CONDITIONAL LETTER OF MAP REVISION REQUEST FOR REEMS RD CHANNEL AND BASIN PEORIA TO DYSART DRAIN AT FALCON DUNES GOLF COURSE

MARICOPA COUNTY, ARIZONA

TECHNICAL DATA NOTEBOOK
DRAFT SUBMITTAL

April 11, 2008

Revised:
October 27, 2008
December 11, 2008

Prepared for:

Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Registered Professional Engineer (Civil)
CERTIFICATE NO.
41978
KRISTYN E.
VAN METER
Date Signed 12/11/08
ARIZONA U.S.A.
EXPIRES 3/31/2011

Prepared by:

Hoskin-Ryan Consultants, Inc.
201 W. Indian School Road
Phoenix, AZ 85013
(602) 252-8384

Federal Emergency Management Agency

Washington, D.C. 20472

September 30, 2009

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 09-09-1350R

The Honorable Fulton Brock
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson Street, 10th Floor
Phoenix, AZ 85003

Community: Maricopa County, AZ
Community No.: 040037

104

Dear Mr. Brock:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas, in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated March 24, 2009, Mr. Mark Mayer, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that hydrologic analysis, better topographic information and the proposed Reems Road Channel and Retention Basin (proposed project) along Reems Road, from Peoria Avenue to approximately 2,500 feet upstream of Northern Avenue, would have on the flood hazard information shown on the effective FIRM.

The proposed project was designed to convey the base (1-percent-annual-chance) flows that would result from planned detention basins referred to as Loop 303 channel and basin, that will be located west of the site; however, the submitted hydrologic analysis does not consider the effect of these basins. The submitted hydraulic analysis is based on this hydrologic analysis.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Mayer and Ms. Kristyn E. Van Meter, Hoskin Ryan Consultants, Inc.

Because this revision request also affects the City of Glendale and the City of Surprise, separate CLOMRs for these communities were issued on the same date as this CLOMR.

We reviewed the submitted data, without consideration of the planned basins, and the data used to prepare the effective FIRM for your community and determined that the proposed project meets the minimum floodplain management criteria of the NFIP. We believe that, if the proposed project is constructed as shown on the preliminary plans entitled "Reems Road Channels and Basin, FCD Project NO.470-12-31, Contract FCD 2005 C018, Sheet 4 to 34 of 59," dated November 2007, revised May 1, 2008, prepared by the Flood Control District of Maricopa County, and the data listed below are received, a revision to the FIRMN would be warranted.

As a result of the hydrologic and hydraulic analysis, updated topographic information and the proposed project, the width of the Special Flood Hazard Area (SFHA), the area subject to inundation by the base flood, will decrease and increase compared to the effective SFHA width. The maximum decrease in SFHA width, approximately 100 feet, will occur approximately 500 feet downstream of Olive Avenue. The maximum increase in SFHA width, approximately 750 feet, will occur approximately 2,000 feet upstream of Olive Avenue.

Upon completion of the project, your community may submit the data listed below and request that we make a final determination on revising the effective FIRM.

- If the planned detention basins, as part of the Loop 303 channel and basin project, are constructed prior to the submittal of the Letter of Map Revision (LOMR) following this CLOMR, then those basins must be incorporated into the LOMR and they hydrologic and hydraulic analyses must be revised accordingly.

- Detailed application and certification forms must be used for requesting final revisions to the maps. Therefore, when the map revision request for the area covered by this letter is submitted, Form 1, entitled "Overview & Concurrence Form," must be included. (A copy of this form is enclosed.)

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  Form 3, entitled "Riverine Structures Form"

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  LOMC Clearinghouse
  6730 Santa Barbara Court
  Elkridge, MD 21075

- "As-built" plans, certified by a registered professional engineer, of all proposed project elements

- An annotated FIRM, at the scale of the effective FIRM, that shows the revised base floodplain boundary delineations shown on the submitted topographic work map and how they tie into the base floodplain boundary delineations shown on the effective FIRM at the downstream and upstream ends of the revised reach

- Documentation of the individual legal notices sent to property owners who will be affected by the increases in width of the base floodplain within the limits of revision. This documentation may

take the form of certified mailing receipts or certification that all property owners have been notified, with an accompanying mailing list and a copy of the letter sent.

- If you submit notification of and acceptance by the affected property owners, FEMA can issue a LOMR that is effective on the date of issuance.

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After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM.

The basis of this CLOMR is, in whole or in part, a channel-modification project. NFIP regulations, as cited in Paragraph 60.3(b)(7), require that communities assure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management regulations. Consequently, the ultimate responsibility for maintenance of the modified channel rests with your community.

This CLOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these take precedence over the minimum NFIP criteria.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Director, Mitigation Division of FEMA in Oakland, California, at (510) 627-7175.

If you have any questions regarding this CLOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,

Dahlia Kasperski

Dahlia Kasperski, P.E., CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

For: Kevin C. Long, Acting Chief
Engineering Management Branch
Mitigation Directorate

Enclosures

cc: (see attached list)

List of Courtesy Copies - Maricopa County, AZ

The Honorable Elaine M. Scruggs
Mayor, City of Glendale

The Honorable Lyn Truitt
Mayor, City of Surprise

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City Engineer
City of Surprise

Mr. Larry Broyles
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Hoskin Ryan Consultants, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

September 30, 2009

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IN REPLY REFER TO:
Case No.: 09-09-1350R

The Honorable Elaine M. Scruggs
Mayor, City of Glendale
5850 West Glendale Avenue
Glendale, AZ 85301

Community: City of Glendale, AZ
Community No.: 040045

104

Dear Mayor Scruggs:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas (the effective FIRM for your community), in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated March 24, 2009, Mr. Mark Mayer, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that hydrologic analysis, better topographic information and the proposed Reems Road Channel and Retention Basin (proposed project) along Reems Road, from Peoria Avenue to approximately 2,500 feet upstream of Northern Avenue, would have on the flood hazard information shown on the effective FIRM.

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Sincerely,

Dahlia Kasperski

Dahlia Kasperski, P.E., CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

For: Kevin C. Long, Acting Chief
Engineering Management Branch
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Federal Emergency Management Agency

Washington, D.C. 20472

September 30, 2009

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IN REPLY REFER TO:
Case No.: 09-09-1350R

The Honorable Lyn Truitt
Mayor, City of Surprise
16000 North Civic Center Plaza
Surprise, AZ 85374

Community: City of Surprise, AZ
Community No.: 040053

104

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Dahlia Kasperski

Dahlia Kasperski, P.E., CFM, Program Specialist
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Mitigation Directorate

For: Kevin C. Long, Acting Chief
Engineering Management Branch
Mitigation Directorate

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Ms. Kristyn E. Van Meter, P.E.
Hoskin Ryan Consultants, Inc.

Board of Directors
Fulton Brock, District 1
Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, District 4
Mary Rose Wilcox, District 5

Flood Control District
of Maricopa County

www.fcd.maricopa.gov

2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601
TT: 602-505-5897 August 11, 2009

LOMC Clearinghouse
6730 Santa Barbara Court
Elkridge, MD 21075
Attn: Mounir Boudjemaa

RE: Case No. 09-09-1350R
Reems Road Channel

Mr. Boudjemaa:

In the "Summary of Additional Data Required to Support a Conditional Letter of Map Revision" attached to a letter from Syed Qayum, CFM, National LOMR Technical Manager, to Krystyne (sic) E. Van Meter, P.E. of Hoskin-Ryan Consultants, Inc., a pre-project conditions model for Reems Road Channel was requested. As stated in the attachment, and in the CLOMR application instructions, the pre-project conditions model would be a duplicate or corrected effective model. However, as explained in the CLOMR request, and in phone conversations with you, there is no effective model. The Reems Road right-of-way, the effective floodplain channel, is not adequate to contain the effective base flood discharge. Flow that overtops the east (left) bank of the road continues east as sheet flow. The effective Zone A boundary on the west (right) was therefore based upon a horizontal projection of the east bank elevation.

You explained in a follow-up phone conversation that the pre-project conditions model was being requested in order to demonstrate that this project would not increase base flood elevations beyond the project boundary. Throughout most of the project reach, the base flood is confined to the proposed channel, culverts, and basin, and the base flood discharge is reduced by the proposed basin. However, as explained in the CLOMR request, since this project is designed based upon a future project that would reduce discharges upstream, culverts and portions of the channel upstream of the culverts in this project will be overtopped by the base flood. At one of the project's four culvert locations, overflow beyond the project boundary occurs only to the east towards Reems Road, where the effective Zone A is assumed to also overflow Reems Road. At the other three culvert locations, the revised condition model shows overflow also to the west, extending beyond the project boundary. As agreed in our subsequent conversations, it is at these three locations that further documentation is needed to demonstrate that the project is not increasing base flood elevations.

The three locations of concern are: model cross sections 2370 – 2600 (upstream of project culverts under an irrigation ditch/agricultural road); 3638 – 3840 (at and upstream of project culverts under Olive Ave); and 5000 – 5080 (at and upstream of project culverts under an irrigation ditch/agricultural road just downstream of the project basin). CLOMR Request work study map sheets 4-6, and Figure 3A, Annotated Flood Insurance Rate Map (Part 1) revised to better reflect that the proposed Zone A boundary is within the western project boundary outside these areas are attached. Cross sections representing these three locations are also attached. Each cross section depicts both the pre-project condition, and the project design. As opposed to the cross sections in the revised conditions model in the CLOMR request, the cross sections on the attachment are oriented looking upstream, and extend well beyond the project boundary, particularly in order to show Reems Road (to the right of station 125 on the cross sections). As we discussed over the phone, it is obvious from these cross sections that if the post-project base flood discharge overtops the proposed culverts and channel, a higher pre-project discharge running down Reems Road would overtop the banks on both sides of the road. Since the channel and culverts provide significantly more conveyance below the road bank elevations (particularly where culverts are being added where none existed previously), less overtopping of Reems Road will occur in the revised condition, so base flood elevations would be lower due to the project. This would be particularly true at cross sections 2370-2600, where post-project flood depths west of the project boundary are no more than 0.2 feet.

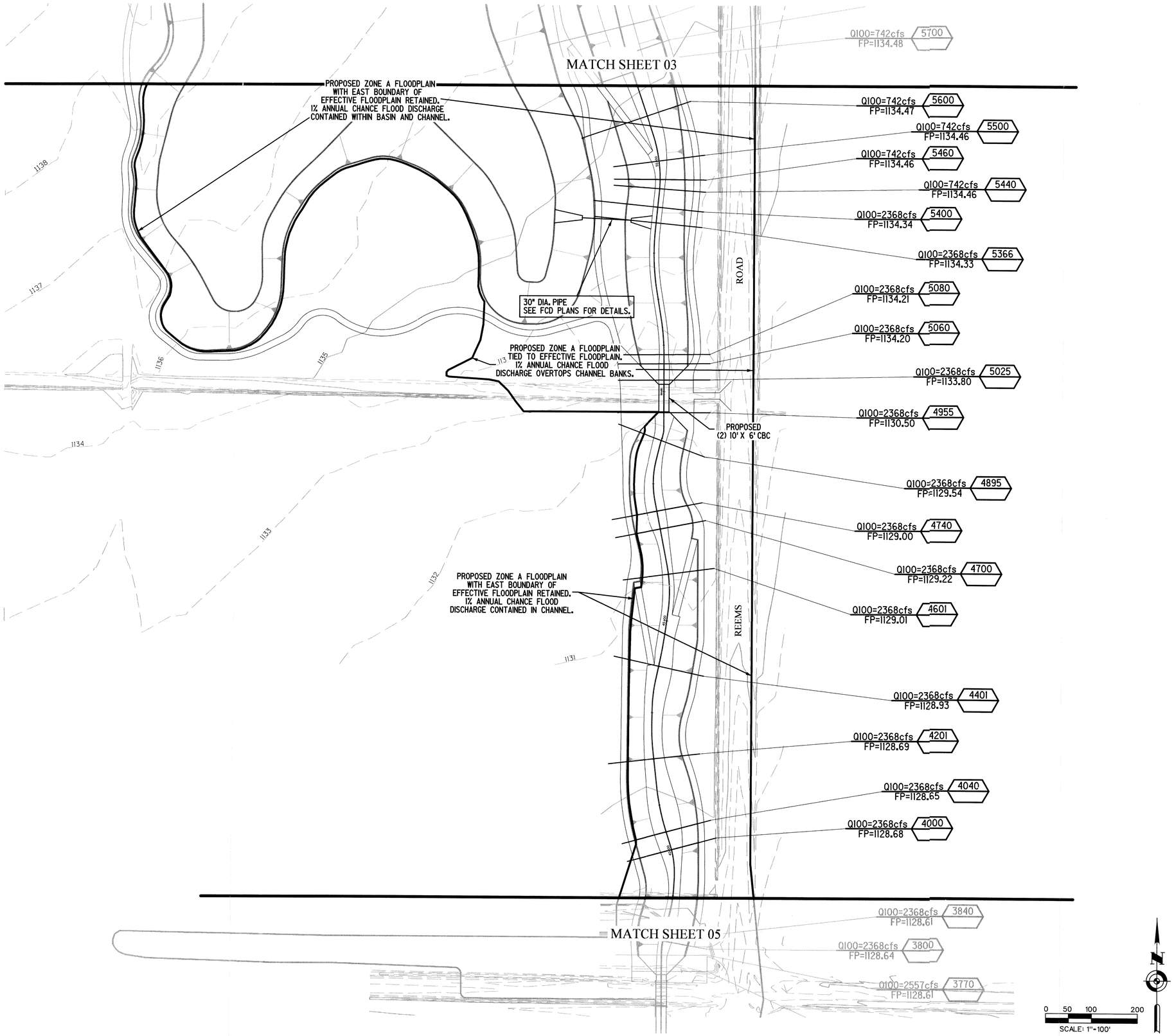
Hopefully this information satisfies your concerns, and review of the CLOMR request may continue. This information has also been sent to you in an e-mail with computer file attachments. Should you need any further information, please do not hesitate to contact me.

Mark Mayer

Mark Mayer
Civil Engineer - Senior
602-506-6726

Attachments: Revised work study map sheets 4-6
Revised Figure 3A, Annotated Flood Insurance Rate Map (Part 1)
Cross sections depicting both the pre-project condition and the project design

Revised Fig 3A is in TDN

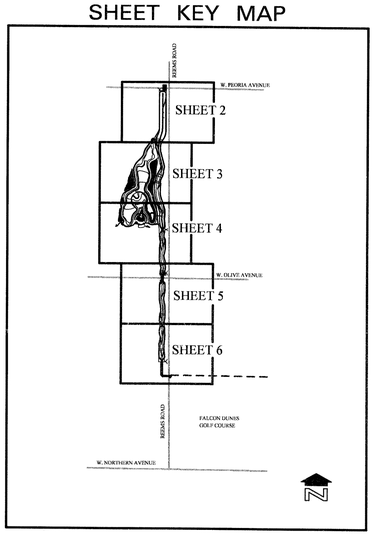


LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin • Ryan Consultants
creative engineering solutions
201 W. Indian School Road, Phoenix, Arizona 85013-3203
Office: (602) 252-8384 Fax: (602) 252-8385 www.hoskinryan.com

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

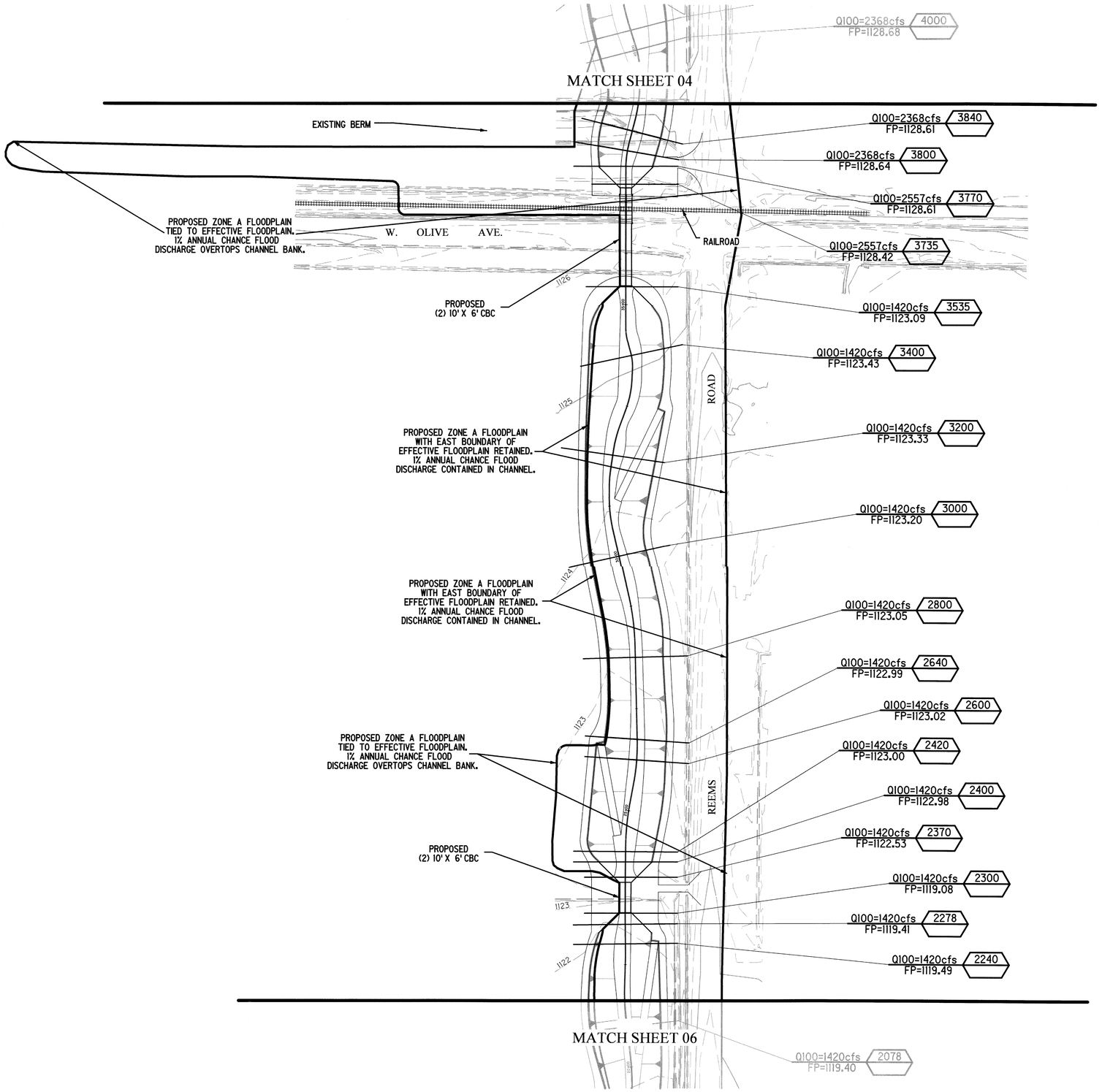
CONTRACT FCD 2007 C016

Registered Professional Engineer (Civil) CERTIFICATE NO. 41978 KRISTYN E. VAN METER Date Signed 3/4/09 ARIZONA U.S.A. EXPIRES 3/31/2011

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	08/03/2009
PLANS CHK.	KVM	08/03/2009

100-YEAR FLOODPLAIN

SHEET 4 OF 6

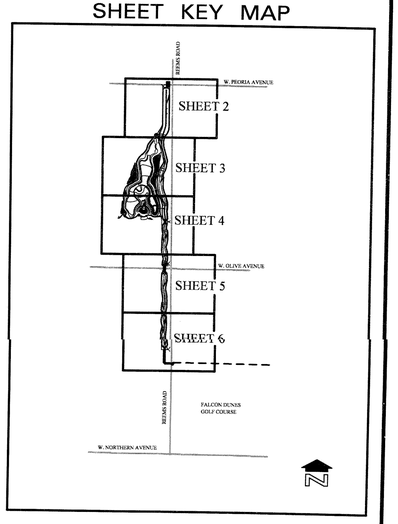


LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

Hoskin • Ryan Consultants
creative engineering solutions
201 W. Indian School Road, Phoenix, Arizona 85013-3203
Office: (602) 252-8384 Fax: (602) 252-8385 www.hoskinryan.com

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

CONTRACT FCD 2007 C016

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	08/03/2009
PLANS CHK.	KVM	08/03/2009

Registered Professional Engineer (Civil) CERTIFICATE NO. 41978 KRISTYN E. VAN METER Date Signed 8/4/09 ARIZONA U.S.A.

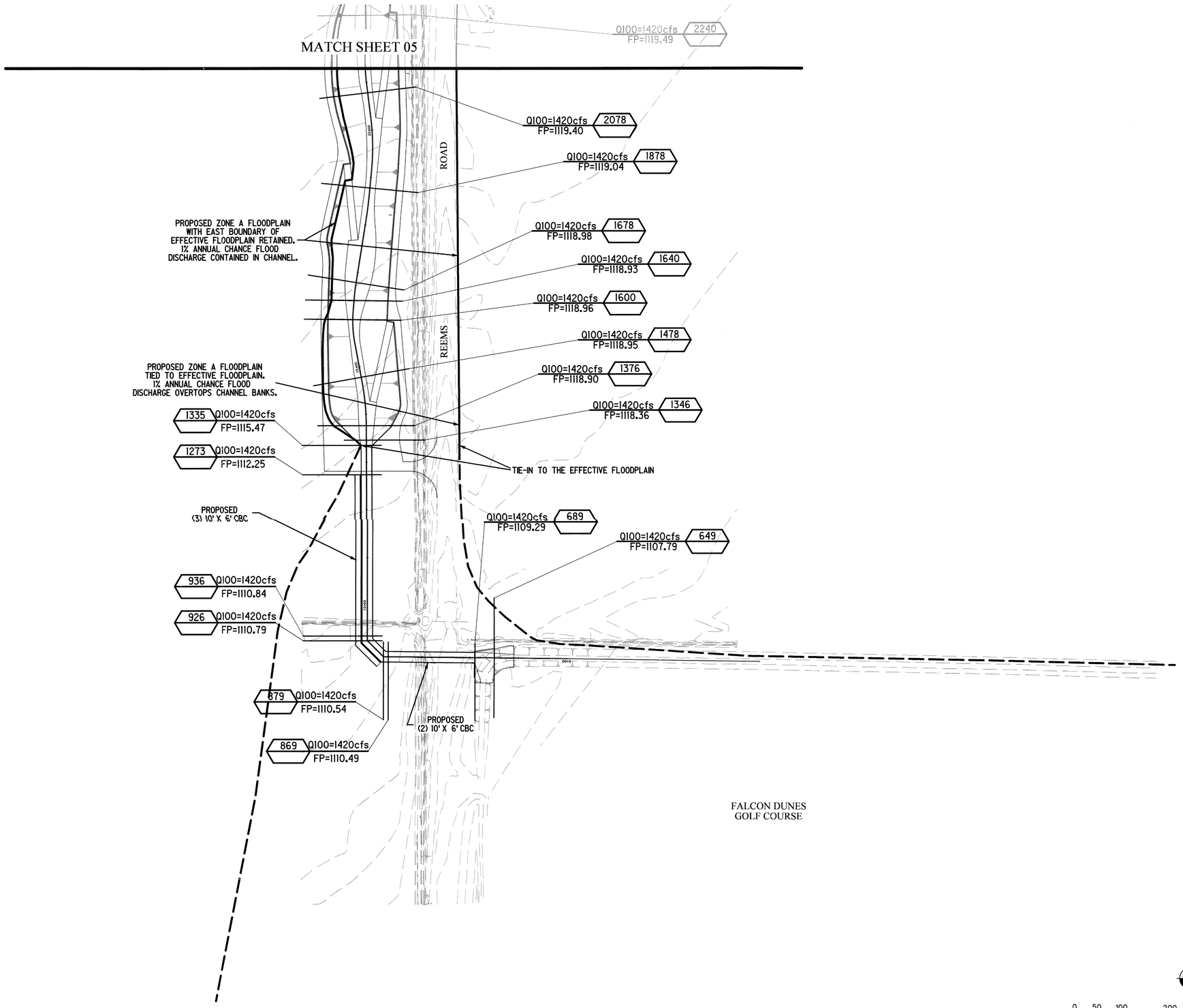
EXPIRES 3/31/2011

0 50 100 200
SCALE: 1"=100'

N

100-YEAR FLOODPLAIN

SHEET 5 OF 6

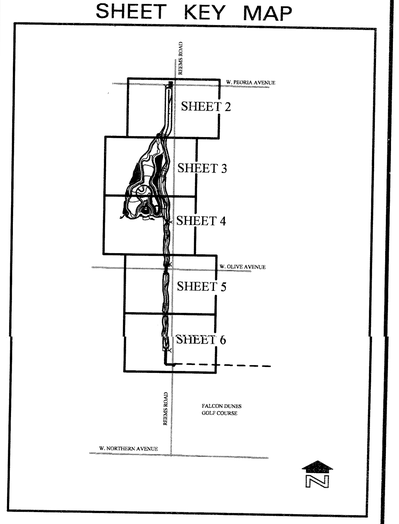


LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147
FEMA EFFECTIVE FLOODPLAIN BOUNDARY	

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

CONTRACT FCD 2007 C016

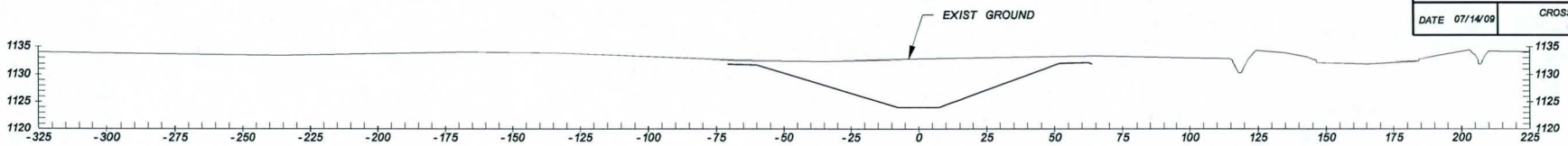
Registered Professional Engineer (Civil) CERTIFICATE NO. 41978 KRISTYN E. VAN METER Date Signed 8/4/09 ARIZONA U.S.A. EXPIRES 3/31/2011

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	08/03/2009
PLANS CHK.	KVM	08/03/2009

100-YEAR FLOODPLAIN

SHEET 6 OF 6

REEMS ROAD CHANNEL AND BASIN		DRAWING NO. XS1
DATE 07/14/09	CROSS SECTIONS SHEET	SHEET 57 OF 59



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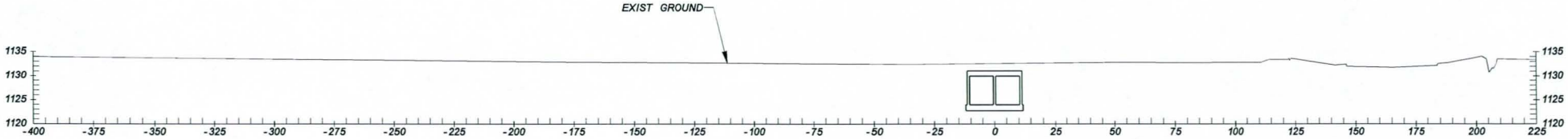

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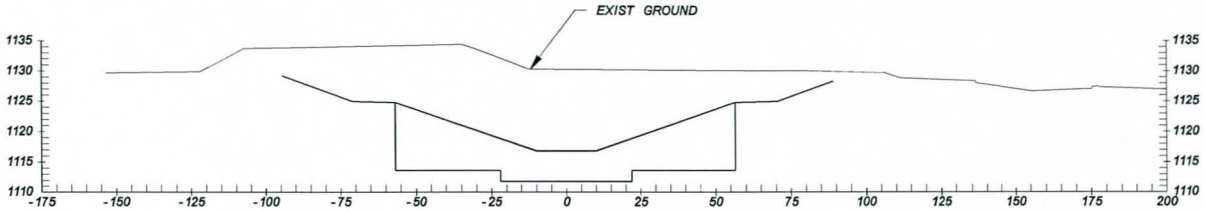
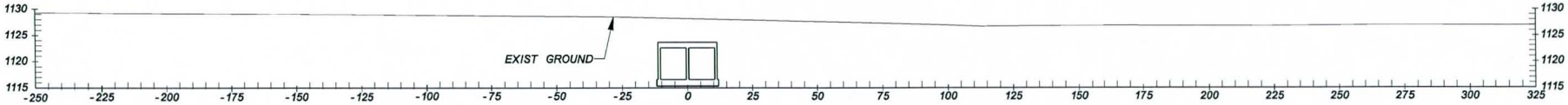
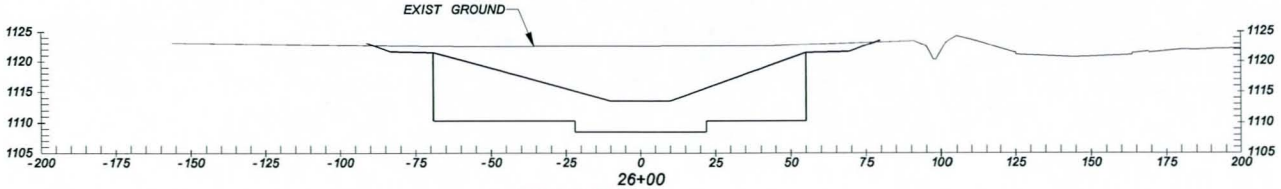


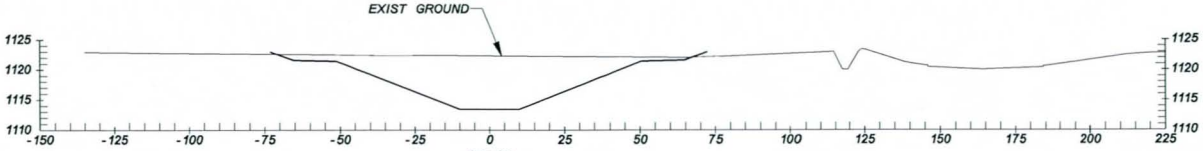
38+50



36+35



26+00



24+00

SCALE:
1" = 20' H
1" = 10' V

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

May 27, 2009

Ms. Kristyne E. Van Meter, P.E.
Hoskin-Ryan Consultants, Inc.
201 West Indian School Road
Phoenix, AZ 85013

IN REPLY REFER TO:
Case No.: 09-09-1350R
Communities: City of Surprise, City of Glendale and Maricopa County, AZ
Community Nos.: 040053, 040045 and 040037

316-AD

Dear Ms. Van Meter:

This is in regard to your request dated April 11, 2008, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a conditional revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Reems Road Channel
Flooding Source:	Reems Road Channel
FIRM Panel(s) Affected:	04013C1585 H, and 1595 H

The data required to complete our review, which must be submitted within 90 days of the date of this letter, are listed on the enclosed summary.

If we do not receive the required data within 90 days, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures, including the flat review and processing fee for requests of this type established by the current fee schedule. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register,* is enclosed for your information.

FEMA receives a very large volume of requests and cannot maintain inactive requests for an indefinite period of time. Therefore, we are unable to grant extensions for the submission of required data/fee for revision requests. If a requester is informed by letter that additional data are required to complete our review of a request, the data/fee **must** be submitted within 90 days of the date of the letter. Any fees already paid will be forfeited for any request for which the requested data are not received within 90 days.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627). If you

have specific questions concerning your request, please contact Mounir Boudjemaa, M.S., at mounir.boudjemaa@mapmodteam.com or at (703) 317-6295.

Sincerely,

Syed Qayum

Syed Qayum, CFM
National LOMR Technical Manager
Michael Baker Jr., Inc.

Enclosures

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

Summary of Additional Data Required to Support a
Conditional Letter of Map Revision

Case No.: 09-09-1350R

Requester: Ms. Kristyne E. Van Meter, P.E.

Communities: City of Surprise, City of Glendale and Maricopa County, AZ

Community Nos.: 040053, 040045 and 040037

The issue below must be addressed before we can continue the review of your request.

The submitted application did not include a pre-project conditions hydraulic model. The pre-project conditions model should reflect any modifications that have occurred within the floodplain since the date of the effective model, but prior to 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. Please submit a pre-project conditions hydraulic model for Reems Road Channel. Please provide paper and digital copies of the input and output files for this model.

Please send the required data and/or fee directly to us at the address shown at the bottom of this page. For identification purposes, please include the case number referenced above on all correspondence.

3601 Eisenhower Avenue, Alexandria, VA 22304-6425 PH:1-877-FEMA MAP FX: 703.960.9125

The Mapping on Demand Team, under contract with the Federal Emergency Management Agency, is the National Service Provider for the National Flood Insurance Program

Federal Emergency Management Agency

Washington, D.C. 20472

FEE SCHEDULE FOR PROCESSING REQUESTS FOR MAP CHANGES

This notice contains the fee schedule for processing certain types of requests for changes to National Flood Insurance Program (NFIP) maps. The fee schedule allows FEMA to further reduce the expenses to the NFIP by more fully recovering the costs associated with processing conditional and final map change requests. The fee schedule for map changes is effective for all requests dated October 1, 2007, or later and supersedes the fee schedule that was established on October 30, 2005.

To develop the fee schedule for conditional and final map change requests, FEMA evaluated the actual costs of reviewing and processing requests for Conditional Letters of Map Amendment (CLOMAs), Conditional Letters of Map Revision – Based on Fill (CLOMR-Fs), Conditional Letters of Map Revision (CLOMRs), Letters of Map Revision – Based on Fill (LOMR-Fs), and Letters of Map Revision (LOMRs).

Based on our review of actual cost data for Fiscal Years 2005 and 2006, FEMA has maintained the following review and processing fees, which are to be submitted with all requests that are not otherwise exempted under 44 CFR 72.5.

Fee Schedule for Requests for CLOMAs, CLOMR-Fs, and LOMR-Fs

Request for single-lot/single-structure CLOMA and CLOMR-F	$500
Request for single-lot/single structure LOMR-F	$425
Request for single-lot/single-structure LOMR-F based on as-built information (CLOMR-F previously issued by FEMA)	$325
Request for multiple-lot/multiple-structure CLOMA	$700
Request for multiple-lot/multiple-structure CLOMR-F and LOMR-F	$800
Request for multiple-lot/multiple-structure LOMR-F based on as-built information (CLOMR-F previously issued by FEMA)	$700

Based on our review of actual cost data for Fiscal Years 2005 and 2006, FEMA has established the following review and processing fees, which are to be submitted with all requests that are not otherwise exempted.

Fee Schedule for Requests for CLOMRs

Request based on new hydrology, bridge, culvert, channel, or combination of any of these	$4,400
Request based on levee, berm, or other structural measure	$5,500

Fee Schedule for Requests for Map Revisions

Requesters must submit the review and processing fees shown below with requests for LOMRs that are not based on structural measures or alluvial fans.

Request based on bridge, culvert, channel, or combination of these	$4,800
Request based on levee, berm, or other structural measure	$6,500
Request based on as-built information submitted as follow-up to CLOMR	$4,800

Fees for CLOMRs, LOMRs, and PMRs Based on Structural Measures on Alluvial Fans

FEMA has maintained the initial fee for requests for CLOMRs and LOMRs based on structural measures on alluvial fans to $5,600. FEMA will also continue to recover the remainder of the review and processing costs by invoicing the requester before issuing a determination letter, consistent with current practice. The prevailing private-sector labor rate charged to FEMA ($60 per hour) will be used to calculate the total reimbursable fees.

Payment Submission Requirements

Requesters must make fee payments for non-exempt requests before we render services. This payment must be in the form of a check or money order or by credit card payment. Please make all checks and money orders in U.S. funds payable to the *National Flood Insurance Program*. FEMA will deposit all fees collected to the National Flood Insurance Fund, which is the source of funding for providing these services.

Flood Control District
of Maricopa County

Board of Directors
Fulton Brock, District 1
Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, District 4
Mary Rose Wilcox, District 5

www.fcd.maricopa.gov

2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601
TT: 602-505-5897

March 24, 2009

FEMA National Service Provider
3601 Eisenhower Avenue
Alexandria, VA 22304-6425

Attn: Mr. Mounir Boudjemaa

Re: Conditional Letter of Map Revision (CLOMR) Request
For Reems Rd. Channel and Basin (Contract No. FCD2007C016)

Dear Mr. Boudjemaa:

Submitted with this letter is a Technical Data Notebook containing completed application forms and appropriate supporting information for a CLOMR request for the following:

Communities: Unincorporated Maricopa County,
City of Glendale,
and City of Surprise, Arizona

Community Numbers: 040037, 040045, and 040053

Flooding Sources: Reems Road Channel

FIRM Panels Affected: 1585 H (09-30-1995) 1595 H (09-30-1995)

This submittal requests that FEMA conditionally revise the existing Zone A for approximately 1 ½ miles along Reems Road based upon the future completion of a channel and off-line basin intended to reduce flood hazards along Reems Road. Please send an invoice for any review fee, if required, to me at the above address.

The Flood Control District looks forward to your approval of this request. If additional information is required, please contact me at (602) 506-6726.

Sincerely,

Mark Mayer
Senior Civil Engineer

Enclosure

Copy to: Mr. Brian Cosson, State Coordinator, NFIP
Arizona Department of Water Resources
3550 N. Central Ave., 2nd Floor
Phoenix, Arizona 85012-2105

Mr. Ed Curtis, Sr. Civil Engineer
Risk Analysis Branch
Mitigation Division
DHS-FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607

Mr. Max Yuan, P.E., Project Engineer
Hazards Study Branch, Mitigation Directorate
Federal Emergency Management Agency
500 C St. SW
Washington, D.C. 20472-001

CONDITIONAL LETTER OF MAP REVISION REQUEST
FOR REEMS RD CHANNEL AND BASIN
MARICOPA COUNTY, ARIZONA

TECHNICAL DATA NOTEBOOK
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CONDITIONAL LETTER OF MAP REVISION REQUEST
FOR REEMS RD CHANNEL AND BASIN
MARICOPA COUNTY, ARIZONA

TECHNICAL DATA NOTEBOOK
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7.4 Flood Profiles....21
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Appendices

A References
B General Documentation & Correspondence
~~*Note: There is no additional general documentation or correspondence for this study.*~~ (m²)
C Survey Field Notes
Note: No survey was performed as part of this study.
D Hydrologic Analysis Supporting Documentation
E Hydraulic Analysis Supporting Documentation
F Erosion and Sediment Transport Analysis Supporting Documentation
Note: Not covered under the scope of this study.

Data CD

HEC-1 Hydrologic Model
HEC-RAS Steady Flow Model
HEC-RAS Unsteady Flow Model

Registered Professional Engineer (Civil)
CERTIFICATE NO.
41978
KRISTYN E.
VAN METER
Date Signed 12/11/08
ARIZONA, U.S.A.
EXPIRES 3/31/2011

1 Introduction

Hoskin•Ryan Consultants, Inc. (HRC), has been contracted by the Flood Control District of Maricopa County (District) to prepare a Conditional Letter of Map Revision (CLOMR) submittal package for the Reems Road Channel and Basin improvement project between Peoria Avenue and Falcon Dunes Golf Course (Figure 1).

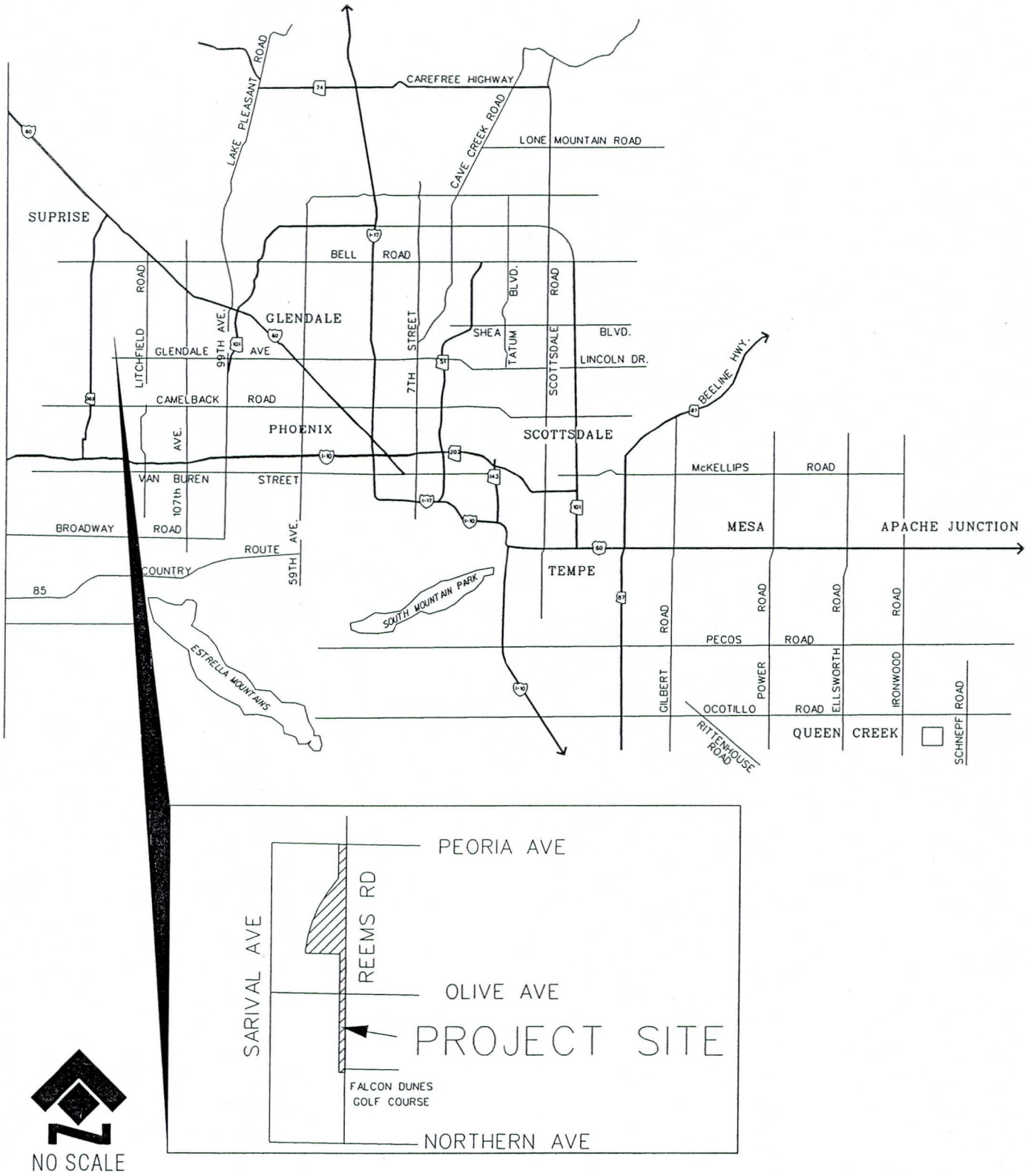
The reach of Reems Road covered by this CLOMR request is currently covered by a FEMA-designated Flood Zone "A" (Figure 2 and Ref. 3). Flow ponds along the west side of Reems Road and within the roadway, between Peoria Avenue and Falcon Dunes Golf Course, ultimately flowing into Falcon Dunes Golf Course. A riprap-lined channel in Greer Ranch, a property north of Peoria Avenue, drains south through box culverts under Peoria Avenue. The box culverts were designed for Greer Ranch by Coe Van Loo (CVL) (Appendix A.2.3) and have been recently installed by the City of Surprise. The District's channel and detention basin project ties into the box culverts and directs the flow south within an improved channel. The purpose of this CLOMR request is to revise the Zone A floodplain based on the District's engineering plans.

1.1 Authority for Study

The District contract number is FCD 2007/C016, with official Notice to Proceed Date of September 5, 2007. The District project manager is Bobbie Ohler, P.E. The Hoskin•Ryan Consultants job number is HRC 07-027-01.

1.2 Location of Study

Reems Road is located in central Maricopa County. The reach of Reems Road covered by this CLOMR request lies between Peoria Avenue and Falcon Dunes Golf Course, adjacent to the west side of Sections 29 and 32, Township 3 North, Range 1 West, of the Gila and Salt River Base and Meridian (Figure 1).



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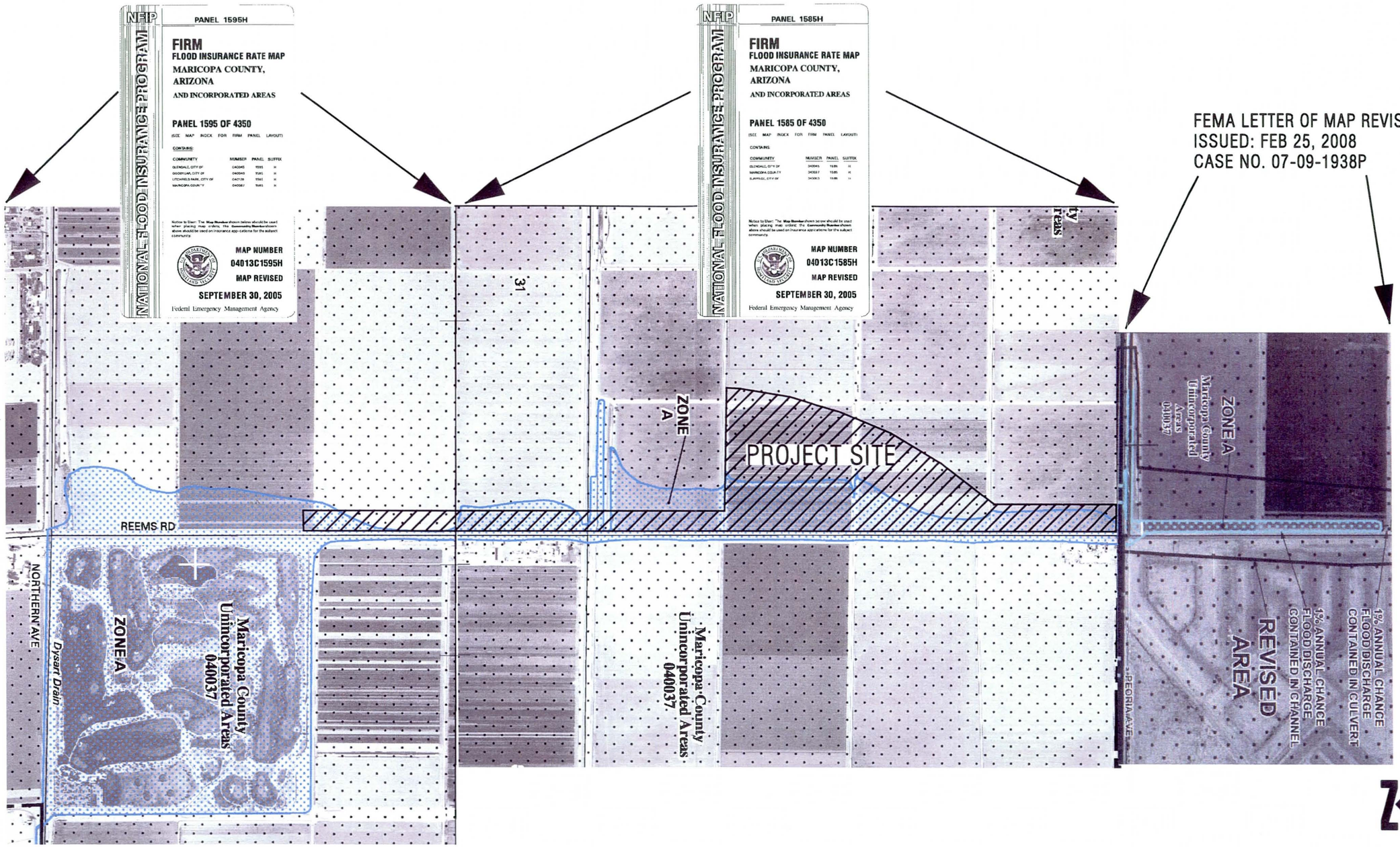
201 W. Indian School Rd., Phoenix, Arizona 85013

REEMS ROAD CHANNEL AND BASIN CLOMR
VICINITY MAP

FIGURE 1

Office: (602) 252-8384 Fax: (602) 252-8385 www.hoskinryan.com

G:\Project 07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\1(Maricopa County).dgn
12/9/2008



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201 West Indian School Road., Phoenix, Arizona 85013-3203

REEMS ROAD CHANNEL AND BASIN CLOMR

EFFECTIVE FLOOD INSURANCE MAP

FIGURE 2

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1.3 Methodology Summary

Design considerations for the channel and basin are documented in the *Reems Road Channel and Basin 90% Design Report* prepared by the District in September, 2007 (Ref. 6). The channel was designed to direct flow along Reems Road from Peoria Avenue to the Falcon Dunes Golf Course. A large detention basin designed to reduce the peak flow in the channel is connected to the channel by a weir and a culvert.

The current effective hydrologic analysis was documented in the Technical Data Notebook for LOMR case #07-09-1938P (Ref. 1 and Appendix A 2.4) prepared by Coe and Van Loo for Greer Ranch, a property immediately north to the site. The District and HRC have corrected the HEC-1 hydrologic modeling for the confluence at the intersection of Peoria Avenue and Reems Road and updated the hydrologic analysis for the proposed conditions with project-in-place.

An unsteady flow HEC-RAS model was developed by the District to obtain the rating curve of the lateral weir designed to divert peak flows from the channel to the detention basin. The rating curve was then updated in the HEC-1 hydrologic modeling to provide information on flow rates in the channel before and after the detention basin.

A steady flow HEC-RAS model was developed by the District and HRC for the floodplain delineation purpose. Cross-section geometries and culvert information were obtained from the construction plans as of August 15, 2008 (Ref. 5). Flow rate information is from the updated HEC-1 hydrologic modeling.

Reems Road Channel and Basin are designed for a future condition under which Loop 303 Channel and Basin, a future project located west to the site, is built and reduces inflows to Reems Road Channel and Basin. Therefore, for the existing condition, the Reems Road Channel and Basin

is under-designed. As indicated by the HEC-RAS output, culverts and portions of the channel do not have sufficient capacity and will be overtopped during the 100-year event.

The proposed Zone A floodplain retains the east boundary of the effective floodplain. The west boundary of the proposed Zone A floodplain is at 100-year water surface elevation along the west side of the proposed channel or tied to the effective floodplain, depending on whether 100-year discharge is contained within the channel. The FEMA effective floodplain was projected west from the elevation of Reems Road (Ref.9, Appendix A.2.1).

The updated HEC-1 and the output of the unsteady and steady HEC-RAS models are provided in the appendices, and electronic copies of HEC-1 and HEC-RAS models are also provided in the data CD. The resulting 100-year floodplain delineation was plotted, as shown on Figure 3 – Annotated FIRM, and the CLOMR Submittal 100-Year Floodplain sheets.

1.4 Acknowledgements

Individuals with HRC responsible for the completion of this project include Paul Hoskin, PE, Project Manager; Kristyn Van Meter, PE, Project Engineer; and Peng Zhang, EIT, Project Hydrologist.

2 Study Documentation Abstract and FEMA Forms

2.1: Study Documentation Abstract for FEMA Submittals		Initial Study		Restudy		CLOMR	X	LOMR		Other	
2.1.1	Date Study Accepted										
2.1.2	Study Contractor	Hoskin-Ryan Consultants, Inc.									
	Contact(s)	Paul Hoskin, PE; Kristyn Van Meter, PE; Peng Zhang, EIT									
	Address	201 W. Indian School Road Phoenix, AZ 85013									
	Phone	(602) 252-8384									
	Internal Ref. No.	HRC 07-027-01; FCD 2007 C016									
	Subcontractors w/ Phone										
2.1.3	FEMA Technical Review Contractor	FEMA National Service Provider									
	Contact(s)										
	Address	3601 Eisenhower Ave Alexandria, VA 22304-6425									
	Phone										
	Internal Ref. No.										
2.1.4	FEMA Regional Reviewer										
	Phone										
2.1.5	State Technical Reviewer										
	Phone										
2.1.6	Local Technical Reviewer	Flood Control District of Maricopa County 2801 W Durango Street Phoenix, AZ 85009									
	Phone	(602)506-1501									
	Internal Ref. No.	2007C016									
2.1.7	Reach Description	Reems Road Channel, between Peoria Avenue and Falcon Dunes Golf Course FIRM 04013C1585H, FIRM 04013C1595H, LOMR case 07-09-1938P									
2.1.8	USGS Quad Sheet(s) with original photo date & latest photo revision date	Waddell, Arizona; 1957; Photo inspected 1975									
2.1.9	Unique Conditions and Problems										
2.1.10	Coordination of Discharges (Agency, Date, Comments)	Peak flows are from the HEC-1 model documented in the LOMR case 07-09-1938P. The HEC-1 model has been updated by the Flood Control District of Maricopa County and HRC.									

FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this 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, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

A. REQUESTED RESPONSE FROM FEMA

This request is for a (check one):

☒ 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, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

B. OVERVIEW

1. 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 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
040037	MARICOPA COUNTY	AZ	04013C	1585H	09/30/05
040037	MARICOPA COUNTY	AZ	04013C	1595H	09/30/05

2. Flooding Source: REEMS RD CHANNEL

3. Project Name/Identifier: REEMS RD CHANNEL

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

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data

☐ Regulatory Floodway Revision ☐ Other (Attach Description)

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following types of flooding and structures (check all that apply)

Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other, Attach Description

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $_____

☒ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for Fee Amounts and Exemptions.

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: MARK MAYER	Company: FLOOD CONTROL DISTRICT OF MARICOPA COUNT	
Mailing Address: 2801 WEST DURANGO STREET PHOENIX, AZ 85009	Daytime Telephone No.: (602)506-1501	Fax No.: (602)506-4601
	E-Mail Address: MKM@MAIL.MARICOPA.GOV	
Signature of Requester (required): Mark Mayer	Date: 3/24/09	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: TIMOTHY S. PHILLIPS, P.E., CHIEF ENGINEER AND GENERAL MANAGER	Community Name: MARICOPA COUNTY	
Mailing Address: 2801 WEST DURANGO STREET PHOENIX, AZ 85009	Daytime Telephone No.: (602)506-1901	Fax No.: (602)506-4601
	E-Mail Address: TSP@MAIL.MARICOPA.GOV	
Community Official's Signature (required): TSP	Date: 3/24/09	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: KRISTYN E. VAN METER, P.E.	License No.: AZ 41978	Expiration Date: 3/31/2011
Company Name: HOSKIN RYAN CONSULTANTS, INC.	Telephone No.: (602)252-8384	Fax No.: (602)252-8385
Signature: Kristyn Van Meter		Date: 1/27/09

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if ...
☐ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this 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, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

A. REQUESTED RESPONSE FROM FEMA

This request is for a (check one):

☒ 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, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

B. OVERVIEW

1. 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	City of Katy	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040045	CITY OF GLENDALE	AZ	04013C	1585H	09/30/05
040045	CITY OF GLENDALE	AZ	04013C	1595H	09/30/05

2. Flooding Source: REEMS RD CHANNEL

3. Project Name/Identifier: REEMS RD CHANNEL

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

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data

☐ Regulatory Floodway Revision ☐ Other (Attach Description)

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following types of flooding and structures (check all that apply)

Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other, Attach Description

C. REVIEW FEE

Has the review fee for the appropriate request category been included? ☐ Yes Fee amount: $_____

☒ No, Attach Explanation

Please see the DHS-FEMA Web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm **for Fee Amounts and Exemptions.**

D. SIGNATURE

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: MARK MAYER	Company: FLOOD CONTROL DISTRICT OF MARICOPA COUNT	
Mailing Address: 2801 WEST DURANGO STREET PHOENIX, AZ 85009	Daytime Telephone No.: (602)506-1501	Fax No.: (602)506-4601
	E-Mail Address: MKM@MAIL.MARICOPA.GOV	
Signature of Requester (required): Mark Mayer	Date: 3/17/09	

As the community official responsible for floodplain management, I hereby acknowledge that we have received and reviewed this Letter of Map Revision (LOMR) or conditional LOMR request. Based upon the community's review, we find the completed or proposed project meets or is designed to meet all of the community floodplain management requirements, including the requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: LARRY BROYLES, CITY ENGINEER	Community Name: CITY OF GLENDALE	
Mailing Address: 5850 W GLENDALE AVE, 3RD FLOOR GLENDALE, AZ 85301	Daytime Telephone No.: (623)930-3653	Fax No.:
	E-Mail Address: LBROYLES@GLENDALEAZ.COM	
Community Official's Signature (required): Larry J. Broyles	Date: 2-26-09	

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

This certification is to be signed and sealed by a licensed land surveyor, registered professional engineer, or architect authorized by law to certify elevation information data, hydrologic and hydraulic analysis, and any other supporting information as per NFIP regulations paragraph 65.2(b) and as described in the MT-2 Forms Instructions. All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Certifier's Name: KRISTYN E. VAN METER, P.E.	License No.: AZ 41978	Expiration Date: 3/31/2011
Company Name: HOSKIN RYAN CONSULTANTS, INC.	Telephone No.: (602)252-8384	Fax No.: (602)252-8385
Signature:		Date: 1/27/2009

Ensure the forms that are appropriate to your revision request are included in your submittal.

Form Name and (Number)	Required if ...
☐ Riverine Hydrology and Hydraulics Form (Form 2)	New or revised discharges or water-surface elevations
☐ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans

Seal (Optional)

FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK BURDEN DISCLOSURE NOTICE

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A. REQUESTED RESPONSE FROM FEMA

This request is for a (check one):

☒ 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, regulatory floodway or flood elevations. (See Parts 60 & 65 of the NFIP Regulations.)

B. OVERVIEW

1. 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	City of Katy	TX	480301	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040053	CITY OF SURPRISE	AZ	04013C	1585H	09/30/05

2. Flooding Source: REEMS RD CHANNEL

3. Project Name/Identifier: REEMS RD CHANNEL

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

5. Basis for Request and Type of Revision:

a. The basis for this revision request is (check all that apply)

☒ Physical Change ☐ Improved Methodology/Data

☐ Regulatory Floodway Revision ☐ Other (Attach Description)

Note: A photograph and narrative description of the area of concern is not required, but is very helpful during review.

b. The area of revision encompasses the following types of flooding and structures (check all that apply)

Types of Flooding: ☒ Riverine ☐ Coastal ☐ Shallow Flooding (e.g., Zones AO and AH)

☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

Structures: ☒ Channelization ☐ Levee/Floodwall ☒ Bridge/Culvert

☐ Dam ☐ Fill ☐ Other, Attach Description

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this 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, SW, Washington DC 20472, Paperwork Reduction Project (3067-0148). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: REEMS RD CHANNEL
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

☐ Not revised (skip to section 2) ☐ No existing analysis ☐ Improved data
☐ Alternative methodology ☒ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	FIS (cfs)	Revised (cfs)
Reems (South of Peoria)	22.84		
Reems (South of Olive)	25.34		

3. Methodology for New Hydrologic Analysis (check all that apply)

☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model HEC-1 [TR-20, HEC-1, HEC-HMS etc.]
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis. The document, "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transp ort considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	OUTLET TO FALCON DUNES GOLF COURSE	RS 649	N/A	N/A
Upstream Limit	PEORIA AVENUE	RS 9168	N/A	N/A

2. Hydraulic Method Used

Hydraulic Analysis HEC-RAS [HEC-2 , HEC-RAS, Other (Attach description)]

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. These tools do not replace engineering judgment. CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/fhm/frm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. If you disagree with a message, please attach an explanation of why the message is not valid in this case. Review of your submittal and resolution of valid modeling discrepancies will result in reduced review time.

HEC-2/HEC-RAS models reviewed with CHECK-2/CHECK-RAS? ☒ Yes ☐ No

4. Models Submitted

Duplicate Effective Model*	Natural File Name:	Floodway File Name:
Corrected Effective Model*	Natural File Name:	Floodway File Name:
Existing or Pre-Project Conditions Model	Natural File Name:	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name: ReemsCLOMR.prj	Floodway File Name:
Other - (attach description)	Natural File Name:	Floodway File Name:

*Not required for revisions to approximate 1%-annual-chance floodplains (Zone A) – for details, refer to the corresponding section of the instructions.

The document "Numerical Models Accepted by FEMA for NFIP Usage" lists the models accepted by FEMA. This document can be found at: http://www.fema.gov/fhm/en_modl.shtm.

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM,** annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

D. COMMON REGULATORY REQUIREMENTS

1. For CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No

For CLOMR requests, if either of the following is true, please submit evidence of compliance with Section 65.12 of the NFIP regulations:
- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
- The proposed project encroaches upon a SFHA with BFEs established and would result in increases above 1.00 foot.

2. Does the request involve the placement or proposed placement of fill? ☐ Yes ☒ No

If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.

3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☐ No

If Yes, attach evidence of regulatory floodway revision notification. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)

4. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☐ No

If Yes, please attach proof of property owner notification and acceptance (if available). Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
Expires September 30, 2005

PAPERWORK REDUCTION ACT

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Flooding Source: REEMS RD CHANNEL
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization.....complete Section B
Bridge/Culvert.....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

1. **Name of Structure: Reems Road Channel**

   Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Along the West side of Reems Road, between Peoria Avenue and the Falcon Dunes Golf Course

   Downstream Limit/Cross Section: Falcon Dunes Golf Course / RS 649

   Upstream Limit/Cross Section: Peoria Avenue / RS 8890

2. **Name of Structure: (2) 10' x 6' CBC at Sta 6+89.68**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Under Reems Rd, Sta 6+89.68 to Sta 13+35

   Downstream Limit/Cross Section: Sta 6+89.68 / RS 649

   Upstream Limit/Cross Section: Sta 13+35 / RS 1346

3. **Name of Structure: (2) 10' x 6' CBC at Sta 23+00.56**

   Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Sta 23+00.56 to Sta 23+60.56

   Downstream Limit/Cross Section: Sta 23+00.56 / RS 2300

   Upstream Limit/Cross Section: Sta 23+60.56 / RS 2370

NOTE: For more structures, attach additional pages as needed.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
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Flooding Source: REEMS RD CHANNEL
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization.....complete Section B
Bridge/Culvert.....complete Section C
Dam .....complete Section D
Levee/Floodwall .....complete Section E
Sediment Transport.....complete Section F (if required)

Description Of Structure

1. **Name of Structure: (2) 10' x 6' CBC at Sta 35+36.43**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Under Olive Ave; Sta 35+36.43 to Sta 37+28.43

   Downstream Limit/Cross Section: Sta 35+36.43 / RS 3535

   Upstream Limit/Cross Section: Sta 37+28.43 / RS 3735

2. **Name of Structure: (2) 10' x 6' CBC at Sta 49+56.46**

   Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Sta 49+56.46 to Sta 50+16.46

   Downstream Limit/Cross Section: Sta 49+56.46 / RS 4955

   Upstream Limit/Cross Section: Sta 50+16.46 / RS 5025

3. **Name of Structure: (6) 10' x 4' CBC at Sta 88+96.25**

   Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam

   Location of Structure: Sta 88+96.25 to Sta 90+38.25

   Downstream Limit/Cross Section: Sta 88+96.25 / RS8890

   Upstream Limit/Cross Section: Sta 90+38.25 / RS 9082

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source: REEMS RD CHANNEL

Name of Structure: Reems Road Channel

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☒ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 1640 (cfs) and/or the 100-year flood.

The design elevation in the channel is based on (check one):

☒ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

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

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☒ Other locations (specify): Inside of two 10'X6' CBC at Sta 6+89.68

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: REEMS RD CHANNEL

Name of Structure: (2) 10' x 6' CBC at Sta 6+89.68

1. This revision reflects (check one):

- ☒ 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

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☒ Erosion Protection
- ☐ 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
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

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

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

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

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: REEMS RD CHANNEL

Name of Structure: (2) 10' x 6' CBC at Sta 23+00.56

1. This revision reflects (check one):

- ☒ 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

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☐ Distances Between Cross Sections
- ☒ Erosion Protection
- ☐ 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
- ☐ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

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

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

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

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: REEMS RD CHANNEL

Name of Structure: (2) 10' x 6' CBC at Sta 35+36.43

1. This revision reflects (check one):

- ☒ 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

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ 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
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

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

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

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

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: REEMS RD CHANNEL

Name of Structure: (2) 10' x 6' CBC at Sta 49+56.46

1. This revision reflects (check one):

- ☒ 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

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ 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
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

- ☐ Levees [Attach Section E (Levee/Floodwall)]
- ☐ Superelevated sections
- ☐ Debris basin/detention basin
- ☐ Other (Describe):
- ☐ Drop structures
- ☐ Transitions in cross sectional geometry
- ☐ Energy dissipator

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

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

The design elevation in the channel is based on (check one):

☐ Subcritical flow ☐ Critical flow ☐ Supercritical flow ☐ Energy grade line

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

☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: REEMS RD CHANNEL

Name of Structure: (6) 10' x 4' CBC at Sta 88+96.25

1. This revision reflects (check one):

- ☒ 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

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS
If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- ☒ Dimensions (height, width, span, radius, length)
- ☒ Shape (culverts only)
- ☒ Material
- ☒ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☐ 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
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

FEMA MT-2 FORMS ATTACHMENT

Form 1, Section C – Review Fee
The fee will be paid upon request.

Form 3, Sections B and C, Number 4 – Sediment Transport Considerations:
Sediment transport was not analyzed for this study. The channel and basin will be maintained by FCDMC on a regular basis so sediment will not impact the hydraulic function of the project.

3 Survey and Mapping Information

No additional survey or mapping was performed as a part of this study. Topographic contours for the channel and basin were provided by the District as part of their improvement plans. Elevations on the District's improvement plans, shown throughout this TDN, are on the NAVD88 Vertical Datum.

4 Hydrology

4.1 Method Description

The project is located in an area covered by the *White Tanks / Agua Fria Area Drainage Master Study* (ADMS) (Ref. 9) and the *Loop 303 / White Tanks Area Drainage Master Plan Update* (ADMSU) (Ref. 8). The current effective floodplain along Reems Road was delineated by the *White Tanks / Agua Fria Area Drainage Master Study* (ADMS) (Ref. 9). In the *White Tanks / Agua Fria ADMS*, the capacities of side swales along Reems Road between Northern Avenue and Cactus Road were identified as not sufficient to convey the 100-year peak flow. The approximate floodplain was based on the elevations of Reems Road and projected west to same elevations. An excerpt related to the floodplain delineation from the *White Tanks / Agua Fria ADMS* is provided in Appendix A.2.1.

In LOMR case #07-09-1938P, a HEC-1 model was taken from the *Loop 303 / White Tanks ADMSU* and revised by David Evans & Associates (DEA) and Coe & Van Loo Consultants (CVL) to reflect detailed hydraulic analysis along Reems Road and Cactus Road. With the approval of LOMR case #07-09-1938P on February 25, 2008, the revised HEC-1 model becomes the current effective hydrologic analysis and provides the best available information. The output of Greer Ranch HEC-1 model was provided in Appendix A 2.4.

4.2 Parameter Estimation

By modifying the HEC-1 model, the District has incorporated the project, Reems Road Channel and Basin, into the HEC-1 model provided by CVL for Greer Ranch. A schematic map for the HEC-1 model updated by the District is provided in Appendix D 3.1. The details of modifications made by the District are given below.

As shown in Appendix 2.4, there was an error in the Greer Ranch HEC-1 model. The concentration point CP165 at the intersection of Peoria Avenue and Reems Road should be a confluence of a flow from north along Reems Road, a flow from west along Peoria Avenue, and a local flow from the drainage sub-basin 165B. However, the Greer Ranch HEC-1 mistakenly set CP165 as a confluence of four flows. The District has corrected this error by turning off one of those hydrograph combination cards, as shown below.

```
* KK 1I165
* KM      ADD HYDROGRAPHS AT CP165
* HC     2   12.53
KK 2I165
KM      ADD HYDROGRAPHS AT CP165
HC     2   15.98
KK CP165
KM      ADD HYDROGRAPHS AT CP165
HC     2   22.84
```

The diversions at Peoria Avenue and Olive Avenue (DI180 and DI193) were updated by the District and HRC. The capacity of (6) 10'X4' box culverts at Peoria Avenue is estimated to be 2800 cfs (Appendix D 5.1), and excess water is diverted to east along Peoria Avenue. The capacity of (2) 10'X6' box culverts at Olive Avenue is 1420 cfs (Appendix D 5.1), and excess water will overtop and flow east along the railroad (Sheet 5 of the *100-Year Floodplain Map*) on Olive Avenue, with a small portion flowing southeast at the railroad crossing at Reems Road. There are two other culvert crossings along the channel (Sta 23+00.56 and Sta 49+56.46),

which will be overtopped by 100-year peak flows. However, diversions are not considered at those two crossings, being consistant with current effective HEC-1 model.

Normal depth routings are adopted for the channel routing from Peoria Avenue to the Detention Basin and from the Detention Basin to the Olive Avenue. Parameters selected for routing are shown in Appendix D3.3.

An unsteady HEC-RAS model was established to route the inflow hydrograph at Peoria Avenue through the channel and basin and simulate the diversion from channel to the detention basin through a lateral weir. The HEC-RAS outputs are provided in Appendix D 6. The diversion results were updated in the HEC-1 model (RMSBSN).

4.3 Problems encountered during the study

No special problems enoutered during the hydrologic study.

4.4 Calibration

No data is available and no calibration for the hydrologic model.

4.5 Final Results

The HEC-1 output is provided in Appendix D 3.4, and peak flows are shown in a figure in Appendix D 3.2. Table 1 summarizes those peak discharges along the channel. The table shows that the flow rates decrease at the weir location, indicating a flow of 1993 cfs overtops to the basin.

Table 1: 100-Year Peak Flow Rates

Location	RS	Q100 (cfs)
Greer Ranch Channel	9168	1845
North of Peoria Avenue	9082	2881
South of Peoria Avenue	8890	2735
Downstream of Spillway to Detention Basin	6807	742
At Detention Basin Weir Outlet	5400	2368
South of Olive Avenue	3535	1420

5 Hydraulics

A steady-flow HEC-RAS model was prepared by the District and modified by HRC for the proposed Reems Road channel. Three cross-sections from the Greer Ranch HEC-RAS model provided by CVL in October 2007 (Appendix A 2.5) were imported into the steady-flow HEC-RAS model as upstream conditions. Box culverts were added to the Peoria Avenue crossing according to the *Greer Ranch Grading and Storm Drains Plan* (Ref. 2).

5.1 Method Description

The effective Zone A floodplain along Reems Road between Peoria and Northern Avenue was delineated by projecting west from Reems Road at the same elevation as Reems Road (Appendix A). There is no effective HEC-RAS model for this section of the floodplain. The steady-flow HEC-RAS model, i.e. the proposed condition model (ReemsCLOMR.prj), provides 100-year water surface elevations for the floodplain delineation. HEC-RAS 4.0 version was used in hydraulic modeling. Downstream boundary condition is set at normal depth with a slope of 0.001 ft/ft.

5.2 Work Study Maps

Sheets 1 through 6 of the 100-Year Floodplain Maps are included in this section.

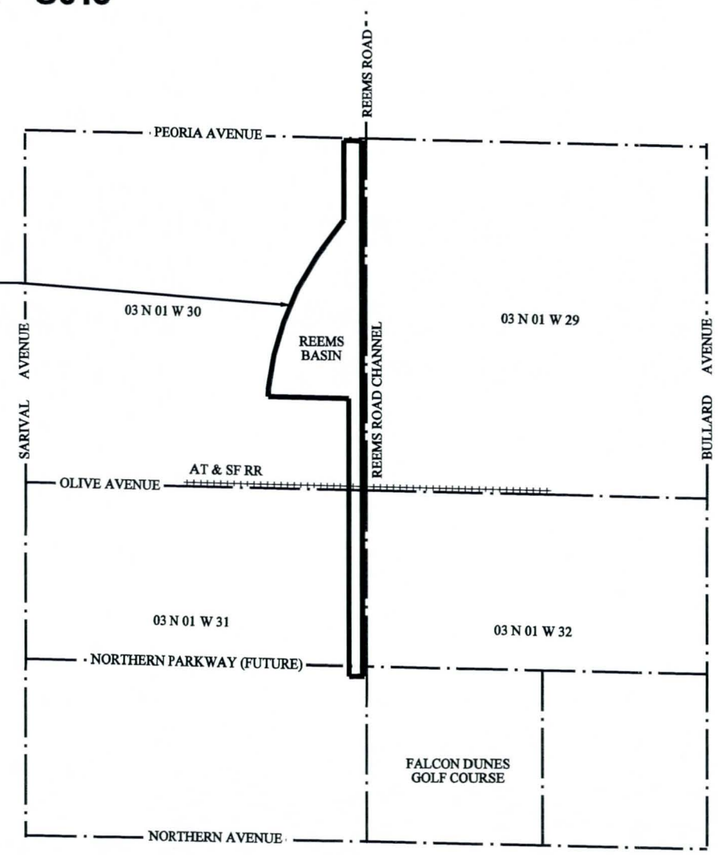
5.3 Parameter Estimation

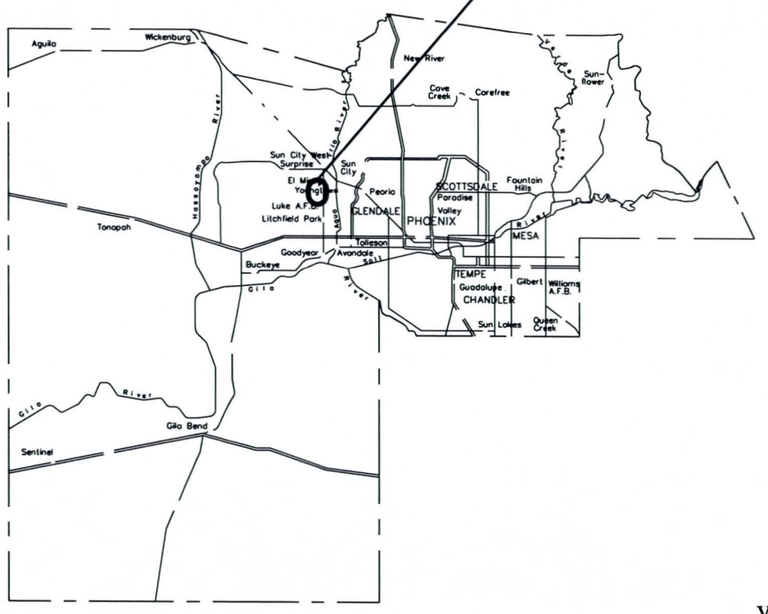
A Manning's roughness coefficient of 0.012 was chosen for the concrete box culverts, 0.035 for grass-lined earthen channel, 0.020 for the concrete channel, and 0.032 for riprap. Two (2) 10' X 6' box culverts crossing the future Northern Parkway were simulated as a series of rectangular cross-sections with lids, from RS 1335 to RS 689. At RS 926 and RS 879, a coefficient of 0.014 was chosen to reflect energy loss at two 45-degree culvert bends. A coefficient of 0.028 was used for the ineffective flow area above the culverts.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN

CONTRACT FCD 2007 C016





VICINITY MAP
NOT TO SCALE

HYDROLOGY/HYDRAULICS

HOSKIN RYAN CONSULTANTS, INC.
201 W. INDIAN SCHOOL ROAD.
PHOENIX, AZ 85013-3203
(602) 252-8384
HRC 07-027-01

TOPOGRAPHIC DATA

GROUND TOPOGRAPHY SURVEY PERFORMED BY PROJECT ENGINEERING CONSULTANTS, 2004.

DATUM

HORIZONTAL COORDINATES SHOWN ARE IN NAD83 STATE PLANE COORDINATES. ELEVATIONS SHOWN ARE NAVD88.

SHEET INDEX

1	COVER SHEET
2-6	100-YR FLOODPLAIN MAPS

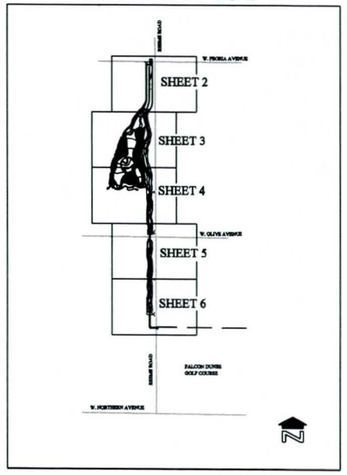
LEGEND

ROAD

PROJECT BOUNDARY

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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Office: (602) 252-8384 Fax: (602) 252-8385 www.hoskinryan.com

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

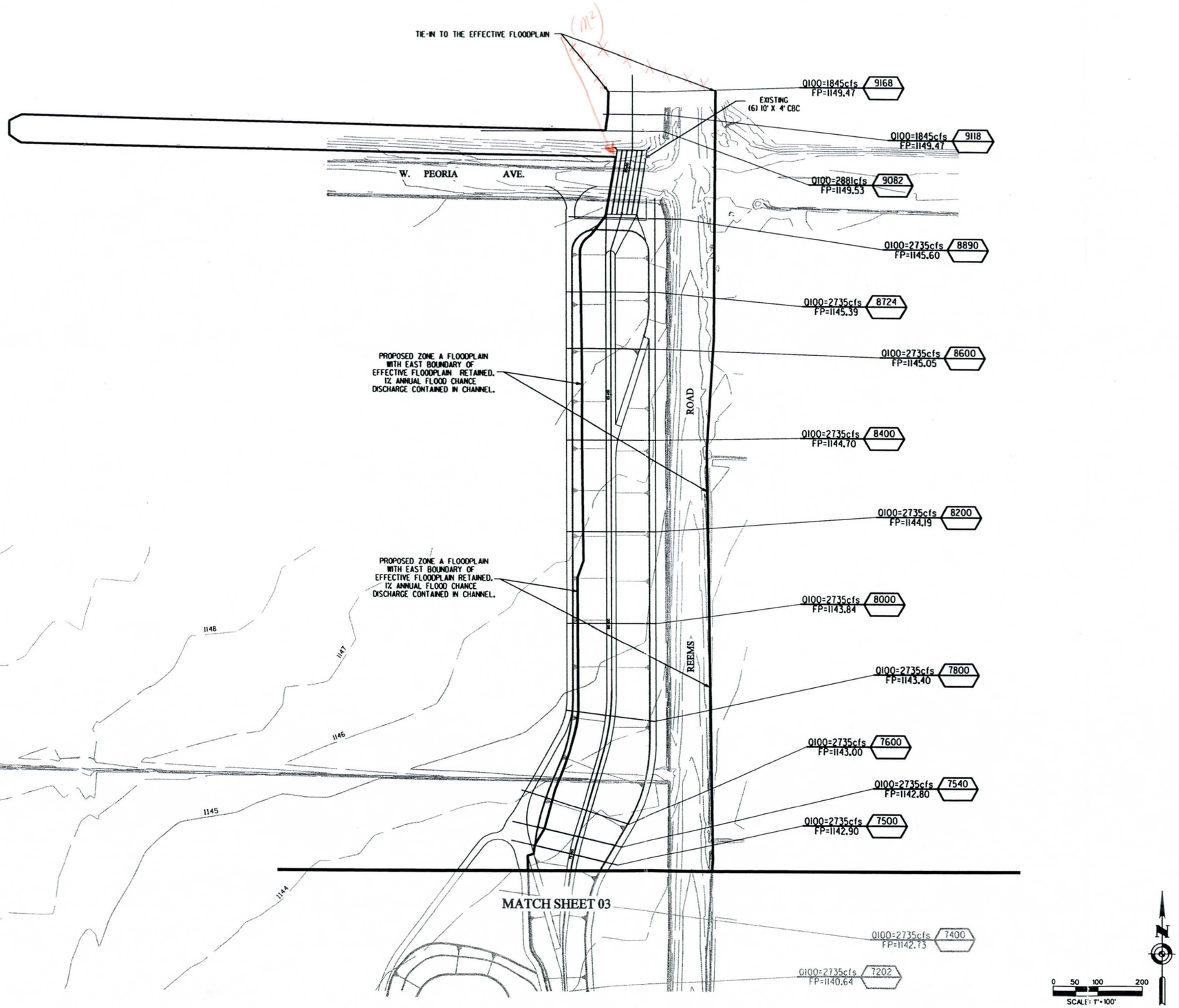
REEMS ROAD CHANNEL AND BASIN
CLOMR SUBMITTAL
CONTRACT FCD 2007 C016

Registered Professional Engineer (Civil) CERTIFICATE NO. 41978 KRISTYN E. VAN METER Date Signed ARIZONA U.S.A.
EXPIRES 3/31/2011

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	12/10/2008
PLANS CHK.	KVM	12/10/2008

100-YEAR FLOODPLAIN

SHEET 1 OF 6

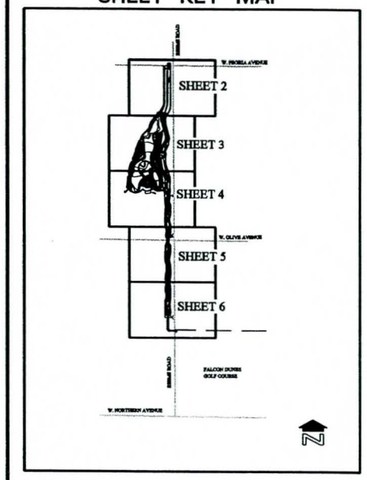


LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

CONTRACT FCD 2007 C016

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EXPIRES 3/31/2011

	BY	DATE
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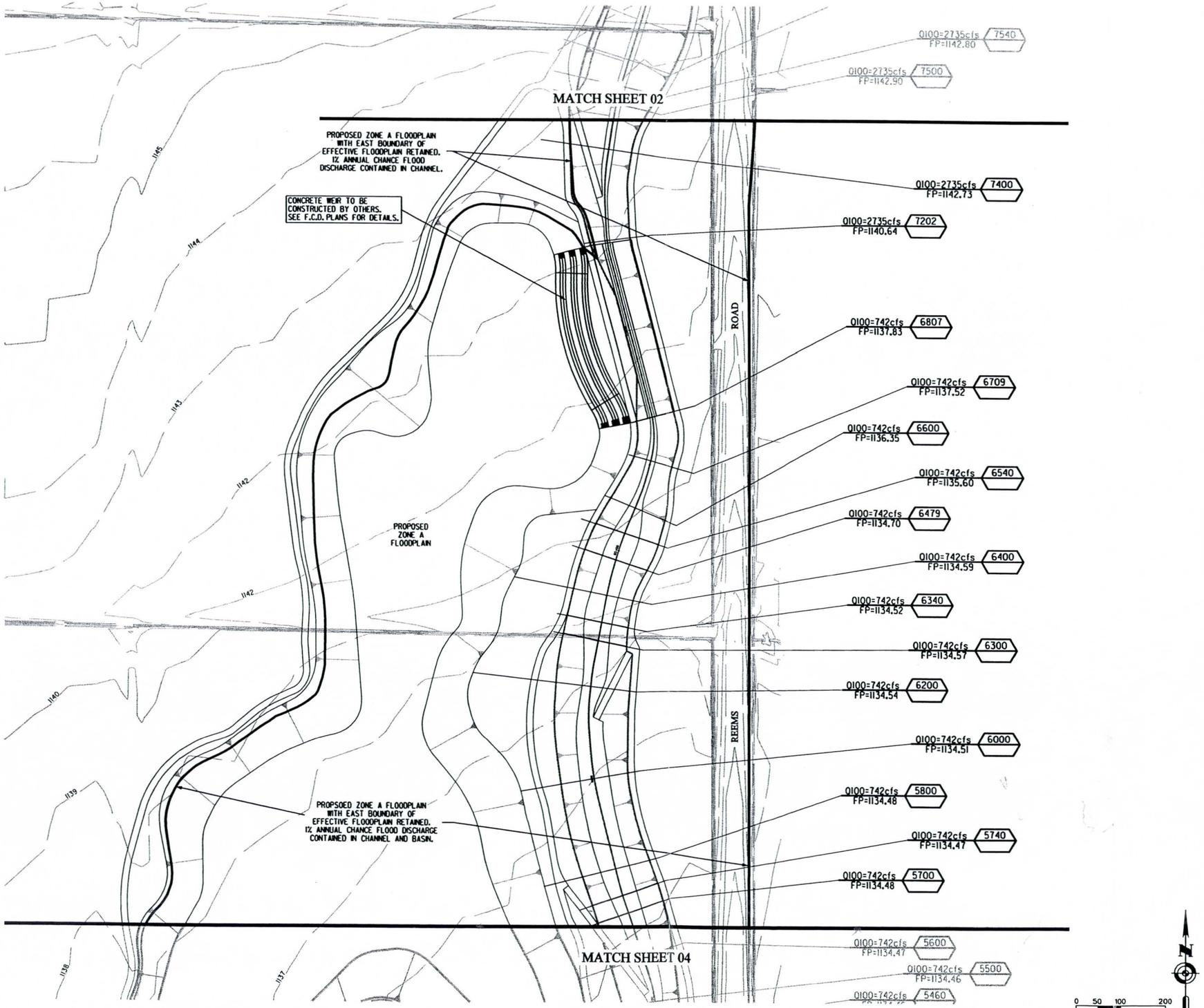
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	12/10/2008
PLANS CHK.	KVM	12/10/2008

100-YEAR FLOODPLAIN

SHEET 2 OF 6

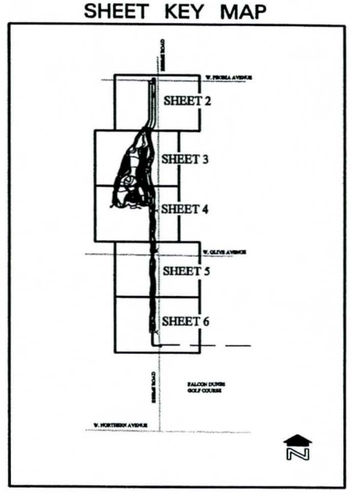


LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147

NOTES

SHEET KEY MAP



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

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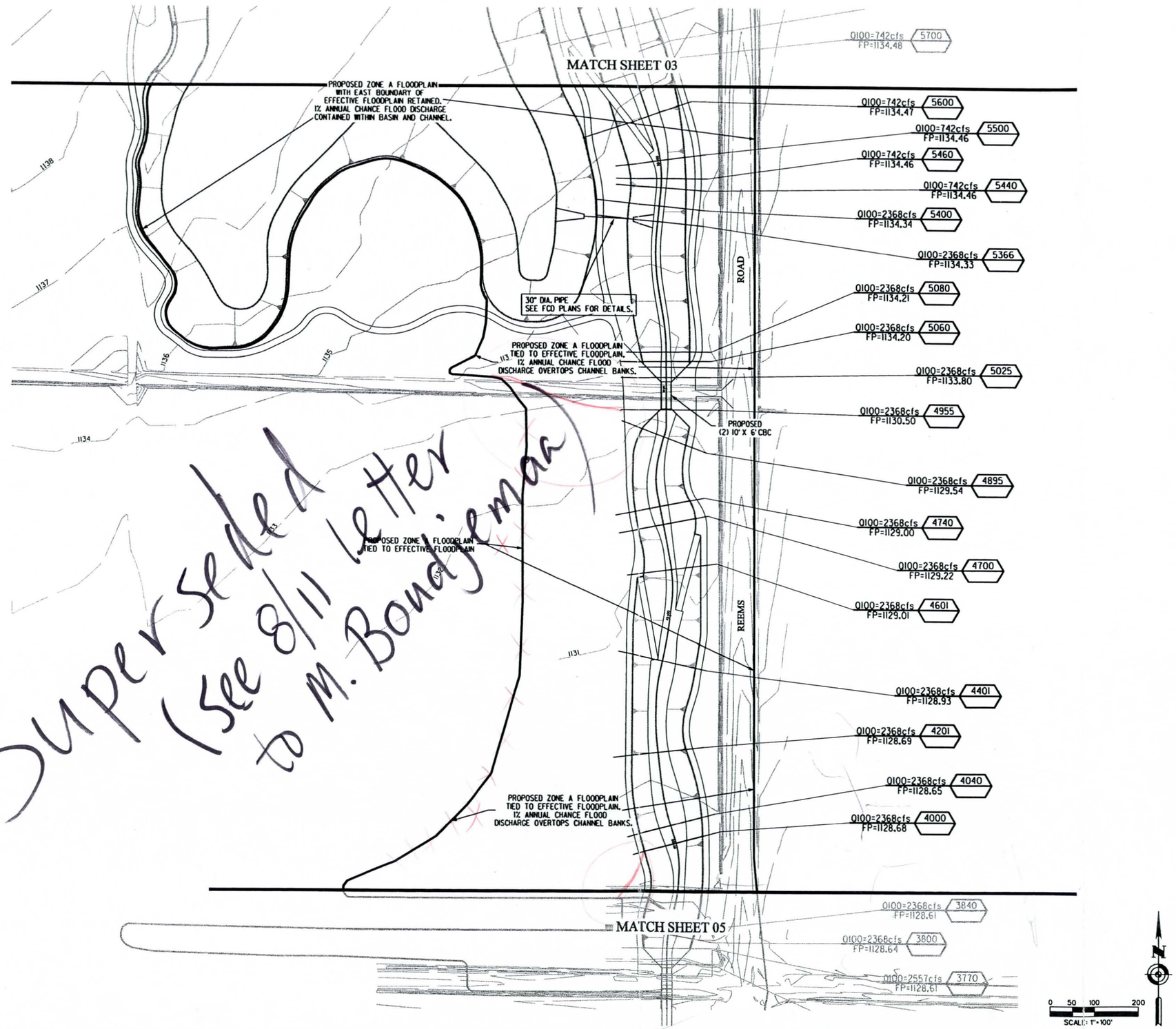
EXPIRES 3/31/2011

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	12/10/2008
PLANS CHK.	KVM	12/10/2008

100-YEAR FLOODPLAIN

SHEET 3 OF 6



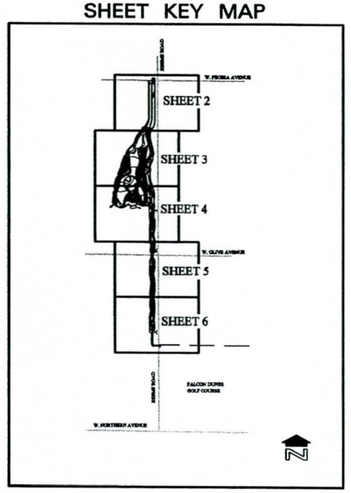
Superseded (see 8/11 letter to M. Bondjemaa)

LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147

NOTES

SHEET KEY MAP



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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

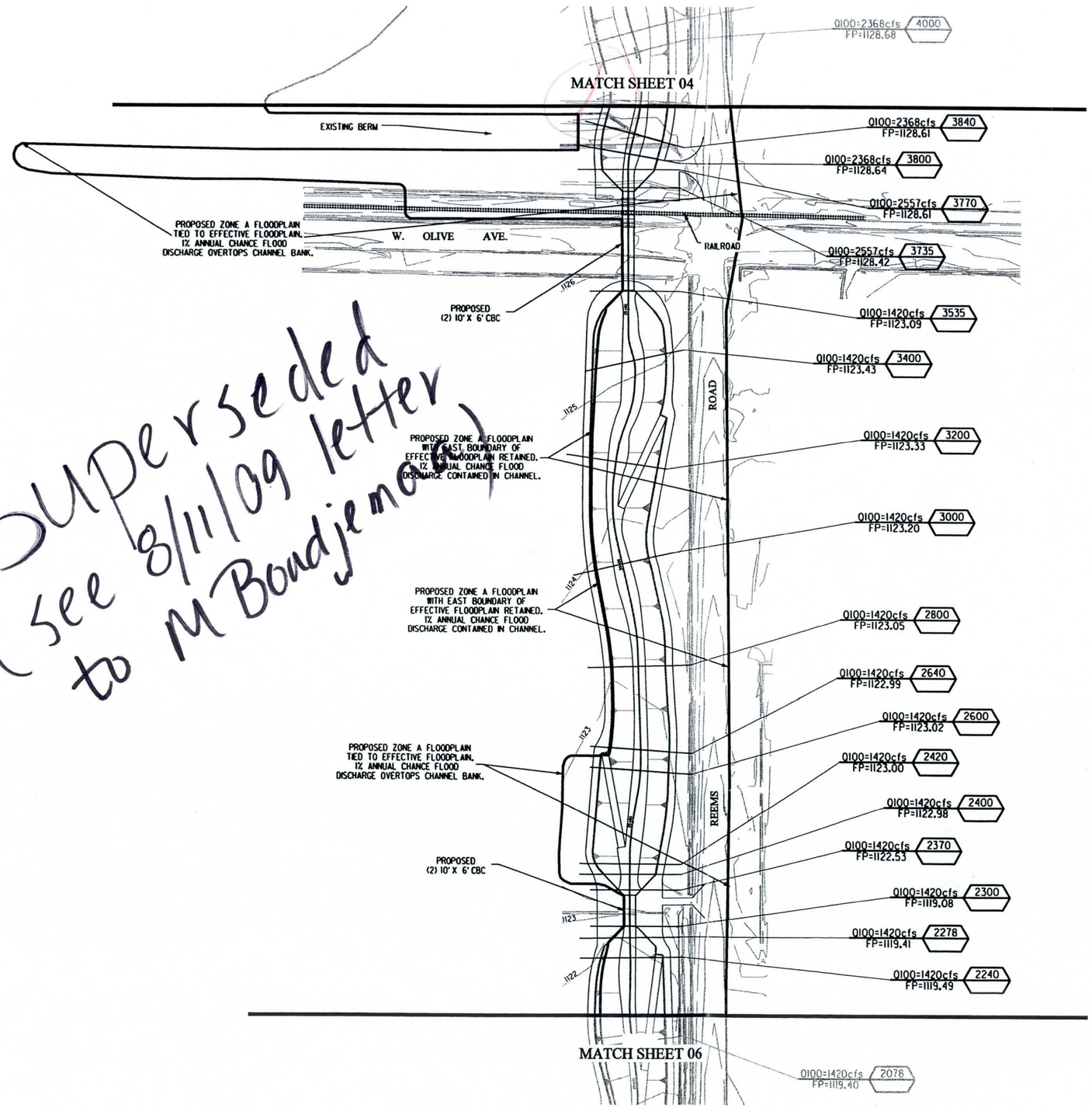
CONTRACT FCD 2007 C016

Registered Professional Engineer (Civil) CERTIFICATE NO. 41978 KRISTYN E. VAN METER Date Signed ARIZONA U.S.A.
EXPIRES 3/31/2011

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	12/10/2008
PLANS CHK.	KVM	12/10/2008

100-YEAR FLOODPLAIN

SHEET 4 OF 6



Superseded (See 8/11/09 letter to M Bondjemo)

LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
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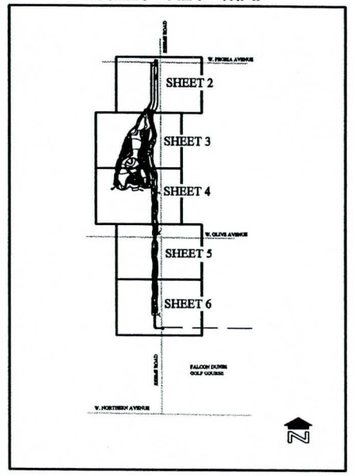
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

REEMS ROAD CHANNEL AND BASIN CLOMR SUBMITTAL

CONTRACT FCD 2007 C016

Registered Professional Engineer (Civil) CERTIFICATE NO. 41978 KRISTYN E. VAN METER Date Signed ARIZONA U.S.A.

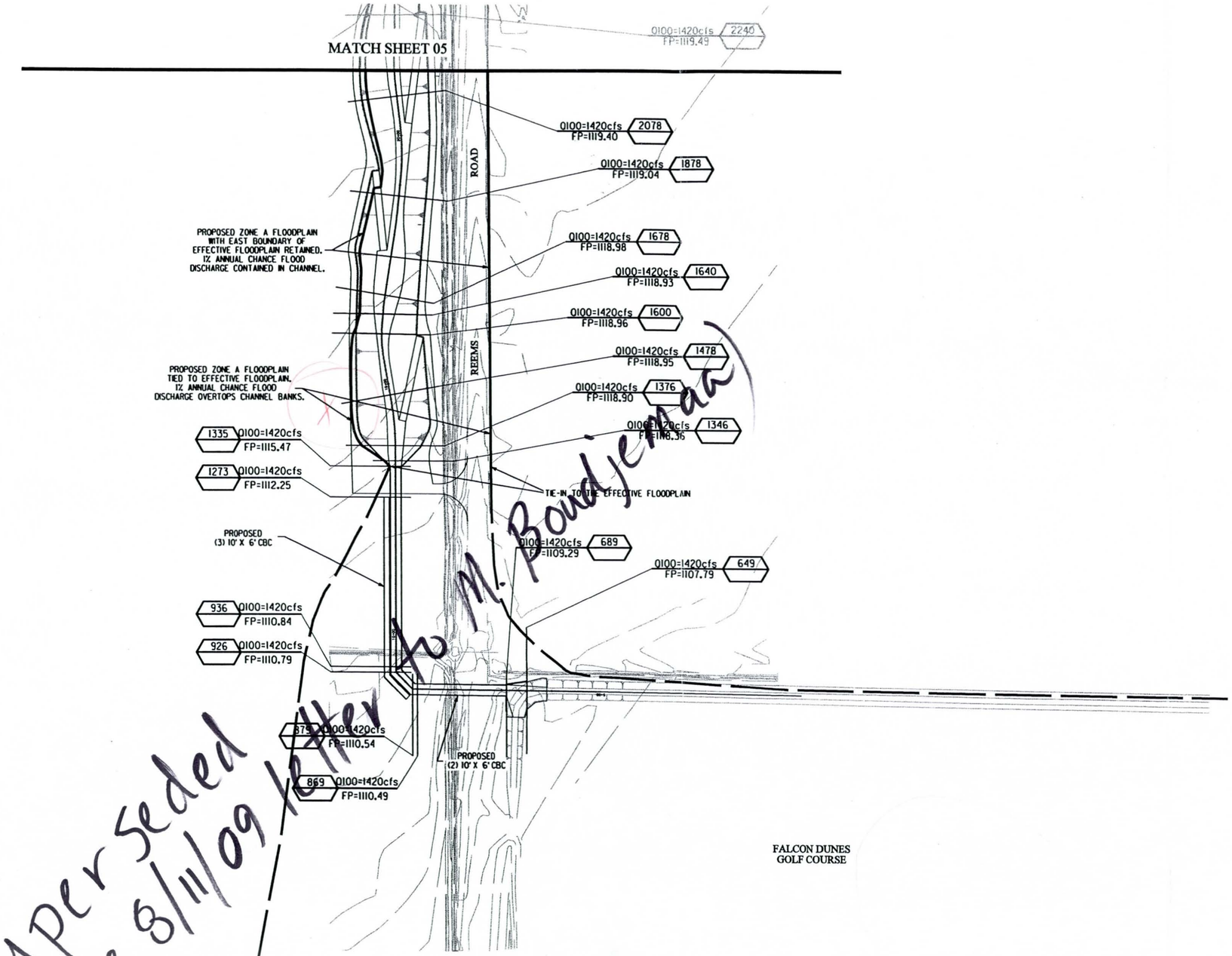
EXPIRES 3/31/2011

	BY	DATE
DESIGN	PZ	12/10/2008
DESIGN CHK.	KVM	12/10/2008
PLANS	PZ	12/10/2008
PLANS CHK.	KVM	12/10/2008

100-YEAR FLOODPLAIN

SHEET 5 OF 6

0 50 100 200
SCALE: 1"=100'

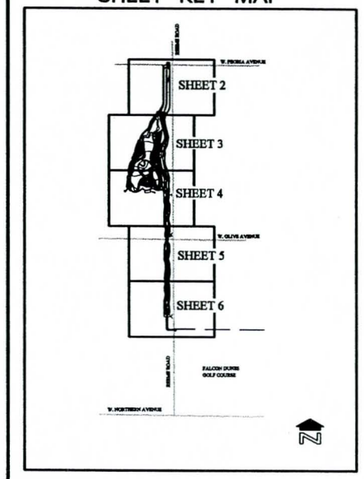


LEGEND

100-YEAR FLOODPLAIN BOUNDARY	
HEC-RAS RIVER STATION, FLOW RATE AND FLOODPLAIN ELEVATION	Q100=1845cfs FP=1149.47 9168
HEC-RAS STATIONING	85+00
HEC-RAS CROSS-SECTION CUT LINE	
EXISTING GROUND	1147
FEMA EFFECTIVE FLOODPLAIN BOUNDARY	

NOTES

SHEET KEY MAP



NO.	REVISION	BY	DATE
2			
1			

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PLANS CHK.	KVM	12/10/2008

100-YEAR FLOODPLAIN

SHEET 6 OF 6

Expansion and contraction coefficients were chosen based on values presented in the FCDMC *Drainage Design Manual for Maricopa County, Volume II – Hydraulics* (Ref. 4). For cross-sections without dramatic contraction or expansion, values of 0.3 and 0.1 were chosen for the expansion and contraction coefficients, respectively. For cross-sections before and after culverts, dramatic contraction and expansion can cause more energy loss, therefore, 0.5 and 0.3 were chosen for the expansion and contraction coefficients, respectively.

5.4 Cross-Section Description

Cross-sections are located along the channel such that the distance between two consecutive sections is less than 400 ft. Cross-sections were also added upstream and downstream of the culvert crossings based on placement recommendations in the *HEC-RAS Hydraulic Reference Manual* (Ref. 7). Cross-section topographic data was obtained from the construction plans dated August 15, 2008 (Ref. 5). Elevations are on the NAVD 1988 vertical datum.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump

No adjustments were made to the model regarding hydraulic jump.

5.5.2 Culverts and Bridges

Five sets of concrete box culverts were added to the HEC-RAS models. The culvert at RS 1335 was simulated in HEC-RAS by 7 consecutive rectangular cross-sections with lids. Other culverts were simulated through standard culvert modeling in HEC-RAS. Invert elevations of the culverts are on the NAVD 1988 vertical datum. A reduced-scale set of plans showing the inverts are included in Appendix A 2.2.

Table 2: Culvert Summary

Culvert Location	RS	Number of Barrels	Size	Length
Peoria Ave	8950	6	10'X4'	130'
	5000	2	10'X6'	60'
Olive Ave	3638	2	10'X6'	192'
	2345	2	10'X6'	60'
Falcon Dunes Golf Course	1335	2	10'X6'	685.45'

5.5.3 Levees and Dikes

There are no levees or dikes along the channel. At four culvert locations, the 100-year water surface will back up and overtop the channel bank.

5.5.4 Islands and Flow Splits

There are no islands or flow splits in the reach covered by this study.

5.5.5 Ineffective Flow Areas

Ineffective flow locations were added upstream and downstream of the culvert crossings, based upon recommended guidelines in the *HEC-RAS Hydraulic Reference Manual* (Ref. 7).

5.5.6 Supercritical Flow

No adjustments were made to the effective model regarding supercritical flow. All models were run in subcritical flow regime.

5.6 Floodway Modeling

No additional floodway modeling was performed for this submittal.

5.7 Problems Encountered During the Study

5.7.1 Special Problems and Solutions

There were no special problems or solutions associated with this study.

5.7.2 Modeling Warning and Error Messages

HEC-RAS

The following types of warning messages are encountered for the steady flow HEC-RAS model. Discussions regarding the messages are also provided below.

(1) The conveyance ratio is higher than 1.4 or less than 0.7, which may indicate the need for additional cross-section.

Response: The distance between 2 neighboring cross-sections in the HEC-RAS model is generally less than 200 ft. Cross-sections have been selected where channel geometry (including slope, n value etc.) changes. It is believed that no additional cross-sections are necessary.

(2) The cross-section end points had to be extended vertically for the computed water surface.

Response: At some culvert locations, water will back up and overtop the channel bank, causing this warning message. However, very slight change of water surface will occur by extending end points vertically.

(3) The velocity head has changed by more than 0.5 feet. This may indicate the need for additional cross-section.

Response: As discussed above, no additional cross-sections are necessary.

(4) The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Response: At some cross-sections with dramatic changes in geometry or discharge, the flow profile will change, e.g. from M2 to S2. It is okay to set critical depth at these locations.

(5) Divided flow calculated for this cross-section.

Response: Inefficient flow areas have been set for these cross-sections showing an irrigation ditch immediately west of Reems Road. Flow is not diverted to the ditch and is contained in the channel.

CHECK-RAS NT

The following warning messages were generated by CHECK-RAS NT, and they are addressed as below.

(1) The left overbank n value of 0.035 and the right overbank n value of 0.035 are less than or equal to the channel n value of 0.035. The overbank n values should be reevaluated.

Response: Grass-lined earthen channel is given an n value of 0.035. The transition from top of bank to natural ground is also given an n value of 0.035.

(2) Channel n value is equal to or less than 0.025. The n value of the channel is usually larger than 0.025. The n value should be reevaluated it if is not representing a concrete lined channel.

Response: A portion of the channel is concrete-lined where the lateral weir is located.

(3) Contraction and expansion loss coefficients are 0.3 and 0.5 respectively. However, this cross-section is not at the structure. They should be equal to 0.1 and 0.3.

Response: Generally, cross-section 4 for culverts should be given contraction and expansion loss coefficients of 0.1 and 0.3. However, in this study, four cross-sections before and after culverts are given contraction and expansion loss coefficients of 0.3 and 0.5, respectively. For cases like RS 2278 and RS 689, it is justified by the dramatic change in geometry.

CHECK-RAS XS

The following warning messages were generated by CHECK-RAS XS, and they are addressed as below.

(1) Discharge decreases in the downstream direction.

Response: Flow decreases at three locations. At Peoria Avenue, a portion of the flow overtops the culverts and diverts east along Peoria Avenue. At the basin, a portion of the flow overtops the lateral weir and gets into the basin. At Olive Avenue, a portion of the flow overtops the culverts and diverts east along the railroad.

(2) RS 7400: This cross-section is located too far upstream from the critical depth cross-section.

Response: The downstream cross-section RS 7202 is located at the lateral weir, and the water surface is set at critical depth due to the dramatic discharge decrease. The distance between RS 7400 and RS 7202 is about 200 feet. No additional cross-section is necessary.

CHECK-RAS Structure

The following warning messages were generated by CHECK-RAS Structure, and they are addressed as below.

(1) 'Cross-section Lid' option is used for this section. Instead, bridge or culvert option should be used. Cross-section lid option may be used to model small obstructions, such as pipe crossing, or the type of flow through the lid sections and the main stream is in supercritical flow.

Response: Due to the length and geometry of the culverts, the cross-section lid option was chosen. This option better models the bend loss at the culvert bend.

(2) RS 8950: The end station of 10335 from upstream road/weir data is greater than the end station of 10334 from upstream internal section / section 3. The high chord elevation of 1151 for the end road/weir station is greater than the ground elevation of 1145.2 for the end ground station. The EGEL at section 3 of 1149.55 is greater than the ground elevation. The road/weir data should be included in the ground data.

Response: The deck/roadway data was obtained from the existing contour at Culvert RS 8950. The upstream/downstream internal sections are defaulted to the upstream /downstream cross-sections (RS 9082 and 8890). It is okay to keep these settings.

5.8 Calibration

There was no special calibration performed as part of this study.

5.9 Final Results

5.9.1 Hydraulic Analysis Results

The 100-year water surface elevations from the Proposed Conditions HEC-RAS model were used to delineate the west boundary of the proposed Zone A floodplain, while the east boundary of the effective floodplain was retained, as shown in Figure 3 and Sheets 1 through 6 of the 100-Year Floodplain Maps. The HEC-RAS model output is included in Appendix E, and the floodplain water surface elevations are summarized in Table 3.

As mentioned in Sections 1 and 4, the project was designed for the future condition and therefore is under-designed for the existing condition. Culverts (RS 5000, RS 3638, RS 2345 and RS 1335) do not have sufficient capacity for the existing condition, causing flow upstream to overtop channel banks. For locations where water is not contained within the banks, the proposed floodplain boundary is tied to the effective floodplain boundary, as shown on Figure 3 and the 100-Year Floodplain sheets. The effective floodplain along Reems Road between Peoria Avenue and Northern Avenue was delineated by projecting west from Reems Road to the same elevations as the top of Reems Road (see the excerpt from the *White Tanks / Agua Fria ADMS* in Appendix A.2.1).

The upstream end of the Reems Road channel ties to the Greer Ranch channel. The LOMR request for Greer Ranch prepared by CVL (Appendix A.2.4) indicated a water surface elevation at the south end of the Greer Ranch channel of 1149.24 ft (NAVD 88). As shown in Table 3, the water surface elevation at RS 9168, where the proposed 100-year floodplain boundary ties to the effective floodplain boundary at Greer Ranch, is

1149.47 ft (NAVD 88). The water surface elevation difference of 0.23 ft is within the allowable tolerance of the regulations.

Table 3: Floodplain Summary Table

Note: Elevations shown are on the NAVD88 Datum.

RS	Q (cfs)	100-Year Floodplain Elevation
9168	1845	1149.47
9118	1845	1149.47
9082	2881	1149.53
8890	2735	1145.60
8724	2735	1145.39
8600	2735	1145.05
8400	2735	1144.70
8200	2735	1144.19
8000	2735	1143.84
7800	2735	1143.40
7600	2735	1143.00
7540	2735	1142.80
7500	2735	1142.90
7400	2735	1142.73
7202	2735	1140.64
6807	742	1137.83
6709	742	1137.52
6600	742	1136.35
6540	742	1135.60
6479	742	1134.70
6400	742	1134.59
6340	742	1134.52
6300	742	1134.57
6200	742	1134.54
6000	742	1134.51
5800	742	1134.48
5740	742	1134.47
5700	742	1134.48
5600	742	1134.47
5500	742	1134.46
5460	742	1134.46
5440	742	1134.46
5400	2368	1134.34
5366	2368	1134.33
5080	2368	1134.21
5060	2368	1134.20
5025	2368	1133.80
4955	2368	1130.50
4895	2368	1129.54
4740	2368	1129.00
4700	2368	1129.22
4601	2368	1129.01
4401	2368	1128.93
4201	2368	1128.69
4040	2368	1128.65

Table 3: Floodplain Summary Table (Continued)

Note: Elevations shown are on the NAVD88 Datum.

RS	Q (cfs)	100-Year Floodplain Elevation
4000	2368	1128.68
3840	2368	1128.61
3800	2368	1128.64
3770	2557	1128.61
3735	2557	1128.42
3535	1420	1123.09
3400	1420	1123.43
3200	1420	1123.33
3000	1420	1123.20
2800	1420	1123.05
2640	1420	1122.99
2600	1420	1123.02
2420	1420	1123.00
2400	1420	1122.98
2370	1420	1122.53
2300	1420	1119.08
2278	1420	1119.41
2240	1420	1119.49
2078	1420	1119.40
1878	1420	1119.04
1678	1420	1118.98
1640	1420	1118.93
1600	1420	1118.96
1478	1420	1118.95
1376	1420	1118.90
1346	1420	1118.36
1335	1420	1115.47
1273	1420	1112.25
936	1420	1110.84
926	1420	1110.79
879	1420	1110.54
869	1420	1110.49
689	1420	1109.29
649	1420	1107.79

6 Erosion and Sediment Transport

Erosion and Sediment Transport were not considered. Erosion control has been considered in the channel design, and FCDMC will perform regular maintenance to remove sediment.

7 Draft FIS Report Data

7.1 Summary of Discharges

See Table 3 in Section 5.9 of this report for the 100-year discharges at each cross-section. No modification to the hydrology was done as part of this study.

7.2 Floodway Data

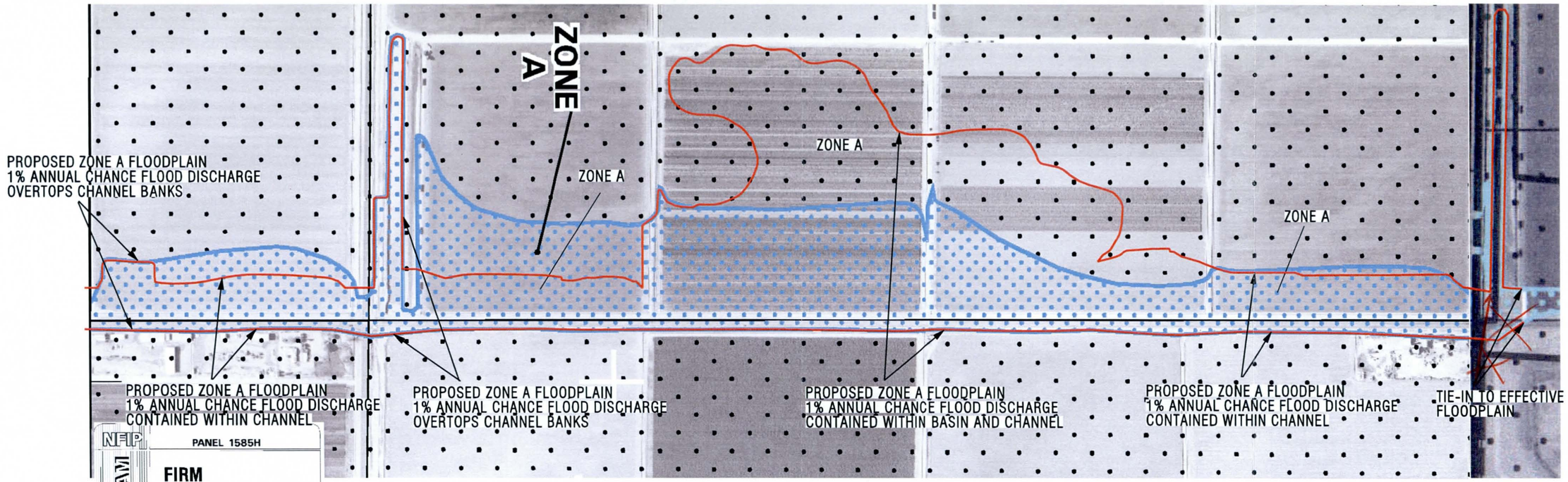
Floodway simulation was not prepared for this submittal.

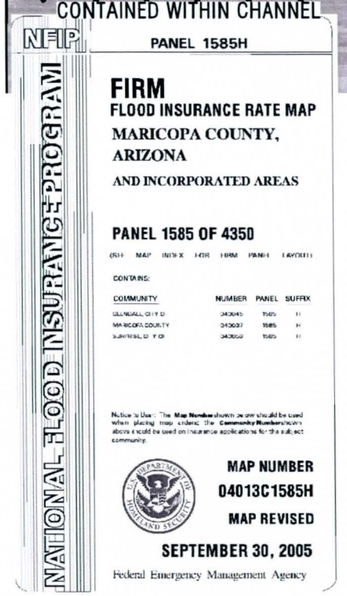
7.3 Annotated Flood Insurance Rate Map

The Annotated Flood Insurance Rate Map is shown in Figure 3A and Figure 3B.

7.4 Flood Profiles

A flood profile is provided in Appendix E.5.5.





SCALE: 1" = 500'

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Phoenix, Arizona 85013-3203

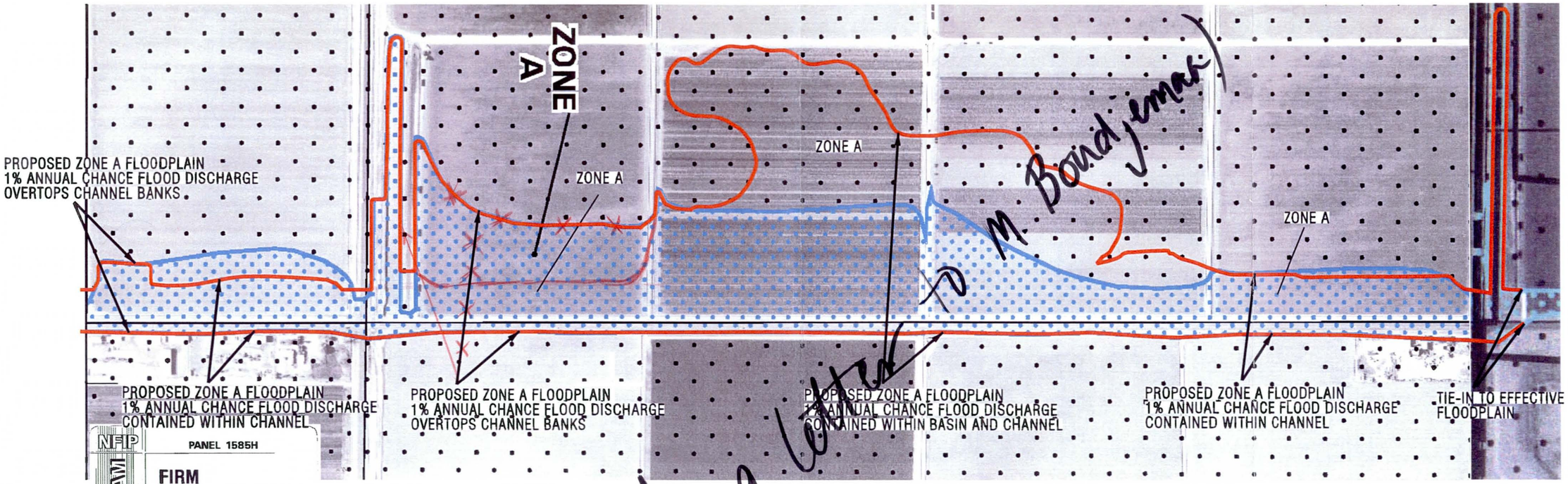
LEGEND

REEMS ROAD CHANNEL AND BASIN
ANNOTATED FLOOD INSURANCE RATE MAP (PART 1)

FIGURE 3A

Office: (602) 252-8384 Fax: (602) 252-8385 www.hoskinryan.com

G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\E-FIG3A - ANNOTATED FIRM.dgn
8/4/2009



D M Boudjemaa

NFIP

PANEL 1585H

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 1585 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GLENDALE, CITY OF	040045	1585	H
MARICOPA COUNTY	040037	1585	H
SURPRISE, CITY OF	040063	1585	H

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C1585H
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

Superseded (see 3/11/09 letter

Oliver

Intersecting Street Names would have been helpful

Peoria

SCALE: 1" = 500'

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Phoenix, Arizona 85013-3203

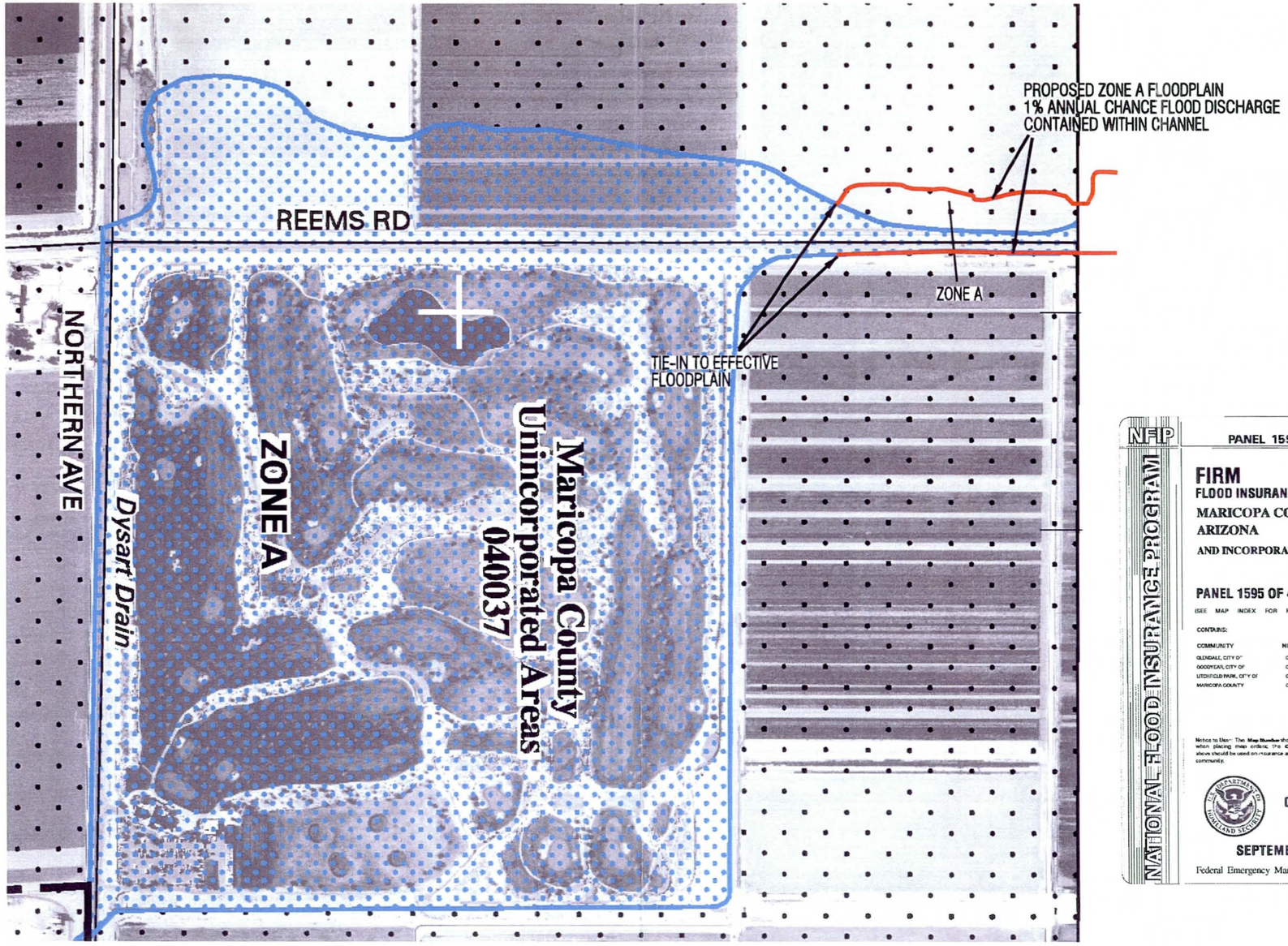
LEGEND

REEMS ROAD CHANNEL AND BASIN
ANNOTATED FLOOD INSURANCE RATE MAP (PART 1)

FIGURE 3A

Office: (602) 252-8384 Fax: (602) 252-8385 www.hoskinryan.com

G:\Projects\07\07-027 On-Call Flood Control District\01 - Reed 24 CLOMR\Hydro\E-FIG3A - ANNOTATED FIRM.dgn
12/11/2008



G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\R-FIG3B - ANNOTATED FIRM.dgn
12/11/2008

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LEGEND

REEMS ROAD CHANNEL AND BASIN
ANNOTATED FLOOD INSURANCE RATE MAP (PART 2)

FIGURE 3B

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Appendix A: References

A.1 Data Collection Summary (References)

A.2 Referenced Documents

A.2.1 Excerpt from *White Tanks / Agua Fria ADMS*

A.2.2 Reems Road Channel and Basin Construction Plans

A.2.3 Paving and Storm Drain Plans for Greer Ranch South – Peoria Avenue

A.2.4 Excerpt from *FEMA LOMR Submittal for Greer Ranch*

A.2.5 Greer Ranch HEC-RAS Model Provided by CVL

A.1 Data Collection Summary (References)

A.1 References

1. Coe and Van Loo, *FEMA LOMR Submittal for Greer Ranch,* September 2007.

2. Coe and Van Loo, *Grading and Storm Drain Plans for Greer Ranch South – Peoria Avenue,* July 2007.

3. Federal Emergency Management Agency, *Flood Insurance Rate Map (FIRM): Maricopa County, Arizona and Unincorporated Areas, Maps Numbered 04013C1585H and 04013C1595H,* dated September 30, 2005.

4. Flood Control District of Maricopa County, *Drainage Design Manual for Maricopa County, Volume II – Hydraulics,* January 1996.

5. Flood Control District of Maricopa County, Engineering Division, *Reems Road Channel and Basin*, FCD Project No. 470-12-31, August 15, 2008

6. Flood Control District of Maricopa County, Engineering Division, *Reems Road Channel and Basin 90% Design Report*, FCD Project No. 470-12-31, September 2007.

7. United States Army Corps of Engineers, Hydrologic Engineering Center, *HEC-RAS River Analysis System, Version 3.1.3*, May 2005.

8. URS, *Loop 303 / White Tanks Area Drainage Master Plan Update,* Flood Control District of Maricopa County Contract No. 99-40, April, 2004.

9. WLB, *White Tanks / Agua Fria Area Drainage Master Study*, prepared for Flood Control District of Maricopa County, October, 1992

A.2.1 Excerpt from *White Tanks / Agua Fria ADMS*

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject WHITE TANKS/AGUA FRIA ADMS - APPROXIMATE DELINEATION ON REEMS ROAD. Prepared by JSE Date 2-19-92

NORTHERN AVENUE TO OLIVE AVENUE

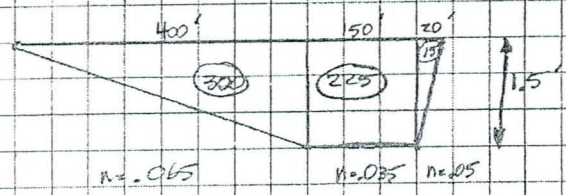
DISCHARGE = ROUTED FLOW FROM DI 193 TO CP 193 = 2255 CFS.

THIS DISCHARGE IS GREATER THAN CAPCITY OF REEMS, THEREFORE APPROXIMATE FLOODPLAIN IS BASED ON TOP OF LEFT BANK ELEVATION AND PROJECTED WEST TO SAME ELEVATION.

OLIVE AVENUE TO PEORIA AVENUE

USE DISCHARGE OF ROUTED FLOW R165 = 3090 cfs

Check Capacity of Typical Cross Section.



$S = .0044^{1/2}$

$A = 540\ ft^2$

$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$Q_1 = \frac{1.49}{.065} 300 \left(\frac{300}{400}\right)^{2/3} (.0044)^{1/2} + Q_2 = \frac{1.49}{.035} 225 \left(\frac{225}{150}\right)^{2/3} (.0044)^{1/2} + Q_3 = \frac{1.49}{.05} 15 \left(\frac{15}{20}\right)^{2/3} (.0044)^{1/2}$

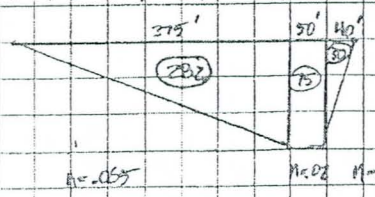
$Q_T = 376 + 832 + 25 = 1233\ cfs < 3090\ cfs$

∴ Use Top of Left Bank Projected West to Same Elevation for Approximate Delineation.

PEORIA AVENUE TO CACTUS ROAD

USE DISCHARGE OF ROUTED FLOW R146 = 1423 cfs

CHECK CAPACITY OF TYPICAL CROSS SECTION



$S = .0067^{1/2}$

$A = 387\ ft^2$

(cont.)

Form 209

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject REEMS ROAD APPROXIMATE DELINEATION Prepared by JSE Date 2-19-92

Cont. From Last Page

$$Q_1 = \frac{1.49}{.065}(282)\left(\frac{282}{375}\right)^{2/3}(.0067)^{1/2} + Q_2 = \frac{1.49}{.02}75\left(\frac{75}{50}\right)^{2/3}.0067^{1/2} + Q_3 = \frac{1.49}{.05}30\left(\frac{30}{40}\right)^{2/3}(.0067)^{1/2}$$

$$Q_T = 438 + 599 + 60 = 1097\text{cfs} < 1423\text{ cfs}$$

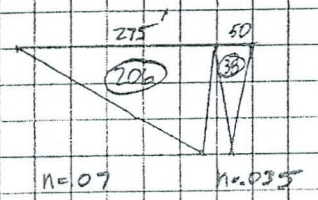
∴ Use Top of Left Bank Elevation Projected West to Same Elevation for Approximate Delineation.

CACTUS ROAD TO WADDELL ROAD

USE DISCHARGE FROM ROUTED FLOW R133 = 273 cfs

Check Capacity From Typical Cross Section

S = .0067 ft/ft
A = 244 ft²



$$Q_1 = \frac{1.49}{.07}(206)\left(\frac{206}{275}\right)^{2/3}(.0067)^{1/2} + Q_2 = \frac{1.49}{.035}(35)\left(\frac{35}{50}\right)^{2/3}(.0067)^{1/2}$$

$$Q_T = 296 + 110 = 406\text{ cfs} > 273\text{ cfs}$$

This is very close so we will still use Top of Left Bank elevation projected west to same elevation for Approximate Delineation

Form 209

The WLB Group Inc. WLB

COMPUTATION DATA SHEET

Subject REEMS ROAD APPROXIMATE DELINEATION Prepared by JSE Date 2-19-92

WADDELL ROAD TO GREENWAY ROAD

USE DISCHARGE = Q AT R122 = 308 cfs

CAPACITY CHECK

THIS CROSS SECTION IS VERY SIMILAR TO THE ONE BETWEEN CACTUS ROAD AND WADDELL ROAD WHICH HAD A CAPACITY OF 406 cfs > 308 cfs.

AGAIN THIS IS VERY CLOSE SO TOP OF LEFT BANK ELEVATION PROJECTED WEST TO SAME ELEVATION WILL BE UTILIZED FOR THE APPROXIMATE DELINEATION

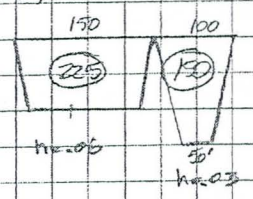
GREENWAY ROAD TO BELL ROAD

USE DISCHARGE = Q AT R115 = 2541 cfs

CHECK CAPACITY

S = .004 ft/ft

A = 375 ft²



$$Q_1 = \frac{1.49}{.06}(225)\left(\frac{225}{150}\right)^{2/3}(.004)^{1/2} + Q_2 = \frac{1.49}{.03}150\left(\frac{150}{100}\right)^{2/3}(.004)^{1/2}$$

$$Q_T = 463 + 617 \text{ cfs} = 1080 \text{ cfs} < 2541 \text{ cfs}$$

∴ USE TOP OF LEFT BANK PROJECTED WEST TO SAME ELEVATION FOR APPROXIMATE DELINEATION.

Form 209

The WLB Group Inc. WLB

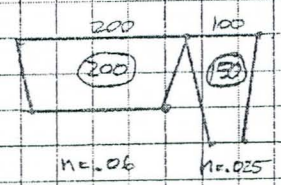
COMPUTATION DATA SHEET

Subject REEMS ROAD APPROXIMATE DELINEATION Prepared by JSE Date 2-19-92

BELL ROAD TO UNION HILLS DRIVE

USE DISCHARGE = Q AT R108 = 1123 cfs

CHECK CAPACITY



S = .0050'/'
A = 350 ft²

$$Q_1 = \frac{1.49}{.06}(200)(1)^{2/3}(.005)^{1/2} + Q_2 = \frac{1.49}{.025}(150)(1.5)^{2/3}(.005)^{1/2}$$

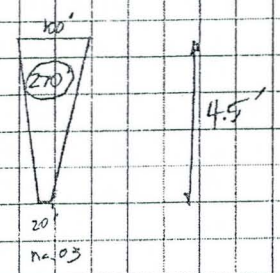
$$Q_T = 351 + 828 = 1180 \text{ cfs} > 1123 \text{ cfs}$$

∴ SINCE THIS IS ALMOST THE SAME USE TOP OF LEFT BANK ELEVATION PROJECTED WEST TO APPROXIMATELY THE SAME ELEVATION FOR APPROXIMATE DELINEATION.

UNION HILLS DRIVE TO BEARDSLEY ROAD

USE AVERAGE DISCHARGE BETWEEN CP108 AND CP103 = (1158 + 267)/2 = 712 cfs

CHECK CAPACITY



S = .005'/'
A = 270 ft²

$$Q = \frac{1.49}{.03}(270)(2.7)^{2/3}(.005)^{1/2} = 1838 \text{ cfs} > 712 \text{ cfs}$$

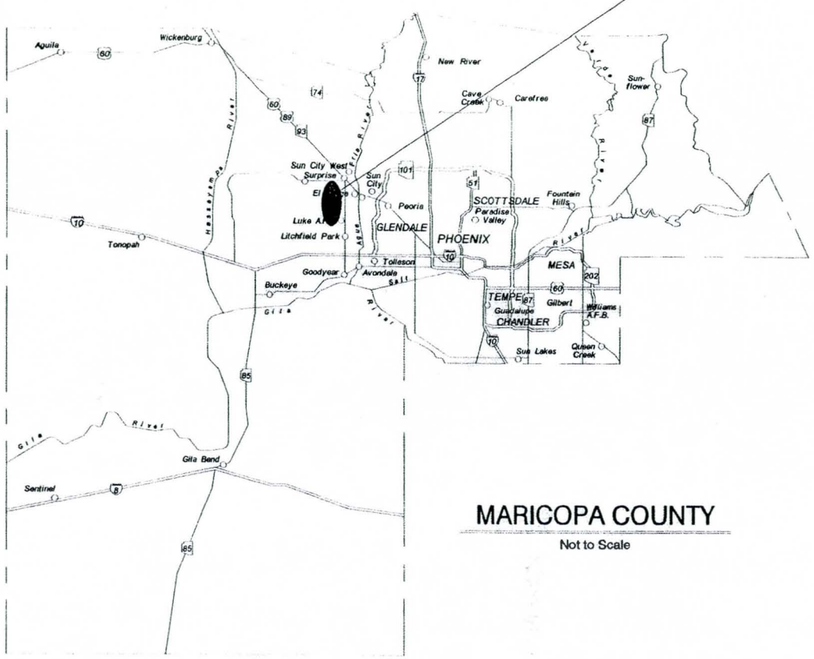
STILL USE TOP OF LEFT BANK ELEVATION PROJECTED WEST FOR APPROXIMATE DELINEATION.

Form 209

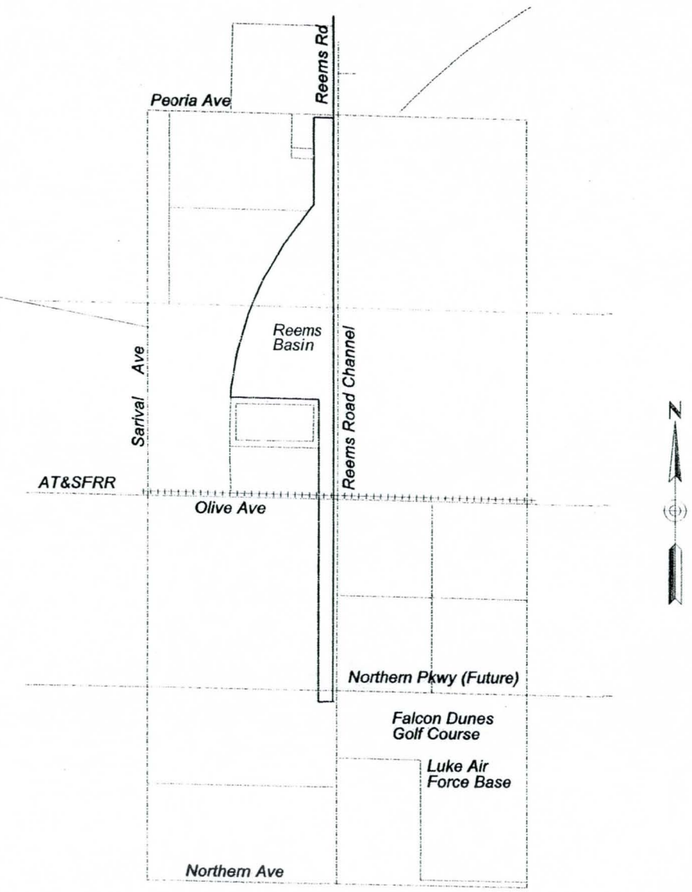
A.2.2 Reems Road Channel and Basin Construction Plans

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

IN COOPERATION WITH
MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
PLANS FOR THE CONSTRUCTION OF
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT CONTROL NO. 4701231
FCD CONTRACT NO. 2005CO18



MARICOPA COUNTY
Not to Scale



VICINITY MAP
Not to Scale

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ISSUE RECOMMENDED BY:

Barbara Ohlen — 1-22-08
PROJECT MANAGER — DATE

ISSUED FOR PUBLIC BIDDING BY:

T. SP. — 1/23/08
CHIEF ENGINEER & GENERAL MANAGER — DATE

BOARD OF DIRECTORS OF
THE FLOOD CONTROL DISTRICT

ANDY KUNASEK - CHAIRMAN

DISTRICT 1	FULTON BROCK
DISTRICT 2	DON STAPLEY
DISTRICT 3	ANDY KUNASEK
DISTRICT 4	MAX WILSON
DISTRICT 5	MARY ROSE WILCOX

Registered Professional Engineer
CERTIFICATE NO. 22
RAYMOND R. RIDDLE
Date Signed 1-22-08
ARIZONA, U.S.A.

LEGEND SHEET

SYMBOLS

- Brass Cap In Hand Hole
- Benchmark
- Brass Cap
- Bush
- Cactus
- Catch Basin
- Chiseled Square
- Miscellaneous Control Point
- Check Shot
- Electric Manhole
- Electric Meter
- Elevation Reference Mark
- Fire Hydrant
- GDAC
- Gas Meter
- Gas Valve
- Iron Pipe
- Irrigation Manhole
- Light Pole
- Palm Tree
- Power Pole
- Rebar
- Rebar With Cap
- Section Corner
- Storm Drain Manhole
- Proposed Slope Indicator
- Existing Slope Indicator
- Sanitary Sewer Manhole
- Telephone Manhole
- Telephone Pole
- Tree
- Transmission Tower
- Well

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

SYMBOLS

- Flow Direction
- Proposed 4" ABC O&M Road
- Soil Cement
- Proposed Asphalt Pavement
- Asphalt Pavement Removal
- Grade Break
- Sawcut & Match
- Connector Pipe Profile No.
- PIP — Protect in Place
- Water Manhole
- Water Meter
- Water Valve
- Maintenance Access Ramp
- Gate
- TBR — Top of Berm
- FOC — Fiber Optic Cable

LINESTYLES

- Centerline
- Cut Line
- Fiber Optic Line
- Fill Line
- Forest/Indian Reservation Line
- High Pressure Gas Line
- Irrigation Line
- Proposed Chain Link Fence Line
- Proposed Fence Line
- Proposed Gas Line
- Proposed Overhead Power Line
- Proposed Overhead Telephone Line
- Proposed Retaining Wall
- Proposed ROW
- Proposed Sanitary Sewer Line
- Proposed Underground Power Line
- Proposed Underground Telephone Line
- Proposed Underground Cable Television Line
- Proposed Water Line
- Proposed Wood Fence Line
- Proposed Storm Drain (width varies 72" pipe shown)
- Section Line
- Temporary Construction Easement
- Tree Line
- Wash Flow Line
- Existing Water Surface Elevation (Profile Views Only)
- Proposed Water Surface Elevation (Profile Views Only)
- Existing Block Wall
- Existing Chain Link Fence Line
- Existing Fence Line
- Existing Gas Line And Size
- Existing Left Guardrail
- Existing Right Guardrail
- Existing Irrigation Line
- Existing Overhead Power Line
- Existing Overhead Telephone Line

LINESTYLES

- Existing Retaining Wall
- Existing Edge Of Paved Road
- Existing ROW
- Existing Sanitary Sewer Line
- Existing Storm Drain Pipe And Size
- Existing Underground Power Line
- Existing Underground Telephone Line
- Existing Underground Cable Television Line
- Existing Water Line And Size
- Existing Wood Fence Line

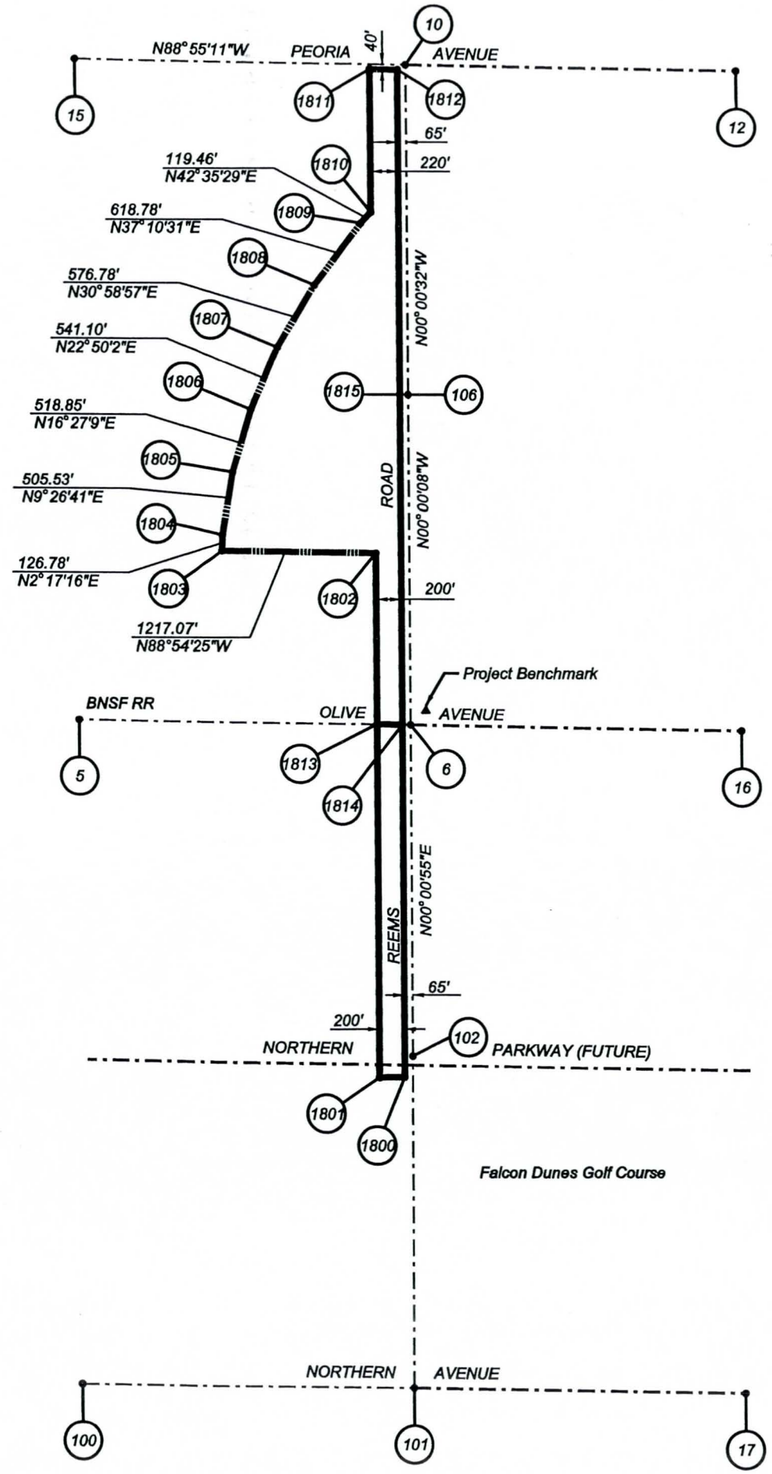
NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO.		SHEET OF
G4	LEGEND SHEET SYMBOLS AND LINESTYLES	4 59



TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

PROJECT CONTROL CHANNEL				
NO.	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	928,594.44	552,079.26	1116.13	ACF Northern/Alsup
101	928561.28	554,719.16	1104.60	BCH Reems/Northern
102	931,191.20	554,722.80	1113.72	BCH Reems
106	936,458.74	554,723.40	1135.00	BCH Reems
5	933,867.48	552,088.19	1136.76	ACF Olive
▲ 6	933,823.38	554,723.51	1126.15	BCH Olive/Reems
10	939,094.17	554,722.99	1145.13	Peoria/Reems
12	939,042.11	557,358.35	1144.53	ACF Peoria
15	939,143.95	552,083.13	1156.86	Fnd AC-1.10
16	933,772.51	557,363.09	1118.71	ACH Olive
17	928,516.15	557,361.27	1100.13	BCH Northern/151 Align

1

PROJECT CONTROL - BASIN		
NO.	NORTHING	EASTING
1800	931,022.13	554,657.76
1801	931,019.41	554,457.76
1802	935,198.46	554,458.41
1803	935,221.72	553,241.53
1804	935,348.40	553,246.59
1805	935,847.08	553,329.55
1806	936,344.68	553,476.50
1807	936,843.38	553,686.48
1808	937,337.87	553,983.39
1809	937,830.91	554,357.29
1810	937,918.85	554,438.14
1811	939,059.54	554,438.00
1812	939,055.39	554,658.00
1813	933,827.82	554,458.51
1814	933,824.47	554,658.50
1815	936,459.67	554,658.30

NOTE:
ALL COODINATES SHOWN ARE GRID VALUES UNLESS OTHERWISE NOTED. USE CONVERSION FACTOR OF 1.00016 TO CONVERT GRID TO GROUND COODINATES.

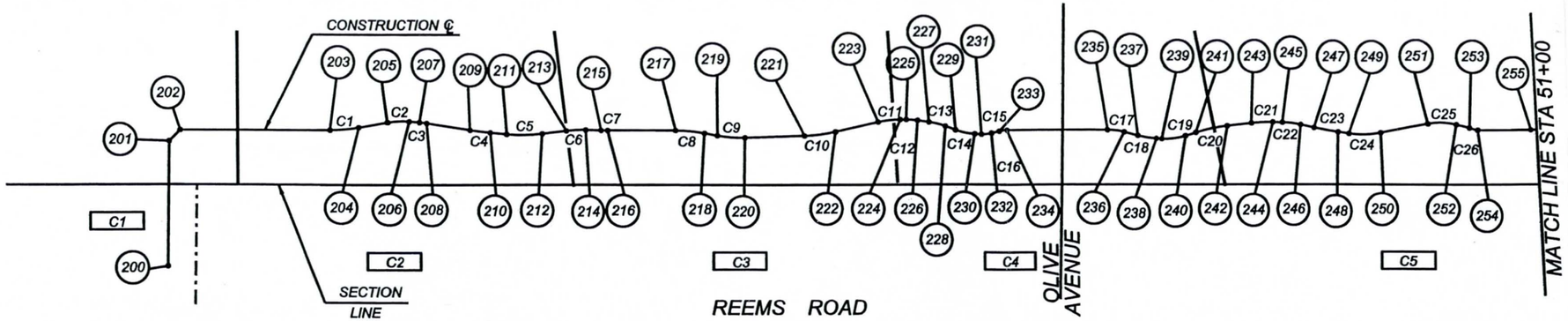
NO.	REVISION	BY	DATE
3			
2			
1	REV BASIN BASIS OF BEARING & COORD'S	WAG	5-1-08

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO.		SHEET OF
G5R	HORIZONTAL & VERTICAL CONTROL	5 59



C# Drawing Sheet Number

1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
200	POB	5+00.00	931104.10	554,970.14
201	PI	8+89.09	931,109.11	554,591.08
202	PI	9+26.20	931,142.43	554,557.78
203	PC	13+78.37	931,594.60	554,557.60
204	PT	14+65.75	931,681.10	554,549.78
205	PC	15+52.24	931,766.64	554,534.40
206	PT	16+18.26	931,832.39	554,531.38
207	PC	16+49.92	931,863.94	554,534.10
208	PT	16+71.34	931,885.20	554,536.70
209	PC	18+05.08	932,017.28	554,557.68
210	PT	18+66.12	932,077.82	554,565.41
211	PC	19+16.28	932,127.75	554,570.24
212	PT	20+24.44	932,235.69	554,568.98
213	PC	20+98.65	932,309.36	554,560.11
214	PT	21+57.63	932,368.23	554,557.39
215	PC	22+05.47	932,416,05	554,558.72
216	PT	22+25.09	932,435.67	554,558.87
217	PC	24+29.05	932,639.62	554,558.53
218	PT	25+15.40	932,725.48	554,566.63
219	PC	25+55.17	932,764.61	554,573.76
220	PT	26+38.40	932,847.45	554,580.10
221	PC	28+21.93	933,030.90	554,575.01
222	PT	29+18.77	933,126.85	554,563.00
223	PC	30+51.52	933,256.36	554,533.85
224	PT	31+19.49	933,323.79	554,526.53
225	PC	31+37.79	933,342.08	554,526.63
226	PT	31+72.29	933,376.46	554,529.18
227	PC	32+07.72	933,411.53	554,534.24

1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
228	PT	32+59.03	933,461.21	554,546.70
229	PC	32+93.02	933,493.16	554,558.31
230	PT	33+52.93	933,551.67	554,570.09
231	PC	33+73.00	933,571.72	554,571.07
232	PT	34+04.56	933,602.99	554,567.88
233	PC	34+29.19	933,626.79	554,561.57
234	PT	34+55.09	933,652.41	554,558.23
235	PC	37+65.75	933,963.06	554,558.16
236	PT	38+16.37	934,013.15	554,564.49
237	PC	38+59.80	934,055.21	554,575.32
238	PT	39+18.78	934,113.40	554,584.34
239	PC	39+37.30	934,131.89	554,585.37
240	PT	40+09.58	934,203.21	554,576.39
241	PC	40+42.69	934,234.78	554,566.42
242	PT	41+40.55	934,330.39	554,546.24
243	PC	42+15.67	934,405.05	554,537.98
244	PT	42+82.56	934,471.82	554,535.09
245	PC	43+12.34	934,501.60	554,535.80
246	PT	43+69.14	934,557.91	554,542.49
247	PC	44+12.38	934,600.18	554,551.63
248	PT	44+87.64	934,674.27	554,564.75
249	PC	45+21.50	934,707.81	554,569.40
250	PT	46+19.70	934,805.54	554,566.86
251	PC	47+63.94	934,947.19	554,539.67
252	PT	48+50.17	935,032.72	554,541.89
253	PC	48+90.88	935,072.26	554,551.63
254	PT	49+16.86	935,097.26	554,558.41
255	PC	50+81.84	935,262.24	554,558.01

1

CHANNEL GEOMETRY CURVE DATA				
CV #	LENGTH	DELTA ANGLE	RADIUS	TANGENT
C1	87.38	10°00'46"	500.00	43.80
C2	66.02	15°07'48"	250.00	33.20
C3	21.42	4°05'27"	300.00	10.71
C4	61.04	3°29'50"	1000.00	30.53
C5	108.16	12°23'39"	500.00	54.29
C6	58.98	8°26'55"	400.00	29.54
C7	19.63	2°14'57"	500.00	9.81
C8	86.35	9°53'41"	500.00	43.28
C9	83.23	11°55'17"	400.00	41.76
C10	96.85	11°05'53"	500.00	48.58
C11	67.97	12°58'55"	300.00	34.13
C12	34.50	7°54'28"	250.00	17.28
C13	51.31	11°45'31"	250.00	25.74
C14	59.91	17°09'47"	200.00	30.18
C15	31.56	18°04'57"	100.00	15.91
C16	25.90	14°50'26"	100.00	13.02
C17	50.63	14°30'12"	200.00	25.45
C18	58.98	11°15'51"	300.00	29.58
C19	72.28	20°42'19"	200.00	36.54
C20	97.86	11°12'52"	500.00	49.09
C21	66.88	7°39'52"	500.00	33.49
C22	56.80	10°50'50"	300.00	28.48
C23	75.26	4°18'44"	1000.00	37.65
C24	98.20	18°45'15"	300.00	49.54
C25	86.23	24°42'11"	200.00	43.80
C26	25.98	14°52'58"	100.00	13.06

NO.	REVISION	BY	DATE
3			
2			
1	REVISED CHANNEL ALIGNMENT AND CONTROL	WAG	5-1-08

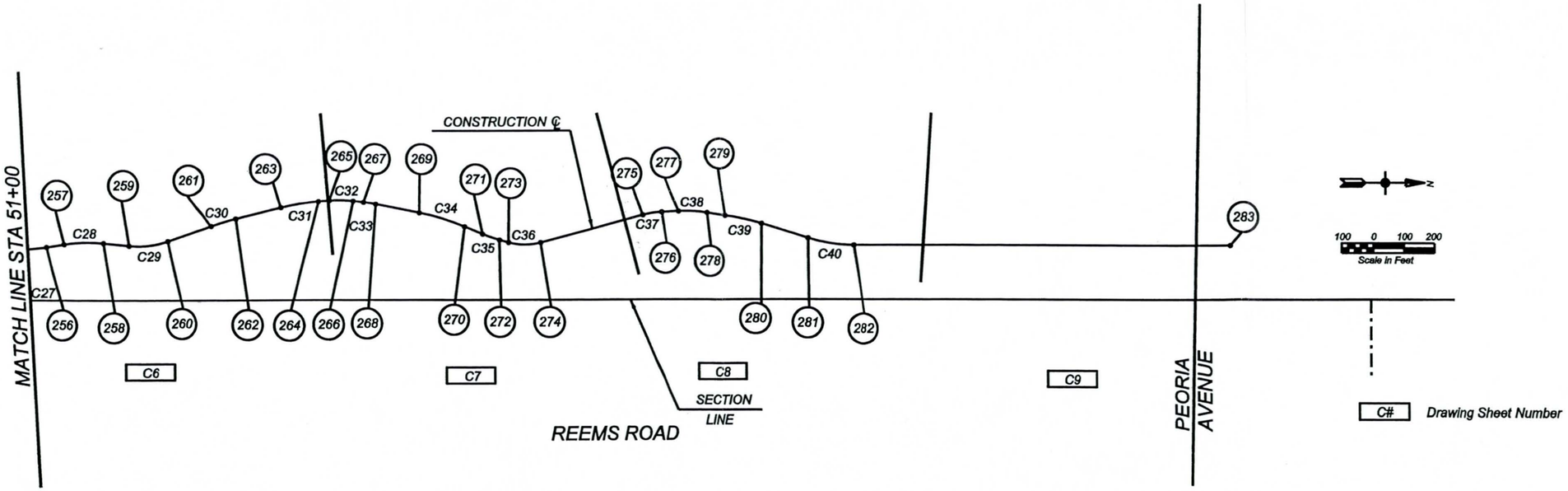
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO.		SHEET OF
G6R	CST ℄ GEOMETRIC LAYOUT STA 5+00 TO STA 51+00	6 59

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE



1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
256	PT	51+59.17	935,339.22	554,551.58
257	PC	52+17.44	935,396.74	554,542.25
258	PT	53+47.58	935,526.45	554,538.27
259	PC	54+31.82	935,610.27	554,546.64
260	PT	55+59.52	935,736.20	554,532.31
261	PC	57+11.60	935,880.27	554,483.58
262	PT	57+96.23	935,961.49	554,459.89
263	PC	59+45.96	936,106.86	554,424.08
264	PT	60+68.91	936,228.12	554,404.56
265	PC	61+03.95	936,263.06	554,401.85
266	PT	61+80.64	936,339.61	554,403.25
267	PC	62+14.34	936,373.09	554,407.08
268	PT	62+53.94	936,412.22	554,413.15
269	PC	64+00.26	936,555.81	554,441.26
270	PT	65+56.24	036,705.01	554,485.91
271	PC	66+19.98	936,764.00	554,510.05
272	PT	66+79.34	936,820.15	554,529.21
273	PC	67+09.68	936,849.39	554,537.29
274	PT	68+14.90	936,953.39	554,537.97

1

CHANNEL GEOMETRY DATA				
PT #	DESC	STATION	NORTHING	EASTING
275	PC	71+62.00	937,289.14	554,449.92
276	PT	72+24.96	937,351.26	554,440.43
277	PC	72+81.48	937,407.72	554,437.79
278	PT	73+75.47	937,501.47	554,442.24
279	PC	74+38.48	937,563.85	554,451.11
280	PT	75+59.99	937,682.24	554,477.88
281	PC	77+16.04	937,831.16	554,524.49
282	PT	78+67.75	937,980.55	554,547.32
283	POE	90+95.22	939,208.02	554,547.24

1

CHANNEL GEOMETRY CURVE DATA				
CV #	LENGTH	DELTA ANGLE	RADIUS	TANGENT
C27	77.32	8°51'38"	500.00	38.74
C28	130.13	14°54'43"	500.00	65.44
C29	127.70	24°23'18"	300.00	64.83
C30	84.63	4°50'56"	1000.00	42.34
C31	122.95	9°23'34"	750.00	61.61
C32	76.69	10°59'05"	400.00	38.46
C33	39.61	4°32'18"	500.00	19.81
C34	155.98	11°10'18"	800.00	78.24
C35	59.36	6°48'10"	500.00	29.72
C36	105.22	30°08'34"	200.00	53.86
C37	62.96	12°01'28"	300.00	31.60
C38	93.99	10°46'13"	500.00	47.13
C39	121.51	9°16'56"	750.00	60.89
C40	151.71	17°23'04"	500.00	76.44

FOR BASIN GRADING PLAN
SEE DRAWING NO. GB1

NO.	REVISION	BY	DATE
3			
2			
1	REVISED CHANNEL ALIGNMENT AND CONTROL	WAG	5-1-08

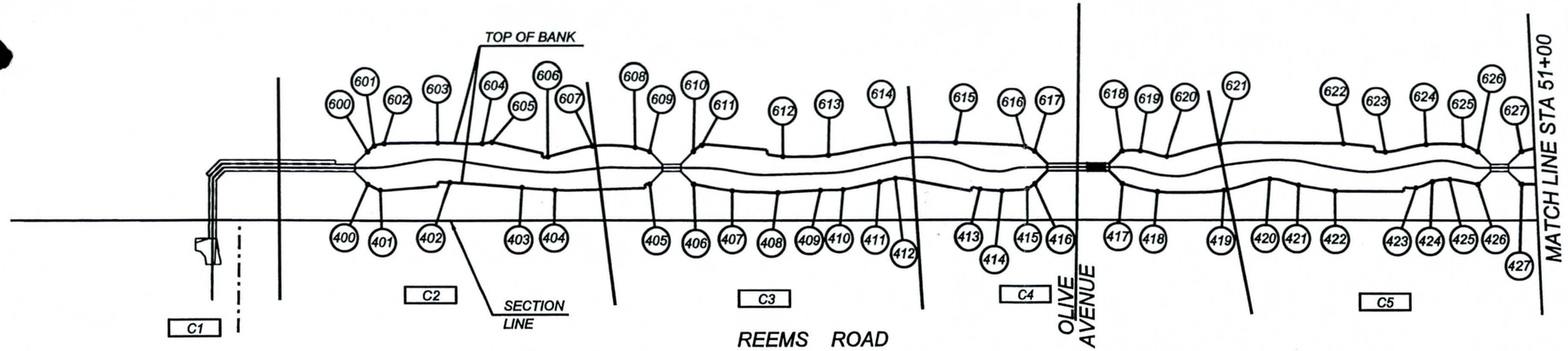
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO.		SHEET OF
G7R	CST ℄ GEOMETRIC LAYOUT STA 51+00 TO POE	7 59

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE



C# Drawing Sheet Number

1

CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
600	POB	931,590.85	554,506.80	N/A
601	PI	931,611.77	554,488.82	50.00
602	PI	931,642.87	554,481.42	200.00
603	PI	931,810.30	554,478.94	2000.00
604	PI	931,951.31	554,481.60	214.00
605	PI	931,982.48	554,477.59	50.00
606	PI	932,156.63	554,523.51	200.00
607	PI	932,294.03	554,490.32	400.00
608	PI	932,425.87	554,494.23	300.00
609	POE	932,471.55	554,506.88	N/A
610	POB	932,610.74	554,506.92	N/A
611	PI	932,636.70	554,487.58	50.00
612	PI	932,892.23	554,522.32	500.00
613	PI	933,034.54	554,518.94	800.00
614	PI	933,244.79	554,483.90	800.00
615	PI	933,441.95	554,481.44	3000.00
616	PI	933,662.85	554,492.51	100.00
617	POE	933,694.58	554,507.11	N/A
618	POB	933,965.68	554,507.24	N/A
619	PI	934,023.01	554,506.12	200.00
620	PI	934,108.95	554,524.05	100.00
621	PI	934,280.88	554,484.66	500.00
622	PI	934,671.29	554,483.75	100.00
623	PI	934,805.18	554,509.66	164.00
624	PI	934,935.83	554,486.01	500.00
625	PI	935,052.30	554,487.18	100.00
626	POE	935,097.26	554,507.31	N/A
627	POB	935,236.45	554,507.31	N/A

1

CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
400	POB	931,590.82	554,608.99	N/A
401	PI	931,630.16	554,627.43	50.00
402	PI	931,848.21	554,602.90	2000.00
403	PI	932,076.01	554,618.90	1000.00
404	PI	932,177.81	554,628.10	1000.00
405	POE	932,471.53	554,609.08	N/A
406	POB	932,610.72	554,609.11	N/A
407	PI	932,732.14	554,629.99	786.00
408	PI	932,875.65	554,636.42	500.00
409	PI	933,009.21	554,628.72	500.00
410	PI	933,079.92	554,626.19	350.00
411	PI	933,194.98	554,603.11	200.00
412	PI	933,246.06	554,592.21	150.00
413	PI	933,518.90	554,626.35	200.00
414	PI	933,587.99	554,631.83	400.00
415	PI	933,669.34	554,624.65	50.00
416	POE	933,694.47	554,609.15	N/A
417	POB	933,965.67	554,609.18	N/A
418	PI	934,077.65	554,634.43	500.00
419	PI	934,293.17	554,629.84	500.00
420	PI	934,438.13	554,594.43	150.00
421	PI	934,529.89	554,613.50	1000.00
422	PI	934,644.93	554,633.24	86.00
423	PI	934,902.00	554,621.70	100.00
424	PI	934,954.52	554,601.73	114.00
425	PI	935,008.73	554,594.42	200.00
426	POE	935,097.26	554,609.50	N/A
427	POB	935,236.46	554,609.51	N/A

TWO WORKING DAYS BEFORE YOU DIG CALL
602-263-1100
BLUE STAKE

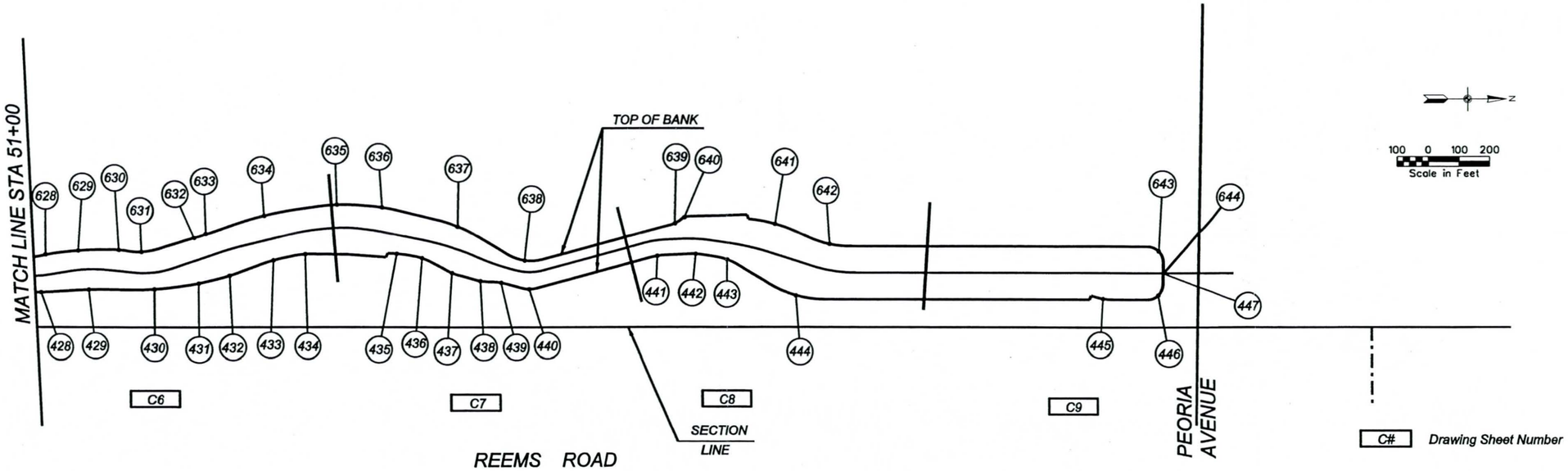
NO.	REVISION	BY	DATE
3			
2			
1	REVISED TOP OF BANK ALIGNMENT AND CONTROL	WAG	5-1-08

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

DRAWING NO.	TOP OF BANK GEOMETRIC LAYOUT STA 5+00 TO STA 51+00	SHEET OF
G8R		8 59



1

CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
628	PI	935,316.31	554,487.98	500.00
629	PI	935,425.86	554,475.19	1000.00
630	PI	935,560.33	554,472.96	1000.00
631	PI	935,634.92	554,479.09	200.00
632	POE	935,805.79	554,433.00	N/A
633	POB	935,843.69	554,421.45	N/A
634	PI	936,031.77	554,361.88	1000.00
635	PI	936,270.98	554,326.19	600.00
636	PI	936,419.00	554,334.72	600.00
637	PI	936,666.30	554,396.66	500.00
638	PI	936,886.18	554,507.04	150.00
639	PI	937,385.25	554,387.17	78.00
640	PI	937,415.68	554,367.95	50.00
641	PI	937,712.23	554,388.60	500.00
642	PI	937,893.05	554,454.16	350.00
643	PI	938,970.98	554,476.27	50.00
644	POE	938,984.51	554,548.29	N/A

1

CHANNEL GEOMETRY DATA				
PT #	DESC	NORTHING	EASTING	RADIUS
428	PI	935,301.57	554,610.04	1500.00
429	PI	935,460.65	554,601.52	1500.00
430	PI	935,675.71	554,600.29	1000.00
431	PI	935,819.37	554,581.60	1000.00
432	PI	935,919.32	554,556.53	600.00
433	PI	936,060.95	554,506.88	600.00
434	PI	936,165.84	554,486.63	300.00
435	PI	936,465.78	554,485.07	400.00
436	PI	936,549.74	554,499.60	200.00
437	PI	936,647.43	554,547.49	200.00
438	PI	936,739.10	554,573.05	200.00
439	PI	936,806.64	554,578.67	200.00
440	PI	936,901.01	554,599.84	100.00
441	PI	937,327.88	554,492.64	200.00
442	PI	937,452.38	554,486.41	200.00
443	PI	937,555.40	554,504.52	200.00
444	PI	937,779.60	554,620.45	350.00
445	PI	938,792.12	554,630.76	200.00
446	PI	938,968.78	554,618.98	50.00
447	POE	938,984.51	554,548.28	N/A

NO.	REVISION	BY	DATE
3			
2			
1	REVISED TOP OF BANK ALIGNMENT AND CONTROL	WAG	5-1-08

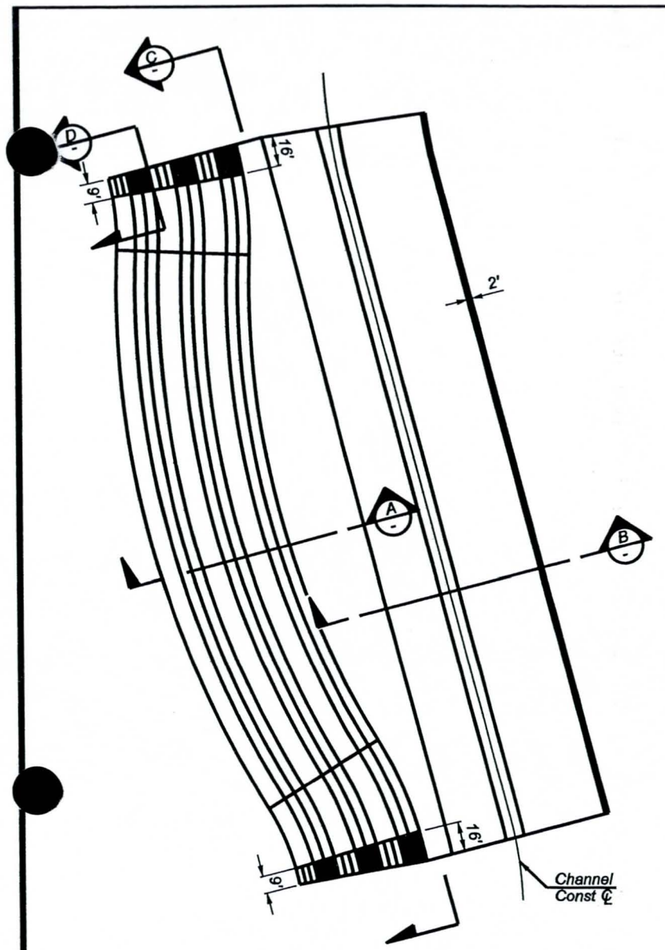
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

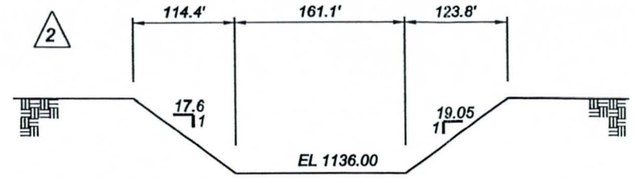
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

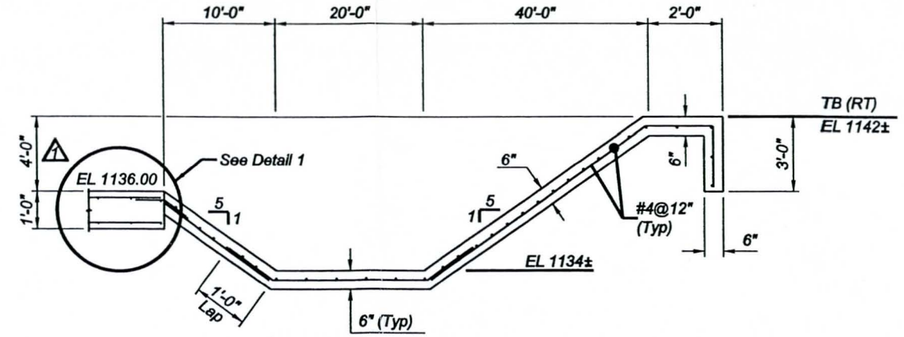
DRAWING NO.		SHEET OF
G9R	TOP OF BANK GEOMETRIC LAYOUT STA 51+00 TO POE	9 59

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

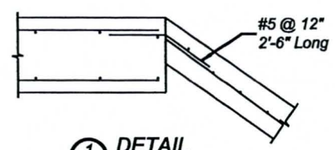




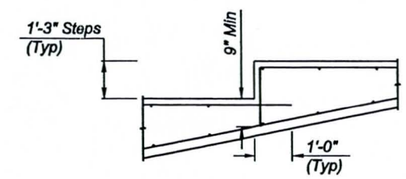
SECTION C-C
NTS



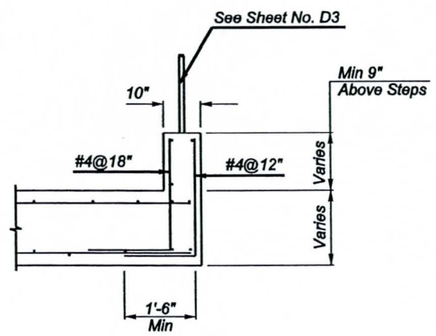
SECTION B-B
NTS



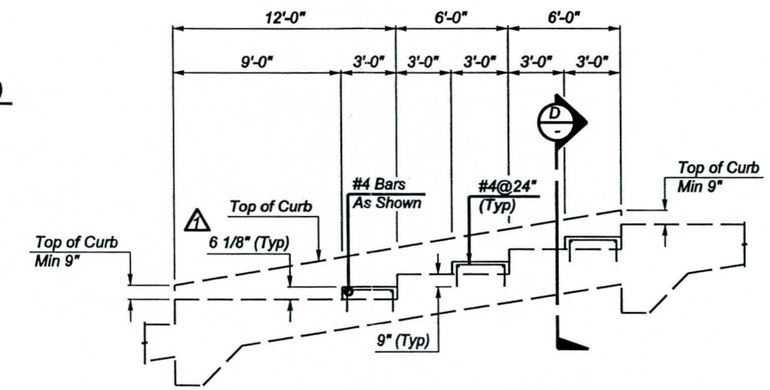
1 DETAIL
NTS



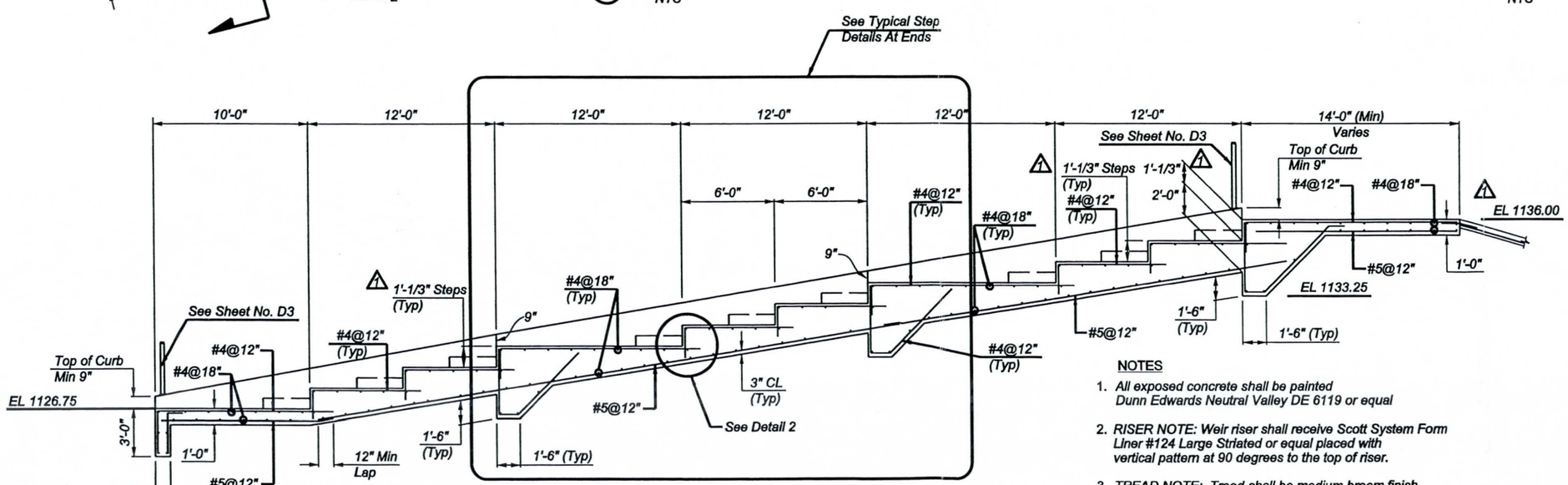
2 DETAIL (TYP)
NTS



D DETAIL
NTS



TYPICAL STEP DETAILS AT ENDS
NTS



SECTION A-A
NTS

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

NOTES

1. All exposed concrete shall be painted Dunn Edwards Neutral Valley DE 6119 or equal
2. RISER NOTE: Weir riser shall receive Scott System Form Liner #124 Large Striated or equal placed with vertical pattern at 90 degrees to the top of riser.
3. TREAD NOTE: Tread shall be medium broom finish

DETAIL D6

NO.	REVISION	BY	DATE
3			
2	REVISED WEIR DIMENSIONS	WAG	5-29-08
1	REVISED WEIR ELEVATION AND STEP HEIGHT	WAG	5-1-08

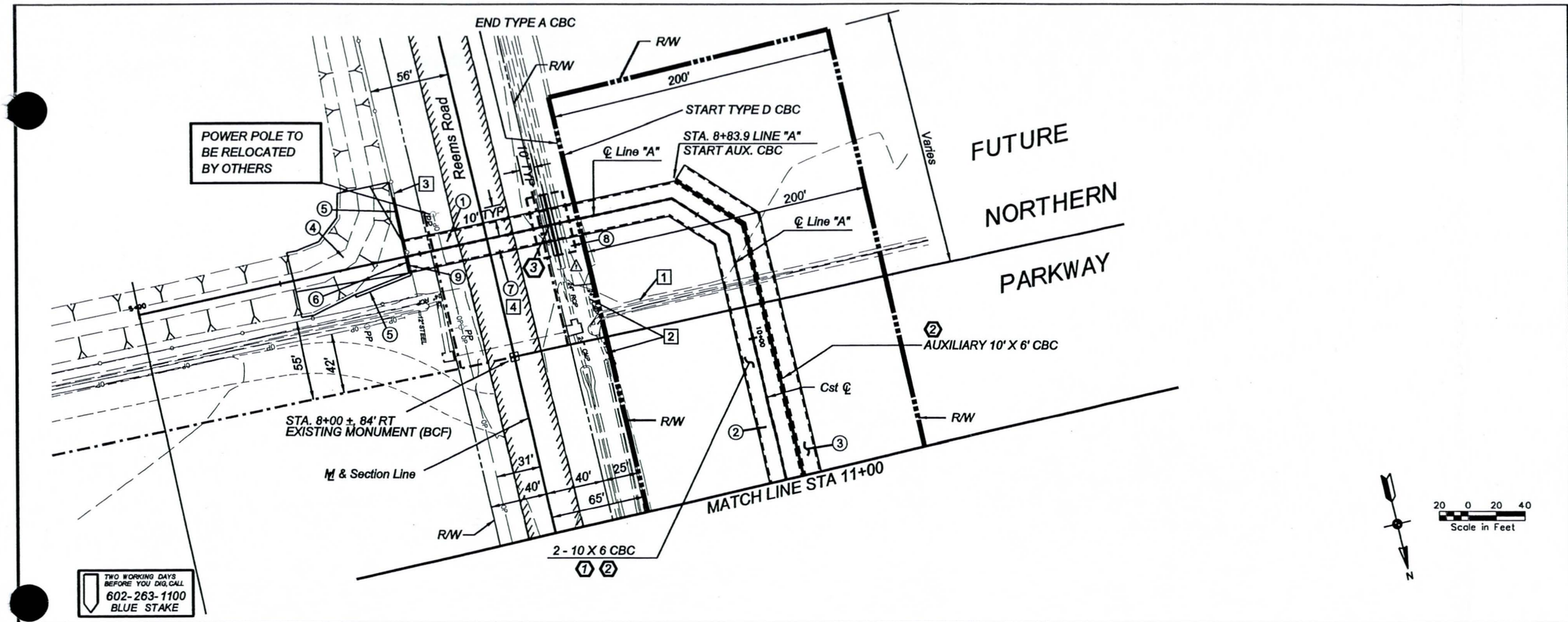
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

Registered Professional Engineer (Civil) CERTIFICATE NO. 18600 KUMAR V. HANUMAIAH Date Signed 1-22-08 ARIZONA, U.S.A.

	BY	DATE
DESIGNED	KVH	01/08
DRAWN	FRC	01/08
CHECKED	JRR	01/08

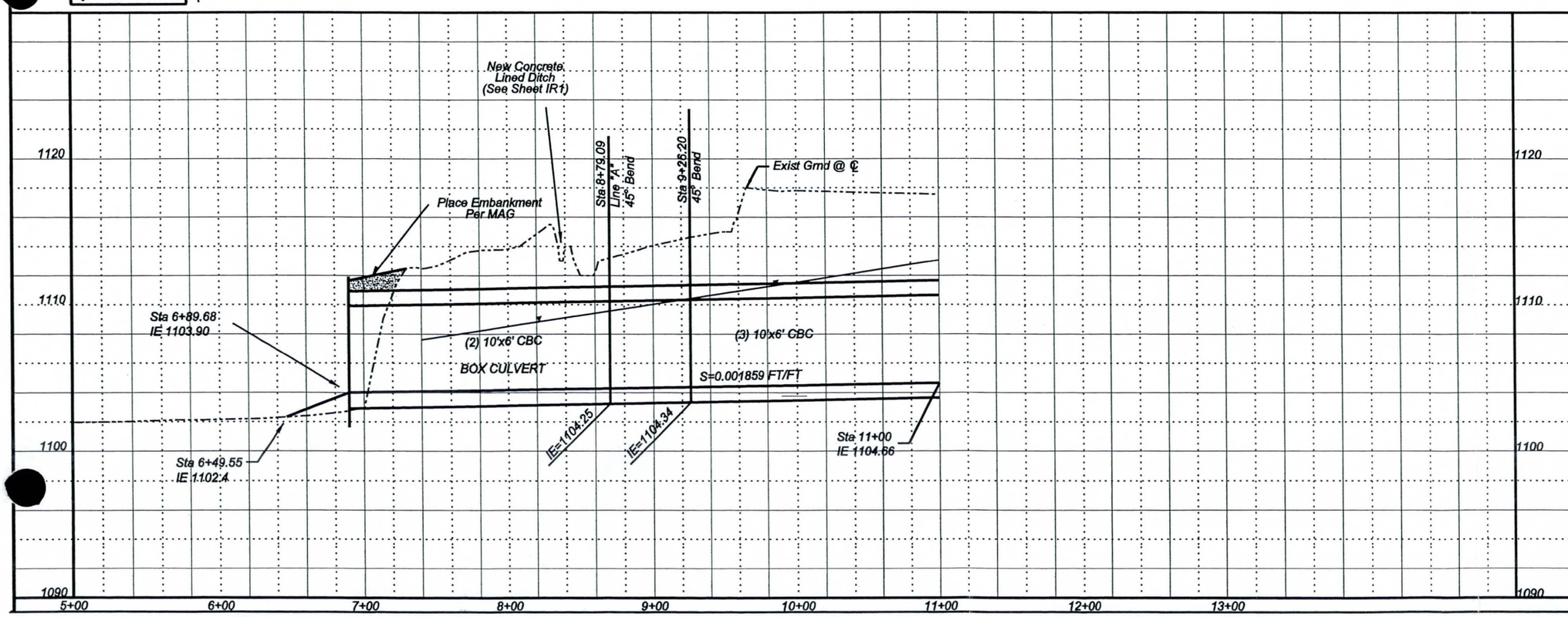
DRAWING NO. D6R | WEIR DETAIL | SHEET 19 OF 59



1	REMOVE CONCRETE LINED DITCH	220 LF
2	REMOVE 24" PIPE & HEADWALLS (NPI)	48 LF
3	REMOVE FENCE (NPI)	75 LF
4	REMOVE PAVEMENT (NPI)	195 SY

1	CONSTRUCT CONCRETE BOX CULVERT TYPE A, SEE DRAWING B1.1, B1.2 & D7	121 LF
2	CONSTRUCT CONCRETE BOX CULVERT TYPE D (30' FILL LOADING) SEE DRAWING B1.1, B1.2 & D7	289 LF
3	CONSTRUCT AUXILIARY CONCRETE BOX CULVERT TYPE B (30' FILL LOADING) SEE DRAWING B1.1, B1.2 & D7	241 LF
4	CONSTRUCT CONCRETE CHANNEL LINING	500 SY
5	CONSTRUCT SOUTH CONCRETE RETAINING WALLS, SEE DRAWING B1.1, B1.2, & D7	2 EA
6	CONSTRUCT ACCESS BARRIER SEE DRAWING B1.2	2 EA
7	PAVEMENT REPLACEMENT MAG 200 TYPE "B" T TOP	195 SY
8	20 MIL PVC SHEET VINYL WATERPROOFING	1,075 SF
9	CONSTRUCT HANDRAIL PER DETAIL ON DRAWING D3	92 LF

1. SEE DRAWING G6 FOR CBC ℄ COORDINATES
2. SEE DRAWING NO. B1.1, B1.2 & D7 FOR CONCRETE BOX CULVERT DETAIL (NOTE: ONE BARREL AUXILIARY IS FOR FUTURE STREET DRAINAGE)
3. SEE DRAWING G10 & DRAWING NO. IR1 FOR CONCRETE LINED DITCH REPLACEMENT



NO.	REVISION	BY	DATE
3			
2			
1	SEE NOTE 4	WAG	2/14/2008

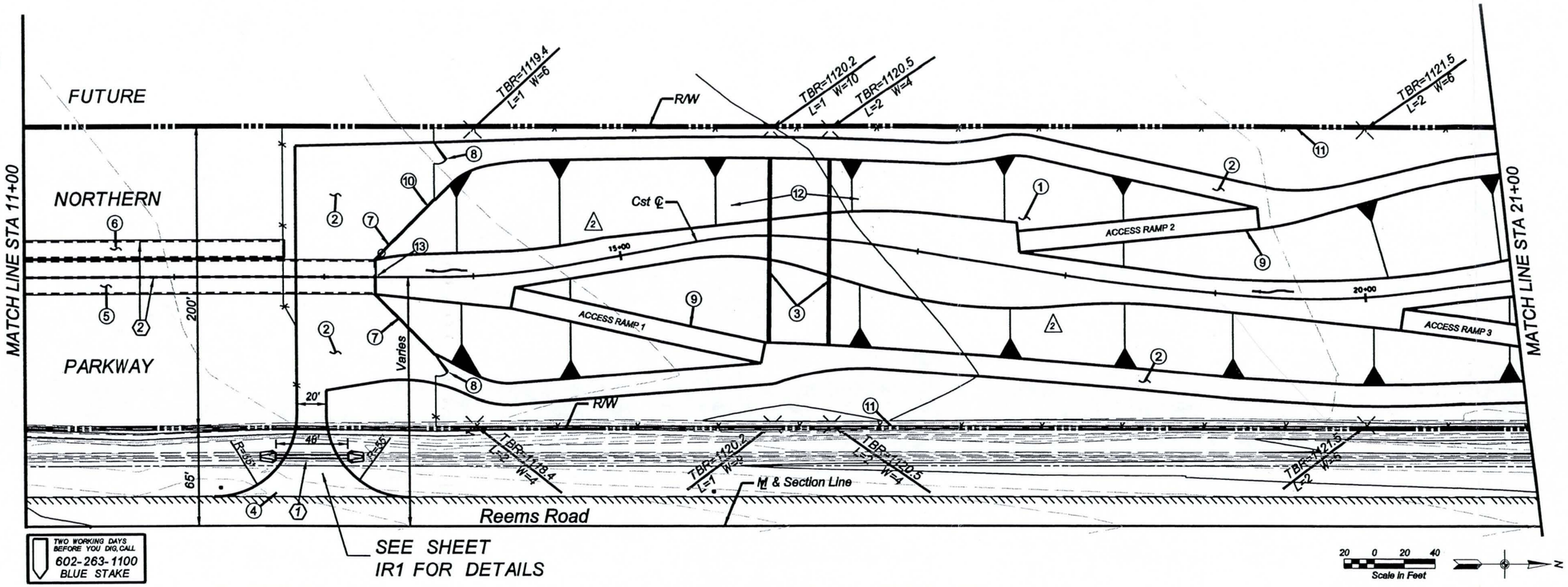
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

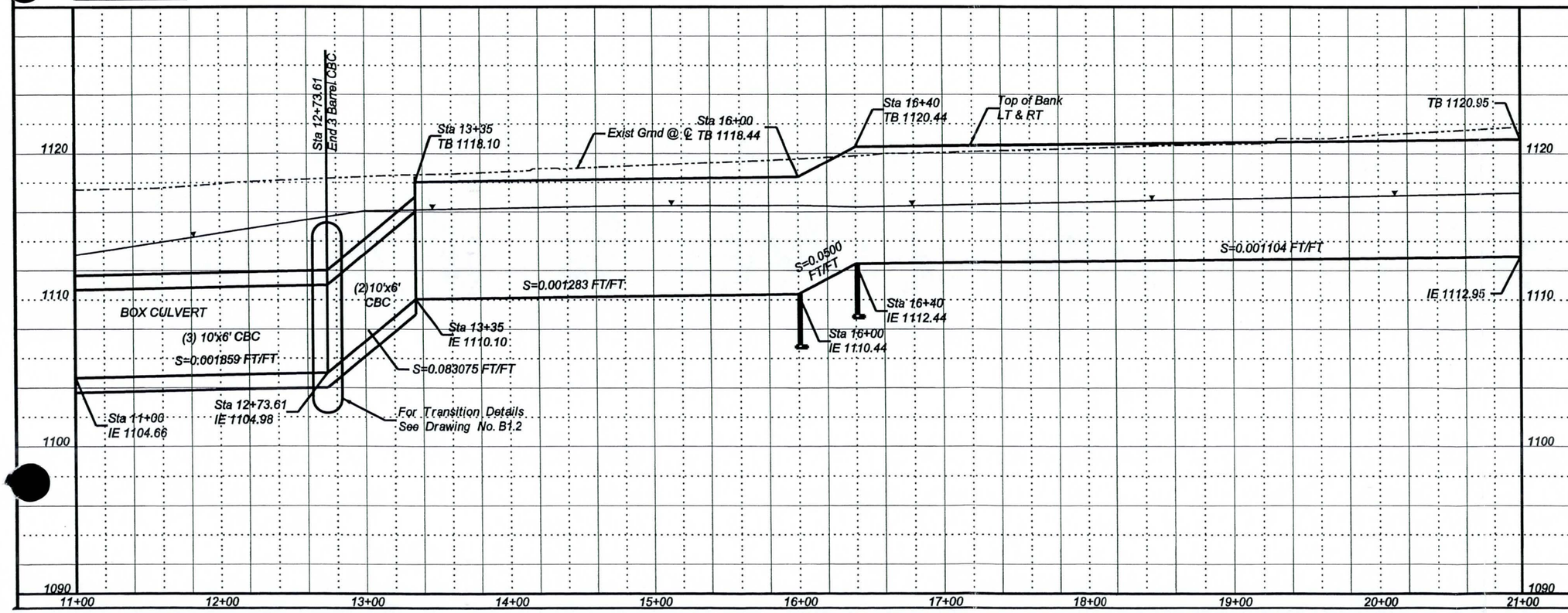
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 1-23-08 ARIZONA, U.S.A.

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
C1R	STA 5+00 TO 11+00	24 59





①	CONSTRUCT EARTHEN CHANNEL	CY
②	CONSTRUCT 4" ABC MAINTENANCE ROAD	4,343 SY
③	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	2 EA
④	PAVEMENT CONNECTION MAG 200 TYPE "B" NOT-TOP	248 SY
⑤	CONSTRUCT CONCRETE BOX CULVERT TYPE D (30' FILL) SEE DRAWING B1.1, B1.2, AND D7	235 LF
⑥	CONSTRUCT AUX. CONC BOX CULVERT TYPE B (30' FILL) SEE DRAWING B1.1, B1.2, AND D7	174 LF
⑦	CONSTRUCT CONCRETE RETAINING WALLS SEE DRAWING B1.1, B1.2, D1 AND D2	2 EA
⑧	CONSTRUCT GATE PER DETAIL ON SHEET D4	2 EA
⑨	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
⑩	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	134 LF
⑪	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,700 LF
⑫	INSTALL PLAIN RIP RAP	1,934 CY
⑬	CONSTRUCT ACCESS BARRIER SEE DRAWING B1.2	2 EA

① SEE DRAWING IR1 FOR PIPE & DITCH CONSTRUCTION

② SEE DRAWING NO. B1.1, B1.2 & D7 FOR CONCRETE BOX CULVERT DETAIL (NOTE: ONE BARREL IS FOR FUTURE STREET DRAINAGE)

NO.	REVISION	BY	DATE
3			
2	REVISED TOP OF SLOPE	WAG	5-8-08
1			

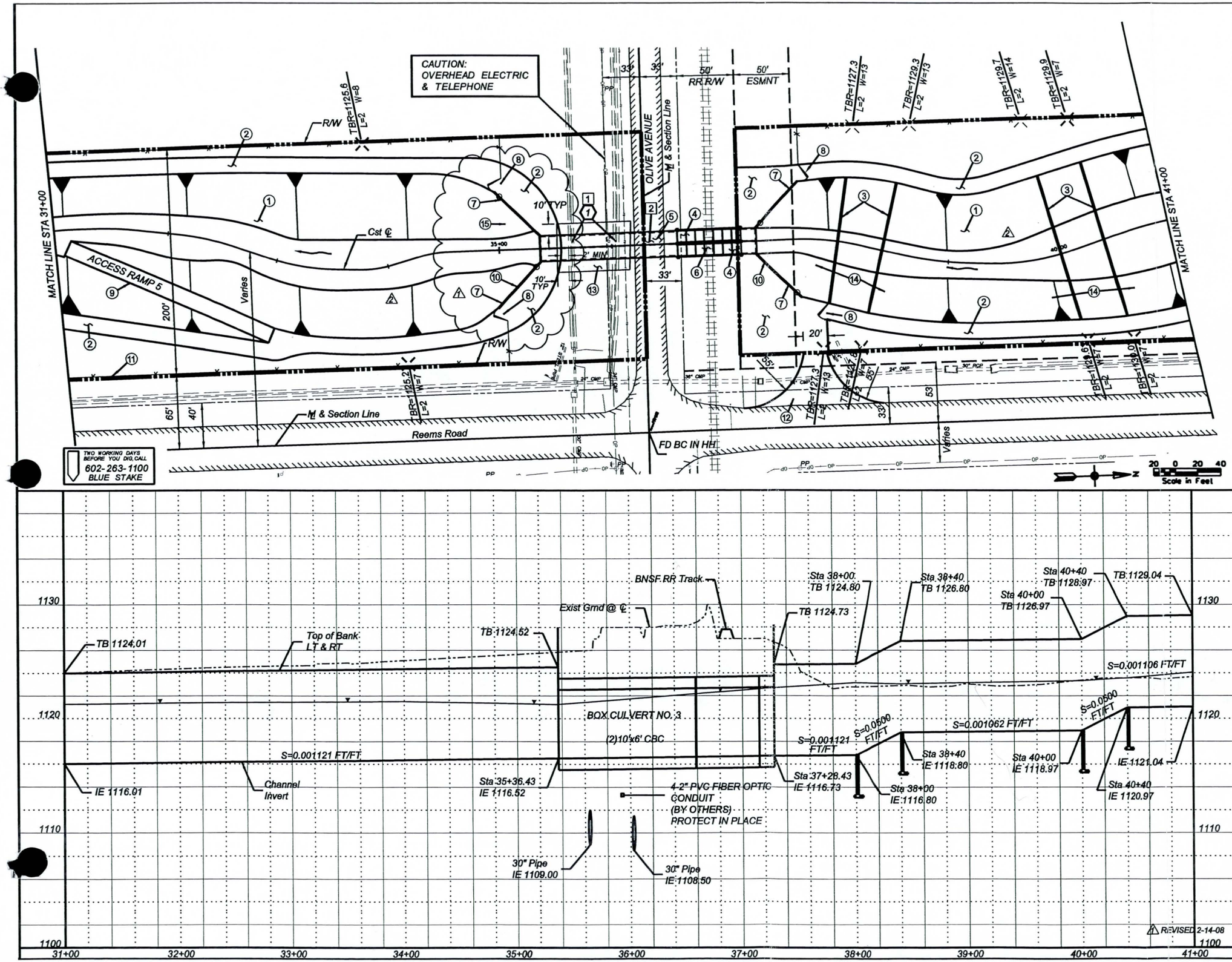
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 1-23-08 ARIZONA, U.S.A.

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
C2TOS	STA 11+00 TO STA 21+00	25 59



1 REMOVE CLD - SEE DRAWINGS IR2 & IR3

2 REMOVE PAVEMENT (NPI) 135 SY

1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINTENANCE ROAD	3,721 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	4 EA
4	CONSTRUCT CONCRETE BOX CULVERT TYPE A, SEE DRAWING B3.1 & B3.2	160 LF
5	PAVEMENT REPLACEMENT MAG 200 TYPE "B" T-TOP	135 SY
6	CONSTRUCT CONCRETE BOX CULVERT TYPE C, SEE DRAWING B3.1 & B3.2 (PRECAST)	112 LF
7	CONSTRUCT CONCRETE RETAINING WALLS AT OLIVE AVENUE	4 EA
8	CONSTRUCT GATE PER DETAIL ON SHEET D4	4 EA
9	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
10	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	268 LF
11	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,580 LF
12	PAVEMENT CONNECTION MAG 200 TYPE "B" (NO T-TOP)	250 SY
13	20 MIL PVC SHEET VINYL WATERPROOFING	2,762 SF
14	INSTALL PLAIN RIP RAP	3,855 CY
15	INSTALL PLAIN RIP RAP APRON 30 FT IN LENGTH & 3FT DEEP	3,855 CY

1 SEE DRAWINGS NO. IR2 & IR3 FOR PIPE AND CONSTRUCTION DETAIL
SEE DRAWING NO. B3.1 & B3.2 FOR CONCRETE BOX CULVERT DETAIL

BNSF REFERENCE INFORMATION:

REEMS RD. MP 6.91, DOT# 025716A

NO.	REVISION	BY	DATE
3			
2	REVISED TOP OF SLOPE	WAG	5-8-08
1	REVISED O&M ROADS	WAG	2-14-08

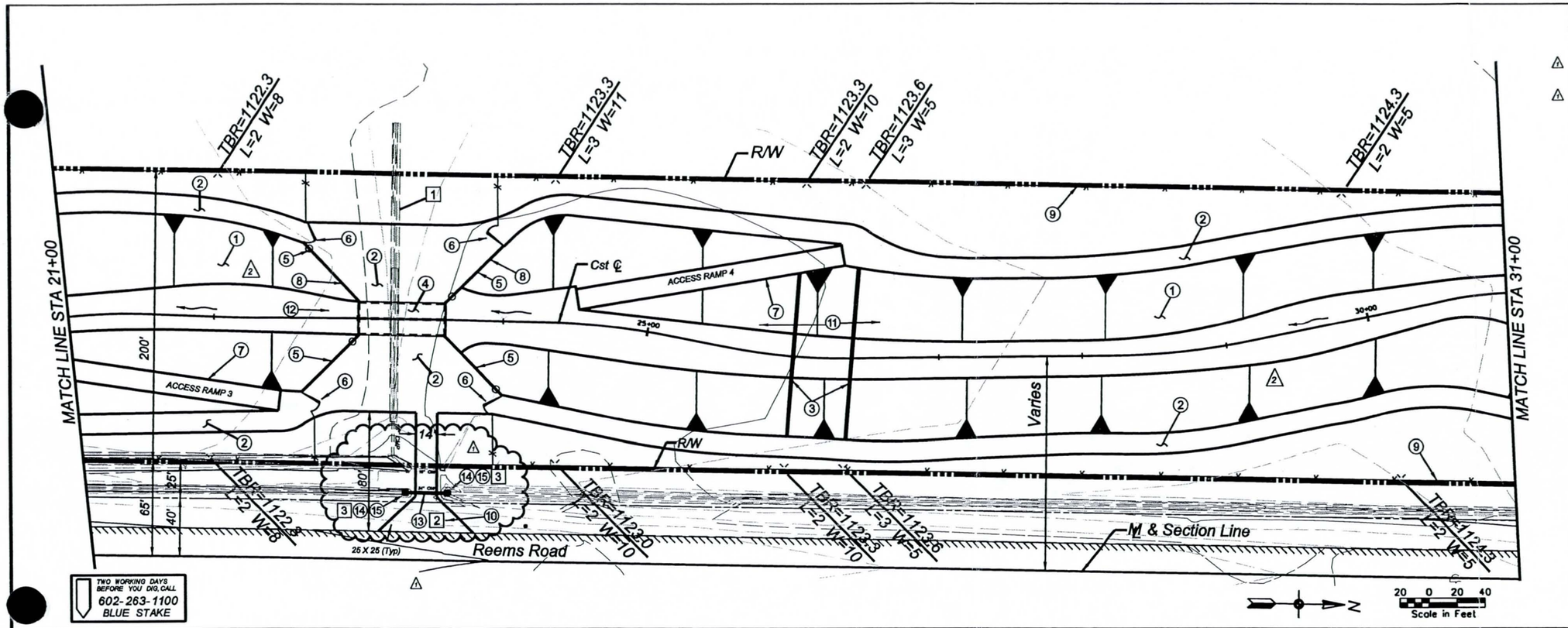
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

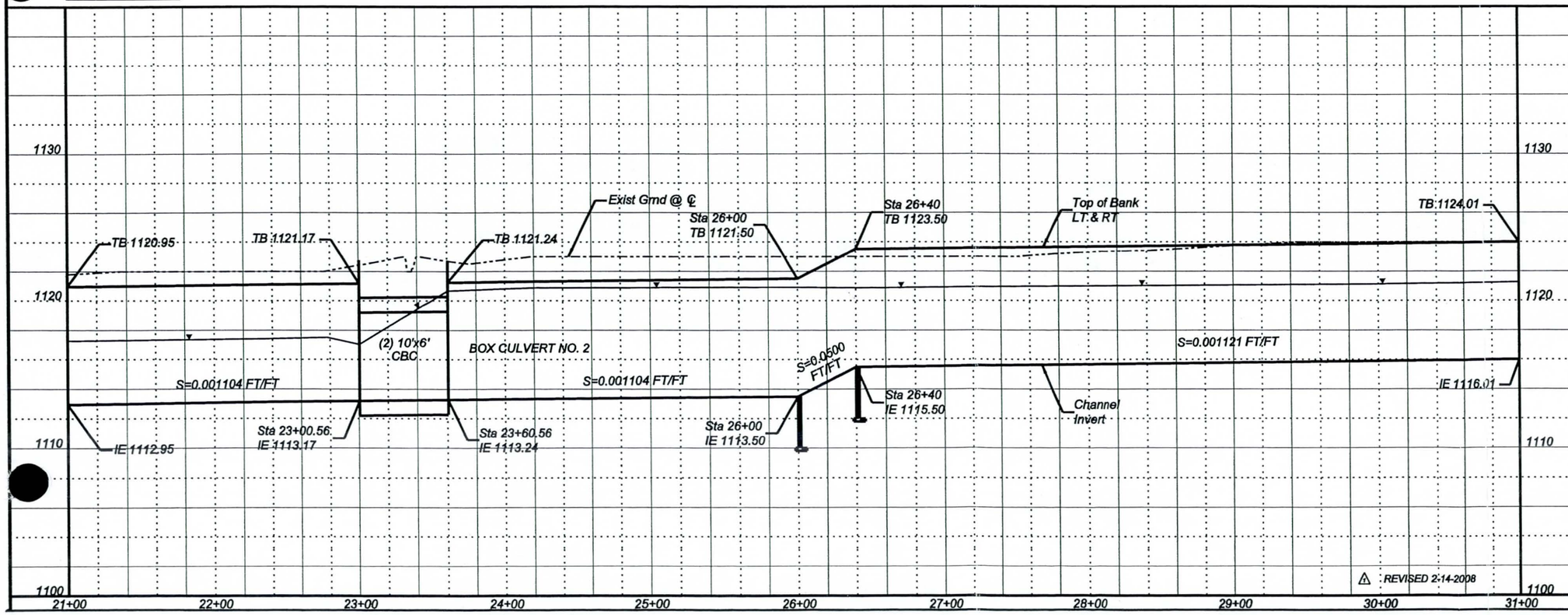
Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 2-14-2008 ARIZONA, U.S.A.

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
C4RTOS	STA 31+00 TO STA 41+00	27 59



1	REMOVE CONCRETE LINED DITCH	180 LF
△2	REMOVE CONCRETE PIPE (NPI)	24 LF
△3	REMOVE CONCRETE HEADWALL (NPI)	2 EA

1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINTENANCE ROAD	4,807 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	2 EA
4	CONSTRUCT CONCRETE BOX CULVERT TYPE A SEE DRAWING B2	60 LF
5	CONSTRUCT CONCRETE RETAINING WALLS SEE DRAWING D1,D2 AND B2	4 EA
6	CONSTRUCT GATE PER DETAIL ON SHEET D4	4 EA
7	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
8	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	268 LF
9	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,837 LF
10	PAVEMENT REPLACEMENT MAG 200 TYPE "B" NOT T-TOP	143 SY
11	INSTALL PLAIN RIP RAP	1,640 CY
12	INSTALL PLAIN RIP RAP APRON 30 FT IN LENGTH & 3 FT DEEP	1,640 CY
△13	INSTALL 24" MAIN LINE PIPE	24 LF
△14	INSTALL CONCRETE HEADWALL PER MWD STD DRAWING 723 & 724	2 EA
△15	CONSTRUCT CONCRETE LINED DITCH PER MWD STD DRAWING 103	10 LF



△ REVISED 2-14-2008

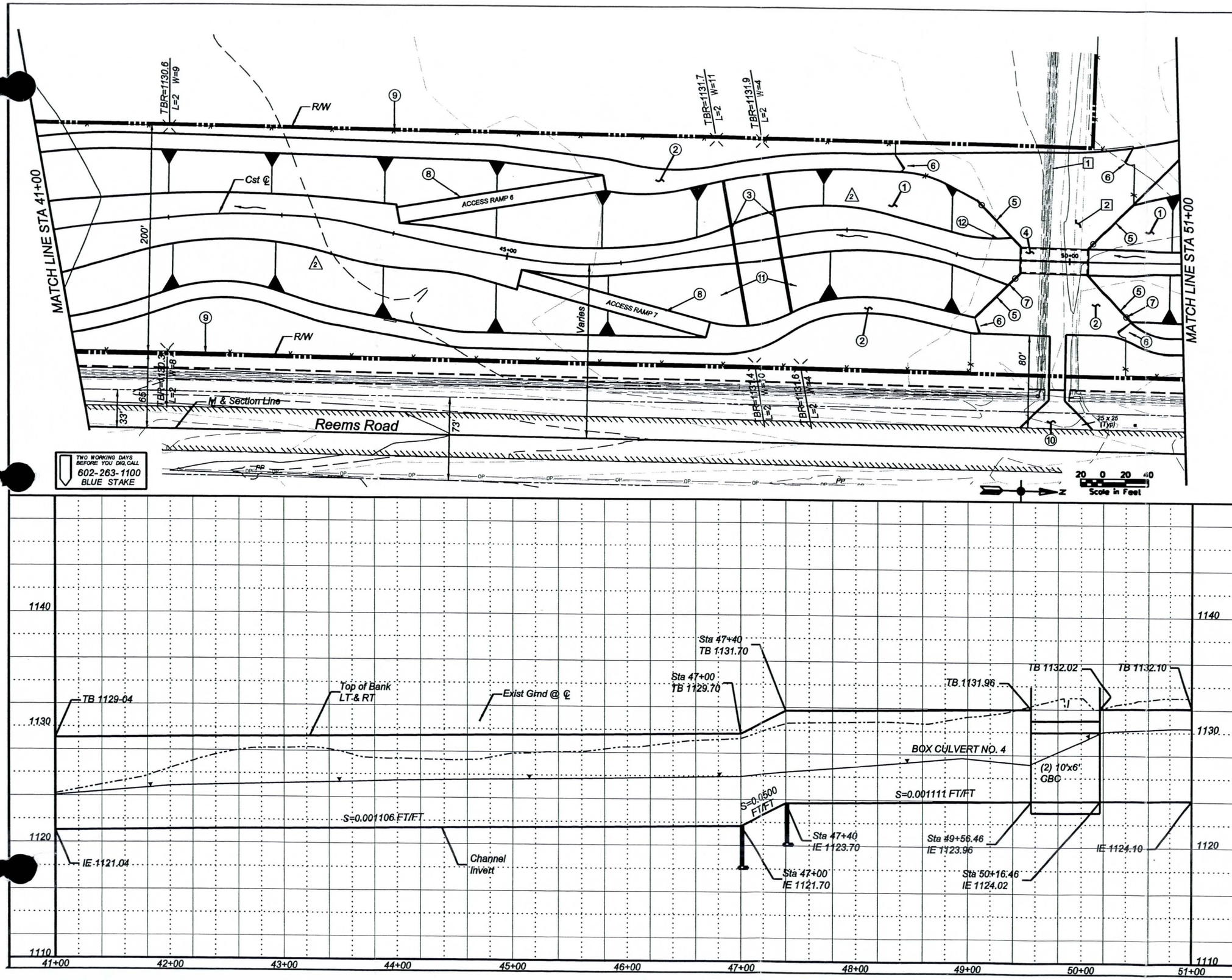
NO.	REVISION	BY	DATE
3			
2	REVISED TOP OF SLOPE	WAG	5-8-08
1	ADDED NEW PIPE & HEADWALLS	WAG	2-14-2008

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
C3RTOS	Sta 21+00 to Sta 31+00	26 59



1 REMOVE CONCRETE LINED DITCH 210 LF

1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINTENANCE ROAD	5,509 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	2 EA
4	CONSTRUCT CONCRETE BOX CULVERT TYPE A, SEE DRAWING B2	60 LF
5	CONSTRUCT CONCRETE RETAINING WALLS SEE DRAWING D1, D2 AND B2	4 EA
6	CONSTRUCT GATE PER DETAIL ON SHEET D4	4 EA
7	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	268 LF
8	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
9	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,695 LF
10	PAVEMENT CONNECTION MAG 200 TYPE "B" NOT T-TOP	143 SY
11	INSTALL PLAIN RIP RAP	1,724 CY
12	INSTALL PLAIN RIP RAP APRON 30 FT IN LENGTH & 3 FT DEEP	1,724 CY

NO.	REVISION	BY	DATE
3			
2	REVISED TOP OF SLOPE	WAG	5-8-08
1			

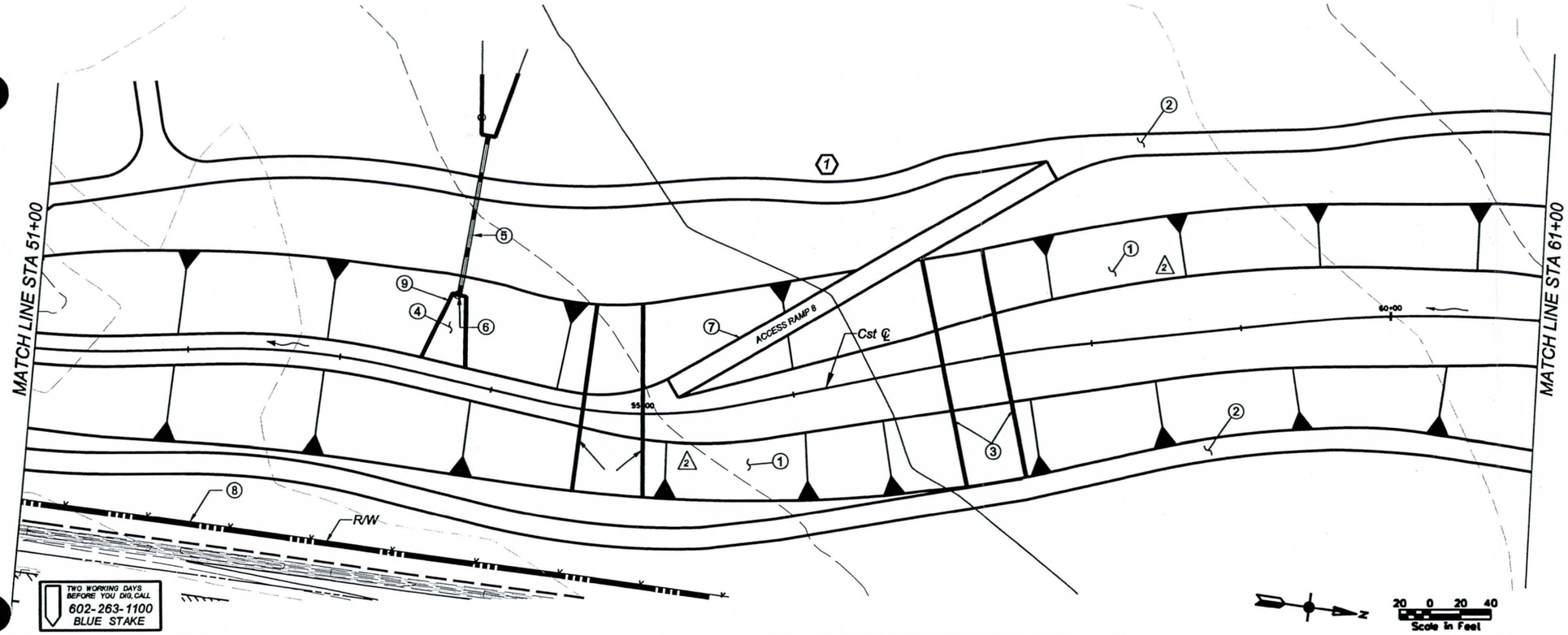
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

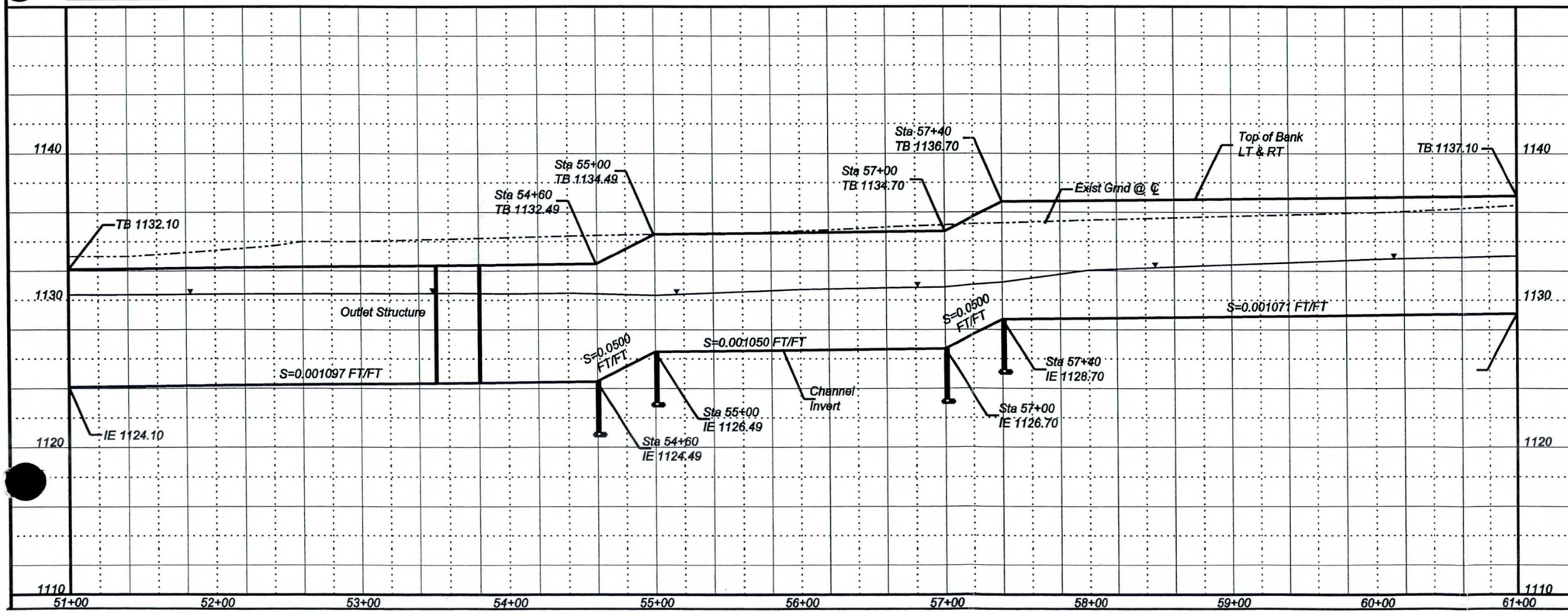
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 11-07-08 ARIZONA, U.S.A.

DRAWING NO.		SHEET OF
C5TOS	PLAN AND PROFILE SHEET STA 41+00 TO STA 51+00	28 59





①	CONSTRUCT EARTHEN CHANNEL	CY
②	CONSTRUCT 4" ABC MAINTENANCE ROAD	3,602 SY
③	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE SEE DETAIL D5	4 EA
④	CONSTRUCT CONCRETE OUTLET STRUCTURE SEE DRAWING NO. D8	1 EA
⑤	INSTALL 30 INCH PIPE SEE DRAWING NO. SD1	107 LF
⑥	INSTALL 30 INCH FLAPGATE - WATERMAN MODEL F-10 OR APPROVED EQUAL	1 EA
⑦	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
⑧	CONSTRUCT FENCE PER DETAIL ON SHEET D4	992 LF
⑨	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	100 LF
⑩	INSTALL PLAIN RIP RAP	3,827 CY

(1) SEE DRAWING NO. GB1 FOR BASIN GRADING PLAN

SEE DRAWING NO. D8 FOR OUTLET STRUCTURE DETAIL

SEE DRAWING NO. D9 FOR INLET STRUCTURE DETAIL

SEE DRAWING SD-1 FOR STORM DRAIN PROFILE

NO.	REVISION	BY	DATE
3			
2	REVISED TOP OF SLOPE	WAG	5-8-08
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

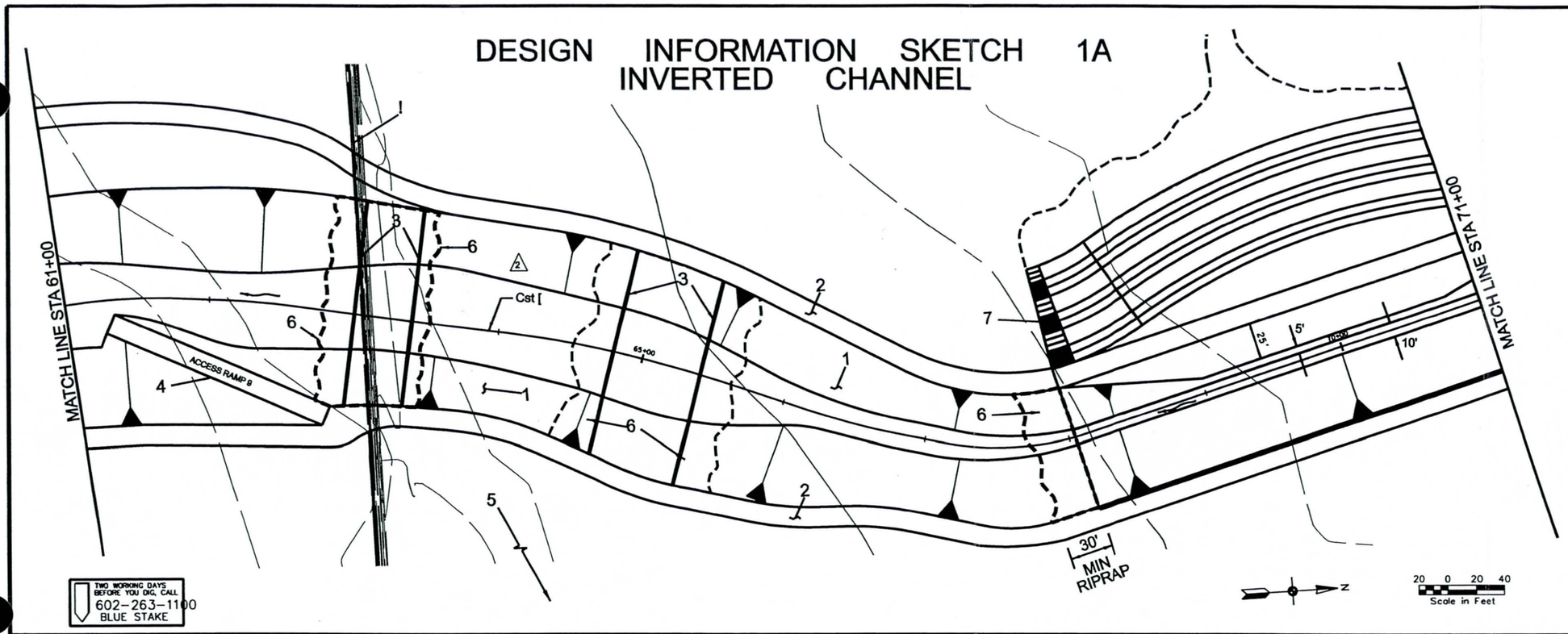
	BY	DATE
DESIGNED	JRR	08/07
DRAWN	FRC	08/07
CHECKED	WAG	08/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDOLE Date Signed 1-23-08 ARIZONA, U.S.A.

DRAWING NO.	PLAN AND PROFILE SHEET STA 51+00 TO STA 61+00	SHEET OF
C6TOS		29 59

SHEETS 30 AND 31 OF 59 SUPERSEDED BY THE FOLLOWING DESIGN INFORMATION SKETCHES 1A AND 1B

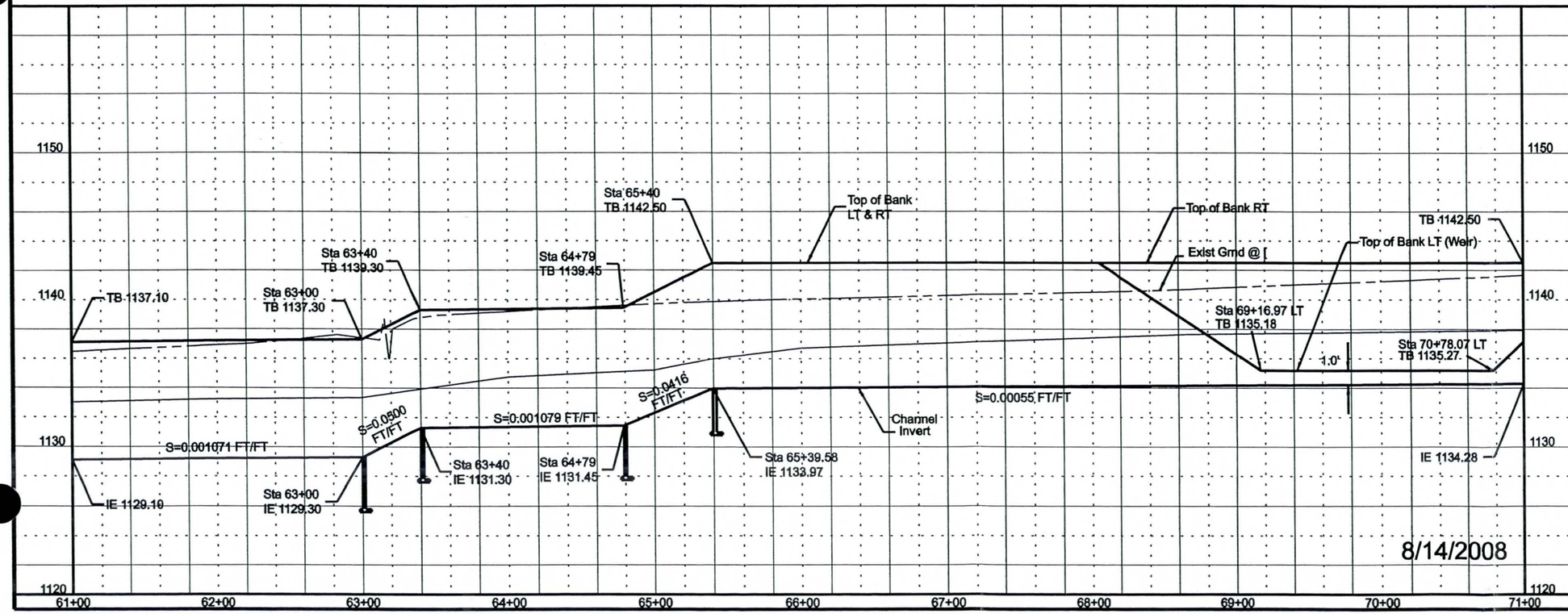
DESIGN INFORMATION SKETCH 1A
INVERTED CHANNEL



! SEE DRAWING GB1 FOR DITCH REMOVALS

1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINTENANCE ROAD	2,996 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	4 EA
4	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
5	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,004 LF
6	INSTALL PLAIN RIP RAP	4,406 CY
7	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	70 LF

SEE DRAWING GB1 FOR BASIN GRADING PLAN



NO.	REVISION	BY	DATE
3			
2			
1			

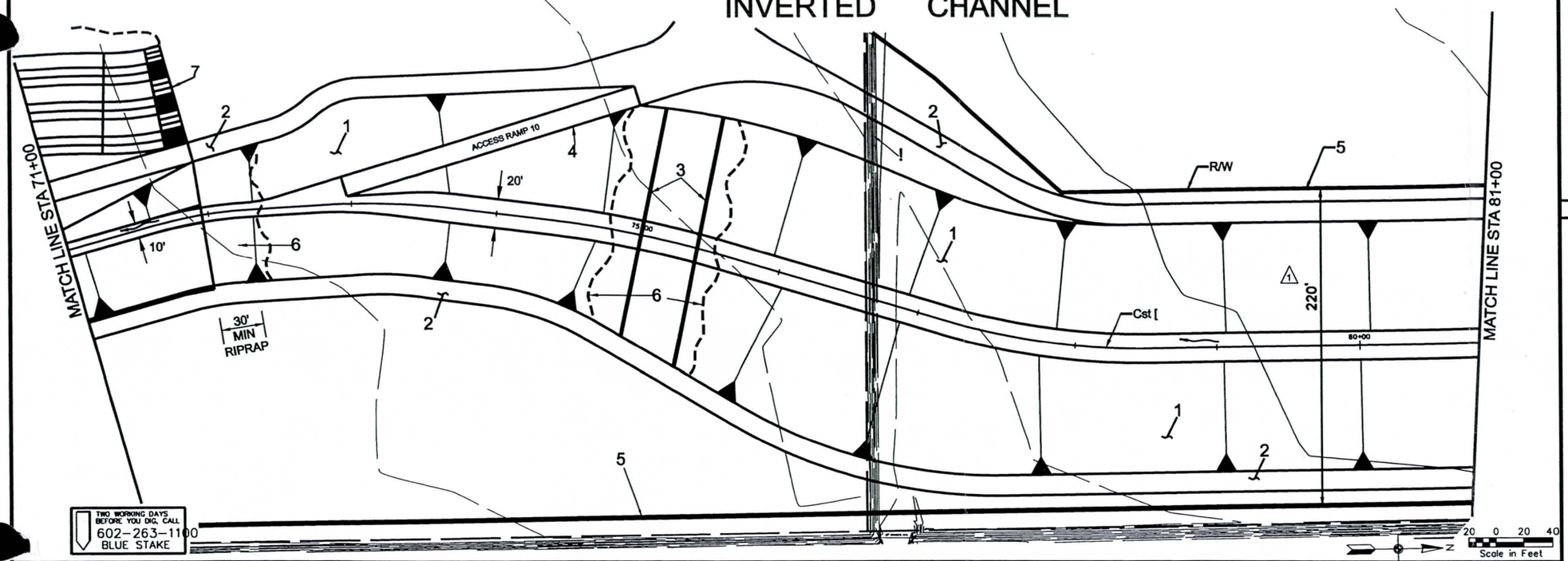
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

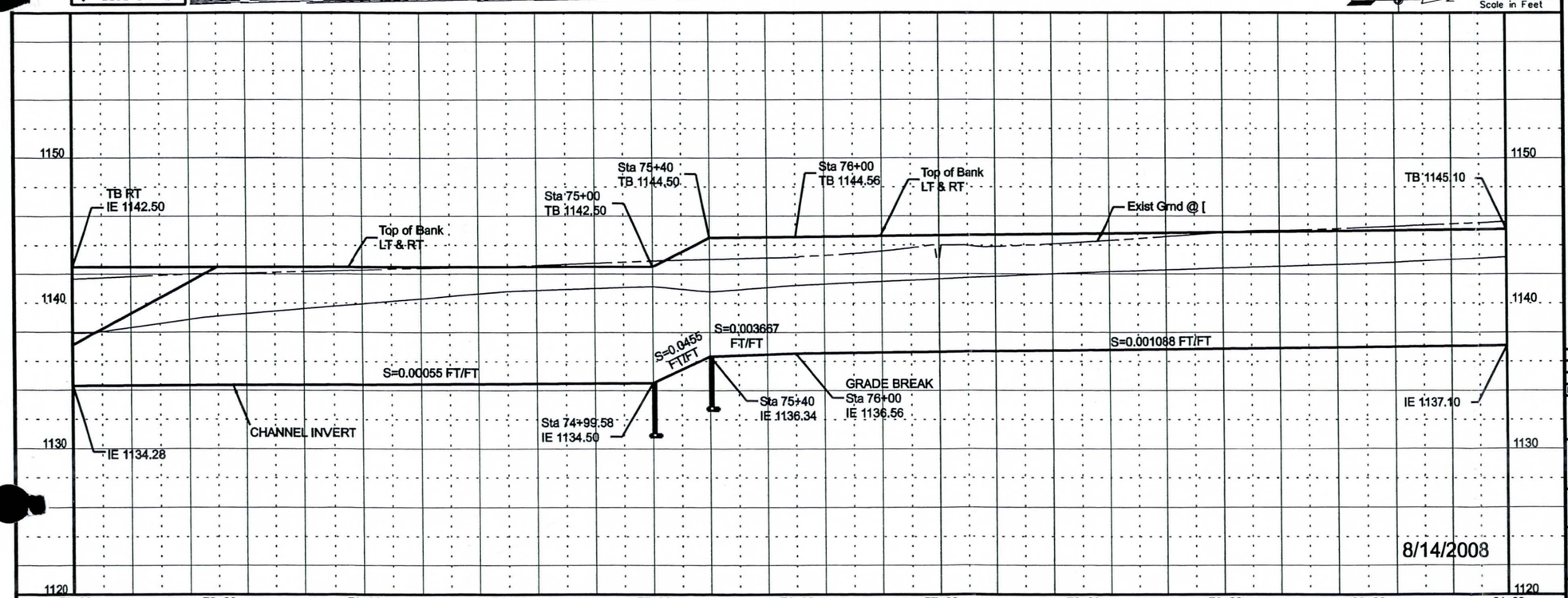
REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
DIS1A	STA 61+00 TO STA 71+00	1 2

DESIGN INFORMATION SKETCH 1B
INVERTED CHANNEL





!	REMOVE CONCRETE LINED DITCH	380 LF
1	CONSTRUCT EARTHEN CHANNEL	CY
2	CONSTRUCT 4" ABC MAINT. RD	3,700 SY
3	CONSTRUCT CONCRETE GRADE CONTROL STRUCTURE. SEE DETAIL D5	2 EA
4	CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
5	CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,251 LF
6	INSTALL PLAIN RIP RAP	2,643 CY
7	CONSTRUCT HANDRAIL PER DETAIL ON SHEET D3	70 LF

SEE DRAWING NO. GB1 FOR BASIN GRADING PLAN

NO.	REVISION	BY	DATE
3			
2			
1	REVISED ROW, ALIGNMENT AND WEIR ELEV	WAG	5/1/2008

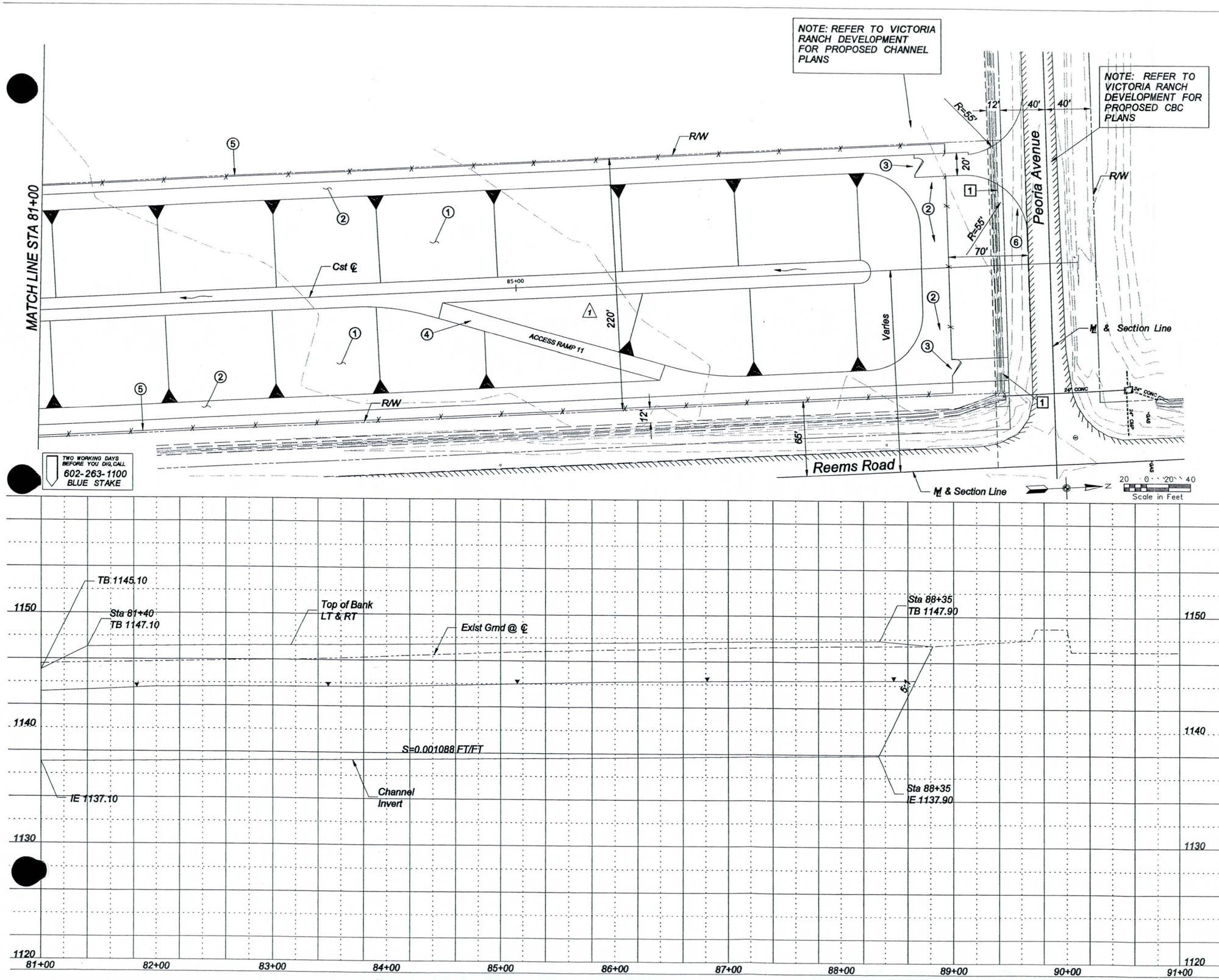
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 12-3-08 ARIZONA, U.S.A.

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
DIS1B	STA 71+00 TO STA 81+00	2 2



1 REMOVE CONCRETE LINED DITCH (NPI)	270 LF

1 CONSTRUCT EARTHEN CHANNEL	CY
2 CONSTRUCT 4" ABC MAINTENANCE ROAD	3,646 SY
3 CONSTRUCT GATE PER DETAIL ON SHEET D4	2 EA
4 CONSTRUCT ACCESS RAMP PER DETAIL ON SHEET D10	NPI
5 CONSTRUCT FENCE PER DETAIL ON SHEET D4	1,896 LF
6 PAVEMENT CONNECTION MAG 200 TYPE "B" (NOT T-TOP)	160 SY

NO.	REVISION	BY	DATE
3			
2			
1	REVISED ROW AND ALIGNMENT FOR CHANNEL	WAG	5/1/2008

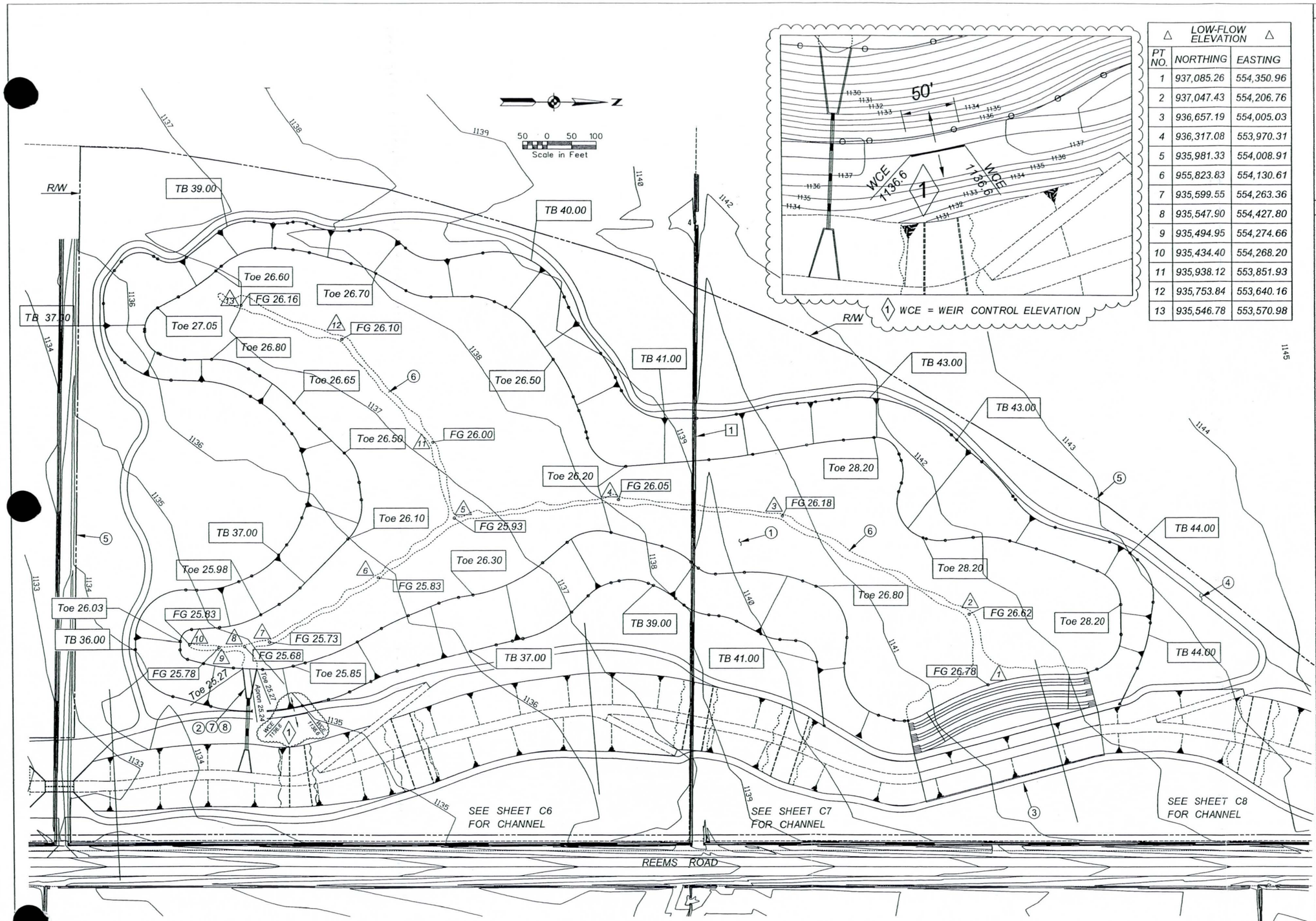
FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 CO18

	BY	DATE
DESIGNED	JRR	11/07
DRAWN	FRC	11/07
CHECKED	WAG	11/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 1-22-08 ARIZONA, U.S.A.

DRAWING NO.	PLAN AND PROFILE SHEET	SHEET OF
C9R	STA 81+00 TO STA 91+00	32 59



△ LOW-FLOW ELEVATION △		
PT NO.	NORTHING	EASTING
1	937,085.26	554,350.96
2	937,047.43	554,206.76
3	936,657.19	554,005.03
4	936,317.08	553,970.31
5	935,981.33	554,008.91
6	955,823.83	554,130.61
7	935,599.55	554,263.36
8	935,547.90	554,427.80
9	935,494.95	554,274.66
10	935,434.40	554,268.20
11	935,938.12	553,851.93
12	935,753.84	553,640.16
13	935,546.78	553,570.98

☐ REMOVE ☐

1 REMOVE CONCRETE LINED DITCH	1,140 LF

◯ CONSTRUCTION ◯

① EXCAVATE BASIN	437,800 CY
② CONSTRUCT INLET STRUCTURE SEE SHEET NO. D9, SD1	1 EA
③ CONSTRUCT WEIR STRUCTURE SEE SHEET NO. D6	1 EA
④ CONSTRUCT 4" ABC MAINTENANCE ROAD	6,182 SY
⑤ INSTALL WIRE FENCE	4,153 LF
⑥ INSTALL RIPRAP	4,762 CY
⑦ CONSTRUCT HANDRAIL	140 LF
⑧ CONSTRUCT ACCESS BARRIER PER DETAIL DRAWING B1.2 MODIFIED, SD1	1 EA

SEE SHEET LP3-LP8 FOR LANDSCAPE MOUND INFORMATION

NO.	REVISION	BY	DATE
3			
2			
1	ADDED BASIN EMERGENCY SPILLWAY	WAG	6/5/2008

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	11/07
DRAWN	FRC	11/07
CHECKED	JRR	11/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 11-23-08 ARIZONA, U.S.A.

TWO WORKING DAYS BEFORE YOU DIG CALL
602-263-1100
BLUE STAKE

WCE = WEIR CONTROL ELEVATION

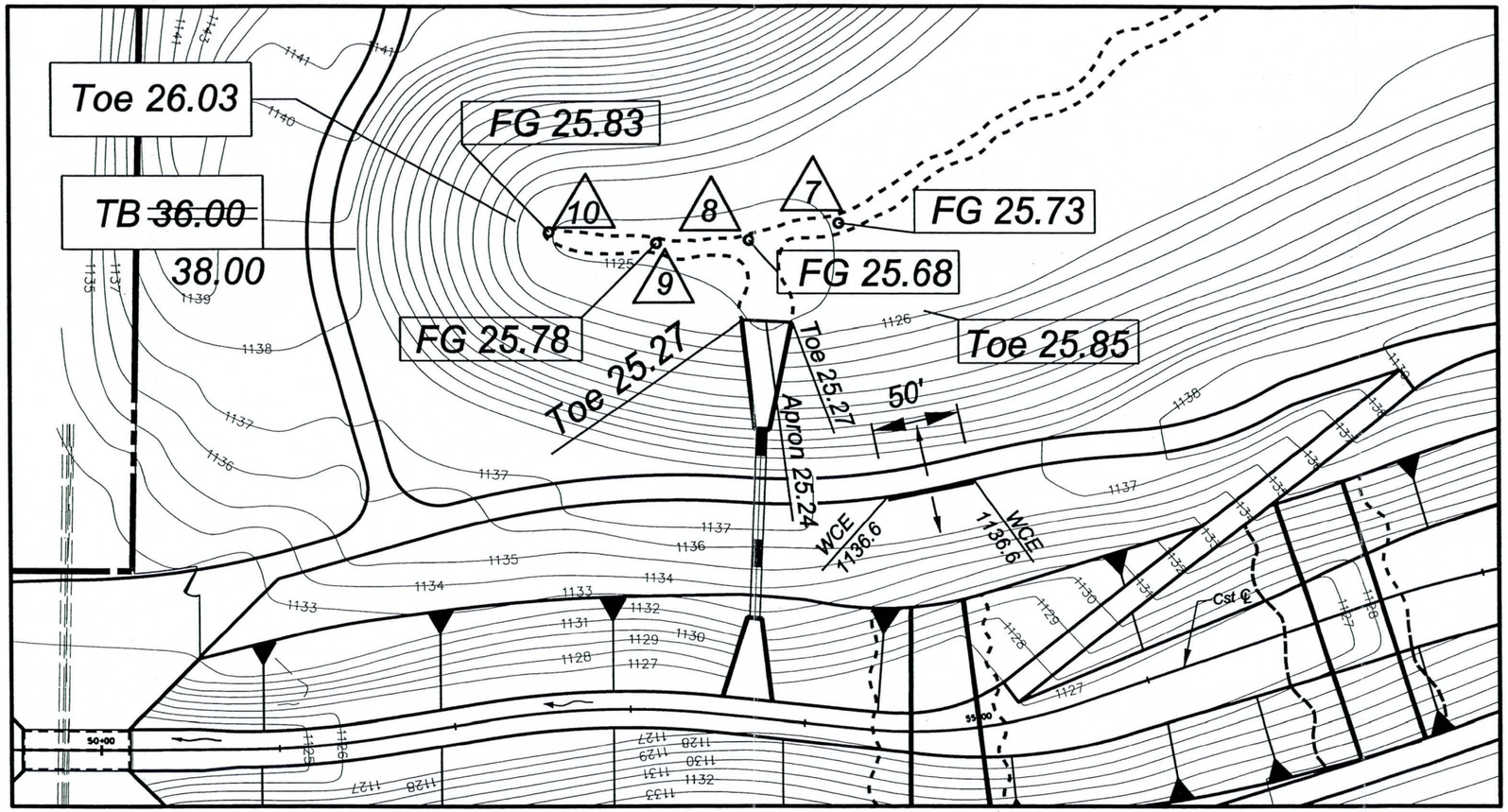
DRAWING NO. GB1R

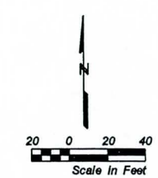
BASIN GRADING PLAN

SHEET 34 OF 59

SHEET 34 OF 59 PARTIALLY SUPERSEDED BY THE FOLLOWING
DESIGN INFORMATION SKETCH 2

DESIGN INFORMATION SKETCH 2
BASIN TB ELEVATION CHANGE





NO.	REVISION	BY	DATE
3	•	•	•
2	•	•	•
1	•	•	•

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

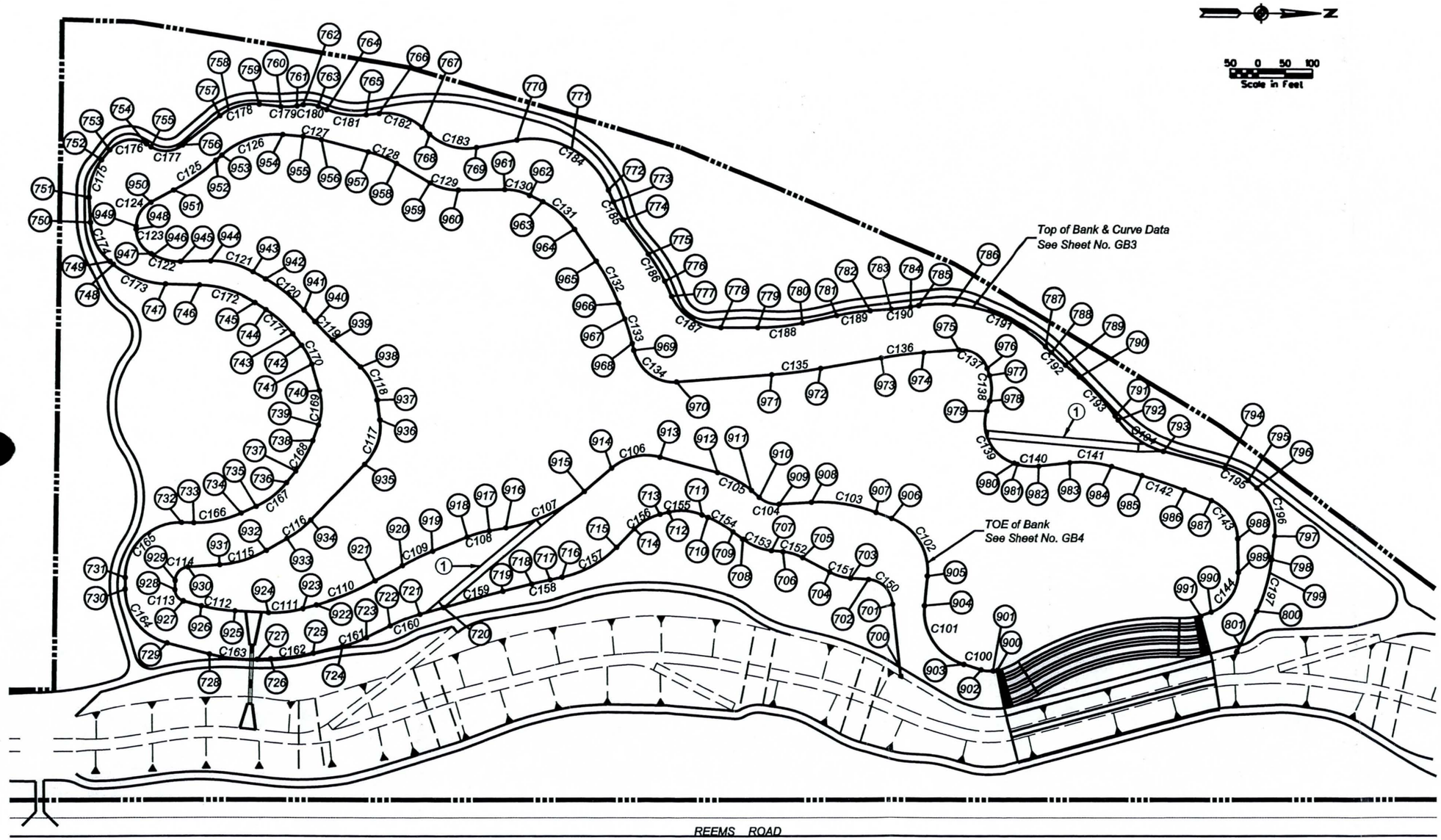
	BY	DATE
DESIGNED	WAG	6/17/2008
DRAWN	JGW	6/17/2008
CHECKED	JRR	6/17/2008

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 6/18/2008 ARIZONA, U.S.A.

DRAWING NO. DI62 | DESIGN INFORMATION SKETCH | SHEET OF 1 1

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

6/17/2008



REMOVE

CONSTRUCTION

① CONSTRUCT ACCESS RAMP NIC
SEE DETAIL D10, SHEET ..

SEE SHEET LP3 - LP8 FOR LANDSCAPE MOUND INFORMATION

SEE DETAIL D6 FOR WEIR DETAIL

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	10/07
DRAWN	FRC	10/07
CHECKED	JRR	10/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 4-22-08 ARIZONA, U.S.A.

DRAWING NO. GB2

BASIN ELEVATIONS

SHEET 35 OF 59

TWO WORKING DAYS BEFORE YOU DIG, CALL
602-263-1100
BLUE STAKE

SHEET 36 OF 59 PARTIALLY SUPERSEDED, SEE DESIGN INFORMATION SKETCH 2

BASIN GEOMETRY DATA				
PT #	DESC	ELEVATION	NORTHING	EASTING
700	POE	1141.39	936,741.79	554,418.47
701	PC	1141.00	936,729.67	554,305.13
702	PT	1140.64	936,683.44	554,260.57
703	PC	1140.47	936,650.31	554,258.26
704	PT	1140.47	936,611.15	554,247.23
705	PC	1139.97	936,560.80	554,221.06
706	PT	1139.78	936,524.49	554,210.27
707	PC	1139.67	936,503.54	554,208.21
708	PT	1139.38	936,451.95	554,187.62
709	PC	1139.27	936,434.68	554,174.19
710	PT	1139.00	936,389.01	554,147.52
711	PC	1138.95	936,378.59	554,143.17
712	PT	1138.65	935,316.95	554,138.14
713	PC	1138.57	936,300.47	554,142.05
714	PT	1138.30	936,252.83	554,168.64
715	PC	1138.07	936,219.20	554,202.27
716	PT	1137.52	936,119.28	554,256.50
717	PC	1137.42	936,097.86	554,261.04
718	PT	1137.26	936,064.63	554,268.68
719	PC	1137.00	936,012.31	554,281.66
720	PT	1136.85	935,903.92	554,310.16
721	PC	1136.80	935,860.44	554,322.25
722	PT	1136.72	935,806.05	554,343.25
723	PC	1136.66	935,763.33	554,364.72
724	PT	1136.60	935,719.68	554,380.63
725	PC	1136.52	935,666.18	554,393.32
726	PT	1136.42	935,588.59	554,403.86
727	PC	1136.39	935,563.85	554,404.77
728	PT	1136.28	935,476.45	554,395.10
729	PC	1136.17	935,399.76	554,374.92
730	PT	1136.00	935,325.20	554,277.73
731	PC	1136.05	935,325.30	554,256.57
732	PT	1136.46	935,427.80	554,157.09
733	PC	1136.52	935,450.29	554,157.65
734	PT	1136.74	935,536.65	554,140.42
735	PC	1136.82	935,564.23	554,128.14
736	PT	1137.00	935,620.05	554,085.18
737	PC	1137.00	935,637.08	554,064.03
738	PT	1137.00	935,668.83	554,008.13
739	PC	1137.00	935,679.32	553,979.83
740	PT	1137.00	935,681.66	553,917.41
741	PC	1137.00	935,667.86	553,869.48
742	PT	1137.00	935,649.97	553,834.81
743	PC	1137.00	935,633.56	553,814.23
744	PT	1137.00	935,584.86	553,770.35
745	PC	1137.00	935,564.84	553,757.56
746	PT	1137.00	935,463.98	553,726.19
747	PC	1137.00	935,401.89	553,724.06
748	PT	1137.00	935,308.75	553,687.47
749	PC	1137.00	935,302.63	553,682.16
750	PT	1137.00	935,268.26	553,611.21

BASIN GEOMETRY DATA				
PT #	DESC	ELEVATION	NORTHING	EASTING
751	PC	1137.23	935,266.17	553,565.81
752	PT	1137.61	935,288.83	553,497.69
753	PC	1137.73	935,303.70	553,479.62
754	PT	1138.10	935,369.23	553,469.24
755	PC	1138.15	935,377.29	553,474.39
756	PT	1138.46	935,434.96	553,471.67
757	PC	1138.90	935,503.27	553,418.37
758	TB	1139.00	935,519.48	553,408.06
759	PT	1139.09	935,575.49	553,397.78
760	PC	1139.15	935,614.93	553,402.03
761	PT	1139.20	935,644.57	553,400.80
762	PC	1139.21	935,655.96	553,398.60
763	PT	1139.26	935,683.57	553,401.10
764	PC	1139.28	935,698.97	553,407.10
765	PT	1139.39	935,770.72	553,416.32
766	PC	1139.43	935,792.92	553,413.74
767	PT	1139.56	935,871.68	553,439.01
768	PC	1139.59	935,885.51	553,451.57
769	PT	1139.73	935,970.50	553,475.92
770	PC	1139.87	936,044.09	553,462.62
771	TB	1140.00	936,142.96	553,478.75
772	PT	1140.23	936,209.63	553,553.53
773	PC	1140.29	936,218.41	553,575.03
774	PT	1140.37	936,236.84	553,607.74
775	PC	1140.55	936,282.76	553,669.58
776	PT	1140.68	936,312.57	553,719.06
777	PC	1140.74	936,325.40	553,745.90
778	PT	1141.00	936,415.27	553,802.79
779	PC	1141.31	936,481.45	553,803.02
780	PT	1141.69	936,563.81	553,794.75
781	PC	1141.99	936,627.93	553,781.50
782	PT	1142.29	936,690.03	553,772.69
783	PC	1142.47	936,730.70	553,769.50
784	PT	1142.64	936,766.12	553,765.45
785	PC	1142.71	936,780.61	553,763.27
786	TB	1143.00	936,843.62	553,761.08
787	PT	N/A	937,012.94	553,837.70
788	PC	1143.00	937,023.72	553,848.15
789	PT	1143.08	937,049.65	553,871.57
790	PC	1143.16	937,075.03	553,892.94
791	PT	1143.37	937,140.84	553,963.57
792	PC	1143.38	937,146.25	553,971.00
793	PT	1143.62	937,229.52	554,027.84
794	PC	1143.89	937,342.86	554,057.52
795	PT	1144.00	937,384.31	554,079.84
796	PC	1144.00	937,399.70	554,093.64
797	PT	1144.00	937,432.02	554,181.34
798	PC	1144.00	937,426.33	554,223.79
799	TB	1144.00	937,422.12	554,247.77
800	PT	1143.75	937,398.07	554,316.59
801	POE	N/A	937,367.38	554,378.86

BASIN GEOMETRY CURVE DATA				
CV #	RADIUS	DELTA ANGLE	LENGTH	TANGENT
C150	50.00	79°54'08"	69.730	41.88
C151	100.00	23°28'18"	40.97	20.77
C152	100.00	21°50'01"	38.11	19.29
C153	100.00	32°14'39"	56.28	28.91
C154	200.00	15°11'40"	53.04	26.68
C155	100.00	36°01'24"	62.87	32.51
C156	100.00	31°39'26"	55.25	28.35
C157	200.00	33°01'26"	115.28	59.29
C158	1,000.00	1°57'14"	34.10	17.05
C159	4,000.00	1°36'20"	112.08	56.05
C160	300.00	11°09'12"	58.40	29.29
C161	200.00	13°20'24"	46.57	23.39
C162	400.00	11°14'-05"	78.43	39.34
C163	300.00	16°51'15"	88.25	44.44
C164	100.00	75°32'13"	131.84	77.48
C165	100.00	91°09'25"	159.10	102.04
C166	200.00	25°26'05"	88.78	45.14
C167	150.00	27°09'31"	71.10	36.23
C168	200.00	18°29'51"	64.57	32.57
C169	100.00	36°24'01"	63.53	32.88
C170	100.00	22°29'36"	39.26	19.89
C171	200.00	18°51'50"	65.85	33.22
C172	200.00	30°37'19"	106.89	54.76
C173	150.00	38°58'15"	102.03	53.07
C174	100.00	46°25'59"	81.04	42.89
C175	100.00	42°04'09"	73.42	38.46
C176	50.00	83°07'48"	72.54	44.34
C177	50.00	70°31'54"	61.55	35.36
C178	100.00	44°06'42"	76.99	40.52
C179	100.00	17°03'28"	29.77	15.00
C180	50.00	32°10'58"	28.08	14.42
C181	150.00	27°54'15"	73.05	37.27
C182	100.00	48°51'24"	85.27	45.42
C183	100.00	52°28'06"	91.57	49.28
C184	150.00	78°01'57"	204.29	121.54
C185	150.00	14°22'49"	37.65	28.92
C186	300.00	11°02'59"	57.86	29.02
C187	100.00	64°15'15"	112.14	62.80
C188	400.00	11°52'40"	82.92	41.61
C189	500.00	7°11'33"	62.77	31.42
C190	500.00	4°05'09"	35.66	17.84
C191	275.00	52°39'49"	252.77	136.10
C192	500.00	4°00'13"	34.94	17.48
C193	400.00	13°51'43"	96.77	48.62
C194	150.00	39°11'50"	102.83	53.53
C195	100.00	27°13'50"	47.53	24.22
C196	100.00	55°43'25"	97.26	52.86
C197	300.00	18°36'31"	97.43	49.15

FOR LOCATION KEY MAP SEE SHEET GB2

TWO WORKING DAYS BEFORE YOU DIG, CALL 602-263-1100 BLUE STAKE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	09/07
DRAWN	FRC	09/07
CHECKED	JRR	09/07

DRAWING NO. GB3

TOP OF BANK ELEVATION & CURVE DATA

SHEET 36 OF 59

BASIN GEOMETRY DATA

PT #	DESC	ELEVATION	NORTHING	EASTING
900	POB	1126.80	936,918.25	554,423.99
901	PC	1126.97	936,911.09	554,425.01
902	PT	1127.20	936,889.17	554,423.26
903	PC	1127.90	936,857.51	554,413.42
904	PT	1127.10	936,787.76	554,307.34
905	PC	1127.01	936,793.39	554,254.48
906	PT	1126.80	936,728.67	554,150.11
907	PC	1126.76	936,698.61	554,138.98
908	PT	1126.59	936,578.05	554,120.77
909	PC	1126.51	936,517.99	554,124.06
910	PT	1126.46	936,482.23	554,111.68
911	PC	1126.44	936,467.77	554,098.96
912	PT	1126.35	936,407.19	554,066.63
913	PC	1126.20	936,301.27	554,038.52
914	PT	1126.23	936,211.27	554,058.64
915	PC	1126.25	936,161.01	554,100.89
916	PT	1126.30	936,018.34	554,167.00
917	PC	1126.26	935,988.57	554,172.08
918	PT	1126.22	935,947.89	554,183.54
919	PC	1126.14	935,884.36	554,208.95
920	PT	1126.08	935,829.23	554,235.01
921	PC	1126.01	935,779.72	554,262.22
922	PT	1125.88	935,672.92	554,305.74
923	PC	1125.85	935,648.15	554,312.63
924	PT	1125.32	935,585.17	554,319.74
925	PC	1125.30	935,524.09	554,316.87
926	PT	1125.60	935,462.85	554,307.60
927	PC	1125.81	935,429.90	554,299.06
928	PT	1126.00	935,414.93	554,279.00
929	PC	1126.03	935,415.52	554,262.21
930	PT	1126.00	935,438.78	554,238.15
931	PC	1125.99	935,496.82	554,234.13
932	PT	1125.98	935,582.23	554,208.26
933	PC	1125.98	935,620.03	554,186.66
934	PT	1126.01	935,664.00	554,152.63
935	PC	1126.10	935,762.66	554,051.45
936	PT	1126.12	935,790.40	553,970.24
937	PC	1126.25	935,786.28	553,934.26
938	PT	1126.50	935,756.88	553,874.20
939	PC	1126.62	935,706.49	553,824.87
940	PT	1126.70	935,674.31	553,791.89
941	PC	1126.65	935,654.88	553,771.02
942	PT	1126.77	935,584.76	553,715.35
943	PC	1126.78	935,561.79	553,702.16
944	PT	1126.80	935,484.71	553,682.25
945	PC	1126.86	935,429.63	553,683.13

BASIN GEOMETRY DATA

PT #	DESC	ELEVATION	NORTHING	EASTING
946	PT	1126.93	935,380.82	553,671.29
947	PC	1126.92	935,376.17	553,668.80
948	PT	1126.99	935,349.79	553,623.98
949	PC	1126.99	935,349.86	553,618.94
950	PT	1127.05	935,376.41	553,575.53
951	PC	1126.90	935,417.88	553,553.51
952	PT	1126.60	935,495.66	553,499.53
953	PC	1126.60	935,506.21	553,490.17
954	PT	1126.64	935,617.97	553,452.91
955	PC	1126.65	935,655.54	553,455.99
956	PT	1126.66	935,689.08	553,461.64
957	PC	1126.68	935,774.00	553,483.51
958	PT	1126.70	935,824.50	553,504.21
959	PC	1126.67	935,885.77	553,539.77
960	PT	1126.64	935,936.68	553,553.28
961	PC	1126.60	936,021.29	553,552.68
962	PT	1126.58	936,066.72	553,563.23
963	PC	1126.57	936,089.74	553,574.74
964	PT	1126.53	936,146.87	553,624.82
965	PC	1126.50	936,185.92	553,682.50
966	PT	1126.41	936,226.34	553,758.86
967	PC	1126.38	936,237.59	553,787.14
968	PT	1126.33	936,251.35	553,831.43
969	PC	1126.31	936,254.17	553,843.79
970	PT	1126.20	936,332.93	553,901.93
971	PC	1126.86	936,506.26	553,888.87
972	PT	1127.21	936,597.10	553,877.83
973	PC	1127.65	936,710.02	553,858.82
974	PT	1127.96	936,789.29	553,848.72
975	PC	1128.20	936,852.20	553,843.24
976	PT	1128.20	936,904.03	553,877.43
977	PC	1128.20	936,908.29	553,890.39
978	PT	1128.20	936,908.44	553,936.81
979	PC	1128.20	936,902.68	553,954.68
980	PT	1128.20	936,953.10	554,049.68
981	PC	1128.20	936,959.98	554,051.69
982	PT	1128.20	936,998.71	554,055.09
983	PC	1128.20	937,056.21	554,048.87
984	PT	1128.20	937,133.43	554,055.61
985	PC	1128.20	937,189.95	554,071.99
986	PT	1128.20	937,267.83	554,098.08
987	PC	1128.20	937,316.40	554,116.60
988	PT	1128.20	937,364.68	554,186.19
989	PC	1128.18	937,365.08	554,247.18
990	PT	1127.00	937,314.74	554,318.50
991	PC	1126.80	937,295.29	554,325.27

BASIN GEOMETRY CURVE DATA

CV #	RADIUS	DELTA ANGLE	LENGTH	TANGENT
C100	50.00	25°24'14"	22.18	11.27
C101	100.00	78°49'55"	137.56	82.16
C102	100.00	75°49'59"	132.24	77.80
C103	300.00	23°27'02"	122.79	62.27
C104	50.00	44°27'39"	38.80	20.44
C105	150.00	26°28'01"	69.29	35.27
C106	100.00	54°58'52"	95.84	51.96
C107	300.00	30°32'14"	159.11	81.47
C108	200.00	12°18'58"	42.35	21.26
C109	500.00	6°58'33"	61.02	30.55
C110	500.00	13°14'39"	115.58	58.05
C111	200.00	18°14'01"	63.65	32.09
C112	300.00	11°52'02"	62.05	31.14
C113	20.00	77°28'30"	27.04	16.04
C114	25.00	84°18'48"	36.67	22.52
C115	200.00	25°46'04"	90.01	45.78
C116	200.00	15°58'49"	55.78	28.07
C117	100.00	50°46'16"	88.70	47.51
C118	100.00	39°18'48"	68.18	35.47
C119	1,000.00	2°38'26"	46.08	23.05
C120	300.00	17°18'50"	89.87	45.27
C121	150.00	30°46'35"	80.57	41.28
C122	100.00	29°18'17"	50.77	25.94
C123	50.00	62°46'35"	54.70	30.45
C124	50.00	61°18'40"	53.39	29.56
C125	400.00	13°35'35"	94.90	47.67
C126	150.00	46°19'46"	121.07	64.05
C127	200.00	9°46'29"	34.06	17.07
C128	200.00	15°46'06"	54.75	27.55
C129	100.00	30°32'18"	53.30	27.30
C130	100.00	26°58'27"	47.08	23.98
C131	150.00	29°28'24"	76.81	39.27
C132	400.00	12°24'00"	86.57	43.45
C133	300.00	8°58'59"	46.42	23.26
C134	75.00	81°28'48"	106.66	64.60
C135	1,000.00	5°19'42"	91.54	45.80
C136	1,000.00	4°39'47"	79.93	39.99
C137	50.00	76°46'56"	66.99	39.60
C138	75.00	36°08'32"	47.20	24.41
C139	75.00	91°38'41"	119.92	77.14
C140	100.00	22°25'18"	39.13	19.82
C141	200.00	22°28'51"	78.01	39.51
C142	1,000.00	4°42'26"	82.15	41.10
C143	75.00	68°45'09"	90.00	51.31
C144	75.00	71°11'02"	93.18	53.68

FOR LOCATION KEY MAP SEE SHEET GB2

NO.	REVISION	BY	DATE
3			
2			
1	UPDATED ELEVATIONS	WAG	6/6/2008

FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

REEMS ROAD CHANNEL AND BASIN
FCD PROJECT NO. 470-12-31
CONTRACT FCD 2005 C018

	BY	DATE
DESIGNED	WAG	09/07
DRAWN	FRC	09/07
CHECKED	JRR	09/07

Registered Professional Engineer (Civil) CERTIFICATE NO. 15608 JEFFREY R. RIDDLE Date Signed 1-23-08 ARIZONA, U.S.A.

DRAWING NO. GB4R

TOE & CURVE DATA

SHEET 37 OF 59

TWO WORKING DAYS BEFORE YOU DIG, CALL 602-263-1100 BLUE STAKE

A.2.3 Paving and Storm Drain Plans for

Geer Ranch South – Peoria Avenue

REEMS CHANNEL BOX CULVERT
FOR
GREER RANCH SOUTH - REEMS ROAD/PEORIA AVENUE

A PORTION OF SECTION 19 AND 20, TOWNSHIP 3 NORTH,
RANGE 1 WEST OF THE GILA & SALT RIVER MERIDIAN
MARICOPA COUNTY, ARIZONA

UTILITIES

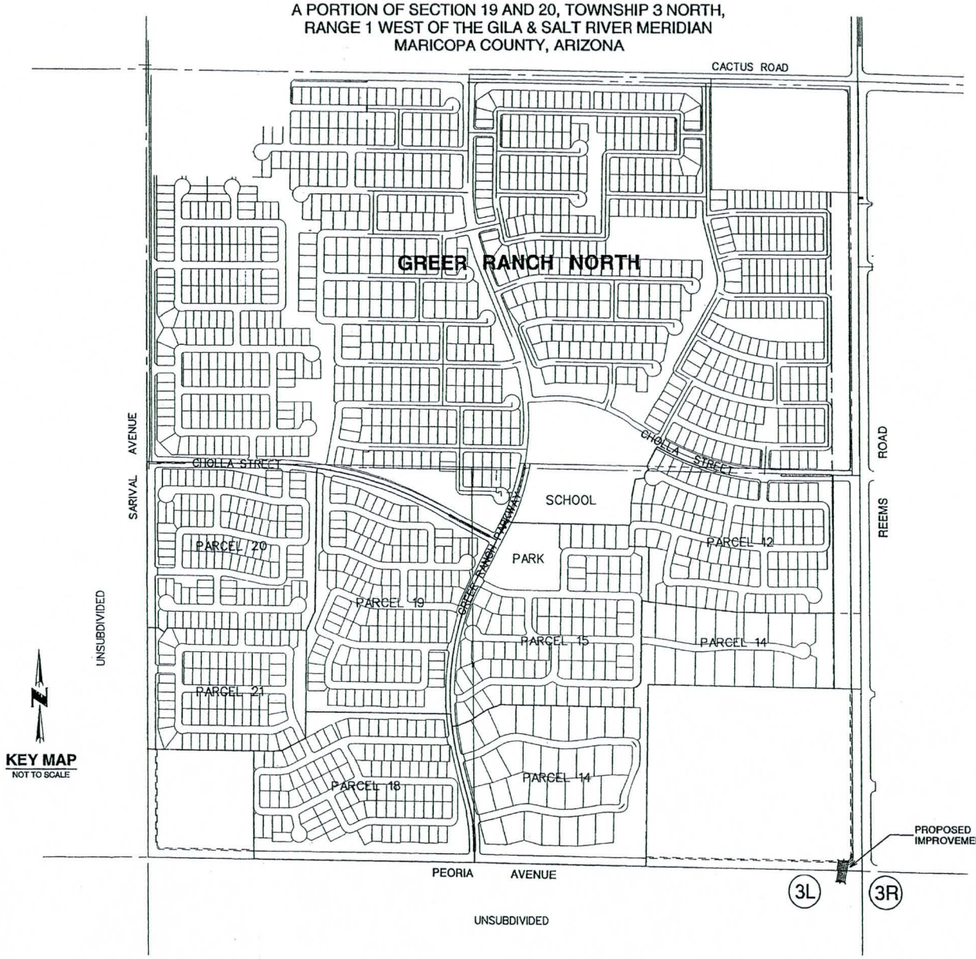
THESE PLANS HAVE BEEN SUBMITTED TO THE FOLLOWING UTILITY COMPANIES FOR REVIEW OF ANY UTILITY CONFLICTS. IF ANY CONFLICTS ARISE DURING THE COURSE OF CONSTRUCTION FROM UNFORESEEN CIRCUMSTANCES, IT SHALL BE REPORTED TO THE APPROPRIATE UTILITY COMPANY AND BE RESOLVED BY THEM AND THE DESIGN ENGINEER.

BEARDSLEY WATER 602-973-6305	BOB GONZALAZ	03/31/06
	COMPANY REPRESENTATIVE	DATE
CITY OF EL MIRAGE 623-933-8318	SHARON ANTES	03/31/06
	COMPANY REPRESENTATIVE	DATE
EL PASO NATURAL GAS 602-438-4229	DENNIS SEGARS	03/31/06
	COMPANY REPRESENTATIVE	DATE
MCI mcilinvestigation.com	DEPT. 42864	03/31/06
	COMPANY REPRESENTATIVE	DATE
KINDER MORGAN ENEGY PARTNERS, L.P. 602-276-2520	DANIEL TARANGO	03/31/06
	COMPANY REPRESENTATIVE	DATE
ARIZONA PUBLIC SERVICE CO. (WEST) 623-975-5760	JOHN CROTEAU	03/31/06
	COMPANY REPRESENTATIVE	DATE
AT&T OSP ENGINEERING 714-963-7964	RUBIN MARTINEZ	03/31/06
	COMPANY REPRESENTATIVE	DATE
COX CABLE 623-322-7050	LYNN MORRIL	03/31/06
	COMPANY REPRESENTATIVE	DATE
EL PASO NATURAL GAS 602-438-4229	DENNIS SEGARS	03/31/06
	COMPANY REPRESENTATIVE	DATE
QWEST 800-283-4237 x1459	KIM JORDAN	03/31/06
	COMPANY REPRESENTATIVE	DATE
SALT RIVER PROJECT 602-236-0800	RACHEL MARSH	03/31/06
	COMPANY REPRESENTATIVE	DATE
SALT RIVER POWER DISTRICT IRRIG./WATER FACILITY 602-236-2962	BOB MAURER	03/31/06
	COMPANY REPRESENTATIVE	DATE
SOUTHWEST GAS CORP. 602-484-5470	CLAUDIA FISHER	03/31/06
	COMPANY REPRESENTATIVE	DATE
SPRINT TELEPHONE 602-417-0950	COLIN SWORD	03/31/06
	COMPANY REPRESENTATIVE	DATE
MARICOPA WATER DISTRICT 602-506-1501	SHELBY BROWN	03/31/06
	COMPANY REPRESENTATIVE	DATE

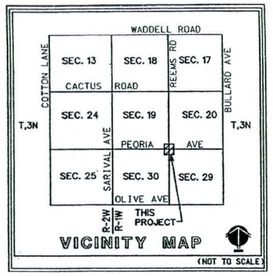
THE IMPROVEMENTS SHOWN ON THIS SET OF PLANS WILL NOT BE FULLY APPROVED BY THE CITY, THE CERTIFICATE OF OCCUPANCY WILL NOT BE ISSUED UNTIL THE OVERHEAD UTILITY UNDERGROUNDING (FOR LINES UNDER 69 KV), RE-LOCATION OF POWER POLES AND IRRIGATION LINE RE-LOCATION AND/OR CONSTRUCTION REQUIREMENTS HAVE BEEN SATISFIED

LEGEND

TC	TOP OF CURB	PC	POINT OF CURVE
G	GUTTER	PT	POINT OF TANGENCY
P	PAVEMENT	PRC	POINT OF REVERSE CURVE
EP	EDGE OF PAVEMENT	VG	VALLEY GUTTER
BVC.	BEGIN VERTICAL CURVE	▲	GRADE BREAK
PI	POINT OF INTERSECTION		PROP. STOP SIGN
EVC	END VERTICAL CURVE		SURVEY MONUMENT
SW	SIDEWALK		PROP. STREET LIGHT
C	CONCRETE		PROP. FIRE HYDRANT
NG	NATURAL GROUND		PROP WATERLINE & VALVE
B/C	BACK OF CURB		EXIST. FIRE HYDRANT
R/W	RIGHT OF WAY	8"W	EXIST. WATERLINE & VALVE
S/W ESM'T	SIDEWALK EASEMENT		PROP. SEWERLINE & MANHOLE
LE ESM'T	LANDSCAPE ESM'T	8"S	EXIST. SEWERLINE & MANHOLE
PUE	PUBLIC UTILITY EASEMENT		PROP. CATCH BASIN
RW	RETAINING WALL		PROP. STORM DRAIN & MANHOLE
LF	LINEAL FOOT		EXIST. CATCH BASIN
GB	GRADE BREAK		EXIST. STORM DRAIN & MANHOLE
TN	TOP OF WATER VALVE		COUNTY / SURPRISE LIMITS
INV	ELEVATION AT PIPE		
MH	MANHOLE		
℄	MONUMENT LINE		



KEY MAP
NOT TO SCALE



BASIS OF BEARINGS

THE NORTH LINE OF THE NORTHEAST QUARTER OF SECTION 19, T.3 N., R.1W HAVING A BEARING OF NORTH 89°53'14" WEST

BENCHMARK

BRASS CAP IN HANDHOLE AT INTERSECTION OF REEMS RD. AND PEORIA AVENUE. (SE COR SEC 19, T3N, R1W) ELEVATION: 1144.61

NOTE: ADD 0.52' TO THE PLAN ELEVATIONS TO MATCH MCFCD REEMS ROAD CHANNEL & BASIN PLANS.

PROJ. NO. 470-12-31

ENGINEER

COE & VAN LOO CONSULTANTS, INC.
4550 NORTH 12TH STREET
PHOENIX, ARIZONA 85014
(602) 264-6831 - TEL.
(602) 264-0928 - FAX
CONTACT: ROGER THEIS

DEVELOPER

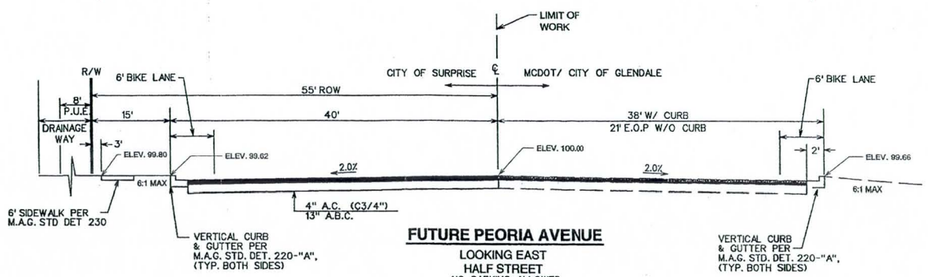
LENNAR COMMUNITIES DEVELOPMENT INC.
1150 W. GROVE PARKWAY
SUITE 100
TEMPE, AZ 85283
(602) 345-0077
CONTACT: MR. ERIC MOLINA

STORM DRAIN ESTIMATED QUANTITIES

DESCRIPTION	UNITS	QUANTITY
SIX BARREL BOX CULVERT PER A.D.O.T. DET. B-2.60 & B-2.65	LF	142
INLET HEADWALL PER A.D.O.T. DET. B-8.10	EA	1
OUTLET HEADWALL PER A.D.O.T. DET. B-8.10	EA	1
RIP-RAP D50=9"	SY	2,618
HANDRAIL DETAIL PER DETAIL ON SHT. 2	LF	200
STORM DRAIN KNOCKOUT	EA	2

PAVING ESTIMATED QUANTITIES

DESCRIPTION	UNITS	QUANTITY
REMOVE & REPLACE EXISTING A.C. PAVEMENT (IN KIND)	SY	425



FUTURE PEORIA AVENUE
LOOKING EAST
HALF STREET
NO PARKING ALLOWED
NTS

SHEET INDEX

1.....COVER SHEET & QUANTITIES
2.....NOTES & DETAILS
3.....PAVING & STORM DRAIN PLANS

LEGEND

(2) STORM DRAIN PLAN SHEET NO.

AS BUILT CERTIFICATION

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

REGISTERED ENGINEER _____ DATE _____

ARIZONA LICENSE REGISTRATION NUMBER _____ DATE _____

APPROVALS:

CITY OF SURPRISE ENGINEER _____ DATE _____

THESE PLANS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT'S ACCESSIBILITIES GUIDELINES, AS PUBLISHED IN FEDERAL REGISTER ON JULY 26, 1991, AS PERTAINS TO CURB AND RAMP, RAMP, CROSS WALK, SLOPE AND CROSS SLOPE OF SIDEWALK, AND PARKING REQUIREMENTS.

BLUE STAKE, INC. CALL FOR THE BLUE STAKE
602-263-1100
1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY

GREER RANCH SOUTH - REEMS ROAD/PEORIA AVENUE

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

REVISIONS	DATE	BY

DESIGNED	D.B.	
DRAWN	STAFF	
CHECKED	R.T.	
DATE	1-16-08	

REEMS CHANNEL BOX CULVERT

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 38805 ROGER D. THEIS Date Signed 1-8-08 ARIZONA, U.S.A.

CVL

SHEET B-1 OF B-3

020063-06
PLAN
59 OF 69

Cert
16 JAN 2008
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CITY OF SURPRISE PAVING GENERAL NOTES

1. CONSTRUCTION WITHIN THE RIGHT-OF-WAY SHALL CONFORM TO THE LATEST APPLICABLE MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND DETAILS UNLESS OTHERWISE STATED ON PLANS.
2. THE CITY OF SURPRISE ENGINEERING SHALL BE NOTIFIED 48 HOURS PRIOR TO ANY CONSTRUCTION WORK AT 263-583-6025.
3. THE ACTUAL POINT OF PAVEMENT MATCHING, AND/OR TERMINATION, SHALL BE DETERMINED IN THE FIELD BY THE CITY OF SURPRISE'S FIELD INSPECTOR.
4. ALL FRAMES, COVERS, VALVE BOXES AND MANHOLE COVERS SHALL BE ADJUSTED TO FINISH GRADE AFTER COMPLETION OF PAVING OR RELATED CONSTRUCTION.
5. CONSTRUCTION OF SURFACE IMPROVEMENTS SHALL NOT BEGIN UNTIL CONFLICTING UNDERGROUND UTILITY CONSTRUCTION IS COMPLETED AND SERVICE CONNECTIONS TO ALL PLATTED LOTS HAVE BEEN ADEQUATELY EXTENDED TO THE RIGHT-OF-WAY.
6. THE PERMITTEE SHALL ARRANGE FOR THE RELOCATION COSTS OF ALL UTILITIES, INCLUDING ANY STREET LIGHTS, AND SUBMIT A UTILITY RELOCATION SCHEDULE PRIOR TO THE ISSUANCE OF A CONSTRUCTION PERMIT.
7. TREES AND SHRUBBERY IN THE RIGHT-OF-WAY THAT CONFLICT WITH PROPOSED IMPROVEMENTS SHALL NOT BE REMOVED WITHOUT APPROVAL OF THE CITY. THE PERMITTEE SHALL BE RESPONSIBLE FOR OBTAINING AUTHORIZATION TO REMOVE AND/OR RELOCATE SAID TREES AND SHRUBBERY.
8. DAMAGED AND/OR DISPLACED CONCRETE CURB, GUTTER, SIDEWALK OR DRIVEWAY SLAB THAT IS WITHIN THE RIGHT-OF-WAY SHALL BE REPAIRED OR REPLACED BEFORE FINAL ACCEPTANCE OF THE WORK.
9. GRADING BETWEEN BACK OF CURB AND PROPERTY LINES SHALL BE LIMITED TO 4:1 SLOPE. PROTECT SLOPES FROM EROSION AND/OR TRANSPORTING SILT ONTO STREETS OR ADJACENT PRIVATE PROPERTY.
10. ALL INLET GRATES ARE TO BE BICYCLE SAFE GRATES.
11. ALL FIRE HYDRANTS SHALL HAVE A TWO-WAY BLUE REFLECTOR INSTALLED PER CITY OF SURPRISE DETAIL.
12. STREET SIGNS SHALL BE FURNISHED AND INSTALLED BY THE DEVELOPER AT THE LOCATIONS SHOWN ON THE PAVING OR STRIPING PLAN. ALL STREET SIGNS SHALL BE INSTALLED PER CITY OF SURPRISE STREET SIGN AND STREET SIGN BASE DETAILS.
13. ASPHALT MIX DESIGN SHALL BE SUBMITTED TO THE CITY OF SURPRISE ENGINEERING DEPARTMENT PRIOR TO THE PLACEMENT OF ANY ASPHALT.
14. THE PLANS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT'S ACCESSIBILITIES GUIDELINES, AS PUBLISHED IN FEDERAL REGISTER ON JULY 26, 1991, AS PERTAINS TO CURB AND RAMP, RAMP, CROSS WALK, SLOPE AND CROSS SLOPE OF SIDEWALK, AND PARKING REQUIREMENTS.

CITY OF SURPRISE ENGINEER'S NOTES

1. 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
2. EXISTING UTILITIES SHOWN ON THESE PLANS HAVE BEEN LOCATED ACCORDING TO INFORMATION PROVIDED BY THE AGENCY OPERATING EACH UTILITY. LOCATIONS SHOWN ARE APPROXIMATE ONLY, AND ARE NOT RELIABLE FOR CONSTRUCTION PURPOSES. CALL BLUE STAKE FOR FIELD LOCATION AT 602-263-1100.
3. THE ENGINEER AND APPLICABLE AGENCY MUST APPROVE, PRIOR TO CONSTRUCTION, ANY ALTERATION OR VARIANCE FROM THESE PLANS. ANY VARIATION FROM THESE PLANS SHALL BE PROPOSED ON CONSTRUCTION FIELD PRINTS AND TRANSMITTED TO THE ENGINEER.
4. THE CONTRACTOR SHALL PROTECT AND MAINTAIN ALL EXISTING UTILITIES ON THE SITE. ANY DAMAGE TO EXISTING UTILITIES, WHETHER SHOWN OR NOT ON THE DRAWING SHALL BE REPAIRED/REPLACED AT THE CONTRACTOR'S EXPENSE. EXISTING SURFACE FEATURES AND FENCING SHALL BE REPLACED IN KIND.
5. ANY INSPECTION BY THE CITY, COUNTY OR THE ENGINEER, SHALL NOT IN ANY WAY RELIEVE THE CONTRACTOR FROM ANY OBLIGATION TO PERFORM THE WORK IN STRICT COMPLIANCE WITH THE APPLICABLE CODES AND AGENCY REQUIREMENTS.
6. CONTRACTOR IS TO LOCATE ALL EXISTING PROPERTY MONUMENTS PRIOR TO CONSTRUCTION. A REGISTERED LAND SURVEYOR AT THE CONTRACTOR'S EXPENSE SHALL REPLACE ANY MONUMENTS DISTURBED DURING THE CONSTRUCTION OF THIS PROJECT.
7. 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.
8. ANY CONSTRUCTION WATER OBTAINED FROM A CITY OF SURPRISE WATER SOURCE MUST BE METERED. CONTACT ARIZONA-AMERICAN WATER COMPANY AT 623-876-4020 TO REQUEST A METER.
9. 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 SUB CONTRACTOR.
10. TRAFFIC CONTROL SHALL BE MAINTAINED IN ACCORDANCE WITH THE MAG SPECIFICATION 401 AND THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
11. PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WORK THE DEVELOPER/CONTRACTOR WILL BE REQUIRED TO CLEAN AND REPAIR ADJACENT (OFF-PROJECT) ROADWAYS USED OR DAMAGED DURING THE COURSE OF CONSTRUCTION.
12. EMERGENCY VEHICLE ACCESS (E.V.A.) MUST BE PROVIDED BY THE DEVELOPER/CONTRACTOR THROUGHOUT THE PROJECT SITE. E.V.A. ROADS AND SIGNAGE SHALL BE MAINTAINED BY THE DEVELOPER/CONTRACTOR AT ALL TIMES. SIGNAGE SHALL BE POSTED AT THE POINT OF ENTRY TO SITE AND AT ALL LOCATIONS WHERE A CHANGE IN DIRECTION OCCURS.
13. THE PLANS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT'S ACCESSIBILITIES GUIDELINES, AS PUBLISHED IN FEDERAL REGISTER ON JULY 26, 1991, AS PERTAINS TO CURB AND RAMP, RAMP, CROSS WALK, SLOPE AND CROSS SLOPE OF SIDEWALK, AND PARKING REQUIREMENTS.

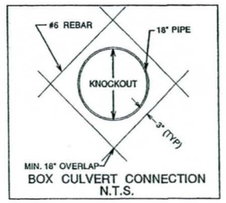
CAUTION REGARDING STORM DRAIN PIPES

CONTRACTOR IS RESPONSIBLE FOR PROTECTING THE PIPE FROM DAMAGE DURING THE CONSTRUCTION STAGE. THE COVER ON THE DRAINAGE PIPE IS DESIGNED FOR FINAL GRADE; THEREFORE, EXTRA CARE MUST BE EXERCISED DURING THE CONSTRUCTION PHASE TO MAINTAIN COVER OVER PIPES.

NOTE: OWNER/CONTRACTOR IS RESPONSIBLE FOR SURVEY VERIFICATION OF EXISTING HORIZONTAL AND VERTICAL CONDITIONS PRIOR TO START OF CONSTRUCTION. A DEVIATION IN EXISTING CONDITIONS MUST BE BROUGHT TO THE ATTENTION OF COE & VAN LOO BEFORE CONSTRUCTION STARTS. COE & VAN LOO WILL NOT BE RESPONSIBLE FOR REMOVAL, REPLACEMENT, OR OTHER MODIFICATIONS THAT MAY BE REQUIRED AS A RESULT OF EXISTING CONDITIONS NOT PROPERLY VERIFIED AND CONFIRMED. SHOULD AN ERROR BE FOUND IN THE HORIZONTAL & VERTICAL CONDITIONS, COE & VAN LOO WILL BE NOTIFIED AND CONSTRUCTION WILL NOT PROCEED UNTIL REVISIONS/MODIFICATIONS HAVE BEEN PREPARED AND SUBMITTED BY COE & VAN LOO.

GRADING & DRAINAGE GENERAL NOTES

1. CONTRACTOR TO FOLLOW RECOMMENDATIONS LISTED IN THE SOILS INVESTIGATION REPORT. SHOULD ANY CONFLICTS ARISE BETWEEN THE SOILS INVESTIGATION REPORT AND THESE GRADING PLANS, THE CIVIL ENGINEER SHALL BE CONTACTED AND THE SOILS INVESTIGATION REPORT RECOMMENDATIONS SHALL BE FOLLOWED.
2. THE ENGINEER MAKES NO REPRESENTATION OR GUARANTEE REGARDING EARTHWORK QUANTITIES OR THAT THE EARTHWORK FOR THIS PROJECT WILL BALANCE DUE TO VARIOUS FIELD CONDITIONS, CHANGING SOIL TYPES, ALLOWABLE CONSTRUCTION TOLERANCES AND CONSTRUCTION METHODS THAT ARE BEYOND THE CONTROL OF THE ENGINEER.
3. 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.
4. 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 IS 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.
5. THE CITY ENGINEER'S OFFICE SHALL BE NOTIFIED BEFORE ANY ONSITE CONSTRUCTION BEGINS AT 623-583-6025.
6. AN APPROVED GRADING AND DRAINAGE PLAN MUST BE ON THE JOBS SITE AT ALL TIMES. DEVIATIONS FROM THIS PLAN MUST BE PRECEDED BY AN APPROVED PLAN REVISION.
7. ALL DRAINAGE PROTECTIVE DEVICES SUCH AS SWALES, INTERCEPTOR DITCHES, PIPES, PROTECTIVE BERMS, BARRIER WALLS, CONCRETE CHANNELS OR OTHER MEASURES DESIGNED TO PROTECT HOMES FROM STORM RUNOFF MUST BE CONSTRUCTED PRIOR TO CONSTRUCTION OF ANY HOUSES.
8. A GRADING PERMIT IS REQUIRED. THE FEE FORS THIS PERMIT IS THREE PERCENT (3%) OF THE CONTRACT, COST PRE SALES TAX. BEFORE A GRADING PERMIT IS ISSUED BY THE CITY OF SURPRISE ENGINEERING DEPARTMENT, THE CONTRACTOR MUST FIRST OBTAIN A DUST CONTROL PERMIT FROM MARICOPA COUNTY ENVIRONMENTAL SERVICES-AIR QUALITY DIVISION AT 602-506-6700.
9. HAUL PERMITS, WHEN REQUIRED, MUST BE OBTAINED PRIOR TO OR CONCURRENTLY WITH THE GRADING AND DRAINAGE PERMIT.
10. A SEPARATE PERMIT IS NECESSARY FOR ANY OFFSITE CONSTRUCTION.
11. CONTRACTOR SHALL PROVIDE LEVEL BOTTOM IN ALL RETENTION BASINS AT ELEVATIONS AS SHOWN ON THE PLANS. SIDE SLOPES IN ALL RETENTION BASINS SHALL NOT EXCEED 4:1 UNLESS NOTED OTHERWISE ON THE PLANS.
12. DRYWELLS, WHEN REQUIRED, MUST BE DRILLED A MINIMUM OF 10 FEET (10') 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.
13. THE OWNER/DEVELOPER SHALL BE RESPONSIBLE FOR REGISTERING THE DRYWELLS SHOWN ON PLAN WITH THE ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (A.D.E.Q.)
14. TRASH RACKS ARE REQUIRED ON ALL EXPOSED INLET/OUTLET PIPES 12" IN DIAMETER OR LARGER.
15. SOILS COMPACTION TEST RESULTS MUST BE SUBMITTED TO THE CITY OF SURPRISE ENGINEERING DEPARTMENT FOR BUILDING PADS THAT HAVE ONE FOOT (1') OR MORE OF FILL MATERIAL INDICATED. THIS INFORMATION MUST HE SUPPLIED PRIOR TO REQUEST FOR BUILDING PERMIT.
16. A P.A.D. CERTIFICATION LETTER FOR EACH PHASE OR PARCEL MUST BE SUBMITTED TO THE CITY OF SURPRISE ENGINEERING DEPARTMENT BY THE DEVELOPER STATING EACH PAD HAS BEEN BUILT IN ACCORDANCE WITH THE SOILS INVESTIGATIVE REPORT AND THE CITY OF SURPRISE REQUIREMENTS.
17. APPROVAL OF THESE PLANS 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 OR ORDINANCE.
18. THE PLANS SHALL COMPLY WITH THE AMERICANS WITH DISABILITIES ACT'S ACCESSIBILITIES GUIDELINES, AS PUBLISHED IN FEDERAL REGISTER ON JULY 26, 1991, AS PERTAINS TO CURB AND RAMP, RAMP, CROSS WALK, SLOPE AND CROSS SLOPE OF SIDEWALK, AND PARKING REQUIREMENTS.



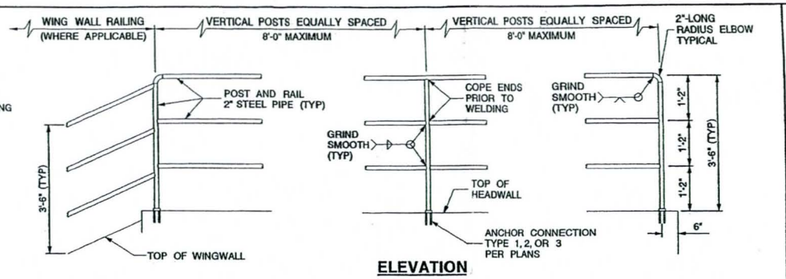
BOX CULVERT CONNECTION
N.T.S.

CONSTRUCTION NOTES

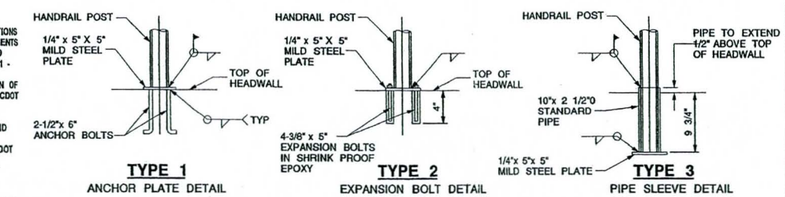
1. 2" ROUND TUBE STEEL ASTM 500 GRADE B1 GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH ASTM A123 WELD 3/8" THICK ALL AROUND. SHOP PRIME WITH RUST INHIBITING PRIMER (FIELD REPAIR PRIMER AS NEEDED.)
2. PAINT HANDRAIL PER M.A.G. SPECIFICATIONS SECTION 530 COLOR PER PLANS
3. VERTICAL POSTS TO BE EVENLY SPACED
4. HANDRAILS TO BE PLACED ON ALL HEADWALLS AND AT THE BACK OF SCUPPERS

MARICOPA COUNTY GENERAL NOTES

1. ALL CONSTRUCTION SHALL CONFORM TO THE MOST CURRENT UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION PUBLISHED BY THE MARICOPA ASSOCIATION OF GOVERNMENTS (MAG), TOGETHER WITH THE MCDOT SUPPLEMENT TO THE MAG STANDARD SPECIFICATIONS AND THE PROJECT SPECIAL PROVISIONS. ALL WORK MUST ALSO COMPLY WITH RESOLUTION 20001-01 - MARICOPA COUNTY RESOLUTION FOR PERMITS TO WORK IN DEDICATED RIGHT-OF-WAY AND RESOLUTION 2001-02 MARICOPA COUNTY RESOLUTION FOR STREET IMPROVEMENTS, INSTALLATION OF UTILITIES AND TRAFFIC CONTROL. ANY EXCEPTIONS MST RECEIVE EXPLICIT APPROVAL FROM MCDOT AND SHALL BE IDENTIFIED ON THE PLANS AS HAVING EXPLICIT APPROVAL FROM MCDOT.
2. THE ENGINEERING DESIGN ON THESE PLANS ARE ONLY APPROVED BY MCDOT IN CONCEPT AND NOT IN DETAIL. CONSTRUCTION QUANTITIES ON THESE PLANS ARE NOT VERIFIED BY MCDOT. APPROVAL OF THESE PLANS ARE FOR PERMIT PURPOSES ONLY AND SHALL NOT PREVENT MCDOT FROM REQUIRING CORRECTION OF ERRORS IN THE PLANS WHERE SUCH ERRORS ARE SUBSEQUENTLY FOUND TO BE IN VIOLATION OF ANY LAW, ORDINANCE, HEALTH, SAFETY, MCDOT ROADWAY DESIGN MANUAL, OR OTHER DESIGN ISSUES.
3. AN APPROVED SET OF PLANS SHALL BE ON THE SITE DURING CONSTRUCTION AND AVAILABLE TO MCDOT AND OTHER INSPECTORS.
4. ALL BOX CULVERTS CONSTRUCTED IN THE PUBLIC RIGHT-OF-WAY SHALL COMPLY WITH ARIZONA DEPARTMENT OF TRANSPORTATION (ADOT) LATEST DESIGN SPECIFICATIONS AND STANDARDS. MINIMUM CLEAR HEIGHT OF BOX CULVERT SHALL BE 4 FEET.
5. CONTRACTOR TO OBTAIN NECESSARY MCDOT PERMITS PRIOR TO CONSTRUCTION WITHIN COUNTY RIGHT-OF-WAY, AND ALL NECESSARY PERMITS FROM LOCAL GOVERNMENTS FOR WORK WITHIN THEIR JURISDICTION.
6. CONTRACTOR SHALL NOTIFY THE MCDOT INSPECTION DEPT. AT LEAST 24 HOURS IN ADVANCE OF ANY CONSTRUCTION AT (602) 506-8606.
7. CONTRACTOR PERFORMING CONSTRUCTION OR EXCAVATION OPERATIONS IS RESPONSIBLE FOR LOCATING AND RELOCATING ALL UTILITIES IN CONFLICT OR WITHIN THE CLEAR ZONE, AT NO EXPENSE TO MARICOPA COUNTY. THE CONTRACTOR SHALL CONTACT "BLUE STAKE" AT (602) 263-1100 PRIOR TO BEGINNING CONSTRUCTION.
8. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ANY REQUIRED PERMITS FOR EARTH MOVING FROM MARICOPA COUNTY AIR QUALITY DEPARTMENT'S DUST COMPLIANCE DIVISION (602) 506-6010 PRIOR TO CONDUCTING EXCAVATION OPERATIONS. A COPY OF THE PERMIT AND DUST CONTROL PLAN SHALL BE SUBMITTED TO THE COUNTY ENGINEER PRIOR TO COMMENCEMENT OF ANY EARTHMOVING ACTIVITIES.
9. PRIOR TO CONDUCTING EXCAVATION OPERATIONS, THE CONTRACTOR SHALL OBTAIN FROM THE ARIZONA STATE HISTORICAL PRESERVATION OFFICER (602) 542-4009, RECOMMENDATIONS REGARDING THE NEED FOR CULTURAL RESOURCES (ARCHAEOLOGICAL) CLEARANCE. ALL DISCOVERIES OF HUMAN REMAINS, CULTURAL ARTIFACTS, OR PALEONTOLOGICAL REMAINS SHALL BE REPORTED TO THE ARIZONA STATE MUSEUM AND MCDOT. UPON DISCOVERY, CONTRACTOR SHALL CEASE OPERATIONS IN THE VICINITY OF THE FIND AND PROTECT THE DISCOVERY AREA FROM FURTHER DISTURBANCE UNTIL THE FIND CAN BE PROFESSIONALLY INVESTIGATED BY THE ARIZONA STATE MUSEUM AND MCDOT.
10. EXCEPT UNDER EMERGENCY CONDITIONS, ROADS SHALL NOT BE CLOSED FOR CONSTRUCTION ACTIVITY UNLESS PRIOR APPROVAL IS OBTAINED FROM THE MCDOT TRANSPORTATION DIRECTOR OR HIS REPRESENTATIVE.
11. PRIOR TO MOVING OR DESTROYING PROTECTED NATIVE PLANT SPECIES, THE CONTRACTOR SHALL FILE A FORMAL NOTICE OF INTENT WITH THE ARIZONA DEPARTMENT OF AGRICULTURE NATIVE PLANTS (602) 542-6408.
12. PRIOR TO INSTALLATION OF CURB, GUTTER, SIDEWALK, BASE COURSE AND WEARING SURFACE, SUBMIT SOIL TEST(S) OF SUB-GRADE AND REVISED PAVEMENT DESIGN/CALCULATIONS TO MCDOT FOR REVIEW AND APPROVAL. IF SUB-GRADE STABILIZATION IS REQUIRED, THE AREA STABILIZED SHALL BE FROM BACK OF SIDEWALK TO BACK OF SIDEWALK AND MATCH THE STABILIZATION DEPTH OF THE PAVEMENT STRUCTURE.
13. ASPHALT MIX DESIGN SHALL BE SUBMITTED TO MCDOT A MINIMUM OF 48 HOURS PRIOR TO PLACING ANY ASPHALT COURSES. (TRENCH WORK EXCLUDED.) ALL PAVED TURNOUTS SHALL HAVE THE SAME ASPHALT AND BASE REQUIREMENTS AS THE ADJACENT ROADWAY UNLESS NOTED OTHERWISE.
14. ALL COMPACTION AND BACKFILL WITHIN COUNTY RIGHT-OF-WAY SHALL CONFORM TO THE MCDOT SUPPLEMENT TO M.A.G. SPECIFICATIONS. BACKFILL UNDER EXISTING PAVEMENT, CURB AND GUTTER OR WITHIN TWO FEET (2') OR LESS FROM THE EDGE OF PAVEMENT SHALL CONSIST OF ONE-HALF (1/2) SACK CLSM.
15. ALL STRUCTURES, SUCH AS MANHOLES, VALVE BOX & COVERS, AND MONITORING WELLS MUST BE MARKED WITH AT LEAST TWO REFLECTIVE YELLOW FLEX POST WHEN STRUCTURES ARE LOCATED OUTSIDE THE TRAVELED WAY AND WITHIN THE RIGHT-OF-WAY. (APPLIES ONLY WHEN THERE IS NO CURB.)
16. ANY SAW CUT ALONG EXISTING ROADWAY EDGE WHICH REMOVES THE EDGE OF THE ROADWAY SHALL BE A MINIMUM OF 1' FROM THE EDGE OF THE EXISTING ROADWAY. THE CUT DISTANCE MAY BE GREATER, BASED ON PAVEMENT CONDITIONS OR ROADWAY ELEVATIONS BUT SHALL NOT BE LOCATED WITHIN A LANE WHEEL PATH, AND IF NEEDED SHALL BE IN HALF LANE INCREMENTS.
17. ALL EXISTING PAVEMENT MARKING, TRAFFIC SIGNS AND SIGNAL EQUIPMENT THAT NEEDS TO BE REMOVED, REPLACED, RELOCATED OR REPAIRED BECAUSE OF CONTRACTOR'S WORK, WILL BE DONE BY THE CONTRACTOR AT HIS EXPENSE. ALL SALVAGED SIGNS SHALL BE DELIVERED TO THE TRAFFIC OPS BUILDING AT 2909 W. DURANGO ST. ARRANGEMENTS CAN BE MADE FOR DELIVERY BY CALLING (602) 506-6562. ALL NEW STREET NAME SIGNS SHALL BE PROVIDED AND INSTALLED BY PERMITTEE AT NO EXPENSE TO MARICOPA COUNTY.
18. PAVEMENT MARKING, SIGNING AND SIGNAL WORK WILL BE INSPECTED AND SHALL MEET COUNTY STANDARDS BEFORE RELEASE OF BOND.
19. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS WITHIN THE RIGHT-OF-WAY TO A CONDITION EQUAL TO OR BETTER THAN EXISTING IMPROVEMENTS PER M.A.G. 107.9. DISPOSAL OF ALL WASTE MATERIAL WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.



ELEVATION



TYPE 1 ANCHOR PLATE DETAIL — **TYPE 2** EXPANSION BOLT DETAIL — **TYPE 3** PIPE SLEEVE DETAIL

HANDRAIL DETAIL

CAUTION!

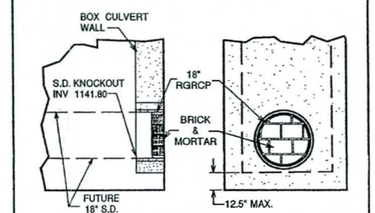
NOTE: ARIZONA PUBLIC SERVICE MAINTAINS CERTAIN ENERGIZED, UNDERGROUND ELECTRICAL POWER LINES IN THE VICINITY OF THIS PROJECT, AND THESE LINES REPRESENT AN EXTREME HAZARD FROM ELECTRICAL SHOCK TO ANY CONSTRUCTION PERSONNEL OR EQUIPMENT COMING IN CONTACT WITH THEM.

ARIZONA LAW REQUIRES ALL PARTIES PLANNING EXCAVATION IN PUBLIC RIGHT-OF-WAY TO CONTACT ALL UTILITY FIRMS FOR LOCATIONS OF THEIR UNDERGROUND FACILITIES. CONTRACTORS MUST BE INSTRUCTED TO CALL THE BLUE STAKE CENTER (263-1100) FOR SUCH LOCATION SERVICE. CONTRACTORS, THEIR EMPLOYEES, AND ALL OTHER PERSONNEL WORKING NEAR ANY UNDERGROUND POWER LINES MUST BE WARNED TO TAKE ADEQUATE PROTECTIVE MEASURES. (SEE: OSHA STANDARD 1926.651 (A)).

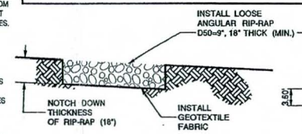
AS AN ADDITIONAL SAFETY PRECAUTION, CONTRACTORS SHOULD ALSO BE INSTRUCTED TO CALL ARIZONA PUBLIC SERVICE TO ARRANGE, IF POSSIBLE, TO HAVE THESE LINES DE-ENERGIZED WHEN THE WORK REACHES THEIR IMMEDIATE VICINITY. IF DE-ENERGIZATION IS FEASIBLE, THE CONTRACTOR MUST GIVE ARIZONA PUBLIC SERVICE AT LEAST TWO DAYS ADVANCE NOTICE OF HIS REQUIREMENT.

NOTE: ARIZONA PUBLIC SERVICE MAINTAINS ENERGIZED AERIAL ELECTRICAL POWER LINES IN THE VICINITY OF THE REFERENCED SITE. DO NOT ASSUME THESE LINES TO BE INSULATED. CONSTRUCTION PERSONNEL WORKING IN THE PROXIMITY OF THESE LINES ARE EXPOSED TO AN EXTREME HAZARD FROM ELECTICAL SHOCK. THE CONTRACTORS, THEIR EMPLOYEES, AND ALL OTHER PERSONNEL WORKING AT THIS SITE MUST BE WARNED OF DANGER AND INSTRUCTED TO TAKE ADEQUATE PROTECTIVE MEASURES.

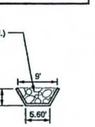
UNDER THE TERMS OF TITLE 40, ARTICLE 6.4, OF ARIZONA REVISED STATUES, THE RESPONSIBILITY RESTS WITH THE "PERSON OR BUSINESS ENTITY" CONTRACTING TO PERFORM ANY FUNCTION, ACTIVITY, WORK OR OPERATION IN CLOSER PROXIMITY TO ANY HIGH-VOLTAGE OVERHEAD LINE THAN PERMITTED BY THIS ARTICLE. OSHA STANDARD 1926.550 (A) (15) ALSO PRESCRIBES MINIMUM CLEARANCES TO BE OBSERVED IN THE PLANNING OF WORK ACTIVITIES. WHEN WORKING CLEARANCES ARE NOT ADEQUATE UNDER THE TERMS OF APPLICABLE LAWS, PERSONS OR BUSINESS ENTITIES SHOULD BE INSTRUCTED TO CALL ARIZONA PUBLIC SERVICE TO ARRANGE FOR PROTECTIVE MEASURES WHICH INCLUDE DE-ENERGIZING OR RELOCATING THE LINES PRIOR TO WORKING IN THE IMMEDIATE VICINITY. THE COST OF SUCH TEMPORARY ARRANGEMENTS SHALL BE BORN BY THE PERSON OR USINESS ENTITY AS REFERENCED ABOVE. ARIZONA PUBLIC SERVICE SHOULD BE NOTIFIED SEVERAL DAYS IN ADVANCE BY THE PERSON OR BUSINESS ENTITY SO AS TO ALLOW SUFFICIENT TIME TO ADJUST ITS FACILITIES.



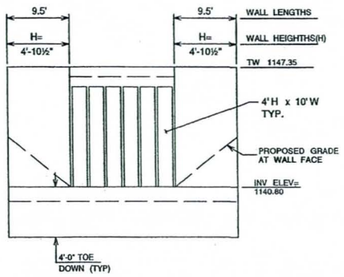
STORM DRAIN BOX CULVERT KNOCKOUT



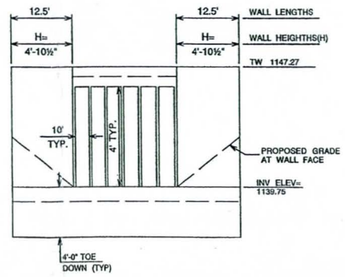
TYPICAL RIP-RAP INSTALLATION DETAIL
NTS



RIP-RAP HEADWALL DIMENSIONS
NTS



ELEVATION BOX INLET WING
LOOKING WEST
NTS



ELEVATION BOX OUTLET WING
LOOKING WEST
NTS

602-263-1100
1-800-STAKE-IT

GREER RANCH SOUTH - REEMS ROAD/PEORIA AVENUE

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

REVISIONS	DATE	BY

DESIGNED D.B.
DRAWN STAFF
CHECKED
DATE 1-16-08

REEMS CHANNEL BOX CULVERT

36805 ROGER D. THIES ARIZONA, U.S.A.

CVL

SHEET B-2 OF B-3

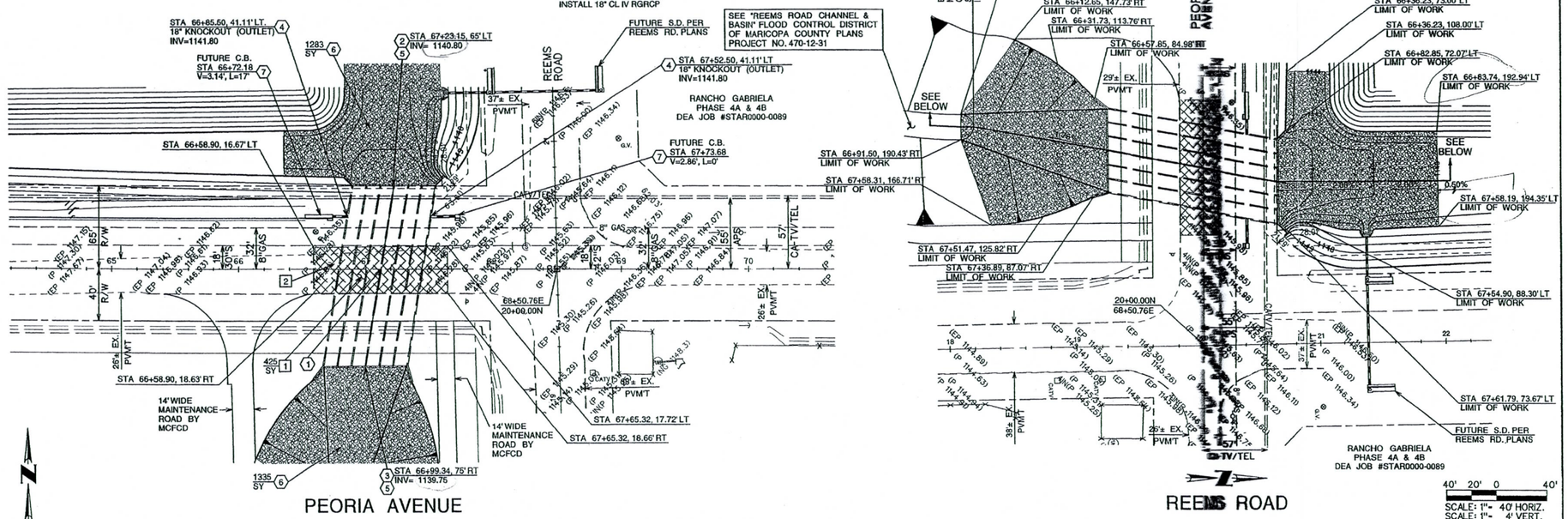
020063-06
PLAN
60 OF 69

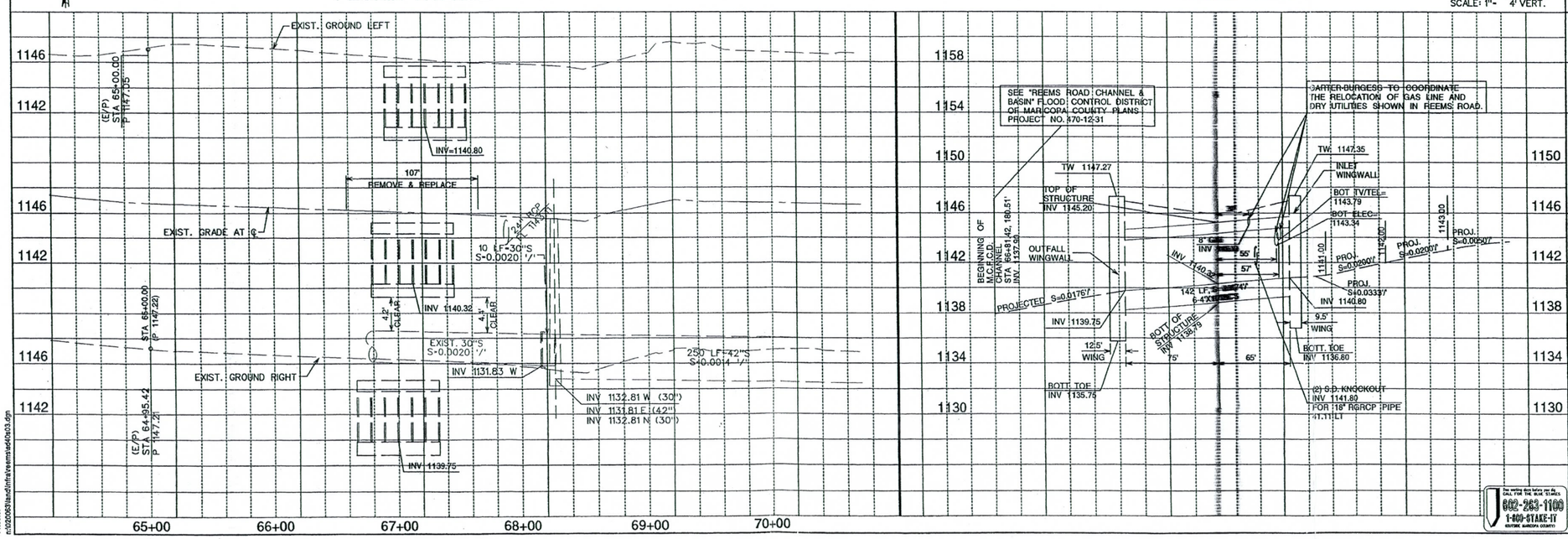
PAVING CONSTRUCTION NOTES

1. REMOVE EXISTING & REPLACE AC PAVEMENT (IN KIND)
2. RE-STRIPE ROAD TO MATCH EXISTING

STORM DRAIN CONSTRUCTION NOTES

1. CONSTRUCT 142 LF, 6 BARREL CONCRETE BOX CULVERT PER ADOT DET. B-2.60 & B-2.65, SKEW ANGLE=10, S=10', H=4'
2. CONSTRUCT INLET HEADWALL PER ADOT DET. B-6.10. SKEW ANGLE=0, WING LENGTH 9.5', TW=1147.35
3. CONSTRUCT OUTLET HEADWALL PER ADOT DET. B-8.10. SKEW ANGLE=0, WING LENGTH 12.5', TW=1147.27
4. CONSTRUCT KNOCKOUT INTO SIDE OF BOX CULVERT PER DETAIL ON SHT. 2, INV=1141.80.
5. CONSTRUCT HAND RAIL AT END OF BOX CULVERT PER DETAIL ON SHT. 2.
6. INSTALL RIP-RAP D50 = 9"
7. FUTURE CATCH BASIN PER M.A.G. STD. DET. 533-1 TYPE "D" & INSTALL 18" CL IV RGRCP





GREER RANCH SOUTH - REEMS ROAD/PEORIA AVENUE

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

REVISIONS	DATE	BY

DESIGNED D.B.
DRAWN STAFF
CHECKED
DATE 1-16-08

REEMS CHANNEL BOX CULVERT

38605 ROGER D. THIES Scottsdale, Arizona

CVL

SHEET B-3 OF B-3

020063-06
PLAN

61 OF 69

Call 602-263-1100 or 602-263-1100 or 1-800-STAKE-IT (ADOT/MC MARICOPA COUNTY)

Cad 16 JAN 2008 11:26:39 n:\020063\land\infra\reems\ad40s03.dgn

A.2.4 Excerpt from *FEMA LOMR Submittal for Greer Ranch*

209SFOTR

COE & VAN LOO
CONSULTANTS, INC.

FEMA LOMR SUBMITTAL FOR GREER RANCH SURPRISE, ARIZONA

June 10, 2005
Revised: July 28, 2005
2nd Revision: September 14, 2007

Prepared for:

Lennar Communities Development, Inc.
1150 West Grove Parkway, Suite 109
Tempe, Arizona 85283
(480) 777-4600

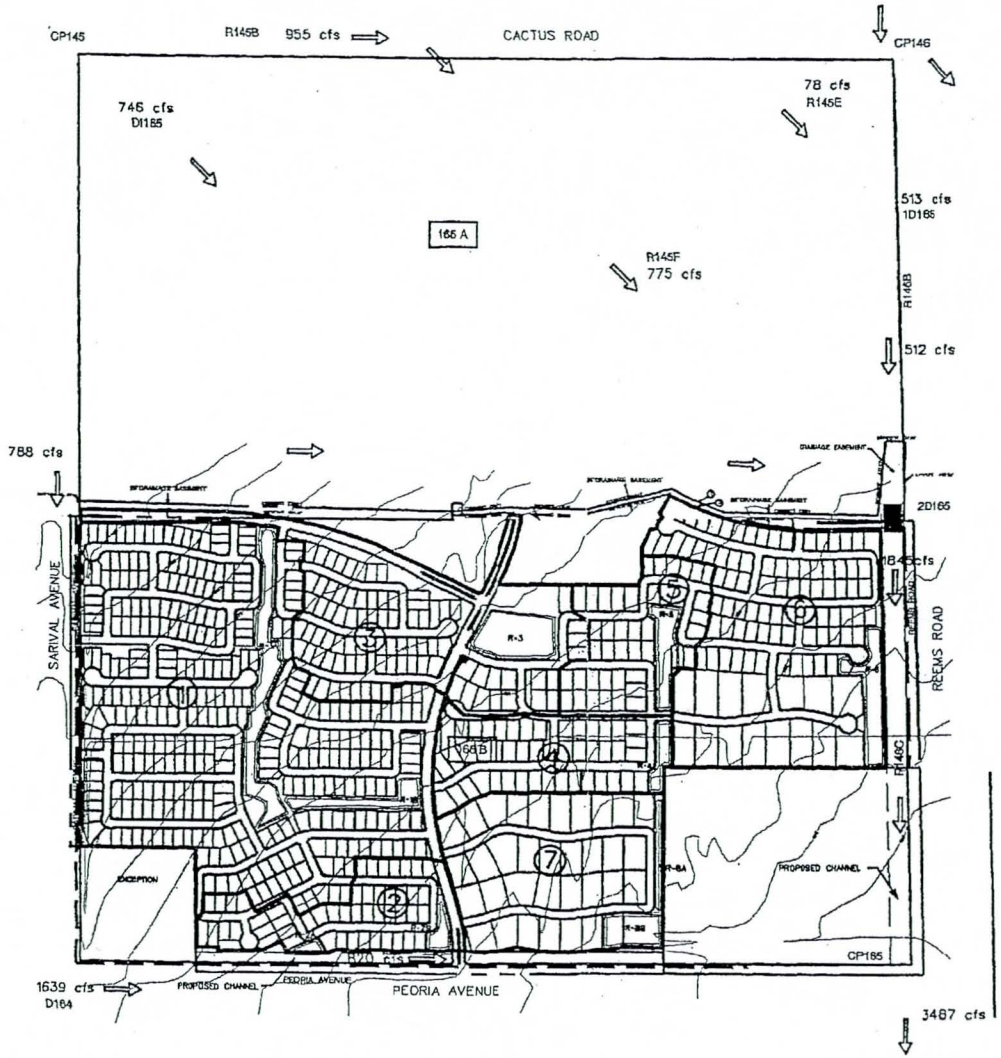
Prepared by:

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

CVL Job Number: 1.01.1020063.06

APPENDIX C

Revised Off-site Hydrology for Greer Ranch



KEY TO SYMBOLS

- DRAINAGE AREA BOUNDARY
- DIRECTION OF OFF-SITE FLOW
- 1D165 HEC-1 IDENTIFICATION
- FEMA FLOODPLAIN LIMIT
- CHANNEL BOUNDARY
- TEMPORARY BERM

NOT TO SCALE

GREER RANCH

COE & VAN LOO
PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE

DRAINAGE MAP - OFFSITE FLOW

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

JOB NO.
020063-09

EXHIBIT

009012F04.max

GREER RANCH (REVISED BY CVL)

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*************************************
                                    *
  LOOD HYDROGRAPH PACKAGE  (HEC-1)  *
            MAY   1991              *
         VERSION 4.0.1E             *
   Lahey F77L-EM/32 version 5.01    *
     Dodson & Associates, Inc.      *
  N DATE  09/06/02  TIME  14:34:41  *
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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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X     X  XXXXXXX   XXXXX          X
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X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X    X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

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

  1           ID         5 - 09 - 0 1
  2           ID
  3           ID         WHITE TANKS AREA DRAINAGE MASTER STUDY *UPDATE*
  4           ID         Original MODEL BY THE WLB Group for FCDMC AS PART OF THE WHITE
  5           ID         TANKS/AGUA FRIA ADMS, Date: October 1991
  6           ID
  7           ID      REVISED BY DAVID EVANS AND ASSOC. JULY 2001
  8           ID    REVISED BY COE & VAN LOO CONSULTANTS INC. AUG 2002
  9           ID      MODIFICATIONS REFLECT DETAILED HYDRAULIC ANALYSES ALONG
 10           ID      REEMS ROAD AND CACTUS ROAD
 11           ID
 12           ID         REVISED HYDROLOGY HEC-1 RUN FOR WHITE TANKS ADMS
 13           ID         100-YEAR, 24-HOUR STORM                  original file: WTADMS.24
 14           ID
 15           ID         SOME NOMENCLATURE CHANGES HAVE BEEN MADE PER REQUEST OF
 16           ID         FCDMC - 5-09-01
 17           ID                                      REVISED BY URS     DATE: 5-09-01
 18           ID                                                         FILE: L303M6I.DAT
 19           ID                                      REVISED BY DEA     DATE: 7-31-01
 20           ID                                                         FILE: DEA.DAT
 21           ID                                      REVISED BY CVL     DATE: 8-01-02
 22           ID                                                         FILE: REEMSREV.DAT
 23           ID
 24           ID
 25           ID
 26           ID        NOTES:
 27           ID        1. THIS HEC-1 MODEL CONTAINS THE FOLLOWING SUPER BASINS: WHITE TANKS 3,
 28           ID           2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2 & 3, 4 THRU 26.
 29           ID        2. REVISED TO REFLECT UPDATED SOILS MAPS AND NEW DEVELOPMENT.
 30           ID        3. AVERAGE XKSAT VALUES FOR EACH SUBBASIN WAS RECEIVED FROM FCDMC
 31           ID           GIS DATA AND THEN ADJUSTED FOR VEGETATION, OR LEFT AS ORIGINALLY IN
 32           ID           THE WLB MODEL.
 33           ID        4. FOR NEW DEVELOPMENTS ONLY 80% OF REPORTED PROVIDED RETENTION
 34           ID           WAS INCLUDED IN THIS MODEL (AS A CONSERVATIVE ESTIMATE). RETENTION
 35           ID           CAPACITIES WERE ESTIMATED BY EEC FOR DEVELOPMENTS WITH NO
 36           ID           DRAINAGE REPORTS.
 37           ID        5. REVISED DRAINAGE BOUNDARIES BASED UPON FIELD INSPECTION OF SUN CITY.
 38           ID           GRAND.  COMBINED SEVERAL BASINS TOGETHER TO MAKE NEW BASINS 114 &115.
 39           ID           ALSO REROUTED SUBBASINS 100A, 101, 102A AND 106 TO THE SOUTH TO 113A.
 40           ID        6. CHANNEL ROUTE ALONG REEMS ROAD UPDATED TO REFLECT NEW CONSTRUCTION.
 41           ID        7. REVISED SCS TYPE II RAINFALL DISTRIBUTION FOR THE 24-HOUR GENERAL
 42           ID           STORM.
 43           ID        8. REVISED RAINFALL DEPTH-AREA REDUCTION FACTORS.
 44           ID        9. PSIF WERE ADJUSTED BASED ON THE VALUES OF XKSAT AND WERE EDITED INTO
 45           ID           THE DATA FILE BY THE FCDMC.
 46           ID       10. AVERAGE XKSAT VALUES FOR SUBBASINS WITH BORROW PITS (WHITE TANKS
 47           ID           AREAS #3 & #4) WERE ESTIMATED BY EEC.
 48           ID
              *DIAGRAM
 49           IT       5                    600
 50           IO       5
 51           IN      15
 52           JD    4.03    .001
 53           PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 54           PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2004          KK   1D133
2005          KM        RETURN DIVERT AT CP133
2006          DR   DI146

2007          KK    R133
2008          KM        ROUTE FLOW FROM CP133 TO CP146
2009          RS       8              -1       0
2010          RC    .035    .035    .075    5280   .0068
2011          RX    1000    1001    1002    1015    1080    1440    1740    2130
2012          RY    1187    1187    1187    1186    1186    1188    1190    1192
              *

2013          KK     146
2014          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 146
2015          BA     .90
2016          LG     .50     .00    4.90     .47     .00
2017          UI     36.     36.     36.     47.    119.    138.    166.    182.    199.    215.
2018          UI    233.    260.    281.    323.    399.    452.    449.    386.    344.    314.
2019          UI    290.    266.    238.    217.    197.    178.    161.    132.    104.     70.
2020          UI     64.     61.     59.     52.     36.     36.     36.     25.     11.     11.
2021          UI     11.     11.     11.     11.     11.     11.     11.     11.     11.     11.
2022          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2023          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2024          KK   1I146
2025          KM        ADD HYDROGRAPHS AT CP146
2026          HC       2   15.02

2027          KK   CP146
2028          KM        ADD HYDROGRAPHS AT CP146
2029          HC       2   18.49

2030          KK    D146
2031          KM        DIVERT TO CP166 FROM CP146
2032          DT   DI166
2033          DI       0     100     200     300     400     500     737
2034          DQ       0       0       0      38     161     182     252

2035          KK   R146A
2036          KM        ROUTE FLOW FROM CP146 TO 1D165
2037          RS       1              -1       0
2038          RC    .035     .02    .035    1300   .0047
2039          RX    1000    1012    1012    1031    1050    1050    1056    1062
2040          RY     4.1     1.1     0.6     0.0     0.6     1.1     2.6     4.1

2041          KK   5D145
2042          KM        RETURN DIVERT AT 5D145
2043          DR  DI165C
```

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

2044          KK   R145B
2045          KM        ROUTE FLOW FROM 5D145 TO 1D165
2046          RS       7              -1       0
2047          RC     .08      .08      .08     1450    .0069
2048          RX    1000     1001     1420     1730     2220     2470     2999     3000
2049          RY    1177     1177     1176     1175     1175     1176     1177     1177

2050          KK   1D165
2051          KM        ADD HYDROGRAPHS AT 1D165
2052          HC       2   18.49

2053          KK   R146B
2054          KM        ROUTE FLOW FROM 1D165 TO 2D165
2055          RS       1              -1       0
2056          RC    .035      .02     .035     1350    .0047
2057          RX    1000     1012     1012     1031     1050     1050     1056     1062
2058          RY     4.1      1.1      0.6      0.0      0.6      1.1      2.6      4.1
2059          KO                                          22

2060          KK   4D145
2061          KM        RETURN DIVERT AT 4D145
2062          DR  DI165B

2063          KK   R145F
2064          KM        ROUTE FLOW FROM 4D145 TO 2D165
2065          RS      11              -1       0
2066          RC     .08      .08      .08     3850    .0069
2067          RX    1000     1001     1420     1730     2220     2470     2999     3000
2068          RY    1177     1177     1176     1175     1175     1176     1177     1177

2069          KK    D145
2070          KM        RETURN DIVERT AT CP145
2071          DR   DI165

2072          KK  R1I165
2073          KM        ROUTE FLOW FROM CP145 TO CP165
2074          RS      38              -1       0
2075          RC     .08      .08      .08     3000    .0069
2076          RX    1000     1001     1420     1730     2220     2470     2999     3000
2077          RY    1177     1177     1176     1175     1175     1176     1177     1177

2078          KK    165A  <- Revision
2079          KM        RUN-OFF FROM SUB-BASIN 165A
2080          BA     .45
2081          LG     .50      .00     4.66      .53      .00
2082          UI     21.      21.      21.      47.      76.      91.     104.     117.     126.     139.
2083          UI    156.     171.     204.     251.     279.     238.     208.     187.     171.     155.
2084          UI    138.     125.     110.     101.      84.      63.      44.      38.      36.      35.
2085          UI     26.      21.      21.      19.       7.       7.       7.       7.       7.       7.
2086          UI      7.       7.       7.       7.       7.       0.       0.       0.       0.       0.
2087          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2088          KK   2D165
2089          KM        ADD HYDROGRAPHS AT 2D165
2090          HC       4   18.50
2091          KO                                      22

2092          KK   R146C
2093          KM        ROUTE FLOW FROM 2D165 TO CP165
2094          RS       1              -1       0
2095          RC    .035     .02     .035     2600    .0047
2096          RX    1000    1012     1012     1031     1050     1050     1056     1062
2097          RY     4.1     1.1      0.6      0.0      0.6      1.1      2.6      4.1
              *

2098          KK     159
2099          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 159
2100          BA     .58
2101          LG     .35     .34     4.15      .40      .00
2102          UI     66.    169.     316.     407.     539.     797.     641.     495.     375.     269.
2103          UI    139.    105.      66.      33.      20.      20.      20.       0.       0.       0.
2104          UI      0.      0.       0.       0.       0.       0.       0.       0.       0.       0.

2105          KK    R159
2106          KM        ROUTE FLOW FROM CP159 TO CP160
2107          RS       1              -1       0
2108          RC    .022    .022     .025      830    .0036
2109          RX    1000    1001     1002     1020     1060     1150     1320     1440
2110          RY    1265    1265     1265     1264     1264     1266     1268     1270
              *

2111          KK     160
2112          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 160
2113          BA     .39
2114          LG     .35     .33     4.58      .32      .00
2115          UI     41.     92.     184.     238.     301.     435.     474.     354.     279.     216.
2116          UI    150.     79.      64.      41.      22.      13.      13.      13.      13.       0.
2117          UI      0.      0.       0.       0.       0.       0.       0.       0.       0.       0.
2118          UI      0.      0.       0.       0.       0.       0.       0.       0.       0.       0.

2119          KK   CP160
2120          KM        ADD HYDROGRAPHS AT CP160
2121          HC       2     .97

2122          KK    R160
2123          KM        ROUTE FLOW FROM CP160 TO CP161
2124          RS       3              -1       0
2125          RC    .075     .04      .04     2650    .0072
2126          RX    1000    1001     1210     1630     1670     1688     1689     1690
2127          RY    1259    1259     1258     1256     1256     1257     1257     1257
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2255          KK    165B   ← Revision
2256          KM        RUN-OFF FROM SUB-BASIN 165B
2257          BA     .45
2258          LG     .50      .00     4.66      .53      .00
2259          UI     21.      21.      21.      47.      76.      91.     104.     117.     126.     139.
2260          UI    156.     171.     204.     251.     279.     238.     208.     187.     171.     155.
2261          UI    138.     125.     110.     101.      84.      63.      44.      38.      36.      35.
2262          UI     26.      21.      21.      19.       7.       7.       7.       7.       7.       7.
2263          UI      7.       7.       7.       7.       7.       0.       0.       0.       0.       0.
2264          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.

2265          KK   1I165
2266          KM        ADD HYDROGRAPHS AT CP165
2267          HC       2   12.53

2268          KK   2I165
2269          KM        ADD HYDROGRAPHS AT CP165
2270          HC       2   15.98                    ← ERROR!

2271          KK   CP165
2272          KM        ADD HYDROGRAPHS AT CP165
2273          HC       2   22.84

2274          KK    D165
2275          KM        DIVERT TO CP180 FROM CP165
2276          DT   DI180
2277          DI       0    1000    5000
2278          DQ       0       0    4000

2279          KK    R165
2280          KM        ROUTE FLOW FROM CP165 TO CP179
2281          RS       7              -1       0
2282          RC    .022     .022     .04     5280    .0038
2283          RX    1000     1001    1002     1030     1075     1090     1250     2000
2284          RY    1135     1135    1135     1134     1134     1135     1133     1137

2285          KK    D163
2286          KM        RETURN DIVERT AT CP163
2287          DR  DI176A

2288          KK    R163
2289          KM        ROUTE FLOW FROM CP163 TO CP176A
2290          RS       6              -1       0
2291          RC    .035     .035    .075     5280    .0040
2292          RX    1000     1001    1002     1010     1025     1320     1620     1845
2293          RY    1197     1197    1197     1196     1196     1198     1200     1202
              *

2294          KK    176A
2295          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 176A
2296          BA     .62
2297          LG     .50      .00     4.32      .62        1
2298          UI     24.      24.      24.      24.      79.      89.     106.     118.     131.     139.
2299          UI    151.     166.     182.     200.     236.     283.     318.     279.     245.     221.
```

GREER RANCH (REVISED BY CVL)

```
2083          .         .      5D145
              .         .         V
              .         .         V
 958          .         .      R145D
              .         .         .
              .         .         .
   5          .         .         .          .<-------   DI146
   1          .         .         .      1D133
              .         .         .          V
              .         .         .          V
   7          .         .         .       R133
              .         .         .          .
              .         .         .          .
 2013         .         .         .          .         146
              .         .         .          .           .
              .         .         .          .           .
 2014         .         .         .      1I146............
              .         .         .          .
              .         .         .          .
   7          .         .      CP146............
              .         .         .
              .         .         .
 2032         .         .         .-------->   DI166
   0          .         .      D146
              .         .         V
              .         .         V
 2035         .         .      R146A
              .         .         .
              .         .         .
   3          .         .         .          .<-------  DI165C
 2041         .         .         .      5D145
              .         .         .          V
              .         .         .          V
   4          .         .         .      R145E
              .         .         .          .
              .         .         .          .
  50          .         .      1D165............
              .         .         V
              .         .         V
 2053         .         .      R146B
              .         .         .
              .         .         .
  62          .         .         .          .<-------  DI165B
 2060         .         .         .      4D145
              .         .         .          V
              .         .         .          V
  63          .         .         .      R145F
              .         .         .          .
              .         .         .          .
 2071         .         .         .          .          .<-------   DI165
  69          .         .         .          .       D145
              .         .         .          .          V
              .         .         .          .          V
 2072         .         .         .          .     R1I165
              .         .         .          .          .
              .         .         .          .          .
  78          .         .         .          .          .        165A
              .         .         .          .          .          .
              .         .         .          .          .          .
  88          .         .      2D165.................................
              .         .         V
              .         .         V
 2092         .         .      R146C
              .         .         .
              .         .         .
  98          .         .         .        159
              .         .         .          V
              .         .         .          V
 105          .         .         .       R159
              .         .         .          .
              .         .         .          .
 2111         .         .         .          .         160
              .         .         .          .           .
              .         .         .          .           .
 2119         .         .         .      CP160............
              .         .         .          V
```

GREER RANCH (REVISED BY CVL)

```
                                  V
                                R160
                                  .
                                  .
                                  .        161
                                  .          .
                                  .          .
                              CP161............
                                  V
                                  V
                                R161
                                  .
                                  .
                                  .        162
                                  .          V
                                  .          V
                                  .       R162
                                  .          .
                                  .          .
                                  .          .        163
                                  .          .          .
                                  .          .          .
                                  .     1I163............
                                  .          .
                                  .          .
                              CP163............
                                  .
                                  .
                                  .-------> DI176A
                                D163
                                  V
                                  V
                                R163
                                  .
                                  .
                                  .          .<-------  DI164A
                                  .       D144
                                  .          V
                                  .          V
                                  .       R144
                                  .          .
                                  .          .
                                  .          .        164A
                                  .          .          .
                                  .          .          .
                                  .    1I164A............
                                  .          .
                                  .          .
                              CP164A...........
                                  V
                                  V
                               R164A
                                  .
                                  .
                                  .        164
                                  .          .
                                  .          .
                              1I164............
                                  .
                                  .
                                  .          .<-------  DI164
                                  .     1D145
                                  .          V
                                  .          V
                                  .       R145
                                  .          .
                                  .          .
                              CP164............
                                  .
                                  .
                                  .-------> DI177
                                D164
                                  V
                                  V
                                R164
                                  .
```

GREER RANCH (REVISED BY CVL)

```
                                                  165B
265                                     1I165............
                                 2I165............
                                 CP165...........
                                 .-------> DI180
                              D165
                                V
                                V
279                           R165
                                 .<------- DI176A
285                            D163
                                 V
                                 V
                               R163
                                              176A
                                 CP176A............
                                 .-------> DI191
                               D176A
                                 V
                                 V
                               R176A
                                              177A
                                 CP177A............
                                 V
                                 V
                               R177A
                                               177
                               1I177............
                                              .<------- DI177
                                              D164
                                                V
                                                V
                                              R164
                                 CP177............
                                 V
                                 V
                                R177
                                               178
                                 CP178............
                                 V
                                 V
                                R178
```

ERROR! CP165 should be 2I165

GREER RANCH (REVISED BY CVL)

ROUTED TO	R199	62.	13.67	15.	4.	2.	0.11
HYDROGRAPH AT	200	216.	12.67	34.	9.	4.	0.29
2 COMBINED AT	CP200	216.	12.67	49.	12.	6.	0.40
2 COMBINED AT	AFR2F3	734.	14.92	634.	295.	146.	32.10
ROUTED TO	RR200	709.	15.42	631.	294.	146.	32.10
HYDROGRAPH AT	141	484.	12.33	50.	12.	6.	0.47
ROUTED TO	R141	478.	12.42	50.	12.	6.	0.47
HYDROGRAPH AT	141A	214.	12.17	16.	4.	2.	0.15
2 COMBINED AT	CP141A	571.	12.33	65.	16.	8.	0.62
ROUTED TO	R141A	533.	12.50	65.	16.	8.	0.62
HYDROGRAPH AT	142	305.	13.00	63.	16.	8.	0.51
2 COMBINED AT	CP142	690.	12.50	127.	32.	15.	1.13
ROUTED TO	R142	645.	12.92	127.	32.	15.	1.13
HYDROGRAPH AT	143	300.	13.00	62.	16.	7.	0.50
2 COMBINED AT	CP143	921.	12.92	188.	47.	23.	1.63
ROUTED TO	R143	900.	13.08	188.	47.	23.	1.63
HYDROGRAPH AT	D130	638.	13.42	165.	41.	20.	5.37
ROUTED TO	R130	603.	14.00	165.	41.	20.	5.37
HYDROGRAPH AT	144	328.	13.00	69.	17.	8.	0.51
2 COMBINED AT	1I144	683.	13.83	232.	58.	28.	6.05
2 COMBINED AT	CP144	1199.	13.08	416.	104.	50.	7.68
DIVERSION TO	DI164A	93.	13.08	22.	5.	3.	7.68
HYDROGRAPH AT	D144	1106.	13.08	394.	99.	47.	7.68
ROUTED TO	R144	1077.	13.33	393.	99.	47.	7.68
HYDROGRAPH AT	145A	287.	13.08	63.	16.	8.	0.49
2 COMBINED AT	CP145A	1318.	13.25	454.	114.	55.	8.17
ROUTED TO	R145A	1289.	13.50	453.	114.	55.	8.17
HYDROGRAPH AT	D131	1405.	13.50	548.	145.	70.	10.47
ROUTED TO	R131	1358.	14.00	544.	145.	70.	10.47
HYDROGRAPH AT	145	297.	13.08	64.	16.	8.	0.48
2 COMBINED AT	1I145	1436.	14.00	588.	161.	78.	9.00
2 COMBINED AT	CP145	2498.	14.00	1028.	272.	131.	11.63
DIVERSION TO	DI164	788.	14.00	228.	57.	27.	11.63
HYDROGRAPH AT	1D145	1710.	14.00	800.	215.	103.	11.63
DIVERSION TO	DI165	746.	14.00	293.	73.	35.	11.63
HYDROGRAPH AT	2D145	964.	14.00	507.	142.	68.	11.63
ROUTED TO	R145B	955.	14.25	507.	142.	68.	11.63
DIVERSION TO	DI165B	793.	14.25	360.	91.	44.	11.63

GREER RANCH (REVISED BY CVL)

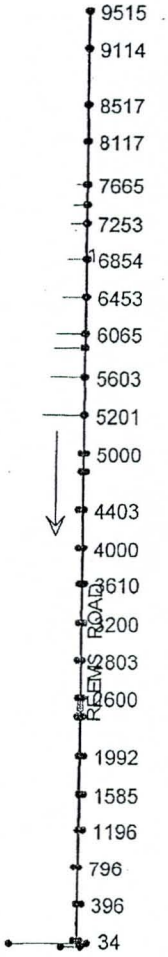
HYDROGRAPH AT	4D145	162.	14.25	147.	51.	24.	11.63
ROUTED TO	R145C	162.	14.33	147.	51.	24.	11.63
DIVERSION TO	DI165C	78.	14.33	62.	18.	9.	11.63
HYDROGRAPH AT	5D145	86.	13.67	85.	33.	16.	11.63
ROUTED TO	R145D	86.	15.50	85.	33.	16.	11.63
HYDROGRAPH AT	1D133	402.	14.42	203.	62.	30.	15.93
ROUTED TO	R133	388.	14.83	199.	62.	30.	15.93
HYDROGRAPH AT	146	523.	13.17	124.	31.	15.	0.90
2 COMBINED AT	1I146	660.	13.50	304.	92.	44.	15.02
2 COMBINED AT	CP146	727.	13.50	376.	122.	59.	18.49
DIVERSION TO	DI166	249.	13.50	99.	25.	12.	18.49
HYDROGRAPH AT	D146	478.	13.50	277.	97.	47.	18.49
ROUTED TO	R146A	476.	13.58	277.	97.	47.	18.49
HYDROGRAPH AT	5D145	78.	14.33	62.	18.	9.	11.63
ROUTED TO	R145E	78.	14.83	61.	18.	9.	11.63
2 COMBINED AT	1D165	513.	13.58	330.	115.	55.	18.49
ROUTED TO	R146B	512.	13.67	330.	115.	55.	18.49
HYDROGRAPH AT	4D145	793.	14.25	360.	91.	44.	11.63
ROUTED TO	R145F	775.	14.92	352.	91.	44.	11.63
HYDROGRAPH AT	D145	746.	14.00	293.	73.	35.	11.63
ROUTED TO	R1I165	745.	14.42	290.	73.	35.	11.63
HYDROGRAPH AT	165A	297.	13.08	64.	16.	8.	0.45
4 COMBINED AT	2D165	1845.	14.75	978.	289.	139.	18.50
ROUTED TO	R146C	1842.	14.83	978.	289.	139.	18.50
HYDROGRAPH AT	159	608.	12.33	61.	15.	7.	0.58
ROUTED TO	R159	594.	12.42	61.	15.	7.	0.58
HYDROGRAPH AT	160	409.	12.42	44.	11.	5.	0.39
2 COMBINED AT	CP160	996.	12.42	105.	26.	13.	0.97
ROUTED TO	R160	893.	12.58	105.	26.	13.	0.97
HYDROGRAPH AT	161	310.	13.00	62.	15.	7.	0.50
2 COMBINED AT	CP161	1087.	12.58	165.	41.	20.	1.47
ROUTED TO	R161	925.	13.08	165.	41.	20.	1.47
HYDROGRAPH AT	162	268.	12.50	34.	8.	4.	0.25
ROUTED TO	R162	198.	13.17	34.	8.	4.	0.25
HYDROGRAPH AT	163	492.	12.92	99.	25.	12.	0.75
2 COMBINED AT	1I163	664.	13.00	132.	33.	16.	1.00
2 COMBINED AT	CP163	1565.	13.00	295.	74.	35.	2.47
DIVERSION TO	DI176A	0.	0.08	0.	0.	0.	2.47

GREER RANCH (REVISED BY CVL)

HYDROGRAPH AT	D163	1565.	13.00	295.	74.	35.	2.47
ROUTED TO	R163	1519.	13.17	295.	74.	35.	2.47
HYDROGRAPH AT	D144	93.	13.08	22.	5.	3.	7.68
ROUTED TO	R144	65.	16.00	22.	5.	3.	7.68
HYDROGRAPH AT	164A	309.	13.08	66.	17.	8.	0.49
2 COMBINED AT	1I164A	302.	13.08	81.	22.	10.	8.17
2 COMBINED AT	CP164A	1765.	13.17	369.	94.	45.	10.64
ROUTED TO	R164A	1698.	13.25	368.	94.	45.	10.64
HYDROGRAPH AT	164	314.	13.08	68.	17.	8.	0.49
2 COMBINED AT	1I164	1944.	13.25	431.	110.	53.	11.13
HYDROGRAPH AT	1D145	788.	14.00	228.	57.	27.	11.63
ROUTED TO	R145	772.	14.42	228.	57.	27.	11.63
2 COMBINED AT	CP164	1944.	13.25	656.	167.	80.	15.08
DIVERSION TO	DI177	257.	13.25	73.	19.	9.	15.08
HYDROGRAPH AT	D164	1639.	13.25	566.	144.	69.	15.08
ROUTED TO	R164	1516.	13.75	562.	144.	69.	15.08
HYDROGRAPH AT	165B	297.	13.08	64.	16.	8.	0.45
2 COMBINED AT	1I165	1669.	13.67	622.	162.	78.	12.53
2 COMBINED AT	2I165	2975.	14.58	1595.	451.	217.	15.98
2 COMBINED AT	CP165	3487.	14.75	2108.	744.	363.	22.84
DIVERSION TO	DI180	2487.	14.75	1108.	278.	134.	22.84
HYDROGRAPH AT	D165	1000.	13.00	1000.	466.	229.	22.84
ROUTED TO	R165	1000.	16.17	998.	465.	229.	22.84
HYDROGRAPH AT	D163	0.	0.08	0.	0.	0.	2.47
ROUTED TO	R163	0.	0.08	0.	0.	0.	2.47
HYDROGRAPH AT	176A	327.	13.25	79.	20.	10.	0.62
2 COMBINED AT	CP176A	322.	13.25	78.	20.	9.	3.09
DIVERSION TO	DI191	0.	0.08	0.	0.	0.	3.09
HYDROGRAPH AT	D176A	322.	13.25	78.	20.	9.	3.09
ROUTED TO	R176A	298.	13.50	78.	20.	9.	3.09
HYDROGRAPH AT	177A	293.	13.08	63.	16.	8.	0.49
2 COMBINED AT	CP177A	493.	13.17	139.	35.	17.	3.58
ROUTED TO	R177A	488.	13.50	139.	35.	17.	3.58
HYDROGRAPH AT	177	291.	13.08	62.	15.	7.	0.49
2 COMBINED AT	1I177	684.	13.33	200.	50.	24.	4.07
HYDROGRAPH AT	D164	257.	13.25	73.	19.	9.	15.08
ROUTED TO	R164	224.	14.00	73.	19.	9.	15.08
2 COMBINED AT	CP177	738.	13.75	261.	66.	32.	16.68

APPENDIX E

Proposed Conditions HEC-RAS Model & CHECK-RAS Output

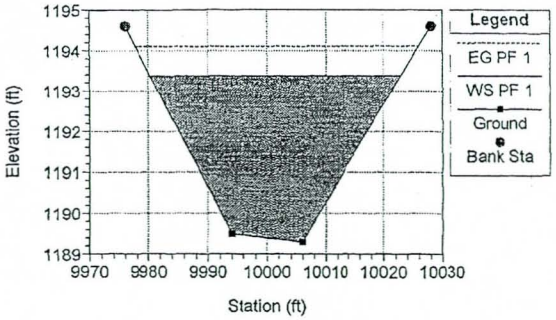

9515
9114
8517
8117
7665
7253
6854
6453
6065
5603
5201
5000
4403
4000
3610
3200
2803
2600
REEMS ROAD
1992
1585
1196
796
396
34

HEC-RAS Plan: LOMR River: REEMS ROAD Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	9515	PF 1	746.00	1189.30	1193.38		1194.11	0.005670	6.86	108.79	42.62	0.76
1	9114	PF 1	746.00	1187.20	1191.35		1191.97	0.004868	6.32	117.95	46.72	0.70
1	8517	PF 1	746.00	1183.90	1187.91		1188.68	0.006259	7.05	105.87	42.94	0.79
1	8117	PF 1	746.00	1181.50	1185.94		1186.53	0.004463	6.15	121.34	46.93	0.67
1	7665	PF 1	746.00	1180.90	1184.73		1184.99	0.002382	4.57	237.01	261.33	0.50
1	7449	PF 1	1539.00	1179.80	1183.66	1183.66	1184.12	0.005316	7.10	352.04	330.56	0.75
1	7258	PF 1	1539.00	1176.70	1181.41	1181.41	1181.82	0.004421	6.63	379.48	362.00	0.68
1	6854	PF 1	1539.00	1174.60	1179.38	1179.38	1179.79	0.003786	6.42	412.14	449.05	0.64
1	6453	PF 1	1539.00	1172.00	1176.99		1177.39	0.003503	6.29	446.25	557.07	0.62
1	6065	PF 1	1539.00	1171.30	1175.68	1175.68	1176.01	0.003472	6.04	492.10	664.54	0.61
1	5914	PF 1	1539.00	1169.90	1174.55	1174.55	1174.85	0.002948	5.86	526.79	708.48	0.57
1	5603	PF 1	1617.00	1168.40	1173.12		1173.38	0.003381	5.86	567.57	778.22	0.60
1	5201	PF 1	1617.00	1167.40	1171.78	1171.78	1172.00	0.003403	5.76	617.91	933.54	0.60
1	5000	PF 1	1845.00	1163.10	1166.68		1167.24	0.003426	6.04	305.57	100.85	0.61
1	4801	PF 1	1845.00	1162.20	1166.16		1166.62	0.002597	5.48	336.39	104.18	0.54
1	4403	PF 1	1845.00	1161.10	1164.78		1165.38	0.003738	6.22	296.58	99.98	0.64
1	4000	PF 1	1845.00	1159.40	1162.69		1163.49	0.005902	7.21	256.03	97.62	0.78
1	3610	PF 1	1845.00	1157.50	1161.50		1161.95	0.002513	5.42	340.32	104.67	0.53
1	3206	PF 1	1845.00	1156.20	1160.70		1161.06	0.001782	4.82	382.56	108.32	0.45
1	2803	PF 1	1845.00	1155.30	1160.05		1160.39	0.001580	4.63	398.29	111.88	0.43
1	2600	PF 1	1845.00	1155.00	1159.43	1157.54	1159.77	0.001497	4.67	394.66	102.08	0.42
1	2550		Culvert									
1	2403	PF 1	1845.00	1154.20	1157.31		1157.91	0.004464	6.25	295.17	113.17	0.68
1	1992	PF 1	1845.00	1152.00	1155.54		1156.16	0.004082	6.32	291.96	102.80	0.66
1	1585	PF 1	1845.00	1150.30	1153.65		1154.34	0.004843	6.67	276.66	102.18	0.71
1	1196	PF 1	1845.00	1148.40	1152.10		1152.68	0.003657	6.11	301.98	102.94	0.63
1	796	PF 1	1845.00	1147.00	1150.55		1151.15	0.004015	6.24	295.44	104.63	0.65
1	396	PF 1	1845.00	1145.30	1149.33		1149.80	0.002706	5.51	334.60	106.08	0.55
1	34	PF 1	1845.00	1143.90	1149.24		1149.35	0.000462	2.71	687.13	273.62	0.24
1	0	PF 1	1845.00	1144.00	1149.31		1149.31	0.000021	0.44	4226.21	1622.43	0.05
1	-39	PF 1	1845.00	1145.62	1148.84	1148.84	1149.27	0.002782	5.35	376.70	453.33	0.98

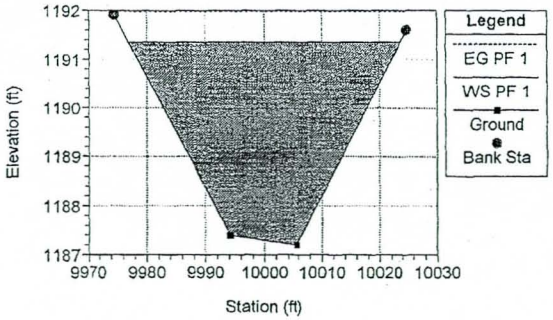
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 9515 STA 95+15



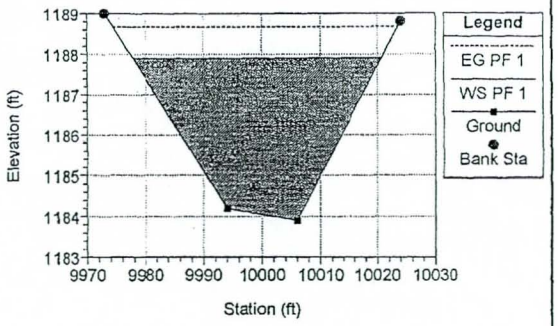
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 9114 STA 91+14



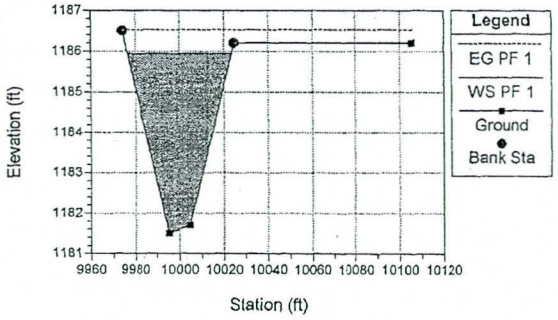
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 8517 STA 85+17



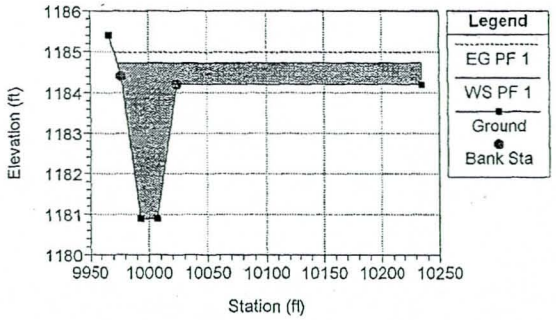
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 8117 STA 81+17



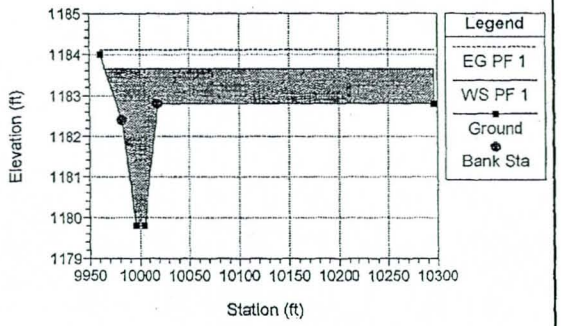
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 7665 STA 76+65



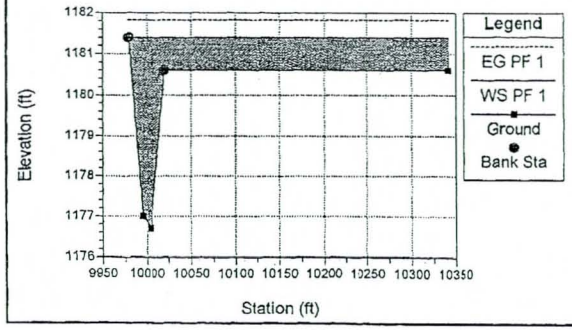
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 7449 STA 74+49



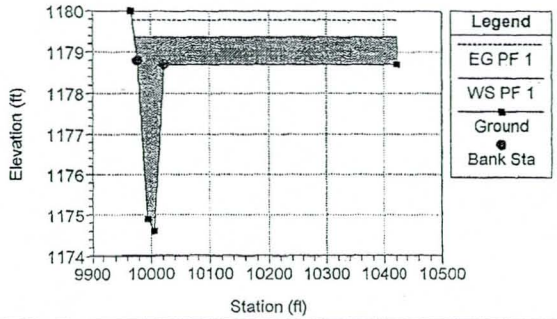
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 7253 STA 72+53



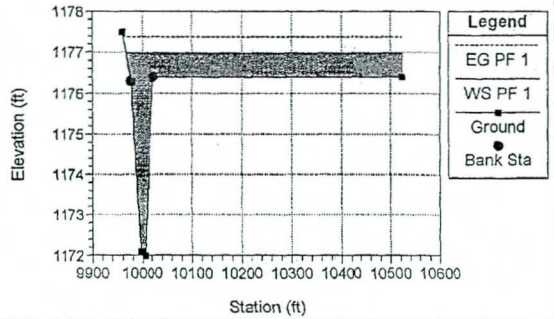
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 6854 STA 68+54



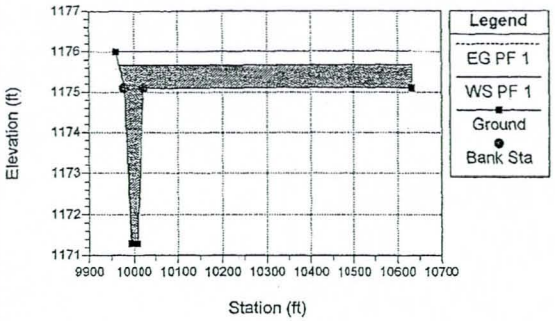
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 6453 STA 64+53



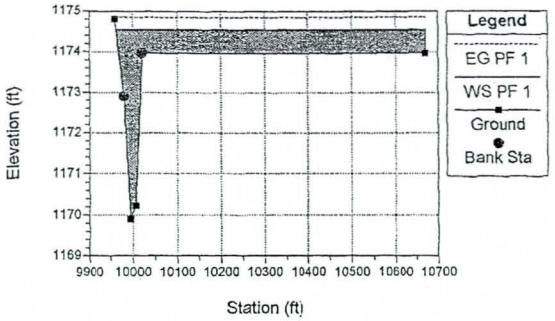
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 6065 STA 60+65



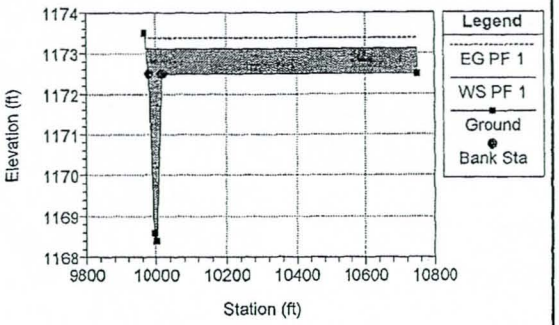
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 5914 STA 59+14



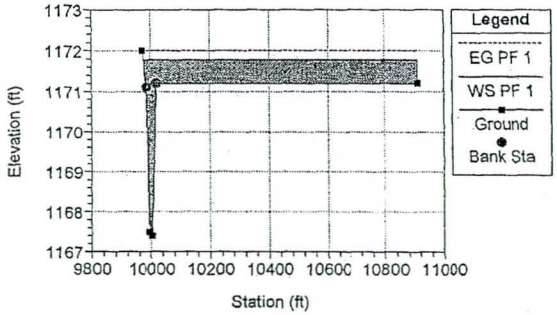
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 5603 STA 56+03



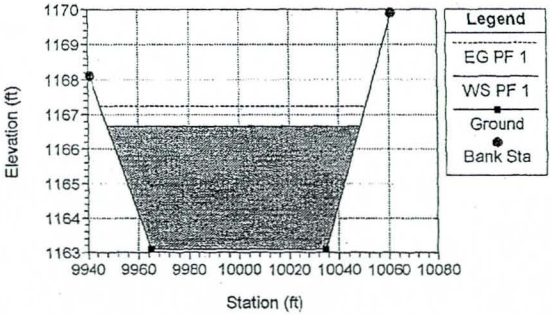
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 5201 STA 52+01



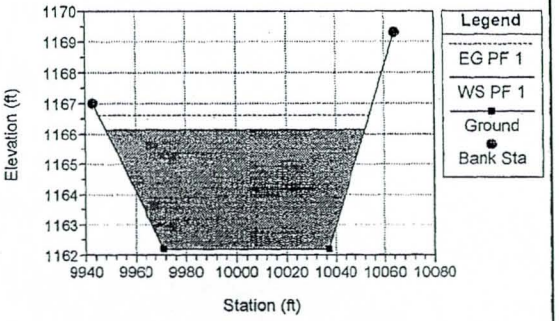
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 5000 STA 50+00



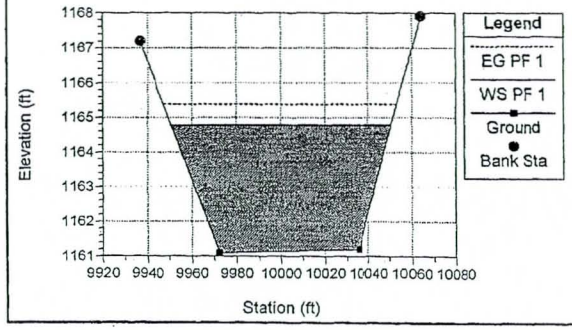
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 4801 STA 4801



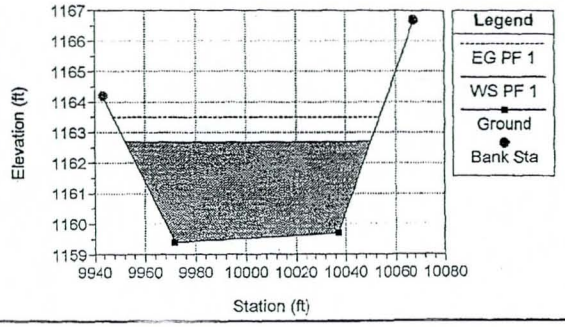
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 4403 STA 44+03



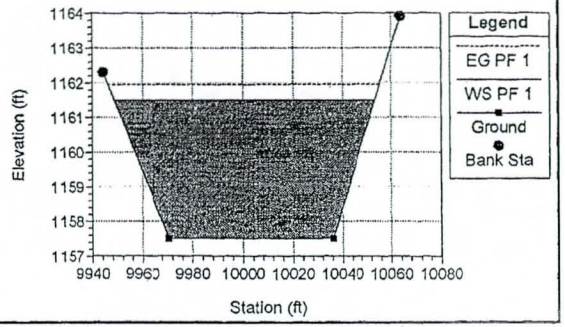
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 4000 STA 40+00



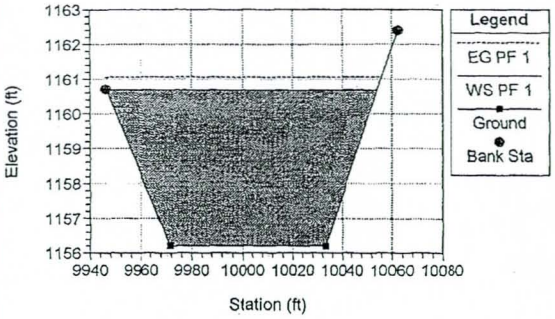
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 3610 STA 36+10



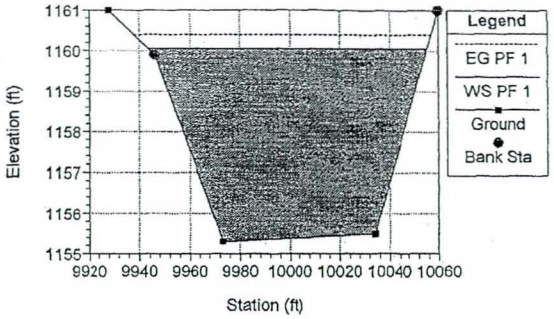
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 3200 STA 32+00



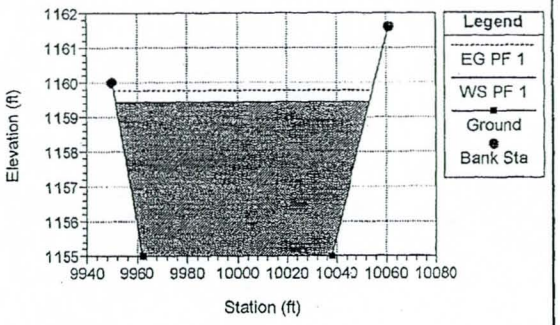
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 2803 STA 28+03



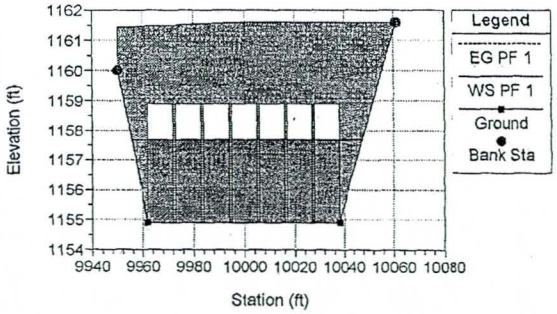
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 2600 STA 26+00



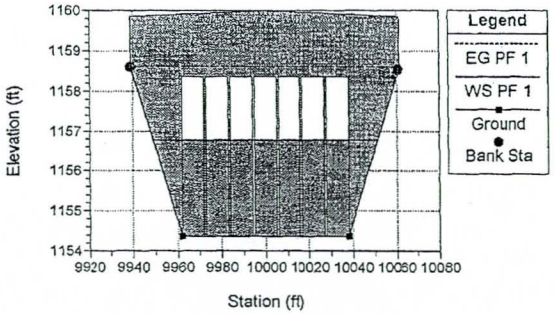
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 2550 Culv



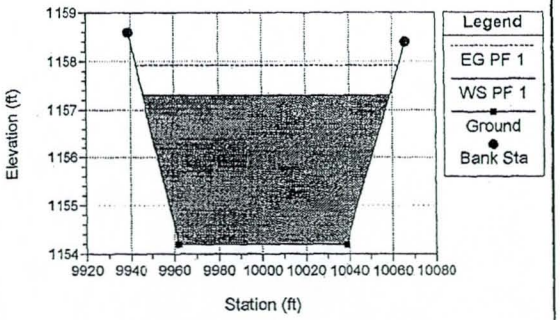
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 2550 Culv



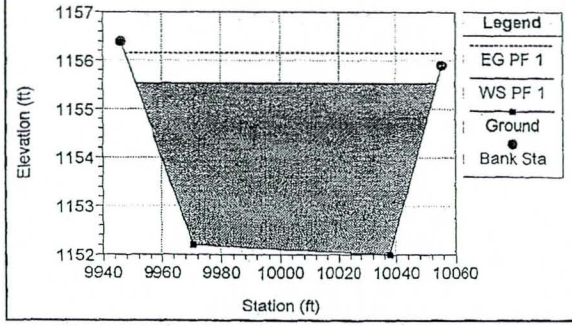
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 2403 STA 24+03



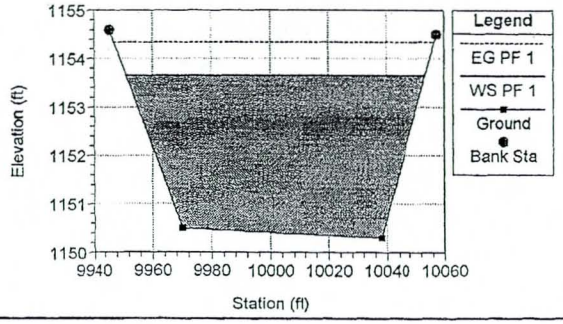
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 1992 STA 19+92



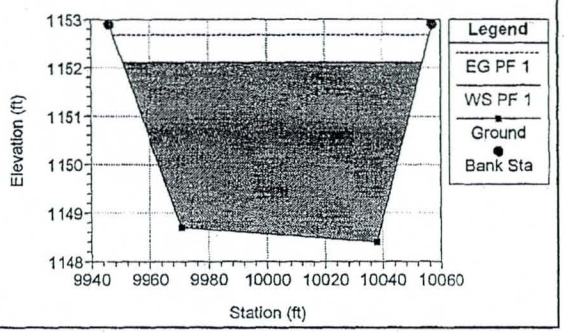
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 1585 STA 15+85



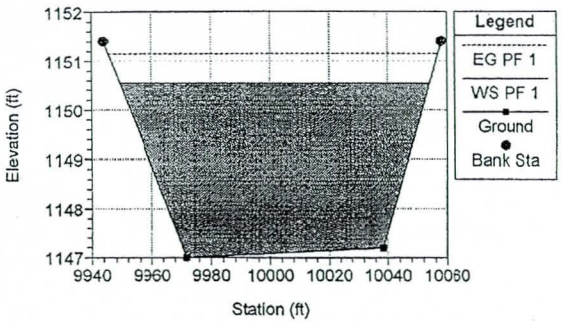
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 1196 STA 11+96



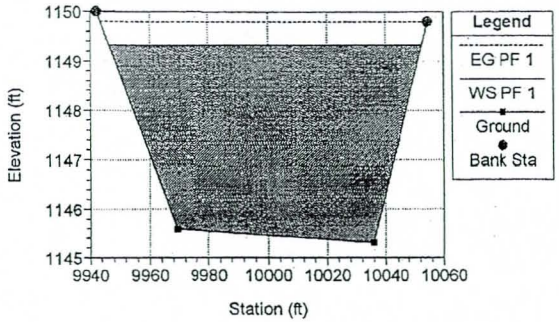
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 796 STA 7+96



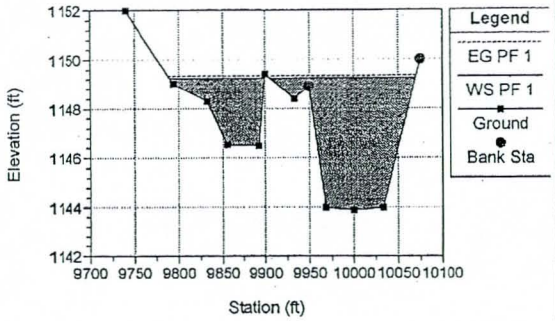
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 396 STA 3+96



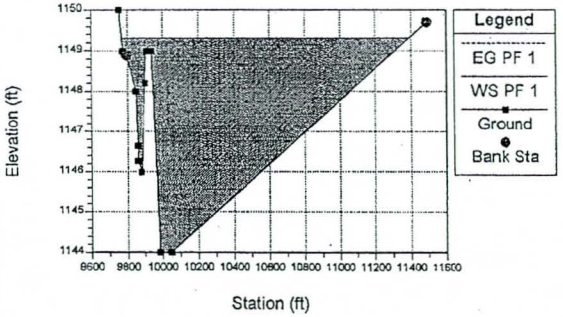
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 34 STA 0+19



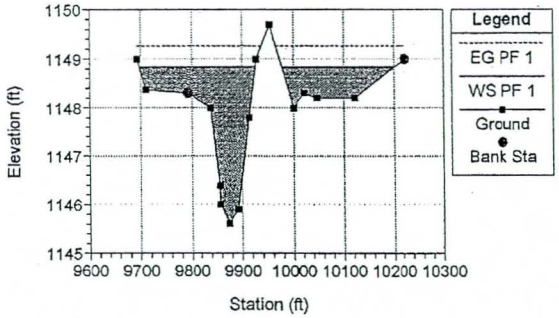
LOMR - Channel

River = REEMS ROAD Reach = 1 RS = 0 STA 0+19



LOMR - Channel

River = REEMS ROAD Reach = 1 RS = -39 STA -0+39



CHECK-RAS Program, XS Check
Cross Section Location and Alignment Review

Project File: C:\Documents and Settings\brent\HecRas\GreerRanch\lomr\backup\LC.prj
Plan File: C:\Documents and Settings\brent\HecRas\GreerRanch\lomr\backup\LC.p01
Geometry File: C:\Documents and Settings\brent\HecRas\GreerRanch\lomr\backup\LC.g01
Flow File: C:\Documents and Settings\brent\HecRas\GreerRanch\lomr\backup\LC.f01
Report File: C:\Documents and Settings\brent\HecRas\GreerRanch\lomr\backup\LC.xs
Selected profiles: PF 1
Date: 9/12/2007
Time: 1:33:15 PM

SECNO	Len Lob	Len Chl	Len Rob	TopWdthAct	Q Total	Flow Code
REEMS ROAD,1						
9515	401	401	401	42.62	746	
9114	597	597	597	46.72	746	
8517	400	400	400	42.94	746	
8117	452	452	452	46.93	746	
7665	216	216	216	261.33	746	E
7449	196	196	196	330.56	1539	E,C
7253	399	399	399	362	1539	E,C
6854	401	401	401	449.05	1539	E,C
6453	388	388	388	557.07	1539	E
6065	151	151	151	664.54	1539	E,C
5914	311	311	311	708.48	1539	E,C
5603	402	402	402	778.22	1617	E
5201	400	400	400	933.54	1617	E,C
5000	199	199	199	100.85	1845	
4801	398	398	398	104.18	1845	
4403	403	403	403	99.98	1845	
4000	390	390	390	97.62	1845	
3610	410	410	410	104.67	1845	
3200	397	397	397	108.32	1845	
2803	400	400	400	111.88	1845	
2600	197	197	197	102.08	1845	
2550	CHOLLA ST.-Up					
2550	CHOLLA ST.-Dn					
2403	411	411	411	113.17	1845	
1992	407	407	407	102.8	1845	
1585	389	389	389	102.18	1845	
1196	400	400	400	102.94	1845	
796	400	400	400	104.63	1845	
396	377	377	377	106.08	1845	
34	34	34	34	273.62	1845	D
0	39	39	39	1622.43	1845	
-39	0	0	0	453.33	1845	D,C

B=blocked obstruction XS SC 05
C=critial depth XS SC 03
D=divided flow XS SC 01
E=cross section extended XS SC 02
K=known water-surface XS SC 04

DISTANCE CHECK

SPACING CHECK

INEFFECTIVE FLOW CHECK

DISCHARGE CHECK

LOCATION CHECK

BOUNDARY CONDITION CHECK

XS BC 02 The name of the stream is REEMS ROAD,1
Normal S = .005 is specified as the downstream boundary
for profile PF 1

A.2.5 Greer Ranch HEC-RAS Model Provided by CVL

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

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

PROJECT DATA
Project Title: Reems Infra
Project File : reems.prj
Run Date and Time: 10/31/2007 9:51:00 AM

Project in English units

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

PLAN DATA

Plan Title: LOMR
Plan File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd
CLOMR\Hydro\References\CVL - GreerRanch\reems.p01

          Geometry Title: LOMR
          Geometry File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd
CLOMR\Hydro\References\CVL - GreerRanch\reems.g01

          Flow Title    : Flow 01
          Flow File     : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd
CLOMR\Hydro\References\CVL - GreerRanch\reems.f01

Plan Summary Information:
Number of:  Cross Sections =   12    Multiple Openings  =    0
            Culverts       =    2    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


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

FLOW DATA

Flow Title: Flow 01
Flow File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd
CLOMR\Hydro\References\CVL - GreerRanch\reems.f01

Flow Data (cfs)
*************************************************************
* River           Reach           RS      *            PF 1 *
* REEMS ROAD      1               2600    *            1845 *
*************************************************************

Boundary Conditions
*****************************************************************************************************
*******
* River           Reach           Profile          *            Upstream
Downstream    *
*****************************************************************************************************
*******
* REEMS ROAD      1               PF 1             *                                 Normal S =
0.005 *
*****************************************************************************************************
```

****

SUMMARY OF MANNING'S N VALUES

River:REEMS ROAD

Reach	River Sta.	n1	n2	n3
1	2600	.03	.03	.03
1	2550	Culvert		
1	2403	.03	.03	.03
1	1992	.03	.03	.03
1	1585	.03	.03	.03
1	1196	.03	.03	.03
1	796	.03	.03	.03
1	396	.03	.03	.03
1	295	.03	.03	.03
1	93	.03	.03	.03
1	43	.03	.03	.03
1	7	.03	.03	.03
1	-100	Culvert		
1	-266	.03	.03	.03

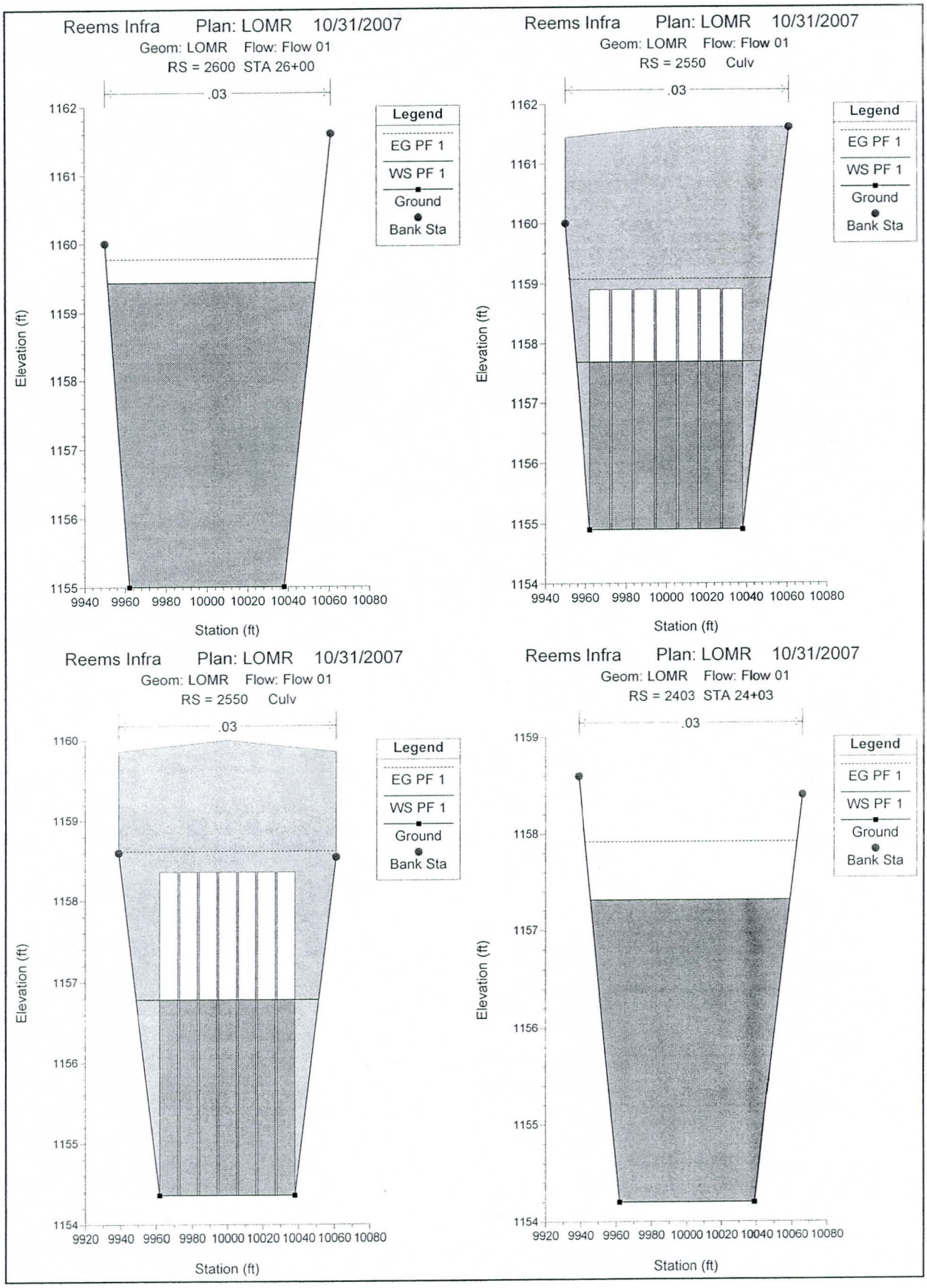
SUMMARY OF REACH LENGTHS

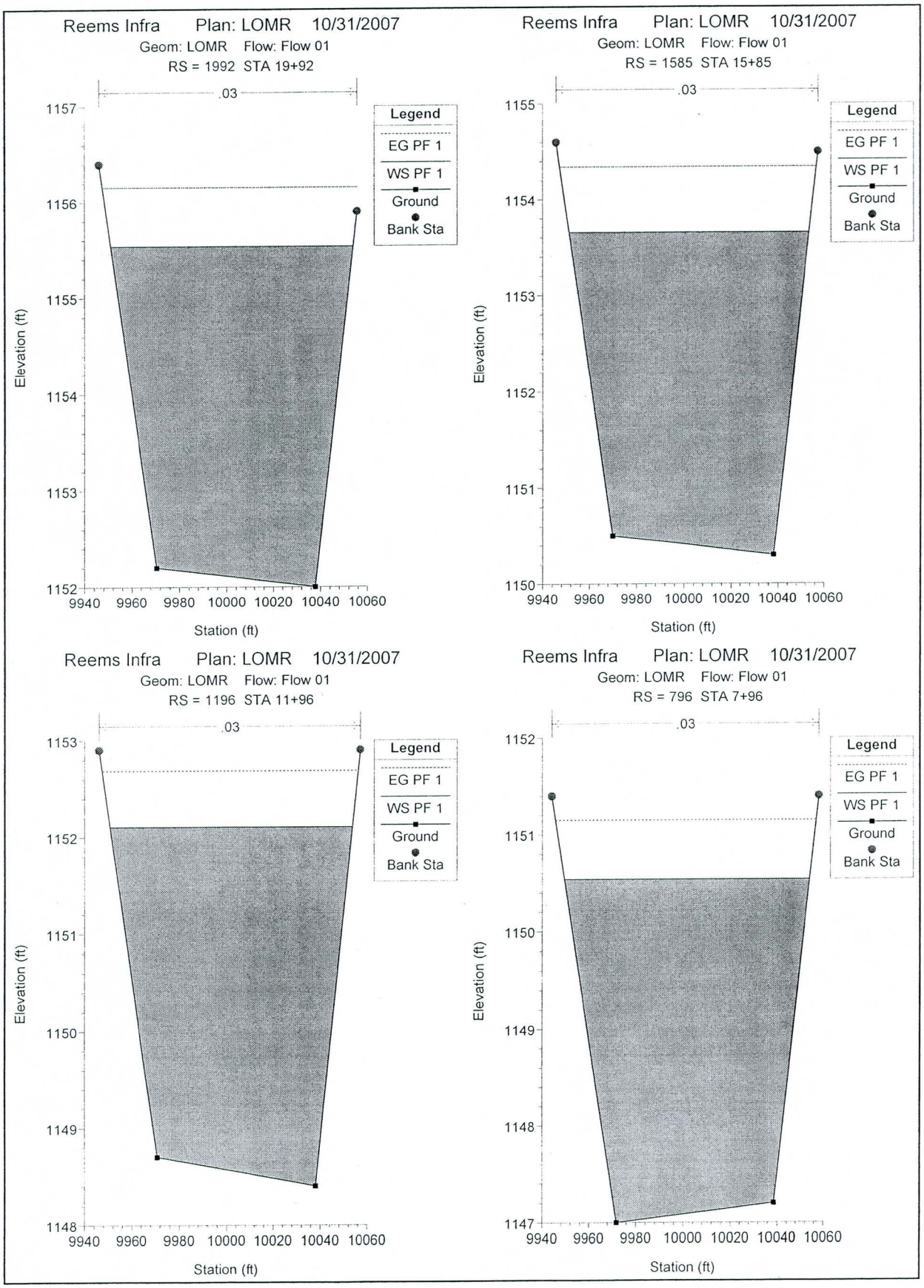
River: REEMS ROAD

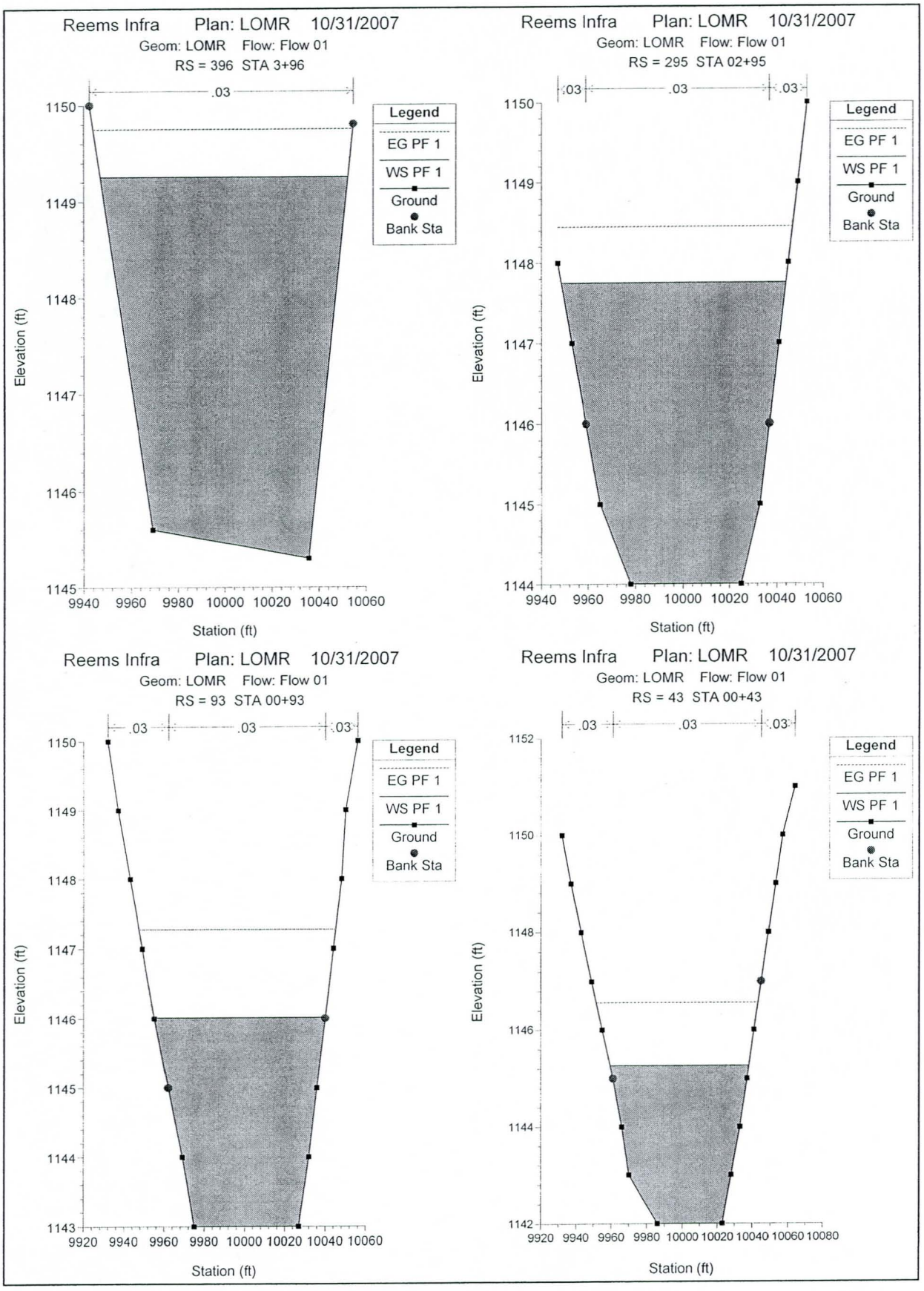
Reach	River Sta.	Left	Channel	Right
1	2600	197	197	197
1	2550	Culvert		
1	2403	411	411	411
1	1992	407	407	407
1	1585	389	389	389
1	1196	400	400	400
1	796	400	400	400
1	396	396	396	396
1	295	202	202	202
1	93	50	50	50
1	43	36	36	36
1	7	259	259	259
1	-100	Culvert		
1	-266	0	0	0

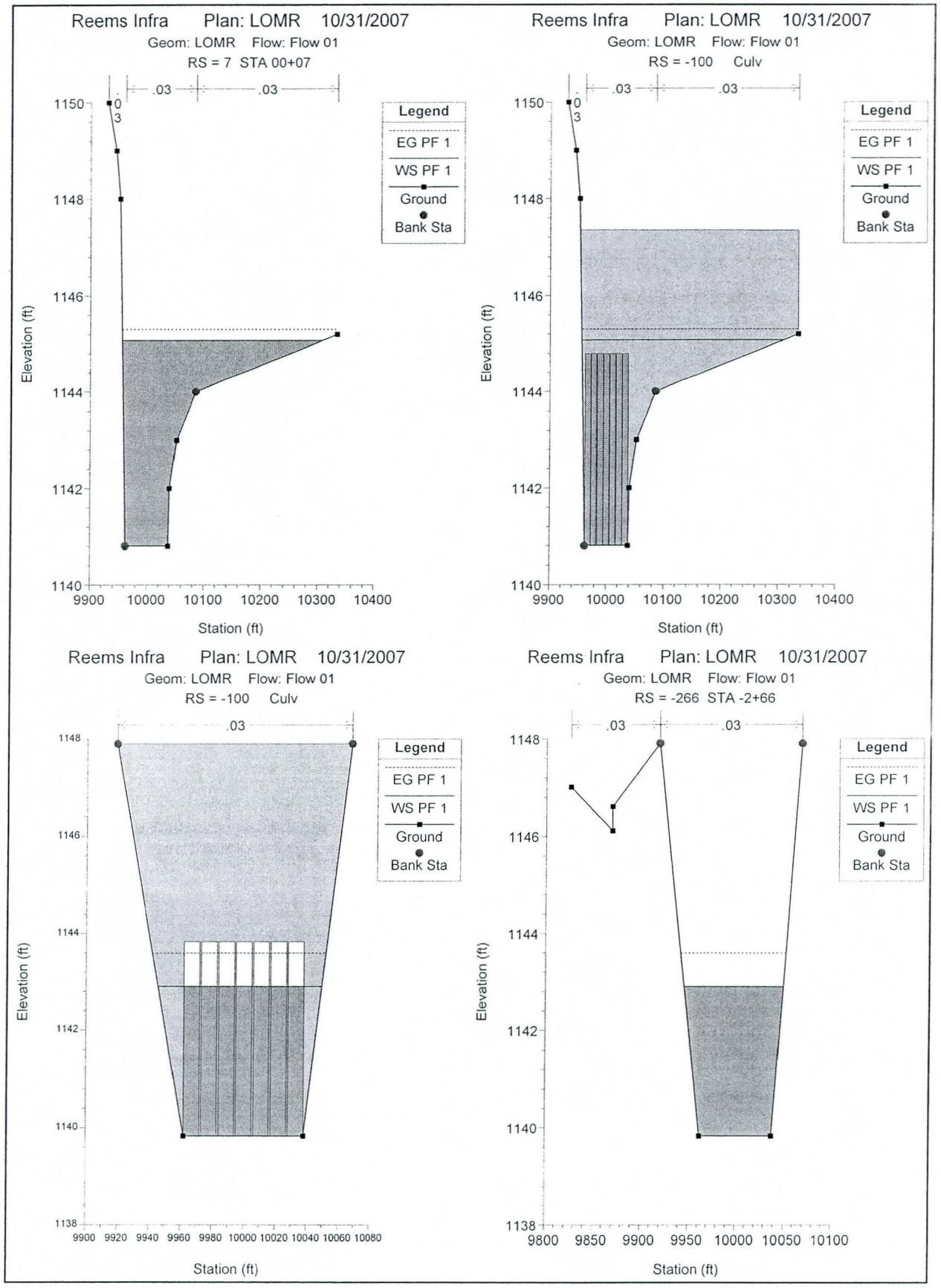
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: REEMS ROAD

Reach	River Sta.	Contr.	Expan.
1	2600	.1	.3
1	2550	Culvert	
1	2403	.1	.3
1	1992	.1	.3
1	1585	.1	.3
1	1196	.1	.3
1	796	.1	.3
1	396	.1	.3
1	295	.1	.3
1	93	.1	.3
1	43	.1	.3
1	7	.1	.3
1	-100	Culvert	
1	-266	.1	.3


Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 2600 STA 26+00
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 2550 Culv
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 2550 Culv
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 2403 STA 24+03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 1992 STA 19+92
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 1585 STA 15+85
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 1196 STA 11+96
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 796 STA 7+96
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 396 STA 3+96
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 295 STA 02+95
.03
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 93 STA 00+93
.03
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 43 STA 00+43
.03
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = 7 STA 00+07
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = -100 Culv
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = -100 Culv
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Reems Infra Plan: LOMR 10/31/2007
Geom: LOMR Flow: Flow 01
RS = -266 STA -2+66
.03
.03
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

Appendix B: General Documentation and Correspondence

B.1 Special Problem Reports

Note: There are no Special Problem Reports associated with this submittal

B.2 Contact Reports

Note: There are no Contact Reports associated with this submittal.

B.3 Meeting Minutes

B.4 General Correspondence

Note: There is no General Correspondence associated with this submittal.

B.5 Contract Documents

Flood Control District
of Maricopa County

INTEROFFICE MEMORANDUM

Date: March 17, 2009

To: Tim Phillips, P.E., Chief Engineer and General Manager

From: Mark Mayer, Sr. Civil Engineer, Planning and Project Management Division MM

Subject: Reems Road Channel and Basin (FCD2007C016)

A Conditional Letter of Map Revision (CLOMR) request for the subject District project is ready to submit to FEMA. Please sign the attached FEMA Overview and Concurrence form for inclusion in the Technical Data Notebook to be submitted in support of the request.

This submittal requests that FEMA conditionally revise portions of two Flood Insurance Rate Maps, based upon the future completion of the channel and basin project. Approximately 1 ½ miles of existing Zone A along Reems Road from just north of Peoria Avenue in Surprise, south through unincorporated Maricopa County to Olive Avenue, and between Olive Avenue and Falcons Dune Golf Course in Glendale will be revised. Officials from Glendale and Surprise have signed their respective copies of the Overview and Concurrence Form.

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

Flood Control District
of Maricopa County

Board of Directors
Fulton Brock, District 1
Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, District 4
Mary Rose Wilcox, District 5

www.fcd.maricopa.gov
2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601
TT: 602-505-5897

February 5, 2009

Mr. Larry Broyles, City Engineer
City of Glendale
58580 W Glendale Ave, 3rd Floor
Glendale, AZ 85301

RE: Conditional Letter of Map Revision Request for Reems Rd. Channel and Basin

Dear Mr. Broyles:

The Flood Control District requests the City of Glendale's concurrence for the above referenced request that FEMA conditionally revise portions of two of the Flood Insurance Rate Maps for the City based upon the future completion of the District's Reems Road channel and basin project. The Technical Data Notebook (TDN) transmitted with this letter includes all the forms, and hydrologic and hydraulic information to be submitted to FEMA in support of the request.

If the City concurs with the request, please sign the Overview and Concurrence form, which is flagged in the TDN, make a copy of the form for the TDN (which is the City's copy), and return the original form to me.

Should you have any comments, or questions concerning this request, however, please contact me. We would appreciate your response by February 27.

Sincerely,

Mark Mayer
Senior Civil Engineer
(602) 506-6726

Attachment: TDN

Flood Control District
of Maricopa County

www.fcd.maricopa.gov
2801 West Durango Street
Phoenix, Arizona 85009
Phone: 602-506-1501
Fax: 602-506-4601
TT: 602-505-5897

Board of Directors
Fulton Brock, District 1
Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, District 4
Mary Rose Wilcox, District 5

February 5, 2009

Mr. Robert Maki, City Engineer
City of Surprise
12425 W Bell Rd.
Surprise, AZ 85374

RE: Conditional Letter of Map Revision Request for Reems Rd. Channel and Basin

Dear Mr. Maki:

The Flood Control District requests the City of Surprise's concurrence for the above referenced request that FEMA conditionally revise portions of two Flood Insurance Rate Maps. Based upon the future completion of the District's Reems Road channel and basin project, the District is proposing a revision of the Flood Hazard Area along Reems Road, including a slight change extending approximately 200 feet north of Peoria Avenue in the City of Surprise. The Technical Data Notebook (TDN) transmitted with this letter includes all the forms, and hydrologic and hydraulic information to be submitted to FEMA in support of the request.

If the City concurs with the request, please sign the Overview and Concurrence form, which is flagged in the TDN, and contact me for pick up of the TDN. Please also contact me should you have any comments, or questions concerning this request. Your response by February 27 would be appreciated.

Sincerely,

Mark Mayer
Senior Civil Engineer
(602) 506-6726

Attachment: TDN

Hoskin • Ryan Consultants, Inc.
201 West Indian School Road
Phoenix, AZ 85013-3203
Tel: (602)252.8384
Fax: (602)252.8385
email: admin@hoskinryan.com
www.hoskinryan.com

TRANSMITTAL FORM

TO: **BOBBIE OHLER**

Company: FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Address: 2801 W. DURANGO ST PHOENIX, AZ 85009

Phone: 602-506-2943

RE: REEMS CLOMR

FROM: **KRISTYN VAN METER**

Project Name: REEMS RD CLOMR

Project Number: HRC 07-027-01 FCD 2007 C016 (1)

Date Sent: 12/16/2008

DESCRIPTION

Bobbie -
Attached are two copies of the Reems CLOMR documentation notebook and maps. If you need anything else, please let me know.

Thanks,
Kristyn

Hoskin • Ryan Consultants, Inc.
creative engineering solutions

Ms. Bobbie Ohler
Project Manager
Flood Control District of Maricopa County
2801 W Durango Street
Phoenix, AZ 85009

December 11, 2008

Re: Comments on Reems Road Channel and Basin CLOMR Technical Data Notebook

Dear Ms. Bobbie Ohler,

Hoskin Ryan Consultants, Inc. has reviewed the comments by Mark Mayer dated November 20, 2008. This letter documents the changes that have been made in the Technical Data Notebook to address these comments.

Comment 1: Table of Contents pages should be sealed; and the CD and its contents should be mentioned.
Response: An engineer seal has been put on the Table of Contents, and a reference to CD has been added to section 1.3.

Comment 2: Page 3, last paragraph of section 1.3, first sentence, appendix should be appendices; and the CD should also be referenced.
Response: Done.

Comment 3: Page 4, 2.1 Study Documentation Abstract. Section 2.1.3 FEMA Technical Review Contractor is: FEMA National Service Provider, 3601 Eisenhower Ave, Alexandria, VA 22304-6425
Response: Done

Comment 4: Section 2.1.6, Local Technical Reviewer is us, and our internal reference number is 2007C016.
Response: Done

Comments 5-8 are for MT-2 Form 1

Comment 5: Page 1, Section B. Overview, should include the communities of Glendale and Surprise.
Response: Done

Comment 6: Page 2, Section C, Review Fees says $4400 is included with the CLOMR request. Who is going to provide the fee?
Response: FCDMC should provide the fee.

Comment 7: In Section D, Signature, my name and contact information can be put in the requestor's box.
Response: Done

Comment 8: Separate pages will need to be completed with signatures for the communities of Unincorporated Maricopa County, Glendale, and Surprise, and copies of the TDN should be provided for each community.
Response: Done

Comments 9-11 are for MT-2 Form2

Comment 9: Page 1, Section A. Hydrology should probably not include FIS and revised cfs values, since only a revised Zone A is proposed, and there are not currently cfs in the FIS, nor will there be as a result of this study.
Response: Flow values have been removed.

Comment 10: Section B Hydraulics. Since #3 indicates models were reviewed with CHECK-RAS, there should be at least some discussion of the results of that review, if not a hard or electronic copy of the results. (Although the CD contains a number of files in addition to those needed for the modeling, no CHECK-RAS file was found.)
Response: An electronic copy of CHECK-RAS results is provided on the CD with the TDN.

Comment 11: In #4, FEMA may want to see a pre-project conditions model.
Response: The pre-project conditions analysis is in Appendix A 2.1, *Excerpt from White Tanks/ Agua Fria ADMS* (WLB, 1992). There was no HEC-RAS prepared for pre-project conditions.

Comment 12 is for MT-2 Form 3

Comment 12: Page 2 Section B. Channelization, indicates drop structures are included but does not indicate a basin is included. Although the plan and profile sheets identify grade control structure, no drop structures were found. This should be clarified or revised.
Response: Revision has been made to indicate a detention basin is included and that no drop structures are included.

Comment 13: Section 3 Survey and Mapping information's last sentence/paragraph sounds as if the culvert at Peoria should already be in place as part of Greer Ranch. If these culverts were designed for Greer Ranch, but are being installed as part of this project, then I suggest that be clarified in Section 1 Introduction, and that the last sentence of Section 3 be deleted.
Response: The culverts at Peoria Ave have been recently installed by the City of Surprise for this project. It is now clarified in Section 1 Introduction.

Comment 14: Section 4 Hydrology should have subsections per State Standard Attachment SSA1-97; and the subsections under subsection 4.2 should provide details of the corrections made by FCD to the "effective" (LOMR) model.

Response: Subsections have been added and details of the corrections to the Greer Ranch HEC-1 have been given.

Comment 15: Page 7. On the fourth line, should be added that the capacity of the Olive Ave. culverts is also shown in Appendix D.5.1. In addition to discussing the overflow of the Peoria and Olive Ave. culverts, the overflow of the other proposed culverts should be discussed.
Response: The reference to Appendix D 5.1 has been added. The purpose of discussion on the Peoria and Olive Ave. culverts is to update the diversions at those locations in HEC-1 (i.e. DI180 and DI193). To be consistent with the WLB and CVL HEC-1 modesl, no diversion is modeled for the other culverts. Therefore, no discussion is brought up regarding the other culverts.

Comment 16: Page 8. Section 5 is either covered already, or should be covered in other sections. Section 5.1 should state the version of model used, and how the starting water surface elevations were derived.
Response: Section 5 has been modified. HEC-RAS version number and the boundary condition have been added.

Comment 17: Page 10. Section 5.5.3 should state whether the proposed water surface is entirely below the existing surrounding grade, with no berms along the proposed channel.
Response: Description has been added.

Comment 18: Page 11. Section 5.7 should have subsections per SSA1-97, and model (including CHECK-RAS) warnings, etc. should be addressed. This would also be a good place to discuss the reasons and significance of decreases in water surface elevations upstream from some cross sections.
Response: Subsections have been added to Section 5.7. The warning messages are discussed in this section.

Comment 19: Page 15, Section 7.4 Flood profiles should acknowledge that a profile is included in Appendix E.5.
Response: The profile has been acknowledged in Section 7.4.

Comment 20: Figure 3A and B. Annotated FIRMs and 100 Year Floodplain maps should be revised to retain most of the existing Zone A along the east side of the proposed channel for its entire length, and along the west side between the basin and Olive Ave. due to overflows of the proposed culverts and channel.
Response: Revisions have been made.

Comment 21: Both the annotated FIRMs and the Floodplain maps should have more complete legends and leader lines distinguishing proposed Zone A boundary lines from existing; and the various dashed lines on the blown up project location on Sheet 1 of the 100 Year Floodplain plans should also be identified in the legend.
Response:Done.

Comment 22: Survey (flight) dates, or the source of topographic information, should be on Sheet 1 of the 100 Year Floodplain plans.
Response: The topographic information was obtained from FCDMC, and it has been noted on Sheet 1.

Comment 23: Appendix A.2.2 Construction Plans, Plan and Profile sheets 1 and 2 of 2, dated 8/14/2008, labeled *Design Information Sketch*, match the HEC-RAS model, but only cover a portion of the channel. This section of the channel is also depicted on Plan and Profile sheets 30 and 31 of 59; however, these sheets depict a flat channel bottom and low flow channel that do not correspond to the HEC-RAS model. This should be clarified.
Response: The *Design Information Sketch* should supersede Sheets 30 and 31. Sheets 30 and 31 have been removed.

Comment 24: Appendix B.5 Contract Documents should include the scope that is referred to in the included *Notice(s) to Proceed*.
Response: The scope has been added.

Comments 25: Appendix D.6 Hydraulic Calculations, if it is to be further divided into subsections. I suggest it would be more helpful to have D.6.6 be the Schematic, D. 6.3 the Summary output, and D6.4 Cross Sections. Otherwise, it is unnecessary to have a subsection D.6.1, if it is the only subsection. Subsection dividers (colored/tabbed sheets) would also be helpful.
Response: Appendix D has been subdivided.

Comment 26: Appendix E: Hydraulic Analysis Supporting Documentation. E.1 and E.3 Tables are unnecessary (only photos, calculations, etc. used to determine "n" or "c&e" values). A note similar to the one used for E.2 could be added to the "Table of Contents" of Appendix E under E.1 and E.3. E.5 should be subdivided further (see comments on Appendix D.6, above), with the Profile being its own subsection.
Response: Tables for E.1 and E.3 have been removed. E.5 has been subdivided.

Should you have any question, please contact me at (602)252-8384.

Sincerely,

Kristyn Van Meter
Project Engineer

Registered Professional Engineer (Civil)
CERTIFICATE NO.
41978
KRISTYN E.
VAN METER
Date Signed 12/15/08
ARIZONA U.S.A.

EXPIRES 3/31/2011

B.3 Meeting Minutes

Hoskin • Ryan Consultants, Inc.
201 West Indian School Road
Phoenix, AZ 85013
Tel: (602) 252-8384
Fax: (602) 252-8385
admin@hoskinryan.com

MEETING MINUTES

DATE: December 18, 2007

PROJECT NAME: Reems Rd CLOMR

PROJECT NO: HRC 07-027-01
FCD 2007 C016

PERSONS PRESENT: Paul Hoskin, HRC
Kristyn Van Meter, HRC
Peng Zhang, HRC
Bobbie Ohler, FCDMC
Jeff Riddle, FCDMC
John Holmes, FCDMC
Michael Duncan, FCDMC
Lynn Thomas, FCDMC

PURPOSE:

DISCUSSION:

1. HRC has modeled the 90% plans in HEC-RAS and prepared preliminary floodplain maps for review.
2. Question: how to tie-in channel to box culvert at Peoria, not on FCD plans?
   Answer: Design of channel tie-in to box culverts at Peoria Ave has not been finalized by CVL or approved/accepted by FCD. To date, HRC has modeled the tie-in as shown on the set of plans obtained from CVL.
3. Channel design notes per Jeff:
   a. Shape of the weir structure has changed to follow contours of basin.
   b. Bottom width of channel has increased, and changed from constant width to varying width.
   c. Channel is concrete-lined adjacent to the weir structure.
4. Question: how was change in Q at spillway determined?
   Answer: Water surface at the weir was defined using a beta version of HEC-RAS by Bing Zhao – Jeff will get us the model for our documentation.
5. Question: Set of 100% plans that HRC was given do not show contours, and have locations where plan does not match profile.
   Answer: Yes – the plans are not finalized. Jeff to get us final set of plans and drawings.

6. Question: Width of channel at Falcon Dunes Golf Course as shown on CAD files is different than in the HEC-RAS model received from FCD. Does the HEC-RAS reflect the existing dimensions of the channel?
   Answer: FCD not sure, will need to check and let us know.
7. ERM on plans would be for in-house reference only, not required by FEMA. FEMA will want to see Datum, and we can add GDACS (NAVD88) points on the maps for reference.
8. Need to add tie-ins to floodplains at north and south ends of study – get from FEMA maps and approved LOMR to the north.
9. Change stationing for HEC-RAS cross-sections to stationing corresponding to plans. Numbers in feet.
10. Show floodplain as Zone A. Include elevations on workmaps, but call out as Zone A on workmaps, annotated FIRM, and in TDN.
11. Question: were there any calculations done re. losses in the long CBC due to bends?
    Answer: Jeff will check with Bing, and get us supporting info.

ACTION ITEMS:

1. FCD will get the following items to HRC during the week of 12/17:
   a. Project CAD files – including new weir/spillway
   b. Ponded water surface info and analysis
   c. Lateral weir HEC-RAS model which determined overtopping Q
   d. Correct width/geometry for Dysart Drain at inflow to Falcon Dunes Golf Course
   e. Calculations re. head losses in CBC with bends.
2. HRC will revise the HEC-RAS per any changes in the channel plans.
3. HRC will prepare a draft TDN and maps for submittal to FCD by the end of January.

B.5 Contract Documents

FLOOD CONTROL DISTRICT of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602) 506-1501
Fax (602) 506-4601

NOTICE TO PROCEED

TO: Paul Hoskin, Principal
Hoskin Ryan Consultants, Inc.
201 West Indian School Road
Phoenix, AZ 85013-3203

September 5, 2007

SUBJECT:	PCN	470.12.31	Low Org	6975
	FCD Contract No.	2007C016		
	Assignment No.	1		

Reems Road Channel and Basin Project - CLOMR Preparation

Your not-to-exceed cost estimate of $44,141.50 for Assignment No. 1 has been received and accepted for this project with a completion date of 3/30/2008. You are hereby authorized to proceed with the work for the referenced project as originally described in the Scope of Work. Please specify the contract title, contract number, assignment number, and the dates of the completed service on all related correspondence, including the invoice. Send the invoices and certificates of performance to the attention of Finance Department, Flood Control District of Maricopa County. The certificate of performance must be dated on or after the final invoice date and must accompany the final invoices.

The Consultant shall provide engineering services to prepare a Conditonal Letter of Map Revision (CLOMR) for the Reems Road Channel and Basin Project. Tasks include data collection and coordination, hydraulic modeling, and preparation of the Technical Data Notebook, per attached detailed Scope of Work. The assignment shall be completed by March 30, 2008.

If at any time during the project assignment a material change in the scope of services to be provided occurs, causing an increase in the original cost estimate shown here, you must provide the District with a written explanation of the additional work along with an estimate of additional costs. No additional work shall commence prior to written authorization by the District. No claims for additional work shall be accepted that have not received prior District approval.

SIGNED: Bobbie Ohler

Bobbie Ohler, P.E.
Project Manager

Timothy S. Phillips, P.E.
Chief Engineer and General Manager

Hoskin • Ryan Consultants, Inc.
creative engineering solutions

August 17, 2007

Bobbie Ohler, P.E.
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, AZ 85009

Re: Proposal to Prepare a Conditional Letter of Map Revision (CLOMR) for the Reems Road Channel and Basin Project

Dear Bobbie:

Hoskin Ryan Consultants, Inc. (HRC) is pleased to submit this proposal for professional services for the above referenced project. We will perform the following services for the fees listed below:

SCOPE OF WORK:
Preparation of a Federal Emergency Management Agency (FEMA) Letter of Map Revision (CLOMR) request for the Reems Road Channel and Basin Project, based on Flood Control District of Maricopa County 90% Engineering Plans.

1.0 Data Collection and Review

1.1 Obtain existing survey, mapping data, hydrology data, hydraulic models, and construction plans from the Flood Control District.
1.2 Obtain hydraulic model for the box culvert at Peoria Avenue
1.3 Obtain flowrate information from developer of property north of Peoria Avenue and Reems Road, for inclusion in the CLOMR.
1.4 Field review, including photography, of study area, study limits, and project features.

Note: Scope assumes that Project flow rates and hydrology, provided by the District, have been reviewed by the District and do not need additional review by Hoskin-Ryan Consultants.

2.0 Hydraulic Modeling

2.1 Review HEC-RAS model provided by the District.
2.2 Modify HEC-RAS model per District 90% engineering design plans.
2.3 Add box culvert at Peoria Road to HEC-RAS model, and 200 feet between current north end of model and box culvert.
2.4 Modify HEC-RAS model using flowrates provided by the District.
2.5 Delineate the revised Zone A Floodplain.
2.6 Provide tie-ins at upstream and downstream ends of model, including matching to the floodplain north of Peoria Ave per recent CLOMR submittal by Coe & Van Loo Consultants.
2.7 Review resulting floodplain delineation with District staff.

3.0 Deliverables

3.1 Prepare a letter of intent to submit CLOMR request to affected property owners. A public meeting is not anticipated.

3.2 Prepare a Technical Data Notebook per ADWR standards.

3.3 Prepare the applicable FEMA CLOMR forms.

3.4 Prepare an annotated FIRM per FEMA standards.

3.5 Prepare floodplain workmaps for the project reach. Workmaps to be provided in hardcopy and digital format based on District's HIS standards for floodplain mapping. Water surface elevations will be provided on the Floodplain Workmaps, but no BFE's will be shown on the FIRM.

4.0 Revisions to LOMR Request

4.1 Revisions to CLOMR package per District review comments.

4.2 Assist the District with additional requirements from FEMA, as necessary.

5.0 Meetings and Coordination

5.1 Two (2) meeting with District staff to coordinate and/or transfer the required data.

5.2 Coordination with District and FEMA staff, as necessary, during the course of the project for review of project elements.

Please see the enclosed "Fee Proposal – Table A" for labor and expense amounts. Project schedule to first FEMA submittal is anticipated to be four (4) months.

HRC appreciates the opportunity to provide this proposal and we look forward to working on your project. If this proposal is acceptable, please sign below to indicate your acceptance and return one original to our offices.

Please do not hesitate to call if you have any questions or would like to discuss the details of this proposal.

Sincerely,

Paul W. R. Hoskin, P.E.
Principal

Proposal Accepted and Agreed Upon
For Client

By: Bobbie Allen

Title: Project Manager

Date: 8-20-07

Appendix C: Survey Field Notes

C.1 Survey Field Notes for Aerial Mapping Control

Note: Aerial Mapping was not performed as part of this study.

C.2 Survey Field Notes for Hydrologic Modeling

Note: Survey for hydrologic modeling purposes was not performed as part of this study.

C.3 Survey Field Notes for Hydraulic Modeling

Note: Survey for hydraulic modeling purposes was not performed as part of this study.

Appendix D: Hydrologic Analysis Supporting Documentation

D.1 Precipitation Data

Note: Precipitation data not used in this study.

D.2 Physical Parameter Calculations

Note: No physical parameter calculations were performed as part of this study.

D.3 Hydrograph Routing Data

D.3.1 Schematic Map for Updated HEC-1

D.3.2 Discharges along Reems Road Channel

D.3.3 Routing along Reems Road Channel

D.3.4 Updated HEC-1 Output

D.4 Reservoir Routing Data

Note: No separate reservoir routing was performed as part of this study.

D.5 Flow Splits and Diversions Data – Culvert Capacity

D.6 Hydrologic Calculations – Unsteady HEC-RAS Model

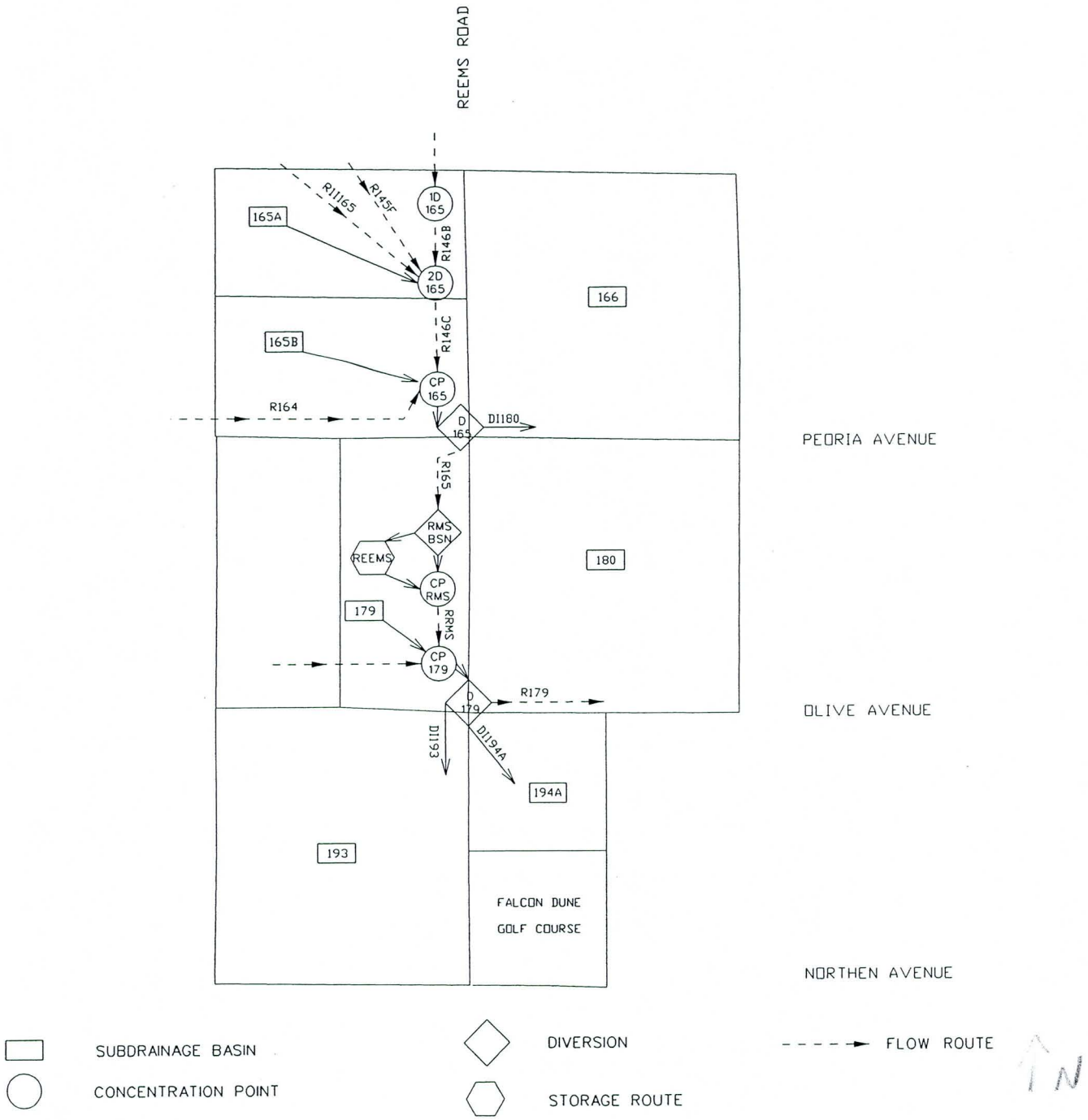
D.6.1 Schematic for Unsteady HEC-RAS

D.6.2 Report for Unsteady HEC-RAS

D.6.3 Summary Table for Unsteady HEC-RAS

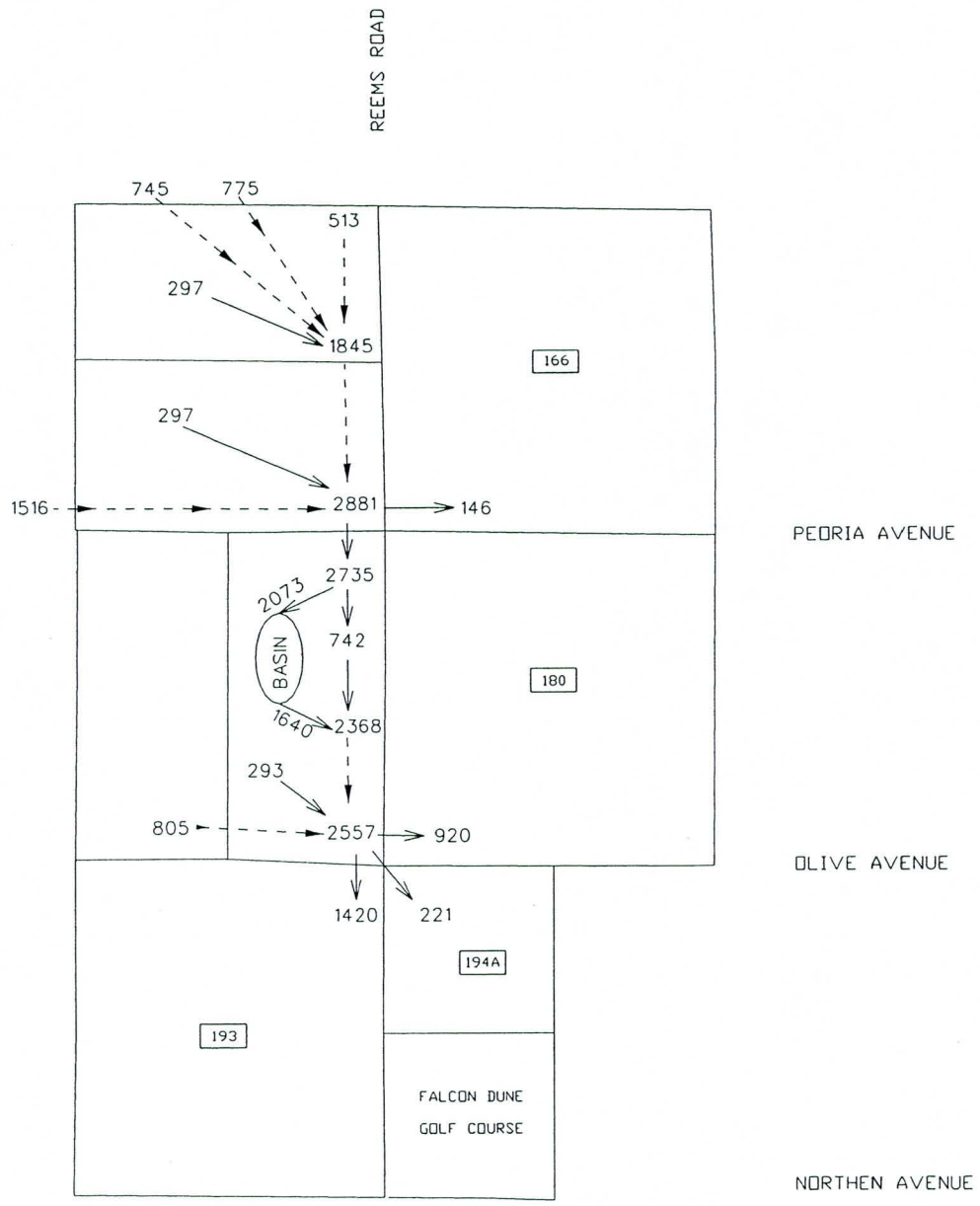
D.6.4 Cross-Sections for Unsteady HEC-RAS

D.3.1 Schematic Map for Updated HEC-1



SCHEMATIC MAP FOR HEC-1

D.3.2 Discharges along Reems Road Channel



N

1" = 3000'

DISCHARGES (IN CFS) FROM HEC-1 OUTPUT (PROPOSED CONDITIONS)

D.3.3 Routing along Reems Road Channel

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Reems Road CLOMR / LOMR PAGE 1 OF

DETAIL Hydrology, COMPUTED Amm DATE 7/16/08

Revise HEC1 based on Plans CHECKED BY DATE

* Routing Reach, see Plans FCD No. 14701231, June 2008 revised Field Copy, Includes addendum & Revisions

→ Routing Reach (R165), Reems Road Channel Reach to d.s. of Side Weir (St. 90+00 to St. 68+00)

- Dist = 2200 ft.
- Channel Geometry, see typical section 80+00

RX	0	5	25	90	110	185	200	201
RY	1146	1145	1144.5	1137	1137	1145	1145	1146

- Channel Slope = 0.0011
- Channel "n" value = 0.035

→ Routing Reach (RRM5), Reems Road to Olive Ave Box (Station 68+00 to St. 36+50)

- Distance = 3150 ft
- Channel Geometry, see typical Section 56+00

RX	0	5	30	90	110	170	185	190
RY	1135	1134	1134	1127	1127	1134.5	1134.5	1135

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT Reems Road CLOMR/LOMR PAGE 2 OF

DETAIL Hydrology COMPUTED Amm DATE 7/15/08

Revise HEC-1 based on plan CHECKED BY DATE

Cont'd

- Channel Slope 0.0011
- Channel "n" Value = 0.035

0210-182 R02-03

D.3.4 Updated HEC-1 Output

```
1*************************************                                    *************************************
 *                                   *                                    *                                   *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                *   U.S. ARMY CORPS OF ENGINEERS    *
 *              JUN   1998           *                                    *   HYDROLOGIC ENGINEERING CENTER   *
 *           VERSION 4.1             *                                    *         609 SECOND STREET         *
 *                                   *                                    *      DAVIS, CALIFORNIA 95616      *
 *  RUN DATE   15OCT08  TIME  17:44:14  *                                 *          (916) 756-1104           *
 *                                   *                                    *                                   *
 *************************************                                    *************************************

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

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

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

1                                          HEC-1 INPUT                                                    PAGE  1

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

  1           ID      7-31-2008 JWH - ENTERED REVISED RATING CURVE FOR WEIR FLOW AT "REEMS" TO
  2           ID                REFLECT HIGHER Q'S ENTERING THE CULVERT AT PEORIA AND REEMS RD.
  3           ID                ALSO, ADDED REVISED DI/DQ CARDS FOR DIVERT TO SIDE WEIR AT
  4           ID                "RMSBSN" TO REFLECT HIGHER INFLOW FROM CP165.
  5           ID
  6           ID      7-21-2008 JWH - CHANGED DIVERT AT D179 TO INDICATE PROPOSED 2-6X10
  7           ID                CULVERT AT OLIVE AVENUE AND REEMS ROAD. DELETED DIVERT CARDS
  8           ID                AT 1D179 AND 2D179. ALSO ADDED ROUTED FLOW FROM CP179 TO CP193.
  9           ID
 10           ID           7-10-2008 JWH - REMOVED THE HYDROGRAPH COMBINATION (HC CARD) AT 1I165
 11           ID                TO SHOW THE APPROPRIATE ROUTING (R146C) OF COMBINED FLOWS
 12           ID                AT 2D165 (Q=1845 CFS) TO CP165, WHICH CVL USED AS DESIGN FLOW
 13           ID                FOR REEMS ROAD CHANNEL AT GREER RANCH (SEE CLOMR SUBMITTAL)
 14           ID                DATED (REVISED) MARCH 16,2004.
 15           ID
 16           ID                ADDED SEQUENCE FOR REEMS ROAD CHANNEL AND BASIN
 17           ID
 18           ID        5 - 09 - 0 1
 19           ID
 20           ID        WHITE TANKS AREA DRAINAGE MASTER STUDY *UPDATE*
 21           ID        Original MODEL BY THE WLB Group for FCDMC AS PART OF THE WHITE
 22           ID        TANKS/AGUA FRIA ADMS, Date: October 1991
 23           ID
 24           ID            REVISED BY DAVID EVANS AND ASSOC. JULY 2001
 25           ID    REVISED BY COE & VAN LOO CONSULTANTS INC. AUG 2002
 26           ID            MODIFICATIONS REFLECT DETAILED HYDRAULIC ANALYSES ALONG
 27           ID            REEMS ROAD AND CACTUS ROAD
 28           ID
 29           ID        REVISED HYDROLOGY HEC-1 RUN FOR WHITE TANKS ADMS
 30           ID        100-YEAR, 24-HOUR STORM                  original file: WTADMS.24
 31           ID
 32           ID        SOME NOMENCLATURE CHANGES HAVE BEEN MADE PER REQUEST OF
 33           ID        FCDMC - 5-09-01
 34           ID                                      REVISED BY URS      DATE: 5-09-01
 35           ID                                                          FILE: L303M6I.DAT
 36           ID                                      REVISED BY DEA      DATE: 7-31-01
 37           ID                                                          FILE: DEA.DAT
 38           ID                                      REVISED BY CVL      DATE: 8-01-02
 39           ID                                                          FILE: REEMSREV.DAT
 40           ID
 41           ID
 42           ID
 43           ID       NOTES:
 44           ID       1. THIS HEC-1 MODEL CONTAINS THE FOLLOWING SUPER BASINS: WHITE TANKS 3,
 45           ID          2A, 2B, 2C, 2D, 2E, 2F, 2G, 2H, 2I, 2J, 2K, 2 & 3, 4 THRU 26.
 46           ID       2. REVISED TO REFLECT UPDATED SOILS MAPS AND NEW DEVELOPMENT.
 47           ID       3. AVERAGE XKSAT VALUES FOR EACH SUBBASIN WAS RECEIVED FROM FCDMC
 48           ID          GIS DATA AND THEN ADJUSTED FOR VEGETATION, OR LEFT AS ORIGINALLY IN
 49           ID          THE WLB MODEL.
 50           ID       4. FOR NEW DEVELOPMENTS ONLY 80% OF REPORTED PROVIDED RETENTION
 51           ID          WAS INCLUDED IN THIS MODEL (AS A CONSERVATIVE ESTIMATE). RETENTION
 52           ID          CAPACITIES WERE ESTIMATED BY EEC FOR DEVELOPMENTS WITH NO
 53           ID          DRAINAGE REPORTS.
 54           ID       5. REVISED DRAINAGE BOUNDARIES BASED UPON FIELD INSPECTION OF SUN CITY.
 55           ID          GRAND.  COMBINED SEVERAL BASINS TOGETHER TO MAKE NEW BASINS 114 &115.
1                                          HEC-1 INPUT                                                    PAGE  2
```

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

 56         ID          ALSO REROUTED SUBBASINS 100A, 101, 102A AND 106 TO THE SOUTH TO 113A.
 57         ID       6. CHANNEL ROUTE ALONG REEMS ROAD UPDATED TO REFLECT NEW CONSTRUCTION.
 58         ID       7. REVISED SCS TYPE II RAINFALL DISTRIBUTION FOR THE 24-HOUR GENERAL
 59         ID          STORM.
 60         ID       8. REVISED RAINFALL DEPTH-AREA REDUCTION FACTORS.
 61         ID       9. PSIF WERE ADJUSTED BASED ON THE VALUES OF XKSAT AND WERE EDITED INTO
 62         ID          THE DATA FILE BY THE FCDMC.
 63         ID      10. AVERAGE XKSAT VALUES FOR SUBBASINS WITH BORROW PITS (WHITE TANKS
 64         ID          AREAS #3 & #4) WERE ESTIMATED BY EEC.
 65         ID
            *DIAGRAM
 66         IT       5                    600
 67         IO       5
 68         IN      15
 69         JD    4.03    .001
 70         PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 71         PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 72         PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 73         PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 74         PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 75         PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 76         PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 77         PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 78         PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 79         PC    .983    .986    .989    .992    .995    .998    1.00   1.000   1.000   1.000
 80         JD    3.79      10
 81         JD    3.51      50
 82         JD    3.39     100
 83         JD    3.29     200
            * ***********************************************************************
            * **************THE FOLLOWING SECTION IS WHITE TANKS 3***********************
            * ***********************************************************************
            * ******TRANSMISSION LOSSES REMOVED - 4/25/00 - ERE*************************
            * ***********************************************************************
            *

 84         KK       1
 85         KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 1.
 86         KM   RAINFALL DEPTH OF 4.00 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
 87         KM   AN AREAL REDUCTION COEFFICIENT OF 1.000 WAS USED
 88         BA    1.94
            *     LG    0.35    0.15   7.981   0.082  19.802
 89         LG     .20     .35    4.00     .52   10.00
 90         UI    182.    327.    743.    975.   1188.   1505.   2189.   1955.   1537.   1242.
 91         UI    988.    748.    415.    308.    229.    182.     63.     56.     56.     56.
 92         UI     56.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 93         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

 94         KK    RCP1
 95         KM        ROUTE FLOW FROM CP1 TO CP2.
 96         RS       5              -1       0
 97         RC     .06     .04     .06   17800   .0469
 98         RX    1000    1125    1300    1390    1405    1490    1590    1750
 99         RY    1440    1439    1437    1428    1428    1439    1442    1444
            *
1                                        HEC-1 INPUT                                        PAGE  3

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


100         KK       2
101         KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 2.
102         BA    1.82
            *     LG    0.35   0.154   6.959   0.119  21.855
103         LG     .18     .35    4.55     .37   12.00
104         UI    115.    115.    259.    443.    557.    643.    728.    849.   1014.   1348.
105         UI   1418.   1145.    985.    864.    735.    634.    545.    404.    268.    202.
106         UI    189.    143.    115.    102.     35.     35.     35.     35.     35.     35.
107         UI     35.      0.      0.      0.      0.      0.      0.      0.      0.      0.
108         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

109         KK     CP2
110         KM        ADD HYDROGRAPHS AT CP2.
111         HC       2    3.76

112         KK    RCP2
113         KM        ROUTE COMBINED HYDROGRAPHS AT CP2 TO CP3.
114         RS       2              -1       0
115         RC     .06    .035     .06    4500   .0111
116         RX    1000    1100    1350    1705    1735    1780    1850    2000
117         RY    1304    1302    1302    1298    1298    1303    1302    1305
            *

118         KK      3A
119         KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 3A
120         BA     .29
121         LG     .15     .35    4.30     .42     .00
122         UI     34.     90.    165.    213.    289.    411.    312.    240.    181.    121.
123         UI     60.     47.     32.     10.     10.     10.     10.      0.      0.      0.
124         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

125         KK   RCP3A
126         KM        ROUTE FLOW FROM CP3A TO CP3
```

```
2244        UI     22.     22.     22.     49.     78.     94.    107.    120.    130.    143.
2245        UI    161.    177.    212.    261.    285.    241.    211.    190.    174.    157.
2246        UI    140.    127.    111.    103.     83.     63.     42.     39.     36.     36.
2247        UI     25.     22.     22.     17.      7.      7.      7.      7.      7.      7.
2248        UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
2249        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2250        KK   1I164
2251        KM        ADD HYDROGRAPHS AT CP164
2252        HC       2   11.13

2253        KK   1D145
2254        KM        RETURN DIVERT AT CP145
2255        DR   DI164

2256        KK    R145
2257        KM        ROUTE FLOW FROM CP145 TO CP164
2258        RS       7              -1       0
2259        RC    .035    .035    .075    5280   .0058
2260        RX    1000    1001    1002    1040    1170    1520    1910    2190
2261        RY    1185    1185    1185    1184    1184    1186    1188    1190

2262        KK   CP164
2263        KM        ADD HYDROGRAPHS AT CP164
2264        HC       2   15.08

2265        KK    D164
2266        KM        DIVERT TO CP177 FROM CP164
2267        DT   DI177
2268        DI       0     295    1091    2467    4521    7345   11030
2269        DQ       0      22     124     352     743    1329    2143

2270        KK    R164
2271        KM        ROUTE REMAINDER FROM CP164 TO CP165
2272        RS       7              -1       0
2273        RC     .04     .04    .075    4900   .0043
2274        RX    1000    1250    1730    2220    2320    2338    2339    2340
2275        RY    1164    1162    1160    1158    1158    1159    1159    1159
            *
```



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

2276        KK    165B
2277        KM        RUN-OFF FROM SUB-BASIN 165B
2278        BA     .45
2279        LG     .50     .00    4.66     .53     .00
2280        UI     21.     21.     21.     47.     76.     91.    104.    117.    126.    139.
2281        UI    156.    171.    204.    251.    279.    238.    208.    187.    171.    155.
2282        UI    138.    125.    110.    101.     84.     63.     44.     38.     36.     35.
2283        UI     26.     21.     21.     19.      7.      7.      7.      7.      7.      7.
2284        UI      7.      7.      7.      7.      7.      0.      0.      0.      0.      0.
2285        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * KK 1I165
            * KM      ADD HYDROGRAPHS AT CP165
            * HC     2   12.53

2286        KK   2I165
2287        KM        ADD HYDROGRAPHS AT CP165
2288        HC       2   15.98

2289        KK   CP165
2290        KM        ADD HYDROGRAPHS AT CP165
2291        HC       2   22.84
            *
            *
2292        KM    THIS SECTION ADDED AND MODIFIED BY JWH 7-31-08 FCDMC TO SHOW
2293        KM    REEMS ROAD BASIN PROJECT
            *
            *

2294        KK    D165
2295        KM        DIVERT TO CP180 FROM CP165
2296        KM        MODIFIES DIVERT TO INDICATE 6-4X10 CULVERT PROPOSED AT PEORIA
2297        DT   DI180
2298        DI       0    1000    2800   10000
2299        DQ       0       1       2    7200
            *

2300        KK    R165
2301        KM        ROUTE TO BASIN NEW CHANNEL
2302        RS       3              -1       0
2303        RC    .035    .035    .035    2200   .0011
2304        RX       0       5      25      90     110     185     200     201
2305        RY    1146    1145  1144.5    1137    1137    1145    1145    1146
            *

2306        KK  RMSBSN
2307        KM     DIVERT SIDE WEIR FLOWS INTO REEMS ROAD BASIN
2308        KM     THE REST BYPASSES THE BASIN AND COMBINES WITH BASIN OUTFLOW
2309        DT  SSPILL
2310        DI       0     371     512     724    1062    2173    2607    2728
2311        DQ       0     152     257     416     669    1501    1826    2065
            *
```

Revision

Revision

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

2312          KK  RSPILL
2313          KO       1
2314          KM    RETURN FLOWS SPILLED INTO THE BASIN
2315          DR  SSPILL
              *

2316          KK   REEMS
2317          KO       1       2
2318          KM    ROUTE SPILLED FLOWS THROUGH THE BASIN
2319          RS       1    ELEV    1125
2320          SV       0    11.5    55.4     202     228     256
2321          SE    1125    1127  1129.5    1136    1137    1138
2322          SQ       0    12.5      38    76.2     129    1570
              *

2323          KK   CPRMS
2324          KM   COMBINE BASIN FLOW WITH BY-PASS FLOW
2325          HC       2
              *

2326          KK    RRMS
2327          KM    ROUTE BASIN OUTFLOW AND BY-PASS TO OLIVE AVENUE
2328          RS       4              -1
2329          RC   0.035   0.035   0.035    3150  0.0011
2330          RX       0       5      30      90     110     170     185     190
2331          RY    1135    1124    1134    1127    1127  1134.5  1134.5    1135
              *
              *  END MODIFICATIONS - JWH 7-31-08
              *

2332          KK    D163
2333          KM         RETURN DIVERT AT CP163
2334          DR  DI176A

2335          KK    R163
2336          KM        ROUTE FLOW FROM CP163 TO CP176A
2337          RS       6              -1       0
2338          RC    .035    .035    .075    5280   .0040
2339          RX    1000    1001    1002    1010    1025    1320    1620    1845
2340          RY    1197    1197    1197    1196    1196    1198    1200    1202
              *

2341          KK    176A
2342          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 176A
2343          BA     .62
2344          LG     .50     .00    4.32     .62       1
2345          UI     24.     24.     24.     24.     79.     89.    106.    118.    131.    139.
2346          UI    151.    166.    182.    200.    236.    283.    318.    279.    245.    221.
2347          UI    203.    189.    171.    155.    142.    129.    117.    105.     87.     69.
2348          UI     46.     43.     41.     40.     37.     24.     24.     24.     21.      7.
2349          UI      7.      7.      7.      7.      7.      7.      7.      7.      7.      7.
2350          UI      7.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2351          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```



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

2352          KK  CP176A
2353          KM        ADD HYDROGRAPHS AT CP176A
2354          HC       2    3.09

2355          KK   D176A
2356          KM        DIVERT TO CP191 FROM CP176A
2357          DT   DI191
2358          DI       0      47     164     349     497    1107    2599    4968    8289
2359          DQ       0       0       0       0       0      60     278     719    1444

2360          KK   R176A
2361          KM        ROUTE REMAINDER FROM CP176A TO CP177A
2362          RS       4              -1       0
2363          RC    .075     .04     .04    2640   .0064
2364          RX    1000    1200    1545    2020    2145    2168    2169    2170
2365          RY    1173    1172    1170    1168    1168    1169    1169    1169
              *

2366          KK    177A
2367          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 177A
2368          BA     .49
2369          LG     .50     .00    4.38     .60     .00
2370          UI     22.     22.     22.     49.     78.     94.    107.    120.    130.    143.
2371          UI    161.    177.    212.    261.    285.    241.    211.    190.    174.    157.
2372          UI    140.    127.    111.    103.     83.     63.     42.     39.     36.     36.
2373          UI     25.     22.     22.     17.      7.      7.      7.      7.      7.      7.
2374          UI      7.      7.      7.      7.      0.      0.      0.      0.      0.      0.
2375          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2376          KK  CP177A
2377          KM        ADD HYDROGRAPHS AT CP177A
2378          HC       2    3.58
```

Revision 2

```
2379          KK   R177A
2380          KM        ROUTE FLOW FROM CP177A TO CP177
2381          RS       8              -1        0
2382          RC    .075      .04      .04    2640    .0064
2383          RX    1000     1200     1545    2020     2145     2168     2169     2170
2384          RY    1173     1172     1170    1168     1168     1169     1169     1169
              *

2385          KK     177
2386          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 177
2387          BA     .49
2388          LG     .50      .00     4.32     .62      .00
2389          UI     22.      22.      22.     51.      79.      96.     110.     122.     133.     147.
2390          UI    164.     182.     220.    273.     282.     238.     209.     189.     174.     154.
2391          UI    138.     124.     111.     98.      78.      60.      39.      39.      36.      35.
2392          UI     22.      22.      22.     11.       7.       7.       7.       7.       7.       7.
2393          UI      7.       7.       7.      7.       0.       0.       0.       0.       0.       0.
2394          UI      0.       0.       0.      0.       0.       0.       0.       0.       0.       0.
1                                                HEC-1 INPUT                                                          PAGE 58

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


2395          KK   1I177
2396          KM        ADD HYDROGRAPHS AT CP177
2397          HC       2    4.07

2398          KK    D164
2399          KM        RETURN DIVERT AT CP164
2400          DR   DI177

2401          KK    R164
2402          KM        ROUTE FLOW FROM CP164 TO CP177
2403          RS      11              -1        0
2404          RC    .035     .035      .07    5280    .0032
2405          RX    1000     1001     1002    1020     1040     1290     1540     1810
2406          RY    1159     1159     1159    1158     1158     1160     1162     1164

2407          KK   CP177
2408          KM        ADD HYDROGRAPHS AT CP177
2409          HC       2   16.68

2410          KK    R177
2411          KM        ROUTE FLOW FROM CP177 TO CP178
2412          RS       3              -1        0
2413          RC     .07      .04      .04    2250    .0067
2414          RX    1000     1170     1550    2020     2060     2078     2079     2080
2415          RY    1149     1148     1146    1144     1144     1145     1145     1145
              *

2416          KK     178
2417          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 178
2418          BA     .44
2419          LG     .50      .00     4.66     .53      .00
2420          UI     20.      20.      20.     46.      71.      86.      98.     109.     119.     131.
2421          UI    147.     162.     196.    244.     253.     214.     188.     170.     156.     139.
2422          UI    124.     112.     100.     89.      71.      55.      35.      35.      33.      32.
2423          UI     20.      20.      20.     11.       6.       6.       6.       6.       6.       6.
2424          UI      6.       6.       6.      6.       0.       0.       0.       0.       0.       0.
2425          UI      0.       0.       0.      0.       0.       0.       0.       0.       0.       0.

2426          KK   CP178
2427          KM        ADD HYDROGRAPHS AT CP178
2428          HC       2   17.12

2429          KK    R178
2430          KM        ROUTE FLOW FROM CP178 TO CP179
2431          RS       5              -1        0
2432          RC    .075      .04      .04    2640    .0034
2433          RX    1000     1040     1560    2110     2320     2348     2349     2350
2434          RY    1137     1136     1134    1132     1132     1133     1133     1133
              *
1                                                HEC-1 INPUT                                                          PAGE 59

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


2435          KK     179
2436          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 179
2437          BA     .46
2438          LG     .50      .00     5.00     .45      .00
2439          UI     20.      20.      20.     41.      70.      84.      97.     109.     117.     129.
2440          UI    144.     158.     184.    225.     264.     234.     203.     181.     165.     152.
2441          UI    135.     122.     109.     98.      86.      68.      52.      36.      35.      33.
2442          UI     32.      20.      20.     20.      12.       6.       6.       6.       6.       6.
2443          UI      6.       6.       6.      6.       6.       0.       0.       0.       0.       0.
2444          UI      0.       0.       0.      0.       0.       0.       0.       0.       0.       0.

2445          KK   1I179
2446          KM        ADD HYDROGRAPHS AT CP179
2447          HC       2   17.58
              *

2448          KK   CP179
```

```
2449          KM        ADD HYDROGRAPHS AT CP179
2450          HC       2   25.34
              *
              * CAPACITY OF TWO CULVERTS UPDATED BY HRC 10-15-08
              *

2451          KK   1D179
2452          KM        DIVERT TO CP193 FROM CP179
2453          KM        MODIFIES DIVERT TO INDICATE 2-6X10 CULVERT PROPOSED AT OLIVE AVENUE
2454          KM        CAPACITY OF CULVERTS IS 1420 CFS
2455          DT   DI193
2456          DI       0    1000   20000
2457          DQ       0    1420    1420
              *

2458          KK   2D179
2459          KM        DIVERT TO CP194A FROM CP179
2460          DT  DI194A
2461          DI       0     240    1000    4000
2462          DQ       0       1     240     240
              *

2463          KK    R179
2464          KM        ROUTE REMAINDER FROM CP179 TO CP180
2465          RS       4              -1       0
2466          RC     .07    .022    .022    5280   .0025
2467          RX    1000    1320    1700    1820    1840    1868    1869    1870
2468          RY    1124    1122    1120    1118    1118    1119    1119    1119
              *
              * ***********************************************************************
              * ***THE FOLLOWING SECTION TAKEN FROM NEW SUPER BASIN 2H WITH NEW SOILS*****
              * ***********************************************************************
              *
1                                    HEC-1 INPUT                                          PAGE 60

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


2469          KK     180
2470          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 180
2471          BA     .99
2472          LG     .50     .00    4.90     .47     .00
2473          UI     35.     35.     35.     35.     84.    120.    138.    163.    176.    191.
2474          UI    203.    220.    238.    261.    280.    321.    391.    430.    449.    390.
2475          UI    350.    319.    296.    277.    255.    231.    214.    196.    178.    166.
2476          UI    146.    120.    101.     66.     62.     60.     57.     57.     41.     35.
2477          UI     35.     35.     26.     11.     11.     11.     11.     11.     11.     11.
2478          UI     11.     11.     11.     11.     11.     11.      0.      0.      0.      0.
2479          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * KK 1I180
              * KM      ADD HYDROGRAPHS AT CP180
              * HC     2   26.33

2480          KK   2D133
2481          KM        RETURN DIVERT AT CP133
2482          DR   1D147

2483          KK    R133
2484          KM        ROUTE FLOW FROM CP133 TO CP147
2485          RS      55              -1       0
2486          RC     .07     .07     .07    6552   .0063
2487          RX    1000    1001    1720    1900    2290    2460    2619    2620
2488          RY    1189    1189    1188  1187.5  1187.5    1188    1189    1189
              *

2489          KK     147
2490          KM        RUNOFF HYDROGRAPH FROM SUB-BASIN 147
2491          BA     .50
2492          LG     .50     .00    4.82     .49     .00
2493          UI     23.     23.     23.     57.     84.    102.    116.    128.    140.    156.
2494          UI    175.    197.    249.    289.    278.    237.    210.    190.    174.    153.
2495          UI    138.    123.    110.     94.     70.     50.     41.     39.     38.     27.
2496          UI     23.     23.     18.      7.      7.      7.      7.      7.      7.      7.
2497          UI      7.      7.      7.      0.      0.      0.      0.      0.      0.      0.
2498          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.

2499          KK   1I147
2500          KM        ADD HYDROGRAPHS AT CP147
2501          HC       2   14.62

2502          KK    D134
2503          KM        RETURN DIVERT AT CP134
2504          DR   2D147

2505          KK    R134
2506          KM        ROUTE FLOW FROM CP134 TO CP147
2507          RS       7              -1       0
2508          RC     .05     .05     .15    5280   .0053
2509          RX    1000    1001    1002    1020    1190    1580    2180    2700
2510          RY    1187    1187    1187    1186    1186    1188    1190    1192
1                                    HEC-1 INPUT                                          PAGE 61

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

```
2262          .           .           .       CP164............
              .           .           .           .
              .           .           .           .
2267          .           .           .           .-------->   DI177
2265          .           .           .        D164
              .           .           .           V
              .           .           .           V
2270          .           .           .        R164
              .           .           .           .
              .           .           .           .
2276          .           .           .           .        165B
              .           .           .           .           .
              .           .           .           .           .
2286          .           .           .       2I165............
              .           .           .           .
              .           .           .           .
2289          .           .       CP165............
              .           .           .
              .           .           .
2297          .           .           .-------->   DI180
2294          .           .        D165
              .           .           V
              .           .           V
2300          .           .        R165
              .           .           .
              .           .           .
2309          .           .           .-------->  SSPILL
2306          .           .      RMSBSN
              .           .           .
              .           .           .
2315          .           .           .           .<--------  SSPILL
2312          .           .           .      RSPILL
              .           .           .           V
              .           .           .           V
2316          .           .           .       REEMS
              .           .           .           .
              .           .           .           .
2323          .           .       CPRMS............
              .           .           V
              .           .           V
2326          .           .        RRMS
              .           .           .
              .           .           .
2334          .           .           .           .<--------  DI176A
2332          .           .           .        D163
              .           .           .           V
              .           .           .           V
2335          .           .           .        R163
              .           .           .           .
              .           .           .           .
2341          .           .           .           .        176A
              .           .           .           .           .
              .           .           .           .           .
2352          .           .           .      CP176A............
              .           .           .           .
              .           .           .           .
2357          .           .           .           .-------->   DI191
2355          .           .           .       D176A
              .           .           .           V
              .           .           .           V
2360          .           .           .       R176A
              .           .           .           .
              .           .           .           .
2366          .           .           .           .        177A
              .           .           .           .           .
              .           .           .           .           .
2376          .           .           .      CP177A............
              .           .           .           V
              .           .           .           V
2379          .           .           .       R177A
              .           .           .           .
              .           .           .           .
2385          .           .           .           .         177
              .           .           .           .           .
              .           .           .           .           .
2395          .           .           .       1I177............
              .           .           .           .
              .           .           .           .
2400          .           .           .           .           .<--------   DI177
2398          .           .           .           .        D164
              .           .           .           .           V
              .           .           .           .           V
2401          .           .           .           .        R164
              .           .           .           .           .
              .           .           .           .           .
2407          .           .           .       CP177............
              .           .           .           V
              .           .           .           V
2410          .           .           .        R177
              .           .           .           .
              .           .           .           .
2416          .           .           .           .         178
              .           .           .           .           .
              .           .           .           .           .
2426          .           .           .       CP178............
```

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                 .         .         .         V
                 .         .         .         V
2429             .         .         .      R178
                 .         .         .         .
                 .         .         .         .
2435             .         .         .         .        179
                 .         .         .         .         .
                 .         .         .         .         .
2445             .         .         .     1I179...........
                 .         .         .         .
                 .         .         .         .
2448             .         .     CP179...........
                 .         .         .
                 .         .         .
2455             .         .         .-------> DI193
2451             .         .     1D179
                 .         .         .
                 .         .         .
2460             .         .         .-------> DI194A
2458             .         .     2D179
                 .         .         V
                 .         .         V
2463             .         .      R179
                 .         .         .
                 .         .         .
2469             .         .         .        180
                 .         .         .         .
                 .         .         .         .
2482             .         .         .         .          .<-------   1D147
2480             .         .         .         .      2D133
                 .         .         .         .          V
                 .         .         .         .          V
2483             .         .         .         .       R133
                 .         .         .         .          .
                 .         .         .         .          .
2489             .         .         .         .          .         147
                 .         .         .         .          .           .
                 .         .         .         .          .           .
2499             .         .         .         .     1I147...........
                 .         .         .         .          .
                 .         .         .         .          .
2504             .         .         .         .          .          .<-------   2D147
2502             .         .         .         .          .        D134
                 .         .         .         .          .           V
                 .         .         .         .          .           V
2505             .         .         .         .          .        R134
                 .         .         .         .          .           .
                 .         .         .         .          .           .
2511             .         .         .         .    CP147 ...........
                 .         .         .         .          .
                 .         .         .         .          .
2516             .         .         .         .          .------->   2D166
2514             .         .         .         .       D147
                 .         .         .         .          V
                 .         .         .         .          V
2519             .         .         .         .       R147
                 .         .         .         .          .
                 .         .         .         .          .
2525             .         .         .         .          .         148
                 .         .         .         .          .           .
                 .         .         .         .          .           .
2535             .         .         .         .     1I148...........
                 .         .         .         .          .
                 .         .         .         .          .
2540             .         .         .         .          .          .<-------   DI148
2538             .         .         .         .          .        D135
                 .         .         .         .          .           V
                 .         .         .         .          .           V
2541             .         .         .         .          .        R135
                 .         .         .         .          .           .
                 .         .         .         .          .           .
2547             .         .         .         .     CP148...........
                 .         .         .         .          .
                 .         .         .         .          .
2552             .         .         .         .          .------->   DI150
2550             .         .         .         .       D148
                 .         .         .         .          V
                 .         .         .         .          V
2555             .         .         .         .       R148
                 .         .         .         .          .
                 .         .         .         .          .
2563             .         .         .         .          .          .<-------   2D166
2561             .         .         .         .          .        D147
                 .         .         .         .          .           V
                 .         .         .         .          .           V
2564             .         .         .         .          .        R147
                 .         .         .         .          .           .
                 .         .         .         .          .           .
2570             .         .         .         .          .           .         166
                 .         .         .         .          .           .           .
                 .         .         .         .          .           .           .
2583             .         .         .         .          .           .           .          .<-------   DI166
2581             .         .         .         .          .           .           .      D146
                 .         .         .         .          .           .           .         V
                 .         .         .         .          .           .           .         V
```

+	165B	297.	13.08	64.	16.	8.	.45
+ 2 COMBINED AT	2I165	1635.	13.67	610.	159.	76.	15.98
+ 2 COMBINED AT	CP165	2881.	14.58	1552.	439.	211.	22.84
+ DIVERSION TO	DI180	146.	14.58	17.	4.	2.	22.84
+ HYDROGRAPH AT	D165	2735.	14.58	1535.	435.	209.	22.84
+ ROUTED TO	R165	2732.	14.75	1534.	435.	209.	22.84
+ DIVERSION TO	SSPILL	2073.	14.75	1044.	283.	136.	22.84
+ HYDROGRAPH AT	RMSBSN	742.	15.33	490.	152.	73.	22.84
+ HYDROGRAPH AT	RSPILL	2073.	14.75	1044.	283.	136.	22.84
+ ROUTED TO	REEMS	1640.	15.42	628.	213.	116.	22.84
+ 2 COMBINED AT	CPRMS	2368.	15.33	1088.	363.	189.	22.84
+ ROUTED TO	RRMS	2326.	15.58	1087.	362.	188.	22.84
+ HYDROGRAPH AT	D163	0.	.00	0.	0.	0.	2.47
+ ROUTED TO	R163	0.	.00	0.	0.	0.	2.47
+ HYDROGRAPH AT	176A	327.	13.25	79.	20.	10.	.62
+ 2 COMBINED AT	CP176A	322.	13.25	78.	20.	9.	3.09
+ DIVERSION TO	DI191	0.	.00	0.	0.	0.	3.09
+ HYDROGRAPH AT	D176A	322.	13.25	78.	20.	9.	3.09
+ ROUTED TO	R176A	298.	13.50	78.	20.	9.	3.09
+ HYDROGRAPH AT	177A	293.	13.08	63.	16.	8.	.49
+ 2 COMBINED AT	CP177A	493.	13.17	139.	35.	17.	3.58
+ ROUTED TO	R177A	488.	13.50	139.	35.	17.	3.58
+ HYDROGRAPH AT	177	291.	13.08	62.	15.	7.	.49
+ 2 COMBINED AT	1I177	684.	13.33	200.	50.	24.	4.07
+ HYDROGRAPH AT	D164	257.	13.25	73.	19.	9.	15.08
+ ROUTED TO	R164	224.	14.00	73.	19.	9.	15.08
+ 2 COMBINED AT	CP177	738.	13.75	261.	66.	32.	16.68
+ ROUTED TO	R177	723.	13.92	260.	66.	32.	16.68
+ HYDROGRAPH AT	178	274.	13.08	59.	15.	7.	.44
+ 2 COMBINED AT	CP178	810.	13.42	314.	80.	39.	17.12
+ ROUTED TO	R178	805.	13.83	312.	80.	39.	17.12
+ HYDROGRAPH AT	179	293.	13.08	64.	16.	8.	.46

+	2 COMBINED AT	1I179	938.	13.58	369.	95.	46.	17.58
+	2 COMBINED AT	CP179	2557.	15.58	1395.	450.	231.	25.34
+	DIVERSION TO	DI193	1420.	13.92	1188.	398.	206.	25.34
+	HYDROGRAPH AT	1D179	1137.	15.58	207.	52.	25.	25.34
+	DIVERSION TO	DI194A	221.	15.67	36.	9.	4.	25.34
+	HYDROGRAPH AT	2D179	920.	15.58	171.	43.	21.	25.34
+	ROUTED TO	R179	826.	15.92	171.	43.	21.	25.34
+	HYDROGRAPH AT	180	515.	13.33	136.	34.	16.	.99
+	HYDROGRAPH AT	2D133	201.	14.42	101.	31.	15.	15.93
+	ROUTED TO	R133	190.	16.00	93.	31.	15.	15.93
+	HYDROGRAPH AT	147	325.	13.00	68.	17.	8.	.50
+	2 COMBINED AT	1I147	310.	13.00	134.	48.	23.	14.62
+	HYDROGRAPH AT	D134	316.	13.25	124.	33.	16.	16.87
+	ROUTED TO	R134	259.	14.17	121.	33.	16.	16.87
+	2 COMBINED AT	CP147	372.	15.33	249.	81.	39.	15.92
+	DIVERSION TO	2D166	367.	15.33	246.	80.	38.	15.92
+	HYDROGRAPH AT	D147	5.	15.33	2.	1.	0.	15.92
+	ROUTED TO	R147	4.	16.42	2.	1.	0.	15.92
+	HYDROGRAPH AT	148	307.	13.00	66.	16.	8.	.48
+	2 COMBINED AT	1I148	291.	13.00	64.	16.	8.	16.40
+	HYDROGRAPH AT	D135	35.	12.83	8.	2.	1.	17.92
+	ROUTED TO	R135	21.	14.58	8.	2.	1.	17.92
+	2 COMBINED AT	CP148	291.	13.00	73.	18.	9.	17.46
+	DIVERSION TO	DI150	44.	13.00	11.	3.	1.	17.46
+	HYDROGRAPH AT	D148	246.	13.00	61.	15.	7.	17.46
+	ROUTED TO	R148	172.	14.08	60.	15.	7.	17.46
+	HYDROGRAPH AT	D147	367.	15.33	246.	80.	38.	15.92
+	ROUTED TO	R147	346.	17.25	232.	80.	38.	15.92
+	HYDROGRAPH AT	166	496.	13.33	132.	33.	16.	.98
+	HYDROGRAPH AT	D146	249.	13.50	99.	25.	12.	18.49
+	ROUTED TO	R146	161.	16.58	88.	25.	12.	18.49
+	ROUTED TO	R146BC	131.	19.50	75.	25.	12.	18.49

D.5 Flow Splits and Diversion Data

– Culvert Capacity

D165 in HEC-1

(6) 10'x4' CBC @ Peoria Ave

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 25, 2008

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	4.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.013
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	142.0
Invert Elevation at Downstream end of Culvert (ft)	1,139.75
Invert Elevation at Upstream end of Culvert (ft)	1,140.8
Culvert Slope (ft/ft)	0.0074
Starting Flow Rate (cfs)	466.0 x 6 = ≈ 800 CFS
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	466.0
Starting Tailwater Depth (ft)	5.0
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	5.0

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
466.0	5.0	8.45	8.03	3.08	4.0	3.08	15.11

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CULVERT INVERT = 1140.80 ft

ROAD ELEVATION = 1149.20 ft ?

WATER DEPTH TO OVERTOP = 1149.20 - 1140.80 = 8.40'

EXCESS WATER OVERTOPS AND FLOWS EAST ALONG PEORIA AVE

DI 193 in MEC-1

(2) 10' x 6' CBC @ OLIVE AVE.

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

October 15, 2008

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	6.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.013
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	192.0
Invert Elevation at Downstream end of Culvert (ft)	1,116.52
Invert Elevation at Upstream end of Culvert (ft)	1,116.73
Culvert Slope (ft/ft)	0.0011
Starting Flow Rate (cfs)	710.0
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	710.0
Starting Tailwater Depth (ft)	5.0
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	5.0

x 2 = 1420

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
710.0	5.0	10.25	7.61	6.0	5.39	6.0	11.83

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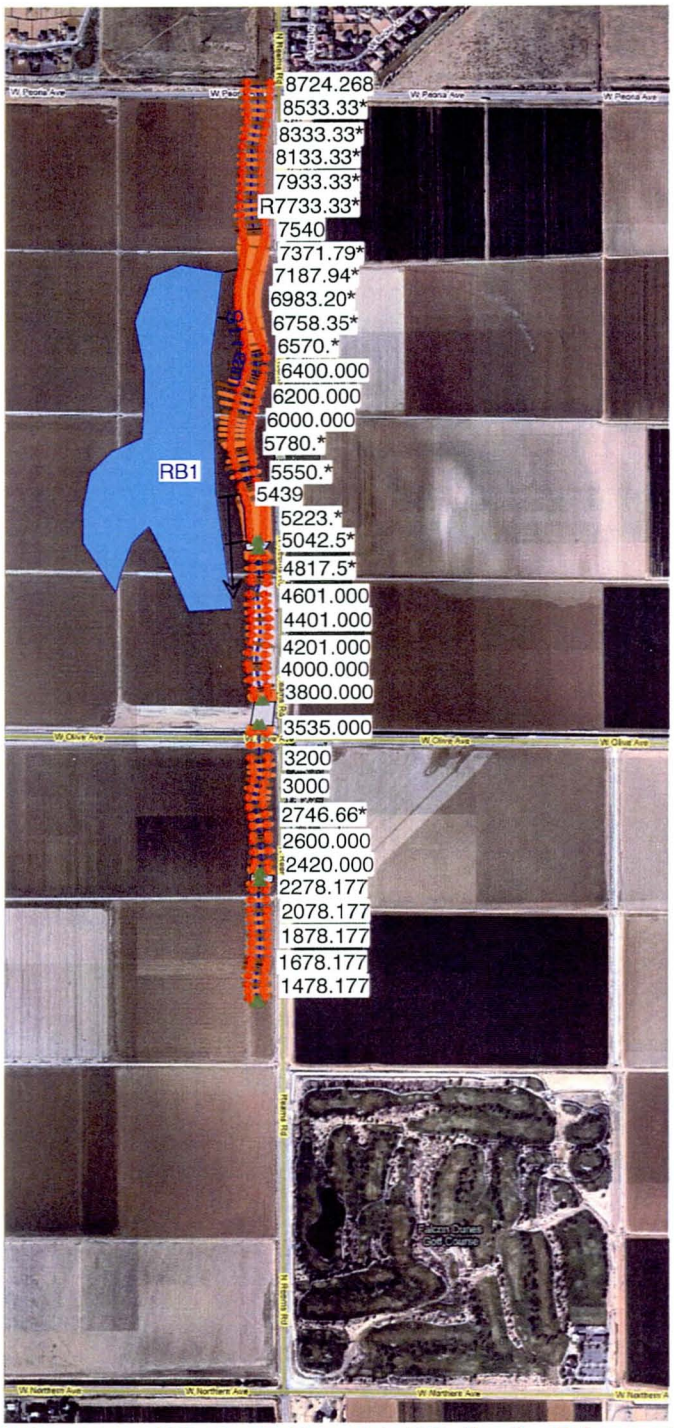
CULVERT INVERT = 1116.73 ft

ROAD ELEVATION = 1127 ft

WATER DEPTH TO OVERTOP = 1127 - 1116.73 = 10.27

EXCESS WATER OVERTOPS AND FLOWS ALONG RR

D.6.1 Schematic for Unsteady HEC-RAS



Note: of the XS's are Geo-Referenced (* Geo-Ref user entered XS - Geo-Ref interpolated XS - Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

D.6.2 Report for Unsteady HEC-RAS

HEC-RAS Version 4.0.0 March 2008
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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

****

PROJECT DATA
Project Title: 100% Channel Unsteady Model
Project File : Unsteady.prj
Run Date and Time: 9/11/2008 9:52:09 AM

Project in English units

Project Description:
Unsteady model to determine flows for the Steady model. The open lid culvert has been removed to improve stability.

For the existing conditions, two hydrographs have been used as boundary conditions. The hydrograph at 2D165 has been used at Peoria Ave, and the hydrograph at 1I179 has been used as a lateral inflow just upstream of Olive Ave. Both hydrographs are taken from the CVL HEC-1 file. The geometry used in the existing analysis has a larger weir above the basin culvert outlet to capture the flow that is overtopping the basin.

The rating curves for the basin inflow and outflow (for the HEC-1 model) were developed from this model.

****

PLAN DATA

Plan Title: Existing Conditions
Plan File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\HEC-RAS\Unsteady.p04

Geometry Title: Design Conditions
Geometry File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\HEC-RAS\Unsteady.g03

Flow Title :
Flow File :

Plan Description:
This plan contains the existing condition hydrographs from the CVL model. The hydrograph at Peoria is from D165. The hydrograph at Olive is from 1I179.

Plan Summary Information:

Number of:	Cross Sections	= 186	Multiple Openings	=	0
	Culverts	= 3	Inline Structures	=	10
	Bridges	= 0	Lateral Structures	=	2

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed only where necessary
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Mixed Flow

****

SUMMARY OF MANNING'S N VALUES

River:Stream

Reach	River Sta.	n1	n2	n3
Reach	8724.268	.035	.035	.035
Reach	8662.13	.035	.035	.035
Reach	8600.000	.035	.035	.035
Reach	8533.33	.035	.035	.035
Reach	8466.66	.035	.035	.035
Reach	8400.000	.035	.035	.035
Reach	8333.33	.035	.035	.035
Reach	8266.66	.035	.035	.035
Reach	8200.000	.035	.035	.035
Reach	8133.33	.035	.035	.035
Reach	8066.66	.035	.035	.035
Reach	8000.000	.035	.035	.035
Reach	7933.33	.035	.035	.035
Reach	7866.66	.035	.035	.035
Reach	7800.000	.035	.035	.035
Reach	7733.33	.035	.035	.035
Reach	7666.66	.035	.035	.035
Reach	7600.000	.035	.035	.035
Reach	7540	.035	.035	.035
Reach	7539.9	Inl Struct		
Reach	7500	.035	.035	.035
Reach	7475.	.035	.035	.035
Reach	7450.	.035	.035	.035
Reach	7425.	.035	.035	.035
Reach	7400.000	.035	.035	.035
Reach	7371.79	.035	.035	.035
Reach	7343.59	.035	.035	.035
Reach	7315.38	.035	.035	.035
Reach	7287.18	.035	.035	.035
Reach	7258.97	.035	.035	.035
Reach	7230.77	.035	.035	.035
Reach	7202.571	.02	.02	.02
Reach	7201.87	Lat Struct		
Reach	7187.94	.02	.02	.02
Reach	7173.32	.02	.02	.02
Reach	7158.69	.02	.02	.02
Reach	7144.07	.02	.02	.02
Reach	7129.44	.02	.02	.02
Reach	7114.82	.02	.02	.02
Reach	7100.2	.02	.02	.02
Reach	7085.57	.02	.02	.02
Reach	7070.95	.02	.02	.02
Reach	7056.32	.02	.02	.02
Reach	7041.70	.02	.02	.02
Reach	7027.07	.02	.02	.02
Reach	7012.45	.02	.02	.02
Reach	6997.82	.02	.02	.02
Reach	6983.20	.02	.02	.02
Reach	6968.58	.02	.02	.02
Reach	6953.95	.02	.02	.02
Reach	6939.33	.02	.02	.02
Reach	6924.70	.02	.02	.02
Reach	6910.08	.02	.02	.02
Reach	6895.45	.02	.02	.02
Reach	6880.83	.02	.02	.02
Reach	6866.20	.02	.02	.02
Reach	6851.58	.02	.02	.02
Reach	6836.96	.02	.02	.02
Reach	6822.33	.02	.02	.02
Reach	6807.711	.02	.02	.02
Reach	6783.03	.035	.035	.035
Reach	6758.35	.035	.035	.035
Reach	6733.67	.035	.035	.035
Reach	6709.000	.035	.035	.035
Reach	6681.75	.035	.035	.035
Reach	6654.5	.035	.035	.035
Reach	6627.25	.035	.035	.035
Reach	6600.000	.035	.035	.035
Reach	6570.	.035	.035	.035
Reach	6540.000	.035	.035	.035
Reach	6539.9	Inl Struct		
Reach	6479	.035	.035	.035
Reach	6400.000	.035	.035	.035
Reach	6340.000	.035	.035	.035
Reach	6339.9	Inl Struct		
Reach	6300.000	.035	.035	.035
Reach	6250.	.035	.035	.035
Reach	6200.000	.035	.035	.035
Reach	6133.33	.035	.035	.035
Reach	6066.66	.035	.035	.035

*Reach	*	6000.000	*	.035*	.035*	.035*
*Reach	*	5960.*	*	.035*	.035*	.035*
*Reach	*	5920.*	*	.035*	.035*	.035*
*Reach	*	5880.*	*	.035*	.035*	.035*
*Reach	*	5840.*	*	.035*	.035*	.035*
*Reach	*	5800.000	*	.035*	.035*	.035*
*Reach	*	5780.*	*	.035*	.035*	.035*
*Reach	*	5760.*	*	.035*	.035*	.035*
*Reach	*	5740.000	*	.035*	.035*	.035*
*Reach	*	5739.9	*Inl Struct*		*	*
*Reach	*	5700.000	*	.035*	.035*	.035*
*Reach	*	5650.*	*	.035*	.035*	.035*
*Reach	*	5600.000	*	.035*	.035*	.035*
*Reach	*	5550.*	*	.035*	.035*	.035*
*Reach	*	5500	*	.035*	.035*	.035*
*Reach	*	5499.9	*Inl Struct*		*	*
*Reach	*	5460	*	.035*	.035*	.035*
*Reach	*	5440.000	*	.035*	.035*	.035*
*Reach	*	5439	*Lat Struct*		*	*
*Reach	*	5420.*	*	.035*	.035*	.035*
*Reach	*	5400.000	*	.035*	.035*	.035*
*Reach	*	5383.001	*	.035*	.035*	.035*
*Reach	*	5365.999	*	.035*	.035*	.035*
*Reach	*	5342.16*	*	.035*	.035*	.035*
*Reach	*	5318.33*	*	.035*	.035*	.035*
*Reach	*	5294.49*	*	.035*	.035*	.035*
*Reach	*	5270.66*	*	.035*	.035*	.035*
*Reach	*	5246.83*	*	.035*	.035*	.035*
*Reach	*	5223.*	*	.035*	.035*	.035*
*Reach	*	5199.16*	*	.035*	.035*	.035*
*Reach	*	5175.33*	*	.035*	.035*	.035*
*Reach	*	5151.5*	*	.035*	.035*	.035*
*Reach	*	5127.66*	*	.035*	.035*	.035*
*Reach	*	5103.83*	*	.035*	.035*	.035*
*Reach	*	5080	*	.035*	.035*	.035*
*Reach	*	5070.*	*	.035*	.035*	.035*
*Reach	*	5060	*	.035*	.035*	.035*
*Reach	*	5051.25*	*	.035*	.035*	.035*
*Reach	*	5042.5*	*	.035*	.035*	.035*
*Reach	*	5033.75*	*	.035*	.035*	.035*
*Reach	*	5025	*	.035*	.035*	.035*
*Reach	*	5000	*Culvert *		*	*
*Reach	*	4955.000	*	.035*	.035*	.035*
*Reach	*	4945.*	*	.035*	.035*	.035*
*Reach	*	4935.*	*	.035*	.035*	.035*
*Reach	*	4925.*	*	.035*	.035*	.035*
*Reach	*	4915.*	*	.035*	.035*	.035*
*Reach	*	4905.*	*	.035*	.035*	.035*
*Reach	*	4895.000	*	.035*	.035*	.035*
*Reach	*	4817.5*	*	.035*	.035*	.035*
*Reach	*	4740.000	*	.035*	.035*	.035*
*Reach	*	4739.9	*Inl Struct*		*	*
*Reach	*	4700.000	*	.035*	.035*	.035*
*Reach	*	4601.000	*	.035*	.035*	.035*
*Reach	*	4534.33*	*	.035*	.035*	.035*
*Reach	*	4467.66*	*	.035*	.035*	.035*
*Reach	*	4401.000	*	.035*	.035*	.035*
*Reach	*	4334.33*	*	.035*	.035*	.035*
*Reach	*	4267.66*	*	.035*	.035*	.035*
*Reach	*	4201.000	*	.035*	.035*	.035*
*Reach	*	4120.5*	*	.035*	.035*	.035*
*Reach	*	4040.000	*	.035*	.035*	.035*
*Reach	*	4039.9	*Inl Struct*		*	*
*Reach	*	4000.000	*	.035*	.035*	.035*
*Reach	*	3920.*	*	.035*	.035*	.035*
*Reach	*	3840.000	*	.035*	.035*	.035*
*Reach	*	3839.9	*Inl Struct*		*	*
*Reach	*	3800.000	*	.035*	.035*	.035*
*Reach	*	3790.*	*	.035*	.035*	.035*
*Reach	*	3780.*	*	.035*	.035*	.035*
*Reach	*	3770	*	.035*	.035*	.035*
*Reach	*	3759.*	*	.035*	.035*	.035*
*Reach	*	3748.*	*	.035*	.035*	.035*
*Reach	*	3737	*	.035*	.035*	.035*
*Reach	*	3638	*Culvert *		*	*
*Reach	*	3535.000	*	.035*	.035*	.035*
*Reach	*	3501.25*	*	.035*	.035*	.035*
*Reach	*	3467.5*	*	.035*	.035*	.035*
*Reach	*	3433.75*	*	.035*	.035*	.035*
*Reach	*	3400	*	.035*	.035*	.035*
*Reach	*	3300.*	*	.035*	.035*	.035*
*Reach	*	3200	*	.035*	.035*	.035*
*Reach	*	3133.33*	*	.035*	.035*	.035*
*Reach	*	3066.66*	*	.035*	.035*	.035*
*Reach	*	3000	*	.035*	.035*	.035*

Reach		2933.33	.035	.035	.035
Reach		2866.66	.035	.035	.035
Reach		2800	.035	.035	.035
Reach		2746.66	.035	.035	.035
Reach		2693.33	.035	.035	.035
Reach		2640.000	.035	.035	.035
Reach		2639.9	Inl Struct		
Reach		2600.000	.035	.035	.035
Reach		2510.	.035	.035	.035
Reach		2420.000	.035	.035	.035
Reach		2400	.035	.035	.035
Reach		2390.	.035	.035	.035
Reach		2380.	.035	.035	.035
Reach		2370	.035	.035	.035
Reach		2345	Culvert		
Reach		2300.000	.035	.035	.035
Reach		2289.08	.035	.035	.035
Reach		2278.177	.035	.035	.035
Reach		2240.000	.035	.035	.035
Reach		2159.08	.035	.035	.035
Reach		2078.177	.035	.035	.035
Reach		2011.51	.035	.035	.035
Reach		1944.84	.035	.035	.035
Reach		1878.177	.035	.035	.035
Reach		1811.51	.035	.035	.035
Reach		1744.84	.035	.035	.035
Reach		1678.177	.035	.035	.035
Reach		1640.000	.035	.035	.035
Reach		1639.9	Inl Struct		
Reach		1600.000	.035	.035	.035
Reach		1539.08	.035	.035	.035
Reach		1478.177	.035	.035	.035
Reach		1427.08	.035	.035	.035
Reach		1376	.035	.035	.035
Reach		1346	.035	.035	.035
Reach		1336	.035	.035	.035

SUMMARY OF REACH LENGTHS

River: Stream

Reach	River Sta.	Left	Channel	Right
Reach	8724.268	70.75	62.15	51.93
Reach	8662.13	70.75	62.15	51.93
Reach	8600.000	66.68	66.68	66.68
Reach	8533.33	66.68	66.68	66.68
Reach	8466.66	66.68	66.68	66.68
Reach	8400.000	66.68	66.68	66.68
Reach	8333.33	66.68	66.68	66.68
Reach	8266.66	66.68	66.68	66.68
Reach	8200.000	66.68	66.68	66.68
Reach	8133.33	66.68	66.68	66.68
Reach	8066.66	66.68	66.68	66.68
Reach	8000.000	66.68	66.68	66.68
Reach	7933.33	66.68	66.68	66.68
Reach	7866.66	66.68	66.68	66.68
Reach	7800.000	75.18	66.68	59.07
Reach	7733.33	75.18	66.68	59.07
Reach	7666.66	75.18	66.68	59.07
Reach	7600.000	54.12	60	74.82
Reach	7540	34.1	40	54.8
Reach	7539.9	Inl Struct		
Reach	7500	23.52	25.01	28.7
Reach	7475.	23.52	25.01	28.7
Reach	7450.	23.52	25.01	28.7
Reach	7425.	23.53	25.01	28.7
Reach	7400.000	28.54	28.19	28.34
Reach	7371.79	28.54	28.19	28.34
Reach	7343.59	28.54	28.19	28.34
Reach	7315.38	28.54	28.19	28.34
Reach	7287.18	28.54	28.19	28.34
Reach	7258.97	28.54	28.19	28.34
Reach	7230.77	28.54	28.19	28.34
Reach	7202.571	14.8	14.64	14.68
Reach	7201.87	Lat Struct		
Reach	7187.94	14.8	14.64	14.68
Reach	7173.32	14.8	14.64	14.68
Reach	7158.69	14.8	14.64	14.68
Reach	7144.07	14.8	14.64	14.68
Reach	7129.44	14.8	14.64	14.68
Reach	7114.82	14.8	14.64	14.68

*Reach	*	7100.2*	* 14.8*	14.64*	14.68*
*Reach	*	7085.57*	* 14.8*	14.64*	14.68*
*Reach	*	7070.95*	* 14.8*	14.64*	14.68*
*Reach	*	7056.32*	* 14.8*	14.64*	14.68*
*Reach	*	7041.70*	* 14.8*	14.64*	14.68*
*Reach	*	7027.07*	* 14.8*	14.64*	14.68*
*Reach	*	7012.45*	* 14.8*	14.64*	14.68*
*Reach	*	6997.82*	* 14.8*	14.64*	14.68*
*Reach	*	6983.20*	* 14.8*	14.64*	14.68*
*Reach	*	6968.58*	* 14.8*	14.64*	14.68*
*Reach	*	6953.95*	* 14.8*	14.64*	14.68*
*Reach	*	6939.33*	* 14.8*	14.64*	14.68*
*Reach	*	6924.70*	* 14.8*	14.64*	14.68*
*Reach	*	6910.08*	* 14.8*	14.64*	14.68*
*Reach	*	6895.45*	* 14.8*	14.64*	14.68*
*Reach	*	6880.83*	* 14.8*	14.64*	14.68*
*Reach	*	6866.20*	* 14.8*	14.64*	14.68*
*Reach	*	6851.58*	* 14.8*	14.64*	14.68*
*Reach	*	6836.96*	* 14.8*	14.64*	14.68*
*Reach	*	6822.33*	* 14.8*	14.64*	14.68*
*Reach	*	6807.711	* 24.95*	24.65*	24.8*
*Reach	*	6783.03*	* 24.95*	24.65*	24.8*
*Reach	*	6758.35*	* 24.95*	24.65*	24.8*
*Reach	*	6733.67*	* 24.95*	24.65*	24.8*
*Reach	*	6709.000	* 29.62*	27.24*	25.8*
*Reach	*	6681.75*	* 29.62*	27.24*	25.8*
*Reach	*	6654.5*	* 29.62*	27.24*	25.8*
*Reach	*	6627.25*	* 29.62*	27.24*	25.8*
*Reach	*	6600.000	* 29.4*	30*	30.96*
*Reach	*	6570.*	* 29.4*	30*	30.96*
*Reach	*	6540.000	* 57.26*	61*	64.64*
*Reach	*	6539.9	*Inl Struct*	*	*
*Reach	*	6479	* 72.6*	79.04*	88.2*
*Reach	*	6400.000	* 60.12*	60*	60.06*
*Reach	*	6340.000	* 40.3*	40*	40.02*
*Reach	*	6339.9	*Inl Struct*	*	*
*Reach	*	6300.000	* 47.96*	50.03*	53.1*
*Reach	*	6250.*	* 47.96*	50.03*	53.1*
*Reach	*	6200.000	* 59.07*	66.68*	73.73*
*Reach	*	6133.33*	* 59.07*	66.68*	73.73*
*Reach	*	6066.66*	* 59.07*	66.68*	73.73*
*Reach	*	6000.000	* 39.06*	40.01*	41.13*
*Reach	*	5960.*	* 39.06*	40.01*	41.13*
*Reach	*	5920.*	* 39.06*	40.01*	41.13*
*Reach	*	5880.*	* 39.06*	40.01*	41.13*
*Reach	*	5840.*	* 39.06*	40.01*	41.13*
*Reach	*	5800.000	* 18.6*	20*	21.4*
*Reach	*	5780.*	* 18.6*	20*	21.4*
*Reach	*	5760.*	* 18.6*	20*	21.4*
*Reach	*	5740.000	* 37.7*	40*	42*
*Reach	*	5739.9	*Inl Struct*	*	*
*Reach	*	5700.000	* 50.29*	50.03*	50.06*
*Reach	*	5650.*	* 50.29*	50.03*	50.06*
*Reach	*	5600.000	* 91.8*	80.02*	65.84*
*Reach	*	5550.*	* 91.8*	80.02*	65.84*
*Reach	*	5500	* 40.56*	40*	39.4*
*Reach	*	5499.9	*Inl Struct*	*	*
*Reach	*	5460	* 20.82*	20*	19.1*
*Reach	*	5440.000	* 20.82*	20*	19.09*
*Reach	*	5439	*Lat Struct*	*	*
*Reach	*	5420.*	* 20.82*	20*	19.09*
*Reach	*	5400.000	* 17.54*	17.5*	17.92*
*Reach	*	5383.001	* 17.54*	17.5*	17.92*
*Reach	*	5365.999	* 23.2*	23.83*	24.47*
*Reach	*	5342.16*	* 23.2*	23.83*	24.47*
*Reach	*	5318.33*	* 23.2*	23.83*	24.47*
*Reach	*	5294.49*	* 23.2*	23.83*	24.47*
*Reach	*	5270.66*	* 23.2*	23.83*	24.47*
*Reach	*	5246.83*	* 23.2*	23.83*	24.47*
*Reach	*	5223.*	* 23.2*	23.83*	24.47*
*Reach	*	5199.16*	* 23.2*	23.83*	24.47*
*Reach	*	5175.33*	* 23.2*	23.83*	24.47*
*Reach	*	5151.5*	* 23.2*	23.83*	24.47*
*Reach	*	5127.66*	* 23.2*	23.83*	24.47*
*Reach	*	5103.83*	* 23.2*	23.83*	24.47*
*Reach	*	5080	* 10*	10*	10.3*
*Reach	*	5070.*	* 10*	10*	10.3*
*Reach	*	5060	* 8.75*	8.75*	8.75*
*Reach	*	5051.25*	* 8.75*	8.75*	8.75*
*Reach	*	5042.5*	* 8.75*	8.75*	8.75*
*Reach	*	5033.75*	* 8.75*	8.75*	8.75*
*Reach	*	5025	* 70*	70*	70*
*Reach	*	5000	*Culvert *	*	*
*Reach	*	4955.000	* 4.16*	10*	15.84*
*Reach	*	4945.*	* 4.16*	10*	15.84*

*Reach	*	4935.*	* 4.16*	10*	15.84*
*Reach	*	4925.*	* 4.16*	10*	15.84*
*Reach	*	4915.*	* 4.16*	10*	15.84*
*Reach	*	4905.*	* 4.16*	10*	15.84*
*Reach	*	4895.000	* 62.3*	77.48*	92.58*
*Reach	*	4817.5*	* 62.3*	77.48*	92.58*
*Reach	*	4740.000	* 40.22*	40*	40*
*Reach	*	4739.9	*Inl Struct*	*	*
*Reach	*	4700.000	* 103.12*	99*	95.84*
*Reach	*	4601.000	* 74.25*	66.68*	60.57*
*Reach	*	4534.33*	* 74.25*	66.68*	60.57*
*Reach	*	4467.66*	* 74.25*	66.68*	60.57*
*Reach	*	4401.000	* 60*	66.68*	72.9*
*Reach	*	4334.33*	* 60*	66.68*	72.9*
*Reach	*	4267.66*	* 60*	66.68*	72.9*
*Reach	*	4201.000	* 74.02*	80.54*	87.5*
*Reach	*	4120.5*	* 74.02*	80.54*	87.5*
*Reach	*	4040.000	* 45*	41.01*	37.89*
*Reach	*	4039.9	*Inl Struct*	*	*
*Reach	*	4000.000	* 94.15*	80.02*	63.9*
*Reach	*	3920.*	* 94.15*	80.02*	63.9*
*Reach	*	3840.000	* 35.36*	40*	45*
*Reach	*	3839.9	*Inl Struct*	*	*
*Reach	*	3800.000	* 7.77*	10*	12.4*
*Reach	*	3790.*	* 7.77*	10*	12.4*
*Reach	*	3780.*	* 7.77*	10*	12.4*
*Reach	*	3770	* 13.42*	13.42*	13.42*
*Reach	*	3759.*	* 13.42*	13.42*	13.42*
*Reach	*	3748.*	* 13.42*	13.42*	13.42*
*Reach	*	3737	* 200*	200*	200*
*Reach	*	3638	*Culvert *	*	*
*Reach	*	3535.000	* 15.6*	15*	16.03*
*Reach	*	3501.25*	* 15.6*	15*	16.03*
*Reach	*	3467.5*	* 15.6*	15*	16.03*
*Reach	*	3433.75*	* 15.6*	15*	16.03*
*Reach	*	3400	* 108.48*	98.4*	84.4*
*Reach	*	3300.*	* 108.48*	98.4*	84.4*
*Reach	*	3200	* 58.8*	66.68*	76.17*
*Reach	*	3133.33*	* 58.8*	66.68*	76.17*
*Reach	*	3066.66*	* 58.8*	66.68*	76.17*
*Reach	*	3000	* 67.05*	66.68*	66.72*
*Reach	*	2933.33*	* 67.05*	66.68*	66.72*
*Reach	*	2866.66*	* 67.05*	66.68*	66.72*
*Reach	*	2800	* 81.5*	79.47*	77.5*
*Reach	*	2746.66*	* 81.5*	79.47*	77.5*
*Reach	*	2693.33*	* 81.5*	79.47*	77.5*
*Reach	*	2640.000	* 45.34*	40*	34.14*
*Reach	*	2639.9	*Inl Struct*	*	*
*Reach	*	2600.000	* 88.36*	90*	92.4*
*Reach	*	2510.*	* 88.36*	90*	92.4*
*Reach	*	2420.000	* 55.32*	54.96*	55.4*
*Reach	*	2400	* 11.76*	11.65*	11.8*
*Reach	*	2390.*	* 11.76*	11.65*	11.8*
*Reach	*	2380.*	* 11.76*	11.65*	11.8*
*Reach	*	2370	* 70*	70*	70*
*Reach	*	2345	*Culvert *	*	*
*Reach	*	2300.000	* 10.9*	10.9*	10.9*
*Reach	*	2289.08*	* 10.9*	10.9*	10.9*
*Reach	*	2278.177	* 38.18*	38.18*	39.24*
*Reach	*	2240.000	* 77.84*	80.92*	85.3*
*Reach	*	2159.08*	* 77.84*	80.92*	85.3*
*Reach	*	2078.177	* 70.92*	66.68*	62.85*
*Reach	*	2011.51*	* 70.92*	66.68*	62.85*
*Reach	*	1944.84*	* 70.92*	66.68*	62.85*
*Reach	*	1878.177	* 67.95*	66.68*	65.67*
*Reach	*	1811.51*	* 67.95*	66.68*	65.67*
*Reach	*	1744.84*	* 67.95*	66.68*	65.67*
*Reach	*	1678.177	* 33.34*	38.18*	42.24*
*Reach	*	1640.000	* 34.84*	40*	43.82*
*Reach	*	1639.9	*Inl Struct*	*	*
*Reach	*	1600.000	* 55.01*	60.87*	66.64*
*Reach	*	1539.08*	* 55.01*	60.87*	66.64*
*Reach	*	1478.177	* 51.19*	51*	42.56*
*Reach	*	1427.08*	* 51.19*	51*	42.56*
*Reach	*	1376	* 40*	40*	40*
*Reach	*	1346	* 10*	10*	10*
*Reach	*	1336	* 0*	0*	0*

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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Stream

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Reach	River Sta.	Contr.	Expan.
Reach	8724.268	.1	.3
Reach	8662.13	.1	.3
Reach	8600.000	.1	.3
Reach	8533.33	.1	.3
Reach	8466.66	.1	.3
Reach	8400.000	.1	.3
Reach	8333.33	.1	.3
Reach	8266.66	.1	.3
Reach	8200.000	.1	.3
Reach	8133.33	.1	.3
Reach	8066.66	.1	.3
Reach	8000.000	.1	.3
Reach	7933.33	.1	.3
Reach	7866.66	.1	.3
Reach	7800.000	.1	.3
Reach	7733.33	.1	.3
Reach	7666.66	.1	.3
Reach	7600.000	.1	.3
Reach	7540	.1	.3
Reach	7539.9	Inl Struct	
Reach	7500	.1	.3
Reach	7475.	.1	.3
Reach	7450.	.1	.3
Reach	7425.	.1	.3
Reach	7400.000	.1	.3
Reach	7371.79	.1	.3
Reach	7343.59	.1	.3
Reach	7315.38	.1	.3
Reach	7287.18	.1	.3
Reach	7258.97	.1	.3
Reach	7230.77	.1	.3
Reach	7202.571	.1	.3
Reach	7201.87	Lat Struct	
Reach	7187.94	.1	.3
Reach	7173.32	.1	.3
Reach	7158.69	.1	.3
Reach	7144.07	.1	.3
Reach	7129.44	.1	.3
Reach	7114.82	.1	.3
Reach	7100.2	.1	.3
Reach	7085.57	.1	.3
Reach	7070.95	.1	.3
Reach	7056.32	.1	.3
Reach	7041.70	.1	.3
Reach	7027.07	.1	.3
Reach	7012.45	.1	.3
Reach	6997.82	.1	.3
Reach	6983.20	.1	.3
Reach	6968.58	.1	.3
Reach	6953.95	.1	.3
Reach	6939.33	.1	.3
Reach	6924.70	.1	.3
Reach	6910.08	.1	.3
Reach	6895.45	.1	.3
Reach	6880.83	.1	.3
Reach	6866.20	.1	.3
Reach	6851.58	.1	.3
Reach	6836.96	.1	.3
Reach	6822.33	.1	.3
Reach	6807.711	.1	.3
Reach	6783.03	.1	.3
Reach	6758.35	.1	.3
Reach	6733.67	.1	.3
Reach	6709.000	.1	.3
Reach	6681.75	.1	.3
Reach	6654.5	.1	.3
Reach	6627.25	.1	.3
Reach	6600.000	.1	.3
Reach	6570.	.1	.3
Reach	6540.000	.1	.3
Reach	6539.9	Inl Struct	
Reach	6479	.1	.3
Reach	6400.000	.1	.3
Reach	6340.000	.1	.3
Reach	6339.9	Inl Struct	
Reach	6300.000	.1	.3
Reach	6250.	.1	.3
Reach	6200.000	.1	.3
Reach	6133.33	.1	.3
Reach	6066.66	.1	.3
Reach	6000.000	.1	.3
Reach	5960.	.1	.3
Reach	5920.	.1	.3

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*Reach          *    5880.*  *       .1*       .3*
*Reach          *    5840.*  *       .1*       .3*
*Reach          *    5800.000*       .1*       .3*
*Reach          *    5780.*  *       .1*       .3*
*Reach          *    5760.*  *       .1*       .3*
*Reach          *    5740.000*       .1*       .3*
*Reach          *    5739.9  *Inl Struct*         *
*Reach          *    5700.000*       .1*       .3*
*Reach          *    5650.*  *       .1*       .3*
*Reach          *    5600.000*       .1*       .3*
*Reach          *    5550.*  *       .1*       .3*
*Reach          *    5500    *       .1*       .3*
*Reach          *    5499.9  *Inl Struct*         *
*Reach          *    5460    *       .1*       .3*
*Reach          *    5440.000*       .1*       .3*
*Reach          *    5439    *Lat Struct*         *
*Reach          *    5420.*  *       .1*       .3*
*Reach          *    5400.000*       .1*       .3*
*Reach          *    5383.001*       .1*       .3*
*Reach          *    5365.999*       .1*       .3*
*Reach          *    5342.16**       .1*       .3*
*Reach          *    5318.33**       .1*       .3*
*Reach          *    5294.49**       .1*       .3*
*Reach          *    5270.66**       .1*       .3*
*Reach          *    5246.83**       .1*       .3*
*Reach          *    5223.*  *       .1*       .3*
*Reach          *    5199.16**       .1*       .3*
*Reach          *    5175.33**       .1*       .3*
*Reach          *    5151.5* *       .1*       .3*
*Reach          *    5127.66**       .1*       .3*
*Reach          *    5103.83**       .1*       .3*
*Reach          *    5080    *       .1*       .3*
*Reach          *    5070.*  *       .1*       .3*
*Reach          *    5060    *       .1*       .3*
*Reach          *    5051.25**       .1*       .3*
*Reach          *    5042.5* *       .1*       .3*
*Reach          *    5033.75**       .1*       .3*
*Reach          *    5025    *       .1*       .3*
*Reach          *    5000    *Culvert  *          *
*Reach          *    4955.000*       .1*       .3*
*Reach          *    4945.*  *       .1*       .3*
*Reach          *    4935.*  *       .1*       .3*
*Reach          *    4925.*  *       .1*       .3*
*Reach          *    4915.*  *       .1*       .3*
*Reach          *    4905.*  *       .1*       .3*
*Reach          *    4895.000*       .1*       .3*
*Reach          *    4817.5* *       .1*       .3*
*Reach          *    4740.000*       .1*       .3*
*Reach          *    4739.9  *Inl Struct*         *
*Reach          *    4700.000*       .1*       .3*
*Reach          *    4601.000*       .1*       .3*
*Reach          *    4534.33**       .1*       .3*
*Reach          *    4467.66**       .1*       .3*
*Reach          *    4401.000*       .1*       .3*
*Reach          *    4334.33**       .1*       .3*
*Reach          *    4267.66**       .1*       .3*
*Reach          *    4201.000*       .1*       .3*
*Reach          *    4120.5* *       .1*       .3*
*Reach          *    4040.000*       .1*       .3*
*Reach          *    4039.9  *Inl Struct*         *
*Reach          *    4000.000*       .1*       .3*
*Reach          *    3920.*  *       .1*       .3*
*Reach          *    3840.000*       .1*       .3*
*Reach          *    3839.9  *Inl Struct*         *
*Reach          *    3800.000*       .1*       .3*
*Reach          *    3790.*  *       .1*       .3*
*Reach          *    3780.*  *       .1*       .3*
*Reach          *    3770    *       .1*       .3*
*Reach          *    3759.*  *       .1*       .3*
*Reach          *    3748.*  *       .1*       .3*
*Reach          *    3737    *       .1*       .3*
*Reach          *    3638    *Culvert  *          *
*Reach          *    3535.000*       .1*       .3*
*Reach          *    3501.25**       .1*       .3*
*Reach          *    3467.5* *       .1*       .3*
*Reach          *    3433.75**       .1*       .3*
*Reach          *    3400    *       .1*       .3*
*Reach          *    3300.*  *       .1*       .3*
*Reach          *    3200    *       .1*       .3*
*Reach          *    3133.33**       .1*       .3*
*Reach          *    3066.66**       .1*       .3*
*Reach          *    3000    *       .1*       .3*
*Reach          *    2933.33**       .1*       .3*
*Reach          *    2866.66**       .1*       .3*
*Reach          *    2800    *       .1*       .3*
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*Reach            *    2746.66**       .1*       .3*
*Reach            *    2693.33**       .1*       .3*
*Reach            *    2640.000*       .1*       .3*
*Reach            *    2639.9  *Inl Struct*         *
*Reach            *    2600.000*       .1*       .3*
*Reach            *    2510.*  *       .1*       .3*
*Reach            *    2420.000*       .1*       .3*
*Reach            *    2400    *       .1*       .3*
*Reach            *    2390.*  *       .1*       .3*
*Reach            *    2380.*  *       .1*       .3*
*Reach            *    2370    *       .1*       .3*
*Reach            *    2345    *Culvert  *         *
*Reach            *    2300.000*       .1*       .3*
*Reach            *    2289.08**       .1*       .3*
*Reach            *    2278.177*       .1*       .3*
*Reach            *    2240.000*       .1*       .3*
*Reach            *    2159.08**       .1*       .3*
*Reach            *    2078.177*       .1*       .3*
*Reach            *    2011.51**       .1*       .3*
*Reach            *    1944.84**       .1*       .3*
*Reach            *    1878.177*       .1*       .3*
*Reach            *    1811.51**       .1*       .3*
*Reach            *    1744.84**       .1*       .3*
*Reach            *    1678.177*       .1*       .3*
*Reach            *    1640.000*       .1*       .3*
*Reach            *    1639.9  *Inl Struct*         *
*Reach            *    1600.000*       .1*       .3*
*Reach            *    1539.08**       .1*       .3*
*Reach            *    1478.177*       .1*       .3*
*Reach            *    1427.08**       .1*       .3*
*Reach            *    1376    *       .3*       .5*
*Reach            *    1346    *       .3*       .5*
*Reach            *    1336    *       .3*       .5*
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D.6.3 Summary Table for Unsteady HEC-RAS

HEC-RAS Plan: Existing Cond River: Stream Reach: Reach Profile: Max WS

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	8724.268	Max WS	2734.00	1137.78	1145.54		1145.83	0.001425	4.28	638.73	145.32	0.36
Reach	8662.13*	Max WS	2733.81	1137.71	1145.46		1145.74	0.001416	4.26	641.38	146.19	0.36
Reach	8600.000	Max WS	2734.10	1137.64	1145.37		1145.65	0.001406	4.24	644.17	147.05	0.36
Reach	8533.33*	Max WS	2733.94	1137.57	1145.23		1145.55	0.001619	4.55	600.67	137.14	0.38
Reach	8466.66*	Max WS	2733.92	1137.50	1145.05		1145.43	0.001922	4.94	553.17	126.76	0.42
Reach	8400.000	Max WS	2733.90	1137.43	1144.83		1145.29	0.002357	5.44	502.44	116.01	0.46
Reach	8333.33*	Max WS	2733.78	1137.36	1144.64		1145.13	0.002515	5.57	491.07	115.04	0.47
Reach	8266.66*	Max WS	2733.76	1137.28	1144.44		1144.95	0.002705	5.71	478.38	113.80	0.49
Reach	8200.000	Max WS	2733.73	1137.21	1144.22		1144.76	0.002958	5.90	463.19	112.27	0.51
Reach	8133.33*	Max WS	2733.51	1137.14	1144.06		1144.57	0.002869	5.74	476.45	117.92	0.50
Reach	8066.66*	Max WS	2733.50	1137.07	1143.91		1144.38	0.002735	5.53	493.98	124.65	0.49
Reach	8000.000	Max WS	2733.59	1137.00	1143.77		1144.21	0.002553	5.29	516.91	132.71	0.47
Reach	7933.33*	Max WS	2733.40	1136.93	1143.58		1144.03	0.002712	5.39	507.57	132.72	0.49
Reach	7866.66*	Max WS	2733.29	1136.85	1143.37		1143.84	0.002916	5.51	495.80	132.20	0.50
Reach	7800.000	Max WS	2733.45	1136.78	1143.14		1143.64	0.003211	5.69	480.30	131.27	0.52
Reach	7733.33*	Max WS	2733.41	1136.71	1142.93		1143.42	0.003283	5.66	483.00	135.44	0.53
Reach	7666.66*	Max WS	2733.37	1136.63	1142.70		1143.20	0.003410	5.66	482.53	139.09	0.54
Reach	7600.000	Max WS	2733.11	1136.56	1142.46		1142.97	0.003620	5.72	477.80	142.00	0.55
Reach	7540	Max WS	2733.09	1136.34	1142.24	1140.81	1142.75	0.003602	5.71	478.66	142.13	0.55
Reach	7539.9		Inl Struct									
Reach	7500	Max WS	2713.75	1134.49	1142.03		1142.24	0.001113	3.68	737.99	175.70	0.32
Reach	7475.*	Max WS	2713.74	1134.47	1141.97		1142.21	0.001296	3.97	683.71	162.56	0.34
Reach	7450.*	Max WS	2713.73	1134.46	1141.89		1142.18	0.001539	4.32	627.70	149.24	0.37
Reach	7425.*	Max WS	2714.32	1134.45	1141.78		1142.13	0.001867	4.75	570.84	135.82	0.41
Reach	7400.000	Max WS	2713.98	1134.43	1141.65		1142.08	0.002325	5.29	512.90	122.32	0.46
Reach	7371.79*	Max WS	2713.51	1134.41	1141.53		1142.01	0.002655	5.58	486.18	118.21	0.48
Reach	7343.59*	Max WS	2712.95	1134.40	1141.38		1141.93	0.003105	5.94	456.82	113.77	0.52
Reach	7315.38*	Max WS	2712.25	1134.38	1141.20		1141.83	0.003743	6.39	424.33	108.83	0.57
Reach	7287.18*	Max WS	2646.03	1134.37	1140.96		1141.69	0.004514	6.84	387.02	103.24	0.62
Reach	7258.97*	Max WS	2619.46	1134.35	1140.59		1141.52	0.006200	7.71	339.79	96.03	0.72
Reach	7230.77*	Max WS	2716.36	1134.34	1139.99	1139.90	1141.51	0.011711	9.90	274.24	85.73	0.98
Reach	7202.571	Max WS	2713.57	1134.32	1139.75	1140.02	1141.64	0.005069	11.05	245.61	80.48	1.11
Reach	7201.87		Lat Struct									
Reach	7187.94*	Max WS	2713.31	1134.31	1139.67	1140.02	1141.68	0.005436	11.36	238.83	79.08	1.15
Reach	7173.32*	Max WS	2713.01	1134.30	1139.59	1140.00	1141.72	0.005858	11.70	231.85	77.67	1.19
Reach	7158.69*	Max WS	2643.99	1134.30	1139.50	1139.96	1141.66	0.006068	11.80	224.12	76.15	1.21
Reach	7144.07*	Max WS	2640.38	1134.29	1139.41	1139.95	1141.72	0.006594	12.19	216.68	74.64	1.26
Reach	7129.44*	Max WS	2616.64	1134.28	1139.31	1139.93	1141.75	0.007120	12.53	208.76	73.01	1.31
Reach	7114.82*	Max WS	2559.61	1134.27	1139.20	1139.88	1141.73	0.007549	12.76	200.58	71.34	1.34
Reach	7100.2*	Max WS	2458.80	1134.27	1139.09	1139.81	1141.64	0.007834	12.83	191.70	69.56	1.36
Reach	7085.57*	Max WS	2280.51	1134.26	1138.98	1139.63	1141.37	0.007538	12.43	183.54	67.85	1.33
Reach	7070.95*	Max WS	2079.06	1134.25	1138.87	1139.41	1141.04	0.006985	11.82	175.91	66.20	1.28
Reach	7056.32*	Max WS	1879.65	1134.24	1138.77	1139.18	1140.69	0.006332	11.13	168.93	64.65	1.21
Reach	7041.70*	Max WS	1678.45	1134.23	1138.67	1138.94	1140.33	0.005556	10.32	162.71	63.25	1.13
Reach	7027.07*	Max WS	1476.66	1134.23	1138.59	1138.68	1139.97	0.004741	9.43	156.64	61.87	1.04
Reach	7012.45*	Max WS	1363.11	1134.22	1138.51	1138.50	1139.77	0.004373	8.98	151.82	60.71	1.00
Reach	6997.82*	Max WS	1082.66	1134.21	1138.47		1139.29	0.002904	7.28	148.65	59.85	0.81
Reach	6983.20*	Max WS	943.80	1134.20	1138.44		1139.08	0.002262	6.42	147.03	59.30	0.72
Reach	6968.58*	Max WS	844.95	1134.20	1138.42		1138.95	0.001874	5.83	144.98	58.69	0.65
Reach	6953.95*	Max WS	1695.82	1134.19	1138.42	1138.98	1140.55	0.007544	11.72	144.75	58.42	1.31
Reach	6939.33*	Max WS	1576.65	1134.18	1138.43	1138.83	1140.27	0.006461	10.88	144.96	58.22	1.21
Reach	6924.70*	Max WS	1416.60	1134.17	1138.43	1138.61	1139.92	0.005234	9.80	144.48	57.88	1.09
Reach	6910.08*	Max WS	1271.30	1134.16	1138.42	1138.39	1139.63	0.004232	8.83	143.99	57.56	0.98
Reach	6895.45*	Max WS	1078.99	1134.16	1138.70		1139.41	0.002307	6.77	159.48	60.27	0.73
Reach	6880.83*	Max WS	1082.42	1134.15	1138.94		1139.54	0.001829	6.22	173.97	62.62	0.66
Reach	6866.20*	Max WS	1026.14	1134.14	1138.99		1139.51	0.001580	5.82	176.18	62.73	0.61
Reach	6851.58*	Max WS	1015.91	1134.13	1138.94		1139.48	0.001623	5.88	172.81	61.88	0.62
Reach	6836.96*	Max WS	1012.72	1134.13	1138.88		1139.44	0.001720	6.01	168.39	60.87	0.64
Reach	6822.33*	Max WS	1009.64	1134.12	1138.83		1139.41	0.001805	6.13	164.70	59.97	0.65
Reach	6807.711	Max WS	1006.70	1134.11	1138.77		1139.38	0.001904	6.26	160.76	58.99	0.67
Reach	6783.03*	Max WS	1001.88	1134.10	1138.74		1139.28	0.005017	5.91	169.45	60.57	0.62
Reach	6758.35*	Max WS	985.42	1134.08	1138.65		1139.14	0.004462	5.63	174.92	61.59	0.59
Reach	6733.67*	Max WS	985.20	1134.07	1138.57		1139.03	0.004130	5.47	180.22	62.65	0.57
Reach	6709.000	Max WS	984.90	1134.06	1138.50		1138.93	0.003813	5.30	185.94	63.85	0.55
Reach	6681.75*	Max WS	984.43	1134.05	1138.39		1138.82	0.003915	5.27	186.90	66.13	0.55
Reach	6654.5*	Max WS	983.77	1134.03	1138.28		1138.71	0.004010	5.24	187.78	68.28	0.56
Reach	6627.25*	Max WS	982.94	1134.02	1138.17		1138.60	0.004216	5.26	186.74	70.08	0.57
Reach	6600.000	Max WS	981.95	1134.00	1138.04		1138.48	0.004449	5.30	185.23	71.67	0.58
Reach	6570.*	Max WS	980.65	1133.98	1137.91		1138.34	0.004587	5.26	186.58	74.93	0.59
Reach	6540.000	Max WS	979.13	1133.97	1137.77	1136.90	1138.20	0.004880	5.27	185.72	77.85	0.60
Reach	6539.9		Inl Struct									
Reach	6479	Max WS	858.17	1131.45	1136.88		1136.99	0.000820	2.67	321.85	98.36	0.26
Reach	6400.000	Max WS	852.09	1131.36	1136.81		1136.92	0.000830	2.69	316.72	96.27	0.26
Reach	6340.000	Max WS	848.95	1131.30	1136.77	1134.03	1136.87	0.000748	2.55	332.65	101.34	0.25
Reach	6339.9		Inl Struct									

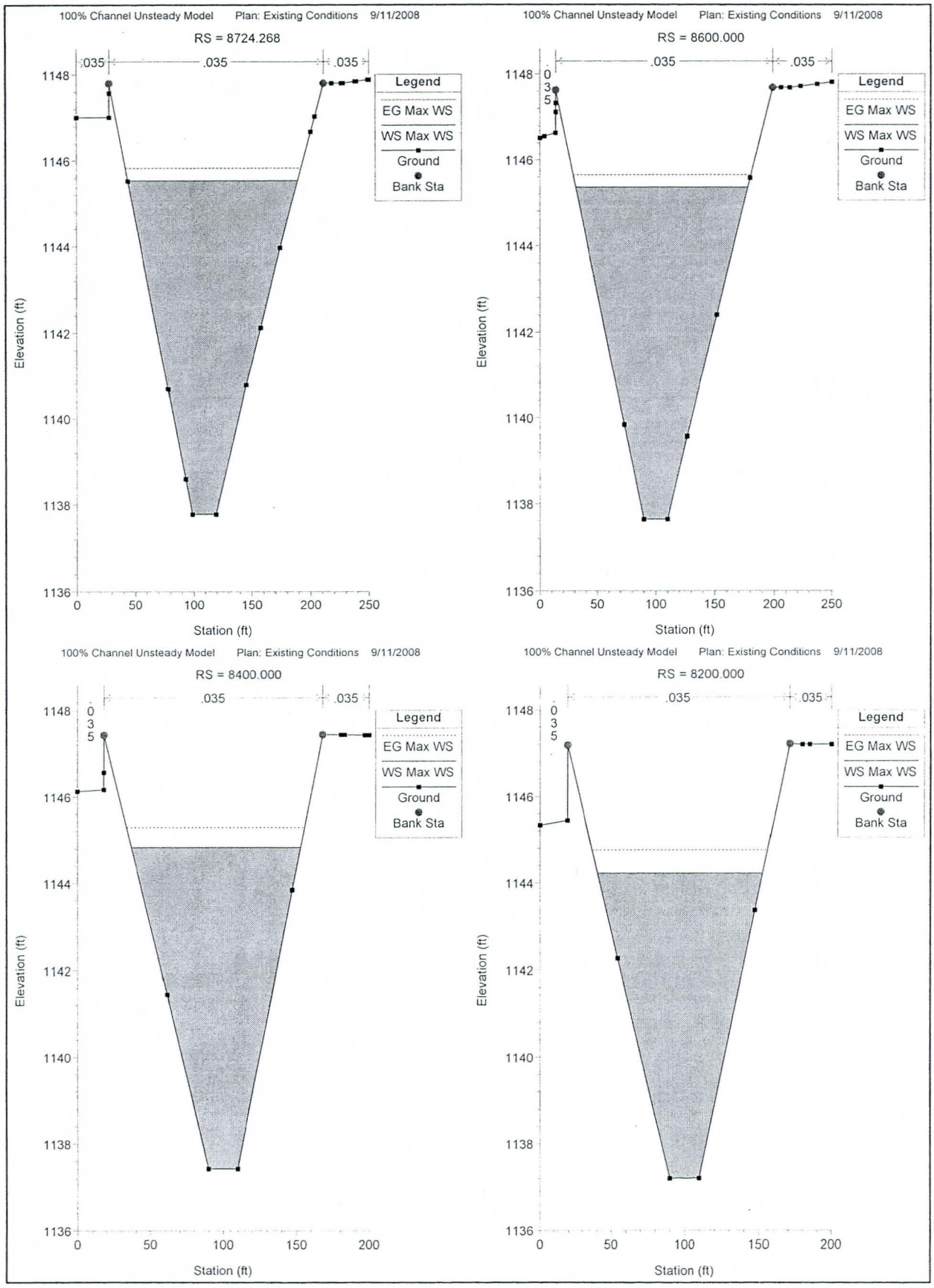
HEC-RAS Plan: Existing Cond River: Stream Reach: Reach Profile: Max WS (Continued)

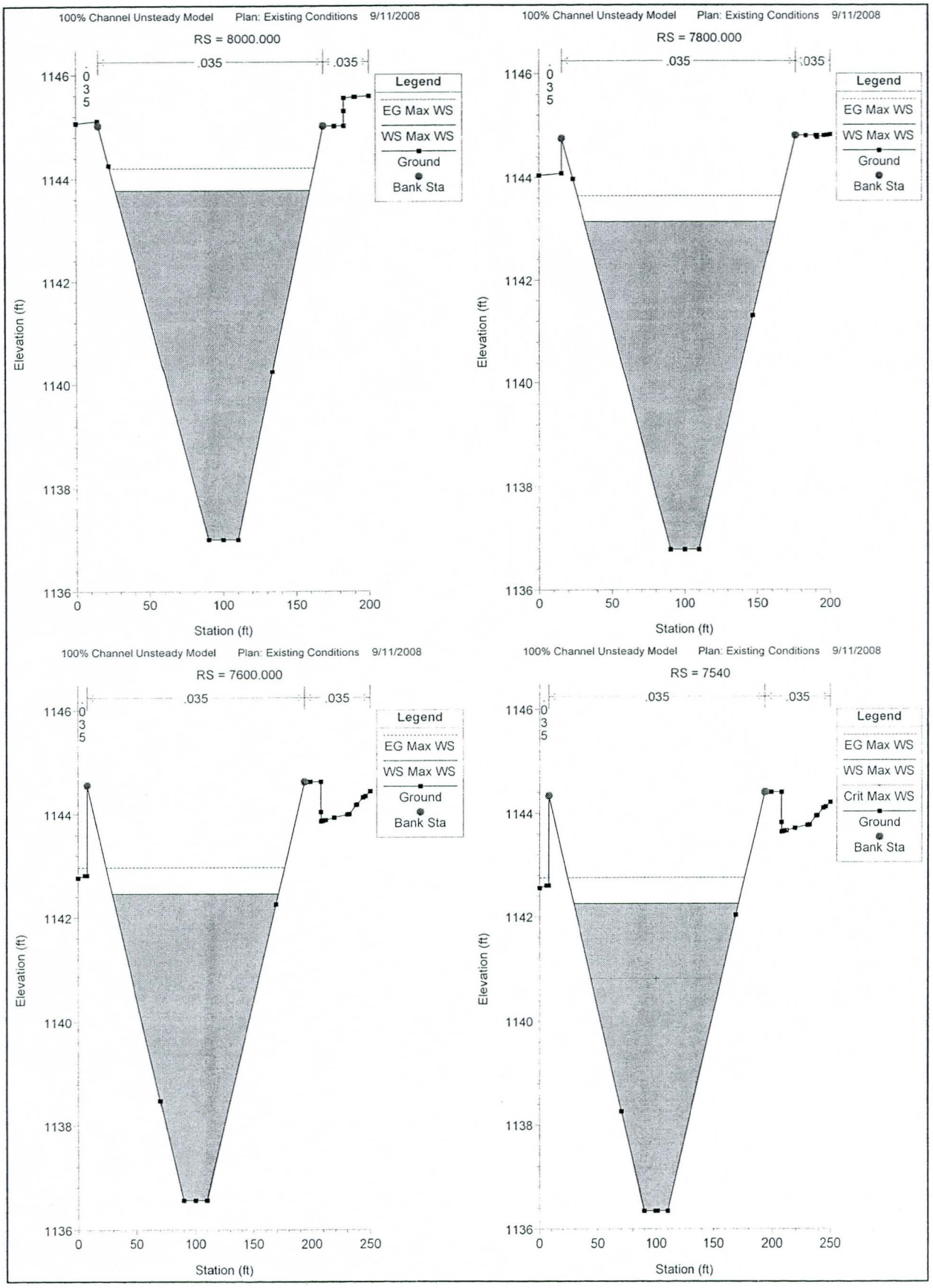
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	6300.000	Max WS	848.95	1129.30	1136.66		1136.70	0.000211	1.61	526.10	123.35	0.14
Reach	6250.*	Max WS	846.69	1129.24	1136.65		1136.69	0.000175	1.47	577.50	136.20	0.13
Reach	6200.000	Max WS	844.76	1129.19	1136.65		1136.68	0.000147	1.34	631.04	149.70	0.11
Reach	6133.33*	Max WS	842.63	1129.12	1136.64		1136.67	0.000146	1.34	630.91	163.41	0.11
Reach	6066.66*	Max WS	840.97	1129.05	1136.63		1136.65	0.000145	1.35	631.86	163.09	0.11
Reach	6000.000	Max WS	839.73	1128.98	1136.62		1136.64	0.000143	1.35	633.92	162.79	0.11
Reach	5960.*	Max WS	839.15	1128.94	1136.61		1136.64	0.000138	1.33	643.74	163.71	0.11
Reach	5920.*	Max WS	838.66	1128.89	1136.61		1136.63	0.000134	1.31	654.84	169.20	0.11
Reach	5880.*	Max WS	838.21	1128.85	1136.60		1136.63	0.000129	1.29	666.51	170.07	0.11
Reach	5840.*	Max WS	837.80	1128.80	1136.60		1136.62	0.000124	1.27	678.02	170.93	0.11
Reach	5800.000	Max WS	838.85	1128.76	1136.59		1136.62	0.000120	1.25	689.41	171.76	0.10
Reach	5780.*	Max WS	838.82	1128.74	1136.59		1136.61	0.000115	1.23	701.65	211.82	0.10
Reach	5760.*	Max WS	838.79	1128.72	1136.59		1136.61	0.000110	1.21	721.63	220.35	0.10
Reach	5740.000	Max WS	838.73	1128.70	1136.59	1131.33	1136.61	0.000104	1.19	733.59	200.00	0.10
Reach	5739.9		Inl Struct									
Reach	5700.000	Max WS	838.73	1126.70	1136.50		1136.51	0.000041	0.90	981.95	200.00	0.06
Reach	5650.*	Max WS	838.60	1126.68	1136.50		1136.51	0.000038	0.88	1030.11	224.86	0.06
Reach	5600.000	Max WS	838.38	1126.66	1136.50		1136.51	0.000035	0.86	1063.86	245.86	0.06
Reach	5550.*	Max WS	837.96	1126.57	1136.49		1136.50	0.000036	0.89	1033.48	224.86	0.06
Reach	5500	Max WS	837.44	1126.49	1136.49	1129.28	1136.50	0.000039	0.93	986.55	200.00	0.06
Reach	5499.9		Inl Struct									
Reach	5460	Max WS	837.44	1124.49	1136.41		1136.41	0.000015	0.69	1348.63	200.00	0.04
Reach	5440.000	Max WS	837.30	1124.49	1136.41		1136.41	0.000015	0.69	1351.47	200.00	0.04
Reach	5439		Lat Struct									
Reach	5420.*	Max WS	893.40	1124.46	1136.40		1136.41	0.000018	0.75	1343.44	220.18	0.05
Reach	5400.000	Max WS	954.94	1124.44	1136.40		1136.41	0.000022	0.82	1303.41	239.98	0.05
Reach	5383.001	Max WS	1008.78	1124.42	1136.40		1136.41	0.000025	0.86	1314.32	237.59	0.05
Reach	5365.999	Max WS	1062.60	1124.40	1136.40		1136.41	0.000027	0.90	1327.76	234.93	0.06
Reach	5342.16*	Max WS	1139.06	1124.37	1136.39		1136.40	0.000031	0.96	1327.41	232.02	0.06
Reach	5318.33*	Max WS	1289.07	1124.35	1136.38		1136.40	0.000040	1.09	1326.13	229.11	0.07
Reach	5294.49*	Max WS	1403.85	1124.32	1136.38		1136.40	0.000047	1.19	1324.23	226.20	0.07
Reach	5270.66*	Max WS	1486.60	1124.30	1136.37		1136.39	0.000052	1.27	1321.70	223.29	0.08
Reach	5246.83*	Max WS	1559.85	1124.27	1136.37		1136.39	0.000057	1.34	1319.64	220.38	0.08
Reach	5223.*	Max WS	1633.09	1124.24	1136.36		1136.39	0.000063	1.40	1316.91	217.46	0.08
Reach	5199.16*	Max WS	1706.32	1124.22	1136.35		1136.38	0.000069	1.47	1312.59	214.55	0.09
Reach	5175.33*	Max WS	1779.55	1124.19	1136.35		1136.38	0.000074	1.54	1309.14	211.64	0.09
Reach	5151.5*	Max WS	1852.78	1124.17	1136.34		1136.37	0.000081	1.61	1303.89	208.73	0.10
Reach	5127.66*	Max WS	1926.02	1124.14	1136.33		1136.37	0.000088	1.68	1298.79	205.82	0.10
Reach	5103.83*	Max WS	1999.26	1124.12	1136.32		1136.37	0.000095	1.76	1292.98	202.91	0.10
Reach	5080	Max WS	2072.50	1124.09	1136.31		1136.36	0.000102	1.83	1286.56	200.00	0.11
Reach	5070.*	Max WS	2103.23	1124.08	1136.31		1136.36	0.000105	1.86	1287.74	200.00	0.11
Reach	5060	Max WS	2133.95	1124.07	1136.31		1136.36	0.000108	1.88	1289.16	200.00	0.11
Reach	5051.25*	Max WS	2160.83	1124.06	1136.30		1136.35	0.000131	2.11	1217.63	200.00	0.12
Reach	5042.5*	Max WS	2187.72	1124.05	1136.28		1136.35	0.000161	2.38	1149.61	200.00	0.14
Reach	5033.75*	Max WS	2202.32	1124.04	1136.27		1136.35	0.000202	2.70	1086.09	200.00	0.15
Reach	5025	Max WS	2202.21	1124.03	1136.27		1136.35	0.000288	2.88	1028.69	200.00	0.15
Reach	5000		Culvert									
Reach	4955.000	Max WS	2201.96	1123.96	1129.99	1130.19	1133.29	0.018130	14.58	151.00	25.08	1.05
Reach	4945.*	Max WS	2201.05	1123.94	1129.84	1129.84	1132.36	0.012701	12.74	172.82	34.37	1.00
Reach	4935.*	Max WS	2199.76	1123.93	1129.72	1129.55	1131.73	0.010737	11.38	193.27	43.30	0.95
Reach	4925.*	Max WS	2201.62	1123.92	1130.11		1131.43	0.006974	9.23	238.51	54.44	0.78
Reach	4915.*	Max WS	2201.06	1123.90	1130.49		1131.37	0.004568	7.53	292.46	66.96	0.63
Reach	4905.*	Max WS	2200.55	1123.89	1130.67		1131.33	0.003427	6.48	339.72	79.16	0.55
Reach	4895.000	Max WS	2200.00	1123.87	1130.79		1131.30	0.002700	5.71	385.49	91.31	0.49
Reach	4817.5*	Max WS	2195.98	1123.78	1130.65		1131.10	0.002466	5.39	407.75	98.66	0.47
Reach	4740.000	Max WS	2193.31	1123.70	1130.51	1128.30	1130.91	0.002264	5.10	430.00	106.09	0.45
Reach	4739.9		Inl Struct									
Reach	4700.000	Max WS	2193.31	1121.70	1130.37		1130.56	0.000778	3.50	633.15	135.23	0.27
Reach	4601.000	Max WS	2166.09	1121.59	1130.30		1130.48	0.000703	3.43	639.69	132.95	0.26
Reach	4534.33*	Max WS	2157.03	1121.52	1130.27		1130.43	0.000624	3.24	673.47	137.89	0.25
Reach	4467.66*	Max WS	2149.23	1121.44	1130.25		1130.39	0.000556	3.07	708.10	143.45	0.23
Reach	4401.000	Max WS	2142.96	1121.37	1130.23		1130.36	0.000498	2.92	744.72	173.41	0.22
Reach	4334.33*	Max WS	2139.51	1121.30	1130.18		1130.32	0.000515	2.98	728.65	174.58	0.22
Reach	4267.66*	Max WS	2065.66	1121.22	1130.15		1130.28	0.000496	2.94	713.97	174.33	0.22
Reach	4201.000	Max WS	2047.32	1121.15	1130.11		1130.25	0.000505	2.99	699.08	173.81	0.22
Reach	4120.5*	Max WS	2027.54	1121.06	1130.11		1130.22	0.000385	2.65	789.01	200.00	0.20
Reach	4040.000	Max WS	2011.73	1120.97	1130.10	1125.08	1130.19	0.000295	2.37	880.41	200.00	0.17
Reach	4039.9		Inl Struct									
Reach	4000.000	Max WS	2011.73	1118.97	1129.92		1129.99	0.000165	2.04	1033.26	193.41	0.13
Reach	3920.*	Max WS	1946.93	1118.89	1129.91		1129.97	0.000157	2.03	986.11	175.25	0.13
Reach	3840.000	Max WS	1926.79	1118.80	1129.90	1123.13	1129.96	0.000155	2.06	958.01	137.86	0.13
Reach	3839.9		Inl Struct									
Reach	3800.000	Max WS	1926.79	1116.80	1129.71		1129.75	0.000079	1.66	1291.54	200.00	0.10
Reach	3790.*	Max WS	1924.10	1116.79	1129.71		1129.75	0.000078	1.66	1293.54	200.00	0.10
Reach	3780.*	Max WS	1921.50	1116.78	1129.71		1129.75	0.000077	1.65	1295.34	200.00	0.09

HEC-RAS Plan: Existing Cond River: Stream Reach: Reach Profile: Max WS (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	3770	Max WS	1918.99	1116.77	1129.71		1129.75	0.000077	1.65	1297.35	200.00	0.09
Reach	3759.*	Max WS	2224.06	1116.76	1129.67		1129.74	0.000143	2.29	1149.12	188.41	0.13
Reach	3748.*	Max WS	2221.30	1116.75	1129.65		1129.74	0.000204	2.78	1014.45	173.99	0.15
Reach	3737	Max WS	2218.98	1116.74	1129.63		1129.74	0.000354	3.16	897.12	156.33	0.16
Reach	3638		Culvert									
Reach	3535.000	Max WS	1575.35	1116.52	1123.56		1124.62	0.004924	8.28	190.28	27.09	0.55
Reach	3501.25*	Max WS	2776.80	1116.48	1124.77		1125.91	0.003976	8.56	330.29	97.53	0.61
Reach	3467.5*	Max WS	2776.36	1116.45	1125.15		1125.73	0.002052	6.11	471.62	168.76	0.45
Reach	3433.75*	Max WS	2762.50	1116.41	1125.29		1125.64	0.001305	4.79	588.62	140.31	0.36
Reach	3400	Max WS	2746.98	1116.37	1125.35		1125.59	0.000922	3.95	705.35	152.96	0.30
Reach	3300.*	Max WS	2654.92	1116.26	1125.23		1125.44	0.000805	3.70	738.28	186.41	0.28
Reach	3200	Max WS	2616.98	1116.15	1125.15		1125.33	0.000699	3.48	789.19	200.00	0.26
Reach	3133.33*	Max WS	2614.74	1116.07	1125.07		1125.28	0.000820	3.80	733.39	200.00	0.28
Reach	3066.66*	Max WS	2611.93	1115.98	1124.96		1125.23	0.000992	4.21	673.48	200.00	0.31
Reach	3000	Max WS	2597.48	1115.90	1124.82		1125.16	0.001239	4.72	607.45	200.00	0.35
Reach	2933.33*	Max WS	2603.31	1115.83	1124.78		1125.08	0.001109	4.46	633.73	188.45	0.33
Reach	2866.66*	Max WS	2598.04	1115.75	1124.74		1125.01	0.000986	4.21	658.93	176.89	0.31
Reach	2800	Max WS	2592.45	1115.68	1124.70		1124.94	0.000885	3.99	681.36	165.34	0.29
Reach	2746.66*	Max WS	2585.36	1115.62	1124.65		1124.87	0.000821	3.86	702.12	159.82	0.28
Reach	2693.33*	Max WS	2577.80	1115.56	1124.60		1124.81	0.000763	3.74	720.22	154.31	0.27
Reach	2640.000	Max WS	2569.96	1115.50	1124.56	1120.44	1124.76	0.000712	3.63	735.60	148.79	0.27
Reach	2639.9		Inl Struct									
Reach	2600.000	Max WS	2569.96	1113.50	1124.35		1124.47	0.000314	2.81	938.94	146.71	0.18
Reach	2510.*	Max WS	2538.92	1113.41	1124.33		1124.44	0.000295	2.77	979.10	173.35	0.18
Reach	2420.000	Max WS	2538.24	1113.31	1124.30		1124.42	0.000287	2.78	1016.48	200.00	0.18
Reach	2400	Max WS	2537.64	1113.27	1124.29		1124.40	0.000289	2.79	1013.93	200.00	0.18
Reach	2390.*	Max WS	2537.51	1113.26	1124.25		1124.40	0.000392	3.33	894.03	190.25	0.21
Reach	2380.*	Max WS	2537.39	1113.25	1124.20		1124.41	0.000549	4.06	787.53	174.97	0.24
Reach	2370	Max WS	2537.26	1113.24	1124.14		1124.41	0.000968	4.89	693.43	162.71	0.26
Reach	2345		Culvert									
Reach	2300.000	Max WS	2518.99	1113.17	1119.88	1119.80	1123.08	0.015691	14.36	175.39	26.18	0.98
Reach	2289.08*	Max WS	2502.90	1113.16	1119.76		1121.10	0.006378	9.26	270.25	57.29	0.75
Reach	2278.177	Max WS	2537.33	1113.14	1120.51		1121.03	0.002512	5.80	437.68	95.86	0.48
Reach	2240.000	Max WS	2531.55	1113.10	1120.41		1120.93	0.002654	5.78	438.14	100.71	0.49
Reach	2159.08*	Max WS	2531.33	1113.02	1120.31		1120.73	0.002213	5.22	484.48	113.37	0.45
Reach	2078.177	Max WS	2530.76	1112.93	1120.22		1120.57	0.001848	4.75	533.35	126.24	0.41
Reach	2011.51*	Max WS	2530.06	1112.85	1120.05		1120.44	0.002087	5.01	504.78	120.48	0.43
Reach	1944.84*	Max WS	2525.54	1112.78	1119.84		1120.29	0.002405	5.33	473.54	114.43	0.46
Reach	1878.177	Max WS	2525.44	1112.70	1119.60		1120.11	0.002872	5.76	438.66	107.88	0.50
Reach	1811.51*	Max WS	2525.18	1112.63	1119.36		1119.91	0.003151	5.95	424.54	106.62	0.53
Reach	1744.84*	Max WS	2524.79	1112.56	1119.09		1119.69	0.003567	6.21	406.27	104.89	0.56
Reach	1678.177	Max WS	2524.22	1112.49	1118.75		1119.43	0.004245	6.62	381.58	102.22	0.60
Reach	1640.000	Max WS	2523.82	1112.45	1118.52	1117.31	1119.26	0.004740	6.87	367.14	100.86	0.63
Reach	1639.9		Inl Struct									
Reach	1600.000	Max WS	2520.04	1110.44	1117.69		1118.13	0.002293	5.31	474.79	111.34	0.45
Reach	1539.08*	Max WS	2519.94	1110.36	1117.54		1117.98	0.002371	5.37	469.54	111.14	0.46
Reach	1478.177	Max WS	2519.86	1110.28	1117.38		1117.84	0.002452	5.42	464.79	111.11	0.47
Reach	1427.08*	Max WS	2519.82	1110.22	1117.23		1117.71	0.002597	5.54	454.77	109.86	0.48
Reach	1376	Max WS	2520.36	1110.15	1117.07		1117.57	0.002776	5.68	443.66	108.52	0.50
Reach	1346	Max WS	2520.12	1110.11	1116.68	1116.85	1120.11	0.016805	14.86	169.62	26.64	1.04
Reach	1336	Max WS	2520.10	1110.10	1116.46	1117.64	1121.60	0.028022	18.20	138.50	22.59	1.29

D.6.4 Cross-Sections for Unsteady HEC-RAS


100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 8724.268
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 8600.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 8400.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 8200.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)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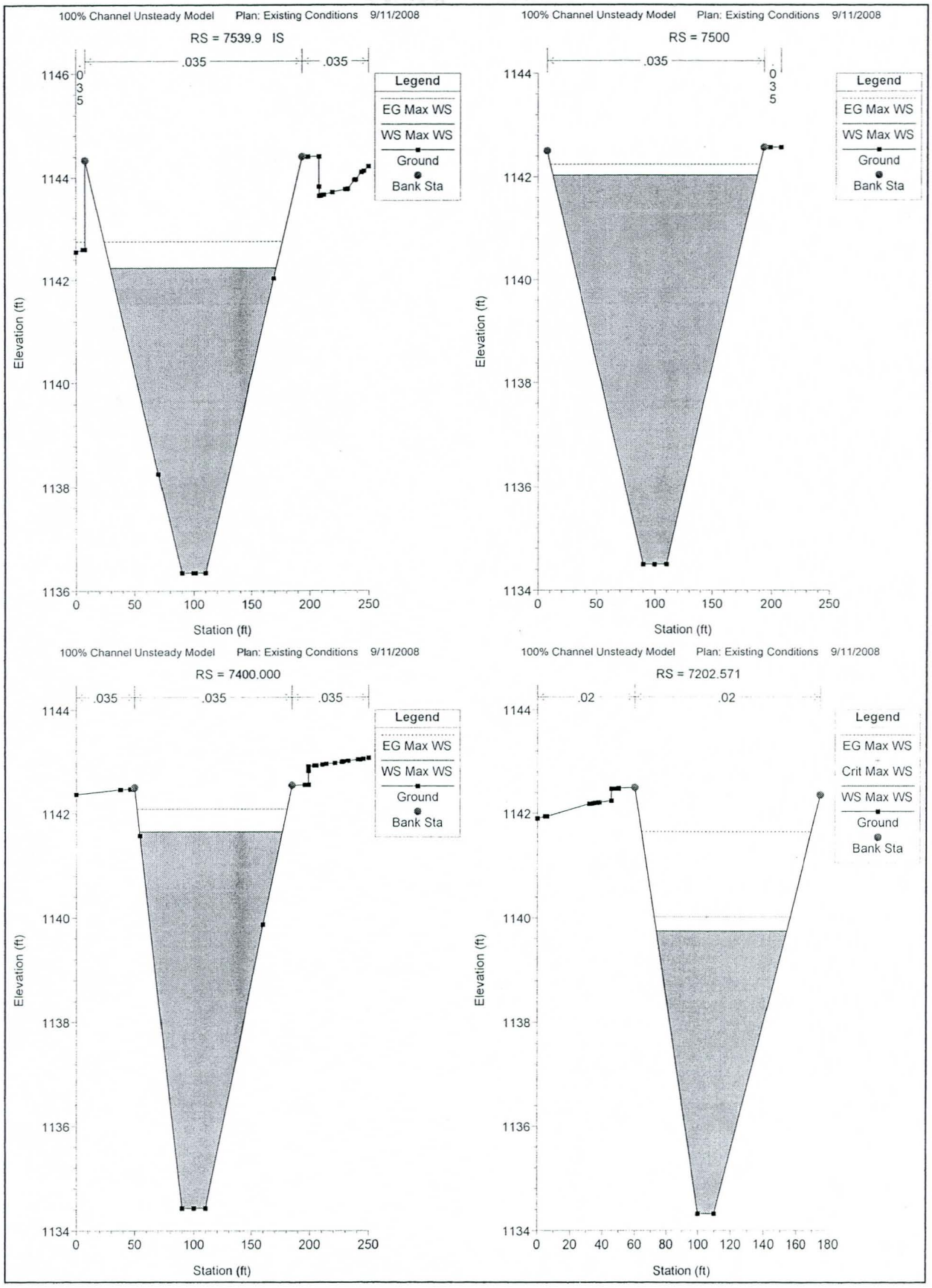
RS = 8000.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 7800.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 7600.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 7540
.035
.035
.035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)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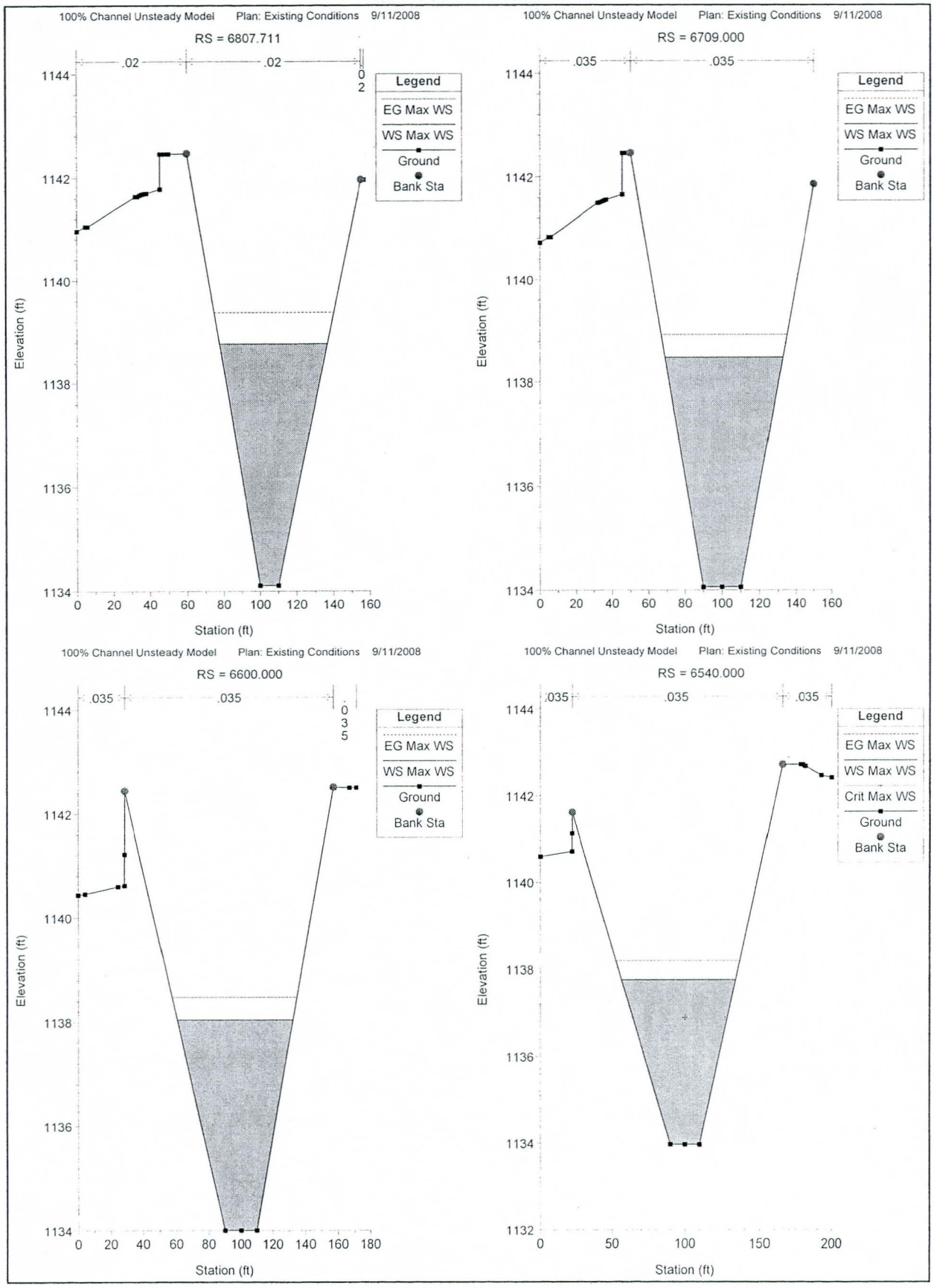
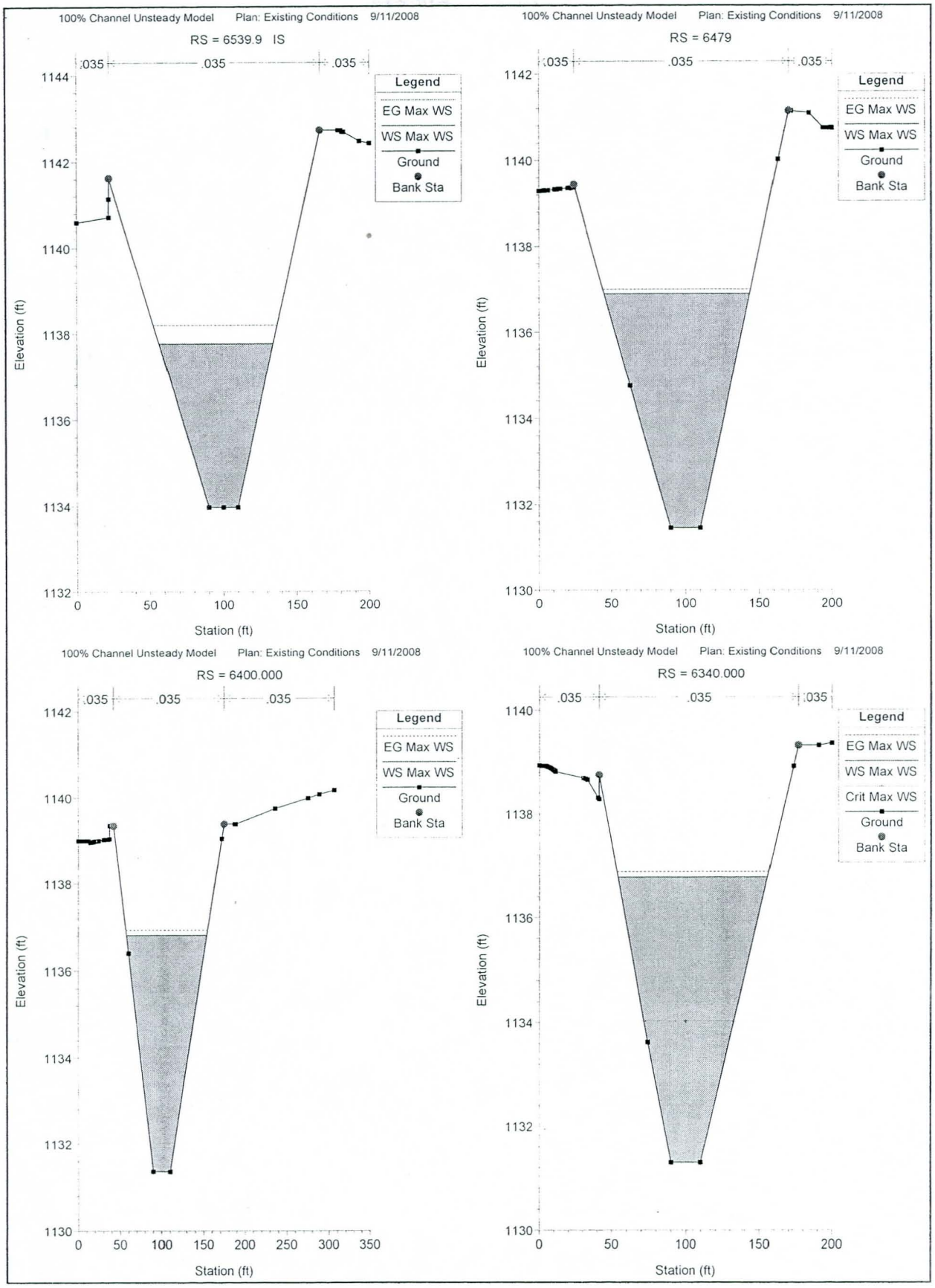
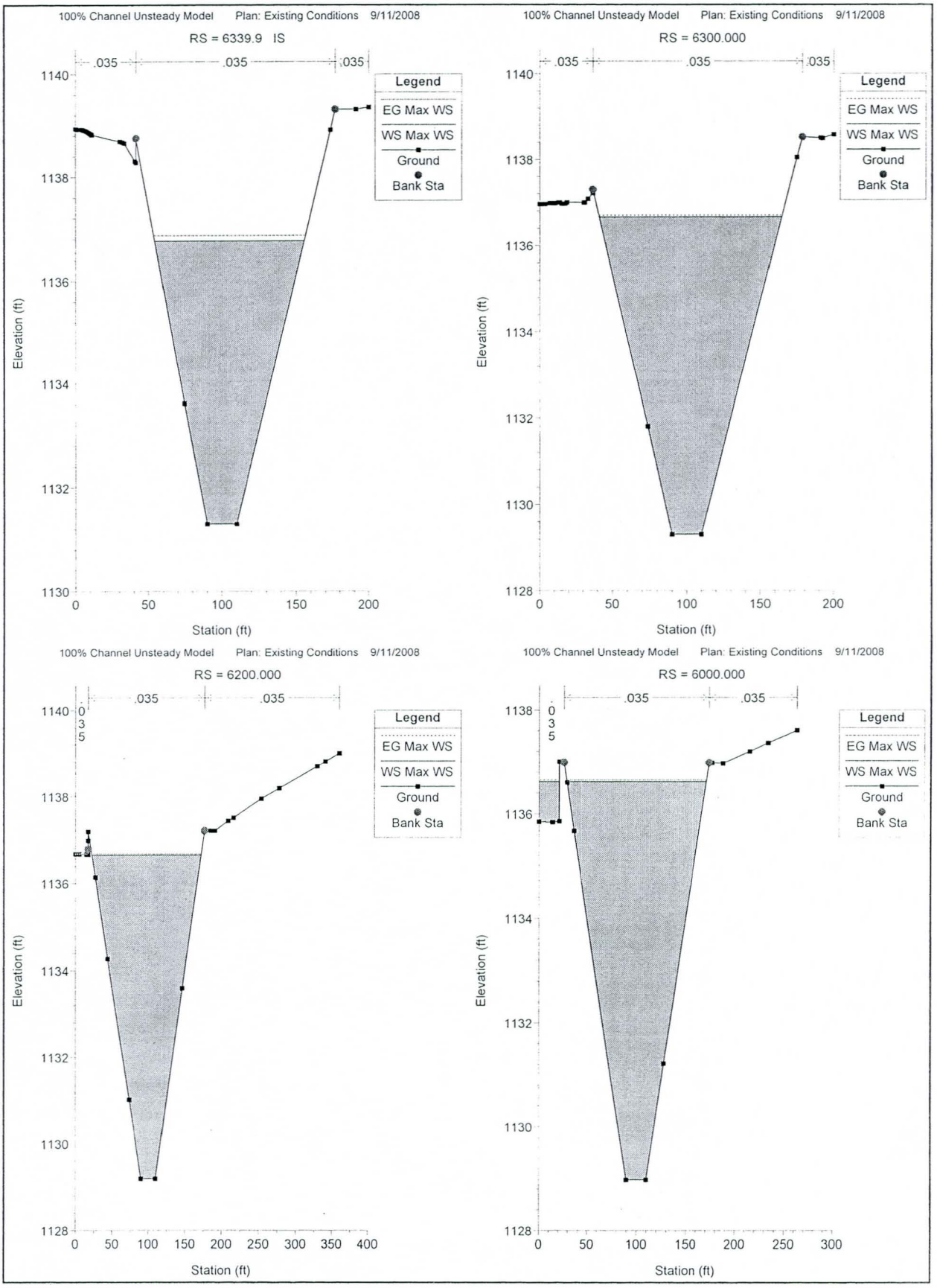
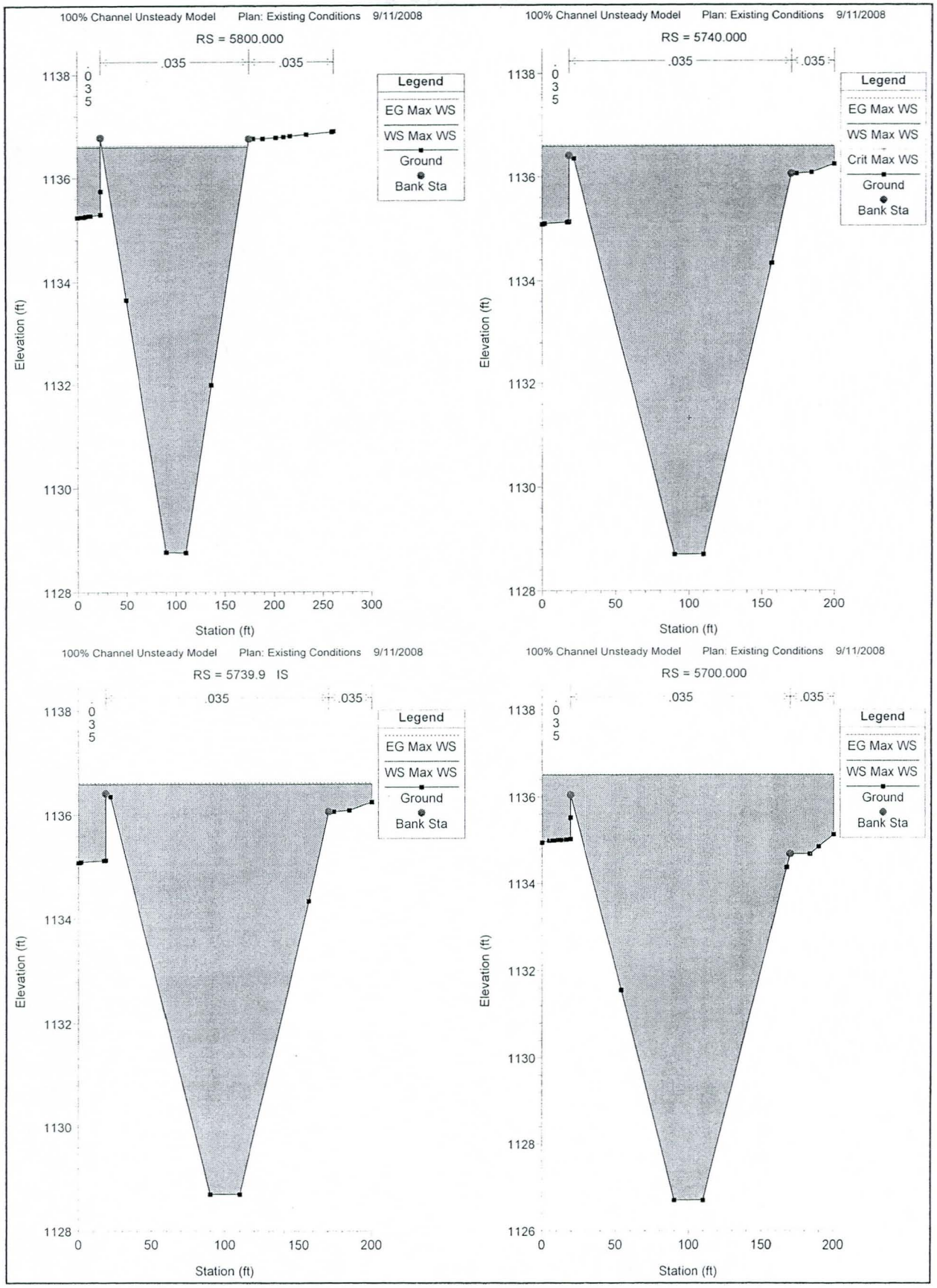
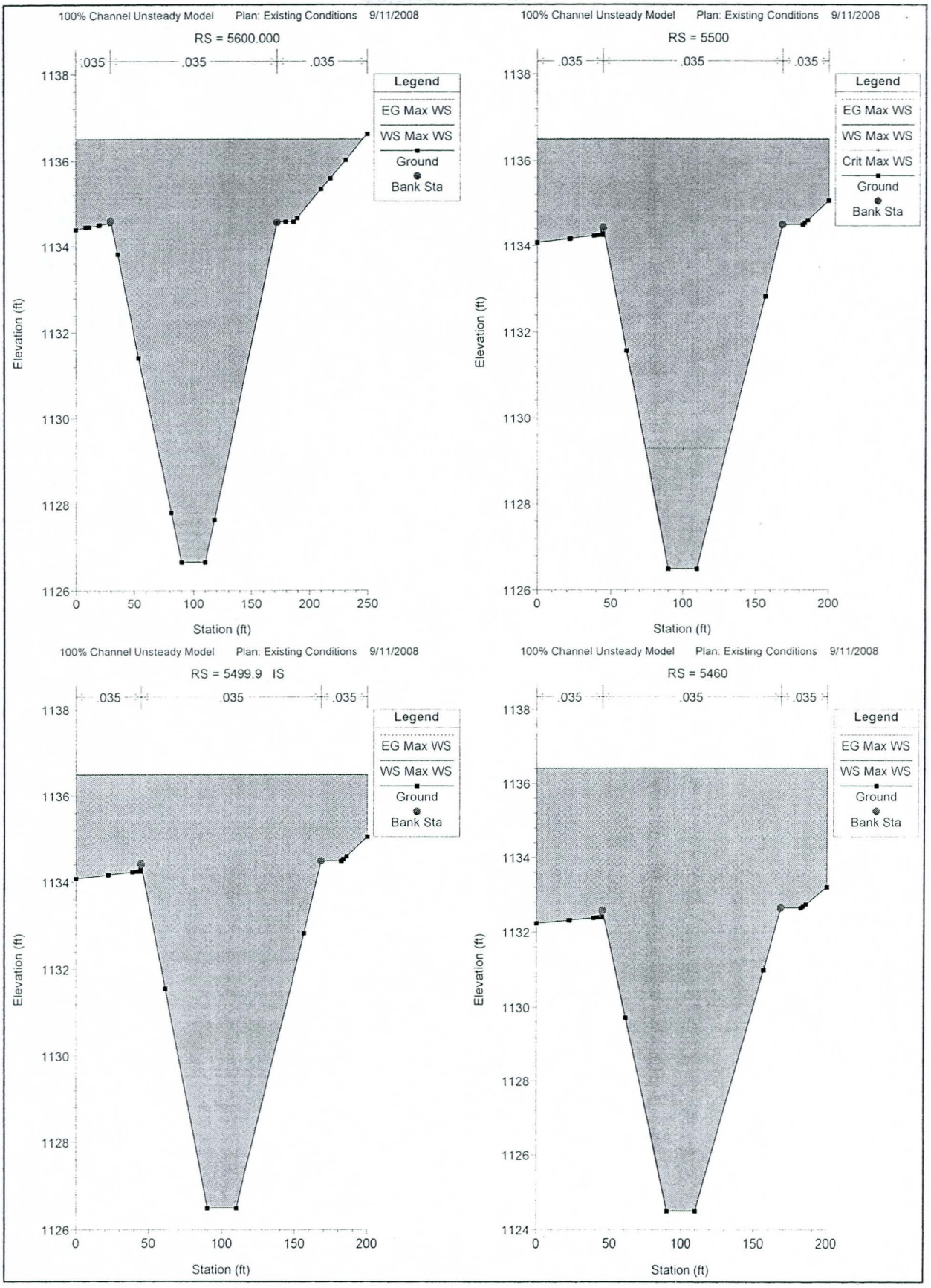
RS = 7539.9 IS
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 7500
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 7400.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 7202.571
.02
.02
Legend
EG Max WS
Crit Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

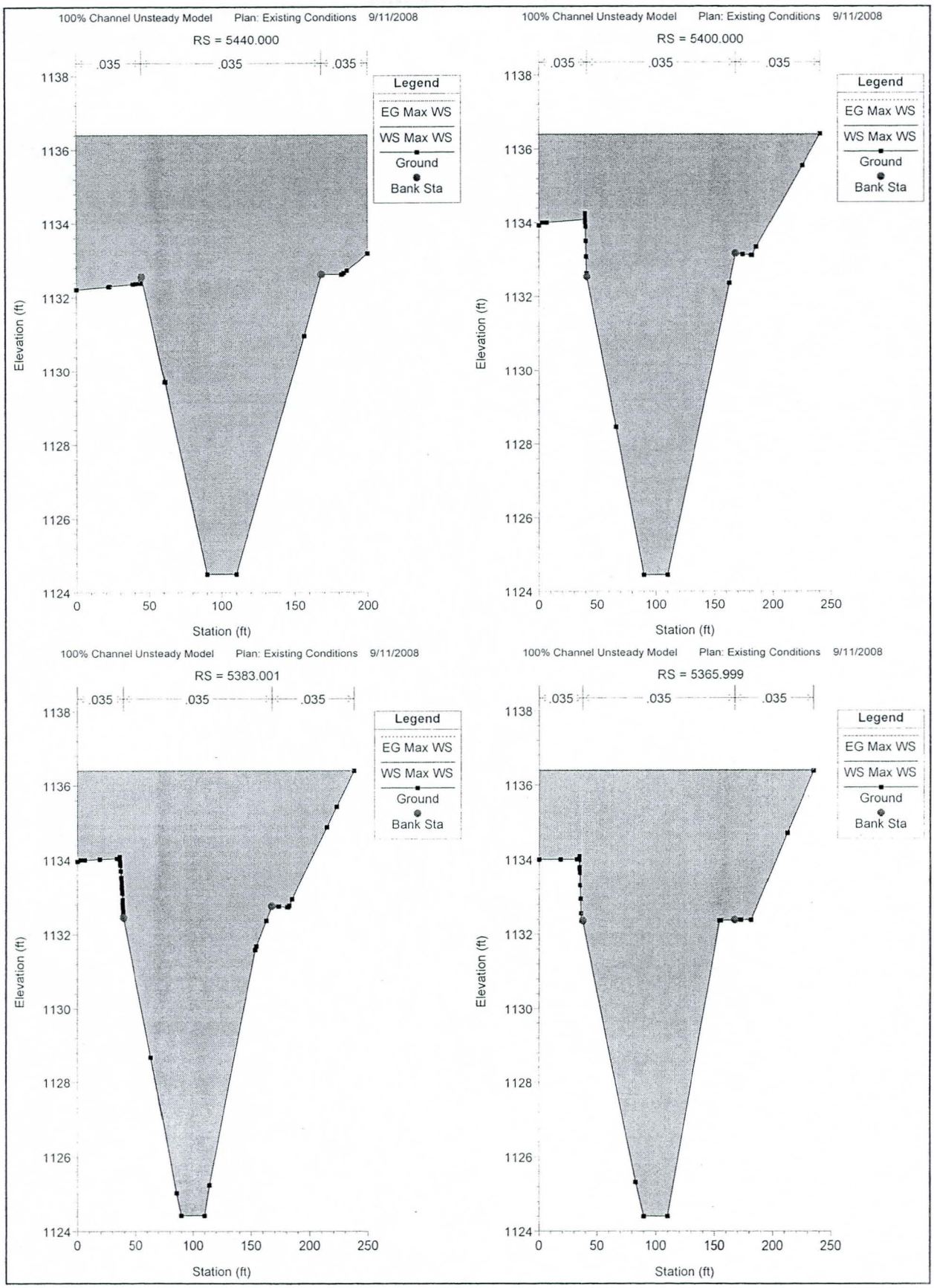

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6807.711
.02
.02
0
2
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6709.000
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6600.000
.035
.035
.
0
3
5
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6540.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

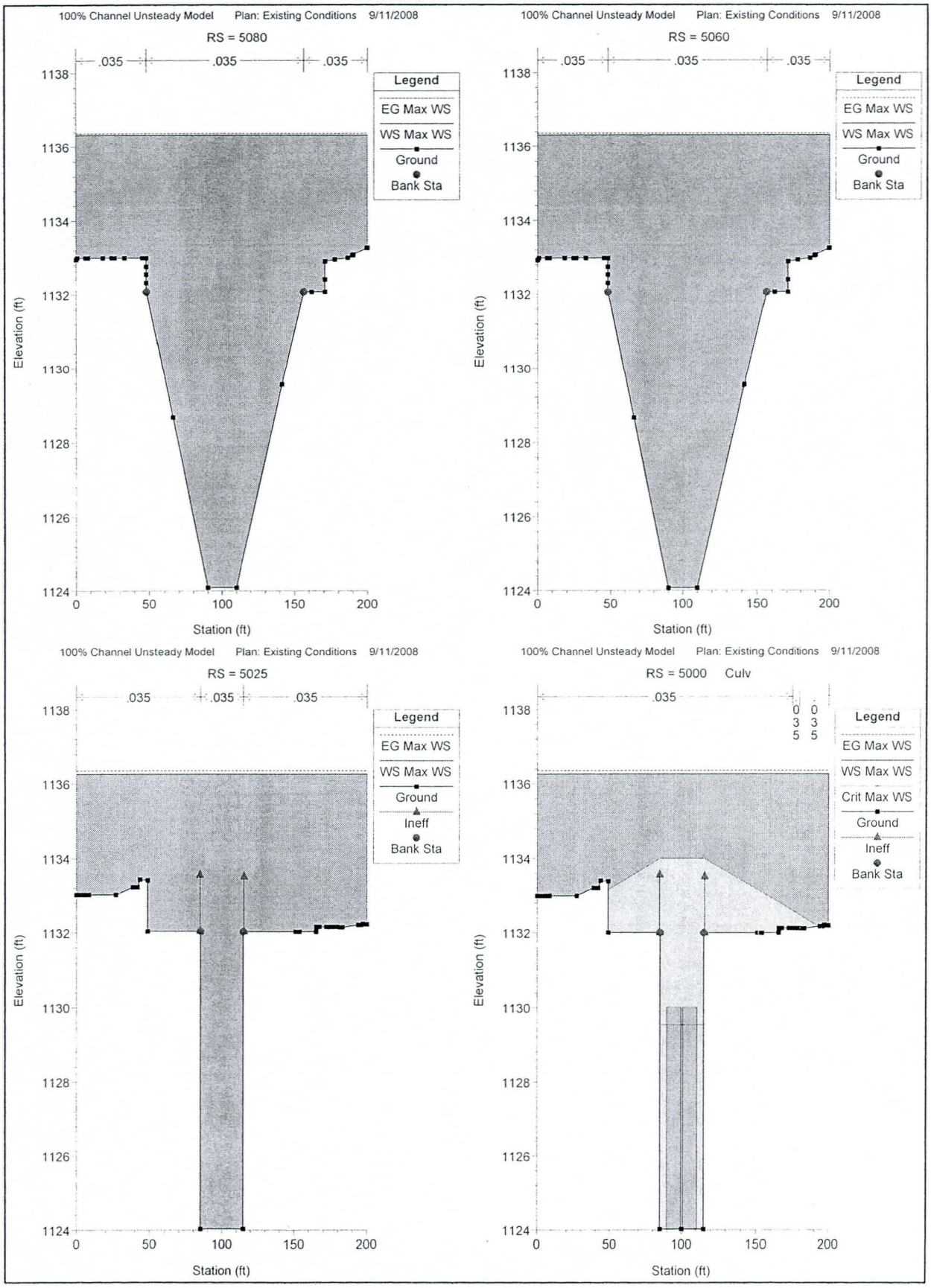

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6539.9 IS
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6479
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6400.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6340.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

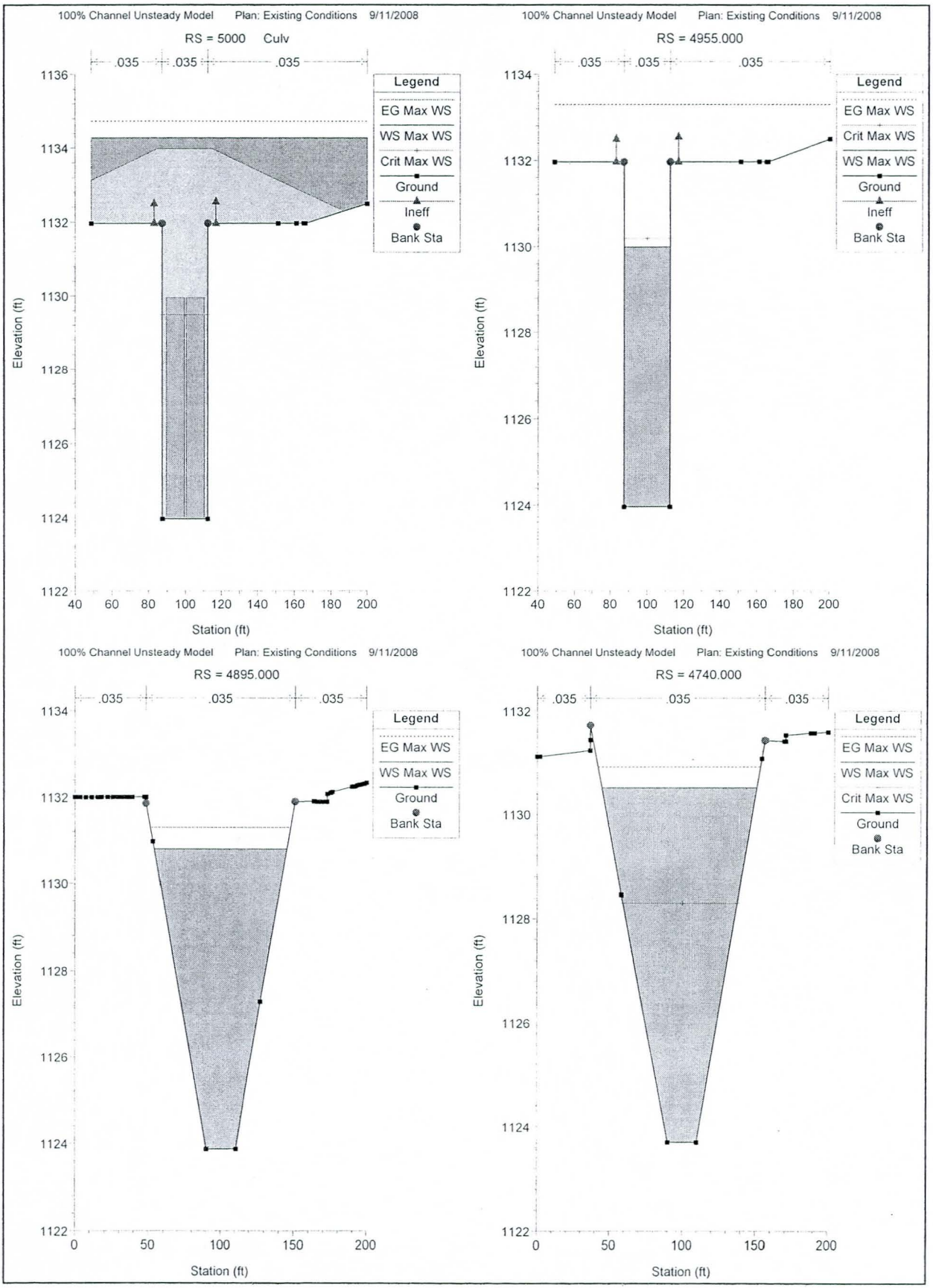

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6339.9 IS
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6300.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6200.000
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 6000.000
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

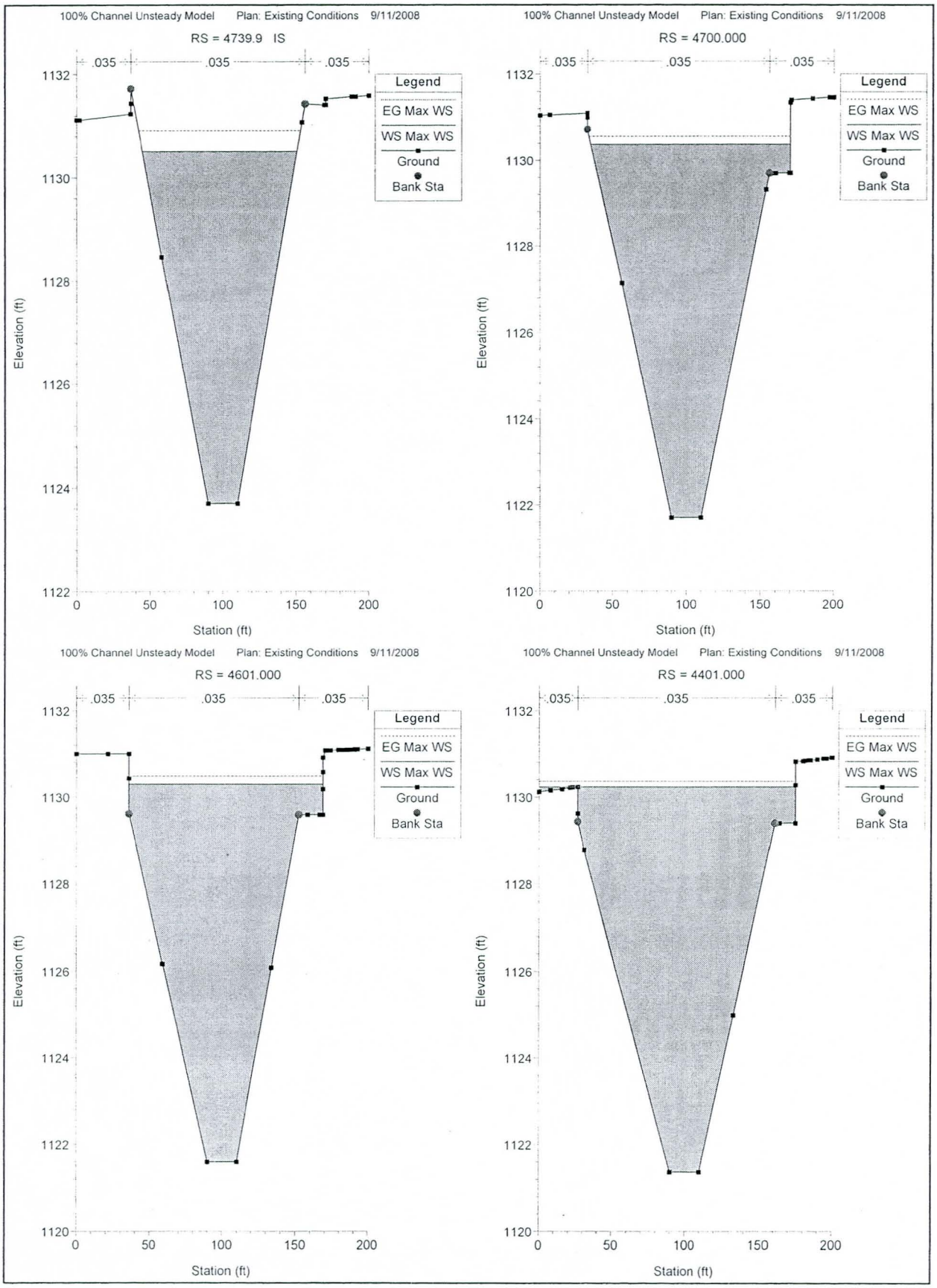

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5800.000
.035
.035
0
3
5
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5740.000
.035
.035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5739.9 IS
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5700.000
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

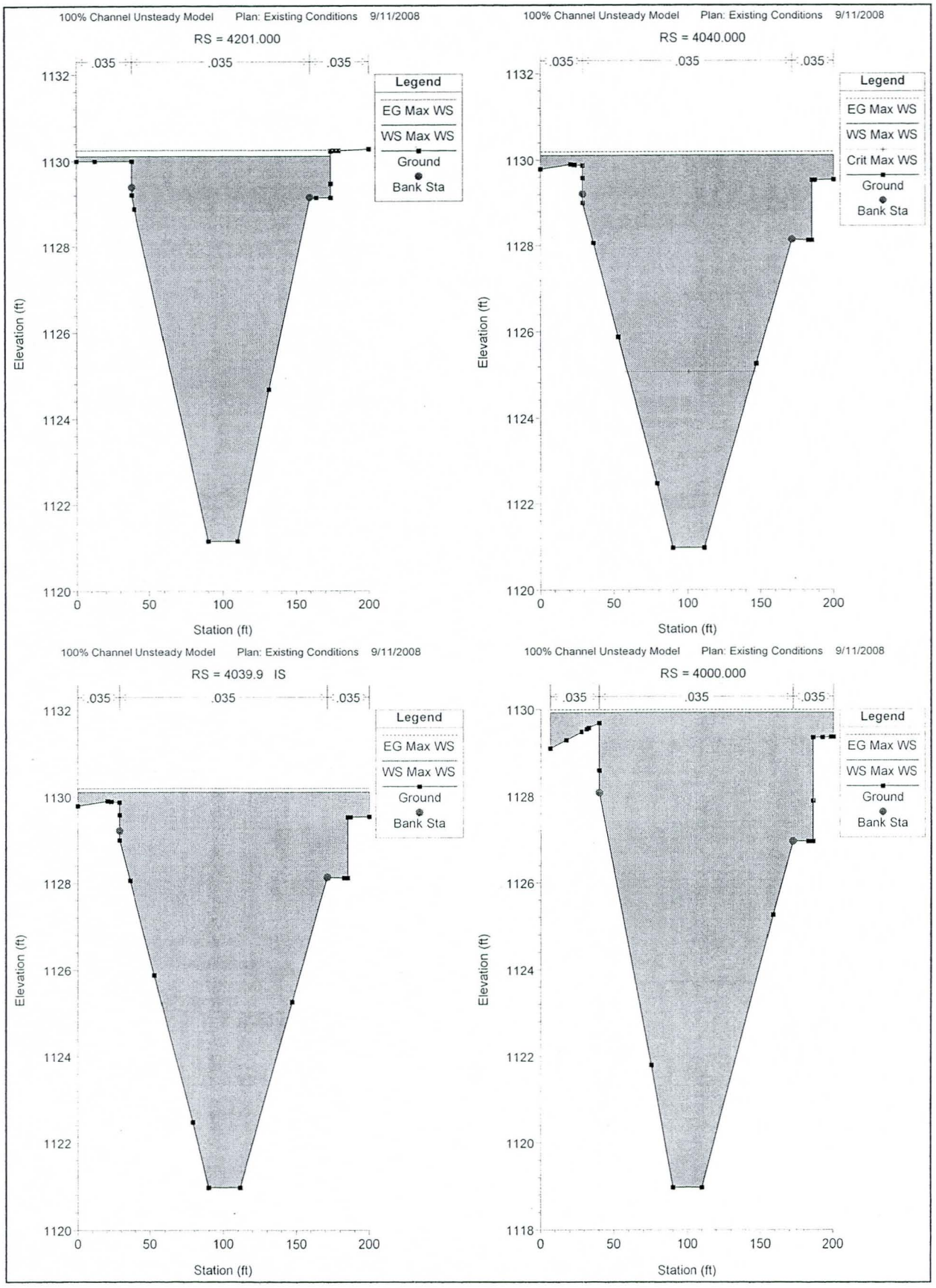

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5600.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5500
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5499.9 IS
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5460
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

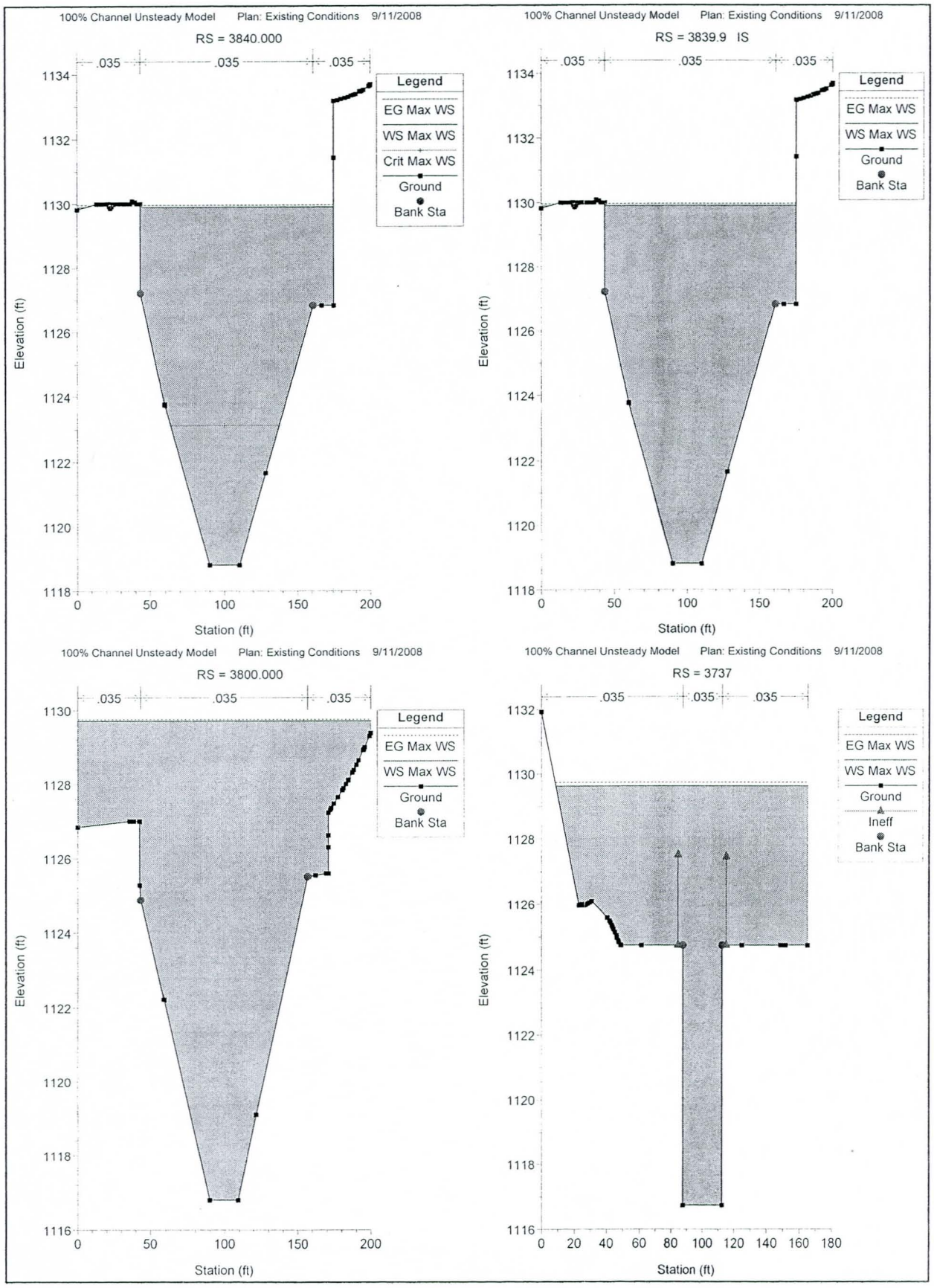

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5440.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5400.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5383.001
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5365.999
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

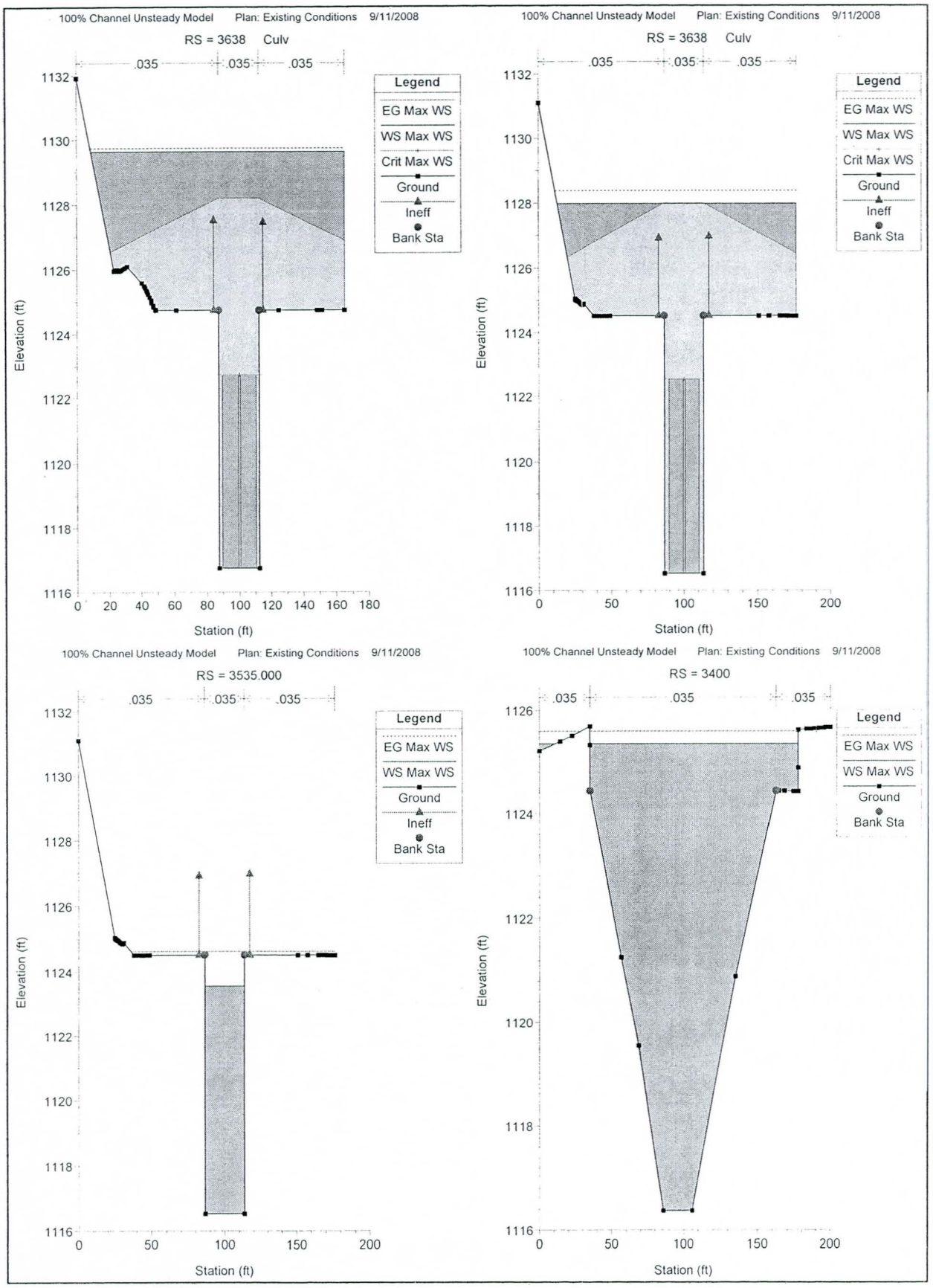

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5080
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5060
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5025
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5000 Culv
.035
0 0
3 3
5 5
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

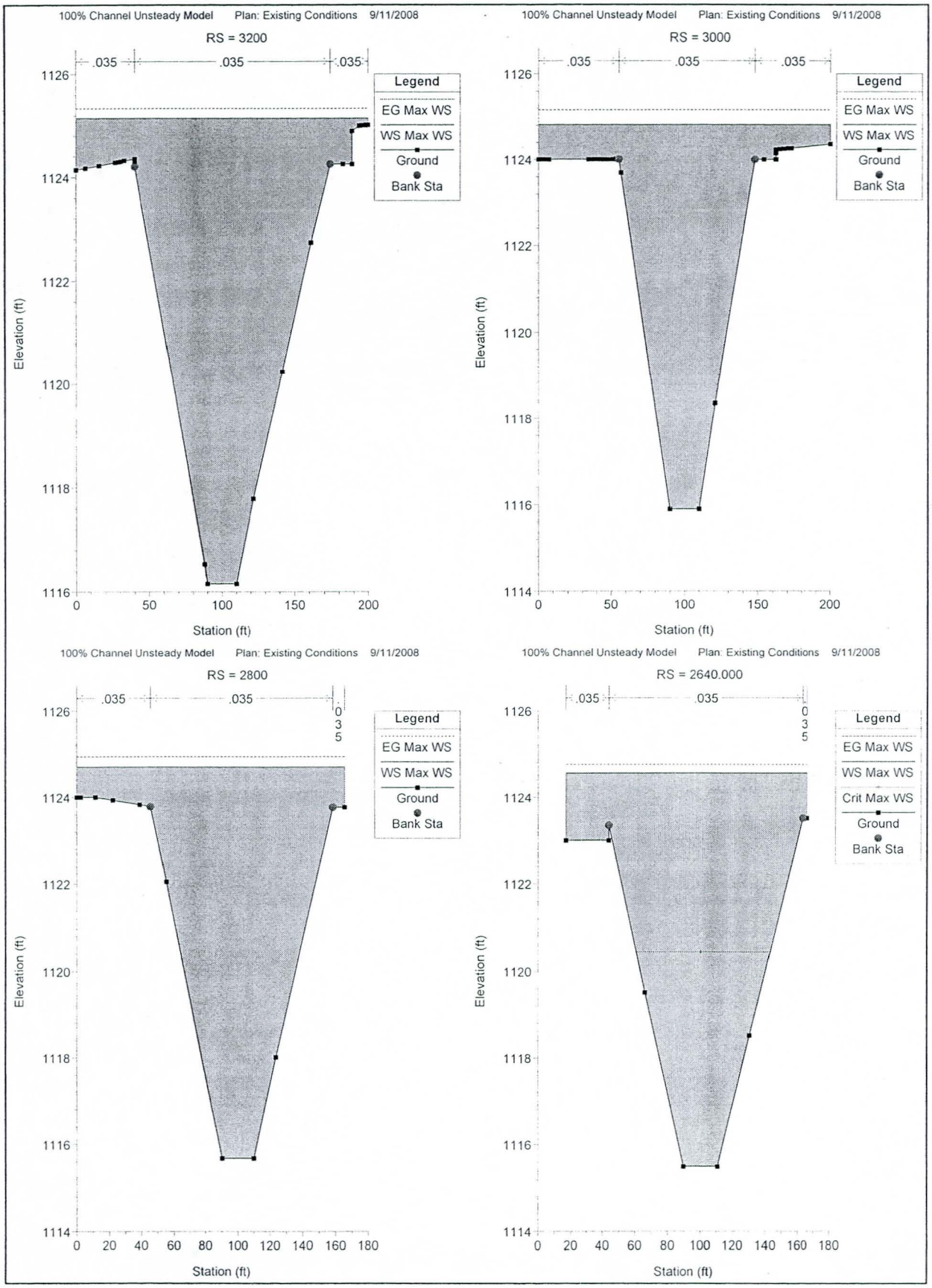

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 5000 Culv
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4955.000
.035 .035 .035
Legend
EG Max WS
Crit Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4895.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4740.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

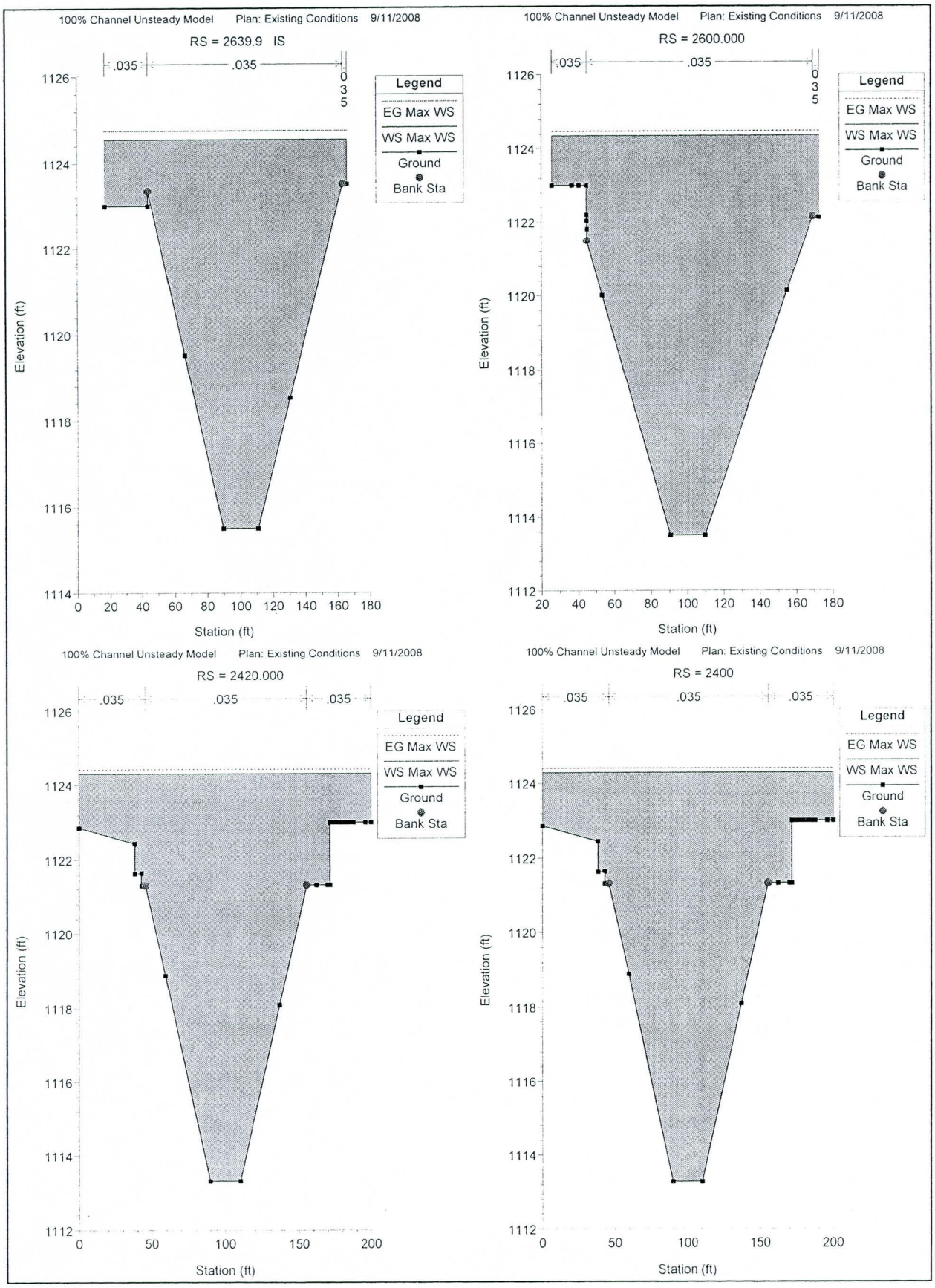

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4739.9 IS
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4700.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4601.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4401.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

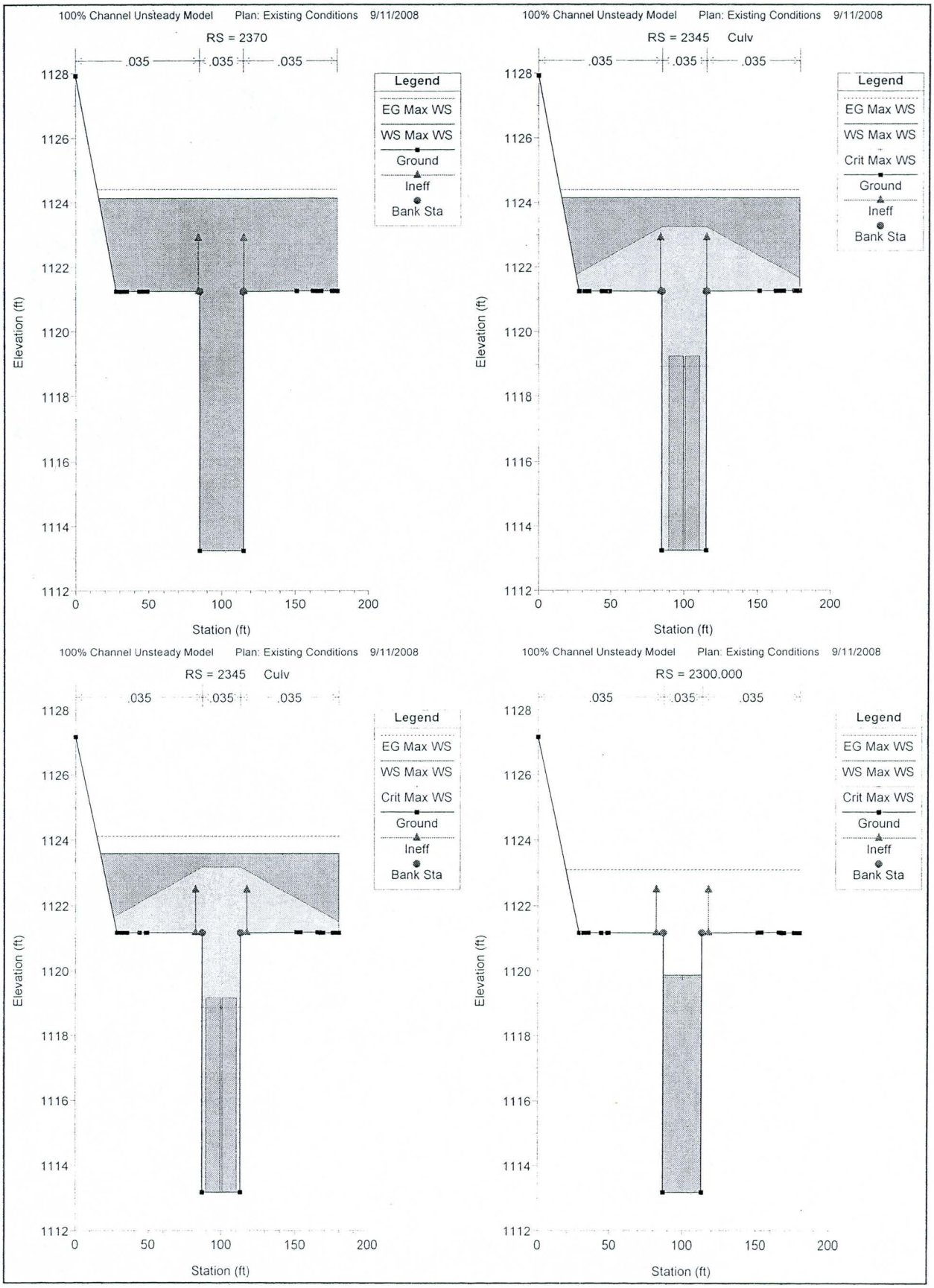

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4201.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4040.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4039.9 IS
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 4000.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

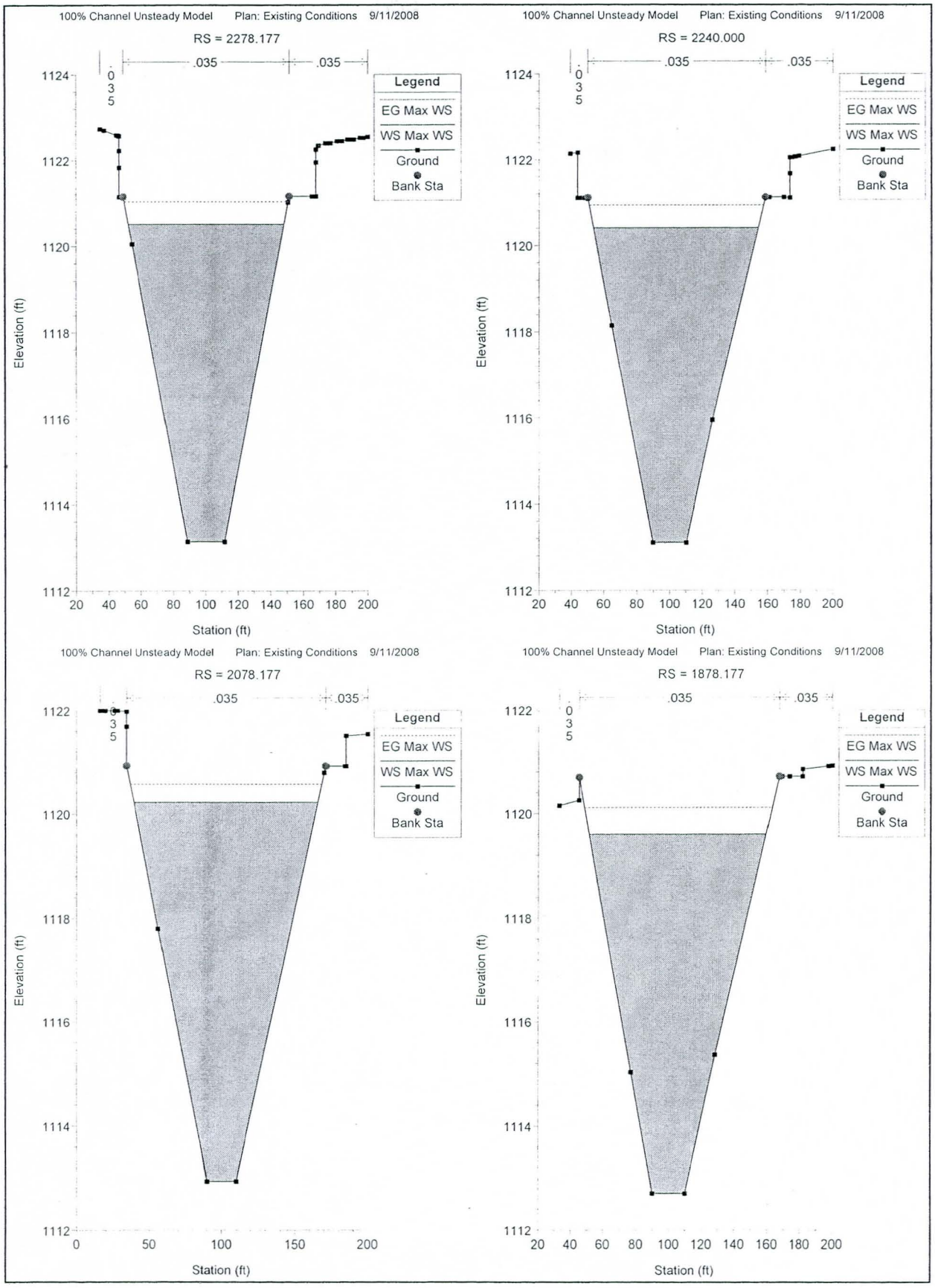

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3840.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3839.9 IS
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3800.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3737
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

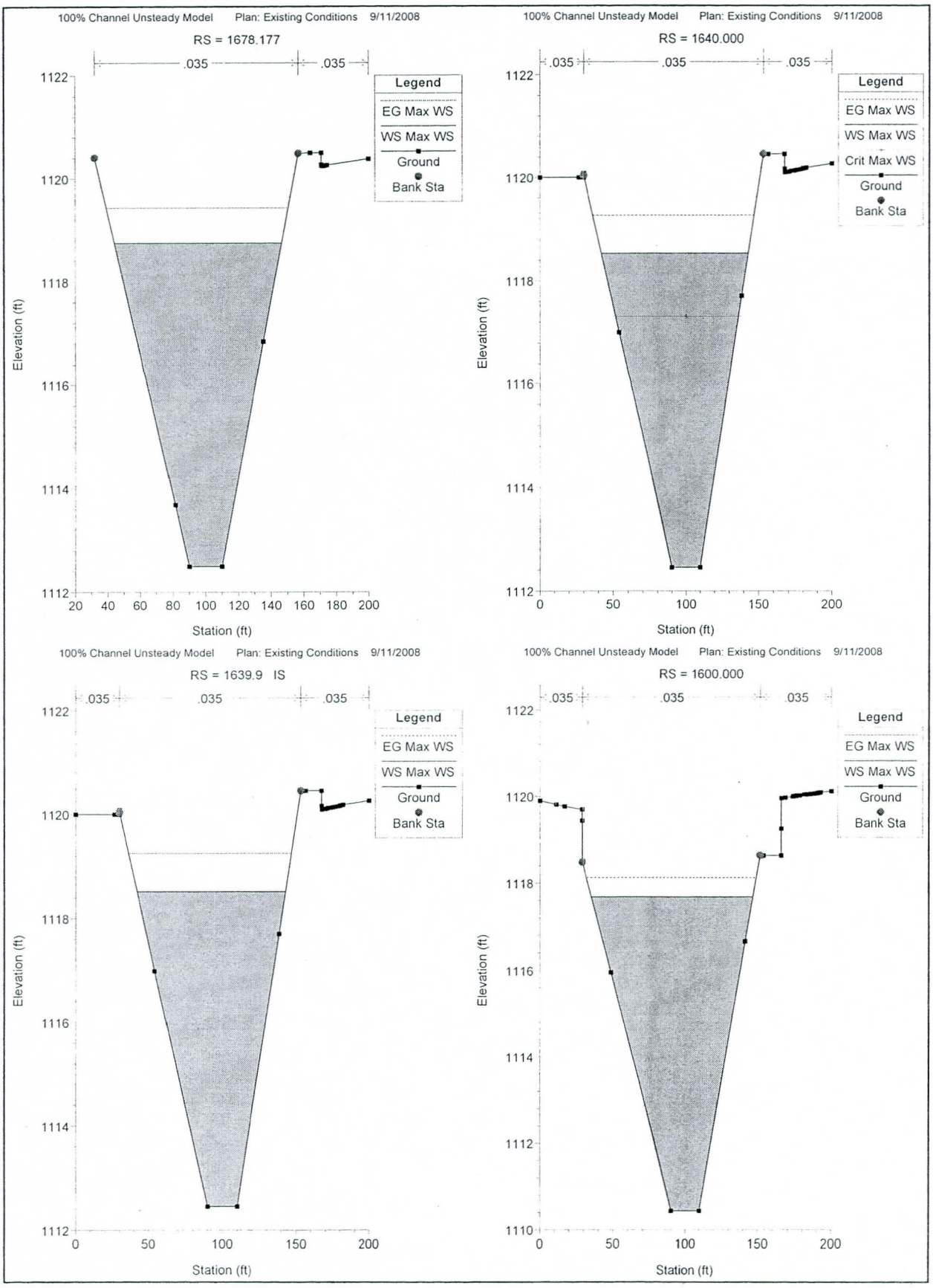

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3638 Culv
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3638 Culv
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3535.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3400
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)

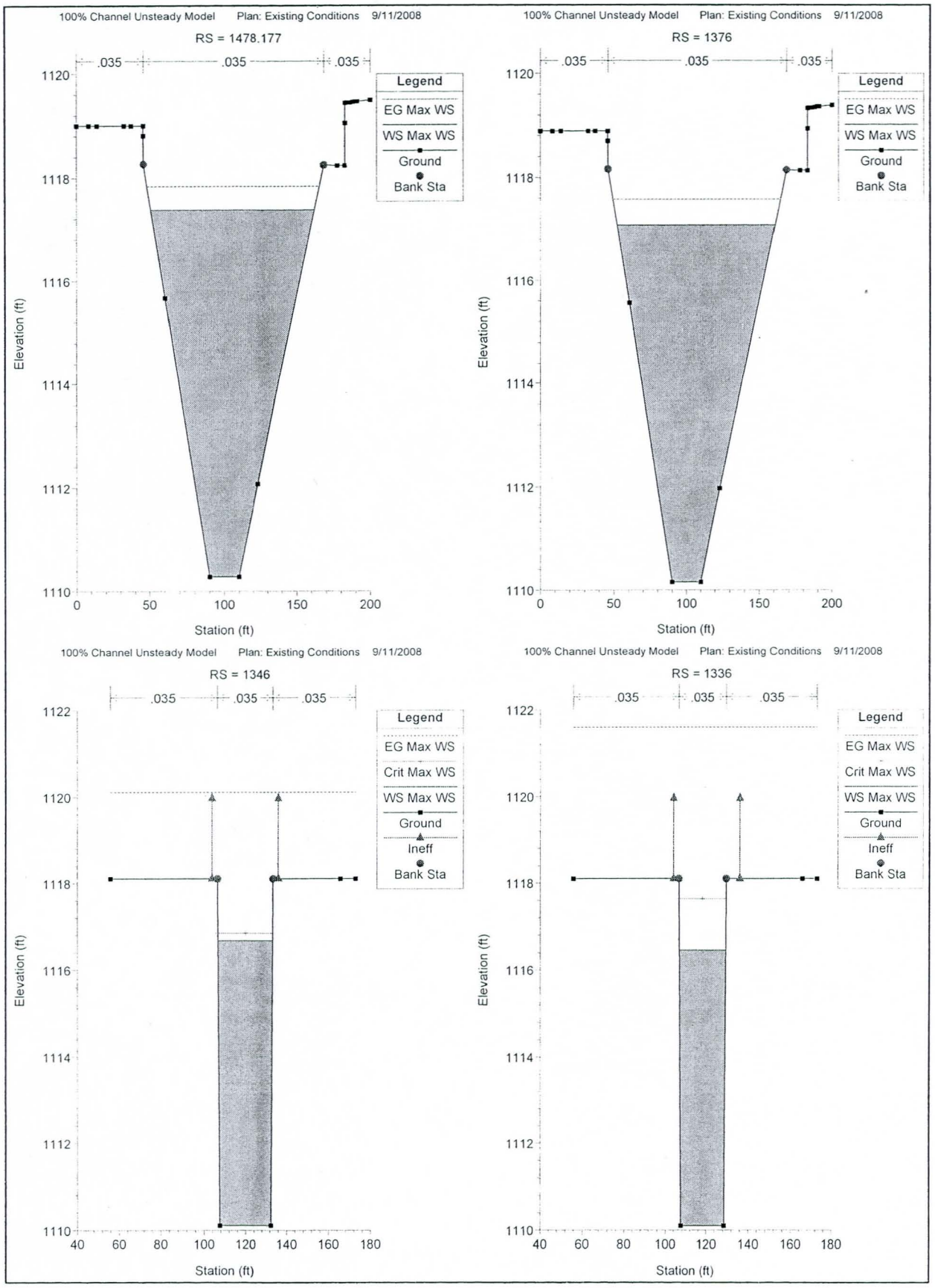

100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3200
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 3000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2800
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2640.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2639.9 IS
.035
.035
0
3
5
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2600.000
.035
.035
0
3
5
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2420.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2400
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2370
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2345 Culv
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2345 Culv
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2300.000
.035 .035 .035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2278.177
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2240.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 2078.177
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1878.177
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1678.177
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1640.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Crit Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1639.9 IS
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1600.000
.035
.035
.035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1478.177
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1376
.035 .035 .035
Legend
EG Max WS
WS Max WS
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1346
.035 .035 .035
Legend
EG Max WS
Crit Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Unsteady Model Plan: Existing Conditions 9/11/2008
RS = 1336
.035 .035 .035
Legend
EG Max WS
Crit Max WS
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

Appendix E: Hydraulic Analysis Supporting Documentation (Steady-Flow HEC-RAS)

E.1 Roughness Coefficient Estimation

Note: Roughness coefficients are included in Section E.5

E.2 Cross-Section Plots

Note: Cross-section plots are included in their respective model output in Section E.5

E.3 Expansion and Contraction Coefficients

Note: Expansion and Contraction Coefficients are included in Section E.5

E.4 Analysis of Structures

Note: No separate hydraulic calculations were performed.

E.5 Hydraulic Modeling

E.5.1 Schematic

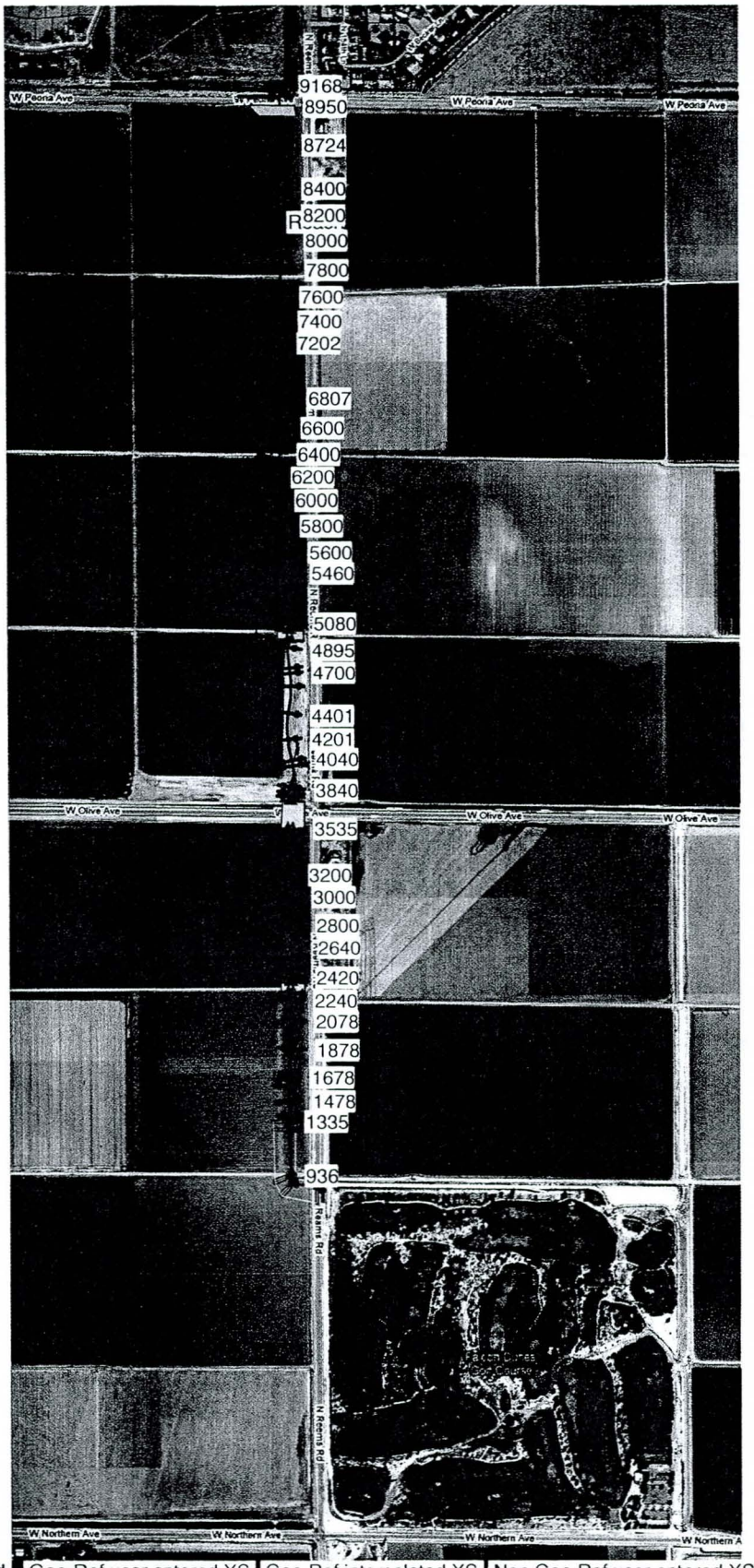
E.5.2 Report

E.5.3 Summary Table

E.5.4 Cross-Sections

E.5.5 100-Year Profile

E.5.1 Schematic



STATION: 9168

None of the XS's are Geo-Referenced (Geo-Ref user entered XS Geo-Ref interpolated XS Non Geo-Ref user entered XS - Non Geo-Ref interpolated XS)

1 in Horiz. = 900 ft 1 in Vert. = 1300 ft

E.5.2 Report

```
                    HEC-RAS Version 4.0.0 March 2008
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

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

PROJECT DATA
Project Title: 100% Channel Steady Model
Project File : ReemsCLOMR.prj
Run Date and Time: 10/20/2008 12:01:38 PM

Project in English units

Project Description:
Channel Only in the Geometry.  The basin and weir have been removed from the
model.
The most downstream cross-section was cut at the bend of the North
Collector Channel, and therefore has a bottom width larger than the 12 ft of
the North Collector Channel.


The boundary
condition at the downstream end was normal depth with a slope of 0.001.

The
flows have been taken from the existing conditions HEC-1 model, and have been
adjusted to the next highest integer.  For example, 369.15 cfs in the unsteady
model became 370 cfs in the steady model.

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

PLAN DATA

Plan Title: Existing Flow for the CLOMR
Plan File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\HEC-
RAS\ReemsCLOMR.p01

          Geometry Title: Design
          Geometry File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd
CLOMR\Hydro\HEC-RAS\ReemsCLOMR.g01

          Flow Title    : Existing Q
          Flow File     : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd
CLOMR\Hydro\HEC-RAS\ReemsCLOMR.f02

Plan Description:
Existing conditions for the CLOMR.  Flow rates are from the existing conditions
HEC-1 model (EC_RMS.dat).


Plan Summary Information:
Number of:  Cross Sections =   79    Multiple Openings  =    0
            Culverts       =    4    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  40
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001
```

```
Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow

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

FLOW DATA

Flow Title: Existing Q
Flow File : G:\Projects\07\07-027 On-Call Flood Control District\01 - Reems Rd CLOMR\Hydro\HEC-
RAS\ReemsCLOMR.f02

Flow Data (cfs)
*************************************************************
* River          Reach          RS      *        Existing *
* Stream         Reach          9168    *            1845 *
* Stream         Reach          9082    *            2881 *
* Stream         Reach          8890    *            2735 *
* Stream         Reach          6807    *             742 *
* Stream         Reach          5400    *            2368 *
* Stream         Reach          3770    *            2557 *
* Stream         Reach          3535    *            1420 *
*************************************************************

Boundary Conditions
*****************************************************************************************************
*******
* River          Reach          Profile          *            Upstream
Downstream    *
*****************************************************************************************************
*******
* Stream         Reach          Existing         *                                Normal S =
0.001 *
*****************************************************************************************************
*******

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

SUMMARY OF MANNING'S N VALUES

River:Stream
*****************************************************************
*.    Reach      *   River Sta.   *   n1    *   n2    *   n3    *
*****************************************************************
*Reach           *    9168        *     .035*     .035*     .035*
*Reach           *    9118        *     .035*     .035*     .035*
*Reach           *    9082        *     .035*     .035*     .035*
*Reach           *    8950        *Culvert  *        *        *
*Reach           *    8890        *     .035*     .035*     .035*
*Reach           *    8724        *     .035*     .035*     .035*
*Reach           *    8600        *     .035*     .035*     .035*
*Reach           *    8400        *     .035*     .035*     .035*
*Reach           *    8200        *     .035*     .035*     .035*
*Reach           *    8000        *     .035*     .035*     .035*
*Reach           *    7800        *     .035*     .035*     .035*
*Reach           *    7600        *     .035*     .035*     .035*
*Reach           *    7540        *     .032*     .032*     .032*
*Reach           *    7500        *     .032*     .032*     .032*
*Reach           *    7400        *     .035*     .035*     .035*
*Reach           *    7202        *      .02*      .02*      .02*
*Reach           *    6807        *      .02*      .02*      .02*
*Reach           *    6709        *     .035*     .035*     .035*
*Reach           *    6600        *     .035*     .035*     .035*
*Reach           *    6540        *     .032*     .032*     .032*
*Reach           *    6479        *     .032*     .032*     .032*
*Reach           *    6400        *     .035*     .035*     .035*
*Reach           *    6340        *     .032*     .032*     .032*
*Reach           *    6300        *     .032*     .032*     .032*
*Reach           *    6200        *     .035*     .035*     .035*
*Reach           *    6000        *     .035*     .035*     .035*
*Reach           *    5800        *     .035*     .035*     .035*
*Reach           *    5740        *     .032*     .032*     .032*
```

*Reach	* 5700	* .032*	.032*	.032*
*Reach	* 5600	* .035*	.035*	.035*
*Reach	* 5500	* .032*	.032*	.032*
*Reach	* 5460	* .032*	.032*	.032*
*Reach	* 5440	* .035*	.035*	.035*
*Reach	* 5400	* .035*	.035*	.035*
*Reach	* 5366	* .035*	.035*	.035*
*Reach	* 5080	* .035*	.035*	.035*
*Reach	* 5060	* .035*	.035*	.035*
*Reach	* 5025	* .035*	.035*	.035*
*Reach	* 5000	*Culvert *	*	*
*Reach	* 4955	* .035*	.035*	.035*
*Reach	* 4895	* .035*	.035*	.035*
*Reach	* 4740	* .032*	.032*	.032*
*Reach	* 4700	* .032*	.032*	.032*
*Reach	* 4601	* .035*	.035*	.035*
*Reach	* 4401	* .035*	.035*	.035*
*Reach	* 4201	* .035*	.035*	.035*
*Reach	* 4040	* .032*	.032*	.032*
*Reach	* 4000	* .032*	.032*	.032*
*Reach	* 3840	* .032*	.032*	.032*
*Reach	* 3800	* .032*	.032*	.032*
*Reach	* 3770	* .035*	.035*	.035*
*Reach	* 3735	* .035*	.035*	.035*
*Reach	* 3638	*Culvert *	*	*
*Reach	* 3535	* .035*	.035*	.035*
*Reach	* 3400	* .035*	.035*	.035*
*Reach	* 3200	* .035*	.035*	.035*
*Reach	* 3000	* .035*	.035*	.035*
*Reach	* 2800	* .035*	.035*	.035*
*Reach	* 2640	* .032*	.032*	.032*
*Reach	* 2600	* .032*	.032*	.032*
*Reach	* 2420	* .035*	.035*	.035*
*Reach	* 2400	* .035*	.035*	.035*
*Reach	* 2370	* .035*	.035*	.035*
*Reach	* 2345	*Culvert *	*	*
*Reach	* 2300	* .035*	.035*	.035*
*Reach	* 2278	* .035*	.035*	.035*
*Reach	* 2240	* .035*	.035*	.035*
*Reach	* 2078	* .035*	.035*	.035*
*Reach	* 1878	* .035*	.035*	.035*
*Reach	* 1678	* .035*	.035*	.035*
*Reach	* 1640	* .032*	.032*	.032*
*Reach	* 1600	* .032*	.032*	.032*
*Reach	* 1478	* .035*	.035*	.035*
*Reach	* 1376	* .035*	.035*	.035*
*Reach	* 1346	* .035*	.035*	.035*
*Reach	* 1335	* .028*	.012*	.028*
*Reach	* 1273	* .028*	.012*	.028*
*Reach	* 936	* .028*	.012*	.028*
*Reach	* 926	* .028*	.014*	.028*
*Reach	* 879	* .028*	.014*	.028*
*Reach	* 869	* .028*	.012*	.028*
*Reach	* 689	* .028*	.012*	.028*
*Reach	* 649	* .02*	.02*	.02*

SUMMARY OF REACH LENGTHS

River: Stream

Reach	River Sta.	Left	Channel	Right
*Reach	* 9168	* 50*	50*	50*
*Reach	* 9118	* 36*	36*	36*
*Reach	* 9082	* 192*	192*	192*
*Reach	* 8950	*Culvert *	*	*
*Reach	* 8890	* 166*	166*	166*
*Reach	* 8724	* 124.25*	124.25*	124.25*
*Reach	* 8600	* 200*	200*	200*
*Reach	* 8400	* 200*	200*	200*
*Reach	* 8200	* 200*	200*	200*
*Reach	* 8000	* 200*	200*	200*
*Reach	* 7800	* 225.7*	200*	177.3*

```
*Reach          *    7600        *    54.09*       60*     74.8*
*Reach          *    7540        *     34.1*       40*     54.8*
*Reach          *    7500        *     94.1*      100*    114.8*
*Reach          *    7400        *  182.519*  197.429*  222.209*
*Reach          *    7202        *   394.86*   394.86*   394.86*
*Reach          *    6807        *   98.711*   98.711*   98.711*
*Reach          *    6709        *   118.47*   109.01*   103.18*
*Reach          *    6600        *     58.8*       60*    61.92*
*Reach          *    6540        *    57.26*       61*    64.64*
*Reach          *    6479        *    72.55*       79*     88.2*
*Reach          *    6400        *    60.09*       60*    60.03*
*Reach          *    6340        *     40.3*       40*    40.02*
*Reach          *    6300        *    95.95*      100*    106.2*
*Reach          *    6200        *    177.2*      200*    221.2*
*Reach          *    6000        *    195.3*      200*    205.6*
*Reach          *    5800        *    55.77*       60*     64.2*
*Reach          *    5740        *     37.7*       40*       42*
*Reach          *    5700        *   100.55*      100*   100.05*
*Reach          *    5600        *   113.52*      100*    87.68*
*Reach          *    5500        *    40.56*       40*     39.4*
*Reach          *    5460        *    20.83*       20*    19.09*
*Reach          *    5440        *    41.66*       40*    38.18*
*Reach          *    5400        *    34.04*       34*    34.86*
*Reach          *    5366        *   278.25*   286.05*   293.55*
*Reach          *    5080        *       20*       20*     20.6*
*Reach          *    5060        *       35*       35*       35*
*Reach          *    5025        *       70*       70*       70*
*Reach          *    5000        *Culvert  *         *         *
*Reach          *    4955        *    24.99*       60*    95.01*
*Reach          *    4895        *   124.64*   155.04*   185.12*
*Reach          *    4740        *    40.22*       40*       40*
*Reach          *    4700        *    103.1*       99*    95.85*
*Reach          *    4601        *    222.8*      200*    181.9*
*Reach          *    4401        *      180*      200*    218.6*
*Reach          *    4201        *   148.05*   161.01*   174.87*
*Reach          *    4040        *       45*       40*    37.89*
*Reach          *    4000        *   188.32*      160*   127.84*
*Reach          *    3840        *    35.36*       40*       45*
*Reach          *    3800        *     23.3*       30*     37.2*
*Reach          *    3770        *       36*       36*       36*
*Reach          *    3735        *      200*      200*      200*
*Reach          *    3638        *Culvert  *         *         *
*Reach          *    3535        *      137*      135*      139*
*Reach          *    3400        *      217*      200*    168.8*
*Reach          *    3200        *    176.5*      200*    228.4*
*Reach          *    3000        *    201.1*      200*    200.1*
*Reach          *    2800        *      166*      160*      166*
*Reach          *    2640        *    45.34*       40*    34.14*
*Reach          *    2600        *   176.76*      180*   184.86*
*Reach          *    2420        *       23*       20*       23*
*Reach          *    2400        *    35.28*       30*     35.4*
*Reach          *    2370        *       70*       70*       70*
*Reach          *    2345        *Culvert  *         *         *
*Reach          *    2300        *    21.82*    21.82*    21.82*
*Reach          *    2278        *    38.18*    38.18*    39.22*
*Reach          *    2240        *    155.7*   161.82*   170.64*
*Reach          *    2078        *    212.7*      200*    188.6*
*Reach          *    1878        *    203.9*      200*      197*
*Reach          *    1678        *    33.32*    38.18*    42.24*
*Reach          *    1640        *    34.84*       40*    43.82*
*Reach          *    1600        *   109.97*    121.8*   133.21*
*Reach          *    1478        *    102.4*      102*     85.1*
*Reach          *    1376        *    29.99*    29.99*    29.99*
*Reach          *    1346        *       11*       11*       11*
*Reach          *    1335        *    61.39*    61.39*    61.39*
*Reach          *    1273        *   337.41*   337.41*   337.41*
*Reach          *    936         *       10*       10*       10*
*Reach          *    926         *    47.11*    47.11*    47.11*
*Reach          *    879         *       10*       10*       10*
*Reach          *    869         *   179.41*   179.41*   179.41*
*Reach          *    689         *    40.13*    40.13*    40.13*
*Reach          *    649         *        0*        0*        0*
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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Stream

Reach	River Sta.	Contr.	Expan.
Reach	9168	.1	.3
Reach	9118	.3	.5
Reach	9082	.3	.5
Reach	8950	Culvert	
Reach	8890	.3	.5
Reach	8724	.3	.5
Reach	8600	.1	.3
Reach	8400	.1	.3
Reach	8200	.1	.3
Reach	8000	.1	.3
Reach	7800	.1	.3
Reach	7600	.1	.3
Reach	7540	.1	.3
Reach	7500	.1	.3
Reach	7400	.1	.3
Reach	7202	.1	.3
Reach	6807	.1	.3
Reach	6709	.1	.3
Reach	6600	.1	.3
Reach	6540	.1	.3
Reach	6479	.1	.3
Reach	6400	.1	.3
Reach	6340	.1	.3
Reach	6300	.1	.3
Reach	6200	.1	.3
Reach	6000	.1	.3
Reach	5800	.1	.3
Reach	5740	.1	.3
Reach	5700	.1	.3
Reach	5600	.1	.3
Reach	5500	.1	.3
Reach	5460	.1	.3
Reach	5440	.1	.3
Reach	5400	.1	.3
Reach	5366	.1	.3
Reach	5080	.1	.3
Reach	5060	.3	.5
Reach	5025	.3	.5
Reach	5000	Culvert	
Reach	4955	.3	.5
Reach	4895	.3	.5
Reach	4740	.1	.3
Reach	4700	.1	.3
Reach	4601	.1	.3
Reach	4401	.1	.3
Reach	4201	.1	.3
Reach	4040	.1	.3
Reach	4000	.1	.3
Reach	3840	.1	.3
Reach	3800	.1	.3
Reach	3770	.3	.5
Reach	3735	.3	.5
Reach	3638	Culvert	
Reach	3535	.3	.5
Reach	3400	.3	.5
Reach	3200	.1	.3
Reach	3000	.1	.3
Reach	2800	.1	.3
Reach	2640	.1	.3
Reach	2600	.1	.3
Reach	2420	.1	.3
Reach	2400	.3	.5
Reach	2370	.3	.5
Reach	2345	Culvert	
Reach	2300	.3	.5
Reach	2278	.3	.5
Reach	2240	.1	.3
Reach	2078	.1	.3
Reach	1878	.1	.3
Reach	1678	.1	.3

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*Reach            *    1640    *       .1*       .3*
*Reach            *    1600    *       .1*       .3*
*Reach            *    1478    *       .1*       .3*
*Reach            *    1376    *       .3*       .5*
*Reach            *    1346    *       .3*       .5*
*Reach            *    1335    *       .3*       .5*
*Reach            *    1273    *       .1*       .3*
*Reach            *    936     *       .1*       .3*
*Reach            *    926     *       .1*       .3*
*Reach            *    879     *       .1*       .3*
*Reach            *    869     *       .1*       .3*
*Reach            *    689     *       .3*       .5*
*Reach            *    649     *       .3*       .5*
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E.5.3 Summary Table

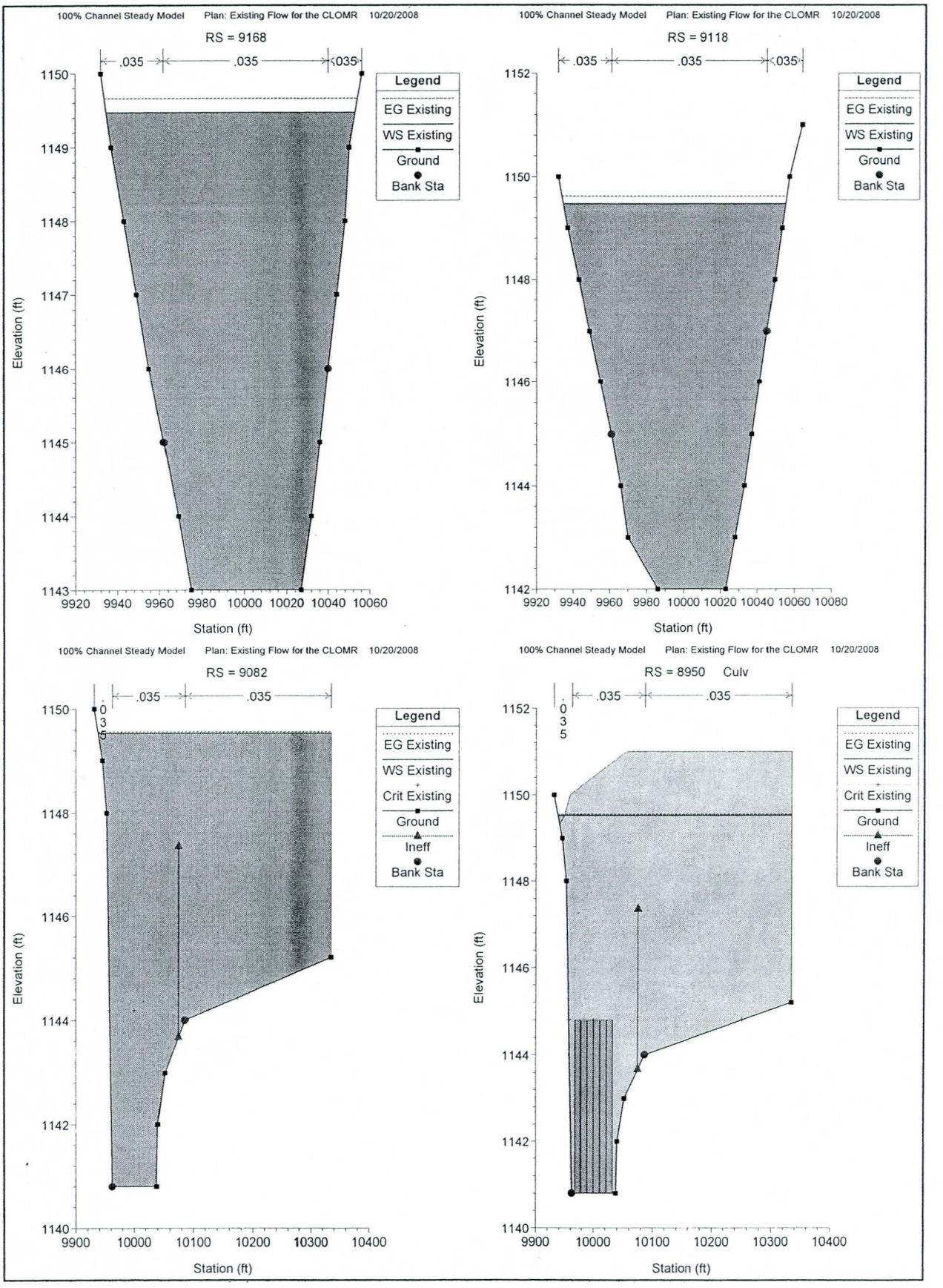
HEC-RAS Plan: Existing River: Stream Reach: Reach Profile: Existing

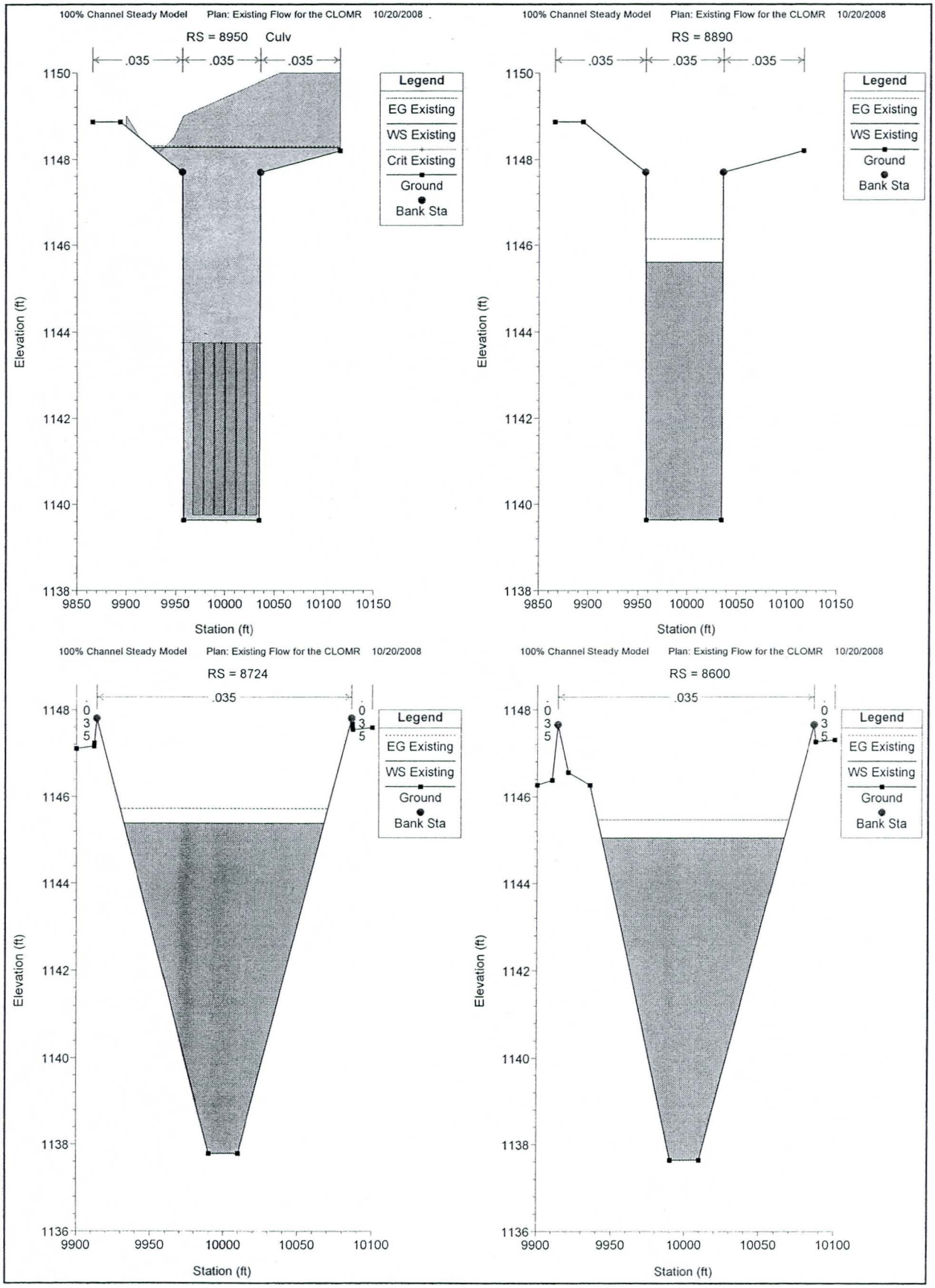
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	9168	Existing	1845.00	1143.00	1149.47		1149.66	0.000647	3.58	559.08	118.19	0.26
Reach	9118	Existing	1845.00	1142.00	1149.47		1149.62	0.000461	3.17	621.16	120.24	0.22
Reach	9082	Existing	2881.00	1140.80	1149.53	1144.19	1149.55	0.000084	1.53	2250.90	396.37	0.10
Reach	8950		Culvert									
Reach	8890	Existing	2735.00	1139.63	1145.60		1146.14	0.002136	5.90	463.81	78.48	0.43
Reach	8724	Existing	2735.00	1137.78	1145.39		1145.72	0.001685	4.63	590.65	135.36	0.39
Reach	8600	Existing	2735.00	1137.63	1145.05		1145.46	0.002135	5.17	529.49	122.87	0.44
Reach	8400	Existing	2735.00	1137.39	1144.70		1145.05	0.001809	4.78	572.54	132.06	0.40
Reach	8200	Existing	2735.00	1137.15	1144.19		1144.63	0.002413	5.29	516.57	126.77	0.46
Reach	8000	Existing	2735.00	1136.91	1143.84		1144.17	0.001913	4.60	594.31	151.61	0.41
Reach	7800	Existing	2735.00	1136.67	1143.40		1143.76	0.002138	4.78	572.22	149.91	0.43
Reach	7600	Existing	2735.00	1136.41	1143.00		1143.33	0.002100	4.63	590.70	160.29	0.43
Reach	7540	Existing	2735.00	1136.32	1142.80		1143.20	0.002087	5.04	542.67	147.56	0.46
Reach	7500	Existing	2735.00	1134.50	1142.90	1139.25	1143.09	0.000703	3.51	783.68	209.78	0.28
Reach	7400	Existing	2735.00	1134.45	1142.73	1139.56	1143.00	0.001139	4.11	664.84	185.99	0.33
Reach	7202	Existing	2735.00	1134.34	1140.64	1140.64	1142.46	0.003935	10.82	252.86	70.18	1.00
Reach	6807	Existing	742.00	1134.12	1137.83		1138.65	0.003218	7.28	101.89	44.00	0.84
Reach	6709	Existing	742.00	1134.06	1137.52		1138.14	0.006882	6.33	117.28	47.85	0.71
Reach	6600	Existing	742.00	1134.00	1136.35	1136.25	1137.13	0.012799	7.08	104.86	58.23	0.93
Reach	6540	Existing	742.00	1133.94	1135.60	1135.60	1136.33	0.013346	6.85	108.27	74.67	1.00
Reach	6479	Existing	742.00	1131.45	1134.70		1134.84	0.001071	2.92	254.31	94.97	0.31
Reach	6400	Existing	742.00	1131.37	1134.59		1134.74	0.001388	3.06	242.72	89.63	0.33
Reach	6340	Existing	742.00	1131.30	1134.52		1134.66	0.001155	3.03	244.55	91.03	0.33
Reach	6300	Existing	742.00	1129.30	1134.57		1134.62	0.000207	1.66	445.93	112.41	0.15
Reach	6200	Existing	742.00	1129.19	1134.54		1134.59	0.000328	1.75	424.37	122.63	0.17
Reach	6000	Existing	742.00	1128.98	1134.51		1134.54	0.000169	1.44	516.90	122.18	0.12
Reach	5800	Existing	742.00	1128.77	1134.48		1134.51	0.000149	1.36	543.88	126.37	0.12
Reach	5740	Existing	742.00	1128.66	1134.47		1134.50	0.000131	1.39	535.37	126.18	0.12
Reach	5700	Existing	742.00	1126.70	1134.48		1134.49	0.000046	0.95	783.83	148.24	0.07
Reach	5600	Existing	742.00	1126.60	1134.47		1134.49	0.000073	1.05	707.22	145.43	0.08
Reach	5500	Existing	742.00	1126.46	1134.46	1128.65	1134.48	0.000070	1.15	647.35	171.61	0.09
Reach	5460	Existing	742.00	1124.49	1134.46		1134.47	0.000029	0.88	891.45	188.10	0.06
Reach	5440	Existing	742.00	1124.47	1134.46		1134.47	0.000035	0.88	897.01	189.94	0.06
Reach	5400	Existing	2368.00	1124.42	1134.34		1134.46	0.000357	2.79	895.84	187.89	0.19
Reach	5366	Existing	2368.00	1124.39	1134.33		1134.44	0.000339	2.73	908.01	181.54	0.19
Reach	5080	Existing	2368.00	1124.07	1134.21		1134.34	0.000384	2.98	885.15	200.00	0.20
Reach	5060	Existing	2368.00	1124.05	1134.20		1134.33	0.000388	3.03	878.22	200.00	0.20
Reach	5025	Existing	2368.00	1124.03	1133.80	1129.82	1134.22	0.001648	5.93	563.19	200.00	0.33
Reach	5000		Culvert									
Reach	4955	Existing	2368.00	1123.96	1130.50	1130.50	1133.75	0.016629	14.46	163.74	25.08	1.00
Reach	4895	Existing	2368.00	1123.87	1129.54		1130.46	0.005630	7.70	307.56	80.63	0.69
Reach	4740	Existing	2368.00	1123.70	1129.00		1129.66	0.003373	6.51	363.47	95.74	0.59
Reach	4700	Existing	2368.00	1121.70	1129.22		1129.47	0.000965	4.06	583.21	122.17	0.33
Reach	4601	Existing	2368.00	1121.59	1129.01		1129.34	0.001689	4.59	515.78	119.52	0.39
Reach	4401	Existing	2368.00	1121.37	1128.93		1129.09	0.000664	3.29	720.18	136.80	0.25
Reach	4201	Existing	2368.00	1121.15	1128.69		1128.93	0.000961	3.91	605.68	116.77	0.30
Reach	4040	Existing	2368.00	1120.90	1128.65		1128.80	0.000455	3.08	769.92	139.08	0.23
Reach	4000	Existing	2368.00	1118.97	1128.68	1122.65	1128.77	0.000210	2.48	981.53	175.96	0.16
Reach	3840	Existing	2368.00	1118.79	1128.61		1128.73	0.000286	2.81	914.34	200.00	0.19
Reach	3800	Existing	2368.00	1116.80	1128.64		1128.71	0.000126	2.20	1198.27	200.00	0.13
Reach	3770	Existing	2557.00	1116.77	1128.61		1128.70	0.000205	2.56	1134.48	200.00	0.15
Reach	3735	Existing	2557.00	1116.74	1128.42	1123.63	1128.65	0.000865	4.63	743.52	165.22	0.24
Reach	3638		Culvert									
Reach	3535	Existing	1420.00	1116.52	1123.09	1120.95	1124.08	0.004876	7.99	177.72	27.08	0.55
Reach	3400	Existing	1420.00	1116.35	1123.43		1123.51	0.000353	2.23	638.06	135.92	0.18
Reach	3200	Existing	1420.00	1116.13	1123.33		1123.43	0.000432	2.43	584.33	126.55	0.20
Reach	3000	Existing	1420.00	1115.90	1123.20		1123.32	0.000564	2.86	496.99	102.62	0.23
Reach	2800	Existing	1420.00	1115.68	1123.05		1123.20	0.000704	3.08	462.28	102.17	0.25
Reach	2640	Existing	1420.00	1115.44	1122.99	1118.87	1123.10	0.000426	2.66	533.22	120.53	0.22
Reach	2600	Existing	1420.00	1113.50	1123.02	1116.85	1123.07	0.000154	1.82	805.04	188.20	0.13
Reach	2420	Existing	1420.00	1113.30	1123.00		1123.04	0.000121	1.66	900.11	200.00	0.11
Reach	2400	Existing	1420.00	1113.28	1122.98		1123.04	0.000153	1.92	792.43	200.00	0.13
Reach	2370	Existing	1420.00	1113.25	1122.53	1117.37	1122.93	0.001298	5.08	280.23	178.44	0.29
Reach	2345		Culvert									
Reach	2300	Existing	1420.00	1113.17	1119.08	1117.68	1120.39	0.007237	9.20	154.35	26.17	0.67
Reach	2278	Existing	1420.00	1113.15	1119.41	1117.08	1119.89	0.002306	5.53	256.82	59.42	0.45
Reach	2240	Existing	1420.00	1113.10	1119.49	1116.46	1119.69	0.001048	3.58	396.74	98.01	0.31
Reach	2078	Existing	1420.00	1112.93	1119.40	1116.27	1119.53	0.000742	2.94	483.02	124.58	0.26
Reach	1878	Existing	1420.00	1112.70	1119.04	1116.52	1119.30	0.001775	4.09	347.42	109.38	0.39
Reach	1678	Existing	1420.00	1112.48	1118.98		1119.09	0.000496	2.67	532.74	111.17	0.21
Reach	1640	Existing	1420.00	1112.38	1118.93		1119.06	0.000530	2.89	490.57	108.88	0.24
Reach	1600	Existing	1420.00	1110.44	1118.96		1119.03	0.000233	2.16	661.29	137.35	0.16
Reach	1478	Existing	1420.00	1110.28	1118.95		1119.00	0.000185	1.78	801.99	165.63	0.13
Reach	1376	Existing	1420.00	1110.15	1118.90		1118.98	0.000277	2.28	656.75	167.64	0.17
Reach	1346	Existing	1420.00	1110.11	1118.36	1114.36	1118.84	0.001183	5.57	254.81	142.44	0.35
Reach	1335	Existing	1420.00	1110.10	1115.47	1115.47	1118.16	0.003159	13.16	107.86	20.21	1.00

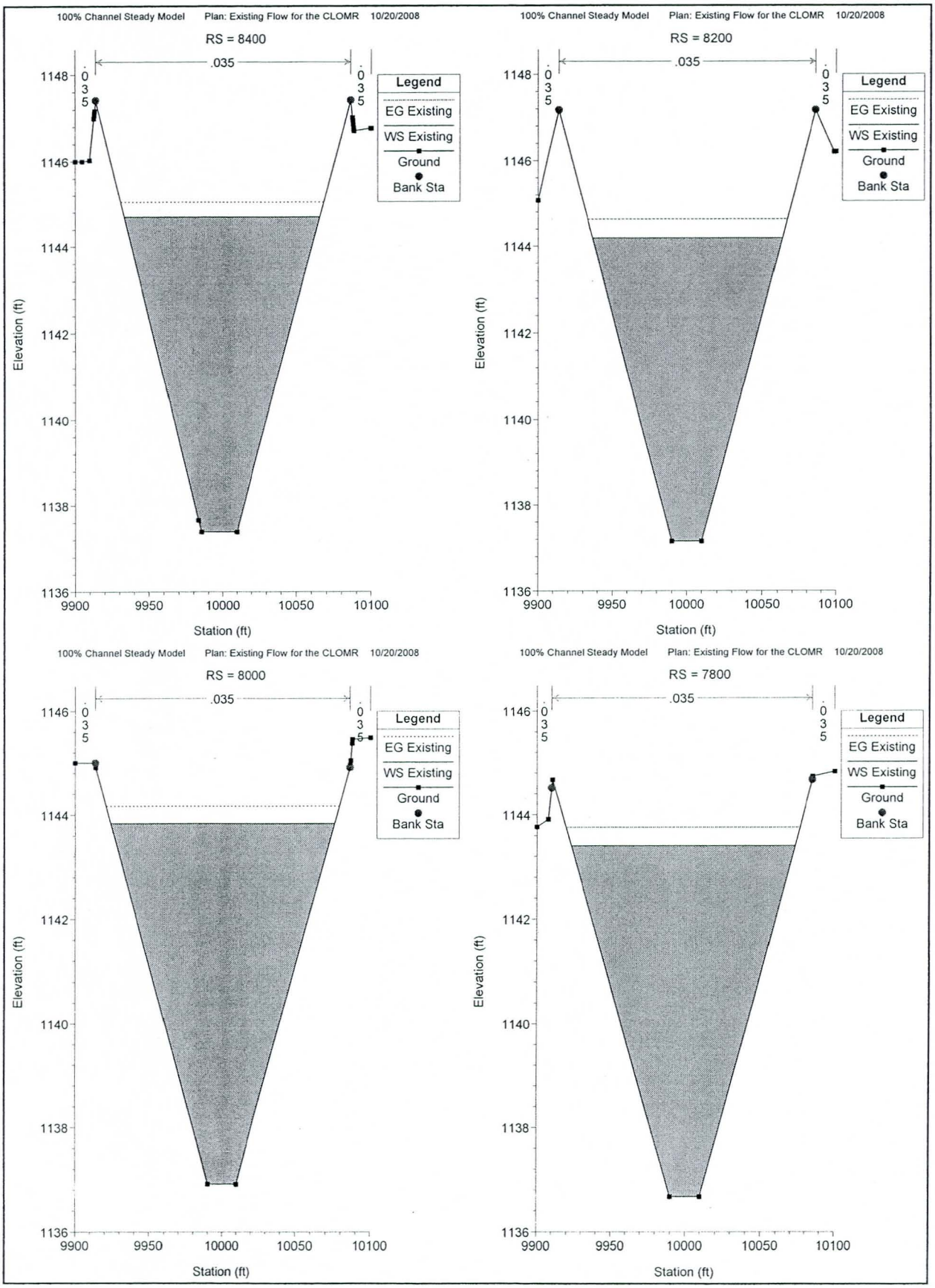
HEC-RAS Plan: Existing River: Stream Reach: Reach Profile: Existing (Continued)

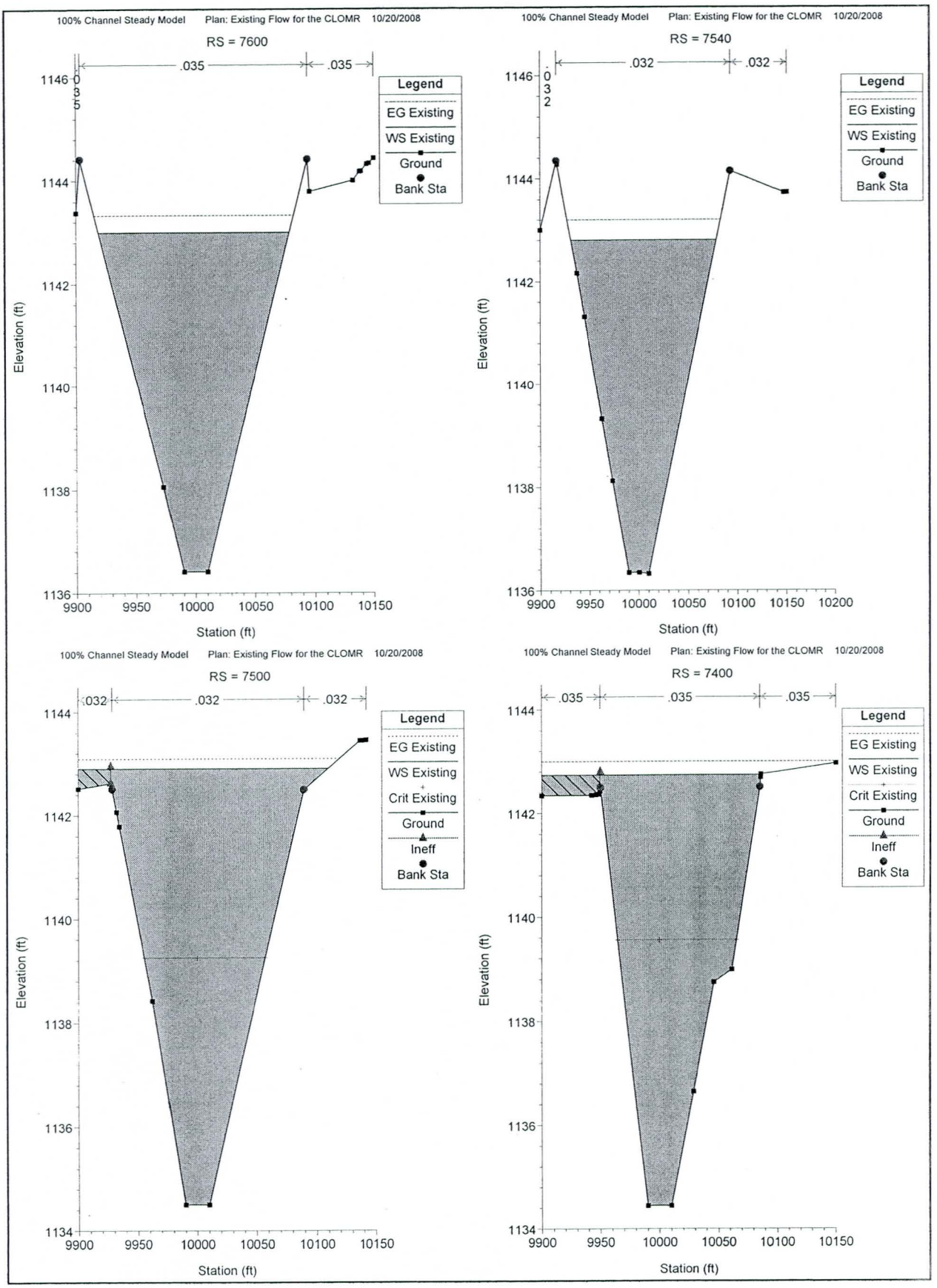
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1273	Existing	1420.00	1104.98	1112.25	1110.37	1114.39	0.004297	11.76	120.79		0.77
Reach	936	Existing	1420.00	1104.35	1110.84	1109.74	1112.99	0.004045	11.76	120.79		0.81
Reach	926	Existing	1420.00	1104.33	1110.79	1109.73	1112.94	0.005497	11.76	120.79		0.81
Reach	879	Existing	1420.00	1104.24	1110.54	1109.63	1112.68	0.005422	11.76	120.79		0.83
Reach	869	Existing	1420.00	1104.22	1110.49	1109.60	1112.64	0.003974	11.76	120.79		0.83
Reach	689	Existing	1420.00	1103.90	1109.29	1109.29	1111.96	0.003117	13.10	108.43	20.21	1.00
Reach	649	Existing	1420.00	1102.40	1107.79	1105.96	1108.33	0.001001	5.89	240.95	58.13	0.51

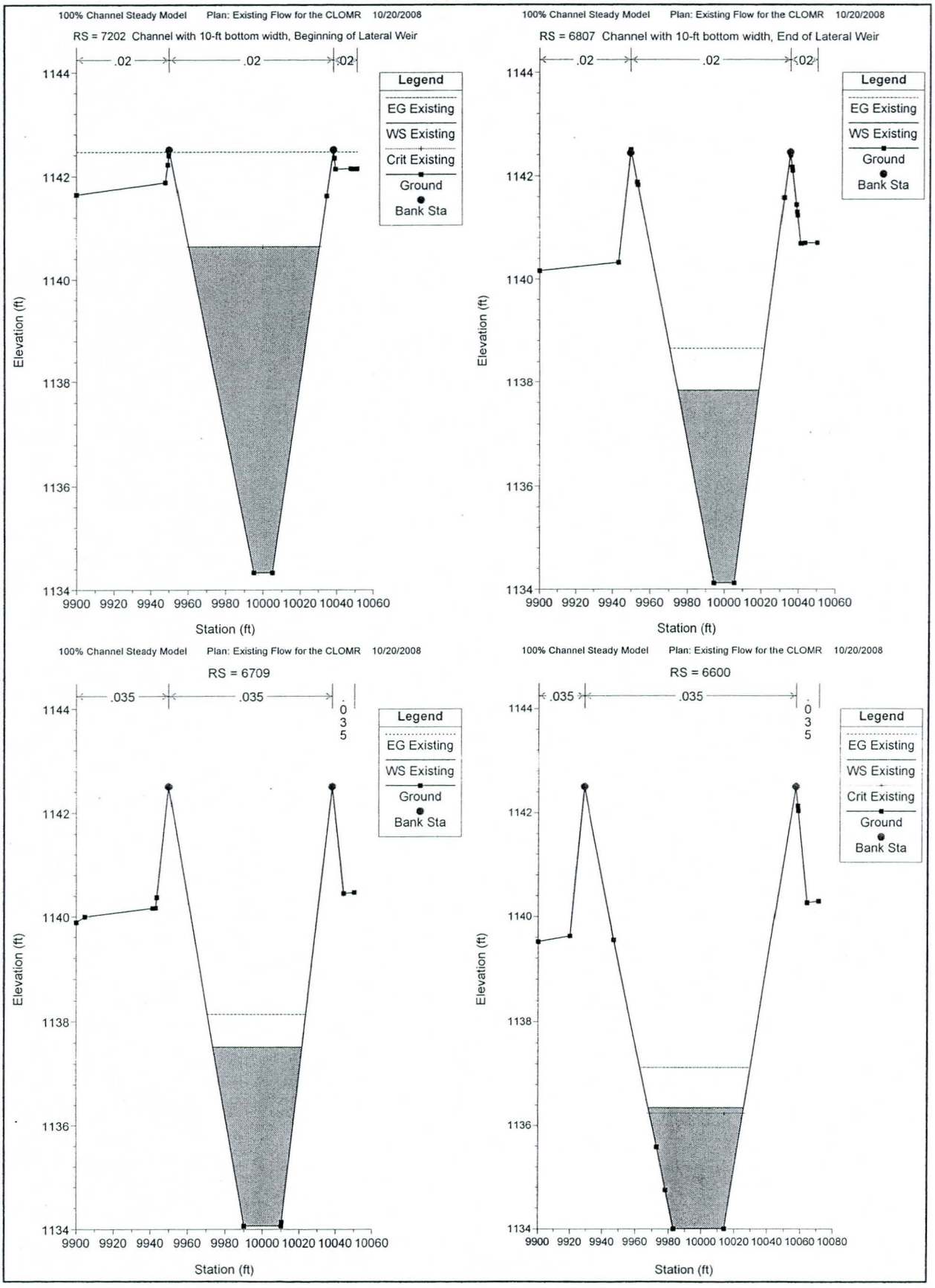
E.5.4 Cross-Sections

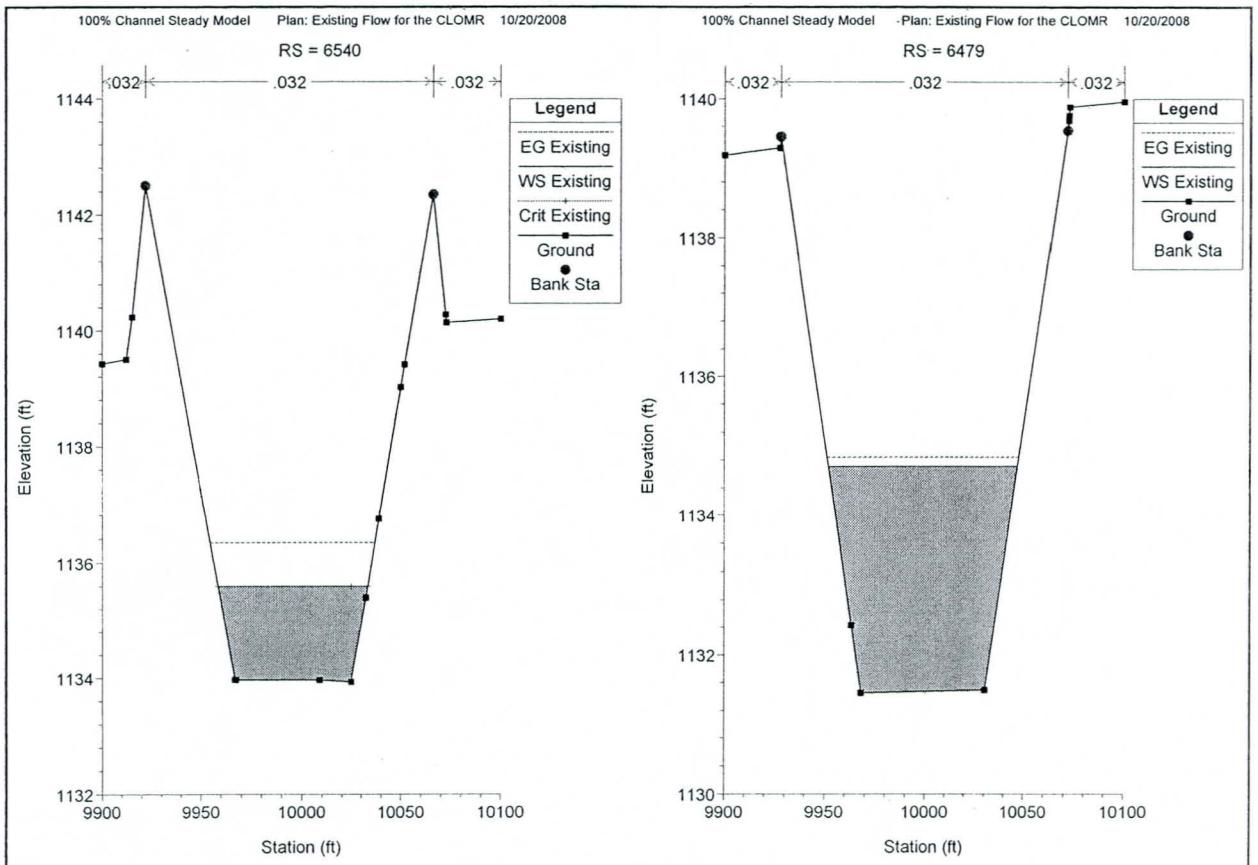

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 9168
.035 .035 .035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 9118
.035 .035 .035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 9082
.035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 8950 Culv
.035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

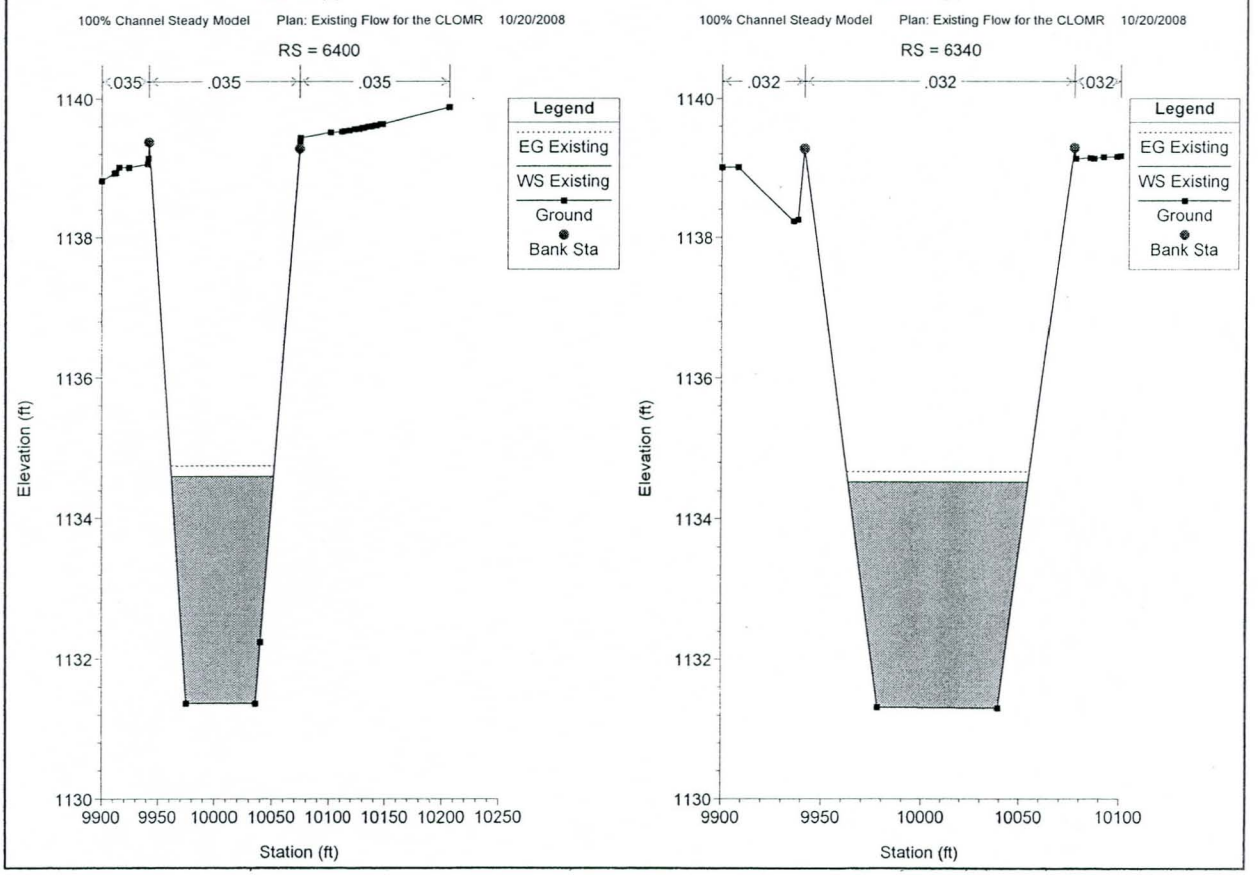

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 8950 Culv
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 8890
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 8724
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 8600
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

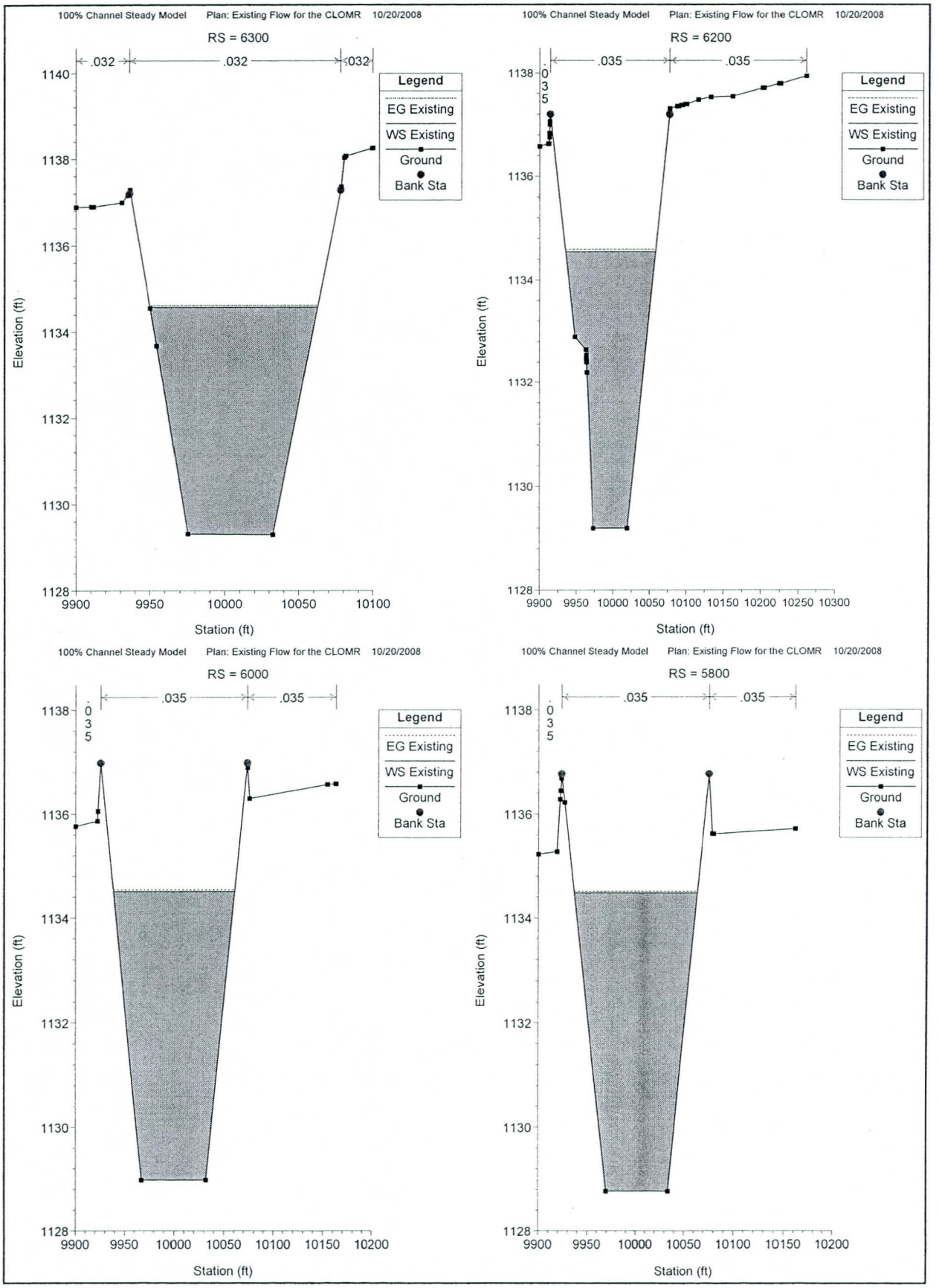

100% Channel Steady Model
Plan: Existing Flow for the CLOMR
10/20/2008
RS = 8400
RS = 8200
RS = 8000
RS = 7800
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1136
1138
1140
1142
1144
1146
1148
9900
9950
10000
10050
10100

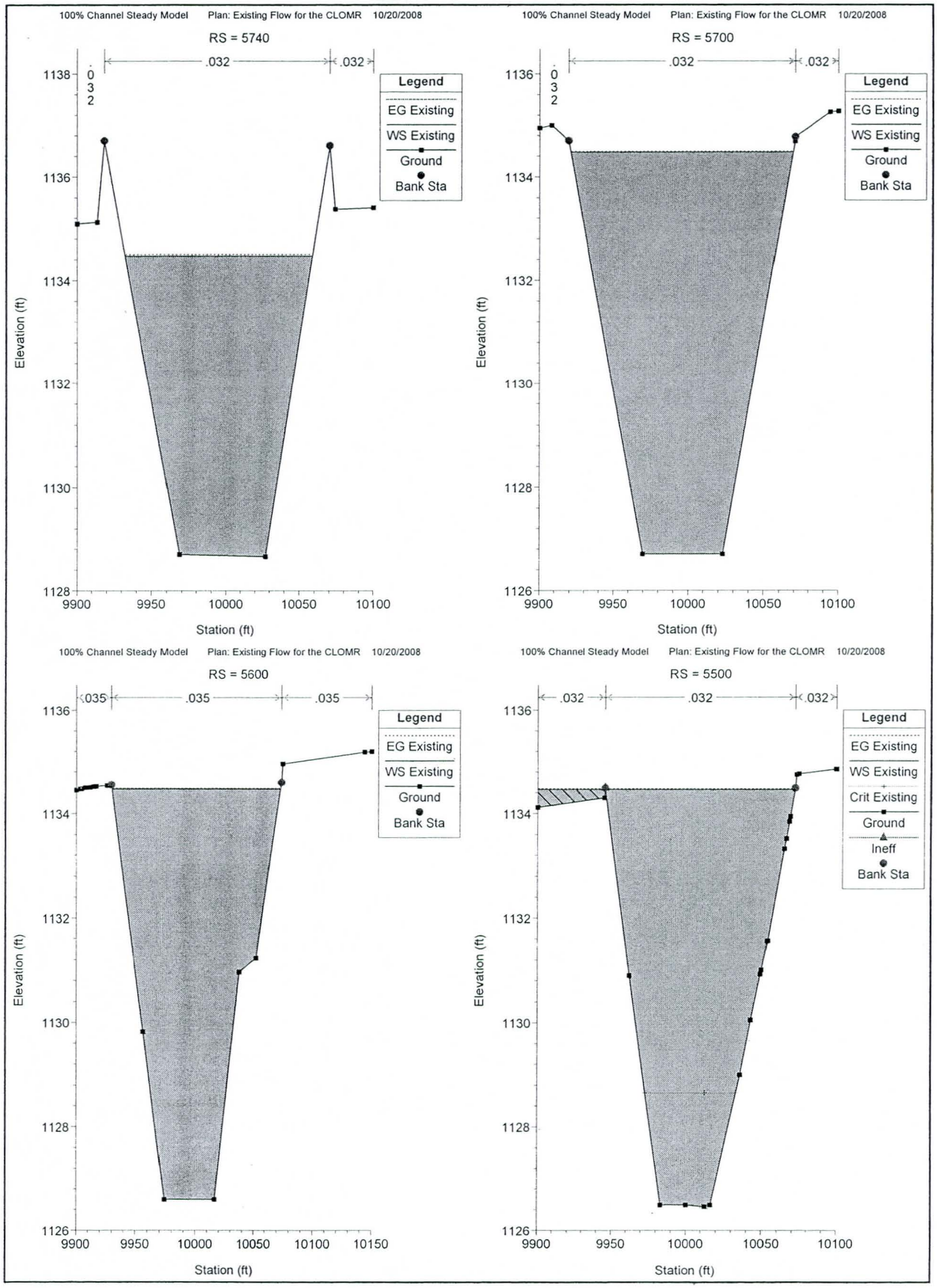

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 7600
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 7540
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 7500
.032
.032
.032
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 7400
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

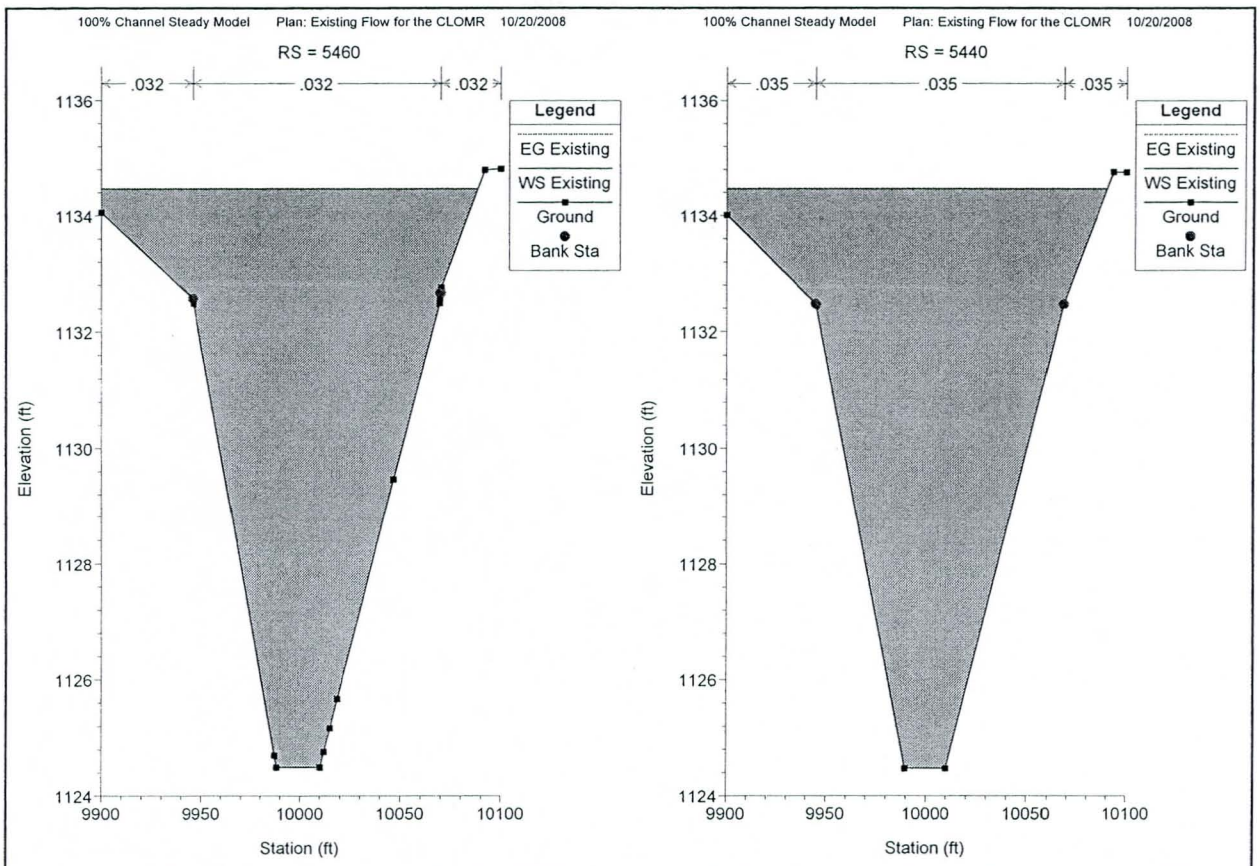

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 7202 Channel with 10-ft bottom width, Beginning of Lateral Weir
.02
.02
.02
Legend
EG Existing
WS Existing
Crit Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6807 Channel with 10-ft bottom width, End of Lateral Weir
.02
.02
.02
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6709
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6600
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

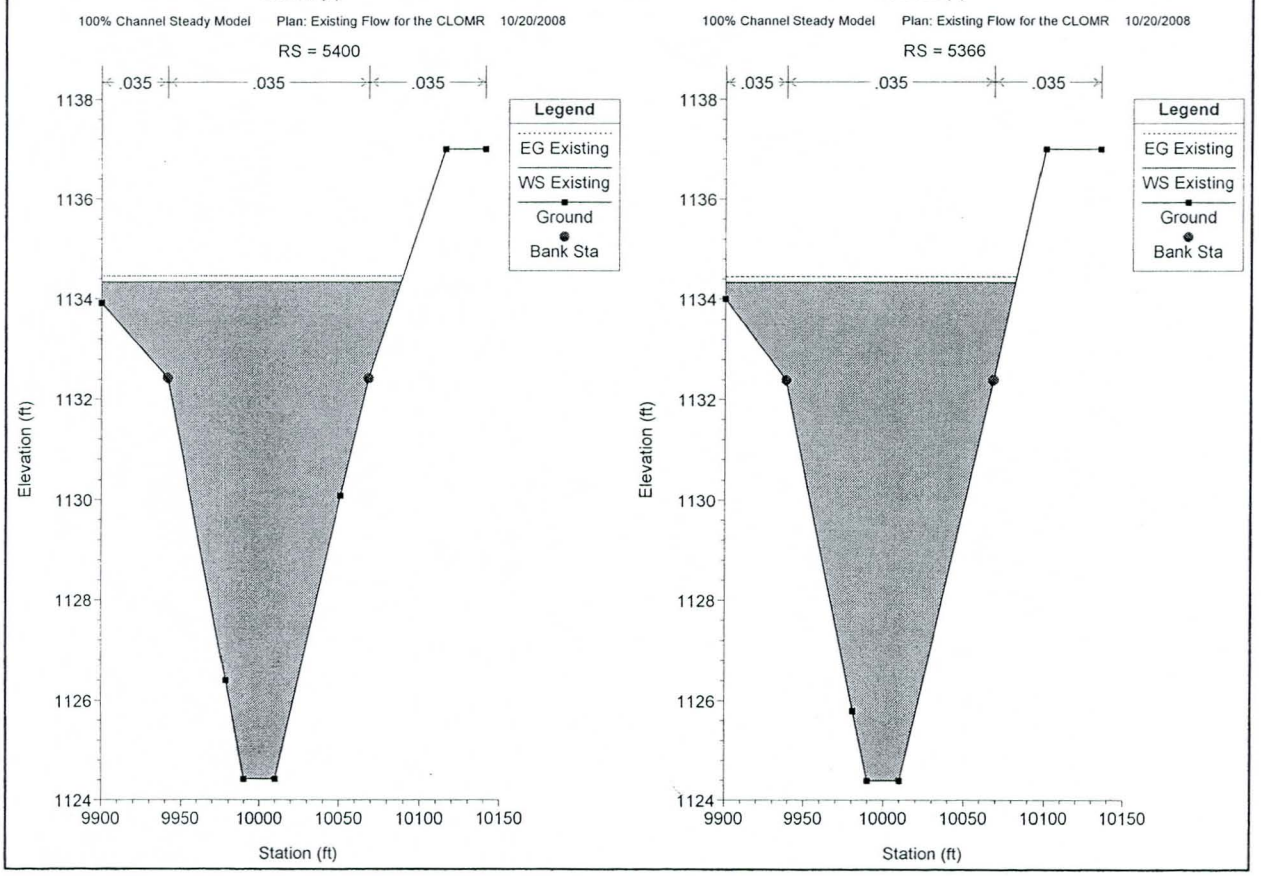

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6540
.032
.032
.032
Legend
EG Existing
WS Existing
Crit Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6479
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

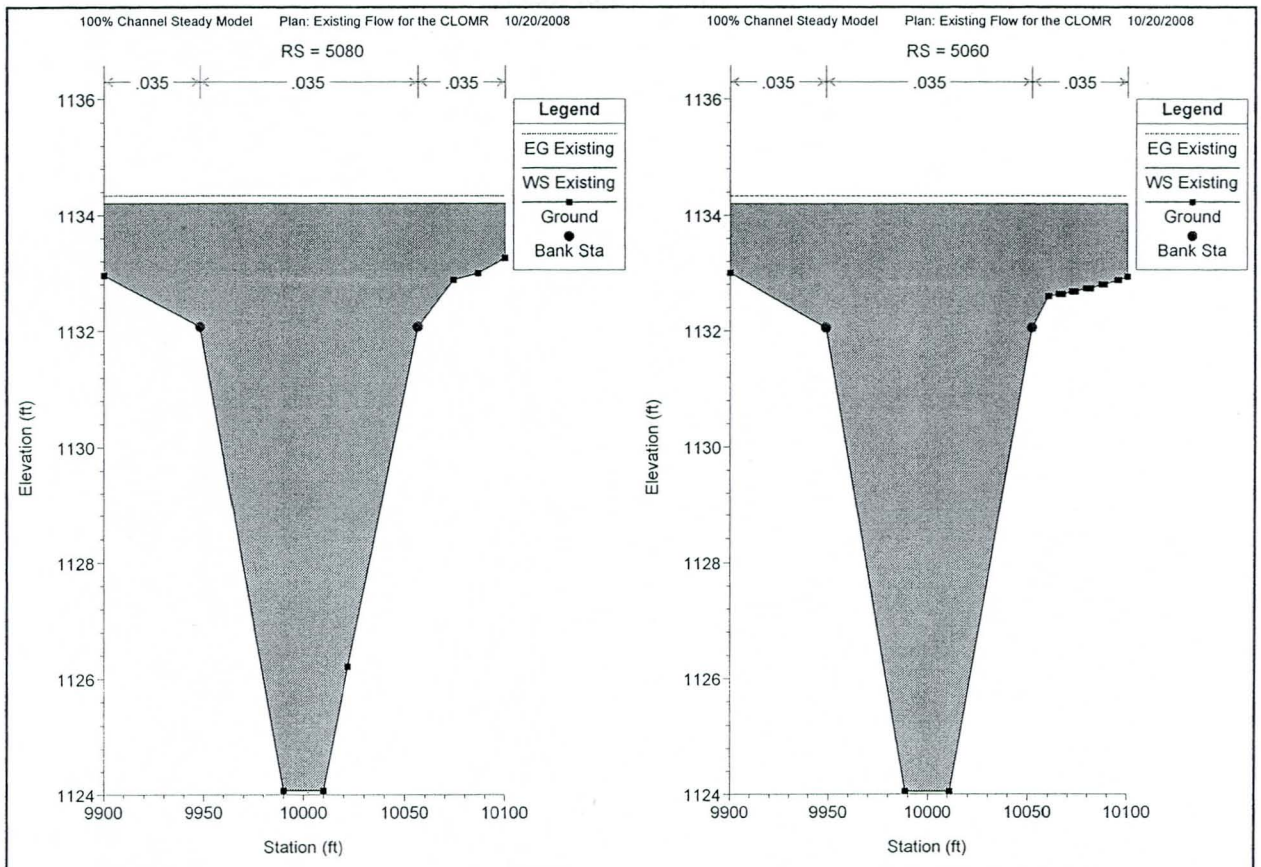

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6400
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6340
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

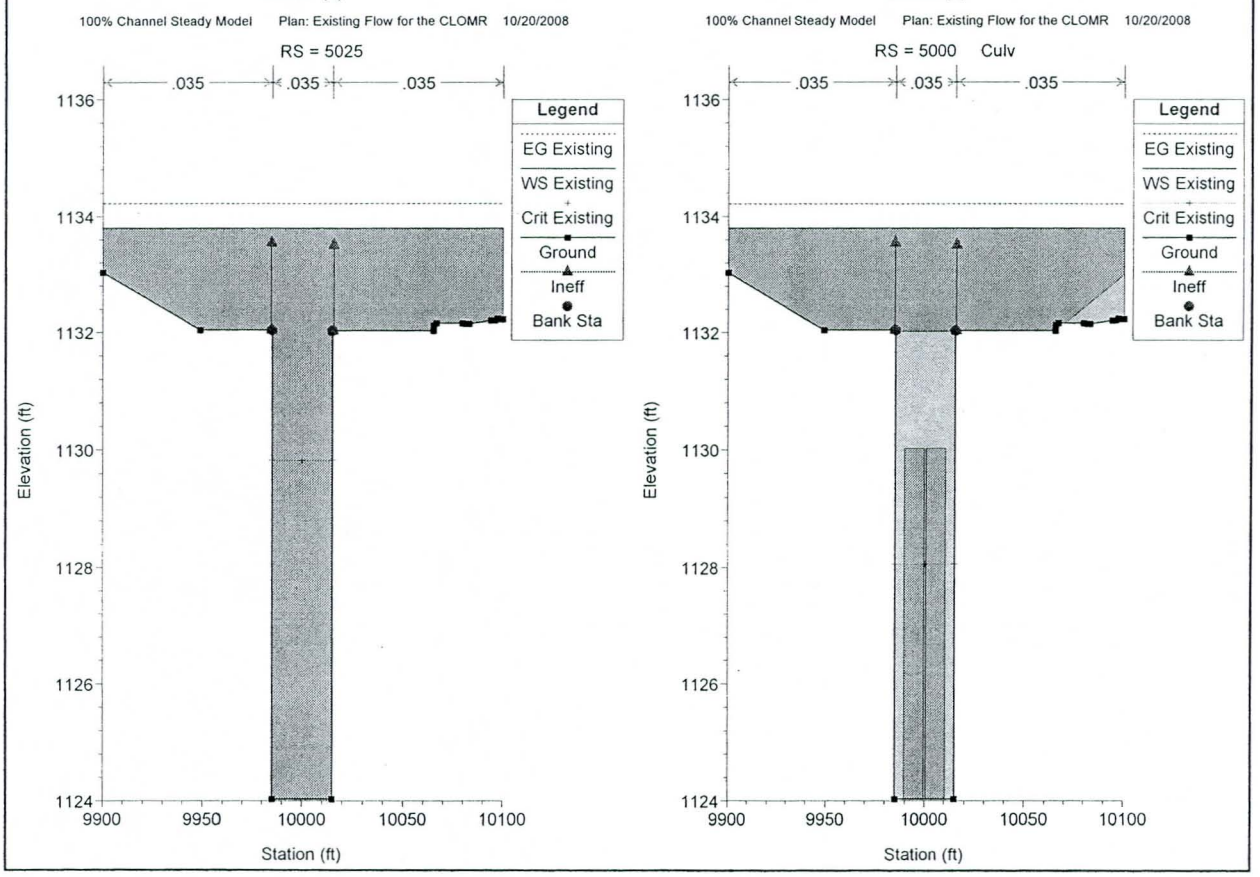

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6300
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6200
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 6000
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5800
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

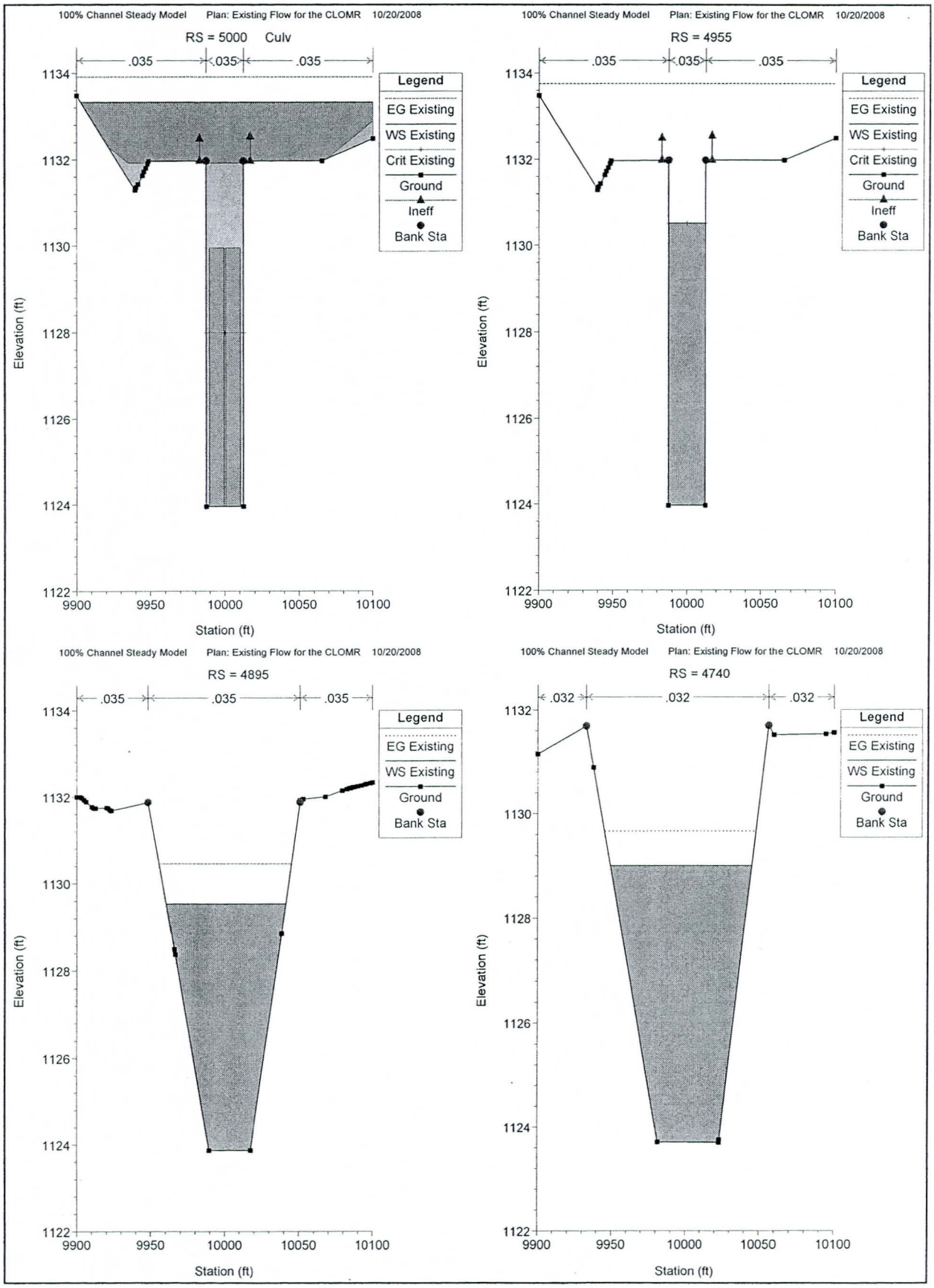

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5740
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5700
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5600
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5500
.032
.032
.032
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

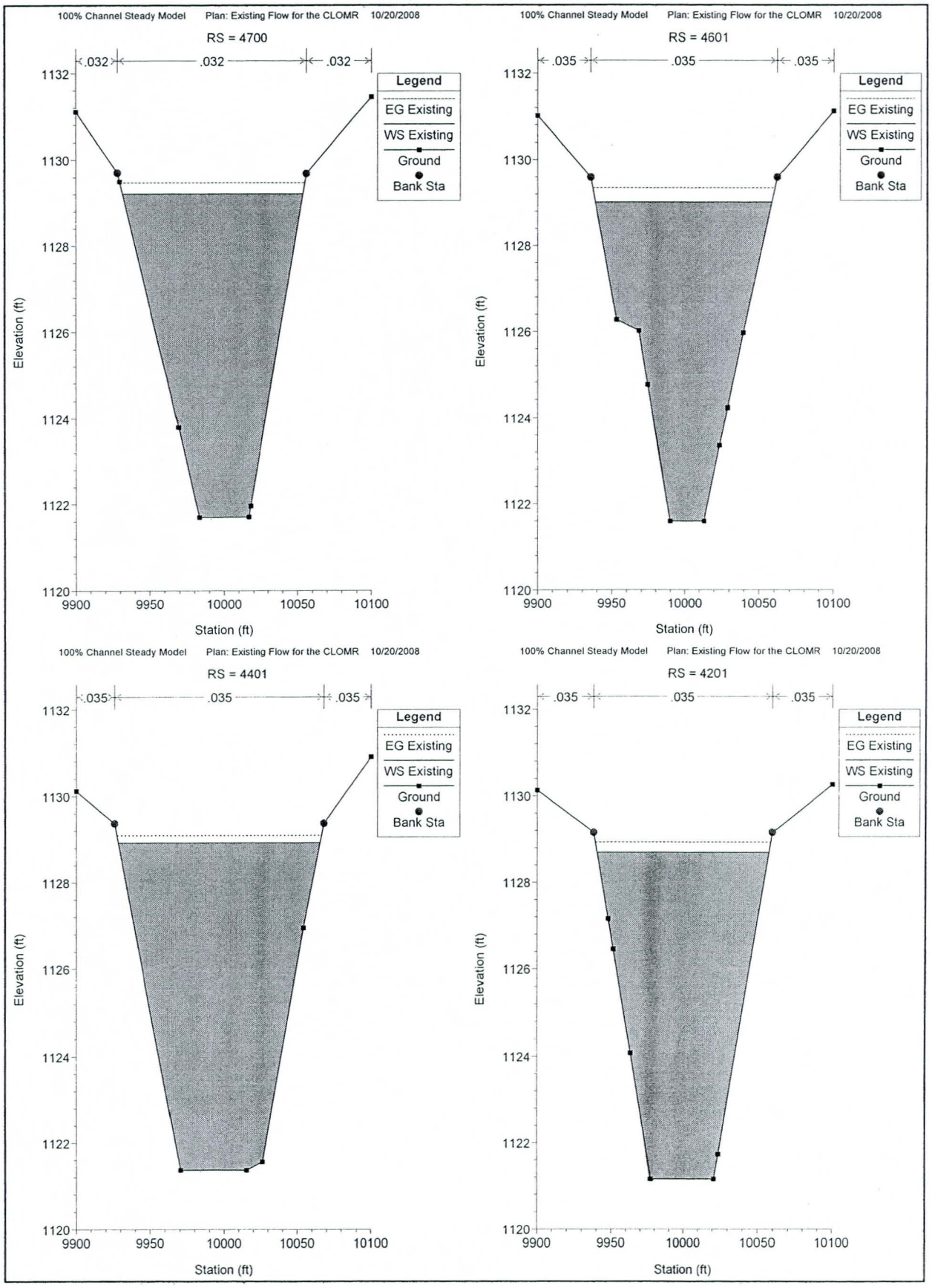

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5460
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5440
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

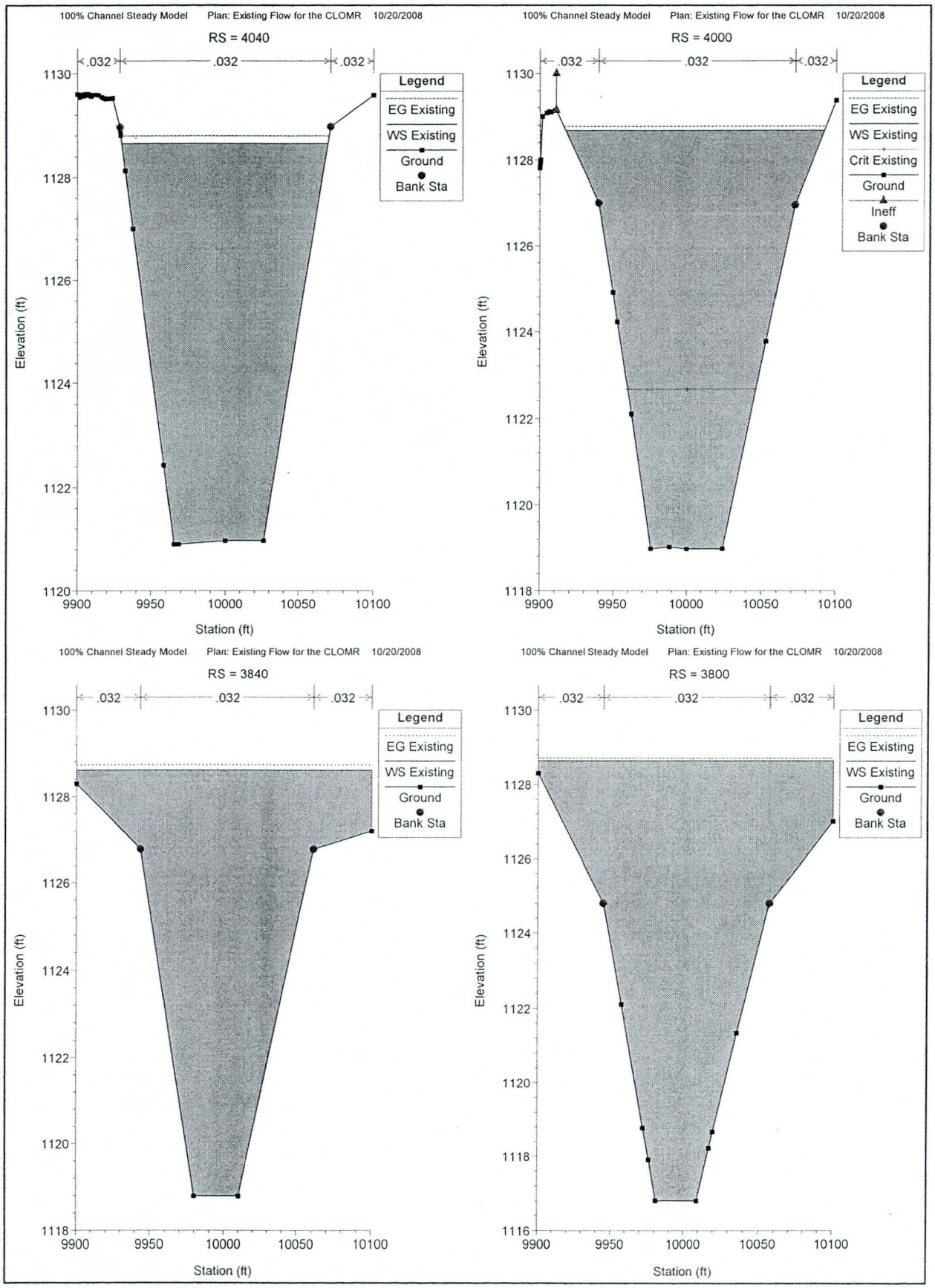

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5400
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5366
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

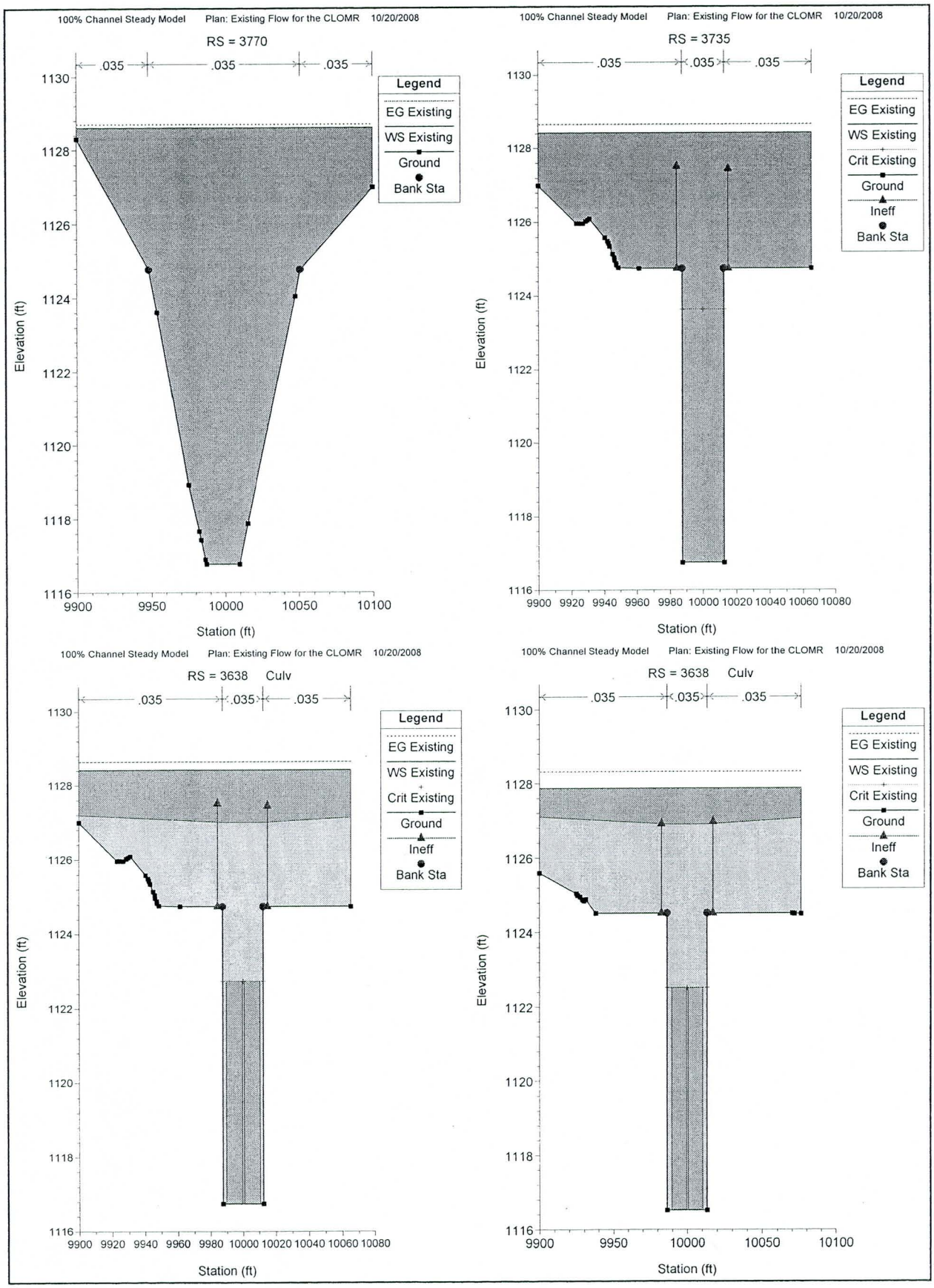

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5080
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
1136
1134
1132
1130
1128
1126
1124
9900
9950
10000
10050
10100
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5060
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
1136
1134
1132
1130
1128
1126
1124
9900
9950
10000
10050
10100
Station (ft)

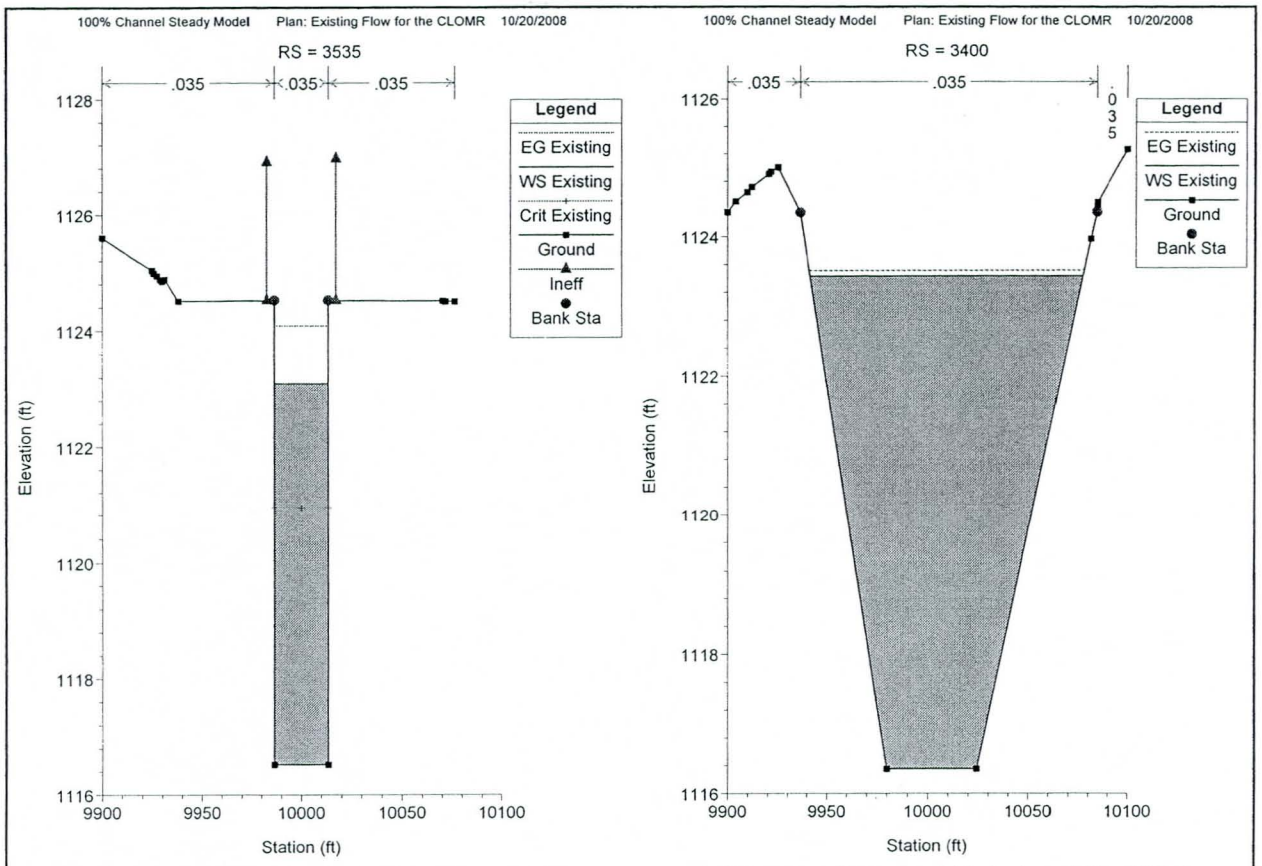

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5025
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
1136
1134
1132
1130
1128
1126
1124
9900
9950
10000
10050
10100
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5000 Culv
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
1136
1134
1132
1130
1128
1126
1124
9900
9950
10000
10050
10100
Station (ft)


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 5000 Culv
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4955
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4895
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4740
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

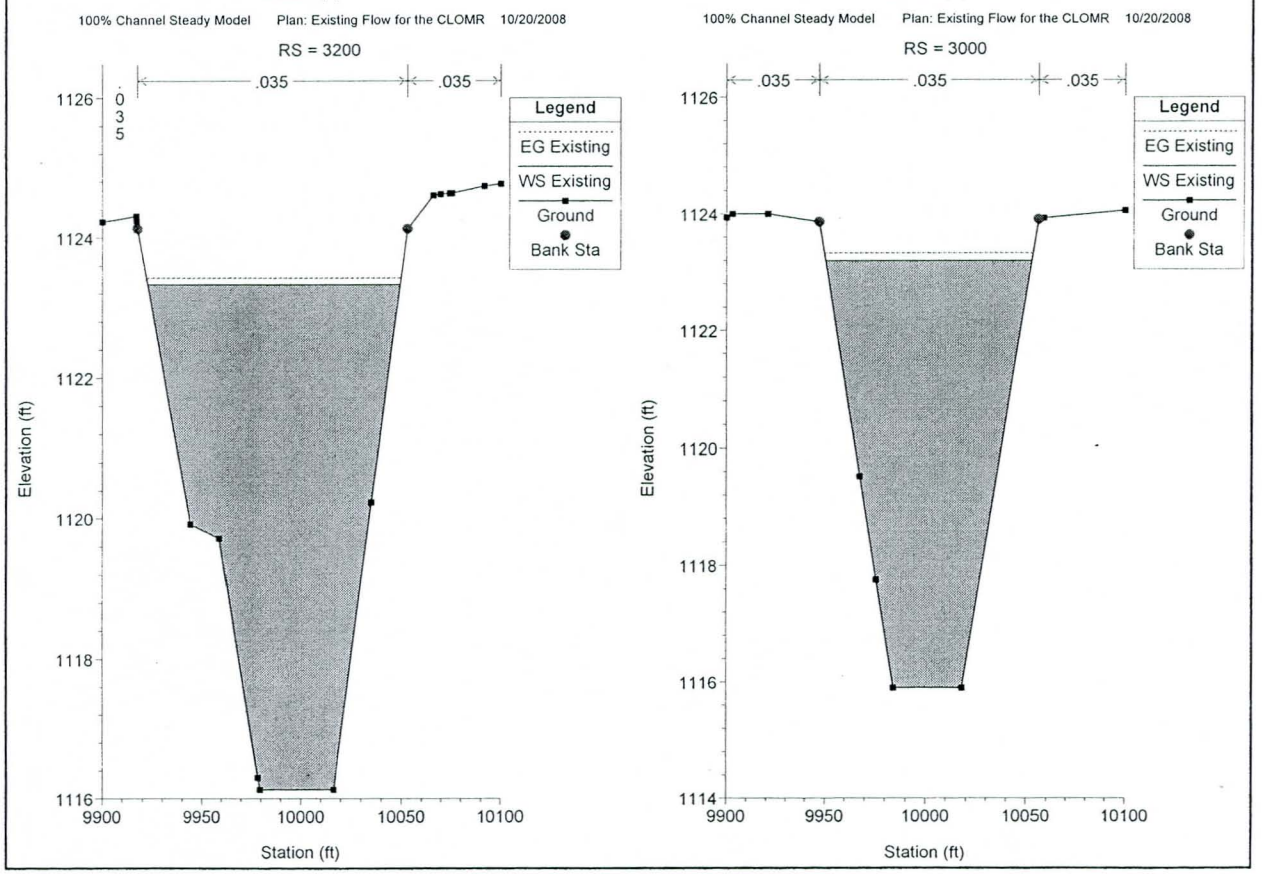

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4700
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4601
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4401
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4201
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4040
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 4000
.032
.032
.032
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3840
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3800
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

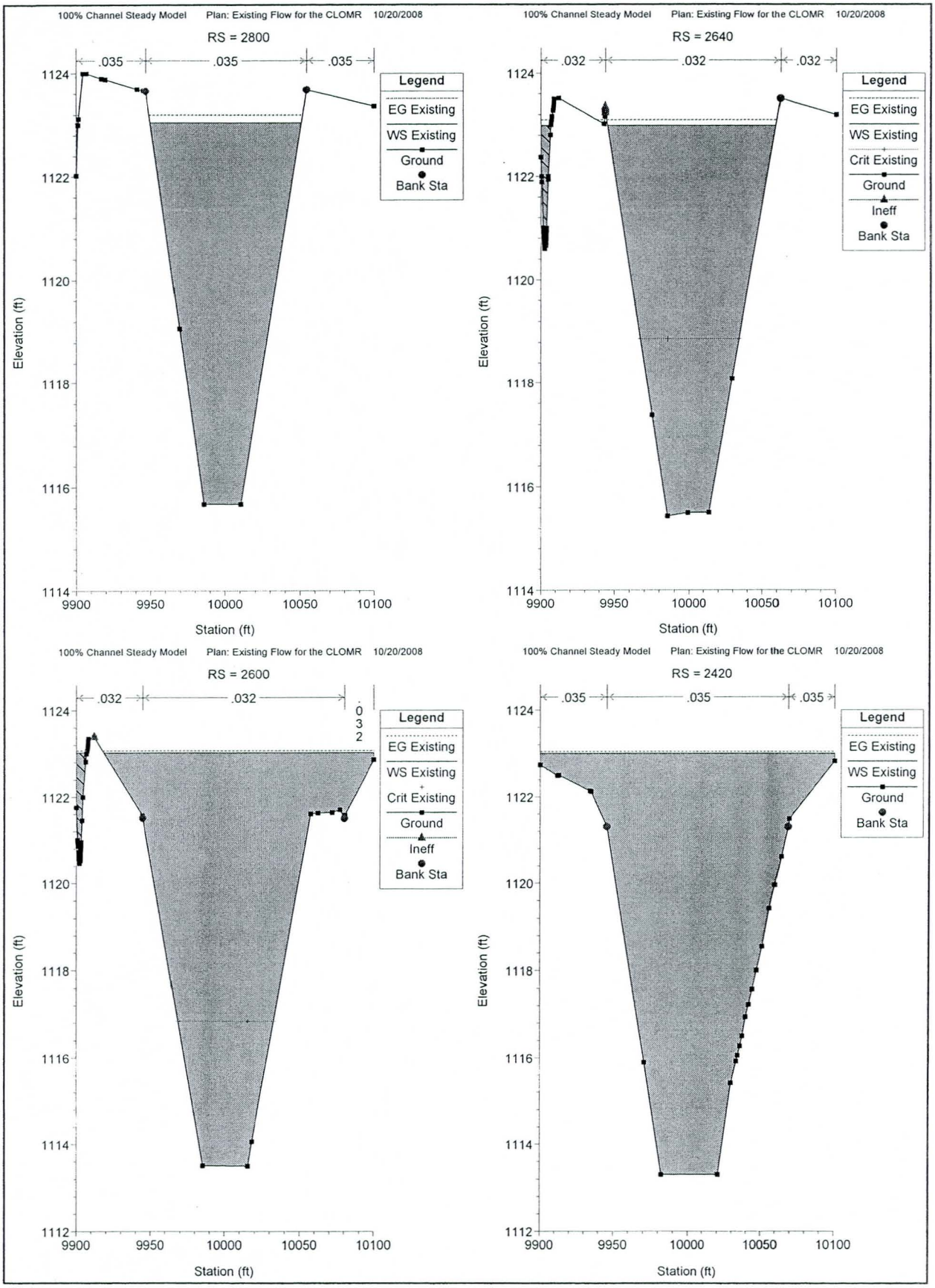

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3770
.035 .035 .035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3735
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3638 Culv
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3638 Culv
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

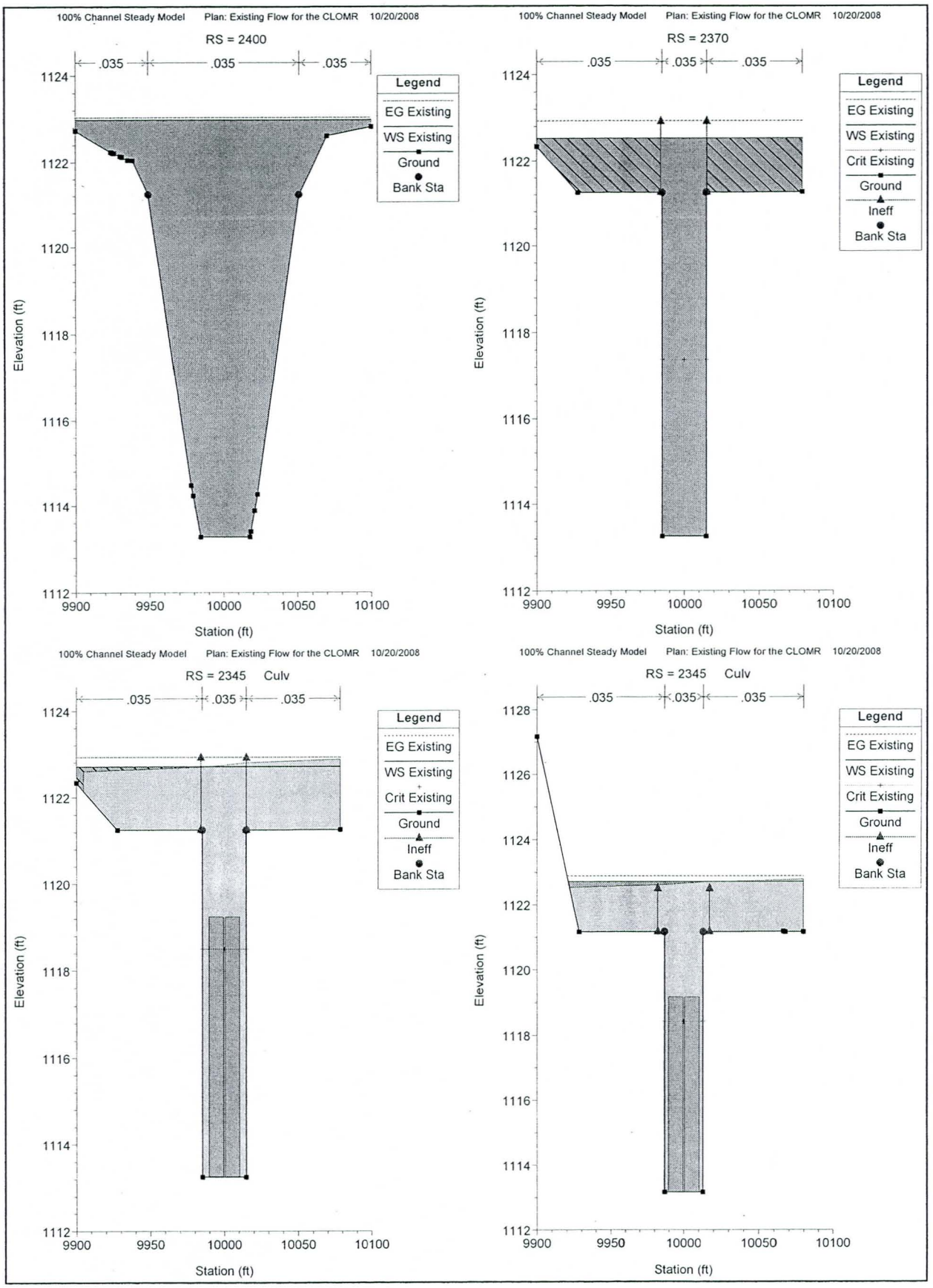

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3535
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
1128
1126
1124
1122
1120
1118
1116
9900
9950
10000
10050
10100

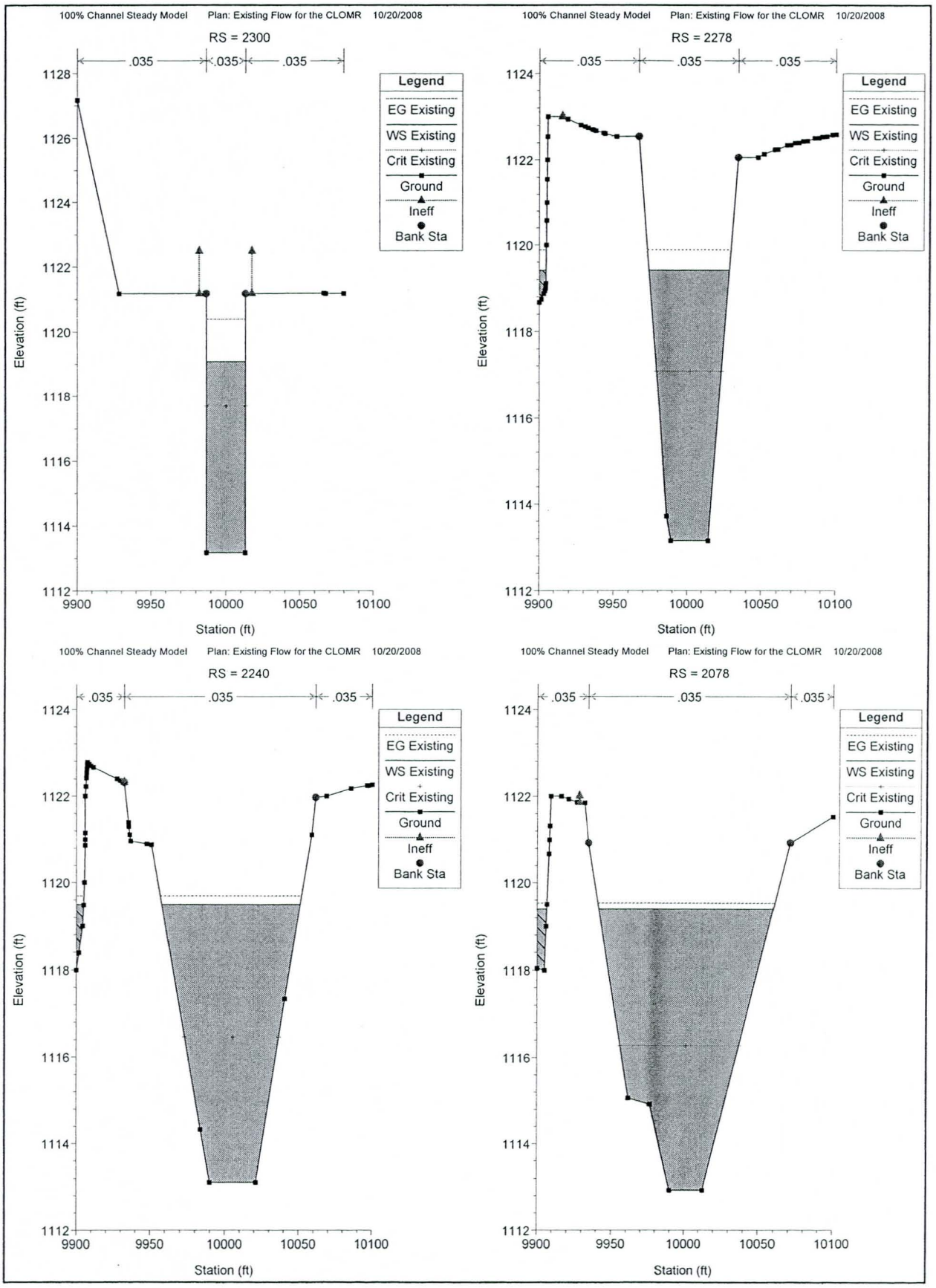
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3400
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1126
1124
1122
1120
1118
1116
9900
9950
10000
10050
10100

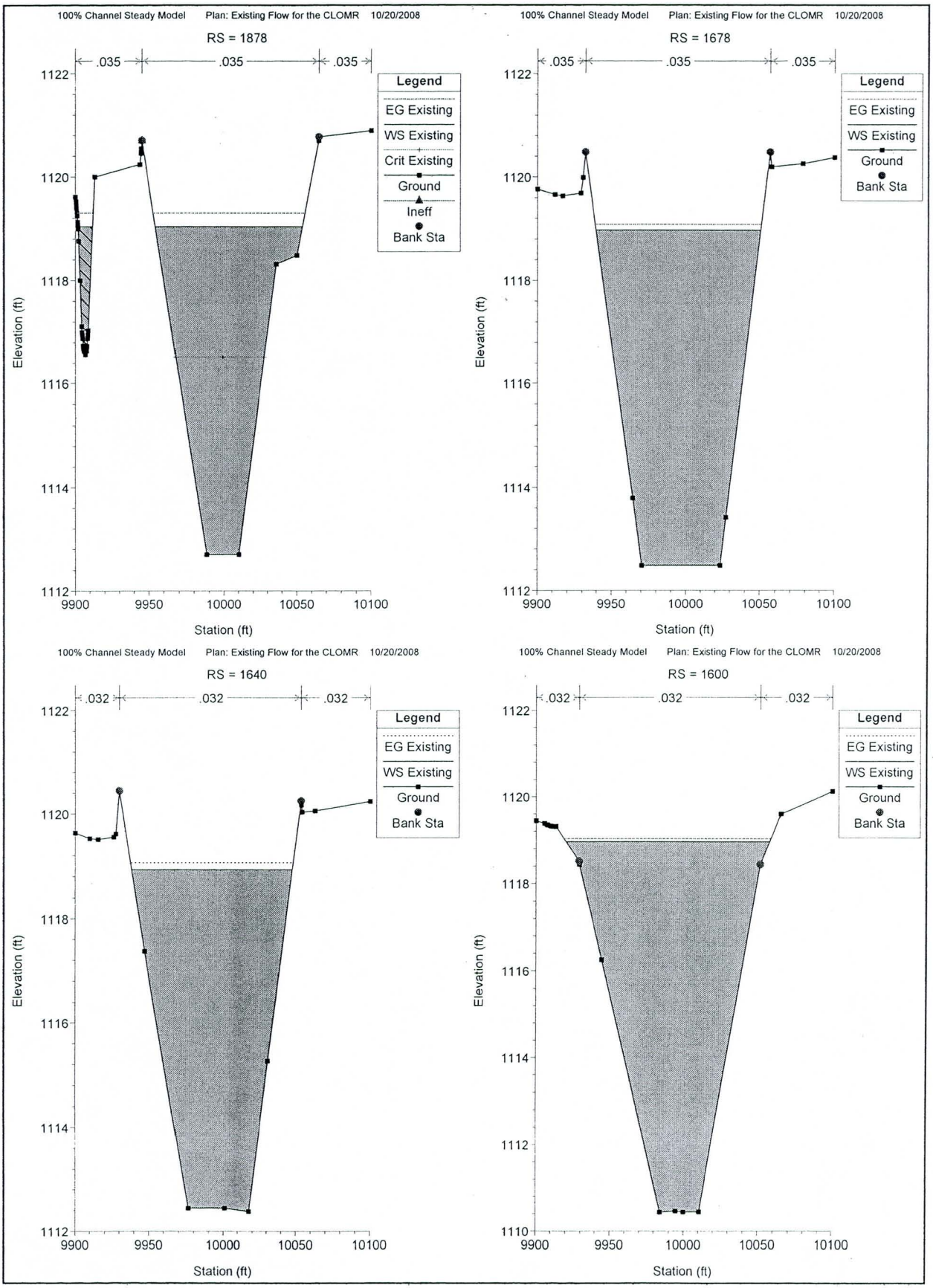

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3200
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1126
1124
1122
1120
1118
1116
9900
9950
10000
10050
10100

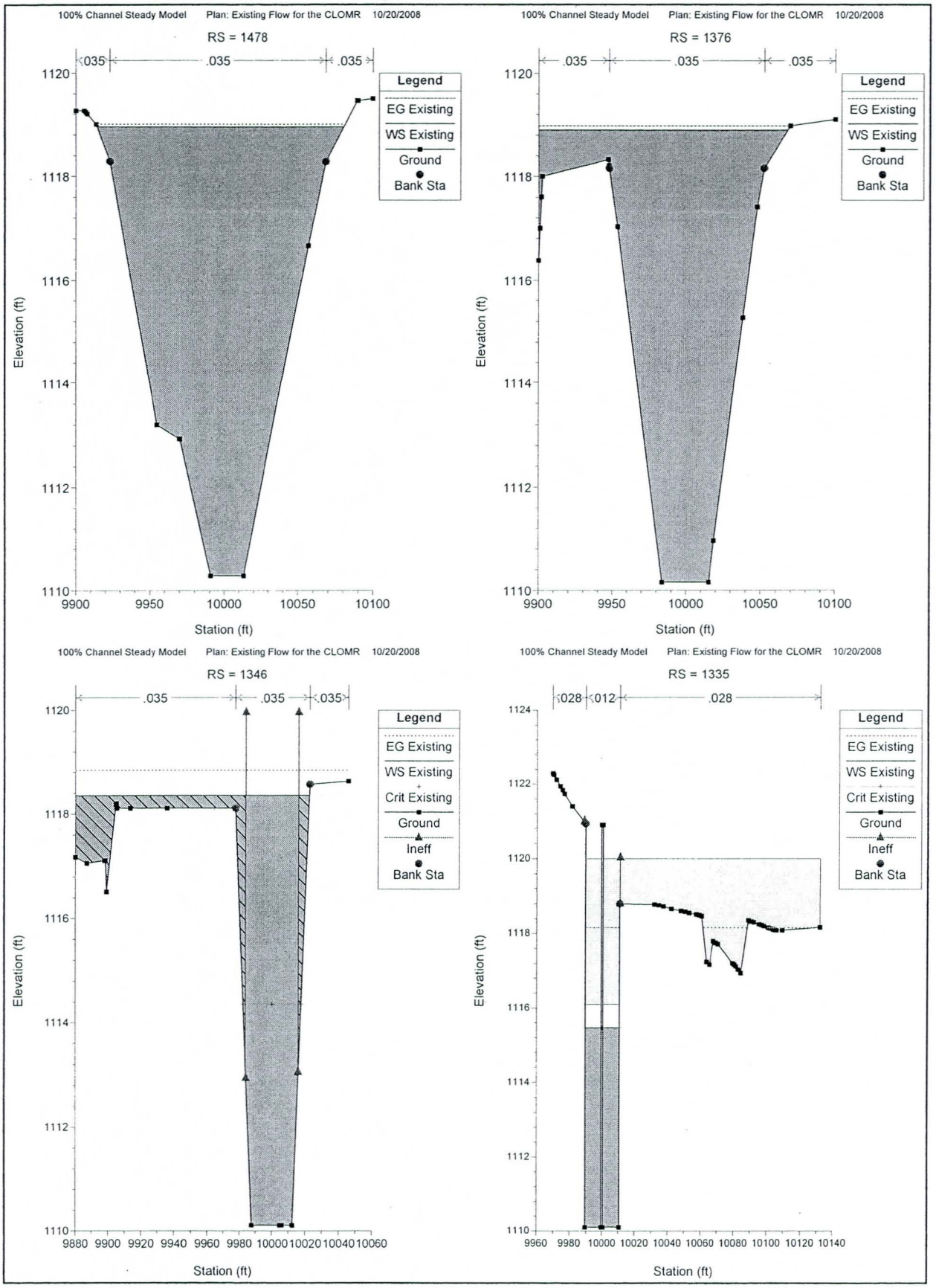
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 3000
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
1126
1124
1122
1120
1118
1116
1114
9900
9950
10000
10050
10100

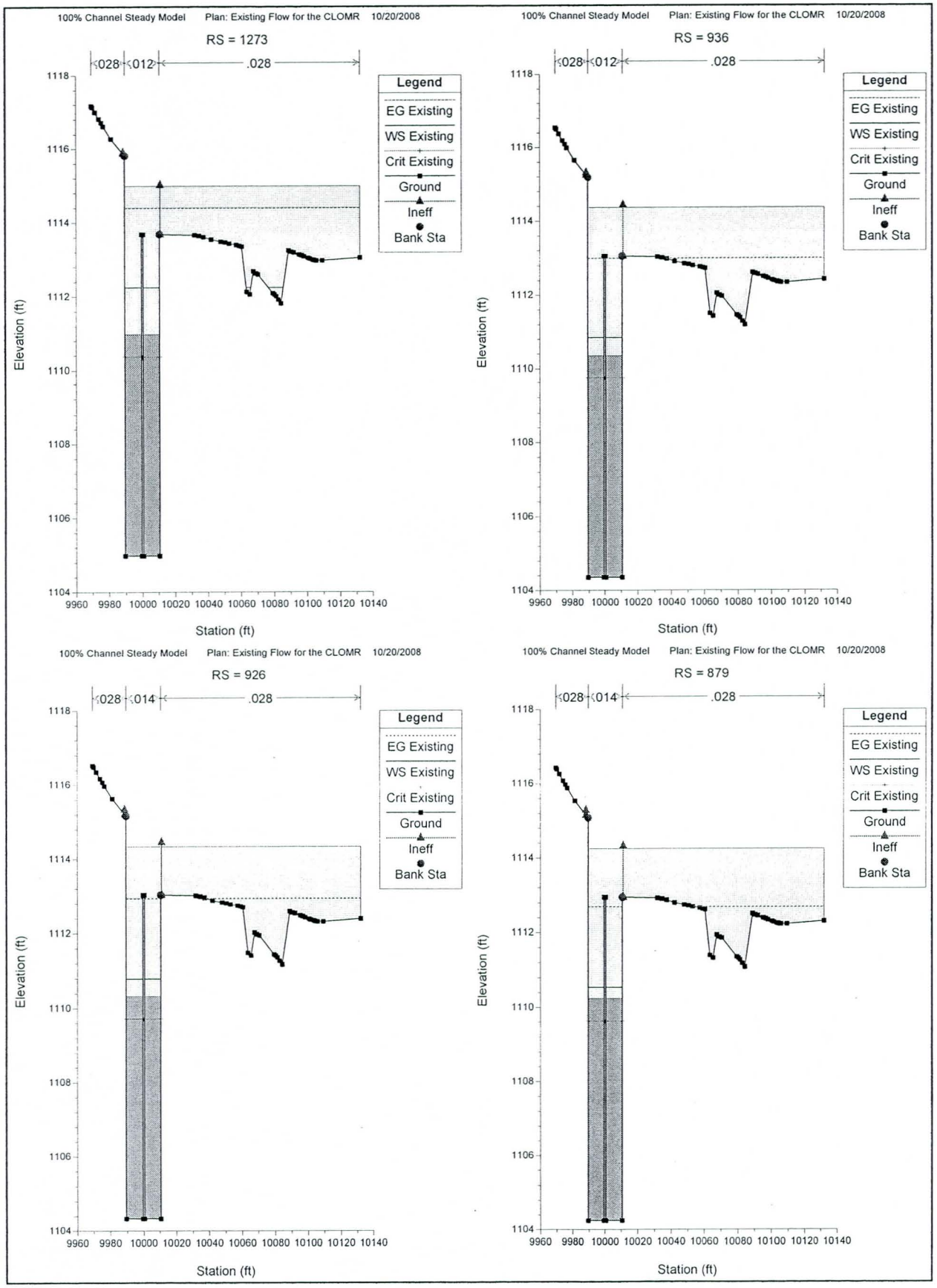

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2800
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2640
.032
.032
.032
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2600
.032
.032
.032
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2420
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

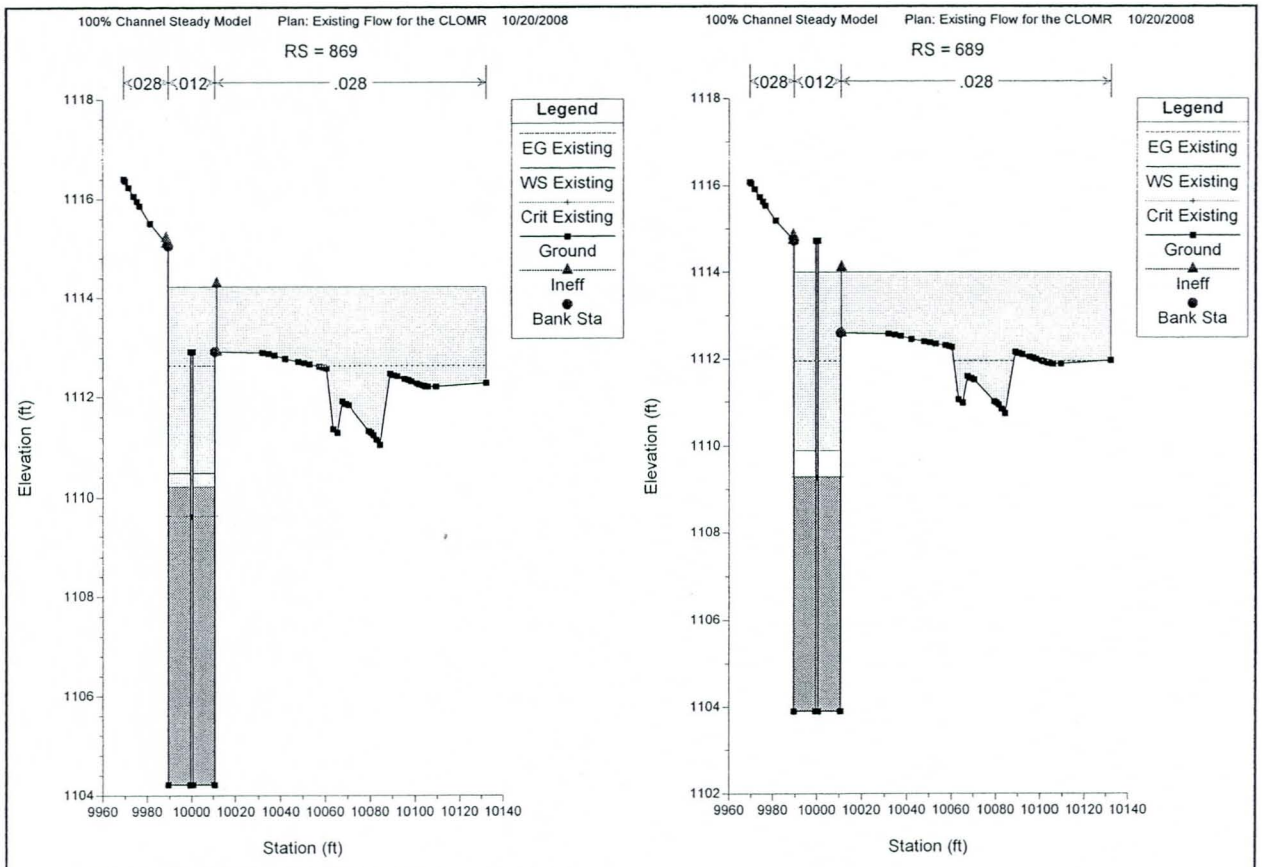

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2400
.035 .035 .035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2370
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2345 Culv
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2345 Culv
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

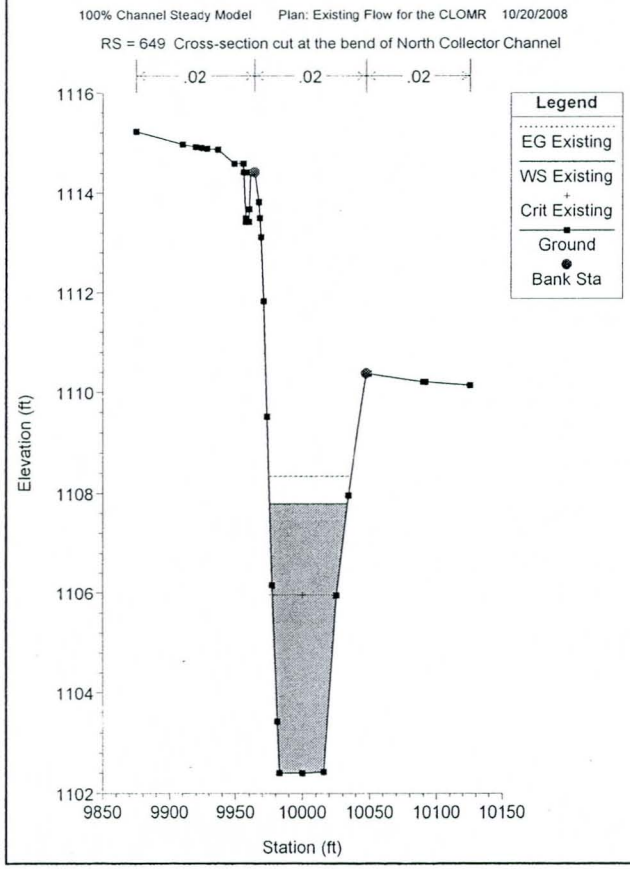

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2300
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2278
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2240
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 2078
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1878
.035
.035
.035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1678
.035
.035
.035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1640
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1600
.032
.032
.032
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

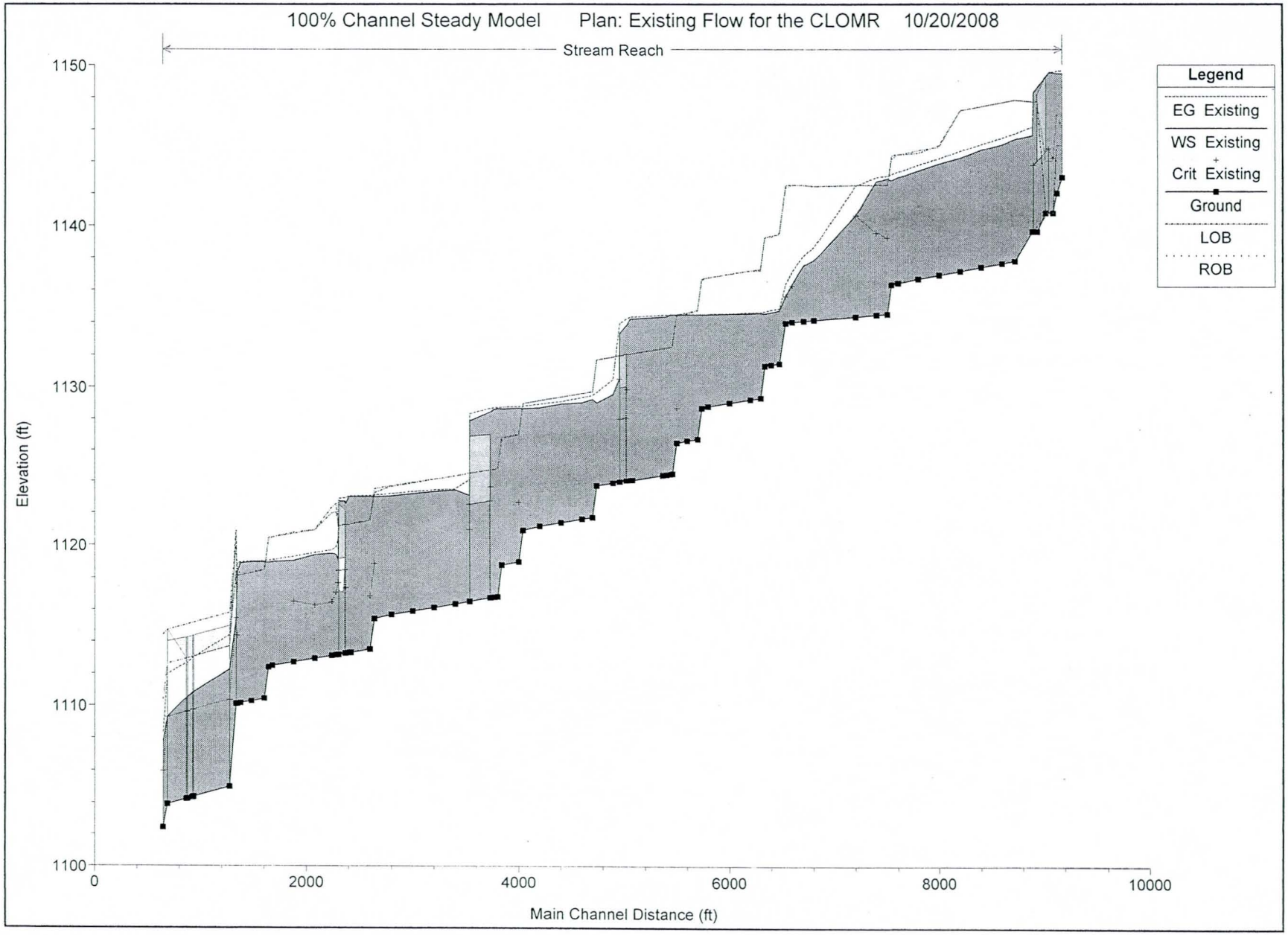

100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1478
.035 .035 .035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1376
.035 .035 .035
Legend
EG Existing
WS Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1346
.035 .035 .035
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1335
.028 .012 .028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 1273
.028 .012 .028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 936
.028 .012 .028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 926
.028 .014 .028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 879
.028 .014 .028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 869
.028
.012
.028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 689
.028
.012
.028
Legend
EG Existing
WS Existing
Crit Existing
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
RS = 649 Cross-section cut at the bend of North Collector Channel
.02
.02
.02
Legend
EG Existing
WS Existing
Crit Existing
Ground
Bank Sta
Elevation (ft)
Station (ft)

E.5.5 100-Year Profile


100% Channel Steady Model Plan: Existing Flow for the CLOMR 10/20/2008
Stream Reach
Legend
EG Existing
WS Existing
Crit Existing
Ground
LOB
ROB
Elevation (ft)
1150
1140
1130
1120
1110
1100
0
2000
4000
6000
8000
10000
Main Channel Distance (ft)

Appendix F: Erosion and Sediment Transportation Supporting Documentation

Note: Erosion and Sediment Transportation analysis was not performed as part of this submittal. FCDMC will perform regular maintenance to remove sediment from the channel and basin.