 105

CULVERT OUTPUT Profile #PF 1
Culvert ID : Culvert #1

Culv Q (cfs)	230.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.66
Q Barrel (cfs)	230.00	Culv Vel DS (ft/s)	6.72
E.G. US. (ft)	1441.06	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1440.46	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1440.83	Culv Frctn Ls (ft)	0.09
W.S. DS (ft)	1440.15	Culv Ext Lss (ft)	0.00
Delta EG (ft)	0.23	Culv Ent Lss (ft)	0.14
Delta WS (ft)	0.31	Q Weir (cfs)	
E.G. IC (ft)	1440.71	Weir Sta Lft (ft)	
E.G. OC (ft)	1441.06	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1440.23	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1440.13	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.73	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	2.54	Min El Weir Flow (ft)	1441.58

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1237

INPUT
Description: Culvert Downstream Section
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.5	99.9	1441.71	100	1436.71	110	1436.71
110.1	1441.71	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	67.3	67.3	67.3	.1	.3

Left Levee Station= 95 Elevation= 1441.5

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.69	Wt. n-Val.		0.015	
W.S. Elev (ft)	1440.15	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1439.24	Flow Area (sq ft)		34.61	

SUPERSEDED

E.G. Slope (ft/ft)	0.001728	Area (sq ft)	34.61
Q Total (cfs)	230.00	Flow (cfs)	230.00
Top Width (ft)	10.14	Top Width (ft)	10.14
Vel Total (ft/s)	6.65	Avg. Vel. (ft/s)	6.65
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)	3.41
Conv. Total (cfs)	5533.7	Conv. (cfs)	5533.7
Length Wtd. (ft)	67.30	Wetted Per. (ft)	16.88
Min Ch El (ft)	1436.71	Shear (lb/sq ft)	0.22
Alpha	1.00	Stream Power (lb/ft s)	1.47
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.07
C & E Loss (ft)	0.01	Cum SA (acres)	0.03

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.89	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1439.57	Flow Area (sq ft)		53.66	
E.G. Slope (ft/ft)	0.002103	Area (sq ft)		53.66	
Q Total (cfs)	385.00	Flow (cfs)		385.00	
Top Width (ft)	23.01	Top Width (ft)		23.01	

SUPERSEDED

Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)	7.17
Max Chl Dpth (ft)	3.25	Hydr. Depth (ft)	2.33
Conv. Total (cfs)	8395.5	Conv. (cfs)	8395.5
Length Wtd. (ft)	0.00	Wetted Per. (ft)	24.54
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.29
Alpha	1.00	Stream Power (lb/ft s)	2.06
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	
C & E Loss (ft)	0.00	Cum SA (acres)	

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.89	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1439.57	Flow Area (sq ft)		53.66	
E.G. Slope (ft/ft)	0.002103	Area (sq ft)		53.66	
Q Total (cfs)	385.00	Flow (cfs)		385.00	
Top Width (ft)	23.01	Top Width (ft)		23.01	
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)		7.17	
Max Chl Dpth (ft)	3.25	Hydr. Depth (ft)		2.33	
Conv. Total (cfs)	8395.5	Conv. (cfs)		8395.5	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		24.54	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.29	

SUPERSEDED

Alpha	1.00	Stream Power (lb/ft s)	2.06
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	
C & E Loss (ft)	0.00	Cum SA (acres)	

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1150

INPUT
Description: Starting Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442	-4	1440.3	8	1440.33	38	1441.15	72	1440.7
77	1441.15	91	1441.1	100	1436.6	110	1436.6	119	1441.1
128	1441.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	150	150	150	.1	.3

Left Levee Station= 91 Elevation= 1441.1

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.64	Element			
Vel Head (ft)	0.83	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.81	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1439.53	Flow Area (sq ft)		52.80	
E.G. Slope (ft/ft)	0.002199	Area (sq ft)		52.80	
Q Total (cfs)	385.00	Flow (cfs)		385.00	
Top Width (ft)	22.86	Top Width (ft)		22.86	
Vel Total (ft/s)	7.29	Avg. Vel. (ft/s)		7.29	
Max Chl Dpth (ft)	3.21	Hydr. Depth (ft)		2.31	
Conv. Total (cfs)	8210.6	Conv. (cfs)		8210.6	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		24.37	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		2.17	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.00	Cum SA (acres)		0.08	

CROSS SECTION RIVER: South Hawes Chan

SUPERSEDED

REACH: 202L/US60 TI - 2 RS: 1000

INPUT
Description: Starting Downstream Channel Section
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1441.1	-4	1439.7	8	1440	38	1440.82	72	1440.2
77	1440.82	91	1440.77	100	1436.27	110	1436.27	119	1440.77
128	1441								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	0	0	0	.1	.3

Left Levee Station= 91 Elevation= 1440.77

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.31	Element			
Vel Head (ft)	0.83	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.48	Reach Len. (ft)			
Crit W.S. (ft)	1439.20	Flow Area (sq ft)		52.79	
E.G. Slope (ft/ft)	0.002201	Area (sq ft)		52.79	
Q Total (cfs)	385.00	Flow (cfs)		385.00	
Top Width (ft)	22.85	Top Width (ft)		22.85	
Vel Total (ft/s)	7.29	Avg. Vel. (ft/s)		7.29	
Max Chl Dpth (ft)	3.21	Hydr. Depth (ft)		2.31	
Conv. Total (cfs)	8207.0	Conv. (cfs)		8207.0	
Length Wtd. (ft)		Wetted Per. (ft)		24.37	
Min Ch El (ft)	1436.27	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		2.17	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Hawes Rd Channel

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1540	.04	.016	.04
202L/US60 TI - 2	1370	.04	.016	.04
202L/US60 TI - 2	1170	.04	.016	.04

SUPERSEDED

River:Southern Ave Sys

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	3490	.04	.025	.04
202L/US60 TI - 2	3365	.04	.015	.04
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	.04	.015	.04
202L/US60 TI - 2	2261	.04	.016	.04
202L/US60 TI - 2	2201	.04	.016	.04
202L/US60 TI - 2	2100	.04	.016	.04
202L/US60 TI - 2	1945	.04	.016	.04
202L/US60 TI - 2	1907	.04	.016	.04
202L/US60 TI - 2	1895	.04	.016	.04
202L/US60 TI - 2	1875	.04	.016	.04
202L/US60 TI - 2	1855	.04	.016	.04
202L/US60 TI - 2	1835	.04	.016	.04
202L/US60 TI - 2	1815	.04	.016	.04
202L/US60 TI - 2	1795	.04	.016	.04
202L/US60 TI - 2	1775	.04	.016	.04
202L/US60 TI - 2	1760	.04	.016	.04
202L/US60 TI - 2	1742	.04	.016	.04
202L/US60 TI - 2	1704	.04	.016	.04
202L/US60 TI - 2	1698	.04	.016	.04
202L/US60 TI - 2	1668	.04	.016	.04
202L/US60 TI - 2	1537	.04	.016	.04
202L/US60 TI - 2	1433	.04	.016	.04
202L/US60 TI - 2	1350	.04	.013	.04
202L/US60 TI - 2	1305	.04	.013	.04
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	.04	.015	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:South Hawes Chan

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1170	.04	.016	.04
202L/US60 TI - 2	1150	.04	.016	.04
202L/US60 TI - 2	1000	.04	.016	.04

SUMMARY OF REACH LENGTHS

River: Hawes Rd Channel

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1540	170	170	170
202L/US60 TI - 2	1370	200	200	200
202L/US60 TI - 2	1170	20	20	20

River: Southern Ave Sys

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	3490	125	125	125
202L/US60 TI - 2	3365	983.8	983.8	983.8
202L/US60 TI - 2	3000	Culvert		

SUPERSEDED

202L/US60 TI - 2	2381	120.3	120.3	120.3
202L/US60 TI - 2	2261	60	60	60
202L/US60 TI - 2	2201	101	101	101
202L/US60 TI - 2	2100	155	155	155
202L/US60 TI - 2	1945	38	38	38
202L/US60 TI - 2	1907	12	12	12
202L/US60 TI - 2	1895	20	20	20
202L/US60 TI - 2	1875	20	20	20
202L/US60 TI - 2	1855	20	20	20
202L/US60 TI - 2	1835	20	20	20
202L/US60 TI - 2	1815	20	20	20
202L/US60 TI - 2	1795	20	20	20
202L/US60 TI - 2	1775	15	15	15
202L/US60 TI - 2	1760	18	18	18
202L/US60 TI - 2	1742	38	38	38
202L/US60 TI - 2	1704	6	6	6
202L/US60 TI - 2	1698	30.3	30.3	30.3
202L/US60 TI - 2	1668	124	131.3	145
202L/US60 TI - 2	1537	103.8	103.8	103.8
202L/US60 TI - 2	1433	88	82.7	45
202L/US60 TI - 2	1350	45.4	45.4	45.4
202L/US60 TI - 2	1305	67.4	67.4	67.4
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	67.3	67.3	67.3
202L/US60 TI - 2	1170	20	20	20

River: South Hawes Chan

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1170	20	20	20
202L/US60 TI - 2	1150	150	150	150
202L/US60 TI - 2	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hawes Rd Channel

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1540	.1	.3
202L/US60 TI - 2	1370	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: Southern Ave Sys

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	3490	.1	.3
202L/US60 TI - 2	3365	.1	.3
202L/US60 TI - 2	3000	Culvert	
202L/US60 TI - 2	2381	.1	.3
202L/US60 TI - 2	2261	.1	.3
202L/US60 TI - 2	2201	.1	.3
202L/US60 TI - 2	2100	.1	.3
202L/US60 TI - 2	1945	.1	.3
202L/US60 TI - 2	1907	.1	.3
202L/US60 TI - 2	1895	.1	.3
202L/US60 TI - 2	1875	.1	.3
202L/US60 TI - 2	1855	.1	.3

SUPERSEDED

202L/US60 TI - 2	1835	.1	.3
202L/US60 TI - 2	1815	.1	.3
202L/US60 TI - 2	1795	.1	.3
202L/US60 TI - 2	1775	.1	.3
202L/US60 TI - 2	1760	.1	.3
202L/US60 TI - 2	1742	.1	.3
202L/US60 TI - 2	1704	.1	.3
202L/US60 TI - 2	1698	.1	.3
202L/US60 TI - 2	1668	.1	.3
202L/US60 TI - 2	1537	.1	.3
202L/US60 TI - 2	1433	.1	.3
202L/US60 TI - 2	1350	.1	.3
202L/US60 TI - 2	1305	.1	.3
202L/US60 TI - 2	1270	Culvert	
202L/US60 TI - 2	1237	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: South Hawes Chan

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1170	.1	.3
202L/US60 TI - 2	1150	.1	.3
202L/US60 TI - 2	1000	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : RMSA3

River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1370 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 1 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2201 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate
the need for additional cross sections.

SUPERSEDED

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2100 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was
used.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1875 Profile: PF 1
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

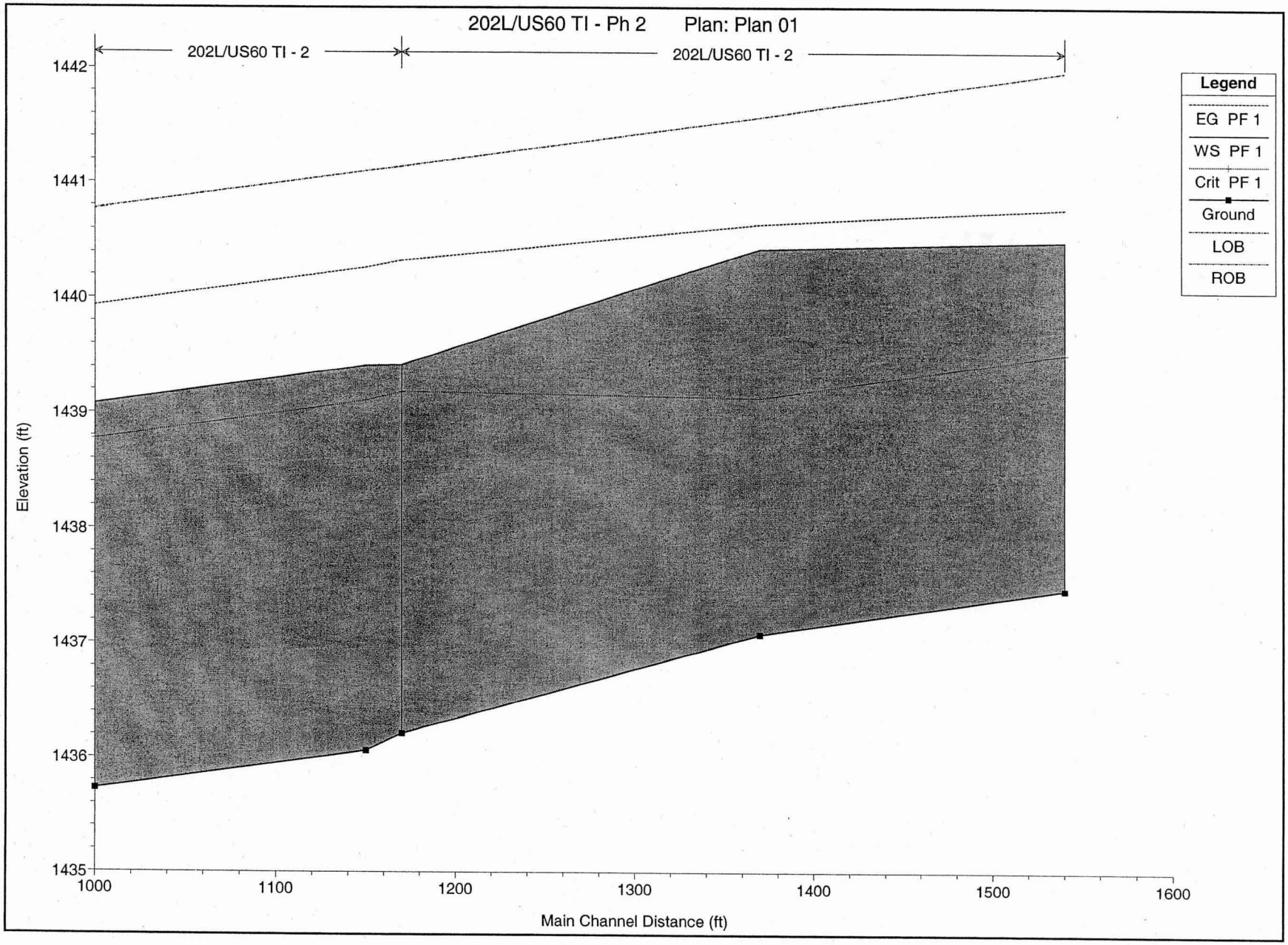
SUPERSEDED

BY 4/28/05 REVISIONS
BY PB

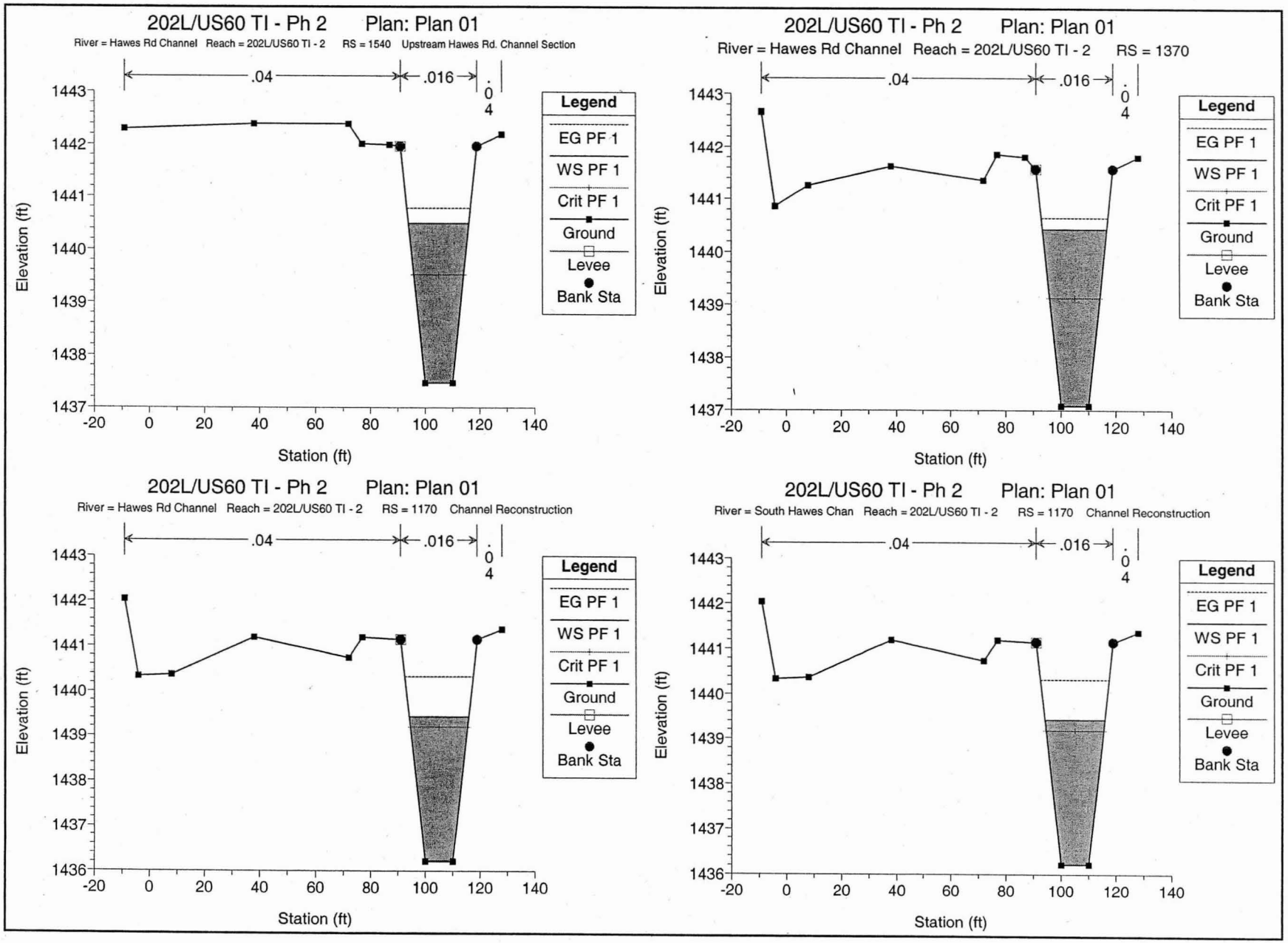
HEC-RAS Plan: Plan 01 Profile: PF 1

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)	
South Hawes Chan	202L/US60 TI - 2	1170	389.00	1436.21	1439.42	1439.19	1440.33	0.002392	7.64	50.94	21.73	0.88
South Hawes Chan	202L/US60 TI - 2	1150	389.00	1436.06	1439.41	1439.11	1440.27	0.002187	7.40	52.55	21.90	0.84
South Hawes Chan	202L/US60 TI - 2	1000	389.00	1435.73	1439.08	1438.77	1439.93	0.002201	7.42	52.42	21.88	0.85
Hawes Rd Channel	202L/US60 TI - 2	1540	208.00	1437.47	1440.50	1439.52	1440.78	0.000807	4.28	48.61	22.11	0.51
Hawes Rd Channel	202L/US60 TI - 2	1370	208.00	1437.08	1440.43	1439.13	1440.65	0.000545	3.71	56.00	23.41	0.42
Hawes Rd Channel	202L/US60 TI - 2	1170	389.00	1436.21	1439.42	1439.19	1440.33	0.002392	7.64	50.94	21.73	0.88

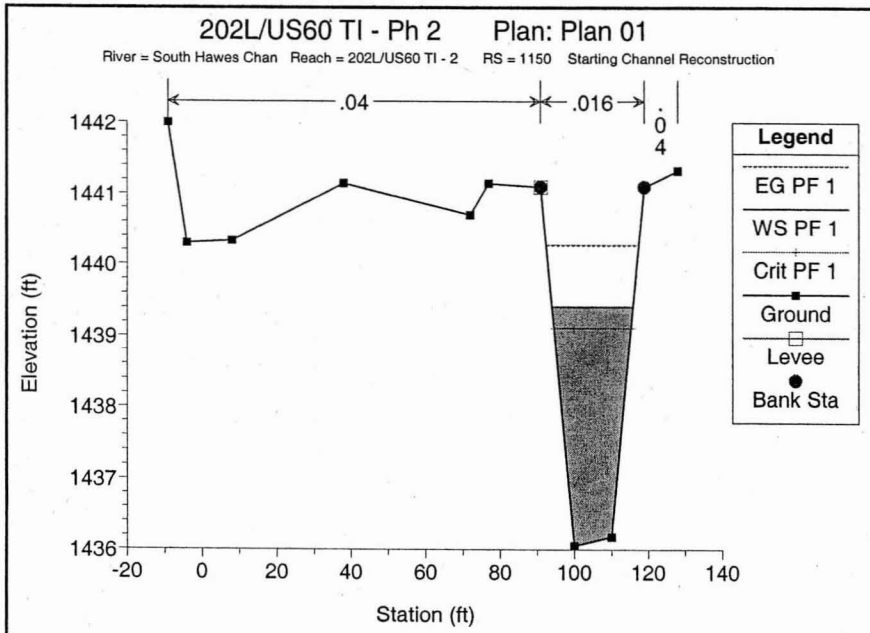
4/28/05
REVISIONS

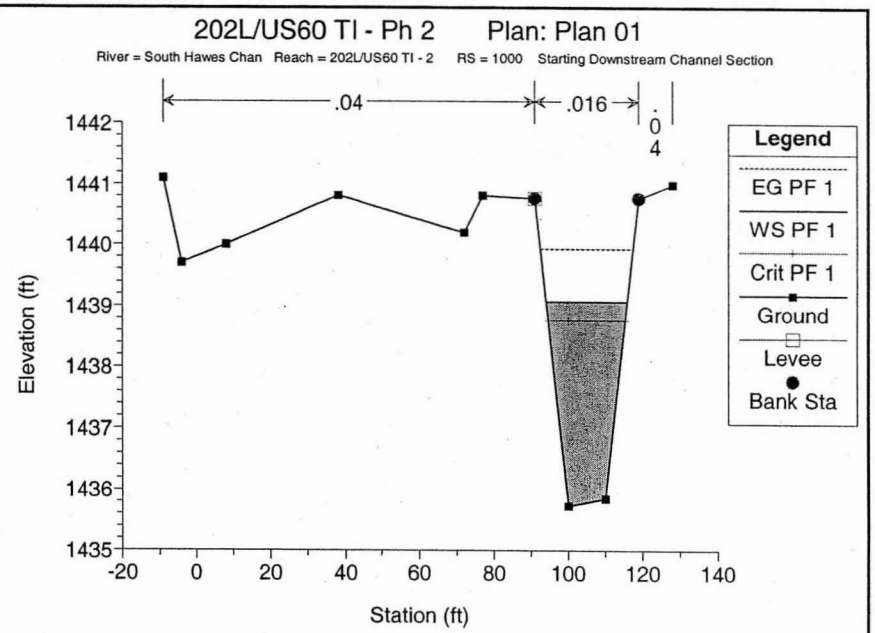


4/28/05
REVISIONS



4/28/05
REVISIONS





4/28/05
REVISIONS

4/28/05
REVISIONS
BY PB
(THIS ENTIRE
REPORT FILE
IS REVISED.)

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 202L/US60 TI - Ph 2
Project File : WSP100HC.prj
Run Date and Time: 4/26/2005 10:13:52 AM

Project in English units

Project Description:
202L/US60 Traffic Interchange - Phase 2
This model is to determine the
channel hydraulics for the 100-year peak flow in the Hawes Road Channel.

PLAN DATA

Plan Title: Plan 01
Plan File : 1:\11194\Phase2\HEC-RAS\V301\WSP100HC.p01

Geometry Title: 202L/US60 TI - Phase 2 FP
Geometry File : 1:\11194\Phase2\HEC-RAS\V301\WSP100HC.g02

Flow Title : 202L/US60 TI - Phase 2 FP
Flow File : 1:\11194\Phase2\HEC-RAS\V301\WSP100HC.f02

Plan Summary Information:
Number of: Cross Sections = 32 Mulitple Openings = 0
Culverts = 2 Inline Weirs = 0
Bridges = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
Flow tolerance factor = 0.001

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

FLOW DATA

Flow Title: 202L/US60 TI - Phase 2 FP
Flow File : 1:\11194\Phase2\HEC-RAS\V301\WSP100HC.f02

Flow Data (cfs)

River	Reach	RS	PF 1
Hawes Rd Channel	202L/US60 TI -	21540	208
Hawes Rd Channel	202L/US60 TI -	21170	389
Southern Ave Sys	202L/US60 TI -	23490	712
Southern Ave Sys	202L/US60 TI -	21897	694
Southern Ave Sys	202L/US60 TI -	21877	653
Southern Ave Sys	202L/US60 TI -	21857	607
Southern Ave Sys	202L/US60 TI -	21837	556
Southern Ave Sys	202L/US60 TI -	21817	500
Southern Ave Sys	202L/US60 TI -	21797	439
Southern Ave Sys	202L/US60 TI -	21777	374
Southern Ave Sys	202L/US60 TI -	21762	322
Southern Ave Sys	202L/US60 TI -	21744	256
Southern Ave Sys	202L/US60 TI -	21706	214
Southern Ave Sys	202L/US60 TI -	21170	389

South Hawes Chan202L/US60 TI - 21170	389
South Hawes Chan202L/US60 TI - 21000	389

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hawes Rd Channel	202L/US60 TI - 2	PF 1	Normal S = .0022	
Southern Ave Sys	202L/US60 TI - 2	PF 1	Normal S = 1E-11	
South Hawes Chan	202L/US60 TI - 2	PF 1		Normal S = .0022

GEOMETRY DATA

Geometry Title: 202L/US60 TI - Phase 2 FP
Geometry File : 1:\11194\Phase2\HEC-RAS\V301\WSP100HC.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Hawes Rd Channel	202L/US60 TI - 2		Confluence
Southern Ave Sys	202L/US60 TI - 2		Confluence
South Hawes Chan	202L/US60 TI - 2	Confluence	

JUNCTION INFORMATION

Name: Confluence
Description: Junction of Southern Ave Syst. w/ Hawes Rd Channel
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
Hawes Rd Channel	202L/US60 TI - 2	to	South Hawes Chan	202L/US60 TI - 2	0	
Southern Ave Sys	202L/US60 TI - 2	to	South Hawes Chan	202L/US60 TI - 2	0	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1540

INPUT
Description: Upstream Hawes Rd. Channel Section
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.3	38	1442.4	72	1442.4	77	1442.02	87	1442
91	1441.97	100	1437.47	110	1437.47	119	1441.97	128	1442.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	170	170	170	.1	.3

Left Levee Station= 91 Elevation= 1441.97

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.78	Element			
Vel Head (ft)	0.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.50	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1439.52	Flow Area (sq ft)		48.61	
E.G. Slope (ft/ft)	0.000807	Area (sq ft)		48.61	
Q Total (cfs)	208.00	Flow (cfs)		208.00	
Top Width (ft)	22.11	Top Width (ft)		22.11	
Vel Total (ft/s)	4.28	Avg. Vel. (ft/s)		4.28	
Max Chl Dpth (ft)	3.03	Hydr. Depth (ft)		2.20	
Conv. Total (cfs)	7321.4	Conv. (cfs)		7321.4	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		23.54	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.45	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)		0.45	
C & E Loss (ft)	0.02	Cum SA (acres)		0.19	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1370

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.66	-4	1440.86	8	1441.26	38	1441.63	72	1441.36
77	1441.86	87	1441.81	91	1441.58	100	1437.08	110	1437.08
119	1441.58	128	1441.81						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	200	200	200	.1	.3

Left Levee Station= 91 Elevation= 1441.58

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.43	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)	1439.13	Flow Area (sq ft)		56.00	
E.G. Slope (ft/ft)	0.000545	Area (sq ft)		56.00	
Q Total (cfs)	208.00	Flow (cfs)		208.00	
Top Width (ft)	23.41	Top Width (ft)		23.41	
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)		3.71	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		2.39	
Conv. Total (cfs)	8906.4	Conv. (cfs)		8906.4	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		24.99	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)		0.25	
C & E Loss (ft)	0.07	Cum SA (acres)		0.10	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.21	110	1436.21	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.42	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1439.19	Flow Area (sq ft)		50.94	
E.G. Slope (ft/ft)	0.002392	Area (sq ft)		50.94	
Q Total (cfs)	389.00	Flow (cfs)		389.00	
Top Width (ft)	21.73	Top Width (ft)		21.73	
Vel Total (ft/s)	7.64	Avg. Vel. (ft/s)		7.64	
Max Chl Dpth (ft)	3.21	Hydr. Depth (ft)		2.34	
Conv. Total (cfs)	7954.2	Conv. (cfs)		7954.2	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		23.37	
Min Ch El (ft)	1436.21	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.49	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)			
C & E Loss (ft)	0.00	Cum SA (acres)			

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3490

INPUT
Description: Southern Avenue Detention Basin
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
25	1457.58	45	1457.34	100	1445.6	225	1444.5	350	1445.6
390	1457.34	405	1457.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
25	.04	45	.025	390	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45	390	125	125	125	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1453.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1453.27	Reach Len. (ft)	125.00	125.00	125.00

Crit W.S. (ft)	1445.68	Flow Area (sq ft)		2293.30	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		2293.30	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	312.07	Top Width (ft)		312.07	
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)		0.31	
Max Chl Dpth (ft)	8.77	Hydr. Depth (ft)		7.35	
Conv. Total (cfs)	513107.3	Conv. (cfs)		513107.3	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		313.99	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01	6.71	0.04
C & E Loss (ft)	0.12	Cum SA (acres)	0.03	1.44	0.14

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3365

INPUT
Description: End RCB Culvert
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	983.8	983.8	983.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1453.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.	0.040	0.015	0.040
W.S. Elev (ft)	1451.95	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1449.37	Flow Area (sq ft)	0.77	80.31	3.39
E.G. Slope (ft/ft)	0.001646	Area (sq ft)	0.77	80.31	3.39
Q Total (cfs)	712.00	Flow (cfs)	0.52	709.15	2.33
Top Width (ft)	23.75	Top Width (ft)	2.51	10.20	11.04
Vel Total (ft/s)	8.43	Avg. Vel. (ft/s)	0.67	8.83	0.69
Max Chl Dpth (ft)	7.94	Hydr. Depth (ft)	0.31	7.87	0.31
Conv. Total (cfs)	17547.3	Conv. (cfs)	12.8	17477.1	57.4
Length Wtd. (ft)	983.80	Wetted Per. (ft)	2.59	24.66	11.06
Min Ch El (ft)	1444.00	Shear (lb/sq ft)	0.03	0.33	0.03
Alpha	1.09	Stream Power (lb/ft s)	0.02	2.96	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	3.30	0.04
C & E Loss (ft)		Cum SA (acres)	0.03	0.98	0.12

CULVERT RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3000

INPUT
Description: Southern Avenue Detention Basin Outlet
Distance from Upstream XS = 41
Deck/Roadway Width = 900
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1454.6		700	1454.6	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Coeff Contr.	Expan.
99.9	110.1	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	1450.4		200	1450.4	

Downstream Bridge Cross Section Data
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
     88 1447.09     99.9 1446.85     100 1437.85     110 1437.85   110.1 1446.85
    147 1450.46     168 1448.96

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3

Upstream Embankment side slope                =      10 horiz. to 1.0 vertical
Downstream Embankment side slope              =      12 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1          Box        6      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - Wingwall flared 45 deg.; inlet top edge bevel=0.43D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                  0   983.8       .013                   .2                .2
Upstream   Elevation =  1444
           Centerline Station =  105
Downstream Elevation =  1437.85
           Centerline Station =  105

CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 2381

INPUT
Description: End Channel Transition, Begin RCB
Station Elevation Data     num=        7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1447.09     99.9 1446.85     100 1437.85     110 1437.85   110.1 1446.85
    147 1450.46     168 1448.96

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1             120.3   120.3   120.3             .1       .3

CROSS SECTION OUTPUT     Profile #PF 1

  E.G. Elev (ft)            1446.23    Element                    Left OB    Channel   Right OB
  Vel Head (ft)                3.92    Wt. n-Val.                            0.015
  W.S. Elev (ft)            1442.31    Reach Len. (ft)            120.30     120.30     120.30
  Crit W.S. (ft)            1443.23    Flow Area (sq ft)                      44.81
  E.G. Slope (ft/ft)       0.008150    Area (sq ft)                           44.81
  Q Total (cfs)              712.00    Flow (cfs)                            712.00
  Top Width (ft)              10.10    Top Width (ft)                         10.10
  Vel Total (ft/s)            15.89    Avg. Vel. (ft/s)                       15.89
  Max Chl Dpth (ft)            4.46    Hydr. Depth (ft)                        4.44
  Conv. Total (cfs)          7886.9    Conv. (cfs)                           7886.9
  Length Wtd. (ft)           120.30    Wetted Per. (ft)                       18.92
  Min Ch El (ft)            1437.85    Shear (lb/sq ft)                        1.21
  Alpha                        1.00    Stream Power (lb/ft s)                 19.15
  Frctn Loss (ft)                      Cum Volume (acre-ft)                    1.89
  C & E Loss (ft)                      Cum SA (acres)                          0.75


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 2261

INPUT
Description: Begin Channel Transition
Station Elevation Data     num=        8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      68 1442.97      76 1444.97      88 1444.73     100 1437.73    116 1438.05
  127.36 1444.73     145 1449.96     170 1447.96

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
      68     .04     88    .016  127.36     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
           88  127.36              60      60      60             .1       .3
Left Levee       Station=      88      Elevation= 1444.73

CROSS SECTION OUTPUT     Profile #PF 1

  E.G. Elev (ft)            1444.74    Element                    Left OB    Channel   Right OB
```

Vel Head (ft)	4.78	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.96	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1441.35	Flow Area (sq ft)		40.58	
E.G. Slope (ft/ft)	0.017927	Area (sq ft)		40.58	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	23.09	Top Width (ft)		23.09	
Vel Total (ft/s)	17.54	Avg. Vel. (ft/s)		17.54	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	5317.7	Conv. (cfs)		5317.7	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		24.21	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		1.88	
Alpha	1.00	Stream Power (lb/ft s)		32.91	
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)		1.77	
C & E Loss (ft)	0.09	Cum SA (acres)		0.70	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2201

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.91	76	1443.91	88	1443.67	100	1437.67	116	1437.99
127.36	1443.67	145	1448.1	160	1446.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	101	101	101	.1	.3

Left Levee Station= 88 Elevation= 1443.67

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1443.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.19	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1441.22	Flow Area (sq ft)		48.99	
E.G. Slope (ft/ft)	0.010828	Area (sq ft)		48.99	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	25.45	Top Width (ft)		25.45	
Vel Total (ft/s)	14.53	Avg. Vel. (ft/s)		14.53	
Max Chl Dpth (ft)	2.52	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	6842.5	Conv. (cfs)		6842.5	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		26.56	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		1.25	
Alpha	1.00	Stream Power (lb/ft s)		18.12	
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)		1.71	
C & E Loss (ft)	0.45	Cum SA (acres)		0.67	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2100

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.81	76	1443.81	88	1443.57	100	1437.57	116	1437.89
127.36	1443.57	145	1448	160	1446				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	153	153	153	.1	.3

Left Levee Station= 88 Elevation= 1443.57

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1442.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.80	Wt. n-Val.		0.016	

W.S. Elev (ft)	1441.83	Reach Len. (ft)	153.00	153.00	153.00
Crit W.S. (ft)	1441.12	Flow Area (sq ft)		99.40	
E.G. Slope (ft/ft)	0.001443	Area (sq ft)		99.40	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	32.42	Top Width (ft)		32.42	
Vel Total (ft/s)	7.16	Avg. Vel. (ft/s)		7.16	
Max Chl Dpth (ft)	4.26	Hydr. Depth (ft)		3.07	
Conv. Total (cfs)	18743.5	Conv. (cfs)		18743.5	
Length Wtd. (ft)	153.00	Wetted Per. (ft)		34.36	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.87	
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)		1.54	
C & E Loss (ft)	0.05	Cum SA (acres)		0.60	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1947

INPUT
Description: End Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.58	88	1443.41	100	1437.41	116	1437.73	127.36	1443.41
145	1445.77	170	1444.77						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 88 Elevation= 1443.42

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1442.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1440.98	Flow Area (sq ft)		77.82	
E.G. Slope (ft/ft)	0.002875	Area (sq ft)		77.82	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	29.63	Top Width (ft)		29.63	
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		9.15	
Max Chl Dpth (ft)	3.57	Hydr. Depth (ft)		2.63	
Conv. Total (cfs)	13278.8	Conv. (cfs)		13278.8	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		31.25	
Min Ch El (ft)	1437.41	Shear (lb/sq ft)		0.45	
Alpha	1.00	Stream Power (lb/ft s)		4.09	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		1.23	
C & E Loss (ft)	0.18	Cum SA (acres)		0.49	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1909

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.78	100	1437.38	116	1437.7	127.36	1443.38	145	1445.74
170	1444.74								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	12	12	12	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.96	Element	Left OB	Channel	Right OB

Vel Head (ft)	2.48	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.48	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)	1440.23	Flow Area (sq ft)		56.36	
E.G. Slope (ft/ft)	0.012155	Area (sq ft)		56.36	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	40.59	Top Width (ft)		40.59	
Vel Total (ft/s)	12.63	Avg. Vel. (ft/s)		12.63	
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	6458.0	Conv. (cfs)		6458.0	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		41.12	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		1.04	
Alpha	1.00	Stream Power (lb/ft s)		13.14	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)		1.17	
C & E Loss (ft)	0.12	Cum SA (acres)		0.46	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1897

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.77	100	1437.37	116	1437.69	127.36	1443.37	145	1445.73
170	1444.73								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.25	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.50	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.18	Flow Area (sq ft)		57.63	
E.G. Slope (ft/ft)	0.010853	Area (sq ft)		57.63	
Q Total (cfs)	694.00	Flow (cfs)		694.00	
Top Width (ft)	40.96	Top Width (ft)		40.96	
Vel Total (ft/s)	12.04	Avg. Vel. (ft/s)		12.04	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	6661.8	Conv. (cfs)		6661.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.50	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.94	
Alpha	1.00	Stream Power (lb/ft s)		11.33	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.07	Cum SA (acres)		0.45	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1877

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.75	100	1437.35	116	1437.67	127.36	1443.35	145	1445.71
170	1444.71								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.98	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.49	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.08	Flow Area (sq ft)		57.78	
E.G. Slope (ft/ft)	0.009540	Area (sq ft)		57.78	
Q Total (cfs)	653.00	Flow (cfs)		653.00	
Top Width (ft)	41.01	Top Width (ft)		41.01	
Vel Total (ft/s)	11.30	Avg. Vel. (ft/s)		11.30	
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	6685.7	Conv. (cfs)		6685.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.55	

Min Ch El (ft)	1437.35	Shear (lb/sq ft)	0.83
Alpha	1.00	Stream Power (lb/ft s)	9.36
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	1.13
C & E Loss (ft)	0.08	Cum SA (acres)	0.43

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1857

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.73	100	1437.33	116	1437.65	127.36	1443.33	145	1445.69
170	1444.69								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.73	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.97	Flow Area (sq ft)		113.50	
E.G. Slope (ft/ft)	0.001032	Area (sq ft)		113.50	
Q Total (cfs)	607.00	Flow (cfs)		607.00	
Top Width (ft)	45.37	Top Width (ft)		45.37	
Vel Total (ft/s)	5.35	Avg. Vel. (ft/s)		5.35	
Max Chl Dpth (ft)	3.40	Hydr. Depth (ft)		2.50	
Conv. Total (cfs)	18892.2	Conv. (cfs)		18892.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		47.30	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.83	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		1.09	
C & E Loss (ft)	0.03	Cum SA (acres)		0.41	

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1837

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.71	100	1437.31	116	1437.63	127.36	1443.31	145	1445.67
170	1444.67								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.78	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.84	Flow Area (sq ft)		116.36	
E.G. Slope (ft/ft)	0.000802	Area (sq ft)		116.36	
Q Total (cfs)	556.00	Flow (cfs)		556.00	
Top Width (ft)	45.49	Top Width (ft)		45.49	
Vel Total (ft/s)	4.78	Avg. Vel. (ft/s)		4.78	
Max Chl Dpth (ft)	3.47	Hydr. Depth (ft)		2.56	
Conv. Total (cfs)	19635.7	Conv. (cfs)		19635.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		47.50	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.59	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.03	
C & E Loss (ft)	0.02	Cum SA (acres)		0.39	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1817

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
     76 1439.69     100 1437.29     116 1437.61  127.36 1443.29     145 1445.65
    170 1444.65

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
      76    .04       76    .016   127.36    .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36              20      20      20          .1          .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1441.09    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.27    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1440.82    Reach Len. (ft)             20.00     20.00      20.00
  Crit W.S. (ft)           1439.70    Flow Area (sq ft)                    119.13
  E.G. Slope (ft/ft)      0.000603    Area (sq ft)                         119.13
  Q Total (cfs)             500.00    Flow (cfs)                           500.00
  Top Width (ft)             45.62    Top Width (ft)                        45.62
  Vel Total (ft/s)            4.20    Avg. Vel. (ft/s)                       4.20
  Max Chl Dpth (ft)           3.53    Hydr. Depth (ft)                       2.61
  Conv. Total (cfs)        20366.0    Conv. (cfs)                         20366.0
  Length Wtd. (ft)           20.00    Wetted Per. (ft)                      47.70
  Min Ch El (ft)           1437.29    Shear (lb/sq ft)                       0.09
  Alpha                       1.00    Stream Power (lb/ft s)                 0.39
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)                   0.98
  C & E Loss (ft)             0.02    Cum SA (acres)                         0.37


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1797

INPUT
Description: Side Weir
Station Elevation Data      num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
      76 1439.67     100 1437.27     116 1437.59  127.36 1443.27     145 1445.63
    170 1444.63

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
      76    .04       76    .016   127.36    .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36              20      20      20          .1          .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1441.06    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.20    Wt. n-Val.                            0.016
  W.S. Elev (ft)           1440.86    Reach Len. (ft)             20.00     20.00      20.00
  Crit W.S. (ft)           1439.54    Flow Area (sq ft)                    121.77
  E.G. Slope (ft/ft)      0.000434    Area (sq ft)                         121.77
  Q Total (cfs)             439.00    Flow (cfs)                           439.00
  Top Width (ft)             45.73    Top Width (ft)                        45.73
  Vel Total (ft/s)            3.61    Avg. Vel. (ft/s)                       3.61
  Max Chl Dpth (ft)           3.59    Hydr. Depth (ft)                       2.66
  Conv. Total (cfs)        21069.1    Conv. (cfs)                         21069.1
  Length Wtd. (ft)           20.00    Wetted Per. (ft)                      47.89
  Min Ch El (ft)           1437.27    Shear (lb/sq ft)                       0.07
  Alpha                       1.00    Stream Power (lb/ft s)                 0.25
  Frctn Loss (ft)             0.01    Cum Volume (acre-ft)                   0.92
  C & E Loss (ft)             0.02    Cum SA (acres)                         0.35


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1777

INPUT
Description: Side Weir
Station Elevation Data      num=       6
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
      76 1439.65     100 1437.25     116 1437.57  127.36 1443.25     145 1445.61
    170 1444.61

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
      76    .04       76    .016   127.36    .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            76  127.36              15      15      15          .1          .3
Left Levee      Station=    76.8      Elevation= 1443.38

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)           1441.03    Element                    Left OB    Channel   Right OB
  Vel Head (ft)               0.14    Wt. n-Val.                            0.016
```

W.S. Elev (ft)	1440.89	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)	1439.34	Flow Area (sq ft)		124.26	
E.G. Slope (ft/ft)	0.000296	Area (sq ft)		124.26	
Q Total (cfs)	374.00	Flow (cfs)		374.00	
Top Width (ft)	45.84	Top Width (ft)		45.84	
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)		3.01	
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)		2.71	
Conv. Total (cfs)	21736.5	Conv. (cfs)		21736.5	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		48.06	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.87	
C & E Loss (ft)	0.01	Cum SA (acres)		0.33	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1762

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.63	100	1437.23	116	1437.55	127.36	1443.23	145	1445.59
170	1444.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	18	18	18	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.92	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)	1439.16	Flow Area (sq ft)		126.29	
E.G. Slope (ft/ft)	0.000209	Area (sq ft)		126.29	
Q Total (cfs)	322.00	Flow (cfs)		322.00	
Top Width (ft)	45.93	Top Width (ft)		45.93	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)		2.55	
Max Chl Dpth (ft)	3.68	Hydr. Depth (ft)		2.75	
Conv. Total (cfs)	22289.4	Conv. (cfs)		22289.4	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		48.21	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.82	
C & E Loss (ft)	0.01	Cum SA (acres)		0.31	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1744

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.61	100	1437.21	116	1437.53	127.36	1443.21	145	1445.57
170	1444.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1441.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.94	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1438.93	Flow Area (sq ft)		128.34	
E.G. Slope (ft/ft)	0.000126	Area (sq ft)		128.34	
Q Total (cfs)	256.00	Flow (cfs)		256.00	
Top Width (ft)	46.02	Top Width (ft)		46.02	
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)		1.99	
Max Chl Dpth (ft)	3.73	Hydr. Depth (ft)		2.79	
Conv. Total (cfs)	22848.1	Conv. (cfs)		22848.1	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		48.35	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.00	Cum SA (acres)		0.29	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1706

INPUT
Description: Begin Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.41	88	1443.17	100	1437.17	116	1437.49	127.36	1443.17
145	1445.53	170	1444.53						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	6	6	6	.1	.3

Left Levee Station= 76.8 Elevation= 1443.38

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.89	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)	1438.97	Flow Area (sq ft)		82.22	
E.G. Slope (ft/ft)	0.000222	Area (sq ft)		82.22	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	30.22	Top Width (ft)		30.22	
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)		2.60	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	14353.5	Conv. (cfs)		14353.5	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		31.90	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.68	
C & E Loss (ft)	0.00	Cum SA (acres)		0.26	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1700

INPUT
Description: End Transistion
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.41	76	1443.41	88	1443.17	100	1437.17	116	1437.49
127.36	1443.17	145	1445.53	170	1444.53				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	30.3	30.3	30.3	.1	.3

Left Levee Station= 88 Elevation= 1443.17

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.88	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.98	Flow Area (sq ft)		82.17	
E.G. Slope (ft/ft)	0.000223	Area (sq ft)		82.17	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	30.22	Top Width (ft)		30.22	
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)		2.60	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	14340.8	Conv. (cfs)		14340.8	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		31.90	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.67	
C & E Loss (ft)	0.01	Cum SA (acres)		0.25	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1670

INPUT
Description: PT of Curve, Begin Transistion
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
66	1439.31	78	1442.38	90	1442.14	100	1437.14	110	1437.34
119.6	1442.14	145	1445.5	170	1444.5				

```
Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      66    .04      90    .016    119.6    .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6             124   129.8     145          .1          .3
Left Levee       Station=      90      Elevation= 1442.14

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1440.97    Element                    Left OB    Channel   Right OB
  Vel Head (ft)              0.20    Wt. n-Val.                            0.016
  W.S. Elev (ft)          1440.78    Reach Len. (ft)            124.00     129.80    145.00
  Crit W.S. (ft)          1439.33    Flow Area (sq ft)                     60.38
  E.G. Slope (ft/ft)     0.000469    Area (sq ft)                          60.38
  Q Total (cfs)            214.00    Flow (cfs)                           214.00
  Top Width (ft)            24.14    Top Width (ft)                        24.14
  Vel Total (ft/s)           3.54    Avg. Vel. (ft/s)                       3.54
  Max Chl Dpth (ft)          3.64    Hydr. Depth (ft)                       2.50
  Conv. Total (cfs)         9880.3   Conv. (cfs)                          9880.3
  Length Wtd. (ft)          129.80   Wetted Per. (ft)                      25.81
  Min Ch El (ft)          1437.14    Shear (lb/sq ft)                       0.07
  Alpha                      1.00    Stream Power (lb/ft s)                 0.24
  Frctn Loss (ft)            0.06    Cum Volume (acre-ft)                   0.62
  C & E Loss (ft)            0.00    Cum SA (acres)                         0.24


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1540

INPUT
Description: PC of Curve
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      70 1440.03     78 1442.03     90 1442.01    100 1437.01    110 1437.21
   119.6 1442.01    168 1442.15

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      70    .04      90    .016    119.6    .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6             106.9   106.9   106.9          .1          .3
Left Levee       Station=      90      Elevation= 1442.01

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1440.91    Element                    Left OB    Channel   Right OB
  Vel Head (ft)              0.18    Wt. n-Val.                            0.016
  W.S. Elev (ft)          1440.73    Reach Len. (ft)            106.90     106.90    106.90
  Crit W.S. (ft)          1439.20    Flow Area (sq ft)                     62.37
  E.G. Slope (ft/ft)     0.000429    Area (sq ft)                          62.37
  Q Total (cfs)            214.00    Flow (cfs)                           214.00
  Top Width (ft)            24.47    Top Width (ft)                        24.47
  Vel Total (ft/s)           3.43    Avg. Vel. (ft/s)                       3.43
  Max Chl Dpth (ft)          3.72    Hydr. Depth (ft)                       2.55
  Conv. Total (cfs)        10331.0   Conv. (cfs)                         10331.0
  Length Wtd. (ft)          106.90   Wetted Per. (ft)                      26.18
  Min Ch El (ft)          1437.01    Shear (lb/sq ft)                       0.06
  Alpha                      1.00    Stream Power (lb/ft s)                 0.22
  Frctn Loss (ft)            0.04    Cum Volume (acre-ft)                   0.44
  C & E Loss (ft)            0.00    Cum SA (acres)                         0.16


CROSS SECTION          RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1433

INPUT
Description: PT of Curve
Station Elevation Data     num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      70 1440.29     78 1442.14     90  1441.9    100  1436.9    110  1437.1
   119.6  1441.9    168 1441.92

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      70    .04      90    .016    119.6    .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6              88    72.8     45          .1          .3
Left Levee       Station=      90      Elevation=  1441.9

CROSS SECTION OUTPUT    Profile #PF 1

  E.G. Elev (ft)          1440.86    Element                    Left OB    Channel   Right OB
  Vel Head (ft)              0.17    Wt. n-Val.                            0.016
  W.S. Elev (ft)          1440.69    Reach Len. (ft)             88.00     72.80     45.00
  Crit W.S. (ft)          1439.08    Flow Area (sq ft)                     64.16
```

E.G. Slope (ft/ft)	0.000397	Area (sq ft)	64.16
Q Total (cfs)	214.00	Flow (cfs)	214.00
Top Width (ft)	24.76	Top Width (ft)	24.76
Vel Total (ft/s)	3.34	Avg. Vel. (ft/s)	3.34
Max Chl Dpth (ft)	3.79	Hydr. Depth (ft)	2.59
Conv. Total (cfs)	10742.1	Conv. (cfs)	10742.1
Length Wtd. (ft)	72.80	Wetted Per. (ft)	26.51
Min Ch El (ft)	1436.90	Shear (lb/sq ft)	0.06
Alpha	1.00	Stream Power (lb/ft s)	0.20
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.28
C & E Loss (ft)	0.00	Cum SA (acres)	0.10

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1360

INPUT
Description: End of Transition
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
60	1442.02	90	1441.82	100	1436.83	110	1437.03	119.6	1441.82
132	1442.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
60	.04	90	.013	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	45.3	45.3	45.3	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.67	Reach Len. (ft)	45.30	45.30	45.30
Crit W.S. (ft)		Flow Area (sq ft)		65.46	
E.G. Slope (ft/ft)	0.000248	Area (sq ft)		65.46	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	24.99	Top Width (ft)		24.99	
Vel Total (ft/s)	3.27	Avg. Vel. (ft/s)		3.27	
Max Chl Dpth (ft)	3.84	Hydr. Depth (ft)		2.62	
Conv. Total (cfs)	13585.0	Conv. (cfs)		13585.0	
Length Wtd. (ft)	45.30	Wetted Per. (ft)		26.76	
Min Ch El (ft)	1436.83	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.17	
C & E Loss (ft)	0.05	Cum SA (acres)		0.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1315

INPUT
Description: Culvert Upstream Section
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.57	99.9	1441.78	100	1436.78	110	1436.78
110.1	1441.78	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.013	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	78	78	78	.1	.3

Left Levee Station= 95 Elevation= 1441.57

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.15	Reach Len. (ft)	78.00	78.00	78.00
Crit W.S. (ft)	1439.19	Flow Area (sq ft)		33.94	
E.G. Slope (ft/ft)	0.001187	Area (sq ft)		33.94	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	10.13	Top Width (ft)		10.13	
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)		6.31	
Max Chl Dpth (ft)	3.37	Hydr. Depth (ft)		3.35	
Conv. Total (cfs)	6212.7	Conv. (cfs)		6212.7	
Length Wtd. (ft)	78.00	Wetted Per. (ft)		16.74	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.95	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.12	
C & E Loss (ft)		Cum SA (acres)		0.04	

```
CULVERT                    RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1270

INPUT
Description: Hawes Road Crossing
Distance from Upstream XS =       12
Deck/Roadway Width        =       46
Weir Coefficient          =      2.6
Bridge Deck/Roadway Skew  =       45
Upstream  Deck/Roadway Coordinates
    num=        5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1441.3              50  1441.5              105    1442
     160  1441.8             230    1442

Upstream Bridge Cross Section Data
Station Elevation Data    num=        8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95 1441.57    99.9 1441.78     100 1436.78     110 1436.78
   110.1 1441.78     115  1441.6 230.001    1442

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .013   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1            .1        .3
Left Levee      Station=      95      Elevation= 1441.57

Downstream  Deck/Roadway Coordinates
    num=        5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1441.3              50  1441.5              105    1442
     160  1441.7             230    1442

Downstream Bridge Cross Section Data
Station Elevation Data    num=        8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
   110.1 1441.71     115  1441.6 230.001    1442

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1            .1        .3
Left Levee      Station=      95      Elevation=  1441.5

Upstream Embankment side slope              =      50 horiz. to 1.0 vertical
Downstream Embankment side slope            =      50 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =  1441.5
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1         Box        4      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 2 - Wingwall flared 18 to 33.7 deg.; inlet top edge bevel=0.083D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                  0      78       .013                  .2               .1
Upstream   Elevation =  1436.78
           Centerline Station =  105
Downstream Elevation =  1436.71
           Centerline Station =  105

CROSS SECTION            RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 1237

INPUT
Description: Culvert Downstream Section
Station Elevation Data    num=        8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
   110.1 1441.71     115  1441.6 230.001    1442

Manning's n Values        num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          99.9   110.1             67.3    67.3    67.3            .1        .3
Left Levee      Station=      95      Elevation=  1441.5
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.015	
W.S. Elev (ft)	1439.73	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1439.13	Flow Area (sq ft)		30.34	
E.G. Slope (ft/ft)	0.002165	Area (sq ft)		30.34	
Q Total (cfs)	214.00	Flow (cfs)		214.00	
Top Width (ft)	10.12	Top Width (ft)		10.12	
Vel Total (ft/s)	7.05	Avg. Vel. (ft/s)		7.05	
Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)		3.00	
Conv. Total (cfs)	4598.9	Conv. (cfs)		4598.9	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		16.03	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.80	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		0.06	
C & E Loss (ft)	0.01	Cum SA (acres)		0.02	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.21	110	1436.21	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.90	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.43	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1439.19	Flow Area (sq ft)		51.11	
E.G. Slope (ft/ft)	0.002370	Area (sq ft)		51.11	
Q Total (cfs)	389.00	Flow (cfs)		389.00	
Top Width (ft)	21.75	Top Width (ft)		21.75	
Vel Total (ft/s)	7.61	Avg. Vel. (ft/s)		7.61	
Max Chl Dpth (ft)	3.22	Hydr. Depth (ft)		2.35	
Conv. Total (cfs)	7990.5	Conv. (cfs)		7990.5	
Length Wtd. (ft)	0.00	Wetted Per. (ft)		23.40	
Min Ch El (ft)	1436.21	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		2.46	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)			
C & E Loss (ft)	0.00	Cum SA (acres)			

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.21	110	1436.21	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

Left Levee Station= 91 Elevation= 1441.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.90	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.43	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1439.19	Flow Area (sq ft)		51.11	
E.G. Slope (ft/ft)	0.002370	Area (sq ft)		51.11	
Q Total (cfs)	389.00	Flow (cfs)		389.00	
Top Width (ft)	21.75	Top Width (ft)		21.75	
Vel Total (ft/s)	7.61	Avg. Vel. (ft/s)		7.61	

Max Chl Dpth (ft)	3.22	Hydr. Depth (ft)	2.35
Conv. Total (cfs)	7990.5	Conv. (cfs)	7990.5
Length Wtd. (ft)	0.00	Wetted Per. (ft)	23.40
Min Ch El (ft)	1436.21	Shear (lb/sq ft)	0.32
Alpha	1.00	Stream Power (lb/ft s)	2.46
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	
C & E Loss (ft)	0.00	Cum SA (acres)	

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1150

INPUT
Description: Starting Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442	-4	1440.3	8	1440.33	38	1441.15	72	1440.7
77	1441.15	91	1441.1	100	1436.06	110	1436.18	119	1441.1
128	1441.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	150	150	150	.1	.3

Left Levee Station= 91 Elevation= 1441.1

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.27	Element			
Vel Head (ft)	0.85	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1439.11	Flow Area (sq ft)		52.55	
E.G. Slope (ft/ft)	0.002187	Area (sq ft)		52.55	
Q Total (cfs)	389.00	Flow (cfs)		389.00	
Top Width (ft)	21.90	Top Width (ft)		21.90	
Vel Total (ft/s)	7.40	Avg. Vel. (ft/s)		7.40	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		2.40	
Conv. Total (cfs)	8319.1	Conv. (cfs)		8319.1	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		23.61	
Min Ch El (ft)	1436.06	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		2.25	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.00	Cum SA (acres)		0.08	

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1000

INPUT
Description: Starting Downstream Channel Section
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1441.1	-4	1439.7	8	1440	38	1440.82	72	1440.2
77	1440.82	91	1440.77	100	1435.73	110	1435.85	119	1440.77
128	1441								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	0	0	0	.1	.3

Left Levee Station= 91 Elevation= 1440.77

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.93	Element			
Vel Head (ft)	0.86	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.08	Reach Len. (ft)			
Crit W.S. (ft)	1438.77	Flow Area (sq ft)		52.42	
E.G. Slope (ft/ft)	0.002201	Area (sq ft)		52.42	
Q Total (cfs)	389.00	Flow (cfs)		389.00	
Top Width (ft)	21.88	Top Width (ft)		21.88	
Vel Total (ft/s)	7.42	Avg. Vel. (ft/s)		7.42	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		2.40	
Conv. Total (cfs)	8290.8	Conv. (cfs)		8290.8	
Length Wtd. (ft)		Wetted Per. (ft)		23.58	
Min Ch El (ft)	1435.73	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.27	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Hawes Rd Channel

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1540	.04	.016	.04
202L/US60 TI - 2	1370	.04	.016	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:Southern Ave Sys

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	3490	.04	.025	.04
202L/US60 TI - 2	3365	.04	.015	.04
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	.04	.015	.04
202L/US60 TI - 2	2261	.04	.016	.04
202L/US60 TI - 2	2201	.04	.016	.04
202L/US60 TI - 2	2100	.04	.016	.04
202L/US60 TI - 2	1947	.04	.016	.04
202L/US60 TI - 2	1909	.04	.016	.04
202L/US60 TI - 2	1897	.04	.016	.04
202L/US60 TI - 2	1877	.04	.016	.04
202L/US60 TI - 2	1857	.04	.016	.04
202L/US60 TI - 2	1837	.04	.016	.04
202L/US60 TI - 2	1817	.04	.016	.04
202L/US60 TI - 2	1797	.04	.016	.04
202L/US60 TI - 2	1777	.04	.016	.04
202L/US60 TI - 2	1762	.04	.016	.04
202L/US60 TI - 2	1744	.04	.016	.04
202L/US60 TI - 2	1706	.04	.016	.04
202L/US60 TI - 2	1700	.04	.016	.04
202L/US60 TI - 2	1670	.04	.016	.04
202L/US60 TI - 2	1540	.04	.016	.04
202L/US60 TI - 2	1433	.04	.016	.04
202L/US60 TI - 2	1360	.04	.013	.04
202L/US60 TI - 2	1315	.04	.013	.04
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	.04	.015	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:South Hawes Chan

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1170	.04	.016	.04
202L/US60 TI - 2	1150	.04	.016	.04
202L/US60 TI - 2	1000	.04	.016	.04

SUMMARY OF REACH LENGTHS

River: Hawes Rd Channel

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1540	170	170	170
202L/US60 TI - 2	1370	200	200	200
202L/US60 TI - 2	1170	20	20	20

River: Southern Ave Sys

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	3490	125	125	125
202L/US60 TI - 2	3365	983.8	983.8	983.8
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	120.3	120.3	120.3
202L/US60 TI - 2	2261	60	60	60
202L/US60 TI - 2	2201	101	101	101
202L/US60 TI - 2	2100	153	153	153
202L/US60 TI - 2	1947	38	38	38
202L/US60 TI - 2	1909	12	12	12
202L/US60 TI - 2	1897	20	20	20
202L/US60 TI - 2	1877	20	20	20
202L/US60 TI - 2	1857	20	20	20
202L/US60 TI - 2	1837	20	20	20
202L/US60 TI - 2	1817	20	20	20
202L/US60 TI - 2	1797	20	20	20
202L/US60 TI - 2	1777	15	15	15
202L/US60 TI - 2	1762	18	18	18
202L/US60 TI - 2	1744	38	38	38
202L/US60 TI - 2	1706	6	6	6
202L/US60 TI - 2	1700	30.3	30.3	30.3

202L/US60 TI - 2	1670	124	129.8	145
202L/US60 TI - 2	1540	106.9	106.9	106.9
202L/US60 TI - 2	1433	88	72.8	45
202L/US60 TI - 2	1360	45.3	45.3	45.3
202L/US60 TI - 2	1315	78	78	78
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	67.3	67.3	67.3
202L/US60 TI - 2	1170	20	20	20

River: South Hawes Chan

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1170	20	20	20
202L/US60 TI - 2	1150	150	150	150
202L/US60 TI - 2	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hawes Rd Channel

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1540	.1	.3
202L/US60 TI - 2	1370	.1	.3
202L/US60 TI - 2	1170	.1	.3

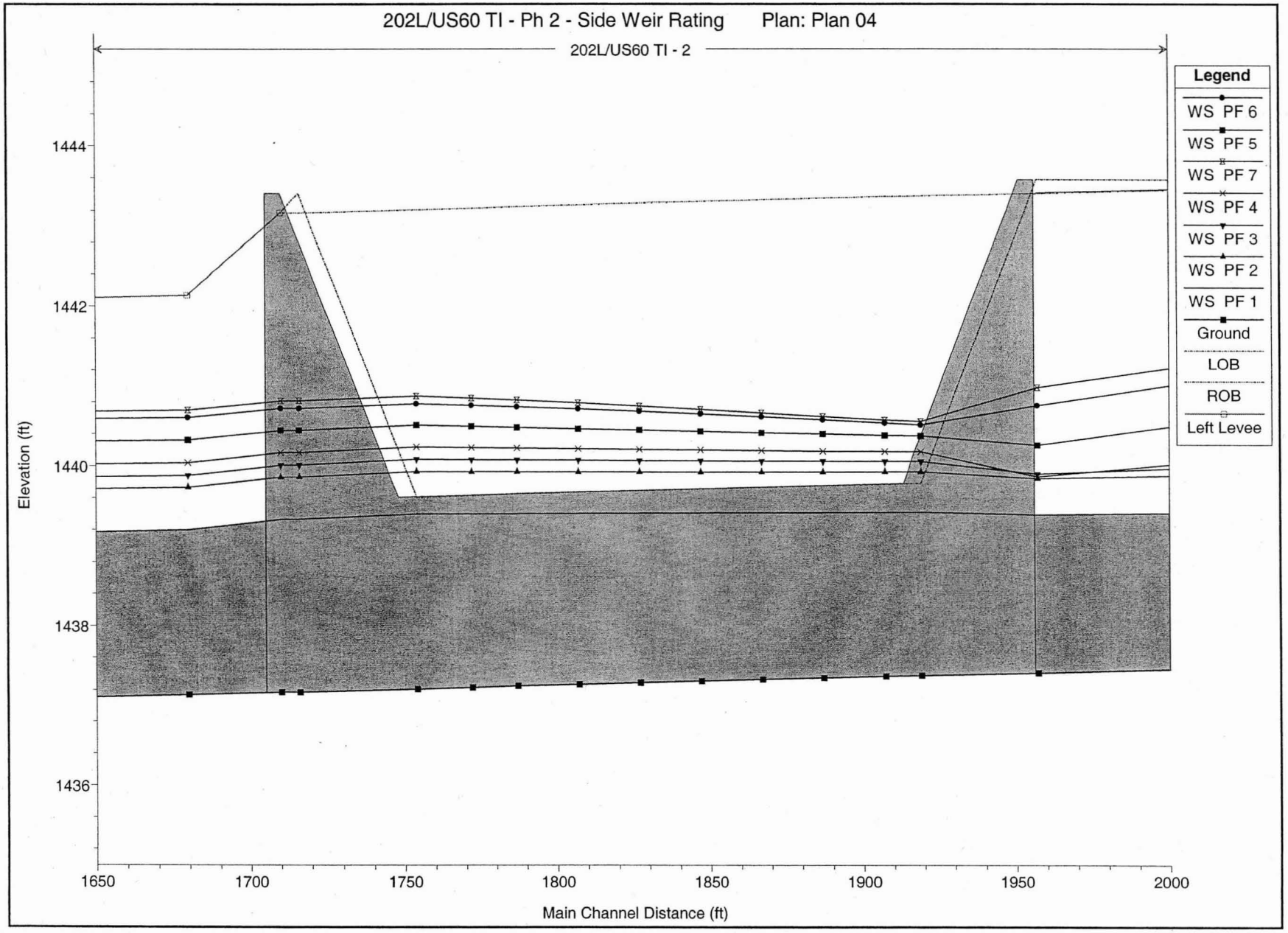
River: Southern Ave Sys

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	3490	.1	.3
202L/US60 TI - 2	3365	.1	.3
202L/US60 TI - 2	3000	Culvert	
202L/US60 TI - 2	2381	.1	.3
202L/US60 TI - 2	2261	.1	.3
202L/US60 TI - 2	2201	.1	.3
202L/US60 TI - 2	2100	.1	.3
202L/US60 TI - 2	1947	.1	.3
202L/US60 TI - 2	1909	.1	.3
202L/US60 TI - 2	1897	.1	.3
202L/US60 TI - 2	1877	.1	.3
202L/US60 TI - 2	1857	.1	.3
202L/US60 TI - 2	1837	.1	.3
202L/US60 TI - 2	1817	.1	.3
202L/US60 TI - 2	1797	.1	.3
202L/US60 TI - 2	1777	.1	.3
202L/US60 TI - 2	1762	.1	.3
202L/US60 TI - 2	1744	.1	.3
202L/US60 TI - 2	1706	.1	.3
202L/US60 TI - 2	1700	.1	.3
202L/US60 TI - 2	1670	.1	.3
202L/US60 TI - 2	1540	.1	.3
202L/US60 TI - 2	1433	.1	.3
202L/US60 TI - 2	1360	.1	.3
202L/US60 TI - 2	1315	.1	.3
202L/US60 TI - 2	1270	Culvert	
202L/US60 TI - 2	1237	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: South Hawes Chan

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1170	.1	.3
202L/US60 TI - 2	1150	.1	.3
202L/US60 TI - 2	1000	.1	.3

HEC-RAS Output for Lateral Weir Rating Curve



4/28/05
REVISION
BY PB

HEC-RAS Plan: RMSAweir

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South Hawes Chan	202L/US60 TI - 2	1170	PF 1	97.00	1436.64	1438.18		1438.54	0.002118	4.81	20.17	16.17	0.76
South Hawes Chan	202L/US60 TI - 2	1170	PF 2	136.78	1436.64	1438.51		1438.95	0.002110	5.33	25.65	17.47	0.78
South Hawes Chan	202L/US60 TI - 2	1170	PF 3	151.79	1436.64	1438.62		1439.09	0.002112	5.50	27.58	17.91	0.78
South Hawes Chan	202L/US60 TI - 2	1170	PF 4	175.73	1436.64	1438.78		1439.29	0.002125	5.76	30.51	18.55	0.79
South Hawes Chan	202L/US60 TI - 2	1170	PF 5	271.11	1436.64	1439.34		1440.00	0.002130	6.53	41.50	20.78	0.81
South Hawes Chan	202L/US60 TI - 2	1170	PF 6	323.73	1436.64	1439.60		1440.33	0.002127	6.86	47.17	21.85	0.82
South Hawes Chan	202L/US60 TI - 2	1170	PF 7	230.85	1436.64	1439.12	1438.82	1439.72	0.002126	6.23	37.03	19.90	0.81
South Hawes Chan	202L/US60 TI - 2	1150	PF 1	97.00	1436.60	1438.13	1437.90	1438.49	0.002198	4.87	19.91	16.10	0.77
South Hawes Chan	202L/US60 TI - 2	1150	PF 2	136.78	1436.60	1438.45	1438.20	1438.90	0.002182	5.40	25.35	17.40	0.79
South Hawes Chan	202L/US60 TI - 2	1150	PF 3	151.79	1436.60	1438.56	1438.30	1439.04	0.002182	5.57	27.27	17.84	0.79
South Hawes Chan	202L/US60 TI - 2	1150	PF 4	175.73	1436.60	1438.72		1439.25	0.002197	5.83	30.16	18.47	0.80
South Hawes Chan	202L/US60 TI - 2	1150	PF 5	271.11	1436.60	1439.27	1438.99	1439.95	0.002199	6.61	41.03	20.69	0.83
South Hawes Chan	202L/US60 TI - 2	1150	PF 6	323.73	1436.60	1439.54		1440.29	0.002193	6.94	46.64	21.75	0.84
South Hawes Chan	202L/US60 TI - 2	1150	PF 7	230.85	1436.60	1439.06		1439.67	0.002195	6.31	36.61	19.82	0.82
South Hawes Chan	202L/US60 TI - 2	1000	PF 1	97.00	1436.27	1437.79	1437.57	1438.16	0.002204	4.88	19.89	16.10	0.77
South Hawes Chan	202L/US60 TI - 2	1000	PF 2	136.78	1436.27	1438.12	1437.87	1438.57	0.002202	5.41	25.27	17.38	0.79
South Hawes Chan	202L/US60 TI - 2	1000	PF 3	151.79	1436.27	1438.23	1437.97	1438.71	0.002201	5.58	27.19	17.82	0.80
South Hawes Chan	202L/US60 TI - 2	1000	PF 4	175.73	1436.27	1438.39	1438.13	1438.92	0.002201	5.83	30.14	18.47	0.80
South Hawes Chan	202L/US60 TI - 2	1000	PF 5	271.11	1436.27	1438.94	1438.66	1439.62	0.002203	6.61	41.00	20.69	0.83
South Hawes Chan	202L/US60 TI - 2	1000	PF 6	323.73	1436.27	1439.21	1438.92	1439.96	0.002202	6.95	46.58	21.74	0.84
South Hawes Chan	202L/US60 TI - 2	1000	PF 7	230.85	1436.27	1438.72	1438.45	1439.34	0.002200	6.31	36.57	19.81	0.82
Southern Ave Sys	202L/US60 TI - 2	3490	PF 1	96.00	1444.50	1446.35	1445.03	1446.35	0.000018	0.29	326.18	256.03	0.05
Southern Ave Sys	202L/US60 TI - 2	3490	PF 2	185.00	1444.50	1447.63	1445.19	1447.63	0.000007	0.28	660.34	266.39	0.03
Southern Ave Sys	202L/US60 TI - 2	3490	PF 3	248.00	1444.50	1448.41	1445.28	1448.41	0.000005	0.28	871.10	272.71	0.03
Southern Ave Sys	202L/US60 TI - 2	3490	PF 4	324.00	1444.50	1449.27	1445.37	1449.27	0.000004	0.29	1108.48	279.67	0.03
Southern Ave Sys	202L/US60 TI - 2	3490	PF 5	480.00	1444.50	1450.84	1445.52	1450.85	0.000003	0.31	1559.73	292.43	0.02
Southern Ave Sys	202L/US60 TI - 2	3490	PF 6	644.00	1444.50	1452.48	1445.64	1452.48	0.000002	0.31	2048.68	305.66	0.02
Southern Ave Sys	202L/US60 TI - 2	3490	PF 7	712.00	1444.50	1453.27	1445.68	1453.27	0.000002	0.31	2293.30	312.07	0.02
Southern Ave Sys	202L/US60 TI - 2	3365	PF 1	96.00	1444.00	1445.91	1445.41	1446.30	0.001655	5.01	19.16	10.05	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 2	185.00	1444.00	1446.96	1446.19	1447.56	0.001711	6.22	29.76	10.08	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 3	248.00	1444.00	1447.61	1446.66	1448.33	0.001768	6.84	36.24	10.10	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 4	324.00	1444.00	1448.31	1447.18	1449.18	0.001840	7.47	43.39	10.12	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 5	480.00	1444.00	1449.62	1448.13	1450.73	0.001985	8.48	56.58	10.15	0.63
Southern Ave Sys	202L/US60 TI - 2	3365	PF 6	644.00	1444.00	1451.10	1449.03	1452.35	0.001932	8.98	71.71	10.19	0.60
Southern Ave Sys	202L/US60 TI - 2	3365	PF 7	712.00	1444.00	1451.95	1449.37	1453.15	0.001646	8.83	84.47	23.75	0.55
Southern Ave Sys	202L/US60 TI - 2	3000		Culvert									
Southern Ave Sys	202L/US60 TI - 2	2381	PF 1	96.00	1437.85	1438.99	1439.27	1440.09	0.008031	8.44	11.38	10.03	0.64
Southern Ave Sys	202L/US60 TI - 2	2381	PF 2	185.00	1437.85	1439.59	1440.04	1441.34	0.008165	10.62	17.42	10.04	0.64
Southern Ave Sys	202L/US60 TI - 2	2381	PF 3	248.00	1437.85	1439.97	1440.52	1442.09	0.008153	11.68	21.24	10.05	0.64
Southern Ave Sys	202L/US60 TI - 2	2381	PF 4	324.00	1437.85	1440.40	1441.04	1442.90	0.008142	12.69	25.53	10.06	0.64
Southern Ave Sys	202L/US60 TI - 2	2381	PF 5	480.00	1437.85	1441.20	1441.99	1444.36	0.008147	14.26	33.66	10.07	0.63

SUPERSEDED

BY 4/28/05 REVISION

HEC-RAS Plan: Plan 02

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
South Hawes Chan	202L/US60 TI - 2	1170	PF 1	97.00	1436.21	1437.67		1438.10	0.002636	5.24	18.52	15.34	0.84
South Hawes Chan	202L/US60 TI - 2	1170	PF 2	136.41	1436.21	1437.99		1438.51	0.002572	5.77	23.63	16.51	0.85
South Hawes Chan	202L/US60 TI - 2	1170	PF 3	151.36	1436.21	1438.10		1438.65	0.002554	5.94	25.47	16.91	0.85
South Hawes Chan	202L/US60 TI - 2	1170	PF 4	175.73	1436.21	1438.27		1438.87	0.002530	6.19	28.37	17.53	0.86
South Hawes Chan	202L/US60 TI - 2	1170	PF 5	282.00	1436.21	1438.90		1439.67	0.002449	7.03	40.11	19.82	0.87
South Hawes Chan	202L/US60 TI - 2	1170	PF 6	326.25	1436.21	1439.13		1439.96	0.002410	7.29	44.77	20.66	0.87
South Hawes Chan	202L/US60 TI - 2	1170	PF 7	215.16	1436.21	1438.52		1439.19	0.002499	6.55	32.86	18.44	0.86
South Hawes Chan	202L/US60 TI - 2	1150	PF 1	97.00	1436.06	1437.66	1437.43	1438.04	0.002200	4.93	19.68	15.56	0.77
South Hawes Chan	202L/US60 TI - 2	1150	PF 2	136.41	1436.06	1437.98	1437.73	1438.45	0.002200	5.47	24.93	16.74	0.79
South Hawes Chan	202L/US60 TI - 2	1150	PF 3	151.36	1436.06	1438.10	1437.84	1438.59	0.002200	5.65	26.80	17.14	0.80
South Hawes Chan	202L/US60 TI - 2	1150	PF 4	175.73	1436.06	1438.27	1438.01	1438.81	0.002200	5.90	29.76	17.75	0.80
South Hawes Chan	202L/US60 TI - 2	1150	PF 5	282.00	1436.06	1438.90	1438.61	1439.61	0.002187	6.76	41.71	20.04	0.83
South Hawes Chan	202L/US60 TI - 2	1150	PF 6	326.25	1436.06	1439.12	1438.82	1439.89	0.002186	7.05	46.31	20.85	0.83
South Hawes Chan	202L/US60 TI - 2	1150	PF 7	215.16	1436.06	1438.52	1438.25	1439.13	0.002200	6.27	34.33	18.66	0.81
South Hawes Chan	202L/US60 TI - 2	1000	PF 1	97.00	1435.73	1437.33	1437.10	1437.71	0.002200	4.93	19.68	15.56	0.77
South Hawes Chan	202L/US60 TI - 2	1000	PF 2	136.41	1435.73	1437.65	1437.40	1438.12	0.002203	5.48	24.91	16.73	0.79
South Hawes Chan	202L/US60 TI - 2	1000	PF 3	151.36	1435.73	1437.77	1437.51	1438.26	0.002202	5.65	26.80	17.14	0.80
South Hawes Chan	202L/US60 TI - 2	1000	PF 4	175.73	1435.73	1437.93	1437.67	1438.48	0.002201	5.91	29.76	17.75	0.80
South Hawes Chan	202L/US60 TI - 2	1000	PF 5	282.00	1435.73	1438.56	1438.27	1439.28	0.002200	6.78	41.62	20.02	0.83
South Hawes Chan	202L/US60 TI - 2	1000	PF 6	326.25	1435.73	1438.79	1438.50	1439.56	0.002203	7.07	46.18	20.83	0.84
South Hawes Chan	202L/US60 TI - 2	1000	PF 7	215.16	1435.73	1438.19	1437.91	1438.80	0.002201	6.27	34.33	18.66	0.81
Southern Ave Sys	202L/US60 TI - 2	3490	PF 1	96.00	1444.50	1446.35		1446.35	0.000018	0.29	326.18	256.03	0.05
Southern Ave Sys	202L/US60 TI - 2	3490	PF 2	185.00	1444.50	1447.63		1447.63	0.000007	0.28	660.34	266.39	0.03
Southern Ave Sys	202L/US60 TI - 2	3490	PF 3	248.00	1444.50	1448.41		1448.41	0.000005	0.28	871.13	272.71	0.03
Southern Ave Sys	202L/US60 TI - 2	3490	PF 4	324.00	1444.50	1449.27		1449.27	0.000004	0.29	1108.51	279.67	0.03
Southern Ave Sys	202L/US60 TI - 2	3490	PF 5	480.00	1444.50	1450.84		1450.85	0.000003	0.31	1559.73	292.43	0.02
Southern Ave Sys	202L/US60 TI - 2	3490	PF 6	644.00	1444.50	1452.48		1452.48	0.000002	0.31	2048.68	305.66	0.02
Southern Ave Sys	202L/US60 TI - 2	3490	PF 7	712.00	1444.50	1453.27		1453.27	0.000002	0.31	2293.30	312.07	0.02
Southern Ave Sys	202L/US60 TI - 2	3365	PF 1	96.00	1444.00	1445.91	1445.41	1446.30	0.001655	5.01	19.16	10.05	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 2	185.00	1444.00	1446.96	1446.19	1447.56	0.001711	6.22	29.76	10.08	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 3	248.00	1444.00	1447.61	1446.66	1448.33	0.001768	6.84	36.24	10.10	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 4	324.00	1444.00	1448.31	1447.19	1449.18	0.001840	7.47	43.39	10.12	0.64
Southern Ave Sys	202L/US60 TI - 2	3365	PF 5	480.00	1444.00	1449.62	1448.13	1450.73	0.001985	8.48	56.58	10.15	0.63
Southern Ave Sys	202L/US60 TI - 2	3365	PF 6	644.00	1444.00	1451.10	1449.03	1452.35	0.001932	8.98	71.71	10.19	0.60
Southern Ave Sys	202L/US60 TI - 2	3365	PF 7	712.00	1444.00	1451.95	1449.37	1453.15	0.001646	8.83	84.47	23.75	0.55
Southern Ave Sys	202L/US60 TI - 2	3000		Culvert									
Southern Ave Sys	202L/US60 TI - 2	2381	PF 1	96.00	1437.85	1439.38		1439.99	0.003208	6.25	15.36	10.03	0.89
Southern Ave Sys	202L/US60 TI - 2	2381	PF 2	185.00	1437.85	1440.04	1440.04	1441.14	0.004113	8.42	21.96	10.05	1.00
Southern Ave Sys	202L/US60 TI - 2	2381	PF 3	248.00	1437.85	1440.52	1440.52	1441.85	0.004178	9.28	26.74	10.06	1.00
Southern Ave Sys	202L/US60 TI - 2	2381	PF 4	324.00	1437.85	1441.03	1441.03	1442.63	0.004297	10.14	31.95	10.07	1.00
Southern Ave Sys	202L/US60 TI - 2	2381	PF 5	480.00	1437.85	1441.98	1441.98	1444.06	0.004556	11.56	41.52	10.09	1.00

4/28/05
REVISION

HEC-RAS Plan: RMSAweir (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southern Ave Sys	202L/US60 TI - 2	2381	PF 6	644.00	1437.85	1441.99	1442.88	1445.71	0.008151	15.47	41.62	10.09	0.60
Southern Ave Sys	202L/US60 TI - 2	2381	PF 7	712.00	1437.85	1442.31	1443.23	1446.23	0.008150	15.89	44.81	10.10	0.55
Southern Ave Sys	202L/US60 TI - 2	2261	PF 1	96.00	1437.73	1439.55	1438.89	1439.70	0.000707	3.07	31.28	21.67	0.45
Southern Ave Sys	202L/US60 TI - 2	2261	PF 2	185.00	1437.73	1440.10	1439.41	1440.37	0.000978	4.24	43.62	23.53	0.55
Southern Ave Sys	202L/US60 TI - 2	2261	PF 3	248.00	1437.73	1440.33	1439.71	1440.72	0.001241	5.05	49.14	24.32	0.63
Southern Ave Sys	202L/US60 TI - 2	2261	PF 4	324.00	1437.73	1439.34	1440.04	1441.61	0.012888	12.11	26.75	20.94	1.89
Southern Ave Sys	202L/US60 TI - 2	2261	PF 5	480.00	1437.73	1439.60	1440.62	1443.01	0.015884	14.81	32.41	21.84	2.14
Southern Ave Sys	202L/US60 TI - 2	2261	PF 6	644.00	1437.73	1439.86	1441.17	1444.26	0.017437	16.83	38.27	22.74	2.29
Southern Ave Sys	202L/US60 TI - 2	2261	PF 7	712.00	1437.73	1439.96	1441.35	1444.74	0.017927	17.54	40.58	23.09	2.33
Southern Ave Sys	202L/US60 TI - 2	2201	PF 1	96.00	1437.67	1439.52	1438.82	1439.65	0.000643	2.93	32.73	22.75	0.43
Southern Ave Sys	202L/US60 TI - 2	2201	PF 2	185.00	1437.67	1440.05	1439.33	1440.31	0.000904	4.06	45.53	24.90	0.53
Southern Ave Sys	202L/US60 TI - 2	2201	PF 3	248.00	1437.67	1440.27	1439.63	1440.64	0.001162	4.85	51.11	25.78	0.61
Southern Ave Sys	202L/US60 TI - 2	2201	PF 4	324.00	1437.67	1440.58	1439.95	1441.05	0.001300	5.47	59.18	27.00	0.65
Southern Ave Sys	202L/US60 TI - 2	2201	PF 5	480.00	1437.67	1441.25	1440.51	1441.84	0.001286	6.13	78.25	29.69	0.67
Southern Ave Sys	202L/US60 TI - 2	2201	PF 6	644.00	1437.67	1440.11	1441.02	1443.04	0.010080	13.74	46.86	25.11	1.77
Southern Ave Sys	202L/US60 TI - 2	2201	PF 7	712.00	1437.67	1440.19	1441.22	1443.47	0.010828	14.53	48.99	25.45	1.85
Southern Ave Sys	202L/US60 TI - 2	2100	PF 1	96.00	1437.57	1439.46	1438.72	1439.59	0.000589	2.85	33.72	22.92	0.41
Southern Ave Sys	202L/US60 TI - 2	2100	PF 2	185.00	1437.57	1439.97	1439.23	1440.22	0.000885	4.03	45.87	24.95	0.52
Southern Ave Sys	202L/US60 TI - 2	2100	PF 3	248.00	1437.57	1440.14	1439.53	1440.52	0.001227	4.94	50.16	25.63	0.62
Southern Ave Sys	202L/US60 TI - 2	2100	PF 4	324.00	1437.57	1440.41	1439.85	1440.90	0.001437	5.67	57.15	26.70	0.68
Southern Ave Sys	202L/US60 TI - 2	2100	PF 5	480.00	1437.57	1441.08	1440.42	1441.70	0.001398	6.32	75.98	29.38	0.69
Southern Ave Sys	202L/US60 TI - 2	2100	PF 6	644.00	1437.57	1441.64	1440.94	1442.38	0.001414	6.91	93.21	31.64	0.71
Southern Ave Sys	202L/US60 TI - 2	2100	PF 7	712.00	1437.57	1441.84	1441.12	1442.63	0.001433	7.14	99.65	32.45	0.72
Southern Ave Sys	202L/US60 TI - 2	1945	PF 1	96.00	1437.41	1439.39	1438.56	1439.50	0.000498	2.69	35.69	23.26	0.38
Southern Ave Sys	202L/US60 TI - 2	1945	PF 2	185.00	1437.41	1439.84	1439.07	1440.08	0.000845	3.97	46.60	25.07	0.51
Southern Ave Sys	202L/US60 TI - 2	1945	PF 3	248.00	1437.41	1439.90	1439.37	1440.31	0.001380	5.15	48.17	25.32	0.66
Southern Ave Sys	202L/US60 TI - 2	1945	PF 4	324.00	1437.41	1439.86	1439.69	1440.59	0.002508	6.87	47.14	25.15	0.88
Southern Ave Sys	202L/US60 TI - 2	1945	PF 5	480.00	1437.41	1440.26	1440.26	1441.34	0.003095	8.34	57.52	26.75	1.00
Southern Ave Sys	202L/US60 TI - 2	1945	PF 6	644.00	1437.41	1440.75	1440.75	1442.02	0.003022	9.04	71.24	28.73	1.01
Southern Ave Sys	202L/US60 TI - 2	1945	PF 7	712.00	1437.41	1440.98	1440.98	1442.28	0.002875	9.15	77.82	29.63	0.99
Southern Ave Sys	202L/US60 TI - 2	1944		Lat. Weir									
Southern Ave Sys	202L/US60 TI - 2	1907	PF 1	96.00	1437.38	1439.42		1439.47	0.000253	1.79	53.69	39.79	0.27
Southern Ave Sys	202L/US60 TI - 2	1907	PF 2	185.00	1437.38	1439.92		1440.02	0.000355	2.46	75.27	44.44	0.33
Southern Ave Sys	202L/US60 TI - 2	1907	PF 3	248.00	1437.38	1440.05		1440.20	0.000503	3.06	81.14	44.71	0.40
Southern Ave Sys	202L/US60 TI - 2	1907	PF 4	324.00	1437.38	1440.17		1440.39	0.000704	3.75	86.43	44.94	0.48
Southern Ave Sys	202L/US60 TI - 2	1907	PF 5	480.00	1437.38	1439.07	1439.75	1441.23	0.013720	11.79	40.71	35.66	1.94
Southern Ave Sys	202L/US60 TI - 2	1907	PF 6	644.00	1437.38	1439.33	1440.09	1441.89	0.013795	12.85	50.11	38.70	1.99
Southern Ave Sys	202L/US60 TI - 2	1907	PF 7	712.00	1437.38	1439.42	1440.22	1442.14	0.013821	13.23	53.81	39.83	2.01
Southern Ave Sys	202L/US60 TI - 2	1895	PF 1	96.00	1437.37	1439.41		1439.46	0.000249	1.78	54.00	39.89	0.27
Southern Ave Sys	202L/US60 TI - 2	1895	PF 2	184.19	1437.37	1439.92		1440.01	0.000346	2.43	75.69	44.46	0.33

HEC-RAS Plan: RMSAweir (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southern Ave Sys	202L/US60 TI - 2	1895	PF 3	245.06	1437.37	1440.05		1440.19	0.000484	3.01	81.54	44.73	0.39
Southern Ave Sys	202L/US60 TI - 2	1895	PF 4	318.87	1437.37	1440.17		1440.38	0.000670	3.67	86.91	44.97	0.47
Southern Ave Sys	202L/US60 TI - 2	1895	PF 5	480.00	1437.37	1440.43	1439.73	1440.80	0.001024	4.87	98.51	45.48	0.58
Southern Ave Sys	202L/US60 TI - 2	1895	PF 6	644.00	1437.37	1439.41	1440.09	1441.64	0.011387	12.00	53.68	39.79	1.82
Southern Ave Sys	202L/US60 TI - 2	1895	PF 7	712.00	1437.37	1439.50	1440.22	1441.89	0.011595	12.42	57.32	40.87	1.85
Southern Ave Sys	202L/US60 TI - 2	1875	PF 1	96.00	1437.35	1439.41		1439.46	0.000240	1.75	54.71	40.10	0.26
Southern Ave Sys	202L/US60 TI - 2	1875	PF 2	181.29	1437.35	1439.92		1440.01	0.000323	2.37	76.55	44.50	0.32
Southern Ave Sys	202L/US60 TI - 2	1875	PF 3	236.45	1437.35	1440.06		1440.18	0.000434	2.87	82.53	44.77	0.37
Southern Ave Sys	202L/US60 TI - 2	1875	PF 4	304.54	1437.35	1440.18		1440.36	0.000587	3.46	88.04	45.02	0.44
Southern Ave Sys	202L/US60 TI - 2	1875	PF 5	473.31	1437.35	1440.42		1440.77	0.000982	4.78	98.92	45.50	0.57
Southern Ave Sys	202L/US60 TI - 2	1875	PF 6	630.75	1437.35	1439.50	1440.04	1441.32	0.008687	10.82	58.29	41.16	1.60
Southern Ave Sys	202L/US60 TI - 2	1875	PF 7	712.00	1437.35	1439.64	1440.20	1441.55	0.008482	11.10	64.16	42.83	1.60
Southern Ave Sys	202L/US60 TI - 2	1855	PF 1	96.00	1437.33	1439.41		1439.46	0.000232	1.73	55.42	40.31	0.26
Southern Ave Sys	202L/US60 TI - 2	1855	PF 2	177.70	1437.33	1439.92		1440.00	0.000300	2.30	77.42	44.54	0.31
Southern Ave Sys	202L/US60 TI - 2	1855	PF 3	226.94	1437.33	1440.06		1440.17	0.000385	2.72	83.51	44.81	0.35
Southern Ave Sys	202L/US60 TI - 2	1855	PF 4	288.82	1437.33	1440.19		1440.35	0.000505	3.23	89.29	45.07	0.41
Southern Ave Sys	202L/US60 TI - 2	1855	PF 5	439.83	1437.33	1440.44		1440.74	0.000798	4.36	100.87	45.58	0.52
Southern Ave Sys	202L/US60 TI - 2	1855	PF 6	584.26	1437.33	1440.74	1439.93	1441.14	0.000949	5.10	114.48	46.18	0.57
Southern Ave Sys	202L/US60 TI - 2	1855	PF 7	692.46	1437.33	1440.78	1440.14	1441.33	0.001268	5.95	116.33	46.26	0.66
Southern Ave Sys	202L/US60 TI - 2	1835	PF 1	96.00	1437.31	1439.41		1439.45	0.000223	1.71	56.13	40.52	0.26
Southern Ave Sys	202L/US60 TI - 2	1835	PF 2	173.32	1437.31	1439.92		1440.00	0.000275	2.21	78.28	44.58	0.29
Southern Ave Sys	202L/US60 TI - 2	1835	PF 3	216.47	1437.31	1440.06		1440.16	0.000336	2.56	84.59	44.86	0.33
Southern Ave Sys	202L/US60 TI - 2	1835	PF 4	271.61	1437.31	1440.19		1440.33	0.000427	3.00	90.53	45.13	0.37
Southern Ave Sys	202L/US60 TI - 2	1835	PF 5	403.41	1437.31	1440.46		1440.70	0.000632	3.92	102.82	45.67	0.46
Southern Ave Sys	202L/US60 TI - 2	1835	PF 6	534.55	1437.31	1440.78		1441.10	0.000739	4.56	117.14	46.29	0.51
Southern Ave Sys	202L/US60 TI - 2	1835	PF 7	634.57	1437.31	1440.83		1441.27	0.000971	5.29	119.85	46.41	0.58
Southern Ave Sys	202L/US60 TI - 2	1815	PF 1	96.00	1437.29	1439.41		1439.45	0.000216	1.69	56.85	40.73	0.25
Southern Ave Sys	202L/US60 TI - 2	1815	PF 2	168.05	1437.29	1439.92		1439.99	0.000249	2.12	79.25	44.62	0.28
Southern Ave Sys	202L/US60 TI - 2	1815	PF 3	204.99	1437.29	1440.07		1440.15	0.000290	2.39	85.68	44.91	0.31
Southern Ave Sys	202L/US60 TI - 2	1815	PF 4	252.86	1437.29	1440.20		1440.32	0.000355	2.75	91.78	45.18	0.34
Southern Ave Sys	202L/US60 TI - 2	1815	PF 5	363.97	1437.29	1440.49		1440.67	0.000485	3.47	104.78	45.75	0.40
Southern Ave Sys	202L/US60 TI - 2	1815	PF 6	479.87	1437.29	1440.81		1441.06	0.000556	4.01	119.81	46.41	0.44
Southern Ave Sys	202L/US60 TI - 2	1815	PF 7	569.75	1437.29	1440.89		1441.22	0.000718	4.62	123.23	46.55	0.50
Southern Ave Sys	202L/US60 TI - 2	1795	PF 1	96.00	1437.27	1439.40		1439.45	0.000208	1.67	57.57	40.95	0.25
Southern Ave Sys	202L/US60 TI - 2	1795	PF 2	161.76	1437.27	1439.92		1439.99	0.000222	2.02	80.22	44.67	0.27
Southern Ave Sys	202L/US60 TI - 2	1795	PF 3	192.49	1437.27	1440.07		1440.15	0.000245	2.22	86.76	44.96	0.28
Southern Ave Sys	202L/US60 TI - 2	1795	PF 4	232.52	1437.27	1440.21		1440.31	0.000287	2.50	93.04	45.24	0.31
Southern Ave Sys	202L/US60 TI - 2	1795	PF 5	321.53	1437.27	1440.51		1440.65	0.000357	3.01	106.74	45.84	0.35
Southern Ave Sys	202L/US60 TI - 2	1795	PF 6	420.29	1437.27	1440.85		1441.03	0.000399	3.43	122.36	46.52	0.37
Southern Ave Sys	202L/US60 TI - 2	1795	PF 7	498.36	1437.27	1440.94		1441.18	0.000507	3.94	126.43	46.69	0.42
Southern Ave Sys	202L/US60 TI - 2	1775	PF 1	96.00	1437.25	1439.40		1439.44	0.000201	1.65	58.30	41.16	0.24

HEC-RAS Plan: RMSAweir (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southern Ave Sys	202L/US60 TI - 2	1775	PF 2	154.35	1437.25	1439.93		1439.98	0.000195	1.90	81.19	44.71	0.25
Southern Ave Sys	202L/US60 TI - 2	1775	PF 3	178.93	1437.25	1440.07		1440.14	0.000204	2.04	87.85	45.01	0.26
Southern Ave Sys	202L/US60 TI - 2	1775	PF 4	210.56	1437.25	1440.22		1440.29	0.000226	2.23	94.29	45.29	0.27
Southern Ave Sys	202L/US60 TI - 2	1775	PF 5	276.09	1437.25	1440.53		1440.63	0.000250	2.54	108.59	45.92	0.29
Southern Ave Sys	202L/US60 TI - 2	1775	PF 6	355.98	1437.25	1440.88		1441.01	0.000270	2.85	124.78	46.62	0.31
Southern Ave Sys	202L/US60 TI - 2	1775	PF 7	420.86	1437.25	1440.98		1441.14	0.000337	3.25	129.39	46.82	0.34
Southern Ave Sys	202L/US60 TI - 2	1760	PF 1	96.00	1437.23	1439.40		1439.44	0.000194	1.63	59.03	41.37	0.24
Southern Ave Sys	202L/US60 TI - 2	1760	PF 2	147.97	1437.23	1439.93		1439.98	0.000172	1.80	82.16	44.75	0.23
Southern Ave Sys	202L/US60 TI - 2	1760	PF 3	168.04	1437.23	1440.08		1440.13	0.000173	1.89	88.93	45.06	0.24
Southern Ave Sys	202L/US60 TI - 2	1760	PF 4	192.95	1437.23	1440.22		1440.29	0.000182	2.02	95.54	45.35	0.25
Southern Ave Sys	202L/US60 TI - 2	1760	PF 5	239.98	1437.23	1440.55		1440.62	0.000180	2.18	110.25	45.99	0.25
Southern Ave Sys	202L/US60 TI - 2	1760	PF 6	304.75	1437.23	1440.90		1440.99	0.000188	2.40	126.75	46.70	0.26
Southern Ave Sys	202L/US60 TI - 2	1760	PF 7	359.00	1437.23	1441.01		1441.12	0.000232	2.73	131.72	46.92	0.29
Southern Ave Sys	202L/US60 TI - 2	1742	PF 1	96.00	1437.21	1439.40		1439.44	0.000188	1.61	59.76	41.58	0.24
Southern Ave Sys	202L/US60 TI - 2	1742	PF 2	139.32	1437.21	1439.93		1439.97	0.000147	1.68	83.13	44.80	0.22
Southern Ave Sys	202L/US60 TI - 2	1742	PF 3	154.11	1437.21	1440.08		1440.13	0.000140	1.71	90.02	45.10	0.21
Southern Ave Sys	202L/US60 TI - 2	1742	PF 4	170.50	1437.21	1440.23		1440.28	0.000136	1.76	96.80	45.40	0.21
Southern Ave Sys	202L/US60 TI - 2	1742	PF 5	194.35	1437.21	1440.56		1440.61	0.000113	1.74	111.91	46.06	0.20
Southern Ave Sys	202L/US60 TI - 2	1742	PF 6	240.13	1437.21	1440.92		1440.98	0.000111	1.87	128.73	46.79	0.20
Southern Ave Sys	202L/US60 TI - 2	1742	PF 7	280.88	1437.21	1441.04		1441.11	0.000134	2.10	134.05	47.02	0.22
Southern Ave Sys	202L/US60 TI - 2	1704	PF 1	96.00	1437.17	1439.33		1439.42	0.000353	2.39	40.09	24.01	0.33
Southern Ave Sys	202L/US60 TI - 2	1704	PF 2	135.78	1437.17	1439.86		1439.96	0.000309	2.55	53.27	26.11	0.31
Southern Ave Sys	202L/US60 TI - 2	1704	PF 3	147.79	1437.17	1440.01		1440.11	0.000296	2.58	57.32	26.72	0.31
Southern Ave Sys	202L/US60 TI - 2	1704	PF 4	159.73	1437.17	1440.16		1440.27	0.000284	2.60	61.39	27.33	0.31
Southern Ave Sys	202L/US60 TI - 2	1704	PF 5	169.11	1437.17	1440.51		1440.60	0.000209	2.38	71.20	28.73	0.27
Southern Ave Sys	202L/US60 TI - 2	1704	PF 6	198.73	1437.17	1440.88		1440.97	0.000193	2.42	82.00	30.19	0.26
Southern Ave Sys	202L/US60 TI - 2	1704	PF 7	229.85	1437.17	1440.98		1441.10	0.000232	2.70	85.15	30.61	0.29
Southern Ave Sys	202L/US60 TI - 2	1698	PF 1	96.00	1437.17	1439.33	1438.32	1439.42	0.000355	2.40	40.02	23.99	0.33
Southern Ave Sys	202L/US60 TI - 2	1698	PF 2	135.78	1437.17	1439.86	1438.57	1439.96	0.000310	2.55	53.21	26.10	0.31
Southern Ave Sys	202L/US60 TI - 2	1698	PF 3	147.79	1437.17	1440.01	1438.63	1440.11	0.000297	2.58	57.25	26.71	0.31
Southern Ave Sys	202L/US60 TI - 2	1698	PF 4	159.73	1437.17	1440.16	1438.70	1440.27	0.000285	2.60	61.33	27.32	0.31
Southern Ave Sys	202L/US60 TI - 2	1698	PF 5	169.11	1437.17	1440.51	1438.75	1440.60	0.000209	2.38	71.16	28.72	0.27
Southern Ave Sys	202L/US60 TI - 2	1698	PF 6	198.73	1437.17	1440.88	1438.90	1440.97	0.000193	2.42	81.96	30.19	0.26
Southern Ave Sys	202L/US60 TI - 2	1698	PF 7	229.85	1437.17	1440.98	1439.05	1441.09	0.000233	2.70	85.10	30.60	0.29
Southern Ave Sys	202L/US60 TI - 2	1668	PF 1	96.00	1437.14	1439.20	1438.53	1439.39	0.000870	3.52	27.30	17.84	0.50
Southern Ave Sys	202L/US60 TI - 2	1668	PF 2	135.78	1437.14	1439.73	1438.83	1439.93	0.000724	3.65	37.23	19.94	0.47
Southern Ave Sys	202L/US60 TI - 2	1668	PF 3	147.79	1437.14	1439.88	1438.92	1440.09	0.000684	3.66	40.36	20.56	0.46
Southern Ave Sys	202L/US60 TI - 2	1668	PF 4	159.73	1437.14	1440.03	1438.99	1440.24	0.000646	3.67	43.55	21.17	0.45
Southern Ave Sys	202L/US60 TI - 2	1668	PF 5	169.11	1437.14	1440.42	1439.06	1440.58	0.000443	3.25	51.97	22.71	0.38
Southern Ave Sys	202L/US60 TI - 2	1668	PF 6	198.73	1437.14	1440.79	1439.24	1440.95	0.000400	3.28	60.61	24.18	0.36
Southern Ave Sys	202L/US60 TI - 2	1668	PF 7	229.85	1437.14	1440.86	1439.42	1441.07	0.000491	3.68	62.53	24.50	0.41

HEC-RAS Plan: RMSAweir (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southern Ave Sys	202L/US60 TI - 2	1537	PF 1	96.00	1437.01	1439.09	1438.41	1439.28	0.000835	3.47	27.69	17.93	0.49
Southern Ave Sys	202L/US60 TI - 2	1537	PF 2	135.78	1437.01	1439.64	1438.70	1439.84	0.000677	3.56	38.13	20.12	0.46
Southern Ave Sys	202L/US60 TI - 2	1537	PF 3	147.79	1437.01	1439.80	1438.79	1440.00	0.000637	3.57	41.41	20.76	0.45
Southern Ave Sys	202L/US60 TI - 2	1537	PF 4	159.73	1437.01	1439.96	1438.87	1440.16	0.000600	3.57	44.74	21.39	0.44
Southern Ave Sys	202L/US60 TI - 2	1537	PF 5	169.11	1437.01	1440.37	1438.93	1440.52	0.000401	3.14	53.91	23.05	0.36
Southern Ave Sys	202L/US60 TI - 2	1537	PF 6	198.73	1437.01	1440.75	1439.11	1440.90	0.000363	3.16	62.79	24.54	0.35
Southern Ave Sys	202L/US60 TI - 2	1537	PF 7	229.85	1437.01	1440.81	1439.28	1441.01	0.000453	3.57	64.42	24.80	0.39
Southern Ave Sys	202L/US60 TI - 2	1433	PF 1	96.00	1436.90	1439.01	1438.29	1439.19	0.000789	3.40	28.25	18.05	0.48
Southern Ave Sys	202L/US60 TI - 2	1433	PF 2	135.78	1436.90	1439.58	1438.59	1439.77	0.000630	3.47	39.12	20.32	0.44
Southern Ave Sys	202L/US60 TI - 2	1433	PF 3	147.79	1436.90	1439.74	1438.68	1439.93	0.000592	3.48	42.52	20.98	0.43
Southern Ave Sys	202L/US60 TI - 2	1433	PF 4	159.73	1436.90	1439.91	1438.75	1440.09	0.000556	3.47	45.97	21.62	0.42
Southern Ave Sys	202L/US60 TI - 2	1433	PF 5	169.11	1436.90	1440.34	1438.82	1440.48	0.000365	3.03	55.74	23.36	0.35
Southern Ave Sys	202L/US60 TI - 2	1433	PF 6	198.73	1436.90	1440.72	1439.00	1440.86	0.000333	3.07	64.82	24.87	0.33
Southern Ave Sys	202L/US60 TI - 2	1433	PF 7	229.85	1436.90	1440.78	1439.18	1440.96	0.000419	3.47	66.28	25.10	0.38
Southern Ave Sys	202L/US60 TI - 2	1350	PF 1	96.00	1436.82	1438.97		1439.14	0.000490	3.33	28.87	18.19	0.47
Southern Ave Sys	202L/US60 TI - 2	1350	PF 2	135.78	1436.82	1439.54		1439.72	0.000391	3.39	40.01	20.49	0.43
Southern Ave Sys	202L/US60 TI - 2	1350	PF 3	147.79	1436.82	1439.71		1439.89	0.000367	3.40	43.48	21.16	0.42
Southern Ave Sys	202L/US60 TI - 2	1350	PF 4	159.73	1436.82	1439.87		1440.05	0.000345	3.40	47.01	21.81	0.41
Southern Ave Sys	202L/US60 TI - 2	1350	PF 5	169.11	1436.82	1440.32		1440.46	0.000224	2.96	57.21	23.61	0.33
Southern Ave Sys	202L/US60 TI - 2	1350	PF 6	198.73	1436.82	1440.70		1440.84	0.000205	2.99	66.42	25.12	0.32
Southern Ave Sys	202L/US60 TI - 2	1350	PF 7	229.85	1436.82	1440.75		1440.93	0.000260	3.39	67.76	25.34	0.37
Southern Ave Sys	202L/US60 TI - 2	1305	PF 1	96.00	1436.78	1438.70	1438.20	1439.09	0.001222	4.98	19.27	10.08	0.63
Southern Ave Sys	202L/US60 TI - 2	1305	PF 2	135.78	1436.78	1439.16	1438.56	1439.66	0.001299	5.68	23.90	10.10	0.65
Southern Ave Sys	202L/US60 TI - 2	1305	PF 3	147.79	1436.78	1439.29	1438.67	1439.83	0.001310	5.85	25.27	10.10	0.65
Southern Ave Sys	202L/US60 TI - 2	1305	PF 4	159.73	1436.78	1439.43	1438.77	1439.99	0.001315	6.00	26.63	10.11	0.65
Southern Ave Sys	202L/US60 TI - 2	1305	PF 5	169.11	1436.78	1439.99	1438.84	1440.41	0.000855	5.24	32.25	10.13	0.52
Southern Ave Sys	202L/US60 TI - 2	1305	PF 6	198.73	1436.78	1440.30	1439.08	1440.79	0.000906	5.61	35.45	10.14	0.53
Southern Ave Sys	202L/US60 TI - 2	1305	PF 7	229.85	1436.78	1440.14	1439.31	1440.86	0.001381	6.79	33.83	10.13	0.66
Southern Ave Sys	202L/US60 TI - 2	1270		Culvert									
Southern Ave Sys	202L/US60 TI - 2	1237	PF 1	96.00	1436.71	1438.33		1438.87	0.002704	5.91	16.26	10.06	0.82
Southern Ave Sys	202L/US60 TI - 2	1237	PF 2	135.78	1436.71	1438.51	1438.49	1439.39	0.003947	7.52	18.06	10.07	0.99
Southern Ave Sys	202L/US60 TI - 2	1237	PF 3	147.79	1436.71	1438.60	1438.60	1439.54	0.004066	7.81	18.93	10.08	1.00
Southern Ave Sys	202L/US60 TI - 2	1237	PF 4	159.73	1436.71	1438.83	1438.70	1439.70	0.003350	7.50	21.30	10.08	0.91
Southern Ave Sys	202L/US60 TI - 2	1237	PF 5	169.11	1436.71	1439.79		1440.25	0.001275	5.46	30.98	10.12	0.55
Southern Ave Sys	202L/US60 TI - 2	1237	PF 6	198.73	1436.71	1440.08		1440.61	0.001368	5.86	33.89	10.13	0.57
Southern Ave Sys	202L/US60 TI - 2	1237	PF 7	229.85	1436.71	1439.24	1439.24	1440.51	0.004141	9.04	25.43	10.10	1.00
Southern Ave Sys	202L/US60 TI - 2	1170	PF 1	96.00	1436.64	1438.42		1438.66	0.001245	3.99	24.08	17.11	0.59
Southern Ave Sys	202L/US60 TI - 2	1170	PF 2	135.78	1436.64	1438.76		1439.08	0.001302	4.49	30.24	18.49	0.62
Southern Ave Sys	202L/US60 TI - 2	1170	PF 3	147.79	1436.64	1438.90	1438.34	1439.21	0.001230	4.51	32.76	19.03	0.61
Southern Ave Sys	202L/US60 TI - 2	1170	PF 4	159.73	1436.64	1439.13		1439.42	0.000996	4.28	37.31	19.96	0.55
Southern Ave Sys	202L/US60 TI - 2	1170	PF 5	169.11	1436.64	1439.97		1440.11	0.000370	3.05	55.46	23.32	0.35

HEC-RAS Plan: RMSAweir (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southern Ave Sys	202L/US60 TI - 2	1170	PF 6	198.73	1436.64	1440.30		1440.45	0.000354	3.13	63.40	24.64	0.34
Southern Ave Sys	202L/US60 TI - 2	1170	PF 7	229.85	1436.64	1438.26	1438.83	1440.04	0.009968	10.72	21.44	16.48	1.66
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 1	1.00	1437.47	1438.58	1437.54	1438.58	0.000001	0.07	13.56	14.44	0.01
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 2	1.00	1437.47	1439.00	1437.54	1439.00	0.000000	0.05	19.93	16.11	0.01
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 3	4.00	1437.47	1439.14	1437.64	1439.14	0.000003	0.18	22.24	16.67	0.03
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 4	16.00	1437.47	1439.35	1437.89	1439.35	0.000028	0.62	25.83	17.51	0.09
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 5	102.00	1437.47	1440.05	1438.81	1440.16	0.000354	2.60	39.20	20.34	0.33
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 6	125.00	1437.47	1440.39	1438.99	1440.50	0.000336	2.71	46.18	21.67	0.33
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 7	1.00	1437.47	1439.78	1437.54	1439.78	0.000000	0.03	33.83	19.25	0.00
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 1	1.00	1437.08	1438.58		1438.58	0.000000	0.05	19.50	16.00	0.01
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 2	1.00	1437.08	1439.00		1439.00	0.000000	0.04	26.51	17.67	0.01
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 3	4.00	1437.08	1439.14		1439.14	0.000001	0.14	29.04	18.23	0.02
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 4	16.00	1437.08	1439.35		1439.35	0.000014	0.49	32.94	19.07	0.07
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 5	102.00	1437.08	1440.03		1440.11	0.000214	2.17	46.97	21.81	0.26
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 6	125.00	1437.08	1440.37		1440.45	0.000213	2.30	54.45	23.14	0.26
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 7	1.00	1437.08	1439.78		1439.78	0.000000	0.02	41.65	20.81	0.00
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 1	1.00	1436.64	1438.58		1438.58	0.000000	0.04	26.93	17.76	0.01
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 2	1.00	1436.64	1439.00		1439.00	0.000000	0.03	34.67	19.43	0.00
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 3	4.00	1436.64	1439.14		1439.14	0.000001	0.11	37.45	19.99	0.01
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 4	16.00	1436.64	1439.35		1439.35	0.000007	0.38	41.69	20.82	0.05
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 5	102.00	1436.64	1440.02		1440.07	0.000128	1.80	56.55	23.50	0.20
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 6	125.00	1436.64	1440.35		1440.41	0.000133	1.93	64.62	28.47	0.21
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 7	1.00	1436.64	1439.78		1439.78	0.000000	0.02	51.19	22.57	0.00

SUPERSEDED

BY 4/28/05 REVISION

HEC-RAS Plan: Plan 02 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Southern Ave Sys	202L/US60 TI - 2	1170	PF 6	201.25	1436.21	1439.93		1440.09	0.000366	3.23	62.34	23.56	0.35
Southern Ave Sys	202L/US60 TI - 2	1170	PF 7	214.16	1436.21	1438.89		1439.34	0.001428	5.36	39.95	19.79	0.66
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 1	1.00	1437.47	1438.14		1438.15	0.000004	0.13	7.65	12.70	0.03
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 2	1.00	1437.47	1438.57		1438.57	0.000001	0.07	13.36	14.38	0.01
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 3	4.00	1437.47	1438.71		1438.71	0.000008	0.26	15.47	14.96	0.04
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 4	16.00	1437.47	1438.93		1438.94	0.000070	0.85	18.89	15.85	0.14
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 5	102.00	1437.47	1439.74		1439.89	0.000575	3.09	32.97	19.07	0.41
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 6	125.00	1437.47	1440.02		1440.18	0.000559	3.25	38.49	20.20	0.41
Hawes Rd Channel	202L/US60 TI - 2	1540	PF 7	1.00	1437.47	1439.26		1439.26	0.000000	0.04	24.25	17.15	0.01
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 1	1.00	1437.08	1438.14		1438.14	0.000001	0.08	12.91	14.26	0.01
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 2	1.00	1437.08	1438.57		1438.57	0.000000	0.05	19.27	15.94	0.01
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 3	4.00	1437.08	1438.71		1438.71	0.000003	0.19	21.61	16.52	0.03
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 4	16.00	1437.08	1438.93		1438.94	0.000030	0.63	25.32	17.40	0.09
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 5	102.00	1437.08	1439.70		1439.80	0.000337	2.56	39.88	20.47	0.32
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 6	125.00	1437.08	1439.98		1440.10	0.000344	2.73	45.81	21.60	0.33
Hawes Rd Channel	202L/US60 TI - 2	1370	PF 7	1.00	1437.08	1439.26		1439.26	0.000000	0.03	31.24	18.71	0.00
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 1	1.00	1436.21	1438.14		1438.14	0.000000	0.04	26.17	17.06	0.01
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 2	1.00	1436.21	1438.57		1438.57	0.000000	0.03	33.69	18.60	0.00
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 3	4.00	1436.21	1438.71		1438.71	0.000001	0.11	36.40	19.13	0.01
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 4	16.00	1436.21	1438.93		1438.93	0.000008	0.39	40.67	19.93	0.05
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 5	102.00	1436.21	1439.70		1439.75	0.000120	1.79	57.05	22.73	0.20
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 6	125.00	1436.21	1439.98		1440.04	0.000134	1.97	63.59	23.76	0.21
Hawes Rd Channel	202L/US60 TI - 2	1170	PF 7	1.00	1436.21	1439.26		1439.26	0.000000	0.02	47.41	21.12	0.00

4/28/05
REVISION

PORTIONS OF THIS REPORT FILE MAY HAVE BEEN SUPERSEDED BY THE 4/28/05 REVISIONS. SEE HEC-RAS FILES ON CD LABELED "SRT PHASE II, FINAL DRAINAGE REPORT" DATED MAY 02, 2005

HEC-RAS Version 3.0.1 Mar 2001
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
XXXXXXX  XXXX     X       XXX XXXX     XXXXXX    XXXX
X     X  X        X           X  X     X    X        X
X     X  X        X    X      X   X    X    X        X
X     X  XXXXXX    XXXX       X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: 202L/US60 TI - Ph 2 - Side Weir Rating
Project File : LWR.prj
Run Date and Time: 4/23/2004 1:17:46 PM

Project in English units

Project Description:
202L/US60 Traffic Interchange - Phase 2
This model is to determine the rating curve for the lateral weir located along the south bank of the Southern Avenue Channel. The lateral weir discharges into Detention Basin NW-1. The coincident peak flows in the Hawes Road Channel are taken from the hydrographs generated by the HEC-1 model NE200250.

PLAN DATA

Plan Title: 202L/US60 TI - Phase 2 - Weir Rating
Plan File : 1:\11194\Phase2\HEC-RAS Lateral Weir Rating\V301 RLWR\LWR.p01

Geometry Title: 202L/US60 TI - Phase 2
Geometry File : 1:\11194\Phase2\HEC-RAS Lateral Weir Rating\V301 RLWR\LWR.g01

Flow Title : 202L/US60 TI - Phase 2
Flow File : 1:\11194\Phase2\HEC-RAS Lateral Weir Rating\V301 RLWR\LWR.f01

Plan Summary Information:

Number of:	Cross Sections	= 32	Mulitple Openings	=	0
	Culverts	= 2	Inline Weirs	=	0
	Bridges	= 0			

Computational Information

Water surface calculation tolerance	= 0.003
Critical depth calculaton tolerance	= 0.003
Maximum number of interations	= 40
Maximum difference tolerance	= 0.1
Flow tolerance factor	= 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance

Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: 202L/US60 TI - Phase 2
Flow File : 1:\11194\Phase2\HEC-RAS Lateral Weir Rating\V301 RLWR\LWR.f01

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3	PF 4	PF 5	PF 6	PF 7
Hawes Rd Channel	202L/US60 TI -	21540	1	1	4	16	102	125	1
Southern Ave Sys	202L/US60 TI -	23490	96	185	248	324	480	644	712
South Hawes Chan	202L/US60 TI -	21170	97	186	252	340	582	769	713

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Hawes Rd Channel	202L/US60 TI -	2PF 1	Normal S = .0022	
Southern Ave Sys	202L/US60 TI -	2PF 1	Normal S = .001	
South Hawes Chan	202L/US60 TI -	2PF 1		Normal S = .0022

GEOMETRY DATA

Geometry Title: 202L/US60 TI - Phase 2
Geometry File : 1:\11194\Phase2\HEC-RAS Lateral Weir Rating\V301 RLWR\LWR.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Hawes Rd Channel	202L/US60 TI - 2		Confluence
Southern Ave Sys	202L/US60 TI - 2		Confluence
South Hawes Chan	202L/US60 TI - 2	Confluence	

JUNCTION INFORMATION

Name: Confluence
Description:
Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Hawes Rd Channel	202L/US60 TI - 2 to	South Hawes Chan	202L/US60 TI - 2	10	

Southern Ave Sys202L/US60 TI - 2 to South Hawes Chan202L/US60 TI - 2 70

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1540

INPUT
Description: Upstream Hawes Rd. Channel Section
Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.3	38	1442.4	72	1442.4	77	1442.02	87	1442
91	1441.97	100	1437.47	110	1437.47	119	1441.97	128	1442.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	170	170	170	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.58	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.58	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1437.54	Flow Area (sq ft)		13.56	
E.G. Slope (ft/ft)	0.000001	Area (sq ft)		13.56	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	14.44	Top Width (ft)		14.44	
Vel Total (ft/s)	0.07	Avg. Vel. (ft/s)		0.07	
Max Chl Dpth (ft)	1.11	Hydr. Depth (ft)		0.94	
Conv. Total (cfs)	1179.8	Conv. (cfs)		1179.8	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		14.96	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.00	Cum SA (acres)		0.14	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.00	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.016	

W.S. Elev (ft)	1439.00	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1437.54	Flow Area (sq ft)		19.93	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		19.93	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	16.11	Top Width (ft)		16.11	
Vel Total (ft/s)	0.05	Avg. Vel. (ft/s)		0.05	
Max Chl Dpth (ft)	1.53	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	2071.2	Conv. (cfs)		2071.2	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		16.83	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.00	Cum SA (acres)		0.15	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1439.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.14	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1437.64	Flow Area (sq ft)		22.24	
E.G. Slope (ft/ft)	0.000003	Area (sq ft)		22.24	
Q Total (cfs)	4.00	Flow (cfs)		4.00	
Top Width (ft)	16.67	Top Width (ft)		16.67	
Vel Total (ft/s)	0.18	Avg. Vel. (ft/s)		0.18	
Max Chl Dpth (ft)	1.67	Hydr. Depth (ft)		1.33	
Conv. Total (cfs)	2426.8	Conv. (cfs)		2426.8	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		17.46	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.26	

C & E Loss (ft)	0.00	Cum SA (acres)	0.16

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.35				
Vel Head (ft)	0.01	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.35	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1437.89	Flow Area (sq ft)		25.83	
E.G. Slope (ft/ft)	0.000028	Area (sq ft)		25.83	
Q Total (cfs)	16.00	Flow (cfs)		16.00	
Top Width (ft)	17.51	Top Width (ft)		17.51	
Vel Total (ft/s)	0.62	Avg. Vel. (ft/s)		0.62	
Max Chl Dpth (ft)	1.88	Hydr. Depth (ft)		1.47	
Conv. Total (cfs)	3007.4	Conv. (cfs)		3007.4	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		18.40	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.29	
C & E Loss (ft)	0.00	Cum SA (acres)		0.16	

CROSS SECTION OUTPUT Profile #PF 5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.16				
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.05	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1438.81	Flow Area (sq ft)		39.20	
E.G. Slope (ft/ft)	0.000354	Area (sq ft)		39.20	
Q Total (cfs)	102.00	Flow (cfs)		102.00	
Top Width (ft)	20.34	Top Width (ft)		20.34	
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)		2.60	
Max Chl Dpth (ft)	2.58	Hydr. Depth (ft)		1.93	

Conv. Total (cfs)	5423.4	Conv. (cfs)	5423.4
Length Wtd. (ft)	170.00	Wetted Per. (ft)	21.56
Min Ch El (ft)	1437.47	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.10
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.42
C & E Loss (ft)	0.01	Cum SA (acres)	0.19

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.39	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1438.99	Flow Area (sq ft)		46.18	
E.G. Slope (ft/ft)	0.000336	Area (sq ft)		46.18	
Q Total (cfs)	125.00	Flow (cfs)		125.00	
Top Width (ft)	21.67	Top Width (ft)		21.67	
Vel Total (ft/s)	2.71	Avg. Vel. (ft/s)		2.71	
Max Chl Dpth (ft)	2.92	Hydr. Depth (ft)		2.13	
Conv. Total (cfs)	6816.5	Conv. (cfs)		6816.5	
Length Wtd. (ft)	170.00	Wetted Per. (ft)		23.04	
Min Ch El (ft)	1437.47	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.11	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.00	0.48	
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.20	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1439.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.78	Reach Len. (ft)	170.00	170.00	170.00
Crit W.S. (ft)	1437.54	Flow Area (sq ft)		33.83	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		33.83	

Q Total (cfs)	1.00	Flow (cfs)	1.00
Top Width (ft)	19.25	Top Width (ft)	19.25
Vel Total (ft/s)	0.03	Avg. Vel. (ft/s)	0.03
Max Chl Dpth (ft)	2.31	Hydr. Depth (ft)	1.76
Conv. Total (cfs)	4410.6	Conv. (cfs)	4410.6
Length Wtd. (ft)	170.00	Wetted Per. (ft)	20.35
Min Ch El (ft)	1437.47	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.37
C & E Loss (ft)	0.00	Cum SA (acres)	0.18

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1370

INPUT
Description:
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.66	-4	1440.86	8	1441.26	38	1441.63	72	1441.36
77	1441.86	87	1441.81	91	1441.58	100	1437.08	110	1437.08
119	1441.58	128	1441.81						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	200	200	200	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1438.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.58	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		19.50	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		19.50	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	16.00	Top Width (ft)		16.00	
Vel Total (ft/s)	0.05	Avg. Vel. (ft/s)		0.05	
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)		1.22	
Conv. Total (cfs)	2007.5	Conv. (cfs)		2007.5	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		16.71	

Min Ch El (ft)	1437.08	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.11
C & E Loss (ft)	0.00	Cum SA (acres)	0.08

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.00	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		26.51	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		26.51	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	17.67	Top Width (ft)		17.67	
Vel Total (ft/s)	0.04	Avg. Vel. (ft/s)		0.04	
Max Chl Dpth (ft)	1.92	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	3121.5	Conv. (cfs)		3121.5	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		18.57	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.15	
C & E Loss (ft)	0.00	Cum SA (acres)		0.09	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1439.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.14	Reach Len. (ft)	200.00	200.00	200.00

Crit W.S. (ft)		Flow Area (sq ft)	29.04
E.G. Slope (ft/ft)	0.000001	Area (sq ft)	29.04
Q Total (cfs)	4.00	Flow (cfs)	4.00
Top Width (ft)	18.23	Top Width (ft)	18.23
Vel Total (ft/s)	0.14	Avg. Vel. (ft/s)	0.14
Max Chl Dpth (ft)	2.06	Hydr. Depth (ft)	1.59
Conv. Total (cfs)	3553.7	Conv. (cfs)	3553.7
Length Wtd. (ft)	200.00	Wetted Per. (ft)	19.20
Min Ch El (ft)	1437.08	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.16
C & E Loss (ft)	0.00	Cum SA (acres)	0.09

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.35				
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.35	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		32.94	
E.G. Slope (ft/ft)	0.000014	Area (sq ft)		32.94	
Q Total (cfs)	16.00	Flow (cfs)		16.00	
Top Width (ft)	19.07	Top Width (ft)		19.07	
Vel Total (ft/s)	0.49	Avg. Vel. (ft/s)		0.49	
Max Chl Dpth (ft)	2.27	Hydr. Depth (ft)		1.73	
Conv. Total (cfs)	4247.3	Conv. (cfs)		4247.3	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		20.14	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.00	Cum SA (acres)		0.09	

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.03	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		46.97	
E.G. Slope (ft/ft)	0.000214	Area (sq ft)		46.97	
Q Total (cfs)	102.00	Flow (cfs)		102.00	
Top Width (ft)	21.81	Top Width (ft)		21.81	
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)		2.17	
Max Chl Dpth (ft)	2.95	Hydr. Depth (ft)		2.15	
Conv. Total (cfs)	6978.8	Conv. (cfs)		6978.8	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		23.21	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.25	
C & E Loss (ft)	0.01	Cum SA (acres)		0.10	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.37	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		54.45	
E.G. Slope (ft/ft)	0.000213	Area (sq ft)		54.45	
Q Total (cfs)	125.00	Flow (cfs)		125.00	
Top Width (ft)	23.14	Top Width (ft)		23.14	
Vel Total (ft/s)	2.30	Avg. Vel. (ft/s)		2.30	
Max Chl Dpth (ft)	3.29	Hydr. Depth (ft)		2.35	
Conv. Total (cfs)	8567.2	Conv. (cfs)		8567.2	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		24.69	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.03	

Alpha	1.00	Stream Power (lb/ft s)		0.07
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.00	0.29
C & E Loss (ft)	0.01	Cum SA (acres)	0.01	0.11

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.78	Element			
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.78	Reach Len. (ft)	200.00	200.00	200.00
Crit W.S. (ft)		Flow Area (sq ft)		41.65	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		41.65	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	20.81	Top Width (ft)		20.81	
Vel Total (ft/s)	0.02	Avg. Vel. (ft/s)		0.02	
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		2.00	
Conv. Total (cfs)	5903.0	Conv. (cfs)		5903.0	
Length Wtd. (ft)	200.00	Wetted Per. (ft)		22.09	
Min Ch El (ft)	1437.08	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.22	
C & E Loss (ft)	0.00	Cum SA (acres)		0.10	

CROSS SECTION RIVER: Hawes Rd Channel
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1438.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.58	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)		26.93	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		26.93	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	17.76	Top Width (ft)		17.76	
Vel Total (ft/s)	0.04	Avg. Vel. (ft/s)		0.04	
Max Chl Dpth (ft)	1.94	Hydr. Depth (ft)		1.52	
Conv. Total (cfs)	3191.4	Conv. (cfs)		3191.4	
Length Wtd. (ft)	10.00	Wetted Per. (ft)		18.68	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.01	
C & E Loss (ft)	0.04	Cum SA (acres)			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.00	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)		34.67	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		34.67	
Q Total (cfs)	1.00	Flow (cfs)		1.00	
Top Width (ft)	19.43	Top Width (ft)		19.43	
Vel Total (ft/s)	0.03	Avg. Vel. (ft/s)		0.03	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)		1.78	
Conv. Total (cfs)	4564.8	Conv. (cfs)		4564.8	
Length Wtd. (ft)	10.00	Wetted Per. (ft)		20.54	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.00	

Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01
C & E Loss (ft)	0.04	Cum SA (acres)	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.14				
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.14	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)		37.45	
E.G. Slope (ft/ft)	0.000001	Area (sq ft)		37.45	
Q Total (cfs)	4.00	Flow (cfs)		4.00	
Top Width (ft)	19.99	Top Width (ft)		19.99	
Vel Total (ft/s)	0.11	Avg. Vel. (ft/s)		0.11	
Max Chl Dpth (ft)	2.50	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	5086.7	Conv. (cfs)		5086.7	
Length Wtd. (ft)	10.00	Wetted Per. (ft)		21.17	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.01	
C & E Loss (ft)	0.05	Cum SA (acres)			

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.35				
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.35	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)		41.69	
E.G. Slope (ft/ft)	0.000007	Area (sq ft)		41.69	

Q Total (cfs)	16.00	Flow (cfs)	16.00
Top Width (ft)	20.82	Top Width (ft)	20.82
Vel Total (ft/s)	0.38	Avg. Vel. (ft/s)	0.38
Max Chl Dpth (ft)	2.71	Hydr. Depth (ft)	2.00
Conv. Total (cfs)	5912.0	Conv. (cfs)	5912.0
Length Wtd. (ft)	10.00	Wetted Per. (ft)	22.10
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01
C & E Loss (ft)	0.05	Cum SA (acres)	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.02	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)		56.55	
E.G. Slope (ft/ft)	0.000128	Area (sq ft)		56.55	
Q Total (cfs)	102.00	Flow (cfs)		102.00	
Top Width (ft)	23.50	Top Width (ft)		23.50	
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	
Max Chl Dpth (ft)	3.38	Hydr. Depth (ft)		2.41	
Conv. Total (cfs)	9026.1	Conv. (cfs)		9026.1	
Length Wtd. (ft)	10.00	Wetted Per. (ft)		25.10	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.01	
C & E Loss (ft)	0.06	Cum SA (acres)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.040	0.016	
W.S. Elev (ft)	1440.35	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)	0.02	64.60	
E.G. Slope (ft/ft)	0.000133	Area (sq ft)	0.02	64.60	
Q Total (cfs)	125.00	Flow (cfs)	0.00	125.00	
Top Width (ft)	28.47	Top Width (ft)	3.64	24.84	
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	0.01	1.93	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)	0.00	2.60	
Conv. Total (cfs)	10843.8	Conv. (cfs)	0.0	10843.8	
Length Wtd. (ft)	10.00	Wetted Per. (ft)	3.64	26.59	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.00	0.02	
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.04	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.00	0.01	
C & E Loss (ft)	0.07	Cum SA (acres)			

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1439.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.78	Reach Len. (ft)	10.00	10.00	10.00
Crit W.S. (ft)		Flow Area (sq ft)		51.19	
E.G. Slope (ft/ft)	0.000000	Area (sq ft)		51.19	

Q Total (cfs)	1.00	Flow (cfs)	1.00
Top Width (ft)	22.57	Top Width (ft)	22.57
Vel Total (ft/s)	0.02	Avg. Vel. (ft/s)	0.02
Max Chl Dpth (ft)	3.14	Hydr. Depth (ft)	2.27
Conv. Total (cfs)	7865.2	Conv. (cfs)	7865.2
Length Wtd. (ft)	10.00	Wetted Per. (ft)	24.06
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01
C & E Loss (ft)	0.06	Cum SA (acres)	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3490

INPUT
Description: Southern Avenue Detention Basin
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
25	1457.58	45	1457.34	100	1445.6	225	1444.5	350	1445.6
390	1457.34	405	1457.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
25	.04	45	.025	390	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
45	390	125	125	125	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1446.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1446.35	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.03	Flow Area (sq ft)		326.18	
E.G. Slope (ft/ft)	0.000018	Area (sq ft)		326.18	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	256.03	Top Width (ft)		256.03	

Vel Total (ft/s)	0.29	Avg. Vel. (ft/s)	0.29
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)	1.27
Conv. Total (cfs)	22771.7	Conv. (cfs)	22771.7
Length Wtd. (ft)	125.00	Wetted Per. (ft)	256.23
Min Ch El (ft)	1444.50	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.79
C & E Loss (ft)	0.04	Cum SA (acres)	1.23

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1447.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1447.63	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.19	Flow Area (sq ft)		660.34	
E.G. Slope (ft/ft)	0.000007	Area (sq ft)		660.34	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	266.39	Top Width (ft)		266.39	
Vel Total (ft/s)	0.28	Avg. Vel. (ft/s)		0.28	
Max Chl Dpth (ft)	3.13	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	71797.0	Conv. (cfs)		71797.0	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		266.90	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		2.82	
C & E Loss (ft)	0.06	Cum SA (acres)		1.30	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1448.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1448.41	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.28	Flow Area (sq ft)		871.10	
E.G. Slope (ft/ft)	0.000005	Area (sq ft)		871.10	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	272.71	Top Width (ft)		272.71	
Vel Total (ft/s)	0.28	Avg. Vel. (ft/s)		0.28	
Max Chl Dpth (ft)	3.91	Hydr. Depth (ft)		3.19	
Conv. Total (cfs)	112100.6	Conv. (cfs)		112100.6	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		273.42	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		3.36	
C & E Loss (ft)	0.07	Cum SA (acres)		1.32	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1449.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1449.27	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.37	Flow Area (sq ft)		1108.48	
E.G. Slope (ft/ft)	0.000004	Area (sq ft)		1108.48	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	279.67	Top Width (ft)		279.67	
Vel Total (ft/s)	0.29	Avg. Vel. (ft/s)		0.29	
Max Chl Dpth (ft)	4.77	Hydr. Depth (ft)		3.96	

Conv. Total (cfs)	164646.2	Conv. (cfs)	164646.2
Length Wtd. (ft)	125.00	Wetted Per. (ft)	280.59
Min Ch El (ft)	1444.50	Shear (lb/sq ft)	0.00
Alpha	1.00	Stream Power (lb/ft s)	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.91
C & E Loss (ft)	0.09	Cum SA (acres)	1.34

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1450.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1450.84	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.52	Flow Area (sq ft)		1559.73	
E.G. Slope (ft/ft)	0.000003	Area (sq ft)		1559.73	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	292.43	Top Width (ft)		292.43	
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)		0.31	
Max Chl Dpth (ft)	6.34	Hydr. Depth (ft)		5.33	
Conv. Total (cfs)	282153.3	Conv. (cfs)		282153.3	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		293.75	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		5.12	
C & E Loss (ft)	0.11	Cum SA (acres)		1.39	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1452.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1452.48	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.64	Flow Area (sq ft)		2048.68	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		2048.68	
Q Total (cfs)	644.00	Flow (cfs)		644.00	
Top Width (ft)	305.66	Top Width (ft)		305.66	
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)		0.31	
Max Chl Dpth (ft)	7.98	Hydr. Depth (ft)		6.70	
Conv. Total (cfs)	431240.5	Conv. (cfs)		431240.5	
Length Wtd. (ft)	125.00	Wetted Per. (ft)		307.39	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		6.28	
C & E Loss (ft)	0.13	Cum SA (acres)		1.43	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1453.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.		0.025	
W.S. Elev (ft)	1453.27	Reach Len. (ft)	125.00	125.00	125.00
Crit W.S. (ft)	1445.68	Flow Area (sq ft)		2293.30	
E.G. Slope (ft/ft)	0.000002	Area (sq ft)		2293.30	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	312.07	Top Width (ft)		312.07	
Vel Total (ft/s)	0.31	Avg. Vel. (ft/s)		0.31	
Max Chl Dpth (ft)	8.77	Hydr. Depth (ft)		7.35	
Conv. Total (cfs)	513107.3	Conv. (cfs)		513107.3	

Length Wtd. (ft)	125.00	Wetted Per. (ft)		313.99	
Min Ch El (ft)	1444.50	Shear (lb/sq ft)		0.00	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.01	6.77	0.04
C & E Loss (ft)	0.12	Cum SA (acres)	0.03	1.44	0.14

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 3365

INPUT
Description: End RCB Culvert
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1454.24	99.9	1451.33	100	1444	110	1444	110.1	1451.33
160	1454.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	983.8	983.8	983.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1446.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.		0.015	
W.S. Elev (ft)	1445.91	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1445.41	Flow Area (sq ft)		19.16	
E.G. Slope (ft/ft)	0.001655	Area (sq ft)		19.16	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	10.05	Top Width (ft)		10.05	
Vel Total (ft/s)	5.01	Avg. Vel. (ft/s)		5.01	
Max Chl Dpth (ft)	1.91	Hydr. Depth (ft)		1.91	
Conv. Total (cfs)	2359.9	Conv. (cfs)		2359.9	
Length Wtd. (ft)	983.80	Wetted Per. (ft)		13.82	
Min Ch El (ft)	1444.00	Shear (lb/sq ft)		0.14	

Alpha	1.00	Stream Power (lb/ft s)	0.72
Frctn Loss (ft)		Cum Volume (acre-ft)	1.30
C & E Loss (ft)		Cum SA (acres)	0.85

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1447.56				
Vel Head (ft)	0.60	Wt. n-Val.		0.015	
W.S. Elev (ft)	1446.96	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1446.19	Flow Area (sq ft)		29.76	
E.G. Slope (ft/ft)	0.001711	Area (sq ft)		29.76	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	10.08	Top Width (ft)		10.08	
Vel Total (ft/s)	6.22	Avg. Vel. (ft/s)		6.22	
Max Chl Dpth (ft)	2.96	Hydr. Depth (ft)		2.95	
Conv. Total (cfs)	4472.0	Conv. (cfs)		4472.0	
Length Wtd. (ft)	983.80	Wetted Per. (ft)		15.93	
Min Ch El (ft)	1444.00	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		1.24	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.83	
C & E Loss (ft)		Cum SA (acres)		0.90	

CROSS SECTION OUTPUT Profile #PF 3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1448.33				
Vel Head (ft)	0.73	Wt. n-Val.		0.015	
W.S. Elev (ft)	1447.61	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1446.66	Flow Area (sq ft)		36.24	
E.G. Slope (ft/ft)	0.001768	Area (sq ft)		36.24	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	10.10	Top Width (ft)		10.10	
Vel Total (ft/s)	6.84	Avg. Vel. (ft/s)		6.84	
Max Chl Dpth (ft)	3.61	Hydr. Depth (ft)		3.59	

Conv. Total (cfs)	5897.9	Conv. (cfs)	5897.9
Length Wtd. (ft)	983.80	Wetted Per. (ft)	17.21
Min Ch El (ft)	1444.00	Shear (lb/sq ft)	0.23
Alpha	1.00	Stream Power (lb/ft s)	1.59
Frctn Loss (ft)		Cum Volume (acre-ft)	2.06
C & E Loss (ft)		Cum SA (acres)	0.92

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1449.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.87	Wt. n-Val.		0.015	
W.S. Elev (ft)	1448.31	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1447.18	Flow Area (sq ft)		43.39	
E.G. Slope (ft/ft)	0.001840	Area (sq ft)		43.39	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	10.12	Top Width (ft)		10.12	
Vel Total (ft/s)	7.47	Avg. Vel. (ft/s)		7.47	
Max Chl Dpth (ft)	4.31	Hydr. Depth (ft)		4.29	
Conv. Total (cfs)	7553.0	Conv. (cfs)		7553.0	
Length Wtd. (ft)	983.80	Wetted Per. (ft)		18.63	
Min Ch El (ft)	1444.00	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		2.00	
Frctn Loss (ft)		Cum Volume (acre-ft)		2.25	
C & E Loss (ft)		Cum SA (acres)		0.92	

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1450.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.12	Wt. n-Val.		0.015	
W.S. Elev (ft)	1449.62	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1448.13	Flow Area (sq ft)		56.58	
E.G. Slope (ft/ft)	0.001985	Area (sq ft)		56.58	

Q Total (cfs)	480.00	Flow (cfs)	480.00
Top Width (ft)	10.15	Top Width (ft)	10.15
Vel Total (ft/s)	8.48	Avg. Vel. (ft/s)	8.48
Max Chl Dpth (ft)	5.61	Hydr. Depth (ft)	5.57
Conv. Total (cfs)	10772.7	Conv. (cfs)	10772.7
Length Wtd. (ft)	983.80	Wetted Per. (ft)	21.23
Min Ch El (ft)	1444.00	Shear (lb/sq ft)	0.33
Alpha	1.00	Stream Power (lb/ft s)	2.80
Frctn Loss (ft)		Cum Volume (acre-ft)	2.80
C & E Loss (ft)		Cum SA (acres)	0.96

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1452.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.25	Wt. n-Val.		0.015	
W.S. Elev (ft)	1451.10	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1449.03	Flow Area (sq ft)		71.71	
E.G. Slope (ft/ft)	0.001932	Area (sq ft)		71.71	
Q Total (cfs)	644.00	Flow (cfs)		644.00	
Top Width (ft)	10.19	Top Width (ft)		10.19	
Vel Total (ft/s)	8.98	Avg. Vel. (ft/s)		8.98	
Max Chl Dpth (ft)	7.10	Hydr. Depth (ft)		7.03	
Conv. Total (cfs)	14651.9	Conv. (cfs)		14651.9	
Length Wtd. (ft)	983.80	Wetted Per. (ft)		24.20	
Min Ch El (ft)	1444.00	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		3.21	
Frctn Loss (ft)		Cum Volume (acre-ft)		3.24	
C & E Loss (ft)		Cum SA (acres)		0.98	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1453.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.21	Wt. n-Val.	0.040	0.015	0.040

W.S. Elev (ft)	1451.95	Reach Len. (ft)	983.80	983.80	983.80
Crit W.S. (ft)	1449.37	Flow Area (sq ft)	0.77	80.31	3.39
E.G. Slope (ft/ft)	0.001646	Area (sq ft)	0.77	80.31	3.39
Q Total (cfs)	712.00	Flow (cfs)	0.52	709.15	2.33
Top Width (ft)	23.75	Top Width (ft)	2.51	10.20	11.04
Vel Total (ft/s)	8.43	Avg. Vel. (ft/s)	0.67	8.83	0.69
Max Chl Dpth (ft)	7.94	Hydr. Depth (ft)	0.31	7.87	0.31
Conv. Total (cfs)	17547.3	Conv. (cfs)	12.8	17477.1	57.4
Length Wtd. (ft)	983.80	Wetted Per. (ft)	2.59	24.66	11.06
Min Ch El (ft)	1444.00	Shear (lb/sq ft)	0.03	0.33	0.03
Alpha	1.09	Stream Power (lb/ft s)	0.02	2.96	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	0.01	3.36	0.04
C & E Loss (ft)		Cum SA (acres)	0.03	0.98	0.12

```
CULVERT                 RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2   RS: 3000

INPUT
Description: Southern Avenue Detention Basin Outlet
Distance from Upstream XS =      41
Deck/Roadway Width        =     900
Weir Coefficient          =     2.6
Upstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
       0  1454.6              700  1454.6

Upstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1454.24    99.9 1451.33     100    1444     110    1444   110.1 1451.33
     160 1454.11

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3

Downstream  Deck/Roadway Coordinates
    num=        2
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
       0  1450.4              200  1450.4

Downstream Bridge Cross Section Data
Station Elevation Data    num=       7
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
      88 1447.09    99.9 1446.85     100 1437.85     110 1437.85   110.1 1446.85
```

```
     147 1450.46     168 1448.96

Manning's n Values          num=        3
     Sta   n Val     Sta   n Val     Sta   n Val
      88     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3

Upstream Embankment side slope                =      10 horiz. to 1.0 vertical
Downstream Embankment side slope              =      12 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1           Box       6      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - Wingwall flared 45 deg.; inlet top edge bevel=0.43D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                  0   983.8       .013                   .2               .2
Upstream   Elevation =  1444
           Centerline Station =  105
Downstream Elevation =  1437.85
           Centerline Station =  105

CULVERT OUTPUT    Profile #PF 1
Culvert ID : Culvert #1

  Culv Q (cfs)              96.00    Culv Ful Lngh (ft)
  # Barrels                     1    Culv Vel US (ft/s)         6.76
  Q Barrel (cfs)            96.00    Culv Vel DS (ft/s)         8.53
  E.G. US. (ft)           1446.30    Culv Inv El Up (ft)     1444.00
  W.S. US. (ft)           1445.91    Culv Inv El Dn (ft)     1437.85
  E.G. DS (ft)            1439.99    Culv Frctn Ls (ft)         6.03
  W.S. DS (ft)            1439.39    Culv Ext Lss (ft)          0.11
  Delta EG (ft)              6.31    Culv Ent Lss (ft)          0.17
  Delta WS (ft)              6.53    Q Weir (cfs)
  E.G. IC (ft)            1446.30    Weir Sta Lft (ft)
  E.G. OC (ft)            1446.27    Weir Sta Rgt (ft)
  Culvert Control           Inlet    Weir Submerg
  Culv WS Inlet (ft)      1445.42    Weir Max Depth (ft)
  Culv WS Outlet (ft)     1438.98    Weir Avg Depth (ft)
  Culv Nml Depth (ft)        1.13    Wr Flw Area (sq ft)
  Culv Crt Depth (ft)        1.42    Min El Weir Flow (ft)   1454.61


Note:    During supercritical analysis, the culvert direct step method went to normal depth.
The
         program then assumed normal depth at the outlet.
Note:    The flow in the culvert is entirely supercritical.

CULVERT OUTPUT    Profile #PF 2
Culvert ID : Culvert #1

  Culv Q (cfs)             185.00    Culv Ful Lngh (ft)
  # Barrels                     1    Culv Vel US (ft/s)         8.41
  Q Barrel (cfs)           185.00    Culv Vel DS (ft/s)        10.70
  E.G. US. (ft)           1447.57    Culv Inv El Up (ft)     1444.00
  W.S. US. (ft)           1446.96    Culv Inv El Dn (ft)     1437.85
```

E.G. DS (ft)	1441.14	Culv Frctn Ls (ft)	5.94
W.S. DS (ft)	1440.04	Culv Ext Lss (ft)	0.21
Delta EG (ft)	6.42	Culv Ent Lss (ft)	0.27
Delta WS (ft)	6.92	Q Weir (cfs)	
E.G. IC (ft)	1447.57	Weir Sta Lft (ft)	
E.G. OC (ft)	1447.52	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1446.20	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1439.58	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.73	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	2.20	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 3
Culvert ID : Culvert #1

Culv Q (cfs)	248.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	9.28
Q Barrel (cfs)	248.00	Culv Vel DS (ft/s)	11.76
E.G. US. (ft)	1448.34	Culv Inv El Up (ft)	1444.00
W.S. US. (ft)	1447.61	Culv Inv El Dn (ft)	1437.85
E.G. DS (ft)	1441.85	Culv Frctn Ls (ft)	5.90
W.S. DS (ft)	1440.51	Culv Ext Lss (ft)	0.25
Delta EG (ft)	6.49	Culv Ent Lss (ft)	0.33
Delta WS (ft)	7.09	Q Weir (cfs)	
E.G. IC (ft)	1448.34	Weir Sta Lft (ft)	
E.G. OC (ft)	1448.28	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1446.67	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1439.96	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.11	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	2.67	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 4
Culvert ID : Culvert #1

Culv Q (cfs)	324.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	10.14
Q Barrel (cfs)	324.00	Culv Vel DS (ft/s)	12.78
E.G. US. (ft)	1449.19	Culv Inv El Up (ft)	1444.00
W.S. US. (ft)	1448.31	Culv Inv El Dn (ft)	1437.85
E.G. DS (ft)	1442.63	Culv Frctn Ls (ft)	5.87
W.S. DS (ft)	1441.03	Culv Ext Lss (ft)	0.29
Delta EG (ft)	6.55	Culv Ent Lss (ft)	0.39
Delta WS (ft)	7.28	Q Weir (cfs)	
E.G. IC (ft)	1449.19	Weir Sta Lft (ft)	
E.G. OC (ft)	1449.11	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1447.20	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1440.39	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.54	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	3.19	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 5
Culvert ID : Culvert #1

Culv Q (cfs)	480.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	11.56
Q Barrel (cfs)	480.00	Culv Vel DS (ft/s)	14.36
E.G. US. (ft)	1450.74	Culv Inv El Up (ft)	1444.00
W.S. US. (ft)	1449.62	Culv Inv El Dn (ft)	1437.85
E.G. DS (ft)	1444.06	Culv Frctn Ls (ft)	5.83
W.S. DS (ft)	1441.98	Culv Ext Lss (ft)	0.34
Delta EG (ft)	6.68	Culv Ent Lss (ft)	0.51
Delta WS (ft)	7.63	Q Weir (cfs)	
E.G. IC (ft)	1450.74	Weir Sta Lft (ft)	
E.G. OC (ft)	1450.64	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1448.15	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1441.19	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.34	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	4.15	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 6
Culvert ID : Culvert #1

Culv Q (cfs)	644.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	12.75
Q Barrel (cfs)	644.00	Culv Vel DS (ft/s)	15.58
E.G. US. (ft)	1452.36	Culv Inv El Up (ft)	1444.00
W.S. US. (ft)	1451.10	Culv Inv El Dn (ft)	1437.85
E.G. DS (ft)	1445.40	Culv Frctn Ls (ft)	5.82
W.S. DS (ft)	1442.88	Culv Ext Lss (ft)	0.36
Delta EG (ft)	6.96	Culv Ent Lss (ft)	0.78
Delta WS (ft)	8.22	Q Weir (cfs)	
E.G. IC (ft)	1452.36	Weir Sta Lft (ft)	
E.G. OC (ft)	1452.08	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1449.05	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1441.98	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.13	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	5.05	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CULVERT OUTPUT Profile #PF 7
Culvert ID : Culvert #1

Culv Q (cfs)	712.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	11.87
Q Barrel (cfs)	712.00	Culv Vel DS (ft/s)	16.00
E.G. US. (ft)	1453.15	Culv Inv El Up (ft)	1444.00
W.S. US. (ft)	1451.95	Culv Inv El Dn (ft)	1437.85

E.G. DS (ft)	1445.92	Culv Frctn Ls (ft)	6.44
W.S. DS (ft)	1443.23	Culv Ext Lss (ft)	0.36
Delta EG (ft)	7.23	Culv Ent Lss (ft)	0.44
Delta WS (ft)	8.71	Q Weir (cfs)	
E.G. IC (ft)	1453.15	Weir Sta Lft (ft)	
E.G. OC (ft)	1452.64	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	1450.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1442.30	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	4.45	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	5.40	Min El Weir Flow (ft)	1454.61

Note: During supercritical analysis, the culvert direct step method went to normal depth. The
program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2381

INPUT
Description: End Channel Transition, Begin RCB
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
88	1447.09	99.9	1446.85	100	1437.85	110	1437.85	110.1	1446.85
147	1450.46	168	1448.96						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
88	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	120.3	120.3	120.3	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1440.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.		0.015	
W.S. Elev (ft)	1438.99	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1439.27	Flow Area (sq ft)		11.38	
E.G. Slope (ft/ft)	0.008031	Area (sq ft)		11.38	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	10.03	Top Width (ft)		10.03	
Vel Total (ft/s)	8.44	Avg. Vel. (ft/s)		8.44	
Max Chl Dpth (ft)	1.14	Hydr. Depth (ft)		1.13	
Conv. Total (cfs)	1071.2	Conv. (cfs)		1071.2	
Length Wtd. (ft)	120.30	Wetted Per. (ft)		12.27	
Min Ch El (ft)	1437.85	Shear (lb/sq ft)		0.46	
Alpha	1.00	Stream Power (lb/ft s)		3.92	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.95	

C & E Loss (ft)	Cum SA (acres)	0.62

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1441.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.015	
W.S. Elev (ft)	1439.59	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1440.04	Flow Area (sq ft)		17.42	
E.G. Slope (ft/ft)	0.008165	Area (sq ft)		17.42	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	10.04	Top Width (ft)		10.04	
Vel Total (ft/s)	10.62	Avg. Vel. (ft/s)		10.62	
Max Chl Dpth (ft)	1.74	Hydr. Depth (ft)		1.74	
Conv. Total (cfs)	2047.4	Conv. (cfs)		2047.4	
Length Wtd. (ft)	120.30	Wetted Per. (ft)		13.48	
Min Ch El (ft)	1437.85	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)		7.00	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.30	
C & E Loss (ft)		Cum SA (acres)		0.68	

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1442.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.12	Wt. n-Val.		0.015	
W.S. Elev (ft)	1439.97	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1440.52	Flow Area (sq ft)		21.24	
E.G. Slope (ft/ft)	0.008153	Area (sq ft)		21.24	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	10.05	Top Width (ft)		10.05	
Vel Total (ft/s)	11.68	Avg. Vel. (ft/s)		11.68	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		2.11	
Conv. Total (cfs)	2746.5	Conv. (cfs)		2746.5	

Length Wtd. (ft)	120.30	Wetted Per. (ft)	14.24
Min Ch El (ft)	1437.85	Shear (lb/sq ft)	0.76
Alpha	1.00	Stream Power (lb/ft s)	8.87
Frctn Loss (ft)		Cum Volume (acre-ft)	1.41
C & E Loss (ft)		Cum SA (acres)	0.69

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1442.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.50	Wt. n-Val.		0.015	
W.S. Elev (ft)	1440.40	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1441.04	Flow Area (sq ft)		25.53	
E.G. Slope (ft/ft)	0.008142	Area (sq ft)		25.53	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	10.06	Top Width (ft)		10.06	
Vel Total (ft/s)	12.69	Avg. Vel. (ft/s)		12.69	
Max Chl Dpth (ft)	2.55	Hydr. Depth (ft)		2.54	
Conv. Total (cfs)	3590.6	Conv. (cfs)		3590.6	
Length Wtd. (ft)	120.30	Wetted Per. (ft)		15.09	
Min Ch El (ft)	1437.85	Shear (lb/sq ft)		0.86	
Alpha	1.00	Stream Power (lb/ft s)		10.91	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.47	
C & E Loss (ft)		Cum SA (acres)		0.70	

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1444.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.16	Wt. n-Val.		0.015	
W.S. Elev (ft)	1441.20	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1441.99	Flow Area (sq ft)		33.66	
E.G. Slope (ft/ft)	0.008147	Area (sq ft)		33.66	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	10.07	Top Width (ft)		10.07	

Vel Total (ft/s)	14.26	Avg. Vel. (ft/s)	14.26
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)	3.34
Conv. Total (cfs)	5317.9	Conv. (cfs)	5317.9
Length Wtd. (ft)	120.30	Wetted Per. (ft)	16.71
Min Ch El (ft)	1437.85	Shear (lb/sq ft)	1.02
Alpha	1.00	Stream Power (lb/ft s)	14.61
Frctn Loss (ft)		Cum Volume (acre-ft)	1.78
C & E Loss (ft)		Cum SA (acres)	0.73

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1445.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.72	Wt. n-Val.		0.015	
W.S. Elev (ft)	1441.99	Reach Len. (ft)	120.30	120.30	120.30
Crit W.S. (ft)	1442.88	Flow Area (sq ft)		41.62	
E.G. Slope (ft/ft)	0.008151	Area (sq ft)		41.62	
Q Total (cfs)	644.00	Flow (cfs)		644.00	
Top Width (ft)	10.09	Top Width (ft)		10.09	
Vel Total (ft/s)	15.47	Avg. Vel. (ft/s)		15.47	
Max Chl Dpth (ft)	4.14	Hydr. Depth (ft)		4.12	
Conv. Total (cfs)	7133.3	Conv. (cfs)		7133.3	
Length Wtd. (ft)	120.30	Wetted Per. (ft)		18.29	
Min Ch El (ft)	1437.85	Shear (lb/sq ft)		1.16	
Alpha	1.00	Stream Power (lb/ft s)		17.92	
Frctn Loss (ft)		Cum Volume (acre-ft)		1.96	
C & E Loss (ft)		Cum SA (acres)		0.75	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1446.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.92	Wt. n-Val.		0.015	
W.S. Elev (ft)	1442.31	Reach Len. (ft)	120.30	120.30	120.30

Crit W.S. (ft)	1443.23	Flow Area (sq ft)	44.81
E.G. Slope (ft/ft)	0.008150	Area (sq ft)	44.81
Q Total (cfs)	712.00	Flow (cfs)	712.00
Top Width (ft)	10.10	Top Width (ft)	10.10
Vel Total (ft/s)	15.89	Avg. Vel. (ft/s)	15.89
Max Chl Dpth (ft)	4.46	Hydr. Depth (ft)	4.44
Conv. Total (cfs)	7886.9	Conv. (cfs)	7886.9
Length Wtd. (ft)	120.30	Wetted Per. (ft)	18.92
Min Ch El (ft)	1437.85	Shear (lb/sq ft)	1.21
Alpha	1.00	Stream Power (lb/ft s)	19.15
Frctn Loss (ft)		Cum Volume (acre-ft)	1.95
C & E Loss (ft)		Cum SA (acres)	0.75

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2261

INPUT
Description: Begin Channel Transition
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1442.97	76	1444.97	88	1444.73	100	1437.73	116	1438.05
127.36	1444.73	145	1449.96	170	1447.96				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	60	60	60	.1	.3

Left Levee Station= 88 Elevation= 1443.77

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.55	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1438.89	Flow Area (sq ft)		31.28	
E.G. Slope (ft/ft)	0.000707	Area (sq ft)		31.28	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	21.67	Top Width (ft)		21.67	
Vel Total (ft/s)	3.07	Avg. Vel. (ft/s)		3.07	
Max Chl Dpth (ft)	1.82	Hydr. Depth (ft)		1.44	

Conv. Total (cfs)	3610.5	Conv. (cfs)	3610.5
Length Wtd. (ft)	60.00	Wetted Per. (ft)	22.57
Min Ch El (ft)	1437.73	Shear (lb/sq ft)	0.06
Alpha	1.00	Stream Power (lb/ft s)	0.19
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.89
C & E Loss (ft)	0.00	Cum SA (acres)	0.58

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.10	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1439.41	Flow Area (sq ft)		43.62	
E.G. Slope (ft/ft)	0.000978	Area (sq ft)		43.62	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	23.53	Top Width (ft)		23.53	
Vel Total (ft/s)	4.24	Avg. Vel. (ft/s)		4.24	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)		1.85	
Conv. Total (cfs)	5914.6	Conv. (cfs)		5914.6	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		24.73	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.46	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		1.21	
C & E Loss (ft)	0.01	Cum SA (acres)		0.63	

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.016	

W.S. Elev (ft)	1440.33	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1439.71	Flow Area (sq ft)		49.14	
E.G. Slope (ft/ft)	0.001241	Area (sq ft)		49.14	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	24.32	Top Width (ft)		24.32	
Vel Total (ft/s)	5.05	Avg. Vel. (ft/s)		5.05	
Max Chl Dpth (ft)	2.60	Hydr. Depth (ft)		2.02	
Conv. Total (cfs)	7040.9	Conv. (cfs)		7040.9	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		25.64	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.75	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)		1.31	
C & E Loss (ft)	0.01	Cum SA (acres)		0.64	

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1441.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.34	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1440.04	Flow Area (sq ft)		26.75	
E.G. Slope (ft/ft)	0.012888	Area (sq ft)		26.75	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	20.94	Top Width (ft)		20.94	
Vel Total (ft/s)	12.11	Avg. Vel. (ft/s)		12.11	
Max Chl Dpth (ft)	1.61	Hydr. Depth (ft)		1.28	
Conv. Total (cfs)	2854.0	Conv. (cfs)		2854.0	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		21.73	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		0.99	
Alpha	1.00	Stream Power (lb/ft s)		12.00	
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)		1.40	
C & E Loss (ft)	0.07	Cum SA (acres)		0.65	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1443.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.41	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.60	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1440.62	Flow Area (sq ft)		32.41	
E.G. Slope (ft/ft)	0.015884	Area (sq ft)		32.41	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	21.84	Top Width (ft)		21.84	
Vel Total (ft/s)	14.81	Avg. Vel. (ft/s)		14.81	
Max Chl Dpth (ft)	1.87	Hydr. Depth (ft)		1.48	
Conv. Total (cfs)	3808.6	Conv. (cfs)		3808.6	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		22.77	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		1.41	
Alpha	1.00	Stream Power (lb/ft s)		20.90	
Frctn Loss (ft)	1.33	Cum Volume (acre-ft)		1.69	
C & E Loss (ft)	0.02	Cum SA (acres)		0.69	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1444.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.40	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.86	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1441.17	Flow Area (sq ft)		38.27	
E.G. Slope (ft/ft)	0.017437	Area (sq ft)		38.27	
Q Total (cfs)	644.00	Flow (cfs)		644.00	
Top Width (ft)	22.74	Top Width (ft)		22.74	
Vel Total (ft/s)	16.83	Avg. Vel. (ft/s)		16.83	

Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)	1.68
Conv. Total (cfs)	4877.0	Conv. (cfs)	4877.0
Length Wtd. (ft)	60.00	Wetted Per. (ft)	23.82
Min Ch El (ft)	1437.73	Shear (lb/sq ft)	1.75
Alpha	1.00	Stream Power (lb/ft s)	29.44
Frctn Loss (ft)	1.38	Cum Volume (acre-ft)	1.85
C & E Loss (ft)	0.07	Cum SA (acres)	0.70

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1444.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.78	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.96	Reach Len. (ft)	60.00	60.00	60.00
Crit W.S. (ft)	1441.35	Flow Area (sq ft)		40.58	
E.G. Slope (ft/ft)	0.017927	Area (sq ft)		40.58	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	23.09	Top Width (ft)		23.09	
Vel Total (ft/s)	17.54	Avg. Vel. (ft/s)		17.54	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	5317.7	Conv. (cfs)		5317.7	
Length Wtd. (ft)	60.00	Wetted Per. (ft)		24.21	
Min Ch El (ft)	1437.73	Shear (lb/sq ft)		1.88	
Alpha	1.00	Stream Power (lb/ft s)		32.91	
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)		1.83	
C & E Loss (ft)	0.09	Cum SA (acres)		0.71	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
water surface was used.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2201

INPUT
Description: Begin Channel Transition
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.91	76	1443.91	88	1443.67	100	1437.67	116	1437.99
127.36	1443.67	145	1448.1	160	1446.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	101	101	101	.1	.3

Left Levee Station= 88 Elevation= 1443.77

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.52	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1438.82	Flow Area (sq ft)		32.73	
E.G. Slope (ft/ft)	0.000643	Area (sq ft)		32.73	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	22.75	Top Width (ft)		22.75	
Vel Total (ft/s)	2.93	Avg. Vel. (ft/s)		2.93	
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)		1.44	
Conv. Total (cfs)	3786.1	Conv. (cfs)		3786.1	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		23.55	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		0.85	
C & E Loss (ft)	0.00	Cum SA (acres)		0.55	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.05	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1439.33	Flow Area (sq ft)		45.53	
E.G. Slope (ft/ft)	0.000904	Area (sq ft)		45.53	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	24.90	Top Width (ft)		24.90	
Vel Total (ft/s)	4.06	Avg. Vel. (ft/s)		4.06	
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)		1.83	
Conv. Total (cfs)	6151.5	Conv. (cfs)		6151.5	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		25.95	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.40	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.00	Cum SA (acres)		0.60	

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.27	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1439.63	Flow Area (sq ft)		51.11	
E.G. Slope (ft/ft)	0.001162	Area (sq ft)		51.11	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	25.78	Top Width (ft)		25.78	
Vel Total (ft/s)	4.85	Avg. Vel. (ft/s)		4.85	
Max Chl Dpth (ft)	2.60	Hydr. Depth (ft)		1.98	
Conv. Total (cfs)	7275.5	Conv. (cfs)		7275.5	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		26.93	

Min Ch El (ft)	1437.67	Shear (lb/sq ft)	0.14
Alpha	1.00	Stream Power (lb/ft s)	0.67
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	1.24
C & E Loss (ft)	0.00	Cum SA (acres)	0.61

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.05	Element			
Vel Head (ft)	0.47	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.58	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1439.95	Flow Area (sq ft)		59.18	
E.G. Slope (ft/ft)	0.001300	Area (sq ft)		59.18	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	27.00	Top Width (ft)		27.00	
Vel Total (ft/s)	5.47	Avg. Vel. (ft/s)		5.47	
Max Chl Dpth (ft)	2.91	Hydr. Depth (ft)		2.19	
Conv. Total (cfs)	8987.3	Conv. (cfs)		8987.3	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		28.30	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		0.93	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		1.34	
C & E Loss (ft)	0.00	Cum SA (acres)		0.62	

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.84	Element			
Vel Head (ft)	0.58	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.25	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1440.51	Flow Area (sq ft)		78.25	
E.G. Slope (ft/ft)	0.001286	Area (sq ft)		78.25	
Q Total (cfs)	480.00	Flow (cfs)		480.00	

Top Width (ft)	29.69	Top Width (ft)	29.69
Vel Total (ft/s)	6.13	Avg. Vel. (ft/s)	6.13
Max Chl Dpth (ft)	3.58	Hydr. Depth (ft)	2.64
Conv. Total (cfs)	13383.1	Conv. (cfs)	13383.1
Length Wtd. (ft)	101.00	Wetted Per. (ft)	31.31
Min Ch El (ft)	1437.67	Shear (lb/sq ft)	0.20
Alpha	1.00	Stream Power (lb/ft s)	1.23
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	1.62
C & E Loss (ft)	0.00	Cum SA (acres)	0.65

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1443.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.93	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.11	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1441.02	Flow Area (sq ft)		46.86	
E.G. Slope (ft/ft)	0.010080	Area (sq ft)		46.86	
Q Total (cfs)	644.00	Flow (cfs)		644.00	
Top Width (ft)	25.11	Top Width (ft)		25.11	
Vel Total (ft/s)	13.74	Avg. Vel. (ft/s)		13.74	
Max Chl Dpth (ft)	2.44	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	6414.2	Conv. (cfs)		6414.2	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		26.19	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		1.13	
Alpha	1.00	Stream Power (lb/ft s)		15.48	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)		1.79	
C & E Loss (ft)	0.44	Cum SA (acres)		0.67	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross

section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1443.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.19	Reach Len. (ft)	101.00	101.00	101.00
Crit W.S. (ft)	1441.22	Flow Area (sq ft)		48.99	
E.G. Slope (ft/ft)	0.010828	Area (sq ft)		48.99	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	25.45	Top Width (ft)		25.45	
Vel Total (ft/s)	14.53	Avg. Vel. (ft/s)		14.53	
Max Chl Dpth (ft)	2.52	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	6842.5	Conv. (cfs)		6842.5	
Length Wtd. (ft)	101.00	Wetted Per. (ft)		26.56	
Min Ch El (ft)	1437.67	Shear (lb/sq ft)		1.25	
Alpha	1.00	Stream Power (lb/ft s)		18.12	
Frctn Loss (ft)	0.82	Cum Volume (acre-ft)		1.77	
C & E Loss (ft)	0.45	Cum SA (acres)		0.67	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 2100

INPUT
Description:
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.81	76	1443.81	88	1443.57	100	1437.57	116	1437.89
127.36	1443.57	145	1448	160	1446				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	155	155	155	.1	.3

Left Levee Station= 88 Elevation= 1443.57

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.46	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1438.72	Flow Area (sq ft)		33.72	
E.G. Slope (ft/ft)	0.000589	Area (sq ft)		33.72	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	22.92	Top Width (ft)		22.92	
Vel Total (ft/s)	2.85	Avg. Vel. (ft/s)		2.85	
Max Chl Dpth (ft)	1.89	Hydr. Depth (ft)		1.47	
Conv. Total (cfs)	3956.8	Conv. (cfs)		3956.8	
Length Wtd. (ft)	155.00	Wetted Per. (ft)		23.74	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.00	Cum SA (acres)		0.49	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.97	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1439.23	Flow Area (sq ft)		45.87	
E.G. Slope (ft/ft)	0.000885	Area (sq ft)		45.87	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	24.95	Top Width (ft)		24.95	
Vel Total (ft/s)	4.03	Avg. Vel. (ft/s)		4.03	
Max Chl Dpth (ft)	2.40	Hydr. Depth (ft)		1.84	
Conv. Total (cfs)	6218.3	Conv. (cfs)		6218.3	
Length Wtd. (ft)	155.00	Wetted Per. (ft)		26.01	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.39	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)		1.04	

C & E Loss (ft)	0.00	Cum SA (acres)	0.54

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.14	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1439.53	Flow Area (sq ft)		50.16	
E.G. Slope (ft/ft)	0.001227	Area (sq ft)		50.16	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	25.63	Top Width (ft)		25.63	
Vel Total (ft/s)	4.94	Avg. Vel. (ft/s)		4.94	
Max Chl Dpth (ft)	2.57	Hydr. Depth (ft)		1.96	
Conv. Total (cfs)	7079.5	Conv. (cfs)		7079.5	
Length Wtd. (ft)	155.00	Wetted Per. (ft)		26.77	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.14	
Alpha	1.00	Stream Power (lb/ft s)		0.71	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)		1.12	
C & E Loss (ft)	0.00	Cum SA (acres)		0.55	

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.41	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1439.85	Flow Area (sq ft)		57.15	
E.G. Slope (ft/ft)	0.001437	Area (sq ft)		57.15	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	26.70	Top Width (ft)		26.70	
Vel Total (ft/s)	5.67	Avg. Vel. (ft/s)		5.67	
Max Chl Dpth (ft)	2.83	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	8547.6	Conv. (cfs)		8547.6	
Length Wtd. (ft)	155.00	Wetted Per. (ft)		27.96	

Min Ch El (ft)	1437.57	Shear (lb/sq ft)	0.18
Alpha	1.00	Stream Power (lb/ft s)	1.04
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	1.21
C & E Loss (ft)	0.02	Cum SA (acres)	0.56

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.70	Element			
Vel Head (ft)	0.62	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.08	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1440.42	Flow Area (sq ft)		75.98	
E.G. Slope (ft/ft)	0.001398	Area (sq ft)		75.98	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	29.38	Top Width (ft)		29.38	
Vel Total (ft/s)	6.32	Avg. Vel. (ft/s)		6.32	
Max Chl Dpth (ft)	3.51	Hydr. Depth (ft)		2.59	
Conv. Total (cfs)	12837.3	Conv. (cfs)		12837.3	
Length Wtd. (ft)	155.00	Wetted Per. (ft)		30.97	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		1.35	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)		1.44	
C & E Loss (ft)	0.05	Cum SA (acres)		0.58	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	1442.38	Element			
Vel Head (ft)	0.74	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.64	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1440.94	Flow Area (sq ft)		93.21	
E.G. Slope (ft/ft)	0.001414	Area (sq ft)		93.21	

Q Total (cfs)	644.00	Flow (cfs)	644.00
Top Width (ft)	31.64	Top Width (ft)	31.64
Vel Total (ft/s)	6.91	Avg. Vel. (ft/s)	6.91
Max Chl Dpth (ft)	4.07	Hydr. Depth (ft)	2.95
Conv. Total (cfs)	17127.5	Conv. (cfs)	17127.5
Length Wtd. (ft)	155.00	Wetted Per. (ft)	33.49
Min Ch El (ft)	1437.57	Shear (lb/sq ft)	0.25
Alpha	1.00	Stream Power (lb/ft s)	1.70
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	1.63
C & E Loss (ft)	0.05	Cum SA (acres)	0.60

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1442.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.84	Reach Len. (ft)	155.00	155.00	155.00
Crit W.S. (ft)	1441.12	Flow Area (sq ft)		99.65	
E.G. Slope (ft/ft)	0.001433	Area (sq ft)		99.65	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	32.45	Top Width (ft)		32.45	
Vel Total (ft/s)	7.14	Avg. Vel. (ft/s)		7.14	
Max Chl Dpth (ft)	4.27	Hydr. Depth (ft)		3.07	
Conv. Total (cfs)	18809.4	Conv. (cfs)		18809.4	
Length Wtd. (ft)	155.00	Wetted Per. (ft)		34.39	
Min Ch El (ft)	1437.57	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.85	
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)		1.60	
C & E Loss (ft)	0.05	Cum SA (acres)		0.61	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1945

INPUT
Description: End Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.58	88	1443.41	100	1437.41	116	1437.73	127.36	1443.41
145	1445.77	170	1444.77						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

Left Levee Station= 88 Elevation= 1443.42

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.50	Element			
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.39	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1438.56	Flow Area (sq ft)		35.69	
E.G. Slope (ft/ft)	0.000498	Area (sq ft)		35.69	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	23.26	Top Width (ft)		23.26	
Vel Total (ft/s)	2.69	Avg. Vel. (ft/s)		2.69	
Max Chl Dpth (ft)	1.98	Hydr. Depth (ft)		1.53	
Conv. Total (cfs)	4303.9	Conv. (cfs)		4303.9	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		24.12	
Min Ch El (ft)	1437.41	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.65	
C & E Loss (ft)	0.02	Cum SA (acres)		0.41	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.84	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1439.07	Flow Area (sq ft)		46.60	
E.G. Slope (ft/ft)	0.000845	Area (sq ft)		46.60	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	25.07	Top Width (ft)		25.07	
Vel Total (ft/s)	3.97	Avg. Vel. (ft/s)		3.97	
Max Chl Dpth (ft)	2.43	Hydr. Depth (ft)		1.86	
Conv. Total (cfs)	6363.1	Conv. (cfs)		6363.1	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		26.14	
Min Ch El (ft)	1437.41	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.37	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.88	
C & E Loss (ft)	0.05	Cum SA (acres)		0.45	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.90	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1439.37	Flow Area (sq ft)		48.17	
E.G. Slope (ft/ft)	0.001380	Area (sq ft)		48.17	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	25.32	Top Width (ft)		25.32	
Vel Total (ft/s)	5.15	Avg. Vel. (ft/s)		5.15	
Max Chl Dpth (ft)	2.49	Hydr. Depth (ft)		1.90	
Conv. Total (cfs)	6676.0	Conv. (cfs)		6676.0	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		26.42	

Min Ch El (ft)	1437.41	Shear (lb/sq ft)	0.16
Alpha	1.00	Stream Power (lb/ft s)	0.81
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.95
C & E Loss (ft)	0.08	Cum SA (acres)	0.46

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.86	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1439.69	Flow Area (sq ft)		47.14	
E.G. Slope (ft/ft)	0.002508	Area (sq ft)		47.14	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	25.15	Top Width (ft)		25.15	
Vel Total (ft/s)	6.87	Avg. Vel. (ft/s)		6.87	
Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	6469.9	Conv. (cfs)		6469.9	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		26.24	
Min Ch El (ft)	1437.41	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		1.93	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		1.02	
C & E Loss (ft)	0.15	Cum SA (acres)		0.47	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1441.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.08	Wt. n-Val.		0.016	

W.S. Elev (ft)	1440.26	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1440.26	Flow Area (sq ft)		57.52	
E.G. Slope (ft/ft)	0.003095	Area (sq ft)		57.52	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	26.75	Top Width (ft)		26.75	
Vel Total (ft/s)	8.34	Avg. Vel. (ft/s)		8.34	
Max Chl Dpth (ft)	2.85	Hydr. Depth (ft)		2.15	
Conv. Total (cfs)	8628.0	Conv. (cfs)		8628.0	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		28.03	
Min Ch El (ft)	1437.41	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		3.31	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		1.20	
C & E Loss (ft)	0.21	Cum SA (acres)		0.48	

Warning: The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1442.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.75	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1440.75	Flow Area (sq ft)		71.24	
E.G. Slope (ft/ft)	0.003022	Area (sq ft)		71.24	
Q Total (cfs)	644.00	Flow (cfs)		644.00	

Top Width (ft)	28.73	Top Width (ft)	28.73
Vel Total (ft/s)	9.04	Avg. Vel. (ft/s)	9.04
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)	2.48
Conv. Total (cfs)	11714.3	Conv. (cfs)	11714.3
Length Wtd. (ft)	38.00	Wetted Per. (ft)	30.24
Min Ch El (ft)	1437.41	Shear (lb/sq ft)	0.44
Alpha	1.00	Stream Power (lb/ft s)	4.02
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1.33
C & E Loss (ft)	0.22	Cum SA (acres)	0.50

Warning: The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1442.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)	1440.98	Flow Area (sq ft)		77.82	
E.G. Slope (ft/ft)	0.002875	Area (sq ft)		77.82	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	29.63	Top Width (ft)		29.63	
Vel Total (ft/s)	9.15	Avg. Vel. (ft/s)		9.15	
Max Chl Dpth (ft)	3.57	Hydr. Depth (ft)		2.63	
Conv. Total (cfs)	13278.8	Conv. (cfs)		13278.8	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		31.25	

Min Ch El (ft)	1437.41	Shear (lb/sq ft)	0.45
Alpha	1.00	Stream Power (lb/ft s)	4.09
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	1.28
C & E Loss (ft)	0.22	Cum SA (acres)	0.50

Warning: The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to

critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

LATERAL WEIR RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1944

INPUT
Description: Side Channel Spillway into NW1 Detention Basin
Lateral weir position = Left overbank
Distance from Upstream XS = 1
Deck/Roadway Width = .1
Weir Coefficient = 2.65
Weir Flow Reference = Water Surface
Weir Embankment Coordinates num = 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1443.58	5	1443.58	43	1439.78	208	1439.61	246	1443.41
251	1443.41								

Weir crest shape = Broad Crested

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 1

E.G. US. (ft)	1439.50	Weir Max Depth (ft)	
W.S. US. (ft)	1439.39	Weir Avg Depth (ft)	
E.G. DS (ft)	1439.41	Weir Submerg	0.00
W.S. DS (ft)	1439.31	Min El Weir Flow (ft)	1439.61
Q US (cfs)	96.00	Wr Top Wdth (ft)	
Q Leaving Total (cfs)	0.00	Total Gate Flow (cfs)	
Q DS (cfs)	96.00	Gate Group Q (cfs)	
Perc Q Leaving	0.00	Gate Open Ht (ft)	
Q Weir (cfs)	0.00	Gate #Open	
Wr Flw Area (sq ft)		Gate Area (sq ft)	
Weir Sta US (ft)		Gate Submerg	
Weir Sta DS (ft)		Gate Invert (ft)	

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 2

E.G. US. (ft)	1440.08	Weir Max Depth (ft)	0.31
W.S. US. (ft)	1439.84	Weir Avg Depth (ft)	0.23
E.G. DS (ft)	1439.95	Weir Submerg	0.00
W.S. DS (ft)	1439.83	Min El Weir Flow (ft)	1439.61
Q US (cfs)	185.00	Wr Top Wdth (ft)	169.44
Q Leaving Total (cfs)	49.06	Total Gate Flow (cfs)	
Q DS (cfs)	135.78	Gate Group Q (cfs)	
Perc Q Leaving	26.61	Gate Open Ht (ft)	
Q Weir (cfs)	49.06	Gate #Open	
Wr Flw Area (sq ft)	38.16	Gate Area (sq ft)	
Weir Sta US (ft)	41.58	Gate Submerg	
Weir Sta DS (ft)	211.02	Gate Invert (ft)	

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 3

E.G. US. (ft)	1440.31	Weir Max Depth (ft)	0.47
W.S. US. (ft)	1439.90	Weir Avg Depth (ft)	0.36
E.G. DS (ft)	1440.11	Weir Submerg	0.00
W.S. DS (ft)	1439.99	Min El Weir Flow (ft)	1439.61
Q US (cfs)	248.00	Wr Top Wdth (ft)	172.26
Q Leaving Total (cfs)	101.32	Total Gate Flow (cfs)	
Q DS (cfs)	147.79	Gate Group Q (cfs)	
Perc Q Leaving	40.41	Gate Open Ht (ft)	
Q Weir (cfs)	101.32	Gate #Open	
Wr Flw Area (sq ft)	62.51	Gate Area (sq ft)	
Weir Sta US (ft)	40.26	Gate Submerg	
Weir Sta DS (ft)	212.52	Gate Invert (ft)	

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 4

E.G. US. (ft)	1440.59	Weir Max Depth (ft)	0.62
W.S. US. (ft)	1439.87	Weir Avg Depth (ft)	0.49
E.G. DS (ft)	1440.26	Weir Submerg	0.00
W.S. DS (ft)	1440.14	Min El Weir Flow (ft)	1439.61
Q US (cfs)	324.00	Wr Top Wdth (ft)	174.92
Q Leaving Total (cfs)	161.98	Total Gate Flow (cfs)	
Q DS (cfs)	159.73	Gate Group Q (cfs)	
Perc Q Leaving	50.70	Gate Open Ht (ft)	
Q Weir (cfs)	161.98	Gate #Open	
Wr Flw Area (sq ft)	85.92	Gate Area (sq ft)	
Weir Sta US (ft)	39.08	Gate Submerg	
Weir Sta DS (ft)	214.00	Gate Invert (ft)	

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 5

E.G. US. (ft)	1441.34	Weir Max Depth (ft)	0.95
W.S. US. (ft)	1440.23	Weir Avg Depth (ft)	0.76
E.G. DS (ft)	1440.60	Weir Submerg	0.00
W.S. DS (ft)	1440.50	Min El Weir Flow (ft)	1439.61
Q US (cfs)	480.00	Wr Top Wdth (ft)	174.06
Q Leaving Total (cfs)	312.27	Total Gate Flow (cfs)	
Q DS (cfs)	169.11	Gate Group Q (cfs)	
Perc Q Leaving	64.77	Gate Open Ht (ft)	
Q Weir (cfs)	312.27	Gate #Open	
Wr Flw Area (sq ft)	132.62	Gate Area (sq ft)	
Weir Sta US (ft)	43.26	Gate Submerg	
Weir Sta DS (ft)	217.32	Gate Invert (ft)	

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 6

E.G. US. (ft)	1442.02	Weir Max Depth (ft)	1.31
W.S. US. (ft)	1440.72	Weir Avg Depth (ft)	1.05
E.G. DS (ft)	1440.97	Weir Submerg	0.00
W.S. DS (ft)	1440.86	Min El Weir Flow (ft)	1439.61
Q US (cfs)	644.00	Wr Top Wdth (ft)	147.88
Q Leaving Total (cfs)	437.97	Total Gate Flow (cfs)	
Q DS (cfs)	198.73	Gate Group Q (cfs)	
Perc Q Leaving	69.14	Gate Open Ht (ft)	
Q Weir (cfs)	437.97	Gate #Open	
Wr Flw Area (sq ft)	155.80	Gate Area (sq ft)	
Weir Sta US (ft)	73.03	Gate Submerg	
Weir Sta DS (ft)	220.91	Gate Invert (ft)	

LATERAL WEIR/SPILLWAY OUTPUT Profile #PF 7

E.G. US. (ft)	1442.28	Weir Max Depth (ft)	1.42
W.S. US. (ft)	1440.94	Weir Avg Depth (ft)	1.12
E.G. DS (ft)	1441.09	Weir Submerg	0.00
W.S. DS (ft)	1440.96	Min El Weir Flow (ft)	1439.61
Q US (cfs)	712.00	Wr Top Wdth (ft)	151.02
Q Leaving Total (cfs)	489.96	Total Gate Flow (cfs)	
Q DS (cfs)	229.85	Gate Group Q (cfs)	
Perc Q Leaving	67.72	Gate Open Ht (ft)	
Q Weir (cfs)	489.96	Gate #Open	
Wr Flw Area (sq ft)	168.64	Gate Area (sq ft)	
Weir Sta US (ft)	70.96	Gate Submerg	
Weir Sta DS (ft)	221.98	Gate Invert (ft)	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1907

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.78	100	1437.38	116	1437.7	127.36	1443.38	145	1445.74
170	1444.74								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	12	12	12	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.42	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)		Flow Area (sq ft)		53.69	
E.G. Slope (ft/ft)	0.000253	Area (sq ft)		53.69	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	39.79	Top Width (ft)		39.79	

Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	1.79
Max Chl Dpth (ft)	2.04	Hydr. Depth (ft)	1.35
Conv. Total (cfs)	6037.3	Conv. (cfs)	6037.3
Length Wtd. (ft)	12.00	Wetted Per. (ft)	40.30
Min Ch El (ft)	1437.38	Shear (lb/sq ft)	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.04
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.61
C & E Loss (ft)	0.00	Cum SA (acres)	0.38

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.92	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)		Flow Area (sq ft)		75.27	
E.G. Slope (ft/ft)	0.000355	Area (sq ft)		75.27	
Q Total (cfs)	185.00	Flow (cfs)		185.00	
Top Width (ft)	44.44	Top Width (ft)		44.44	
Vel Total (ft/s)	2.46	Avg. Vel. (ft/s)		2.46	
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)		1.69	
Conv. Total (cfs)	9816.7	Conv. (cfs)		9816.7	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		45.23	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.83	
C & E Loss (ft)	0.00	Cum SA (acres)		0.42	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.016	

W.S. Elev (ft)	1440.05	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)		Flow Area (sq ft)		81.14	
E.G. Slope (ft/ft)	0.000503	Area (sq ft)		81.14	
Q Total (cfs)	248.00	Flow (cfs)		248.00	
Top Width (ft)	44.71	Top Width (ft)		44.71	
Vel Total (ft/s)	3.06	Avg. Vel. (ft/s)		3.06	
Max Chl Dpth (ft)	2.67	Hydr. Depth (ft)		1.81	
Conv. Total (cfs)	11055.2	Conv. (cfs)		11055.2	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		45.66	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.89	
C & E Loss (ft)	0.00	Cum SA (acres)		0.43	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.17	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)		Flow Area (sq ft)		86.43	
E.G. Slope (ft/ft)	0.000704	Area (sq ft)		86.43	
Q Total (cfs)	324.00	Flow (cfs)		324.00	
Top Width (ft)	44.94	Top Width (ft)		44.94	
Vel Total (ft/s)	3.75	Avg. Vel. (ft/s)		3.75	
Max Chl Dpth (ft)	2.79	Hydr. Depth (ft)		1.92	
Conv. Total (cfs)	12213.5	Conv. (cfs)		12213.5	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		46.04	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.31	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.96	
C & E Loss (ft)	0.00	Cum SA (acres)		0.44	

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1441.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.07	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)	1439.75	Flow Area (sq ft)		40.71	
E.G. Slope (ft/ft)	0.013720	Area (sq ft)		40.71	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	35.66	Top Width (ft)		35.66	
Vel Total (ft/s)	11.79	Avg. Vel. (ft/s)		11.79	
Max Chl Dpth (ft)	1.69	Hydr. Depth (ft)		1.14	
Conv. Total (cfs)	4097.9	Conv. (cfs)		4097.9	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		36.08	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		0.97	
Alpha	1.00	Stream Power (lb/ft s)		11.40	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.16	
C & E Loss (ft)	0.11	Cum SA (acres)		0.45	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.56	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.33	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)	1440.09	Flow Area (sq ft)		50.11	
E.G. Slope (ft/ft)	0.013795	Area (sq ft)		50.11	
Q Total (cfs)	644.00	Flow (cfs)		644.00	

Top Width (ft)	38.70	Top Width (ft)	38.70
Vel Total (ft/s)	12.85	Avg. Vel. (ft/s)	12.85
Max Chl Dpth (ft)	1.94	Hydr. Depth (ft)	1.29
Conv. Total (cfs)	5483.0	Conv. (cfs)	5483.0
Length Wtd. (ft)	12.00	Wetted Per. (ft)	39.18
Min Ch El (ft)	1437.38	Shear (lb/sq ft)	1.10
Alpha	1.00	Stream Power (lb/ft s)	14.16
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	1.28
C & E Loss (ft)	0.13	Cum SA (acres)	0.47

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1442.14	Element			
Vel Head (ft)	2.72	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.42	Reach Len. (ft)	12.00	12.00	12.00
Crit W.S. (ft)	1440.22	Flow Area (sq ft)		53.81	
E.G. Slope (ft/ft)	0.013821	Area (sq ft)		53.81	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	39.83	Top Width (ft)		39.83	
Vel Total (ft/s)	13.23	Avg. Vel. (ft/s)		13.23	
Max Chl Dpth (ft)	2.04	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	6056.3	Conv. (cfs)		6056.3	
Length Wtd. (ft)	12.00	Wetted Per. (ft)		40.34	
Min Ch El (ft)	1437.38	Shear (lb/sq ft)		1.15	
Alpha	1.00	Stream Power (lb/ft s)		15.23	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		1.23	
C & E Loss (ft)	0.14	Cum SA (acres)		0.47	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the

need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1895

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.77	100	1437.37	116	1437.69	127.36	1443.37	145	1445.73
170	1444.73								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.46	Element			
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		54.00	
E.G. Slope (ft/ft)	0.000249	Area (sq ft)		54.00	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	39.89	Top Width (ft)		39.89	
Vel Total (ft/s)	1.78	Avg. Vel. (ft/s)		1.78	
Max Chl Dpth (ft)	2.04	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	6085.3	Conv. (cfs)		6085.3	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		40.40	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.59	
C & E Loss (ft)	0.00	Cum SA (acres)		0.37	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.01	Element			
Vel Head (ft)	0.09	Wt. n-Val.		0.016	

W.S. Elev (ft)	1439.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		75.69	
E.G. Slope (ft/ft)	0.000346	Area (sq ft)		75.69	
Q Total (cfs)	184.19	Flow (cfs)		184.19	
Top Width (ft)	44.46	Top Width (ft)		44.46	
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)		2.43	
Max Chl Dpth (ft)	2.55	Hydr. Depth (ft)		1.70	
Conv. Total (cfs)	9903.2	Conv. (cfs)		9903.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.27	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.81	
C & E Loss (ft)	0.00	Cum SA (acres)		0.41	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.05	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		81.54	
E.G. Slope (ft/ft)	0.000484	Area (sq ft)		81.54	
Q Total (cfs)	245.06	Flow (cfs)		245.06	
Top Width (ft)	44.73	Top Width (ft)		44.73	
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)		3.01	
Max Chl Dpth (ft)	2.68	Hydr. Depth (ft)		1.82	
Conv. Total (cfs)	11142.4	Conv. (cfs)		11142.4	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.69	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.87	
C & E Loss (ft)	0.00	Cum SA (acres)		0.42	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.17	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		86.91	
E.G. Slope (ft/ft)	0.000670	Area (sq ft)		86.91	
Q Total (cfs)	318.87	Flow (cfs)		318.87	
Top Width (ft)	44.97	Top Width (ft)		44.97	
Vel Total (ft/s)	3.67	Avg. Vel. (ft/s)		3.67	
Max Chl Dpth (ft)	2.80	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	12321.2	Conv. (cfs)		12321.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.08	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.29	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.94	
C & E Loss (ft)	0.01	Cum SA (acres)		0.42	

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.43	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.73	Flow Area (sq ft)		98.51	
E.G. Slope (ft/ft)	0.001024	Area (sq ft)		98.51	
Q Total (cfs)	480.00	Flow (cfs)		480.00	
Top Width (ft)	45.48	Top Width (ft)		45.48	
Vel Total (ft/s)	4.87	Avg. Vel. (ft/s)		4.87	

Max Chl Dpth (ft)	3.06	Hydr. Depth (ft)	2.17
Conv. Total (cfs)	15003.6	Conv. (cfs)	15003.6
Length Wtd. (ft)	20.00	Wetted Per. (ft)	46.91
Min Ch El (ft)	1437.37	Shear (lb/sq ft)	0.13
Alpha	1.00	Stream Power (lb/ft s)	0.65
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1.14
C & E Loss (ft)	0.00	Cum SA (acres)	0.44

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.24	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.09	Flow Area (sq ft)		53.68	
E.G. Slope (ft/ft)	0.011387	Area (sq ft)		53.68	
Q Total (cfs)	644.00	Flow (cfs)		644.00	
Top Width (ft)	39.79	Top Width (ft)		39.79	
Vel Total (ft/s)	12.00	Avg. Vel. (ft/s)		12.00	
Max Chl Dpth (ft)	2.04	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	6035.0	Conv. (cfs)		6035.0	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		40.30	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		0.95	
Alpha	1.00	Stream Power (lb/ft s)		11.36	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		1.27	
C & E Loss (ft)	0.10	Cum SA (acres)		0.46	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.40	Wt. n-Val.		0.016	

W.S. Elev (ft)	1439.50	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.22	Flow Area (sq ft)		57.32	
E.G. Slope (ft/ft)	0.011595	Area (sq ft)		57.32	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	40.87	Top Width (ft)		40.87	
Vel Total (ft/s)	12.42	Avg. Vel. (ft/s)		12.42	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	6612.1	Conv. (cfs)		6612.1	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.41	
Min Ch El (ft)	1437.37	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		12.45	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		1.21	
C & E Loss (ft)	0.10	Cum SA (acres)		0.45	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1875

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.75	100	1437.35	116	1437.67	127.36	1443.35	145	1445.71
170	1444.71								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		54.71	
E.G. Slope (ft/ft)	0.000240	Area (sq ft)		54.71	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	40.10	Top Width (ft)		40.10	
Vel Total (ft/s)	1.75	Avg. Vel. (ft/s)		1.75	

Max Chl Dpth (ft)	2.06	Hydr. Depth (ft)	1.36
Conv. Total (cfs)	6196.4	Conv. (cfs)	6196.4
Length Wtd. (ft)	20.00	Wetted Per. (ft)	40.62
Min Ch El (ft)	1437.35	Shear (lb/sq ft)	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.04
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.57
C & E Loss (ft)	0.00	Cum SA (acres)	0.35

CROSS SECTION OUTPUT Profile #PF 2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.01				
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		76.55	
E.G. Slope (ft/ft)	0.000323	Area (sq ft)		76.55	
Q Total (cfs)	181.29	Flow (cfs)		181.29	
Top Width (ft)	44.50	Top Width (ft)		44.50	
Vel Total (ft/s)	2.37	Avg. Vel. (ft/s)		2.37	
Max Chl Dpth (ft)	2.57	Hydr. Depth (ft)		1.72	
Conv. Total (cfs)	10082.6	Conv. (cfs)		10082.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.33	
Min Ch El (ft)	1437.35	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.00	Cum SA (acres)		0.39	

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

CROSS SECTION OUTPUT Profile #PF 3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.18				
Vel Head (ft)	0.13	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.06	Reach Len. (ft)	20.00	20.00	20.00

Crit W.S. (ft)		Flow Area (sq ft)	82.53
E.G. Slope (ft/ft)	0.000434	Area (sq ft)	82.53
Q Total (cfs)	236.45	Flow (cfs)	236.45
Top Width (ft)	44.77	Top Width (ft)	44.77
Vel Total (ft/s)	2.87	Avg. Vel. (ft/s)	2.87
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)	1.84
Conv. Total (cfs)	11355.1	Conv. (cfs)	11355.1
Length Wtd. (ft)	20.00	Wetted Per. (ft)	45.76
Min Ch El (ft)	1437.35	Shear (lb/sq ft)	0.05
Alpha	1.00	Stream Power (lb/ft s)	0.14
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.83
C & E Loss (ft)	0.00	Cum SA (acres)	0.40

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

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.36				
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.18	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		88.04	
E.G. Slope (ft/ft)	0.000587	Area (sq ft)		88.04	
Q Total (cfs)	304.54	Flow (cfs)		304.54	
Top Width (ft)	45.02	Top Width (ft)		45.02	
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)		3.46	
Max Chl Dpth (ft)	2.83	Hydr. Depth (ft)		1.96	
Conv. Total (cfs)	12574.6	Conv. (cfs)		12574.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.16	
Min Ch El (ft)	1437.35	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.90	
C & E Loss (ft)	0.01	Cum SA (acres)		0.40	

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.42	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		98.92	
E.G. Slope (ft/ft)	0.000982	Area (sq ft)		98.92	
Q Total (cfs)	473.31	Flow (cfs)		473.31	
Top Width (ft)	45.50	Top Width (ft)		45.50	
Vel Total (ft/s)	4.78	Avg. Vel. (ft/s)		4.78	
Max Chl Dpth (ft)	3.07	Hydr. Depth (ft)		2.17	
Conv. Total (cfs)	15100.1	Conv. (cfs)		15100.1	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.94	
Min Ch El (ft)	1437.35	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.62	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		1.09	
C & E Loss (ft)	0.02	Cum SA (acres)		0.42	

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.50	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.04	Flow Area (sq ft)		58.29	
E.G. Slope (ft/ft)	0.008687	Area (sq ft)		58.29	
Q Total (cfs)	630.75	Flow (cfs)		630.75	
Top Width (ft)	41.16	Top Width (ft)		41.16	
Vel Total (ft/s)	10.82	Avg. Vel. (ft/s)		10.82	
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.42	
Conv. Total (cfs)	6767.2	Conv. (cfs)		6767.2	

Length Wtd. (ft)	20.00	Wetted Per. (ft)	41.70
Min Ch El (ft)	1437.35	Shear (lb/sq ft)	0.76
Alpha	1.00	Stream Power (lb/ft s)	8.20
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	1.24
C & E Loss (ft)	0.12	Cum SA (acres)	0.44

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.55	Element			
Vel Head (ft)	1.91	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.64	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.20	Flow Area (sq ft)		64.16	
E.G. Slope (ft/ft)	0.008482	Area (sq ft)		64.16	
Q Total (cfs)	712.00	Flow (cfs)		712.00	
Top Width (ft)	42.83	Top Width (ft)		42.83	
Vel Total (ft/s)	11.10	Avg. Vel. (ft/s)		11.10	
Max Chl Dpth (ft)	2.29	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	7730.8	Conv. (cfs)		7730.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		43.42	
Min Ch El (ft)	1437.35	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		8.68	
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)		1.18	
C & E Loss (ft)	0.15	Cum SA (acres)		0.44	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1855

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.73	100	1437.33	116	1437.65	127.36	1443.33	145	1445.69
170	1444.69								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

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

76 127.36 20 20 20 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		55.42	
E.G. Slope (ft/ft)	0.000232	Area (sq ft)		55.42	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	40.31	Top Width (ft)		40.31	
Vel Total (ft/s)	1.73	Avg. Vel. (ft/s)		1.73	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.37	
Conv. Total (cfs)	6308.8	Conv. (cfs)		6308.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		40.83	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.54	
C & E Loss (ft)	0.00	Cum SA (acres)		0.34	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		77.42	
E.G. Slope (ft/ft)	0.000300	Area (sq ft)		77.42	
Q Total (cfs)	177.70	Flow (cfs)		177.70	
Top Width (ft)	44.54	Top Width (ft)		44.54	
Vel Total (ft/s)	2.30	Avg. Vel. (ft/s)		2.30	
Max Chl Dpth (ft)	2.59	Hydr. Depth (ft)		1.74	
Conv. Total (cfs)	10263.5	Conv. (cfs)		10263.5	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.39	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.03	

Alpha	1.00	Stream Power (lb/ft s)	0.07
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.73
C & E Loss (ft)	0.00	Cum SA (acres)	0.37

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.06	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		83.51	
E.G. Slope (ft/ft)	0.000385	Area (sq ft)		83.51	
Q Total (cfs)	226.94	Flow (cfs)		226.94	
Top Width (ft)	44.81	Top Width (ft)		44.81	
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)		2.72	
Max Chl Dpth (ft)	2.73	Hydr. Depth (ft)		1.86	
Conv. Total (cfs)	11569.7	Conv. (cfs)		11569.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.83	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.79	
C & E Loss (ft)	0.00	Cum SA (acres)		0.37	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.19	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		89.29	
E.G. Slope (ft/ft)	0.000505	Area (sq ft)		89.29	
Q Total (cfs)	288.82	Flow (cfs)		288.82	

Top Width (ft)	45.07	Top Width (ft)	45.07
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)	3.23
Max Chl Dpth (ft)	2.86	Hydr. Depth (ft)	1.98
Conv. Total (cfs)	12856.5	Conv. (cfs)	12856.5
Length Wtd. (ft)	20.00	Wetted Per. (ft)	46.25
Min Ch El (ft)	1437.33	Shear (lb/sq ft)	0.06
Alpha	1.00	Stream Power (lb/ft s)	0.20
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.86
C & E Loss (ft)	0.01	Cum SA (acres)	0.38

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

CROSS SECTION OUTPUT Profile #PF 5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.74				
Vel Head (ft)	0.30	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.44	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		100.87	
E.G. Slope (ft/ft)	0.000798	Area (sq ft)		100.87	
Q Total (cfs)	439.83	Flow (cfs)		439.83	
Top Width (ft)	45.58	Top Width (ft)		45.58	
Vel Total (ft/s)	4.36	Avg. Vel. (ft/s)		4.36	
Max Chl Dpth (ft)	3.11	Hydr. Depth (ft)		2.21	
Conv. Total (cfs)	15569.2	Conv. (cfs)		15569.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		47.07	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.47	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.05	
C & E Loss (ft)	0.02	Cum SA (acres)		0.40	

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.74	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1439.93	Flow Area (sq ft)		114.48	
E.G. Slope (ft/ft)	0.000949	Area (sq ft)		114.48	
Q Total (cfs)	584.26	Flow (cfs)		584.26	
Top Width (ft)	46.18	Top Width (ft)		46.18	
Vel Total (ft/s)	5.10	Avg. Vel. (ft/s)		5.10	
Max Chl Dpth (ft)	3.41	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	18969.8	Conv. (cfs)		18969.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.03	
Min Ch El (ft)	1437.33	Shear (lb/sq ft)		0.14	
Alpha	1.00	Stream Power (lb/ft s)		0.72	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		1.20	
C & E Loss (ft)	0.02	Cum SA (acres)		0.42	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.78	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1440.14	Flow Area (sq ft)		116.33	
E.G. Slope (ft/ft)	0.001268	Area (sq ft)		116.33	
Q Total (cfs)	692.46	Flow (cfs)		692.46	
Top Width (ft)	46.26	Top Width (ft)		46.26	
Vel Total (ft/s)	5.95	Avg. Vel. (ft/s)		5.95	
Max Chl Dpth (ft)	3.45	Hydr. Depth (ft)		2.51	
Conv. Total (cfs)	19448.6	Conv. (cfs)		19448.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.16	

Min Ch El (ft)	1437.33	Shear (lb/sq ft)	0.19
Alpha	1.00	Stream Power (lb/ft s)	1.14
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	1.14
C & E Loss (ft)	0.03	Cum SA (acres)	0.41

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1835

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.71	100	1437.31	116	1437.63	127.36	1443.31	145	1445.67
170	1444.67								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.45	Element			
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		56.13	
E.G. Slope (ft/ft)	0.000223	Area (sq ft)		56.13	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	40.52	Top Width (ft)		40.52	
Vel Total (ft/s)	1.71	Avg. Vel. (ft/s)		1.71	
Max Chl Dpth (ft)	2.10	Hydr. Depth (ft)		1.39	
Conv. Total (cfs)	6421.9	Conv. (cfs)		6421.9	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.05	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.52	
C & E Loss (ft)	0.00	Cum SA (acres)		0.32	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1440.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		78.28	
E.G. Slope (ft/ft)	0.000275	Area (sq ft)		78.28	
Q Total (cfs)	173.32	Flow (cfs)		173.32	
Top Width (ft)	44.58	Top Width (ft)		44.58	
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)		2.21	
Max Chl Dpth (ft)	2.61	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	10445.2	Conv. (cfs)		10445.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.45	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.70	
C & E Loss (ft)	0.00	Cum SA (acres)		0.35	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.06	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		84.59	
E.G. Slope (ft/ft)	0.000336	Area (sq ft)		84.59	
Q Total (cfs)	216.47	Flow (cfs)		216.47	
Top Width (ft)	44.86	Top Width (ft)		44.86	
Vel Total (ft/s)	2.56	Avg. Vel. (ft/s)		2.56	
Max Chl Dpth (ft)	2.75	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	11807.0	Conv. (cfs)		11807.0	

Length Wtd. (ft)	20.00	Wetted Per. (ft)	45.91
Min Ch El (ft)	1437.31	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.10
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.76
C & E Loss (ft)	0.00	Cum SA (acres)	0.35

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

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.33				
Vel Head (ft)	0.14	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.19	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		90.53	
E.G. Slope (ft/ft)	0.000427	Area (sq ft)		90.53	
Q Total (cfs)	271.61	Flow (cfs)		271.61	
Top Width (ft)	45.13	Top Width (ft)		45.13	
Vel Total (ft/s)	3.00	Avg. Vel. (ft/s)		3.00	
Max Chl Dpth (ft)	2.88	Hydr. Depth (ft)		2.01	
Conv. Total (cfs)	13140.2	Conv. (cfs)		13140.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.34	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.82	
C & E Loss (ft)	0.01	Cum SA (acres)		0.36	

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

CROSS SECTION OUTPUT Profile #PF 5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.70				
Vel Head (ft)	0.24	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.46	Reach Len. (ft)	20.00	20.00	20.00

Crit W.S. (ft)		Flow Area (sq ft)	102.82
E.G. Slope (ft/ft)	0.000632	Area (sq ft)	102.82
Q Total (cfs)	403.41	Flow (cfs)	403.41
Top Width (ft)	45.67	Top Width (ft)	45.67
Vel Total (ft/s)	3.92	Avg. Vel. (ft/s)	3.92
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)	2.25
Conv. Total (cfs)	16043.2	Conv. (cfs)	16043.2
Length Wtd. (ft)	20.00	Wetted Per. (ft)	47.21
Min Ch El (ft)	1437.31	Shear (lb/sq ft)	0.09
Alpha	1.00	Stream Power (lb/ft s)	0.34
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.38

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

CROSS SECTION OUTPUT Profile #PF 6

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1441.10				
Vel Head (ft)	0.32	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.78	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		117.14	
E.G. Slope (ft/ft)	0.000739	Area (sq ft)		117.14	
Q Total (cfs)	534.55	Flow (cfs)		534.55	
Top Width (ft)	46.29	Top Width (ft)		46.29	
Vel Total (ft/s)	4.56	Avg. Vel. (ft/s)		4.56	
Max Chl Dpth (ft)	3.47	Hydr. Depth (ft)		2.53	
Conv. Total (cfs)	19659.6	Conv. (cfs)		19659.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.22	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.51	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.15	
C & E Loss (ft)	0.02	Cum SA (acres)		0.40	

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

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.83	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		119.85	
E.G. Slope (ft/ft)	0.000971	Area (sq ft)		119.85	
Q Total (cfs)	634.57	Flow (cfs)		634.57	
Top Width (ft)	46.41	Top Width (ft)		46.41	
Vel Total (ft/s)	5.29	Avg. Vel. (ft/s)		5.29	
Max Chl Dpth (ft)	3.52	Hydr. Depth (ft)		2.58	
Conv. Total (cfs)	20368.7	Conv. (cfs)		20368.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.41	
Min Ch El (ft)	1437.31	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.79	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		1.09	
C & E Loss (ft)	0.03	Cum SA (acres)		0.39	

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

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1815

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.69	100	1437.29	116	1437.61	127.36	1443.29	145	1445.65
170	1444.65								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.45	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.41	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		56.85	
E.G. Slope (ft/ft)	0.000216	Area (sq ft)		56.85	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	40.73	Top Width (ft)		40.73	
Vel Total (ft/s)	1.69	Avg. Vel. (ft/s)		1.69	
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	6536.5	Conv. (cfs)		6536.5	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.27	
Min Ch El (ft)	1437.29	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.49	
C & E Loss (ft)	0.00	Cum SA (acres)		0.30	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		79.25	
E.G. Slope (ft/ft)	0.000249	Area (sq ft)		79.25	
Q Total (cfs)	168.05	Flow (cfs)		168.05	
Top Width (ft)	44.62	Top Width (ft)		44.62	
Vel Total (ft/s)	2.12	Avg. Vel. (ft/s)		2.12	
Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)		1.78	
Conv. Total (cfs)	10650.6	Conv. (cfs)		10650.6	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.52	
Min Ch El (ft)	1437.29	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.66	
C & E Loss (ft)	0.00	Cum SA (acres)		0.33	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.07	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		85.68	
E.G. Slope (ft/ft)	0.000290	Area (sq ft)		85.68	
Q Total (cfs)	204.99	Flow (cfs)		204.99	
Top Width (ft)	44.91	Top Width (ft)		44.91	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	2.78	Hydr. Depth (ft)		1.91	
Conv. Total (cfs)	12046.8	Conv. (cfs)		12046.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.99	
Min Ch El (ft)	1437.29	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.72	
C & E Loss (ft)	0.00	Cum SA (acres)		0.33	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.20	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		91.78	
E.G. Slope (ft/ft)	0.000355	Area (sq ft)		91.78	
Q Total (cfs)	252.86	Flow (cfs)		252.86	
Top Width (ft)	45.18	Top Width (ft)		45.18	
Vel Total (ft/s)	2.75	Avg. Vel. (ft/s)		2.75	
Max Chl Dpth (ft)	2.91	Hydr. Depth (ft)		2.03	

Conv. Total (cfs)	13427.0	Conv. (cfs)	13427.0
Length Wtd. (ft)	20.00	Wetted Per. (ft)	46.43
Min Ch El (ft)	1437.29	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.12
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.78
C & E Loss (ft)	0.01	Cum SA (acres)	0.34

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.49	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		104.78	
E.G. Slope (ft/ft)	0.000485	Area (sq ft)		104.78	
Q Total (cfs)	363.97	Flow (cfs)		363.97	
Top Width (ft)	45.75	Top Width (ft)		45.75	
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)		3.47	
Max Chl Dpth (ft)	3.20	Hydr. Depth (ft)		2.29	
Conv. Total (cfs)	16523.4	Conv. (cfs)		16523.4	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		47.35	
Min Ch El (ft)	1437.29	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.23	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.95	
C & E Loss (ft)	0.01	Cum SA (acres)		0.36	

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.81	Reach Len. (ft)	20.00	20.00	20.00

Crit W.S. (ft)		Flow Area (sq ft)	119.81
E.G. Slope (ft/ft)	0.000556	Area (sq ft)	119.81
Q Total (cfs)	479.87	Flow (cfs)	479.87
Top Width (ft)	46.41	Top Width (ft)	46.41
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	4.01
Max Chl Dpth (ft)	3.52	Hydr. Depth (ft)	2.58
Conv. Total (cfs)	20359.8	Conv. (cfs)	20359.8
Length Wtd. (ft)	20.00	Wetted Per. (ft)	48.41
Min Ch El (ft)	1437.29	Shear (lb/sq ft)	0.09
Alpha	1.00	Stream Power (lb/ft s)	0.34
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	1.09
C & E Loss (ft)	0.02	Cum SA (acres)	0.38

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

CROSS SECTION OUTPUT Profile #PF 7

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1441.22				
Vel Head (ft)	0.33	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.89	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		123.23	
E.G. Slope (ft/ft)	0.000718	Area (sq ft)		123.23	
Q Total (cfs)	569.75	Flow (cfs)		569.75	
Top Width (ft)	46.55	Top Width (ft)		46.55	
Vel Total (ft/s)	4.62	Avg. Vel. (ft/s)		4.62	
Max Chl Dpth (ft)	3.60	Hydr. Depth (ft)		2.65	
Conv. Total (cfs)	21268.2	Conv. (cfs)		21268.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.65	
Min Ch El (ft)	1437.29	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.52	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.03	
C & E Loss (ft)	0.03	Cum SA (acres)		0.37	

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

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1795

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.67	100	1437.27	116	1437.59	127.36	1443.27	145	1445.63
170	1444.63								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.45	Element			
Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.40	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		57.57	
E.G. Slope (ft/ft)	0.000208	Area (sq ft)		57.57	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	40.95	Top Width (ft)		40.95	
Vel Total (ft/s)	1.67	Avg. Vel. (ft/s)		1.67	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	6652.2	Conv. (cfs)		6652.2	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		41.48	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.47	
C & E Loss (ft)	0.00	Cum SA (acres)		0.28	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.99	Element			
Vel Head (ft)	0.06	Wt. n-Val.		0.016	

W.S. Elev (ft)	1439.92	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		80.22	
E.G. Slope (ft/ft)	0.000222	Area (sq ft)		80.22	
Q Total (cfs)	161.76	Flow (cfs)		161.76	
Top Width (ft)	44.67	Top Width (ft)		44.67	
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)		2.02	
Max Chl Dpth (ft)	2.65	Hydr. Depth (ft)		1.80	
Conv. Total (cfs)	10857.3	Conv. (cfs)		10857.3	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		45.59	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.63	
C & E Loss (ft)	0.00	Cum SA (acres)		0.31	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.07	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		86.76	
E.G. Slope (ft/ft)	0.000245	Area (sq ft)		86.76	
Q Total (cfs)	192.49	Flow (cfs)		192.49	
Top Width (ft)	44.96	Top Width (ft)		44.96	
Vel Total (ft/s)	2.22	Avg. Vel. (ft/s)		2.22	
Max Chl Dpth (ft)	2.80	Hydr. Depth (ft)		1.93	
Conv. Total (cfs)	12288.1	Conv. (cfs)		12288.1	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.07	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.68	
C & E Loss (ft)	0.00	Cum SA (acres)		0.31	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.21	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		93.04	
E.G. Slope (ft/ft)	0.000287	Area (sq ft)		93.04	
Q Total (cfs)	232.52	Flow (cfs)		232.52	
Top Width (ft)	45.24	Top Width (ft)		45.24	
Vel Total (ft/s)	2.50	Avg. Vel. (ft/s)		2.50	
Max Chl Dpth (ft)	2.94	Hydr. Depth (ft)		2.06	
Conv. Total (cfs)	13715.8	Conv. (cfs)		13715.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		46.52	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.73	
C & E Loss (ft)	0.01	Cum SA (acres)		0.32	

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.51	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		106.74	
E.G. Slope (ft/ft)	0.000357	Area (sq ft)		106.74	
Q Total (cfs)	321.53	Flow (cfs)		321.53	
Top Width (ft)	45.84	Top Width (ft)		45.84	
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)		3.01	
Max Chl Dpth (ft)	3.24	Hydr. Depth (ft)		2.33	

Conv. Total (cfs)	17008.8	Conv. (cfs)	17008.8
Length Wtd. (ft)	20.00	Wetted Per. (ft)	47.49
Min Ch El (ft)	1437.27	Shear (lb/sq ft)	0.05
Alpha	1.00	Stream Power (lb/ft s)	0.15
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.90
C & E Loss (ft)	0.01	Cum SA (acres)	0.34

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.85	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		122.36	
E.G. Slope (ft/ft)	0.000399	Area (sq ft)		122.36	
Q Total (cfs)	420.29	Flow (cfs)		420.29	
Top Width (ft)	46.52	Top Width (ft)		46.52	
Vel Total (ft/s)	3.43	Avg. Vel. (ft/s)		3.43	
Max Chl Dpth (ft)	3.58	Hydr. Depth (ft)		2.63	
Conv. Total (cfs)	21035.8	Conv. (cfs)		21035.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.59	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.22	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		1.04	
C & E Loss (ft)	0.02	Cum SA (acres)		0.35	

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

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.016	

W.S. Elev (ft)	1440.94	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		126.43	
E.G. Slope (ft/ft)	0.000507	Area (sq ft)		126.43	
Q Total (cfs)	498.36	Flow (cfs)		498.36	
Top Width (ft)	46.69	Top Width (ft)		46.69	
Vel Total (ft/s)	3.94	Avg. Vel. (ft/s)		3.94	
Max Chl Dpth (ft)	3.66	Hydr. Depth (ft)		2.71	
Conv. Total (cfs)	22126.9	Conv. (cfs)		22126.9	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		48.87	
Min Ch El (ft)	1437.27	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.32	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.97	
C & E Loss (ft)	0.02	Cum SA (acres)		0.35	

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

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1775

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.65	100	1437.25	116	1437.57	127.36	1443.25	145	1445.61
170	1444.61								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	15	15	15	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.40	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		58.30	
E.G. Slope (ft/ft)	0.000201	Area (sq ft)		58.30	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	41.16	Top Width (ft)		41.16	

Vel Total (ft/s)	1.65	Avg. Vel. (ft/s)	1.65
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)	1.42
Conv. Total (cfs)	6769.1	Conv. (cfs)	6769.1
Length Wtd. (ft)	15.00	Wetted Per. (ft)	41.70
Min Ch El (ft)	1437.25	Shear (lb/sq ft)	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.03
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.44
C & E Loss (ft)	0.00	Cum SA (acres)	0.26

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.93	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		81.19	
E.G. Slope (ft/ft)	0.000195	Area (sq ft)		81.19	
Q Total (cfs)	154.35	Flow (cfs)		154.35	
Top Width (ft)	44.71	Top Width (ft)		44.71	
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)		1.90	
Max Chl Dpth (ft)	2.68	Hydr. Depth (ft)		1.82	
Conv. Total (cfs)	11065.8	Conv. (cfs)		11065.8	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		45.66	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.59	
C & E Loss (ft)	0.00	Cum SA (acres)		0.29	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.016	

W.S. Elev (ft)	1440.07	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		87.85	
E.G. Slope (ft/ft)	0.000204	Area (sq ft)		87.85	
Q Total (cfs)	178.93	Flow (cfs)		178.93	
Top Width (ft)	45.01	Top Width (ft)		45.01	
Vel Total (ft/s)	2.04	Avg. Vel. (ft/s)		2.04	
Max Chl Dpth (ft)	2.82	Hydr. Depth (ft)		1.95	
Conv. Total (cfs)	12531.7	Conv. (cfs)		12531.7	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		46.14	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.64	
C & E Loss (ft)	0.00	Cum SA (acres)		0.29	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.22	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		94.29	
E.G. Slope (ft/ft)	0.000226	Area (sq ft)		94.29	
Q Total (cfs)	210.56	Flow (cfs)		210.56	
Top Width (ft)	45.29	Top Width (ft)		45.29	
Vel Total (ft/s)	2.23	Avg. Vel. (ft/s)		2.23	
Max Chl Dpth (ft)	2.97	Hydr. Depth (ft)		2.08	
Conv. Total (cfs)	14007.4	Conv. (cfs)		14007.4	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		46.61	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.69	
C & E Loss (ft)	0.00	Cum SA (acres)		0.30	

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.53	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		108.59	
E.G. Slope (ft/ft)	0.000250	Area (sq ft)		108.59	
Q Total (cfs)	276.09	Flow (cfs)		276.09	
Top Width (ft)	45.92	Top Width (ft)		45.92	
Vel Total (ft/s)	2.54	Avg. Vel. (ft/s)		2.54	
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)		2.36	
Conv. Total (cfs)	17470.5	Conv. (cfs)		17470.5	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		47.62	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.85	
C & E Loss (ft)	0.01	Cum SA (acres)		0.32	

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1441.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.88	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		124.78	
E.G. Slope (ft/ft)	0.000270	Area (sq ft)		124.78	
Q Total (cfs)	355.98	Flow (cfs)		355.98	
Top Width (ft)	46.62	Top Width (ft)		46.62	
Vel Total (ft/s)	2.85	Avg. Vel. (ft/s)		2.85	

Max Chl Dpth (ft)	3.63	Hydr. Depth (ft)	2.68
Conv. Total (cfs)	21682.7	Conv. (cfs)	21682.7
Length Wtd. (ft)	15.00	Wetted Per. (ft)	48.75
Min Ch El (ft)	1437.25	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.12
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.98
C & E Loss (ft)	0.01	Cum SA (acres)	0.33

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

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	15.00	15.00	15.00
Crit W.S. (ft)		Flow Area (sq ft)		129.39	
E.G. Slope (ft/ft)	0.000337	Area (sq ft)		129.39	
Q Total (cfs)	420.86	Flow (cfs)		420.86	
Top Width (ft)	46.82	Top Width (ft)		46.82	
Vel Total (ft/s)	3.25	Avg. Vel. (ft/s)		3.25	
Max Chl Dpth (ft)	3.73	Hydr. Depth (ft)		2.76	
Conv. Total (cfs)	22935.1	Conv. (cfs)		22935.1	
Length Wtd. (ft)	15.00	Wetted Per. (ft)		49.07	
Min Ch El (ft)	1437.25	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.91	
C & E Loss (ft)	0.01	Cum SA (acres)		0.33	

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

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1760

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.63	100	1437.23	116	1437.55	127.36	1443.23	145	1445.59
170	1444.59								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	18	18	18	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.40	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		59.03	
E.G. Slope (ft/ft)	0.000194	Area (sq ft)		59.03	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	41.37	Top Width (ft)		41.37	
Vel Total (ft/s)	1.63	Avg. Vel. (ft/s)		1.63	
Max Chl Dpth (ft)	2.17	Hydr. Depth (ft)		1.43	
Conv. Total (cfs)	6886.9	Conv. (cfs)		6886.9	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		41.92	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.42	
C & E Loss (ft)	0.00	Cum SA (acres)		0.25	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.93	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		82.16	
E.G. Slope (ft/ft)	0.000172	Area (sq ft)		82.16	
Q Total (cfs)	147.97	Flow (cfs)		147.97	
Top Width (ft)	44.75	Top Width (ft)		44.75	
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	

Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)	1.84
Conv. Total (cfs)	11275.6	Conv. (cfs)	11275.6
Length Wtd. (ft)	18.00	Wetted Per. (ft)	45.73
Min Ch El (ft)	1437.23	Shear (lb/sq ft)	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.03
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.56
C & E Loss (ft)	0.00	Cum SA (acres)	0.27

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.08	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		88.93	
E.G. Slope (ft/ft)	0.000173	Area (sq ft)		88.93	
Q Total (cfs)	168.04	Flow (cfs)		168.04	
Top Width (ft)	45.06	Top Width (ft)		45.06	
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)		1.89	
Max Chl Dpth (ft)	2.85	Hydr. Depth (ft)		1.97	
Conv. Total (cfs)	12776.8	Conv. (cfs)		12776.8	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		46.22	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.04	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.61	
C & E Loss (ft)	0.00	Cum SA (acres)		0.28	

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.29	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.06	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.22	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		95.54	
E.G. Slope (ft/ft)	0.000182	Area (sq ft)		95.54	
Q Total (cfs)	192.95	Flow (cfs)		192.95	
Top Width (ft)	45.35	Top Width (ft)		45.35	
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)		2.02	
Max Chl Dpth (ft)	2.99	Hydr. Depth (ft)		2.11	
Conv. Total (cfs)	14301.0	Conv. (cfs)		14301.0	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		46.70	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.66	
C & E Loss (ft)	0.00	Cum SA (acres)		0.28	

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

CROSS SECTION OUTPUT Profile #PF 5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.62				
Vel Head (ft)	0.07	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.55	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		110.25	
E.G. Slope (ft/ft)	0.000180	Area (sq ft)		110.25	
Q Total (cfs)	239.98	Flow (cfs)		239.98	
Top Width (ft)	45.99	Top Width (ft)		45.99	
Vel Total (ft/s)	2.18	Avg. Vel. (ft/s)		2.18	
Max Chl Dpth (ft)	3.32	Hydr. Depth (ft)		2.40	
Conv. Total (cfs)	17888.4	Conv. (cfs)		17888.4	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		47.74	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.82	

C & E Loss (ft)	0.01	Cum SA (acres)	0.30

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

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.99	Element			
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.90	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		126.75	
E.G. Slope (ft/ft)	0.000188	Area (sq ft)		126.75	
Q Total (cfs)	304.75	Flow (cfs)		304.75	
Top Width (ft)	46.70	Top Width (ft)		46.70	
Vel Total (ft/s)	2.40	Avg. Vel. (ft/s)		2.40	
Max Chl Dpth (ft)	3.67	Hydr. Depth (ft)		2.71	
Conv. Total (cfs)	22216.1	Conv. (cfs)		22216.1	
Length Wtd. (ft)	18.00	Wetted Per. (ft)		48.89	
Min Ch El (ft)	1437.23	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.94	
C & E Loss (ft)	0.01	Cum SA (acres)		0.32	

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

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.12	Element			
Vel Head (ft)	0.12	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.01	Reach Len. (ft)	18.00	18.00	18.00
Crit W.S. (ft)		Flow Area (sq ft)		131.72	
E.G. Slope (ft/ft)	0.000232	Area (sq ft)		131.72	
Q Total (cfs)	359.00	Flow (cfs)		359.00	
Top Width (ft)	46.92	Top Width (ft)		46.92	
Vel Total (ft/s)	2.73	Avg. Vel. (ft/s)		2.73	

Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)	2.81
Conv. Total (cfs)	23575.2	Conv. (cfs)	23575.2
Length Wtd. (ft)	18.00	Wetted Per. (ft)	49.23
Min Ch El (ft)	1437.23	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.11
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.87
C & E Loss (ft)	0.01	Cum SA (acres)	0.31

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

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1742

INPUT
Description: Side Weir
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1439.61	100	1437.21	116	1437.53	127.36	1443.21	145	1445.57
170	1444.57								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	38	38	38	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.40	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		59.76	
E.G. Slope (ft/ft)	0.000188	Area (sq ft)		59.76	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	41.58	Top Width (ft)		41.58	
Vel Total (ft/s)	1.61	Avg. Vel. (ft/s)		1.61	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		1.44	
Conv. Total (cfs)	7006.0	Conv. (cfs)		7006.0	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		42.14	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	

Alpha	1.00	Stream Power (lb/ft s)	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.40
C & E Loss (ft)	0.00	Cum SA (acres)	0.23

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.93	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		83.13	
E.G. Slope (ft/ft)	0.000147	Area (sq ft)		83.13	
Q Total (cfs)	139.32	Flow (cfs)		139.32	
Top Width (ft)	44.80	Top Width (ft)		44.80	
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)		1.68	
Max Chl Dpth (ft)	2.72	Hydr. Depth (ft)		1.86	
Conv. Total (cfs)	11487.3	Conv. (cfs)		11487.3	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		45.80	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.53	
C & E Loss (ft)	0.01	Cum SA (acres)		0.25	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.08	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		90.02	
E.G. Slope (ft/ft)	0.000140	Area (sq ft)		90.02	
Q Total (cfs)	154.11	Flow (cfs)		154.11	

Top Width (ft)	45.10	Top Width (ft)	45.10
Vel Total (ft/s)	1.71	Avg. Vel. (ft/s)	1.71
Max Chl Dpth (ft)	2.87	Hydr. Depth (ft)	2.00
Conv. Total (cfs)	13024.0	Conv. (cfs)	13024.0
Length Wtd. (ft)	38.00	Wetted Per. (ft)	46.30
Min Ch El (ft)	1437.21	Shear (lb/sq ft)	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.57
C & E Loss (ft)	0.01	Cum SA (acres)	0.26

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.23	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		96.80	
E.G. Slope (ft/ft)	0.000136	Area (sq ft)		96.80	
Q Total (cfs)	170.50	Flow (cfs)		170.50	
Top Width (ft)	45.40	Top Width (ft)		45.40	
Vel Total (ft/s)	1.76	Avg. Vel. (ft/s)		1.76	
Max Chl Dpth (ft)	3.02	Hydr. Depth (ft)		2.13	
Conv. Total (cfs)	14597.4	Conv. (cfs)		14597.4	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		46.79	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.62	
C & E Loss (ft)	0.01	Cum SA (acres)		0.26	

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

surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.56	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		111.91	
E.G. Slope (ft/ft)	0.000113	Area (sq ft)		111.91	
Q Total (cfs)	194.35	Flow (cfs)		194.35	
Top Width (ft)	46.06	Top Width (ft)		46.06	
Vel Total (ft/s)	1.74	Avg. Vel. (ft/s)		1.74	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		2.43	
Conv. Total (cfs)	18310.5	Conv. (cfs)		18310.5	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		47.85	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.00	Cum SA (acres)		0.28	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.92	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		128.73	
E.G. Slope (ft/ft)	0.000111	Area (sq ft)		128.73	
Q Total (cfs)	240.13	Flow (cfs)		240.13	
Top Width (ft)	46.79	Top Width (ft)		46.79	
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)		1.87	

Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)	2.75
Conv. Total (cfs)	22755.0	Conv. (cfs)	22755.0
Length Wtd. (ft)	38.00	Wetted Per. (ft)	49.03
Min Ch El (ft)	1437.21	Shear (lb/sq ft)	0.02
Alpha	1.00	Stream Power (lb/ft s)	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.89
C & E Loss (ft)	0.00	Cum SA (acres)	0.30

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1441.11	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.016	
W.S. Elev (ft)	1441.04	Reach Len. (ft)	38.00	38.00	38.00
Crit W.S. (ft)		Flow Area (sq ft)		134.05	
E.G. Slope (ft/ft)	0.000134	Area (sq ft)		134.05	
Q Total (cfs)	280.88	Flow (cfs)		280.88	
Top Width (ft)	47.02	Top Width (ft)		47.02	
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)		2.10	
Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)		2.85	
Conv. Total (cfs)	24222.7	Conv. (cfs)		24222.7	
Length Wtd. (ft)	38.00	Wetted Per. (ft)		49.39	
Min Ch El (ft)	1437.21	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.81	
C & E Loss (ft)	0.00	Cum SA (acres)		0.29	

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1704

INPUT
Description: Begin Side Weir
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
76	1443.41	88	1443.17	100	1437.17	116	1437.49	127.36	1443.17
145	1445.53	170	1444.53						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
76	.04	76	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
76	127.36	6	6	6	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.42	Element			
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.33	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		40.09	
E.G. Slope (ft/ft)	0.000353	Area (sq ft)		40.09	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	24.01	Top Width (ft)		24.01	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	2.16	Hydr. Depth (ft)		1.67	
Conv. Total (cfs)	5107.7	Conv. (cfs)		5107.7	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		24.96	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.35	
C & E Loss (ft)	0.00	Cum SA (acres)		0.20	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.96	Element			
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.86	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		53.27	

E.G. Slope (ft/ft)	0.000309	Area (sq ft)	53.27
Q Total (cfs)	135.78	Flow (cfs)	135.78
Top Width (ft)	26.11	Top Width (ft)	26.11
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)	2.55
Max Chl Dpth (ft)	2.69	Hydr. Depth (ft)	2.04
Conv. Total (cfs)	7724.8	Conv. (cfs)	7724.8
Length Wtd. (ft)	6.00	Wetted Per. (ft)	27.31
Min Ch El (ft)	1437.17	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.10
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.47
C & E Loss (ft)	0.00	Cum SA (acres)	0.22

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.01	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		57.32	
E.G. Slope (ft/ft)	0.000296	Area (sq ft)		57.32	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	26.72	Top Width (ft)		26.72	
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)		2.58	
Max Chl Dpth (ft)	2.84	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	8583.0	Conv. (cfs)		8583.0	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		27.99	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.51	
C & E Loss (ft)	0.00	Cum SA (acres)		0.23	

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.27	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.16	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		61.39	
E.G. Slope (ft/ft)	0.000284	Area (sq ft)		61.39	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	27.33	Top Width (ft)		27.33	
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)		2.60	
Max Chl Dpth (ft)	2.99	Hydr. Depth (ft)		2.25	
Conv. Total (cfs)	9473.0	Conv. (cfs)		9473.0	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		28.67	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.55	
C & E Loss (ft)	0.00	Cum SA (acres)		0.23	

CROSS SECTION OUTPUT Profile #PF 5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.60				
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.51	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		71.20	
E.G. Slope (ft/ft)	0.000209	Area (sq ft)		71.20	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	28.73	Top Width (ft)		28.73	
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)		2.38	
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	11704.4	Conv. (cfs)		11704.4	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		30.23	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.69	
C & E Loss (ft)	0.00	Cum SA (acres)		0.25	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.88	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		82.00	
E.G. Slope (ft/ft)	0.000193	Area (sq ft)		82.00	
Q Total (cfs)	198.73	Flow (cfs)		198.73	
Top Width (ft)	30.19	Top Width (ft)		30.19	
Vel Total (ft/s)	2.42	Avg. Vel. (ft/s)		2.42	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)		2.72	
Conv. Total (cfs)	14298.1	Conv. (cfs)		14298.1	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		31.87	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)		0.79	
C & E Loss (ft)	0.00	Cum SA (acres)		0.26	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)		Flow Area (sq ft)		85.15	
E.G. Slope (ft/ft)	0.000232	Area (sq ft)		85.15	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	30.61	Top Width (ft)		30.61	
Vel Total (ft/s)	2.70	Avg. Vel. (ft/s)		2.70	
Max Chl Dpth (ft)	3.81	Hydr. Depth (ft)		2.78	
Conv. Total (cfs)	15081.4	Conv. (cfs)		15081.4	
Length Wtd. (ft)	6.00	Wetted Per. (ft)		32.34	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	

Alpha	1.00	Stream Power (lb/ft s)	0.10
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	0.72
C & E Loss (ft)	0.00	Cum SA (acres)	0.26

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1698

INPUT
Description: End Transition
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
68	1441.41	76	1443.41	88	1443.17	100	1437.17	116	1437.49
127.36	1443.17	145	1445.53	170	1444.53				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
68	.04	88	.016	127.36	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
88	127.36	30.3	30.3	30.3	.1	.3

Left Levee Station= 88 Elevation= 1443.17

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.33	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.32	Flow Area (sq ft)		40.02	
E.G. Slope (ft/ft)	0.000355	Area (sq ft)		40.02	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	23.99	Top Width (ft)		23.99	
Vel Total (ft/s)	2.40	Avg. Vel. (ft/s)		2.40	
Max Chl Dpth (ft)	2.16	Hydr. Depth (ft)		1.67	
Conv. Total (cfs)	5094.0	Conv. (cfs)		5094.0	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		24.94	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.35	
C & E Loss (ft)	0.01	Cum SA (acres)		0.20	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.86	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.57	Flow Area (sq ft)		53.21	
E.G. Slope (ft/ft)	0.000310	Area (sq ft)		53.21	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	26.10	Top Width (ft)		26.10	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)		2.55	
Max Chl Dpth (ft)	2.69	Hydr. Depth (ft)		2.04	
Conv. Total (cfs)	7711.5	Conv. (cfs)		7711.5	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		27.30	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.46	
C & E Loss (ft)	0.01	Cum SA (acres)		0.22	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.01	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.63	Flow Area (sq ft)		57.25	
E.G. Slope (ft/ft)	0.000297	Area (sq ft)		57.25	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	26.71	Top Width (ft)		26.71	
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)		2.58	
Max Chl Dpth (ft)	2.84	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	8569.7	Conv. (cfs)		8569.7	

Length Wtd. (ft)	30.30	Wetted Per. (ft)	27.98
Min Ch El (ft)	1437.17	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.10
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.50
C & E Loss (ft)	0.01	Cum SA (acres)	0.22

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.16	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.70	Flow Area (sq ft)		61.33	
E.G. Slope (ft/ft)	0.000285	Area (sq ft)		61.33	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	27.32	Top Width (ft)		27.32	
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)		2.60	
Max Chl Dpth (ft)	2.99	Hydr. Depth (ft)		2.25	
Conv. Total (cfs)	9459.0	Conv. (cfs)		9459.0	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		28.66	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.54	
C & E Loss (ft)	0.01	Cum SA (acres)		0.23	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	

W.S. Elev (ft)	1440.51	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.75	Flow Area (sq ft)		71.16	
E.G. Slope (ft/ft)	0.000209	Area (sq ft)		71.16	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	28.72	Top Width (ft)		28.72	
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)		2.38	
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	11694.6	Conv. (cfs)		11694.6	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		30.22	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.07	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.68	
C & E Loss (ft)	0.01	Cum SA (acres)		0.25	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.88	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1438.90	Flow Area (sq ft)		81.96	
E.G. Slope (ft/ft)	0.000193	Area (sq ft)		81.96	
Q Total (cfs)	198.73	Flow (cfs)		198.73	
Top Width (ft)	30.19	Top Width (ft)		30.19	
Vel Total (ft/s)	2.42	Avg. Vel. (ft/s)		2.42	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)		2.71	
Conv. Total (cfs)	14288.1	Conv. (cfs)		14288.1	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		31.86	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.08	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.78	
C & E Loss (ft)	0.01	Cum SA (acres)		0.26	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.98	Reach Len. (ft)	30.30	30.30	30.30
Crit W.S. (ft)	1439.05	Flow Area (sq ft)		85.10	
E.G. Slope (ft/ft)	0.000233	Area (sq ft)		85.10	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	30.60	Top Width (ft)		30.60	
Vel Total (ft/s)	2.70	Avg. Vel. (ft/s)		2.70	
Max Chl Dpth (ft)	3.81	Hydr. Depth (ft)		2.78	
Conv. Total (cfs)	15068.3	Conv. (cfs)		15068.3	
Length Wtd. (ft)	30.30	Wetted Per. (ft)		32.33	
Min Ch El (ft)	1437.17	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.10	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)		0.71	
C & E Loss (ft)	0.01	Cum SA (acres)		0.26	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1668

INPUT
Description: PT of Curve, Begin Transition
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
66	1439.31	78	1442.38	90	1442.14	100	1437.14	110	1437.34
119.6	1442.14	145	1445.5	170	1444.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
66	.04	90	.016	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	124	131.3	145	.1	.3

Left Levee Station= 90 Elevation= 1442.14

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.20	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1438.53	Flow Area (sq ft)		27.30	
E.G. Slope (ft/ft)	0.000870	Area (sq ft)		27.30	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	17.84	Top Width (ft)		17.84	
Vel Total (ft/s)	3.52	Avg. Vel. (ft/s)		3.52	
Max Chl Dpth (ft)	2.06	Hydr. Depth (ft)		1.53	
Conv. Total (cfs)	3255.1	Conv. (cfs)		3255.1	
Length Wtd. (ft)	131.30	Wetted Per. (ft)		18.77	
Min Ch El (ft)	1437.14	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.28	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)		0.32	
C & E Loss (ft)	0.00	Cum SA (acres)		0.18	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.73	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1438.83	Flow Area (sq ft)		37.23	
E.G. Slope (ft/ft)	0.000724	Area (sq ft)		37.23	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	19.94	Top Width (ft)		19.94	
Vel Total (ft/s)	3.65	Avg. Vel. (ft/s)		3.65	
Max Chl Dpth (ft)	2.59	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	5046.3	Conv. (cfs)		5046.3	
Length Wtd. (ft)	131.30	Wetted Per. (ft)		21.12	
Min Ch El (ft)	1437.14	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.29	

Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.43
C & E Loss (ft)	0.00	Cum SA (acres)	0.20

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.09	Element			
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.88	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1438.92	Flow Area (sq ft)		40.36	
E.G. Slope (ft/ft)	0.000684	Area (sq ft)		40.36	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	20.56	Top Width (ft)		20.56	
Vel Total (ft/s)	3.66	Avg. Vel. (ft/s)		3.66	
Max Chl Dpth (ft)	2.74	Hydr. Depth (ft)		1.96	
Conv. Total (cfs)	5649.8	Conv. (cfs)		5649.8	
Length Wtd. (ft)	131.30	Wetted Per. (ft)		21.81	
Min Ch El (ft)	1437.14	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.29	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		0.46	
C & E Loss (ft)	0.00	Cum SA (acres)		0.21	

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.24	Element			
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.03	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1438.99	Flow Area (sq ft)		43.55	
E.G. Slope (ft/ft)	0.000646	Area (sq ft)		43.55	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	21.17	Top Width (ft)		21.17	
Vel Total (ft/s)	3.67	Avg. Vel. (ft/s)		3.67	
Max Chl Dpth (ft)	2.89	Hydr. Depth (ft)		2.06	

Conv. Total (cfs)	6282.1	Conv. (cfs)	6282.1
Length Wtd. (ft)	131.30	Wetted Per. (ft)	22.49
Min Ch El (ft)	1437.14	Shear (lb/sq ft)	0.08
Alpha	1.00	Stream Power (lb/ft s)	0.29
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.50
C & E Loss (ft)	0.00	Cum SA (acres)	0.21

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.42	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1439.06	Flow Area (sq ft)		51.97	
E.G. Slope (ft/ft)	0.000443	Area (sq ft)		51.97	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	22.71	Top Width (ft)		22.71	
Vel Total (ft/s)	3.25	Avg. Vel. (ft/s)		3.25	
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)		2.29	
Conv. Total (cfs)	8032.1	Conv. (cfs)		8032.1	
Length Wtd. (ft)	131.30	Wetted Per. (ft)		24.21	
Min Ch El (ft)	1437.14	Shear (lb/sq ft)		0.06	
Alpha	1.00	Stream Power (lb/ft s)		0.19	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		0.64	
C & E Loss (ft)	0.00	Cum SA (acres)		0.23	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.79	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1439.24	Flow Area (sq ft)		60.61	
E.G. Slope (ft/ft)	0.000400	Area (sq ft)		60.61	
Q Total (cfs)	198.73	Flow (cfs)		198.73	

Top Width (ft)	24.18	Top Width (ft)	24.18
Vel Total (ft/s)	3.28	Avg. Vel. (ft/s)	3.28
Max Chl Dpth (ft)	3.65	Hydr. Depth (ft)	2.51
Conv. Total (cfs)	9933.5	Conv. (cfs)	9933.5
Length Wtd. (ft)	131.30	Wetted Per. (ft)	25.86
Min Ch El (ft)	1437.14	Shear (lb/sq ft)	0.06
Alpha	1.00	Stream Power (lb/ft s)	0.19
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.73
C & E Loss (ft)	0.00	Cum SA (acres)	0.24

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.86	Reach Len. (ft)	124.00	131.30	145.00
Crit W.S. (ft)	1439.42	Flow Area (sq ft)		62.53	
E.G. Slope (ft/ft)	0.000491	Area (sq ft)		62.53	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	24.50	Top Width (ft)		24.50	
Vel Total (ft/s)	3.68	Avg. Vel. (ft/s)		3.68	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		2.55	
Conv. Total (cfs)	10368.5	Conv. (cfs)		10368.5	
Length Wtd. (ft)	131.30	Wetted Per. (ft)		26.21	
Min Ch El (ft)	1437.14	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.27	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		0.66	
C & E Loss (ft)	0.00	Cum SA (acres)		0.24	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1537

INPUT
Description: PC of Curve
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

```
     70 1440.03      78 1442.03      90 1442.01     100 1437.01     110 1437.21
  119.6 1442.01     168 1442.15

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
      70     .04      90    .016   119.6     .04

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            90   119.6             103.8   103.8   103.8             .1       .3
Left Levee      Station=      90      Elevation= 1442.01
```

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.09	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1438.41	Flow Area (sq ft)		27.69	
E.G. Slope (ft/ft)	0.000835	Area (sq ft)		27.69	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	17.93	Top Width (ft)		17.93	
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)		3.47	
Max Chl Dpth (ft)	2.08	Hydr. Depth (ft)		1.54	
Conv. Total (cfs)	3322.0	Conv. (cfs)		3322.0	
Length Wtd. (ft)	103.80	Wetted Per. (ft)		18.86	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.08	
Alpha	1.00	Stream Power (lb/ft s)		0.27	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.00	Cum SA (acres)		0.13	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.64	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1438.70	Flow Area (sq ft)		38.13	
E.G. Slope (ft/ft)	0.000677	Area (sq ft)		38.13	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	20.12	Top Width (ft)		20.12	
Vel Total (ft/s)	3.56	Avg. Vel. (ft/s)		3.56	

Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)	1.89
Conv. Total (cfs)	5217.2	Conv. (cfs)	5217.2
Length Wtd. (ft)	103.80	Wetted Per. (ft)	21.32
Min Ch El (ft)	1437.01	Shear (lb/sq ft)	0.08
Alpha	1.00	Stream Power (lb/ft s)	0.27
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	0.32
C & E Loss (ft)	0.00	Cum SA (acres)	0.14

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1440.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.80	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1438.79	Flow Area (sq ft)		41.41	
E.G. Slope (ft/ft)	0.000637	Area (sq ft)		41.41	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	20.76	Top Width (ft)		20.76	
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57	
Max Chl Dpth (ft)	2.79	Hydr. Depth (ft)		1.99	
Conv. Total (cfs)	5855.6	Conv. (cfs)		5855.6	
Length Wtd. (ft)	103.80	Wetted Per. (ft)		22.04	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.27	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		0.34	
C & E Loss (ft)	0.00	Cum SA (acres)		0.14	

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.96	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1438.87	Flow Area (sq ft)		44.74	

E.G. Slope (ft/ft)	0.000600	Area (sq ft)	44.74
Q Total (cfs)	159.73	Flow (cfs)	159.73
Top Width (ft)	21.39	Top Width (ft)	21.39
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	3.57
Max Chl Dpth (ft)	2.95	Hydr. Depth (ft)	2.09
Conv. Total (cfs)	6522.6	Conv. (cfs)	6522.6
Length Wtd. (ft)	103.80	Wetted Per. (ft)	22.74
Min Ch El (ft)	1437.01	Shear (lb/sq ft)	0.07
Alpha	1.00	Stream Power (lb/ft s)	0.26
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.37
C & E Loss (ft)	0.00	Cum SA (acres)	0.15

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.37	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1438.93	Flow Area (sq ft)		53.91	
E.G. Slope (ft/ft)	0.000401	Area (sq ft)		53.91	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	23.05	Top Width (ft)		23.05	
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)		3.14	
Max Chl Dpth (ft)	3.36	Hydr. Depth (ft)		2.34	
Conv. Total (cfs)	8449.5	Conv. (cfs)		8449.5	
Length Wtd. (ft)	103.80	Wetted Per. (ft)		24.59	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.48	
C & E Loss (ft)	0.00	Cum SA (acres)		0.16	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.90	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.16	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.75	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1439.11	Flow Area (sq ft)		62.79	
E.G. Slope (ft/ft)	0.000363	Area (sq ft)		62.79	
Q Total (cfs)	198.73	Flow (cfs)		198.73	
Top Width (ft)	24.54	Top Width (ft)		24.54	
Vel Total (ft/s)	3.16	Avg. Vel. (ft/s)		3.16	
Max Chl Dpth (ft)	3.73	Hydr. Depth (ft)		2.56	
Conv. Total (cfs)	10428.7	Conv. (cfs)		10428.7	
Length Wtd. (ft)	103.80	Wetted Per. (ft)		26.26	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.55	
C & E Loss (ft)	0.00	Cum SA (acres)		0.17	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1441.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.81	Reach Len. (ft)	103.80	103.80	103.80
Crit W.S. (ft)	1439.28	Flow Area (sq ft)		64.42	
E.G. Slope (ft/ft)	0.000453	Area (sq ft)		64.42	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	24.80	Top Width (ft)		24.80	
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)		3.57	
Max Chl Dpth (ft)	3.80	Hydr. Depth (ft)		2.60	
Conv. Total (cfs)	10802.0	Conv. (cfs)		10802.0	
Length Wtd. (ft)	103.80	Wetted Per. (ft)		26.55	
Min Ch El (ft)	1437.01	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		0.46	
C & E Loss (ft)	0.00	Cum SA (acres)		0.16	

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1433

INPUT
Description: PT of Curve
Station Elevation Data num= 7

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
70	1440.29	78	1442.14	90	1441.9	100	1436.9	110	1437.1
119.6	1441.9	168	1441.92						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
70	.04	90	.016	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	88	82.7	45	.1	.3

Left Levee Station= 90 Elevation= 1441.9

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.19	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.01	Reach Len. (ft)	88.00	82.70	45.00
Crit W.S. (ft)	1438.29	Flow Area (sq ft)		28.25	
E.G. Slope (ft/ft)	0.000789	Area (sq ft)		28.25	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	18.05	Top Width (ft)		18.05	
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)		3.40	
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		1.56	
Conv. Total (cfs)	3416.7	Conv. (cfs)		3416.7	
Length Wtd. (ft)	82.70	Wetted Per. (ft)		19.00	
Min Ch El (ft)	1436.90	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.25	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)		0.17	
C & E Loss (ft)	0.00	Cum SA (acres)		0.09	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.77	Element			
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.58	Reach Len. (ft)	88.00	82.70	45.00

Crit W.S. (ft)	1438.59	Flow Area (sq ft)	39.12
E.G. Slope (ft/ft)	0.000630	Area (sq ft)	39.12
Q Total (cfs)	135.78	Flow (cfs)	135.78
Top Width (ft)	20.32	Top Width (ft)	20.32
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)	3.47
Max Chl Dpth (ft)	2.68	Hydr. Depth (ft)	1.93
Conv. Total (cfs)	5407.9	Conv. (cfs)	5407.9
Length Wtd. (ft)	82.70	Wetted Per. (ft)	21.54
Min Ch El (ft)	1436.90	Shear (lb/sq ft)	0.07
Alpha	1.00	Stream Power (lb/ft s)	0.25
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.22
C & E Loss (ft)	0.00	Cum SA (acres)	0.09

CROSS SECTION OUTPUT Profile #PF 3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.93				
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.74	Reach Len. (ft)	88.00	82.70	45.00
Crit W.S. (ft)	1438.68	Flow Area (sq ft)		42.52	
E.G. Slope (ft/ft)	0.000592	Area (sq ft)		42.52	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	20.98	Top Width (ft)		20.98	
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)		3.48	
Max Chl Dpth (ft)	2.84	Hydr. Depth (ft)		2.03	
Conv. Total (cfs)	6076.6	Conv. (cfs)		6076.6	
Length Wtd. (ft)	82.70	Wetted Per. (ft)		22.27	
Min Ch El (ft)	1436.90	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.25	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.00	Cum SA (acres)		0.09	

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.91	Reach Len. (ft)	88.00	82.70	45.00
Crit W.S. (ft)	1438.75	Flow Area (sq ft)		45.97	
E.G. Slope (ft/ft)	0.000556	Area (sq ft)		45.97	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	21.62	Top Width (ft)		21.62	
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)		3.47	
Max Chl Dpth (ft)	3.01	Hydr. Depth (ft)		2.13	
Conv. Total (cfs)	6774.4	Conv. (cfs)		6774.4	
Length Wtd. (ft)	82.70	Wetted Per. (ft)		23.00	
Min Ch El (ft)	1436.90	Shear (lb/sq ft)		0.07	
Alpha	1.00	Stream Power (lb/ft s)		0.24	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.26	
C & E Loss (ft)	0.00	Cum SA (acres)		0.10	

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.34	Reach Len. (ft)	88.00	82.70	45.00
Crit W.S. (ft)	1438.82	Flow Area (sq ft)		55.74	
E.G. Slope (ft/ft)	0.000365	Area (sq ft)		55.74	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	23.36	Top Width (ft)		23.36	
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)		3.03	
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)		2.39	
Conv. Total (cfs)	8848.5	Conv. (cfs)		8848.5	
Length Wtd. (ft)	82.70	Wetted Per. (ft)		24.94	
Min Ch El (ft)	1436.90	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.35	

C & E Loss (ft)	0.00	Cum SA (acres)	0.10

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.72	Reach Len. (ft)	88.00	82.70	45.00
Crit W.S. (ft)	1439.00	Flow Area (sq ft)		64.82	
E.G. Slope (ft/ft)	0.000333	Area (sq ft)		64.82	
Q Total (cfs)	198.73	Flow (cfs)		198.73	
Top Width (ft)	24.87	Top Width (ft)		24.87	
Vel Total (ft/s)	3.07	Avg. Vel. (ft/s)		3.07	
Max Chl Dpth (ft)	3.82	Hydr. Depth (ft)		2.61	
Conv. Total (cfs)	10895.1	Conv. (cfs)		10895.1	
Length Wtd. (ft)	82.70	Wetted Per. (ft)		26.63	
Min Ch El (ft)	1436.90	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.40	
C & E Loss (ft)	0.00	Cum SA (acres)		0.11	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1440.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.78	Reach Len. (ft)	88.00	82.70	45.00
Crit W.S. (ft)	1439.18	Flow Area (sq ft)		66.28	
E.G. Slope (ft/ft)	0.000419	Area (sq ft)		66.28	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	25.10	Top Width (ft)		25.10	
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)		3.47	
Max Chl Dpth (ft)	3.88	Hydr. Depth (ft)		2.64	
Conv. Total (cfs)	11232.5	Conv. (cfs)		11232.5	

Length Wtd. (ft)	82.70	Wetted Per. (ft)	26.89
Min Ch El (ft)	1436.90	Shear (lb/sq ft)	0.06
Alpha	1.00	Stream Power (lb/ft s)	0.22
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.31
C & E Loss (ft)	0.00	Cum SA (acres)	0.10

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1350

INPUT
Description: End of Transition
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
60	1442.02	90	1441.82	100	1436.82	110	1437.02	119.6	1441.82
132	1442.06								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
60	.04	90	.013	119.6	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
90	119.6	45.4	45.4	45.4	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.14	Element			
Vel Head (ft)	0.17	Wt. n-Val.		0.013	
W.S. Elev (ft)	1438.97	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		28.87	
E.G. Slope (ft/ft)	0.000490	Area (sq ft)		28.87	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	18.19	Top Width (ft)		18.19	
Vel Total (ft/s)	3.33	Avg. Vel. (ft/s)		3.33	
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.59	
Conv. Total (cfs)	4338.0	Conv. (cfs)		4338.0	
Length Wtd. (ft)	45.40	Wetted Per. (ft)		19.16	
Min Ch El (ft)	1436.82	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.12	
C & E Loss (ft)	0.02	Cum SA (acres)		0.05	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.54	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		40.01	
E.G. Slope (ft/ft)	0.000391	Area (sq ft)		40.01	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	20.49	Top Width (ft)		20.49	
Vel Total (ft/s)	3.39	Avg. Vel. (ft/s)		3.39	
Max Chl Dpth (ft)	2.72	Hydr. Depth (ft)		1.95	
Conv. Total (cfs)	6869.0	Conv. (cfs)		6869.0	
Length Wtd. (ft)	45.40	Wetted Per. (ft)		21.73	
Min Ch El (ft)	1436.82	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.15	
C & E Loss (ft)	0.03	Cum SA (acres)		0.05	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1439.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.71	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		43.48	
E.G. Slope (ft/ft)	0.000367	Area (sq ft)		43.48	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	21.16	Top Width (ft)		21.16	
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)		3.40	
Max Chl Dpth (ft)	2.89	Hydr. Depth (ft)		2.06	

Conv. Total (cfs)	7716.2	Conv. (cfs)	7716.2
Length Wtd. (ft)	45.40	Wetted Per. (ft)	22.48
Min Ch El (ft)	1436.82	Shear (lb/sq ft)	0.04
Alpha	1.00	Stream Power (lb/ft s)	0.15
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	0.16
C & E Loss (ft)	0.04	Cum SA (acres)	0.05

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1440.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.87	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		47.01	
E.G. Slope (ft/ft)	0.000345	Area (sq ft)		47.01	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	21.81	Top Width (ft)		21.81	
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)		3.40	
Max Chl Dpth (ft)	3.05	Hydr. Depth (ft)		2.15	
Conv. Total (cfs)	8600.0	Conv. (cfs)		8600.0	
Length Wtd. (ft)	45.40	Wetted Per. (ft)		23.21	
Min Ch El (ft)	1436.82	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.04	Cum SA (acres)		0.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.46	Element	Left OB	Channel	Right OB

Vel Head (ft)	0.14	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.32	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		57.21	
E.G. Slope (ft/ft)	0.000224	Area (sq ft)		57.21	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	23.61	Top Width (ft)		23.61	
Vel Total (ft/s)	2.96	Avg. Vel. (ft/s)		2.96	
Max Chl Dpth (ft)	3.50	Hydr. Depth (ft)		2.42	
Conv. Total (cfs)	11288.1	Conv. (cfs)		11288.1	
Length Wtd. (ft)	45.40	Wetted Per. (ft)		25.22	
Min Ch El (ft)	1436.82	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.03	Cum SA (acres)		0.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.70	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		66.42	
E.G. Slope (ft/ft)	0.000205	Area (sq ft)		66.42	
Q Total (cfs)	198.73	Flow (cfs)		198.73	
Top Width (ft)	25.12	Top Width (ft)		25.12	
Vel Total (ft/s)	2.99	Avg. Vel. (ft/s)		2.99	
Max Chl Dpth (ft)	3.88	Hydr. Depth (ft)		2.64	
Conv. Total (cfs)	13865.6	Conv. (cfs)		13865.6	
Length Wtd. (ft)	45.40	Wetted Per. (ft)		26.91	
Min Ch El (ft)	1436.82	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.09	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.27	

C & E Loss (ft)	0.03	Cum SA (acres)	0.06

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.93	Element			
Vel Head (ft)	0.18	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.75	Reach Len. (ft)	45.40	45.40	45.40
Crit W.S. (ft)		Flow Area (sq ft)		67.76	
E.G. Slope (ft/ft)	0.000260	Area (sq ft)		67.76	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	25.34	Top Width (ft)		25.34	
Vel Total (ft/s)	3.39	Avg. Vel. (ft/s)		3.39	
Max Chl Dpth (ft)	3.93	Hydr. Depth (ft)		2.67	
Conv. Total (cfs)	14252.0	Conv. (cfs)		14252.0	
Length Wtd. (ft)	45.40	Wetted Per. (ft)		27.15	
Min Ch El (ft)	1436.82	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.05	Cum SA (acres)		0.05	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1305

INPUT
Description: Culvert Upstream Section
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.57	99.9	1441.78	100	1436.78	110	1436.78
110.1	1441.78	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0	.04	99.9	.013	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	67.4	67.4	67.4	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1439.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.		0.013	
W.S. Elev (ft)	1438.70	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1438.20	Flow Area (sq ft)		19.27	
E.G. Slope (ft/ft)	0.001222	Area (sq ft)		19.27	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	10.08	Top Width (ft)		10.08	
Vel Total (ft/s)	4.98	Avg. Vel. (ft/s)		4.98	
Max Chl Dpth (ft)	1.92	Hydr. Depth (ft)		1.91	
Conv. Total (cfs)	2746.0	Conv. (cfs)		2746.0	
Length Wtd. (ft)	67.40	Wetted Per. (ft)		13.84	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.53	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.09	
C & E Loss (ft)		Cum SA (acres)		0.04	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.50	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.16	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1438.56	Flow Area (sq ft)		23.90	
E.G. Slope (ft/ft)	0.001299	Area (sq ft)		23.90	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	10.10	Top Width (ft)		10.10	
Vel Total (ft/s)	5.68	Avg. Vel. (ft/s)		5.68	
Max Chl Dpth (ft)	2.38	Hydr. Depth (ft)		2.37	
Conv. Total (cfs)	3767.5	Conv. (cfs)		3767.5	
Length Wtd. (ft)	67.40	Wetted Per. (ft)		14.76	

Min Ch El (ft)	1436.78	Shear (lb/sq ft)	0.13
Alpha	1.00	Stream Power (lb/ft s)	0.75
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11
C & E Loss (ft)		Cum SA (acres)	0.04

CROSS SECTION OUTPUT Profile #PF 3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.83				
Vel Head (ft)	0.53	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.29	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1438.67	Flow Area (sq ft)		25.27	
E.G. Slope (ft/ft)	0.001310	Area (sq ft)		25.27	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	10.10	Top Width (ft)		10.10	
Vel Total (ft/s)	5.85	Avg. Vel. (ft/s)		5.85	
Max Chl Dpth (ft)	2.51	Hydr. Depth (ft)		2.50	
Conv. Total (cfs)	4083.9	Conv. (cfs)		4083.9	
Length Wtd. (ft)	67.40	Wetted Per. (ft)		15.03	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.14	
Alpha	1.00	Stream Power (lb/ft s)		0.80	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.12	
C & E Loss (ft)		Cum SA (acres)		0.04	

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.99				
Vel Head (ft)	0.56	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.43	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1438.77	Flow Area (sq ft)		26.63	
E.G. Slope (ft/ft)	0.001315	Area (sq ft)		26.63	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	10.11	Top Width (ft)		10.11	

Vel Total (ft/s)	6.00	Avg. Vel. (ft/s)	6.00
Max Chl Dpth (ft)	2.65	Hydr. Depth (ft)	2.64
Conv. Total (cfs)	4404.7	Conv. (cfs)	4404.7
Length Wtd. (ft)	67.40	Wetted Per. (ft)	15.30
Min Ch El (ft)	1436.78	Shear (lb/sq ft)	0.14
Alpha	1.00	Stream Power (lb/ft s)	0.86
Frctn Loss (ft)		Cum Volume (acre-ft)	0.14
C & E Loss (ft)		Cum SA (acres)	0.04

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.43	Wt. n-Val.		0.013	
W.S. Elev (ft)	1439.99	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1438.84	Flow Area (sq ft)		32.25	
E.G. Slope (ft/ft)	0.000855	Area (sq ft)		32.25	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	10.13	Top Width (ft)		10.13	
Vel Total (ft/s)	5.24	Avg. Vel. (ft/s)		5.24	
Max Chl Dpth (ft)	3.20	Hydr. Depth (ft)		3.18	
Conv. Total (cfs)	5784.5	Conv. (cfs)		5784.5	
Length Wtd. (ft)	67.40	Wetted Per. (ft)		16.41	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.55	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.19	
C & E Loss (ft)		Cum SA (acres)		0.04	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.30	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1439.08	Flow Area (sq ft)		35.45	

E.G. Slope (ft/ft)	0.000906	Area (sq ft)	35.45
Q Total (cfs)	198.73	Flow (cfs)	198.73
Top Width (ft)	10.14	Top Width (ft)	10.14
Vel Total (ft/s)	5.61	Avg. Vel. (ft/s)	5.61
Max Chl Dpth (ft)	3.52	Hydr. Depth (ft)	3.50
Conv. Total (cfs)	6602.4	Conv. (cfs)	6602.4
Length Wtd. (ft)	67.40	Wetted Per. (ft)	17.04
Min Ch El (ft)	1436.78	Shear (lb/sq ft)	0.12
Alpha	1.00	Stream Power (lb/ft s)	0.66
Frctn Loss (ft)		Cum Volume (acre-ft)	0.22
C & E Loss (ft)		Cum SA (acres)	0.04

CROSS SECTION OUTPUT Profile #PF 7

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.86				
Vel Head (ft)	0.72	Wt. n-Val.		0.013	
W.S. Elev (ft)	1440.14	Reach Len. (ft)	67.40	67.40	67.40
Crit W.S. (ft)	1439.31	Flow Area (sq ft)		33.83	
E.G. Slope (ft/ft)	0.001381	Area (sq ft)		33.83	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	10.13	Top Width (ft)		10.13	
Vel Total (ft/s)	6.79	Avg. Vel. (ft/s)		6.79	
Max Chl Dpth (ft)	3.36	Hydr. Depth (ft)		3.34	
Conv. Total (cfs)	6184.6	Conv. (cfs)		6184.6	
Length Wtd. (ft)	67.40	Wetted Per. (ft)		16.72	
Min Ch El (ft)	1436.78	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		1.19	
Frctn Loss (ft)		Cum Volume (acre-ft)		0.13	
C & E Loss (ft)		Cum SA (acres)		0.04	

CULVERT RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1270

```
INPUT
Description: Hawes Road Crossing
Distance from Upstream XS =      12
Deck/Roadway Width        =      46
Weir Coefficient          =     2.6
Bridge Deck/Roadway Skew  =      45
Upstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1441.3              50  1441.5             105    1442
     160  1441.8             230    1442

Upstream Bridge Cross Section Data
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95 1441.57    99.9 1441.78     100 1436.78     110 1436.78
   110.1 1441.78     115  1441.6 230.001    1442

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .013   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       5
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0  1441.3              50  1441.5             105    1442
     160  1441.7             230    1442

Downstream Bridge Cross Section Data
Station Elevation Data    num=       8
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0  1441.3      95  1441.5    99.9 1441.71     100 1436.71     110 1436.71
   110.1 1441.71     115  1441.6 230.001    1442

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .04    99.9    .015   110.1     .04

Bank Sta: Left   Right    Coeff Contr.   Expan.
          99.9   110.1             .1       .3

Upstream Embankment side slope              =      50 horiz. to 1.0 vertical
Downstream Embankment side slope            =      50 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =  1441.5
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name      Shape      Rise    Span
Culvert #1            Box       4      10
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 2 - Wingwall flared 18 to 33.7 deg.; inlet top edge bevel=0.083D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    n Value   Entrance Loss Coef   Exit Loss Coef
                .4      66       .013                   .2               .1
Upstream   Elevation =  1436.78
           Centerline Station =  105
Downstream Elevation =  1436.71
           Centerline Station =  105
```

CULVERT OUTPUT Profile #PF 1
Culvert ID : Culvert #1

Culv Q (cfs)	96.00	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.52
Q Barrel (cfs)	96.00	Culv Vel DS (ft/s)	5.97
E.G. US. (ft)	1439.09	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1438.70	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1438.87	Culv Frctn Ls (ft)	0.12
W.S. DS (ft)	1438.33	Culv Ext Lss (ft)	
Delta EG (ft)	0.22	Culv Ent Lss (ft)	0.09
Delta WS (ft)	0.37	Q Weir (cfs)	
E.G. IC (ft)	1438.98	Weir Sta Lft (ft)	
E.G. OC (ft)	1439.09	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1438.52	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1438.32	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.02	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	1.42	Min El Weir Flow (ft)	1441.50

CULVERT OUTPUT Profile #PF 2
Culvert ID : Culvert #1

Culv Q (cfs)	135.78	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.42
Q Barrel (cfs)	135.78	Culv Vel DS (ft/s)	7.59
E.G. US. (ft)	1439.66	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1439.16	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1439.39	Culv Frctn Ls (ft)	0.14
W.S. DS (ft)	1438.51	Culv Ext Lss (ft)	0.01
Delta EG (ft)	0.28	Culv Ent Lss (ft)	0.13
Delta WS (ft)	0.65	Q Weir (cfs)	
E.G. IC (ft)	1439.55	Weir Sta Lft (ft)	
E.G. OC (ft)	1439.66	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1438.90	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1438.50	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.57	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	1.79	Min El Weir Flow (ft)	1441.50

CULVERT OUTPUT Profile #PF 3
Culvert ID : Culvert #1

Culv Q (cfs)	147.79	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.62
Q Barrel (cfs)	147.79	Culv Vel DS (ft/s)	7.81
E.G. US. (ft)	1439.83	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1439.29	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1439.54	Culv Frctn Ls (ft)	0.14
W.S. DS (ft)	1438.60	Culv Ext Lss (ft)	0.01
Delta EG (ft)	0.29	Culv Ent Lss (ft)	0.14
Delta WS (ft)	0.70	Q Weir (cfs)	
E.G. IC (ft)	1439.71	Weir Sta Lft (ft)	
E.G. OC (ft)	1439.83	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1439.01	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1438.60	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.72	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	1.89	Min El Weir Flow (ft)	1441.50

CULVERT OUTPUT Profile #PF 4

Culvert ID : Culvert #1

Culv Q (cfs)	159.73	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	6.79
Q Barrel (cfs)	159.73	Culv Vel DS (ft/s)	7.65
E.G. US. (ft)	1439.99	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1439.43	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1439.70	Culv Frctn Ls (ft)	0.14
W.S. DS (ft)	1438.83	Culv Ext Lss (ft)	0.00
Delta EG (ft)	0.29	Culv Ent Lss (ft)	0.14
Delta WS (ft)	0.60	Q Weir (cfs)	
E.G. IC (ft)	1439.86	Weir Sta Lft (ft)	
E.G. OC (ft)	1439.99	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1439.13	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1438.80	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.87	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	1.99	Min El Weir Flow (ft)	1441.50

CULVERT OUTPUT Profile #PF 5
Culvert ID : Culvert #1

Culv Q (cfs)	169.11	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.52
Q Barrel (cfs)	169.11	Culv Vel DS (ft/s)	5.51
E.G. US. (ft)	1440.41	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1439.99	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1440.25	Culv Frctn Ls (ft)	0.07
W.S. DS (ft)	1439.79	Culv Ext Lss (ft)	0.00
Delta EG (ft)	0.16	Culv Ent Lss (ft)	0.09
Delta WS (ft)	0.20	Q Weir (cfs)	
E.G. IC (ft)	1439.98	Weir Sta Lft (ft)	
E.G. OC (ft)	1440.41	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1439.85	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1439.78	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.99	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	2.07	Min El Weir Flow (ft)	1441.50

CULVERT OUTPUT Profile #PF 6
Culvert ID : Culvert #1

Culv Q (cfs)	198.73	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	5.92
Q Barrel (cfs)	198.73	Culv Vel DS (ft/s)	5.92
E.G. US. (ft)	1440.79	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1440.30	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1440.61	Culv Frctn Ls (ft)	0.07
W.S. DS (ft)	1440.08	Culv Ext Lss (ft)	0.00
Delta EG (ft)	0.18	Culv Ent Lss (ft)	0.11
Delta WS (ft)	0.22	Q Weir (cfs)	
E.G. IC (ft)	1440.35	Weir Sta Lft (ft)	
E.G. OC (ft)	1440.79	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1440.14	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1440.07	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.35	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	2.31	Min El Weir Flow (ft)	1441.50

CULVERT OUTPUT Profile #PF 7
Culvert ID : Culvert #1

Culv Q (cfs)	229.85	Culv Ful Lngh (ft)	
# Barrels	1	Culv Vel US (ft/s)	7.78
Q Barrel (cfs)	229.85	Culv Vel DS (ft/s)	9.05
E.G. US. (ft)	1440.86	Culv Inv El Up (ft)	1436.78
W.S. US. (ft)	1440.14	Culv Inv El Dn (ft)	1436.71
E.G. DS (ft)	1440.51	Culv Frctn Ls (ft)	0.15
W.S. DS (ft)	1439.24	Culv Ext Lss (ft)	0.01
Delta EG (ft)	0.35	Culv Ent Lss (ft)	0.19
Delta WS (ft)	0.90	Q Weir (cfs)	
E.G. IC (ft)	1440.71	Weir Sta Lft (ft)	
E.G. OC (ft)	1440.86	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1439.73	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1439.25	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.72	Wr Flw Area (sq ft)	
Culv Crt Depth (ft)	2.54	Min El Weir Flow (ft)	1441.50

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1237

INPUT
Description: Culvert Downstream Section
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1441.3	95	1441.5	99.9	1441.71	100	1436.71	110	1436.71
110.1	1441.71	115	1441.6	230.001	1442				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.04	99.9	.015	110.1	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
99.9	110.1	67.3	67.3	67.3	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1438.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.		0.015	
W.S. Elev (ft)	1438.33	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)		Flow Area (sq ft)		16.26	
E.G. Slope (ft/ft)	0.002704	Area (sq ft)		16.26	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	10.06	Top Width (ft)		10.06	
Vel Total (ft/s)	5.91	Avg. Vel. (ft/s)		5.91	
Max Chl Dpth (ft)	1.62	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	1846.3	Conv. (cfs)		1846.3	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		13.24	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		1.22	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)		0.07	

C & E Loss (ft)	0.09	Cum SA (acres)	0.02

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	1439.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.88	Wt. n-Val.		0.015	
W.S. Elev (ft)	1438.51	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1438.49	Flow Area (sq ft)		18.06	
E.G. Slope (ft/ft)	0.003947	Area (sq ft)		18.06	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	10.07	Top Width (ft)		10.07	
Vel Total (ft/s)	7.52	Avg. Vel. (ft/s)		7.52	
Max Chl Dpth (ft)	1.80	Hydr. Depth (ft)		1.79	
Conv. Total (cfs)	2161.1	Conv. (cfs)		2161.1	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		13.60	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		2.46	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.17	Cum SA (acres)		0.02	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1439.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.		0.015	
W.S. Elev (ft)	1438.60	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1438.60	Flow Area (sq ft)		18.93	
E.G. Slope (ft/ft)	0.004066	Area (sq ft)		18.93	

Q Total (cfs)	147.79	Flow (cfs)	147.79
Top Width (ft)	10.08	Top Width (ft)	10.08
Vel Total (ft/s)	7.81	Avg. Vel. (ft/s)	7.81
Max Chl Dpth (ft)	1.89	Hydr. Depth (ft)	1.88
Conv. Total (cfs)	2317.7	Conv. (cfs)	2317.7
Length Wtd. (ft)	67.30	Wetted Per. (ft)	13.77
Min Ch El (ft)	1436.71	Shear (lb/sq ft)	0.35
Alpha	1.00	Stream Power (lb/ft s)	2.72
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.09
C & E Loss (ft)	0.05	Cum SA (acres)	0.02

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to

critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1439.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.87	Wt. n-Val.		0.015	
W.S. Elev (ft)	1438.83	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1438.70	Flow Area (sq ft)		21.30	
E.G. Slope (ft/ft)	0.003350	Area (sq ft)		21.30	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	10.08	Top Width (ft)		10.08	
Vel Total (ft/s)	7.50	Avg. Vel. (ft/s)		7.50	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		2.11	
Conv. Total (cfs)	2759.5	Conv. (cfs)		2759.5	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		14.24	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		2.35	

Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.10
C & E Loss (ft)	0.18	Cum SA (acres)	0.02

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.25	Element			
Vel Head (ft)	0.46	Wt. n-Val.		0.015	
W.S. Elev (ft)	1439.79	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)		Flow Area (sq ft)		30.98	
E.G. Slope (ft/ft)	0.001275	Area (sq ft)		30.98	
Q Total (cfs)	169.11	Flow (cfs)		169.11	
Top Width (ft)	10.12	Top Width (ft)		10.12	
Vel Total (ft/s)	5.46	Avg. Vel. (ft/s)		5.46	
Max Chl Dpth (ft)	3.08	Hydr. Depth (ft)		3.06	
Conv. Total (cfs)	4736.5	Conv. (cfs)		4736.5	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		16.16	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.83	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.14	
C & E Loss (ft)	0.10	Cum SA (acres)		0.03	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	1440.61	Element			
Vel Head (ft)	0.53	Wt. n-Val.		0.015	
W.S. Elev (ft)	1440.08	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)		Flow Area (sq ft)		33.89	

E.G. Slope (ft/ft)	0.001368	Area (sq ft)	33.89
Q Total (cfs)	198.73	Flow (cfs)	198.73
Top Width (ft)	10.13	Top Width (ft)	10.13
Vel Total (ft/s)	5.86	Avg. Vel. (ft/s)	5.86
Max Chl Dpth (ft)	3.37	Hydr. Depth (ft)	3.34
Conv. Total (cfs)	5373.0	Conv. (cfs)	5373.0
Length Wtd. (ft)	67.30	Wetted Per. (ft)	16.73
Min Ch El (ft)	1436.71	Shear (lb/sq ft)	0.17
Alpha	1.00	Stream Power (lb/ft s)	1.01
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.16
C & E Loss (ft)	0.11	Cum SA (acres)	0.03

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1440.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.27	Wt. n-Val.		0.015	
W.S. Elev (ft)	1439.24	Reach Len. (ft)	67.30	67.30	67.30
Crit W.S. (ft)	1439.24	Flow Area (sq ft)		25.43	
E.G. Slope (ft/ft)	0.004141	Area (sq ft)		25.43	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	10.10	Top Width (ft)		10.10	
Vel Total (ft/s)	9.04	Avg. Vel. (ft/s)		9.04	
Max Chl Dpth (ft)	2.53	Hydr. Depth (ft)		2.52	
Conv. Total (cfs)	3571.6	Conv. (cfs)		3571.6	
Length Wtd. (ft)	67.30	Wetted Per. (ft)		15.06	
Min Ch El (ft)	1436.71	Shear (lb/sq ft)		0.44	
Alpha	1.00	Stream Power (lb/ft s)		3.95	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.25	Cum SA (acres)		0.02	

Warning: The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to

critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION RIVER: Southern Ave Sys
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	1438.66	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.42	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)		Flow Area (sq ft)		24.08	
E.G. Slope (ft/ft)	0.001245	Area (sq ft)		24.08	
Q Total (cfs)	96.00	Flow (cfs)		96.00	
Top Width (ft)	17.11	Top Width (ft)		17.11	
Vel Total (ft/s)	3.99	Avg. Vel. (ft/s)		3.99	
Max Chl Dpth (ft)	1.78	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	2720.7	Conv. (cfs)		2720.7	
Length Wtd. (ft)	70.00	Wetted Per. (ft)		17.95	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.10	
Alpha	1.00	Stream Power (lb/ft s)		0.42	

Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.04
C & E Loss (ft)	0.01	Cum SA (acres)	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.08	Element			
Vel Head (ft)	0.31	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.76	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)		Flow Area (sq ft)		30.24	
E.G. Slope (ft/ft)	0.001302	Area (sq ft)		30.24	
Q Total (cfs)	135.78	Flow (cfs)		135.78	
Top Width (ft)	18.49	Top Width (ft)		18.49	
Vel Total (ft/s)	4.49	Avg. Vel. (ft/s)		4.49	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		1.64	
Conv. Total (cfs)	3763.2	Conv. (cfs)		3763.2	
Length Wtd. (ft)	70.00	Wetted Per. (ft)		19.49	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.57	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)		0.04	
C & E Loss (ft)	0.01	Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.21	Element			
Vel Head (ft)	0.32	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.90	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)	1438.34	Flow Area (sq ft)		32.76	
E.G. Slope (ft/ft)	0.001230	Area (sq ft)		32.76	
Q Total (cfs)	147.79	Flow (cfs)		147.79	
Top Width (ft)	19.03	Top Width (ft)		19.03	
Vel Total (ft/s)	4.51	Avg. Vel. (ft/s)		4.51	
Max Chl Dpth (ft)	2.26	Hydr. Depth (ft)		1.72	
Conv. Total (cfs)	4213.9	Conv. (cfs)		4213.9	

Length Wtd. (ft)	70.00	Wetted Per. (ft)	20.09
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.13
Alpha	1.00	Stream Power (lb/ft s)	0.56
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.05
C & E Loss (ft)	0.02	Cum SA (acres)	

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1439.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.13	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)		Flow Area (sq ft)		37.31	
E.G. Slope (ft/ft)	0.000996	Area (sq ft)		37.31	
Q Total (cfs)	159.73	Flow (cfs)		159.73	
Top Width (ft)	19.96	Top Width (ft)		19.96	
Vel Total (ft/s)	4.28	Avg. Vel. (ft/s)		4.28	
Max Chl Dpth (ft)	2.49	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	5060.2	Conv. (cfs)		5060.2	
Length Wtd. (ft)	70.00	Wetted Per. (ft)		21.14	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.47	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)		0.05	
C & E Loss (ft)	0.02	Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1440.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.97	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)		Flow Area (sq ft)		55.46	
E.G. Slope (ft/ft)	0.000370	Area (sq ft)		55.46	

Q Total (cfs)	169.11	Flow (cfs)	169.11
Top Width (ft)	23.32	Top Width (ft)	23.32
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)	3.05
Max Chl Dpth (ft)	3.33	Hydr. Depth (ft)	2.38
Conv. Total (cfs)	8787.5	Conv. (cfs)	8787.5
Length Wtd. (ft)	70.00	Wetted Per. (ft)	24.89
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.05
Alpha	1.00	Stream Power (lb/ft s)	0.16
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.08
C & E Loss (ft)	0.05	Cum SA (acres)	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.016	
W.S. Elev (ft)	1440.30	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)		Flow Area (sq ft)		63.40	
E.G. Slope (ft/ft)	0.000354	Area (sq ft)		63.40	
Q Total (cfs)	198.73	Flow (cfs)		198.73	
Top Width (ft)	24.64	Top Width (ft)		24.64	
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)		3.13	
Max Chl Dpth (ft)	3.66	Hydr. Depth (ft)		2.57	
Conv. Total (cfs)	10567.3	Conv. (cfs)		10567.3	
Length Wtd. (ft)	70.00	Wetted Per. (ft)		26.37	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)		0.09	
C & E Loss (ft)	0.06	Cum SA (acres)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1440.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.78	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.26	Reach Len. (ft)	70.00	70.00	70.00
Crit W.S. (ft)	1438.83	Flow Area (sq ft)		21.44	
E.G. Slope (ft/ft)	0.009968	Area (sq ft)		21.44	
Q Total (cfs)	229.85	Flow (cfs)		229.85	
Top Width (ft)	16.48	Top Width (ft)		16.48	
Vel Total (ft/s)	10.72	Avg. Vel. (ft/s)		10.72	
Max Chl Dpth (ft)	1.62	Hydr. Depth (ft)		1.30	
Conv. Total (cfs)	2302.2	Conv. (cfs)		2302.2	
Length Wtd. (ft)	70.00	Wetted Per. (ft)		17.24	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.77	
Alpha	1.00	Stream Power (lb/ft s)		8.30	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)		0.05	
C & E Loss (ft)	0.05	Cum SA (acres)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for
additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1170

INPUT
Description: Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442.04	-4	1440.34	8	1440.37	38	1441.19	72	1440.74
77	1441.19	91	1441.14	100	1436.64	110	1436.64	119	1441.14
128	1441.37								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	20	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.54	Element			
Vel Head (ft)	0.36	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.18	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		20.17	
E.G. Slope (ft/ft)	0.002118	Area (sq ft)		20.17	
Q Total (cfs)	97.00	Flow (cfs)		97.00	
Top Width (ft)	16.17	Top Width (ft)		16.17	
Vel Total (ft/s)	4.81	Avg. Vel. (ft/s)		4.81	
Max Chl Dpth (ft)	1.54	Hydr. Depth (ft)		1.25	
Conv. Total (cfs)	2107.7	Conv. (cfs)		2107.7	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		16.89	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.76	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.00	Cum SA (acres)		0.06	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.95	Element			
Vel Head (ft)	0.44	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.51	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		25.65	
E.G. Slope (ft/ft)	0.002110	Area (sq ft)		25.65	
Q Total (cfs)	136.78	Flow (cfs)		136.78	
Top Width (ft)	17.47	Top Width (ft)		17.47	
Vel Total (ft/s)	5.33	Avg. Vel. (ft/s)		5.33	
Max Chl Dpth (ft)	1.87	Hydr. Depth (ft)		1.47	
Conv. Total (cfs)	2977.3	Conv. (cfs)		2977.3	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		18.35	

Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.18
Alpha	1.00	Stream Power (lb/ft s)	0.98
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.10
C & E Loss (ft)	0.00	Cum SA (acres)	0.07

CROSS SECTION OUTPUT Profile #PF 3

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.09				
Vel Head (ft)	0.47	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.62	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		27.58	
E.G. Slope (ft/ft)	0.002112	Area (sq ft)		27.58	
Q Total (cfs)	151.79	Flow (cfs)		151.79	
Top Width (ft)	17.91	Top Width (ft)		17.91	
Vel Total (ft/s)	5.50	Avg. Vel. (ft/s)		5.50	
Max Chl Dpth (ft)	1.98	Hydr. Depth (ft)		1.54	
Conv. Total (cfs)	3302.9	Conv. (cfs)		3302.9	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		18.84	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.19	
Alpha	1.00	Stream Power (lb/ft s)		1.06	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.11	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT Profile #PF 4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1439.29				
Vel Head (ft)	0.51	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.78	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		30.51	
E.G. Slope (ft/ft)	0.002125	Area (sq ft)		30.51	
Q Total (cfs)	175.73	Flow (cfs)		175.73	
Top Width (ft)	18.55	Top Width (ft)		18.55	

Vel Total (ft/s)	5.76	Avg. Vel. (ft/s)	5.76
Max Chl Dpth (ft)	2.14	Hydr. Depth (ft)	1.64
Conv. Total (cfs)	3811.9	Conv. (cfs)	3811.9
Length Wtd. (ft)	20.00	Wetted Per. (ft)	19.56
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.21
Alpha	1.00	Stream Power (lb/ft s)	1.19
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.12
C & E Loss (ft)	0.00	Cum SA (acres)	0.07

CROSS SECTION OUTPUT Profile #PF 5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.00				
Vel Head (ft)	0.66	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.34	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		41.50	
E.G. Slope (ft/ft)	0.002130	Area (sq ft)		41.50	
Q Total (cfs)	271.11	Flow (cfs)		271.11	
Top Width (ft)	20.78	Top Width (ft)		20.78	
Vel Total (ft/s)	6.53	Avg. Vel. (ft/s)		6.53	
Max Chl Dpth (ft)	2.70	Hydr. Depth (ft)		2.00	
Conv. Total (cfs)	5873.8	Conv. (cfs)		5873.8	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		22.06	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		1.63	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.16	
C & E Loss (ft)	0.00	Cum SA (acres)		0.08	

CROSS SECTION OUTPUT Profile #PF 6

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	1440.33				
Vel Head (ft)	0.73	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.60	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)		Flow Area (sq ft)		47.17	

E.G. Slope (ft/ft)	0.002127	Area (sq ft)	47.17
Q Total (cfs)	323.73	Flow (cfs)	323.73
Top Width (ft)	21.85	Top Width (ft)	21.85
Vel Total (ft/s)	6.86	Avg. Vel. (ft/s)	6.86
Max Chl Dpth (ft)	2.96	Hydr. Depth (ft)	2.16
Conv. Total (cfs)	7020.1	Conv. (cfs)	7020.1
Length Wtd. (ft)	20.00	Wetted Per. (ft)	23.25
Min Ch El (ft)	1436.64	Shear (lb/sq ft)	0.27
Alpha	1.00	Stream Power (lb/ft s)	1.85
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.18
C & E Loss (ft)	0.00	Cum SA (acres)	0.08

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1439.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.60	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.12	Reach Len. (ft)	20.00	20.00	20.00
Crit W.S. (ft)	1438.82	Flow Area (sq ft)		37.03	
E.G. Slope (ft/ft)	0.002126	Area (sq ft)		37.03	
Q Total (cfs)	230.85	Flow (cfs)		230.85	
Top Width (ft)	19.90	Top Width (ft)		19.90	
Vel Total (ft/s)	6.23	Avg. Vel. (ft/s)		6.23	
Max Chl Dpth (ft)	2.48	Hydr. Depth (ft)		1.86	
Conv. Total (cfs)	5006.5	Conv. (cfs)		5006.5	
Length Wtd. (ft)	20.00	Wetted Per. (ft)		21.07	
Min Ch El (ft)	1436.64	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		1.45	
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)		0.14	
C & E Loss (ft)	0.00	Cum SA (acres)		0.08	

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1150

INPUT
Description: Starting Channel Reconstruction
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1442	-4	1440.3	8	1440.33	38	1441.15	72	1441.7
77	1441.15	91	1441.1	100	1436.6	110	1436.6	119	1441.1
128	1441.33								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	150	150	150	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.49	Element			
Vel Head (ft)	0.37	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.13	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1437.90	Flow Area (sq ft)		19.91	
E.G. Slope (ft/ft)	0.002198	Area (sq ft)		19.91	
Q Total (cfs)	97.00	Flow (cfs)		97.00	
Top Width (ft)	16.10	Top Width (ft)		16.10	
Vel Total (ft/s)	4.87	Avg. Vel. (ft/s)		4.87	
Max Chl Dpth (ft)	1.53	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	2069.1	Conv. (cfs)		2069.1	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		16.82	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.79	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.00	Cum SA (acres)		0.06	

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.90	Element			
Vel Head (ft)	0.45	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.45	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1438.20	Flow Area (sq ft)		25.35	
E.G. Slope (ft/ft)	0.002182	Area (sq ft)		25.35	
Q Total (cfs)	136.78	Flow (cfs)		136.78	

Top Width (ft)	17.40	Top Width (ft)	17.40
Vel Total (ft/s)	5.40	Avg. Vel. (ft/s)	5.40
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)	1.46
Conv. Total (cfs)	2928.0	Conv. (cfs)	2928.0
Length Wtd. (ft)	150.00	Wetted Per. (ft)	18.27
Min Ch El (ft)	1436.60	Shear (lb/sq ft)	0.19
Alpha	1.00	Stream Power (lb/ft s)	1.02
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	0.09
C & E Loss (ft)	0.00	Cum SA (acres)	0.06

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1439.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.56	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1438.30	Flow Area (sq ft)		27.27	
E.G. Slope (ft/ft)	0.002182	Area (sq ft)		27.27	
Q Total (cfs)	151.79	Flow (cfs)		151.79	
Top Width (ft)	17.84	Top Width (ft)		17.84	
Vel Total (ft/s)	5.57	Avg. Vel. (ft/s)		5.57	
Max Chl Dpth (ft)	1.96	Hydr. Depth (ft)		1.53	
Conv. Total (cfs)	3249.9	Conv. (cfs)		3249.9	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		18.76	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		1.10	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.09	
C & E Loss (ft)	0.00	Cum SA (acres)		0.06	

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1439.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.016	

W.S. Elev (ft)	1438.72	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)		Flow Area (sq ft)		30.16	
E.G. Slope (ft/ft)	0.002197	Area (sq ft)		30.16	
Q Total (cfs)	175.73	Flow (cfs)		175.73	
Top Width (ft)	18.47	Top Width (ft)		18.47	
Vel Total (ft/s)	5.83	Avg. Vel. (ft/s)		5.83	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		1.63	
Conv. Total (cfs)	3748.9	Conv. (cfs)		3748.9	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		19.47	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		1.24	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.10	
C & E Loss (ft)	0.00	Cum SA (acres)		0.06	

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1439.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.27	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)	1438.99	Flow Area (sq ft)		41.03	
E.G. Slope (ft/ft)	0.002199	Area (sq ft)		41.03	
Q Total (cfs)	271.11	Flow (cfs)		271.11	
Top Width (ft)	20.69	Top Width (ft)		20.69	
Vel Total (ft/s)	6.61	Avg. Vel. (ft/s)		6.61	
Max Chl Dpth (ft)	2.67	Hydr. Depth (ft)		1.98	
Conv. Total (cfs)	5780.9	Conv. (cfs)		5780.9	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		21.96	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		1.70	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.14	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	1440.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.54	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)		Flow Area (sq ft)		46.64	
E.G. Slope (ft/ft)	0.002193	Area (sq ft)		46.64	
Q Total (cfs)	323.73	Flow (cfs)		323.73	
Top Width (ft)	21.75	Top Width (ft)		21.75	
Vel Total (ft/s)	6.94	Avg. Vel. (ft/s)		6.94	
Max Chl Dpth (ft)	2.94	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	6912.4	Conv. (cfs)		6912.4	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		23.14	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		1.92	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)		0.16	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT Profile #PF 7

E.G. Elev (ft)	1439.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.62	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.06	Reach Len. (ft)	150.00	150.00	150.00
Crit W.S. (ft)		Flow Area (sq ft)		36.61	
E.G. Slope (ft/ft)	0.002195	Area (sq ft)		36.61	
Q Total (cfs)	230.85	Flow (cfs)		230.85	
Top Width (ft)	19.82	Top Width (ft)		19.82	
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)		6.31	
Max Chl Dpth (ft)	2.46	Hydr. Depth (ft)		1.85	
Conv. Total (cfs)	4927.6	Conv. (cfs)		4927.6	
Length Wtd. (ft)	150.00	Wetted Per. (ft)		20.98	
Min Ch El (ft)	1436.60	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		1.51	

Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	0.13
C & E Loss (ft)	0.00	Cum SA (acres)	0.07

CROSS SECTION RIVER: South Hawes Chan
REACH: 202L/US60 TI - 2 RS: 1000

INPUT
Description: Starting Downstream Channel Section
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-9	1441.1	-4	1439.7	8	1440	38	1440.82	72	1440.2
77	1440.82	91	1440.77	100	1436.27	110	1436.27	119	1440.77
128	1441								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-9	.04	91	.016	119	.04

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
91	119	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.16	Element			
Vel Head (ft)	0.37	Wt. n-Val.		0.016	
W.S. Elev (ft)	1437.79	Reach Len. (ft)			
Crit W.S. (ft)	1437.57	Flow Area (sq ft)		19.89	
E.G. Slope (ft/ft)	0.002204	Area (sq ft)		19.89	
Q Total (cfs)	97.00	Flow (cfs)		97.00	
Top Width (ft)	16.10	Top Width (ft)		16.10	
Vel Total (ft/s)	4.88	Avg. Vel. (ft/s)		4.88	
Max Chl Dpth (ft)	1.52	Hydr. Depth (ft)		1.24	
Conv. Total (cfs)	2066.1	Conv. (cfs)		2066.1	
Length Wtd. (ft)		Wetted Per. (ft)		16.82	
Min Ch El (ft)	1436.27	Shear (lb/sq ft)		0.16	
Alpha	1.00	Stream Power (lb/ft s)		0.79	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	1438.57	Element			

Vel Head (ft)	0.45	Wt. n-Val.	0.016
W.S. Elev (ft)	1438.12	Reach Len. (ft)	
Crit W.S. (ft)	1437.87	Flow Area (sq ft)	25.27
E.G. Slope (ft/ft)	0.002202	Area (sq ft)	25.27
Q Total (cfs)	136.78	Flow (cfs)	136.78
Top Width (ft)	17.38	Top Width (ft)	17.38
Vel Total (ft/s)	5.41	Avg. Vel. (ft/s)	5.41
Max Chl Dpth (ft)	1.85	Hydr. Depth (ft)	1.45
Conv. Total (cfs)	2915.1	Conv. (cfs)	2915.1
Length Wtd. (ft)		Wetted Per. (ft)	18.25
Min Ch El (ft)	1436.27	Shear (lb/sq ft)	0.19
Alpha	1.00	Stream Power (lb/ft s)	1.03
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	1438.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.23	Reach Len. (ft)			
Crit W.S. (ft)	1437.97	Flow Area (sq ft)		27.19	
E.G. Slope (ft/ft)	0.002201	Area (sq ft)		27.19	
Q Total (cfs)	151.79	Flow (cfs)		151.79	
Top Width (ft)	17.82	Top Width (ft)		17.82	
Vel Total (ft/s)	5.58	Avg. Vel. (ft/s)		5.58	
Max Chl Dpth (ft)	1.95	Hydr. Depth (ft)		1.53	
Conv. Total (cfs)	3235.5	Conv. (cfs)		3235.5	
Length Wtd. (ft)		Wetted Per. (ft)		18.74	
Min Ch El (ft)	1436.27	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		1.11	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	1438.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.39	Reach Len. (ft)			
Crit W.S. (ft)	1438.13	Flow Area (sq ft)		30.14	
E.G. Slope (ft/ft)	0.002201	Area (sq ft)		30.14	
Q Total (cfs)	175.73	Flow (cfs)		175.73	
Top Width (ft)	18.47	Top Width (ft)		18.47	
Vel Total (ft/s)	5.83	Avg. Vel. (ft/s)		5.83	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		1.63	
Conv. Total (cfs)	3745.7	Conv. (cfs)		3745.7	
Length Wtd. (ft)		Wetted Per. (ft)		19.47	
Min Ch El (ft)	1436.27	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		1.24	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	1439.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.94	Reach Len. (ft)			
Crit W.S. (ft)	1438.66	Flow Area (sq ft)		41.00	
E.G. Slope (ft/ft)	0.002203	Area (sq ft)		41.00	
Q Total (cfs)	271.11	Flow (cfs)		271.11	
Top Width (ft)	20.69	Top Width (ft)		20.69	
Vel Total (ft/s)	6.61	Avg. Vel. (ft/s)		6.61	
Max Chl Dpth (ft)	2.67	Hydr. Depth (ft)		1.98	
Conv. Total (cfs)	5776.0	Conv. (cfs)		5776.0	
Length Wtd. (ft)		Wetted Per. (ft)		21.95	
Min Ch El (ft)	1436.27	Shear (lb/sq ft)		0.26	

Alpha	1.00	Stream Power (lb/ft s)	1.70
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.96	Element			
Vel Head (ft)	0.75	Wt. n-Val.		0.016	
W.S. Elev (ft)	1439.21	Reach Len. (ft)			
Crit W.S. (ft)	1438.92	Flow Area (sq ft)		46.58	
E.G. Slope (ft/ft)	0.002202	Area (sq ft)		46.58	
Q Total (cfs)	323.73	Flow (cfs)		323.73	
Top Width (ft)	21.74	Top Width (ft)		21.74	
Vel Total (ft/s)	6.95	Avg. Vel. (ft/s)		6.95	
Max Chl Dpth (ft)	2.94	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	6899.3	Conv. (cfs)		6899.3	
Length Wtd. (ft)		Wetted Per. (ft)		23.13	
Min Ch El (ft)	1436.27	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		1.92	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #PF 7

			Left OB	Channel	Right OB
E.G. Elev (ft)	1439.34	Element			
Vel Head (ft)	0.62	Wt. n-Val.		0.016	
W.S. Elev (ft)	1438.72	Reach Len. (ft)			
Crit W.S. (ft)	1438.45	Flow Area (sq ft)		36.57	
E.G. Slope (ft/ft)	0.002200	Area (sq ft)		36.57	
Q Total (cfs)	230.85	Flow (cfs)		230.85	
Top Width (ft)	19.81	Top Width (ft)		19.81	
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)		6.31	

Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)	1.85
Conv. Total (cfs)	4921.2	Conv. (cfs)	4921.2
Length Wtd. (ft)		Wetted Per. (ft)	20.97
Min Ch El (ft)	1436.27	Shear (lb/sq ft)	0.24
Alpha	1.00	Stream Power (lb/ft s)	1.51
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

SUMMARY OF MANNING'S N VALUES

River:Hawes Rd Channel

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1540	.04	.016	.04
202L/US60 TI - 2	1370	.04	.016	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:Southern Ave Sys

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	3490	.04	.025	.04
202L/US60 TI - 2	3365	.04	.015	.04
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	.04	.015	.04
202L/US60 TI - 2	2261	.04	.016	.04
202L/US60 TI - 2	2201	.04	.016	.04
202L/US60 TI - 2	2100	.04	.016	.04
202L/US60 TI - 2	1945	.04	.016	.04
202L/US60 TI - 2	1944	Lat. Weir		
202L/US60 TI - 2	1907	.04	.016	.04
202L/US60 TI - 2	1895	.04	.016	.04
202L/US60 TI - 2	1875	.04	.016	.04
202L/US60 TI - 2	1855	.04	.016	.04
202L/US60 TI - 2	1835	.04	.016	.04
202L/US60 TI - 2	1815	.04	.016	.04
202L/US60 TI - 2	1795	.04	.016	.04
202L/US60 TI - 2	1775	.04	.016	.04
202L/US60 TI - 2	1760	.04	.016	.04
202L/US60 TI - 2	1742	.04	.016	.04
202L/US60 TI - 2	1704	.04	.016	.04
202L/US60 TI - 2	1698	.04	.016	.04
202L/US60 TI - 2	1668	.04	.016	.04
202L/US60 TI - 2	1537	.04	.016	.04
202L/US60 TI - 2	1433	.04	.016	.04
202L/US60 TI - 2	1350	.04	.013	.04
202L/US60 TI - 2	1305	.04	.013	.04
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	.04	.015	.04
202L/US60 TI - 2	1170	.04	.016	.04

River:South Hawes Chan

Reach	River Sta.	n1	n2	n3
202L/US60 TI - 2	1170	.04	.016	.04
202L/US60 TI - 2	1150	.04	.016	.04
202L/US60 TI - 2	1000	.04	.016	.04

SUMMARY OF REACH LENGTHS

River: Hawes Rd Channel

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1540	170	170	170
202L/US60 TI - 2	1370	200	200	200
202L/US60 TI - 2	1170	20	20	20

River: Southern Ave Sys

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	3490	125	125	125
202L/US60 TI - 2	3365	983.8	983.8	983.8
202L/US60 TI - 2	3000	Culvert		
202L/US60 TI - 2	2381	120.3	120.3	120.3
202L/US60 TI - 2	2261	60	60	60
202L/US60 TI - 2	2201	101	101	101
202L/US60 TI - 2	2100	155	155	155
202L/US60 TI - 2	1945	38	38	38
202L/US60 TI - 2	1944	Lat. Weir		
202L/US60 TI - 2	1907	12	12	12
202L/US60 TI - 2	1895	20	20	20
202L/US60 TI - 2	1875	20	20	20
202L/US60 TI - 2	1855	20	20	20
202L/US60 TI - 2	1835	20	20	20
202L/US60 TI - 2	1815	20	20	20
202L/US60 TI - 2	1795	20	20	20
202L/US60 TI - 2	1775	15	15	15
202L/US60 TI - 2	1760	18	18	18
202L/US60 TI - 2	1742	38	38	38
202L/US60 TI - 2	1704	6	6	6
202L/US60 TI - 2	1698	30.3	30.3	30.3
202L/US60 TI - 2	1668	124	131.3	145
202L/US60 TI - 2	1537	103.8	103.8	103.8
202L/US60 TI - 2	1433	88	82.7	45
202L/US60 TI - 2	1350	45.4	45.4	45.4
202L/US60 TI - 2	1305	67.4	67.4	67.4
202L/US60 TI - 2	1270	Culvert		
202L/US60 TI - 2	1237	67.3	67.3	67.3
202L/US60 TI - 2	1170	20	20	20

River: South Hawes Chan

Reach	River Sta.	Left	Channel	Right
202L/US60 TI - 2	1170	20	20	20
202L/US60 TI - 2	1150	150	150	150
202L/US60 TI - 2	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Hawes Rd Channel

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1540	.1	.3
202L/US60 TI - 2	1370	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: Southern Ave Sys

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	3490	.1	.3
202L/US60 TI - 2	3365	.1	.3
202L/US60 TI - 2	3000	Culvert	
202L/US60 TI - 2	2381	.1	.3
202L/US60 TI - 2	2261	.1	.3
202L/US60 TI - 2	2201	.1	.3
202L/US60 TI - 2	2100	.1	.3
202L/US60 TI - 2	1945	.1	.3
202L/US60 TI - 2	1944	Lat. Weir	
202L/US60 TI - 2	1907	.1	.3
202L/US60 TI - 2	1895	.1	.3
202L/US60 TI - 2	1875	.1	.3
202L/US60 TI - 2	1855	.1	.3
202L/US60 TI - 2	1835	.1	.3
202L/US60 TI - 2	1815	.1	.3
202L/US60 TI - 2	1795	.1	.3
202L/US60 TI - 2	1775	.1	.3
202L/US60 TI - 2	1760	.1	.3
202L/US60 TI - 2	1742	.1	.3
202L/US60 TI - 2	1704	.1	.3
202L/US60 TI - 2	1698	.1	.3
202L/US60 TI - 2	1668	.1	.3
202L/US60 TI - 2	1537	.1	.3
202L/US60 TI - 2	1433	.1	.3
202L/US60 TI - 2	1350	.1	.3
202L/US60 TI - 2	1305	.1	.3
202L/US60 TI - 2	1270	Culvert	
202L/US60 TI - 2	1237	.1	.3
202L/US60 TI - 2	1170	.1	.3

River: South Hawes Chan

Reach	River Sta.	Contr.	Expan.
202L/US60 TI - 2	1170	.1	.3
202L/US60 TI - 2	1150	.1	.3
202L/US60 TI - 2	1000	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : RMSAweir

River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1540 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is

less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1540 Profile: PF 2
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1540 Profile: PF 3
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1370 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1370 Profile: PF 2
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1370 Profile: PF 3
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 2
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 3
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 4
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 5
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 6
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Hawes Rd Channel Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 7
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 2
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate

the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 3
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 4
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 5
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 6
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3490 Profile: PF 7
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 1 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 2 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 3 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 4 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 5 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal
depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 6 Culv:

Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 3000 Profile: PF 7 Culv: Culvert #1
Note: During supercritical analysis, the culvert direct step method went to normal depth. The program then assumed normal depth at the outlet.
Note: The flow in the culvert is entirely supercritical.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 1
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 2
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 3
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 4
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 5
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 6
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2261 Profile: PF 7
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2201 Profile: PF 4
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2201 Profile: PF 5
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2201 Profile: PF 6
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2201 Profile: PF 7

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2100 Profile: PF 5

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2100 Profile: PF 6

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 2100 Profile: PF 7

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 2

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 3

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 4

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 5

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 6

Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set

equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1945 Profile: PF 7
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 5
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 6
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1907 Profile: PF 7
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1895 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1895 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1895 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1895 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1875 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed

water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1875 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1875 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1875 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1855 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1855 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1855 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1855 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1855 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1855 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1835 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1835 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1835 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1835 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1835 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1835 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1815 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1815 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1815 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1815 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1815 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1815 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1795 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1795 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1795 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1795 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1795 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1795 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1775 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1775 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1775 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1775 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1775 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1775 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1760 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1760 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1760 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1760 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1760 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1760 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 2
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 3
Warning:The cross-section end points had to be extended vertically for the computed

water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 4
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 5
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 6
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1742 Profile: PF 7
Warning:The cross-section end points had to be extended vertically for the computed water surface.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 2
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 3
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 4
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 5
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 6
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1698 Profile: PF 7
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 2
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 3

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 4
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 5
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 6
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1350 Profile: PF 7
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 1
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 2
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 3
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 4
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 5
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 6
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.
River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1237 Profile: PF 7
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth
for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The
program defaulted to critical depth.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 3

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 5

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 6

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

River: Southern Ave Sys Reach: 202L/US60 TI - 2 RS: 1170 Profile: PF 7

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

APPENDIX B

ON-SITE DRAINAGE CALCULATIONS

HYDROLOGIC CALCULATIONS

US 60 MAINLINE

POWER ROAD TO SOSSAMAN ROAD

US 60

EASTBOUND LANES

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

US60 - Power Road to Sossaman Road
Eastbound Lanes

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
146	CB146	1.53	0.85	5.15	6.70	Existing CB	0.80	7.50
144	CB144	0.85	0.87	5.15	3.81	CB146	0.56	4.37
128	CB128	1.40	0.89	5.15	6.42	CB144	0.20	6.62
134	CB134	0.76	0.91	5.15	3.59	CB128 & 130	0.89	4.48
140	CB140	0.74	0.90	5.15	3.43	CB134	0.19	3.62
124	CB124	0.80	0.88	5.15	3.63	CB140	0.45	4.08
126	CB126	0.80	0.87	5.15	3.55	CB124	0.61	4.16
122	CB122	1.59	0.86	5.15	7.06	CB126	0.14	7.20
120	CB120	1.83	0.87	5.15	8.20	CB122	0.37	8.57
118	CB118	1.32	0.89	5.15	6.05	CB120	0.66	6.71
116	CB116	0.77	0.95	5.15	3.75	CB118	0.63	4.38
114	CB114	0.44	0.95	5.15	2.14	CB116	0.42	2.56
112	CB112	0.34	0.95	5.15	1.66	CB114	0.30	1.96
111	CB111	0.33	0.95	5.15	1.63	CB112	0.13	1.76
108	CB108	1.39	0.90	5.15	6.41			6.41
104	CB104	1.24	0.856	5.15	5.46	CB108	0.704	6.16

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

CB 146

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 146

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0152
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.500
T	Width of Spread (ft)		13.28

Gutter Flow

Eo	Gutter Flow Ratio	0.520
d	Depth of Flow (ft)	0.38
V	Average Velocity (ft/sec)	3.93

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	25.31	10.05	0.60	4.484	3.016
Parallel Bar P-1-7/8	3.00	1.72	0.82	2.458	0.558
Combination			0.93	6.942	0.558

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 144

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0101
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.355
T	Width of Spread (ft)		11.46

Gutter Flow

Eo	Gutter Flow Ratio	0.590
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	2.98

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.92	6.70	0.60	2.598	1.757
Parallel Bar P-1-7/8	3.00	1.72	0.88	1.554	0.203
Combination			0.95	4.152	0.203

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 128

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0039
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.632
T	Width of Spread (ft)		16.75

Gutter Flow

Eo	Gutter Flow Ratio	0.420
d	Depth of Flow (ft)	0.45
V	Average Velocity (ft/sec)	2.25

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.37	6.70	0.58	3.874	2.758
Parallel Bar P-1-7/8	3.00	1.72	0.72	1.978	0.780
Combination			0.88	5.852	0.780

CB 134

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0050
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.480
T	Width of Spread (ft)		13.51

Gutter Flow

Eo	Gutter Flow Ratio	0.512
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	2.27

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.69	6.70	0.67	2.983	1.497
Parallel Bar P-1-7/8	3.00	1.72	0.86	1.284	0.213
Combination			0.95	4.267	0.213

CB
14C

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 140

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0038
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.618
T	Width of Spread (ft)		13.08

Gutter Flow

Eo	Gutter Flow Ratio	0.527
d	Depth of Flow (ft)	0.38
V	Average Velocity (ft/sec)	1.95

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.23	3.35	0.44	1.585	2.033
Parallel Bar P-1-7/8	3.00	1.72	0.78	1.579	0.454
Combination			0.87	3.164	0.454

CB 124

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 124

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0052
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.098
T	Width of Spread (ft)		12.90

Gutter Flow

Eo	Gutter Flow Ratio	0.534
d	Depth of Flow (ft)	0.38
V	Average Velocity (ft/sec)	2.26

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.08	3.35	0.39	1.585	2.513
Parallel Bar P-1-7/8	3.00	1.72	0.76	1.902	0.611
Combination			0.85	3.487	0.611

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 126

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0041
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.160
T	Width of Spread (ft)		13.66

Gutter Flow

Eo	Gutter Flow Ratio	0.507
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	2.07

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	13.47	6.70	0.71	2.954	1.206
Parallel Bar P-1-7/8	3.00	1.72	0.88	1.064	0.142
Combination			0.97	4.018	0.142

CB 122

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 122

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0053
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.199
T	Width of Spread (ft)		16.27

Gutter Flow

Eo	Gutter Flow Ratio	0.432
d	Depth of Flow (ft)	0.44
V	Average Velocity (ft/sec)	2.58

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.50	10.05	0.73	5.244	1.955
Parallel Bar P-1-7/8	3.00	1.72	0.81	1.582	0.374
Combination			0.95	6.825	0.374

CB 120

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 120

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0043
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		8.566
T	Width of Spread (ft)		18.22

Gutter Flow

Eo	Gutter Flow Ratio	0.388
d	Depth of Flow (ft)	0.48
V	Average Velocity (ft/sec)	2.47

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.52	10.05	0.70	6.015	2.551
Parallel Bar P-1-7/8	3.00	1.72	0.74	1.887	0.664
Combination			0.92	7.902	0.664

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 118

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0055
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.709
T	Width of Spread (ft)		15.64

Gutter Flow

Eo	Gutter Flow Ratio	0.650
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	2.56

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	22.10	10.05	0.66	4.457	2.252
Parallel Bar P-1-7/8	3.00	1.72	0.72	1.628	0.625
Combination			0.91	6.084	0.625

CB 116

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 116

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0045
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.376
T	Width of Spread (ft)		13.58

Gutter Flow

Eo	Gutter Flow Ratio	0.716
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	2.17

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.84	6.70	0.60	2.620	1.756
Parallel Bar P-1-7/8	3.00	1.72	0.76	1.335	0.422
Combination			0.90	3.954	0.422

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 114

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0043
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.561
T	Width of Spread (ft)		10.82

Gutter Flow

Eo	Gutter Flow Ratio	0.819
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	1.91

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.66	3.35	0.42	1.088	1.473
Parallel Bar P-1-7/8	3.00	1.72	0.79	1.169	0.305
Combination			0.88	2.256	0.305

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 112

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0059
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.957
T	Width of Spread (ft)		8.84

Gutter Flow

Eo	Gutter Flow Ratio	0.899
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	2.05

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.03	3.35	0.44	0.870	1.087
Parallel Bar P-1-7/8	3.00	1.72	0.88	0.959	0.129
Combination			0.93	1.828	0.129

CB 111

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 111

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0066
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.755
T	Width of Spread (ft)		8.14

Gutter Flow

Eo	Gutter Flow Ratio	0.925
d	Depth of Flow (ft)	0.24
V	Average Velocity (ft/sec)	2.10

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	11.76	3.35	0.45	0.795	0.960
Parallel Bar P-1-7/8	3.00	1.72	0.91	0.878	0.082
Combination			0.95	1.673	0.082

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 108

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0038
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.411
T	Width of Spread (ft)		16.61

Gutter Flow

Eo	Gutter Flow Ratio	0.424
d	Depth of Flow (ft)	0.45
V	Average Velocity (ft/sec)	2.21

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.94	6.70	0.60	3.821	2.590
Parallel Bar P-1-7/8	3.00	1.72	0.73	1.886	0.704
Combination			0.89	5.707	0.704

CB 104

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 104

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0022
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.164
T	Width of Spread (ft)		18.27

Gutter Flow

Eo	Gutter Flow Ratio	0.387
d	Depth of Flow (ft)	0.48
V	Average Velocity (ft/sec)	1.77

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.63	6.70	0.67	4.118	2.046
Parallel Bar P-1-7/8	3.00	1.72	0.74	1.520	0.527
Combination			0.91	5.637	0.527

US 60

WESTBOUND LANES

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

US60 - Power Road to Sossaman Road
Westbound Lanes

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
195	CB195	1.22	0.86	5.15	5.40	Exst CB	0.85	6.25
194	CB194	1.00	0.86	5.15	4.43	CB195	0.66	5.09
192	CB192	0.92	0.87	5.15	4.12	CB194	0.36	4.48
190	CB190	1.49	0.90	5.15	6.93	CB192	0.23	7.16
184	CB184	0.57	0.85	5.15	2.48	CB180	0.11	2.60
178	CB178	1.90	0.85	5.15	8.28	CB184	0.16	8.44
174	CB174	2.24	0.86	5.15	9.93	CB178	0.63	10.56
170	CB170	1.78	0.85	5.15	7.78	CB174	1.30	9.08
168	CB168	1.52	0.85	5.15	6.66	CB170	0.71	7.37
166	CB166	1.15	0.88	5.15	5.22	CB168	0.77	5.99
164	CB164	1.25	0.87	5.15	5.57	CB166	0.61	6.19
160	CB160	1.33	0.89	5.15	6.06			6.06
156	CB156	1.23	0.86	5.15	5.45	CB160	0.63	6.08

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

CB 195

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 195

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0203
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.250
T	Width of Spread (ft)		11.52

Gutter Flow

Eo	Gutter Flow Ratio	0.587
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	4.24

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	24.32	6.70	0.44	2.751	3.499
Parallel Bar P-1-7/8	3.00	1.72	0.81	2.841	0.658
Combination			0.89	5.592	0.658

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 194

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0153
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.098
T	Width of Spread (ft)		11.21

Gutter Flow

Eo	Gutter Flow Ratio	0.600
d	Depth of Flow (ft)	0.34
V	Average Velocity (ft/sec)	3.63

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.31	6.70	0.51	2.617	2.481
Parallel Bar P-1-7/8	3.00	1.72	0.86	2.122	0.359
Combination			0.93	4.739	0.359

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 192

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0090
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.484
T	Width of Spread (ft)		11.91

Gutter Flow

Eo	Gutter Flow Ratio	0.571
d	Depth of Flow (ft)	0.36
V	Average Velocity (ft/sec)	2.87

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.76	6.70	0.60	2.694	1.790
Parallel Bar P-1-7/8	3.00	1.72	0.87	1.560	0.230
Combination			0.95	4.254	0.230

CB 190

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 190

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0013
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.163
T	Width of Spread (ft)		21.54

Gutter Flow

Eo	Gutter Flow Ratio	0.329
d	Depth of Flow (ft)	0.55
V	Average Velocity (ft/sec)	1.50

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.09	6.70	0.69	4.922	2.241
Parallel Bar P-1-7/8	3.00	1.72	0.71	1.585	0.657
Combination			0.91	6.506	0.657

CB 184

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/29/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 184

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0050
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.604
T	Width of Spread (ft)		10.65

Gutter Flow

Eo	Gutter Flow Ratio	0.625
d	Depth of Flow (ft)	0.33
V	Average Velocity (ft/sec)	2.03

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	10.77	3.35	0.49	1.273	1.331
Parallel Bar P-1-7/8	3.00	1.72	0.88	1.170	0.161
Combination			0.94	2.443	0.161

CB 178

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/29/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 178

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0044
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		8.441
T	Width of Spread (ft)		18.03

Gutter Flow

Eo	Gutter Flow Ratio	0.392
d	Depth of Flow (ft)	0.48
V	Average Velocity (ft/sec)	2.48

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.46	10.05	0.70	5.941	2.500
Parallel Bar P-1-7/8	3.00	1.72	0.75	1.864	0.636
Combination			0.92	7.805	0.636

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 174

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0045
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		10.560
T	Width of Spread (ft)		19.64

Gutter Flow

Eo	Gutter Flow Ratio	0.361
d	Depth of Flow (ft)	0.51
V	Average Velocity (ft/sec)	2.64

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	23.31	10.05	0.64	6.734	3.826
Parallel Bar P-1-7/8	3.00	1.72	0.66	2.529	1.297
Combination			0.88	9.263	1.297

CB 170

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 170

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0035
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		9.103
T	Width of Spread (ft)		19.87

Gutter Flow

Eo	Gutter Flow Ratio	0.321
d	Depth of Flow (ft)	0.44
V	Average Velocity (ft/sec)	2.27

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	24.36	13.40	0.76	6.941	2.162
Parallel Bar P-1-7/8	3.00	1.72	0.67	1.457	0.705
Combination			0.92	8.398	0.705

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 168

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0045
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.371
T	Width of Spread (ft)		16.94

Gutter Flow

Eo	Gutter Flow Ratio	0.612
d	Depth of Flow (ft)	0.42
V	Average Velocity (ft/sec)	2.42

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	22.06	10.05	0.67	4.904	2.467
Parallel Bar P-1-7/8	3.00	1.72	0.69	1.701	0.767
Combination			0.90	6.604	0.767

CB 166

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 166

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0055
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.991
T	Width of Spread (ft)		14.97

Gutter Flow

Eo	Gutter Flow Ratio	0.467
d	Depth of Flow (ft)	0.42
V	Average Velocity (ft/sec)	2.51

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.72	6.70	0.57	3.443	2.548
Parallel Bar P-1-7/8	3.00	1.72	0.76	1.933	0.615
Combination			0.90	5.376	0.615

CB 164

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 164

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0085
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.199
T	Width of Spread (ft)		13.86

Gutter Flow

Eo	Gutter Flow Ratio	0.501
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	3.00

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.92	6.70	0.52	3.235	2.964
Parallel Bar P-1-7/8	3.00	1.72	0.76	2.263	0.701
Combination			0.89	5.498	0.701

CB 160

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 160

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0052
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.056
T	Width of Spread (ft)		15.21

Gutter Flow

Eo	Gutter Flow Ratio	0.460
d	Depth of Flow (ft)	0.42
V	Average Velocity (ft/sec)	2.46

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.60	6.70	0.58	3.499	2.557
Parallel Bar P-1-7/8	3.00	1.72	0.75	1.927	0.630
Combination			0.90	5.426	0.630

CB 156

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 156

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0010
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		0.00
Q	Discharge (cfs)		6.076
T	Width of Spread (ft)		21.20

Gutter Flow

Eo	Gutter Flow Ratio	0.512
d	Depth of Flow (ft)	0.50
V	Average Velocity (ft/sec)	1.30

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.22	6.70	0.62	3.748	2.328
Parallel Bar P-1-7/8	3.00	1.72	0.65	1.523	0.805
Combination			0.87	5.271	0.805

POWER ROAD

RAMP C & D

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Power Road Ramp C

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
7	CB7	0.97	0.88	4.22	3.60			3.60
7	CB7	0.97	0.88	5.15	4.40			4.40
8	CB8	0.85	0.82	4.22	2.94	CB7	0.16	3.10
8	CB8	0.85	0.82	5.15	3.59	CB7	0.49	4.08
9	CB9	1.10	0.88	5.15	4.99	CB164	0.70	5.69
11	CB11	0.44	0.85	5.15	1.93	CB9 & CB8	0.78	2.71

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage basins.

CB 7

10-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 7 - 10 year

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0238
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.136
T	Width of Spread (ft)		7.96

Gutter Flow

Eo	Gutter Flow Ratio	0.765
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	4.02

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.00	3.35	0.33	1.023	2.113
Parallel Bar P-1-7/8	3.00	1.72	0.92	1.949	0.163
Combination			0.95	2.973	0.163

5'-18"φ SLOTTED DRAIN.

CB 7
25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 7 - 25 year

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0238
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.384
T	Width of Spread (ft)		9.45

Gutter Flow

Eo	Gutter Flow Ratio	0.684
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	4.22

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.58	3.35	0.27	1.200	3.184
Parallel Bar P-1-7/8	3.00	1.72	0.85	2.697	0.487
Combination			0.89	3.897	0.487

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

CB/B
10-yr

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 8 - 10 year

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0238
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.087
T	Width of Spread (ft)		7.89

Gutter Flow

Eo	Gutter Flow Ratio	0.769
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	4.01

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.85	3.35	0.33	1.016	2.071
Parallel Bar P-1-7/8	3.00	1.72	0.93	1.918	0.154
Combination			0.95	2.933	0.154

5' 19" SLOTTED DRAIN

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

CB 8

25-yr

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 8 - 25 year

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0238
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.569
T	Width of Spread (ft)		8.50

Gutter Flow

Eo	Gutter Flow Ratio	0.734
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	4.10

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.29	3.35	0.31	1.090	2.479
Parallel Bar P-1-7/8	3.00	1.72	0.90	2.219	0.260
Combination			0.93	3.309	0.260

CB 9

25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 9

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.751
T	Width of Spread (ft)		14.48

Gutter Flow

Eo	Gutter Flow Ratio	0.686
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	2.09

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.07	6.70	0.59	2.813	1.938
Parallel Bar P-1-7/8	3.00	1.72	0.73	1.416	0.521
Combination			0.89	4.230	0.521

10'- 15" ϕ SLOTTED DRAIN

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

CB 11

25-ye

Inlets on Sag
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 11 - 25 year from east

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite/Dep
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	7.38
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.223
d_curb	Depth at Curb (ft)	0.348
Qi	Intercepted Flow (cfs)	2.440

CB 11 25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 11 - 25 year from ramp

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0670
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	5.08
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.177
d_curb	Depth at Curb (ft)	0.302
Qi	Intercepted Flow (cfs)	1.720

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 04/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 11 - 25 year combo

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	8.16
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.239
d_curb	Depth at Curb (ft)	0.364
Qi	Intercepted Flow (cfs)	2.700

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Power Road Ramp D

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
110	CB110	1.19	0.83	4.22	4.19			4.19
110	CB110	1.19	0.83	5.15	5.11			5.11
12	CB12	0.25	0.95	4.22	1.00	CB110	0.45	1.45
12	CB12	0.25	0.95	5.15	1.22	CB110	0.76	1.98
13	CB13	0.38	0.95	5.15	1.86	CB14 & CB12	0.17	2.03
14	CB14	0.36	0.95	5.15	1.74	CB111	0.08	1.82

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage basins.

CB 110

large

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0220
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.190
T	Width of Spread (ft)		9.43

Gutter Flow

Eo	Gutter Flow Ratio	0.684
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	4.05

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.75	3.35	0.28	1.191	2.999
Parallel Bar P-1-7/8	3.00	1.72	0.85	2.550	0.448
Combination			0.89	3.742	0.448

5'-18"ø SLOTTED DRAIN

CB 110

25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0220
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.110
T	Width of Spread (ft)		10.34

Gutter Flow

Eo	Gutter Flow Ratio	0.639
d	Depth of Flow (ft)	0.32
V	Average Velocity (ft/sec)	4.20

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	22.12	3.35	0.26	1.308	3.802
Parallel Bar P-1-7/8	3.00	1.72	0.80	3.047	0.755
Combination			0.85	4.355	0.755

CB 112

10-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.450
T	Width of Spread (ft)		5.35

Gutter Flow

Eo	Gutter Flow Ratio	0.997
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	3.16

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.71	3.35	0.37	0.539	0.911
Parallel Bar P-1-7/8	3.00	1.72	0.97	0.882	0.028
Combination			0.98	1.422	0.028

5'-18" ϕ SLOTTED DRAIN

CB 112

ZS-4C

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.980
T	Width of Spread (ft)		6.44

Gutter Flow

Eo	Gutter Flow Ratio	0.978
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	3.37

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.89	3.35	0.33	0.650	1.330
Parallel Bar P-1-7/8	3.00	1.72	0.95	1.260	0.069
Combination			0.96	1.911	0.069

CB 13

25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			L. Depression
	Cross Slope		
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)		4.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	10.02
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.197
d_curb	Depth at Curb (ft)	0.284
Qi	Intercepted Flow (cfs)	2.030

CB 14

25-4R

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 14

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0050
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.824
T	Width of Spread (ft)		8.89

Gutter Flow

Eo	Gutter Flow Ratio	0.896
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	1.89

o

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	11.12	3.35	0.48	0.867	0.957
Parallel Bar P-1-7/8	3.00	1.72	0.89	0.854	0.102
Combination			0.94	1.722	0.102

SOSSAMAN ROAD

RAMPS A & B

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Sossaman Road Ramp A

Drainage Area	Catch Basin Designation	Contributing Area[1] (acres)	Runoff Coefficient C	Rainfall Intensity I (in/hr)	Peak Flow Q (cfs)	Catch Basin Bypass Flow	Bypass Flow Q_{bypass} (cfs)	Total Flow Q_{total} (cfs)
19	CB19	1.28	0.83	5.15	5.47			5.47
18	CB18	0.71	0.78	5.15	2.85	CB19	0.77	3.62
17	CB17	0.55	0.77	5.15	2.20	CB18	0.30	2.51
188	CB188	0.87	0.86	5.15	3.85	CB17 & CB190	0.79	4.64
180	CB180	0.53	0.85	5.15	2.32	CB188	0.01	2.33

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage basins.

CB 19

25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/28/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 19

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0334
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.502
T	Width of Spread (ft)		9.71

Gutter Flow

Eo	Gutter Flow Ratio	0.670
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	5.05

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	25.28	3.35	0.23	1.242	4.260
Parallel Bar P-1-7/8	3.00	1.72	0.82	3.494	0.766
Combination			0.86	4.736	0.766

5' 18" Φ SLOTTED DRAIN

CB 18

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/28/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 18

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0190
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.602
T	Width of Spread (ft)		9.08

Gutter Flow

Eo	Gutter Flow Ratio	0.703
d	Depth of Flow (ft)	0.30
V	Average Velocity (ft/sec)	3.71

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.49	3.35	0.32	1.145	2.457
Parallel Bar P-1-7/8	3.00	1.72	0.88	2.154	0.303
Combination			0.92	3.299	0.303

5'-18"Φ SLOTTED DRAIN

CB 17

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/28/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB
CB 17

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0068
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.506
T	Width of Spread (ft)		9.75

Gutter Flow

Eo	Gutter Flow Ratio	0.668
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	2.28

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	11.29	3.35	0.47	1.176	1.330
Parallel Bar P-1-7/8	3.00	1.72	0.90	1.200	0.130
Combination			0.95	2.376	0.130

5'-18"Ø SLOTTED DRAIN

CB 188

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 07/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB

Project Description

CB 188

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0050
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.651
T	Width of Spread (ft)		13.73

Gutter Flow

Eo	Gutter Flow Ratio	0.505
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	2.29

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.01	10.05	0.86	4.017	0.634
Parallel Bar P-1-7/8	3.00	1.72	0.98	0.621	0.012
Combination			1.00	4.639	0.012

15'-18"Φ SLOTTED DRAIN

CB 180

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 07/26/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - Ph II - 95% Submittal
Computed by :TGB

Project Description

CB 180

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0033
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.336
T	Width of Spread (ft)		11.14

Gutter Flow

Eo	Gutter Flow Ratio	0.603
d	Depth of Flow (ft)	0.34
V	Average Velocity (ft/sec)	1.68

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	9.22	3.35	0.56	1.300	1.036
Parallel Bar P-1-7/8	3.00	1.72	0.89	0.926	0.111
Combination			0.95	2.225	0.111

5' - 18"ϕ SLOTTED DRAIN

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Sossaman Road Ramp B

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
20	CB20	1.90	0.81	4.22	6.49			6.49
20	CB20	1.90	0.95	5.15	9.30			9.30
130	CB130	0.84	0.82	4.22	2.91	CB20	1.08	3.99
130	CB130	0.84	0.82	5.15	3.55	CB20	2.28	5.83

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage basins.

CB 20
10-y

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/04/2004

Project No. :AZ 01107
Project Name.:Super Red Tan TI - 95% Submittal
Computed by :TGB

Project Description

CB 20 - 10 year-

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0400
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.507
T	Width of Spread (ft)		10.06

Gutter Flow

Eo	Gutter Flow Ratio	0.653
d	Depth of Flow (ft)	0.32
V	Average Velocity (ft/sec)	5.61

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	28.97	3.35	0.20	1.291	5.216
Parallel Bar P-1-7/8	3.00	1.72	0.79	4.140	1.076
Combination			0.83	5.431	1.076

CB 20

25-yk

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0400
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		9.300
T	Width of Spread (ft)		11.83

Gutter Flow

Eo	Gutter Flow Ratio	0.574
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	6.02

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	35.62	3.35	0.16	1.515	7.785
Parallel Bar P-1-7/8	3.00	1.72	0.71	5.501	2.284
Combination			0.75	7.016	2.284

CB 130

10-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0037
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.990
T	Width of Spread (ft)		13.72

Gutter Flow

Eo	Gutter Flow Ratio	0.505
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	1.97

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.88	13.40	1.00	3.990	0.000
Parallel Bar P-1-7/8	0.30	1.72	0.00	0.000	0.000
Combination			1.00	3.990	0.000

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0037
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	2.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	5.830
T	Width of Spread	(ft)	16.07

Gutter Flow

Eo	Gutter Flow Ratio		0.437
d	Depth of Flow	(ft)	0.44
V	Average Velocity	(ft/sec)	2.14

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.98	13.40	0.96	5.611	0.219
Parallel Bar P-1-7/8	0.30	1.72	0.51	0.113	0.106
Combination			0.98	5.724	0.106

US 60

ELLSWORTH ROAD TO CRISMON ROAD

US 60

EASTBOUND LANES

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

US60 Ellsworth Road to Crismo Road
Eastbound Lanes

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
437	CB437	1.52	0.95	5.15	7.47			7.47
434	CB434	1.21	0.95	5.15	5.92	CB437	0.16	6.08
435	CB435	0.97	0.95	5.15	4.73	CB434	0.82	5.55
432	CB432	1.06	0.95	5.15	5.18	CB435	0.32	5.50
430	CB430	0.83	0.95	5.15	4.07	CB432	0.82	4.89
428	CB428	0.76	0.95	5.15	3.72	CB430	0.57	4.29
426	CB426	0.61	0.95	5.15	3.00	CB428	0.33	3.33
424	CB424	0.81	0.95	5.15	3.97	CB426	0.42	4.38
422	CB422	0.79	0.95	5.15	3.86	CB424	0.25	4.11
420	CB420	0.40	0.95	5.15	1.96	CB422	0.24	2.19
418	CB418	0.49	0.95	5.15	2.41	CB420	0.08	2.49
416	CB416	0.37	0.95	5.15	1.83	CB418	0.11	1.94
408	CB408	1.38	0.95	5.15	6.75			6.75
404	CB404	1.21	0.95	5.15	5.91	CB408	0.81	6.71
406	CB406	0.69	0.95	5.15	3.39	CB404	0.37	3.75
680	CB680	2.29	0.85	5.15	10.02	CB406	0.13	10.15
634	CB634	1.69	0.82	5.15	7.12	CB680		7.12

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

Exist CB/319
PhI

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/15/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description

CB #

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.270
T	Width of Spread (ft)		13.88

Gutter Flow

Eo	Gutter Flow Ratio	0.500
d	Depth of Flow (ft)	0.40
V	Average Velocity (ft/sec)	2.06

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.632
Qi	Intercepted Flow (cfs)	2.697
Qb	By-pass Flow (cfs)	1.573

Exist
CB/319 PhI

997+45
C-15.91
no slotted.

CB/634

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/15/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description

CB #

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.120
T	Width of Spread (ft)		17.16

Gutter Flow

Eo	Gutter Flow Ratio	0.411
d	Depth of Flow (ft)	0.46
V	Average Velocity (ft/sec)	2.30

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.18	6.70	0.56	4.007	3.113
Parallel Bar P-1-7/8	3.00	1.72	0.69	2.162	0.951
Combination			0.87	6.169	0.951

CB/634

1000+00 EB

C-15.91

10' slotted.

CB 689

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0037
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		10.150
T	Width of Spread (ft)		20.10 ← TAU = 22'-0"

Gutter Flow

Eo	Gutter Flow Ratio		0.352
d	Depth of Flow (ft)		0.52 ≈ dAU = 0.5 - OK! use
V	Average Velocity (ft/sec)		2.42

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	21.80	16.75	0.93	9.421	0.729
Parallel Bar P-1-7/8	2.00	1.72	0.84	0.611	0.119
Combination			0.99	10.031	0.119

25' - 19" SLOTTED DRAIN

CB/40a

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/20/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by : VMW

Project Description

CB # 406

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0112
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.037
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.751
T	Width of Spread (ft)		15.06

Gutter Flow

Eo	Gutter Flow Ratio	0.465
d	Depth of Flow (ft)	0.42
V	Average Velocity (ft/sec)	1.55

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	10.92	6.70	0.82	3.074	0.677
Parallel Bar P-1-7/8	2.00	1.72	0.81	0.550	0.128
Combination			0.97	3.623	0.128

CB/406
Sta. 1022+30.2
C-15.92
10' Slotted.

CB/404

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/20/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by : VMW

Project Description

CB # 404

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0159
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.708
T	Width of Spread (ft)		12.54

Gutter Flow

Eo	Gutter Flow Ratio	0.547
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	3.90

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	23.98	10.05	0.62	4.185	2.523
Parallel Bar P-1-7/8	3.00	1.72	0.86	2.159	0.365
Combination			0.95	6.343	0.365

CB/404
Sta 1025+00
C-15.91
15' slotted.

CB/408

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/20/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by : VMW

Project Description

CB # 408

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0228
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.748
T	Width of Spread (ft)		11.62

Gutter Flow

Eo	Gutter Flow Ratio	0.583
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	4.51

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	26.08	6.70	0.41	2.794	3.954
Parallel Bar P-1-7/8	3.00	1.72	0.80	3.146	0.808
Combination			0.88	5.940	0.808

CB/408
Sta. 1029+86.41
C- 15.91
10' slotted.

CB/A16

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0084
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.942
T	Width of Spread (ft)		8.06

Gutter Flow

Eo	Gutter Flow Ratio	0.928
d	Depth of Flow (ft)	0.24
V	Average Velocity (ft/sec)	2.36

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	13.17	3.35	0.41	0.797	1.145
Parallel Bar P-1-7/8	2.00	1.72	0.75	0.855	0.290
Combination			0.85	1.652	0.290

CB418

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0059
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	4.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	2.425
T	Width of Spread	(ft)	9.80

Gutter Flow

Eo	Gutter Flow Ratio		0.860
d	Depth of Flow	(ft)	0.27
V	Average Velocity	(ft/sec)	2.14

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	13.37	6.70	0.71	1.731	0.694
Parallel Bar P-1-7/8	2.00	1.72	0.84	0.582	0.112
Combination			0.95	2.313	0.112

CB
420

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/30/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0049
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.197
T	Width of Spread (ft)		9.78

Gutter Flow

Eo	Gutter Flow Ratio	0.861
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	1.95

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.13	6.70	0.76	1.680	0.517
Parallel Bar P-1-7/8	2.00	1.72	0.84	0.436	0.081
Combination			0.96	2.116	0.081

CB
422

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/30/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0076
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.107
T	Width of Spread (ft)		11.78

Gutter Flow

Eo	Gutter Flow Ratio	0.782
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	2.63

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.62	10.05	0.75	3.090	1.017
Parallel Bar P-1-7/8	2.00	1.72	0.77	0.779	0.237
Combination			0.94	3.870	0.237

CB/424

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB # ~~426~~ 424

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0055
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.385
T	Width of Spread (ft)		13.02

Gutter Flow

Eo	Gutter Flow Ratio	0.736
d	Depth of Flow (ft)	0.34
V	Average Velocity (ft/sec)	2.35

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.74	10.05	0.78	3.411	0.974
Parallel Bar P-1-7/8	2.00	1.72	0.75	0.727	0.247
Combination			0.94	4.138	0.247

CB/426

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB # 426

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0092
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.327
T	Width of Spread (ft)		10.25

Gutter Flow

Eo	Gutter Flow Ratio	0.842
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	2.72

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.58	6.70	0.58	1.924	1.403
Parallel Bar P-1-7/8	2.00	1.72	0.70	0.988	0.415
Combination			0.88	2.912	0.415

CB/428

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB # 428

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0098
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.287
T	Width of Spread (ft)		11.34

Gutter Flow

Eo	Gutter Flow Ratio	0.799
d	Depth of Flow (ft)	0.30
V	Average Velocity (ft/sec)	2.94

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.31	10.05	0.71	3.033	1.254
Parallel Bar P-1-7/8	2.00	1.72	0.74	0.927	0.327
Combination			0.92	3.960	0.327

CB/430

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB # ~~436~~ 430

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0130
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.890
T	Width of Spread (ft)		11.29

Gutter Flow

Eo	Gutter Flow Ratio	0.801
d	Depth of Flow (ft)	0.30
V	Average Velocity (ft/sec)	3.38

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	23.35	10.05	0.64	3.115	1.775
Parallel Bar P-1-7/8	2.00	1.72	0.68	1.209	0.567
Combination			0.88	4.323	0.567

CB/432

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. : AZ01107
Project Name. : Loop 202/US 60 T.I.
Computed by : VMW

Inlets on Grade: Slotted Drain and Grate Inlet

CB# 432 Roadway and Discharge Data

			Composite
·	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0155
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.500
T	Width of Spread (ft)		11.45

Gutter Flow

Eo	Gutter Flow Ratio	0.795
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	3.71

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	25.92	10.05	0.59	3.225	2.275
Parallel Bar P-1-7/8	2.00	1.72	0.64	1.452	0.823
Combination			0.85	4.677	0.823

CB/435
CRISMON & RAMP 'B'

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. : AZ01107
Project Name.: Loop202/US60T.I.
Computed by : VMW

Inlets on Grade: Slotted Drain and Grate Inlet

CB#435 Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0110
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.550
T	Width of Spread (ft)		12.40

Gutter Flow

Eo	Gutter Flow Ratio	0.759
d	Depth of Flow (ft)	0.32
V	Average Velocity (ft/sec)	3.25

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	23.86	13.34	0.77	4.279	1.271
Parallel Bar P-1-7/8	2.00	1.72	0.75	0.952	0.320
Combination			0.94	5.230	0.320

CB/434

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. : AZ01107
Project Name.: Loop 202/US 60 T.I.
Computed by : VMW

Inlets on Grade: Slotted Drain and Grate Inlet

CB#434 Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.075
T	Width of Spread (ft)		12.44

Gutter Flow

Eo	Gutter Flow Ratio	0.452
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	3.92

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	35.11	13.34	0.58	3.505	2.570
Parallel Bar P-1-7/8	3.00	1.72	0.68	1.753	0.817
Combination			0.87	5.258	0.817

CB/437

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 05/19/2004

Project No. : AZ01107
Project Name.: Loop 202/US 60 T.I.
Computed by : VMW

Inlets on Grade: Slotted Drain and Grate Inlet

CB# 437 Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0128
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.467
T	Width of Spread (ft)		13.65

Gutter Flow

Eo	Gutter Flow Ratio	0.714
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	3.67

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	28.88	20.10	0.88	6.591	0.876
Parallel Bar P-1-7/8	2.00	1.72	0.82	0.714	0.162
Combination			0.98	7.305	0.162

CB/437
US-60 1070+50
C – 15.92
30' slotted

US 60

WESTBOUND LANES

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

US60 Ellsworth Road to Crismon Road
Westbound Lanes

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
474	CB474	1.05	0.95	5.15	5.12			5.12
469	CB469	0.63	0.95	5.15	3.10	CB474	0.76	3.85
472	CB472	0.85	0.95	5.15	4.17	CB469	0.41	4.58
467	CB467	0.88	0.95	5.15	4.30	CB470	0.28	4.58
463	CB463	0.74	0.95	5.15	3.62	CB466	0.65	4.27
459	CB459	0.72	0.95	5.15	3.53	CB464	0.51	4.04
457	CB457	0.56	0.95	5.15	2.72	CB462	0.40	3.12
458	CB458	0.50	0.95	5.15	2.45	CB460	0.37	2.82
482	CB482	0.50	0.95	5.15	2.44	CB458	0.31	2.75
456	CB456	0.50	0.95	5.15	2.44	CB482	0.30	2.74
454	CB454	0.36	0.95	5.15	1.78	CB456	0.29	2.07
450	CB450	0.54	0.95	5.15	2.64	CB454	0.13	2.77
448	CB448	0.28	0.95	5.15	1.39	CB450	0.33	1.72
442	CB442	1.93	0.88	5.15	8.72			8.72
440	CB440	1.65	0.83	5.15	7.03	CB442	0.91	7.94
438	CB438	1.16	0.84	5.15	5.03	CB440	1.25	6.28
678	CB678	0.87	0.88	5.15	3.98			3.98
677	CB677	1.83	0.81	5.15	7.61	CB678	0.11	7.72

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

Exist CB
#326 PhI

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/15/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description

CB #

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		~~4.620~~ will now be 4.253 since bypass of 677 increased
T	Width of Spread (ft)		14.35

Gutter Flow

Eo	Gutter Flow Ratio	0.485
d	Depth of Flow (ft)	0.40
V	Average Velocity (ft/sec)	2.09

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.22	10.05	0.89	4.112	0.508
Parallel Bar P-1-7/8	3.00	1.72	0.99	0.502	0.006
Combination			1.00	4.614	0.006

Exist CB/326 sta. 1005+55
C-15.91
15' slotted (exist).

15'-18"Ø SLOTTED DRAIN

CB/677

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/30/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.720
T	Width of Spread (ft)		17.73

Gutter Flow

Eo	Gutter Flow Ratio	0.398
d	Depth of Flow (ft)	0.47
V	Average Velocity (ft/sec)	2.35

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.03	10.05	0.74	5.722	1.998
Parallel Bar P-1-7/8	3.00	1.72	0.78	1.566	0.433
Combination			0.94	7.287	0.433

CB 677
sta. 1009+34
C-15.91
slotted = 15'

CB/678

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/09/2004

Project No. : AZ01107
Project Name. : Loop 202/US 60 T.I
Computed by : VMW

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.980
T	Width of Spread (ft)		13.47

Gutter Flow

Eo	Gutter Flow Ratio	0.514
d	Depth of Flow (ft)	0.39
V	Average Velocity (ft/sec)	2.03

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	13.06	6.70	0.73	2.890	1.090
Parallel Bar P-1-7/8	3.00	1.72	0.90	0.978	0.112
Combination			0.97	3.868	0.112

CB 678
sta. 1016 + 80.62
C-15.91
Slotted = 10'

CB/438

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/15/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description

CB # 438

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0120
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.280
T	Width of Spread (ft)		12.84

Gutter Flow

Eo	Gutter Flow Ratio	0.742
d	Depth of Flow (ft)	0.33
V	Average Velocity (ft/sec)	3.45

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	25.99	20.10	0.93	5.846	0.434
Parallel Bar P-1-7/8	2.00	1.72	0.93	0.402	0.032
Combination			0.99	6.248	0.032 → To 673 on WSPam

CB/438
Sta. 1022+30.41
C - 15.92
30' slotted.

CB 44

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/23/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T.I.
Computed by :VMW

Project Description

CB 440

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0174
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		7.939
T	Width of Spread (ft)		13.12

Gutter Flow

Eo	Gutter Flow Ratio	0.733
d	Depth of Flow (ft)	0.34
V	Average Velocity (ft/sec)	4.19

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	32.21	13.40	0.62	4.924	3.015
Parallel Bar P-1-7/8	2.00	1.72	0.58	1.762	1.253
Combination			0.84	6.686	1.253

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/23/2004

Project No. :AZ01107
Project Name.:Loop 202/ US60 T.I.
Computed by :VMW

Project Description

CB442

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0253
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		8.720
T	Width of Spread (ft)		12.70

Gutter Flow

Eo	Gutter Flow Ratio	0.541
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	4.95

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	30.92	10.05	0.51	4.423	4.297
Parallel Bar P-1-7/8	3.00	1.72	0.79	3.388	0.909
Combination			0.90	7.811	0.909

CB 448

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T.I.
Computed by :VMW

Project Description

CB 448

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0106
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.721
T	Width of Spread (ft)		8.73

Gutter Flow

Eo	Gutter Flow Ratio	0.596
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	2.25

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.81	3.35	0.35	0.600	1.121
Parallel Bar P-1-7/8	3.00	1.72	0.78	0.874	0.247
Combination			0.86	1.474	0.247

CB 450

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T.I.
Computed by :VMW

Project Description

CB 450

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0107
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.768
T	Width of Spread (ft)		10.42

Gutter Flow

Eo	Gutter Flow Ratio	0.521
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	2.55

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.13	6.70	0.52	1.432	1.336
Parallel Bar P-1-7/8	3.00	1.72	0.75	1.004	0.331
Combination			0.88	2.437	0.331

CB 454

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T.I.
Computed by :VMW

Project Description

CB 454

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0062
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.066
T	Width of Spread (ft)		10.34

Gutter Flow

Eo	Gutter Flow Ratio	0.524
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	1.93

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.09	6.70	0.65	1.348	0.718
Parallel Bar P-1-7/8	3.00	1.72	0.82	0.590	0.128
Combination			0.94	1.938	0.128

CB 456

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB 456

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0061
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.742
T	Width of Spread (ft)		11.53

Gutter Flow

Eo	Gutter Flow Ratio	0.481
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	2.06

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.32	6.70	0.59	1.605	1.137
Parallel Bar P-1-7/8	3.00	1.72	0.75	0.851	0.286
Combination			0.90	2.456	0.286

CB 482

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB 482

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0072
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.752
T	Width of Spread (ft)		11.19

Gutter Flow

Eo	Gutter Flow Ratio	0.492
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	2.19

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.11	6.70	0.56	1.554	1.198
Parallel Bar P-1-7/8	3.00	1.72	0.75	0.896	0.302
Combination			0.89	2.450	0.302

CB 458

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T. I.
Computed by :VMW

Project Description

CB 458

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0064
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.822
T	Width of Spread (ft)		11.55

Gutter Flow

Eo	Gutter Flow Ratio	0.480
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	2.11

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.79	6.70	0.57	1.617	1.205
Parallel Bar P-1-7/8	3.00	1.72	0.74	0.894	0.312
Combination			0.89	2.510	0.312

CB 457

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/ US60 T.I.
Computed by :VMW

Project Description

CB 460

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0050
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.122
T	Width of Spread (ft)		12.57

Gutter Flow

Eo	Gutter Flow Ratio	0.448
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	1.97

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.55	6.70	0.58	1.808	1.314
Parallel Bar P-1-7/8	3.00	1.72	0.72	0.942	0.372
Combination			0.88	2.750	0.372

CB
459

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0093
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.038
T	Width of Spread (ft)		12.32

Gutter Flow

Eo	Gutter Flow Ratio	0.456
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	2.66

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	23.46	10.05	0.63	2.563	1.475
Parallel Bar P-1-7/8	3.00	1.72	0.73	1.073	0.402
Combination			0.90	3.636	0.402

CB 46

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 464

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0124
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.272
T	Width of Spread (ft)		11.92

Gutter Flow

Eo	Gutter Flow Ratio	0.468
d	Depth of Flow (ft)	0.24
V	Average Velocity (ft/sec)	3.00

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	26.00	10.05	0.59	2.499	1.773
Parallel Bar P-1-7/8	3.00	1.72	0.71	1.265	0.508
Combination			0.88	3.764	0.508

CB 46

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 466

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0191
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.584
T	Width of Spread (ft)		11.29

Gutter Flow

Eo	Gutter Flow Ratio	0.489
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	3.59

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	30.13	10.05	0.52	2.376	2.208
Parallel Bar P-1-7/8	3.00	1.72	0.70	1.556	0.652
Combination			0.86	3.932	0.652

CB 472

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/29/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T.I.
Computed by :VMW

Project Description

CB 472

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0196
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.582
T	Width of Spread (ft)		11.23

Gutter Flow

Eo	Gutter Flow Ratio	0.491
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	3.62

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	30.32	10.05	0.52	2.362	2.220
Parallel Bar P-1-7/8	3.00	1.72	0.71	1.566	0.654
Combination			0.86	3.928	0.654

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 469

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0158
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.845
T	Width of Spread (ft)		10.95

Gutter Flow

Eo	Gutter Flow Ratio	0.501
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	3.20

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	26.26	10.05	0.58	2.232	1.613
Parallel Bar P-1-7/8	3.00	1.72	0.74	1.201	0.412
Combination			0.89	3.433	0.412

CB 474

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 474

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0108
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.120
T	Width of Spread (ft)		13.10

Gutter Flow

Eo	Gutter Flow Ratio	0.433
d	Depth of Flow (ft)	0.26
V	Average Velocity (ft/sec)	2.98

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	27.46	10.05	0.56	2.865	2.255
Parallel Bar P-1-7/8	3.00	1.72	0.67	1.499	0.755
Combination			0.85	4.365	0.755

ELLSWORTH ROAD

RAMPS A, C, AND D

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ellsworth Road Ramp A

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
21	CB21	0.47	0.95	4.22	1.88			1.88
681	CB681	0.20	0.95	4.22	0.80	CB21	0.67	1.47
682	CB682	0.51	0.95	4.22	2.03			2.03
645	CB645	0.27	0.95	4.22	1.08			1.08
632	CB632	0.28	0.95	4.22	1.12			1.12

[1] Refer to the drainage area maps insert in this report for delineation of the drainage basins.

CB 21

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0042
Sx	Pavement Cross Slope	(ft/ft)	0.0098
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.890
T	Width of Spread (ft)		13.62

Gutter Flow

Eo	Gutter Flow Ratio	0.804
d	Depth of Flow (ft)	0.26
V	Average Velocity (ft/sec)	1.60

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.646
Qi	Intercepted Flow (cfs)	1.220
Qb	By-pass Flow (cfs)	0.670

CB 681

Ellsworth Ramp A

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/19/2003

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0042
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		0.00
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.471
T	Width of Spread (ft)		9.80

Gutter Flow

Eo	Gutter Flow Ratio	0.000
d	Depth of Flow (ft)	0.20
V	Average Velocity (ft/sec)	1.53

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	1.61	10.05	1.00	1.471	0.000
Parallel Bar P-1-7/8	2.00	1.72	0.00	0.000	0.000
Combination			1.00	1.471	0.000

Ellsworth Ramp A
Sta 29 +80 CB#681
C-15.92
15' slotted

CB 682

Ellsworth Co

Ramp A

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 09/10/2003

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description

Super Red Tan - Phase II

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		0.0303
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0370
Sw	Gutter Cross Slope	(ft/ft)	0.016
n	Manning's Coefficient		4.50
W	Gutter Width (ft)		1.00
a	Gutter Depression (inch)		2.030
Q	Discharge (cfs)		5.79
T	Width of Spread (ft)		

Gutter Flow

Eo	Gutter Flow Ratio	0.991
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	4.00

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.23	13.40	0.88	1.793	0.237
Parallel Bar P-1-7/8	2.00	1.72	1.00	0.236	0.001
Combination			1.00	2.029	0.001

Ellsworth Ramp A
Sta. 23+40 Lt. CB#682
C-15.92 , 20' slotted dr.

CB 645

ELLSWORTH RAMP A

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 09/10/2003

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description
Super Red Tan - Phase II

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0338
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		0.00
Q	Discharge (cfs)		1.080
T	Width of Spread (ft)		3.41

Gutter Flow

Eo	Gutter Flow Ratio	0.993
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	4.10

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.999
Qi	Intercepted Flow (cfs)	1.079
Qb	By-pass Flow (cfs)	0.001

Ellsworth Ramp A CB# 645
Sta. 20+00 Lt.
C-15.91, no slotted dr.

CB 632

Ellsworth Rd Ramp A

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 09/10/2003

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description
Super Red Tan - Phase II

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0092
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.120
T	Width of Spread (ft)		5.80

Gutter Flow

Eo	Gutter Flow Ratio	0.893
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	2.32

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	7.73	3.35	0.64	0.718	0.402
Parallel Bar P-1-7/8	3.00	1.72	1.00	0.402	0.000
Combination			1.00	1.120	0.000

Ellsworth Ramp A.
Station 16+05 Lt CB # 632
G-15.91, 5' Slotted drain

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ellsworth Road Ramp C

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
481	CB481	0.69	0.95	4.22	2.75			2.75
24	CB24	0.43	0.95	4.22	1.71	CB481 & 446	0.11	1.82
444	CB444	0.39	0.95	4.22	1.56	CB448	0.26	1.82
446	CB446	0.42	0.95	4.22	1.69	CB448	0.10	1.79
446	CB446	0.42	0.95	5.15	2.06	CB448	0.25	2.31

[1] Refer to the drainage area maps insert in this report for delineation of the drainage areas.

CB
481

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/30/2004

Project No. :
Project Name. :
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0582
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.751
T	Width of Spread (ft)		7.57

Gutter Flow

Eo	Gutter Flow Ratio	0.660
d	Depth of Flow (ft)	0.15
V	Average Velocity (ft/sec)	4.79

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	31.08	13.40	0.64	1.754	0.997
Parallel Bar P-1-7/8	3.00	1.72	0.91	0.907	0.090
Combination			0.97	2.661	0.090

CB
24

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 08/30/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	8.21
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.182
d_curb	Depth at Curb (ft)	0.250
Qi	Intercepted Flow (cfs)	1.790

cfs
446

Ellsworth
Lo-Ramp
10-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
·	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0132
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.790
T	Width of Spread (ft)		8.50

Gutter Flow

Eo	Gutter Flow Ratio	0.608
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	2.47

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.06	3.35	0.33	0.582	1.208
Parallel Bar P-1-7/8	3.00	1.72	0.78	0.943	0.264
Combination			0.85	1.526	0.264

CB 446

Ellswort Rd-Ramp C
25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0132
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.310
T	Width of Spread (ft)		9.36

Gutter Flow

Eo	Gutter Flow Ratio	0.566
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	2.63

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.40	3.35	0.29	0.668	1.642
Parallel Bar P-1-7/8	3.00	1.72	0.73	1.199	0.443
Combination			0.81	1.867	0.443 ←

5'-18"ϕ SLOTTED DRAIN

CB 24

Ellsworth Rd ramp

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0208
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	8.28
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.183
d_curb	Depth at Curb (ft)	0.251
Qi	Intercepted Flow (cfs)	1.820

CB
444

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0132
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.820
T	Width of Spread (ft)		8.56

Gutter Flow

Eo	Gutter Flow Ratio	0.605
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	2.48

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.21	10.05	0.79	1.445	0.375
Parallel Bar P-1-7/8	3.00	1.72	0.95	0.355	0.020
Combination			0.99	1.800	0.020

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ellsworth Road Ramp D

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
443	CB443	0.72	0.95	4.22	2.89			2.89
25	CB25	0.41	0.95	4.22	1.63	CB412 & 443	0.51	2.14
410	CB410	0.36	0.95	5.15	1.74	CB412	0.15	1.89
412	CB412	0.40	0.95	5.15	1.96	CB416	0.29	2.25

[1] Refer to the drainage area maps insert in this report for delineation of the drainage areas.

CB/443

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0080
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.890
T	Width of Spread (ft)		9.91

Gutter Flow

Eo	Gutter Flow Ratio	0.856
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	2.50

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.80	6.70	0.63	1.819	1.071
Parallel Bar P-1-7/8	2.00	1.72	0.76	0.812	0.258
Combination			0.91	2.632	0.258

10'-18"Φ SLOTTED DRAIN

CB/25

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

		Composite/Dep
	Cross Slope	
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0370
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	4.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	10.75
WGR	Grate Width (ft)	2.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.250
d_curb	Depth at Curb (ft)	0.375
Qi	Intercepted Flow (cfs)	2.140

CB
410

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0143
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.890
T	Width of Spread (ft)		6.90
	*		

Gutter Flow

Eo	Gutter Flow Ratio	0.966
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	2.92

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.04	3.35	0.36	0.689	1.201
Parallel Bar P-1-7/8	2.00	1.72	0.79	0.954	0.247
Combination			0.87	1.643	0.247

CB/412

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0130
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.256
T	Width of Spread (ft)		7.78

Gutter Flow

Eo	Gutter Flow Ratio	0.938
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	2.90

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.93	6.70	0.63	1.412	0.844
Parallel Bar P-1-7/8	2.00	1.72	0.82	0.694	0.150
Combination			0.93	2.106	0.150

ELLSWORTH ROAD

RAMP B

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ellsworth Road Ramp B

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
39	CB39- East	0.17	0.95	4.22	0.68			0.68
39	CB39- West	0.23	0.95	4.22	0.92			0.92
600	CB600	0.13	0.95	4.22	0.53			0.53
601	CB601	0.38	0.95	4.22	1.52			1.52
611	CB611	0.40	0.95	4.22	1.61			1.61
623	CB623	0.22	0.95	4.22	0.88	CB633	0.07	0.95
633	CB633	0.16	0.95	4.22	0.64			0.64
652	CB652	0.32	0.95	4.22	1.28			1.28
655	CB655	0.29	0.95	4.22	1.18	CB623	0.21	1.39

[1] Refer to the drainage area maps insert in this report for delineation of the drainage areas.

CE 60

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/09/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0027
Sx	Pavement Cross Slope	(ft/ft)	0.0560
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		0.530
T	Width of Spread (ft)		3.59

Gutter Flow

Eo	Gutter Flow Ratio	0.965
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	1.35

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.996
Qi	Intercepted Flow (cfs)	0.528
Qb	By-pass Flow (cfs)	0.002

CB 601

ELLSWORTH
RAMP B
STA. 23+55

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0127
Sx	Pavement Cross Slope	(ft/ft)	0.0560
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.520
T	Width of Spread (ft)		4.03 < TALL=10'

Gutter Flow

Eo	Gutter Flow Ratio	0.934
d	Depth of Flow (ft)	0.25 < dALL=6"
V	Average Velocity (ft/sec)	3.12

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	9.35	3.35	0.55	0.836	0.684
Parallel Bar P-1-7/8	3.00	1.72	1.00	0.684	0.000
Combination			1.00	1.520	0.000

5' SLOTTED DRAIN

CB 652

ELLSWORTH
RAMP B
STA. 23+8

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0187
Sx	Pavement Cross Slope	(ft/ft)	0.0500
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.280
T	Width of Spread (ft)		4.72 < TALL = 10'

Gutter Flow

Eo	Gutter Flow Ratio		1.000
d	Depth of Flow (ft)		0.18 < dALL = 6'
V	Average Velocity	(ft/sec)	3.01

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.04	6.67	0.77	0.980	0.300
Parallel Bar P-1-7/8	2.00	1.72	0.99	0.296	0.004
Combination			1.00	1.276	0.004

10' SLOTTED DRAIN

CROSS OVER FLOW
100% INTERCE

CB 611

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0082
Sx	Pavement Cross Slope	(ft/ft)	0.0500
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.610
T	Width of Spread (ft)		5.69 ← TALL=10'

Gutter Flow

Eo	Gutter Flow Ratio	0.979
d	Depth of Flow (ft)	0.23 ← dALL=6"
V	Average Velocity (ft/sec)	2.37

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	10.39	6.67	0.84	1.356	0.254
Parallel Bar P-1-7/8	2.00	1.72	0.98	0.249	0.004
Combination			1.00	1.606	0.004

10' SLOTTED DRAIN

CB 655

ELLSWORTH RAMP 'B' STA. 41+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.390
T	Width of Spread (ft)		8.97 ← TALL = 10'

Gutter Flow

Eo	Gutter Flow Ratio	0.584
d	Depth of Flow (ft)	0.18 ← dALL = 3'
V	Average Velocity (ft/sec)	1.72

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.25	6.67	0.76	1.052	0.338
Parallel Bar P-1-7/8	3.00	1.72	0.92	0.312	0.026
Combination			0.98	1.364	0.026

10' SLOTTED DRAIN

CROSS OVER FLOW
100% INTERCEP

CB 623

ELLSWORTH RAMP B

STA. 46+12.5

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		0.950
T	Width of Spread (ft)		7.77 < TALL = 10'

Gutter Flow

Eo	Gutter Flow Ratio		0.648
d	Depth of Flow (ft)		0.16 < dALL = 3'
V	Average Velocity	(ft/sec)	1.57

Inlet Interception

	Inlet Type		Parallel Bar P-1-7/8
L	Grate Length (ft)		1.72
WGR	Grate Width (ft)		3.00
e	Inlet Efficiency		0.777
Qi	Intercepted Flow	(cfs)	0.738
Qb	By-pass Flow	(cfs)	0.212 ← TO CB 655

CB 633

ELLSWORTH
RAMP B
STA. 19+81.6

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/25/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0320
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		0.640
T	Width of Spread (ft)		5.31 < TALL = 10'

Gutter Flow

Eo	Gutter Flow Ratio	0.785
d	Depth of Flow (ft)	0.14 < dALL = 3"
V	Average Velocity (ft/sec)	1.54

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.898
Qi	Intercepted Flow (cfs)	0.575
Qb	By-pass Flow (cfs)	0.065 ← to CB623

CB 39

Ellsworth Ramp B
STA. 56+46
(East End)

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Slotted Drain Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*		Slotted Drain
T	Width of Spread (ft)		7.17 < TALL=10'-OK!
L	Length of Inlet (ft)		10.00
W1	Slotted Drain Opening	(in)	1.75
CLF	Clogging Factor	(%)	50.00
d_slot	Depth over Slotted Drain	(ft)	0.161
d_curb	Depth at Curb (ft)		0.229 < clau=3"-OK!
Qi	Intercepted Flow (cfs)		0.680

Note: These calculations are based on the assumption that the slotted drain is located W/2 from the face of the curb.

CB 39

ELLSWOO
RAMP B
STA. 56+48
(WEST E

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Slotted Drain Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Slotted Drain
T	Width of Spread (ft)	8.77
L	Length of Inlet (ft)	10.00
W1	Slotted Drain Opening (in)	1.75
CLF	Clogging Factor (%)	50.00
d_slot	Depth over Slotted Drain (ft)	0.193
d_curb	Depth at Curb (ft)	0.261
Qi	Intercepted Flow (cfs)	0.920

Note: These calculations are based on the assumption that the slotted drain is located W/2 from the face of the curb.

CRISMON ROAD

RAMPS A & B

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Crismon Road Ramp A

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
470	CB470	0.36	0.95	5.15	1.76	CB668	0.11	1.87
468	CB468	0.36	0.95	5.15	1.74	CB672 & 26	0.85	2.59
26	CB26	0.21	0.95	4.22	0.85			0.85
26	CB26	0.21	0.95	5.15	1.04			1.04
33	CB33	0.60	0.95	4.22	2.42			2.42

[1] Refer to the drainage area maps insert in this report for delineation of the drainage areas.

CB/32
CRISMON RD
RAMP A

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/23/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0230
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.420
T	Width of Spread (ft)		8.58

Gutter Flow

Eo	Gutter Flow Ratio	0.604
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	3.28

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	22.92	13.40	0.79	1.922	0.498
Parallel Bar P-1-7/8	3.00	1.72	0.94	0.469	0.029
Combination			0.99	2.391	0.029

CB/33
Sta. 26+58 Crismon A
C-15.91
30' slotted

CB 470

Cosmon Rd
Ramp A

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 470

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		0.0161
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0208
Sw	Gutter Cross Slope	(ft/ft)	0.016
n	Manning's Coefficient		2.50
W	Gutter Width (ft)		1.00
a	Gutter Depression (inch)		~~1.869~~ 1.726
Q	Discharge (cfs)		8.33
T	Width of Spread (ft)		

Gutter Flow

Eo	Gutter Flow Ratio	0.617
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	2.69

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.36	3.35	0.30	0.569	1.300
Parallel Bar P-1-7/8	3.00	1.72	0.78	1.016	0.284
Combination			0.85	1.585	0.284

CB 468

CRISMON

RAMPA

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/29/2004

Project No. :AZ01107
Project Name.:Loop 202/ US 60 T.I.
Computed by :VMW

Project Description

CB 468

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0114
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.592
T	Width of Spread (ft)		10.04

Gutter Flow

Eo	Gutter Flow Ratio	0.536
d	Depth of Flow (ft)	0.20
V	Average Velocity (ft/sec)	2.56

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.79	10.05	0.72	1.868	0.724
Parallel Bar P-1-7/8	3.00	1.72	0.85	0.618	0.106
Combination			0.96	2.486	0.106

CB 26

CRISMON RAMP A

10-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 26

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

		Composite
	Cross Slope	
S	Longitudinal Slope (ft/ft)	0.0142
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0208
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.50
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	0.850
T	Width of Spread (ft)	6.32

Gutter Flow

Eo	Gutter Flow Ratio	0.742
d	Depth of Flow (ft)	0.13
V	Average Velocity (ft/sec)	2.11

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.842
Qi	Intercepted Flow (cfs)	0.716
Qb	By-pass Flow (cfs)	0.134 (10y) for ramp.

CB 26

Crismon Rd Ramp A

25-yr

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :AZ01107
Project Name.:Loop 202/US60 T.I.
Computed by :VMW

Project Description

CB 26

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0142
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.040
T	Width of Spread (ft)		6.85

Gutter Flow

Eo	Gutter Flow Ratio	0.706
d	Depth of Flow (ft)	0.14
V	Average Velocity (ft/sec)	2.21

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.810
Qi	Intercepted Flow (cfs)	0.842
Qb	By-pass Flow (cfs)	0.198 (25y) onto US-60 (CB 46B)

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Crismon Road Ramp B

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
34	CB34	0.56	0.95	4.22	2.25			2.25
37	CB37	0.55	0.95	4.22	2.20	CB34	0.04	2.24

[1] Refer to the drainage area maps insert in this report for delineation of the drainage areas.

CB 34

CRISMON & RAMP B STA. 27+8

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 10/20/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0240
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.240
T	Width of Spread (ft)		6.56 < OK!

Gutter Flow

Eo	Gutter Flow Ratio	0.975
d	Depth of Flow (ft)	0.21 – OK!
V	Average Velocity (ft/sec)	3.72

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.81	10.05	0.75	1.674	0.566
Parallel Bar P-1-7/8	2.00	1.72	0.93	0.524	0.042
Combination			0.98	2.198	0.042

15' – 18" Φ SLOTTED DRAIN
C-1592

Area - 0.56 Acres
C = 0.95
Q = 2.24 cfs

CB/37

CRISMON RD RAMP 'B'

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/24/2004

Project No. :AZ01107
Project Name.:Loop 202/US 60 T.I.
Computed by :VMW

Project Description

CB #

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0370
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	4.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	11.14
WGR	Grate Width (ft)	2.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.258
d_curb	Depth at Curb (ft)	0.383
Qi	Intercepted Flow (cfs)	2.240

CB 37 (SAG)
crismonB 29+65.71
C-15.92
no slotted.

LOOP 202

HYDROLOGIC CALCULATIONS

LOOP 202

EASTBOUND LANES

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

L202 - Eastbound

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
722	CB722	1.60	0.95	4.22	6.41			6.41
725	CB725	0.89	0.95	4.22	3.57	CB722	0.16	3.73
729	CB729	1.10	0.95	4.22	4.41	CB725/732	0.04	4.45
732	CB732	0.28	0.95	4.22	1.12			1.12

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

CB 722

202 EB

STA. 454+18.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/17/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		0.0060
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0370
Sw	Gutter Cross Slope	(ft/ft)	0.016
n	Manning's Coefficient		4.50
W	Gutter Width (ft)		1.00
a	Gutter Depression (inch)		6.410
Q	Discharge (cfs)		15.07 ← OK
T	Width of Spread (ft)		

Gutter Flow

Eo	Gutter Flow Ratio		0.667
d	Depth of Flow (ft)		0.38 < OK!
V	Average Velocity (ft/sec)		2.62

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	22.07	13.40	0.81	5.218	1.192
Parallel Bar P-1-7/8	3.00	1.72	0.86	1.031	0.161
Combination			0.97	6.249	0.161

20'- 19"Ø SLOTTED DRAIN

CB 725

202 EB
STA 458+11

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/17/2004

Project No. :
Project Name. :
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.720
T	Width of Spread (ft)		11.88 ✓ OK

Gutter Flow

Eo	Gutter Flow Ratio		0.778
d	Depth of Flow (ft)		0.31 ✓ OK
V	Average Velocity (ft/sec)		2.35

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.67	10.05	0.81	3.014	0.706
Parallel Bar P-1-7/8	3.00	1.72	0.96	0.676	0.030
Combination			0.99	3.690	0.030

15'-18" ϕ SLOTTED DRAIN

CB 729

L202 EB

STA. 460+59

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/17/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	4.50
a	Gutter Depression	(inch)	1.00

Inlet Interception

	Inlet Type *Sag*		Parallel Bar P-1-7/8
T	Width of Spread	(ft)	14.89 ~OK
WGR	Grate Width	(ft)	3.00
L	Grate Length	(ft)	1.72
d_ave	Depth of Flow	(ft)	0.333
d_curb	Depth at Curb	(ft)	0.458 ~OK
Qi	Intercepted Flow	(cfs)	4.450

CB 732

L202 EB
STA. 462+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/17/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0034
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.120
T	Width of Spread (ft)		7.66 ~ OK

Gutter Flow

Eo	Gutter Flow Ratio	0.942
d	Depth of Flow (ft)	0.23 ~ ok
V	Average Velocity (ft/sec)	1.48

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	7.92	3.35	0.63	0.703	0.417
Parallel Bar P-1-7/8	3.00	1.72	0.97	0.404	0.013
Combination			0.99	1.107	0.013

5'-18" ϕ SLOTTED DRAIN

LOOP 202

WESTBOUND LANES

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

L202 - Westbound

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
822	CB822	0.74	0.95	4.22	2.96			2.96
824	CB824	0.88	0.95	4.22	3.52	CB822	0.21	3.73
828	CB828	0.81	0.95	4.22	3.25			3.25
830	CB830	0.66	0.95	4.22	2.64	CB828	0.35	2.99
807	CB807	1.32	0.95	4.22	5.29	CB830	0.07	5.36
723	CB723	1.64	0.95	4.22	6.57	CB807	0.19	6.76
727	CB727	1.35	0.95	4.22	5.41	CB723	0.11	5.52
731	CB731	0.97	0.95	4.22	3.89	CB727	0.17	4.06
733	CB733	0.74	0.95	4.22	2.97			2.97
714	CB714	0.54	0.95	4.22	2.16			2.16
715	CB715	0.78	0.95	4.22	3.14	CB714	0.06	3.20

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

UB 822
2D2 WP
Sta 426+90
ok!

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 07/07/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0064
Sx	Pavement Cross Slope	(ft/ft)	0.0360
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.960
T	Width of Spread (ft)		8.10

Gutter Flow

Eo	Gutter Flow Ratio	0.887
d	Depth of Flow (ft)	0.30
V	Average Velocity (ft/sec)	2.48

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.43	6.70	0.67	1.997	0.963
Parallel Bar P-1-7/8	2.00	1.72	0.78	0.751	0.212
Combination			0.93	2.748	0.212

18" ϕ - 10' SLOTTED DRAIN

CB 824
202 WB
Sta 430+3

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 07/07/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0106
Sx	Pavement Cross Slope	(ft/ft)	0.0360
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.730
T	Width of Spread (ft)		7.54

Gutter Flow

Eo	Gutter Flow Ratio	0.717
d	Depth of Flow (ft)	0.35
V	Average Velocity (ft/sec)	3.33

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.28	3.35	0.38	1.425	2.305
Parallel Bar P-1-7/8	3.00	1.72	0.90	2.072	0.233
Combination			0.94	3.497	0.233

CB 828

L202WB
STA. 437+1

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/25/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		0.0108
S	Longitudinal Slope	(ft/ft)	0.0360
Sx	Pavement Cross Slope	(ft/ft)	0.0370
Sw	Gutter Cross Slope	(ft/ft)	0.016
n	Manning's Coefficient		4.50
W	Gutter Width (ft)		1.00
a	Gutter Depression (inch)		3.250
Q	Discharge (cfs)		7.60
T	Width of Spread (ft)		

Gutter Flow

Eo	Gutter Flow Ratio	0.910
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	3.09

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.47	6.67	0.58	1.882	1.368
Parallel Bar P-1-7/8	2.00	1.72	0.75	1.021	0.347
Combination			0.89	2.903	0.347

13"- 10' SLOTTED DRAIN

CB 830

L202 WB
STA. 440+0

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/25/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0106
Sx	Pavement Cross Slope	(ft/ft)	0.0360
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.990
T	Width of Spread (ft)		7.39

Gutter Flow

Eo	Gutter Flow Ratio	0.920
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	3.01

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.74	10.00	0.81	2.408	0.582
Parallel Bar P-1-7/8	2.00	1.72	0.89	0.517	0.065
Combination			0.98	2.925	0.065

19"- 15' SLOTTED DRAIN

CB 807

L202WE

STA. 445+4

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/25/2004

Project No. :
Project Name. :
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0074
Sx	Pavement Cross Slope	(ft/ft)	0.0355
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.990
T	Width of Spread (ft)		10.36

Gutter Flow

Eo	Gutter Flow Ratio	0.784
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	3.12

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.77	13.40	0.85	5.062	0.928
Parallel Bar P-1-7/8	2.00	1.72	0.79	0.734	0.193
Combination			0.97	5.797	0.193

20'-19"Ø SLOTTED DRAIN

CB 723

L202 WB
STA. 453+32.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/25/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.770
T	Width of Spread (ft)		15.42

Gutter Flow

Eo	Gutter Flow Ratio	0.656
d	Depth of Flow (ft)	0.38
V	Average Velocity (ft/sec)	2.66

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	22.70	16.75	0.91	6.162	0.608
Parallel Bar P-1-7/8	2.00	1.72	0.83	0.502	0.106
Combination			0.98	6.664	0.106

25'-18" ϕ SLOTTED DRAIN

CB 727

L202 WB
STA. 459+

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/25/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0028
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.520
T	Width of Spread (ft)		16.58

Gutter Flow

Eo	Gutter Flow Ratio	0.622
d	Depth of Flow (ft)	0.41
V	Average Velocity (ft/sec)	1.89

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	16.86	13.40	0.94	5.201	0.319
Parallel Bar P-1-7/8	2.00	1.72	0.90	0.287	0.032
Combination			0.99	5.488	0.032

20'-18"ϕ SLOTTED DRAIN

CB 731

L202 WB
STA. 461+25
SAG

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 08/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	17.37 ~ OK!
WGR	Grate Width (ft)	2.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.382
d_curb	Depth at Curb (ft)	0.507 ≈ Dw = 0.5'
Qi	Intercepted Flow (cfs)	4.060

CB 73

L202 W
STA. 463

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0022
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.970
T	Width of Spread (ft)		13.41 - OK!

Gutter Flow

Eo	Gutter Flow Ratio	0.722
d	Depth of Flow (ft)	0.34 - OK!
V	Average Velocity (ft/sec)	1.51

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	11.52	6.67	0.79	2.345	0.625
Parallel Bar P-1-7/8	2.00	1.72	0.78	0.489	0.136
Combination			0.95	2.834	0.136

10'-13"Ø SLOTTED DRAIN

C

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 10/07/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.170
T	Width of Spread (ft)		10.19

Gutter Flow

Eo	Gutter Flow Ratio	0.845
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	1.79

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	11.44	6.70	0.80	1.726	0.444
Parallel Bar P-1-7/8	2.00	1.72	0.86	0.382	0.062
Combination			0.97	2.108	0.062

C-15.92

slotted dr= 10'

CB 715

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 10/07/2004

Project No. :
Project Name. :
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.202
T	Width of Spread (ft)		12.16

Gutter Flow

Eo	Gutter Flow Ratio	0.768
d	Depth of Flow (ft)	0.32
V	Average Velocity (ft/sec)	1.94

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	13.93	10.05	0.90	2.882	0.320
Parallel Bar P-1-7/8	2.00	1.72	0.92	0.293	0.027
Combination			0.99	3.175	0.027

C-15.92
Slotted dr = 15'

DIRECTIONAL RAMPS

HYDROLOGIC CALCULATIONS

RAMP W-S

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ramp W-S

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
673	CB673	0.86	0.95	4.22	3.45			3.45
670	CB670 - East	0.23	0.95	4.22	0.92			0.92
670	CB670 - West	0.75	0.95	4.22	3.01			3.01
622	CB622 -East	0.99	0.95	4.22	3.97			3.97
622	CB622 - West	0.14	0.95	4.22	0.56	CB610	0.17	0.73
610	CB610	1.04	0.95	4.22	4.17			4.17
609	CB609	0.12	0.95	4.22	0.48			0.48
608	CB608	0.40	0.95	4.22	1.60	CB607	0.39	1.99
607	CB607	1.33	0.95	4.22	5.33			5.33
717	CB717	1.21	0.95	4.22	4.85			4.85
718	CB718	0.39	0.95	4.22	1.56	CB717	0.61	2.17
719	CB719	0.27	0.95	4.22	1.08	CB718	0.19	1.27

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

CB 673

RAMP W.
STA. 19+20

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 10/21/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		0.0101
S	Longitudinal Slope	(ft/ft)	0.0200
Sx	Pavement Cross Slope	(ft/ft)	0.0370
Sw	Gutter Cross Slope	(ft/ft)	0.016
n	Manning's Coefficient		4.50
W	Gutter Width (ft)		1.00
a	Gutter Depression (inch)		3.440
Q	Discharge (cfs)		10.18 ≥ TALL=10' OK
T	Width of Spread (ft)		

Gutter Flow

Eo	Gutter Flow Ratio		0.845
d	Depth of Flow (ft)		0.28 < 0.5 - OK
V	Average Velocity (ft/sec)		2.84

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.32	13.40	0.91	3.117	0.323
Parallel Bar P-1-7/8	2.00	1.72	0.95	0.308	0.015
Combination			1.00	3.425	0.015

USE 20' - 18"Φ SLOTTED DRAIN

100% INTERCEPTION

CB 67a

WEST E
RAMP W
STA 20+85

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/15/2004

Project No. :
Project Name.:
Computed by : DNS

Inlets on Sag: Slotted Drain Inlet

Roadway and Discharge Data

		Composite/Dep
	Cross Slope	
Sx	Pavement Cross Slope (ft/ft)	0.0167
Sw	Gutter Cross Slope (ft/ft)	0.0370
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	4.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Slotted Drain
T	Width of Spread (ft)	8.02
L	Length of Inlet (ft)	15.00
W1	Slotted Drain Opening (in)	1.75
CLF	Clogging Factor (%)	50.00
d_slot	Depth over Slotted Drain (ft)	0.184
d_curb	Depth at Curb (ft)	0.309
Qi	Intercepted Flow (cfs)	3.010

Note: These calculations are based on the assumption that the slotted drain is located W/2 from the face of the curb.

CB 676

EAST EPL
LAMOW-S
STA. 20+3

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/15/2004

Project No. :
Project Name.:
Computed by : DNJ

Inlets on Sag: Slotted Drain Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0167
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*		Slotted Drain
T	Width of Spread	(ft)	6.27
L	Length of Inlet	(ft)	5.00
W1	Slotted Drain Opening	(in)	1.75
CLF	Clogging Factor	(%)	50.00
d_slot	Depth over Slotted Drain	(ft)	0.154
d_curb	Depth at Curb	(ft)	0.279
Qi	Intercepted Flow	(cfs)	0.920

Note: These calculations are based on the assumption that the slotted drain is located W/2 from the face of the curb.

CB 622

RAMP W-:
STA. 36+16
WEST END
(Sump)

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/09/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite/Dep
Sx	Pavement Cross Slope	(ft/ft)	0.0360
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	1.80
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.100
d_curb	Depth at Curb (ft)	0.225
Qi	Intercepted Flow (cfs)	0.730

CB 622

RAMP W.
STA. 36+16
EAST END
(SUMP)

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/23/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Slotted Drain Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0360
Sw	Gutter Cross Slope (ft/ft)	0.0667
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Slotted Drain
T	Width of Spread (ft)	4.07 < TALL = 16'
L	Length of Inlet (ft)	10.00 ← SLOTTED DRAIN
W1	Slotted Drain Opening (in)	1.75
CLF	Clogging Factor (%)	0.50
d_slot	Depth over Slotted Drain (ft)	0.182
d_curb	Depth at Curb (ft)	0.307 < TALL = 6"
Qi	Intercepted Flow (cfs)	3.970

Note: These calculations are based on the assumption that the slotted drain is located W/2 from the face of the curb.

Assumed SLOTTED INTERCEPTED FLOW - upstream of catch basin - Limitation of program.

CB 610

RAMP W-S
STA. 37+40

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/23/2004

Project No. :
Project Name. : —
Computed by : DNJ

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.180
T	Width of Spread (ft)		12.62 ← TAIL = 16' MULTILANE RAMP

Gutter Flow

Eo	Gutter Flow Ratio	0.543
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	2.40

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.74	6.67	0.66	2.767	1.413
Parallel Bar P-1-7/8	3.00	1.72	0.88	1.245	0.168
Combination			0.96	4.012	0.168 ← TO CB622

C8
608

RAMP W.
STA 45+5

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/23/2004

Project No. :
Project Name.:
Computed by : DWJ

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		0.0160
S	Longitudinal Slope	(ft/ft)	0.0207
Sx	Pavement Cross Slope	(ft/ft)	0.0370
Sw	Gutter Cross Slope	(ft/ft)	0.016
n	Manning's Coefficient		4.50
W	Gutter Width (ft)		1.00
a	Gutter Depression (inch)		1.990
Q	Discharge (cfs)		6.80
T	Width of Spread (ft)		

Gutter Flow

Eo	Gutter Flow Ratio	0.968
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	3.09

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.89	10.05	0.84	1.662	0.328
Parallel Bar P-1-7/8	2.00	1.72	0.97	0.318	0.010
Combination			0.99	1.980	0.010

CROSS OVE 100% INTERCE

15' SLOTTED DRAIN

(CB) 607

RAMP W-
STA. 49+

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/23/2004

Project No. :
Project Name.:
Computed by : DNJ

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Uniform
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0160
Sx	Pavement Cross Slope	(ft/ft)	0.0550
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.330
T	Width of Spread (ft)		7.23 < T_{ALL} = 10'

Gutter Flow

Eo	Gutter Flow Ratio	0.904
d	Depth of Flow (ft)	0.32
V	Average Velocity (ft/sec)	4.24

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.36	10.05	0.71	3.764	1.566
Parallel Bar P-1-7/8	2.00	1.72	0.75	1.179	0.386
Combination			0.93	4.944	0.386 ← TO CB 60

15' SLOTTED DRAIN

CB 609

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/09/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0109
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		0.480
T	Width of Spread (ft)		5.35

Gutter Flow

Eo	Gutter Flow Ratio	0.817
d	Depth of Flow (ft)	0.11
V	Average Velocity (ft/sec)	1.66

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	8.41	3.35	0.60	0.288	0.192
Parallel Bar P-1-7/8	3.00	1.72	0.99	0.190	0.002
Combination			1.00	0.478	0.002

CB 717

RAMP W-S
STA. 75+04

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/24/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0201
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.860
T	Width of Spread (ft)		10.19 < TALL=16'

Gutter Flow

Eo	Gutter Flow Ratio		0.845
d	Depth of Flow (ft)		0.28
V	Average Velocity (ft/sec)		4.01

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	26.04	10.05	0.58	2.840	2.020
Parallel Bar P-1-7/8	2.00	1.72	0.70	1.407	0.614
Combination			0.87	4.246	0.614 ← TO CB 718

15' SLOTTED DRAIN

CB 718

RAMP W-E
STA. 79+46

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/24/2004

Project No. :
Project Name.:
Computed by : ONJ

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0162
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.170
T	Width of Spread (ft)		8.80 ← TALL = 16'

Gutter Flow

Eo	Gutter Flow Ratio	0.593
d	Depth of Flow (ft)	0.18 ← dALL = 3'
V	Average Velocity (ft/sec)	2.80

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.82	6.67	0.52	1.133	1.037
Parallel Bar P-1-7/8	3.00	1.72	0.82	0.850	0.187
Combination			0.91	1.983	0.187 ← TO CB 719

10' SLOTTED DRAIN

CB 719

RAMP W-
STA. 824

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/24/2004

Project No. :
Project Name.:
Computed by : DNJ

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.270
T	Width of Spread (ft)		9.35

Gutter Flow

Eo	Gutter Flow Ratio	0.566
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	1.45

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	10.55	6.67	0.84	1.060	0.210
Parallel Bar P-1-7/8	3.00	1.72	0.96	0.200	0.009
Combination			0.99	1.261	0.009 ← 100% INTERCEPTIC

10' SLOTTED DRAIN

RAMP S-E

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ramp S-E

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
506	CB506	0.37	0.95	4.22	1.47			1.47
511	CB511	0.15	0.95	4.22	0.61	CB512	0.66	1.27
508	CB508	0.15	0.95	4.22	0.59	CB506/511	0.29	0.87
512	CB512	1.21	0.95	4.22	4.86			4.86
614	CB614	1.16	0.95	4.22	4.63			4.63
618	CB618	0.41	0.95	4.22	1.64	CB614	0.35	1.99
624	CB624	0.76	0.95	4.22	3.04	CB618/619	0.50	3.54
629	CB629	1.10	0.80	4.22	3.70	CB624	0.35	4.05
628	CB628	0.57	0.81	4.22	1.95	CB629/630	0.21	2.16
630	CB630	0.69	0.86	4.22	2.50	CB683	0.10	2.60
635	CB635	0.72	0.87	4.22	2.64	CB683	0.00	2.64
683	CB683	1.37	0.85	5.15	6.00	CB684	0.10	6.10
684	CB684	1.14	0.85	5.15	5.00	CB680	0.11	5.11

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

CB 506

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/20/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0077
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.468
T	Width of Spread (ft)		8.73

Gutter Flow

Eo	Gutter Flow Ratio	0.596
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	1.92

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	13.43	~~6.70~~ 3.35	~~0.71~~ .40	~~1.045~~ .592	~~0.423~~ .174
Parallel Bar P-1-7/8	2.00	1.72	~~0.77~~ .60	~~0.324~~ .702	~~0.099~~ .174
Combination			~~0.93~~ .88	~~1.369~~ 1.294	0.099 .174

CB 506, Ramp S-E
Sta 20+75.50

CB

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/04/2004

(to CB out 504)

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0208
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	4.72
WGR	Grate Width (ft)	3.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.112
d_curb	Depth at Curb (ft)	0.180
Qi	Intercepted Flow (cfs)	0.870

CB 511

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/20/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0041
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		~~0.907~~ 1.27
T	Width of Spread (ft)		~~8.21~~ 9.21

Gutter Flow

Eo	Gutter Flow Ratio	~~0.623~~ 0.560
d	Depth of Flow (ft)	~~0.17~~ 0.19
V	Average Velocity (ft/sec)	~~1.34~~ 1.46

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	~~8.96~~ 10.61	3.35	0.~~57~~ .49	0.51~~7~~ .628	0.~~390~~ .642
Parallel Bar P-1-7/8	2.00	1.72	0.~~76~~ .82	0.~~297~~ .578	0.~~093~~ 0.114
Combination	3		0.90 .91	0.~~814~~ 1.156	0.~~093~~ 0.114

Ramp S-E

CB 511

Sta 22+83.0

CB 512

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/20/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0163
Sx	Pavement Cross Slope	(ft/ft)	0.0570
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.856
T	Width of Spread (ft)		6.04

Gutter Flow

Eo	Gutter Flow Ratio	0.773
d	Depth of Flow (ft)	0.37
V	Average Velocity (ft/sec)	4.53

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	~~17.12~~	~~6.70~~	~~0.59~~	2.869	1.987
Parallel Bar P-1-7/8	~~2.00~~	~~1.72~~	~~0.85~~	1.690	0.297
Combination			~~0.94~~	4.559	0.297

1.72
3
0.864 inlet eff.
4.196 intercepted
0.660 bypass

Ramp S-E
CB 512
Sta 25+00.00

CB 614

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/21/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0268
Sx	Pavement Cross Slope	(ft/ft)	0.0320
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	2.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	4.632
T	Width of Spread	(ft)	7.21

Gutter Flow

Eo	Gutter Flow Ratio		0.752
d	Depth of Flow	(ft)	0.32
V	Average Velocity	(ft/sec)	4.93

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	20.47	~~6.70~~ 3.35	0.51 0.28	~~2.363~~ 1.274	2 ~~.269~~ 3.358
Parallel Bar P-1-7/8	2.00	1.72	0.82 0.90	~~1.852~~ 3.001	0.417 0.351
Combination			0.92 2	~~4.215~~ 4.281	0.417 0.351

Ramp SE
CB 614
Sta 57+90.95

CB 618

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/21/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0268
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	2.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	~~2.059~~ 1.993
T	Width of Spread	(ft)	~~7.85~~ 7.75

Gutter Flow

Eo	Gutter Flow Ratio		~~0.643~~ 0.619
d	Depth of Flow	(ft)	0.16
V	Average Velocity	(ft/sec)	~~3.33~~ 3.30

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	~~21.99~~ 31.63	~~10.05~~ 6.70	~~0.67~~ 0.49	~~1.373~~ 0.97	~~0.686~~ 1.023
Parallel Bar P-1-7/8	~~2.00~~ 3	1.72	~~0.75~~ 0.86	~~0.517~~ 0.845	~~0.169~~ 0.148
Combination			~~0.92~~ 0.93	~~1.890~~ 1.845	~~0.169~~ 0.148

Ramp SE

CB 618

Sta 63+67

CB 624

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/21/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0201
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		~~3.208~~ 3.535
T	Width of Spread (ft)		~~9.78~~ 10.14

Gutter Flow

Eo	Gutter Flow Ratio		0 ~~.547~~ .532
d	Depth of Flow (ft)		0.20
V	Average Velocity (ft/sec)		~~3.35~~ 3.42

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	~~25.51~~ 26.49	~~13.40~~ 10.105	0.74 0.62	2.369 2.019	0.838
Parallel Bar P-1-7/8	2.00	1.72	0.70 0.77	0.588 1.169	0.251 1.516
Combination	2		0.92 0.90	2.957 3.188	0.251 0.347

Ramp SE

CB 624

Sta 69+02

CB 6028

RAMP S-E
STA. 73+58.

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	2.50
a	Gutter Depression	(inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	11.67 ← TALL=16'
WGR	Grate Width (ft)	2.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.251
d_curb	Depth at Curb (ft)	0.319 ← dALL=6"
Qi	Intercepted Flow (cfs)	2.160

CB 629

RAMP S-E

STA. 72+60

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/27/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0043
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.050
T	Width of Spread (ft)		14.26 < TALL=16'

Gutter Flow

Eo	Gutter Flow Ratio	0.404
d	Depth of Flow (ft)	0.29 < dALL=6"
V	Average Velocity (ft/sec)	1.99

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.22	13.40	0.88	3.579	0.471
Parallel Bar P-1-7/8	2.00	1.72	0.73	0.346	0.126
Combination			0.97	3.924	0.126

20'-18"ϕ SLOTTED DRAIN

CB 630

RAMP S-E
STA. 74+58

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0041
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.600
T	Width of Spread (ft)		12.18

Gutter Flow

Eo	Gutter Flow Ratio	0.460
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	1.75

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.21	10.05	0.86	2.228	0.372
Parallel Bar P-1-7/8	2.00	1.72	0.77	0.286	0.086
Combination			0.97	2.514	0.086

13'- 18"Φ SLOTTED DRAIN

CB 635

RAMP S-1
STA. 76+41

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/26/2004

Project No. :
Project Name. :
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0041
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.640
T	Width of Spread (ft)		12.25

Gutter Flow

Eo	Gutter Flow Ratio	0.458
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	1.76

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.33	10.05	0.85	2.253	0.387
Parallel Bar P-1-7/8	2.00	1.72	0.76	0.296	0.092
Combination			0.97	2.548	0.092

15'-18" Φ SLOTTED DRAIN

CB 683

US 60
STA 1011+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0040
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		6.100
T	Width of Spread (ft)		16.85

Gutter Flow

Eo	Gutter Flow Ratio	0.350
d	Depth of Flow (ft)	0.34
V	Average Velocity (ft/sec)	2.15

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	23.10	20.10	0.97	5.945	0.155
Parallel Bar P-1-7/8	2.00	1.72	0.89	0.138	0.017
Combination			1.00	6.083	0.017

30' - 19" SLOTTED DRAIN

CB 68'

US60 EB
STA. 1014+2

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/26/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0020
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		5.110
T	Width of Spread (ft)		17.96

Gutter Flow

Eo	Gutter Flow Ratio	0.331
d	Depth of Flow (ft)	0.36
V	Average Velocity (ft/sec)	1.58

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	17.63	13.40	0.92	4.718	0.392
Parallel Bar P-1-7/8	2.00	1.72	0.76	0.298	0.094
Combination			0.98	5.016	0.094

20'-18' ϕ SLOTTED DRAIN

RAMP E-N

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ramp E-N

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
196	CB196	0.72	0.95	4.22	2.89			2.89
500	CB500	0.34	0.95	4.22	1.36	CB501	0.06	1.42
501	CB501	0.08	0.95	4.22	0.32	CB507	0.33	0.65
502	CB502	1.88	0.95	4.22	7.52			7.52
507	CB507	0.07	0.95	4.22	0.28	CB509	1.17	1.45
509	CB509	0.07	0.95	4.22	0.28	CB502	3.25	3.53
647	CB647 - Sag	0.62	0.95	4.22	2.49	CB648	0.30	2.79
648	CB648	0.79	0.95	4.22	3.17	CB849	0.20	3.37
649	CB649	0.67	0.95	4.22	2.67			2.67

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

CB 647

RAMP E-N
STA. 16+23.
LOCATED IN
ANCHOR SLA

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/08/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
Sx	Pavement Cross Slope (ft/ft)	0.0400
Sw	Gutter Cross Slope (ft/ft)	0.0400
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.50 ← CB WIDTH
a	Gutter Depression (inch)	0.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	8.93 ← TALL=10' - OK!
WGR	Grate Width (ft)	1.72
L	Grate Length (ft)	2.00
d_ave	Depth of Flow (ft)	0.307
d_curb	Depth at Curb (ft)	0.357 ← OK!
Qi	Intercepted Flow (cfs)	2.780

NOTES:

1. BECAUSE CB IS LOCATED IN ANCHOR SLAB, NO GUTTER SLOPE OR DEPRESSION USED. MATCH ROADWAY CROSS SLOPE OF 0.04%

CB 648

RAMP E-N
STA. 19+20

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0076
Sx	Pavement Cross Slope	(ft/ft)	0.0400
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	4.50
a	Gutter Depression	(inch)	1.00 3.375
Q	Discharge	(cfs)	~~3.482~~
T	Width of Spread	(ft)	~~7.99~~ 7.90

Gutter Flow

Eo	Gutter Flow Ratio		0.88~~5~~9
d	Depth of Flow	(ft)	~~0.31~~ 0.30
V	Average Velocity	(ft/sec)	~~3.79~~ 2.77

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.73	~~3.35~~ 6.70	0.35 0.64	1.219 2.15	2.263 1.23 0
Parallel Bar P-1-7/8	3.00	1.72	0.81 0.75	1.839 0.919	0.424 0.301
Combination	2		0.88 0.91	3.058 3.074	0.424 0.301

SLOTE DRAIN = 10'

Ramp E-N
CB 648
Sta 19+20

CB 649

RAMP E-1
STA. 27+30

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
·	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0090
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.665
T	Width of Spread (ft)		9.27

Gutter Flow

Eo	Gutter Flow Ratio	0.882
d	Depth of Flow (ft)	0.26
V	Average Velocity (ft/sec)	2.58

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.65	~~3.35~~ 6.70	~~0.35~~ 0.63	~~0.937~~ 1.690	~~1.728~~ 0.925
Parallel Bar P-1-7/8	~~3~~.00	1.72	~~0.82~~ 0.80	~~1.422~~ 0.774	~~0.306~~ 0.199
Combination	2		~~0.89~~ 0.93	~~2.359~~ 2.466	~~0.306~~ 0.199

Ramp E-N

CB 649

Sta 27+3

1-4 CB 502

RAMP E-N
STA. 52+75

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/05/2004

Project No. :
Project Name.: RAMP E-N - STA. 52+75
Computed by : DUJ

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0252
Sx	Pavement Cross Slope	(ft/ft)	0.0560
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	4.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	7.520
T	Width of Spread	(ft)	7.46 ← OK

Gutter Flow

Eo	Gutter Flow Ratio		0.891
d	Depth of Flow	(ft)	0.33 ← OK!
V	Average Velocity	(ft/sec)	5.51

Inlet Interception

	Inlet Type		Parallel Bar P-1-7/8
L	Grate Length	(ft)	1.72
WGR	Grate Width	(ft)	2.00
e	Inlet Efficiency		0.568
Qi	Intercepted Flow	(cfs)	4.274
Qb	By-pass Flow	(cfs)	3.246 ← TO CB501

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

RAMP E-N
STA. 53+50

Inlets on Grade
Date: 06/05/2004

Project No. :
Project Name.:
Computed by : DNJ

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0252
Sx	Pavement Cross Slope	(ft/ft)	0.0560
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	4.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	3.530
T	Width of Spread	(ft)	5.93 ← OK!

Gutter Flow

Eo	Gutter Flow Ratio		0.966
d	Depth of Flow	(ft)	0.25 ← OK!
V	Average Velocity	(ft/sec)	4.45

Inlet Interception

	Inlet Type		Parallel Bar P-1-7/8
L	Grate Length	(ft)	1.72
WGR	Grate Width	(ft)	2.00
e	Inlet Efficiency		0.668
Qi	Intercepted Flow	(cfs)	2.357
Qb	By-pass Flow	(cfs)	1.173 → TO CB/?

CB
S07

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

E-N RAMP
STA. 54+27

Inlets on Grade
Date: 06/05/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0252
Sx	Pavement Cross Slope	(ft/ft)	0.0560
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.450
T	Width of Spread (ft)		4.67 ← OK

Gutter Flow

Eo	Gutter Flow Ratio	1.000
d	Depth of Flow (ft)	0.18 ← OK
V	Average Velocity (ft/sec)	3.47

Inlet Interception

	Inlet Type		Parallel Bar P-1-7/8
L	Grate Length (ft)		1.72
WGR	Grate Width (ft)		2.00
e	Inlet Efficiency		0.775
Qi	Intercepted Flow	(cfs)	1.124
Qb	By-pass Flow	(cfs)	0.326 ~ Bypass Flow ≈ 0.3 CFS OK!

CB 501

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

RAMP E-N
STA. 55+12

Inlets on Grade
Date: 06/05/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0252
Sx	Pavement Cross Slope	(ft/ft)	0.0274
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width	(ft)	4.50
a	Gutter Depression	(inch)	1.00
Q	Discharge	(cfs)	0.650
T	Width of Spread	(ft)	3.52 ← ok!

Gutter Flow

Eo	Gutter Flow Ratio	1.000
d	Depth of Flow (ft)	0.13 ← ok
V	Average Velocity (ft/sec)	1.74

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	2.00
e	Inlet Efficiency	0.914
Qi	Intercepted Flow (cfs)	0.594
Qb	By-pass Flow (cfs)	0.056 ~ 100% INTERCEPT OK!

C8
S00

RAMP E-
STA. 58+

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/20/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0252
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.420
T	Width of Spread (ft)		4.90 < TAU = 10'

Gutter Flow

Eo	Gutter Flow Ratio	1.000
d	Depth of Flow (ft)	0.17 < OK
V	Average Velocity (ft/sec)	3.45

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	15.61	10.05	0.84	1.198	0.222
Parallel Bar P-1-7/8	2.00	1.72	1.00	0.221	0.001
Combination			1.00	1.419	0.001

18"Ø SLOTTED DRAIN
LENGTH = 15'

CB 196

RAMP E-1

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 08/20/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0146
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.890
T	Width of Spread (ft)		8.57 < TALL

Gutter Flow

Eo	Gutter Flow Ratio		0.909
d	Depth of Flow (ft)		0.25 < d ALL
V	Average Velocity (ft/sec)		3.19

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.51	13.40	0.90	2.605	0.285
Parallel Bar P-1-7/8	2.00	1.72	0.98	0.279	0.007
Combination			1.00	2.883	0.007

NO BYPASS FLOW

20' - 18"Φ SLOTTED DRAIN

RAMP N-E

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ramp N-E

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
619	CB619	0.69	0.95	4.22	2.76			2.76
713	CB713	1.23	0.95	4.22	4.95			4.95
721	CB721	0.59	0.95	4.22	2.37	CB711/713	0.33	2.70
711	CB711	0.50	0.95	4.22	2.00			2.00

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

CB 619

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 04/22/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0240
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.763
T	Width of Spread (ft)		8.95

Gutter Flow

Eo	Gutter Flow Ratio	0.585
d	Depth of Flow (ft)	0.18
V	Average Velocity (ft/sec)	3.44

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	24.77	10.05	0.61	1.680	1.083
Parallel Bar P-1-7/8	2.00	1.72	0.67	0.724	0.359
Combination			0.87	2.404	0.359

Ramp N-E

CB 619

Sta 161+35.25

Ramp NE
CB 713
Sta 37+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/11/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0150
Sx	Pavement Cross Slope	(ft/ft)	0.0600
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		4.950
T	Width of Spread (ft)		6.93

Gutter Flow

Eo	Gutter Flow Ratio	0.915
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	4.09

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	18.56	10.05	0.75	3.734	1.216
Parallel Bar P-1-7/8	2.00	1.72	0.78	0.951	0.265
Combination			0.95	4.685	0.265

CB 721
Ramp NE
Sta 40+66

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/11/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

	Cross Slope	Composite/Dep
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0370
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	4.50
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	12.82
WGR	Grate Width (ft)	2.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.291
d_curb	Depth at Curb (ft)	0.416
Qi	Intercepted Flow (cfs)	2.700

Kamp NE 8
Junc w/ 202

CB 711
Sta 42+70

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/11/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0060
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.000
T	Width of Spread (ft)		8.90

Gutter Flow

Eo	Gutter Flow Ratio	0.896
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	2.07

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	12.21	6.70	0.76	1.522	0.478
Parallel Bar P-1-7/8	2.00	1.72	0.87	0.416	0.062
Combination			0.97	1.938	0.062

RAMP S-W

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ramp S-W

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
498	CB498	0.06	0.95	4.22	0.24			0.24
504	CB504	0.75	0.95	4.22	3.02			3.02
503	CB503	0.71	0.95	4.22	2.85	CB504	0.24	3.09
499	CB499	0.11	0.95	4.22	0.43	CB503	0.24	0.67

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

Ramp SW
CB 498
Sta

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/14/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0107
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0208
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		0.240
T	Width of Spread (ft)		4.12

Gutter Flow

Eo	Gutter Flow Ratio	0.919
d	Depth of Flow (ft)	0.08
V	Average Velocity (ft/sec)	1.39

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.976
Qi	Intercepted Flow (cfs)	0.234
Qb	By-pass Flow (cfs)	0.006

Ramp SW
CB 504
Sta 24+70

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/14/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0340
Sx	Pavement Cross Slope	(ft/ft)	0.0600
Sw	Gutter Cross Slope	(ft/ft)	0.0370
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		4.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.020
T	Width of Spread (ft)		5.38

Gutter Flow

Eo	Gutter Flow Ratio	0.986
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	4.75

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	19.08	6.70	0.54	1.634	1.386
Parallel Bar P-1-7/8	2.00	1.72	0.82	1.142	0.244
Combination			0.92	2.776	0.244

CB 503

Ramp S-W
Sta. 33+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/09/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0113
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0667
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.090
T	Width of Spread (ft)		9.56

Gutter Flow

Eo	Gutter Flow Ratio	0.677
d	Depth of Flow (ft)	0.31
V	Average Velocity (ft/sec)	2.92

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	14.29	3.35	0.38	1.179	1.911
Parallel Bar P-1-7/8	3.00	1.72	0.88	1.677	0.234
Combination			0.92	2.856	0.234

Ramp SW
Sta 34+15
CB 499

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/15/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0044
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		0.610
T	Width of Spread (ft)		4.94

Gutter Flow

Eo	Gutter Flow Ratio	0.939
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	1.56

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	4.68	3.35	0.90	0.546	0.064
Parallel Bar P-1-7/8	3.00	1.72	1.00	0.064	0.000
Combination			1.00	0.~~610~~ 0.67	0.000

RAMP W-N

Loop 202/US60 Traffic Interchange
On-Site Drainage
Runoff Computations

Ramp W-N

Drainage Area	Catch Basin Designation	Contributing Area[1]	Runoff Coefficient C	Rainfall Intensity I	Peak Flow Q	Catch Basin Bypass Flow	Bypass Flow Q_{bypass}	Total Flow Q_{total}
		(acres)		(in/hr)	(cfs)		(cfs)	(cfs)
826	CB826	0.53	0.95	4.22	2.12	CB824	0.23	2.35
650	CB650	0.26	0.95	4.22	1.04	CB826	0.19	1.23
651	CB651	0.85	0.95	4.22	3.40	CB650	0.10	3.50
821	CB821	0.26	0.95	4.22	1.04			1.04

[1] Refer to the drainage area maps inserted in this report for delineation of the drainage areas.

Ramp W-1
CB 826
Sta 15+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/16/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0162
Sx	Pavement Cross Slope	(ft/ft)	0.0450
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		2.620
T	Width of Spread (ft)		5.27

Gutter Flow

Eo	Gutter Flow Ratio	0.854
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	3.78

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	3.00
e	Inlet Efficiency	0.927
Qi	Intercepted Flow (cfs)	2.430
Qb	By-pass Flow (cfs)	0.190

Ramp W-N
CB 650
Sta 19+00

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/16/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Grate Inlet

Roadway and Discharge Data

			Composite
	Cross Slope		
S	Longitudinal Slope	(ft/ft)	0.0162
Sx	Pavement Cross Slope	(ft/ft)	0.0600
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.230
T	Width of Spread (ft)		3.44

Gutter Flow

Eo	Gutter Flow Ratio	0.972
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	3.27

Inlet Interception

	Inlet Type	Parallel Bar P-1-7/8
L	Grate Length (ft)	1.72
WGR	Grate Width (ft)	2.00
e	Inlet Efficiency	0.922
Qi	Intercepted Flow (cfs)	1.134
Qb	By-pass Flow (cfs)	0.096

Ramp W-N
Sta ~~CB~~ 25+81.0
CB 651
Sag

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 06/16/2004

Project No. :
Project Name.:
Computed by :

Inlets on Sag: Grate Inlet

Roadway and Discharge Data

			Composite/Dep
	Cross Slope		
Sx	Pavement Cross Slope	(ft/ft)	0.0600
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Parallel Bar P-1-7/8
T	Width of Spread (ft)	6.18
WGR	Grate Width (ft)	2.00
L	Grate Length (ft)	1.72
d_ave	Depth of Flow (ft)	0.346
d_curb	Depth at Curb (ft)	0.472
Qi	Intercepted Flow (cfs)	3.500

Ramp W N
CB 821
Sta 35+80.81

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/16/2004

Project No. :
Project Name.:
Computed by :

Inlets on Grade: Slotted Drain and Grate Inlet

Roadway and Discharge Data

	Cross Slope		Composite
S	Longitudinal Slope	(ft/ft)	0.0124
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0670
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.50
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		1.040
T	Width of Spread (ft)		5.00

Gutter Flow

Eo	Gutter Flow Ratio	0.937
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	2.62

Inlet Interception

INLET INTERCEPTION	LT or WGR (ft)	L (ft)	E	Qi (cfs)	Qb (cfs)
Slotted drain	8.01	3.35	0.62	0.648	0.392
Parallel Bar P-1-7/8	2.00	1.72	1.00	0.391	0.001
Combination			1.00	1.039	0.001

Qb goes to US60
CB 610

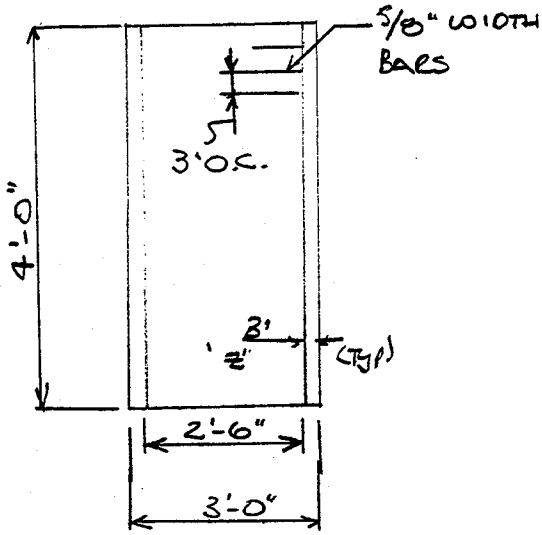
MEDIAN AND OFF-SITE CATCH BASINS

HYDROLOGIC CALCULATIONS

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: L202/US60 T1 Project No: AZ11070
Computed by: DNJ Date: AUG. 24, 04
Checked By: Date:
Sheet Name Sheet: Of:

C-15.80 LENGTHENED TO 4'-0" (C-15.81)



OPEN AREA

OF BARS: $\frac{48" - 6" (ENDS)}{3"} = 14$ BARS

BAR AREA: $\frac{5/8"}{12} \times 2.5' = 0.1302\ FT^2$

TOTAL BAR AREA: $14 \times 0.1302\ FT^2$

$1.82\ FT^2$

$\therefore 4.0' \times 2.5' - 1.82$ (BARS) = $\underline{\underline{8.18\ FT^2}}$

PERIMETER

ENDS: $2.5\ FT \times 2 = 5.0\ FT$

SIDES: $2[4' - 14(0.0521')] = 6.54\ FT$

$\therefore 5.0\ FT + 6.54\ FT = \underline{\underline{11.54\ FT.}}$

LOOP 202/US 60 T.I.
OFF-SITE CATCH BASIN COMPUTATIONS

ADOT RATIONAL METHOD
10 & 25-YEAR STORMS

1. Runoff Coefficients are area-weighted when more than one land use is present.
2. The minimum time of concentration is 10 minutes per ADOT.
3. Calculated discharges rounded to 0.1 cfs for design.
4. Inlet depths are calculated using ADOT design criteria.

Variable	Description	Single Value	Double Value
Cw	Weir Coefficient	3.00	
P	Perimeter	8.27	11.54
	Perimeter Debris Factor	0.75	
Co	Orifice Coefficient	0.67	
A	Area of Grate (C-15.80)	4.09	8.177
	Area Debris Factor	0.50	

Computed by: DNJ
Checked by: _____
Approved by: _____

Drainage Area	Design					Inlet				US Bypass Flow		Total	Depth at Inlet (ft)			Depth
Station to Station	Area (ac)	Avg. C	Tc (hr)	I (in/hr)	Q (cfs)	No.	Station	Type	Double	Qc (cfs)	Inlet No.	Flow Qt (cfs)	Weir	Orifice	Design	Control
US60																
Sta 877+00 to Sta 888+85	1.130	0.70	0.167	5.15	4.1	119	885+35	C-15.80		0	NA	4.1	0.36	0.14	0.36	Weir
Sta 884+70 to Sta 891+40	0.420	0.70	0.167	5.15	1.5	121	885+35	C-15.80		0	NA	1.5	0.19	0.02	0.19	Weir
Sta 1024+36 to Sta 1035+80.5	1.140	0.70	0.167	5.15	4.1	480	1025+07.5	C-15.80		0	NA	4.1	0.37	0.14	0.37	Weir
Sta 1024+32 to Sta 1034+46	0.089	0.70	0.167	5.15	0.3	441	1025+00	C-15.80		0	NA	0.3	0.07	0.00	0.07	Weir
Replace Existing Catch Basin	NA	NA	NA	NA	NA	453	1049+50	C-15.80		0	NA	NA	NA	NA	NA	NA
Replace Existing Catch Basin	NA	NA	NA	NA	NA	461	1055+26.46	C-15.80		0	NA	NA	NA	NA	NA	NA
L202																
Sta 22+50 to Sta 1430+50	2.110	0.90	0.167	4.22	8.0	823	1430+50	C-15.80	D	0	NA	8.0	0.46	0.13	0.46	Weir
Sta 1430+50 to Sta 1433+93.8	1.070	0.82	0.167	4.22	3.7	825	1433+93.8	C-15.80		0	NA	3.7	0.34	0.11	0.34	Weir
Sta 1433+93.8 to Sta 1436+70	1.000	0.83	0.167	4.22	3.5	827	1436+70	C-15.80		0	NA	3.5	0.33	0.10	0.33	Weir
Sta 1436+70 to Sta 1440+25	1.430	0.84	0.167	4.22	5.1	829	1440+25	C-15.80		0	NA	5.1	0.42	0.21	0.42	Weir
Sta 1440+25 to Sta 1445+83.07	1.910	0.80	0.167	4.22	6.4	804	1445+83.07	C-15.80	D	0	NA	6.4	0.40	0.09	0.40	Weir
Sta 1453+00 to Sta 1457+72.44	0.810	0.70	0.167	4.22	2.4	724	1457+72.44	C-15.81		0	NA	2.4	0.25	0.05	0.25	Weir
Sta 1457+72.44 to Sta 1467+55	2.160	0.70	0.167	4.22	6.4	730	1461+70.7	C-15.81	D	0	NA	6.4	0.39	0.08	0.39	Weir
Ramp W-S																
Sta 19+80 to Sta 26+60	0.750	0.70	0.167	4.22	2.2	675	20+85.17	C-15.80		0	NA	2.2	0.24	0.04	0.24	Weir
Sta 18+30 to Sta 25+30	0.740	0.70	0.167	4.22	2.2	671	20+85.17	C-15.80		0	NA	2.2	0.24	0.04	0.24	Weir
Sta 13+35.7 to Sta 19+80	1.200	0.70	0.167	4.22	3.5	672	18+20	C-15.80		0	NA	3.5	0.33	0.10	0.33	Weir
Sta 26+60 to Sta 42+25	1.350	0.70	0.167	4.22	4.0	621	36+16	C-15.80		0	NA	4.0	0.36	0.13	0.36	Weir
Sta 31+40 to Sta 40+90	0.440	0.70	0.167	4.22	1.3	642	36+12.55	C-15.81		0	NA	1.3	0.17	0.01	0.17	Weir
Sta 75+10 to Sta 79+15	0.560	0.70	0.167	4.22	1.7	716	79+19.01	C-15.80		0	NA	1.7	0.20	0.02	0.20	Weir
Sta 79+15 to Sta 82+00	0.210	0.70	0.167	4.22	0.6	720	81+84.03	C-15.80		0	NA	0.6	0.10	0.00	0.10	Weir
Ramp E-N																
Sta 33+94.72 to Sta 65+92.01	4.490	0.83	0.167	4.22	15.7	197	65+92.01	C-15.80	D	0	NA	15.7	0.72	0.52	0.72	Weir
Ramp N-E																
Sta 63+10 to Sta 69+65	0.910	0.70	0.167	4.22	2.7	712	40+66	C-15.81		0	NA	2.7	0.28	0.06	0.28	Weir
Ramp S-E																
Sta 60+10 to Sta 63+70	0.270	0.70	0.167	4.22	0.8	617	63+49.55	C-15.80		0	NA	0.8	0.12	0.01	0.12	Weir

Drainage Area	Design					Inlet				US Bypass Flow		Total	Depth at Inlet (ft)			Depth
Station to Station	Area (ac)	Avg. C	Tc (hr)	I (in/hr)	Q (cfs)	No.	Station	Type	Double	Qc (cfs)	Inlet No.	Flow Qt (cfs)	Weir	Orifice	Design	Control
Ramp S-W																
Sta 21+00 to Sta 34+15	0.920	0.70	0.167	4.22	2.7	497	34+15	C-15.80		0	NA	2.7	0.28	0.06	0.28	Weir
Ramp W-N																
19+25 to 25+81.02	0.180	0.70	0.167	4.22	0.5	908	25+81.02	C-15.80		0	NA	0.5	0.09	0.00	0.09	Weir
Power Road Ramp D																
Sta 11+00 to Sta 22+10	0.660	0.70	0.167	4.22	1.9	113	871+70	C-15.80		0	NA	1.9	0.22	0.03	0.22	Weir
Ellsworth Rd Ramp A																
Sta 16+25.94 to Sta 22+30	0.780	0.70	0.167	4.22	2.3	631	16+25.94	C-15.80		0	NA	2.3	0.25	0.04	0.25	Weir
Ellsworth Road Ramp B																
Sta. 14+74.55 - Basin S-W	NA	NA	NA	NA	NA	267	14+74.55	C-15.80		0	NA	NA	NA	NA	NA	
Sta 21+46.49 to Sta 28+50	0.630	0.70	0.167	4.22	1.9	602	21+46.49	C-15.80		0	NA	1.9	0.22	0.03	0.22	Weir
Sta 28+50 to Sta 29+10	0.270	0.70	0.167	4.22	0.8	604	28+50	C-15.80		0	NA	0.8	0.12	0.01	0.12	Weir
Sta 28+80 to Sta 33+80	0.900	0.70	0.167	4.22	2.7	605	28+80	C-15.80		0	NA	2.7	0.27	0.06	0.27	Weir
Sta 33+80 to Sta 38+40	1.070	0.70	0.167	4.22	3.2	613	33+80	C-15.80		0	NA	3.2	0.31	0.08	0.31	Weir
Sta 38+40 to Sta 45+60	1.720	0.70	0.167	4.22	5.1	616	38+40	C-15.80		0	NA	5.1	0.42	0.21	0.42	Weir
Crismon Road Ramp A																
Sta 16+06 to Sta 23+65	0.900	0.70	0.167	4.22	2.7	41	23+65	C-15.80		0	NA	2.7	0.27	0.06	0.27	Weir

RIPRAP CALCULATIONS

Determination of d_{50} for Riprap Splash Pads (Detail DI) and Storm Drain Outlets (Detail DJ)

Equation: $d_{50} = (0.02/TW)(Q/D_o)^{4/3}$

where:

TW: tailwater depth above the invert of the pipe, feet

Q: Pipe discharge in cfs for design storm or or 25 year, whichever is greater

D_o: Maximum inside pipe wide, feet.

Outlet Pipe Designation	Pipe Diameter (D_o)	Discharge (Q)	Tailwater Depth[1] (TW)	Riprap Size d_{50}		Recommended d_{50} Size
	(feet)	(cfs)	(feet)	(feet)	(inches)	(inches)
504	2	3.6	0.4	0.11	1.32	6
908	2	4.2	0.4	0.13	1.59	6
607	2	6.5	0.4	0.24	2.89	6
647	2	3.0	0.4	0.09	1.05	6
648	2	7.5	0.4	0.29	3.49	6
508	2	3.3	0.4	0.10	1.16	6
512	2	5.9	0.4	0.21	2.55	6
649	2	3.3	0.4	0.10	1.16	6
905	2.5	37.9	0.4	1.87	22.48	9
830	2	9.4	0.4	0.39	4.70	6
498	2	0.3	0.4	0.00	0.05	6
722	2	7.8	0.4	0.31	3.70	6
723	2	8.0	0.4	0.32	3.82	6
725	2	7.3	0.4	0.28	3.35	6
729	2	5.4	0.4	0.19	2.25	6
727	2	6.6	0.4	0.25	2.95	6
731	2	13.9	0.4	0.66	7.94	9
713	2	6.0	0.4	0.22	2.61	6
606	2	19.0	0.4	1.00	12.04	9
414	2	24.3	0.4	1.40	16.76	18
500	2	1.7	0.4	0.04	0.47	6
501	2	0.4	0.4	0.01	0.07	6
502	2	9.2	0.4	0.38	4.59	6
507	2	0.3	0.4	0.00	0.06	6
509	2	0.3	0.4	0.00	0.06	6
482	2	2.4	0.4	0.07	0.78	6
458	2	2.4	0.4	0.07	0.78	6
614	2	5.2	0.4	0.18	2.12	6

[1] Tailwater elevations at the outlets are assumed to be 0.2 times the pipe diameter.

Outlet Pipes Discharges Based on the 25-year Storm Event

Pipe Designation	Area	C-Coefficient	Intensity[2]	Q
	(acres)		(inches/hour)	(cfs)
504	0.74	0.95	5.15	3.6
908	0.85	0.95	5.15	4.2
607	1.33	0.95	5.15	6.5
647	0.62	0.95	5.15	3.0
648	1.53	0.95	5.15	7.5
508	0.67	0.95	5.15	3.3
512	1.21	0.95	5.15	5.9
649	0.67	0.95	5.15	3.3
905	8.45	0.87	5.15	37.9
830	2.09	0.87	5.15	9.4
498	0.06	0.95	5.15	0.3
722	1.6	0.95	5.15	7.8
723	1.64	0.95	5.15	8.0
725	1.7	0.83	5.15	7.3
729	1.1	0.95	5.15	5.4
727	1.35	0.95	5.15	6.6
731	3.41	0.79	5.15	13.9
713	1.23	0.95	5.15	6.0
606	4.72	0.78	5.15	19.0
414	NA	NA	NA	24.3
500	0.34	0.95	5.15	1.7
501	0.08	0.95	5.15	0.4
502	1.88	0.95	5.15	9.2
507	0.07	0.95	5.15	0.3
509	0.07	0.95	5.15	0.3
482	0.5	0.95	5.15	2.4
458	0.5	0.95	5.15	2.4
614	1.16	0.95	5.15	5.7

[2] Intensity is based on the 25-year storm event.

DRAINAGE DITCH CALCULATIONS

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: LOOP 202/US60 TI
Computed by: ONJ
Checked By:
Sheet Name S-E CHANNEL

Project No:
Date: Oct. 31, 2004
Date:
Sheet: 1 Of: 7

DESIGN OF S-E CHANNEL

I. DESIGN ASSUMPTIONS & CRITERIA.

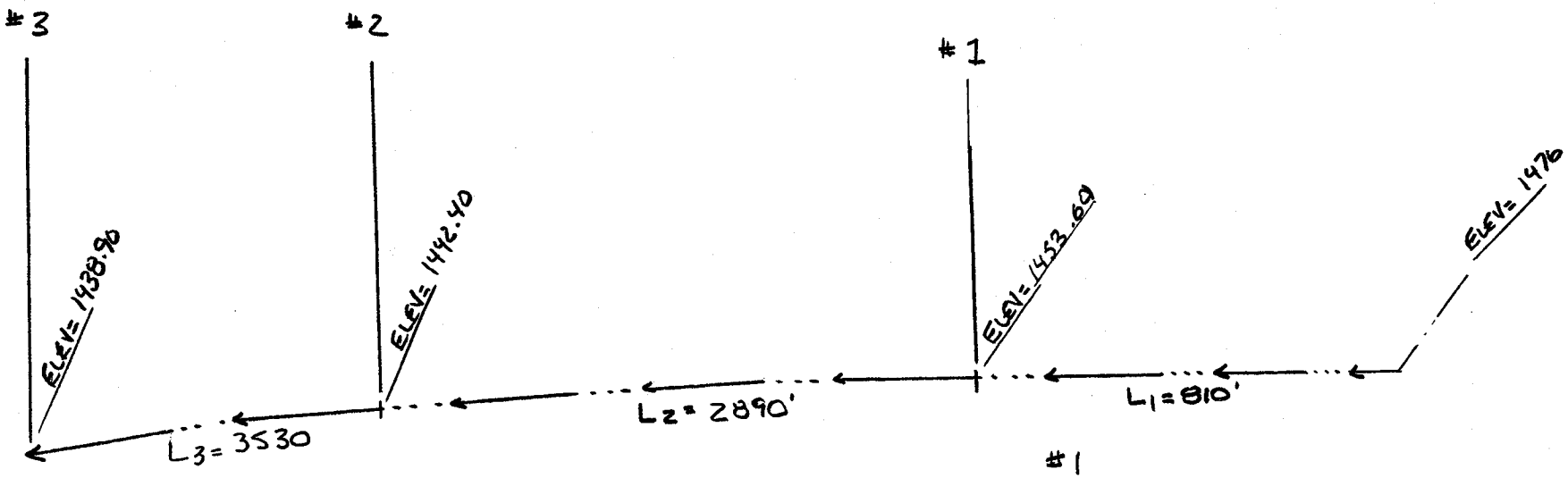
1. CHANNEL SIZED FOR 50-yr STORM EVENT.
2. ADOT METHOD FOR TIME OF CONCENTRATION CALCS.
3. FLOW MASTER PROGRAM USED
4. CONTRIBUTING AREA IS LIMITED BY R/W.
   - NO CONTRIBUTING DRAINAGE AREAS OUTSIDE R/W
5. BARE GROUND - ROUGHNESS COEFFIENT 'n' = 0.024

II APPROACH.

1. CHANNEL SEPARATED INTO 3-SECTIONS - #1, #2, & #3
2. CUMULATIVE AREA & WEIGHTED C_w-VALUE CALC.
3. CUMULATIVE t_c - FOR EACH SECTION.

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: LOOP 202/USGO T1 Project No: ____
Computed by: DWJ Date: ____
Checked By: ____ Date: ____
Sheet Name S-E CHANNEL Sheet: 2 Of: 7



#3

TOTAL AREA= 9.40 AC.

PAV'T=0.80 AC

R/W= 8.60

$C_w = \frac{0.80(0.95)+8.6(0.60)}{9.40}$

= 0.63

tc= 30 minutes

I = 3.38

Q = 0.63(3.38)(9.40)

= 20 CFS

#2

TOTAL AREA= 6.88 ACRES

PAV'T= 0.80 ACRES

R/W= 6.08 ACRES

$C_w = \frac{0.80(0.95)+6.08(0.60)}{6.88}$

= 0.64

tc= 25 minutes

I = 3.92

Q = 0.64(3.92)(6.88)

= 17.3 CFS

#1

TOTAL AREA= 2.82 ACRES

PAV'T= 0.80 ACRES

R/W = 2.02 ACRES

$C_w = \frac{0.80(0.95)+2.02(0.60)}{2.82}$

= 0.70

tc= SEE tc CALCS -10 min

I = 5.86 in/hr

Q = 0.70(5.86)(2.82)

= 11.6 CFS

Worksheet for S-E Channel # 1

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00430	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	11.20	ft^3/s

Results		
Normal Depth:	1.17	ft
Flow Area:	4.09	ft^2
Wetted Perimeter:	7.39	ft
Top Width:	7.01	ft
Critical Depth:	0.97	ft
Critical Slope:	0.01145	ft/ft
Velocity:	2.74	ft/s
Velocity Head:	0.12	ft
Specific Energy:	1.28	ft
Froude Number:	0.63	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	1.17	ft
Critical Depth:	0.97	ft
Channel Slope:	0.00430	ft/ft
Critical Slope:	0.01145	ft/ft

Worksheet for S-E Channel #2

Project Description		
Flow Element:	Trapezoidal Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.020	
Channel Slope:	0.00430	ft/ft
Left Side Slope:	3.10	ft/ft (H:V)
Right Side Slope:	3.10	ft/ft (H:V)
Bottom Width:	2.00	ft
Discharge:	17.30	ft^3/s

Results		
Normal Depth:	0.99	ft
Flow Area:	5.03	ft^2
Wetted Perimeter:	8.46	ft
Top Width:	8.14	ft
Critical Depth:	0.87	ft
Critical Slope:	0.00745	ft/ft
Velocity:	3.44	ft/s
Velocity Head:	0.18	ft
Specific Energy:	1.18	ft
Froude Number:	0.77	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.99	ft
Critical Depth:	0.87	ft
Channel Slope:	0.00430	ft/ft

Worksheet for S-E Channel #2

Critical Slope:	0.00745	ft/ft

6/:

Worksheet for S-E Channel *3

Project Description		
Flow Element:	Trapezoidal Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00430	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Bottom Width:	4.00	ft
Discharge:	20.00	ft^3/s

Results		
Normal Depth:	0.95	ft
Flow Area:	6.55	ft^2
Wetted Perimeter:	10.03	ft
Top Width:	9.72	ft
Critical Depth:	0.76	ft
Critical Slope:	0.01061	ft/ft
Velocity:	3.05	ft/s
Velocity Head:	0.15	ft
Specific Energy:	1.10	ft
Froude Number:	0.66	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.95	ft
Critical Depth:	0.76	ft
Channel Slope:	0.00430	ft/ft

Worksheet for S-E Channel *3

Critical Slope:	0.01061	ft/ft

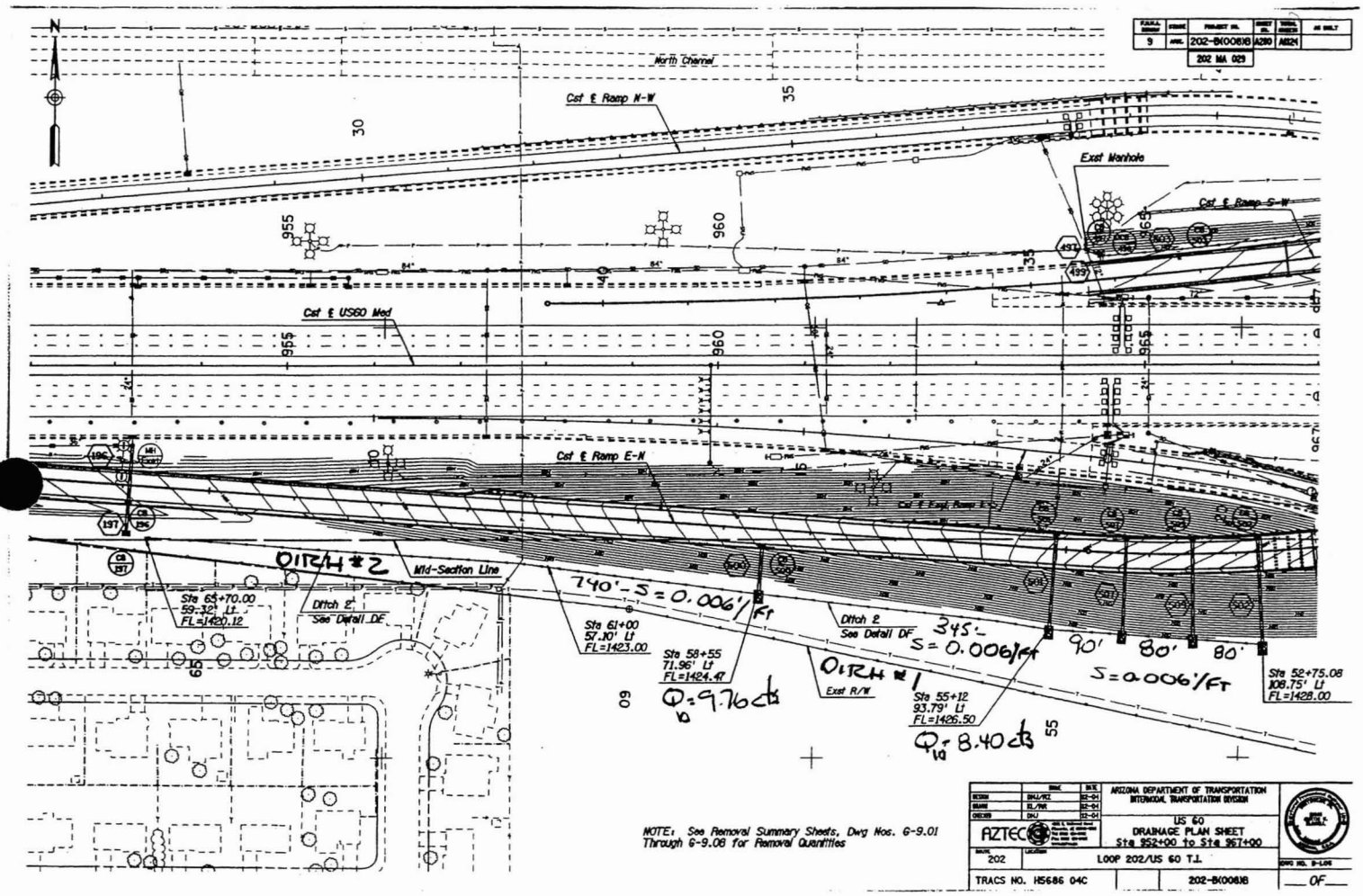
AZTEC ENGINEERING

3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: US60/L202 T1 Project No: AZ01107
Computed by: DNJ Date: DEC 13, 2004
Checked By: Date:
Sheet Name Sheet: 1 Of: 3

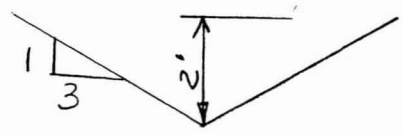
RAMP E-N DRAINAGE DITCH - CUT DITCH - NON-DEPRESSED ROADWAY

DESIGN STORM FREQUENCY = 10 YRS



DITCH: DETAIL DF

DITCH 2:



Worksheet for E-N Channel #1

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00600	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	8.40	ft^3/s

Results		
Normal Depth:	0.98	ft
Flow Area:	2.91	ft^2
Wetted Perimeter:	6.23	ft
Top Width:	5.91	ft
Critical Depth:	0.87	ft
Critical Slope:	0.01190	ft/ft
Velocity:	2.89	ft/s
Velocity Head:	0.13	ft
Specific Energy:	1.11	ft
Froude Number:	0.73	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.98	ft
Critical Depth:	0.87	ft
Channel Slope:	0.00600	ft/ft
Critical Slope:	0.01190	ft/ft

Worksheet for E-N Channel #2

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00600	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	9.70	ft^3/s

Results		
Normal Depth:	1.04 — OK!	ft
Flow Area:	3.24	ft^2
Wetted Perimeter:	6.57	ft
Top Width:	6.24	ft
Critical Depth:	0.92	ft
Critical Slope:	0.01168	ft/ft
Velocity:	2.99	ft/s
Velocity Head:	0.14	ft
Specific Energy:	1.18	ft
Froude Number:	0.73	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	1.04	ft
Critical Depth:	0.92	ft
Channel Slope:	0.00600	ft/ft
Critical Slope:	0.01168	ft/ft

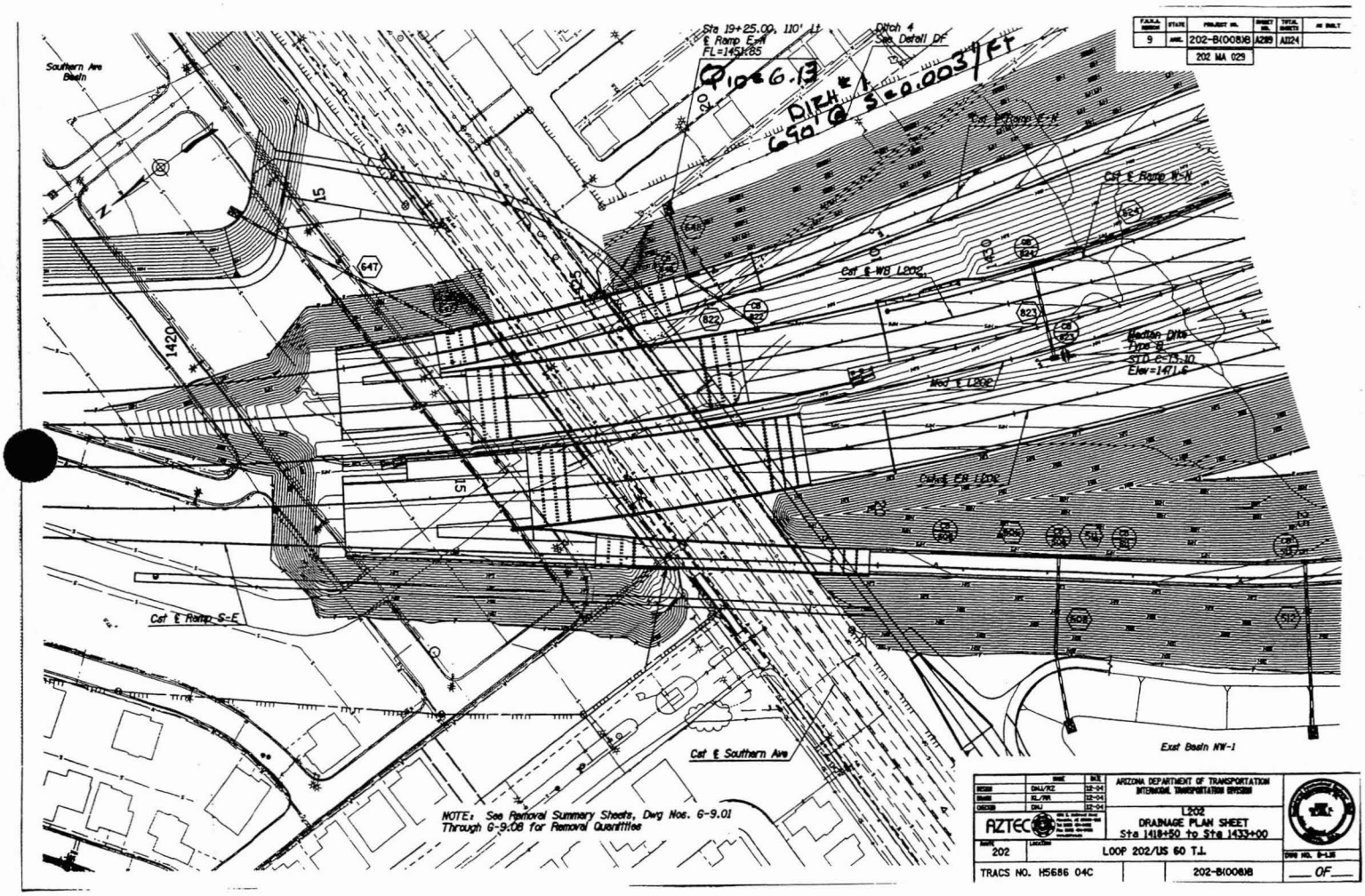
AZTEC ENGINEERING

3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: US60/L202L T1 Project No: A201107
Computed by: DNJ Date: DEC 13, 04
Checked By: Date:
Sheet Name Sheet: 1 Of: 4

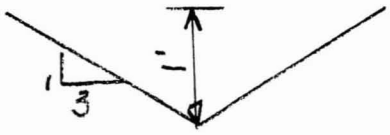
RAMP E-N (NORTH END)

DESIGN STORM - 10 yr = 6.13 cfs



DITCH DETAIL: DF

DITCH 4

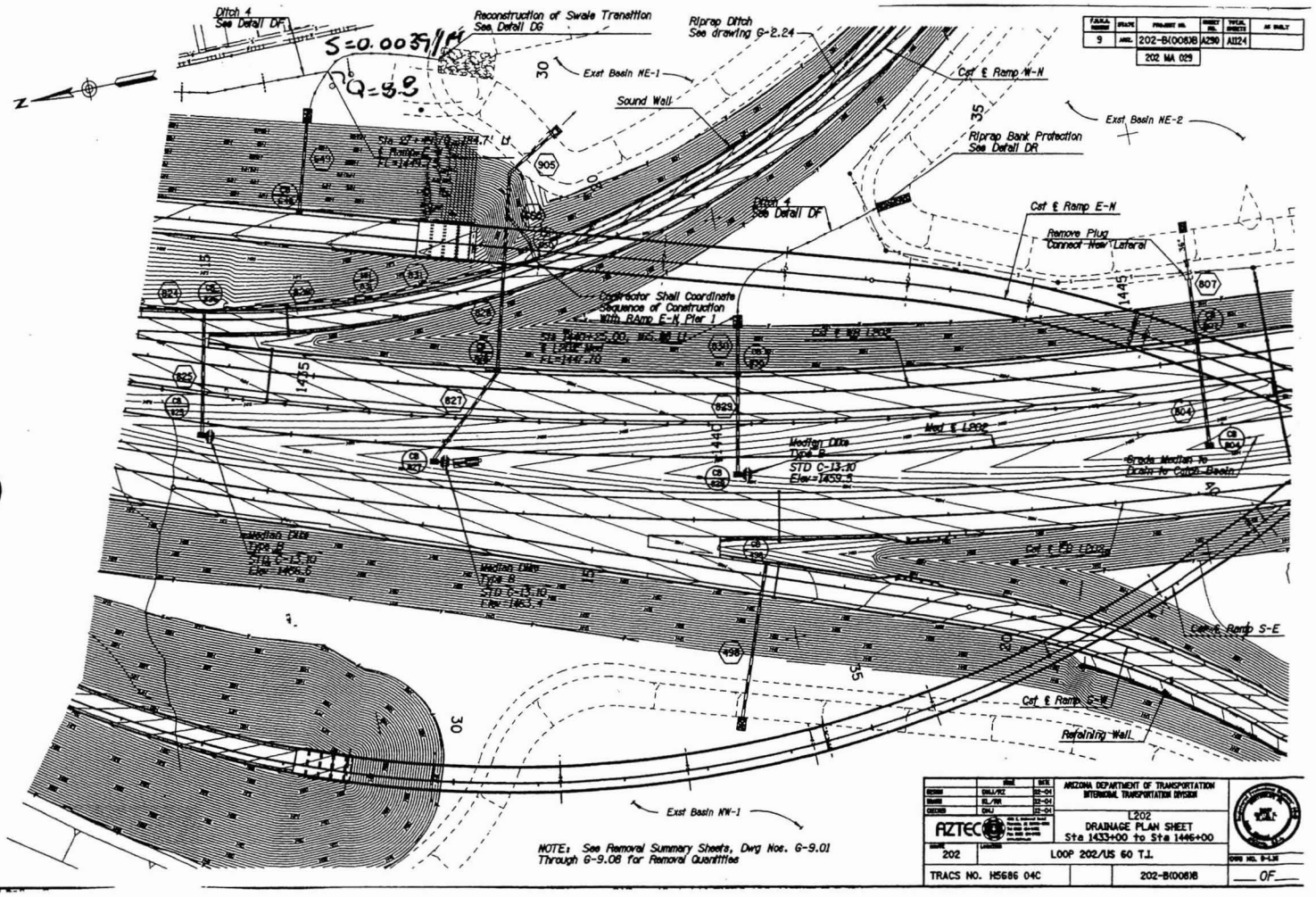


AZTEC ENGINEERING

3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: US60/L202 TI
Project No: A201107
Computed by: DWJ
Date: DEC 13, 04
Checked By:
Date:
Sheet Name
Sheet: 2 Of: 4

RAMP E-N (NORTH END)



Worksheet for North Ramp E-N #1

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00300	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	6.13	ft^3/s

Results		
Normal Depth:	1.00	ft
Flow Area:	2.98	ft^2
Wetted Perimeter:	6.30	ft
Top Width:	5.98	ft
Critical Depth:	0.76	ft
Critical Slope:	0.01241	ft/ft
Velocity:	2.06	ft/s
Velocity Head:	0.07	ft
Specific Energy:	1.06	ft
Froude Number:	0.51	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	1.00	ft
Critical Depth:	0.76	ft
Channel Slope:	0.00300	ft/ft
Critical Slope:	0.01241	ft/ft

DITCH WILL RUN BANK FULL (should NOT BE A problem because of large e/w)

Worksheet for North Ramp E-N #2

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00390	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	8.80	ft^3/s

Results		
Normal Depth:	1.09	ft
Flow Area:	3.54	ft^2
Wetted Perimeter:	6.87	ft
Top Width:	6.52	ft
Critical Depth:	0.88	ft
Critical Slope:	0.01183	ft/ft
Velocity:	2.48	ft/s
Velocity Head:	0.10	ft
Specific Energy:	1.18	ft
Froude Number:	0.59	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

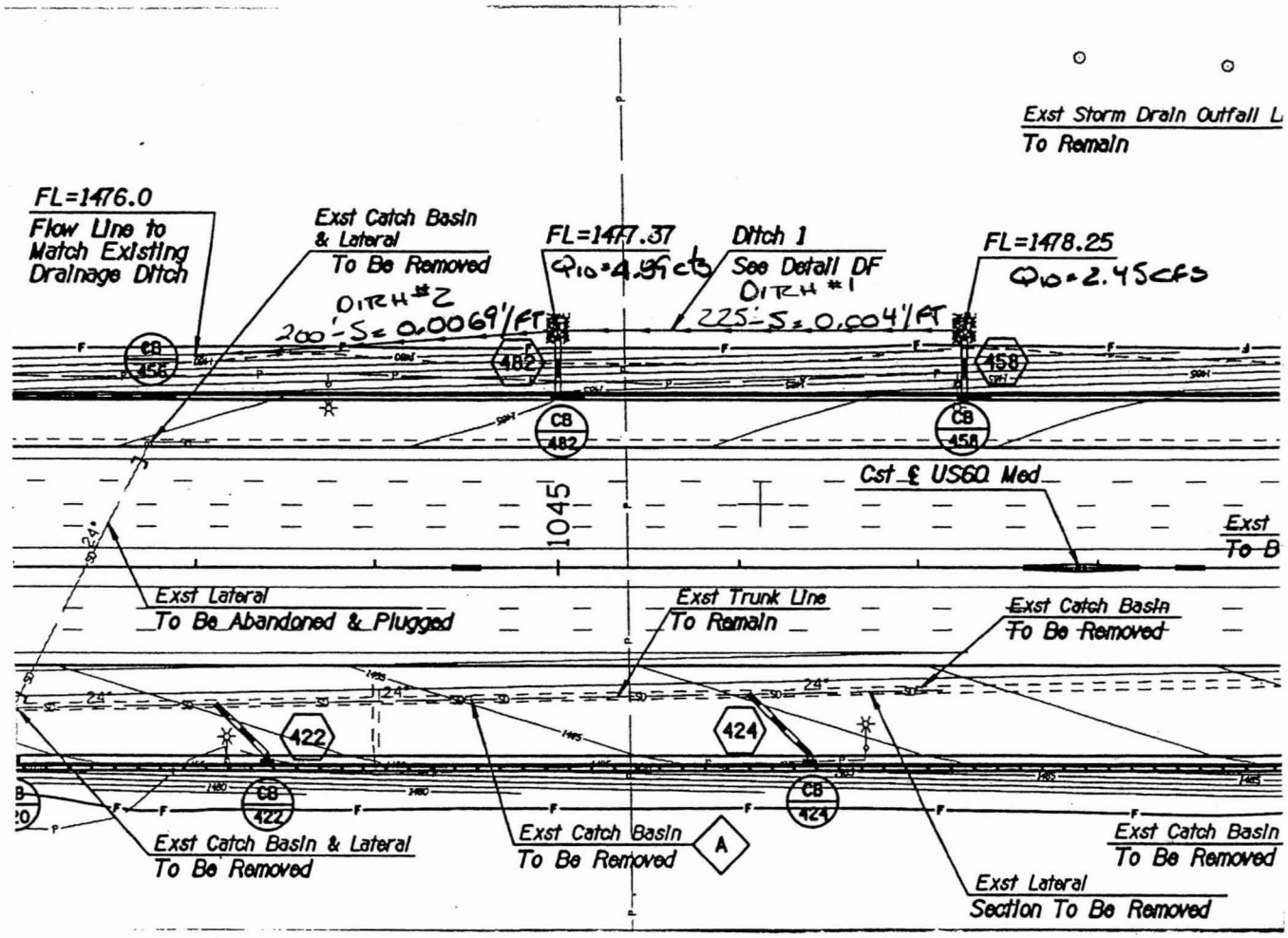
GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	1.09 ~ DITCH WILL RUN BANK FULL (LARGE R/W - SHOULD NOT BE A PROBLEM)	ft
Critical Depth:	0.88	ft
Channel Slope:	0.00390	ft/ft
Critical Slope:	0.01183	ft/ft

AZTEC ENGINEERING
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

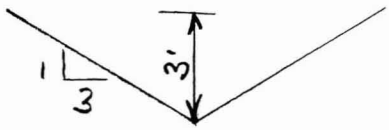
Project: US60/L202L TI
Project No: A2 01107
Computed by: DNJ
Date: DEC 13, 2004
Checked By:
Date:
Sheet Name
Sheet:
Of:

US60 WESTBOUND LANES - STA. 1043+00 TO STA. 1047+20

DESIGN STORM - 10-yrs



DITCH DETAIL OF
DITCH 1:



Worksheet for US60 WB Ditch #1

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00400	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	2.45	ft^3/s

Results		
Normal Depth:	0.67	ft
Flow Area:	1.34	ft^2
Wetted Perimeter:	4.23	ft
Top Width:	4.02	ft
Critical Depth:	0.53	ft
Critical Slope:	0.01403	ft/ft
Velocity:	1.82	ft/s
Velocity Head:	0.05	ft
Specific Energy:	0.72	ft
Froude Number:	0.56	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.67	ft
Critical Depth:	0.53	ft
Channel Slope:	0.00400	ft/ft
Critical Slope:	0.01403	ft/ft

Worksheet for US60 WB Ditch #2

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.00690	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	4.89	ft^3/s

Results		
Normal Depth:	0.78	ft
Flow Area:	1.84	ft^2
Wetted Perimeter:	4.95	ft
Top Width:	4.70	ft
Critical Depth:	0.70	ft
Critical Slope:	0.01279	ft/ft
Velocity:	2.66	ft/s
Velocity Head:	0.11	ft
Specific Energy:	0.89	ft
Froude Number:	0.75	
Flow Type:	Subcritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.78	ft
Critical Depth:	0.70	ft
Channel Slope:	0.00690	ft/ft
Critical Slope:	0.01279	ft/ft

AZTEC ENGINEERING

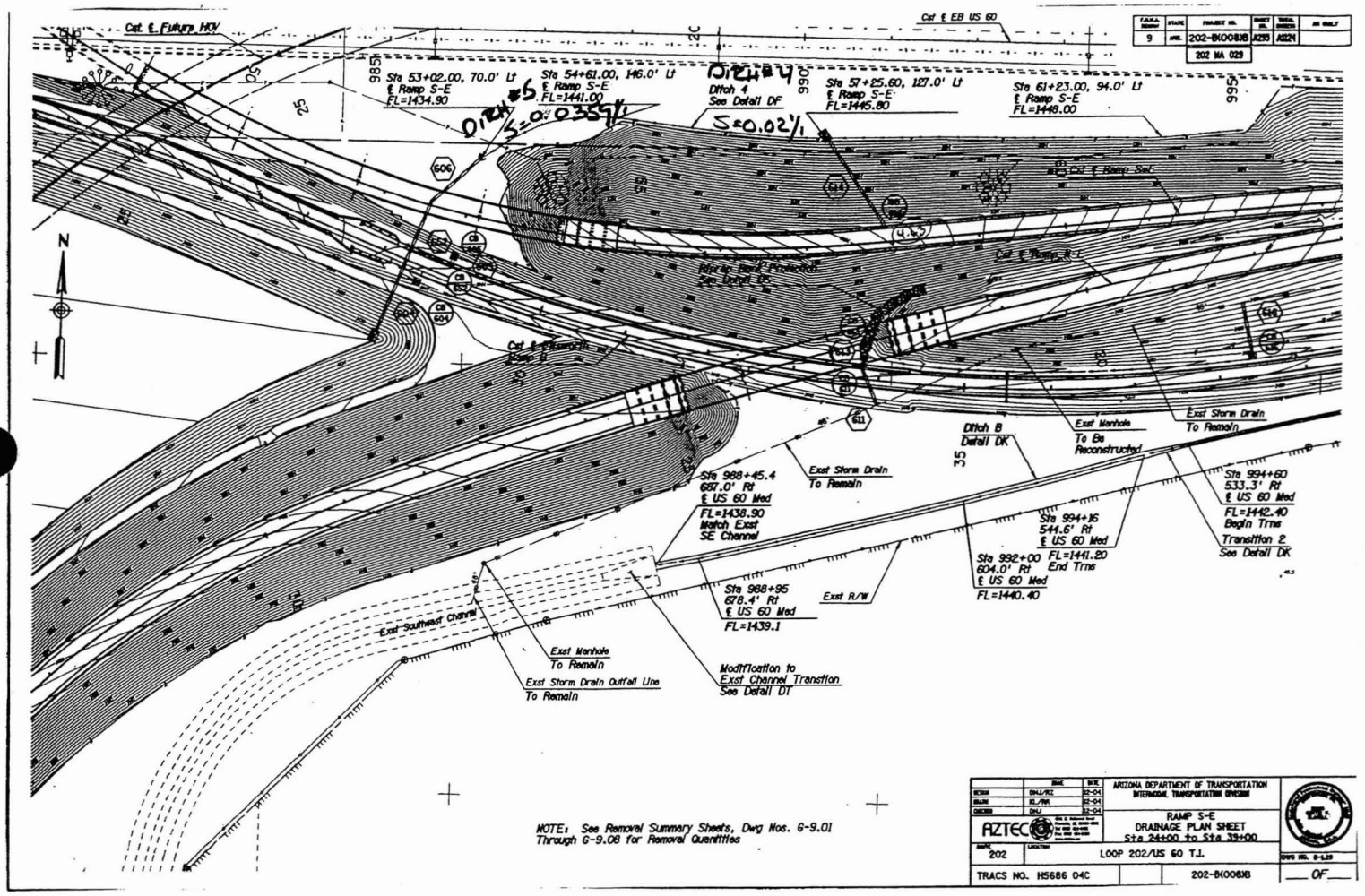
3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: US60/L202 TI
Computed by: DNJ
Checked By:
Sheet Name

Project No: AZ1107
Date: DEC 13, 04
Date:
Sheet: 1 Of: 3

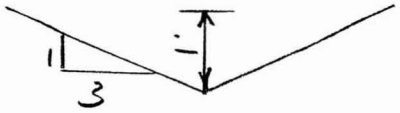
RAMP S-E (EAST END)

DESIGN STORM = 10-yr



DITCH: DETAIL DF

DITCH 4



Worksheet for Ramp S-E Ditch #4

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.02000	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	4.63	ft^3/s

Results		
Normal Depth:	0.63	ft
Flow Area:	1.18	ft^2
Wetted Perimeter:	3.97	ft
Top Width:	3.77	ft
Critical Depth:	0.68	ft
Critical Slope:	0.01288	ft/ft
Velocity:	3.91	ft/s
Velocity Head:	0.24	ft
Specific Energy:	0.87	ft
Froude Number:	1.23	
Flow Type:	Supercritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.63	ft
Critical Depth:	0.68	ft
Channel Slope:	0.02000	ft/ft
Critical Slope:	0.01288	ft/ft

Worksheet for Ramp S-E Ditch #5

Project Description		
Flow Element:	Triangular Channel	
Friction Method:	Manning Formula	
Solve For:	Normal Depth	

Input Data		
Roughness Coefficient:	0.024	
Channel Slope:	0.03540	ft/ft
Left Side Slope:	3.00	ft/ft (H:V)
Right Side Slope:	3.00	ft/ft (H:V)
Discharge:	4.63	ft^3/s

Results		
Normal Depth:	0.56	ft
Flow Area:	0.96	ft^2
Wetted Perimeter:	3.57	ft
Top Width:	3.39	ft
Critical Depth:	0.68	ft
Critical Slope:	0.01289	ft/ft
Velocity:	4.84	ft/s
Velocity Head:	0.36	ft
Specific Energy:	0.93	ft
Froude Number:	1.61	
Flow Type:	Supercritical	

GVF Input Data		
Downstream Depth:	0.00	ft
Length:	0.00	ft
Number Of Steps:	0	

GVF Output Data		
Upstream Depth:	0.00	ft
Profile Description:	N/A	
Profile Headloss:	0.00	ft
Downstream Velocity:	0.00	ft/s
Upstream Velocity:	0.00	ft/s
Normal Depth:	0.56	ft
Critical Depth:	0.68	ft
Channel Slope:	0.03540	ft/ft
Critical Slope:	0.01289	ft/ft

STORM CAD ANALYSES

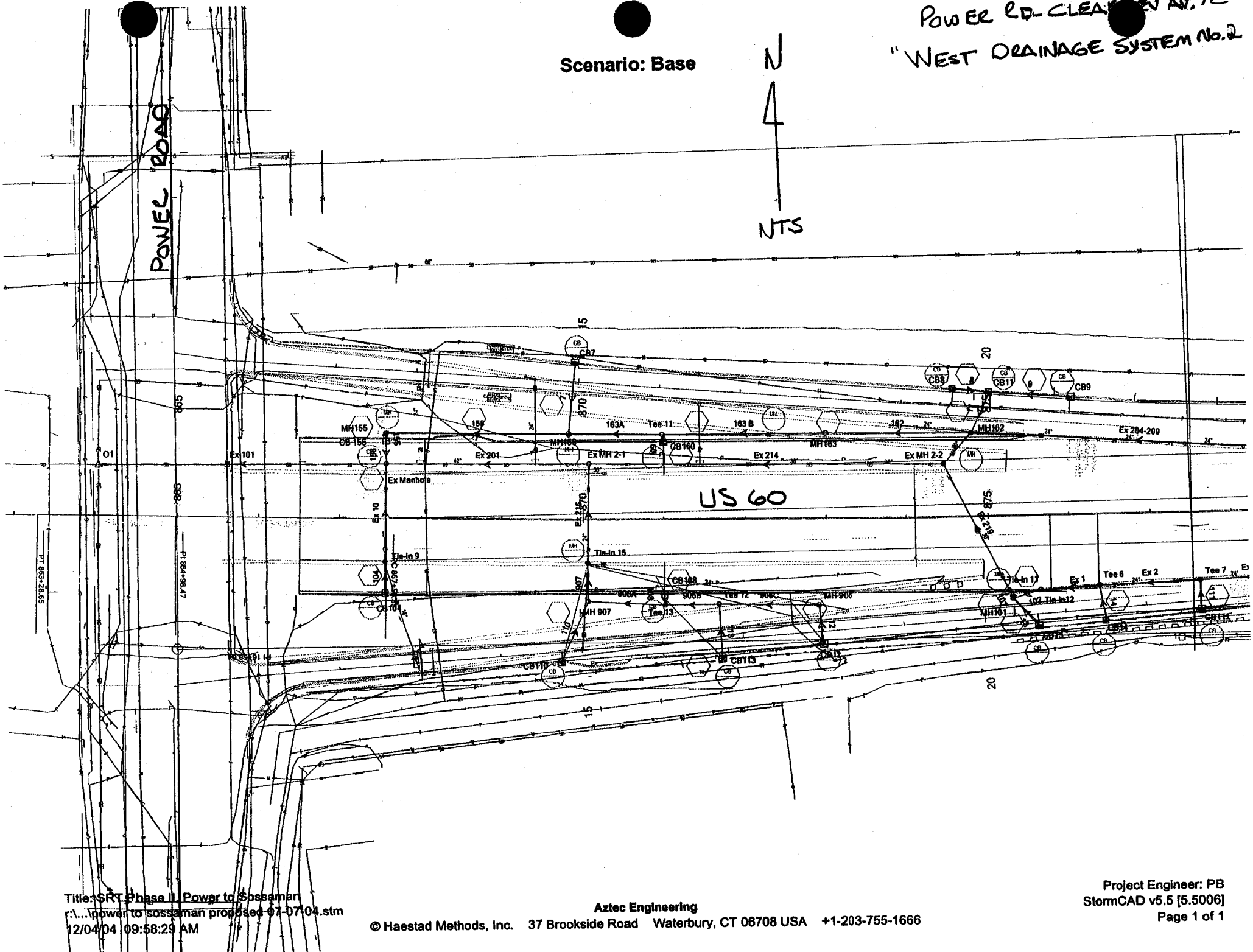
US 60

POWER ROAD
TO SOSSAMAN ROAD

POWER RD CLEA[illegible]EN AV. 1/2
"WEST DRAINAGE SYSTEM No. 2

Scenario: Base

N
NTS



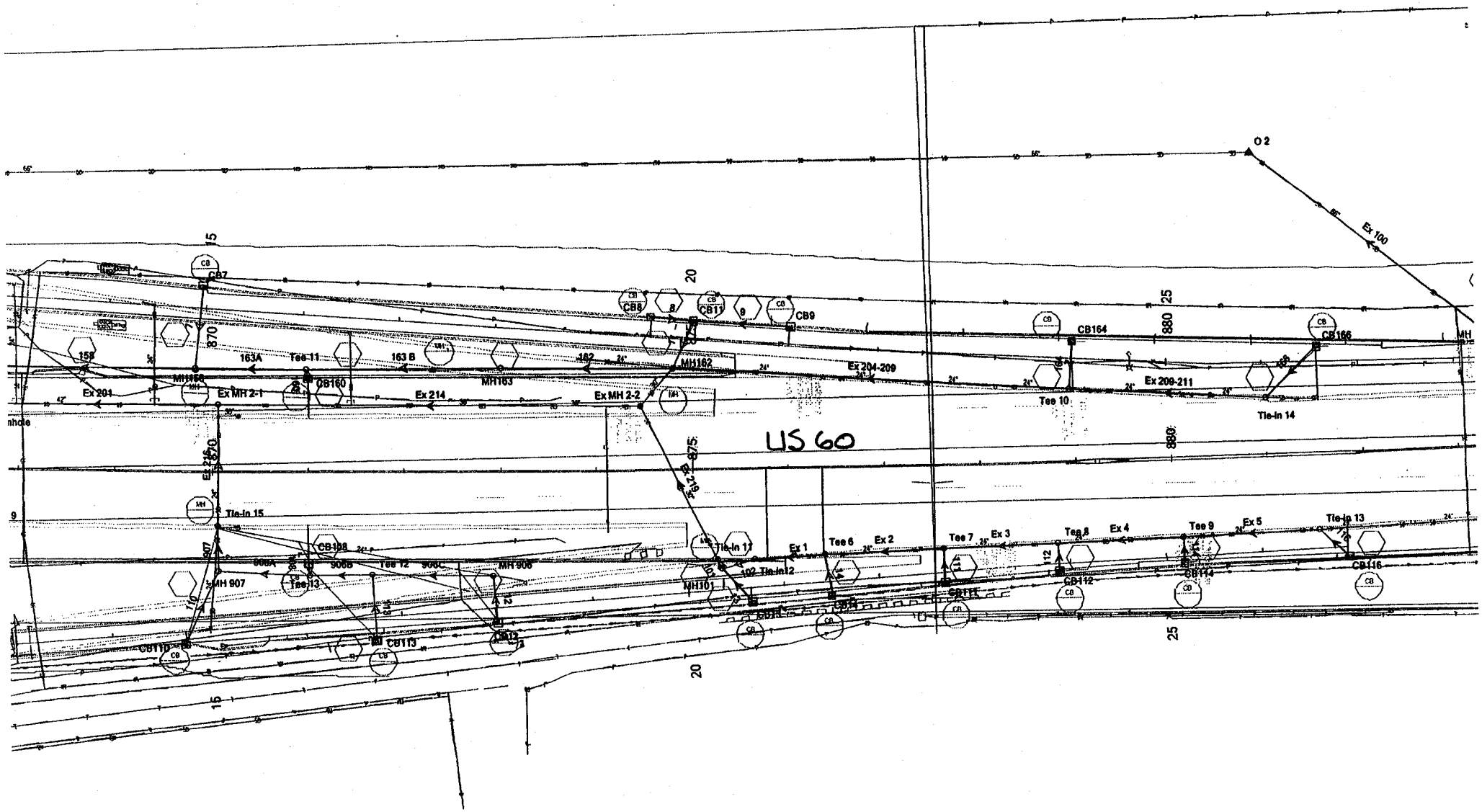
Title: SRT Phase II Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 09:58:29 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

POWER RO-CLEARWATER AV 72

Scenario: Base



Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 09:58:13 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

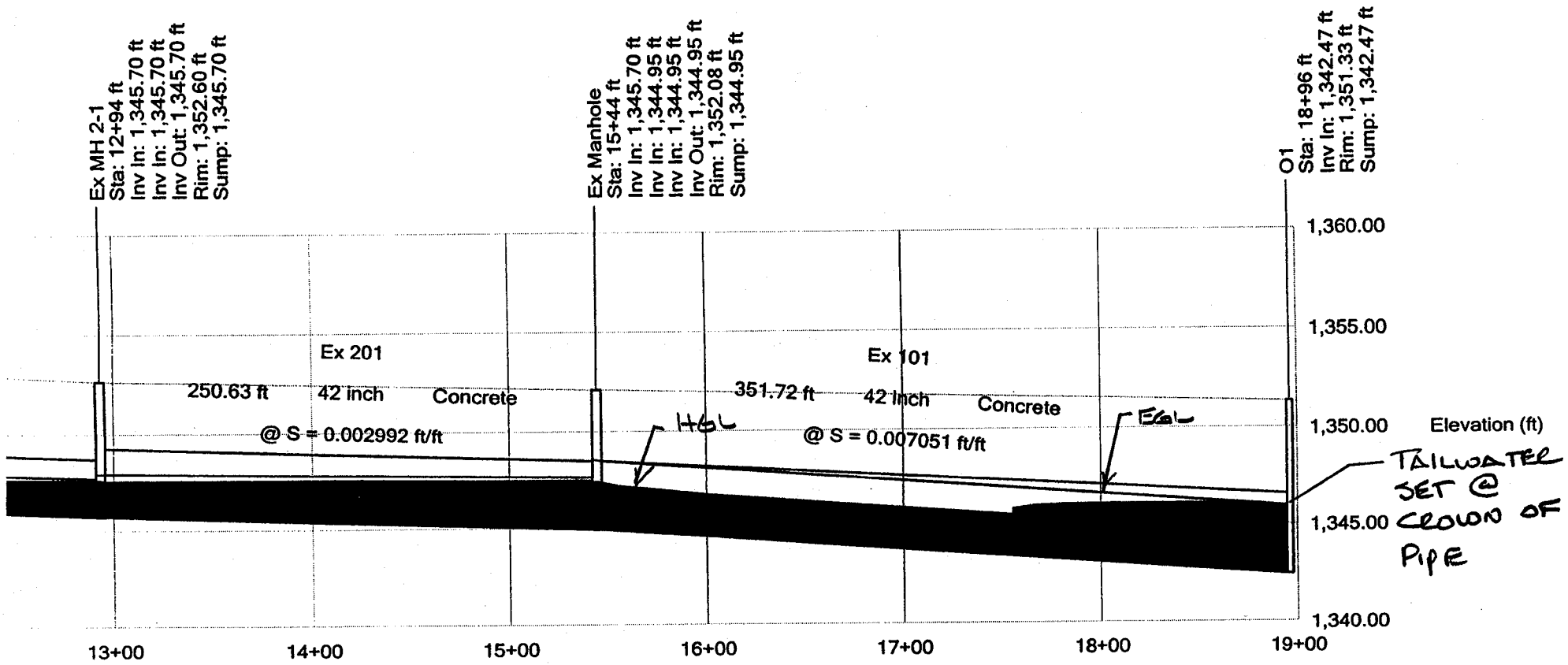
Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

USGO STORM DRAIN PROFILE
POWER RD - CLEARVIEW AVE

/3

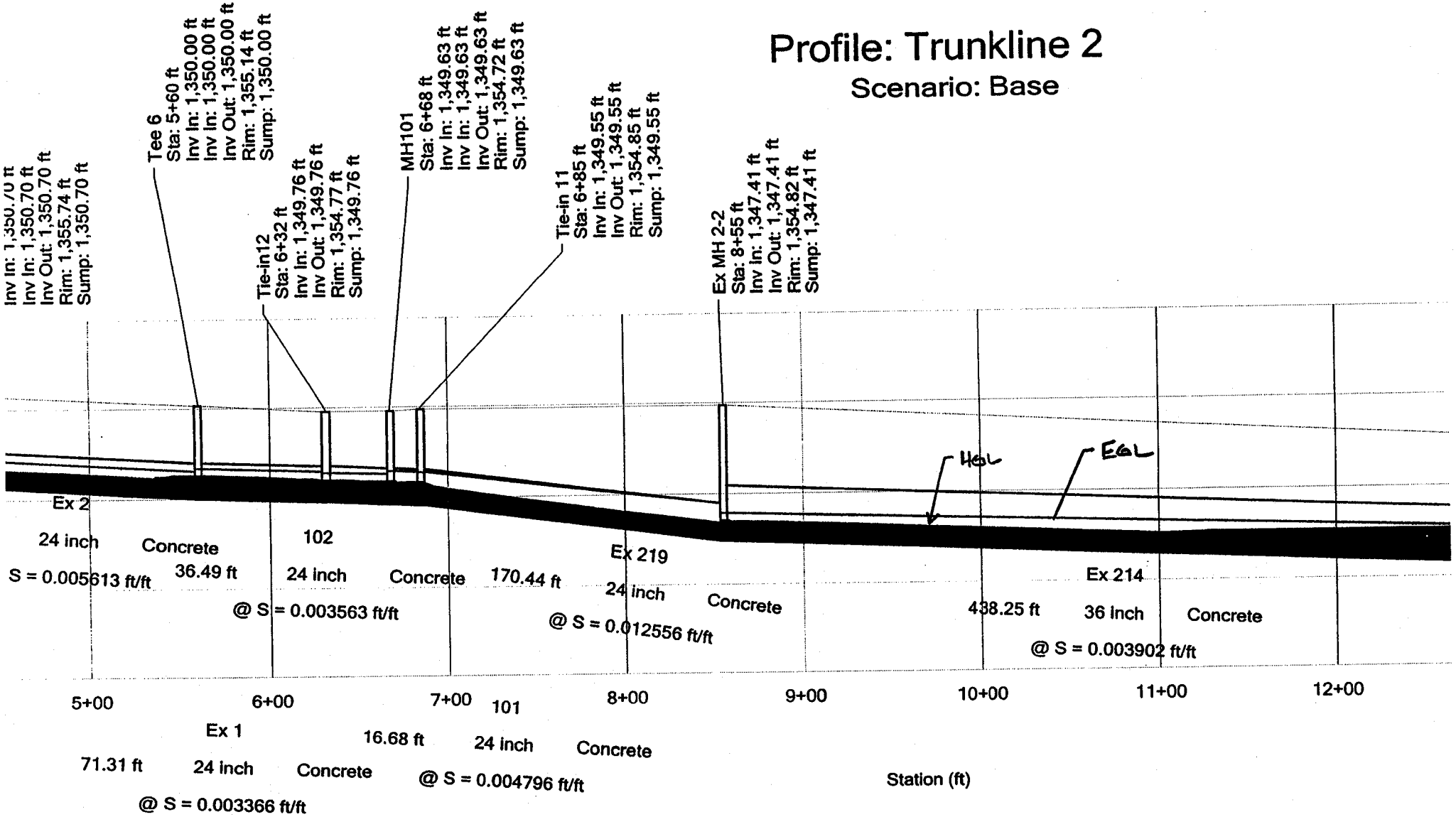
Profile
Scenario: Base

"WEST DRAINAGE SYSTEM NO 2"



US60 STORM ... POWER RD - CLEARVIEW ... E 7/

Profile
Scenario: Base



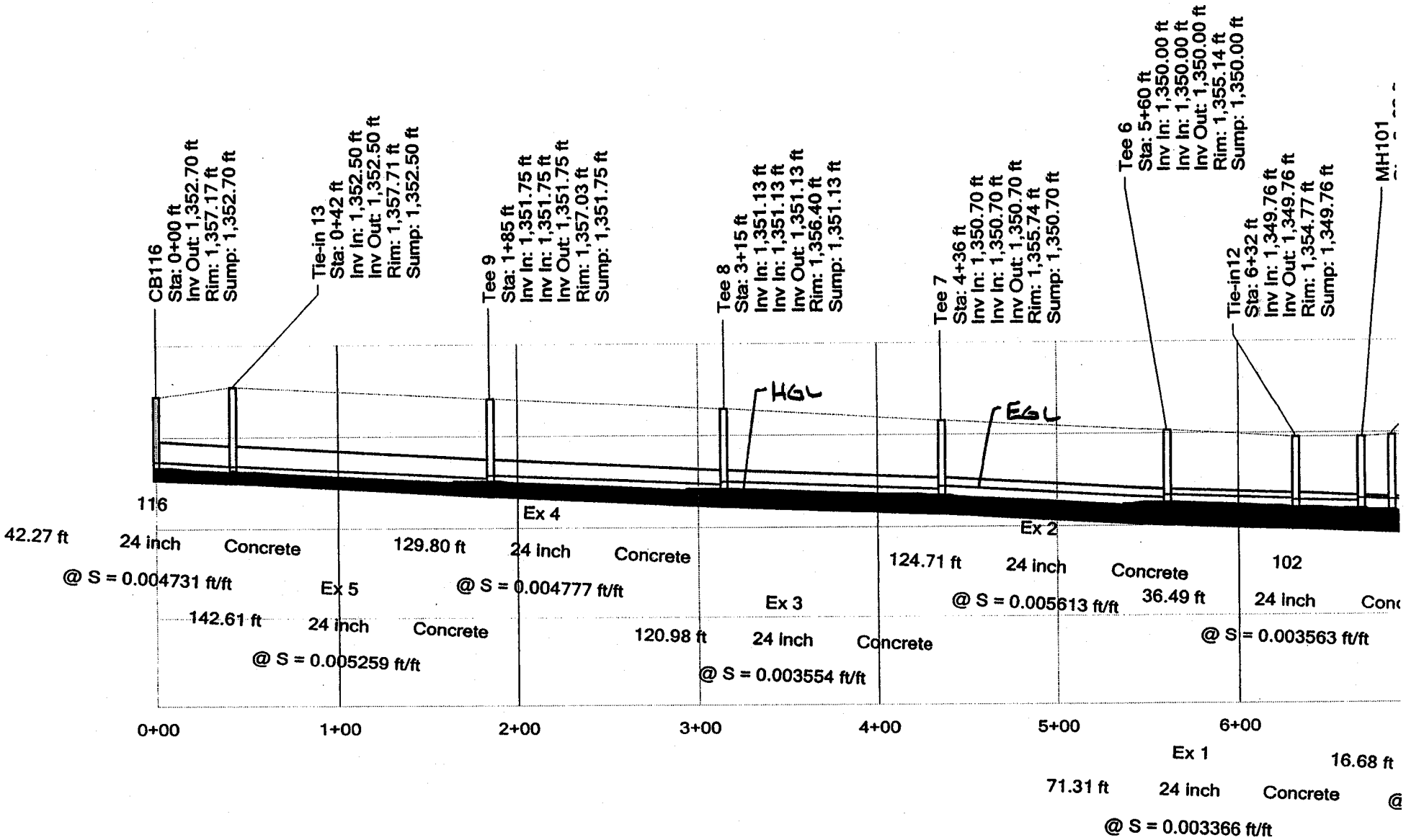
Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 10:32:14 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

USGO STORM DRAIN PROFILE 3/3
POWER RD - CLEARVIEW

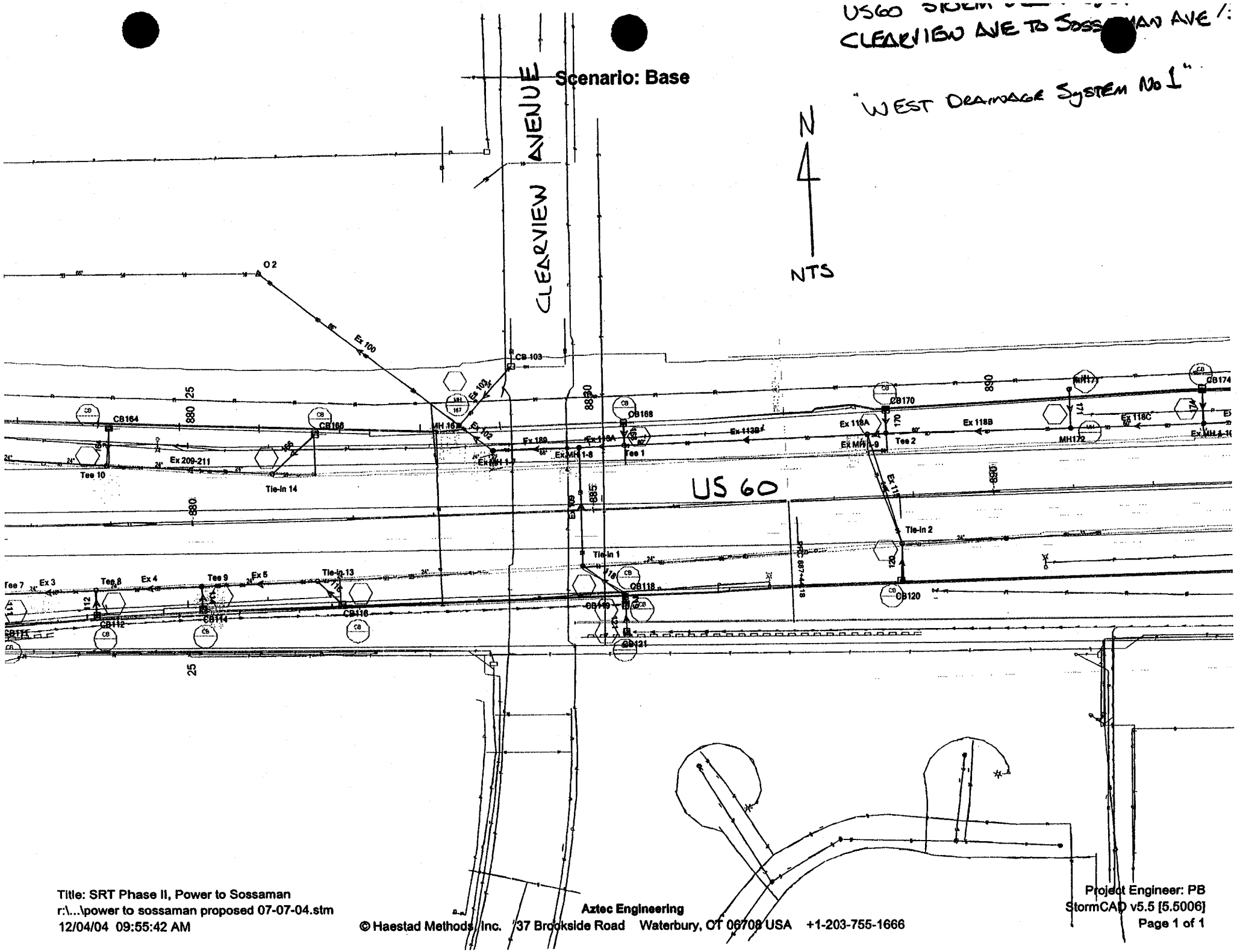
Profile
Scenario: Base



USGO STORM ... CLEARVIEW AVE TO SOSSAMAN AVE /:

"WEST DRAINAGE SYSTEM No 1"

Scenario: Base



Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 09:55:42 AM

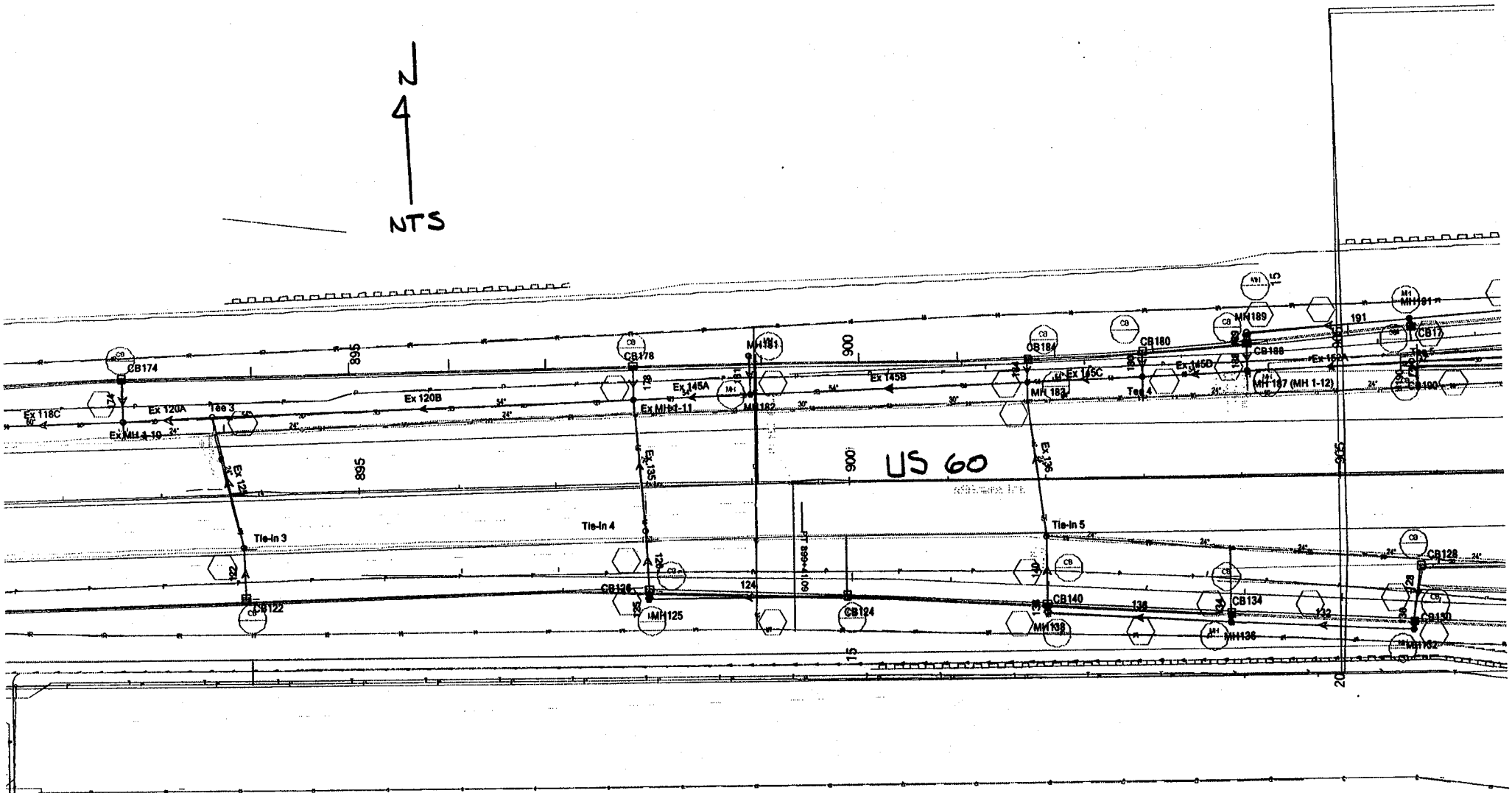
Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

US60 STORM DRAIN SYSTEM
CLEARVIEW AVE TO SOSSAMAN

73

Scenario: Base



Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 09:53:21 AM

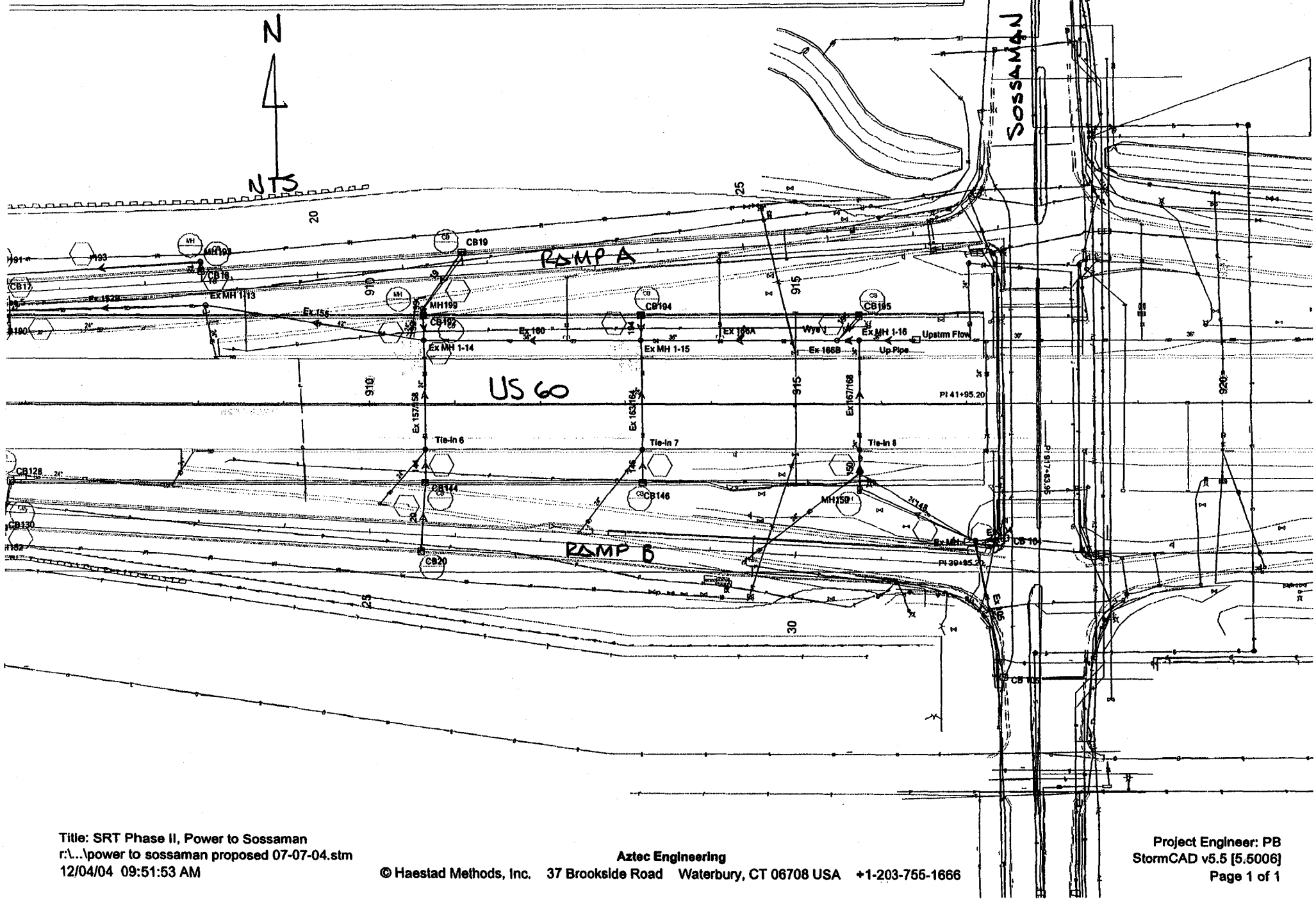
Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

US60 STORM DRAIN SYSTEM
CLE[illegible]IEW AVE - SOSSAMAN RD

7/3

Scenario: Base



Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 09:51:53 AM

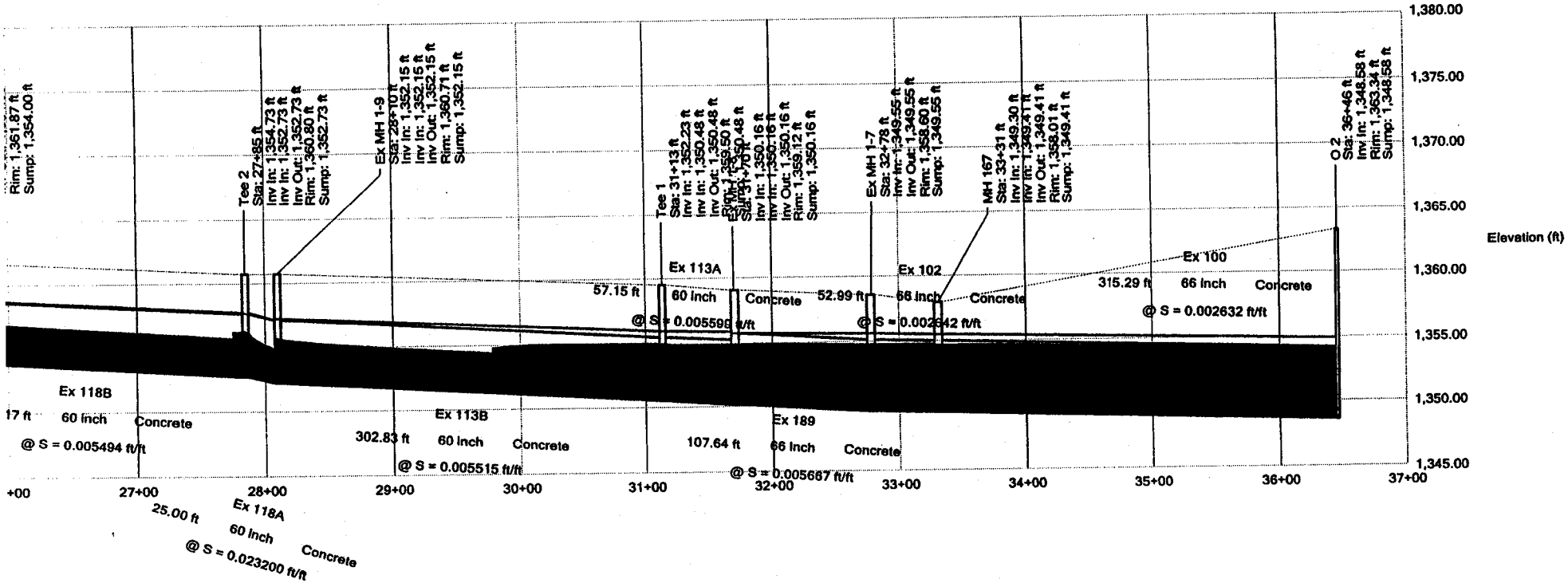
Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

US60 STORM DRAIN PROFILE
CLEARVIEW AVE - SOSSAMAN RD

4

Profile
Scenario: Base



Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 10:23:55 AM

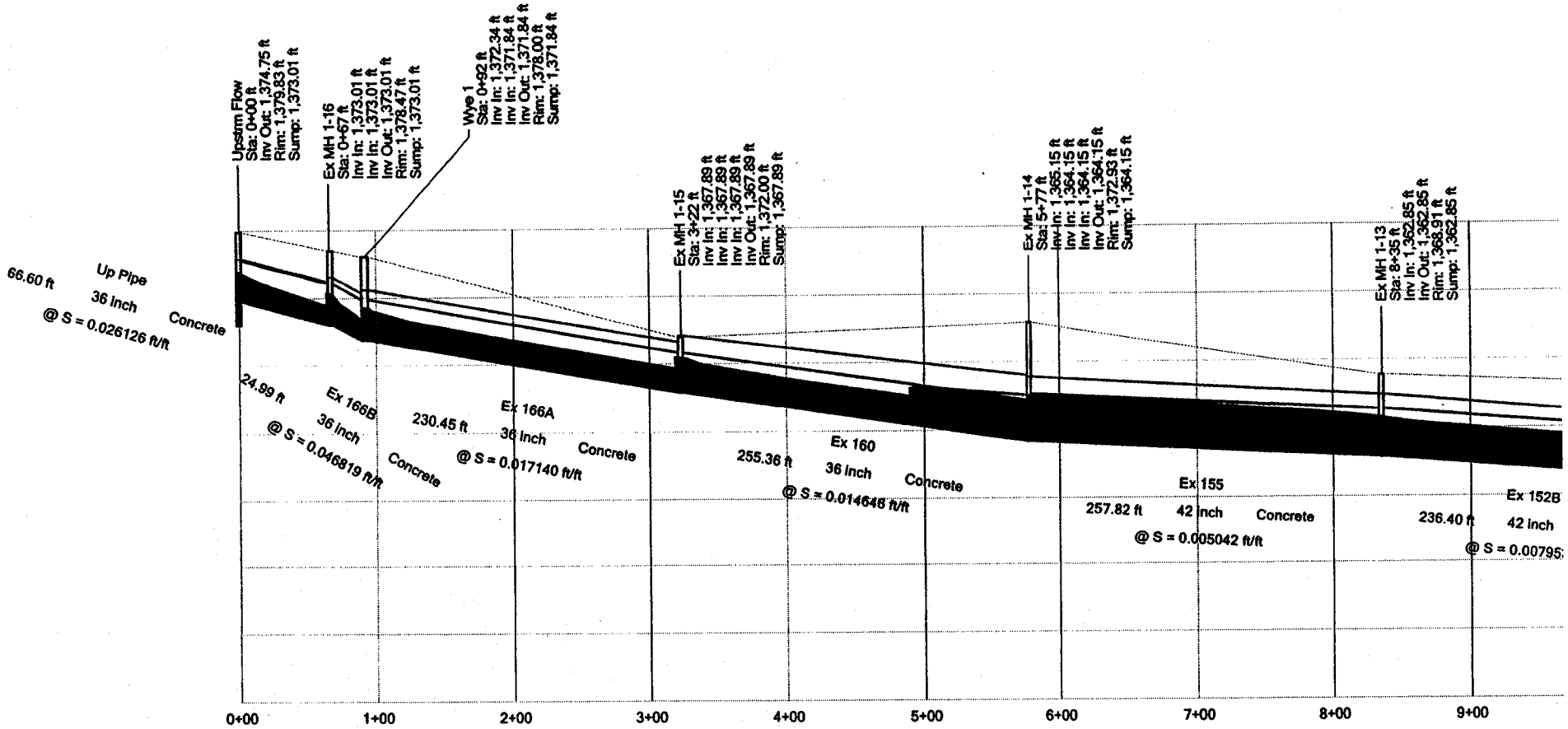
Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

USGS STORM [illegible]
CLEARVIEW AVE - SOSSAMA[illegible]RO

14

Profile
Scenario: Base

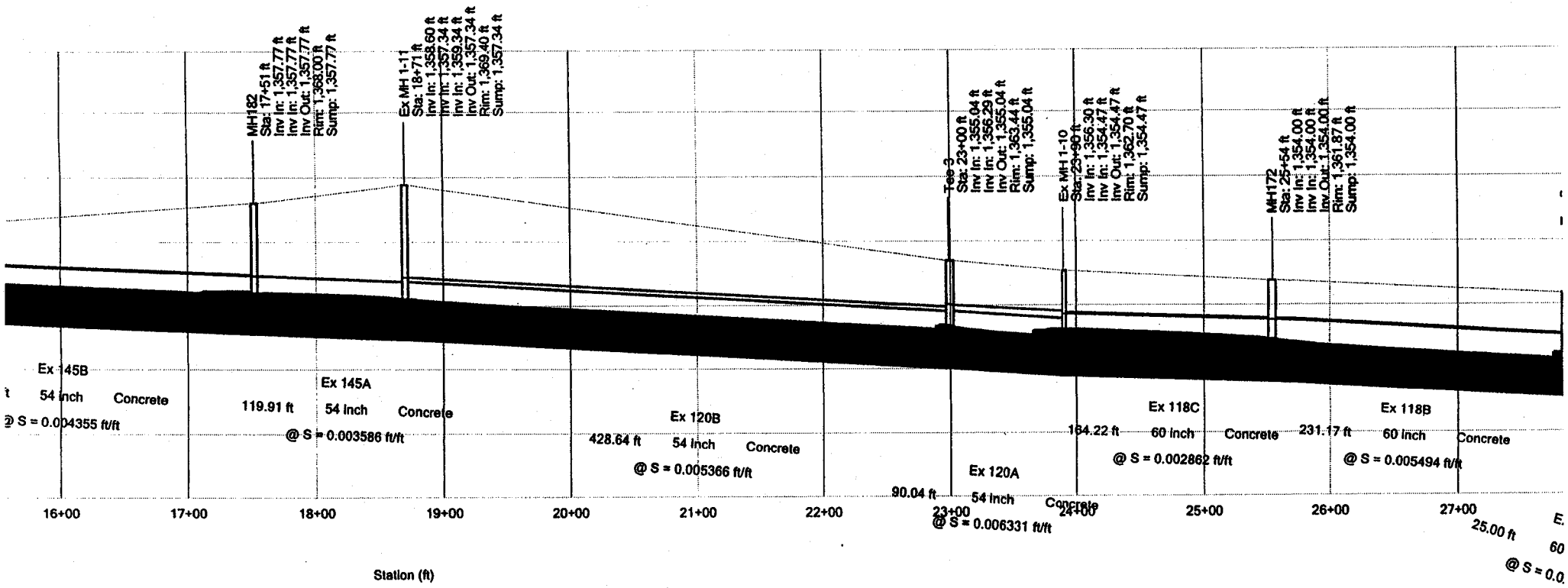


USGO STORM DRAIN PROFILE
CLEARVIEW AVE TO SOSSAMAN RD

7/4

Profile
Scenario: Base

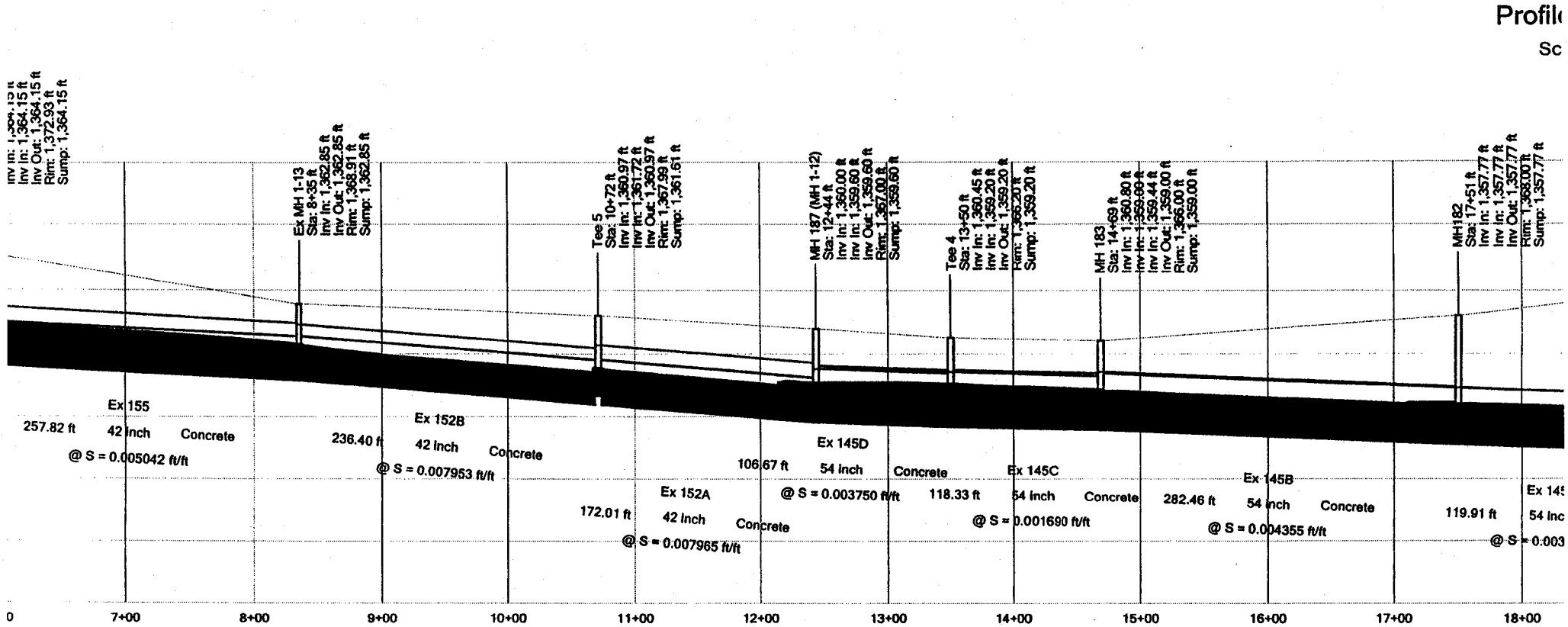
Profile: Trunk Line
Scenario: Base



USGO STORM DRAIN PROFILE
CLEARVIEW AVE - SOSSAMAN

4/4

Profile
Scenario: Base



Title: SRT Phase II, Power to Sossaman
r:\...\power to sossaman proposed 07-07-04.stm
12/04/04 10:16:36 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PB
StormCAD v5.5 [5.5006]
Page 1 of 1

Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
CB104	Tie-in 9	1.24	0.86	1.07	1.07	5.15	5.54	37.47	0.004003	18 inch	0.012	7.20
Tie-in 9	Ex Manhole	N/A	N/A	N/A	1.07	5.13	5.51	121.92	0.015584	18 inch	0.012	14.21
Ex Manhol	O1	N/A	N/A	N/A	13.82	4.34	60.50	351.72	0.007051	42 inch	0.012	91.52
Tie-in 15	Ex MH 2-1	N/A	N/A	N/A	3.03	4.93	15.04	122.91	0.016109	24 inch	0.012	31.10
Ex MH 2-1	Ex Manhole	N/A	N/A	N/A	5.52	4.52	25.14	250.63	0.002992	42 inch	0.012	59.62
CB116	Tie-in 13	0.77	0.95	0.73	0.73	5.15	3.80	42.27	0.004731	24 inch	0.012	16.86
Tie-in 13	Tee 9	N/A	N/A	N/A	0.73	5.12	3.78	142.61	0.005259	24 inch	0.012	17.77
CB114	Tee 9	0.44	0.95	0.42	0.42	5.15	2.17	27.97	0.003575	24 inch	0.012	14.65
Tee 9	Tee 8	N/A	N/A	N/A	1.15	5.04	5.84	129.80	0.004777	24 inch	0.012	16.94
CB112	Tee 8	0.34	0.95	0.32	0.32	5.15	1.68	30.49	0.004592	24 inch	0.012	16.61
Tee 8	Tee 7	N/A	N/A	N/A	1.47	4.97	7.38	120.98	0.003554	24 inch	0.012	14.61
CB111	Tee 7	0.33	0.95	0.31	0.31	5.15	1.63	37.42	0.004009	24 inch	0.012	15.52
Tee 7	Tee 6	N/A	N/A	N/A	1.79	4.91	8.83	124.71	0.005613	24 inch	0.012	18.36
CB14	Tee 6	0.36	0.95	0.34	0.34	5.15	1.78	42.33	0.007796	24 inch	0.012	21.64
Tee 6	Tie-in12	N/A	N/A	N/A	2.13	4.85	10.40	71.31	0.003366	24 inch	0.012	14.22
Tie-in12	MH101	N/A	N/A	N/A	2.13	4.81	10.32	36.49	0.003563	24 inch	0.012	14.63
MH101	Tie-in 11	N/A	N/A	N/A	2.49	4.79	12.03	16.68	0.004796	24 inch	0.012	16.97
Tie-in 11	Ex MH 2-2	N/A	N/A	N/A	2.49	4.79	12.01	170.44	0.012556	24 inch	0.012	27.46
Ex MH 2-2	Ex MH 2-1	N/A	N/A	N/A	2.49	4.73	11.88	438.25	0.003902	36 inch	0.012	45.13
CB13	MH101	0.38	0.95	0.36	0.36	6.73	2.45	47.00	0.004681	24 inch	0.012	16.77
CB160	Tee 11	1.33	0.89	1.18	1.18	5.15	6.14	9.82	-0.073320	24 inch	0.012	-66.36
Tee 11	MH158	N/A	N/A	N/A	5.32	4.51	24.19	116.72	0.006768	30 inch	0.012	36.55
CB7	MH158	0.97	0.88	0.85	0.85	5.15	4.43	84.20	0.111876	24 inch	0.012	81.97
CB166	Tie-in 14	1.15	0.88	1.01	1.01	5.15	5.25	75.34	0.003318	24 inch	0.012	14.12
Tie-in 14	Tee 10	N/A	N/A	N/A	1.01	5.10	5.21	205.62	0.003648	24 inch	0.012	14.80
CB164	Tee 10	1.25	0.87	1.09	1.09	5.15	5.65	45.33	0.005515	24 inch	0.012	18.20
Tee 10	MH162	N/A	N/A	N/A	2.10	4.98	10.54	413.70	0.005487	24 inch	0.012	18.15
CB8	CB11	0.85	0.82	0.70	0.70	5.15	3.62	40.50	0.003210	24 inch	0.012	13.88
CB9	CB11	1.10	0.88	0.97	0.97	5.15	5.03	98.90	0.003033	24 inch	0.012	13.50
CB11	MH162	0.44	0.85	0.37	2.04	4.99	10.25	52.00	0.000000	30 inch	0.012	0.00
MH162	MH163	N/A	N/A	N/A	4.14	4.80	20.02	250.30	0.002996	30 inch	0.012	24.32
MH163	Tee 11	N/A	N/A	N/A	4.14	4.64	19.35	199.28	0.001957	30 inch	0.012	19.66
MH158	MH155	N/A	N/A	N/A	6.18	4.45	27.68	226.10	0.000000	30 inch	0.012	0.00
MH155	CB 156	N/A	N/A	N/A	6.18	4.35	27.10	7.50	0.002667	30 inch	0.012	22.95
CB 156	Ex Manhole	1.23	0.86	1.06	7.23	4.35	31.73	28.00	0.003214	30 inch	0.012	25.19
CB12	MH 906	0.25	0.95	0.24	0.24	5.15	1.23	50.80	0.037402	24 inch	0.012	47.39
MH 906	Tee 12	N/A	N/A	N/A	0.24	5.13	1.23	120.50	0.004979	24 inch	0.012	17.29
CB113	Tee 12	0.58	0.95	0.55	0.55	5.15	2.86	70.90	0.066573	24 inch	0.012	63.23
Tee 12	Tee 13	N/A	N/A	N/A	0.79	5.03	4.00	70.20	0.004986	24 inch	0.012	17.30
CB108	Tee 13	1.39	0.90	1.25	1.25	6.73	8.49	8.70	0.070115	24 inch	0.012	64.89
Tee 13	MH 907	N/A	N/A	N/A	2.04	4.99	10.26	94.00	0.005000	24 inch	0.012	17.33
CB110	MH 907	1.19	0.83	0.99	0.99	5.15	5.13	84.80	0.118632	24 inch	0.012	84.41
MH 907	Tie-in 15	N/A	N/A	N/A	3.03	4.95	15.10	49.00	0.005714	24 inch	0.012	18.52
Tie-in 1	Ex MH 1-8	N/A	N/A	N/A	2.26	5.10	11.63	147.97	0.027506	24 inch	0.012	40.64
Ex MH 1-8	Ex MH 1-7	N/A	N/A	N/A	37.53	4.29	162.29	107.64	0.005667	66 inch	0.012	273.85
Ex MH 1-9	Tee 1	N/A	N/A	N/A	33.98	4.34	148.61	302.83	0.005515	60 inch	0.012	209.51
CB168	Tee 1	1.52	0.85	1.29	1.29	5.15	6.71	27.10	0.004797	24 inch	0.012	16.97
Tee 1	Ex MH 1-8	N/A	N/A	N/A	35.27	4.30	152.79	57.15	0.005599	60 inch	0.012	211.11
Ex MH 1-7	MH 167	N/A	N/A	N/A	37.53	4.28	161.76	52.99	0.002642	66 inch	0.012	186.98
CB121	CB119	0.42	0.70	0.29	0.29	5.15	1.53	31.70	0.037539	18 inch	0.012	22.05
CB119	CB118	1.13	0.70	0.79	1.08	5.14	5.62	7.50	0.005333	24 inch	0.012	17.90

Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
CB118	Tie-in 1	1.32	0.89	1.17	2.26	5.13	11.70	68.10	0.004993	24 inch	0.012	17.32
CB 103	MH 167	0.97	0.88	0.85	0.85	5.15	4.43	99.95	0.107054	24 inch	0.012	80.18
MH 167	O 2	N/A	N/A	N/A	38.38	4.27	165.07	315.29	0.002632	66 inch	0.012	186.64
CB120	Tie-in 2	1.83	0.87	1.59	1.59	5.15	8.26	45.40	0.004405	24 inch	0.012	16.27
Tie-in 2	Ex MH 1-9	N/A	N/A	N/A	1.59	5.13	8.23	144.92	0.026842	24 inch	0.012	40.15
Tee 2	Ex MH 1-9	N/A	N/A	N/A	32.38	4.34	141.71	25.00	0.023200	60 inch	0.012	429.73
CB170	Tee 2	1.78	0.85	1.51	1.51	5.15	7.85	31.00	0.005161	24 inch	0.012	17.61
CB174	Ex MH 1-1(	2.24	0.86	1.93	1.93	5.15	10.00	41.30	0.004843	24 inch	0.012	17.05
CB124	MH125	0.80	0.88	0.70	0.70	5.15	3.65	200.80	0.003287	24 inch	0.012	14.05
MH125	CB126	N/A	N/A	N/A	0.70	5.01	3.56	6.90	0.004348	24 inch	0.012	16.16
CB126	Tie-in 4	0.80	0.87	0.70	1.40	5.01	7.07	52.30	0.003250	24 inch	0.012	13.97
Tie-in 4	Ex MH 1-1	N/A	N/A	N/A	1.40	4.98	7.02	146.54	0.004777	24 inch	0.012	16.94
CB178	Ex MH 1-1	1.90	0.85	1.61	1.61	5.15	8.38	31.50	0.012698	24 inch	0.012	27.62
Ex MH 1-1	Tee 3	N/A	N/A	N/A	27.58	4.55	126.38	428.64	0.005366	54 inch	0.012	156.04
Tee 3	Ex MH 1-1(	N/A	N/A	N/A	28.94	4.44	129.67	90.04	0.006331	54 inch	0.012	169.49
CB184	MH 183	0.57	0.85	0.48	0.48	5.15	2.52	21.00	0.004762	24 inch	0.012	16.91
CB18	MH193	0.71	0.78	0.55	0.55	5.15	2.87	7.50	0.009333	24 inch	0.012	23.68
MH193	MH191	N/A	N/A	N/A	0.55	5.15	2.87	230.00	0.015826	24 inch	0.012	30.83
CB17	MH191	0.50	0.77	0.39	0.39	5.15	2.00	7.50	0.018667	24 inch	0.012	33.48
MH191	MH189	N/A	N/A	N/A	0.94	5.05	4.78	167.40	0.002688	30 inch	0.012	23.04
MH189	CB188	N/A	N/A	N/A	0.94	4.93	4.67	7.50	0.002667	30 inch	0.012	22.95
CB188	MH 187 (M	0.43	0.86	0.37	1.31	4.91	6.48	26.70	0.007116	30 inch	0.012	37.48
CB146	Tie-in 7	1.53	0.85	1.30	1.30	5.15	6.75	38.71	0.003617	24 inch	0.012	14.74
Tie-in 7	Ex MH 1-1	N/A	N/A	N/A	1.30	5.13	6.72	132.24	0.008091	24 inch	0.012	22.04
CB194	Ex MH 1-1	1.00	0.86	0.86	0.86	5.15	4.46	27.90	0.005376	24 inch	0.012	17.97
Ex MH 1-1	Ex MH 1-1	N/A	N/A	N/A	13.54	4.95	67.59	255.36	0.014646	36 inch	0.012	87.44
CB20	CB144	1.90	0.81	1.54	1.54	5.15	7.99	78.70	0.082465	24 inch	0.012	70.37
CB144	Tie-in 6	0.85	0.87	0.74	2.28	5.14	11.80	38.70	0.005168	24 inch	0.012	17.62
Tie-in 6	Ex MH 1-1	N/A	N/A	N/A	2.28	5.12	11.76	132.63	0.015683	24 inch	0.012	30.69
CB192	Ex MH 1-1	0.92	0.87	0.80	1.86	5.13	9.64	27.30	0.010256	24 inch	0.012	24.82
Ex MH 1-1	Ex MH 1-1	N/A	N/A	N/A	17.69	4.90	87.39	257.82	0.005042	42 inch	0.012	77.39
Upstrm Flc	Ex MH 1-1	10.02	0.85	8.49	8.49	5.15	44.09	66.60	0.026126	36 inch	0.012	116.79
Ex MH	MH150	N/A	N/A	N/A	1.84	5.11	9.48	149.10	0.134943	24 inch	0.012	90.02
MH150	Tie-in 8	N/A	N/A	N/A	1.84	5.09	9.44	51.00	0.002157	24 inch	0.012	11.38
Tie-in 8	Ex MH 1-1	N/A	N/A	N/A	1.84	5.06	9.38	132.03	0.005681	24 inch	0.012	18.47
Ex MH 1-1	Wye 1	N/A	N/A	N/A	10.33	5.00	52.05	24.99	0.046819	36 inch	0.012	156.34
Wye 1	Ex MH 1-1	N/A	N/A	N/A	11.38	4.99	57.30	230.45	0.017140	36 inch	0.012	94.59
CB195	Wye 1	1.22	0.86	1.05	1.05	5.15	5.45	38.40	0.005208	24 inch	0.012	17.69
Ex MH 1-1	Tee 5	N/A	N/A	N/A	17.69	4.83	86.08	236.40	0.007953	42 inch	0.012	97.19
Tee 5	MH 187 (M	N/A	N/A	N/A	19.03	4.77	91.57	172.01	0.007965	42 inch	0.012	97.27
CB190	Tee 5	1.49	0.90	1.34	1.34	5.15	6.96	3.10	-0.241935	24 inch	0.012	-120.54
MH 187 (M	Tee 4	N/A	N/A	N/A	20.34	4.74	97.07	106.67	0.003750	54 inch	0.012	130.45
Tee 4	MH 183	N/A	N/A	N/A	20.79	4.70	98.58	118.33	0.001690	54 inch	0.012	87.58
CB180	Tee 4	0.53	0.85	0.45	0.45	5.15	2.34	21.80	0.025229	24 inch	0.012	38.93
CB128	CB130	1.40	0.89	1.25	1.25	5.15	6.47	51.60	0.008333	24 inch	0.012	22.37
CB130	MH132	0.84	0.82	0.69	1.93	5.13	10.00	7.50	0.001333	24 inch	0.012	8.95
MH132	MH136	N/A	N/A	N/A	1.93	5.12	9.99	186.80	0.003051	24 inch	0.012	13.54
CB134	MH136	0.76	0.91	0.69	0.69	5.15	3.59	7.50	0.006667	24 inch	0.012	20.01
MH136	MH138	N/A	N/A	N/A	2.63	5.02	13.29	187.50	0.002987	24 inch	0.012	13.39
MH138	CB140	N/A	N/A	N/A	2.63	4.92	13.02	7.50	0.004000	24 inch	0.012	15.50
CB140	Tie-in 5	0.74	0.90	0.67	3.29	4.92	16.31	67.90	0.004860	24 inch	0.012	17.08

Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
Tie-in 5	MH 183	N/A	N/A	N/A	3.29	4.89	16.22	156.52	0.012586	24 inch	0.012	27.49
CB19	MH199	1.28	0.83	1.06	1.06	5.15	5.52	79.70	0.105646	24 inch	0.012	79.65
MH199	CB192	N/A	N/A	N/A	1.06	5.14	5.50	6.50	0.010769	24 inch	0.012	25.43
CB 104	Ex MH	0.97	0.88	0.85	0.85	5.15	4.43	41.30	0.164165	24 inch	0.012	99.29
CB 105	Ex MH	1.19	0.83	0.99	0.99	5.15	5.13	163.23	0.042027	24 inch	0.012	50.24
MH 183	MH182	N/A	N/A	N/A	24.56	4.66	115.26	282.46	0.004355	54 inch	0.012	140.57
MH182	Ex MH 1-1	N/A	N/A	N/A	24.56	4.58	113.42	119.91	0.003586	54 inch	0.012	127.57
MH181	MH182	N/A	N/A	N/A	0.00	0.00	0.00	38.50	0.004935	54 inch	0.012	149.65
Ex MH 1-1	MH172	N/A	N/A	N/A	30.87	4.42	137.68	164.22	0.002862	60 inch	0.012	150.93
MH172	Tee 2	N/A	N/A	N/A	30.87	4.38	136.16	231.17	0.005494	60 inch	0.012	209.12
MH171	MH172	N/A	N/A	N/A	0.00	0.00	0.00	50.20	0.004980	54 inch	0.012	150.33
CB122	Tie-in 3	1.59	0.86	1.37	1.37	5.15	7.10	50.90	0.003340	24 inch	0.012	14.16
Tie-in 3	Tee 3	N/A	N/A	N/A	1.37	5.12	7.06	134.04	0.016040	24 inch	0.012	31.04

Scenario: Base

Pipe Report

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,347.25	1,347.10	1,352.27	1,352.35	3.52	3.75	1,348.23	1,348.01
1,346.85	1,344.95	1,352.35	1,352.08	4.00	5.63	1,347.76	1,347.43
1,344.95	1,342.47	1,352.08	1,351.33	3.63	5.36	1,347.39	1,345.97
1,347.68	1,345.70	1,353.20	1,352.60	3.52	4.90	1,349.08	1,347.66
1,345.70	1,344.95	1,352.60	1,352.08	3.40	3.63	1,347.58	1,347.48
1,352.70	1,352.50	1,357.17	1,357.71	2.47	3.21	1,353.38	1,353.15
1,352.50	1,351.75	1,357.71	1,357.03	3.21	3.28	1,353.18	1,352.60
1,351.85	1,351.75	1,356.43	1,357.03	2.58	3.28	1,352.61	1,352.60
1,351.75	1,351.13	1,357.03	1,356.40	3.28	3.27	1,352.60	1,352.14
1,351.27	1,351.13	1,355.72	1,356.40	2.45	3.27	1,352.14	1,352.14
1,351.13	1,350.70	1,356.40	1,355.74	3.27	3.04	1,352.14	1,351.76
1,350.85	1,350.70	1,354.79	1,355.74	1.94	3.04	1,351.76	1,351.76
1,350.70	1,350.00	1,355.74	1,355.14	3.04	3.14	1,351.76	1,351.27
1,350.33	1,350.00	1,354.14	1,355.14	1.81	3.14	1,351.26	1,351.27
1,350.00	1,349.76	1,355.14	1,354.77	3.14	3.01	1,351.27	1,351.00
1,349.76	1,349.63	1,354.77	1,354.72	3.01	3.09	1,351.00	1,350.88
1,349.63	1,349.55	1,354.72	1,354.85	3.09	3.30	1,350.88	1,350.84
1,349.55	1,347.41	1,354.85	1,354.82	3.30	5.41	1,350.80	1,348.34
1,347.41	1,345.70	1,354.82	1,352.60	4.41	3.90	1,348.50	1,347.60
1,349.85	1,349.63	1,353.83	1,354.72	1.98	3.09	1,350.88	1,350.88
1,346.67	1,347.39	1,352.46	1,352.71	3.79	3.32	1,350.20	1,350.19
1,347.14	1,346.35	1,352.71	1,352.10	3.07	3.25	1,350.12	1,349.78
1,356.71	1,347.29	1,361.78	1,352.10	3.07	2.81	1,357.45	1,350.20
1,352.50	1,352.25	1,357.08	1,357.87	2.58	3.62	1,353.34	1,353.07
1,352.25	1,351.50	1,357.87	1,356.64	3.62	3.14	1,353.07	1,352.66
1,351.75	1,351.50	1,355.19	1,356.64	1.44	3.14	1,352.59	1,352.66
1,351.50	1,349.23	1,356.64	1,354.60	3.14	3.37	1,352.66	1,351.13
1,348.87	1,348.74	1,353.72	1,353.63	2.85	2.89	1,351.38	1,351.37
1,349.04	1,348.74	1,353.83	1,353.63	2.79	2.89	1,351.42	1,351.38
1,348.64	1,348.64	1,353.63	1,354.60	2.49	3.46	1,351.35	1,351.32
1,348.38	1,347.63	1,354.60	1,353.53	3.72	3.40	1,351.09	1,350.58
1,347.53	1,347.14	1,353.53	1,352.71	3.50	3.07	1,350.56	1,350.18
1,346.69	1,346.69	1,352.10	1,353.60	2.91	4.41	1,349.72	1,348.71
1,345.91	1,345.89	1,353.60	1,351.31	5.19	2.92	1,348.32	1,348.30
1,345.79	1,345.70	1,351.31	1,352.08	3.02	3.88	1,348.20	1,348.06
1,351.28	1,349.38	1,356.10	1,353.50	2.82	2.12	1,351.66	1,349.80
1,349.38	1,348.78	1,353.50	1,353.00	2.12	2.22	1,349.76	1,349.69
1,353.50	1,348.78	1,358.40	1,353.00	2.90	2.22	1,354.09	1,349.71
1,348.78	1,348.43	1,353.00	1,353.00	2.22	2.57	1,349.67	1,349.69
1,349.04	1,348.43	1,352.49	1,353.00	1.45	2.57	1,350.08	1,349.74
1,348.43	1,347.96	1,353.00	1,352.30	2.57	2.34	1,349.61	1,349.59
1,358.12	1,348.06	1,363.07	1,352.30	2.95	2.24	1,358.92	1,349.59
1,347.96	1,347.68	1,352.30	1,353.20	2.34	3.52	1,349.36	1,349.14
1,354.23	1,350.16	1,359.00	1,359.12	2.77	6.96	1,355.45	1,354.84
1,350.16	1,349.55	1,359.12	1,358.60	3.46	3.55	1,354.84	1,354.78
1,352.15	1,350.48	1,360.71	1,369.50	3.56	14.02	1,355.64	1,354.91
1,352.36	1,352.23	1,358.61	1,369.50	4.25	15.27	1,354.93	1,354.91
1,350.48	1,350.16	1,369.50	1,359.12	14.02	3.96	1,354.91	1,354.84
1,349.55	1,349.41	1,358.60	1,358.01	3.55	3.10	1,354.78	1,354.69
1,356.40	1,355.21	1,379.00	1,358.20	21.10	1.49	1,356.86	1,356.05
1,354.71	1,354.67	1,358.20	1,358.61	1.49	1.94	1,356.04	1,356.04

Scenario: Base

Pipe Report

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,354.57	1,354.23	1,358.61	1,359.00	2.04	2.77	1,355.80	1,355.43
1,360.00	1,349.30	1,383.97	1,358.01	21.97	6.71	1,360.74	1,354.66
1,349.41	1,348.58	1,358.01	1,363.34	3.10	9.26	1,354.65	1,354.08
1,356.24	1,356.04	1,360.04	1,361.20	1.80	3.16	1,357.26	1,357.05
1,356.04	1,352.15	1,361.20	1,360.71	3.16	6.56	1,357.06	1,355.64
1,352.73	1,352.15	1,360.80	1,360.71	3.07	3.56	1,356.14	1,355.64
1,354.89	1,354.73	1,359.94	1,360.80	3.05	4.07	1,357.07	1,357.04
1,356.50	1,356.30	1,361.56	1,362.70	3.06	4.40	1,358.19	1,358.15
1,361.00	1,360.34	1,364.72	1,364.20	1.72	1.86	1,361.70	1,361.25
1,360.34	1,360.31	1,364.20	1,363.99	1.86	1.68	1,361.25	1,361.25
1,360.21	1,360.04	1,363.99	1,365.26	1.78	3.22	1,361.22	1,360.98
1,360.04	1,359.34	1,365.26	1,369.40	3.22	8.06	1,360.98	1,360.65
1,359.00	1,358.60	1,363.84	1,369.40	2.84	8.80	1,360.65	1,360.65
1,357.34	1,355.04	1,369.40	1,363.44	7.56	3.90	1,360.65	1,358.49
1,355.04	1,354.47	1,363.44	1,362.70	3.90	3.73	1,358.39	1,358.15
1,360.90	1,360.80	1,365.56	1,366.00	2.66	3.20	1,362.16	1,362.16
1,365.16	1,365.09	1,369.91	1,370.10	2.75	3.01	1,365.75	1,365.60
1,365.00	1,361.36	1,370.10	1,367.10	3.10	3.74	1,365.59	1,362.84
1,361.50	1,361.36	1,366.85	1,367.10	3.35	3.74	1,362.84	1,362.84
1,360.86	1,360.41	1,367.10	1,366.40	3.74	3.49	1,362.84	1,362.82
1,360.31	1,360.29	1,366.40	1,366.20	3.59	3.41	1,362.82	1,362.82
1,360.19	1,360.00	1,366.20	1,367.00	3.51	4.50	1,362.82	1,362.82
1,369.10	1,368.96	1,373.33	1,374.00	2.23	3.04	1,370.61	1,370.59
1,368.96	1,367.89	1,374.00	1,372.00	3.04	2.11	1,370.59	1,370.51
1,368.04	1,367.89	1,373.09	1,372.00	3.05	2.11	1,370.52	1,370.51
1,367.89	1,364.15	1,372.00	1,372.93	1.11	5.78	1,370.51	1,367.53
1,373.02	1,366.53	1,377.94	1,370.43	2.92	1.90	1,374.03	1,367.77
1,366.43	1,366.23	1,370.43	1,371.33	2.00	3.10	1,367.71	1,367.71
1,366.23	1,364.15	1,371.33	1,372.93	3.10	6.78	1,367.71	1,367.53
1,365.43	1,365.15	1,370.14	1,372.93	2.71	5.78	1,367.57	1,367.53
1,364.15	1,362.85	1,372.93	1,368.91	5.28	2.56	1,367.53	1,365.76
1,374.75	1,373.01	1,379.83	1,378.47	2.08	2.46	1,376.91	1,375.36
1,394.24	1,374.12	1,402.00	1,377.40	5.76	1.28	1,395.34	1,375.59
1,373.87	1,373.76	1,377.40	1,378.76	1.53	3.00	1,375.59	1,375.52
1,373.76	1,373.01	1,378.76	1,378.47	3.00	3.46	1,375.52	1,375.36
1,373.01	1,371.84	1,378.47	1,378.00	2.46	3.16	1,375.36	1,374.29
1,371.84	1,367.89	1,378.00	1,372.00	3.16	1.11	1,374.29	1,370.51
1,372.54	1,372.34	1,377.65	1,378.00	3.11	3.66	1,374.30	1,374.29
1,362.85	1,360.97	1,368.91	1,367.99	2.56	3.52	1,365.74	1,363.94
1,360.97	1,359.60	1,367.99	1,367.00	3.52	3.90	1,363.94	1,362.82
1,360.97	1,361.72	1,367.45	1,367.99	4.48	4.27	1,363.94	1,363.94
1,359.60	1,359.20	1,367.00	1,366.20	2.90	2.50	1,362.82	1,362.71
1,359.20	1,359.00	1,366.20	1,366.00	2.50	2.50	1,362.67	1,362.16
1,361.00	1,360.45	1,365.91	1,366.20	2.91	3.75	1,363.21	1,363.21
1,363.54	1,363.11	1,367.79	1,366.86	2.25	1.75	1,364.44	1,364.40
1,363.01	1,363.00	1,366.86	1,367.10	1.85	2.10	1,364.37	1,364.34
1,363.00	1,362.43	1,367.10	1,366.20	2.10	1.77	1,364.34	1,364.03
1,362.57	1,362.52	1,365.99	1,366.20	1.42	1.68	1,364.03	1,364.03
1,362.43	1,361.87	1,366.20	1,365.60	1.77	1.73	1,364.03	1,363.37
1,361.87	1,361.84	1,365.60	1,365.39	1.73	1.55	1,363.37	1,363.35
1,361.74	1,361.41	1,365.39	1,367.00	1.65	3.59	1,363.30	1,362.87

Scenario: Base

Pipe Report

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,361.41	1,359.44	1,367.00	1,366.00	3.59	4.56	1,362.86	1,362.16
1,374.12	1,365.70	1,377.85	1,370.40	1.73	2.70	1,374.95	1,367.62
1,365.60	1,365.53	1,370.40	1,370.14	2.80	2.61	1,367.60	1,367.59
1,401.02	1,394.24	1,405.97	1,402.00	2.95	5.76	1,401.76	1,395.48
1,401.10	1,394.24	1,405.65	1,402.00	2.55	5.76	1,401.90	1,395.47
1,359.00	1,357.77	1,366.00	1,368.00	2.50	5.73	1,362.16	1,361.13
1,357.77	1,357.34	1,368.00	1,369.40	5.73	7.56	1,361.07	1,360.65
1,357.96	1,357.77	1,364.60	1,368.00	2.14	5.73	1,361.08	1,361.08
1,354.47	1,354.00	1,362.70	1,361.87	3.23	2.87	1,358.15	1,357.41
1,354.00	1,352.73	1,361.87	1,360.80	2.87	3.07	1,357.34	1,356.24
1,354.25	1,354.00	1,361.10	1,361.87	2.35	3.37	1,357.34	1,357.34
1,358.61	1,358.44	1,362.21	1,363.00	1.60	2.56	1,359.61	1,359.39
1,358.44	1,356.29	1,363.00	1,363.44	2.56	5.15	1,359.38	1,359.38

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
O1					13.82				15.85	4.29	59.74			
Ex Manhol					13.82				15.27	4.34	60.50			
Tie-in 9					1.07				10.14	5.13	5.51			
CB104	1.24	0.86	1.07	0.00	1.07	10.00	0.00	0.00	10.00	5.15	5.54	0.00	0.00	0.00
Ex MH 2-1					5.52				14.03	4.52	25.14			
Tie-in 15					3.03				11.42	4.93	15.04			
Ex MH 2-2					2.49				12.67	4.73	11.88			
MH101					2.49				12.29	4.79	12.03			
Tie-in12					2.13				12.17	4.81	10.32			
Tee 6					2.13				11.93	4.85	10.40			
Tee 7					1.79				11.57	4.91	8.83			
Tee 8					1.47				11.13	4.97	7.38			
Tee 9					1.15				10.69	5.04	5.84			
Tie-in 13					0.73				10.16	5.12	3.78			
CB116	0.77	0.95	0.73	0.00	0.73	10.00	0.00	0.00	10.00	5.15	3.80	0.00	0.00	0.00
CB114	0.44	0.95	0.42	0.00	0.42	10.00	0.00	0.00	10.00	5.15	2.17	0.00	0.00	0.00
CB112	0.34	0.95	0.32	0.00	0.32	10.00	0.00	0.00	10.00	5.15	1.68	0.00	0.00	0.00
CB111	0.33	0.95	0.31	0.00	0.31	10.00	0.00	0.00	10.00	5.15	1.63	0.00	0.00	0.00
CB14	0.36	0.95	0.34	0.00	0.34	10.00	0.00	0.00	10.00	5.15	1.78	0.00	0.00	0.00
Tie-in 11					2.49				12.33	4.79	12.01			
CB13	0.38	0.95	0.36	0.00	0.36	0.00	0.00	0.00	0.00	6.73	2.45	0.00	0.00	0.00
CB 156	1.23	0.86	1.06	0.00	7.23	0.00	0.00	15.20	15.20	4.35	31.73	0.00	0.00	0.00
MH155					6.18				15.18	4.35	27.10			
MH158					6.18				14.51	4.45	27.68			
Tee 11					5.32				14.11	4.51	24.19			
CB160	1.33	0.89	1.18	0.00	1.18	10.00	0.00	0.00	10.00	5.15	6.14	0.00	0.00	0.00
CB7	0.97	0.88	0.85	0.00	0.85	10.00	0.00	0.00	10.00	5.15	4.43	0.00	0.00	0.00
MH163					4.14				13.27	4.64	19.35			
MH162					4.14				12.25	4.80	20.02			
Tee 10					2.10				11.10	4.98	10.54			
Tie-in 14					1.01				10.30	5.10	5.21			
CB166	1.15	0.88	1.01	0.00	1.01	10.00	0.00	0.00	10.00	5.15	5.25	0.00	0.00	0.00
CB164	1.25	0.87	1.09	0.00	1.09	10.00	0.00	0.00	10.00	5.15	5.65	0.00	0.00	0.00
CB11	0.44	0.85	0.37	0.00	2.04	10.00	0.00	11.03	11.03	4.99	10.25	0.00	0.00	0.00
CB8	0.85	0.82	0.70	0.00	0.70	10.00	0.00	0.00	10.00	5.15	3.62	0.00	0.00	0.00
CB9	1.10	0.88	0.97	0.00	0.97	10.00	0.00	0.00	10.00	5.15	5.03	0.00	0.00	0.00
MH 907					3.03				11.30	4.95	15.10			
Tee 13					2.04				11.02	4.99	10.26			
Tee 12					0.79				10.76	5.03	4.00			
MH 906					0.24				10.13	5.13	1.23			
CB12	0.25	0.95	0.24	0.00	0.24	10.00	0.00	0.00	10.00	5.15	1.23	0.00	0.00	0.00
CB113	0.58	0.95	0.55	0.00	0.55	10.00	0.00	0.00	10.00	5.15	2.86	0.00	0.00	0.00
CB108	1.39	0.90	1.25	0.00	1.25	0.00	0.00	0.00	0.00	6.73	8.49	0.00	0.00	0.00
CB110	1.19	0.83	0.99	0.00	0.99	10.00	0.00	0.00	10.00	5.15	5.13	0.00	0.00	0.00
O 2					38.38				16.68	4.21	162.90			
Ex MH 1-7					37.53				15.99	4.28	161.76			
Ex MH 1-8					37.53				15.84	4.29	162.29			
Tie-in 1					2.26				10.29	5.10	11.63			
Tee 1					35.27				15.76	4.30	152.79			
Ex MH 1-9					33.98				15.33	4.34	148.61			
CB168	1.52	0.85	1.29	0.00	1.29	10.00	0.00	0.00	10.00	5.15	6.71	0.00	0.00	0.00

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
CB118	1.32	0.89	1.17	0.00	2.26	10.00	0.00	10.10	10.10	5.13	11.70	0.00	0.00	0.00
CB119	1.13	0.70	0.79	0.00	1.08	10.00	0.00	10.07	10.07	5.14	5.62	0.00	0.00	0.00
CB121	0.42	0.70	0.29	0.00	0.29	10.00	0.00	0.00	10.00	5.15	1.53	0.00	0.00	0.00
MH 167					38.38				16.09	4.27	165.07			
CB 103	0.97	0.88	0.85	0.00	0.85	10.00	0.00	0.00	10.00	5.15	4.43	0.00	0.00	0.00
Tie-in 2					1.59				10.15	5.13	8.23			
CB120	1.83	0.87	1.59	0.00	1.59	10.00	0.00	0.00	10.00	5.15	8.26	0.00	0.00	0.00
Tee 2					32.38				15.30	4.34	141.71			
CB170	1.78	0.85	1.51	0.00	1.51	10.00	0.00	0.00	10.00	5.15	7.85	0.00	0.00	0.00
MH172					30.87				14.96	4.38	136.16			
Ex MH 1-1					30.87				14.65	4.42	137.68			
CB174	2.24	0.86	1.93	0.00	1.93	10.00	0.00	0.00	10.00	5.15	10.00	0.00	0.00	0.00
Tee 3					28.94				14.52	4.44	129.67			
Ex MH 1-1					27.58				13.87	4.55	126.38			
Tie-in 4					1.40				11.11	4.98	7.02			
CB126	0.80	0.87	0.70	0.00	1.40	10.00	0.00	10.92	10.92	5.01	7.07	0.00	0.00	0.00
MH125					0.70				10.89	5.01	3.56			
CB124	0.80	0.88	0.70	0.00	0.70	10.00	0.00	0.00	10.00	5.15	3.65	0.00	0.00	0.00
CB178	1.90	0.85	1.61	0.00	1.61	10.00	0.00	0.00	10.00	5.15	8.38	0.00	0.00	0.00
MH182					24.56				13.65	4.58	113.42			
MH 183					24.56				13.17	4.66	115.26			
CB184	0.57	0.85	0.48	0.00	0.48	10.00	0.00	0.00	10.00	5.15	2.52	0.00	0.00	0.00
Tee 4					20.79				12.85	4.70	98.58			
MH 187 (M					20.34				12.66	4.74	97.07			
CB188	0.43	0.86	0.37	0.00	1.31	10.00	0.00	11.53	11.53	4.91	6.48	0.00	0.00	0.00
MH189					0.94				11.40	4.93	4.67			
MH191					0.94				10.65	5.05	4.78			
MH193					0.55				10.02	5.15	2.87			
CB18	0.71	0.78	0.55	0.00	0.55	10.00	0.00	0.00	10.00	5.15	2.87	0.00	0.00	0.00
CB17	0.50	0.77	0.39	0.00	0.39	10.00	0.00	0.00	10.00	5.15	2.00	0.00	0.00	0.00
Tee 5					19.03				12.41	4.77	91.57			
Ex MH 1-1					17.69				12.06	4.83	86.08			
Ex MH 1-1					17.69				11.59	4.90	87.39			
Ex MH 1-1					13.54				11.28	4.95	67.59			
Tie-in 7					1.30				10.14	5.13	6.72			
CB146	1.53	0.85	1.30	0.00	1.30	10.00	0.00	0.00	10.00	5.15	6.75	0.00	0.00	0.00
CB194	1.00	0.86	0.86	0.00	0.86	10.00	0.00	0.00	10.00	5.15	4.46	0.00	0.00	0.00
Tie-in 6					2.28				10.20	5.12	11.76			
CB144	0.85	0.87	0.74	0.00	2.28	10.00	0.00	10.09	10.09	5.14	11.80	0.00	0.00	0.00
CB20	1.90	0.81	1.54	0.00	1.54	10.00	0.00	0.00	10.00	5.15	7.99	0.00	0.00	0.00
CB192	0.92	0.87	0.80	0.00	1.86	10.00	0.00	10.11	10.11	5.13	9.64	0.00	0.00	0.00
Wye 1					11.38				11.00	4.99	57.30			
Ex MH 1-1					10.33				10.98	5.00	52.05			
Upstrm Flc	10.02	0.85	8.49	0.00	8.49	10.00	0.00	0.00	10.00	5.15	44.09	0.00	0.00	0.00
Tie-in 8					1.84				10.61	5.06	9.38			
MH150					1.84				10.40	5.09	9.44			
CB195	1.22	0.86	1.05	0.00	1.05	10.00	0.00	0.00	10.00	5.15	5.45	0.00	0.00	0.00
CB190	1.49	0.90	1.34	0.00	1.34	10.00	0.00	0.00	10.00	5.15	6.96	0.00	0.00	0.00
CB180	0.53	0.85	0.45	0.00	0.45	10.00	0.00	0.00	10.00	5.15	2.34	0.00	0.00	0.00
Tie-in 5					3.29			-	11.69	4.89	16.22			
CB140	0.74	0.90	0.67	0.00	3.29	10.00	0.00	11.50	11.50	4.92	16.31	0.00	0.00	0.00

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
MH138					2.63				11.48	4.92	13.02			
MH136					2.63				10.84	5.02	13.29			
MH132					1.93				10.18	5.12	9.99			
CB130	0.84	0.82	0.69	0.00	1.93	10.00	0.00	10.14	10.14	5.13	10.00	0.00	0.00	0.00
CB128	1.40	0.89	1.25	0.00	1.25	10.00	0.00	0.00	10.00	5.15	6.47	0.00	0.00	0.00
CB134	0.76	0.91	0.69	0.00	0.69	10.00	0.00	0.00	10.00	5.15	3.59	0.00	0.00	0.00
MH199					1.06				10.09	5.14	5.50			
CB19	1.28	0.83	1.06	0.00	1.06	10.00	0.00	0.00	10.00	5.15	5.52	0.00	0.00	0.00
Ex MH					1.84				10.26	5.11	9.48			
CB 104	0.97	0.88	0.85	0.00	0.85	10.00	0.00	0.00	10.00	5.15	4.43	0.00	0.00	0.00
CB 105	1.19	0.83	0.99	0.00	0.99	10.00	0.00	0.00	10.00	5.15	5.13	0.00	0.00	0.00
MH181					0.00				0.00	0.00	0.00			
MH171					0.00				0.00	0.00	0.00			
Tie-in 3					1.37				10.19	5.12	7.06			
CB122	1.59	0.86	1.37	0.00	1.37	10.00	0.00	0.00	10.00	5.15	7.10	0.00	0.00	0.00

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
	59.74	1,351.33	1,351.33	1,342.47	1,342.47			
	60.50	1,352.08	1,352.08	1,347.43	1,347.39			
	5.51	1,352.35	1,352.35	1,347.76	1,347.76			
0.00	5.54	1,352.27	1,352.27	1,348.23	1,348.23	5.15	5.54	
	25.14	1,352.60	1,352.60	1,347.60	1,347.58			
	15.04	1,353.20	1,353.20	1,349.14	1,349.08			
	11.88	1,354.82	1,354.82	1,348.50	1,348.50			
	12.03	1,354.72	1,354.72	1,350.88	1,350.88			
	10.32	1,354.77	1,354.77	1,351.00	1,351.00			
	10.40	1,355.14	1,355.14	1,351.27	1,351.27			
	8.83	1,355.74	1,355.74	1,351.76	1,351.76			
	7.38	1,356.40	1,356.40	1,352.14	1,352.14			
	5.84	1,357.03	1,357.03	1,352.60	1,352.60			
	3.78	1,357.71	1,357.71	1,353.18	1,353.18			
0.00	3.80	1,357.17	1,357.17	1,353.38	1,353.38	5.15	3.80	
0.00	2.17	1,356.43	1,356.43	1,352.61	1,352.61	5.15	2.17	
0.00	1.68	1,355.72	1,355.72	1,352.14	1,352.14	5.15	1.68	
0.00	1.63	1,354.79	1,354.79	1,351.76	1,351.76	5.15	1.63	
0.00	1.78	1,354.14	1,354.14	1,351.26	1,351.26	5.15	1.78	
	12.01	1,354.85	1,354.85	1,350.84	1,350.80			
0.00	2.45	1,353.83	1,353.83	1,350.88	1,350.88	6.73	2.45	
0.00	31.73	1,351.31	1,351.31	1,348.30	1,348.20	6.73	7.18	
	27.10	1,353.60	1,353.60	1,348.71	1,348.32			
	27.68	1,352.10	1,352.10	1,349.78	1,349.72			
	24.19	1,352.71	1,352.71	1,350.18	1,350.12			
0.00	6.14	1,352.46	1,352.46	1,350.20	1,350.20	5.15	6.14	
0.00	4.43	1,361.78	1,361.78	1,357.45	1,357.45	5.15	4.43	
	19.35	1,353.53	1,353.53	1,350.58	1,350.56			
	20.02	1,354.60	1,354.60	1,351.13	1,351.09			
	10.54	1,356.64	1,356.64	1,352.66	1,352.66			
	5.21	1,357.87	1,357.87	1,353.07	1,353.07			
0.00	5.25	1,357.08	1,357.08	1,353.34	1,353.34	5.15	5.25	
0.00	5.65	1,355.19	1,355.19	1,352.59	1,352.59	5.15	5.65	
0.00	10.25	1,353.63	1,353.63	1,351.37	1,351.35	5.15	1.94	
0.00	3.62	1,353.72	1,353.72	1,351.38	1,351.38	5.15	3.62	
0.00	5.03	1,353.83	1,353.83	1,351.42	1,351.42	5.15	5.03	
	15.10	1,352.30	1,352.30	1,349.59	1,349.36			
	10.26	1,353.00	1,353.00	1,349.69	1,349.61			
	4.00	1,353.00	1,353.00	1,349.69	1,349.67			
	1.23	1,353.50	1,353.50	1,349.80	1,349.76			
0.00	1.23	1,356.10	1,356.10	1,351.66	1,351.66	5.15	1.23	
0.00	2.86	1,358.40	1,358.40	1,354.09	1,354.09	5.15	2.86	
0.00	8.49	1,352.49	1,352.49	1,350.08	1,350.08	6.73	8.49	
0.00	5.13	1,363.07	1,363.07	1,358.92	1,358.92	5.15	5.13	
	162.90	1,363.34	1,363.34	1,348.58	1,348.58			
	161.76	1,358.60	1,358.60	1,354.78	1,354.78			
	162.29	1,359.12	1,359.12	1,354.84	1,354.84			
	11.63	1,359.00	1,359.00	1,355.45	1,355.45			
	152.79	1,369.50	1,369.50	1,354.91	1,354.91			
	148.61	1,360.71	1,360.71	1,355.64	1,355.64			
0.00	6.71	1,358.61	1,358.61	1,354.93	1,354.93	5.15	6.71	

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
0.00	11.70	1,358.61	1,358.61	1,356.04	1,355.80	5.15	6.10	
0.00	5.62	1,358.20	1,358.20	1,356.05	1,356.04	5.15	4.11	
0.00	1.53	1,379.00	1,379.00	1,356.86	1,356.86	5.15	1.53	
	165.07	1,358.01	1,358.01	1,354.66	1,354.65			
0.00	4.43	1,383.97	1,383.97	1,360.74	1,360.74	5.15	4.43	
	8.23	1,361.20	1,361.20	1,357.06	1,357.06			
0.00	8.26	1,360.04	1,360.04	1,357.26	1,357.26	5.15	8.26	
	141.71	1,360.80	1,360.80	1,356.24	1,356.14			
0.00	7.85	1,359.94	1,359.94	1,357.07	1,357.07	5.15	7.85	
	136.16	1,361.87	1,361.87	1,357.34	1,357.34			
	137.68	1,362.70	1,362.70	1,358.15	1,358.15			
0.00	10.00	1,361.56	1,361.56	1,358.19	1,358.19	5.15	10.00	
	129.67	1,363.44	1,363.44	1,358.49	1,358.39			
	126.38	1,369.40	1,369.40	1,360.65	1,360.65			
	7.02	1,365.26	1,365.26	1,360.98	1,360.98			
0.00	7.07	1,363.99	1,363.99	1,361.25	1,361.22	5.15	3.61	
	3.56	1,364.20	1,364.20	1,361.25	1,361.25			
0.00	3.65	1,364.72	1,364.72	1,361.70	1,361.70	5.15	3.65	
0.00	8.38	1,363.84	1,363.84	1,360.65	1,360.65	5.15	8.38	
	113.42	1,368.00	1,368.00	1,361.08	1,361.07			
	115.26	1,366.00	1,366.00	1,362.16	1,362.16			
0.00	2.52	1,365.56	1,365.56	1,362.16	1,362.16	5.15	2.52	
	98.58	1,366.20	1,366.20	1,362.71	1,362.67			
	97.07	1,367.00	1,367.00	1,362.82	1,362.82			
0.00	6.48	1,366.20	1,366.20	1,362.82	1,362.82	5.15	1.92	
	4.67	1,366.40	1,366.40	1,362.82	1,362.82			
	4.78	1,367.10	1,367.10	1,362.84	1,362.84			
	2.87	1,370.10	1,370.10	1,365.59	1,365.59			
0.00	2.87	1,369.91	1,369.91	1,365.75	1,365.75	5.15	2.87	
0.00	2.00	1,366.85	1,366.85	1,362.84	1,362.84	5.15	2.00	
	91.57	1,367.99	1,367.99	1,363.94	1,363.94			
	86.08	1,368.91	1,368.91	1,365.74	1,365.74			
	87.39	1,372.93	1,372.93	1,367.53	1,367.53			
	67.59	1,372.00	1,372.00	1,370.51	1,370.51			
	6.72	1,374.00	1,374.00	1,370.59	1,370.59			
0.00	6.75	1,373.33	1,373.33	1,370.61	1,370.61	5.15	6.75	
0.00	4.46	1,373.09	1,373.09	1,370.52	1,370.52	5.15	4.46	
	11.76	1,371.33	1,371.33	1,367.71	1,367.71			
0.00	11.80	1,370.43	1,370.43	1,367.77	1,367.71	5.15	3.84	
0.00	7.99	1,377.94	1,377.94	1,374.03	1,374.03	5.15	7.99	
0.00	9.64	1,370.14	1,370.14	1,367.59	1,367.57	5.15	4.16	
	57.30	1,378.00	1,378.00	1,374.29	1,374.29			
	52.05	1,378.47	1,378.47	1,375.36	1,375.36			
0.00	44.09	1,379.83	1,379.83	1,376.91	1,376.91	5.15	44.09	
	9.38	1,378.76	1,378.76	1,375.52	1,375.52			
	9.44	1,377.40	1,377.40	1,375.59	1,375.59			
0.00	5.45	1,377.65	1,377.65	1,374.30	1,374.30	5.15	5.45	
0.00	6.96	1,367.45	1,367.45	1,363.94	1,363.94	5.15	6.96	
0.00	2.34	1,365.91	1,365.91	1,363.21	1,363.21	5.15	2.34	
	16.22	1,367.00	1,367.00	1,362.86	1,362.86			
0.00	16.31	1,365.39	1,365.39	1,363.35	1,363.30	5.15	3.46	

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
	13.02	1,365.60	1,365.60	1,363.37	1,363.37			
	13.29	1,366.20	1,366.20	1,364.03	1,364.03			
	9.99	1,367.10	1,367.10	1,364.34	1,364.34			
0.00	10.00	1,366.86	1,366.86	1,364.40	1,364.37	5.15	3.58	
0.00	6.47	1,367.79	1,367.79	1,364.44	1,364.44	5.15	6.47	
0.00	3.59	1,365.99	1,365.99	1,364.03	1,364.03	5.15	3.59	
	5.50	1,370.40	1,370.40	1,367.62	1,367.60			
0.00	5.52	1,377.85	1,377.85	1,374.95	1,374.95	5.15	5.52	
	9.48	1,402.00	1,402.00	1,395.47	1,395.34			
0.00	4.43	1,405.97	1,405.97	1,401.76	1,401.76	5.15	4.43	
0.00	5.13	1,405.65	1,405.65	1,401.90	1,401.90	5.15	5.13	
	0.00	1,364.60	1,364.60	1,361.08	1,361.08			
	0.00	1,361.10	1,361.10	1,357.34	1,357.34			
	7.06	1,363.00	1,363.00	1,359.38	1,359.38			
0.00	7.10	1,362.21	1,362.21	1,359.61	1,359.61	5.15	7.10	

US 60

TI TO ELLSWORTH ROAD

US60/L202 11 TO ELLSWORTH

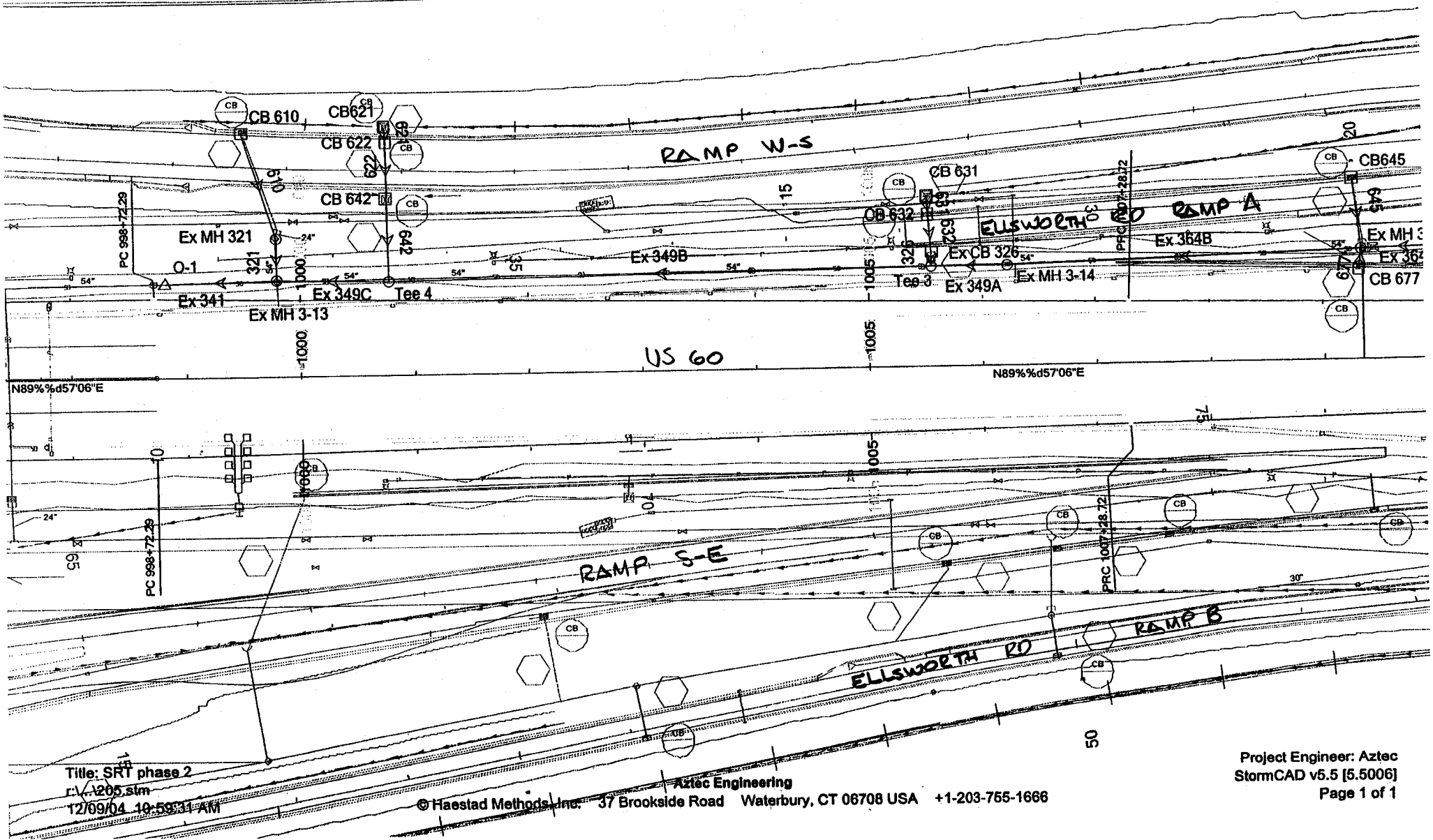
EAST DRAINAGE SYSTEM No. 4

1/4

N
4
NTS

Scenario: Base

NORTH CHANNEL



Title: SRT phase 2
r:\...\205.stm
12/09/04 10:59:31 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

USGO/L202 TI TO ELLS...

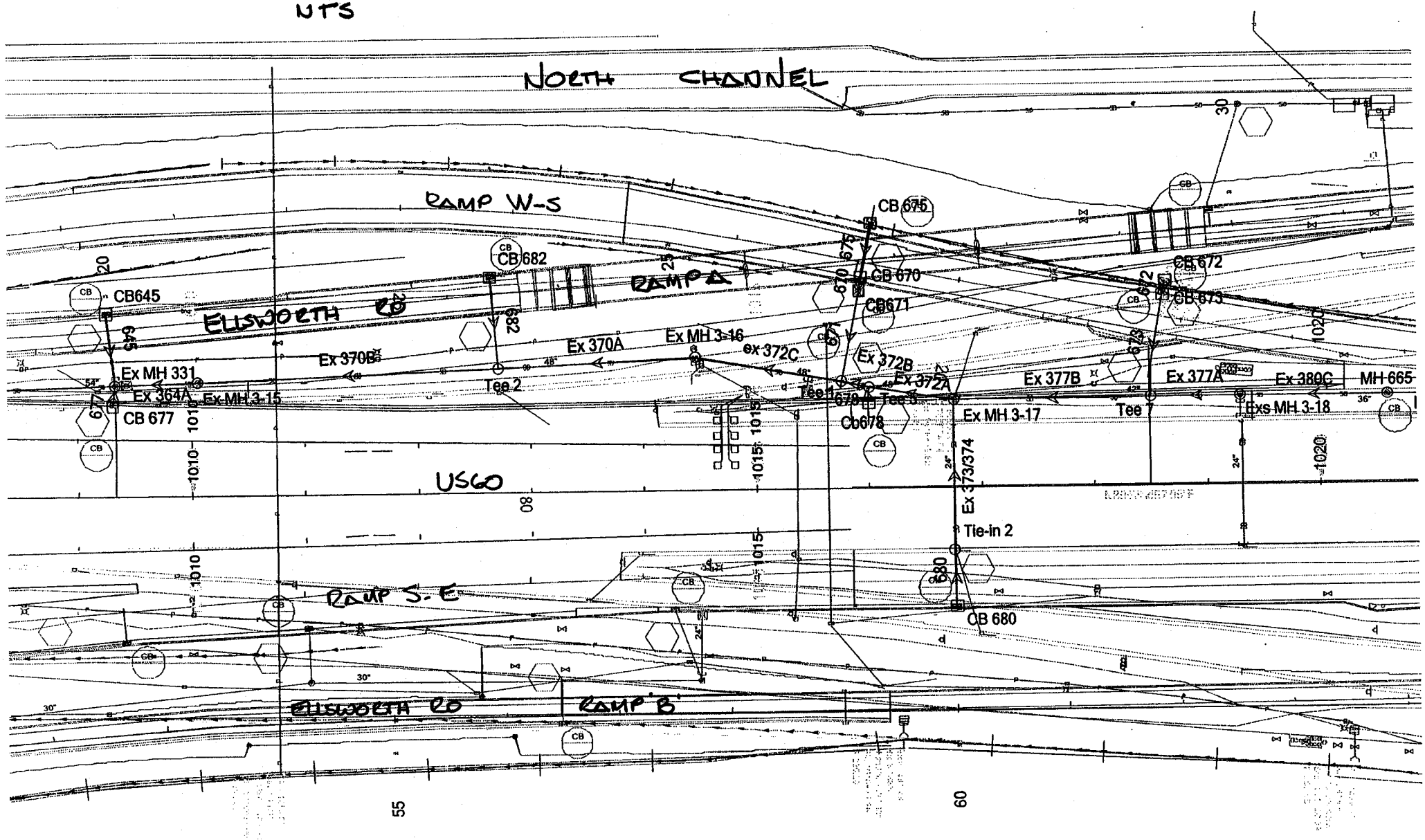
EAST DRAINAGE System No. 1

7/4

N

NTS

Scenario: Base

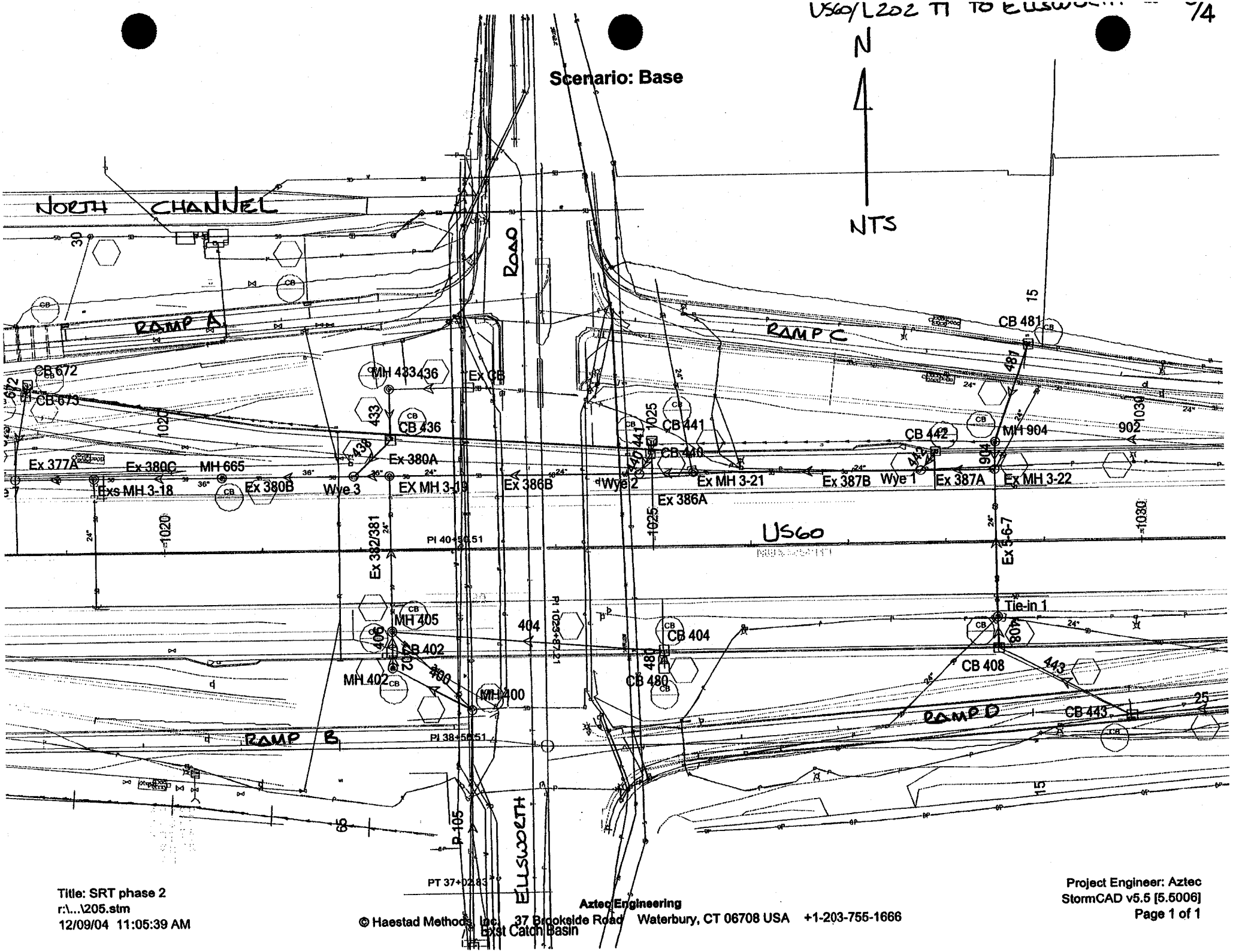


Title: SRT phase 2
r:\...\205.stm
12/09/04 11:05:15 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

US60/L202 TI TO ELLSWORTH 7/4



Title: SRT phase 2
r:\...\205.stm
12/09/04 11:05:39 AM

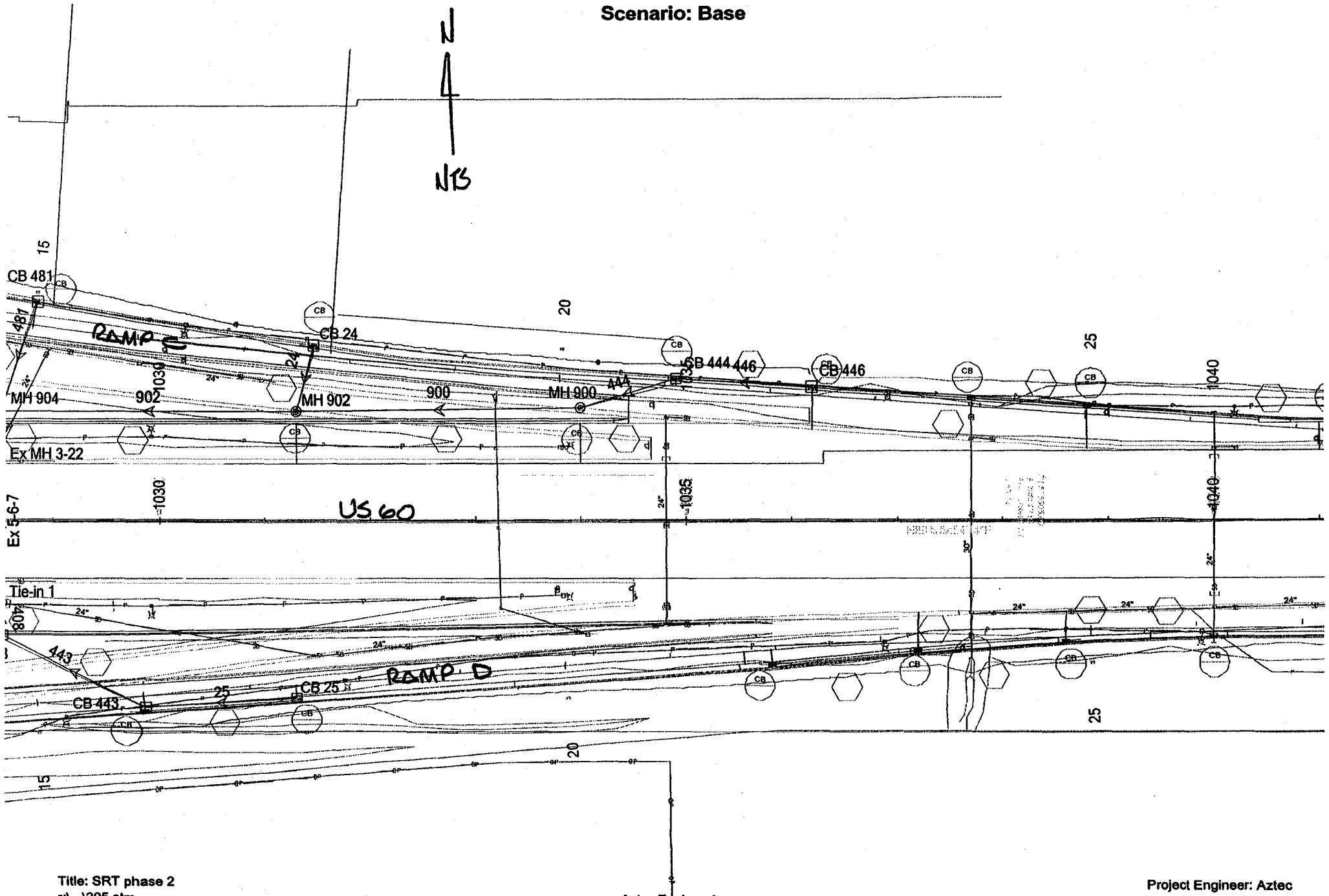
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Aztec Engineering

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

US60/L202 TI TO ELLSWORTH RD T/4

Scenario: Base



Title: SRT phase 2
r:\...\205.stm
12/09/04 11:06:04 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

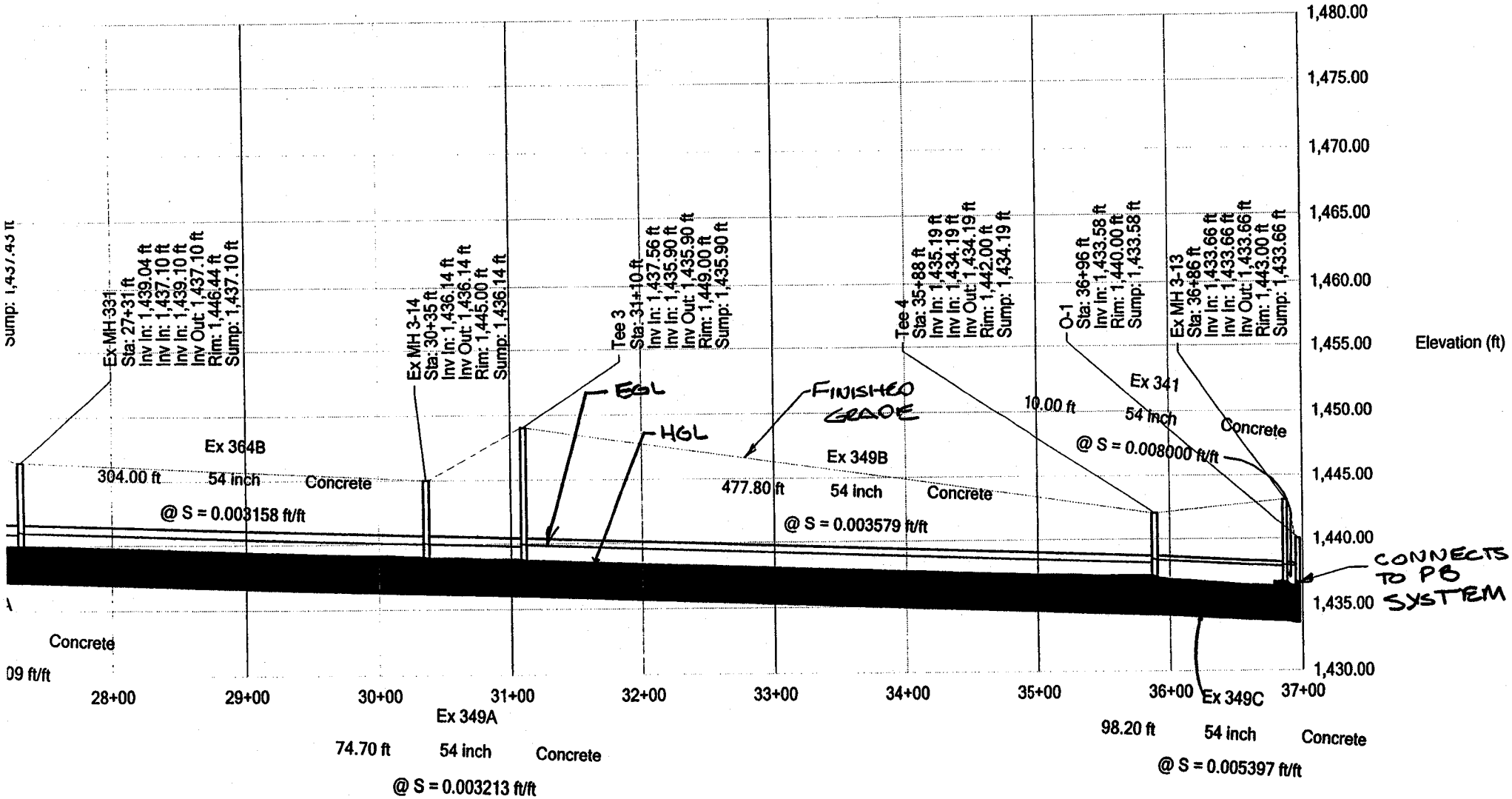
Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

US60/L202 TO

TRUNKLINE ALONG US 60

/4

Profile
Scenario: Base



Title: SRT phase 2
r:\...\205.stm
12/09/04 12:05:27 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

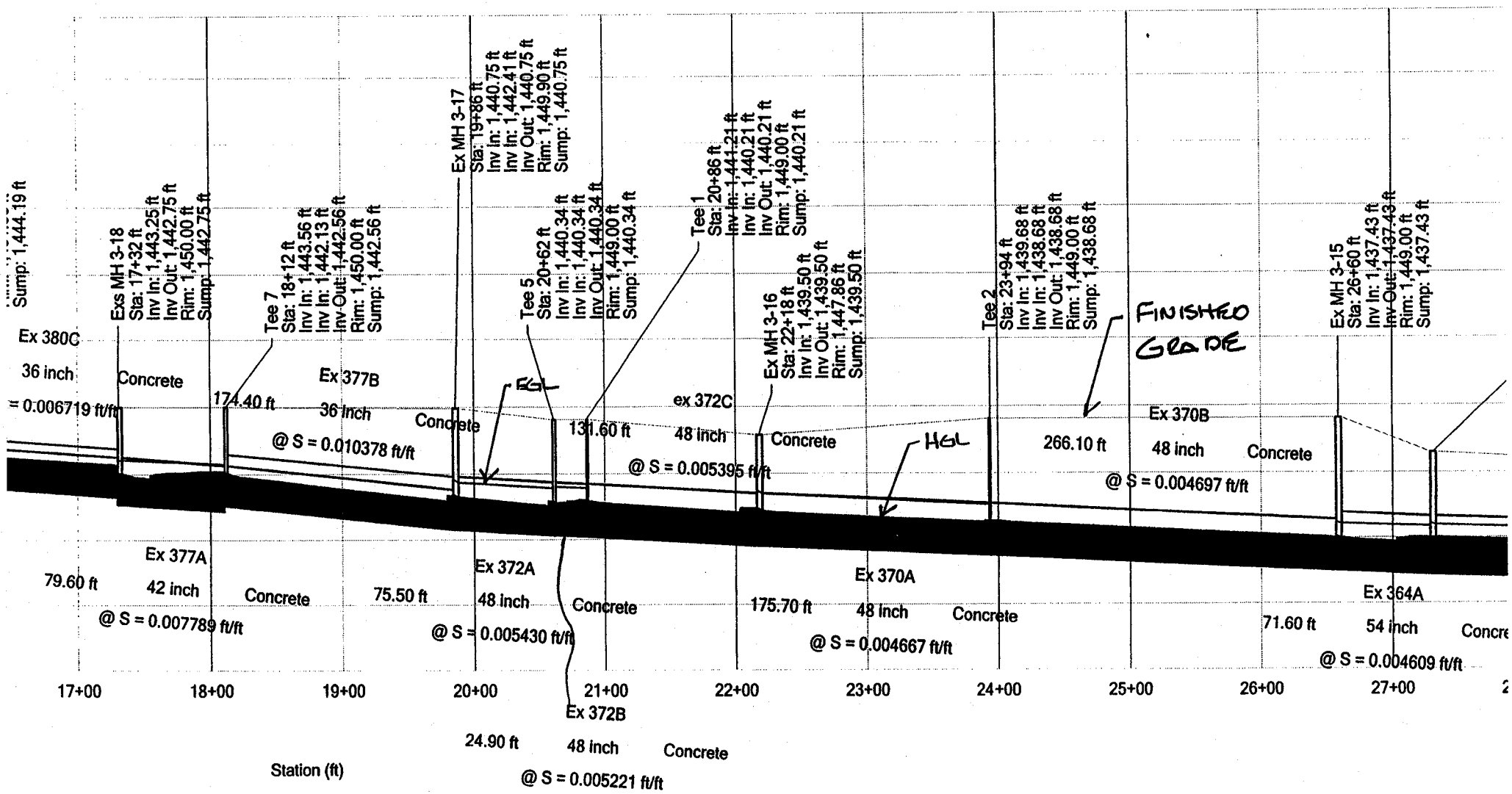
Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

Scenario: Base

US60/L202T1 TO ELLSWORTH RD
TRUNKLINE ALONG US60

-/4

Profile
Scenario: Base



US60/LC02 TO ... 7/4

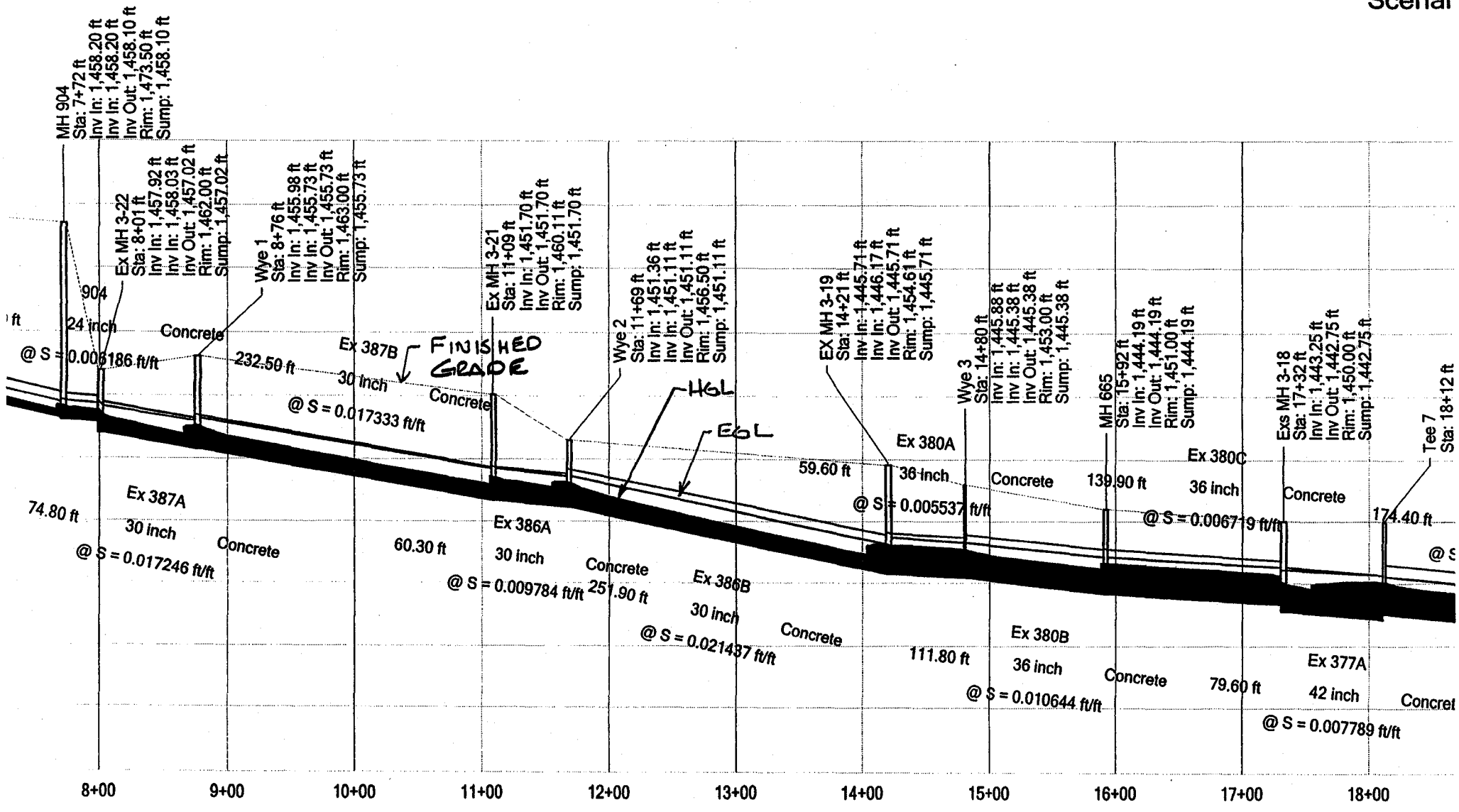
TRUNKLINE ALONG US60

Profile

Scenario: Base

Profile: I

Scenar



Stat

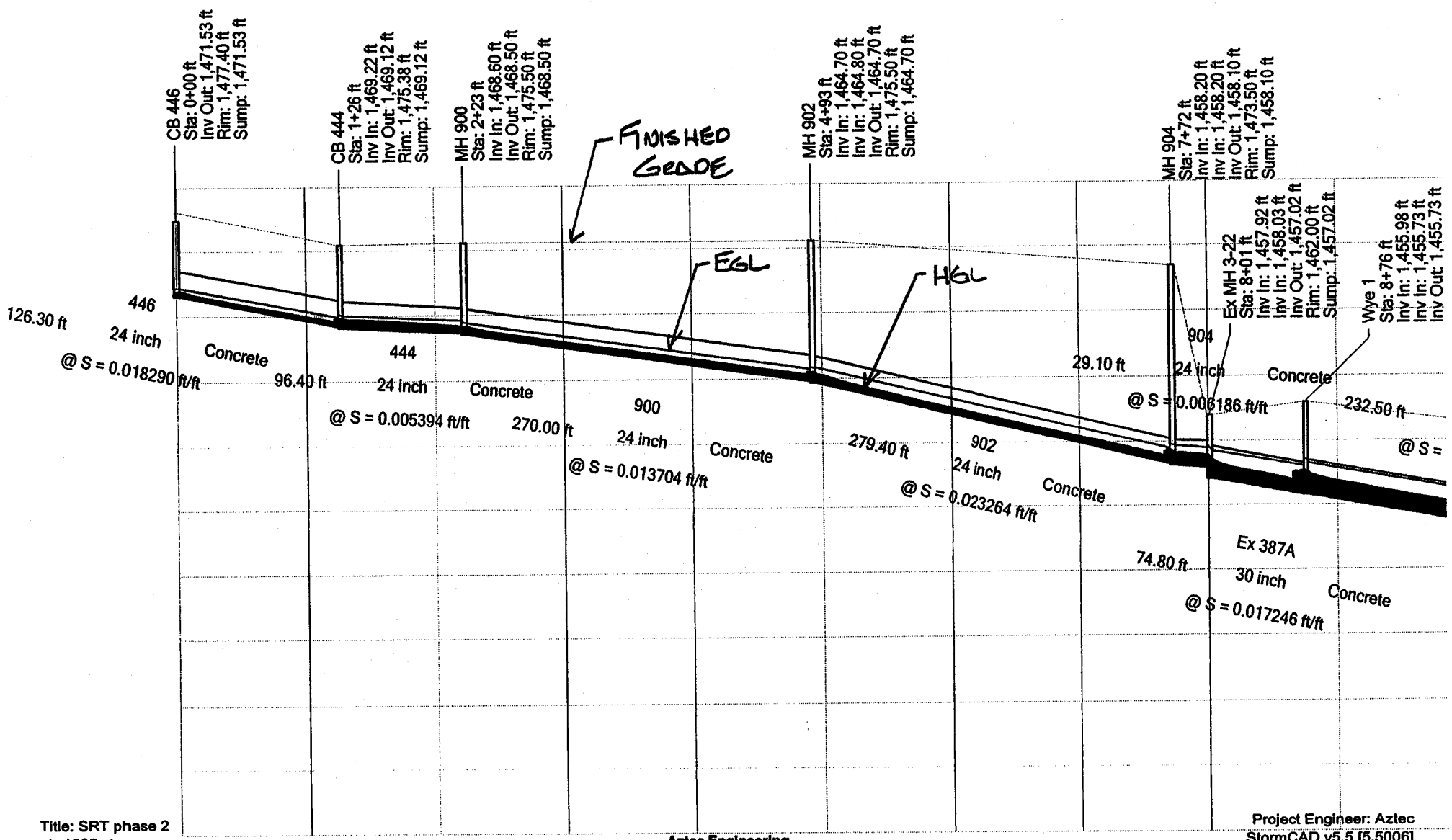
Title: SRT phase 2
r:\...\205.stm
12/09/04 12:10:11 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

US60/202L TI TO ELLSWORTH RD 4/4
TRUNKLINE ALONG US60

Profile
Scenario: Base



Title: SRT phase 2
r:\...\205.stm
12/09/04 12:10:27 PM

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666
Aztec Engineering

Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
CB 610	Ex MH 321	1.04	0.95	0.99	0.99	5.15	5.13	92.30	0.004875	24 inch	0.012	17.11
Ex MH 32	Ex MH 3-1	N/A	N/A	N/A	0.99	5.10	5.08	39.00	0.011538	54 inch	0.012	228.83
CB621	CB 622	1.35	0.70	0.95	0.95	5.15	4.91	9.50	0.005263	24 inch	0.012	17.78
CB 622	CB 642	1.13	0.95	1.07	2.02	5.14	10.47	55.10	0.004537	24 inch	0.012	16.51
CB 642	Tee 4	0.44	0.70	0.31	2.33	5.12	12.00	70.30	0.061593	24 inch	0.012	60.82
Tee 3	Tee 4	N/A	N/A	N/A	21.35	4.28	92.22	477.80	0.003579	54 inch	0.012	127.44
CB 631	CB 632	0.78	0.70	0.55	0.55	5.15	2.83	14.50	0.011034	24 inch	0.012	25.74
CB 632	Ex CB 326	0.28	0.95	0.27	0.81	5.14	4.21	38.70	0.004910	24 inch	0.012	17.17
Ex CB 326	Tee 3	0.78	0.70	0.55	1.36	5.12	7.01	3.00	0.543333	24 inch	0.012	180.64
Tee 4	Ex MH 3-1	N/A	N/A	N/A	23.68	4.20	100.21	98.20	0.005397	54 inch	0.012	156.50
CB645	Ex MH 331	0.27	0.95	0.26	0.26	5.15	1.33	55.10	0.157532	24 inch	0.012	97.27
CB 677	Ex MH 331	1.83	0.81	1.48	1.48	5.15	7.69	15.40	0.024026	24 inch	0.012	37.99
CB 682	Tee 2	0.51	0.95	0.48	0.48	5.15	2.52	82.00	0.246829	24 inch	0.012	121.75
CB 675	CB 670	0.75	0.70	0.52	0.52	5.15	2.73	48.00	0.016458	24 inch	0.012	31.44
CB 670	CB671	0.98	0.95	0.93	1.46	5.13	7.53	5.50	0.005455	24 inch	0.012	18.10
CB671	Tee 1	0.74	0.70	0.52	1.97	5.13	10.20	79.20	0.008586	24 inch	0.012	22.71
Tee 1	Ex MH 3-1	N/A	N/A	N/A	17.77	4.53	81.09	131.60	0.005395	48 inch	0.012	114.29
Ex MH 3-1	Tee 2	N/A	N/A	N/A	17.77	4.49	80.47	175.70	0.004667	48 inch	0.012	106.30
Tee 2	Ex MH 3-1	N/A	N/A	N/A	18.26	4.44	81.76	266.10	0.004697	48 inch	0.012	106.65
Ex MH 3-1	Ex MH 331	N/A	N/A	N/A	18.26	4.37	80.41	71.60	0.004609	54 inch	0.012	144.62
Cb678	Tee 5	0.87	0.88	0.77	0.77	5.15	3.97	15.00	0.137333	24 inch	0.013	83.83
CB 672	CB 673	1.20	0.70	0.84	0.84	5.15	4.36	7.00	0.017143	24 inch	0.012	32.09
CB 673	Tee 7	0.86	0.95	0.82	1.66	5.14	8.58	84.40	0.002962	24 inch	0.012	13.34
CB 436	Wye 3	1.16	0.84	0.97	1.16	5.11	6.00	52.90	0.014367	24 inch	0.012	29.37
Ex CB	MH 433	0.20	0.95	0.19	0.19	5.15	0.99	100.00	0.188500	24 inch	0.012	106.40
MH 433	CB 436	N/A	N/A	N/A	0.19	5.13	0.98	51.80	0.131467	24 inch	0.012	88.86
CB 441	CB 440	0.81	0.70	0.57	0.57	5.15	2.94	6.70	0.010448	24 inch	0.012	25.05
CB 440	Wye 2	0.67	0.95	0.64	1.20	5.15	6.24	28.20	0.013830	24 inch	0.012	28.82
Wye 2	EX MH 3-1	N/A	N/A	N/A	7.12	4.75	34.07	251.90	0.021437	30 inch	0.012	65.06
CB 402	MH 405	0.69	0.95	0.66	1.20	4.95	5.98	24.00	0.004167	24 inch	0.012	15.82
MH 402	CB 402	N/A	N/A	N/A	0.54	4.96	2.71	9.90	0.004040	24 inch	0.012	15.58
CB 480	CB 404	1.14	0.70	0.80	0.80	5.15	4.14	7.50	0.013333	24 inch	0.012	28.30
CB 404	MH 405	1.21	0.95	1.15	1.95	5.14	10.08	277.00	0.010000	24 inch	0.012	24.51
MH 400	MH 402	N/A	N/A	N/A	0.54	4.99	2.72	90.90	0.049615	24 inch	0.012	54.59
MH 405	EX MH 3-1	N/A	N/A	N/A	3.14	4.94	15.66	154.00	0.016753	24 inch	0.012	31.72
EX MH 3-	Wye 3	N/A	N/A	N/A	10.26	4.70	48.62	59.60	0.005537	36 inch	0.013	49.63
Wye 3	MH 665	N/A	N/A	N/A	11.43	4.68	53.91	111.80	0.010644	36 inch	0.012	74.54
MH 665	Exs MH 3-1	N/A	N/A	N/A	11.43	4.65	53.62	139.90	0.006719	36 inch	0.013	54.67
Exs MH 3-	Tee 7	N/A	N/A	N/A	11.43	4.61	53.14	79.60	0.007789	42 inch	0.012	96.19
Tee 7	Ex MH 3-17	N/A	N/A	N/A	13.09	4.59	60.58	174.40	0.010378	36 inch	0.012	73.61
CB 680	Tie-in 2	2.29	0.85	1.95	1.95	5.15	10.10	49.80	0.004819	24 inch	0.012	17.01
Tie-in 2	Ex MH 3-17	N/A	N/A	N/A	1.95	5.13	10.06	131.00	0.012137	24 inch	0.012	27.00
CB 24	MH 902	0.43	0.95	0.41	0.41	5.15	2.12	55.00	0.052727	24 inch	0.012	56.27
MH 902	MH 904	N/A	N/A	N/A	1.18	4.93	5.85	279.40	0.023264	24 inch	0.012	37.38
CB 444	MH 900	0.39	0.95	0.37	0.77	5.09	3.95	96.40	0.005394	24 inch	0.012	18.00
MH 900	MH 902	N/A	N/A	N/A	0.77	5.04	3.91	270.00	0.013704	24 inch	0.012	28.69
CB 481	MH 904	0.69	0.95	0.66	0.66	5.15	3.40	107.60	0.096561	24 inch	0.012	76.15
CB 446	CB 444	0.42	0.95	0.40	0.40	5.15	2.07	126.30	0.018290	24 inch	0.012	33.14
MH 904	Ex MH 3-22	N/A	N/A	N/A	1.83	4.85	8.96	29.10	0.006186	24 inch	0.012	19.27
Ex MH 3-2	Wye 1	N/A	N/A	N/A	4.22	4.83	20.55	74.80	0.017246	30 inch	0.012	58.35
CB 408	Tie-in 1	1.38	0.95	1.31	2.38	5.00	12.02	50.30	0.005368	24 inch	0.012	17.95

Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)
CB 25	CB 443	0.41	0.95	0.39	0.39	5.15	2.02	142.00	0.005000	24 inch	0.012	17.33
CB 443	CB 408	0.72	0.95	0.68	1.07	5.05	5.46	185.60	0.038147	24 inch	0.012	47.86
Tie-in 1	Ex MH 3-22	N/A	N/A	N/A	2.38	4.98	11.97	152.00	0.005263	24 inch	0.012	17.78
CB 442	Wye 1	1.93	0.88	1.70	1.70	5.15	8.82	24.90	0.004819	24 inch	0.012	17.01
Wye 1	Ex MH 3-21	N/A	N/A	N/A	5.92	4.82	28.72	232.50	0.017333	30 inch	0.012	58.50
Ex MH 3-2	Wye 2	N/A	N/A	N/A	5.92	4.76	28.41	60.30	0.009784	30 inch	0.012	43.95
Ex MH 3-1	Tee 5	N/A	N/A	N/A	15.03	4.55	69.00	75.50	0.005430	48 inch	0.012	114.67
Tee 5	Tee 1	N/A	N/A	N/A	15.80	4.53	72.19	24.90	0.005221	48 inch	0.012	112.43
Ex MH 33	Ex MH 3-14	N/A	N/A	N/A	20.00	4.36	87.82	304.00	0.003158	54 inch	0.012	119.71
Ex MH 3-1	Tee 3	N/A	N/A	N/A	20.00	4.30	86.64	74.70	0.003213	54 inch	0.012	120.75
Ex MH 3-1	O-1	N/A	N/A	N/A	24.67	4.18	104.02	10.00	0.008000	54 inch	0.012	190.54
Exst Catch	MH 400	0.57	0.95	0.54	0.54	5.15	2.81	238.00	0.004202	24 inch	0.012	15.89

Scenario: Base

Pipe Report

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,435.97	1,435.52	1,444.47	1,442.61	6.50	5.09	1,436.77	1,436.68
1,434.11	1,433.66	1,442.61	1,443.00	4.00	4.84	1,436.68	1,436.68
1,440.02	1,439.97	1,443.80	1,443.63	1.78	1.66	1,441.07	1,441.08
1,439.87	1,439.62	1,443.63	1,444.80	1.76	3.18	1,441.03	1,440.81
1,439.52	1,435.19	1,444.80	1,442.00	3.28	4.81	1,440.77	1,437.86
1,435.90	1,434.19	1,449.00	1,442.00	8.60	3.31	1,438.74	1,437.20
1,439.54	1,439.38	1,441.90	1,444.58	0.36	3.20	1,440.13	1,440.12
1,439.38	1,439.19	1,444.58	1,444.44	3.20	3.25	1,440.10	1,440.16
1,439.19	1,437.56	1,444.44	1,449.00	3.25	9.44	1,440.13	1,439.41
1,434.19	1,433.66	1,442.00	1,443.00	3.31	4.84	1,437.13	1,436.74
1,447.72	1,439.04	1,452.58	1,446.44	2.86	5.40	1,448.12	1,440.55
1,439.47	1,439.10	1,445.72	1,446.44	4.25	5.34	1,440.46	1,440.55
1,459.92	1,439.68	1,464.68	1,449.00	2.76	7.32	1,460.47	1,442.07
1,442.91	1,442.12	1,447.90	1,445.34	2.99	1.22	1,443.67	1,443.73
1,442.02	1,441.99	1,445.34	1,447.30	1.32	3.31	1,443.72	1,443.72
1,441.89	1,441.21	1,447.30	1,449.00	3.41	5.79	1,443.69	1,443.58
1,440.21	1,439.50	1,449.00	1,447.86	4.79	4.36	1,442.94	1,442.41
1,439.50	1,438.68	1,447.86	1,449.00	4.36	6.32	1,442.22	1,441.45
1,438.68	1,437.43	1,449.00	1,449.00	6.32	7.57	1,441.42	1,440.05
1,437.43	1,437.10	1,449.00	1,446.44	7.07	4.84	1,440.05	1,440.00
1,442.40	1,440.34	1,448.38	1,449.00	3.98	6.66	1,443.10	1,442.93
1,443.93	1,443.81	1,448.80	1,447.00	2.87	1.19	1,446.06	1,446.06
1,443.81	1,443.56	1,447.00	1,450.00	1.19	4.44	1,446.04	1,445.94
1,446.64	1,445.88	1,451.52	1,453.00	2.88	5.12	1,448.09	1,448.09
1,472.50	1,453.65	1,476.50	1,460.60	2.00	4.95	1,472.84	1,453.79
1,453.55	1,446.74	1,460.60	1,451.52	5.05	2.78	1,453.89	1,448.14
1,451.92	1,451.85	1,455.90	1,455.84	1.98	1.99	1,453.32	1,453.32
1,451.75	1,451.36	1,455.84	1,456.50	2.09	3.14	1,453.29	1,453.30
1,451.11	1,445.71	1,456.50	1,454.61	2.89	6.40	1,453.09	1,448.22
1,448.85	1,448.75	1,451.64	1,452.50	0.79	1.75	1,450.28	1,450.28
1,448.99	1,448.95	1,454.50	1,451.64	3.51	0.69	1,450.30	1,450.29
1,450.72	1,450.62	1,455.93	1,455.70	3.21	3.08	1,452.91	1,452.91
1,451.52	1,448.75	1,455.70	1,452.50	2.18	1.75	1,452.66	1,450.40
1,453.60	1,449.09	1,477.00	1,454.50	21.40	3.41	1,454.17	1,450.31
1,448.75	1,446.17	1,452.50	1,454.61	1.75	6.44	1,450.18	1,448.29
1,445.71	1,445.38	1,454.61	1,453.00	5.90	4.62	1,448.13	1,447.82
1,445.38	1,444.19	1,453.00	1,451.00	4.62	3.81	1,447.77	1,446.68
1,444.19	1,443.25	1,451.00	1,450.00	3.81	3.75	1,446.60	1,445.63
1,442.75	1,442.13	1,450.00	1,450.00	3.75	4.37	1,445.03	1,445.13
1,442.56	1,440.75	1,450.00	1,449.90	4.44	6.15	1,445.07	1,443.40
1,444.24	1,444.00	1,448.08	0.00	1.84	-1,446.00	1,445.38	1,445.11
1,444.00	1,442.41	0.00	1,449.90	1,446.00	5.49	1,445.14	1,443.84
1,467.60	1,464.70	1,472.46	1,475.50	2.86	8.80	1,468.11	1,465.60
1,464.70	1,458.20	1,475.50	1,473.50	8.80	13.30	1,465.56	1,459.29
1,469.12	1,468.60	1,475.38	1,475.50	4.26	4.90	1,469.82	1,469.24
1,468.50	1,464.80	1,475.50	1,475.50	5.00	8.70	1,469.19	1,465.59
1,468.59	1,458.20	1,473.46	1,473.50	2.87	13.30	1,469.24	1,459.29
1,471.53	1,469.22	1,478.00	1,475.38	4.47	4.16	1,472.03	1,469.86
1,458.10	1,457.92	1,473.50	1,462.00	13.40	2.08	1,459.17	1,458.89
1,457.02	1,455.73	1,462.00	1,463.00	2.48	4.77	1,458.56	1,457.64
1,459.10	1,458.83	1,463.10	1,465.80	2.00	4.97	1,460.35	1,460.10

Scenario: Base

Pipe Report

Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,467.09	1,466.38	1,471.94	1,472.51	2.85	4.13	1,467.58	1,467.19
1,466.28	1,459.20	1,472.51	1,463.10	4.23	1.90	1,467.11	1,460.62
1,458.83	1,458.03	1,465.80	1,462.00	4.97	1.97	1,460.07	1,459.23
1,456.10	1,455.98	1,461.79	1,463.00	3.69	5.02	1,457.82	1,457.81
1,455.73	1,451.70	1,463.00	1,460.11	4.77	5.91	1,457.56	1,453.59
1,451.70	1,451.11	1,460.11	1,456.50	5.91	2.89	1,453.52	1,453.20
1,440.75	1,440.34	1,449.90	1,449.00	5.15	4.66	1,443.26	1,442.96
1,440.34	1,440.21	1,449.00	1,449.00	4.66	4.79	1,442.91	1,442.98
1,437.10	1,436.14	1,446.44	1,445.00	4.84	4.36	1,439.96	1,439.04
1,436.14	1,435.90	1,445.00	1,449.00	4.36	8.60	1,438.98	1,438.79
1,433.66	1,433.58	1,443.00	1,440.00	4.84	1.92	1,436.66	1,436.66
1,466.00	1,465.00	0.00	1,477.00	1,468.00	10.00	1,466.58	1,465.57

© Haestad Methods, Inc.
Aztec Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
O-1					24.67				16.99	4.18	103.99			
Ex MH 3-1					24.67				16.97	4.18	104.02			
Ex MH 321					0.99				10.32	5.10	5.08			
CB 610	1.04	0.95	0.99	0.00	0.99	10.00	0.00	0.00	10.00	5.15	5.13	0.00	0.00	0.00
Tee 4					23.68				16.81	4.20	100.21			
CB 642	0.44	0.70	0.31	0.00	2.33	10.00	0.00	10.20	10.20	5.12	12.00	0.00	0.00	0.00
CB 622	1.13	0.95	1.07	0.00	2.02	10.00	0.00	10.03	10.03	5.14	10.47	0.00	0.00	0.00
CB621	1.35	0.70	0.95	0.00	0.95	10.00	0.00	0.00	10.00	5.15	4.91	0.00	0.00	0.00
Tee 3					21.35				15.90	4.28	92.22			
Ex CB 326	0.78	0.70	0.55	0.00	1.36	10.00	0.00	10.19	10.19	5.12	7.01	0.00	0.00	0.00
CB 632	0.28	0.95	0.27	0.00	0.81	10.00	0.00	10.04	10.04	5.14	4.21	0.00	0.00	0.00
CB 631	0.78	0.70	0.55	0.00	0.55	10.00	0.00	0.00	10.00	5.15	2.83	0.00	0.00	0.00
Ex MH 3-1					20.00				15.75	4.30	86.64			
Ex MH 331					20.00				15.14	4.36	87.82			
CB645	0.27	0.95	0.26	0.00	0.26	10.00	0.00	0.00	10.00	5.15	1.33	0.00	0.00	0.00
CB 677	1.83	0.81	1.48	0.00	1.48	10.00	0.00	0.00	10.00	5.15	7.69	0.00	0.00	0.00
Ex MH 3-1					18.26				15.01	4.37	80.41			
Tee 2					18.26				14.53	4.44	81.76			
CB 682	0.51	0.95	0.48	0.00	0.48	10.00	0.00	0.00	10.00	5.15	2.52	0.00	0.00	0.00
Ex MH 3-1					17.77				14.22	4.49	80.47			
Tee 1					17.77				14.00	4.53	81.09			
CB671	0.74	0.70	0.52	0.00	1.97	10.00	0.00	10.15	10.15	5.13	10.20	0.00	0.00	0.00
CB 670	0.98	0.95	0.93	0.00	1.46	10.00	0.00	10.13	10.13	5.13	7.53	0.00	0.00	0.00
CB 675	0.75	0.70	0.52	0.00	0.52	10.00	0.00	0.00	10.00	5.15	2.73	0.00	0.00	0.00
Tee 5					15.80				13.95	4.53	72.19			
Cb678	0.87	0.88	0.77	0.00	0.77	10.00	0.00	0.00	10.00	5.15	3.97	0.00	0.00	0.00
Ex MH 3-1					15.03				13.82	4.55	69.00			
Tee 7					13.09				13.57	4.59	60.58			
CB 673	0.86	0.95	0.82	0.00	1.66	10.00	0.00	10.08	10.08	5.14	8.58	0.00	0.00	0.00
CB 672	1.20	0.70	0.84	0.00	0.84	10.00	0.00	0.00	10.00	5.15	4.36	0.00	0.00	0.00
Exs MH 3-					11.43				13.44	4.61	53.14			
MH 665					11.43				13.18	4.65	53.62			
Wye 3					11.43				13.01	4.68	53.91			
CB 436	1.16	0.84	0.97	0.00	1.16	10.00	0.00	10.25	10.25	5.11	6.00	0.00	0.00	0.00
MH 433					0.19				10.16	5.13	0.98			
Ex CB	0.20	0.95	0.19	0.00	0.19	10.00	0.00	0.00	10.00	5.15	0.99	0.00	0.00	0.00
EX MH 3-1					10.26				12.89	4.70	48.62			
Wye 2					7.12				12.58	4.75	34.07			
CB 440	0.67	0.95	0.64	0.00	1.20	10.00	0.00	10.02	10.02	5.15	6.24	0.00	0.00	0.00
CB 441	0.81	0.70	0.57	0.00	0.57	10.00	0.00	0.00	10.00	5.15	2.94	0.00	0.00	0.00
MH 405					3.14				11.34	4.94	15.66			
CB 402	0.69	0.95	0.66	0.00	1.20	10.00	0.00	11.25	11.25	4.95	5.98	0.00	0.00	0.00
MH 402					0.54				11.21	4.96	2.71			
CB 404	1.21	0.95	1.15	0.00	1.95	10.00	0.00	10.09	10.09	5.14	10.08	0.00	0.00	0.00
CB 480	1.14	0.70	0.80	0.00	0.80	10.00	0.00	0.00	10.00	5.15	4.14	0.00	0.00	0.00
MH 400					0.54				11.04	4.99	2.72			
Tie-in 2					1.95				10.15	5.13	10.06			
CB 680	2.29	0.85	1.95	0.00	1.95	10.00	0.00	0.00	10.00	5.15	10.10	0.00	0.00	0.00
Ex MH 3-2					5.92				12.47	4.76	28.41			
Wye 1					5.92				12.15	4.82	28.72			
Ex MH 3-2					4.22				12.03	4.83	20.55			

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
MH 904					1.83				11.95	4.85	8.96			
MH 902					1.18				11.41	4.93	5.85			
CB 24	0.43	0.95	0.41	0.00	0.41	10.00	0.00	0.00	10.00	5.15	2.12	0.00	0.00	0.00
MH 900					0.77				10.71	5.04	3.91			
CB 444	0.39	0.95	0.37	0.00	0.77	10.00	0.00	10.36	10.36	5.09	3.95	0.00	0.00	0.00
CB 481	0.69	0.95	0.66	0.00	0.66	10.00	0.00	0.00	10.00	5.15	3.40	0.00	0.00	0.00
CB 446	0.42	0.95	0.40	0.00	0.40	10.00	0.00	0.00	10.00	5.15	2.07	0.00	0.00	0.00
Tie-in 1					2.38				11.08	4.98	11.97			
CB 408	1.38	0.95	1.31	0.00	2.38	10.00	0.00	10.95	10.95	5.00	12.02	0.00	0.00	0.00
CB 443	0.72	0.95	0.68	0.00	1.07	10.00	0.00	10.64	10.64	5.05	5.46	0.00	0.00	0.00
CB 25	0.41	0.95	0.39	0.00	0.39	10.00	0.00	0.00	10.00	5.15	2.02	0.00	0.00	0.00
CB 442	1.93	0.88	1.70	0.00	1.70	10.00	0.00	0.00	10.00	5.15	8.82	0.00	0.00	0.00
Exst Catch	0.57	0.95	0.54	0.00	0.54	10.00	0.00	0.00	10.00	5.15	2.81	0.00	0.00	0.00

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
	103.99	1,440.00	1,440.00	1,436.66	1,436.66			
	104.02	1,443.00	1,443.00	1,436.68	1,436.66			
	5.08	1,442.61	1,442.61	1,436.68	1,436.68			
0.00	5.13	1,444.47	1,444.47	1,436.77	1,436.77	5.15	5.13	
	100.21	1,442.00	1,442.00	1,437.20	1,437.13			
0.00	12.00	1,444.80	1,444.80	1,440.81	1,440.77	5.15	1.60	
0.00	10.47	1,443.63	1,443.63	1,441.08	1,441.03	5.15	5.57	
0.00	4.91	1,443.80	1,443.80	1,441.07	1,441.07	5.15	4.91	
	92.22	1,449.00	1,449.00	1,438.79	1,438.74			
0.00	7.01	1,444.44	1,444.44	1,440.16	1,440.13	5.15	2.83	
0.00	4.21	1,444.58	1,444.58	1,440.12	1,440.10	5.15	1.38	
0.00	2.83	1,441.90	1,441.90	1,440.13	1,440.13	5.15	2.83	
	86.64	1,445.00	1,445.00	1,439.04	1,438.98			
	87.82	1,446.44	1,446.44	1,440.00	1,439.96			
0.00	1.33	1,452.58	1,452.58	1,448.12	1,448.12	5.15	1.33	
0.00	7.69	1,445.72	1,445.72	1,440.46	1,440.46	5.15	7.69	
	80.41	1,449.00	1,449.00	1,440.09	1,440.05			
	81.76	1,449.00	1,449.00	1,441.45	1,441.42			
0.00	2.52	1,464.68	1,464.68	1,460.47	1,460.47	5.15	2.52	
	80.47	1,447.86	1,447.86	1,442.41	1,442.22			
	81.09	1,449.00	1,449.00	1,442.98	1,442.94			
0.00	10.20	1,447.30	1,447.30	1,443.72	1,443.69	5.15	2.69	
0.00	7.53	1,445.34	1,445.34	1,443.73	1,443.72	5.15	4.83	
0.00	2.73	1,447.90	1,447.90	1,443.67	1,443.67	5.15	2.73	
	72.19	1,449.00	1,449.00	1,442.93	1,442.91			
0.00	3.97	1,448.38	1,448.38	1,443.10	1,443.10	5.15	3.97	
	69.00	1,449.90	1,449.90	1,443.40	1,443.26			
	60.58	1,450.00	1,450.00	1,445.13	1,445.07			
0.00	8.58	1,447.00	1,447.00	1,446.06	1,446.04	5.15	4.24	
0.00	4.36	1,448.80	1,448.80	1,446.06	1,446.06	5.15	4.36	
	53.14	1,450.00	1,450.00	1,445.08	1,445.03			
	53.62	1,451.00	1,451.00	1,446.68	1,446.60			
	53.91	1,453.00	1,453.00	1,447.82	1,447.77			
0.00	6.00	1,451.52	1,451.52	1,448.14	1,448.09	5.15	5.06	
	0.98	1,460.60	1,460.60	1,453.92	1,453.89			
0.00	0.99	1,476.50	1,476.50	1,472.84	1,472.84	5.15	0.99	
	48.62	1,454.61	1,454.61	1,448.22	1,448.13			
	34.07	1,456.50	1,456.50	1,453.20	1,453.09			
0.00	6.24	1,455.84	1,455.84	1,453.32	1,453.29	5.15	3.30	
0.00	2.94	1,455.90	1,455.90	1,453.32	1,453.32	5.15	2.94	
	15.66	1,452.50	1,452.50	1,450.28	1,450.18			
0.00	5.98	1,451.64	1,451.64	1,450.29	1,450.28	5.15	3.40	
	2.71	1,454.50	1,454.50	1,450.31	1,450.30			
0.00	10.08	1,455.70	1,455.70	1,452.91	1,452.66	5.15	5.97	
0.00	4.14	1,455.93	1,455.93	1,452.91	1,452.91	5.15	4.14	
	2.72	1,477.00	1,477.00	1,454.24	1,454.17			
	10.06	0.00	0.00	0.04	0.00			
0.00	10.10	1,448.08	1,448.08	1,445.38	1,445.38	5.15	10.10	
	28.41	1,460.11	1,460.11	1,453.59	1,453.52			
	28.72	1,463.00	1,463.00	1,457.64	1,457.56			
	20.55	1,462.00	1,462.00	1,458.93	1,458.56			

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
	8.96	1,473.50	1,473.50	1,459.29	1,459.17			
	5.85	1,475.50	1,475.50	1,465.59	1,465.56			
0.00	2.12	1,472.46	1,472.46	1,468.11	1,468.11	5.15	2.12	
	3.91	1,475.50	1,475.50	1,469.23	1,469.19			
0.00	3.95	1,475.38	1,475.38	1,469.86	1,469.82	5.15	1.92	
0.00	3.40	1,473.46	1,473.46	1,469.24	1,469.24	5.15	3.40	
0.00	2.07	1,478.00	1,477.40	1,472.03	1,472.03	5.15	2.07	
	11.97	1,465.80	1,465.80	1,460.10	1,460.07			
0.00	12.02	1,463.10	1,463.10	1,460.62	1,460.35	5.15	6.81	
0.00	5.46	1,472.51	1,472.51	1,467.19	1,467.11	5.15	3.55	
0.00	2.02	1,471.94	1,471.94	1,467.58	1,467.58	5.15	2.02	
0.00	8.82	1,461.79	1,461.79	1,457.82	1,457.82	5.15	8.82	
0.00	2.81	0.00	0.00	0.00	0.00	5.15	2.81	

© Haestad Methods, Inc.

Scenario: Base

Outlet Report

Label	Station (ft)	Ground Elevation (ft)	Set Rim Equal to Ground Elevation?	Rim Elevation (ft)	Sump Elevation (ft)	Tailwater Condition	Tailwater Elevation (ft)	Description
O-1	0+00	1,440.00	true	1,440.00	1,433.58	User-Specifie	1,436.66	

US 60

ELLSWORTH ROAD TO CRISMON ROAD

US60 LATERAL C
STA. 1037+ 69.75
EAST DRAINAGE System No. 2

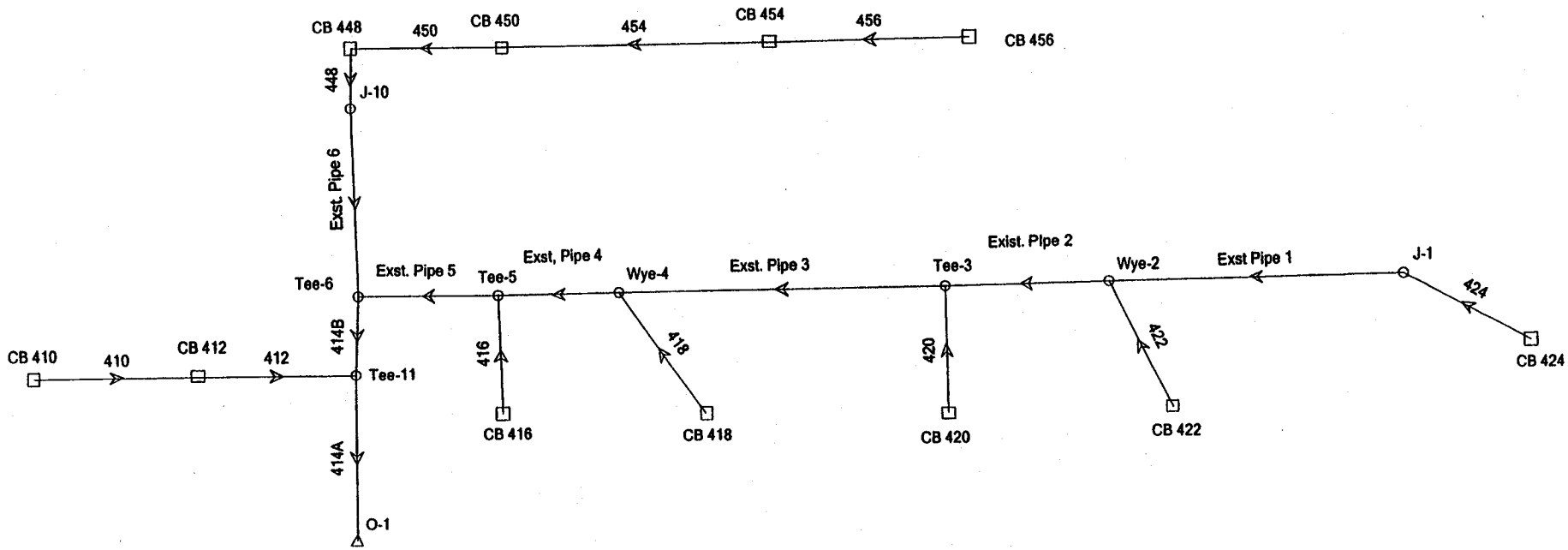
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options	
Analysis Type	Backwater Analysis
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)
Hydraulic Grade Converger	0.00 ft
Number of Flow Profile Ste	5
Return Period	25 year
Minimum Time of Concentra	5.00 min

Created: 06/11/04 03:36:53 PM

Scenario: Base

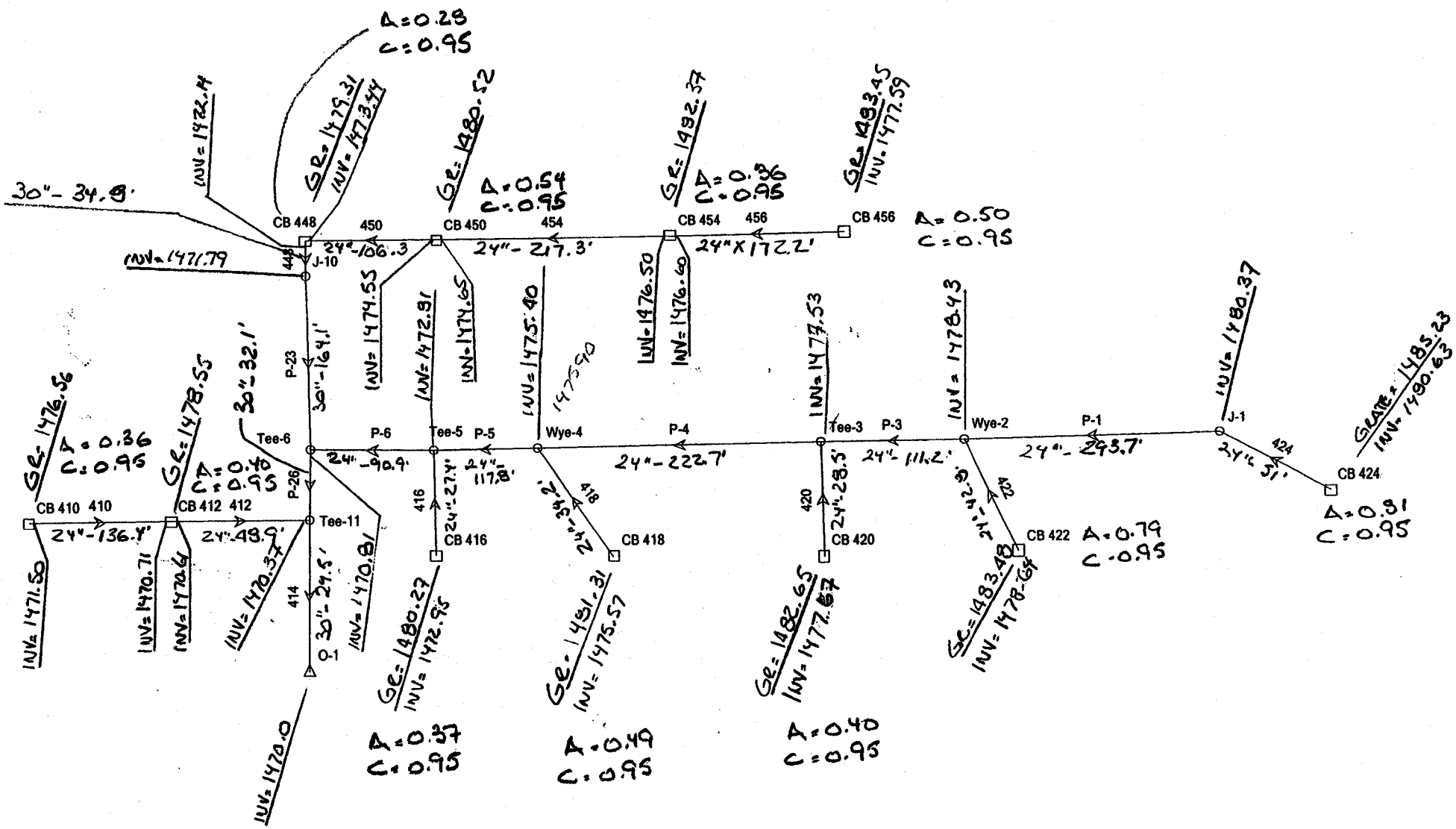


Title: SRT phase 2
r:\...\us 60 west - ells to cris (dnj)\203.stm
11/15/04 12:36:34 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

Scenario: Base



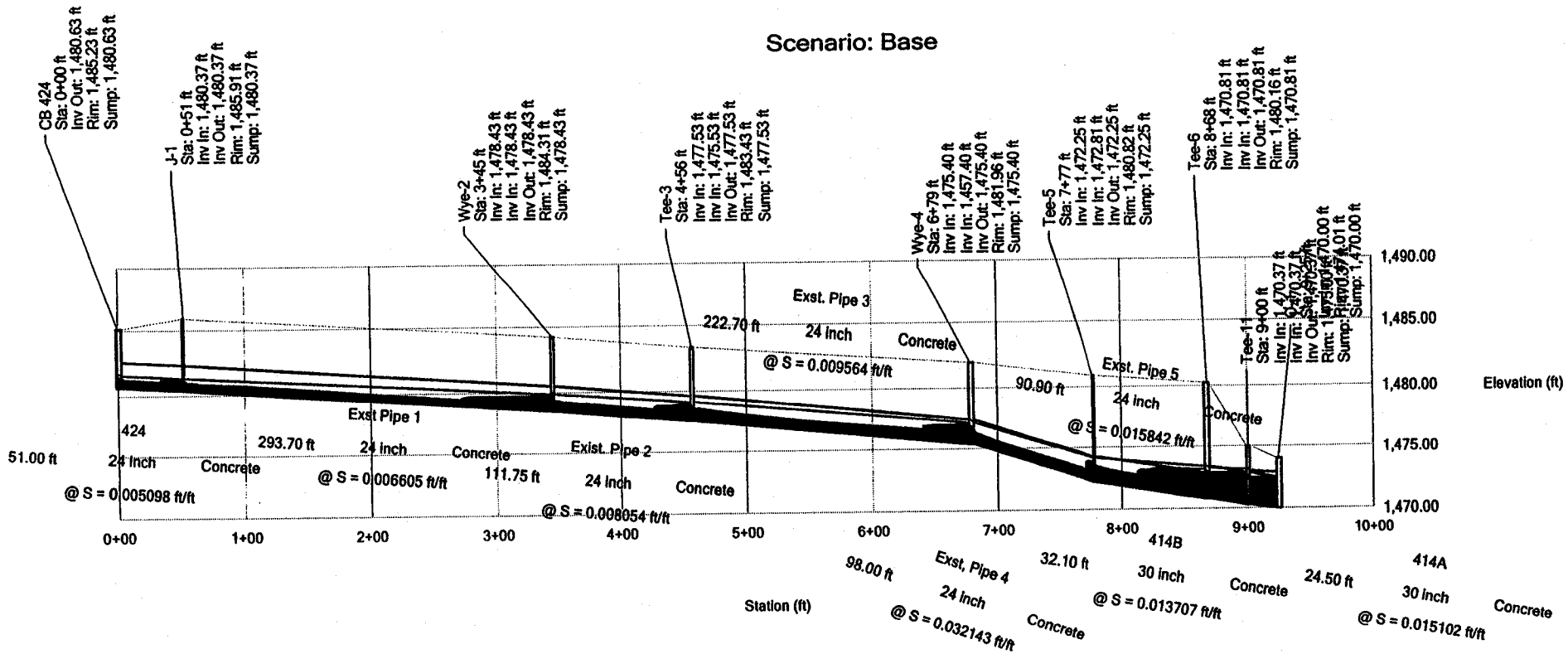
Title: SRT phase 2
r:\...\us 60 west - ells to cris (dnj)\203.stm
11/15/04 09:48:51 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

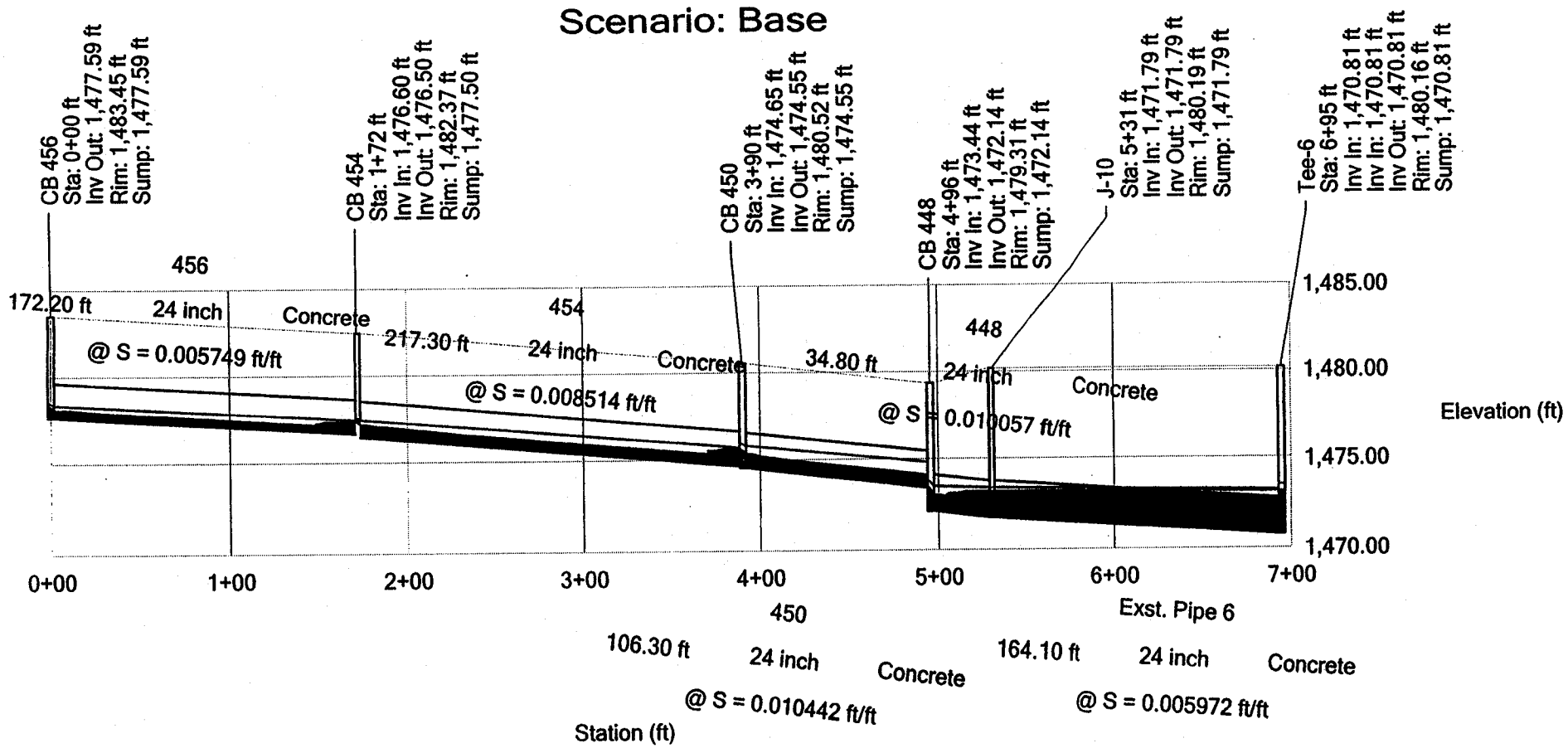
Profile: Profile - 1

Scenario: Base



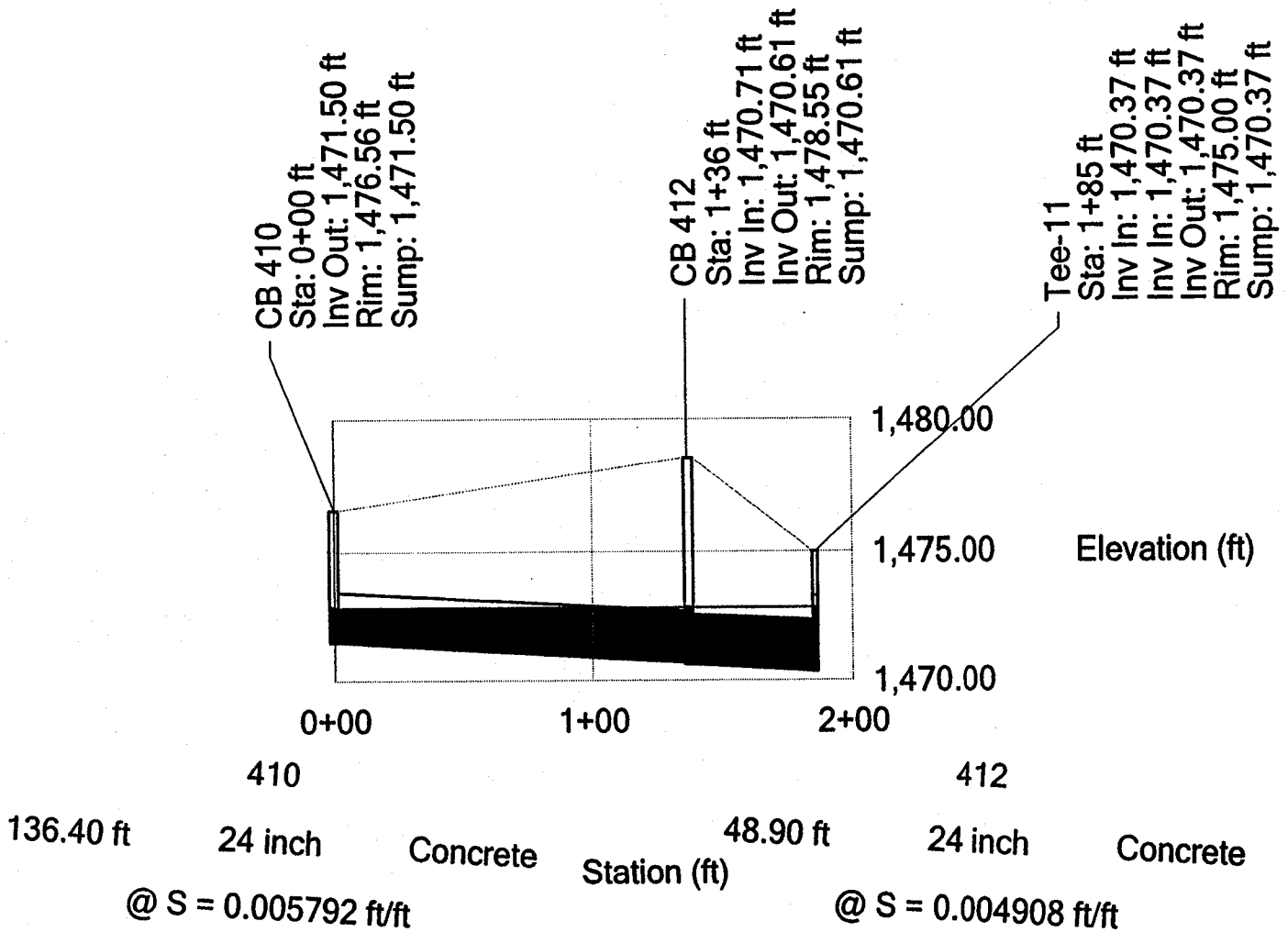
Profile: Profile - 2

Scenario: Base



Profile: Profile - 3

Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
Exst. Pipe	Wye-4	Tee-5	N/A	N/A	N/A	2.37	4.84	11.54	98.00	0.032143	24 inch	0.013	40.56	1,475.40	1,472.25	1,481.96	1,480.82
Exst. Pipe	Tee-5	Tee-6	N/A	N/A	N/A	2.72	4.82	13.19	90.90	0.015842	24 inch	0.012	30.84	1,472.25	1,470.81	1,480.82	1,480.16
418	CB 418	Wye-4	0.49	0.95	0.47	0.47	5.15	2.42	34.20	0.004971	24 inch	0.012	17.28	1,457.57	1,457.40	1,481.32	1,481.96
416	CB 416	Tee-5	0.37	0.95	0.35	0.35	5.15	1.82	27.40	0.005109	24 inch	0.012	17.52	1,472.95	1,472.81	1,480.27	1,480.82
450	CB 450	CB 448	0.54	0.95	0.51	1.33	4.94	6.62	106.30	0.010442	24 inch	0.012	25.04	1,474.55	1,473.44	1,480.52	1,479.31
454	CB 454	CB 450	0.36	0.95	0.34	0.82	5.04	4.15	217.30	0.008514	24 inch	0.012	22.61	1,476.50	1,474.65	1,482.37	1,480.52
456	CB 456	CB 454	0.50	0.95	0.48	0.48	5.15	2.47	172.20	0.005749	24 inch	0.012	18.58	1,477.59	1,476.60	1,483.45	1,482.37
448	CB 448	J-10	0.28	0.95	0.27	1.60	4.90	7.88	34.80	0.010057	24 inch	0.012	24.58	1,472.14	1,471.79	1,479.31	1,480.19
Exst. Pipe	J-10	Tee-6	N/A	N/A	N/A	1.60	4.88	7.86	164.10	0.005972	24 inch	0.012	18.94	1,471.79	1,470.81	1,480.19	1,480.16
414B	Tee-6	Tee-11	N/A	N/A	N/A	4.31	4.79	20.83	32.10	0.013707	30 inch	0.012	52.02	1,470.81	1,470.37	1,480.16	1,475.00
410	CB 410	CB 412	0.36	0.95	0.34	0.34	5.15	1.78	136.40	0.005792	24 inch	0.012	18.65	1,471.50	1,470.71	1,476.56	1,478.55
412	CB 412	Tee-11	0.40	0.95	0.38	0.72	5.06	3.68	48.90	0.004908	24 inch	0.012	17.17	1,470.61	1,470.37	1,478.55	1,475.00
414A	Tee-11	O-1	N/A	N/A	N/A	5.04	4.78	24.28	24.50	0.015102	30 inch	0.012	54.60	1,470.37	1,470.00	1,475.00	1,474.01
Exist. Pipe	Wye-2	Tee-3	N/A	N/A	N/A	1.52	4.97	7.61	111.75	0.008054	24 inch	0.012	21.99	1,478.43	1,477.53	1,484.31	1,483.43
422	CB 422	Wye-2	0.79	0.95	0.75	0.75	5.15	3.90	42.80	0.004907	24 inch	0.012	17.17	1,478.64	1,478.43	1,483.48	1,484.31
420	CB 420	Tee-3	0.40	0.95	0.38	0.38	5.15	1.97	28.50	0.075088	24 inch	0.013	61.99	1,477.67	1,475.53	1,482.58	1,483.43
Exst. Pipe	Tee-3	Wye-4	N/A	N/A	N/A	1.90	4.92	9.42	222.70	0.009564	24 inch	0.012	23.97	1,477.53	1,475.40	1,483.43	1,481.96
424	CB 424	J-1	0.81	0.95	0.77	0.77	5.15	3.99	51.00	0.005098	24 inch	0.012	17.50	1,480.63	1,480.37	1,485.23	1,485.91
Exst Pipe	J-1	Wye-2	N/A	N/A	N/A	0.77	5.12	3.97	293.70	0.006605	24 inch	0.012	19.92	1,480.37	1,478.43	1,485.91	1,484.31

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
4.56	6.57	1,476.62	1,473.90	
6.57	7.35	1,473.56	1,473.12	
21.75	22.56	1,477.03	1,477.03	
5.32	6.01	1,473.90	1,473.90	
3.97	3.87	1,475.46	1,474.14	
3.87	3.87	1,477.22	1,475.64	
3.86	3.77	1,478.14	1,477.35	
5.17	6.40	1,473.14	1,473.23	
6.40	7.35	1,473.23	1,473.12	
6.85	2.13	1,472.82	1,472.85	
3.06	5.84	1,472.88	1,472.88	
5.94	2.63	1,472.86	1,472.85	
2.13	1.51	1,472.48	1,472.50	
3.88	3.90	1,479.41	1,478.89	
2.84	3.88	1,479.72	1,479.72	
2.91	5.90	1,478.89	1,478.89	
3.90	4.56	1,478.63	1,477.03	
2.60	3.54	1,481.33	1,481.22	
3.54	3.88	1,481.07	1,479.72	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					5.04				12.39	4.78	24.25					24.25	1,474.01	1,474.01	1,470.00
Tee-11					5.04				12.35	4.78	24.28					24.28	1,475.00	1,475.00	1,472.85
Tee-6					4.31				12.30	4.79	20.83					20.83	1,480.16	1,480.16	1,473.12
Tee-5					2.72				12.14	4.82	13.19					13.19	1,480.82	1,480.82	1,473.90
Wye-4					2.37				11.99	4.84	11.54					11.54	1,481.96	1,481.96	1,477.03
CB 418	0.49	0.95	0.47	0.00	0.47	10.00	0.00	0.00	10.00	5.15	2.42	0.00	0.00	0.00	0.00	2.42	1,481.32	1,481.32	1,477.04
CB 416	0.37	0.95	0.35	0.00	0.35	10.00	0.00	0.00	10.00	5.15	1.82	0.00	0.00	0.00	0.00	1.82	1,480.27	1,480.27	1,473.92
J-10					1.60				11.71	4.88	7.86					7.86	1,480.19	1,480.19	1,473.23
CB 448	0.28	0.95	0.27	0.00	1.60	10.00	0.00	11.62	11.62	4.90	7.88	0.00	0.00	0.00	0.00	7.88	1,479.31	1,479.31	1,473.45
CB 450	0.54	0.95	0.51	0.00	1.33	10.00	0.00	11.36	11.36	4.94	6.62	0.00	0.00	0.00	0.00	6.62	1,480.52	1,480.52	1,475.64
CB 454	0.36	0.95	0.34	0.00	0.82	10.00	0.00	10.70	10.70	5.04	4.15	0.00	0.00	0.00	0.00	4.15	1,482.37	1,482.37	1,477.35
CB 456	0.50	0.95	0.48	0.00	0.48	10.00	0.00	0.00	10.00	5.15	2.47	0.00	0.00	0.00	0.00	2.47	1,483.45	1,483.45	1,478.33
CB 412	0.40	0.95	0.38	0.00	0.72	10.00	0.00	10.61	10.61	5.06	3.68	0.00	0.00	0.00	0.00	3.68	1,478.55	1,478.55	1,472.88
CB 410	0.36	0.95	0.34	0.00	0.34	10.00	0.00	0.00	10.00	5.15	1.78	0.00	0.00	0.00	0.00	1.78	1,476.56	1,476.56	1,472.89
Tee-3					1.90				11.47	4.92	9.42					9.42	1,483.43	1,483.43	1,478.89
Wye-2					1.52				11.18	4.97	7.61					7.61	1,484.31	1,484.31	1,479.72
CB 422	0.79	0.95	0.75	0.00	0.75	10.00	0.00	0.00	10.00	5.15	3.90	0.00	0.00	0.00	0.00	3.90	1,483.48	1,483.48	1,479.79
CB 420	0.40	0.95	0.38	0.00	0.38	10.00	0.00	0.00	10.00	5.15	1.97	0.00	0.00	0.00	0.00	1.97	1,482.58	1,482.65	1,478.90
J-1					0.77				10.19	5.12	3.97					3.97	1,485.91	1,485.91	1,481.22
CB 424	0.81	0.95	0.77	0.00	0.77	10.00	0.00	0.00	10.00	5.15	3.99	0.00	0.00	0.00	0.00	3.99	1,485.23	1,485.23	1,481.59

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,470.00			
1,472.48			
1,472.82			
1,473.56			
1,476.62			
1,477.03	5.15	2.42	
1,473.90	5.15	1.82	
1,473.23			
1,473.14	5.15	1.38	
1,475.46	5.15	2.66	
1,477.22	5.15	1.78	
1,478.14	5.15	2.47	
1,472.86	5.15	1.97	
1,472.88	5.15	1.78	
1,478.63			
1,479.41			
1,479.72	5.15	3.90	
1,478.89	5.15	1.97	
1,481.07			
1,481.33	5.15	3.99	

202 L LATERAL
STA. 1049+5

EAST DRAINAGE SYSTEM No. 3

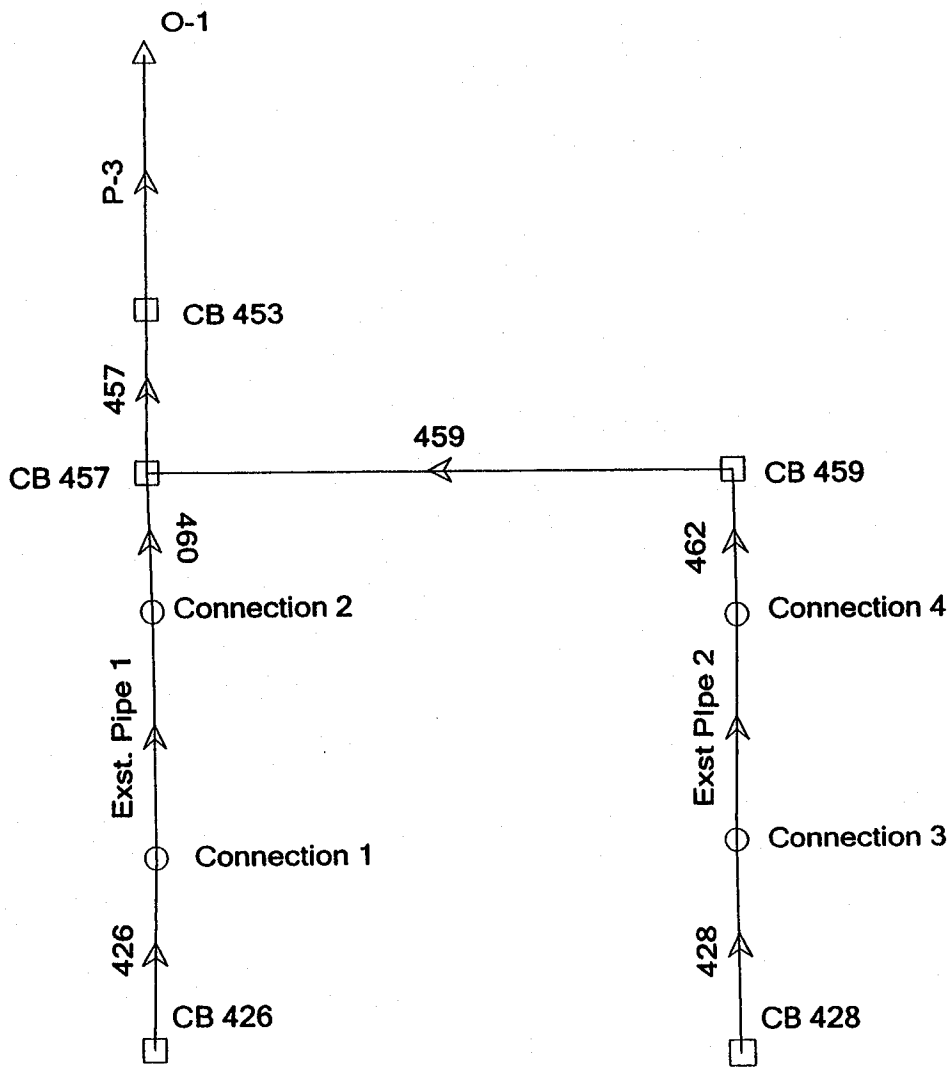
Scenario Summary Report
Scenario: Base

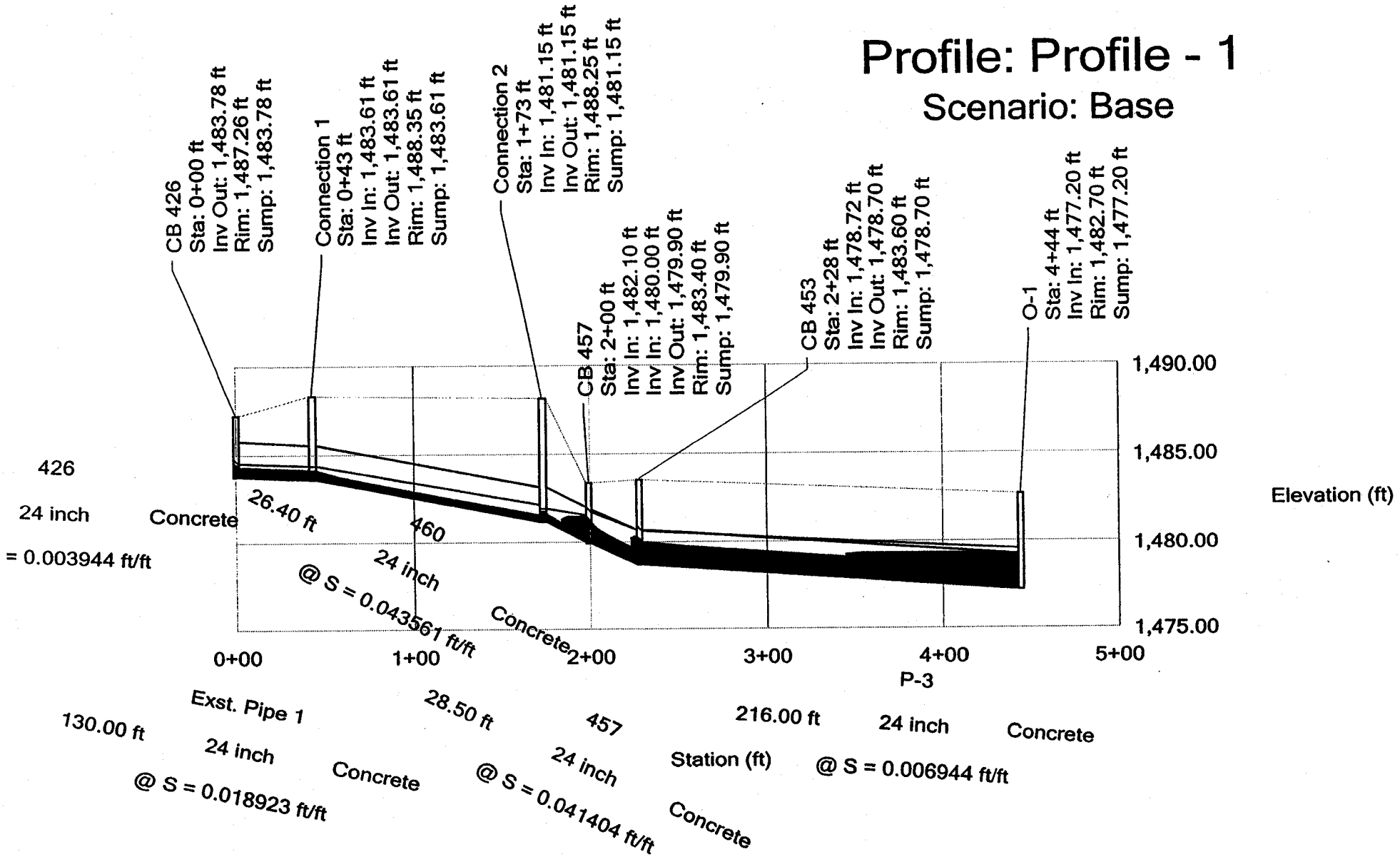
Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Step	5	
Return Period	25 year	
Minimum Time of Concentra	5.00	min

Created: 06/11/04 03:36:53 PM

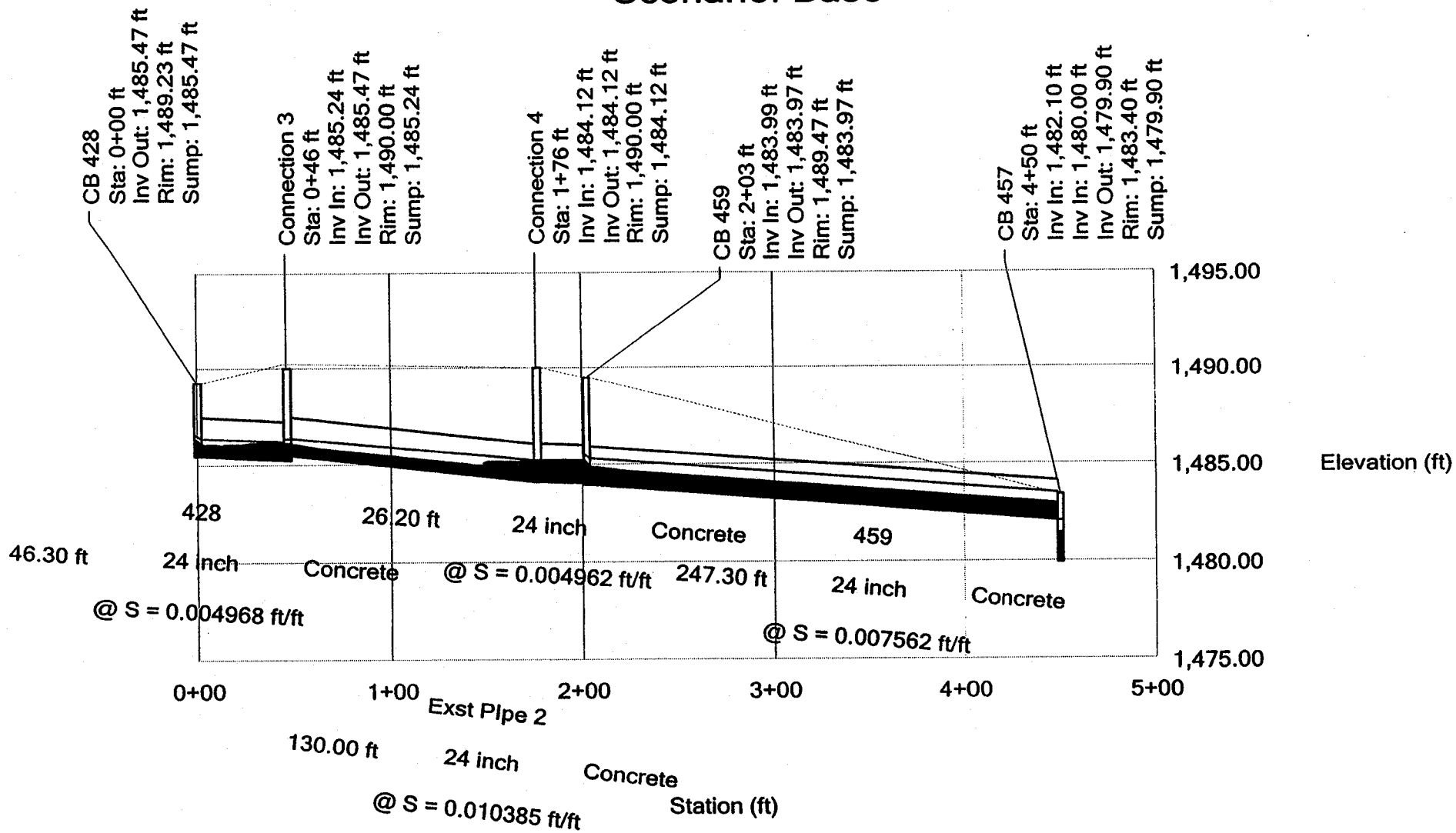
Scenario: Base




Profile: Profile - 1
Scenario: Base
CB 426
Sta: 0+00 ft
Inv Out: 1,483.78 ft
Rim: 1,487.26 ft
Sump: 1,483.78 ft
Connection 1
Sta: 0+43 ft
Inv In: 1,483.61 ft
Inv Out: 1,483.61 ft
Rim: 1,488.35 ft
Sump: 1,483.61 ft
Connection 2
Sta: 1+73 ft
Inv In: 1,481.15 ft
Inv Out: 1,481.15 ft
Rim: 1,488.25 ft
Sump: 1,481.15 ft
CB 457
Sta: 2+00 ft
Inv In: 1,482.10 ft
Inv In: 1,480.00 ft
Inv Out: 1,479.90 ft
Rim: 1,483.40 ft
Sump: 1,479.90 ft
CB 453
Sta: 2+28 ft
Inv In: 1,478.72 ft
Inv Out: 1,478.70 ft
Rim: 1,483.60 ft
Sump: 1,478.70 ft
O-1
Sta: 4+44 ft
Inv In: 1,477.20 ft
Rim: 1,482.70 ft
Sump: 1,477.20 ft
1,490.00
1,485.00
1,480.00
1,475.00
Elevation (ft)
426
24 inch
Concrete
= 0.003944 ft/ft
26.40 ft
460
24 inch
@ S = 0.043561 ft/ft
Concrete
0+00
1+00
2+00
3+00
4+00
5+00
P-3
130.00 ft
Exst. Pipe 1
24 inch
Concrete
@ S = 0.018923 ft/ft
28.50 ft
457
24 inch
@ S = 0.041404 ft/ft
Concrete
216.00 ft
24 inch
Concrete
@ S = 0.006944 ft/ft
Station (ft)

Profile: Profile - 2

Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inle Rational Coefficient	Upstream Inlet CA (acres)	pstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
426	CB 426	Connection	0.61	0.95	0.58	0.58	5.15	3.01	43.10	0.003944	24 inch	0.012	15.39	1,483.78	1,483.61	1,487.26	1,488.35
Exst. Pipe	Connection	Connection	N/A	N/A	N/A	0.58	5.12	2.99	130.00	0.018923	24 inch	0.013	31.12	1,483.61	1,481.15	1,488.35	1,488.25
460	Connection	CB 457	N/A	N/A	N/A	0.58	5.07	2.96	26.40	0.043561	24 inch	0.012	51.15	1,481.15	1,480.00	1,488.25	1,483.40
428	CB 428	Connection	0.76	0.95	0.72	0.72	5.15	3.75	46.30	0.004968	24 inch	0.012	17.27	1,485.47	1,485.24	1,489.23	1,490.24
Exst Pipe 2	Connection	Connection	N/A	N/A	N/A	0.72	5.12	3.73	130.00	0.010385	24 inch	0.012	24.97	1,485.47	1,484.12	1,490.24	1,490.00
462	Connection	CB 459	N/A	N/A	N/A	0.72	5.06	3.69	26.20	0.004962	24 inch	0.012	17.26	1,484.12	1,483.99	1,490.00	1,489.47
459	CB 459	CB 457	0.72	0.95	0.68	1.41	5.05	7.15	247.30	0.007562	24 inch	0.012	21.31	1,483.97	1,482.10	1,489.47	1,483.40
457	CB 457	CB 453	0.56	0.95	0.53	2.52	4.94	12.54	28.50	0.041404	24 inch	0.012	49.86	1,479.90	1,478.72	1,483.40	1,483.60
P-3	CB 453	O-1	0.50	0.60	0.30	2.82	4.94	14.02	216.00	0.006944	24 inch	0.012	20.42	1,478.70	1,477.20	1,483.60	1,482.70

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
1.48	2.74	1,484.39	1,484.21	
2.74	5.10	1,484.21	1,481.57	
5.10	1.40	1,481.75	1,481.50	
1.76	3.00	1,486.15	1,486.15	
2.77	3.88	1,486.15	1,485.21	
3.88	3.48	1,485.21	1,485.21	
3.50	-0.70	1,484.92	1,482.90	
1.50	2.88	1,481.17	1,480.35	
2.90	3.50	1,480.05	1,479.20	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					2.82				11.88	4.86	13.79					13.79	1,482.70	1,482.70	1,477.20
CB 453	0.50	0.60	0.30	0.00	2.82	10.00	0.00	11.37	11.37	4.94	14.02	0.00	0.00	0.00	0.00	14.02	1,483.60	1,483.60	1,480.35
CB 457	0.56	0.95	0.53	0.00	2.52	10.00	0.00	11.33	11.33	4.94	12.54	0.00	0.00	0.00	0.00	12.54	1,483.40	1,483.40	1,481.50
Connection					0.58				10.54	5.07	2.96					2.96	1,488.25	1,488.25	1,481.75
Connection					0.58				10.19	5.12	2.99					2.99	1,488.35	1,488.35	1,484.21
CB 426	0.61	0.95	0.58	0.00	0.58	10.00	0.00	0.00	10.00	5.15	3.01	0.00	0.00	0.00	0.00	3.01	1,487.26	1,487.26	1,484.60
CB 459	0.72	0.95	0.68	0.00	1.41	10.00	0.00	10.66	10.66	5.05	7.15	0.00	0.00	0.00	0.00	7.15	1,489.47	1,489.47	1,485.21
Connection					0.72				10.56	5.06	3.69					3.69	1,490.00	1,490.00	1,485.21
Connection					0.72				10.18	5.12	3.73					3.73	1,490.24	1,490.00	1,486.15
CB 428	0.76	0.95	0.72	0.00	0.72	10.00	0.00	0.00	10.00	5.15	3.75	0.00	0.00	0.00	0.00	3.75	1,489.23	1,489.23	1,486.40

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,477.20			
1,480.05	5.15	1.56	
1,481.17	5.15	2.76	
1,481.75			
1,484.21			
1,484.39	5.15	3.01	
1,484.92	5.15	3.55	
1,485.21			
1,486.15			
1,486.15	5.15	3.75	

US60 LATERAL @
STA. 1055+[redacted].46

EAST DRAINAGE SYSTEM No. 4

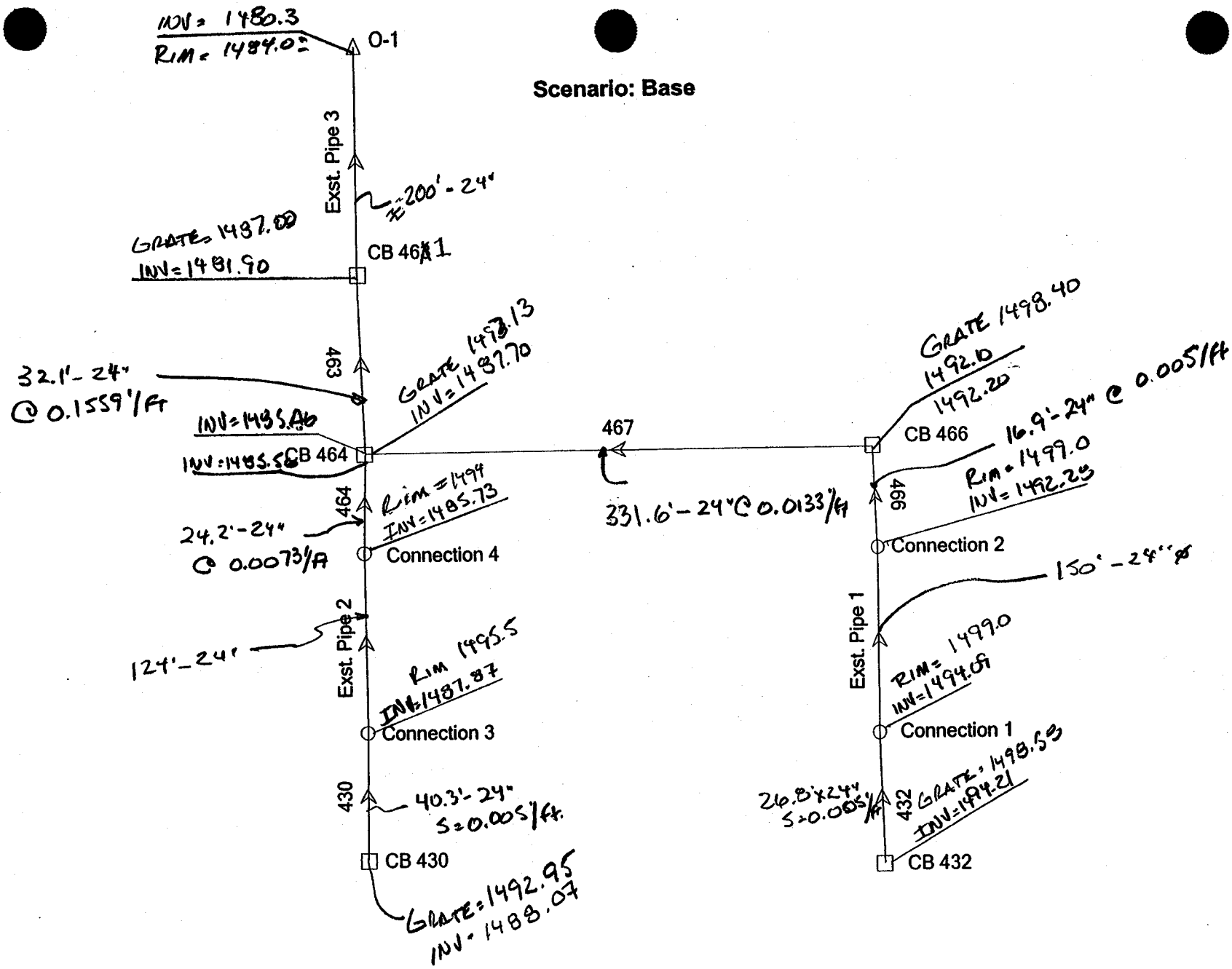
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Actual Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Ste	5	
Return Period	25 year	
Minimum Time of Concentra	5.00	min

Created: 06/11/04 03:36:53 PM

Scenario: Base

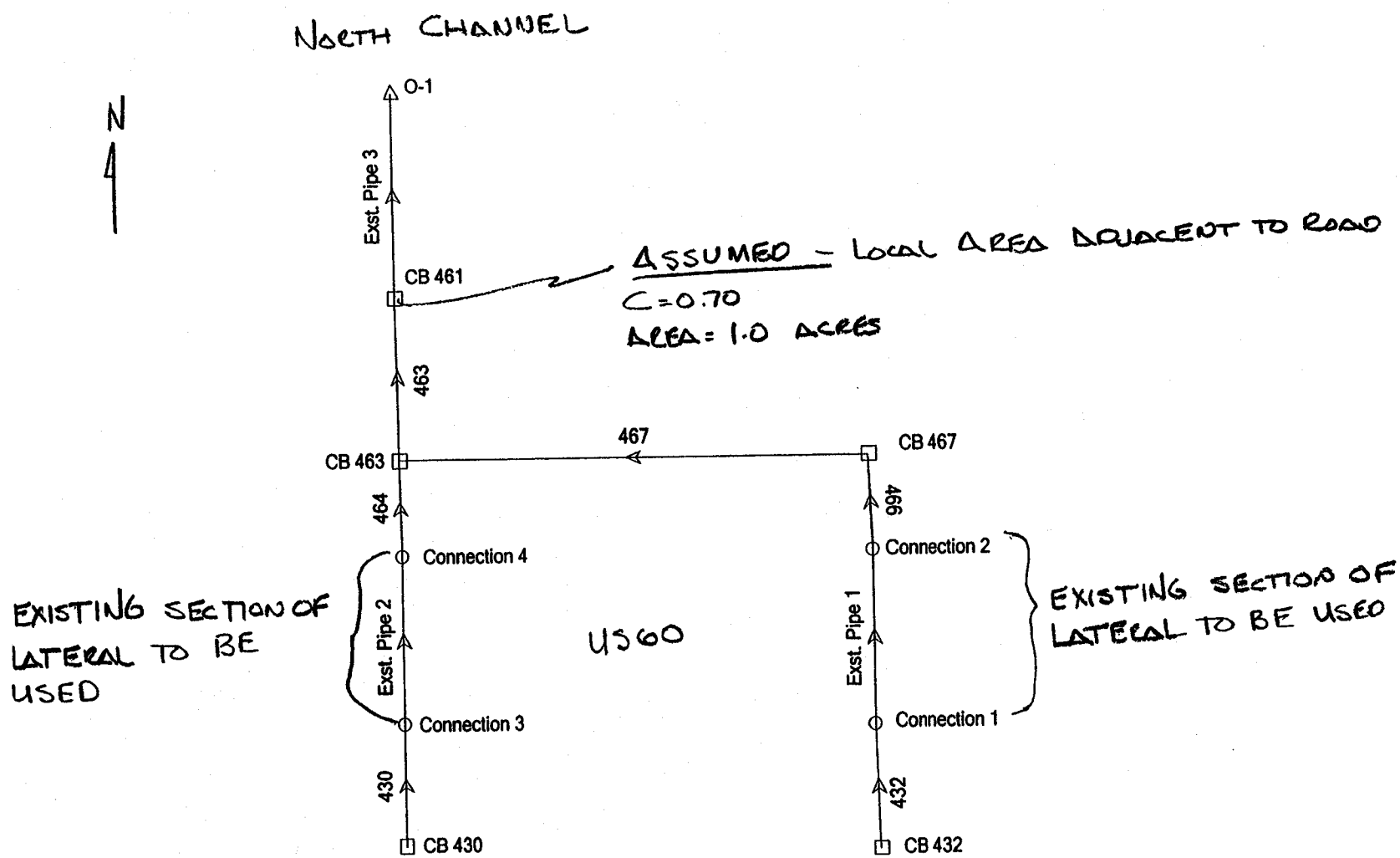


Title: SRT phase 2
r:\...\us 60 west - ells to cris (dnj)\201.stm
11/12/04 02:35:06 PM

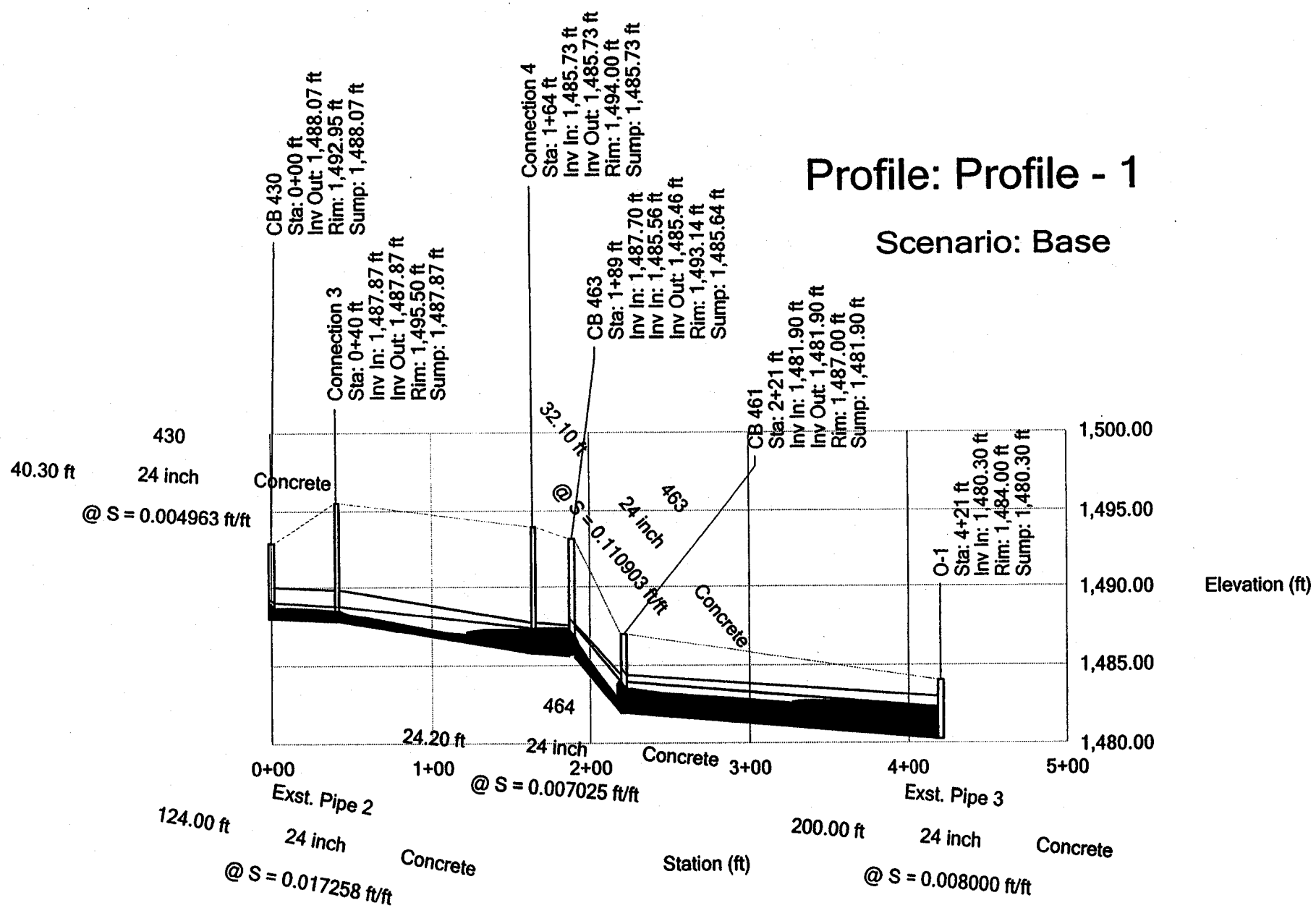
Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

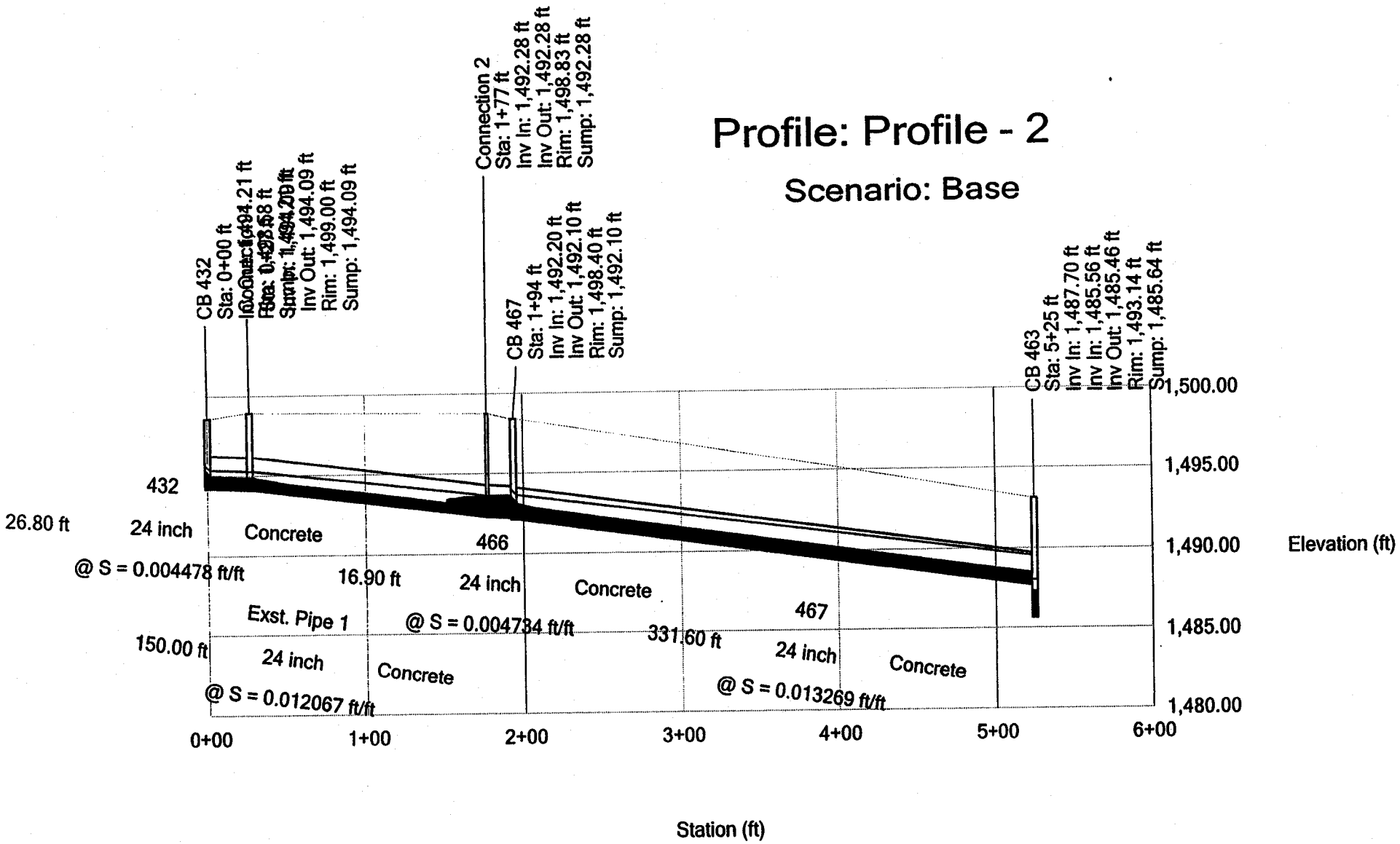
Project Engineer: Aztec
StormCAD v5.5 [5.5006]
Page 1 of 1

Scenario: Base



Profile
Scenario: Base




Profile: Profile - 2
Scenario: Base
CB 432
Sta: 0+00 ft
Inv Out: 1,494.21 ft
Rim: 1,499.00 ft
Sump: 1,494.09 ft
Connection 2
Sta: 1+77 ft
Inv In: 1,492.28 ft
Inv Out: 1,492.28 ft
Rim: 1,498.83 ft
Sump: 1,492.28 ft
CB 467
Sta: 1+94 ft
Inv In: 1,492.20 ft
Inv Out: 1,492.10 ft
Rim: 1,498.40 ft
Sump: 1,492.10 ft
CB 463
Sta: 5+25 ft
Inv In: 1,487.70 ft
Inv In: 1,485.56 ft
Inv Out: 1,485.46 ft
Rim: 1,493.14 ft
Sump: 1,485.64 ft
432
26.80 ft
24 inch
Concrete
@ S = 0.004478 ft/ft
16.90 ft
466
24 inch
Concrete
@ S = 0.004734 ft/ft
331.60 ft
467
24 inch
Concrete
@ S = 0.013269 ft/ft
Exst. Pipe 1
150.00 ft
24 inch
Concrete
@ S = 0.012067 ft/ft
1,500.00
1,495.00
1,490.00
1,485.00
1,480.00
Elevation (ft)
0+00
1+00
2+00
3+00
4+00
5+00
6+00
Station (ft)

US60 LATERAL
STA. 1062+ 51.4

EAST DRAINAGE SYSTEM No 5

Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

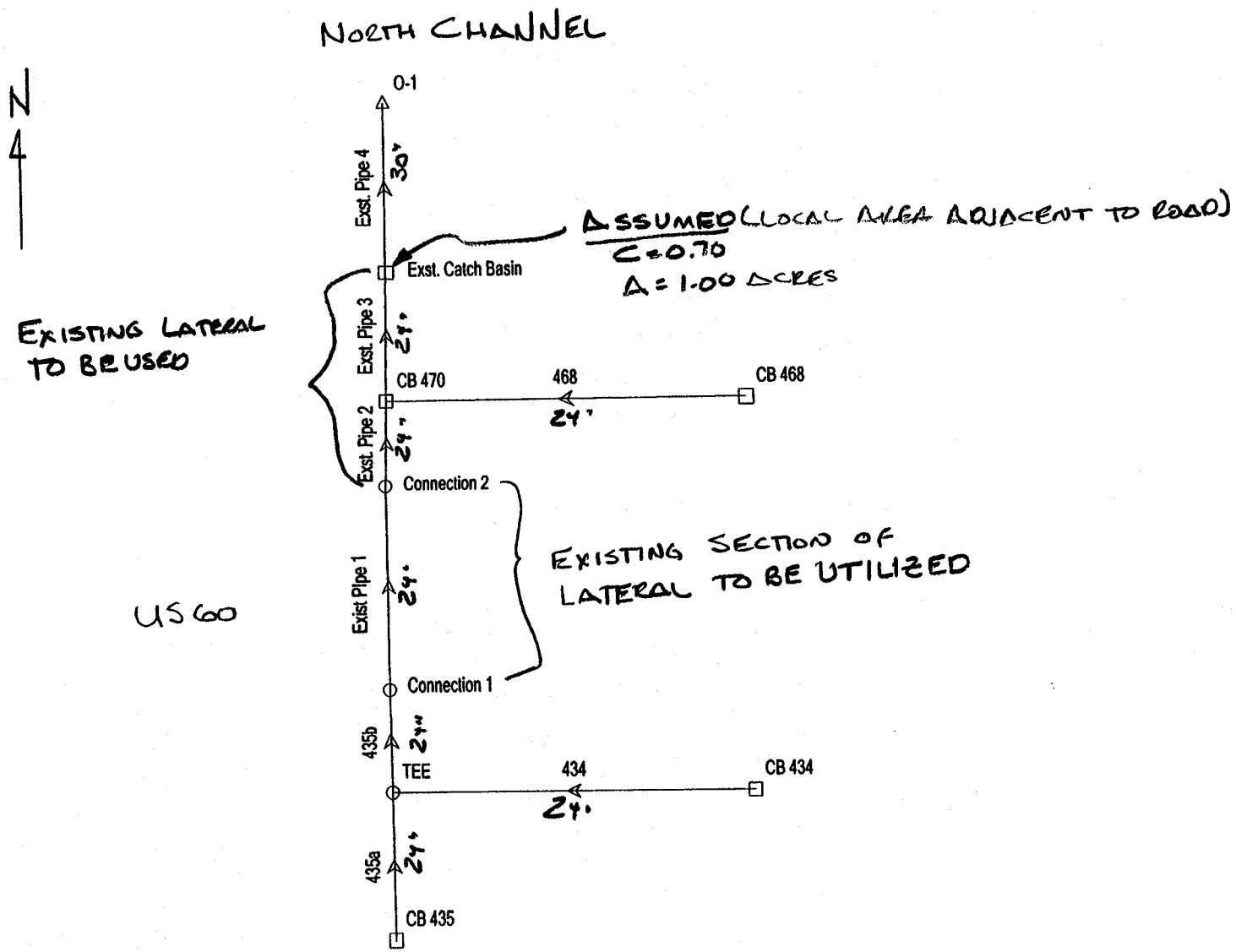
Gravity Calculation Options	
Analysis Type	Backwater Analysis
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)
Hydraulic Grade Converger	0.00 ft
Number of Flow Profile Ste	5
Return Period	25 year
Minimum Time of Concentra	5.00 min

Created: 08/31/04 01:06:55 PM

NOTES:

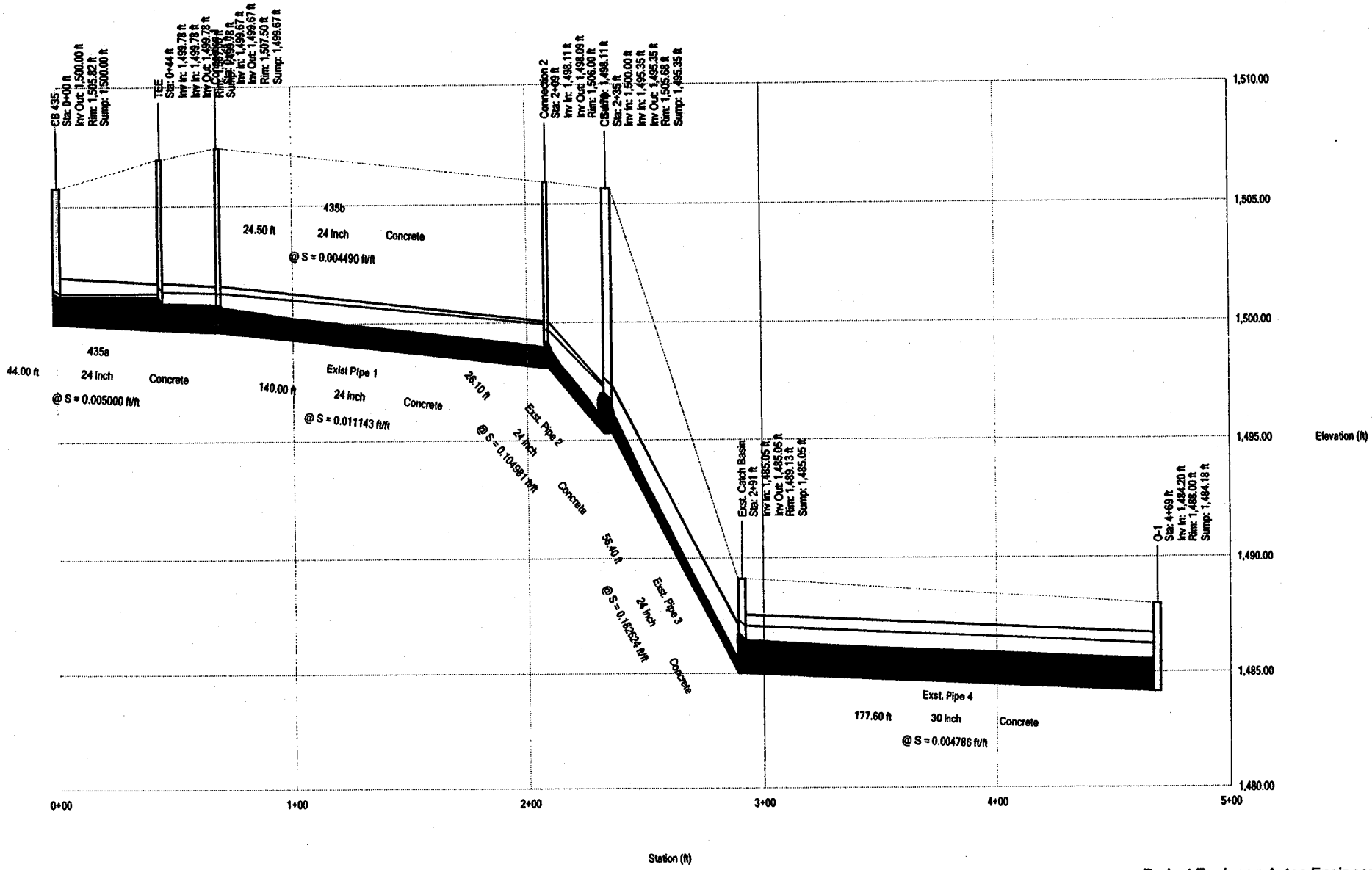
1. GRATE + INVERT ELEVATIONS TAKEN FROM FIELD SURVEY.
2. LENGTHS OF EXISTING PIPES TAKEN FROM AS-BUILTS.

Scenario: Base



Profile
Scenario: Base

Profile: Profile - 1
Scenario: Base



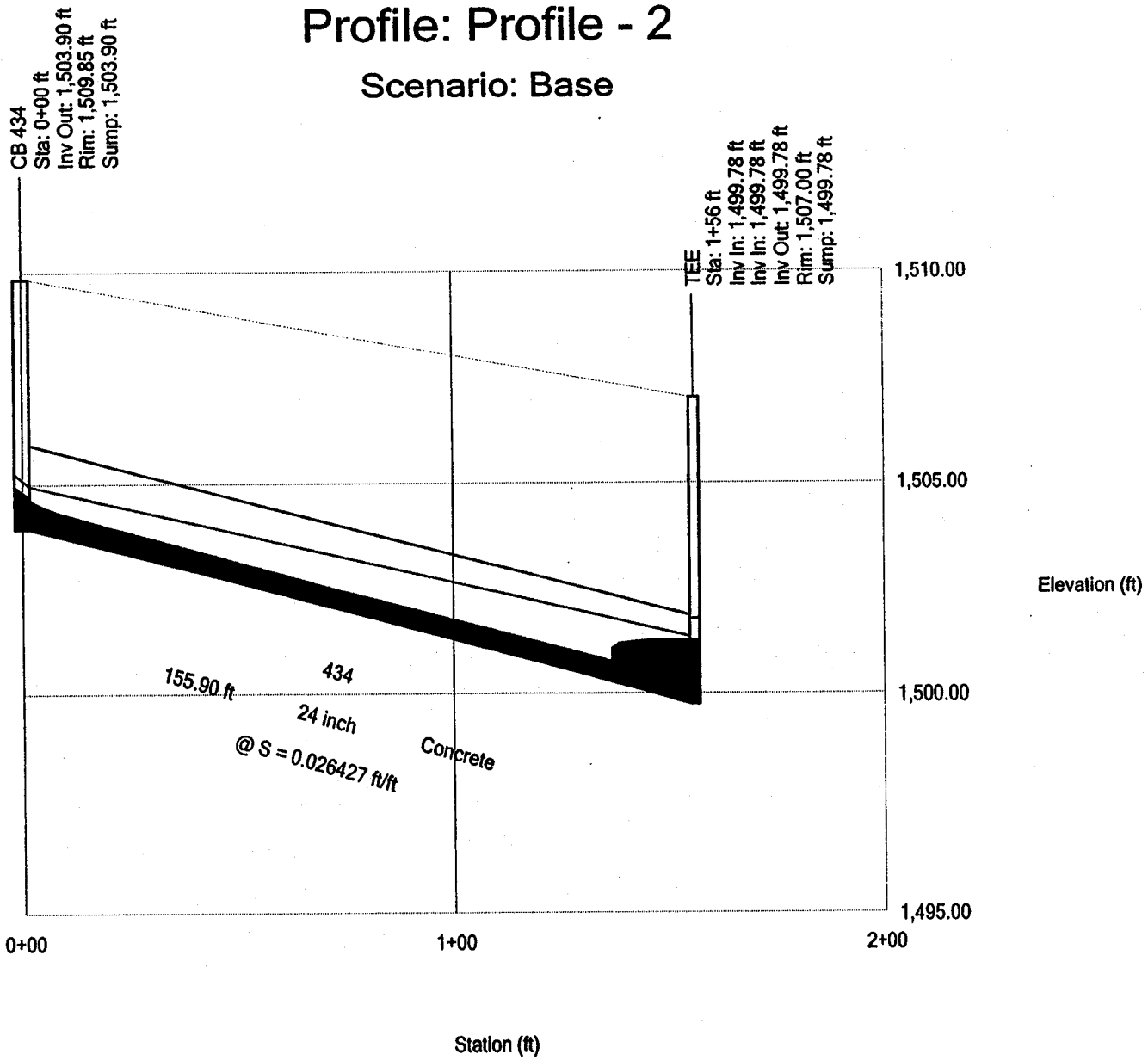
Title: Loop 202/US 60 TI
r:\...\us 60 west - ells to cris (dnj)\200.stm
11/12/04 02:22:57 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

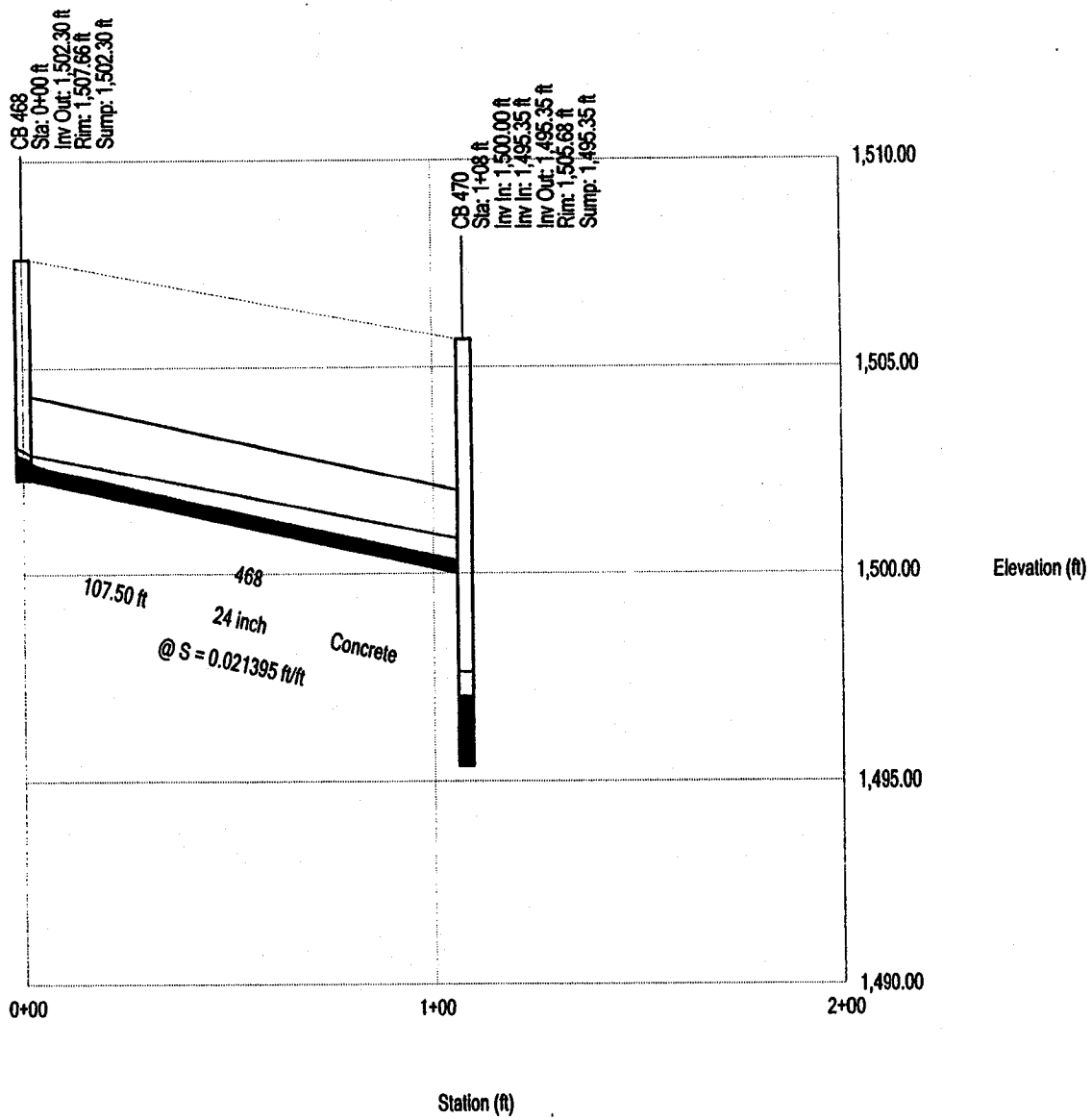
Profile: Profile - 2

Scenario: Base



Profile: Profile - 3

Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inle Rational Coefficient	Upstream Inlet CA (acres)	pstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)
Exst. Pipe	CB 470	Exst. Catch Ba	0.36	0.95	0.34	2.76	5.04	14.00	56.40	0.182624	24 inch	0.012	104.73	1,495.35	1,485.05	1,505.68
Exst. Pipe	Exst. Catch Ba	O-1	1.00	0.70	0.70	3.46	5.03	17.53	177.60	0.004786	30 inch	0.012	30.74	1,485.05	1,484.20	1,489.13
468	CB 468	CB 470	0.36	0.95	0.34	0.34	5.15	1.78	107.50	0.021395	24 inch	0.012	35.85	1,502.30	1,500.00	1,507.66
435a	CB 435	TEE	1.21	0.95	1.15	1.15	5.15	5.97	44.00	0.005000	24 inch	0.012	17.33	1,500.00	1,499.78	1,505.82
435b	TEE	Connection 1	N/A	N/A	N/A	2.07	5.10	10.65	24.50	0.004490	24 inch	0.012	16.42	1,499.78	1,499.67	1,507.00
434	CB 434	TEE	0.97	0.95	0.92	0.92	5.15	4.78	155.90	0.026427	24 inch	0.012	39.84	1,503.90	1,499.78	1,509.85
Exist Pipe	Connection 1	Connection 2	N/A	N/A	N/A	2.07	5.09	10.63	140.00	0.011143	24 inch	0.012	25.87	1,499.67	1,498.11	1,507.50
Exst. Pipe	Connection 2	CB 470	N/A	N/A	N/A	2.07	5.04	10.53	26.10	0.104981	24 inch	0.012	79.40	1,498.09	1,495.35	1,506.00

Scenario: Base

Pipe Report

Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
1,489.13	8.33	2.08	1,496.70	1,486.76	
1,488.00	1.58	1.30	1,486.47	1,485.55	
1,505.68	3.36	3.68	1,502.76	1,500.30	
1,507.00	3.82	5.22	1,501.24	1,501.24	
1,507.50	5.22	5.83	1,500.95	1,500.84	
1,507.00	3.95	5.22	1,504.67	1,501.24	
1,506.00	5.83	5.89	1,500.84	1,499.00	
1,505.68	5.91	8.33	1,499.25	1,497.06	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					3.46				11.20	4.96	17.28					17.28	1,488.00	1,488.00	1,484.18
Exst. Catch Ba	1.00	0.70	0.70	0.00	3.46	10.00	0.00	10.74	10.74	5.03	17.53	0.00	0.00	0.00	0.00	17.53	1,489.13	1,489.13	1,486.76
CB 470	0.36	0.95	0.34	0.00	2.76	10.00	0.00	10.70	10.70	5.04	14.00	0.00	0.00	0.00	0.00	14.00	1,505.68	1,505.68	1,497.06
CB 468	0.36	0.95	0.34	0.00	0.34	10.00	0.00	0.00	10.00	5.15	1.78	0.00	0.00	0.00	0.00	1.78	1,507.66	1,507.66	1,502.92
Connection 2					2.07				10.68	5.04	10.53					10.53	1,506.00	1,506.00	1,499.25
Connection 1					2.07				10.38	5.09	10.63					10.63	1,507.50	1,507.50	1,500.84
TEE					2.07				10.30	5.10	10.65					10.65	1,507.00	1,507.00	1,501.24
CB 435	1.21	0.95	1.15	0.00	1.15	10.00	0.00	0.00	10.00	5.15	5.97	0.00	0.00	0.00	0.00	5.97	1,505.82	1,505.82	1,501.37
CB 434	0.97	0.95	0.92	0.00	0.92	10.00	0.00	0.00	10.00	5.15	4.78	0.00	0.00	0.00	0.00	4.78	1,509.85	1,509.85	1,504.96

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,484.18			
1,486.47	5.15	3.63	
1,496.70	5.15	1.78	
1,502.76	5.15	1.78	
1,499.25			
1,500.84			
1,500.95			
1,501.24	5.15	5.97	
1,504.67	5.15	4.78	

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
430	CB 430	Connection	0.83	0.95	0.79	0.79	5.15	4.09	40.30	0.004963	24 inch	0.012	17.26	1,488.07	1,487.87	1,492.95	1,495.50
Exst. Pipe	Connection	Connection	N/A	N/A	N/A	0.79	5.13	4.07	124.00	0.017258	24 inch	0.012	32.19	1,487.87	1,485.73	1,495.50	1,494.00
464	Connection	CB 463	N/A	N/A	N/A	0.79	5.08	4.04	24.20	0.007025	24 inch	0.012	20.54	1,485.73	1,485.56	1,494.00	1,493.14
463	CB 463	CB 461	0.74	0.95	0.70	3.33	4.96	16.67	32.10	0.110903	24 inch	0.012	81.61	1,485.46	1,481.90	1,493.14	1,487.00
Exst. Pipe	CB 461	O-1	1.00	0.70	0.70	4.03	4.96	20.16	200.00	0.008000	24 inch	0.012	21.92	1,481.90	1,480.30	1,487.00	1,484.00
432	CB 432	Connection	1.06	0.95	1.01	1.01	5.15	5.23	26.80	0.004478	24 inch	0.012	16.40	1,494.21	1,494.09	1,498.58	1,499.00
Exst. Pipe	Connection	Connection	N/A	N/A	N/A	1.01	5.13	5.21	150.00	0.012067	24 inch	0.012	26.92	1,494.09	1,492.28	1,499.00	1,498.83
466	Connection	CB 467	N/A	N/A	N/A	1.01	5.08	5.15	16.90	0.004734	24 inch	0.012	16.86	1,492.28	1,492.20	1,498.83	1,498.40
467	CB 467	CB 463	0.88	0.95	0.84	1.84	5.07	9.41	331.60	0.013269	24 inch	0.012	28.23	1,492.10	1,487.70	1,498.40	1,493.14

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
2.88	5.63	1,488.78	1,488.53	
5.63	6.27	1,488.58	1,487.36	
6.27	5.58	1,487.36	1,487.35	
5.68	3.10	1,486.93	1,483.94	
3.10	1.70	1,483.51	1,482.30	
2.37	2.91	1,495.02	1,494.87	
2.91	4.55	1,494.89	1,493.55	
4.55	4.20	1,493.55	1,493.55	
4.30	3.44	1,493.20	1,488.50	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					4.03				11.66	4.89	19.89					19.89	1,484.00	1,484.00	1,480.30
CB 461	1.00	0.70	0.70	0.00	4.03	10.00	0.00	11.24	11.24	4.96	20.16	0.00	0.00	0.00	0.00	20.16	1,487.00	1,487.00	1,483.94
CB 463	0.74	0.95	0.70	0.00	3.33	10.00	0.00	11.22	11.22	4.96	16.67	0.00	0.00	0.00	0.00	16.67	1,493.14	1,493.14	1,487.35
Connection					0.79				10.44	5.08	4.04					4.04	1,494.00	1,494.00	1,487.36
Connection					0.79				10.15	5.13	4.07					4.07	1,495.50	1,495.50	1,488.58
CB 430	0.83	0.95	0.79	0.00	0.79	10.00	0.00	0.00	10.00	5.15	4.09	0.00	0.00	0.00	0.00	4.09	1,492.95	1,492.95	1,489.04
CB 467	0.88	0.95	0.84	0.00	1.84	10.00	0.00	10.53	10.53	5.07	9.41	0.00	0.00	0.00	0.00	9.41	1,498.40	1,498.40	1,493.55
Connection					1.01				10.47	5.08	5.15					5.15	1,498.83	1,498.83	1,493.55
Connection					1.01				10.10	5.13	5.21					5.21	1,499.00	1,499.00	1,494.89
CB 432	1.06	0.95	1.01	0.00	1.01	10.00	0.00	0.00	10.00	5.15	5.23	0.00	0.00	0.00	0.00	5.23	1,498.58	1,498.58	1,495.32

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,480.30			
1,483.51	5.15	3.63	
1,486.93	5.15	3.65	
1,487.36			
1,488.58			
1,488.78	5.15	4.09	
1,493.20	5.15	4.34	
1,493.55			
1,494.89			
1,495.02	5.15	5.23	

USGO LATERAL @
STA. 1065+19
EAST DRAINAGE SYSTEM No.6

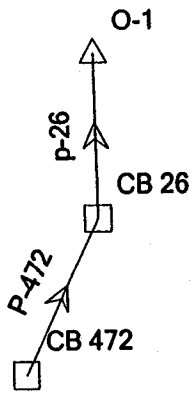
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options	
Analysis Type	Backwater Analysis
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)
Hydraulic Grade Converger	0.00 ft
Number of Flow Profile Step	5
Return Period	25 year
Minimum Time of Concentra	5.00 min

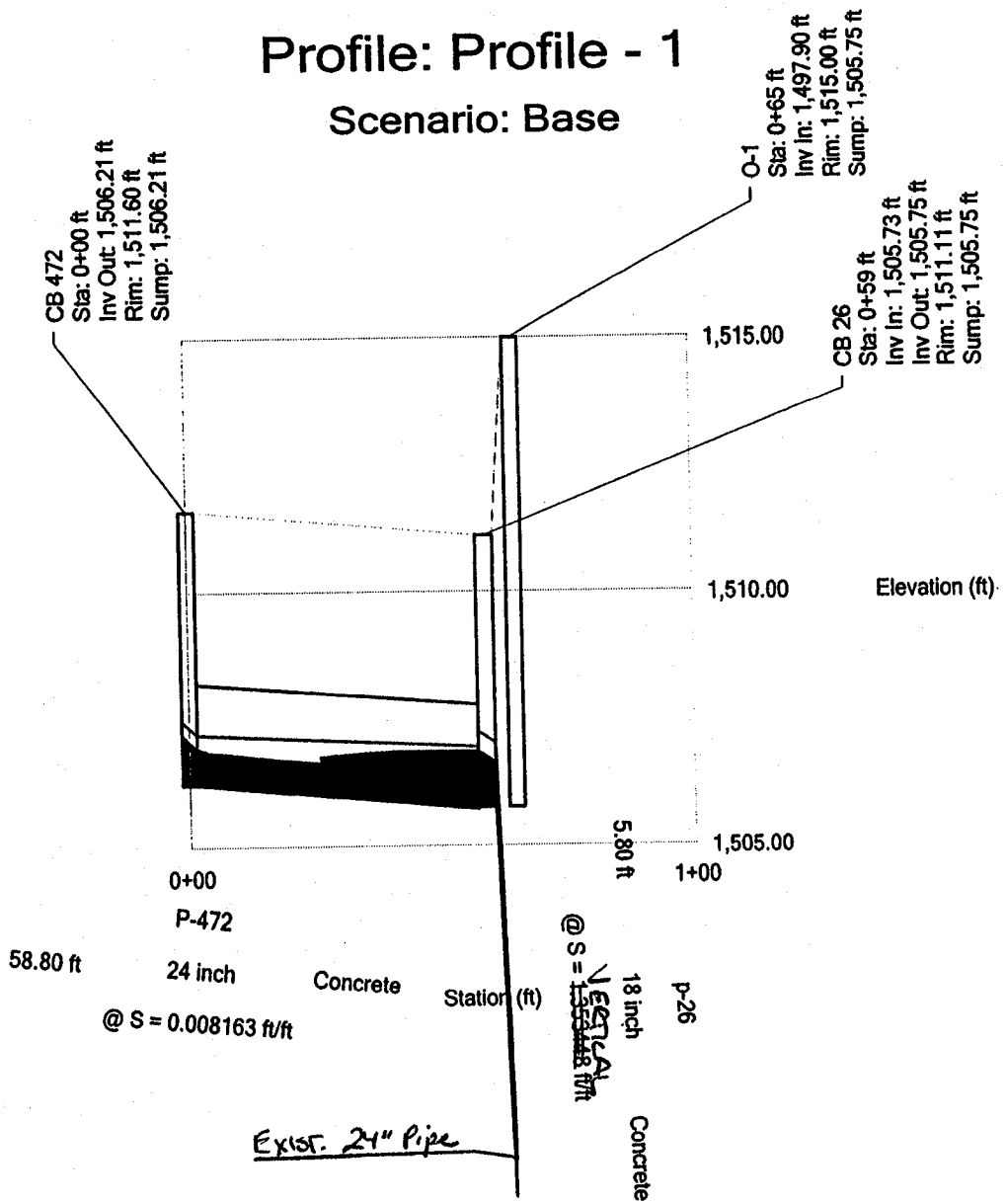
Created: 01/26/05 02:46:57 PM

Scenario: Base



Profile: Profile - 1

Scenario: Base



© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)
CB 472	CB 26	0.85	0.95	0.81	0.81	5.15	4.19	58.80	0.008163	24 inch	0.012	22.14	1,506.21	1,505.73	1,511.60	1,511.11	3.39
CB 26	O-1	0.21	0.95	0.20	1.01	5.12	5.20	5.80	1.353448	18 inch	0.012	132.38	1,505.75	1,497.90	1,511.11	1,515.00	3.86

Scenario: Base

Pipe Report

Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
3.38	1,506.93	1,506.85
15.60	1,506.63	1,499.40

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					1.01				10.18	5.12	5.20					5.20	1,515.00	1,515.00	1,505.75
CB 26	0.21	0.95	0.20	0.00	1.01	10.00	0.00	10.18	10.18	5.12	5.20	0.00	0.00	0.00	0.00	5.20	1,511.11	1,511.11	1,506.85
CB 472	0.85	0.95	0.81	0.00	0.81	10.00	0.00	0.00	10.00	5.15	4.19	0.00	0.00	0.00	0.00	4.19	1,511.60	1,511.60	1,507.19

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,505.75			
1,506.63	5.15	1.04	
1,506.93	5.15	4.19	

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

CRISMON RD RAMPS AND
DESIGN STORM 10-yr

EAST DRAINAGE SYSTEMS No. 7 & 8

Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

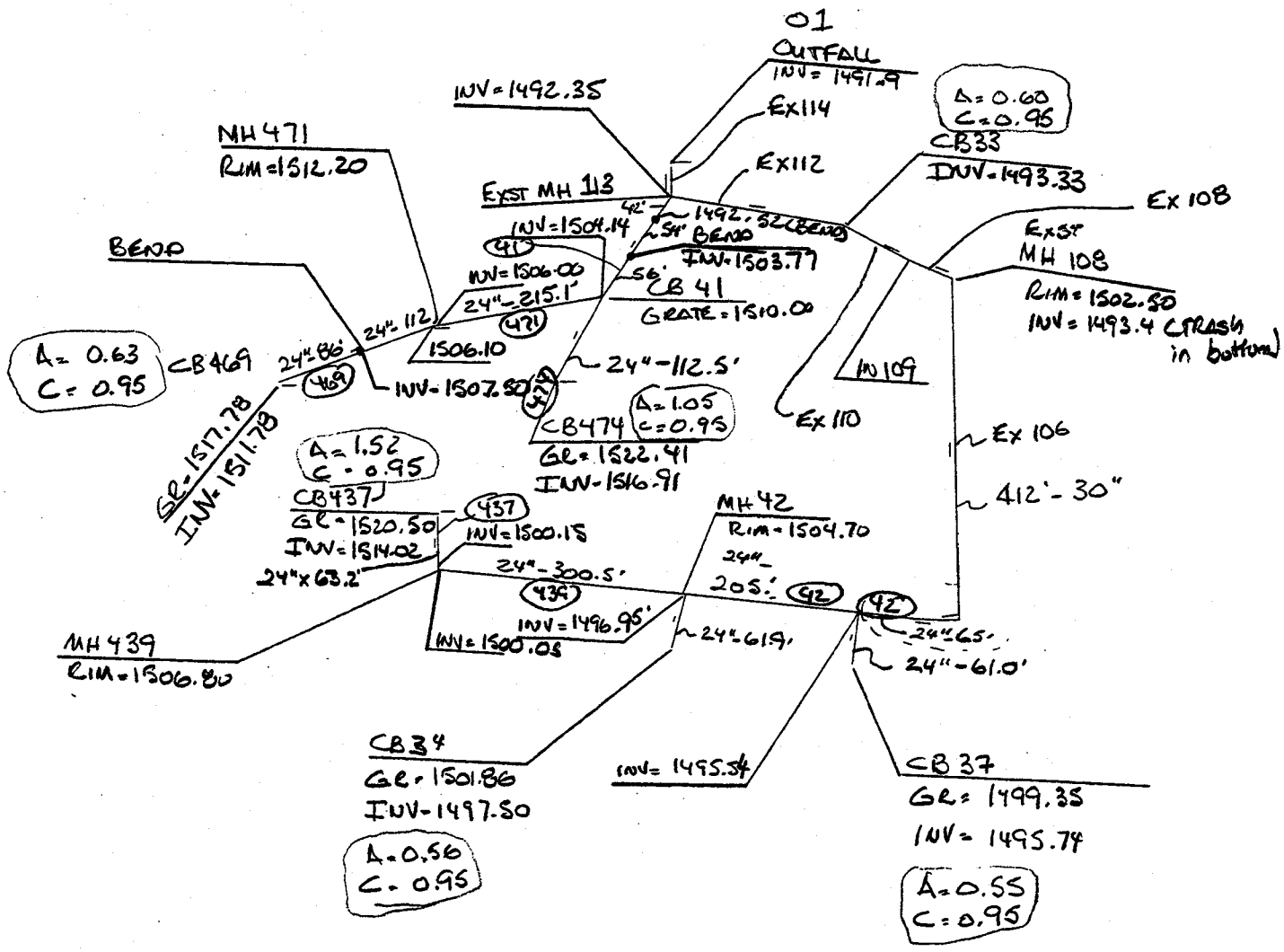
Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Ste	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

Created: 07/13/04 04:07:31 PM

NOTES.

1. EXISTING LINE (30" Ø) ALONG CRISMON ROAD IS UNDERSIZED.
2. SYSTEM OPERATES UNDER SURCHARGE CONDITIONS.

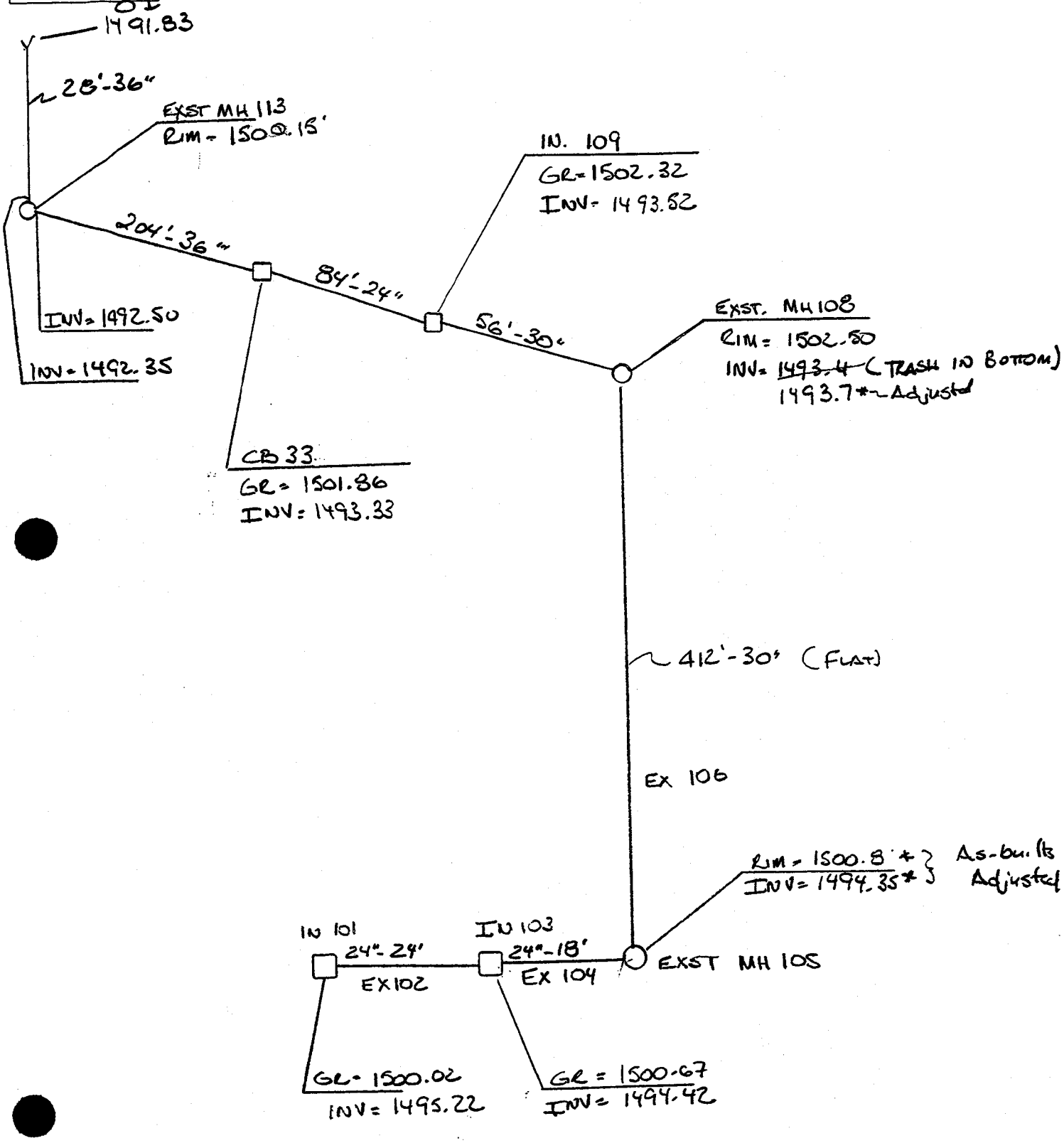
Scenario: Base



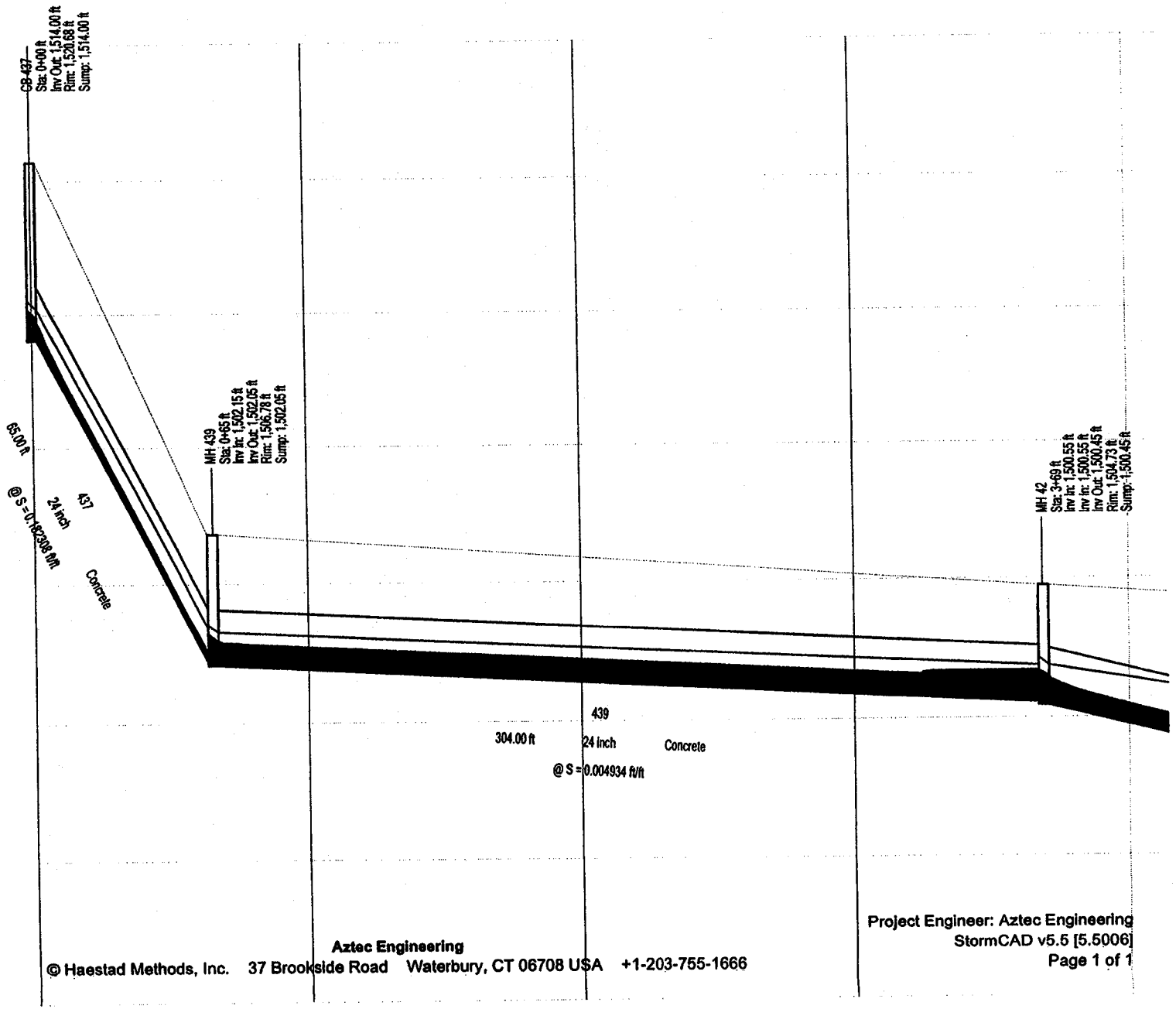
AZTEC ENGINEERING

3747 East Grove Street
Phoenix, AZ 85040-3982
Phone (602) 454-0402
Fax (602) 454-0403

Project: _____ Project No: _____
Computed by: _____ Date: _____
Checked By: _____ Date: _____
Sheet Name _____ Sheet: _____ Of: _____

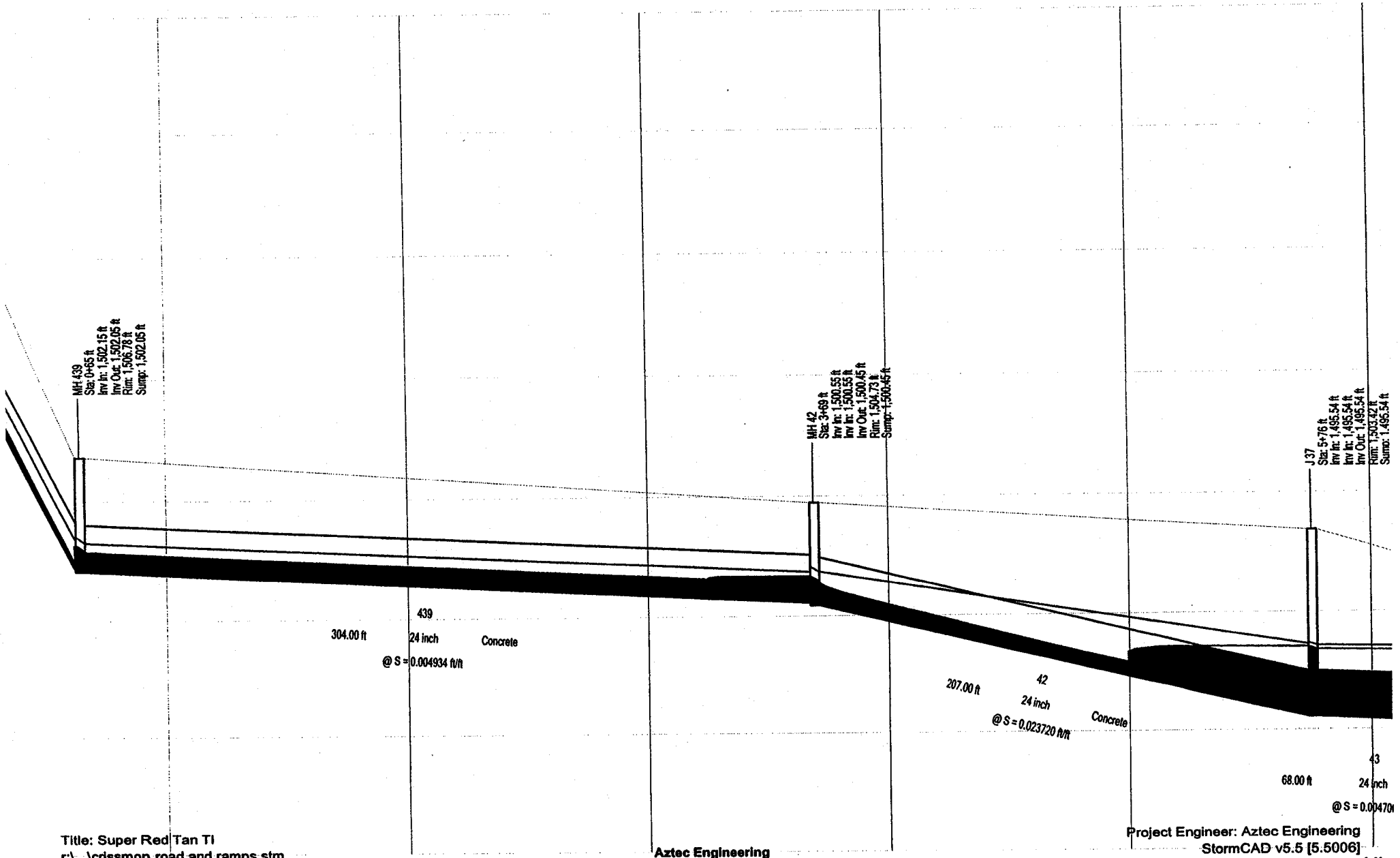


Profile
Scenario: Base



Title: Super Red Tan TI
r:\...\crissmon road and ramps.stm
12/10/04 10:19:24 AM

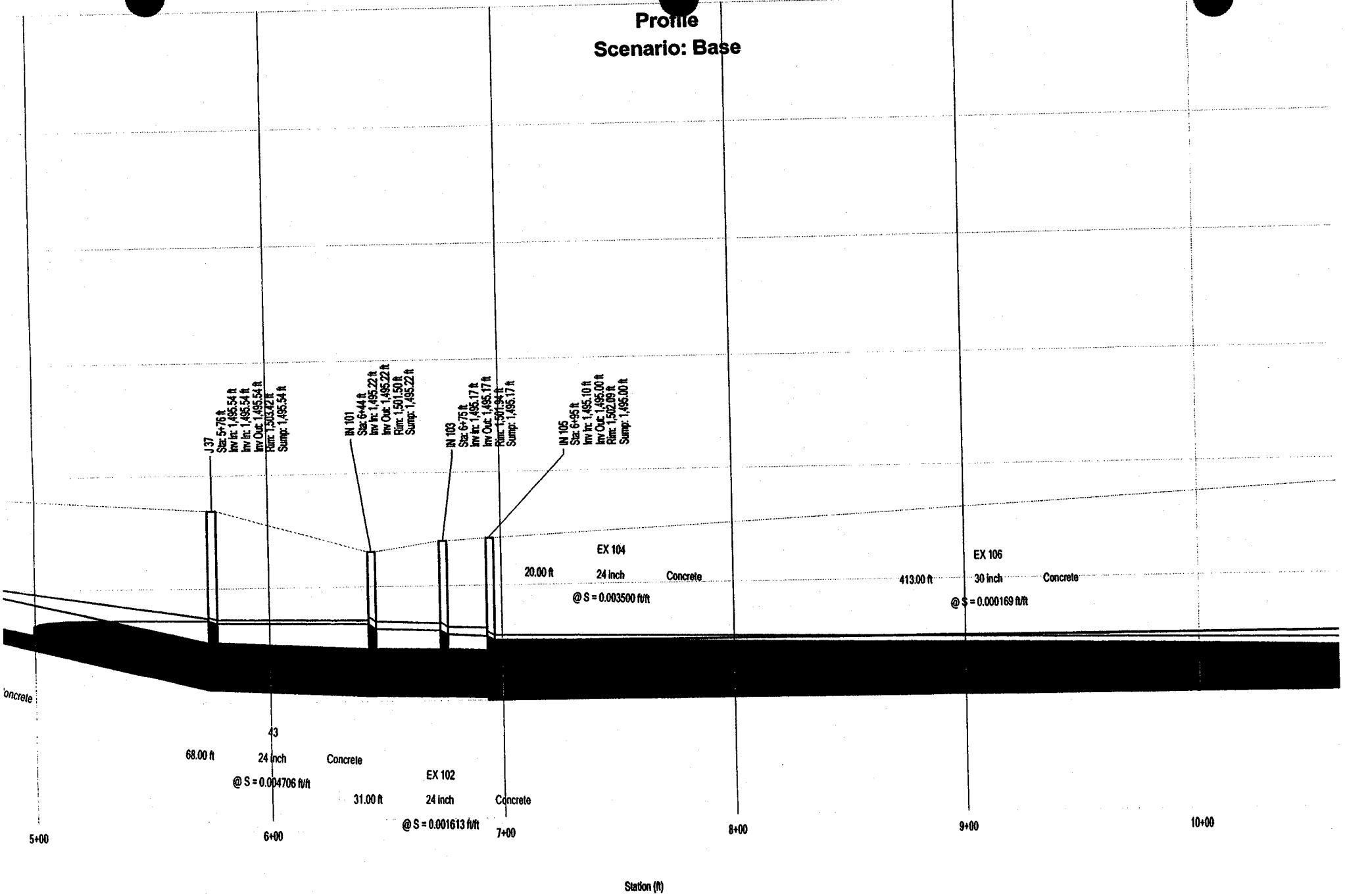
Profile
Scenario: Base



Title: Super Red Tan Tl
r:\...\crissmon road and ramps.stm
12/10/04 10:19:00 AM

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base

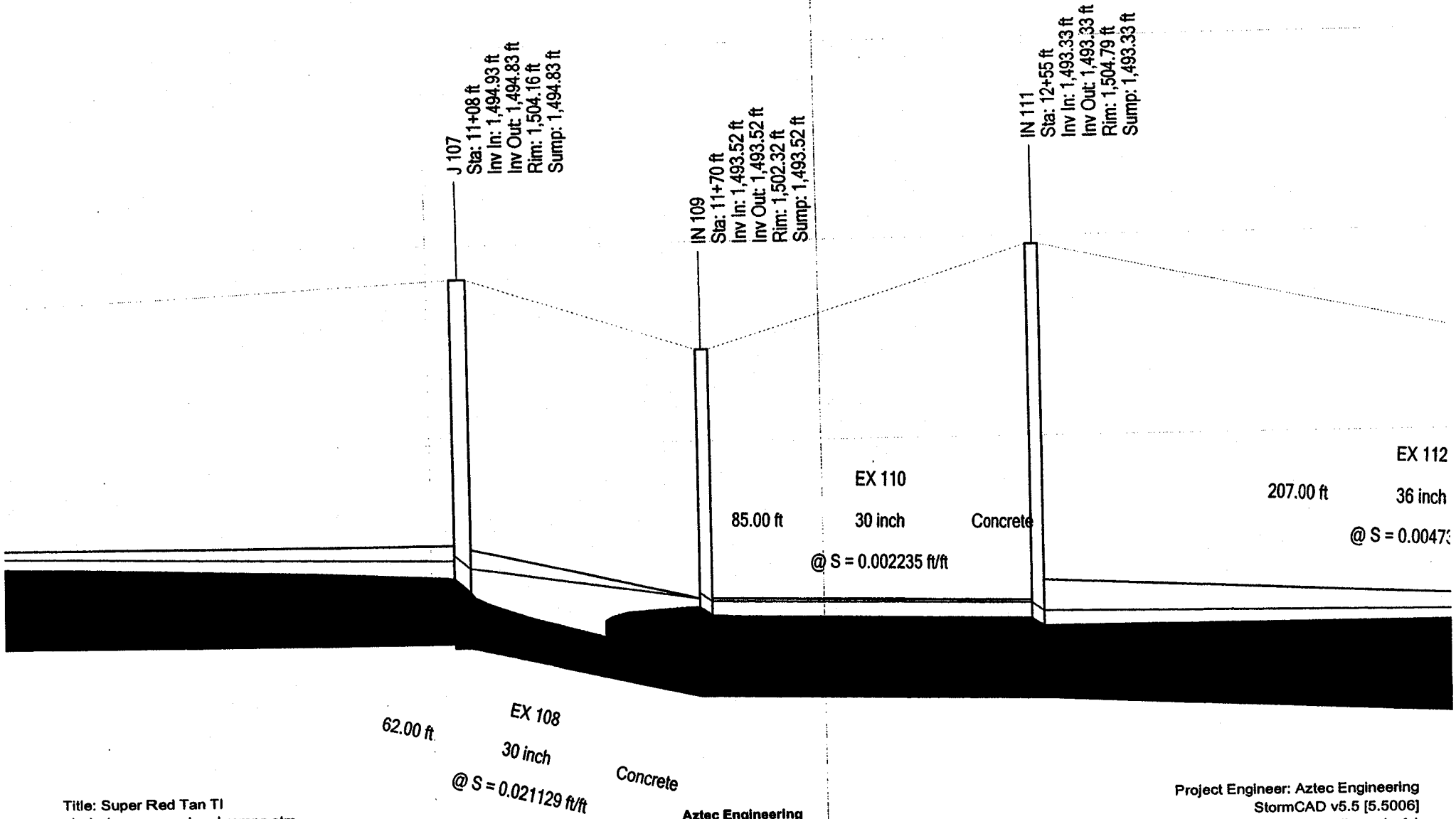


Title: Super Red Tan TI
r:\...\crissmon road and ramps.stm
12/10/04 10:20:39 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base



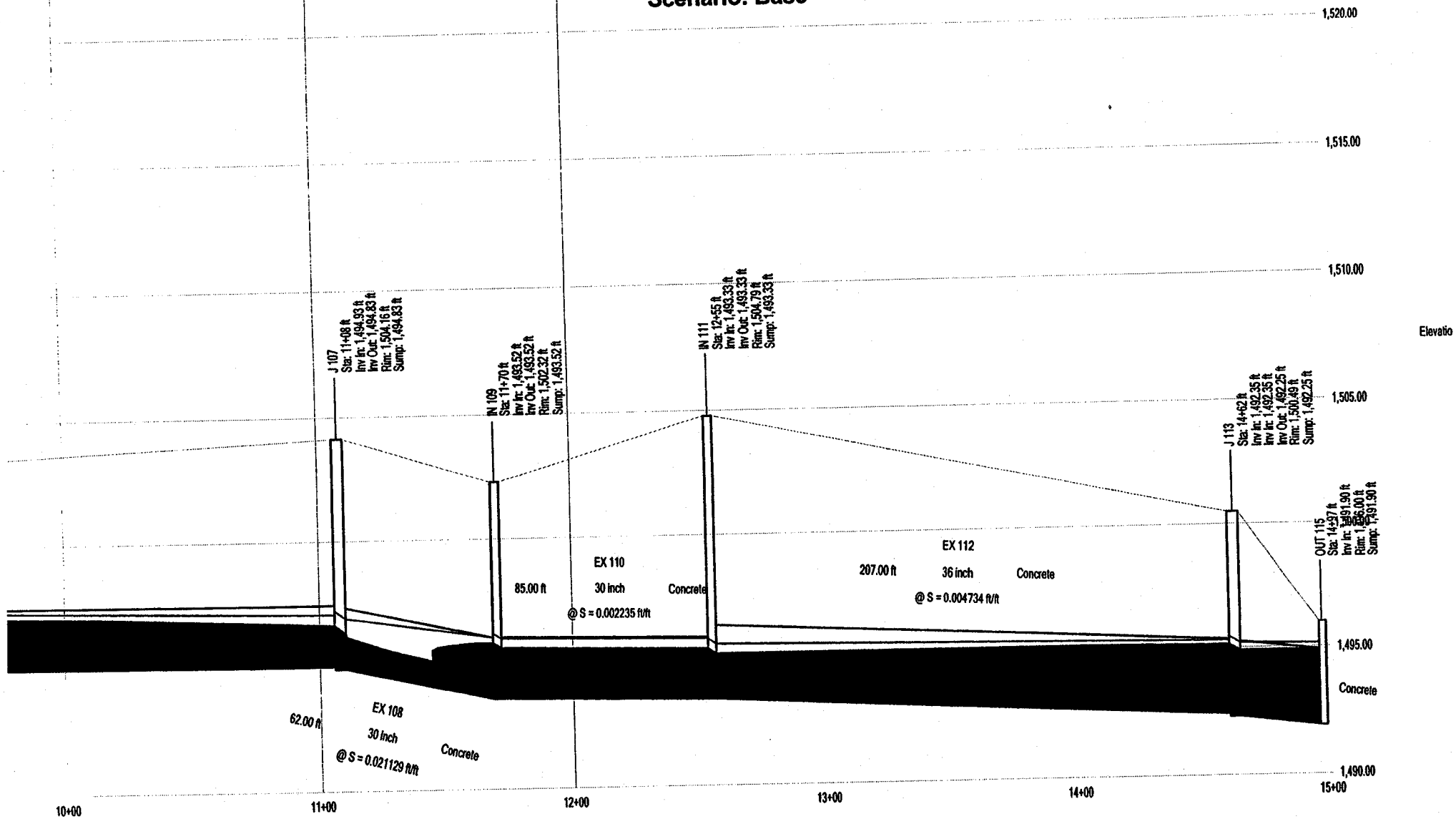
Title: Super Red Tan TI
r:\...\crissmon road and ramps.stm
01/19/05 09:22:03 AM

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Aztec Engineering

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]

Profile
Scenario: Base



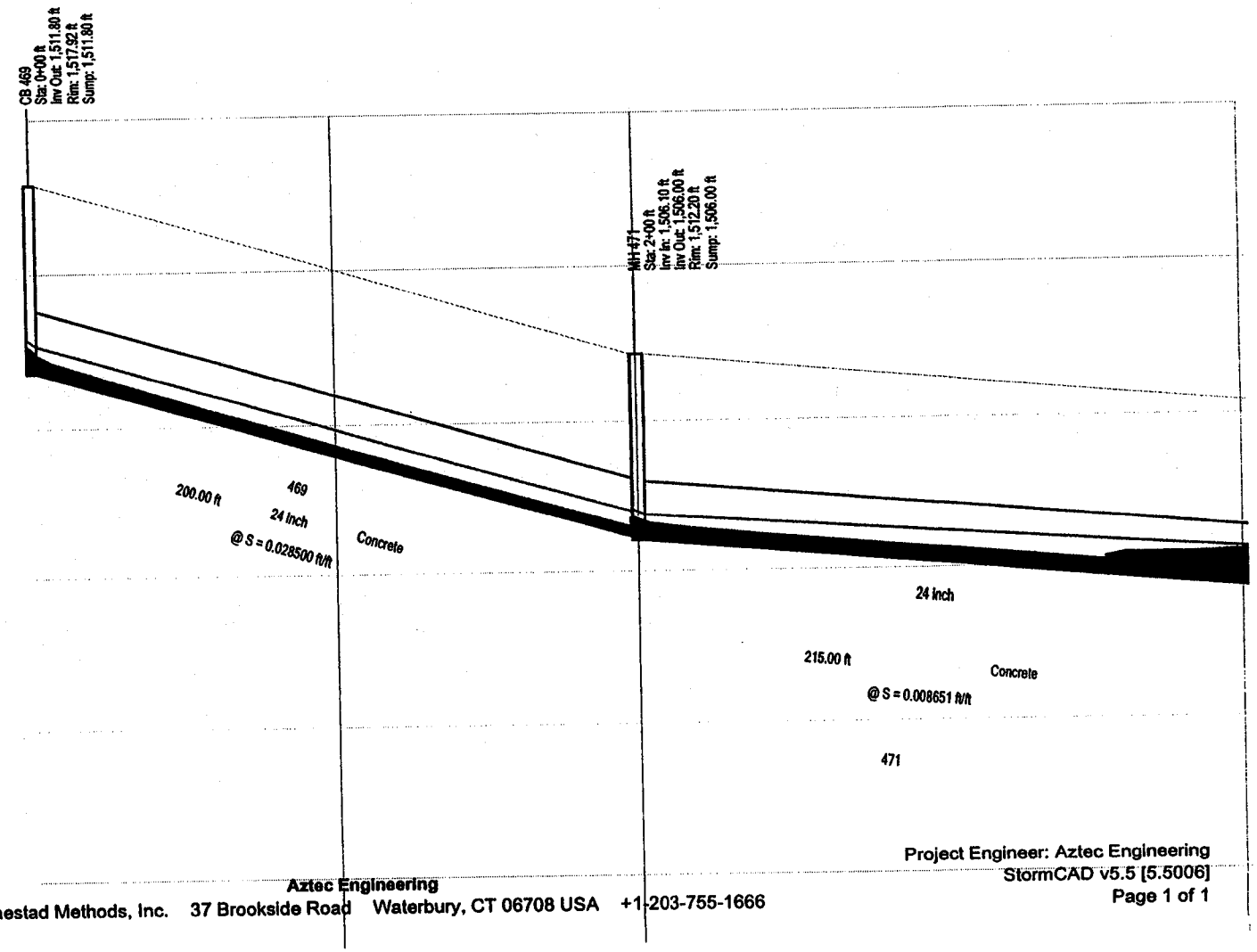
Title: Super Red Tan Tl
r:\...\crissmon road and ramps.stm
12/10/04 10:17:19 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base

Profile: Profile - 2
Scenario: Base



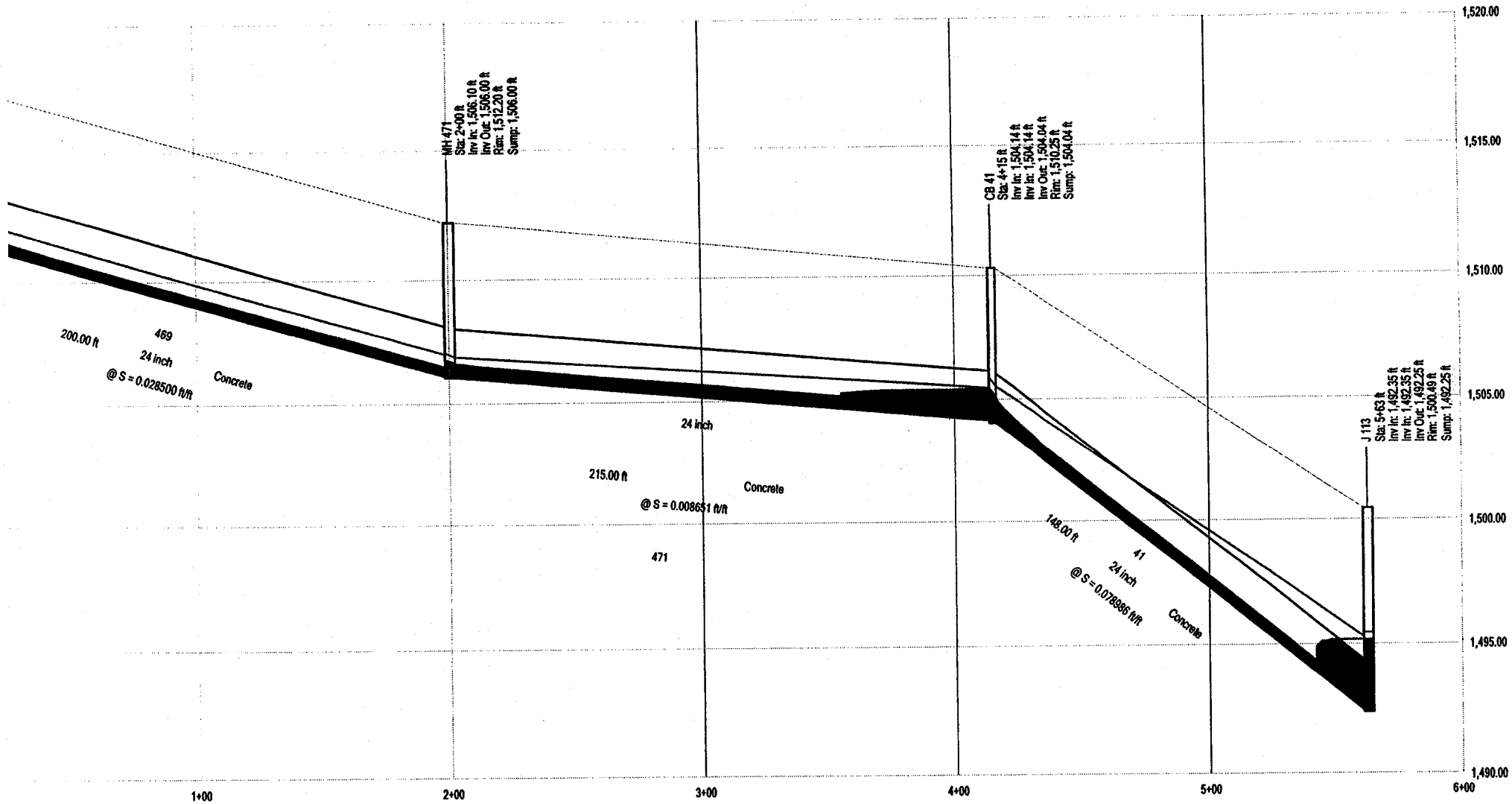
Title: Super Red Tan TI
r:\...\crissmon road and ramps.stm
12/10/04 10:23:29 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base

Profile: Profile - 2
Scenario: Base



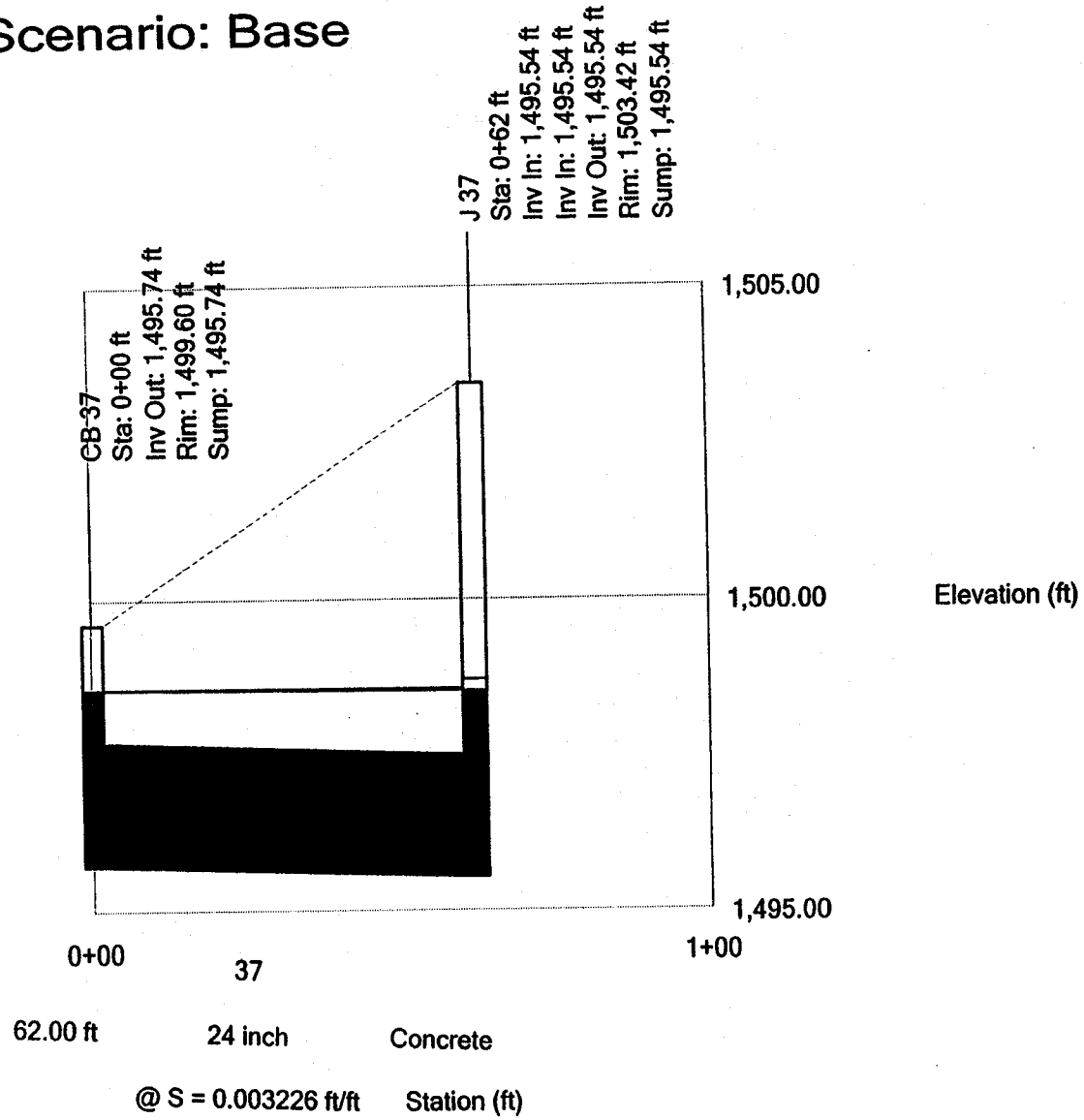
Title: Super Red Tan TI
r:\...\crissmon road and ramps.stm
12/10/04 10:23:14 AM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

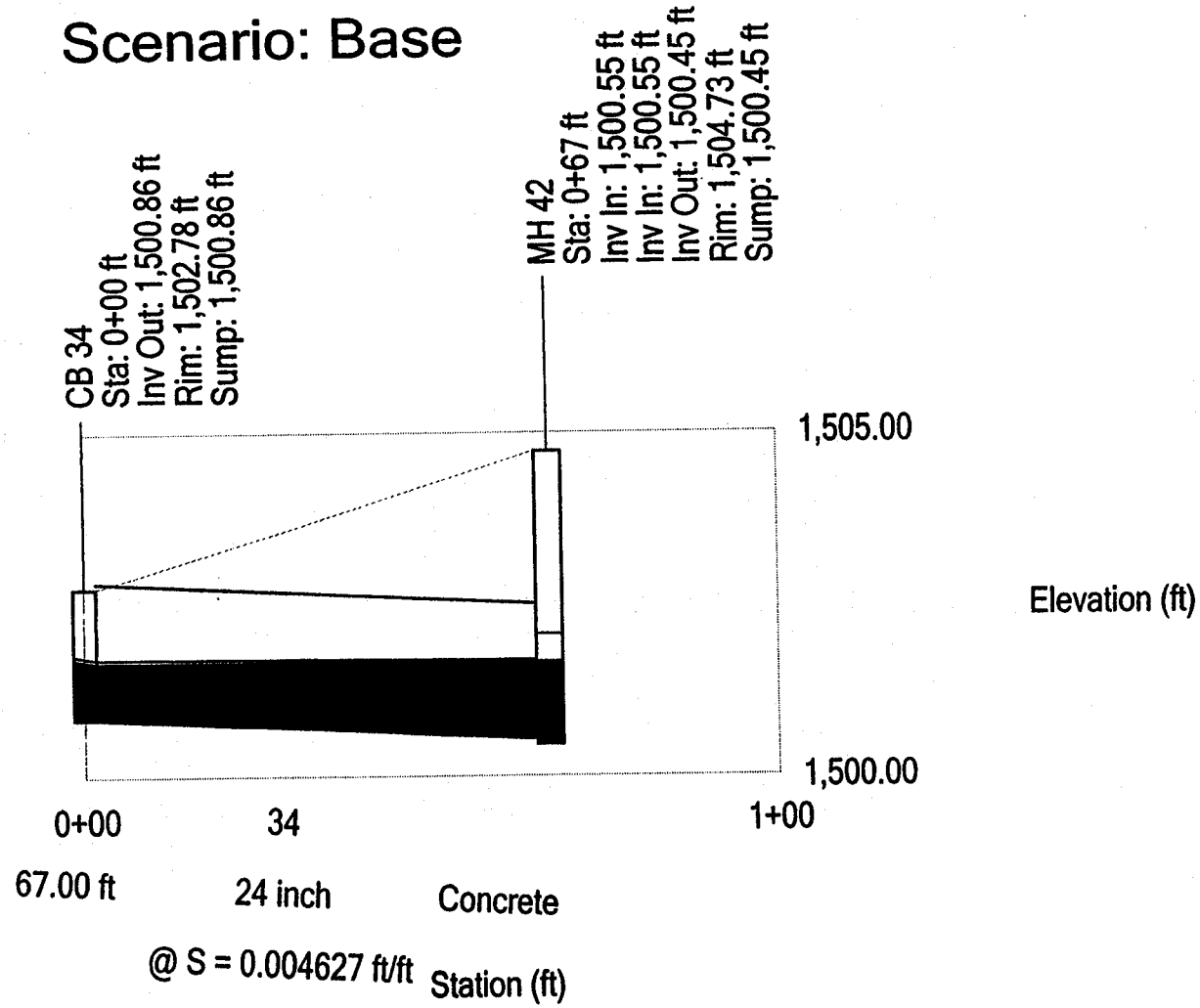
Profile: Profile - 4

Scenario: Base



Profile: Profile - 3

Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
474	CB 474	CB 41	1.05	0.95	0.99	0.99	4.22	4.23	113.00	0.113009	24 inch	0.012	82.38	1,516.91	1,504.14	1,522.54	1,510.25
41	CB 41	J 113	0.66	0.70	0.46	2.06	4.20	8.70	148.00	0.078986	24 inch	0.012	68.87	1,504.04	1,492.35	1,510.25	1,500.49
EX 114	J 113	OUT 115	N/A	N/A	N/A	8.63	3.31	28.80	35.00	0.010000	36 inch	0.012	72.25	1,492.25	1,491.90	1,500.49	1,496.00
469	CB 469	MH 471	0.63	0.95	0.60	0.60	5.54	3.34	200.00	0.028500	24 inch	0.012	41.37	1,511.80	1,506.10	1,517.92	1,512.20
471	MH 471	CB 41	N/A	N/A	N/A	0.60	5.54	3.34	215.00	0.008651	24 inch	0.012	22.79	1,506.00	1,504.14	1,512.20	1,510.25
437	CB 437	MH 439	1.52	0.95	1.44	1.44	4.22	6.14	65.00	0.182308	24 inch	0.012	104.64	1,514.00	1,502.15	1,520.68	1,506.78
439	MH 439	MH 42	N/A	N/A	N/A	1.44	4.21	6.13	304.00	0.004934	24 inch	0.012	17.21	1,502.05	1,500.55	1,506.78	1,504.73
34	CB 34	MH 42	0.56	0.95	0.53	0.53	4.22	2.26	67.00	0.004627	24 inch	0.012	16.67	1,500.86	1,500.55	1,502.78	1,504.73
42	MH 42	J 37	N/A	N/A	N/A	1.98	4.07	8.11	207.00	0.023720	24 inch	0.012	37.74	1,500.45	1,495.54	1,504.73	1,503.42
37	CB 37	J 37	0.55	0.95	0.52	0.52	4.22	2.22	62.00	0.003226	24 inch	0.012	13.92	1,495.74	1,495.54	1,499.60	1,503.42
43	J 37	IN 101	N/A	N/A	N/A	2.50	4.02	10.12	68.00	0.004706	24 inch	0.012	16.81	1,495.54	1,495.22	1,503.42	1,501.50
EX 102	IN 101	IN 103	2.34	0.70	1.64	4.14	3.53	14.72	31.00	0.001613	24 inch	0.012	9.84	1,495.22	1,495.17	1,501.50	1,501.94
EX 104	IN 103	IN 105	0.15	0.95	0.14	4.28	3.52	15.19	20.00	0.003500	24 inch	0.012	14.50	1,495.17	1,495.10	1,501.94	1,502.09
EX 106	IN 105	J 107	1.22	0.80	0.98	5.26	3.52	18.65	413.00	0.000169	30 inch	0.012	5.78	1,495.00	1,494.93	1,502.09	1,504.16
EX 108	J 107	IN 109	N/A	N/A	N/A	5.26	3.38	17.92	62.00	0.021129	30 inch	0.012	64.59	1,494.83	1,493.52	1,504.16	1,502.32
EX 110	IN 109	IN 111	1.21	0.70	0.85	6.11	3.37	20.76	85.00	0.002235	30 inch	0.012	21.01	1,493.52	1,493.33	1,502.32	1,504.79
EX 112	IN 111	J 113	0.49	0.95	0.47	6.57	3.35	22.19	207.00	0.004734	36 inch	0.012	49.71	1,493.33	1,492.35	1,504.79	1,500.49

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
3.63	4.11	1,517.63	1,505.43	
4.21	6.14	1,505.09	1,495.15	
5.24	1.10	1,494.92	1,494.90	
4.12	4.10	1,512.44	1,506.78	
4.20	4.11	1,506.64	1,505.43	
4.68	2.63	1,514.88	1,503.19	
2.73	2.18	1,502.93	1,501.70	
-0.08	2.18	1,501.70	1,501.70	
2.28	5.88	1,501.46	1,498.56	
1.86	5.88	1,498.56	1,498.56	
5.88	4.28	1,498.43	1,498.31	
4.28	4.77	1,498.11	1,498.00	
4.77	4.99	1,497.82	1,497.74	
4.59	6.73	1,497.56	1,496.62	
6.83	6.30	1,496.26	1,495.80	
6.30	8.96	1,495.58	1,495.41	
8.46	5.14	1,495.19	1,495.15	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
OUT 115					8.63				17.94	3.31	28.76					28.76	1,496.00	1,496.00	1,491.90
J 113					8.63				17.88	3.31	28.80					28.80	1,500.49	1,500.49	1,495.15
CB 41	0.66	0.70	0.46	0.00	2.06	0.00	0.00	10.14	10.14	4.20	8.70	0.00	0.00	0.00	0.00	8.70	1,510.25	1,510.25	1,505.43
CB 474	1.05	0.95	0.99	0.00	0.99	10.00	0.00	0.00	10.00	4.22	4.23	0.00	0.00	0.00	0.00	4.23	1,522.54	1,522.54	1,517.90
MH 471					0.60				0.42	5.54	3.34					3.34	1,512.20	1,512.20	1,506.78
CB 469	0.63	0.95	0.60	0.00	0.60	0.00	0.00	0.00	0.00	5.54	3.34	0.00	0.00	0.00	0.00	3.34	1,517.92	1,517.92	1,512.67
IN 111	0.49	0.95	0.47	0.00	6.57	10.00	0.00	17.37	17.37	3.35	22.19	0.00	0.00	0.00	0.00	22.19	1,504.79	1,504.79	1,495.41
IN 109	1.21	0.70	0.85	0.00	6.11	10.00	0.00	17.08	17.08	3.37	20.76	0.00	0.00	0.00	0.00	20.76	1,502.32	1,502.32	1,495.80
J 107					5.26				16.99	3.38	17.92					17.92	1,504.16	1,504.16	1,496.62
IN 103	0.15	0.95	0.14	0.00	4.28	10.00	0.00	15.11	15.11	3.52	15.19	0.00	0.00	0.00	0.00	15.19	1,501.94	1,501.94	1,498.00
IN 101	2.34	0.70	1.64	0.00	4.14	15.00	0.00	11.81	15.00	3.53	14.72	0.00	0.00	0.00	0.00	14.72	1,501.50	1,501.50	1,498.31
J 37					2.50				11.46	4.02	10.12					10.12	1,503.42	1,503.42	1,498.56
MH 42					1.98				11.07	4.07	8.11					8.11	1,504.73	1,504.73	1,501.70
MH 439					1.44				10.06	4.21	6.13					6.13	1,506.78	1,506.78	1,503.19
CB 437	1.52	0.95	1.44	0.00	1.44	10.00	0.00	0.00	10.00	4.22	6.14	0.00	0.00	0.00	0.00	6.14	1,520.68	1,520.68	1,515.21
CB 34	0.56	0.95	0.53	0.00	0.53	10.00	0.00	0.00	10.00	4.22	2.26	0.00	0.00	0.00	0.00	2.26	1,502.78	1,502.78	1,501.75
CB 37	0.55	0.95	0.52	0.00	0.52	10.00	0.00	0.00	10.00	4.22	2.22	0.00	0.00	0.00	0.00	2.22	1,499.60	1,499.60	1,498.57
IN 105	1.22	0.80	0.98	0.00	5.26	10.00	0.00	15.18	15.18	3.52	18.65	0.00	0.00	0.00	0.00	18.65	1,502.09	1,502.09	1,497.74

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,491.90			
1,494.92			
1,505.09	5.54	2.58	
1,517.63	4.22	4.23	
1,506.64			
1,512.44	5.54	3.34	
1,495.19	4.22	1.98	
1,495.58	4.22	3.60	
1,496.26			
1,497.82	4.22	0.61	
1,498.11	3.53	5.83	
1,498.43			
1,501.46			
1,502.93			
1,514.88	4.22	6.14	
1,501.70	4.22	2.26	
1,498.56	4.22	2.22	
1,497.56	4.22	4.18	

202 LOOP

202 L
STA. 19+20 RAMP E-N
COMBINATION OF
202L WESTBOUND
+ RAMP E-N
DRAINAGE SYSTEM No. 1

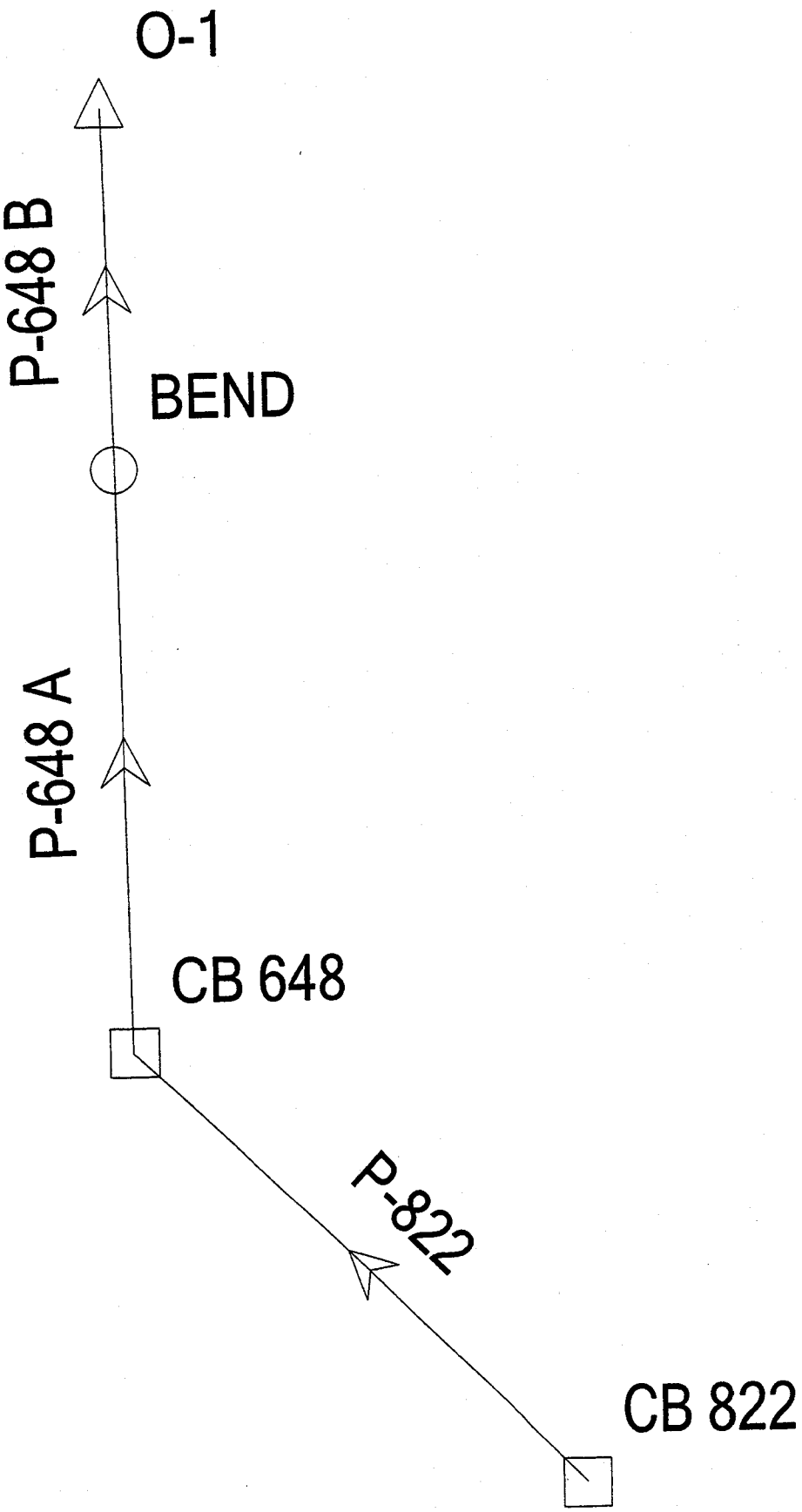
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Step	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

Created: 01/20/05 02:42:04 PM

Scenario: Base



Title: Loop 202/US60 T.I.
r:\...\ramp w-n sta 19+20.stm
01/20/05 03:05:29 PM

© Haestad Methods, Inc.

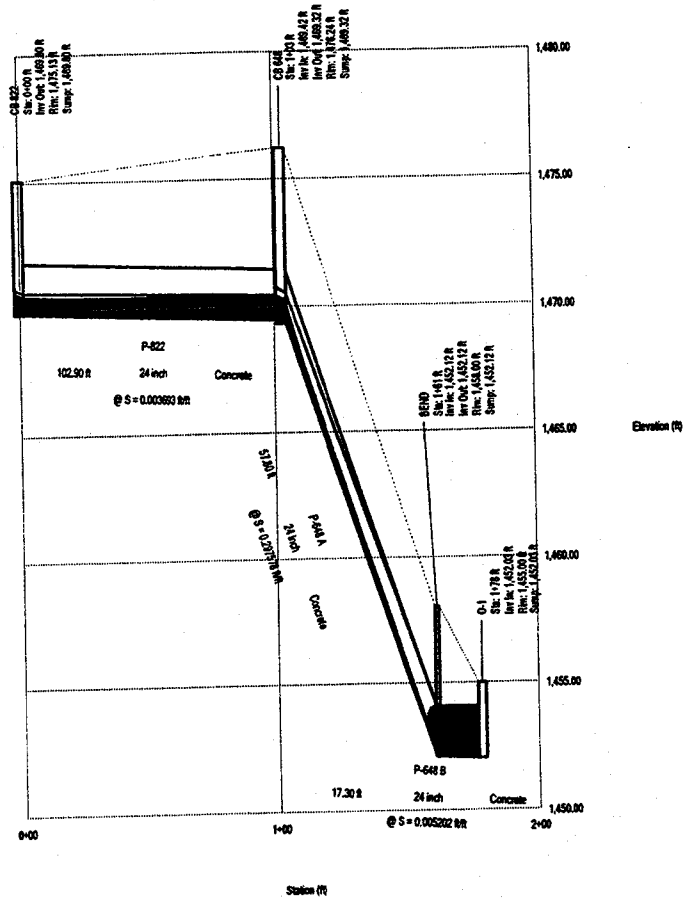
Aztec Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]

Profile
Scenario: Base

Profile: Profile - 1

Scenario: Base



Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)
CB 822	CB 648	0.74	0.95	0.70	0.70	4.22	2.99	102.90	0.003693	24 inch	0.013	13.75	1,469.80
CB 648	BEND	0.79	0.95	0.75	1.45	4.15	6.08	57.80	0.297578	24 inch	0.013	123.40	1,469.32
BEND	O-1	N/A	N/A	N/A	1.45	4.15	6.07	17.30	0.005202	24 inch	0.012	17.68	1,452.12

Scenario: Base

Pipe Report

Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,469.42	1,475.13	1,476.24	3.33	4.82	1,470.46	1,470.39
1,452.12	1,476.24	1,458.00	4.92	3.88	1,470.19	1,454.07
1,452.03	1,458.00	1,455.00	3.88	0.97	1,454.04	1,454.03

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
O-1					1.45				10.59	4.14	6.06			
BEND					1.45				10.54	4.15	6.07			
CB 648	0.79	0.95	0.75	0.00	1.45	10.00	0.00	10.49	10.49	4.15	6.08	0.00	0.00	0.00
CB 822	0.74	0.95	0.70	0.00	0.70	10.00	0.00	0.00	10.00	4.22	2.99	0.00	0.00	0.00

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
	6.06	1,455.00	1,455.00	1,452.03	1,452.03			
	6.07	1,458.00	1,458.00	1,454.07	1,454.04			
0.00	6.08	1,476.24	1,476.24	1,470.39	1,470.19	4.22	3.19	
0.00	2.99	1,475.13	1,475.13	1,470.63	1,470.46	4.22	2.99	

202L LATERAL
STA. 1430+50

202L FREEWAY DRAINAGE
SYSTEM No. 2

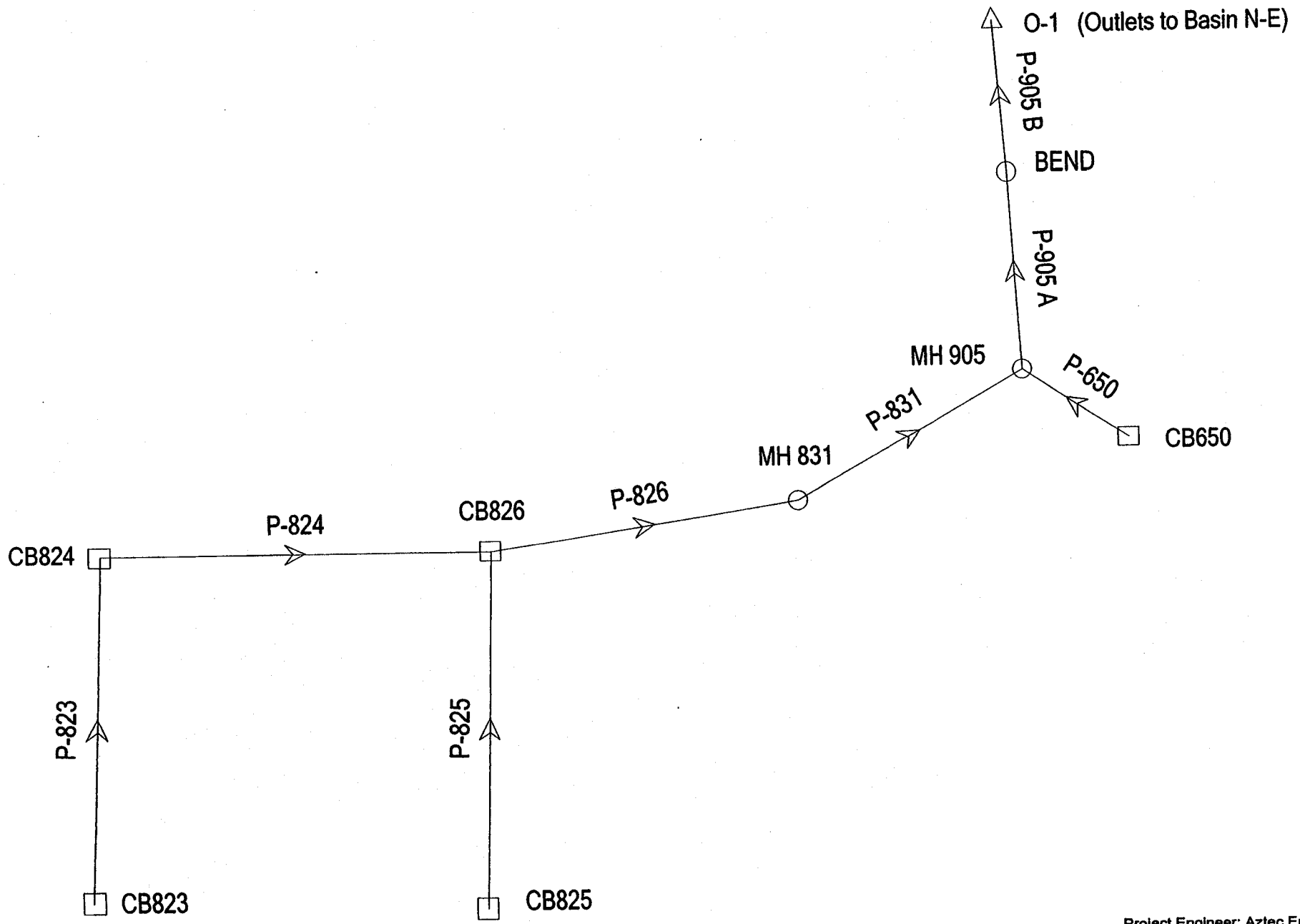
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options	
Analysis Type	Backwater Analysis
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)
Hydraulic Grade Converger	0.00 ft
Number of Flow Profile Step	5
Return Period	10 year
Minimum Time of Concentra	5.00 min

Created: 09/10/04 08:15:35 AM

Scenario: Base

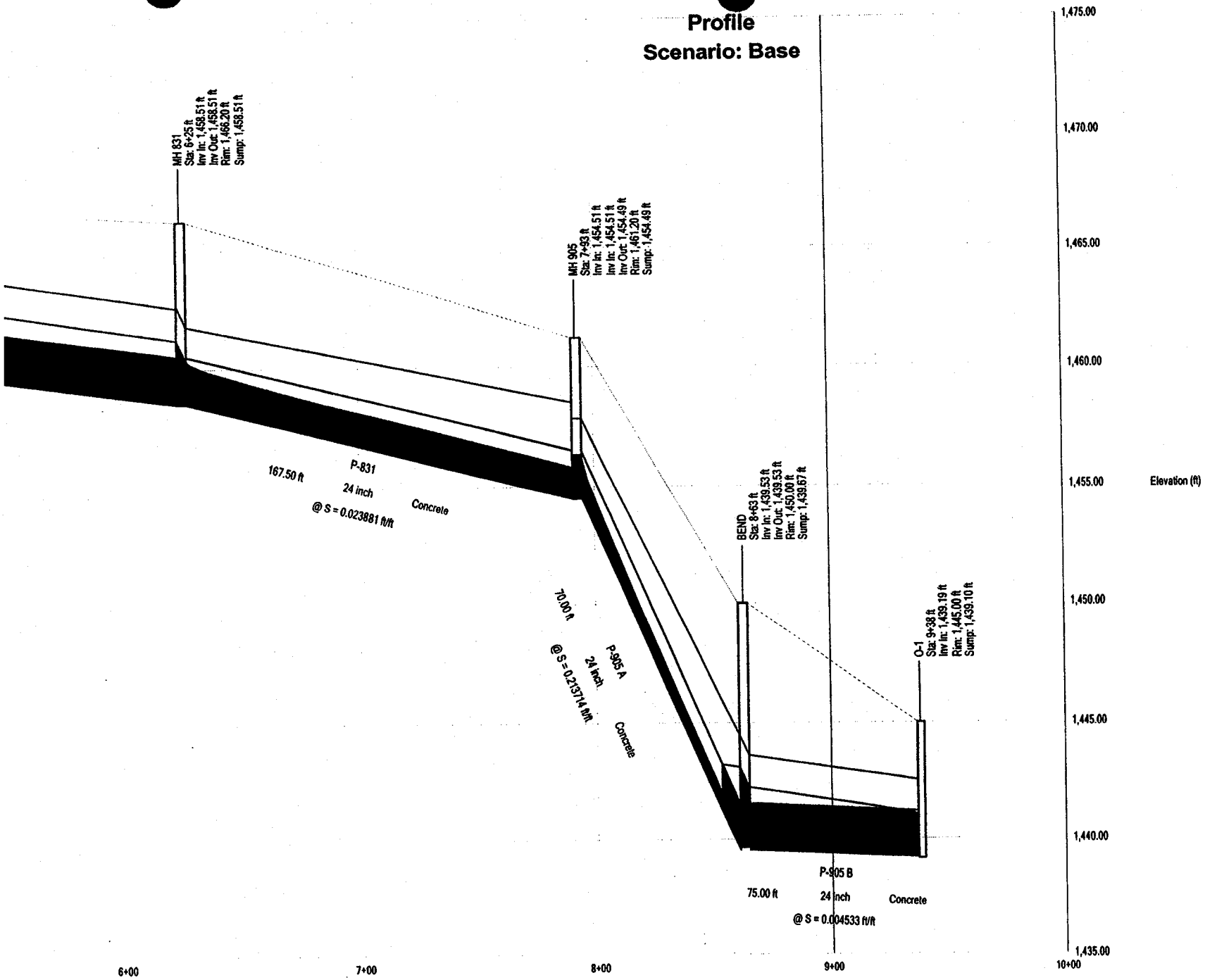


Title: Loop 202/US 60 T I
r:\...\storm drain at sta 1430+50.stm
01/19/05 01:07:34 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base



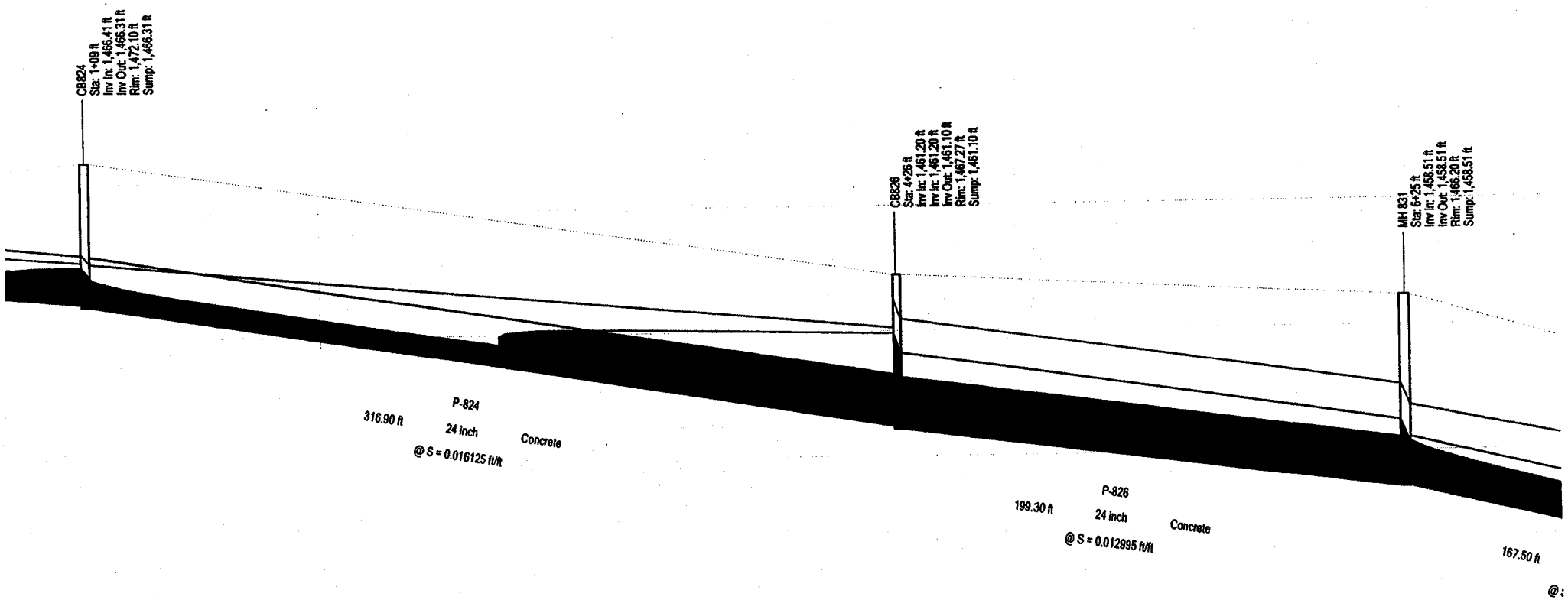
Title: Loop 202/US 60 T I
r:\...\storm drain at sta 1430+50.stm
01/19/05 12:58:31 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base

Profile: Profile - 3
Scenario: Base

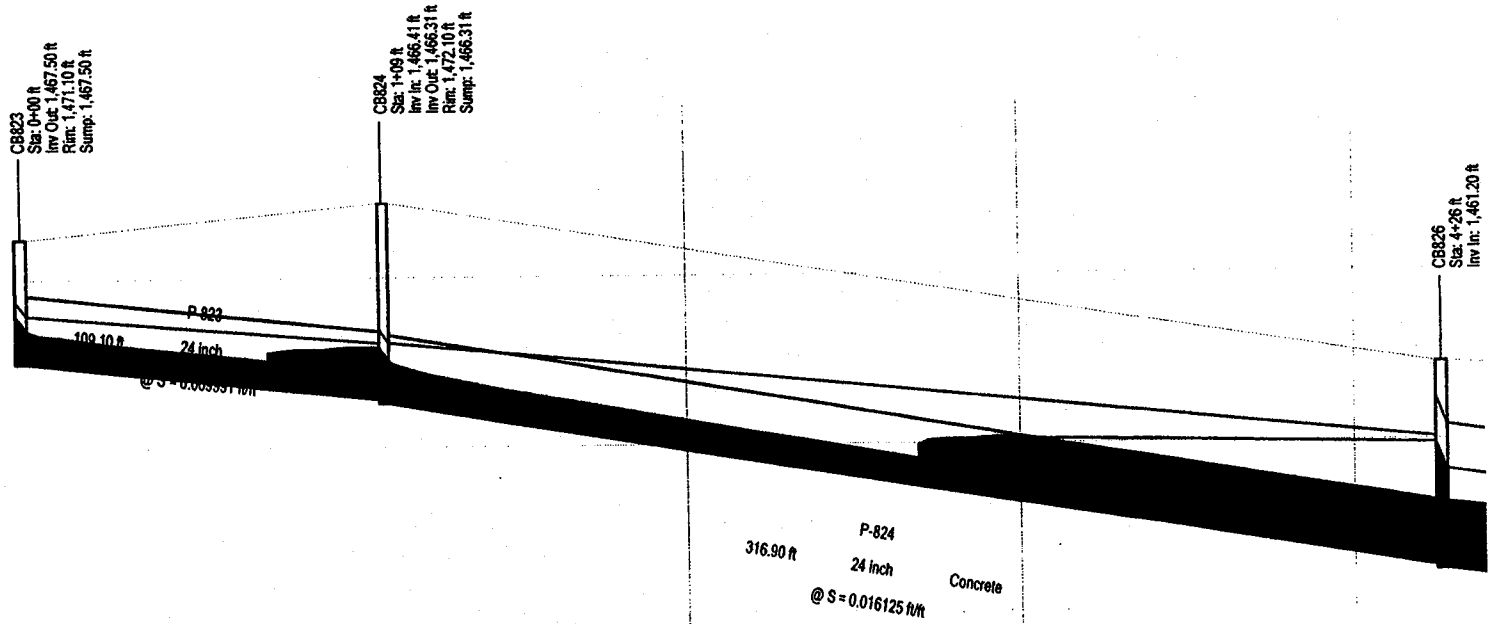


Title: Loop 202/US 60 T I
r:\...\storm drain at sta 1430+50.stm
01/19/05 01:00:05 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile
Scenario: Base



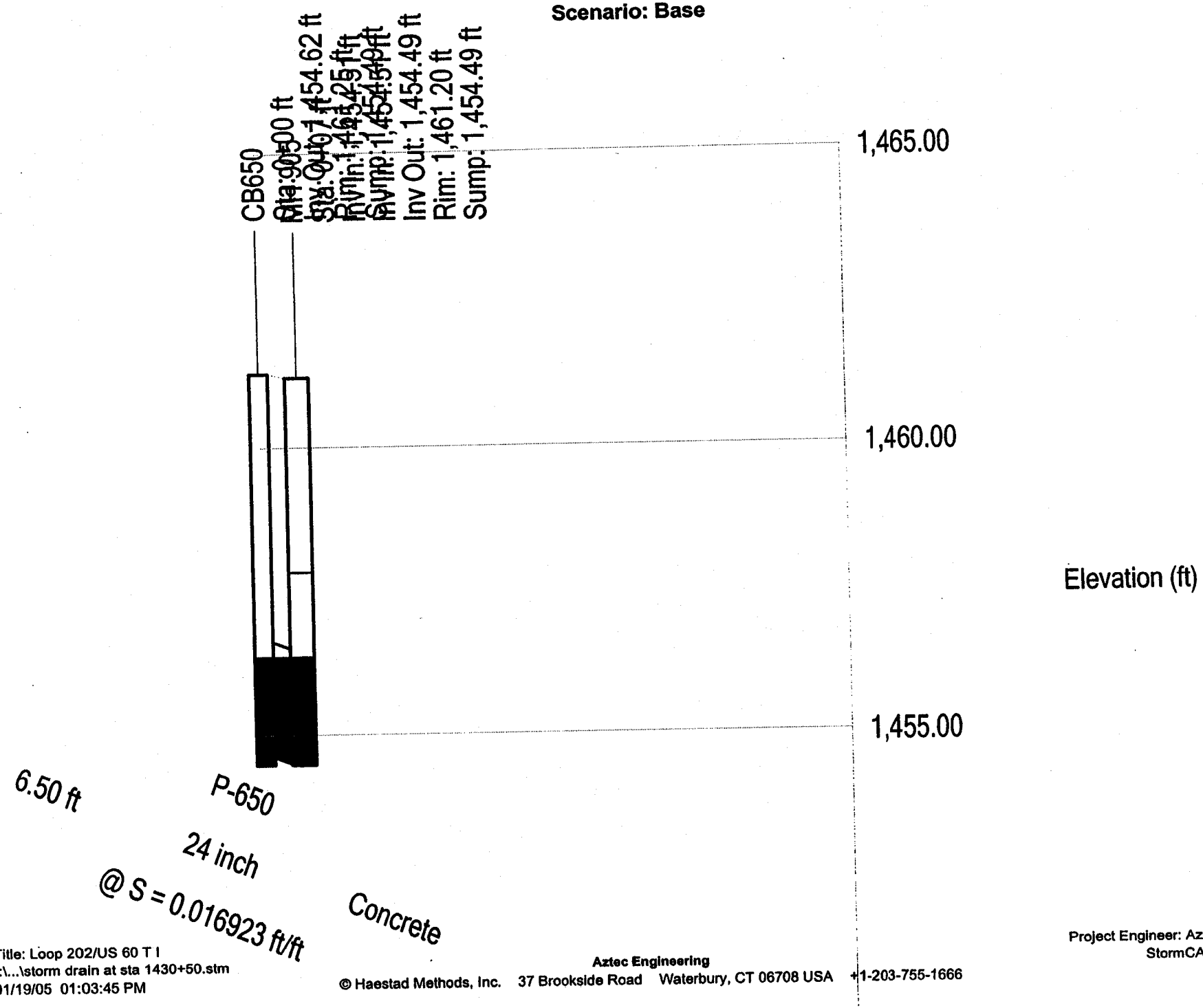
Title: Loop 202/US 60 T I
r:\...\storm drain at sta 1430+50.stm
01/19/05 01:00:16 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile

Scenario: Base



Title: Loop 202/US 60 T I
r:\...\storm drain at sta 1430+50.stm
01/19/05 01:03:45 PM

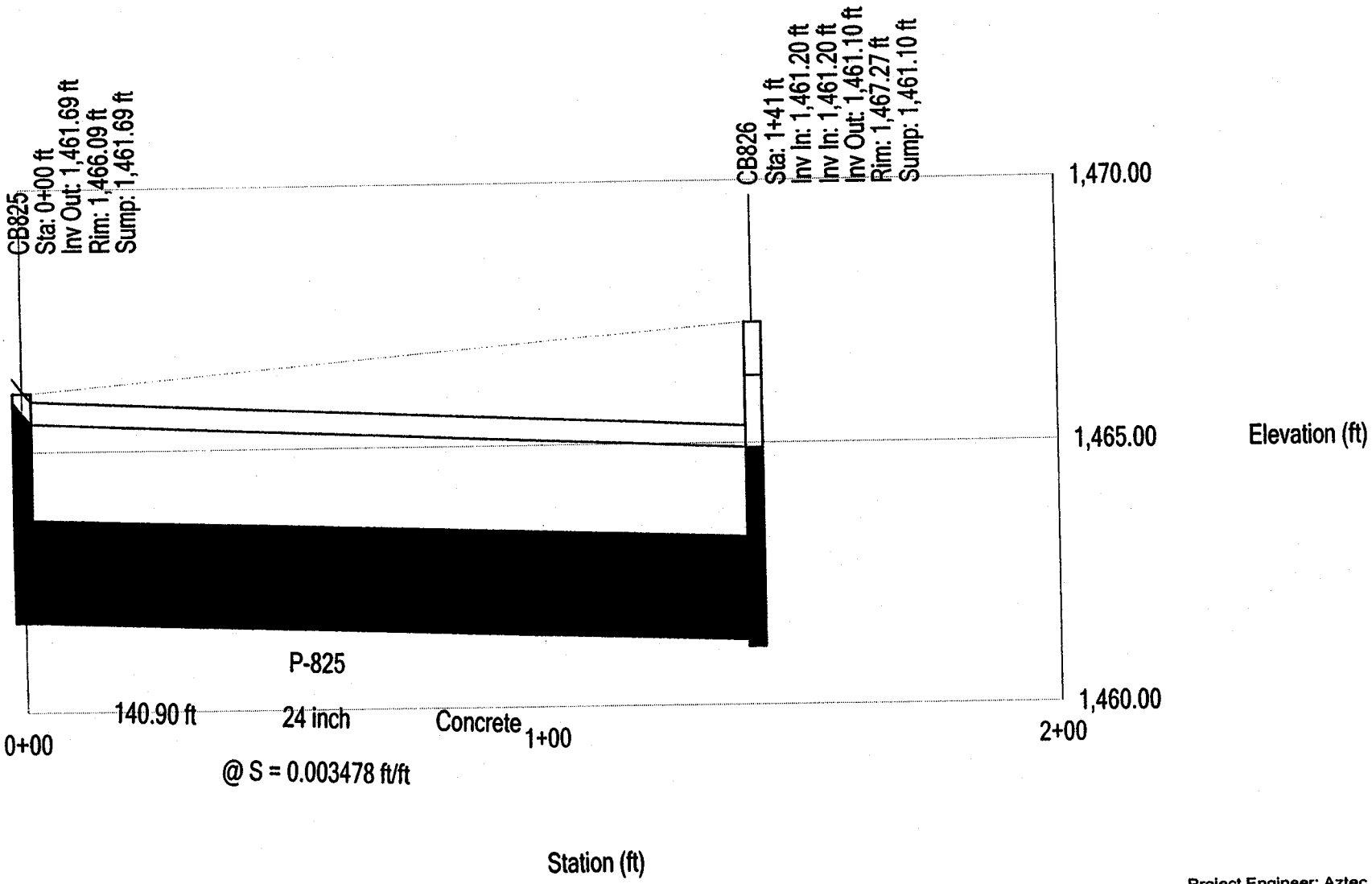
© Haestad Methods, Inc.

Aztec Engineering
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]

Profile: Profile - 2

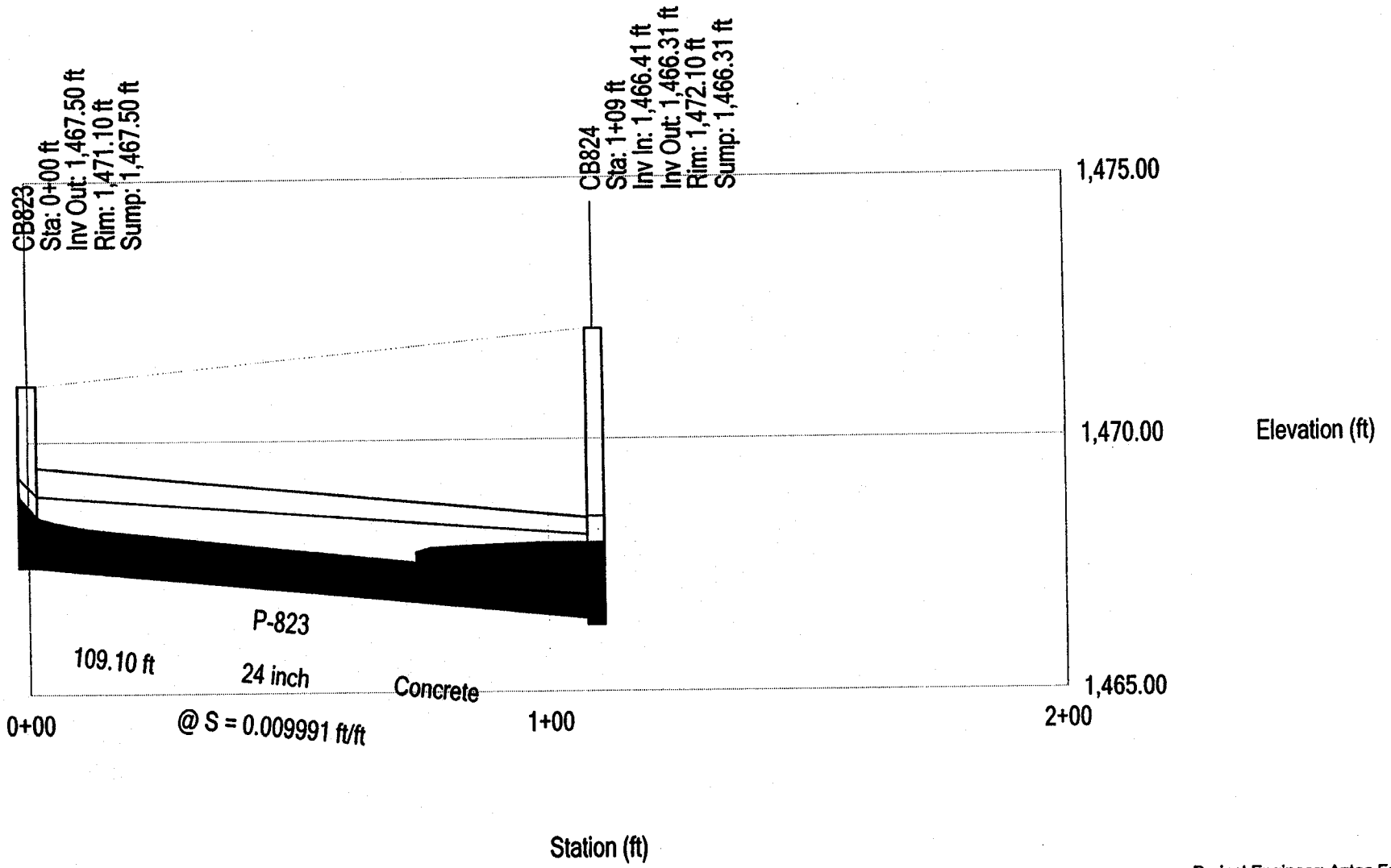
Scenario: Base



© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile: Profile - 1

Scenario: Base



Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)
BEND	O-1	N/A	N/A	N/A	7.35	4.02	29.78	75.00	0.004533	24 inch	0.012	16.50	1,439.53	1,439.19	1,450.00	1,445.00	8.47
CB823	CB824	2.11	0.90	1.91	1.91	4.22	8.11	109.10	0.009991	24 inch	0.012	24.50	1,467.50	1,466.41	1,471.10	1,472.10	1.60
CB824	CB826	0.88	0.95	0.84	2.74	4.18	11.57	316.90	0.016125	24 inch	0.012	31.12	1,466.31	1,461.20	1,472.10	1,467.27	3.79
CB825	CB826	4.67	0.83	3.85	3.85	4.22	16.39	140.90	0.003478	24 inch	0.012	14.45	1,461.69	1,461.20	1,466.09	1,467.27	2.40
CB826	MH 831	0.53	0.95	0.50	7.10	4.10	29.38	199.30	0.012995	24 inch	0.012	27.94	1,461.10	1,458.51	1,467.27	1,466.20	4.17
MH 831	MH 905	N/A	N/A	N/A	7.10	4.06	29.03	167.50	0.023881	24 inch	0.012	37.87	1,458.51	1,454.51	1,466.20	1,461.20	5.69
MH 905	BEND	N/A	N/A	N/A	7.35	4.03	29.82	70.00	0.213714	24 inch	0.012	113.29	1,454.49	1,439.53	1,461.20	1,450.00	4.71
CB650	MH 905	0.26	0.95	0.25	0.25	4.22	1.05	6.50	0.016923	24 inch	0.012	31.88	1,454.62	1,454.51	1,461.25	1,461.20	4.63

Scenario: Base

Pipe Report

Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
3.81	1,442.24	1,441.05
3.69	1,468.51	1,467.94
4.07	1,467.53	1,464.89
4.07	1,465.52	1,464.89
5.69	1,464.08	1,461.21
4.69	1,460.36	1,455.84
8.47	1,456.35	1,443.08
4.69	1,456.35	1,456.35

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					7.35				11.57	4.00	29.65					29.65	1,445.00	1,445.00	1,439.10
BEND					7.35				11.44	4.02	29.78					29.78	1,450.00	1,450.00	1,443.08
MH 905					7.35				11.40	4.03	29.82					29.82	1,461.20	1,461.20	1,456.35
MH 831					7.10				11.19	4.06	29.03					29.03	1,466.20	1,466.20	1,461.21
CB826	0.53	0.95	0.50	0.00	7.10	10.00	0.00	10.84	10.84	4.10	29.38	0.00	0.00	0.00	0.00	29.38	1,467.27	1,467.27	1,464.89
CB824	0.88	0.95	0.84	0.00	2.74	10.00	0.00	10.26	10.26	4.18	11.57	0.00	0.00	0.00	0.00	11.57	1,472.10	1,472.10	1,467.94
CB823	2.11	0.90	1.91	0.00	1.91	10.00	0.00	0.00	10.00	4.22	8.11	0.00	0.00	0.00	0.00	8.11	1,471.10	1,471.10	1,468.91
CB825	4.67	0.83	3.85	0.00	3.85	10.00	0.00	0.00	10.00	4.22	16.39	0.00	0.00	0.00	0.00	16.39	1,466.09	1,466.09	1,465.95
CB650	0.26	0.95	0.25	0.00	0.25	10.00	0.00	0.00	10.00	4.22	1.05	0.00	0.00	0.00	0.00	1.05	1,461.25	1,461.25	1,456.35

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,439.10			
1,442.24			
1,456.35			
1,460.36			
1,464.08	4.22	2.14	
1,467.53	4.22	3.56	
1,468.51	4.22	8.11	
1,465.52	4.22	16.39	
1,456.35	4.22	1.05	

202L LATERAL @
STA 1436+70

Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

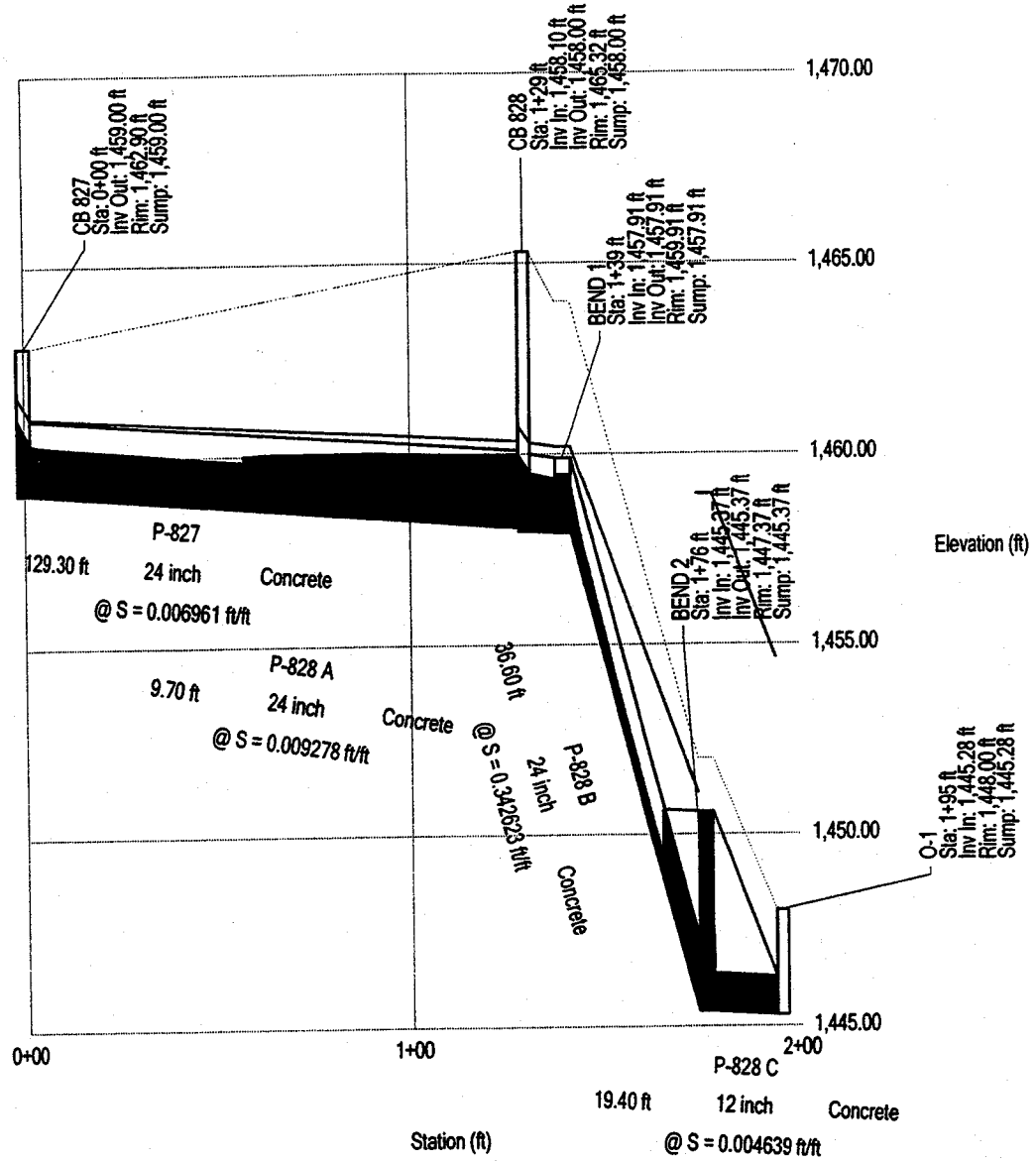
Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Step	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

Created: 01/19/05 01:16:48 PM

Profile: Profile - 1

Scenario: Base

Profile
Scenario: Base



Scenario: Base

Pipe Report

Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)
CB 827	CB 828	4.34	0.82	3.56	3.56	4.22	15.14	129.30	0.006961	24 inch	0.012	20.45	1,459.00
CB 828	BEND 1	0.81	0.95	0.77	4.33	4.18	18.23	9.70	0.009278	24 inch	0.012	23.61	1,458.00
BEND 1	BEND 2	N/A	N/A	N/A	4.33	4.18	18.22	36.60	0.342623	24 inch	0.012	143.44	1,457.91
BEND 2	O-1	N/A	N/A	N/A	4.33	4.17	18.21	19.40	0.004639	12 inch	0.012	2.63	1,445.37

Scenario: Base

Pipe Report

Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
1,458.10	1,462.90	1,465.32	1.90	5.22	1,460.40	1,460.00
1,457.91	1,465.32	1,464.00	5.32	4.09	1,459.54	1,459.33
1,445.37	1,464.00	1,452.00	4.09	4.63	1,459.45	1,450.60
1,445.28	1,452.00	1,448.00	5.63	1.72	1,450.60	1,446.28

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)
O-1					4.33				10.36	4.17	18.20			
BEND 2					4.33				10.34	4.17	18.21			
BEND 1					4.33				10.32	4.18	18.22			
CB 828	0.81	0.95	0.77	0.00	4.33	10.00	0.00	10.30	10.30	4.18	18.23	0.00	0.00	0.00
CB 827	4.34	0.82	3.56	0.00	3.56	10.00	0.00	0.00	10.00	4.22	15.14	0.00	0.00	0.00

Scenario: Base

Node Report

Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
	18.20	1,448.00	1,448.00	1,445.28	1,445.28			
	18.21	1,452.00	1,447.37	1,450.60	1,450.60			
	18.22	1,464.00	1,459.91	1,459.45	1,459.45			
0.00	18.23	1,465.32	1,465.32	1,460.00	1,459.54	4.22	3.27	
0.00	15.14	1,462.90	1,462.90	1,461.05	1,460.40	4.22	15.14	

202 L LATERAL @.
STA. 1440+

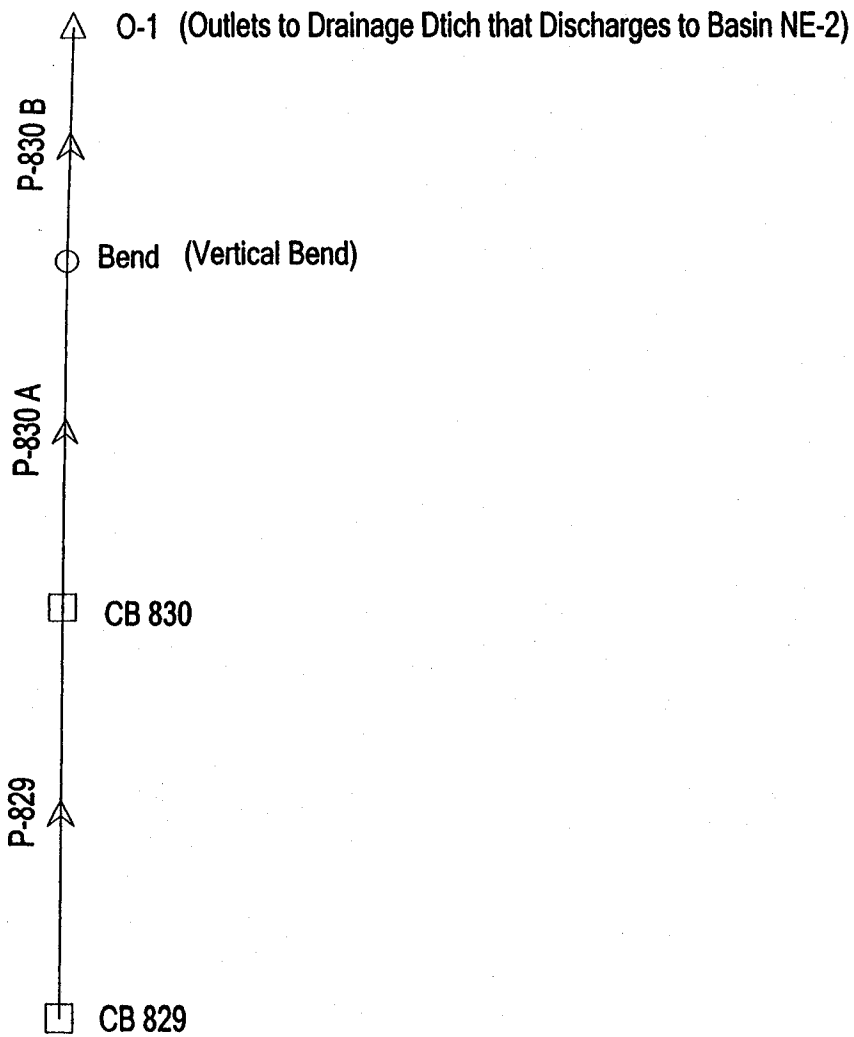
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Ste	5	
Return Period	10 year	
Minimum Time of Concentr	5.00	min

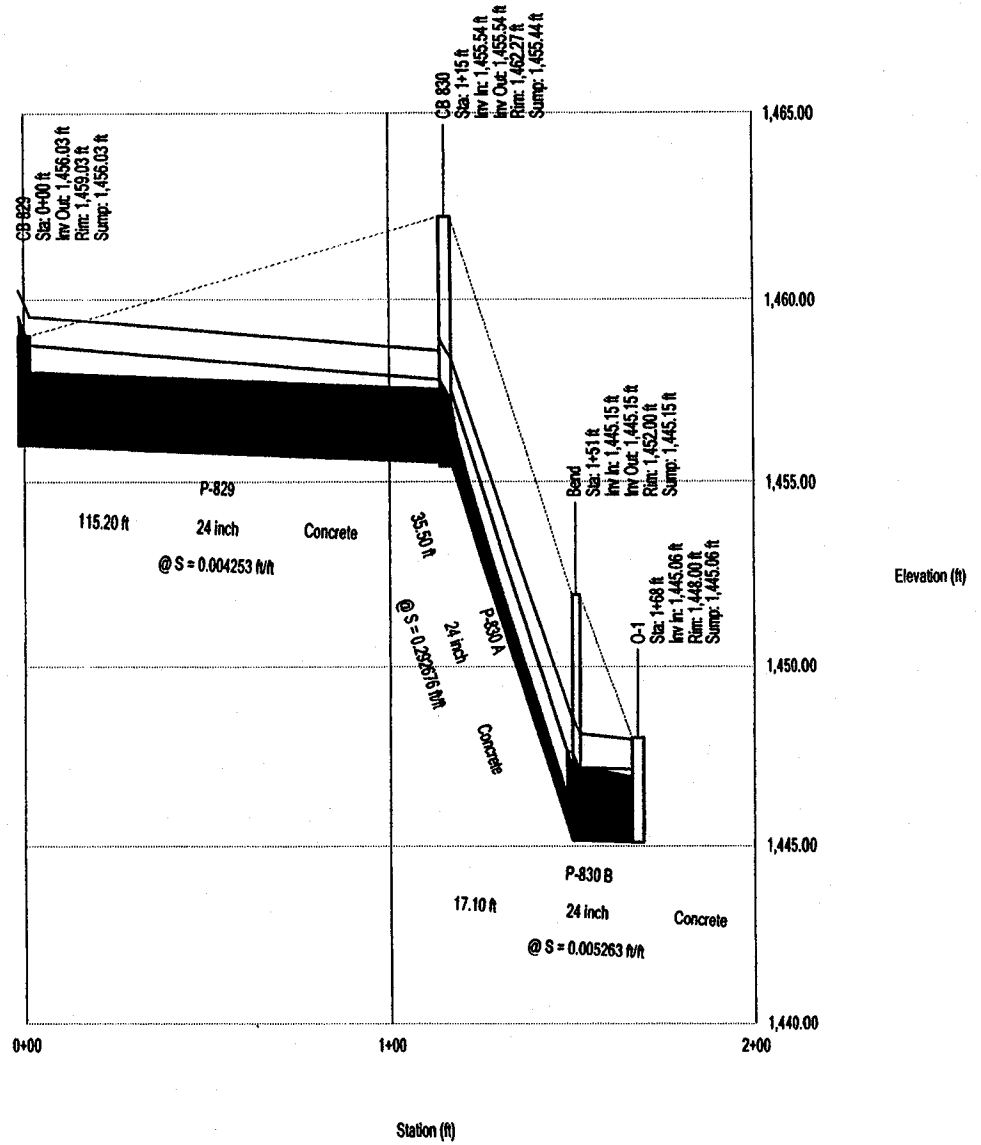
Created: 09/10/04 09:05:19 AM

Scenario: Base



Profile
Scenario: Base

Profile: Profile - 1
Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
P-829	CB 829	CB 830	6.25	0.83	5.19	5.19	4.22	22.07	115.20	0.004253	24 inch	0.012	15.98	1,456.03	1,455.54	1,459.03	1,462.27
P-830 A	CB 830	Bend	0.66	0.95	0.63	5.81	4.18	24.51	35.50	0.292676	24 inch	0.012	132.58	1,455.54	1,445.15	1,462.27	1,452.00
P-830 B	Bend	O-1	N/A	N/A	N/A	5.81	4.18	24.50	17.10	0.005263	24 inch	0.012	17.78	1,445.15	1,445.06	1,452.00	1,448.00

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
1.00	4.73	1,458.77	1,457.84	
4.73	4.85	1,457.29	1,447.58	
4.85	0.94	1,447.10	1,446.81	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					5.81				10.33	4.17	24.47					24.47	1,448.00	1,448.00	1,445.06
Bend					5.81				10.29	4.18	24.50					24.50	1,452.00	1,452.00	1,447.58
CB 830	0.66	0.95	0.63	0.00	5.81	10.00	0.00	10.27	10.27	4.18	24.51	0.00	0.00	0.00	0.00	24.51	1,462.27	1,462.27	1,457.84
CB 829	6.25	0.83	5.19	0.00	5.19	10.00	0.00	0.00	10.00	4.22	22.07	0.00	0.00	0.00	0.00	22.07	1,459.03	1,459.03	1,459.54

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,445.06			
1,447.10			
1,457.29	4.22	2.67	
1,458.77	4.22	22.07	

202L LATERAL @ STA. 1445+00

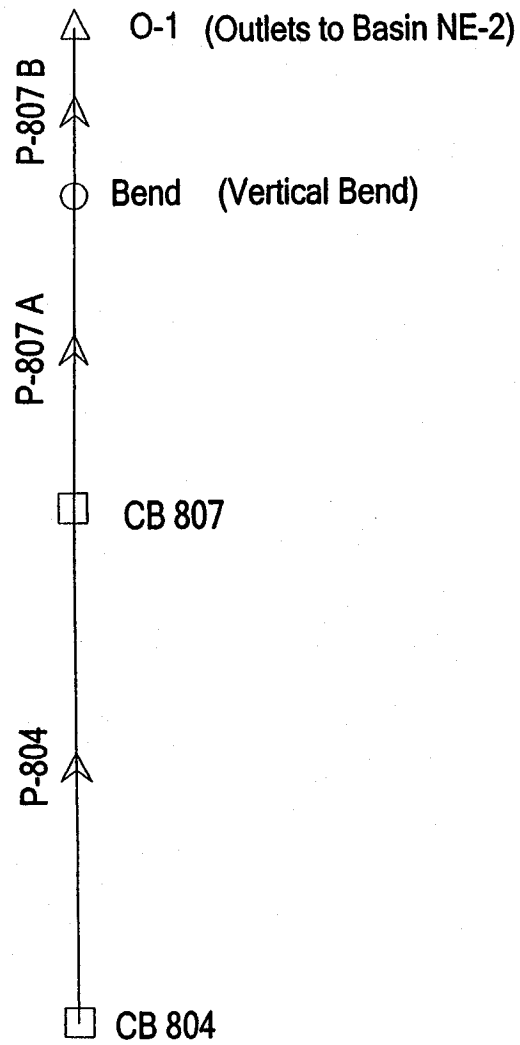
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Ste	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

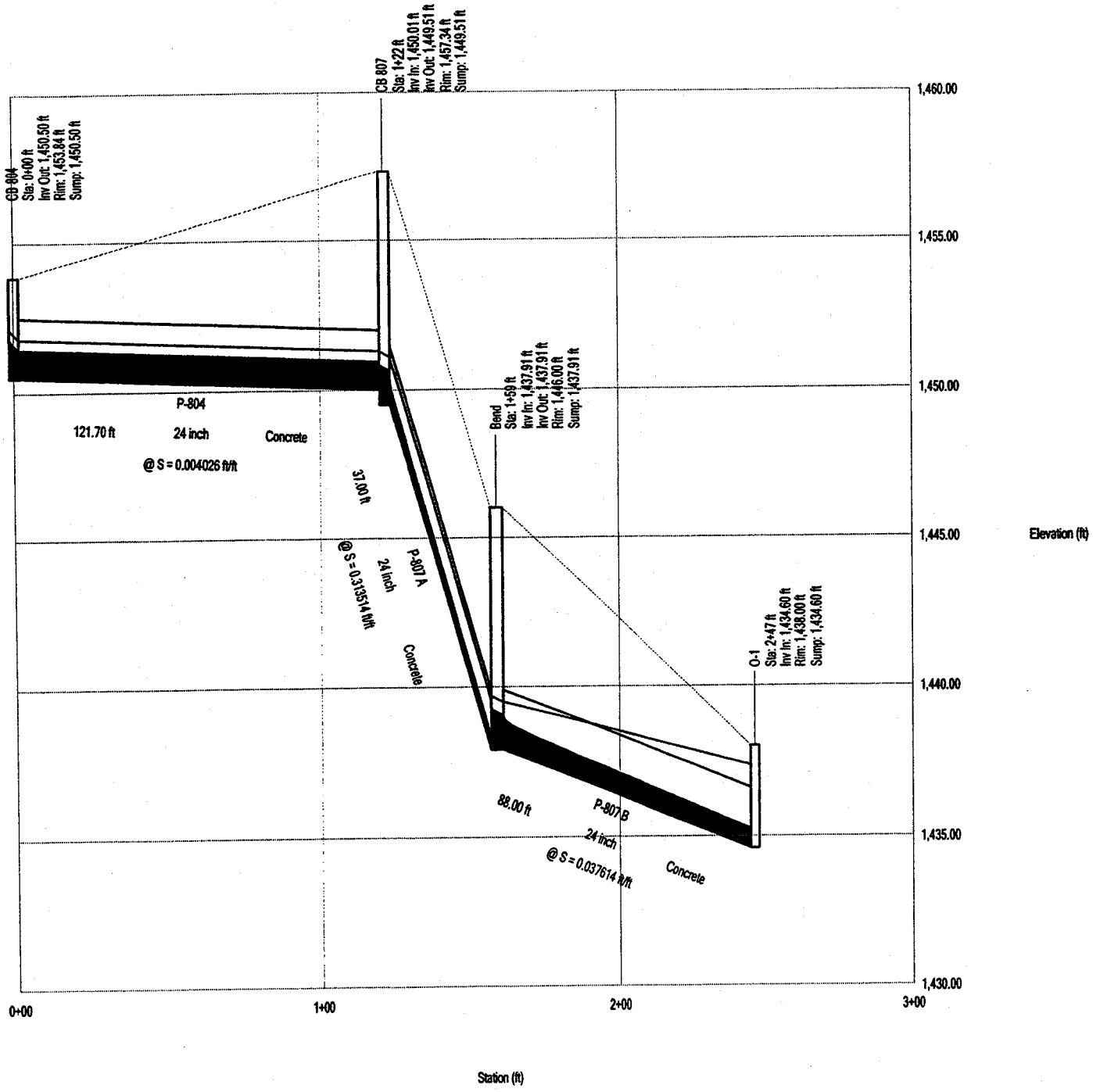
Created: 09/10/04 09:22:35 AM

Scenario: Base



Profile
Scenario: Base

Profile: Profile - 1
Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
P-804	CB 804	CB 807	1.91	0.85	1.62	1.62	4.22	6.90	121.70	0.004026	24 inch	0.012	15.55	1,450.50	1,450.01	1,453.84	1,457.34
P-807 A	CB 807	Bend	0.72	0.95	0.68	2.31	4.16	9.67	37.00	0.313514	24 inch	0.012	137.22	1,449.51	1,437.91	1,457.34	1,446.00
P-807 B	Bend	O-1	N/A	N/A	N/A	2.31	4.16	9.67	88.00	0.037614	24 inch	0.012	47.53	1,437.91	1,434.60	1,446.00	1,438.00

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
1.34	5.33	1,451.43	1,450.94	
5.83	6.09	1,450.62	1,439.25	
6.09	1.40	1,439.02	1,435.22	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					2.31				10.57	4.14	9.63					9.63	1,438.00	1,438.00	1,434.60
Bend					2.31				10.45	4.16	9.67					9.67	1,446.00	1,446.00	1,439.25
CB 807	0.72	0.95	0.68	0.00	2.31	10.00	0.00	10.42	10.42	4.16	9.67	0.00	0.00	0.00	0.00	9.67	1,457.34	1,457.34	1,450.85
CB 804	1.91	0.85	1.62	0.00	1.62	10.00	0.00	0.00	10.00	4.22	6.90	0.00	0.00	0.00	0.00	6.90	1,453.84	1,453.84	1,451.79

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,434.60			
1,439.02			
1,450.62	4.22	2.91	
1,451.43	4.22	6.90	

202L LATERAL @
STA. 1457+72

Scenario Summary Report
Scenario: Base

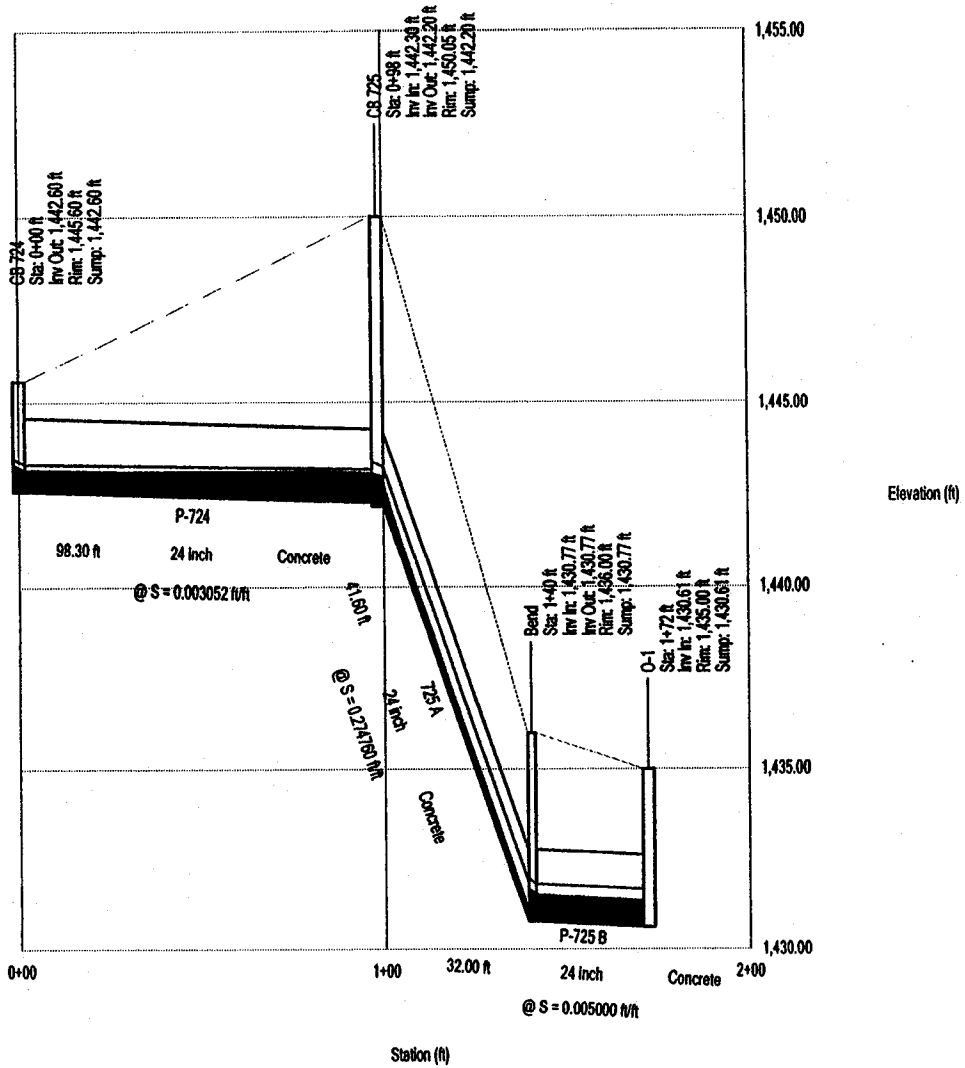
Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Ste	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

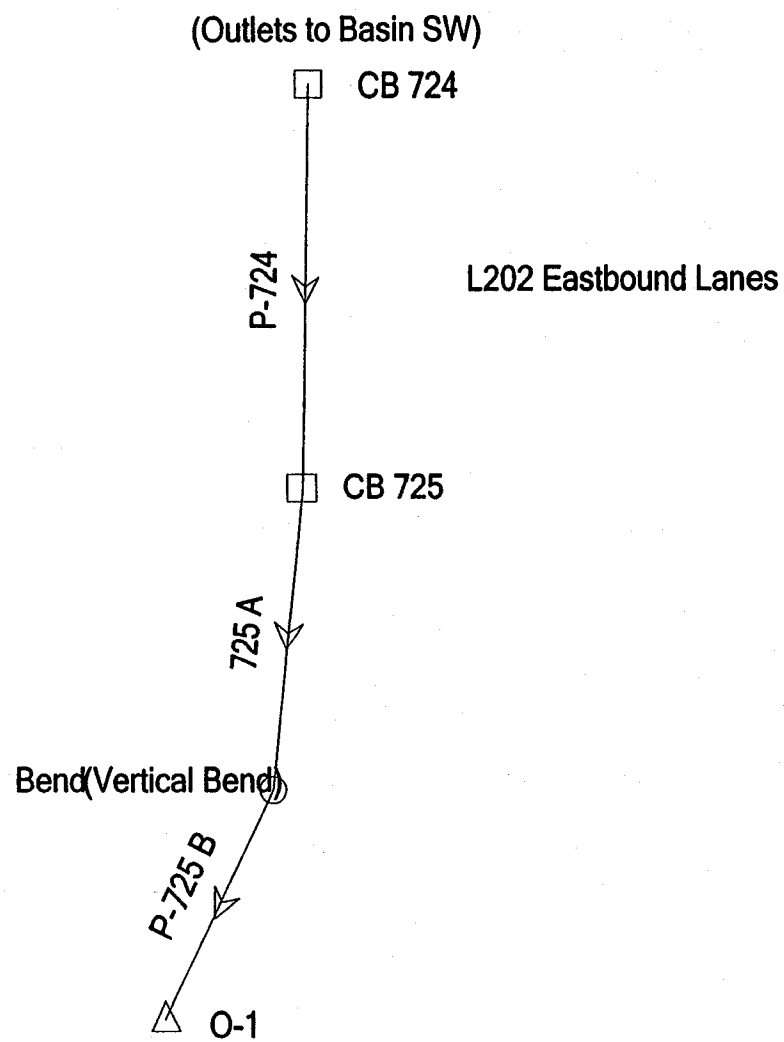
Created: 09/10/04 09:41:49 AM

Profile
Scenario: Base

Profile: Profile - 1
Scenario: Base



Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inlet Rational Coefficient	Upstream Inlet CA (acres)	Upstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
P-724	CB 724	CB 725	0.81	0.70	0.57	0.57	4.22	2.41	98.30	0.003052	24 inch	0.012	13.54	1,442.60	1,442.30	1,445.60	1,450.05
725 A	CB 725	Bend	0.58	0.95	0.55	1.12	4.15	4.68	41.60	0.274760	24 inch	0.012	128.46	1,442.20	1,430.77	1,450.05	1,436.00
P-725 B	Bend	O-1	N/A	N/A	N/A	1.12	4.15	4.67	32.00	0.005000	24 inch	0.012	17.33	1,430.77	1,430.61	1,436.00	1,435.00

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
1.00	5.75	1,443.18	1,443.10	
5.85	3.23	1,442.96	1,431.67	
3.23	2.39	1,431.53	1,431.32	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					1.12				10.65	4.13	4.65					4.65	1,435.00	1,435.00	1,430.61
Bend					1.12				10.54	4.15	4.67					4.67	1,436.00	1,436.00	1,431.67
CB 725	0.58	0.95	0.55	0.00	1.12	10.00	0.00	10.50	10.50	4.15	4.68	0.00	0.00	0.00	0.00	4.68	1,450.05	1,450.05	1,443.10
CB 724	0.81	0.70	0.57	0.00	0.57	10.00	0.00	0.00	10.00	4.22	2.41	0.00	0.00	0.00	0.00	2.41	1,445.60	1,445.60	1,443.34

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,430.61			
1,431.53			
1,442.96	4.22	2.34	
1,443.18	4.22	2.41	

COCL [illegible]
@ STA. 1462+[illegible]

STORM DRAIN SIZED BASED ON EXISTING CONDITION. CHECK FOR SUFFICIENT CAPACITY TO ACCOMODATE FUTURE CONDITIONS.

Scenario Summary Report
Scenario: Base

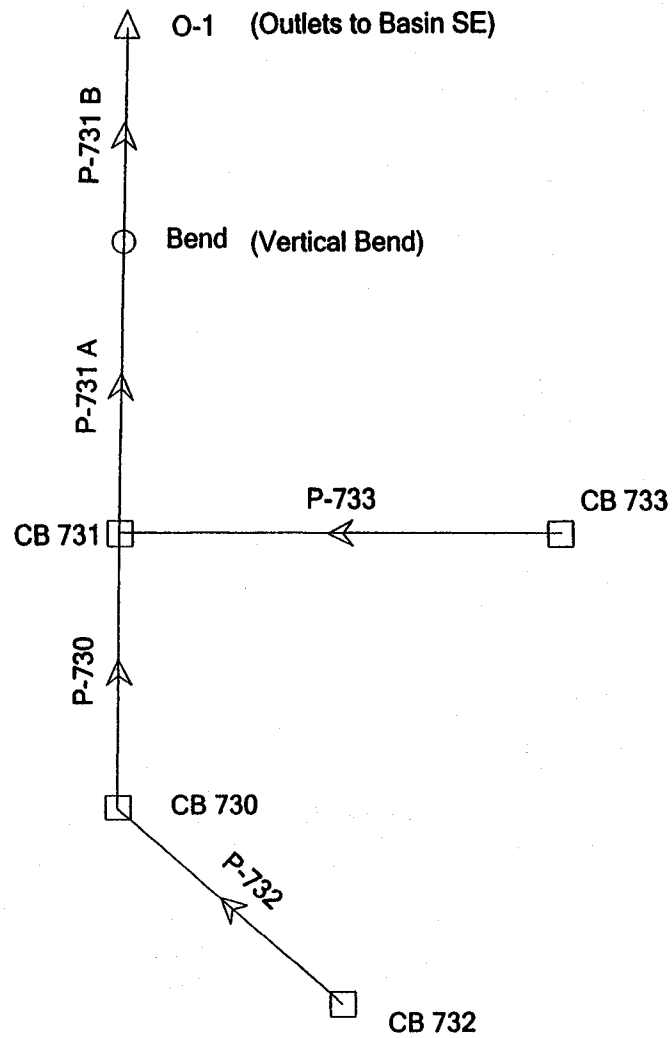
Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Step	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

Created: 09/10/04 10:21:55 AM

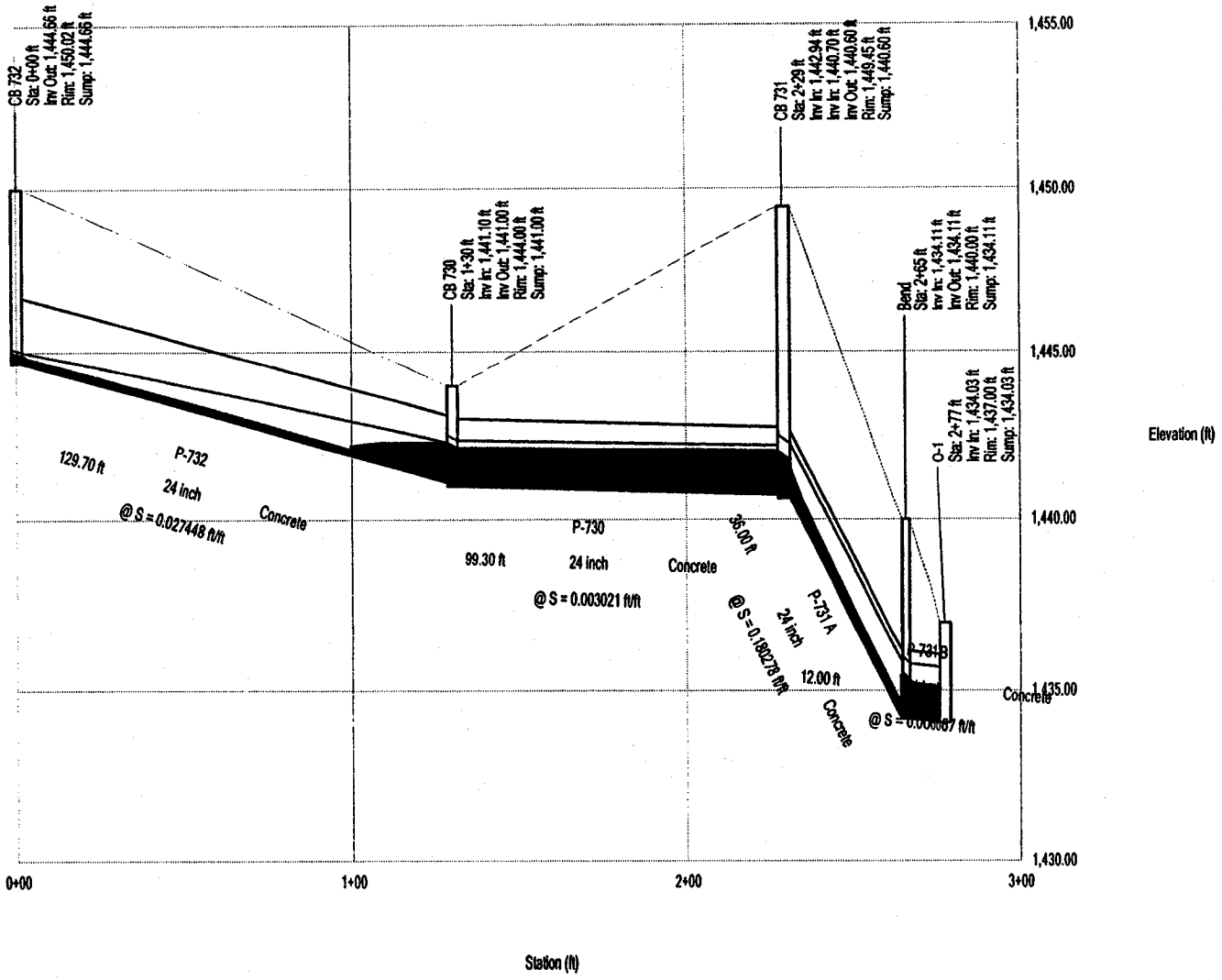
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base



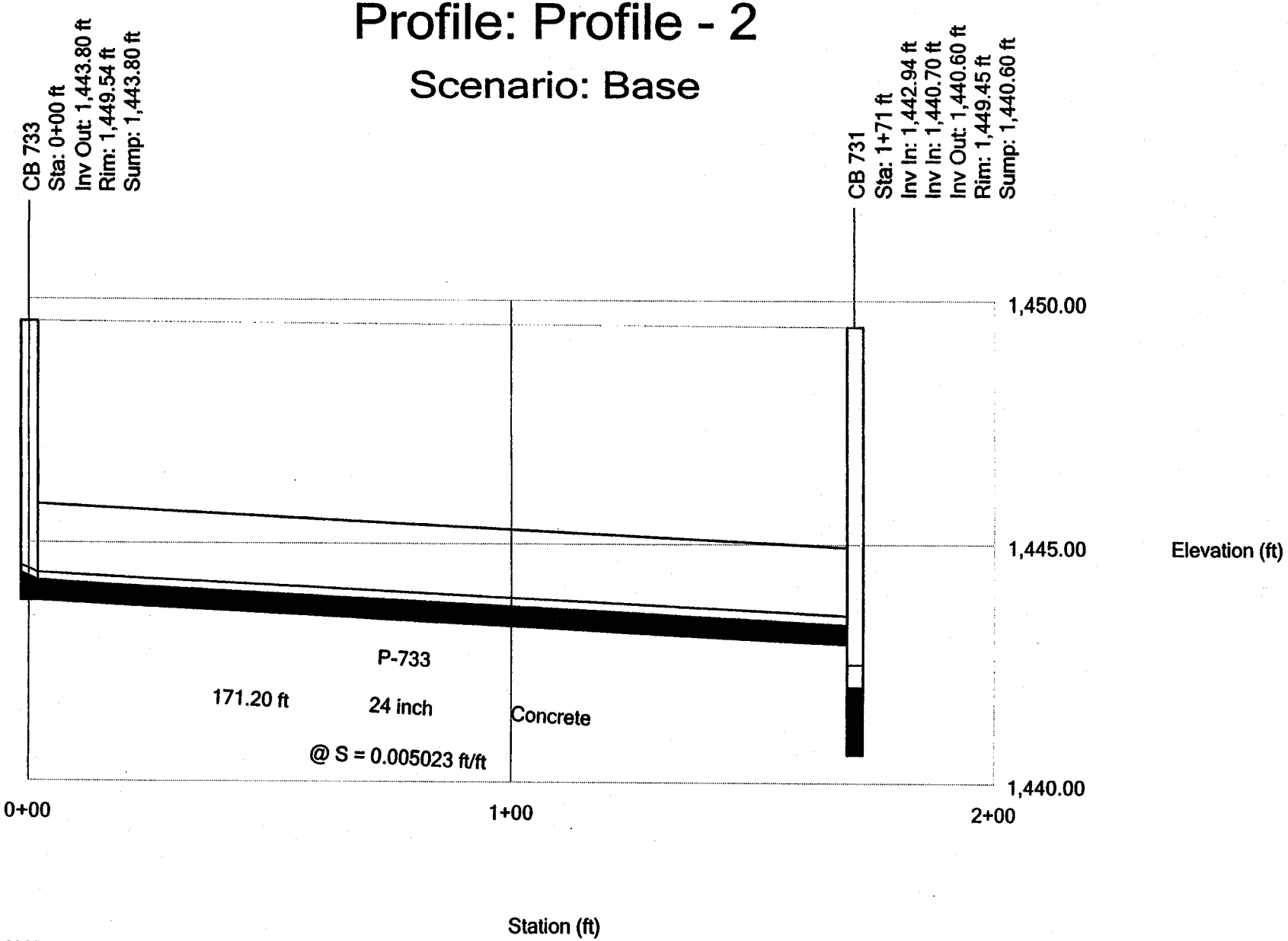
Profile: Profile - 1

Scenario: Base



Profile: Profile - 2

Scenario: Base



© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inle Rational Coefficient	Upstream Inlet CA (acres)	pstream Calculate System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)
P-732	CB 732	CB 730	0.16	0.95	0.15	0.15	4.22	0.65	129.70	0.027448	24 inch	0.012	40.60	1,444.66	1,441.10	1,450.02	1,444.00
P-730	CB 730	CB 731	2.16	0.70	1.51	1.66	4.16	6.97	99.30	0.003021	24 inch	0.012	13.47	1,441.00	1,440.70	1,444.00	1,449.45
P-731 A	CB 731	Bend	0.52	0.95	0.49	2.52	4.10	10.42	36.00	0.180278	24 inch	0.012	104.05	1,440.60	1,434.11	1,449.45	1,440.00
P-731 B	Bend	O-1	N/A	N/A	N/A	2.52	4.10	10.41	12.00	0.006667	24 inch	0.012	20.01	1,434.11	1,434.03	1,440.00	1,437.00
P-733	CB 733	CB 731	0.38	0.95	0.36	0.36	4.22	1.54	171.20	0.005023	24 inch	0.012	17.37	1,443.80	1,442.94	1,449.54	1,449.45

Scenario: Base

Pipe Report

Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
3.36	0.90	1,444.94	1,442.27	
1.00	6.75	1,442.14	1,442.04	
6.85	3.89	1,441.76	1,435.50	
3.89	0.97	1,435.27	1,435.10	
3.74	4.51	1,444.23	1,443.34	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					2.52				10.90	4.10	10.40					10.40	1,437.00	1,437.00	1,434.03
Bend					2.52				10.87	4.10	10.41					10.41	1,440.00	1,440.00	1,435.50
CB 731	0.52	0.95	0.49	0.00	2.52	10.00	0.00	10.84	10.84	4.10	10.42	0.00	0.00	0.00	0.00	10.42	1,449.45	1,449.45	1,442.04
CB 730	2.16	0.70	1.51	0.00	1.66	10.00	0.00	10.45	10.45	4.16	6.97	0.00	0.00	0.00	0.00	6.97	1,444.00	1,444.00	1,442.27
CB 732	0.16	0.95	0.15	0.00	0.15	10.00	0.00	0.00	10.00	4.22	0.65	0.00	0.00	0.00	0.00	0.65	1,450.02	1,450.02	1,445.03
CB 733	0.38	0.95	0.36	0.00	0.36	10.00	0.00	0.00	10.00	4.22	1.54	0.00	0.00	0.00	0.00	1.54	1,449.54	1,449.54	1,444.38

Scenario: Base

Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,434.03			
1,435.27			
1,441.76	4.22	2.10	
1,442.14	4.22	6.43	
1,444.94	4.22	0.65	
1,444.23	4.22	1.54	

Ramps W.S & W-D

RAMPS W-S & W-N
10-YR DESIGN STORM

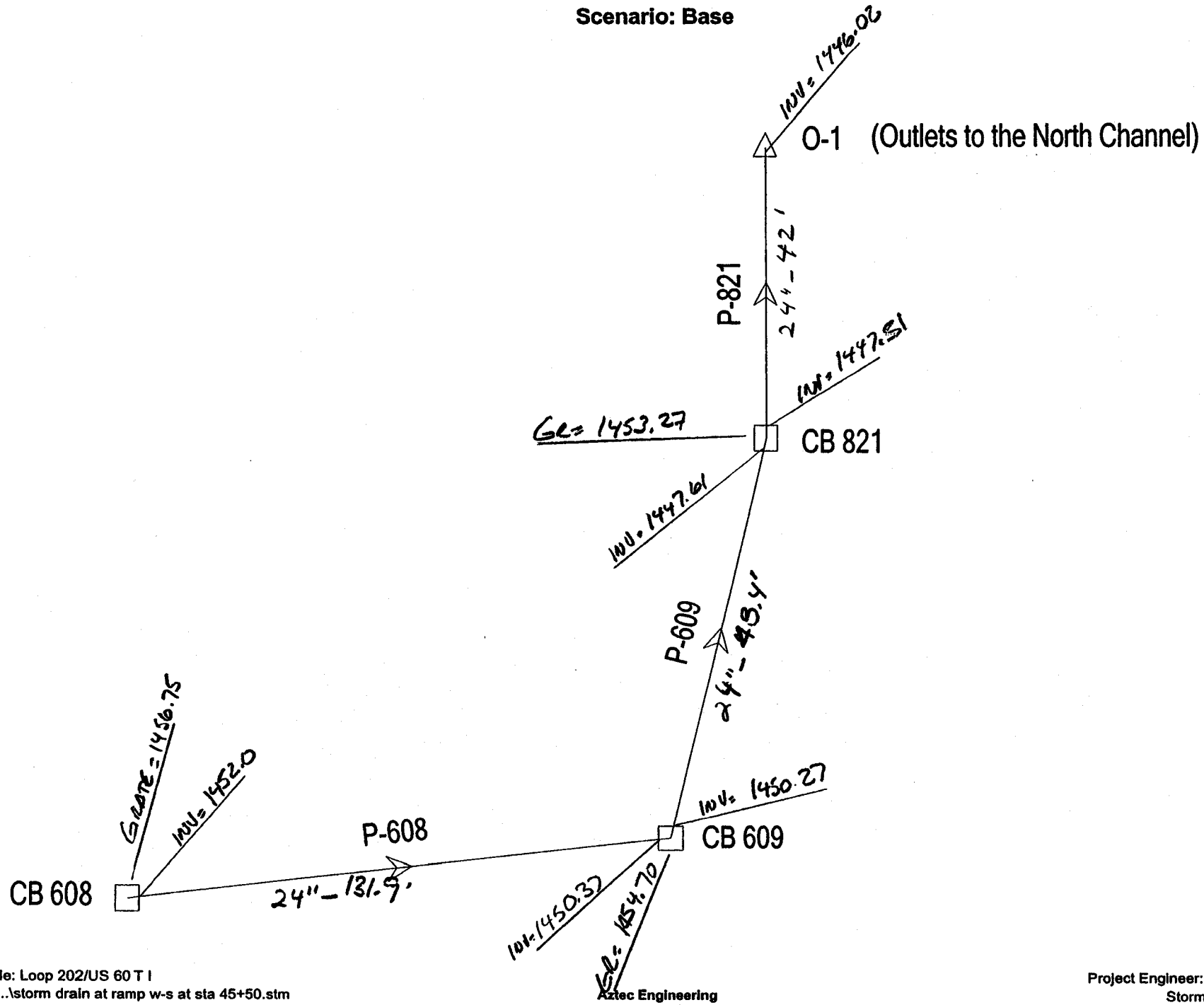
Scenario Summary Report
Scenario: Base

Scenario Summary	
Physical Properties Alternat	Base-Physical Properties
Catchments Alternative	Base-Catchments
System Flows Alternative	Base-System Flows
Structure Headlosses Alterr	Base-Structure Headlosses
Boundary Conditions Altern	Base-Boundary Conditions
Design Constraints Alternat	Base-Design Constraints
Capital Cost Alternative	Base-Capital Cost
User Data Alternative	Base-User Data

Gravity Calculation Options		
Analysis Type	Backwater Analysis	
Average Velocity Method	Uniform Flow Velocity (Vn or Vf)	
Hydraulic Grade Converger	0.00	ft
Number of Flow Profile Ste	5	
Return Period	10 year	
Minimum Time of Concentra	5.00	min

Created: 09/10/04 10:44:57 AM

Scenario: Base



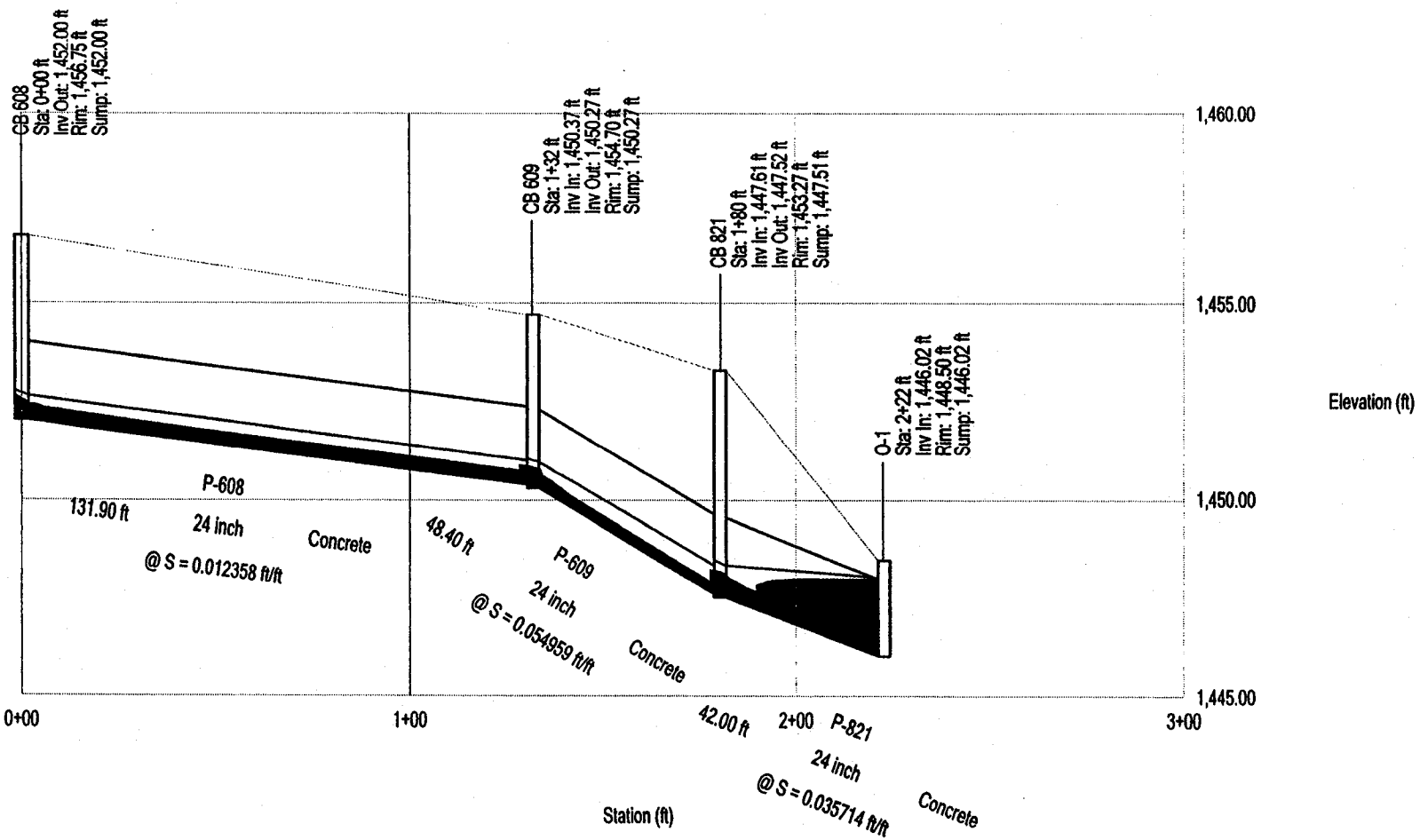
Title: Loop 202/US 60 T I
r:\...\storm drain at ramp w-s at sta 45+50.stm
11/16/04 03:25:37 PM

Aztec Engineering
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Aztec Engineering
StormCAD v5.5 [5.5006]
Page 1 of 1

Profile: Profile - 1

Scenario: Base



Scenario: Base

Pipe Report

Label	Upstream Node	Downstream Node	Upstream Inlet Area (acres)	Upstream Inle Rational Coefficient	Upstream Inlet CA (acres)	pstream Calculated System CA (acres)	System Intensity (in/hr)	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)
P-608	CB 608	CB 609	0.40	0.95	0.38	0.38	4.22	1.62	131.90	0.012358	24 inch	0.012	27.24	1,452.00	1,450.37	1,456.75	1,454.70	2.75
P-609	CB 609	CB 821	0.12	0.95	0.11	0.49	4.16	2.07	48.40	0.054959	24 inch	0.012	57.45	1,450.27	1,447.61	1,454.70	1,453.27	2.43
P-821	CB 821	O-1	0.26	0.95	0.25	0.74	4.14	3.09	42.00	0.035714	24 inch	0.012	46.31	1,447.52	1,446.02	1,453.27	1,448.50	3.75

Scenario: Base

Pipe Report

Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Description
2.33	1,452.44	1,450.88	
3.66	1,450.77	1,448.25	
0.48	1,448.13	1,448.02	

Scenario: Base

Node Report

Label	Area (acres)	Inlet C	Inlet CA (acres)	External CA (acres)	System CA (acres)	Time of Concentration (min)	External Time of Concentration (min)	Upstream Time Of Concentration (min)	System Flow Time (min)	System Intensity (in/hr)	System Rational Flow (cfs)	Additional Flow (cfs)	Additional Carryover (cfs)	Known Flow (cfs)	Upstream Additional Flow (cfs)	Total System Flow (cfs)	Ground Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)
O-1					0.74				10.64	4.13	3.09					3.09	1,448.50	1,448.50	1,446.02
CB 821	0.26	0.95	0.25	0.00	0.74	10.00	0.00	10.56	10.56	4.14	3.09	0.00	0.00	0.00	0.00	3.09	1,453.27	1,453.27	1,448.25
CB 609	0.12	0.95	0.11	0.00	0.49	10.00	0.00	10.46	10.46	4.16	2.07	0.00	0.00	0.00	0.00	2.07	1,454.70	1,454.70	1,450.88
CB 608	0.40	0.95	0.38	0.00	0.38	10.00	0.00	0.00	10.00	4.22	1.62	0.00	0.00	0.00	0.00	1.62	1,456.75	1,456.75	1,452.59

Scenario: Base

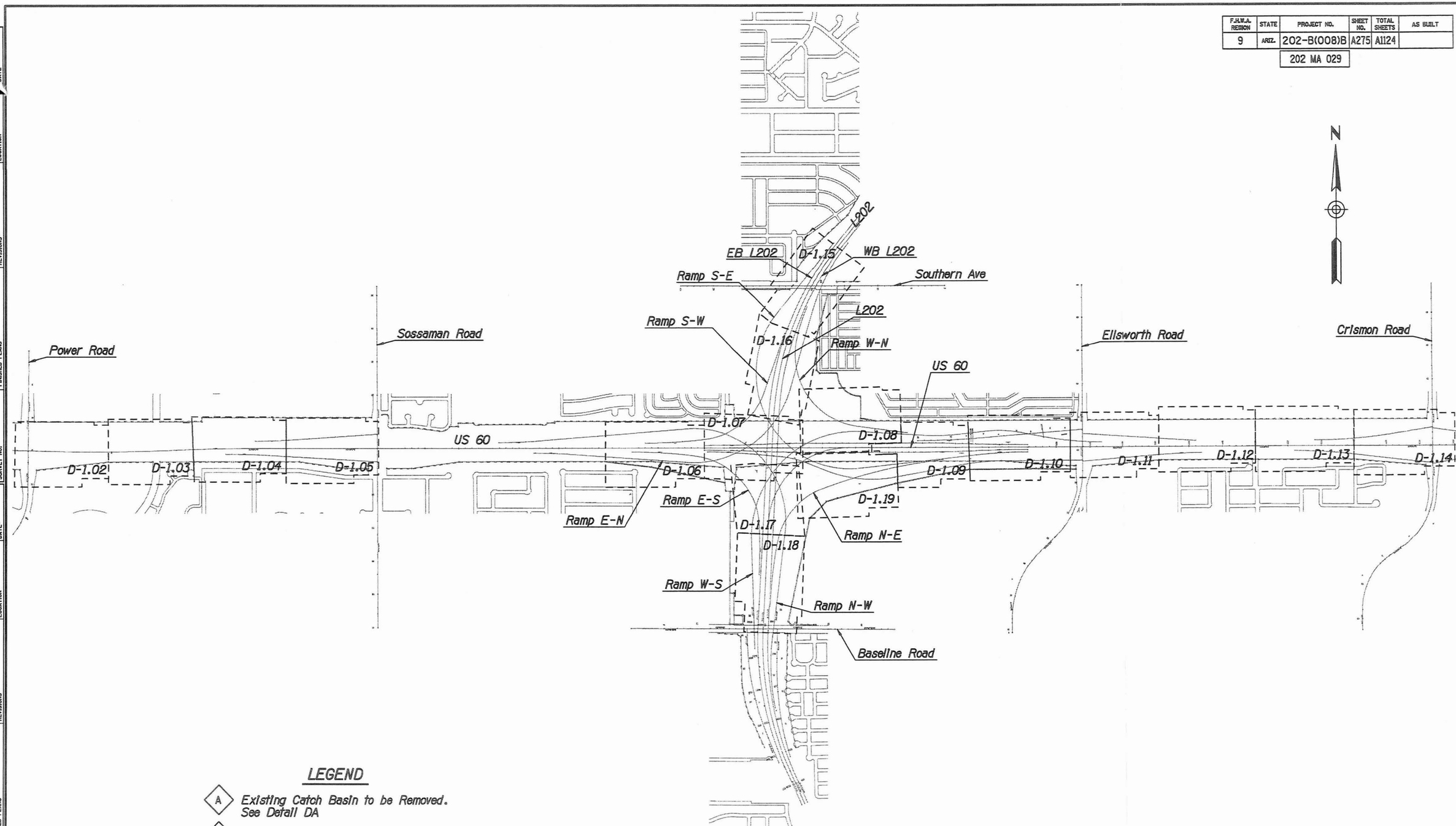
Node Report

Hydraulic Grade Line Out (ft)	Local Intensity (in/hr)	Local Rational Flow (cfs)	Description
1,446.02			
1,448.13	4.22	1.05	
1,450.77	4.22	0.48	
1,452.44	4.22	1.62	

APPENDIX C

STAGE IV (95%) PLANS

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A275	A1124	
		202 MA 029			



DRAINAGE KEY MAP

No Scale

LEGEND

- (A) Existing Catch Basin to be Removed. See Detail DA
- (B) Not Applicable
- (C) Not Applicable
- (D) Existing Manhole to be Capped. See Detail DD

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	KL	12-04
CHECKED	VW	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

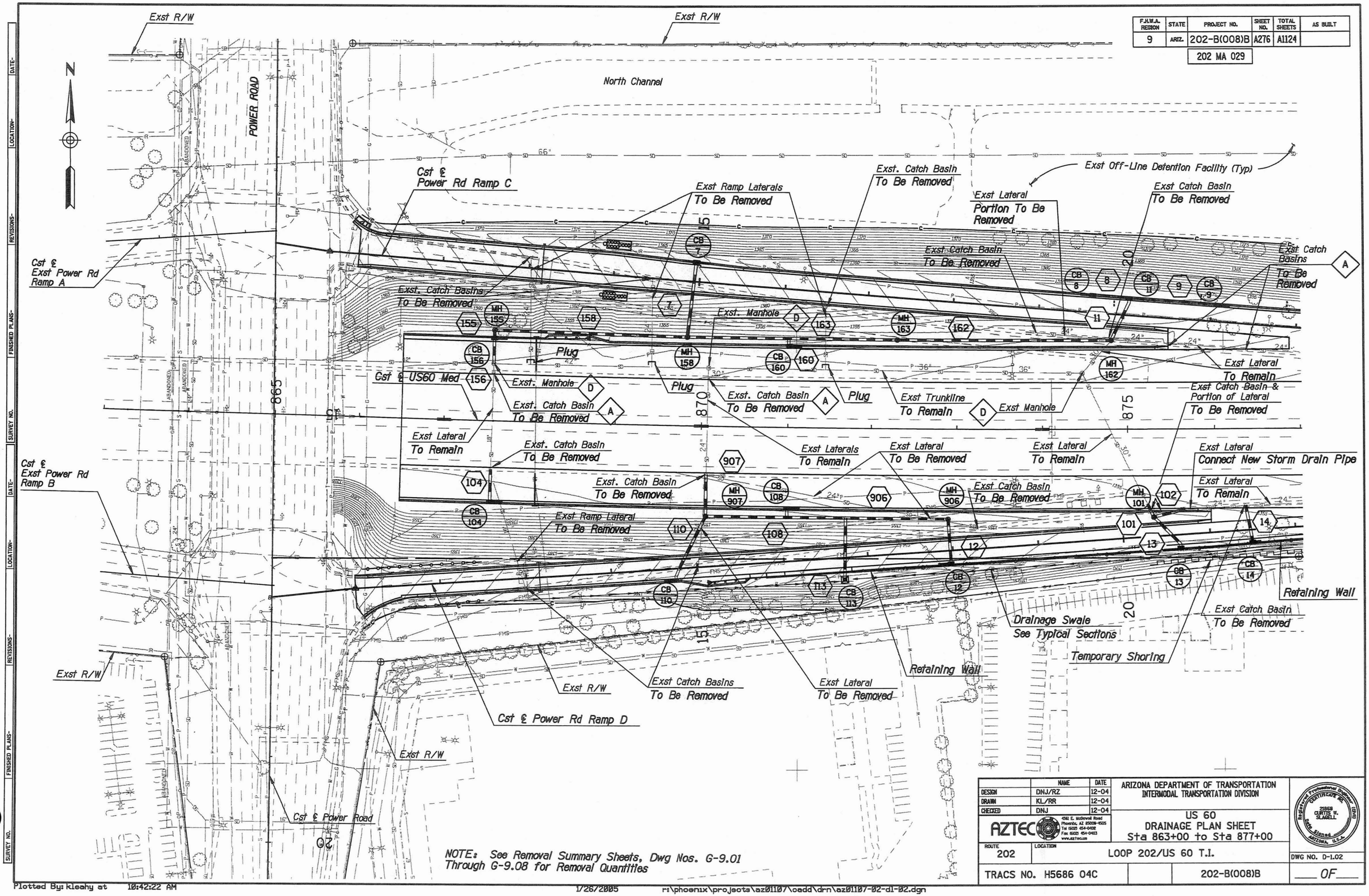
L202
DRAINAGE KEY MAP

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-1.01
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 1:48:01 PM 1/26/2005 R:\Phoenix\Projects\Az01107\Cadd\Drn\AZ01107-02-KY-01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A276	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

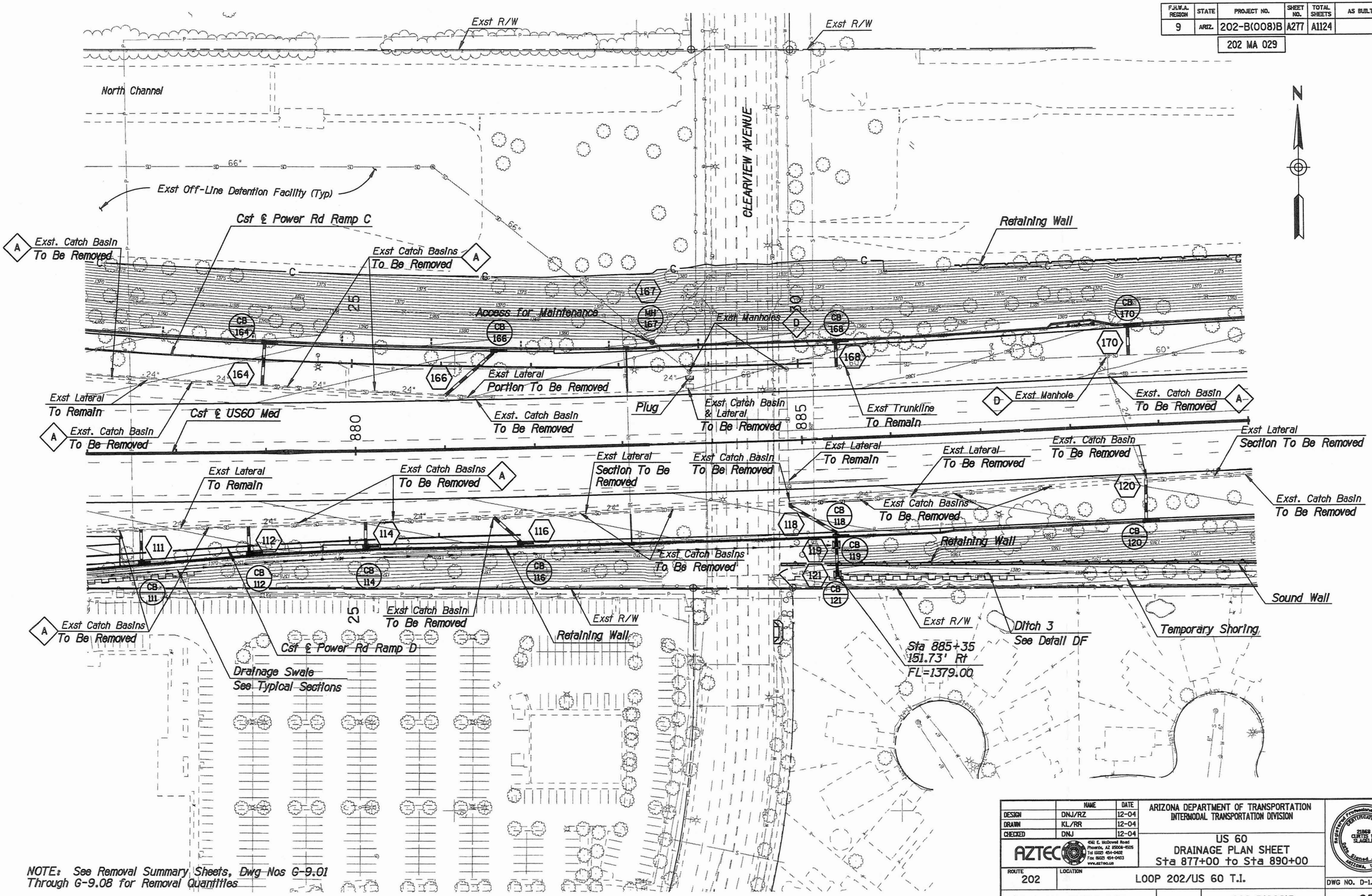
US 60
DRAINAGE PLAN SHEET
Sta 863+00 to Sta 877+00

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-1.02
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 10:42:22 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-02.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A277	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-1505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 877+00 to Sta 890+00

Registered Professional Engineer (Civil) CERTIFICATE NO. 21869 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

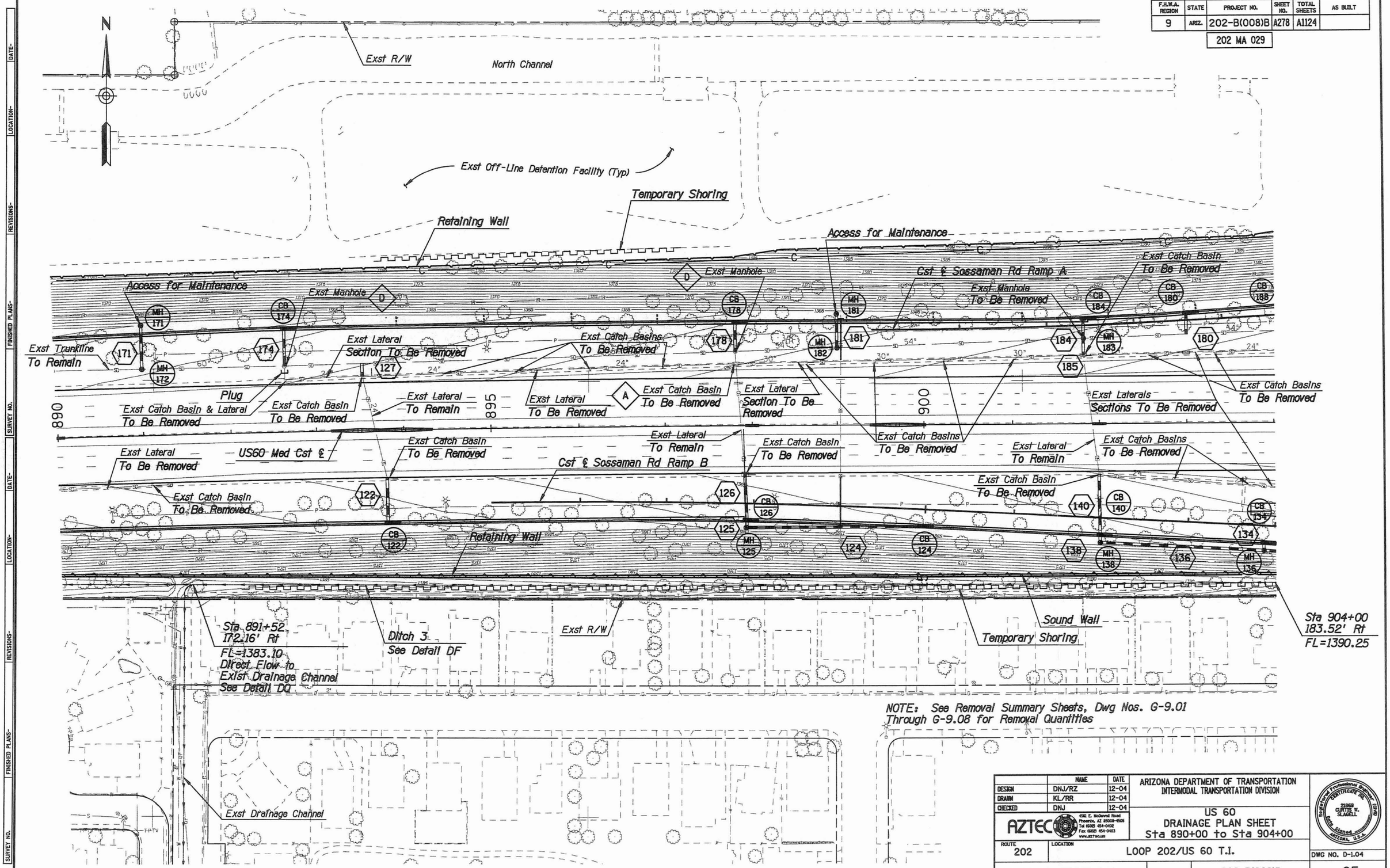
ROUTE	LOCATION
202	LOOP 202/US 60 T.I.

DWG NO. D-1.03

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A278	A1124	
		202 MA 029			



	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 890+00 to Sta 904+00

Registered Professional Engineer CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

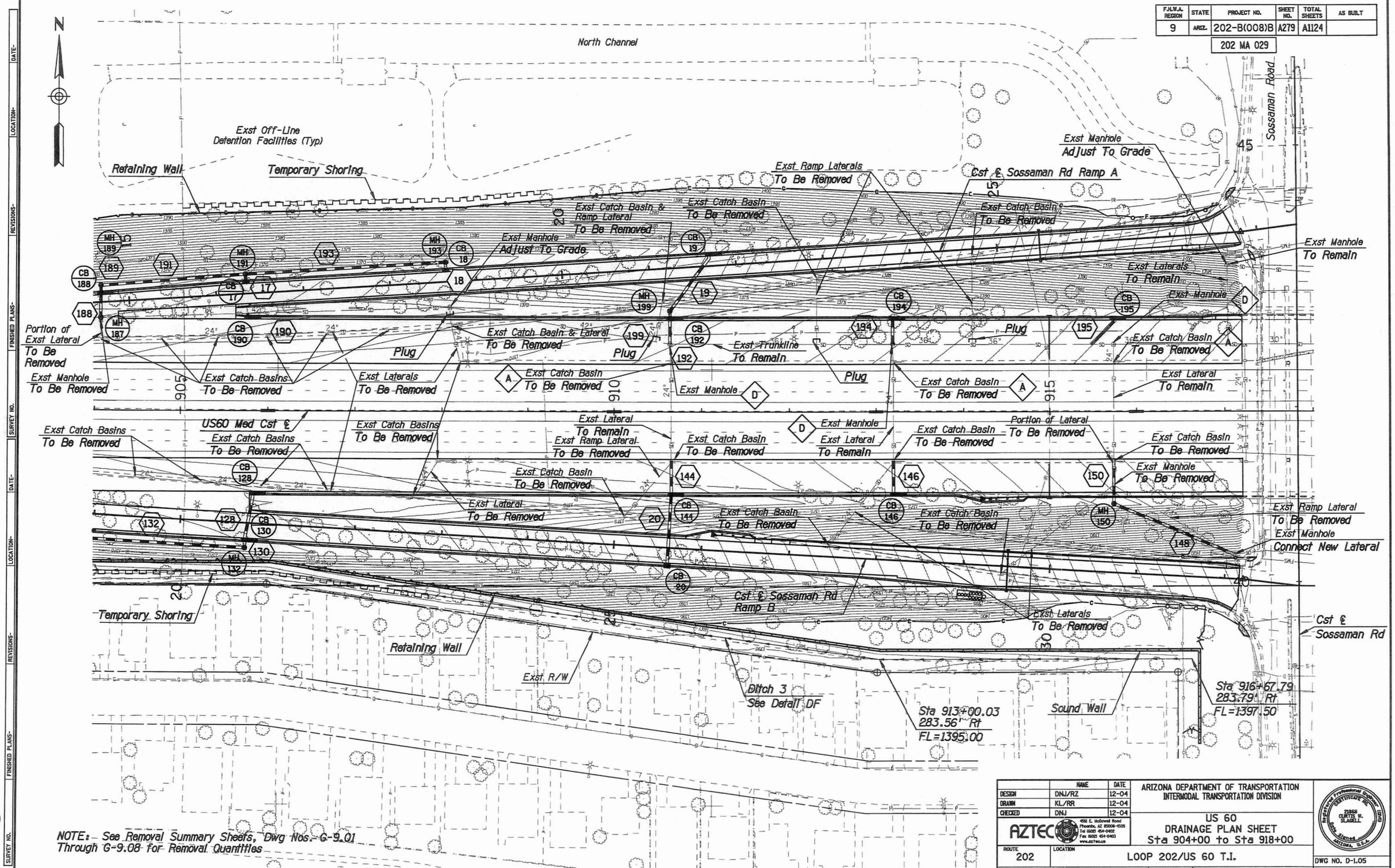
ROUTE	LOCATION	DWG NO. D-1.04
202	LOOP 202/US 60 T.I.	
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 10:42:28 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-04.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A279	A1124	

202 MA 029



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 904+00 to Sta 918+00

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A. Expires 12/31/05

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.05

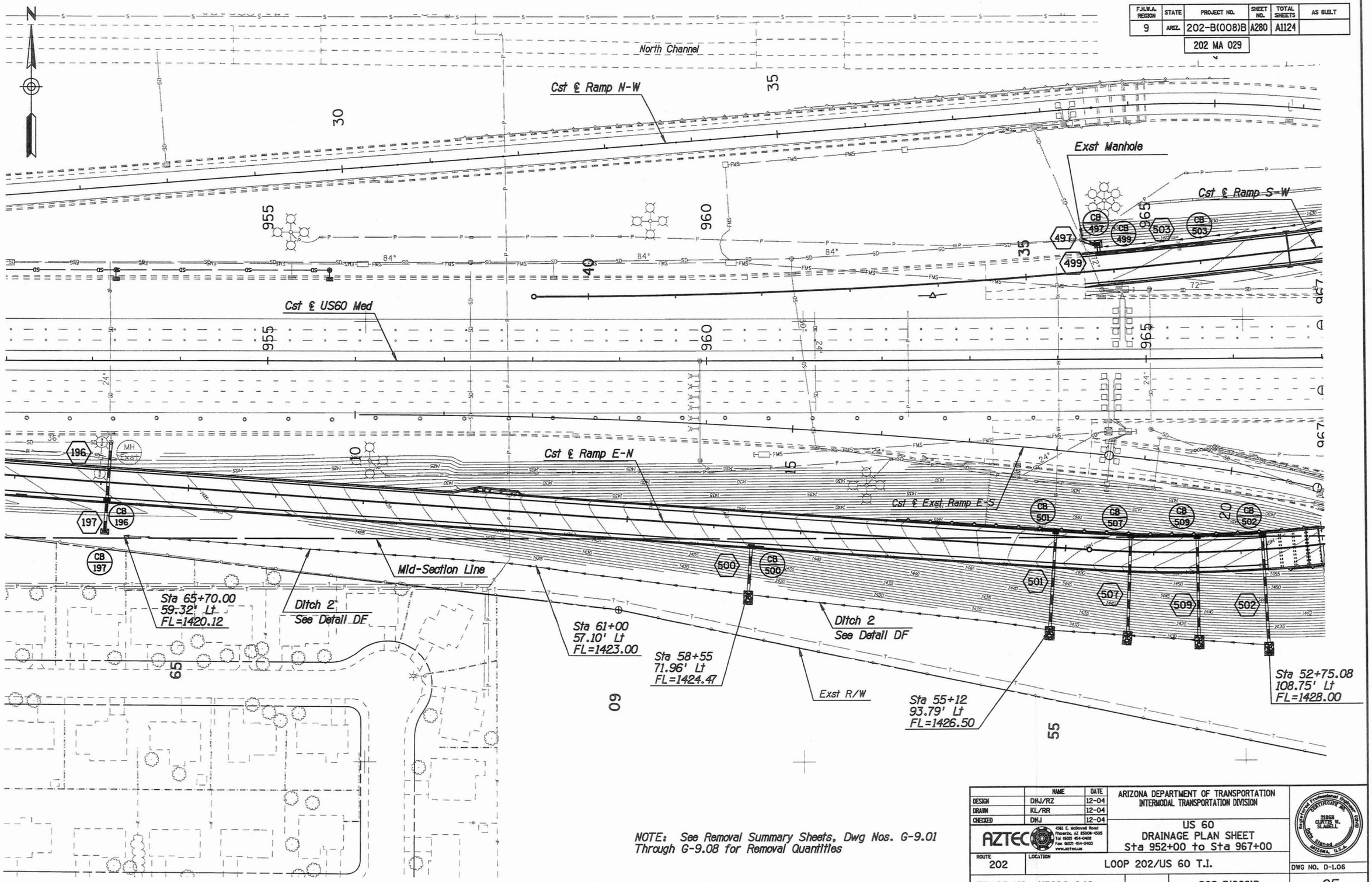
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 10:42:33 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-05.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A280	A1124	

202 MA 029



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 952+00 to Sta 967+00

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Signed
ARIZONA, U.S.A.

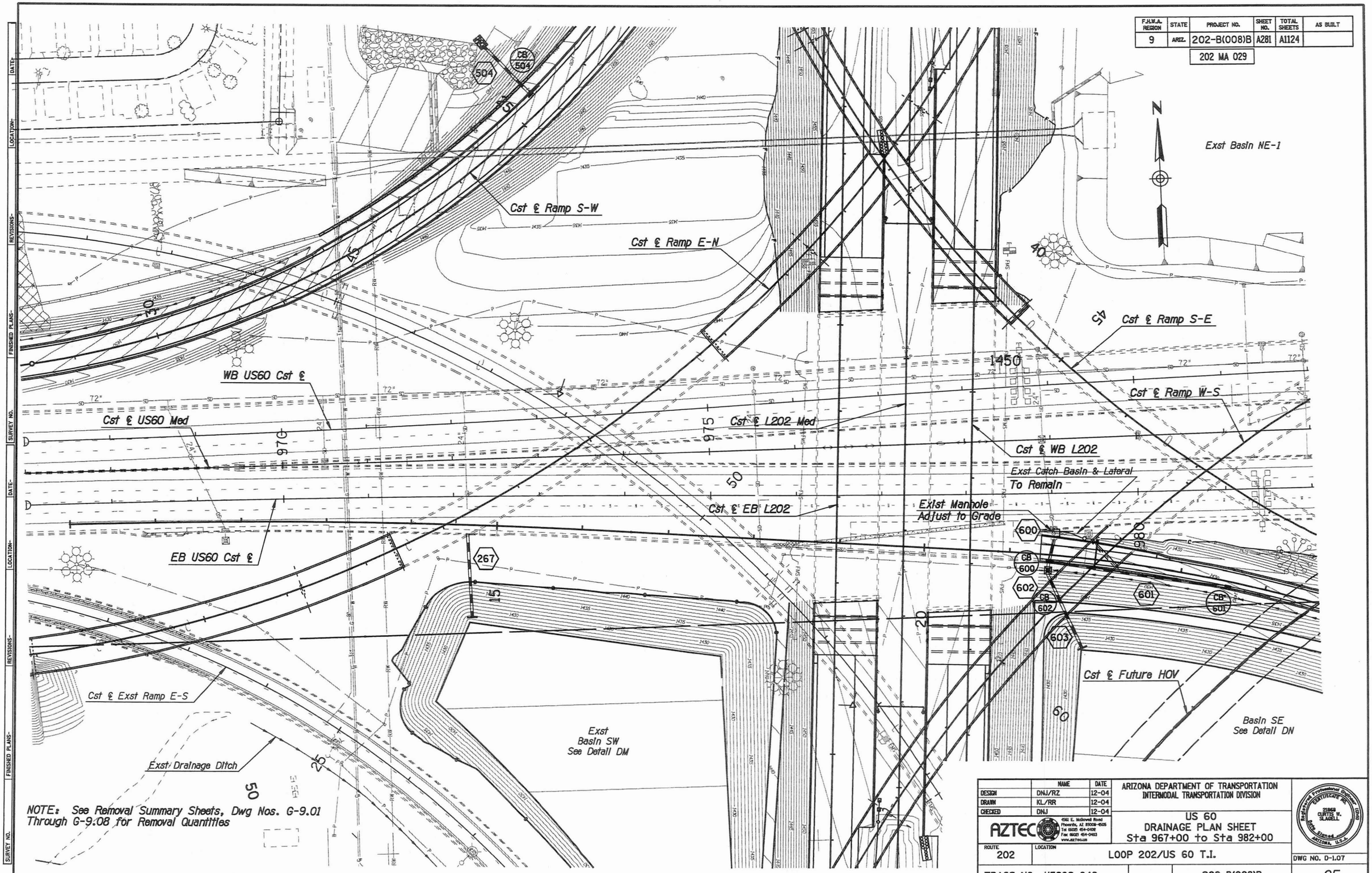
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.06

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:42:39 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-06.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A281	A1124	
		202 MA 029			



	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4141 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0102
Fax (602) 454-0463
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 967+00 to Sta 982+00

Registered Professional Engineer (CIVIL)
CERTIFICATE NO. 21963
CURTIS M. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION
202	LOOP 202/US 60 T.I.

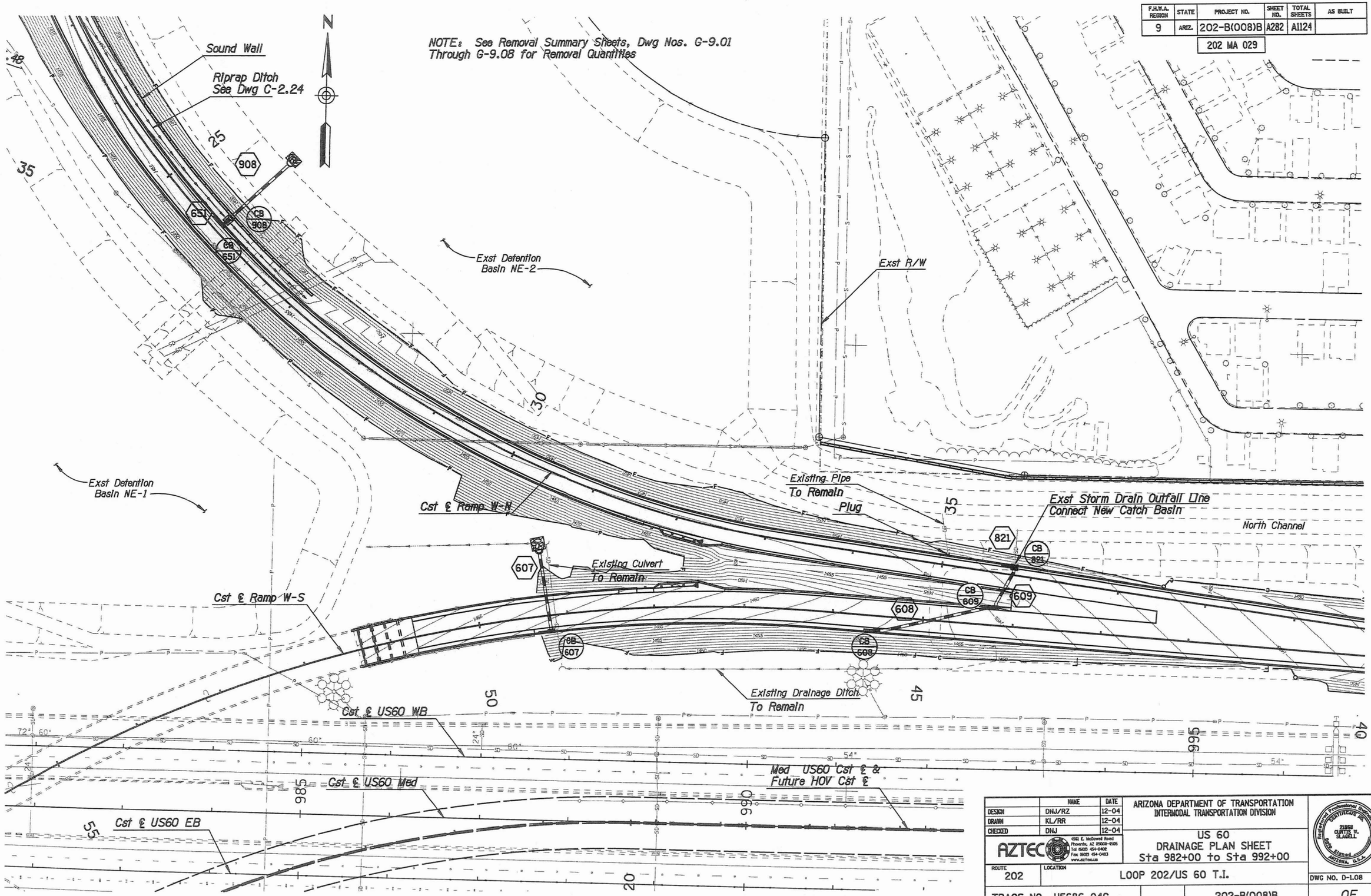
DWG NO. D-1.07

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:42:43 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-07.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A282	A1124	

202 MA 029



	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0453
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

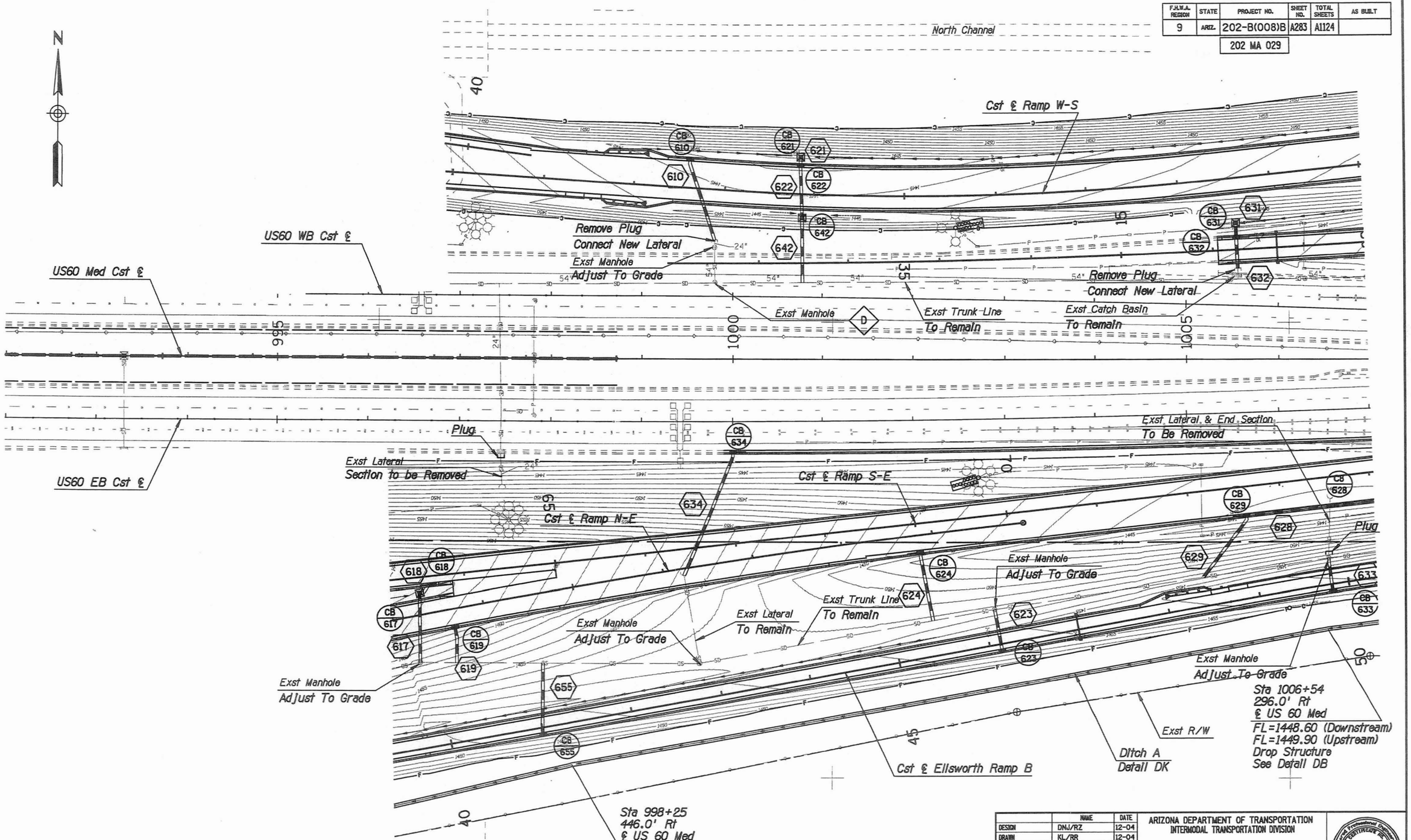
US 60
DRAINAGE PLAN SHEET
Sta 982+00 to Sta 992+00

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO. D-1.08
202	LOOP 202/US 60 T.I.	
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 10:42:51 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-08.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A283	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 WWW.AZTECGLOB

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 992+00 to Sta 1007+00

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

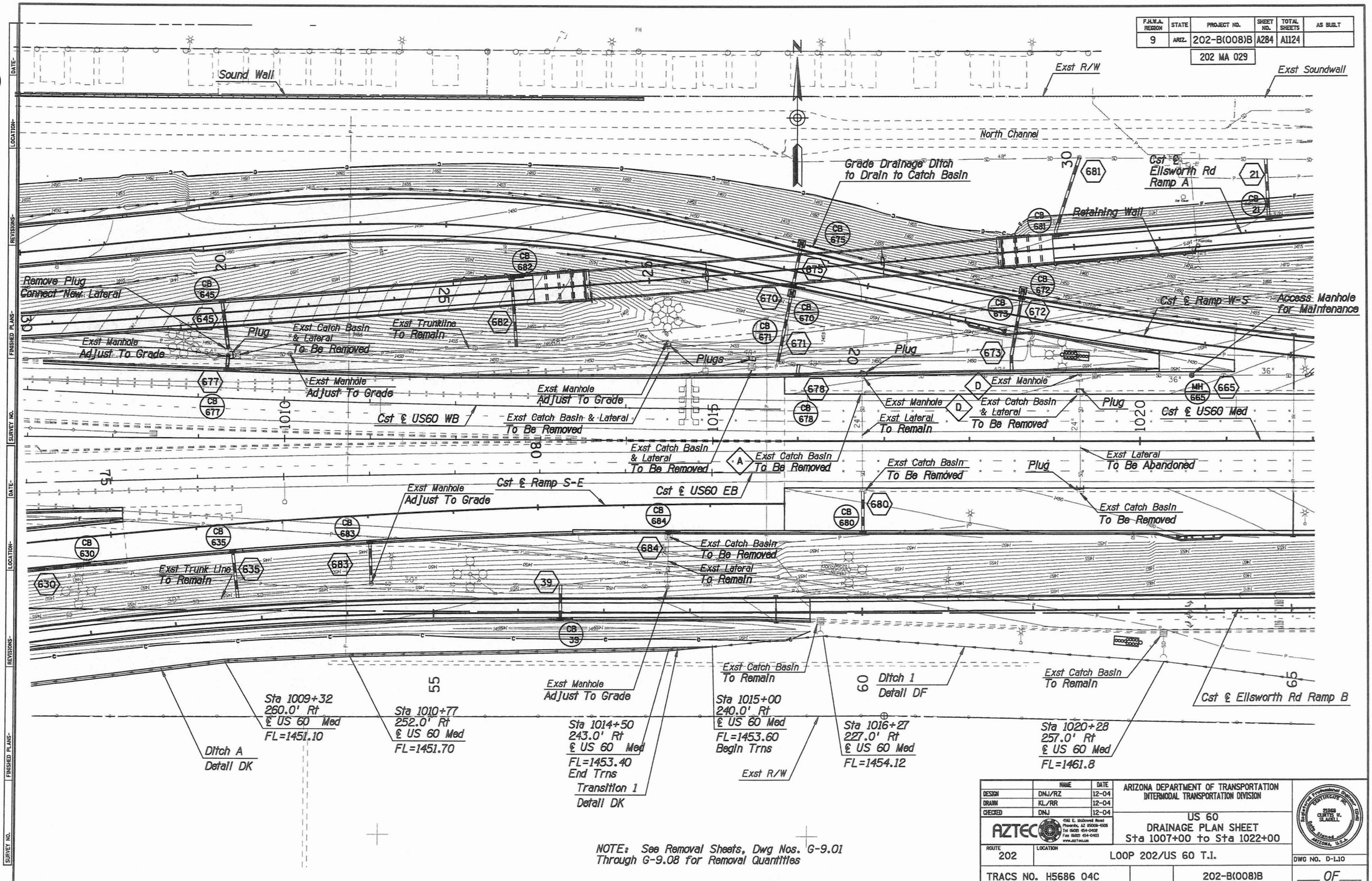
DWG NO. D-1.09

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:42:55 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-09.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A284	A1124	
		202 MA 029			



	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 1007+00 to Sta 1022+00

Registered Professional Engineer (Civil) 21868 CURTIS W. SLAGELL ARIZONA, U.S.A. Date Signed

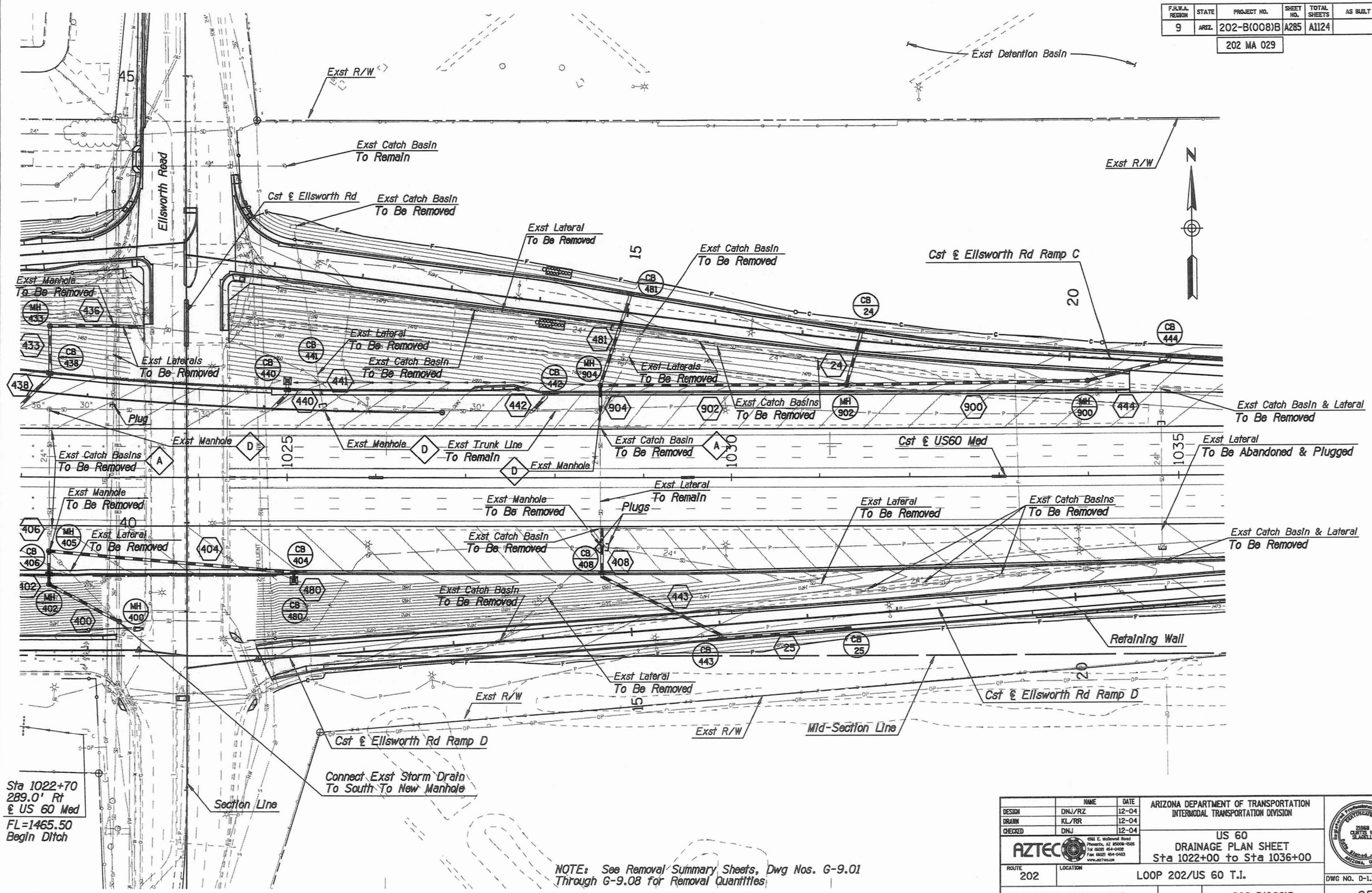
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.10

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:43:01 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-10.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A285	A1124	
		202 MA 029			



	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0432
Fax (602) 454-0453
www.aztecgo.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 1022+00 to Sta 1036+00

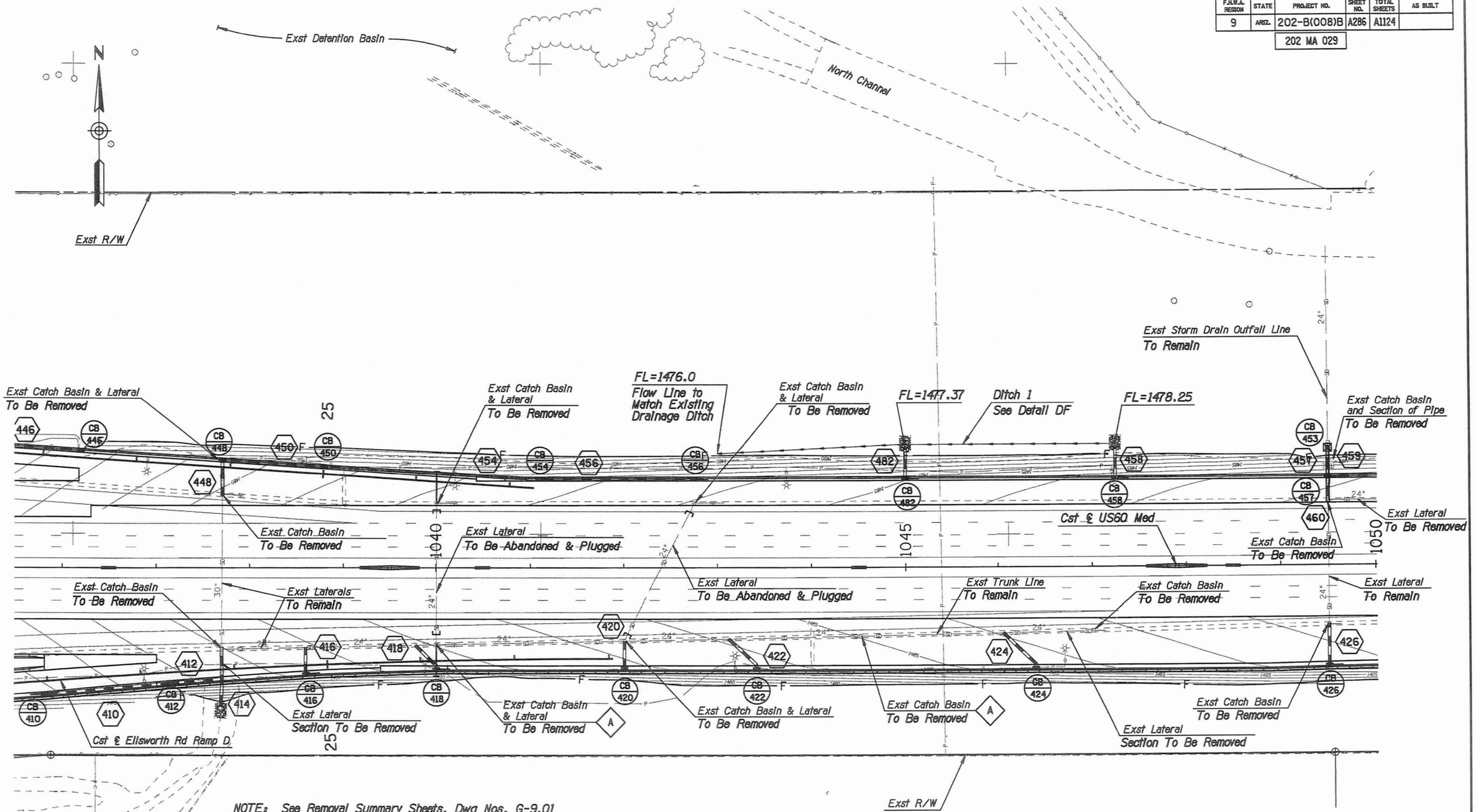
Registered Professional Engineer (Civil)
CERTIFICATE NO. 23868
CURTIS W. SLABELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-1.11

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:43:03 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-11.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A286	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 1036+00 to Sta 1050+00

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

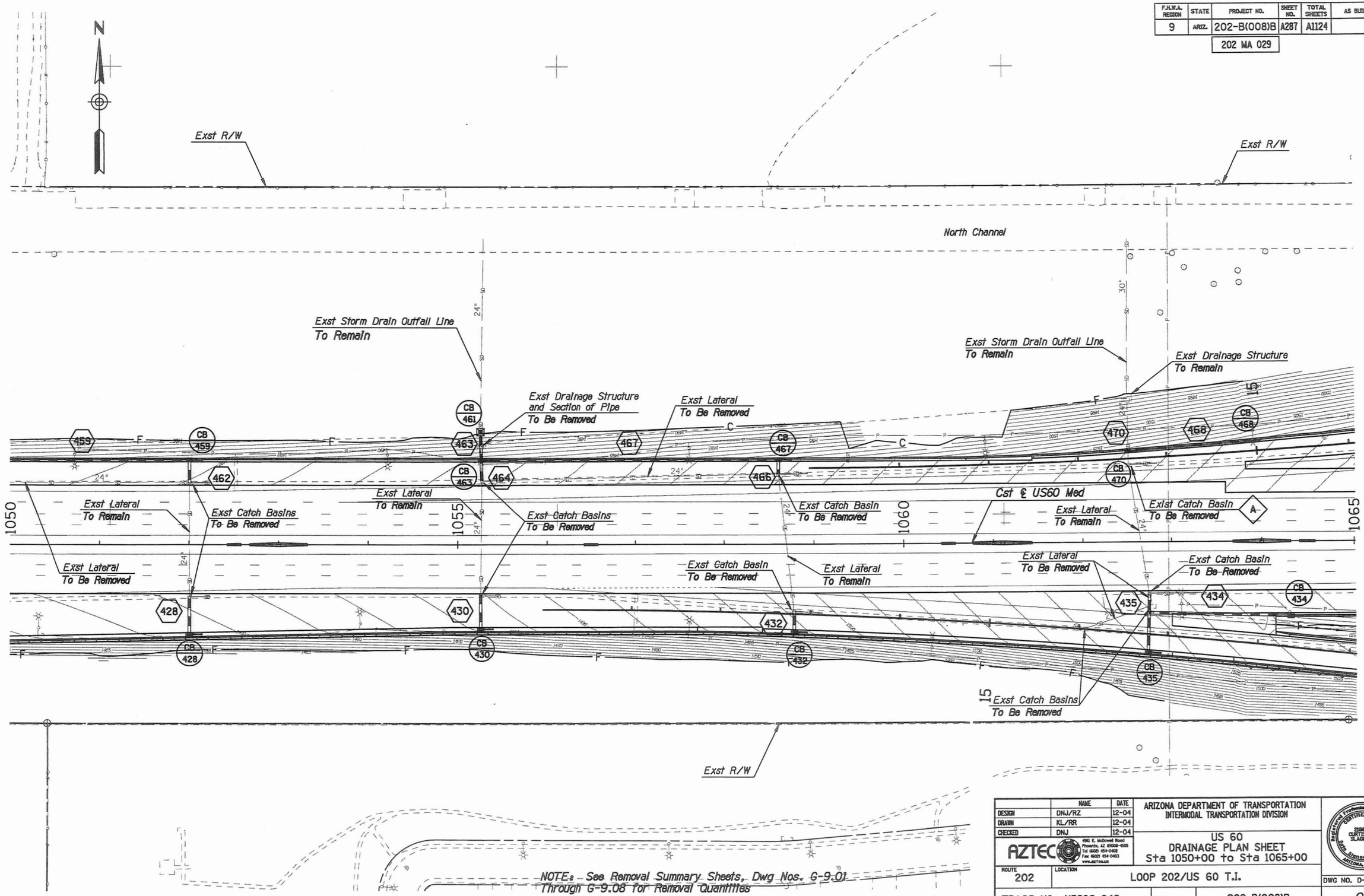
DWG NO. D-1.12

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 10:43:06 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-12.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A287	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 1050+00 to Sta 1065+00

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.13

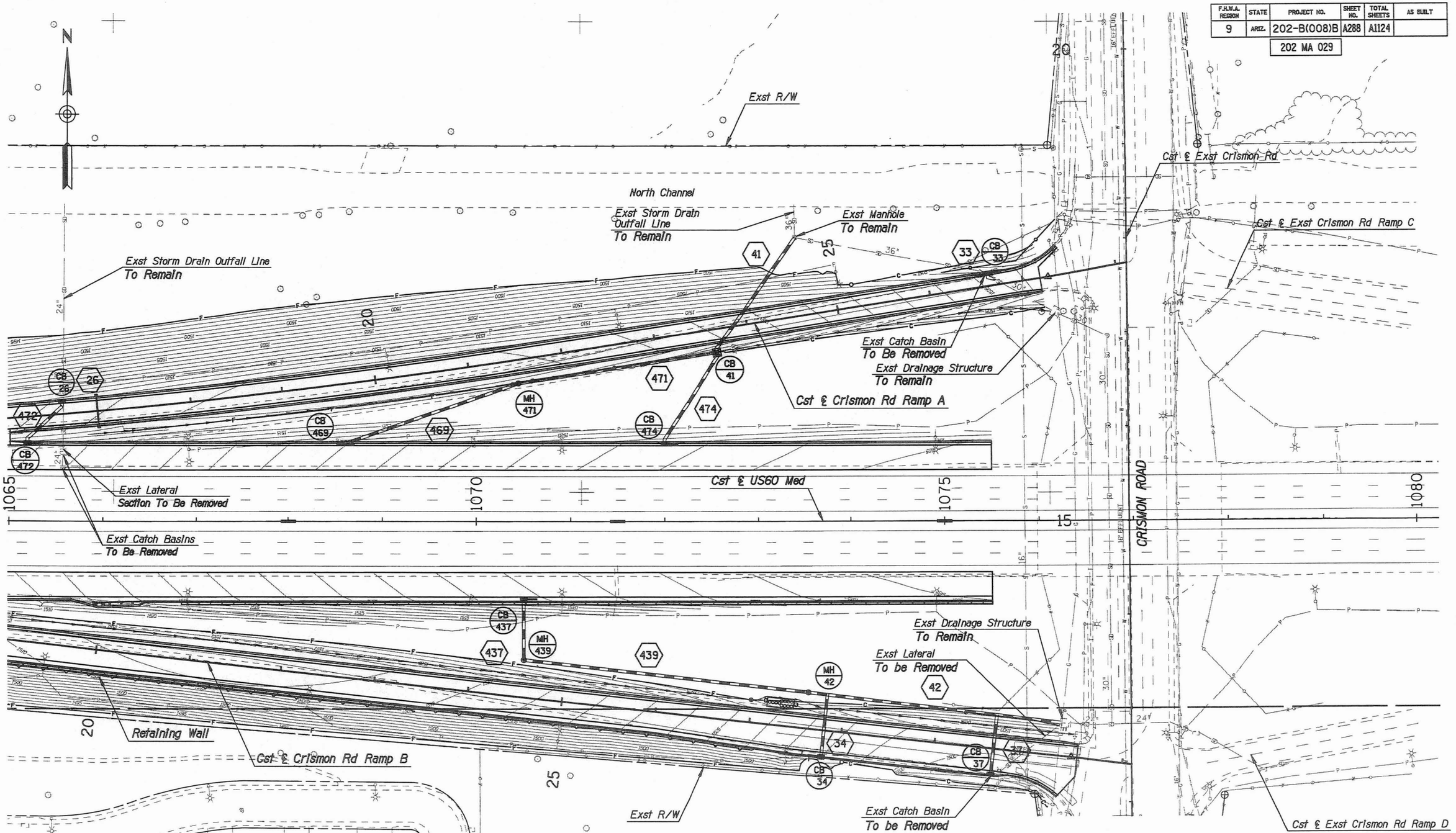
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

DATE- | LOCATION- | REVISIONS- | FINISHED PLANS- | SURVEY NO.

Plotted By: kleahy at 10:43:13 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dl-13.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A288	A1124	

202 MA 029



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

US 60
DRAINAGE PLAN SHEET
Sta 1065+00 to Sta 1080+00

Registered Professional Engineer (Civil) CERTIFICATE NO. 21859 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

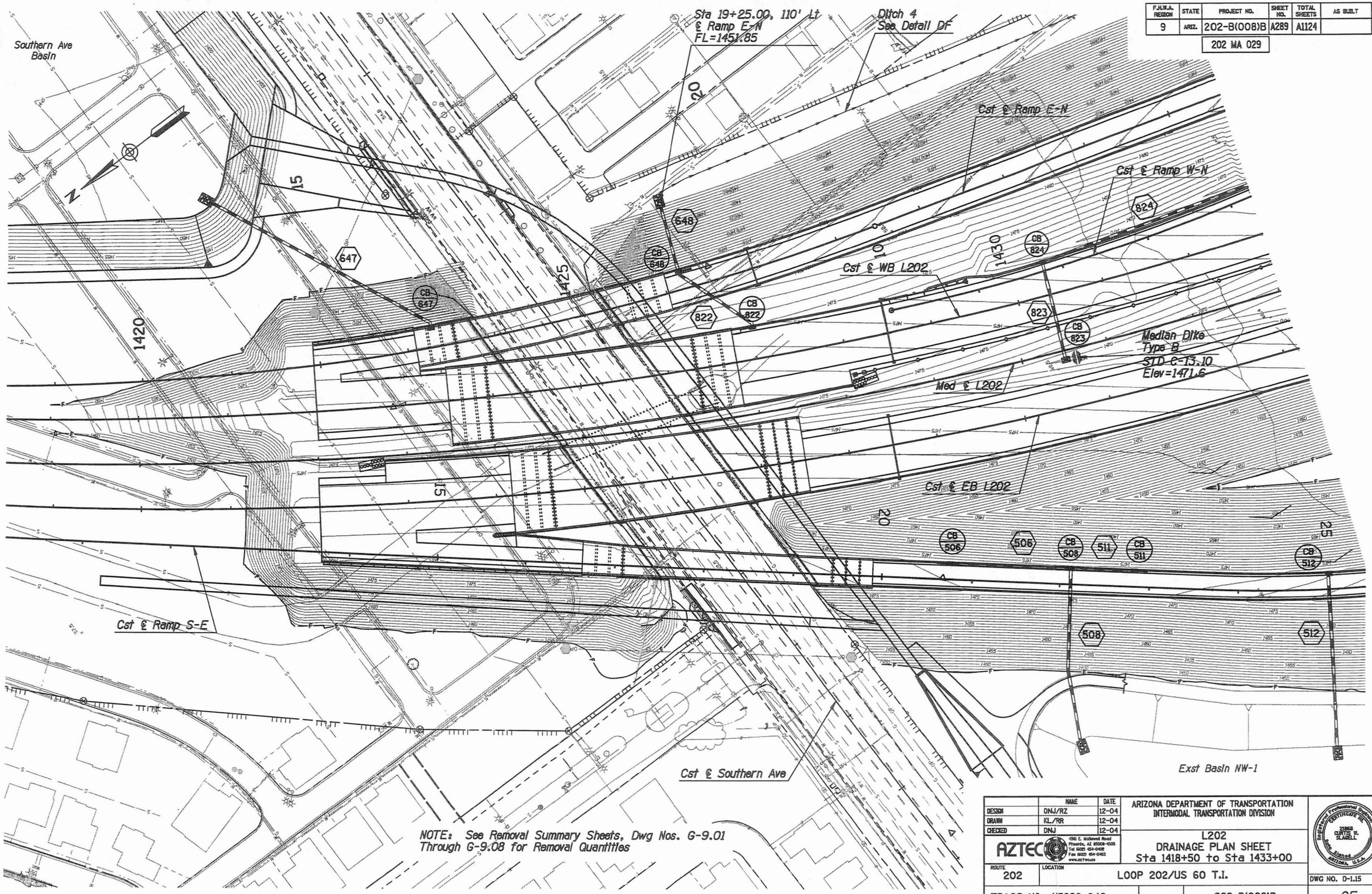
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.14

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:43:15 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-d1-14.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A289	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

L202
DRAINAGE PLAN SHEET
Sta 1418+50 to Sta 1433+00

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION
202	LOOP 202/US 60 T.I.

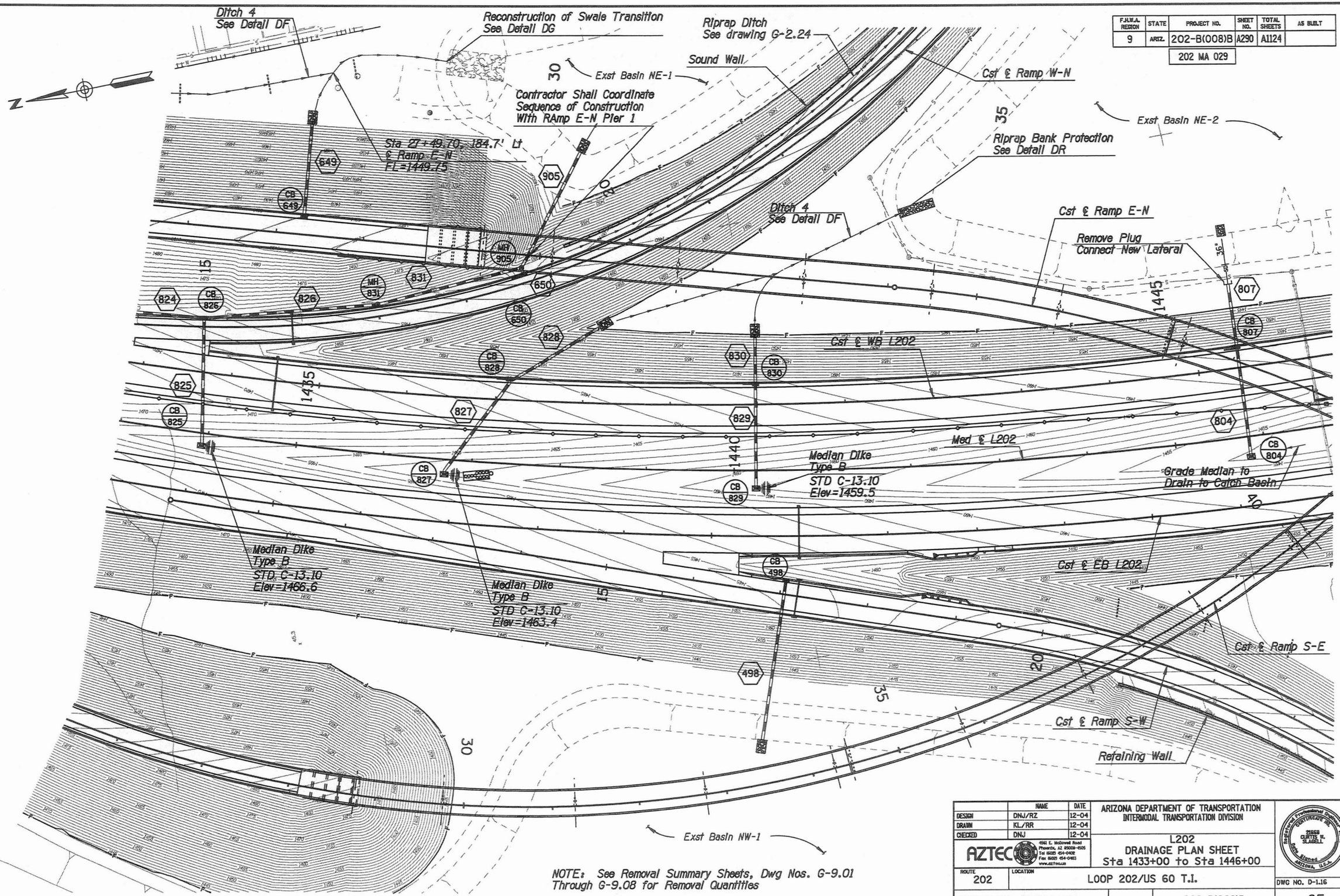
DWG NO. D-1.15

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 10:43:23 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-15.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A290	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

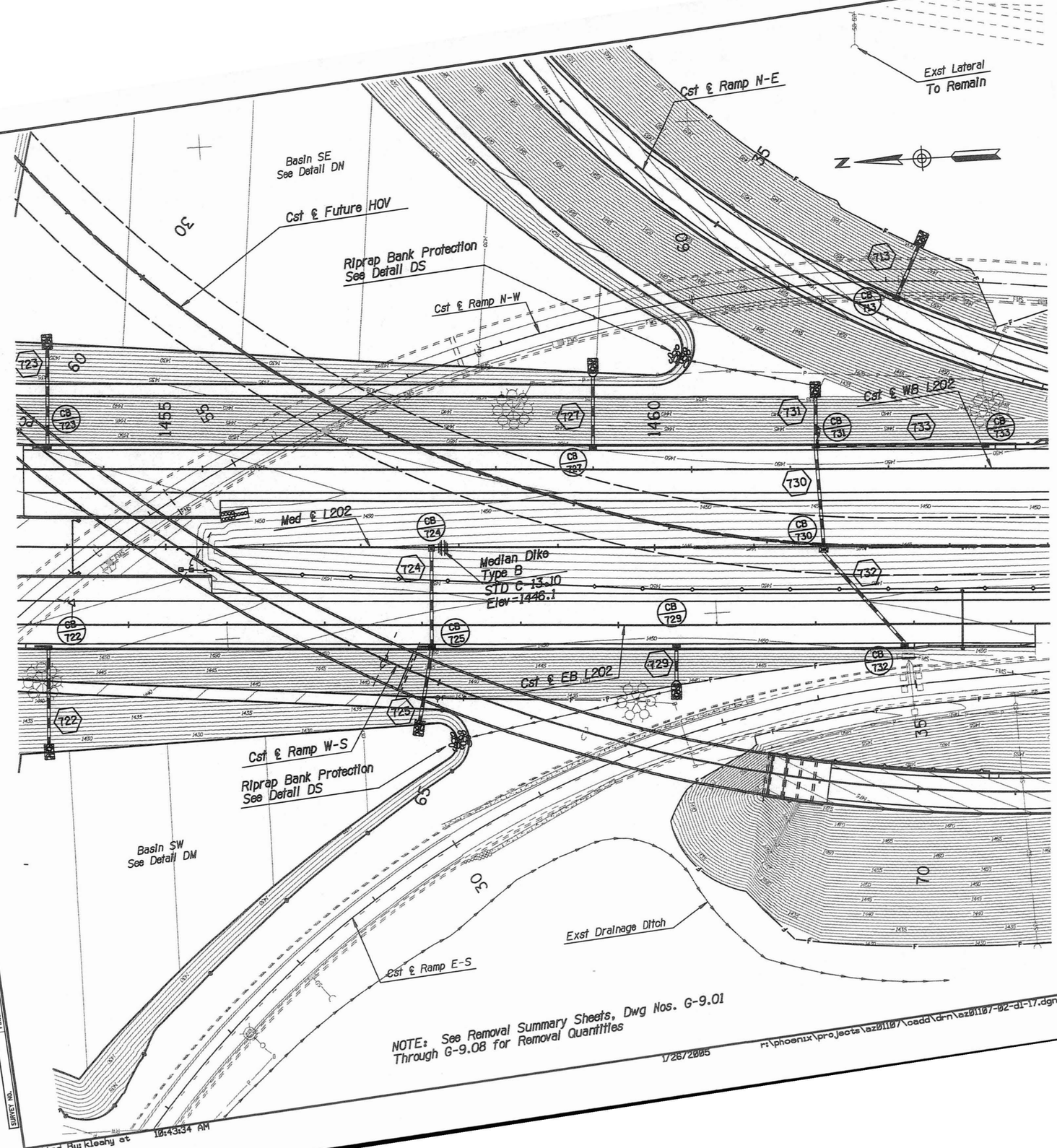
L202
DRAINAGE PLAN SHEET
Sta 1433+00 to Sta 1446+00

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21858
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-1.16
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A291	A1124	
		202 MA 029			



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

L202
DRAINAGE PLAN SHEET
Sta 1453+50 to Sta 1464+00

LOOP 202/US 60 T.I.

ROUTE	LOCATION	
202		202-B(008)B

TRACS NO. H5686 04C

Registered Professional Engineer (Civil) CERTIFICATE NO. 22825 CURTIS V. SLAGELE Arizona, U.S.A.

DWG NO. D-1.17

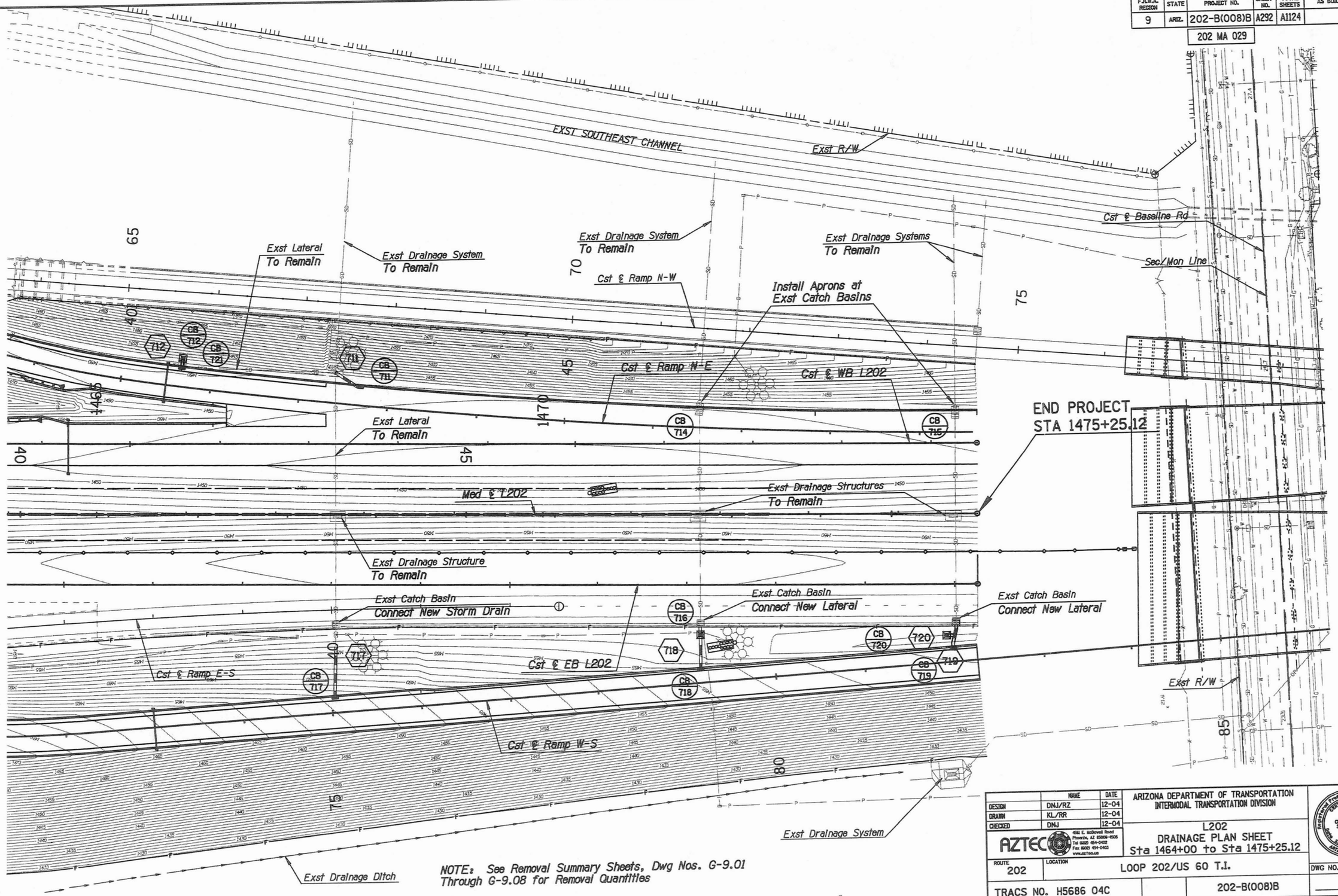
___ OF ___

FINISHED PLANS- REVISIONS- LOCATION- DATE- SURVEY NO.

Plotted By: kleahy at 10:43:34 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-17.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A292	A1124	

202 MA 029



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01 Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

L202
DRAINAGE PLAN SHEET
Sta 1464+00 to Sta 1475+25.12

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL State of ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-1.18

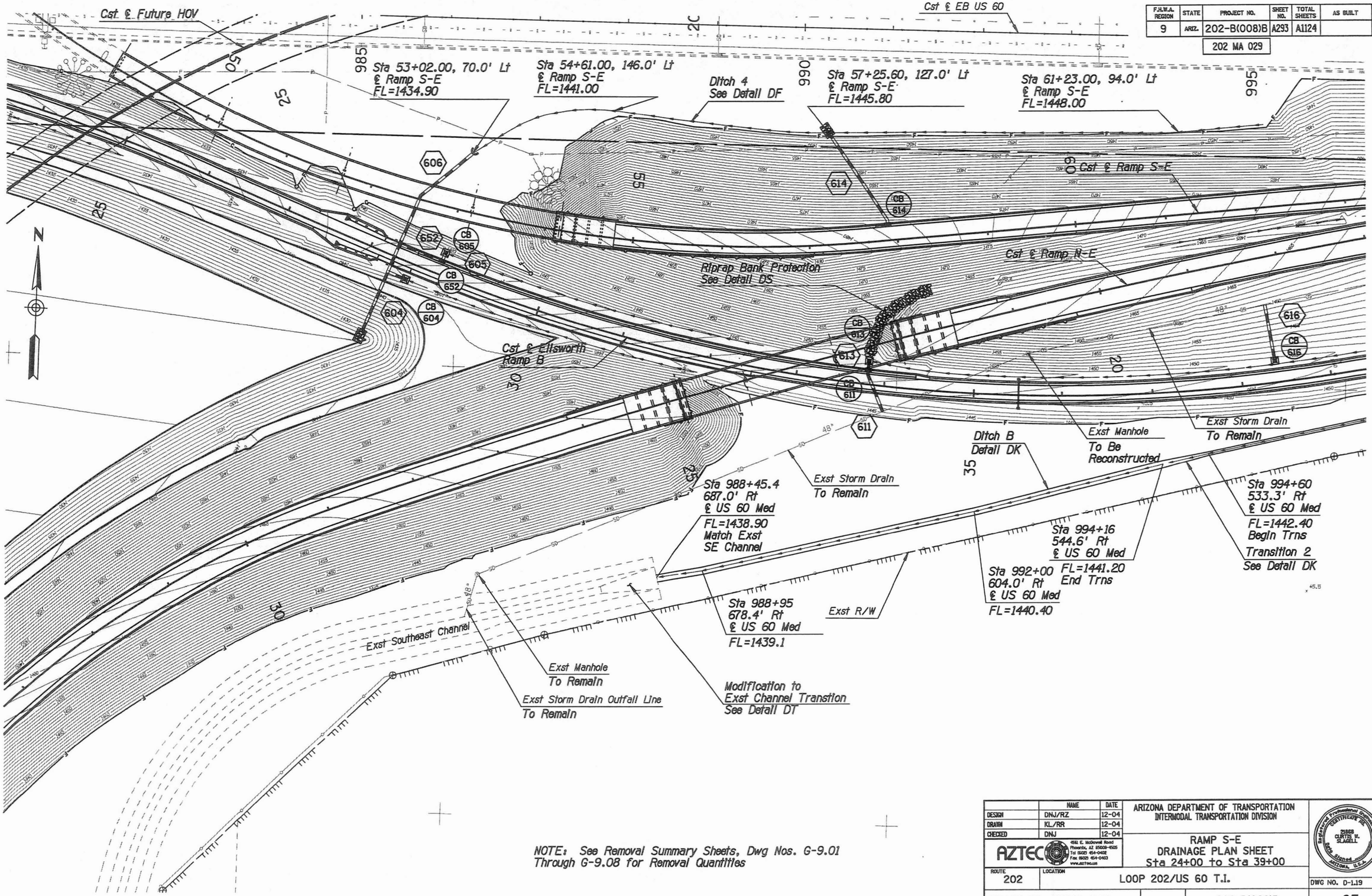
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:43:37 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-d1-18.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A293	A1124	

202 MA 029



NOTE: See Removal Summary Sheets, Dwg Nos. G-9.01
Through G-9.08 for Removal Quantities

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

RAMP S-E
DRAINAGE PLAN SHEET
Sta 24+00 to Sta 39+00

Registered Professional Engineer (Civil)
21868
CLIFTON W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-1.19

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:43:47 AM 1/26/2005 r:\phoenix\projects\az01107\osdd\drn\az01107-02-d1-19.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A43	A1124	
		202 MA 029			

Station	Plan Ref No.	⊖ Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	◪ Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated (Coating)	Class - Non Trench (In.)	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail - NRCP	NRCIPCP	CHDPEPP	End Sec (Each)	Size, (In) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth (Ft.)	Inlet Depression L (0.0) (In.)	Inlet Depression Ft.	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
Power Rd Ramp C Sta 14+95 19.68' Lt to US60 Med Sta 869+82.84 103.5' Lt	7	1		24	85												III	III	3			X					C-15.91			5.3		5			1361.78			58	17				CB7 to MH158
Power Rd Ramp C Sta 19+61.5 17.5' Lt to Sta 20+07.52 17.5' Lt	8	1		24	41												III	III	3			X					C-15.91			4.7		5			1353.31			24	8				CB8 to CB11
Power Rd Ramp C Sta 21+06 17.5' Lt to Sta 20+07.52 17.5' Lt	9	1		24	99												III	III	3			X					C-15.91			4.8		10			1353.63			54	20				CB9 to CB11
Power Rd Ramp C Sta 20+07.52 17.5' Lt to US60 Med Sta 874+81.24 103.59' Lt	11	1		30	52												III	III	2			X					C-15.91			4.8					1353.23			36	13				CB11 to MH162
Power Rd Ramp D Sta 17+97 13.5' Rt to US60 Med Sta 872+90 105.00' Rt	12	1		24	51												III	III	3			X					C-15.92			5.0		5			1356.10			33	10				CB12 to MH906
Power Rd Ramp D Sta 20+65 13.5' Rt to US60 Med Sta 875+29.44 102.54' Rt	13	1		24	47												III	III	3			X					C-15.92			3.9					1353.28			29	9				CB13 to MH101
Power Rd Ramp D Sta 21+49 12.56' Rt to Sta 21+43.96 30.96' Lt	14	1		24	45												III	III	3			X					C-15.92			3.9		5			1353.90			24	9				CB14 to Existing Lateral (Prefabricated Tee)
Sossaman Rd Ramp A Sta 16+35 11.5' Lt to Sta 16+35 22.5' Lt	17	1		24	8												III	III	3			X					C-15.91			5.6		5			1366.85			5	2				CB17 to MH191
Sossaman Rd Ramp Sta 18+65 11.5' Lt to Sta 18+65 22.5' Lt	18	1		24	8												III	III	3			X					C-15.91			5.0		5			1369.91			4	2				CB18 to MH193
Sheet Total																																40							267	90				

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

⊖ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 654-0492 Fax (602) 654-0493 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21858 CURTIS W. SUMNER Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.01

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:10 PM 1/26/2005 R:\Phoenix\Projects\Az01107\Cadd\Drn\AZ01107-02-NP-01.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A44	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench (In.)	Class - Trench (In.)	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	End Sec (Each)	S-Single / D-Double	Location (Catch basin, Manhole, Headwall & Junction Structure)	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type (Grate)	Elev. (0.00) (Ft.)	Depth (Ft.)	L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (In.)	Pipe Bkfl (0) (In.)	Drn Exc (0) (In.)	Berm/Dike Emb (0) (In.)	REMARKS
Sossaman Rd Ramp A Sta 21+70 11.5' Lt to	19	1		24	80												III	III	3			X				C-15.91				4.0		5			1377.85			56	16			CB19 to MH199
to US60 Med Sta 910+63.15 115.5' Lt																																										
Sossaman Rd Ramp B Sta 25+61.5 17.5'	20	1		24	79												III	III	3			X				C-15.91				5.2		5			1377.94			49	16			CB20 to CB144
Rt to US60 Med Sta 910+64.41 92.5' Rt																																										
Ellsworth Rd Ramp A Sta 32+28.75 13.5'	21	4		24	69												III	III				X				C-15.92				7.1		15			1474.97			72	14			CB21 to Existing Storm Drain
Lt to Sta 32+30.58 83.74' Lt																																										(Prefabricated Tee)
Ellsworth Rd Rp C Sta 17+65.18 8.9' Lt	24	1		24	55												III	III	3							C-15.91				5.0					1472.46			37	12			CB24 to MH902
to US60 Med Sta 1031+30 103.5' Lt																																										
Ellsworth Rd Ramp D Sta 17+43.63 13.5' Rt	25	1		24	142												III	III	3			X				C-15.92				5.0					1471.94			97	29			CB25 to CB443
to Sta 16+00 13.5' Rt																																										
Crismon Rd Ramp A Sta 16+63.69 11.5'	26	1		18	6												III	III	3			X				C-15.91				5.5					1511.11			2	1			CB26 Vertical to Exst Lateral
Lt to Sta 16+63.69 11.5' Lt																																										(Prefabricated Tee)
Crismon Rd Ramp A Sta 26+64.4 11.5' Lt	33	1		24	4												III	III	3			X				C-15.91				5.1		20			1504.40			2	2			CB33 (Vertical Pipe) to Exst
																																										Pipe (Prefabricated Tee)
Crismon Rd Ramp B Sta 27+80 25.5' Rt	34	1		24	62												III	III	3			X				C-15.92				4.5		15			1501.86			43	13			CB34 to Pipe 42
to Sta 27+80.76 36.83' Lt																																										(Prefabricated Tee)
Crismon Rd Ramp B Sta 29+63.0 25.5'	37	1		24	61												III	III	3			X				C-15.92				3.8					1499.32			33	13			CB37 to Pipe 42
Rt to Sta 29+66.46 36.01' Lt																																										(Prefabricated Tee)
Sheet Total																																60							391	116			

QUANTITIES: Cubic Yard

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4581 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.02

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A45	A1124	
		202 MA 029			

Station	Plan Ref No.	⊖ Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	◪ Corrugation	Wall Thickness (0.00) (In.)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00) (In.)	Unpainted	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	NRCP C-13.20 & C-13.25	NRCIPCP Detail -	CHDPEPP Size, (In)	End Sec Standard or Detail	Each S-Single / D-Double	Catch basin, Manhole, Headwall & Junction Structure: Location	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type	Grate Elev. (0.00) (Ft.)	Grate Dep'th (Ft.)	Inlet Depression L (0.0) (In.)	Pipe Exc (0) (Ft.)	Pipe Bk'fl (0) (Ft.)	Drn Exc (0) (Ft.)	Berm/Dike Emb (0) (Ft.)	REMARKS
Ellsworth Ramp B Sta 56+48.76 5.5' Rt to Sta 56+49.43 32.59' Lt	39	4		24	40												III	III			X				C-15.91			5.0		20			1456.07			44	8			CB39 to Existing Trunkline (Prefabricated Tee)
Crismon Rd Ramp A Sta 23+65 25' Rt to Sta 24+65.47 83.48' Lt	41	3		24	152												II	II	2		X				C-15.80			6.0					1510.00			131	31			CB41 to Existing Manhole
Crismon Rd Ramp B Sta 27+60 38.59' Lt to Sta 30+30.02 35.19' Lt	42	2		24	271												II	II	1		X			24	C-18.10			7.6					1504.70			298	54			MH42 to Existing Catch Basin
US60 Med Sta 875+29.44 102.54' Rt to to Sta 875+22.36 88.01' Rt	101	1		30	17												III	III	3		X			24	C-18.10			5.5					1354.70			10	3			MH101 to Existing Lateral
US60 Med Sta 875+63.93 94.11 Rt to Sta 875+29.44 102.54 Rt	102	1		24	36												III	III	3		X															20	7			Existing Lateral to MH101
US60 Med Sta 867+55.43 92.5' Rt to Sta 867+55.43 55.09' Rt	104	1		18	39												IV	IV	2		X				C-15.91			4.3		10			1351.25			17	6			CB104 to Existing Lateral
US60 Med Sta 871+00 92.5' Rt to Sta 871+00 104.69' Rt	108	1		24	9												III	III	3		X				C-15.91			3.7		10			1352.49			3	2			CB108 to Pipe 906 (Prefabricated Tee)
Power Rd Ramp D Sta 14+75 11.5' Rt to US60 Med Sta 870+06.40 105.00' Rt	110	1		24	85												III	III	3		X				C-15.91			5.2		5			1363.07			53	17			CB110 to MH907
US60 Med Sta 877+60 121.36' Rt to Sta 877+60 84.92' Rt	111	1		24	37												III	III	3		X				C-15.92			4.2		5			1354.79			19	8			CB111 to Existing Lateral (Prefabricated Tee)
Sheet Total																								2						50							595	136			

QUANTITIES	Cubic Yard
Pipe Exc (0)	
Pipe Bk'fl (0)	
Drn Exc (0)	
Berm/Dike Emb (0)	

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

⊖ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4540 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.03

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

RE: DATE: 01-05-2000

Plotted By: kleahy at 12:43:11 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-03.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A46	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc Coating	Blt. Coated Zinc Coating	Aluminum Coating	Blt. Coated Aluminum Coating	Corrugation	Wall Thickness (0.00)	Uncoated	Blt. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole (In.)	Standard or Detail	End Sec (Each)	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Grate Depth (Ft.)	Grate L (0.0) (Ft.)	Inlet Depression (In.)	Pipe Exc (0) (Cubic Yard)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 878+80 112.36' Rt to Sta 878+80 83.16' Rt	112	1		24	31											III	III	3			X				C-15.92				4.4		5			1355.50			19	7			CB112 to Existing Lateral (Prefabricated Tee)
US60 Med Sta 871+70 176.38' Rt to Sta 871+69.98 104.65' Rt	113	1		24	71											III	III	3			X				C-15.80				4.9					1358.40			53	14			CB113 to Pipe 906
US60 Med Sta 880+10 106.94' Rt to Sta 880+09.43 79.50' Rt	114	1		24	28											III	III	3			X				C-15.92				4.4		5			1356.16			16	6			CB114 to Existing Lateral (Prefabricated Tee)
US60 Med Sta 881+80.85 106.5' Rt to Sta 881+52.20 76.60' Rt	116	1		24	47											III	III	3			X				C-15.92				4.5		10			1356.98			26	9			CB116 to Existing Lateral
US60 Med Sta 885+35 106.5' Rt to Sta 884+83.65 67.58' Rt	118	1		24	69											III	III	3			X				C-15.92				4.2		15			1358.61			36	14			CB118 to Existing Lateral
US60 Med Sta 885+35 118.5' Rt to Sta 885+35 106.5' Rt	119	1		24	8											III	III	3			X				C-15.80				3.5					1358.20			4	2			CB119 to CB118
US60 Med Sta 888+83.23 105' Rt to Sta 888+83.54 60.08' Rt	120	1		24	46											III	III	3			X				C-15.91				4.1		15			1360.04			23	9			CB120 to Existing Lateral
US60 Med Sta 885+35 151.73' Rt to Sta 885+35 118.50' Rt	121	1		18	50											IV	IV				X				C-15.80				5.0					1379.00			41	10			CB121 to CB119
US60 Med Sta 893+80.40 104.5' Rt to Sta 893+80.33 54.51' Rt	122	1		24	51											III	III	3			X				C-15.91				3.9		15			1362.21			25	10			CB122 to Existing Lateral
Sheet Total																															65						243	81			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. C-4.04

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:11 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-04.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A47	A1124	
		202 MA 029			

DESCRIPTION							CSP									CAP			RCP	NRCP	NRCIPCP	CHDPEPP	END TREATMENT																	QUANTITIES	
				In.	In.	Ft. / Degree	In.	Coating								In.					In.		Each																	Cubic Yard	
																								Catch basin, Manhole, Headwall & Junction Structure																	
																									Ea			Ft.			Grate	Ft.										
Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated	Size, Smooth	Length (0)	Skew (0)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (in) Manhole	End Sec Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth	L (0.0)	Inlet Depression	Pipe Exc (0)	Pipe Bkfl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 899+95 114.26' Rt to Sta 897+92 117' Rt	124	1		24	201											III	III	3			X				C-15.91			4.0		5			1364.72			126	41			CB124 to MH125
US60 Med Sta 897+92 117.00' Rt Sta 897+92 106.57' Rt	125	1		24	7											III	III	3			X			24	C-18.10			3.9					1364.20			4	1			MH125 to CB126
US60 Med Sta 897+92 106.57' Rt to Sta 897+90.95 54.24' Rt	126	1		24	53											III	III	3			X				C-15.91			4.0		10			1363.99			28	11			CB126 to Existing Lateral
US60 Med Sta 893+54.37 59.22' Lt to Sta 893+53.55 76.68' Lt	127	1		24	18											III	III	3			X															12	4			Connection Between Existing Lateral & Trunk Line
US60 Med Sta 906+00 92.5' Rt to Sossman Rd Ramp B Sta 20+75 17.5' Rt	128	1		24	52											III	III	3			X				C-15.91			4.5		10			1367.79			25	10			CB128 to CB130
Sossaman Rd Ramp B Sta 20+75 17.5' Rt to Sta 20+75 28.5' Rt	130	1		24	8											III	III	3			X				C-15.91			4.1		20			1366.86			3	2			CB130 to MH132
Sossaman Rd Ramp B 20+75 28.5' Rt to to Sta 903+87.2 146.9' Rt	132	1		24	187											III	III	3			X			24	C-18.10			4.1					1367.10			68	38			MH132 to MH136
Sossaman Rd Ramp B 18+87.6 17.50' Rt to US60 Med Sta 903+87.20 146.90' Rt	134	1		24	8											III	III	3			X				C-15.91			3.7		10			1365.99			3	2			CB134 to MH136
US60 Med Sta 903+87.2 146.9' Rt to Sta 902+00 136.5' Rt	136	1		24	188											III	III	3			X			24	C-18.10			3.8					1366.20			68	38			MH136 to MH138
Sheet Total																								3						55							337	147			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 WWW.AZTECLLC.US

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CLINTON W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.05

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:11 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-05.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A48	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	End Sec	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Grate Depth (In.)	Grate L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (Ft.)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
US60 Med Sta 902+00 136.5' Rt to Sta 902+00 125.5' Rt	138	1		24	8												III	III	3			X			24	C-18.10			3.7					1365.60			3	2			MH138 to CB140
US60 Med Sta 902+00 125.5' Rt to Sta 901+99.17 56.83' Rt	140	1		24	68												III	III	3			X				C-15.91			3.9		5			1365.39			35	14			CB140 to Existing Lateral
US 60 Med Sta 910+64.41 92.5' Rt to Sta 910+64.64 54.85' Rt	144	1		24	39												III	III	3			X				C-15.91			4.2		10			1370.34			21	8			CB144 to Existing Lateral
US60 Med Sta 913+19.45 92.5' Rt to Sta 913+19.46 56.3' Rt	146	1		24	39												III	III	3			X				C-15.91			4.5		15			1373.33			21	8			CB146 to Existing Lateral
US60 Med Sta 917+09.52 164.09' Rt to Sta 915+74.18 105' RT	148	1		24	150												III	III	3			X																97	30			Existing Manhole to MH150
US60 Med Sta 915+74.18 105.5' Rt to US60 Med Sta 915+74.18 54.5' Lt	150	1		24	51												III	III	3			X			24	C-18.10			3.4					1377.40			25	10			MH150 to Existing Lateral
US60 Med Sta 867+55.89 105.5' Lt to Sta 867+55.89 94.5' Lt	155	1		30	8												III	III	2			X			24	C-18.10			7.7					1353.60			5	2			MH155 to CB156
US60 Med Sta 867+55.89 94.5' Lt to Sta 867+55.89 66.89' Lt	156	1		30	29												III	III	2			X				C-15.92			5.7		10			1351.31			24	7			CB156 to Existing Manhole
US60 Med Sta 869+82.84 103.5' Lt to Sta 867+55.89 105.5' Lt	158	1		30	227												III	III	2			X			24	C-18.10			5.4					1352.10			134	56			MH158 to MH155
Sheet Total																									4						40							365	137			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Registered ARIZONA, U.S.A.

DWG NO. G-4.06

___ OF ___

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 12:43:12 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-06.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A49	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth (Ft.)	L (0.0) (Ft.)	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 871+00 92.5' Lt to	160	1		24	8												III	III	3			X				C-15.91			5.0		10			1352.46			4	2			CB160 to Pipe 163
Sta 871+00 103.5' Lt																																									(Prefabricated Tee)
US60 Med Sta 874+81.24 103.5' Lt to	162	1		30	251												III	III	2			X			24	C-18.10			6.2					1354.60			180	62			MH162 to MH163
Sta 872+30 103.5' Lt																																									
US60 Med Sta 872+30 103.5' Lt to	163	1		30	247												III	III	2			X			24	C-18.10			8.3					1355.80			164	61			MH163 to MH158
Sta 869+82.84 103.5' Lt																																									
US60 Med Sta 879+00 120.5' Lt to	164	1		24	47												III	III	3			X				C-15.91			3.9		10			1355.42			30	9			CB164 to Existing Lateral
Sta 878+96.26 74.33' Lt																																									(Prefabricated Tee)
US60 Med Sta 881+75 108+65 to	166	1		24	75												III	III	3			X				C-15.91			4.5		10			1356.86			43	15			CB166 to Existing Lateral
Sta 881+00.81 59.78' Lt																																									
US60 Med Sta 883+37.05 114.17' Lt	167																								24	C-18.10			8.6					1358.00							MH167 (New Manhole on Existing
																																									Trunk Line for Maint. Access)
US60 Med Sta 885+43 106.5' Lt to	168	2		24	28												II	II	1			X				C-15.92			6.4		15			1358.61			23	5			CB168 to Existing Trunk Line
Sta 885+43 79.94' Lt																																									
US60 Med Sta 888+70 104.5' Lt to	170	1		24	31												III	III	3			X				C-15.91			5.3		20			1359.94			21	6			CB170 to Existing Trunk Line
Sta 888+70 78.56' Lt																																									
US60 Med Sta 891+00 126.3' Lt to	171	1		54	51												II	II							24	C-18.10			6.9					1361.10			100	50			MH171 to MH172
Sta 891+00 76.12' Lt																									24	C-18.10															(Maintenance Access)
Sheet Total																									5						65						565	210			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.07

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTISS W. SLAGELL Date Signed Arizona, U.S.A.

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:12 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-07.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A50	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00) (In.)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00) (In.)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail - NRCP	Size, (In) Manhole NRCIPCP	Standard or Detail CHDPEPP	End Sec (Each)	S-Single / D-Double (Ea)	Location	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type (Grate)	Elev. (0.00) (Ft.)	Depth (In.)	L (0.0) (Ft.)	Inlet Depression	Pipe Exc (0) (Cubic Yard)	Pipe Bk-fl (0) (Cubic Yard)	Drn Exc (0) (Cubic Yard)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
US60 Med Sta 892+63.78 116.5' Lt to Sta 892+63.78 75.75' Lt	174	1		24	42												III	III	3			X				C-15.91			5.3		15			1361.56			28	8			CB174 to Existing Trunk Line
US60 Med Sta 897+80.8 116.5' Lt to Sta 897+80.8 86.13' Lt	178	1		24	32												III	III	3			X				C-15.91			5.1		15			1363.84			21	7			CB178 to Existing Trunk Line
US60 Med Sta 903+00 123.69' Lt to Sta 903+00 101.89' Lt	180	1		24	22												III	III	2			X				C-15.91			5.2		5			1365.91			17	5			CB180 to Existing Trunk Line
US60 Med Sta 899+00 127.0' Lt to Sta 899+00 88.47' Lt	181	1		54	39												II	II							24	C-18.10			6.6					1364.60			65	23			MH181 to MH182
																									24	C-18.10																(Maintenance Access)
US60 St 901+82.45 118.32' Lt to Sta 901+82.79 97.87' Lt	184	1		24	21												III	III	3			X				C-15.91			4.8		5			1365.56			13	4			CB184 to MH183
US60 Med Sta 901+82.45 78.44' Lt to Sta 901+82.79 97.87' Lt	185	2		24	20												II	II	1			X			24	C-18.10			5.5					Conc Cap			17	4			Connection Between Exst Pipe and MH183
US60 Med Sta 904+07.2 131.64' Lt to Sta 904+07.2 105.59' Lt	188	1		30	27												III	III	2			X				C-15.91			6.3		15			1366.20			24	7			CB188 to MH187 (Concrete Cap)
																									24	C-18.10			5.0					Conc Cap							
US60 Med Sta 904+07.2 142.64' Lt to Sta 904+07.2 131.64' Lt	189	1		30	8												III	III	2			X			24	C-18.10			6.1					1366.40			6	2			MH189 to CB188
US60 Med Sta 905+81 104.5' Lt to Sta 905+81 111.12' Lt	190	1		24	4												III	III	3			X				C-15.91			6.0		10			1367.45			2	1			CB190 to Existing Trunk Line (Prefabricated Tee)
Sheet Total																									5						65						193	61			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecaz.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 — LOCATION: LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.08

TRACS NO. H 5686 04C — 202-B(008)B — ___ OF ___

RE., DATE: 01-05-2000

Plotted By: kleahy at 12:43:12 PM — 1/26/2005 — r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-08.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A51	A1124	

202 MA 029

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

DESCRIPTION							CSP						CAP				RCP		NRCP	NRCIPCP	CHDPEPP	
Station	Plan Ref No. ⬡	◓ Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	◪ Corrugation	Wall Thickness (0.00) (In.)	Zinc (Coating)	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00) (In.)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S
Sossaman Rd Ramp A Sta 16+35 22.5' LT to US60 Med Sta 904+07.20 142.64' Lt	191	1		30	168												III	III	2			X
US60 Med Sta 910+63.10 104.5' Lt to Sta 910+63.18 77.80' Lt	192	1		24	28												III	III	3			X
Sossaman Rd Ramp A Sta 18+65 22.5' Lt to Sta 16+35 22.50' Lt	193	1		24	230												III	III	3			X
US60 Med Sta 913+18.57 104.5' Lt to Sta 913+18.57 77.10' Lt	194	1		24	28												III	III	3			X
US60 Med Sta 915+74.20 104.5' Lt to Sta 915+49.21 76.97' Lt	195	1		24	39												III	III	3			X
Ramp E-N Sta 65+92.07 19.5' Lt to US60 953+20.88 92.83' Rt	196	1		24	69												III	III	3			X
Ramp E-N Sta 65+92.01 59.13' Lt to Sta 65+92.07 19.50' Lt	197	1		24	35												III	III	3			X
US60 Med Sta 910+63.10 115.5' Lt to Sta 910+63.10 104.5' Lt	199	1		24	7												III	III	3			X
Ellsworth Rd Ramp B 14+74.49 107.27' Rt to Sta 14+66 7.50' Rt	267	4		24	97												III	III				X
Sheet Total																						

	END TREATMENT														QUANTITIES (Cubic Yard)				
Plan Ref No.	End Sec (Each): C-13.20 & C-13.25	End Sec: Detail -	Catch basin, Manhole, Headwall & Junction Structure: Size, (In) Manhole	Standard or Detail	S-Single / D-Double (Ea)	Location	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Grate: Type	Grate: Elev. (0.00) (Ft.)	Inlet Depression: Depth (In.)	Inlet Depression: L (0.0) (Ft.)	Pipe Exc (0)	Pipe Bkfl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
191			24	C-18.10			6.2					1367.10			127	41			MH191 to MH189
192				C-15.91			5.0		10			1370.14			17	6			CB192 to Existing Manhole
193			24	C-18.10			5.1					1370.10			144	57			MH193 to MH191
194				C-15.91			5.3		10			1373.09			18	6			CB194 to Existing Manhole
195				C-15.91			5.4		10			1377.65			26	8			CB195 to Existing Trunk Line (Prefabricated Wye)
196				C-15.92			6.0		15			1422.65			52	14			CB196 to Existing Manhole
197				DH			3.0					1420.00			30	7			CB197 to CB196
199			24	C-18.10			4.8					1370.40			3	1			MH199 to CB192
267				B-11.11								1426.40			98	19			Existing SW Basin to Existing Catch Basin
Sheet Total			3						45						515	159			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◓ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer, CERTIFICATE NO. 21868, CURTIS W. SLAGELL (CIVIL), Date Signed, ARIZONA, U.S.A.

DWG NO. G-4.09

TRACS NO. H 5686 04C | 202-B(008)B | ____ OF ____

REV. DATE: 01-05-2000

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A52	A1124	

202 MA 029

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

DESCRIPTION

Station	Plan Ref No. ⬡	◓ Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)
US60 Med Sta 1023+10.8 161.60' Rt to	400	7		24	91	
Sta 1022+30.10 119.89' Rt						
US60 Med Sta 1022+30.10 119.89' Rt to	402	1		24	10	
Sta 1022+30.10 106.5' Rt						
US60 Med Sta 1025+07.5 104.5' Rt to	404	1		24	277	
Sta 1022+30.10 82.96' Rt						
US60 Med Sta 1022+30.10 106.5' Rt to	406	1		24	24	
Sta 1022+30.10 82.96' Rt						
US60 Med Sta 1028+52.02 104.5' Rt to	408	1		24	51	
Sta 1028+52.02 54.75' Rt						
Els Rd Ramp D Sta 21+96.20 13.50' Rt to	410	1		24	137	
US60 Med Sta 1037+20 122.08' Rt						
US60 Med Sta 1037+20 122.08' Rt to	412	2		24	49	
Sta 1037+69.97 118.67' Rt						
US60 Med Sta 1037+69.75 86.61' Rt to	414	1		30	57	
Sta 1037+68.84 147.30' Rt						
US60 Med Sta 1038+60 111.97' Rt to	416	2		24	28	
Sta 1038+60 85.01' Rt						
Sheet Total						

CSP / CAP / RCP / NRCP / NRCIPCP / CHDPEPP

Station	CSP ◪ Corrugation	CSP Wall Thickness (0.00) (In.)	CSP Coating: Zinc	CSP Coating: Bit. Coated Zinc	CSP Coating: Aluminum	CSP Coating: Bit. Coated Aluminum	CAP ◪ Corrugation	CAP Wall Thickness (0.00) (In.)	CAP Uncoated	CAP Bit. Coated	RCP Class - Non Trench	RCP Class - Trench	NRCP Class	NRCIPCP Min Wall Thickness (0) (In.)	CHDPEPP AASHTO M-294 Type C	CHDPEPP AASHTO M-294 Type S
US60 Med Sta 1023+10.8 161.60' Rt to											V	V				
Sta 1022+30.10 119.89' Rt																
US60 Med Sta 1022+30.10 119.89' Rt to											III	III	3			X
Sta 1022+30.10 106.5' Rt																
US60 Med Sta 1025+07.5 104.5' Rt to											III	III	3			X
Sta 1022+30.10 82.96' Rt																
US60 Med Sta 1022+30.10 106.5' Rt to											III	III	3			X
Sta 1022+30.10 82.96' Rt																
US60 Med Sta 1028+52.02 104.5' Rt to											III	III	3			X
Sta 1028+52.02 54.75' Rt																
Els Rd Ramp D Sta 21+96.20 13.50' Rt to											III	III	3			X
US60 Med Sta 1037+20 122.08' Rt																
US60 Med Sta 1037+20 122.08' Rt to											II	II	1			X
Sta 1037+69.97 118.67' Rt																
US60 Med Sta 1037+69.75 86.61' Rt to											III	III	3			X
Sta 1037+68.84 147.30' Rt																
US60 Med Sta 1038+60 111.97' Rt to											II	II	1			X
Sta 1038+60 85.01' Rt																
Sheet Total																

END TREATMENT

Station	End Sec (Each) Detail - C-13.20	End Sec (Each) Detail - C-13.25	Catch basin, Manhole, Headwall & Junction Structure: Size, (In) Manhole	Standard or Detail	S-Single / D-Double (Ea)	Location	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Grate Type	Grate Elev. (0.00) (Ft.)	Inlet Depression Depth (In.)	Inlet Depression L (0.0) (Ft.)
US60 Med Sta 1023+10.8 161.60' Rt to			24	C-18.10			22.0					1475.60		
Sta 1022+30.10 119.89' Rt														
US60 Med Sta 1022+30.10 119.89' Rt to			24	C-18.10			5.5					1454.50		
Sta 1022+30.10 106.5' Rt														
US60 Med Sta 1025+07.5 104.5' Rt to				C-15.92			5.4		15			1455.70		
Sta 1022+30.10 82.96' Rt			24	C-18.10								1451.40		
US60 Med Sta 1022+30.10 106.5' Rt to				C-15.92			3.0		10			1451.64		
Sta 1022+30.10 82.96' Rt														
US60 Med Sta 1028+52.02 104.5' Rt to				C-15.91			4.3		10			1463.10		
Sta 1028+52.02 54.75' Rt														
Els Rd Ramp D Sta 21+96.20 13.50' Rt to				C-15.92			5.2		5			1476.56		
US60 Med Sta 1037+20 122.08' Rt														
US60 Med Sta 1037+20 122.08' Rt to				C-15.92			8.1		10			1478.55		
Sta 1037+69.97 118.67' Rt														
US60 Med Sta 1037+69.75 86.61' Rt to	1													
Sta 1037+68.84 147.30' Rt														
US60 Med Sta 1038+60 111.97' Rt to				C-15.92			7.5		5			1480.27		
Sta 1038+60 85.01' Rt														
Sheet Total	1		3						55					

QUANTITIES (Cubic Yard) / REMARKS

Station	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 1023+10.8 161.60' Rt to	158	18			MH400 to MH402
Sta 1022+30.10 119.89' Rt					
US60 Med Sta 1022+30.10 119.89' Rt to	5	2			MH402 to CB406
Sta 1022+30.10 106.5' Rt					
US60 Med Sta 1025+07.5 104.5' Rt to	133	56			CB404 to MH405
Sta 1022+30.10 82.96' Rt					
US60 Med Sta 1022+30.10 106.5' Rt to	8	5			CB406 to MH405
Sta 1022+30.10 82.96' Rt					
US60 Med Sta 1028+52.02 104.5' Rt to	15	6			CB408 to Existing Lateral
Sta 1028+52.02 54.75' Rt					
Els Rd Ramp D Sta 21+96.20 13.50' Rt to	87	27			CB410 to CB412
US60 Med Sta 1037+20 122.08' Rt					
US60 Med Sta 1037+20 122.08' Rt to	45	10			CB412 to Pipe 414
Sta 1037+69.97 118.67' Rt					(Prefabricated Tee)
US60 Med Sta 1037+69.75 86.61' Rt to	49	11			Exist Lateral to Drainage Ditch
Sta 1037+68.84 147.30' Rt					(Prefabricated Tee)
US60 Med Sta 1038+60 111.97' Rt to	29	6			CB416 to Existing Lateral
Sta 1038+60 85.01' Rt					(Prefabricated Tee)
Sheet Total	529	141			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◓ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION

A	$2\frac{2}{3} \times \frac{1}{2}$	D	6x2
B	3x1	E	3x1 or $9 \times 2\frac{1}{2}$
C	$9 \times 2\frac{1}{2}$		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) Certificate No. 21868 CURTIS W. SLAGELL, Date Signed, ARIZONA, U.S.A.

DWG NO. G-4.10

____ OF ____

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 12:43:13 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-10.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A53	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00) (In.)	Zinc Coating	Bit. Coated Zinc Coating	Aluminum Coating	Bit. Coated Aluminum Coating	Corrugation	Wall Thickness (0.00) (In.)	Uncoated	Bit. Coated	Class - Non Trench (CSP)	Class - Trench (CSP)	Class (CAP)	Min Wall Thickness (0) (In.) (RCP)	AASHTO M-294 Type C (NRCP)	AASHTO M-294 Type S (NRCIPCP)	C-13.20 & C-13.25 (NRCIPCP)	Detail - (NRCIPCP)	Size, (In) Manhole (CHDPEPP)	Standard or Detail (CHDPEPP)	End Sec (Each)	S-Single / D-Double (End Treatment)	Location (Catch basin, Manhole, Headwall & Junction Structure)	H (0.0) (Ea)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type (Grate)	Elev. (0.00) (Ft.)	Depth (Ft.)	Inlet Depression L (0.0) (In.)	Pipe Exc (0) (Cubic Yard)	Pipe Bk-fl (0) (Cubic Yard)	Drn Exc (0) (Cubic Yard)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
US60 Med Sta 1040+00 106.79' Rt to	418	1		24	35												III	III	3			X				C-15.92			5.2		10			1481.31			25	7			CB418 to Existing Trunkline
Sta 1039+77.69 82.66' Rt																																										(Prefabricated Wye)
US60 Med Sta 1042+00.65 106.50' Rt to	420	1		24	29												III	III	3			X				C-15.92			6.0					1482.65			27	7			CB420 to Existing Lateral
Sta 1042+00.65 75.94' Rt																																										(Prefabricated Tee)
US60 Med Sta 1043+40 106.5' Rt to	422	1		24	43												III	III	3			X				C-15.92			5.0					1483.48			28	9			CB422 to Existing Lateral
Sta 1043+11.52 76.15' Rt																																										(Prefabricated Wye)
US60 Med Sta 1046+40 106.5' Rt to	424	1		24	51												III	III	3			X				C-15.92			4.8		15			1485.23			30	10			CB424 to Existing Lateral
Sta 1040+00.65 70.42' Rt																																										
US60 Med Sta 1049+50.5 103.48' Rt to	426	1		24	44												III	III	3			X				C-15.92			3.7		10			1487.26			20	9			CB426 to Existing Lateral
Sta 1049+50.5 60.89' Rt																																										
US60 Med Sta 1052+00.46 100.29' Lt to	428	1		24	47												III	III	3			X				C-15.92			3.9		15			1489.23			51	10			CB428 to Existing Lateral
Sta 1052+00.52 57.97' Rt																																										
US60 Med Sta 1055+25.57 94.50' Rt to	430	1		24	41												III	III	3			X				C-15.92			5.1		15			1492.95			27	9			CB430 to Existing Lateral
Sta 1055+25.57 54.46' Rt																																										
US60 Med Sta 1058+77.38 97.71' Rt to	432	1		24	27												III	III	3			X				C-15.92			4.6		15			1498.58			15	6			CB432 to Existing Lateral
Sta 1058+77.33 72.45' Rt																																										
US60 Med Sta 1022+31.04' 169.00' Lt to	433	1		24	52												III	III	3			X			24	C-18.10			7.1					1460.60			32	10			MH433 to CB438
Sta 1022+30.67 113.92' Lt																																										
Sheet Total																									1						80						255	77			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.11

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:14 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-11.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A54	A1124	
		202 MA 029			

DESCRIPTION							CSP									CAP			RCP			NRCP	NRCIPCP	CHDPEPP	END TREATMENT															QUANTITIES				
				In.	In.	Ft. / Degree	In.	Coating								In.							In.		Each															Cubic Yard				
																									End Sec	Catch basin, Manhole, Headwall & Junction Structure																		
																										Ea			Ft.			Grate Ft.		Inlet Depression										
Station	Plan Ref No.	◐ Controlling Fill Height Range	Size, Corrugated	Size, Smooth	Length (0)	Skew (0)	◪ Corrugation	Wall Thickness (0.00)	Zinc	Blt. Coated Zinc	Aluminum	Blt. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00)	Uncoated	Blt. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (in) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth In.	Depth Ft.	L (0.0)	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 1064+30 80.50' Rt to	434	1		24	156											III	III	3			X				C-15.92			6.1		20			1509.85			117	31			CB434 to Pipe 435
Sta 1062+73.96 79.86' Rt																																											(Prefabricated Tee)
Crismon Rd Ramp B 16+80.26 19.50' Rt to	435	1		24	69											III	III	3			X				C-15.92			6.7		20			1505.82			56	14			CB435 to Existing Lateral
US60 Med Sta 1062+74.45 54.50' Rt																																											
US60 Med Sta 1023+45.67 167.75' Lt to	436	2		24	100											II	II	2			X																91	20			Existing Catch Basin to MH433
Sta 1022+31.04 169.00' Lt																																											
US60 Med Sta 1070+50 82.5' Rt to	437	2		24	64											II	II	1			X				C-15.92			6.7			30		1520.50			66	13			CB437 to MH439
Crismon Rd Ramp B Sta 24+55.53 39.77' Lt																																											
US60 Med Sta 1022+30.67 113.92' Lt to	438	1		24	53											III	III	3			X				C15.92			5.1			30		1451.52			32	11			CB438 to Existing Lateral
Sta 1021+95.09 76.25' Lt																																											(Prefabricated Wye)
Crismon Rd Ramp B Sta 24+55.53 39.77' Lt	439	2		24	305											II	II	1			X			24	C-18.10			6.8					1506.80			304	61			MH439 to MH42
to Sta 27+60 38.59' Lt																																											
US60 Med Sta 1025+00 95.81' Lt to	440	1		24	29											III	III	3			X				C-15.92			4.3		20			1455.84			12	5			CB440 to Existing Lateral
Sta 1024+82.08 75.52' Lt																																											(Prefabricated Wye)
US60 Med Sta 1025+00.80 108.20' Lt to	441	1		24	7											III	III	3			X				C-15.80			4.0					1455.90			2	1			CB441 to CB440
Sta 1025+00 95.81' Lt																																											
US60 Med Sta 1027+90 92.5' Lt to	442	1		24	25											III	III	3			X				C-15.91			6.0		15			1461.79			23	5			CB442 to Existing Lateral
Sta 1027+74.5 74.6' Lt																																											(Prefabricated Wye)
Sheet Total																								1						75	60						703	161			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◐ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.12

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

REV. DATE: 01-05-2000

DATE- | LOCATION- | REVISIONS- | FINISHED PLANS- | SURVEY NO.

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A55	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc Coating (In.)	Bit. Coated Zinc	Aluminum Coating (In.)	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated (In.)	Bit. Coated	Class - Non Trench (In.)	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C (In.)	AASHTO M-294 Type S	C-13.20 & C-13.25 (Each)	Detail - (End Sec)	Size, (In) Manhole (Ea)	Standard or Detail	S-Single / D-Double	Location (Catch basin, Manhole, Headwall & Junction Structure)	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type (Grate)	Elev. (0.00) (Ft.)	Depth (Ft.)	L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (Cubic Yard)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
Elsworth Rd Ramp D Sta 16+00 13.5' Rt to US60 Med Sta 1029+52.02 104.5' Rt	443	1		24	156												III	III	3			X			C-15.92			6.4		10			1472.51			111	31			CB443 to CB408
Elsworth Rd Ramp C Sta 21+10.70 5.5' Lt to US60 Med Sta 1034+00 103.50' Lt	444	1		24	97												III	III	3			X			C-15.91			6.4		15			1475.38			73	20			CB444 to MH900
US60 Med Sta 1036+20 122.91' Lt to Elsworth Rd Ramp C Sta 21+10.70 5.5' Lt	446	1		24	127												III	III	3			X			C-15.91			5.9		10			1477.40			92	25			CB446 to CB444
US60 Med Sta 1037+70.97 112.78' Lt to Sta 1037+70.97 75.91' Lt	448	2		30	35												II	II	1			X			C-15.91			7.3		10			1479.31			32	7			CB448 to Existing Lateral
US60 Med Sta 1038+80 105.48' Lt to Sta 1037+70.97 112.78' Lt	450	1		24	107												III	III	3			X			C-15.91			6.1		10			1480.52			76	21			CB450 to CB448
US60 Med Sta 1041+00 92.50' Lt to Sta 1038+80 105.48' Lt	454	1		24	218												III	III	3			X			C-15.91			6		10			1482.37			153	44			CB454 to CB450
US60 Med Sta 1042+75.16 92.50' Lt to Sta 1041+00 92.50' Lt	456	1		24	173												III	III	3			X			C-15.91			6.0		10			1483.45			118	35			CB456 to CB454
US60 Med Sta 1049+50 92.50' Lt to Sta 1049+50 124.5' Lt	457	1		24	29												III	III	3			X			C-15.91 C-15.80			7.9 4.9		10			1487.66 1483.60			18	6			CB457 to CB453
US60 Med Sta 1047+25 92.50' Lt to Sta 1047+25 130.83' Lt	458	1		24	26												III	III	3			X	1		C-15.91			8.0		10			1486.23			19	7			CB458 to Drainage Ditch
Sheet Total																							1							95						692	196			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 — LOCATION: LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C — 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.13

___ OF ___

RL: DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY/MAPPING RSR DATE- LOCATION- DELINEATOR/GUARDRAIL CURB & GUTTER FINISHED PLANS- SURVEY NO.

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A56	A1124	
		202 MA 029			

DESCRIPTION								CSP								CAP			RCP		NRCP	NRCIPCP	CHDPEPP	END TREATMENT														QUANTITIES	
				In.	In.	Ft.	Degree	In.	Coating							In.					In.			Each														Cubic Yard	
																												Catch basin, Manhole, Headwall & Junction Structure											
																									Ea					Ft.		Grate	Ft.							
Station	Plan Ref No.	◐ Controlling Fill Height Range	Size, Corrugated	Size, Smooth	Length (0)	Skew (0)	◪ Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail - End Sec	Size, (In) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth In.	Depth Ft.	L (0.0)	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 1052+00.70 92.50' Lt to Sta 1049+50.41 92.5' Lt	459	1		24	248											III	III	1		X				C-15.91			5.6		15			1489.47			161	50			CB459 to CB457
US60 Med Sta 1049+50 66.62' Lt to Sta 1049+50 92.50' Lt	460	2		24	27											II	II	1		X							7.9					1487.66			23	5			Existing Lateral to CB457
US60 Med Sta 1052+00.7 92.5' Lt to Sta 1052+00.7 66.76' Lt	462	1		24	27											III	III	3		X															17	5			Existing Lateral to CB459
US60 Med Sta 1055+26.46 92.5' Lt to Sta 1055+25.60 126.05' Lt	463	1		24	33											III	III	3		X				C-15.91			7.8		15			1493.13			23	5			CB463 to CB461
																								C-15.80			5.1					1487.00							
US60 Med Sta 1055+27.24 68.34' Lt to Sta 1055+26.46 92.50' Lt	464	2		24	25											II	II	1		X															16	6			Existing Lateral to CB463
US60 Med Sta 1058+60.76 75.56' Lt to Sta 1058+60.76 92.50' Lt	466	2		24	17											II	II	1		X															13	3			Existing Lateral to CB467
US60 Med Sa 1058+60.76 92.50' Lt to Sta 1055+26.46 92.50' Lt	467	1		24	332											III	III	3		X				C-15.91			6.4		15			1498.40			225	67			CB467 to CB463
US60 Med Sta 1063+85 109.92' Lt to Sta 1062+51.47 99.83' Lt	468	1		24	131											III	III	3		X				C-15.91			5.5		15			1507.66			93	26			CB468 to CB470
US60 Med Sta 1068+56 80.50' Rt to Crismon Rd Ramp A Sta 21+50 25' Rt	469	1		24	199											III	III	3		X				C-15.91			6.1		15			1517.78			70	17			CB469 to MH471
Sheet Total																														75						641	184			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◐ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec-us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

DWG NO. G-4.14

___ OF ___

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A57	A1124	
		202 MA 029			

DESCRIPTION																												END TREATMENT																		QUANTITIES	
					In.	In.	Ft.	Degree		In.	Coating						In.									Each		Catch basin, Manhole, Headwall & Junction Structure																		Cubic Yard	
																										End Sec	Ea					Ft.			Grate	Ft.		Inlet Depression									
Station	Plan Ref No.	◐ Controlling Fill Height Range	Size, Corrugated	Size, Smooth	Length (0)	Skew (0)	◪ Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (in) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth	L (0.0)	In.	Ft.	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 1062+51.47 99.83' Lt to	470	1		24	5											III	III			X					C-15.91			5.8		5			1505.68			2	1				CB470 to Existing Pipe (Vertical)
Sta 1062+51.47 99.83' Lt																																															(Prefabricated Tee)
Crismon Rd Ramp A Sta 21+50 25' Rt to	471	2		24	216											II	II	1		X				24	C-18.10			6.2					1512.20			106	23				MH471 to CB41
Sta 23+65 25' Rt																																															
US60 Med Sta 1065+19 80.50' Lt to	472	1		24	59											III	III	3		X					C-15.91			5.5		15			1511.60			37	12				CB472 to CB26
Crismon Rd Ramp A Sta 16+63.69 11.50' Lt																																															
US60 Med Sta 1072+00 80.50' Lt to	474	1		24	113											III	III	3		X					C-15.91			5.6		15			1522.41			89	23				CB474 to CB41
Crismon Rd Ramp A Sta 23+65 25' Rt																																															
US60 Med Sta 1025+07.5 115.5' Rt to	480	1		24	8											III	III	3		X					C-15.80			5.2					1455.93			4	2				CB480 to CB404
Sta 1025+07.5 104.5' Rt																																															
Ellsworth Rd Ramp C Sta 15+00 19.50' Lt	481	1		24	108											III	III	3		X					C-15.91			5.0		20			1473.46			70	22				CB481 to MH904
to US60 Med Sta 1028+50.7 103.5' Lt																																															
US60 Med Sta 1045+00 92.50' Lt to	482	1		24	24											III	III	3		X	1				C-15.91			7.4		10			1484.87			17	7				CB482 to Drainage Ditch
Sta 1045+00 128.89' Lt																																															
Ramp S-W Sta 34+15 30.50' Rt to	497	1		24	18											III	III	3		X					C-15.80			6.2					1424.30			19	4				CB497 to Existing Manhole
Sta 34+32.84 37.03' Rt																																															
Ramp S-W Sta 17+05 13.5' Lt to	498	1		24	185											III	III	3		X	1				C-15.91			5.0					1464.27			141	35				CB498 to Basin NW-1
Sta 17+05 166.59' Rt																																															
Sheet Total																					2		1							65							485	129				

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◒ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-1505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (CIVIL) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.15

___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:15 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-15.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A58	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	CSP Class - Non Trench	CAP Class - Trench	RCP Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	NRCP C-13.20 & C-13.25	NRCIPCP Detail -	CHDPEPP Size, (In)	End Sec Standard or Detail	End Sec S-Single / D-Double	Catch basin, Manhole, Headwall & Junction Structure Location	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Grate Type	Grate Elev. (0.00) (Ft.)	Inlet Depression Dep'th (In.)	Inlet Depression L (0.0) (Ft.)	Pipe Exc (0) (Cubic Yard)	Pipe Bk'fl (0) (Cubic Yard)	Drn Exc (0) (Cubic Yard)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
Ramp S-W Sta 34+15 17.50' Rt to Sta 34+15 30.5' Rt	499	1		24	8												III	III	3			X				C-15.91			6.0		5			1424.11			7	2			CB499 to CB497
Ramp E-N Sta 58+55 19.5' Lt to Sta 58+55 71.96' Lt	500	1		24	51												III	III	3			X	1			C-15.92			6.5		15			1439.97			15	6			CB500 to Drainage Ditch
Ramp E-N Sta 55+12 15.5' Rt to Sta 55+12 93.79' Lt	501	1		24	115												III	III	3			X	1			C-15.92			4.5					1448.58			63	23			CB501 to Drainage Ditch
Ramp E-N Sta 52+75 15.5' Rt to Sta 52+75.08 108.75' Lt	502	1		24	120												III	III	3			X	1			C-15.92			4.5					1454.18			7	6			CB502 to Drainage Ditch
Ramp S-W Sta 33+00 17.50' Lt to Sta 34+15 17.50' Rt	503	1		24	112												III	III	3			X				C-15.91			6.0		5			1425.21			75	22			CB503 to CB499
Ramp S-W Sta 25+25 19.5' Rt to Sta 25+06.70 98.76' Rt	504	1		24	76												III	III	3			X	1			C-15.92			7.7		10			1448.04			63	15			CB504 to Basin NW-1
Ramp S-E Sta 20+75.50 15.26' Lt to Sta 22+12.10 15.26' Lt	506	1		24	134												III	III	3			X				C-15.92			5.0		5			1476.38			85	27			CB506 to CB508
Ramp E-N Sta 54+27 15.5' Rt to Sta 54+27 99.95' Lt	507	1		24	110												III	III	3			X	1			C-15.92			4.5					1450.35			8	5			CB507 to Drainage Ditch
Ramp S-E Sta 22+12.10 15.26' Lt to Sta 22+30.14 171.31' Rt	508	5		24	195												IV	IV					1			C-15.92			5.9					1475.85			172	39			CB508 to NW-2 Basin
Sheet Total																							6								40							495	145			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLABELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.16

___ OF ___

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 12:43:15 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-16.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A59	A1124	
		202 MA 029			

Station	Plan Ref No.	⬡ Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	◪ Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	End Sec (Each)	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Grate Depth (In.)	Grate L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (Ft.)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
Ramp E-N Sta 53+50 15.5' Rt to Sta 53+50 101.69' Lt	509	1		24	116												III	III	3			X	1			C-15.92			4.5					1452.29			6	3			CB509 to Drainage Ditch
Ramp S-E Sta 22+83 15.26' Lt to Sta22+12.10 15.26' Lt	511	1		24	68												III	III	3			X				C-15.92			5.0		5			1475.83			44	14			CB511 to CB508
Ramp S-E Sta 25+00 15.5' Lt to Sta 25+00 172' Rt	512	4		24	194												III	III				X	1			C-15.91			5.0					1477.64			155	39			CB512 to Basin NW-1
Elsworth Ramp B Sta 21+46.49 5.50' Rt to Sta 21+50.66 18.06' Rt	600	1		24	25												III	III	3			X				C-15.91			4.4					1428.03			14	5			CB600 to Existing Manhole Stubout
Elsworth Ramp B Sta 23+55.5 5.5' Rt to Sta 21+46.5 5.5' Rt	601	1		24	205												III	III	3			X				C-15.91			4.0		5			1429.53			88	41			CB601 to CB600
Elsworth Rd Ramp B Sta 21+46.49 18.19' Rt to Sta 21+46.49 5.50' Rt	602	1		24	9												III	III	3			X				C-15.80			4.0					1428.00			3	2			CB602 to CB600
Elsworth Rd Ramp B Sta 21+94.09 100.95' Rt to Sta 21+46.49 18.19' Rt	603	4		18	94												III	III	2			X				B-11.11											69	15			Southeast Infield Area to CB602
Elsworth Rd Ramp B Sta 28+50 19.08' Rt to Sta 28+28.76 18.99' Rt	604	1		24	20												III	III	3			X				C-15.80			6.0					1439.00			12	4			CB604 to Culvert 606 (Prefabricated Tee)
Elsworth Rd Ramp B Sta 28+80 25.43' Lt to Sta 28+80 13.5' Lt	605	1		24	7												III	III	3			X				C-15.80			4.8					1438.40			4	1			CB605 to CB652
Sheet Total																							2								10							395	124			

FILL HEIGHT RANGE TABLE (Ft.)												
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◒ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.17

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:15 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-17.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A60	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	CSP Corrugation	CSP Wall Thickness (0.00)	CSP Zinc Coating	CSP Bit. Coated Zinc Coating	CSP Aluminum Coating	CAP Bit. Coated Aluminum Coating	CAP Corrugation	CAP Wall Thickness (0.00)	CAP Uncoated	CAP Bit. Coated	RCP Class - Non Trench	RCP Class - Trench	RCP Class	RCP Min Wall Thickness (0) (In.)	NRCP AASHTO M-294 Type C	NRCIPCP AASHTO M-294 Type S	CHDPEPP C-13.20 & C-13.25	End Sec Detail - Size, (In) Manhole	Standard or Detail	Each S-Single / D-Double	Catch basin, Manhole, Headwall & Junction Structure Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Grate Depth (Ft.)	Grate L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (Ft.)	Inlet Depression Pipe Bk-fl (0) (Ft.)	Inlet Depression Drn Exc (0) (Ft.)	Inlet Depression Berm/Dike Emb (0) (Ft.)	QUANTITIES Cubic Yard	REMARKS
Ellsworth Rd Ramp B Sta 28+66.24	606	4		24	240												III	III			X		2															243	48			Culvert 606
140.05' Lt to Sta 28+28.68 72.12' Rt																																								
Ramp W-S Sta 49+20 15.5' Lt to	607	1		24	89												III	III	3		X				C-15.92			4.5		15			1462.24			60	17			CB607 to Existing Basin NW-2
Sta 49+23.43 70.42' Rt																																								
Ramp W-S Sta 45+50 15.5' Lt to	608	1		24	132												III	III	3		X				C-15.92			4.9		15			1456.75			76	27			CB608 to CB609
Sta 44+20.25 17.5' Rt																																								
Ramp W-S Sta 44+20.25 17.5' Rt to	609	1		24	49												III	III	3		X				C-15.91			4.6		5			1454.70			26	10			CB609 to CB821
Ramp W-N Sta 35+80.80 7.50' Lt																																								
Ramp W-S Sta 37+40 29.5' Rt to	610	3		24	93												II	II	2		X				C-15.91			8.8		10			1444.47			111	19			CB610 to Existing Stubout
Sta 37+08.16 55.4' Lt																																								
Ellsworth Ramp B Sta 33+80 13.5' Lt to	611	1		24	48												III	III	3		X				C-15.92			4.8		10			1446.21			44	10			CB611 to Existing Trunkline
Sta 34+01.08 28.49' Rt																																								(Prefabricated Tee)
Ellsworth Rd Ramp B Sta 33+80 26.00' Lt	613	1		24	7												III	III	3		X				C-15.80			4.0					1445.90			3	1			CB613 to CB611
to Sta 33+80 13.5' Lt																																								
Ramp S-E Sta 57+90 15.50' Lt to	614	1		24	121												III	III	3		X		1		C-15.92			6.6		5			1478.32			67	23			CB614 to Drainage Ditch
Sta 57+31.59 119.' Lt																																								
Ellsworth Rd Ramp B Sta 38+40 24.0' Lt	616	6		24	62												IV	IV							C-15.80			7.8					1449.40			62	12			CB616 to Existing Trunk Line
to Sta 38+36.37 87.00' Lt																																								(Prefabricated Tee)
Sheet Total																							3							65							692	167			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL DATE SIGNED ARIZONA, U.S.A.

DWG NO. G-4.18

___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:16 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-18.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A61	A1124	

202 MA 029

DESCRIPTION: Station	Plan Ref No. ⬡	◓ Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	CSP: ◪ Corrugation	CSP: Wall Thickness (0.00) (In.)	CSP Coating: Zinc	CSP Coating: Bit. Coated Zinc	CSP Coating: Aluminum	CSP Coating: Bit. Coated Aluminum	CAP: ◪ Corrugation	CAP: Wall Thickness (0.00) (In.)	CAP: Uncoated	CAP: Bit. Coated	RCP: Class - Non Trench	RCP: Class - Trench	NRCP: Class	NRCIPCP: Min Wall Thickness (0) (In.)	CHDPEPP: AASHTO M-294 Type C	CHDPEPP: AASHTO M-294 Type S	End Sec (Each): C-13.20 & C-13.25	Detail -	Size, (In)	Manhole Standard or Detail	S-Single / D-Double (Ea)	Location	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Grate: Type	Grate: Elev. (0.00) (Ft.)	Inlet Depression: Depth (In.)	Inlet Depression: L (0.0) (Ft.)	QUANTITIES (Cubic Yard): Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
Ramp S-E Sta 63+49.55 17.17' Rt to	617	1		24	62												III	III	3			X				C-15.80			6.0					1463.05			65	12			CB617 to Existing Manhole
Sta 63+42.22 76.76' Rt																																									
Ramp S-E Sta 63+65 7.50' Rt to	618	1		24	16												III	III	3			X				C-15.91			6.0	10				1463.41			10	3			CB618 to CB617
Sta 63+49.55 17.17' Rt																																									
Ramp N-E Sta 16+35.25 17.50' Lt to	619	1		24	43												III	II	3			X				C-15.91			7.5	15				1461.67			15	4			CB619 to Existing Trunk Line
Sta 16+40.49 58.93 ' Lt																																									(Prefabricated Tee)
Ramp W-S Sta 36+16 42' Rt to	621	1		24	10												III	III	3			X				C-15.80			3.8					1443.80			4	2			CB621 to CB622
Sta 36+16 29.5' Rt																																									
Ramp W-S Sta 36+16 29.5' Rt to	622	1		24	55												III	III	3			X				C-15.91			4.0	10				1443.63			33	11			CB622 to CB642
Sta 36+12.55 26.00' Lt																																									
Elsworth Ramp B Sta 46+12.5 5.5' Rt to	623	1		24	45												III	III	3			X				C-15.91			5.0					1454.34			32	9			CB623 to Existing Trunkline
Sta 46+12.53 38.72' Lt																																									Manhole
Ramp S-E Sta 69+02 30.36' Rt to	624	4		24	75												III	III				X				C-15.91			5.0	15				1449.09			68	15			CB624 to Existing Pipe
Sta 69+07.49 108.02' Rt																																									(Prefabricated Tee)
Ramp S-E Sta 73+58.84 29.50' Rt to	628	1		24	96												III	III	3			X				C-15.91			4.2					1444.53			47	19			CB628 to CB629
Sta 72+60 29.50' Rt																																									
Ramp S-E Sta 72+60 29.50' Rt to	629	2		24	79												III	III	3			X				C-15.91			4.8	20				1444.75			71	16			CB629 to Existing Trunk Line
Sta 72+06.63 93.87' Rt																																									(Prefabricated Wye)
Sheet Total																														70							345	91			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◓ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer Certificate No. 21868 CURTIS W. SLAGELL (Civil) Date Signed ARIZONA, U.S.A.

DWG NO. G-4.19

TRACS NO. H 5686 04C | 202-B(008)B | ____ OF ____

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 12:43:16 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-19.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A62	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc Coating	Blt. Coated Zinc Coating	Aluminum Coating	Blt. Coated Aluminum Coating	Corrugation	Wall Thickness (0.00)	Uncoated	Blt. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Grate Depth (In.)	Grate L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (Ft.)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
Ramp S-E Sta 74+58 29.50' Rt to Sta 73+58.84 29.50' Rt	630	1		24	97												III	III	3			X				C-15.91	End Sec		4.0		15			1444.77			44	19			CB630 to CB628
Ellsworth Rd Ramp A Sta 16+25.94 29.53' Lt to Sta 16+25.60 11.5' Lt	631	1		24	15												III	III	3			X				C-15.80	Each		2.4					1441.90			5	3			CB631 to CB632
Ellsworth Rd Ramp A Sta 16+25.6 11.5' Lt to US60 Med Sta 1005+55 100' Lt	632	1		24	33												III	III	3			X				C-15.91			5.3		5			1444.58			20	7			CB632 to Existing Catch Basin Stubout
Ellsworth Ramp B Sta 49+81.60 5.5' Rt to Sta 49+82.4 28.95' Lt	633	1		24	35												III	III	3			X				C-15.91			5.0					1456.48			24	7			CB633 to Existing Trunkline Manhole
US60 Med Sta 1000+00 101.15' Rt to Sta 999+47.04 237.70' Rt	634	6		24	145												IV	IV								C-15.91			3.2		10			1441.73			56	28			CB634 to Existing Pipe
Ramp S-E Sta 76+40 29.5' Rt to Sta 76+41.42 85.82' Rt	635	6		24	53												IV	IV								C-15.91			4.0		15			1445.40			70	11			CB635 to Existing Trunk Line
Ramp W-S 36+12.55 26.00' Lt to Sta 36+13.08 97.34' Lt	642	1		24	71												III	III	3			X				C-15.81			5.3					1444.80			67	14			CB642 to Exst Trunk Line (Prefabricated Tee)
Ellsworth Rd Ramp A 20+00 11.5' Lt to US60 Med Sta 1009+34 104.6' Lt	645	1		24	56												III	III	3			X				C-15.91			5.0					1452.58			46	11			CB645 to Exst Manhole Stubout
Ramp E-N Sta 16+30 19.50' Lt to Sta 14+04.55 188.19' Lt	647	1		24	280												III	III	3			X	1			C-15.92			7.6					1475.19			194	55			CB647 to Southern Ave Basin
Sheet Total																							1								45							526	155			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed Arizona, U.S.A.

DWG NO. G-4.20

___ OF ___

REV. DATE: 01-05-2000

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 12:43:16 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-20.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A63	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00) (In.)	Zinc Coating	Bit. Coated Zinc Coating	Aluminum Coating	Bit. Coated Aluminum Coating	Corrugation	Wall Thickness (0.00) (In.)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth (In.)	L (0.0) (Ft.)	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
			CSP				CAP						RCP				NRCP		NRCIPCP		CHDPEPP		END TREATMENT																		QUANTITIES
																							Each				Catch basin, Manhole, Headwall & Junction Structure													Cubic Yard
																							End Sec			Ea				Ft.		Grate		Ft.							
Ramp E-N Sta 19+20 19.5' Lt to Sta 19+20 94.65' Lt	648	2		24	75											II	II	1			X	1			C-15.92			7.1		10			1476.24			58	15			CB648 to Drainage Ditch
Ramp E-N Sta 27+30 19.5' Lt to Sta 27+30 125.22' Lt	649	1		24	107											III	III	3			X	1			C-15.92			6.4		10			1483.85			0	22			CB649 to Drainage Ditch
Ramp W-N Sta 18+70 7.50' Lt to Sta 18+70 17.50' Lt	650	1		24	7											III	III	3			X				C-15.92			6.9					1461.25			5	1			CB650 to MH 905
Ramp W-N Sta 25+81.02 7.50' Lt to Sta 25+81.02 17.89' Lt	651	1		24	6											III	III	3			X	1			C-15.92			6.0					1453.56			4	1			CB651 to CB908
Ellsworth Ramp B Sta 28+80 13.5' Lt to Sta 28+28.82 14.86' Lt	652	1		24	50											III	III	3			X				C-15.92			5.6		10			1438.57			33	10			CB652 to Culvert 606 (Prefabricated Tee)
Ellsworth Ramp B Sta 41+00 5.5' Rt to Sta 41+13.40 69.78' Lt	655	1		24	78											III	III	3			X				C-15.91			5.0		10			1451.26			63	16			CB655 to Existing Trunkline (Prefabricated Tee)
US60 Med Sta 1020+60 74.48' Lt	665																							24	C-18.10			6.4					1450.60							MH665 (Maintenance Access to Existing Trunk Line)
Ramp W-S Sta 20+85.17 15.5. Lt to Sta 20+85.17 26.0' Lt	670	1		24	6											III	III	3			X				C-15.92			3.5		20			1445.34			3	1			CB670 to CB671
Ramp W-S Sta 20+85.17 26.0' Lt to Sta 20+85.17 106.66' Lt	671	4		24	80											III	III				X				C-15.80			5.4					1447.30			98	16			CB671 to Existing Pipe (Prefabricated Tee)
Sheet Total																						3		1						60							264	82			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

DWG NO. G-4.21

___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:17 PM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-np-21.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A64	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench (CSP Coating)	Class - Trench (CSP Coating)	Class (CAP In.)	Min Wall Thickness (0) (RCP In.)	AASHTO M-294 Type C (NRCP In.)	AASHTO M-294 Type S (NRCP In.)	C-13.20 & C-13.25 (NRCIPCP In.)	Detail - (CHDPEPP In.)	Size, (In) Manhole (End Sec Each)	Standard or Detail	S-Single / D-Double	Location (Catch basin, Manhole, Headwall & Junction Structure Ea)	H (0.0) (Ft.)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type (Grate Ft.)	Elev. (0.00) (Ft.)	Depth (Ft.)	L (0.0) (Inlet Depression In.)	Pipe Exc (0) (Cubic Yard)	Pipe Bkfl (0) (Cubic Yard)	Drn Exc (0) (Cubic Yard)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
Ramp W-S Sta 18+20 19.50' Rt to Sta 18+20 30' Rt	672	1		24	7												III	III	3			X				C-15.80			4.9					1448.80			2	1			CB672 to CB673
Ramp W-S Sta 18+20 19.5' Rt to US60 Med Sta 1018+50 76.46' Lt	673	1		24	107												III	III	3			X				C-15.92			3.4		20			1447.00			49	17			CB673 to Exist US60 Trunkline (Prefabricated Tee)
Ramp W-S Sta 20+85.17 33.5' Rt to Sta 20+85.17 15.5' Lt	675	1		24	48												III	III	3			X				C-15.80			5.0					1447.90			20	10			CB675 to CB670
US60 Med Sta 1009+34 77.78' Lt to Sta 1009+34 96.62' Lt	677	2		24	16												II	II	1			X				C-15.91			6.5		15			1445.72			13	3			CB677 to Existing Manhole
US60 Med Sta 1016+00 74.74' Lt to Sta 1016+01.22 88.49' Lt	678	1		24	11												III	III	3			X				C-15.91			6.2		10			1448.38			8	2			CB678 to Existing Trunk Line (Prefabricated Tee)
US60 Med Sta 1016+74.00 104.5 Rt to Sta 1016+74.00 54.5' Rt	680	1		24	50												III	III	3			X				C-15.91			4.1		25			1448.08			26	10			CB680 to Existing Lateral
Ellsworth Rd Ramp A Sta 29+80 13.5' Lt to Sta 30+14.66 103.06' Lt	681	1		24	94												III	III	3			X				C-15.92			7.0		15			1473.77			87	19			CB681 to Existing Manhole
Ellsworth Rd Ramp A Sta 23+40 13.5' Lt to Sta 23+39.81 65.06' Rt	682	4		24	82												III	III				X				C-15.92			5.0		20			1464.68			77	17			CB682 to Existing Trunk Line (Prefabricated Tee)
US 60 Med Sta 1011+00 75.80' Rt to Sta 1011+01.9 168.11' Rt	683	1		24	47												III	III	3			X				C-15.91			5.2			30		1446.19			42	9			CB683 to Existing Manhole
Sheet Total																															105	30					324	88			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.22

TRACS NO. H 5686 04C 202-B(008)B ___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:17 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-22.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A65	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0) (In.)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	End Sec (Each)	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18° Slotted Drn (0)	L 24° Slotted Drn (0)	Type	Elev. (0.00)	Grate (Ea)	Grate (Ft.)	Inlet Depression (Ft.)	Depth (In.)	L (0.0) (Ft.)	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 1014+49.27 104.5' Rt to Sta 1014+49.33 113.33' Rt	684	1		24	3												III	III	3			X				C-15.91				4.7		20			1447.24					1	1			CB684 to Existing Pipe
L202 Med Sta 1467+95.56 141.52' Lt to Sta 1467+67.56 159.00' Lt	711	2		24	32												II	II	1			X				C-15.92				6.5		10			1451.52					29	7			CB711 to Existing Manhole
Ramp N-E Sta 40+66 34.00' Lt to Sta 40+66 23.49' Lt	712	1		24	7												III	III	3			X				C-15.81				5.0					1451.24					4	1			CB712 to CB721
Ramp N-E Sta 37+00 19.50' Lt to Sta 37+00 75.50' Lt	713	1		24	55												III	III	3			X	1			C-15.92				7.0		15			1452.11					31	11			CB713 to Drainage Swale
L202 Med Sta 1471+77.55 116.60 Lt	714																									C-15.92				6.2		10			1450.93									CB714 Remove Steel Cap & Bring to Grade
L202 Med Sta 1474+63.98 112.50' Lt	715																									C-15.92				6.2		15			1450.08									CB715 Remove Steel Cap & Bring to Grade
Ramp W-S Sta 79+19.01 54.04' Lt	716																									C-15.80				6.4					1452.30									CB716 Connects to Existing Pipe
Ramp W-S Sta 75+04 15.5' Lt to L202 Med Sta 1467+67.56 48.48' Rt	717	1		24	56												III	III	3			X				C-15.92				5.8		15			1462.49					32	11			CB717 to Existing Pipe
Ramp W-S Sta 79+16 13.5' Lt to Sta 79+19.01 54.04' Lt	718	1		24	35												III	III	3			X				C-15.91				6.9		10			1454.47					23	7			CB718 to CB 716
																										C-15.80				6.4					1452.30									
Sheet Total																							1									95								120	38			

QUANTITIES: Cubic Yard

FILL HEIGHT RANGE TABLE (Ft.)												
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 WWW.AZTECUS.COM

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION: LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

DWG NO. G-4.23 ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed Arizona, U.S.A.

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:18 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-23.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A66	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00) (In.)	Zinc Coating	Bit. Coated Zinc Coating	Aluminum Coating	Bit. Coated Aluminum Coating	Corrugation	Wall Thickness (0.00) (In.)	Uncoated	Bit. Coated	Class - Non Trench (CSP)	Class - Trench (CSP)	Class (CAP)	Min Wall Thickness (0) (In.) (RCP)	AASHTO M-294 Type C (NRCP)	AASHTO M-294 Type S (NRCP)	C-13.20 & C-13.25 (NRCIPCP)	Detail - (NRCIPCP)	Size, (In) Manhole (CHDPEPP)	Standard or Detail (End Sec)	S-Single / D-Double (Each)	Location (Ea)	H (0.0) (Catch basin, Manhole, Headwall & Junction Structure)	L Wing (0.0) (Ft.)	L 18" Slotted Drn (0) (Ft.)	L 24" Slotted Drn (0) (Ft.)	Type (Grate)	Elev. (0.00) (Ft.)	Depth (Inlet Depression) (In.)	L (0.0) (Inlet Depression) (Ft.)	Pipe Exc (0) (Cubic Yard)	Pipe Bk-fl (0) (Cubic Yard)	Drn Exc (0) (Cubic Yard)	Berm/Dike Emb (0) (Cubic Yard)	REMARKS
Ramp W-S Sta 82+00 13.5' Lt to Sta 82+05.57 43.44' Rt	719	1		24	19												III	III	3			X				C-15.91			5.3		10			1451.65			15	5			CB719 to Existing CB
Ramp W-S Sta 81+84.03 30.91' Lt to Sta 82+02.59 28.76' Lt	720	1		24	18												III	III	3			X				C-15.80			6.0					1451.10			11	4			CB720 to Pipe 719 (Prefabricated Tee)
Ramp N-E Sta 40+66 18.5' Lt	721			24	Exst																					C-15.92			5.7					1449.69							CB721 (Connect Catch Basin to Exst Pipe Installed In Phase 1)
L202 Med 1453+80.59 100.5' Rt to Sta 1453+80.59 201.11 Rt	722	1		24	101												III	III	3			X	1			C-15.92			6.4		20			1452.21			79	20			CB722 to Basin SW
L202 Med Sta 1453+80.49 100.5' Lt to Sta 1450+80.46 201' Lt	723	1		24	100												III	III	3			X	1			C-15.92			7.2			25		1452.68			73	20			CB723 to Infield Area
L202 Med Sta 1457+72.44 to Sta 1457+72.44 100.5' Rt	724	1		24	99												III	III	3			X				C-15.80			3.0					1445.60			93	20			CB724 to CB725
L202 Med Sta 1457+72.44 100.5' Rt to Sta 1457+60.20 176.42' Rt	725	1		24	74												III	III	3			X	1			C-15.92			8.1		15			1450.05			42	15			CB725 to Infield Area
L202 Med Sta 1459+37.56 100.5' Lt to Sta 1459+38.01 173.16' Lt	727	1		24	72												III	III	3			X	1			C-15.92			7.0		20			1449.73			41	14			CB727 to Drainage Ditch
L202 Med Sta 1460+21.54 100.5' Rt to Sta 1460+21.54 136.00' Rt	729	1		24	33												III	III	3			X	1			C-15.92			7.0					1449.63			17	7			CB729 to Infield Area
Sheet Total																							5								65	25						371	105			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C | 202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.24

___ OF ___

REV. DATE: 01-05-2000

Plotted By: kleahy at 12:43:18 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-24.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

NRCP — NRCIPCP — CHDPEPP

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A67	A1124	
		202 MA 029			

DESCRIPTION						CSP								CAP			RCP									END TREATMENT																QUANTITIES	
				In.	In.	Ft.	Degree	In.	Coating					In.							In.					Each																	Cubic Yard	
																										End Sec																		
																											Ea																		
																															Ft.														
																																						Grate						
																																							Ft.					
Station	Plan Ref No.	⬡ Controlling Fill Height Range	Size, Corrugated	Size, Smooth	Length (0)	Skew (0)	◪ Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	◪ Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (in) Manhole	Standard or Detail	S-Single / D-Double	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Depth	L (0.0)	Pipe Exc (0)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
L202 Med Sta 1461+70.70 to Sta 1461.63.32 100.5' Lt	730	1		24	100											III	III	3			X				DH			3.0					1444.00			99	20			CB730 to CB731
L202 Med Sta 1461+63.32 100.5' Lt to Sta 1461+63.33 152.04' Lt	731	1		24	48											III	III	3			X	1			C-15.92			9.0					1449.45			34	9			CB731 to Infield Area
L202 Med Sta 1462+52.44 100.5' Rt to Sta 1461+70.70	732	1		24	130											III	III	3			X				C-15.92			5.6		5			1450.02			122	28			CB732 to CB730
L202 Med Sta 1463+37.56 100.5' Lt to Sta 1461+63.32 100.5' Lt	733	1		24	172											III	III	3			X				C-15.92			6.0		10			1449.54			122	34			CB733 to CB731
L202 Med Sta 1445+83.07 22.69' Rt to Sta 1445.83.07 100.01' Lt	804	1		24	122											III	III	3			X				DH			3.3					1453.84			111	24			CB804 to CB807
L202 Med Sta 1445+83.07 100.01' Lt to Sta 1445+82.35 173.55' Lt	807	1		36	75											II	II	2			X				C-15.92			8.0		20			1457.34			89	22			CB807 to Stubout from Basin NE-2
Ramp W-N Sta 35+80.80 7.5' Lt	821	1																							C-15.92			5.0		5			1453.27							CB821 to Existing Pipe - Phase I
L202 Med Sta 1427+07.85 94.01' Lt to Ramp E-N Sta 19+20 19.50' Lt	822	1		24	103											III	III	3			X				C-15.92			5.5		10			1475.13			85	21			CB822 to CB648
L202 Med Sta 1430+50 10.48' Rt to Ramp W-N Sta 11+77.92 7.50' Lt	823	1		24	110											III	III	3			X				DH			3.6					1471.10			104	22			CB823 to CB824
Sheet Total																						1								50							766	180			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

◒ SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

◪ PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-4.25

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

REV. DATE: 01-05-2000

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 12:43:18 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-25.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A68	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	End Sec (Each)	S-Single / D-Double	Location (Catch basin, Manhole, Headwall & Junction Structure)	H (0.0) (Ea)	L Wing (0.0) (Ft.)	L 18° Slotted Drn (0) (Ft.)	L 24° Slotted Drn (0) (Ft.)	Type (Grate)	Elev. (0.00) (Ft.)	Depth (Ft.)	L (0.0) (Ft.)	Inlet Depression Pipe Exc (0) (Cubic Yard)	Pipe Bk-fl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
Ramp W-N Sta 11+77.92 7.50' Lt to	824	1		24	318												III	III	3			X				C-15.91			6.0		5			1472.10			230	64			CB824 to CB826
Ramp W-N Sta 15+00 7.50' Lt																																										
L202 Med Sta 1433+93.8 14.09' Rt to	825	1		24	141												III	III	3			X				C-15.80			4.4					1466.09			139	30			CB825 to CB826
Ramp W-N Sta 15+00 7.5' Lt																																										
Ramp W-N Sta 15+00 7.50' Lt to	826	1		24	200												III	III	3			X				C-15.91			6.4					1467.27			170	40			CB826 to MH831
Ramp W-N Sta 17+00 13.40' Lt																																										
L202 Med Sta 1436+70 17' Rt to	827	1		24	130												III	III	3			X				C-15.80			3.9					1462.90			127	26			CB827 to CB828
Sta 1437+37.25 93.34' Lt																																										
L202 Med Sta 1437+37.25 93.34' Lt to	828	1		24	121												III	III	3			X	1			C-15.92			7.5		10			1465.32			65	24			CB828 to Drainage Ditch
Sta 1438+41.00 159' Lt																																										
L202 Med Sta 1440+25 20.30' Rt to	829	1		24	116												III	III	3			X				C-15.80			3					1459.03			99	23			CB829 to CB830
Sta 1440+25 95.89' Lt																																										
L202 Med Sta 1440+25 95.89' Lt to	830	1		24	53												III	III	3			X	1			C-15.92			7.0		15			1462.27			33	11			CB830 to Drainage Ditch
Sta 1440+25 150.28' Lt																																										
Ramp W-N Sta 17+00 13.40' Lt to	831	1		24	168												III	III	3			X			24	C-18.10			7.7					1466.20			141	34			MH831 to MH905
Sta 18+70 17.50' Lt																																										
US60 Med Sta 1034+00 103.5' Lt to	900	1		24	270												III	III	3			X			24	C-18.10			7.0					1475.50			159	54			MH900 to MH902
Sta 1031+30 103.5' Lt																																										
Sheet Total																							2		2						30						1163	306			

FILL HEIGHT RANGE TABLE (Ft.)

RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION

A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

ABBREVIATIONS

RSD	Ramp South Detour	RA	Ramp A
EP	Edge of Pavement	RB	Ramp B
PSAR	Pump Station Access Road	RSE	Ramp South East
PRD	Price Road Detour	RC	Ramp C
SBFRD	South Bound Frontage Road Detour	RD	Ramp D
SCR	South Connector Road	PR	Price Road
NCR	North Connector Road	PRNB	Price Road North Bound
CVD	Chandler Village Drive	PRSB	Price Road South Bound
EB	East Bound	SBFR	South Bound Frontage Road
WB	West Bound	NBFR	North Bound Frontage Road
RSW	Ramp South West	RS	Ramp South
REN	Ramp East North	RN	Ramp North
		RWN	Ramp West North

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202
LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C
202-B(008)B

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
ARIZONA, U.S.A.
Signed

DWG NO. G-4.26
___ OF ___

Plotted By: kleahy at 12:43:19 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-26.dgn

NOTE:
THE ZEROS IN PARENTHESIS (0, 0.0 & 0.00) IN THE HEADING OF SOME OF THE COLUMNS ARE THE RECOMMENDED PRECISION OF THE VALUE TO BE ENTERED IN THE COLUMN.

NOTE:
FOR PIPE CULVERT PLACEMENT SEE STANDARD DRAWING C-13.15

NOTE:
PIPE OPTIONS SELECTED ARE THOSE REQUIRED TO MEET MINIMUM SERVICE LIFE.
SHADED PIPE OPTION FIELDS ARE NOT ALLOWABLE ALTERNATES.

CSP - CORRUGATED STEEL PIPE
CAP - CORRUGATED ALUMINUM PIPE
RCP - REINFORCED CONCRETE PIPE
NRCP - NON-REINFORCED CONCRETE PIPE
NRCIPCP - NON-REINFORCED CAST-IN-PLACE CONCRETE PIPE
CHDPEPP - CORRUGATED HIGH DENSTIY POLYETHYLENE PLASTIC PIPE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A69	A1124	
		202 MA 029			

Station	Plan Ref No.	Controlling Fill Height Range	Size, Corrugated (In.)	Size, Smooth (In.)	Length (0) (Ft.)	Skew (0) (Degree)	Corrugation	Wall Thickness (0.00)	Zinc	Bit. Coated Zinc	Aluminum	Bit. Coated Aluminum	Corrugation	Wall Thickness (0.00)	Uncoated	Bit. Coated	Class - Non Trench	Class - Trench	Class	Min Wall Thickness (0)	AASHTO M-294 Type C	AASHTO M-294 Type S	C-13.20 & C-13.25	Detail -	Size, (In) Manhole	Standard or Detail	End Sec Each	S-Single / D-Double	Ea	Location	H (0.0)	L Wing (0.0)	L 18" Slotted Drn (0)	L 24" Slotted Drn (0)	Type	Elev. (0.00)	Grate Depth (Ft.)	Grate L (0.0) (Ft.)	Inlet Depression (In.)	Pipe Exc (0) (Ft.)	Pipe Bkfl (0)	Drn Exc (0)	Berm/Dike Emb (0)	REMARKS
US60 Med Sta 1031+30 103.5' Lt to Sta 1028+50.70 103.50' Lt	902	1		24	280												III	III	3			X			24	C-18.10					5.1					1469.80			145	56			MH902 to MH904
US60 Med Sta 1028+50.70 103.50' Lt to Sta 1028+50.88 74.36' Lt	904	1		24	30												III	III	3			X			24	C-18.10					5.4					1463.50			19	6			MH904 to Existing Manhole
Ramp W-N Sta 18+70 17.50' Lt to Sta 19+85.87 114.18' Lt	905	4		24	145												III	III				X	1		24	C-18.10					7.0					1461.50			121	29			MH905 to Existing Basin NE-1
US60 Med Sta 870+06.40 105' Rt to Sta 872+90 105' Rt	906			24	285												III	III	3			X			24	C-18.10					4.1					1353.50			102	57			MH906 to MH907
US60 Med Sta 870+06.4 105' Rt to Sta 870+06.11 54.92' Rt	907			24	49												III	III	3			X			24	C-18.10					4.3					1352.30			25	10			MH907 to Existing Lateral
Ramp W-N Sta 25+81.02 17.89' Lt to Sta 25+81.02 109.89' Lt	908	1		24	88												III	III	3			X				C-15.80					5.9					1453.50			58	18			CB908 to Basin NE-2
RCBC 4 Sta 12+90.00 63.00' Lt to Sta 12+90.00 5.00' Lt	950	8		24	57													V								C-15.80						4.00				1451.00			44	22			CB950 to RCBC4
Sheet Total																							1		5																514	198			

FILL HEIGHT RANGE TABLE (Ft.)													
RANGE NO.		1	2	3	4	5	6	7	8	9	10	11	12
FILL	>	1	3	5	8	11	15	20	25	30	40	55	70
HEIGHT (Ft.)	≤	3	5	8	11	15	20	25	30	40	55	70	90

SHOULD FIELD CONDITIONS VARY FROM THE RANGE INDICATED, CONTACT DESIGN FOR RE-EVALUATION OF PIPE DESIGN REQUIREMENTS.

PIPE CORRUGATION			
A	2⅔x½	D	6x2
B	3x1	E	3x1 or 9x2½
C	9x2½		

ABBREVIATIONS

RSD	Ramp South Detour	RA	Ramp A
EP	Edge of Pavement	RB	Ramp B
PSAR	Pump Station Access Road	RSE	Ramp South East
PRD	Price Road Detour	RC	Ramp C
SBFRD	South Bound Frontage Road Detour	RD	Ramp D
SCR	South Connector Road	PR	Price Road
NCR	North Connector Road	PRNB	Price Road North Bound
CVD	Chandler Village Drive	PRSB	Price Road South Bound
EB	East Bound	SBFR	South Bound Frontage Road
WB	West Bound	NBFR	North Bound Frontage Road
RSW	Ramp South West	RS	Ramp South
REN	Ramp East North	RN	Ramp North
		RWN	Ramp West North

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	RDR	12-04
CHECKED	VW	12-04

AZTEC
4141 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
WWW.AZTECGLAB

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

NEW PIPE SUMMARY SHEET

ROUTE 202
LOCATION LOOP 202/US 60 T.I.

TRACS NO. H 5686 04C
202-B(008)B

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-4.27
___ OF ___

Plotted By: kleahy at 12:43:19 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-np-27.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A85	A1124	
		202 MA 029			

REMOVAL SUMMARY FOR DWG NO. D-1.02

Approximate Station to Station	Loc	MH EA	CB EA	Pipe (LF) 18"	24"	30"	36"
US 60 Med 867+55 to Power Rd Ramp D 12+98	RT		2	143			
US 60 Med 867+56	LT		1				
US 60 Med 867+98 to Power Rd Ramp C 13+01	LT		1		118		
US 60 Med 869+42 to Power Rd Ramp C 14+46	LT		1		98		
US 60 Med 870+06 to Power Rd Ramp D 15+01	RT		2		105		
US 60 Med 870+07	LT		1				
US 60 Med 871+45 to Power Rd Ramp C 16+50	LT		1		67		
US 60 Med 872+58 to US 60 Med 873+24	RT		1		325		
US 60 Med 873+93 to US 60 Med 874+81	LT		2		87		
US 60 Med 875+26 to US 60 Med 875+64	RT		1		35		
US 60 Med 875+48	LT		1				
US 60 Med 876+36	RT		1				
US 60 Med 876+38	LT		1				

REMOVAL SUMMARY FOR DWG NO. D-1.03

Approximate Station to Station	Loc	MH EA	CB EA	Pipe (LF) 18"	24"	30"	36"
US 60 Med 877+28	LT		1				
US 60 Med 878+18	LT		1				
US 60 Med 879+22	LT		1				
US 60 Med 880+23	LT		1				
US 60 Med 881+04 to US 60 Med 881+33	LT		1		30		
US 60 Med 877+36	RT		1				
US 60 Med 878+35	RT		1				
US 60 Med 879+35	RT		1				
US 60 Med 880+40	RT		1				
US 60 Med 881+44	RT		1				
US 60 Med 881+44 to US 60 Med 882+50	RT		1		86		
US 60 Med 882+50 to US 60 Med 883+54	RT		1		105		
US 60 Med 883+76 to US 60 Med 883+78	LT		1		10		
US 60 Med 884+84	RT		1				
US 60 Med 884+84 to US 60 Med 885+63	RT		1		70		
US 60 Med 885+63 to US 60 Med 886+67	RT		1		105		
US 60 Med 886+67 to US 60 Med 887+75	RT		1		105		
US 60 Med 888+46	LT		1				
US 60 Med 888+84	RT		1				
US 60 Med 888+84 to US 60 Med 889+94	RT		1		110		

REMOVAL SUMMARY FOR DWG NO. D-1.04

Approximate Station to Station	Loc	MH EA	CB EA	Pipe (LF) 18"	24"	30"	36"
US 60 Med 889+94 to US 60 Med 891+09	RT		1		113		
US 60 Med 892+64 to US 60 Med 892+54	LT		1		10		
US 60 Med 892+64 to US 60 Med 893+54	LT		1		87		
US 60 Med 893+81	RT		1				
US 60 Med 893+54 to US 60 Med 894+44	LT		1		87		
US 60 Med 894+44 to US 60 Med 895+28	LT		1		82		
US 60 Med 895+28 to US 60 Med 896+13	LT		1		82		
US 60 Med 896+13 to US 60 Med 896+97	LT		1		82		
US 60 Med 897+91	RT		1				
US 60 Med 897+82 to US 60 Med 898+63	LT		2			77	
US 60 Med 898+63 to US 60 Med 899+43	LT		1			77	
US 60 Med 899+43 to US 60 Med 900+22	LT		1			77	
US 60 Med 900+22 to US 60 Med 901+03	LT		1			77	
US 60 Med 901+03 to US 60 Med 901+83	LT		1			72	
US 60 Med 901+83	LT	1					
US 60 Med 902+00	RT		1				
US 60 Med 902+00 to US 60 Med 902+85	RT		1		82		
US 60 Med 902+85 to US 60 Med 903+69	RT		1		82		
US 60 Med 901+83 to US 60 Med 902+58	LT		1		68		
US 60 Med 902+58 to US 60 Med 903+40	LT		1		72		

REMOVAL SUMMARY FOR DWG NO. D-1.05

Approximate Station to Station	Loc	MH EA	CB EA	Pipe (LF) 18"	24"	30"	36"
US 60 Med 904+06 to US 60 Med 904+08	LT		1		10		
US 60 Med 904+08	LT	1					
US 60 Med 904+08 to US 60 Med 904+78	LT		1		62		
US 60 Med 904+78 to US 60 Med 905+43	LT		1		62		
US 60 Med 905+43 to US 60 Med 905+97	LT		1		52		
US 60 Med 905+97 to US 60 Med 906+67	LT		1		67		
US 60 Med 906+67 to US 60 Med 907+38	LT		1		67		
US 60 Med 908+09 to US 60 Med 908+12	LT		1		12		
US 60 Med 908+12 to US 60 Med 908+20	LT		1		40		
US 60 Med 903+69 to US 60 Med 904+48	RT		1		77		
US 60 Med 904+48 to US 60 Med 905+24	RT		1		72		
US 60 Med 905+24 to US 60 Med 905+94	RT		1		67		
US 60 Med 905+94 to US 60 Med 906+68	RT		1		72		
US 60 Med 906+68 to US 60 Med 907+68	RT		1		97		
US 60 Med 907+68 to US 60 Med 907+95	RT		1		45		
US 60 Med 910+12 to US 60 Med 910+65	RT		2		80		
US 60 Med 910+65	LT		1				
US 60 Med 910+48 to US 60 Med 910+55	LT		1		40		
US 60 Med 912+32 to Sossaman Rd Ramp A 22+92	LT		1		70		
US 60 Med 913+20	LT		1				
US 60 Med 913+19 to Sossaman Rd Ramp B 27+45	RT		2		121		
US 60 Med 914+11 to Sossaman Rd Ramp A 24+71	LT		1		94		
Sossaman Rd Ramp B 29+43 to US 60 Med 915+75	RT		1		165		
Sossaman Rd Ramp B 32+09 to US 60 Med 915+75	RT	1			160		
US 60 Med 915+75	RT		1		26		
US 60 Med 915+75	LT		1				

	NAME	DATE
DESIGN	VMW	12-04
DRAWN	KL	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

REMOVAL SUMMARY

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. G-9.07

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS-- | REVISIONS-- | LOCATION-- | DATE--

Plotted By: kleahy at 12:43:20 PM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-rs-01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A86	A1124	
		202 MA 029			

Approximate Station to Station	Loc	MH EA	CB EA	Pipe (LF) 18"	24"	30"	36"
REMOVAL SUMMARY FOR DWG NO. D-1.10							
US 60 Med 1009+45	Lt		1		8		
US 60 Med 1014+48	LT		1		11		
US 60 Med 1016+75	LT		1				
US 60 Med 1016+76	RT		1				
US 60 Med 1019+30	LT		1		20		
US 60 Med 1015+46	LT		1		5		
REMOVAL SUMMARY FOR DWG NO. D-1.11							
US 60 Med 1022+30 to Ellsworth Ramp B 66+36	RT	1			110		
US 60 Med 1022+30	RT		1				
US 60 Med 1022+30	LT		1				
US 60 Med 1023+03 to US 60 Med 1023+06	LT	1			88		
Ellsworth Rd Ramp C 13+28 to Ellsworth Rd Ramp C 15+18	LT		1		188		
Ellsworth Rd Ramp C 14+83 to Ellsworth Rd Ramp C 15+18	LT		1		96		
Ellsworth Rd Ramp C 15+18 to Ellsworth Rd Ramp C 16+04	LT		1		84		
Ellsworth Rd Ramp C 16+04 to Ellsworth Rd Ramp C 17+19	LT		1		114		
US 60 Med 1025+40 to Ellsworth Rd Ramp C 11+16	LT		1		200		
US 60 Med 1028+51	LT		1				
US 60 Med 1028+51	RT		1				
Ellsworth Rd Ramp D 13+51 to US 60 Med 1028+52	RT	1	1		156		
US 60 Med 1028+52 to US 60 Med 1031+51	RT		1		295		
US 60 Med 1031+51 to US 60 Med 1032+16	RT		1		62		
US 60 Med 1032+16 to US 60 Med 1033+01	RT		1		84		
US 60 Med 1033+01 to US 60 Med 1034+80	RT		1		178		
US 60 Med 1034+80 to US 60 Med 1034+80	RT				12		
US 60 Med 1034+81 to US 60 Med 1034+81	LT		1		42		

Approximate Station to Station	Loc	MH EA	CB EA	Pipe (LF) 18"	24"	30"	36"
REMOVAL SUMMARY FOR DWG NO. D-1.12							
US 60 Med 1037+70 to US 60 Med 1037+71	LT		2		32		
US 60 Med 1037+70 to US 60 Med 1037+70	RT		1				40
US 60 Med 1040+00 to US 60 Med 1040+00	RT		1		10		
US 60 Med 1040+01 to US 60 Med 1040+01	LT		1		5		
US 60 Med 1042+71 to US 60 Med 1042+75	LT		1		8		
US 60 Med 1042+01 to US 60 Med 1042+04	RT		1		5		
US 60 Med 1044+51	RT		1				
US 60 Med 1046+16 to US 60 Med 1047+01	RT		1		85		
US 60 Med 1049+51	RT		1				
US 60 Med 1049+51 to US 60 Med 1049+51	LT		1		36		
US 60 Med 1049+51 to US 60 Med 1049+51	LT		1		20		
REMOVAL SUMMARY FOR DWG NO. D-1.13							
US 60 Med 1049+51 to US 60 Med 1052+01	LT		1		248		
US 60 Med 1052+01	RT		1				
US 60 Med 1055+26	RT		1				
US 60 Med 1055+28	LT		1				
US 60 Med 1055+26	LT		1				
US 60 1055+26 to US 60 Med 1058+60	LT		1		320		
US 60 Med 1058+77	RT		1				
US 60 Med 1062+01 to US 60 Med 1062+79	RT		2		80		
US 60 Med 1062+79 to US 60 Med 1062+75	RT		1		19		
US 60 Med 1062+52	LT		1				
US 60 Med 1062+51	LT		1				
REMOVAL SUMMARY FOR DWG NO. D-1.14							
US 60 Med 1065+57 Crismon Rd Ramp A 16+64	LT		1		55		
US 60 Med 1065+56 to US 60 Med 1065+57	LT		1		16		
Crismon Rd Ramp A 26+62	LT		1				
Crismon Rd Ramp B 29+69 to Crismon Rd Ramp B 30+32	RT		1		90		

	NAME	DATE
DESIGN	VMW	12-04
DRAWN	KL	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

REMOVAL SUMMARY

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

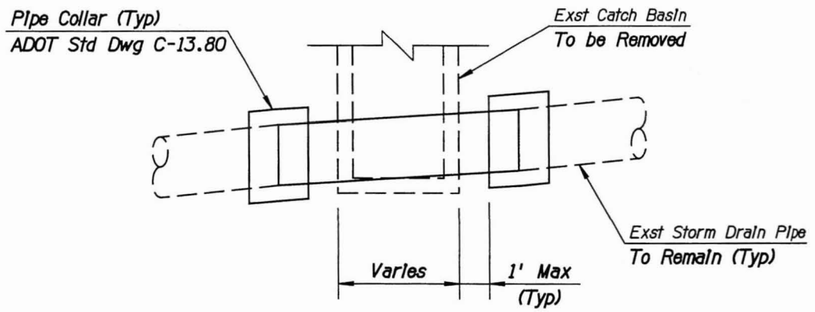
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. G-9.08

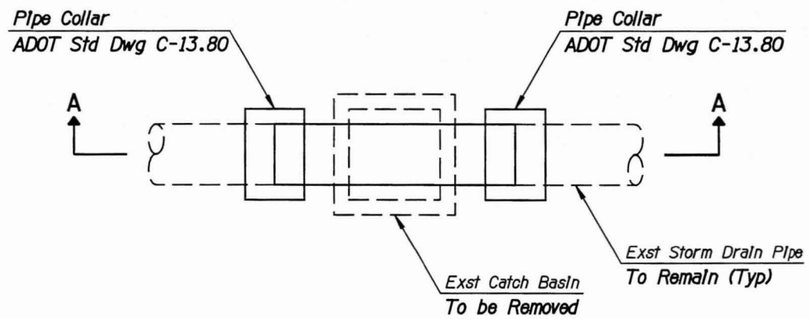
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A341	A1124	
		202 MA 029			



SECTION A-A



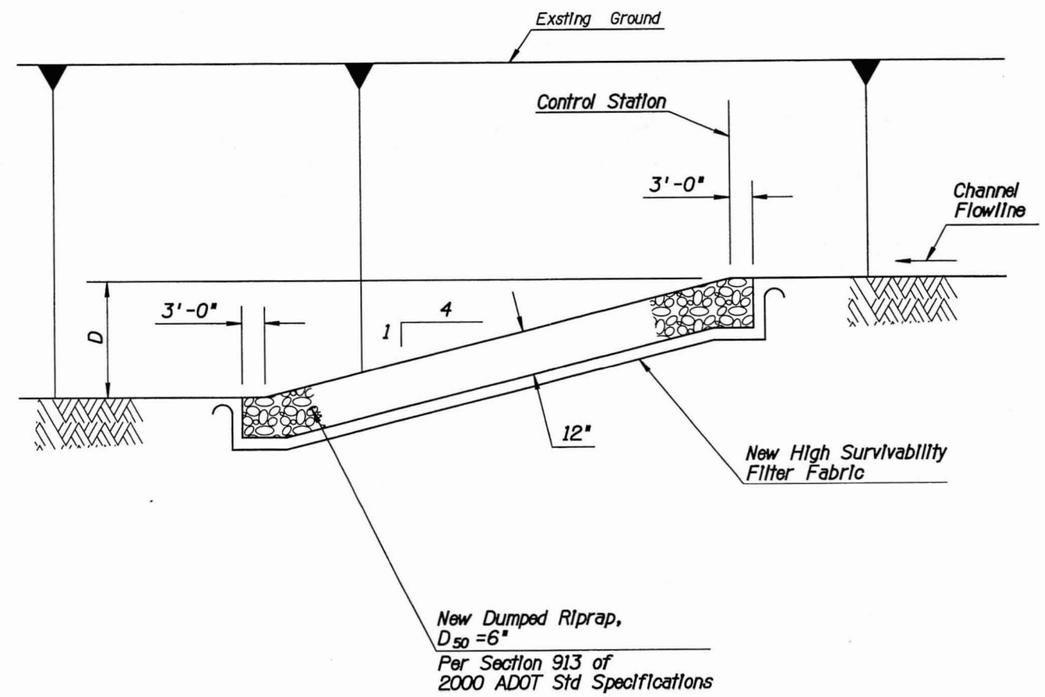
PLAN

Existing Catch Basin Removal	
Station	Size
US60 Med Sta. 867+56, 55.2' Lt	18"
US 60 Med Sta. 870+06.9, 56.6 Lt	24" x 30" Reducer
US60 Med Sta. 875+48.2, 99.5' Lt	24"
US60 Med Sta 876+38.4, 92.5' Lt	24"
US60 Med Sta 877+28.1, 85.9' Lt	24"
US60 Med Sta 877+35.7, 83.5' Rt	24"
US60 Med Sta. 878+18.1, 79.4' Lt	24"
US60 Med Sta. 878+35.3, 81.0' Rt	24"
US60 Med Sta. 879+17.7, 70.5' Lt	24"
US60 Med Sta. 879+35.1, 79.0' Rt	24"
US60 Med Sta. 880+22.7', 65.2' Lt	24"
US60 Med Sta. 880+40.3, 76.9' Rt	24"
US60 Med Sta 888+45.9, 57.6' Lt	24"
US60 Med Sta. 897+82.1, 70.5' Lt	24" x 30" Reducer
US60 Med Sta. 910+64.6, 57.2' Lt	24"
US60 Med Sta. 913+19.7, 57.2' Lt	24"
US60 Med Sta. 915+74.7, 55.2' Lt	24"
US60 Med Sta. 1016+74.6, 55.1 Lt	24"
US60 Med Sta. 1022+30.4, 55.0' Lt	24"
US60 Med Sta. 1022+30.4, 55.2' Rt	24"
US60 Med Sta. 1028+50.4, 54.4' Lt	24"
US60 Med Sta. 1040+00, 80.4' Rt	24"
US60 Med Sta. 1044+51, 71.5' Rt	24"
US60 Med Sta. 1062+52.3, 86.5' Lt	24"

NOTE:
See ADOT Std Dwg C-13.15
for Pipe Installation.

DETAIL DA

CATCH BASIN REMOVAL



CHANNEL RIPRAP DROP STRUCTURES	
CONTROL STATION	D (FT)
US60 MED STA 998+25, 446' RT	1.0
US60 MED STA 1006+54, 296' RT	1.3

DETAIL DB

SOUTHEAST CHANNEL RIPRAP DROP STRUCTURES

	NAME	DATE
DESIGN	VMW	12-04
DRAWN	AEL	12-04
CHECKED	RJZ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecgs.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DA & DB

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A. Expires 6/30/06

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

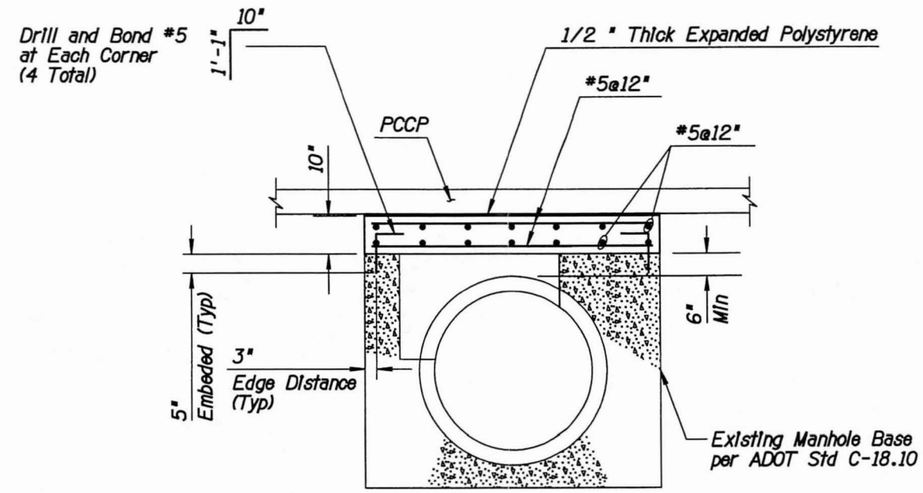
DWG NO. D-3.01

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A342	A1124	

202 MA 029



NOTE:

1. Cap shall be a Minimumum of 6-Inches Above the Pipe Crown for New Manholes Located Under the Roadway.

Existing Manhole Base Concrete Cap
US60 Med Sta 867+55.78, 66.32' Lt
US60 Med Sta. 870+07.33, 68.04' Lt
US60 Med Sta. 874+46.46, 65.37' Lt
US60 Med Sta. 883+77.77, 80.07' Lt
US60 Med Sta. 884+85.63, 79.45' Lt
US60 Med Sta. 888+46.13, 78.89' Lt
US60 Med Sta 892+63.70, 75.75' Lt
US60 Med Sta. 897+80.86, 85.52' Lt
US60 Med Sta. 910+63.18, 77.80' Lt
US60 Med Sta. 913+18.57, 77.10' Lt
US60 Med Sta. 915+74.59 76.93' Lt
US60 Med Sta. 999+79.44, 83.76' Lt
US60 Med Sta. 1016+75.62, 75.53' Lt
US60 Med Sta.1019+29.64, 77.07' Lt
US60 Med Sat. 1022+30.36, 76.09' Lt
US60 Med Sta. 1025+42.4, 75.58' Lt
US60 Med Sta. 1028+50.88, 74.36' Lt

DETAIL DD

MANHOLE BASE CONCRETE CAP

	NAME	DATE
DESIGN	VMW	12-04
DRAWN	AEL	12-04
CHECKED	RJZ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DD

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.02

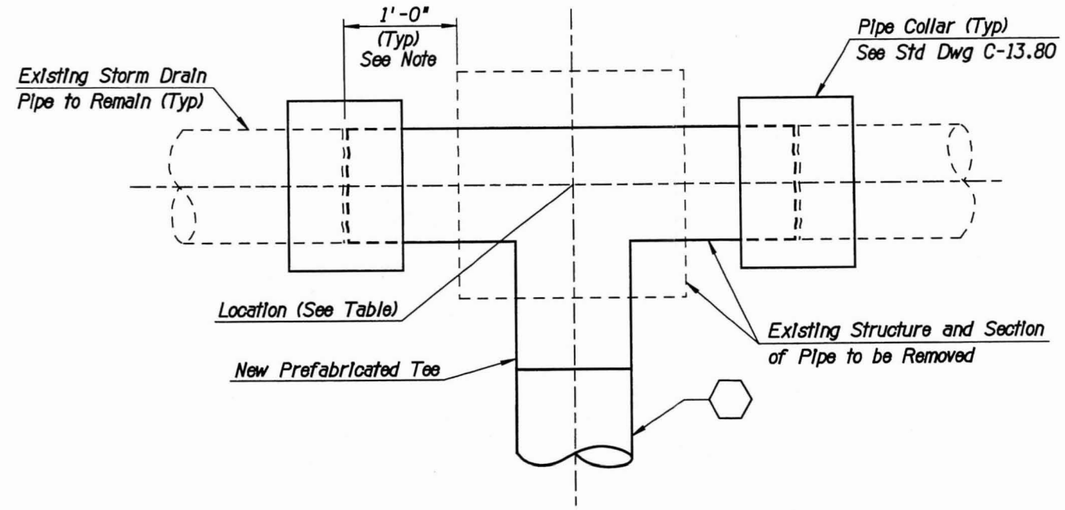
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

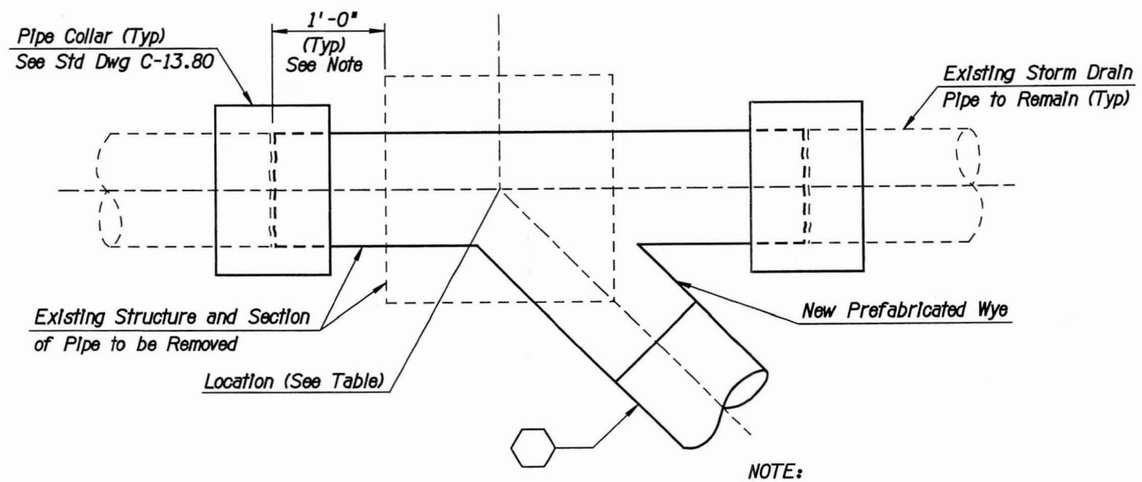
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A343	A1124	
		202 MA 029			

TEE CONNECTIONS SUMMARY		
Pipe Designation	Stationing (Ft)	Size
14	Power Rd Ramp D Sta. 21+43.96, 30.96' Lt	24" x 24" x 24"
21	Ellsworth Rd Ramp A Sta. 32+30.58, 83.74' Lt	48" x 48" x 48"
26	Crismon Rd Ramp A Sta. 16+63.69, 11.5' Lt	24" x 24" x 18"
33	Crismon Rd Ramp A Sta. 26+64.40, 11.5' Lt	30" x 30" x 24"
34	Crismon Rd Ramp B Sta. 27+80.76, 36.83' Lt	24" x 24" x 24"
37	Crismon Rd Ramp B Sta. 29+66.46,36.01' Lt	24" x 24" x 24"
39	Ellsworth Rd Ramp B Sta. 56+49.43, 32.59' Lt	30"x 30" x 24"
111	US 60 Med Sta. 877+60, 84.92' Rt	24" x 24" x 24"
112	US 60 Med Sta. 878+80, 83.16' Rt	24" x 24" x 24"
114	US 60 Med Sta. 880+09.43, 79.5' Rt	24" x 24" x 24"
164	US 60 Med Sta. 879+96.26, 74.33' Lt	24" x 24" x 24"
190	US 60 Med Sta. 905+81.00, 111.12' Lt	42" x 42" x 24"
412	US 60 Med Sta. 1037+69.97, 118.67' Rt	30" x 30" x 24"
414	US60 Med Sta 1037+68.84, 86.61' Rt	30" x 30" x 24"
416	US 60 Med Sta.1038+60.00, 85.01' Rt	24" x 24" x 24"
420	US 60 Med Sta. 1042+00.65, 75.94' Rt	24" x 24" x 24"
434	US 60 Med Sta. 1062+73.96, 79.86' Rt	24" x 24" x 24"
470	US 60 Med Sta. 1062+51.47, 99.83' Lt	24" x 24" x 24"
604	Ellsworth Rd Ramp B Sta. 28+28.76, 18.99' Rt	24" x 24" x 24"
611	Ellsworth Rd Ramp B Sta. 34+01.08, 28.49' Rt	48" x 48" x 24"
616	Ellsworth Rd Ramp B Sta. 38+36.37, 87.00' Lt	48" x 48" x 24"
619	Ramp N-E Sta. 16+40.00, 58.93' Lt	48" x 48" x 24"
624	Ramp S-E Sta. 69+07.49, 108.02' Rt	42" x 42" x 24"
635	Ramp S-E Sta. 76+41.42, 85.52' Rt	42" x 42" x 24"
652	Ellsworth Rd Ramp B Sta. 28+28.82, 14.86' Lt	24" x 24" x 24"
655	Ellsworth Rd Ramp B Sta. 41+13.40, 69.78' Lt	48" x 48" x 24"
671	Ramp W-S Sta. 20+85.17, 106.66' Lt	48" x 48" x 24"
673	US 60 Med Sta. 1017+81.5, 76.11' Lt	42" x 42" x 24"
678	US 60 Med Sta. 1016+01.22, 88.49' Lt	48" x 48" x 24"
682	Ellsworth Rd Ramp A Sta. 23+39.81, 65.06' Rt	48" x 48" x 24"
720	Ramp W-S Sta. 82+02.59, 28.76' Lt	24" x 24" x 24"

WYE CONNECTIONS SUMMARY		
Pipe Designation	Stationing (Ft)	Size
195	US 60 Med Sta. 915+49.21, 76.97' Lt	36" x 36" x 24"
418	US 60 Med Sta.1039+77.69, 82.66' Rt	24" x 24" x 24"
422	US 60 Med Sta. 1043+11.52, 76.15' Rt	24" x 24" x 24"
438	US 60 Med Sta.1021+95.09, 76.25' Lt	36" x 36" x 24"
440	US 60 Med Sta.1024+82.08, 75.52' Lt	24" x 24" x 24"
442	US 60 Med Sta.1027+74.5, 74.6' Lt	24" x 24" x 24"
629	Ramp S-E Sta. 72+06.63, 93.87' Rt	42" x 42" x 24"



TEE INSTALLATION DETAIL



NOTE:
1. Section of Existing Pipe to be Removed

WYE INSTALLATION DETAIL

NOTE:
See ADOT Std Dwg C-13.15 for Typical Pipe Installation.

DETAIL DE

PIPE/STRUCTURE REMOVAL

	NAME	DATE
DESIGN	VMW	12-04
DRAWN	DES	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

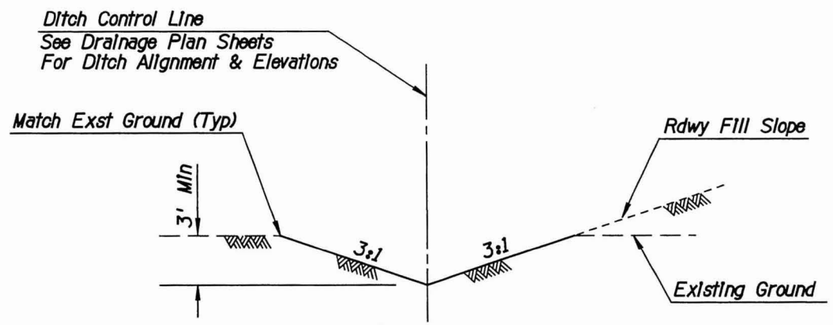
DWG NO. D-3.03

TRACS NO. H 5686 04C | 202-B(008)B | ___ OF ___

DATE- | LOCATION- | REVISIONS- | FINISHED PLANS- | SURVEY NO.

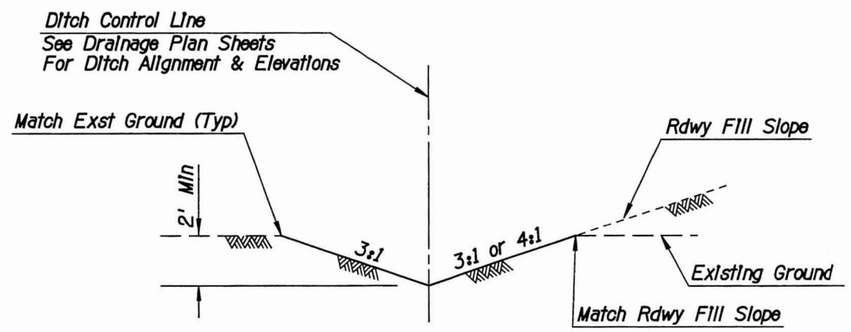
Plotted By: kleahy at 10:27:59 AM 1/26/2005 R:\Phoenix\Projects\Az01107\Cadd\Drn\AZ01107-02-DD-DE.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A344	A1124	
		202 MA 029			



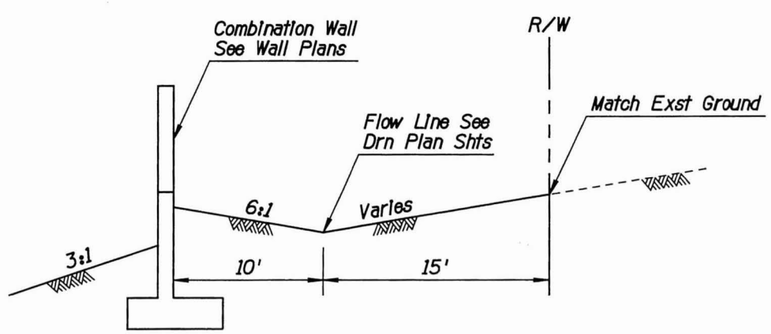
DITCH 1 - TYPICAL SECTION

NOTE: Side Slopes are 3:1 Unless Otherwise Noted.

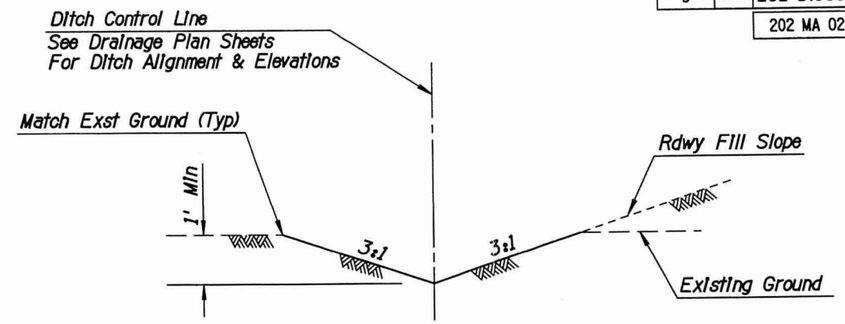


DITCH 2 - TYPICAL SECTION

NOTE: Side Slopes are 3:1 Unless Otherwise Noted.



DITCH 3 - TYPICAL SECTION



DITCH 4 - TYPICAL SECTION

NOTE: Side Slopes are 3:1 Unless Otherwise Noted.

DETAIL DF

TYPICAL DITCH SECTIONS

	NAME	DATE
DESIGN	RJZ	12-04
DRAWN	AEL	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DF

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

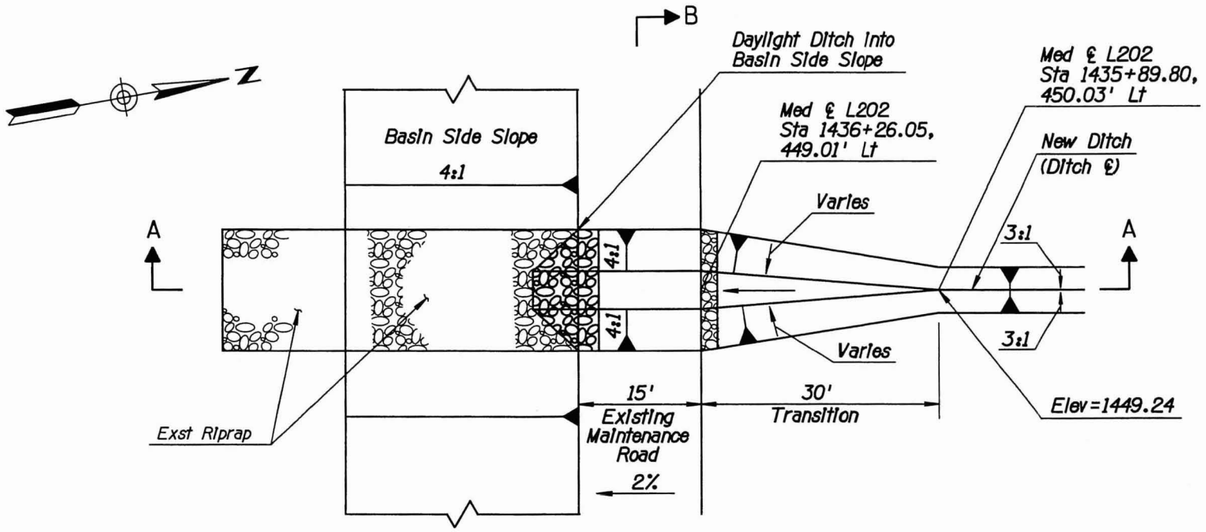
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.04

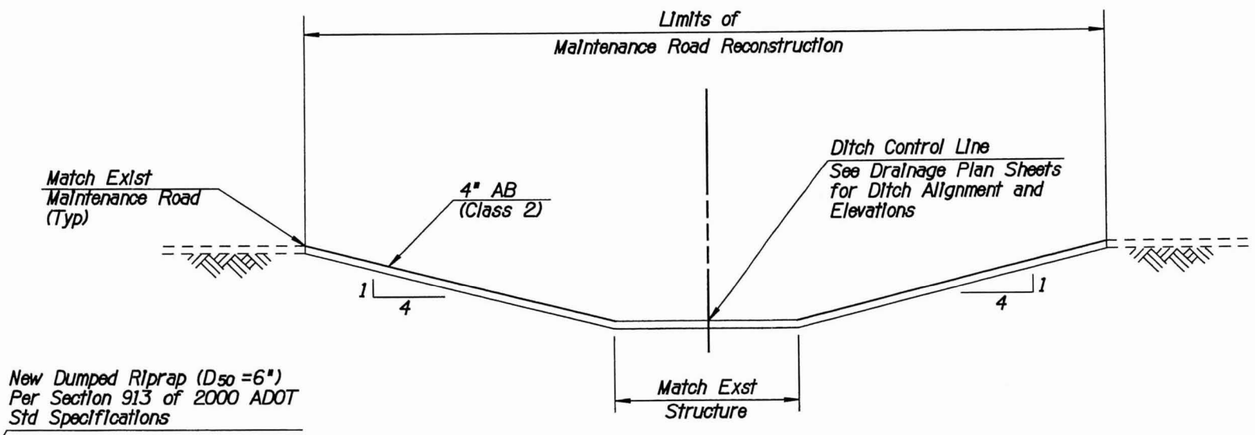
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

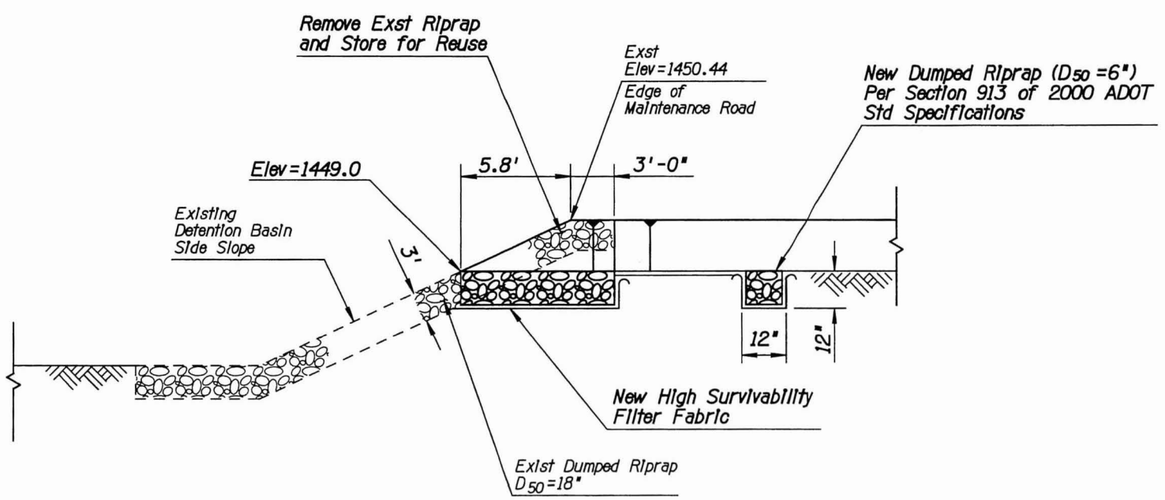
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A345	A1124	
		202 MA 029			



PLAN
SWALE ENTERING DETENTION BASIN NE-1



SECTION B-B



SECTION A-A

DETAIL DG

DITCH ENTERING DETENTION BASIN NE-1

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	KRL/AEL	12-04
CHECKED	RJZ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec-usa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DG

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

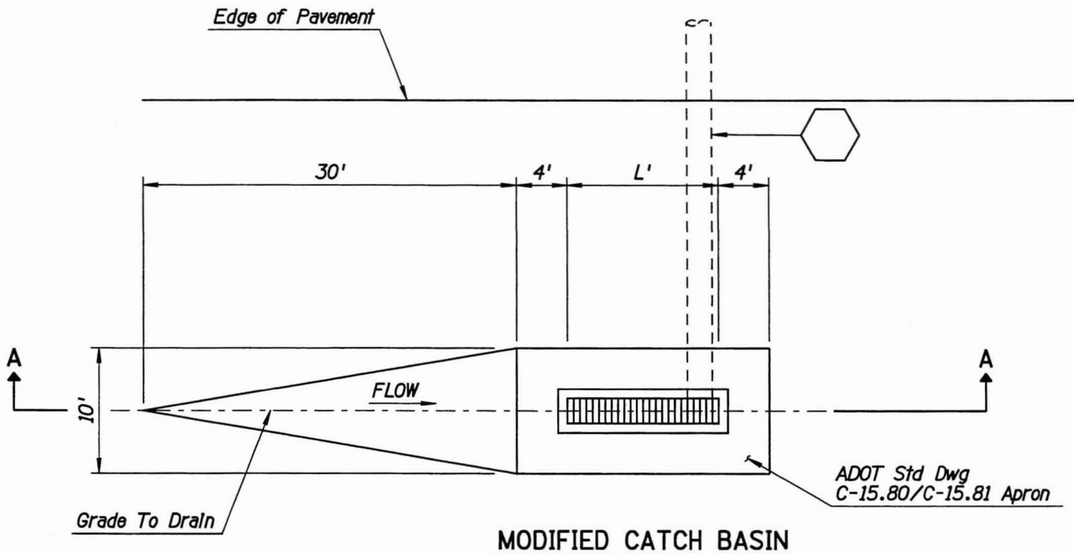
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.05

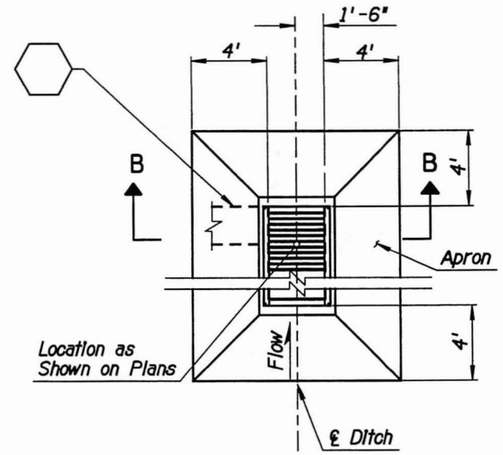
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:35:31 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dd-dg.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A346	A1124	
		202 MA 029			

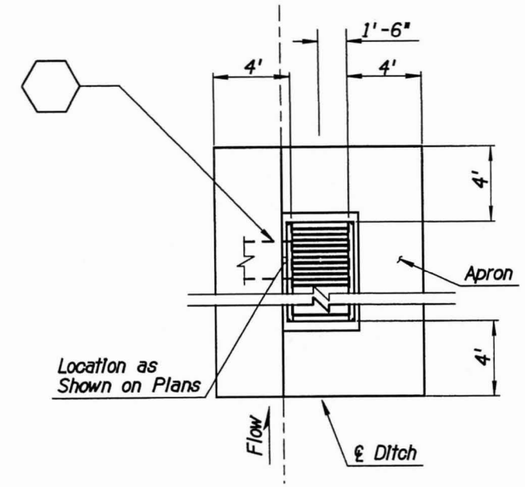


MODIFIED CATCH BASIN



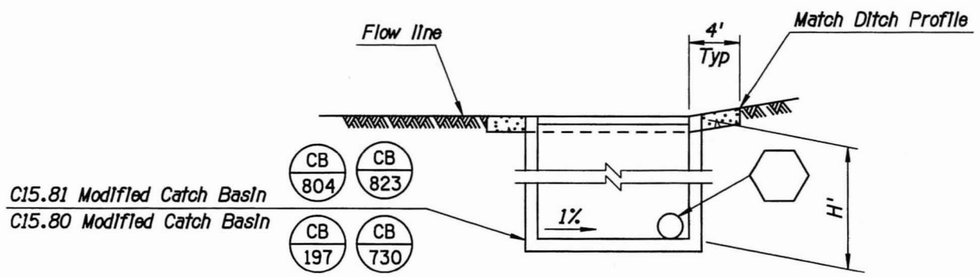
PLAN

Modified ADOT Std Dwg C-15.80

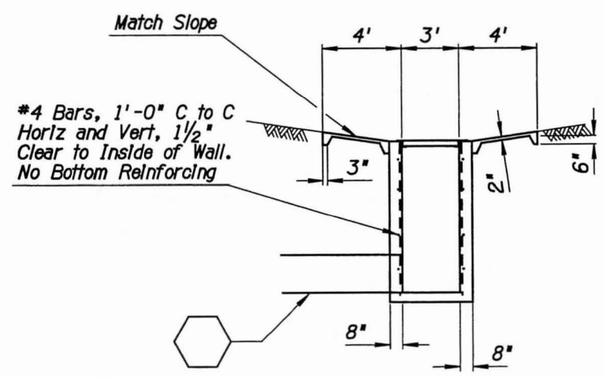


PLAN

Modified ADOT Std Dwg C-15.81

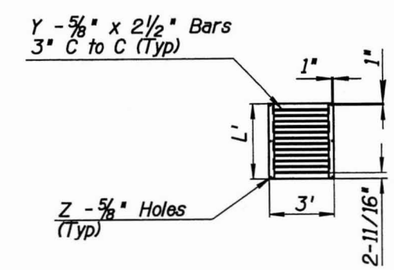


SECTION A-A



SECTION B-B

General Notes:
1. See ADOT Std Dwgs C-15.80 & C-15.81 for additional construction details.



CB	⬡	STA & OFFSET	H (FT)	L (FT)
730	730	L202 Med 1461+70.70	3.0	4
804	804	L202 Med 1445+83.07, 22.69' Rt	3.3	4
823	823	L202 Med 1430+50.00, 10.48' Rt	3.6	4
197	197	Ramp E-N 65+92, 59.13' Lt	3.0	4

DETAIL DH

CATCH BASIN MODIFICATIONS

	NAME	DATE
DESIGN	RJZ	12-04
DRAWN	KRL/AEL	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0463 www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DH

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL DATE SIGNED ARIZONA, U.S.A.

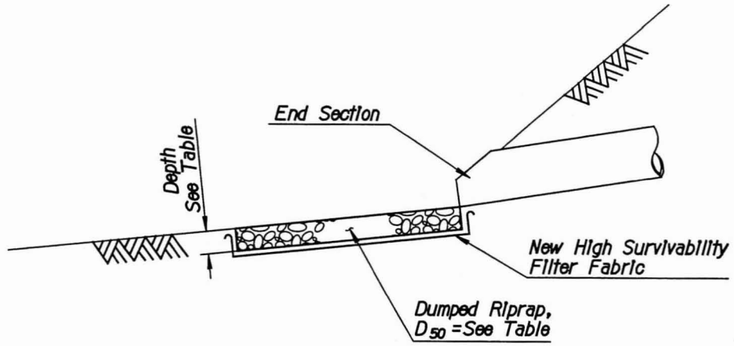
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.06

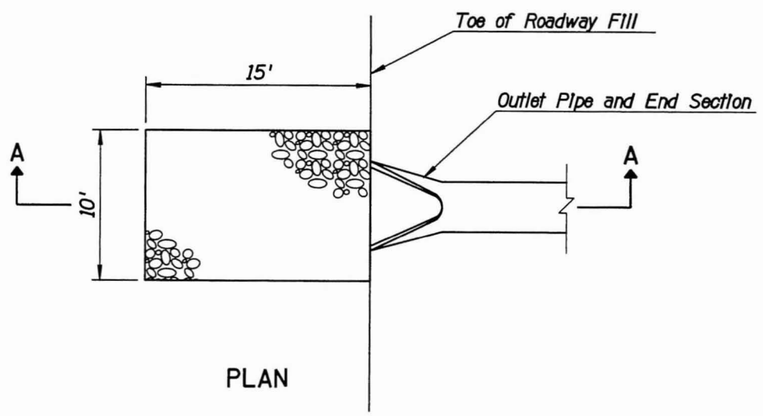
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A347	A1124	
		202 MA 029			



SECTION A-A



PLAN

Riprap Splash Pad				
Pipe	Location	Pipe Size	D_{50} Riprap	Depth
414	US60 Med Sta 1037+68.84, 147.30 Rt	30"	18"	36"
498	Ramp S-W Sta 17+05, 166.59' Rt	24"	6"	12"
504	Ramp S-W Sta 24+70.00, 96.83' Rt	24"	6"	12"
607	Ramp W-S Sta 49+23.37, 68.84' Rt	24"	6"	12"
647	Ramp E-N Sta 14+04.55, 188.19' Lt	24"	6"	12"
648	Ramp E-N Sta. 19+20, 94.65' Lt	24"	6"	12"
508	Ramp S-E Sta. 22+30.14, 171.31' Rt	24"	6"	12"
512	Ramp S-E sat. 25+00, 172.00' RT	24"	6"	12"
606	Ellsworth Rd Ramp B Sta. 28+28.66, 72.12' Rt	24"	9"	18"
649	Ramp E-N Sta. 27+30, 125.22' Lt	24"	6"	12"
713	Ramp N-E Sta. 37+00, 75.5' Rt	24"	6"	12"
722	L202 Med Sta. 1453+80.59, 201.11' Rt	24"	6"	12"
723	L202 Med Sta. 1450+80.46, 201.00' Lt	24"	6"	12"
725	L202 Med Sta. 1457+60.20, 176.42' RT	24"	6"	12"
727	L202 Med Sta. 1459+38.01, 173.16' Lt	24"	6"	12"
729	L202 Med Sta. 1460+21.54, 136.00' Rt	24"	6"	12"
731	L202 Med Sta. 1461+63.33, 152.04' Lt	24"	9"	18"
828	L202 Med Sta. 1438+41.00, 159.00' Lt	24"	6"	12"
830	L202 Med Sta. 1440+25, 150.28' Lt	24"	6"	12"
905	L202 Med Sta. 1437+88.9, 372.58' Lt	24"	9"	18"
908	Ramp W-N Sta 25+81, 109.89' Lt	24"	6"	12"

DETAIL DI

RIPRAP SPLASH PAD

	NAME	DATE
DESIGN	VMW	12-04
DRAWN	AEL	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DI

Registered Professional Engineer (CIVIL) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

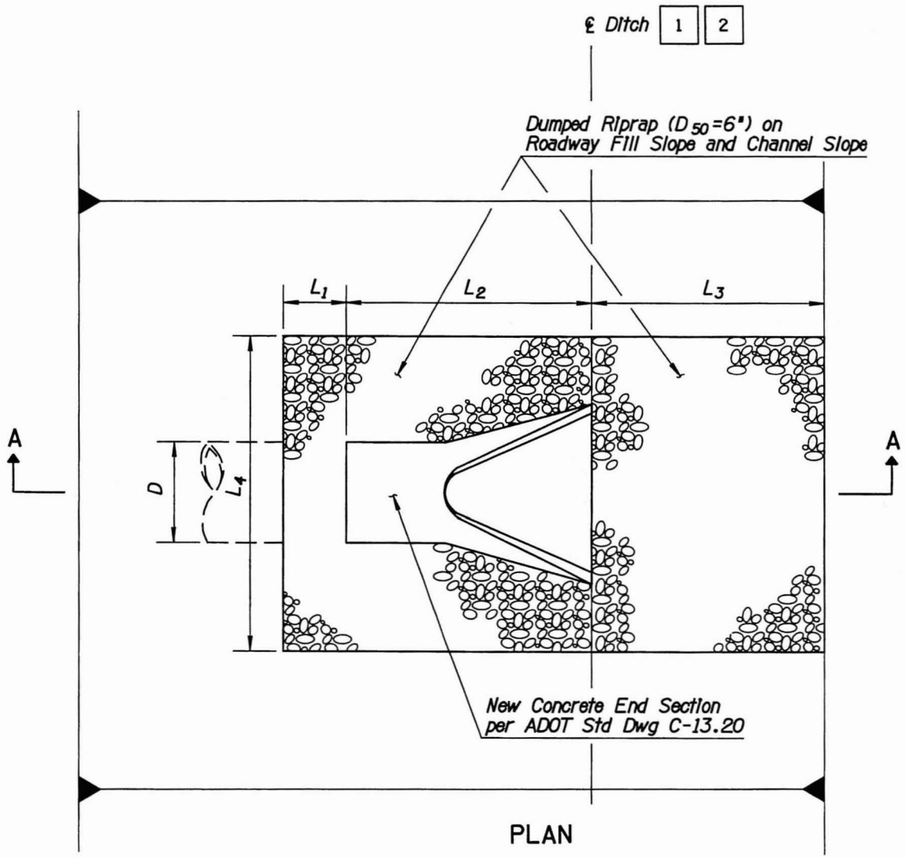
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.07

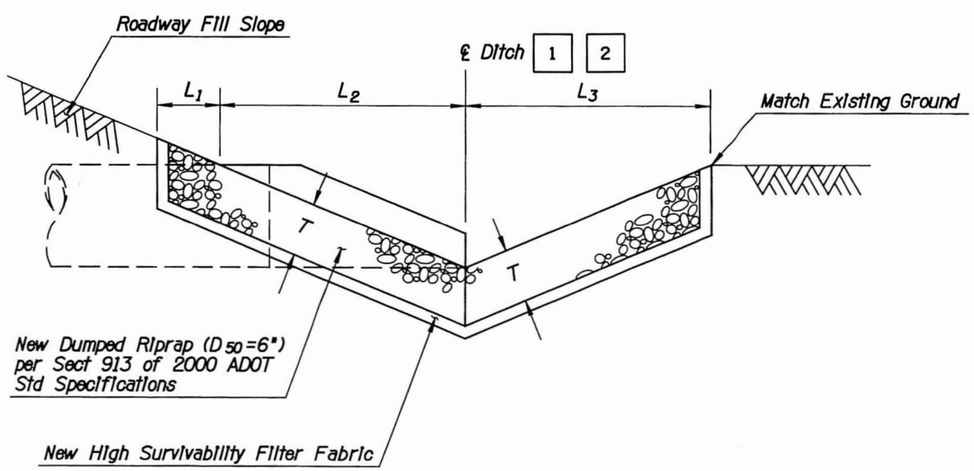
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A348	A1124	
		202 MA 029			



PLAN



SECTION A-A

EROSION PROTECTION DIMENSIONS								
Pipe ID	DITCH	D	L1	L2	L3	L4	T	Comments
458	1	24"	4'	8.8'	12'	12'	12"	4:1 Side Slopes
482	1	24"	4'	8.8'	12'	12'	12"	4:1 Side Slopes
500	2	24"	3'	6.6'	6'	12'	12"	3:1 Side Slopes
501	2	24"	3'	6.6'	6'	12'	12"	3:1 Side Slopes
502	2	24"	3'	6.6'	6'	12'	12"	3:1 Side Slopes
507	2	24"	3'	6.6'	6'	12'	12"	3:1 Side Slopes
509	2	24"	3'	6.6'	6'	12'	12"	3:1 Side Slopes
607	Exst	24"	3'	6.6'	6'	12'	12"	3:1 Side Slopes
614	4	24"	4'		9'	12'	12"	4:1 Side Slope for L1 & L2;
								6:1 Side Slope for L3

DETAIL DJ

EROSION PROTECTION AT STORM DRAIN OUTLETS

	NAME	DATE
DESIGN	VW	12-04
DRAWN	KRL/AEL	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DJ

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

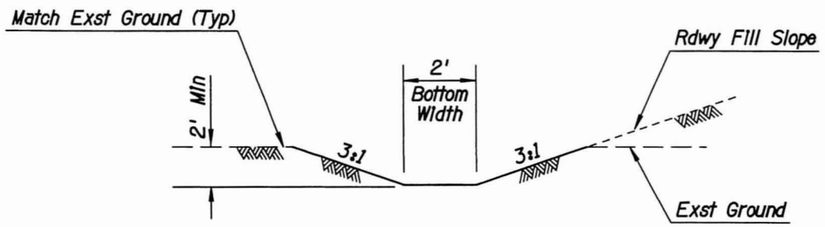
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.08

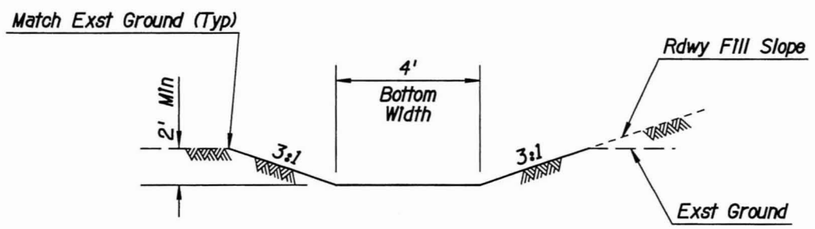
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

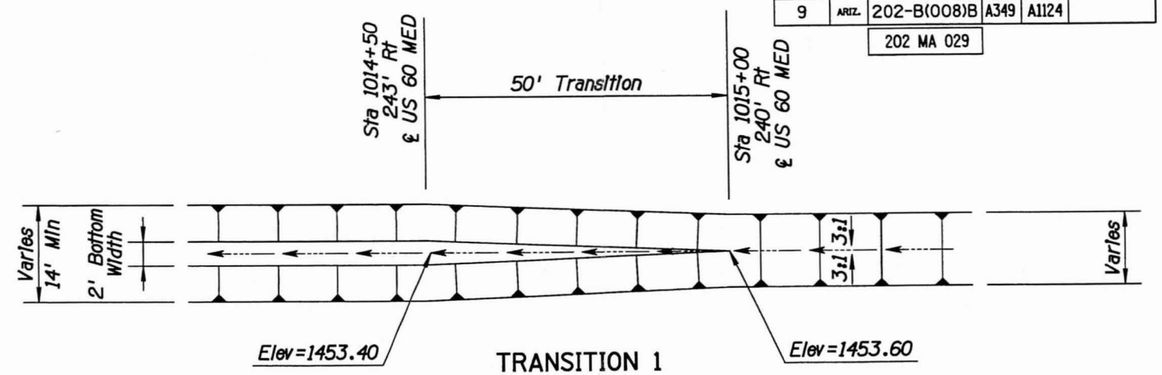
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A349	A1124	
		202 MA 029			



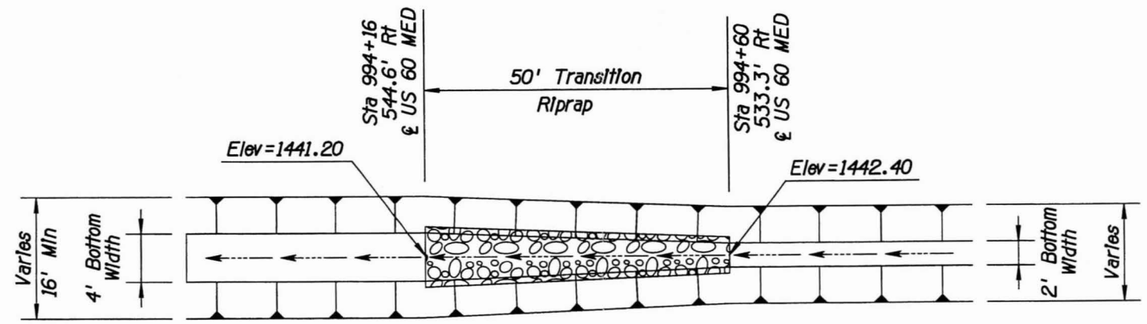
DITCH A - TYPICAL SECTION



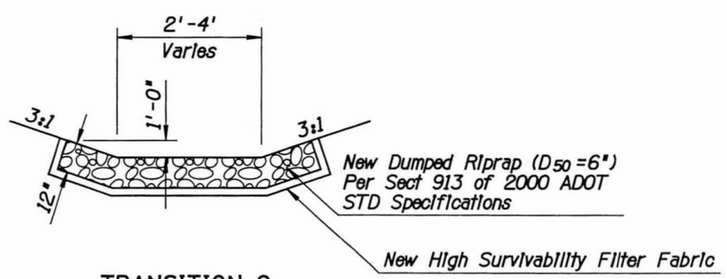
DITCH B - TYPICAL SECTION



TRANSITION 1



TRANSITION 2



TRANSITION 2

DETAIL DK

SOUTHEAST CHANNEL SECTIONS & TRANSITIONS

	NAME	DATE
DESIGN	RJZ	12-04
DRAWN	AEL	12-04
CHECKED	DNJ	12-04

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-1505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

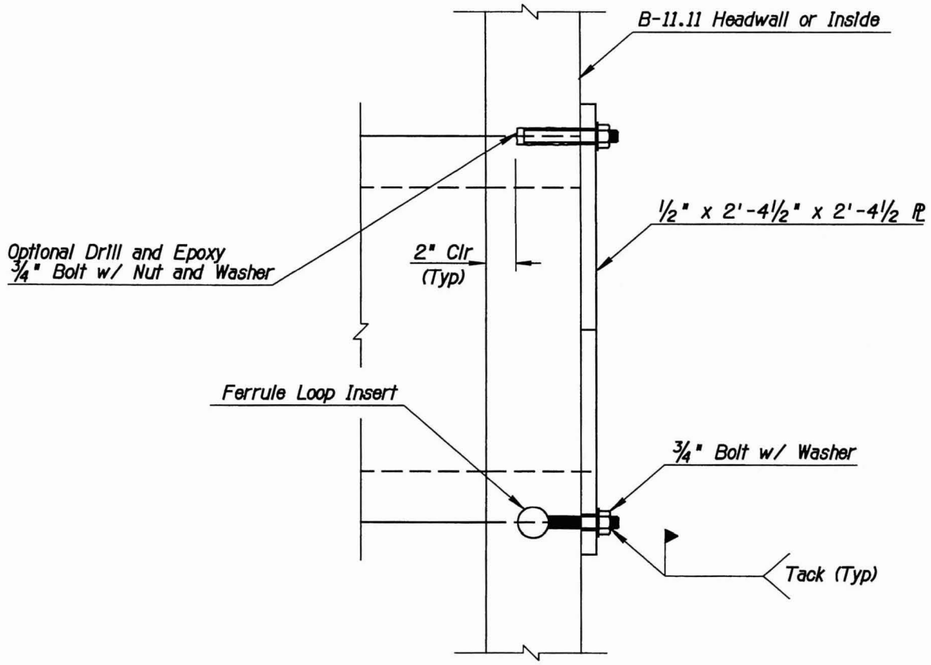
DETAIL SHEET
DETAIL DK

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-3.09

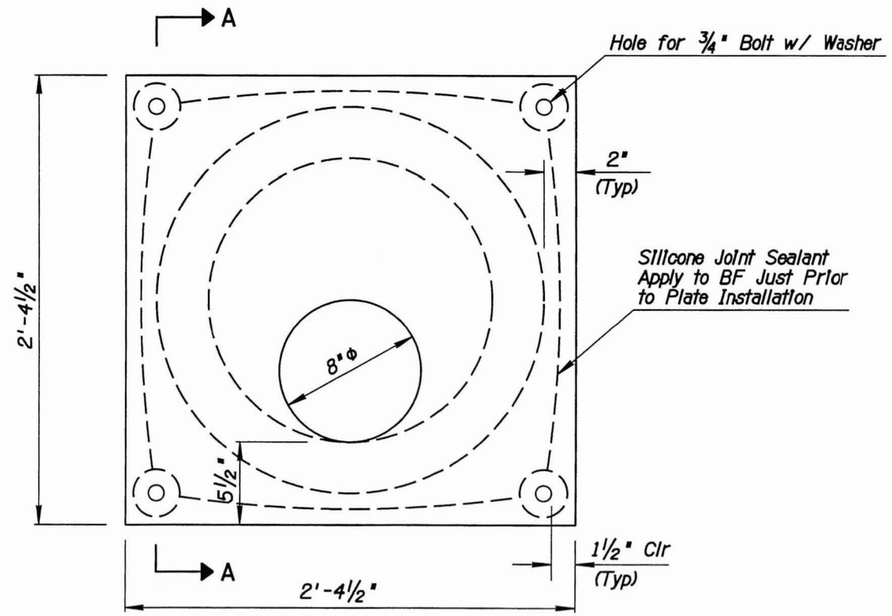
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A350	A1124	
		202 MA 029			



SECTION A-A

Scale:



ORIFICE PLATE

Scale:

NOTES:

1. Ferrule Loop Inserts shall have a 2400 lbs working pullout strength.
2. Epoxy shall be HIT HY 150 adhesive or an approved equal and produce an allowable tensile bond strength of 2400 lbs. Installation shall follow all of the manufacturer's instructions.

DETAIL DL

ORIFICE OPENING

	NAME	DATE
DESIGN	JMC	12-04
DRAWN	AEL/RAN	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 WWW.AZTECLLM

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

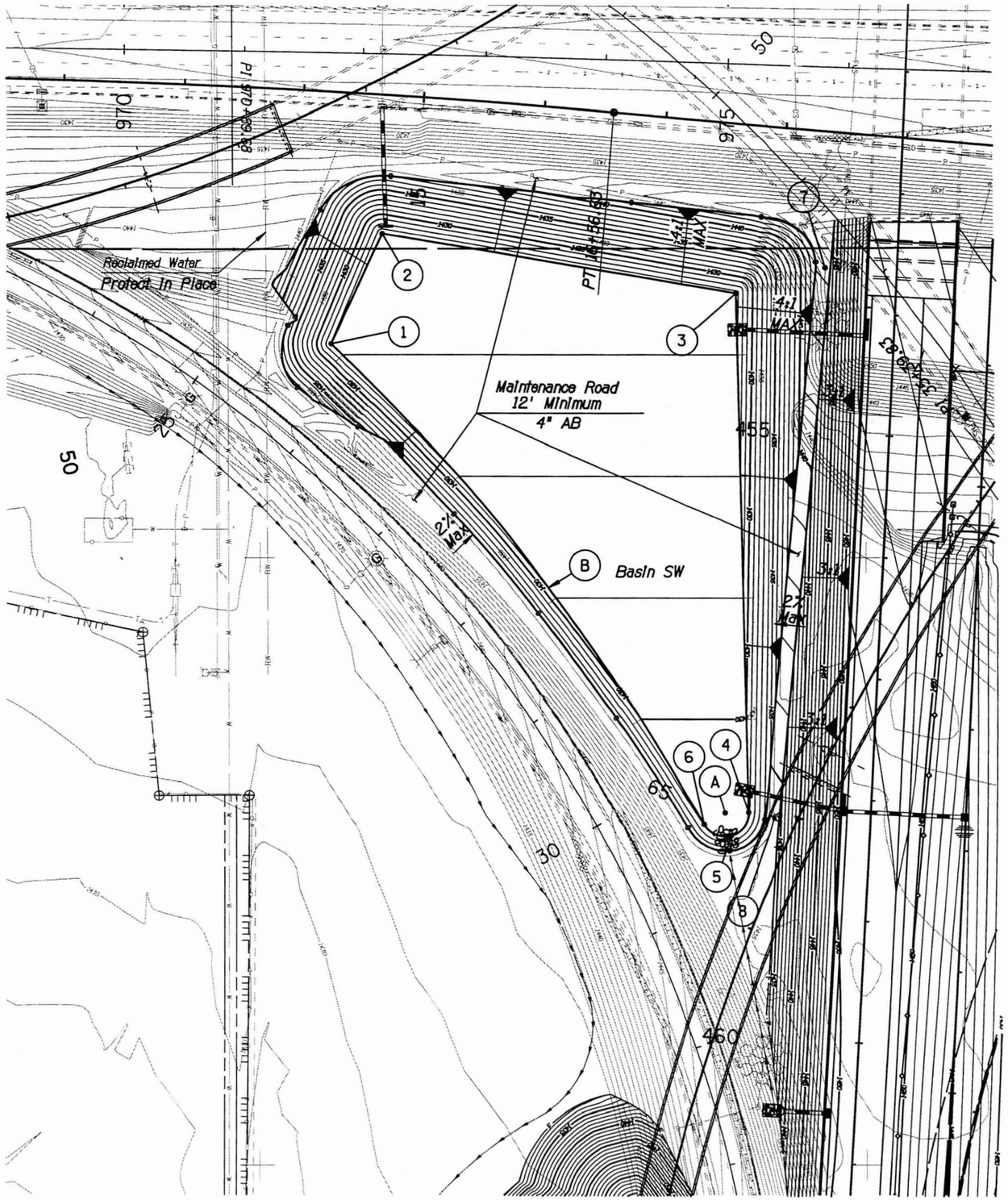
DETAIL SHEET
DETAIL DL

Registered Professional Engineer (CIVIL) CERTIFICATE NO. 21868 CURTIS W. SLAGELL DATE SIGNED ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-3.10
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A351	A1124	
		202 MA 029			



N

POINT DATA			
NO.	NORTHING	EASTING	ELEVATION
1	868176.089	781560.429	1426.91
2	868266.971	781602.944	1426.00
3	868217.961	781893.435	1426.49
4	867790.404	781902.910	1430.77
5	867771.149	781888.507	1430.96
6	867780.518	781866.361	1430.86
7	868239.105	781965.746	1443.16
8	867788.848	781922.915	1434.45

RADIUS POINT DATA			
NO.	RADIUS	NORTHING	EASTING
A	19.5'	867789.972	781883.415
B	1650'	866980.529	780423.267

DETAIL DM

BASIN SW GRADING PLAN
(Finished Contours)

	NAME	DATE
DESIGN	DRR	12-04
DRAWN	RDR	12-04
CHECKED	MDS	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DM

Registered Professional Engineer CERTIFICATE NO. 21868 CURTIS W. SLADELL Signed ARIZONA, U.S.A. Date

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

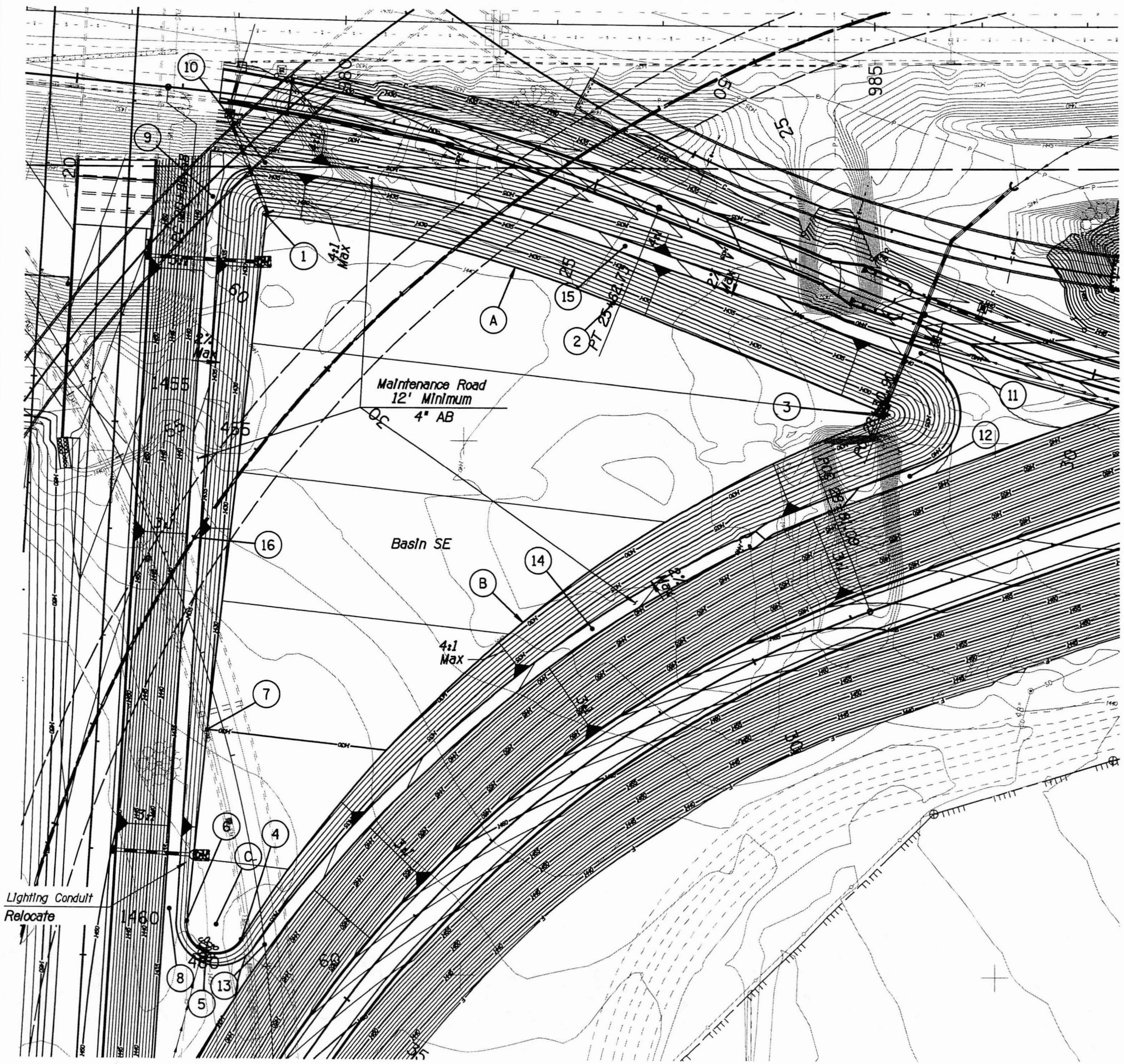
DWG NO. D-3.11

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 10:35:43 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dd-dm.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A352	A1124	

202 MA 029



POINT DATA			
NO.	NORTHING	EASTING	ELEVATION
1	868210.329	782314.596	1426.00
2	868129.798	782642.293	1426.37
3	868026.683	782901.395	1426.98
4	867532.336	782295.003	1431.58
5	867520.784	782262.804	1431.70
6	867549.534	782244.265	1431.48
7	867728.378	782261.942	1430.00
8	867550.237	782228.248	1434.11
9	868226.072	782265.997	1437.04
10	868259.859	782305.778	1436.72
11	868080.561	782936.795	1441.44
12	867975.401	782936.551	1440.83
13	867520.090	782310.999	1435.21
14	867860.905	782681.106	1439.04
15	868184.437	782647.688	1438.17
16	867900.694	782247.823	1435.33

RADIUS POINT DATA			
NO.	RADIUS	NORTHING	EASTING
A	1228.5'	866988.364	782188.044
B	1201'	866899.402	783315.687
C	27.5'	867546.829	782271.632

DETAIL DN

BASIN SE GRADING PLAN (Finished Contours)

	NAME	DATE
DESIGN	DRR	12-04
DRAWN	RDR	12-04
CHECKED	MDS	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DN

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

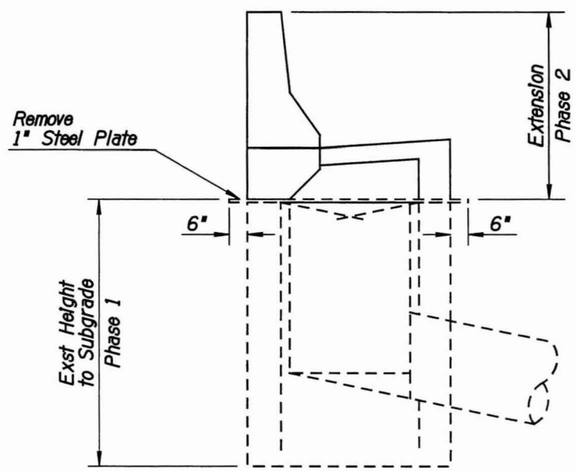
Registered Professional Engineer (Civil) Certificate No. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. D-3.12

TRACS NO. H5686 04C | 202-B(008)B | ____ OF ____

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO. DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A353	A1124	
		202 MA 029			



CATCH BASIN EXTENSION FOR CB 714 CB 715

CB	CST ℄ EB L202 (PH 1) STA & OFFSET	MED ℄ L202 (PH 2) STA & OFFSET	EXST ELEV AT STEEL CAP	FINAL GRATE ELEV
714	472+15.14, 193.60' Lt	1471+77.55, 116.60' Lt	1449.52	1450.93
715	475+01.54, 189.50' Lt	1474+63.98, 112.50' Lt	1448.69	1450.08

DETAIL DO

CATCH BASIN EXTENSION

	NAME	DATE
DESIGN	RJZ	12-04
DRAWN	AEL	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0400 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DO

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

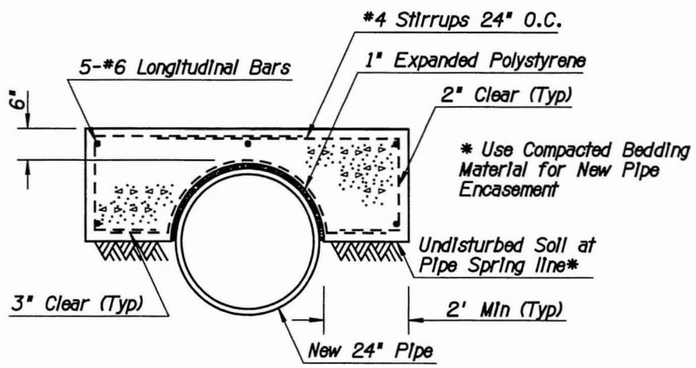
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.13

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A354	A1124	

202 MA 029



Notes: 1. Place Class 'B' Concrete per Section 601 of the Standard Specifications.

PIPE DESIGNATION	LOCATION
406	℄ US60 Med 1022+30.1 83.0' Rt to 106.3' Rt

DETAIL DP

PIPE PROTECTION

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	AEL	12-04
CHECKED	VMW	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

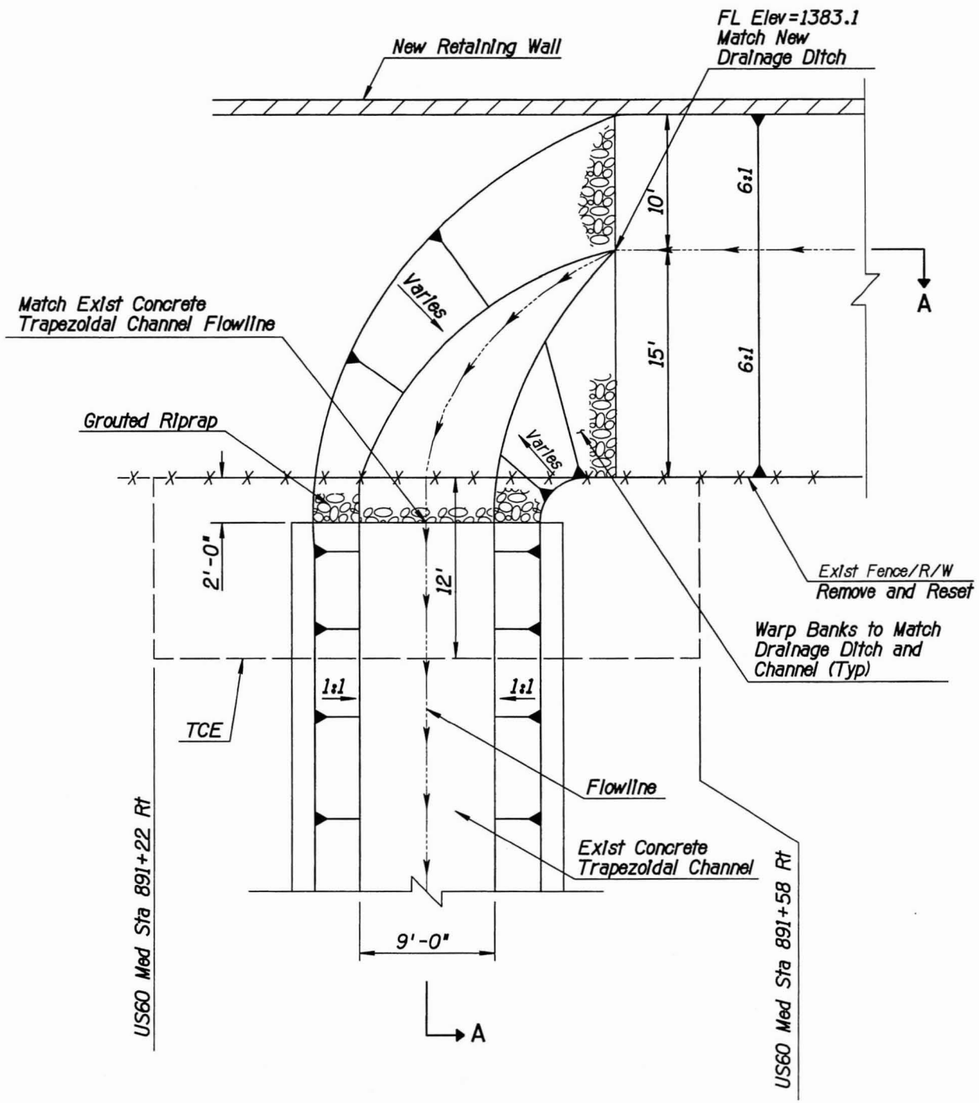
DETAIL SHEET
DETAIL DP

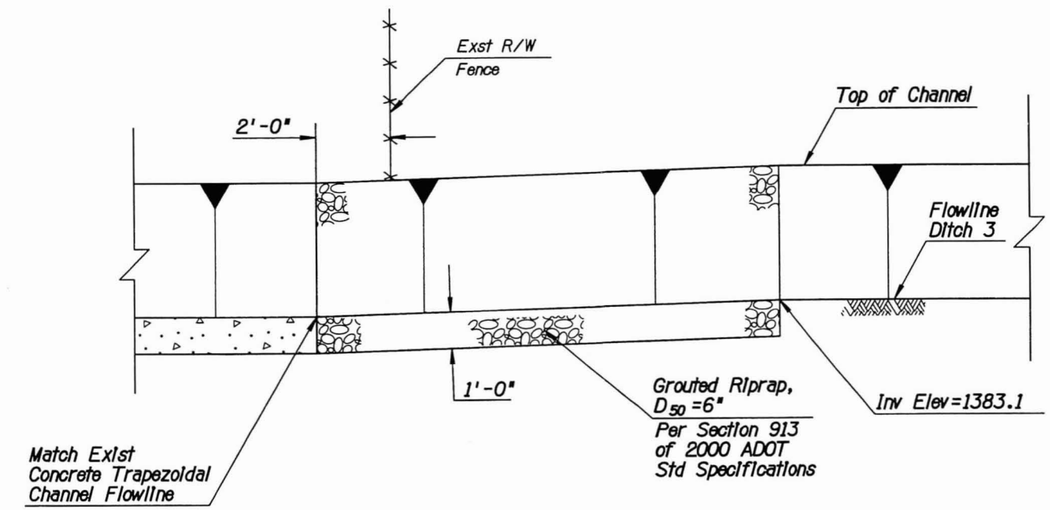
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS M. SLABELL Signed ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-3.14
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A355	A1124	
		202 MA 029			





SECTION A-A
N.T.S.

DETAIL DQ

DITCH TO CHANNEL TRANSITION

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	KL	12-04
CHECKED	VWW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0400 Fax (602) 454-0403 www.aztecjv.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

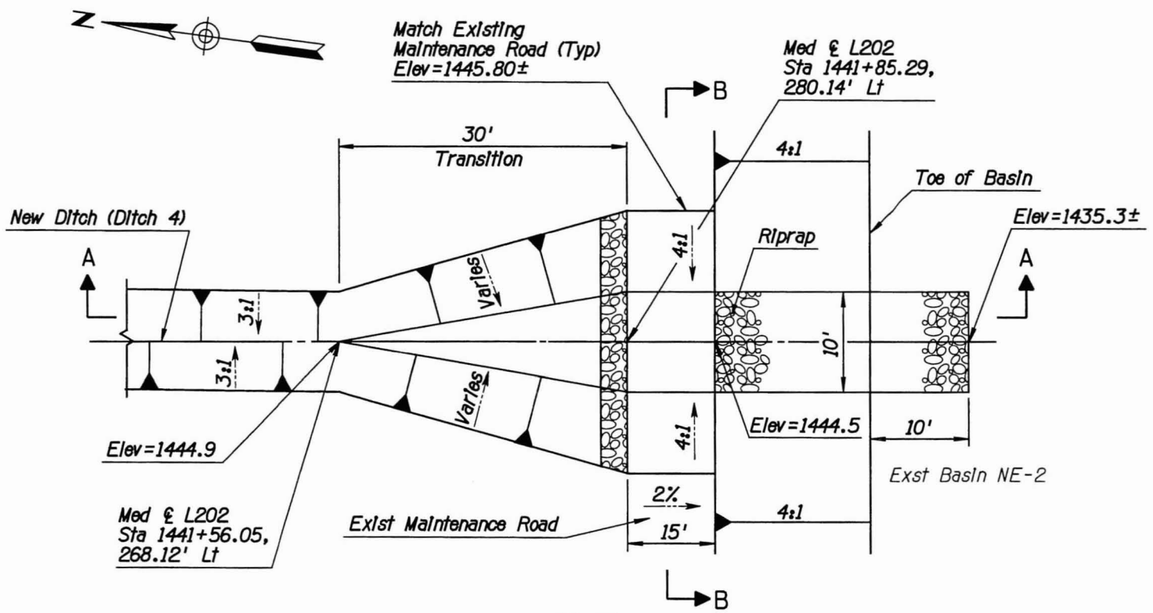
DETAIL SHEET
DETAIL DQ

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

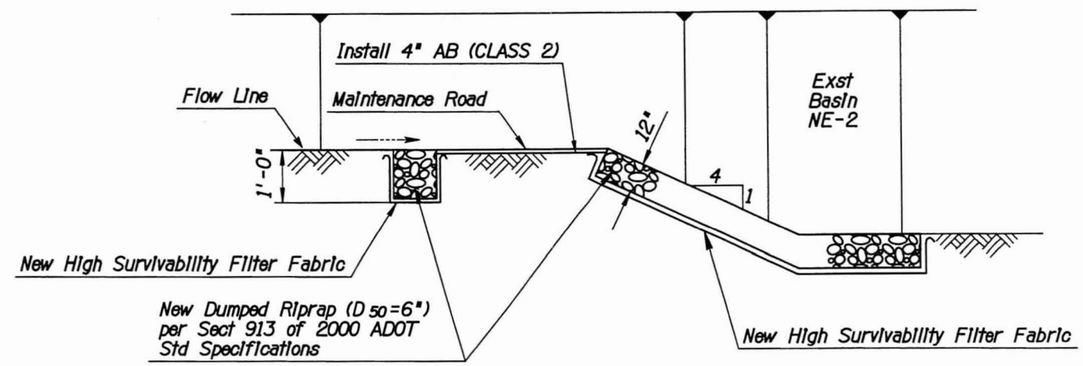
ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-3.15
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 10:35:47 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dd-dq.dgn

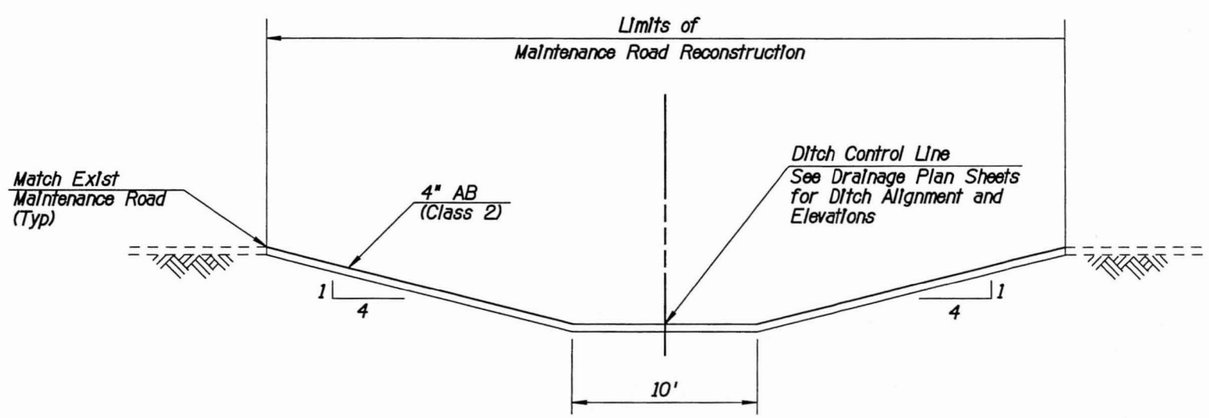
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A356	A1124	
		202 MA 029			



PLAN



SECTION A-A



SECTION B-B

DETAIL DR

DITCH TRANSITION TO BASIN NE-2

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	KRL/AEL	12-04
CHECKED	VMW	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DR

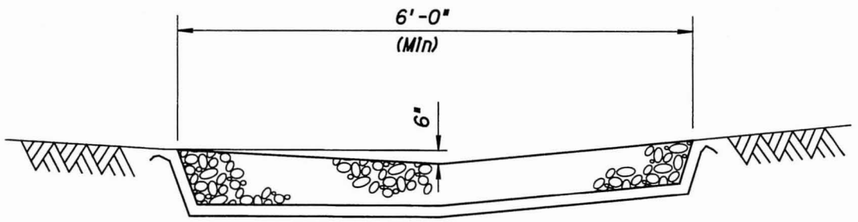
Registered Professional Engineer (Civil) CERTIFICATE NO. 23868 CURTIS W. SLAGELL ARIZONA, U.S.A.

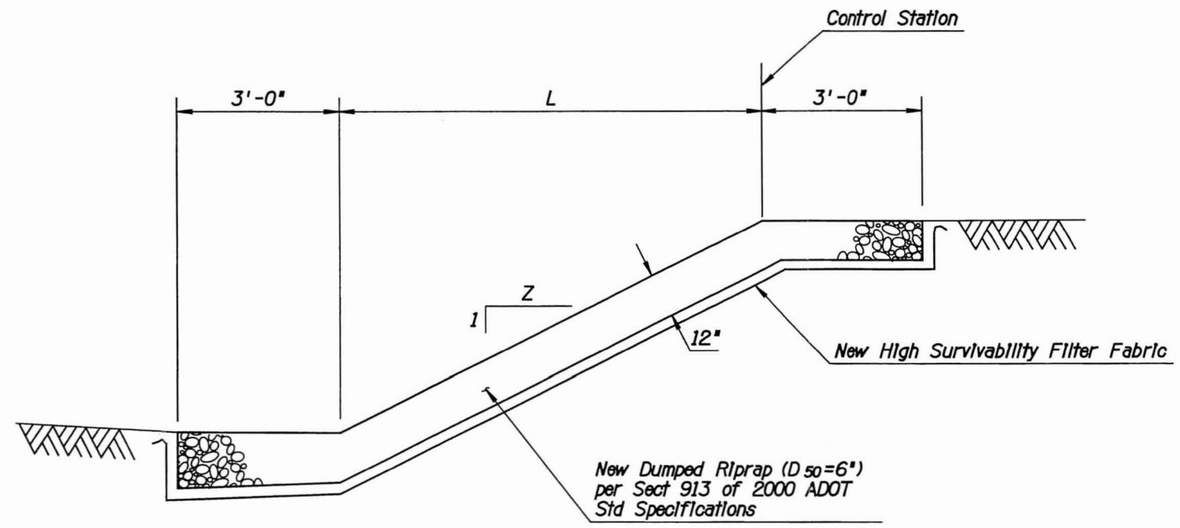
ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-3.16
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 10:35:47 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dd-dr.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A357	A1124	

202 MA 029





CONTROL STATION	L	Z
ELLSWORTH RD RAMP B STA 34+43, 112' Lt	116'	VARIES
℄ 202L MED STA 1458+10, 193' Rt	12'	4
℄ 202L MED STA 1460+37, 189' Lt	12'	4

DETAIL DS

RIPRAP BANK PROTECTION

	NAME	DATE
DESIGN	DNJ	12-04
DRAWN	KRL/AEL	12-04
CHECKED	VMW	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DS

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21856
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

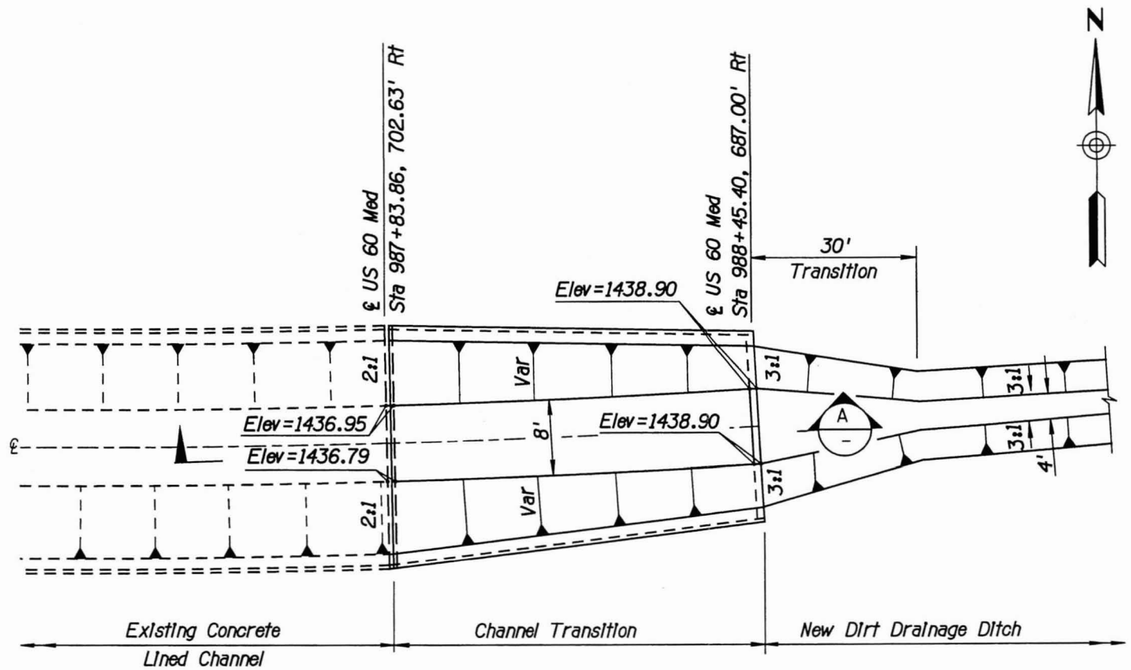
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-3.17

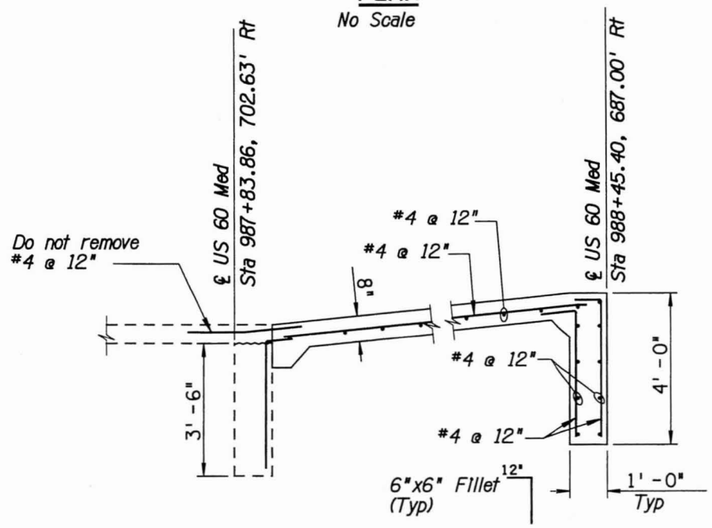
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A358	A1124	
		202 MA 029			



PLAN
No Scale



SECTION A
No Scale

NOTES:

1. Turndowns shall be constructed along total width of channel including side slopes.
2. Remove and reconstruct channel transition.

DETAIL DT

SOUTHEAST CHANNEL TRANSITION

	NAME	DATE
DESIGN	RES	12-04
DRAWN	DES	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

DETAIL SHEET
DETAIL DT

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

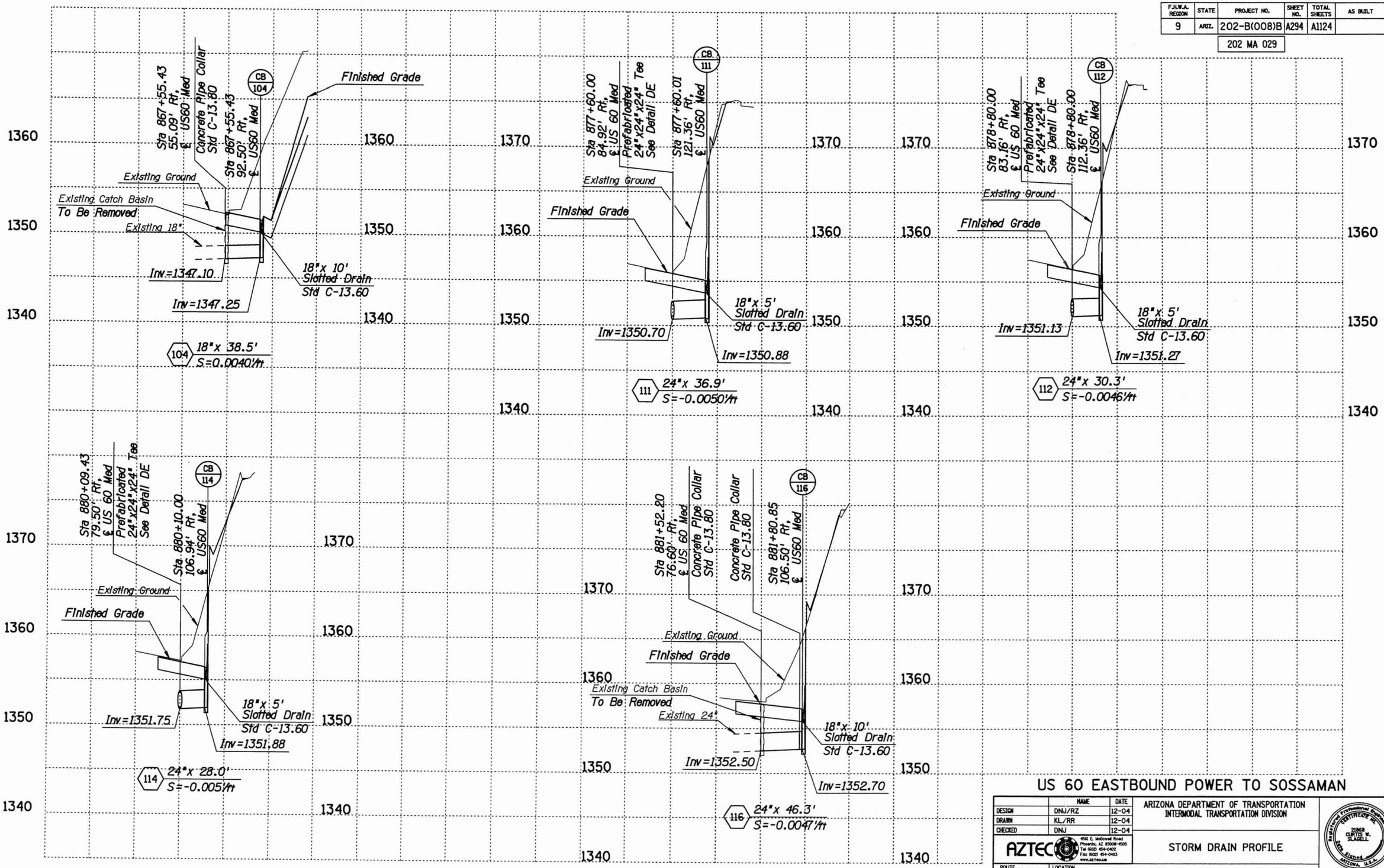
DWG NO. D-3.18

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A294	A1124	
		202 MA 029			



US 60 EASTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	
TRACS NO. H5686 04C	202-B(008)B	

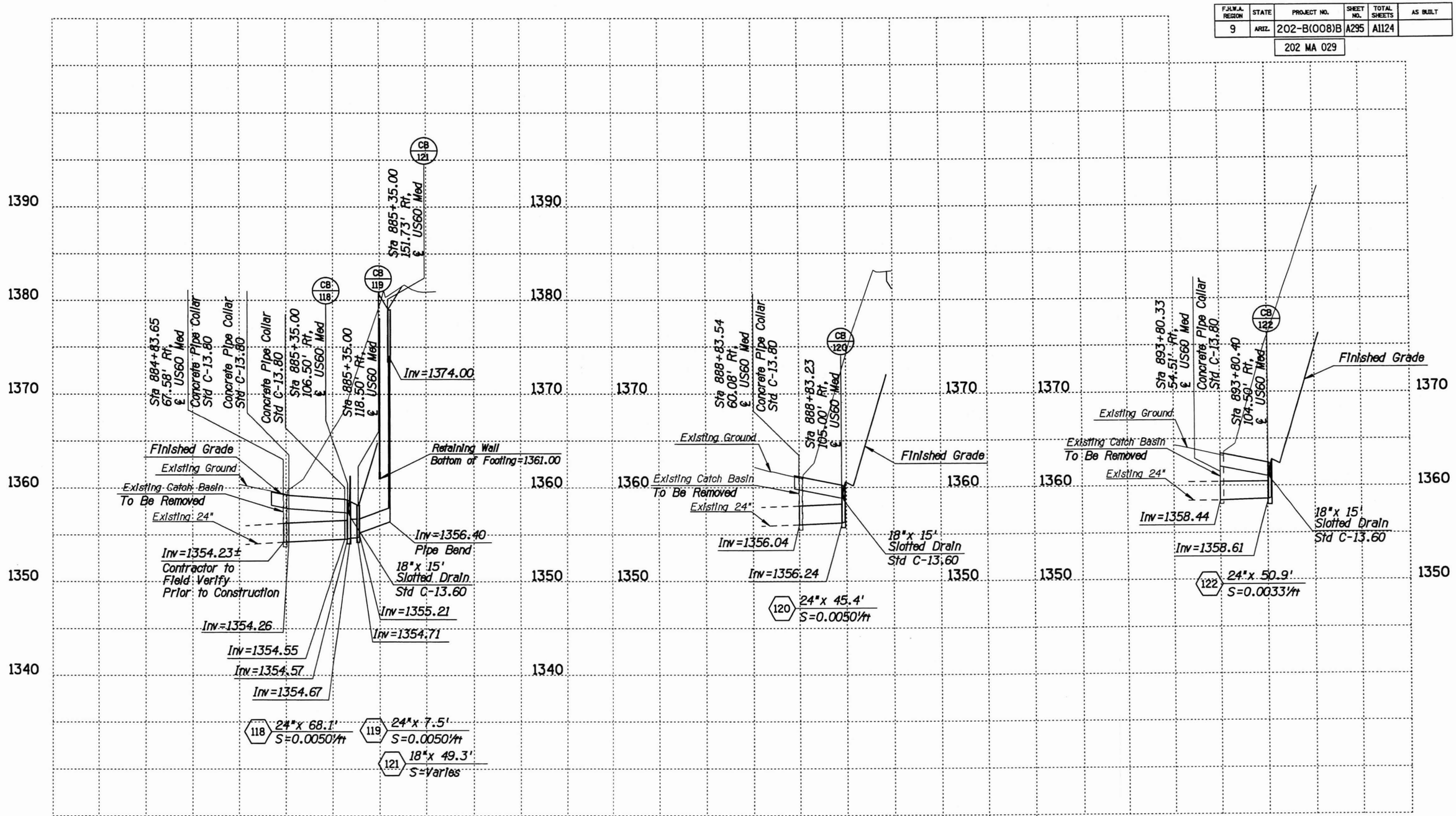
DWG NO. D-2.01

___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:22 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A295	A1124	
		202 MA 029			



US 60 EASTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.02

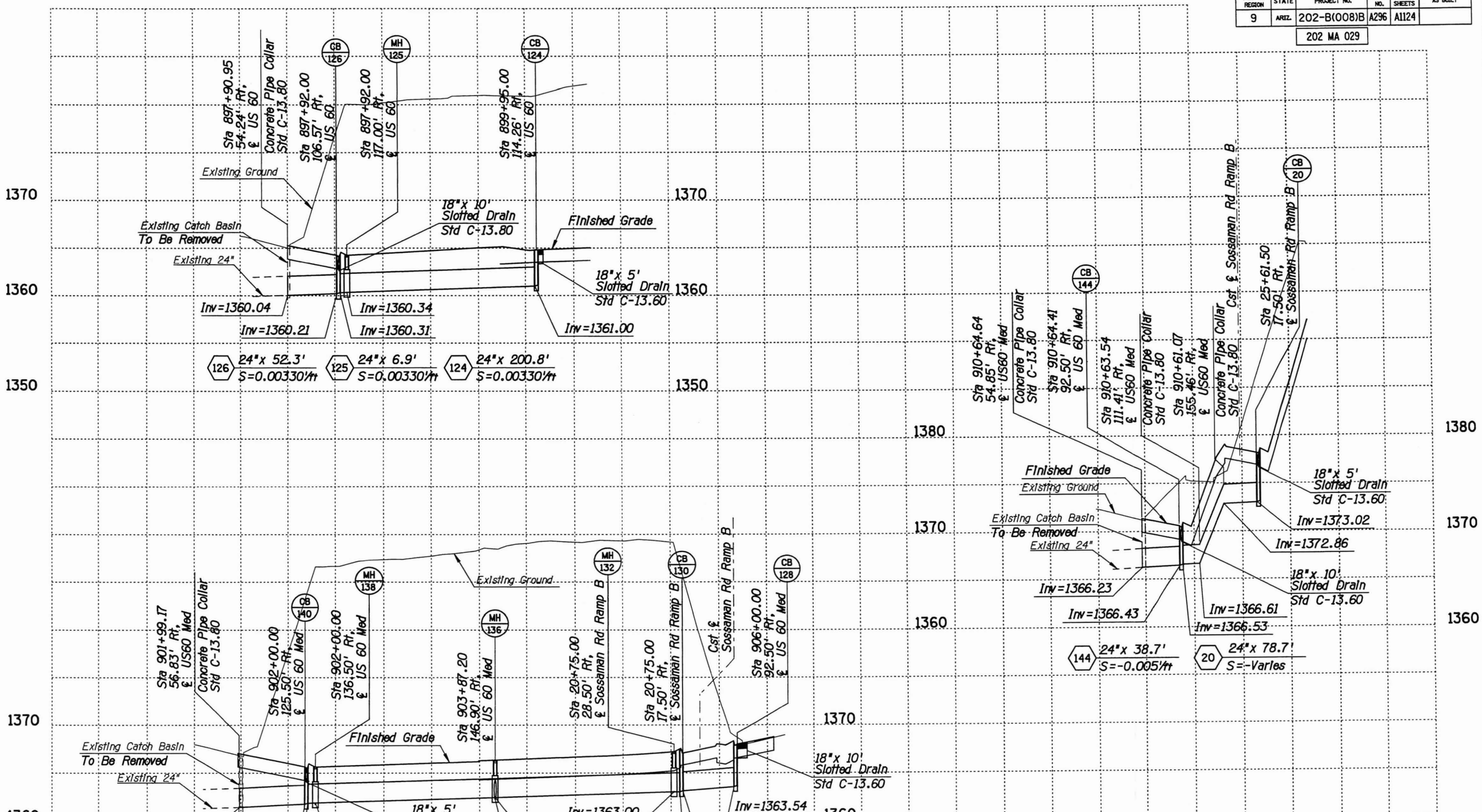
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A. Date Signed

Plotted By: kleahy at 11:16:23 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-02.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A296	A1124	
		202 MA 029			



US 60 EASTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

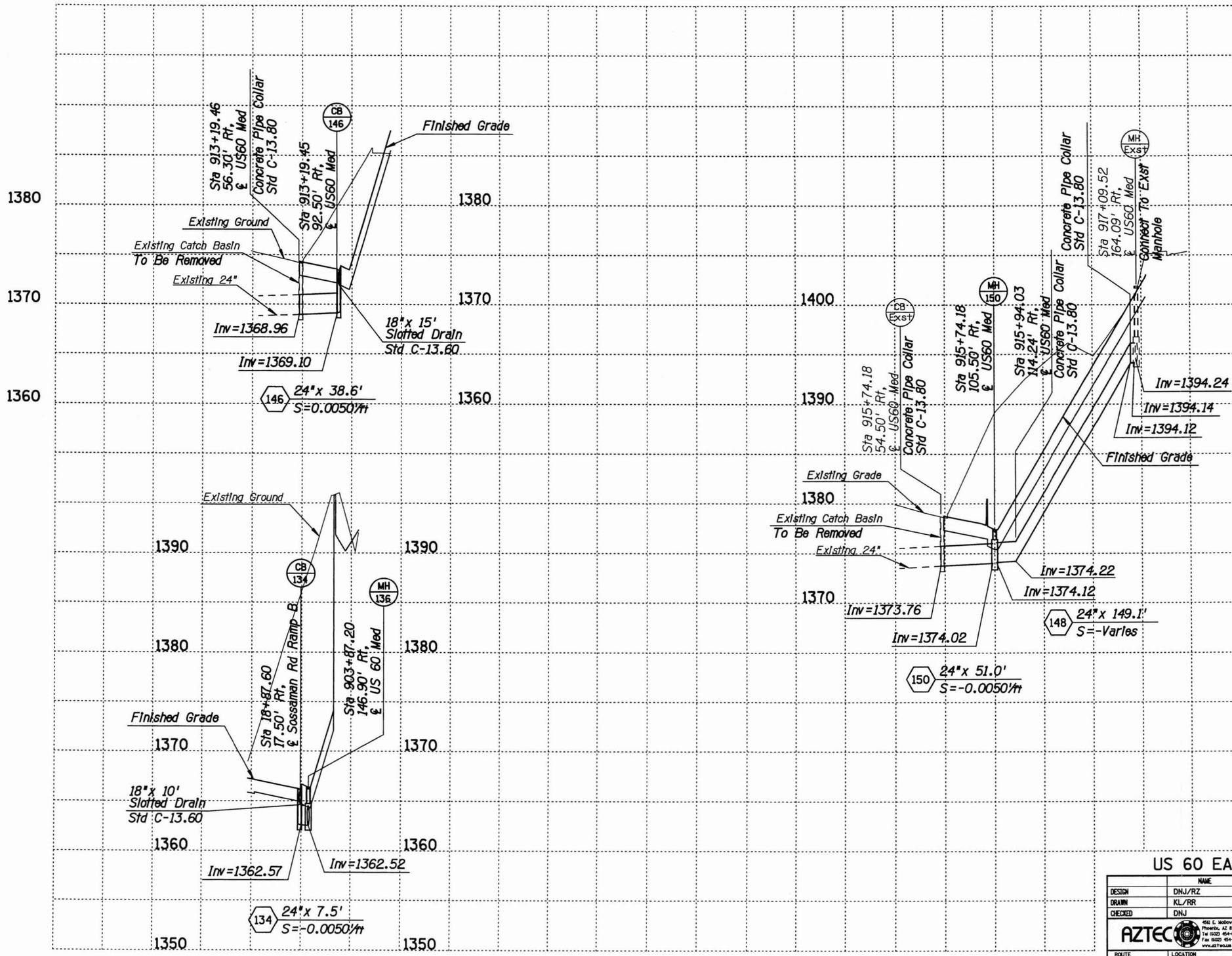
Registered Professional Engineer (Civil) CERTIFICATE NO. 22868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-2.03
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

LOCATION- DATE- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 11:16:24 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-03.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A297	A1124	
		202 MA 029			



US 60 EASTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

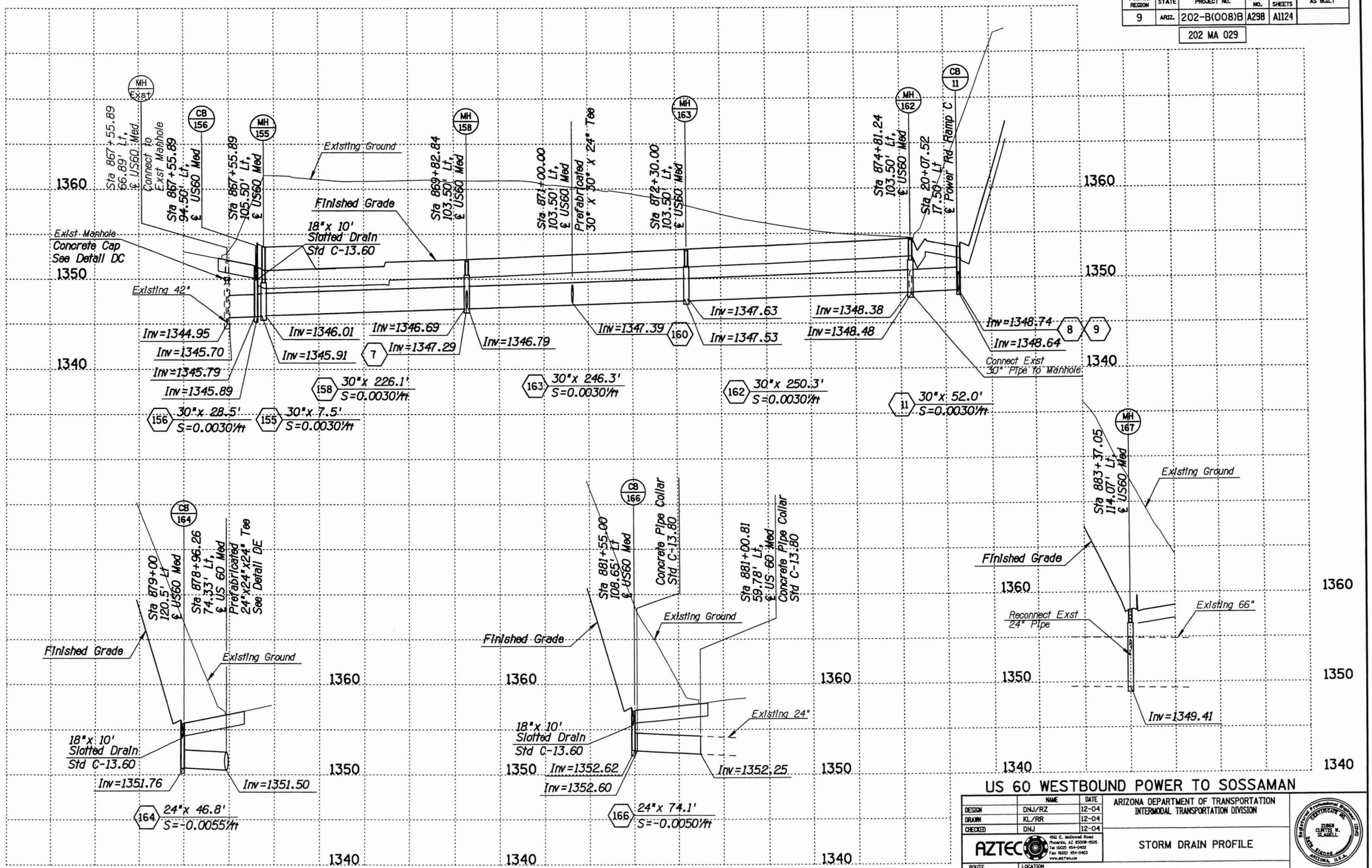
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.04

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A298	A1124	
		202 MA 029			



US 60 WESTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CLIFTON W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.05

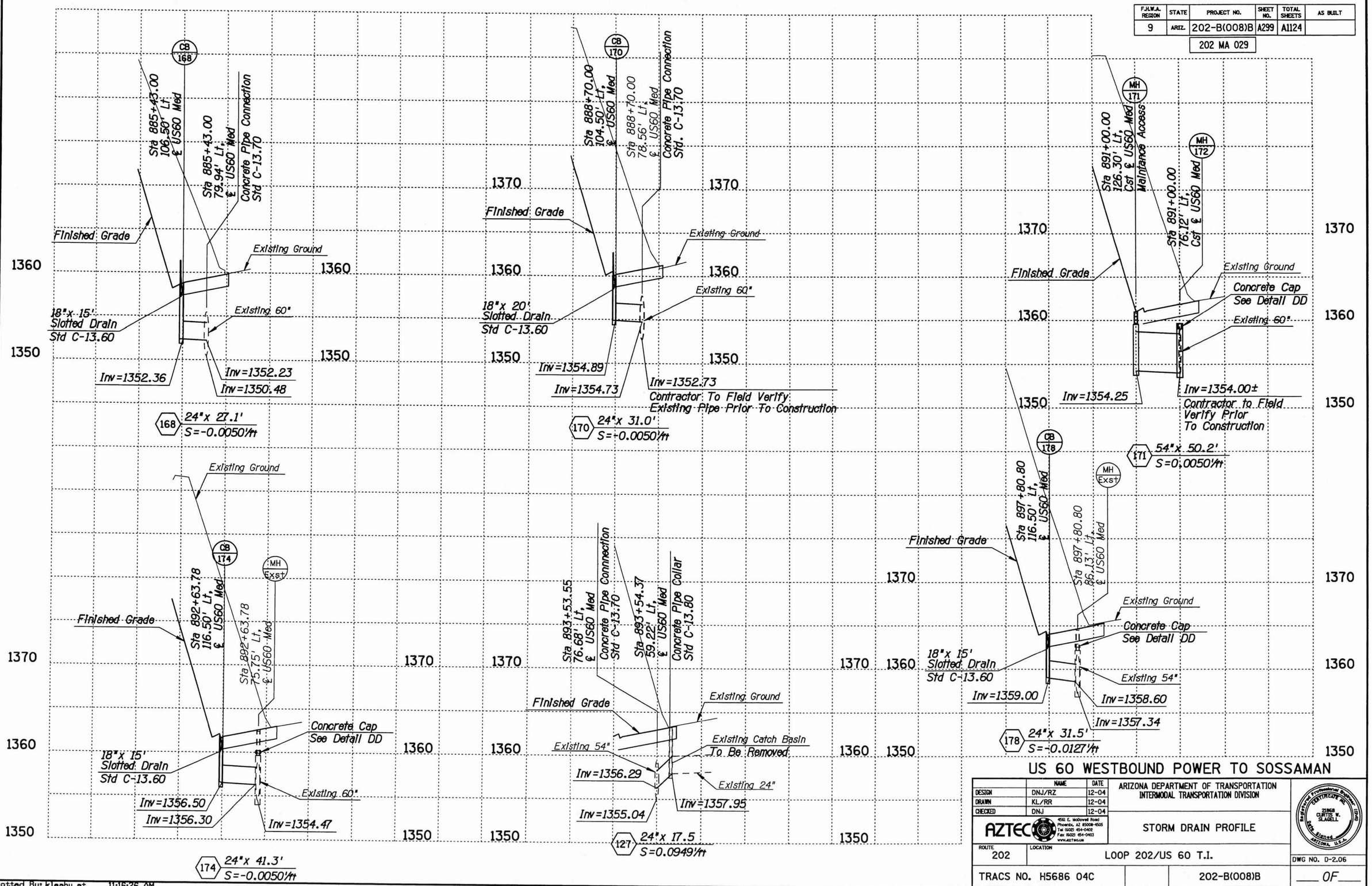
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:25 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-05.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A299	A1124	

202 MA 029



US 60 WESTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A. Date Signed

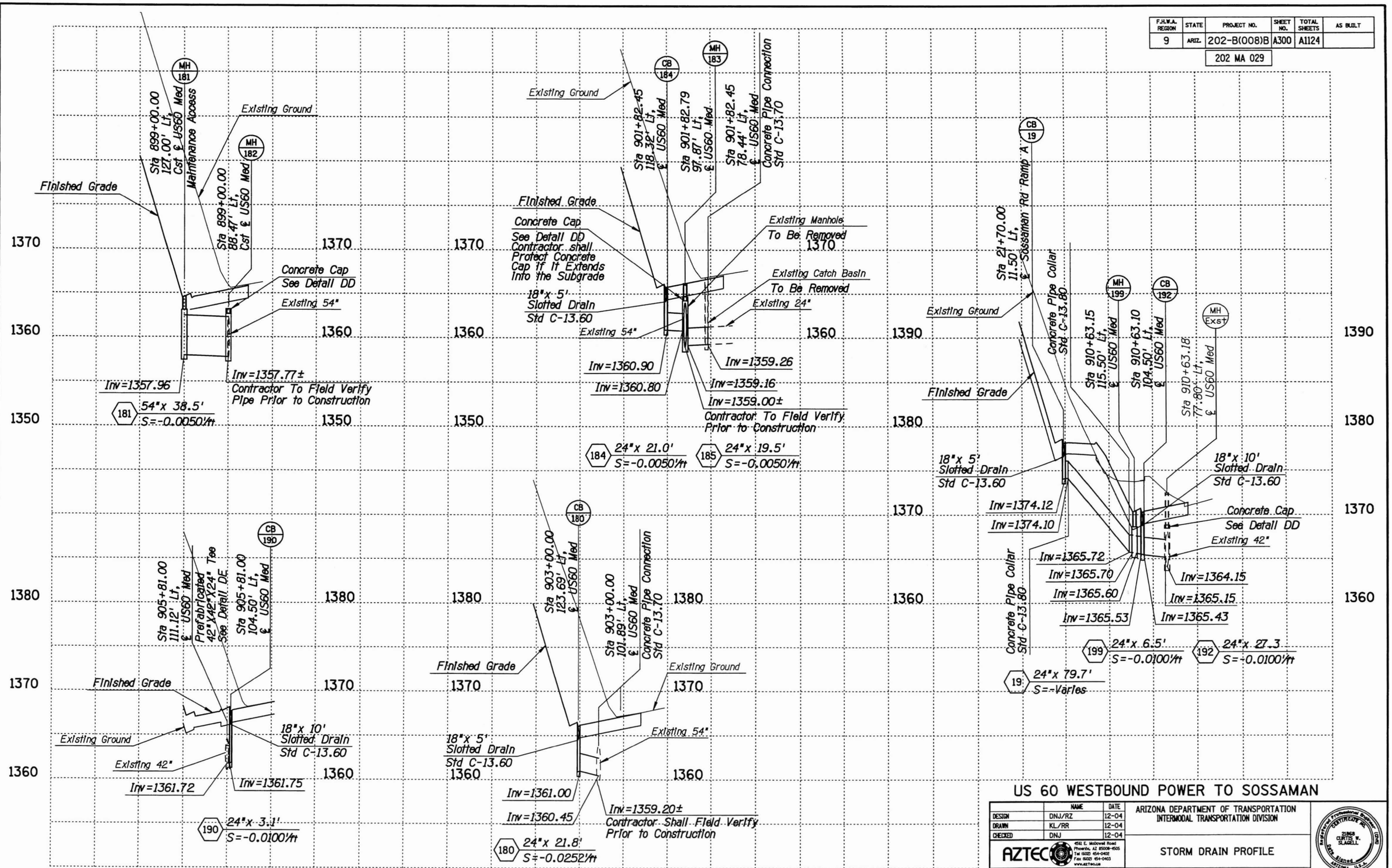
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.06

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:26 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-06.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A300	A1124	
		202 MA 029			



US 60 WESTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4521 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

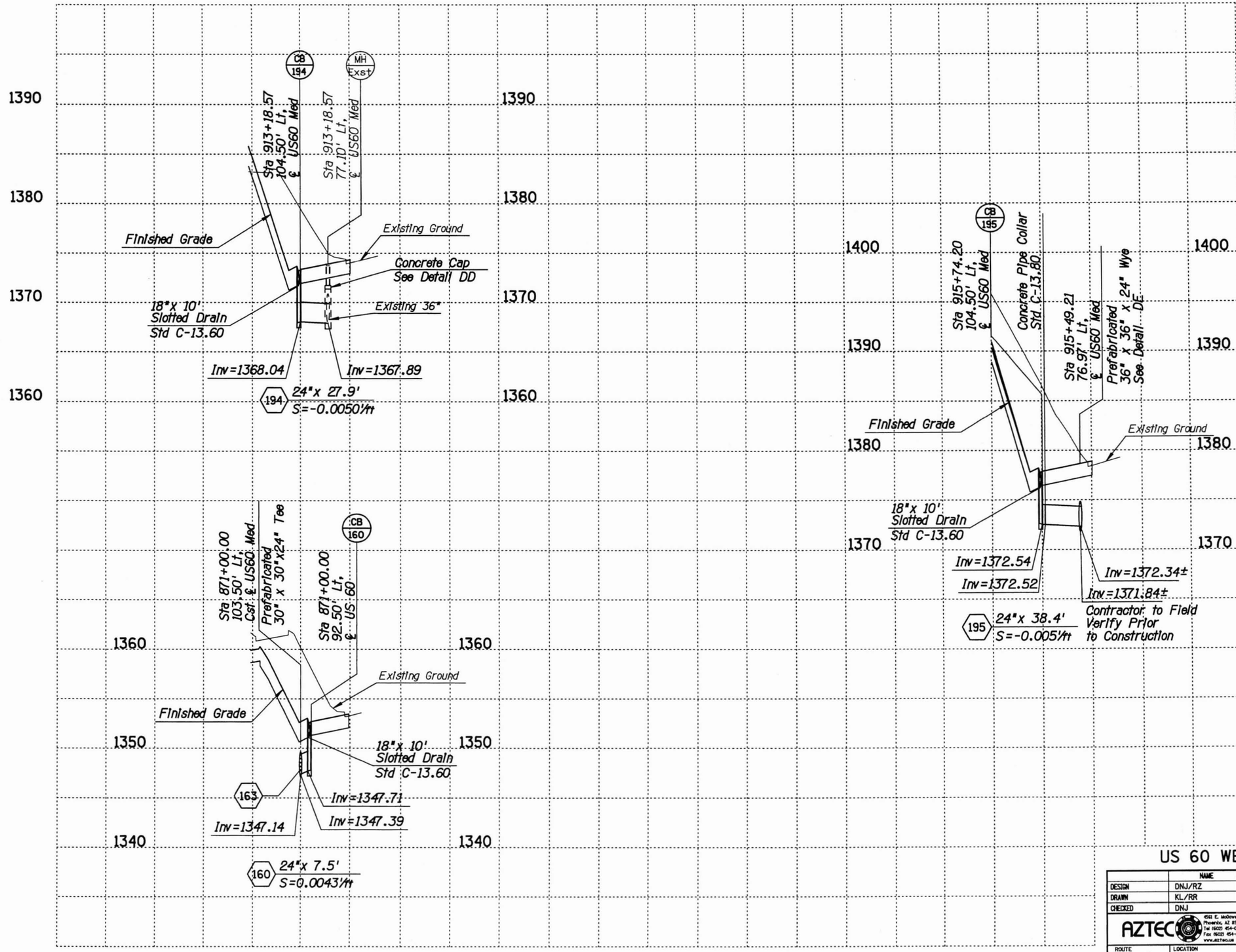
Registered Professional Engineer (Civil)
CERTIFICATE NO. 23863
CURTIS W. SLABELL
Date Signed
ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-2.07
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 11:16:27 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-07.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A301	A1124	
		202 MA 029			



US 60 WESTBOUND POWER TO SOSSAMAN

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

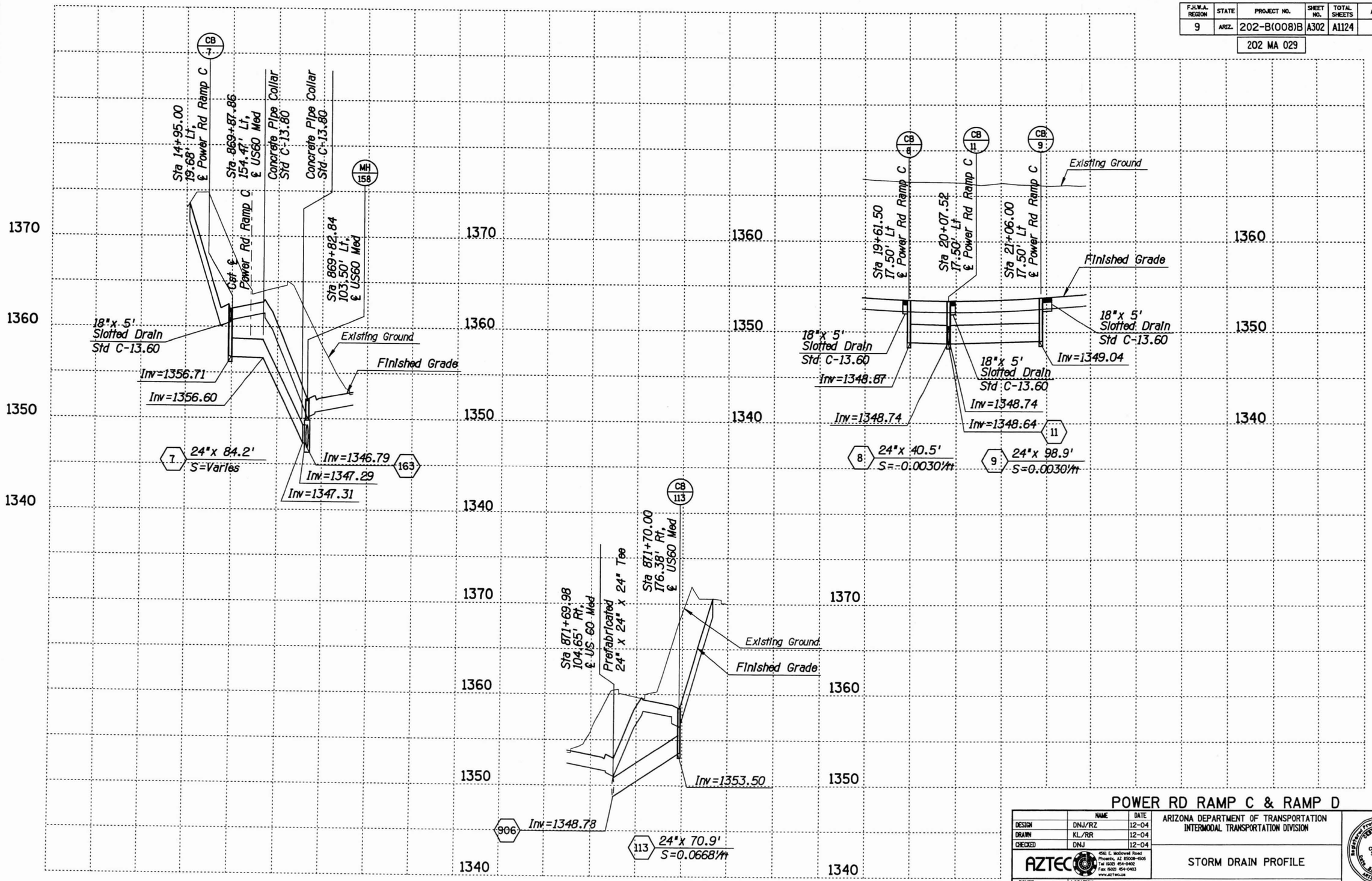
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. D-2.08

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

FINISHED PLANS- REVISIONS- LOCATION- DATE- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A302	A1124	
		202 MA 029			



POWER RD RAMP C & RAMP D

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecw.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

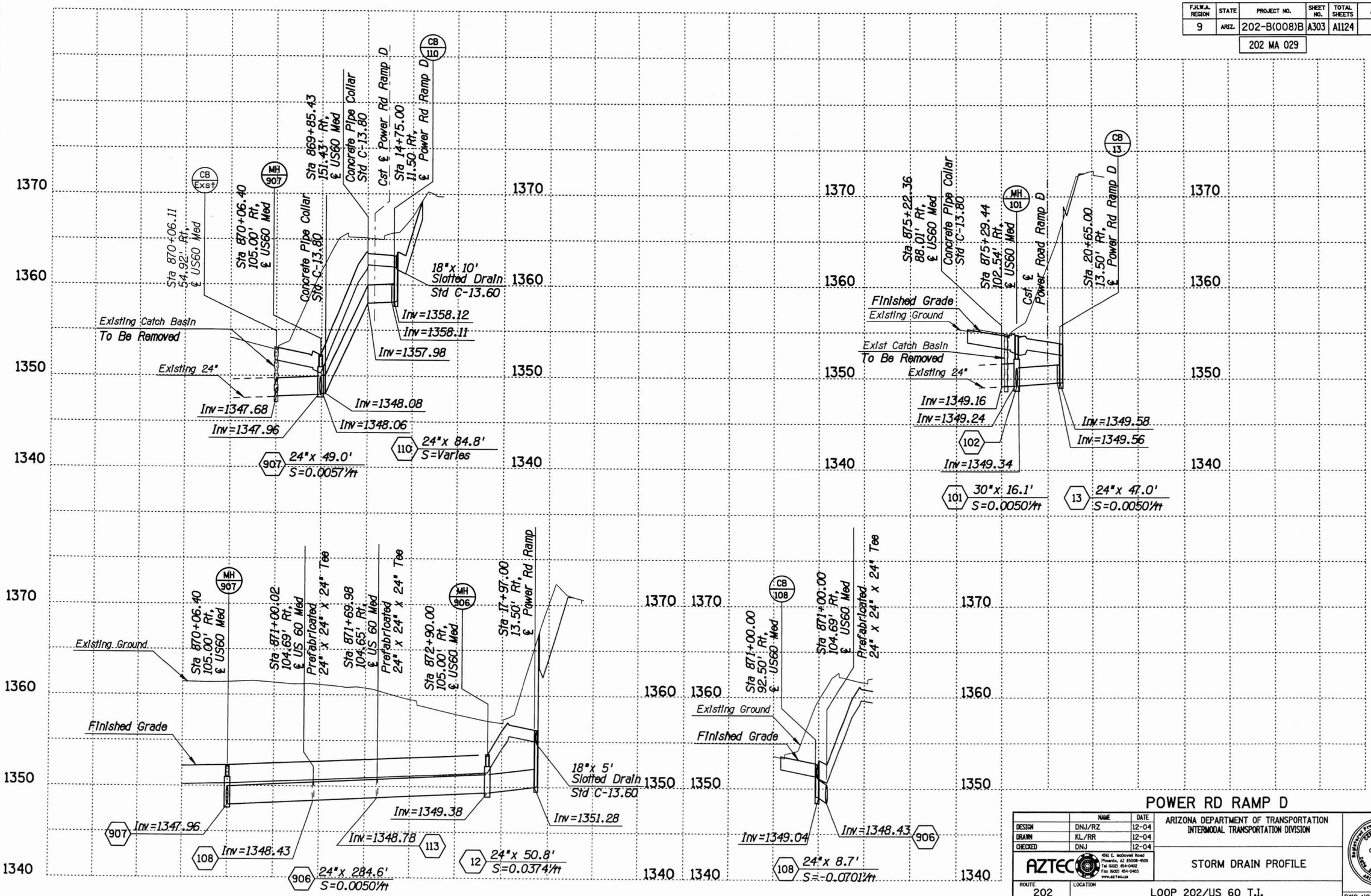
DWG NO. D-2.09

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:29 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-09.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A303	A1124	
		202 MA 029			



POWER RD RAMP D

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0463 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

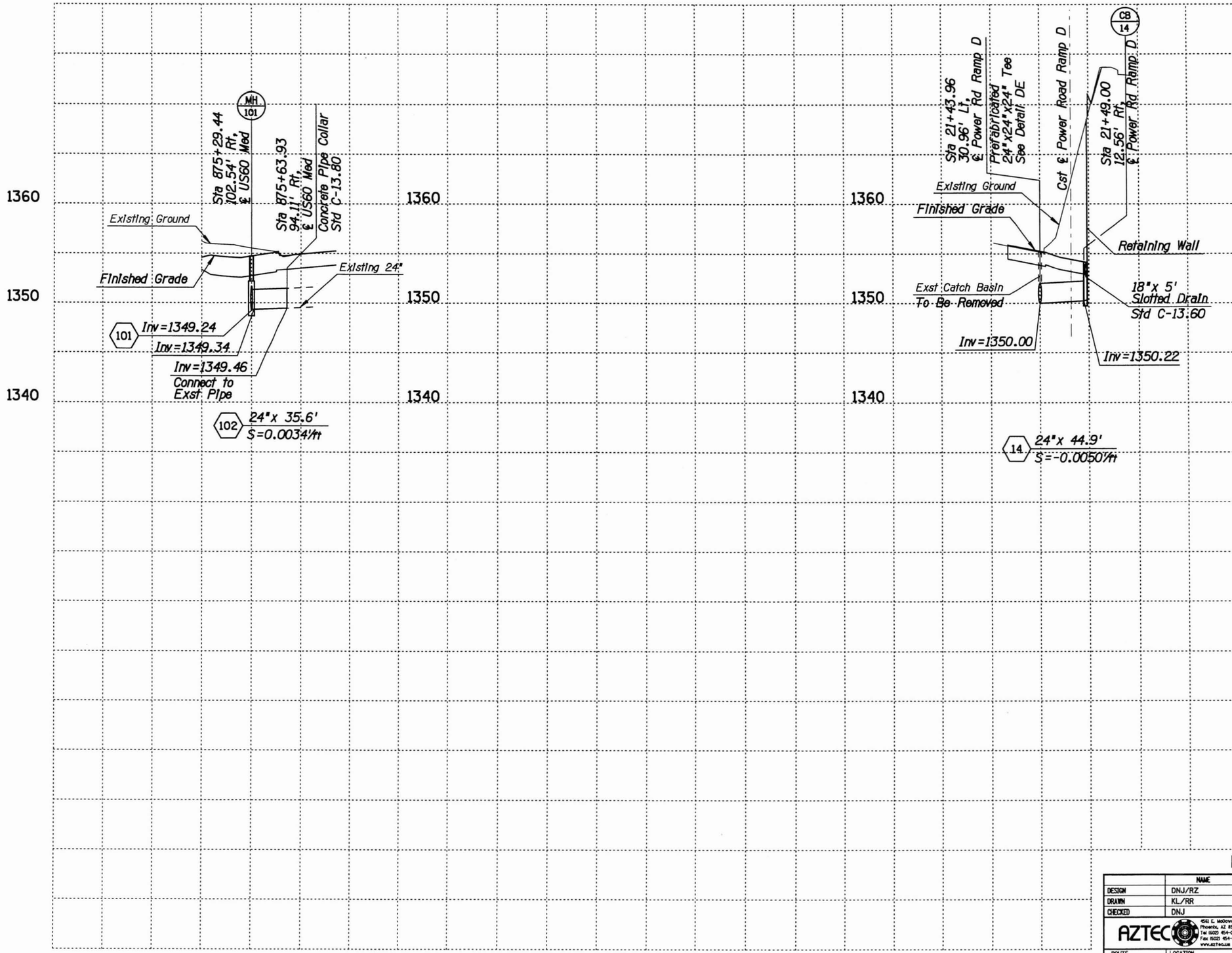
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.10

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:30 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-10.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A304	A1124	
		202 MA 029			



POWER RD RAMP D

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

STORM DRAIN PROFILE

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

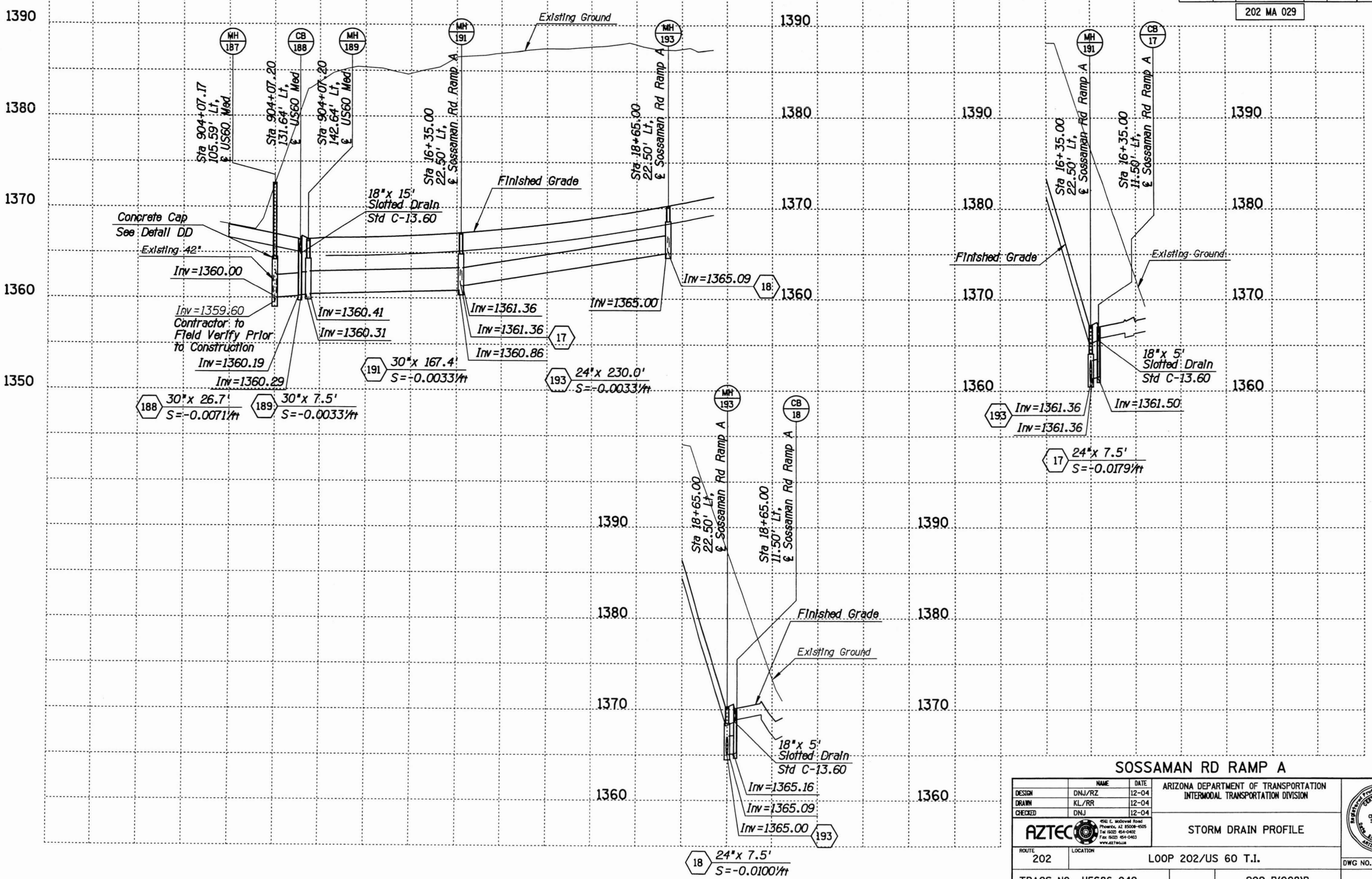
DWG NO. D-2.11

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:31 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-11.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A305	A1124	
		202 MA 029			



SOSSAMAN RD RAMP A

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4541 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	

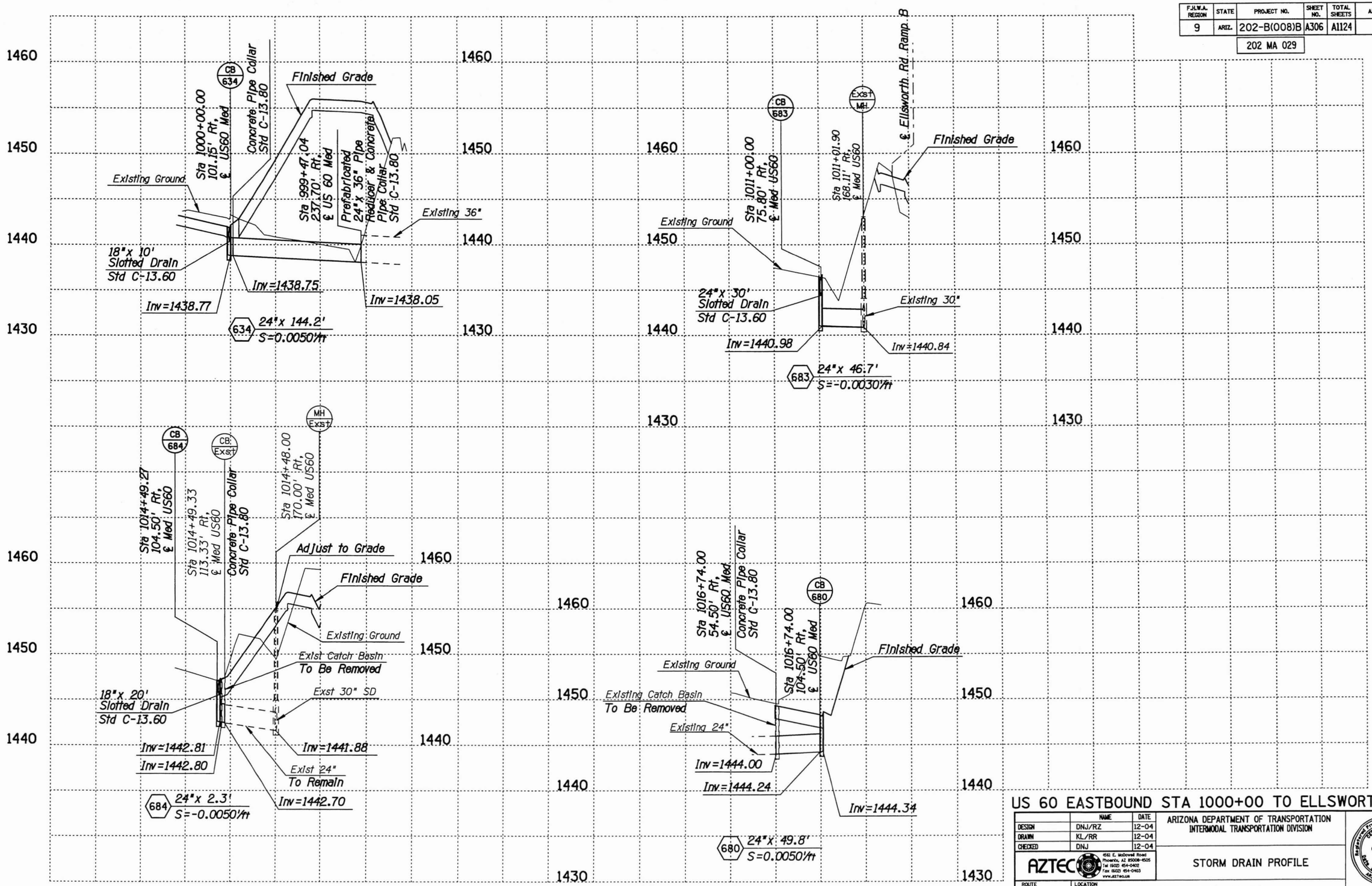
DWG NO. D-2.12

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:32 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-12.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A306	A1124	

202 MA 029



US 60 EASTBOUND STA 1000+00 TO ELLSWORTH RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4141 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

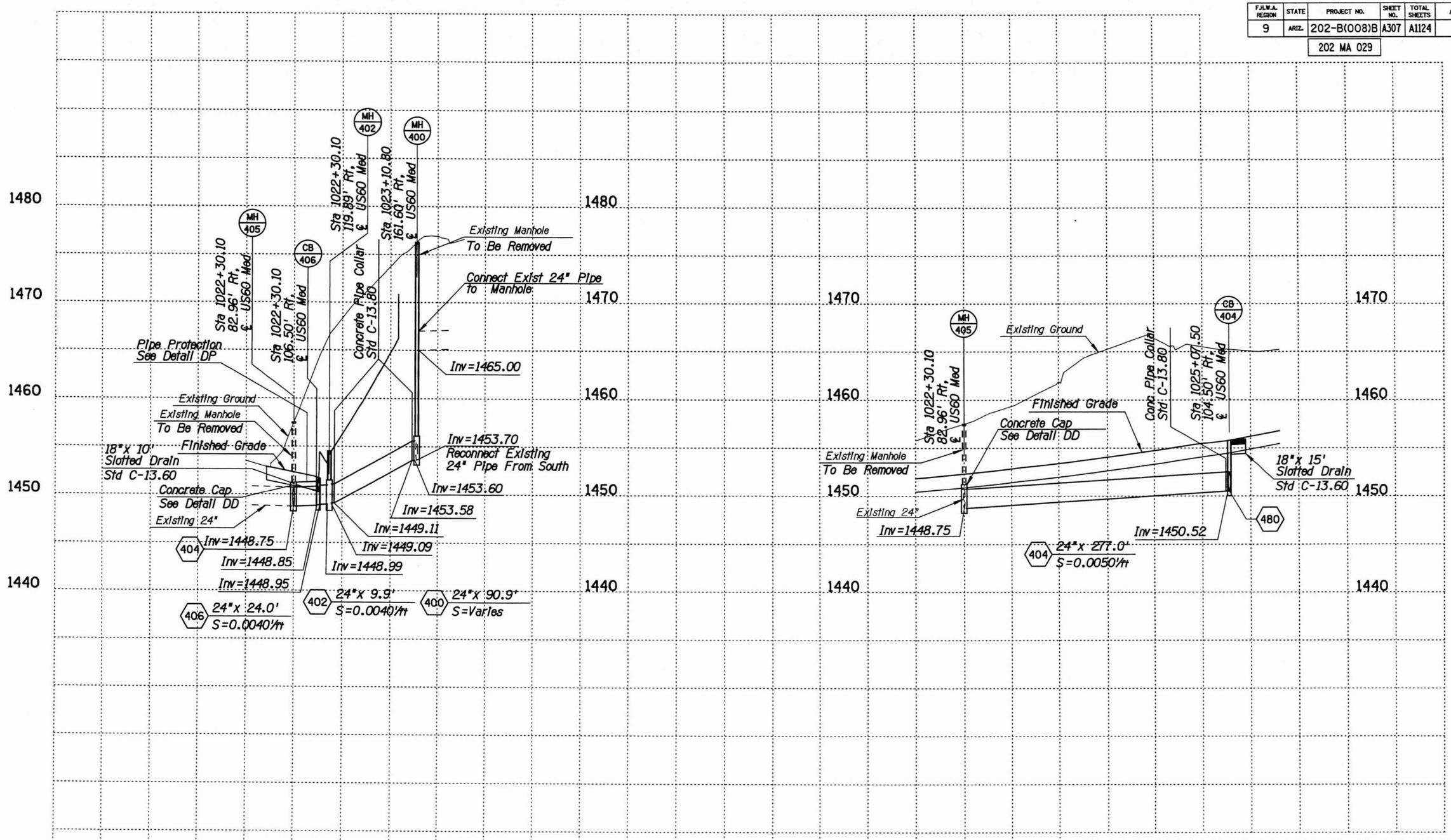
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.13

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:33 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-13.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A307	A1124	
		202 MA 029			



US 60 EASTBOUND STA 1000+00 TO ELLSWORTH RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.14

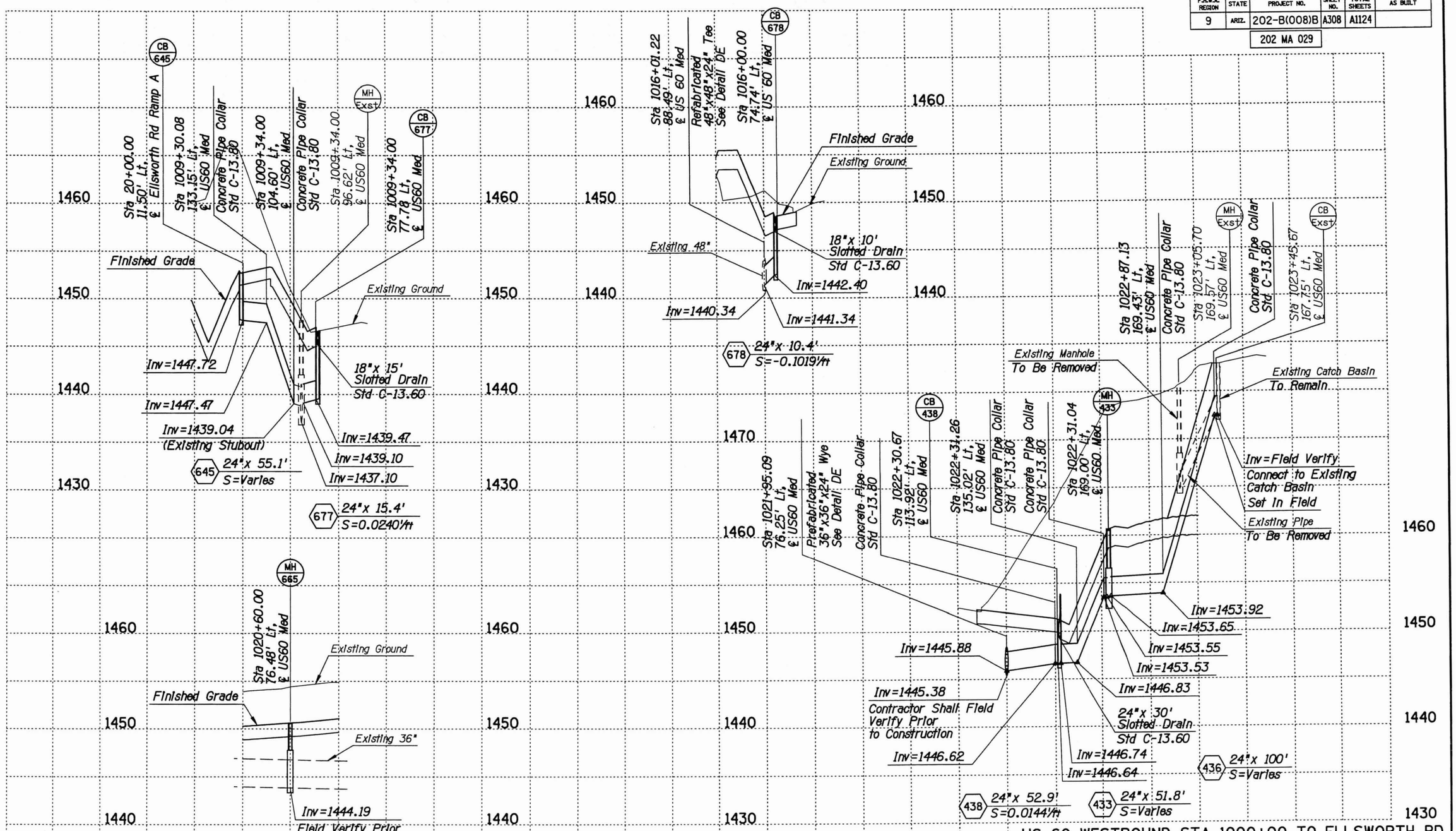
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:33 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-14.dgn

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A308	A1124	

202 MA 029



US 60 WESTBOUND STA 1000+00 TO ELLSWORTH RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0463 www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer CERTIFICATE NO. 21868 CLIFTIS N. SLAGELL ARIZONA, U.S.A. Date Signed 12-17-04

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

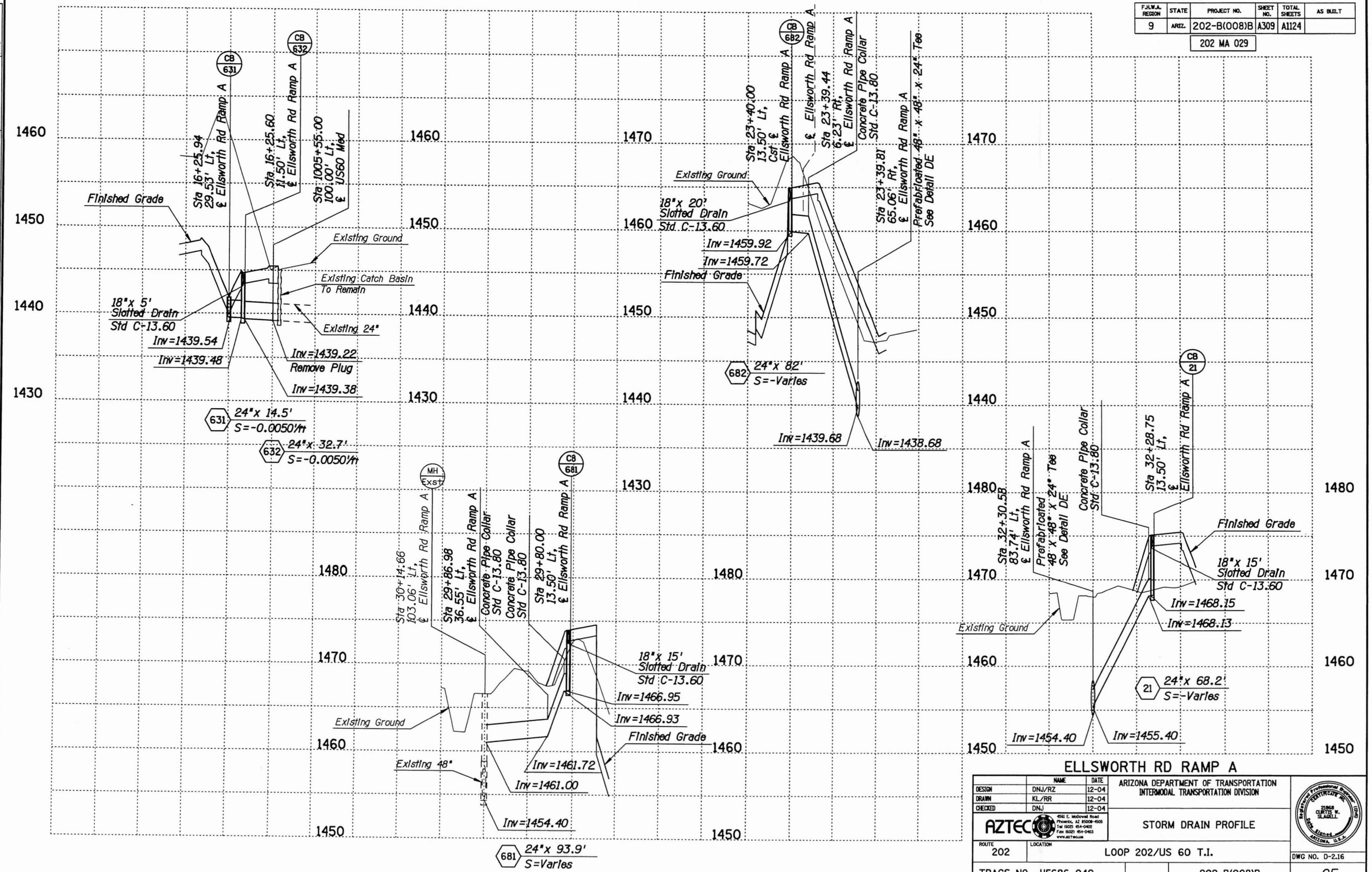
DWG NO. D-2.15

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

DATE- | LOCATION- | REVISIONS- | FINISHED PLANS- | SURVEY NO.

Plotted By: kleahy at 12:26:13 PM 1/26/2005 R:\Phoenix\Projects\Az01107\Cadd\Drn\AZ01107-02-DR-15.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A309	A1124	
		202 MA 029			



ELLSWORTH RD RAMP A

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4582 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21968 CURTIS W. SLAGELL ARIZONA, U.S.A.

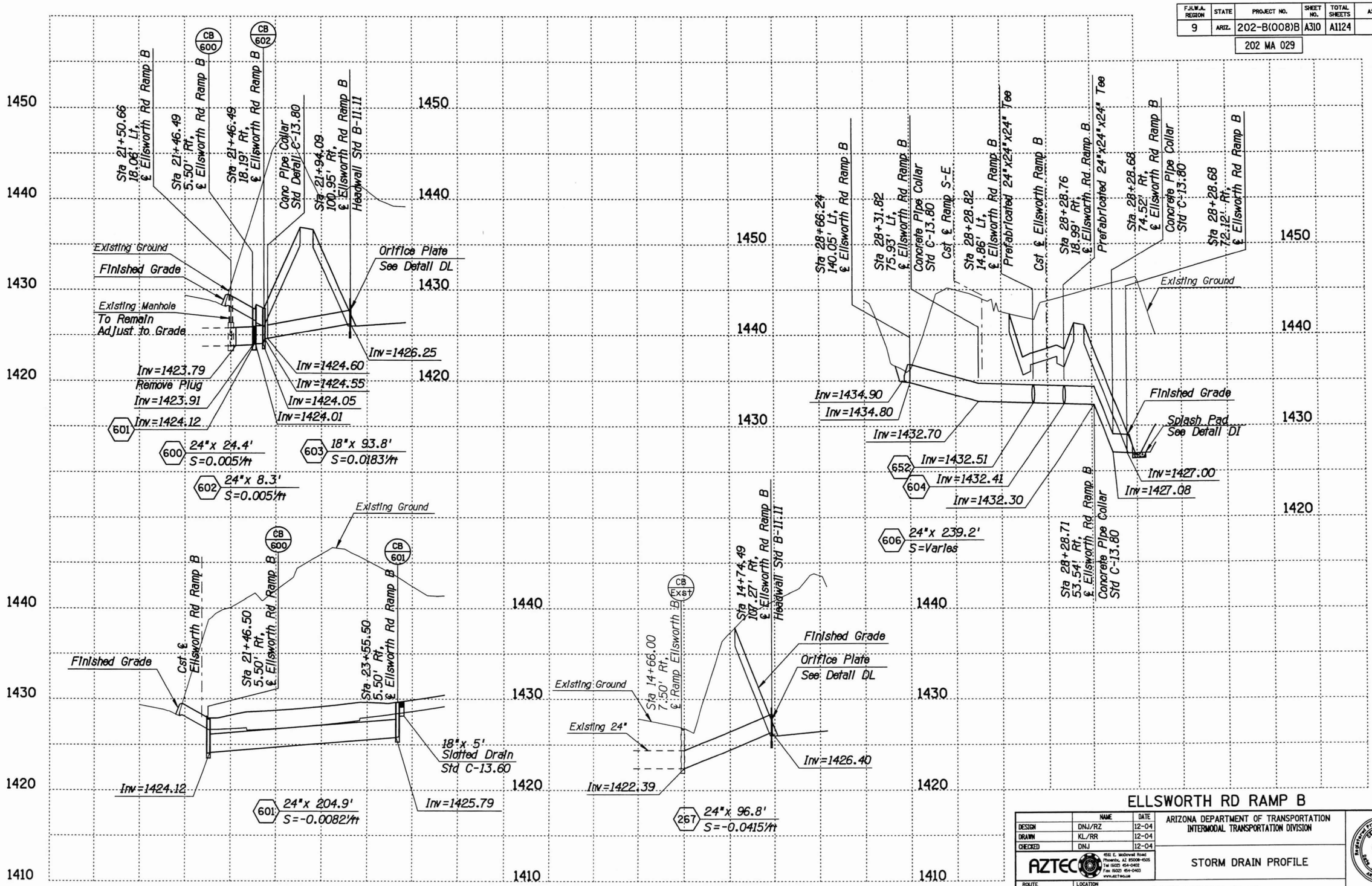
DWG NO. D-2.16

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:35 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-16.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A310	A1124	
		202 MA 029			



ELLSWORTH RD RAMP B

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

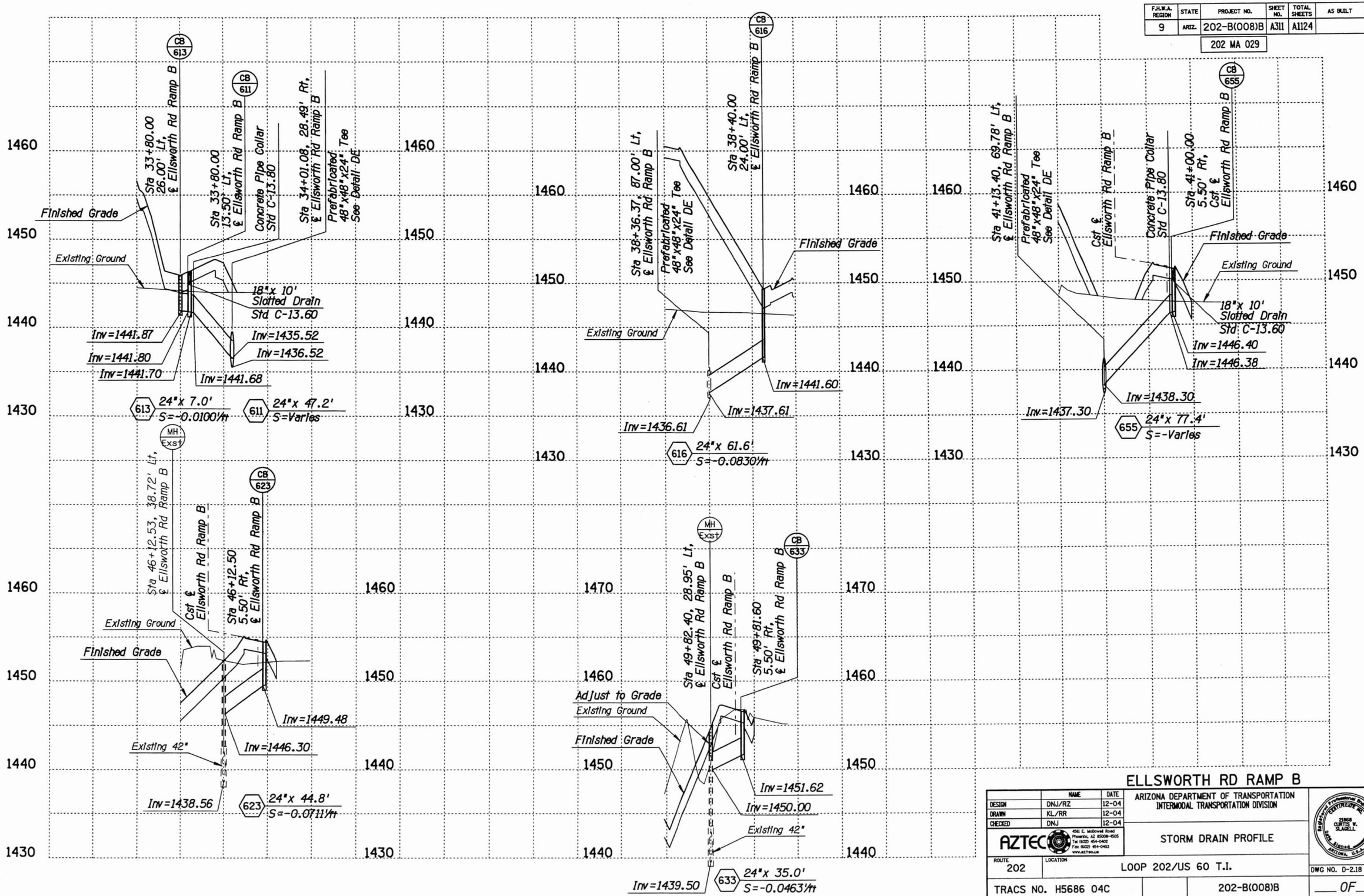
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-2.17
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:36 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-17.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A311	A1124	
		202 MA 029			



ELLSWORTH RD RAMP B

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0400 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.18

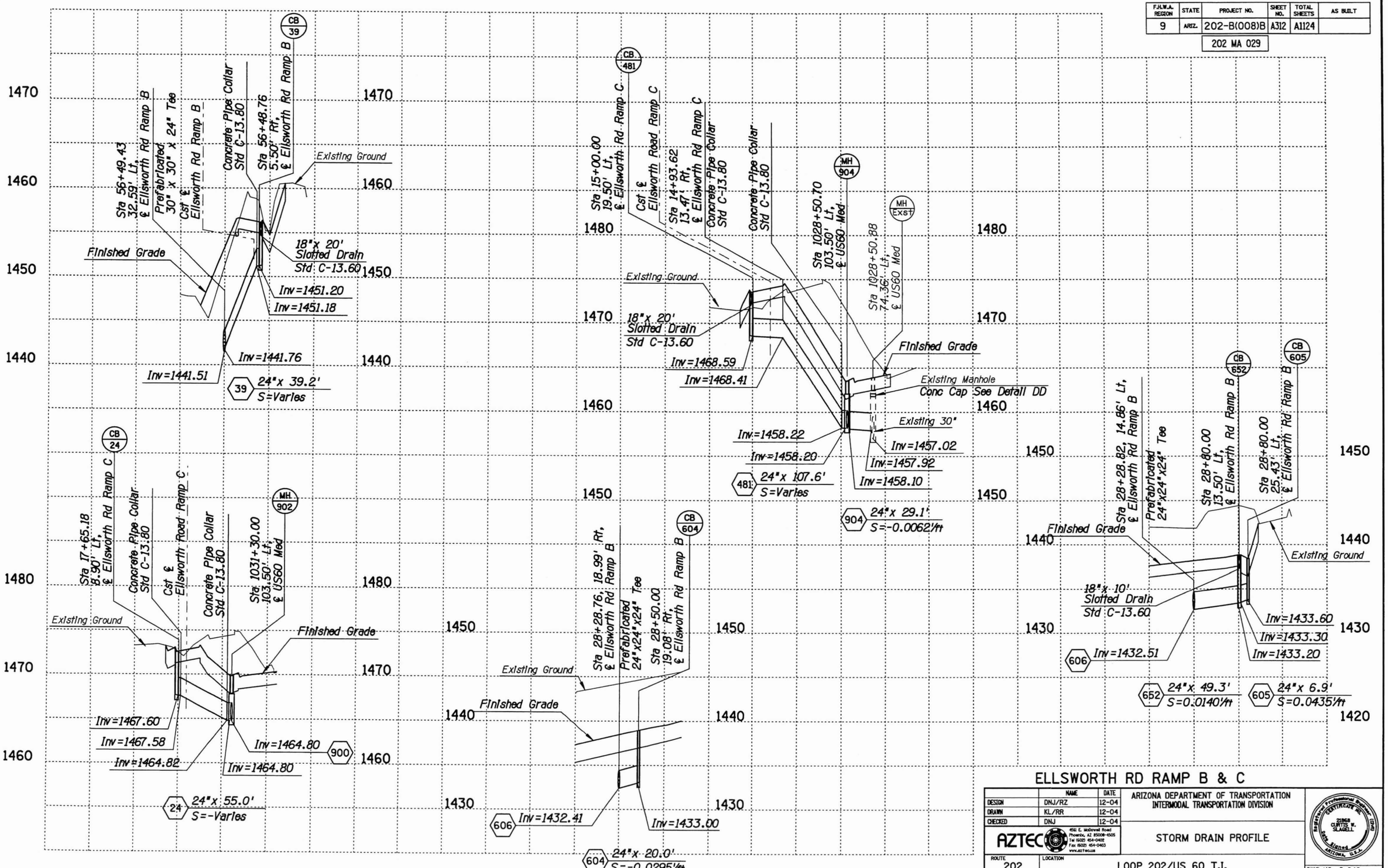
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. GLAGELL STATE OF ARIZONA U.S.A.

Plotted By: kleahy at 11:16:37 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-18.dgn

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A312	A1124	
		202 MA 029			



ELLSWORTH RD RAMP B & C

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A. Date Signed

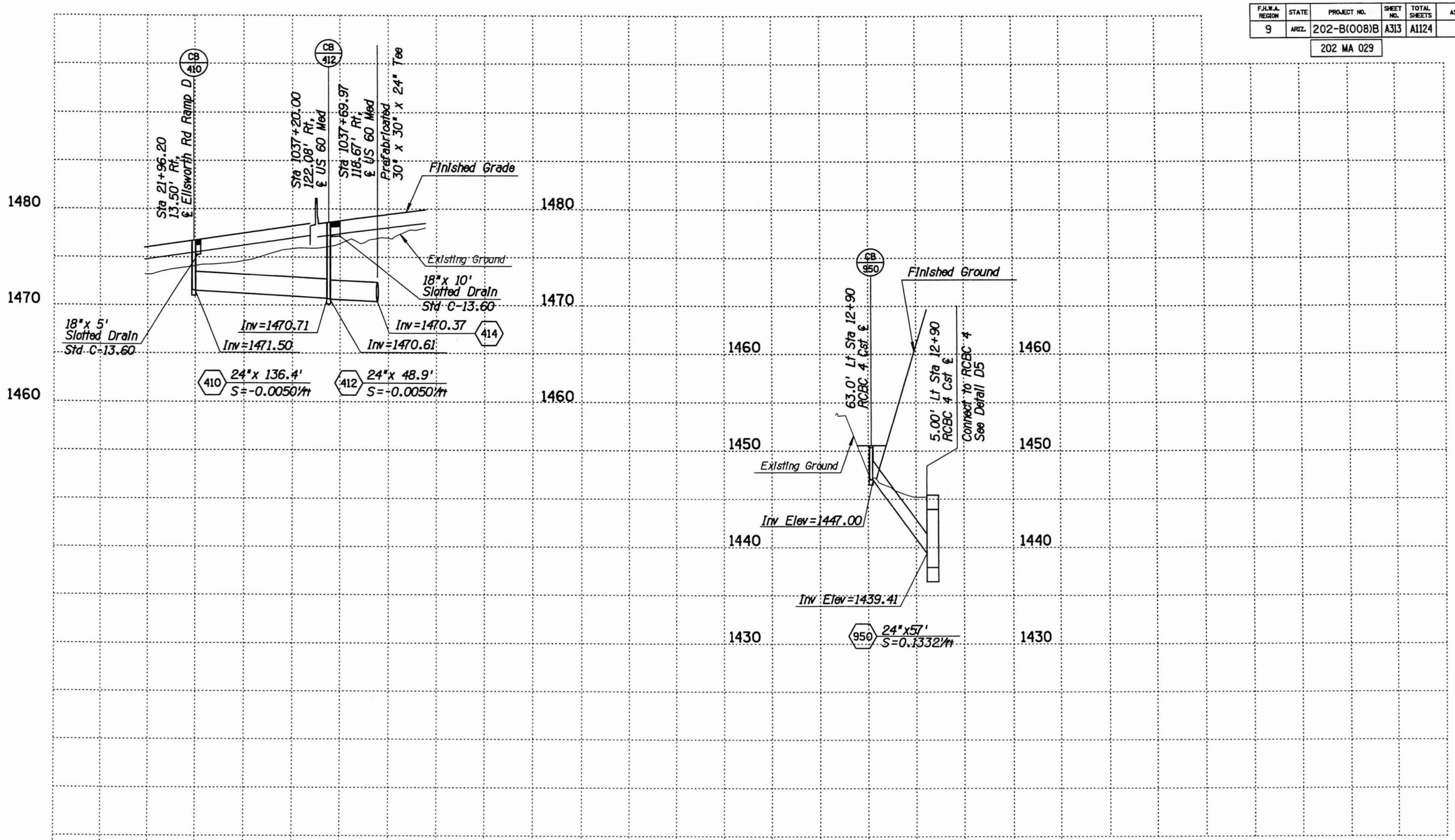
DWG NO. D-2.19

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:38 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-19.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A313	A1124	
		202 MA 029			



ELLSWORTH RD RAMP D & RCBC 4

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4141 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202

LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21862 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. D-2.20

TRACS NO. H5686 04C

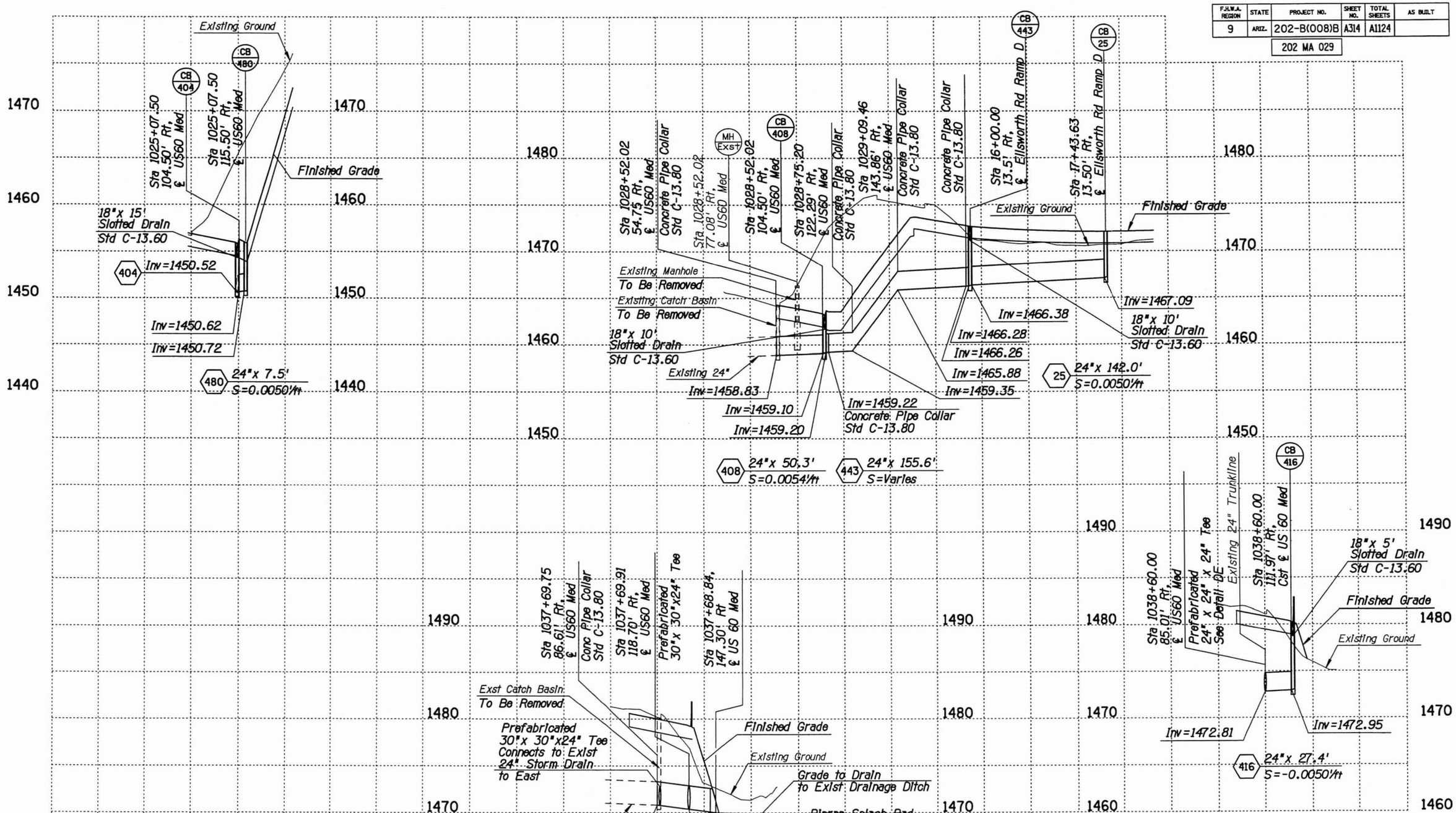
202-B(008)B

___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:39 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-20.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A314	A1124	
		202 MA 029			



US 60 EASTBOUND ELLSWORTH RD TO CRISMON RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

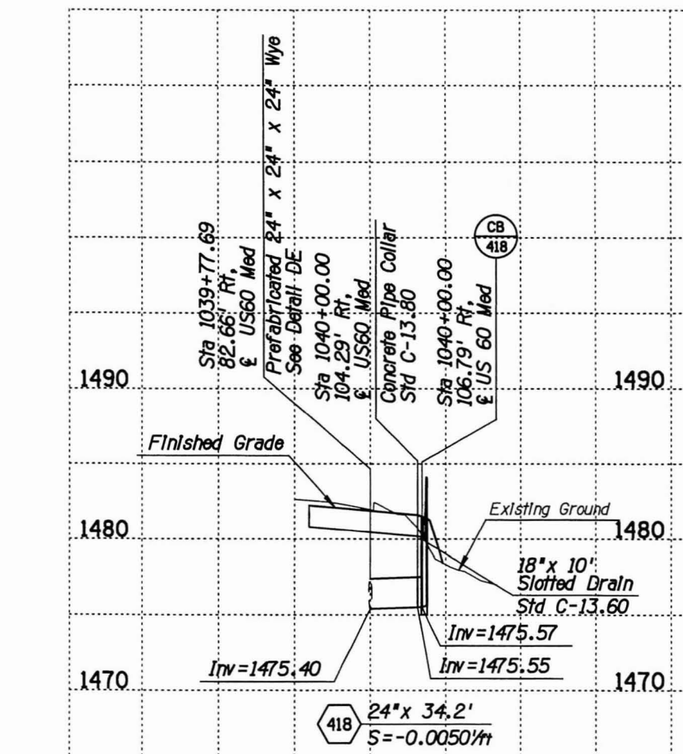
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Registered ARIZONA, U.S.A.

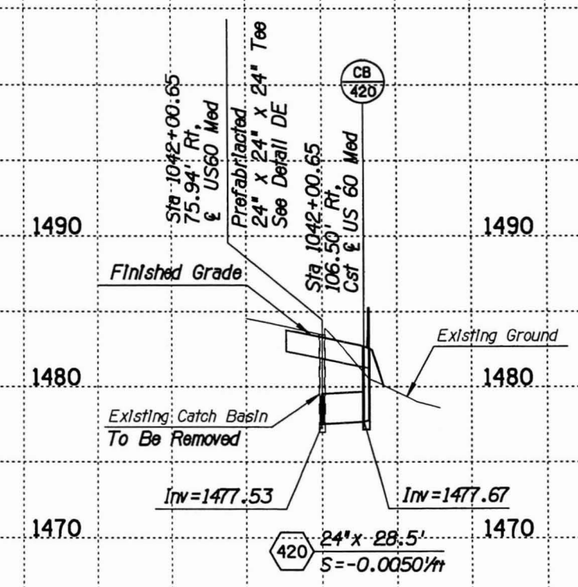
ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-2.21

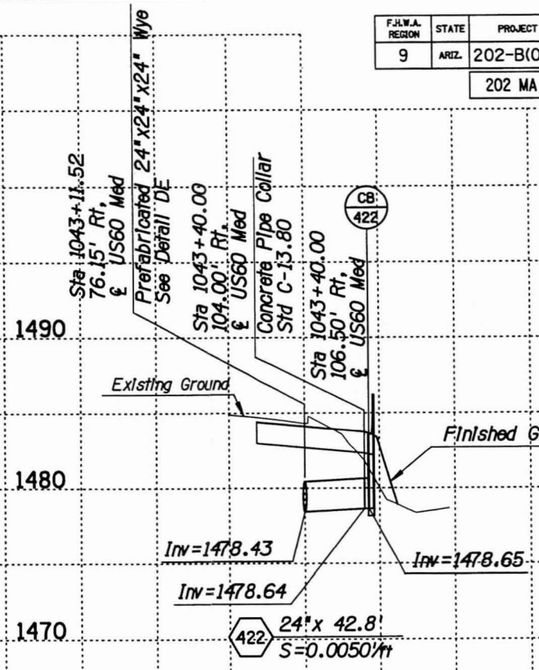
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

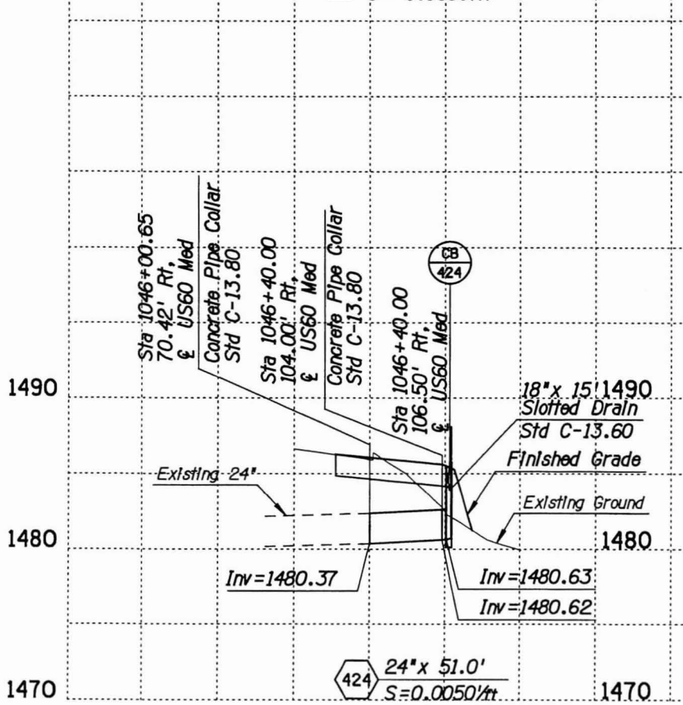
Plotted By: kleahy at 11:16:40 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-21.dgn

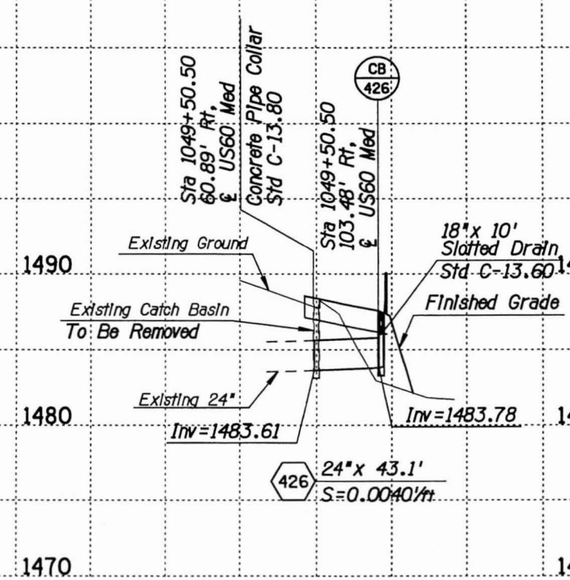
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A315	A1124	
		202 MA 029			

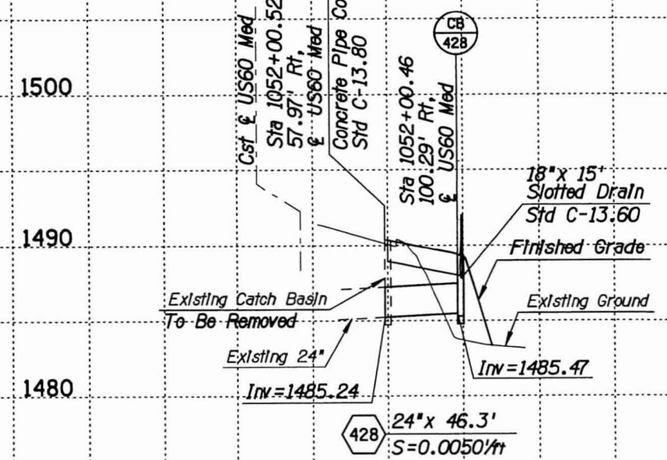












US 60 EASTBOUND ELLSWORTH RD TO CRISMON RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0400 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

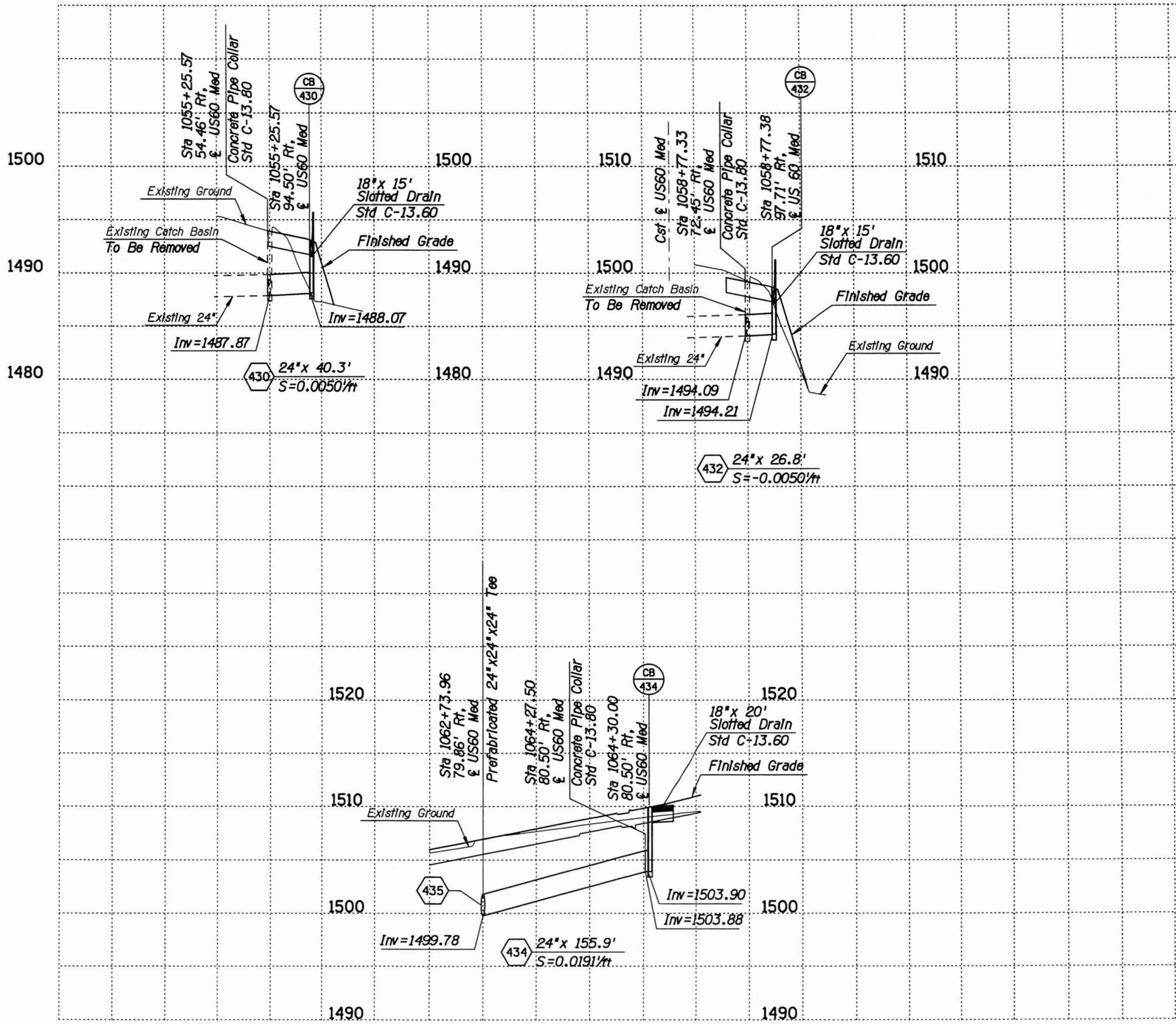
DWG NO. D-2.22

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO.

Plotted By: kleahy at 11:16:41 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-22.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A316	A1124	
		202 MA 029			



US 60 EASTBOUND ELLSWORTH RD TO CRISMON RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
WWW.AZTECLAB

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CLIFTON W. SLAGELL Date Signed ARIZONA, U.S.A.

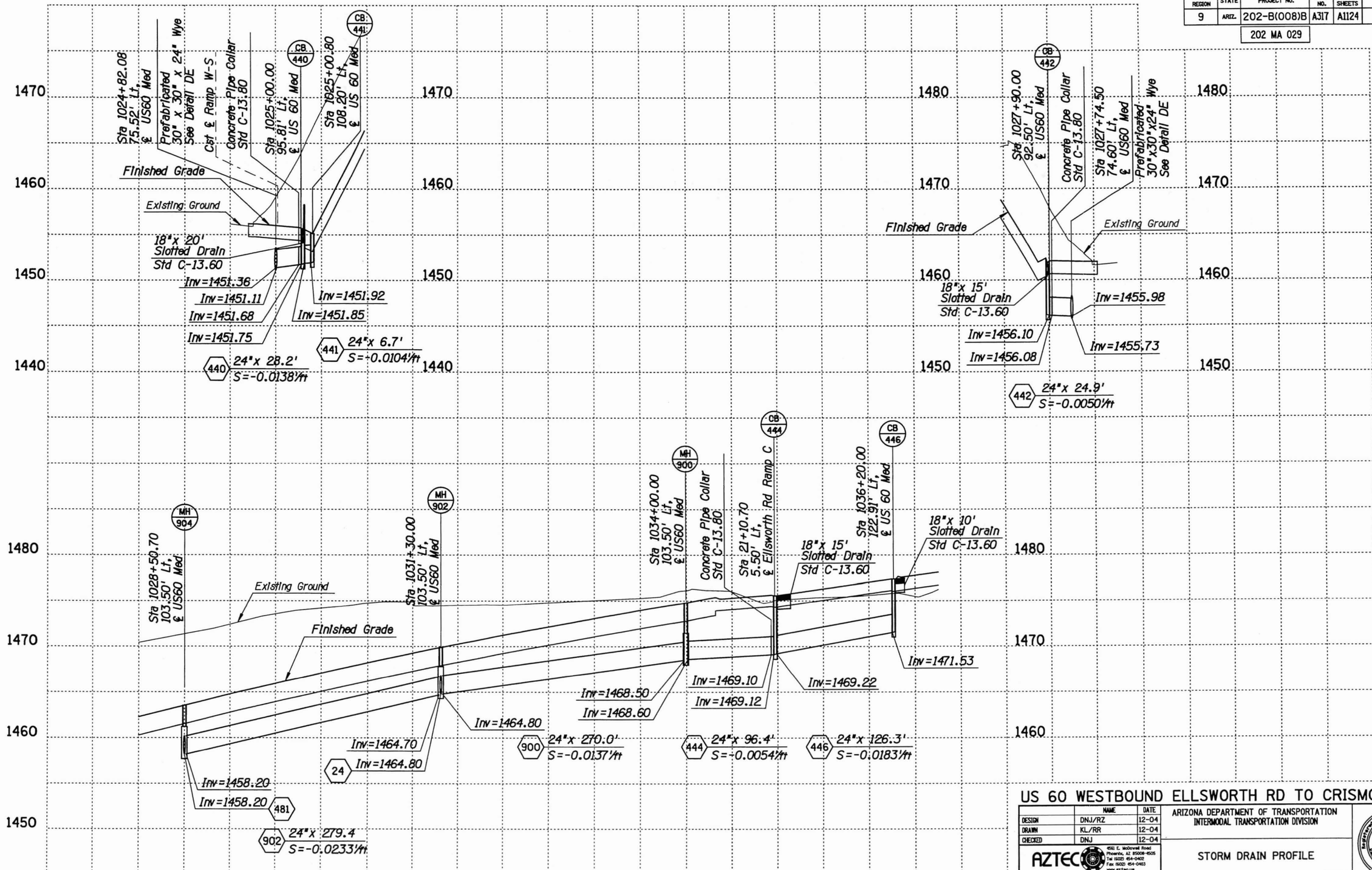
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.23

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A317	A1124	
		202 MA 029			



US 60 WESTBOUND ELLSWORTH RD TO CRISMON RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4521 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0403 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 22868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

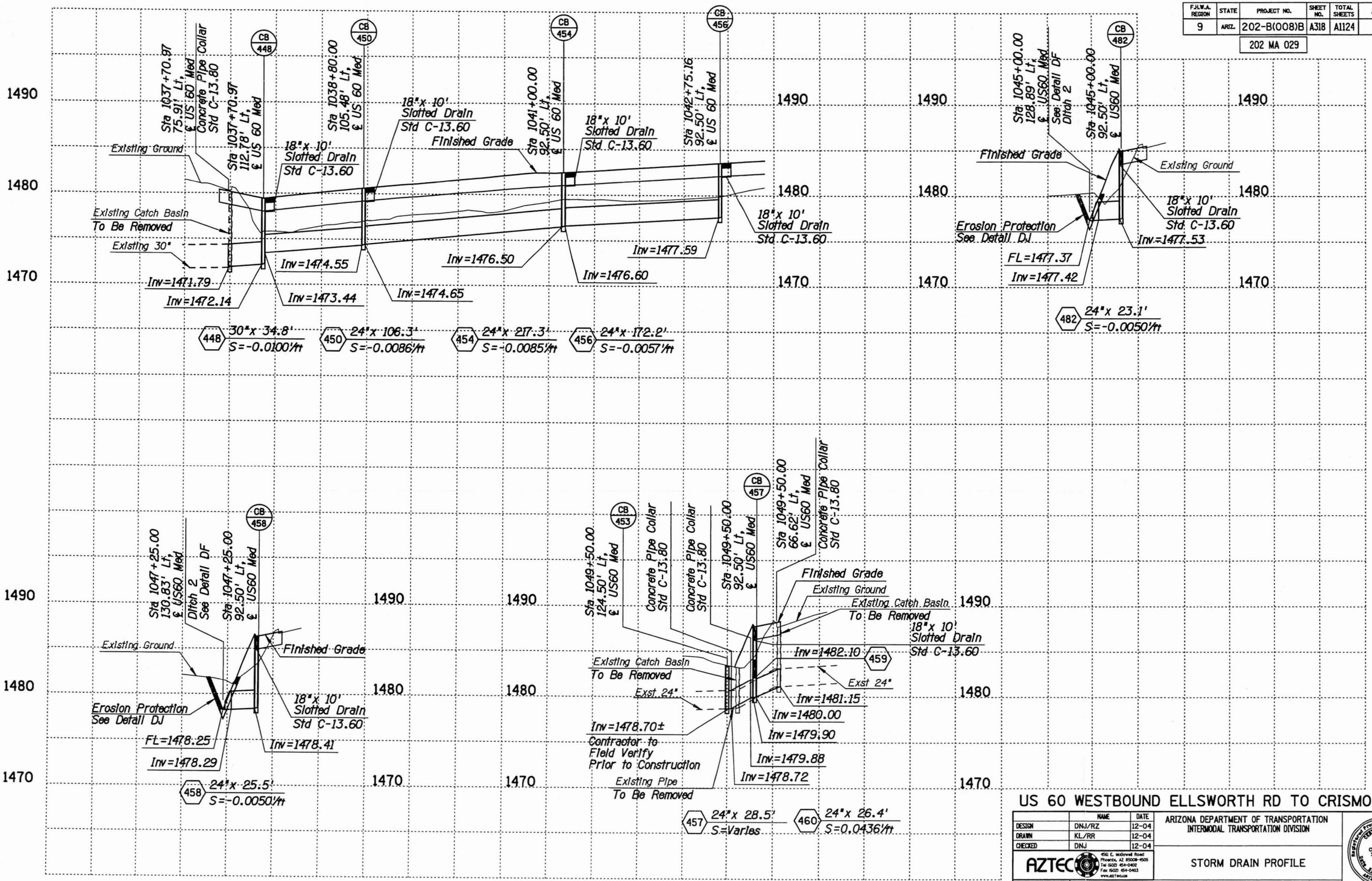
DWG NO. D-2.24

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:43 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-24.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A318	A1124	
		202 MA 029			



US 60 WESTBOUND ELLSWORTH RD TO CRISMON RD

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

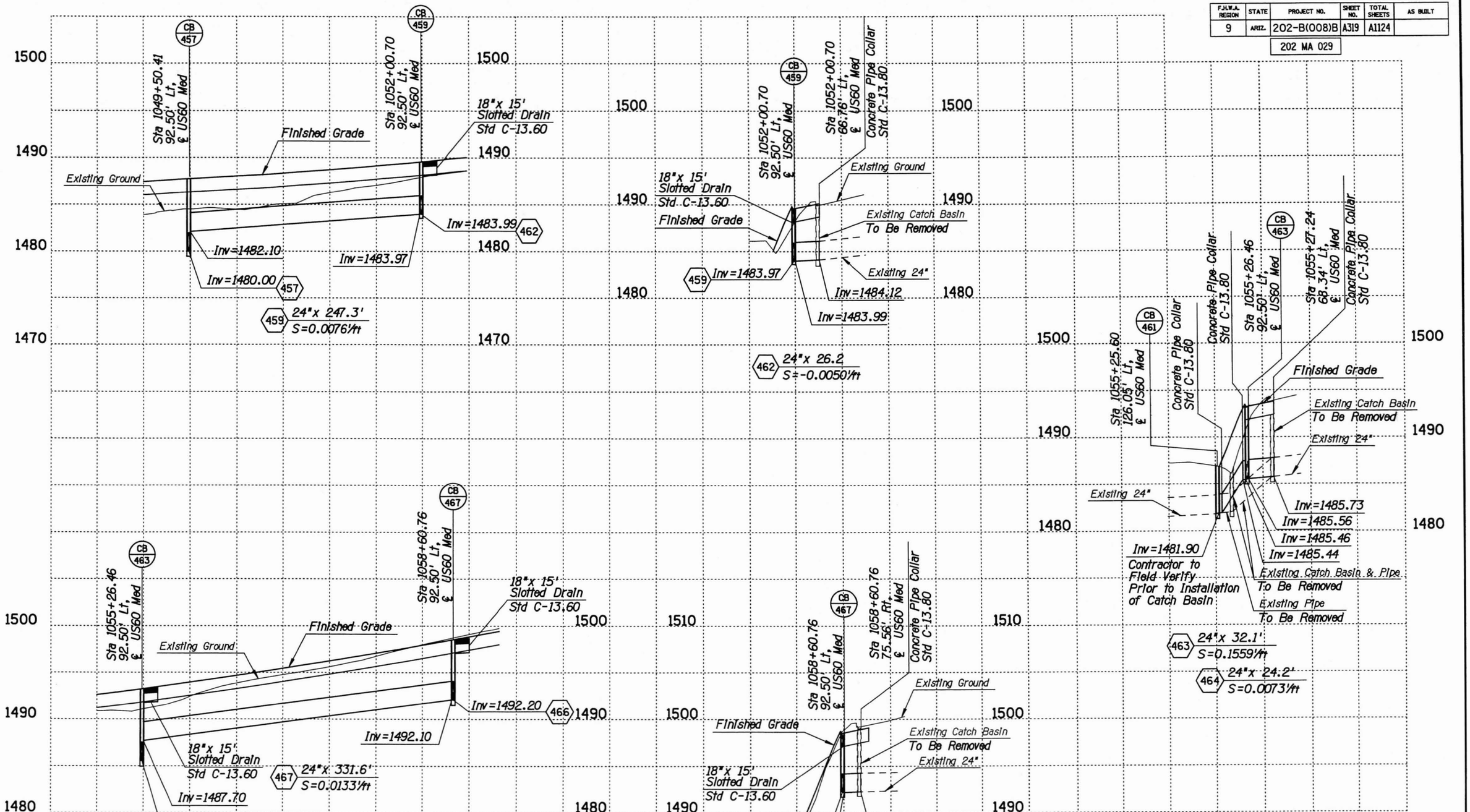
DWG NO. D-2.25

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:44 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-25.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A319	A1124	
		202 MA 029			



US 60 WESTBOUND ELLSWORTH TO CRISMON

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4141 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

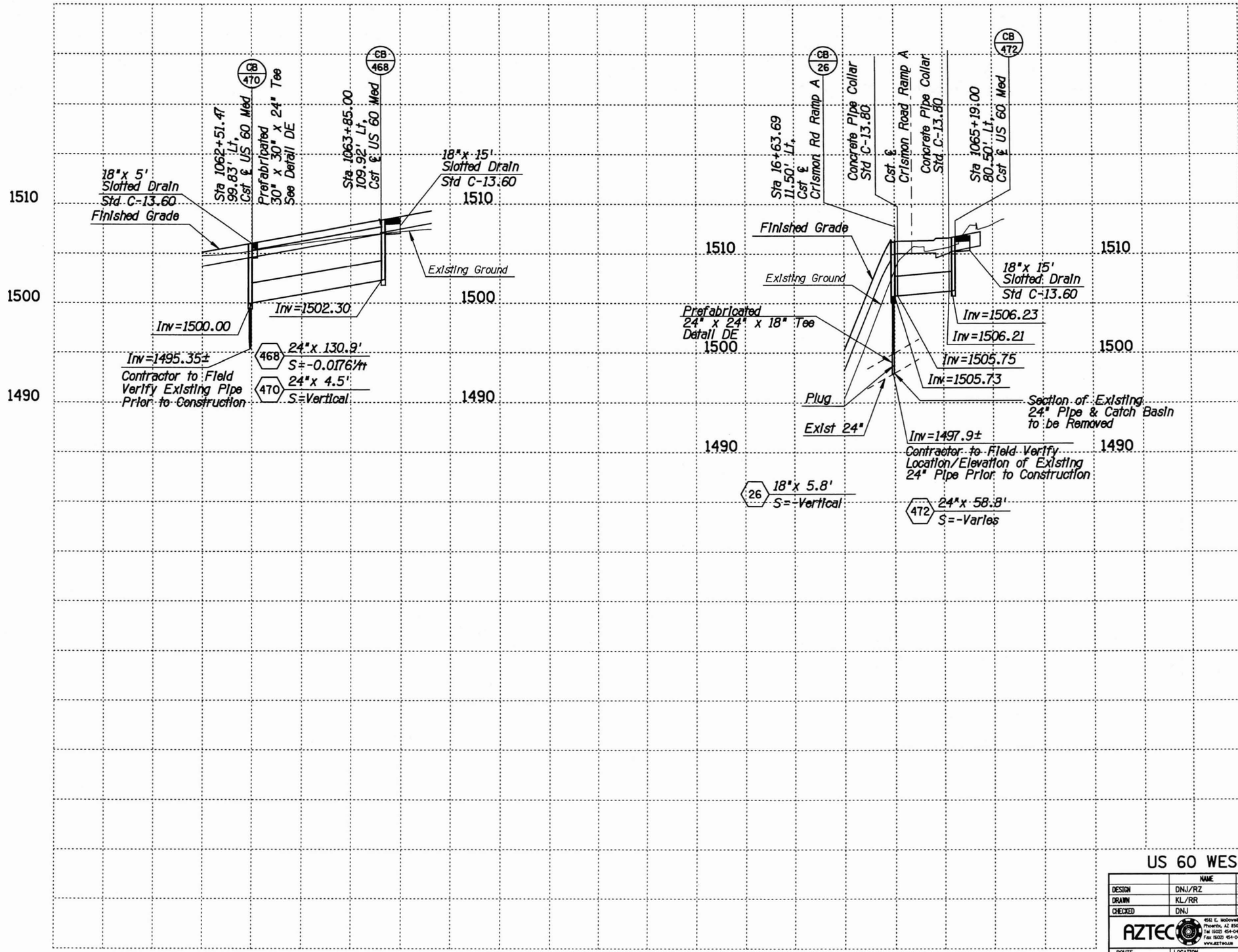
STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS N. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-2.26
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A320	A1124	
		202 MA 029			



US 60 WESTBOUND ELLSWORTH TO CRISMON

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

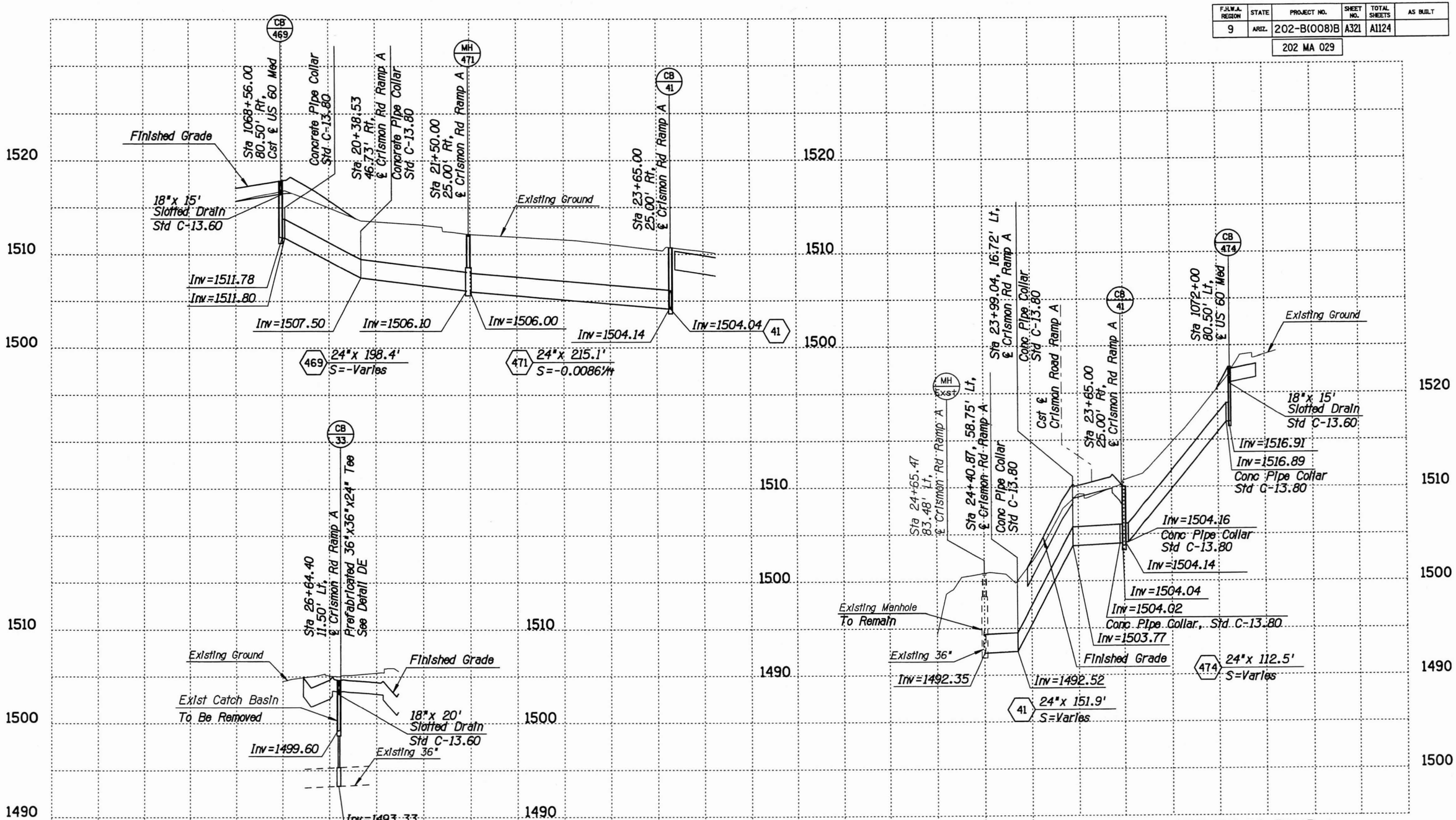
STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed Arizona, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-2.27
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 11:16:45 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-27.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A321	A1124	
		202 MA 029			



CRISMON RD RAMP A

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC — 4540 E. McDowell Road, Phoenix, AZ 85008-6505, Tel (602) 454-0402, Fax (602) 454-0403, WWW.AZTEC.US

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) — CERTIFICATE NO. 21868 — CURTIS W. SLAGELL — Date Signed — ARIZONA, U.S.A.

ROUTE 202 — LOCATION: LOOP 202/US 60 T.I.

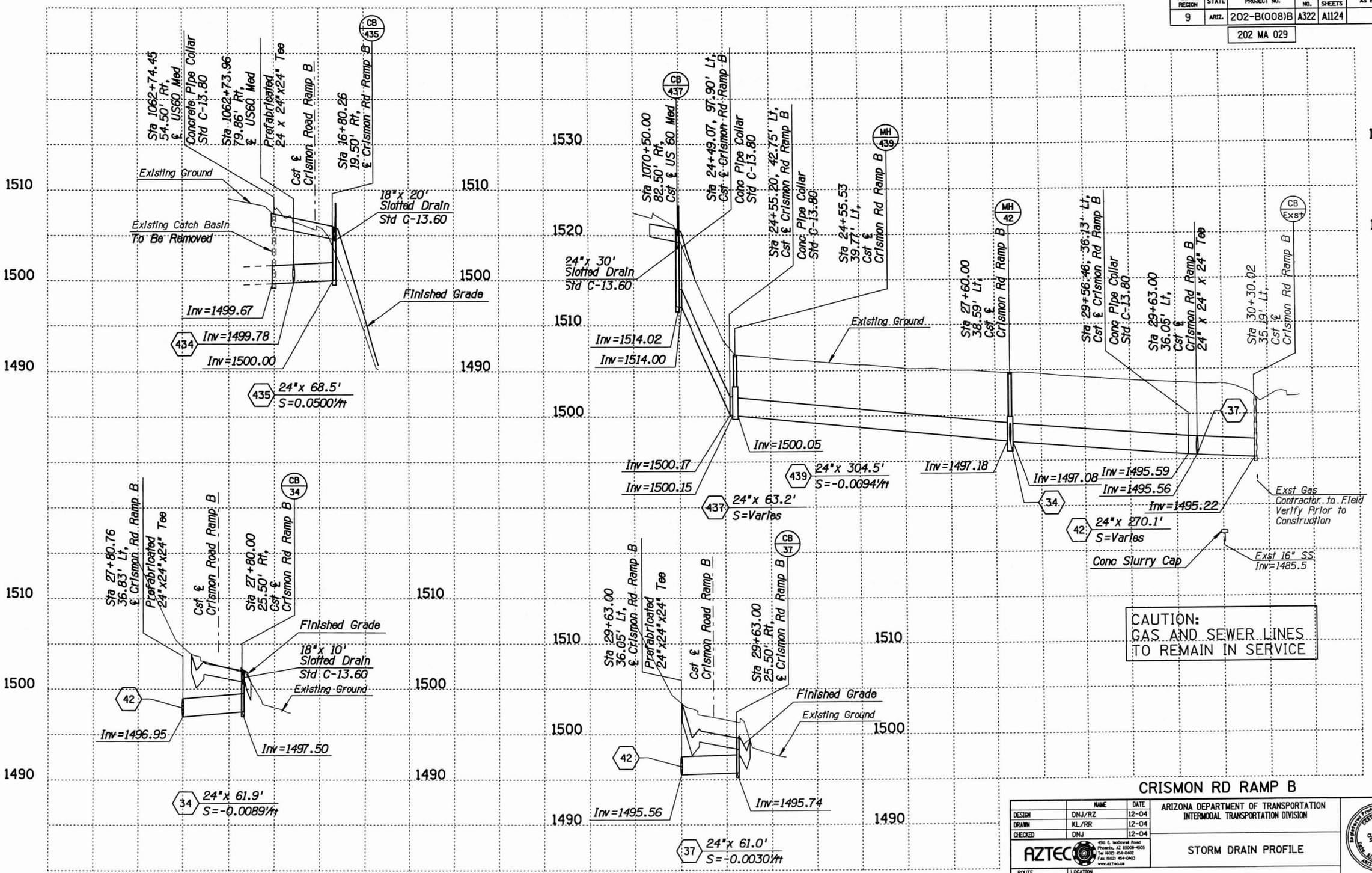
DWG NO. D-2.28

TRACS NO. H5686 04C — 202-B(008)B — ___ OF ___

SURVEY NO. | FINISHED PLANS~ | REVISIONS~ | LOCATION~ | DATE~

Plotted By: kleahy at 11:16:46 AM — 1/26/2005 — r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-28.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A322	A1124	
		202 MA 029			



CRISMON RD RAMP B

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

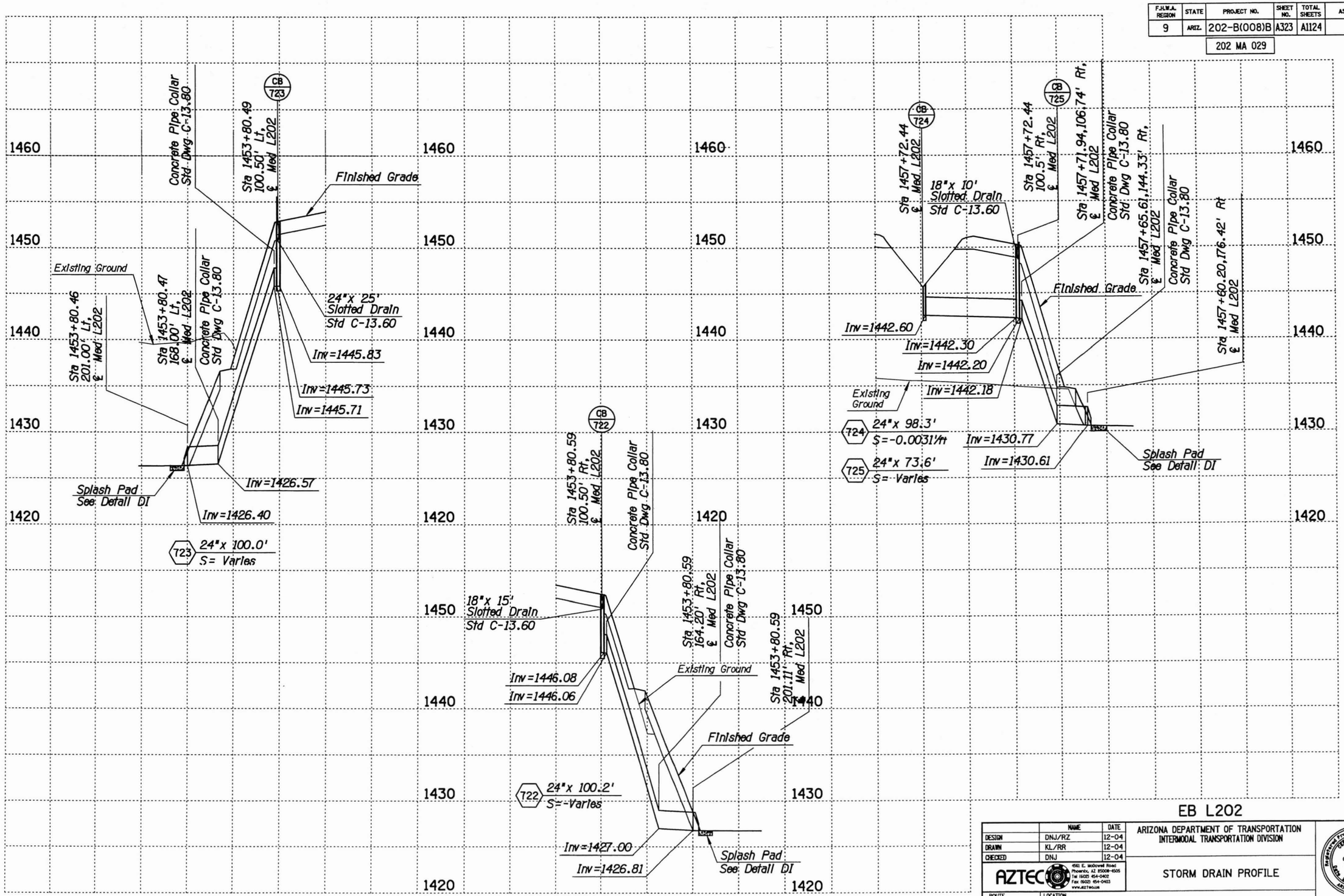
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

ROUTE	LOCATION	DWG NO.
202	LOOP 202/US 60 T.I.	D-2.29
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

Plotted By: kleahy at 11:16:47 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-29.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A323	A1124	

202 MA 029



EB L202

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

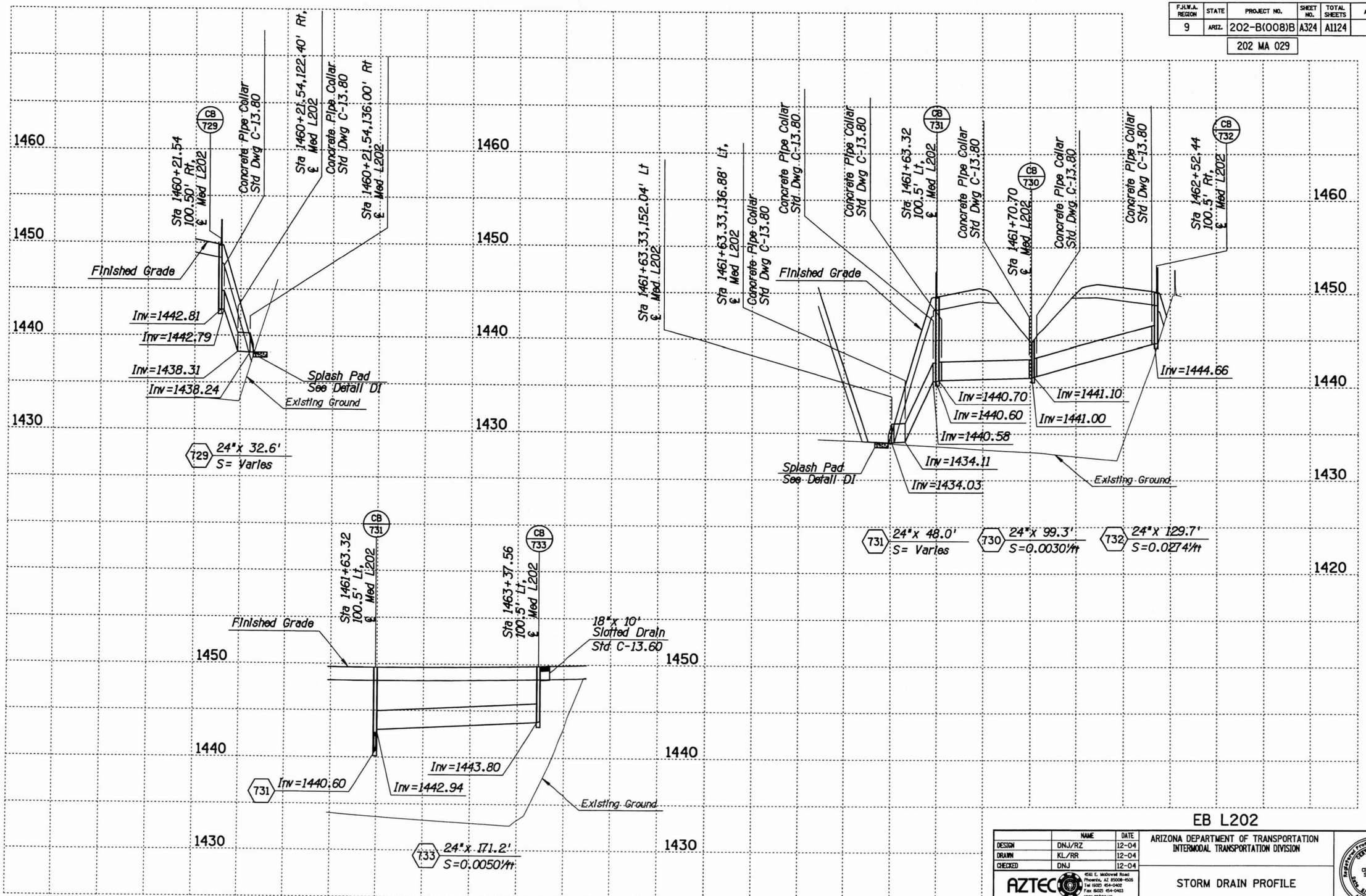
DWG NO. D-2.30

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:48 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-31.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A324	A1124	
		202 MA 029			



EB L202

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil)
CERTIFICATE NO. 21868
CURTIS W. SLAGELL
Date Signed
ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

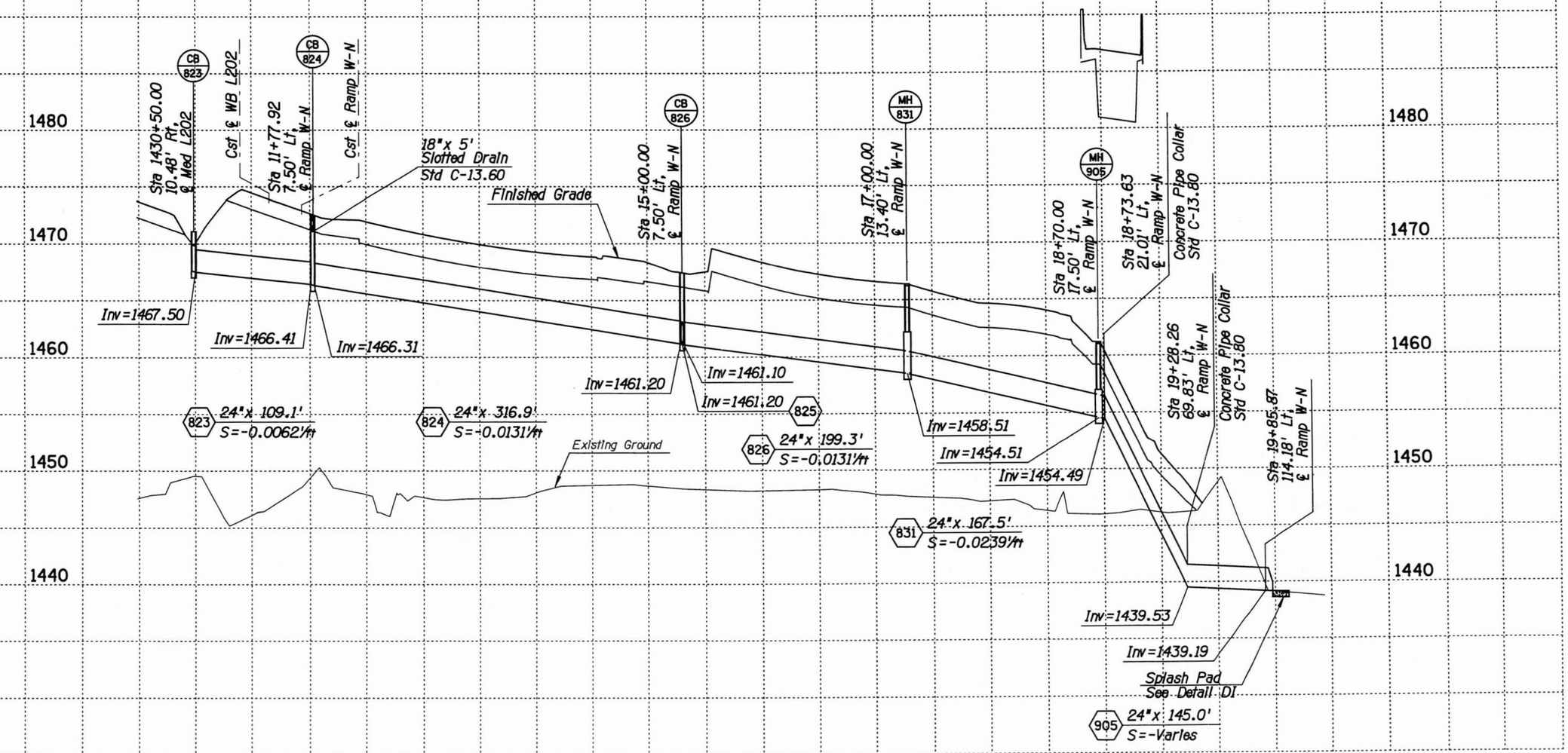
DWG NO. D-2.31

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:49 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-32.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A325	A1124	

202 MA 029



WB L202

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

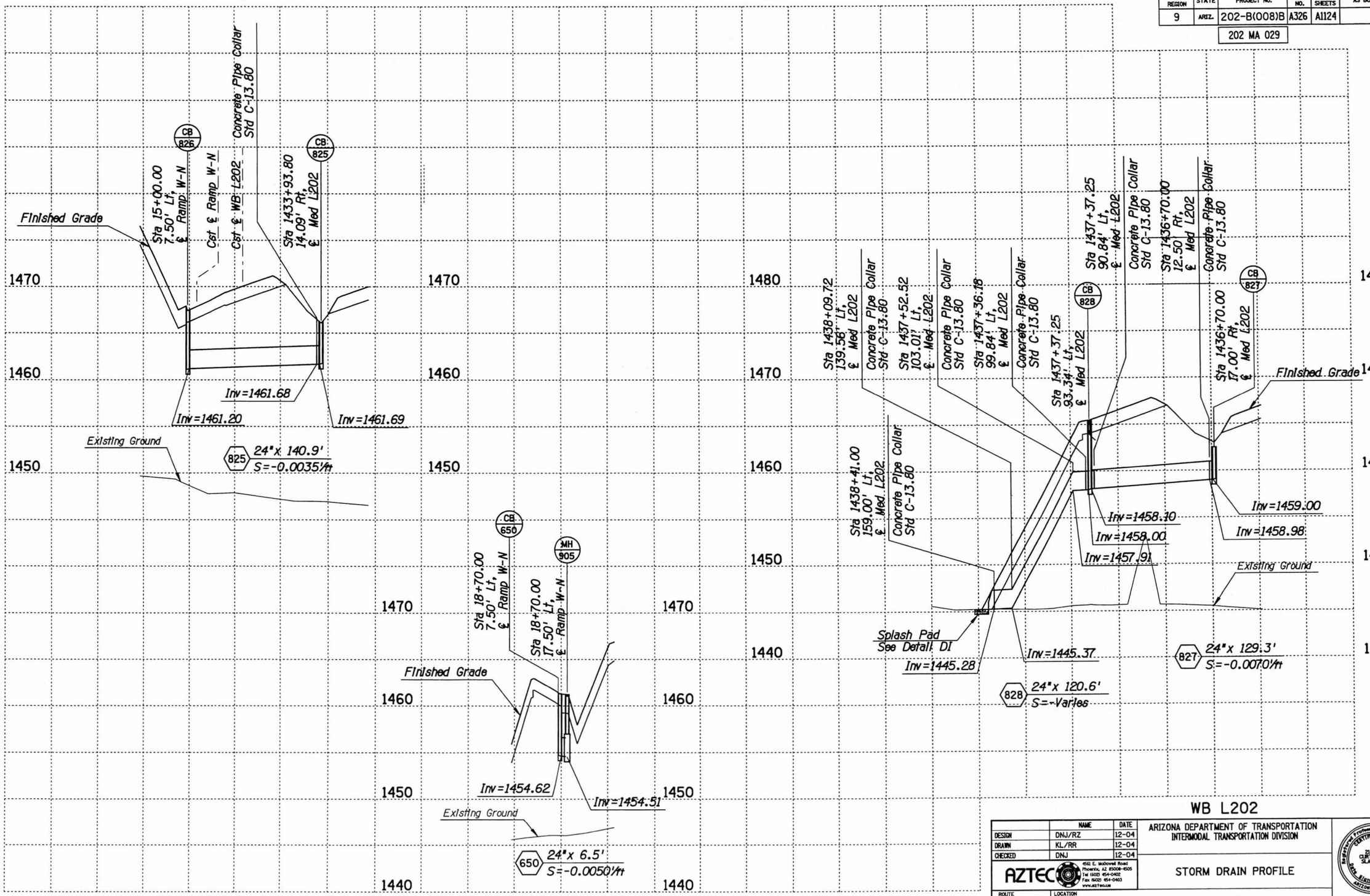
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLADELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-2.32
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:49 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-33.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A326	A1124	
		202 MA 029			



WB L202

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

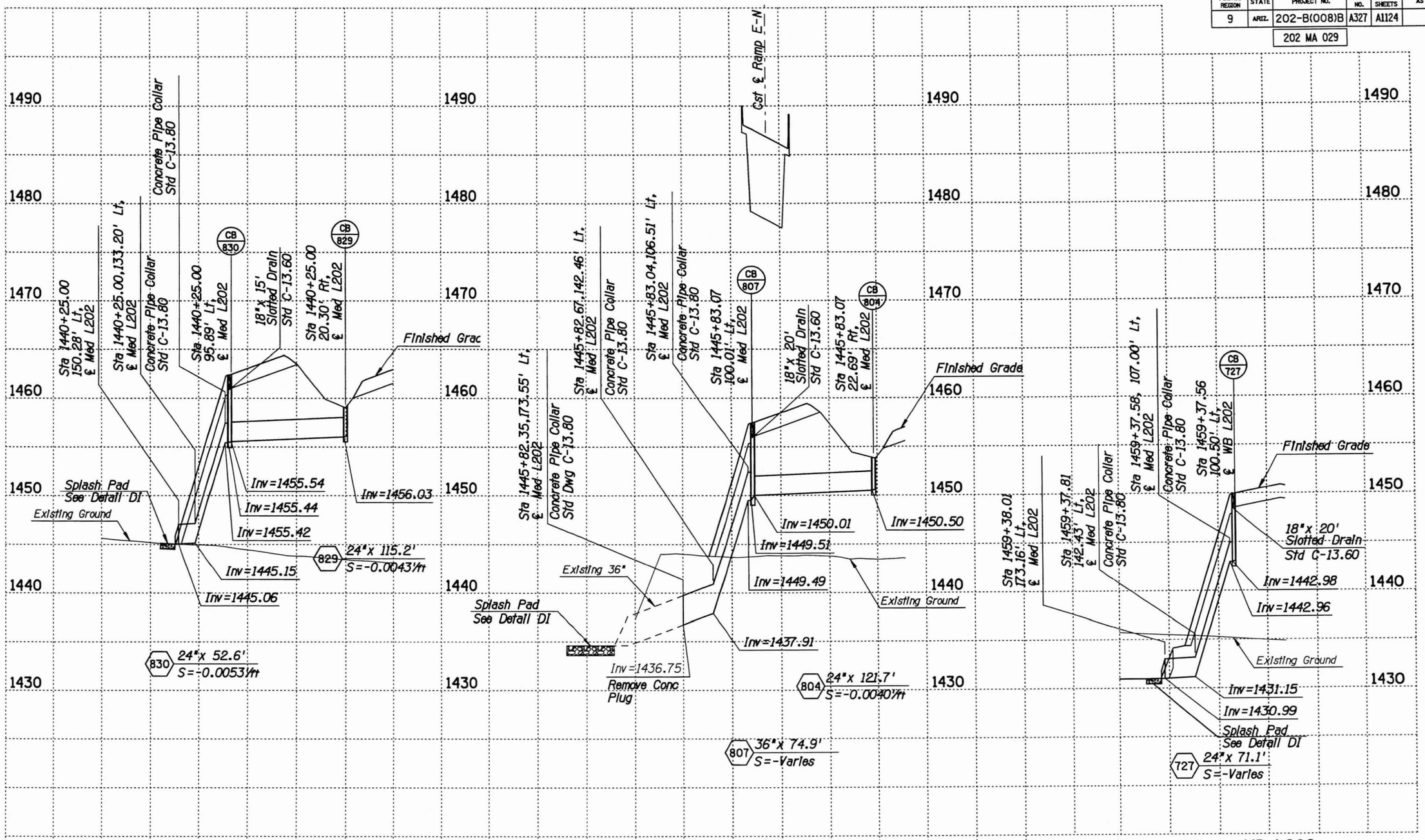
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION	
202	LOOP 202/US 60 T.I.	DWG NO. D-2.33
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:50 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-34.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A327	A1124	
		202 MA 029			



WB L202

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 WWW.AZTECJ.COM

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.34

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

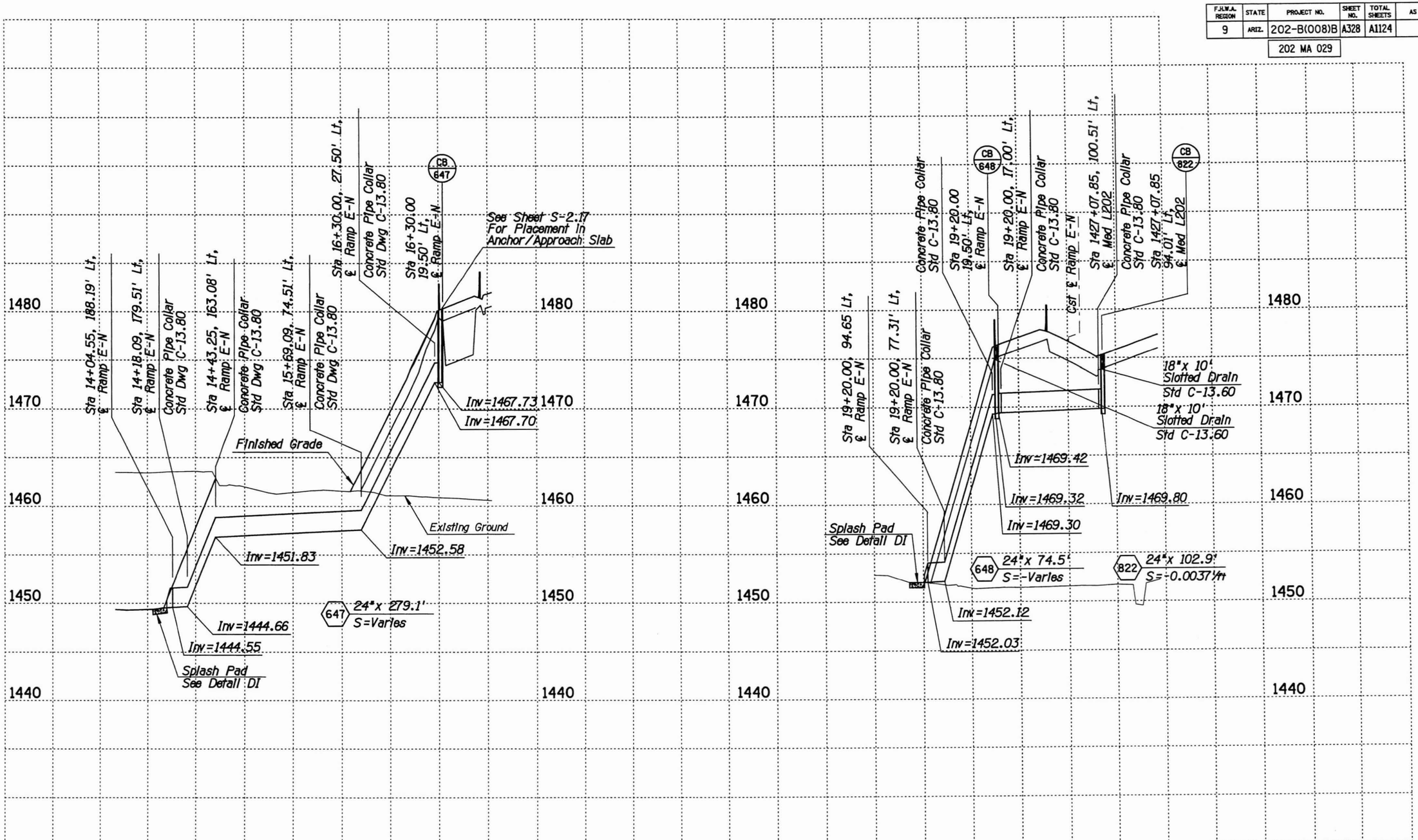
Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS M. SLAGELL Date Signed ARIZONA, U.S.A.

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 12:36:46 PM 1/26/2005 R:\Phoenix\Projects\Az01107\Cadd\Drn\AZ01107-02-DR-35.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A328	A1124	

202 MA 029



RAMP E-N

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-1505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

DWG NO. D-2.35

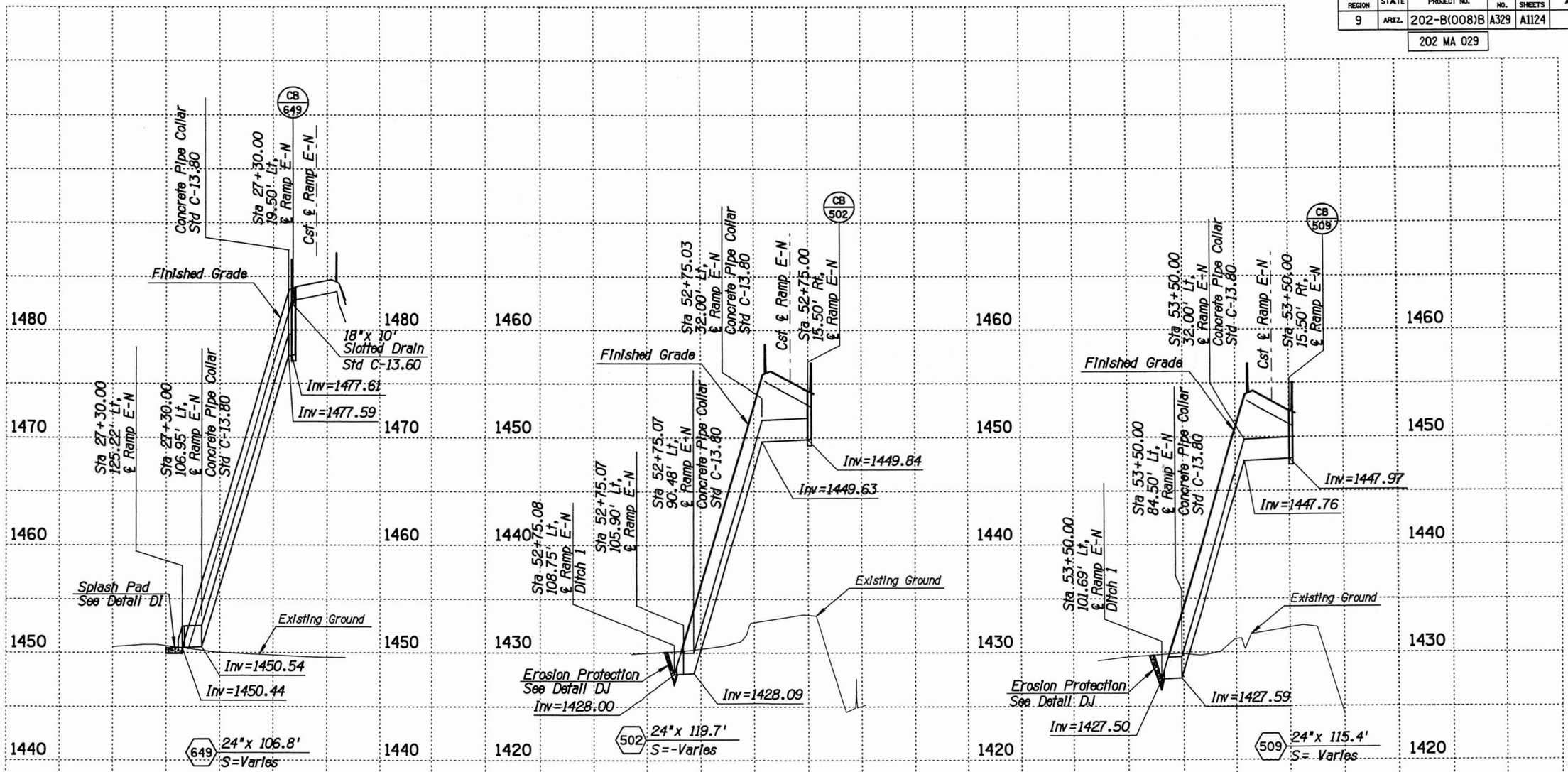
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:51 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-37.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A329	A1124	

202 MA 029



RAMP E-N

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE	LOCATION
202	LOOP 202/US 60 T.I.

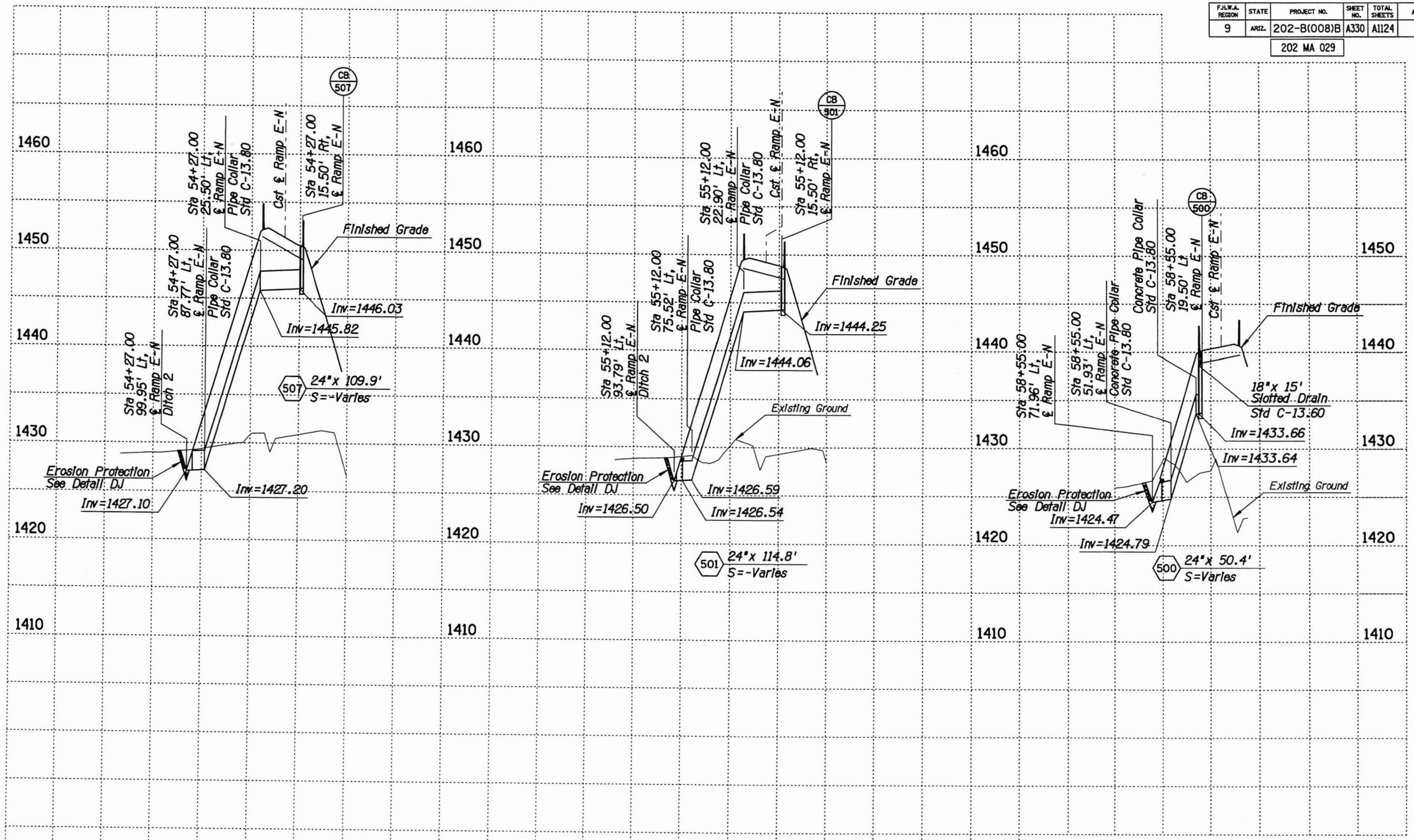
DWG NO. D-2.36

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:52 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-38.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A330	A1124	
		202 MA 029			



RAMP E-N

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecp.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

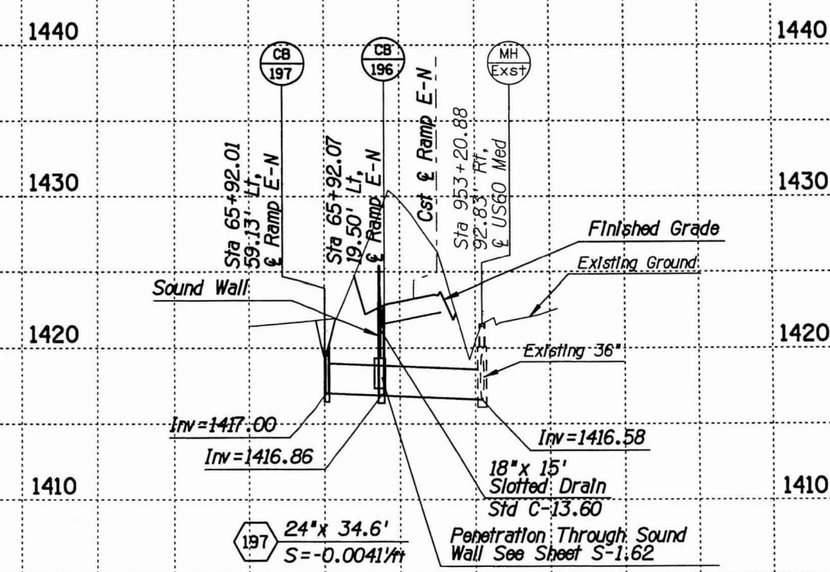
DWG NO. D-2.37

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:53 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-39.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A331	A1124	
		202 MA 029			



RAMP E-N

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4581 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

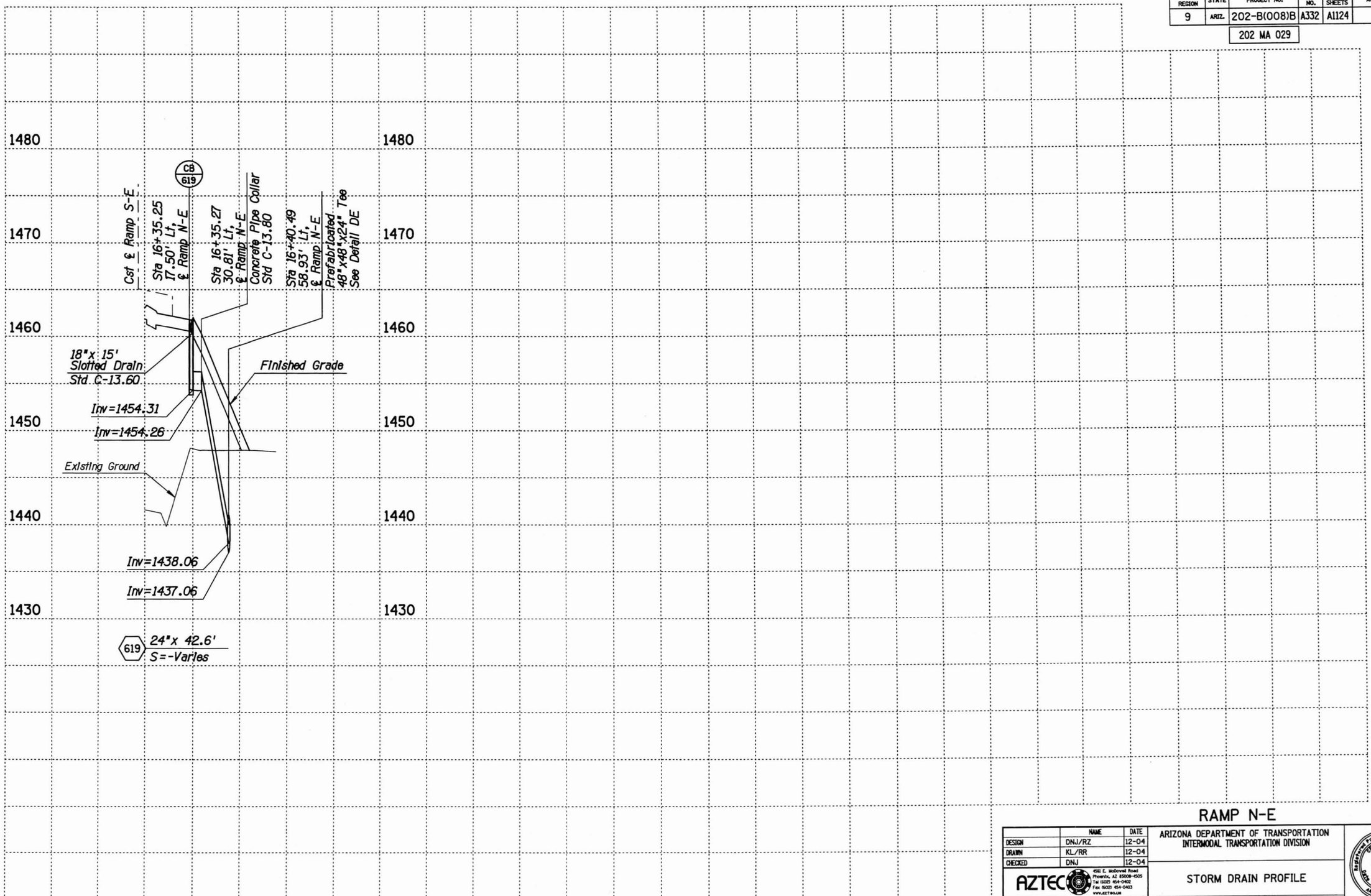
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.38

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A332	A1124	
		202 MA 029			



RAMP N-E

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.39

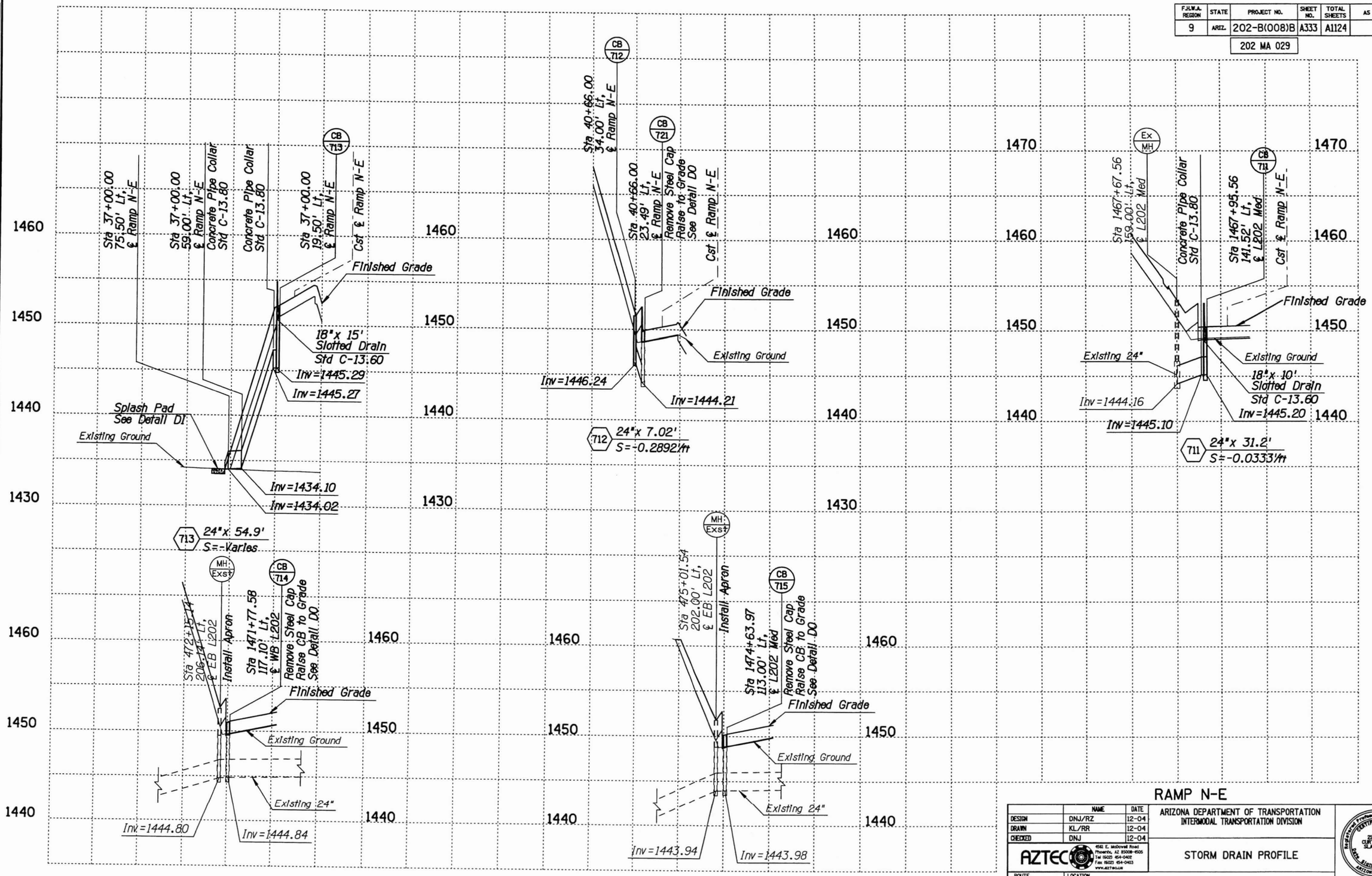
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:54 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-41.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A333	A1124	

202 MA 029



RAMP N-E

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4521 E. McDowell Road
Phoenix, AZ 85008-6505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21968 CURTIS W. SLAGELL ARIZONA, U.S.A.

ROUTE	LOCATION
202	LOOP 202/US 60 T.I.

DWG NO. D-2.40

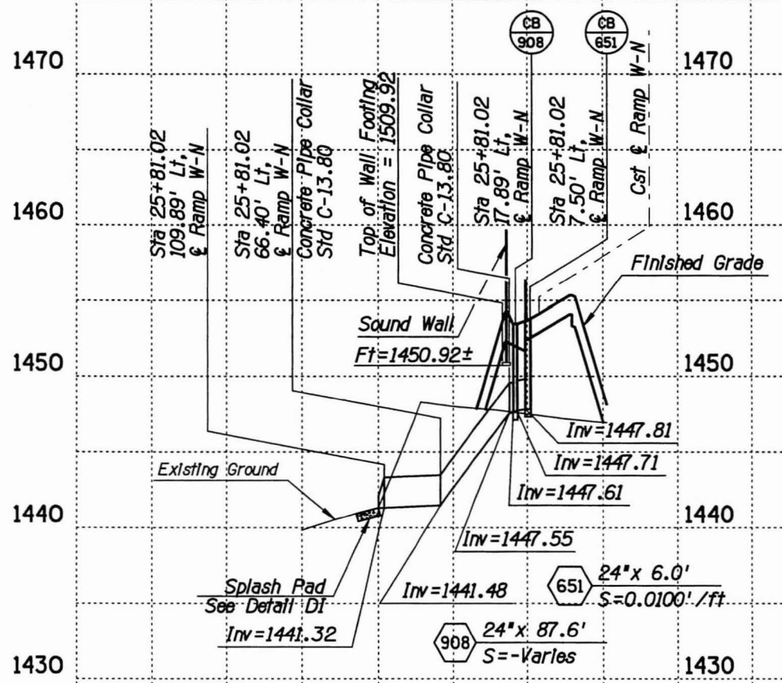
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

Plotted By: kleahy at 11:16:55 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-42.dgn

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A334	A1124	

202 MA 029



RAMP W-N

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.41

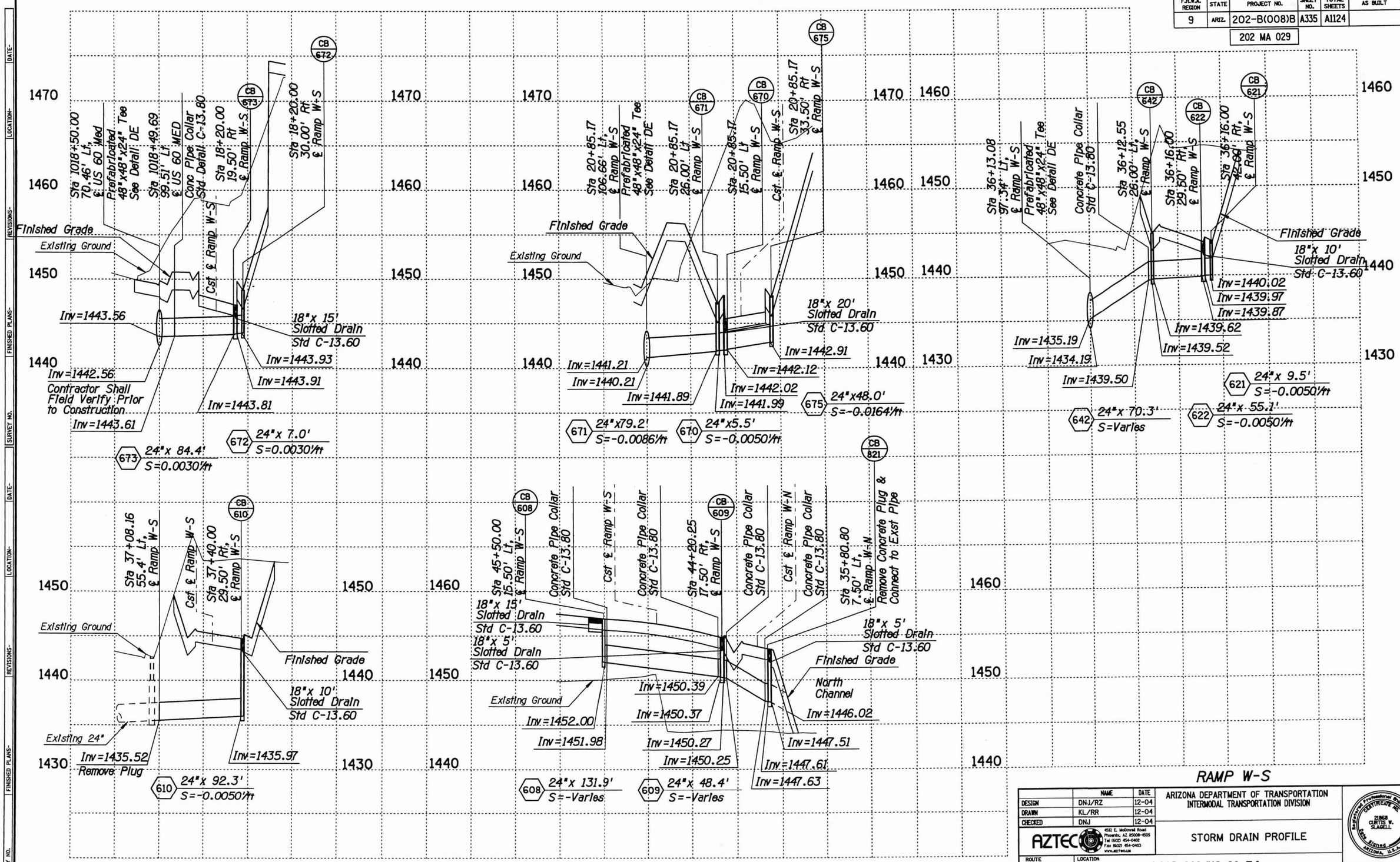
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO.

Plotted By: kleahy at 11:16:56 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-43.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A335	A1124	

202 MA 029



RAMP W-S

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL ARIZONA, U.S.A.

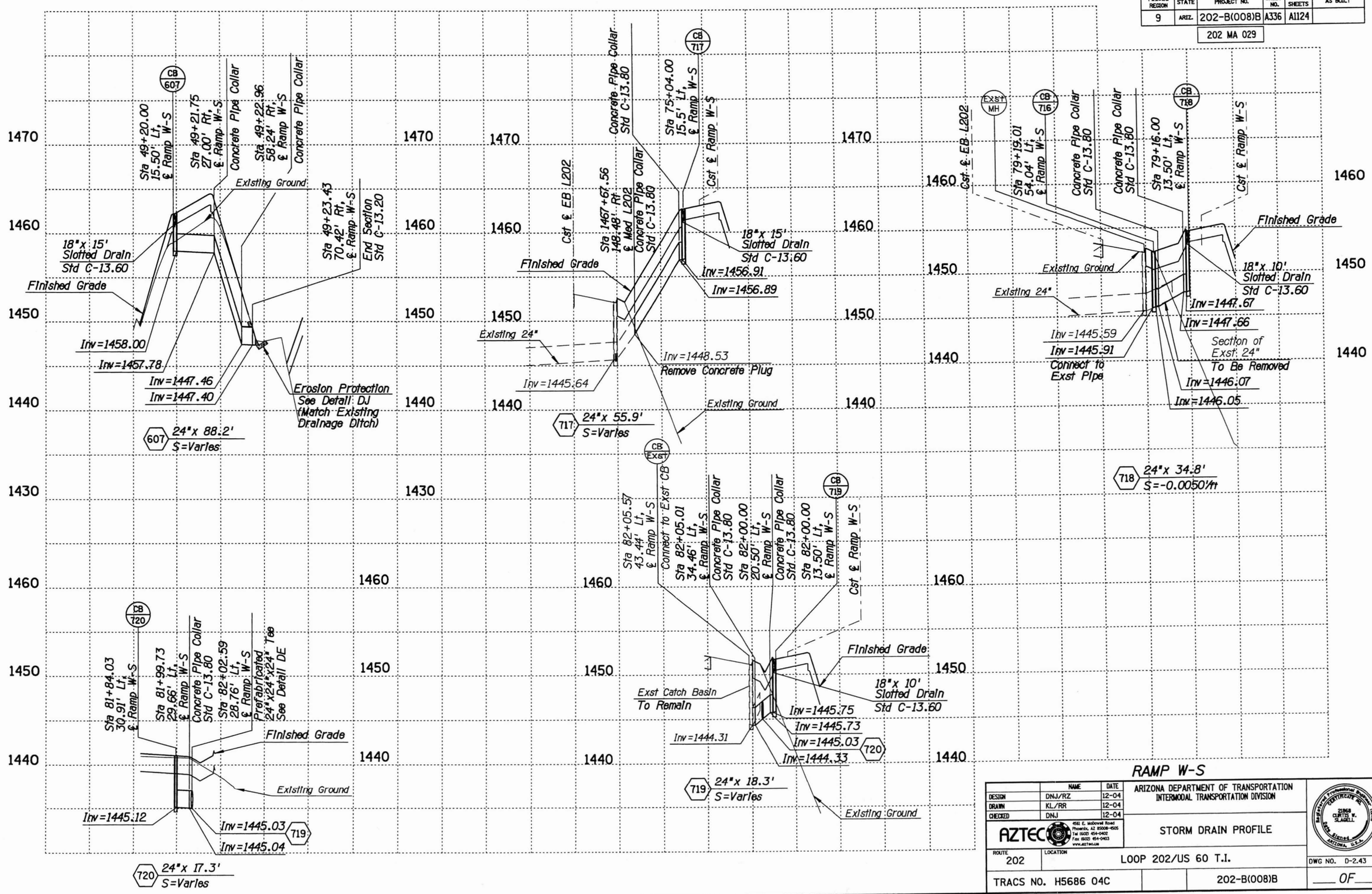
ROUTE	LOCATION	DWG NO. D-2.42
202	LOOP 202/US 60 T.I.	
TRACS NO. H5686 04C	202-B(008)B	___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

Plotted By: kleahy at 11:16:57 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-44.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A336	A1124	

202 MA 029



RAMP W-S

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC — 4561 E. McDowell Road, Phoenix, AZ 85008-6505, Tel (602) 454-0402, Fax (602) 454-0403, www.aztecusa

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) — CERTIFICATE NO. 21868 — CURTIS W. SLAGELL — Date Signed — ARIZONA, U.S.A.

ROUTE 202 — LOCATION: LOOP 202/US 60 T.I.

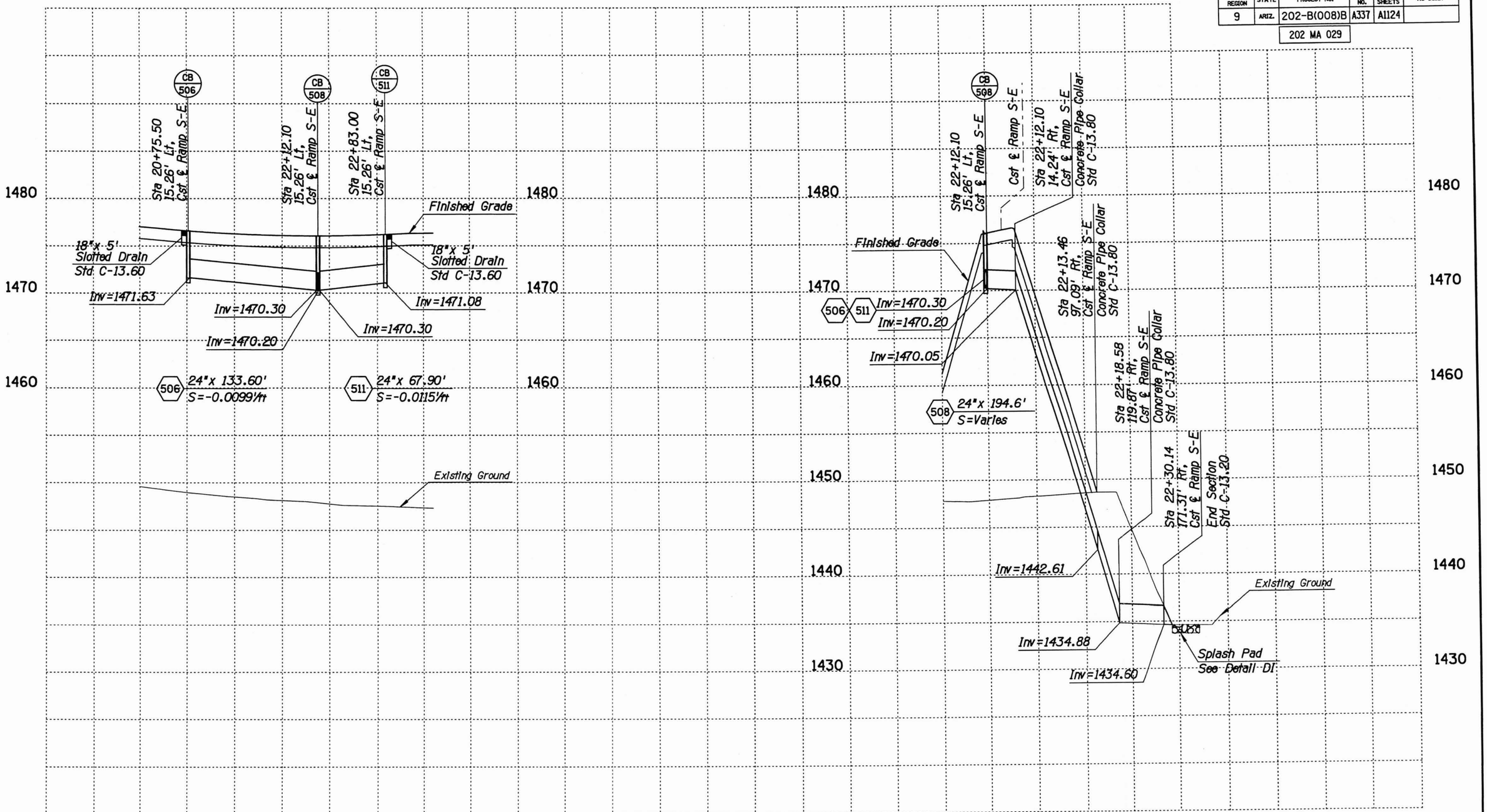
DWG NO. D-2.43

TRACS NO. H5686 04C — 202-B(008)B — ___ OF ___

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

Plotted By: kleahy at 11:16:58 AM — 1/26/2005 — r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-45.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A337	A1124	
		202 MA 029			



RAMP S-E

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4141 E. McDowell Road Phoenix, AZ 85008-4505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecjob

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.44

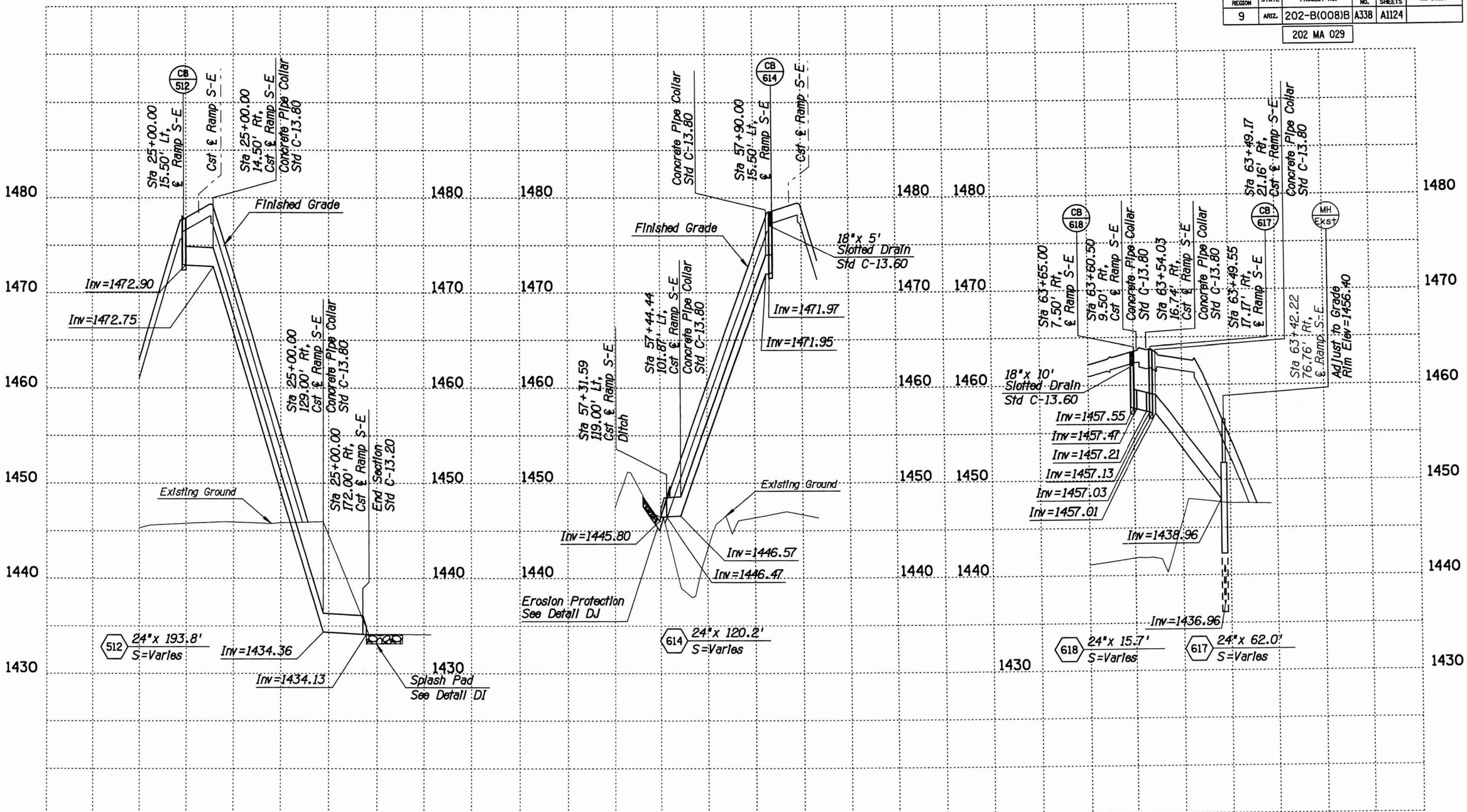
TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:16:59 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-46.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A338	A1124	

202 MA 029



RAMP S-E

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztec.us

STORM DRAIN PROFILE

Registered Professional Engineer (CIVIL) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

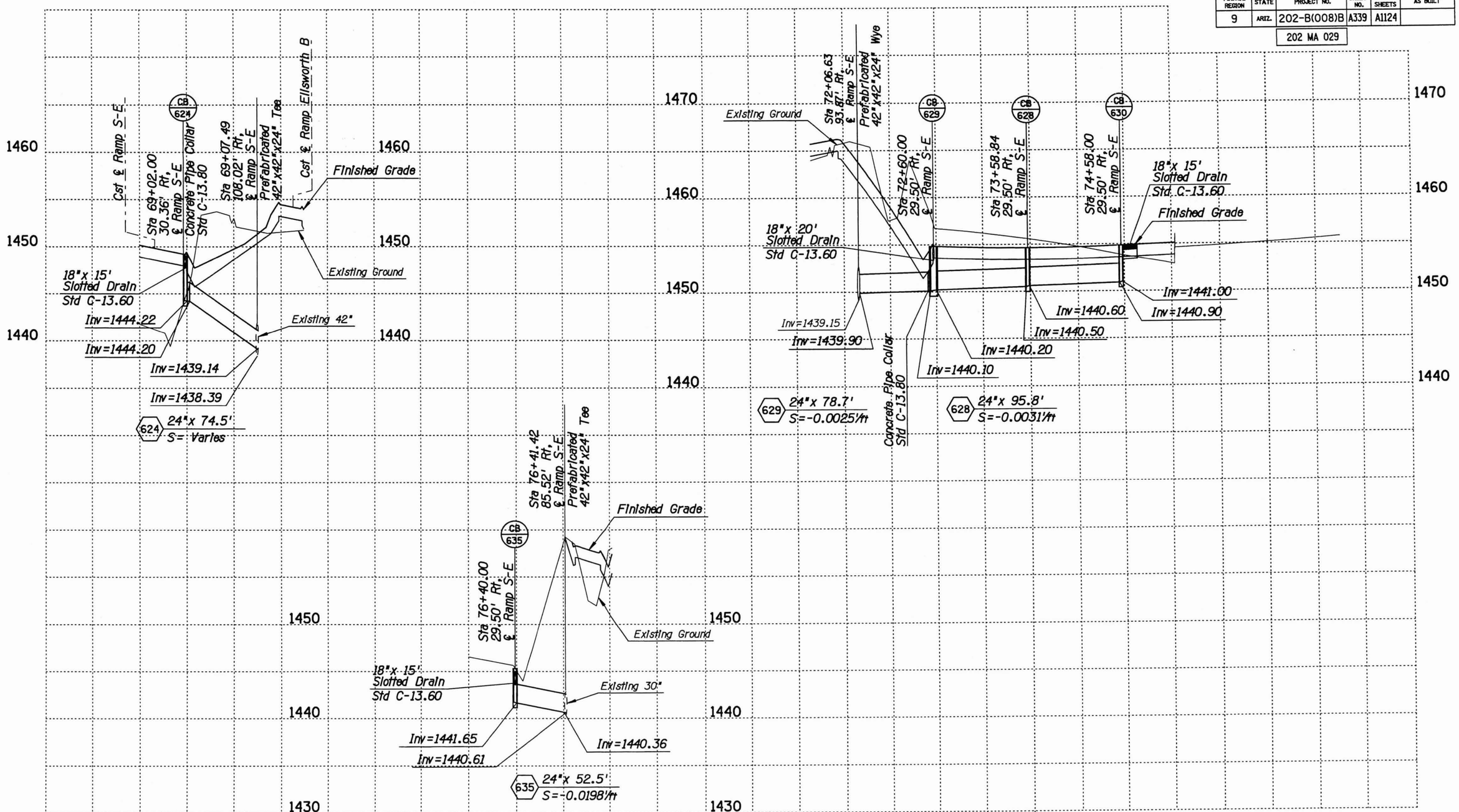
DWG NO. D-2.45

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

FINISHED PLANS- | REVISIONS- | LOCATION- | DATE- | SURVEY NO.

Plotted By: kleahy at 11:17:00 AM 1/26/2005 r:\phoenix\projects\az01107\oadd\drn\az01107-02-dr-47.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A339	A1124	
		202 MA 029			



RAMP S-E

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC
4561 E. McDowell Road
Phoenix, AZ 85008-4505
Tel (602) 454-0402
Fax (602) 454-0403
www.aztecjm

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGELL Date Signed ARIZONA, U.S.A.

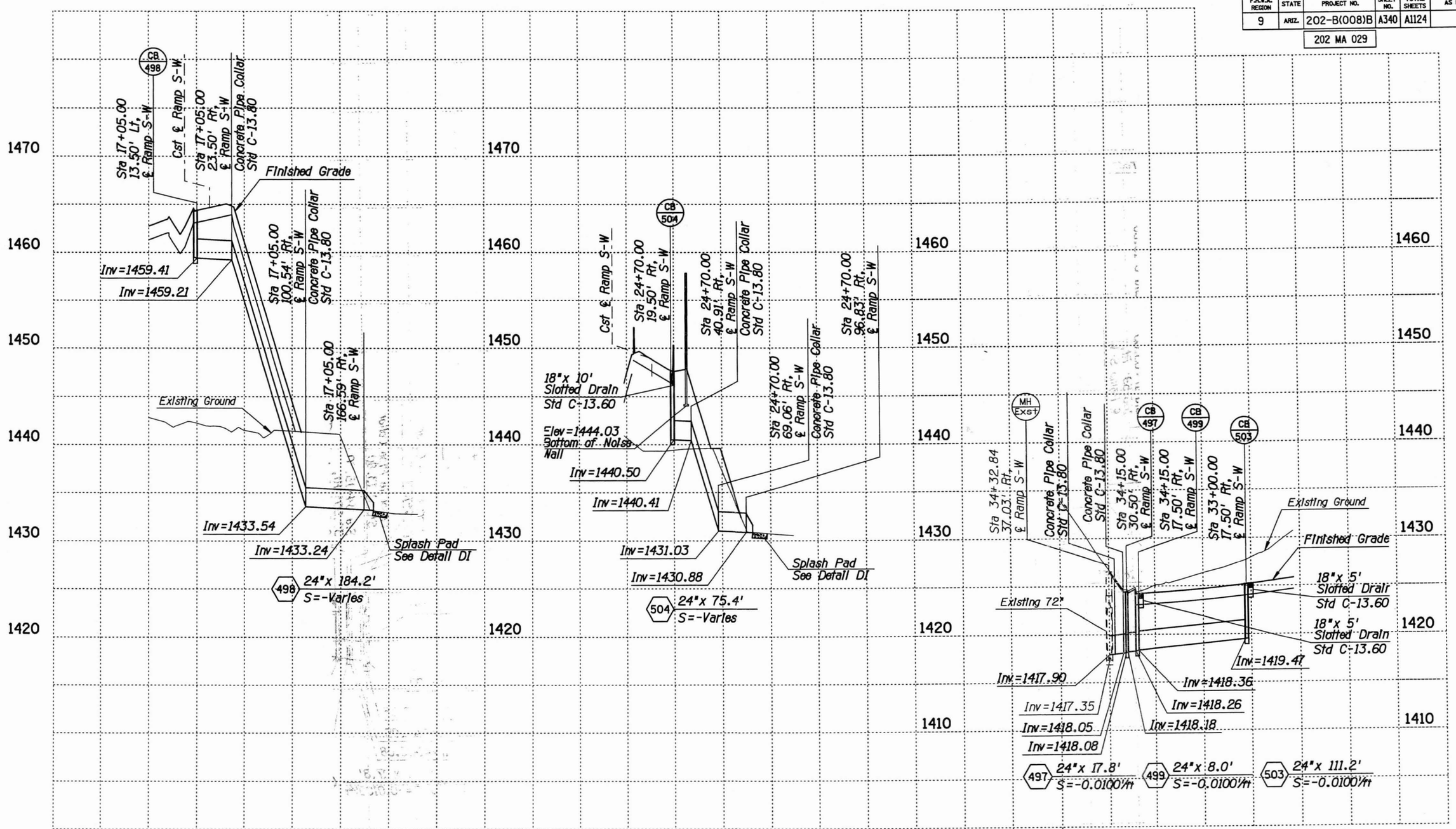
ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.46

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-B(008)B	A340	A1124	
		202 MA 029			



RAMP S-W

	NAME	DATE
DESIGN	DNJ/RZ	12-04
DRAWN	KL/RR	12-04
CHECKED	DNJ	12-04

AZTEC 4561 E. McDowell Road Phoenix, AZ 85008-6505 Tel (602) 454-0402 Fax (602) 454-0403 www.aztecus.com

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

STORM DRAIN PROFILE

Registered Professional Engineer (Civil) CERTIFICATE NO. 21868 CURTIS W. SLAGLE Date Signed ARIZONA, U.S.A.

ROUTE 202 | LOCATION LOOP 202/US 60 T.I.

DWG NO. D-2.47

TRACS NO. H5686 04C | 202-B(008)B | ___ OF ___

SURVEY NO. | FINISHED PLANS- | REVISIONS- | LOCATION- | DATE-

Plotted By: kleahy at 11:17:01 AM 1/26/2005 r:\phoenix\projects\az01107\cadd\drn\az01107-02-dr-49.dgn