

**FEMA LOMR SUBMITTAL
FOR
SHEELY FARMS EAST
PHOENIX, ARIZONA**

March 19, 2002

Prepared for:

**Sunbelt Holdings
6720 N. Scottsdale Road, Suite 160
Scottsdale, Arizona 85253
(480) 905-0770**

Prepared by:

**Coe & Van Loo Consultants, Inc.
4550 North 12th Street
Phoenix, Arizona 85014
(602) 264-6831**

CVL Project No. 98-0094-10-03



**FEMA LOMR Submittal
for
Sheely Farms East
Phoenix, Arizona**

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February 28, 2002

Hassan Mushtaq
Floodplain Administrator
City of Phoenix
200 W. Washington Street
Phoenix, Arizona 85003

**Re: Letter of Map Revision Request for Sheely Farms East
CVL Project #: 98-0094-10**

Dear Mr. Mushtaq:

This is a request for a Letter of Map Revision (LOMR) to the effective Flood Insurance Rate Map (FIRM) for the City of Phoenix, Arizona. Pertinent information about this request is listed below:

Community Affected: City of Phoenix, Arizona
Flooding Source: Maryvale Area
FIRM Panel Affected: 04013C 2085F (7/19/01)

The existing condition is a Zone A flood zone caused by ponding along the elevated top of bank of the Roosevelt Irrigation District Canal which runs along the southern boundary of the site. The top of bank intercepts the flows from the east creating a backwater condition up to elevation 1023 (approximately), at which point the flows begin to overtop the bank.

The new Zone AE is shown based on the recently constructed infrastructure channels of Sheely Farms East and the existing Agua Fria Freeway Channel constructed by the Arizona Department of Transportation. Exhibit 2, located within this report, shows the new floodplain Zone AE.

If you have any questions regarding this submittal, please call either Doug Both or myself at (602) 264-6831.

Sincerely,

Coe & Van Loo Consultants, Inc.

Les F. Olson, P.E., R.L.S.
President

LFO:se

Executive Summary

Coe & Van Loo Consultants, Inc. (CVL) has been contracted by Sunbelt Holdings to provide engineering services in support of the proposed development of Sheely Farms East. The site consists of approximately 390 acres of agricultural farmland that will be developed into single-family residential homes, multi-family complexes, commercial tracts, city parks, and school sites. The site is located in Section 33, Township 2 North, Range 1 East of the Gila and Salt River Meridian and is located within the City of Phoenix jurisdictional limits. The property is bounded by McDowell Road on the south, Thomas Road on the north, 91st Avenue on the east, and the recently constructed Agua Fria Freeway (Loop 101) on the west. See Figures 1 and 2.

Under existing conditions, the site slopes to the southwest at approximately 0.25 percent. Offsite flows impact the site along the northern and eastern boundaries. These flows are quantified in the Maryvale Area Drainage Master Study (ADMS) done by Wood, Patel & Associates in association with CH2MHill (November 1996). The offsite flows combine with generated onsite runoff and are conveyed across the site in a southwesterly direction as sheet flow. The Roosevelt Irrigation District (RID) Canal is located along the southern boundary of the site and causes the runoff to pond against the northern edge of the canal. A berm prevents stormwater runoff from discharging into the canal creating a backwater condition and the FEMA designated Flood Zone A as seen on the FIRM Map (see Exhibit 1). The Maryvale ADMS HEC-1 model is used as the *effective model* for the LOMR submittal and is included in Appendix G.

The proposed development of Sheely Farms East will incorporate the use of drainage channels to be constructed along the eastern and northern boundaries of the site. These channels will function to convey offsite flows (and a portion of the onsite flows) to the Agua Fria Freeway (AFF) Interceptor Channel, that runs along the western boundary of the property. These channels will eliminate the existing FEMA Flood Zone A and are designed to contain the 100-year, 24-hour stormwater flows thereby creating a Flood Zone AE (see Exhibit 2). The design flows for the proposed conditions

analysis were obtained by modifying the Maryvale ADMS HEC-1 model to account for development of the site (see Appendix H). The existing condition HEC-RAS analysis for the AFF Channel and the Sheely Farms East channel systems is submitted as the *post-project conditions model* for the LOMR submittal and is included in Appendix I.

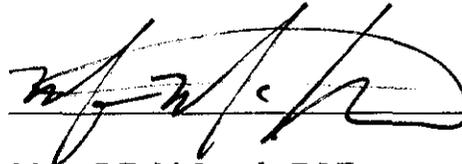
REFERENCES

1. *Maryvale Area Drainage Master Study (FCD #93-29)*, Wood Patel & Associates, Inc. in association with CH2M Hill, November 1996.
2. Federal Emergency Management Agency, Flood Insurance Rate Map, Map No. 04013C2085F, July 19, 2001.
3. *Master Drainage Report for Sheely Farms East Infrastructure*, Coe & Van Loo Consultants, Inc., December 15, 2000.

DOCUMENT QUALITY ASSURANCE

As part of CVL's policy to provide quality products to its clients, all reports are subject to review for technical accuracy, validity of conclusions and appropriateness of recommendations.

This document was prepared by:



Printed/Typed Name: Marc C.F. McIntosh, E.I.T.

Date: March 19, 2002

This document was reviewed under the direction of:



Printed/Typed Name: J. Doug Both, Project Manager

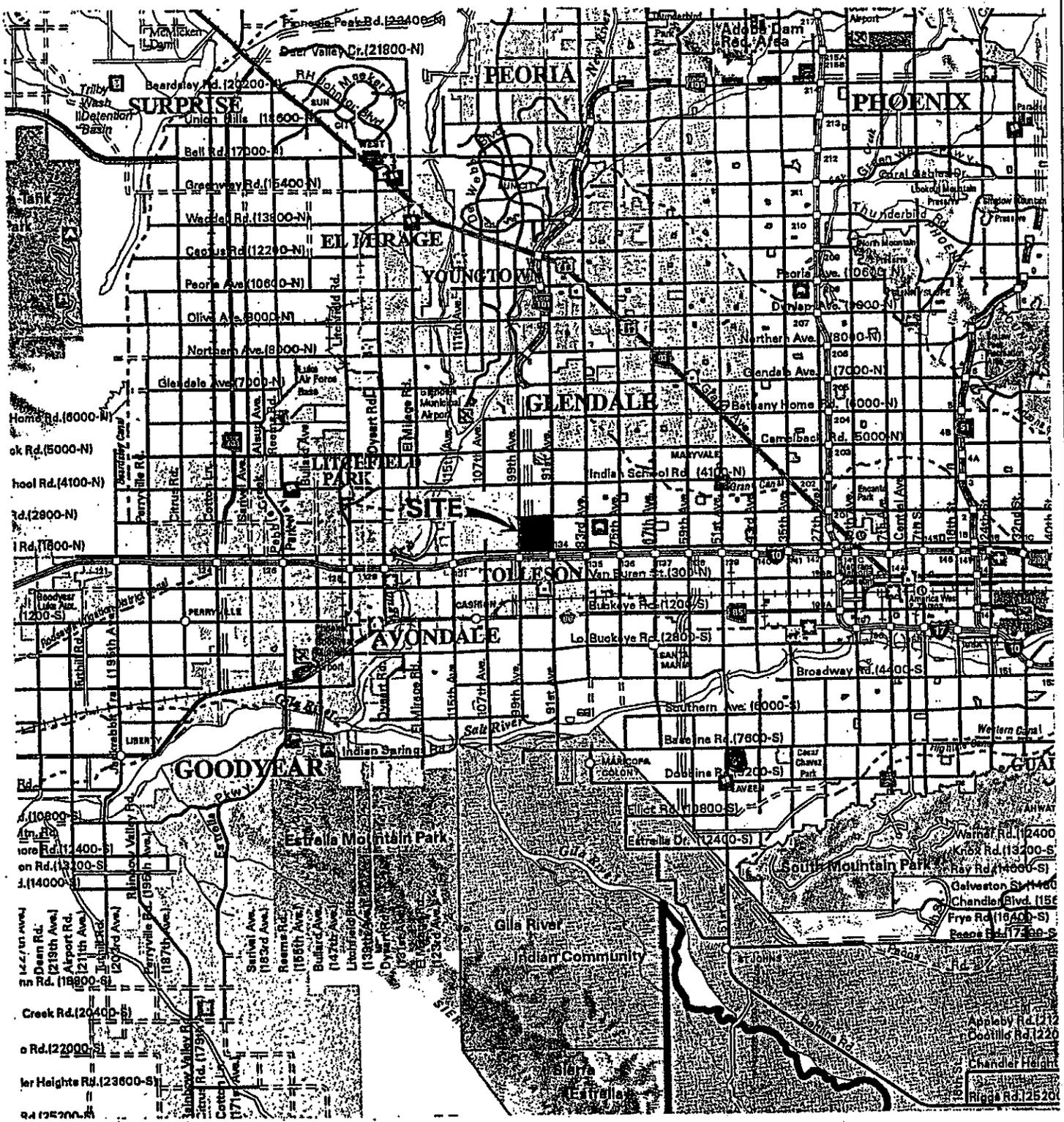
Date: March 19, 2002

This document was prepared under the direction of:

Printed/Typed Name: Les F. Olson, P.E., R.L.S.

Date: March 19, 2002

FIGURES



0 1 2 3 4 5 6
SCALE IN MILES

VICINITY MAP

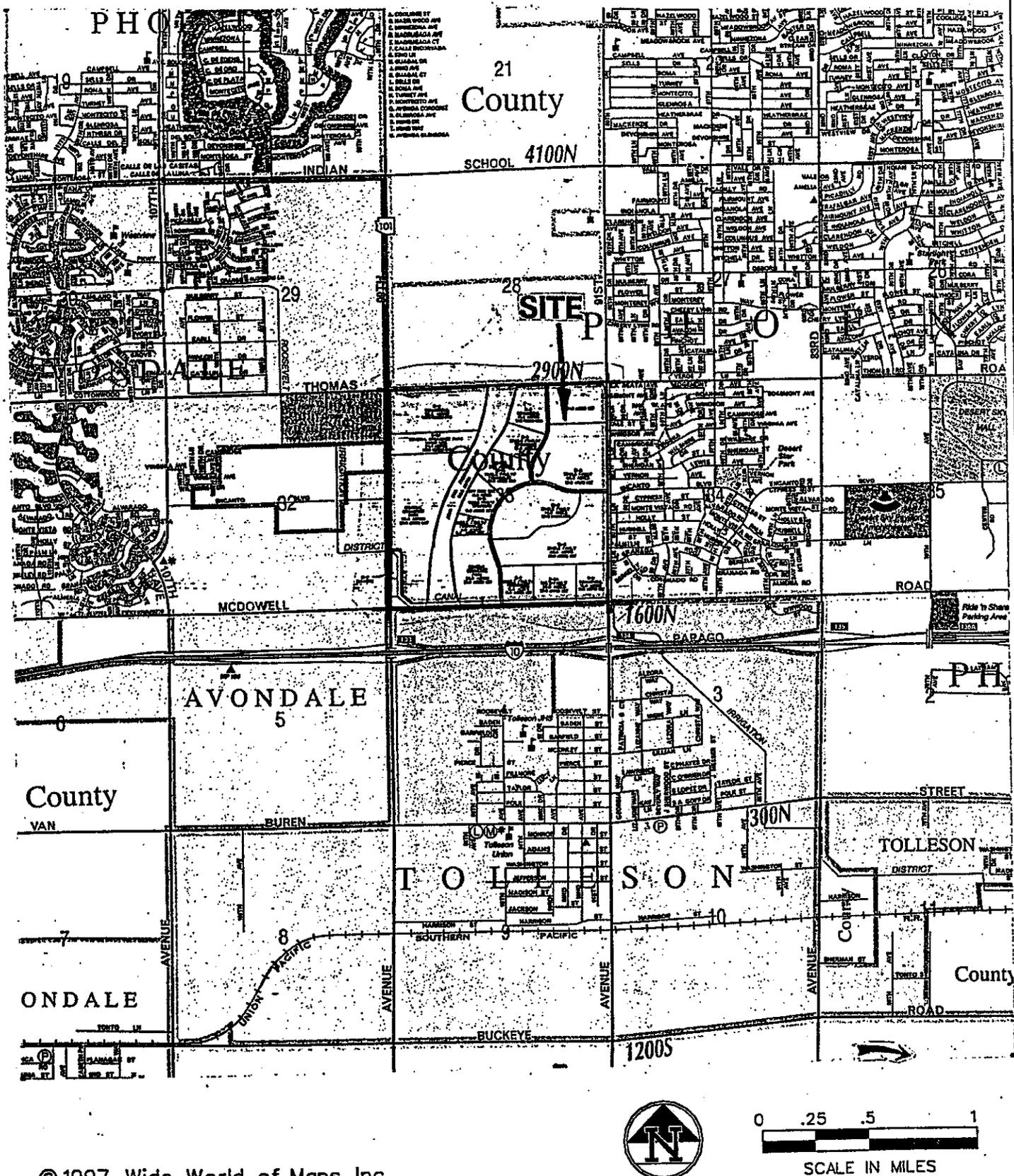
SHEELY FARMS

JOB NO
980094-05

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

COE & VAN LOO
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FIGURE 1



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LOCATION MAP

4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

SHEELY FARMS

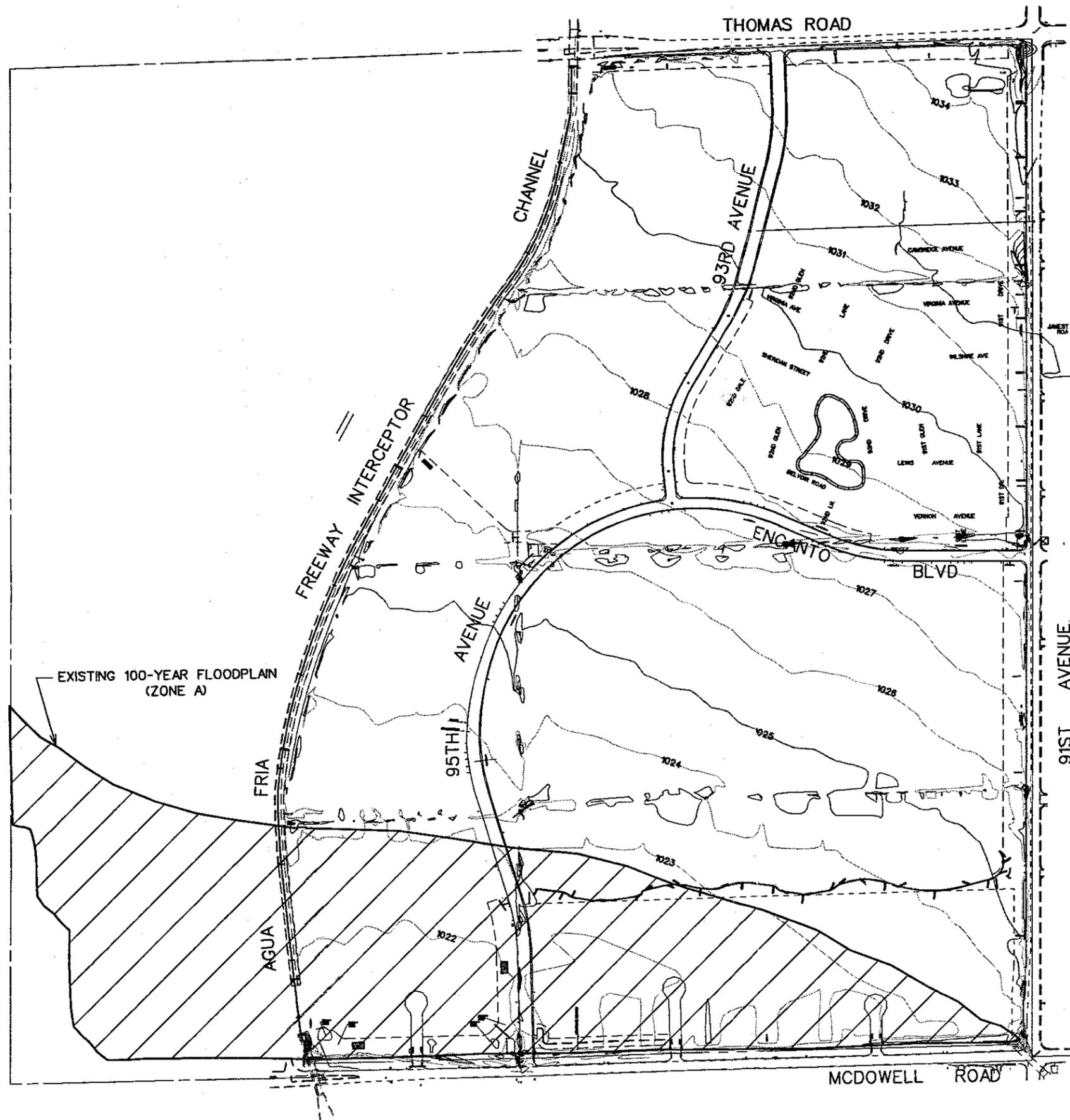
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JOB NO
 980094-05

FIGURE 2

EXHIBITS

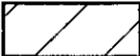
CVL

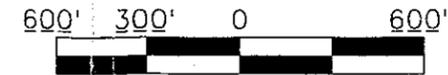


DEVELOPER
 SUNBELT/SHEELY HOLDINGS
 MARK HAMMONS
 6720 N. SCOTTSDALE ROAD, SUITE 160
 SCOTTSDALE, ARIZONA 85253
 PH. (480) 905-0770

BENCHMARK
 MARICOPA COUNTY HIGHWAY DEPT.
 BRASS CAP IN HAND HOLE @
 91ST AVE. & THOMAS ROAD
 ELEVATION 1036.53
 (C.O.P. DATUM)

LEGEND

-  100 - YEAR FLOODPLAIN (ZONE A)
-  ELEVATION CONTOUR



SCALE: 1" = 600'

SHEELY FARMS INFRASTRUCTURE

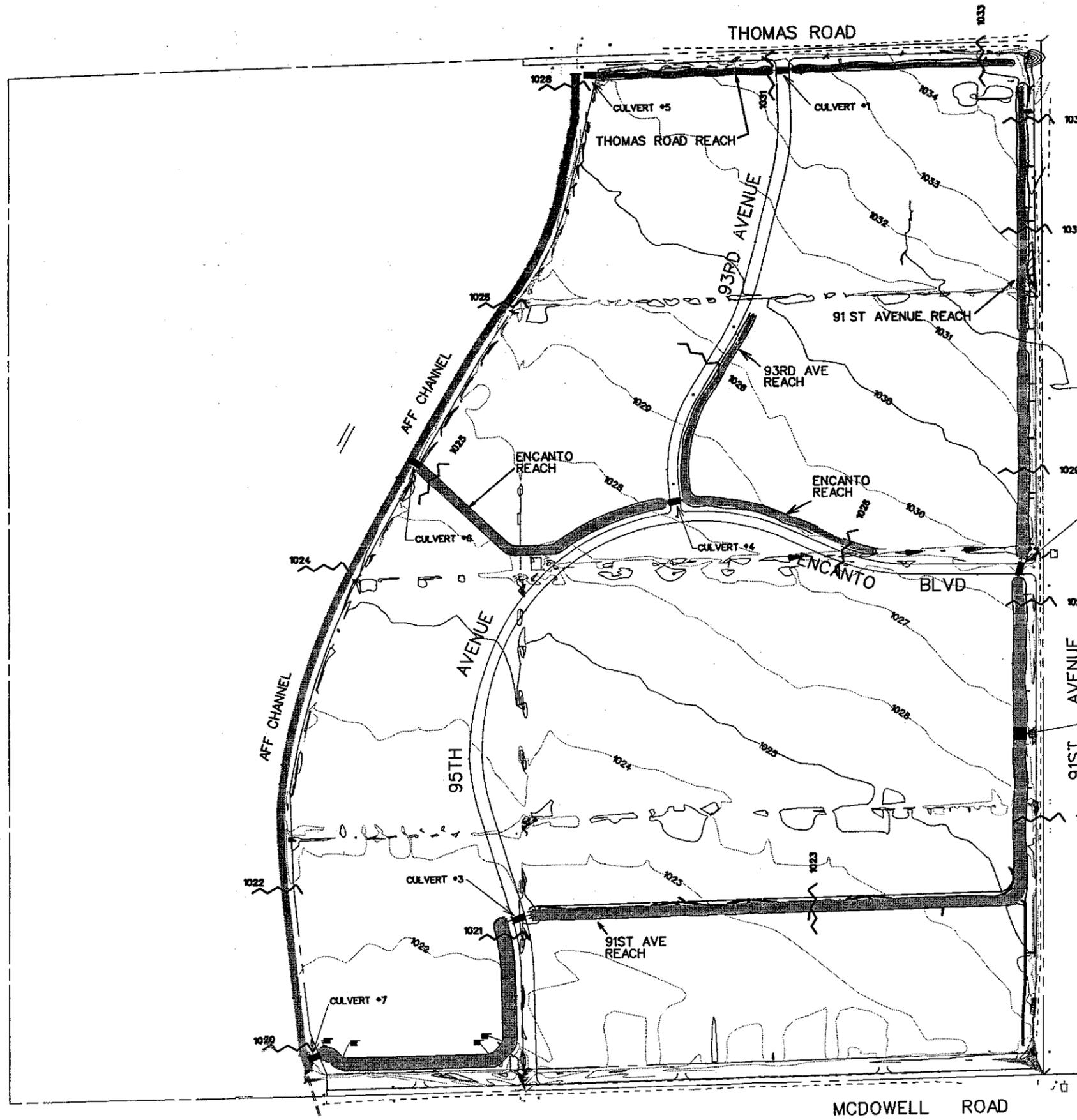
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EXISTING FLOOD INSURANCE MAP

4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

JOB NO
 98009410

EXHIBIT 1

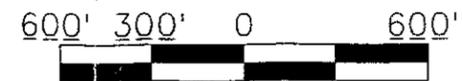


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BENCHMARK
 MARICOPA COUNTY HIGHWAY DEPT.
 BRASS CAP IN HAND HOLE @
 91ST AVE. & THOMAS ROAD
 ELEVATION 1036.53
 (C.O.P. DATUM)

LEGEND

-  100-YEAR FLOODPLAIN (ZONE AE)
-  1030 ELEVATION CONTOUR
-  1030 BASE FLOOD ELEVATION



SCALE: 1" = 600'

DEVELOPER
 SUNBELT/SHEELY HOLDINGS
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 SCOTTSDALE, ARIZONA 85253
 PH. (480) 905-0770

SHEELY FARMS INFRASTRUCTURE

REVISED FLOOD INSURANCE MAP

4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

JOB NO
 98009408

EXHIBIT 2

COE & VAN LOO
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APPENDICES

APPENDIX A

**Revision Requester and
Community Official Form
(MT-2 Form 1)**



PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

1. REQUESTED RESPONSE FROM FEMA

This request is for a:

- CLOMR A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision, or proposed hydrology changes (See 44 CFR Ch. 1, Parts 60,65 & 72).
- LOMR A letter from FEMA officially revising the current NFIP map to show the changes to floodplains, floodway or flood elevations. LOMRs typically decrease flood hazards. (See 44 CFR Ch. 1 Parts 60 & 65.)
- Other Describe: _____

2. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)

- Physical Change
- Improved Methodology/Data
- Floodway Revision

Other Describe: As-built conditions of Agua Fria Fwy channel & Sheely Farms East Development.
 Note: A photograph is not required, but is very helpful during review.

2. Flooding Source: Southeast portion of Maryvale area & elevated cross-section of R.I.D. Canal.

3. Project Name/Identifier: Sheely Farms East

4. FEMA zone designations affected: A
 (example: A, AH, AO, A1-A30, A99, AE, V, V1-V30, VE, B, C, D, X)

5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	State	Map No.	Panel No.	Effective Date
Ex: 480301	Katy, City	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040051	City of Phoenix	AZ	04013C	2085F	07/19/01

6. The area of revision encompasses the following types of flooding and structures. Check all that apply.

Types of Flooding	Structures
<input type="checkbox"/> Riverine	<input checked="" type="checkbox"/> Channelization
<input type="checkbox"/> Coastal	<input type="checkbox"/> Levee/Floodwall
<input type="checkbox"/> Alluvial fan	<input checked="" type="checkbox"/> Bridge/Culvert
<input type="checkbox"/> Shallow Flooding (e.g. Zones AO and AH)	<input type="checkbox"/> Dam
<input type="checkbox"/> Lakes	<input type="checkbox"/> Fill
<input checked="" type="checkbox"/> Other (describe)	<input checked="" type="checkbox"/> Other (describe)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

APPENDIX B

**Riverine Hydraulic Analysis Form
(MT-2 Form 4)**

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: Intersection of Agua Fria Fwy & McDowell Rd.

Upstream Limit: Intersection of 91st Ave. & Thomas Rd.

2. MODELS SUBMITTED

SEE ATTACHED EXPLANATION

Requirements: for areas which have detailed flooding:

Full input and output listings along with files on diskette for each of the models listed below (items 1-4) and a summary of the source of input parameters used in the models must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective model to Corrected Effective model). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

for areas which do not have detailed flooding:

Only the 100-year (Base) flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 described below must be submitted.

If hydraulic models are not developed, hydraulic analyses (including all calculations) for existing or pre-project conditions and revised or post-project conditions must be submitted.

1. Duplicate Effective Model Natural File Name _____ Floodway File Name _____

Copies of the hydraulic analysis used in the effective FIS referred to as the effective models (10-, 50-, 100-, and 500-year multi-profile runs and the floodway run) must be obtained and then reproduced on the requester's equipment to produce the Duplicate Effective model. This is required to assure that the effective models input data has been transferred correctly to the requester's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

2. Corrected Effective Model Natural File Name _____ Floodway File Name _____

The Corrected Effective model is the model that corrects any errors that occur in the Duplicate Effective model, adds any additional cross-sections to the Duplicate Effective model, or incorporates more detailed topographic information than that used in the currently effective model. The Corrected Effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.

3. Existing or Pre-Project Conditions Model Natural File Name _____ Floodway File Name _____

The Duplicate Effective model or Corrective Effective model is modified to produce the Existing or Pre-Project Conditions model to reflect any modifications that have occurred within the floodplain since the date of the Effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the Corrected Effective model or Duplicate Effective model.

4. Revised or Post-Project Conditions Model Natural File Name _____ Floodway File Name _____

The Existing or Pre-Project Conditions model (or Duplicate Effective model or Corrected Effective model, as appropriate) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for the proposed project this model must reflect proposed conditions.

5. Other - Please attach a sheet describing all other models submitted along with the file names. Natural Floodway

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

3. STARTING WATER-SURFACE ELEVATIONS

Explain how they were determined.

Explanation Attached Yes No

NOTE: If the effective study is an approximate study, the slope/area method is recommended.
For detailed analysis studies, using a known water-surface elevation is recommended.

4. RESULTS (from the model used to revise the 100-year water surface elevations)

If the results indicate any of the following, attach an explanation - to this form, or to the hydraulic model printout- as to the reasonableness of the situation.

- Supercritical depth Critical Depth Drawdowns Negative Floodway Surcharges
- Floodway Surcharges Greater Than Maximum Allowed by Community/State
- Water surface elevations higher than the end points of cross sections.
- Floodway discharge is different than the Natural 100-year (base) flood discharge.
- Project causes 100-year floodplain or floodway elevations to increase (state if increases are located off the requester's property)

Explanation attached with Form Explanation provided on attached printout

If Hydraulic model used is HEC-2, has it been checked with FEMA'S CHECK-2 computer program? Yes No
(see instructions for information on how to obtain CHECK-2)

5. REVISED FIRM/FBFM AND FLOOD PROFILES

1. Profile Transition

a. 100-Year Water-Surface Elevations - indicate the difference in water surface elevations where the project 100-year elevations tie into the existing 100-year water surface elevations at each end of the project.

Downstream End _____ within _____ (feet)
Cross-Section #

Upstream End _____ within _____ (feet)
Cross-Section #

b. Floodway Elevations - indicate the difference in water surface elevations where the project floodway elevations tie into the existing floodway water surface elevations at each end of the project.

Downstream End _____ within _____ (feet)
Cross-Section #

Upstream End _____ within _____ (feet)
Cross-Section #

c. Floodway widths - indicate the difference in floodway widths where the project floodway widths tie into the existing floodway width at each end of the project.

Downstream End _____ within _____ (feet)
Cross-Section #

Upstream End _____ within _____ (feet)
Cross-Section #

2. Profile Checklist (check box if information has been provided on profile)

The following information (unless in parentheses) must be included at the same scale as the existing profiles for this project:

- Stream Name Community Name Corporate Limits labeled Study limits labeled
- Confluences labeled Channel Stationing Streambed profiled Cross Sections labeled
- Horizontal/Vertical Scales indicated 100-year elevs profiled*
- Road Crossings Labeled Low Chord Elevations Top of Road Elevations

*All recurrence intervals in the effective study must also be profiled.

Floodway Data Table

Attach a Floodway Data Table for each cross section listed in the published Floodway Data table in the FIS report.

Floodway Data Table Attached Yes Not Required

APPENDIX C

**Riverine/Coastal Mapping Form
(MT-2 Form 5)**



PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management Federal Emergency Management Agency, 500 C Street.S.W., Washington DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Note: Fill out one form for each flooding source studied

Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

This is a Manual Digital submission. Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance as possible.

1. MAPPING CHANGES

1. A topographic workmap must be submitted showing the following information (check N/A when not applicable):

- | | | | |
|---|---|-----------------------------|---|
| a. Revised approximate 100-year floodplain boundaries (Zone A) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| b. Revised detailed 100- and 500-year floodplain boundaries. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| c. Revised floodway boundaries | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| d. Location and alignment of all cross sections with stationing control indicated. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| e. Stream alignments, road alignments and dam alignments. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| f. Current community boundaries. | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| g. Effective 100-year floodplain and floodway boundaries from FIRM/FBFM reduced or enlarged to the scale of the topographic workmap | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| h. Tie-ins between the effective and revised 100-, 500-year and floodway boundaries | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| i. The requester's property boundaries and community easements | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| j. The signed certification of a registered professional engineer | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| k. Location and description of reference marks | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| l. Vertical datum (example: NGVD, NAVD) | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> N/A |
| m. Coastal zone designations tie into adjacent areas not being revised | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| n. Location and alignment of all coastal transects used to revise the coastal analyze | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |
| o. V-zone has been delineated to extend landward to the heel of the primary frontal dune | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input checked="" type="checkbox"/> N/A |

If any items are marked No or N/A please attach an explanation.

2. What is the source and date of the updated topographic information (example: orthophoto maps, July 1985; filed survey, May 1979, beach profile, June 1987 etc.)?

Field Survey, February 2002

3. What is the scale and contour interval of the following workmaps?

Effective FS	Scale <u>N/A</u>	Contour Interval <u>N/A</u>
Revision Request	Scale <u>1" = 600'</u>	Contour Interval <u>1'</u>

NOTE: Revised topographic information must be of equal or greater detail than effective.

4. Attach an annotated FIRM/FBFM at the scale of the effective FIRM/FBFM showing the revised 100- and 500-year floodplain and the floodway boundaries and how they tie into those shown on the effective FIRM/FBFM downstream and upstream of the revisions or adjacent to the area of revision for coastal studies. FIRM/FBFM attached? Yes No

(see Exhibits 1 & 2)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. EARTH FILL PLACEMENT

1. The fill is: Existing Proposed

2. Has fill been/will be placed in the regulatory floodway? Yes No
If Yes, please attach completed Riverine Hydraulic Analysis Form (Form 4).

3. Has fill been/will be placed in floodway fringe area between the floodway and 100-year floodplain boundaries? Yes No

If Yes, then complete A, B, C, and D below.

a. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? Yes No

If Yes, justify steeper slopes _____

b. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.)

Yes No

If No, describe erosion protection provided _____

c. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? Yes No

d. Can structures conceivably be constructed on the fill at any time in the future? Yes No

If Yes, attach certification of fill compaction (Item 3c. above) by the community's NFIP permit official, a registered professional Engineer, or an accredited soils engineer in accordance with Subparagraph 65.5(a)(6) of the NFIP regulations.

Fill certification attached Yes No

4. Has fill been/will be placed in a V zone? Yes No

If Yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall?

Yes No

If Yes, attach the Coastal Structures Form (Form 10).

APPENDIX D

**Channelization Form
(MT-2 Form 6)**



PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

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Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. REACH TO BE REVISED

Describe the limits of the revision **OR** submit a copy of the FIRM with the revision area clearly highlighted. Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: Intersection of Agua Fria Fwy interceptor channel at McDowell Rd.

Upstream Limit: Intersection of 91st Ave. & Thomas Rd.

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

- Description of the inlet and outlet
- Description of the shape of the channel (both cross sectional and planimetric configuration) and its lining (channel bottom and sides):

3. ACCESSORY STRUCTURES

The channelization includes:

- Levees (Attach Levee/Floodwall System Analysis Form - Form 8)
- Drop structures
- Superelevated sections
- Transitions in cross sectional geometry
- Debris basin/detention basin
- Energy dissipater
- Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

- Channel alignment and locations of inlet, outlet, and accessory structures
- Channel lining
- Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 622 (cfs) and/or the 100-year flood.
2. The design elevation in the channel based on:
- Subcritical flow
 - Critical flow
 - Supercritical flow
 - Energy grade line
3. If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.
- | | | |
|---------------------|------------------------------|--|
| Inlet to channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Outlet of channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| At Drop Structures? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Transitions? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Other locations? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
- Explanation Attached? Yes No N/A

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.75 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: Culvert inlet at Agua Fria Fwy interceptor channel at McDowell Rd.

Upstream Limit: Culvert outlet at Agua Fria Fwy interceptor channel & Thomas Rd.

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

- Description of the inlet and outlet
- Description of the shape of the channel (both cross sectional and planimetric configuration) and its lining (channel bottom and sides):

3. ACCESSORY STRUCTURES

The channelization includes:

- Levees (Attach Levee/Floodwall System Analysis Form - Form 8)
- Drop structures
- Superelevated sections
- Transitions in cross sectional geometry
- Debris basin/detention basin
- Energy dissipater
- Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

- Channel alignment and locations of inlet, outlet, and accessory structures
- Channel lining
- Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 2,550 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

- Subcritical flow
- Critical flow
- Supercritical flow
- Energy grade line

3. If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

- | | | |
|---------------------|------------------------------|--|
| Inlet to channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Outlet of channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| At Drop Structures? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Transitions? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Other locations? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |

Explanation Attached? Yes No N/A

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: Agua Fria Fwy interceptor channel at Thomas Rd.
Upstream Limit: Intersection of 91st Ave. & Thomas Rd.

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

- Description of the inlet and outlet
- Description of the shape of the channel (both cross sectional and planimetric configuration) and its lining (channel bottom and sides):

3. ACCESSORY STRUCTURES

The channelization includes:

- Levees (Attach Levee/Floodwall System Analysis Form - Form 8)
- Drop structures
- Superelevated sections
- Transitions in cross sectional geometry
- Debris basin/detention basin
- Energy dissipater
- Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

- Channel alignment and locations of inlet, outlet, and accessory structures
- Channel lining
- Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 78 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

- Subcritical flow
- Critical flow
- Supercritical flow
- Energy grade line

3. If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

- | | | |
|---------------------|------------------------------|--|
| Inlet to channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Outlet of channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| At Drop Structures? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Transitions? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Other locations? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

Explanation Attached? Yes No N/A

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the base flood water-surface elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: Agua Fria Fwy interceptor channel at Station 53+00

Upstream Limit: Intersection of 92nd Ave. alignment & Encanto Blvd.

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

- Description of the inlet and outlet
- Description of the shape of the channel (both cross sectional and planimetric configuration) and its lining (channel bottom and sides):

3. ACCESSORY STRUCTURES

The channelization includes:

- Levees (Attach Levee/Floodwall System Analysis Form - Form 8)
- Drop structures
- Superelevated sections
- Transitions in cross sectional geometry
- Debris basin/detention basin
- Energy dissipater
- Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

- Channel alignment and locations of inlet, outlet, and accessory structures
- Channel lining
- Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 206 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

- Subcritical flow
- Critical flow
- Supercritical flow
- Energy grade line

3. If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

- | | | |
|---------------------|---|-----------------------------|
| Inlet to channel? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Outlet of channel? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Drop Structures? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| At Transitions? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Other locations? | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No |

Explanation Attached? Yes No N/A

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

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You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. REACH TO BE REVISED

Describe the limits of the revision OR submit a copy of the FIRM with the revision area clearly highlighted.
Copy of FIRM(s) attached depicting area of the revision (highlighted, or circled)? Yes

Downstream Limit: Intersection of 93rd Ave. & Encanto Blvd.

Upstream Limit: 93rd Ave.: 1300 feet south of Thomas Rd.

2. CHANNEL DESCRIPTION

Attach the following information about the channel (check box if information has been provided):

- Description of the inlet and outlet
- Description of the shape of the channel (both cross sectional and planimetric configuration) and its lining (channel bottom and sides):

3. ACCESSORY STRUCTURES

The channelization includes:

- Levees (Attach Levee/Floodwall System Analysis Form - Form 8)
- Drop structures
- Superelevated sections
- Transitions in cross sectional geometry
- Debris basin/detention basin
- Energy dissipater
- Other (Describe):

4. DRAWING CHECKLIST

Attach the plans of the channelization certified by a registered professional engineer. The plan detail and information should include (check box if information has been provided):

- Channel alignment and locations of inlet, outlet, and accessory structures
- Channel lining
- Typical cross sections and profiles of channel banks and invert

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

5. HYDRAULIC CONSIDERATIONS

1. The channel was designed to carry 100 (cfs) and/or the 100-year flood.

2. The design elevation in the channel based on:

- Subcritical flow
- Critical flow
- Supercritical flow
- Energy grade line

3. If there is the potential for a hydraulic jump at the following locations, check the box(es) that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

- | | | |
|---------------------|------------------------------|--|
| Inlet to channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Outlet of channel? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| At Drop Structures? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| At Transitions? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Other locations? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |

Explanation Attached? Yes No N/A

6. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood water-surface elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

APPENDIX E

**Bridge/Culvert Form
(MT-2 Form 7)**



PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #1

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 9 + 52 of Thomas Rd. Reach

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix I)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #2

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 59+87.50 of 91st Ave. Reach

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix I)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.): Culvert #2A

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 51+06 of 91st Avenue Reach

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
HEC RAS v 2.2

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix L)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #3

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 17+34 of 91st Ave. Reach (at 95th Ave.)

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix L)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

FEDERAL EMERGENCY MANAGEMENT AGENCY
BRIDGE/CULVERT

O.M.B. Burden No. 3067-0148
Expires April 30, 2001

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #4

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 15+13 of Encanto Reach

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix L)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale Area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #5

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 0+00 of Thomas Rd. Reach

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No NA

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix L)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skaw Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

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You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #6

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 0+00 of Encanto Reach

3. This revision reflects (check one of the following):
- New bridge/culvert not modeled in the FIS
 - Modified bridge/culvert previously modeled in the FIS
 - New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No NA

(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix L)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

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You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert #7

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 0+00 of 91st Ave. Reach

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
Culvert Master

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A
(See Appendix F)

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix L)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

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Community Name: City of Phoenix, Arizona
Flooding Source: Southern & Eastern portion of Maryvale area
Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert at Thomas Rd.

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 76+10 of Agua Fria Fwy interceptor channel

3. This revision reflects (check one of the following):
- New bridge/culvert not modeled in the FIS
 - Modified bridge/culvert previously modeled in the FIS
 - New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
HEC-RAS v 2.2

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix I)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

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You are not required to respond to this collection of information unless a valid OMB Control Number is displayed in the upper right corner of this form.

Community Name: City of Phoenix, Arizona

Flooding Source: Southern & Eastern portion of Maryvale area

Project Name/Identifier: Sheely Farms East

1. IDENTIFIER

1. Name of structure (roadway, railroad, etc.) Culvert at McDowell RD.

2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier):
Station 19+00 of Agua Fria Fwy interceptor channel

3. This revision reflects (check one of the following):

- New bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- New analysis of bridge/culvert previously modeled in the FIS

4. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8)
HEC-RAS v 2.2

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). (Attach justification)

Justification attached Yes No N/A

PLEASE REFER TO THE INSTRUCTIONS FOR THE APPROPRIATE MAILING ADDRESS

2. DRAWING CHECKLIST

Attach plans of the structure(s) certified by a registered professional engineer. The plan detail and information should include the following (check the boxes if the information has been provided): (See Appendix I)

- Dimensions (height, width, span, radius, length)
- Shape (culverts only)
- Material
- Beveling or Rounding
- Wing Wall Angle
- Low Chord Elevations - Upstream and Downstream
- Top of Road Elevations - Upstream and Downstream
- Structure Invert Elevations - Upstream and Downstream
- Stream Invert Elevations - Upstream and Downstream
- Skew Angle
- Cross-Section Locations
- Distances Between Cross Sections
- Erosion Protection

3. SEDIMENT TRANSPORT CONSIDERATIONS

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the 100-year (base flood) water-surface elevations; and/or based on the stream geomorphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including sewer and deposition) to affect the base flood elevations, then provide the following information (Check the box if provided):

- Estimated sediment load
- Method used to estimate sediment transport
- Method used to estimate scour and/or deposition
- Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport

APPENDIX F

**Attachment of Explanations
and Descriptions and FEMA Map**



LOMR SUBMITTAL FOR SHEELY FARMS EAST

ATTACHMENT OF EXPLANATIONS & DESCRIPTIONS

Form #4 – Riverine Hydraulic Analysis

Section 1 – Reach To Be Revised

See accompanying copy of FIRM Panel 04013C2085E for highlighted areas of revision

Section 2 – Models Submitted

- 1) There is currently no existing FIS model to modify. There is a HEC-1 model for the Maryvale Area Drainage Master Study, done by Wood Patel & Associates, Inc. in association with CH2M Hill dated 1996. The file, "100.dat," is included on Disk #1. According to this model, the area on the north side of the Roosevelt Irrigation District (R.I.D.) Canal between 91st Avenue and 99th Avenue will pond to an elevation of 1023 feet during the 100-year event. The area of ponding is labeled as "RES33" and the routing information can be found on line 11527 through 11534 of the HEC-1 model.

- 4) The Post-Project Condition Models are included on Disk #2 and are labeled as follows:

<u>HEC-RAS filename</u>	<u>Description</u>
mainab.prj	91 st Avenue Reach
aff.prj	Agua Fria Freeway Interceptor Channel
ThomasAB.prj	Thomas Road Reach
CH4AB.prj	Encanto Reach
CH5AB.prj	93 rd Avenue Reach

Section 3 – Starting Water-Surface Elevations for HEC-RAS models

- a) main.prj Normal depth was used at the upstream end of the reach and the calculated headwater for Culvert #7 was used at the downstream end of reach.

- b) aff.prj Normal depth was used at upstream end of the reach and a known water surface elevation was used at the downstream ends of reach.

- c) thomas.prj Normal depth was used at upstream end of the reach and the calculated headwater for Culvert #5 was used at downstream end of reach.
- d) interior4.prj Normal depth was used at upstream end of the reach and the calculated headwater for Culvert #6 was used at downstream end of reach.
- e) interior5.prj Normal depth was used at upstream end of the reach and the calculated headwater for Culvert #4 was used at downstream end of reach.

Section 4 – Results

- 1) Proposed development diverts flows around and thru the site. As such, the combined discharge rates differ from the existing condition due to the proposed routing and diversions, not from altered hydrology.
- 2) The increased floodplain elevations are contained within the channel sections

Section 5 – Revised FIRM/FBFM and Flood Profiles

- 1) There is no existing model to tie into.
- 2) See attached plans.

Form #5 – Riverine/Coastal Mapping

Section 1 – Mapping Changes

- 1) a) No - The revised approximate floodplain boundaries are not needed since detailed mapping is shown.
- h) N/A - There are no tie-ins available.
- m) N/A - The area is not in a coastal region.
- n) N/A - The area is not in a coastal region.
- o) N/A - The area is not in a coastal region.
- 4) The FIRM panel showing the revised 100-year floodplain is included.

Form #6 – Channelization

Section 1 – Reach To Be Revised

- 1) The FIRM panel showing the revised 100-year floodplain is included.

- 2) main.prj – 91st Avenue Reach

Inlet: No structure; collects sheet flow from east along 91st Ave.

Outlet: Culvert #7 – triple 10'x 4' RCB

Lining: Bottom and sides – earthen with landscaping

Side slopes: 4:1 and 3:1 H:V

Bottom width: 8-30'

Depth: 4-6'

aff.prj – Agua Fria Freeway Interceptor Channel

Inlet: quadruple 10'x 6' RCB

Outlet: triple 10'x 8' RCB

Lining: Bottom and sides – 6" thick reinforced concrete

Side slopes: 1.5:1 H:V

Bottom width: 15'

Depth: 8-12'

thomas.prj – Thomas Road Reach

Inlet: No structure; collects sheet flow from north along Thomas Road

Outlet: Culvert #5 – double 36" diameter RGRCP's

Lining: Bottom and sides – earthen with landscaping

Side slopes: 3:1 and 4:1 H:V

Bottom width: 6'

Depth: 4'

interior4.prj – Encanto Reach

Inlet: No single structure; collects onsite storm drain flows

Outlet: Culvert #6 – double 48" diameter RGRCP's

Lining: Bottom and sides – earthen with landscaping

Side slopes: 3:1 and 4:1 H:V

Bottom width: 6-10'

Depth: 5-8'

interior5.prj – 93rd Avenue Reach

Inlet: No single structure; collects onsite storm drain flows

Outlet: Culvert #4 – 10'x 4' RCB at confluence with Encanto Reach

Lining: Bottom and sides – earthen with landscaping

Side slopes: 3:1 H:V

Bottom width: 6'

Depth: 5-6'

Section 4 – Drawing Checklist

- 1) See the attached plans.

Section 5 – Hydraulic Considerations

- 3) Rip-rap will be placed at the outlet of each culvert to ensure no scour or erosion occurs.

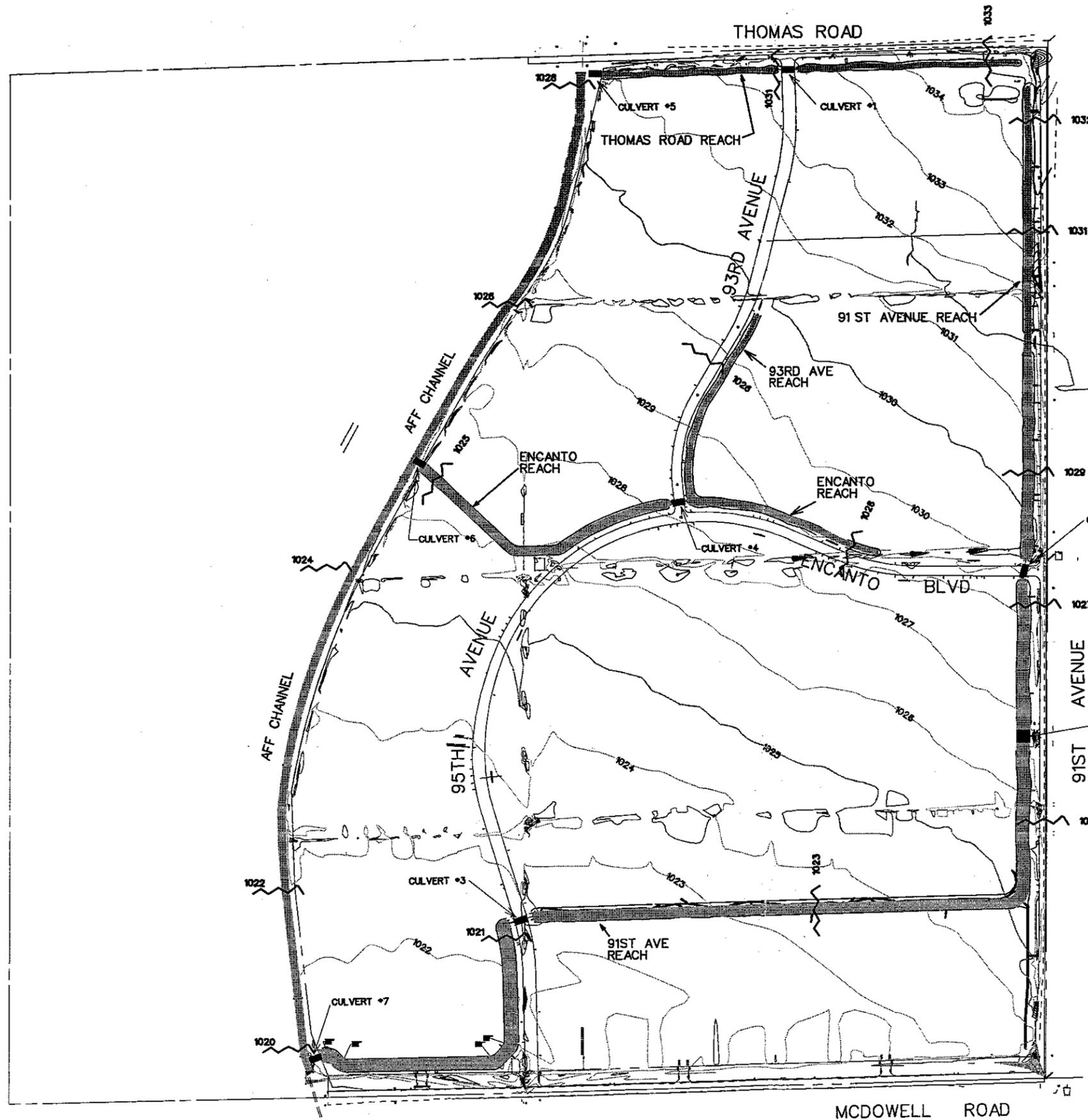
Form #7 – Bridge/Culvert

Section 1 – Identifier

- 4) CulvertMaster was used to analyze the culverts within the five on-site channels to ensure the accuracy of the HEC-RAS modeling. The headwater and tailwater conditions generated by CulvertMaster for those culverts which tie into the Agua Fria Freeway Interceptor Channel were used in the HEC-RAS models for upstream and downstream water surface elevations.

Section 2 – Drawing Checklist

See attached plans.



DEVELOPER
 SUNBELT/SHEELY HOLDINGS
 MARK HAMMONS
 6720 N. SCOTTSDALE ROAD, SUITE 160
 SCOTTSDALE, ARIZONA 85253
 PH. (480) 905-0770

BENCHMARK
 MARICOPA COUNTY HIGHWAY DEPT.
 BRASS CAP IN HAND HOLE @
 91ST AVE. & THOMAS ROAD
 ELEVATION 1036.53
 (C.O.P. DATUM)

LEGEND

-  100-YEAR FLOODPLAIN (ZONE AE)
-  1030 ELEVATION CONTOUR
-  1030 BASE FLOOD ELEVATION



600' 300' 0 600'

SCALE: 1" = 600'

DEVELOPER
 SUNBELT/SHEELY HOLDINGS
 MARK HAMMONS
 6720 N. SCOTTSDALE ROAD, SUITE 160
 SCOTTSDALE, ARIZONA 85253
 PH. (480) 905-0770

SHEELY FARMS INFRASTRUCTURE

REVISED FLOOD INSURANCE MAP

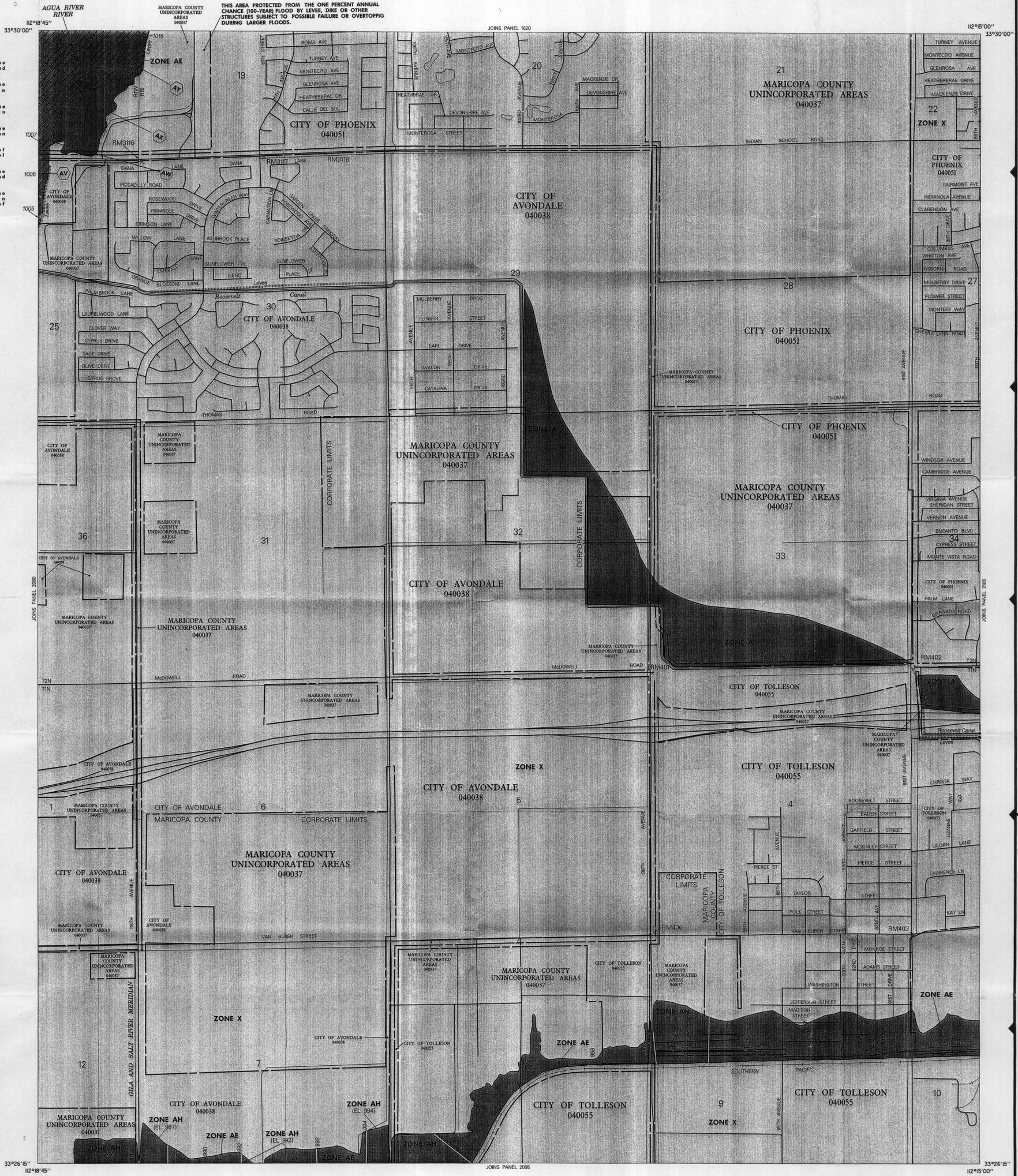
4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

JOB NO
 98009408

EXHIBIT 2

COE & VAN LOO
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM401	1021.09	Rim of handhole at centerline intersection of 99th Avenue and McDowell Road.
RM402	1025.39	Rim of handhole at centerline intersection of 91st Avenue (Main Street) and McDowell Road.
RM403	1014.82	Rim of handhole at centerline intersection of 91st Avenue (Main Street) and Van Buren Street.
RM404	1008.13	Rim of handhole at centerline intersection of 99th Avenue and Van Buren Street.
RM3116	1014.11	Brass cap at the intersection of 115th Avenue and Indian School Road.
RM3117	1017.26	Brass cap in hand hole at the intersection of 111th Avenue and Indian School Road.
RM3118	1019.18	Cotton picker spindle at the centerline of Indian School Road in line to the south with east wall of Salt River Project substation.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- ZONE A** No base flood elevations determined.
- ZONE AE** Base flood elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined; areas of abated fan flooding; velocities also determined.
- ZONE A99** To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
- ZONE V** Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- ZONE VE** Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- ZONE X** Areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile and areas protected by levees from 100-year flood.

OTHER AREAS

- ZONE X** Areas determined to be outside 500-year floodplain.
- ZONE D** Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

- Identified 1983
- Identified 1990
- Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

BOUNDARIES

- Floodplain Boundary
- Floodway Boundary
- Zone D Boundary
- Boundary Dividing Special Flood Hazard Zones and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
- Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.
- Cross Section Line
- Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum, Elevation Reference Mark.
- RM7 x Elevation Reference Mark
- M2 River Mile

Horizontal Coordinates Based on North American Datum of 1987 (NAD 87) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on BEFs, and for any information on floodway delineations, prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AI, A30, AH, AO, A99, V, VE and VI-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 100 inch.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1980 (PL 96-581).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:

APRIL 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

SEPTEMBER 4, 1991

Map revised July 19, 2001 to update corporate limits, to change base flood elevations, to add base flood elevations to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET

1000 0 1000

LEGEND

To obtain more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, users are encouraged to consult the Flood Profiles and Floodway Data tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent computed whole-foot elevations and therefore may not exactly reflect the flood elevation data presented in the FIS. BFEs shown on the FIRM are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

ERM elevations listed on this map were obtained and/or developed to establish vertical control for determination of flood elevations and floodplain boundaries portrayed on this map. Users should be aware that these ERM elevations may have changed since the publication of this map. To obtain up-to-date elevation information on National Geodetic Survey (NGS) ERMs shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov. Map users should seek verification of non-NGS ERM monument elevations when using these elevations for construction or floodplain management purposes.

Coastal BFE's shown on this map may apply only landward of 0.0' NGVD. Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this community. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 2085 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS	COMMUNITY	NUMBER	PANEL	SUFFIX
	AVONDALE CITY OF MARICOPA COUNTY UNINCORPORATED AREAS	040038	2085	F
	PHOENIX CITY OF MARICOPA COUNTY UNINCORPORATED AREAS	040037	2085	F
	TOLLESON CITY OF MARICOPA COUNTY UNINCORPORATED AREAS	040055	2085	F

MAP NUMBER 04013C2085 F

MAP REVISED: JULY 19, 2001

Federal Emergency Management Agency

APPENDIX G

Pre-Development HEC-1 Model



Effective Hydrologic/Hydraulic Model

Sheely Farms East (the site) is impacted by offsite flows along its northern and eastern boundaries. The existing flows are quantified by the Maryvale ADMS for the 100-year, 24-hour storm event. The results from this study are presented as the effective hydrologic and hydraulic model for floodplain analysis.

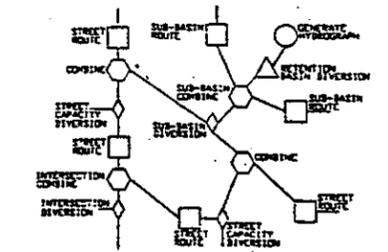
In the Maryvale ADMS, the watershed area is modeled by the HEC-1 computer program using routing methods and diversion card techniques which account for street flow capacities, street intersection flow splits, existing storm drain flows, etc. The model also accounts for retention systems and areas of stormwater ponding.

The following pages are taken from the Maryvale ADMS and show the methodologies used to create the HEC-1 model, the output relevant to the Sheely Farms East site, and modeling of the stormwater ponding along the upstream side of the Roosevelt Canal (existing FEMA Zone A).

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY

MARYVALE
AREA DRAINAGE MASTER STUDY
FCD CONTRACT # 93-29

LEGEND



INDEX MAP

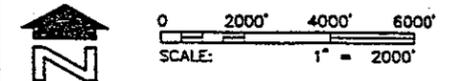
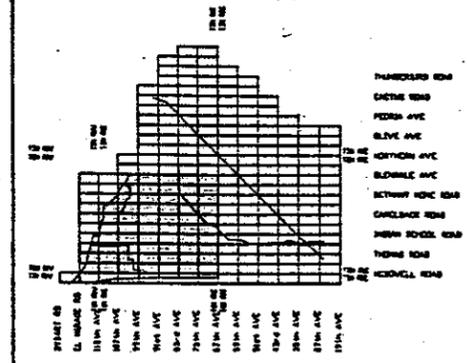
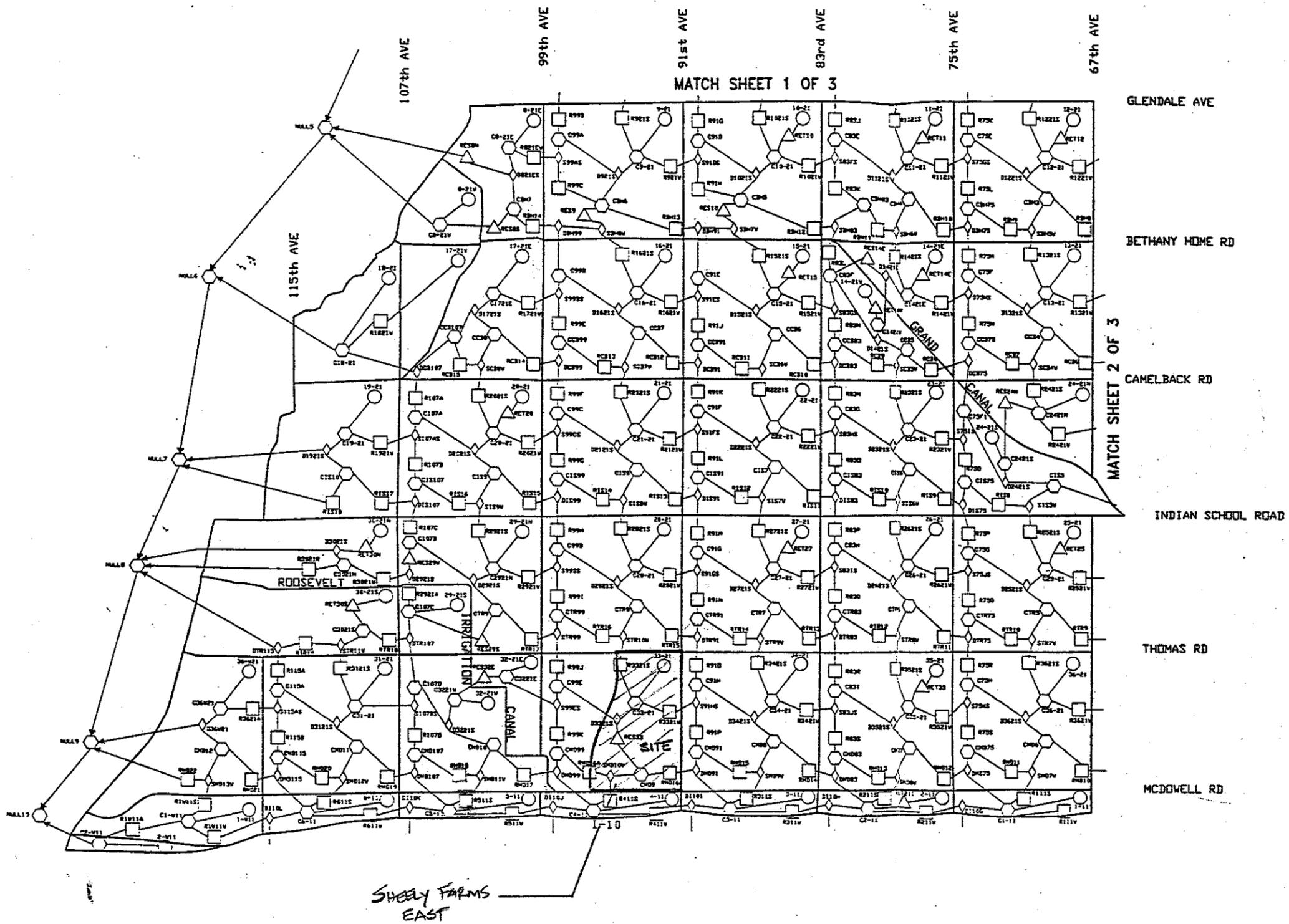


EXHIBIT 1
HEC-1 SCHEMATIC

CIM WOOD / PATEL

DESIGN	BY	DATE	FLOOD CONTROL DISTRICT
DESIGN CHK.	-	-	OF MARICOPA COUNTY
PLANS	-	-	RECOMMENDED BY: _____ DATE _____
PLANS CHK.	DWD	OCT 95	APPROVED BY: _____ DATE _____
SUBMITTED BY:	CHIEF ENGINEER AND GENERAL MANAGER		
DATE: OCT 95	SHEET	3	OF 3



OPERATION	STATION	Q ₂₄	t _p	AVERAGE Q			CUMMULATIVE AREA
				6	24	72	
3 COMBINED AT	C26-21	769.	13.08	277.	81.	27.	41.28
DIVERSION TO	D2621W	200.	13.08	72.	21.	7.	41.28
HYDROGRAPH AT	D2621S	569.	13.08	205.	60.	20.	41.28
2 COMBINED AT	CTR6	704.	13.08	234.	67.	22.	41.28
DIVERSION TO	STR8S	181.	13.08	57.	14.	5.	41.28
HYDROGRAPH AT	STR8W	523.	13.08	177.	53.	18.	41.28
ROUTED TO	RTR12	521.	13.17	177.	53.	18.	41.28
HYDROGRAPH AT	D831S	371.	13.00	263.	99.	34.	47.02
ROUTED TO	R83P	370.	13.17	263.	99.	34.	47.02
HYDROGRAPH AT	D2621W	200.	13.08	72.	21.	7.	41.28
2 COMBINED AT	C83H	557.	13.08	324.	118.	40.	57.03
DIVERSION TO	S831W	182.	13.08	45.	11.	4.	57.03
HYDROGRAPH AT	S831S	374.	13.08	280.	106.	37.	57.03
ROUTED TO	R83Q	374.	13.25	279.	106.	37.	57.03
2 COMBINED AT	CTR83	875.	13.17	444.	156.	53.	56.35
DIVERSION TO	D83TR	654.	13.17	374.	138.	47.	56.35
HYDROGRAPH AT	DTR83	221.	13.17	71.	18.	6.	56.35
ROUTED TO	RTR13	219.	13.33	70.	18.	6.	56.35
HYDROGRAPH AT	S1S7S	343.	13.08	123.	31.	10.	55.24
ROUTED TO	R2721S	331.	13.50	122.	31.	10.	55.24
HYDROGRAPH AT	27-21	618.	12.58	171.	49.	16.	1.00
DIVERSION TO	D2721R	31.	12.58	4.	1.	0.	1.00
HYDROGRAPH AT	RET27	587.	12.58	167.	48.	16.	1.00
HYDROGRAPH AT	S831W	182.	13.08	45.	11.	4.	57.03
ROUTED TO	R2721W	171.	13.58	45.	11.	4.	57.03
3 COMBINED AT	C27-21	785.	13.42	296.	82.	27.	65.57
DIVERSION TO	D2721W	235.	13.42	89.	25.	8.	65.57
HYDROGRAPH AT	D2721S	549.	13.42	207.	57.	19.	65.57
2 COMBINED AT	CTR7	761.	13.42	275.	74.	25.	66.67
DIVERSION TO	STR9S	437.	13.42	151.	38.	13.	66.67
HYDROGRAPH AT	STR9W	324.	13.42	124.	36.	12.	66.67
ROUTED TO	RTR14	320.	13.50	124.	36.	12.	66.67
HYDROGRAPH AT	D911S	257.	13.25	196.	74.	26.	55.24
ROUTED TO	R91M	255.	13.42	195.	74.	26.	55.24
HYDROGRAPH AT	D2721W	235.	13.42	89.	25.	8.	65.57
2 COMBINED AT	C91G	489.	13.42	278.	98.	34.	65.57
DIVERSION TO	S91GW	67.	13.42	9.	2.	1.	65.57
HYDROGRAPH AT	S91GS	422.	13.42	269.	96.	33.	65.57

THOMAS E. OF 91ST

ROUTED TO	R91N	420.	13.58	268.	96.	33.	65.57
2 COMBINED AT	CTR91	739.	13.50	391.	132.	45.	66.67
DIVERSION TO	D91TR	561.	13.50	346.	120.	42.	66.67
HYDROGRAPH AT	DTR91	178.	13.50	45.	11.	4.	66.67
ROUTED TO	RTR15	175.	13.75	45.	11.	4.	66.67
HYDROGRAPH AT	S1S8S	302.	13.25	121.	31.	10.	59.10
ROUTED TO	R2821S	299.	13.58	119.	31.	10.	59.10
HYDROGRAPH AT	28-21	620.	12.58	148.	38.	13.	1.00
HYDROGRAPH AT	S91GW	67.	13.42	9.	2.	1.	65.57
ROUTED TO	R2821W	57.	13.83	9.	2.	1.	65.57
3 COMBINED AT	C28-21	620.	13.33	271.	71.	24.	70.44
DIVERSION TO	D2821W	353.	13.33	153.	40.	13.	70.44
HYDROGRAPH AT	D2821S	207.	13.33	90.	24.	8.	70.44
2 COMBINED AT	CTR8	361.	13.67	134.	35.	12.	70.44
DIVERSION TO	STR10S	102.	13.67	34.	9.	3.	70.44
HYDROGRAPH AT	STR10W	259.	13.67	100.	26.	9.	70.44
ROUTED TO	RTR16	256.	13.83	99.	26.	9.	70.44
HYDROGRAPH AT	D991S	183.	13.33	81.	24.	8.	59.10
ROUTED TO	R99H	179.	13.56	81.	26.	8.	59.10
HYDROGRAPH AT	D2821W	353.	13.33	153.	40.	13.	70.44
2 COMBINED AT	C99D	523.	13.42	229.	64.	21.	70.44
DIVERSION TO	S99DW	189.	13.42	81.	21.	7.	70.44
HYDROGRAPH AT	S99DS	334.	13.42	148.	42.	14.	70.44
ROUTED TO	R99I	332.	13.58	167.	42.	14.	70.44
2 COMBINED AT	CTR99	580.	13.67	246.	68.	23.	70.44
DIVERSION TO	D99TR	145.	13.67	62.	17.	6.	70.44
HYDROGRAPH AT	DTR99	435.	13.67	185.	51.	17.	70.44
ROUTED TO	RTR17	434.	13.83	184.	51.	17.	70.44
HYDROGRAPH AT	S1S9S	338.	13.42	138.	39.	13.	60.83
ROUTED TO	R2921S	336.	13.58	137.	39.	13.	60.83
HYDROGRAPH AT	29-21	396.	12.67	119.	30.	10.	0.76
HYDROGRAPH AT	S99DW	189.	13.42	81.	21.	7.	70.44
ROUTED TO	R2921W	188.	13.58	80.	21.	7.	70.44
3 COMBINED AT	C2921N	724.	13.50	304.	84.	28.	72.92
DIVERSION TO	D2921W	239.	13.50	100.	28.	9.	72.92
HYDROGRAPH AT	D2921S	485.	13.50	204.	56.	19.	72.92
2 COMBINED AT	CTR9	888.	13.58	384.	107.	36.	74.02
ROUTED TO	RES29S	607.	14.42	255.	71.	24.	74.02
HYDROGRAPH AT	D1071S	735.	13.50	309.	94.	32.	60.83

91ST N. OF THOMAS
 91ST @ THOMAS
 91ST S. OF THOMAS

THOMAS W. OF 91ST

ROUTED TO	R3521W	104.	13.17	18.	5.	2.	46.34
3 COMBINED AT	C35-21	637.	12.42	203.	55.	18.	58.41
DIVERSION TO	D3521W	235.	12.42	70.	19.	6.	58.41
HYDROGRAPH AT	D3521S	325.	12.42	96.	26.	9.	58.41
2 COMBINED AT	CMD7	524.	13.08	163.	42.	14.	58.41
DIVERSION TO	SMD8S	133.	13.08	39.	10.	3.	58.41
HYDROGRAPH AT	SMD8W	391.	13.08	124.	33.	11.	58.41
ROUTED TO	RMD13	384.	13.17	124.	33.	11.	58.41
HYDROGRAPH AT	D83TR	654.	13.17	374.	138.	47.	56.35
ROUTED TO	R83R	652.	13.25	373.	138.	47.	56.35
HYDROGRAPH AT	D3521W	235.	12.42	70.	19.	6.	58.41
2 COMBINED AT	C83I	826.	13.17	430.	155.	53.	66.13
DIVERSION TO	S83JW	239.	13.17	71.	18.	6.	66.13
HYDROGRAPH AT	S83JS	587.	13.17	359.	138.	47.	66.13
ROUTED TO	R83S	585.	13.25	359.	138.	47.	66.13
2 COMBINED AT	CMD83	964.	13.25	479.	170.	58.	66.13
DIVERSION TO	D83MD	516.	13.25	332.	133.	46.	66.13
HYDROGRAPH AT	DMD83	448.	13.25	147.	37.	12.	66.13
ROUTED TO	RMD14	445.	13.33	146.	37.	12.	66.13
HYDROGRAPH AT	STR9S	437.	13.42	151.	38.	13.	66.67
ROUTED TO	R3421S	425.	13.75	149.	38.	13.	66.67
HYDROGRAPH AT	34-21	690.	12.58	185.	52.	18.	1.01
HYDROGRAPH AT	S83JW	239.	13.17	71.	18.	6.	66.13
ROUTED TO	R3421W	234.	13.50	71.	18.	6.	66.13
3 COMBINED AT	C34-21	883.	13.58	368.	99.	33.	75.40
DIVERSION TO	D3421W	486.	13.58	203.	55.	18.	75.40
HYDROGRAPH AT	D3421S	398.	13.58	166.	45.	15.	75.40
2 COMBINED AT	CMD8	825.	13.33	309.	81.	27.	75.40
DIVERSION TO	SMD9S	227.	13.33	82.	21.	7.	75.40
HYDROGRAPH AT	SMD9W	598.	13.33	226.	60.	20.	75.40
ROUTED TO	RMD15	597.	13.50	226.	60.	20.	75.40
HYDROGRAPH AT	D91TR	561.	13.50	346.	120.	42.	66.67
ROUTED TO	R910	560.	13.67	345.	120.	42.	66.67
HYDROGRAPH AT	D3421W	486.	13.58	203.	55.	18.	75.40
2 COMBINED AT	C91H	1040.	13.58	536.	174.	60.	75.40
DIVERSION TO	S91HW	204.	13.58	58.	15.	5.	75.40
HYDROGRAPH AT	S91HS	837.	13.58	477.	160.	55.	75.40
ROUTED TO	R91P	834.	13.67	477.	160.	55.	75.40
2 COMBINED AT	CMD91	1417.	13.67	702.	220.	75.	75.40

McDowell E. of 91ST

91ST S. OF THOMAS
AREA E. OF SITE

91ST @ ENCANTO

91ST S. OF ENCANTO

91ST @ McDowell

DIVERSION TO	D91MD	982.	13.67	559.	184.	63.	75.40
HYDROGRAPH AT	DMD91	436.	13.67	143.	36.	12.	75.40
ROUTED TO	RMD16	433.	13.83	143.	36.	12.	75.40
HYDROGRAPH AT	STR10S	102.	13.67	34.	9.	3.	70.44
ROUTED TO	R3321S	100.	13.92	34.	9.	3.	70.44
HYDROGRAPH AT	33-21	588.	12.67	159.	41.	14.	0.99
HYDROGRAPH AT	S91HW	204.	13.58	58.	15.	5.	75.40
ROUTED TO	R3321W	200.	13.92	58.	15.	5.	75.40
3 COMBINED AT	C33-21	588.	13.33	239.	61.	20.	81.26
DIVERSION TO	D3321W	335.	13.33	138.	35.	12.	81.26
HYDROGRAPH AT	D3321S	205.	13.33	84.	21.	7.	81.26
ROUTED TO	RES33	0.	17.92	0.	0.	0.	81.26
2 COMBINED AT	CMD9	433.	13.83	143.	36.	12.	81.26
DIVERSION TO	SMD10S	195.	13.83	63.	16.	5.	81.26
HYDROGRAPH AT	SMD10W	235.	13.83	80.	20.	7.	81.26
ROUTED TO	RMD16A	233.	14.00	80.	20.	7.	81.26
HYDROGRAPH AT	D99TR	145.	13.67	62.	17.	6.	70.44
ROUTED TO	R99J	143.	14.00	61.	17.	6.	70.44
HYDROGRAPH AT	D3321W	335.	13.33	138.	35.	12.	81.26
2 COMBINED AT	C99E	435.	13.75	194.	52.	17.	81.26
DIVERSION TO	S99EW	157.	13.75	67.	17.	6.	81.26
HYDROGRAPH AT	S99ES	278.	13.75	127.	35.	12.	81.26
ROUTED TO	R99K	277.	13.92	126.	35.	12.	81.26
2 COMBINED AT	CMD99	509.	13.92	206.	55.	18.	81.26
DIVERSION TO	D99MD	366.	13.92	148.	40.	13.	81.26
HYDROGRAPH AT	DMD99	142.	13.92	58.	15.	5.	81.26
ROUTED TO	RMD17	142.	14.17	57.	15.	5.	81.26
HYDROGRAPH AT	32-21E	239.	12.33	42.	11.	4.	0.24
HYDROGRAPH AT	S99EW	157.	13.75	67.	17.	6.	81.26
2-COMBINED-AT	C3221E	285.	12.50	101.	26.	9.	81.50
ROUTED TO	RES32E	197.	13.00	71.	18.	6.	81.50
HYDROGRAPH AT	32-21W	694.	12.42	118.	31.	10.	0.77
2 COMBINED AT	C3221W	588.	12.42	168.	43.	14.	82.27
DIVERSION TO	D3221W	552.	12.42	158.	41.	14.	82.27
HYDROGRAPH AT	D3221S	35.	12.42	10.	3.	1.	82.27
2 COMBINED AT	CMD10	152.	14.08	66.	18.	6.	82.27
DIVERSION TO	SMD11S	39.	14.08	14.	4.	1.	82.27
HYDROGRAPH AT	SMD11W	113.	14.08	52.	14.	5.	82.27

91ST S. OF McDowell

McDowell W. OF 91ST

OVERFLOW INTO SITE
FROM 91ST NEAR
ENCANTO

ONSITE POND
ROUTING

Table 4-2: Summary of Computed Water Surface Elevations

Ponding Area Exhibit	Ponding Area Name	Computed Peak Discharge from the Ponding Area (cfs)		Computed Water Surface Elevation	
		Q100-Yr 6-Hr (cfs)	Q100-Yr 24-Hr (cfs)	Q100-Yr 6-Hr Event	Q100-Yr 6-Hr Event
A	RES8N	401	488	1053.1	1053.1
A	RES8S	1042	1152	1055.5	1055.5
B	PA55	121	124	1102.4	1102.8
B	PA59	615	626	1101.1	1101.1
B	PA63	986	1084	1097.0	1097.0
C	PA43	1032	982	1108.4	1108.3
C	PA47	373	368	1104.9	1104.9
C	PA51	947	910	1105.7	1105.7
D	RES14E	83	86	1087.6	1087.6
E	RES36	2409	2305	1138.2	1138.2
* F	RES33	0	0	1123.0	1123.0
G	RES6	2141	1681	1146.0	1145.8
H	RES26T	3104	2893	1113.2	1113.2
I	RES29S	565	620	1021.7	1021.7
J	RES29W	627	674	1018.4	1018.4
K	RES10	994	1070	1068.7	1068.8
L	RES32E	188	197	1021.1	1021.1
M	RES22	473	379	1136.2	1136.2
N	RES9	897	970	1058.5	1058.6
O	RES26S	1100	989	1138.6	1138.6
P	RES8	458	369	1150.6	1150.5
Q	RES26E	3033	2547	1099.4	1099.3
R	RES24N	382	364	1097.5	1097.5
S	RES26N	398	145	1141.8	1141.7

* AREA OF ONSITE PONDING FOR SHEELY FARMS SITE DUE TO ELEVATED RID CANAL TOP OF BANK.

APPENDIX H

Post-Development HEC-1 Model



Post-Project Conditions Hydrologic Model

In order to safely mitigate offsite flows impacting the Sheely Farms East site, drainage channels are proposed. These channels will convey the offsite flows around and through the site, eliminating the existing stormwater ponding (existing FEMA Zone A) along the north side of the Roosevelt Canal.

Design flows for the proposed channels were obtained using a modified edition of the Maryvale ADMS HEC-1 model by Wood, Patel and Associates, dated November 7, 1997. This model was further modified to reflect post-project conditions.

The following pages show excerpts from the modified Maryvale ADMS HEC-1 model input and output files. Also included is a table that clearly describes the HEC-1 stationing in relation to the Sheely Farms East improvements and the 100-year, 24-hour flow values used in the channel modeling analysis..

HEC-1 Station	Location Description	Q ₁₀₀ (cfs)
DTR91	Flow along Thomas Road west of 91 st Avenue	178
R910	Flow along 91 st Avenue south of Thomas Road and north of Encanto Boulevard	559
C91H	Total Flow along 91 st Avenue near Encanto Boulevard Intersection	1042
S91HW	Total flow being conveyed within Channel 3 along west side of 91 st Avenue	562
S91HS	Flow along 91 st Avenue south of Encanto Boulevard and North of McDowell Road	480
RMD15	Flow along McDowell Road east of 91 st Avenue	597
CMD91	Total flow at 91 st Avenue and McDowell Road intersection	1077
D91MD	Flow along 91 st Avenue south of McDowell Road	982
DMD91	Flow along McDowell Road west of 91 st Avenue	95
3321ES	Sheely Farms east site – southern portion (Parcels 1-6, 8, 9)	320
C33-21	Total combined flow from southern portion of site and routed off-site flows within Channel 3 (i.e. the total flow to be conveyed by lower reach of Channel 2 and Channel 1)	622
RTRAF	Flow within ADOT channel downstream of Thomas Road crossing	1918
3321N	Sheely Farms east site – northern portion (Parcels 7, 10-13)	206
CAFD	Total combined flow within ADOT channel after adding runoff generated by north portion of Sheely Farms east site	1944
CMDAF1	Total combined flow within ADOT channel after adding runoff from Channel 1	2549

ID MARYVALE ADMS - FCD#93-29: CH2M HILL & Wood/Patel & Associates
 ID Model for Entire Study Area (Approximately 100 square miles)
 ID Existing Conditions
 ID 100Yr-24Hr Event
 ID Clark Unit Hydrograph
 ID 24-Hour SCS TYPE II Rainfall Pattern was used to determine TC & R
 ID Green-Ampt Precipitation Losses
 ID Model Prepared and Checked by David Dust and Jim Geisbush
 ID MV100-24 (BASE79): SWW\132586\HEC-1
 ID January 1997
 ID

ID =====
 ID === WOOD/PATEL 7-NOV-97 David T. Phelps File: 100AF1.ih1
 ID === EXISTING CONDITION MODEL Base File: ADOT016d.ih1
 ID === FCDMC PRECIPITATION ---- 100-yr 24-hr Precip
 ID === Proposed Agua Fria Freeway Alingment modeled, Sub-Basin parameters rev.
 ID === Proposed Agua Fria Channel modeled - 2nd cut Routing Geometry
 ID === (RX & RY revised per prelim channel design as of 15 Oct 97)
 ID === Proposed Agua Fria Freeway (AFF) Outfall Channel Modeled (RES9 Removed)
 ID === Proposed BASIN AFF modeled @ confluence I-10 and AFF Channel
 ID === 1st trial (Bypass = 1700 cfs in AFF & 7300 cfs in I-10)
 ID ADMS multiple use of Diversion ID D2631N fixed
 ID

ID =====
 ID
 ID === COE & VAN LOO 16-NOV-2000 Rick Lozano
 ID === File: Sheely.dat Base File: 100AF1.ih1
 ID === Proposed development of Sheely Farms East with free discharge to Agua
 ID === Fria Channel and diversion of offsite flows around site
 ID === (revised basin 33-21E to reflect developed conditions and diversion
 ID === cards along Thomas, 91st to model diversion of flows)
 ID

KKSTR10W
 KM STREET CAPACITY DIVERSION
 KM THOMAS
 KM DIVERSION TO SOUTH
 KM ===== REVISED BY CVL ----> All flow is to be conveyed west
 KM ===== 16-NOV-2000, r1 into ADOT channel
 KO 0 2 25
 DTSTR10S
 DI 0 26. 41. 618. 1058.
 DQ 0 0.0 0.0 0.0 0.0

KK S91HS
 KM 91ST
 KM DIVERSION TO WEST
 KM ===== REVISED BY CVL ----> Divert flow in excess of
 KM ===== 16-NOV-2000, r1 480 cfs (100 cfs in street,
 KM ===== 380 cfs in storm drain) west
 KM ===== into proposed channel along
 KM ===== 91st Ave
 KM STORM DRAIN ALONG 91ST AVE
 KM CAP= 380.0 CFS SOUTH

DT S91HW
 DI 0 480. 1067. 1556.
 DQ 0 0.1 587. 1076.
 KK R91P
 KM STREET ROUTE
 KM SOUTH
 KM 91ST Avenue
 RS 4 FLOW -1.
 RC 0.02 0.016 0.02 2700. 0.0020
 RX 44.9 45. 66. 66.1 134. 134.1 155. 155.1
 RY 4.3 0.3 0.3 0.0 0.0 0.3 0.3 4.3

KK CMD91
 KM INTERSECTION COMBINE
 KM MCDOWELL & 91ST
 HC 2 75.397
 KK DMD91

KM STREET INTERSECTION DIVERSION
 KM MCDOWELL & 91ST
 KM ===== REVISED BY CVL ----> Divert 982 cfs South (including
 KM ===== 16-NOV-2000, r1 storm drain flows) per existing
 KM ===== conditions model

KM DIVERSION SOUTH
 KM STORM DRAIN ALONG 91ST AVE
 KM CAP= 380.0 CFS SOUTH
 DT D91MD

DI 0 380. 982. 10380.
 DQ 0 380. 982. 982.

*

KK RMD16
 KM STREET ROUTE
 KM WEST
 KM MCDOWELL

RS 6 FLOW -1.
 RC 0.02 0.016 0.02 2660. 0.0006
 RX 44.9 45. 66. 66.1 134. 134.1 155. 155.1
 RY 4.3 0.3 0.3 0.0 0.0 0.3 0.3 4.3

*

KKSM D10W
 KM STREET CAPACITY DIVERSION
 KM MCDOWELL
 KM DIVERSION TO SOUTH

DTSMD10S
 DI 0 15. 28. 467. 800.
 DQ 0 0.1 9. 212. 365.

*

KKRMD16A
 KM STREET ROUTE
 KM WEST
 KM MCDOWELL

KM ===== REVISED BY WOOD/PATEL ----> PROPOSED AFF Alignment
 KM ===== 15-OCT-97, dtp Revised L and Slope

RS 6 FLOW -1.
 RC 0.02 0.016 0.02 1420. 0.0067
 RX 44.9 45. 66. 66.1 134. 134.1 155. 155.1
 RY 4.3 0.3 0.3 0.0 0.0 0.3 0.3 4.3

*

KK3321ES

KM SUB-BASIN 3321ES

KM ===== REVISED BY CVL ----> The southern half of the
 KM ===== 16-NOV-2000, rl site draining to the main
 KM ===== channel along southern part
 KM ===== of site

KO	0	2	200							
BA	.383									
LG	.190	.160	9.700	.060	51.000					
UC	1.033	.599								
UA	0	5	16	30	65	77	84	90	94	97
UA	100									

*
 KK S91HW
 KM RETRIEVAL OF channel DIVERSION
 KM 91ST
 DR S91HW
 *

KKR3321W

KM ===== REVISED BY CVL ----> ROUTE diverted offsite flows
 KM ===== 16-NOV-2000, rl from the east through main
 KM ===== channel along 91st Avenue
 KM ===== and southern part of site to
 KM ===== AFF channel

KM ===== Channel section is arbitrary
 KM ===== TRAP Section: B = 20' , H = 10'

KO	0	2	200						
RS	9	FLOW	-1.						
RC	0.030	0.030	0.030	5800.	0.0020				
RX	100	120	122	125	130	135	140	160	
RY	10	0	0	0	0	0	0	10	

*
 KKC33-21

KM SUB-BASIN COMBINE
 KM ===== REVISED BY CVL ----> Combined offsite and onsite
 KM ===== 16-NOV-2000, rl at southwest corner of site
 KM =====
 KM ===== REVISED by WOOD/PATEL ----> ADMS HC combine Area Reduced
 KM ===== 16-OCT-97, dtp Model proposed AFF alignment
 KO 0 2 200
 HC 2 79.871

*
 KK RTRAF
 KM Retrieval of Interseciton Diversion (Thomas Road & AFF)
 DRDTRAFFS
 *

KK RAF9

KM ===== REVISED BY CVL ----> ROUTE AFF channel flows to
 KM ===== 16-NOV-2000, rl northern most confluence
 KM ===== point

KM CHANNEL ROUTE

KM SOUTH ==> from Thomas Rd S. approximately 1/2 mi.

KM Proposed AFF Alignment

KM ===== REVISED BY WOOD/PATEL ----> PROPOSED 2nd CUT GEOMETRY
 KM ===== 15-OCT-97, dtp TRAP Section: B = 20' , H = 10'

KO	0	2	200						
RS	9	FLOW	-1.						
RC	0.015	0.015	0.015	2960.	0.0017				

RX	100	120	122	125	130	135	140	160
RY	10	0	0	0	0	0	0	10

*

KK3321EN

KM SUB-BASIN 3321EN

KM ===== REVISED BY CVL ----> The northern part of the site
 KM ===== 16-NOV-2000, rl draining to interior channels
 KM ===== and into the AFF Channel

KO	0	2	25					
BA	.227							
LG	.190	.150	9.700	.060	59.000			
UC	.796	.593						
UA	0	5	16	30	65	77	84	90
UA	100							94
								97

*

KK CAFD

KM Hydrograph Combine along proposed AFF alignment

KM ===== REVISED by WOOD/PATEL ----> ADMS HC combine Area Reduced
 KM ===== 16-OCT-97, dtp Model proposed AFF alignment

HC 2 79.871

*

KK RAF10

KM ===== REVISED BY CVL ----> ROUTE AFF channel flows to
 KM ===== 16-NOV-2000, rl southern most confluence
 KM ===== point

KM CHANNEL ROUTE

KM SOUTH ==> from 1/2 mi. S. of Thomas to McDowell Rd

KM ===== REVISED BY WOOD/PATEL ----> PROPOSED 2nd CUT GEOMETRY

KM ===== 15-OCT-97, dtp TRAP Section: B = 20' , H = 10'

KO	0	2	200					
RS	4	FLOW	-1.					
RC	0.015	0.015	0.015	3100.	0.0017			
RX	100	120	122	125	130	135	140	160
RY	10	0	0	0	0	0	0	10

*

KKCMDAF1

KM ===== REVISED BY CVL ----> Combine AFF channel flows and
 KM ===== 16-NOV-2000, rl flows within main channel at
 KM ===== southwest corner of site
 KM =====

KM Hydrograph Combine at Intersection of McDowell Road and

KM Proposed AFF

KM ===== REVISED by WOOD/PATEL ----> ADMS HC combine Area Reduced
 KM ===== 16-OCT-97, dtp Model proposed AFF alignment

KO 0 2 300
 HC 2 79.871

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* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* MAY 1991
* VERSION 4.0.1E
* Lahey F77L-EM/32 version 5.01
* Dodson & Associates, Inc.
* RUN DATE 12/01/00 TIME 17:45:04
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*
* U.S. ARMY CORPS OF ENGINEERS
* HYDROLOGIC ENGINEERING CENTER
* 609 SECOND STREET
* DAVIS, CALIFORNIA 95616
* (916) 551-1748
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE. THE DEFINITION OF -AMSK- 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

RUNOFF SUMMARY

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	FLOW IN CUBIC FEET PER SECOND			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				TIME IN HOURS, AREA IN SQUARE MILES					
				6-HOUR	24-HOUR	72-HOUR			
ROUTED TO									
+	RTR14	320.	13.53	124.	36.	26.	66.67		
HYDROGRAPH AT									
+	D91IS	256.	13.23	196.	74.	55.	55.24		

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			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
+ ROUTED TO	R91M	255.	13.40	195.	74.	55.	55.24		
+ HYDROGRAPH AT	D2721W	235.	13.40	89.	25.	18.	65.57		
+ 2 COMBINED AT	C91G	488.	13.40	278.	98.	72.	65.57		
+ DIVERSION TO	S91GW	66.	13.40	9.	2.	2.	65.57		
+ HYDROGRAPH AT	S91GS	421.	13.40	269.	96.	70.	65.57		
+ ROUTED TO	R91N	420.	13.53	268.	96.	70.	65.57		
+ 2 COMBINED AT	CTR91	739.	13.53	391.	132.	97.	66.67		
+ DIVERSION TO	D91TR	561.	13.53	346.	120.	89.	66.67		
+ HYDROGRAPH AT	DTR91	178.	13.53	45.	11.	8.	66.67		
+ ROUTED TO	RTR15	174.	13.73	45.	11.	8.	66.67		
+ ROUTED TO	RMD15	597.	13.47	223.	60.	43.	75.40		
+ HYDROGRAPH AT	D91TR	561.	13.53	346.	120.	89.	66.67		
+ ROUTED TO	R91O	559.	13.63	345.	120.	88.	66.67		

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			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
+ HYDROGRAPH AT	D3421W	488.	13.57	202.	55.	39.	75.40		
+ 2 COMBINED AT	C91H	1042.	13.60	535.	174.	127.	75.40		
+ DIVERSION TO	S91HW	562.	13.60	140.	35.	25.	75.40		
+ HYDROGRAPH AT	S91HS	480.	13.53	395.	139.	102.	75.40		
+ ROUTED TO	R91P	480.	13.70	395.	139.	102.	75.40		
+ 2 COMBINED AT	CMD91	1077.	13.47	618.	199.	145.	75.40		
+ DIVERSION TO	D91MD	982.	13.17	609.	197.	144.	75.40		
+ HYDROGRAPH AT	DMD91	95.	13.47	9.	2.	2.	75.40		
+ ROUTED TO	RMD16	80.	13.87	9.	2.	2.	75.40		
+ DIVERSION TO	SMD10S	33.	13.87	3.	1.	1.	75.40		
+ HYDROGRAPH AT	SMD10W	47.	13.87	6.	1.	1.	75.40		
+ ROUTED TO	RMD16A	46.	14.00	6.	1.	1.	75.40		
+ HYDROGRAPH AT	3321ES	320.	12.43	85.	27.	19.	0.38		
+ HYDROGRAPH AT	S91HW	562.	13.60	140.	35.	25.	75.40		

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			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
				6-HOUR	24-HOUR	72-HOUR			
+ ROUTED TO	R3321W	554.	13.83	140.	35.	25.	75.40		
+ 2 COMBINED AT	C33-21	622.	13.80	211.	58.	42.	79.87		
+ HYDROGRAPH AT	RTRAF	1918.	13.57	848.	242.	175.	69.31		
+ ROUTED TO	RAF9	1917.	13.60	848.	242.	175.	69.31		
+ HYDROGRAPH AT	3321EN	206.	12.33	53.	17.	12.	0.23		
+ 2 COMBINED AT	CAFD	1944.	13.60	866.	252.	183.	79.87		
+ ROUTED TO	RAF10	1941.	13.67	865.	252.	183.	79.87		
+ 2 COMBINED AT	CMDAF1	2549.	13.70	1063.	309.	224.	79.87		
+ 2 COMBINED AT	CMDAF2	2559.	13.70	1068.	311.	225.	79.87		

APPENDIX I

Post-Development HEC-RAS Models



Post-Project Conditions Hydraulic Model

The proposed channel systems are modeled using the HEC-RAS computer program. A water surface profile for each channel system was determined using design flows from the as-built conditions hydrologic model (Appendix H). Included in this appendix is the HEC-RAS models for the Agua Fria Freeway (AFF) Interceptor Channel, the 91st Avenue Reach, the Thomas Road Reach, the Encanto Reach, and the 93rd Avenue Reach (see Plate 1 – HEC-RAS Cross-Section Map).

Design and construction of the AFF Channel along the western boundary of the site allows for free discharge of developed onsite flows from Sheely Farms East site in accordance with the *Master Drainage Report for Sheely Farms East* (Coe & Van Loo Consultants, Inc., May 2001). Premier Engineering, Inc. designed the AFF Channel in 1999 and provided a copy of their HEC-RAS analysis for the channel. This model (slightly modified to reflect updated flow values) was used as a basis to determine boundary conditions for the Sheely Farms East channel systems and is included within this appendix.

The Sheely Farms East channel systems are modeled as straight channels with varying bottom widths, 4:1 side slopes adjacent to roadways, 3:1 side slopes for all other areas, and with a Manning's Coefficient of 0.030. Some of the systems do have significant bends along the centerline; however, these bends do not adversely impact the water surface profiles significantly due to the extremely low velocities. The boundary conditions were established at the downstream end of the channels using the modified AFF Channel HEC-RAS model output and the culvert headwater calculations for outfall structures (see Appendix J). The flow regimes within the channel systems are sub-critical with average velocities below 5 fps, and the 100-year, 24-hour storm flows are fully contained within the channel sections with flow depths ranging from 3-5 feet.

ADOT CHANNEL

HEC-RAS Plan: AFF River: AFF-IC Reach: Reach-1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	22502	500.00	1045.09	1048.67	1047.74	1049.15	0.000999	5.52	90.60	33.53	0.59
Reach-1	22400	500.00	1044.99	1048.57		1049.04	0.001001	5.52	90.53	33.52	0.59
Reach-1	22000	500.00	1044.59	1048.17		1048.64	0.001001	5.52	90.51	33.52	0.59
Reach-1	21600	500.00	1044.19	1047.77		1048.24	0.001002	5.53	90.48	33.51	0.59
Reach-1	21200	500.00	1043.79	1047.37		1047.84	0.001004	5.53	90.43	33.51	0.59
Reach-1	21122	500.00	1043.71	1047.29		1047.76	0.001002	5.53	90.49	33.52	0.59
Reach-1	20800	500.00	1043.39	1046.97		1047.44	0.001006	5.53	90.37	33.50	0.59
Reach-1	20400	500.00	1042.99	1046.56		1047.04	0.001010	5.54	90.23	33.48	0.59
Reach-1	20000	500.00	1042.59	1046.15		1046.63	0.001018	5.56	89.98	33.45	0.60
Reach-1	19982	500.00	1042.59	1046.13		1046.62	0.001038	5.59	89.48	33.50	0.60
Reach-1	19862	500.00	1042.47	1046.00		1046.49	0.001051	5.62	89.00	33.34	0.61
Reach-1	19600	500.00	1042.20	1045.73		1046.22	0.001059	5.63	88.75	33.31	0.61
Reach-1	19200	500.00	1041.80	1045.26		1045.78	0.001142	5.78	86.46	33.03	0.63
Reach-1	18802	500.00	1041.40	1044.63		1045.25	0.001485	6.33	78.96	32.11	0.71
Reach-1	18702	500.00	1041.30	1044.35		1045.07	0.001841	6.82	73.32	31.40	0.79
Reach-1	18662	500.00	1041.26	1043.91	1043.91	1044.95	0.003133	8.18	61.13	29.81	1.01
Reach-1	18587	500.00	1041.18	1043.88	1043.02	1044.31	0.001046	5.29	94.47	35.00	0.57
Reach-1	18500	Culvert									
Reach-1	18413	500.00	1040.74	1042.58	1042.58	1043.52	0.003525	7.75	64.50	35.00	1.01
Reach-1	18395	500.00	1034.67	1039.63	1036.51	1039.76	0.000159	2.88	173.57	35.00	0.23
Reach-1	18320	500.00	1034.60	1039.47		1039.72	0.000351	3.96	126.34	34.03	0.36
Reach-1	18230	500.00	1034.51	1039.45		1039.68	0.000334	3.89	128.55	34.21	0.35
Reach-1	18130	500.00	1034.41	1039.42		1039.65	0.000316	3.81	131.08	34.44	0.34
Reach-1	18000	600.00	1034.28	1039.26		1039.59	0.000468	4.62	129.83	34.33	0.42
Reach-1	17600	600.00	1033.88	1039.12		1039.41	0.000387	4.32	138.82	35.11	0.38
Reach-1	17200	700.00	1033.48	1038.86		1039.23	0.000477	4.87	143.83	35.53	0.43
Reach-1	16800	700.00	1033.08	1038.73		1039.04	0.000379	4.44	157.60	37.85	0.38
Reach-1	16400	800.00	1032.68	1038.46		1038.86	0.000473	5.05	158.47	36.75	0.43
Reach-1	16000	800.00	1032.28	1038.32		1038.67	0.000402	4.76	167.98	37.52	0.40
Reach-1	15600	900.00	1031.88	1038.08		1038.49	0.000461	5.17	173.92	37.99	0.43
Reach-1	15200	1012.00	1031.48	1037.78		1038.28	0.000548	5.69	177.82	38.30	0.47
Reach-1	14800	1012.00	1031.08	1037.61		1038.06	0.000479	5.42	186.62	38.98	0.44
Reach-1	14400	1125.00	1030.68	1037.31		1037.85	0.000559	5.91	190.50	39.28	0.47
Reach-1	14000	1125.00	1030.28	1037.13		1037.62	0.000492	5.64	199.34	39.95	0.45
Reach-1	13600	1237.00	1029.88	1036.83		1037.40	0.000563	6.08	203.41	40.25	0.48
Reach-1	13270	1350.00	1029.55	1036.51		1037.19	0.000667	6.63	203.75	40.28	0.52

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	13170	1350.00	1029.45	1036.45		1037.12	0.000652	6.57	205.41	40.40	0.51
Reach-1	13085	1350.00	1029.37	1036.40		1037.06	0.000641	6.53	206.61	40.48	0.51
Reach-1	13064	1350.00	1029.34	1036.39		1037.05	0.000635	6.51	207.41	40.55	0.51
Reach-1	12989	1350.00	1029.27	1036.48	1032.84	1036.93	0.000377	5.35	252.39	35.00	0.35
Reach-1	12900	Culvert									
Reach-1	12803	1350.00	1029.08	1036.10		1036.57	0.000332	5.49	245.82	47.00	0.37
Reach-1	12728	1350.00	1029.00	1035.73		1036.48	0.000756	6.93	194.75	39.59	0.55
Reach-1	12648	1350.00	1028.92	1035.68		1036.42	0.000747	6.90	195.66	39.66	0.55
Reach-1	12548	1350.00	1028.82	1035.61		1036.34	0.000732	6.85	197.04	39.78	0.54
Reach-1	12400	1350.00	1028.67	1035.51		1036.23	0.000711	6.78	199.13	39.92	0.53
Reach-1	12000	1350.00	1028.27	1035.27		1035.94	0.000651	6.57	205.49	40.40	0.51
Reach-1	11600	1475.00	1027.87	1034.82		1035.64	0.000798	7.24	203.59	40.27	0.57
Reach-1	11200	1475.00	1027.47	1034.54		1035.32	0.000749	7.08	208.30	40.62	0.55
Reach-1	10800	1475.00	1027.07	1034.28		1035.02	0.000694	6.89	214.03	41.04	0.53
Reach-1	10400	1600.00	1026.67	1033.80		1034.69	0.000855	7.60	210.56	40.77	0.59
Reach-1	10000	1600.00	1026.27	1033.48		1034.35	0.000816	7.47	214.17	41.05	0.58
Reach-1	9600	1600.00	1025.87	1033.19		1034.02	0.000771	7.32	218.52	41.36	0.56
Reach-1	9200	1600.00	1025.47	1032.92		1033.71	0.000720	7.14	223.98	41.76	0.54
Reach-1	8800	1725.00	1025.07	1032.42		1033.38	0.000881	7.85	219.87	41.47	0.60
Reach-1	8400	1850.00	1024.67	1031.67		1032.93	0.001222	9.00	205.52	40.40	0.70
Reach-1	8020	1850.00	1024.30	1030.96		1032.40	0.001485	9.65	191.69	39.37	0.77
Reach-1	7914	1850.00	1024.19	1030.65		1032.22	0.001661	10.05	184.15	38.79	0.81
Reach-1	7839	1850.00	1024.11	1029.86	1029.86	1032.01	0.002591	11.77	157.17	36.64	1.00
Reach-1	7724	1850.00	1024.00	1026.55	1027.85	1030.98	0.011066	16.90	109.45	43.00	1.87
Reach-1	7711	1850.00	1019.60	1029.27	1023.45	1029.57	0.000183	4.45	415.63	43.00	0.25
Reach-1	7701	1850.00	1019.57	1029.26	1023.42	1029.57	0.000182	4.44	416.85	43.01	0.25
Reach-1	7610	Culvert									
Reach-1	7507	1850.00	1019.07	1028.09		1028.44	0.000224	4.77	387.79	43.01	0.28
Reach-1	7367	1920.00	1018.90	1026.89		1028.19	0.001181	9.15	209.94	38.53	0.69
Reach-1	7247	1920.00	1018.76	1026.75		1028.05	0.001183	9.15	209.83	38.52	0.69
Reach-1	7137	1920.00	1018.63	1026.62		1027.92	0.001182	9.15	209.86	38.53	0.69
Reach-1	6800	1920.00	1018.22	1026.23		1027.52	0.001174	9.13	210.41	38.56	0.69
Reach-1	6400	1920.00	1017.74	1025.76		1027.05	0.001164	9.10	211.05	38.60	0.69
Reach-1	6000	1920.00	1017.26	1025.30		1026.58	0.001152	9.06	211.81	38.65	0.68
Reach-1	5600	1940.00	1016.78	1024.78		1026.10	0.001202	9.23	210.13	38.52	0.70
Reach-1	5200	1940.00	1016.30	1024.30		1025.62	0.001202	9.23	210.18	38.54	0.70

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	4800	1940.00	1015.83	1023.82		1025.14	0.001203	9.23	210.19	38.60	0.70
Reach-1	4400	1940.00	1015.35	1023.33		1024.66	0.001212	9.26	209.54	38.49	0.70
Reach-1	4000	1940.00	1014.87	1022.85		1024.18	0.001214	9.26	209.40	38.49	0.70
Reach-1	3600	1940.00	1014.39	1022.36		1023.70	0.001221	9.28	208.99	38.45	0.70
Reach-1	3200	1940.00	1013.91	1021.86		1023.21	0.001230	9.31	208.39	38.40	0.70
Reach-1	2800	1940.00	1013.43	1021.36		1022.72	0.001246	9.35	207.47	38.34	0.71
Reach-1	2400	1940.00	1012.95	1020.82		1022.21	0.001286	9.46	205.02	38.14	0.72
Reach-1	2340	1940.00	1012.88	1020.72		1022.13	0.001309	9.53	203.57	37.93	0.72
Reach-1	2240	1940.00	1012.76	1020.59		1022.00	0.001312	9.54	203.44	37.97	0.73
Reach-1	2197	1940.00	1012.71	1020.54		1021.95	0.001311	9.53	203.58	38.03	0.73
Reach-1	2155	1940.00	1012.66	1020.48		1021.89	0.001315	9.54	203.38	38.01	0.73
Reach-1	2105	1940.00	1012.60	1020.42		1021.83	0.001319	9.55	203.16	38.00	0.73
Reach-1	2020	2550.00	1012.50	1019.72		1021.61	0.001666	11.04	230.91	32.00	0.72
Reach-1	1900	Culvert									
Reach-1	1770	2550.00	1002.34	1016.36		1016.87	0.000256	5.68	448.78	32.00	0.27
Reach-1	1650	2550.00	1001.98	1016.42		1016.78	0.000191	4.84	527.36	65.44	0.30
Reach-1	1560	2550.00	1001.71	1016.42		1016.76	0.000175	4.68	545.29	66.54	0.29
Reach-1	1471	2550.00	1001.43	1016.51		1016.71	0.000087	3.58	712.04	77.58	0.21
Reach-1	1371	2550.00	1001.13	1016.39		1016.69	0.000147	4.38	582.23	68.71	0.27
Reach-1	995	2550.00	1000.00	1016.39	1008.33	1016.62	0.000104	3.85	662.53	73.24	0.23

CHANNELS 1 THROUGH 3

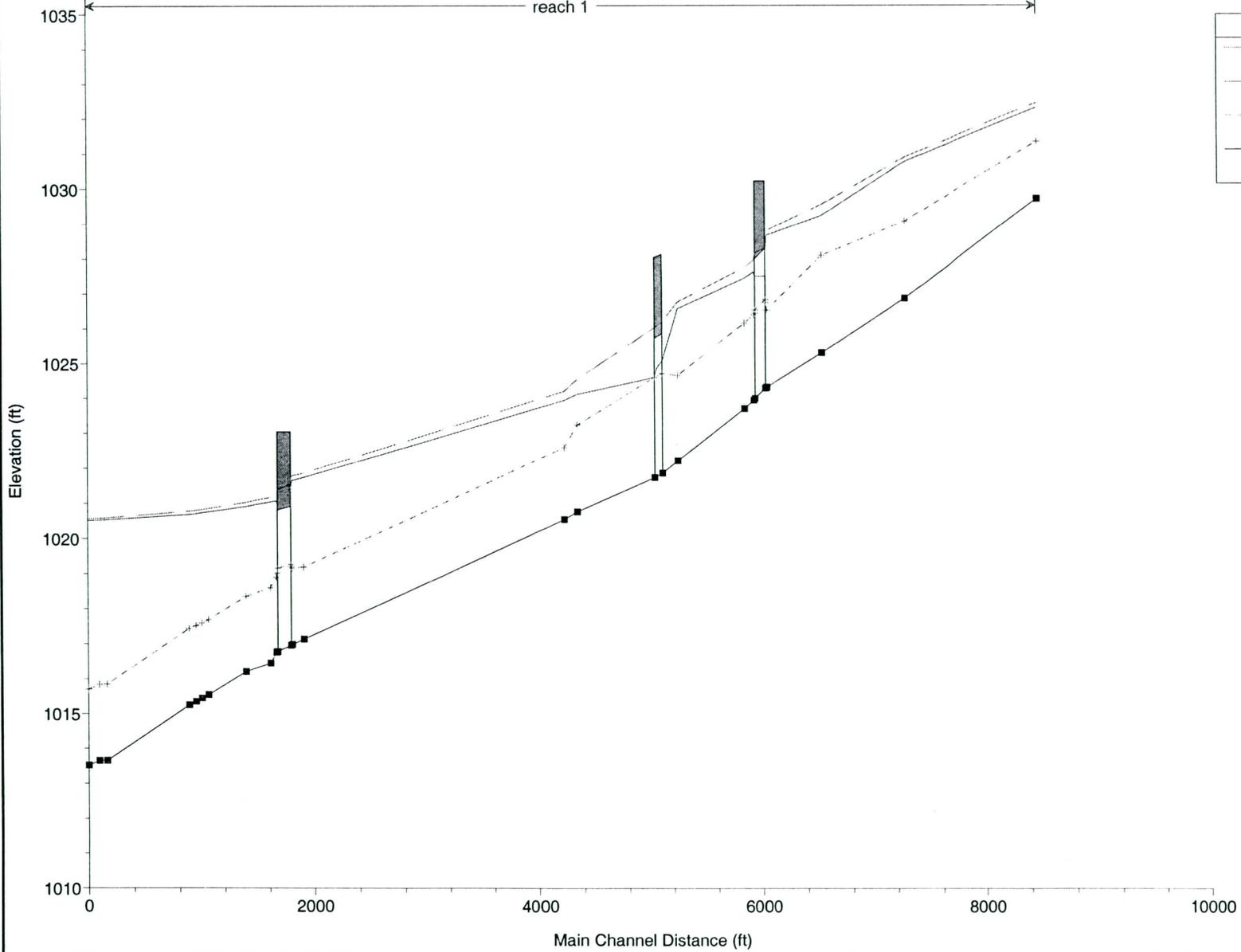
91ST AVE

HEC-RAS Plan: Alt B River: 91st Ave Reach: reach 1

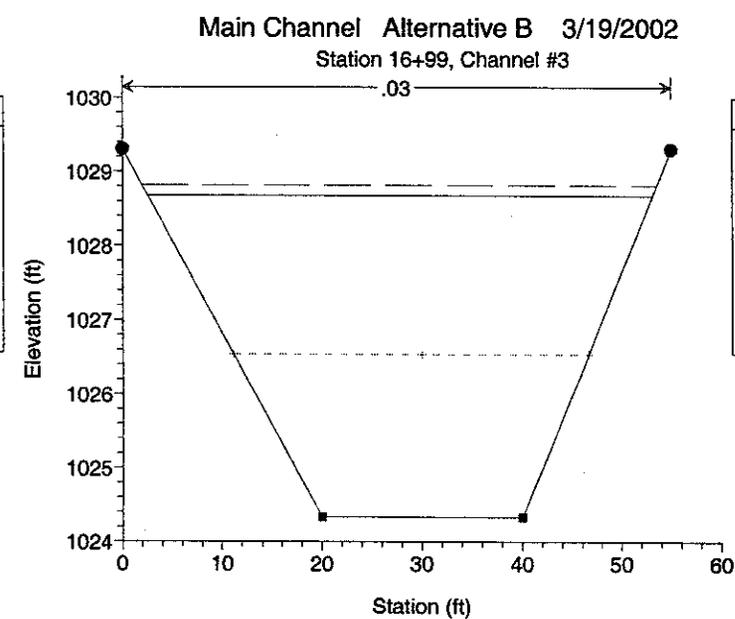
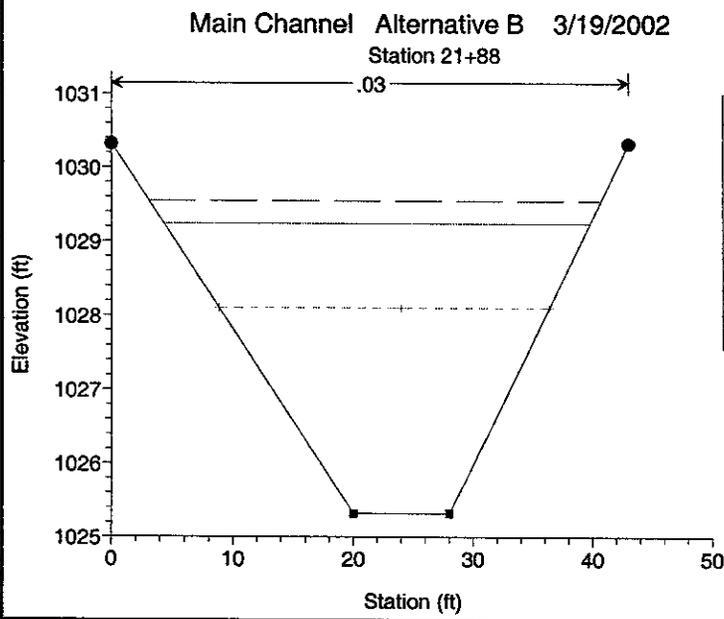
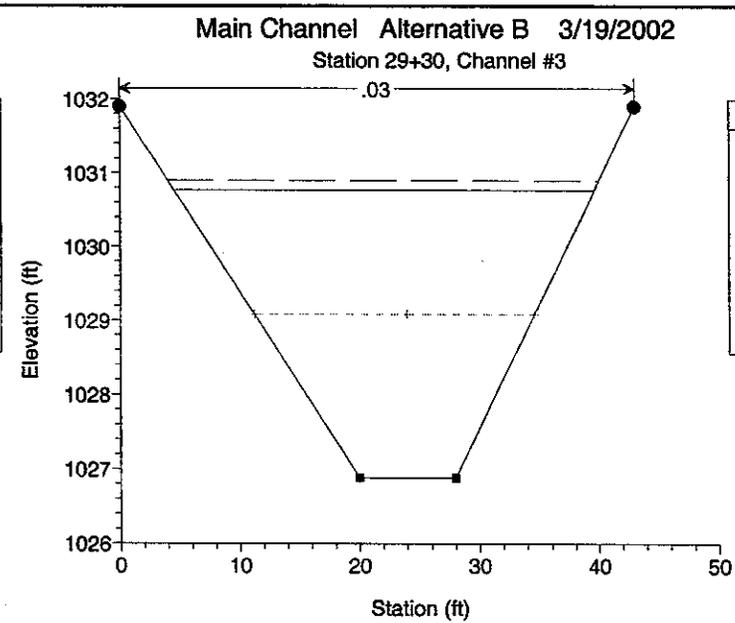
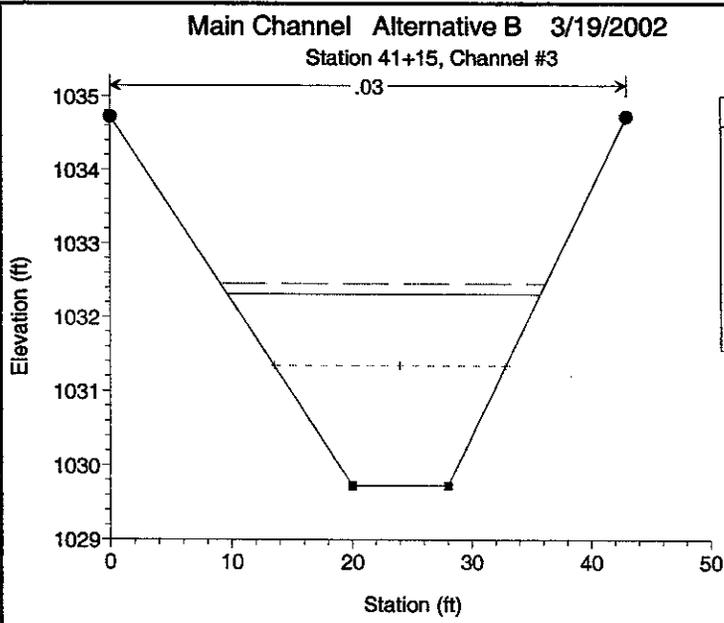
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
reach 1	8462	134.00	1029.73	1032.31	1031.34	1032.46	0.001945	3.04	44.08	26.12	0.41
reach 1	7277	240.00	1026.88	1030.77	1029.08	1030.90	0.001091	2.86	83.85	35.12	0.33
reach 1	6535	380.00	1025.32	1029.24	1028.11	1029.55	0.002630	4.46	85.14	35.44	0.51
reach 1	6046	460.00	1024.33	1028.68	1026.54	1028.82	0.000861	3.00	153.51	50.62	0.30
reach 1	6035	460.00	1024.30	1028.22	1026.75	1028.71	0.000590	5.59	82.33	21.00	0.50
reach 1	5987.5	Culvert									
reach 1	5940	460.00	1024.00	1027.50	1026.45	1028.11	0.000826	6.25	73.55	21.00	0.59
reach 1	5929	550.00	1023.95	1027.63	1026.41	1027.95	0.002391	4.57	120.48	45.50	0.49
reach 1	5847	550.00	1023.71	1027.45	1026.17	1027.75	0.002232	4.44	123.76	46.22	0.48
reach 1	5247	550.00	1022.22	1026.58	1024.66	1026.77	0.001177	3.50	157.32	52.14	0.35
reach 1	5106	Culvert									
reach 1	4347	562.00	1020.76	1024.12	1023.24	1024.55	0.003513	5.25	106.97	43.74	0.59
reach 1	4231	562.00	1020.54	1023.94	1022.60	1024.21	0.001868	4.11	136.87	50.42	0.44
reach 1	1908	562.00	1017.13	1021.74	1019.19	1021.86	0.000614	2.78	202.00	57.65	0.26
reach 1	1806	610.00	1016.98	1021.65	1019.15	1021.79	0.000702	3.01	202.74	56.84	0.28
reach 1	1795	610.00	1016.96	1021.47	1019.20	1021.74	0.000256	4.23	144.21	32.00	0.35
reach 1	1734	Culvert									
reach 1	1673	610.00	1016.78	1020.99	1019.01	1021.31	0.000315	4.53	134.80	32.00	0.39
reach 1	1662	610.00	1016.76	1021.07	1018.90	1021.22	0.000865	3.14	194.30	60.17	0.31
reach 1	1608	610.00	1016.45	1021.04	1018.59	1021.17	0.000692	2.92	209.18	61.11	0.28
reach 1	1392	610.00	1016.21	1020.91	1018.35	1021.03	0.000625	2.80	217.89	62.77	0.26
reach 1	1056	610.00	1015.55	1020.76	1017.69	1020.85	0.000422	2.43	250.81	66.33	0.22
reach 1	997	610.00	1015.45	1020.74	1017.59	1020.82	0.000397	2.38	256.37	67.00	0.21
reach 1	946	610.00	1015.35	1020.71	1017.51	1020.80	0.000411	2.47	246.85	62.15	0.22
reach 1	886	622.00	1015.25	1020.68	1017.44	1020.78	0.000404	2.47	251.71	62.65	0.22
reach 1	162	622.00	1013.66	1020.54	1015.85	1020.59	0.000166	1.80	345.34	70.45	0.14
reach 1	94	622.00	1013.65	1020.53	1015.84	1020.58	0.000164	1.79	347.35	71.05	0.14
reach 1	0	622.00	1013.52	1020.52	1015.71	1020.57	0.000043	1.74	357.37	72.11	0.14

Main Channel Alternative B 3/19/2002

reach 1

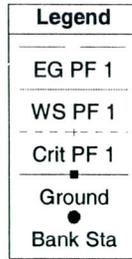
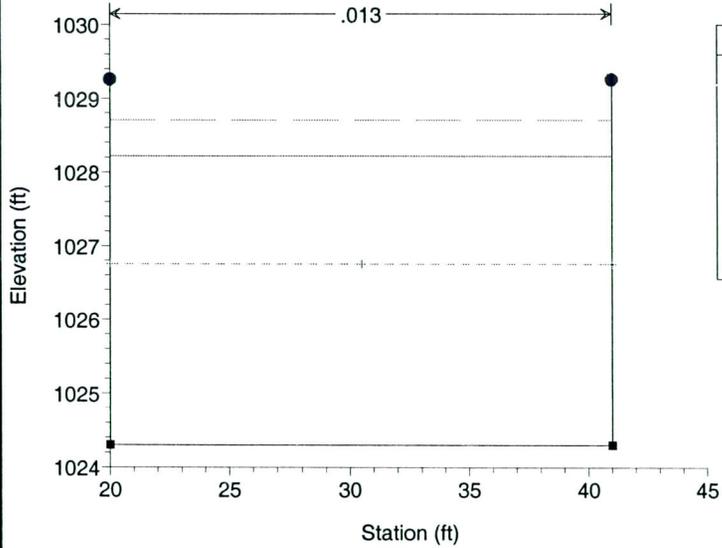


Legend	
EG PF 1	(dotted line)
WS PF 1	(dash-dot line)
Crit PF 1	(dashed line)
Ground	(solid line with square markers)



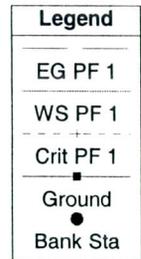
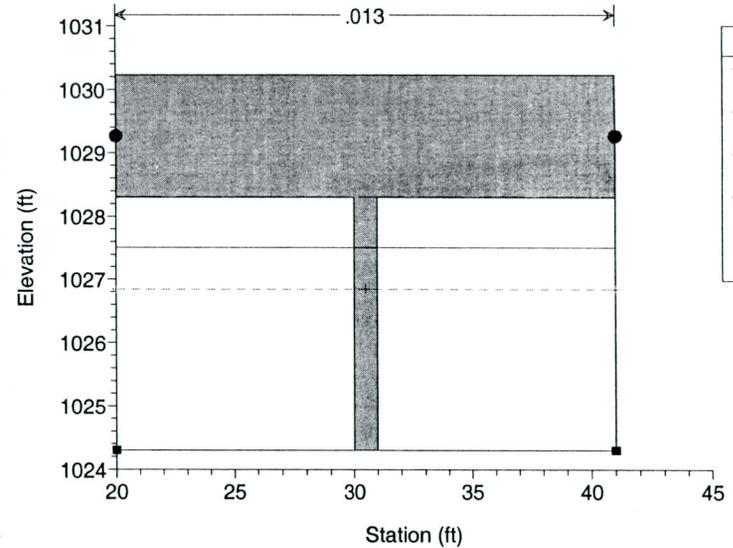
Main Channel Alternative B 3/19/2002

Station 16+88, Channel #3



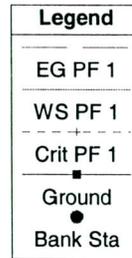
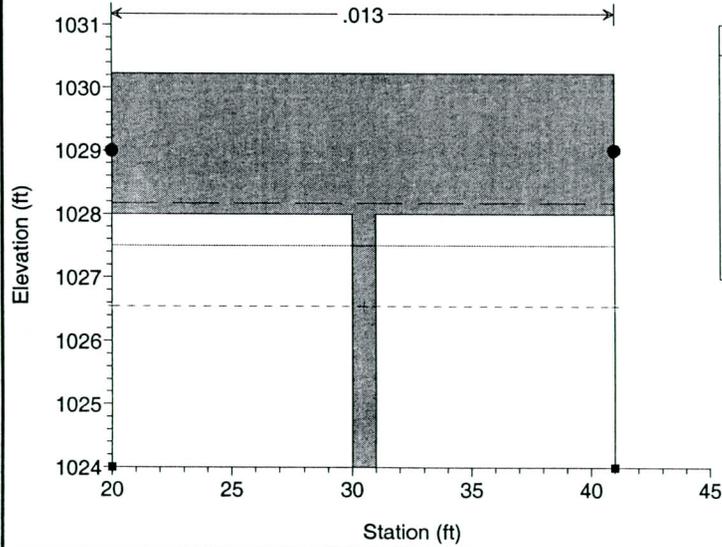
Main Channel Alternative B 3/19/2002

Sta 59+80; 2 - 10' x 4' CBC's



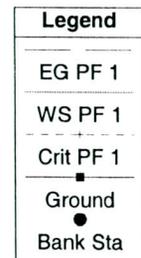
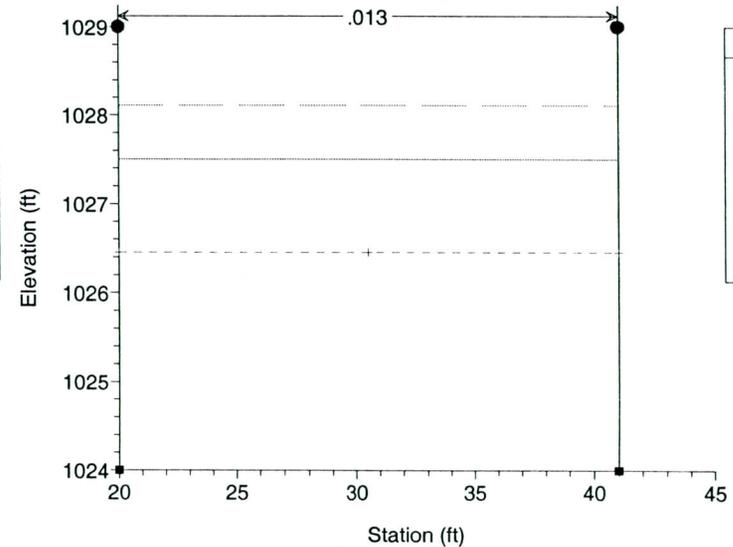
Main Channel Alternative B 3/19/2002

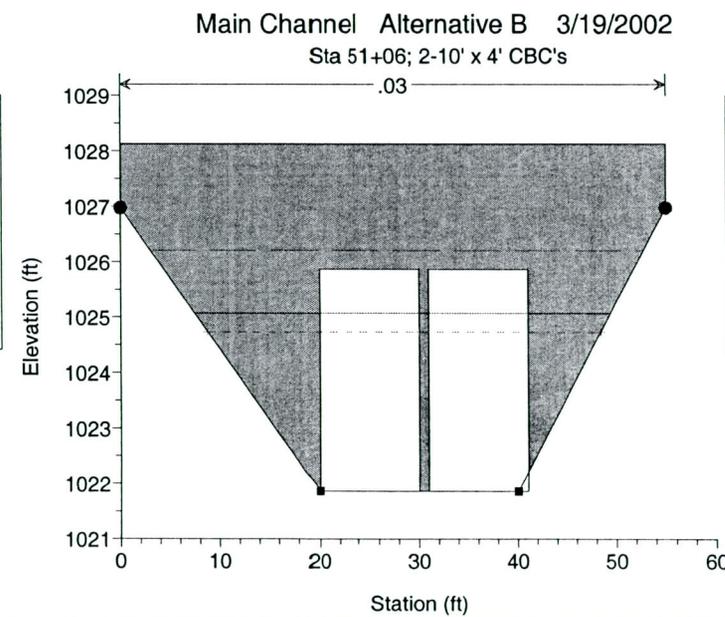
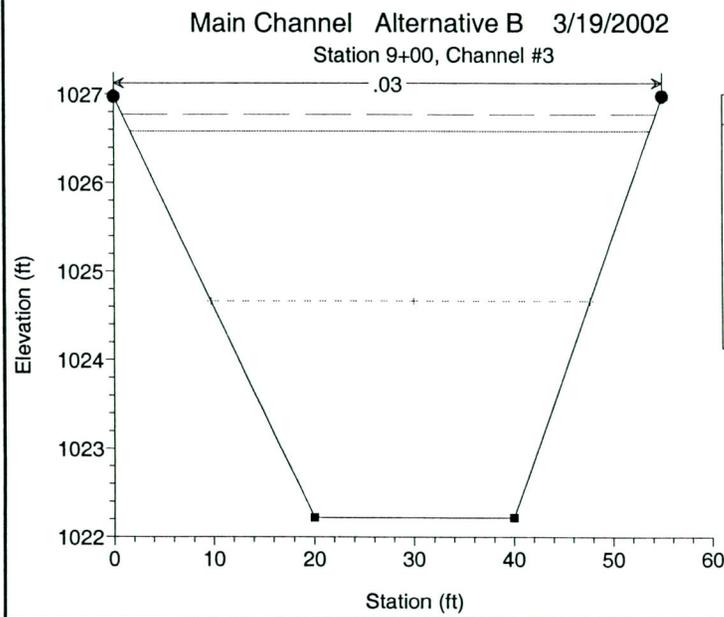
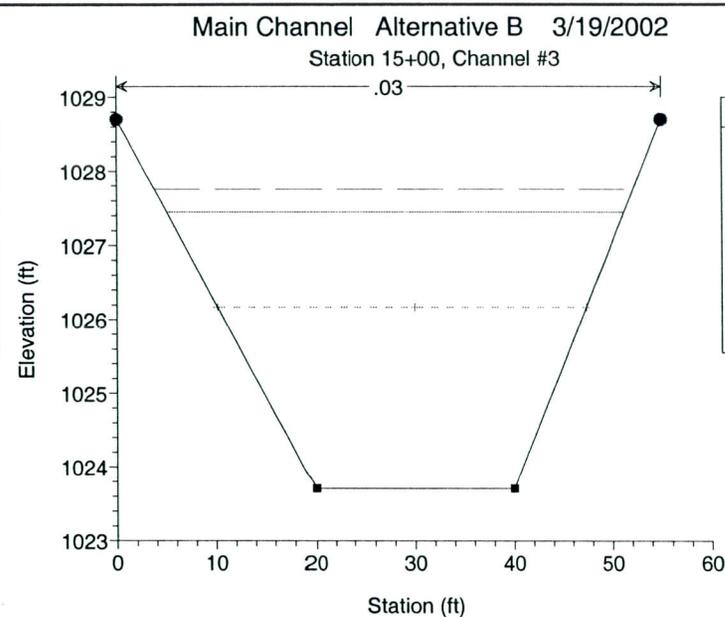
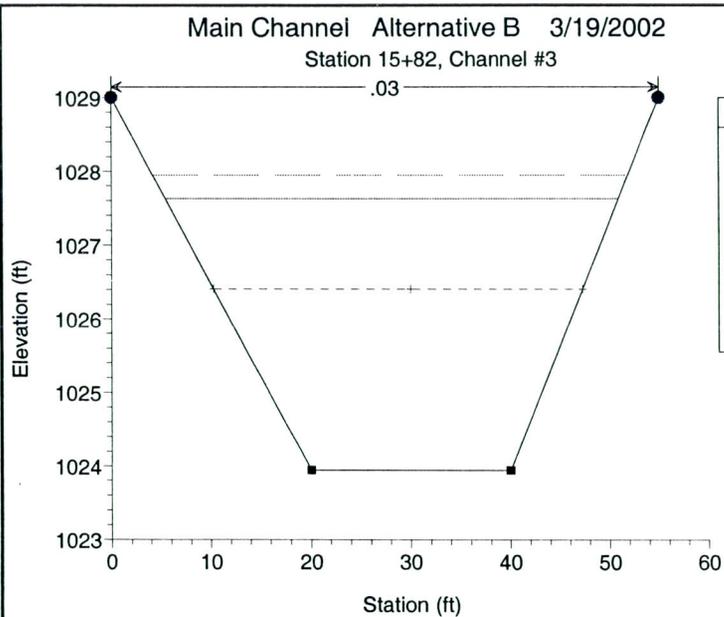
Sta 59+80; 2 - 10' x 4' CBC's

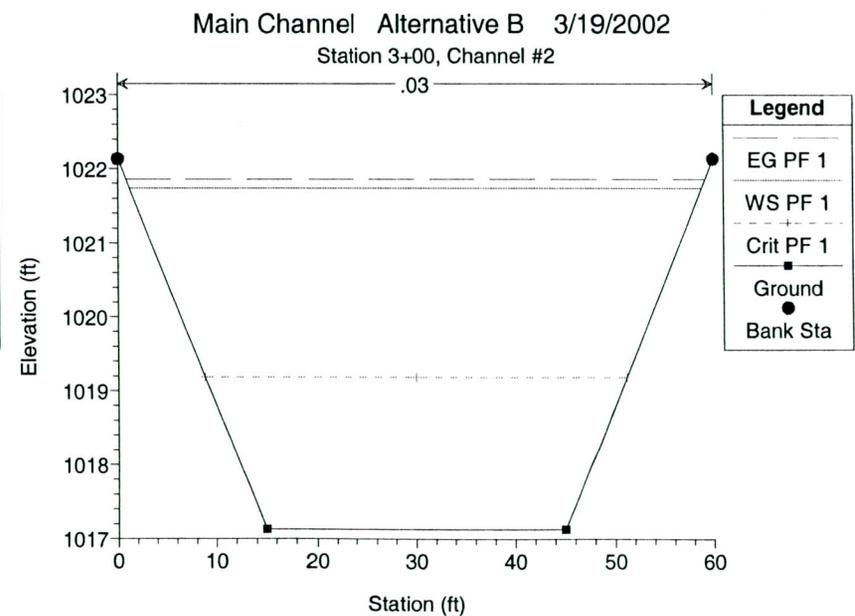
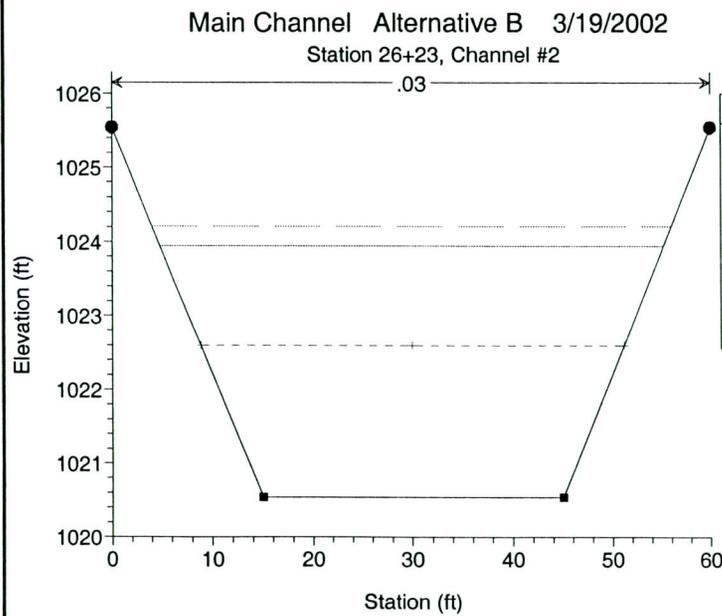
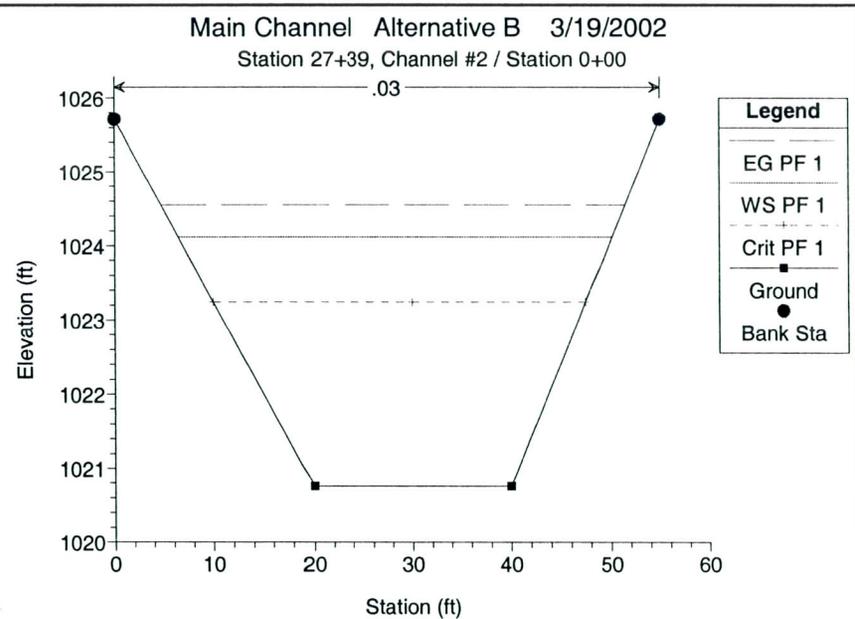
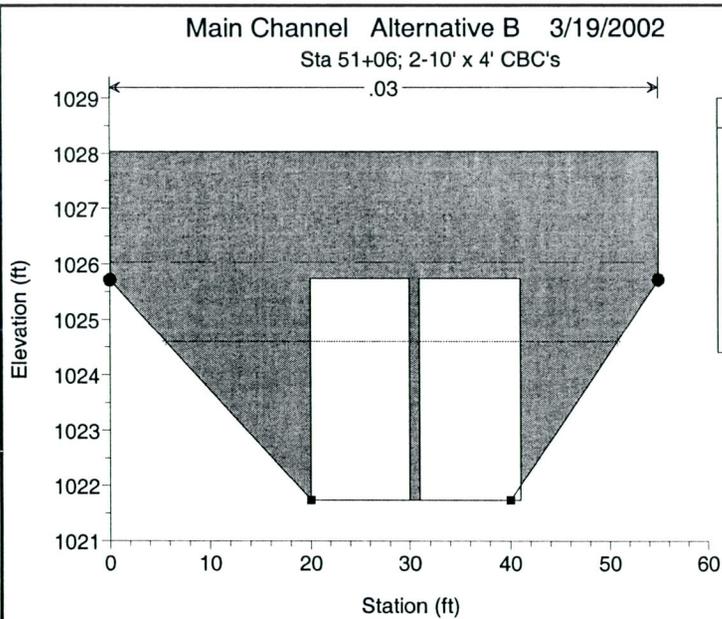


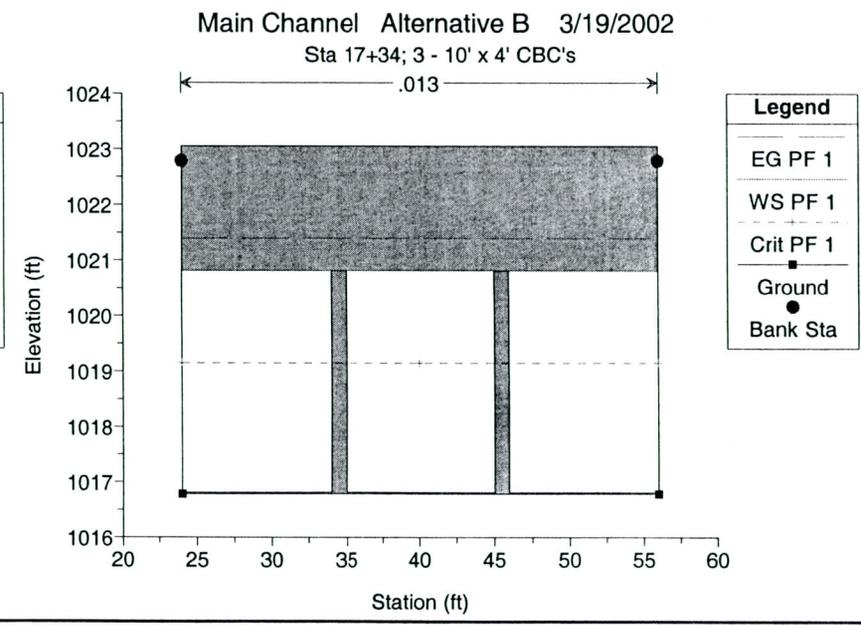
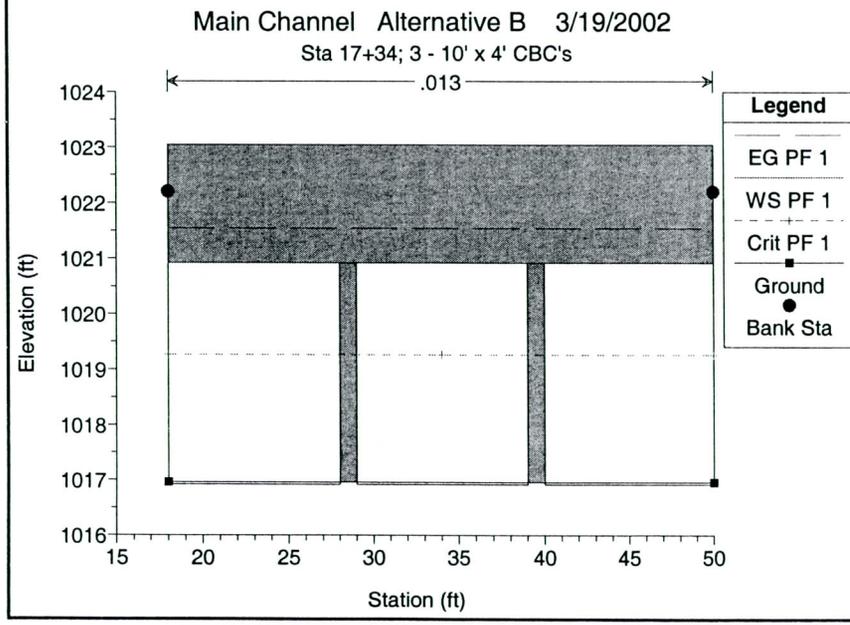
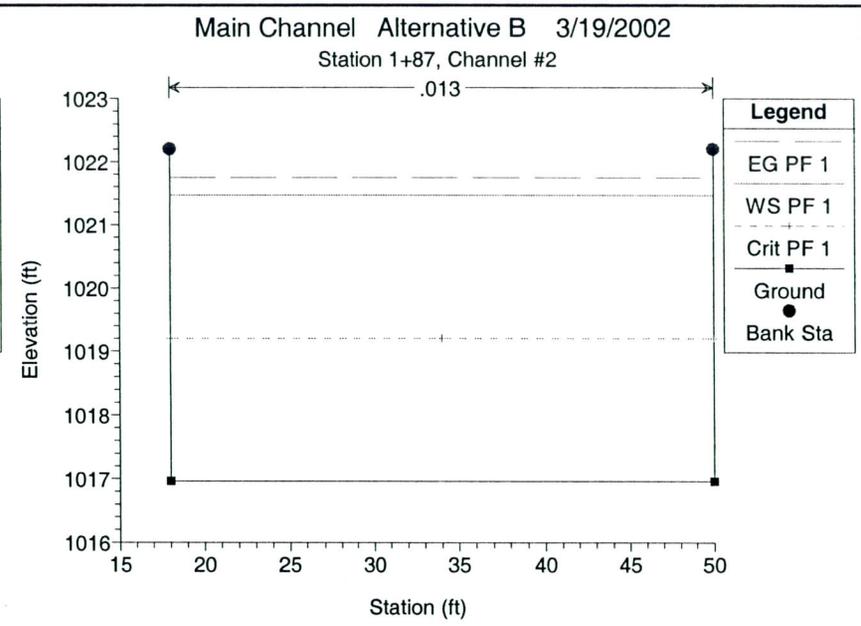
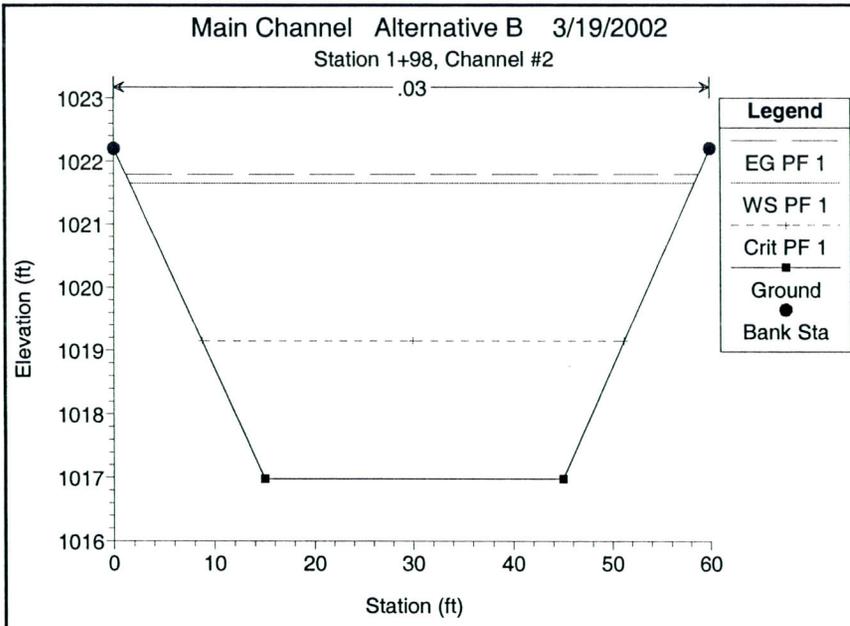
Main Channel Alternative B 3/19/2002

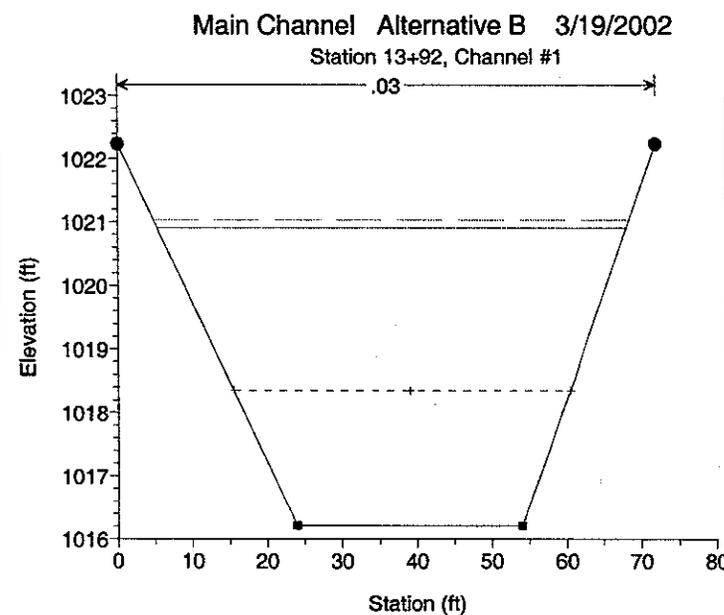
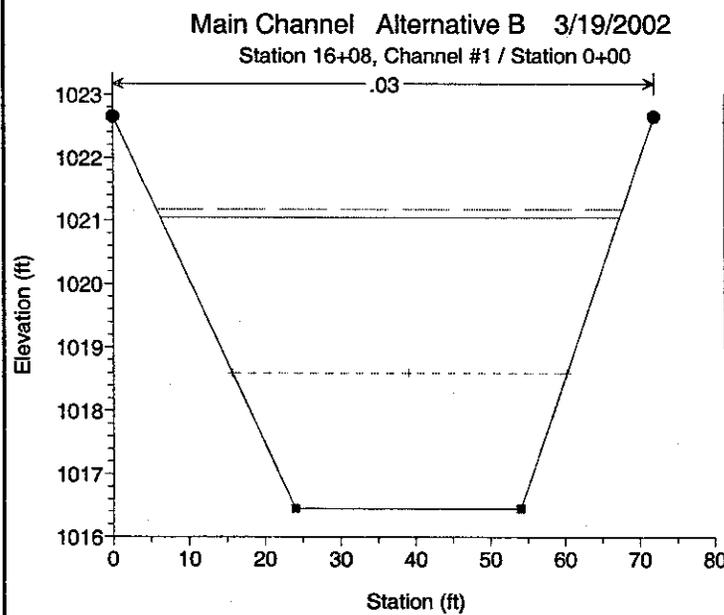
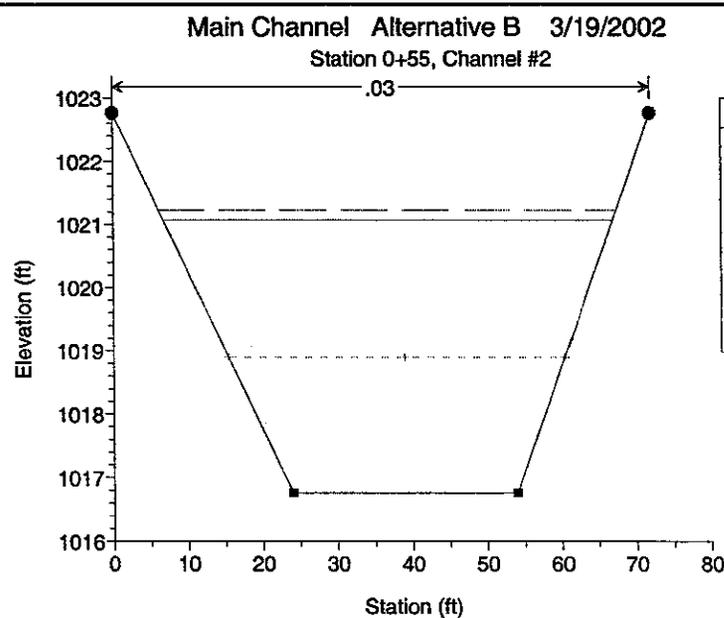
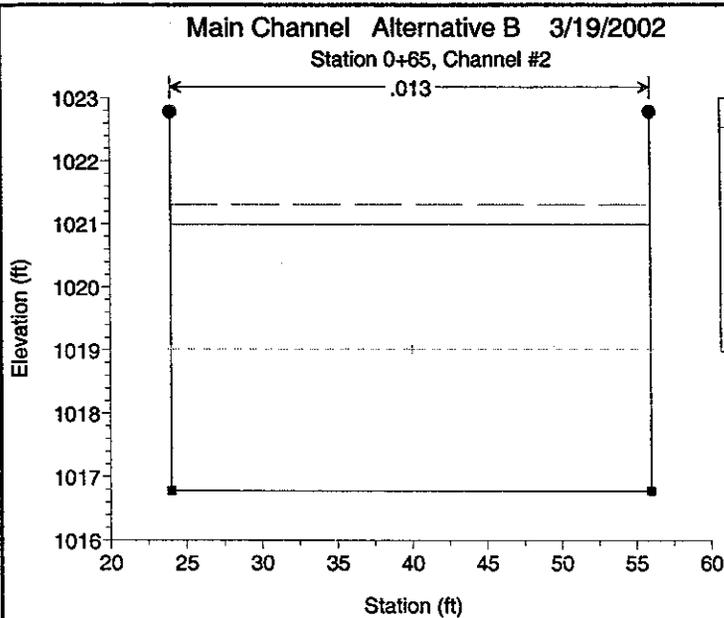
Station 15+93, Channel #3

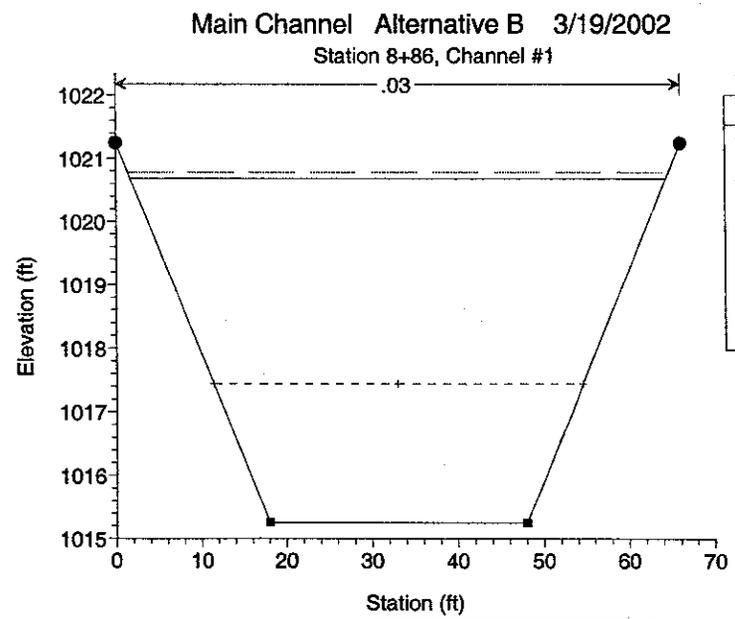
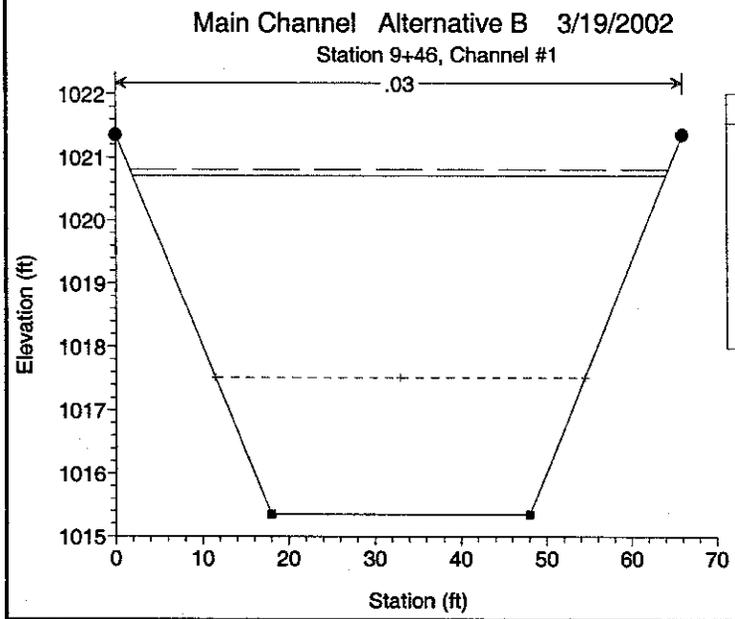
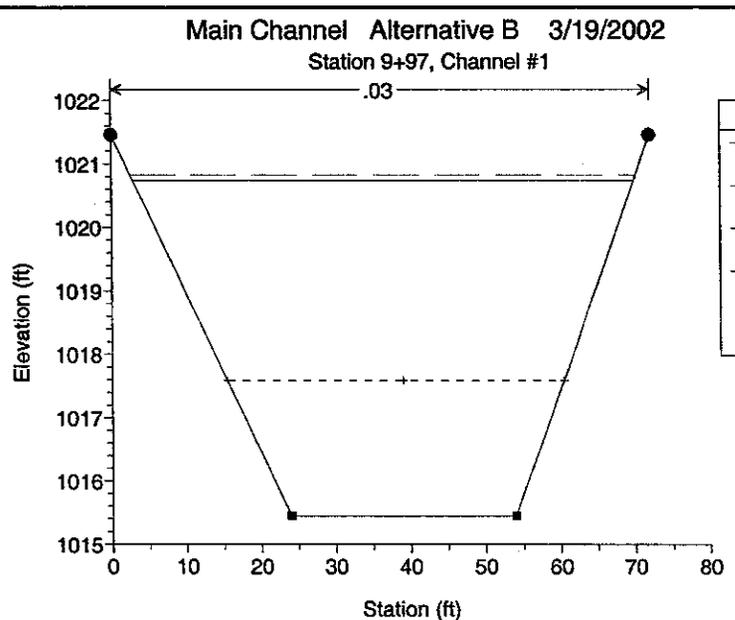
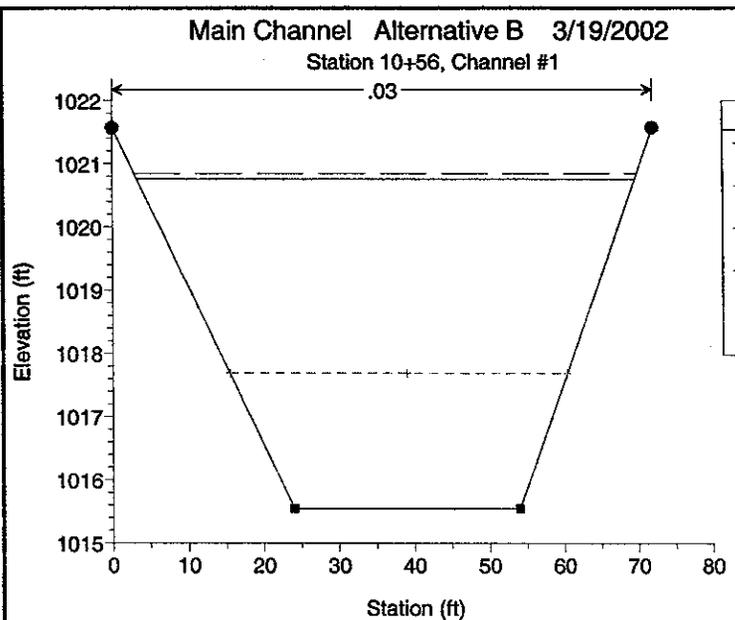






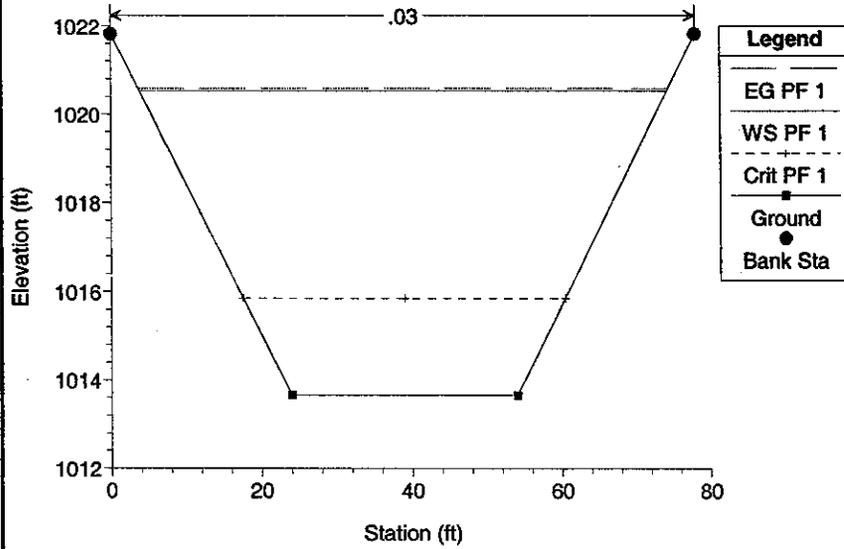






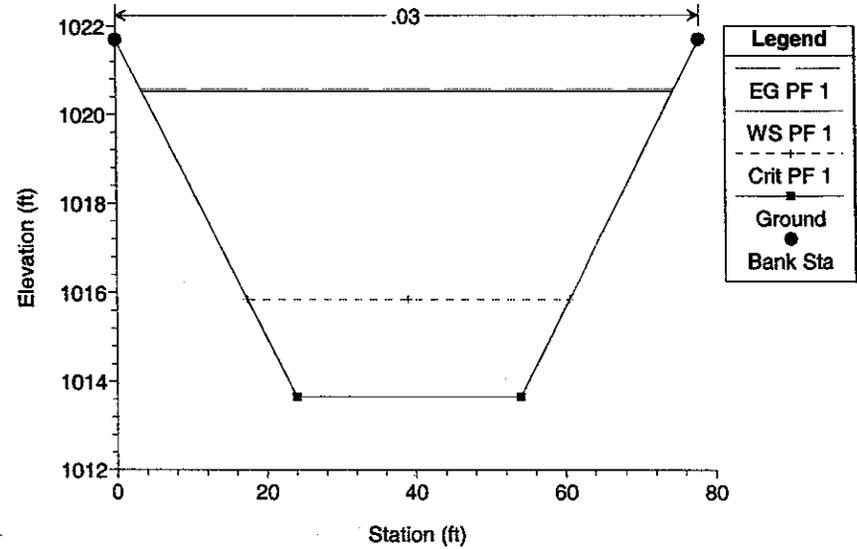
Main Channel Alternative B 3/19/2002

Station 1+62, Channel #1



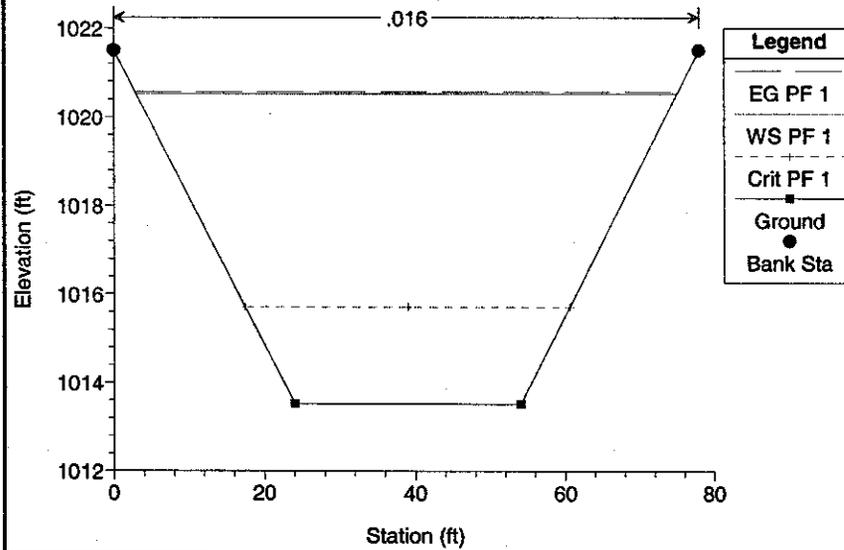
Main Channel Alternative B 3/19/2002

Station 0+94, Channel #1



Main Channel Alternative B 3/19/2002

Station 0+00, Channel #1



CHANNEL 4

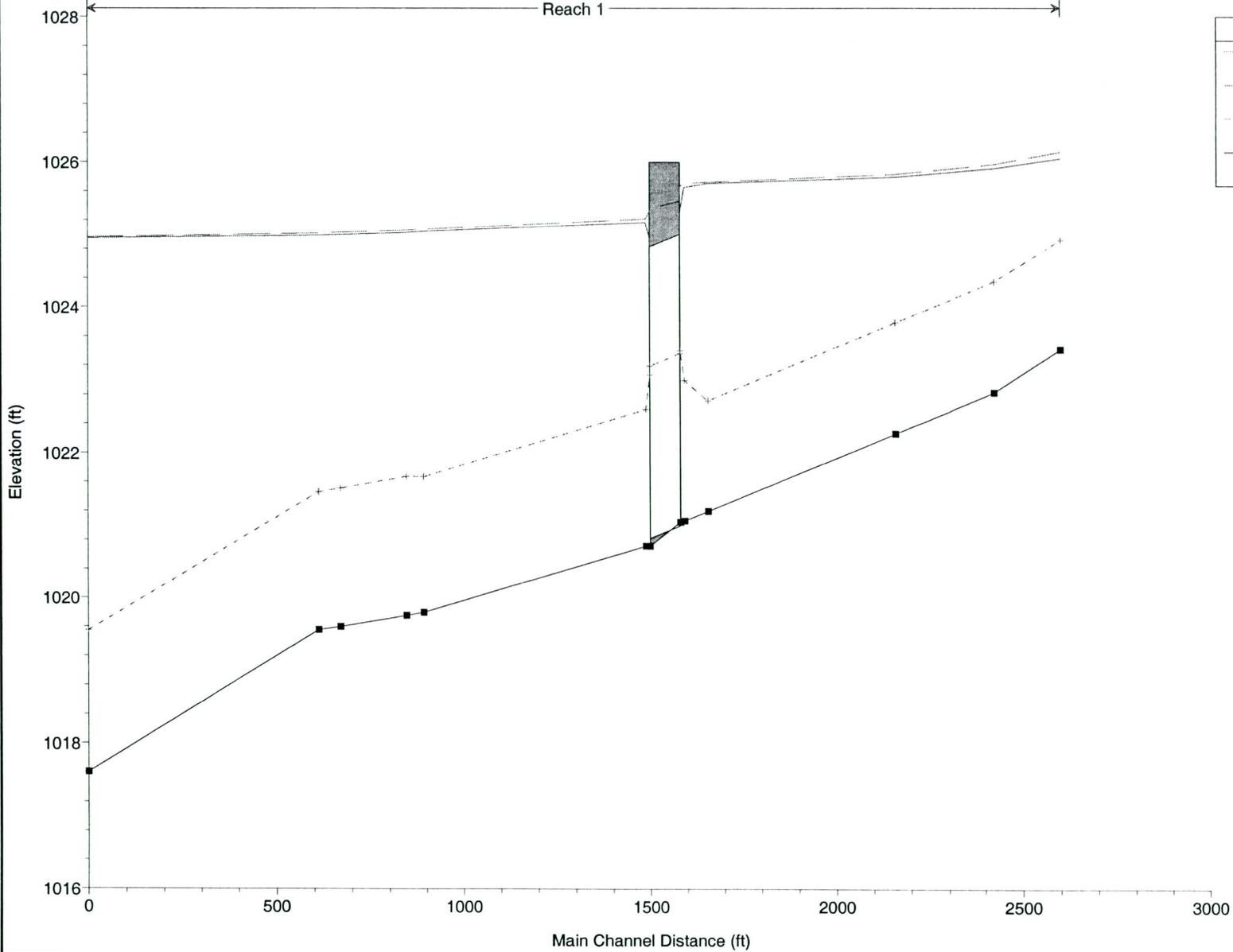
ENCANTO BLVD

HEC-RAS Plan: #4 (100) River: Encanto Reach: Reach 1

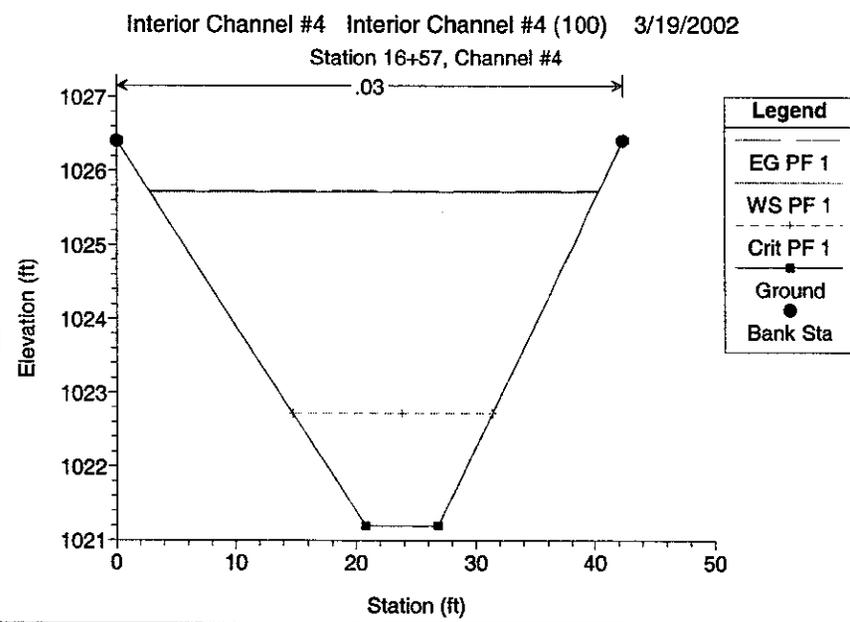
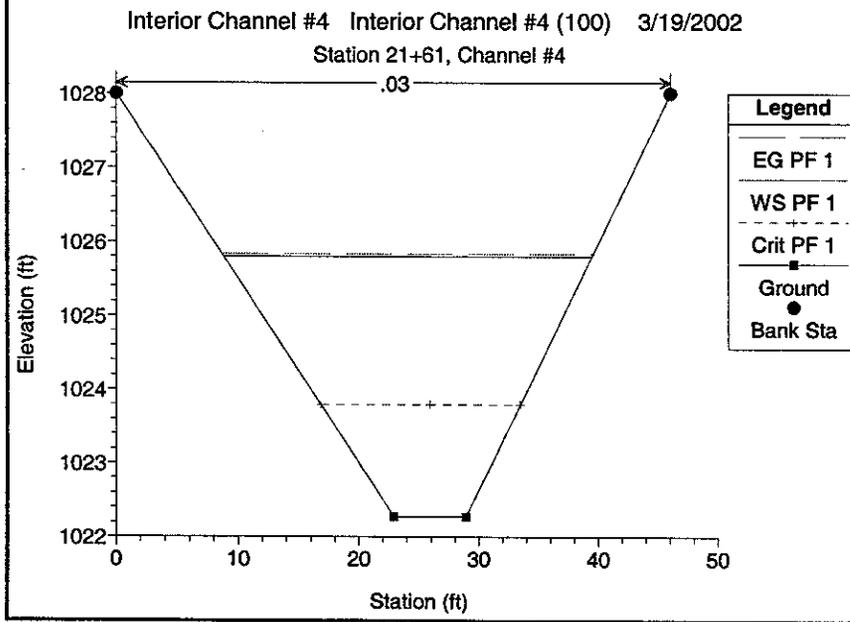
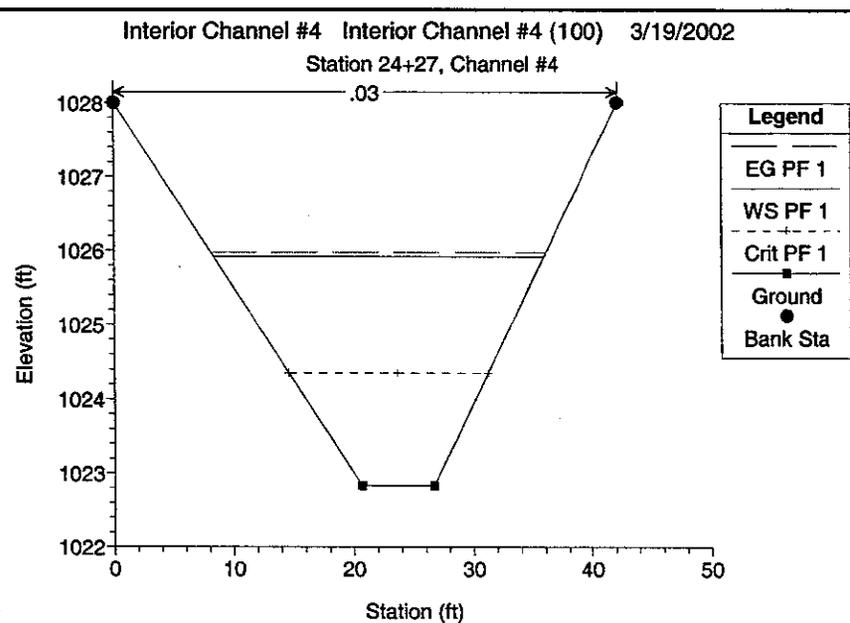
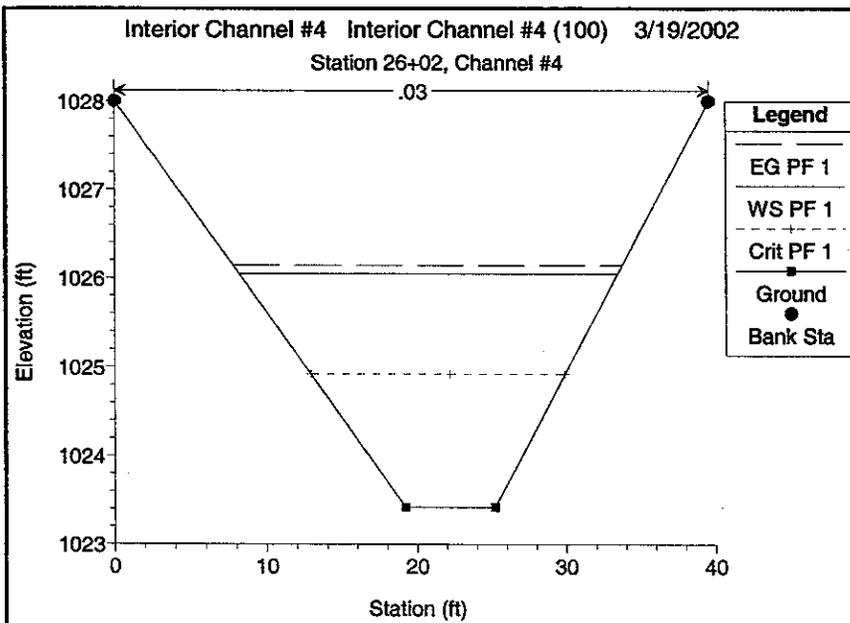
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	2602	100.00	1023.42	1026.05	1024.92	1026.14	0.001303	2.43	41.18	25.30	0.34
Reach 1	2427	100.00	1022.83	1025.91	1024.35	1025.97	0.000684	1.93	51.80	27.59	0.25
Reach 1	2161	100.00	1022.27	1025.80	1023.79	1025.83	0.000376	1.55	64.67	30.68	0.19
Reach 1	1657	100.00	1021.20	1025.71	1022.72	1025.73	0.000122	1.02	98.29	37.58	0.11
Reach 1	1593	206.00	1021.07	1025.65	1022.99	1025.71	0.000372	1.89	108.85	37.51	0.20
Reach 1	1582	206.00	1021.05	1025.31	1023.41	1025.67	0.000590	4.84	42.58	10.00	0.41
Reach 1	1513	Culvert									
Reach 1	1501	206.00	1020.72	1024.95	1023.07	1025.32	0.000600	4.87	42.31	10.00	0.42
Reach 1	1490	206.00	1020.72	1025.17	1022.60	1025.22	0.000360	1.81	113.62	41.09	0.19
Reach 1	893	206.00	1019.80	1025.04	1021.67	1025.07	0.000169	1.36	151.48	47.79	0.13
Reach 1	847	206.00	1019.76	1025.03	1021.67	1025.06	0.000195	1.48	139.40	42.92	0.14
Reach 1	671	206.00	1019.60	1025.00	1021.51	1025.03	0.000174	1.42	145.47	43.90	0.14
Reach 1	613	206.00	1019.56	1024.99	1021.46	1025.02	0.000162	1.37	150.40	45.41	0.13
Reach 1	0	206.00	1017.61	1024.95	1019.55	1024.96	0.000050	0.91	227.51	51.99	0.08

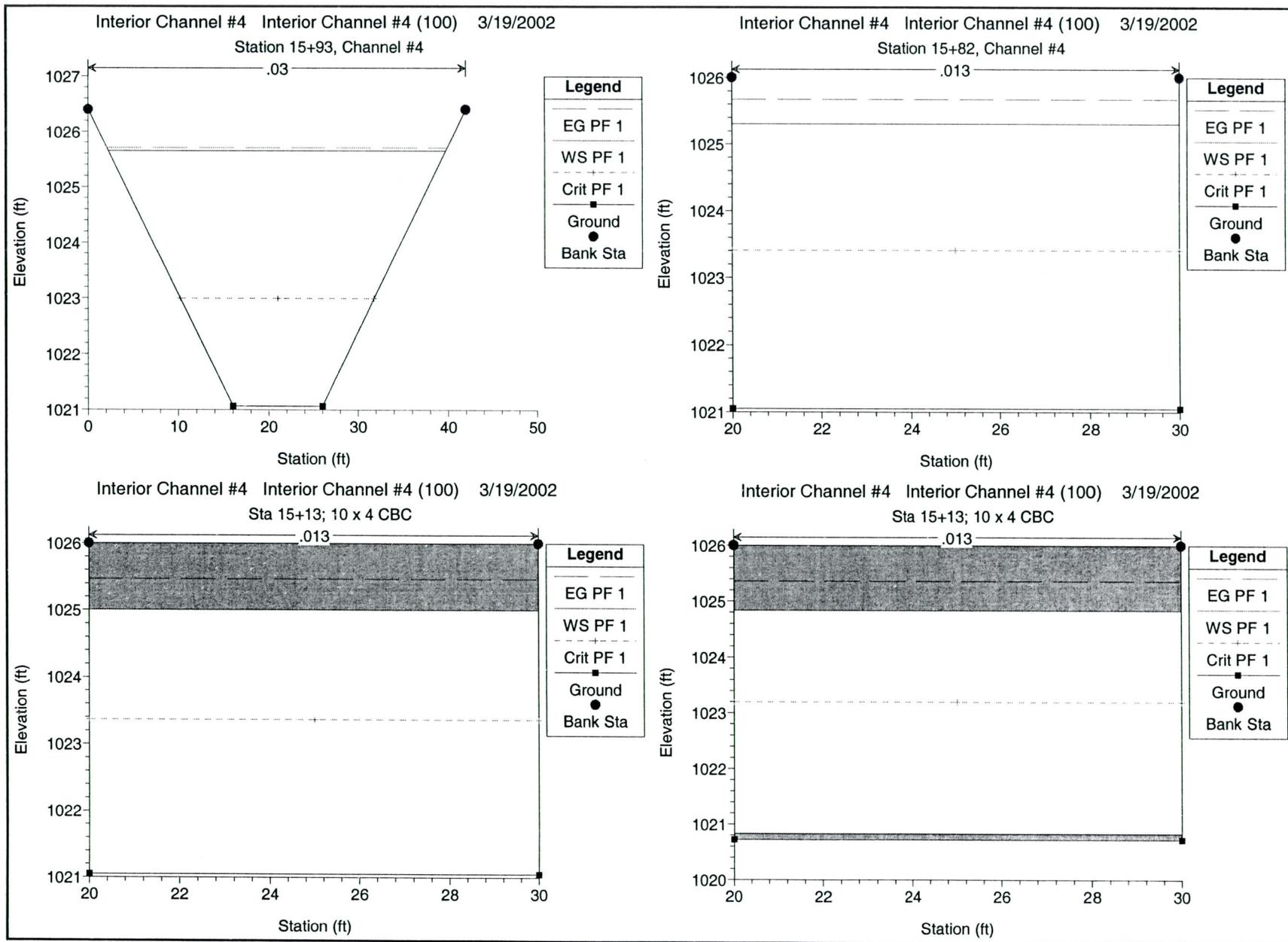
Interior Channel #4 Interior Channel #4 (100) 3/19/2002

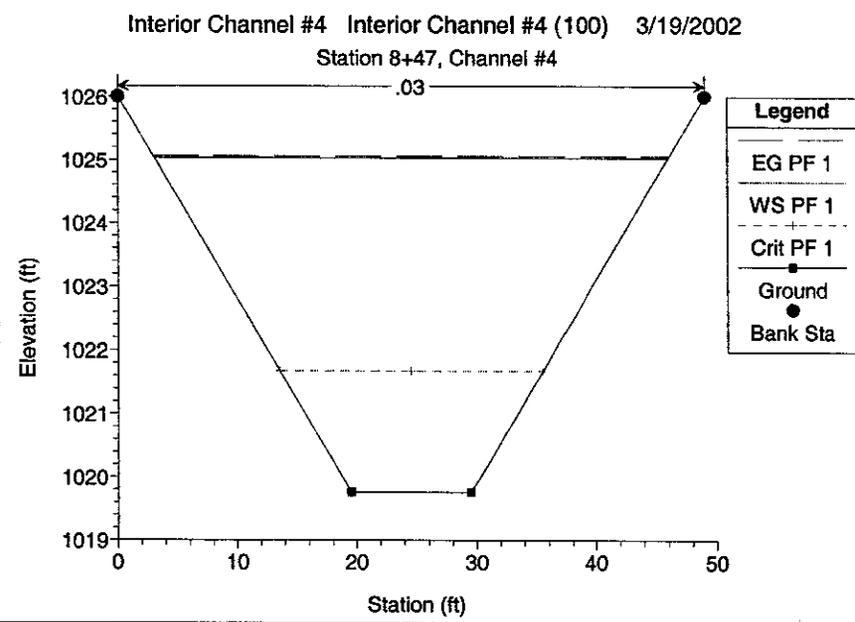
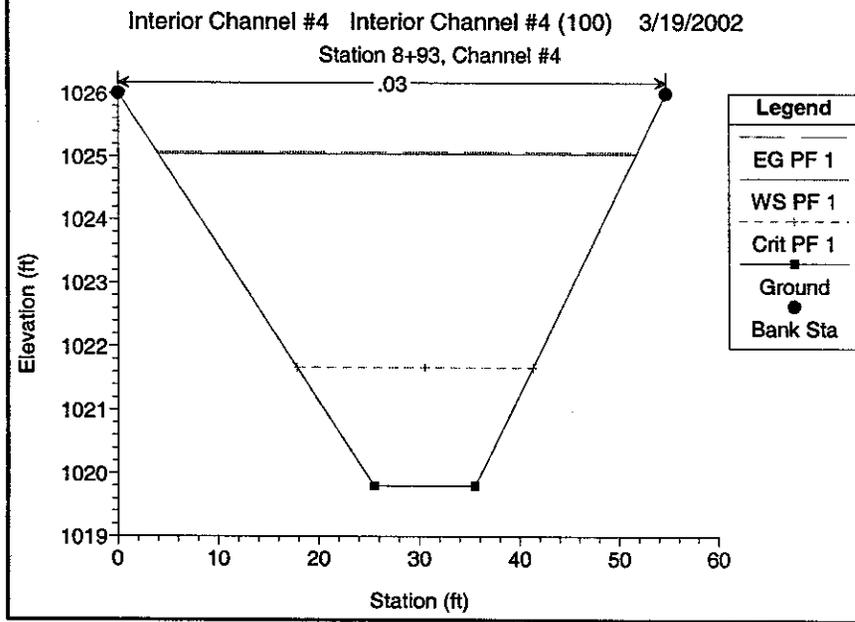
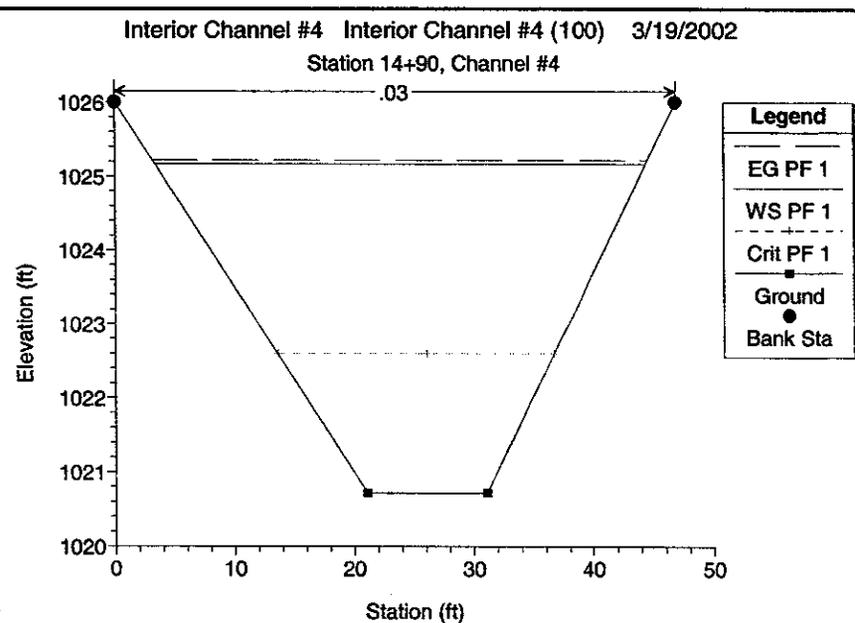
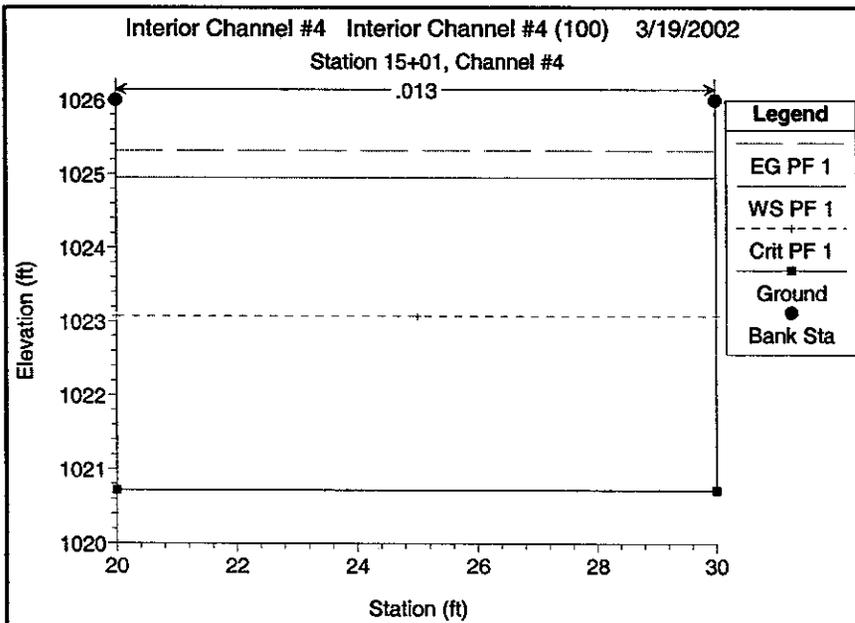
Reach 1

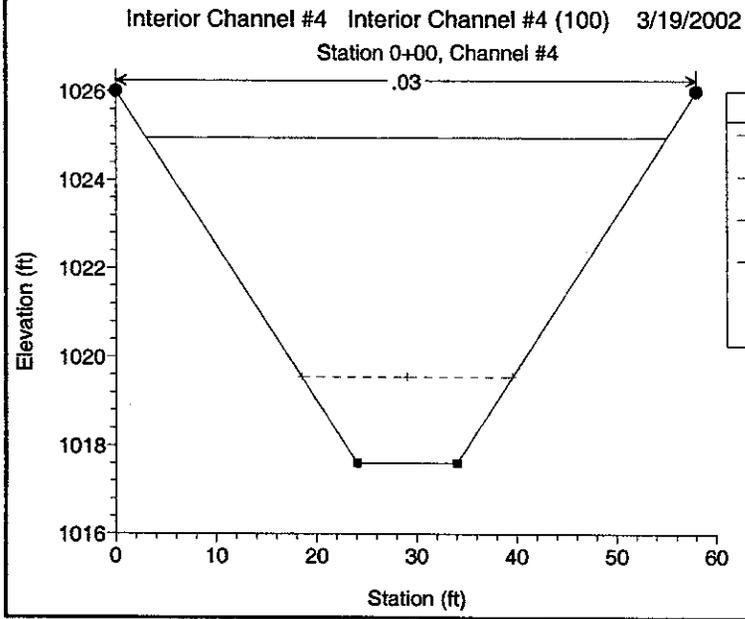
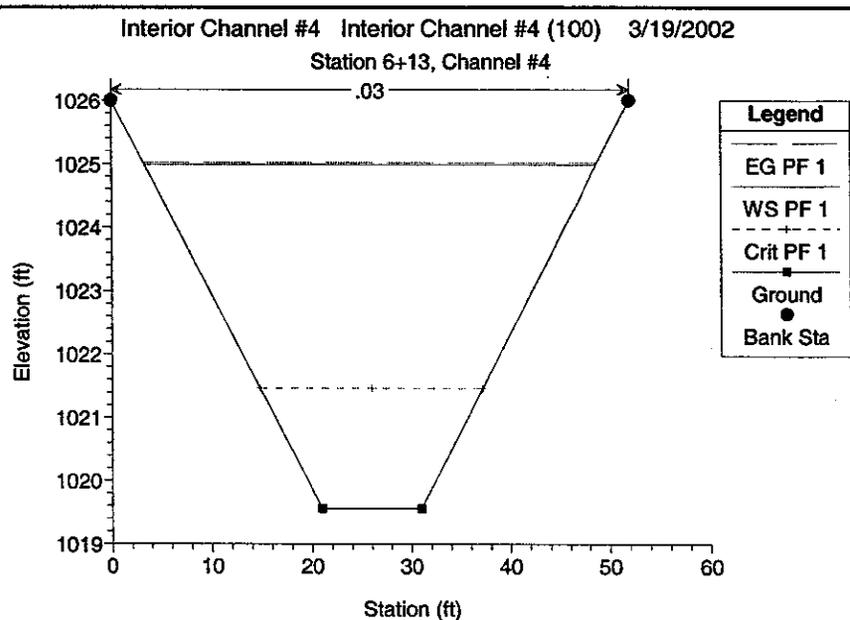
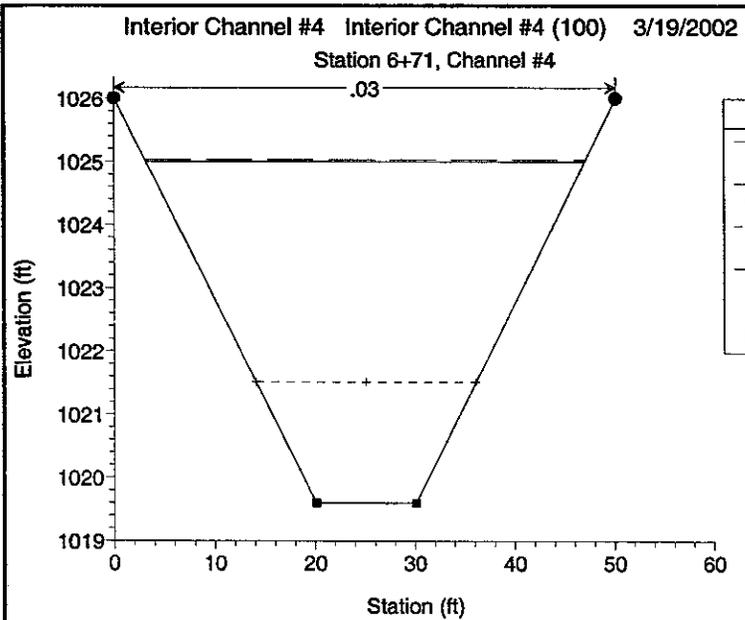


Legend	
EG PF 1
WS PF 1
Crit PF 1
Ground	■









CHANNEL 5
93rd AVE

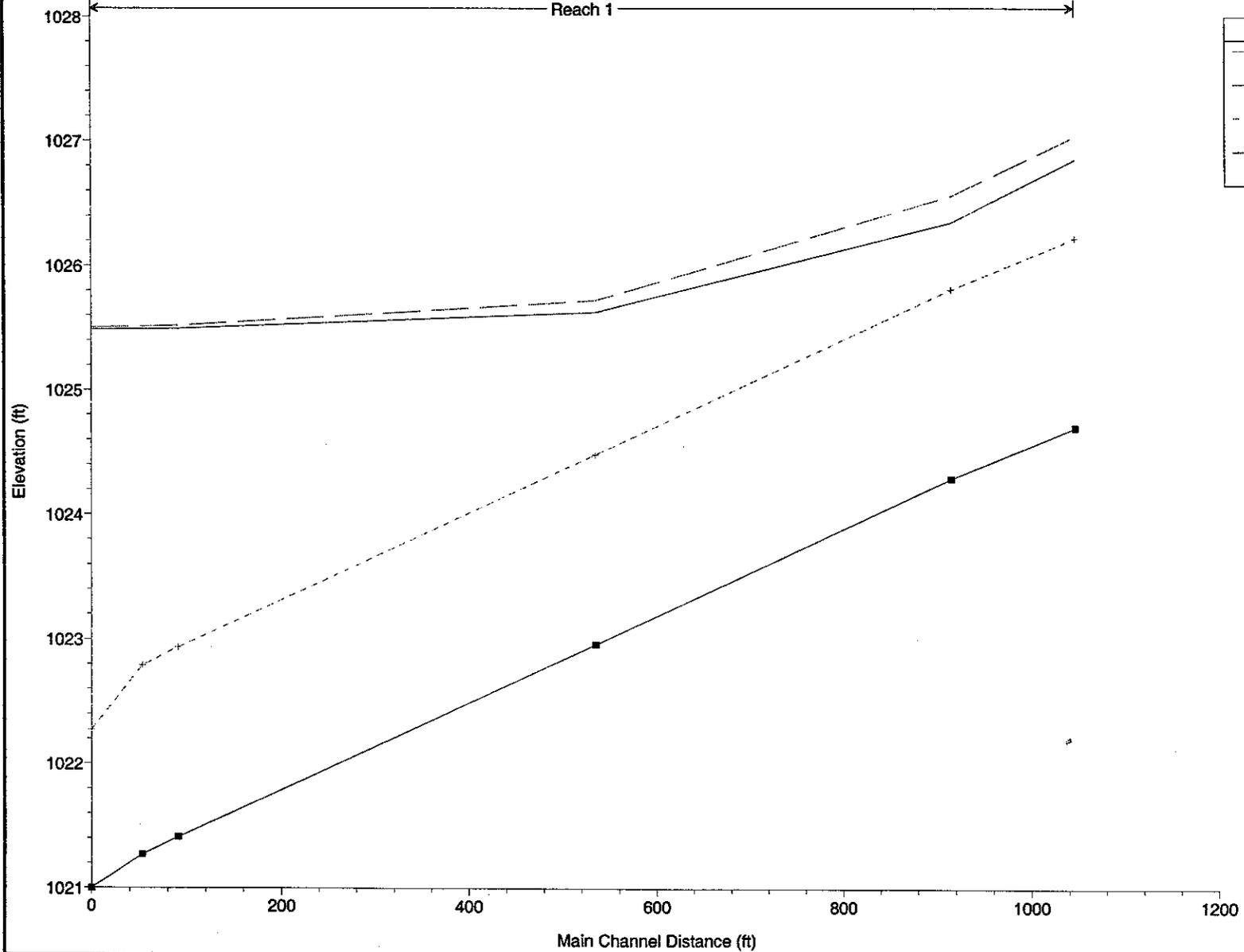
HEC-RAS Plan: #5(100) River: 93rd Reach: Reach 1

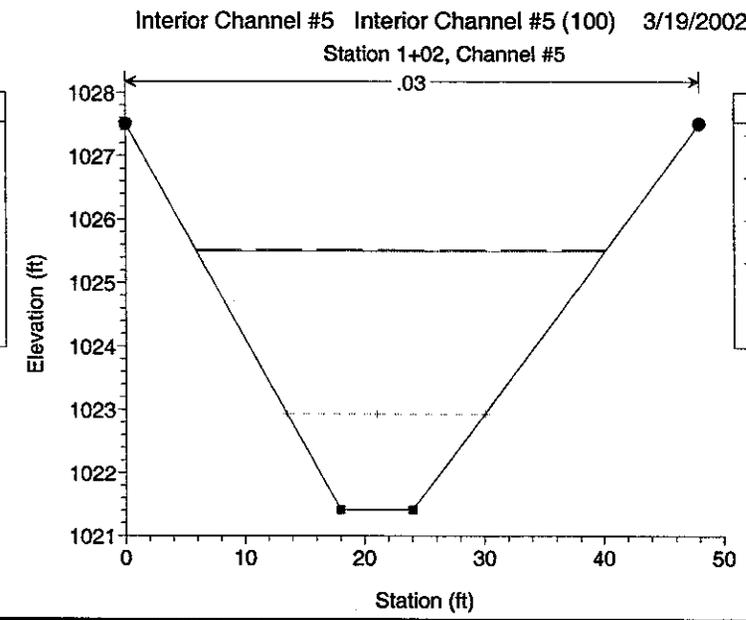
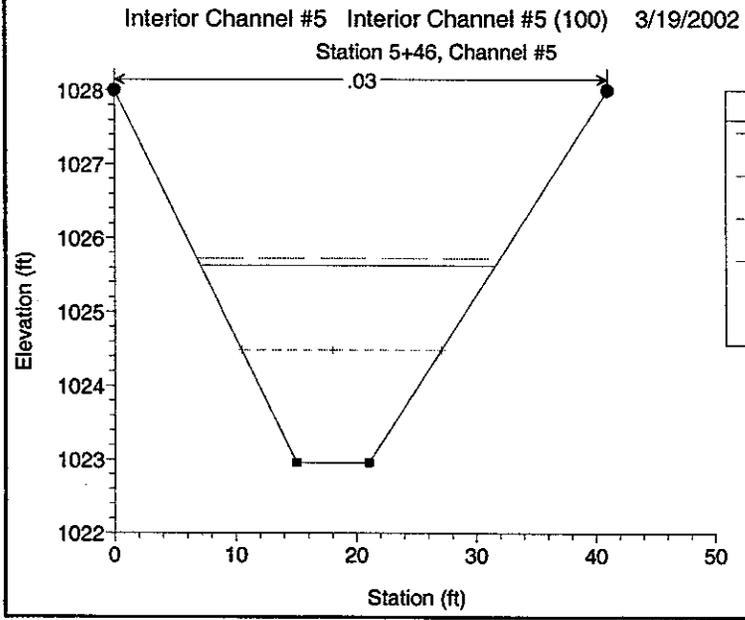
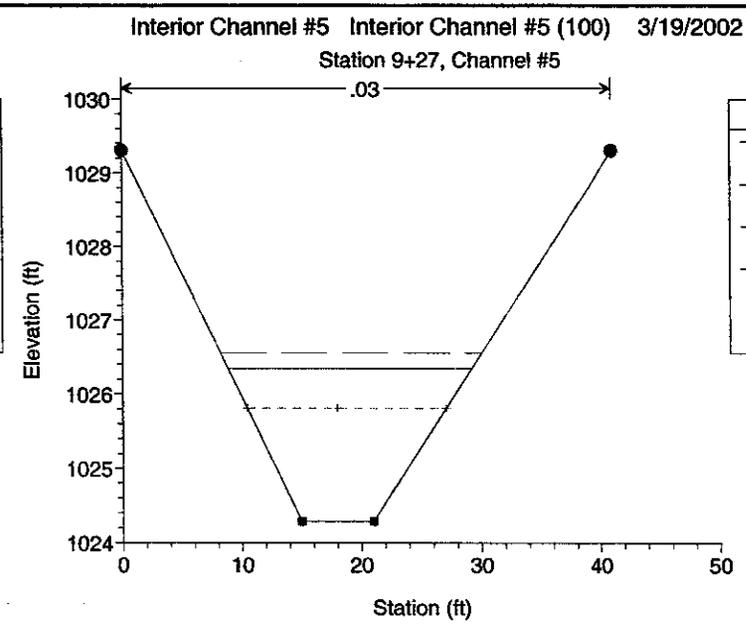
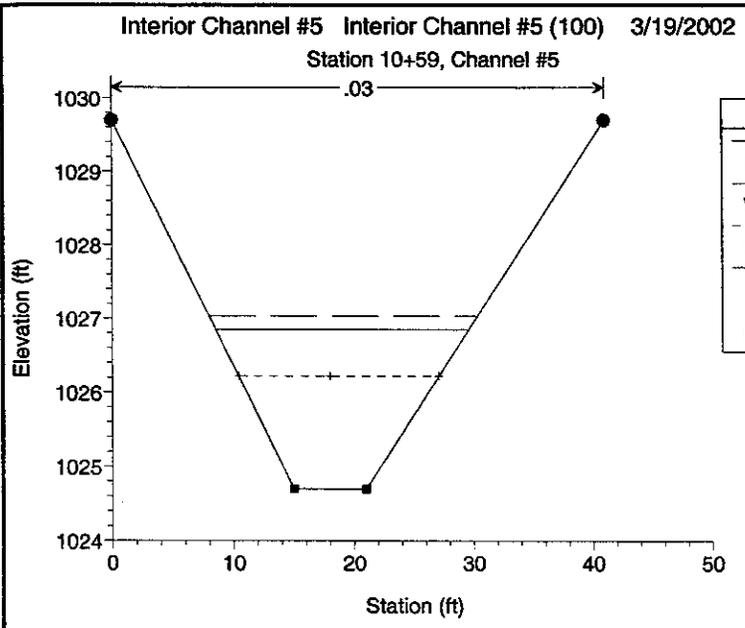
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	1059	100.00	1024.70	1026.85	1026.22	1027.03	0.003266	3.44	29.05	21.04	0.52
Reach 1	927	100.00	1024.29	1026.35	1025.81	1026.56	0.003938	3.69	27.10	20.36	0.56
Reach 1	546	100.00	1022.96	1025.63	1024.48	1025.72	0.001300	2.45	40.75	24.53	0.34
Reach 1	102	100.00	1021.41	1025.50	1022.94	1025.52	0.000197	1.22	82.13	34.19	0.14
Reach 1	64	100.00	1021.27	1025.49	1022.79	1025.51	0.000166	1.14	87.72	35.55	0.13
Reach 1	11	100.00	1021.00	1025.49	1022.27	1025.50	0.000097	0.96	104.63	36.61	0.10

Interior Channel #5 Interior Channel #5 (100) 3/19/2002

Reach 1

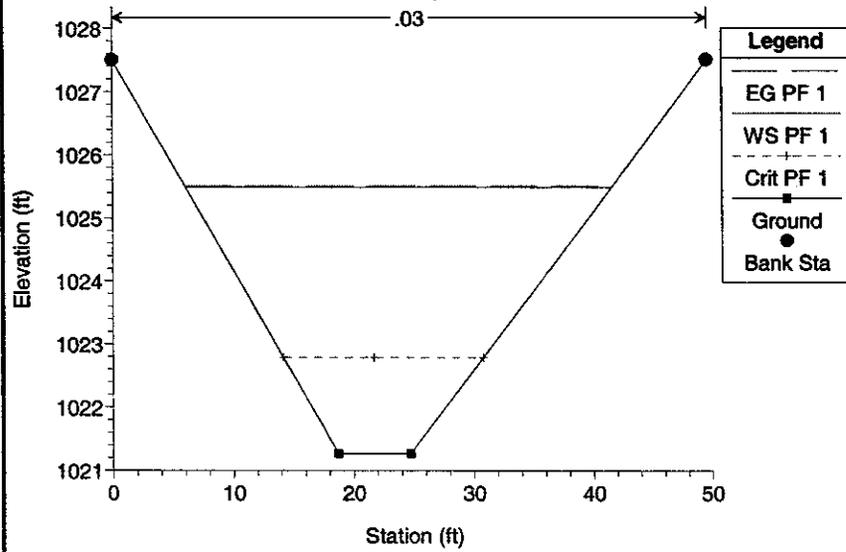
Legend	
EG PF 1	—
WS PF 1	- - -
Crit PF 1	- · -
Ground	■





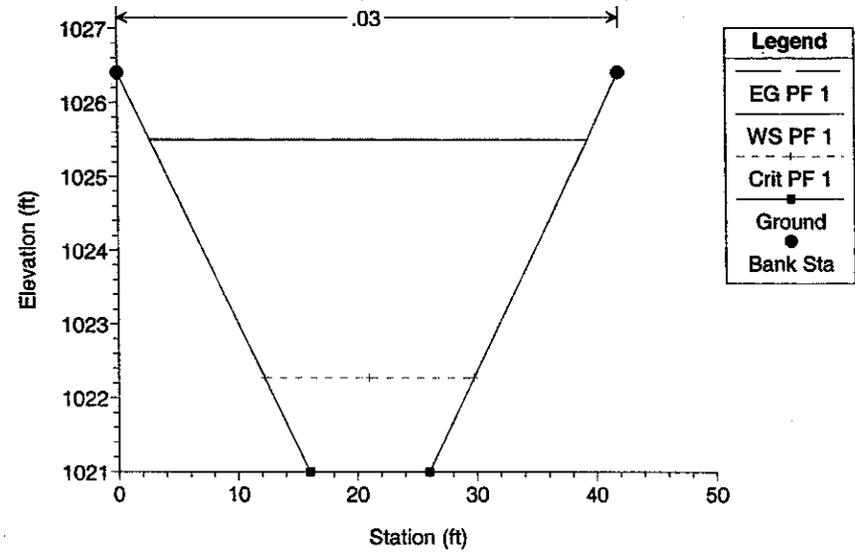
Interior Channel #5 Interior Channel #5 (100) 3/19/2002

Station 0+64, Channel #5



Interior Channel #5 Interior Channel #5 (100) 3/19/2002

Station 0+11, Channel #5 / Station 15+93,



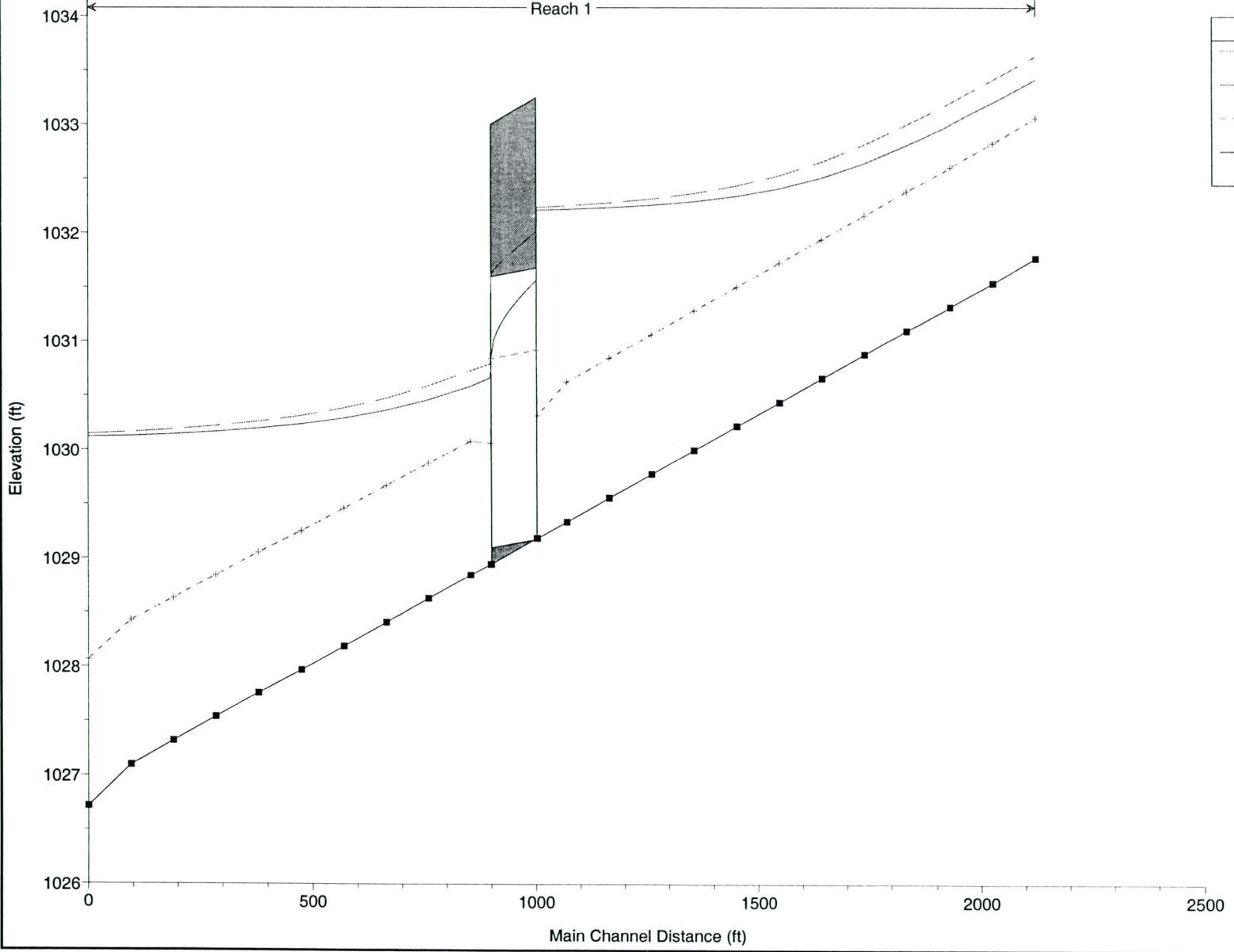
CHANNEL 6 THOMAS ROAD

HEC-RAS Plan: Thomas Road River: Thomas Road Reach: Reach 1

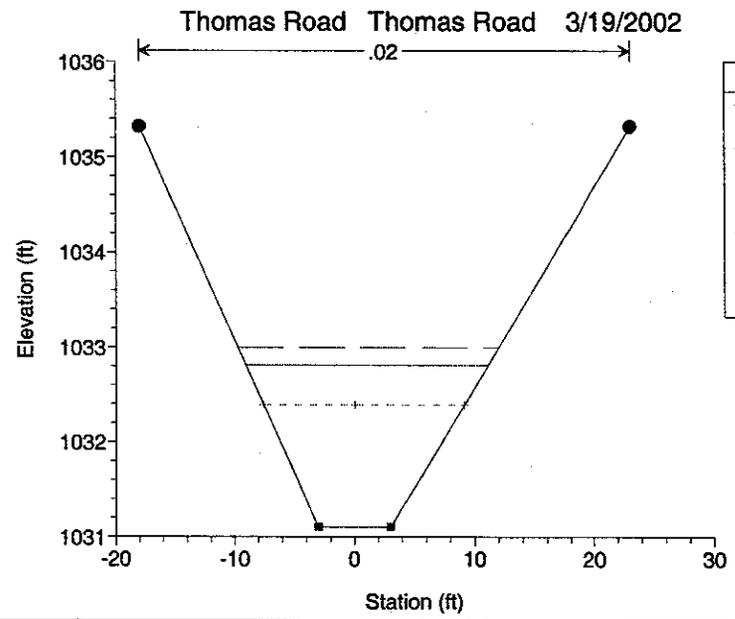
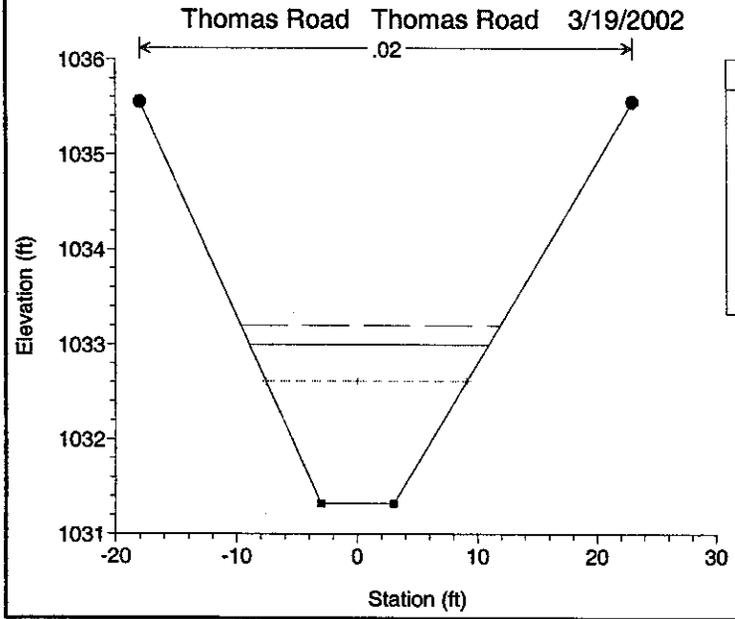
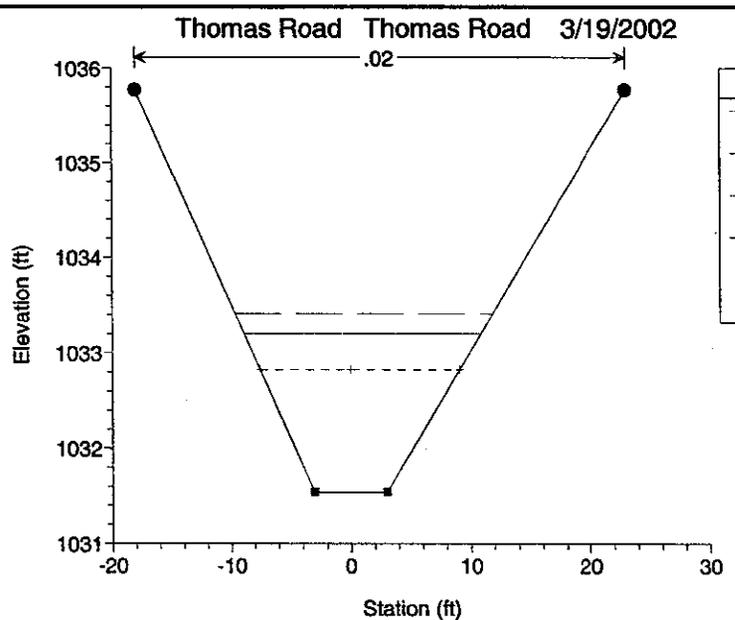
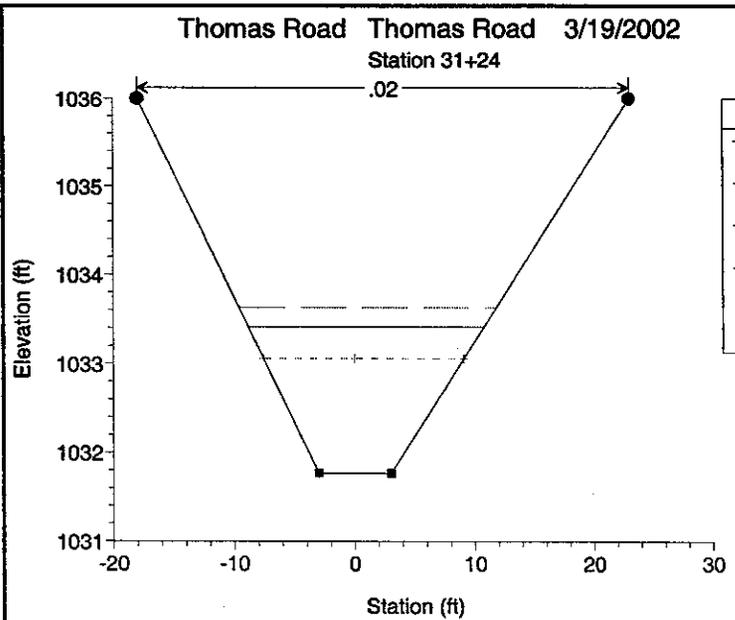
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach 1	2124	78.00	1031.77	1033.42	1033.06	1033.63	0.002318	3.70	21.07	19.61	0.63
Reach 1	2028*	78.00	1031.54	1033.20	1032.83	1033.41	0.002218	3.64	21.41	19.76	0.62
Reach 1	1932*	78.00	1031.32	1033.00	1032.61	1033.20	0.002132	3.59	21.73	19.89	0.61
Reach 1	1836*	78.00	1031.10	1032.81	1032.39	1033.00	0.001968	3.48	22.39	20.18	0.58
Reach 1	1740*	78.00	1030.88	1032.65	1032.17	1032.82	0.001713	3.31	23.57	20.69	0.55
Reach 1	1644*	78.00	1030.66	1032.52	1031.95	1032.66	0.001390	3.06	25.47	21.46	0.50
Reach 1	1549*	78.00	1030.44	1032.42	1031.73	1032.54	0.001062	2.77	28.12	22.47	0.44
Reach 1	1453*	78.00	1030.22	1032.35	1031.51	1032.44	0.000775	2.47	31.62	23.75	0.38
Reach 1	1357*	78.00	1030.00	1032.30	1031.29	1032.37	0.000552	2.18	35.86	25.23	0.32
Reach 1	1261*	78.00	1029.78	1032.26	1031.07	1032.32	0.000391	1.91	40.77	26.84	0.27
Reach 1	1165*	78.00	1029.56	1032.24	1030.84	1032.28	0.000279	1.69	46.21	28.49	0.23
Reach 1	1070	78.00	1029.34	1032.22	1030.63	1032.26	0.000201	1.49	52.28	30.26	0.20
Reach 1	1004	78.00	1029.19	1032.22	1030.32	1032.24	0.000125	1.27	61.27	31.48	0.16
Reach 1	952	Culvert									
Reach 1	900	78.00	1028.95	1030.66	1030.06	1030.79	0.001215	2.89	27.03	22.54	0.46
Reach 1	855	78.00	1028.85	1030.58	1030.08	1030.73	0.001532	3.04	25.62	23.58	0.51
Reach 1	760.**	78.00	1028.63	1030.46	1029.88	1030.59	0.001280	2.88	27.06	23.59	0.47
Reach 1	665.**	78.00	1028.41	1030.36	1029.67	1030.47	0.001014	2.67	29.19	23.89	0.43
Reach 1	570.**	78.00	1028.19	1030.29	1029.46	1030.38	0.000779	2.45	31.85	24.33	0.38
Reach 1	475.**	78.00	1027.97	1030.24	1029.25	1030.31	0.000588	2.23	35.01	24.89	0.33
Reach 1	380.**	78.00	1027.76	1030.20	1029.06	1030.26	0.000448	2.03	38.39	25.51	0.29
Reach 1	285.**	78.00	1027.54	1030.17	1028.85	1030.22	0.000337	1.85	42.25	26.16	0.26
Reach 1	190.**	78.00	1027.32	1030.15	1028.64	1030.19	0.000257	1.68	46.36	26.82	0.23
Reach 1	95.**	78.00	1027.10	1030.13	1028.43	1030.17	0.000197	1.54	50.74	27.50	0.20
Reach 1	0.	78.00	1026.72	1030.12	1028.07	1030.15	0.000128	1.33	58.71	28.54	0.16

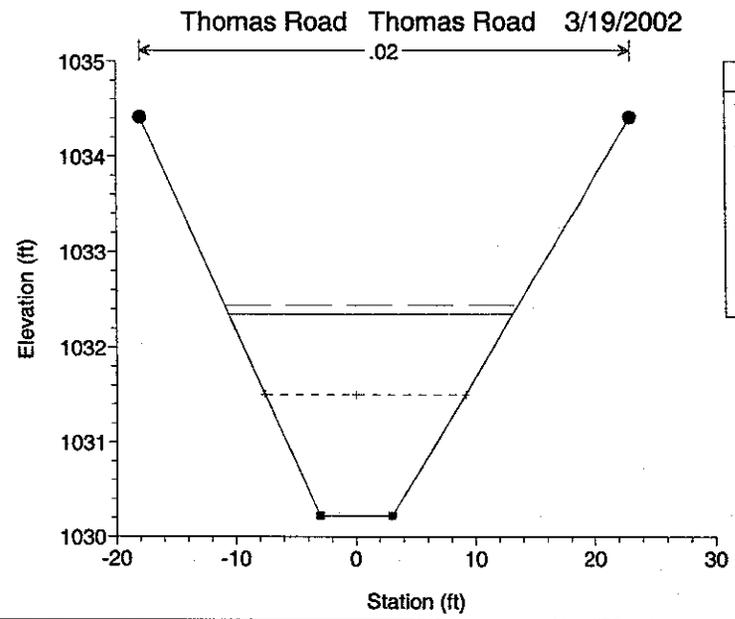
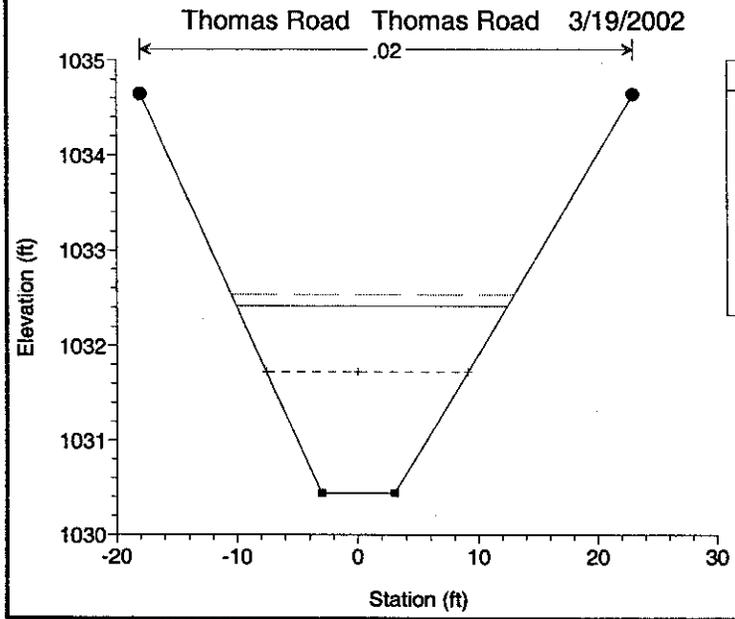
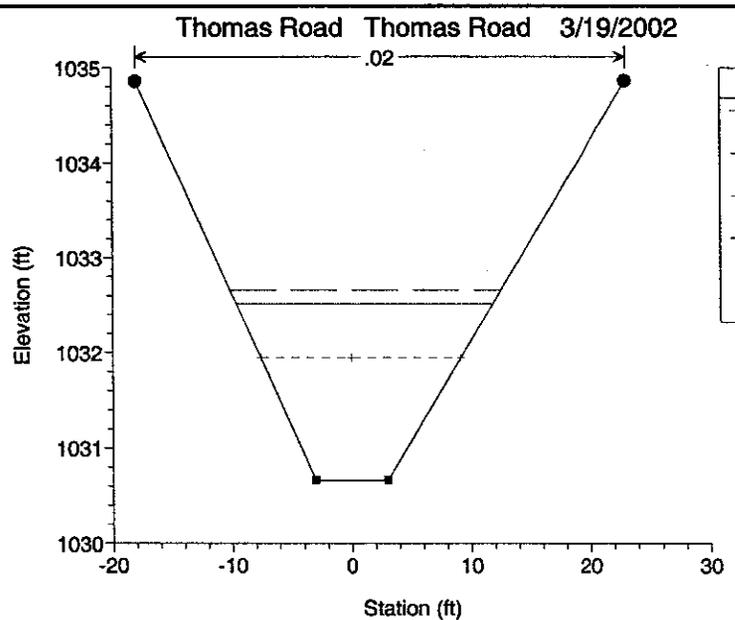
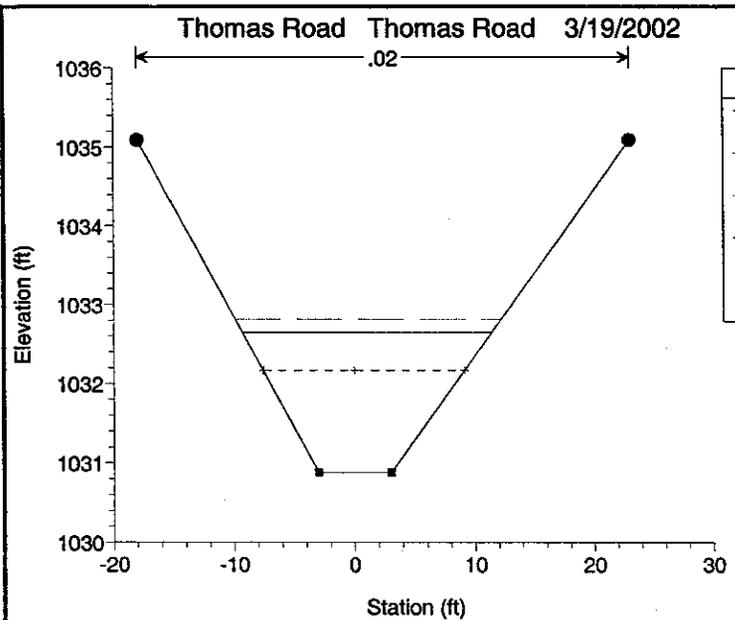
Thomas Road Thomas Road 3/19/2002

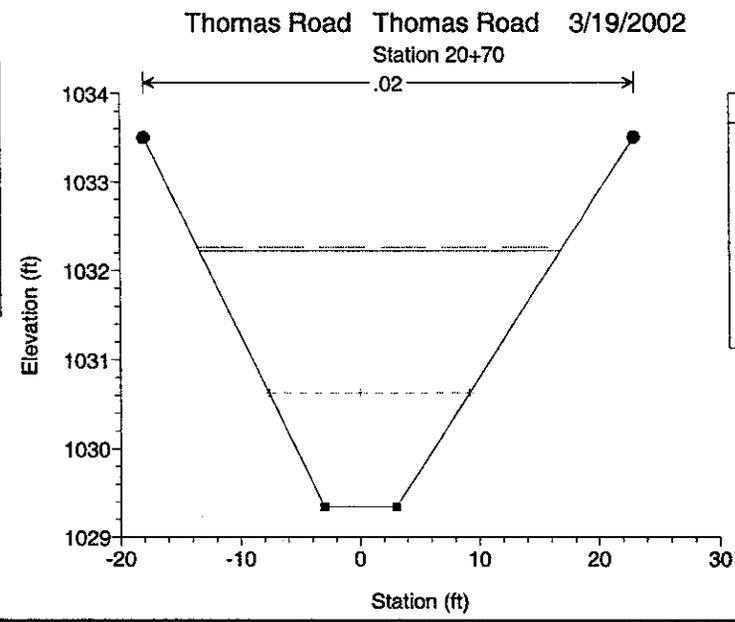
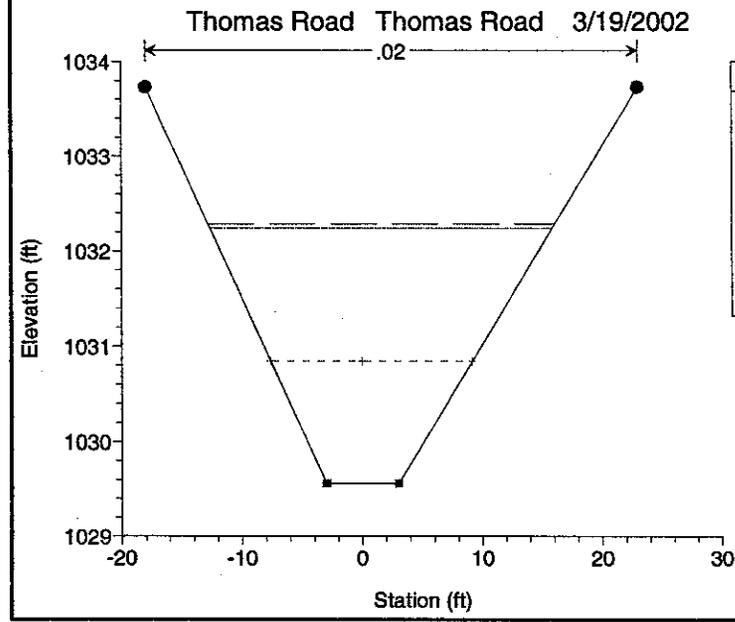
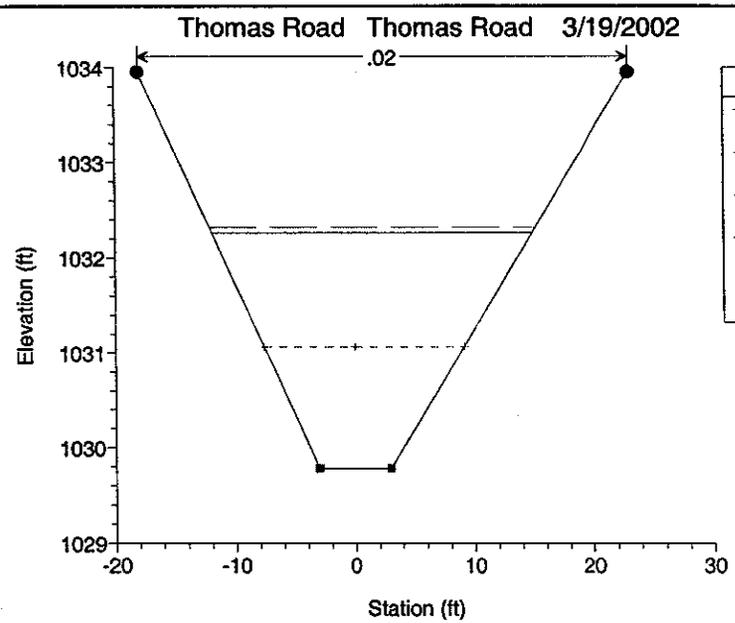
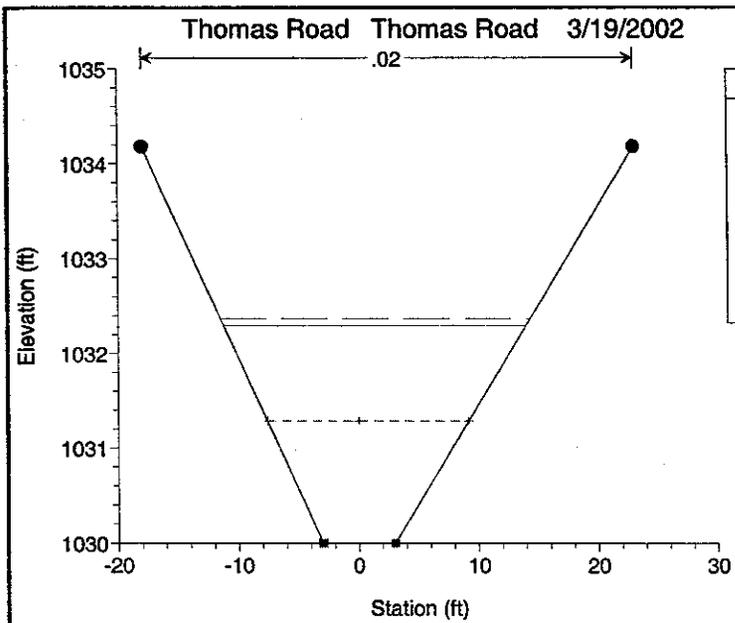
Reach 1

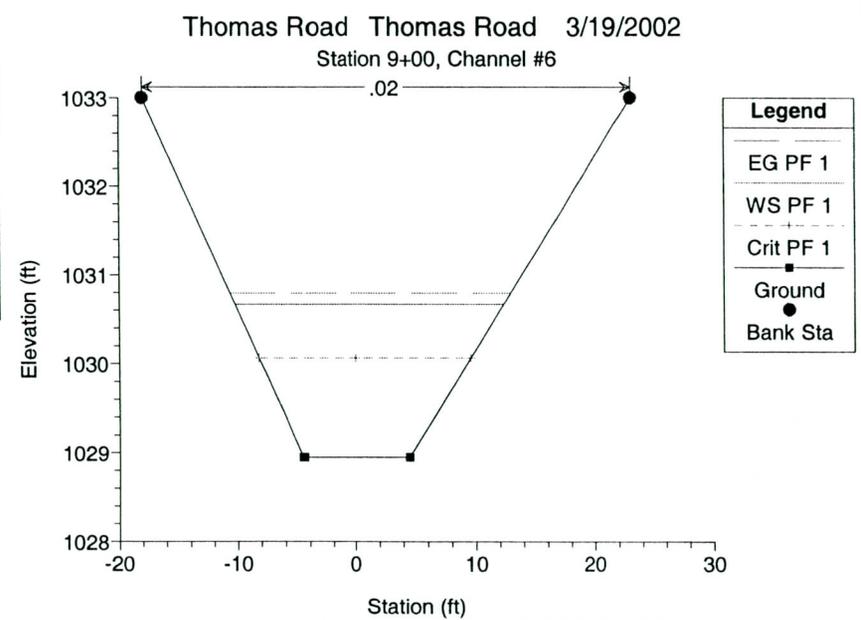
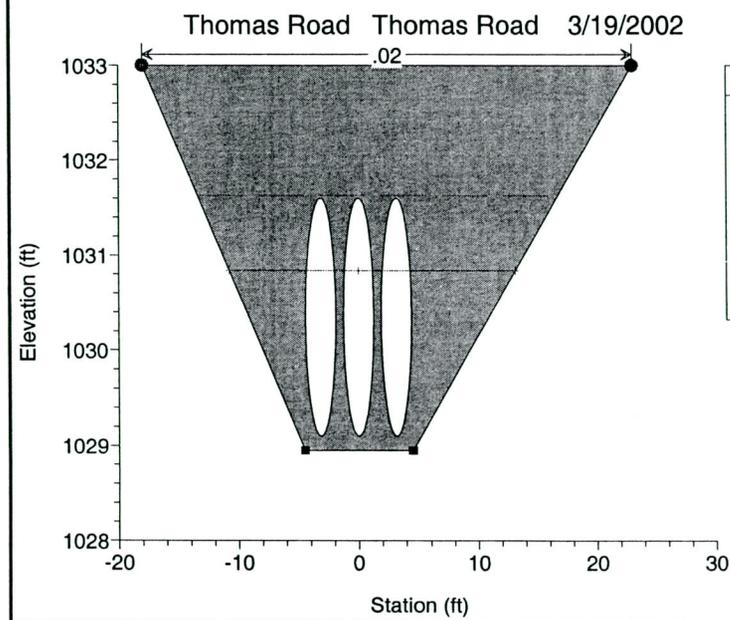
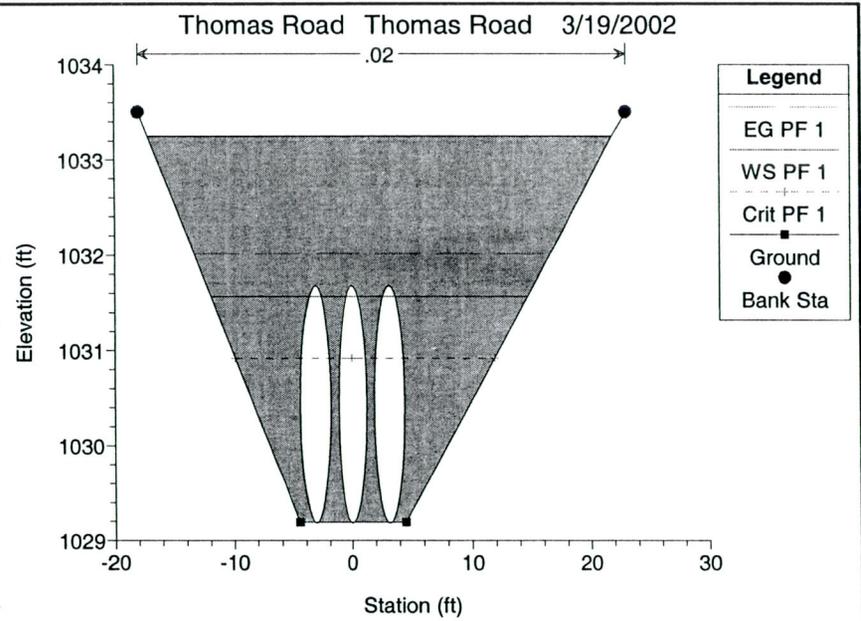
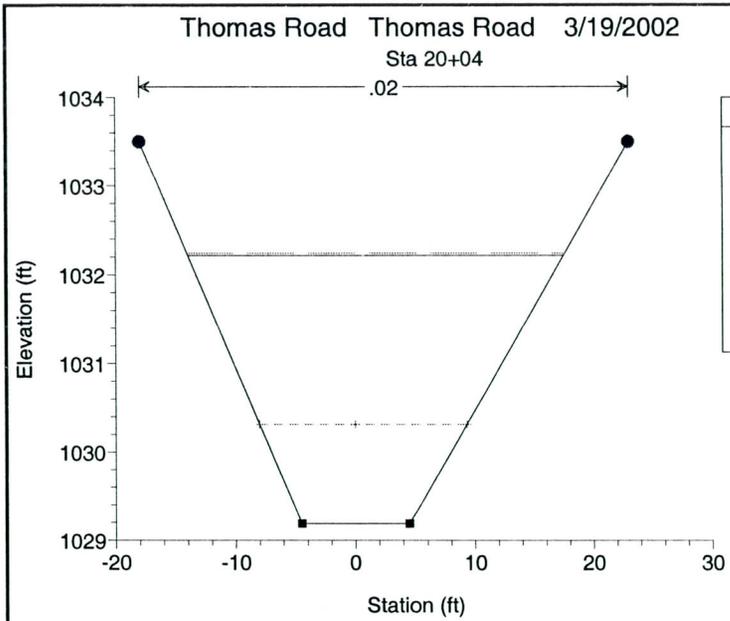


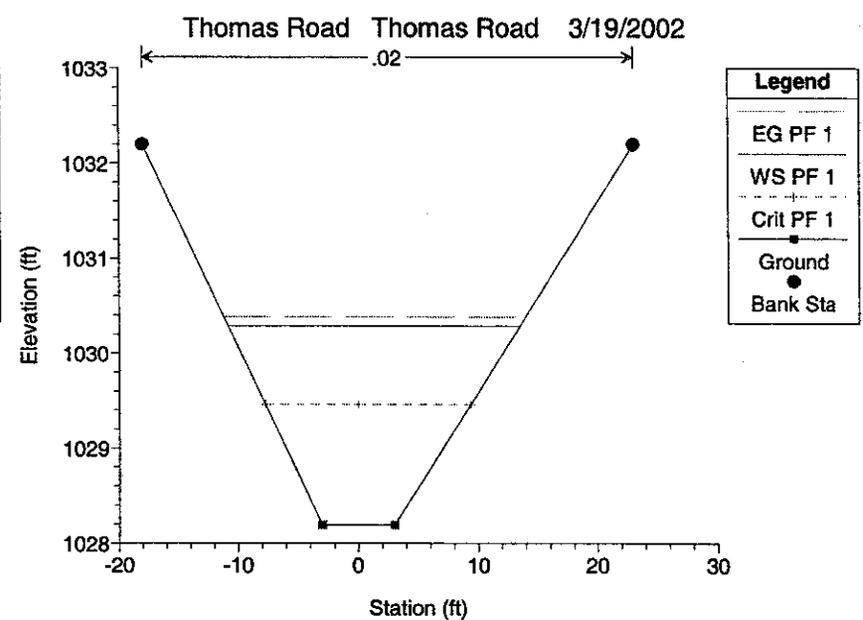
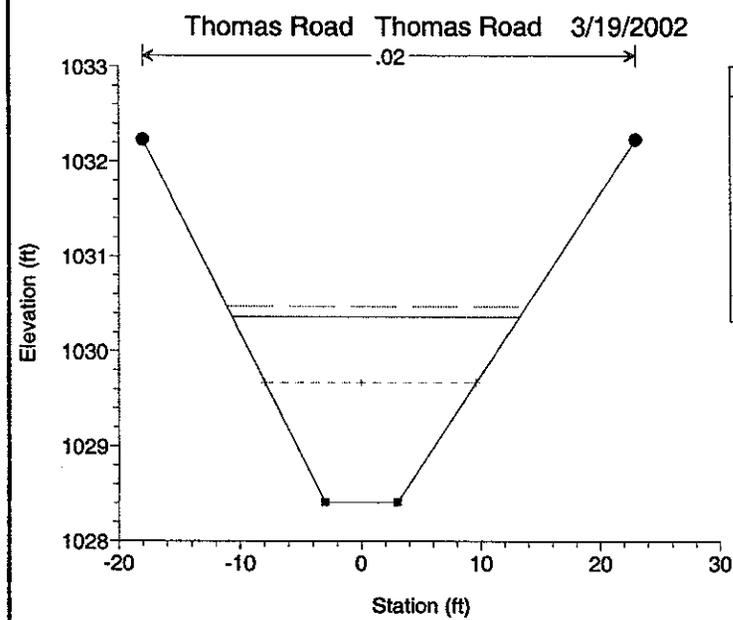
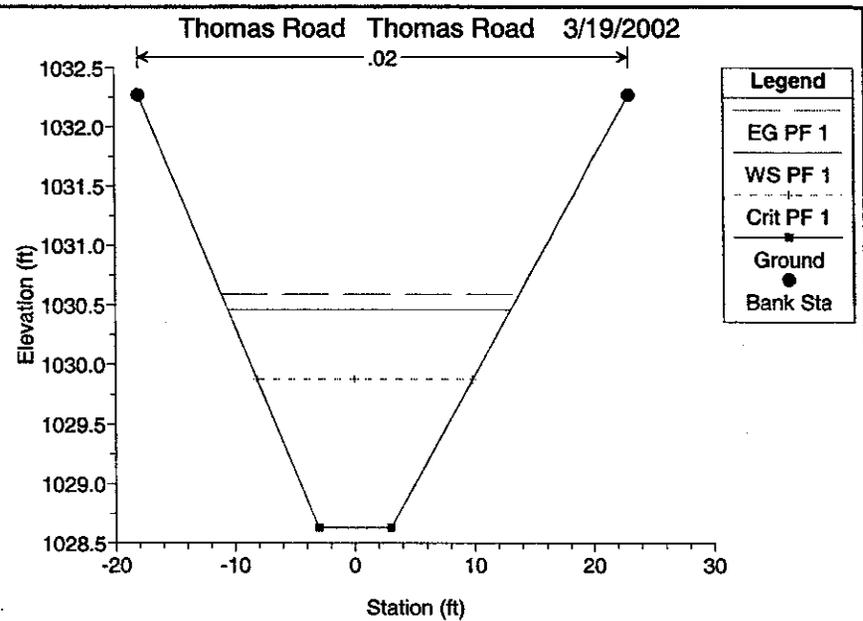
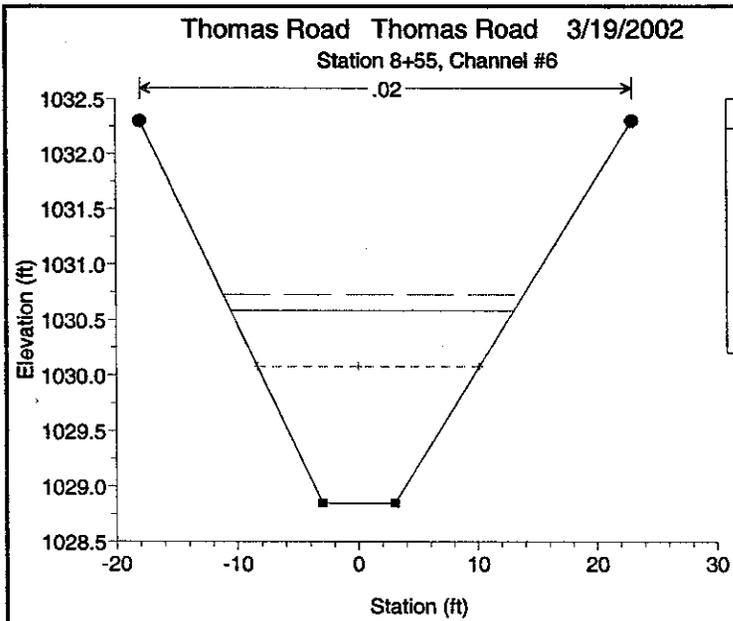
Legend	
EG PF 1
WS PF 1	- . - . - .
Crit PF 1	-----
Ground	■

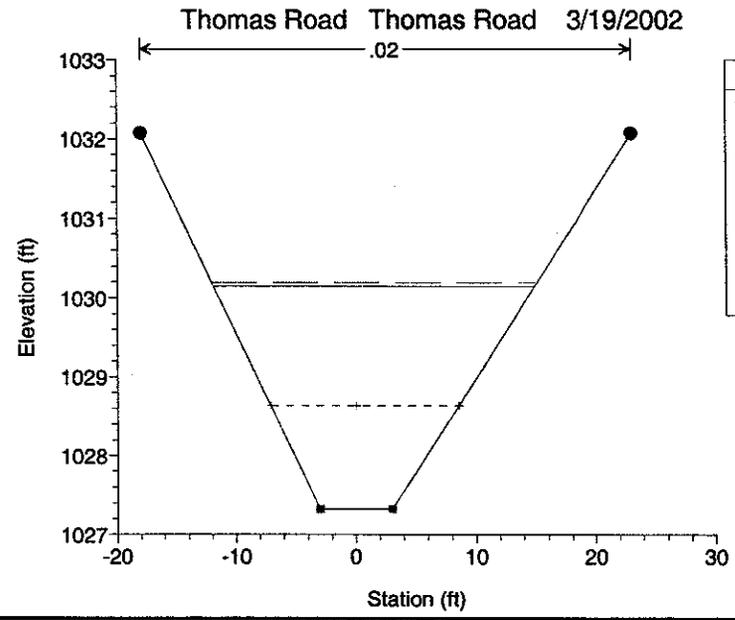
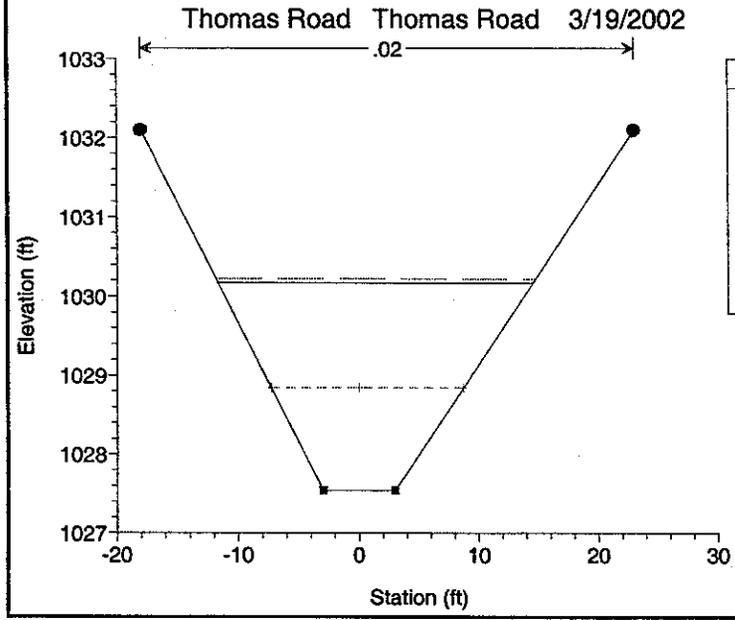
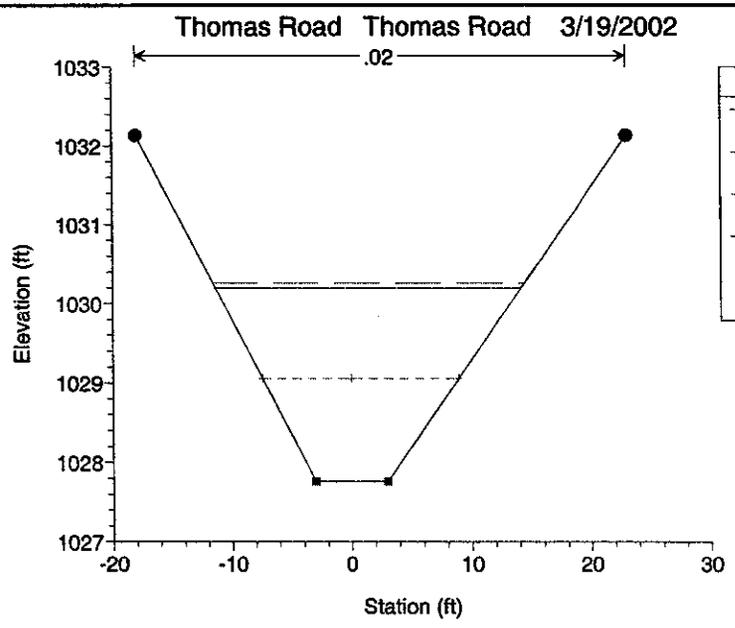
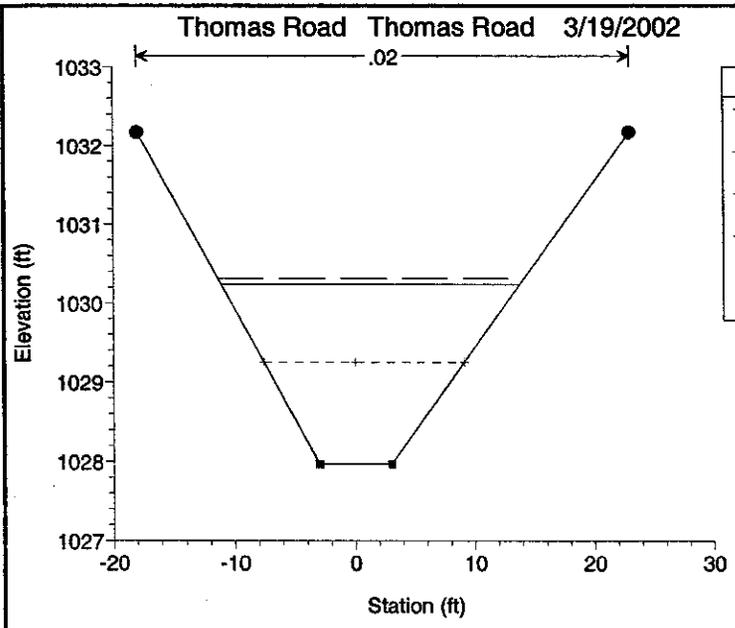


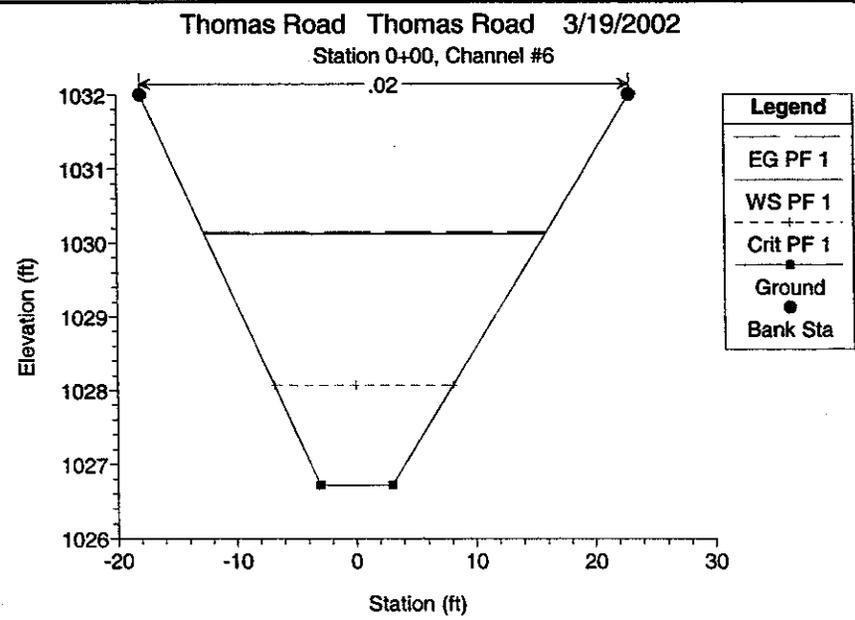
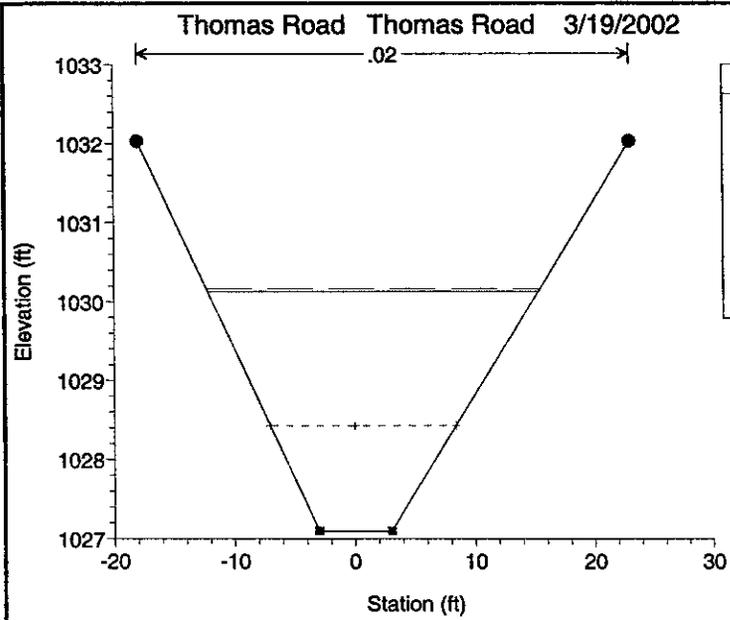






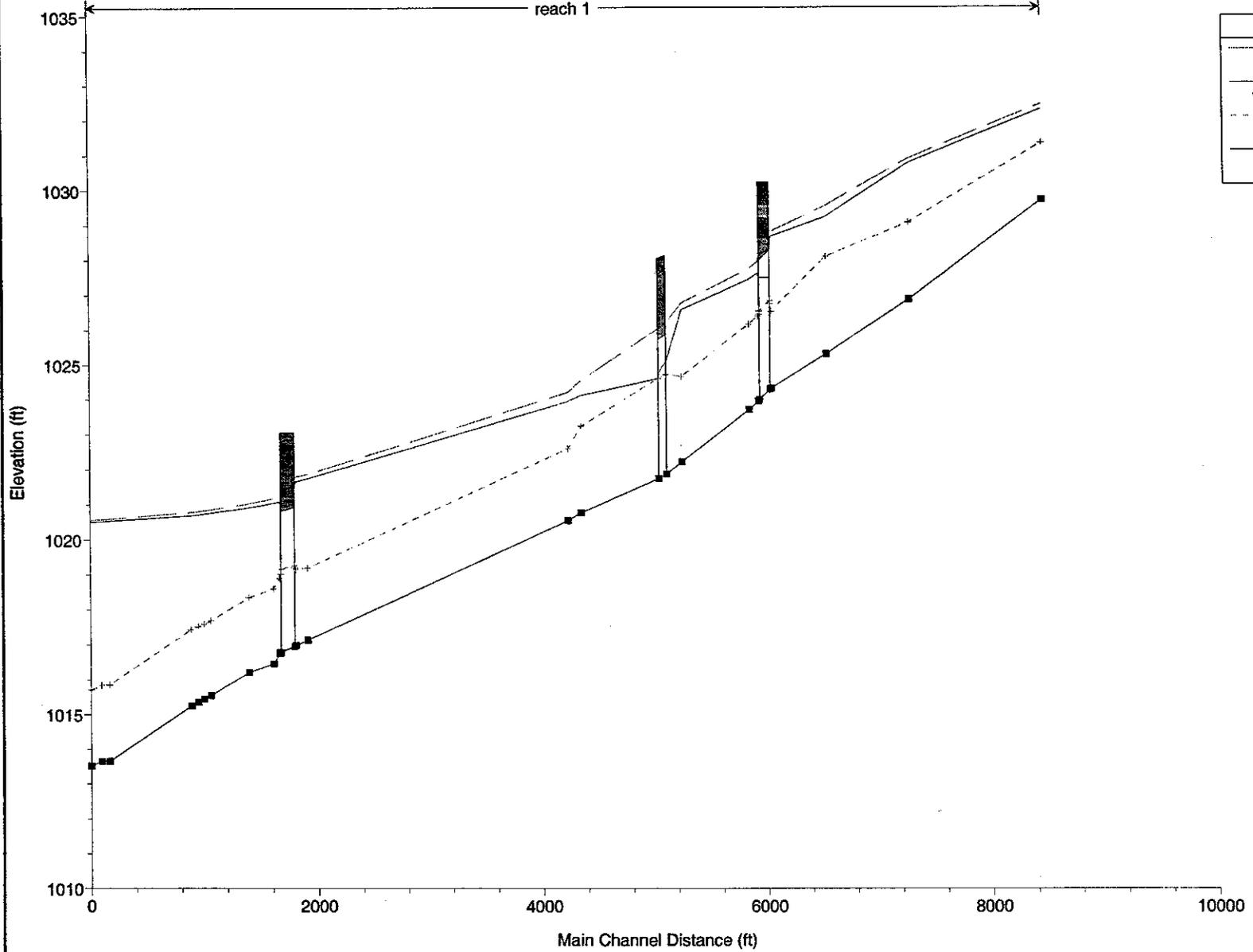




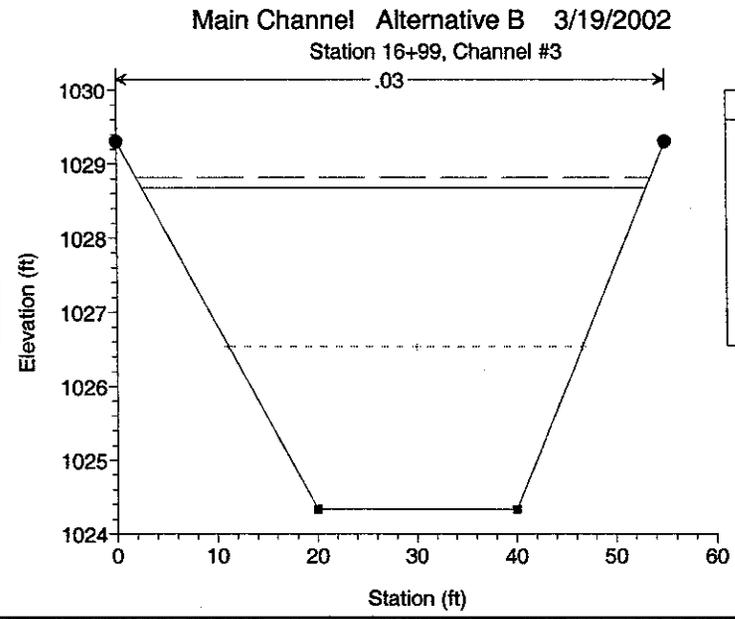
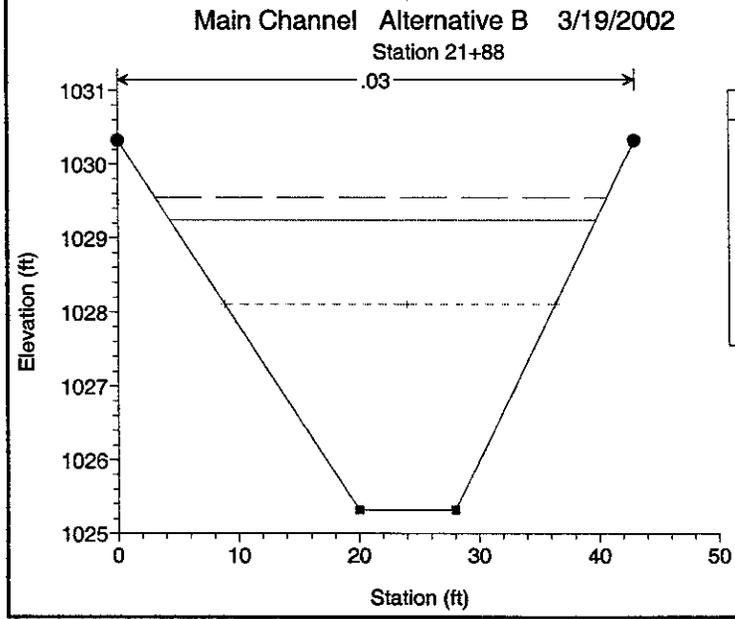
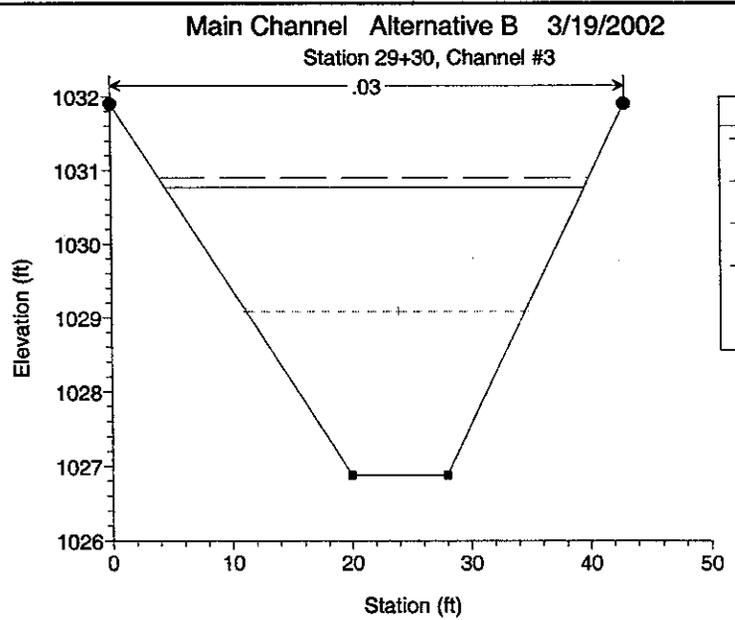
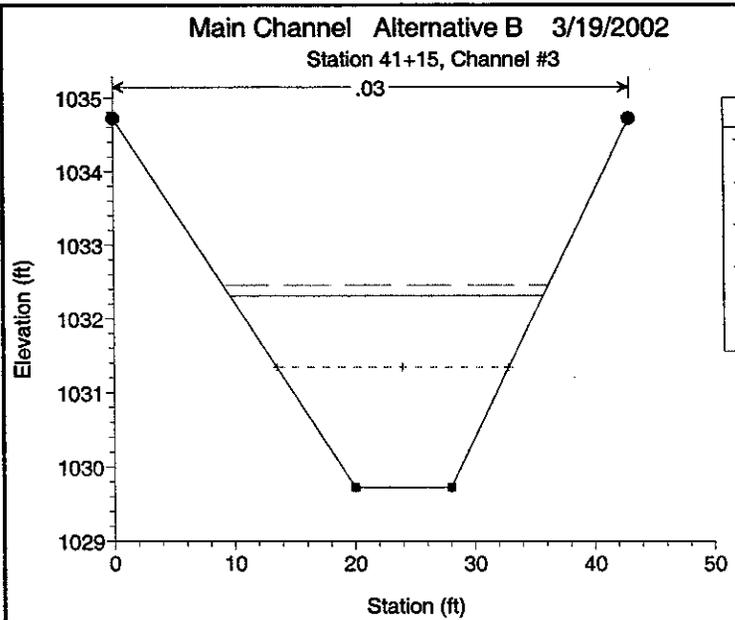


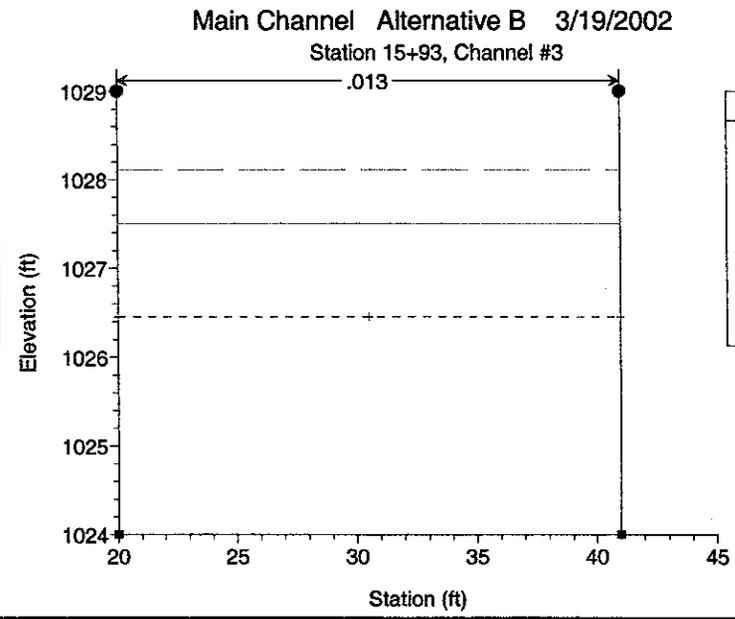
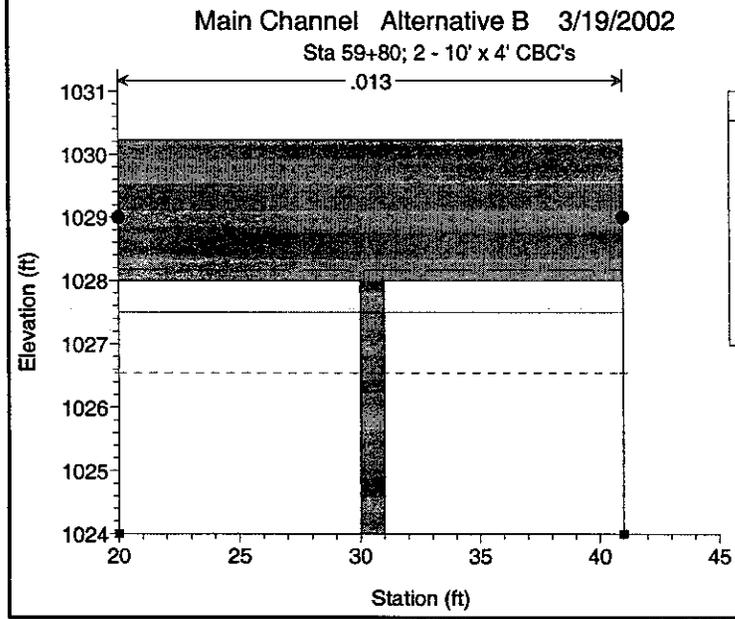
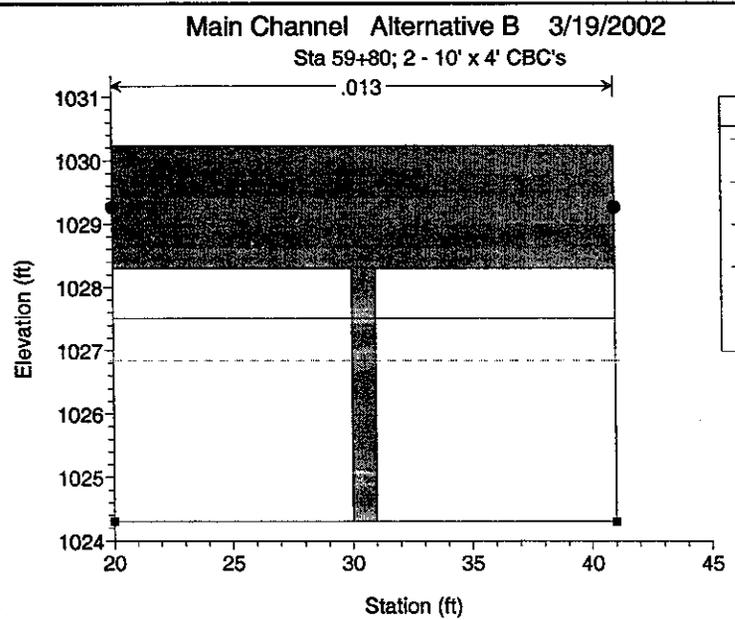
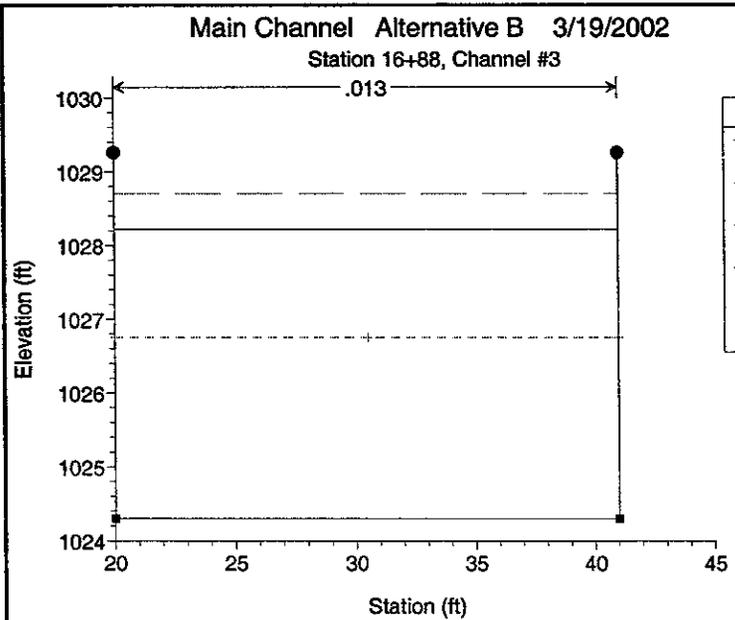
Main Channel Alternative B 3/19/2002

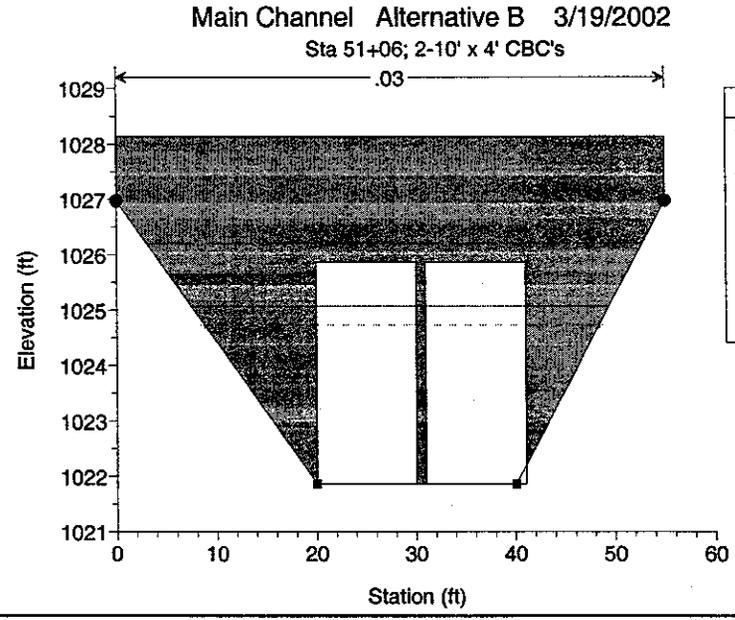
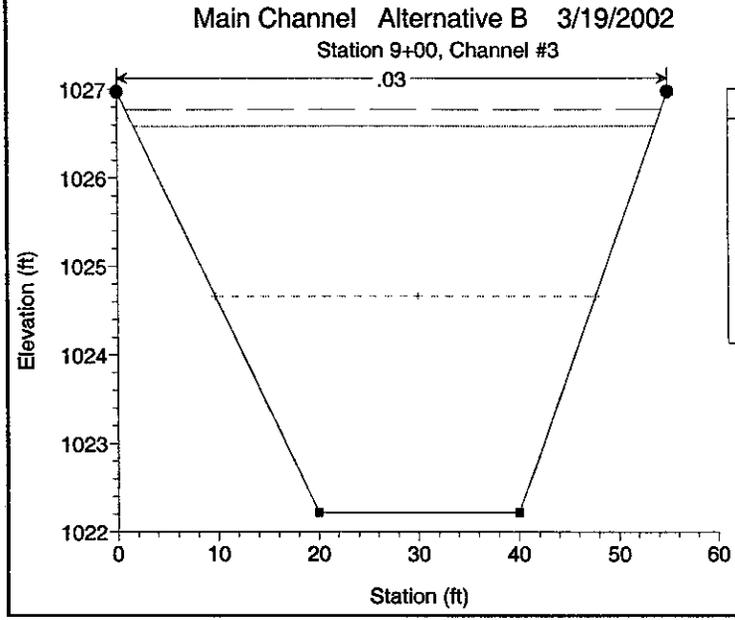
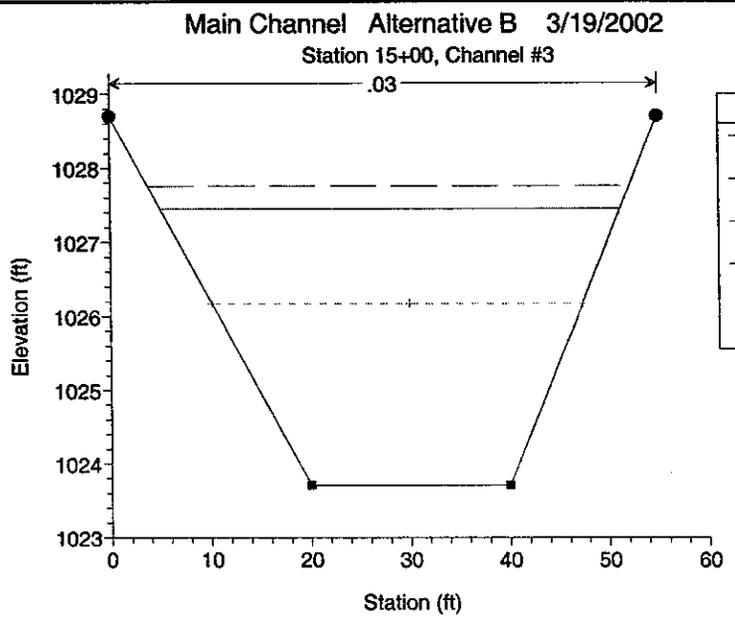
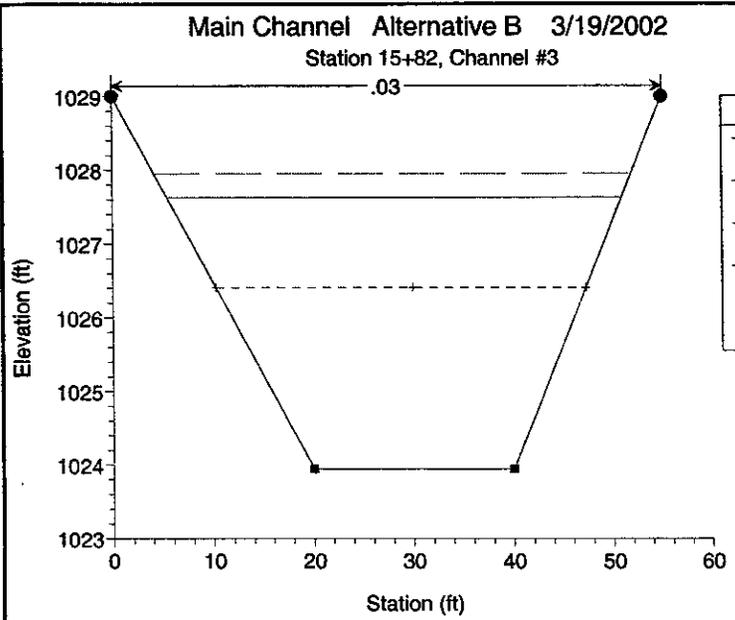
reach 1

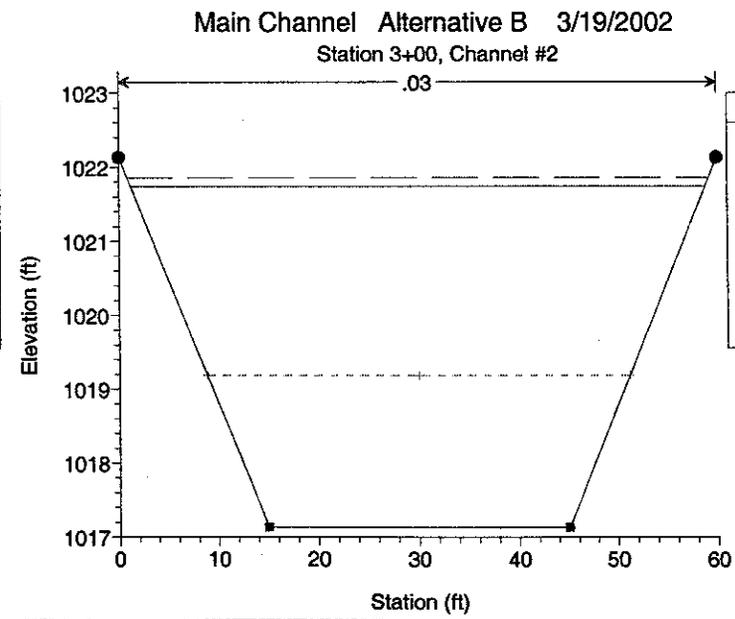
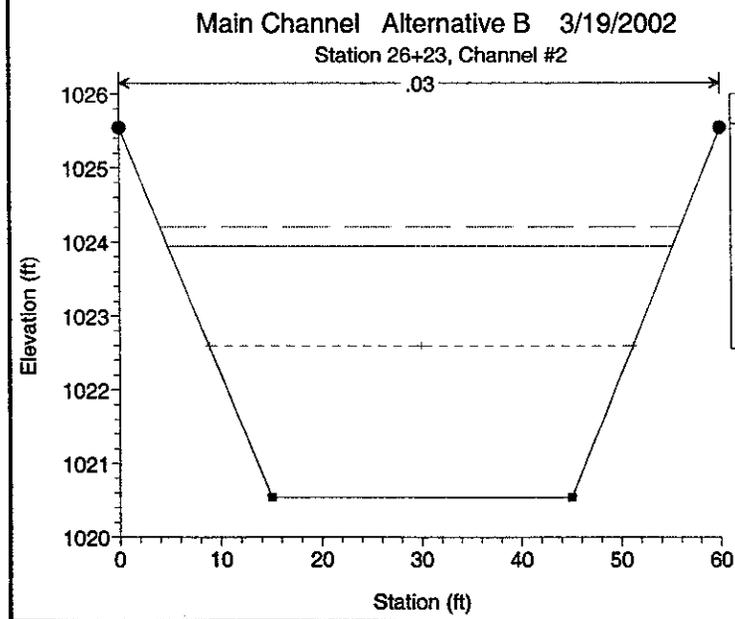
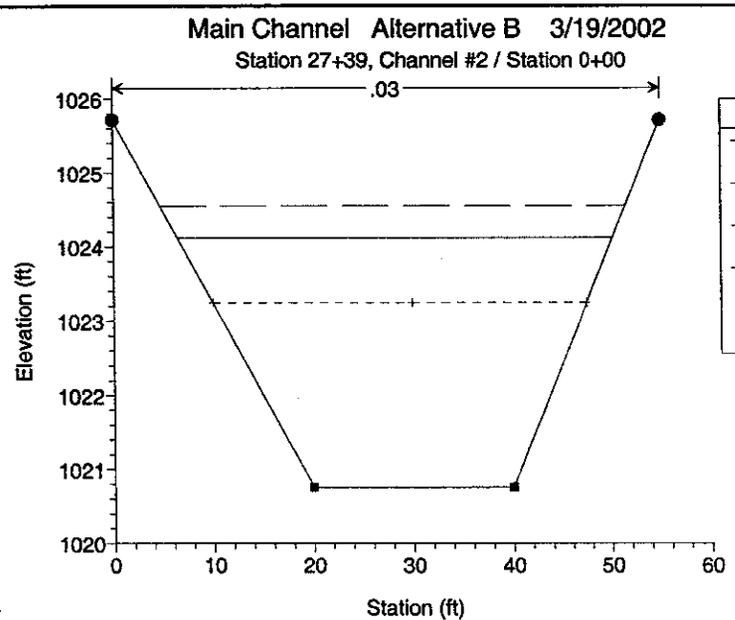
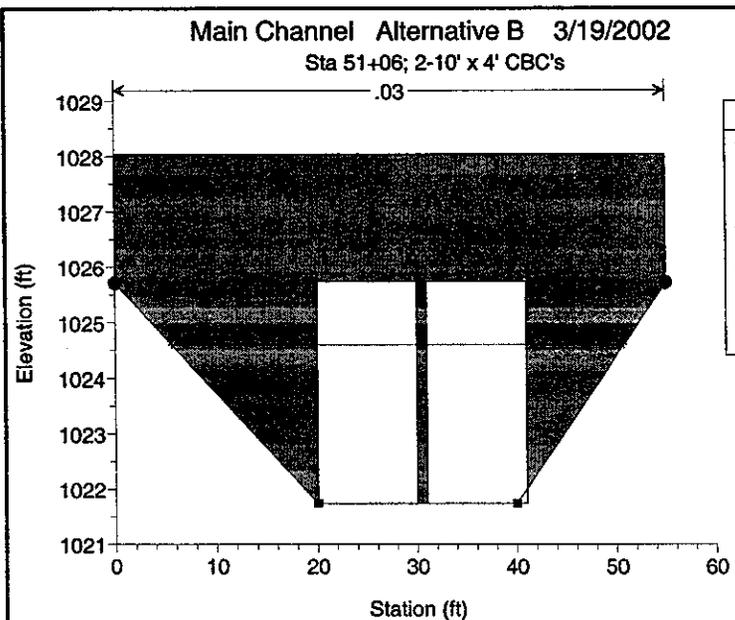


Legend
EG PF 1
WS PF 1
Crit PF 1
Ground



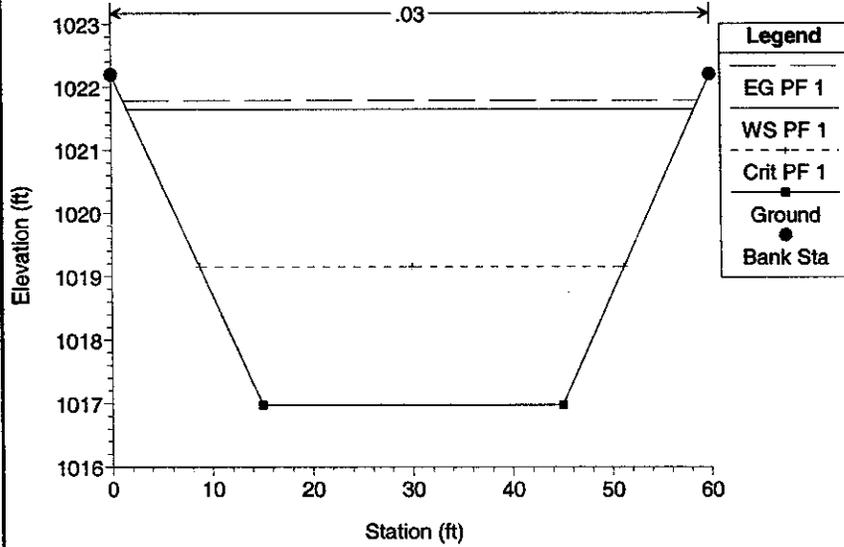






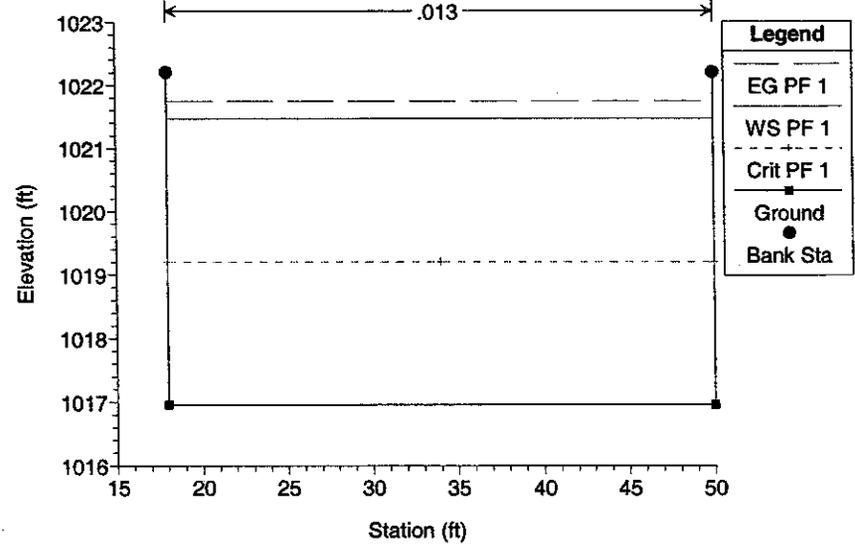
Main Channel Alternative B 3/19/2002

Station 1+98, Channel #2



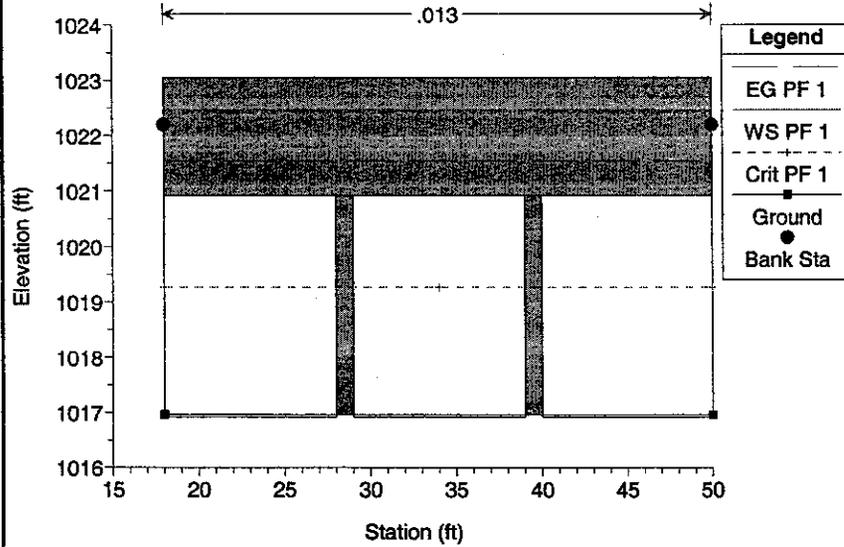
Main Channel Alternative B 3/19/2002

Station 1+87, Channel #2



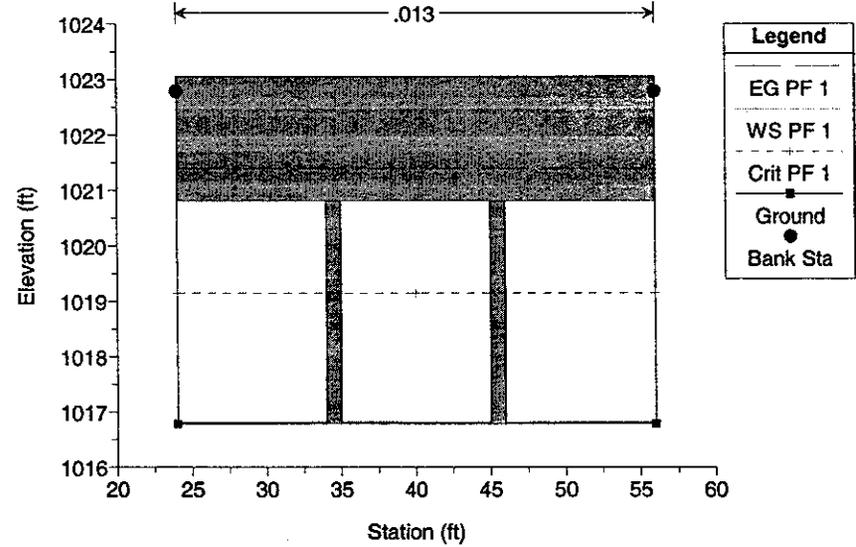
Main Channel Alternative B 3/19/2002

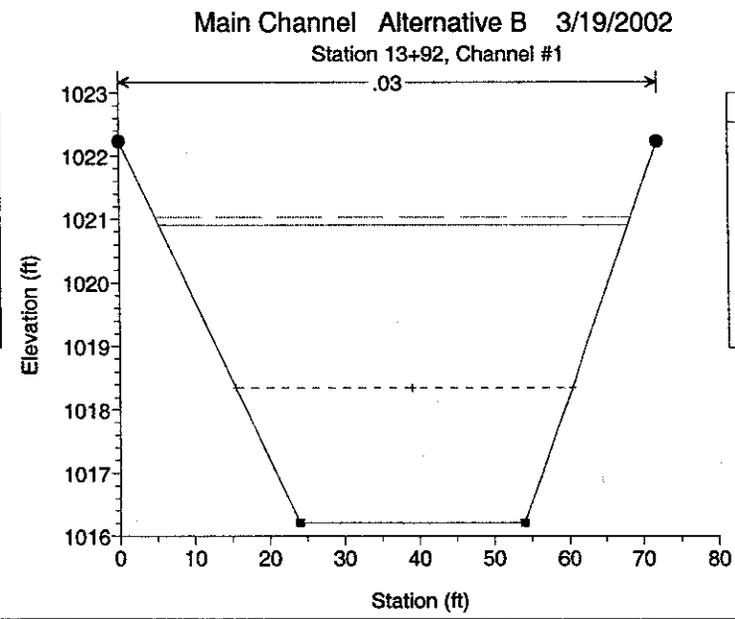
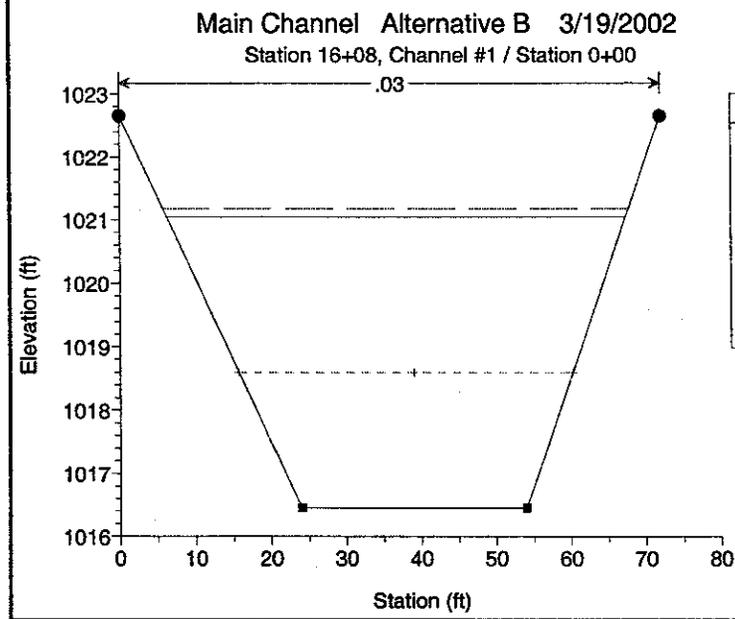
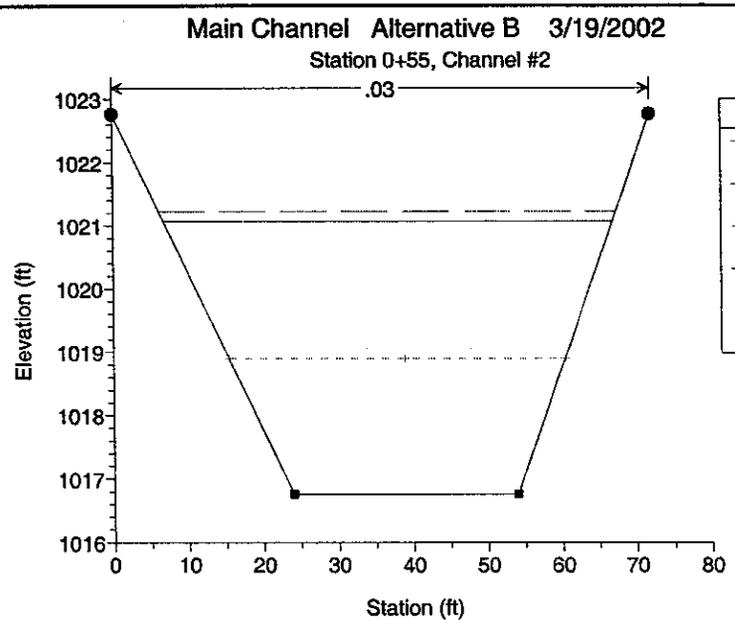
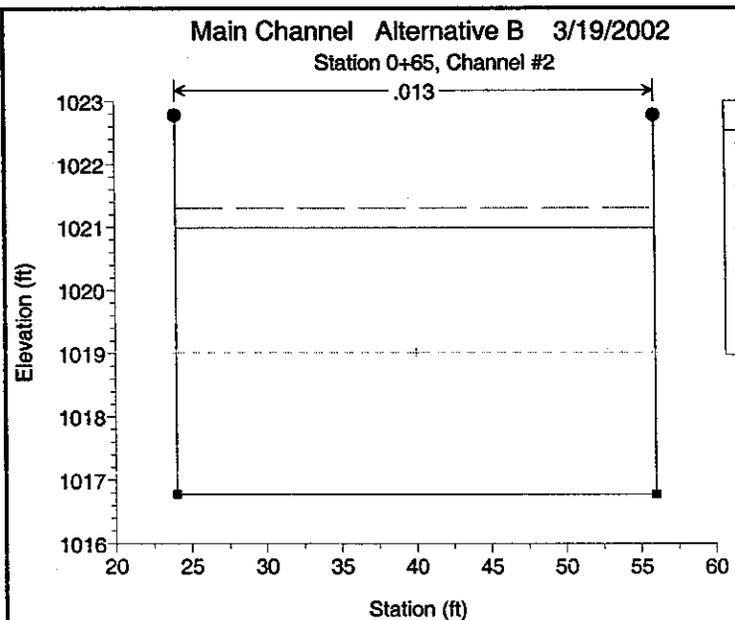
Sta 17+34; 3 - 10' x 4' CBC's

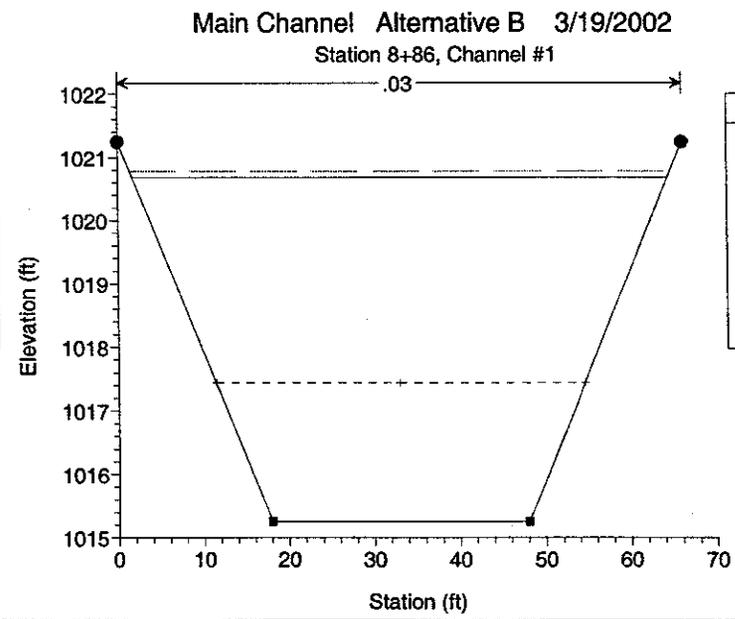
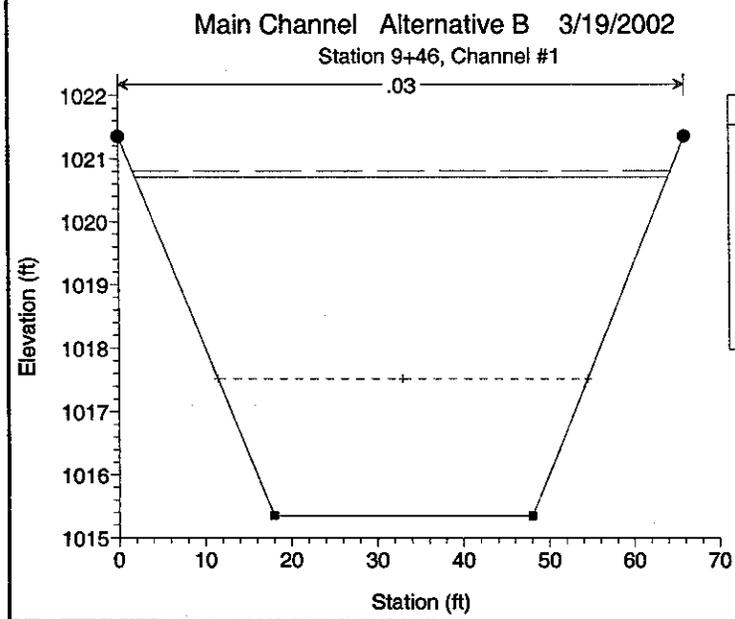
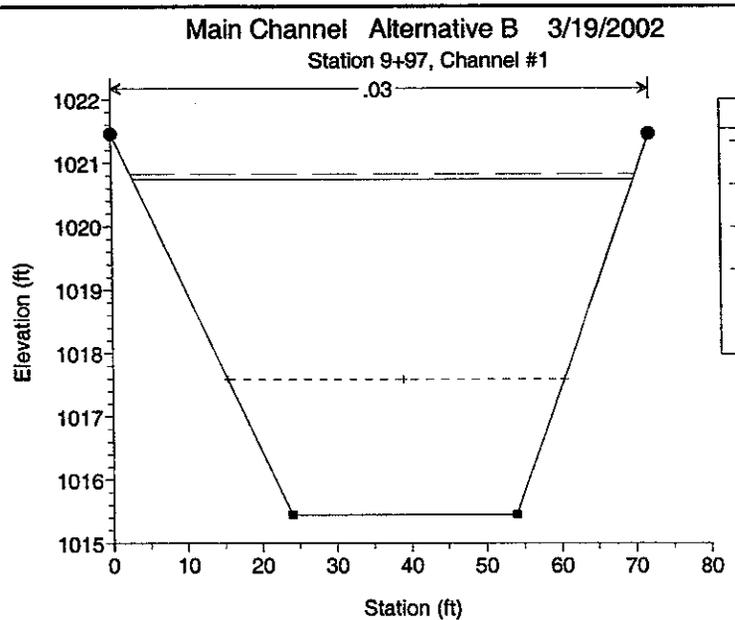
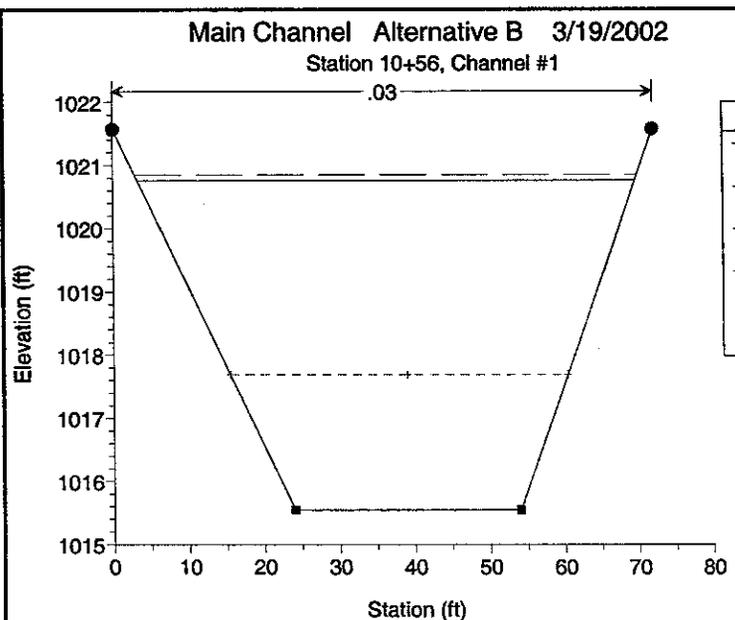


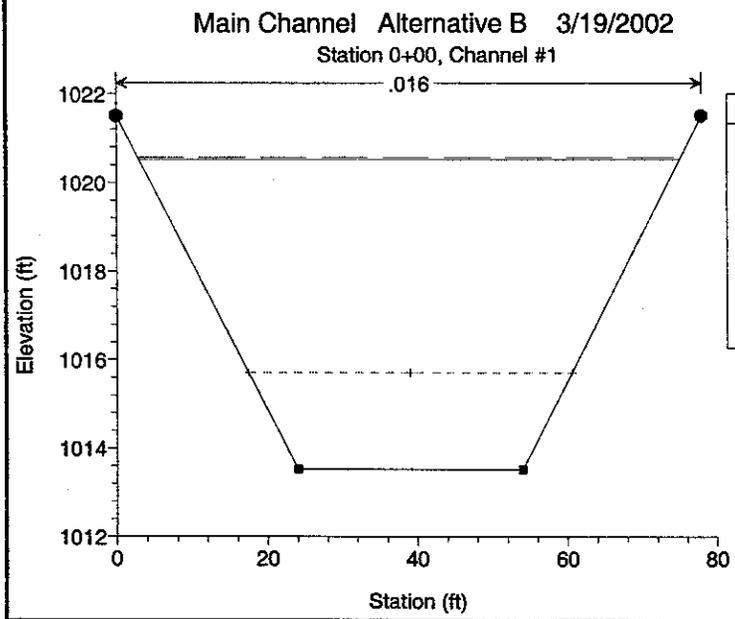
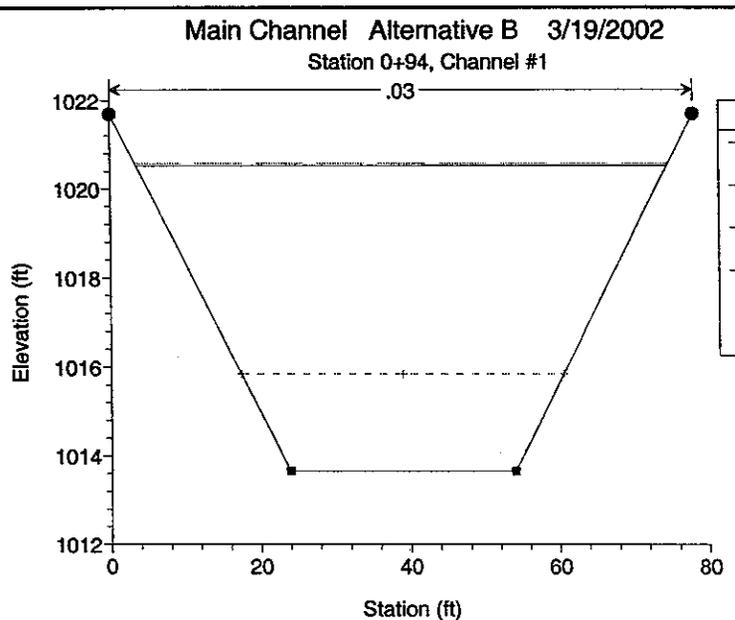
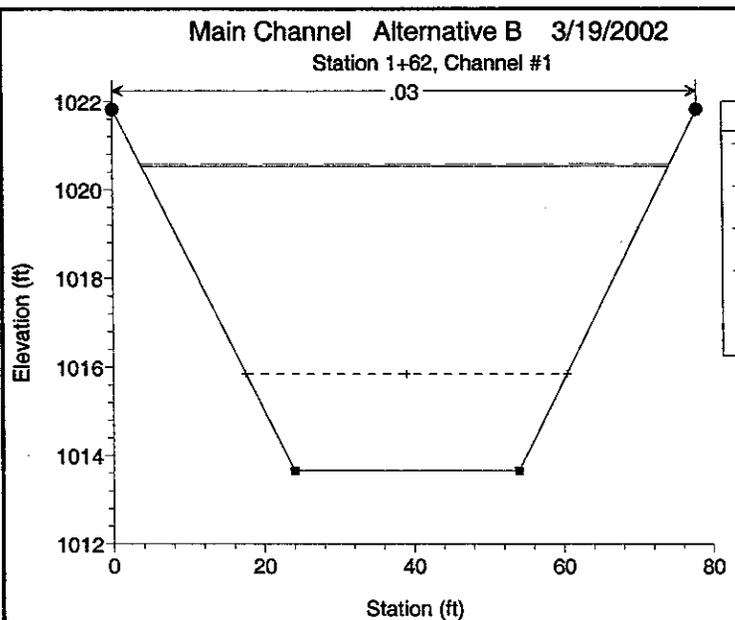
Main Channel Alternative B 3/19/2002

Sta 17+34; 3 - 10' x 4' CBC's









CHANNEL 4
ENCANTO BLVD

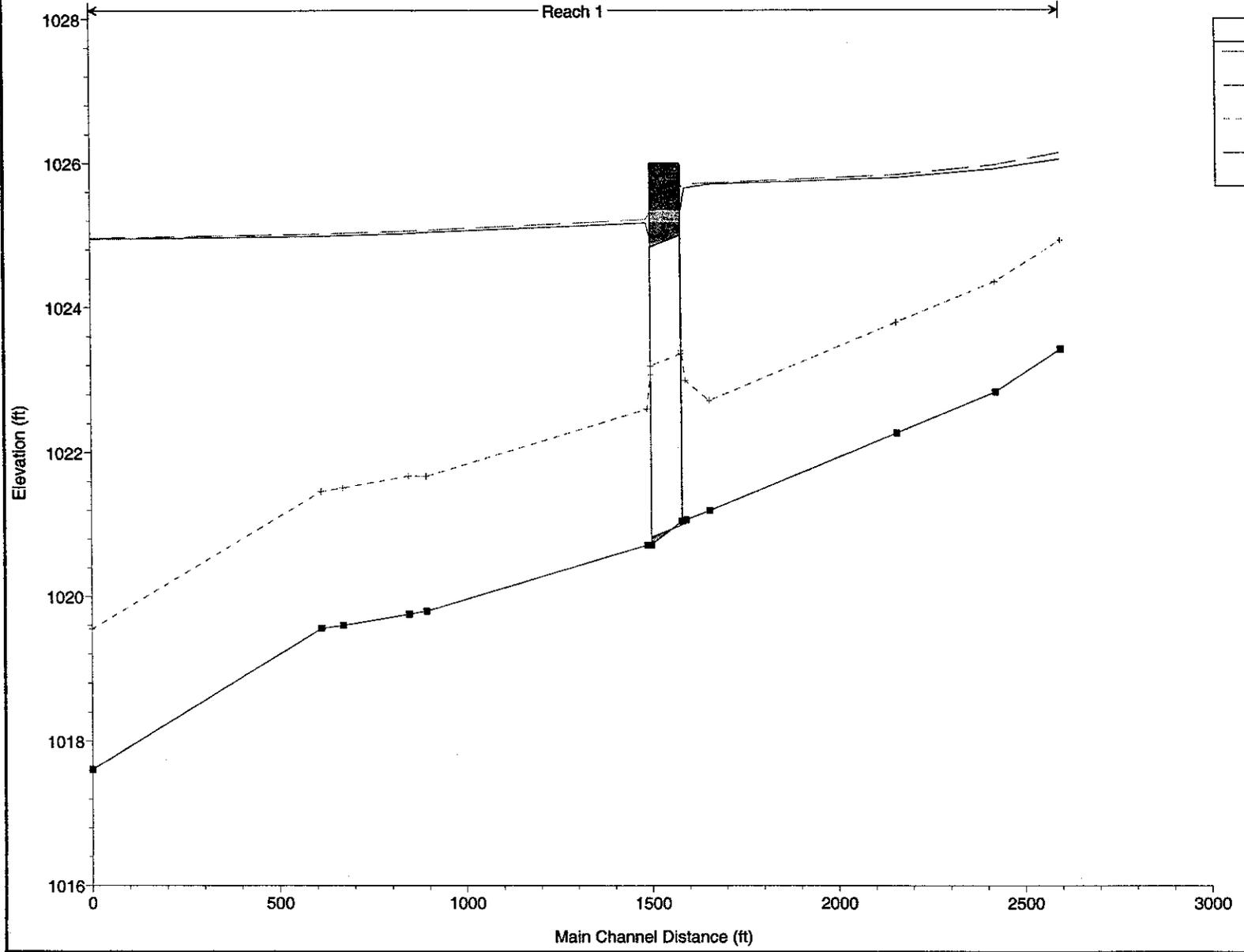
HEC-RAS Plan: #4 (100) River: Encanto Reach: Reach 1

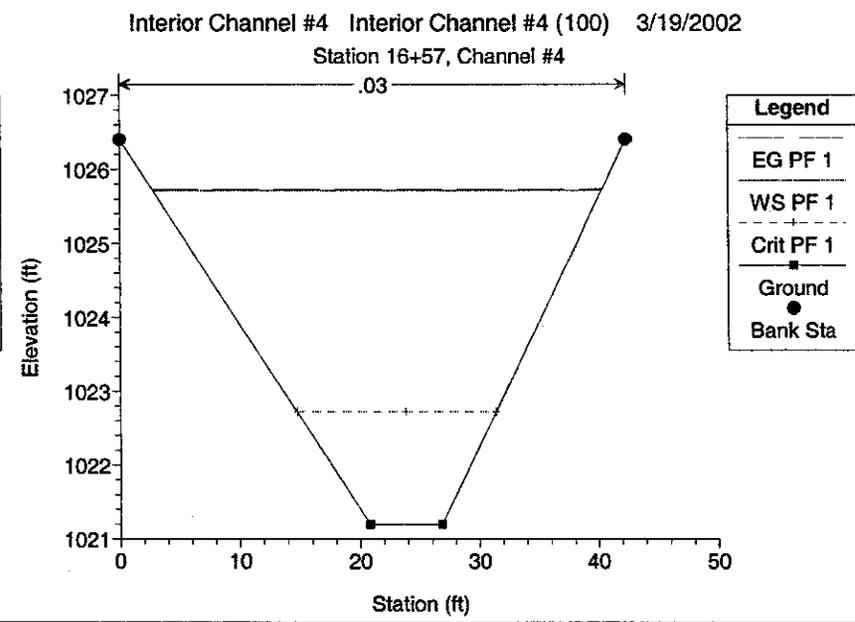
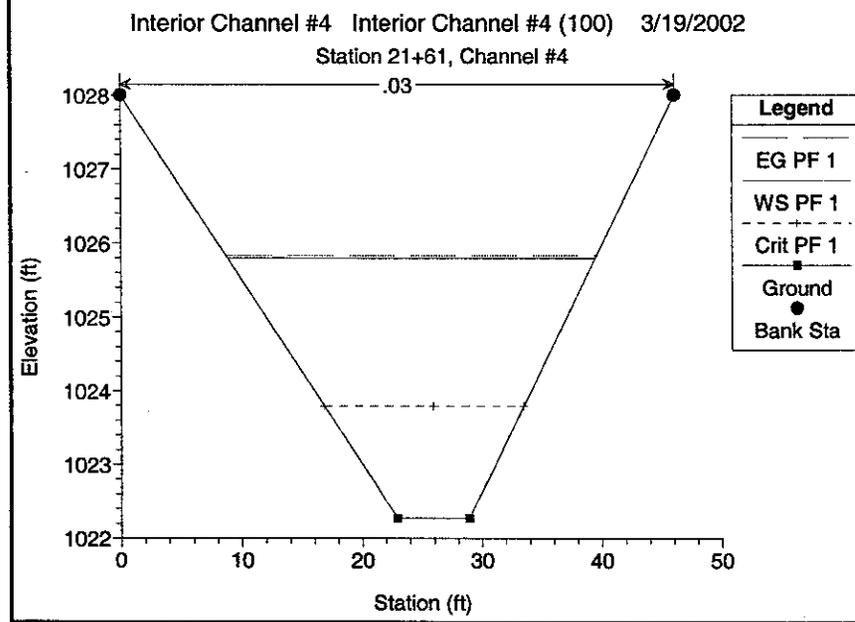
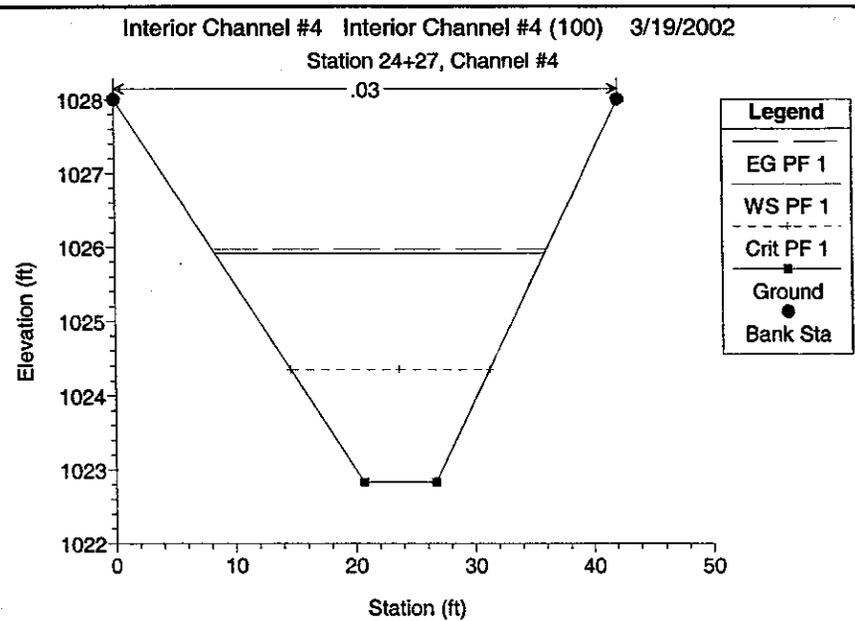
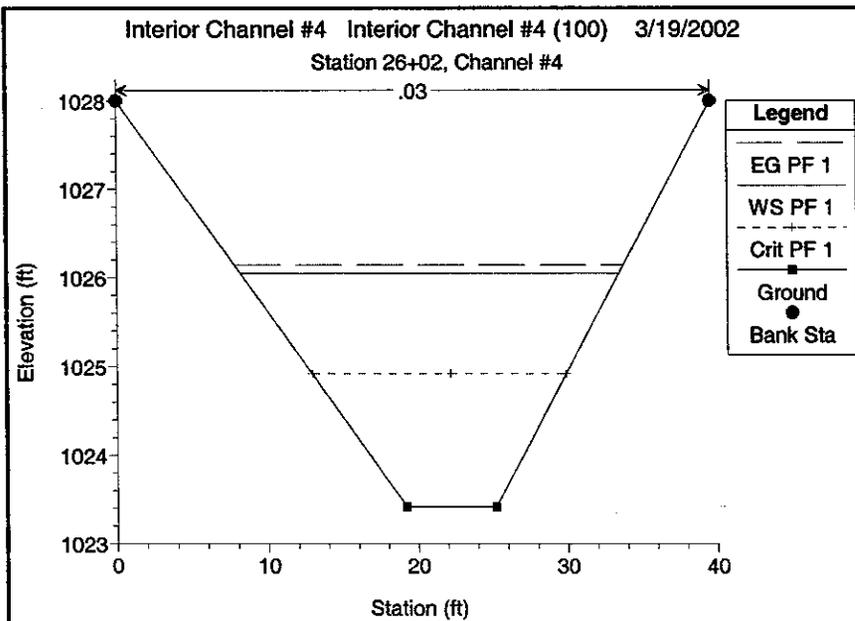
	Flow (cfs)	Water Surface Elevation (ft)	Channel Bottom Elevation (ft)	Flow Depth (ft)	Velocity (ft/s)	Velocity Head (ft)	Total Head (ft)	Top Width (ft)	Friction Slope	
	100.00	1023.42	1026.05	1024.92	1026.14	0.001303	2.43	41.18	25.30	0.34
	100.00	1022.83	1025.91	1024.35	1025.97	0.000684	1.93	51.80	27.59	0.25
	100.00	1022.27	1025.80	1023.79	1025.83	0.000376	1.55	64.67	30.68	0.19
	100.00	1021.20	1025.71	1022.72	1025.73	0.000122	1.02	98.29	37.58	0.11
	206.00	1021.07	1025.65	1022.99	1025.71	0.000372	1.89	108.85	37.51	0.20
	206.00	1021.05	1025.31	1023.41	1025.67	0.000590	4.84	42.58	10.00	0.41
	Culvert									
	206.00	1020.72	1024.95	1023.07	1025.32	0.000600	4.87	42.31	10.00	0.42
	206.00	1020.72	1025.17	1022.60	1025.22	0.000360	1.81	113.62	41.09	0.19
	206.00	1019.80	1025.04	1021.67	1025.07	0.000169	1.36	151.48	47.79	0.13
	206.00	1019.76	1025.03	1021.67	1025.06	0.000195	1.48	139.40	42.92	0.14
	206.00	1019.60	1025.00	1021.51	1025.03	0.000174	1.42	145.47	43.90	0.14
	206.00	1019.56	1024.99	1021.46	1025.02	0.000162	1.37	150.40	45.41	0.13
	206.00	1017.61	1024.95	1019.55	1024.96	0.000050	0.91	227.51	51.99	0.08

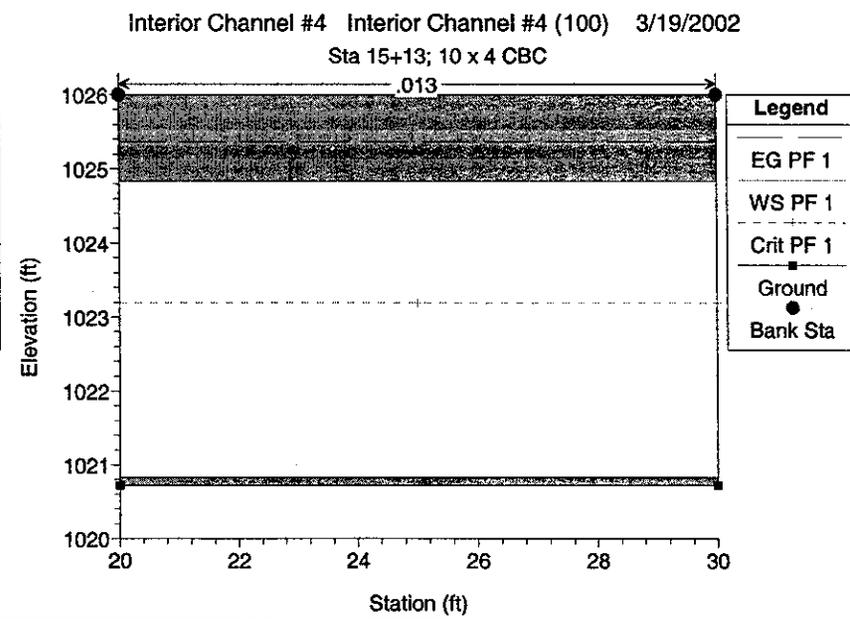
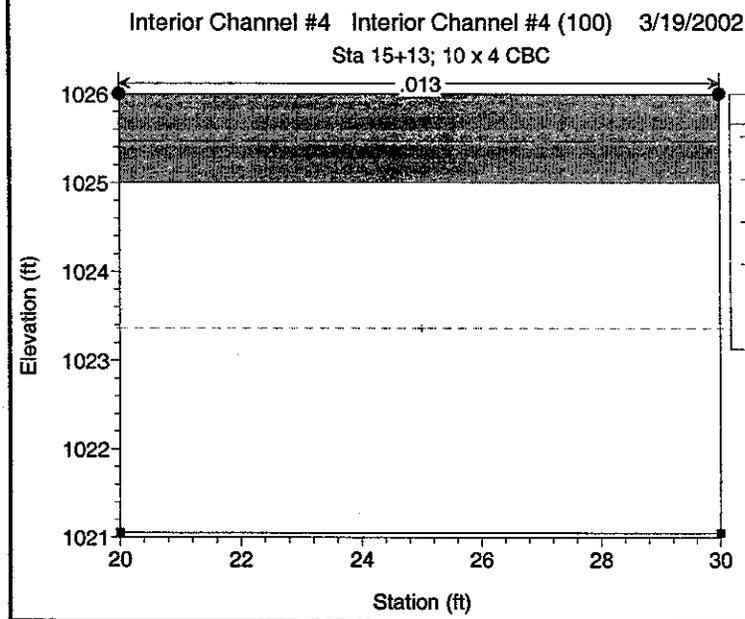
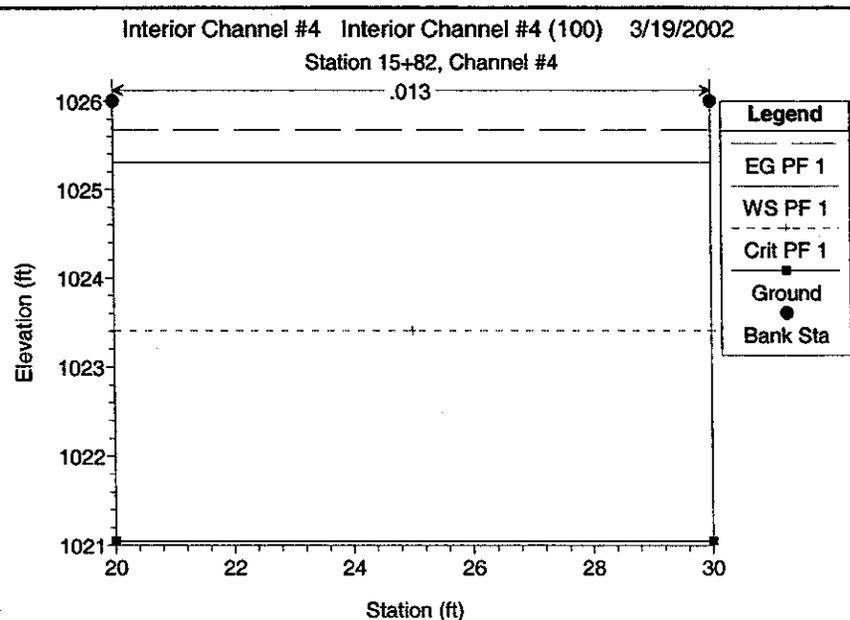
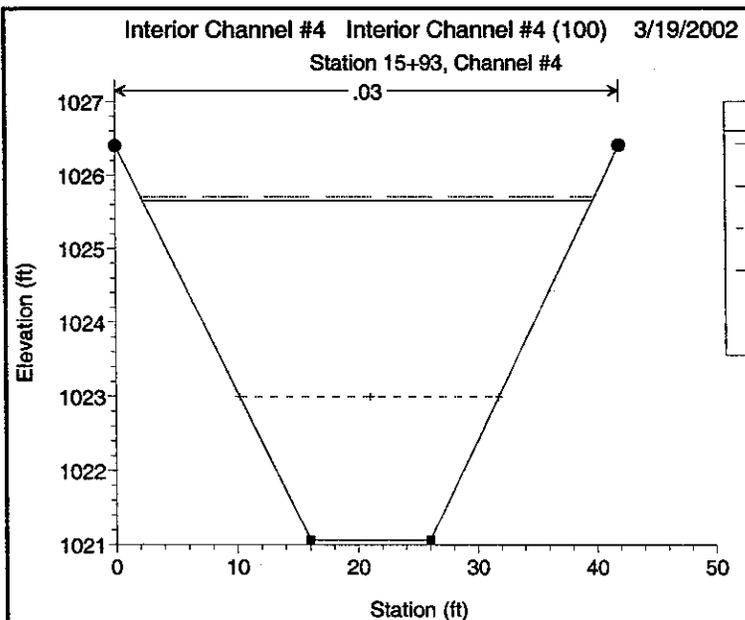
Interior Channel #4 Interior Channel #4 (100) 3/19/2002

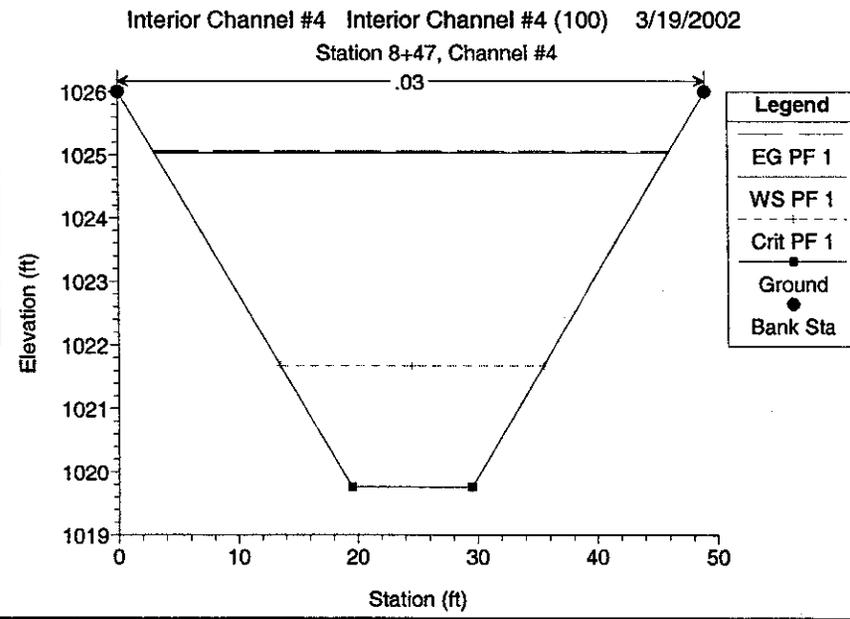
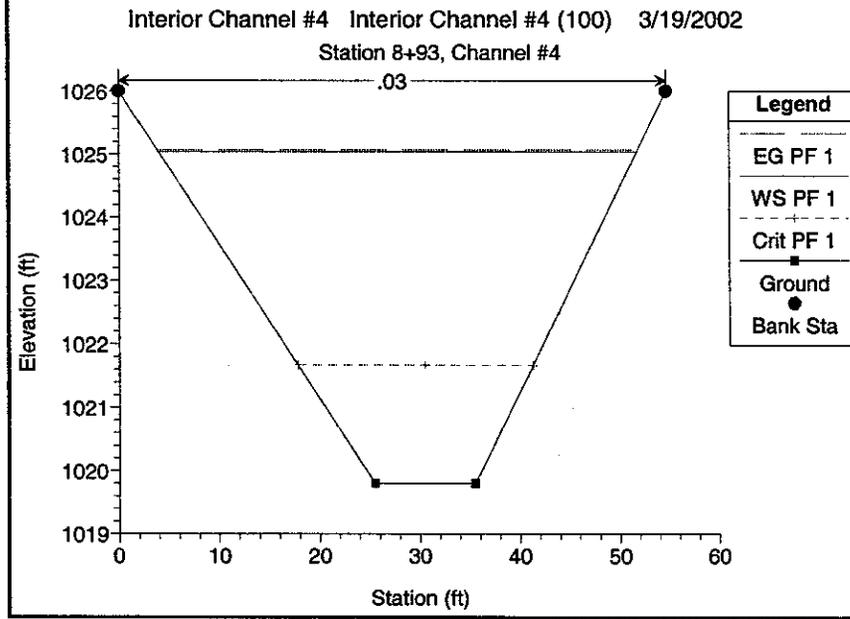
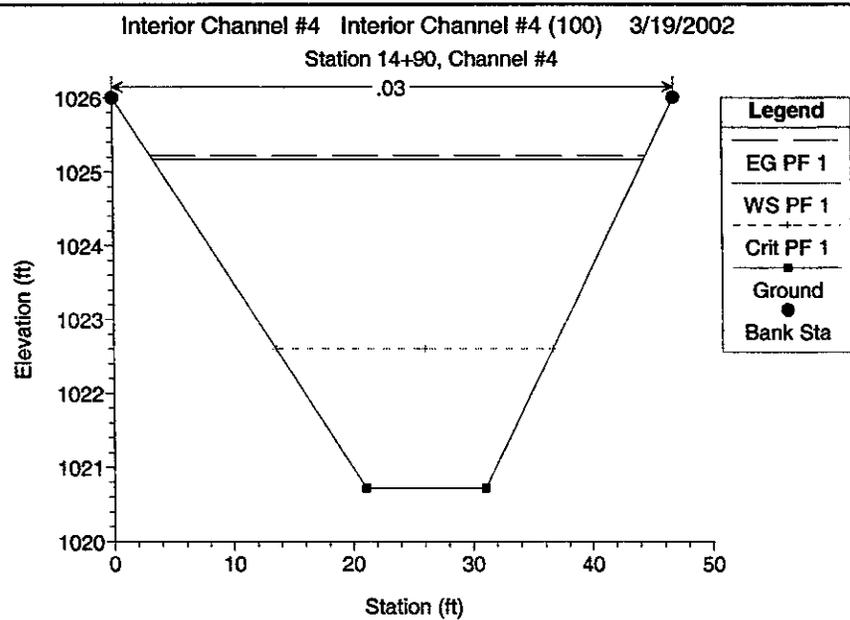
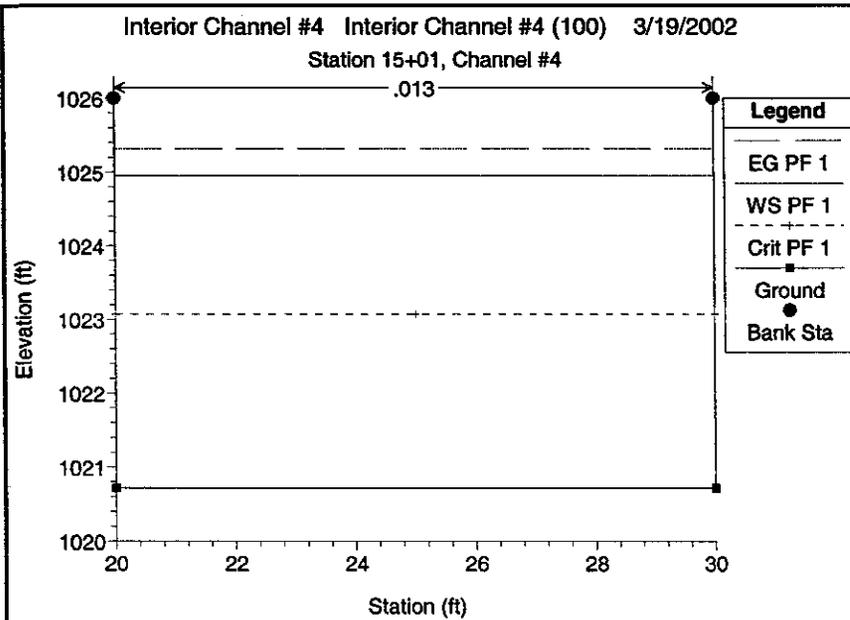
Reach 1

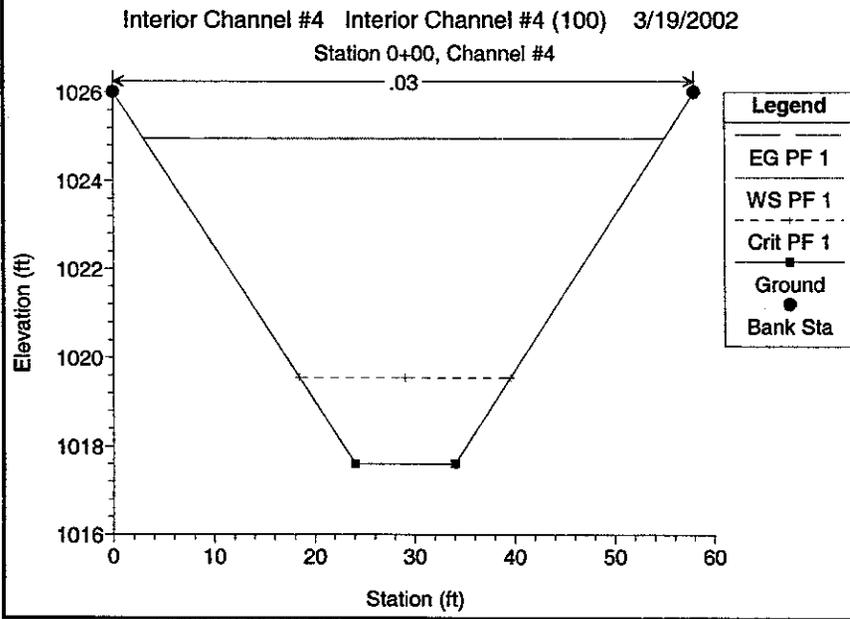
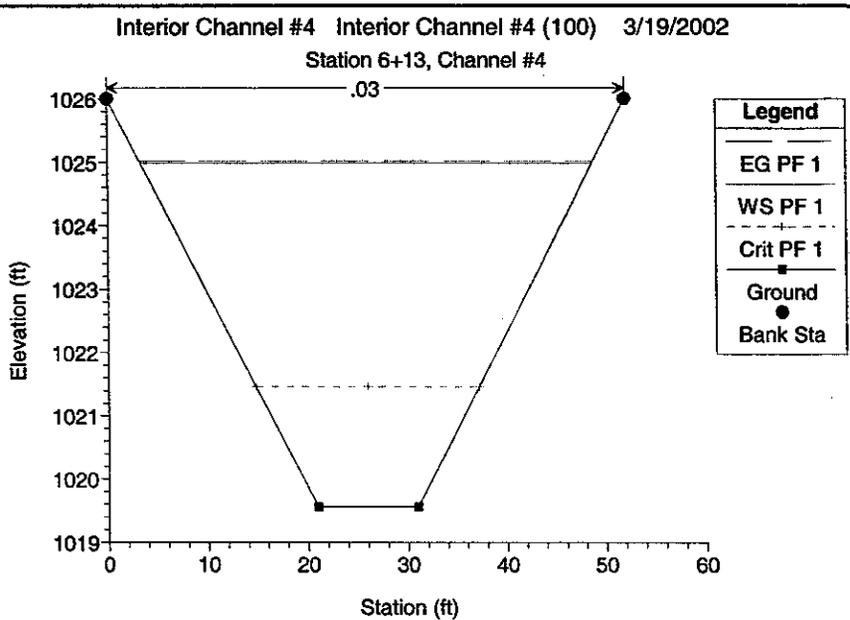
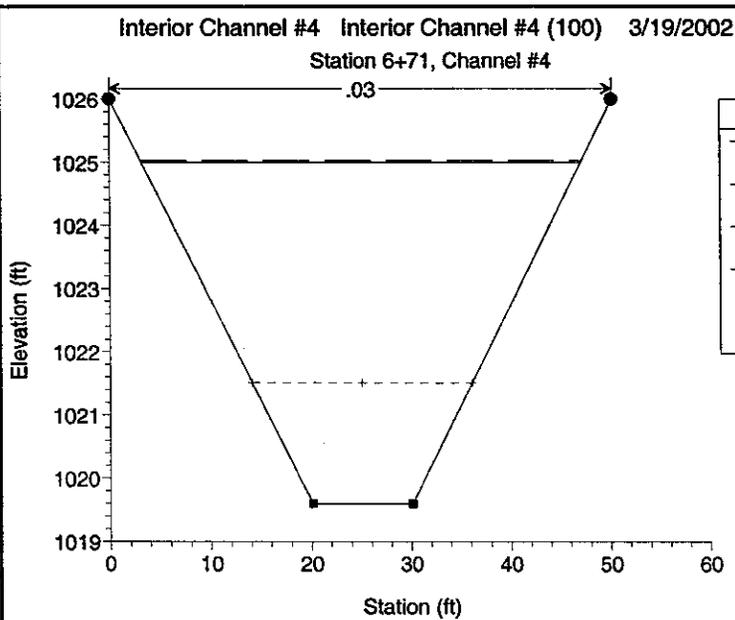
Legend	
EG PF 1	—
WS PF 1	- - -
Crit PF 1	- · -
Ground	■











CHANNEL 5

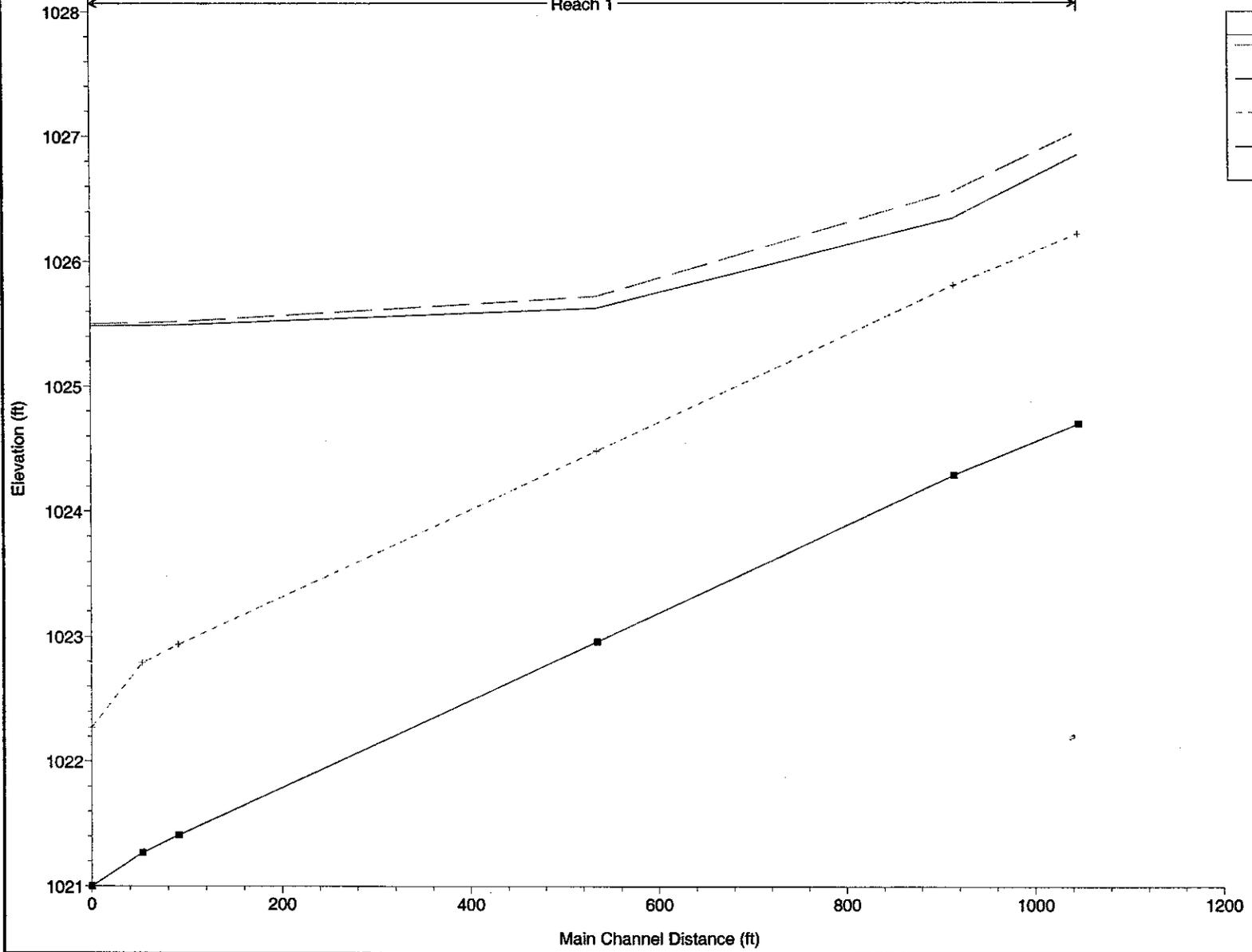
93rd AVE

HEC-RAS Plan: #5(100) River: 93rd Reach: Reach 1

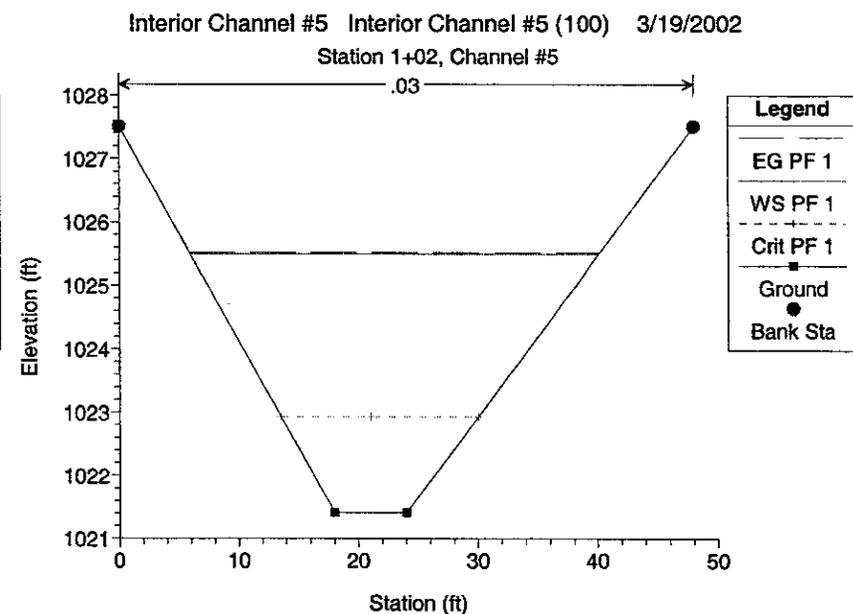
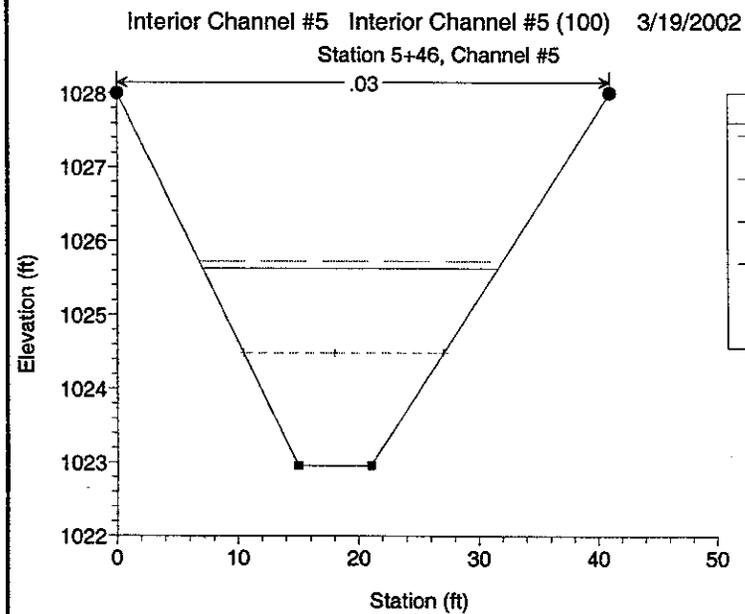
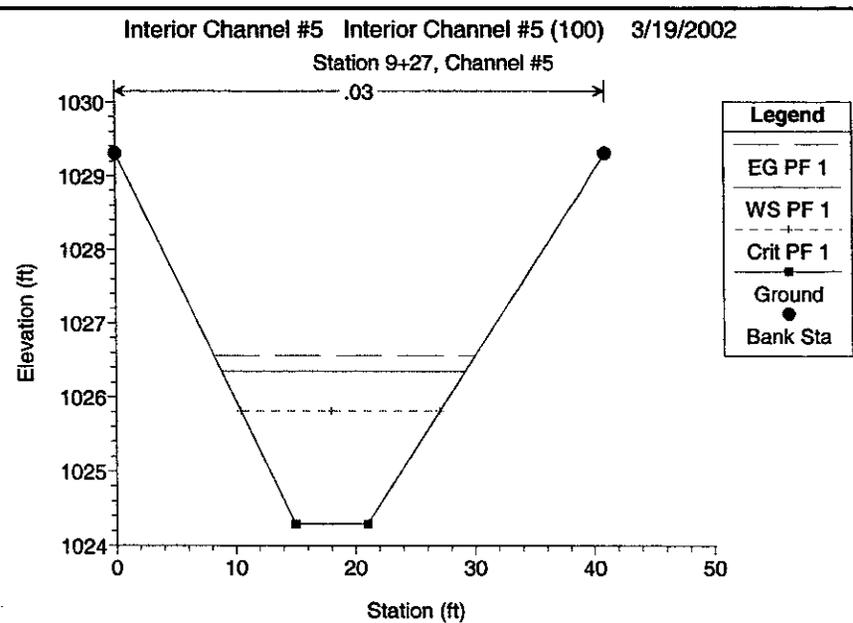
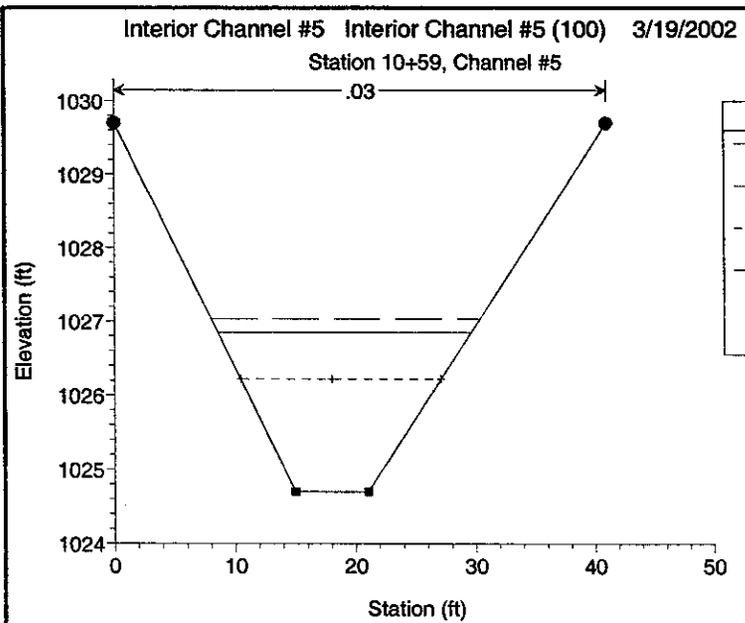
Depth	W/S Elev	Ch W/S	Top Width	Flow Area	Top Width	Froude Fcn			
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100.00	1024.29	1026.35	1025.81	1026.56	0.003938	3.69	27.10	20.36	0.56
100.00	1022.96	1025.63	1024.48	1025.72	0.001300	2.45	40.75	24.53	0.34
100.00	1021.41	1025.50	1022.94	1025.52	0.000197	1.22	82.13	34.19	0.14
100.00	1021.27	1025.49	1022.79	1025.51	0.000166	1.14	87.72	35.55	0.13
100.00	1021.00	1025.49	1022.27	1025.50	0.000097	0.96	104.63	36.61	0.10

Interior Channel #5 Interior Channel #5 (100) 3/19/2002

Reach 1

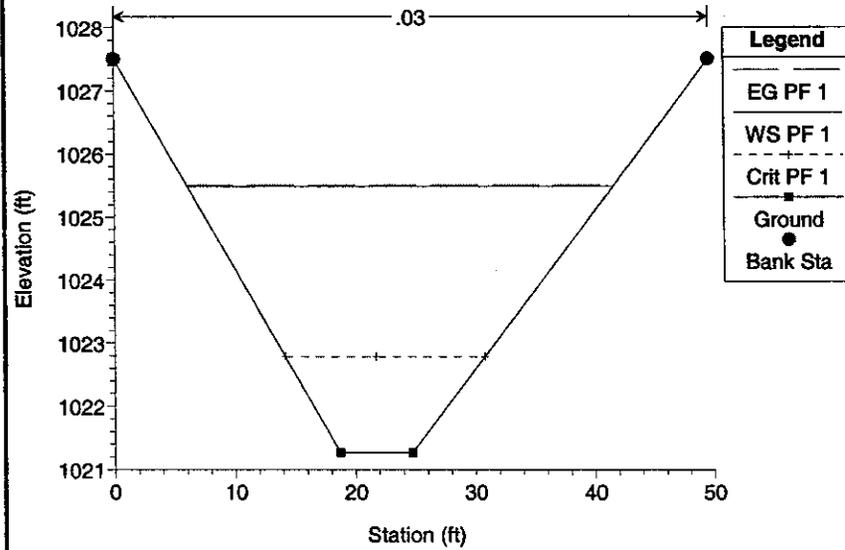


Legend
EG PF 1
WS PF 1
Crit PF 1
Ground



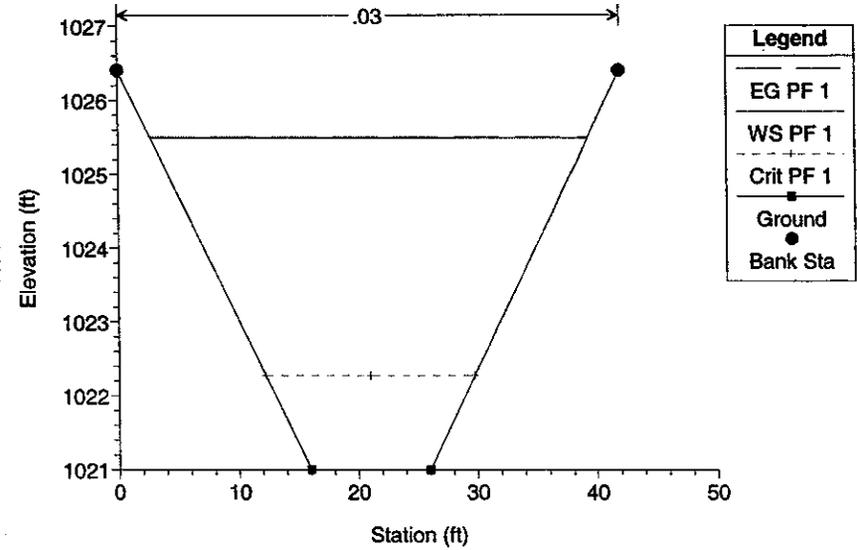
Interior Channel #5 Interior Channel #5 (100) 3/19/2002

Station 0+64, Channel #5



Interior Channel #5 Interior Channel #5 (100) 3/19/2002

Station 0+11, Channel #5 / Station 15+93,



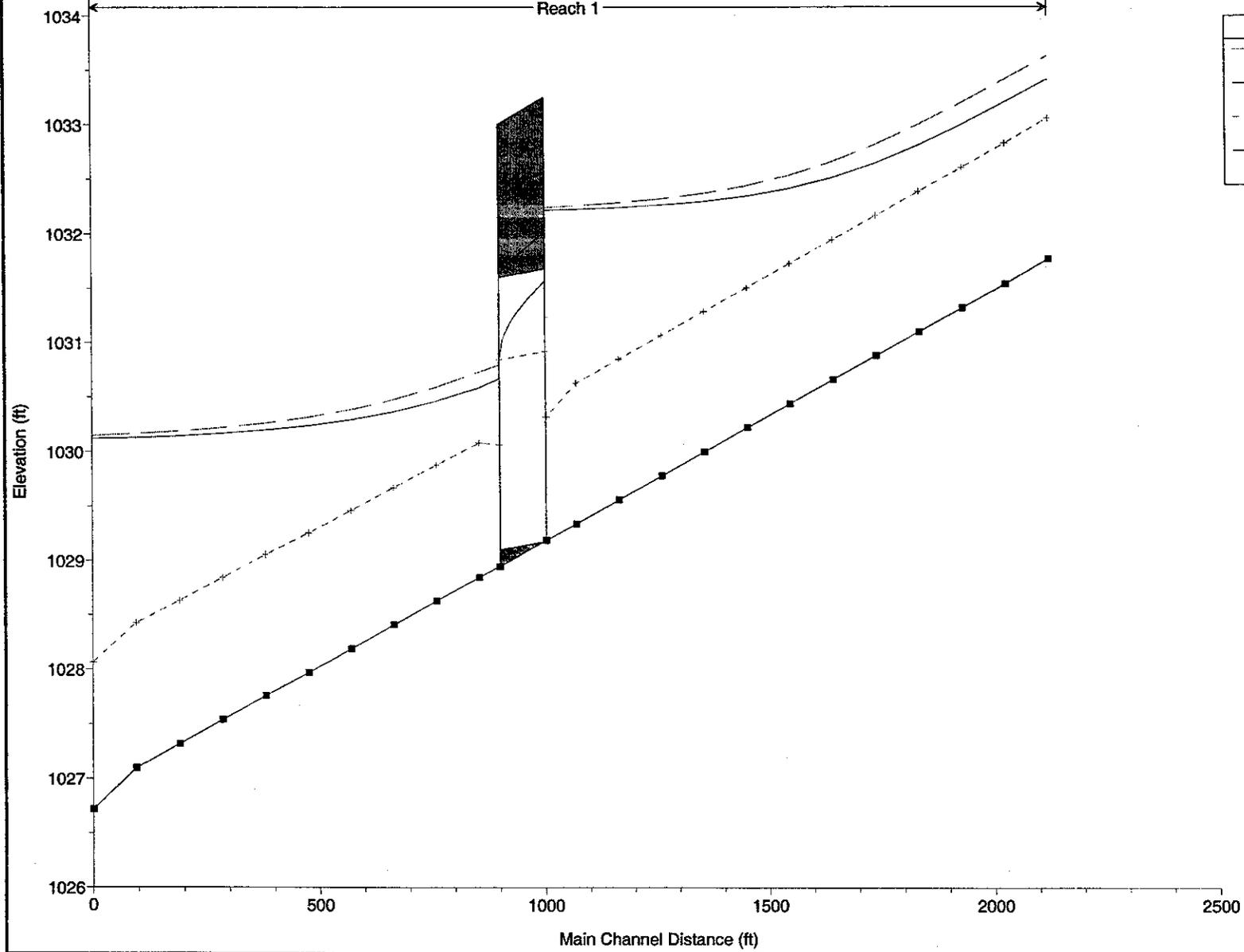
CHANNEL 6
THOMAS ROAD

HEC-RAS Plan: Thomas Road River: Thomas Road Reach: Reach 1

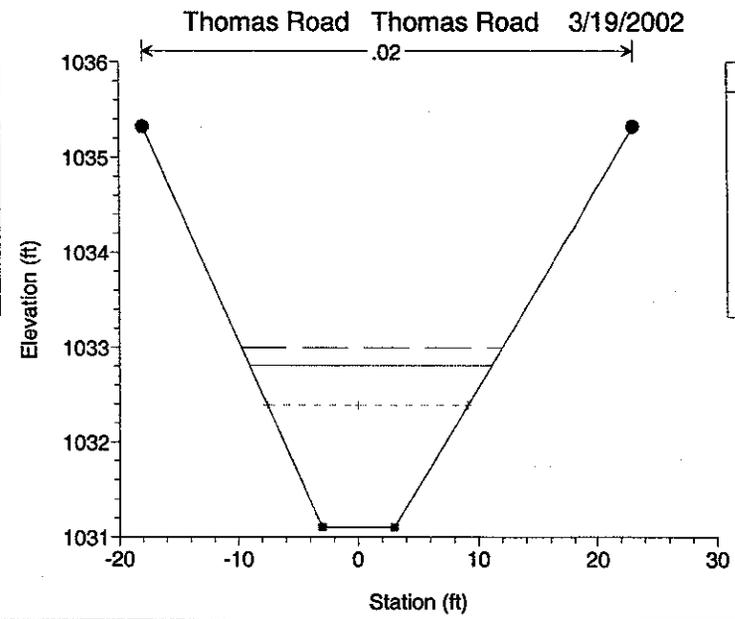
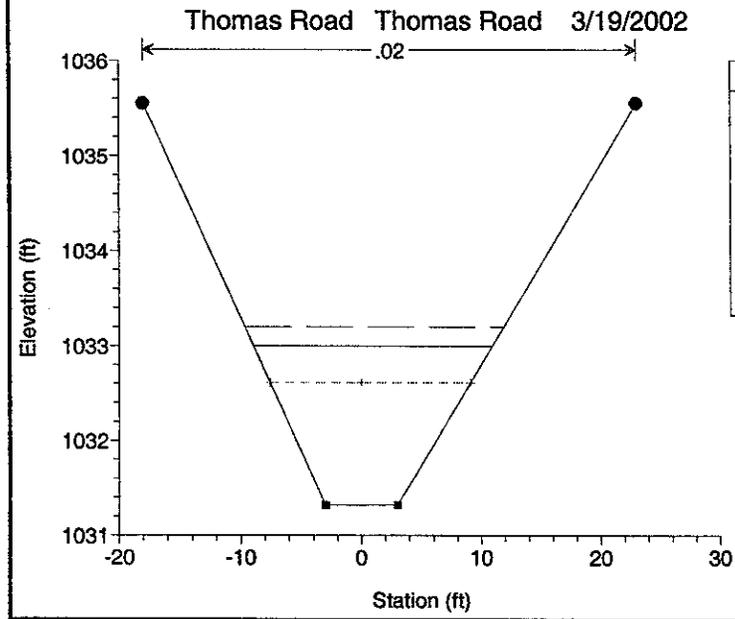
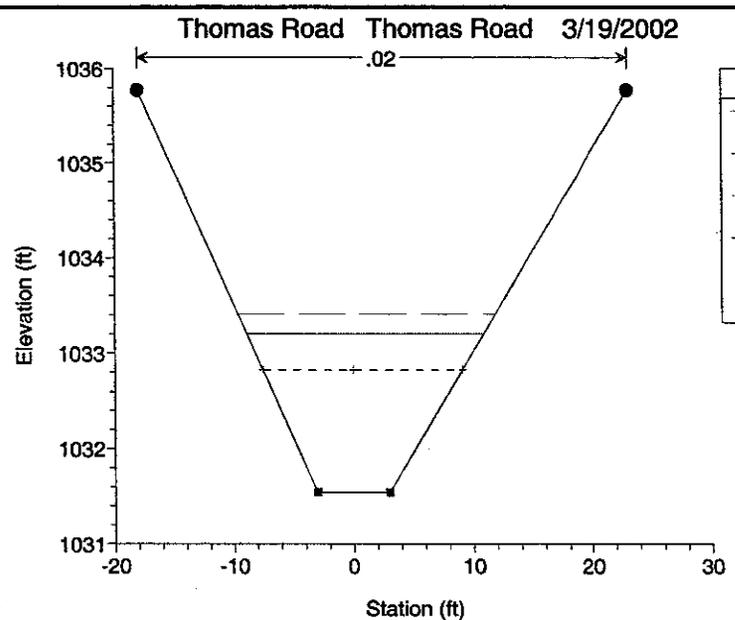
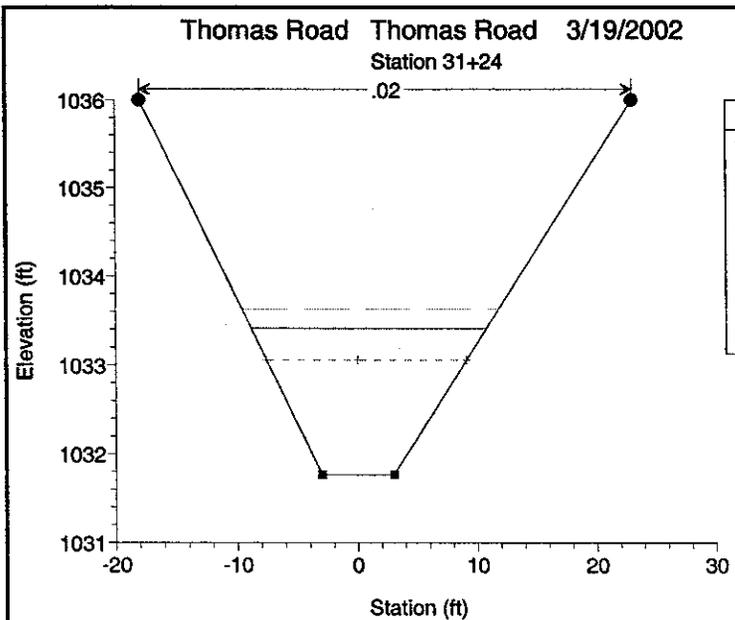
Reach	Water Surface Elevation (ft)	Top of Bank Elevation (ft)	Channel Bottom Elevation (ft)	Bank Elevation (ft)	Bank Slope	Bank Protection	Bank Width (ft)	Top of Bank Elevation (ft)	Bank Slope
	78.00	1031.77	1033.42	1033.06	1033.63	0.002318	3.70	21.07	19.61
	78.00	1031.54	1033.20	1032.83	1033.41	0.002218	3.64	21.41	19.76
	78.00	1031.32	1033.00	1032.61	1033.20	0.002132	3.59	21.73	19.89
	78.00	1031.10	1032.81	1032.39	1033.00	0.001968	3.48	22.39	20.18
	78.00	1030.88	1032.65	1032.17	1032.82	0.001713	3.31	23.57	20.69
	78.00	1030.66	1032.52	1031.95	1032.66	0.001390	3.06	25.47	21.46
Reach 1	78.00	1030.44	1032.42	1031.73	1032.54	0.001062	2.77	28.12	22.47
Reach 1	78.00	1030.22	1032.35	1031.51	1032.44	0.000775	2.47	31.62	23.75
Reach 1	78.00	1030.00	1032.30	1031.29	1032.37	0.000552	2.18	35.86	25.23
Reach 1	78.00	1029.78	1032.26	1031.07	1032.32	0.000391	1.91	40.77	26.84
Reach 1	78.00	1029.56	1032.24	1030.84	1032.28	0.000279	1.69	46.21	28.49
Reach 1	78.00	1029.34	1032.22	1030.63	1032.26	0.000201	1.49	52.28	30.26
Reach 1	78.00	1029.19	1032.22	1030.32	1032.24	0.000125	1.27	61.27	31.48
	Culvert								
Reach 1	78.00	1028.95	1030.66	1030.06	1030.79	0.001215	2.89	27.03	22.54
Reach 1	78.00	1028.85	1030.58	1030.08	1030.73	0.001532	3.04	25.62	23.58
Reach 1	78.00	1028.63	1030.46	1029.88	1030.59	0.001280	2.88	27.06	23.59
Reach 1	78.00	1028.41	1030.36	1029.67	1030.47	0.001014	2.67	29.19	23.89
Reach 1	78.00	1028.19	1030.29	1029.46	1030.38	0.000779	2.45	31.85	24.33
Reach 1	78.00	1027.97	1030.24	1029.25	1030.31	0.000588	2.23	35.01	24.89
Reach 1	78.00	1027.76	1030.20	1029.06	1030.26	0.000448	2.03	38.39	25.51
Reach 1	78.00	1027.54	1030.17	1028.85	1030.22	0.000337	1.85	42.25	26.16
Reach 1	78.00	1027.32	1030.15	1028.64	1030.19	0.000257	1.68	46.36	26.82
Reach 1	78.00	1027.10	1030.13	1028.43	1030.17	0.000197	1.54	50.74	27.50
Reach 1	78.00	1026.72	1030.12	1028.07	1030.15	0.000128	1.33	58.71	28.54

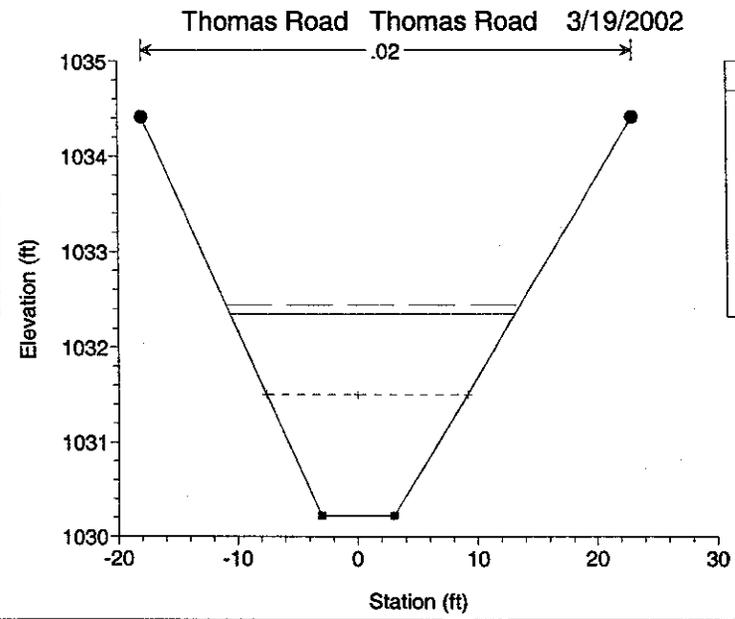
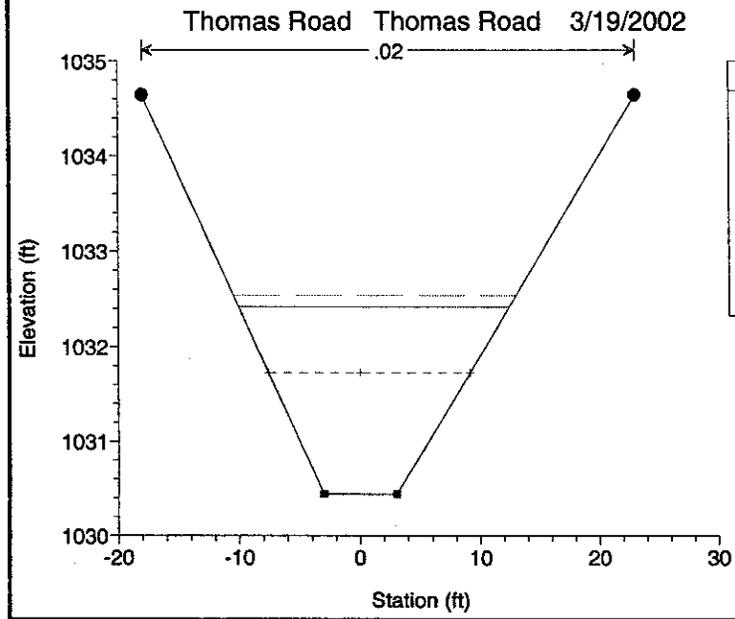
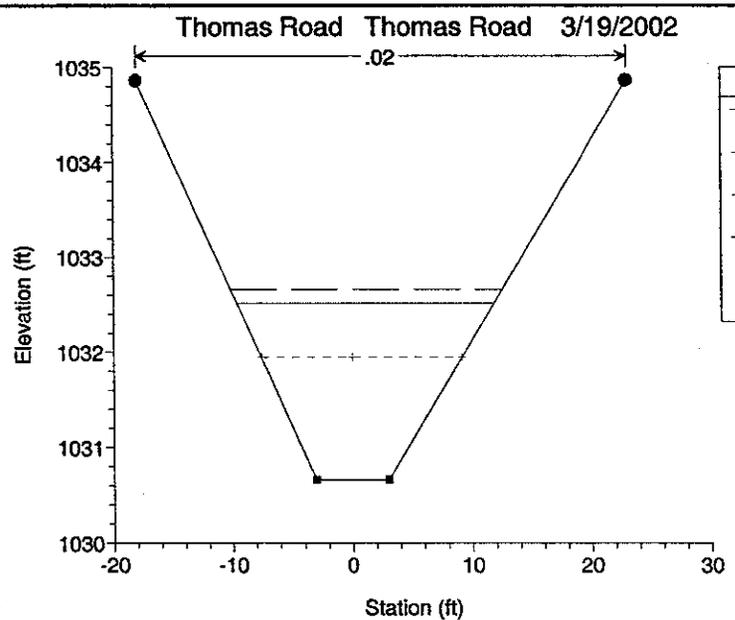
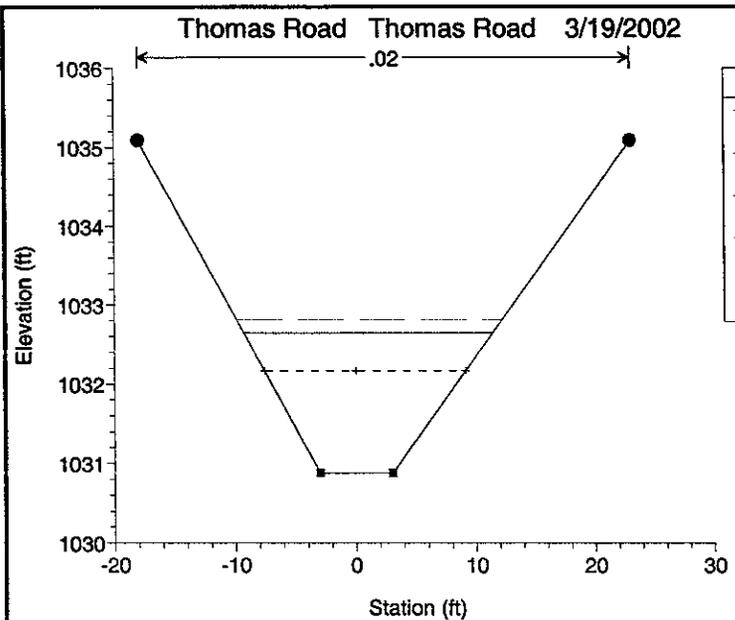
Thomas Road Thomas Road 3/19/2002

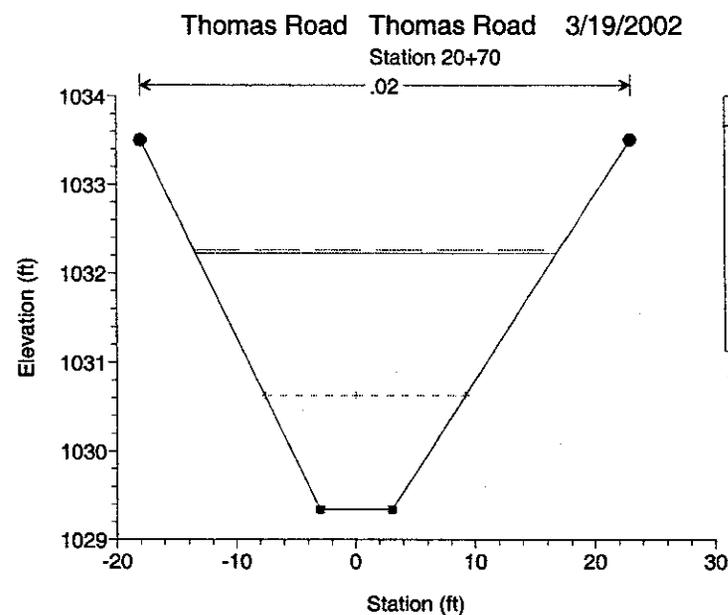
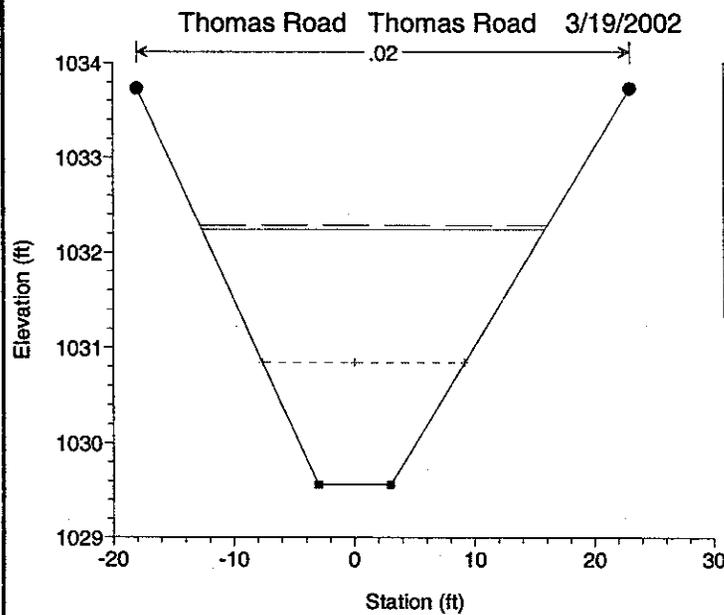
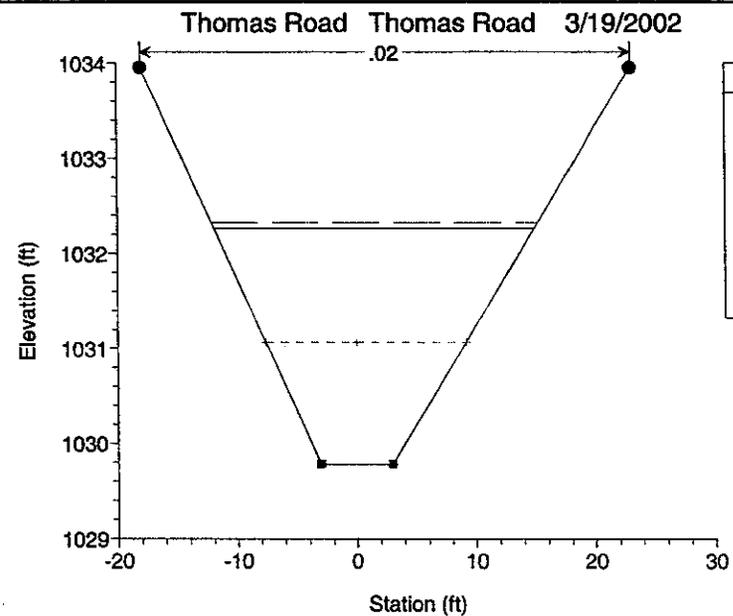
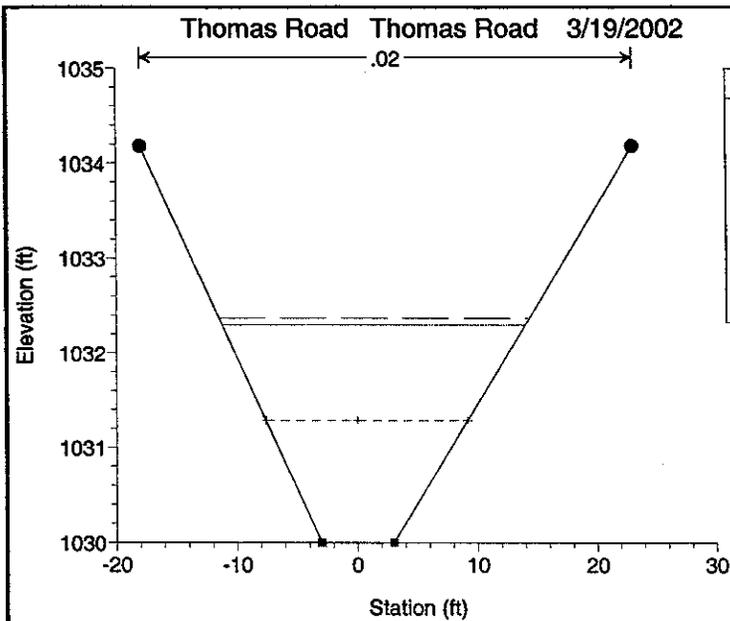
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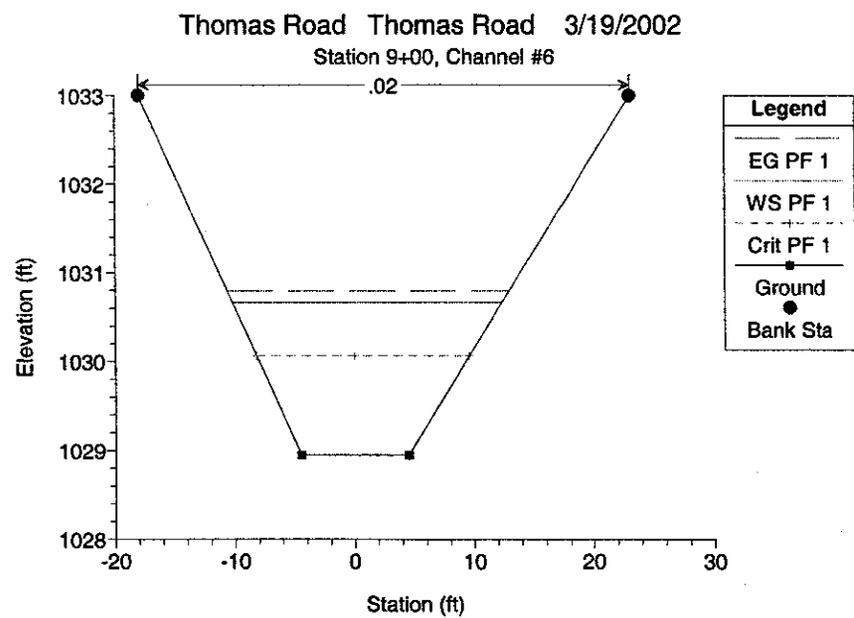
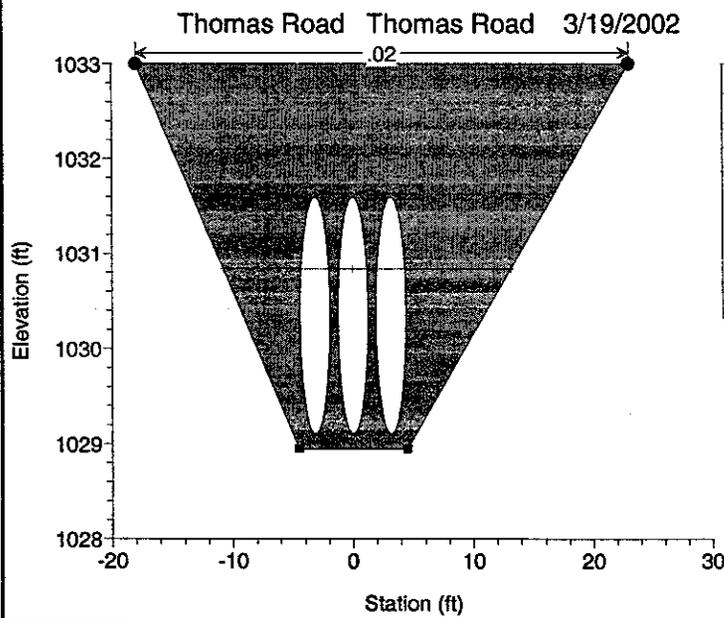
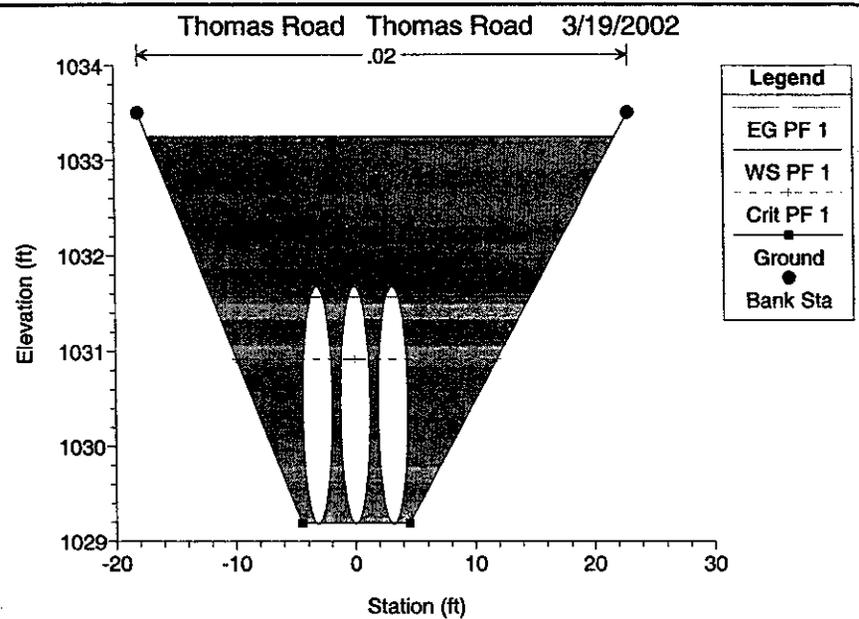
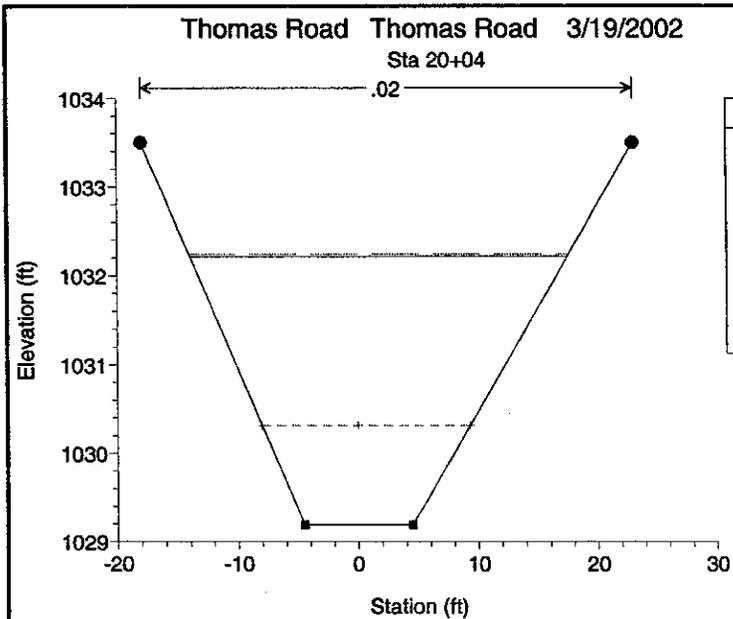


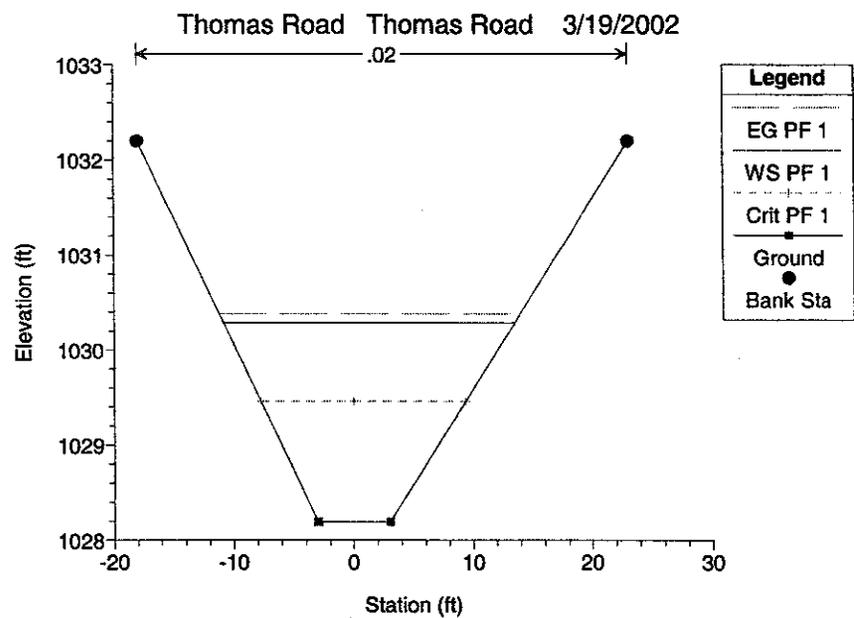
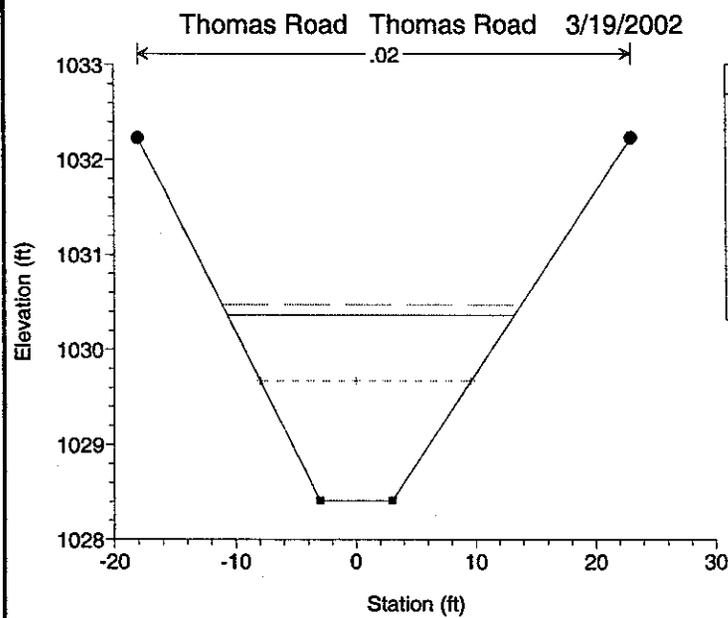
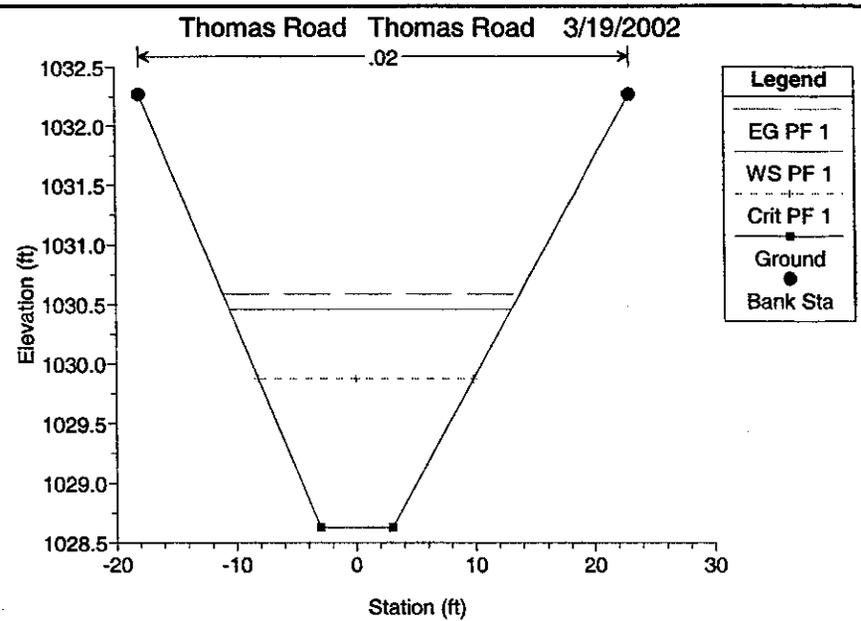
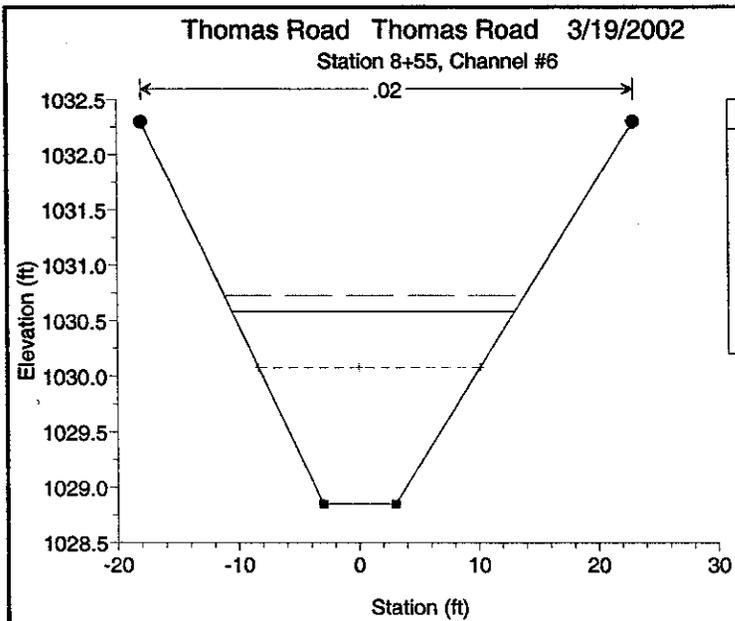
Legend	
EG PF 1	---
WS PF 1	...
Crit PF 1	-.-.-
Ground	■

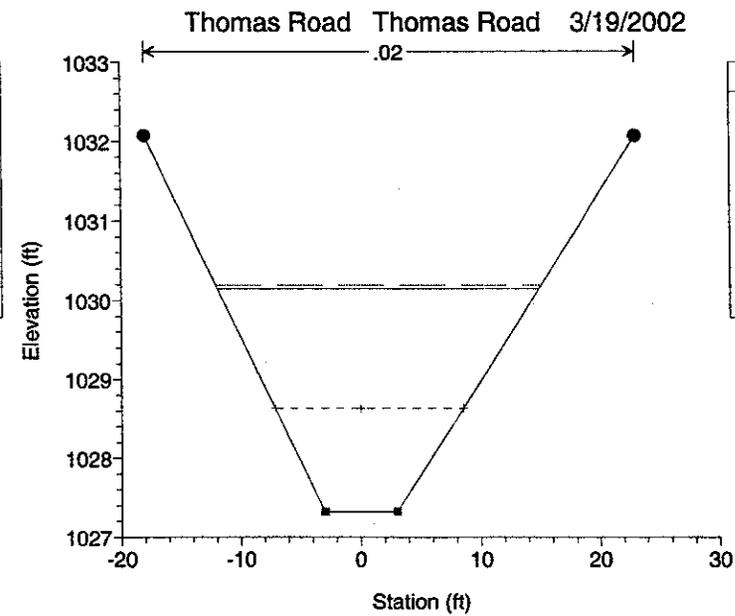
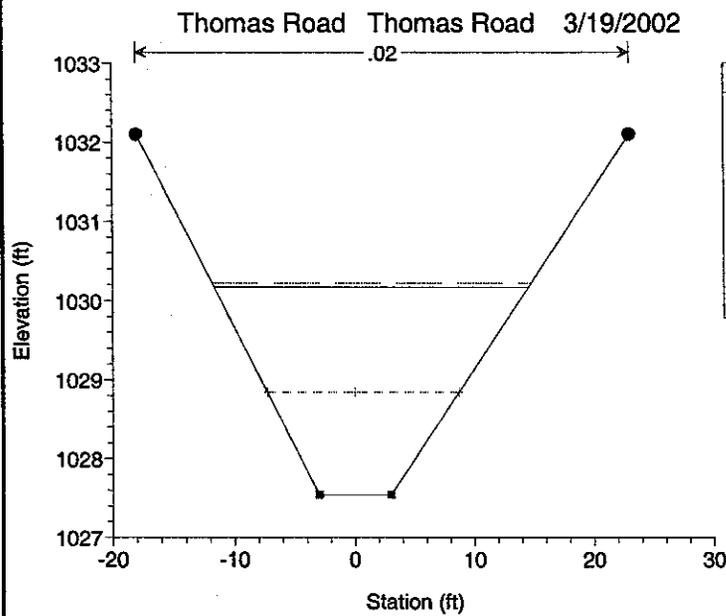
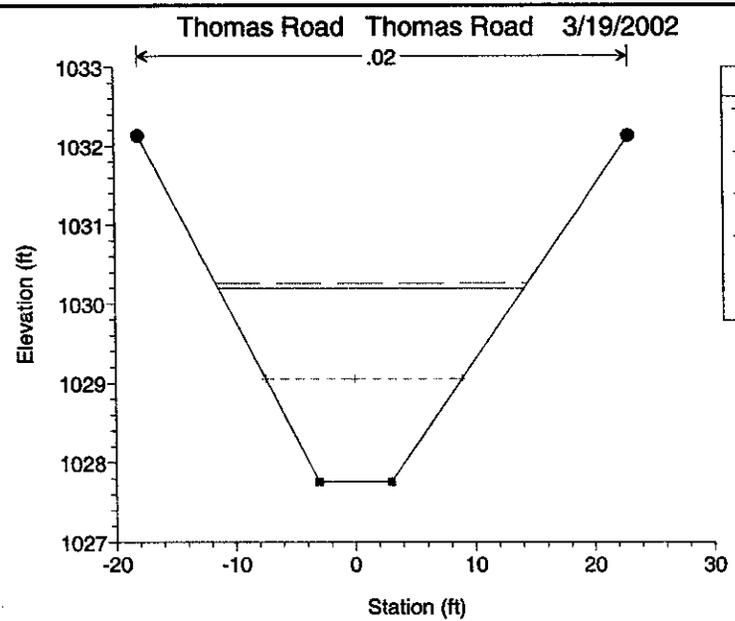
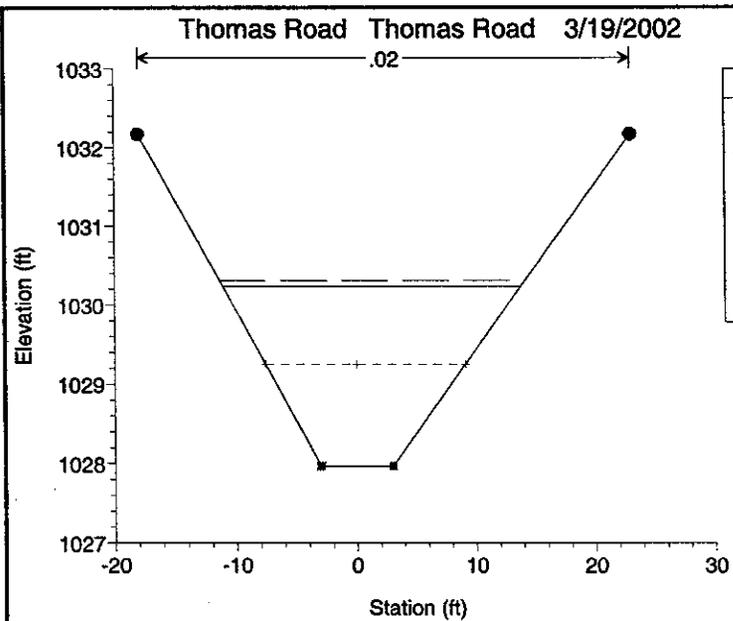


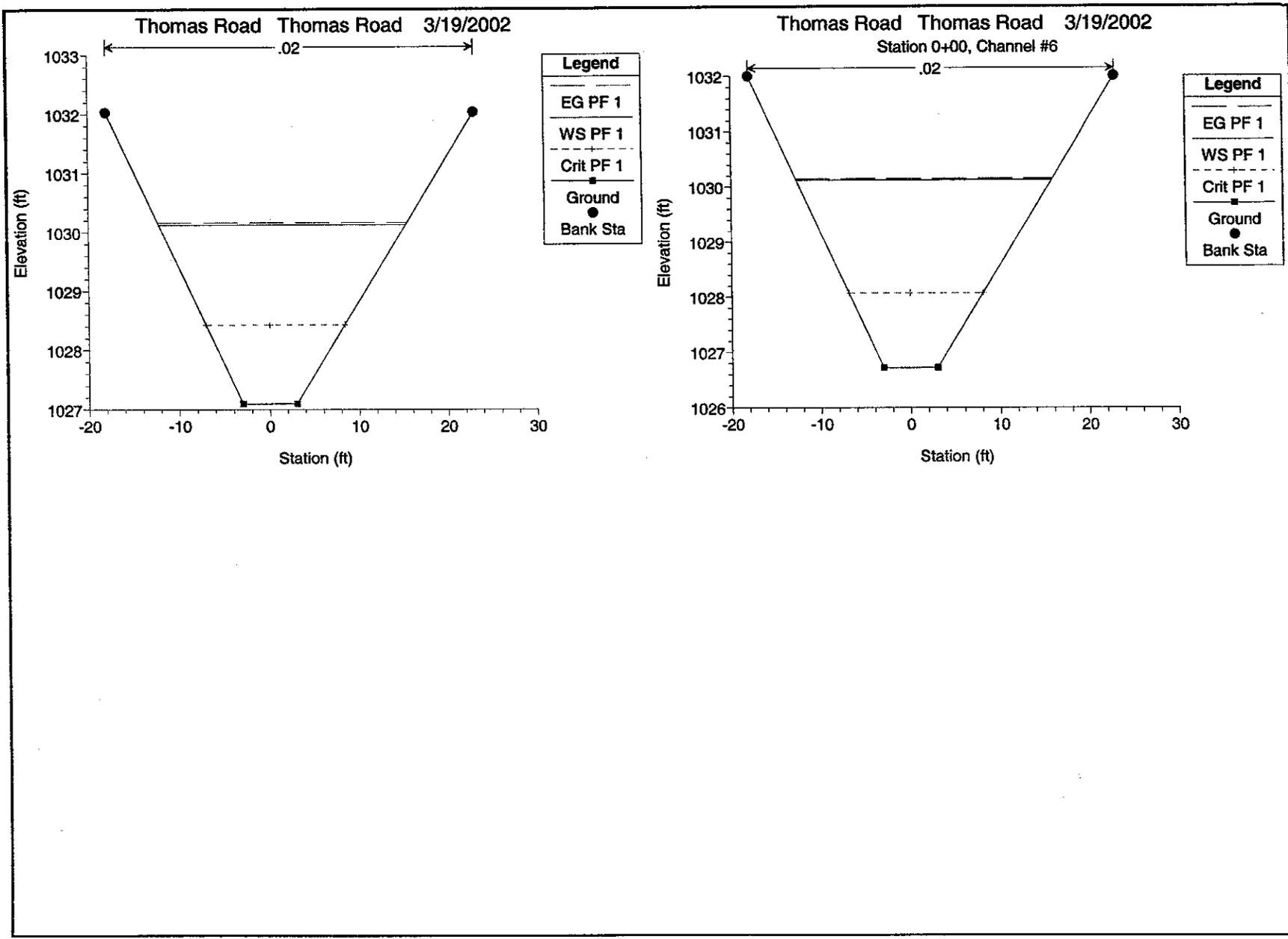




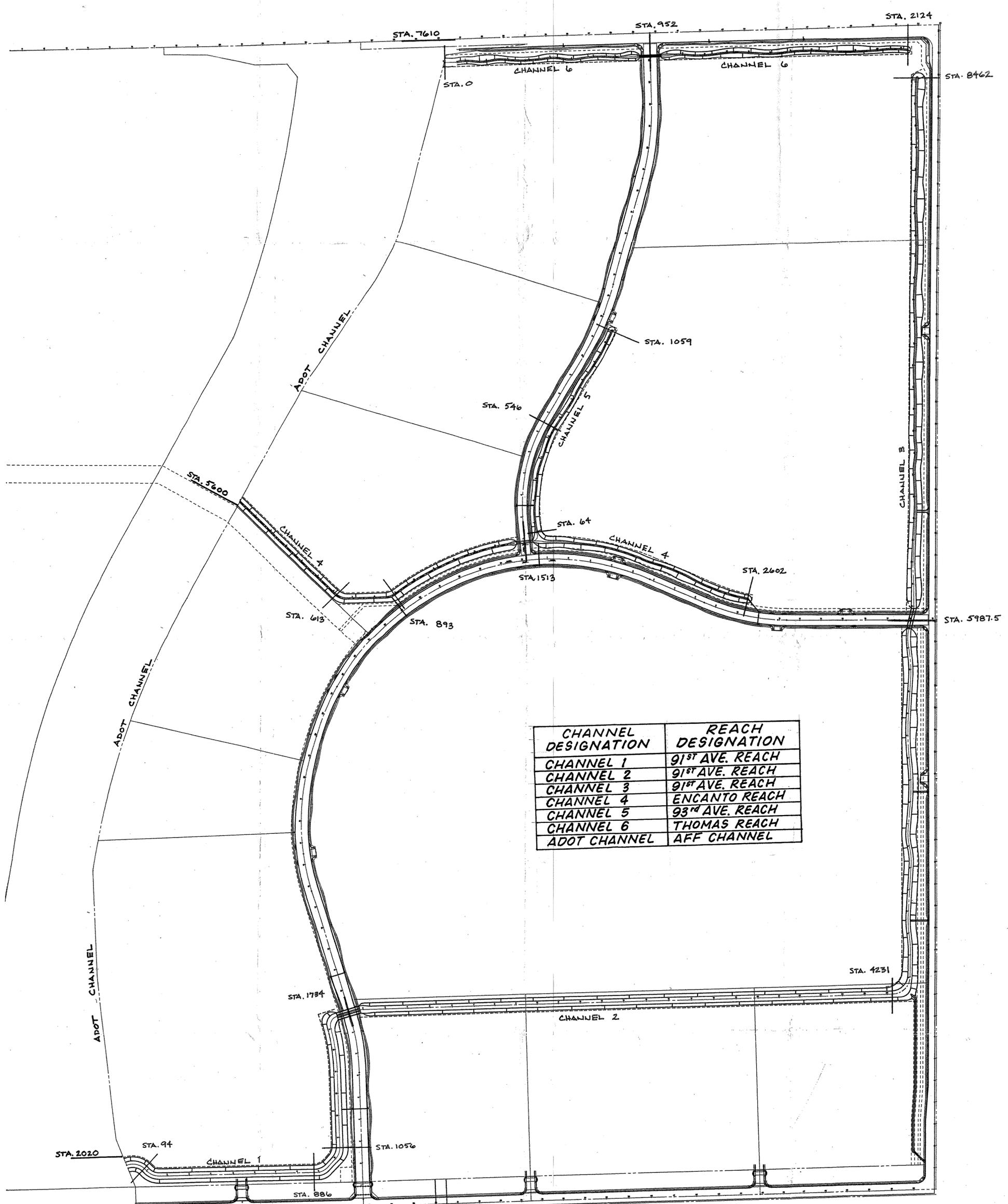




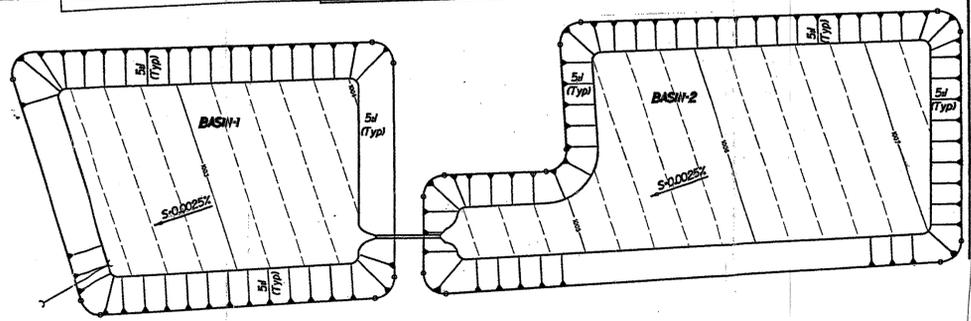




HEC-RAS CROSS SECTION MAP



CHANNEL DESIGNATION	REACH DESIGNATION
CHANNEL 1	91 ST AVE. REACH
CHANNEL 2	91 ST AVE. REACH
CHANNEL 3	91 ST AVE. REACH
CHANNEL 4	ENCANTO REACH
CHANNEL 5	93 RD AVE. REACH
CHANNEL 6	THOMAS REACH
ADOT CHANNEL	AFF CHANNEL



SCALE
1" = 200'

N
↑

APPENDIX J

Culvert Calculations



CULVERT 1

Culvert Calculator Report

93rd & Thomas Road

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	1,033.25 ft	Headwater Depth/ Height	1.23
Computed Headwater Elevation	1,032.25 ft	Discharge	78.00 cfs
Inlet Control HW Elev	1,031.98 ft	Tailwater Elevation	1,030.60 ft
Outlet Control HW Elev	1,032.25 ft	Control Type	Outlet Control

Grades			
Upstream Invert	1,029.18 ft	Downstream Invert	1,029.10 ft
Length	102.00 ft	Constructed Slope	0.000784 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	1.74 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	1.74 ft
Velocity Downstream	7.14 ft/s	Critical Slope	0.005835 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	2.50 ft
Section Size	30 inch	Rise	2.50 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	1,032.25 ft	Upstream Velocity Head	0.45 ft
Ke	0.50	Entrance Loss	0.22 ft

Inlet Control Properties			
Inlet Control HW Elev	1,031.98 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	14.7 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

CULVERT 2
Culvert Calculator Report
Encanto & 91st (Culvert 2)

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,030.24 ft	Headwater Depth/ Height	1.09
Computed Headwater Elevation	1,028.67 ft	Discharge	460.00 cfs
Inlet Control HW Elev	1,028.65 ft	Tailwater Elevation	1,027.33 ft
Outlet Control HW Elev	1,028.67 ft	Control Type	Outlet Control

Grades

Upstream Invert	1,024.30 ft	Downstream Invert	1,024.00 ft
Length	95.00 ft	Constructed Slope	0.003158 ft/ft

Hydraulic Profile

Profile	S1	Depth, Downstream	3.33 ft
Slope Type	Steep	Normal Depth	2.53 ft
Flow Regime	Subcritical	Critical Depth	2.54 ft
Velocity Downstream	6.91 ft/s	Critical Slope	0.003122 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev	1,028.67 ft	Upstream Velocity Head	0.89 ft
Ke	0.50	Entrance Loss	0.45 ft

Inlet Control Properties

Inlet Control HW Elev	1,028.65 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	80.0 ft ²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

CULVERT 2A
Culvert Calculator Report
91st Ave (Culvert 2A)

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,028.13 ft	Headwater Depth/ Height	1.09
Computed Headwater Elevation	1,026.23 ft	Discharge	460.00 cfs
Inlet Control HW Elev	1,026.21 ft	Tailwater Elevation	1,024.60 ft
Outlet Control HW Elev	1,026.23 ft	Control Type	Outlet Control

Grades

Upstream Invert	1,021.86 ft	Downstream Invert	1,021.74 ft
Length	68.00 ft	Constructed Slope	0.001765 ft/ft

Hydraulic Profile

Profile	M2	Depth, Downstream	2.86 ft
Slope Type	M1d	Normal Depth	3.11 ft
Flow Regime	Subcritical	Critical Depth	2.54 ft
Velocity Downstream	8.04 ft/s	Critical Slope	0.003122 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev	1,026.23 ft	Upstream Velocity Head	0.95 ft
Ke	0.50	Entrance Loss	0.48 ft

Inlet Control Properties

Inlet Control HW Elev	1,026.21 ft	Flow Control	Unsubmerged
Inlet Type	90 and 15 ° wingwall flares	Area Full	80.0 ft ²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

CULVERT 3

Culvert Calculator Report

95th S. of Encanto (Culvert 3)

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	1,023.12 ft	Headwater Depth/ Height	1.12
Computed Headwater Elevation	1,021.40 ft	Discharge	610.00 cfs
Inlet Control HW Elev	1,020.92 ft	Tailwater Elevation	1,020.61 ft
Outlet Control HW Elev	1,021.40 ft	Control Type	Outlet Control

Grades			
Upstream Invert	1,016.92 ft	Downstream Invert	1,016.81 ft
Length	122.00 ft	Constructed Slope	0.000902 ft/ft

Hydraulic Profile			
Profile	M2	Depth, Downstream	3.80 ft
Slope Type	Mild	Normal Depth	N/A ft
Flow Regime	Subcritical	Critical Depth	2.34 ft
Velocity Downstream	5.35 ft/s	Critical Slope	0.003095 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties			
Outlet Control HW Elev	1,021.40 ft	Upstream Velocity Head	0.44 ft
Ke	0.50	Entrance Loss	0.22 ft

Inlet Control Properties			
Inlet Control HW Elev	1,020.92 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft ²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

CULVERT 4

Culvert Calculator Report

93rd & Encanto Boulevard (Culvert 4)

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,027.00 ft	Headwater Depth/ Height	1.12
Computed Headwater Elevation	1,025.49 ft	Discharge	206.00 cfs
Inlet Control HW Elev	1,025.04 ft	Tailwater Elevation	1,024.77 ft
Outlet Control HW Elev	1,025.49 ft	Control Type	Outlet Control

Grades

Upstream Invert	1,021.00 ft	Downstream Invert	1,020.83 ft
Length	81.00 ft	Constructed Slope	0.002099 ft/ft

Hydraulic Profile

Profile	M1	Depth, Downstream	3.94 ft
Slope Type	Mild	Normal Depth	2.70 ft
Flow Regime	Subcritical	Critical Depth	2.36 ft
Velocity Downstream	5.23 ft/s	Critical Slope	0.003098 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	1		

Outlet Control Properties

Outlet Control HW Elev	1,025.49 ft	Upstream Velocity Head	0.46 ft
Ke	0.50	Entrance Loss	0.23 ft

Inlet Control Properties

Inlet Control HW Elev	1,025.04 ft	Flow Control	N/A
Inlet Type	90 and 15 ° wingwall flares	Area Full	40.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

NOTES: 1. COMPUTED HEADWATER ELEVATION
USED FOR CHANNEL 5 BOUNDARY
CONDITION IN HEC-RAS

CULVERT 5
Culvert Calculator Report
Thomas Roadside Channel @ ADOT Channel

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	1,032.00 ft	Headwater Depth/ Height	1.13
Computed Headwater Elevation	1,030.12 ft	Discharge	78.00 cfs
Inlet Control HW Elev	1,029.93 ft	Tailwater Elevation	1,028.09 ft
Outlet Control HW Elev	1,030.12 ft	Control Type	Outlet Control

Grades			
Upstream Invert	1,026.72 ft	Downstream Invert	1,024.67 ft
Length	96.00 ft	Constructed Slope	0.021354 ft/ft

Hydraulic Profile			
Profile	CompositePressureS1S2	Depth, Downstream	3.42 ft
Slope Type	N/A	Normal Depth	1.32 ft
Flow Regime	N/A	Critical Depth	2.03 ft
Velocity Downstream	5.52 ft/s	Critical Slope	0.005318 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev	1,030.12 ft	Upstream Velocity Head	0.91 ft
Ke	0.50	Entrance Loss	0.45 ft

Inlet Control Properties			
Inlet Control HW Elev	1,029.93 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	14.1 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

NOTES: 1. COMPUTED HEADWATER ELEVATION
 USED FOR CHANNEL 6 BOUNDARY
 CONDITION IN HEZ-RAS

CULVERT 6
Culvert Calculator Report
Interior Channel #4 @ ADOT Channel (a)

Solve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	1,025.00 ft	Headwater Depth/ Height	1.84
Computed Headwater Elevation	1,024.95 ft	Discharge	60.00 cfs
Inlet Control HW Elev	1,024.80 ft	Tailwater Elevation	1,024.80 ft
Outlet Control HW Elev	1,024.95 ft	Control Type	Outlet Control

Grades			
Upstream Invert	1,017.61 ft	Downstream Invert	1,017.05 ft
Length	47.00 ft	Constructed Slope	0.011915 ft/ft

Hydraulic Profile			
Profile	Pressure	Depth, Downstream	7.75 ft
Slope Type	N/A	Normal Depth	1.19 ft
Flow Regime	N/A	Critical Depth	1.62 ft
Velocity Downstream	2.39 ft/s	Critical Slope	0.003634 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	4.00 ft
Section Size	48 inch	Rise	4.00 ft
Number Sections	2		

Outlet Control Properties			
Outlet Control HW Elev	1,024.95 ft	Upstream Velocity Head	0.09 ft
Ke	0.50	Entrance Loss	0.04 ft

Inlet Control Properties			
Inlet Control HW Elev	1,024.80 ft	Flow Control	Unsubmerged
Inlet Type	Square edge w/headwall	Area Full	25.1 ft ²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

- NOTES:**
1. TAILWATER ELEVATION BASED ON 100-YEAR PEAK FLOW WITHIN ADOT CHANNEL
 2. DISCHARGE OF 60 cfs (COMPUTED BY HEC-1 MODEL) WITHIN CHANNEL 4 WHEN ADOT CHANNEL FLOW HYDROGRAPH AT PEAK
 3. COMPUTED HEADWATER ELEVATION USED FOR CHANNEL 4 BOUNDARY CONDITION IN HEC-RAS

CULVERT 7

Culvert Calculator Report Channel #1 @ ADOT Channel

Solve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,021.00 ft	Headwater Depth/ Height	1.75
Computed Headwater Elevation	1,020.52 ft	Discharge	622.00 cfs
Inlet Control HW Elev	1,019.80 ft	Tailwater Elevation	1,019.80 ft
Outlet Control HW Elev	1,020.52 ft	Control Type	Outlet Control

Grades

Upstream Invert	1,013.52 ft	Downstream Invert	1,013.02 ft
Length	70.00 ft	Constructed Slope	0.007143 ft/ft

Hydraulic Profile

Profile	Pressure	Depth, Downstream	6.78 ft
Slope Type	N/A	Normal Depth	1.79 ft
Flow Regime	N/A	Critical Depth	2.37 ft
Velocity Downstream	5.18 ft/s	Critical Slope	0.003099 ft/ft

Section

Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	3		

Outlet Control Properties

Outlet Control HW Elev	1,020.52 ft	Upstream Velocity Head	0.42 ft
Ke	0.50	Entrance Loss	0.21 ft

Inlet Control Properties

Inlet Control HW Elev	1,019.80 ft	Flow Control	Unsubmerged
Inlet Type	90 and 15 ° wingwall flares	Area Full	120.0 ft ²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	2
C	0.04000	Equation Form	1
Y	0.80000		

NOTES: 1. COMPUTED HEADWATER ELEVATION
USED FOR CHANNEL 1 BOUNDARY
CONDITION IN HEC-RAS

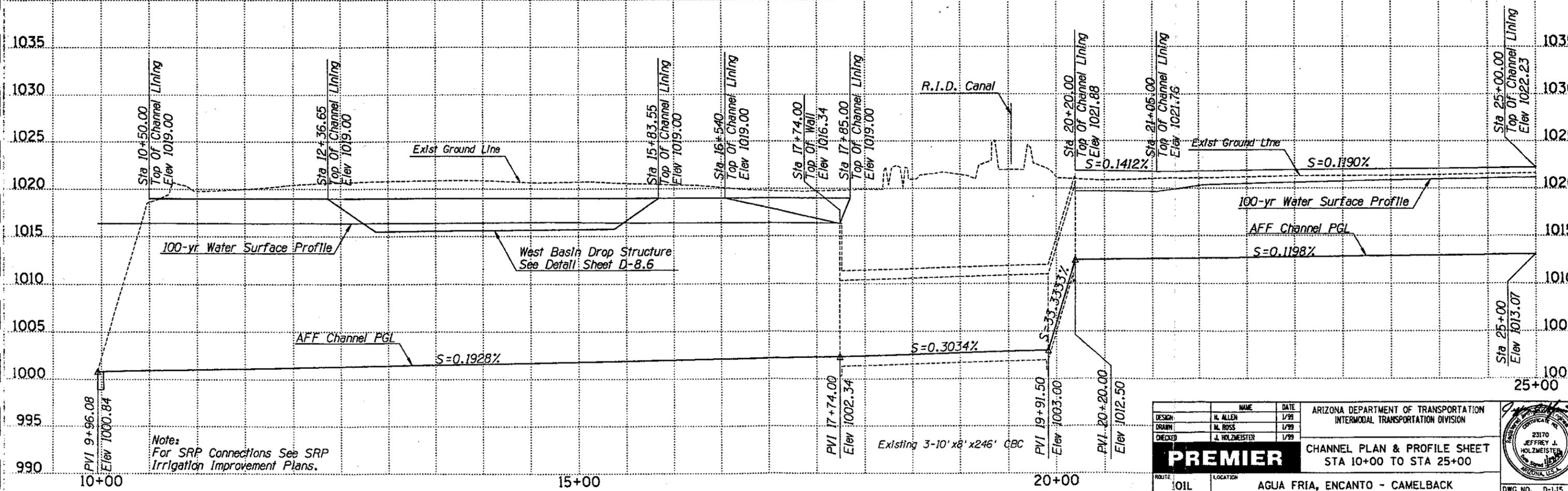
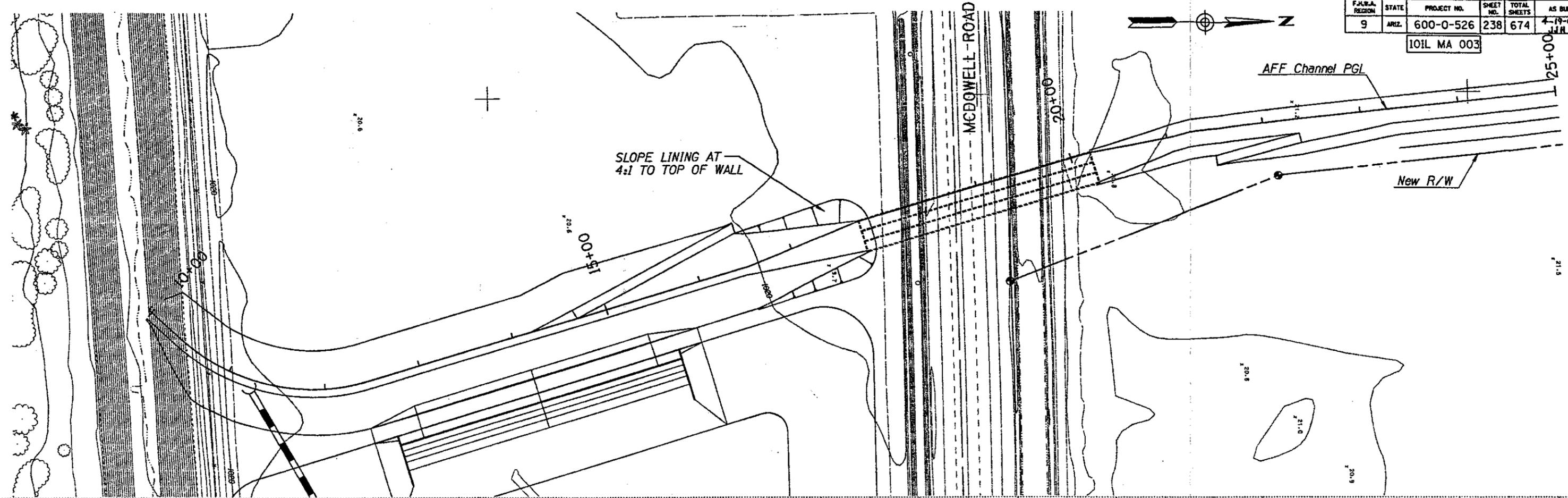
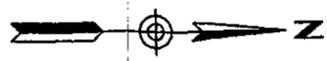
APPENDIX K

Agua Fria Freeway Channel Plans



F.J.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-0-526	238	674	4-19-01

101L MA 003



Note:
For SRP Connections See SRP
Irrigation Improvement Plans.

DESIGN	H. ALLEN	DATE	1/99
DRAWN	M. ROSS	DATE	1/99
CHECKED	J. HOLZMEISTER	DATE	1/99

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

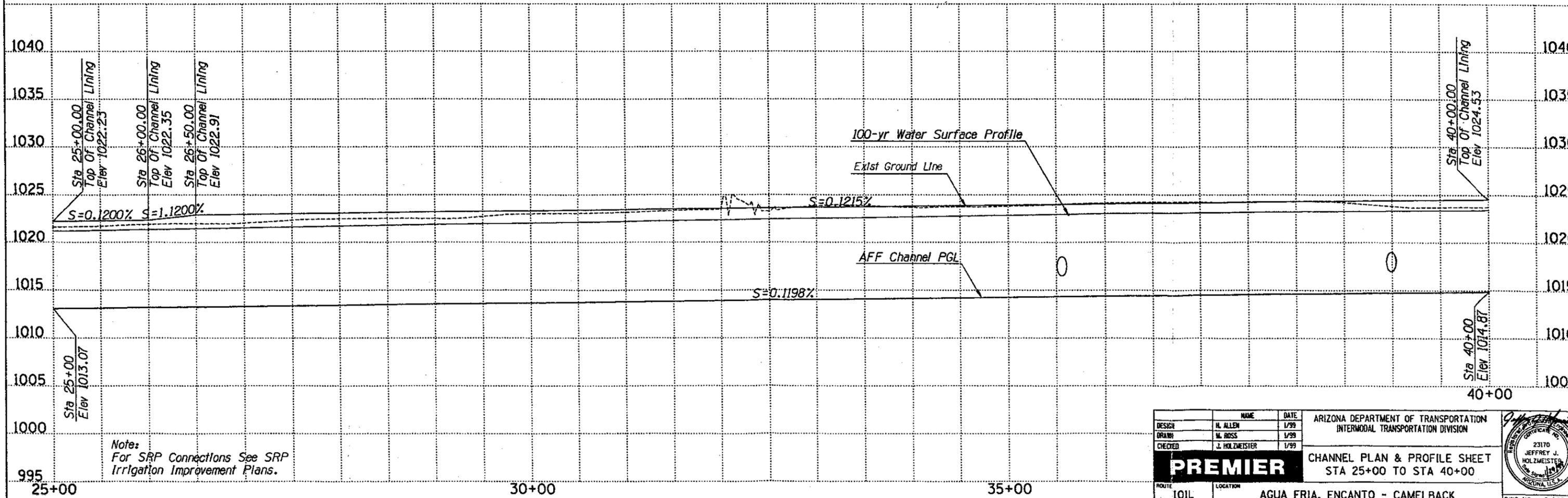
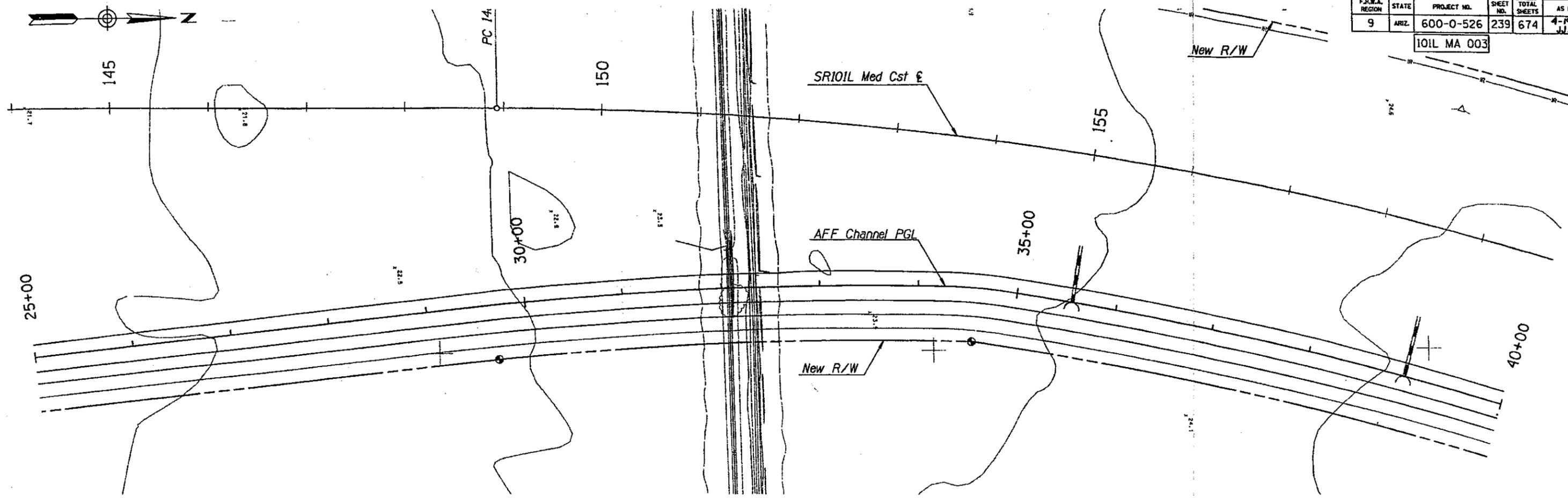
PREMIER CHANNEL PLAN & PROFILE SHEET
STA 10+00 TO STA 25+00

ROUTE: 101L LOCATION: AGUA FRIA, ENCANTO - CAMELBACK

DWG NO. D-115

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-0-526	239	674	4-19-01 J.J.H.

101L MA 003



Note:
For SRP Connections See SRP
Irrigation Improvement Plans.

DESIGN	H. ALLEN	DATE	1/99
DRAWN	M. ROSS		1/99
CHECKED	J. HOLZMEISTER		1/99

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

PREMIER

ROUTE 101L LOCATION AGUA FRIA, ENCANTO - CAMELBACK

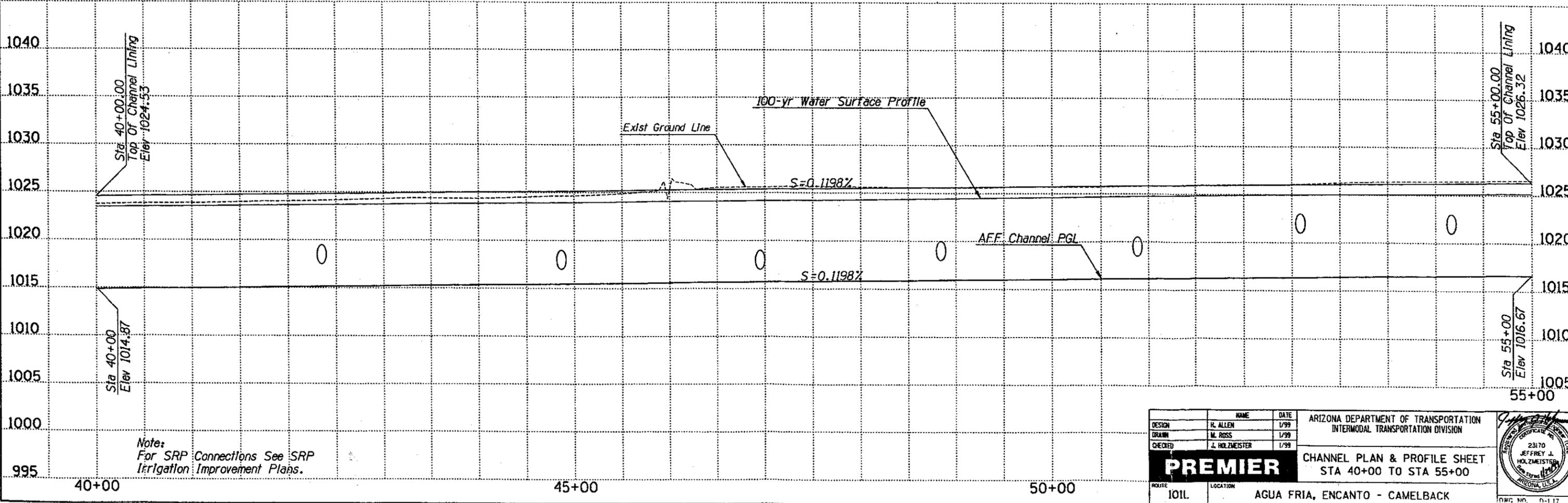
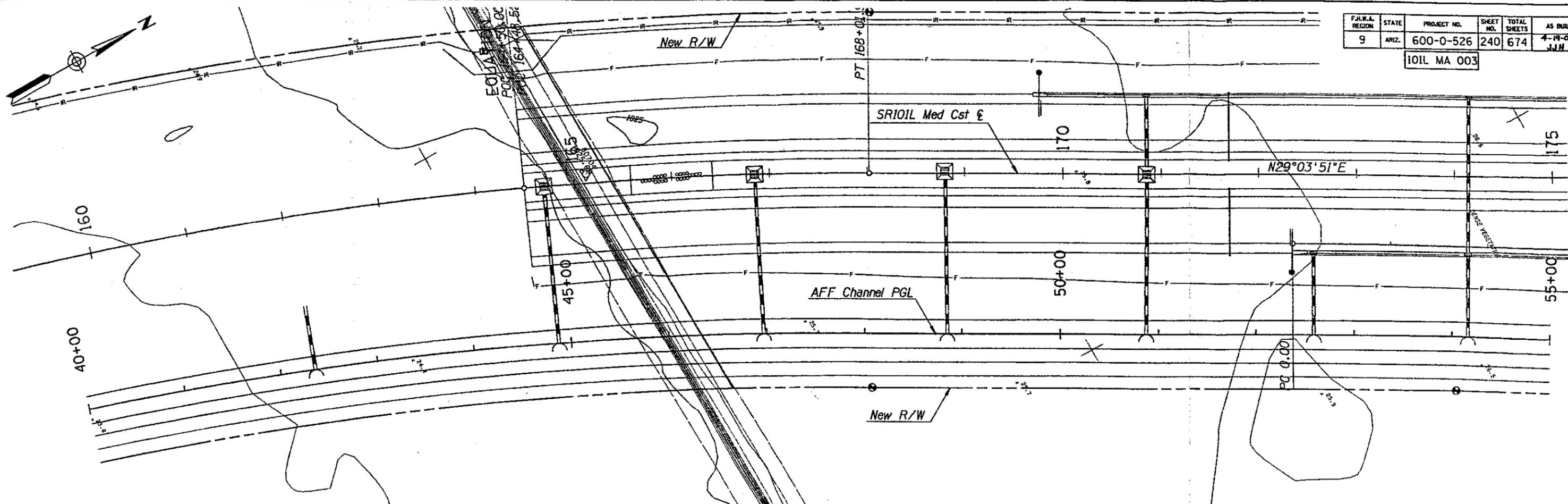
CHANNEL PLAN & PROFILE SHEET
STA 25+00 TO STA 40+00

23170
JEFFREY J.
HOLZMEISTER
REGISTERED PROFESSIONAL ENGINEER
ARIZONA, U.S.A.

DWG NO. 0-116

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-0-526	240	674	4-19-01 J.J.H.

IOIL MA 003



Note:
For SRP Connections See SRP
Irrigation Improvement Plans.

DESIGN	H. ALLEN	1/99
DRAWN	M. ROSS	1/99
CHECKED	J. HOLZMEISTER	1/99

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

PREMIER

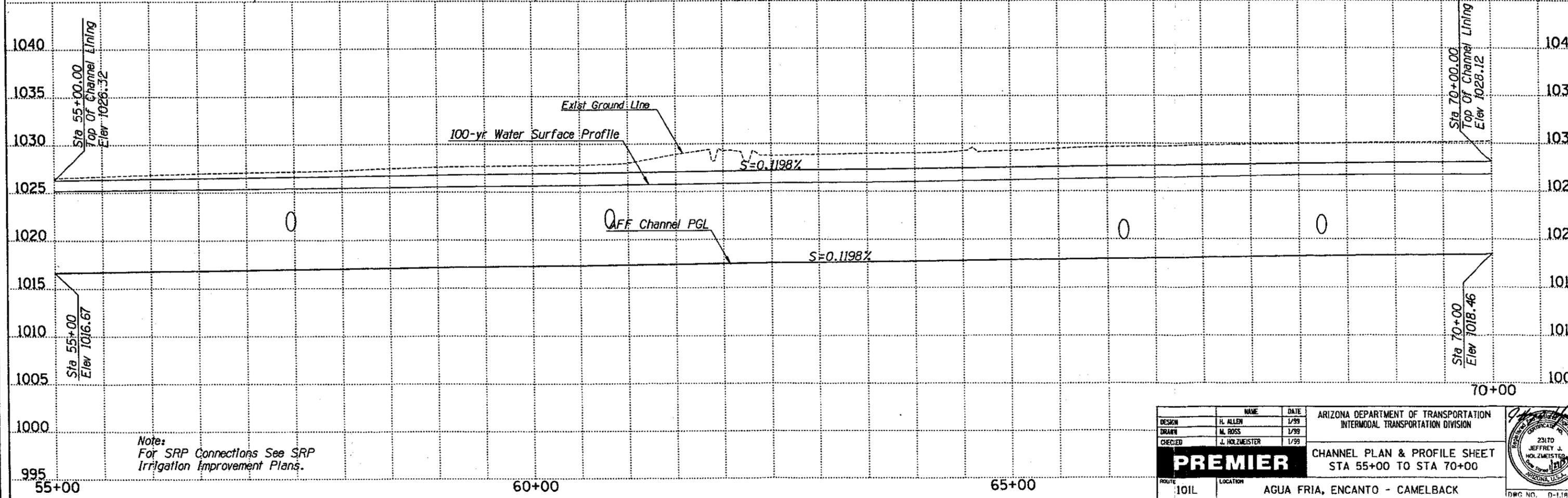
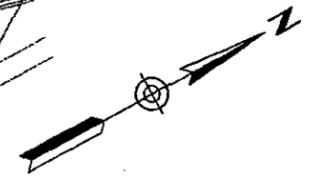
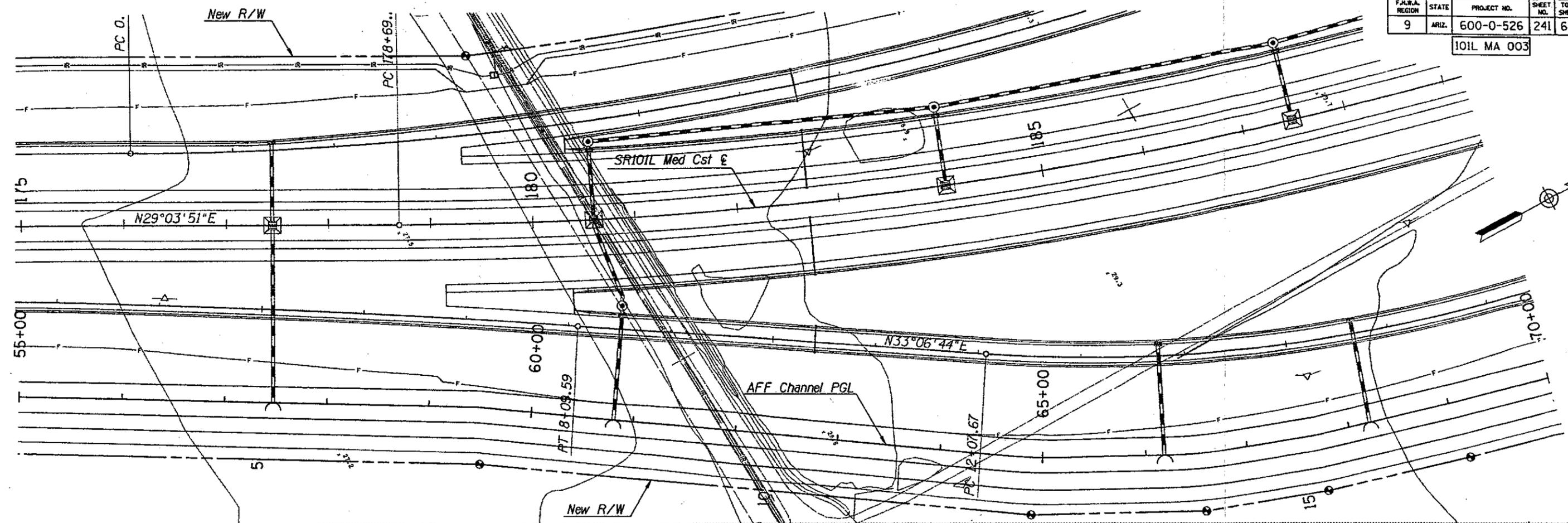
ROUTE 101L LOCATION AGUA FRIA, ENCANTO - CAMELBACK

CHANNEL PLAN & PROFILE SHEET
STA 40+00 TO STA 55+00

23170
JEFFREY J.
HOLZMEISTER
Professional Engineer
No. 1171
ARIZONA, U.S.A.

FIG. NO. 0-117

F.A.R.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-0-526	241	674	4-19-07
101L MA 003					



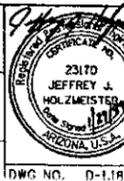
Note:
For SRP Connections See SRP
Irrigation Improvement Plans.

DESIGN	H. ALLEN	1/99	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION
DRAWN	M. ROSS	1/99	
CHECKED	J. HOLZMEISTER	1/99	

PREMIER

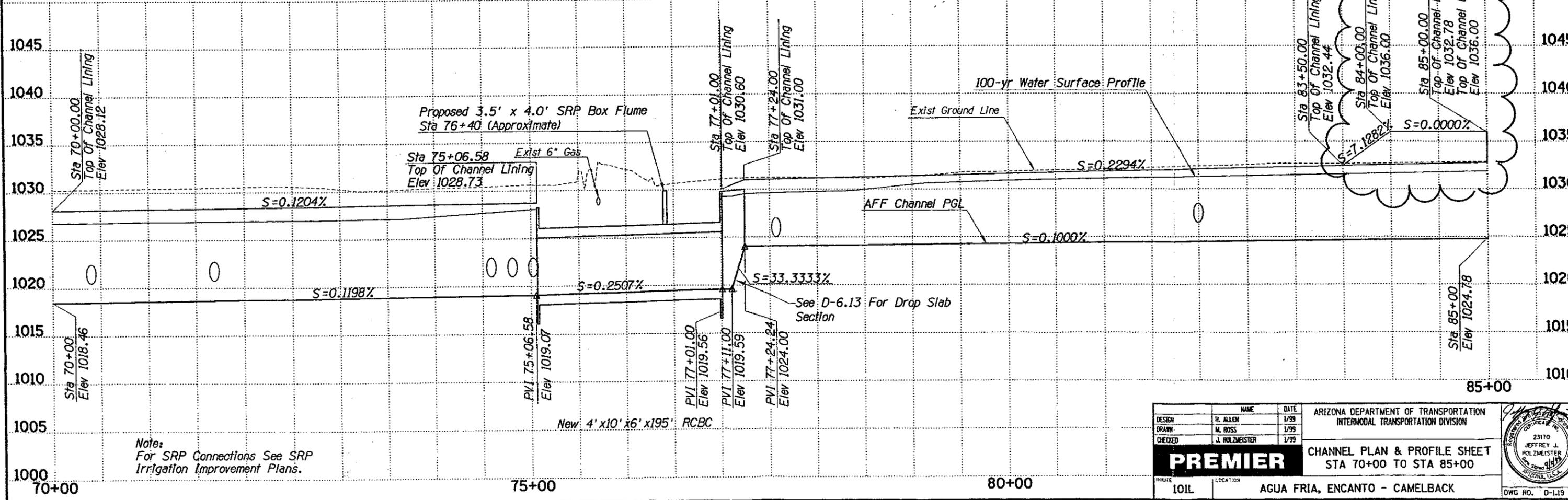
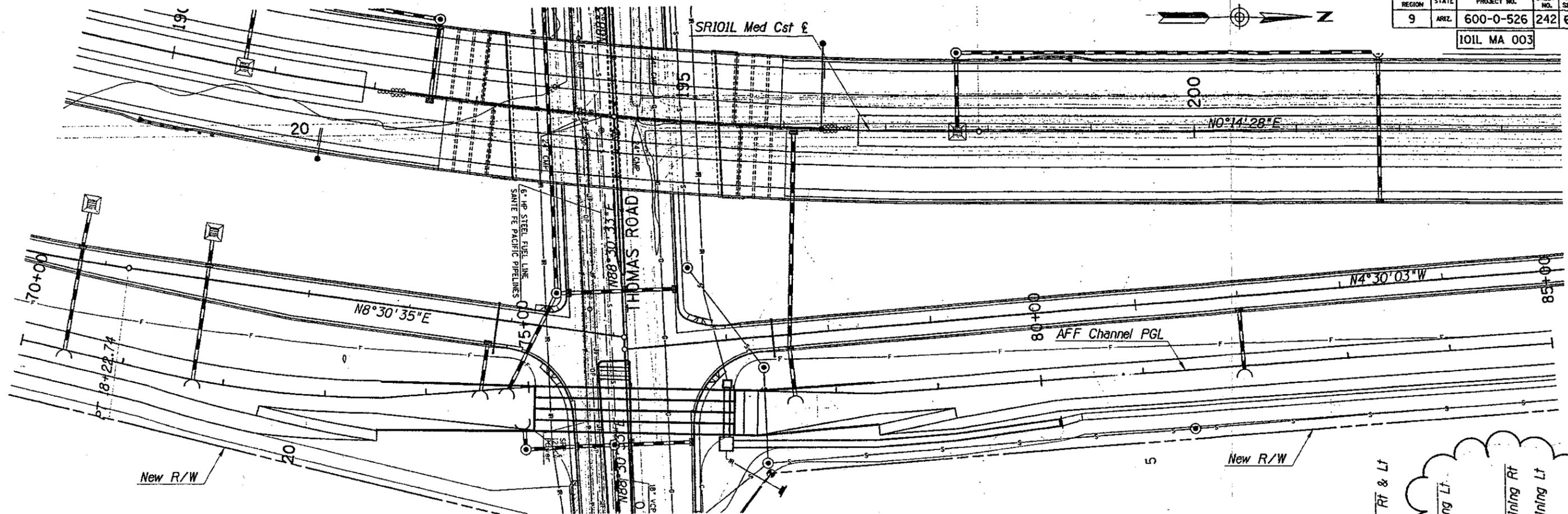
ROUTE 101L LOCATION AGUA FRIA, ENCANTO - CAMELBACK

CHANNEL PLAN & PROFILE SHEET
STA 55+00 TO STA 70+00



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARZ	600-0-526	242	674	4-19-01 J.J.H.

IOIL MA 003



Note:
For SRP Connections See SRP
Irrigation Improvement Plans.

DESIGN	H. ALLEN	DATE	1/99
DRAWN	M. ROSS	DATE	1/99
CHECKED	J. HOLZWEISER	DATE	1/99

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION

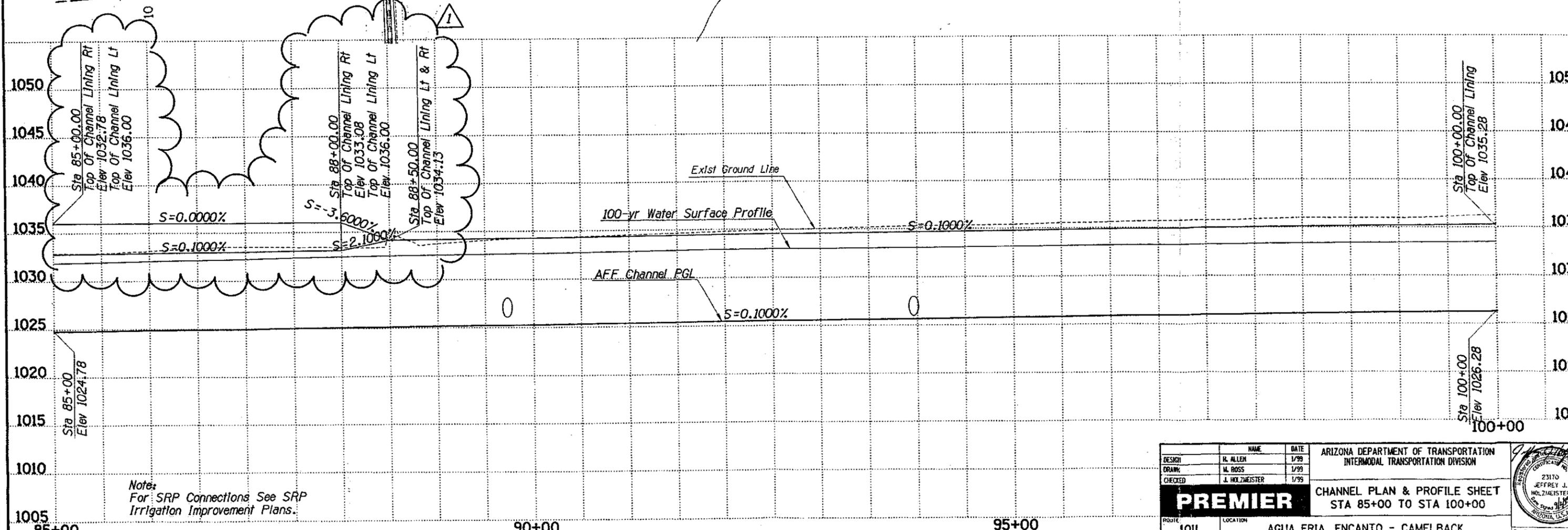
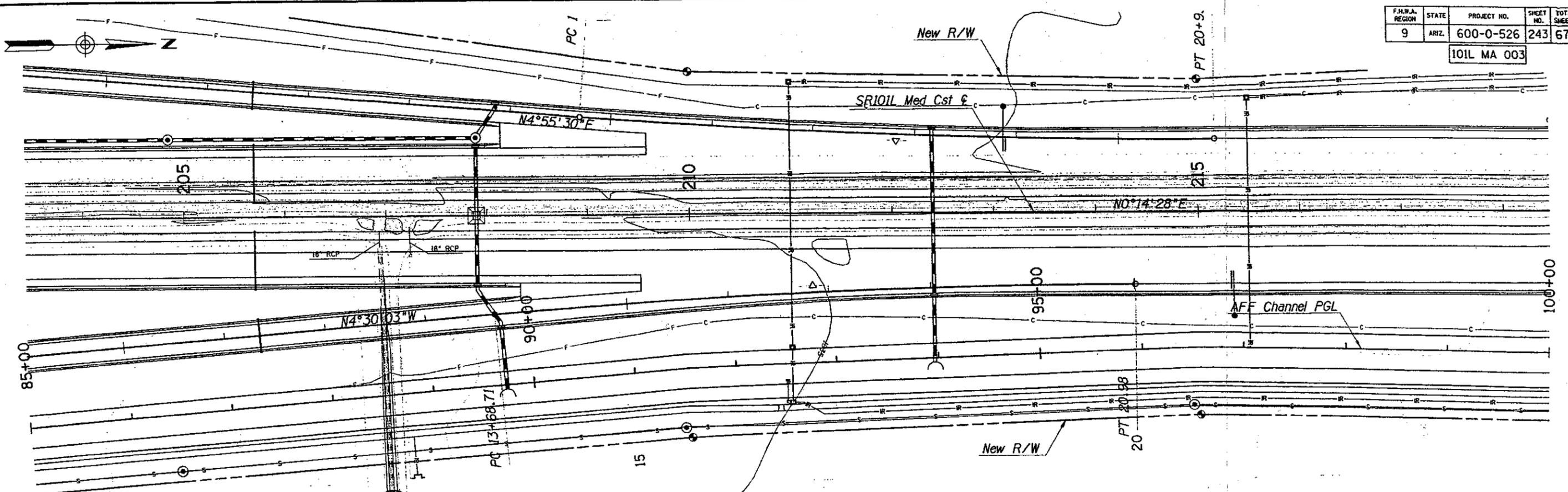
CHANNEL PLAN & PROFILE SHEET
STA 70+00 TO STA 85+00

101L AGUA FRIA, ENCANTO - CAMELBACK

DWG. NO. D-119

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	600-0-526	243	674	4-19-01 JJH

101L MA 003



Sta 85+00.00
Top Of Channel Lining Rt
Elev 1032.78
Top Of Channel Lining Lt
Elev 1036.00

Sta 88+00.00
Top Of Channel Lining Rt
Elev 1033.08
Top Of Channel Lining Lt
Elev 1036.00

Sta 88+50.00
Top Of Channel Lining Lt & Rt
Elev 1034.13

Sta 100+00.00
Top Of Channel Lining
Elev 1035.28

Sta 85+00
Elev 1024.78

Sta 100+00
Elev 1026.28

Note:
For SRP Connections See SRP
Irrigation Improvement Plans.

DESIGN	NAME	DATE
DESIGN	R. ALLEN	1/99
DRAWN	M. BOSS	1/99
CHECKED	J. HOLZMEISTER	1/99

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
PREMIER
CHANNEL PLAN & PROFILE SHEET
STA 85+00 TO STA 100+00



ROUTE 101L LOCATION AGUA FRIA, ENCANTO - CAMELBACK

APPENDIX L

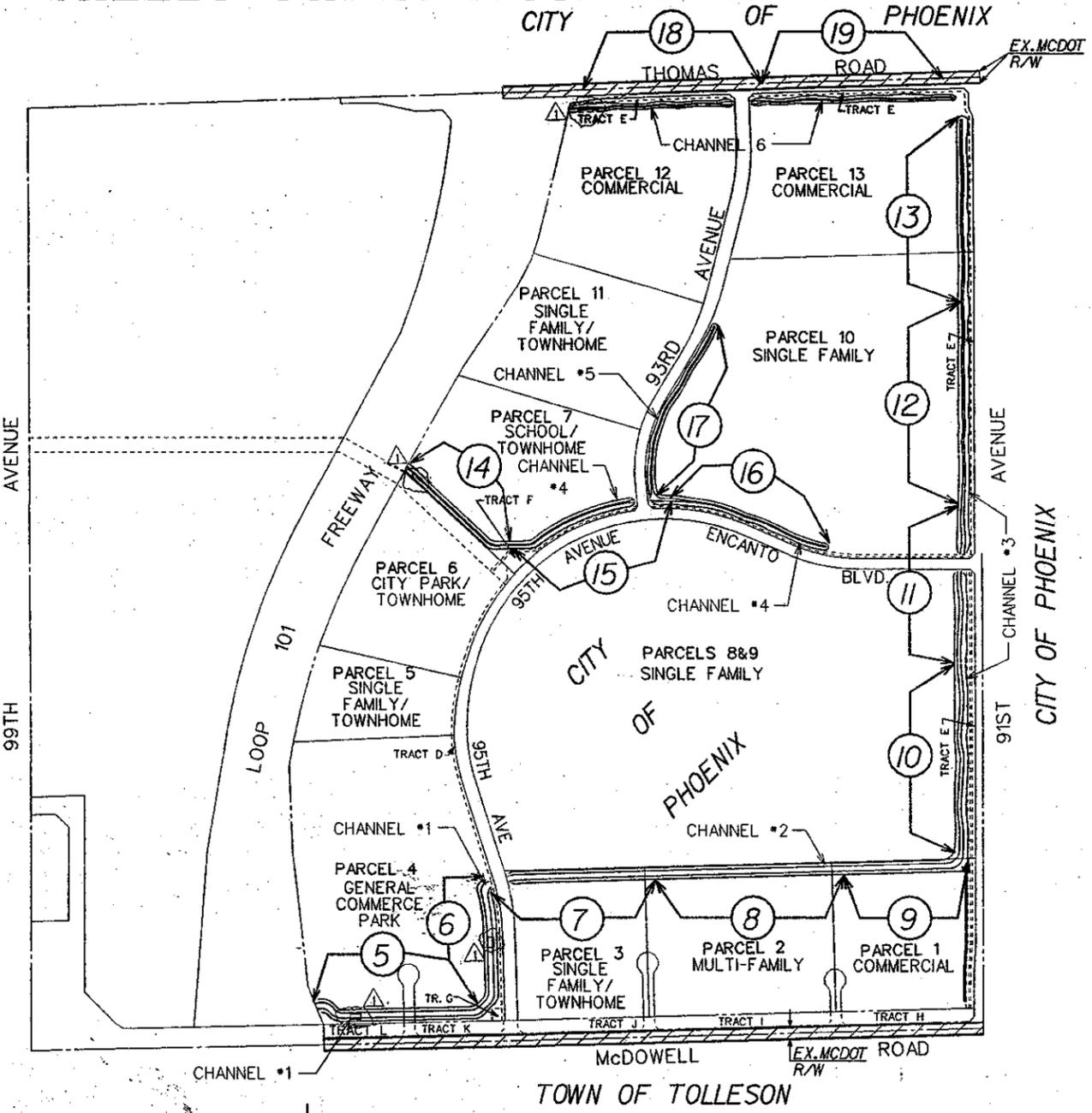
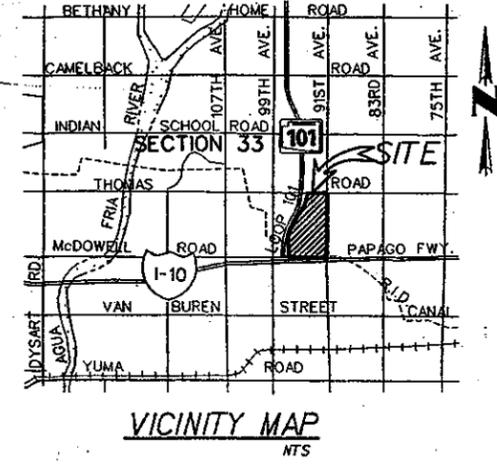
As-Built Channel Grading Plans



CHANNEL GRADING PLANS FOR SHEELY FARMS INFRASTRUCTURE

LEGEND

F.G.	FINISH GRADE	R/W	RIGHT OF WAY
T.B.	TOP OF BERM	S/W ESMPT	SIDEWALK EASEMENT
B.F.E.	BASE FLOOD ELEVATION	P.U.E.	PUBLIC UTILITY EASEMENT
W.S.E.L.	WATER SURFACE ELEVATION	R.W.	RETAINING WALL
▲	GRADE BREAK	L.F.	LINEAL FOOT
→	DIRECTION OF FLOW	⊙	SURVEY MONUMENT
(13.50)	TOP OF CURB ELEVATION	— — — — —	INDICATES EXISTING FENCE
(13.50)	EXIST. TOP OF CURB ELEVATION	— — — — —	INDICATES NEW FENCE
F.F.	FINISHED FLOOR ELEVATION	— — — — —	RETAINING WALL
R.Y.	REAR YARD ELEVATION	LE	LANDSCAPE EASEMENT
D/W	DRIVEWAY ENTRANCE LOCATION		
13.50x	SPOT ELEVATION		
B/C	BACK OF CURB		
FG-13.50	FINISHED GRADE		



DEVELOPER
SUNBELT/SHEELY HOLDINGS
MARK HAMMONS
6720 N. SCOTTSDALE ROAD, SUITE 160
SCOTTSDALE, ARIZONA 85253
PH. (480) 905-0770

BENCHMARK
MARICOPA COUNTY HIGHWAY DEPT.
BRASS CAP IN HAND HOLE @
91ST AVE. & THOMAS ROAD
ELEVATION 1036.53
(C.O.P. DATUM)

AS-BUILT CERTIFICATION

I HEREBY CERTIFY THAT THE "RECORD DRAWING" MEASUREMENTS AND SURVEY MONUMENTS AS SHOWN HEREON WERE MADE UNDER MY SUPERVISION OR AS NOTED AND ARE CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

C. U. COATS, INC.
4550 N. 12TH ST.
PHX. AZ. 85014
PHONE 602.2646831

LARRY E. SULLIVAN
 REGISTERED LAND SURVEYOR
 22782
 REGISTRATION NO.

APPROVAL

DEVELOPMENT SERVICE DEPT. _____ DATE _____
LANDSCAPE ARCHITECT _____

THESE PLANS HAVE BEEN APPROVED BY THE DEVELOPMENT SERVICES DEPARTMENT FOR THE ISSUANCE OF THE FOLLOWING PERMIT(S):

GRADING	LSM	OCC. _____	DATE 3/16/1
PAVING	_____	OCC. _____	DATE _____
CONCRETE	_____	OCC. _____	DATE _____
DRAIN. FAC.	LSM	OCC. _____	DATE 2/16/1
WATER	_____	OCC. _____	DATE _____
WASTEWATER	_____	OCC. _____	DATE _____
OTHER	_____	OCC. _____	DATE _____

THESE PLANS HAVE BEEN APPROVED BY THE DEVELOPMENT SERVICES DEPARTMENT FOR THE ISSUANCE OF THE FOLLOWING PERMIT(S):

GRADING	LSM	OCC. _____	DATE 2/16/1
PAVING	_____	OCC. _____	DATE _____
CONCRETE	_____	OCC. _____	DATE _____
DRAIN. FAC.	LSM	OCC. _____	DATE 2/16/1

▲ ADDED 4 CHANNEL SEDIMENT TRAPS W/ DRYWELLS AND INTERCEPTORS
REVISED SHEETW 1, 2, 5, 6, 14, & 18

THE QUANTITIES SHOWN ARE AN ESTIMATE ONLY THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL QUANTITIES BEFORE BIDDING.

ESTIMATED QUANTITIES

DESCRIPTION	UNITS	QUANTITY
3'-10"x4" BOX CULVERTS	LF	64
42" RGRCP PIPES	LF	92
36" RGRCP PIPES	LF	177
STRAIGHT HEADWALL (MAG DETAIL)	EA	2
INLET HEADWALL (ADOT DETAIL)	EA	1
INLET TRASH RACK	EA	2
OUTFALL ACCESS BARRIER	EA	2
CANTILEVER RETAINING WALL (ADOT)	EA	1
SEDIMENT TRAPS	EA	4

ESTIMATED QUANTITIES

EXCAVATION	136,433 C.Y. (RAW)
EMBANKMENT	26,632 C.Y. (RAW)



LEGEND
③ PLAN SHEET NOS.

SHEET INDEX

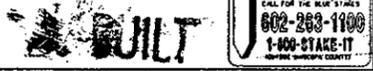
1.....	COVER SHEET
2.....	GENERAL NOTES
3-4.....	GRADING & DETAILS
5-6.....	CHANNEL #1 PLAN AND PROFILES
7-9.....	CHANNEL #2 PLAN & PROFILES
10-13.....	CHANNEL #3 PLAN & PROFILES
14-16.....	CHANNEL #4 PLAN & PROFILES
17.....	CHANNEL #5 PLAN & PROFILE
18-19.....	CHANNEL #6 PLAN & PROFILES
20-22.....	ADOT DETAILS

SHEELY FARMS INFRASTRUCTURE
COE & VAN LOO
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE
 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

CHANNEL GRADING PLANS
 CSFR *0100432 ZONING *Z137-99-5 OS *13-5 & 6, 14-5 & 6
 DSD *99-8024 SDEV *2000633

SHEET
 1 OF 22
 98-0094-08
 PLAN

DATE: Mar. 07, 2001
 TIME: 09:23:49
 FILE: n:\980094\Nand\Infra\9d101.dgn



GRADING & DRAINAGE GENERAL NOTES

- A. A GRADING PERMIT IS REQUIRED UNDER CHAPTER 32A OF THE PHOENIX CITY CODE.
- B. HAUL PERMITS, WHEN REQUIRED, MUST BE OBTAINED PRIOR TO OR CONCURRENTLY WITH THE GRADING AND DRAINAGE PERMIT.
- C. EXCAVATING CONTRACTOR MUST GIVE LOCATION FOR WASTING EXCESS EXCAVATION AND A LETTER FROM OWNER GIVING PERMISSION FOR DUMPING PRIOR TO STARTING ONSITE CONSTRUCTION. IF EXCESS EXCAVATION EXCEEDS 100 CUBIC YARDS, THE DUMPING SITE WILL ALSO REQUIRE A GRADING AND DRAINAGE PERMIT.
- D. DEVELOPMENT SERVICES DEPARTMENT'S FIELD INSPECTION GROUP SHALL BE NOTIFIED 48 HOURS BEFORE ANY ONSITE AND/OR OFFSITE CONSTRUCTION BEGINS, TELEPHONE (602) 262-7811.
- E. MINIMUM FINISH FLOOR ELEVATIONS SHOWN ARE SAFE FROM THE 100-YEAR FLOOD OR PER MINIMUM SPECIFIED IN THE CITY OF PHOENIX STORM DRAIN DESIGN MANUAL, WHICHEVER IS GREATER.
- F. STAKING PAD ELEVATIONS IS THE RESPONSIBILITY OF THE OWNER AND HIS ENGINEER. THE OWNER'S ENGINEER SHALL SUBMIT ONE SEALED COPY OF THIS GRADING AND DRAINAGE PLAN DESIGNATED AS "RECORD DRAWING" (BEARING AN ORIGINAL SIGNATURE) PRIOR TO THE REQUEST FOR FINAL INSPECTION.
- G. A SEPARATE PERMIT IS NECESSARY FOR ANY OFFSITE CONSTRUCTION.
- H. AN APPROVED GRADING AND DRAINAGE PLAN SHALL BE ON THE JOB SITE AT ALL TIMES. DEVIATIONS FROM THE PLAN MUST BE PRECEDED BY AN APPROVED PLAN REVISION.
- I. DRYWELLS, WHEN REQUIRED, MUST BE DRILLED A MINIMUM OF 10 FEET INTO PERMEABLE POROUS STRATA OR PERCOLATION TESTS WILL BE REQUIRED. THE GRADING AND DRAINAGE INSPECTOR MUST BE PRESENT BEFORE BACKFILL OR WELL PIPES ARE PLACED WITHIN ANY DRYWELLS.
- J. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR REGISTERING THE DRYWELLS SHOWN ON PLAN WITH THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (A.D.E.Q.). FOR INFORMATION ABOUT SPECIFIC REQUIREMENTS, CONTACT THE WATER PERMITS UNIT AT (602) 257-2270.
- K. GRADING AND DRAINAGE PLAN APPROVAL INCLUDES THE CONSTRUCTION OF ALL SURFACE IMPROVEMENTS SHOWN ON THE APPROVED PLAN, INCLUDING, BUT NOT LIMITED TO, RETENTION AREAS, SEDIMENTATION BASINS, AND/OR OTHER DRAINAGE FACILITIES, DRAINAGE PATTERNS, WALLS, CURBS, ASPHALT PAVEMENT, AND BUILDING FLOOR ELEVATIONS.
- L. CONTRACTOR SHALL PROVIDE LEVEL BOTTOM IN ALL RETENTION BASINS AT ELEVATIONS SHOWN ON THE PLANS. SLOPE PROTECTION SHALL BE APPLIED TO PREVENT EROSION.
- M. GRADES SHOWN IN RETENTION BASINS ARE DESIGN FINISHED GRADES. SHOULD THE CONTRACTOR OR ANY SUBCONTRACTOR PLAN TO PLACE SPOIL DIRT FROM FOOTINGS, UTILITY TRENCHES, LANDSCAPING, SWIMMING POOLS, ETC., IN THE BASINS, THEN THE BASINS SHOULD BE SUFFICIENTLY OVER-EXCAVATED DURING THE ROUGH GRADING OPERATION TO ALLOW FOR THE PLACEMENT OF THE FILL OR LANDSCAPING MATERIALS.
- N. CONTRACTOR IS RESPONSIBLE FOR LOCATING AND CONFIRMING DEPTHS OF ALL THE EXISTING UTILITY LINES WITHIN PROPOSED RETENTION BASIN AREAS. IF THE BASIN CANNOT BE CONSTRUCTED AS PER PLAN BECAUSE OF CONFLICTS, THE CONTRACTOR SHOULD DISCUSS MODIFICATION OF BASIN CONFIGURATION WITH THE CITY INSPECTOR TO DETERMINE IF A PLAN REVISION OR A FIELD CHANGE IS REQUIRED.
- O. ALL DRAINAGE PROTECTIVE DEVICES SUCH AS SWALES, INTERCEPTOR DITCHES, PIPES, PROTECTIVE BERMS, BARRIER WALLS, CONCRETE CHANNELS, OR OTHER MEASURES DESIGNED TO PROTECT ADJACENT BUILDINGS OR PROPERTY FROM STORM RUNOFF MUST BE COMPLETED PRIOR TO BUILDING CONSTRUCTION.
- P. CONSTRUCTION MUST BE PHASED SO THE NEWLY ALIGNED CHANNEL IS FULLY OPERATIONAL BEFORE THE EXISTING DRAINAGE CHANNEL IS FILLED. FLOOD WATER CONVEYANCE MUST BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.
- Q. ALL KNOWN EXISTING UNDERGROUND UTILITIES WITHIN PROPOSED RETENTION AREAS HAVE BEEN DESIGNED TO MAINTAIN A MINIMUM 15" OF COVER OVER CITY OWNED UTILITY LINES AND THE MINIMUM SPECIFIED BY OTHER UTILITY OWNERS.
- R. REQUIRED RETAINING WALLS SHOWN ON THE GRADING AND DRAINAGE PLANS ARE TO BE REVIEWED, PERMITTED, AND INSPECTED BY THE BUILDING SAFETY BRANCH OF THE DEVELOPMENT SERVICES DEPARTMENT.
- S. CERTIFICATE OF OCCUPANCY (C. OF O.) FOR ANY BUILDING IS DENIED UNTIL ALL GRADING AND DRAINAGE IMPROVEMENTS ARE COMPLETED.
- T. THE ENGINEERING DESIGN ON THESE PLANS ARE ONLY APPROVED BY THE CITY IN SCOPE AND NOT IN DETAIL. CONSTRUCTION QUANTITIES ON THESE PLANS ARE NOT VERIFIED BY THE CITY. APPROVAL OF THESE PLANS ARE FOR PERMIT PURPOSES ONLY AND SHALL NOT PREVENT THE CITY FROM REQUIRING CORRECTION OF ERRORS IN THE PLANS WHERE SUCH ERRORS ARE SUBSEQUENTLY FOUND TO BE IN VIOLATION OF ANY LAW, ORDINANCE, HEALTH, SAFETY, OR OTHER DESIGN ISSUES.
- U. THE CITY OF PHOENIX POLICE DEPARTMENT ENFORCES LAWS REGARDING THE OPERATION OF COMMERCIAL VEHICLES. THIS INCLUDES ENFORCEMENT OF CITY, STATE, COUNTY AND LOCAL LAWS AND ORDINANCES. QUESTIONS REGARDING COMMERCIAL VEHICLE ENFORCEMENT MAY BE DIRECTED TO THE COMMERCIAL VEHICLE ENFORCEMENT SUPERVISOR AT (602) 495-7813 (SOUTH RESOURCE BUREAU).
- V. RETENTION BASIN SIDE SLOPES SHALL BE A MAXIMUM OF 4:1 UNLESS APPROVAL IS RECEIVED FROM THE PLAN REVIEWER FOR A STEEPER SLOPE.

NOTE:

THE OWNER/DEVELOPER IS RESPONSIBLE FOR OBTAINING ADOT AND ANY OTHER JURISDICTIONAL APPROVALS AND PERMITS FOR THE CONSTRUCTION SHOWN ON THESE PLANS WHICH FALLS OUTSIDE THE CITY OF PHOENIX RIGHT-OF-WAY.

ENGINEER'S NOTES/GRADING

THESE PLANS ARE NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS THE APPROVAL BLOCK HAS BEEN SIGNED BY THE APPROPRIATE AGENCIES. ALL WORK SHALL CONFORM TO THE CURRENT MARICOPA ASSOCIATION OF GOVERNMENTS (M.A.G.) SPECIFICATIONS AND STANDARD DETAILS TOGETHER WITH THE SUPPLEMENT OF THE APPROPRIATE AGENCY.

A THOROUGH ATTEMPT HAS BEEN MADE TO SHOW THE LOCATIONS OF ALL UNDERGROUND OBSTRUCTIONS AND UTILITY LINES IN THE WORK AREA. HOWEVER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO OBSTRUCTIONS AND UTILITY LINES ENCOUNTERED DURING CONSTRUCTION AND SHALL DETERMINE THE EXACT LOCATION OF UTILITIES IN THE AREA.

THE ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE DUE TO THE VARYING FIELD CONDITIONS, CHANGING SOIL TYPES, ALLOWABLE CONSTRUCTION TOLERANCES, AND CONSTRUCTION METHODS THAT ARE BEYOND THE CONTROL OF THE ENGINEER.

PRIOR TO BIDDING THE WORK, THE CONTRACTOR SHALL THOROUGHLY SATISFY HIMSELF AS TO THE ACTUAL CONDITIONS AND EARTHWORK QUANTITIES, IF ANY. NO CLAIM SHALL BE MADE AGAINST THE OWNER/DEVELOPER OR ENGINEER FOR ANY EXCESS OR DEFICIENCY THEREIN ACTUAL OR RELATIVE.

THE ENGINEER WILL PERFORM FIELD SURVEYS FOR PAD ELEVATION CERTIFICATIONS UPON NOTIFICATION BY THE GRADING CONTRACTOR THAT THE PADS ARE COMPLETE AND READY FOR CERTIFICATION. IT IS UNDERSTOOD THAT THE CERTIFICATION PROVIDES ONLY A REPRESENTATIVE ELEVATION OF THE AVERAGE GRADE OF EACH LOT, BUILDING, OR UNIT PAD AND SHALL NOT BE CONSTRUED TO INCLUDE YARD AND STREET SUBGRADE CERTIFICATION OR CERTIFICATION THAT THE ENTIRE PAD IS LEVEL, THAT IT WAS CONSTRUCTED IN THE DESIGNED LOCATION, OR WAS GRADED TO THE CROSS-SECTION SET FORTH ON THE PLANS OR AS DESIGNATED IN THE SOILS REPORT.

THE CONTRACTOR SHALL MAKE NO CLAIM AGAINST THE OWNER OR THE ENGINEER REGARDING ALLEGED INACCURACY OF CONSTRUCTION STAKES SET BY THE ENGINEER UNLESS ALL SURVEY STAKES SET BY THE ENGINEER ARE MAINTAINED INTACT AND CAN BE VERIFIED AS TO THEIR ORIGIN. IF, IN THE OPINION OF THE ENGINEER, THE STAKES ARE NOT MAINTAINED INTACT AND CANNOT BE VERIFIED AS TO THEIR ORIGIN, ANY REMEDIAL WORK REQUIRED TO CORRECT ANY ITEM OR IMPROPER CONSTRUCTION WORK IN THIS DEVELOPMENT SHALL BE PERFORMED AT THE SOLE EXPENSE OF THE RESPONSIBLE CONTRACTOR OR SUBCONTRACTOR.

NOTHING CONTAINED IN THE CONTRACT DOCUMENTS SHALL CREATE, NOR SHALL BE CONSTRUED TO CREATE, ANY CONTRACTUAL RELATIONSHIP BETWEEN THE ENGINEER AND THE CONTRACTOR OR ANY SUBCONTRACTOR.

THE ENGINEER WILL NOT BE RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES OR FOR SAFETY PRECAUTIONS OR PROGRAMS UTILIZED IN CONNECTION WITH THE WORK, AND HE WILL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S FAILURE TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

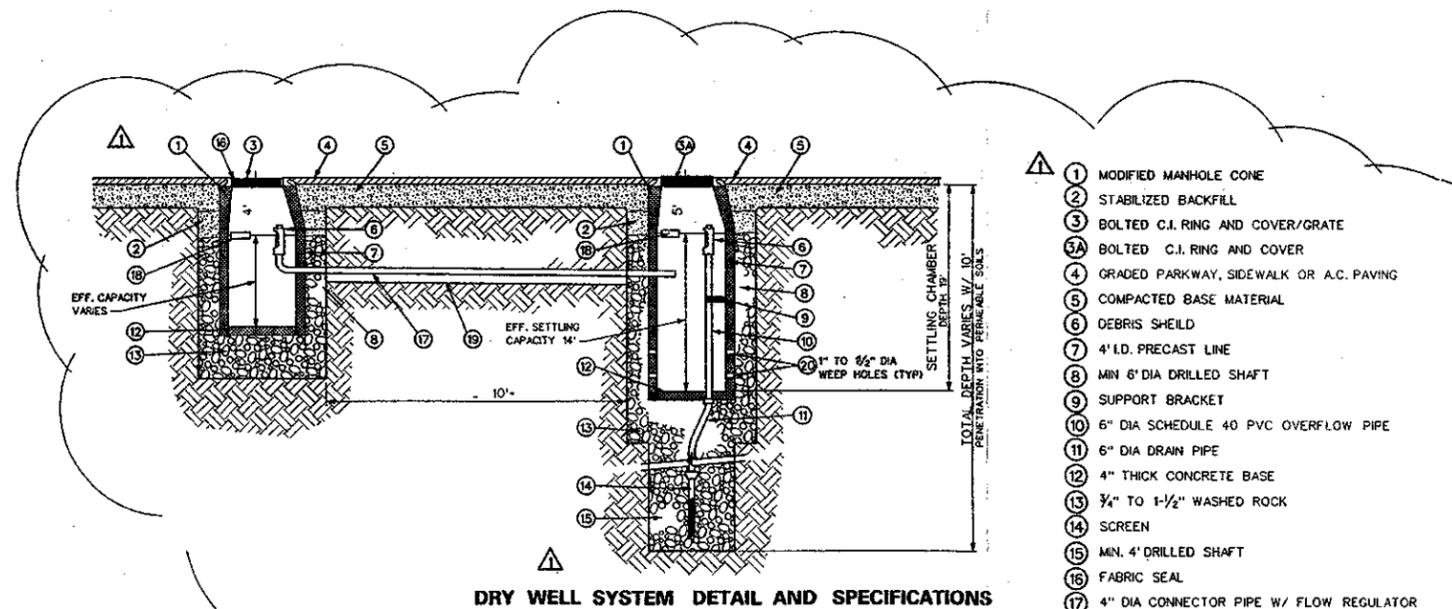
ALL CONDUITS (BOX CULVERT, REINFORCED CONCRETE PIPE, CAST-IN-PLACE PIPE, AND/OR CORRUGATED METAL PIPE) SHOWN ON THESE PLANS ARE DESIGNED FOR STANDARD HIGHWAY LOADINGS. THE STANDARD SATISFACTORY MINIMUM COVER REQUIREMENTS, AS ESTABLISHED BY THE CONDUIT MANUFACTURER, MAY NOT ALWAYS BE ADEQUATE DURING CONSTRUCTION. WHEN CONSTRUCTION EQUIPMENT, FREQUENTLY HEAVIER THAN TRAFFIC LOADS FOR WHICH THE CONDUIT HAS BEEN DESIGNED, IS TO BE DRIVEN OVER OR CLOSE TO THE BURIED CONDUIT, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE CONDUIT. THE ADEQUACY OF THE COVER REQUIREMENTS FOR CONDUITS SHALL BE ANALYZED AND CHECKED BY THE CONTRACTOR TO ADDRESS LOADING CONDITIONS IMPOSED BY CONSTRUCTION ACTIVITY. ANY CONDUIT DAMAGED BY CONSTRUCTION ACTIVITY SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

ALL EARTHWORK CONSTRUCTION SHALL CONFORM TO THE LATEST M.A.G. STANDARD DETAILS AND/OR SPECIFICATIONS INCLUDING ANY SUPPLEMENTS THERETO AND THE SOILS REPORT PREPARED BY:

SPEEDIE & ASSOCIATES

PROJECT NO. 9905425A DATED AUG. 8, 2000

DATA FOR EARTHWORK CALCULATIONS IS PROVIDED IN THE SOILS REPORT AND (IF APPLICABLE) ANY SUPPLEMENTS THERETO.



- 1 MODIFIED MANHOLE CONE
 - 2 STABILIZED BACKFILL
 - 3 BOLTED C.I. RING AND COVER/GRATE
 - 3A BOLTED C.I. RING AND COVER
 - 4 GRADED PARKWAY, SIDEWALK OR A.C. PAVING
 - 5 COMPACTED BASE MATERIAL
 - 6 DEBRIS SHIELD
 - 7 4" I.D. PRECAST LINE
 - 8 MIN 6" DIA DRILLED SHAFT
 - 9 SUPPORT BRACKET
 - 10 6" DIA SCHEDULE 40 PVC OVERFLOW PIPE
 - 11 6" DIA DRAIN PIPE
 - 12 4" THICK CONCRETE BASE
 - 13 3/4" TO 1-1/2" WASHED ROCK
 - 14 SCREEN
 - 15 MIN. 4" DRILLED SHAFT
 - 16 FABRIC SEAL
 - 17 4" DIA CONNECTOR PIPE W/ FLOW REGULATOR
 - 18 MIN. 4 QUART CAPACITY ABSORBENT
 - 19 SLURRY BACKFILL
 - 20 8 PERFORATIONS PER LINEAR FOOT FOR BOTTOM
- 3 FEET OF CHAMBER

DRY WELL SYSTEM DETAIL AND SPECIFICATIONS

SHEELY FARMS INFRASTRUCTURE
 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

COE & VAN LOO
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DESIGNED	STAHJA	REVISIONS	DATE
DRAWN	REVISIONS	ADDED DRYWELL DET.	
CHECKED	BRUST	DATE	2/23/01

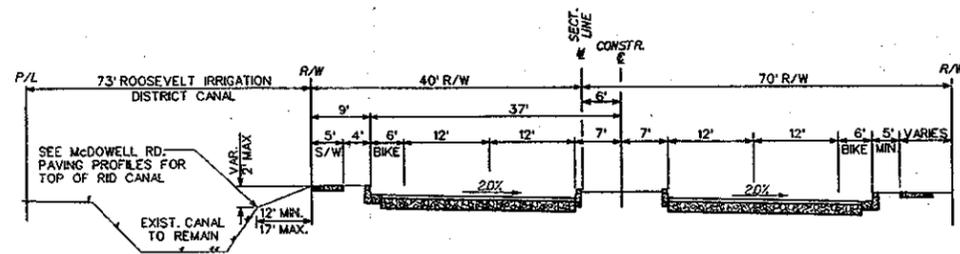
CHANNEL GRADING PLANS

SHEET 2 OF 22
 98-0094-08
 PLAN

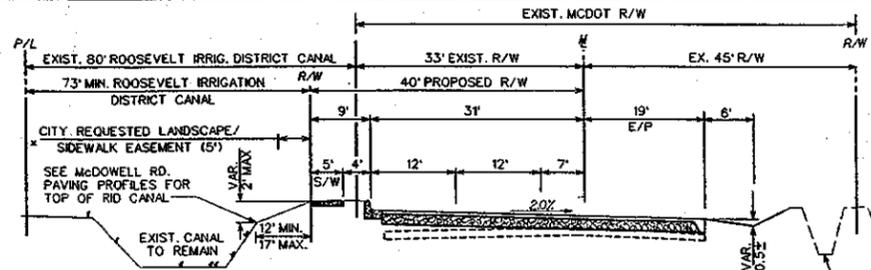
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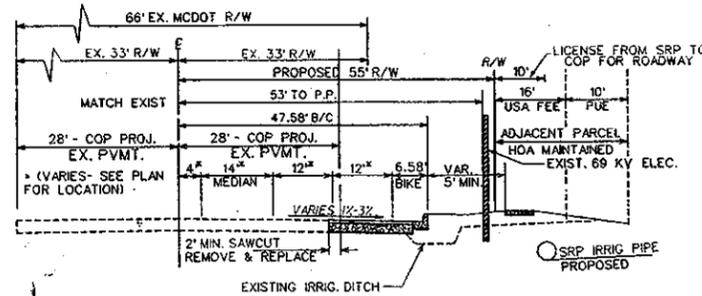
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 002-263-1100
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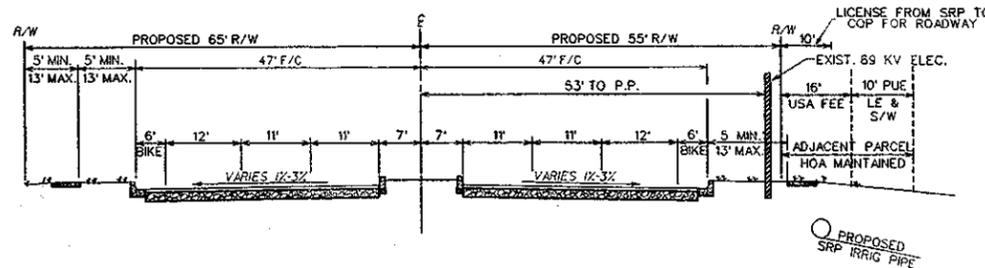
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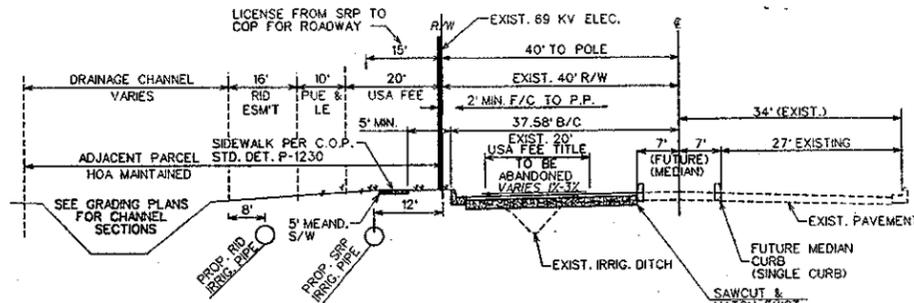
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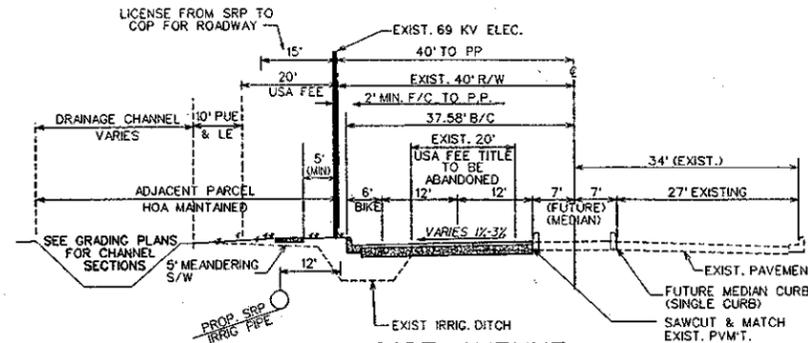
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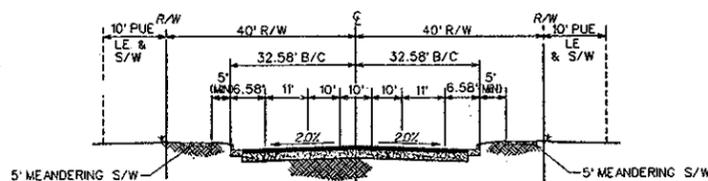
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LOOKING EAST



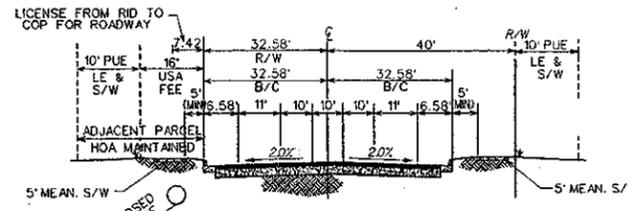
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LOOKING NORTH
MCDOWELL TO ENCANTO



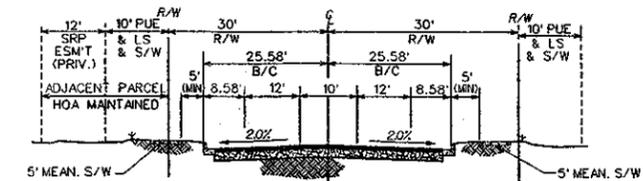
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LOOKING NORTH
ENCANTO TO THOMAS



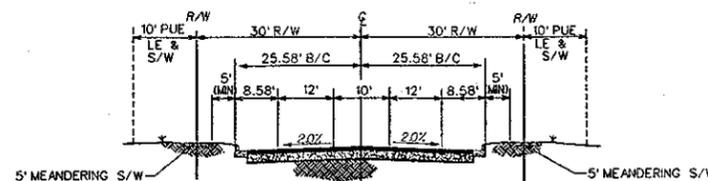
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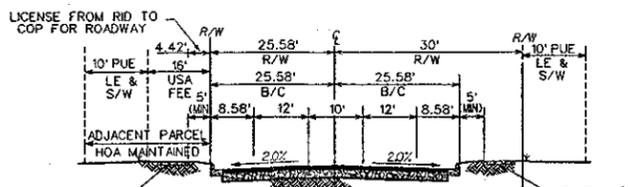
95TH AVENUE ADJACENT
TO COMMERCIAL



95TH AVENUE FROM WELL
SITE TO 93RD AVENUE
ENCANTO FROM 93RD AVENUE
TO 91ST AVENUE



93RD AVENUE ADJACENT
TO SINGLE FAMILY & TOWNHOMES



95TH AVENUE ADJACENT TO
TOWNHOMES & PARK- TO WELL SITE

DATE: Mar. 07, 2001
TIME: 09:25:13
FILE: n:\980094\land\Inra\p01d03.dgn

SHEELY FARMS INFRASTRUCTURE

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TEL: (602) 264-6831

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DESIGNED	DATE	BY
ST.M.H.J.A.		
DRAWN		
CHECKED		
DATE		



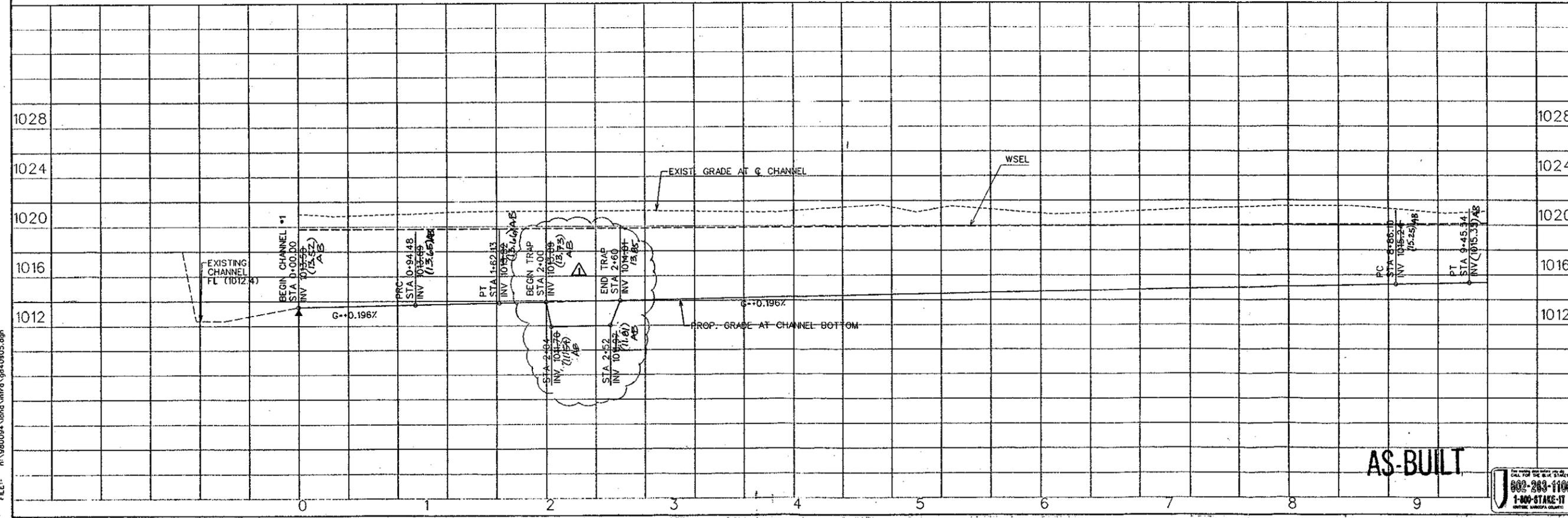
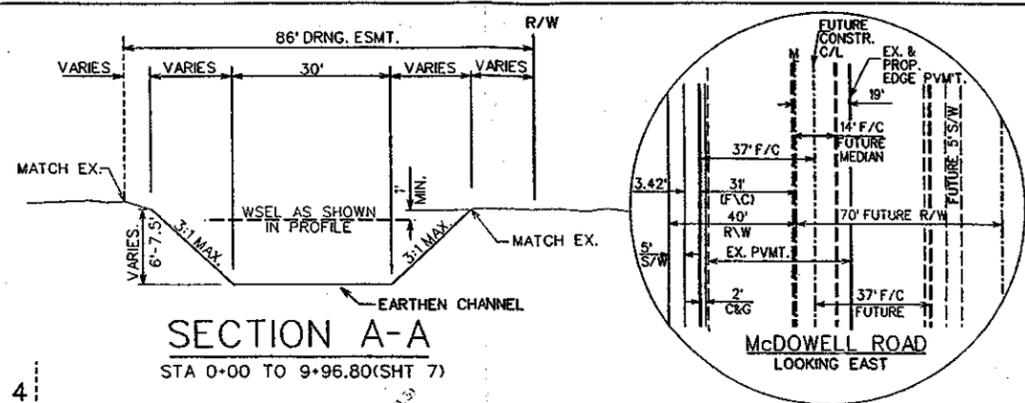
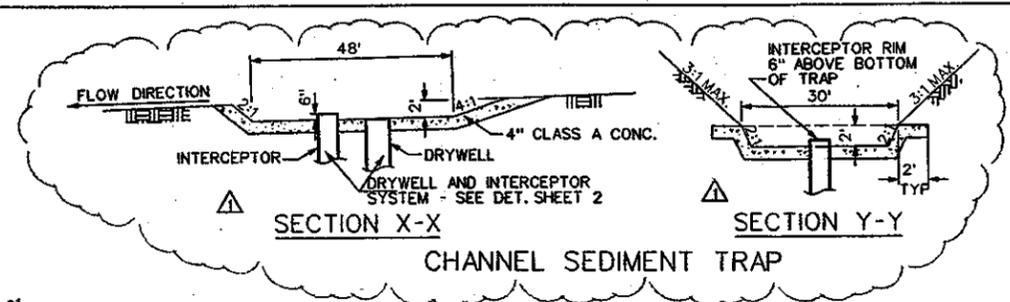
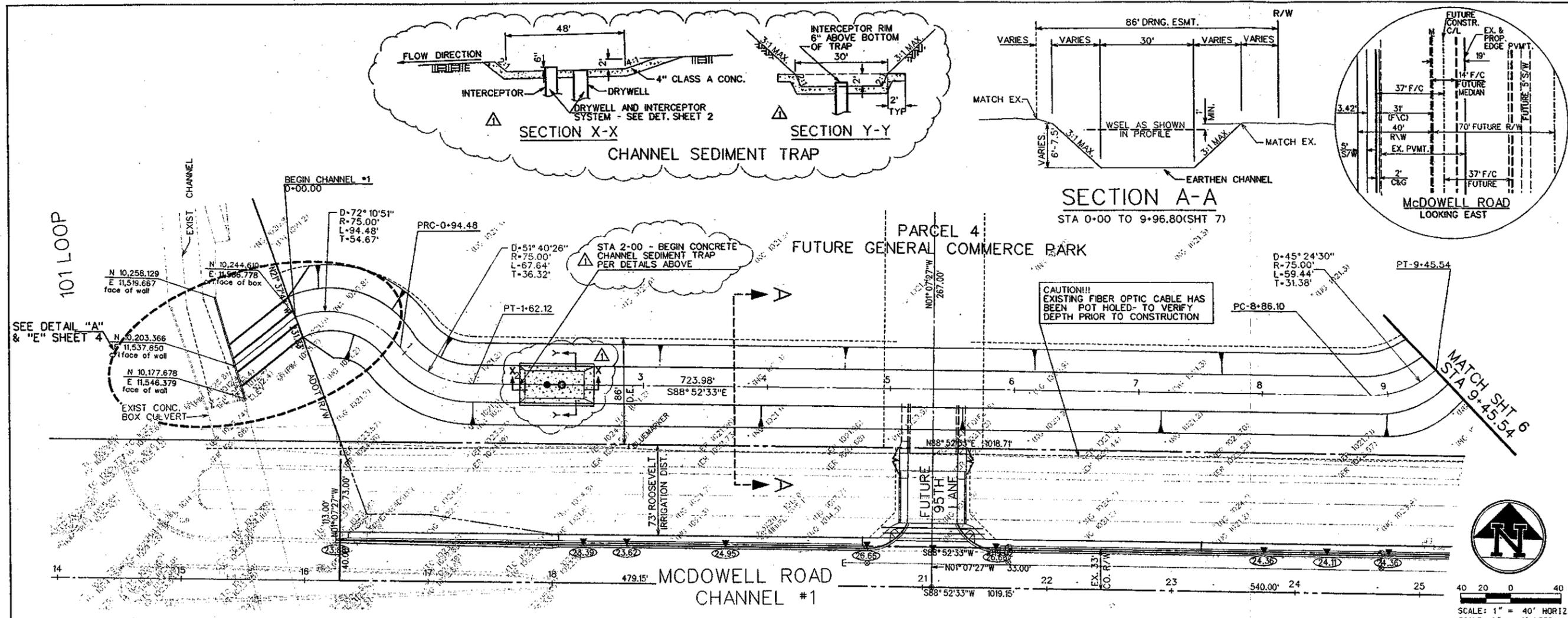
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SHEET
3 OF 22
98-0094-08
PLAN

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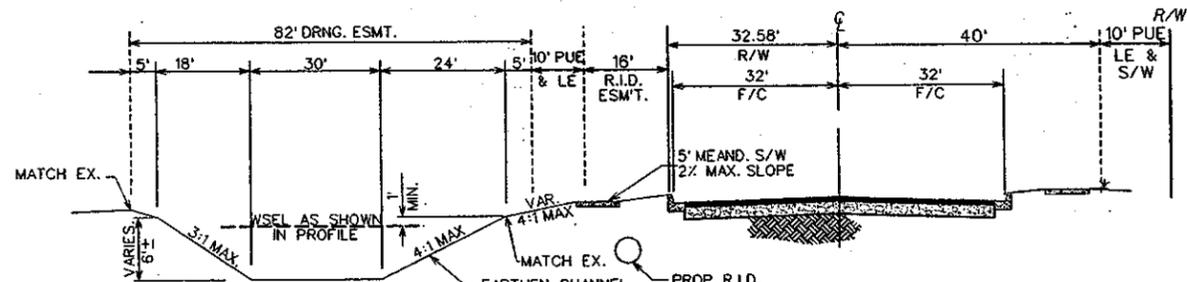
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DRAWN	REBY/PA/S	ADD SEDIMENT TRAP	12-4-01	SLT
CHECKED	B.RUST			
DATE			2/23/01	

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 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

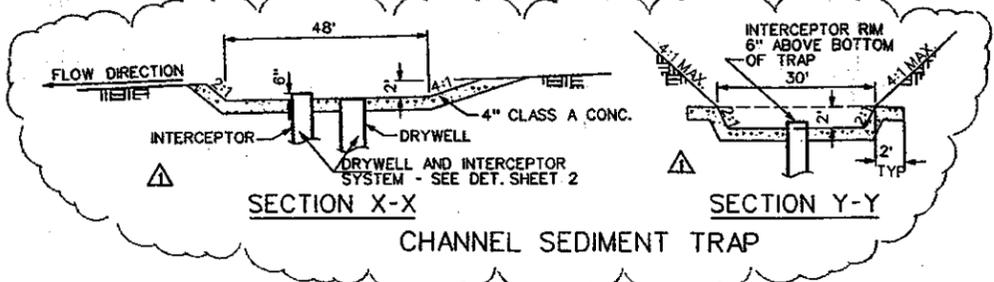
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 SHEET 5 OF 22
 98-0094-08 PLAN
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AS-BUILT

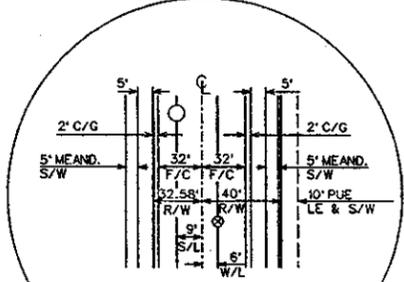




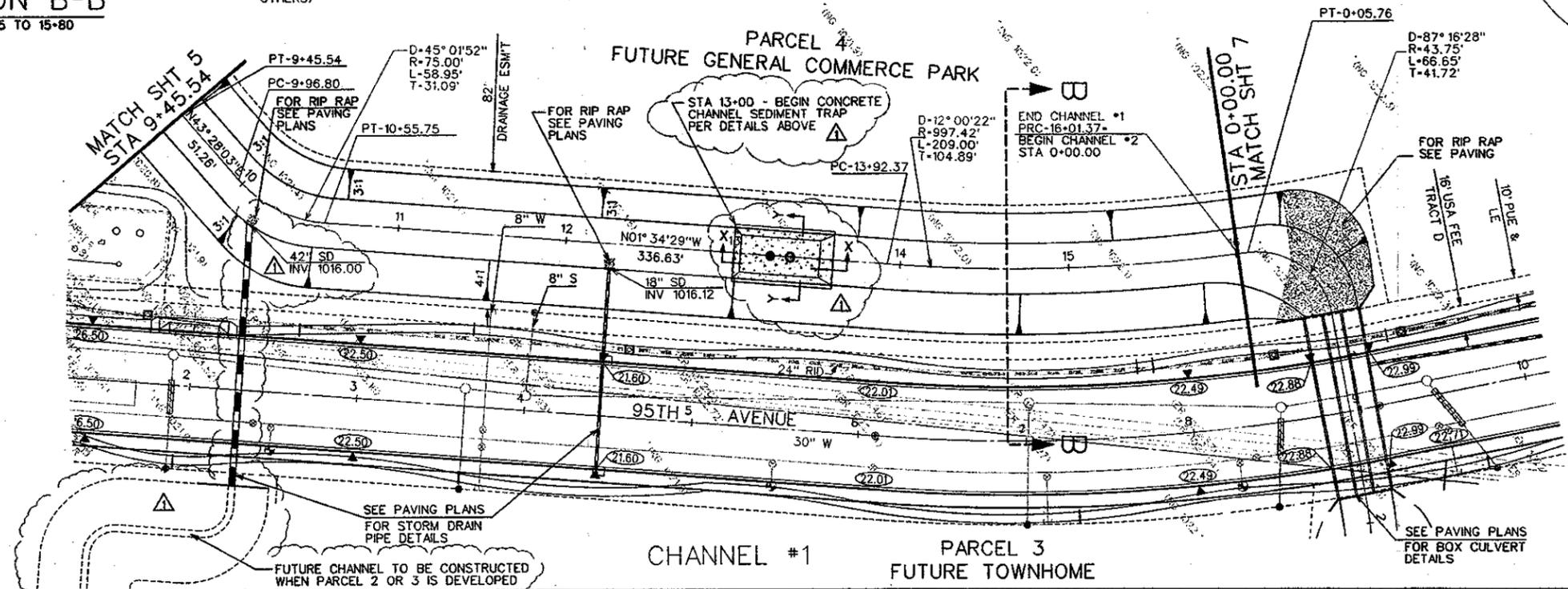
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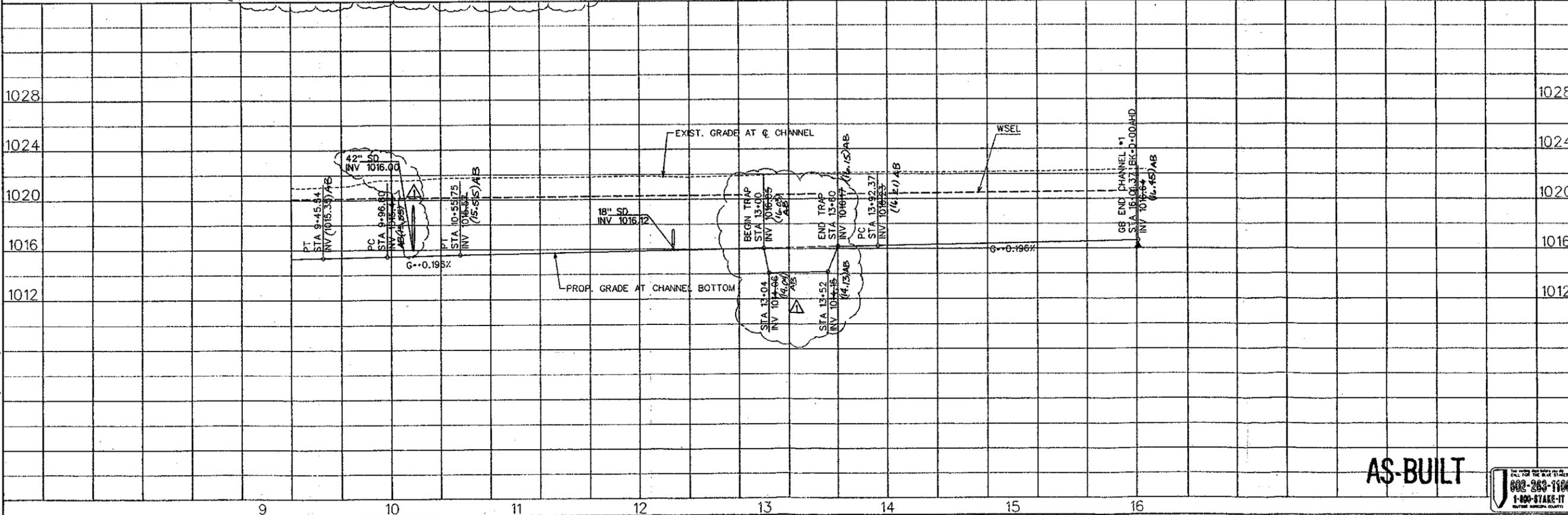
SECTION X-X **SECTION Y-Y**
CHANNEL SEDIMENT TRAP



TYPICAL COLLECTOR THRU COMMERCIAL



CHANNEL #1 **PARCEL 3 FUTURE TOWNHOME**



AS-BUILT

DESIGNED	BY	DATE
ST.M.J.A.	DATE	10/28
DRAWN	REVISIONS	
CHECKED	1. ADD STORM DRAIN & SEDIMENT TRAP	12-4-01
DATE	2. BRUSH	2/23/01



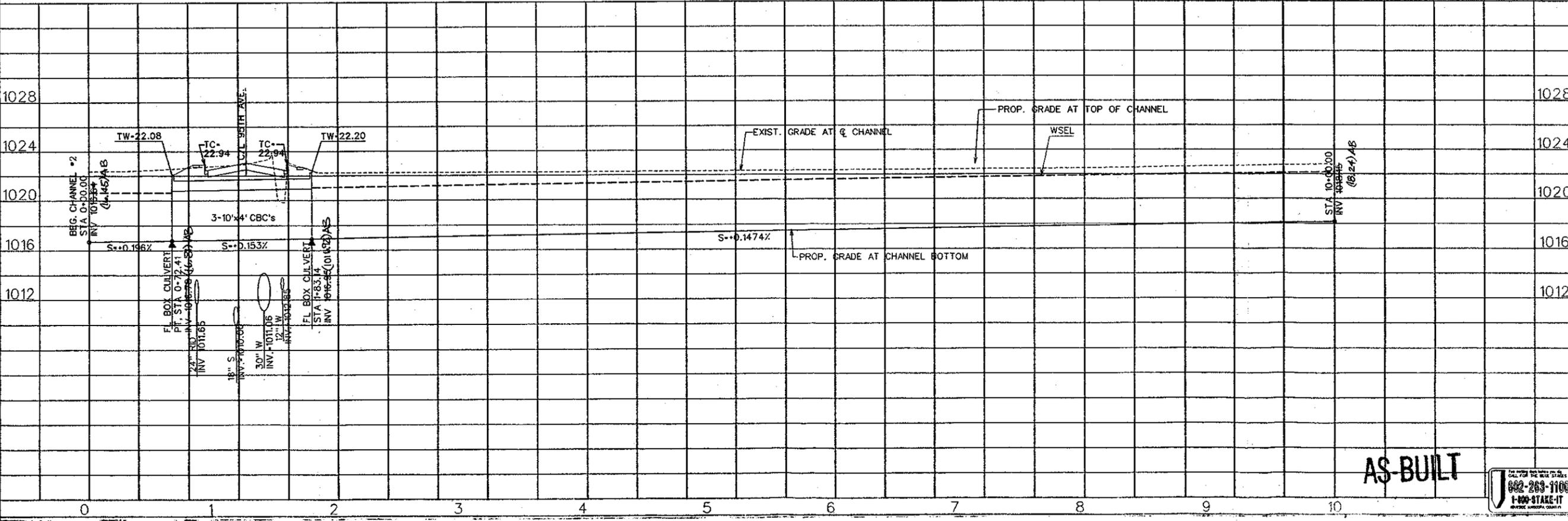
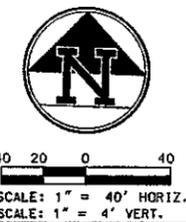
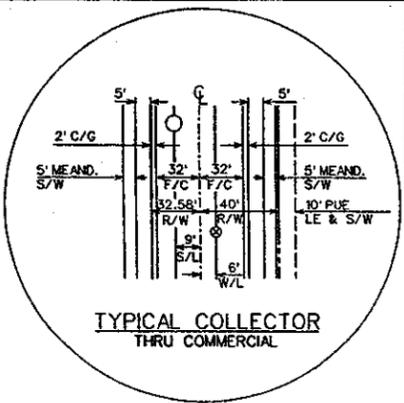
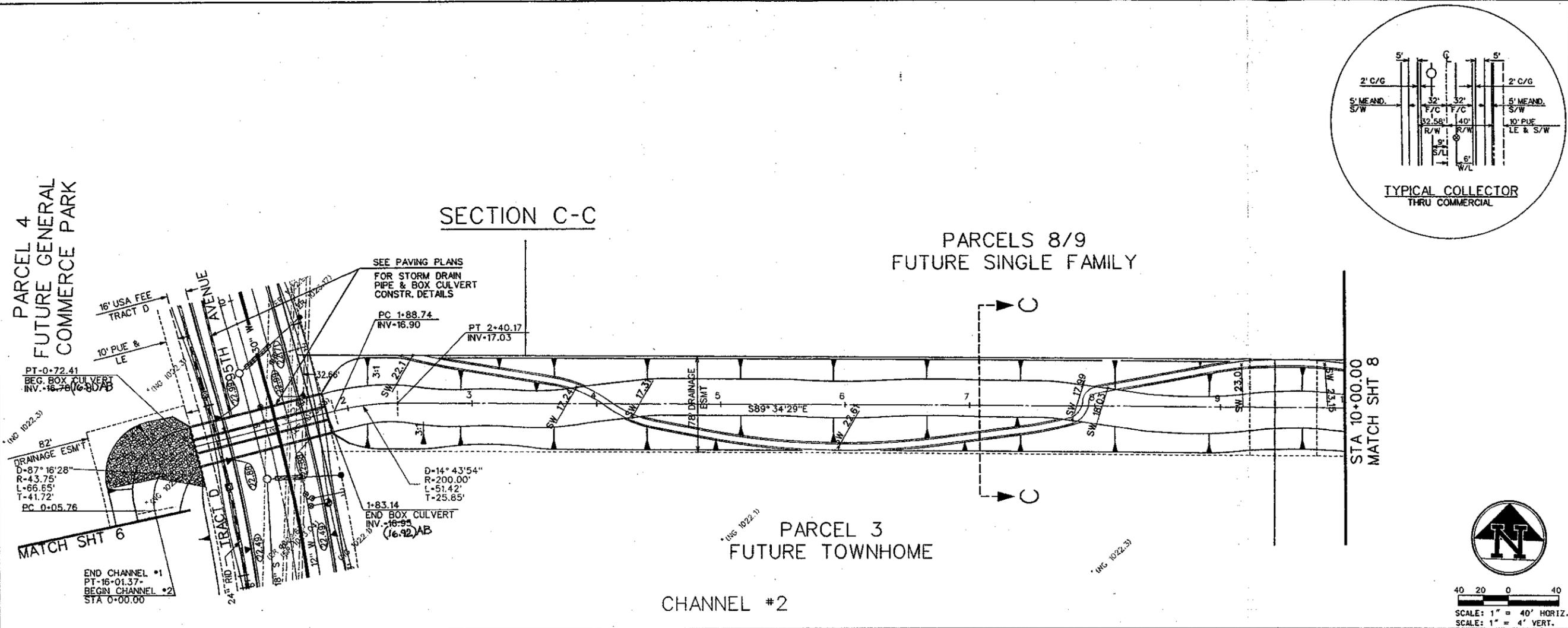
CHANNEL GRADING PLANS
SHEET 6 OF 22
98-0094-08 PLAN

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COE & VAN LOO
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4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

DATE: Nov. 15, 2000
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DSD *99-8024 SDEY *2000633 CSPR *0100432 ZONING *Z137-99-5 OS *13-5 & 6, 14-5 & 6

DATE: Mar. 07, 2001
 TIME: 09:28:42
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SHEELY FARMS INFRASTRUCTURE
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 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

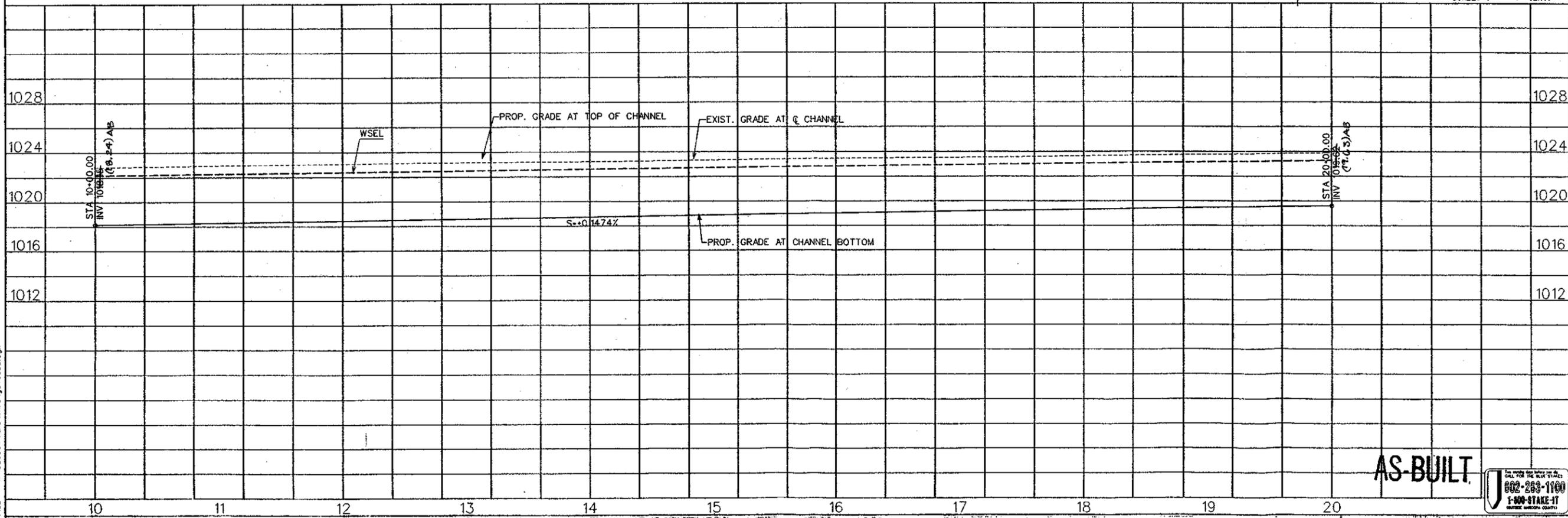
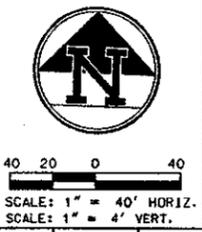
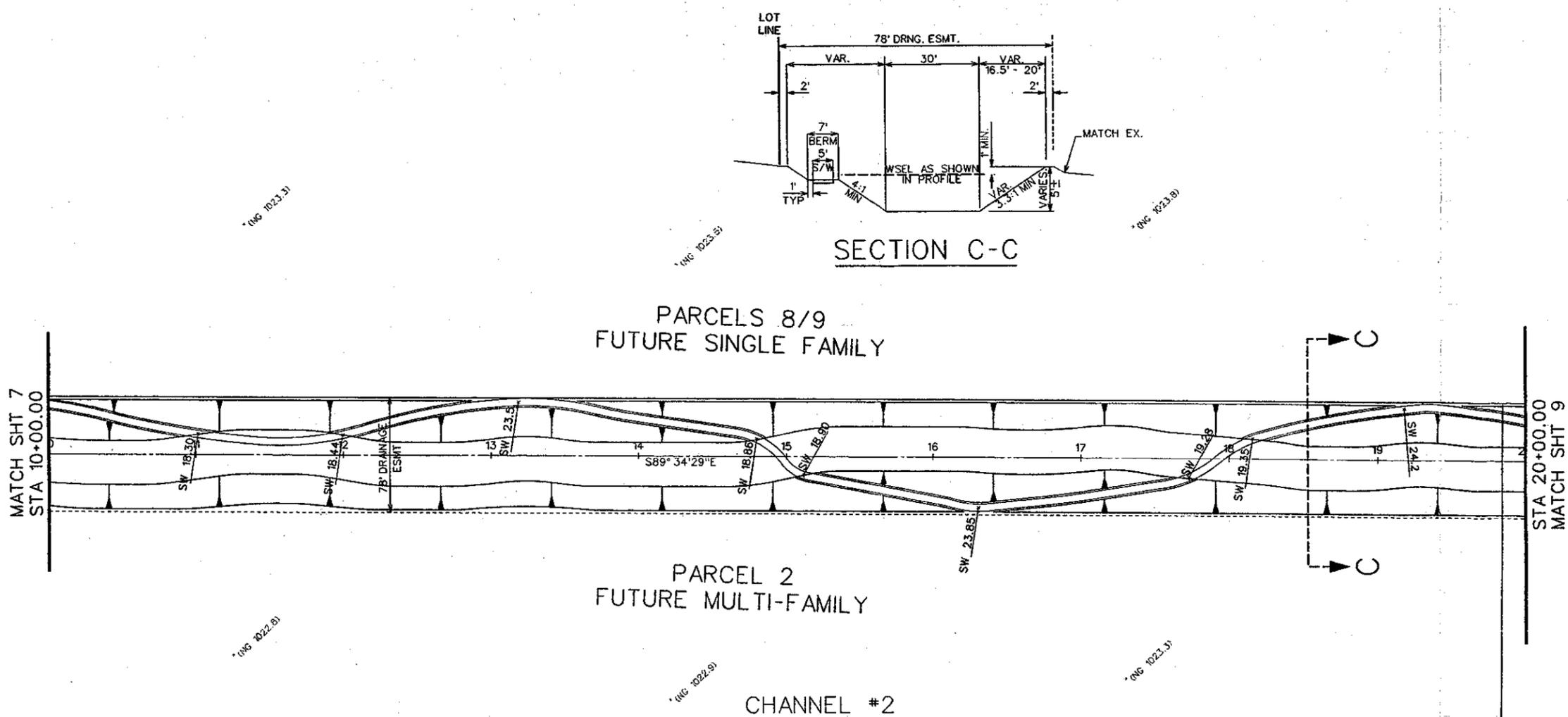
CHANNEL GRADING PLANS
 SHEET 7 OF 22
 98-0094-08
 PLAN

DSD 99-8024 SDEV 2000633 CSPR 0100432 ZONING 7137-99-5 OS 435 & 6.145 & 6

DESIGNED: ST.MH.JA.
 DRAWN: REV.DIP.AS
 CHECKED: B.RUST
 DATE: 2/23/01

AS-BUILT

DATE: Mar. 07, 2001
 TIME: 09:26:59
 FILE: n:\980094\land\infra\gr4\08.dgn



AS-BUILT

CALL FOR THE BLUE STAKE
 602-283-1100
 1-800-STAKE-IT

DESIGNED	STAMP	DATE	BY
DRAWN	RB		
CHECKED	BR		
DATE		2/23/01	

REVISIONS	DATE	BY
1028		
1024		
1020		
1016		
1012		

CHANNEL GRADING PLANS

13135
 E. THOMPSON
 VAN LOO
 LANDSCAPE ARCHITECTURE
 PHOENIX, ARIZONA

SHEET 8 OF 22

98-0094-08 PLAN

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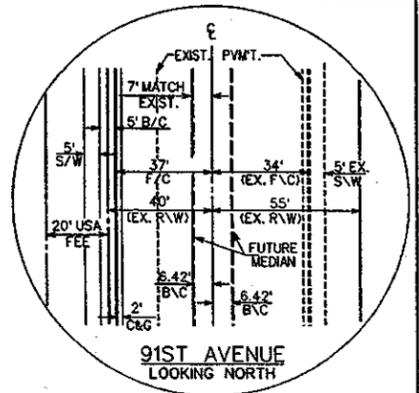
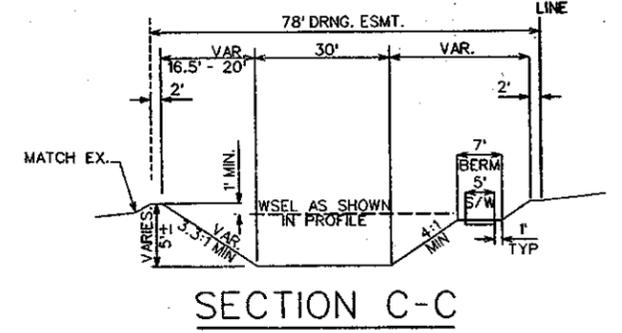
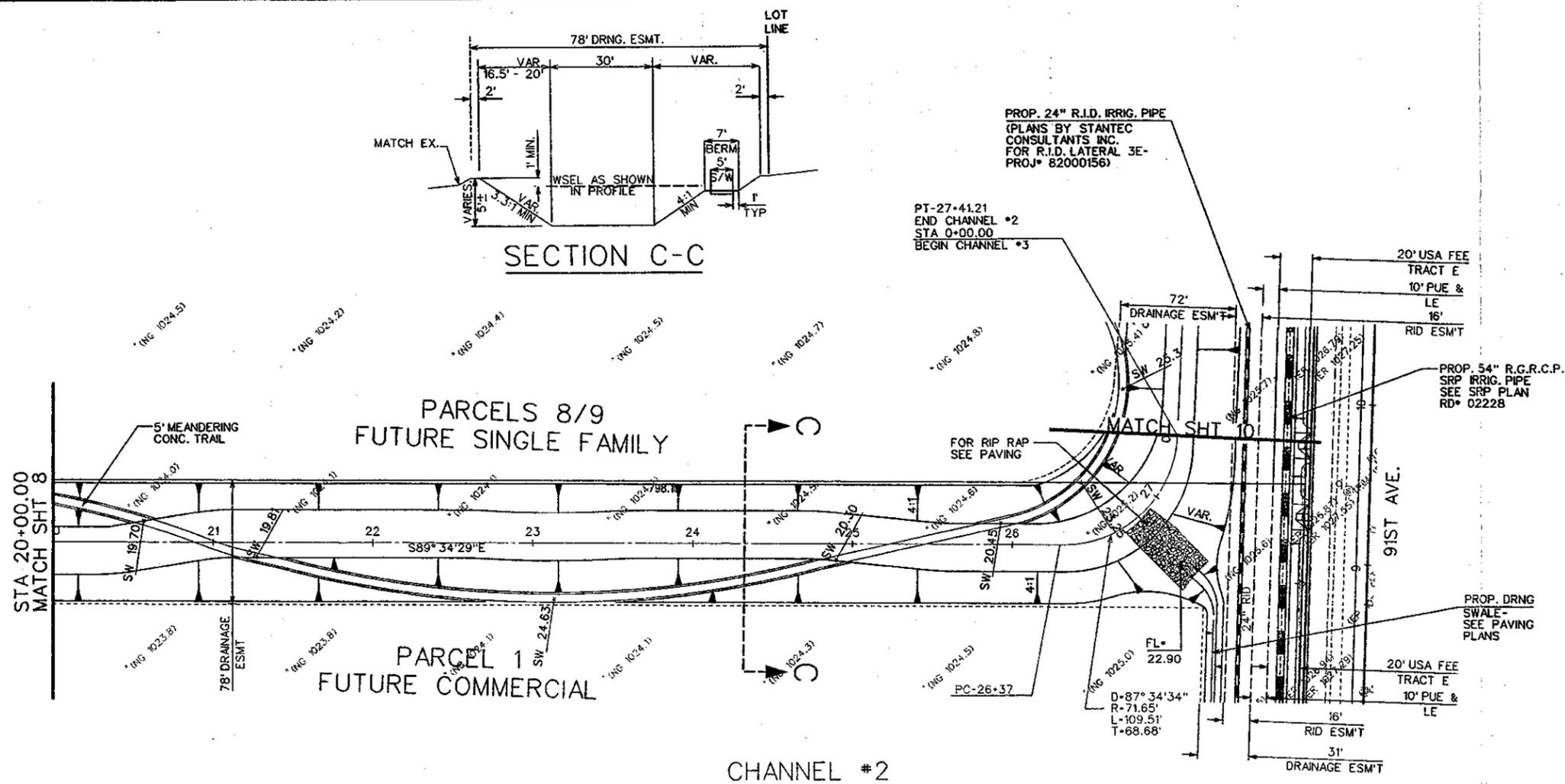
4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
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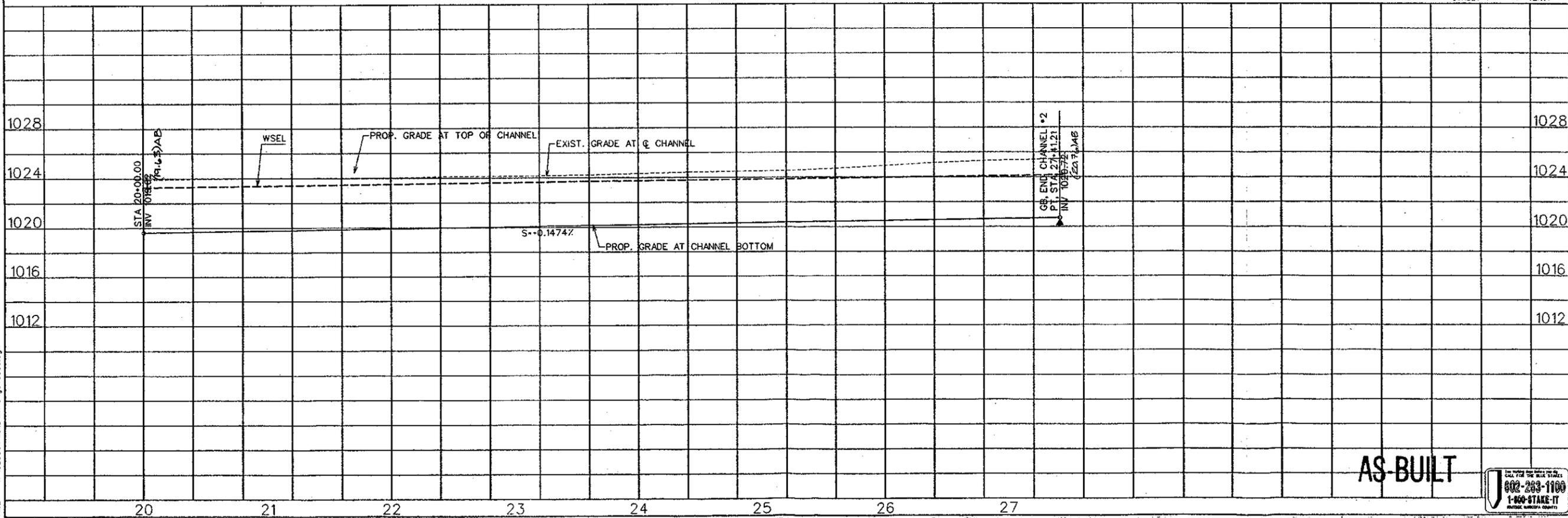
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 SCALE: 1" = 4' VERT.



DESIGNED	ST.A.M./J.A.	REVISIONS	DATE	BY
DRAWN	R.B.V./P.A.S.			
CHECKED	B.R.U.S.T.			
DATE	2/23/01			

DATE	DESCRIPTION
1012	
1016	
1020	
1024	
1028	



SHEET 9 OF 22
 PLAN 98-0094-08

SHEELY FARMS INFRASTRUCTURE

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 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

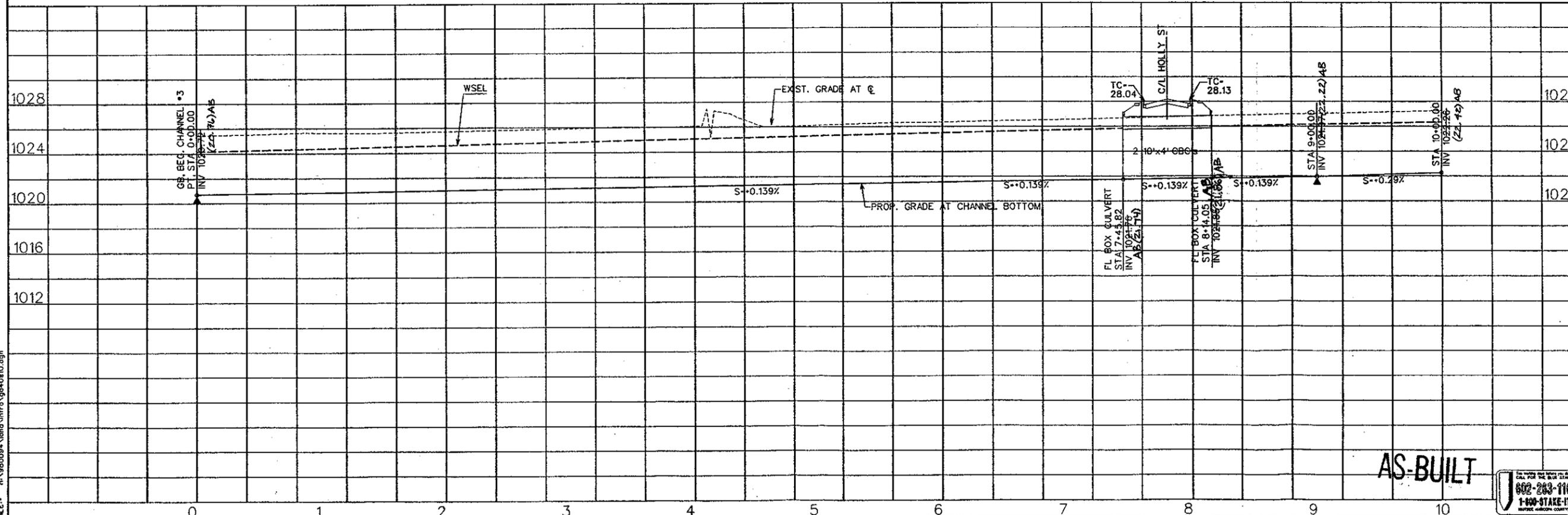
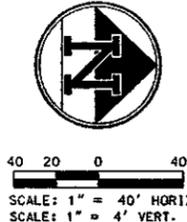
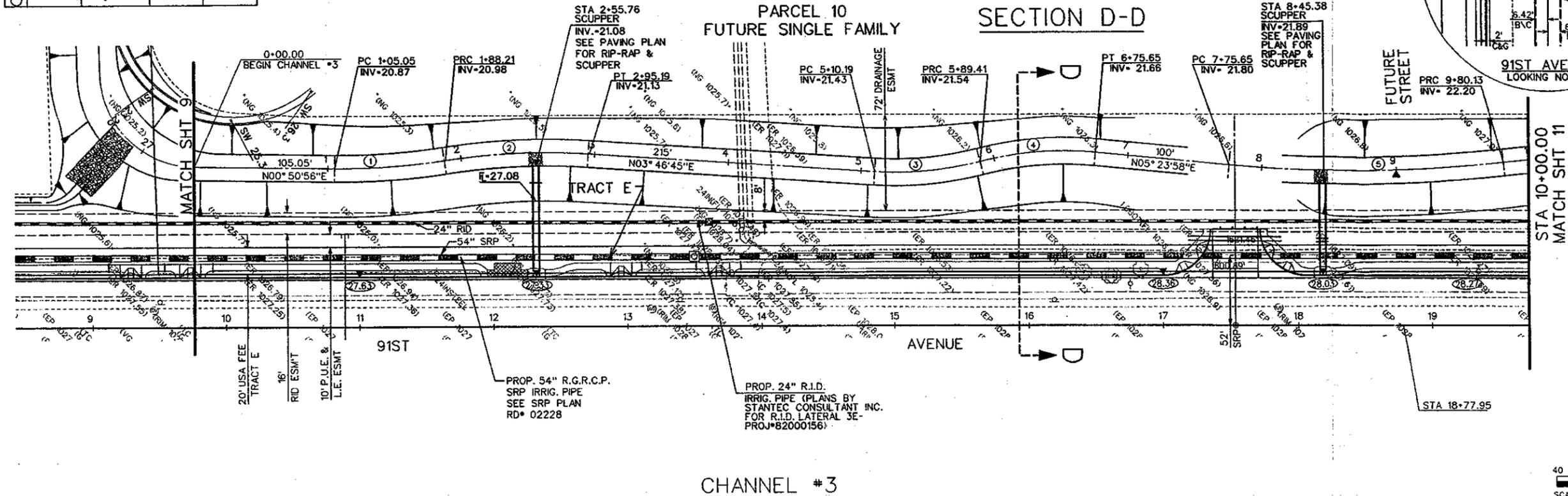
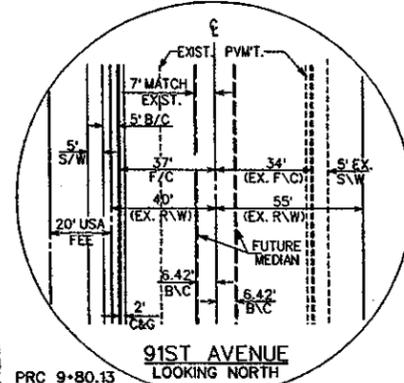
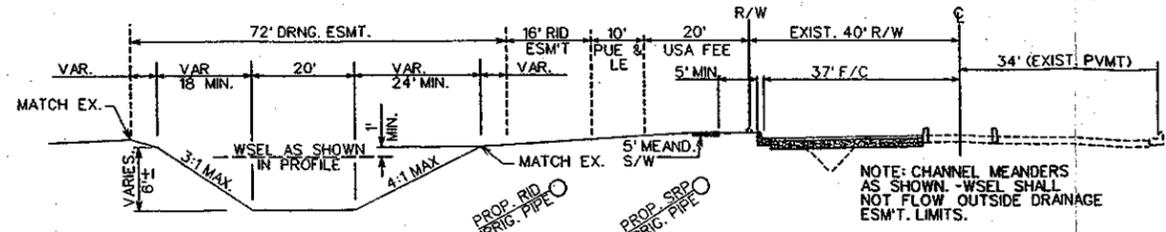
4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

DSD 98-0024 SDEV 2000633 CSPP 0100432 ZONING 7137-995 05 13-5 & 6.14-5 & 6

AS-BUILT

13136
 E. THOMPSON
 VAN LOO
 1-800-STAKE-IT
 602-263-1100

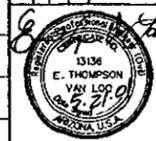
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3	0250.00'	018°09'20"	0079.22'	0039.94'
4	0250.00'	019°45'56"	0086.24'	0043.55'
5	1000.00'	011°42'56"	0204.48'	0102.60'



AS-BUILT

DESIGNED	DRAWN	CHECKED	DATE	ST. M. J. A.	REVISIONS	DATE	BY

ST. M. J. A.	REVISIONS	DATE	BY



SHEET 10 OF 22
98-0094-08 PLAN

SHEELY FARMS INFRASTRUCTURE

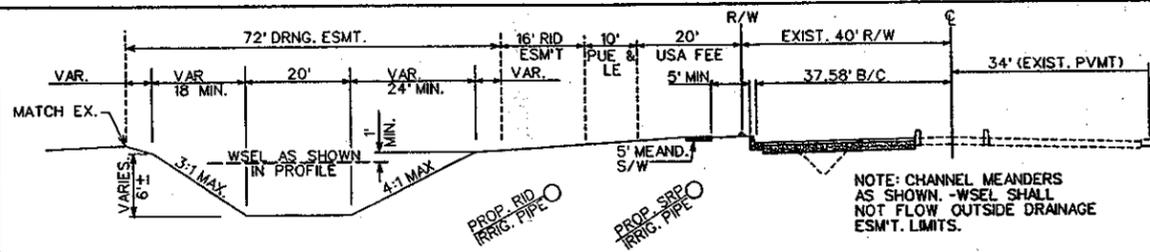
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4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

CHANNEL GRADING PLANS

DSD 99-8024 SDEV 2000633 CSFR 0100432 ZONING 2137-99-5 OS 13-5 & 6, 14-5 & 6

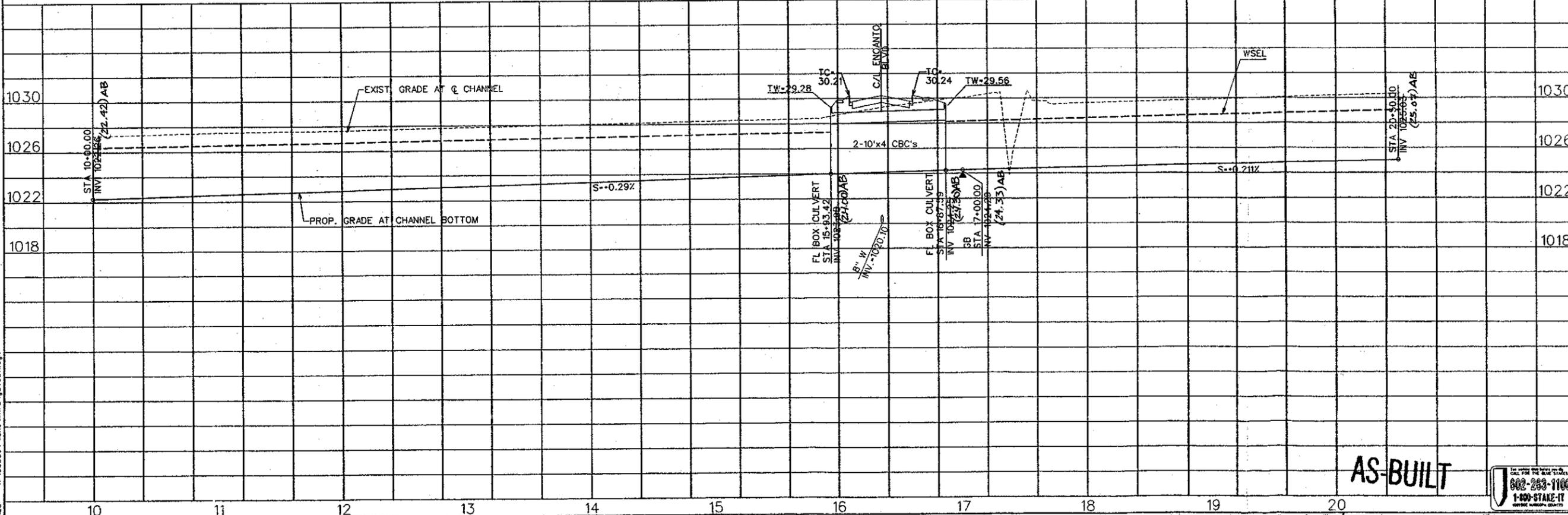
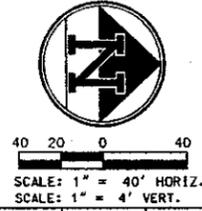
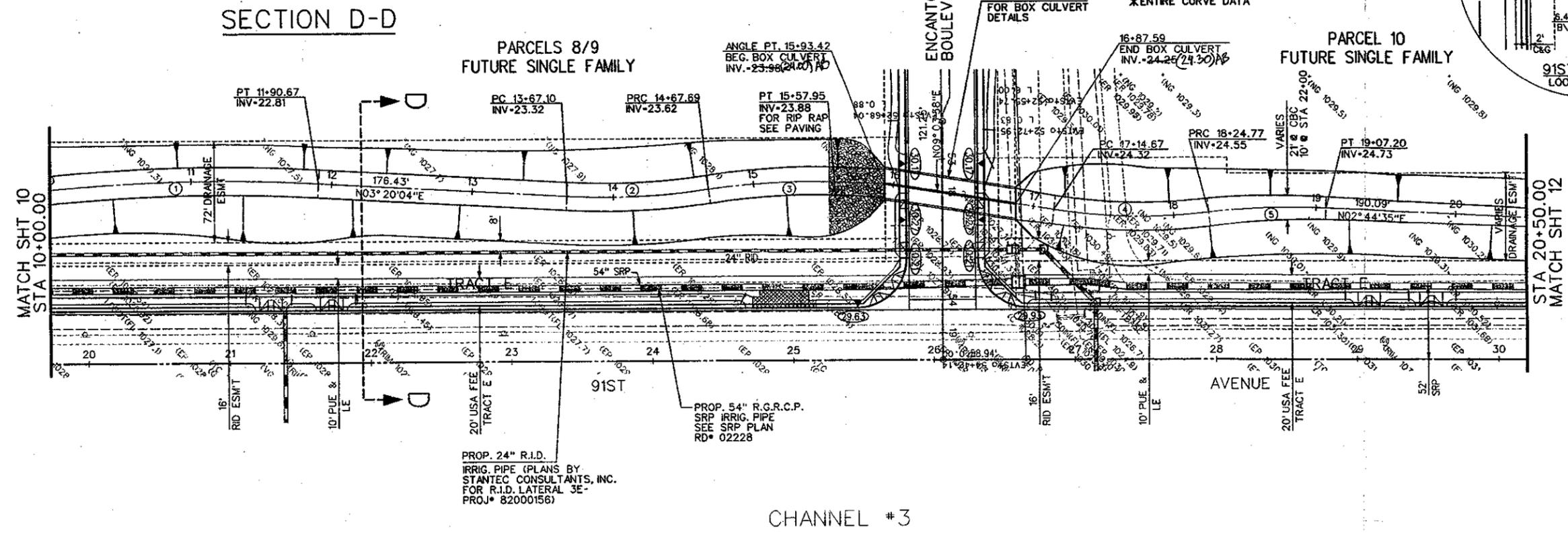
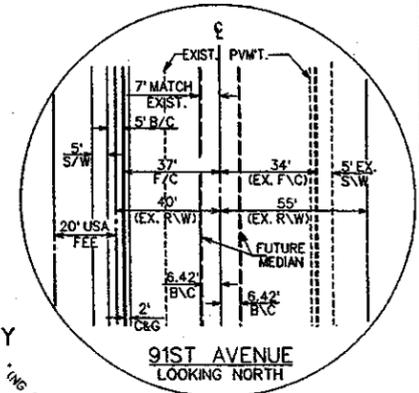
DATE: Mon, 07, 2001
TIME: 09:27:25
FILE: n:\980094\land\infra\gd40a10.dgn



C/L CHANNEL CURVE DATA

NO.	RADIUS	DELTA	LENGTH	TANGENT
1	1250.00'	009°39'02"	0210.54'	0105.52'
2	0500.00'	011°31'37"	0100.59'	0050.47'
3	0500.00'	010°20'33"	0090.26'	0045.25'
4	0400.00'	015°46'13"	0110.10'	0055.40'
5	0500.00'	009°26'43"	0082.43'	0041.31'

XENTRE CURVE DATA



DESIGNED BY: ST.M.H.A. DATE: 07/23/01
 DRAWN BY: BRUST
 CHECKED BY: BRUST
 DATE: 07/23/01

REVISIONS: 01
 DATE: 07/23/01

CHANNEL GRADING PLANS

AS-BUILT

SHEET 11 OF 22

98-0094-08 PLAN

SHEELY FARMS INFRASTRUCTURE

COE & VAN LOO

PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

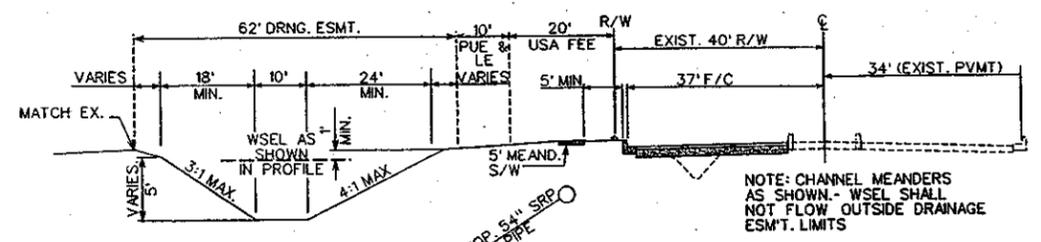
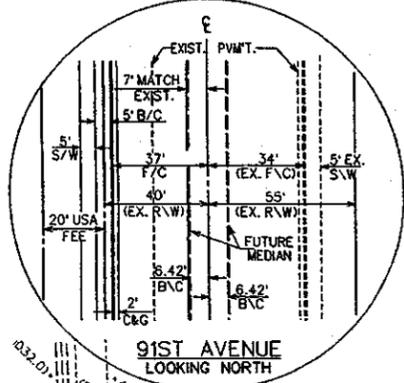
DATE: Mar. 07, 2001
 TIME: 09:27:36
 FILE: n:\980094\land\infra\gd\0411.dgn

DSD 99-8024 SDEY 2000633 CSFR 0100452 ZONING 2137-99-5 OS 13-5 & 6, 14-5 & 6

C/L CHANNEL CURVE DATA

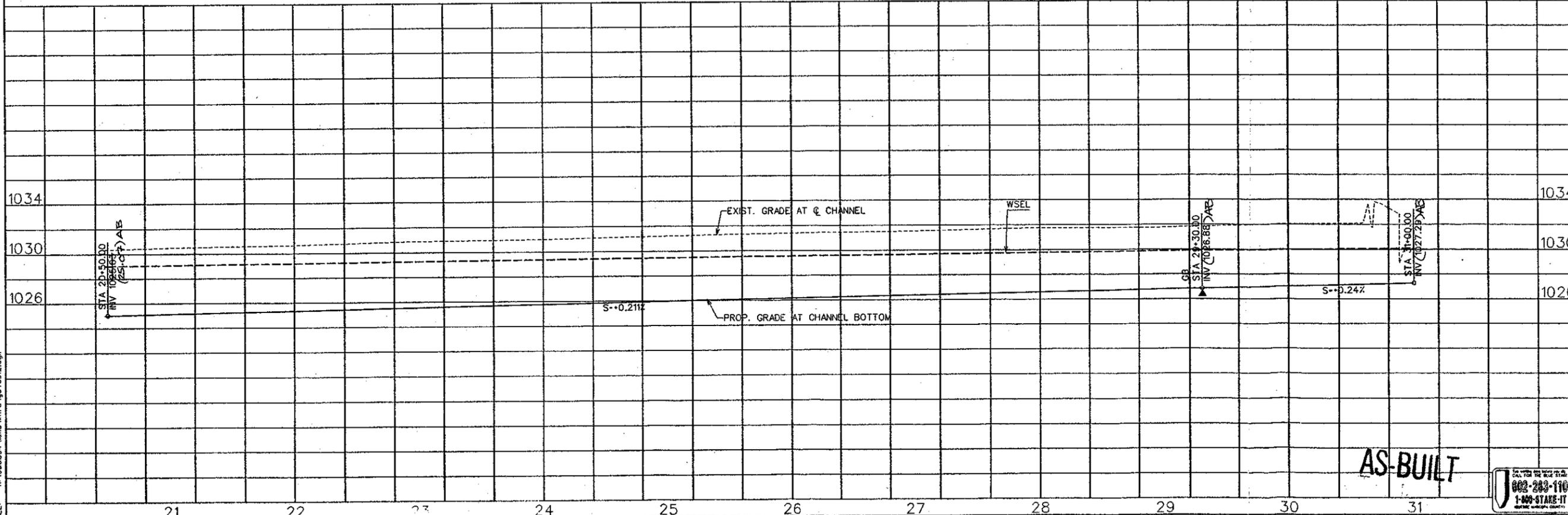
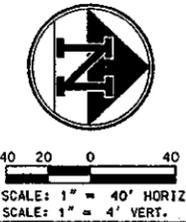
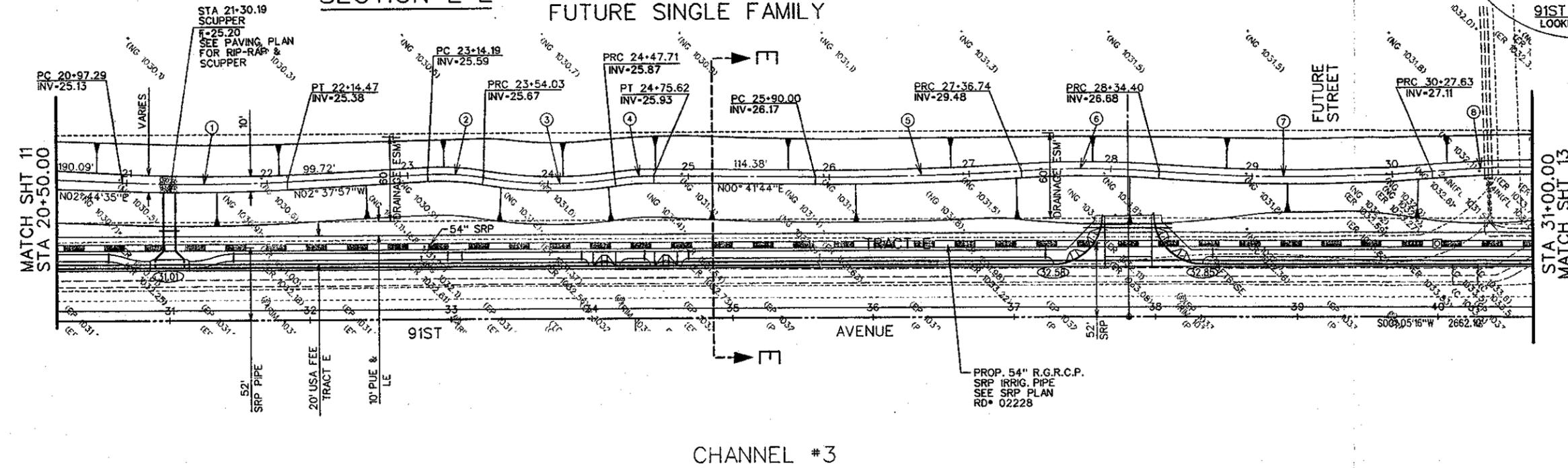
NO.	RADIUS	DELTA	LENGTH	TANGENT
①	1250.00'	005°22'15"	0117.18'	0058.63'
②	0179.00'	012°45'10"	0039.84'	0020.00'
③	0292.37'	018°21'32"	0093.68'	0047.25'
④	0179.00'	008°56'02"	0027.91'	0013.98'
⑤	2000.00'	004°12'14"	0146.74'	0073.40'
⑥	0700.00'	007°59'38"	0097.66'	0048.91'
⑦	1250.00'	008°51'25"	0193.23'	0096.81'
⑧	1000.00'	008°44'33"	0152.59'	0076.44'

* ENTIRE CURVE DATE



NOTE: CHANNEL MEANDERS AS SHOWN - WSEL SHALL NOT FLOW OUTSIDE DRAINAGE ESMT. LIMITS

SECTION E-E PARCEL 10 FUTURE SINGLE FAMILY



CHANNEL GRADING PLANS

DESIGNED	DRAWN	CHECKED	DATE	REVISIONS	DATE	BY
ST. M. J. A.	REBEKAH AS	BRIST	2/23/01			

AS-BUILT

1336 E. THOMPSON VAN LOO ARCHITECTURE

SHEET 12 OF 22

98-0094-08 PLAN

SHEELY FARMS INFRASTRUCTURE

4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831

COE & VAN LOO

PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

DATE: Mar. 07, 2001
TIME: 09:27:51
FILE: n:\980094\hard\info\gd4\0s12.dgn

DSD 99-8024 SDEV 2000633 CSPP 0100432 ZONING 2137-99-5 OS #13-5 & 6.14-5 & 6

PARCEL 10
FUTURE SINGLE FAMILY

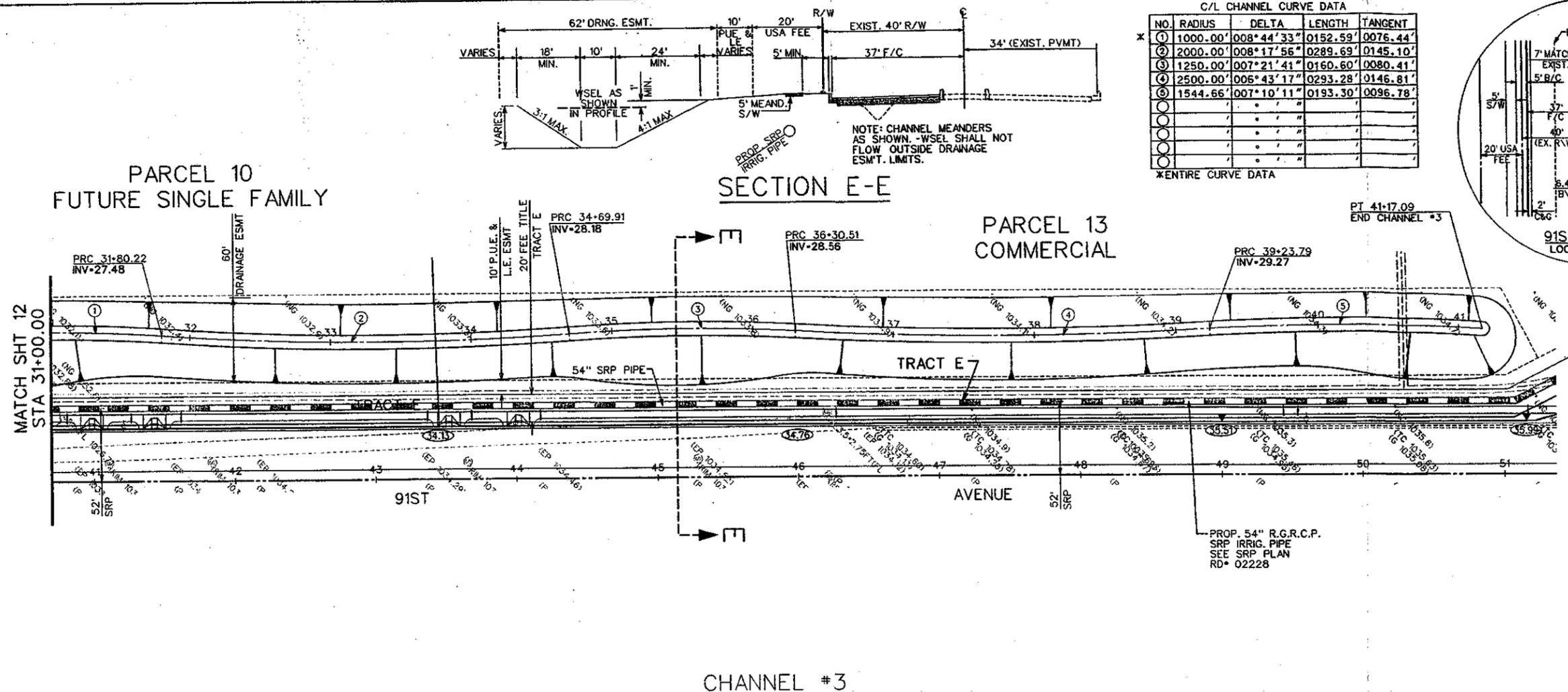
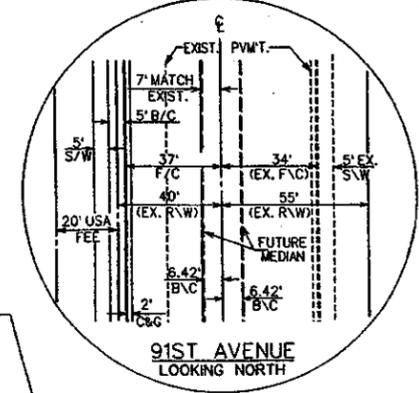
PARCEL 13
COMMERCIAL

SECTION E-E

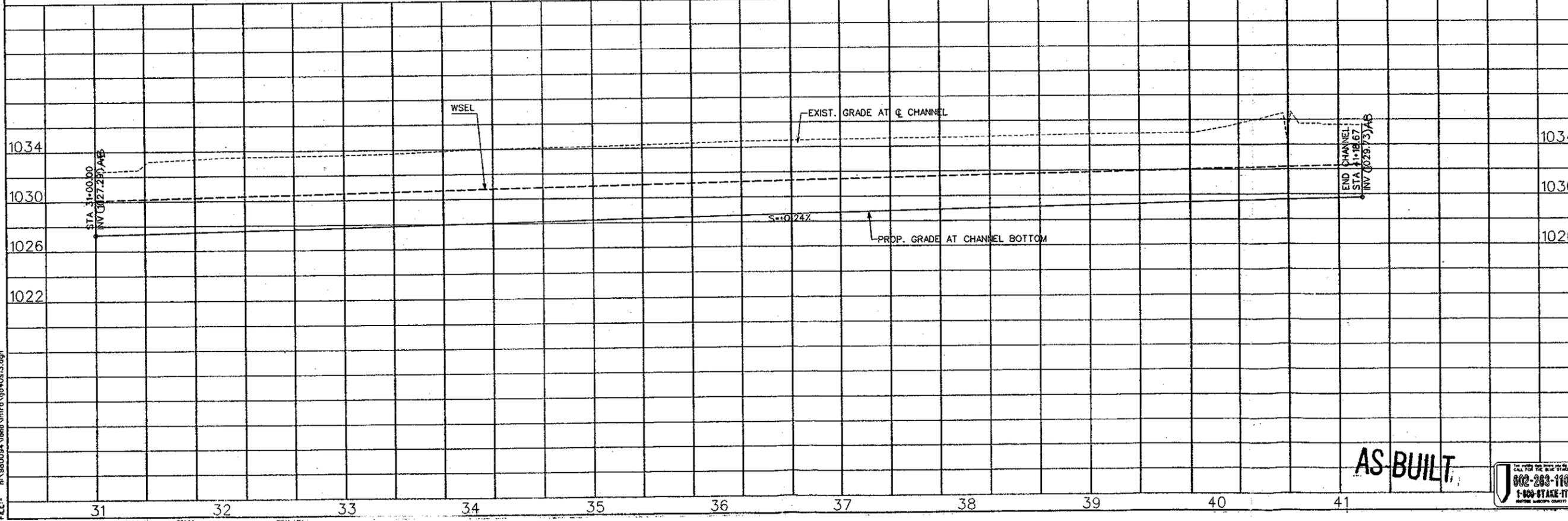
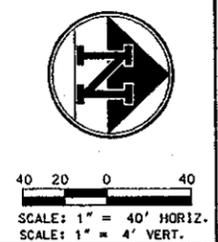
C/L CHANNEL CURVE DATA

NO.	RADIUS	DELTA	LENGTH	TANGENT
1	1000.00'	008°44'33"	0152.59'	0076.44'
2	2000.00'	008°17'56"	0289.69'	0145.10'
3	1250.00'	007°21'41"	0160.60'	0080.41'
4	2500.00'	006°43'17"	0293.28'	0146.81'
5	1544.66'	007°10'11"	0193.30'	0096.78'

X ENTIRE CURVE DATA



CHANNEL #3



AS BUILT

DESIGNED BY: ST.MH.JA
 DRAWN BY: REB.V.P.J.S.
 CHECKED BY: B.RUST
 DATE: 2/23/01

REVISIONS: 1034
 1030
 1026

DATE: 2/23/01

CHANNEL GRADING PLANS

13 OF 22

98-0094-08 PLAN

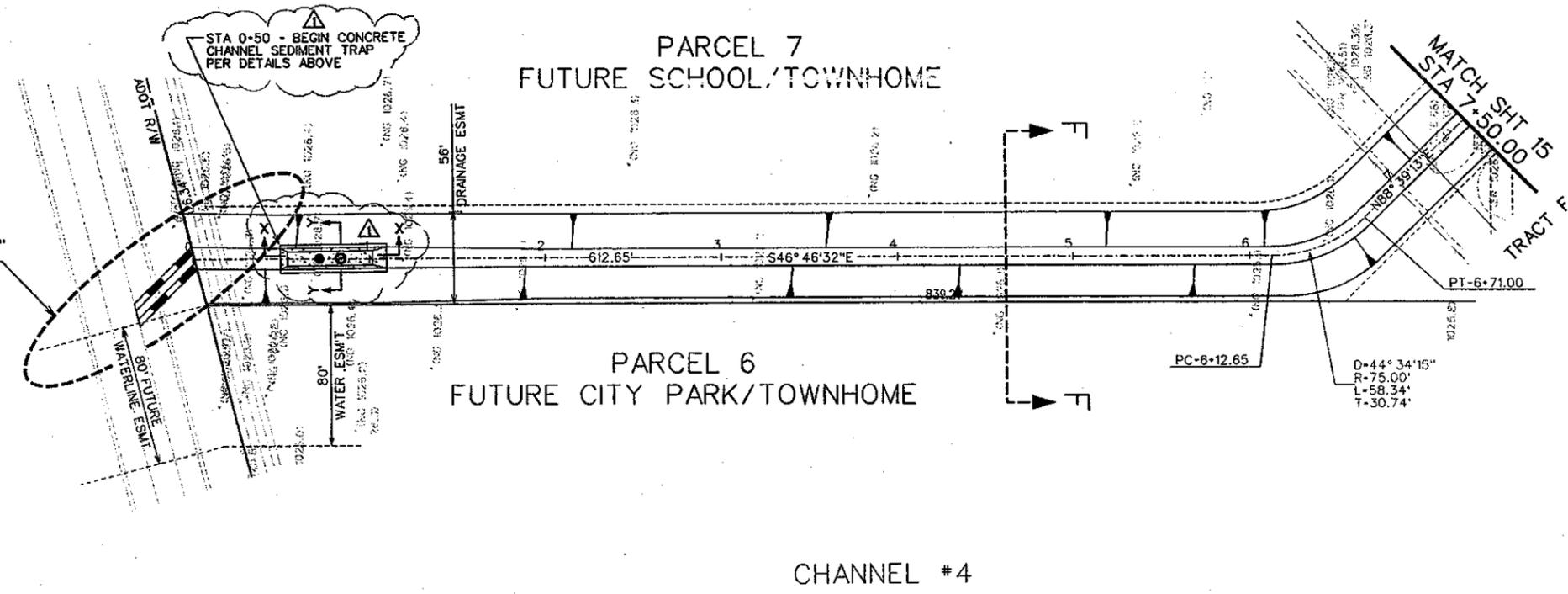
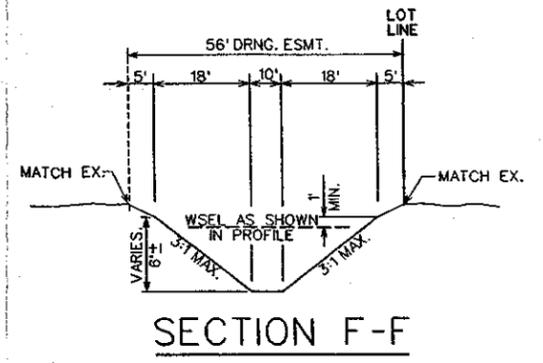
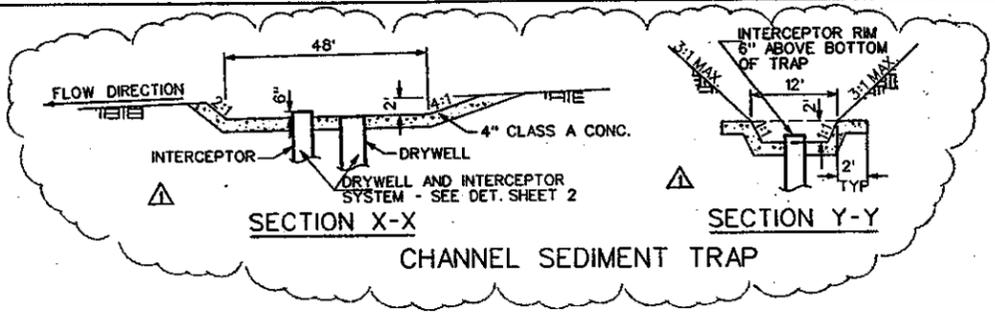
SHEELY FARMS INFRASTRUCTURE

COE & VAN LOO

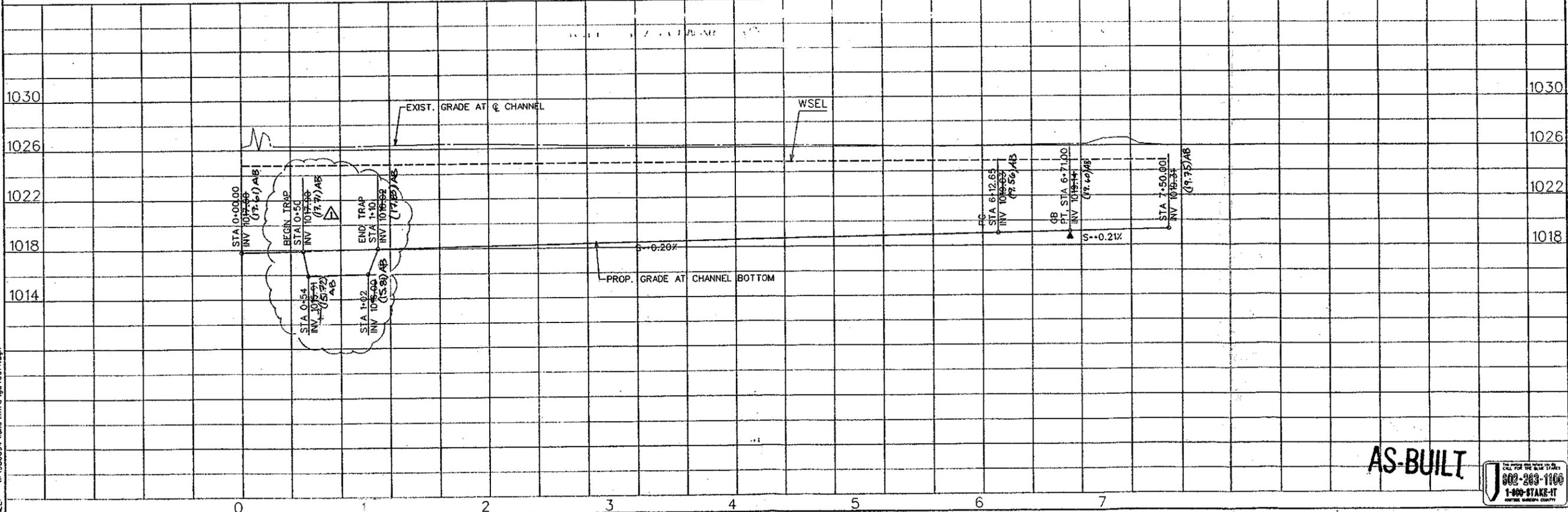
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

DATE: Mar. 07, 2001
 TIME: 09:28:02
 FILE: n:\880094\Irrig\Infra\980403.dgn



NOTE:
CHANNEL CONFIGURATION
AT SCHOOL SITE
IS PRELIMINARY.
SCHOOL SITE GRADING
MAY ALTER SECTION.



DESIGNED BY	DATE	BY
ST. M. H. A.	12-4-01	SLT
REVISIONS		
1. ADD SEDIMENT TRAP		
DRAWN BY		
BRUST		
CHECKED		
DATE	2/23/01	

CHANNEL GRADING PLANS

DESIGNED BY ST. M. H. A. DATE 12-4-01 BY SLT

DRAWN BY BRUST

CHECKED

DATE 2/23/01

AS-BUILT

802-283-1100

1-800-STAKE-IT

SHEET 14 OF 22

98-0094-08 PLAN

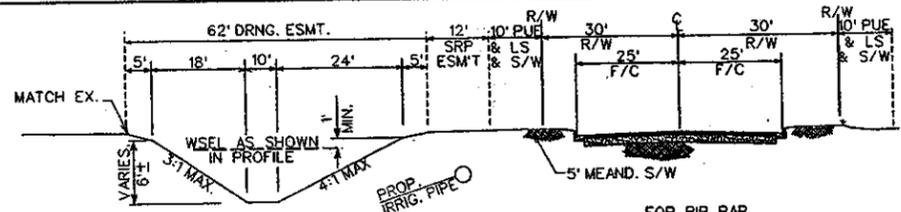
SHEELY FARMS INFRASTRUCTURE

COE & VAN LOO

PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

DATE: Mar. 07, 2001
TIME: 09:28:15
FILE: n:\980094\cond\infra\gd\0314.dgn

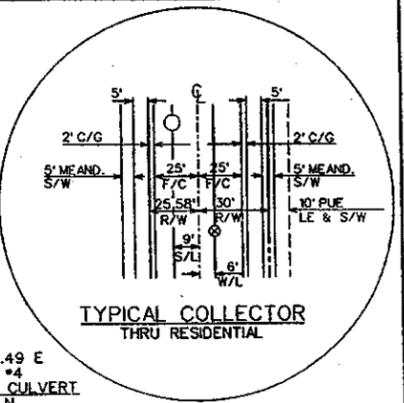


PARCEL 7
FUTURE SCHOOL/TOWNHOME

C/L CHANNEL CURVE DATA

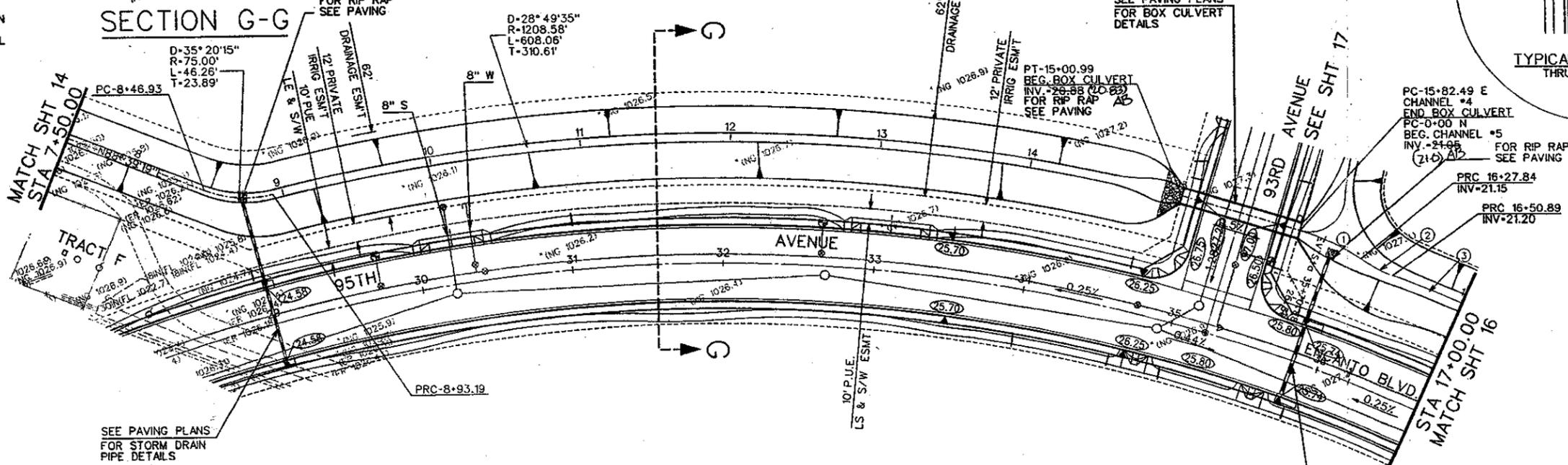
NO.	RADIUS	DELTA	LENGTH	TANGENT
①	0150.00'	017°19'15"	0045.35'	0022.35'
②	0100.00'	013°12'26"	0023.05'	0011.58'
③	1006.00'	003°56'45"	0069.28'	0034.66'

X C/L TOTAL CURVE DATA

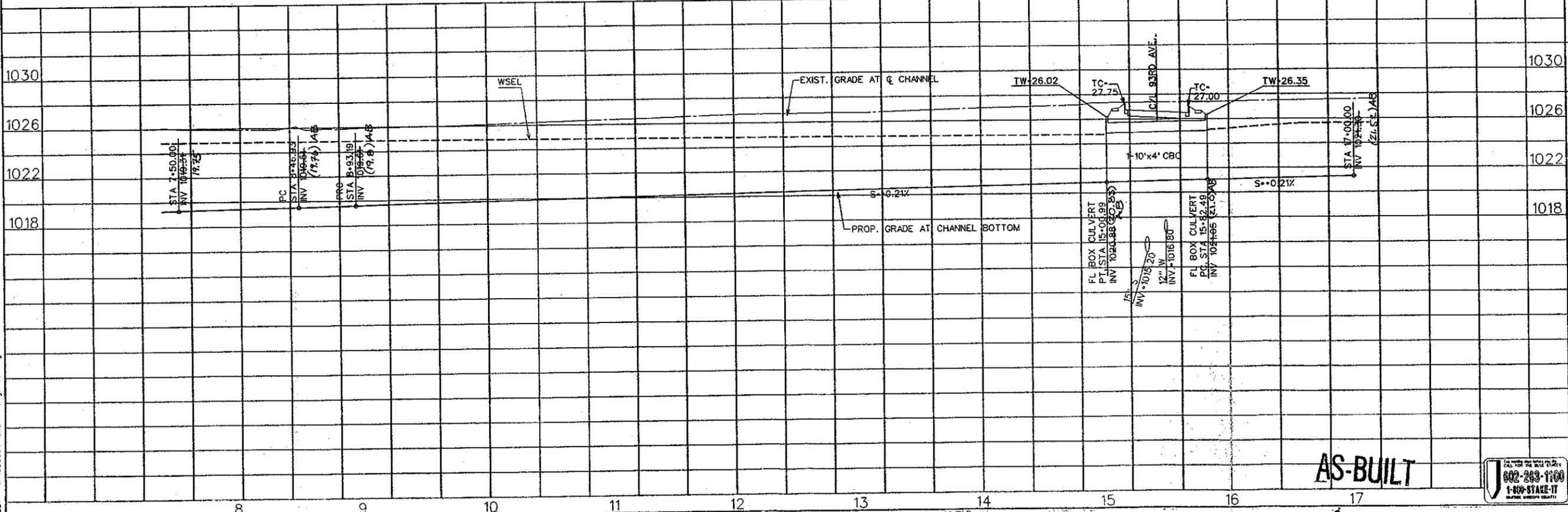


NOTE:
CHANNEL CONFIGURATION
AT SCHOOL SITE
IS PRELIMINARY. SCHOOL
SITE GRADING MAY
ALTER SECTION.

SECTION G-G



PARCELS 8/9
FUTURE SINGLE FAMILY
CHANNEL #4



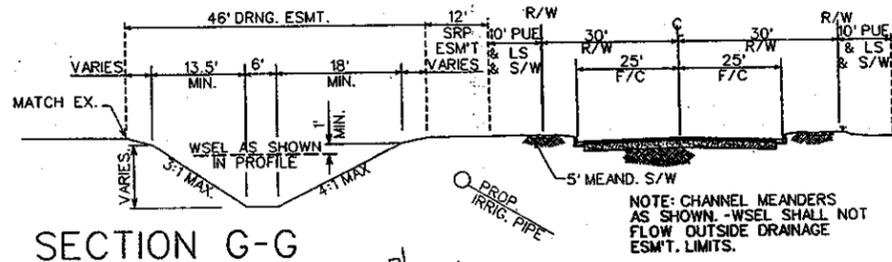
DESIGNED BY	DATE
ST. MALJA	
REVISIONS	
DRAWN BY	
CHECKED BY	
DATE	



SHEELY FARMS INFRASTRUCTURE
COE & VAN LOO
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE
 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

DATE: Mar. 07, 2001
 TIME: 09:28:30
 FILE: n:\980094\land\info\p4d9s15.dgn

DSD #99-8024 SDEV #200633 CSPR #000432 ZONING #Z17-99-5 OS #3-5 & 6, 14-5 & 6

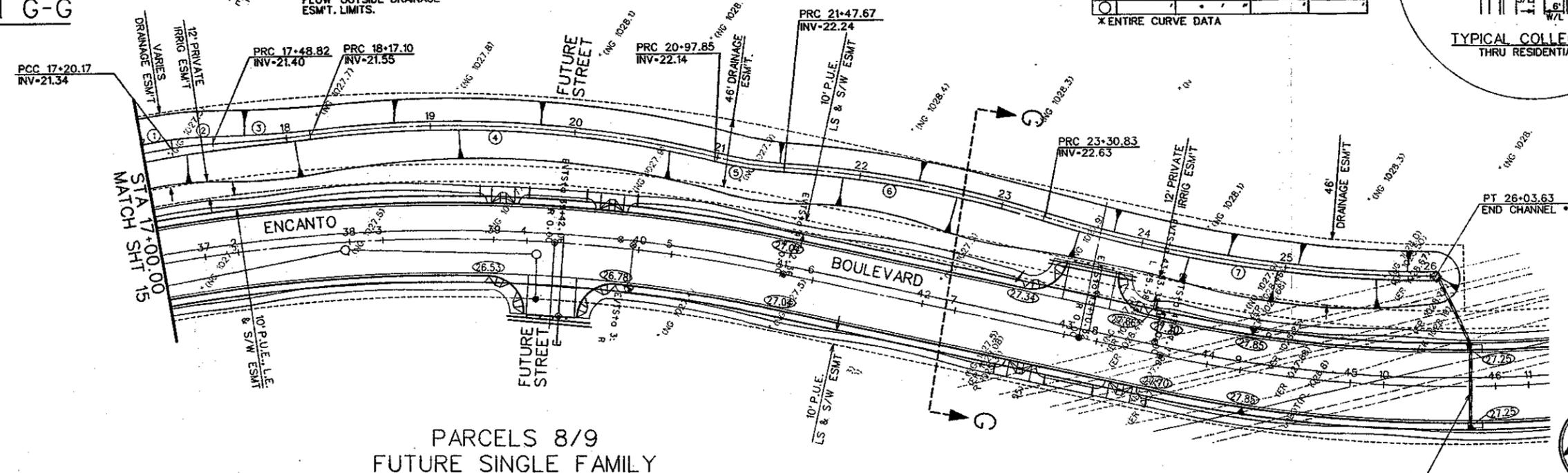
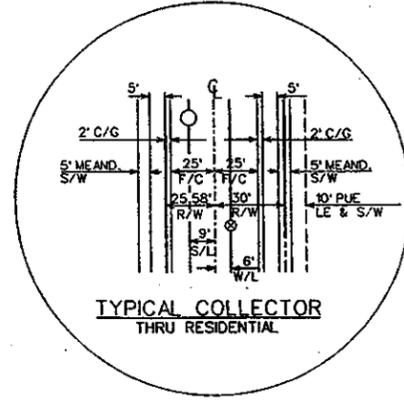


PARCEL 10
FUTURE SINGLE FAMILY

C/L CHANNEL CURVE DATA

NO.	RADIUS	DELTA	LENGTH	TANGENT
1	1006.00'	003°56'45"	0069.28'	0034.66'
2	0250.00'	008°34'00"	0028.65'	0014.34'
3	0904.92'	004°19'22"	0068.28'	0034.15'
4	0171.40'	020°51'09"	0280.75'	0141.94'
5	0298.24'	009°34'19"	0049.82'	0024.97'
6	0784.46'	013°22'39"	0183.16'	0092.00'
7	0880.98'	017°44'31"	0272.80'	0137.50'

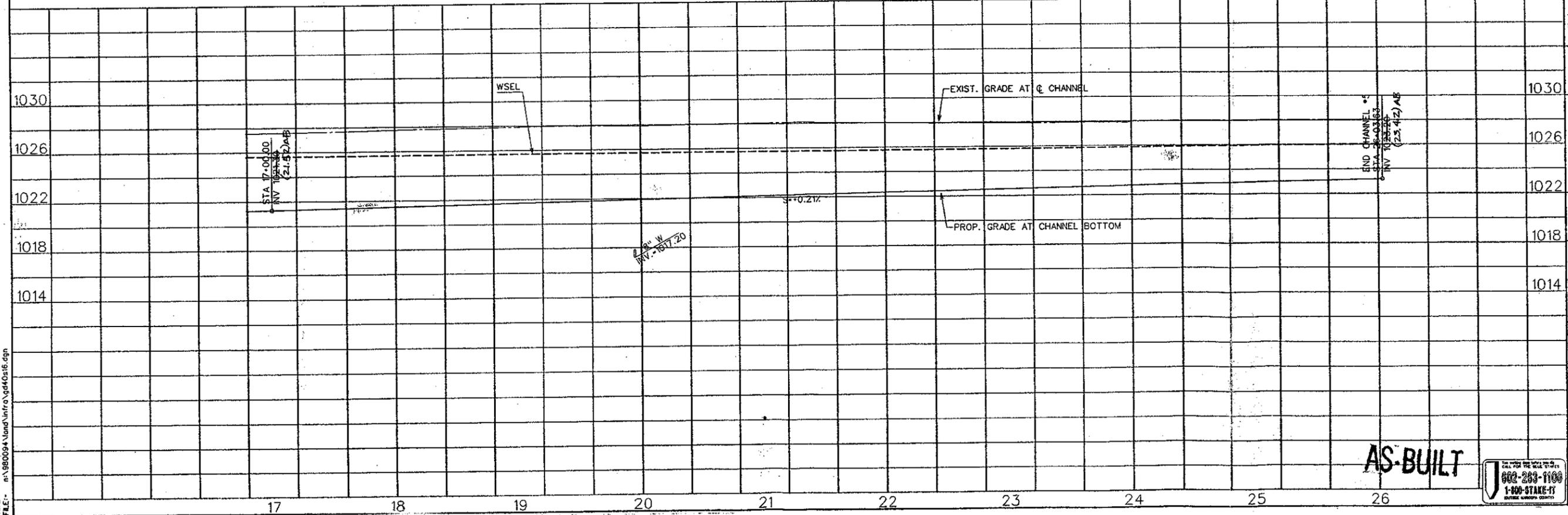
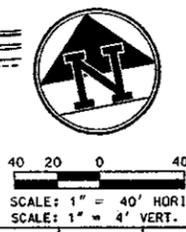
XENTIRE CURVE DATA



PARCELS 8/9
FUTURE SINGLE FAMILY

CHANNEL #4

SEE PAVING PLANS
FOR STORM DRAIN
PIPE DETAILS



CHANNEL GRADING PLANS

DESIGNED	ST. AM. J.A.	REVISIONS	DATE	BY
DRAWN	BY: J.P. AS			
CHECKED	BRUST			
DATE	2/23/01			



AS-BUILT

SHEET 16 OF 22

98-0094-08 PLAN

SHEELY FARMS INFRASTRUCTURE

COE & VAN LOO

PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

DATE: Mar. 07, 2001
TIME: 09:28:40
FILE: n:\980094\land\infra\gd40s16.dgn

SDS #99-8024 SDEY #2000633 CSFR #0100432 ZONING #2157-99-5 OS #13-5 & 6, 14-5 & 6

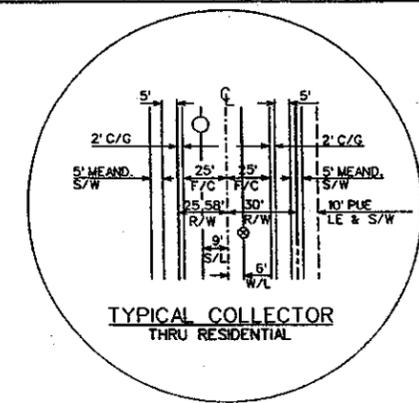
PARCEL 7
FUTURE SCHOOL/TOWNHOME

SECTION H-H

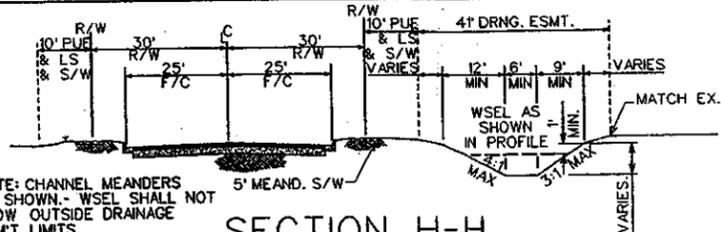
C/L CHANNEL CURVE DATA

NO.	RADIUS	DELTA	LENGTH	TANGENT
①	0023.63'	097°27'26"	0040.19'	0026.92'
②	0156.19'	008°44'35"	0023.84'	0011.94'
③	0463.52'	018°48'36"	0152.17'	0076.78'
④	0813.45'	005°01'20"	0071.30'	0035.68'
⑤	0275.96'	018°33'52"	0089.42'	0045.10'
⑥	1135.83'	004°08'03"	0081.96'	0041.00'
⑦	0366.47'	017°27'39"	0111.68'	0056.28'
⑧	0380.88'	010°47'28"	0071.74'	0035.97'
⑨	0509.55'	011°53'49"	0105.81'	0053.09'
⑩	0997.09'	013°31'50"	0235.47'	0118.28'

KENTRE CURVE DATA

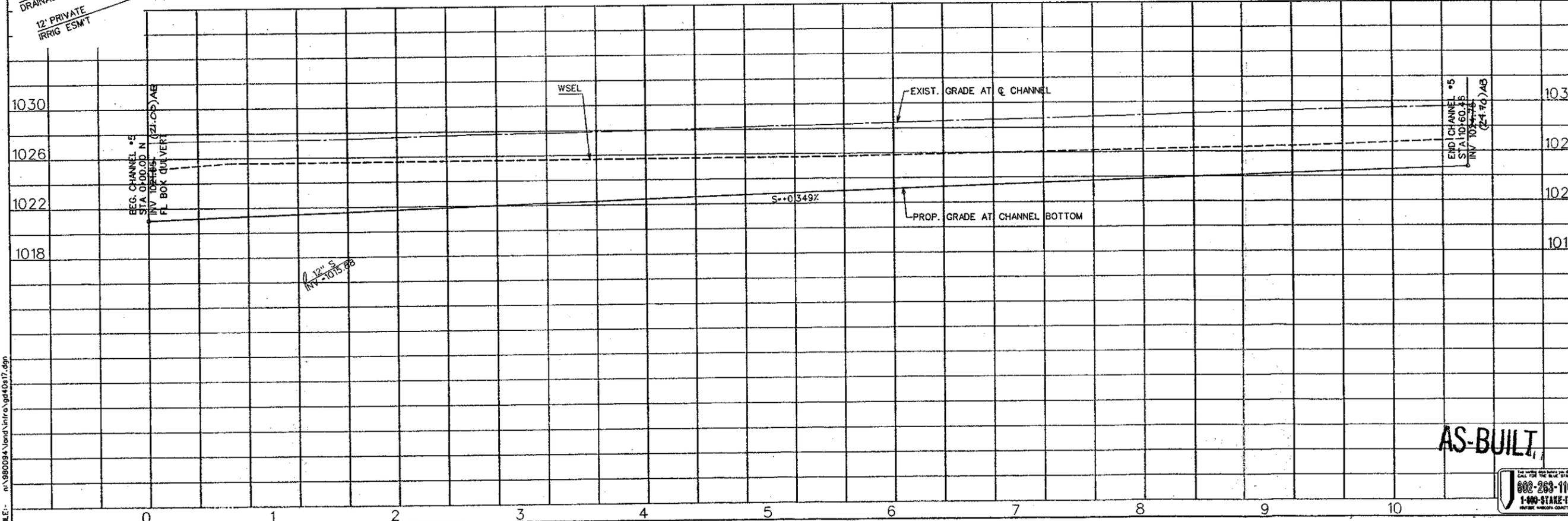
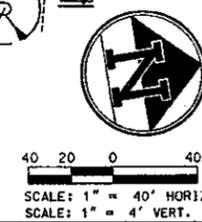
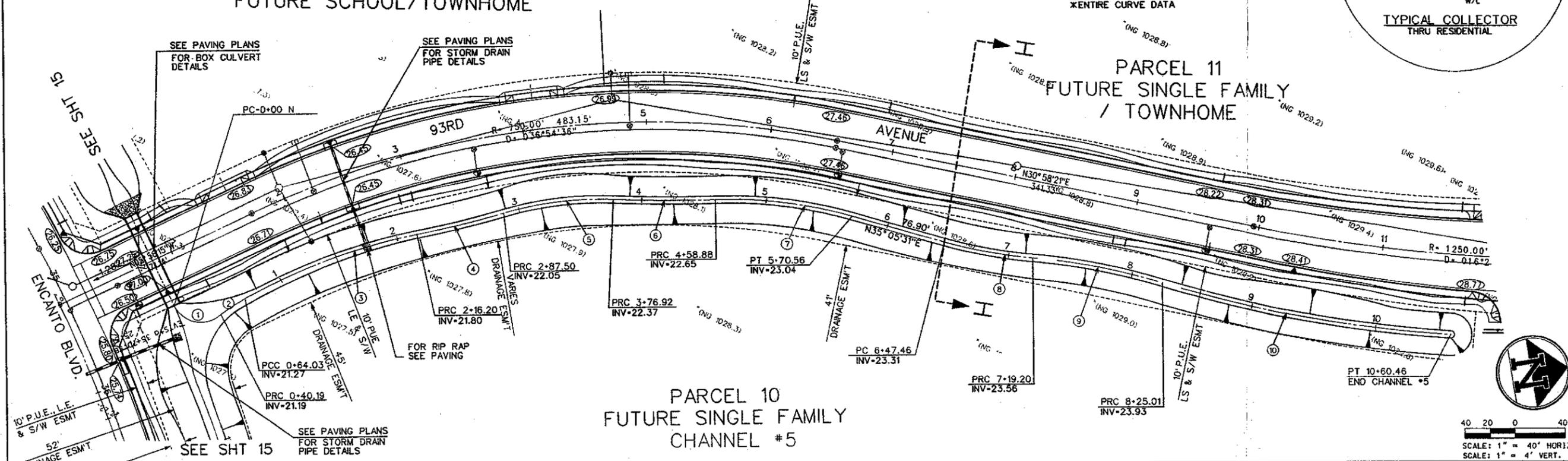


NOTE: CHANNEL MEANDERS AS SHOWN - WSEL SHALL NOT FLOW OUTSIDE DRAINAGE ESMT. LIMITS.



PARCEL 11
FUTURE SINGLE FAMILY / TOWNHOME

PARCEL 10
FUTURE SINGLE FAMILY
CHANNEL #5



CHANNEL GRADING PLANS

DESIGNED	ST. M. J. A.	DATE	BY
DRAWN	REVISIONS		
CHECKED			
DATE			

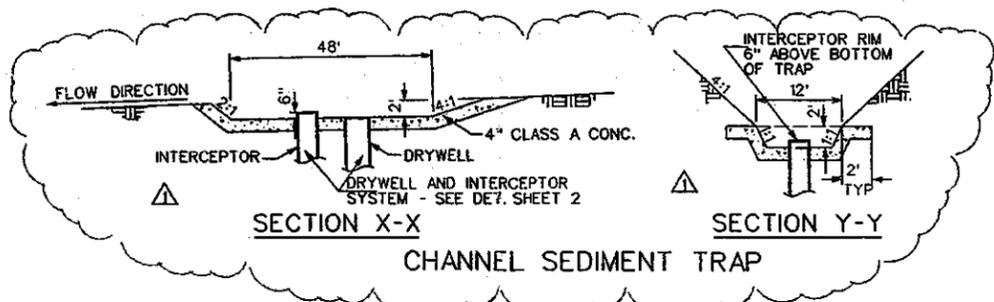
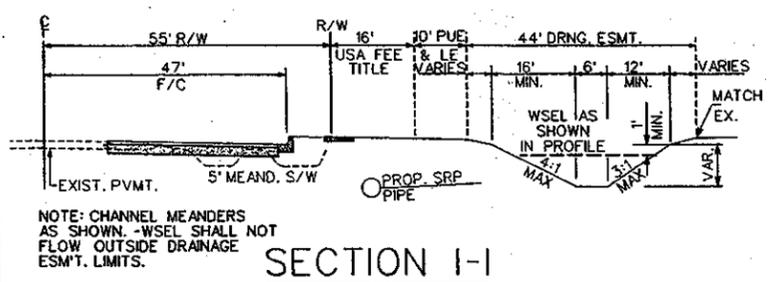
AS-BUILT

SHEET 17 OF 22
98-0094-08 PLAN

SHEELY FARMS INFRASTRUCTURE
COE & VAN LOO
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE
 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

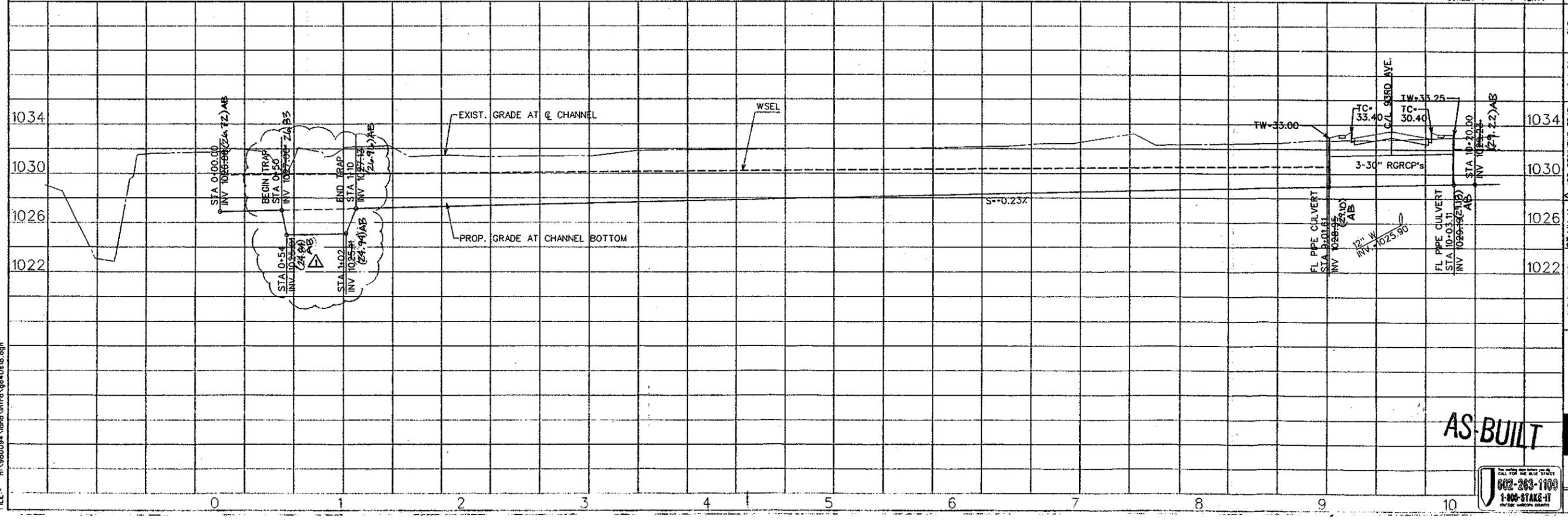
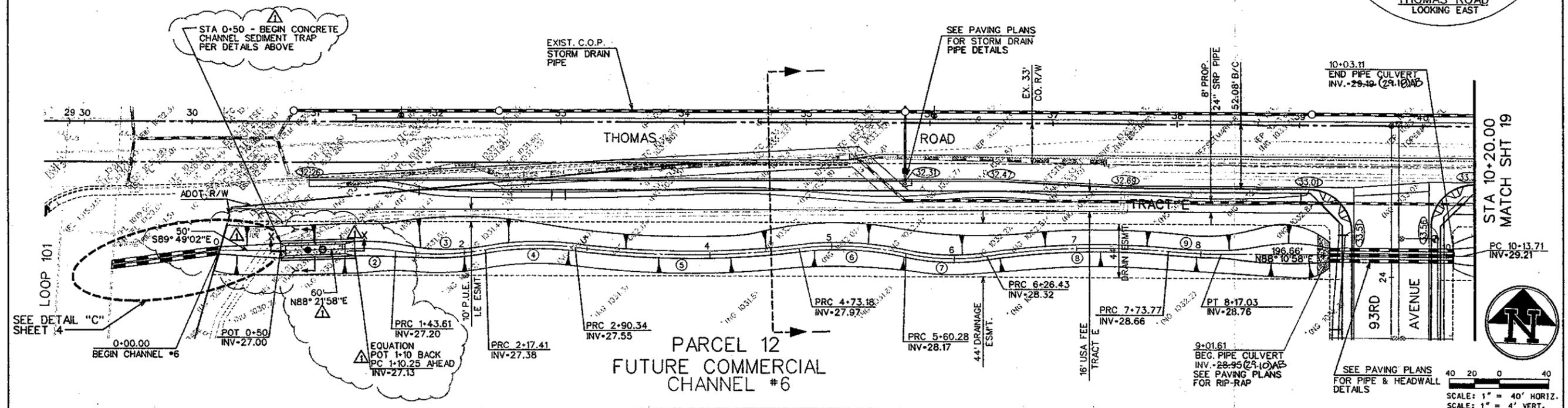
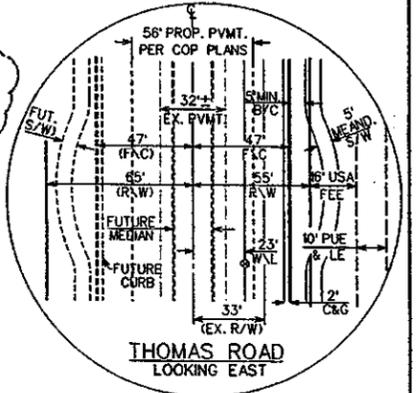
DATE: Mar. 07, 2001
 TIME: 09:28:56
 FILE: n:\380034\land\infra\get0417.dgn

DSD 99-8024 S02 2000633 CSPP 0100432 ZONING 2137-99-5 OS 3-5 & 6, 145 & 6



CHANNEL CURVE DATA

NO.	RADIUS	DELTA	LENGTH	TANGENT
1	0181.10'	010°33'11"	0033.36'	0016.73'
2	0218.29'	019°22'11"	0073.80'	0037.25'
3	0232.63'	017°57'40"	0072.93'	0036.76'
4	0727.06'	014°24'32"	0182.84'	0091.91'
5	0259.31'	019°14'46"	0067.10'	0043.97'
6	0181.18'	020°55'04"	0066.15'	0033.45'
7	0615.74'	013°42'36"	0147.34'	0074.02'
8	0500.00'	004°57'27"	0043.26'	0021.64'



SHEELY FARMS INFRASTRUCTURE
 COE & VAN LOO
 PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE
 4550 NORTH 12TH STREET
 PHOENIX, ARIZONA 85014
 TELEPHONE (602) 264-6831

CHANNEL GRADING PLANS
 SHEET 18 OF 22
 98-0094-08
 PLAN

DSD 99-8024 SDEV 2000633 CSFR 000432 ZONING 2137-99-5 OS 13-5 & 6, 14-5 & 6

DESIGNED ST.MH/JA
 DRAWN RB/BY/PT/AS
 CHECKED B/RT/ST
 DATE 2/23/01

SLT 12-4-01
 ADD SEDIMENT TRAP

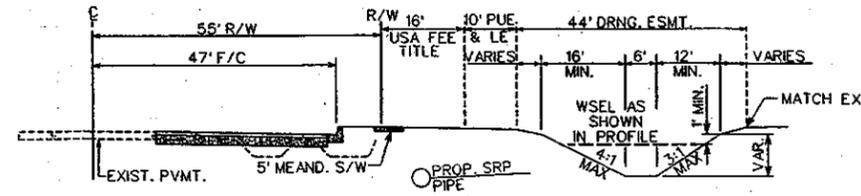
15136
 E. THOMPSON
 CIVIL ENGINEER
 LICENSE NO. 12-990
 ARIZONA

802-263-1100
 1-800-STAKE-IT

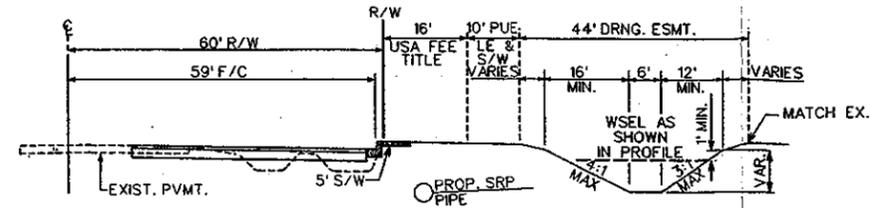
DATE: Mar. 07, 2001
 TIME: 09:33:26
 FILE: n:\980094\land\mfr\gd40s18.dgn

BC CURVE DATA				
NO.	RADIUS	DELTA	LENGTH	TANGENT
1	0350.00'	005°47'38"	0035.39'	0017.71'
2	0284.60'	013°32'01"	0067.23'	0033.77'
3	0488.19'	015°54'59"	0135.62'	0068.25'
4	0549.05'	012°47'05"	0122.51'	0061.51'
5	0568.11'	010°33'21"	0104.67'	0052.48'
6	0996.36'	011°01'30"	0191.72'	0096.16'
7	1677.73'	009°11'37"	0269.21'	0134.89'
8	0482.72'	012°11'28"	0102.71'	0051.55'

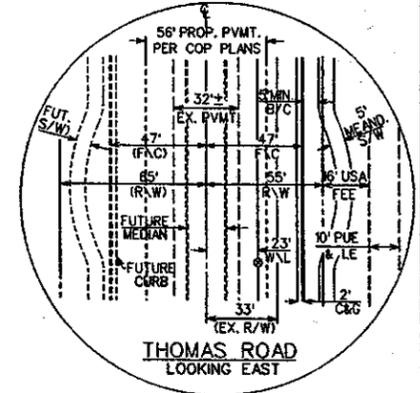
* CENTRE CURVE DATA



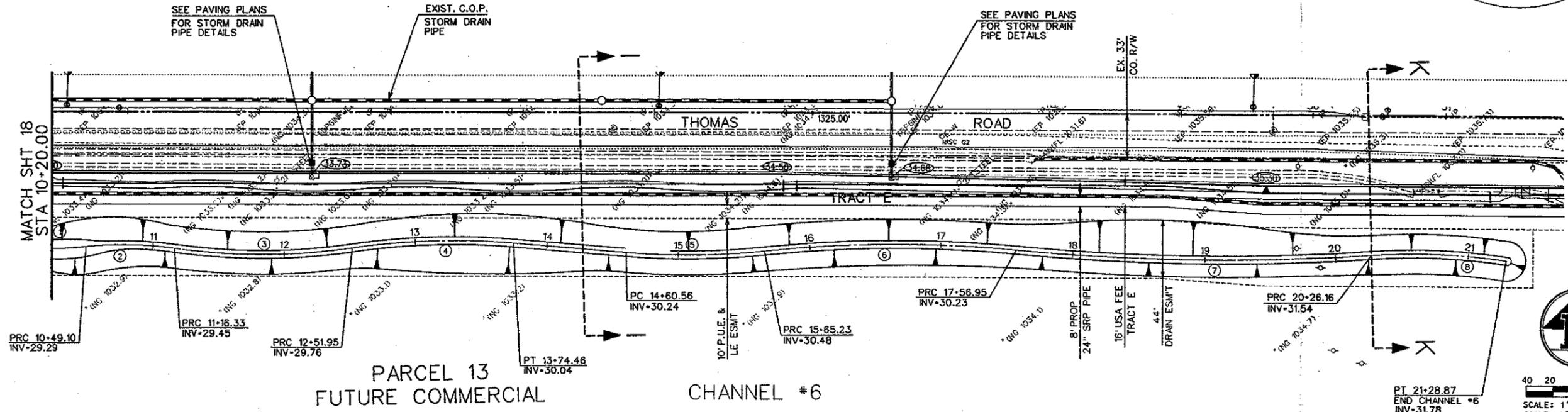
SECTION I-I



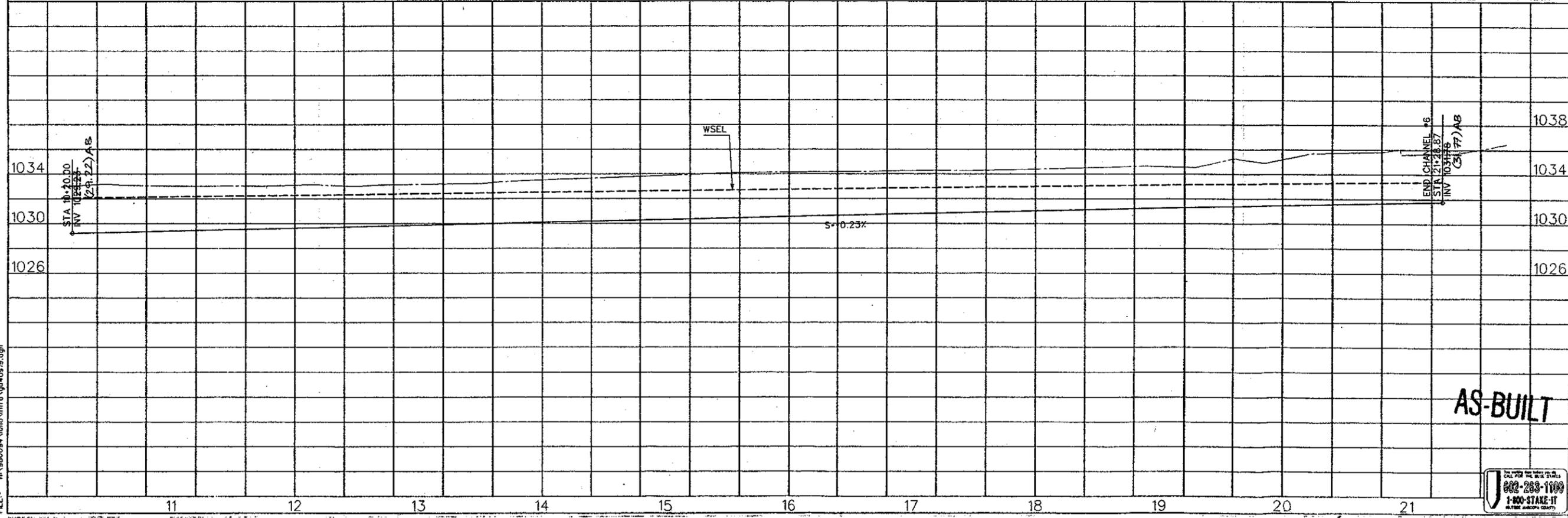
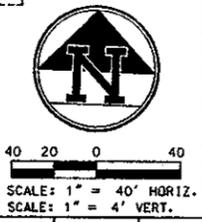
SECTION K-K



THOMAS ROAD
LOOKING EAST



PARCEL 13
FUTURE COMMERCIAL
CHANNEL #6



DESIGNED	ST.M.H.J.A.	DATE	BY
DRAWN	R.B.B./P.F.S.		
CHECKED	B.B.R.		
DATE	2/23/01		

REVISIONS

NO.	DATE	BY
1	10/38	
2	10/34	
3	10/30	
4	10/26	

CHANNEL GRADING PLANS

AS-BUILT

13136
E. THOMPSON
VAN LOO
2-7-01
PHOENIX, ARIZONA

SHEET
19 OF 22
98-0094-08
P.L.A.N.

SHEELY FARMS INFRASTRUCTURE

COE & VAN LOO

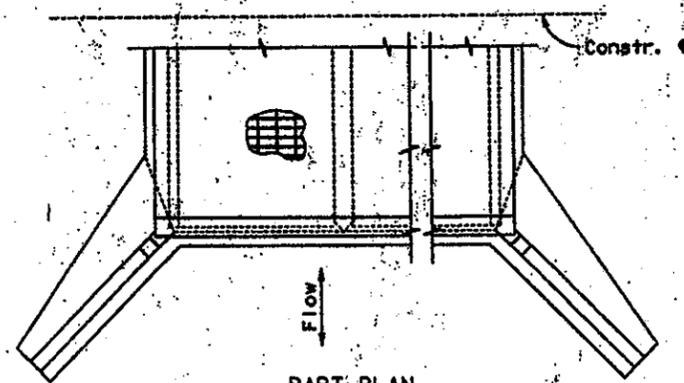
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
TELEPHONE (602) 264-6831

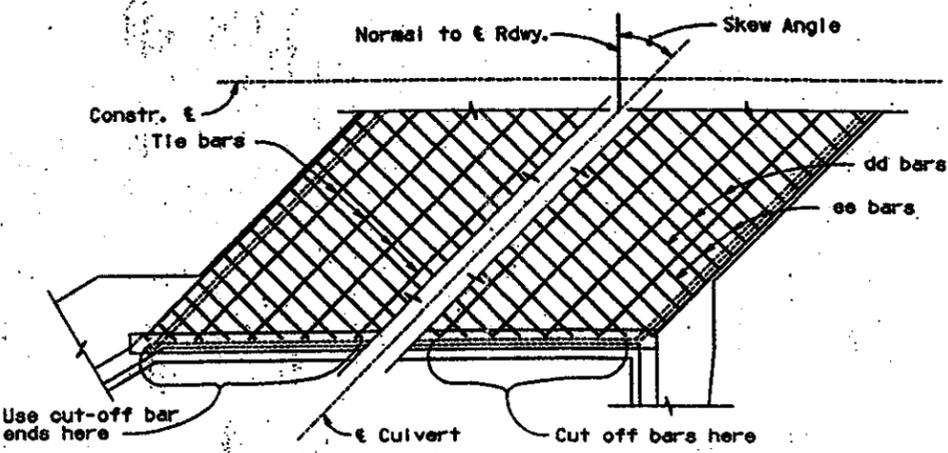
DATE: Mar. 07, 2001
TIME: 09:35:17
FILE: n:\980094\land\infra\gd\0319.dgn

1-800-STAKE-IT
ALTA ENGINEERING COMPANY

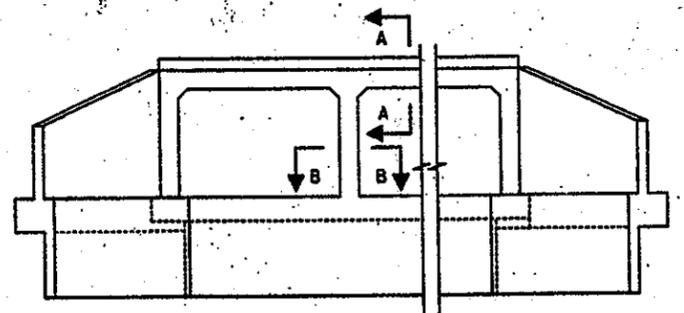
DSD 99-8024 SDEV 2000633 CSPP 0100432 ZONING 2137-99-5 OS 13-5 & 6, 14-5 & 6



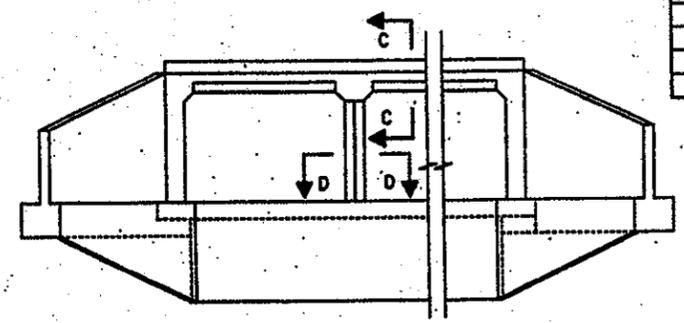
PART PLAN
Showing Inlet & Outlet Details



PART PLAN-SKEWED CULVERT
Showing Reinf. Steel Placement



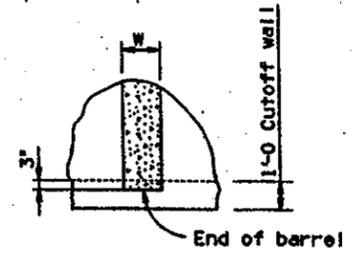
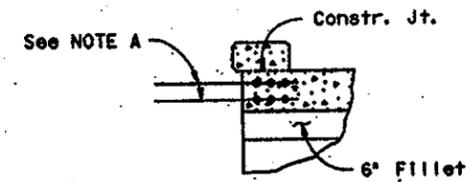
TYPICAL ELEVATION-OUTLET END



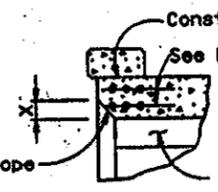
TYPICAL ELEVATION-INLET END

Span 'S'	Dim. 'X'
6'	3'
8'	4'
10'	5'
12'	6'

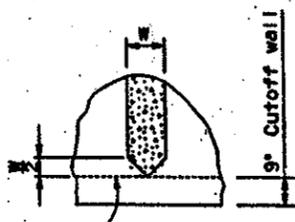
SECTION A-A



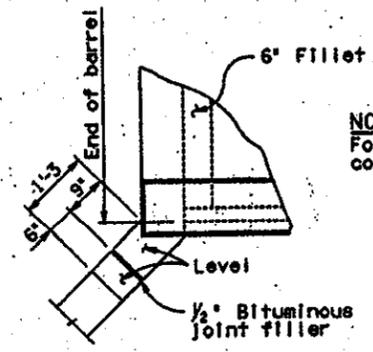
SECTION B-B



SECTION C-C

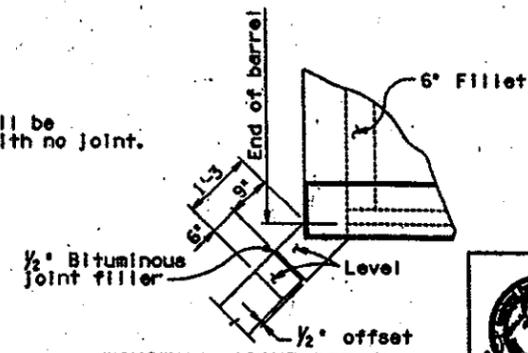


SECTION D-D



WINGWALL JOINT DETAIL
For all barrels under 8ft. (H < 8')

NOTE
Footing shall be continuous with no joint.



WINGWALL JOINT DETAIL
For all barrels 8ft. and over (H >= 8')

NOTE:
Specially designed sections shall be used along with the standard barrels when necessary.

Thickness of top and bottom slabs vary with depths of fill as shown.

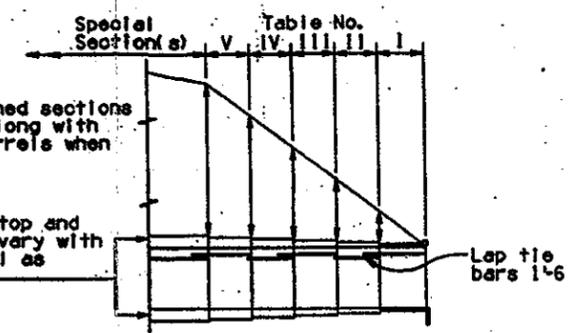


DIAGRAM SHOWING TABLES TO BE USED FOR VARIOUS FILL HEIGHTS

NOTE: Culvert barrels always begin and end with Table No. 1.

GENERAL NOTES:

Construction Specification - Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, latest Edition.

Design Specifications - AASHTO Standard Specifications for Highway Bridges, Edition of 1989 and 1990 Interim Specifications.

Loading Class - HS20-44 and/or Interstate Alternate Loading.

All concrete shall be Class 'S' unless noted otherwise.

Reinforcing steel shall conform to ASTM Specification A615. Bar sizes #6 and smaller shall be designed as Grade 40 but may be furnished as Grade 40 or Grade 60. Bar sizes #7 and larger shall be designed and furnished as Grade 60.

All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.

All reinforcing steel shall have 2 inch clear cover unless noted otherwise.

Stresses:
Concrete f'c = 3000 psi
Grade 40 reinforcing steel fs = 20000 psi
Grade 60 reinforcing steel fs = 24000 psi

Chamfer all exposed corners 1/4" as per Standard B-19.10 unless noted otherwise.

Dimensions shall not be scaled from drawings.

QUANTITY NOTE:

Total Box Culvert Quantities include Barrel Quantities and Headwall Quantities. Add Apron Quantity when apron is used.
Standard headwall quantities include wings, curb and cut-off wall.
Barrel Quantities are obtained by multiplying length of box by quantities per linear foot of box.

DESIGN APPROVED <i>[Signature]</i>	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DRAWINGS	REVISION 4-92
	APPROVED FOR PUBLICATION <i>[Signature]</i>	MISCELLANEOUS DETAILS FOR STANDARD BOX CULVERTS

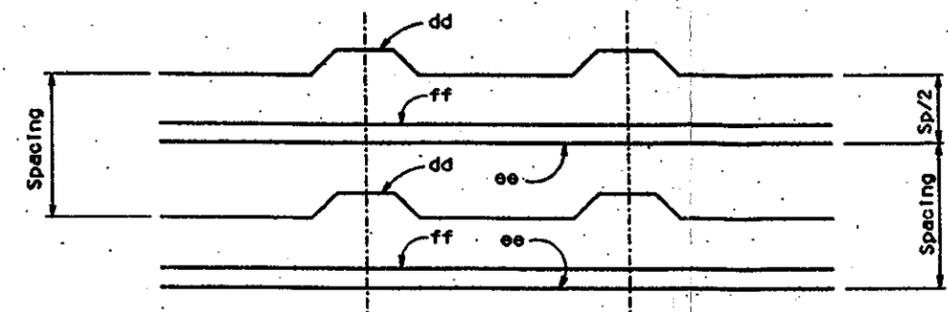
DESIGNED	CHECKED	DATE	REVISIONS	DATE

CHANEL GRADING PLANS

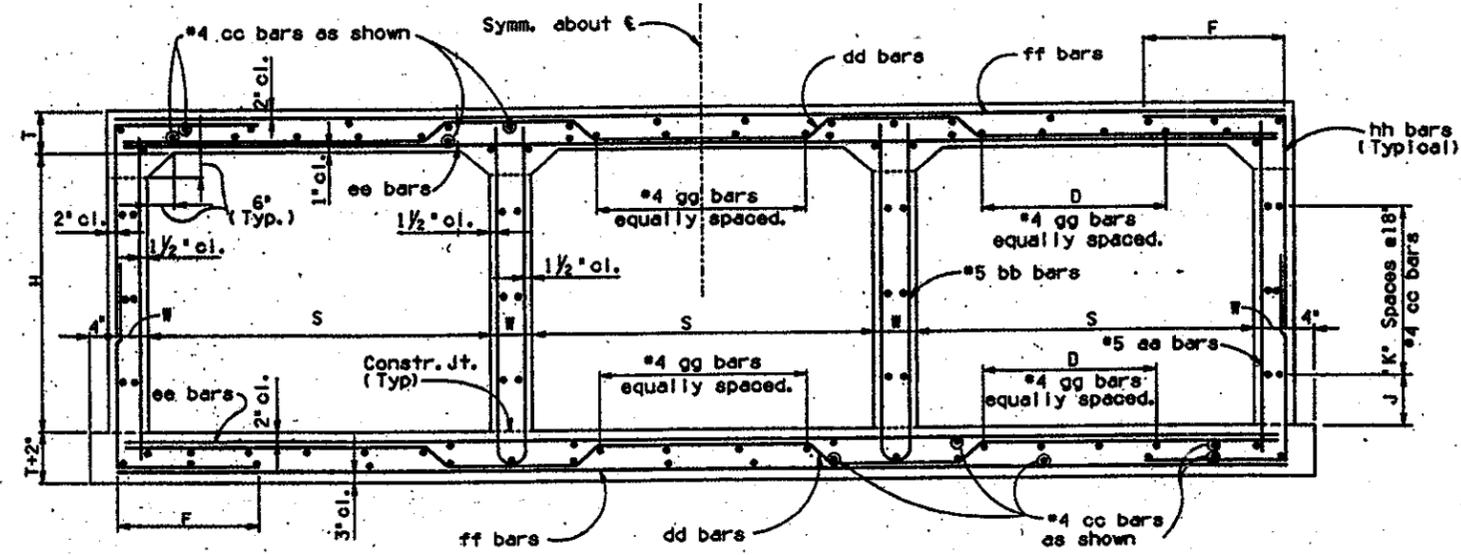
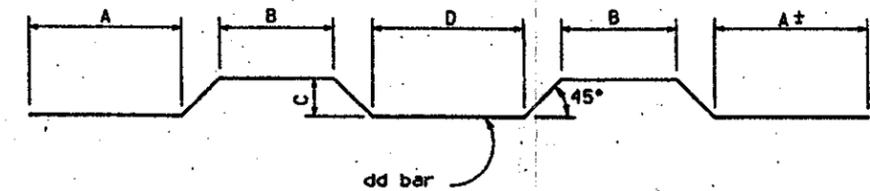
TABLE NO. 1
0'-10' FILL

Span 'S'	Height 'H'	Top Slab 'T'	aa		bb		cc	dd				ee		ff		gg		hh							
			Spacing	Length	Spacing	Length		Number*	Bar Size	Spacing	Length	A	B	C	D	Bar Size	Spacing	Length	Bar Size	Spacing	Length	F			
3'	9 1/2"	8"	12"	7'-4"	12"	8'-9"	68	5	14"	20'-2"	4'-7"	2'-7"	6 1/2"	3'-1"	5	14"	20'-3"	5	14"	20'-3"	30	4	7"	5'-1"	2'-5"
4'	9 1/2"	8"	12"	5'-4"	12"	10'-9"	76	5	14"	20'-2"	4'-7"	2'-7"	6 1/2"	3'-1"	5	14"	20'-3"	5	14"	20'-3"	30	4	7"	5'-7"	2'-5"
5'	9 1/2"	8"	12"	5'-4"	12"	12'-9"	76	5	14"	20'-2"	4'-7"	2'-7"	6 1/2"	3'-1"	5	14"	20'-3"	5	14"	20'-3"	30	4	7"	6'-1"	2'-5"
6'	9 1/2"	8"	12"	7'-4"	12"	14'-9"	84	5	14"	20'-2"	4'-7"	2'-7"	6 1/2"	3'-1"	5	14"	20'-3"	5	14"	20'-3"	30	4	7"	6'-7"	2'-5"
7'	9 1/2"	8"	12"	8'-4"	12"	16'-9"	92	5	13"	20'-2"	4'-7"	2'-7"	6 1/2"	3'-1"	5	13"	20'-3"	5	13"	20'-3"	30	4	6 1/2"	7'-1"	2'-5"
3'	9 1/2"	9"	12"	4'-4"	12"	8'-9"	68	6	14"	26'-4"	6'-1"	3'-8"	6 1/2"	4'-2"	6	14"	26'-7"	6	14"	26'-7"	36	6	7"	5'-6"	2'-6"
4'	9 1/2"	9"	12"	5'-4"	12"	10'-9"	76	6	14"	26'-4"	6'-1"	3'-8"	6 1/2"	4'-2"	6	14"	26'-7"	6	14"	26'-7"	36	6	7"	6'-0"	2'-6"
5'	9 1/2"	9"	12"	6'-4"	12"	12'-9"	76	6	14"	26'-4"	6'-1"	3'-8"	6 1/2"	4'-2"	6	14"	26'-7"	6	14"	26'-7"	36	6	7"	6'-6"	2'-6"
6'	9 1/2"	9"	12"	7'-4"	12"	14'-9"	84	6	14"	26'-4"	6'-1"	3'-8"	6 1/2"	4'-2"	6	14"	26'-7"	6	14"	26'-7"	36	6	7"	7'-0"	2'-6"
7'	9 1/2"	9"	12"	8'-4"	12"	16'-9"	92	6	13"	26'-4"	6'-1"	3'-8"	6 1/2"	4'-2"	6	13"	26'-7"	6	13"	26'-7"	36	5	6 1/2"	7'-5"	2'-6"
8'	9 1/2"	9"	12"	9'-4"	12"	18'-9"	92	6	13"	26'-4"	6'-1"	3'-8"	6 1/2"	4'-2"	6	13"	26'-7"	6	13"	26'-7"	36	6	6 1/2"	8'-0"	2'-6"
3'	10 1/2"	11"	12"	4'-6"	12"	9'-2"	68	7	17"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	6	17"	33'-3"	7	17"	33'-3"	66	6	8 1/2"	6'-1"	3'-0"
4'	10 1/2"	11"	12"	5'-6"	12"	11'-2"	76	7	17"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	6	17"	33'-3"	7	17"	33'-3"	66	6	8 1/2"	6'-7"	3'-0"
5'	10 1/2"	11"	12"	6'-6"	12"	13'-2"	76	6	12"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	5	12"	33'-3"	6	12"	33'-3"	66	5	6"	6'-8"	2'-8"
6'	10 1/2"	11"	12"	7'-6"	12"	15'-2"	84	6	12"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	5	12"	33'-3"	6	12"	33'-3"	66	5	6"	7'-2"	2'-8"
7'	10 1/2"	11"	12"	8'-6"	12"	17'-2"	92	7	15"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	5	15"	33'-3"	7	15"	33'-3"	66	6	7 1/2"	7'-9"	2'-8"
8'	10 1/2"	11"	12"	9'-6"	12"	19'-2"	92	7	15"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	5	15"	33'-3"	7	15"	33'-3"	66	6	7 1/2"	8'-3"	2'-8"
9'	10 1/2"	11"	12"	10'-6"	12"	21'-2"	100	7	15"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	6	15"	33'-3"	7	15"	33'-3"	66	6	7 1/2"	8'-9"	2'-8"
10'	10 1/2"	11"	12"	11'-6"	12"	23'-2"	108	7	14"	32'-9"	7'-7"	4'-8"	7 1/2"	5'-2"	5	14"	33'-3"	7	14"	33'-3"	66	6	7"	9'-3"	2'-8"
8'	12 1/2"	13"	12"	9'-10"	12"	20'-0"	92	7	13"	39'-4"	9'-1"	5'-6"	9 1/2"	6'-2"	5	13"	39'-11"	7	13"	39'-11"	78	6	6 1/2"	8'-7"	2'-10"
9'	12 1/2"	13"	12"	10'-10"	12"	22'-0"	100	8	16"	39'-4"	9'-1"	5'-6"	9 1/2"	6'-2"	5	16"	39'-11"	8	16"	39'-11"	78	6	8"	9'-1"	2'-10"
10'	12 1/2"	13"	12"	11'-10"	12"	24'-0"	108	8	16"	39'-4"	9'-1"	5'-6"	9 1/2"	6'-2"	5	16"	39'-11"	8	16"	39'-11"	78	6	8"	9'-1"	2'-10"
11'	12 1/2"	13"	12"	12'-10"	12"	26'-0"	108	7	12"	39'-4"	9'-1"	5'-6"	9 1/2"	6'-2"	4	12"	39'-11"	7	12"	39'-11"	78	6	6"	10'-1"	2'-10"
12'	12 1/2"	13"	12"	13'-10"	12"	28'-0"	116	7	12"	39'-4"	9'-1"	5'-6"	9 1/2"	6'-2"	5	12"	39'-11"	7	12"	39'-11"	78	6	6"	10'-8"	2'-10"

* Total number of bars in the cross-section.



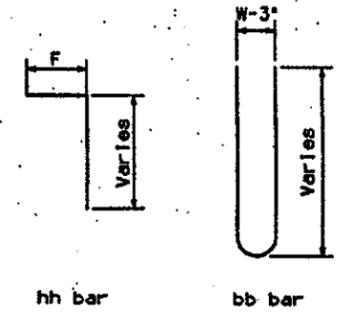
REINFORCING BAR PLACING DIAGRAM



TYPICAL SECTION

NOTE:
Reinforcing shown is for placement location only. Use the appropriate table to determine the reinforcing requirements.

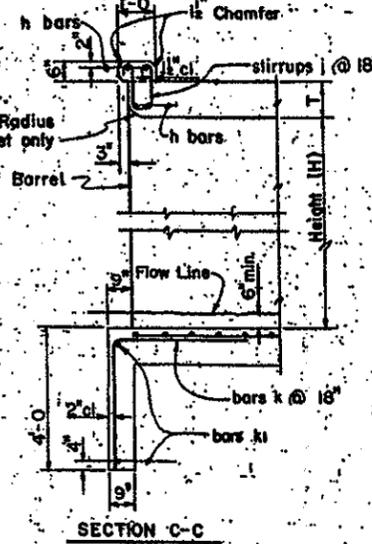
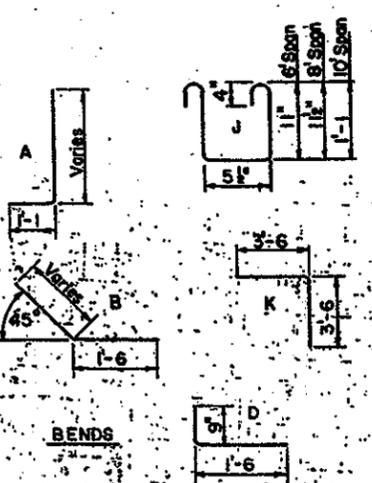
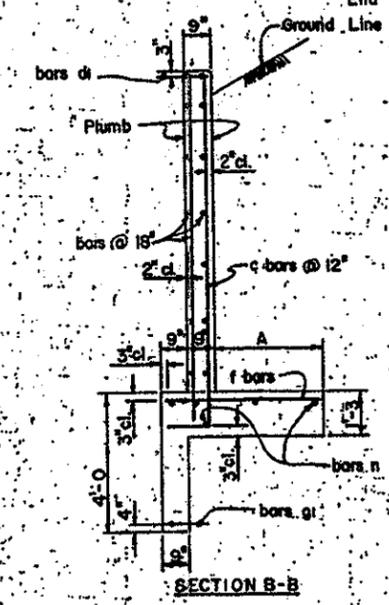
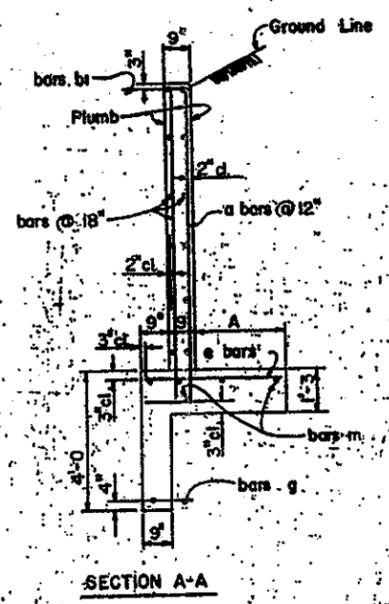
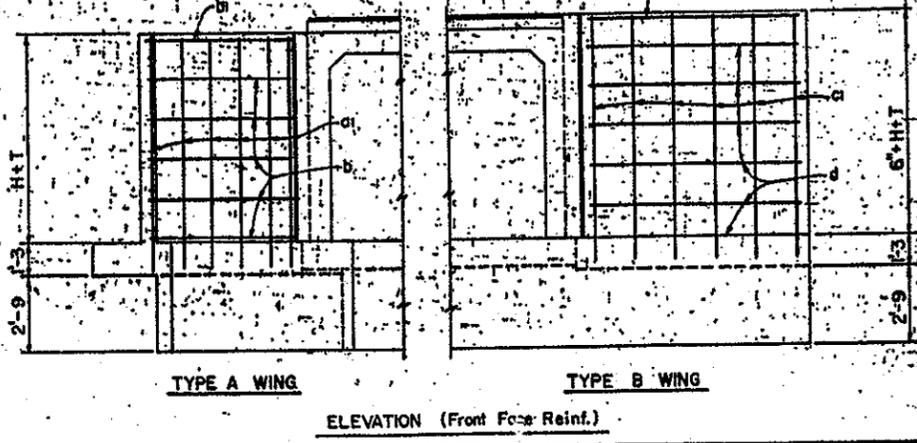
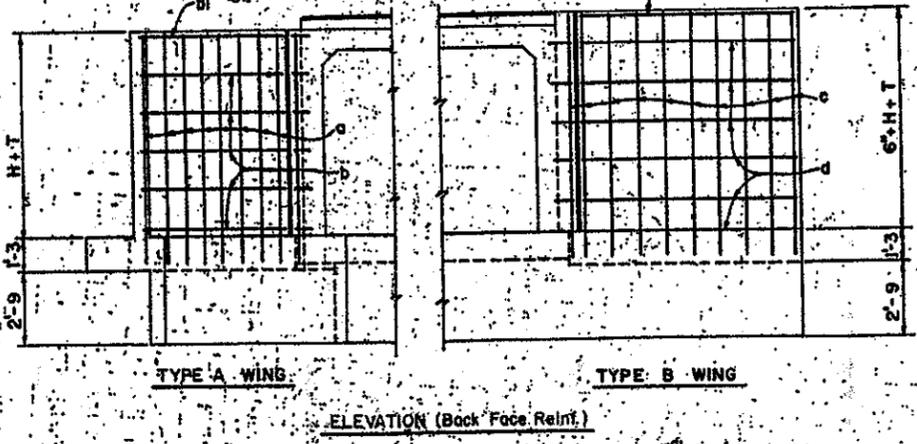
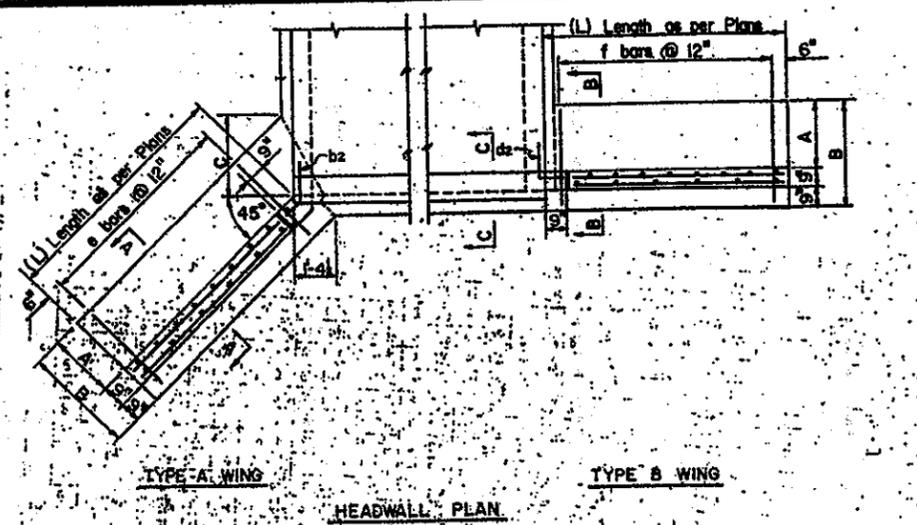
J' Height 'H'	J' Dia.	J' Spacing
3'	3"	2
4'	3"	2
5'	3"	2
6'	3"	3
7'	3"	4
8'	3"	4
9'	3"	5
10'	3"	6
11'	3"	6
12'	3"	7



BENDS

NOTE:
See B-02.35 for Tables II thru V.
See B-01.10 for General Notes and Miscellaneous Details.
See B-02.70 for Quantities.

DESIGN APPROVED <i>[Signature]</i>	ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DRAWINGS	REVISION 4-92
	TRIPLE BARREL BOX CULVERT	STANDARD NO. B-02.30



DIMENSIONS

Height of Opening	A	B	C
3'	1'-6"	3'-0"	1'-9"
4'	2'-0"	3'-6"	2'-6"
5'	2'-6"	4'-0"	3'-2"
6'	3'-0"	4'-6"	3'-11"
7'	3'-3"	4'-9"	4'-3"

CURB & CUT-OFF WALL QUANTITIES PER EACH ADDITIONAL BARREL

6' Spans		8' Spans		10' Spans	
Conc.	Steel	Conc.	Steel	Conc.	Steel
.859	.76	1.114	1.03	1.370	1.130

NOTE:
See B-01.10 for general notes and miscellaneous details.

WINGS STEEL LIST (L=H+2)

Mark	3' Height		4' Height		5' Height		6' Height		7' Height	
	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size
TYPE A WING										
o	A	12 #5	5-6 #4	8-5 #5	5-6 #6	7-6 #5	8-6 #6	8-6 #6	20 #7	8-6
o	B	8 #4	4-6 #4	8-4 #4	5-6 #4	6-6 #4	6-6 #4	7-6 #4	10 #4	8-6
o	C	8 #4	4-0 #2	5-0 #2	5-0 #2	5-0 #2	6-0 #2	7-0 #2	10 #2	8-0
o	D	4 #6	4-0 #4	6-6 #5	5-0 #4	6-0 #4	6-0 #4	7-0 #4	10 #4	8-0
o	E	8 #4	2-3 #4	4-4 #4	2-3 #4	4-4 #4	2-3 #4	4-4 #4	10 #4	2-3
o	F	8 #4	2-6 #4	4-5 #5	3-0 #6	4-5 #5	3-6 #6	4-5 #5	10 #5	4-5
o	G	2 #4	6-9 #4	7-9 #4	2 #4	8-9 #4	2 #4	9-9 #4	2 #4	10-9
o	H	8 #4	5-0 #3	6-0 #3	6-0 #3	7-0 #3	6-0 #3	8-0 #3	10 #3	8-0
TYPE B WING										
o	A	12 #5	6-0 #4	8-5 #5	7-0 #6	8-0 #6	8-0 #6	20 #7	8-0	8-0
o	B	8 #4	5-0 #4	8-4 #4	6-0 #4	7-0 #4	8-0 #4	10 #4	8-0	8-0
o	C	8 #4	4-0 #2	5-0 #2	5-0 #2	6-0 #2	7-0 #2	10 #2	8-0	8-0
o	D	4 #6	4-0 #4	6-6 #5	5-0 #4	6-0 #4	6-0 #4	7-0 #4	10 #4	8-0
o	E	8 #4	2-3 #4	4-4 #4	2-3 #4	4-4 #4	2-3 #4	4-4 #4	10 #4	2-3
o	F	8 #4	2-6 #4	4-5 #5	3-0 #6	4-5 #5	3-6 #6	4-5 #5	10 #5	4-5
o	G	2 #4	6-3 #4	7-3 #4	2 #4	8-3 #4	2 #4	9-3 #4	2 #4	10-3
o	H	8 #4	5-0 #3	6-0 #3	6-0 #3	7-0 #3	6-0 #3	8-0 #3	10 #3	8-0

CURB & CUT-OFF WALL STEEL LIST

Mark	6' Spans		8' Spans		10' Spans	
	No.	Size	No.	Size	No.	Size
TYPE A WING						
h	str	16 #4	7-0	8-8 #4	9-0	8-9 #4
i	J	8 #4	3-6 #4	7-3 #6	8-3 #6	9-3 #6
k	K	4 #4	7-0 #4	5-7 #6	8-7 #6	9-7 #6
l	str	2 #2	4-6	6-8 #2	6-9	8-9 #2
TYPE B WING						
h	str	16 #4	7-0	8-8 #4	9-0	8-9 #4
i	J	8 #4	3-6 #4	7-3 #6	8-3 #6	9-3 #6
k	K	4 #4	7-0 #4	5-7 #6	8-7 #6	9-7 #6
l	str	2 #2	7-3	6-8 #2	6-9	8-9 #2

○ Additional number of bars per each extra barrel.
◇ Additional length of bars per each extra barrel.

APPROXIMATE HEADWALL QUANTITIES*

Span	Height	Hdwl. Type A Wings		Hdwl. Type B Wings	
		For L=H+2	Per each Add. Ft.	For L=H+2	Per each Add. Ft.
6'	3'	4.16	297	3.16	19
	4'	5.52	575	3.65	23
	5'	7.07	456	4.64	25
	6'	8.86	636	4.63	33
	7'	10.58	864	3.067	41
	3'	4.47	319	3.57	19
	4'	5.80	397	3.66	23
6'	5'	7.35	477	4.76	25
	6'	9.14	658	4.68	33
	7'	10.88	888	5.09	41
	3'	4.81	344	3.80	19
	4'	6.13	423	3.64	23
	5'	7.66	503	4.20	25
	6'	9.46	683	4.73	33
10'	7'	11.19	911	5.125	41
	8'	13.09	946	5.290	43

* Includes curb and cut-off wall quantities for a single barrel.

DESIGN APPROVED
R.C. Bruck

APPROVED FOR DISTRIBUTION
R.C. Bruck

ARIZONA DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
STANDARD DRAWINGS

INLET OR OUTLET
LEVEL WINGS,
HEIGHT 3' TO 7'

REVISION

STANDARD NO.
B-08.10

APPENDIX M

Maintenance Agreements





City of Phoenix

STREET TRANSPORTATION DEPARTMENT

March 14, 2002

FEMA
LOMA Depot
3601 Eisenhower Avenue, Suite 600
Alexandria, VA. 22304-6425

Gentlemen:

RE: REQUEST FOR A LETTER OF MAP REVISION FOR
SHEELY FARMS EAST AND AGUA FRIA FREEWAY INTERCEPTOR
CHANNEL (CASE NO. 01-09-772R)

The City of Phoenix will adopt and enforce the modified regulatory floodway, according to the Phoenix City Code, Article I, Chapter 32B, Floodplains. A copy of the stated regulation is included with this submittal. The City of Phoenix understands the responsibility and the liability for the inspections and ensures the flow carrying capacities within the altered or relocated portions of any watercourse/drainage channels associated with the development of Sheely Farms East. Attached is a copy of the City of Phoenix Policy and Procedure for maintenance of Drainage Facilities. This submittal is in accordance with 65.12 of the National Flood Insurance Program Regulations.

If you have any technical questions, please contact Mr. Doug Both or Mr. Les F. Olson, P.E., R.L.S., Coe & Van Loo Consultants, 4550 North 12th Street, Phoenix, AZ. 85014-4291, phone (602) 264-6831, fax (602) 264-0928. If you have any other questions, please contact this office at (602) 262-4960.

Sincerely,

Hasan Mushtaq, Ph. D., P.E., C.F.M.
Floodplain Manager

HM/DW/aff/01-09-772r sheely.doc

Attachments



CITY OF PHOENIX

STREET MAINTENANCE DIVISION POLICY AND PROCEDURE

4.14

1 of 2
NUMBER

MAINTENANCE OF DRAINAGE FACILITIES

12-02-92

SUBJECT

ISSUE DATE

PURPOSE:

To insure all drainage facilities are maintained and kept clear from objects that may impede the flow of storm runoff.

POLICY:

All drainage facilities shall be inspected and cleaned on a maintenance schedule.

PROCEDURE:

1. The Street Maintenance Drainage Foreman shall visually inspect each drainage facility in his/her section once a month.
2. The Drainage Foreman shall schedule the cleaning as needed, but no more than the established service levels, unless it is determined that if allowed to exist could become an obstruction to drainage.
3. The following is the established service levels.
 - a) Man-made Drainage Easements: Inspected and cleaned, if needed, once a month.
 - b). Dedicated Natural Washes: Inspected monthly and cleaned of debris twice annually.
 - c) Un-dedicated Natural Washes: Inspect twice annually and notify adjacent property owner to clean as needed. If the property owner does not remove the debris from the wash, the Foreman shall advise the area Street Maintenance Field Inspector who shall follow through by notifying NIH - Zoning Enforcement.
 - d) Man-made Detention Basins: Inspect monthly and clean as needed.
 - e) Storm Drainage Inlets: Inspect monthly and clean as needed.

S.M.P. 4.14
Maintenance
Page 2 of 2

The Street Maintenance Section shall respond to any complaints regarding the clogging of drainage facilities and correct the problem within five days of notification. The above service levels shall be followed for routine maintenance. Extenuating circumstances may require deviation.

DTM:ve

Art. I, § 32B-1

FLOODPLAINS

Art. I, § 32B-1

Chapter 32B.

Floodplains

ARTICLE I. General.

§ 32B-1. Implementation.

§ 32B-2. Definitions.

ARTICLE II. Regulations.

§ 32B-3. Maps.

§ 32B-4. Classification of floodplains.

§ 32B-5. Regulation.

§ 32B-6. Interim elevations.

§ 32B-7. Coordination in floodplain management.

§ 32B-8. Nonprohibited construction.

§ 32B-9. Anchored structures.

§ 32B-10. Sand and gravel operations.

§ 32B-11. Variance provisions.

§ 32B-12. Appeals.

§ 32B-13. Structures in violation of regulations.

§ 32B-14. Diversion of water flow.

§ 32B-15. Violation as separate offense.

§ 32B-16. Severability.

§ 32B-17. Flood plain plan review fees.

ARTICLE I. General.

Sec. 32B-1. Implementation.

To implement the regulation of the floodplain areas in the City of Phoenix, the City Council is designated as the Floodplain Board and the City Engineer is designated as the Administrative Agent for these regulations. (Ord. No. G-2027, § 2.)

Person — means any individual or his agent, firm, partnership, association, corporation, or any agent of the aforementioned groups, or a federal, state, county or municipal government agency or political subdivision thereof.

Reasonable alteration or repair — means any modification or improvement to existing facilities in which the total cost does not exceed fifty percent of the real cash value assessed at the commencement of construction. A reasonable alteration, however, should not be construed to mean any improvement which would increase the flood hazard to that property or the properties of surrounding homes.

Selected floodway — means the limits, as determined by the City Engineer, where the permitted encroachment in the floodplain will allow passage of the 100-year flood without increasing the flood heights more than one foot. Additional hydraulic criteria such as maximum flow velocities of five feet per second at the limits of the selected floodway, smooth transitions around developments, and equal conveyance removal from each side will be used in computing the lines of the selected floodway.

Structure — means a walled and roofed building or mobile home that may or may not be habitable, may or may not be constructed on a permanent foundation, and was man-made.

Substantial improvement — means any repair, reconstruction or improvement of a structure, the cost of which equals or exceeds fifty percent of the market value of the structure either before the improvement or repair is started or if the structure was damaged and is being restored, before the damage occurred. A substantial improvement will not be permitted nor should it be construed to mean any modification which will increase flood hazard risk.

Watercourse — means any lake, river, creek, stream, wash, arroyo, channel, or other body of water having banks and bed through which waters flow at least periodically. The term may include specifically designated areas in which flood damage may occur. (Ord. No. G-2027, § 2.)

ARTICLE II. Regulations.

Sec. 32B-3. Maps.

The areas of special flood hazard and the selected floodway for designated floodplains are shown on the maps labeled FIRM and FBFM, Series C, dated June 1, 1984, on file with the City Engineer, which maps

Sec. 32B-4. Classification of floodplains.

To encourage the safe and orderly development of floodplain land, the Board recognizes that the floodplains consist of two distinct areas: The floodway fringe area having lower water velocities and shallower depths of flow and, the Selected Floodway which contains greater flow depths and damaging velocities. The Board also recognizes that encroachment into the floodway fringe area will not substantially increase the flood hazard to adjoining properties. It is also recognized that development and construction within the selected floodway will require higher standards of engineering and construction than development within the floodway fringe area in order to insure that there is no substantial hazard to such development or construction and that it does not create a substantial hazard to other property within the floodplain. (Ord. No. G-2027, § 2.)

Sec. 32B-5. Regulation.

In order to promote the public health, safety and general welfare, the Floodplain Board will enforce the following regulations:

1. No person may either obstruct, divert, or reduce the capacity within the area of special flood hazard by constructing any development or altering the width or course of said floodways except as provided in these regulations.

2. Construction and development may occur within the floodway fringe and the areas of shallow flooding provided that the City Engineer review and approve all such requests for building permits prior to issuance by the building official. The City Engineer will ascertain that the proposed construction will incorporate appropriate flood-proofing measures to the 'regulatory flood elevation', or that the 'lowest floor' is above the 'regulatory flood elevation'. A 'dwelling unit' shall be so constructed so as to place the 'lowest floor' elevation of the 'dwelling unit' above the 'regulatory flood elevation'. Appropriate flood-proofing measures may include, but not be limited to: providing access during flood events, maintaining electrical, water, and sewer services, designing foundations and structures to withstand hydraulic loadings expected during the base flood and designing windows, doorways and other openings located below the level of the base flood to prevent the entrance of floodwaters. Any applicant for a building permit has the burden of furnishing the Development Services Director satisfactory evidence to enable him to either determine that the applicant's property does not fall within the area of special flood hazard or that there is no substantial hazard, either to the proposed development or to the property.

and Floodway Maps (FBFM): no new flood boundary and floodway map, construction, substantial improvements, or other development (including fill) shall be permitted unless it is demonstrated that the cumulative effect of the proposed developments, when combined with all other existing and proposed developments will not increase the water surface elevation of the base flood more than one foot at a point within the community. (Ord. No. G-2027, § 2; Ord. No. G-3092, § 4; Ord. No. G-3313, § 1.)

Sec. 32B-6. Interim elevations.

When base flood elevations and delineations are not available due to recent annexation or other causes, the City Engineer may obtain, review, and reasonably utilize any base flood elevation data available from a Federal, State, County or other political subdivision for the purpose of securing a base flood determination, until such time as the Federal Emergency Management Agency has published the final FIRM (Flood Insurance Rate Maps) and FBFW (Flood Boundary and Floodway Maps). (Ord. No. G-2027, § 2; Ord. No. G-3313, § 1.)

Sec. 32B-7. Coordination in floodplain management.

The Floodplain Board may adopt other regulations which provide for coordination with all other interested and affected political subdivisions and state agencies and may enter into agreements for cooperative regulations, planning, designs, and construction. The Development Services Director shall advise the Flood Control District of Maricopa County and any other adjacent jurisdiction having responsibility for floodplain management, in writing, and provide a copy of any development plan of all applications for floodplain use permits or variances to develop land in a floodplain or floodway within one mile of the boundary between the City's area of jurisdiction and the area of jurisdiction of the District. The Development Services Director shall also advise the District and any adjacent jurisdiction having responsibility for floodplain management in writing and provide a copy of any development plan of any major development proposed within a floodplain or floodway which could affect floodplains, floodways or watercourses outside the City's area of jurisdiction. Written notice and a copy of the plan of development shall be sent to any adjacent jurisdiction no later than three working days after having been received. (Ord. No. G-2027, § 2; Ord. No. G-3092, § 5; Ord. No. G-3313, § 1.)

Sec. 32B-8. Nonprohibited construction.

Written authorization shall not be required nor shall the Floodplain Board prohibit:

to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria:

A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one foot above grade. Openings may be equipped with screens, louvers, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters. (Ord. No. G-3092, § 6.)

Sec. 32B-10. Sand and gravel operations.

Sand and gravel operations are allowed within the floodplain subject to the following conditions:

1. Within the Selected Floodway, sand and gravel operations may be conducted without permit provided that:

(a) The operations are restricted to extraction of sand and gravel for commercial purposes; and

(b) Excavations are not so located nor of such depth as to present a hazard to other development, including, but not limited to roads, bridges, culverts, and utilities.

2. No stockpiling, within the Selected Floodway, of material or tailings that may obstruct, divert, or retard the flow of floodwaters will be permitted except as reviewed and approved by the City Engineer, on an individual permit basis.

3. Stockpiling of sand and gravel products within the Floodway Fringe Area may be done without permit provided that the operator furnishes the City Engineer satisfactory evidence that such stockpiling is within the Floodway Fringe Area rather than in the Selected Floodway.

4. Excavations for sand and gravel for commercial purposes within the Floodway Fringe Area which exceed the definitions contained in Section 32A-6, paragraph (b)(1) (Grading and Drainage) of the City Code will be permitted subject to review and approval by the City Engineer, on an individual permit basis. (Ord. No. G-2027, § 2.)

Sec. 32B-11. Variance provisions.

A. The City Engineer may authorize variances from the terms of this Chapter when a literal enforcement of any provisions of this ordinance

Sec. 32B-12. Appeals.

Appeals from decisions of the City Engineer in application of these regulations may be taken to the Floodplain Appeal Board which consists of the Deputy City Manager, Chairman; the Planning Director, and the Water and Wastewater Director, members. The Floodplain Appeal Board shall be advisory to the City Engineer and shall make recommendations on matters appealed to it. If the applicant is not satisfied with the recommendation and the City Engineer's decision resulting from the appeal to the Floodplain Appeal Board, the applicant may then appeal to the City Council acting as the Floodplain Board. Any person aggrieved by a decision of the Floodplain Board may bring special action in a court of competent jurisdiction. The Floodplain Appeal Board and the Floodplain Board, when reviewing an appeal from a decision of the City Engineer, shall follow the rules and standards set forth in this ordinance. (Ord. No. G-2027, § 2; Ord. No. G-3313, § 1.)

Sec. 32B-13. Structures in violation of regulations.

Except as provided in paragraphs 32B-8 and 32B-10, all new development located or maintained within any area of special flood hazard in violation of the regulations of this Chapter and without written authorization from the Floodplain Board or the City Engineer as administrative agent of the Floodplain Board is hereby declared to be a public nuisance per se and may be abated, prevented or restrained by action of the City. (Ord No. G-2027, § 2.)

Sec. 32B-14. Diversion of water flow.

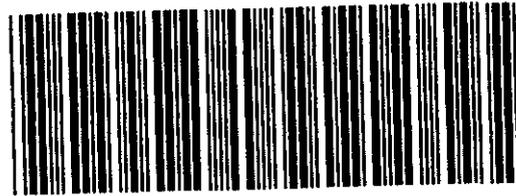
A. It is unlawful for any person to divert, retard, or obstruct any watercourse in the City of Phoenix whenever such action creates a hazard to life or property without securing the written authorization required by the preceding regulations.

B. Any person violating the provisions of this section shall be guilty of a misdemeanor. (Ord. No. G-2027, § 2.)

First American Title

When Recorded Return To:

Storey & Pieroni PLC
3030 E. Camelback Road
Suite 265
Phoenix, AZ 85016
Attention: Lesa J. Storey



OFFICIAL RECORDS OF
MARICOPA COUNTY RECORDER
HELEN PURCELL

2001-0367453 05/02/2001 03:34

CINDY 2 OF 8

201800-1255435

DRAINAGE AREA MAINTENANCE AGREEMENT

This DRAINAGE AREA MAINTENANCE AGREEMENT ("*Agreement*") is executed as of the 2nd day of May, 2001, by SUNBELT/SHEELY, L.L.C., an Arizona limited liability company ("*Sunbelt*").

Recitals

A. Sunbelt is the master developer of the approximately 400 acre mixed use master planned community located in Phoenix, Arizona between Loop 101 (west boundary), Thomas Road (north boundary), 91st Avenue (east boundary) and McDowell Road (south boundary), known as Sheely Farms (the "*Project*").

B. Sunbelt has prepared for the Project and the City of Phoenix has approved the Final Plat (as defined in Section 1.5 below). The Final Plat dedicates to the public various drainage easements intended to accommodate both onsite drainage flows within the Project and historic offsite drainage flows (with each such drainage easement dedicated pursuant to the Final Plat being hereinafter referred to as a "*Drainage Easement*" and the real property on which each such Drainage Easement is located being hereinafter referred to as a "*Drainage Easement Area*"). In addition, the Final Plat sets forth the location and gives the dimensions of each of the various separate numbered development parcels within the Project, which development parcels are more particularly described in Exhibit A attached hereto and incorporated herein (with each such parcel being hereinafter generically referred to as a "*Parcel*" or specifically referred to by the word "Parcel" combined with its particular number as identified in Exhibit A (for example, "*Parcel 1*," "*Parcel 8/9*," "*Parcel 11*," etc.)).

C. To effectuate the common use and maintenance of the Drainage Easement Areas, Sunbelt desires to enter into and record this Agreement as part of a general plan of improvement for the benefit of all Owners (as hereinafter defined). It is Sunbelt's intent that this Agreement not be merged or extinguished (and nothing herein shall constitute or be construed to constitute a merger or extinguishment) of this Agreement by virtue of the ownership by Sunbelt, as of the date of recordation of this Agreement, of all of the Parcels.

NOW, THEREFORE, for valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and for the purpose of protecting the value, utility and desirability of the Parcels and to promote a general plan of improvement for the benefit of the Parcels and all

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Owners, Sunbelt hereby declares and agrees that the Parcels shall be held, sold and conveyed subject to this Agreement and the hereinafter described covenants, conditions, and restrictions, which are for the purpose of protecting the value, utility, and desirability of, and shall run with, the Parcels, and which shall be binding upon the Owners and any Person (as hereinafter defined) now or hereafter having any right, title or interest in any Parcel or part thereof, and their respective heirs, personal representatives, successors and assigns, and shall inure to the benefit of each Owner of all or any portion of any Parcel, and any Person now or hereafter having any right, title or interest in any Parcel, all in accordance with and subject to the following provisions:

Article 1 Definitions

Except as otherwise expressly provided in this Agreement, the following terms shall, for purposes of this Agreement, have the respective meanings set forth below:

- 1.1 "**Cure Period**" shall mean a period of 30 days following delivery of written notice to a defaulting Owner by any other Owner, which notice shall specify in reasonable detail the nature of the alleged default or failure to perform; or, if the alleged default or failure to perform is of a type that cannot be remedied within 30 days, then such longer period as may be reasonable under the circumstances if remedy is commenced by the defaulting Owner within 30 days after delivery of such written notice and is thereafter diligently pursued to completion. Notwithstanding any contrary provision of this Section, in the event of emergency, the "**Cure Period**" hereunder shall be shortened to such period of time as is reasonable under the circumstances.
- 1.2 "**Default**" shall mean the failure by an Owner to perform any of its obligations under this Agreement (such Owner being referred to herein as a "**defaulting Owner**"), which failure remains uncured following expiration of the Cure Period.
- 1.3 "**Drainage Easement**" shall have the meaning set forth in **Recital B** of this Agreement.
- 1.4 "**Drainage Easement Area**" shall have the meaning set forth in **Recital B** of this Agreement.
- 1.5 "**Final Plat**" shall mean the Final Plat for Sheely Farms Infrastructure, recorded in the official records of Maricopa County, Arizona, the recording information for which is as set forth in **Exhibit A** attached hereto.
- 1.6 "**Maintenance Costs**" shall mean the costs and expenses incurred by an Owner in connection with the operation, maintenance, repair, replacement and/or restoration of a Drainage Easement Area as provided in this Agreement, consisting of the following:
 - (a) **Insurance.** Premiums for insurance carried with respect to a Drainage Easement Area in accordance with **Section 2.2**;
 - (b) **Trash and Debris Removal.** Costs of cleaning, collection, and removal of trash, rubbish and debris from a Drainage Easement Area;

(c) **Other Obligations.** Costs incurred in order to fully satisfy the maintenance, repair and other obligations of the Owner of a Drainage Easement Area as described in Article 2 hereof.

1.7 "Owner" shall mean any Person who shall from time to time be the record owner of fee title to any Parcel or any part thereof, whether or not subject to any deed of trust, mortgage, or other security instrument or encumbrance. The term "Owner" shall include all Persons holding title to a Parcel, even if there is more than one, and contract purchasers, but shall exclude any lessee, any tenant, or those having an interest in the Parcel merely as security for the performance of an obligation. If fee simple title to a Parcel is vested of record in a trustee pursuant to Arizona Revised Statutes, Section 33-801 *et seq.*, fee simple title shall be deemed to be in the trustor. If fee simple title to a Parcel is vested of record in a trustee pursuant to a subdivision trust agreement, dual beneficiary trust agreement, or similar arrangement, the beneficiary of any such trust who, under the terms of the trust, is entitled to possession of the trust property shall be deemed to be the "Owner." If a Parcel is subject to a contract for conveyance of real property under the provisions of Arizona Revised Statutes, Section 33-741 *et seq.*, the purchaser under such contract (and not the seller) shall be deemed to be the "Owner." Notwithstanding any contrary provision hereof, in the event of an assignment to an Owners Association established for a Parcel, which assignment complies with the requirements of Section 7.2 below, that Owners Association shall be deemed to be the "Owner" of such Parcel.

1.8 "Owners Association" shall mean any homeowners' association or property owners' association established for a Parcel pursuant to a recorded declaration of covenants, conditions and restrictions, which charges such association with responsibility for (among other things) the maintenance, repair and administration of Drainage Easement Areas within such Parcel as provided in this Agreement, its successors and assigns.

1.9 "Parcel" shall have the meaning set forth in Recital B of this Agreement.

1.10 "Person" shall mean any individual, partnership, firm, association, corporation, trust, limited liability company, governmental agency, administrative tribunal, or any other form of business or legal entity.

1.11 "Project" shall have the meaning set forth in Recital A of this Agreement.

1.12 "Public Lot" shall mean any individual residential condominium unit or individual subdivided residential lot within a Parcel that is designated for separate ownership or occupancy pursuant to a subdivision plat (or a condominium plat and condominium declaration) recorded after the date hereof with respect to such Parcel, but only if (a) a residential dwelling unit has been constructed thereon, and (ii) an Owners Association has been established for such Parcel and the assignment and assumption of this Agreement as provided for in Section 7.2 has occurred.

Article 2
Drainage Easement Area Maintenance and Operation

- 2.1 **Drainage Easement Area Maintenance and Operation.** Each Owner shall, at its sole cost and expense, cause the Drainage Easement Area located within its Parcel to be operated and maintained in good condition and state of repair in a commercially reasonable manner, which obligation shall include, without limitation, the following:
- (a) **Debris and Refuse.** Cleaning, collection, and removal of trash, rubbish and debris from such Drainage Easement Area, so that drainage flows may be accommodated within and pass through such Drainage Easement Area in a free and unobstructed manner;
 - (b) **No Alteration of Flow.** Neither engaging in nor permitting any alteration of such Drainage Easement Area if such alteration would materially increase the flow of surface water onto any other Drainage Easement Area, either in the aggregate or by directing the flow of surface water to a limited area; and
 - (c) **Governmental Requirements.** Compliance with all applicable requirements of governmental agencies pertaining to such Drainage Easement Area, including without limitation, any alterations or additions required to be made to, or safety appliances and devices required to be maintained in or about such Drainage Easement Area under any laws, ordinances, rules regulations or orders now or hereafter adopted, enacted or made applicable to such Drainage Easement Area.
- 2.2 **Insurance.** Each Owner of a Parcel on which a Drainage Easement Area is located shall obtain and maintain commercial general liability insurance, including contractual liability coverage, insuring against claims for bodily injury and property damage resulting from such Owner's activities or omissions under this Agreement (including, but not limited to, bodily injury and/or property damage occurring in, on or about the Drainage Easement Area located on such Owner's Parcel in connection with such Owner's activities on the Drainage Easement Area pursuant to this Agreement). The limits of liability of such insurance shall not be less than \$2,000,000.00 combined single limit for bodily injury, property damage or personal injury. Each Owner that is required to maintain insurance under this Section shall, upon the request of any other Owner, provide a certificate of insurance evidencing the insurance required under this Section. Any certificate of insurance provided pursuant to this Section shall include the name and address of the insurance company, policy number, and liability coverage and amounts.
- 2.3 **Indemnity.** Each Owner shall indemnify, defend and hold harmless each other Owner for, from and against all claims, losses, liabilities, actions, proceedings, costs and expenses (including, but not limited to, reasonable attorneys' fees and costs of suit) arising from (a) any Default by the indemnifying Owner of its obligations under this Agreement, and/or (b) any injury to any Person and/or property damage resulting from such Owner's activities or omissions under this Agreement.
- 2.4 **Payment of Maintenance Costs; Mechanics Liens.** Each Owner of a Parcel on which a Drainage Easement Area is located shall pay, as and when due, all Maintenance Costs

relating to such Drainage Easement Area. No Owner shall permit any mechanics' or materialmen's lien to be filed or to stand against any Parcel in connection with any work or materials supplied or provided to a Drainage Easement Area by such Owner in connection with this Agreement; and, such Owner shall cause any such mechanics' or materialmen's lien filed in violation of this provision to be released (by bonding or otherwise) within 20 days after notice thereof is delivered to such Owner.

Article 3
Default and Enforcement

3.1 **Enforcement.** In the event of Default by an Owner, the other Owners shall have the following rights and remedies:

- (a) **Self-Help.** Any other Owner shall have the right, but not the obligation, to exercise self-help and undertake such actions as are reasonably necessary to cure the non-performance by the defaulting Owner (including, but not limited to, the performance of necessary maintenance work to cure the Default condition and the incurrence of Maintenance Costs), provided that the Owner undertaking such actions does so in good faith. Any Owner exercising self-help in the foregoing manner shall be entitled to reimbursement from the defaulting Owner, upon written demand therefor (which written demand shall be accompanied by copies of receipts, invoices, or other reasonable supporting evidence of the amounts for which reimbursement is claimed), of all Maintenance Costs and other amounts expended by such Owner in connection with such cure, together with interest thereon at the rate of 18% per annum from the date expended until repaid in full. The exercise by an Owner of its self-help rights hereunder shall not be deemed to waive the Default so cured or any other Default or non-performance by the defaulting Owner or the rights or remedies of the curing Owner or any other Owner with respect thereto. Amounts payable by a defaulting Owner pursuant to this **Subsection (a)** shall be the personal obligation of the defaulting Owner and shall be secured by the lien described in **Subsection (b)**.
- (b) **Lien.** The amount owed by a defaulting Owner pursuant to **Subsection (a)** above to an Owner effecting a cure pursuant to that Subsection, together with such costs and reasonable attorneys' fees as may be incurred in seeking to collect such amounts (whether or not suit is filed), shall be not only the personal obligation of such defaulting Owner, but shall also be a charge on the land and shall be a continuing lien upon the defaulting Owner's Parcel (or portion thereof); provided, however, that such lien shall be subordinate and inferior to (i) the lien of all taxes, bonds, assessments and other levies which by law would be superior thereto, and (ii) the lien of any first mortgage or first deed of trust made in good faith and for value and now or hereafter recorded against the defaulting Owner's Parcel (or portion thereof). An Owner claiming a lien pursuant to this **Subsection (b)** may at its option record a notice of lien setting forth the name of the defaulting Owner, the legal description of the Parcel against which the notice of lien is recorded and the amount claimed to be past due as of the date of the recording of the notice. An Owner shall not be obligated to release any such recorded notice of lien until the

amount due thereunder has been paid in full. Failure to record a notice of lien shall have the effect provided in Section 6.2 below. The lien under this Subsection (b) may be foreclosed in the manner provided by the laws of the State of Arizona for the foreclosure of a realty mortgage. The personal obligation for any delinquent amounts payable by a defaulting Owner pursuant to Subsection (a) shall not pass to the successors in title of such Owner unless expressly assumed by them (unless title is transferred to one or more such successors for purposes of avoiding payment of any such amount or is transferred to a Person controlling, controlled by or under common control with the Owner transferring title). Each Owner shall, within 15 days after written request by any other Owner, furnish to any third party designated by such Owner a certificate stating the amounts (if any) then owed to such Owner pursuant to Subsection (a). Any such third party shall be entitled to rely on such certificate and such certificate shall be deemed to be conclusive between the third party and the Owner providing such certificate. If any Owner fails to return such certificate prior to expiration of the foregoing 15-day period, then such Owner shall be deemed to have delivered a certificate stating that no amounts are then owed to such Owner pursuant to Subsection (a). Notwithstanding the foregoing, in no event shall any defaulting Owner be entitled to avoid the payment of amounts due under Subsection (a) that are otherwise payable by such defaulting Owner on the basis of a certificate issued to a third party if the certificate contains a mistake concerning the amount payable by such defaulting Owner. Notwithstanding any contrary provision hereof, no lien or other encumbrance shall attach against a Public Lot and no homeowner or holder of any interest in a Public Lot shall have any personal liability as a result of any term or provision of this Agreement.

(c) Other Remedies. The other Owners shall have such other rights and remedies against the defaulting Owner as may be available at law or in equity, which rights and remedies shall be in addition to (and not in lieu of) the rights and remedies set forth in Subsections (a) and (b) above.

3.2 No Waiver. An Owner's waiver or failure to object by to any Default or non-performance by another Owner of any term, covenant or provision of this Agreement shall not be deemed to be a waiver of such term, covenant or provision, nor a waiver of any subsequent Default or non-performance of such term, covenant or provision or any other term, covenant or provision of this Agreement.

3.3 License. Each Owner is hereby granted a temporary license for access and passage over and across such portions of a defaulting Owner's Parcel (other than the interior of any building or other structure on such Parcel) as is reasonably necessary in connection with the exercise of such Owner's self-help rights provided in Section 3.1(a).

Article 4
Damage or Destruction to Drainage Easement Area

In the event the drainage improvements within a Drainage Easement Area are damaged or destroyed, the Owner of the Parcel on which such Drainage Easement Area is located shall restore, repair or rebuild such damaged or destroyed drainage improvements to the same general

appearance and condition as existed immediately prior to such damage or destruction, all in accordance with the requirements of applicable law (including, but not limited to, the master drainage plan for the Project approved by the City of Phoenix). Any insurance proceeds paid to any Owner on account of any such damage or destruction to the drainage improvements within the Drainage Easement Area on its Parcel shall be used by such Owner to reconstruct and repair such drainage improvements (and the excess, if any, shall belong solely to such Owner). In the event that such insurance proceeds are insufficient to cover the cost of such repair and reconstruction, the Owner of such Drainage Easement Area shall be solely responsible for payment of the costs that exceed such insurance proceeds.

Article 5
Transfers of Interest, Rights, Powers and Obligations

- 5.1 **Assumption Statement.** Concurrently with the transfer of all right, title and interest in any Parcel by any Owner, the transferee shall execute and deliver to the other Owners a written statement in which: (i) the name and address of the transferee shall be disclosed, and (ii) the transferee shall acknowledge its obligation to be bound by this Agreement and perform all obligations hereunder in accordance with the provisions of this Agreement. Failure to deliver any such written statement shall not affect the running of any covenants herein with the land, nor shall such failure negate, modify or otherwise affect the liability of any transferee pursuant to the provisions of this Agreement.
- 5.2 **Interests in Owners and Encumbrances.** Nothing contained herein shall affect or impair the right of each Owner to issue and transfer ownership interests in itself, or to encumber its interest in its Parcel.

Article 6
Mortgagee Provisions

- 6.1 **Mortgagee Protection.** This Agreement, and the rights, privileges, covenants, agreements and easements hereunder with respect to each Owner and Parcel, shall (except as provided in **Sections 3.1(b), 6.2 and 7.2** of this Agreement) be superior and senior to any lien placed upon any Parcel, including the lien of any mortgage or deed of trust. Notwithstanding the foregoing, no breach hereof shall defeat, render invalid, diminish or impair the lien of any mortgage or deed of trust made in good faith and for value, but all of the covenants and restrictions, easements and conditions and other provisions, terms and conditions contained in this Agreement shall be binding upon and effective against any Person (including any mortgagee or beneficiary under a deed of trust) who acquires title to any Parcel or any portion thereof by foreclosure, trustee's sale, deed in lieu of foreclosure or otherwise.
- 6.2 **Subordination As To Encumbrance Prior To Lien Claim.** The lien created under **Section 3.1(b)** shall be subject and subordinate to the interests of any bona fide purchaser or encumbrancer of all or any part of a Parcel, or any interest therein, for fair value, who acquired its interest prior to the date of recordation of the claim of lien, notwithstanding the fact that the claim of lien may be asserted with respect to work performed or costs incurred prior to the date the claim was duly recorded.

Article 7
Covenants and Recordation

- 7.1 **Covenants Run With the Land.** All of the provisions, agreements, rights, powers, covenants, conditions and obligations contained in this Agreement shall be binding upon and inure to the benefit of the Owners, and their respective heirs, successors (by merger, consolidation or otherwise) and assigns, devisees, administrators, representatives, and all other Persons acquiring any Parcel, or any portion thereof, or any interest therein, whether by operation of law or in any manner whatsoever. All of the provisions of this Agreement shall constitute equitable servitudes and be covenants running with the land pursuant to applicable law.
- 7.2 **Establishment of Owners Association.** If an Owners Association is established with respect to a Parcel, then the Owner of that Parcel may assign to such Owners Association all of such Owner's rights, interest and obligations under this Agreement; provided, however, that any assignment pursuant to this **Section 7.2** shall be conditioned upon the execution by the assigning Owner and such Owners Association of a written and recorded instrument of assignment specifically referring to this Agreement and the recording information therefor, under which the Owners Association assumes all of the assigning Owner's covenants and obligations under this Agreement and agrees to be bound by all of the terms, conditions and provisions hereof applicable to the assigning Owner. Upon any such assignment and assumption (i) the assigning Owner shall be released from all further liability and obligation under this Agreement, and (ii) the assignee Owners Association shall be deemed to be the "Owner" of the Parcel for all purposes under this Agreement (whether or not one or more other Persons hold fee simple title to any portion of the Parcel and/or would otherwise be considered an "Owner" hereunder).
- 7.3 **Recordation.** This Agreement shall become effective and binding upon all Owners, and their respective successors in interest and permitted assigns, in accordance with the provisions of this **Article 7** upon recordation of this Agreement in the Office of the Maricopa County Recorder.
- 7.4 **No Termination.** The breach of this Agreement shall not entitle any Owner or other Person to cancel, rescind or otherwise terminate this Agreement, or any conditions, covenants, easements or restrictions hereunder.
- 7.5 **Rule Against Perpetuities.** If any of the covenants, conditions, restrictions or other provisions of this Agreement shall be unlawful, void or voidable for violation of the rule against perpetuities, then such provisions shall continue only until 21 years after the death of the last survivor of the now living descendants of the person holding the office of President of the United States on the date this Agreement is recorded.
- 7.6 **Public Lots.** Notwithstanding any contrary provision hereof: (a) this Agreement shall not create any liens, conditions or exceptions to title or covenants running with any Public Lot, (b) any title insurer can rely on this Section when issuing any commitment to insure title to any Public Lot or when issuing a title insurance policy for any Public Lot, and (c) this Agreement shall automatically terminate as to any Public Lot, without the necessity

of any notice, agreement or recording by or between the parties, upon conveyance of the Public Lot to a home buyer by a recorded deed.

7.7 **Parcels 5, 6 and 11.** No Drainage Easement or Drainage Easement Area is located on Parcels 5, 6 and 11 and, as a result, the Owners of those Parcels shall have no maintenance or other obligations with respect to those Parcels pursuant to **Article 2** of this Agreement. This Agreement is being recorded with respect to Parcels 5, 6 and 11 solely for the purpose of providing to the Owners of those Parcels the self-help and other remedies set forth in **Article 3** of this Agreement in the event of a Default by any Owner of its obligations under **Article 2** with respect to any Drainage Easement Area that benefits said Parcels 5, 6 and/or 11. Notwithstanding any contrary provision of this Agreement, the Owner of any of said Parcels 5, 6 and/or 11 may in its sole and absolute discretion elect to exempt its Parcel from the effect of this Agreement and terminate this Agreement with respect to such Parcel, by recording in the official records of Maricopa County, Arizona, an instrument (i) signed by such Owner, (ii) referencing this Agreement and the recording information therefor, (iii) containing a legal description of the Parcel as to which such instrument is being recorded, and (iv) stating that such Owner has elected to exercise its right under this **Section 7.7** to exempt the described Parcel from the effect of this Agreement and terminate this Agreement with respect to such described Parcel. From and after the recordation of an instrument described in the preceding sentence, this Agreement shall not affect, shall not constitute an exception to title with respect to, and shall be terminated and of no further force or effect with respect to, the Parcel described in such instrument.

**Article 8
Miscellaneous**

8.1 **Negation of Partnership.** None of the terms or provisions of this Agreement shall be deemed to create a partnership between or among any Owners Association, any Owner, and/or any combination of any of the foregoing, in their respective businesses or otherwise, nor shall it cause them to be considered joint venturers or members of any joint enterprise. This Agreement is not intended nor shall it be construed to create any third party beneficiary rights in any Person who is not an Owner, unless expressly otherwise provided herein.

8.2 **Termination and Amendment.** This Agreement shall be perpetual in duration (except with respect to any Parcel for which this Agreement has been terminated pursuant to **Section 7.7** above). Except as otherwise specified in this Agreement (including, but not limited to, the provisions of **Section 7.7** allowing unilateral termination by an Owner of Parcels 5, 6 and/or 11), this Agreement may be terminated, canceled, changed, modified or amended in whole or in part only by written and recorded instrument executed by the Owners of all of the Parcels. Upon termination of this Agreement, all rights and privileges derived from and all duties and obligations created and imposed by the provisions of this Agreement shall terminate and have no further force or effect; provided, however, that the termination of this Agreement shall not limit or affect any remedy at law or in equity that an Owner may have against any other Owner with respect to any liability or obligation arising or to be performed under this Agreement prior to the date of such termination.

8.3 **Excusable Delays.** Whenever performance is required of any Owner hereunder, that Owner shall use all due diligence to perform and take all necessary measures in good faith to perform; provided, however, that if completion of performance shall be delayed at any time by reason of acts of God, war, civil commotion, riots, strikes, picketing, or other labor disputes, or damage to work in progress by reason of fire or other casualty or cause beyond the reasonable control of an Owner (financial inability, imprudent management or negligence excepted), then the time for performance as herein specified shall be appropriately extended by the amount of the delay actually so caused.

8.4 **Severability.** Invalidation of any of the provisions contained in this Agreement, or of the application thereof to any Person, by judgment or court order shall in no way affect any of the other provisions hereof or the application thereof to any other Person or circumstance and the same shall remain in full force and effect unless enforcement of this Agreement as so invalidated would be unreasonable or grossly inequitable under all the circumstances or would frustrate the purposes of this Agreement.

8.5 **Notices.**

(a) **Procedure.** Any notice to any Owner (the Owner to whom such notice is being given being hereinafter referred to as the "*receiving party*", and the Person giving such notice being hereinafter referred to as the "*delivering party*") shall be in writing and given by delivering the same to the receiving party in person or by sending the same by United States registered, certified or express mail, return receipt requested, with postage prepaid, or by "Federal Express" or similar overnight delivery, addressed as follows: (i) if the receiving party has previously delivered notice to the delivering party designating the receiving party's address in accordance with Section 5.1 or this Section 8.5, then such notice shall be given to the address as so designated, or (ii) if the receiving party has not previously delivered notice to the delivering party designating the receiving party's address in accordance with Section 5.1 or this Section 8.5, then notice shall be given to the address of the record owner of the receiving party's Parcel (or portion thereof) as set forth in the Official Records of the Maricopa County Tax Assessor's office and to the address of the receiving party's Arizona statutory agent (if one exists) at its address on file in the records of the Arizona Corporation Commission. Any Owner may change its mailing address at any time by giving written notice of such change to any other Owner in the manner provided herein at least 15 days prior to the effective date of such change. All notices under this Agreement shall be deemed given, received, made or communicated on the date personal delivery is effected or, if mailed, on the delivery date or attempted delivery date shown on the return receipt.

(b) **Form and Effect of Notice.** Every notice (other than the giving or withholding of consent, approval or satisfaction under this Agreement, but including requests therefor) given to an Owner or other Person shall comply with the following requirements. Each such notice shall state: (i) the Section of this Agreement pursuant to which the notice is given; and (ii) the period of time within which the recipient of the notice must respond or if no response is required, a statement to

that effect. Each request for consent or approval shall contain reasonably sufficient data or documentation to enable the recipient to make an informed decision.

8.6 **Captions.** The captions preceding the text of each Article, Section and Subsection hereof are included only for convenience of reference and shall be disregarded in the construction and interpretation of this Agreement.

8.7 **References.** All references herein to a given Article, Section or Subsection refer to the Article, Section or Subsection of this Agreement.

8.8 **Context.** Whenever required by the context of this Agreement: (a) the singular shall include the plural, and vice versa, and the masculine shall include the feminine and neuter genders, and vice versa, and (b) the use of the words "including", "such as", or words of similar import, when following any general term, statement or matter shall not be construed to limit such statement, term or matter to specific items, whether or not language of non-limitation, such as "without limitation" or "but not limited to" are used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest scope of such statement, terms or matter.

8.9 **Litigation Expenses.**

(a) **Payment to Prevailing Party.** If any Owner shall bring an action or proceeding (including, without limitation, any cross-complaint, counterclaim or third party claim) against any other Owner or by reason of the Default or alleged Default of any covenant, term or obligation hereof, or for the enforcement of any provision hereof, or to interpret, or otherwise arising out of this Agreement, the prevailing party in such action or proceeding shall be entitled to its costs and expenses of suit, including but not limited to reasonable attorneys' fees, which shall be payable whether or not such action is prosecuted to judgment. "*Prevailing party*" within the meaning of this **Section 8.9** shall include, without limitation, a Person who dismisses an action for recovery hereunder in exchange for payment of the sums allegedly due, performance of covenants allegedly breached or consideration substantially equal to the relief sought in the action.

(b) **Attorneys' Fees in Third Party Litigation.** If any Owner is required to initiate or defend any action or proceeding with a third party (including, without limitation, any cross-complaint, counterclaim or third party claim) because of any other Owner's Default under or failure to enforce this Agreement, or otherwise arising out of this Agreement, then the Owner so initiating or defending shall be entitled to reasonable attorneys' fees from such other Owner.

(c) **Scope of Fees.** Attorneys' fees under this **Section 8.9** shall include attorneys' fees on any appeal, and, in addition, a Person entitled to attorneys' fees shall be entitled to all other reasonable costs and expenses incurred in connection with such action.

8.12 **Time.** Time is of the essence of this Agreement and each and every provision hereof.

20100507453

IN WITNESS WHEREOF, Sunbelt has executed and acknowledged this Agreement as of the date first above written.

SUNBELT:

SUNBELT/SHEELY, L.L.C., an Arizona limited liability company

By: SUNBELT HOLDINGS MANAGEMENT, INC., an Arizona corporation, its Manager

By: John W. Sheely
Its: President

STATE OF ARIZONA)
)ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 1st day of May 2001, by John W. Graham the President of Sunbelt Holdings Management, Inc., an Arizona corporation, the Manager of Sunbelt/Sheely, L.L.C., an Arizona limited liability company, on behalf thereof.

Connie S. Dean
Notary Public

My Commission Expires:
11-08-02



20030743

LENDER CONSENT

The undersigned is the Beneficiary, and Sunbelt/Sheely, L.L.C., an Arizona limited liability company, is the Trustor, under that certain Deed of Trust recorded concurrently herewith, in the official records of Maricopa County, Arizona (the "Deed of Trust"). The undersigned hereby consents to the foregoing Drainage Easement Area Maintenance Agreement and agrees that such Drainage Easement Area Maintenance Agreement shall continue in effect even in the event of (i) foreclosure of the Deed of Trust, (ii) sale of the property encumbered by the Deed of Trust (the "Covered Property"), or any portion thereof, pursuant to the trustee's power of sale contained in the Deed of Trust, (iii) transfer of the Covered Property or any portion thereof by conveyance in lieu of foreclosure or trustee's sale pursuant to the Deed of Trust, or (iv) any other acquisition of fee title to the Covered Property or any portion thereof by the undersigned, its successors, or assigns.

Dated this 2nd day of May, 2001.

SELLER:

Ted Don Sheely
Ted Don Sheely

Kenneth Wayne Sheely
Kenneth Wayne Sheely

James Patrick Sheely
James Patrick Sheely

Robert M. Sheely
Robert M. Sheely

William W. Sheely
William W. Sheely, by John H. Sheely
his attorney in fact

Ross A. Sheely
Ross A. Sheely, by John H. Sheely
his attorney in fact

John H. Sheely
John H. Sheely

Mary Alice Sheely
Mary Alice Sheely

STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by Ted Don Sheely.

Doris A. Hisle
Notary Public

My  COMMISSION EXPIRES:

STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by Kenneth Wayne Sheely.

Doris A. Hisle
Notary Public

My Commission Expires: 

STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by James Patrick Sheely.

Doris A. Hisle
Notary Public

My Commission Expires: 

20030745

STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by Robert M. Sheely.

Doris A. Hisle
Notary Public

My Commission Expires:



STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by John H. Sheely, the attorney in fact for William W. Sheely.

Doris A. Hisle
Notary Public

My Commission Expires:



STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by John H. Sheely, the attorney in fact for Ross A. Sheely.

Doris A. Hisle
Notary Public

My Commission Expires:



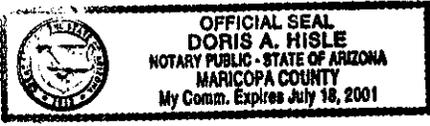
2000037453

STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by John H. Sheely.

Doris A. Hisle
Notary Public

My Commission Expires:



STATE OF ARIZONA)
) ss.
County of Maricopa)

The foregoing instrument was acknowledged before me this 30 day of April 2001, by Mary Alice Sheely.

Doris A. Hisle
Notary Public

My Commission Expires:



20100745

EXHIBIT A

Legal description of Sheely Farms Project

Parcel 1, Parcel 2, Parcel 3, Parcel 4, Parcel 5, Parcel 6, Parcel 7, Parcels 8/9, Parcel 10, Parcel 11, Parcel 12, and Parcel 13, according to the Final Plat for Sheely Farms Infrastructure, recorded in Book 561 of Maps, page 42, official records of Maricopa County, Arizona.