NORTH INLET CHANNEL IMPROVEMENTS
AT
WHITE TANKS FRS #3

CONDITIONAL LETTER OF MAP REVISION SUBMITTAL
TECHNICAL DATA NOTEBOOK

CONTRACT FCD 2004 C045

ASSIGNMENT 2

April 2007

WP #042284.02

Prepared for:

Flood Control District of Maricopa County
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1.0 INTRODUCTION

1.1 Purpose of Study

The proposed improvements related to the North Inlet Channel (NIC) of White Tanks Flood Retarding Structure (FRS) #3 are located on both sides of the Beardsley Canal, from north of Olive Avenue to approximately the Glendale Avenue alignment. The purpose of the improvements is to convey the design flood event to the White Tanks FRS #3. Phase I of the NIC project is a diversion channel and is located on the east side of the Beardsley Canal Wash, from Olive Avenue to Northern Avenue. Phase II of the NIC project is improvements to the existing channel that is south of Northern Avenue and west of the Beardsley Canal. The proposed NIC improvements impact both the Beardsley Canal Wash floodplain and the Perryville Road Wash floodplain. Kirkham Michael and Associates prepared the construction drawings of both Phase I and Phase II improvements for the Flood Control District of Maricopa County (FCDMC) (January 2006 and May 2006). Wood, Patel & Associates, Inc. (Wood/Patel) was contracted to prepare documents for the Conditional Letter of Map Revision (CLOMR) submittal. The proposed channel and its impacted area are located primarily within the unincorporated area of Maricopa County limits, Section 33, Townships 3 North, Range 2 West, and Sections 4, 9, 15 and 16, Townships 2 North, Range 2 West relative to the Gila and Salt River Baseline and Meridian. Figure 1 shows the location map for the project and Figure 2 shows in greater detail the project vicinity.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panels 04013C1580H and 04013C1590H dated September 30, 2005, designate the study area as a Special Flood Hazard Area, Zone AE (see Exhibit A).

Zone "AE" is defined as: A special flood hazard area that corresponds to the 100-year floodplains and the base flood elevations for this zone are defined in the Flood Insurance Study (FIS) by detailed methods.

The proposed channel improvements will significantly reduce the flood flows from Beardsley Canal Wash to the Perryville Road Wash. Also, the cross-sections for the hydraulic modeling are based on new topographic mapping and surveyed data. According to FEMA floodplain management policy, these proposed modifications to the

floodplain and floodway require a Conditional Letter of Map Revision (CLOMR). The scope of work for this project includes generating a Technical Data Notebook for the CLOMR and preparing work maps for the floodplain and floodway delineations. The public notices of this project and the Effective FIS data are included in Appendix A.

This report documents the engineering analysis and MT-2 forms necessary to meet the FEMA requirements for the CLOMR. Once the CLOMR is issued and the channel improvements built, a set of as-built plans will be prepared for a Letter of Map Revision (LOMR) submittal.

1.2 Background

The White Tanks FRS #3 is located in the vicinity of Glendale Avenue and Jackrabbit Trail. The structure was constructed by the Soil Conservation Service in 1954 to provide flood protection to farmland and irrigation facilities in the downstream watershed. Storm runoff from the east slope of the White Tank Mountains generally flows southeasterly to the existing Beardsley Canal Wash and thence southerly along the west side of the Beardsley Canal to FRS #3. The Beardsley Canal Wash has roadway crossings at Northern and Olive Avenues.

Outlet of Beardsley Canal Wash Crossing at Olive Avenue.

The Beardsley Canal is operated by the Maricopa County Municipal Water Conservancy District No. 1 (MWD). In general, the flow line of the Beardsley Canal is about 3 to 4 feet higher than the flow line of the Beardsley Canal Wash.

Outlet of the Beardsley Canal Wash crossing at Northern Avenue.

Between FRS #3 and the Northern Avenue crossing, the existing channel is mostly prismatic with a well-defined cross-section. The wash north of Northern Avenue is defined but is in a natural condition without any improvements. The natural wash intercepts overland flow from the northwest for almost the entire length; however, Cholla Wash and Waterfall Wash concentrate most of the flows.

The NIC Corridor from just north of Olive Avenue to south of Northern Avenue has two fairly diverse characteristics. On the west, the immediate landscape character is reflective of a desert wash/riparian character. In contrast, the east side of the canal is sparsely vegetated, consisting of primarily Creosote and Bursage with very few trees. The majority of significant vegetation is concentrated along the immediate western slope of canal embankment and existing channel/wash bottom. It should be noted that the landscape character found on the west side of the corridor is a direct result of the concentrated runoff. West of Beardsley Canal, the density of trees and other vegetation is significantly greater than that found on the east side of the canal. The concentration of plants varies from very dense to the immediate west of the canal and then transitions to

the much reduced density beyond the limits of the existing channel/wash flow lines. West of the existing Beardsley Canal Wash, the vegetation patterns return to those typical of the natural desert conditions found in the adjacent foothills and White Tank Mountains.

Currently the areas adjacent to the NIC Corridor are typically either undisturbed desert or in agricultural use. It is our understanding that a significant portion of the adjacent areas are either under development or in the planning stages for residential community development.

Beardsley Canal Wash south of Northern Avenue.

The Beardsley Canal Wash's eastern side slope is the Beardsley Canal maintenance road embankment. The 100-year storm conveyance capacity of the wash is inadequate at several locations. Therefore, the embankment can be overtopped at several locations by significant storm events.

1.3 Previous Studies

This section briefly describes studies and reports that contain information pertinent to this study.

White Tanks Flood Retention Structure No. 3, Inlet Improvements, Final Conceptual Design Report, AGK Engineers, Inc., December 1994 – This study developed alternatives for improvements to the Beardsley Canal Wash that have not been implemented since the hydrology and the FCDMC's policy regarding the aesthetics of flood control features have changed.

Level II, Draft, Phase II Alternatives Analysis Report, Loop 303 Corridor / White Tanks Area Drainage Master Plan Update, URS, September 2001 – This report is the basis for design and includes an evaluation of the entire White Tanks drainage basin hydrology and drainage plan. URS Inc. finalized the hydrologic model in February 2005 to reflect the most current hydrologic conditions within the watershed. This hydrology has been approved by the FCDMC and accepted by the Federal Emergency Management Agency (FEMA) for Case No. 03-09-1653P, *Bullard Wash upstream of Indian School Road*, and more recently for Case No. 06-09-B034P, *Goodyear Centerpointe, Bullard Wash Floodplain Re-delineation Study at Interstate 10.*

White Tanks FRS #3, North Inlet Channel Pre-Design Study Report, Wood/Patel, July 2002 – The purpose of this pre-design study is to identify alternatives to prevent breakouts from the Beardsley Canal Wash across the Beardsley Canal between Peoria Avenue and the White Tanks FRS #3.

North Inlet Channel Pre-Design Study Report, Kirkham Michael, November 2004 – The purpose of this pre-design study is to recommended a cost-effective design that will prevent breakouts from the Beardsley Canal Wash across the Beardsley Canal at Olive Avenue, Northern Avenue, and the Beardsley-Cholla Wash confluence.

Perryville Road Wash Floodplain Analysis, URS, September 2003 – This study is for the delineation of the 100-year floodplain for Perryville Road Wash located within Maricopa County, Arizona. The cross-section data were obtained from field surveyed points. The HEC-RAS models are used for this study by replacing the peak flows for the study reach.

North Inlet Channel Design Calculations and Analyses – Notebook and Design Plans, Kirkham Michael. This set of design plans is for the Phase I of the North Inlet Channel from Olive Avenue to Northern Avenue and will be used for the CLOMR package for this portion of the study reach.

WT FRS #3, NIC - South Channel Design Calculations and Analyses – Notebook and Design Plans, Kirkham Michael. This set of design plans is for the Phase II of the North Inlet Channel south of Northern Avenue and will be used for the CLOMR package for this portion of the study reach.

1.4 Methods of Analysis

Hydrology – The hydrologic information for this study is based on *Loop 303 Corridor/White Tanks Area Drainage Master Plan Update*, URS (September 2001). This report is the basis for the design and includes an evaluation of the entire White Tanks drainage basin hydrology and drainage plan. URS Inc. finalized the hydrologic model in February 2005 to reflect the most current hydrologic conditions within the watershed. This hydrology has been approved by the FCDMC and accepted by the Federal Emergency Management Agency (FEMA) for recent LOMR studies. We are utilizing this FEMA accepted hydrology for the study.

Hydraulics – The proposed channelization conditions and all study reaches were modeled utilizing the COE's HEC-RAS, version 3.1.3, May 2005, hydraulic modeling software. The analysis followed methods and procedures as outlined in the "Drainage Design Manual for Maricopa County, Volume 2 – Hydraulics". The Effective FIS models were obtained from the FCDMC. In order to match the base models and tie into the FIS floodplain and floodway at the upstream and downstream limits of the reaches, the revised reaches were modeled using the same flow regime as the effective FIS models.

2.0 ADWR/FEMA FORMS

2.1 Study Documentation Abstract for FEMA Submittals

Study Documentation Abstract for FEMA Submittals		Initial Study		Restudy		CLOMR	X	LOMR		Other	
2.1.1	Date Study Accepted										
2.1.2	Study Prime Contractor Contact(s) Address Phone Internal Reference Number	Wood, Patel & Associates, Inc. Jeff Minch, P.E. 2051 Northern Avenue, Suite 100 Phoenix, AZ 85021 (602) 335-8500 Fax: (602) 335-8580 Wood/Patel Project No. 042284.02									
2.1.3	Study Sub-Contractor Contact(s) Address Phone Internal Reference Number	N/A									
2.1.4	FEMA Technical Review Contact(s) Address Phone Internal Reference Number	Michael Baker, Jr., Inc. Mounir Boudjemaa, M.S. 3601 Eisenhower Ave., Suite 600 Alexandria, Virginia 22304 (703) 960-8800 Case No. to be assigned									
2.1.5	FEMA Regional Reviewer Phone	Michael Baker, Jr., Inc. (703) 960-8800									
2.1.6	State Technical Reviewer Phone	Arizona Department of Water Resources (602) 417-2445									
2.1.7	Local Technical Reviewer Phone	Michael Duncan, P.E., CFM Floodplain Delineation Branch Flood Control District of Maricopa County Phone: (602) 506-4732									

2.1.8	Reach Description	Beardsley Canal Wash and Perryville Road Wash
2.1.9	USGS Quad Sheet(s) with original photo date & latest photo revision date	7.5 Minute Waddell, AZ Quad Map, 1957, photo revised 1971
2.1.10	Unique Conditions and Problems	Diversion at Olive Ave. for Beardsley Canal Wash and split flow conditions along Perryville Road Wash
2.1.11	Coordination of Peak Discharges (Agency, Date, Comments)	The base flows (100-year peak flows) were approved by the Flood Control District of Maricopa County

2.2 FEMA Forms

The basis of this CLOMR is better scientific data, including better quality mapping and hydraulic analysis, and physical changes of the watercourse; therefore, the appropriate FEMA forms from the current FEMA MT-2 packet (expires September 30, 2005) are as follows:

Form 1 – Overview & Concurrence Form provides the basic information regarding the revision request and requires the signatures of the requester, community official, and engineer. This form is required for all revision requests. The Public Notice announcement is included in Appendix A

Form 2 – Riverine Hydrology & Hydraulics Form provides the basic information on the scope and methodology of hydrologic and/or hydraulic analyses that are prepared in support of the revision request. This form should be used for revision requests that involve new or revised hydrologic and/or hydraulic analyses of rivers, streams, ponds, or small lakes.

Form 3 – Riverine Structures Form provides the basic information regarding hydraulic structures constructed in the stream channel or floodplain. This form should be used for revision requests that involve new or proposed channelization, bridges/culverts, dams, and/or levees/floodwalls.

2.2.1 Form 1 – Overview & Concurrence Form

The attached "Overview & Concurrence Form" is provided per FEMA requirements for submittals. The basis for this revision request is physical change, specifically, a diversion channel and channelization.

It should be noted that the preparation of this CLOMR utilizes better scientific data than the regulatory FIS including one (1) foot contours (Beardsley Canal Wash), more accurate spot elevations (surveyed cross-sections for Perryville Road Wash), detailed aerial photography and a better understanding of the current site conditions.

Since two flooding sources (Beardsley Canal Wash and Perryville Road Wash) and two communities (unincorporated areas of Maricopa County and City of Glendale) are involved, two sets of "Overview & Concurrence Form" are included.

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
040037	Maricopa County	AZ	04013C	1580H	09/30/05
[illegible]37	Maricopa County	AZ	04013C	1590H	09/30/05

2. Flooding Source: Beardsley Canal Wash and Perryville Road Wash

3. Project Name/Identifier: North Inlet Channel Improvements

4. FEMA zone designations affected: AE, 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 FEMA Web site at http://www.fema.gov/mit/tsd/frm_fees.htm **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: Michael Duncan, P.E., CFM	Company: Flood Control District, Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, AZ, 85009	Daytime Telephone No.: (602) 506-4732	Fax No.: (602) 506-4601
	E-Mail Address: mwd@mail.maricopa.gov	
Signature of Requester (required): Michael Duncan		Date: 6-4-07

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 & General Manager		Telephone No.: (602) 506-1501
Community Name: Flood Control District of Maricopa County	Community Official's Signature (required): T S P	Date: 6/5/07

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. 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: Jeffrey R. Minch, P.E.	License No.: 24999	Expiration Date: 09/30/09
Company Name: Wood, Patel & Associates, Inc.	Telephone No.: 602-335-8500	Fax No.: 602-335-8580
Signature: Jeffrey R. Minch		Date: 4-30-07

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

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

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☒ 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	1590H	09/30/05

2. Flooding Source: Beardsley Canal Wash and Perryville Road Wash

3. Project Name/Identifier: North Inlet Channel Improvements

4. FEMA zone designations affected: AE (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 FEMA Web site at http://www.fema.gov/mit/tsd/frm_fees.htm **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: Michael Duncan, P.E., CFM	Company: Flood Control District, Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, AZ, 85009	Daytime Telephone No.: (602) 506-4732	Fax No.: (602) 506-4601
	E-Mail Address: mwd@mail.maricopa.gov	
Signature of Requester (required): Michael Duncan		Date: 6-4-07

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, P.E., City Engineer		Telephone No.: (623) 930-3630
,munity Name: City of Glendale	Community Official's Signature (required): Larry J Broyles	Date: 6-21-07

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. 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: Jeffrey R. Minch, P.E.	License No.: 24999	Expiration Date: 09/30/09
Company Name: Wood, Patel & Associates, Inc.	Telephone No.: 602-335-8500	Fax No.: 602-335-8580
Signature: Jeffrey R. Minch		Date: 4-30-07

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

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☒ 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)

2.2.2 Form 2 – Riverine Hydrology & Hydraulics Form

The attached "Riverine Hydrology & Hydraulics Form" is provided per FEMA requirements for submittals. Responses to questions in the following sections require further explanation:

Hydrology:

Although the hydrologic model has been approved by the FCDMC and accepted by FEMA for recent LOMR studies, the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated based on the proposed CLOMR diversion channel. Table 4 summarized the 100-year flows for the proposed conditions. The effective FIS flows are included in Appendix A.

Hydraulic Models Submitted:

Duplicate Effective Models

Beardsley Canal Wash: The HEC-2 model (1.H2I) provided by the FCDMC, was used as the effective FIS model. This model was run to create the *Duplicate Effective FIS Model* for the study reach and the modeling results are shown in Table 1a. The output file for this model is included in Appendix B1.

Perryville Road Wash: The HEC-RAS model (Camelbackfinalrev.prj) covers the downstream portion of the study reach. The HEC-2 model (7.H2I), used as the effective FIS model, covers the upstream reach from Camelback Road to Northern Avenue. These models were run to create the *Duplicate Effective FIS Models* for the study reach and the modeling results are shown in Table 1b and Table 1c. The output files for the models are included in Appendix B2 and Appendix B3.

Corrected Effective FIS Models

Beardsley Canal Wash: Since the revised models are HEC-RAS models the *Corrected Effective FIS Models* were created by importing the *Duplicate Effective HEC-2 Models* into HEC-RAS with updated peak flows. The modeling results are shown in Table 2a and the output file for this model is included in

Appendix C1. Note that the datum for both the Duplicate Effective FIS model and the Corrected Effective FIS model for Beardsley Canal Wash is NGVD 29, and the datum for the Post-Project Condition model is NAVD 88. The datum relationship is NAVD 88 = NGVD29 + 1.78 within the project area.

Perryville Road Wash: Although it is not necessary to tie-in to the upstream effective FIS for the Perryville Road Wash (new study limit), the HEC-2 model 7.H2I was converted onto a HEC-RAS model for the upstream portion of Perryville Road Wash. The summary output of the *Corrected Effective FIS Model* for the upstream portion of the Perryville Road Wash is shown in Table 2b. The output file is included in Appendix C2.

Design or Post-Project Condition Models

Beardsley Canal Wash: The HEC-RAS model (Design_NIC.Prj) was developed by Kirkham Michael for both the Beardsley Canal Wash Phase I and Phase II study reaches. The modeling results are shown in Table 3a. The output file for this model is included in Appendix D1. The water surface profiles are shown in Figure 3a and Figure 3b.

Perryville Road Wash: Since there is a berm along Perryville Road from north of Camelback Road to north of Glendale Avenue and the berm is not an engineered levee, this wash was modeled for both with and without levee conditions according to FEMA guidelines. It is also noted that split flow conditions exist at several locations on the east side of the Perryville Road Wash. Therefore, two HEC-RAS models were developed for both with and without levee conditions. Split flow rating curves were estimated by using the HEC-RAS model sideweir capability and then input into the HEC-1 hydrologic model. Two significant split flow locations were identified: the first one is located on the north side of Bethany Home Road; and the second one is located on the west side of 183rd Avenue south of Camelback Road. Sheet flow conditions exist at these locations. The floodplain on the west side of the levee was delineated based on the modeling results for the levee condition, and the floodplain on the east side of the levee was delineated based on the modeling results for the without levee condition. The floodway analysis was also developed based on the model for the

without levee conditions. The modeling results are shown in Tables 3b to 3c. The output files for the models are included in Appendix D2 and Appendix D3. The water surface profiles are shown in Figure 3c.

Comparison of Duplicate Effective FIS Model and Corrected Effective FIS Model					
		Beardsley Canal Wash			
Duplicate Effective FIS Model			Corrected Effective FIS Model*		
Cross Section	FP	FW	Cross Section	FP	FW
3.678	1321.7	1321.7	3.678	1321.8	1321.8
3.610	1320.8	1320.8	3.610	1320.7	1320.7
3.540	1318.8	1318.8	3.540	1319.0	1319.0
3.460	1315.5	1315.5	3.460	1315.3	1315.3
3.383	1311.6	1311.6	3.383	1312.1	1312.1
3.301	1308.6	1308.6	3.301	1308.2	1308.2
3.214	1304.2	1304.2	3.214	1304.8	1304.8
3.167	1303.9	1303.9	3.167	1304.7	1304.7
3.081	1303.2	1303.2	3.081	1303.9	1303.9
2.907	1294.6	1294.6	2.907	1295.2	1295.2
2.826	1289.1	1289.8	2.826	1289.7	1290.7
2.741	1288.0	1288.6	2.741	1288.3	1288.7
2.640	1287.3	1287.5	2.640	1287.5	1287.7
2.553	1285.7	1286.2	2.553	1285.8	1286.3
2.468	1283.0	1283.9	2.468	1283.2	1284.0
2.392	1279.7	1280.6	2.392	1279.7	1280.7
2.330	1278.6	1278.6	2.330	1279.0	1279.0
2.267	1278.1	1278.1	2.267	1277.2	1277.2
2.186	1278.1	1278.1	2.186	1276.7	1276.7
2.167	1278.1	1278.1	2.167	1276.7	1276.7
2.159	1274.7	1274.7	2.159	1273.2	1273.2
2.072	1269.1	1269.4	2.072	1268.0	1268.1
1.996	1265.6	1265.6	1.996	1264.3	1264.3
1.920	1262.8	1262.8	1.920	1261.1	1261.1
1.844	1259.4	1259.4	1.844	1257.6	1257.7
1.768	1253.6	1253.9	1.768	1252.5	1252.8
1.692	1250.8	1250.8	1.692	1252.1	1252.1
1.616	1250.7	1250.7	1.616	1252.1	1252.1
1.556	1249.1	1248.9	1.556	1249.6	1249.6
1.466	1245.5	1245.7	1.466	1245.8	1246.0
1.388	1240.7	1240.8	1.388	1241.0	1241.2
1.313	1238.5	1238.5	1.313	1238.4	1238.4
1.237	1238.3	1238.3	1.237	1237.7	1237.7
1.159	1238.2	1238.2	1.159	1237.2	1237.2
1.148	1234.6	1234.6	1.148	1235.1	1235.4
1.074	1229.0	1229.0	1.074	1231.2	1230.9
0.998	1225.7	1225.7	0.998	1228.3	1228.1
0.920	1221.5	1221.5	0.920	1223.3	1223.5
0.846	1220.2	1220.9	0.846	1222.5	1223.8
0.770	1220.0	1219.9	0.770	1222.5	1222.7
0.696	1217.2	1217.2	0.696	1220.7	1219.4
0.620	1215.1	1215.1	0.620	1217.2	1217.2
0.543	1213.9	1213.9	0.543	1216.2	1216.2
0.465	1211.4	1211.4	0.465	1213.2	1212.9
0.390	1208.1	1208.1	0.390	1210.0	1209.8
0.307	1202.3	1203.2	0.307	1203.4	1204.4
0.231	1200.0	1200.3	0.231	1201.0	1201.6
0.156	1198.3	1198.3	0.156	1199.3	1199.3
0.070	1195.2	1195.2	0.070	1196.3	1196.5
0.000	1192.8	1192.8	0.000	1194.0	1193.8
* - flows are different					

Comparison of Duplicate Effective FIS Model and Corrected Effective FIS Model					
		Perryville Road Wash			
Duplicate Effective FIS Model			Corrected Effective FIS Model		
Cross Section	FP	FW	Cross Section	FP	FW
3.727	1229.3	1229.3	3.727	1229.3	1229.3
3.681	1226.6	1226.6	3.681	1226.6	1226.6
3.653	1226.6	1226.6	3.653	1226.6	1226.6
3.558	1225.6	1225.6	3.558	1225.6	1225.6
3.549	1222.6	1222.6	3.549	1222.6	1222.6
3.461	1217.8	1217.8	3.461	1217.8	1217.8
3.400	1215.2	1215.2	3.400	1215.3	1215.3
3.326	1212.7	1212.7	3.326	1212.7	1212.7
3.262	1210.0	1210.1	3.262	1210.0	1210.1
3.197	1207.2	1207.8	3.197	1207.2	1207.8
3.116	1204.4	1205.1	3.116	1204.5	1205.2
3.045	1201.9	1202.2	3.045	1202.0	1202.2
2.955	1199.2	1199.4	2.955	1199.2	1199.4
2.874	1197.2	1197.5	2.874	1197.2	1197.5
2.785	1193.5	1193.5	2.785	1193.6	1193.6
2.704	1189.3	1189.5	2.704	1189.3	1189.5
2.626	1186.9	1187.0	2.626	1187.0	1187.2
2.576	1185.1	1185.1	2.576	1185.2	1185.2
2.501	1183.6	1184.0	2.501	1183.6	1184.0
2.453	1181.9	1182.1	2.453	1181.9	1182.1
2.381	1178.4	1178.7	2.381	1178.4	1178.6
2.303	1175.5	1175.5	2.303	1175.5	1175.5
2.216	1172.8	1172.8	2.216	1172.9	1172.8
2.136	1169.5	1169.6	2.136	1169.5	1169.7
2.066	1169.6	1169.6	2.066	1169.6	1169.6
2.018	1169.1	1169.1	2.018	1169.1	1169.1
1.937	1168.4	1168.4	1.937	1168.4	1168.4
1.851	1165.4	1165.4	1.851	1165.4	1165.4
1.737	1160.7	1161.0	1.737	1160.8	1161.0
1.640	1157.8	1157.8	1.640	1157.9	1157.8
1.545	1154.7	1154.8	1.545	1154.8	1154.9
1.463	1152.9	1152.9	1.463	1152.9	1152.9
1.429	1152.1	1152.1	1.429	1152.1	1152.1
1.389	1151.9	1151.9	1.389	1152.0	1152.0
1.318	1151.2	1151.2	1.318	1151.2	1151.2
1.225	1150.2	1150.2	1.225	1150.2	1150.2
1.123	1148.9	1148.9	1.123	1148.9	1148.9
1.025	1146.4	1146.4	1.025	1146.4	1146.4
0.938	1144.4	1144.4	0.938	1144.4	1144.4
0.830	1142.1	1142.1	0.830	1142.1	1142.1
0.736	1138.4	1138.4	0.736	1138.4	1138.5
0.686	1137.3	1137.4	0.686	1137.3	1137.4
0.606	1134.6	1134.5	0.606	1134.6	1134.5
0.523	1132.4	1132.4	0.523	1132.4	1132.4
0.489	1131.7	1131.7	0.489	1131.7	1131.7
0.422	1129.9	1130.0	0.422	1130.0	1130.0
0.350	1128.8	1128.8	0.350	1128.8	1128.8
0.265	1126.4	1126.4	0.265	1126.6	1126.6
0.177	1124.4	1124.4	0.177	1124.9	1124.8
0.088	1123.0	1123.0	0.088	1123.3	1123.3
0.000	1121.3	1121.3	0.000	1121.3	1121.3

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: Beardsley Canal Wash
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)
D/S Northern Ave	10.87	3,655	7,131
U/S Northern Ave	10.87	5,141	5,679
D/S Olive Ave	4.86	1,755	1,115 (see notes)

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/mit/tsd/en_modl.htm.

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 transport 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	FRS #3	0.231/501+60	Zone A	Tie into Zone A
Upstream Limit	North of Olive Ave	2.553/614+02.55	1287.5(=1285.7+1.8)	1287.8

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/mit/tsd/frm_soft.htm. 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: 1.H2I & 1.H2O	Floodway File Name: 1.H2I & 1.H2O
Corrected Effective Model*	Natural File Name: Corrected.Prj	Floodway File Name: Corrected.Prj
Existing or Pre-Project Conditions Model	Natural File Name:	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name: Design_NIC.Prj	Floodway File Name: Design_NIC.Prj
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/mit/tsd/en_modl.htm.

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

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Flooding Source: Perryville Road Wash
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)
Camelback Road	14.1	470	1,227
U/S Camelback Road	13.0	1,190	653
Glendale Ave	11.6	1,450	671(see notes)

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/mit/tsd/en_modl.htm.

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 transport 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	D/S of Camelback Road	0.000/0.10	1121.3	1121.0
Upstream Limit	South of Northern Ave	34	end of FP/no tie-in	1212.8

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/mit/tsd/frm_soft.htm. 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: 7.H2I & Eff_DS.Prj	Floodway File Name: 7.H2I & Eff_DS.Prj
Corrected Effective Model*	Natural File Name: CorrectUS.Prj	Floodway File Name: CorrectUS.Prj
Existing or Pre-Project Conditions Model	Natural File Name:	Floodway File Name:
Revised or Post-Project Conditions Model	Natural File Name: Levee.Prj	Floodway File Name: Floodway.Prj
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/mit/tsd/en_modl.htm.

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.

2.2.3 Form 3 – Riverine Structure Form

The attached "Riverine Structure Form" is provided per FEMA requirements for submittals.

The channel design concept for the Beardsley Canal Wash – NIC Phase I is a trapezoidal cross-section with 55' bottom width and 6:1 (H:V) side slope. Drop structures are proposed to obtain the desired longitudinal slopes. A 2-10'x5' box culvert is proposed for the diversion culvert at Olive Avenue and a 3-10'x5' box culvert is proposed for the diversion channel at Northern Avenue. The construction plans for the channel and the box culverts are included in Exhibit B1.

The channel design concept for the Beardsley Canal Wash – NIC Phase II is a trapezoidal cross-section with 150' bottom width and 5:1 (H:V) side slope. Drop structures are also proposed to obtain the desired longitudinal slopes. A 4-12'x6' box culvert is proposed for the Beardsley Canal Wash at Northern Avenue to prevent the 100-year flood from overtopping the roadway. The construction plans for the channel and the box culvert are included in Exhibit B2.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

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

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 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: Beardsley Canal Wash
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: North Inlet Channel - Phase I**

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

   Location of Structure: Olive Ave to Northern Ave

   Downstream Limit/Cross Section: 15455.43

   Upstream Limit/Cross Section: 20456.34

2. **Name of Structure: North Inlet Channel - Phase II**

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

   Location of Structure: Northern Ave to 1,200 ft north of Glendale Ave

   Downstream Limit/Cross Section: 51000 (0.390)

   Upstream Limit/Cross Section: 54905.08 (1.148)

3. **Name of Structure: North Inlet Channel - Phase I: Olive Ave Culvert**

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

   Location of Structure: Olive Ave

   Downstream Limit/Cross Section: 20456.34

   Upstream Limit/Cross Section: 20787.34

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

B. CHANNELIZATION

Flooding Source: Beardsley Canal Wash

Name of Structure: North Inlet Channel - Phase I

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 1,600 (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):

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. See page 41 section 5.0

C. BRIDGE/CULVERT

Flooding Source: Beardsley Canal Wash - North Inlet Channel Phase I

Name of Structure: Olive Ave Culvert/Northern Ave Culvert

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.

FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B. No. 3067-0148
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Flooding Source: Beardsley Canal Wash
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: North Inlet Channel - Phase I: Northern Ave Culvert**

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

   Location of Structure: Northern Ave

   Downstream Limit/Cross Section: 15042.37

   Upstream Limit/Cross Section: 15455.43

2. **Name of Structure: North Inlet Channel - Phase II: Northern Ave Culvert**

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

   Location of Structure: Northern Ave

   Downstream Limit/Cross Section: 54905.08 (1.148)

   Upstream Limit/Cross Section: 55042.91 (1.159)

3. **Name of Structure:**

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

   Location of Structure:

   Downstream Limit/Cross Section:

   Upstream Limit/Cross Section:

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

B. CHANNELIZATION

Flooding Source: Beardsley Canal Wash

Name of Structure: North Inlet Channel - Phase II

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 7,131 (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):

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. See page 41 section 5.0

C. BRIDGE/CULVERT

Flooding Source: Beardsley Canal Wash - North Inlet Channel Phase II

Name of Structure: Northern Ave Culvert

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.

D. DAM

Flooding Source:

Name of Structure:

1. This request is for (check one): ☐ Existing dam ☐ New dam ☐ Modification of existing dam

2. The dam was designed by (check one): ☐ Federal agency ☐ State agency ☐ Local government agency

   ☐ Private organization Name of the agency or organization:

3. Does the project involve revised hydrology? ☐ Yes ☐ No

   If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

4. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

   If yes, then fill out Section F (Sediment Transport).
   If No, then attach your explanation for why debris/sediment analysis was not considered.

5. Does the Base Flood Elevation behind the dam or downstream of the dam change?

   ☐ Yes ☐ No If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

Stillwater Elevation Behind the Dam

FREQUENCY (% annual chance)	FIS	REVISED
10-year (10%)		
50-year (2%)		
100-year (1%)		
500-year (0.2%)		
Normal Pool Elevation		

6. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one):

☐ upgrading of an existing levee/floodwall system
☐ a newly constructed levee/floodwall system
☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

☐ earthen embankment, dike, berm, etc.	Station	to
☐ structural floodwall	Station	to
☐ Other (describe):	Station	to

c. Structural Type (check one):

☐ monolithic cast-in place reinforced concrete
☐ reinforced concrete masonry block
☐ sheet piling
☐ Other (describe):

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency?

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers:

2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers:

3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers:

4. A layout detail for the embankment protection measures. Sheet Numbers:

5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers:

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

3.0 feet or more at the downstream end and throughout	☐ Yes	☐ No
3.5 feet or more at the upstream end	☐ Yes	☐ No
4.0 feet within 100 feet upstream of all structures and/or constrictions	☐ Yes	☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).	☐ Yes	☐ No
2.0 feet above the 1%-annual-chance stillwater surge elevation	☐ Yes	☐ No

2. Freeboard (continued)

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

a. Openings through the levee system (check one): ☐ exists ☐ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

a. The maximum levee slope landside is:

b. The maximum levee slope floodside is:

c. The range of velocities along the levee during the base flood is: (min.) to (max.)

d. Embankment material is protected by (describe what kind):

e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D_{100}	D_{50}	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

4. Embankment Protection (continued)

f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No

g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

a. Identify locations and describe the basis for selection of critical location for analysis:

☐ Overall height: Sta. ; height ft.

☐ Limiting foundation soil strength:

Sta. , depth to

strength ϕ = degrees, c = psf

slope: SS = (h) to (v)

(Repeat as needed on an added sheet for additional locations)

b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):

c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No

If Yes, describe methodology used:

e. Was a seepage analysis for the foundation performed? ☐ Yes ☐ No

f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No

g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No

h. The duration of the base flood hydrograph against the embankment is hours.

Attach engineering analysis to support construction plans.

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability

a. Describe analysis submittal based on Code (check one):

☐ UBC (1988) or ☐ Other (specify):

b. Stability analysis submitted provides for:

☐ Overturning ☐ Sliding If not, explain:

c. Loading included in the analyses were:

☐ Lateral earth @ P_A = psf; P_p = psf

☐ Surcharge-Slope @ , ☐ surface psf

☐ Wind @ P_w = psf

☐ Seepage (Uplift); ☐ Earthquake @ P_{eq} = %g

☐ 1%-annual-chance significant wave height: ft.

☐ 1%-annual-chance significant wave period: sec.

d. Summary of Stability Analysis Results: Factors of Safety.

Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
ad & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)

(Note: Extend table on an added sheet as needed and reference)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

7. Settlement

a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☐ No

b. The computed range of settlement is ft. to ft.

c. Settlement of the levee crest is determined to be primarily from :

☐ Foundation consolidation
☐ Embankment compression
☐ Other (Describe):

d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

Draining to pressure conduit: acres
Draining to ponding area: acres

b. Relationships Established

Ponding elevation vs. storage	☐ Yes	☐ No
Ponding elevation vs. gravity flow	☐ Yes	☐ No
Differential head vs. gravity flow	☐ Yes	☐ No

c. The river flow duration curve is enclosed: ☐ Yes ☐ No

d. Specify the discharge capacity of the head pressure conduit: cfs

e. Which flooding conditions were analyzed?

• Gravity flow (Interior Watershed)	☐ Yes	☐ No
• Common storm (River Watershed)	☐ Yes	☐ No
• Historical ponding probability	☐ Yes	☐ No
• Coastal wave overtopping	☐ Yes	☐ No

If No for any of the above, attach explanation.

f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No

If No, attach explanation.

g. The rate of seepage through the levee system for the base flood is cfs

h. The length of levee system used to drive this seepage rate in item g: ft.

8. Interior Drainage (continued)

i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants:
For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem
Hydrocompaction ☐ is ☐ is not a problem
Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☐ No

Attach supporting documentation

d. 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.

E. LEVEE/FLOODWALL (CONTINUED)

10. Operational Plan And Criteria

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No

    b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations? ☐ Yes ☐ No

    c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations? ☐ Yes ☐ No

    If the answer is No to any of the above, please attach supporting documentation.

11. Maintenance Plan

    a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
    If No, please attach supporting documentation.

12. Operations and Maintenance Plan

    Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

F. SEDIMENT TRANSPORT

Flooding Source:

Name of Structure:

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume acre-feet

Debris load associated with the base flood discharge: Volume acre-feet

Sediment transport rate (percent concentration by volume)

Method used to estimate sediment transport:

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition:

Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:
Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

3.0 SURVEY AND MAPPING INFORMATION

3.1 Field Survey Information

Beardsley Canal Wash and Diversion Channel:

A field survey was conducted to supplement information on the aerial topographic mapping. Updated topographic mapping was used to digitalize new hydraulic model cross-sections within the project reach. The vertical datum used is NAVD 88. The elevation reference marks description is included on the work maps (Exhibit C).

Perryville Road Wash:

Field survey to obtain cross-section data was performed by URS Corp. The work started in August 2001 and was finished by June 2002. The horizontal control is the NAD 1983 coordinate system and the vertical datum is NGVD 29.

An average vertical datum difference from NAVD 88 to NGVD 29 is -1.78 ft (NAVD 88 = NGVD29 + 1.78) within the project area.

3.2 Mapping

Beardsley Canal Wash and Diversion Channel:

Detailed mapping exceeding standards for Flood Insurance Study (FIS) mapping requirements was developed for this study area. Consultant Engineering Inc. provided project benchmarks and control points survey data for this project. Work maps were prepared based on the 1-foot contour mapping at a scale of 1" = 200' and are shown on Exhibit C1. Note that the topography and floodplains of Beardsley Canal Wash were shifted, due to ground-surface coordinates versus grid-projection coordinates, following FCDMC's direction. Based on a location at ½ mile south of Olive Avenue in the middle of the floodplain (at NAD83 X = 531,260 ft and Y = 931,313 ft, with NAVD88 Z = 1,250 ft) and the Corps of Engineers software CORPSCON, the shift is 114 ft to the south and 65 ft to the west.

Perryville Road Wash:

The floodplain analysis was performed based on cross-section data surveyed by URS Corp. The floodplain boundary limits were delineated based on the hydraulic modeling

results and aerial photography of the study area. The study work maps were prepared at a scale of 1" = 400' and are included in Exhibit C2.

Addendum to Section 4.1 Hydrology

The *Level II, Phase II Alternatives Analysis Report, Loop 303 Corridor / White Tanks Area Drainage Master Plan Update*, URS, Inc., September 2001 is the basis for the hydrology which includes an evaluation of the entire White Tanks drainage basin hydrology and drainage plan. URS finalized the hydrologic model in February 2005 to reflect the most current hydrologic conditions within the watershed. This hydrology has been approved by the FCDMC and accepted by the Federal Emergency Management Agency (FEMA) for Case No. 03-09-1653P, Bullard Wash upstream of Indian School Road, and more recently for Case No. 06-09-B034P, Goodyear Centerpointe, Bullard Wash Floodplain Re-delineation Study at Interstate 10.

However, the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated based on the proposed CLOMR for the North Inlet Channel. The first major revision is that the flow diverted east at Northern Avenue (hydrograph name SIDEWR) is now contained within the proposed channel and conveyed south. The general approach used to account for the interaction of hydrology and hydraulics is that the HEC-RAS model was used to develop a rating curve for the hydrologic model and then the hydrologic model was used to route the flood hydrograph. Finally, the peak flows from the HEC-1 model were input to the HEC-RAS models for floodplain delineations. All HEC-RAS models that were used to develop the rating curves for the hydrology-hydraulics interaction are included on the enclosed CD. The HEC-RAS model name for the side weir flow diversion at Northern Avenue is Sideweir.prj.

The second change is the split flow modeling north of Bethany Home Road along Perryville Road Wash. New rating curves were developed based on HEC-RAS modeling results and its name is WeirRating.prj. The 100-year, 24-hour HEC-1 model for the area north of Northern Avenue and west of the Beardsley Canal was utilized to update this portion of the original HEC-1 model. Also, after a field visit, it was found that storm runoff from sub-basin 215A flows to sub-basin 233 except for a small portion fraction of the flow which is conveyed north of Bethany Home Road to sub-basin 215 through two 24-inch pipes with approximately 4 ft. head above the pipe soffit (inlet control water head is about 6 ft, see attached pipe culvert performance curve). The diversion rating curve to south at Camelback Road and 183rd Avenue was also revised based on HEC-RAS modeling results and its name is Rating.prj.

Table 4 summarizes the 100-year flows for the proposed conditions. The effective FIS flows are included in Appendix A of the CLOMR document.

4.0 HYDROLOGY AND HYDRAULICS

4.1 Hydrology

As discussed previously, the hydrologic model has been approved by the FCDMC and accepted by FEMA for recent LOMR studies. However, the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated based on the proposed CLOMR diversion channel. Table 4 summarizes the 100-year flows for the proposed conditions. The effective FIS flows are included in Appendix A.

4.2 Hydraulic Models

The proposed channelization conditions and all study reaches were modeled utilizing the COE's HEC-RAS, version 3.1.3, May 2005, hydraulic modeling software. The effective FIS models, corrected effective FIS models and revised (post-project condition) models were discussed in detail in Section 2.2.2.

4.3 Parameter Estimation

4.3.1 Roughness Coefficients

The Manning's n-values vary from the proposed channel conditions to natural wash conditions. They are shown in the cross-section plots for the proposed condition models.

4.3.2 Expansion and Contraction Coefficients

The values for expansion and contraction coefficients used in this study vary from 0.10 to 0.50.

4.4 Cross-Section Description

The cross-sections were chosen to be at approximately 500 ft. spacing and immediately upstream and downstream of culverts. The orientation of the cross-sections within the project limits was perpendicular to the direction of flow with the perspective of looking downstream. Geometric data for the cross-sections were obtained through field survey for the Perryville Road Wash and topographic mapping for the North Inlet Channel project. The cross-section plots are included in Appendix D.

4.5 Modeling Considerations

4.5.1 Hydraulic Jump and Drop Analysis

Hydraulic jumps occur at drop structures where erosion protection was provided.

4.5.2 Bridges and Culverts

No bridge crossings existed in the study reaches. Culverts were modeled in the HEC-RAS models using the culvert modeling option.

4.5.3 Levees and Dikes

No certified levees exist in the study reaches. An earthen dike exists from cross-section 23 upstream to section 3 on the downstream end for the Perryville Road Wash. The dike was modeled for the levee in place condition and the levee failed condition (no levee). The levee in place model keeps water on the flood side of the levee unless the water overtops the top of the levee. The levee failed condition allows water to flood on the landward side of the levee. The floodplain is mapped using the higher BFEs on the flood side of the levee and the levee failed BFEs on the landward side of the levee.

4.5.4 Islands and Flow Splits

There were a few locations along the Perryville Road Wash where the computed water-surface elevation exceeded the wash bank on the east side causing split flows. To quantify these split flows the lateral weir option was applied at these locations and the resultant rating curve was input into the HEC-1 hydrologic model. There flow splits occurred near Bethany Home Road and 183rd Avenue.

4.5.5 Ineffective Flow Areas

In general, ineffective flow areas were modeled for a few cross- sections for the Perryville Road Wash.

4.5.6 Supercritical Flow

The subcritical flow option available in HEC-RAS is utilized to analyze the flow regime of the study reaches. Supercritical flow occurs downstream of the drop structures.

4.6 Floodway Modeling

Perryville Road Wash: The HEC-RAS encroachment option was used to develop the floodway for Perryville Road Wash. Equal conveyance reduction (Method 4) was initially used with a target increase value in the water-surface elevation of 1.0 ft. The encroachment table in HEC-RAS was then reviewed for any increases in the water surface elevations above 1.0 ft. Where such an increase was noticed the Method 1 was applied to reduce the water surface increase below 1.0 ft. Finally, all encroachment stations were input using Method 1. Note that no floodway analysis was performed along Camelback Road (cross-sections 0.039 to 0.7) of the Perryville Road Wash model since the floodplain of Camelback Road spills laterally for most of its length.

Beardsley Canal Wash: Because the 100-year flow is contained in the washes, the top widths of both floodway and floodplain are the same in the channelized study reaches and the floodway and floodplain are delineated as coincidental. Method 1 was used for other natural wash areas.

4.7 Problems Encountered During the Study

No problems were encountered other than the levee and lateral weir modeling issues as discussed previously during the hydraulic modeling process.

4.8 Calibration

No calibration of hydraulic parameters was performed for this study reach.

4.9 Final Results

The proposed channelization conditions and all study reaches were modeled utilizing the COE's HEC-RAS, version 3.1.3, May 2005, hydraulic modeling software.

Beardsley Canal Wash: The HEC-RAS model (Design_NIC.Prj) was developed by Kirkham Michael for both the Beardsley Canal Wash Phase I and Phase II study reaches. The modeling results are shown in Table 3a. The output file for this model is included in Appendix D1.

Perryville Road Wash: The HEC-RAS modeling results of the floodplain for both with and without levee conditions and the floodway modeling results are shown in Tables 3b

to 3d. The output files for the models are included in Appendix D2 and Appendix D3. The water surface profiles are shown in Figure 3.

The hydraulic modeling results show that the water surface elevations from post-project conditions are matching the water surface elevations of the effective FIS models very well at the tie-in locations and that the proposed channels contain the 100-year flood.

5.0 EROSION AND SEDIMENT TRANSPORT

The pre-study and design studies did not find sediment transport to be an issue in the design and function of the NIC project. Therefore, sediment transport analysis was not performed for this study. Erosion protection was provided for channel drop structures and culvert outlet locations.

6.0 DRAFT FIS REPORT DATA

6.1 Summary of Discharge

Table 4 provides a summary of discharges in FEMA format for the study area from *Flood Insurance Study, Maricopa County Arizona and Unincorporated Areas, Volume 1 of 17,* revised September 30, 2005.

Table 4

Summary of Discharges in FEMA FIS Format

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharges (cfs)			
			10-year	50-year	100-year	500-year
Beardsley Canal Wash	FRS #3	12.25	--[1]	--[1]	7,567	--[1]
	Northern Avenue (D/S)	10.87	--[1]	--[1]	7,131	--[1]
	Northern Avenue (U/S)	10.87	--[1]	--[1]	5,679	--[1]
	Olive Avenue (D/S)	4.86	--[1]	--[1]	1,115	--[1]
	Diversion Channel	4.86	--[1]	--[1]	1,600	--[1]
	Olive Avenue (U/S)	4.86	--[1]	--[1]	2,715	--[1]
	Peoria Avenue	0.29	--[1]	--[1]	313	--[1]
Perryville Road Wash	Camelback Road at 183rd Avenue	14.08	--[1]	--[1]	852	--[1]
	Camelback Road at W. 183rd Avenue, Upstream of Breakout	14.08	--[1]	--[1]	1,257	--[1]
	Camelback Road	13.04	--[1]	--[1]	653	--[1]
	Bethany Home Road	12.54	--[1]	--[1]	1,054	--[1]
	Maryland Avenue	11.74	--[1]	--[1]	738	--[1]
	Glendale Avenue	11.58	--[1]	--[1]	671	--[1]
	800 ft s. of Northern Ave.	0.19	--[1]	--[1]	340	--[1]

--[1] Not Computed

Note that the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated for the proposed CLOMR conditions. This hydrology has been approved by the FCDMC and accepted by FEMA.

6.3 Annotated Flood Insurance Rate Map

Exhibit D contains the revisions to the effective FIRM panels 04013C1580H and 04013C1590H. Refer to Exhibit C for *Post-Project Conditions Models* work maps.

6.4 Flood Profiles

Figure 3 contains the 100-year peak flow flood profiles for the *Post-Project Conditions Models* for the study reaches.

7.0 REFERENCES

1. Flood Control District of Maricopa County, *White Tanks/Agua Fria Area Drainage Master Study*, The WLB Group, Inc., October 1992.

2. URS, *Loop 303 Corridor/White Tanks Area Drainage Master Plan Update, Final Volume IV, Level III Area Drainage Master Plan Update Report*, prepared for the Flood Control District of Maricopa County, February 2005.

3. Wood, Patel & Associates, Inc., *Goodyear Centerpointe – Bullard Wash Floodplain Re-delineation Study at Interstate 10,* LOMR Case No. 06-09-B034P, June 2006.

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

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

6. Chow, Ven Te, Ph. D., *Open Channel Hydraulics*, McGraw-Hill, 1959.

7. Federal Emergency Management Agency, *FIRM Flood Insurance Rate Map, Maricopa County, Arizona and Incorporated Areas, Map Nos. 04013C1580H and 04013C1590H.*

8. Federal Emergency Management Agency, FEMA, Flood *Insurance Study, Maricopa County and Incorporated Areas*, Arizona, 2005.

9. Wood, Patel & Associates, Inc., *White Tanks FRS #3, North Inlet Channel Pre-Design Study Report,* July 2002.

10. Kirkham Michael, *North Inlet Channel Pre-Design Study Report*, November 2004.

11. URS, *Perryville Road Wash Floodplain Analysis*, September 2003.

12. Kirkham Michael, *North Inlet Channel Design Calculations and Analyses – Notebook and Design Plans*.

13. Kirkham Michael, *WT FRS #3, NIC - South Channel Design Calculations and Analyses – Notebook and Design Plans*.

FIGURES

Figure 1 – Project Location Map

Figure 2 – Project Vicinity Map

Figure 3 – Draft FEMA FIS Flood Profiles

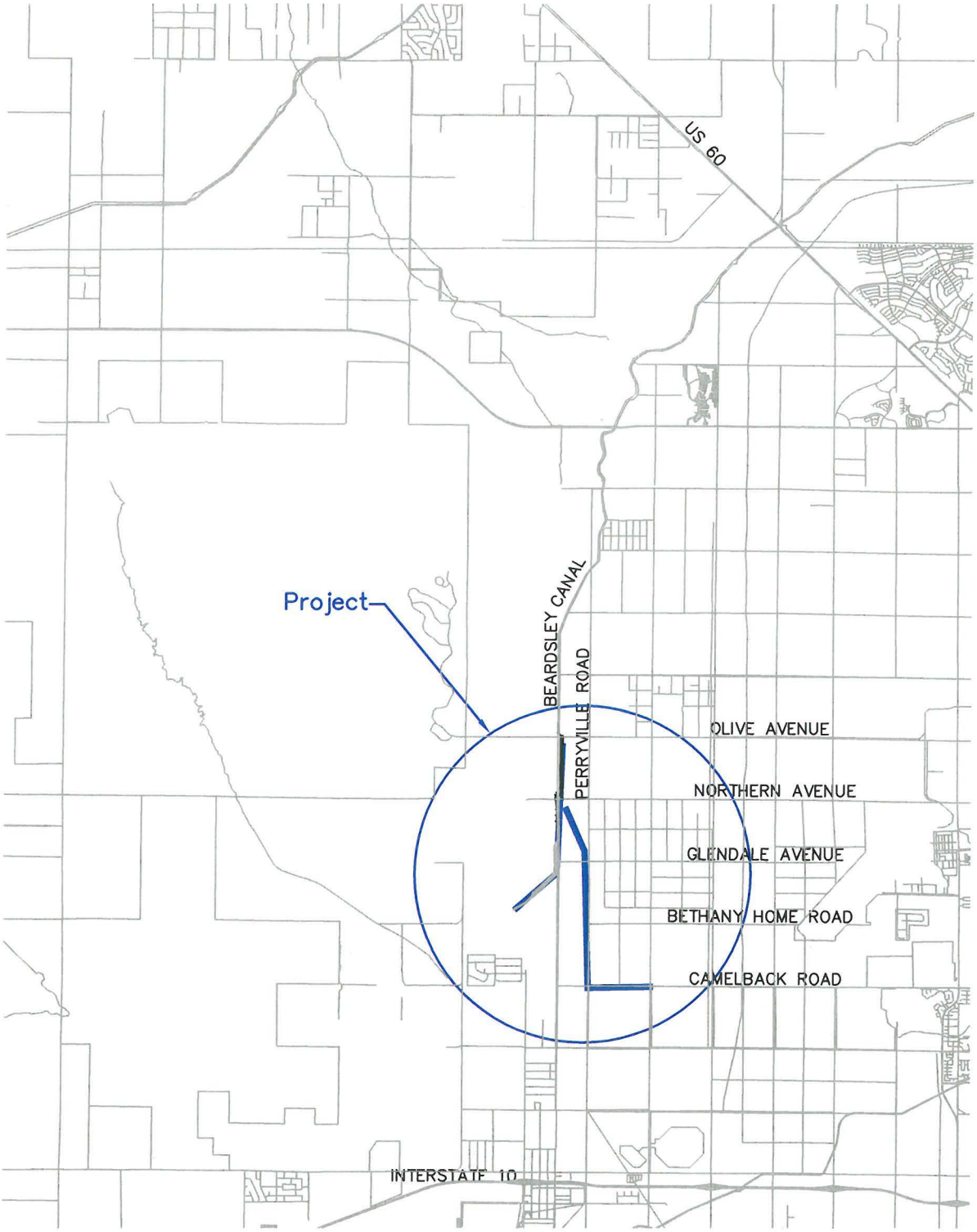
Figure 3a – Beardsley Canal Wash

Figure 3b – North Inlet Channel

Figure 3c – Perryville Road Wash

FIGURE 1

Project Location Map



N

NOT TO SCALE

NORTH INLET CHANNEL IMPROVEMENTS
PROJECT LOCATION MAP

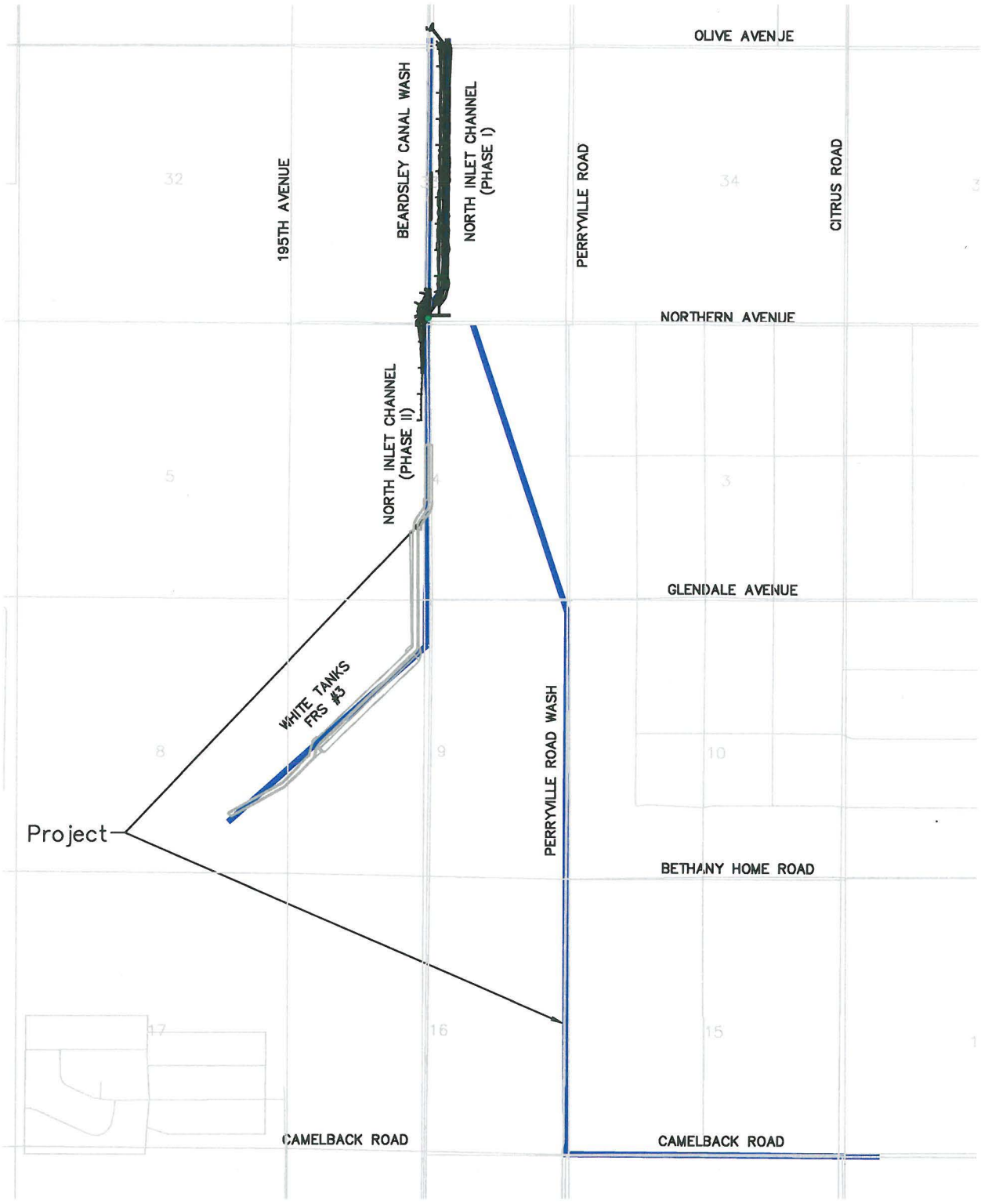
Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021 (602) 335-8500

DRAWN BY: K. RIDDLE	Figure 1
JOB NO: 042284.02	

W:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\Drawings\Exhibits\ Location Map.dwg

FIGURE 2

Project Vicinity Map



N

NOT TO SCALE

NORTH INLET CHANNEL IMPROVEMENTS PROJECT VINCINITY MAP

Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
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DRAWN BY: K. RIDDLE

JOB NO: 042284.02

Figure 2

W:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\Drawings\Exhibits\ Vicinity Map.dwg

FIGURE 3

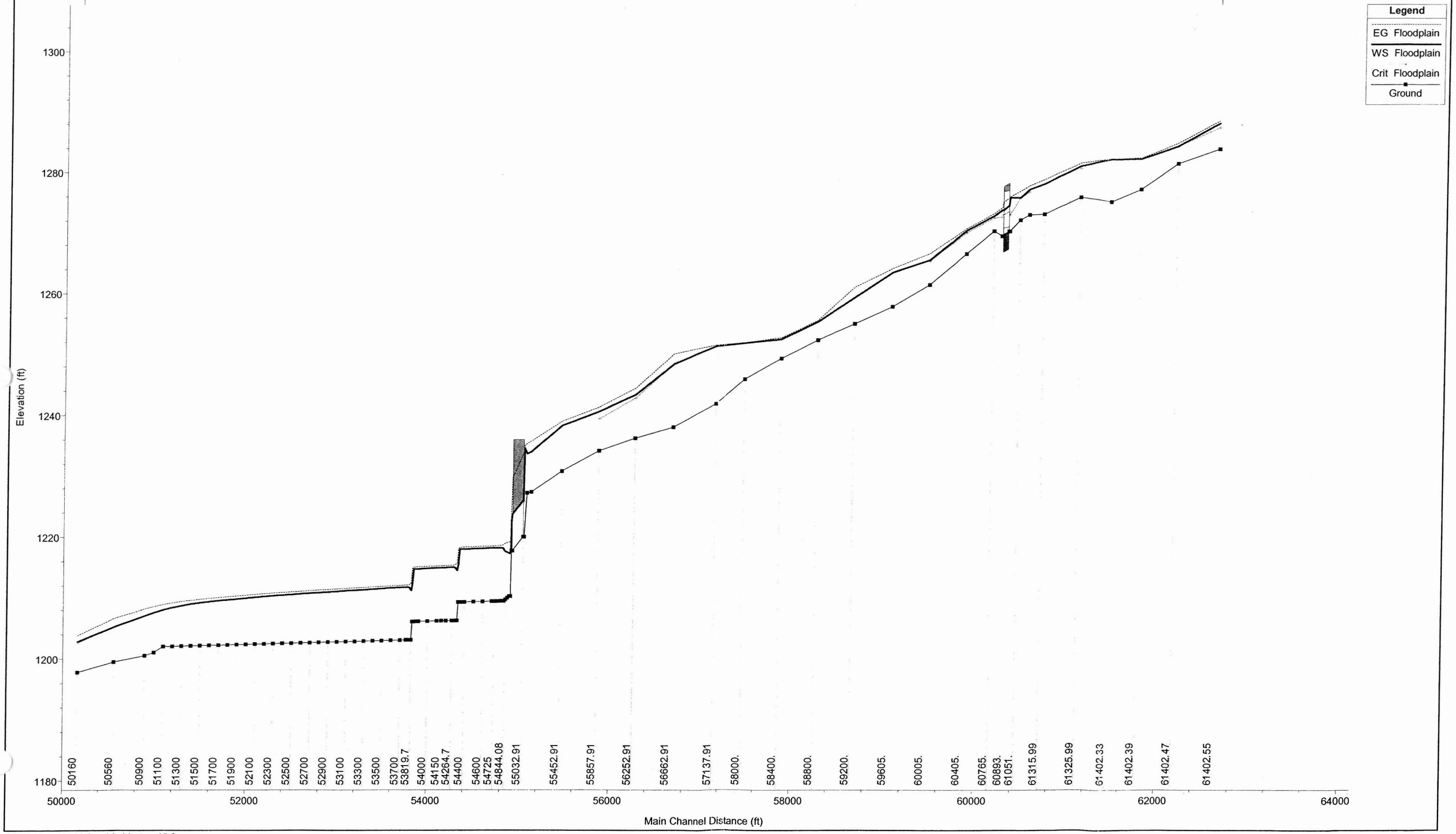
Draft FEMA FIS Flood Profiles

FIGURE 3a

Beardsley Canal Wash

Revised_North Inlet Chanel Plan: Design 4/26/2007

BCW Olive-FRS #3



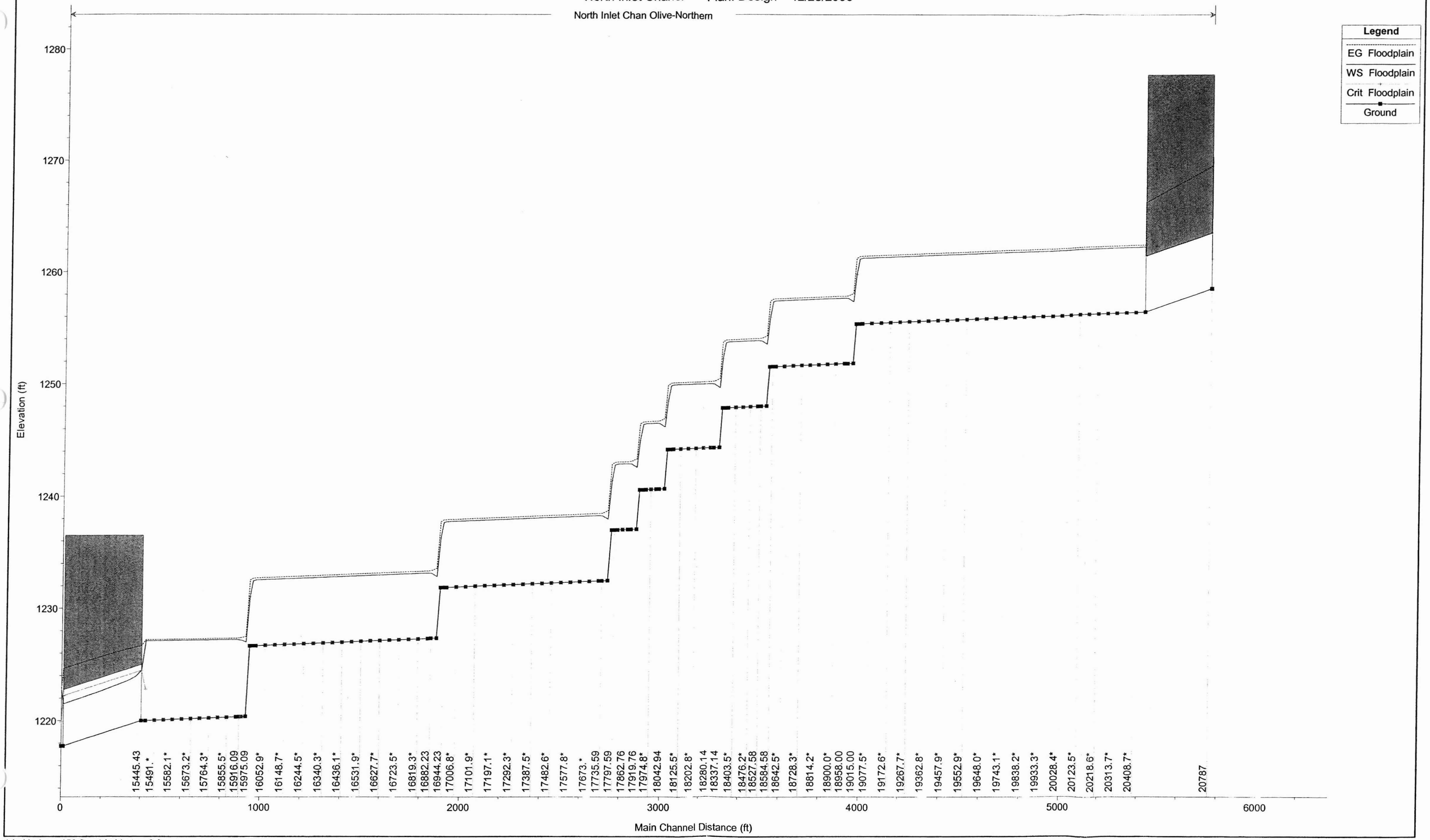
1 in Horiz. = 1000 ft 1 in Vert. = 15 ft

FIGURE 3b

North Inlet Channel

North Inlet Chanel Plan: Design 12/28/2006

North Inlet Chan Olive-Northern



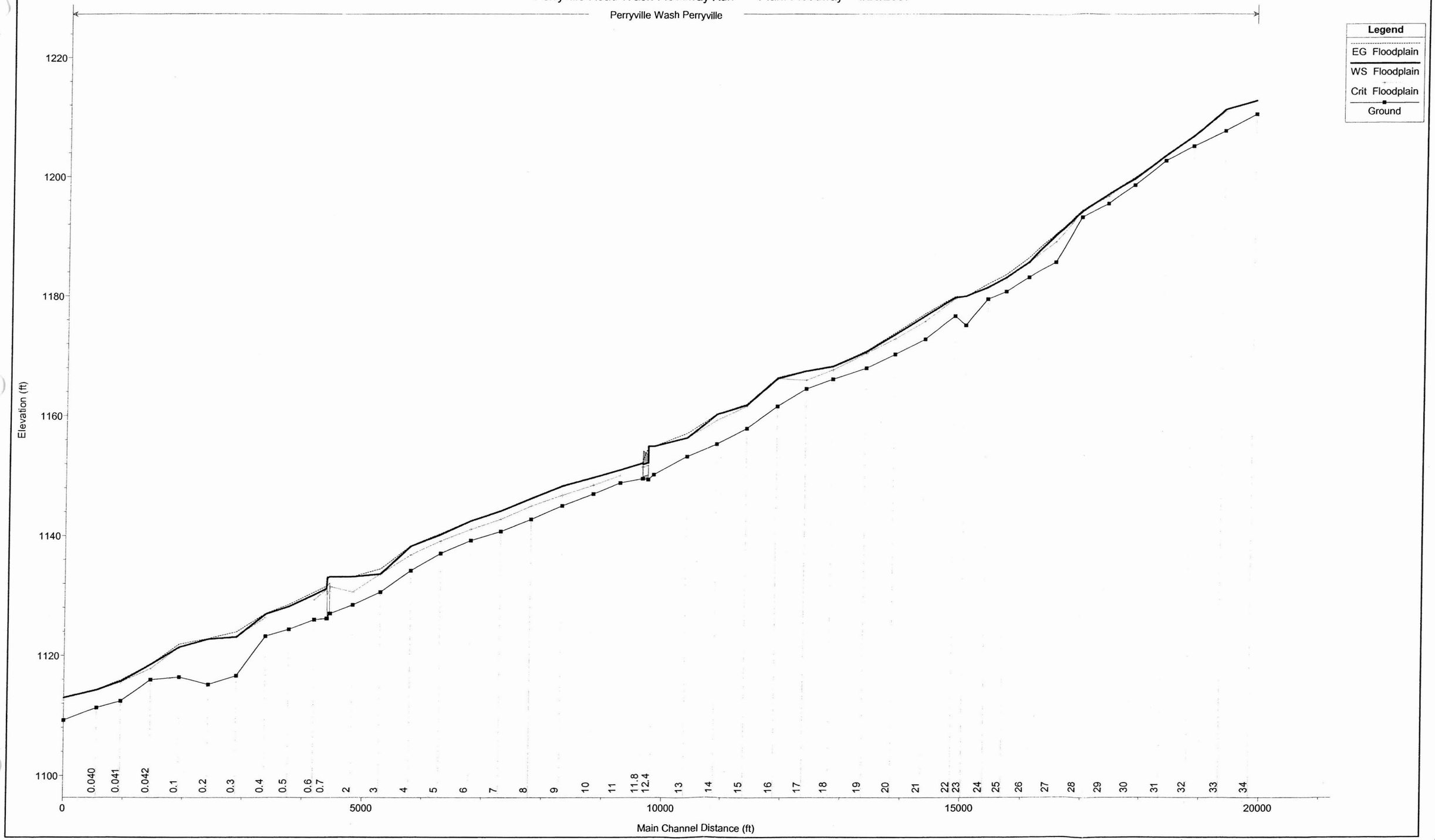
1 in Horiz. = 450 ft 1 in Vert. = 8 ft

FIGURE 3c

Perryville Road Wash

Perryville Road Wash Floodway Run Plan: Floodway 4/26/2007

Perryville Wash Perryville



1 in Horiz. = 1500 ft 1 in Vert. = 15 ft

TABLES

Table 1 – Duplicate Effective FIS Hydraulic Modeling Results

- **Table 1a** Beardsley Canal Wash (HEC-2)
- **Table 1b** Perryville Road Wash (Downstream, HEC-RAS)
- **Table 1c** Perryville Road Wash (Upstream, HEC-2)

Table 2 – Corrected FIS HEC-RAS Modeling Results

- **Table 2a** Beardsley Canal Wash (HEC-RAS)
- **Table 2b** Perryville Road Wash (Upstream HEC-RAS)

Table 3 – HEC-RAS Output Summary Table for Post-Project Conditions Models

- **Table 3a** Beardsley Canal Wash and NIC
- **Table 3b** Perryville Road Wash with Levee
- **Table 3c** Perryville Road Wash without Levee and Floodway

Table 4 – Summary of Discharge in FEMA FIS Format

Table 5 – Floodway Data in FEMA FIS Format

TABLE 1

Duplicate Effective FIS Hydraulic Modeling Results

TABLE 1a

Beardsley Canal Wash (HEC-2)

Table 1a

FLOODWAY DATA, WASH "1" - BEARDSLEY CANAL
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
.000	192.	540.	8.2	1192.8	1192.8	.0
.070	212.	512.	8.6	1195.2	1195.2	.0
.156	353.	720.	6.1	1198.3	1198.3	.0
.231	158.	457.	9.7	1200.3	1200.0	.3
.307	167.	563.	7.8	1203.2	1202.3	.9
.390	110.	401.	11.0	1208.1	1208.1	.0
.465	118.	424.	9.7	1211.4	1211.4	.0
.543	160.	623.	6.6	1213.9	1213.9	.0
.620	145.	603.	6.8	1215.1	1215.1	.0
.696	92.	371.	11.1	1217.2	1217.2	.0
.770	121.	604.	6.8	1219.9	1220.0	-.1
.846	140.	715.	5.4	1220.9	1220.2	.7
.920	104.	362.	10.8	1221.5	1221.5	.0
.998	74.	323.	12.0	1225.7	1225.7	.0
1.074	75.	353.	10.4	1229.0	1229.0	.0
1.148	189.	670.	5.5	1234.6	1234.6	.0
1.159	361.	1237.	3.4	1238.2	1238.2	.0
1.237	348.	1623.	2.9	1238.3	1238.3	.0
1.313	209.	842.	6.1	1238.5	1238.5	.0
1.388	143.	494.	10.4	1240.8	1240.7	.1
1.466	173.	533.	9.6	1245.7	1245.5	.2
1.556	131.	451.	8.5	1248.9	1249.1	-.2
1.616	199.	742.	2.8	1250.7	1250.7	.0
1.692	160.	297.	6.9	1250.8	1250.8	.0
1.768	177.	379.	5.4	1253.9	1253.6	.3
1.844	75.	212.	9.7	1259.4	1259.4	.0
1.920	76.	273.	7.5	1262.8	1262.8	.0
1.996	63.	200.	10.2	1265.6	1265.6	.0
2.072	68.	282.	6.2	1269.4	1269.1	.3
2.159	17.	118.	14.9	1274.7	1274.7	.0
2.167	633.	2033.	1.1	1278.1	1278.1	.0
2.186	608.	1952.	1.2	1278.1	1278.1	.0
2.267	382.	981.	2.3	1278.1	1278.1	.0
2.330	123.	357.	2.8	1278.6	1278.6	.0
2.392	103.	149.	6.7	1280.6	1279.7	.9
2.468	101.	210.	4.8	1283.9	1283.0	.9
2.553	108.	224.	4.4	1286.2	1285.7	.5
2.640	110.	357.	2.8	1287.5	1287.3	.2
2.741	50.	126.	5.6	1288.6	1288.0	.6
2.826	72.	242.	2.9	1289.8	1289.1	.7
2.907	64.	97.	7.3	1294.6	1294.6	.0
3.009	86.	121.	5.9	1301.4	1301.3	.1
3.081	75.	193.	3.7	1303.2	1303.2	.0
3.167	54.	142.	2.1	1303.9	1303.9	.0
3.214	67.	56.	5.3	1304.2	1304.2	.0
3.301	54.	69.	4.3	1308.6	1308.6	.0
3.383	32.	51.	5.8	1311.6	1311.6	.0
3.460	25.	49.	6.1	1315.5	1315.5	.0
3.540	50.	74.	4.0	1318.8	1318.8	.0
3.610	54.	46.	3.2	1320.8	1320.8	.0
3.678	37.	69.	2.1	1321.7	1321.7	.0

TABLE 1b

Perryville Road Wash (Downstream, HEC-RAS)

HEC-RAS Plan: Plan 01 River: Camelback Road W Reach: Camelback Main 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)	
Camelback Main	42	PF 1	883.17	1115.92	1118.61		1118.64	0.000944	1.04	653.15	551.62	0.12
Camelback Main	41	PF 1	639.53	1112.40	1115.27	1115.26	1115.50	0.028093	4.59	166.19	358.73	0.60
Camelback Main	40	PF 1	826.68	1111.29	1114.27		1114.36	0.001175	1.13	384.28	317.51	0.13
Camelback Main	39	PF 1	1054.85	1109.22	1112.96		1113.08	0.004987	2.31	383.84	422.28	0.26
Camelback Main	38	PF 1	1009.55	1107.35	1112.02		1112.16	0.000926	4.18	544.43	527.79	0.37
Camelback Main	37	PF 1	1127.62	1103.73	1109.44	1108.76	1111.07	0.005445	10.24	111.73	34.18	0.81
Camelback Main	36.9		Culvert									
Camelback Main	36.4	PF 1	1133.01	1103.53	1109.07	1109.07	1109.76	0.002120	6.79	187.39	83.19	0.56
Camelback Main	36	PF 1	1153.64	1100.04	1106.47	1106.47	1106.88	0.004014	7.58	556.75	677.17	0.67
Camelback Main	35	PF 1	996.64	1097.94	1104.18	1104.18	1104.51	0.002926	6.59	528.44	698.20	0.59
Camelback Main	34	PF 1	697.85	1095.66	1100.73		1100.92	0.003371	4.87	291.79	514.08	0.48
Camelback Main	33	PF 1	673.99	1093.67	1098.59	1098.59	1098.87	0.005038	5.83	233.50	446.81	0.58
Camelback Main	32	PF 1	702.49	1090.52	1096.35	1096.09	1096.43	0.001199	3.33	450.97	610.84	0.28
Camelback Main	31.9		Culvert									
Camelback Main	31.4	PF 1	696.72	1090.28	1094.20	1092.51	1094.33	0.001477	2.87	243.34	106.12	0.33
Camelback Main	31	PF 1	711.49	1088.94	1093.16	1093.14	1093.43	0.006559	6.11	226.43	366.96	0.65
Camelback Main	30	PF 1	737.27	1085.92	1090.49	1090.32	1090.68	0.003916	5.15	265.61	350.61	0.54
Camelback Main	29	PF 1	759.99	1084.29	1088.45	1088.30	1088.63	0.004294	5.28	272.62	371.19	0.56
Camelback Main	28	PF 1	755.31	1082.38	1086.84	1086.63	1086.95	0.002634	4.18	346.84	488.07	0.43
Camelback Main	27	PF 1	567.89	1079.87	1085.12	1085.12	1085.38	0.002972	5.06	217.05	395.81	0.46
Camelback Main	26.9	PF 1	518.30	1079.77	1084.30	1082.31	1084.58	0.001834	4.32	134.60	126.15	0.39
Camelback Main	26.7		Culvert									
Camelback Main	26.4	PF 1	526.89	1079.69	1082.51	1082.51	1082.68	0.002931	4.35	227.22	416.97	0.47
Camelback Main	26	PF 1	582.34	1077.68	1078.45	1078.24	1078.86	0.007121	2.27	115.52	89.42	0.58
Camelback Main	25	PF 1	696.88	1074.33	1075.73		1075.97	0.002344	0.87	183.52	88.43	0.16
Camelback Main	24	PF 1	748.18	1070.13	1074.34		1074.48	0.001198	1.24	279.43	112.43	0.13
Camelback Main	23	PF 1	575.19	1068.44	1073.94	1071.29	1074.12	0.001133	3.40	169.18	42.11	0.30
Camelback Main	22.3		Culvert									
Camelback Main	22	PF 1	437.32	1068.01	1070.23	1070.23	1071.13	0.013173	7.62	58.33	34.06	0.96
Camelback Main	21	PF 1	556.83	1061.98	1067.76		1068.05	0.002320	4.71	163.12	156.92	0.43
Camelback Main	20	PF 1	676.33	1060.29	1066.24		1066.80	0.002564	6.25	147.90	145.36	0.59
Camelback Main	19	PF 1	795.84	1059.86	1064.93		1065.49	0.002682	6.63	206.07	231.49	0.61
Camelback Main	18	PF 1	910.00	1058.34	1063.34	1063.34	1063.59	0.004863	5.58	325.90	477.95	0.58
Camelback Main	17	PF 1	1065.71	1055.19	1062.34	1058.58	1062.45	0.000634	3.16	562.54	415.80	0.22
Camelback Main	16.9		Culvert									
Camelback Main	16.4	PF 1	971.81	1054.83	1060.85	1058.13	1061.06	0.002500	4.03	355.03	361.98	0.30
Camelback Main	16	PF 1	1033.84	1056.05	1060.20		1060.26	0.002267	2.39	539.83	500.96	0.27
Camelback Main	15	PF 1	951.62	1055.41	1059.39		1059.45	0.002308	2.36	499.48	449.21	0.25
Camelback Main	14	PF 1	592.57	1053.77	1057.66		1057.79	0.003969	4.33	277.37	466.91	0.50
Camelback Main	13	PF 1	393.66	1052.76	1056.62		1056.66	0.001106	2.59	314.27	499.54	0.30
Camelback Main	12	PF 1	362.96	1051.70	1055.64		1055.86	0.004447	4.94	157.06	404.08	0.58

HEC-RAS Plan: Plan 01 River: Camelback Road W Reach: Camelback Main Profile: PF 1 (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)	
Camelback Main	11	PF 1	469.34	1048.24	1055.66	1049.94	1055.69	0.000095	1.42	422.03	441.37	0.10
Camelback Main	10.7		Culvert									
Camelback Main	10.4	PF 1	220.59	1048.24	1055.01	1049.21	1055.02	0.000016	0.59	379.87	88.23	0.04
Camelback Main	10	PF 1	110.85	1050.70	1054.95		1055.00	0.000464	1.81	69.68	54.34	0.20
Camelback Main	9	PF 1	133.06	1050.46	1054.63		1054.70	0.000726	2.25	65.11	40.72	0.25
Camelback Main	8	PF 1	154.84	1049.63	1054.33		1054.39	0.000526	2.00	89.04	53.14	0.22
Camelback Main	7	PF 1	177.06	1049.48	1053.92		1054.02	0.000980	2.68	70.93	31.95	0.29
Camelback Main	6	PF 1	205.81	1048.39	1053.17		1053.29	0.001212	2.91	80.90	33.43	0.30
Camelback Main	5	PF 1	205.81	1048.35	1052.32		1052.50	0.002142	3.46	74.56	122.18	0.39
Camelback Main	4	PF 1	205.81	1047.01	1051.29		1051.46	0.001856	3.31	62.70	26.16	0.36
Camelback Main	3	PF 1	205.81	1045.65	1050.44		1050.61	0.001836	3.27	62.85	24.01	0.36
Camelback Main	2	PF 1	205.81	1044.77	1049.65		1049.75	0.001543	2.80	84.92	56.28	0.30
Camelback Main	1	PF 1	205.81	1043.70	1048.55	1046.51	1048.68	0.001503	2.82	72.97	123.42	0.30

TABLE 1c

Perryville Road Wash (Upstream, HEC-2)

Table 1c

FLOODWAY DATA, PERRYVILLE ROAD WASH - W
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
.000	384.	155.	3.0	1121.3	1121.3	.0
.088	473.	534.	2.1	1123.0	1123.0	.0
.177	355.	595.	2.1	1124.4	1124.4	.0
.265	349.	341.	3.6	1126.4	1126.4	.0
.350	388.	668.	1.8	1128.8	1128.8	.0
.422	317.	397.	3.1	1130.0	1129.9	.1
.489	268.	409.	2.9	1131.7	1131.7	.0
.523	155.	270.	4.4	1132.4	1132.4	.0
.606	109.	163.	7.3	1134.5	1134.6	-.1
.686	135.	298.	4.0	1137.4	1137.3	.1
.736	130.	173.	6.9	1138.4	1138.4	.0
.830	123.	227.	5.3	1142.1	1142.1	.0
.938	201.	318.	3.7	1144.4	1144.4	.0
1.025	193.	242.	4.6	1146.4	1146.4	.0
1.123	220.	331.	4.0	1148.9	1148.9	.0
1.225	327.	601.	2.5	1150.2	1150.2	.0
1.318	253.	383.	3.9	1151.2	1151.2	.0
1.389	235.	667.	2.2	1151.9	1151.9	.0
1.429	137.	296.	4.7	1152.1	1152.1	.0
1.463	242.	374.	3.7	1152.9	1152.9	.0
1.545	169.	301.	4.6	1154.8	1154.7	.1
1.640	257.	295.	4.9	1157.8	1157.8	.0
1.737	136.	337.	4.4	1161.0	1160.7	.3
1.851	50.	150.	9.9	1165.4	1165.4	.0
1.937	101.	360.	4.1	1168.4	1168.4	.0
2.018	122.	372.	4.0	1169.1	1169.1	.0
2.066	114.	556.	2.7	1169.6	1169.6	.0
2.136	95.	202.	7.4	1169.6	1169.5	.1
2.216	87.	264.	5.6	1172.8	1172.8	.0
2.303	97.	201.	7.4	1175.5	1175.5	.0
2.381	122.	251.	5.9	1178.7	1178.4	.3
2.453	210.	344.	4.2	1182.1	1181.9	.2
2.501	193.	470.	3.1	1184.0	1183.6	.4
2.576	293.	368.	3.9	1185.1	1185.1	.0
2.626	325.	353.	4.1	1187.0	1186.9	.1
2.704	273.	543.	2.7	1189.5	1189.3	.2
2.785	350.	375.	3.9	1193.5	1193.5	.0
2.874	400.	571.	2.5	1197.5	1197.2	.3
2.955	328.	499.	2.9	1199.4	1199.2	.2
3.045	462.	473.	3.1	1202.2	1201.9	.3
3.116	350.	530.	2.7	1205.1	1204.4	.7
3.197	320.	545.	2.7	1207.8	1207.2	.6
3.262	300.	413.	3.5	1210.1	1210.0	.1
3.326	322.	431.	3.4	1212.7	1212.7	.0
3.400	377.	499.	2.9	1215.2	1215.2	.0
3.461	456.	389.	3.7	1217.8	1217.8	.0
3.549	698.	356.	4.1	1222.6	1222.6	.0
3.558	792.	379.	3.8	1225.6	1225.6	.0
3.653	732.	1584.	.9	1226.6	1226.6	.0
3.681	259.	300.	4.9	1226.6	1226.6	.0
3.727	179.	306.	4.9	1229.3	1229.3	.0

TABLE 2

Corrected FIS HEC-RAS Modeling Results

TABLE 2a

Beardsley Canal Wash (HEC-RAS)

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW

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)	
BCW	3.678	Floodplain	148.00	1318.80	1321.75		1321.82	0.001120	2.14	69.20	36.83	0.27
BCW	3.678	Floodway	148.00	1318.80	1321.75		1321.83	0.001117	2.14	69.23	36.79	0.27
BCW	3.61	Floodplain	148.00	1318.30	1320.67	1320.40	1320.97	0.007436	4.50	40.04	49.15	0.67
BCW	3.61	Floodway	148.00	1318.30	1320.66	1320.40	1320.96	0.007578	4.53	39.67	48.82	0.68
BCW	3.54	Floodplain	313.00	1316.30	1318.96		1319.17	0.003985	3.69	84.93	52.01	0.51
BCW	3.54	Floodway	313.00	1316.30	1318.95		1319.17	0.003971	3.72	84.21	50.45	0.51
BCW	3.46	Floodplain	313.00	1312.60	1315.25	1315.25	1316.13	0.016028	7.51	41.65	24.17	1.01
BCW	3.46	Floodway	313.00	1312.60	1315.25	1315.25	1316.13	0.016015	7.51	41.66	24.17	1.01
BCW	3.383	Floodplain	313.00	1309.10	1312.11	1311.43	1312.44	0.004979	4.60	68.01	35.76	0.58
BCW	3.383	Floodway	313.00	1309.10	1312.09	1311.43	1312.44	0.004970	4.71	66.45	32.16	0.58
BCW	3.301	Floodplain	313.00	1306.10	1308.18	1308.18	1308.86	0.016312	6.60	47.89	40.47	1.00
BCW	3.301	Floodway	313.00	1306.10	1308.18	1308.18	1308.86	0.016312	6.60	47.89	40.47	1.00
BCW	3.214	Floodplain	313.00	1302.70	1304.82		1304.98	0.003507	3.25	98.69	72.52	0.47
BCW	3.214	Floodway	313.00	1302.70	1304.80		1304.97	0.003707	3.31	95.57	66.87	0.48
BCW	3.167	Floodplain	313.00	1299.80	1304.70		1304.74	0.000354	1.65	199.72	95.33	0.17
BCW	3.167	Floodway	313.00	1299.80	1304.69		1304.74	0.000333	1.70	184.44	54.28	0.16
BCW	3.081	Floodplain	1048.00	1297.50	1303.89		1304.22	0.001827	4.71	250.59	88.65	0.40
BCW	3.081	Floodway	1048.00	1297.50	1303.90		1304.23	0.001810	4.70	246.67	75.51	0.40
BCW	3.009	Floodplain	1048.00	1296.60	1301.94	1301.94	1302.87	0.008505	8.49	181.57	112.88	0.82
BCW	3.009	Floodway	1048.00	1296.60	1301.88	1301.88	1302.85	0.009058	8.66	167.16	85.75	0.84
BCW	2.907	Floodplain	1048.00	1291.30	1295.19	1295.19	1296.25	0.010968	8.44	142.00	84.11	0.92
BCW	2.907	Floodway	1048.00	1291.30	1295.16	1295.16	1296.27	0.011562	8.60	133.45	63.51	0.94
BCW	2.826	Floodplain	1048.00	1285.70	1289.74		1289.90	0.001496	3.55	427.75	199.21	0.35
BCW	2.826	Floodway	1048.00	1285.70	1290.65		1290.84	0.001093	3.48	301.39	71.71	0.30
BCW	2.741	Floodplain	1048.00	1283.90	1288.26		1288.65	0.006593	6.03	284.77	169.79	0.69
BCW	2.741	Floodway	1048.00	1283.90	1288.72		1289.67	0.009496	7.78	134.63	49.91	0.84

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW (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)	
BCW	2.64	Floodplain	1048.00	1282.90	1287.48		1287.55	0.000879	2.61	592.81	199.63	0.27
BCW	2.64	Floodway	1048.00	1282.90	1287.69		1287.84	0.001447	3.52	368.00	110.11	0.34
BCW	2.553	Floodplain	1048.00	1282.10	1285.79	1285.62	1286.54	0.008999	7.26	186.04	123.64	0.82
BCW	2.553	Floodway	1048.00	1282.10	1286.25		1286.72	0.004617	5.83	233.54	108.42	0.60
BCW	2.468	Floodplain	1048.00	1279.70	1283.20	1282.58	1283.35	0.005175	3.99	366.48	290.81	0.57
BCW	2.468	Floodway	1048.00	1279.70	1284.01	1283.47	1284.43	0.005556	5.48	213.87	101.32	0.63
BCW	2.392	Floodplain	1048.00	1275.40	1279.72	1279.72	1280.29	0.012034	7.14	189.76	163.27	0.90
BCW	2.392	Floodway	1048.00	1275.40	1280.73	1280.73	1281.61	0.008891	7.81	160.69	103.38	0.81
BCW	2.33	Floodplain	1048.00	1273.30	1278.95		1279.08	0.000947	3.24	530.12	268.01	0.29
BCW	2.33	Floodway	1048.00	1273.30	1278.96		1279.11	0.001008	3.39	404.06	122.88	0.30
BCW	2.267	Floodplain	2715.00	1271.10	1277.16	1277.16	1277.88	0.008153	8.80	644.45	366.20	0.82
BCW	2.267	Floodway	2715.00	1271.10	1277.16	1277.16	1277.88	0.008153	8.80	644.45	366.20	0.82
BCW	2.186	Floodplain	2715.00	1269.50	1276.69		1276.80	0.000192	2.90	1232.04	442.32	0.20
BCW	2.186	Floodway	2715.00	1269.50	1276.69		1276.80	0.000192	2.90	1232.04	442.32	0.20
BCW	2.167	Floodplain	1115.00	1267.60	1276.72	1274.08	1276.74	0.000074	1.58	1204.26	553.37	0.10
BCW	2.167	Floodway	1115.00	1267.60	1276.72	1274.08	1276.74	0.000074	1.58	1204.26	553.37	0.10
BCW	2.163		Bridge									
BCW	2.159	Floodplain	1115.00	1267.20	1273.17	1273.17	1273.88	0.002413	8.04	223.34	161.44	0.61
BCW	2.159	Floodway	1115.00	1267.20	1273.17	1273.17	1273.88	0.002413	8.04	223.34	161.44	0.61
BCW	2.072	Floodplain	1115.00	1263.50	1267.96		1268.36	0.003759	5.69	268.61	167.54	0.55
BCW	2.072	Floodway	1115.00	1263.50	1268.07		1268.65	0.004542	6.37	191.41	65.18	0.61
BCW	1.996	Floodplain	1115.00	1260.40	1264.27	1264.27	1265.51	0.013825	8.96	124.45	50.76	1.01
BCW	1.996	Floodway	1115.00	1260.40	1264.27	1264.27	1265.51	0.013821	8.96	124.46	50.76	1.01
BCW	1.92	Floodplain	1115.00	1255.20	1261.12		1261.73	0.004082	6.28	177.44	48.39	0.58
BCW	1.92	Floodway	1115.00	1255.20	1261.10		1261.72	0.004133	6.31	176.59	48.26	0.58
BCW	1.844	Floodplain	1115.00	1252.40	1257.61	1257.43	1259.06	0.011394	9.67	115.29	35.04	0.94

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW (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)	
BCW	1.844	Floodway	1115.00	1252.40	1257.65	1257.45	1259.07	0.011014	9.55	116.71	35.20	0.92
BCW	1.768	Floodplain	1115.00	1250.70	1252.51	1252.51	1252.96	0.019094	6.38	211.75	233.91	1.18
BCW	1.768	Floodway	1115.00	1250.70	1252.82	1252.82	1253.38	0.017137	6.70	187.61	166.80	1.15
BCW	1.692	Floodplain	1115.00	1247.70	1252.12		1252.19	0.000445	2.11	537.38	186.47	0.20
BCW	1.692	Floodway	1115.00	1247.70	1252.06		1252.14	0.000465	2.14	510.22	161.20	0.20
BCW	1.616	Floodplain	1115.00	1244.00	1252.10		1252.12	0.000067	1.20	1072.60	250.00	0.08
BCW	1.616	Floodway	1115.00	1244.00	1252.05		1252.07	0.000064	1.17	1024.14	199.96	0.08
BCW	1.556	Floodplain	5679.00	1241.00	1249.58	1249.58	1251.57	0.006599	11.72	549.02	163.94	0.82
BCW	1.556	Floodway	5679.00	1241.00	1249.60	1249.60	1251.54	0.006405	11.57	545.75	138.48	0.80
BCW	1.466	Floodplain	5679.00	1237.50	1245.83	1245.83	1247.55	0.009921	11.73	556.40	175.95	0.94
BCW	1.466	Floodway	5679.00	1237.50	1246.02	1245.97	1247.55	0.008435	11.09	588.86	179.25	0.87
BCW	1.388	Floodplain	5679.00	1234.50	1241.04	1241.04	1242.55	0.014257	12.35	609.05	202.06	1.10
BCW	1.388	Floodway	5679.00	1234.50	1241.18	1241.18	1243.03	0.014771	12.87	537.88	142.78	1.12
BCW	1.313	Floodplain	5679.00	1230.80	1238.38		1239.33	0.004407	8.50	815.54	203.15	0.65
BCW	1.313	Floodway	5679.00	1230.80	1238.39		1239.33	0.004383	8.49	817.23	203.54	0.65
BCW	1.237	Floodplain	5679.00	1227.80	1237.72		1238.14	0.001655	6.69	1413.54	342.21	0.42
BCW	1.237	Floodway	5679.00	1227.80	1237.74		1238.15	0.001634	6.66	1420.10	342.41	0.42
BCW	1.159	Floodplain	5679.00	1224.40	1237.20	1234.51	1237.71	0.000675	6.68	1010.92	164.93	0.36
BCW	1.159	Floodway	5679.00	1224.40	1237.22	1234.51	1237.73	0.000668	6.65	1014.69	167.13	0.35
BCW	1.1535		Bridge									
BCW	1.148	Floodplain	5679.00	1224.00	1235.08	1234.51	1236.10	0.002041	10.37	770.33	193.08	0.60
BCW	1.148	Floodway	5679.00	1224.00	1235.39	1234.51	1236.25	0.001606	9.41	828.75	189.42	0.54
BCW	1.074	Floodplain	7131.00	1221.00	1231.16	1231.16	1234.17	0.005759	14.14	541.61	103.64	0.91
BCW	1.074	Floodway	7131.00	1221.00	1230.90	1230.90	1234.27	0.006657	14.85	495.63	75.41	0.97
BCW	0.998	Floodplain	7131.00	1218.30	1228.33	1228.33	1231.40	0.005691	14.42	544.12	94.43	0.91
BCW	0.998	Floodway	7131.00	1218.30	1228.10	1228.10	1231.56	0.006570	15.18	497.55	74.31	0.98

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW (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)	
BCW	0.92	Floodplain	7131.00	1215.60	1223.31	1223.31	1225.52	0.006418	12.25	641.82	151.57	0.92
BCW	0.92	Floodway	7131.00	1215.60	1223.48	1223.26	1225.92	0.006800	12.58	572.53	103.74	0.93
BCW	0.846	Floodplain	7131.00	1213.60	1222.49		1223.24	0.001535	7.90	1282.48	295.00	0.49
BCW	0.846	Floodway	7131.00	1213.60	1223.75		1224.50	0.001151	7.52	1113.37	140.18	0.43
BCW	0.77	Floodplain	7567.00	1211.30	1222.53		1222.75	0.000533	5.02	2475.60	470.00	0.29
BCW	0.77	Floodway	7567.00	1211.30	1222.68		1223.87	0.001891	9.56	941.72	121.15	0.55
BCW	0.696	Floodplain	7567.00	1210.00	1220.72	1220.72	1222.22	0.002699	10.97	1084.86	398.59	0.65
BCW	0.696	Floodway	7567.00	1210.00	1219.35	1219.35	1222.46	0.006142	14.80	570.33	91.66	0.95
BCW	0.62	Floodplain	7567.00	1207.80	1217.19		1217.57	0.001148	6.23	1868.48	449.75	0.41
BCW	0.62	Floodway	7567.00	1207.80	1217.15		1218.41	0.002759	9.63	899.44	145.50	0.63
BCW	0.543	Floodplain	7567.00	1206.70	1216.19		1216.93	0.002007	8.24	1345.86	322.94	0.54
BCW	0.543	Floodway	7567.00	1206.70	1216.21		1217.28	0.002499	9.22	989.74	159.63	0.60
BCW	0.465	Floodplain	7567.00	1205.00	1213.16	1213.16	1215.47	0.006008	12.42	669.79	177.08	0.90
BCW	0.465	Floodway	7567.00	1205.00	1212.89	1212.89	1215.52	0.007189	13.17	597.74	117.93	0.98
BCW	0.39	Floodplain	7567.00	1201.80	1209.98	1209.98	1212.30	0.006360	12.41	646.71	149.78	0.92
BCW	0.39	Floodway	7567.00	1201.80	1209.81	1209.81	1212.48	0.007440	13.15	581.35	110.14	0.99
BCW	0.307	Floodplain	7567.00	1197.70	1203.39	1203.39	1204.82	0.005441	10.11	820.56	290.00	1.02
BCW	0.307	Floodway	7567.00	1197.70	1204.38	1203.76	1205.85	0.003640	9.74	777.08	175.63	0.82
BCW	0.231	Floodplain	7567.00	1196.00	1201.03		1202.03	0.005772	8.59	963.79	345.47	0.84
BCW	0.231	Floodway	7567.00	1196.00	1201.59	1201.59	1203.66	0.008523	11.55	655.05	160.67	1.01
BCW	0.156	Floodplain	7567.00	1193.90	1199.27		1200.18	0.004024	7.95	1085.98	397.22	0.74
BCW	0.156	Floodway	7567.00	1193.90	1199.25		1200.17	0.004096	7.99	1056.79	353.00	0.74
BCW	0.07	Floodplain	7567.00	1192.00	1196.34	1196.34	1197.88	0.006184	10.07	807.04	331.56	0.92
BCW	0.07	Floodway	7567.00	1192.00	1196.45	1196.18	1197.94	0.005700	9.86	784.18	211.97	0.88
BCW	0	Floodplain	7567.00	1189.40	1194.00	1193.76	1195.62	0.005506	10.43	775.50	214.95	0.88
BCW	0	Floodway	7567.00	1189.40	1193.75	1193.75	1195.60	0.006768	11.12	714.71	191.88	0.97

TABLE 2b

Perryville Road Wash (Upstream HEC-RAS)

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-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)	
Reach-1	3.727	PF 1	1486.00	1226.50	1229.25		1229.66	0.009781	5.18	303.78	178.49	0.65
Reach-1	3.727	PF 2	1486.00	1226.50	1229.25		1229.66	0.009794	5.18	303.65	178.47	0.65
Reach-1	3.681	PF 1	1457.00	1224.00	1226.60		1227.00	0.012565	5.08	307.84	263.03	0.71
Reach-1	3.681	PF 2	1457.00	1224.00	1226.60		1226.99	0.012554	5.08	307.74	258.71	0.71
Reach-1	3.653	PF 1	1457.00	1224.00	1226.59		1226.60	0.000531	1.13	1597.23	734.14	0.15
Reach-1	3.653	PF 2	1457.00	1224.00	1226.59		1226.60	0.000531	1.13	1596.68	732.39	0.15
Reach-1	3.558	PF 1	1457.00	1225.00	1225.64	1225.64	1225.88	0.008473	4.02	377.87	794.25	0.98
Reach-1	3.558	PF 2	1457.00	1225.00	1225.64	1225.64	1225.88	0.008437	4.02	378.06	792.46	0.98
Reach-1	3.549	PF 1	1450.00	1222.00	1222.59	1222.59	1222.85	0.011545	4.08	355.80	698.00	1.01
Reach-1	3.549	PF 2	1450.00	1222.00	1222.60	1222.60	1222.85	0.011479	4.07	356.48	698.32	1.00
Reach-1	3.461	PF 1	1450.00	1215.10	1217.83	1217.47	1218.16	0.012925	6.42	393.17	313.75	0.91
Reach-1	3.461	PF 2	1450.00	1215.10	1217.82	1217.46	1218.15	0.013168	6.46	390.27	310.89	0.92
Reach-1	3.4	PF 1	1450.00	1210.90	1215.25		1215.59	0.005081	6.11	517.00	380.60	0.63
Reach-1	3.4	PF 2	1450.00	1210.90	1215.25		1215.59	0.005014	6.08	518.64	377.43	0.63
Reach-1	3.326	PF 1	1450.00	1208.50	1212.74		1213.29	0.007155	8.22	446.61	323.47	0.78
Reach-1	3.326	PF 2	1450.00	1208.50	1212.73		1213.29	0.007274	8.27	443.31	322.19	0.78
Reach-1	3.262	PF 1	1450.00	1206.80	1209.99	1209.86	1210.37	0.010671	6.86	445.72	388.87	0.86
Reach-1	3.262	PF 2	1450.00	1206.80	1210.06		1210.44	0.009776	6.73	415.83	300.00	0.83
Reach-1	3.197	PF 1	1450.00	1204.90	1207.19		1207.33	0.007217	5.21	651.26	573.48	0.70
Reach-1	3.197	PF 2	1450.00	1204.90	1207.75		1207.94	0.005424	5.44	548.12	319.52	0.63
Reach-1	3.116	PF 1	1450.00	1202.60	1204.45		1204.51	0.005659	3.15	804.19	748.27	0.56
Reach-1	3.116	PF 2	1450.00	1202.60	1205.15		1205.32	0.006613	4.87	534.55	350.00	0.66
Reach-1	3.045	PF 1	1450.00	1200.70	1201.96	1201.50	1202.06	0.008138	3.65	683.48	807.62	0.67
Reach-1	3.045	PF 2	1450.00	1200.70	1202.23	1202.00	1202.46	0.009427	4.66	474.11	462.00	0.75
Reach-1	2.955	PF 1	1450.00	1197.30	1199.22	1198.86	1199.41	0.006150	4.66	601.78	544.01	0.64
Reach-1	2.955	PF 2	1450.00	1197.30	1199.44		1199.65	0.005322	4.70	504.66	328.00	0.61

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (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-1	2.874	PF 1	1450.00	1195.30	1197.20		1197.31	0.004051	3.61	752.76	688.95	0.51
Reach-1	2.874	PF 2	1450.00	1195.30	1197.48		1197.66	0.004247	4.14	567.11	400.00	0.54
Reach-1	2.785	PF 1	1450.00	1191.60	1193.58	1193.58	1193.95	0.016639	8.05	479.09	562.84	1.06
Reach-1	2.785	PF 2	1450.00	1191.60	1193.61	1193.61	1194.06	0.018335	8.52	389.00	350.00	1.12
Reach-1	2.704	PF 1	1450.00	1185.70	1189.31		1189.51	0.003994	5.23	581.19	335.42	0.56
Reach-1	2.704	PF 2	1450.00	1185.70	1189.49		1189.70	0.003592	5.17	553.01	273.00	0.53
Reach-1	2.626	PF 1	1450.00	1183.20	1187.04		1187.45	0.006977	6.76	511.81	537.39	0.73
Reach-1	2.626	PF 2	1450.00	1183.20	1187.16		1187.69	0.007469	7.22	401.54	307.80	0.76
Reach-1	2.576	PF 1	1450.00	1181.10	1185.23		1185.75	0.004987	7.14	460.61	346.78	0.66
Reach-1	2.576	PF 2	1450.00	1181.10	1185.15		1185.78	0.005907	7.66	376.72	233.41	0.71
Reach-1	2.501	PF 1	1450.00	1178.80	1183.59		1184.05	0.005301	6.84	429.15	259.74	0.66
Reach-1	2.501	PF 2	1450.00	1178.80	1184.00		1184.30	0.003160	5.67	469.64	193.34	0.52
Reach-1	2.453	PF 1	1450.00	1180.00	1181.85	1181.39	1181.98	0.007025	4.77	713.84	733.18	0.67
Reach-1	2.453	PF 2	1450.00	1180.00	1182.08	1181.71	1182.47	0.011838	6.78	352.73	210.00	0.90
Reach-1	2.381	PF 1	1484.00	1173.70	1178.44	1178.44	1179.38	0.006382	8.32	262.10	186.38	0.74
Reach-1	2.381	PF 2	1484.00	1173.70	1178.62		1179.49	0.005539	7.98	250.36	122.00	0.70
Reach-1	2.303	PF 1	1484.00	1170.70	1175.49	1175.49	1176.24	0.006551	7.72	326.12	261.50	0.74
Reach-1	2.303	PF 2	1484.00	1170.70	1175.50	1175.50	1176.65	0.008714	8.92	202.97	97.00	0.85
Reach-1	2.216	PF 1	1484.00	1168.30	1172.88	1172.15	1173.33	0.003818	6.29	383.73	193.77	0.57
Reach-1	2.216	PF 2	1484.00	1168.30	1172.83		1173.50	0.005020	7.16	262.72	87.00	0.66
Reach-1	2.136	PF 1	1484.00	1166.00	1169.54	1169.54	1170.65	0.011959	8.62	188.46	95.72	0.95
Reach-1	2.136	PF 2	1484.00	1166.00	1169.71	1169.58	1170.65	0.009444	8.00	204.52	95.00	0.86
Reach-1	2.066	PF 1	1484.00	1163.50	1169.60		1169.69	0.000540	3.20	895.44	308.84	0.23
Reach-1	2.066	PF 2	1484.00	1163.50	1169.59		1169.74	0.000746	3.76	556.25	113.97	0.27
Reach-1	2.018	PF 1	1484.00	1164.50	1169.13		1169.43	0.001939	4.61	416.57	201.00	0.41
Reach-1	2.018	PF 2	1484.00	1164.50	1169.13		1169.43	0.001958	4.63	371.77	122.02	0.41

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (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-1	1.937	PF 1	1484.00	1163.00	1168.38		1168.66	0.001625	4.30	359.21	101.26	0.38
Reach-1	1.937	PF 2	1484.00	1163.00	1168.38		1168.66	0.001627	4.30	359.10	101.25	0.38
Reach-1	1.851	PF 1	1484.00	1160.00	1165.44	1165.44	1166.95	0.012819	9.84	150.76	50.13	1.00
Reach-1	1.851	PF 2	1484.00	1160.00	1165.44	1165.44	1166.95	0.012915	9.87	150.33	50.06	1.00
Reach-1	1.737	PF 1	1484.00	1156.10	1160.76		1160.99	0.003715	4.85	529.15	336.76	0.53
Reach-1	1.737	PF 2	1484.00	1156.10	1160.99		1161.40	0.004670	5.76	335.47	136.15	0.60
Reach-1	1.64	PF 1	1433.00	1153.30	1157.86	1157.77	1158.49	0.006340	7.02	316.98	267.78	0.71
Reach-1	1.64	PF 2	1433.00	1153.30	1157.81	1157.81	1158.49	0.006870	7.23	303.90	261.68	0.74
Reach-1	1.545	PF 1	1375.00	1151.50	1154.75		1155.28	0.006247	6.23	283.97	172.15	0.69
Reach-1	1.545	PF 2	1375.00	1151.50	1154.86		1155.33	0.005208	5.86	303.23	169.30	0.63
Reach-1	1.463	PF 1	1375.00	1149.60	1152.93		1153.18	0.003638	4.47	496.62	408.86	0.52
Reach-1	1.463	PF 2	1375.00	1149.60	1152.90		1153.23	0.004395	4.88	374.83	242.03	0.57
Reach-1	1.429	PF 1	1375.00	1148.40	1152.11		1152.45	0.004311	4.69	293.19	137.77	0.56
Reach-1	1.429	PF 2	1375.00	1148.40	1152.13		1152.47	0.004131	4.64	296.81	137.06	0.55
Reach-1	1.389	PF 1	1477.00	1147.50	1151.96		1152.04	0.000668	2.33	813.41	419.72	0.23
Reach-1	1.389	PF 2	1477.00	1147.50	1151.97		1152.05	0.000711	2.41	669.66	234.75	0.24
Reach-1	1.318	PF 1	1477.00	1146.50	1151.21		1151.56	0.002833	4.81	392.16	257.79	0.48
Reach-1	1.318	PF 2	1477.00	1146.50	1151.21		1151.55	0.002833	4.80	391.71	252.90	0.48
Reach-1	1.225	PF 1	1477.00	1145.50	1150.24		1150.45	0.001726	4.04	603.68	329.38	0.38
Reach-1	1.225	PF 2	1477.00	1145.50	1150.24		1150.45	0.001716	4.04	604.51	327.00	0.38
Reach-1	1.123	PF 1	1335.00	1145.00	1148.86		1149.18	0.003504	4.59	330.15	220.18	0.51
Reach-1	1.123	PF 2	1335.00	1145.00	1148.86		1149.18	0.003503	4.58	330.18	220.00	0.51
Reach-1	1.025	PF 1	1116.00	1143.50	1146.42		1146.86	0.006179	5.42	247.54	197.90	0.66
Reach-1	1.025	PF 2	1116.00	1143.50	1146.42		1146.85	0.006205	5.43	246.76	193.00	0.66
Reach-1	0.938	PF 1	1190.00	1140.30	1144.41		1144.74	0.003585	4.79	320.35	202.63	0.52
Reach-1	0.938	PF 2	1190.00	1140.30	1144.42		1144.75	0.003549	4.77	321.64	201.00	0.52

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (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-1	0.83	PF 1	1190.00	1137.00	1142.08		1142.55	0.004106	5.53	229.97	128.26	0.57
Reach-1	0.83	PF 2	1190.00	1137.00	1142.06		1142.54	0.004159	5.55	228.48	125.86	0.57
Reach-1	0.736	PF 1	1190.00	1135.00	1138.44	1138.23	1139.31	0.011297	7.55	170.11	118.03	0.90
Reach-1	0.736	PF 2	1190.00	1135.00	1138.46	1138.25	1139.31	0.010968	7.47	172.45	117.21	0.89
Reach-1	0.686	PF 1	1190.00	1133.00	1137.29		1137.64	0.003429	5.01	343.66	256.13	0.52
Reach-1	0.686	PF 2	1190.00	1133.00	1137.40		1137.75	0.003139	4.90	299.92	135.00	0.50
Reach-1	0.606	PF 1	1190.00	1129.90	1134.64	1134.64	1135.36	0.009474	6.99	222.51	266.89	0.83
Reach-1	0.606	PF 2	1190.00	1129.90	1134.54	1134.32	1135.44	0.011247	7.58	159.73	86.42	0.90
Reach-1	0.523	PF 1	1190.00	1129.00	1132.39		1132.62	0.002866	4.03	421.10	328.97	0.46
Reach-1	0.523	PF 2	1190.00	1129.00	1132.38		1132.69	0.003562	4.49	274.17	131.28	0.51
Reach-1	0.489	PF 1	1190.00	1129.00	1131.66		1131.85	0.003225	4.21	415.79	269.50	0.49
Reach-1	0.489	PF 2	1190.00	1129.00	1131.65		1131.84	0.003265	4.23	413.89	268.97	0.49
Reach-1	0.422	PF 1	1234.00	1126.00	1130.02		1130.44	0.005561	6.05	405.32	325.37	0.65
Reach-1	0.422	PF 2	1234.00	1126.00	1130.03		1130.44	0.005490	6.01	405.49	317.00	0.65
Reach-1	0.35	PF 1	1234.00	1125.00	1128.75		1128.90	0.002637	4.32	751.10	599.11	0.45
Reach-1	0.35	PF 2	1234.00	1125.00	1128.76		1128.91	0.002631	4.32	642.36	388.10	0.45
Reach-1	0.265	PF 1	1234.00	1123.50	1126.62	1126.40	1126.99	0.007688	6.12	424.55	388.87	0.74
Reach-1	0.265	PF 2	1234.00	1123.50	1126.57	1126.46	1126.96	0.008253	6.24	402.46	349.00	0.77
Reach-1	0.177	PF 1	1277.00	1122.00	1124.87		1124.91	0.002740	2.40	788.12	415.53	0.40
Reach-1	0.177	PF 2	1277.00	1122.00	1124.79		1124.84	0.002706	2.37	745.12	356.00	0.39
Reach-1	0.088	PF 1	1129.00	1120.50	1123.32		1123.40	0.003884	3.69	676.14	553.29	0.51
Reach-1	0.088	PF 2	1129.00	1120.50	1123.28		1123.36	0.003775	3.58	647.79	474.00	0.50
Reach-1	0	PF 1	470.00	1119.00	1121.33	1120.86	1121.51	0.004570	3.40	155.09	218.78	0.53
Reach-1	0	PF 2	470.00	1119.00	1121.33	1120.86	1121.51	0.004570	3.40	155.09	218.78	0.53

TABLE 3

HEC-RAS Output Summary Table for Post-Project Conditions Models

TABLE 3a

Beardsley Canal Wash and NIC

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3

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)	
Olive-FRS #3	61402.55	Floodplain	1048.00	1283.88	1288.09	1287.40	1288.53	0.004472	5.66	257.64	150.71	0.59
Olive-FRS #3	61402.55	Floodway	1048.00	1283.88	1288.05	1287.39	1288.51	0.004601	5.83	249.42	145.34	0.60
Olive-FRS #3	61402.47	Floodplain	1048.00	1281.48	1284.36	1284.36	1284.84	0.019594	7.02	211.47	206.61	1.09
Olive-FRS #3	61402.47	Floodway	1048.00	1281.48	1284.35	1284.35	1284.83	0.018552	6.83	207.78	185.91	1.06
Olive-FRS #3	61402.39	Floodplain	1048.00	1277.18	1282.24		1282.40	0.002623	3.85	344.49	259.56	0.44
Olive-FRS #3	61402.39	Floodway	1048.00	1277.18	1282.22		1282.40	0.002740	4.06	317.08	213.38	0.45
Olive-FRS #3	61402.33	Floodplain	1048.00	1275.08	1282.11		1282.15	0.000283	2.02	924.33	342.12	0.16
Olive-FRS #3	61402.33	Floodway	1048.00	1275.08	1282.10		1282.15	0.000284	2.15	739.71	182.88	0.16
Olive-FRS #3	61325.99	Floodplain	2715.00	1275.95	1281.12	1280.70	1281.63	0.004625	6.74	551.21	349.26	0.62
Olive-FRS #3	61325.99	Floodway	2715.00	1275.95	1281.12	1280.70	1281.63	0.004614	6.73	550.40	295.00	0.62
Olive-FRS #3	61315.99	Floodplain	2715.00	1273.13	1278.11		1278.86	0.011257	9.03	472.20	304.78	0.93
Olive-FRS #3	61315.99	Floodway	2715.00	1273.13	1278.11		1278.86	0.011259	9.04	472.17	304.74	0.93
Olive-FRS #3	61151.	Floodplain	2715.00	1273.01	1277.18	1276.73	1277.80	0.010467	7.68	443.96	196.04	0.79
Olive-FRS #3	61151.	Floodway	2715.00	1273.01	1277.18	1276.73	1277.80	0.010508	7.69	443.37	195.97	0.79
Olive-FRS #3	61051.	Floodplain	2715.00	1272.12	1275.80	1275.80	1276.89	0.015781	9.36	340.27	149.45	1.01
Olive-FRS #3	61051.	Floodway	2715.00	1272.12	1275.81	1275.81	1276.89	0.015677	9.34	340.98	149.46	1.01
Olive-FRS #3	60967.	Floodplain	1115.00	1270.27	1275.80	1272.95	1275.95	0.000750	3.07	362.77	122.12	0.26
Olive-FRS #3	60967.	Floodway	1115.00	1270.27	1275.74	1272.98	1275.95	0.001092	3.66	304.62	61.81	0.29
Olive-FRS #3	60893.		Culvert									
Olive-FRS #3	60865.	Floodplain	1115.00	1269.47	1273.78	1272.63	1274.20	0.018429	5.19	215.04	117.77	0.52
Olive-FRS #3	60865.	Floodway	1115.00	1269.47	1273.76	1272.67	1274.25	0.021452	5.61	198.62	60.26	0.54
Olive-FRS #3	60765.	Floodplain	1115.00	1270.30	1272.79	1272.46	1273.22	0.007710	5.42	213.62	134.56	0.69
Olive-FRS #3	60765.	Floodway	1115.00	1270.30	1272.88	1272.46	1273.26	0.006562	5.13	225.55	136.11	0.64
Olive-FRS #3	60405.	Floodplain	1115.00	1266.54	1270.37	1270.02	1270.71	0.009221	4.65	239.92	161.79	0.67
Olive-FRS #3	60405.	Floodway	1115.00	1266.54	1270.43		1270.89	0.010080	5.41	206.28	104.25	0.68
Olive-FRS #3	60005.	Floodplain	1115.00	1261.42	1265.49	1265.28	1266.58	0.011230	8.35	133.53	50.72	0.91

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	60005.	Floodway	1115.00	1261.42	1265.49	1265.29	1266.58	0.011219	8.35	133.58	50.73	0.91
Olive-FRS #3	59605.	Floodplain	1115.00	1257.83	1263.48		1264.12	0.003544	6.41	173.95	39.90	0.54
Olive-FRS #3	59605.	Floodway	1115.00	1257.83	1263.48		1264.12	0.003551	6.41	173.82	39.89	0.54
Olive-FRS #3	59200.	Floodplain	1115.00	1255.00	1259.36	1259.36	1261.08	0.022293	10.51	106.04	31.28	1.01
Olive-FRS #3	59200.	Floodway	1115.00	1255.00	1259.36	1259.36	1261.08	0.022286	10.51	106.05	31.28	1.01
Olive-FRS #3	58800.	Floodplain	1115.00	1252.33	1255.32		1255.54	0.006590	3.82	291.88	188.71	0.54
Olive-FRS #3	58800.	Floodway	1115.00	1252.33	1255.34		1255.56	0.006311	3.77	295.82	188.70	0.53
Olive-FRS #3	58400.	Floodplain	1115.00	1249.29	1252.43		1252.69	0.007771	4.08	273.42	169.44	0.57
Olive-FRS #3	58400.	Floodway	1115.00	1249.29	1252.43		1252.73	0.007996	4.35	256.26	130.61	0.55
Olive-FRS #3	58000.	Floodplain	1115.00	1245.87	1251.84		1251.90	0.000789	1.98	572.14	186.89	0.18
Olive-FRS #3	58000.	Floodway	1115.00	1245.87	1251.90		1251.96	0.000743	1.94	581.39	171.72	0.17
Olive-FRS #3	57137.91	Floodplain	5679.00	1241.86	1251.33		1251.50	0.001355	3.32	1721.34	320.89	0.24
Olive-FRS #3	57137.91	Floodway	5679.00	1241.86	1251.41		1251.58	0.001290	3.27	1748.10	319.58	0.24
Olive-FRS #3	56662.91	Floodplain	5679.00	1238.04	1248.35	1248.35	1250.04	0.008254	12.27	621.54	177.09	0.84
Olive-FRS #3	56662.91	Floodway	5679.00	1238.04	1248.24	1248.24	1250.12	0.008950	12.75	576.01	140.71	0.87
Olive-FRS #3	56252.91	Floodplain	5679.00	1236.24	1243.32	1242.79	1244.41	0.013919	8.36	679.33	197.98	0.80
Olive-FRS #3	56252.91	Floodway	5679.00	1236.24	1243.26	1242.79	1244.39	0.014646	8.50	668.04	197.43	0.81
Olive-FRS #3	55857.91	Floodplain	5679.00	1234.16	1240.60	1239.41	1241.34	0.004682	6.92	820.73	219.13	0.63
Olive-FRS #3	55857.91	Floodway	5679.00	1234.16	1240.72	1239.41	1241.42	0.004265	6.70	847.79	222.04	0.60
Olive-FRS #3	55452.91	Floodplain	5679.00	1230.80	1238.27		1239.00	0.007311	6.86	827.92	313.37	0.61
Olive-FRS #3	55452.91	Floodway	5679.00	1230.80	1238.73		1239.44	0.005646	6.74	842.96	177.77	0.55
Olive-FRS #3	55117.91	Floodplain	5679.00	1227.40	1234.02	1234.02	1235.79	0.012178	10.67	532.33	152.18	1.01
Olive-FRS #3	55117.91	Floodway	5679.00	1227.40	1234.49	1234.49	1236.70	0.011164	11.92	476.29	107.94	1.00
Olive-FRS #3	55068.91	Floodplain	5679.00	1227.25	1233.67		1235.37	0.001474	10.49	541.39	114.46	0.85
Olive-FRS #3	55068.91	Floodway	5679.00	1227.25	1233.67		1235.37	0.001474	10.49	541.39	114.46	0.85
Olive-FRS #3	55042.91	Floodplain	5679.00	1220.00	1234.56	1225.80	1234.98	0.000107	5.31	1196.31	121.71	0.25

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	55042.91	Floodway	5679.00	1220.00	1234.56	1225.80	1234.98	0.000107	5.31	1196.31	121.71	0.25
Olive-FRS #3	55032.91		Culvert									
Olive-FRS #3	54905.08	Floodplain	5679.00	1217.75	1222.70	1222.70	1225.18	0.002213	12.63	449.56	90.77	1.00
Olive-FRS #3	54905.08	Floodway	5679.00	1217.75	1222.70	1222.70	1225.18	0.002214	12.63	449.52	90.77	1.00
Olive-FRS #3	54899.08	Floodplain	7131.00	1210.25	1217.27		1219.19	0.001136	11.13	640.55	91.33	0.74
Olive-FRS #3	54899.08	Floodway	7131.00	1210.25	1217.27		1219.19	0.001136	11.13	640.56	91.33	0.74
Olive-FRS #3	54884.08	Floodplain	7131.00	1210.25	1217.30		1219.15	0.001083	10.91	653.48	92.70	0.72
Olive-FRS #3	54884.08	Floodway	7131.00	1210.25	1217.30		1219.15	0.001083	10.91	653.49	92.70	0.72
Olive-FRS #3	54864.08	Floodplain	7131.00	1209.98	1217.44		1219.06	0.000887	10.21	698.60	93.65	0.66
Olive-FRS #3	54864.08	Floodway	7131.00	1209.98	1217.44		1219.06	0.000887	10.21	698.61	93.65	0.66
Olive-FRS #3	54844.08	Floodplain	7131.00	1209.71	1217.58		1218.98	0.000719	9.50	751.02	95.52	0.60
Olive-FRS #3	54844.08	Floodway	7131.00	1209.71	1217.58		1218.98	0.000719	9.49	751.03	95.52	0.60
Olive-FRS #3	54828.09	Floodplain	7131.00	1209.47	1217.84		1218.85	0.000503	8.08	882.78	120.43	0.53
Olive-FRS #3	54828.09	Floodway	7131.00	1209.47	1217.84		1218.85	0.000503	8.08	882.80	120.43	0.53
Olive-FRS #3	54827	Floodplain	7131.00	1209.48	1217.95		1218.80	0.002322	7.39	965.42	130.89	0.48
Olive-FRS #3	54827	Floodway	7131.00	1209.48	1217.95		1218.80	0.002322	7.39	965.44	130.89	0.48
Olive-FRS #3	54821.18	Floodplain	7131.00	1209.48	1218.01		1218.76	0.002116	6.94	1028.07	144.05	0.46
Olive-FRS #3	54821.18	Floodway	7131.00	1209.48	1218.01		1218.76	0.002116	6.94	1028.09	144.05	0.46
Olive-FRS #3	54816	Floodplain	7131.00	1209.47	1218.15		1218.69	0.001432	5.88	1213.31	162.45	0.38
Olive-FRS #3	54816	Floodway	7131.00	1209.47	1218.15		1218.69	0.001432	5.88	1213.33	162.45	0.38
Olive-FRS #3	54800	Floodplain	7131.00	1209.47	1218.20		1218.63	0.001129	5.27	1353.31	178.99	0.34
Olive-FRS #3	54800	Floodway	7131.00	1209.47	1218.20		1218.63	0.001129	5.27	1353.33	178.99	0.34
Olive-FRS #3	54775	Floodplain	7131.00	1209.46	1218.21		1218.59	0.001034	4.96	1437.90	196.45	0.32
Olive-FRS #3	54775	Floodway	7131.00	1209.46	1218.21		1218.59	0.001034	4.96	1437.93	196.45	0.32
Olive-FRS #3	54750	Floodplain	7131.00	1209.45	1218.22		1218.56	0.000660	4.68	1523.48	214.05	0.31
Olive-FRS #3	54750	Floodway	7131.00	1209.45	1218.22		1218.56	0.000660	4.68	1523.51	214.05	0.31

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	54725	Floodplain	7131.00	1209.44	1218.22		1218.53	0.000632	4.50	1586.02	229.57	0.30
Olive-FRS #3	54725	Floodway	7131.00	1209.44	1218.22		1218.53	0.000632	4.50	1586.05	229.57	0.30
Olive-FRS #3	54700	Floodplain	7131.00	1209.43	1218.20		1218.52	0.000648	4.53	1574.28	229.46	0.30
Olive-FRS #3	54700	Floodway	7131.00	1209.43	1218.20		1218.52	0.000648	4.53	1574.31	229.46	0.30
Olive-FRS #3	54600	Floodplain	7131.00	1209.39	1218.13		1218.45	0.000649	4.53	1574.66	229.93	0.30
Olive-FRS #3	54600	Floodway	7131.00	1209.39	1218.13		1218.45	0.000649	4.53	1574.69	229.93	0.30
Olive-FRS #3	54500	Floodplain	7131.00	1209.35	1218.08		1218.38	0.000639	4.45	1602.54	237.74	0.30
Olive-FRS #3	54500	Floodway	7131.00	1209.35	1218.08		1218.38	0.000639	4.45	1602.57	237.74	0.30
Olive-FRS #3	54400	Floodplain	7131.00	1209.31	1218.01		1218.32	0.000647	4.47	1596.01	237.44	0.30
Olive-FRS #3	54400	Floodway	7131.00	1209.31	1218.01		1218.32	0.000647	4.47	1596.04	237.44	0.30
Olive-FRS #3	54361.7	Floodplain	7131.00	1209.29	1217.98		1218.29	0.001019	4.44	1606.07	219.57	0.29
Olive-FRS #3	54361.7	Floodway	7131.00	1209.29	1217.98		1218.29	0.001019	4.44	1606.09	219.57	0.29
Olive-FRS #3	54346.7	Floodplain	7131.00	1209.28	1217.96		1218.27	0.001022	4.44	1604.62	219.52	0.29
Olive-FRS #3	54346.7	Floodway	7131.00	1209.28	1217.96		1218.27	0.001022	4.44	1604.64	219.52	0.29
Olive-FRS #3	54331.7	Floodplain	7131.00	1209.27	1215.54	1215.54	1218.02	0.014129	12.63	564.54	115.14	1.01
Olive-FRS #3	54331.7	Floodway	7131.00	1209.27	1215.54	1215.54	1218.02	0.014134	12.63	564.47	115.13	1.01
Olive-FRS #3	54319.7	Floodplain	7131.00	1206.27	1214.48		1215.70	0.005176	8.88	803.31	130.68	0.63
Olive-FRS #3	54319.7	Floodway	7131.00	1206.27	1214.48		1215.70	0.005176	8.88	803.31	130.68	0.63
Olive-FRS #3	54299.7	Floodplain	7131.00	1206.26	1214.91		1215.43	0.001865	5.80	1229.44	176.71	0.39
Olive-FRS #3	54299.7	Floodway	7131.00	1206.26	1214.91		1215.43	0.001865	5.80	1229.44	176.71	0.39
Olive-FRS #3	54279.7	Floodplain	7131.00	1206.26	1215.04		1215.34	0.000983	4.39	1625.74	220.25	0.28
Olive-FRS #3	54279.7	Floodway	7131.00	1206.26	1215.04		1215.34	0.000983	4.39	1625.74	220.25	0.28
Olive-FRS #3	54264.7	Floodplain	7131.00	1206.25	1215.03		1215.33	0.000985	4.39	1624.33	220.14	0.28
Olive-FRS #3	54264.7	Floodway	7131.00	1206.25	1215.03		1215.33	0.000985	4.39	1624.33	220.14	0.28
Olive-FRS #3	54200	Floodplain	7131.00	1206.24	1214.95		1215.27	0.000658	4.55	1567.25	229.61	0.31
Olive-FRS #3	54200	Floodway	7131.00	1206.24	1214.95		1215.27	0.000658	4.55	1567.23	229.61	0.31

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	54150	Floodplain	7131.00	1206.24	1214.93		1215.24	0.000651	4.48	1592.77	237.28	0.30
Olive-FRS #3	54150	Floodway	7131.00	1206.24	1214.93		1215.24	0.000651	4.48	1592.74	237.28	0.30
Olive-FRS #3	54100	Floodplain	7131.00	1206.20	1214.89		1215.20	0.000648	4.47	1594.56	237.37	0.30
Olive-FRS #3	54100	Floodway	7131.00	1206.20	1214.89		1215.20	0.000648	4.47	1594.53	237.37	0.30
Olive-FRS #3	54000	Floodplain	7131.00	1206.16	1214.82		1215.14	0.000656	4.49	1587.90	237.06	0.31
Olive-FRS #3	54000	Floodway	7131.00	1206.16	1214.82		1215.14	0.000656	4.49	1587.87	237.06	0.31
Olive-FRS #3	53900	Floodplain	7131.00	1206.12	1214.74		1215.07	0.000684	4.61	1546.10	228.69	0.31
Olive-FRS #3	53900	Floodway	7131.00	1206.12	1214.74		1215.07	0.000685	4.61	1546.07	228.68	0.31
Olive-FRS #3	53861.7	Floodplain	7131.00	1206.10	1214.71		1215.04	0.001084	4.60	1550.72	210.30	0.30
Olive-FRS #3	53861.7	Floodway	7131.00	1206.10	1214.71		1215.04	0.001084	4.60	1550.69	210.30	0.30
Olive-FRS #3	53846.7	Floodplain	7131.00	1206.08	1214.70		1215.01	0.001048	4.48	1591.18	219.03	0.29
Olive-FRS #3	53846.7	Floodway	7131.00	1206.08	1214.70		1215.01	0.001048	4.48	1591.15	219.03	0.29
Olive-FRS #3	53831.7	Floodplain	7131.00	1206.08	1212.31	1212.31	1214.76	0.014181	12.56	567.75	117.20	1.01
Olive-FRS #3	53831.7	Floodway	7131.00	1206.08	1212.31	1212.31	1214.76	0.014179	12.56	567.78	117.20	1.01
Olive-FRS #3	53819.7	Floodplain	7131.00	1203.08	1211.15		1212.45	0.005568	9.14	780.37	128.35	0.65
Olive-FRS #3	53819.7	Floodway	7131.00	1203.08	1211.18		1212.47	0.005494	9.09	784.06	128.57	0.65
Olive-FRS #3	53799.7	Floodplain	7131.00	1203.07	1211.62		1212.16	0.001946	5.89	1211.53	175.90	0.40
Olive-FRS #3	53799.7	Floodway	7131.00	1203.07	1211.64		1212.18	0.001927	5.87	1215.65	176.08	0.39
Olive-FRS #3	53779.7	Floodplain	7131.00	1203.07	1211.75		1212.06	0.001022	4.44	1604.32	219.47	0.29
Olive-FRS #3	53779.7	Floodway	7131.00	1203.07	1211.78		1212.08	0.001013	4.43	1609.25	219.65	0.29
Olive-FRS #3	53764.7	Floodplain	7131.00	1203.07	1211.74		1212.05	0.001029	4.45	1600.70	219.34	0.29
Olive-FRS #3	53764.7	Floodway	7131.00	1203.07	1211.76		1212.07	0.001020	4.44	1605.66	219.52	0.29
Olive-FRS #3	53700	Floodplain	7131.00	1203.04	1211.68		1211.99	0.000664	4.51	1581.45	236.76	0.31
Olive-FRS #3	53700	Floodway	7131.00	1203.04	1211.70		1212.01	0.000657	4.49	1587.01	237.02	0.31
Olive-FRS #3	53600	Floodplain	7131.00	1203.00	1211.62		1211.92	0.000655	4.43	1607.94	244.42	0.30
Olive-FRS #3	53600	Floodway	7131.00	1203.00	1211.64		1211.95	0.000648	4.42	1613.85	244.71	0.30

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	53500	Floodplain	7567.00	1202.96	1211.50		1211.85	0.000765	4.77	1587.72	243.43	0.33
Olive-FRS #3	53500	Floodway	7567.00	1202.96	1211.52		1211.87	0.000757	4.75	1593.93	243.73	0.33
Olive-FRS #3	53400	Floodplain	7567.00	1202.92	1211.40		1211.77	0.000803	4.90	1543.16	234.97	0.34
Olive-FRS #3	53400	Floodway	7567.00	1202.92	1211.42		1211.79	0.000794	4.88	1549.45	235.27	0.34
Olive-FRS #3	53300	Floodplain	7567.00	1202.88	1211.31		1211.69	0.000820	4.94	1532.22	234.46	0.34
Olive-FRS #3	53300	Floodway	7567.00	1202.88	1211.34		1211.71	0.000810	4.92	1538.77	234.77	0.34
Olive-FRS #3	53200	Floodplain	7567.00	1202.84	1211.22		1211.60	0.000839	4.98	1520.11	233.84	0.34
Olive-FRS #3	53200	Floodway	7567.00	1202.84	1211.25		1211.63	0.000828	4.96	1526.94	234.16	0.34
Olive-FRS #3	53100	Floodplain	7567.00	1202.80	1211.14		1211.52	0.000835	4.91	1540.90	241.11	0.34
Olive-FRS #3	53100	Floodway	7567.00	1202.80	1211.17		1211.54	0.000823	4.89	1548.24	241.47	0.34
Olive-FRS #3	53000	Floodplain	7567.00	1202.76	1211.03		1211.43	0.000880	5.06	1495.75	232.74	0.35
Olive-FRS #3	53000	Floodway	7567.00	1202.76	1211.06		1211.46	0.000867	5.03	1503.19	233.09	0.35
Olive-FRS #3	52900	Floodplain	7567.00	1202.72	1210.94		1211.34	0.000903	5.10	1482.65	232.12	0.36
Olive-FRS #3	52900	Floodway	7567.00	1202.72	1210.97		1211.37	0.000890	5.08	1490.45	232.49	0.35
Olive-FRS #3	52800	Floodplain	7567.00	1202.68	1210.84		1211.25	0.000928	5.15	1468.94	231.47	0.36
Olive-FRS #3	52800	Floodway	7567.00	1202.68	1210.87		1211.28	0.000913	5.12	1477.12	231.86	0.36
Olive-FRS #3	52700	Floodplain	7567.00	1202.64	1210.75		1211.15	0.000929	5.10	1485.04	238.30	0.36
Olive-FRS #3	52700	Floodway	7567.00	1202.64	1210.79		1211.19	0.000913	5.07	1493.86	238.75	0.36
Olive-FRS #3	52600	Floodplain	7567.00	1202.60	1210.65		1211.06	0.000957	5.15	1470.26	237.57	0.36
Olive-FRS #3	52600	Floodway	7567.00	1202.60	1210.69		1211.09	0.000939	5.11	1479.52	238.03	0.36
Olive-FRS #3	52500	Floodplain	7567.00	1202.56	1210.54		1210.96	0.000987	5.20	1454.52	236.77	0.37
Olive-FRS #3	52500	Floodway	7567.00	1202.56	1210.58		1211.00	0.000968	5.17	1464.30	237.27	0.37
Olive-FRS #3	52400	Floodplain	7567.00	1202.52	1210.43		1210.86	0.001021	5.26	1437.94	235.92	0.38
Olive-FRS #3	52400	Floodway	7567.00	1202.52	1210.47		1210.90	0.001000	5.22	1448.26	236.45	0.37
Olive-FRS #3	52300	Floodplain	7567.00	1202.48	1210.33		1210.76	0.001029	5.22	1449.41	242.33	0.38
Olive-FRS #3	52300	Floodway	7567.00	1202.48	1210.38		1210.80	0.001007	5.18	1460.61	242.93	0.37

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	52200	Floodplain	7567.00	1202.44	1210.19		1210.65	0.001101	5.40	1401.25	234.05	0.39
Olive-FRS #3	52200	Floodway	7567.00	1202.44	1210.24		1210.69	0.001075	5.36	1412.86	234.64	0.38
Olive-FRS #3	52100	Floodplain	7567.00	1202.40	1210.07		1210.53	0.001148	5.48	1381.18	233.02	0.40
Olive-FRS #3	52100	Floodway	7567.00	1202.40	1210.12		1210.58	0.001119	5.43	1393.60	233.66	0.39
Olive-FRS #3	52000	Floodplain	7567.00	1202.36	1209.94		1210.42	0.001202	5.57	1359.63	231.91	0.41
Olive-FRS #3	52000	Floodway	7567.00	1202.36	1209.99		1210.47	0.001168	5.51	1372.95	232.60	0.40
Olive-FRS #3	51900	Floodplain	7567.00	1202.32	1209.78		1210.29	0.001312	5.73	1320.49	230.28	0.42
Olive-FRS #3	51900	Floodway	7567.00	1202.32	1209.84		1210.34	0.001271	5.67	1335.02	231.05	0.42
Olive-FRS #3	51800	Floodplain	7567.00	1202.28	1209.66		1210.15	0.001307	5.67	1335.46	236.13	0.42
Olive-FRS #3	51800	Floodway	7567.00	1202.28	1209.72		1210.21	0.001262	5.60	1351.49	237.02	0.41
Olive-FRS #3	51700	Floodplain	7567.00	1202.24	1209.52		1210.02	0.001348	5.67	1334.63	241.44	0.42
Olive-FRS #3	51700	Floodway	7567.00	1202.24	1209.60		1210.08	0.001297	5.59	1352.53	242.48	0.42
Olive-FRS #3	51600	Floodplain	7567.00	1202.20	1209.36		1209.88	0.001439	5.80	1304.88	239.71	0.44
Olive-FRS #3	51600	Floodway	7567.00	1202.20	1209.44		1209.95	0.001378	5.71	1324.59	240.86	0.43
Olive-FRS #3	51500	Floodplain	7567.00	1202.16	1209.18		1209.73	0.001551	5.95	1271.81	237.77	0.45
Olive-FRS #3	51500	Floodway	7567.00	1202.16	1209.27		1209.80	0.001475	5.85	1293.75	239.06	0.44
Olive-FRS #3	51400	Floodplain	7567.00	1202.12	1208.98		1209.57	0.001691	6.13	1234.39	235.56	0.47
Olive-FRS #3	51400	Floodway	7567.00	1202.12	1209.09		1209.65	0.001596	6.01	1259.23	237.03	0.46
Olive-FRS #3	51300	Floodplain	7567.00	1202.08	1208.69		1209.37	0.002014	6.63	1140.70	220.29	0.51
Olive-FRS #3	51300	Floodway	7567.00	1202.08	1208.82		1209.47	0.001874	6.47	1168.87	221.82	0.50
Olive-FRS #3	51200	Floodplain	7567.00	1202.04	1208.39		1209.15	0.002338	6.98	1084.54	217.21	0.55
Olive-FRS #3	51200	Floodway	7567.00	1202.04	1208.55		1209.26	0.002129	6.76	1119.43	219.13	0.53
Olive-FRS #3	51100	Floodplain	7567.00	1202.00	1208.00		1208.88	0.002889	7.49	1010.02	213.05	0.61
Olive-FRS #3	51100	Floodway	7567.00	1202.00	1208.23		1209.02	0.002521	7.16	1057.33	215.70	0.57
Olive-FRS #3	51000	Floodplain	7567.00	1201.00	1207.55		1208.54	0.003750	7.96	950.82	222.94	0.68
Olive-FRS #3	51000	Floodway	7567.00	1201.00	1207.91		1208.74	0.002966	7.34	1030.23	228.50	0.61

HEC-RAS Plan: Design River: BCW Reach: Olive-FRS #3 (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)	
Olive-FRS #3	50900	Floodplain	7567.00	1200.50	1207.03		1208.15	0.003790	8.53	919.50	267.89	0.69
Olive-FRS #3	50900	Floodway	7567.00	1200.50	1207.65		1208.47	0.002467	7.39	1101.62	326.25	0.57
Olive-FRS #3	50560	Floodplain	7567.00	1199.48	1205.19	1205.19	1206.60	0.005332	10.04	826.94	291.26	1.01
Olive-FRS #3	50560	Floodway	7567.00	1199.48	1205.92	1205.66	1207.34	0.004157	9.58	790.16	225.00	0.90
Olive-FRS #3	50160	Floodplain	7567.00	1197.78	1202.78	1202.53	1203.82	0.006003	8.72	944.12	340.58	0.85
Olive-FRS #3	50160	Floodway	7567.00	1197.78	1203.78	1203.47	1205.34	0.006006	10.06	756.77	190.00	0.88

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern

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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	20788.34	Floodplain	1600.00	1258.50	1270.28		1270.30	0.000026	1.12	1498.58	175.00	0.06	9912.50	10087.50
Olive-Northern	20788.34	Floodway	1600.00	1258.50	1270.28		1270.30	0.000026	1.12	1498.58	175.00	0.06	9912.50	10087.50
Olive-Northern	20787.34	Floodplain	1600.00	1258.50	1270.28	1261.17	1270.30	0.000026	1.12	1498.58	175.00	0.06	9912.50	10087.50
Olive-Northern	20787.34	Floodway	1600.00	1258.50	1270.28	1261.17	1270.30	0.000026	1.12	1498.58	175.00	0.06	9912.50	10087.50
Olive-Northern	20787		Culvert											
Olive-Northern	20456.34	Floodplain	1600.00	1256.43	1262.25		1262.43	0.000728	3.36	476.62	118.89	0.30	9940.56	10059.44
Olive-Northern	20456.34	Floodway	1600.00	1256.43	1262.25		1262.43	0.000728	3.36	476.62	118.89	0.30	9940.56	10059.44
Olive-Northern	20408.7*	Floodplain	1600.00	1256.39	1262.22		1262.39	0.000726	3.35	477.28	118.95	0.29	9940.52	10059.48
Olive-Northern	20408.7*	Floodway	1600.00	1256.39	1262.22		1262.39	0.000726	3.35	477.28	118.95	0.29	9940.52	10059.48
Olive-Northern	20361.2*	Floodplain	1600.00	1256.36	1262.18		1262.36	0.000728	3.36	476.68	118.89	0.30	9940.55	10059.45
Olive-Northern	20361.2*	Floodway	1600.00	1256.36	1262.18		1262.36	0.000728	3.36	476.68	118.89	0.30	9940.55	10059.45
Olive-Northern	20313.7*	Floodplain	1600.00	1256.32	1262.15		1262.32	0.000725	3.35	477.34	118.96	0.29	9940.52	10059.48
Olive-Northern	20313.7*	Floodway	1600.00	1256.32	1262.15		1262.32	0.000725	3.35	477.34	118.96	0.29	9940.52	10059.48
Olive-Northern	20266.1*	Floodplain	1600.00	1256.29	1262.12		1262.29	0.000728	3.36	476.72	118.90	0.30	9940.55	10059.45
Olive-Northern	20266.1*	Floodway	1600.00	1256.29	1262.12		1262.29	0.000728	3.36	476.72	118.90	0.30	9940.55	10059.45
Olive-Northern	20218.6*	Floodplain	1600.00	1256.25	1262.08		1262.26	0.000725	3.35	477.39	118.96	0.29	9940.52	10059.48
Olive-Northern	20218.6*	Floodway	1600.00	1256.25	1262.08		1262.26	0.000725	3.35	477.39	118.96	0.29	9940.52	10059.48
Olive-Northern	20171.0*	Floodplain	1600.00	1256.22	1262.05		1262.22	0.000728	3.36	476.80	118.90	0.30	9940.55	10059.45
Olive-Northern	20171.0*	Floodway	1600.00	1256.22	1262.05		1262.22	0.000728	3.36	476.80	118.90	0.30	9940.55	10059.45
Olive-Northern	20123.5*	Floodplain	1600.00	1256.18	1262.01		1262.19	0.000725	3.35	477.45	118.97	0.29	9940.52	10059.48
Olive-Northern	20123.5*	Floodway	1600.00	1256.18	1262.01		1262.19	0.000725	3.35	477.45	118.97	0.29	9940.52	10059.48
Olive-Northern	20075.9*	Floodplain	1600.00	1256.14	1261.98		1262.15	0.000722	3.35	478.13	119.04	0.29	9940.48	10059.52
Olive-Northern	20075.9*	Floodway	1600.00	1256.14	1261.98		1262.15	0.000722	3.35	478.13	119.04	0.29	9940.48	10059.52
Olive-Northern	20028.4*	Floodplain	1600.00	1256.11	1261.94		1262.12	0.000724	3.35	477.57	118.98	0.29	9940.51	10059.49
Olive-Northern	20028.4*	Floodway	1600.00	1256.11	1261.94		1262.12	0.000724	3.35	477.57	118.98	0.29	9940.51	10059.49
Olive-Northern	19980.8*	Floodplain	1600.00	1256.07	1261.91		1262.08	0.000722	3.35	478.25	119.05	0.29	9940.48	10059.53
Olive-Northern	19980.8*	Floodway	1600.00	1256.07	1261.91		1262.08	0.000722	3.35	478.25	119.05	0.29	9940.48	10059.53
Olive-Northern	19933.3*	Floodplain	1600.00	1256.04	1261.87		1262.05	0.000724	3.35	477.67	118.99	0.29	9940.50	10059.50
Olive-Northern	19933.3*	Floodway	1600.00	1256.04	1261.87		1262.05	0.000724	3.35	477.67	118.99	0.29	9940.50	10059.50
Olive-Northern	19885.8*	Floodplain	1600.00	1256.00	1261.84		1262.01	0.000721	3.34	478.35	119.06	0.29	9940.47	10059.53
Olive-Northern	19885.8*	Floodway	1600.00	1256.00	1261.84		1262.01	0.000721	3.34	478.35	119.06	0.29	9940.47	10059.53
Olive-Northern	19838.2*	Floodplain	1600.00	1255.97	1261.80		1261.98	0.000724	3.35	477.79	119.00	0.29	9940.50	10059.50
Olive-Northern	19838.2*	Floodway	1600.00	1255.97	1261.80		1261.98	0.000724	3.35	477.79	119.00	0.29	9940.50	10059.50

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	19790.7*	Floodplain	1600.00	1255.93	1261.77		1261.94	0.000721	3.34	478.45	119.07	0.29	9940.47	10059.54
Olive-Northern	19790.7*	Floodway	1600.00	1255.93	1261.77		1261.94	0.000721	3.34	478.45	119.07	0.29	9940.47	10059.54
Olive-Northern	19743.1*	Floodplain	1600.00	1255.90	1261.74		1261.91	0.000723	3.35	477.90	119.02	0.29	9940.49	10059.51
Olive-Northern	19743.1*	Floodway	1600.00	1255.90	1261.74		1261.91	0.000723	3.35	477.90	119.02	0.29	9940.49	10059.51
Olive-Northern	19695.6*	Floodplain	1600.00	1255.86	1261.70		1261.87	0.000720	3.34	478.60	119.09	0.29	9940.46	10059.54
Olive-Northern	19695.6*	Floodway	1600.00	1255.86	1261.70		1261.87	0.000720	3.34	478.60	119.09	0.29	9940.46	10059.54
Olive-Northern	19648.0*	Floodplain	1600.00	1255.82	1261.67		1261.84	0.000717	3.34	479.31	119.16	0.29	9940.42	10059.58
Olive-Northern	19648.0*	Floodway	1600.00	1255.82	1261.67		1261.84	0.000717	3.34	479.31	119.16	0.29	9940.42	10059.58
Olive-Northern	19600.5*	Floodplain	1600.00	1255.79	1261.63		1261.81	0.000719	3.34	478.76	119.10	0.29	9940.45	10059.55
Olive-Northern	19600.5*	Floodway	1600.00	1255.79	1261.63		1261.81	0.000719	3.34	478.76	119.10	0.29	9940.45	10059.55
Olive-Northern	19552.9*	Floodplain	1600.00	1255.75	1261.60		1261.77	0.000716	3.34	479.47	119.17	0.29	9940.41	10059.59
Olive-Northern	19552.9*	Floodway	1600.00	1255.75	1261.60		1261.77	0.000716	3.34	479.47	119.17	0.29	9940.41	10059.59
Olive-Northern	19505.4*	Floodplain	1600.00	1255.72	1261.56		1261.74	0.000719	3.34	478.93	119.12	0.29	9940.44	10059.56
Olive-Northern	19505.4*	Floodway	1600.00	1255.72	1261.56		1261.74	0.000719	3.34	478.93	119.12	0.29	9940.44	10059.56
Olive-Northern	19457.9*	Floodplain	1600.00	1255.68	1261.53		1261.70	0.000716	3.34	479.63	119.19	0.29	9940.41	10059.59
Olive-Northern	19457.9*	Floodway	1600.00	1255.68	1261.53		1261.70	0.000716	3.34	479.63	119.19	0.29	9940.41	10059.59
Olive-Northern	19410.3*	Floodplain	1600.00	1255.65	1261.50		1261.67	0.000718	3.34	479.11	119.14	0.29	9940.43	10059.57
Olive-Northern	19410.3*	Floodway	1600.00	1255.65	1261.50		1261.67	0.000718	3.34	479.11	119.14	0.29	9940.43	10059.57
Olive-Northern	19362.8*	Floodplain	1600.00	1255.61	1261.46		1261.63	0.000715	3.33	479.83	119.21	0.29	9940.40	10059.61
Olive-Northern	19362.8*	Floodway	1600.00	1255.61	1261.46		1261.63	0.000715	3.33	479.83	119.21	0.29	9940.40	10059.61
Olive-Northern	19315.2*	Floodplain	1600.00	1255.57	1261.43		1261.60	0.000712	3.33	480.58	119.29	0.29	9940.36	10059.64
Olive-Northern	19315.2*	Floodway	1600.00	1255.57	1261.43		1261.60	0.000712	3.33	480.58	119.29	0.29	9940.36	10059.64
Olive-Northern	19267.7*	Floodplain	1600.00	1255.54	1261.39		1261.57	0.000714	3.33	480.05	119.23	0.29	9940.38	10059.62
Olive-Northern	19267.7*	Floodway	1600.00	1255.54	1261.39		1261.57	0.000714	3.33	480.05	119.23	0.29	9940.38	10059.62
Olive-Northern	19220.1*	Floodplain	1600.00	1255.50	1261.36		1261.53	0.000711	3.33	480.79	119.31	0.29	9940.35	10059.65
Olive-Northern	19220.1*	Floodway	1600.00	1255.50	1261.36		1261.53	0.000711	3.33	480.79	119.31	0.29	9940.35	10059.65
Olive-Northern	19172.6*	Floodplain	1600.00	1255.47	1261.33		1261.50	0.000713	3.33	480.30	119.26	0.29	9940.37	10059.63
Olive-Northern	19172.6*	Floodway	1600.00	1255.47	1261.33		1261.50	0.000713	3.33	480.30	119.26	0.29	9940.37	10059.63
Olive-Northern	19125.0*	Floodplain	1600.00	1255.43	1261.29		1261.46	0.000710	3.33	481.03	119.33	0.29	9940.34	10059.67
Olive-Northern	19125.0*	Floodway	1600.00	1255.43	1261.29		1261.46	0.000710	3.33	481.03	119.33	0.29	9940.34	10059.67
Olive-Northern	19077.5*	Floodplain	1600.00	1255.40	1261.26		1261.43	0.000712	3.33	480.53	119.28	0.29	9940.36	10059.64
Olive-Northern	19077.5*	Floodway	1600.00	1255.40	1261.26		1261.43	0.000712	3.33	480.53	119.28	0.29	9940.36	10059.64

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	19030.00	Floodplain	1600.00	1255.36	1261.22		1261.40	0.000709	3.32	481.30	119.36	0.29	9940.32	10059.68
Olive-Northern	19030.00	Floodway	1600.00	1255.36	1261.22		1261.40	0.000709	3.32	481.30	119.36	0.29	9940.32	10059.68
Olive-Northern	19015.00	Floodplain	1600.00	1255.35	1261.15		1261.38	0.001262	3.83	417.32	97.38	0.33	9951.31	10048.69
Olive-Northern	19015.00	Floodway	1600.00	1255.35	1261.15		1261.38	0.001262	3.83	417.32	97.38	0.33	9951.31	10048.69
Olive-Northern	19000.00	Floodplain	1600.00	1255.34	1259.74	1259.74	1261.21	0.013501	9.71	164.79	56.23	1.00	9971.89	10028.11
Olive-Northern	19000.00	Floodway	1600.00	1255.34	1259.74	1259.74	1261.21	0.013501	9.71	164.79	56.23	1.00	9971.89	10028.11
Olive-Northern	18986.00	Floodplain	1600.00	1251.84	1257.34		1258.08	0.005318	6.92	231.07	64.98	0.65	9967.51	10032.49
Olive-Northern	18986.00	Floodway	1600.00	1251.84	1257.34		1258.08	0.005318	6.92	231.07	64.98	0.65	9967.51	10032.49
Olive-Northern	18958.00	Floodplain	1600.00	1251.82	1257.64		1257.86	0.001246	3.82	419.11	97.52	0.32	9951.24	10048.76
Olive-Northern	18958.00	Floodway	1600.00	1251.82	1257.64		1257.86	0.001246	3.82	419.11	97.52	0.32	9951.24	10048.76
Olive-Northern	18943.00	Floodplain	1600.00	1251.81	1257.66		1257.83	0.000716	3.34	479.60	119.19	0.29	9940.41	10059.59
Olive-Northern	18943.00	Floodway	1600.00	1251.81	1257.66		1257.83	0.000716	3.34	479.60	119.19	0.29	9940.41	10059.59
Olive-Northern	18900.0*	Floodplain	1600.00	1251.78	1257.63		1257.80	0.000716	3.34	479.51	119.18	0.29	9940.41	10059.59
Olive-Northern	18900.0*	Floodway	1600.00	1251.78	1257.63		1257.80	0.000716	3.34	479.51	119.18	0.29	9940.41	10059.59
Olive-Northern	18857.1*	Floodplain	1600.00	1251.75	1257.60		1257.77	0.000717	3.34	479.43	119.17	0.29	9940.42	10059.58
Olive-Northern	18857.1*	Floodway	1600.00	1251.75	1257.60		1257.77	0.000717	3.34	479.43	119.17	0.29	9940.42	10059.58
Olive-Northern	18814.2*	Floodplain	1600.00	1251.71	1257.57		1257.74	0.000712	3.33	480.56	119.28	0.29	9940.36	10059.64
Olive-Northern	18814.2*	Floodway	1600.00	1251.71	1257.57		1257.74	0.000712	3.33	480.56	119.28	0.29	9940.36	10059.64
Olive-Northern	18771.2*	Floodplain	1600.00	1251.68	1257.54		1257.71	0.000712	3.33	480.48	119.27	0.29	9940.36	10059.64
Olive-Northern	18771.2*	Floodway	1600.00	1251.68	1257.54		1257.71	0.000712	3.33	480.48	119.27	0.29	9940.36	10059.64
Olive-Northern	18728.3*	Floodplain	1600.00	1251.65	1257.51		1257.68	0.000713	3.33	480.40	119.27	0.29	9940.37	10059.63
Olive-Northern	18728.3*	Floodway	1600.00	1251.65	1257.51		1257.68	0.000713	3.33	480.40	119.27	0.29	9940.37	10059.63
Olive-Northern	18685.4*	Floodplain	1600.00	1251.62	1257.48		1257.65	0.000713	3.33	480.33	119.26	0.29	9940.37	10059.63
Olive-Northern	18685.4*	Floodway	1600.00	1251.62	1257.48		1257.65	0.000713	3.33	480.33	119.26	0.29	9940.37	10059.63
Olive-Northern	18642.5*	Floodplain	1600.00	1251.58	1257.45		1257.62	0.000708	3.32	481.48	119.38	0.29	9940.31	10059.69
Olive-Northern	18642.5*	Floodway	1600.00	1251.58	1257.45		1257.62	0.000708	3.32	481.48	119.38	0.29	9940.31	10059.69
Olive-Northern	18599.58	Floodplain	1600.00	1251.55	1257.41		1257.59	0.000709	3.32	481.32	119.36	0.29	9940.32	10059.68
Olive-Northern	18599.58	Floodway	1600.00	1251.55	1257.41		1257.59	0.000709	3.32	481.32	119.36	0.29	9940.32	10059.68
Olive-Northern	18584.58	Floodplain	1600.00	1251.54	1257.34		1257.57	0.001262	3.83	417.33	97.38	0.33	9951.31	10048.69
Olive-Northern	18584.58	Floodway	1600.00	1251.54	1257.34		1257.57	0.001262	3.83	417.33	97.38	0.33	9951.31	10048.69
Olive-Northern	18569.58	Floodplain	1600.00	1251.53	1255.93	1255.93	1257.40	0.013514	9.71	164.74	56.22	1.00	9971.89	10028.11
Olive-Northern	18569.58	Floodway	1600.00	1251.53	1255.93	1255.93	1257.40	0.013514	9.71	164.74	56.22	1.00	9971.89	10028.11
Olive-Northern	18555.58	Floodplain	1600.00	1248.03	1253.53		1254.27	0.005327	6.93	230.93	64.96	0.65	9967.52	10032.48

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	18555.58	Floodway	1600.00	1248.03	1253.53		1254.27	0.005327	6.93	230.93	64.96	0.65	9967.52	10032.48
Olive-Northern	18527.58	Floodplain	1600.00	1248.01	1253.82		1254.05	0.001248	3.82	418.95	97.51	0.32	9951.25	10048.75
Olive-Northern	18527.58	Floodway	1600.00	1248.01	1253.82		1254.05	0.001248	3.82	418.95	97.51	0.32	9951.25	10048.75
Olive-Northern	18512.58	Floodplain	1600.00	1248.00	1253.85		1254.02	0.000717	3.34	479.41	119.17	0.29	9940.42	10059.58
Olive-Northern	18512.58	Floodway	1600.00	1248.00	1253.85		1254.02	0.000717	3.34	479.41	119.17	0.29	9940.42	10059.58
Olive-Northern	18476.2*	Floodplain	1600.00	1247.97	1253.82		1253.99	0.000715	3.33	479.89	119.21	0.29	9940.39	10059.61
Olive-Northern	18476.2*	Floodway	1600.00	1247.97	1253.82		1253.99	0.000715	3.33	479.89	119.21	0.29	9940.39	10059.61
Olive-Northern	18439.8*	Floodplain	1600.00	1247.94	1253.80		1253.97	0.000713	3.33	480.39	119.27	0.29	9940.37	10059.63
Olive-Northern	18439.8*	Floodway	1600.00	1247.94	1253.80		1253.97	0.000713	3.33	480.39	119.27	0.29	9940.37	10059.63
Olive-Northern	18403.5*	Floodplain	1600.00	1247.91	1253.77		1253.94	0.000711	3.33	480.87	119.31	0.29	9940.34	10059.66
Olive-Northern	18403.5*	Floodway	1600.00	1247.91	1253.77		1253.94	0.000711	3.33	480.87	119.31	0.29	9940.34	10059.66
Olive-Northern	18367.14	Floodplain	1600.00	1247.88	1253.74		1253.92	0.000709	3.32	481.34	119.36	0.29	9940.32	10059.68
Olive-Northern	18367.14	Floodway	1600.00	1247.88	1253.74		1253.92	0.000709	3.32	481.34	119.36	0.29	9940.32	10059.68
Olive-Northern	18352.14	Floodplain	1600.00	1247.87	1253.67		1253.90	0.001262	3.83	417.34	97.38	0.33	9951.31	10048.69
Olive-Northern	18352.14	Floodway	1600.00	1247.87	1253.67		1253.90	0.001262	3.83	417.34	97.38	0.33	9951.31	10048.69
Olive-Northern	18337.14	Floodplain	1600.00	1247.86	1252.26	1252.26	1253.73	0.013531	9.72	164.66	56.21	1.00	9971.90	10028.11
Olive-Northern	18337.14	Floodway	1600.00	1247.86	1252.26	1252.26	1253.73	0.013531	9.72	164.66	56.21	1.00	9971.90	10028.11
Olive-Northern	18323.14	Floodplain	1600.00	1244.36	1249.66		1250.50	0.006193	7.32	218.61	63.43	0.69	9968.29	10031.71
Olive-Northern	18323.14	Floodway	1600.00	1244.36	1249.66		1250.50	0.006193	7.32	218.61	63.43	0.69	9968.29	10031.71
Olive-Northern	18295.14	Floodplain	1600.00	1244.34	1250.00		1250.25	0.001382	3.96	404.21	96.29	0.34	9951.85	10048.15
Olive-Northern	18295.14	Floodway	1600.00	1244.34	1250.00		1250.25	0.001382	3.96	404.21	96.29	0.34	9951.85	10048.15
Olive-Northern	18280.14	Floodplain	1600.00	1244.33	1250.03		1250.21	0.000797	3.47	461.50	117.35	0.31	9941.33	10058.67
Olive-Northern	18280.14	Floodway	1600.00	1244.33	1250.03		1250.21	0.000797	3.47	461.50	117.35	0.31	9941.33	10058.67
Olive-Northern	18241.5*	Floodplain	1600.00	1244.30	1250.00		1250.18	0.000780	3.44	465.28	117.85	0.30	9941.08	10058.92
Olive-Northern	18241.5*	Floodway	1600.00	1244.30	1250.00		1250.18	0.000780	3.44	465.28	117.85	0.30	9941.08	10058.92
Olive-Northern	18202.8*	Floodplain	1600.00	1244.27	1249.97		1250.15	0.000763	3.41	469.16	118.36	0.30	9940.82	10059.18
Olive-Northern	18202.8*	Floodway	1600.00	1244.27	1249.97		1250.15	0.000763	3.41	469.16	118.36	0.30	9940.82	10059.18
Olive-Northern	18164.2*	Floodplain	1600.00	1244.24	1249.94		1250.12	0.000746	3.38	473.13	118.87	0.30	9940.57	10059.43
Olive-Northern	18164.2*	Floodway	1600.00	1244.24	1249.94		1250.12	0.000746	3.38	473.13	118.87	0.30	9940.57	10059.43
Olive-Northern	18125.5*	Floodplain	1600.00	1244.21	1249.92		1250.09	0.000730	3.35	477.20	119.39	0.30	9940.31	10059.69
Olive-Northern	18125.5*	Floodway	1600.00	1244.21	1249.92		1250.09	0.000730	3.35	477.20	119.39	0.30	9940.31	10059.69
Olive-Northern	18086.94	Floodplain	1600.00	1244.18	1249.89		1250.06	0.000713	3.32	481.34	119.91	0.29	9940.04	10059.96
Olive-Northern	18086.94	Floodway	1600.00	1244.18	1249.89		1250.06	0.000713	3.32	481.34	119.91	0.29	9940.04	10059.96

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	18071.94	Floodplain	1600.00	1244.17	1249.81		1250.04	0.001280	3.84	416.18	97.73	0.33	9951.13	10048.87
Olive-Northern	18071.94	Floodway	1600.00	1244.17	1249.81		1250.04	0.001280	3.84	416.18	97.73	0.33	9951.13	10048.87
Olive-Northern	18056.94	Floodplain	1600.00	1244.16	1248.40	1248.40	1249.87	0.013740	9.74	164.24	56.50	1.01	9971.75	10028.25
Olive-Northern	18056.94	Floodway	1600.00	1244.16	1248.40	1248.40	1249.87	0.013740	9.74	164.24	56.50	1.01	9971.75	10028.25
Olive-Northern	18042.94	Floodplain	1600.00	1240.66	1246.17		1246.91	0.005268	6.90	231.88	65.08	0.64	9967.46	10032.54
Olive-Northern	18042.94	Floodway	1600.00	1240.66	1246.17		1246.91	0.005268	6.90	231.88	65.08	0.64	9967.46	10032.54
Olive-Northern	18014.94	Floodplain	1600.00	1240.64	1246.47		1246.69	0.001238	3.81	420.09	97.60	0.32	9951.20	10048.80
Olive-Northern	18014.94	Floodway	1600.00	1240.64	1246.47		1246.69	0.001238	3.81	420.09	97.60	0.32	9951.20	10048.80
Olive-Northern	17999.94	Floodplain	1600.00	1240.63	1246.49		1246.66	0.000711	3.33	480.81	119.31	0.29	9940.35	10059.65
Olive-Northern	17999.94	Floodway	1600.00	1240.63	1246.49		1246.66	0.000711	3.33	480.81	119.31	0.29	9940.35	10059.65
Olive-Northern	17974.8*	Floodplain	1600.00	1240.61	1246.47		1246.64	0.000710	3.33	481.07	119.33	0.29	9940.33	10059.67
Olive-Northern	17974.8*	Floodway	1600.00	1240.61	1246.47		1246.64	0.000710	3.33	481.07	119.33	0.29	9940.33	10059.67
Olive-Northern	17949.76	Floodplain	1600.00	1240.59	1246.45		1246.63	0.000709	3.32	481.30	119.36	0.29	9940.32	10059.68
Olive-Northern	17949.76	Floodway	1600.00	1240.59	1246.45		1246.63	0.000709	3.32	481.30	119.36	0.29	9940.32	10059.68
Olive-Northern	17934.76	Floodplain	1600.00	1240.58	1246.38		1246.61	0.001262	3.83	417.32	97.38	0.33	9951.31	10048.69
Olive-Northern	17934.76	Floodway	1600.00	1240.58	1246.38		1246.61	0.001262	3.83	417.32	97.38	0.33	9951.31	10048.69
Olive-Northern	17919.76	Floodplain	1600.00	1240.57	1244.97	1244.97	1246.44	0.013496	9.71	164.81	56.23	1.00	9971.89	10028.12
Olive-Northern	17919.76	Floodway	1600.00	1240.57	1244.97	1244.97	1246.44	0.013496	9.71	164.81	56.23	1.00	9971.89	10028.12
Olive-Northern	17905.76	Floodplain	1600.00	1237.07	1242.58		1243.32	0.005267	6.90	231.89	65.08	0.64	9967.46	10032.54
Olive-Northern	17905.76	Floodway	1600.00	1237.07	1242.58		1243.32	0.005267	6.90	231.89	65.08	0.64	9967.46	10032.54
Olive-Northern	17877.76	Floodplain	1600.00	1237.05	1242.88		1243.10	0.001238	3.81	420.09	97.60	0.32	9951.20	10048.80
Olive-Northern	17877.76	Floodway	1600.00	1237.05	1242.88		1243.10	0.001238	3.81	420.09	97.60	0.32	9951.20	10048.80
Olive-Northern	17862.76	Floodplain	1600.00	1237.04	1242.90		1243.07	0.000711	3.33	480.81	119.31	0.29	9940.35	10059.65
Olive-Northern	17862.76	Floodway	1600.00	1237.04	1242.90		1243.07	0.000711	3.33	480.81	119.31	0.29	9940.35	10059.65
Olive-Northern	17837.6*	Floodplain	1600.00	1237.02	1242.88		1243.05	0.000710	3.33	481.07	119.33	0.29	9940.33	10059.67
Olive-Northern	17837.6*	Floodway	1600.00	1237.02	1242.88		1243.05	0.000710	3.33	481.07	119.33	0.29	9940.33	10059.67
Olive-Northern	17812.59	Floodplain	1600.00	1237.00	1242.86		1243.04	0.000709	3.32	481.30	119.36	0.29	9940.32	10059.68
Olive-Northern	17812.59	Floodway	1600.00	1237.00	1242.86		1243.04	0.000709	3.32	481.30	119.36	0.29	9940.32	10059.68
Olive-Northern	17797.59	Floodplain	1600.00	1236.99	1242.79		1243.02	0.001262	3.83	417.32	97.38	0.33	9951.31	10048.69
Olive-Northern	17797.59	Floodway	1600.00	1236.99	1242.79		1243.02	0.001262	3.83	417.32	97.38	0.33	9951.31	10048.69
Olive-Northern	17782.59	Floodplain	1600.00	1236.98	1241.38	1241.38	1242.85	0.013500	9.71	164.80	56.23	1.00	9971.89	10028.12
Olive-Northern	17782.59	Floodway	1600.00	1236.98	1241.38	1241.38	1242.85	0.013500	9.71	164.80	56.23	1.00	9971.89	10028.12

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	17764.59	Floodplain	1600.00	1232.48	1237.96		1238.71	0.005399	6.96	229.80	64.82	0.65	9967.59	10032.41
Olive-Northern	17764.59	Floodway	1600.00	1232.48	1237.96		1238.71	0.005399	6.96	229.80	64.82	0.65	9967.59	10032.41
Olive-Northern	17735.59	Floodplain	1600.00	1232.46	1238.26		1238.49	0.001262	3.83	417.34	97.38	0.33	9951.31	10048.69
Olive-Northern	17735.59	Floodway	1600.00	1232.46	1238.26		1238.49	0.001262	3.83	417.34	97.38	0.33	9951.31	10048.69
Olive-Northern	17720.59	Floodplain	1600.00	1232.45	1238.28		1238.46	0.000725	3.35	477.46	118.97	0.29	9940.52	10059.49
Olive-Northern	17720.59	Floodway	1600.00	1232.45	1238.28		1238.46	0.000725	3.35	477.46	118.97	0.29	9940.52	10059.49
Olive-Northern	17673.*	Floodplain	1600.00	1232.41	1238.25		1238.42	0.000722	3.35	478.13	119.04	0.29	9940.48	10059.52
Olive-Northern	17673.*	Floodway	1600.00	1232.41	1238.25		1238.42	0.000722	3.35	478.13	119.04	0.29	9940.48	10059.52
Olive-Northern	17625.4*	Floodplain	1600.00	1232.38	1238.21		1238.39	0.000724	3.35	477.57	118.98	0.29	9940.51	10059.49
Olive-Northern	17625.4*	Floodway	1600.00	1232.38	1238.21		1238.39	0.000724	3.35	477.57	118.98	0.29	9940.51	10059.49
Olive-Northern	17577.8*	Floodplain	1600.00	1232.34	1238.18		1238.35	0.000722	3.35	478.25	119.05	0.29	9940.48	10059.53
Olive-Northern	17577.8*	Floodway	1600.00	1232.34	1238.18		1238.35	0.000722	3.35	478.25	119.05	0.29	9940.48	10059.53
Olive-Northern	17530.2*	Floodplain	1600.00	1232.30	1238.14		1238.32	0.000719	3.34	478.93	119.12	0.29	9940.44	10059.56
Olive-Northern	17530.2*	Floodway	1600.00	1232.30	1238.14		1238.32	0.000719	3.34	478.93	119.12	0.29	9940.44	10059.56
Olive-Northern	17482.6*	Floodplain	1600.00	1232.27	1238.11		1238.28	0.000721	3.34	478.38	119.06	0.29	9940.47	10059.53
Olive-Northern	17482.6*	Floodway	1600.00	1232.27	1238.11		1238.28	0.000721	3.34	478.38	119.06	0.29	9940.47	10059.53
Olive-Northern	17435.0*	Floodplain	1600.00	1232.23	1238.07		1238.25	0.000718	3.34	479.08	119.13	0.29	9940.43	10059.57
Olive-Northern	17435.0*	Floodway	1600.00	1232.23	1238.07		1238.25	0.000718	3.34	479.08	119.13	0.29	9940.43	10059.57
Olive-Northern	17387.5*	Floodplain	1600.00	1232.20	1238.04		1238.21	0.000720	3.34	478.53	119.08	0.29	9940.46	10059.54
Olive-Northern	17387.5*	Floodway	1600.00	1232.20	1238.04		1238.21	0.000720	3.34	478.53	119.08	0.29	9940.46	10059.54
Olive-Northern	17339.9*	Floodplain	1600.00	1232.16	1238.01		1238.18	0.000718	3.34	479.21	119.15	0.29	9940.43	10059.57
Olive-Northern	17339.9*	Floodway	1600.00	1232.16	1238.01		1238.18	0.000718	3.34	479.21	119.15	0.29	9940.43	10059.57
Olive-Northern	17292.3*	Floodplain	1600.00	1232.12	1237.97		1238.14	0.000715	3.33	479.92	119.22	0.29	9940.39	10059.61
Olive-Northern	17292.3*	Floodway	1600.00	1232.12	1237.97		1238.14	0.000715	3.33	479.92	119.22	0.29	9940.39	10059.61
Olive-Northern	17244.7*	Floodplain	1600.00	1232.09	1237.94		1238.11	0.000717	3.34	479.40	119.17	0.29	9940.42	10059.58
Olive-Northern	17244.7*	Floodway	1600.00	1232.09	1237.94		1238.11	0.000717	3.34	479.40	119.17	0.29	9940.42	10059.58
Olive-Northern	17197.1*	Floodplain	1600.00	1232.05	1237.90		1238.08	0.000714	3.33	480.11	119.24	0.29	9940.38	10059.62
Olive-Northern	17197.1*	Floodway	1600.00	1232.05	1237.90		1238.08	0.000714	3.33	480.11	119.24	0.29	9940.38	10059.62
Olive-Northern	17149.5*	Floodplain	1600.00	1232.02	1237.87		1238.04	0.000716	3.34	479.59	119.19	0.29	9940.41	10059.59
Olive-Northern	17149.5*	Floodway	1600.00	1232.02	1237.87		1238.04	0.000716	3.34	479.59	119.19	0.29	9940.41	10059.59
Olive-Northern	17101.9*	Floodplain	1600.00	1231.98	1237.84		1238.01	0.000713	3.33	480.31	119.26	0.29	9940.37	10059.63
Olive-Northern	17101.9*	Floodway	1600.00	1231.98	1237.84		1238.01	0.000713	3.33	480.31	119.26	0.29	9940.37	10059.63
Olive-Northern	17054.4*	Floodplain	1600.00	1231.94	1237.80		1237.97	0.000710	3.33	481.06	119.33	0.29	9940.33	10059.67

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	17054.4*	Floodway	1600.00	1231.94	1237.80		1237.97	0.000710	3.33	481.06	119.33	0.29	9940.33	10059.67
Olive-Northern	17006.8*	Floodplain	1600.00	1231.91	1237.77		1237.94	0.000712	3.33	480.55	119.28	0.29	9940.36	10059.64
Olive-Northern	17006.8*	Floodway	1600.00	1231.91	1237.77		1237.94	0.000712	3.33	480.55	119.28	0.29	9940.36	10059.64
Olive-Northern	16959.23	Floodplain	1600.00	1231.87	1237.73		1237.91	0.000709	3.32	481.32	119.36	0.29	9940.32	10059.68
Olive-Northern	16959.23	Floodway	1600.00	1231.87	1237.73		1237.91	0.000709	3.32	481.32	119.36	0.29	9940.32	10059.68
Olive-Northern	16944.23	Floodplain	1600.00	1231.86	1237.66		1237.89	0.001262	3.83	417.33	97.38	0.33	9951.31	10048.69
Olive-Northern	16944.23	Floodway	1600.00	1231.86	1237.66		1237.89	0.001262	3.83	417.33	97.38	0.33	9951.31	10048.69
Olive-Northern	16929.23	Floodplain	1600.00	1231.85	1236.25	1236.25	1237.72	0.013507	9.71	164.76	56.22	1.00	9971.89	10028.11
Olive-Northern	16929.23	Floodway	1600.00	1231.85	1236.25	1236.25	1237.72	0.013507	9.71	164.76	56.22	1.00	9971.89	10028.11
Olive-Northern	16911.23	Floodplain	1600.00	1227.35	1232.83		1233.58	0.005398	6.96	229.82	64.82	0.65	9967.59	10032.41
Olive-Northern	16911.23	Floodway	1600.00	1227.35	1232.83		1233.58	0.005398	6.96	229.82	64.82	0.65	9967.59	10032.41
Olive-Northern	16882.23	Floodplain	1600.00	1227.33	1233.13		1233.36	0.001261	3.83	417.37	97.38	0.33	9951.31	10048.69
Olive-Northern	16882.23	Floodway	1600.00	1227.33	1233.13		1233.36	0.001261	3.83	417.37	97.38	0.33	9951.31	10048.69
Olive-Northern	16867.23	Floodplain	1600.00	1227.31	1233.15		1233.33	0.000719	3.34	478.74	119.10	0.29	9940.45	10059.55
Olive-Northern	16867.23	Floodway	1600.00	1227.31	1233.15		1233.33	0.000719	3.34	478.74	119.10	0.29	9940.45	10059.55
Olive-Northern	16819.3*	Floodplain	1600.00	1227.27	1233.12		1233.29	0.000717	3.34	479.43	119.17	0.29	9940.42	10059.58
Olive-Northern	16819.3*	Floodway	1600.00	1227.27	1233.12		1233.29	0.000717	3.34	479.43	119.17	0.29	9940.42	10059.58
Olive-Northern	16771.4*	Floodplain	1600.00	1227.24	1233.08		1233.26	0.000719	3.34	478.86	119.11	0.29	9940.44	10059.56
Olive-Northern	16771.4*	Floodway	1600.00	1227.24	1233.08		1233.26	0.000719	3.34	478.86	119.11	0.29	9940.44	10059.56
Olive-Northern	16723.5*	Floodplain	1600.00	1227.20	1233.05		1233.22	0.000716	3.34	479.54	119.18	0.29	9940.41	10059.59
Olive-Northern	16723.5*	Floodway	1600.00	1227.20	1233.05		1233.22	0.000716	3.34	479.54	119.18	0.29	9940.41	10059.59
Olive-Northern	16675.6*	Floodplain	1600.00	1227.17	1233.01		1233.19	0.000719	3.34	478.96	119.12	0.29	9940.44	10059.56
Olive-Northern	16675.6*	Floodway	1600.00	1227.17	1233.01		1233.19	0.000719	3.34	478.96	119.12	0.29	9940.44	10059.56
Olive-Northern	16627.7*	Floodplain	1600.00	1227.13	1232.98		1233.15	0.000716	3.34	479.65	119.19	0.29	9940.40	10059.60
Olive-Northern	16627.7*	Floodway	1600.00	1227.13	1232.98		1233.15	0.000716	3.34	479.65	119.19	0.29	9940.40	10059.60
Olive-Northern	16579.8*	Floodplain	1600.00	1227.10	1232.94		1233.12	0.000718	3.34	479.08	119.13	0.29	9940.43	10059.57
Olive-Northern	16579.8*	Floodway	1600.00	1227.10	1232.94		1233.12	0.000718	3.34	479.08	119.13	0.29	9940.43	10059.57
Olive-Northern	16531.9*	Floodplain	1600.00	1227.06	1232.91		1233.08	0.000715	3.34	479.75	119.20	0.29	9940.40	10059.60
Olive-Northern	16531.9*	Floodway	1600.00	1227.06	1232.91		1233.08	0.000715	3.34	479.75	119.20	0.29	9940.40	10059.60
Olive-Northern	16484.0*	Floodplain	1600.00	1227.03	1232.88		1233.05	0.000718	3.34	479.20	119.14	0.29	9940.43	10059.57
Olive-Northern	16484.0*	Floodway	1600.00	1227.03	1232.88		1233.05	0.000718	3.34	479.20	119.14	0.29	9940.43	10059.57
Olive-Northern	16436.1*	Floodplain	1600.00	1226.99	1232.84		1233.01	0.000715	3.33	479.89	119.21	0.29	9940.39	10059.61
Olive-Northern	16436.1*	Floodway	1600.00	1226.99	1232.84		1233.01	0.000715	3.33	479.89	119.21	0.29	9940.39	10059.61

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	16388.2*	Floodplain	1600.00	1226.95	1232.81		1232.98	0.000712	3.33	480.60	119.29	0.29	9940.36	10059.64
Olive-Northern	16388.2*	Floodway	1600.00	1226.95	1232.81		1232.98	0.000712	3.33	480.60	119.29	0.29	9940.36	10059.64
Olive-Northern	16340.3*	Floodplain	1600.00	1226.92	1232.77		1232.95	0.000714	3.33	480.05	119.23	0.29	9940.38	10059.62
Olive-Northern	16340.3*	Floodway	1600.00	1226.92	1232.77		1232.95	0.000714	3.33	480.05	119.23	0.29	9940.38	10059.62
Olive-Northern	16292.4*	Floodplain	1600.00	1226.88	1232.74		1232.91	0.000711	3.33	480.77	119.30	0.29	9940.35	10059.65
Olive-Northern	16292.4*	Floodway	1600.00	1226.88	1232.74		1232.91	0.000711	3.33	480.77	119.30	0.29	9940.35	10059.65
Olive-Northern	16244.5*	Floodplain	1600.00	1226.85	1232.70		1232.88	0.000713	3.33	480.23	119.25	0.29	9940.38	10059.63
Olive-Northern	16244.5*	Floodway	1600.00	1226.85	1232.70		1232.88	0.000713	3.33	480.23	119.25	0.29	9940.38	10059.63
Olive-Northern	16196.6*	Floodplain	1600.00	1226.81	1232.67		1232.84	0.000710	3.33	480.93	119.32	0.29	9940.34	10059.66
Olive-Northern	16196.6*	Floodway	1600.00	1226.81	1232.67		1232.84	0.000710	3.33	480.93	119.32	0.29	9940.34	10059.66
Olive-Northern	16148.7*	Floodplain	1600.00	1226.78	1232.64		1232.81	0.000713	3.33	480.40	119.27	0.29	9940.37	10059.63
Olive-Northern	16148.7*	Floodway	1600.00	1226.78	1232.64		1232.81	0.000713	3.33	480.40	119.27	0.29	9940.37	10059.63
Olive-Northern	16100.8*	Floodplain	1600.00	1226.74	1232.60		1232.77	0.000710	3.33	481.13	119.34	0.29	9940.33	10059.67
Olive-Northern	16100.8*	Floodway	1600.00	1226.74	1232.60		1232.77	0.000710	3.33	481.13	119.34	0.29	9940.33	10059.67
Olive-Northern	16052.9*	Floodplain	1600.00	1226.71	1232.57		1232.74	0.000712	3.33	480.60	119.29	0.29	9940.36	10059.64
Olive-Northern	16052.9*	Floodway	1600.00	1226.71	1232.57		1232.74	0.000712	3.33	480.60	119.29	0.29	9940.36	10059.64
Olive-Northern	16005.09	Floodplain	1600.00	1226.67	1232.53		1232.71	0.000709	3.32	481.34	119.36	0.29	9940.32	10059.68
Olive-Northern	16005.09	Floodway	1600.00	1226.67	1232.53		1232.71	0.000709	3.32	481.34	119.36	0.29	9940.32	10059.68
Olive-Northern	15990.09	Floodplain	1600.00	1226.66	1232.46		1232.69	0.001262	3.83	417.34	97.38	0.33	9951.31	10048.69
Olive-Northern	15990.09	Floodway	1600.00	1226.66	1232.46		1232.69	0.001262	3.83	417.34	97.38	0.33	9951.31	10048.69
Olive-Northern	15975.09	Floodplain	1600.00	1226.65	1231.05	1231.05	1232.52	0.013521	9.71	164.70	56.21	1.00	9971.89	10028.11
Olive-Northern	15975.09	Floodway	1600.00	1226.65	1231.05	1231.05	1232.52	0.013521	9.71	164.70	56.21	1.00	9971.89	10028.11
Olive-Northern	15950.09	Floodplain	1600.00	1220.38	1227.00		1227.51	0.002793	5.70	280.91	64.72	0.48	9967.64	10032.36
Olive-Northern	15950.09	Floodway	1600.00	1220.38	1227.00		1227.51	0.002793	5.70	280.91	64.72	0.48	9967.64	10032.36
Olive-Northern	15928.0*	Floodplain	1600.00	1220.37	1227.16		1227.39	0.001108	3.88	412.42	85.19	0.31	9957.40	10042.60
Olive-Northern	15928.0*	Floodway	1600.00	1220.37	1227.16		1227.39	0.001108	3.88	412.42	85.19	0.31	9957.40	10042.60
Olive-Northern	15926.0*	Floodplain	1600.00	1220.37	1227.16		1227.38	0.001031	3.76	425.02	86.99	0.30	9956.50	10043.50
Olive-Northern	15926.0*	Floodway	1600.00	1220.37	1227.16		1227.38	0.001031	3.76	425.02	86.99	0.30	9956.50	10043.50
Olive-Northern	15916.09	Floodplain	1600.00	1220.36	1227.19		1227.36	0.000721	3.25	492.14	96.08	0.25	9951.96	10048.04
Olive-Northern	15916.09	Floodway	1600.00	1220.36	1227.19		1227.36	0.000721	3.25	492.14	96.08	0.25	9951.96	10048.04
Olive-Northern	15901.09	Floodplain	1600.00	1220.35	1227.23		1227.33	0.000317	2.54	629.07	127.08	0.20	9941.46	10068.54
Olive-Northern	15901.09	Floodway	1600.00	1220.35	1227.23		1227.33	0.000317	2.54	629.07	127.08	0.20	9941.46	10068.54

HEC-RAS Plan: Design River: North Inlet Chan Reach: Olive-Northern (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	Sta W.S. Lft	Sta W.S. Rgt
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(ft)
Olive-Northern	15855.5*	Floodplain	1600.00	1220.31	1227.22		1227.32	0.000312	2.53	632.39	127.34	0.20	9941.33	10068.67
Olive-Northern	15855.5*	Floodway	1600.00	1220.31	1227.22		1227.32	0.000312	2.53	632.39	127.34	0.20	9941.33	10068.67
Olive-Northern	15809.9*	Floodplain	1600.00	1220.28	1227.20		1227.30	0.000309	2.52	634.46	127.49	0.20	9941.25	10068.75
Olive-Northern	15809.9*	Floodway	1600.00	1220.28	1227.20		1227.30	0.000309	2.52	634.46	127.49	0.20	9941.25	10068.75
Olive-Northern	15764.3*	Floodplain	1600.00	1220.24	1227.19		1227.29	0.000305	2.51	637.85	127.75	0.20	9941.12	10068.88
Olive-Northern	15764.3*	Floodway	1600.00	1220.24	1227.19		1227.29	0.000305	2.51	637.85	127.75	0.20	9941.12	10068.88
Olive-Northern	15718.8*	Floodplain	1600.00	1220.21	1227.18		1227.27	0.000302	2.50	639.96	127.91	0.20	9941.04	10068.96
Olive-Northern	15718.8*	Floodway	1600.00	1220.21	1227.18		1227.27	0.000302	2.50	639.96	127.91	0.20	9941.04	10068.96
Olive-Northern	15673.2*	Floodplain	1600.00	1220.17	1227.16		1227.26	0.000297	2.49	643.38	128.17	0.20	9940.91	10069.09
Olive-Northern	15673.2*	Floodway	1600.00	1220.17	1227.16		1227.26	0.000297	2.49	643.38	128.17	0.20	9940.91	10069.09
Olive-Northern	15627.6*	Floodplain	1600.00	1220.14	1227.15		1227.25	0.000295	2.48	645.54	128.34	0.19	9940.83	10069.17
Olive-Northern	15627.6*	Floodway	1600.00	1220.14	1227.15		1227.25	0.000295	2.48	645.54	128.34	0.19	9940.83	10069.17
Olive-Northern	15582.1*	Floodplain	1600.00	1220.10	1227.14		1227.23	0.000290	2.47	649.04	128.60	0.19	9940.70	10069.30
Olive-Northern	15582.1*	Floodway	1600.00	1220.10	1227.14		1227.23	0.000290	2.47	649.04	128.60	0.19	9940.70	10069.30
Olive-Northern	15536.5*	Floodplain	1600.00	1220.07	1227.12		1227.22	0.000287	2.46	651.26	128.77	0.19	9940.61	10069.39
Olive-Northern	15536.5*	Floodway	1600.00	1220.07	1227.12		1227.22	0.000287	2.46	651.26	128.77	0.19	9940.61	10069.39
Olive-Northern	15491.*	Floodplain	1600.00	1220.04	1227.11		1227.21	0.000285	2.45	653.47	128.94	0.19	9940.53	10069.47
Olive-Northern	15491.*	Floodway	1600.00	1220.04	1227.11		1227.21	0.000285	2.45	653.47	128.94	0.19	9940.53	10069.47
Olive-Northern	15455.43	Floodplain	1600.00	1220.00	1227.10	1222.78	1227.19	0.000280	2.44	657.07	129.21	0.19	9940.40	10069.60
Olive-Northern	15455.43	Floodway	1600.00	1220.00	1227.10	1222.78	1227.19	0.000280	2.44	657.07	129.21	0.19	9940.40	10069.60
Olive-Northern	15445.43		Culvert											
Olive-Northern	15042.37	Floodplain	1600.00	1217.75	1222.70	1219.87	1222.90	0.000164	3.56	449.38	90.85	0.28	9980.80	10071.65
Olive-Northern	15042.37	Floodway	1600.00	1217.75	1222.70	1219.87	1222.90	0.000164	3.56	449.38	90.85	0.28	9980.80	10071.65

TABLE 3b

Perryville Road Wash with Levee

HEC-RAS Plan: With Levee River: Perryville Wash Reach: Perryville Profile: Floodplain

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)	
Perryville	34	Floodplain	340.00	1210.46	1212.74		1212.80	0.001896	1.96	173.85	108.99	0.27
Perryville	33	Floodplain	380.00	1207.62	1211.16	1210.90	1211.27	0.005330	3.41	183.60	308.94	0.42
Perryville	32	Floodplain	420.00	1205.06	1206.74	1206.69	1206.87	0.014943	4.20	158.58	396.71	0.75
Perryville	31	Floodplain	460.00	1202.66	1203.74	1203.40	1203.78	0.003719	1.64	288.03	476.10	0.36
Perryville	30	Floodplain	500.00	1198.54	1199.59	1199.59	1199.84	0.020586	4.09	127.27	273.42	0.99
Perryville	29	Floodplain	525.00	1195.43	1196.99	1196.64	1197.04	0.002509	1.82	318.60	550.04	0.37
Perryville	28	Floodplain	550.00	1193.12	1194.04	1194.04	1194.28	0.017085	2.82	164.35	340.98	0.73
Perryville	27	Floodplain	575.00	1185.67	1190.25	1189.05	1190.48	0.004612	4.76	202.22	207.86	0.49
Perryville	26	Floodplain	600.00	1183.13	1185.55	1185.55	1186.41	0.022025	7.83	82.57	51.21	1.03
Perryville	25	Floodplain	625.00	1180.73	1183.20	1182.91	1183.62	0.003135	5.20	126.33	88.35	0.74
Perryville	24	Floodplain	650.00	1179.45	1181.71	1181.71	1182.39	0.005326	6.76	104.75	82.26	0.97
Perryville	23	Floodplain	671.00	1175.04	1180.25	1177.70	1180.27	0.000261	1.25	650.65	402.11	0.12
Perryville	22	Floodplain	690.00	1176.60	1179.81	1179.24	1180.11	0.006697	4.47	165.44	126.09	0.56
Perryville	21	Floodplain	700.00	1172.70	1176.63	1175.68	1177.01	0.005839	4.99	145.44	113.78	0.54
Perryville	20	Floodplain	710.00	1170.20	1173.63	1172.76	1173.93	0.006258	4.34	163.55	81.31	0.54
Perryville	19	Floodplain	720.00	1167.90	1171.20	1170.31	1171.45	0.004293	4.00	182.33	100.86	0.48
Perryville	18	Floodplain	730.00	1166.05	1169.23	1168.10	1169.38	0.003178	3.16	249.07	166.08	0.37
Perryville	17	Floodplain	738.00	1164.46	1168.02	1167.02	1168.12	0.002374	2.84	303.68	193.89	0.33
Perryville	16	Floodplain	800.00	1161.53	1166.23	1166.23	1166.44	0.006749	5.15	330.88	602.53	0.54
Perryville	15	Floodplain	850.00	1157.86	1161.78	1161.78	1162.05	0.009123	5.42	248.43	340.70	0.63
Perryville	14	Floodplain	920.00	1155.28	1160.15	1159.29	1160.23	0.002068	2.83	418.11	305.04	0.28
Perryville	13	Floodplain	1054.00	1153.20	1156.30	1156.30	1157.14	0.041872	7.42	144.76	94.05	0.97
Perryville	12.4	Floodplain	204.00	1150.18	1154.98	1152.16	1154.98	0.000004	0.09	1817.53	873.64	0.01
Perryville	12.2	Floodplain	37.00	1149.35	1154.98	1149.68	1154.98	0.000005	0.17	221.28	1270.06	0.01
Perryville	12		Culvert									
Perryville	11.8	Floodplain	133.00	1149.50	1152.16	1150.73	1152.27	0.003190	2.58	51.48	309.66	0.29
Perryville	11	Floodplain	183.00	1148.79	1151.03	1150.01	1151.08	0.003089	1.86	98.69	65.46	0.26
Perryville	10	Floodplain	233.00	1146.97	1149.71	1148.41	1149.77	0.002795	1.90	124.16	77.15	0.25
Perryville	9	Floodplain	283.00	1144.98	1148.28	1146.72	1148.34	0.002729	1.98	143.66	78.73	0.25
Perryville	8	Floodplain	323.00	1142.71	1146.17	1144.91	1146.29	0.005828	2.86	113.27	64.25	0.37
Perryville	7	Floodplain	353.00	1140.67	1144.20	1142.71	1144.30	0.002953	2.53	141.33	73.00	0.31
Perryville	6	Floodplain	400.00	1139.15	1142.58	1141.04	1142.72	0.003456	2.98	134.43	56.31	0.34
Perryville	5	Floodplain	450.00	1137.00	1140.24	1139.04	1140.46	0.005788	3.76	119.78	57.60	0.44
Perryville	4	Floodplain	500.00	1134.13	1138.26	1136.76	1138.38	0.003143	2.85	191.59	141.57	0.32
Perryville	3	Floodplain	550.00	1130.55	1133.58	1133.58	1134.42	0.033490	7.37	74.67	44.02	1.00
Perryville	2	Floodplain	600.00	1128.41	1133.37	1130.54	1133.43	0.000435	1.91	321.38	419.42	0.18
Perryville	1	Floodplain	653.00	1126.97	1133.15	1132.12	1133.19	0.001466	1.95	451.01	303.30	0.22
Perryville	0.8		Culvert									
Perryville	0.7	Floodplain	653.00	1126.14	1132.49	1132.49	1133.03	0.009709	6.18	149.40	214.35	0.79

HEC-RAS Plan: With Levee River: Perryville Wash Reach: Perryville Profile: Floodplain (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)	
Perryville	0.6	Floodplain	653.00	1125.96	1130.11	1129.25	1130.56	0.005768	5.39	125.67	126.33	0.63
Perryville	0.5	Floodplain	653.00	1124.36	1128.12		1128.48	0.004198	5.21	196.59	202.87	0.55
Perryville	0.4	Floodplain	653.00	1123.20	1126.84	1126.32	1126.98	0.003240	3.65	310.63	312.16	0.46
Perryville	0.3	Floodplain	653.00	1121.00	1123.08	1123.08	1123.92	0.016490	7.32	89.20	53.16	1.00
Perryville	0.2	Floodplain	653.00	1118.76	1122.45	1120.69	1122.56	0.000842	2.76	277.90	265.74	0.33
Perryville	0.1	Floodplain	852.00	1116.38	1120.97	1120.97	1121.50	0.006762	5.87	172.73	308.22	0.86
Perryville	0.042	Floodplain	852.00	1115.92	1118.24	1117.57	1118.30	0.002363	1.48	462.42	480.74	0.18
Perryville	0.041	Floodplain	852.00	1112.40	1115.43	1115.36	1115.65	0.020658	4.14	228.56	410.73	0.52
Perryville	0.040	Floodplain	827.00	1111.29	1114.28		1114.36	0.001169	1.13	385.44	318.21	0.13
Perryville	0.039	Floodplain	1055.00	1109.22	1112.96	1112.52	1113.08	0.005009	2.31	383.28	421.98	0.26

TABLE 3c

Perryville Road Wash without Levee and Floodway

HEC-RAS Plan: Floodway River: Perryville Wash Reach: Perryville

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)	
Perryville	34	Floodplain	340.00	1210.46	1212.72		1212.78	0.001983	1.98	171.36	108.74	0.28
Perryville	34	Floodway	340.00	1210.46	1212.89		1212.94	0.001427	1.79	190.47	110.59	0.24
Perryville	33	Floodplain	380.00	1207.62	1211.20	1210.90	1211.29	0.004692	3.22	193.98	317.58	0.39
Perryville	33	Floodway	380.00	1207.62	1211.40	1211.11	1211.57	0.006398	3.97	130.29	139.00	0.47
Perryville	32	Floodplain	420.00	1205.06	1206.71	1206.69	1206.86	0.018708	4.65	145.85	384.59	0.84
Perryville	32	Floodway	420.00	1205.06	1207.71	1207.13	1207.91	0.007715	4.38	127.02	135.00	0.59
Perryville	31	Floodplain	460.00	1202.66	1203.51		1203.54	0.003451	1.39	328.59	636.62	0.33
Perryville	31	Floodway	460.00	1202.66	1204.26		1204.41	0.006493	3.17	148.93	131.14	0.52
Perryville	30	Floodplain	500.00	1198.54	1199.59	1199.59	1199.84	0.020586	4.09	127.27	273.42	0.99
Perryville	30	Floodway	500.00	1198.54	1199.76	1199.64	1200.05	0.011286	4.29	116.44	130.00	0.80
Perryville	29	Floodplain	525.00	1195.43	1196.98	1196.64	1197.03	0.002619	1.85	313.78	546.40	0.38
Perryville	29	Floodway	525.00	1195.43	1197.33	1196.82	1197.48	0.003529	3.08	170.72	130.00	0.47
Perryville	28	Floodplain	550.00	1193.12	1194.06	1194.06	1194.28	0.015548	2.73	171.40	351.10	0.70
Perryville	28	Floodway	550.00	1193.12	1194.74	1194.47	1194.94	0.010214	3.89	156.86	155.00	0.65
Perryville	27	Floodplain	575.00	1185.67	1190.19	1189.05	1190.45	0.005038	4.94	191.35	186.61	0.51
Perryville	27	Floodway	575.00	1185.67	1190.84	1189.74	1191.32	0.005610	5.80	129.84	116.00	0.55
Perryville	26	Floodplain	600.00	1183.13	1185.66	1185.55	1186.41	0.018245	7.33	88.90	58.93	0.94
Perryville	26	Floodway	600.00	1183.13	1185.97	1185.97	1187.03	0.020179	8.27	72.57	34.76	1.01
Perryville	25	Floodplain	625.00	1180.73	1183.04	1182.90	1183.56	0.004317	5.81	112.59	84.73	0.86
Perryville	25	Floodway	625.00	1180.73	1183.29		1183.68	0.002759	5.01	124.64	78.95	0.70
Perryville	24	Floodplain	650.00	1179.45	1181.41	1181.41	1181.97	0.006323	6.74	142.39	134.51	1.03
Perryville	24	Floodway	650.00	1179.45	1181.71	1181.71	1182.48	0.005723	7.02	92.57	61.27	1.01
Perryville	23	Floodplain	671.00	1175.04	1179.94		1179.95	0.000106	0.75	1006.83	537.76	0.08
Perryville	23	Floodway	671.00	1175.04	1180.30		1180.34	0.000421	1.60	420.29	123.32	0.15
Perryville	22	Floodplain	690.00	1176.60	1179.67	1179.44	1179.87	0.005657	3.92	230.25	283.84	0.51
Perryville	22	Floodway	690.00	1176.60	1179.83	1179.23	1180.12	0.006482	4.43	166.57	124.00	0.55

HEC-RAS Plan: Floodway River: Perryville Wash Reach: Perryville (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)	
Perryville	21	Floodplain	700.00	1172.70	1176.59	1175.70	1176.98	0.005980	5.02	144.56	101.72	0.55
Perryville	21	Floodway	700.00	1172.70	1176.58	1175.68	1176.98	0.006197	5.09	139.58	58.18	0.56
Perryville	20	Floodplain	710.00	1170.20	1173.47	1172.76	1173.75	0.006679	4.37	183.15	212.23	0.55
Perryville	20	Floodway	710.00	1170.20	1173.73	1172.75	1173.99	0.005500	4.14	171.34	83.34	0.51
Perryville	19	Floodplain	720.00	1167.90	1170.60	1170.34	1170.77	0.005705	3.66	229.41	226.00	0.50
Perryville	19	Floodway	720.00	1167.90	1171.15	1170.31	1171.42	0.005288	4.13	175.96	95.06	0.50
Perryville	18	Floodplain	730.00	1166.05	1168.18	1167.60	1168.30	0.003702	2.28	271.28	226.17	0.35
Perryville	18	Floodway	730.00	1166.05	1168.97	1167.94	1169.11	0.003276	2.80	255.70	171.31	0.35
Perryville	17	Floodplain	738.00	1164.46	1167.43	1165.89	1167.49	0.001079	1.66	412.62	245.19	0.20
Perryville	17	Floodway	738.00	1164.46	1168.22	1166.75	1168.27	0.001148	2.11	410.36	226.28	0.22
Perryville	16	Floodplain	800.00	1161.53	1166.15	1166.15	1166.35	0.007759	4.73	309.67	594.68	0.50
Perryville	16	Floodway	800.00	1161.53	1166.58	1166.58	1166.97	0.011945	6.18	194.17	215.66	0.62
Perryville	15	Floodplain	850.00	1157.86	1161.73	1161.54	1161.91	0.006266	3.85	293.45	390.08	0.45
Perryville	15	Floodway	850.00	1157.86	1162.49	1161.81	1162.68	0.004464	3.74	246.75	138.99	0.39
Perryville	14	Floodplain	920.00	1155.28	1160.19	1159.20	1160.26	0.002232	2.47	430.11	308.97	0.25
Perryville	14	Floodway	920.00	1155.28	1160.86	1159.16	1161.03	0.002820	3.16	278.03	95.00	0.29
Perryville	13	Floodplain	1054.00	1153.20	1156.30	1156.30	1157.05	0.037832	7.06	153.00	114.70	0.92
Perryville	13	Floodway	1054.00	1153.20	1156.39	1156.39	1157.20	0.038284	7.25	147.14	97.13	0.92
Perryville	12.4	Floodplain	204.00	1150.18	1154.89		1154.89	0.000005	0.09	1742.68	863.38	0.01
Perryville	12.4	Floodway	204.00	1150.18	1154.97		1154.97	0.000034	0.26	789.81	328.00	0.03
Perryville	12.2	Floodplain	37.00	1149.35	1154.89	1149.68	1154.89	0.000005	0.17	217.88	1347.59	0.01
Perryville	12.2	Floodway	37.00	1149.35	1154.97	1149.68	1154.97	0.000005	0.17	221.03	345.00	0.01
Perryville	12		Culvert									
Perryville	11.8	Floodplain	133.00	1149.50	1152.08		1152.19	0.003583	2.68	49.72	287.28	0.30
Perryville	11.8	Floodway	133.00	1149.50	1152.16		1152.26	0.003218	2.59	51.35	267.00	0.29
Perryville	11	Floodplain	183.00	1148.79	1150.95	1150.00	1151.00	0.002868	1.74	105.63	90.97	0.25

HEC-RAS Plan: Floodway River: Perryville Wash Reach: Perryville (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)	
Perryville	11	Floodway	183.00	1148.79	1151.05	1150.01	1151.10	0.002988	1.84	99.80	65.67	0.26
Perryville	10	Floodplain	233.00	1146.97	1149.68	1148.40	1149.73	0.002753	1.87	125.36	80.53	0.25
Perryville	10	Floodway	233.00	1146.97	1149.74	1148.41	1149.80	0.002831	1.92	121.17	68.93	0.25
Perryville	9	Floodplain	283.00	1144.98	1148.24	1146.72	1148.30	0.002755	1.97	144.47	82.35	0.25
Perryville	9	Floodway	283.00	1144.98	1148.28	1146.72	1148.34	0.002759	2.00	141.65	73.68	0.25
Perryville	8	Floodplain	323.00	1142.71	1146.19	1144.91	1146.30	0.005453	2.78	118.36	79.15	0.36
Perryville	8	Floodway	323.00	1142.71	1146.18	1144.91	1146.31	0.005703	2.84	113.75	60.26	0.36
Perryville	7	Floodplain	353.00	1140.67	1144.09	1142.71	1144.20	0.003405	2.67	134.05	72.36	0.33
Perryville	7	Floodway	353.00	1140.67	1144.22	1142.70	1144.32	0.002994	2.55	138.49	65.88	0.31
Perryville	6	Floodplain	400.00	1139.15	1142.41	1141.00	1142.54	0.003343	2.85	143.03	66.65	0.33
Perryville	6	Floodway	400.00	1139.15	1142.55	1141.04	1142.69	0.003555	3.01	133.09	56.08	0.34
Perryville	5	Floodplain	450.00	1137.00	1140.12	1139.06	1140.32	0.005795	3.68	128.33	67.17	0.43
Perryville	5	Floodway	450.00	1137.00	1140.34	1139.05	1140.54	0.005059	3.60	125.02	52.17	0.41
Perryville	4	Floodplain	500.00	1134.13	1138.17	1136.76	1138.28	0.003054	2.75	193.41	147.11	0.32
Perryville	4	Floodway	500.00	1134.13	1138.38	1136.76	1138.52	0.003320	3.02	165.62	65.41	0.33
Perryville	3	Floodplain	550.00	1130.55	1133.58	1133.58	1134.42	0.033239	7.35	74.88	44.08	0.99
Perryville	3	Floodway	550.00	1130.55	1133.58	1133.58	1134.42	0.033239	7.35	74.88	44.08	0.99
Perryville	2	Floodplain	600.00	1128.41	1133.13	1130.54	1133.15	0.000267	1.44	557.78	331.75	0.14
Perryville	2	Floodway	600.00	1128.41	1133.12	1130.54	1133.18	0.000551	2.06	291.88	85.77	0.20
Perryville	1	Floodplain	653.00	1126.97	1133.09	1131.45	1133.10	0.000107	0.69	883.64	219.79	0.06
Perryville	1	Floodway	653.00	1126.97	1133.09	1131.45	1133.09	0.000107	0.69	883.08	219.78	0.06
Perryville	0.8		Culvert									
Perryville	0.7	Floodplain	653.00	1126.14	1131.14	1130.96	1131.54	0.004192	5.10	128.02	53.48	0.55
Perryville	0.7	Floodway	653.00	1126.14	1131.14	1130.96	1131.54	0.004192	5.10	128.02	53.48	0.55
Perryville	0.6	Floodplain	653.00	1125.96	1130.11	1129.25	1130.54	0.005687	5.34	128.07	92.35	0.62
Perryville	0.6	Floodway	653.00	1125.96	1130.11	1129.25	1130.54	0.005687	5.34	128.07	92.35	0.62

HEC-RAS Plan: Floodway River: Perryville Wash Reach: Perryville (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)	
Perryville	0.5	Floodplain	653.00	1124.36	1128.12		1128.48	0.004195	5.21	196.68	202.99	0.55
Perryville	0.5	Floodway	653.00	1124.36	1128.12		1128.48	0.004195	5.21	196.68	202.99	0.55
Perryville	0.4	Floodplain	653.00	1123.20	1126.84	1126.31	1126.98	0.003245	3.65	310.44	312.06	0.46
Perryville	0.4	Floodway	653.00	1123.20	1126.84	1126.31	1126.98	0.003245	3.65	310.44	312.06	0.46
Perryville	0.3	Floodplain	653.00	1121.00	1123.08	1123.08	1123.92	0.016455	7.32	89.27	53.17	0.99
Perryville	0.3	Floodway	653.00	1121.00	1123.08	1123.08	1123.92	0.016455	7.32	89.27	53.17	0.99
Perryville	0.2	Floodplain	653.00	1118.76	1122.45		1122.56	0.000841	2.76	277.93	265.60	0.33
Perryville	0.2	Floodway	653.00	1118.76	1122.45		1122.56	0.000841	2.76	277.93	265.60	0.33
Perryville	0.1	Floodplain	852.00	1116.38	1120.97	1120.97	1121.50	0.006762	5.87	172.73	308.22	0.86
Perryville	0.1	Floodway	852.00	1116.38	1120.97	1120.97	1121.50	0.006762	5.87	172.73	308.22	0.86
Perryville	0.042	Floodplain	852.00	1115.92	1118.24	1117.57	1118.30	0.002363	1.48	462.42	480.74	0.18
Perryville	0.042	Floodway	852.00	1115.92	1118.24	1117.57	1118.29	0.002373	1.48	461.66	480.36	0.18
Perryville	0.041	Floodplain	852.00	1112.40	1115.43	1115.36	1115.65	0.020658	4.14	228.56	410.73	0.52
Perryville	0.041	Floodway	852.00	1112.40	1115.43	1115.36	1115.65	0.020468	4.12	229.31	411.28	0.52
Perryville	0.040	Floodplain	827.00	1111.29	1114.28		1114.36	0.001169	1.13	385.44	318.21	0.13
Perryville	0.040	Floodway	827.00	1111.29	1114.27		1114.36	0.001177	1.13	383.96	317.33	0.13
Perryville	0.039	Floodplain	1055.00	1109.22	1112.96	1112.52	1113.08	0.005009	2.31	383.28	421.98	0.26
Perryville	0.039	Floodway	1055.00	1109.22	1112.96	1112.52	1113.08	0.005009	2.31	383.28	421.98	0.26

TABLE 4

Summary of Discharge in FEMA FIS Format

Table 4

Summary of Discharges in FEMA FIS Format

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharges (cfs)			
			10-year	50-year	100-year	500-year
Beardsley Canal Wash	FRS #3	12.25	--[1]	--[1]	7,567	--[1]
	Northern Avenue (D/S)	10.87	--[1]	--[1]	7,131	--[1]
	Northern Avenue (U/S)	10.87	--[1]	--[1]	5,679	--[1]
	Olive Avenue (D/S)	4.86	--[1]	--[1]	1,115	--[1]
	Diversion Channel	4.86	--[1]	--[1]	1,600	--[1]
	Olive Avenue (U/S)	4.86	--[1]	--[1]	2,715	--[1]
	Peoria Avenue	0.29	--[1]	--[1]	313	--[1]
Perryville Road Wash	Camelback Road at 183rd Avenue	14.08	--[1]	--[1]	852	--[1]
	Camelback Road W. 183rd Avenue, Upstream of Breakout	14.08	--[1]	--[1]	1,257	--[1]
	Camelback Road	13.04	--[1]	--[1]	653	--[1]
	Bethany Home Road	12.54	--[1]	--[1]	1,054	--[1]
	Maryland Avenue	11.74	--[1]	--[1]	738	--[1]
	Glendale Avenue	11.58	--[1]	--[1]	671	--[1]
	800 ft s. of Northern Ave.	0.19	--[1]	--[1]	340	--[1]

--[1] Not Computed

Note that the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated for the proposed CLOMR conditions. This hydrology has been approved by the FCDMC and accepted by FEMA.

TABLE 5

Floodway Data in FEMA FIS Format

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
North Inlet Channel	20788.34		175.0	1499	1.1	1270.3	1270.3	1270.3	0.0
North Inlet Channel	20787.34		175.0	1499	1.1	1270.3	1270.3	1270.3	0.0
North Inlet Channel	20456.34		118.9	477	3.4	1262.3	1262.3	1262.3	0.0
North Inlet Channel	19030		119.4	481	3.3	1261.2	1261.2	1261.2	0.0
North Inlet Channel	19015		97.4	417	3.8	1261.2	1261.2	1261.2	0.0
North Inlet Channel	19000		56.2	165	9.7	1259.7	1259.7	1259.7	0.0
North Inlet Channel	18986		65.0	231	6.9	1257.3	1257.3	1257.3	0.0
North Inlet Channel	18958		97.5	419	3.8	1257.6	1257.6	1257.6	0.0
North Inlet Channel	18943		119.2	480	3.3	1257.7	1257.7	1257.7	0.0
North Inlet Channel	18599.58		119.4	481	3.3	1257.4	1257.4	1257.4	0.0
North Inlet Channel	18584.58		97.4	417	3.8	1257.3	1257.3	1257.3	0.0
North Inlet Channel	18569.58		56.2	165	9.7	1255.9	1255.9	1255.9	0.0
North Inlet Channel	18555.58		65.0	231	6.9	1253.5	1253.5	1253.5	0.0
North Inlet Channel	18527.58		97.5	419	3.8	1253.8	1253.8	1253.8	0.0
North Inlet Channel	18512.58		119.2	479	3.3	1253.9	1253.9	1253.9	0.0
North Inlet Channel	18367.14		119.4	481	3.3	1253.7	1253.7	1253.7	0.0
North Inlet Channel	18352.14		97.4	417	3.8	1253.7	1253.7	1253.7	0.0
North Inlet Channel	18337.14		56.2	165	9.7	1252.3	1252.3	1252.3	0.0
North Inlet Channel	18323.14		63.4	219	7.3	1249.7	1249.7	1249.7	0.0
North Inlet Channel	18295.14		96.3	404	4.0	1250.0	1250.0	1250.0	0.0
North Inlet Channel	18280.14		117.4	462	3.5	1250.0	1250.0	1250.0	0.0
North Inlet Channel	18086.94		119.9	481	3.3	1249.9	1249.9	1249.9	0.0
North Inlet Channel	18071.94		97.7	416	3.8	1249.8	1249.8	1249.8	0.0
North Inlet Channel	18056.94		56.5	164	9.7	1248.4	1248.4	1248.4	0.0
North Inlet Channel	18042.94		65.1	232	6.9	1246.2	1246.2	1246.2	0.0
North Inlet Channel	18014.94		97.6	420	3.8	1246.5	1246.5	1246.5	0.0
North Inlet Channel	17999.94		119.3	481	3.3	1246.5	1246.5	1246.5	0.0
North Inlet Channel	17949.76		119.4	481	3.3	1246.5	1246.5	1246.5	0.0
North Inlet Channel	17934.76		97.4	417	3.8	1246.4	1246.4	1246.4	0.0
North Inlet Channel	17919.76		56.2	165	9.7	1245.0	1245.0	1245.0	0.0

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
North Inlet Channel	17905.76		65.1	232	6.9	1242.6	1242.6	1242.6	0.0
North Inlet Channel	17877.76		97.6	420	3.8	1242.9	1242.9	1242.9	0.0
North Inlet Channel	17862.76		119.3	481	3.3	1242.9	1242.9	1242.9	0.0
North Inlet Channel	17812.59		119.4	481	3.3	1242.9	1242.9	1242.9	0.0
North Inlet Channel	17797.59		97.4	417	3.8	1242.8	1242.8	1242.8	0.0
North Inlet Channel	17782.59		56.2	165	9.7	1241.4	1241.4	1241.4	0.0
North Inlet Channel	17764.59		64.8	230	7.0	1238.0	1238.0	1238.0	0.0
North Inlet Channel	17735.59		97.4	417	3.8	1238.3	1238.3	1238.3	0.0
North Inlet Channel	17720.59		119.0	477	3.4	1238.3	1238.3	1238.3	0.0
North Inlet Channel	16959.23		119.4	481	3.3	1237.7	1237.7	1237.7	0.0
North Inlet Channel	16944.23		97.4	417	3.8	1237.7	1237.7	1237.7	0.0
North Inlet Channel	16929.23		56.2	165	9.7	1236.3	1236.3	1236.3	0.0
North Inlet Channel	16911.23		64.8	230	7.0	1232.8	1232.8	1232.8	0.0
North Inlet Channel	16882.23		97.4	417	3.8	1233.1	1233.1	1233.1	0.0
North Inlet Channel	16867.23		119.1	479	3.3	1233.2	1233.2	1233.2	0.0
North Inlet Channel	16005.09		119.4	481	3.3	1232.5	1232.5	1232.5	0.0
North Inlet Channel	15990.09		97.4	417	3.8	1232.5	1232.5	1232.5	0.0
North Inlet Channel	15975.09		56.2	165	9.7	1231.1	1231.1	1231.1	0.0
North Inlet Channel	15950.09		64.7	281	5.7	1227.0	1227.0	1227.0	0.0
North Inlet Channel	15916.09		96.1	492	3.3	1227.2	1227.2	1227.2	0.0
North Inlet Channel	15901.09		127.1	629	2.5	1227.2	1227.2	1227.2	0.0
North Inlet Channel	15455.43		129.2	657	2.4	1227.1	1227.1	1227.1	0.0
North Inlet Channel	15042.37		90.9	449	3.6	1222.7	1222.7	1222.7	0.0
Beardsley Canal Wash	61402.55		145.3	249	5.8	1288.1	1288.1	1288.1	0.0
Beardsley Canal Wash	61402.47		185.9	208	6.8	1284.4	1284.4	1284.4	0.0
Beardsley Canal Wash	61402.39		213.4	317	4.1	1282.2	1282.2	1282.2	0.0
Beardsley Canal Wash	61402.33		182.9	740	2.2	1282.1	1282.1	1282.1	0.0
Beardsley Canal Wash	61325.99		295.0	550	6.7	1281.1	1281.1	1281.1	0.0
Beardsley Canal Wash	61315.99		304.7	472	9.0	1278.1	1278.1	1278.1	0.0
Beardsley Canal Wash	61151		196.0	443	7.7	1277.2	1277.2	1277.2	0.0

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
Beardsley Canal Wash	61051		149.5	341	9.3	1275.8	1275.8	1275.8	0.0
Beardsley Canal Wash	60967		61.8	305	3.7	1275.8	1275.8	1275.7	-0.1
Beardsley Canal Wash	60865		60.3	199	5.6	1273.8	1273.8	1273.8	0.0
Beardsley Canal Wash	60765		136.1	226	5.1	1272.8	1272.8	1272.9	0.1
Beardsley Canal Wash	60405		104.3	206	5.4	1270.4	1270.4	1270.4	0.1
Beardsley Canal Wash	60005		50.7	134	8.4	1265.5	1265.5	1265.5	0.0
Beardsley Canal Wash	59605		39.9	174	6.4	1263.5	1263.5	1263.5	0.0
Beardsley Canal Wash	59200		31.3	106	10.5	1259.4	1259.4	1259.4	0.0
Beardsley Canal Wash	58800		188.7	296	3.8	1255.3	1255.3	1255.3	0.0
Beardsley Canal Wash	58400		130.6	256	4.4	1252.4	1252.4	1252.4	0.0
Beardsley Canal Wash	58000		171.7	581	1.9	1251.8	1251.8	1251.9	0.1
Beardsley Canal Wash	57137.91		319.6	1748	3.3	1251.3	1251.3	1251.4	0.1
Beardsley Canal Wash	56662.91		140.7	576	12.8	1248.4	1248.4	1248.2	-0.1
Beardsley Canal Wash	56252.91		197.4	668	8.5	1243.3	1243.3	1243.3	-0.1
Beardsley Canal Wash	55857.91		222.0	848	6.7	1240.6	1240.6	1240.7	0.1
Beardsley Canal Wash	55452.91		177.8	843	6.7	1238.3	1238.3	1238.7	0.5
Beardsley Canal Wash	55117.91		107.9	476	11.9	1234.0	1234.0	1234.5	0.5
Beardsley Canal Wash	55068.91		114.5	541	10.5	1233.7	1233.7	1233.7	0.0
Beardsley Canal Wash	55042.91		121.7	1196	5.3	1234.6	1234.6	1234.6	0.0
Beardsley Canal Wash	54905.08		90.8	450	12.6	1222.7	1222.7	1222.7	0.0
Beardsley Canal Wash	54899.08		91.3	641	11.1	1217.3	1217.3	1217.3	0.0
Beardsley Canal Wash	54884.08		92.7	653	10.9	1217.3	1217.3	1217.3	0.0
Beardsley Canal Wash	54864.08		93.7	699	10.2	1217.4	1217.4	1217.4	0.0
Beardsley Canal Wash	54844.08		95.5	751	9.5	1217.6	1217.6	1217.6	0.0
Beardsley Canal Wash	54828.09		120.4	883	8.1	1217.8	1217.8	1217.8	0.0
Beardsley Canal Wash	54827		130.9	965	7.4	1218.0	1218.0	1218.0	0.0
Beardsley Canal Wash	54821.18		144.1	1028	6.9	1218.0	1218.0	1218.0	0.0
Beardsley Canal Wash	54816		162.5	1213	5.9	1218.2	1218.2	1218.2	0.0
Beardsley Canal Wash	54800		179.0	1353	5.3	1218.2	1218.2	1218.2	0.0
Beardsley Canal Wash	54775		196.5	1438	5.0	1218.2	1218.2	1218.2	0.0

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
Beardsley Canal Wash	54750		214.1	1524	4.7	1218.2	1218.2	1218.2	0.0
Beardsley Canal Wash	54725		229.6	1586	4.5	1218.2	1218.2	1218.2	0.0
Beardsley Canal Wash	54700		229.5	1574	4.5	1218.2	1218.2	1218.2	0.0
Beardsley Canal Wash	54600		229.9	1575	4.5	1218.1	1218.1	1218.1	0.0
Beardsley Canal Wash	54500		237.7	1603	4.5	1218.1	1218.1	1218.1	0.0
Beardsley Canal Wash	54400		237.4	1596	4.5	1218.0	1218.0	1218.0	0.0
Beardsley Canal Wash	54361.7		219.6	1606	4.4	1218.0	1218.0	1218.0	0.0
Beardsley Canal Wash	54346.7		219.5	1605	4.4	1218.0	1218.0	1218.0	0.0
Beardsley Canal Wash	54331.7		115.1	564	12.6	1215.5	1215.5	1215.5	0.0
Beardsley Canal Wash	54319.7		130.7	803	8.9	1214.5	1214.5	1214.5	0.0
Beardsley Canal Wash	54299.7		176.7	1229	5.8	1214.9	1214.9	1214.9	0.0
Beardsley Canal Wash	54279.7		220.3	1626	4.4	1215.0	1215.0	1215.0	0.0
Beardsley Canal Wash	54264.7		220.1	1624	4.4	1215.0	1215.0	1215.0	0.0
Beardsley Canal Wash	54200		229.6	1567	4.6	1215.0	1215.0	1215.0	0.0
Beardsley Canal Wash	54150		237.3	1593	4.5	1214.9	1214.9	1214.9	0.0
Beardsley Canal Wash	54100		237.4	1595	4.5	1214.9	1214.9	1214.9	0.0
Beardsley Canal Wash	54000		237.1	1588	4.5	1214.8	1214.8	1214.8	0.0
Beardsley Canal Wash	53900		228.7	1546	4.6	1214.7	1214.7	1214.7	0.0
Beardsley Canal Wash	53861.7		210.3	1551	4.6	1214.7	1214.7	1214.7	0.0
Beardsley Canal Wash	53846.7		219.0	1591	4.5	1214.7	1214.7	1214.7	0.0
Beardsley Canal Wash	53831.7		117.2	568	12.6	1212.3	1212.3	1212.3	0.0
Beardsley Canal Wash	53819.7		128.6	784	9.1	1211.2	1211.2	1211.2	0.0
Beardsley Canal Wash	53799.7		176.1	1216	5.9	1211.6	1211.6	1211.6	0.0
Beardsley Canal Wash	53779.7		219.7	1609	4.4	1211.8	1211.8	1211.8	0.0
Beardsley Canal Wash	53764.7		219.5	1606	4.4	1211.7	1211.7	1211.8	0.0
Beardsley Canal Wash	53700		237.0	1587	4.5	1211.7	1211.7	1211.7	0.0
Beardsley Canal Wash	53600		244.7	1614	4.4	1211.6	1211.6	1211.6	0.0
Beardsley Canal Wash	53500		243.7	1594	4.8	1211.5	1211.5	1211.5	0.0
Beardsley Canal Wash	53400		235.3	1549	4.9	1211.4	1211.4	1211.4	0.0
Beardsley Canal Wash	53300		234.8	1539	4.9	1211.3	1211.3	1211.3	0.0

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
Beardsley Canal Wash	53200		234.2	1527	5.0	1211.2	1211.2	1211.3	0.0
Beardsley Canal Wash	53100		241.5	1548	4.9	1211.1	1211.1	1211.2	0.0
Beardsley Canal Wash	53000		233.1	1503	5.0	1211.0	1211.0	1211.1	0.0
Beardsley Canal Wash	52900		232.5	1490	5.1	1210.9	1210.9	1211.0	0.0
Beardsley Canal Wash	52800		231.9	1477	5.1	1210.8	1210.8	1210.9	0.0
Beardsley Canal Wash	52700		238.8	1494	5.1	1210.8	1210.8	1210.8	0.0
Beardsley Canal Wash	52600		238.0	1480	5.1	1210.7	1210.7	1210.7	0.0
Beardsley Canal Wash	52500		237.3	1464	5.2	1210.5	1210.5	1210.6	0.0
Beardsley Canal Wash	52400		236.5	1448	5.2	1210.4	1210.4	1210.5	0.0
Beardsley Canal Wash	52300		242.9	1461	5.2	1210.3	1210.3	1210.4	0.1
Beardsley Canal Wash	52200		234.6	1413	5.4	1210.2	1210.2	1210.2	0.0
Beardsley Canal Wash	52100		233.7	1394	5.4	1210.1	1210.1	1210.1	0.0
Beardsley Canal Wash	52000		232.6	1373	5.5	1209.9	1209.9	1210.0	0.0
Beardsley Canal Wash	51900		231.1	1335	5.7	1209.8	1209.8	1209.8	0.1
Beardsley Canal Wash	51800		237.0	1351	5.6	1209.7	1209.7	1209.7	0.1
Beardsley Canal Wash	51700		242.5	1353	5.6	1209.5	1209.5	1209.6	0.1
Beardsley Canal Wash	51600		240.9	1325	5.7	1209.4	1209.4	1209.4	0.1
Beardsley Canal Wash	51500		239.1	1294	5.9	1209.2	1209.2	1209.3	0.1
Beardsley Canal Wash	51400		237.0	1259	6.0	1209.0	1209.0	1209.1	0.1
Beardsley Canal Wash	51300		221.8	1169	6.5	1208.7	1208.7	1208.8	0.1
Beardsley Canal Wash	51200		219.1	1119	6.8	1208.4	1208.4	1208.6	0.2
Beardsley Canal Wash	51100		215.7	1057	7.2	1208.0	1208.0	1208.2	0.2
Beardsley Canal Wash	51000		228.5	1030	7.3	1207.6	1207.6	1207.9	0.4
Beardsley Canal Wash	50900		326.3	1102	7.4	1207.0	1207.0	1207.7	0.6
Beardsley Canal Wash	50560		225.0	790	9.6	1205.2	1205.2	1205.9	0.7
Beardsley Canal Wash	50160		190.0	757	10.1	1202.8	1202.8	1203.8	1.0

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
Perryville Rd. Wash	34		110.6	190	1.8	1212.7	1212.7	1212.9	0.2
Perryville Rd. Wash	33		139.0	130	4.0	1211.2	1211.2	1211.4	0.2
Perryville Rd. Wash	32		135.0	127	4.4	1206.7	1206.7	1207.7	1.0
Perryville Rd. Wash	31		131.1	149	3.2	1203.5	1203.5	1204.3	0.8
Perryville Rd. Wash	30		130.0	116	4.3	1199.6	1199.6	1199.8	0.2
Perryville Rd. Wash	29		130.0	171	3.1	1197.0	1197.0	1197.3	0.3
Perryville Rd. Wash	28		155.0	157	3.9	1194.1	1194.1	1194.7	0.7
Perryville Rd. Wash	27		116.0	130	5.8	1190.2	1190.2	1190.8	0.6
Perryville Rd. Wash	26		34.8	73	8.3	1185.7	1185.7	1186.0	0.3
Perryville Rd. Wash	25		79.0	125	5.0	1183.0	1183.0	1183.3	0.3
Perryville Rd. Wash	24		61.3	93	7.0	1181.4	1181.4	1181.7	0.3
Perryville Rd. Wash	23		123.3	420	1.6	1179.9	1179.9	1180.3	0.4
Perryville Rd. Wash	22		124.0	167	4.4	1179.7	1179.7	1179.8	0.2
Perryville Rd. Wash	21		58.2	140	5.1	1176.6	1176.6	1176.6	0.0
Perryville Rd. Wash	20		83.3	171	4.1	1173.5	1173.5	1173.7	0.3
Perryville Rd. Wash	19		95.1	176	4.1	1170.6	1170.6	1171.2	0.6
Perryville Rd. Wash	18		171.3	256	2.8	1168.2	1168.2	1169.0	0.8
Perryville Rd. Wash	17		226.3	410	2.1	1167.4	1167.4	1168.2	0.8
Perryville Rd. Wash	16		215.7	194	6.2	1166.2	1166.2	1166.6	0.4
Perryville Rd. Wash	15		139.0	247	3.7	1161.7	1161.7	1162.5	0.8
Perryville Rd. Wash	14		95.0	278	3.2	1160.2	1160.2	1160.9	0.7
Perryville Rd. Wash	13		97.1	147	7.3	1156.3	1156.3	1156.4	0.1
Perryville Rd. Wash	12.4		328.0	790	0.3	1154.9	1154.9	1155.0	0.1
Perryville Rd. Wash	12.2		345.0	221	0.2	1154.9	1154.9	1155.0	0.1
Perryville Rd. Wash	11.8		267.0	51	2.6	1152.1	1152.1	1152.2	0.1
Perryville Rd. Wash	11		65.7	100	1.8	1151.0	1151.0	1151.1	0.1
Perryville Rd. Wash	10		68.9	121	1.9	1149.7	1149.7	1149.7	0.1
Perryville Rd. Wash	9		73.7	142	2.0	1148.2	1148.2	1148.3	0.0
Perryville Rd. Wash	8		60.3	114	2.8	1146.2	1146.2	1146.2	0.0

Table 5
Floodway Data in FIS Format for North Inlet Channel Improvements

FLOODING SOURCE			FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
			Width	Section Area	Mean Velocity	Regulatory	Without	With	Increase
Reach	Cross Section	FEMA ID	(ft)	(sq. ft.)	(fps)		Floodway	Floodway	(ft)
Perryville Rd. Wash	7		65.9	138	2.6	1144.1	1144.1	1144.2	0.1
Perryville Rd. Wash	6		56.1	133	3.0	1142.4	1142.4	1142.6	0.1
Perryville Rd. Wash	5		52.2	125	3.6	1140.1	1140.1	1140.3	0.2
Perryville Rd. Wash	4		65.4	166	3.0	1138.2	1138.2	1138.4	0.2
Perryville Rd. Wash	3		44.1	75	7.4	1133.6	1133.6	1133.6	0.0
Perryville Rd. Wash	2		85.8	292	2.1	1133.1	1133.1	1133.1	0.0
Perryville Rd. Wash	1		219.8	883	0.7	1133.1	1133.1	1133.1	0.0
Perryville Rd. Wash	0.7		53.5	128	5.1	1131.1	1131.1	1131.1	0.0

APPENDIX A

General Documentation and Correspondence

Michael Duncan - FCDX

From: Michael Duncan - FCDX
Sent: Thursday, November 13, 2008 5:52 PM
To: 'Jon Wolf'
Subject: EMAIL 2 OF 2 -- NIC CLOMR -- More items
Attachments: No-insurable_structures.pdf; transmit_to_property_owner.pdf; Alternatives_background.pdf

4) The affected parcels, all of which are owned by the "Maricopa Water District", for short, are listed on the determination of no-insurable structures.

5) The Maricopa Water District is a partner in the design project. The were notified of the BFE changes in the Design Report and CLOMR Report. Two transmittal sheets to "MWD" of these reports is attached.

6) Background for the selected alternative is also attached.

Let me know if anything else comes up.

Mike Duncan
602-506-4732

FLOOD CONTROL DISTRICT
of Maricopa County
2801 W. Durango Street, Phoenix, Arizona 85009
Telephone (602) 506-1501 Fax (602) 372-6232

FLOOD HAZARD FLOOD INSURANCE RATE MAPS (FIRM) INFORMATION

Property Address: DETERMINATION -- Vacant land with no insurable structures
City: _____ **State:** AZ **Zip:** 85 _____ **Parcel No.:** see below
Requested By: _____ **Phone:** _____
Mailing Address: _____ **Fax No.:** _____

Select one (REQUIRED): ☑ **Vacant Land** ☐ **Existing Building**

The following is based upon the above property information:

FIRM Community Number: _____ **Map Number:** 04013C
Panel Number: _____ **Suffix:** _____ **Effective Date:** _____

☐ Based upon the above information, the property's exact location cannot be made on the FIRM.

☐ The property is located in Flood Insurance Rate Map (FIRM) Zone _____. Zone B, C or X are outside the delineated 100 year floodplain. Flood insurance is available, but not required by the Federal Insurance Administration, for buildings concerned with a federally insured loan. Flood insurance is optional at the discretion of the owner or lending institution.

☐ The property is located in Flood Insurance Rate Map (FIRM) Zone D. Zone D is an area in which flood hazards are undetermined. Flood insurance is available, but not required by the Federal Insurance Administration, for buildings concerned with a federally insured loan. Flood insurance is optional at the discretion of the owner or lending institution.

☐ The property is wholly or partially within a Special Flood Hazard Area, FIRM Zone _____. Federal law requires flood insurance as a condition of federally insured mortgage or loan secured by buildings within a Special Flood Hazard Zone.

Base Flood Elevation, (AO Zone, use depth), if shown is _____ feet, NGVD.
If erosion setback is applicable, Level 1 erosion setback is: _____.

☑ There are no insurable structures on these six parcels (which are all vacant land): 502-09-010A, 502-22-001A, 502-22-002A, 502-22-003A, 502-22-004A, and 502-28-004A. All of these parcels are owned by the Maricopa County Municipal Water Conservation District Number One, P.O. Box 900, Waddell, AZ 85355

This community participates in the National Flood Insurance Program - Regular. Check with your insurance carrier for premium discounts on flood insurance. The discounts vary depending on the community in which the property is located.

NOTE: The above flood hazard information is based on the property information furnished to us and the current Flood Insurance Rate Map for the area. The erosion setback is determined using the Flood Insurance Study maps. The District, the County or any officer or employee thereof do not warrant the accuracy of this information and are not responsible for any expense, losses or damage that may result from reliance on this information by the requestor or any third party.

Michael R. Duncan — Floodplain Management

11-13-08 — Date

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

(602) 506-1501

LETTER OF TRANSMITTAL

DATE	JOB NO.
2-6-07	
ATTENTION	
RE:	

TO Carol Uraine
Maricopa Water District
P.O. Box 900
Waddell, AZ 85355-0900

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

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ CLOMR

COPIES	DATE	NO.	DESCRIPTION
1			Draft CLOMR package for WJ FRSH NIC

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☒ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Please share this with Glen! Thanks!

COPY TO _____

SIGNED: Barbara Olcott

6910-009 R8-93

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
2801 West Durango Street
Phoenix, Arizona 85009

(602) 506-1501

LETTER OF TRANSMITTAL

DATE 1-7-07	JOB NO.
ATTENTION	
RE:	

TO Carol Uraine
Maricopa Water District
P.O. Box 900
Wickenburg, AZ 85358-0900

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

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1			½ size - final plans for NIC - South Channel

THESE ARE TRANSMITTED as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☑ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comment ☐ _____
☐ FOR BIDS DUE _____ 19_____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS Carol - attached is one half size set of the final plans for WTFR's NIC - South Channel. We will be sending a full-size mylar from Jim Swaim's office in the next week. Please let me know ASAP if you have any further comments - we are trying to "wrap up" the design contract. Thanks!

COPY TO _____

SIGNED: Bobbie McKee

6910-009 R8-93

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

WHITE TANKS
FLOOD RETARDING STRUCTURE # 3
NORTH INLET CHANNEL

BACKGROUND ON ALTERNATIVES

Five alternatives were considered during the Pre-Design phase of this project; see the attached excerpts from the Pre-Design Report. Alternative 4, which features an additional channel on the east side of Beardsley Canal, was selected, based mostly on costs. The costs are on page 21 and the advantages are on page 22, which are attached.

In addition, during the Design phase, the alternatives were considered again, and the same Alternative 4 was chosen.

WHITE TANKS
FLOOD RETARDING STRUCTURE #3
NORTH INLET CHANNEL

PRE-DESIGN STUDY REPORT

CONTRACT FCD 2000 C036

ASSIGNMENT 3

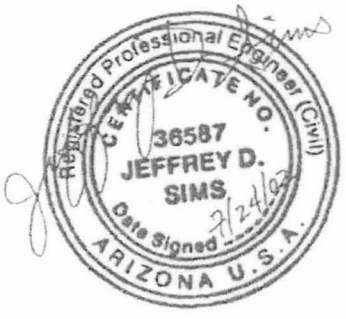
July 24, 2002
WP #011315.03

Prepared for:

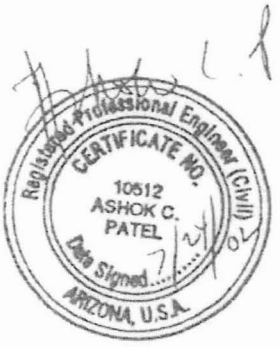
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
Phone: (602) 506-1501
Fax: (602) 506-4601

Prepared by:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500
Fax: (602) 335-8580



Engineer



Peer Reviewer

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3.0 DEVELOPMENT OF ALTERNATIVES

3.1 Description of Alternatives – North Inlet Channel

Four alternatives have been developed to prevent breakout along the Beardsley Canal Wash. The alternatives are: native desertscaped earthen channel, concrete channel with native desertscaped overbanks, detention basin near Olive, and additional channel on east side of Beardsley Canal. A no action alternative is also discussed. Each alternative is further described below.

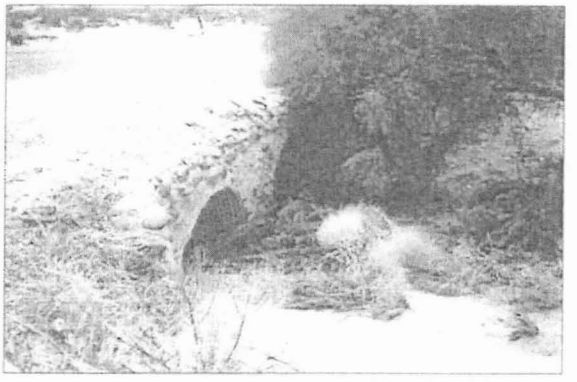
The channel alignment has been divided into different segments based upon flow rates and treatments. Segment 1 is from Waterfall Wash to Olive Avenue. Segment 2 continues from Olive Avenue to Cholla Wash. Segment 3 is between Cholla Wash and Northern Avenue and Segment 4 extends from Northern Avenue to FRS #3. In the initial phase of this study, the channel investigations included an additional segment between Peoria Avenue and the north end of Segment 1 at Waterfall Wash. However, since it was determined that the existing wash has adequate capacity for the 100-year flows and there is not a risk of breakout above the Waterfall Wash confluence, the District removed this segment from the analysis.

3.1.1 Alternative 1 – Native Desertscaped Earthen Channel

The native desertscaped earthen channel alternative is an earth channel from Waterfall Wash to the FRS #3 that includes kinder and gentler topographic features. It requires drops to maintain sub-critical flow conditions. The proposed channel slope is 0.05% with 6:1 side slopes, 2.0 feet of freeboard, and a maximum permissible velocity of 3.0 ft/s.

The maximum permissible velocity was determined using *TR-25, Design of Open Channels, NRSC*. From References 11 and 18, it is estimated that the D_{75} of material in the wash is between 1 and 2 millimeters. The non-scouring velocity for sediment laden flow is thus estimated to be approximately 3 ft/s from Figure 6-1 of TR-25. This can be compared with existing flow velocities in the Beardsley Canal Wash of 6 to 12 ft/s.

This alternative includes a 6-foot wide equestrian trail, a 5-foot wide pedestrian trail, landscaping, and multi-use facilities. A 5-barrel 10-foot by 6-foot box culvert at Olive Avenue and a 10-barrel 10-foot by 6-foot box culvert at Northern Avenue was considered as part of this Alternative. The approximate length of the channel and trail improvements is 10,750 feet. A sketch of the channel cross-section is shown in Appendix A. A conceptual layout and profile of Alternative 1 are shown in Plate 3-1, sheets 1 through 3.



These culverts at the Olive Avenue crossing would be replaced by a 5-barrel 10'x6' box culvert in Alternative 1.

3.1.2 Alternative 2 – Concrete Channel with Native Desertscaped Overbanks

This alternative consists of constructing a 6-inch thick concrete-lined channel with native desertscaped overbanks consisting of trails, landscaping, and multi-use features. The longitudinal channel slope would be between 0.31% and 0.35%, with 2:1 side slopes, 2.0 feet of freeboard, and a maximum flow velocity is 15 ft/s. The box culvert sizes at Olive and Northern are the same for this alternative as in Alternative 1. The length of improvements for this alternative is also 10,750 feet. The channel cross-section is depicted in Appendix A. Plate 3-2, sheets 1 through 3, shows the conceptual plan and profile for Alternative 2.

3.1.3 Alternative 3 – Detention Basin Near Olive Avenue

The goal of Alternative 3 is to prevent breakouts across the Beardsley Canal with a minimum of channel improvements. The flow rate in the Beardsley Canal Wash cannot be increased above the existing conditions where adverse impacts

to adjacent property would occur. The breakout flow at Olive Avenue for the 100-year event is 622 cfs according to the Loop 303 study and 500 cfs according to FEMA. Alternative 3 prevents the breakout at Olive Avenue and does not increase existing flow rates in the Beardsley Canal Wash Corridor between Olive and Northern Avenues.

This alternative includes constructing an off-line detention basin in the northwest corner of the Olive Avenue and Beardsley Canal crossing to reduce the downstream peak by about 650 cfs. A drop structure and a segment of concrete-lined channel would be constructed near the basin along with an overflow spillway structure to divert flow into the basin. A site plan sketch of the basin is shown in Appendix A. As part of the improvements, a 5-barrel 10-foot by 6-foot box culvert would be constructed at Olive and a 12-barrel 10-foot by 7-foot box culvert would be constructed at Northern. These culverts would provide a 100-year dry crossing across the Beardsley Canal Wash. The equestrian and pedestrian trails would extend past Olive Avenue along the concrete-lined channel to the drop structure. The length of trails would be approximately 9,840 feet. Plate 3-3, sheets 1 through 3, shows the plan of Alternative 3.

Slope protection on the west embankment of the Beardsley Canal would be put in place at the confluence with Cholla Wash. The purpose of the slope protection is to prevent erosion of the Beardsley Canal embankment from impinging flow from Cholla Wash. The protection will be of sufficient height to provide protection against run-up.

It was determined that the capacity of the channel south of Northern Avenue is adequate; therefore, no upsizing of the channel is needed. However, since this portion of channel will now be carrying a significant increase in flow due to the Northern Avenue culvert improvements, slope protection for the east bank along the channel has been considered. Hydroseeding would be applied to the channel areas impacted by construction activities south of Northern Avenue.

West embankment of Beardsley Canal to receive slope protection at confluence with Cholla Wash.

Between Olive and Northern Avenues, no improvements would be made along the existing natural corridor of the Beardsley Canal Wash, with the exception of slope protection at Cholla Wash discussed earlier in this section. Additionally, a 100-foot trail corridor would be placed on the east side of the Beardsley Canal right-of-way.

3.1.4 Alternative 4 – Additional Channel on East Side of Beardsley Canal

Alternative 4 would also prevent breakouts with partial improvements. It includes a diversion of 622 cfs at Olive Avenue into a proposed additional channel on the east side of the Beardsley Canal between Olive and Northern Avenues. This diversion would be routed back into the Beardsley Canal Wash at Northern Avenue. This additional channel on the east side of the Beardsley Canal (East Channel) would be a kinder and gentler earth-lined channel and would include pedestrian and equestrian trails, a maintenance path, landscape features, and amenities. The channel would be at a 0.09% slope with varying side slopes, 2.0 feet of freeboard, and a 10-foot bottom width. A sketch of a typical east channel cross-section is shown in Appendix A. The diversion at Olive would require a drop into a 10-foot by 6-foot box culvert to cross under the road and canal. The crossing at Northern would require a 10-foot by 6-foot box culvert. The plan and profile for Alternative 4 are shown on Plate 3-4.

A Manning's n value of 0.03 was used for the channel. This is appropriate for an earth-lined channel with gradual undulating banks, vegetative cover, and an

aged-channel condition. Excessive vegetative growth with a Manning's n value of 0.04 will still work, since the channel was designed with an extra foot of freeboard.

With this alternative, slope protection at Cholla Wash and along the channel south of Northern Avenue would also be constructed.

The maximum permissible velocity was determined using *TR-25, Design of Open Channels, NRSC*. It is assumed that the D_{75} of material along the East Channel alignment would also be between 1 and 2 millimeters. The non-scouring velocity for sediment laden flow is thus estimated to be approximately 3 ft/s from Figure 6-1 of TR-25.

In addition to the box culverts required for the East Channel, box culverts would be required for the Beardsley Canal Wash crossings at Olive Avenue and Northern Avenue to provide dry crossings at these locations. This alternative proposes a 4-barrel 10-foot by 6-foot box culvert at Olive Avenue and a 12-barrel 10-foot by 7-foot box culvert at Northern Avenue. The length of trails proposed for this alternative is about 9,180 feet.

3.1.5 Alternative 5 – No Action

The No Action Alternative would not alter the existing Beardsley Canal Wash in any way. The 100-year storm discharge would breakout at Olive and Northern Avenues. A significant concern of a possible canal breach exists where the Cholla Wash impinges upon the Beardsley Canal embankment. If the breach occurs, it would create a significant flood hazard to the parcel/property owners on the downstream side of the canal. A floodplain delineation would also need to be performed east of the canal to determine which properties would be at risk. These properties would need flood insurance due to the continued risk of breakout from the Beardsley Canal Wash. The current floodplain limits on the west side of the Beardsley Canal would remain as is. The risk of damages to the Beardsley Canal would not change.

Table 3-2

North Inlet Channel Cost Summary

Construction Elements	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Excavation	$4,104,412	$817,100	$357,178	$296,436
Channel Lining	$0	$6,646,252	$337,291	$0
Railing	$0	$322,500	$20,700	$0
Overflow Structure	$0	$0	$127,100	$0
Slope Protection	$0	$0	$972,188	$921,788
Drop Structures	$2,969,137	$578,704	$66,620	$230,268
Culverts	$369,939	$369,939	$418,587	$544,447
Landscaping	$1,231,956	$171,763	$213,494	$193,853
Maintenance Road	$150,500	$150,500	$83,580	$72,100
Aesthetic Treatment	$368,064	$360,376	$107,937	$94,632
Construction Subtotal:	***$9,194,009***	***$9,417,133***	***$2,704,675***	***$2,353,523***
12% Engineering & Construction Administration	$1,103,281	$1,130,056	$324,561	$282,423
20% Construction & Other Contingency	$1,838,802	$1,883,427	$540,935	$470,705
Construction Total:	**$12,136,092**	**$12,430,616**	**$3,570,170**	**$3,106,650**
Right-of-Way				
Right-of-Way	$1,607,620	$446,899	$335,879	$300,771
10% Administrative Costs	$160,762	$44,690	$33,588	$30,077
Right-of-Way Total:	**$1,768,382**	**$491,589**	**$369,467**	**$330,848**
PROJECT TOTAL (Rounded):	**$13,900,000**	**$12,900,000**	**$3,900,000**	**$3,400,000**
Operation & Maintenance				
50 Year Operation & Maintenance	$3,592,083	$581,375	$807,885	$742,051
LIFE CYCLE TOTAL (Rounded):	**$17,500,000**	**$13,500,000**	**$4,700,000**	**$4,200,000**

Table 3-3

North Inlet Channel Alternative Opportunities Evaluation

Advantage	Alternative				
	1	2	3	4	5
Increased safety	•	•	•	•	
Cost effectiveness			•	•	•
Partnering opportunities			•	•	
Low impact of adjacent neighbors			•	•	•
Ability to implement monetarily			•	•	•
Acceptable to Public			•	•	
Acceptable to DISTRICT			•	•	
Low environmental impact			•	•	•
Provides relief to FRS #3 inflow volume				•	
Low O & M costs		•	•	•	
Ability to phase construction			•	•	
Low Construction Impact			•	•	•

Some alternative opportunities are not identified in Table 3-3. Because the owner of property over which breakout flow traverses is responsible for the conveyance across the property, an agreement might be possible for cost participation with the MWD in the form of land acquisition for property on the east side of the Beardsley Canal and assistance with improvements through this area as part of Alternative 4. This agreement may also include right-of-way for a channel along Northern Avenue between the Beardsley Canal and Perryville Road if a Northern Avenue Diversion Alternative is selected.

3.4.2 Northern Avenue Diversion Alternative Evaluation

The Northern Avenue Diversion Alternative evaluation includes a determination of cost savings due to reduced excavation in FRS #3 if storm runoff is diverted down the Northern Avenue alignment. *The unit prices used in the URS Loop 303 Report were utilized for all Northern Avenue Diversion elements so a direct comparison could be made to the Baseline model.* These unit prices are shown in Table 3-4. The excavation quantity for the detention basins includes three feet of

Public Notice Announcement

The purpose of this newsletter is to update residents of the latest design plans for the White Tanks FRS #3 North Inlet Channel (NIC) Flood Control Project. The NIC project is a cooperative effort between the Flood Control District of Maricopa County (District) and the Maricopa Water District (MWD).

Through the efforts of a large District planning study called the White Tanks Area Drainage Master Plan, it was determined that 100-year flood waters currently break out across the Beardsley Canal and flow to the east, inundating a residential area. The following measures were recommended to alleviate the problem:

* Construction of a channel along the east side of the Beardsley Canal from Olive Avenue to Northern Ave.

* Construction of a flow-splitter structure and road/canal crossing at Olive.

* Construction of a road/canal crossing at Northern.

* Construction of a box culvert crossing at Northern.

* Erosion protection at the confluence of Cholla Wash and Beardsley Canal Wash.

* Improvements to the existing channel west of the Beardsley Canal and south of Northern.

Once complete, the NIC project will protect the Beardsley Canal between Olive and Northern, the existing flood control channel south of Northern Avenue, and approximately 118 homes east of the Beardsley Canal.

Design of the project features began in September of 2004 and 30% plans are currently available for public review and comment (see public meeting information on reverse side). The final design of the NIC project is scheduled for completion by Fall 2005 and it is anticipated that construction will begin on the project features in early 2006. Total construction cost for the project is estimated to be $5.9 million.

www.fcd.maricopa.gov

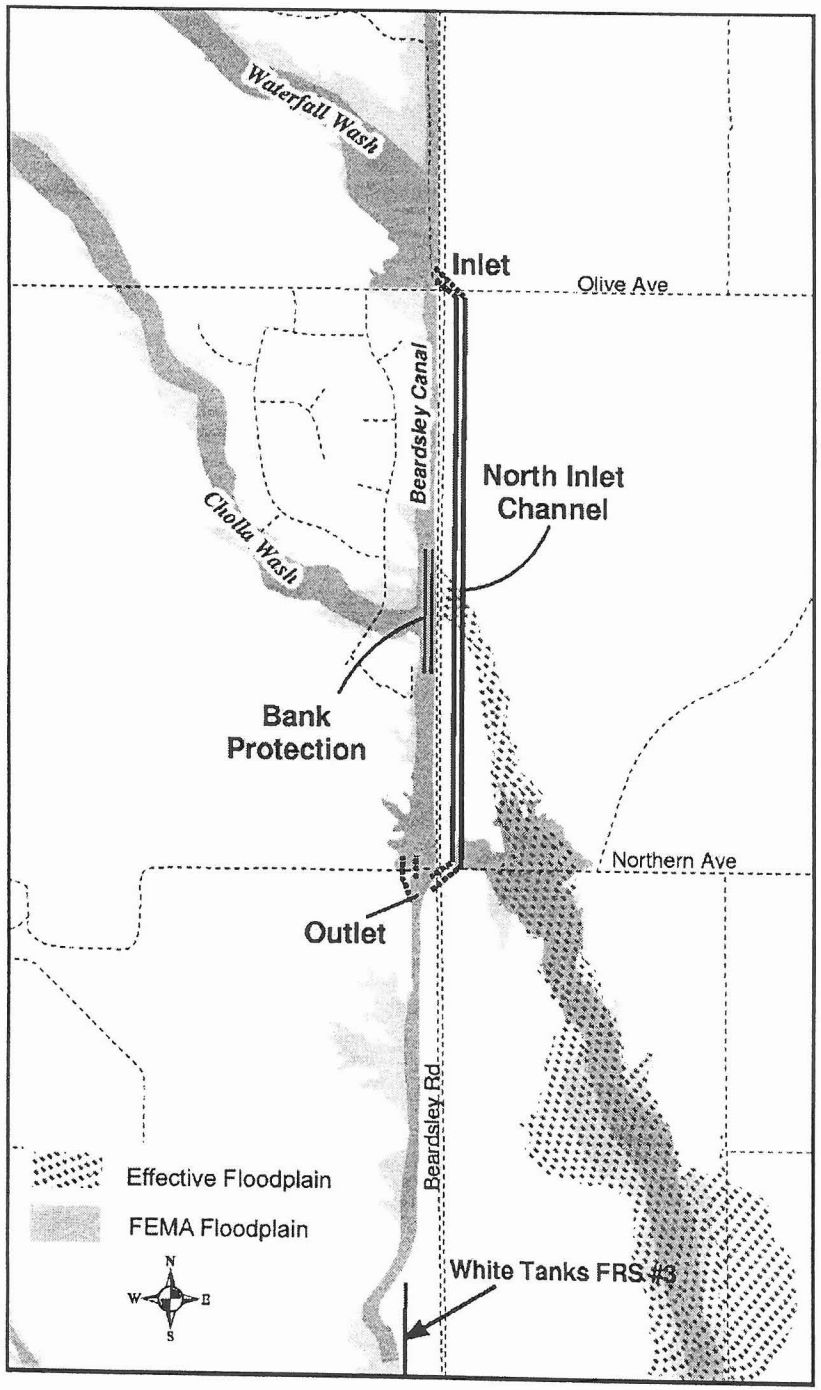
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

White Tanks FRS #3 North Inlet Channel Flood Control Project

January 2005

Public Meeting Information Inside

White Tanks FRS #3 North Inlet Channel Flood Control Project



Public Meeting

Tuesday, February 8, 2005
6:00 - 7:30 p.m.

Willow Canyon High School
Cafeteria
17901 W Lundberg St
Surprise, AZ 85374

The District is holding a public meeting to give residents an opportunity to review exhibits of the 30% design plans and provide any comment on the project. District staff and representatives from the consultant team will be available at the meeting to answer any questions. A formal presentation will not be given.

Please direct all questions to:

Bobbie Ohler, Project Manager
Flood Control District of
Maricopa County
2801 W. Durango St.
Phoenix, AZ 85009
Phone: (602) 506-2943
Fax: (602) 506-8561
Email: bao@mail.maricopa.gov

Para recibir una copia de este folleto en Español, favor de llamar a Joe Muñoz al Distrito de Control de Inundaciones Condado de Maricopa al 602-506-1501.

Flood Control District of Maricopa County

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

June 25, 2007

Mounir Boudjemaa, M.S.
Revisions Manager - Arizona
MOD Team
Michael Baker Jr. Inc.
3601 Eisenhower Avenue
Alexandria, Virginia 22304-6425

Subject: **Submission of CLOMR package for North Inlet Channel Improvements at White Tanks Flood Retarding Structure No. 3**

Watercourses: **Beardsley Canal Wash -- NAVD88 Vertical Datum**
Perryville Road Wash -- NGVD29 Vertical Datum

No. of FIRM panels affected: 2

Dear Mounir:

The project of the enclosed CLOMR package affects two watercourses: Beardsley Canal Wash which flows into the White Tanks Flood Retarding Structure No. 3, and Perryville Road Wash which is the next watercourse to the east. There are two separate sets of work maps for the two watercourses, and two different vertical datums are used, as noted above.

We will send the appropriate fees, once a case number has been assigned. The report, models, and CAD files are in electronic form on the CD at the back of the notebook.

Sincerely,

Mike Duncan

Mike Duncan, P.E., CFM
Project Manager
phone: 602-506-4732 email: mwd@mail.maricopa.gov

Enclosures: 1 notebook

Copies to:

Max Yuan
Hazards Study Branch, Mitigation Directorate
Federal Emergency Management Agency
500 C STREET SW
WASHINGTON DC 20472-0001

Brian Cosson, CFM
NFIP Coordinator, Flood Mitigation
Arizona Department of Water Resources
3550 N CENTRAL AV
PHOENIX AZ 85012-2105

Larry Broyles, P.E.
City Engineer
Engineering Department
5850 W. GLENDALE AV, STE 315
Glendale AZ 85301-2599

Jeffrey Minch, P.E.
Wood, Patel & Associates, Inc.
2051 W NORTHERN AV, STE 100
PHOENIX AZ 85021

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

FLOOD CONTROL DISTRICT
RECEIVED
JUL 26 '07
CH & GM | FINANCE
PIO | LANDS
ADMIN | O & M
REG | P & PM
ENG | FILE
CONTRACTS |
ROUTING

July 24, 2007

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Communities: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-FEE

Dear Mr. Duncan:

This responds to your request dated June 25, 2007, 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:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 H

FEMA has implemented a procedure to recover costs associated with reviewing and processing requests for modifications to published flood information and maps. A copy of the notice summarizing the current fee schedule, which was published in the *Federal Register*, is enclosed for your information. In accordance with this schedule, the fee for your request is $4,000 and must be submitted before we can begin processing your request. Payment of this fee must be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program (NFIP), or a credit card payment (Visa or MasterCard only). For identification purposes, the case number referenced above must be included on the check or money order.

The payment must be sent to the following address:

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

Upon receipt of the requested payment, we will begin our technical review of your request. When you write to us about your request, please include the case number referenced above in your letter. Unless otherwise directed by you in writing, we will keep the submitted data in our files.

If you have general questions about your request, FEMA policy, or the NFIP, 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 call the Revisions Coordinator for your State, Mounir Boudjemaa, M.S., who may be reached at (703) 317-6295.

Sincerely,

Syed Qayum

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

Enclosure

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 30, 2005, or later and supersedes the fee schedule that was established on September 1, 2002.

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), Letters of Map Revision (LOMRs), and Physical Map Revisions (PMRs).

Based on our review of actual cost data for Fiscal Years 2004 and 2005, FEMA has established 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 us)	$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)	$700

Fee Schedule for Requests for CLOMRs

Request based on new hydrology, bridge, culvert, channel, or combination of any of these	$4,000
Request based on levee, berm, or other structural measure	$5,000

Fee Schedule for Requests for LOMRs and PMRs

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

Request based on bridge, culvert, channel, or combination thereof	$4,400
Request based on levee, berm, or other structural measure	$6,000
Request based on as-built information submitted as follow-up to CLOMR	$4,000

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

FEMA has revised 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.* We will deposit all fees collected to the National Flood Insurance Fund, which is the source of funding for providing this service.

U.S. Department of Homeland Security
MT-RA-EM (Baker) 0302
500 C Street, SW
Washington, DC 20472

FEMA

UNITED STATES POSTAGE
PITNEY BOWES
02 1P $ 00.41⁰
0002428934 JUL 24 2007
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Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

September 24, 2007

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Communities: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-ACK

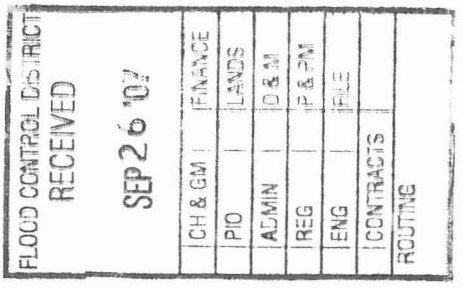
Dear Mr. Duncan:

This responds to your submittal dated August 13, 2007 concerning a June 25, 2007 request 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:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 H

We have completed an inventory of the items you submitted. Our review of the submitted data indicates we have the minimum data required to perform a detailed technical review of your request. We have also received the required review and processing fee ($4,000). If additional data are required or if delays are encountered, we will inform you within 60 days of the date of this letter.

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 your case reviewer,Mr. Jon Wolf, CFM by e-mail at Jon.Wolf@mapmodteam.com or by telephone at (970) 375-9729, or the Revisions Coordinator for your State, Mr. 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.

cc: Mr. Jeffery Minch, P.E.
Wood, Patel & Associates

Michael Duncan - FCDX

From: Michael Duncan - FCDX
Sent: Thursday, September 27, 2007 10:42 AM
To: Jon Wolf (jwolf@mbakercorp.com)
Subject: Hydrology info. regarding Beardsley Canal and Perryville Rd. Washes
Attachments: Figure_4-1 - Produced 5-21-04 Exist Cond Basins.pdf

Jon, here's the hydrology background:

The Loop 303/White Tanks HEC-1 model, by URS, for over 200 square miles was reviewed under:

case no. 03-09-1653P, Bullard Wash (by URS), effective DEC 30 2004.

I also had case 04-09-0318P, Camelback Road Wash (by URS), effective DEC 30 2004, that used this HEC-1;
and Wood Patel used this HEC-1 in case 06-09-B034P, Goodyear Centerpointe (which is listed in the references at p. 44)

The HEC-1 on the CD has modifications, by Wood Patel for the current case, at about 5 locations.

I have attached a sub-basin map, from 2004, of the entire HEC-1. The current case is located at roughly mid-height, and around subbasins 3 and 10. Let me know of anything else that might help you.

Mike Duncan, P.E., CFM
Project Manager
602-506-4732

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

FLOOD CONTROL DISTRICT
RECEIVED
OCT 12 '07
CH & GM
PIO
ADMIN
REG
ENG
CONTRACTS
MWD

October 10, 2007

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Community: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-AD

Dear Mr. Duncan:

This responds to your submittal dated August 13, 2007 concerning a June 25, 2007, request 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 and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 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 your case reviewer, Jon Wolf, CFM by e-mail at Jon.Wolf@mapmodteam.com or by telephone at (970) 903-0558, or the Revisions Coordinator for your State, 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

cc: Mr. Jeffery Minch, P.E.
Wood, Patel & Associates

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

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

Case No.: 07-09-1500R

Requester: Michael Duncan, P.E., CFM

Community: City of Glendale and
Maricopa County, AZ

Community Nos.: 040045 and 040037

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

1. The submitted workmap set entitled "Exhibit C-Study Work Maps, C1 Beardsley Canal Wash" prepared by Wood, Patel, dated April 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

    (a) Boundary delineation of the entire currently effective floodway and the entire currently effective base (1-percent-annual-chance) flood
    (b) Boundary delineations of the corrected effective floodway and corrected effective base flood
    (c) The topographic information provided is unreadable. Please enlarge the topographic contour information used for the boundary delineation of the base flood
    (d) Locations and alignments of the effective cross sections
    (d) Flow line used in the hydraulic model

2. The submitted workmap set entitled "Exhibit C-Study Work Maps, C2 Perryville Road Wash" prepared by Wood, Patel, dated April 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

    (a) Boundary delineation of the entire currently effective floodway and the entire currently effective base (1-percent-annual-chance) floo.
    (b) Boundary delineations of the corrected effective floodway and corrected effective base flood
    (c) Topographic contour information used for the boundary delineation of the base flood
    (d) Flow line used in the hydraulic model

3. The submitted proposed conditions HEC-RAS model for Beardsley Canal Wash did not include a floodway analysis. Please revise the proposed HEC-RAS model to include an analysis of the regulatory floodway. Please be sure that the surcharges do not exceed the 1-foot maximum allowed, and that there are no negative surcharges.

4. As required on page 9 of the instructions for the MT-2 application/certification forms (copy enclosed), please provide a copy of the duplicate effective model for Beardsley Canal Wash and for Perrysville Road Wash (upstream portion). This is required to ensure that the effective model's input data has been transferred correctly to the requester's equipment and to ensure that the revised data will be

integrated into the effective data to provide a continuous Flood Insurance Study model upstream and downstream of the revised reach.

5. The narrative portion of the North Inlet Channel Improvements submittal states that an existing earthen dike results in a levee condition between Cross Sections 3 and 23 on the Perryville Road Wash. Furthermore, the submittal states that there is no intent to certify this levee, but rather model it in a comparative fashion, depicting the flooding both with the levee in place, and with the levee having failed. The without levee model was not found on the submitted disk. Please submit a copy of the without levee scenario proposed conditions HEC-RAS model.

6. The narrative portion of the North Inlet Channel Improvements submittal states that the hydrologic information for this study is based on the *Loop 303 Corridor/White Tanks Area Drainage Master Plan Update* (URS, 2001 and 2005), and that this hydrology has been previously been approved by the Flood Control District of Maricopa County (FCDMC) and by the Federal Emergency Management Agency (FEMA). Yet in Section 4.1, the submittal further states that the "the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated based on the proposed CLOMR diversion channel." Please identify those portions of the previously-approved *Loop 303 Corridor/White Tanks* hydrology that have been altered for use in this CLOMR, and the nature of the alteration. Please provide all relevant hydrologic back-up data and calculations used to determine the discharges for the baseflood found in the submitted HEC-1 hydrologic model. In addition, it is unclear, based upon the above statements, whether the discharges used in the submitted hydraulic models utilized future conditions land-uses. Please verify that all discharges used in the hydraulic models represent existing land-use conditions.

Please send the required data directly to Michael Baker Jr., Inc., Attention: Jon Wolf, CFM, at 1030 Waterfall Lane, Durango, CO 81301. For identification purposes, please include the case number referenced above on all correspondence.

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.

3. Indicate if the CHECK-2 or CHECK-RAS programs were used to verify that the hydraulic estimates and assumptions in the model are comparable to the assumptions and limitations of HEC-2 or HEC-RAS. CHECK-2 and CHECK-RAS are review tools that identify areas of potential error or concern. These tools do not replace engineering judgment. CHECK-2 and CHECK-RAS can be downloaded from FEMA's Internet site at 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 the comment messages, please attach an explanation of why the messages are not valid in each case. To reduce processing time, review your hydraulic model and resolve valid modeling discrepancies, before submitting it for review.

4. Indicate the hydraulic models submitted.

   Submittal requirements for areas that have detailed flooding: Printouts of input and output listings along with files on diskette or CD for each of the models and supporting data (e.g., description of vegetation and land use map) for the source of input parameters used in the models listed below must be provided. The summary must include a description of any changes made from model to model (e.g., Duplicate Effective Model to Corrected Effective Model). At a minimum, the Duplicate Effective Model and the Revised or Post-Project Conditions Model must be submitted. The hydraulic analyses shall be performed for all flood frequencies and the floodway published in the effective FIS.

   Submittal requirements for areas that do not have detailed flooding: Only the 1% annual chance (Base) flood computations are required. A hydraulic model is not required for areas that do not have detailed flooding; however, Base Flood Elevations (BFEs) may not be added to the revised FIRM. If a hydraulic model is developed for the area, the Existing or Pre-project Model and the Revised or Post-Project Conditions Model, if applicable, described below must be submitted.

   Duplicate Effective Model

   The duplicate effective model is a copy of the hydraulic analysis used in the effective FIS, referred to as the effective model. The effective model should be obtained and then reproduced on the requester's equipment to produce the duplicate effective model. This is required to ensure that the effective model's input data has been transferred correctly to the requester's equipment and to ensure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.

   For information on how to obtain copies of the effective FIS models, see FEMA's Internet site at http://www.fema.gov/fhm/st_order.shtm. If data from the effective model is available and the same modeling program is being used, the requester must generate models that duplicate the FIS profiles and the elevations shown in the Floodway Data Table in the FIS report to within 0.1 foot. The appropriate FEMA Regional Office should be contacted if this model cannot be produced. See Appendix C for the addresses and telephone numbers of FEMA's Regional Offices. If the effective model is not available, the new model must be calibrated to reproduce the FIS profiles within 0.5 foot. If an alternative hydraulic model is used, it must be shown that the use of the original model is inappropriate and the new model must be calibrated to reproduce the FIS profiles within 0.5 foot.

   Corrected Effective Model

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

Michael Duncan - FCDX

From: Michael Duncan - FCDX
Sent: Tuesday, October 23, 2007 5:42 PM
To: Jon Wolf (jwolf@mbakercorp.com)
Subject: CLOMR FOR NORTH INLET CHANNEL -- an example of surveyed cross-sections and background topo.
Attachments: sample_survey-XSECs_plus_contours.TIF

Hi Jon, I will call you on Wednesday to discuss this.

The attached work map shows surveyed cross-sections and background contours; see notes at upper right.

This is the background on this Loop303/White Tanks/Agua Fria watershed:

1. In 1989, we obtained 2 foot topo., started building the first hydrology model (and its a big one) for this area, and delineated some floodplains for the whole area (finished around 1992). [by the WLB Group]

2. Then in 2001, we restudied the whole area, including updated hydrology, and about 10 miles of new floodplains. [by URS]
   At that time, since the 1989 topo. was 12 years old, there is land subsidence in the watershed, and since we only had 10 miles to delineate, we chose the economical choice of field-surveyed cross-sections. The work maps had the old 1989 topo. as just a background; and with the notes at the upper right of each work map.

This style of work map was used for these two FEMA cases:
case no. 03-09-1653P Bullard Wash, issued SEP 15 2004, effective DEC 30 2004, and
case no. 04-09-0318P Camelback Road Wash, issued SEP 15 2004, effective DEC 30 2004

(Perryville Road Wash becomes Camelback Road Wash, as it flows downstream)

Michael Duncan - FCDX

From: Michael Duncan - FCDX
Sent: Tuesday, November 06, 2007 9:17 AM
To: 'Jon Wolf'
Subject: Any chance to look at the electronic topo FW: Case No. 0709-1500R - North Inlet Channel

Hi Jon, we are putting together our "responses game plan". Did you happen to look at the revised-NIC-sheets at the FTP site, to see if the electronic 1-foot contours were suitable for your use?

If you've had any trouble in viewing, then we will plan on preparing a disk with instructions and electronic-contours-included, for our submittal.

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Tuesday, October 23, 2007 2:22 PM
To: Jon.Wolf@mapmodteam.com
Cc: Bobbie Ohler - FCDX; Michael Duncan - FCDX; Shimin Zou; Alissa Connelly
Subject: Case No. 0709-1500R - North Inlet Channel Improvements CLOMR Additional Data Request

Good afternoon Jon,

Per our conversation on Friday (10/19), I have placed a copy of the work map AutoCAD electronic files (ZIP) on our FTP site for the Beardsley Canal Wash and Perryville Road Wash. Please see the FTP site address and password below for access. Can you please review these files and let me know if they will be sufficient for your review of the topographic mapping information (20 scale mapping text)? I will be contacting Michael Duncan and others at the FCDMC regarding your concern that surveyed cross-sections were used in-lieu of topographic mapping for the Perryville Road Wash hydraulic modeling. Your assistance is appreciated. Thanks.

Jeff

Username: fema
Password: woodpatel

Site address: ftp://ftp.woodpatel.com

Jeffrey R. Minch, P.E.
Vice President - Water Resources

Wood, Patel & Associates, Inc.
2051 West Northern Avenue, Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8577
Mobile: (602) 695-5487
Fax: (602) 544-9509
E-mail: jminch@woodpatel.com
Website: http://www.woodpatel.com

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

December 27, 2007

Jon Wolf
Michael Baker, Jr.
1030 Waterfall Lane
Durango, CO 81301

SUBJECT: FEMA Case No. 07-09-1500R
CLOMR for North Inlet Channel Improvements

Dear Jon:

In response to your letter of October 10, 2007, I have enclosed the following additional and revised data:

* A revised CD of revised models, CAD, etc., including some new readme files;
* A new comparison table for the water surface elevations of the Duplicate Effective and Corrected Effective models;
* A new page 36.5 of Hydrology-related text to insert between pages 36 and 37;
* A replacement page 42;
* These replacement tables: 3b, 3c, and 4, for the Tables section of the report;
* Reference letters: the Consultant's transmittal/explanation letter, and a copy of your letter;
* These replacement maps: Exhibit C1 sheets 2, 3, and 4 (Beardsley Canal Wash);
Exhibit C2 sheets 2, 3, and 4 (Perryville Road Wash); and
Exhibit D panel 2 of 2 (annotated FIRM).

If you have any questions, please call me at 602-506-4732, or email me at mwd@mail.maricopa.gov

Yours truly,

Michael Duncan

Michael Duncan, P.E., CFM
Project Manager

Enclosures

Copies to:

Mounir Boudjemaa, M.S.
Revisions Manager - Arizona
MOD Team
Michael Baker Jr. Inc.
3601 Eisenhower Avenue
Alexandria, Virginia 22304-6425

Jeffrey R. Minch, P.E.
Vice President - Water Resources
Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Gordon W. R. Wark, P.E.
James S. Campbell, P.E.
Thomas R. Gettings, R.L.S.
Michael T. Young, P.E.
Peter Hemingway, P.E.
Jeffrey R. Minch, P.E.
Robert D. Gofonia, P.E., R.L.S.
Patrick W. Marum, P.E.
Scott D. Gookin, P.E.
Sergio E. Oliden, P.E.
Carnell Thurman. P.E.

December 21, 2007

Mr. Michael Duncan, P.E., CFM
Flood Delineation Branch
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

REFERENCE LETTERS

Phone: (602) 506-4732
Fax: (602) 506-4601
Email: mwd@mail.maricopa.gov

Re: **North Inlet Channel and Perryville Road Wash**
Conditional Letter of Map Revision FEMA Additional Data Request
Contract FCD 2005C021
Assignment No. 5
WP# 062665.05

Dear Mr. Duncan:

Wood, Patel & Associates, Inc. (Wood/Patel) has compiled the additional data as requested by you and FEMA for the Beardsley Canal Wash and the Perryville Road Wash. Per your request, we also revised the hydrologic model to move the lateral weir diversion at 183rd Avenue downstream of the concentration point at Camelback Road. The revised HEC-1 model, work maps, FIRM panel and HEC-RAS models are included on the CD with this letter. Attached to this letter is a revised Table 4 (TDN page 42 and Table 4) based on the new flows for the revisions noted above.

Also included with this submittal is the additional data requested by FEMA in a letter to you dated October 10, 2007 (attached) and subsequent conversations with the FEMA reviewer, Jon Wolf, CFM. A summary of the additional data provided corresponds to the items in the FEMA letter and is summarized below by issue number:

Item 1 – Exhibit C – Study Work Maps, C1 Beardsley Canal Wash

Wood/Patel has compiled the following information based on discussions with you and the FEMA reviewer:

(a) The work maps now display and annotate the entire current effective floodplain and floodway limits.

(b) Based on discussions with the FEMA reviewer, it was agreed to that it would not be necessary to map the corrected effective floodplain and floodway boundaries.

(c) Based on discussions with the FEMA reviewer, Wood/Patel has provided the AutoCAD electronic files on the enclosed CD for review.

(d) Based on discussions with the FEMA reviewer, Wood/Patel has illustrated the locations, alignments and labeled the effective FIRM cross-sections on the work maps.

(e) Wood/Patel confirmed with the FEMA reviewer that the "Cross-Section Line = 10,000" is the hydraulic baseline/flow line used in the hydraulic model. We changed the work map legend label to hydraulic baseline/flow line.

The work maps for Beardsley Canal Wash have been re-plotted and three (3) copies are provided for distribution.

Item 2 – Exhibit C – Study Work Maps, C2 Perryville Road Wash

Wood/Patel has prepared the following information based on discussions with you and the FEMA reviewer:

(a) The work maps now display and annotate the entire current effective floodplain and floodway limits.
(b) Based on discussions with the FEMA reviewer, it was agreed to that it would not be necessary to map the corrected effective floodplain and floodway boundaries.
(c) The aerial photography has been replaced with topographic contour information based on 1989 aerial photography (from Contract FCD 89-50 by the WLB Group) for reference. It should be noted that the hydraulic cross-section data used to redefine the floodplain and floodway for the Perryville Road Wash is based on field surveyed cross-sections obtained in 2001 (URS Corporation) which do not match the topographic mapping.
(d) The flow line used in the hydraulic model is annotated as the hydraulic baseline/flow line. The work map legend label has been revised to reflect this change.

Wood/Patel has also provided the AutoCAD electronic files on the enclosed CD for FEMA review. We have also illustrated the locations, alignments and labeled the effective FIRM cross-sections on the work maps and re-plotted three (3) copies for distribution.

Item 3 – Beardsley Canal Wash – HEC-RAS Model

Wood/Patel confirmed with FEMA's technical reviewer that the HEC-RAS floodway analysis was provided with the original submittal. No additional data is needed at this time.

Item 4 – Duplicate Effective Models

Wood/Patel confirmed with FEMA's technical reviewer that duplicate effective HEC-2 and HEC-RAS models were provided with the original submittal. Per the FEMA reviewer's request, Wood/Patel has developed a comparison table between the duplicate effective and corrected effective HEC-RAS models for the Beardsley Canal Wash and Perryville Road Wash (attached). A spreadsheet with separate work sheets for each flooding source is also included on the enclosed CD for reference in the HEC-RAS subdirectory.

Item 5 – Perryville Road Wash HEC-RAS Model

Wood/Patel confirmed with FEMA's technical reviewer that the Perryville Road Wash HEC-RAS floodway analysis provided with the original submittal represents the "without levee" condition. The revised models to reflect the flow changes at 183rd Avenue and Camelback Road are included on the enclosed CD.

Item 6 – Hydrology

Wood/Patel confirmed with FEMA's technical reviewer that they would like a narrative summary of the changes that were made to the hydrologic model. It should be noted that all discharges used in the hydraulic models represent existing land use conditions. A summary of the changes is provided below:

The *Level II, Phase II Alternatives Analysis Report, Loop 303 Corridor / White Tanks Area Drainage Master Plan Update*, URS, Inc., September 2001 is the basis for the hydrology which includes an evaluation of the entire White Tanks drainage basin hydrology and drainage plan. URS finalized the hydrologic model in February 2005 to reflect the most current hydrologic conditions within the watershed. This hydrology has been approved by the FCDMC and accepted by the Federal Emergency Management Agency (FEMA) for Case No. 03-09-1653P, Bullard Wash upstream of Indian School Road, and more recently for Case No. 06-09-B034P, Goodyear Centerpointe, Bullard Wash Floodplain Re-delineation Study at Interstate 10.

However, the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated based on the proposed CLOMR for the North Inlet Channel. The first major revision is that the flow diverted east at Northern Avenue (hydrograph name DI189) is now contained within the proposed channel and conveyed south. The second change is the split flow modeling north of Bethany Home Road along Perryville Road Wash. New rating curves were developed based on HEC-RAS modeling results. The 100-year, 24-hour HEC-1 model for the area north of Northern Avenue and west of the Beardsley Canal was utilized to update this portion of the original HEC-1 model. Also, after a field visit, it was found that storm runoff from sub-basin 215A flows to sub-basin 233 except for a small portion fraction of the flow which is conveyed north of Bethany Home Road to sub-basin 215 through 2 - 24-inch pipe with approximately 4 ft. head. The diversion rating curve to south at Camelback Road and 183rd Avenue was also revised based on HEC-RAS modeling results. The referenced HEC-RAS models are included on the enclosed CD.

Table 4 (attached) summarizes the 100-year flows for the proposed conditions. The effective FIS flows are included in Appendix A of the CLOMR document.

The general approach used to account for the interaction of hydrology and hydraulics is that the HEC-RAS model was used to develop rating curves for the hydrologic model and then the hydrologic model was used to account for the routing time issues. Finally, the peak flows from the HEC-1 model were input to the HEC-RAS models for floodplain delineations.

Wood/Patel has also included three (3) copies of a revised Exhibit D Annotated FIRM Panel 2 of 2, reflecting the results of the hydrology changes for Perryville Road Wash near 183rd Avenue and Camelback Road.

We appreciate the opportunity to be of service to the Flood Control District of Maricopa County and look forward to working with you on future projects. If we can be of further assistance on this project, please do not hesitate to contact me at 602-335-5877.

Sincerely,

Wood, Patel & Associates, Inc.

Jeffrey R. Minch, P.E.
Vice President – Water Resources

JRM/ac

Attachments

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

January 3, 2008

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Communities: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-ACK

Dear Mr. Duncan:

This responds to your submittal dated December 27, 2007 concerning a June 25, 2007, request 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:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 H

We have completed an inventory of the items you submitted. Our review of the submitted data indicates we have the minimum data required to perform a detailed technical review of your request. We have also received the required review and processing fee ($4,000). If additional data are required or if delays are encountered, we will inform you within 60 days of the date of this letter.

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 your case reviewer, Mr. Jon Wolf, CFM, by e-mail at Jon.Wolf@mapmodteam.com or by telephone at (970) 375-9729, or the Revisions Coordinator for your State, Mr. 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.

cc: Mr. Jeffery Minch, P.E.
Wood, Patel & Associates

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

FLOOD CONTROL DISTRICT
RECEIVED
JAN 14 '08
CH & GM | FINANCE
PIO | LANDS
ADMIN | O & M
REG | P & PM
ENG | FILE
CONTRACTS
MWL

January 10, 2008

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Community: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-AD

Dear Mr. Duncan:

This responds to your submittal dated December 27, 2007 concerning a June 25, 2007, request 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 and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 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 your case reviewer, Jon Wolf, CFM by e-mail at Jon.Wolf@mapmodteam.com or by telephone at (970) 903-0558, or the Revisions Coordinator for your State, 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

cc: Mr. Jeffery Minch, P.E.
Wood, Patel & Associates

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

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

Case No.: 07-09-1500R

Requester: Michael Duncan, P.E., CFM

Community: City of Glendale and
Maricopa County, AZ

Community Nos.: 040045 and 040037

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

1. The submitted workmap set entitled "Exhibit C-Study Work Maps, C1 Beardsley Canal Wash" prepared by Wood, Patel, dated December 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

   (a) The topographic information provided is unreadable. Please enlarge the topographic contour information used for the boundary delineation of the base flood

   (b) Flow line used in the hydraulic model. The December 27, 2007 submittal shows the flow line only in the diversion. Please show the flow line on both sides of the wash.

2. As required on page 9 of the instructions for the MT-2 application/certification forms (copy enclosed), please provide a copy of the duplicate effective model for Beardsley Canal Wash and for Perrysville Road Wash (upstream portion). This is required to ensure that the effective model's input data has been transferred correctly to the requester's equipment and to ensure that the revised data will be integrated into the effective data to provide a continuous Flood Insurance Study model upstream and downstream of the revised reach.

3. The narrative portion of the North Inlet Channel Improvements submittal states that the hydrologic information for this study is based on the *Loop 303 Corridor/White Tanks Area Drainage Master Plan Update* (URS, 2001 and 2005), and that this hydrology has been previously been approved by the Flood Control District of Maricopa County (FCDMC) and by the Federal Emergency Management Agency (FEMA). In Section 4.1, the submittal further states that the "the 100-year peak flows used in this study are slightly different from the effective FIS peak flows since the hydrology has been updated based on the proposed CLOMR diversion channel." The December 27, 2007 submittal identified four modifications to the previously-approved *Loop 303 Corridor/White Tanks* hydrology that have been made for use in this CLOMR. However, our review revealed that these modifications have, in some locations, resulted in significant changes to the effective discharges. Accordingly, please provide all relevant hydraulic and hydrologic back-up data and all calculations associated with each of the four modifications. Please also discuss the nature of the diversion channel at North Avenue and whether this diversion was approved and/or constructed through the FEMA MT-2 revision process.

Please send the required data directly to Michael Baker Jr., Inc., Attention: Jon Wolf, CFM, at 1030 Waterfall Lane, Durango, CO 81301. For identification purposes, please include the case number referenced above on all correspondence.

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.

Jeff Minch

From: Jon Wolf [JonWolf@mapmodteam.com]
Sent: Friday, February 29, 2008 11:06 AM
To: Michael Duncan - FCDX; Jon Wolf
Cc: Jeff Minch
Subject: [Possible Spam]RE: [ ] Case No. 07-09-1500R; City of Glendale and Maricopa County, AZ; 040045 and 040037 - Phone Call Summary

mike/jeff-

just took another look at jeff's feb. 18 email. I apologize, but I guess I missed that part about wanting me to respond when I read it the first time around. I just skimmed it I guess, and thought he was just summarizing our conversation. anyway, yes- it looks good to me. I believe that we're all on the same page with regard to what we're looking for in the next submittal.

again, I do apologize for not reading it closer the first time around.

JON WOLF, CFM
HYDROLOGIST
MICHAEL BAKER JR. INC.
1030 WATERFALL LANE
DURANGO, COLORADO 81301
PHONE 970.375.9729
MOBILE 970.903.0558
JWOLF@MBAKERCORP.COM
JON.WOLF@MAPMODTEAM.COM

From: Michael Duncan - FCDX [mailto:mwd@mail.maricopa.gov]
Sent: Thursday, February 28, 2008 4:35 PM
To: Jon Wolf
Cc: Jon Wolf; Jeff Minch
Subject: FW: [ ] Case No. 07-09-1500R; City of Glendale and Maricopa County, AZ; 040045 and 040037 - Phone Call Summary

Jon, did you get a chance to look at Jeff Minch's email yet?

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Monday, February 18, 2008 5:24 PM
To: Jon.Wolf@mapmodteam.com
Cc: Michael Duncan - FCDX; Shimin Zou; Alissa Connelly
Subject: [ ] Case No. 07-09-1500R; City of Glendale and Maricopa County, AZ; 040045 and 040037 - Phone Call Summary

Good evening Jon,

Provided below is our understanding of the additional data you are requesting to continue processing the North Inlet Channel (NIC) CLOMR based on our phone conversation on Thursday, February 14th. The item numbers below correspond to the items listed in your letter.

1. (a) You indicated you will review the work maps electronically using the AutoCAD files sent with the previous additional data request submittal. These files can be reviewed using eDrawings (http://www.solidworks.com/pages/products/edrawings/eDrawings.html) or similar software if your AutoCAD license availability is limited.

1. (b) Wood/Patel used construction centerlines to define the flow line/hydraulic baseline (Sta. 10000) for the hydraulic cross-sections representing the proposed construction project. The line type is noted in the work map legend. You noted that the hydraulic baseline for the Beardsley Canal Wash north of Northern Avenue (Exhibit C1, Sheets 3 and 4) will need to be moved to within the floodplain boundary. Wood/Patel proposed to submit revised Sheets 3 & 4 along with the revised

corresponding HEC-RAS model. You concurred with the proposed revision.

2. After our discussion regarding the definition of duplicate effective model, it is our understanding that Wood/Patel can resubmit the HEC-2 models with a more current run date to illustrate that the effective model's input data has been accurately transferred to our equipment.

3. You requested that we provide more detailed discussions supporting the four changes to the hydrologic model and provide supporting calculations for the changes. The four changed locations to be documented include: the diversion at Northern Avenue (proposed NIC); split flow north of Bethany Home Road (Perryville Rd. Wash); revised discharge from basin 215A to basin 233 based on existing culvert; and, revised rating at Camelback Road and 183rd Avenue.

Please respond to this e-mail to confirm that our understandings are the same so that we can proceed with the preparation of the additional data as requested. If we have misunderstood our conversation, please provide revisions or clarification to the direction provided above. Thank you for your assistance on this project.

Jeff

Jeffrey R. Minch, P.E.
Principal/Vice President - Water Resources

Wood, Patel & Associates, Inc.
2051 West Northern Avenue, Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8577
Mobile: (602) 695-5487
Fax: (602) 544-9509
E-mail: jminch@woodpatel.com
Website: http://www.woodpatel.com

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Gordon W. R. Wark, P.E.
James S. Campbell, P.E.
Thomas R. Gettings, R.L.S.
Michael T. Young, P.E.
Peter Hemingway, P.E.
Jeffrey R. Minch, P.E.
Robert D. Gofonia, P.E., R.L.S.
Patrick W. Marum, P.E.
Scott D. Gookin, P.E.
Carnell Thurman. P.E.

April 2, 2008

Mr. Michael Duncan, P.E., CFM
Flood Delineation Branch
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

Phone: (602) 506-4732
Fax: (602) 506-4601
Email: mwd@mail.maricopa.gov

Re: **North Inlet Channel and Perryville Road Wash**
Conditional Letter of Map Revision FEMA Additional Data Request
Contract FCD 2005C021
Assignment No. 5
WP# 062665.05

Dear Mr. Duncan:

Wood, Patel & Associates, Inc. (Wood/Patel) has compiled the additional data as requested by you and FEMA for the Beardsley Canal Wash and the Perryville Road Wash. Per your request, we are also including additional supporting data on the CD enclosed with this letter.

Also included with this submittal is the additional data requested by FEMA in a letter to you dated January 10, 2008 and subsequent e-mail correspondence with the FEMA reviewer, Jon Wolf, CFM (attached). A summary of the additional data provided with this submittal is provided below:

1. Wood/Patel has modified the flow line/hydraulic baseline for the cross-sections representing the proposed North Inlet Channel construction project. The line type is noted in the work map legend. We have moved the hydraulic baseline for the Beardsley Canal Wash north of Northern Avenue (Exhibit C1, Sheets 3 and 4) within the floodplain boundary. Please note that the previous HEC-RAS model provided by another Consultant used the proposed construction centerline for the project as the hydraulic baseline.

   We have included three copies of revised Exhibit C1, Sheets 3 and 4 for distribution. Also included on the CD is the corresponding HEC-RAS model and updated AutoCAD files for electronic review of the work maps.

2. Per our discussions with Jon Wolf, we have included updated HEC-2 model output files on the CD to illustrate that the effective model's input data has been accurately transferred to our equipment.

3. Wood/Patel has attached an addendum to Section 4.1 Hydrology (page 36.5) of the Technical Data Notebook to clarify the four changes to the hydrologic model as a result of the proposed project. Supporting HEC-RAS electronic files and a PDF of the pipe culvert rating curve are included on the CD.

MISSION: CLIENT SERVICE™

We appreciate the opportunity to be of service to the Flood Control District of Maricopa County and look forward to working with you on future projects. If we can be of further assistance on this project, please do not hesitate to contact me at 602-335-5877.

Sincerely,

Wood, Patel & Associates, Inc.

Jeffrey R. Minch, P.E.
Vice President – Water Resources

JRM/gg

Attachments

EXPIRES 9-30-09

W:\2004Projects\042284.02_North Inlet Channel CLOMR\Project Support\Admin\062665 05 NIC_Additional Data Request 4-02-08.doc

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

April 3, 2007 8

Jon Wolf
Michael Baker, Jr.
1030 Waterfall Lane
Durango, CO 81301

SUBJECT: FEMA Case No. 07-09-1500R
CLOMR for North Inlet Channel Improvements

Dear Jon:

In response to your letter of January 10, 2008, I have enclosed the following additional and revised data:

* A CD containing:
  - Revised Beardsley Canal Wash CAD files;
  - These revised hydraulic models:
    - Duplicate and Proposed models for Beardsley Canal Wash,
    - Duplicate models for Perryville Road Wash;
  - Backup models and analyses for the diversion ratings of the HEC-1; and
  - Revised HEC-1 model.

* A new page 36.5 of Hydrology-related text to replace the previous version;
* These replacement maps: Exhibit C1 sheets 3 and 4 (Beardsley Canal Wash);
* Reference letters: the Consultant's transmittal/explanation letter,
  a copy of a related email, and
  a copy of your letter of January 10;

If you have any questions, please call me at 602-506-4732, or email me at mwd@mail.maricopa.gov

Yours truly,

Michael Duncan

Michael Duncan, P.E., CFM
Project Manager

Enclosures

Copies to:

Mounir Boudjemaa, M.S.
Revisions Manager - Arizona
MOD Team
Michael Baker Jr. Inc.
3601 Eisenhower Avenue
Alexandria, Virginia 22304-6425

Jeffrey R. Minch, P.E.
Vice President - Water Resources
Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021

Michael Duncan - FCDX

From: Jon Wolf [JonWolf@mapmodteam.com]
Sent: Friday, April 04, 2008 1:15 PM
To: Michael Duncan - FCDX
Cc: Jeff Minch; Mounir Boudjemaa; andrew.friend@mapmodteam.com; jon.wolf@mapmodteam.com
Subject: ADDITIONAL DATA Received – City of Glendale and Maricopa County, Arizona (Case Number 07-09-1500R) – Response Required

Dear Mr. Duncan:

We have received your recent submittal of data, in response to our letter dated January 10, 2008, requesting information for the above-referenced Case Number (07-09-1500R). This case number is for a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a conditional revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for the City of Glendale and Maricopa County, Arizona. This e-mail is being sent to officially acknowledge the receipt of your additional data for the above-referenced case number and replaces the paper copy acknowledgement letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

We are reviewing your submitted data and will contact you if additional information is required to process your request.

If additional information is not required, we will issue a final letter of determination within 90 days of receiving your submittal dated April 3, 2008.

If you have general questions about your request, FEMA policy, or the NFIP, 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, the case reviewer's contact information is listed below, or please contact the Revisions Coordinator for your State, Mounir Boudjemaa, M.S., at Mounir.Boudjemaa@mapmodteam.com or at (703) 317-6295.

Please be assured we will do our best to respond to all inquiries in a timely manner.

Thank you,

Jon Wolf, CFM
FEMA Map Mod Team
1030 Waterfall Lane
Durango, CO 81301
970.903.0558
Jon.Wolf@mapmodteam.com

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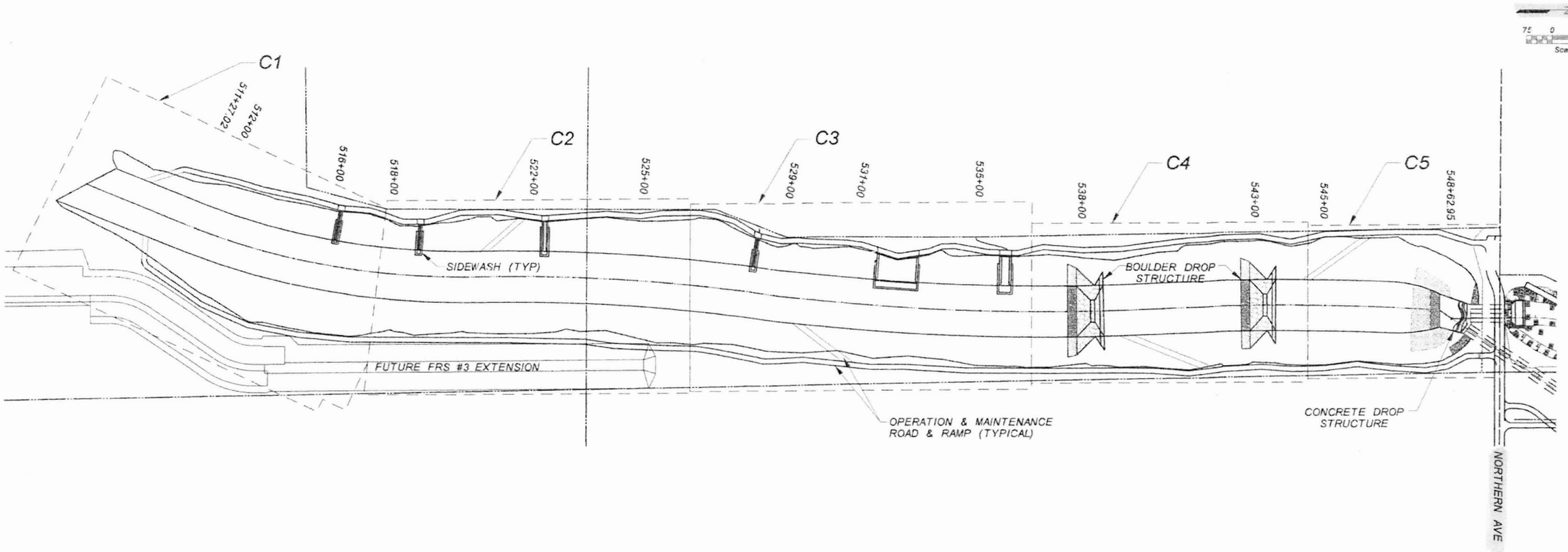
If you have received this e-mail transmission in error, please reply to the sender, so that we can arrange for proper delivery, and then please delete the message from your inbox. Thank you.

Michael Duncan - FCDX

From: Michael Duncan - FCDX
Sent: Thursday, April 17, 2008 1:01 PM
To: 'Jon Wolf'
Subject: North Inlet Channel - CLOMR - plan excerpts
Attachments: NIC-CLOMR.pdf

Jon, here are some plan-view and cross-section excerpts near Northern Ave, from the draft plans. The new channel will be deeper and wider.

Mike Duncan, P.E., CFM
Project Manager
602-506-4732



NOTES

1. STATION AND OFFSET ARE BASED OFF SOUTH CHANNEL CONSTRUCTION CENTERLINE. SEE DWG NO G4 FOR GEOMETRIC LAYOUT.

NO.	REVISION	BY	DATE
3			
2			
1			

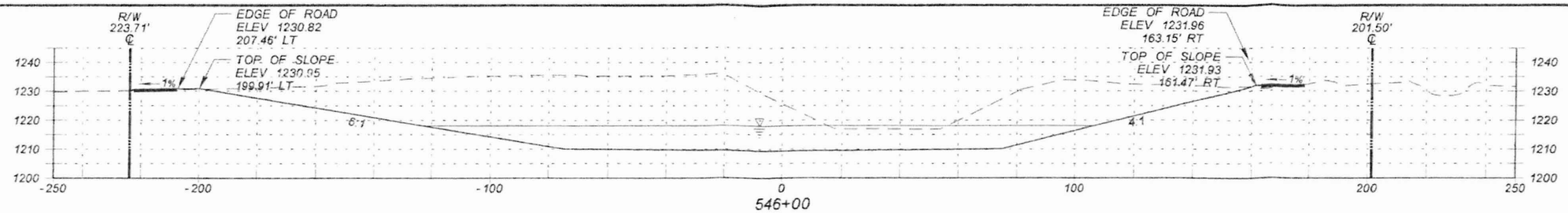
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
G5	GEOMETRIC SHEET	4 35



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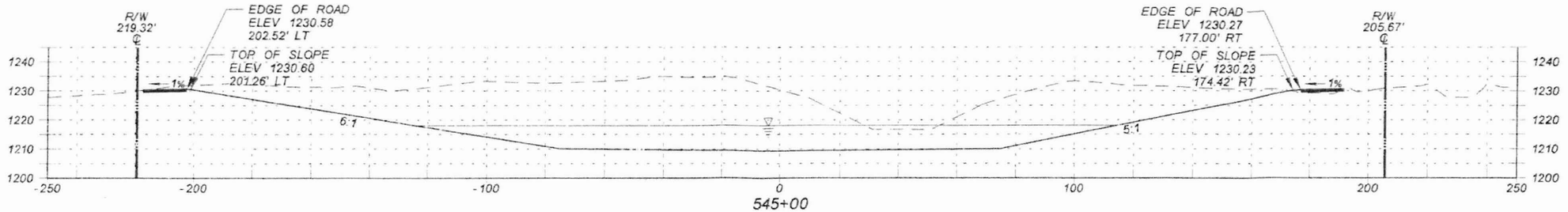

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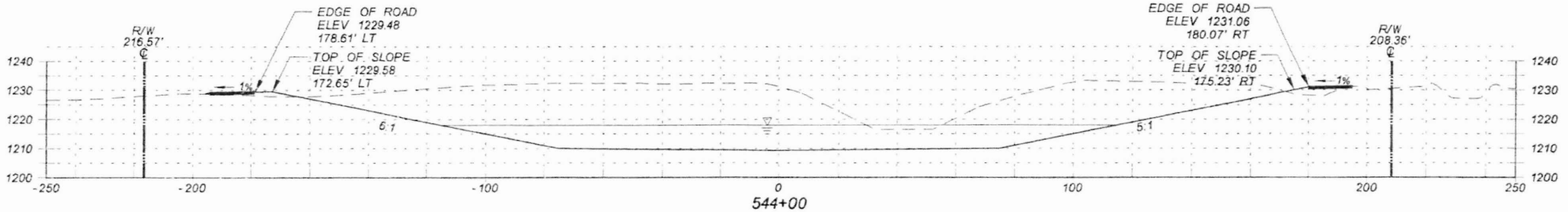

544+00

NO	REVISION	BY	DATE
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2			
1			

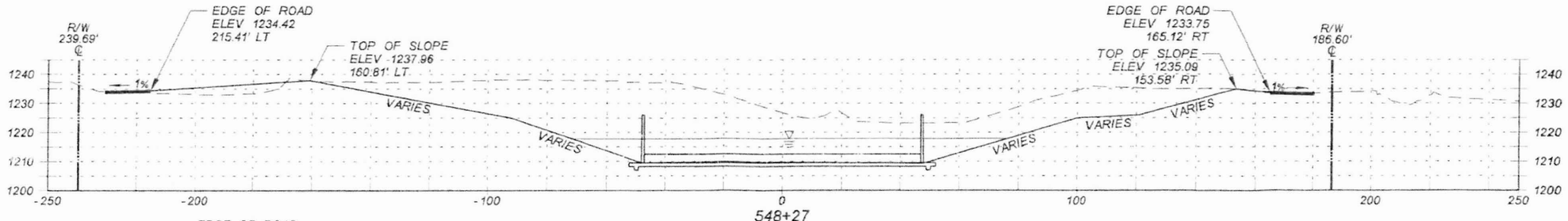
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

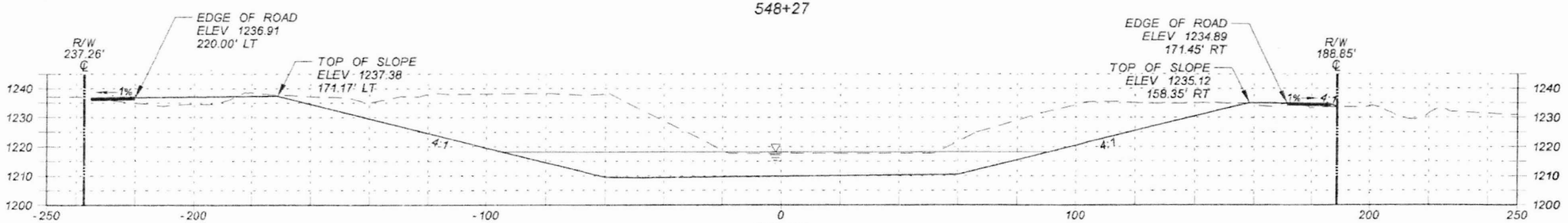
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

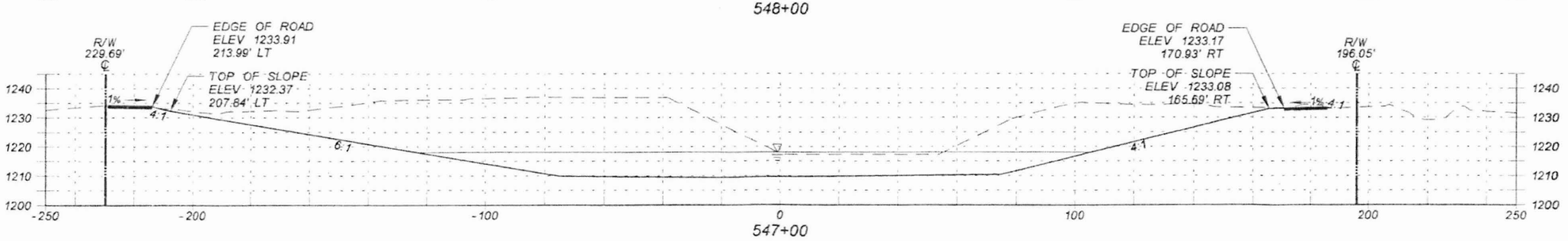
DRAWING NO.		SHEET OF
XS10	CROSS SECTIONS	34 35



548+27



548+00



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NO.	REVISION	BY	DATE
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2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

Barry J. Ling 10146

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
XS11	CROSS SECTIONS	35 35

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

April 22, 2008

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Community: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-AD

Dear Mr. Duncan:

This responds to your submittal dated April 2, 2008 concerning a June 25, 2007, request 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 and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 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 your case reviewer, Jon Wolf, CFM by e-mail at Jon.Wolf@mapmodteam.com or by telephone at (970) 903-0558, or the Revisions Coordinator for your State, 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

cc: Mr. Jeffery Minch, P.E.
Wood, Patel & Associates

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

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

Case No.: 07-09-1500R

Requester: Michael Duncan, P.E., CFM

Community: City of Glendale and
Maricopa County, AZ

Community Nos.: 040045 and 040037

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

1. The submitted workmap set entitled "Exhibit C-Study Work Maps, C1 Beardsley Canal Wash" prepared by Wood, Patel, dated December 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

    (a) The proposed water surface elevations shown at each cross section on the workmap do not match those shown in the proposed conditions model after those in the proposed conditions model were adjusted for the datum shift. Please correct this apparent inconsistency or explain why this is not necessary.

2. The submitted workmap set entitled "Exhibit C-Study Work Maps, C2 Perryville Road Wash" prepared by Wood, Patel, dated December 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

    (a) On the workmap, the cross section alignments are labeled with two different numbers. The top number describes the cross section's location within the proposed model, and the bottom number cross-references the cross section to the duplicate effective and corrected effective models. These bottom numbers, however, do not match those used within the duplicate effective and corrected effective models for Perryville Road Wash for both the "with levee" and the "without levee" scenarios, thus a meaningful comparison of water surface elevation changes is not possible. Please revise the cross-referencing numbering of the cross sections or explain why this is not necessary.

    (b) The submittal states that Perryville Road Wash was modeled both "with levee" and "without levee" scenarios, however, the Perryville Road Wash workmaps only depict flooding under the "with levee" scenario. Please revise the workmaps to also include the baseflood delineation as it would appear under the "without levee" scenario. Alternately, provide a second set of workmaps for Perryville Road Wash that depict flooding under the "without levee" scenario.

3. Numerous cross sections found in the submitted HEC-RAS hydraulic model along the Beardsley Canal Wash and along the North Inlet Channel are not shown on the above-referenced topographic work maps. Please revise the above-referenced work maps to include all modeled cross sections, or explain why this is not necessary.

4. Paragraph 65.6(a)(2) of the National Flood Insurance Program (NFIP) regulations states that to avoid discontinuities between revised and unrevised flood data, the hydraulic analyses must be extensive enough to ensure a logical transition between the revised floodplain boundaries and those developed previously for areas not affected by the revision. Our review indicates that the boundary of the base (1-percent-annual-chance) flood shown on the above referenced Perryville Road Wash work maps does not logically tie in to the effective base floodplain boundary at the upstream end of the revision. Please revise the boundary delineation at the upstream end of the revision to provide a logical tie in.

5. Paragraph 65.6(a)(2) of the National Flood Insurance Program (NFIP) regulations states that to avoid discontinuities between revised and unrevised flood data, hydraulic analyses must have a logical transition between revised elevations of the base flood and those developed previously for areas not affected by the revision. Our review indicates that the corrected effective conditions and the proposed conditions hydraulic analyses along Beardsley Canal Wash do not tie into the effective hydraulic analysis at the downstream end of the proposed revised reach. Please provide revised corrected effective conditions and proposed conditions hydraulic analyses for Beardsley Canal Wash that tie into the effective hydraulic analysis within 0.5 foot, or within 0.0 feet if practical.

6. The base floodplain topwidths shown in the proposed hydraulic analysis along the Beardsley Canal Wash and along Perryville Road Wash do not match the approximate base floodplain topwidths shown on the above-referenced topographic work maps at numerous cross sections. Please provide an explanation for these discrepancies, or make the appropriate changes.

7. Our review revealed negative surcharges on several of the cross sections between the natural (unencroached) and encroached profiles of the corrected effective and proposed conditions HEC-RAS hydraulic models for Beardsley Canal Wash and for Perryville Road Wash. Please revise the floodway analysis to eliminate all negative surcharges, or explain why this is not necessary.

8. From our technical review it appears as though the "with levee" scenario base floodplain delineation is not mapped correctly at several locations along Perryville Road Wash. For example, the base flood elevation at Cross Section 34, is approximately 1,212.7 feet in the submitted "with levee" scenario hydraulic model, however on the above-referenced topographic work map the base floodplain is mapped to approximately 1,212 on the left bank and 1,215 on the right bank. Please provide an explanation for these discrepancies, or make the appropriate revisions. Please review all mapping to insure the baseflood floodplain is mapped correctly at each cross sections.

9. The downstream reach lengths shown in the Perryville Road Wash proposed conditions hydraulic analysis, "with levee" scenario, at Cross Sections 0.04, 2, 24 and 28 do not match the approximate downstream reach lengths shown on the above-referenced topographic work map. Please make the appropriate changes, or explain why this is not necessary.

10. If the above-mentioned topographic work maps or the annotated FIRMs change as a result of the revisions to the hydraulic model requested in Items 3-9 please revise the work maps and annotated FIRMs to show the appropriate changes.

Please send the required data directly to Michael Baker Jr., Inc., Attention: Jon Wolf, CFM, at 1030 Waterfall Lane, Durango, CO 81301. For identification purposes, please include the case number referenced above on all correspondence.

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.

Michael Duncan - FCDX

From: Michael Duncan - FCDX
Sent: Wednesday, July 09, 2008 1:46 PM
To: 'Jon Wolf'
Subject: request for some clarification of comments
Attachments: nic REQUEST FOR CLARIFICATIONS.doc; 22Apr08_JonWolf_ltr.pdf.pdf

Hi Jon,
How is cool Durango? Its 102 degrees here in Phoenix, heading for 108, or more. We are putting together our "plan of attack" for responding to your comments on the North Inlet Channel Improvements, and I would like to get some clarifications on some of your comments. Please see the attached document. I have also attached a pdf of your comment letter of April22, 2008.

Mike Duncan, P.E., CFM
Project Manager
602-506-4732

REQUEST FOR CLARIFICATIONS

Case No. 07-09-1500R
North Inlet Channel Improvements

from Mike Duncan, July 9, 2008

Ref: Jon Wolf comment letter of April 22, 2008

****

Comment 1 a)
On Beardsley Canal Wash maps, proposed WS Elevations do not match model ... after datum shift.

There is no datum shift necessary. The Beardsley Canal Wash topo. is in the NAVD 1988 datum; the Beardsley Canal model elevations are in the NAVD 1988 datum; and the Beardsley Canal Wash work maps are in the NAVD 1988 datum. I checked all of the WS Elevations on the maps (C1 – Sheet 2, dated 12/20/07; C1 – Sheets 3 and 4, dated 4/2/08) and they match the model (named "Design_NIC" and dated 3/12/08 10:16 am).

Is anything other than an explanation needed for this comment?

****

Comment 2 a)
On Perryville Road Wash maps, two sets of cross-section ID's are displayed ... thus a meaningful comparison of water surface elevation changes is not possible. Please revise cross-referencing numbering ... or explain.

After the proposed CLOMR project, the discharges of Perryville Road Wash will decrease from 1,486 cfs to 340 cfs at the upstream part, and will decrease from 1,234 cfs to 653 cfs at the downstream part. The profiles plots indicate that the new (proposed) water surfaces are one foot lower in most cases:

X-SEC	OLD W.S. EL.	NEW W.S. EL.	DELTA	COMMENTS
	(FT. NGVD29)	(FT. NGVD29)	(FT.)	
A	1121	1121	0	due to boundary conditions
B	1130	1130	0	due to boundary conditions
C	1142	1141	-1	
D	1150	1149	-1	
E *	1158	1159	+1 *	OLD=1400cfs, NEW=1000cfs
F	1169	1168	-1	
G *	1178	1178	0 *	OLD=1500cfs, NEW=700cfs
H	1194	1193	-1	
I	1208	1207	-1	

* Unusual results at these two locations; keep in mind that the old study used 2-ft-contour large-area topographic mapping, with approx. + or – 1 ft. accuracy; while in the new study, each cross-section was field surveyed which is much more accurate.

Is any further comparison really needed? If so, what would be its purpose?

****

Comment 3)
Numerous cross-sections of the Beardsley Canal Wash and the North Inlet Channel models do not appear on the work maps… please include all modeled cross sections, or explain …

This HEC-RAS modeling is not just for typical floodplain delineation purposes. It was developed as the design basis for a construction project that includes multiple, steep drop (grade control) structures. In addition, the two parallel flow paths, the associated upstream splitting structure, and the box culverts that bring the two flows together, led to the use of the split-flow optimization features of HEC-RAS in the model development. For these reasons, close cross-section spacing was used, and, in addition, interpolated cross-sections were used. Since we had this detailed (more accurate) model, there was no good reason to remove cross-sections from the modeling so that all cross-sections could be reasonably displayed on the work maps.

Do you really want us to build a less accurate model, just so that all cross-sections are on the work maps?

****

Comment 4)
… Perryville Road Wash work maps does not logically tie into the effective base floodplain boundary at the upstream end…

Since the upstream end of Perryville Road Wash does not tie into anything, am I right in assuming that this comment should refer to Beardsley Canal Wash instead?

Also, is the tie-in concerns for the horizontal (floodplain boundary lines), or the vertical, or both?

****

Comment 5)
... the corrected effective ...and proposed... analyses for Beardsley Canal Wash do not tie in downstream within...0.5 feet... (vertically)

Jon, as we discussed by phone on 04-23-08, the downstream floodplain for tie-in is the Zone A floodplain of the White Tanks No. 3 Flood Retarding Structure. Since Zone A floodplains do not include water surface elevations, there is no vertical elevations to tie into.

Does this settle this comment?

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

July 17, 2008

Jon Wolf
Michael Baker, Jr.
1030 Waterfall Lane
Durango, CO 81301

SUBJECT: FEMA Case No. 07-09-1500R
CLOMR for North Inlet Channel Improvements

Dear Jon:

In response to your letter of April 22, 2008, I have enclosed the following items:

* A document of 10 responses to the 10 comments;

* Revised MT-2 application forms with revised tie-data;

* A table and 4 profile plots that compare the Duplicate, Corrected, and Proposed water surface elevations of Perryville Road Wash;

* A CD containing revised CAD files and HEC-RAS files, for Beardsley Canal Wash and Perryville Road Wash;

* These revised maps: Exhibit C1 sheets 1 through 4 (Beardsley Canal Wash);
Exhibit C2 sheets 1 through 4 (Perryville Road Wash); and

* Revised annotated FIRM's

If you have any questions, please call me at 602-506-4732, or email me at mwd@mail.maricopa.gov

Yours truly,

Michael Duncan

Michael Duncan, P.E., CFM
Project Manager

Enclosures

Copies to:

Mounir Boudjemaa, M.S.
Revisions Manager - Arizona
MOD Team
Michael Baker Jr. Inc.
3601 Eisenhower Avenue
Alexandria, Virginia 22304-6425

Jeffrey R. Minch, P.E.
Vice President – Water Resources
Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021

RESPONSES TO FEMA REVIEW COMMENTS OF APRIL 22, 2008

CASE NO: 07-09-1500R
IDENTIFIER: NORTH INLET CHANNEL IMPROVEMENTS

FROM: Mike Duncan, Project Manager, Flood Control District of Maricopa County
DATE: July 17, 2008

COMMENT:

1. The submitted workmap set entitled "Exhibit C-Study Work Maps, C1 Beardsley Canal Wash" prepared by Wood, Patel, dated December 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

   (a) The proposed water surface elevations shown at each cross section on the workmap do not match those shown in the proposed conditions model after those in the proposed conditions model were adjusted for the datum shift. Please correct this apparent inconsistency or explain why this is not necessary.

RESPONSE TO COMMENT 1 a):
There is no datum shift necessary. The Beardsley Canal Wash topo. is in the NAVD 1988 datum; the Beardsley Canal model elevations are in the NAVD 1988 datum; and the Beardsley Canal Wash work maps are in the NAVD 1988 datum. I checked all of the WS Elevations on the maps (C1 – Sheet 2, dated 12/20/07; C1 – Sheets 3 and 4, dated 4/2/08) and they match the model (named "Design_NIC" and dated 3/12/08 10:16 am). The mentioning of the conversion factor between the two vertical datums, at the end of section 3.1, on page 35 of the text, is just mentioned as an aside. The Beardsley Canal Wash and Diversion Channel mapping and models are in NAVD 1988; and the Perryville Road Wash mapping, surveying, and models are in NGVD 1929.

COMMENT:

2. The submitted workmap set entitled "Exhibit C-Study Work Maps, C2 Perryville Road Wash" prepared by Wood, Patel, dated December 2007, does not provide essential information required to complete our detailed review of this request. Please provide the following information, which was omitted from the submitted topographic work map set.

   (a) On the workmap, the cross section alignments are labeled with two different numbers. The top number describes the cross section's location within the proposed model, and the bottom number cross-references the cross section to the duplicate effective and corrected effective models. These bottom numbers, however, do not match those used within the duplicate effective and corrected effective models for Perryville Road Wash for both the "with levee" and the "without levee" scenarios, thus a meaningful comparison of water surface elevation changes is not possible. Please revise the cross-referencing numbering of the cross sections or explain why this is not necessary.

RESPONSE TO COMMENT 2 a):
See the enclosed table and four profile plots that compare the water surface elevations of the Duplicate Effective, Corrected Effective, and Proposed models of Perryville Road Wash. These underlying factors explain the increases or decreases in water surface elevations: 1) after the proposed CLOMR project, the discharges of Perryville Road Wash will decrease from 1,486 cfs to 340 cfs at the upstream part, and will decrease from 1,234 cfs to 653 cfs at the downstream part; 2) the effective study used 2-

ft-contour large-area topographic mapping, with approximately + or - 1 ft. accuracy; while in the new study, each cross-section was field surveyed, which is more accurate.

COMMENT 2b):

(b) The submittal states that Perryville Road Wash was modeled both "with levee" and "without levee" scenarios, however, the Perryville Road Wash workmaps only depict flooding under the "with levee" scenario. Please revise the workmaps to also include the baseflood delineation as it would appear under the "without levee" scenario. Alternately, provide a second set of workmaps for Perryville Road Wash that depict flooding under the "without levee" scenario.

RESPONSE TO COMMENT 2b):

A revised work map (C2 Perryville Road Wash Sheet 3) is enclosed. The revisions include a floodplain gutter line at the levee (berm) and revised water surface elevations (for both with and without levee conditions).

COMMENT:

3. Numerous cross sections found in the submitted HEC-RAS hydraulic model along the Beardsley Canal Wash and along the North Inlet Channel are not shown on the above-referenced topographic work maps. Please revise the above-referenced work maps to include all modeled cross sections, or explain why this is not necessary.

RESPONSE TO COMMENT 3:

This HEC-RAS modeling is not just for typical floodplain delineation purposes. It was developed as the design basis for a construction project that includes multiple, steep drop (grade control) structures. In addition, the two parallel flow paths, the associated upstream splitting structure, and the box culverts that bring the two flows together, led to the use of the split-flow optimization features of HEC-RAS in the model development. For these reasons, close cross-section spacing was used, and, in addition, interpolated cross-sections were used. Since we had this detailed (more accurate) model, there was no good reason to remove cross-sections from the modeling so that all cross-sections could be reasonably displayed on the work maps. This is why the models contain a large number of cross-sections.

COMMENT:

4. Paragraph 65.6(a)(2) of the National Flood Insurance Program (NFIP) regulations states that to avoid discontinuities between revised and unrevised flood data, the hydraulic analyses must be extensive enough to ensure a logical transition between the revised floodplain boundaries and those developed previously for areas not affected by the revision. Our review indicates that the boundary of the base (1-percent-annual-chance) flood shown on the above referenced Perryville Road Wash work maps does not logically tie in to the effective base floodplain boundary at the upstream end of the revision. Please revise the boundary delineation at the upstream end of the revision to provide a logical tie in.

RESPONSE TO COMMENT 4:

Since Perryville Rd. Wash does not have an upstream tie-in, I assume that this comment refers to Beardsley Canal Wash. Cross-section 2.309 (a.k.a. 61325.99, with a floodplain W.S. elevation of 1281.0 ft NAVD88) of the proposed work map of Beardsley Canal Wash is located very close to cross-section 0.131 (with a floodplain W.S. elevation of 1279.1 ft NGVD29) of Waterfall Wash of the effective study by the WLB Group. Using the vertical datum conversion,

Proposed WS El. at xsec. 2.309 = 1281.0 - 1.78 = 1279.22,

which is just 0.12 ft higher than the effective study. This is within the 0.5 ft. vertical-tie-in guideline. Now horizontally, due to the probable vertical differences between the old topo. and the new topo., a transitional line was required to accomplish the horizontal tie-in.
Also, revised MT-2 application forms, with revised tie-in data, are enclosed.

COMMENT:

5. Paragraph 65.6(a)(2) of the National Flood Insurance Program (NFIP) regulations states that to avoid discontinuities between revised and unrevised flood data, hydraulic analyses must have a logical transition between revised elevations of the base flood and those developed previously for areas not affected by the revision. Our review indicates that the corrected effective conditions and the proposed conditions hydraulic analyses along Beardsley Canal Wash do not tie into the effective hydraulic analysis at the downstream end of the proposed revised reach. Please provide revised corrected effective conditions and proposed conditions hydraulic analyses for Beardsley Canal Wash that tie into the effective hydraulic analysis within 0.5 foot, or within 0.0 feet if practical.

RESPONSE TO COMMENT 5:
The downstream tie-in is at a Zone A floodplain (which is the ponding area of the White Tanks # 3 Flood Retarding Structure), and which does not have any flood elevations. Thus there is no vertical elevations to tie into. At this location, the horizontal tie-in/transition was made based on engineering judgment.

COMMENT:

6. The base floodplain topwidths shown in the proposed hydraulic analysis along the Beardsley Canal Wash and along Perryville Road Wash do not match the approximate base floodplain topwidths shown on the above-referenced topographic work maps at numerous cross sections. Please provide an explanation for these discrepancies, or make the appropriate changes.

RESPONSE TO COMMENT 6:
The HEC-RAS models and the work maps have been revised. Please note that for the proposed constructed channels (North Inlet Channel Phases I and II), the floodplain boundaries were placed at the top of the proposed channel banks. In these areas, the all of the top widths of the models do not match these boundaries. These boundaries were placed at the top of banks to help insure that the County's Floodplain Regulations could be used to regulate any future attempts to might modify the channel banks.

COMMENT:

7. Our review revealed negative surcharges on several of the cross sections between the natural (unencroached) and encroached profiles of the corrected effective and proposed conditions HEC-RAS hydraulic models for Beardsley Canal Wash and for Perryville Road Wash. Please revise the floodway analysis to eliminate all negative surcharges, or explain why this is not necessary.

RESPONSE TO COMMENT 7:
The HEC-RAS models have been revised to limit the floodway negative surcharges to less than 0.05 ft.

COMMENT:

8. From our technical review it appears as though the "with levee" scenario base floodplain delineation is not mapped correctly at several locations along Perryville Road Wash. For example, the base flood elevation at Cross Section 34, is approximately 1,212.7 feet in the submitted "with levee" scenario hydraulic model, however on the above-referenced topographic work map the base floodplain is mapped to approximately 1,212 on the left bank and 1,215 on the right bank. Please provide an explanation for these discrepancies, or make the appropriate revisions. Please review all mapping to insure the baseflood floodplain is mapped correctly at each cross sections.

RESPONSE TO COMMENT 8:

The cross-sections for the proposed Perryville Road Wash floodplain delineation were all field surveyed. On the other hand, the background topographic contours have an approximate accuracy of plus or minus 1 foot, are based on aerial photography that was flown 19 years ago (in 1989), and are included on the maps just for basic reference.

COMMENT:

9. The downstream reach lengths shown in the Perryville Road Wash proposed conditions hydraulic analysis, "with levee" scenario, at Cross Sections 0.04, 2, 24 and 28 do not match the approximate downstream reach lengths shown on the above-referenced topographic work map. Please make the appropriate changes, or explain why this is not necessary.

RESPONSE TO COMMENT 9:

These reach lengths have been revised in the accompanying revised HEC-RAS models.

COMMENT:

10. If the above-mentioned topographic work maps or the annotated FIRMs change as a result of the revisions to the hydraulic model requested in Items 3-9 please revise the work maps and annotated FIRMs to show the appropriate changes.

RESPONSE TO COMMENT 10:

The following items were revised and are included in this submittal:

Exhibit C – Study Work Maps C1 Beardsley Canal Wash Sheet 1 through 4 of 4

Exhibit C – Study Work Maps C2 Perryville Road Wash Sheet 1 through 4 of 4

Annotated FIRM's

MT-2 application forms for Beardsley Canal Wash and Perryville Road Wash

Michael Duncan - FCDX

From: Jon Wolf [JonWolf@mapmodteam.com]

Sent: Monday, July 21, 2008 7:43 AM

To: Michael Duncan - FCDX

Cc: jminch@woodpatel.com; Joseph Kuechenmeister; jon.wolf@mapmodteam.com

Subject: ADDITIONAL DATA Received – City of Glendale and Maricopa County, AZ (Case Number 07-09-1500R) – Response Required

Dear Mr. Duncan:

We have received your recent submittal of data, in response to our letter dated April 22, 2008, requesting information for the above-referenced Case Number (07-09-1500R). This case number is for a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a conditional revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for the City of Glendale and Maricopa County, AZ. This e-mail is being sent to officially acknowledge the receipt of your additional data for the above-referenced case number and replaces the paper copy acknowledgement letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

We are reviewing your submitted data and will contact you if additional information is required to process your request.

If additional information is not required, we will issue a final letter of determination within 90 days of receiving your submittal dated July 17, 2008.

If you have general questions about your request, FEMA policy, or the NFIP, 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, the case reviewer's contact information is listed below, or please contact the Revisions Coordinator for your State, Mounir Boudjemaa, M.S., at Mounir.Boudjemaa@mapmodteam.com or at (703) 317-6295.

Please be assured we will do our best to respond to all inquiries in a timely manner.

Thank you,

Jon Wolf, CFM
FEMA Map Mod Team
1030 Waterfall Lane
Durango, CO 81301
970.903.0558
jon.wolf@mapmodteam.com

Confidentiality Notice: This e-mail transmission may contain confidential or legally privileged information that is intended only for the individual or entity named in the e-mail address. If you are not the intended recipient, you are hereby notified that any disclosure, copying, distribution, or reliance upon the contents of this e-mail is strictly prohibited.

If you have received this e-mail transmission in error, please reply to the sender, so that we can arrange for proper delivery, and then please delete the message from your inbox. Thank you.

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

August 11, 2008

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

IN REPLY REFER TO:
Case No.: 07-09-1500R
Community: City of Glendale and
Maricopa County, AZ
Community Nos.: 040045 and 040037

316-AD

Dear Mr. Duncan:

This responds to your submittal dated July 17, 2008 concerning a June 25, 2007, request 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 and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	North Inlet Channel Improvements
Flooding Sources:	Beardsley Canal Wash and Perryville Road Wash
FIRM Panel(s) Affected:	04013C1580 H and 04013C1590 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 your case reviewer, Jon Wolf, CFM by e-mail at Jon.Wolf@mapmodteam.com or by telephone at (970) 903-0558, or the Revisions Coordinator for your State, 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

cc: Mr. Jeffery Minch, P.E.
Wood, Patel & Associates

NATIONAL FLOOD INSURANCE PROGRAM

FEMA NATIONAL SERVICE PROVIDER

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

Case No.: 07-09-1500R

Requester: Michael Duncan, P.E., CFM

Community: City of Glendale and
Maricopa County, AZ

Community Nos.: 040045 and 040037

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

1. The base floodplain and floodway topwidths shown in the proposed hydraulic analysis at numerous cross sections on Beardsley Canal Wash do not match the approximate base floodplain and floodway topwidths shown on the submitted workmap set entitled "Exhibit C-Study Work Maps, C1 Beardsley Canal Wash" prepared by Wood, Patel, dated July 2008. Please provide an explanation for these discrepancies, or make the appropriate changes.

2. The downstream reach lengths shown in the proposed hydraulic analysis at several cross sections on Beardsley Canal Wash do not match the approximate downstream reach lengths shown on the above-referenced topographic work map. Please make the appropriate changes, or explain why this is not necessary.

3. The downstream reach length shown in the proposed hydraulic analysis at cross section 20456.34 on the North Inlet Channel does not match the approximate downstream reach length shown on the above-referenced topographic work map. Please make the appropriate changes, or explain why this is not necessary.

4. The base floodplain and floodway topwidths shown in the proposed "with levee" and "without levee" hydraulic analysis at numerous cross sections on Perryville Road Wash do not match the approximate base floodplain and floodway topwidths shown on the submitted workmap set entitled "Exhibit C-Study Work Maps, C2 Perryville Road Wash" prepared by Wood, Patel, dated July 2008. Please provide an explanation for these discrepancies, or make the appropriate changes.

5. The downstream reach length shown in the proposed hydraulic analysis at cross section 28 on the Perryville Road Wash does not match the approximate downstream reach length shown on the above-referenced topographic work map. Please make the appropriate changes, or explain why this is not necessary.

Please send the required data directly to Michael Baker Jr., Inc., Attention: Jon Wolf, CFM, at 1030 Waterfall Lane, Durango, CO 81301. For identification purposes, please include the case number referenced above on all correspondence.

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

October 30, 2008

Jon Wolf
Michael Baker, Jr.
1030 Waterfall Lane
Durango, CO 81301

SUBJECT: FEMA Case No. 07-09-1500R
CLOMR for North Inlet Channel Improvements

Dear Jon:

In response to your letter of August 11, 2008, I have enclosed the following items:

* Revised maps: Exhibit C1 sheets 1 through 4 (Beardsley Canal Wash);
Exhibit C2 sheets 1 through 4 (Perryville Road Wash);

* Revised annotated FIRM's
* CD of revised files

* Expanded comparison spreadsheets, with comments and more columns, for Channel Distances and Top Widths, for Beardsley Canal Wash, Perryville Road Wash, and North Inlet Channel.

The major revisions involved moving cross sections on the maps, to match the modeling and the design plan sheets. Also, since some of the model cross sections have "dry islands", the map top widths are checked in the spreadsheets by using the distance between the Sta. W.S. Lft. and the Sta. W.S. Rgt. of the modeling.

If you have any questions, please call me at 602-506-4732, or email me at mwd@mail.maricopa.gov

Yours truly,

Michael Duncan

Michael Duncan, P.E., CFM
Project Manager

Enclosures

Copies to:

Mounir Boudjemaa, M.S.
Revisions Manager - Arizona
MOD Team
Michael Baker Jr. Inc.
3601 Eisenhower Avenue
Alexandria, Virginia 22304-6425

Jeffrey R. Minch, P.E.
Vice President - Water Resources
Wood, Patel & Associates, Inc.
2051 West Northern, Suite 100
Phoenix, Arizona 85021

Michael Duncan - FCDX

From: Michael Duncan - FCDX

Sent: Thursday, November 13, 2008 5:45 PM

To: 'Jon Wolf'

Subject: EMAIL 1 OF 2 NIC-CLOMR -- More items

Attachments: MT-2_Form-1s.pdf; Glendale_strip_annex_dimensions.pdf; Glendale_strip_annex_mapbook.pdf

Jon,
1) The four sheets of MT-2 Form 1's are attached. In the original report they were located between pages 10 and 15 of the text.

2) The Glendale City strip annexations in the area of the CLOMR are shown in the two attached exhibits. It looks like the east-west and the north-south strips are just 10 feet wide.

3) The notices of the related public meetings are at the front of Appendix A of the CLOMR report.

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
040037	Maricopa County	AZ	04013C	1580H	09/30/05
)37	Maricopa County	AZ	04013C	1590H	09/30/05

2. Flooding Source: Beardsley Canal Wash and Perryville Road Wash

3. Project Name/Identifier: North Inlet Channel Improvements

4. FEMA zone designations affected: AE, 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 FEMA Web site at http://www.fema.gov/mit/tsd/frm_fees.htm **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: Michael Duncan, P.E., CFM	Company: Flood Control District, Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, AZ, 85009	Daytime Telephone No.: (602) 506-4732	Fax No.: (602) 506-4601
	E-Mail Address: mwd@mail.maricopa.gov	
Signature of Requester (required): Michael Duncan		Date: 6-4-07

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 & General Manager		Telephone No.: (602) 506-1501
Community Name: Flood Control District of Maricopa County	Community Official's Signature (required): T—SP	Date: 6/5/07

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. 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: Jeffrey R. Minch, P.E.	License No.: 24999	Expiration Date: 09/30/09
Company Name: Wood, Patel & Associates, Inc.	Telephone No.: 602-335-8500	Fax No.: 602-335-8580
Signature: Jeffrey R. Minch		Date: 4-30-07

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

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	1590H	09/30/05

2. Flooding Source: Beardsley Canal Wash and Perryville Road Wash

3. Project Name/Identifier: North Inlet Channel Improvements

4. FEMA zone designations affected: AE (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 FEMA Web site at http://www.fema.gov/mit/tsd/frm_fees.htm **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: Michael Duncan, P.E., CFM	Company: Flood Control District, Maricopa County	
Mailing Address: 2801 West Durango Street Phoenix, AZ, 85009	Daytime Telephone No.: (602) 506-4732	Fax No.: (602) 506-4601
	E-Mail Address: mwd@mail.maricopa.gov	
Signature of Requester (required): Michael Duncan		Date: 6-4-07

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, P.E., City Engineer		Telephone No.: (623) 930-3630
.munity Name: City of Glendale	Community Official's Signature (required): Larry J Broyles	Date: 6-21-07

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. 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: Jeffrey R. Minch, P.E.	License No.: 24999	Expiration Date: 09/30/09
Company Name: Wood, Patel & Associates, Inc.	Telephone No.: 602-335-8500	Fax No.: 602-335-8580
Signature: Jeffrey R. Minch		Date: 4-30-07

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

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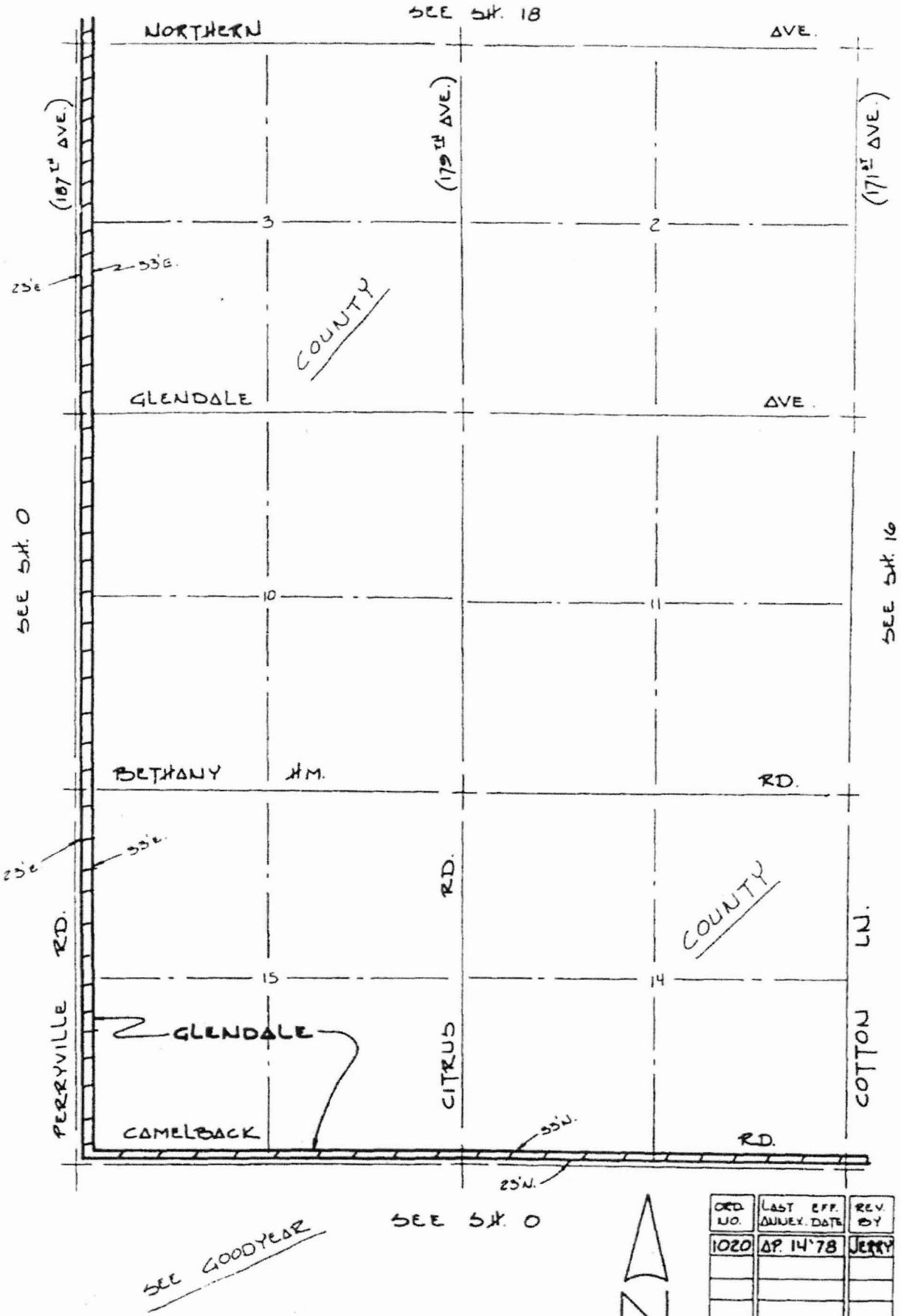
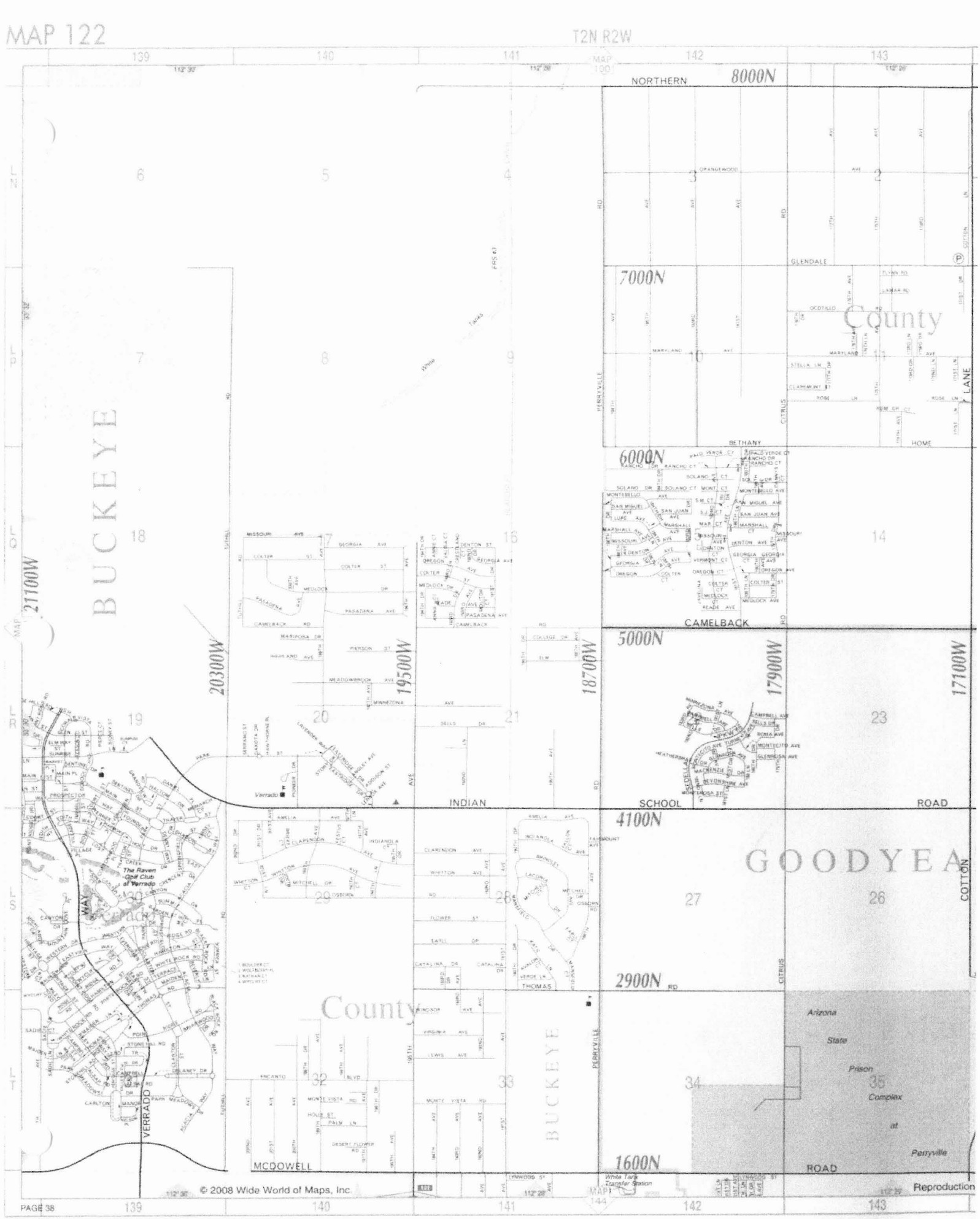
☒ Riverine Structures Form (Form 3)	Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam
☐ Coastal Analysis Form (Form 4)	New or revised coastal elevations
☐ Coastal Structures Form (Form 5)	Addition/revision of coastal structure
☐ Alluvial Fan Flooding Form (Form 6)	Flood control measures on alluvial fans



ORD. NO.	LAST EFF. ANNEX. DATE	REV. BY
1020	AP. 14 '78	JERRY

CITY OF GLENDALE T.2N.-R.2W.


MAP 122
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VERRADO
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at
Perryville
The Raven Golf Club at Verrado
White Tank Transfer Station
20300W
19500W
18700W
17900W
17100W
21100W
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PAGE 38

Michael Duncan - FCDX

From: Jon Wolf [JonWolf@mapmodteam.com]
Sent: Friday, November 14, 2008 9:10 AM
To: Michael Duncan - FCDX
Subject: RE: EMAIL 2 OF 2 -- NIC CLOMR -- More items

thanks for the rapid response mike. i think this covers everything. i will continue preparing the finalization docs. i am still planning on submitting to denver for approval by the COB today.

JON WOLF, CFM
HYDROLOGIST
MICHAEL BAKER JR. INC.
1030 WATERFALL LANE
DURANGO, COLORADO 81301
PHONE 970.375.9729
MOBILE 970.903.0558
JWOLF@MBAKERCORP.COM
JON.WOLF@MAPMODTEAM.COM

From: Michael Duncan - FCDX [mailto:mwd@mail.maricopa.gov]
Sent: Thursday, November 13, 2008 5:45 PM
To: Jon Wolf
Subject: EMAIL 2 OF 2 -- NIC CLOMR -- More items

4) The affected parcels, all of which are owned by the "Maricopa Water District", for short, are listed on the determination of no-insurable structures.

5) The Maricopa Water District is a partner in the design project. The were notified of the BFE changes in the Design Report and CLOMR Report. Two transmittal sheets to "MWD" of these reports is attached.

6) Background for the selected alternative is also attached.

Let me know if anything else comes up.

Mike Duncan
602-506-4732

Federal Emergency Management Agency

Washington, D.C. 20472

November 20, 2008

FLOOD CONTROL DISTRICT
RECEIVED
DEC - 1 '08

	CH & GM		FINANCE
	PIO		R.E.D.
	ADMIN		O & M
	FMS		P & PM
	ENG		FILE
	CONTRACTS		
ROUTING			

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 07-09-1500R

Mr. Andrew Kunasek
Chairman, Maricopa County
Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

Community: Maricopa County, AZ
Community No.: 040037

104

Dear Mr. Kunasek:

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) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas, in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated June 25, 2007, Mr. Michael Duncan, P.E., CFM, Project Manager, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that numerous proposed channel modifications, including channel improvements, channelization, flow diversion and channel creation; drainage structure improvements; and revised hydrologic and hydraulic analyses and updated topographic information would have on the flood hazard information shown on the effective FIRM and FIS report. The affected reaches will include: Beardsley Canal Wash from approximately 4,730 feet downstream of Northern Avenue to approximately 2,100 feet upstream of Olive Avenue; Perryville Road Wash from approximately 4,330 feet downstream of Perryville Road to just upstream of Northern Avenue; and the proposed Northern Inlet Channel (NIC) from just downstream of Northern Avenue to just upstream of Olive Avenue. The proposed drainage modifications along Beardsley Canal Wash will include diversion of a portion of the Beardsley Canal Wash flow at a location just downstream of Olive Avenue into the proposed NIC, a diversion channel located east of and parallel to Beardsley Canal Wash. The diversion will convey flow a distance of approximately 4,500 feet and then return it to the main Beardsley Canal Wash channel near Northern Avenue. Additional improvements along Beardsley Canal Wash will include in-channel excavation to clear aggraded material and updated drainage structures. The proposed project also will eliminate the existing overland flow that currently occurs between Beardsley Canal Wash and Perryville Road Wash in the vicinity of Northern Avenue during high-water events.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Jeffery Minch, P.E., Wood, Patel & Associates, Inc., and Mr. Duncan.

Because this revision request also affects the City of Glendale, a separate CLOMR for that community was issued on the same date as this CLOMR.

We reviewed the submitted data 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. The submitted existing conditions HEC-RAS hydraulic computer model for Beardsley Canal Wash and Perryville Road Wash, dated May 2007, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe

that, if the proposed project is constructed as shown in the submitted report, entitled "North Inlet Channel Improvements at White Tanks FRS #3, Conditional Letter of Map Revision Submittal, Technical Data Notebook," prepared for the Flood Control District of Maricopa County by Wood, Patel & Associates, Inc., dated April 2007 and revised January 2008, April 2008, July 2008, and November 2008, and the data listed below are received, a revision to the effective FIRM would be warranted.

Beardsley Canal Wash

Our review of existing conditions revealed that the Base (1-percent-annual-chance) Flood Elevations (BFEs) increased in some areas and decreased in other areas compared to the effective BFEs for Beardsley Canal Wash. The maximum increase in BFE, 4.6 feet, occurred just upstream of Northern Avenue. The maximum decrease in BFE, 4.7 feet, occurred just downstream of Olive Avenue.

The proposed conditions model incorporated the proposed project into the existing conditions model. As a result of the proposed project, the BFEs for Beardsley Canal Wash will increase in some areas and decrease in other areas compared to the existing conditions BFEs. The maximum increase in BFE, 5.5 feet, will occur approximately 1,710 feet upstream of Northern Avenue. The maximum decrease in BFE, 15.2 feet, will occur approximately 770 feet downstream of Northern Avenue.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the BFEs for Beardsley Canal Wash will increase in some areas and decrease in other areas compared to the effective BFEs. The maximum increase in BFE, 4.3 feet, will occur approximately 1,710 feet upstream of Northern Avenue. The maximum decrease in BFE, 14.3 feet, will occur approximately 1,270 feet downstream of Northern Avenue.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the width of the Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, will increase in some areas and decrease in other areas compared to the effective SFHA width along Beardsley Canal Wash. The maximum increase in SFHA width, approximately 180 feet, will occur approximately 2,370 feet downstream of Northern Avenue. The maximum decrease in SFHA width, approximately 540 feet, will occur approximately 1,570 feet downstream of Northern Avenue.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the width of the regulatory floodway will increase in some areas and decrease in other areas compared to the effective floodway width along Beardsley Canal Wash. The maximum increase in floodway width, approximately 270 feet, will occur approximately 370 feet downstream of Northern Avenue. The maximum decrease in floodway width, approximately 510 feet, will occur just upstream of Olive Avenue.

Perryville Road Wash

Our review of existing conditions revealed that the BFEs increased in some areas and decreased in other areas compared to the effective BFEs for Perryville Road Wash. The maximum increase in BFE, 1.7 feet, occurred approximately 2,720 feet upstream of Bethany Home Road. The maximum decrease in BFE, 2.6 feet, occurred approximately 3,720 feet upstream of Bethany Home Road.

The proposed conditions model incorporated the proposed project into the existing conditions model. As a result of the proposed project, the BFEs for Perryville Road Wash will increase in some areas and decrease in other areas compared to the existing conditions BFEs. The maximum increase in BFE, 1.8

feet, will occur just upstream of Camelback Road. The maximum decrease in BFE, 3.2 feet, will occur approximately 730 feet upstream of Glendale Avenue.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the BFEs for Perryville Road Wash will increase in some areas and decrease in other areas compared to the effective BFEs. The maximum increase in BFE, 1.6 feet, will occur just upstream of Camelback Road. The maximum decrease in BFE, 3.8 feet, will occur approximately 1,110 feet upstream of Glendale Avenue.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the width of the SFHA will increase in some areas and decrease in other areas compared to the effective SFHA width. The maximum increase in SFHA width, approximately 760 feet, will occur approximately 2,250 feet upstream of Bethany Home Road. The maximum decrease in SFHA width, approximately 330 feet, will occur approximately 750 feet upstream of Camelback Road. In addition, approximately the upper 1,685 feet of the effective Perryville Road Wash floodplain and two effective cross sections will be eliminated.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the width of the regulatory floodway will increase in some areas and decrease in other areas compared to the effective floodway width along Perryville Road Wash. The maximum increase in floodway width, approximately 290 feet, will occur approximately 2,250 feet upstream of Bethany Home Road. The maximum decrease in floodway width, approximately 450 feet, will occur approximately 1,110 feet upstream of Glendale Avenue.

Proposed Northern Inlet Channel

As a result of the new hydrologic and hydraulic analyses and proposed project, BFEs, an SFHA, and a regulatory floodway will be established along the proposed NIC from just downstream of Northern Avenue to just upstream of Olive Avenue. The BFEs, SFHA, and floodway will be contained in the proposed NIC.

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 and FIS report.

- With this request, your community has complied with all requirements of Paragraph 65.12(a) of the NFIP regulations. Compliance with Paragraph 65.12(b) also is necessary before FEMA can issue a Letter of Map Revision (LOMR) when a community proposes to permit encroachments into the effective regulatory floodway that will cause increases in BFE in excess of those permitted under Paragraph 60.3(d)(3). Please provide evidence that your community has, prior to approval of the proposed encroachment, adopted floodplain management ordinances that incorporate the increased BFEs and revised floodway boundary delineations to reflect post-project conditions, as stated in Paragraph 65.12(b).

- Detailed application and certification forms, which were used in processing this request, 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.)

- The detailed application and certification forms listed below may be required if as-built conditions differ from the preliminary plans. If required, please submit new forms (copies of

which are enclosed) or annotated copies of the previously submitted forms showing the revised information.

Form 2, entitled "Riverine Hydrology & Hydraulics Form"

Form 3, entitled "Riverine Structures Form"

Hydraulic analyses, for as-built conditions, of the base flood and the regulatory floodway, together with a topographic work map showing the revised floodplain and floodway boundaries, must be submitted with Form 2.

- Effective October 1, 2007, FEMA revised the fee schedule for reviewing and processing requests for conditional and final modifications to published flood information and maps. In accordance with this schedule, the current fee for this map revision request is $4,800 and must be received before we can begin processing the request. Please note, however, that the fee schedule is subject to change, and requesters are required to submit the fee in effect at the time of the submittal. Payment of this fee shall be made in the form of a check or money order, made payable in U.S. funds to the National Flood Insurance Program, or by credit card (Visa or MasterCard only). The payment, along with the revision application, must be forwarded to the following address:

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

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

- Community acknowledgment of the map revision request

- A copy of the public notice distributed by your community stating its intent to revise the regulatory floodway, or a statement by your community that it has notified all affected property owners and affected adjacent jurisdictions

- An annotated FIRM, at the scale of the effective FIRM, that shows the revised base floodplain boundary delineations shown on the submitted 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 affected by any increase in BFE and/or increase in width and/or shifting 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 documents that show both notification of and acceptance by the affected property owners, FEMA can issue a LOMR that is effective on the date of issuance.

  - If you submit notification of, but not acceptance by, the affected property owners, FEMA may issue a LOMR that will become effective 1 month after the date of issuance.

After receiving appropriate documentation to show that the project has been completed, FEMA will initiate a revision to the FIRM and FIS report. Because the BFEs would change as a result of the project, a 90-day appeal period would be initiated, during which community officials and interested persons may appeal the revised BFEs based on scientific or technical data.

The basis of this CLOMR is, in whole or in part, a channel-modification/culvert 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 and culvert 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 criteria 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,

Joshua A. Smith, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

For: William R. Blanton Jr., CFM, Chief
Engineering Management Branch
Mitigation Directorate

Enclosures

cc: The Honorable Elaine M. Scruggs
Mayor, City of Glendale

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County

Mr. Ted Collins, CFM
Principal Floodplain Administrator
Flood Control District of Maricopa County

Mr. Tim S. Phillips, P.E.
Chief Engineer and General Manager
Flood Control District of Maricopa County

Mr. Brian Cosson, CFM
NFIP Coordinator
Office of Dam Safety and Flood Mitigation
Arizona Department of Water Resources

Mr. Jeffery Minch, P.E.
Wood, Patel & Associates, Inc.

Federal Emergency Management Agency

Washington, D.C. 20472

November 20, 2008

FLOOD CONTROL DISTRICT
RECEIVED
DEC – 1 '03

	CH & GM		FINANCE
	PIO		R.E.D.
	ADMIN		O & M
	FMS		P & PM
	ENG		FILE
	CONTRACTS		
ROUTING			

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 07-09-1500R

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) and Flood Insurance Study (FIS) report for Maricopa County, Arizona and Incorporated Areas (the effective FIRM and FIS report for your community, in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated June 25, 2007, Mr. Michael Duncan, P.E., CFM, Project Manager, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that numerous proposed channel modifications, including channel improvements, channelization, flow diversion and channel creation; drainage structure improvements; and revised hydrologic and hydraulic analyses and updated topographic information would have on the flood hazard information shown on the effective FIRM and FIS report. The affected reaches will include: Beardsley Canal Wash from approximately 4,730 feet downstream of Northern Avenue to approximately 2,100 feet upstream of Olive Avenue; Perryville Road Wash from approximately 4,330 feet downstream of Perryville Road to just upstream of Northern Avenue; and the proposed Northern Inlet Channel (NIC) from just downstream of Northern Avenue to just upstream of Olive Avenue. The proposed drainage modifications along Beardsley Canal Wash will include diversion of a portion of the Beardsley Canal Wash flow at a location just downstream of Olive Avenue into the proposed NIC, a diversion channel located east of and parallel to Beardsley Canal Wash. The diversion will convey flow a distance of approximately 4,500 feet and then return it to the main Beardsley Canal Wash channel near Northern Avenue. Additional improvements along Beardsley Canal Wash will include in-channel excavation to clear aggraded material and updated drainage structures. The proposed project also will eliminate the existing overland flow that currently occurs between Beardsley Canal Wash and Perryville Road Wash in the vicinity of Northern Avenue during high-water events. Please note that the project elements along Beardsley Canal Wash and the proposed NIC will not affect your community.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Jeffery Minch, P.E., Wood, Patel & Associates, Inc., and Mr. Duncan.

Because this revision request also affects the unincorporated areas of Maricopa County, a separate CLOMR for that community was issued on the same date as this CLOMR.

We reviewed the submitted data 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. The submitted existing conditions HEC-RAS hydraulic computer model for Perryville Road Wash, dated May 2007, based on updated topographic information, was used as the base conditions model in our review of the proposed conditions model for this CLOMR request. We believe that, if the proposed project is constructed as shown in the submitted report, entitled "North Inlet Channel Improvements at White Tanks FRS #3, Conditional Letter of Map Revision Submittal, Technical Data Notebook," prepared for the Flood Control District of Maricopa County by Wood, Patel& Associates, Inc., dated April 2007, and revised January 2008, April 2008, July 2008, and November 2008, and the data listed below are received, a revision to the effective FIRM would be warranted.

Our review of existing conditions revealed that the Base (1-percent-annual-chance) Flood Elevations (BFEs) increased in some areas and decreased in other areas compared to the effective BFEs for Perryville Road Wash. The maximum increase in BFE, 1.7 feet, occurred approximately 2,720 feet upstream of Bethany Home Road. The maximum decrease in BFE, 2.6 feet, occurred approximately 3,720 feet upstream of Bethany Home Road.

The proposed conditions model incorporated the proposed project into the existing conditions model. As a result of the proposed project, the BFEs for Perryville Road Wash will increase in some areas and decrease in other areas compared to the existing conditions BFEs. The maximum increase in BFE, 1.8 feet, will occur just upstream of Camelback Road. The maximum decrease in BFE, 3.2 feet, will occur approximately 730 feet upstream of Glendale Avenue.

As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the BFEs for Perryville Road Wash will increase in some areas and decrease in other areas compared to the effective BFEs. The maximum increase in BFE, 1.6 feet, will occur just upstream of Camelback Road. The maximum decrease in BFE, 3.8 feet, will occur approximately 1,110 feet upstream of Glendale Avenue.

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As a result of the updated hydrologic and hydraulic analyses, new topographic information, and proposed project, the width of the regulatory floodway will increase in some areas and decrease in other areas compared to the effective floodway width along Perryville Road Wash. The maximum increase in floodway width, approximately 290 feet, will occur approximately 2,250 feet upstream of Bethany Home Road. The maximum decrease in floodway width, approximately 450 feet, will occur approximately 1,110 feet upstream of Glendale 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 and FIS report.

- With this request, your community has complied with all requirements of Paragraph 65.12(a) of the NFIP regulations. Compliance with Paragraph 65.12(b) also is necessary before FEMA can issue a Letter of Map Revision (LOMR) when a community proposes to permit encroachments into the effective regulatory floodway that will cause increases in BFE in excess of those permitted under Paragraph 60.3(d)(3). Please provide evidence that your community has, prior to approval of the proposed encroachment, adopted floodplain management ordinances that incorporate the increased BFEs and revised floodway boundary delineations to reflect post-project conditions, as stated in Paragraph 65.12(b).

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  Alexandria, VA 22304-6425

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- Community acknowledgment of the map revision request

- A copy of the public notice distributed by your community stating its intent to revise the regulatory floodway, or a statement by your community that it has notified all affected property owners and affected adjacent jurisdictions

- An annotated FIRM, at the scale of the effective FIRM, that shows the revised base floodplain boundary delineations shown on the submitted 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

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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,

Joshua A. Smith

Joshua A. Smith, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate

For: William R. Blanton Jr., CFM, Chief
Engineering Management Branch
Mitigation Directorate

Enclosures

cc: Mr. Andrew Kunasek
Chairman, Maricopa County
Board of Supervisors

Mr. Michael Duncan, P.E., CFM
Project Manager
Flood Control District of Maricopa County

Mr. Ted Collins, CFM
Principal Floodplain Administrator
Flood Control District of Maricopa County

Mr. Tim S. Phillips, P.E.
Chief Engineer and General Manager
Flood Control District of Maricopa County

Mr. Tim Murphy, P.E., CFM
Floodplain Delineation Branch Manager
Flood Control District of Maricopa County

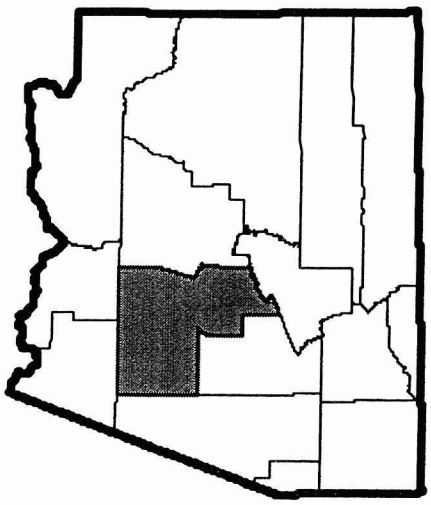
Mr. Brian Cosson, CFM
NFIP Coordinator
Office of Dam Safety and Flood Mitigation
Arizona Department of Water Resources

Mr. Jeffery Minch, P.E.
Wood, Patel & Associates, Inc.

FIS Data

FLOOD INSURANCE STUDY

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS
VOLUME 1 OF 17



COMMUNITY NAME	COMMUNITY NUMBER
AVONDALE, CITY OF	040038
BUCKEYE, TOWN OF	040039
CAREFREE, TOWN OF	040126
CAVE CREEK, TOWN OF	040129
CHANDLER, CITY OF	040040
EL MIRAGE, CITY OF	040041
FOUNTAIN HILLS, TOWN OF	040135
GILA BEND, TOWN OF	040043
GILBERT, TOWN OF	040044
GLENDALE, CITY OF	040045
GOODYEAR, CITY OF	040046
GUADALUPE, TOWN OF	040111
LITCHFIELD PARK, CITY O	040128
MARICOPA COUNTY (UNINCORPORATED AREAS)	040037
MESA, CITY OF	040048
PARADISE VALLEY, TOWN OF	040049
PEORIA, CITY OF	040050
PHOENIX, CITY OF	040051
QUEEN CREEK, TOWN OF	040132
SCOTTSDALE, CITY O	045012
SURPRISE, CITY OF	040053
TEMPE, CITY OF	040054
TOLLESON, CITY OF	040055
WICKENBURG, TOWN OF	040056
YOUNGTOWN, TOWN OF	040057

REVISED

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
04013CV001A

Table 3. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Star Wash Tributary C					
Upstream of confluence with Star Wash	--[1]	--[1]	--[1]	2,600	--[1]
Star Wash Tributary D					
Upstream of confluence with Star Wash	--[1]	--[1]	--[1]	3,300	--[1]
Upstream of confluence with Star Wash Tributary E	--[1]	--[1]	--[1]	2,000	--[1]
Star Wash Tributary E					
Upstream of confluence with Star Wash	--[1]	--[1]	--[1]	3,000	--[1]
Beardsley Canal Wash					
Downstream of Northern Avenue	10.87	--[1]	--[1]	3,655	--[1]
Upstream of Northern Avenue	10.87	--[1]	--[1]	5,141	--[1]
At the confluence with Cholla Wash	6.01	--[1]	--[1]	3,816	--[1]
Downstream of Olive Avenue	4.86	--[1]	--[1]	1,755	--[1]
Upstream of Olive Avenue	4.86	--[1]	--[1]	2,245	--[1]
At Peoria Avenue	0.29	--[1]	--[1]	296	--[1]
Cholla Wash					
At the confluence with Beardsley Canal Wash	6.01	--[1]	--[1]	3,816	--[1]
At the confluence with Cholla Wash North Fork	3.99	--[1]	--[1]	3,227	--[1]
Upstream of the confluence with Cholla Wash North Fork	3.18	--[1]	--[1]	2,527	--[1]

--[1] Not Computed

Table 3. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
White Granite Wash					
At the retention basin on Caterpillar Proving Grounds	3.46	--[1]	--[1]	1,933	--[1]
At 0.8 miles upstream of the confluence with White Granite Wash North Fork (interpolated discharge from White Tanks/Agua Fria ADMS HEC-1 run)	0.39	--[1]	--[1]	344	--[1]
White Granite Wash North Fork					
At 0.1 miles upstream of the confluence with White Granite Wash	1.60	--[1]	--[1]	1,353	--[1]
191st Avenue Wash (Peak discharges have been derived by performing a HEC-2 split flow analysis along 191st Avenue Wash)					
200 feet north of Interstate 10	--[1]	--[1]	--[1]	617	--[1]
At Indian School Road	--[1]	--[1]	--[1]	147	--[1]
At Camelback Road	--[1]	--[1]	--[1]	564	--[1]
Perryville Road Wash					
At Camelback Road	13.17	--[1]	--[1]	470	--[1]
At the intersection of Camelback Road and Perryville Road	13.04	--[1]	--[1]	1,190	--[1]
At Glendale Avenue	11.58	--[1]	--[1]	1,450	--[1]
Bullard Wash					
At Lower Buckeye Road	91.66	--[1]	--[1]	4,906	--[1]
At Yuma Road	89.93	--[1]	--[1]	4,438	--[1]
Downstream of Interstate 10	88.27	--[1]	--[1]	4,446	--[1]
Upstream of Interstate 10	88.27	--[1]	--[1]	5,319	--[1]

--[1] Not Computed

FLOOD INSURANCE STUDY

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS
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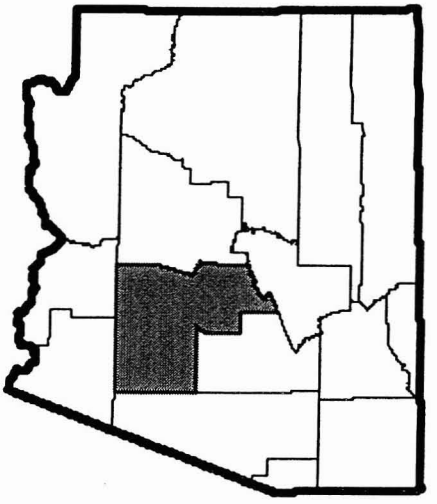

COMMUNITY NAME	COMMUNITY NUMBER
AVONDALE, CITY OF	040038
BUCKEYE, TOWN OF	040039
CAREFREE, TOWN OF	040126
CAVE CREEK, TOWN OF	040129
CHANDLER, CITY OF	040040
EL MIRAGE, CITY OF	040041
FOUNTAIN HILLS, TOWN OF	040135
GILA BEND, TOWN OF	040043
GILBERT, TOWN OF	040044
GLENDALE, CITY OF	040045
GOODYEAR, CITY OF	040046
GUADALUPE, TOWN OF	040111
LITCHFIELD PARK, CITY OF	040128
MARICOPA COUNTY (UNINCORPORATED AREAS)	040037
MESA, CITY OF	040048
PARADISE VALLEY, TOWN OF	040049
PEORIA, CITY OF	040050
PHOENIX, CITY OF	040051
QUEEN CREEK, TOWN OF	040132
SCOTTSDALE, CITY OF	045012
SURPRISE, CITY OF	040053
TEMPE, CITY OF	040054
TOLLESON, CITY OF	040055
WICKENBURG, TOWN OF	040056
YOUNGTOWN, TOWN OF	040057

REVISED

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
04013CV002A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Beardsley Canal Wash								
A	0.231	158	457	9.7	1,200.0	1,200.0	1,200.3	0.3
B	0.465	118	424	9.7	1,211.4	1,211.4	1,211.4	0.0
C	0.696	92	371	11.1	1,217.2	1,217.2	1,217.2	0.0
D	1.074	75	353	10.4	1,229.0	1,229.0	1,229.0	0.0
E	1.466	173	533	9.6	1,245.5	1,245.5	1,245.7	0.2
F	1.844	75	212	9.7	1,259.4	1,259.4	1,259.4	0.0
G	2.186	608	1,952	1.2	1,278.1	1,278.1	1,278.1	0.0
H	2.553	108	224	4.4	1,285.7	1,285.7	1,286.2	0.5
I	2.907	64	97	7.3	1,294.6	1,294.6	1,294.6	0.0
J	3.301	54	69	4.3	1,308.6	1,308.6	1,308.6	0.0
K	3.678	37	69	2.1	1,321.7	1,321.7	1,321.7	0.0

[1]Miles Above White Tanks Structure #3

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

BEARDSLEY CANAL WASH

FLOOD INSURANCE STUDY

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS
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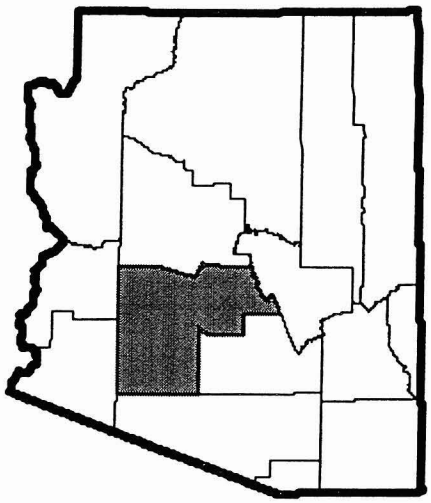

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LITCHFIELD PARK, CITY O	040128
MARICOPA COUNTY (UNINCORPORATED AREAS)	040037
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QUEEN CREEK, TOWN OF	040132
SCOTTSDALE, CITY O	045012
SURPRISE, CITY OF	040053
TEMPE, CITY OF	040054
TOLLESON, CITY OF	040055
WICKENBURG, TOWN OF	040056
YOUNGTOWN, TOWN OF	040057

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Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
04013CV003A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Perryville Road Wash								
A	0.000	384	155	3.0	1,121.3	1,121.3	1,121.3	0.0
B	0.422	317	397	3.1	1,129.9	1,129.9	1,130.0	0.1
C	0.830	123	227	5.3	1,142.1	1,142.1	1,142.1	0.0
D	1.225	327	601	2.5	1,150.2	1,150.2	1,150.2	0.0
E	1.640	257	295	4.9	1,157.8	1,157.8	1,157.8	0.0
F	2.018	122	372	4.0	1,169.1	1,169.1	1,169.1	0.0
G	2.381	122	251	5.9	1,178.4	1,178.4	1,178.7	0.3
H	2.785	350	375	3.9	1,193.5	1,193.5	1,193.5	0.0
I	3.197	320	545	2.7	1,207.2	1,207.2	1,207.8	0.6
J	3.461	456	389	3.7	1,217.8	1,217.8	1,217.8	0.0
K	3.727	179	306	4.9	1,229.3	1,229.3	1,229.3	0.0

[1]Miles Above Limit of Detailed Study

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PERRYVILLE ROAD WASH

FLOOD INSURANCE STUDY

MARICOPA COUNTY, ARIZONA
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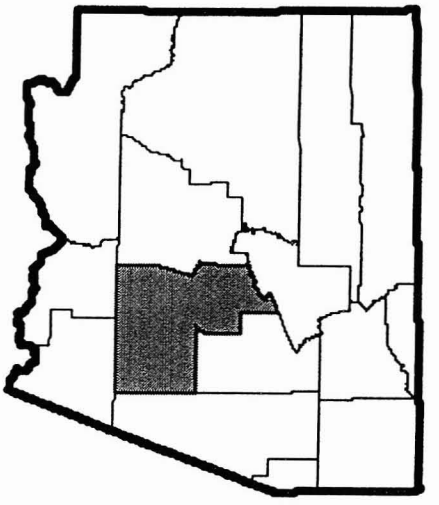
VOLUME 12 OF 17



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WICKENBURG, TOWN OF	040056
YOUNGTOWN, TOWN OF	040057

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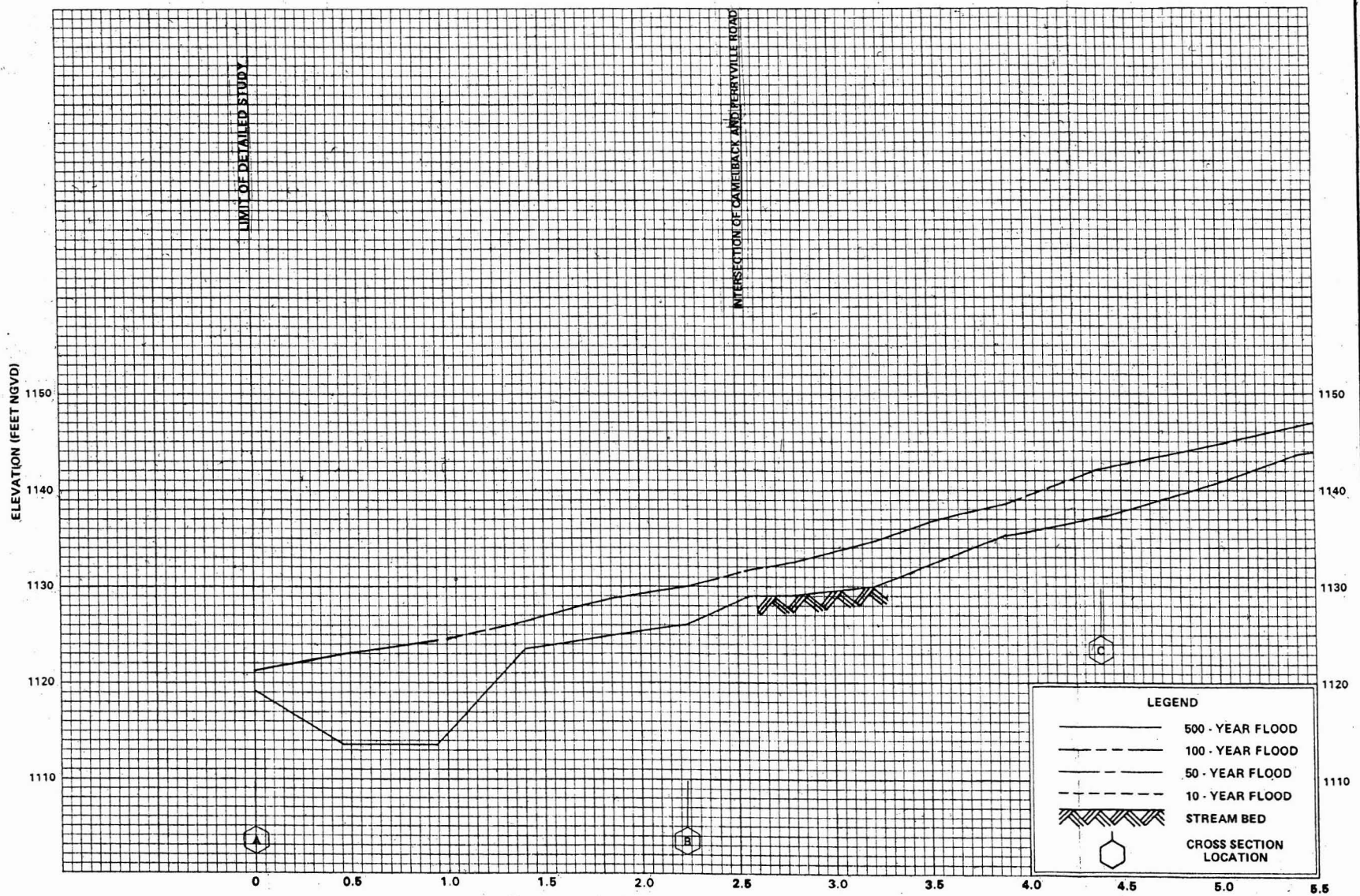
Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
04013CV012A



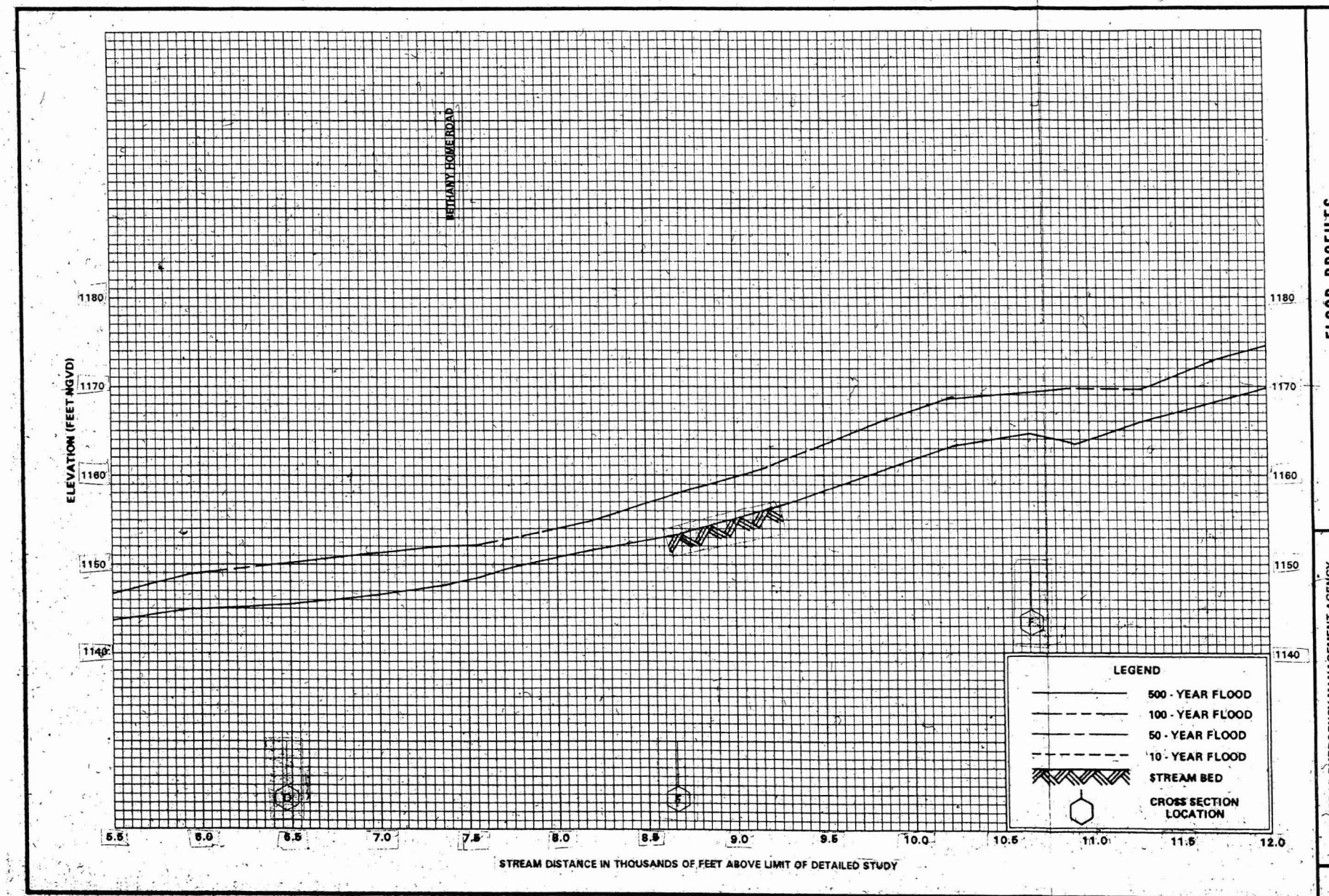
FLOOD PROFILES

PERRYVILLE ROAD WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

735P



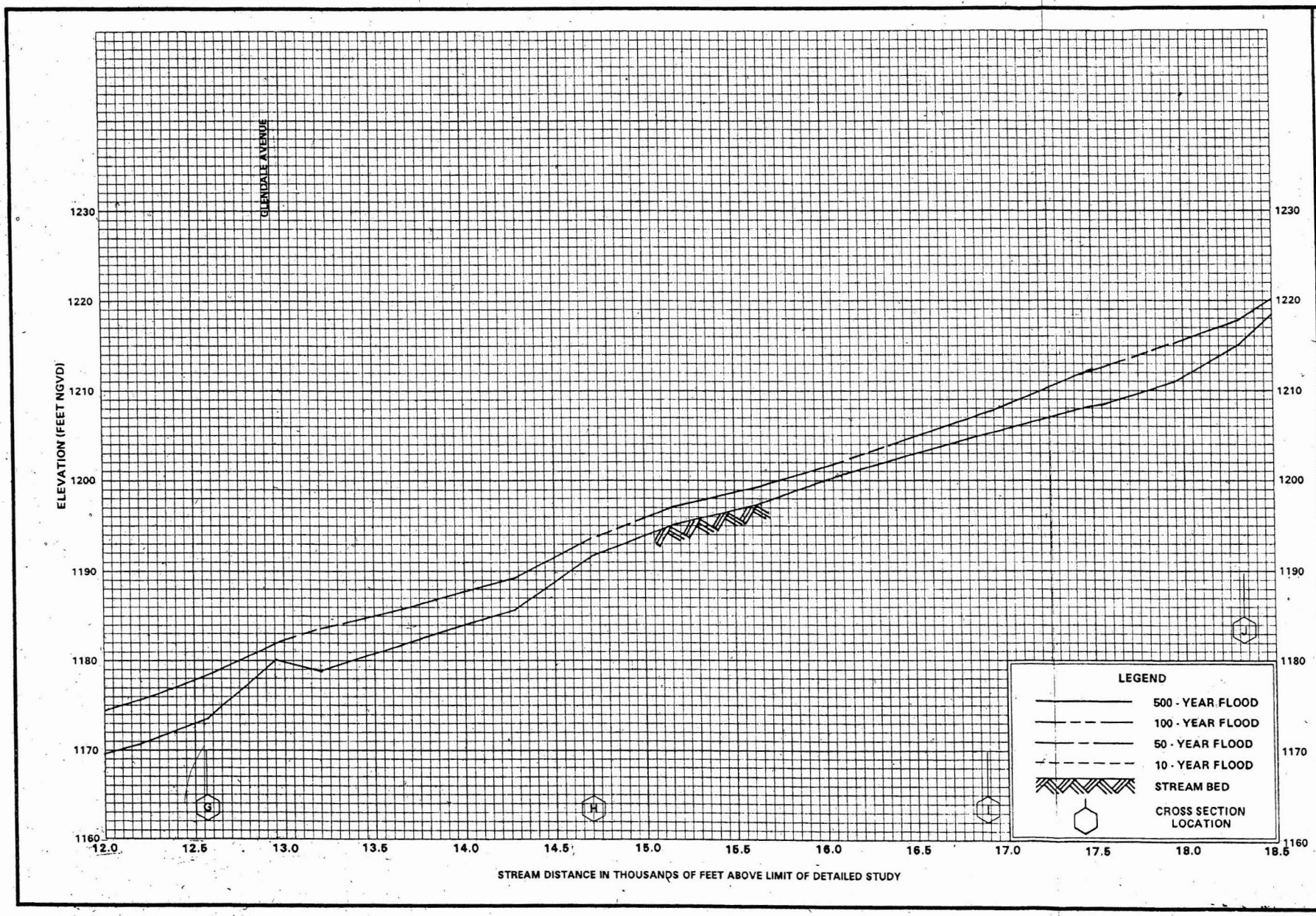
FLOOD PROFILES

PERRYVILLE ROAD WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

736P



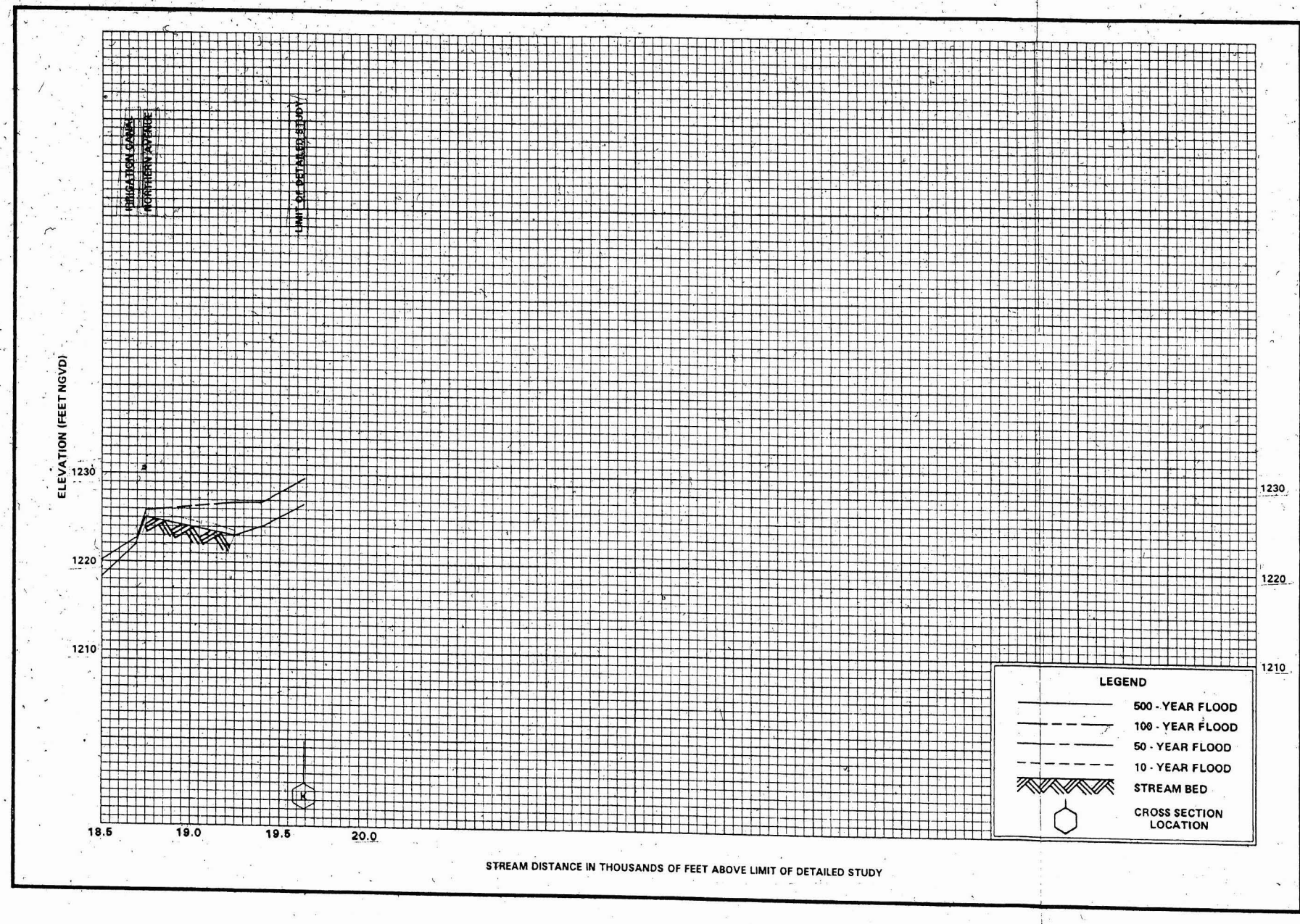
FLOOD PROFILES

PERRYVILLE ROAD WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

737P



FLOOD PROFILES

PERRYVILLE ROAD WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

738P

08-04-08

= WASH 1B

From: Michael Duncan - FCDX Sent: Mon 08/04/2008 9:43 AM
To: 'Jon Wolf'
Cc:
Subject: EMAIL 2 OF 2 -- Waterfall Wash
Attachments: White_Tanks_byWLB_sht13of64.pdf (6 MB)

and here is the work map in pdf

Let me know if any else comes up.

Mike Duncan
Project Manager
602-506-4732

WATERFALL WASH

From: Michael Duncan - FCDX Sent: Mon 08/04/2008 9:41 AM
To: 'Jon Wolf'
Cc:
Subject: EMAIL 1 OF 2 -- Waterfall Wash items
Attachments: Waterfall_Wash_fromFIS.pdf (2 MB); 1B.dat.H2I (24 KB)

Table 3. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Cholla Wash North Fork					
Upstream of the confluence with Cholla Wash	0.81	--[1]	--[1]	704	--[1]
Waterfall Wash					
At the confluence with Beardsley Canal Wash	4.86	--[1]	--[1]	2,245	--[1]
White Tanks No. 3 Wash					
At White Tanks Structure #3	2.86	--[1]	--[1]	1,743	--[1]
Bedrock Wash					
At White Tanks Structure #3	4.93	--[1]	--[1]	1,738	--[1]
At the confluence with Bedrock Wash North Fork	3.86	--[1]	--[1]	1,920	--[1]
Bedrock Wash North Fork					
At 0.15 miles upstream of the confluence with Bedrock Wash	2.1	--[1]	--[1]	1,560	--[1]
Jackrabbit Trail Wash					
At Thomas Road	2.07	--[1]	--[1]	1,105	--[1]
At Indian School Road	1.36	--[1]	--[1]	726	--[1]
At Camelback Road	0.43	--[1]	--[1]	221	--[1]
At Medlock Drive	0.22	--[1]	--[1]	187	--[1]
Tuthill Dike Wash					
Downstream of Interstate 10	13.90	--[1]	--[1]	4,061	--[1]
Upstream of Interstate 10	13.90	--[1]	--[1]	5,503	--[1]

--[1] Not Computed

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Waterfall Wash								
A	0.206	675	890	2.5	1,282.7	1,282.7	1,283.4	0.7
B	0.434	301	477	4.7	1,295.0	1,295.0	1,295.3	0.3
C	0.585	275	457	4.9	1,303.0	1,303.0	1,303.8	0.8
D	0.873	343	433	5.3	1,321.2	1,321.2	1,321.2	0.0
E	1.352	297	319	7.2	1,358.7	1,358.7	1,358.7	0.0
F	1.706	88	241	9.5	1,388.7	1,388.7	1,388.8	0.1
G	2.083	57	214	10.7	1,422.3	1,422.3	1,422.3	0.0
H	2.551	74	202	9.0	1,468.9	1,468.9	1,468.9	0.0
I	3.030	95	216	8.4	1,525.0	1,525.0	1,525.0	0.0
J	3.555	61	183	9.9	1,646.1	1,646.1	1,646.1	0.0

[1]Miles Above Confluence With Beardsley Canal Wash

FLOOD PROFILES

WATERFALL WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ AND INCORPORATED AREAS

823P

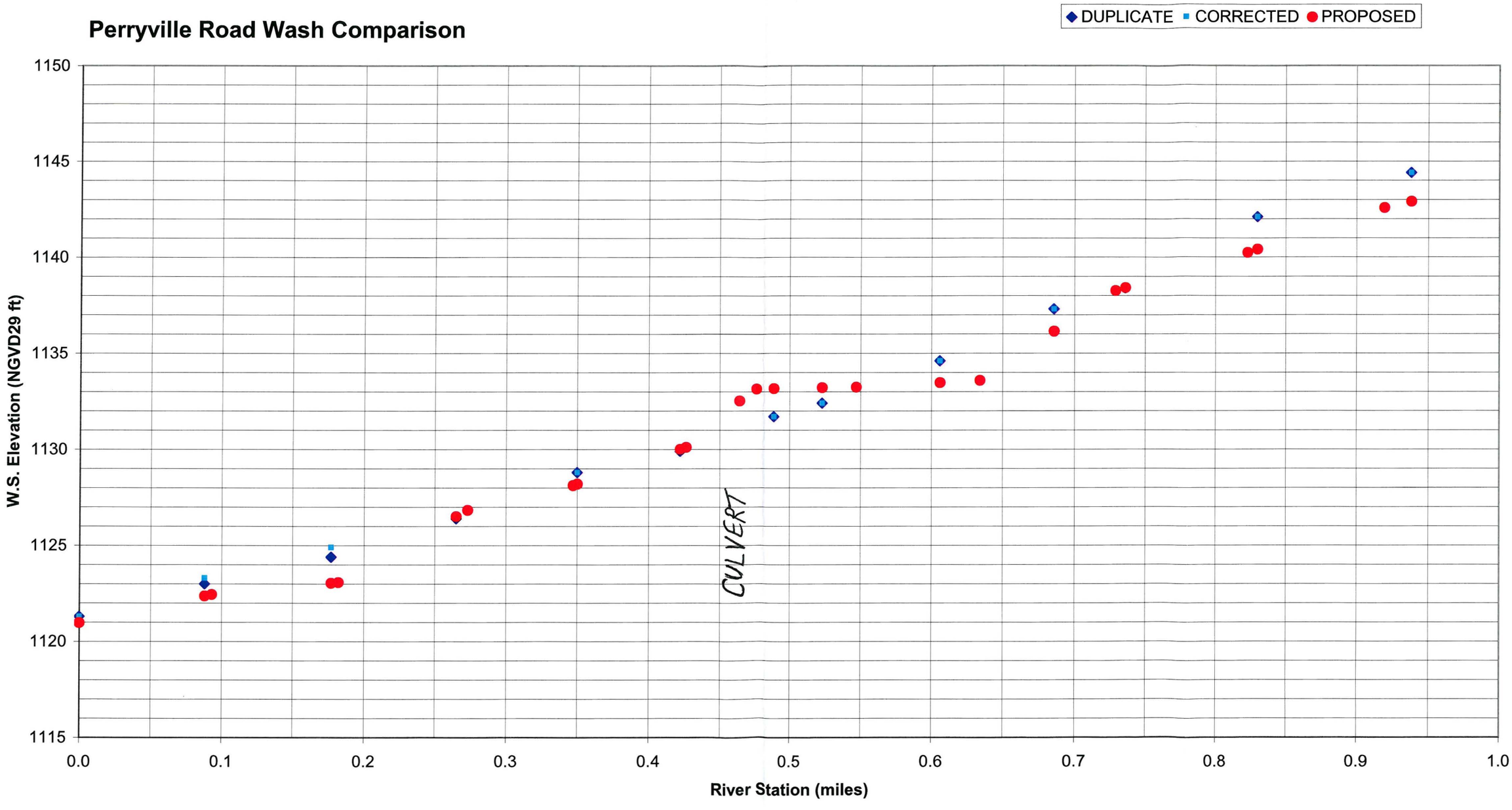
JULY 17, 2008

PERRYVILLE ROAD WASH -- COMPARISON OF FLOODPLAIN ELEVATIONS OF DUPLICATE EFFECTIVE, CORRECTED EFFECTIVE, & PROPOSED MODELS Case #07-09-1500R

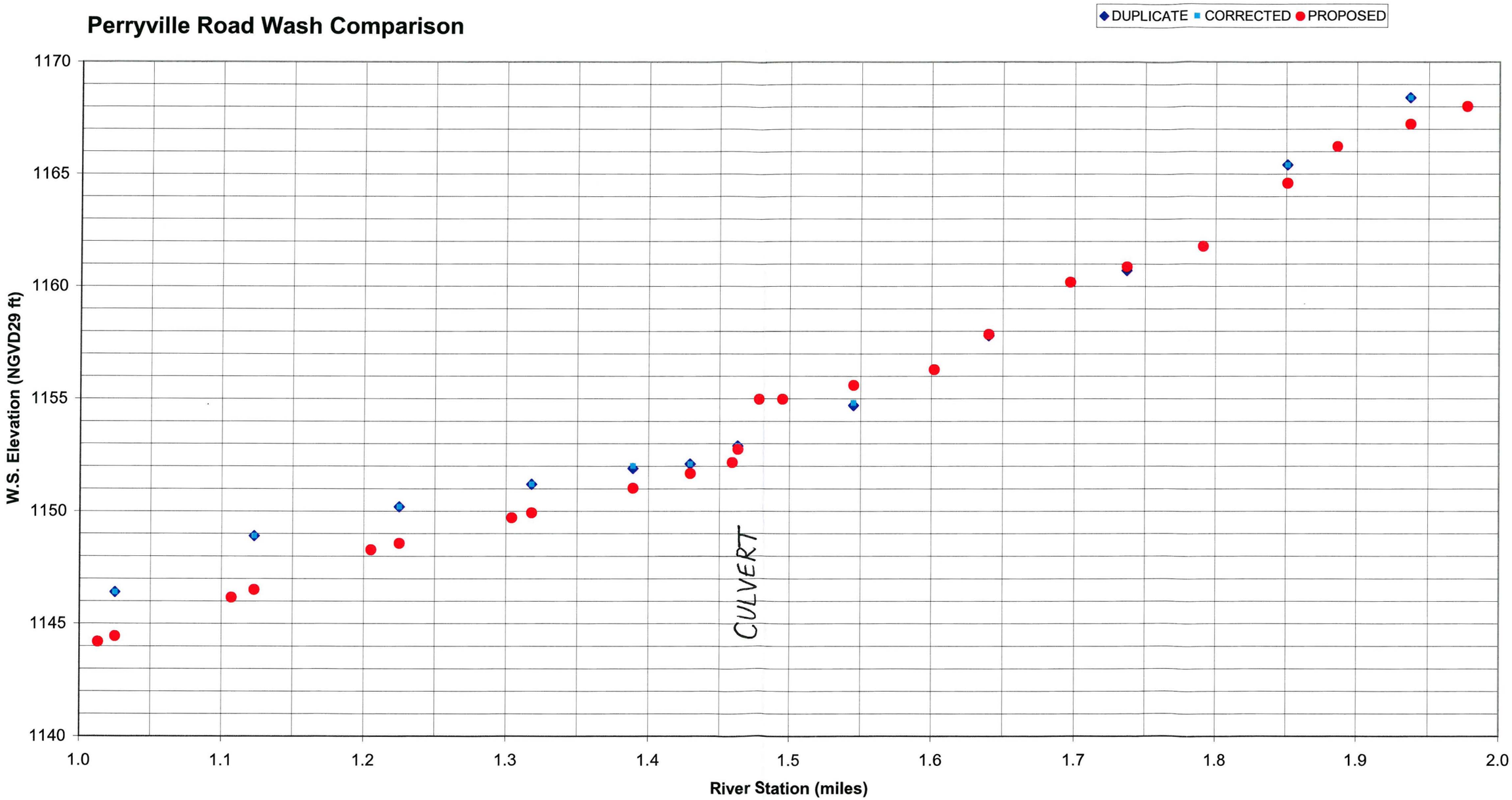
Cross Section ID	Camelback Road Wash combined with Perryville Rd. Wash Stationing (mile)	Perryville Road Wash Stationing (mile)	Duplicate Effective FP WS Elevation in NGVD29 (ft)	Corrected Effective FP WS Elevation in NGVD29 (ft)	Proposed FP WS Elevation in NGVD29 (ft) inc. interpolation	Change from Duplicate (ft)	Change from Corrected (ft)
		STA	DUPLICATE	CORRECTED	PROPOSED		
		3.727	1229.30	1229.30	no floodplain		
		3.681	1226.60	1226.60	no floodplain		
		3.653	1226.60	1226.60	no floodplain		
		3.558	1225.60	1225.60	no floodplain		
		3.549	1222.60	1222.60	no floodplain		
		3.461	1217.80	1217.80	no floodplain		
		3.400	1215.20	1215.30	no floodplain		
		STA	DUPLICATE	CORRECTED	PROPOSED		
34	7.608	3.392	1214.93 *	1215.02 *	1212.75	-2.18	-2.27
		3.326	1212.70	1212.70	1211.65	-1.05	-1.05
33	7.513	3.297			1211.16		
		3.262	1210.00	1210.00	1209.62	-0.38	-0.38
32	7.413	3.197	1207.20	1207.20	1206.76	-0.44	-0.44
		3.116	1204.40	1204.50	1203.98	-0.42	-0.52
31	7.325	3.109			1203.74		
		3.045	1201.90	1202.00	1201.00	-0.90	-1.00
30	7.228	3.012			1199.59		
		STA	DUPLICATE	CORRECTED	PROPOSED		
		2.955	1199.20	1199.20	1197.80	-1.40	-1.40
29	7.145	2.929			1196.99		
		2.874	1197.20	1197.20	1195.12	-2.08	-2.08
28	7.059	2.843			1194.06		
		2.785	1193.50	1193.60	1191.46	-2.04	-2.14
27	6.974	2.758			1190.25		
		2.704	1189.30	1189.30	1187.19	-2.11	-2.11
26	6.893	2.677			1185.66		
		2.626	1186.90	1187.00	1183.94	-2.96	-3.06
25	6.820	2.604			1183.20		
		2.576	1185.10	1185.20	1182.47	-2.63	-2.73
24	6.763	2.547			1181.71		
		2.501	1183.60	1183.60	1180.69	-2.91	-2.91
23	6.697	2.481			1180.25		
		2.453	1181.90	1181.90	1179.89	-2.01	-2.01
22	6.663	2.447			1179.81		
		2.381	1178.40	1178.40	1177.58	-0.82	-0.82
21	6.569	2.353			1176.63		
		2.303	1175.50	1175.50	1175.07	-0.43	-0.43
20	6.473	2.257			1173.63		
		2.216	1172.80	1172.90	1172.54	-0.26	-0.36
19	6.382	2.166			1171.20		
		2.136	1169.50	1169.50	1170.64	1.14	1.14
		2.066	1169.60	1169.60	1169.32	-0.28	-0.28
18	6.277	2.061			1169.23		
		2.018	1169.10	1169.10	1168.61	-0.49	-0.49
		STA	DUPLICATE	CORRECTED	PROPOSED		
17	6.193	1.977			1168.02		
		1.937	1168.40	1168.40	1167.23	-1.17	-1.17
16	6.102	1.886			1166.23		
		1.851	1165.40	1165.40	1164.59	-0.81	-0.81
15	6.007	1.791			1161.78		
		1.737	1160.70	1160.80	1160.87	0.17	0.07
14	5.913	1.697			1160.19		
		1.640	1157.80	1157.90	1157.86	0.06	-0.04
13	5.818	1.602			1156.30		
		1.545	1154.70	1154.80	1155.60	0.90	0.80
12.4	5.711	1.495			1154.98		
12.2	5.694	1.478			1154.98		
		1.463	1152.90	1152.90	1152.75	-0.15	-0.15
11.8	5.675	1.459			1152.16		
		1.429	1152.10	1152.10	1151.68	-0.42	-0.42
11	5.605	1.389	1151.90	1152.00	1151.03	-0.87	-0.97
		1.318	1151.20	1151.20	1149.93	-1.27	-1.27
10	5.520	1.304			1149.71		
		1.225	1150.20	1150.20	1148.57	-1.63	-1.63
9	5.421	1.205			1148.28		
		1.123	1148.90	1148.90	1146.51	-2.39	-2.39
8	5.323	1.107			1146.17		
		1.025	1146.40	1146.40	1144.45	-1.95	-1.95
7	5.229	1.013			1144.20		
		STA	DUPLICATE	CORRECTED	PROPOSED		
		0.938	1144.40	1144.40	1142.91	-1.49	-1.49
6	5.135	0.919			1142.58		
		0.830	1142.10	1142.10	1140.41	-1.69	-1.69
5	5.039	0.823			1140.24		
		0.736	1138.40	1138.40	1138.41	0.01	0.01
4	4.945	0.729			1138.26		
		0.686	1137.30	1137.30	1136.14	-1.16	-1.16
3	4.850	0.634			1133.58		
		0.606	1134.60	1134.60	1133.47	-1.13	-1.13
2	4.763	0.547			1133.24		
		0.523	1132.40	1132.40	1133.21	0.81	0.81
		0.489	1131.70	1131.70	1133.16	1.46	1.46
1	4.692	0.476			1133.14		
0.7	4.680	0.464			1132.52		
0.6	4.642	0.426			1130.11		
		0.422	1129.90	1130.00	1130.01	0.11	0.01
		0.350	1128.80	1128.80	1128.20	-0.60	-0.60
0.5	4.563	0.347			1128.12		
0.4	4.489	0.273			1126.84		
		0.265	1126.40	1126.60	1126.51	0.11	-0.09
0.3	4.398	0.182			1123.08		
		0.177	1124.40	1124.90	1123.04	-1.36	-1.86
0.2	4.309	0.093			1122.45		
		0.088	1123.00	1123.30	1122.37	-0.63	-0.93
0.1	4.216	0.000	1121.30	1121.30	1120.97	-0.33	-0.33

* INTERPOLATED ELEVATIONS

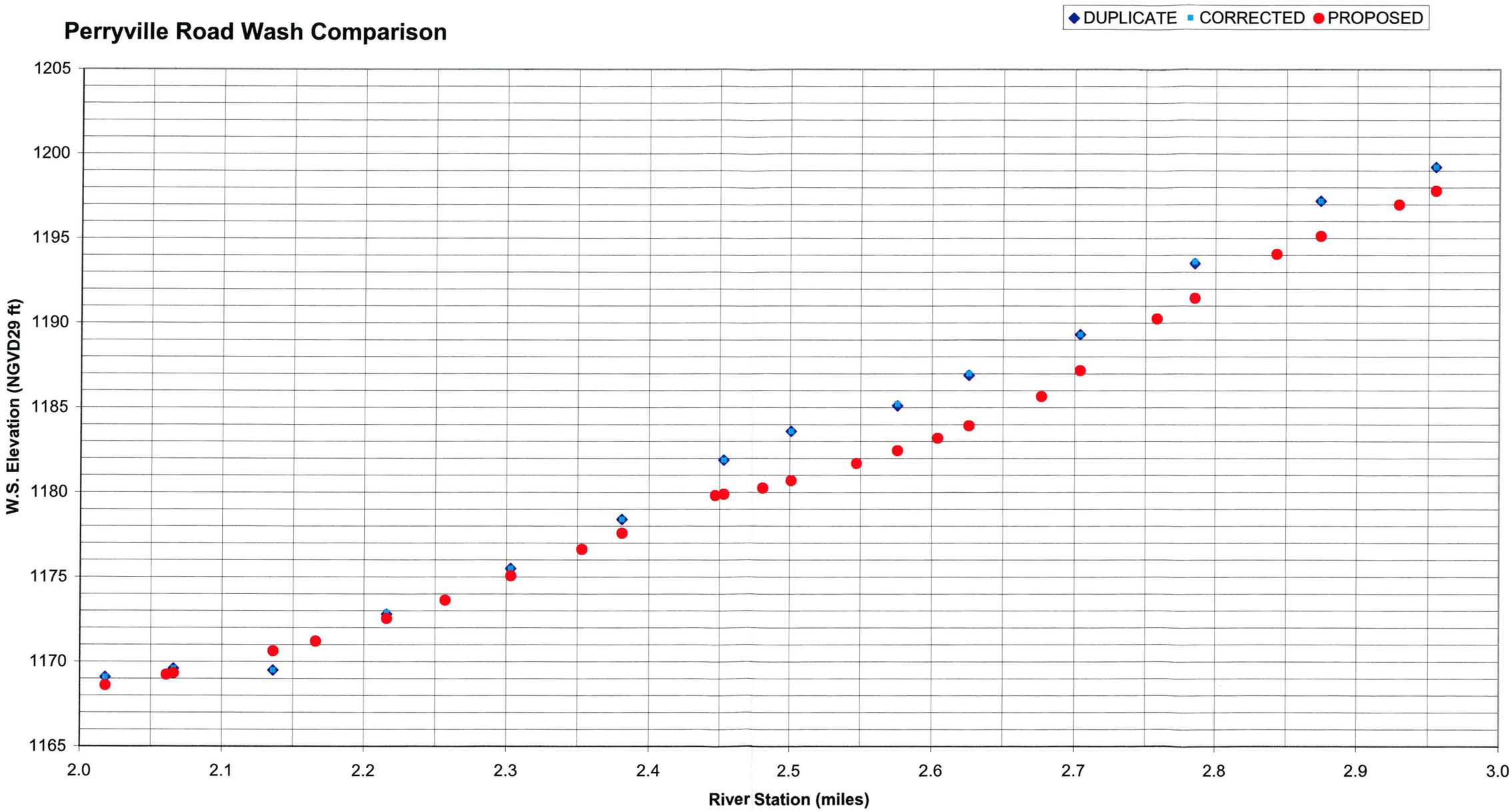
Perryville Road Wash Comparison



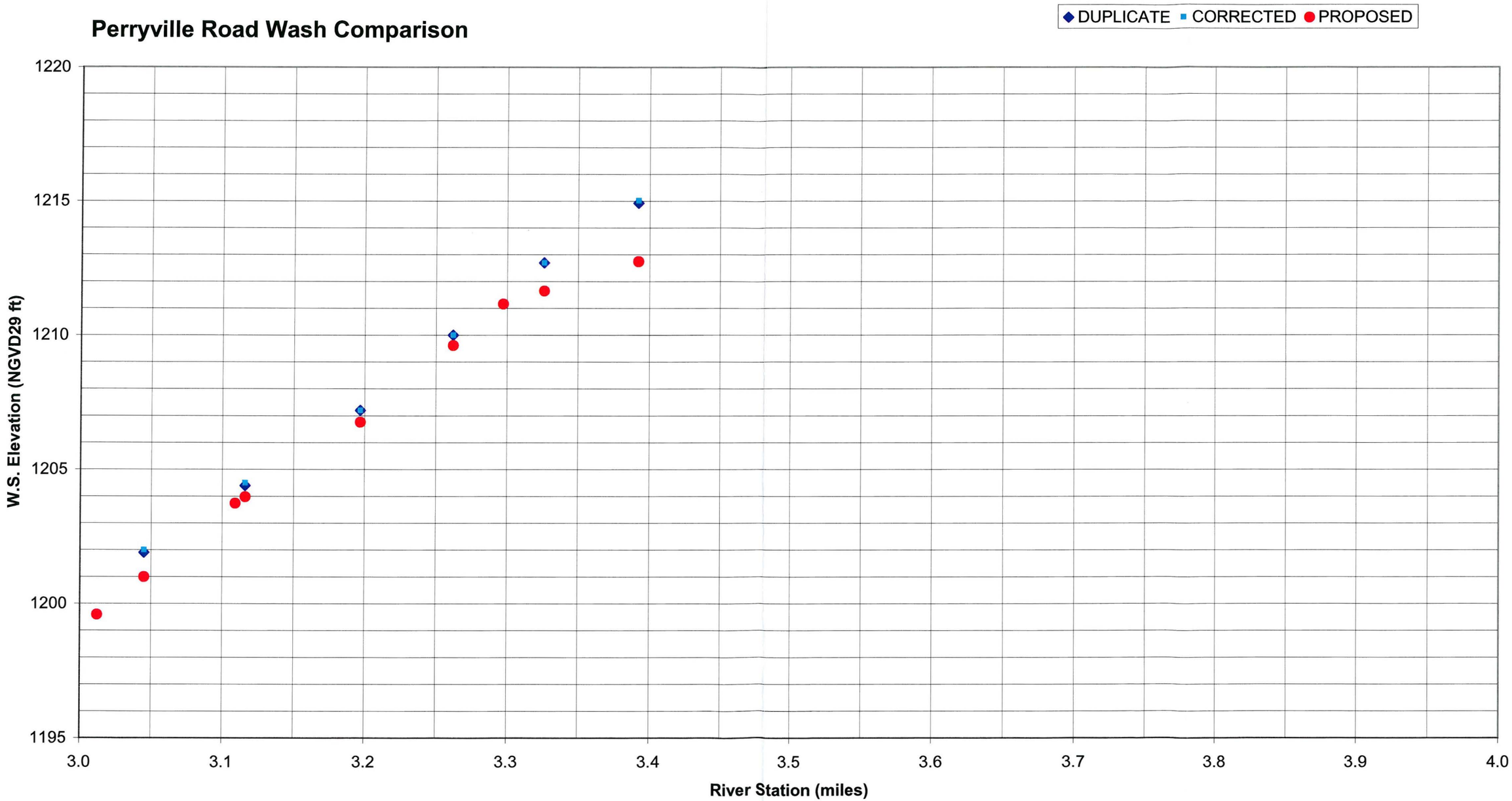
Perryville Road Wash Comparison



Perryville Road Wash Comparison



Perryville Road Wash Comparison



Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
61402.55	360		360	0
61402.47	320		320	0
61402.39	260		260	0
61402.33	300		300	0
61325.99	400		400	0
61315.99	165		165	0.01
61151	100		100	0
61051	114		120	6.5
60967	82		80	-1.8
60893	culvert			
60865	86		90	4
60765	295		300	5
60405	400		400	0
60005	400		400	0
59605	405		400	-5
59200	400		400	0
58800	400		400	0
58400	400		400	0
58000	320		320	0
57137.91	475		480	5
56662.91	410		400	-10
56252.91	395		400	5
55857.91	405		400	-5
55452.91	335		340	5
55117.91	48	75	75	0
55068.91	27			na
55042.91	138		100	-37.82
55032.91	culvert			
54905.08	6	79.09	110	30.91
54899.08	15			na
54884.08	20			na
54864.08	20			na
54844.08	17			na
54828.09	1			na
54827	6	227	250	23
54821.18	5			na
54816	16			na
54800	25			na
54775	25			na
54750	25			na
54725	25			na
54700	100			na
54600	100	400	400	0
54500	100			na
54400	38			na
54361.7	15			na
54346.7	15			na
54331.7	12			na
54319.7	20			na
54299.7	20			na
54279.7	15			na
54264.7	65			na
54200	50	500	480	-20
54150	50			na
54100	100			na

Wood/Patel Check

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
61402.55	360		360	0
61402.47	320		320	0
61402.39	260		260	0
61402.33	300		301	1
61325.99	400		400	0
61315.99	165		167	2
61151	100		104	4
61051	114		118	5
60967	82		83	1
60893				
60865	86		88	2
60765	295		300	5
60405	400		405	5
60005	400		395	-5
59605	405		410	5
59200	400		402	2
58800	400		401	1
58400	400		410	10
58000	320		314	-6
57137.91	475		481	6
56662.91	410		405	-5
56252.91	395		395	0
55857.91	405		405	0
55452.91	335		340	5
55117.91	48	75	75	0
55068.91	27			na
55042.91	124		124	0
55032.91				
54905.08	6	79	79	0
54899.08	15			na
54884.08	20			na
54864.08	20			na
54844.08	17			na
54828.09	1			na
54827	6	227	227	0
54821.18	5			na
54816	16			na
54800	25			na
54775	25			na
54750	25			na
54725	25			na
54700	100			na
54600	100	400	400	0
54500	100			na
54400	38			na
54361.7	15			na
54346.7	15			na
54331.7	12			na
54319.7	20			na
54299.7	20			na
54279.7	15			na
54264.7	65			na
54200	50	500	498	-2
54150	50			na
54100	100			na

Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
54000	100			na
53900	38			na
53861.7	15			na
53846.7	15			na
53831.7	12			na
53819.7	20			na
53799.7	20			na
53779.7	15			na
53764.7	65			na
53700	100	300	400	100
53600	100			na
53500	100			na
53400	100	400	400	0
53300	100			na
53200	100			na
53100	100			na
53000	100	400	400	0
52900	100			na
52800	100			na
52700	100			na
52600	100	600	400	-200
52500	100			na
52400	100			na
52300	100			na
52200	100			na
52100	100			na
52000	100	200	400	200
51900	100			na
51800	100	400	350	-50
51700	100			na
51600	100			na
51500	100			na
51400	100	400	400	0
51300	100			na
51200	100			na
51100	100			na
51000	100	840	760	-80
50900	340			na
50560	400			na
50160				
	12185.2		12160	

Wood/Patel Check

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
54000	100			na
53900	38			na
53861.7	15			na
53846.7	15			na
53831.7	12			na
53819.7	20			na
53799.7	20			na
53779.7	15			na
53764.7	65			na
53700	100	300	300	0
53600	100			na
53500	100			na
53400	100	400	400	0
53300	100			na
53200	100			na
53100	100			na
53000	100	400	400	0
52900	100			na
52800	100			na
52700	100			na
52600	100	600	600	0
52500	100			na
52400	100			na
52300	100			na
52200	100			na
52100	100			na
52000	100	200	200	0
51900	100			na
51800	100	400	400	0
51700	100			na
51600	100			na
51500	100			na
51400	100	400	402	2
51300	100			na
51200	100			na
51100	100			na
51000	100	780	776	-4
50900	315			na
50560	365			na
50160	1			
	12111		12145	

XSs not on workmap. modeled for engineering design only.
d/s reach lengths are summed from XSs not shown

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
61402.55	134.27	335	200.73
61402.47	200.71	350	149.29
61402.39	253.5	110	-143.5
61402.33	336.12	110	-226.12
61325.99	322.79	560	237.21
61315.99	315.17	300	**-15.17**
61151	200.53	200	**-0.53**
61051	149.45	150	**0.55**
60967	122.11	60	-62.11
60893	culvert		
60865	117.77	70	**-47.77**
60765	134.56	130	**-4.56**
60405	161.8	160	**-1.8**
60005	50.72	45	**-5.72**
59605	39.9	40	**0.1**
59200	31.28	30	**-1.28**
58800	188.71	180	**-8.71**
58400	169.44	260	90.56
58000	186.89	180	**-6.89**
57137.91	320.89	300	**-20.89**
56662.91	177.09	180	**2.91**
56252.91	197.98	220	**22.02**
55857.91	219.13	220	**0.87**
55452.91	313.37	320	**6.63**
55117.91	152.18	190	**37.82**
55068.91	114.46		na
55042.91	121.71	50	-71.71
55032.91	culvert		na
54905.08	90.77	50	**-40.77**
54899.08	91.33		na
54884.08	92.7		na
54864.08	93.65		na
54844.08	95.52		na
54828.09	120.43		na
54827	130.89	230	99.11
54821.18	144.05		na
54816	162.45		na
54800	178.99		na
54775	196.45		na
54750	214.05		na
54725	229.57		na
54700	229.46		na

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
61402.6	9975.07	10109.33	134	143	**8.5**	
61402.5	9985.48	10216.76	231	234	**3.1**	
61402.4	9983.41	10236.91	254	254	**0.0**	
61402.3	9968.3	10304.42	336	336	**-0.1**	
61326	9980.85	10552	571	577	**5.8**	
61316	9979	10294.16	315	309	**-5.8**	
61151	9983.65	10184.18	201	201	**0.2**	
61051	9966.56	10116	149	174	**24.8**	FP/FW is adjusted to structure edge on left side
60967	9985.34	10093.02	108	99	**-8.4**	
60893			0			
60865	9906.7	10033.45	127	124	**-3.1**	
60765	9922.99	10057.55	135	137	**2.3**	
60405	9979.67	10141.46	162	162	**0.4**	
60005	9980.82	10031.54	51	49	**-1.8**	
59605	9977.56	10017.45	40	40	**0.2**	
59200	9985.75	10017.03	31	32	**0.5**	
58800	9961.8	10150.51	189	189	**0.6**	
58400	9989.41	10158.93	170	169	**-0.8**	
58000	9960.28	10147.17	187	185	**-2.0**	
57137.9	9949.32	10270.21	321	324	**3.5**	
56662.9	9980.14	10157.23	177	176	**-0.7**	
56252.9	9978.79	10176.76	198	196	**-1.9**	
55857.9	9975.92	10195.05	219	221	**1.7**	
55452.9	9971.91	10291.67	320	321	**1.6**	
55117.9	9848.01	10005.16	157	171	**14.0**	
55068.9	9959.61	10074.06	114		na	
55042.9	9953.52	10075.23	122	114	**-7.7**	
55032.9			0		na	
54905.1	9953.12	10043.89	91	118	**26.9**	FP/FW is delineated to top of channel banks.
54899.1	9944.21	10035.55	91		na	
54884.1	9944.86	10037.57	93		na	
54864.1	9948.78	10042.43	94		na	
54844.1	9953.92	10049.44	96		na	
54828.1	9949.77	10070.2	120		na	
54827	9944.54	10075.42	131	241	110.5	FP/FW is delineated to top of channel banks.
54821.2	9927.68	10071.73	144		na	
54816	9939.98	10102.43	162		na	
54800	9930.07	10109.05	179		na	
54775	9914.85	10111.3	196		na	
54750	9901.17	10115.23	214		na	
54725	9881.4	10110.96	230		na	
54700	9881.69	10111.15	229		na	

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference	River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
				Wood/Patel Check						
54600	229.93	360	130.07	54600	9876.6	10106.53	230	355	124.6	FP/FW is delineated to top of channel banks.
54500	237.74		na	54500	9780.42	10018.16	238		na	
54400	237.44		na	54400	9778.59	10016.02	237		na	
54361.7	219.57		na	54361.7	9793.5	10013.07	220		na	
54346.7	219.52		na	54346.7	9793.53	10013.04	220		na	
54331.7	115.14		na	54331.7	9845.71	9960.85	115		na	
54319.7	130.68		na	54319.7	9837.94	9968.62	131		na	
54299.7	176.71		na	54299.7	9814.93	9991.64	177		na	
54279.7	220.25		na	54279.7	9793.15	10013.41	220		na	
54264.7	220.14		na	54264.7	9793.21	10013.35	220		na	
54200	229.61	350	120.39	54200	9856.8	10086.41	230	346	116.5	FP/FW is delineated to top of channel banks.
54150	237.28		na	54150	9783.67	10020.95	237		na	
54100	237.37		na	54100	9785.62	10022.99	237		na	
54000	237.06		na	54000	9785.79	10022.85	237		na	
53900	228.69		na	53900	9803.94	10032.62	229		na	
53861.7	210.3		na	53861.7	9811.83	10022.13	210		na	
53846.7	219.03		na	53846.7	9811.77	10030.8	219		na	
53831.7	117.2		na	53831.7	9862.68	9979.88	117		na	
53819.7	128.35		na	53819.7	9857.12	9985.44	128		na	
53799.7	175.9		na	53799.7	9834.34	10010.22	176		na	
53779.7	219.47		na	53779.7	9813.55	10033.01	219		na	
53764.7	219.34		na	53764.7	9813.62	10032.94	219		na	
53700	236.76	300	63.24	53700	9848.6	10085.34	237	332	95.0	FP/FW is delineated to top of channel banks.
53600	244.42		na	53600	9806.08	10050.48	244		na	
53500	243.43		na	53500	9806.58	10049.98	243		na	
53400	234.97	300	65.03	53400	9915.3	10150.25	235	304	68.6	FP/FW is delineated to top of channel banks.
53300	234.46		na	53300	9809.9	10044.34	234		na	
53200	233.84		na	53200	9810.34	10044.15	234		na	
53100	241.11		na	53100	9802.8	10043.88	241		na	
53000	232.74	300	67.26	53000	9894.87	10127.59	233	294	60.8	FP/FW is delineated to top of channel banks.
52900	232.12		na	52900	9812.54	10044.63	232		na	
52800	231.47		na	52800	9801.9	10033.34	231		na	
52700	238.3		na	52700	9790.52	10028.78	238		na	
52600	237.57	340	102.43	52600	9881.99	10119.51	238	342	104.6	FP/FW is delineated to top of channel banks.
52500	236.77		na	52500	9773.64	10010.36	237		na	
52400	235.92		na	52400	9759.9	9995.78	236		na	
52300	242.33		na	52300	9757.31	9999.59	242		na	
52200	234.05		na	52200	9758	9992	234		na	
52100	233.02		na	52100	9758.6	9991.57	233		na	
52000	231.91	310	78.09	52000	9862.65	10094.51	232	327	95.1	FP/FW is delineated to top of channel banks.
51900	230.28		na	51900	9769.89	10000.11	230		na	
51800	236.13	300	63.87	51800	9871.73	10107.79	236	300	63.6	FP/FW is delineated to top of channel banks.

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
51700	241.44		na
51600	239.71		na
51500	237.77		na
51400	235.56	300	64.44
51300	220.29		na
51200	217.21		na
51100	213.05		na
51000	222.94	220	**-2.94**
50900	267.89		na
50560	291.26		na
50160	340.58	370	**29.42**

XSs not on workmap. modeled for engineering design only.

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
51700	9755.85	9997.2	241		na	
51600	9758.59	9998.21	240		na	
51500	9775.43	10013.09	238		na	
51400	9880.39	10115.82	235	288	52.8	FP/FW is delineated to top of channel banks.
51300	9824.92	10045.08	220		na	
51200	9846.48	10063.52	217		na	
51100	9863.6	10076.4	213		na	
51000	9892.43	10114.76	222	227	**5.1**	
50900	9905.65	10163.19	258		na	
50560	9844.07	10332.67	489		na	
50160	9939.96	10280.54	341	372	**30.9**	

1. Cross section left station where the calculated water surface intersects existing ground defining the floodplain boundary on the left side.
2. Cross section right station where the calculated water surface intersects existing ground defining the floodplain boundary on the right side.
3. This column is subtracting the left and right stations where the calculated water surface intersects the ground defining the total floodplain width.

BEARDSLEY CANAL WASH

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
61402.55	38.42	120	-81.58
61402.47	136.32	110	**26.32**
61402.39	103.38	110	**-6.62**
61402.33	92.88	110	**-17.12**
61325.99	279.15	560	-280.85
61315.99	305	300	**5**
61151	200.26	200	**0.26**
61051	149.46	150	**-0.54**
60967	71.28	60	**11.28**
60893	culvert		
60865	60.26	70	**-9.74**
60765	136.45	130	**6.45**
60405	104.25	100	**4.25**
60005	50.72	45	**5.72**
59605	39.9	40	**-0.1**
59200	31.28	30	**1.28**
58800	188.86	180	**8.86**
58400	130.61	130	**0.61**
58000	171.72	180	**-8.28**
57137.91	319.05	300	**19.05**
56662.91	172	170	**2**
56252.91	107.49	110	**-2.51**
55857.91	222.04	220	**2.04**
55452.91	177.77	180	**-2.23**
55117.91	107.94	190	-82.06
55068.91	114.46		114.46
55042.91	121.71	50	71.71
55032.91	culvert		
54905.08	90.77	50	**40.77**
54899.08	91.33		**na**
54884.08	92.7		**na**
54864.08	93.65		**na**
54844.08	95.52		**na**
54828.09	120.43		**na**
54827	130.89	230	-99.11
54821.18	144.06		**na**
54816	162.45		**na**
54800	178.99		**na**

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
61402.55	9975.07	10095	120	121.59	**1.7**	
61402.47	9985.48	10100	115	118.04	**3.5**	
61402.39	9983.41	10111	128	118.53	**-9.1**	
61402.33	9968.3	10091.18	123	120.47	**-2.4**	
61325.99	9980.85	10552	571	576.9	**5.8**	
61315.99	9979	10294.16	315	309.35	**-5.8**	
61151	9983.65	10184.18	201	200.72	**0.2**	
61051	9966.56	10116	149	174.24	**24.8**	FP/FW is adjusted to structure edge on left side
60967	9985.34	10093.02	108	99.26	**-8.4**	
60893						
60865	9971.31	10033.45	62	60.65	**-1.5**	
60765	9922.99	10057.55	135	136.87	**2.3**	
60405	9979.67	10083.92	104	103.79	**-0.5**	
60005	9980.82	10031.54	51	48.88	**-1.8**	
59605	9977.55	10022.46	45	40.08	**-4.8**	
59200	9985.75	10017.03	31	31.8	**0.5**	
58800	9961.8	10150.51	189	189.28	**0.6**	
58400	9989.41	10120.14	131	131.14	**0.4**	
58000	9960.28	10147.17	187	184.86	**-2.0**	
57137.91	9949.32	10270.21	321	324.41	**3.5**	
56662.91	9980.14	10130	150	152.18	**2.3**	
56252.91	9978.79	10085	106	106.06	**-0.1**	
55857.91	9975.92	10195.05	219	220.87	**1.7**	
55452.91	9971.91	10125	153	158.4	**5.3**	
55117.91	9848.01	10005.16	157	171.14	**14.0**	
55068.91	9959.61	10074.06	114		**na**	
55042.91	9953.52	10075.23	122	114.02	**-7.7**	
55032.91			0			
54905.08	9953.12	10043.89	91	117.69	**26.9**	FP/FW is delineated to top of channel banks.
54899.08	9944.21	10035.55	91		**na**	
54884.08	9944.86	10037.57	93		**na**	
54864.08	9948.78	10042.43	94		**na**	
54844.08	9953.92	10049.44	96		**na**	
54828.09	9949.77	10070.2	120		**na**	
54827	9944.54	10075.42	131	241	110.5	FP/FW is delineated to top of channel banks.
54821.18	9927.68	10071.73	144		**na**	
54816	9939.98	10102.43	162		**na**	
54800	9930.07	10109.05	179		**na**	

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
54775	196.45		na
54750	214.05		na
54725	229.57		na
54700	229.46		na
54600	229.93	360	-130.07
54500	237.74		na
54400	237.44		na
54361.7	219.57		na
54346.7	219.52		na
54331.7	115.13		na
54319.7	130.68		na
54299.7	176.71		na
54279.7	220.25		na
54264.7	220.14		na
54200	229.61	350	-120.39
54150	237.28		na
54100	237.37		na
54000	237.06		na
53900	228.68		na
53861.7	210.3		na
53846.7	219.03		na
53831.7	117.2		na
53819.7	128.57		na
53799.7	176.08		na
53779.7	219.65		na
53764.7	219.52		na
53700	237.02	300	-62.98
53600	244.71		na
53500	243.73		na
53400	235.27	300	-64.73
53300	234.77		na
53200	234.16		na
53100	241.47		na
53000	233.09	300	-66.91
52900	232.49		na
52800	231.86		na
52700	238.75		na
52600	238.03	340	-101.97

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
54775	9914.85	10111.3	196		na	
54750	9901.17	10115.23	214		na	
54725	9881.4	10110.96	230		na	
54700	9881.69	10111.15	229		na	
54600	9876.6	10106.53	230	355	124.6	FP/FW is delineated to top of channel banks.
54500	9780.42	10018.16	238		na	
54400	9778.59	10016.02	237		na	
54361.7	9793.5	10013.07	220		na	
54346.7	9793.53	10013.04	220		na	
54331.7	9845.71	9960.85	115		na	
54319.7	9837.94	9968.62	131		na	
54299.7	9814.93	9991.64	177		na	
54279.7	9793.15	10013.41	220		na	
54264.7	9793.21	10013.35	220		na	
54200	9856.8	10086.41	230	346	116.5	FP/FW is delineated to top of channel banks.
54150	9783.67	10020.95	237		na	
54100	9785.62	10022.99	237		na	
54000	9785.79	10022.85	237		na	
53900	9803.94	10032.62	229		na	
53861.7	9811.83	10022.13	210		na	
53846.7	9811.77	10030.8	219		na	
53831.7	9862.68	9979.88	117		na	
53819.7	9857.12	9985.44	128		na	
53799.7	9834.34	10010.22	176		na	
53779.7	9813.55	10033.01	219		na	
53764.7	9813.62	10032.94	219		na	
53700	9848.6	10085.34	237	332	95.0	FP/FW is delineated to top of channel banks.
53600	9806.08	10050.48	244		na	
53500	9806.58	10049.98	243		na	
53400	9915.3	10150.25	235	304	68.6	FP/FW is delineated to top of channel banks.
53300	9809.9	10044.34	234		na	
53200	9810.34	10044.15	234		na	
53100	9802.8	10043.88	241		na	
53000	9894.87	10127.59	233	294	60.8	FP/FW is delineated to top of channel banks.
52900	9812.54	10044.63	232		na	
52800	9801.9	10033.34	231		na	
52700	9790.52	10028.78	238		na	
52600	9881.99	10119.51	238	342	104.6	FP/FW is delineated to top of channel banks.

BEARDSLEY CANAL WASH

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
52500	237.27		na
52400	236.45		na
52300	242.93		na
52200	234.64		na
52100	233.66		na
52000	232.6	310	-77.4
51900	231.05		na
51800	237.02	300	-62.98
51700	242.48		na
51600	240.86		na
51500	239.06		na
51400	237.03	300	-62.97
51300	221.82		na
51200	219.13		na
51100	215.7		na
51000	228.5	220	8.5
50900	326.25		na
50560	225		na
50160	190	240	-50

XSs not on workmap. modeled for engineering design only.

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
52500	9773.64	10010.36	237		na	
52400	9759.9	9995.78	236		na	
52300	9757.31	9999.59	242		na	
52200	9758	9992	234		na	
52100	9758.6	9991.57	233		na	
52000	9862.65	10094.51	232	327	95.1	FP/FW is delineated to top of channel banks.
51900	9769.89	10000.11	230		na	
51800	9871.73	10107.79	236	300	63.6	FP/FW is delineated to top of channel banks.
51700	9755.85	9997.2	241		na	
51600	9758.59	9998.21	240		na	
51500	9775.43	10013.09	238		na	
51400	9880.39	10115.82	235	288	52.8	FP/FW is delineated to top of channel banks.
51300	9824.92	10045.08	220		na	
51200	9846.48	10063.52	217		na	
51100	9863.6	10076.4	213		na	
51000	9892.43	10114.76	222	227	5.1	
50900	9905.65	10163.19	258		na	
50560	9844.07	10332.67	489		na	
50160	9939.96	10175	235	238	3.4	

1. Left encroachment station defining the floodway boundary on the left side.
2. Right encroachment station defining the floodway boundary on the right side.
3. Difference between the left and right encroachment stations defining the total floodway width.

Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
20788.34	1			na
20787.34	331			na
20787				na
20456.34	47.54	1426.2	1310	116.2
20408.7*	47.54			47.54
20361.2*	47.54			47.54
20313.7*	47.54			47.54
20266.1*	47.54			47.54
20218.6*	47.54			47.54
20171.0*	47.54			47.54
20123.5*	47.54			47.54
20075.9*	47.54			47.54
20028.4*	47.54			47.54
19980.8*	47.54			47.54
19933.3*	47.54			47.54
19885.8*	47.54			47.54
19838.2*	47.54			47.54
19790.7*	47.54			47.54
19743.1*	47.54			47.54
19695.6*	47.54			47.54
19648.0*	47.54			47.54
19600.5*	47.54			47.54
19552.9*	47.54			47.54
19505.4*	47.54			47.54
19457.9*	47.54			47.54
19410.3*	47.54			47.54
19362.8*	47.54			47.54
19315.2*	47.54			47.54
19267.7*	47.54			47.54
19220.1*	47.54			47.54
19172.6*	47.54			47.54
19125.0*	47.54			47.54
19077.5*	47.54			47.54
19030	15	87	90	-3
19015	15			na
19000	14			na
18986	28			na
18958	15			na
18943	42.92	343	340	3.37
18900.0*	42.92			42.92
18857.1*	42.92			42.92
18814.2*	42.92			42.92
18771.2*	42.92			42.92
18728.3*	42.92			42.92
18685.4*	42.92			42.92
18642.5*	42.93			42.93
18599.58	15	87	90	-3
18584.58	15			na
18569.58	14			na
18555.58	28			na
18527.58	15			na
18512.58	36.36	145	150	-4.56
18476.2*	36.36			36.36

Wood/Patel Check

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
20788.34	1			na
20787.34	331			na
20787				na
20456.34	47.54	1426	1417	9.0
20408.7*	47.54			47.5
20361.2*	47.54			47.5
20313.7*	47.54			47.5
20266.1*	47.54			47.5
20218.6*	47.54			47.5
20171.0*	47.54			47.5
20123.5*	47.54			47.5
20075.9*	47.54			47.5
20028.4*	47.54			47.5
19980.8*	47.54			47.5
19933.3*	47.54			47.5
19885.8*	47.54			47.5
19838.2*	47.54			47.5
19790.7*	47.54			47.5
19743.1*	47.54			47.5
19695.6*	47.54			47.5
19648.0*	47.54			47.5
19600.5*	47.54			47.5
19552.9*	47.54			47.5
19505.4*	47.54			47.5
19457.9*	47.54			47.5
19410.3*	47.54			47.5
19362.8*	47.54			47.5
19315.2*	47.54			47.5
19267.7*	47.54			47.5
19220.1*	47.54			47.5
19172.6*	47.54			47.5
19125.0*	47.54			47.5
19077.5*	47.54			47.5
19030	15	87	89	-1.8
19015	15			na
19000	14			na
18986	28			na
18958	15			na
18943	42.92	343	340	3.2
18900.0*	42.92			42.9
18857.1*	42.92			42.9
18814.2*	42.92			42.9
18771.2*	42.92			42.9
18728.3*	42.92			42.9
18685.4*	42.92			42.9
18642.5*	42.93			42.9
18599.58	15	87	91	-3.6
18584.58	15			na
18569.58	14			na
18555.58	28			na
18527.58	15			na
18512.58	36.36	145	143	2.6
18476.2*	36.36			36.4

Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
18439.8*	36.36			36.36
18403.5*	36.36			36.36
18367.14	15	87	90	-3
18352.14	15			na
18337.14	14			na
18323.14	28			na
18295.14	15			na
18280.14	38.64	193.2	190	3.2
18241.5*	38.64			38.64
18202.8*	38.64			38.64
18164.2*	38.64			38.64
18125.5*	38.64			38.64
18086.94	15	87	90	-3
18071.94	15			na
18056.94	14			na
18042.94	28			na
18014.94	15			na
17999.94	25.09	50	40	10.18
17974.8*	25.09			25.09
17949.76	15	87	90	-3
17934.76	15			na
17919.76	14			na
17905.76	28			na
17877.76	15			na
17862.76	25.08	50.16	40	10.16
17837.6*	25.08			25.08
17812.59	15	91.95	90	1.95
17797.59	15			na
17782.59	18			na
17764.59	28.95			na
17735.59	15			na
17720.59	47.58	761	760	1.28
17673.*	47.58			47.58
17625.4*	47.58			47.58
17577.8*	47.58			47.58
17530.2*	47.58			47.58
17482.6*	47.58			47.58
17435.0*	47.58			47.58
17387.5*	47.58			47.58
17339.9*	47.58			47.58
17292.3*	47.58			47.58
17244.7*	47.58			47.58
17197.1*	47.58			47.58
17149.5*	47.58			47.58
17101.9*	47.58			47.58
17054.4*	47.58			47.58
17006.8*	47.58			47.58
16959.23	15	91.95	90	1.95
16944.23	15			na
16929.23	18			na
16911.23	28.95			na
16882.23	15			na
16867.23	47.9	814.3	850	-35.7

Wood/Patel Check

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
18439.8*	36.36			36.4
18403.5*	36.36			36.4
18367.14	15	87	92	-4.6
18352.14	15			na
18337.14	14			na
18323.14	28			na
18295.14	15			na
18280.14	38.64	193	190	3.7
18241.5*	38.64			38.6
18202.8*	38.64			38.6
18164.2*	38.64			38.6
18125.5*	38.64			38.6
18086.94	15	87	88	-1.2
18071.94	15			na
18056.94	14			na
18042.94	28			na
18014.94	15			na
17999.94	25.09	50	49	0.9
17974.8*	25.09			
17949.76	15	87	87	-0.1
17934.76	15			na
17919.76	14			na
17905.76	28			na
17877.76	15			na
17862.76	25.08	50	51	-0.9
17837.6*	25.08			25.1
17812.59	15	92	91	1.2
17797.59	15			na
17782.59	18			na
17764.59	28.95			na
17735.59	15			na
17720.59	47.58	761	760	1.3
17673.*	47.58			47.6
17625.4*	47.58			47.6
17577.8*	47.58			47.6
17530.2*	47.58			47.6
17482.6*	47.58			47.6
17435.0*	47.58			47.6
17387.5*	47.58			47.6
17339.9*	47.58			47.6
17292.3*	47.58			47.6
17244.7*	47.58			47.6
17197.1*	47.58			47.6
17149.5*	47.58			47.6
17101.9*	47.58			47.6
17054.4*	47.58			47.6
17006.8*	47.58			47.6
16959.23	15	92	93	-1.2
16944.23	15			na
16929.23	18			na
16911.23	28.95			na
16882.23	15			na
16867.23	47.9	862	858	3.7

Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference		River Station	XLCH (Model)	XLCH additive (Model)	XLCH (map)	Difference
						Wood/Patel Check				
16819.3*	47.9			47.9		16819.3*	47.9			47.9
16771.4*	47.9			47.9		16771.4*	47.9			47.9
16723.5*	47.9			47.9		16723.5*	47.9			47.9
16675.6*	47.9			47.9		16675.6*	47.9			47.9
16627.7*	47.9			47.9		16627.7*	47.9			47.9
16579.8*	47.9			47.9		16579.8*	47.9			47.9
16531.9*	47.9			47.9		16531.9*	47.9			47.9
16484.0*	47.9			47.9		16484.0*	47.9			47.9
16436.1*	47.9			47.9		16436.1*	47.9			47.9
16388.2*	47.9			47.9		16388.2*	47.9			47.9
16340.3*	47.9			47.9		16340.3*	47.9			47.9
16292.4*	47.9			47.9		16292.4*	47.9			47.9
16244.5*	47.9			47.9		16244.5*	47.9			47.9
16196.6*	47.9			47.9		16196.6*	47.9			47.9
16148.7*	47.9			47.9		16148.7*	47.9			47.9
16100.8*	47.9			47.9		16100.8*	47.9			47.9
16052.9*	47.9	144.9	100	**44.9**	<--- sh	16052.9*	47.9			**na**
16005.09	15			**na**		16005.09	15	97	96	**0.8**
15990.09	15			**na**		15990.09	15			**na**
15975.09	18			**na**		15975.09	18			**na**
15950.09	22			**na**		15950.09	22			**na**
15928.0*	2			**na**		15928.0*	2			**na**
15926.0*	10			**na**		15926.0*	10			**na**
15916.09	15			**na**		15916.09	15			**na**
15901.09	45.57					15901.09	45.57			
15855.5*	45.57			45.57		15855.5*	45.57			45.6
15809.9*	45.57			45.57		15809.9*	45.57			45.6
15764.3*	45.57			45.57		15764.3*	45.57			45.6
15718.8*	45.57			45.57		15718.8*	45.57			45.6
15673.2*	45.57			45.57		15673.2*	45.57			45.6
15627.6*	45.57			45.57		15627.6*	45.57			45.6
15582.1*	45.57			45.57		15582.1*	45.57			45.6
15536.5*	45.57			45.57		15536.5*	45.57			45.6
15491.*	45.57			45.57		15491.*	45.57			45.6
15455.43	423.06			423.06		15455.43	423.06			423.1
15445.43	culvert			**na**		15445.43				**na**
15042.37			72	**na**		15042.37	0			**na**

XSs not on workmap. modeled for engineering design only.
d/s reach lengths are summed from XSs not shown

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
20788.34	175		na
20787.34	175		na
20787	culvert		na
20456.34	118.89	145	**-26.11**
20408.7*	118.95		**118.95**
20361.2*	118.89		**118.89**
20313.7*	118.96		**118.96**
20266.1*	118.9		**118.9**
20218.6*	118.96		**118.96**
20171.0*	118.9		**118.9**
20123.5*	118.97		**118.97**
20075.9*	119.04		**119.04**
20028.4*	118.98		**118.98**
19980.8*	119.05		**119.05**
19933.3*	118.99		**118.99**
19885.8*	119.06		**119.06**
19838.2*	119		**119**
19790.7*	119.07		**119.07**
19743.1*	119.02		**119.02**
19695.6*	119.09		**119.09**
19648.0*	119.16		**119.16**
19600.5*	119.1		**119.1**
19552.9*	119.17		**119.17**
19505.4*	119.12		**119.12**
19457.9*	119.19		**119.19**
19410.3*	119.14		**119.14**
19362.8*	119.21		**119.21**
19315.2*	119.29		**119.29**
19267.7*	119.23		**119.23**
19220.1*	119.31		**119.31**
19172.6*	119.26		**119.26**
19125.0*	119.33		**119.33**
19077.5*	119.28		**119.28**
19030	119.36	145	**-25.64**
19015	97.38		na
19000	56.23		na
18986	64.98		na
18958	97.52		na
18943	119.19	145	**-25.81**
18900.0*	119.18		**119.18**

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
20788.34	9912.5	10087.5	175		na	
20787.34	9912.5	10087.5	175		na	
20787			culvert		na	
20456.34	9940.56	10059.44	118.88	93	**25.6**	FP/FW is delineated to top of channel banks.
20408.7*	9940.52	10059.48	118.96		119.0	
20361.2*	9940.55	10059.45	118.9		118.9	
20313.7*	9940.52	10059.48	118.96		119.0	
20266.1*	9940.55	10059.45	118.9		118.9	
20218.6*	9940.52	10059.48	118.96		119.0	
20171.0*	9940.55	10059.45	118.9		118.9	
20123.5*	9940.52	10059.48	118.96		119.0	
20075.9*	9940.48	10059.52	119.04		119.0	
20028.4*	9940.51	10059.49	118.98		119.0	
19980.8*	9940.48	10059.53	119.05		119.1	
19933.3*	9940.5	10059.5	119		119.0	
19885.8*	9940.47	10059.53	119.06		119.1	
19838.2*	9940.5	10059.5	119		119.0	
19790.7*	9940.47	10059.54	119.07		119.1	
19743.1*	9940.49	10059.51	119.02		119.0	
19695.6*	9940.46	10059.54	119.08		119.1	
19648.0*	9940.42	10059.58	119.16		119.2	
19600.5*	9940.45	10059.55	119.1		119.1	
19552.9*	9940.41	10059.59	119.18		119.2	
19505.4*	9940.44	10059.56	119.12		119.1	
19457.9*	9940.41	10059.59	119.18		119.2	
19410.3*	9940.43	10059.57	119.14		119.1	
19362.8*	9940.4	10059.61	119.21		119.2	
19315.2*	9940.36	10059.64	119.28		119.3	
19267.7*	9940.38	10059.62	119.24		119.2	
19220.1*	9940.35	10059.65	119.3		119.3	
19172.6*	9940.37	10059.63	119.26		119.3	
19125.0*	9940.34	10059.67	119.33		119.3	
19077.5*	9940.36	10059.64	119.28		119.3	
19030	9940.32	10059.68	119.36	145	**-25.6**	FP/FW is delineated to top of channel banks.
19015	9951.31	10048.69	97.38		na	
19000	9971.89	10028.11	56.22		na	
18986	9967.51	10032.49	64.98		na	
18958	9951.24	10048.76	97.52		na	
18943	9940.41	10059.59	119.18	145	**-26.0**	FP/FW is delineated to top of channel banks.
18900.0*	9940.41	10059.59	119.18		119.2	

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
18857.1*	119.17		119.17
18814.2*	119.28		119.28
18771.2*	119.27		119.27
18728.3*	119.27		119.27
18685.4*	119.26		119.26
18642.5*	119.38		119.38
18599.58	119.36	145	-25.64
18584.58	97.38		na
18569.58	56.22		na
18555.58	64.96		na
18527.58	97.51		na
18512.58	119.17	145	-25.83
18476.2*	119.21		119.21
18439.8*	119.27		119.27
18403.5*	119.31		119.31
18367.14	119.36	145	-25.64
18352.14	97.38		na
18337.14	56.21		na
18323.14	63.43		na
18295.14	96.29		na
18280.14	117.35	145	-27.65
18241.5*	117.85		117.85
18202.8*	118.36		118.36
18164.2*	118.87		118.87
18125.5*	119.39		119.39
18086.94	119.91	145	-25.09
18071.94	97.73		na
18056.94	56.5		na
18042.94	65.08		na
18014.94	97.6		na
17999.94	119.31	145	-25.69
17974.8*	119.33		119.33
17949.76	119.36	145	-25.64
17934.76	97.38		na
17919.76	56.23		na
17905.76	65.08		na
17877.76	97.6		na
17862.76	119.31	145	-25.69
17837.6*	119.33		119.33
17812.59	119.36	145	-25.64

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
18857.1*	9940.42	10059.58	119.16		119.2	
18814.2*	9940.36	10059.64	119.28		119.3	
18771.2*	9940.36	10059.64	119.28		119.3	
18728.3*	9940.37	10059.63	119.26		119.3	
18685.4*	9940.37	10059.63	119.26		119.3	
18642.5*	9940.31	10059.69	119.38		119.4	
18599.58	9940.32	10059.68	119.36	145	-25.6	FP/FW is delineated to top of channel banks.
18584.58	9951.31	10048.69	97.38		na	
18569.58	9971.89	10028.11	56.22		na	
18555.58	9967.52	10032.48	64.96		na	
18527.58	9951.25	10048.75	97.5		na	
18512.58	9940.42	10059.58	119.16	145	-26.1	FP/FW is delineated to top of channel banks.
18476.2*	9940.39	10059.61	119.22		119.2	
18439.8*	9940.37	10059.63	119.26		119.3	
18403.5*	9940.34	10059.66	119.32		119.3	
18367.14	9940.32	10059.68	119.36	145	-26.1	FP/FW is delineated to top of channel banks.
18352.14	9951.31	10048.69	97.38		na	
18337.14	9971.9	10028.11	56.21		na	
18323.14	9968.29	10031.71	63.42		na	
18295.14	9951.85	10048.15	96.3		na	
18280.14	9941.33	10058.67	117.34	146	-28.3	FP/FW is delineated to top of channel banks.
18241.5*	9941.08	10058.92	117.84		117.8	
18202.8*	9940.82	10059.18	118.36		118.4	
18164.2*	9940.57	10059.43	118.86		118.9	
18125.5*	9940.31	10059.69	119.38		119.4	
18086.94	9940.04	10059.96	119.92	144	-24.5	FP/FW is delineated to top of channel banks.
18071.94	9951.13	10048.87	97.74		na	
18056.94	9971.75	10028.25	56.5		na	
18042.94	9967.46	10032.54	65.08		na	
18014.94	9951.2	10048.8	97.6		na	
17999.94	9940.35	10059.65	119.3	145	-25.3	FP/FW is delineated to top of channel banks.
17974.8*	9940.33	10059.67	119.34		119.3	
17949.76	9940.32	10059.68	119.36	144	-24.8	FP/FW is delineated to top of channel banks.
17934.76	9951.31	10048.69	97.38		na	
17919.76	9971.89	10028.12	56.23		na	
17905.76	9967.46	10032.54	65.08		na	
17877.76	9951.2	10048.8	97.6		na	
17862.76	9940.35	10059.65	119.3	143	-23.8	FP/FW is delineated to top of channel banks.
17837.6*	9940.33	10059.67	119.34		119.3	
17812.59	9940.32	10059.68	119.36	144	-24.5	FP/FW is delineated to top of channel banks.

FP Top Width Check											
5% of FIRM scale = 50'				Wood/Patel Check							
River Station	Top Width (model)	Top Width (map)	Difference	River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
17797.59	97.38		**97.38**	17797.59	9951.31	10048.69	97.38		97.4	
17782.59	56.23		**56.23**	17782.59	9971.89	10028.12	56.23		56.2	
17764.59	64.82		**64.82**	17764.59	9967.59	10032.41	64.82		64.8	
17735.59	97.38		**97.38**	17735.59	9951.31	10048.69	97.38		97.4	
17720.59	118.97	145	**-26.03**	17720.59	9940.52	10059.49	118.97	145	**-25.9**	FP/FW is delineated to top of channel banks.
17673.*	119.04		**119.04**	17673.*	9940.48	10059.52	119.04		119.0	
17625.4*	118.98		**118.98**	17625.4*	9940.51	10059.49	118.98		119.0	
17577.8*	119.05		**119.05**	17577.8*	9940.48	10059.53	119.05		119.1	
17530.2*	119.12		**119.12**	17530.2*	9940.44	10059.56	119.12		119.1	
17482.6*	119.06		**119.06**	17482.6*	9940.47	10059.53	119.06		119.1	
17435.0*	119.13		**119.13**	17435.0*	9940.43	10059.57	119.14		119.1	
17387.5*	119.08		**119.08**	17387.5*	9940.46	10059.54	119.08		119.1	
17339.9*	119.15		**119.15**	17339.9*	9940.43	10059.57	119.14		119.1	
17292.3*	119.22		**119.22**	17292.3*	9940.39	10059.61	119.22		119.2	
17244.7*	119.17		**119.17**	17244.7*	9940.42	10059.58	119.16		119.2	
17197.1*	119.24		**119.24**	17197.1*	9940.38	10059.62	119.24		119.2	
17149.5*	119.19		**119.19**	17149.5*	9940.41	10059.59	119.18		119.2	
17101.9*	119.26		**119.26**	17101.9*	9940.37	10059.63	119.26		119.3	
17054.4*	119.33		**119.33**	17054.4*	9940.33	10059.67	119.34		119.3	
17006.8*	119.28		**119.28**	17006.8*	9940.36	10059.64	119.28		119.3	
16959.23	119.36	145	**-25.64**	16959.23	9940.32	10059.68	119.36	145	**-25.1**	FP/FW is delineated to top of channel banks.
16944.23	97.38		**na**	16944.23	9951.31	10048.69	97.38		**na**	
16929.23	56.22		**na**	16929.23	9971.89	10028.11	56.22		**na**	
16911.23	64.82		**na**	16911.23	9967.59	10032.41	64.82		**na**	
16882.23	97.38		**na**	16882.23	9951.31	10048.69	97.38		**na**	
16867.23	119.1	145	**-25.9**	16867.23	9940.45	10059.55	119.1	145	**-25.5**	FP/FW is delineated to top of channel banks.
16819.3*	119.17		**119.17**	16819.3*	9940.42	10059.58	119.16		119.2	
16771.4*	119.11		**119.11**	16771.4*	9940.44	10059.56	119.12		119.1	
16723.5*	119.18		**119.18**	16723.5*	9940.41	10059.59	119.18		119.2	
16675.6*	119.12		**119.12**	16675.6*	9940.44	10059.56	119.12		119.1	
16627.7*	119.19		**119.19**	16627.7*	9940.4	10059.6	119.2		119.2	
16579.8*	119.13		**119.13**	16579.8*	9940.43	10059.57	119.14		119.1	
16531.9*	119.2		**119.2**	16531.9*	9940.4	10059.6	119.2		119.2	
16484.0*	119.14		**119.14**	16484.0*	9940.43	10059.57	119.14		119.1	
16436.1*	119.21		**119.21**	16436.1*	9940.39	10059.61	119.22		119.2	
16388.2*	119.29		**119.29**	16388.2*	9940.36	10059.64	119.28		119.3	
16340.3*	119.23		**119.23**	16340.3*	9940.38	10059.62	119.24		119.2	
16292.4*	119.3		**119.3**	16292.4*	9940.35	10059.65	119.3		119.3	
16244.5*	119.25		**119.25**	16244.5*	9940.38	10059.63	119.25		119.3	
16196.6*	119.32		**119.32**	16196.6*	9940.34	10059.66	119.32		119.3	

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference		River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
								Wood/Patel Check			
16148.7*	119.27		**119.27**		16148.7*	9940.37	10059.63	119.26		119.3	
16100.8*	119.34		**119.34**		16100.8*	9940.33	10059.67	119.34		119.3	
16052.9*	119.29	145	**-25.71**	<---	16052.9*	9940.36	10059.64	119.28		na	
16005.09	119.36		na		16005.09	9940.32	10059.68	119.36	145	**-25.8**	FP/FW is delineated to top of channel banks.
15990.09	97.38		na		15990.09	9951.31	10048.69	97.38		na	
15975.09	56.21		na		15975.09	9971.89	10028.11	56.22		na	
15950.09	64.72		na		15950.09	9967.64	10032.36	64.72		na	
15928.0*	85.19		na		15928.0*	9957.4	10042.6	85.2		na	
15926.0*	86.99		na		15926.0*	9956.5	10043.5	87		na	
15916.09	96.08		na		15916.09	9951.96	10048.04	96.08		na	
15901.09	127.08	145	**-17.92**		15901.09	9941.46	10068.54	127.08	146	**-18.8**	FP/FW is delineated to top of channel banks.
15855.5*	127.34		**127.34**		15855.5*	9941.33	10068.67	127.34		127.3	
15809.9*	127.49		**127.49**		15809.9*	9941.25	10068.75	127.5		127.5	
15764.3*	127.75		**127.75**		15764.3*	9941.12	10068.88	127.76		127.8	
15718.8*	127.91		**127.91**		15718.8*	9941.04	10068.96	127.92		127.9	
15673.2*	128.17		**128.17**		15673.2*	9940.91	10069.09	128.18		128.2	
15627.6*	128.34		**128.34**		15627.6*	9940.83	10069.17	128.34		128.3	
15582.1*	128.6		**128.6**		15582.1*	9940.7	10069.3	128.6		128.6	
15536.5*	128.77		**128.77**		15536.5*	9940.61	10069.39	128.78		128.8	
15491.*	128.94		128.94		15491.*	9940.53	10069.47	128.94		128.9	
15455.43	129.21		na		15455.43	9940.4	10069.6	129.2		na	
15445.43	culvert		na		15445.43			culvert		na	
15042.37	90.85		na		15042.37	9980.83	10071.61	90.78		na	

XSs not on workmap. modeled for engineering design only.

1. Cross section left station where the calculated water surface intersects existing ground defining the floodplain boundary on the left side.
2. Cross section right station where the calculated water surface intersects existing ground defining the floodplain boundary on the right side.
3. This column is subtracting the left and right stations where the calculated water surface intersects the ground defining the total floodplain width

NORTH INLET CHANNEL

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
20788.34	175		na
20787.34	175		na
20787	culvert		
20456.34	118.89	145	-26.11
20408.7*	118.95		118.95
20361.2*	118.89		118.89
20313.7*	118.96		118.96
20266.1*	118.9		118.9
20218.6*	118.96		118.96
20171.0*	118.9		118.9
20123.5*	118.97		118.97
20075.9*	119.04		119.04
20028.4*	118.98		118.98
19980.8*	119.05		119.05
19933.3*	118.99		118.99
19885.8*	119.06		119.06
19838.2*	119		119
19790.7*	119.07		119.07
19743.1*	119.02		119.02
19695.6*	119.09		119.09
19648.0*	119.16		119.16
19600.5*	119.1		119.1
19552.9*	119.17		119.17
19505.4*	119.12		119.12
19457.9*	119.19		119.19
19410.3*	119.14		119.14
19362.8*	119.21		119.21
19315.2*	119.29		119.29
19267.7*	119.23		119.23
19220.1*	119.31		119.31
19172.6*	119.26		119.26
19125.0*	119.33		119.33
19077.5*	119.28		119.28
19030	119.36	145	-25.64
19015	97.38		na
19000	56.23		na

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
20788.34	9912.5	10087.5	175		na	
20787.34	9912.5	10087.5	175		na	
20787			culvert			
20456.34	9940.56	10059.44	118.88	93	25.6	FP/FW is delineated to top of channel banks.
20408.7*	9940.52	10059.48	118.96		119.0	
20361.2*	9940.55	10059.45	118.9		118.9	
20313.7*	9940.52	10059.48	118.96		119.0	
20266.1*	9940.55	10059.45	118.9		118.9	
20218.6*	9940.52	10059.48	118.96		119.0	
20171.0*	9940.55	10059.45	118.9		118.9	
20123.5*	9940.52	10059.48	118.96		119.0	
20075.9*	9940.48	10059.52	119.04		119.0	
20028.4*	9940.51	10059.49	118.98		119.0	
19980.8*	9940.48	10059.53	119.05		119.1	
19933.3*	9940.5	10059.5	119		119.0	
19885.8*	9940.47	10059.53	119.06		119.1	
19838.2*	9940.5	10059.5	119		119.0	
19790.7*	9940.47	10059.54	119.07		119.1	
19743.1*	9940.49	10059.51	119.02		119.0	
19695.6*	9940.46	10059.54	119.08		119.1	
19648.0*	9940.42	10059.58	119.16		119.2	
19600.5*	9940.45	10059.55	119.1		119.1	
19552.9*	9940.41	10059.59	119.18		119.2	
19505.4*	9940.44	10059.56	119.12		119.1	
19457.9*	9940.41	10059.59	119.18		119.2	
19410.3*	9940.43	10059.61	119.18		119.2	
19362.8*	9940.4	10059.61	119.21		119.2	
19315.2*	9940.36	10059.64	119.28		119.3	
19267.7*	9940.38	10059.62	119.24		119.2	
19220.1*	9940.35	10059.65	119.3		119.3	
19172.6*	9940.37	10059.63	119.26		119.3	
19125.0*	9940.34	10059.67	119.33		119.3	
19077.5*	9940.36	10059.64	119.28		119.3	
19030	9940.32	10059.68	119.36	145	-25.6	FP/FW is delineated to top of channel banks.
19015	9951.31	10048.69	97.38		na	
19000	9971.89	10028.11	56.22		na	

NORTH INLET CHANNEL

FW Top Width Check											
5% of FIRM scale = 50'										Wood/Patel Check	
River Station	Top Width (model)	Top Width (map)	Difference		River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
18986	64.98		na		18986	9967.51	10032.49	64.98		na	
18958	97.52		na		18958	9951.24	10048.76	97.52		na	
18943	119.19	145	**-25.81**		18943	9940.41	10059.59	119.18	145	**-26.0**	FP/FW is delineated to top of channel banks.
18900.0*	119.18		**119.18**		18900.0*	9940.41	10059.59	119.18		119.2	
18857.1*	119.17		**119.17**		18857.1*	9940.42	10059.58	119.16		119.2	
18814.2*	119.28		**119.28**		18814.2*	9940.36	10059.64	119.28		119.3	
18771.2*	119.27		**119.27**		18771.2*	9940.36	10059.64	119.28		119.3	
18728.3*	119.27		**119.27**		18728.3*	9940.37	10059.63	119.26		119.3	
18685.4*	119.26		**119.26**		18685.4*	9940.37	10059.63	119.26		119.3	
18642.5*	119.38		**119.38**		18642.5*	9940.31	10059.69	119.38		119.4	
18599.58	119.36	145	**-25.64**		18599.58	9940.32	10059.68	119.36	145	**-25.6**	FP/FW is delineated to top of channel banks.
18584.58	97.38		na		18584.58	9951.31	10048.69	97.38		na	
18569.58	56.22		na		18569.58	9971.89	10028.11	56.22		na	
18555.58	64.96		na		18555.58	9967.52	10032.48	64.96		na	
18527.58	97.51		na		18527.58	9951.25	10048.75	97.5		na	
18512.58	119.17	145	**-25.83**		18512.58	9940.42	10059.58	119.16	145	**-26.1**	FP/FW is delineated to top of channel banks.
18476.2*	119.21		**119.21**		18476.2*	9940.39	10059.61	119.22		119.2	
18439.8*	119.27		**119.27**		18439.8*	9940.37	10059.63	119.26		119.3	
18403.5*	119.31		**119.31**		18403.5*	9940.34	10059.66	119.32		119.3	
18367.14	119.36	145	**-25.64**		18367.14	9940.32	10059.68	119.36	145	**-26.1**	FP/FW is delineated to top of channel banks.
18352.14	97.38		na		18352.14	9951.31	10048.69	97.38		na	
18337.14	56.21		na		18337.14	9971.9	10028.11	56.21		na	
18323.14	63.43		na		18323.14	9968.29	10031.71	63.42		na	
18295.14	96.29		na		18295.14	9951.85	10048.15	96.3		na	
18280.14	117.35		**117.35**		18280.14	9941.33	10058.67	117.34	146	**-28.3**	FP/FW is delineated to top of channel banks.
18241.5*	117.85		**117.85**		18241.5*	9941.08	10058.92	117.84		117.8	
18202.8*	118.36		**118.36**		18202.8*	9940.82	10059.18	118.36		118.4	
18164.2*	118.87		**118.87**		18164.2*	9940.57	10059.43	118.86		118.9	
18125.5*	119.39		**119.39**		18125.5*	9940.31	10059.69	119.38		119.4	
18086.94	119.91	145	**-25.09**		18086.94	9940.04	10059.96	119.92	144	**-24.5**	FP/FW is delineated to top of channel banks.
18071.94	97.73		na		18071.94	9951.13	10048.87	97.74		na	
18056.94	56.5		na		18056.94	9971.75	10028.25	56.5		na	
18042.94	65.08		na		18042.94	9967.46	10032.54	65.08		na	
18014.94	97.6		na		18014.94	9951.2	10048.8	97.6		na	
17999.94	119.31	145	**-25.69**		17999.94	9940.35	10059.65	119.3	145	**-25.3**	FP/FW is delineated to top of channel banks.
17974.8*	119.33		**119.33**		17974.8*	9940.33	10059.67	119.34		119.3	

NORTH INLET CHANNEL

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
17949.76	119.36	145	**-25.64**
17934.76	97.38		**na**
17919.76	56.23		**na**
17905.76	65.08		**na**
17877.76	97.6		**na**
17862.76	119.31	145	**-25.69**
17837.6*	119.33		**119.33**
17812.59	119.36	145	**-25.64**
17797.59	97.38		**na**
17782.59	56.23		**na**
17764.59	64.82		**na**
17735.59	97.38		**na**
17720.59	118.97	145	**-26.03**
17673.*	119.04		**119.04**
17625.4*	118.98		**118.98**
17577.8*	119.05		**119.05**
17530.2*	119.12		**119.12**
17482.6*	119.06		**119.06**
17435.0*	119.13		**119.13**
17387.5*	119.08		**119.08**
17339.9*	119.15		**119.15**
17292.3*	119.22		**119.22**
17244.7*	119.17		**119.17**
17197.1*	119.24		**119.24**
17149.5*	119.19		**119.19**
17101.9*	119.26		**119.26**
17054.4*	119.33		**119.33**
17006.8*	119.28		**119.28**
16959.23	119.36	145	**-25.64**
16944.23	97.38		**na**
16929.23	56.22		**na**
16911.23	64.82		**na**
16882.23	97.38		**na**
16867.23	119.1	145	**-25.9**
16819.3*	119.17		**119.17**
16771.4*	119.11		**119.11**

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
17949.76	9940.32	10059.68	119.36	144	**-24.8**	FP/FW is delineated to top of channel banks.
17934.76	9951.31	10048.69	97.38		**na**	
17919.76	9971.89	10028.12	56.23		**na**	
17905.76	9967.46	10032.54	65.08		**na**	
17877.76	9951.2	10048.8	97.6		**na**	
17862.76	9940.35	10059.65	119.3	143	**-23.8**	FP/FW is delineated to top of channel banks.
17837.6*	9940.33	10059.67	119.34		**119.3**	
17812.59	9940.32	10059.68	119.36	144	**-24.5**	FP/FW is delineated to top of channel banks.
17797.59	9951.31	10048.69	97.38		**na**	
17782.59	9971.89	10028.12	56.23		**na**	
17764.59	9967.59	10032.41	64.82		**na**	
17735.59	9951.31	10048.69	97.38		**na**	
17720.59	9940.52	10059.49	118.97	145	**-25.9**	FP/FW is delineated to top of channel banks.
17673.*	9940.48	10059.52	119.04		**119.0**	
17625.4*	9940.51	10059.49	118.98		**119.0**	
17577.8*	9940.48	10059.53	119.05		**119.1**	
17530.2*	9940.44	10059.56	119.12		**119.1**	
17482.6*	9940.47	10059.53	119.06		**119.1**	
17435.0*	9940.43	10059.57	119.14		**119.1**	
17387.5*	9940.46	10059.54	119.08		**119.1**	
17339.9*	9940.43	10059.57	119.14		**119.1**	
17292.3*	9940.39	10059.61	119.22		**119.2**	
17244.7*	9940.42	10059.58	119.16		**119.2**	
17197.1*	9940.38	10059.62	119.24		**119.2**	
17149.5*	9940.41	10059.59	119.18		**119.2**	
17101.9*	9940.37	10059.63	119.26		**119.3**	
17054.4*	9940.33	10059.67	119.34		**119.3**	
17006.8*	9940.36	10059.64	119.28		**119.3**	
16959.23	9940.32	10059.68	119.36	145	**-25.1**	FP/FW is delineated to top of channel banks.
16944.23	9951.31	10048.69	97.38		**na**	
16929.23	9971.89	10028.11	56.22		**na**	
16911.23	9967.59	10032.41	64.82		**na**	
16882.23	9951.31	10048.69	97.38		**na**	
16867.23	9940.45	10059.55	119.1	145	**-25.5**	FP/FW is delineated to top of channel banks.
16819.3*	9940.42	10059.58	119.16		**119.2**	
16771.4*	9940.44	10059.56	119.12		**119.1**	

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
16723.5*	119.18		**119.18**
16675.6*	119.12		**119.12**
16627.7*	119.19		**119.19**
16579.8*	119.13		**119.13**
16531.9*	119.2		**119.2**
16484.0*	119.14		**119.14**
16436.1*	119.21		**119.21**
16388.2*	119.29		**119.29**
16340.3*	119.23		**119.23**
16292.4*	119.3		**119.3**
16244.5*	119.25		**119.25**
16196.6*	119.32		**119.32**
16148.7*	119.27		**119.27**
16100.8*	119.34		**119.34**
16052.9*	119.29	145	**-25.71**
16005.09	119.36		**na**
15990.09	97.38		**na**
15975.09	56.21		**na**
15950.09	64.72		**na**
15928.0*	85.19		**na**
15926.0*	86.99		**na**
15916.09	96.08		**na**
15901.09	127.08	145	**-17.92**
15855.5*	127.34		**127.34**
15809.9*	127.49		**127.49**
15764.3*	127.75		**127.75**
15718.8*	127.91		**127.91**
15673.2*	128.17		**128.17**
15627.6*	128.34		**128.34**
15582.1*	128.6		**128.6**
15536.5*	128.77		**128.77**
15491.*	128.94		**128.94**
15455.43	129.21		**na**
15445.43	culvert		**na**
15042.37	90.85		**na**

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
16723.5*	9940.41	10059.59	119.18		119.2	
16675.6*	9940.44	10059.56	119.12		119.1	
16627.7*	9940.4	10059.6	119.2		119.2	
16579.8*	9940.43	10059.57	119.14		119.1	
16531.9*	9940.4	10059.6	119.2		119.2	
16484.0*	9940.43	10059.57	119.14		119.1	
16436.1*	9940.39	10059.61	119.22		119.2	
16388.2*	9940.36	10059.64	119.28		119.3	
16340.3*	9940.38	10059.62	119.24		119.2	
16292.4*	9940.35	10059.65	119.3		119.3	
16244.5*	9940.38	10059.63	119.25		119.3	
16196.6*	9940.34	10059.66	119.32		119.3	
16148.7*	9940.37	10059.63	119.26		119.3	
16100.8*	9940.33	10059.67	119.34		119.3	
16052.9*	9940.36	10059.64	119.28		**na**	
16005.09	9940.32	10059.68	119.36	145	**-25.9**	FP/FW is delineated to top of channel banks.
15990.09	9951.31	10048.69	97.38		**na**	
15975.09	9971.89	10028.11	56.22		**na**	
15950.09	9967.64	10032.36	64.72		**na**	
15928.0*	9957.4	10042.6	85.2		**na**	
15926.0*	9956.5	10043.5	87		**na**	
15916.09	9951.96	10048.04	96.08		**na**	
15901.09	9941.46	10068.54	127.08	146	**-18.8**	FP/FW is delineated to top of channel banks.
15855.5*	9941.33	10068.67	127.34		127.3	
15809.9*	9941.25	10068.75	127.5		127.5	
15764.3*	9941.12	10068.88	127.76		127.8	
15718.8*	9941.04	10068.96	127.92		127.9	
15673.2*	9940.91	10069.09	128.18		128.2	
15627.6*	9940.83	10069.17	128.34		128.3	
15582.1*	9940.7	10069.3	128.6		128.6	
15536.5*	9940.61	10069.39	128.78		128.8	
15491.*	9940.53	10069.47	128.94		128.9	
15455.43	9940.4	10069.6	129.2		**na**	
15445.43			culvert		**na**	
15042.37	9980.83	10071.61	90.78		**na**	

FW Top Width Check												
5% of FIRM scale = 50'					Wood/Patel Check							
River Station	Top Width (model)	Top Width (map)	Difference		River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
XSs not on workmap. modeled for engineering design only.												
					1. Left encroachment station defining the floodway boundary on the left side.							
					2. Right encroachment station defining the floodway boundary on the right side.							
					3. Difference between the left and right encroachment stations defining the total floodway width.							

Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH (map)	Difference
34	500	500	0
33	530	550	-20
32	460	480	-20
31	515	550	-35
30	440	440	0
29	450	450	0
28	200	500	-300
27	430	450	-20
26	385	360	25
25	300	300	0
24	250	250	0
23	180	200	-20
22	495	500	-5
21	505	500	5
20	480	500	-20
19	555	550	5
18	445	450	-5
17	480	500	-20
16	500	500	0
15	500	500	0
14	500	500	0
13	565.6	560	5.6
12.4	90	90	0
12.2	90	90	0
12			
11.8	370	350	20
11	450	450	0
10	520	500	20
9	515	520	-5
8	500	490	10
7	495	500	-5
6	505	500	5
5	500	500	0
4	500	500	0
3	460	450	10
2	230	230	0
1	60	70	-10
0.8			
0.7	203	200	3
0.6	420	420	0
0.5	390	400	-10
0.4	480	500	-20
0.3	470	490	-20
0.2	490	500	-10
0.1	480	500	-20
0.042	500	500	0
0.041	400	400	0
0.04	500	500	0
0.039			

Wood/Patel Check

River Station	XLCH (Model)	XLCH (map)	Difference
34	500	519	-19
33	530	527	3
32	460	464	-4
31	515	538	-23
30	440	465	-25
29	450	449	1
28	500	510	-10
27	430	443	-13
26	385	390	-5
25	300	311	-11
24	250	247	3
23	180	186	-6
22	495	498	-3
21	505	502	3
20	480	489	-9
19	555	543	12
18	445	446	-1
17	480	501	-21
16	500	494	6
15	500	502	-2
14	500	503	-3
13	566	564	1
12.4	90	93	-3
12.2	90	97	-7
12			
11.8	370	367	3
11	450	449	1
10	520	522	-2
9	515	526	-11
8	500	485	15
7	495	506	-11
6	505	499	6
5	500	501	-1
4	500	505	-5
3	460	459	1
2	230	252	-22
1	60	84	-24
0.8			
0.7	203	202	1
0.6	420	422	-2
0.5	390	385	5
0.4	480	476	4
0.3	470	469	1
0.2	490	492	-2
0.1	480	490	-10
0.042	500	501	-1
0.041	400	400	0
0.04	500	501	-1
0.039	0	0	na

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
34	108.99	350	-241.01
33	308.94	310	**-1.06**
32	396.71	600	-203.29
31	476.1	700	-223.9
30	273.42	620	-346.58
29	550.04	700	-149.96
28	340.98	910	-569.02
27	207.86	350	-142.14
26	51.21	430	-378.79
25	88.35	250	-161.65
24	82.26	150	-67.74
23	402.11	450	**-47.89**
22	126.09	150	**-23.91**
21	113.78	100	**13.78**
20	81.31	110	**-28.69**
19	100.86	120	**-19.14**
18	166.08	150	**16.08**
17	193.89	240	**-46.11**
16	602.53	800	-197.47
15	340.7	370	**-29.3**
14	305.04	300	**5.04**
13	94.05	220	-125.95
12.4	873.64	860	**13.64**
12.2	1270.06	1260	**10.06**
12			**0**
11.8	309.66	300	**9.66**
11	65.46	70	**-4.54**
10	77.15	90	**-12.85**
9	78.73	90	**-11.27**
8	64.25	80	**-15.75**
7	73	100	**-27**
6	56.31	60	**-3.69**
5	57.6	80	**-22.4**
4	141.57	140	**1.57**
3	44.02	40	**4.02**

certified levee

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
34	9895.64	10004.71	109	114.19	5.12	
33	9777.94	10097.25	319	320.35	1.04	
32	9881.33	10486.34	605	601.81	-3.20	
31	9573.19	10270.3	697	695.05	-2.06	
30	9968.3	10576.71	608	596.53	-11.88	
29	9703	10398.61	696	701.61	6.00	
28	9504.8	10430.97	926	920.21	-5.96	
27	9984.76	10334.65	350	339.64	-10.25	
26	9795.42	10199.88	404	398.81	-5.65	
25	9983.03	10254.23	271	272.70	1.50	
24	9692.52	10123.54	431	431.53	0.51	
23	9750.74	10384.97	634	635.56	1.33	
22	9750.28	10092.56	342	344.15	1.87	
21	9733.36	10163.82	430	432.68	2.22	
20	9753.04	10053.39	300	300.83	0.48	
19	9748.59	10042.32	294	293.42	-0.31	
18	9786.92	10123.59	337	337.61	0.94	
17	9859.53	10190.16	331	329.20	-1.43	
16	9928.13	10770.21	842	838.13	-3.95	
15	9894.68	10331.47	437	443.53	6.74	
14	9950.87	10255.99	305	306.92	1.80	
13	9938.61	10156.85	218	221.80	3.56	
12.4	9564	10437.65	874	873.07	-0.58	
12.2	9799.87	11069.93	1270	1278.88	8.82	
12						
11.8	9969.71	10279.38	310	309.49	-0.18	
11	9971.76	10045	73	73.61	0.37	
10	9963.84	10056.46	93	91.81	-0.81	
9	9959.73	10047.89	88	89.62	1.46	
8	9981.81	10070.75	89	90.55	1.61	
7	9971.96	10059.08	87	89.40	2.28	
6	9964.14	10020.41	56	56.66	0.39	
5	9965.2	10049.7	85	87.36	2.86	
4	9988.92	10130.48	142	138.43	-3.13	
3	9991.14	10035.17	44	42.57	-1.46	

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
2	359.16	400	**-40.84**
1	303.04	300	**3.04**
0.8			**0**
0.7	218.54	200	**18.54**
0.6	93.38	160	**-66.62**
0.5	202.87	240	**-37.13**
0.4	312.16	310	**2.16**
0.3	53.16	90	**-36.84**
0.2	265.74	340	**-74.26**
0.1	308.22	400	**-91.78**
0.042	477.88	480	**-2.12**
0.041	418.1	420	**-1.9**
0.04	305.88	360	**-54.12**
0.039	421.98	430	**-8.02**

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
2	9901.1	10287.8	387	391.07	4.37	
1	9708.17	10010.93	303	304.98	2.22	
0.8						
0.7	9790.67	10009.21	219	212.89	-5.65	
0.6	9905.34	10074.79	169	167.12	-2.33	
0.5	9814.82	10063.13	248	246.26	-2.05	
0.4	9725.92	10037.99	312	312.88	0.81	
0.3	9918.71	10010.29	92	94.16	2.58	
0.2	9719.22	10054.18	335	337.27	2.31	
0.1	9637.67	10044.87	407	409.16	1.96	
0.042	9582.75	10060.63	478	480.36	2.48	
0.041	9632.81	10052.62	420	420.17	0.36	
0.04	9688.07	10047.66	360	358.27	-1.32	
0.039	9626.8	10058	431	433.83	2.63	

1. The left station is where the water surface intersects existing ground defining the floodplain boundary on the left side from the Perryville Road Wash HEC-RAS model with no levee condition.

2. The right station is where the water surface intersects existing ground defining the floodplain boundary on the right side from the Perryville Road Wash HEC-RAS model with levee condition.

3. This column is subtracting the left and right stations where water intersects the ground defining the total floodplain width. Note that using the left and right water surface stations from the two different models is accounting for the widest floodplain.

Channel Length Check

5% of FIRM scale = 50'

River Station	XLCH (Model)	XLCH (map)	Difference
34	500	500	0
33	530.00	550	-20
32	460	480	-20
31	515	550	-35
30	440	440	0
29	450	450	0
28	500	500	0
27	430	450	-20
26	385.00	360	25
25	300.00	300	0
24	250	250	0
23	180	200	-20
22	495	500	-5
21	505	500	5
20	480	500	-20
19	555	550	5
18	445.00	450	-5
17	480.00	500	-20
16	500	500	0
15	500	500	0
14	500	500	0
13	565.6	560	5.6
12.4	90	90	0
12.2	90	90	0
12			
11.8	370	350	20
11	450	450	0
10	520	500	20
9	515	520	-5
8	500	490	10
7	495	500	-5
6	505	500	5
5	500	500	0
4	500	500	0
3	460	450	10
2	230	230	0
1	60	70	-10
0.8			
0.7	203	200	3
0.6	420	420	0
0.5	390	400	-10
0.4	480	500	-20
0.3	470	490	-20
0.2	490	500	-10
0.1	480	500	-20
0.042	500	500	0
0.041	400	400	0
0.04	500	500	0
0.039			

Wood/Patel Check

River Station	XLCH (Model)	XLCH (map)	Difference
34	500	519	-19
33	530	527	3
32	460	464	-4
31	515	538	-23
30	440	465	-25
29	450	449	1
28	500	510	-10
27	430	443	-13
26	385	390	-5
25	300	311	-11
24	250	247	3
23	180	186	-6
22	495	498	-3
21	505	502	3
20	480	489	-9
19	555	543	12
18	445	446	-1
17	480	501	-21
16	500	494	6
15	500	502	-2
14	500	503	-3
13	566	564	1
12.4	90	93	-3
12.2	90	97	-7
12			
11.8	370	367	3
11	450	449	1
10	520	522	-2
9	515	526	-11
8	500	485	15
7	495	506	-11
6	505	499	6
5	500	501	-1
4	500	505	-5
3	460	459	1
2	230	252	-22
1	60	84	-24
0.8			
0.7	203	202	1
0.6	420	422	-2
0.5	390	385	5
0.4	480	476	4
0.3	470	469	1
0.2	490	492	-2
0.1	480	490	-10
0.042	500	501	-1
0.041	400	400	0
0.04	500	501	-1
0.039	0	0	na

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
34	109.09	350	-240.91
33	304.47	310	**-5.53**
32	401.75	600	-198.25
31	476.52	700	-223.48
30	273.42	620	-346.58
29	546.4	700	-153.6
28	351.1	910	-558.9
27	186.61	350	-163.39
26	58.93	430	-371.07
25	84.73	275	-190.27
24	134.51	400	-265.49
23	537.76	650	-112.24
22	283.84	340	-56.16
21	101.72	420	-318.28
20	212.23	300	-87.77
19	226	300	-74
18	226.17	350	-123.83
17	245.19	330	-84.81
16	594.68	840	-245.32
15	390.08	450	-59.92
14	308.97	300	**8.97**
13	114.7	220	-105.3
12.4	873.64	860	**13.64**
12.2	1270.06	1260	**10.06**
12			**0**
11.8	309.66	300	**9.66**
11	65.46	70	**-4.54**
10	77.15	90	**-12.85**
9	78.73	90	**-11.27**
8	64.25	80	**-15.75**
7	73	100	**-27**
6	56.21	60	**-3.79**
5	57.52	80	**-22.48**

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
34	9895.64	10004.71	109	114.19	5.12	
33	9777.94	10097.25	319	320.35	1.04	
32	9881.33	10486.34	605	601.81	-3.20	
31	9573.19	10270.3	697	695.05	-2.06	
30	9968.3	10576.71	608	596.53	-11.88	
29	9703	10398.61	696	701.61	6.00	
28	9504.8	10430.97	926	920.21	-5.96	
27	9984.76	10334.65	350	339.64	-10.25	
26	9795.42	10199.88	404	398.81	-5.65	
25	9983.03	10254.23	271	272.70	1.50	
24	9692.52	10123.54	431	431.53	0.51	
23	9750.74	10384.97	634	635.56	1.33	
22	9750.28	10092.56	342	344.15	1.87	
21	9733.36	10163.82	430	432.68	2.22	
20	9753.04	10053.39	300	300.83	0.48	
19	9748.59	10042.32	294	293.42	-0.31	
18	9786.92	10123.59	337	337.61	0.94	
17	9859.53	10190.16	331	329.20	-1.43	
16	9928.13	10770.21	842	838.13	-3.95	
15	9894.68	10331.47	437	443.53	6.74	
14	9950.87	10255.99	305	306.92	1.80	
13	9938.61	10156.85	218	221.80	3.56	
12.4	9564	10437.65	874	873.07	-0.58	
12.2	9799.87	11069.93	1270	1278.88	8.82	
12						
11.8	9969.71	10279.38	310	309.49	-0.18	
11	9971.76	10045	73	73.61	0.37	
10	9963.84	10056.46	93	91.81	-0.81	
9	9959.73	10047.89	88	89.62	1.46	
8	9981.81	10070.75	89	90.55	1.61	
7	9971.96	10059.08	87	89.40	2.28	
6	9964.14	10020.41	56	56.66	0.39	
5	9965.2	10049.7	85	87.36	2.86	

FP Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
4	141.52	140	**1.52**
3	44.08	40	**4.08**
2	356.36	400	**-43.64**
1	302.72	300	**2.72**
0.8			**0**
0.7	218.54	200	**18.54**
0.6	92.35	160	**-67.65**
0.5	202.99	240	**-37.01**
0.4	312.06	310	**2.06**
0.3	53.17	90	**-36.83**
0.2	265.6	340	**-74.4**
0.1	308.22	400	**-91.78**
0.042	477.88	480	**-2.12**
0.041	418.1	420	**-1.9**
0.04	305.88	360	**-54.12**
0.039	421.98	430	**-8.02**

Wood/Patel Check

River Station	Sta W.S. Lft[1]	Sta W.S. Rgt[2]	FP Width (model)[3]	Top Width (map)	Difference	Comments
4	9988.92	10130.48	142	138.43	-3.13	
3	9991.14	10035.17	44	42.57	-1.46	
2	9901.1	10287.8	387	391.07	4.37	
1	9708.17	10010.93	303	304.98	2.22	
0.8						
0.7	9790.67	10009.21	219	212.89	-5.65	
0.6	9905.34	10074.79	169	167.12	-2.33	
0.5	9814.82	10063.13	248	246.26	-2.05	
0.4	9725.92	10037.99	312	312.88	0.81	
0.3	9918.71	10010.29	92	94.16	2.58	
0.2	9719.22	10054.18	335	337.27	2.31	
0.1	9637.67	10044.87	407	409.16	1.96	
0.042	9582.75	10060.63	478	480.36	2.48	
0.041	9632.81	10052.62	420	420.17	0.36	
0.04	9688.07	10047.66	360	358.27	-1.32	
0.039	9626.8	10058	431	433.83	2.63	

1. The left station is where the water surface intersects existing ground defining the floodplain boundary on the left side from the Perryville Road Wash HEC-RAS model with no levee condition.

2. The right station is where the water surface intersects existing ground defining the floodplain boundary on the right side from the Perryville Road Wash HEC-RAS model with levee condition.

3. This column is subtracting the left and right stations where water intersects the ground defining the total floodplain width. Note that using the left and right water surface stations from the two different models is accounting for the widest floodplain.

PERRYVILLE ROAD WASH - WITHOUT LEVEE

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
34	110.26	100	**10.26**
33	139	125	**14**
32	135	125	**10**
31	132.68	150	**-17.32**
30	130	110	**20**
29	130	140	**-10**
28	155	150	**5**
27	116	100	**16**
26	34.76	30	**4.76**
25	78.95	75	**3.95**
24	61.27	75	**-13.73**
23	123.32	120	**3.32**
22	124	75	**49**
21	58.18	50	**8.18**
20	83.34	75	**8.34**
19	95.06	100	**-4.94**
18	171.31	200	**-28.69**
17	226.28	260	**-33.72**
16	215.66	240	**-24.34**
15	138.99	140	**-1.01**
14	95	100	**-5**
13	97.13	100	**-2.87**
12.4	328	350	**-22**
12.2	345	350	**-5**
12			**0**
11.8	267	270	**-3**
11	65.67	70	**-4.33**
10	68.93	70	**-1.07**
9	73.68	70	**3.68**
8	60.26	50	**10.26**
7	65.88	75	**-9.12**
6	56.08	50	**6.08**
5	52.17	50	**2.17**
4	65.41	60	**5.41**
3	44.08	50	**-5.92**
2	86.05	80	**6.05**
1	220.92	240	**-19.08**
0.8			**0**

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
34	9895.64	10004.73	109.09	114.19	5.1	
33	9875	10014	139	137.88	-1.12	
32	9987	10122	135	134.02	-0.98	
31	9970	10109	139	133.95	-5.05	
30	9968.3	10100	131.7	130.01	-1.69	
29	9970	10100	130	137.68	7.68	
28	9945	10100	155	159.12	4.12	
27	9984.76	10100	115.24	107.36	-7.88	
26	9975	10020	45	36.1	-8.9	
25	9983.03	10077	93.97	82.7	-11.27	
24	9943	10033	90	80.46	-9.54	
23	9961	10106	145	135	-10	
22	9970	10082.98	112.98	120.77	7.79	
21	9970	10055	85	79.64	-5.36	
20	9967	10050.87	83.87	81.72	-2.15	
19	9942	10025.11	83.11	89.33	6.22	
18	9900	10031	131	130.54	-0.46	
17	9920	10168.13	248.13	259.88	11.75	
16	9986	10330	344	337.48	-6.52	
15	9980	10120	140	138.9	-1.1	
14	9950.87	10045	94.13	95.5	1.37	
13	9938.61	10050	111.39	111.41	0.02	
12.4	9945	10273	328	328.97	0.97	
12.2	9844	10189	345	343.68	-1.32	
12						
11.8	9973	10240	267	278.73	11.73	
11	9971.76	10045	73.24	73.61	0.37	
10	9963.84	10035	71.16	67.88	-3.28	
9	9959.73	10036	76.27	74.13	-2.14	
8	9981.81	10053	71.19	64.58	-6.61	
7	9971.96	10040	68.04	65.93	-2.11	
6	9964.14	10020.34	56.2	56.61	0.41	
5	9965.2	10017	51.8	52.91	1.11	
4	9988.92	10054	65.08	64.58	-0.5	
3	9991.14	10035.22	44.08	42.16	-1.92	
2	9924	10012	88	81.1	-6.9	
1	9790	10010.89	220.89	232.68	11.79	
0.8						

PERRYVILLE ROAD WASH - WITHOUT LEVEE

FW Top Width Check

5% of FIRM scale = 50'

River Station	Top Width (model)	Top Width (map)	Difference
0.7			
0.6			
0.5			
0.4			
0.3			
0.2			
0.1			
0.042			
0.041			
0.04			
0.039			

no effective floodway, none proposed

Wood/Patel Check

River Station	Enc Sta L[1]	Enc Sta R[2]	FW Width (model)[3]	FW Width (map)	Difference	Comments
0.7	9850	10009.21	159.21	153.57	-5.64	
0.6						
0.5						
0.4						
0.3						
0.2						
0.1						
0.042						
0.041						
0.04						
0.039						

1. Left encroachment station defining the floodway boundary on the left side.
2. Right encroachment station defining the floodway boundary on the right side.
3. Difference between the left and right encroachment stations defining the total floodway width.

APPENDIX B

HEC-2 Output Files for Duplicate Effective FIS Model

APPENDIX B1

Beardsley Canal Wash (HEC-2)

```
1*****************************************
 *  HEC-2 WATER SURFACE PROFILES          *
 *                                        *
 *  Version   4.6.2;  May 1991            *
 *                                        *
 *  RUN DATE    02NOV06    TIME   15:28:02 *
 *****************************************
```

```
*****************************************
*  U.S. ARMY CORPS OF ENGINEERS         *
*  HYDROLOGIC ENGINEERING CENTER        *
*  609 SECOND STREET, SUITE D           *
*  DAVIS, CALIFORNIA 95616-4687         *
*          (916) 756-1104               *
*****************************************
```

```
X     X  XXXXXXX   XXXXX             XXXXX
X     X  X        X     X           X     X
X     X  X        X                 X     X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                 X
X     X  X        X     X           X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

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1
    02NOV06       15:28:02                                                                PAGE    1


                                                                THIS RUN EXECUTED 02NOV06    15:28:02
 ************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
 ************************************


T1      WHITE TANKS / AGUA FRIA AREA DRAINAGE MASTER STUDY
T2      100 - YEAR STORM EVENT     FLOODPLAIN RUN       FILE:  1.H2I
T3      WASH "1" - BEARDSLEY CANAL - WHITE TANKS STRUCTURE #3 NORTH TO PEORIA AV

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0         2         0         0       .0055       0         0         0       1195        0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0         0         0         0         0         0         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         1        53        21        22        54        51         4         8
     42         5        26         0       110         0       200

NC      .03       .04       .028        .1         .3
QT        2      4414      4414
ET                           9.1                                                    9947.34   10139.22
          BEGIN BACKWATER ANALYSIS AT NORMAL DEPTH.  TIE FLOODPLAIN INTO 100-YR
          PONDING WATER SURFACE BEHIND WHITE TANKS STRUCTURE #3

          Q @ X1 = 0.000 TO X1 = 0.390 EQUALS Q AT CP12 + (.7) Q AT SUB-WT3
          Q = 4125 + (.7)413  =4414 CFS

X1    0.000        20      9960     10120     0.000     0.000     0.000
GR     1210      9875      1200      9895      1198      9905      1196      9915      1194      9930
GR     1192      9960      1190      9970    1189.4     10000    1189.5     10030    1189.6     10100
GR     1190     10120      1192     10135      1194     10145      1196     10155    1196.7     10190
GR   1197.6     10270    1197.1     10295      1198     10320      1200     10350    1200.4     10365

ET                           9.1                                                    9948.33   10160.30
X1    0.070        13      9960     10155       360       370       370
GR     1210      9900      1200      9920      1198      9930      1196      9940      1194      9960
GR   1192.4     10000      1192     10110      1194     10155    1196.2     10165    1195.7     10205
GR     1196     10235      1198     10440      1200     10670

ET                           9.1                                                    9907.83   10260.83
X1    0.156        17      9910     10150       460       450       455
GR     1210      9875      1200      9895      1198      9910      1196      9940      1194     10000
GR   1193.9     10020      1194     10045      1196     10080      1198     10150      1197     10200
       1198     10250      1200     10325      1202     10455    1203.2     10490      1202     10540
       1204     10560      1206     10575
1
```

```
NH       4       .04      9970       .03      10115       .03      10260       .04      10285
ET                        9.1                                                          9954.33      10115
X1   0.231         18      9925      10115        400       325        395
GR    1210       9910      1202       9925       1200      9955       1198      9970      1196      10000
GR  1196.1      10025      1196      10045       1198     10075       1200     10105    1200.5      10115
GR    1200      10135      1198      10150       1196     10160     1195.3     10165      1196      10175
GR    1198      10190      1200      10260     1200.4     10285

NH       6       .03      9775       .03       9890       .025      10055       .04      10245        .03
NH   10340       .04     10655
ET                        9.1                                                          9881.25      10065
X1   0.307         23      9785      10065        345       360        400
GR    1210       9775      1206       9785       1204      9825       1202      9890      1200       9935
GR    1198       9980    1197.7      10000       1198     10015       1200     10030      1202      10040
GR    1204      10055      1206      10065       1206     10165       1204     10245      1202      10255
GR    1200      10275    1199.4      10285       1200     10300       1202     10315      1204      10340
GR    1206      10480      1208      10615       1210     10655

NC     .03        .04       .03         .1         .3
ET                        9.1                                                          9931.33    10041.47
X1   0.390         11      9935      10040        420       480        440
GR    1209       9910      1208       9935       1206      9955       1204      9970      1202       9985
GR  1201.8      10000      1202      10010       1204     10020       1206     10030      1208      10040
GR    1210      10060

QT       2       4125      4125
ET                        9.1                                                          9922.83    10040.76

          Q @ X1 = 0.465 TO X1 = 0.770 EQUALS Q AT CP12
          Q = 4125 CFS

X1   0.465         15      9930      10030        410       390        395
GR  1217.4       9880      1216       9895       1214      9905       1212      9920      1210       9930
GR    1208       9950      1206       9990       1205     10000       1206     10010      1208      10020
GR    1210      10030      1212      10045       1214     10120       1216     10240      1218      10360

                          9.1                                                          9940.37      10100
     0.543         14      9950      10030        445       370        410
GR    1219       9910      1218       9920       1216      9930       1214      9940      1212       9950
GR    1210       9970      1208       9985     1206.7     10000       1208     10010      1210      10030
GR    1212      10120      1214      10175       1216     10245       1218     10320

ET                        9.1                                                          9954.5       10100
X1   0.620         13      9970      10060        410       410        410
GR  1220.7       9920      1220       9930       1212      9970       1210      9980      1208       9995
GR  1207.8      10000      1208      10005       1210     10020       1212     10060      1214      10290
GR    1216      10370      1218      10410       1220     10475
```



```
ET                        9.1                                                          9954.17    10045.83
X1   0.696         19      9970      10030        400       400        400
GR  1222.5       9920      1222       9930       1220      9940       1218      9950      1216       9960
GR    1214       9970      1212       9980       1210     10000       1212     10015      1214      10030
GR    1216      10040      1218      10050       1220     10075     1220.2     10110      1220      10130
GR    1219      10215      1220      10245     1218.6     10305       1220     10335

ET                        9.1                                                          9950.13    10071.28
X1   0.770         17      9970      10035        390       390        390
GR    1221       9930      1220       9950       1218      9960       1216      9970      1214       9975
GR    1212       9990    1211.3      10000       1212     10010       1214     10020      1216      10035
GR    1218      10170    1218.3      10190     1217.5     10225     1218.5     10260    1217.5      10310
GR    1218      10340      1220      10400

QT       2       3890      3890
ET                        9.1                                                          9943.22    10083.40

          Q @ X1 = 0.846 TO X1 = 0.998 EQUALS (Q AT CP12 + Q AT CP10)/2
          Q = (4125 + 3655)/2 = 3890 CFS

X1   0.846         14      9960      10040        400       400        400
GR  1222.3       9920      1222       9930       1220      9945       1218      9955      1216       9960
     1214        9975    1213.6      10000       1214     10025       1216     10040      1218      10060
    1218.3      10080      1218      10100       1220     10140       1222     10215
```

```
ET                      9.1                                                             9966.26     10070
X1     0.920      12    9970      10070       395        395        395
      1227.2    9935    1224       9955      1222       9965       1220       9970      1218       9980
      1216      9990    1215.6    10000      1216      10010       1218      10025      1220      10070
GR     1222    10100    1222.4    10110

ET                      9.1                                                             9969.28   10043.59
X1     0.998      10    9975      10035       410        410        410
GR    1230.3    9940    1230       9955      1224       9975       1220       9985      1218.3     10000
GR     1220    10015    1222      10025      1224      10035       1226      10045      1227.8     10055

NC      .03      .04     .03        .3        .5
QT        2     3655    3655
ET                      9.1                                                             9957.19   10032.60

         Q @ X1 = 1.074 TO X1 = 1.148 EQUALS Q AT CP10 (DOWNSTREAM OF DIVER-
         Q = 3655 CFS                                    SION AT NORTHERN AVE.)

X1     1.074      10    9965      10030       400        400        400
GR    1231.8    9930    1230       9950      1228       9965       1222       9985      1221      10000
GR     1222    10010    1228      10030      1230      10035       1232      10045      1233.5    10080

NC     .024     .024    .024        .3        .5
ET                      9.11                                                            9880      10069.42
1
   02NOV06     15:28:02                                                                        PAGE    4


         NORTHERN AVENUE
         CROSS SECTION EXTENDED - APPROXIMATELY 1486 CFS BREAKS OUT EAST OVER
         BEARDSLEY CANAL FOR NEXT THREE UPSTREAM CROSS SECTIONS.

X1     1.148      18    9989      10011       395        405        390
X3       10                                                                  1234.5    1234.5
GR    1234.5    9880    1234.5     9920      1232       9940       1230       9970      1228       9980
GR     1227     9989    1224.7     9990      1224       9992       1224.7     9994      1227       9995
GR     1227    10005    1224.7    10006      1224      10008       1224.7    10010      1227      10011
GR     1228    10020    1236      10080      1236.5    10230

          2     4150    4150
          1      1.5     2.5         0        16         .1        113        .41      1224.4     1224
ET                      9.11                                                            9886      10247.26

         Q @ X1 = 1.159 EQUALS Q AT CP10 MINUS A PORTION OF BREAKOUT FLOW TO
         Q = 5141 - 991 = 4150 CFS                                 THE EAST
         CROSS SECTION EXTENDED-FLOW WILL BREAKOUT TO THE EAST

         PONDING OCCURS IN THE RIGHT OVERBANK UPSTREAM OF CULVERTS.  THIS
         WILL PRECLUDE ESTABLISHING A FLOODWAY FOR THE NEXT TWO UPSTREAM CROSS
         SECTIONS.  NO LOSS OF VOLUME IS REQUIRED BECAUSE OF BREAKOUT.

X1     1.159      21    9989      10011        60         60         60
X2                         1      1230.4    1234.5
X3       10                                                                  1234.5    1234.5
BT       21     9886    1234.5    1234.5      9909      1234.5     1234.5      9916      1234.5    1234.5
BT     9927    1234.5   1234.5     9968      1234.6     1234.6      9989      1234.7    1227.4     9990
BT    1234.7   1229.7     9992    1234.72    1230.4       9994    1234.73     1229.7      9995    1234.75
BT    1227.4    10005   1234.8    1227.4     10006     1234.81     1229.7     10008    1234.82    1230.4
BT    10010   1234.83   1229.7     10011    1234.85     1227.4      10034      1238      1238      10080
BT     1238     1238    10115      1238      1238      10145       1238       1238     10200      1237
BT     1237    10280    1239       1239
GR    1234.5    9886    1234.5     9909     1233.75      9916      1229.7      9927      1228.7     9968
GR    1227.4    9989    1225.1     9990      1224.4      9992      1225.1      9994      1227.4     9995
GR    1227.4   10005    1225.1    10006      1224.4     10008      1225.1     10010      1227.4    10011
GR     1238    10034    1238      10080      1238      10115       1238      10145      1237      10200
GR     1239    10280

NC      .03      .05    .035        .3        .5
QT        2     4645    4645
ET                      9.1                                                             9950      10298.35

         Q AT X1 = 1.237 EQUALS Q AT CP10 MINUS A PORTION OF BREAKOUT FLOW TO
         Q = 5141 - 495 = 4645 CFS                       THE EAST
         CROSS SECTION EXTENDED-FLOW WILL BREAKOUT TO THE EAST

X1     1.237      18    9975      10030       390        390        410
GR    1237.1    9950    1236       9975      1230       9985       1228       9995      1227.8    10000
      1228     10010    1230      10020      1232      10030       1233.1    10070      1232      10090
      1231.2   10100    1232      10120      1234      10140       1236      10185      1234.5    10235
GR     1236    10275    1238      10295      1240      10315
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NC      .03       .05       .035       .1        .3
QT        2      5141       5141
ET                           9.1                                                  9963.26    10172.92

          Q AT X1 = 1.313 TO X1 = 1.466 EQUALS Q AT CP10 (UPSTREAM OF DIVERSION
          Q = 5141 CFS                                    AT NORTHERN AVE.)

X1    1.313        16       9975      10075       405       405       405
GR   1239.1      9950       1238       9975      1234      9980      1232      9990    1230.8      10000
GR     1232     10020       1234      10045    1234.5     10075    1234.4     10110      1236      10150
GR     1238     10160       1240      10210      1242     10240    1242.8     10280    1243.2      10325
GR     1244     10410

NH        5       .05       9960        .03       9985       .035     10065       .06     10100        .04
NH    10230
ET                           9.1                                                  9982.22    10125
X1    1.388        18       9985      10025       395       395       395
GR   1244.1      9960       1244       9970      1240      9985      1236      9995    1234.5      10000
GR     1236     10005       1238      10015    1238.3     10025      1238     10040    1238.5      10065
GR     1238     10075       1236      10085    1235.9     10095      1236     10100      1238      10125
GR     1240     10165       1242      10200    1242.7     10230

NC      .03       .03       .035        .1        .3
ET                           9.1                                                  9980.75    10160
X1    1.466        18       9980      10035       410       410       410
GR   1247.8      9960       1246       9980      1240      9990      1238      9995    1237.5      10000
GR     1238     10005       1240      10015      1244     10025    1244.3     10035      1244      10045
GR     1242     10065     1241.9      10085      1242     10100      1244     10115      1246      10160
GR     1247     10220       1248      10320    1249.6     10365

QT        2      3816       3816
ET                           9.1                                                  9964.3     10102.78

          Q AT X1 = 1.556
          Q = 3816 CFS

      1.556        10       9975      10045       475       475       475
GR     1250      9955       1248       9975      1242      9990      1241      10000     1242      10015
GR     1244     10035       1246      10045      1248     10060      1250     10140     1251      10170

QT        2      2048       2048
ET                           9.1                                                  9950     10149.96

          Q @ X1 = 1.556 TO X1 = 1.996 EQUALS (Q AT SUB 10/4 + Q AT CP3*)
          Q = (1173/4 + 1755) = 2048 CFS
                                    * = DOWNSTREAM OF DIVERSON AT OLIVE AVE.

          CONFLUENCE WITH WASH "1A" - CHOLLA WASH
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          CROSS SECTION EXTENDED DUE TO OVERTOPPING OF BEARDSLEY CANAL DIKE

X1    1.616        12       9965      10060       320       320       320
GR   1249.7      9950       1248       9965      1246      9980      1244      10000     1246      10040
GR   1247.1     10060       1246      10080    1245.6     10085      1246     10095     1248      10110
GR     1250     10125       1252      10200

ET                           9.1                                                  9974.68    10135.88
X1    1.692        11       9985      10035       400       400       400
GR   1251.9      9960       1250       9985      1248      9995    1247.7      10000     1248      10010
GR   1249.3     10035     1248.2      10100      1250     10130      1252     10145     1254      10170
GR   1255.3     10190

NH        5       .04       9940        .035      9960        .03     10045       .04     10220        .035
NH    10325
ET                           9.1                                                  9962.88    10140
X1    1.768        14       9960      10045       400       400       400
GR   1254.6      9940       1254       9960      1252      9975    1250.7      10000     1252      10020
GR   1252.9     10045     1250.8      10095    1252.1     10140    1251.2     10180     1252      10220
GR     1254     10240       1256      10265      1258     10295      1260     10325

        .04       .05       .035        .1        .3
                             9.1                                                  9980.82    10055.88
X1    1.844         7       9980      10020       400       400       400
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GR     1261       9965       1260       9980       1254       9990       1252.4     10000      1254       10010
GR     1258      10020      1259.6      10060
                                 9.1                                                              9973.1     10048.95
X1     1.920         10       9975      10030        405        405        405
GR    1265.2       9960       1264       9970       1262       9975       1260       9980       1256        9990
GR    1255.2      10000       1256      10010       1260      10020       1262      10030       1263       10055

NC       .04        .05        .035        .1         .3
ET                                 9.1                                                              9974       10037
X1     1.996          8       9965      10055        400        400        400
GR    1268.7       9965       1268       9970       1262       9980     1260.4       10000      1262       10015
GR      1264      10025       1266      10040       1267      10055

NC       .04        .04        .035        .3         .5
QT         2       1755       1755
ET                                 9.1                                                              9972.17    10040

            Q @ X1 = 2.072 TO X1 = 2.159 EQUALS Q AT CP3 (DOWNSTREAM OF DIVERSION
            Q = 1755 CFS                                  AT OLIVE AVENUE)

X1     2.072          9       9965      10020        400        400        400
GR    1271.1       9965       1270       9970       1264       9985     1263.5       10000      1264       10005
GR      1266      10020       1268      10145       1270      10275     1270.5       10300
1
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NC      .024       .024       .024         .3         .5
ET                                 9.11                                                             9910     10542.73

            OLIVE AVENUE
            NEXT THREE UPSTREAM CROSS SECTIONS EXTENDED - APPROXIMATELY 490 CFS
            BREAKS OUT EAST OVER BEARDSLEY CANAL.

            FLOODPLAIN LIMITS BASED UPON UPSTREAM FLOW COMING OVER THE TOP OF
            OLIVE AVENUE.

X1     2.159         16       9991    10008.2        440        460        460
          10                                                                          1275.6     1275.6
      1275.7       9910       1274       9970     1271.2       9991     1269.2       9991.5     1267.7       9993
GR    1267.2       9995     1267.6    10004.6     1268.1    10006.4     1269.4      10007.6     1271.2     10008.2
GR      1272      10050       1274      10200       1276      10440       1278        10530     1279.5      10720
GR      1280      10910

QT         2       2245       2245
SB      1.25        1.5        2.5          0         10         .1        104          .56     1268.2     1267.8
ET                                 9.11                                                             9910     10542.73

            Q @ X1 = 2.107 TO X1 = 2.267 EQUALS Q AT CP3 (UPSTREAM OF DIVERSION
            Q = 2245 CFS                                  AT OLIVE AVE.)

            PONDING OCCURS IN THE RIGHT OVERBANK UPSTREAM OF CULVERTS.  THIS WILL
            PRECLUDE ESTABLISHING A FLOODWAY FOR NEXT THREE UPSTEAM CROSS
            SECTIONS.  NO VOLUME LOSS IS REQUIRED BECAUSE OF BREAKOUT.

X1     2.167         24       9991    10008.2         40         40         40
X2                                1     1275.6     1275.9
X3         10                                                                       1275.9     1275.9
BT         24       9910       1277       1277       9940     1276.63    1276.63       9968     1276.5     1276.5
BT       9991     1276.4     1271.6     9991.5     1276.4     1273.6       9993     1276.4     1275.1       9995
BT     1276.4     1275.6       9997     1276.4     1275.1     9998.5     1276.4     1273.6       9999     1276.4
BT     1271.6      10001     1276.4     1271.6    10001.3     1276.4     1273.4    10002.8     1276.4     1274.7
BT     10004.     1276.4     1275.2    10006.4     1276.4     1274.7    10007.6     1276.4     1273.4    10008.2
BT     1276.4     1271.6      10055     1276.2     1276.2      10085     1276.1     1276.1      10100     1275.9
BT     1275.9      10300     1276.1     1276.1      10500     1277.3     1277.3      10530       1278       1278
BT      10720     1279.5     1279.5
GR       1277       9910     1274.7       9940     1274.0       9968     1271.6       9991     1269.6     9991.5
GR     1268.1       9993     1267.6       9995     1268.1       9997     1269.6     9998.5     1271.6       9999
GR     1271.6      10001     1269.8    10001.3     1268.5    10002.8     1268.0    10004.6     1268.5    10006.4
GR     1269.8    10007.6     1271.6    10008.2     1272.3      10055     1273.2      10085     1274.3      10100
GR     1275.3      10300       1277      10500       1278      10530     1279.5      10720

ET                                 9.1                                                              9910     10518.19
X1     2.186         18       9955      10075        100        100        100
GR      1277       9910     1276.5       9920       1276       9930       1274       9940       1272       9955
GR      1270       9980     1269.5      10000       1270      10010     1270.5      10030       1270      10045
          1272      10075       1274      10100     1275.5      10130       1275      10225       1276      10315
      1277.5      10410       1278      10515       1280      10580
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NC      .04       .07       .035        .1         .3
ET                          9.1                                          9970     10352.22

          NEXT FOUR UPSTREAM CROSS SECTIONS ARE AT THE CONFLUENCE WITH
          WASH "1B" - WATERFALL WASH

X1    2.267        16       9970       10025        410        415        430
GR   1277.8      9970       1276        9985       1272       9995     1271.1     10000      1272      10005
GR     1274     10025       1276       10130     1276.3      10145     1275.3     10160      1276      10200
GR   1276.9     10230       1276       10280       1275      10310       1276     10330      1278      10350
GR     1280     10430

QT        2       997        997
ET                          9.1                                                  9977.12      10100

          Q @ X1 = 2.330 TO X1 = 2.640 EQUALS Q AT I1CP3.
          Q = 997 CFS

X1    2.330         9       9965       10040        330        330        330
GR   1280.3      9965       1280        9970       1278       9980       1274      9990      1273.3      10000
GR     1274     10010       1276       10040       1278      10160       1280     10335

NH        5       .04       9965        .035      10030        .05      10085      .035      10225        .05
NH    10300
ET                          9.1                                                  9986.62      10090
X1    2.392        14       9965       10030        330        330        330
GR   1282.7      9965       1282        9975       1280       9985       1278      9995      1275.4      10000
GR     1276     10005       1278       10015       1280      10030     1280.3     10060       1280      10085
GR     1278     10110     1278.7       10155       1280      10225       1282     10300

NH        3       .04       9970        .035      10055        .05      10300
ET                          9.1                                                  9983.68      10085
X1    2.468        11       9970       10055        400        400        400
GR   1285.8      9970       1284        9980       1280       9995     1279.7     10000       1280      10005
GR     1282     10020     1283.1       10055       1282      10080     1280.4     10100       1282      10170
GR   1283.5     10300

          3       .04       9960        .035      10030        .07      10325
ET                          9.1                                                  9976.58      10085
X1    2.553        10       9960       10030        450        450        450
GR   1288.7      9960       1288        9965       1286       9975       1284      9985      1282.1      10000
GR     1284     10030       1285       10060       1286      10110       1288     10200       1289      10325

NC      .035      .07       .035         .1         .3
ET                          9.1                                                  9969.89      10080
X1    2.640        14       9965       10040        460        460        460
GR   1298.8      9950       1288        9965       1286       9980       1284      9990      1282.9      10000
GR     1284     10010     1284.3       10040       1284      10090     1283.5     10110       1284      10130
GR     1286     10150       1288       10175       1290      10220       1292     10255
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QT        2       710        710
ET                          9.1                                                  9985.09      10035

          Q @ X1 = 2.741 TO X1 = 3.081 EQUALS Q AT SUB-3A + Q AT SUB-3/2
          Q = 296 + 828/2 = 710 CFS

X1    2.741        17       9965       10035        530        530        530
GR   1292.1      9965       1292        9970       1290       9980       1284      9995      1283.9      10000
GR     1284     10005       1286       10015       1288      10025     1288.4     10035       1288      10045
GR     1286     10125     1285.8       10145       1286      10150       1290     10170       1292      10215
GR     1294     10285     1294.4       10340

ET                          9.1                                                  9983.29      10055
X1    2.826        10       9965       10055        450        450        450
GR     1291      9965       1290        9980       1286       9995     1285.7     10000       1286      10020
GR     1287     10055       1288       10115       1290      10190       1292     10205     1293.5      10250

ET                          9.1                                                  9980.56     10044.07
X1    2.907         8       9985       10030        430        430        430
GR   1295.9      9970       1294        9985       1292       9995     1291.3     10000       1292      10010
          1294     10030       1296       10080     1297.7      10110

NC        2       .035      10025         .07      10125
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ET                          9.1                                                                9980.79    10066.54
      3.009         7      9995     10025       540       540       540                 
     1301.8      9975      1300      9995    1296.6     10000      1298     10005      1300       10025
       1302     10090    1302.5     10125

NC      .04       .07      .035        .1        .3
ET                          9.1                                                       9974.80    10050.31
X1    3.081         9      9985     10035       380       380       380
GR   1303.8      9970      1302      9985      1300      9990    1297.5     10000      1298       10005
GR     1300     10020      1302     10035      1304     10060    1304.2     10085

QT        2       296       296
ET                          9.1                                                       9980.18    10034.46

          Q @ X1 = 3.167 TO X1 = 3.540 EQUALS Q AT SUB-3A
          Q = 296 CFS

X1    3.167        13      9960     10035       450       370       450
GR   1306.3      9860      1306      9905      1305      9930      1306      9960      1304        9980
GR     1300      9990    1299.8     10000      1300     10010      1302     10020      1304       10035
GR     1306     10130    1306.3     10210      1308     10280

ET                          9.1                                                       9949.66    10016.53
X1    3.214        17      9950     10015       230       280       250
GR   1312.8      9920      1312      9930      1310      9940      1304      9950    1302.7       10000
GR     1304     10015      1306     10030      1308     10040      1310     10050      1312       10060
GR     1313     10070      1312     10080      1310     10085    1308.6     10115      1310       10145
GR     1312     10180      1314     10260
1                                                                                          PAGE    10
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ET                          9.1                                                       9986.85    10040.75
X1    3.301        16      9990     10025       460       460       460
GR   1314.5      9960      1314      9970      1310      9980      1308      9990    1306.1       10000
GR     1307     10020      1308     10025      1310     10075      1312     10100      1313       10140
GR     1312     10200    1312.4     10235      1312     10270    1310.3     10285      1312       10300
GR     1313     10320

                            9.1                                                       9985.95    10018.11
      3.383        11      9985     10020       430       430       430
GR   1319.1      9970      1318      9975      1312      9985      1310      9990    1309.1       10000
GR     1310     10010      1312     10020      1314     10030      1316     10045      1318       10075
GR   1319.1     10120

ET                          9.1                                                       9988.73    10013.82
X1    3.460        10      9975     10030       410       410       410
GR   1320.4      9975      1320      9985      1314      9990    1312.6     10000      1314       10010
GR     1318     10020      1320     10030      1322     10090      1324     10245    1325.2       10290

ET                          9.1                                                       9993.35    10043.80
X1    3.540        10      9980     10050       420       420       420
GR   1321.3      9980      1320      9990    1316.3     10000    1317.3     10015    1317.1       10030
GR     1318     10040      1320     10050      1322     10090      1324     10165      1326       10310

QT        2       148       148
ET                          9.1                                                       9987.09    10041.01

          Q @ X1 = 3.610 TO X1 = 3.678 EQUALS Q AT SUB-3A/2
          Q = 296/2 = 148 CFS

X1    3.610         8      9975     10010       370       370       370
GR     1324      9975      1320      9990    1318.3     10000      1320     10010      1322       10090
GR     1324     10155      1326     10370    1326.6     10420

ET                          9.1                                                       9984.76    10021.55
X1    3.678        13      9960     10030       360       360       360
GR     1330      9960      1320      9990    1318.8     10000      1320     10015      1324       10030
GR     1326     10050      1328     10120    1328.2     10160    1327.4     10185    1328.4       10225
GR   1327.7     10270      1328     10320      1330     10400
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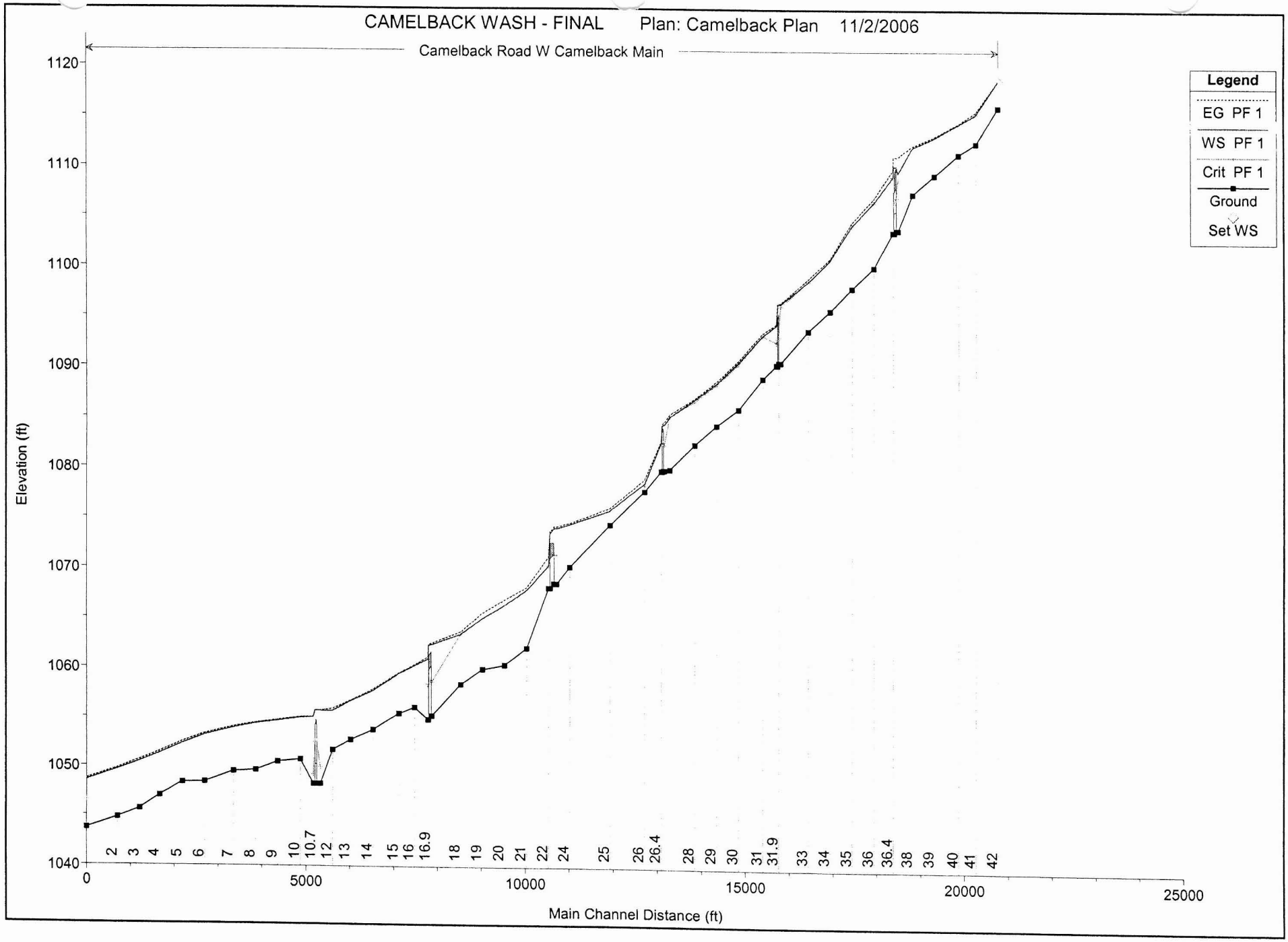
FLOODWAY DATA, WASH "1" - BEARDSLEY CAN
PROFILE NO. 2

STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
.000	192.	540.	8.2	1192.8	1192.8	.0
.070	212.	512.	8.6	1195.2	1195.2	.0
.156	353.	720.	6.1	1198.3	1198.3	.0
.231	158.	457.	9.7	1200.3	1200.0	.3
.307	167.	563.	7.8	1203.2	1202.3	.9
.390	110.	401.	11.0	1208.1	1208.1	.0
.465	118.	424.	9.7	1211.4	1211.4	.0
.543	160.	623.	6.6	1213.9	1213.9	.0
.620	145.	603.	6.8	1215.1	1215.1	.0
.696	92.	371.	11.1	1217.2	1217.2	.0
.770	121.	604.	6.8	1219.9	1220.0	-.1
.846	140.	715.	5.4	1220.9	1220.2	.7
.920	104.	362.	10.8	1221.5	1221.5	.0
.998	74.	323.	12.0	1225.7	1225.7	.0
1.074	75.	353.	10.4	1229.0	1229.0	.0
1.148	189.	670.	5.5	1234.6	1234.6	.0
1.159	361.	1237.	3.4	1238.2	1238.2	.0
1.237	348.	1623.	2.9	1238.3	1238.3	.0
1.313	209.	842.	6.1	1238.5	1238.5	.0
1.388	143.	494.	10.4	1240.8	1240.7	.1
1.466	173.	533.	9.6	1245.7	1245.5	.2
1.556	131.	451.	8.5	1248.9	1249.1	-.2
1.616	199.	742.	2.8	1250.7	1250.7	.0
1.692	160.	297.	6.9	1250.8	1250.8	.0
1.768	177.	379.	5.4	1253.9	1253.6	.3
1.844	75.	212.	9.7	1259.4	1259.4	.0
1.920	76.	273.	7.5	1262.8	1262.8	.0
1.996	63.	200.	10.2	1265.6	1265.6	.0
2.072	68.	282.	6.2	1269.4	1269.1	.3
2.159	17.	118.	14.9	1274.7	1274.7	.0
2.167	633.	2033.	1.1	1278.1	1278.1	.0
2.186	608.	1952.	1.2	1278.1	1278.1	.0
2.267	382.	981.	2.3	1278.1	1278.1	.0
2.330	123.	357.	2.8	1278.6	1278.6	.0
2.392	103.	149.	6.7	1280.6	1279.7	.9
2.468	101.	210.	4.8	1283.9	1283.0	.9
2.553	108.	224.	4.4	1286.2	1285.7	.5
2.640	110.	357.	2.8	1287.5	1287.3	.2
2.741	50.	126.	5.6	1288.6	1288.0	.6
2.826	72.	242.	2.9	1289.8	1289.1	.7
2.907	64.	97.	7.3	1294.6	1294.6	.0
3.009	86.	121.	5.9	1301.4	1301.3	.1
3.081	75.	193.	3.7	1303.2	1303.2	.0
3.167	54.	142.	2.1	1303.9	1303.9	.0
3.214	67.	56.	5.3	1304.2	1304.2	.0
3.301	54.	69.	4.3	1308.6	1308.6	.0
3.383	32.	51.	5.8	1311.6	1311.6	.0
3.460	25.	49.	6.1	1315.5	1315.5	.0
3.540	50.	74.	4.0	1318.8	1318.8	.0
3.610	54.	46.	3.2	1320.8	1320.8	.0
3.678	37.	69.	2.1	1321.7	1321.7	.0

APPENDIX B2

Perryville Road Wash (Downstream, HEC-RAS)


CAMELBACK WASH - FINAL Plan: Camelback Plan 11/2/2006
Camelback Road W Camelback Main
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Set WS
Elevation (ft)
1120
1110
1100
1090
1080
1070
1060
1050
1040
0
5000
10000
15000
20000
25000
Main Channel Distance (ft)
2 3 4 5 6 7 8 9 10 10.7 12 13 14 15 16 16.9 18 19 20 21 22 24 25 26 26.4 28 29 30 31 31.9 33 34 35 36 36.4 38 39 40 41 42

HEC-RAS Plan: Plan 01 River: Camelback Road W Reach: Camelback Main 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)	
Camelback Main	42	PF 1	883.17	1115.92	1118.61		1118.64	0.000944	1.04	653.15	551.62	0.12
Camelback Main	41	PF 1	639.53	1112.40	1115.27	1115.26	1115.50	0.028093	4.59	166.19	358.73	0.60
Camelback Main	40	PF 1	826.68	1111.29	1114.27		1114.36	0.001175	1.13	384.28	317.51	0.13
Camelback Main	39	PF 1	1054.85	1109.22	1112.96		1113.08	0.004987	2.31	383.84	422.28	0.26
Camelback Main	38	PF 1	1009.55	1107.35	1112.02		1112.16	0.000926	4.18	544.43	527.79	0.37
Camelback Main	37	PF 1	1127.62	1103.73	1109.44	1108.76	1111.07	0.005445	10.24	111.73	34.18	0.81
Camelback Main	36.9		Culvert									
Camelback Main	36.4	PF 1	1133.01	1103.53	1109.07	1109.07	1109.76	0.002120	6.79	187.39	83.19	0.56
Camelback Main	36	PF 1	1153.64	1100.04	1106.47	1106.47	1106.88	0.004014	7.58	556.75	677.17	0.67
Camelback Main	35	PF 1	996.64	1097.94	1104.18	1104.18	1104.51	0.002926	6.59	528.44	698.20	0.59
Camelback Main	34	PF 1	697.85	1095.66	1100.73		1100.92	0.003371	4.87	291.79	514.08	0.48
Camelback Main	33	PF 1	673.99	1093.67	1098.59	1098.59	1098.87	0.005038	5.83	233.50	446.81	0.58
Camelback Main	32	PF 1	702.49	1090.52	1096.35	1096.09	1096.43	0.001199	3.33	450.97	610.84	0.28
Camelback Main	31.9		Culvert									
Camelback Main	31.4	PF 1	696.72	1090.28	1094.20	1092.51	1094.33	0.001477	2.87	243.34	106.12	0.33
Camelback Main	31	PF 1	711.49	1088.94	1093.16	1093.14	1093.43	0.006559	6.11	226.43	366.96	0.65
Camelback Main	30	PF 1	737.27	1085.92	1090.49	1090.32	1090.68	0.003916	5.15	265.61	350.61	0.54
Camelback Main	29	PF 1	759.99	1084.29	1088.45	1088.30	1088.63	0.004294	5.28	272.62	371.19	0.56
Camelback Main	28	PF 1	755.31	1082.38	1086.84	1086.63	1086.95	0.002634	4.18	346.84	488.07	0.43
Camelback Main	27	PF 1	567.89	1079.87	1085.12	1085.12	1085.38	0.002972	5.06	217.05	395.81	0.46
Camelback Main	26.9	PF 1	518.30	1079.77	1084.30	1082.31	1084.58	0.001834	4.32	134.60	126.15	0.39
Camelback Main	26.7		Culvert									
Camelback Main	26.4	PF 1	526.89	1079.69	1082.51	1082.51	1082.68	0.002931	4.35	227.22	416.97	0.47
Camelback Main	26	PF 1	582.34	1077.68	1078.45	1078.24	1078.86	0.007121	2.27	115.52	89.42	0.58
Camelback Main	25	PF 1	696.88	1074.33	1075.73		1075.97	0.002344	0.87	183.52	88.43	0.16
Camelback Main	24	PF 1	748.18	1070.13	1074.34		1074.48	0.001198	1.24	279.43	112.43	0.13
Camelback Main	23	PF 1	575.19	1068.44	1073.94	1071.29	1074.12	0.001133	3.40	169.18	42.11	0.30
Camelback Main	22.3		Culvert									
Camelback Main	22	PF 1	437.32	1068.01	1070.23	1070.23	1071.13	0.013173	7.62	58.33	34.06	0.96
Camelback Main	21	PF 1	556.83	1061.98	1067.76		1068.05	0.002320	4.71	163.12	156.92	0.43
Camelback Main	20	PF 1	676.33	1060.29	1066.24		1066.80	0.002564	6.25	147.90	145.36	0.59
Camelback Main	19	PF 1	795.84	1059.86	1064.93		1065.49	0.002682	6.63	206.07	231.49	0.61
Camelback Main	18	PF 1	910.00	1058.34	1063.34	1063.34	1063.59	0.004863	5.58	325.90	477.95	0.58
Camelback Main	17	PF 1	1065.71	1055.19	1062.34	1058.58	1062.45	0.000634	3.16	562.54	415.80	0.22
Camelback Main	16.9		Culvert									
Camelback Main	16.4	PF 1	971.81	1054.83	1060.85	1058.13	1061.06	0.002500	4.03	355.03	361.98	0.30
Camelback Main	16	PF 1	1033.84	1056.05	1060.20		1060.26	0.002267	2.39	539.83	500.96	0.27
Camelback Main	15	PF 1	951.62	1055.41	1059.39		1059.45	0.002308	2.36	499.48	449.21	0.25
Camelback Main	14	PF 1	592.57	1053.77	1057.66		1057.79	0.003969	4.33	277.37	466.91	0.50
Camelback Main	13	PF 1	393.66	1052.76	1056.62		1056.66	0.001106	2.59	314.27	499.54	0.30
Camelback Main	12	PF 1	362.96	1051.70	1055.64		1055.86	0.004447	4.94	157.06	404.08	0.58

HEC-RAS Plan: Plan 01 River: Camelback Road W Reach: Camelback Main Profile: PF 1 (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)	
Camelback Main	11	PF 1	469.34	1048.24	1055.66	1049.94	1055.69	0.000095	1.42	422.03	441.37	0.10
Camelback Main	10.7		Culvert									
Camelback Main	10.4	PF 1	220.59	1048.24	1055.01	1049.21	1055.02	0.000016	0.59	379.87	88.23	0.04
Camelback Main	10	PF 1	110.85	1050.70	1054.95		1055.00	0.000464	1.81	69.68	54.34	0.20
Camelback Main	9	PF 1	133.06	1050.46	1054.63		1054.70	0.000726	2.25	65.11	40.72	0.25
Camelback Main	8	PF 1	154.84	1049.63	1054.33		1054.39	0.000526	2.00	89.04	53.14	0.22
Camelback Main	7	PF 1	177.06	1049.48	1053.92		1054.02	0.000980	2.68	70.93	31.95	0.29
Camelback Main	6	PF 1	205.81	1048.39	1053.17		1053.29	0.001212	2.91	80.90	33.43	0.30
Camelback Main	5	PF 1	205.81	1048.35	1052.32		1052.50	0.002142	3.46	74.56	122.18	0.39
Camelback Main	4	PF 1	205.81	1047.01	1051.29		1051.46	0.001856	3.31	62.70	26.16	0.36
Camelback Main	3	PF 1	205.81	1045.65	1050.44		1050.61	0.001836	3.27	62.85	24.01	0.36
Camelback Main	2	PF 1	205.81	1044.77	1049.65		1049.75	0.001543	2.80	84.92	56.28	0.30
Camelback Main	1	PF 1	205.81	1043.70	1048.55	1046.51	1048.68	0.001503	2.82	72.97	123.42	0.30

APPENDIX B3

Perryville Road Wash (Upstream, HEC-2)

```
1*******************************************
*  HEC-2 WATER SURFACE PROFILES           *
*                                         *
   Version   4.6.2;  May 1991             *
*                                         *
*  RUN DATE    02NOV06    TIME   15:17:58  *
*******************************************
```

```
**************************************
*  U.S. ARMY CORPS OF ENGINEERS      *
*  HYDROLOGIC ENGINEERING CENTER     *
*  609 SECOND STREET, SUITE D        *
*  DAVIS, CALIFORNIA 95616-4687      *
*          (916) 756-1104            *
**************************************
```

```
X     X  XXXXXXX   XXXXX             XXXXX
X     X  X        X     X           X     X
X     X  X        X                 X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                 X
X     X  X        X     X           X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

1

THIS RUN EXECUTED 02NOV06 15:17:58

```
************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
```

```
T1      WHITE TANKS / AGUA FRIA AREA DRAINAGE MASTER STUDY
T2      100 - YEAR STORM EVENT     FLOODPLAIN RUN       FILE:  7.H2I
T3      PERRYVILLE ROAD WASH - WASH 7 - CAMELBACK ROAD TO NORTHERN AVENUE

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

      0         2         0         0         0         0         0         0   1121.33         0

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1         0         0         0         0         0         0         0         0         0


J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        43         1        53        21        22        54        51         4         8
     42         5        26         0       110         0       200

NC      .08       .045      .035        .1         .3
QT        2       470       470
ET                          9.1                                                    9675      10060
```

BEGIN DETAILED STUDY AT AGRICULTURAL RESERVOIR.

FLOODPLAIN AND FLOODWAY IS COINCIDENT IN MOST CASES, HOWEVER, SMALL INCREMENTAL RISES IN WSEL ARE ALLOWED TO SMOOTH THE FLOODWAY WITHOUT OVERTOPPING THE LIMITING ELEVATIONS ALONG THE ROADWAY

STARTING WSEL AND DISCHARGES ARE TAKEN FROM SPLIT FLOW ANALYSIS RUN

WHERE CROSS SECTIONS ARE EXTENDED, THE SPLIT FLOW ANALYSIS WAS USED TO CALCULATE THE ACTUAL DISCHARGE THAT WOULD BE CONTAINED AND THEN CONVEYED TO THE SOUTH OR EAST

APPOXIMATELY 680 CFS BREAKS OUT AND CONTINUES SOUTH AS SHEET FLOW
Q AT X1 = 0.000
Q = 470 CFS WSEL = 1121.33 FT.

```
X1    0.000        12       9945      10060        0.0        0.0        0.0
GR   1123.5      9215       1122       9565       1121       9730       1122       9850       1122       9885
GR     1121      9930       1122       9945       1120       9975       1119      10000     1120.5      10025
       1120     10040     1120.5      10060
```

```
          2       1129       1129
ET                            9.1                                                                  9586       10060

          SUBSEQUENT DISCHARGE DATA IS ALSO TAKEN FROM THE SPLIT FLOW ANALYSIS
          Q AT X1 = 0.088                                                 RUN
          Q = 1129 CFS

          APPROXIMATELY 148 CFS BREAKS OUT AND CONTINUES SOUTH AS SHEET FLOW

X1    0.088         13       9970       10030        465         465         465
GR     1124       9310       1122        9885       1120        9910      1113.5       9925       1120        9940
GR     1122       9950     1122.5        9970       1122        9980      1120.5      10000       1122       10015
GR   1122.5      10030     1122.2       10045     1122.5       10060

QT        2       1277       1277
ET                            9.1                                                                  9669       10025

          Q AT X1 = 0.177
          Q = 1277 CFS
X1    0.177         13       9970       10030        470         470         470
GR     1127       9325       1126        9490       1124        9710      1122.1       9890       1120        9905
GR   1113.5       9920     1122.1        9940       1124        9950      1124.5       9970       1124        9985
GR     1122      10000       1124       10010     1124.5       10030

QT        2       1234       1234
ET                            9.1                                                                  9685       10034

          Q AT X1 = 0.265 TO X1 = 0.422
          Q = 1234 CFS

X1    0.265          9       9970       10030        465         465         465
GR     1128       9430       1126        9745       1125        9910      1125.5       9970       1124        9990
GR   1123.5      10000       1124       10010       1126       10030      1127.3      10045

ET                            9.1                                                                  9650     10038.38
X1    0.350         10       9980       10030        450         450         450
GR     1129       9390       1128        9585       1127        9850        1127       9920     1127.5        9960
       1126       9980       1125       10000       1126       10015        1128      10030     1129.4       10045

NC      .08       .045       .035          .3          .5
ET                            9.1                                                                  9708       10025
X1    0.422          8       9970       10025        380         380         380
GR     1130       9700     1128.5        9890       1129        9930        1128       9970       1126       10000
GR     1128      10015       1130       10025     1131.3       10045

NC      .05       .05        .035          .3          .5
QT        2       1190       1190
ET                            9.1                                                                  9935       10205
1
   02NOV06       15:17:58                                                                                          PAGE     3


          Q AT X1 = 0.489 TO X1 = 0.938
          Q = 1190 CFS
          INTERSECTION OF CAMELBACK ROAD AND PERRYVILLE ROAD

X1    0.489          8       9960       10030        180         400         330
GR   1132.5       9850       1132        9930       1130        9960        1129      10000     1129.3       10030
GR     1130      10105       1132       10225     1132.5       10250

NC      .035      .08        .035          .1          .3
ET                            9.1                                                                  9945       10100
X1    0.523         12       9915       10080        120         400         200
GR   1134.5       9915       1134        9935       1130        9960        1129      10000       1130       10040
GR     1132      10050     1133.8       10060       1132       10080        1131      10145       1132       10245
GR     1134      10515     1134.5       10650

ET                            9.1                                                                9982.49    10092.03
X1    0.606         10       9970       10065        440         440         440
GR     1138       9970     1129.9       10000       1132       10025        1134      10040       1135       10065
GR   1134.2      10085       1135       10110       1134       10250        1136      10500       1137       10580

ET                            9.1                                                                  9965       10100
X1    0.686         11       9955       10040        420         420         420
       1139.5       9955       1134        9980       1133       10000        1134      10020       1136       10035
       1136.5      10040     1135.8       10055       1136       10060        1138      10310       1140       10500
GR     1140.7      10570
```

```
                          9.1                                                                  9969.19    10099.53
     0.736         11     9960      10050        265        265        265
    1140.5       9960     1136       9980       1135      10000       1136      10020     1139.5       10050
GR    1137      10060   1138.3      10070     1138.5      10115       1140      10220       1142       10525
GR    1143      10650

ET                        9.1                                                                  9976.98    10103.09
X1   0.830          9     9975      10050        500        500        500
GR  1142.5       9975     1137      10000       1138      10020       1140      10035     1141.8       10050
GR  1141.5      10075     1142      10090       1144      10490       1145      10770

ET                        9.1                                                                     9941       10142
          APPROXIMATELY 385 CFS BREAKS OUT OVER THE NEXT FOUR UPSTREAM CROSS
          SECTIONS.  BREAKOUT FLOWS CONTINUE OVERLAND TO THE SOUTHEAST AS SHEET
          FLOW.

X1   0.938          7     9940      10030        570        570        570
GR  1144.5       9940     1142       9970     1140.3      10000       1142      10030       1144       10085
GR    1146      10370     1148      10640

QT       2       1116     1116
ET                        9.1                                                                     9965       10158
1
   02NOV06      15:17:58                                                                                PAGE     4



          Q AT X1 = 1.025
          Q = 1116 CFS

X1   1.025          8     9965      10060        455        455        455
GR  1146.1       9965     1144       9985     1143.5      10000       1144      10020       1145       10060
GR    1146      10100     1148      10400       1150      10690

QT       2       1335     1335
ET                        9.1                                                                     9965       10185

          Q AT X1 = 1.123
          Q = 1335 CFS

     1.123          8     9965      10080        520        520        520
GR  1148.5       9965     1146       9980       1145      10000       1146      10030       1148       10080
GR    1150      10325   1151.7      10525       1152      10760

QT       2       1477     1477
ET                        9.1                                                                     9965       10292

          Q AT X1 = 1.225 TO X1 = 1.389
          Q = 1477 CFS

X1   1.225          9     9965      10050        540        540        540
GR  1150.2       9965     1146       9985     1145.5      10000       1146      10020       1148       10050
GR  1148.7      10085   1148.3      10170       1150      10250       1152      10620

ET                        9.1                                                                     9946       10199
X1   1.318          7     9945      10040        490        490        490
GR  1151.4       9945     1148       9965     1146.5      10000       1148      10020       1150       10040
GR    1152      10310     1153      10490

ET                        9.1                                                                     9940       10175
X1   1.389          9     9925      10130        375        375        375
GR  1153.6       9925     1152       9940       1150       9955       1148       9965     1147.5       10000
GR    1148      10010     1150      10130       1152      10365       1154      10635

NC    .045        .08     .035         .3         .5
QT       2       1375     1375
ET                        9.1                                                                  9976.79    10113.85

          Q AT X1 = 1.429 TO X1 = 1.545
          Q = 1375 CFS
          BETHANY HOME ROAD

X1   1.429         11     9960      10110        210        210        210
GR  1152.6       9960     1152       9980       1150       9995     1148.7      10000       1150       10015
GR  1150.3      10025     1150      10035     1148.4      10055       1150      10090       1152       10110
GR    1154      10190
```

				9.1						9957.66	10200
	1.463		14	9970	10080	180	180	180			
	1153.3		9900	1153.6	9915	1153.5	9950	1152	9970	1150	9985
GR	1149.6		10000	1150	10020	1152	10080	1152.2	10100	1152	10130
GR	1151.6		10195	1152	10260	1154	10490	1156	10610		
NC	.045		.06	.035	.1	.3					
ET				9.1						9964.07	10133.37

APPROXIMATELY 108 CFS BREAKS OUT OVER THE NEXT THREE UPSTREAM CROSS SECTIONS. BREAKOUT FLOWS CONTINUE OVERLAND TO THE SOUTHEAST AS SHEET FLOW.

X1	1.545		12	9960	10040	430	430	430			
GR	1155.2		9960	1154	9970	1152	9985	1151.5	10000	1152	10040
GR	1154		10080	1156	10230	1158	10505	1158.3	10565	1158	10650
GR	1156.9		10740	1158	10830						
QT		2	1433	1433							
ET				9.1						9935	10198.32

Q AT X1 = 1.640
Q = 1433 CFS

X1	1.640		11	9970	10025	505	505	505			
GR	1157.5		9935	1156	9945	1157.6	9970	1156	9980	1154	9990
GR	1153.3		10000	1154	10010	1156	10025	1157.5	10065	1156.9	10085
GR	1158.4		10270								
QT		2	1484	1484							
ET				9.1						9963.85	10100

Q AT X1 = 1.737 TO X1 = 2.381
Q = 1484 CFS

X1	1.737		14	9960	10030	505	540	510			
GR	1161		9960	1160	9975	1158	9980	1156.1	10000	1158.1	10015
GR	1159.4		10030	1158.6	10070	1160	10255	1162	10375	1164	10440
GR	1166.5		10530	1165.1	10690	1166	10755	1168	10890		
				9.1						9972.76	10022.93
X1	1.851		7	9970	10050	605	590	605			
GR	1166		9970	1164	9980	1162	9985	1160	10000	1162	10010
GR	1166		10025	1166.5	10050						
ET				9.1						9960.25	10061.50
X1	1.937		8	9965	10050	465	370	450			
GR	1168.5		9960	1166	9965	1164	9985	1163	10000	1164	10020
GR	1166		10050	1168	10060	1170.5	10070				

ET				9.1						9952.98	10075
X1	2.018		9	9970	10045	400	435	430			
GR	1169.4		9950	1168	9965	1166	9970	1164.5	10000	1166	10045
GR	1168		10075	1170	10215	1172	10550	1173	10570		
ET				9.1						9956	10070
X1	2.066		11	9980	10020	245	275	255			
GR	1170.4		9940	1170	9955	1166	9965	1164	9980	1163.5	10000
GR	1164		10020	1166	10080	1168	10165	1170	10290	1172	10625
GR	1174		10720								
ET				9.1						9950	10045
X1	2.136		11	9965	10030	365	375	370			
GR	1173.7		9930	1172	9935	1170	9945	1168	9965	1166	10000
GR	1168		10030	1170	10050	1170.2	10190	1170.7	10370	1172	10475
GR	1173		10580								
ET				9.1						9978	10065
X1	2.216		11	9985	10030	420	415	420			
GR	1176.7		9955	1176	9970	1170	9985	1168.3	10000	1170	10030
GR	1172		10130	1174	10225	1175.1	10390	1175.2	10535	1174.8	10610
GR	1176		10780								
				9.1						9973	10070
	2.303		15	9980	10025	460	465	460			
GR	1180		9950	1178	9965	1176	9970	1174	9980	1172	9990

```
GR   1170.7      10000      1172       10015      1174       10025      1174.8     10050      1174.3     10100
GR   1174.5      10145      1176       10280      1176.9     10335      1178       10555      1180       10680

                             9.1                                                                 9963       10085
X1      2.381         12    9980       10020      410        405        410
GR   1182.5       9945      1180       9955       1178       9965       1176       9980       1174       9990
GR   1173.7      10000      1174       10005      1176       10020      1178       10045      1178.2     10055
GR   1177.6      10105      1179.6     10210

NC        .07        .07     .035        .1         .3
QT           2       1450     1450
ET                           9.1                                                                 9940       10150

          Q AT X1 = 2.453 TO X1 = 3.549
          Q = 1450 CFS
          GLENDALE AVENUE

X1      2.453         12    9970       10020      370        370        380
GR      1182        9645      1182       9685       1182.5     9710       1182       9750       1180.2     9915
GR      1181        9970      1180       10000      1180       10020      1182       10390      1182.2     10500
GR      1180       10565      1184       10735
```

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ET                           9.1                                                                 9981.66    10175
X1      2.501         14    9980       10020      210        420        255
GR      1184        9950      1184.4     9970       1184       9980       1180       9995       1178.8     10000
GR      1180       10020      1182       10055      1182.6     10095      1182       10135      1180.6     10145
GR      1182       10150      1184       10265      1186       10505      1188       10585

ET                           9.1                                                                 9947       10240
X1      2.576         14    9985       10020      360        280        350
GR   1185.3       9945      1184       9960       1182       9985       1181.1     10000      1182       10020
GR      1184       10045      1185.8     10150      1184       10210      1182       10220      1181.9     10225
GR      1182       10230      1184       10240      1186       10410      1188       10625

ET                           9.1                                                                 9900       10225
X1      2.626         25    9975       10020      320        210        310
        1188        9820      1186       9840       1185.2     9850       1186       9890       1186.2     9900
        1186        9930      1184.9     9940       1186       9955       1186.3     9965       1186       9975
GR      1184        9990      1183.2     10000      1184       10010      1186       10020      1187.3     10110
GR      1186       10180      1184       10185      1183.4     10190      1184       10200      1186       10210
GR   1186.8       10240      1186.4     10325      1187.8     10440      1186.9     10550      1188       10600

ET                           9.1                                                                 9777       10050
X1      2.704         17    9975       10015      380        380        410
GR   1190.2       9750      1187.1     9840       1189       9855       1185.9     9875       1187       9900
GR   1185.9       9915      1188.4     9960       1188       9975       1186       9990       1185.7     10000
GR      1186       10005      1188       10015      1188.7     10025      1187.3     10055      1188       10085
GR      1190       10125      1192       10150

ET                           9.1                                                                 9750       10100
X1      2.785         13    9985       10015      375        455        430
GR   1193.7       9685      1192.2     9770       1192.6     9805       1193.1     9840       1192.5     9920
GR      1192        9985      1191.6     10000      1192       10015      1192.9     10080      1193       10170
GR      1194       10315      1196       10390      1198       10785

ET                           9.1                                                                 9800       10200
X1      2.874          8    9910       10025      445        470        470
GR   1197.5       9540      1196       9600       1195.8     9730       1196       9910       1195.3     10000
GR      1196       10025      1196.5     10140      1197.5     10285

ET                           9.1                                                                 9922       10250
X1      2.955         15    9940       10030      435        400        425
GR   1201.5       9890      1200       9910       1198       9940       1197.3     10000      1197.5     10030
GR      1198       10145      1198.5     10180      1197.9     10255      1198.5     10380      1199       10445
GR   1200.3       10565      1200.3     10615      1200.8     10690      1200.4     10745      1202       10915

ET                           9.1                                                                 9838       10300
X1      3.045         15    9850       10010      535        300        475
GR      1204        9730      1205.4     9770       1204       9815       1202       9835       1201.5     9850
GR   1200.7       9895      1201.0     9950       1201.2     10000      1201.5     10010      1201.7     10060
GR   1201.1       10210      1200.5     10345      1200.5     10410      1200.9     10485      1202       10650
```

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ET                           9.1                                                                 9850       10200
```

```
X1    3.116       16       9980      10030       315       365       375
GR     1208     9675       1206       9715      1204      9730    1202.7      9750      1204      9875
       1204.7   9905       1204       9925    1203.6      9965    1204.3      9980      1204      9990
       1202.6   10000      1204       10030   1202.8      10185   1202.7      10320     1204      10460
GR     1206     10605

ET                          9.1                                                       9880.48   10200
X1    3.197       18       9985      10020       425       445       430
GR     1210     9855       1208       9870      1206      9895    1205.6      9910      1206      9925
GR    1206.5    9965       1206       9985    1204.9      10000     1206      10020     1206.7    10050
GR     1206     10095    1205.2       10115     1206      10140   1206.2      10160     1206      10180
GR    1205.9    10230      1206       10400     1208      10490

ET                          9.1                                                       9750      10050
X1    3.262       17       9970      10020       350       330       345
GR     1212     9635       1210       9660      1209      9735    1208.8      9805      1208.6    9860
GR    1208.4    9900      1209.6      9970      1208      9985    1206.8      10000     1208      10010
GR    1208.8    10020     1208.2      10035     1210      10050     1212      10060     1214      10075
GR    1215.2    10090      1214       10105

ET                          9.1                                                       9776.25   10098.44
X1    3.326       18       9985      10010       320       360       335
GR    1219.1    9695       1218       9720      1216      9730    1214        9750      1212      9790
GR     1211     9840       1212       9890    1212.5      9920    1212        9935      1210      9985
GR    1208.5    10000      1210       10010   1211.6      10050     1212      10095     1214      10105
GR     1216     10140    1217.2       10180     1216      10210

ET                          9.1                                                       9879.84   10257.27
X1    3.400       17       9975      10020       370       370       390
GR    1216.3    9850       1216       9870      1214      9895    1212.5      9910      1214      9935
GR     1214     9975     1210.9       10000     1212      10010     1214      10020     1214.5    10055
GR     1214     10115    1213.5       10125     1214      10185     1216      10305     1217.7    10340
GR     1218     10430      1220       10485

ET                          9.1                                                       9831.16   10287.06
X1    3.461       20       9970      10025       410       280       370
GR     1220     9635       1218       9825    1217.7      9835      1218      9850      1217.1    9870
GR     1220     9905     1217.7       9950      1218      9970    1215.1      10000     1217.1    10025
GR    1215.2    10050    1218.8       10090     1218      10125     1216      10170     1215.6    10180
GR     1216     10195    1216.5       10220   1215.8      10255     1218      10290      1220     10420

       .025      .025       .025        .1        .3
ET                          9.1                                                       9820.65   10519.02
```

IRRIGATION CANAL

FLOODPLAIN AND FLOODWAY WIDTHS ARE COINCIDENT FOR THE NEXT FIVE

UPSTREAM CROSS SECTIONS DUE TO PONDING CONSTRAINTS

```
X1    3.549        5       9500      10600       280       350       375
GR     1225     9500       1222       9900      1222      10000     1222      10400      1223      10600

NC     .022      .022       .022        .3        .5
QT        2     1457       1457
ET                          9.1                                                       9770.30   10562.76
```

Q AT X1 = 3.558 TO X1 = 3.681 EQUALS Q AT CP188
Q = 1457 CFS
NORTHERN AVENUE

```
X1    3.558        7       9640      10385        50       450        50
GR     1228     9525       1226       9640      1225      10000     1225      10385     1225.7    10580
GR     1226     10670      1228       10850

NC      .07       .07       .045        .1        .3
ET                          9.1                                                       9385.71   10118.10
X1    3.653       14       9940      10080       600       100       500
GR     1228     9325       1226       9410    1223.9      9475    1224.2      9490      1223.7    9535
GR    1224.3    9590       1223       9630    1224.3      9675    1223.5      9790       1224     9855
GR     1225     9940       1224       10000     1226      10080   1226.6      10120

ET                          9.1                                                       9844.18   10102.89
X1    3.681        9       9910      10085       250        50       150
GR     1230     9505     1229.2       9575      1228      9665      1227      9795       1226     9910
       1224.7   10000      1224       10050     1226      10085   1226.8      10110

QT        2     1486       1486
```

```
ET                              9.1                                                                 9905.54    10084.44

          Q AT X1 = 3.705 EQUALS Q AT CP10
          Q = 1486 CFS

X1     3.727          6        9915       10055         255         230         240
GR      1232       9860        1230        9900        1228        9915      1226.5       10000        1228       10055
GR    1229.5      10090
```

FLOODWAY DATA, PERRYVILLE ROAD WASH - W
PROFILE NO. 2

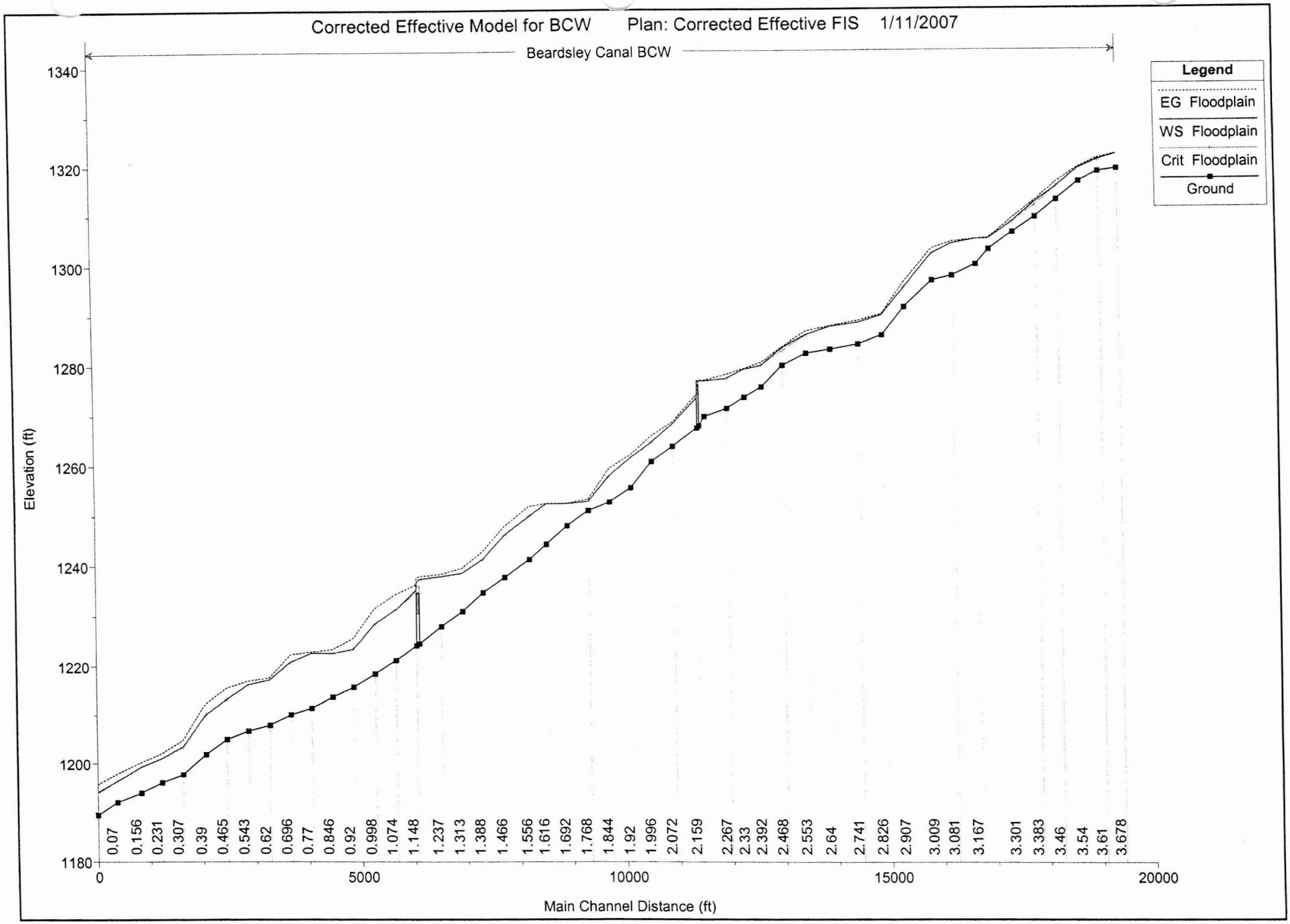
STATION	FLOODWAY WIDTH	FLOODWAY SECTION AREA	FLOODWAY MEAN VELOCITY	WATER SURFACE ELEVATION WITH FLOODWAY	WITHOUT FLOODWAY	DIFFERENCE
.000	384.	155.	3.0	1121.3	1121.3	.0
.088	473.	534.	2.1	1123.0	1123.0	.0
.177	355.	595.	2.1	1124.4	1124.4	.0
.265	349.	341.	3.6	1126.4	1126.4	.0
.350	388.	668.	1.8	1128.8	1128.8	.0
.422	317.	397.	3.1	1130.0	1129.9	.1
.489	268.	409.	2.9	1131.7	1131.7	.0
.523	155.	270.	4.4	1132.4	1132.4	.0
.606	109.	163.	7.3	1134.5	1134.6	-.1
.686	135.	298.	4.0	1137.4	1137.3	.1
.736	130.	173.	6.9	1138.4	1138.4	.0
.830	123.	227.	5.3	1142.1	1142.1	.0
.938	201.	318.	3.7	1144.4	1144.4	.0
1.025	193.	242.	4.6	1146.4	1146.4	.0
1.123	220.	331.	4.0	1148.9	1148.9	.0
1.225	327.	601.	2.5	1150.2	1150.2	.0
1.318	253.	383.	3.9	1151.2	1151.2	.0
1.389	235.	667.	2.2	1151.9	1151.9	.0
1.429	137.	296.	4.7	1152.1	1152.1	.0
1.463	242.	374.	3.7	1152.9	1152.9	.0
1.545	169.	301.	4.6	1154.8	1154.7	.1
1.640	257.	295.	4.9	1157.8	1157.8	.0
1.737	136.	337.	4.4	1161.0	1160.7	.3
1.851	50.	150.	9.9	1165.4	1165.4	.0
1.937	101.	360.	4.1	1168.4	1168.4	.0
2.018	122.	372.	4.0	1169.1	1169.1	.0
2.066	114.	556.	2.7	1169.6	1169.6	.0
2.136	95.	202.	7.4	1169.6	1169.5	.1
2.216	87.	264.	5.6	1172.8	1172.8	.0
2.303	97.	201.	7.4	1175.5	1175.5	.0
2.381	122.	251.	5.9	1178.7	1178.4	.3
2.453	210.	344.	4.2	1182.1	1181.9	.2
2.501	193.	470.	3.1	1184.0	1183.6	.4
2.576	293.	368.	3.9	1185.1	1185.1	.0
2.626	325.	353.	4.1	1187.0	1186.9	.1
2.704	273.	543.	2.7	1189.5	1189.3	.2
2.785	350.	375.	3.9	1193.5	1193.5	.0
2.874	400.	571.	2.5	1197.5	1197.2	.3
2.955	328.	499.	2.9	1199.4	1199.2	.2
3.045	462.	473.	3.1	1202.2	1201.9	.3
3.116	350.	530.	2.7	1205.1	1204.4	.7
3.197	320.	545.	2.7	1207.8	1207.2	.6
3.262	300.	413.	3.5	1210.1	1210.0	.1
3.326	322.	431.	3.4	1212.7	1212.7	.0
3.400	377.	499.	2.9	1215.2	1215.2	.0
3.461	456.	389.	3.7	1217.8	1217.8	.0
3.549	698.	356.	4.1	1222.6	1222.6	.0
3.558	792.	379.	3.8	1225.6	1225.6	.0
3.653	732.	1584.	.9	1226.6	1226.6	.0
3.681	259.	300.	4.9	1226.6	1226.6	.0
3.727	179.	306.	4.9	1229.3	1229.3	.0

APPENDIX C

HEC-RAS Output Files for Corrected Effective FIS Models

APPENDIX C1

Beardsley Canal Wash


Corrected Effective Model for BCW Plan: Corrected Effective FIS 1/11/2007
Beardsley Canal BCW
Legend
EG Floodplain
WS Floodplain
Crit Floodplain
Ground
Elevation (ft)
1340
1320
1300
1280
1260
1240
1220
1200
1180
0
5000
10000
15000
20000
Main Channel Distance (ft)
0.07
0.156
0.231
0.307
0.39
0.465
0.543
0.62
0.696
0.77
0.846
0.92
0.998
1.074
1.148
1.237
1.313
1.388
1.466
1.556
1.616
1.692
1.768
1.844
1.92
1.996
2.072
2.159
2.267
2.33
2.392
2.468
2.553
2.64
2.741
2.826
2.907
3.009
3.081
3.167
3.301
3.383
3.46
3.54
3.61
3.678

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW

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)	
BCW	3.678	Floodplain	148.00	1318.80	1321.75		1321.82	0.001120	2.14	69.20	36.83	0.27
BCW	3.678	Floodway	148.00	1318.80	1321.75		1321.83	0.001117	2.14	69.23	36.79	0.27
BCW	3.61	Floodplain	148.00	1318.30	1320.67	1320.40	1320.97	0.007436	4.50	40.04	49.15	0.67
BCW	3.61	Floodway	148.00	1318.30	1320.66	1320.40	1320.96	0.007578	4.53	39.67	48.82	0.68
BCW	3.54	Floodplain	313.00	1316.30	1318.96		1319.17	0.003985	3.69	84.93	52.01	0.51
BCW	3.54	Floodway	313.00	1316.30	1318.95		1319.17	0.003971	3.72	84.21	50.45	0.51
BCW	3.46	Floodplain	313.00	1312.60	1315.25	1315.25	1316.13	0.016028	7.51	41.65	24.17	1.01
BCW	3.46	Floodway	313.00	1312.60	1315.25	1315.25	1316.13	0.016015	7.51	41.66	24.17	1.01
BCW	3.383	Floodplain	313.00	1309.10	1312.11	1311.43	1312.44	0.004979	4.60	68.01	35.76	0.58
BCW	3.383	Floodway	313.00	1309.10	1312.09	1311.43	1312.44	0.004970	4.71	66.45	32.16	0.58
BCW	3.301	Floodplain	313.00	1306.10	1308.18	1308.18	1308.86	0.016312	6.60	47.89	40.47	1.00
BCW	3.301	Floodway	313.00	1306.10	1308.18	1308.18	1308.86	0.016312	6.60	47.89	40.47	1.00
BCW	3.214	Floodplain	313.00	1302.70	1304.82		1304.98	0.003507	3.25	98.69	72.52	0.47
BCW	3.214	Floodway	313.00	1302.70	1304.80		1304.97	0.003707	3.31	95.57	66.87	0.48
BCW	3.167	Floodplain	313.00	1299.80	1304.70		1304.74	0.000354	1.65	199.72	95.33	0.17
BCW	3.167	Floodway	313.00	1299.80	1304.69		1304.74	0.000333	1.70	184.44	54.28	0.16
BCW	3.081	Floodplain	1048.00	1297.50	1303.89		1304.22	0.001827	4.71	250.59	88.65	0.40
BCW	3.081	Floodway	1048.00	1297.50	1303.90		1304.23	0.001810	4.70	246.67	75.51	0.40
BCW	3.009	Floodplain	1048.00	1296.60	1301.94	1301.94	1302.87	0.008505	8.49	181.57	112.88	0.82
BCW	3.009	Floodway	1048.00	1296.60	1301.88	1301.88	1302.85	0.009058	8.66	167.16	85.75	0.84
BCW	2.907	Floodplain	1048.00	1291.30	1295.19	1295.19	1296.25	0.010968	8.44	142.00	84.11	0.92
BCW	2.907	Floodway	1048.00	1291.30	1295.16	1295.16	1296.27	0.011562	8.60	133.45	63.51	0.94
BCW	2.826	Floodplain	1048.00	1285.70	1289.74		1289.90	0.001496	3.55	427.75	199.21	0.35
BCW	2.826	Floodway	1048.00	1285.70	1290.65		1290.84	0.001093	3.48	301.39	71.71	0.30
BCW	2.741	Floodplain	1048.00	1283.90	1288.26		1288.65	0.006593	6.03	284.77	169.79	0.69
BCW	2.741	Floodway	1048.00	1283.90	1288.72		1289.67	0.009496	7.78	134.63	49.91	0.84

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW (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)	
BCW	2.64	Floodplain	1048.00	1282.90	1287.48		1287.55	0.000879	2.61	592.81	199.63	0.27
BCW	2.64	Floodway	1048.00	1282.90	1287.69		1287.84	0.001447	3.52	368.00	110.11	0.34
BCW	2.553	Floodplain	1048.00	1282.10	1285.79	1285.62	1286.54	0.008999	7.26	186.04	123.64	0.82
BCW	2.553	Floodway	1048.00	1282.10	1286.25		1286.72	0.004617	5.83	233.54	108.42	0.60
BCW	2.468	Floodplain	1048.00	1279.70	1283.20	1282.58	1283.35	0.005175	3.99	366.48	290.81	0.57
BCW	2.468	Floodway	1048.00	1279.70	1284.01	1283.47	1284.43	0.005556	5.48	213.87	101.32	0.63
BCW	2.392	Floodplain	1048.00	1275.40	1279.72	1279.72	1280.29	0.012034	7.14	189.76	163.27	0.90
BCW	2.392	Floodway	1048.00	1275.40	1280.73	1280.73	1281.61	0.008891	7.81	160.69	103.38	0.81
BCW	2.33	Floodplain	1048.00	1273.30	1278.95		1279.08	0.000947	3.24	530.12	268.01	0.29
BCW	2.33	Floodway	1048.00	1273.30	1278.96		1279.11	0.001008	3.39	404.06	122.88	0.30
BCW	2.267	Floodplain	2715.00	1271.10	1277.16	1277.16	1277.88	0.008153	8.80	644.45	366.20	0.82
BCW	2.267	Floodway	2715.00	1271.10	1277.16	1277.16	1277.88	0.008153	8.80	644.45	366.20	0.82
BCW	2.186	Floodplain	2715.00	1269.50	1276.69		1276.80	0.000192	2.90	1232.04	442.32	0.20
BCW	2.186	Floodway	2715.00	1269.50	1276.69		1276.80	0.000192	2.90	1232.04	442.32	0.20
BCW	2.167	Floodplain	1115.00	1267.60	1276.72	1274.08	1276.74	0.000074	1.58	1204.26	553.37	0.10
BCW	2.167	Floodway	1115.00	1267.60	1276.72	1274.08	1276.74	0.000074	1.58	1204.26	553.37	0.10
BCW	2.163		Bridge									
BCW	2.159	Floodplain	1115.00	1267.20	1273.17	1273.17	1273.88	0.002413	8.04	223.34	161.44	0.61
BCW	2.159	Floodway	1115.00	1267.20	1273.17	1273.17	1273.88	0.002413	8.04	223.34	161.44	0.61
BCW	2.072	Floodplain	1115.00	1263.50	1267.96		1268.36	0.003759	5.69	268.61	167.54	0.55
BCW	2.072	Floodway	1115.00	1263.50	1268.07		1268.65	0.004542	6.37	191.41	65.18	0.61
BCW	1.996	Floodplain	1115.00	1260.40	1264.27	1264.27	1265.51	0.013825	8.96	124.45	50.76	1.01
BCW	1.996	Floodway	1115.00	1260.40	1264.27	1264.27	1265.51	0.013821	8.96	124.46	50.76	1.01
BCW	1.92	Floodplain	1115.00	1255.20	1261.12		1261.73	0.004082	6.28	177.44	48.39	0.58
BCW	1.92	Floodway	1115.00	1255.20	1261.10		1261.72	0.004133	6.31	176.59	48.26	0.58
BCW	1.844	Floodplain	1115.00	1252.40	1257.61	1257.43	1259.06	0.011394	9.67	115.29	35.04	0.94

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW (Continued)

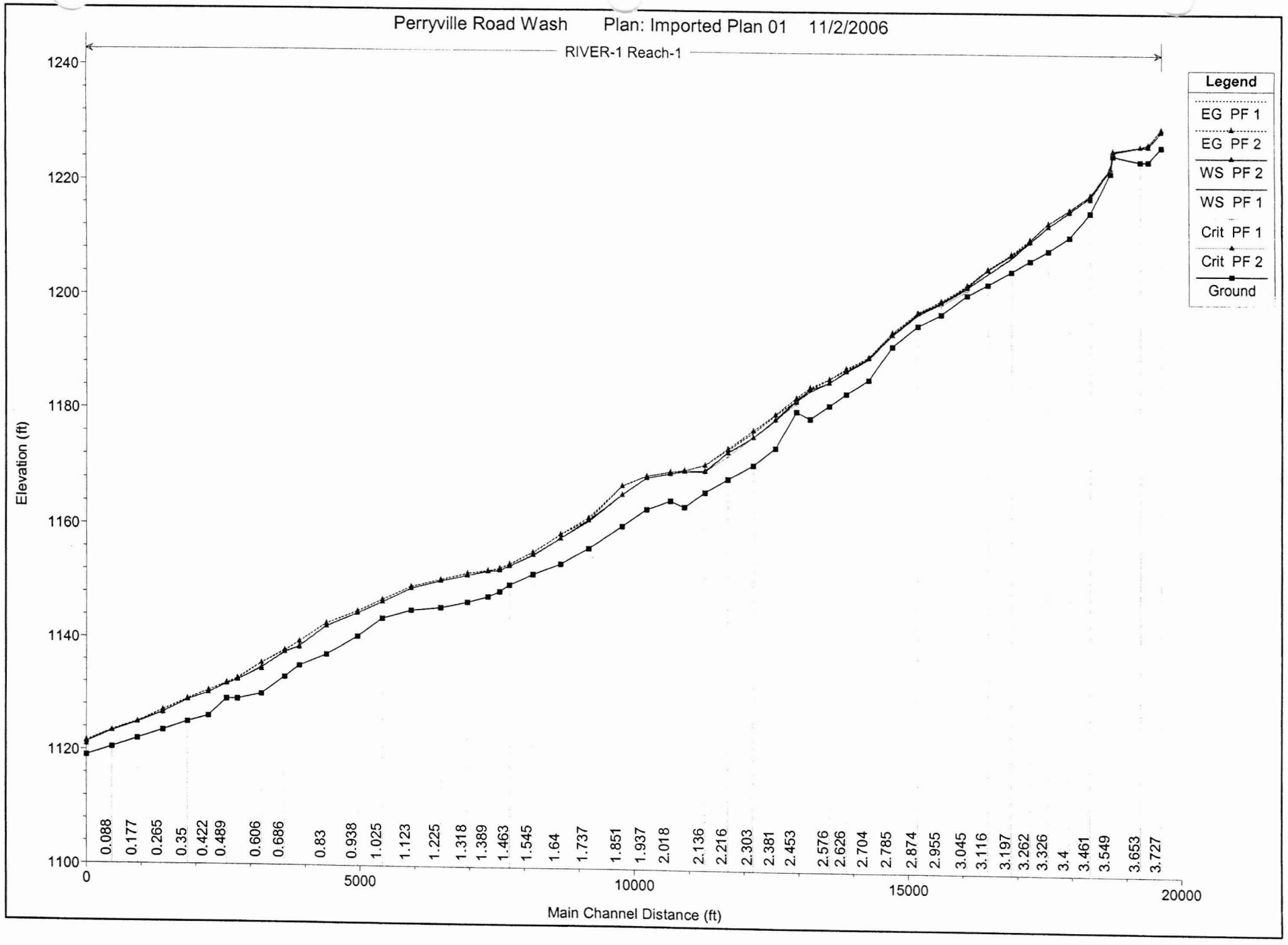
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
BCW	1.844	Floodway	1115.00	1252.40	1257.65	1257.45	1259.07	0.011014	9.55	116.71	35.20	0.92
BCW	1.768	Floodplain	1115.00	1250.70	1252.51	1252.51	1252.96	0.019094	6.38	211.75	233.91	1.18
BCW	1.768	Floodway	1115.00	1250.70	1252.82	1252.82	1253.38	0.017137	6.70	187.61	166.80	1.15
BCW	1.692	Floodplain	1115.00	1247.70	1252.12		1252.19	0.000445	2.11	537.38	186.47	0.20
BCW	1.692	Floodway	1115.00	1247.70	1252.06		1252.14	0.000465	2.14	510.22	161.20	0.20
BCW	1.616	Floodplain	1115.00	1244.00	1252.10		1252.12	0.000067	1.20	1072.60	250.00	0.08
BCW	1.616	Floodway	1115.00	1244.00	1252.05		1252.07	0.000064	1.17	1024.14	199.96	0.08
BCW	1.556	Floodplain	5679.00	1241.00	1249.58	1249.58	1251.57	0.006599	11.72	549.02	163.94	0.82
BCW	1.556	Floodway	5679.00	1241.00	1249.60	1249.60	1251.54	0.006405	11.57	545.75	138.48	0.80
BCW	1.466	Floodplain	5679.00	1237.50	1245.83	1245.83	1247.55	0.009921	11.73	556.40	175.95	0.94
BCW	1.466	Floodway	5679.00	1237.50	1246.02	1245.97	1247.55	0.008435	11.09	588.86	179.25	0.87
BCW	1.388	Floodplain	5679.00	1234.50	1241.04	1241.04	1242.55	0.014257	12.35	609.05	202.06	1.10
BCW	1.388	Floodway	5679.00	1234.50	1241.18	1241.18	1243.03	0.014771	12.87	537.88	142.78	1.12
BCW	1.313	Floodplain	5679.00	1230.80	1238.38		1239.33	0.004407	8.50	815.54	203.15	0.65
BCW	1.313	Floodway	5679.00	1230.80	1238.39		1239.33	0.004383	8.49	817.23	203.54	0.65
BCW	1.237	Floodplain	5679.00	1227.80	1237.72		1238.14	0.001655	6.69	1413.54	342.21	0.42
BCW	1.237	Floodway	5679.00	1227.80	1237.74		1238.15	0.001634	6.66	1420.10	342.41	0.42
BCW	1.159	Floodplain	5679.00	1224.40	1237.20	1234.51	1237.71	0.000675	6.68	1010.92	164.93	0.36
BCW	1.159	Floodway	5679.00	1224.40	1237.22	1234.51	1237.73	0.000668	6.65	1014.69	167.13	0.35
BCW	1.1535		Bridge									
BCW	1.148	Floodplain	5679.00	1224.00	1235.08	1234.51	1236.10	0.002041	10.37	770.33	193.08	0.60
BCW	1.148	Floodway	5679.00	1224.00	1235.39	1234.51	1236.25	0.001606	9.41	828.75	189.42	0.54
BCW	1.074	Floodplain	7131.00	1221.00	1231.16	1231.16	1234.17	0.005759	14.14	541.61	103.64	0.91
BCW	1.074	Floodway	7131.00	1221.00	1230.90	1230.90	1234.27	0.006657	14.85	495.63	75.41	0.97
BCW	0.998	Floodplain	7131.00	1218.30	1228.33	1228.33	1231.40	0.005691	14.42	544.12	94.43	0.91
BCW	0.998	Floodway	7131.00	1218.30	1228.10	1228.10	1231.56	0.006570	15.18	497.55	74.31	0.98

HEC-RAS Plan: Corrected River: Beardsley Canal Reach: BCW (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
BCW	0.92	Floodplain	7131.00	1215.60	1223.31	1223.31	1225.52	0.006418	12.25	641.82	151.57	0.92
BCW	0.92	Floodway	7131.00	1215.60	1223.48	1223.26	1225.92	0.006800	12.58	572.53	103.74	0.93
BCW	0.846	Floodplain	7131.00	1213.60	1222.49		1223.24	0.001535	7.90	1282.48	295.00	0.49
BCW	0.846	Floodway	7131.00	1213.60	1223.75		1224.50	0.001151	7.52	1113.37	140.18	0.43
BCW	0.77	Floodplain	7567.00	1211.30	1222.53		1222.75	0.000533	5.02	2475.60	470.00	0.29
BCW	0.77	Floodway	7567.00	1211.30	1222.68		1223.87	0.001891	9.56	941.72	121.15	0.55
BCW	0.696	Floodplain	7567.00	1210.00	1220.72	1220.72	1222.22	0.002699	10.97	1084.86	398.59	0.65
BCW	0.696	Floodway	7567.00	1210.00	1219.35	1219.35	1222.46	0.006142	14.80	570.33	91.66	0.95
BCW	0.62	Floodplain	7567.00	1207.80	1217.19		1217.57	0.001148	6.23	1868.48	449.75	0.41
BCW	0.62	Floodway	7567.00	1207.80	1217.15		1218.41	0.002759	9.63	899.44	145.50	0.63
BCW	0.543	Floodplain	7567.00	1206.70	1216.19		1216.93	0.002007	8.24	1345.86	322.94	0.54
BCW	0.543	Floodway	7567.00	1206.70	1216.21		1217.28	0.002499	9.22	989.74	159.63	0.60
BCW	0.465	Floodplain	7567.00	1205.00	1213.16	1213.16	1215.47	0.006008	12.42	669.79	177.08	0.90
BCW	0.465	Floodway	7567.00	1205.00	1212.89	1212.89	1215.52	0.007189	13.17	597.74	117.93	0.98
BCW	0.39	Floodplain	7567.00	1201.80	1209.98	1209.98	1212.30	0.006360	12.41	646.71	149.78	0.92
BCW	0.39	Floodway	7567.00	1201.80	1209.81	1209.81	1212.48	0.007440	13.15	581.35	110.14	0.99
BCW	0.307	Floodplain	7567.00	1197.70	1203.39	1203.39	1204.82	0.005441	10.11	820.56	290.00	1.02
BCW	0.307	Floodway	7567.00	1197.70	1204.38	1203.76	1205.85	0.003640	9.74	777.08	175.63	0.82
BCW	0.231	Floodplain	7567.00	1196.00	1201.03		1202.03	0.005772	8.59	963.79	345.47	0.84
BCW	0.231	Floodway	7567.00	1196.00	1201.59	1201.59	1203.66	0.008523	11.55	655.05	160.67	1.01
BCW	0.156	Floodplain	7567.00	1193.90	1199.27		1200.18	0.004024	7.95	1085.98	397.22	0.74
BCW	0.156	Floodway	7567.00	1193.90	1199.25		1200.17	0.004096	7.99	1056.79	353.00	0.74
BCW	0.07	Floodplain	7567.00	1192.00	1196.34	1196.34	1197.88	0.006184	10.07	807.04	331.56	0.92
BCW	0.07	Floodway	7567.00	1192.00	1196.45	1196.18	1197.94	0.005700	9.86	784.18	211.97	0.88
BCW	0	Floodplain	7567.00	1189.40	1194.00	1193.76	1195.62	0.005506	10.43	775.50	214.95	0.88
BCW	0	Floodway	7567.00	1189.40	1193.75	1193.75	1195.60	0.006768	11.12	714.71	191.88	0.97

APPENDIX C2

Perryville Road Wash (Upstream)


Perryville Road Wash Plan: Imported Plan 01 11/2/2006
RIVER-1 Reach-1
Legend
EG PF 1
EG PF 2
WS PF 2
WS PF 1
Crit PF 1
Crit PF 2
Ground
Elevation (ft)
1240
1220
1200
1180
1160
1140
1120
1100
0
5000
10000
15000
20000
Main Channel Distance (ft)
0.088
0.177
0.265
0.35
0.422
0.489
0.606
0.686
0.83
0.938
1.025
1.123
1.225
1.318
1.389
1.463
1.545
1.64
1.737
1.851
1.937
2.018
2.136
2.216
2.303
2.381
2.453
2.576
2.626
2.704
2.785
2.874
2.955
3.045
3.116
3.197
3.262
3.326
3.4
3.461
3.549
3.653
3.727

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-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)	
Reach-1	3.727	PF 1	1486.00	1226.50	1229.25		1229.66	0.009781	5.18	303.78	178.49	0.65
Reach-1	3.727	PF 2	1486.00	1226.50	1229.25		1229.66	0.009794	5.18	303.65	178.47	0.65
Reach-1	3.681	PF 1	1457.00	1224.00	1226.60		1227.00	0.012565	5.08	307.84	263.03	0.71
Reach-1	3.681	PF 2	1457.00	1224.00	1226.60		1226.99	0.012554	5.08	307.74	258.71	0.71
Reach-1	3.653	PF 1	1457.00	1224.00	1226.59		1226.60	0.000531	1.13	1597.23	734.14	0.15
Reach-1	3.653	PF 2	1457.00	1224.00	1226.59		1226.60	0.000531	1.13	1596.68	732.39	0.15
Reach-1	3.558	PF 1	1457.00	1225.00	1225.64	1225.64	1225.88	0.008473	4.02	377.87	794.25	0.98
Reach-1	3.558	PF 2	1457.00	1225.00	1225.64	1225.64	1225.88	0.008437	4.02	378.06	792.46	0.98
Reach-1	3.549	PF 1	1450.00	1222.00	1222.59	1222.59	1222.85	0.011545	4.08	355.80	698.00	1.01
Reach-1	3.549	PF 2	1450.00	1222.00	1222.60	1222.60	1222.85	0.011479	4.07	356.48	698.32	1.00
Reach-1	3.461	PF 1	1450.00	1215.10	1217.83	1217.47	1218.16	0.012925	6.42	393.17	313.75	0.91
Reach-1	3.461	PF 2	1450.00	1215.10	1217.82	1217.46	1218.15	0.013168	6.46	390.27	310.89	0.92
Reach-1	3.4	PF 1	1450.00	1210.90	1215.25		1215.59	0.005081	6.11	517.00	380.60	0.63
Reach-1	3.4	PF 2	1450.00	1210.90	1215.25		1215.59	0.005014	6.08	518.64	377.43	0.63
Reach-1	3.326	PF 1	1450.00	1208.50	1212.74		1213.29	0.007155	8.22	446.61	323.47	0.78
Reach-1	3.326	PF 2	1450.00	1208.50	1212.73		1213.29	0.007274	8.27	443.31	322.19	0.78
Reach-1	3.262	PF 1	1450.00	1206.80	1209.99	1209.86	1210.37	0.010671	6.86	445.72	388.87	0.86
Reach-1	3.262	PF 2	1450.00	1206.80	1210.06		1210.44	0.009776	6.73	415.83	300.00	0.83
Reach-1	3.197	PF 1	1450.00	1204.90	1207.19		1207.33	0.007217	5.21	651.26	573.48	0.70
Reach-1	3.197	PF 2	1450.00	1204.90	1207.75		1207.94	0.005424	5.44	548.12	319.52	0.63
Reach-1	3.116	PF 1	1450.00	1202.60	1204.45		1204.51	0.005659	3.15	804.19	748.27	0.56
Reach-1	3.116	PF 2	1450.00	1202.60	1205.15		1205.32	0.006613	4.87	534.55	350.00	0.66
Reach-1	3.045	PF 1	1450.00	1200.70	1201.96	1201.50	1202.06	0.008138	3.65	683.48	807.62	0.67
Reach-1	3.045	PF 2	1450.00	1200.70	1202.23	1202.00	1202.46	0.009427	4.66	474.11	462.00	0.75
Reach-1	2.955	PF 1	1450.00	1197.30	1199.22	1198.86	1199.41	0.006150	4.66	601.78	544.01	0.64
Reach-1	2.955	PF 2	1450.00	1197.30	1199.44		1199.65	0.005322	4.70	504.66	328.00	0.61

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (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-1	2.874	PF 1	1450.00	1195.30	1197.20		1197.31	0.004051	3.61	752.76	688.95	0.51
Reach-1	2.874	PF 2	1450.00	1195.30	1197.48		1197.66	0.004247	4.14	567.11	400.00	0.54
Reach-1	2.785	PF 1	1450.00	1191.60	1193.58	1193.58	1193.95	0.016639	8.05	479.09	562.84	1.06
Reach-1	2.785	PF 2	1450.00	1191.60	1193.61	1193.61	1194.06	0.018335	8.52	389.00	350.00	1.12
Reach-1	2.704	PF 1	1450.00	1185.70	1189.31		1189.51	0.003994	5.23	581.19	335.42	0.56
Reach-1	2.704	PF 2	1450.00	1185.70	1189.49		1189.70	0.003592	5.17	553.01	273.00	0.53
Reach-1	2.626	PF 1	1450.00	1183.20	1187.04		1187.45	0.006977	6.76	511.81	537.39	0.73
Reach-1	2.626	PF 2	1450.00	1183.20	1187.16		1187.69	0.007469	7.22	401.54	307.80	0.76
Reach-1	2.576	PF 1	1450.00	1181.10	1185.23		1185.75	0.004987	7.14	460.61	346.78	0.66
Reach-1	2.576	PF 2	1450.00	1181.10	1185.15		1185.78	0.005907	7.66	376.72	233.41	0.71
Reach-1	2.501	PF 1	1450.00	1178.80	1183.59		1184.05	0.005301	6.84	429.15	259.74	0.66
Reach-1	2.501	PF 2	1450.00	1178.80	1184.00		1184.30	0.003160	5.67	469.64	193.34	0.52
Reach-1	2.453	PF 1	1450.00	1180.00	1181.85	1181.39	1181.98	0.007025	4.77	713.84	733.18	0.67
Reach-1	2.453	PF 2	1450.00	1180.00	1182.08	1181.71	1182.47	0.011838	6.78	352.73	210.00	0.90
Reach-1	2.381	PF 1	1484.00	1173.70	1178.44	1178.44	1179.38	0.006382	8.32	262.10	186.38	0.74
Reach-1	2.381	PF 2	1484.00	1173.70	1178.62		1179.49	0.005539	7.98	250.36	122.00	0.70
Reach-1	2.303	PF 1	1484.00	1170.70	1175.49	1175.49	1176.24	0.006551	7.72	326.12	261.50	0.74
Reach-1	2.303	PF 2	1484.00	1170.70	1175.50	1175.50	1176.65	0.008714	8.92	202.97	97.00	0.85
Reach-1	2.216	PF 1	1484.00	1168.30	1172.88	1172.15	1173.33	0.003818	6.29	383.73	193.77	0.57
Reach-1	2.216	PF 2	1484.00	1168.30	1172.83		1173.50	0.005020	7.16	262.72	87.00	0.66
Reach-1	2.136	PF 1	1484.00	1166.00	1169.54	1169.54	1170.65	0.011959	8.62	188.46	95.72	0.95
Reach-1	2.136	PF 2	1484.00	1166.00	1169.71	1169.58	1170.65	0.009444	8.00	204.52	95.00	0.86
Reach-1	2.066	PF 1	1484.00	1163.50	1169.60		1169.69	0.000540	3.20	895.44	308.84	0.23
Reach-1	2.066	PF 2	1484.00	1163.50	1169.59		1169.74	0.000746	3.76	556.25	113.97	0.27
Reach-1	2.018	PF 1	1484.00	1164.50	1169.13		1169.43	0.001939	4.61	416.57	201.00	0.41
Reach-1	2.018	PF 2	1484.00	1164.50	1169.13		1169.43	0.001958	4.63	371.77	122.02	0.41

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (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-1	1.937	PF 1	1484.00	1163.00	1168.38		1168.66	0.001625	4.30	359.21	101.26	0.38
Reach-1	1.937	PF 2	1484.00	1163.00	1168.38		1168.66	0.001627	4.30	359.10	101.25	0.38
Reach-1	1.851	PF 1	1484.00	1160.00	1165.44	1165.44	1166.95	0.012819	9.84	150.76	50.13	1.00
Reach-1	1.851	PF 2	1484.00	1160.00	1165.44	1165.44	1166.95	0.012915	9.87	150.33	50.06	1.00
Reach-1	1.737	PF 1	1484.00	1156.10	1160.76		1160.99	0.003715	4.85	529.15	336.76	0.53
Reach-1	1.737	PF 2	1484.00	1156.10	1160.99		1161.40	0.004670	5.76	335.47	136.15	0.60
Reach-1	1.64	PF 1	1433.00	1153.30	1157.86	1157.77	1158.49	0.006340	7.02	316.98	267.78	0.71
Reach-1	1.64	PF 2	1433.00	1153.30	1157.81	1157.81	1158.49	0.006870	7.23	303.90	261.68	0.74
Reach-1	1.545	PF 1	1375.00	1151.50	1154.75		1155.28	0.006247	6.23	283.97	172.15	0.69
Reach-1	1.545	PF 2	1375.00	1151.50	1154.86		1155.33	0.005208	5.86	303.23	169.30	0.63
Reach-1	1.463	PF 1	1375.00	1149.60	1152.93		1153.18	0.003638	4.47	496.62	408.86	0.52
Reach-1	1.463	PF 2	1375.00	1149.60	1152.90		1153.23	0.004395	4.88	374.83	242.03	0.57
Reach-1	1.429	PF 1	1375.00	1148.40	1152.11		1152.45	0.004311	4.69	293.19	137.77	0.56
Reach-1	1.429	PF 2	1375.00	1148.40	1152.13		1152.47	0.004131	4.64	296.81	137.06	0.55
Reach-1	1.389	PF 1	1477.00	1147.50	1151.96		1152.04	0.000668	2.33	813.41	419.72	0.23
Reach-1	1.389	PF 2	1477.00	1147.50	1151.97		1152.05	0.000711	2.41	669.66	234.75	0.24
Reach-1	1.318	PF 1	1477.00	1146.50	1151.21		1151.56	0.002833	4.81	392.16	257.79	0.48
Reach-1	1.318	PF 2	1477.00	1146.50	1151.21		1151.55	0.002833	4.80	391.71	252.90	0.48
Reach-1	1.225	PF 1	1477.00	1145.50	1150.24		1150.45	0.001726	4.04	603.68	329.38	0.38
Reach-1	1.225	PF 2	1477.00	1145.50	1150.24		1150.45	0.001716	4.04	604.51	327.00	0.38
Reach-1	1.123	PF 1	1335.00	1145.00	1148.86		1149.18	0.003504	4.59	330.15	220.18	0.51
Reach-1	1.123	PF 2	1335.00	1145.00	1148.86		1149.18	0.003503	4.58	330.18	220.00	0.51
Reach-1	1.025	PF 1	1116.00	1143.50	1146.42		1146.86	0.006179	5.42	247.54	197.90	0.66
Reach-1	1.025	PF 2	1116.00	1143.50	1146.42		1146.85	0.006205	5.43	246.76	193.00	0.66
Reach-1	0.938	PF 1	1190.00	1140.30	1144.41		1144.74	0.003585	4.79	320.35	202.63	0.52
Reach-1	0.938	PF 2	1190.00	1140.30	1144.42		1144.75	0.003549	4.77	321.64	201.00	0.52

HEC-RAS Plan: Imported Pla River: RIVER-1 Reach: Reach-1 (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-1	0.83	PF 1	1190.00	1137.00	1142.08		1142.55	0.004106	5.53	229.97	128.26	0.57
Reach-1	0.83	PF 2	1190.00	1137.00	1142.06		1142.54	0.004159	5.55	228.48	125.86	0.57
Reach-1	0.736	PF 1	1190.00	1135.00	1138.44	1138.23	1139.31	0.011297	7.55	170.11	118.03	0.90
Reach-1	0.736	PF 2	1190.00	1135.00	1138.46	1138.25	1139.31	0.010968	7.47	172.45	117.21	0.89
Reach-1	0.686	PF 1	1190.00	1133.00	1137.29		1137.64	0.003429	5.01	343.66	256.13	0.52
Reach-1	0.686	PF 2	1190.00	1133.00	1137.40		1137.75	0.003139	4.90	299.92	135.00	0.50
Reach-1	0.606	PF 1	1190.00	1129.90	1134.64	1134.64	1135.36	0.009474	6.99	222.51	266.89	0.83
Reach-1	0.606	PF 2	1190.00	1129.90	1134.54	1134.32	1135.44	0.011247	7.58	159.73	86.42	0.90
Reach-1	0.523	PF 1	1190.00	1129.00	1132.39		1132.62	0.002866	4.03	421.10	328.97	0.46
Reach-1	0.523	PF 2	1190.00	1129.00	1132.38		1132.69	0.003562	4.49	274.17	131.28	0.51
Reach-1	0.489	PF 1	1190.00	1129.00	1131.66		1131.85	0.003225	4.21	415.79	269.50	0.49
Reach-1	0.489	PF 2	1190.00	1129.00	1131.65		1131.84	0.003265	4.23	413.89	268.97	0.49
Reach-1	0.422	PF 1	1234.00	1126.00	1130.02		1130.44	0.005561	6.05	405.32	325.37	0.65
Reach-1	0.422	PF 2	1234.00	1126.00	1130.03		1130.44	0.005490	6.01	405.49	317.00	0.65
Reach-1	0.35	PF 1	1234.00	1125.00	1128.75		1128.90	0.002637	4.32	751.10	599.11	0.45
Reach-1	0.35	PF 2	1234.00	1125.00	1128.76		1128.91	0.002631	4.32	642.36	388.10	0.45
Reach-1	0.265	PF 1	1234.00	1123.50	1126.62	1126.40	1126.99	0.007688	6.12	424.55	388.87	0.74
Reach-1	0.265	PF 2	1234.00	1123.50	1126.57	1126.46	1126.96	0.008253	6.24	402.46	349.00	0.77
Reach-1	0.177	PF 1	1277.00	1122.00	1124.87		1124.91	0.002740	2.40	788.12	415.53	0.40
Reach-1	0.177	PF 2	1277.00	1122.00	1124.79		1124.84	0.002706	2.37	745.12	356.00	0.39
Reach-1	0.088	PF 1	1129.00	1120.50	1123.32		1123.40	0.003884	3.69	676.14	553.29	0.51
Reach-1	0.088	PF 2	1129.00	1120.50	1123.28		1123.36	0.003775	3.58	647.79	474.00	0.50
Reach-1	0	PF 1	470.00	1119.00	1121.33	1120.86	1121.51	0.004570	3.40	155.09	218.78	0.53
Reach-1	0	PF 2	470.00	1119.00	1121.33	1120.86	1121.51	0.004570	3.40	155.09	218.78	0.53

APPENDIX D

HEC-RAS Output Files for Post-Project Conditions Models

APPENDIX D1

Beardsley Canal Wash and NIC

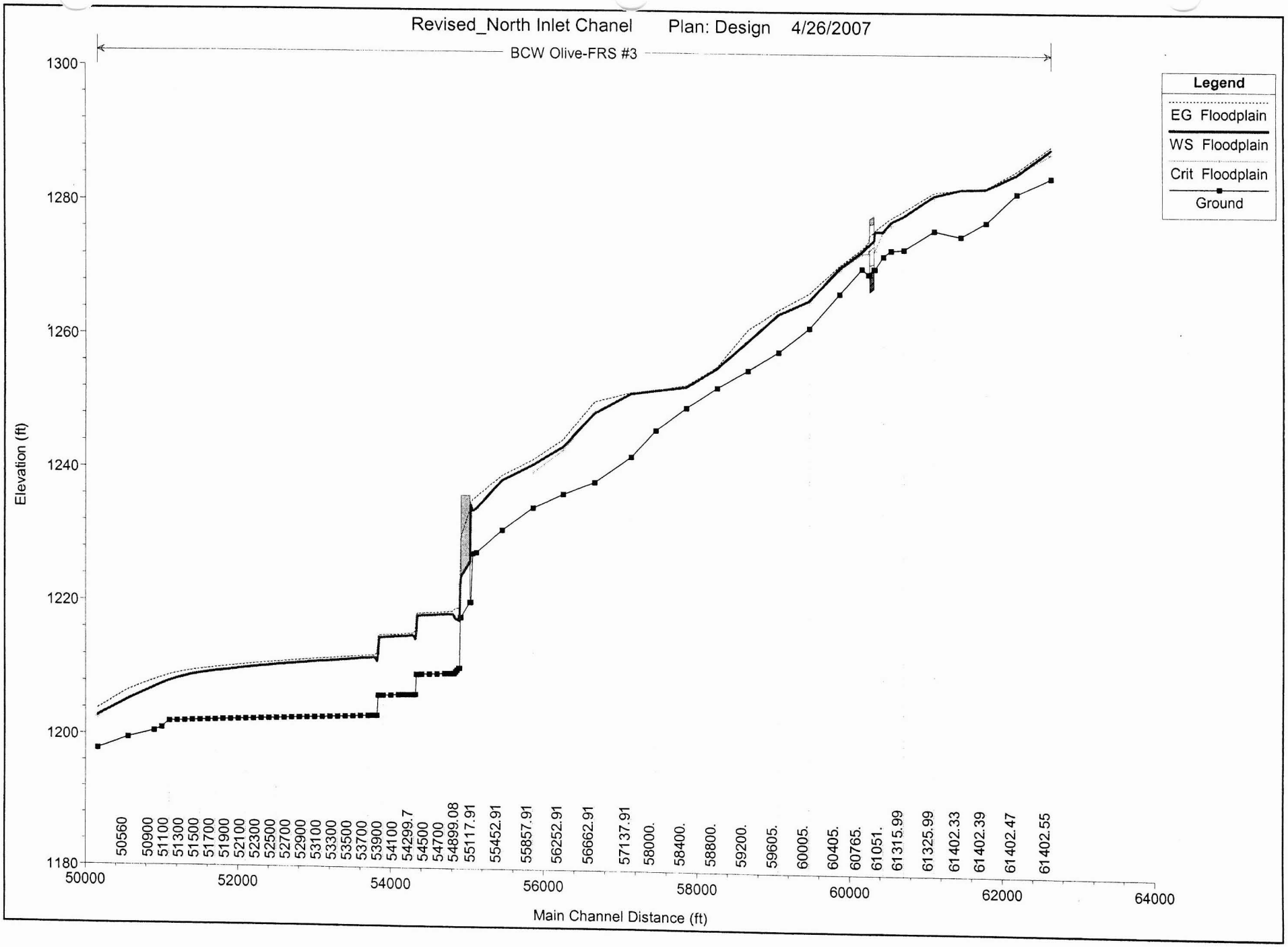

Revised_North Inlet Chanel Plan: Design 4/26/2007
BCW Olive-FRS #3
Legend
EG Floodplain
WS Floodplain
Crit Floodplain
Ground
Elevation (ft)
1300
1280
1260
1240
1220
1200
1180
50560
50900
51100
51300
51500
51700
51900
52100
52300
52500
52700
52900
53100
53300
53500
53700
53900
54100
54299.7
54500
54700
54899.08
55117.91
55452.91
55857.91
56252.91
56662.91
57137.91
58000.
58400.
58800.
59200.
59605.
60005.
60405.
60765.
61051.
61315.99
61325.99
61402.33
61402.39
61402.47
61402.55
50000
52000
54000
56000
58000
60000
62000
64000
Main Channel Distance (ft)

EXHIBIT A

Effective FEMA FIRM Panels

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3176 (central Arizona)*. The **horizontal datum** was *NAD83, GRS80 spheroid*. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the *National Geodetic Vertical Datum of 1929*. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(310) 713-3191

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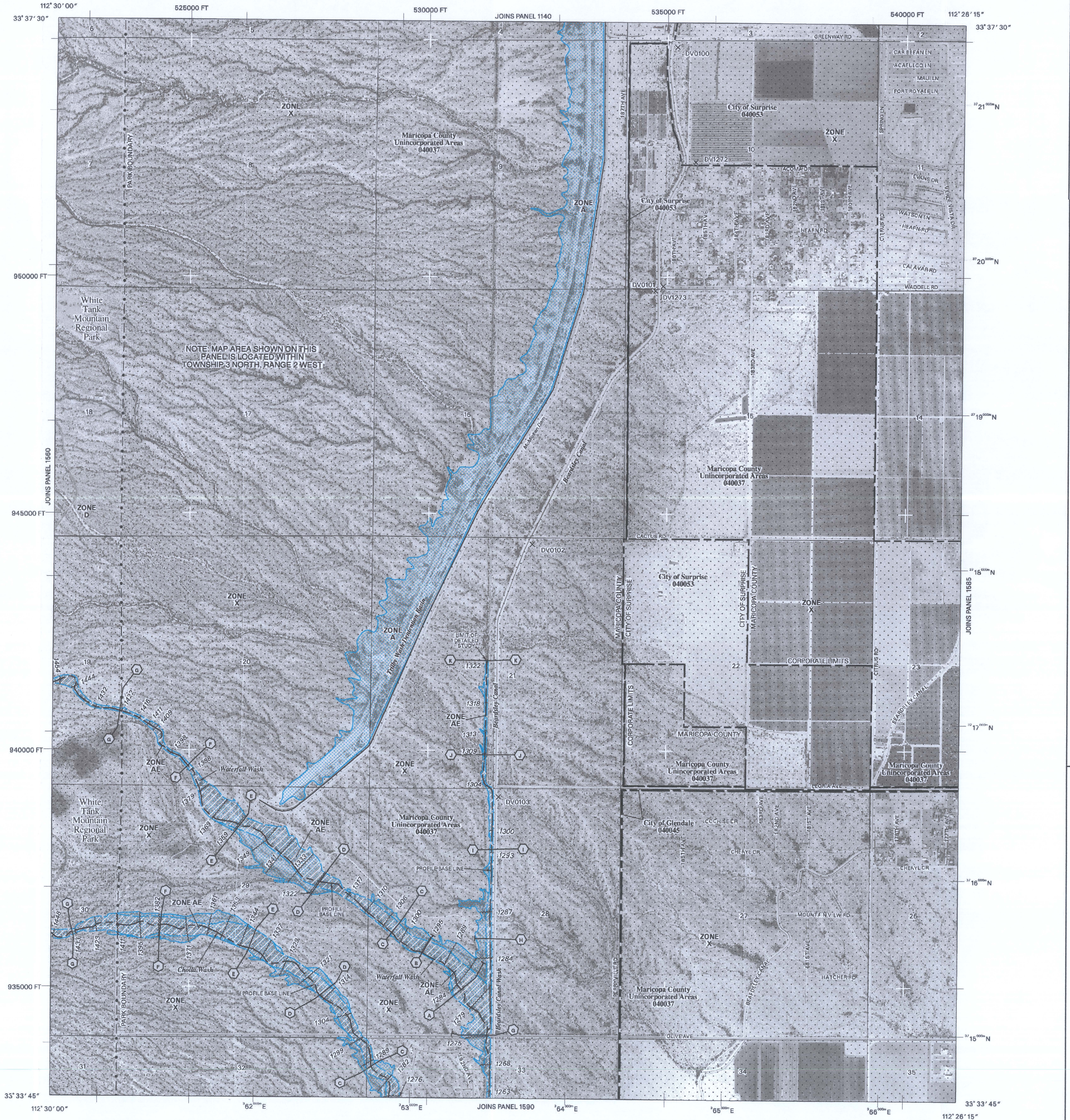

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

~~513~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

(A)——(A)	Cross section line
(2)-------(2)	Transect line
112° 07' 08", 33° 25' 41"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.
4276000mE	1000-meter Universal Transverse Mercator grid tick values zone 12.
875000 FT	5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)
×DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1988

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

September 4, 1991, September 30, 1995, July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1580H

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

PANEL 1580 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GLENDALE, CITY OF	040045	1580	H
MARICOPA COUNTY	040037	1580	H
SURPRISE, CITY OF	040053	1580	H

EXHIBIT A

EFFECTIVE FIRM PANEL 1 OF 2

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

04013C1580H

MAP REVISED

SEPTEMBER 30, 2005

Federal Emergency Management Agency

W:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\Drawings\Exhibits\ FEMA MAP_A.dwg

NOTES TO USERS

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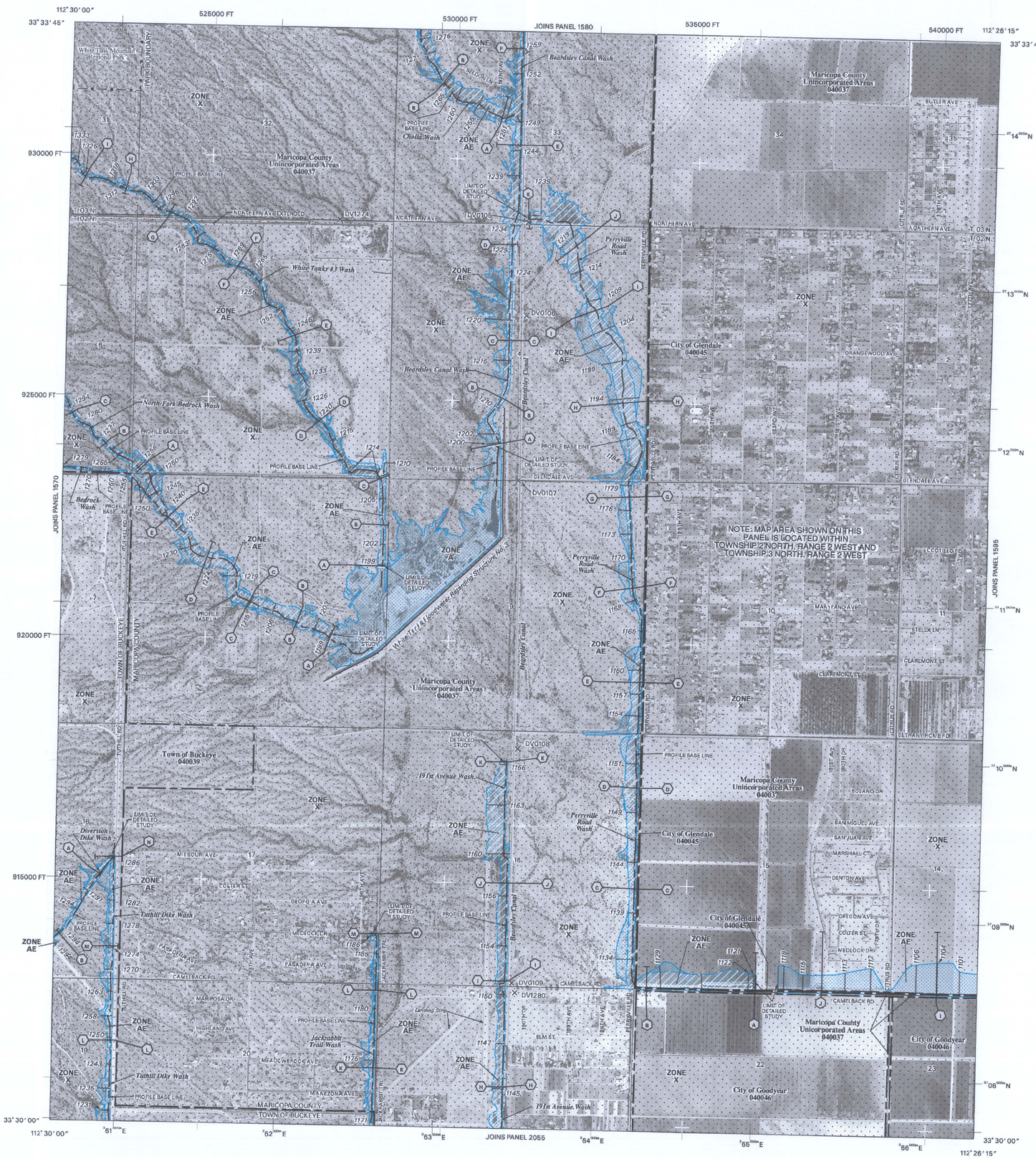

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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ZONE A — No Base Flood Elevations determined.

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ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

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OTHERWISE PROTECTED AREAS (OPAs)

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- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
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- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

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- 2-2 — Transect line

112° 07′ 08″, 33° 25′ 41″ — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.

"76 000mE — 1000-meter Universal Transverse Mercator grid tick values zone 12

875000 FT — 5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)

X DV2313 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

* M1.5 — River Mile

MAP REPOSITORY
Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 4, 1991, September 30, 1995, July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1590H

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

PANEL 1590 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BUCKEYE, TOWN OF	040039	1590	H
GLENDALE, CITY OF	040045	1590	H
GOODYEAR, CITY OF	040046	1590	H
MARICOPA COUNTY	040037	1590	H

EXHIBIT A
EFFECTIVE FIRM PANEL 2 OF 2

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
04013C1590H
MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

W:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\Drawings\Exhibits\ FEMA MAP_B.dwg

EXHIBIT B

Proposed Construction Plans

EXHIBIT B1

North Inlet Channel Improvements – Phase I

EXHIBIT B1

North Inlet Channel Improvements – Phase I

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

IN COOPERATION WITH MARICOPA COUNTY MUNICIPAL WATER CONSERVATION DISTRICT NO. 1

PLANS FOR THE CONSTRUCTION OF

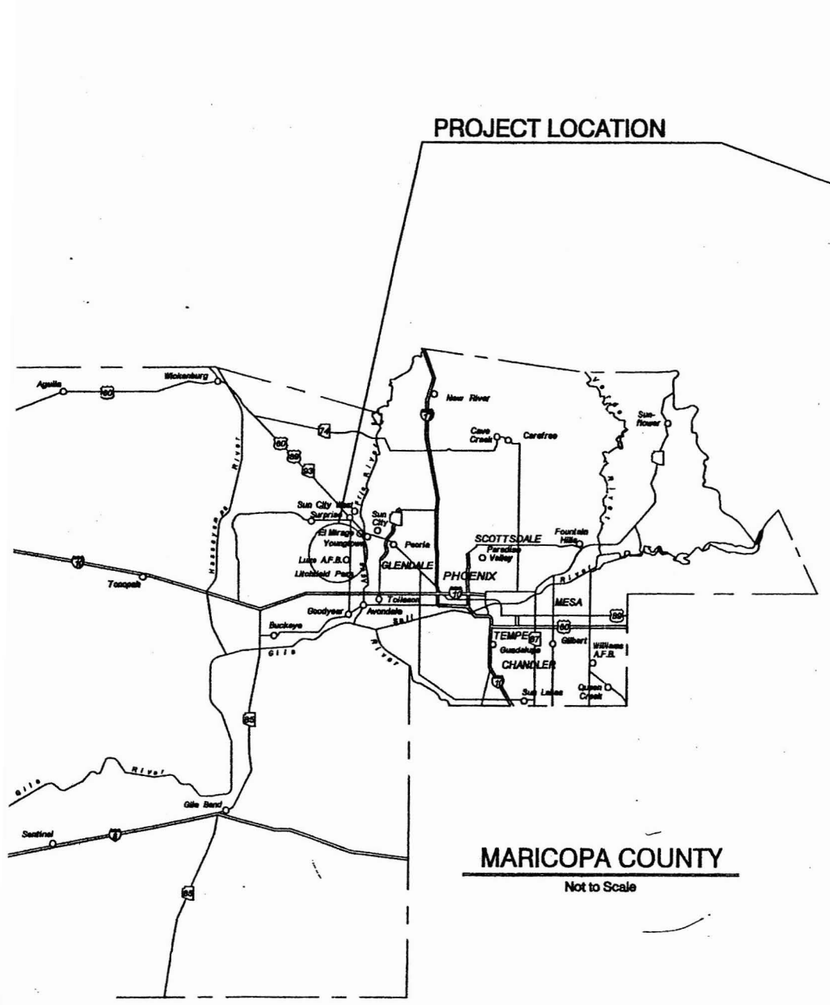
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3

NORTH INLET CHANNEL

PCN 470.04.31

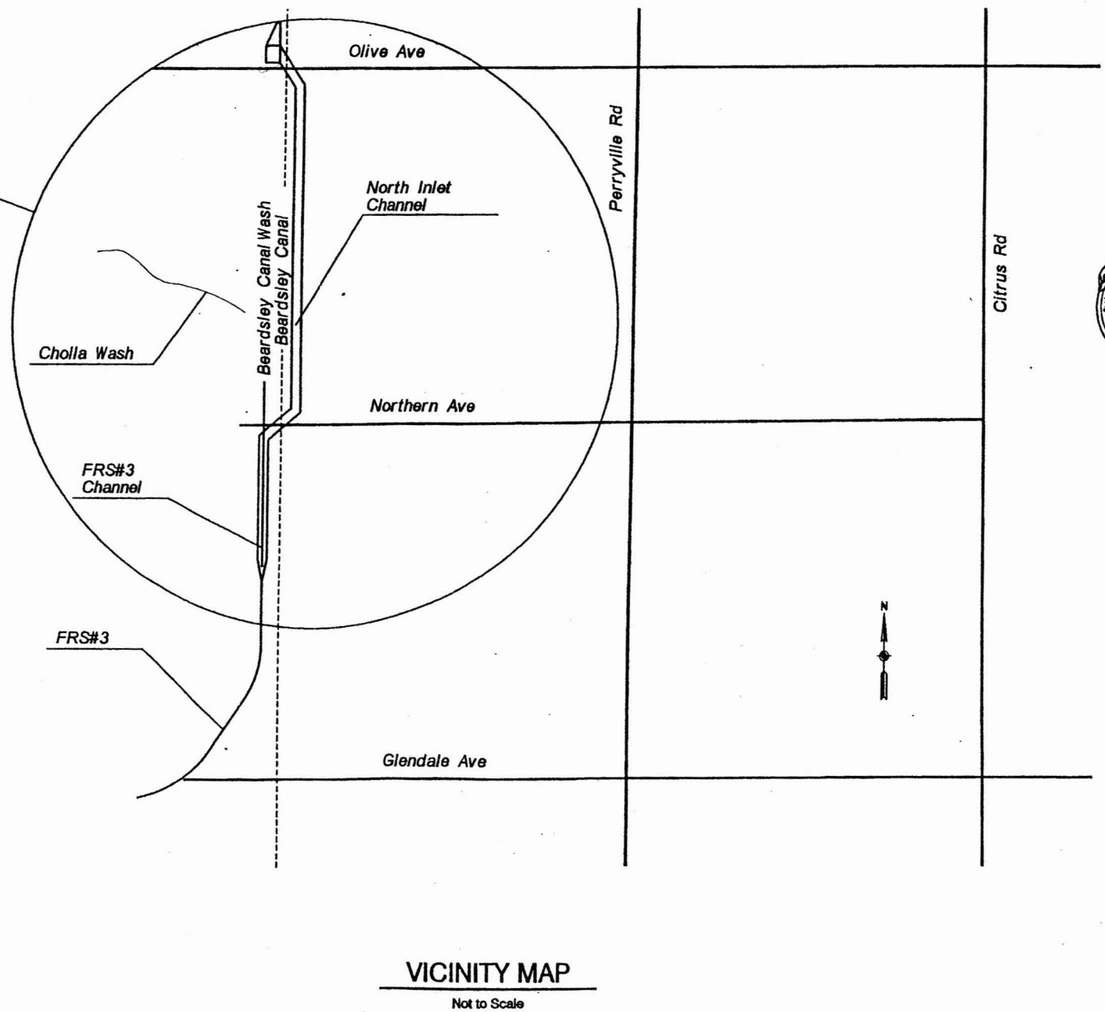
FCD CONTRACT No. 2005C019

Revisions added from Addendum 1 + 2



MARICOPA COUNTY

Not to Scale



VICINITY MAP

Not to Scale

KIRKHAM MICHAEL

9201 North 25th Avenue - Suite 150
Phoenix, AZ 85021 (602)944-6564 Fax (602) 944-6592

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY:

B.A. Old, P.E. — 3-16-06

PROJECT MANAGER — DATE

ISSUED FOR PUBLIC BIDDING BY:

CHIEF ENGINEER AND GENERAL MANAGER

JAMES R. SWEENEY
GENERAL MANAGER, MARICOPA COUNTY MUNICIPAL WATER CONSERVATION DISTRICT NO.1

BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT

DON STAPLEY - CHAIRMAN

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

LEGEND

- BENCHMARK
- EXISTING SURVEY MONUMENT (BRASS CAP FLUSH)
- EXISTING SURVEY MONUMENT (BRASS CAP IN HAND HOLE)
- EXISTING COMBINED CURB & GUTTER - MAG
- DET 220 TYPE "A" EXISTING DITCH
- IR — EXISTING IRRIGATION LINE (NOTE - PRIVATE OR RWCD)
- EXISTING IRRIGATION STRUCTURE
- EXISTING IRRIGATION STANDPIPE
- W — EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER & BOX
- EXISTING WATER VALVE
- SS — EXISTING SEWER LINE
- EXISTING MANHOLE
- SD — EXISTING STORM DRAIN
- EF — EXISTING EFFLUENT LNE
- TV — EXISTING UNDERGROUND CABLE TELEVISION
- E — EXISTING UNDERGROUND ELECTRIC
- 4D — EXISTING UNDERGROUND TELEPHONE DUCTS (SPECIFY NUMBER)
- G — EXISTING GAS LINE
- T — EXISTING UNDERGROUND TELEPHONE CABLE
- TELEPHONE RISER
- EXISTING STREET SIGN
- STOP — STOP SIGN
- EXISTING TRAFFIC SIGN
- EXISTING UTILITY POLE
- EXISTING WIRE FENCE
- EXISTING WOOD FENCE
- EXISTING CHAIN LINK FENCE
- GATE W/ POSTS
- MAIL BOX
- DOWN ANCHOR
- STREET LIGHT
- EASEMENT LINE
- EXISTING OR NEW R/W LINE
- PAVEMENT CENTER LINE AND OR MONUMENT LINE (℄ AND / OR ℄)
- CUT LINE
- FILL LINE
- GEOTEXTILE BARRIER
- NEW WIRE FENCE
- 2 — BORING HOLE / NUMBER (SEE SPECIAL PROVISIONS)
- TREE

UTILITY NOTIFICATION

COMPANY	CONTACT	PHONE NUMBER
WATER UTILITY OF GREATER BUCKEYE	JACK MEISTER	(623) 386-4252 & (602) 224-0711
BROADWING COMMUNICATIONS	NORMAN GARCIA	(512) 742-3827
QWEST	MATTHEW PHILLIPS	(602) 203-5873
MCI	PETE PHILLIPS / DAVE JORDON	(303) 214-7101 & (602) 241-6408
SOUTHWEST GAS	JEAN PACHECO	(602) 484-5277
APS	BOBBY GARZA	(602) 371-7989
COX COMMUNICATIONS	PHIL MASTERS	(623) 594-0505
MWD	GLEN VORTHERMS	(623) 546-8266

ABBREVIATIONS

℄	CENTERLINE
CSTR	CONSTRUCTION
DESC	DESCRIPTION
EQ	EQUAL
EXST	EXISTING
FOC	FIBRE OPTIC CABLE
OHE	OVERHEAD ELECTRIC
PG	PAGE
P/L	PROPERTY LINE
PRV	PRIVATE
R/W	RIGHT-OF-WAY
SPG	SPACING
UGT	UNDERGROUND TELE CABLE
TW	TOP OF WALL
TN	TOP OF NUT
MAG	MARICOPA ASSOCIATION OF GOVERNMENTS
EXPJT	EXPANSION JOINT
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
PROP	PROPOSED
TOB	TOP OF BANK
NIC	NORTH INLET CHANNEL
BCW	BEARDSLEY CANAL WASH
SRE	SONORAN RIDGE ESTATES

INDEX OF SHEETS

DRAWING NUMBER	TITLE	SHEET No.	
G1	COVER SHEET & VICINITY MAP	1	
G2	GENERAL NOTES & INDEX	2	
G3	KEY MAP & GENERAL NOTES	3	
G4-G6	GEOMETRIC SHEETS	4-6	
G7-G9	TYPICAL SECTIONS	7-9	
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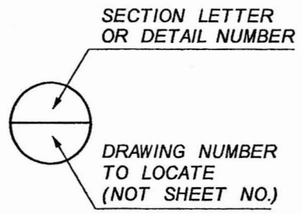
C1-C13	PLAN & PROFILE SHEETS	13-25	
C14-C15	PLAN & PROFILE - SOIL CEMENT BANK PROTECTION	26-27	
C16	NORTHERN AVENUE PROFILE ADJUSTMENT	28	
ST1-ST3	SIDE WEIR STRUCTURE DETAILS	29-31	
ST4-ST5	BEARDSLEY CANAL WASH CULVERT INLET DETAILS	32-33	
ST6	CONJOINED WINGWALL AND OUTLET APRON DETAIL	34	
DS1-DS3	DROP STRUCTURE DETAILS	35-37	
~~B1-B9~~	~~BORING & TEST PIT LOGS~~	~~38-46~~	(DELETED FROM PLAN SET. SEE APPENDIX "A" OF SGC)
XS01-XS10	CROSS SECTIONS	47-56	
APPENDIX A	APPENDIX A		
1-11	MWD BEARDSLEY CANAL LINING IMPROVEMENTS	57-67	

GENERAL NOTES

1. ALL CONSTRUCTION TO BE PERFORMED ACCORDING TO APPLICABLE MAG STANDARD DETAILS AND MAG SPECIFICATIONS, INCLUDING REVISIONS 1998 THROUGH 2005, UNLESS OTHERWISE NOTED.
2. FACILITIES WHICH ARE NOT SPECIFICALLY LOCATED WITH ACTUAL HORIZONTAL AND VERTICAL CONTROLS ARE APPROXIMATE AND ARE SHOWN TO THE BEST AVAILABLE INFORMATION.
3. EXISTING UTILITIES AND OTHER FACILITIES HAVE BEEN PLACED ON THE PLANS FROM FIELD SURVEYS, EXISTING MAPS AND OTHER CURRENT PLANS WITHIN THE AREA OF THIS PROJECT. THE CONTRACTOR WILL DETERMINE THE EXACT LOCATION AND/OR ELEVATION OF EXISTING UTILITIES WHICH PERTAIN TO AND AFFECT THE CONSTRUCTION OF THIS PROJECT.
4. TWO (2) WORKING DAYS PRIOR TO EXCAVATING, THE CONTRACTOR SHALL CALL FOR BLUE STAKES AT THE BLUE STAKE CENTER (PHONE: 602-263-1100).
5. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PRIOR TO CONSTRUCTION.
6. ANY WORK PERFORMED WITHOUT THE APPROVAL OF THE FLOOD CONTROL DISTRICT AND/OR THE ENGINEER AND ALL WORK AND MATERIALS NOT IN CONFORMANCE WITH THE SPECIFICATIONS ARE SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
7. THE ENGINEER WILL DETERMINE THE NUMBER AND LOCATION OF THE REQUIRED COMPACTION TESTS FOR STRUCTURAL BACKFILL.
8. ALIGNMENTS WITH STATIONS AND OFFSETS ALONG WITH NORTHING, EASTING, ELEVATION SURVEY POINTS WILL BE PROVIDED TO THE CONTRACTOR FOR THE CONSTRUCTION OF NORTH INLET CHANNEL, THE FRS#3 IMPROVEMENTS, SOIL CEMENT BANK PROTECTION AT CHOLLA WASH AND NORTHERN AVENUE PROFILE ADJUSTMENT.
9. BEFORE BEGINNING ANY WORK, THE CONTRACTOR WILL DETERMINE ACCURACY OF BENCHMARK INFORMATION PROVIDED AND WILL SET ANY TEMPORARY BENCHMARKS NEEDED FOR CONSTRUCTION OF THIS PROJECT BEFORE REMOVING BENCHMARKS AT NORTHERN AVENUE OR OLIVE AVENUE THAT WILL HAVE TO BE REPLACED AFTER CONSTRUCTION IS COMPLETE.
10. CONTRACTOR WILL LOCATE 1/2" REBAR FND AT NORTHERN AVENUE AND MID-SECTION LINE AND PROVIDE A TEMPORARY BENCHMARK BASED ON THIS POINT THAT CAN REMAIN IN PLACE DURING CONSTRUCTION OF THE ENTIRE PROJECT.
11. PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WORK, THE CONTRACTOR WILL BE REQUIRED TO CLEAN ADJACENT (OFF-PROJECT) ROADWAYS USED DURING THE COURSE OF CONSTRUCTION. SEE SUPPLEMENTARY GENERAL CONDITIONS, SECTION 107.9 FOR CLEANING OF STREETS DURING CONSTRUCTION.
12. NO ACCESS TO STATE LANDS WILL BE AVAILABLE UNTIL SEPTEMBER 1, 2006.
13. BORING LOGS HAVE BEEN DELETED FROM THIS PLAN SET. SEE APPENDIX "A" OF THE SUPPLEMENTARY GENERAL CONDITIONS FOR BORING LOGS.



DETAIL REFERENCE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

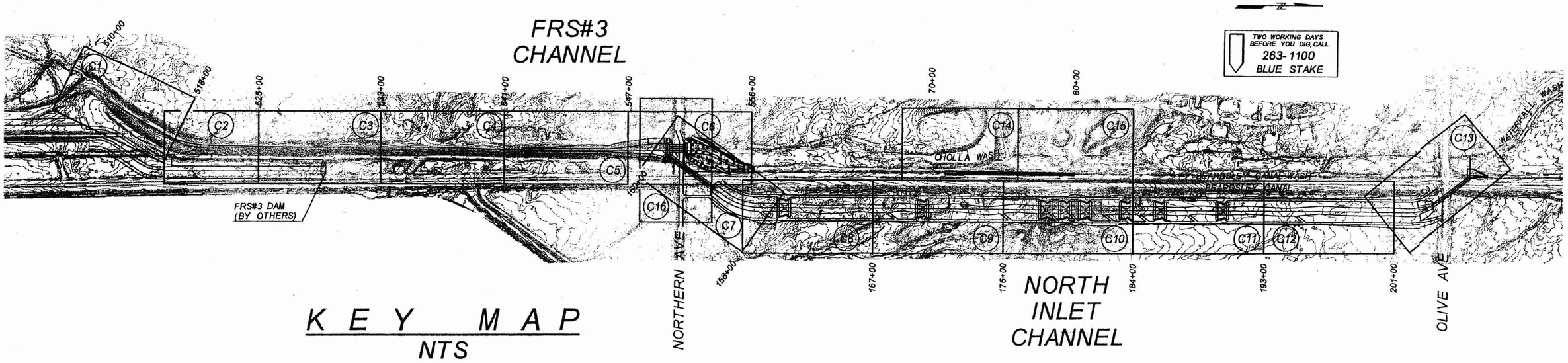
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

Barry J. Ling 19745

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
G2	GENERAL NOTES & INDEX	02 56



K E Y M A P
NTS

MARICOPA COUNTY GENERAL NOTES

All construction shall conform to the latest Maricopa County Department of Transportation (MCDOT) Roadway Design Manual and M.A.G. Specifications and Maricopa County Special Provisions for Construction of Street mprovements.

Contractor shall obtain necessary MCDOT permits prior to construction within County Right-of-Way

The engineering designs on these plans are only approved by Maricopa County Department of Transportation in scope and not in detail. Construction quantities on these plans are not verified by Maricopa County Department of Transportation. Approval of these plans are for permit purposes only and shall not prevent Maricopa County Department of Transportation from requiring correction of errors in the plans where such errors are subsequently found to be in violation of any law, ordinance, health, safety, or other design issues.

Contractor shall notify the MCDOT Inspection Department at least 24 hours in advance of any construction at (602) 506-8606.

An approved set of plans shall be on the site during construction and inspections.

Contractor performing construction or excavating operations is responsible for locating, relocating and/or protecting all utilities in conflict or within the clear zone, at no expense to Maricopa County.

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.

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.*)

9) 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 traffic signs that are removed shall be stockpiled on the project site and the contractor is to notify the inspector when all signs have been removed. All new street name signs shall be provided and installed by permittee at no expense to Maricopa County.

10) Pavement marking, signing and signal work will be inspected and will have to meet County Standards before release of bond.

11) Asphalt mix design shall be submitted to MCDOT a minimum of 48 hours prior to placing any asphalt courses. (Trench work excluded.)

12) Prior to conducting excavation operations, the Contractor shall obtain from the Arizona State Historical Preservation Officer (SHPO) (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.

13) 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.

14) Except under emergency conditions, roads shall not be closed for construction activity unless prior approval is obtained from the Transportation Director or his representative.

15) 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.

16) 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 the Maricopa County Department of Transportation 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.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

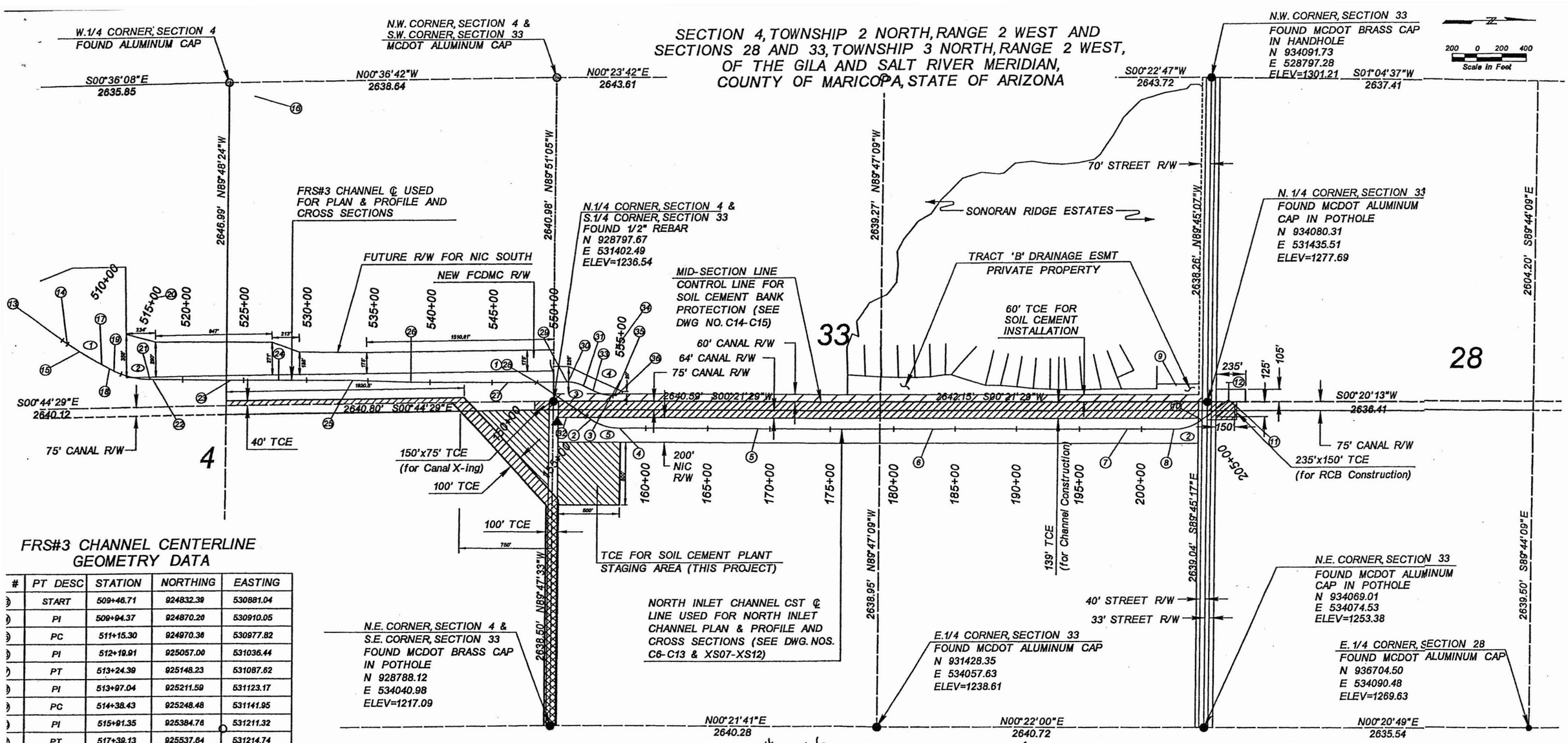
KIRKHAM MICHAEL

DRAWING NO. G3

KEY MAP & GENERAL NOTES

SHEET OF 03 56

SECTION 4, TOWNSHIP 2 NORTH, RANGE 2 WEST AND SECTIONS 28 AND 33, TOWNSHIP 3 NORTH, RANGE 2 WEST, OF THE GILA AND SALT RIVER MERIDIAN, COUNTY OF MARICOPA, STATE OF ARIZONA



FRS#3 CHANNEL CENTERLINE GEOMETRY DATA

#	PT DESC	STATION	NORTHING	EASTING
)	START	509+46.71	924832.39	530881.04
)	PI	509+94.37	924870.20	530910.05
)	PC	511+15.30	924970.36	530977.82
)	PI	512+19.91	925057.00	531036.44
)	PT	513+24.39	925148.23	531087.62
)	PI	513+97.04	925211.59	531123.17
)	PC	514+38.43	925248.48	531141.95
)	PI	515+91.35	925384.76	531211.32
)	PT	517+39.13	925537.64	531214.74
)	PI	517+61.49	925559.99	531215.24
)	PI	523+95.23	926193.64	531226.23
)	PI	527+82.23	926580.64	531226.00
)	PI	533+73.82	927172.23	531226.38
)	PI	538+48.75	927646.87	531243.19
)	PI	546+29.49	928427.59	531247.27
)	PI	548+62.95	928661.04	531244.25
)	PI	551+07.81	928905.89	531243.15
)	PC	551+15.19	928913.26	531243.42
)	PT	551+82.26	928980.29	531245.90
)	PI	552+47.16	929039.88	531276.68
)	PC	553+33.37	929116.48	531316.25
)	PI	554+24.18	929197.16	531357.92
)	PT	555+11.81	929287.95	531359.67
)	END	555+23.65	929299.78	531359.90

NORTH INLET CHANNEL CENTERLINE GEOMETRY DATA

PT #	PT DESC	STATION	NORTHING	EASTING
①	START	150+00.00	928661.03	531244.25
②	PC	155+41.20	929102.18	531557.76
③	PI	156+67.37	929205.03	531630.84
④	PT	157+85.64	929331.19	531631.70
⑤	PI	169+03.43	930448.96	531639.24
⑥	PI	183+13.12	931858.62	531647.61
⑦	PI	198+86.73	933432.21	531656.25
⑧	PC	202+65.37	933810.82	531661.01
⑨	PI	203+91.44	933936.88	531662.60
⑩	PT	205+07.91	934036.39	531585.19
⑪	PI	207+85.79	934255.73	531414.56
⑫	END	209+25.00	934255.73	531275.36

CURVE DATA

424 35.6 360 126.07

NO	LENGTH	CENTRAL ANGLE	RADIUS	TANGENT
①	209.09	04°47'32"	2500.00	104.61
②	300.69	25°41'42"	670.50	152.92
③	131.97	26°12'18"	300.00	67.07
④	178.44	26°12'53"	390.00	90.81
⑤	244.44	35°00'47"	400.00	126.17
⑥	250.17	39°48'56"	360.00	130.37

See G6, curve 135 These circled #'s are incorrect

BASIS OF SURVEY

THE COORDINATES SHOWN ARE US STATE PLANE 1983 (AT GROUND)
ZONE IS ARIZONA CENTRAL 0202
DATUM IS NAD 1983 (CONUS)
GEOID MODEL IS GEOID99 (CONUS)
THE PROJECT LOCATION USED IS A CEI CONTROL POINT # 5000

LATITUDE=33°33'05.44869"
LONGITUDE=112°28'13.25470"
HEIGHT=1141.647

GROUND NORTHING=928752.397
GROUND EASTING=531387.997
ELEV=1234.665

THE GRID TO GROUND SCALE FACTOR USED IS 1.0001228150

▲ PROJECT BENCHMARK J265
N=928828.31, E=531580.08, Elev=1231.05

Note: Additional Project Benchmarks and Control Points are shown on Record of Survey dated 10-22-04 by Consultant Engineering Inc. (CEI)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

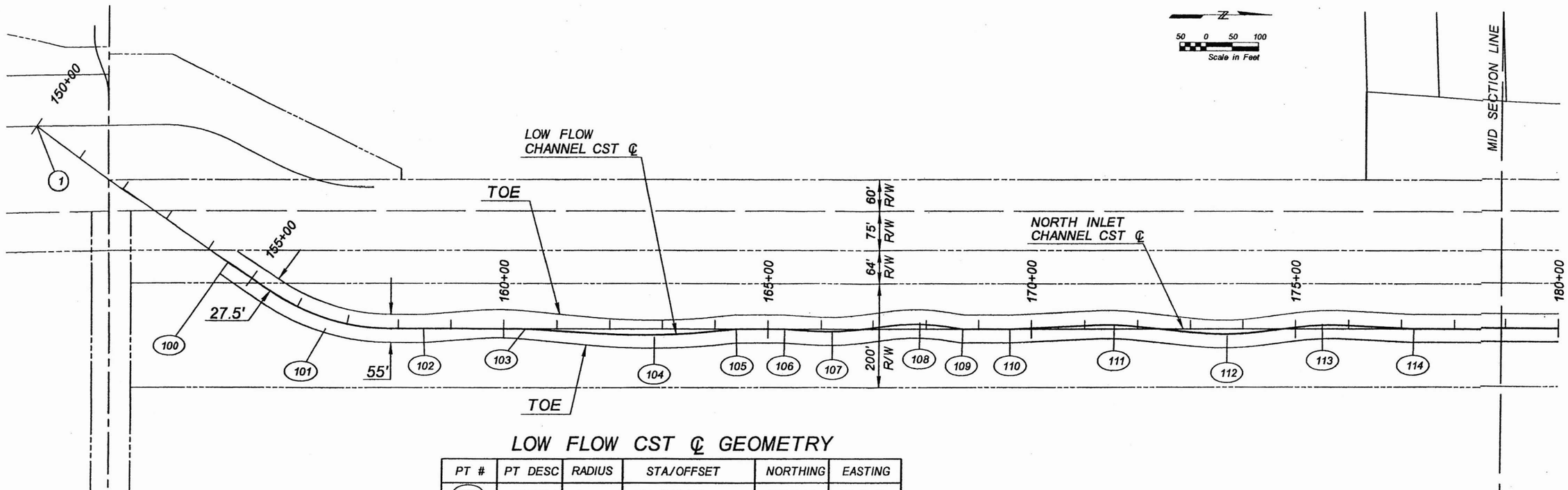
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

Burt J. Ling 19148 Expires 3/31/06 Registered Professional Land Surveyor State of Arizona U.S.A.

KIRKHAM MICHAEL

DRAWING NO.	GEOMETRIC SHEET	SHEET OF
G4		04 56



LOW FLOW CST ℄ GEOMETRY

PT #	PT DESC	RADIUS	STA/OFFSET	NORTHING	EASTING
100	START		154+47.93, 0.00	929026.15	531503.73
101	PC		155+41.20, 0.00	929102.18	531557.76
	PI	400.00	156+63.42, 19.43 R	929205.03	531630.84
	PT		157+85.64, 0.00	929331.19	531631.70
102	PI		158+48.04, 0.00	929393.60	531632.12
103	PC		160+24.03, 0.00	929569.59	531633.31
	PI	500.00	160+40.50, 0.00	929586.05	531633.42
	PT		160+56.93, 1.08 R	929602.47	531634.61
104	PC		161+83.65, 9.46 R	929729.13	531643.86
	PI	1200.00	162+85.46, 16.15 R	929830.90	531651.32
	PT		163+86.95, 5.58 R	929932.45	531641.33
105	PI		164+40.50, 0.00	929986.04	531636.12
106	PI		165+30.50, 0.00	930076.04	531636.73
107	PC		165+82.92, 3.84 R	930128.43	531640.92
	PI	400.00	166+21.24, 6.64 R	930166.73	531643.98
	PT		166+59.40, 2.10 R	930204.92	531639.70
108	PC		167+32.42, 6.59 L	930278.00	531631.50
	PI	400.00	167+88.30, 13.23 L	930333.92	531625.23
	PT		168+43.85, 4.21 L	930389.41	531634.63
109	PI		168+69.74, 0.00	930415.27	531639.02
110	PI		169+59.74, 0.00	930505.27	531639.58
111	PC		171+16.64, 7.65 L	930662.21	531632.86
	PI	500.00	171+55.79, 9.56 L	930701.37	531631.18
	PT		171+94.76, 5.34 L	930740.32	531635.63
112	PC		173+13.80, 7.54 R	930859.28	531649.21
	PI	475.00	173+69.98, 13.61 R	930915.42	531655.62
	PT		174+26.01, 6.34 R	930971.49	531648.69
113	PC		175+04.20, 3.80 L	931049.74	531639.01
	PI	500.00	175+50.36, 9.79 L	931095.93	531633.29
	PT		175+96.83, 7.16 L	931142.39	531636.20
114	PI		177+23.09, 0.00	931268.61	531644.11

NOTE
SEE DWG NO G4 FOR LOCATION OF POINT (1) AND NIC CENTERLINE.

NOTES

1. STATION AND OFFSET ARE BASED OFF NORTH INLET CHANNEL CONSTRUCTION CENTERLINE. SEE DWG NO G4 OR GEOMETRIC LAYOUT.
2. CHANNEL TOE OF SLOPE IS A CONSTANT 27.5 FT (LT & RT) FROM MEANDERING LOW FLOW CHANNEL (EXCEPT AT TRANSITIONS INTO AND OUT OF DIVERSION STRUCTURE CULVERTS AND DROP STRUCTURES)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

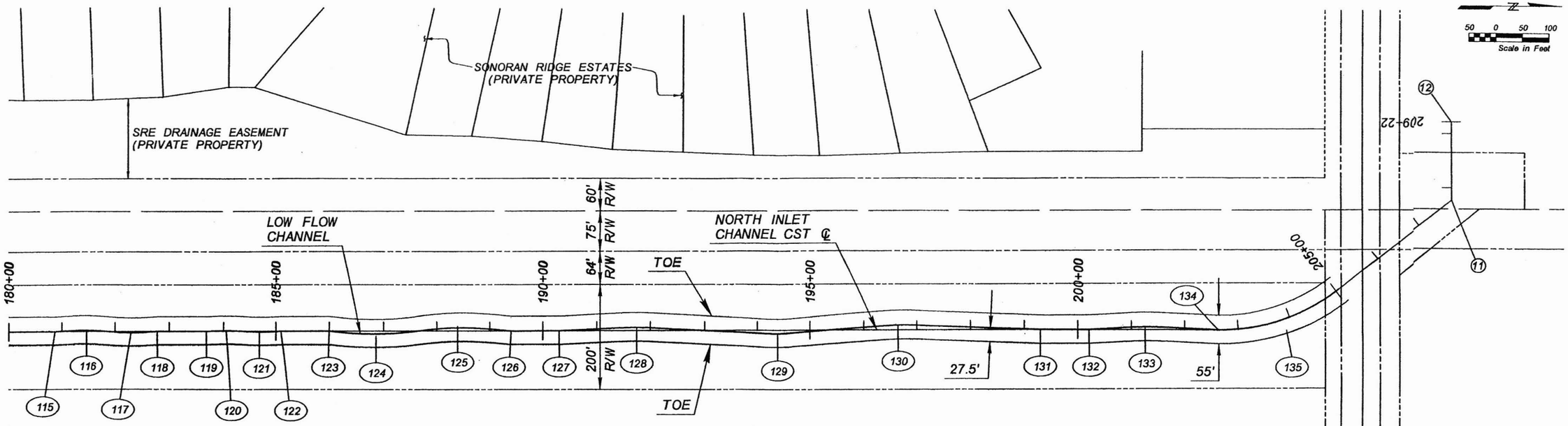
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

19148 Barry J. Ling — 2-1-06 — ARIZONA U.S.A.

KIRKHAM MICHAEL

DRAWING NO. G5 | GEOMETRIC SHEET | SHEET OF 05 56



NOTES

STATION AND OFFSET ARE BASED OFF NORTH INLET CHANNEL CONSTRUCTION CENTERLINE. SEE DWG NO G4 OR GEOMETRIC LAYOUT.

CHANNEL TOE OF SLOPE IS A CONSTANT 27.5 FT (LT & RT) FROM MEANDERING LOW FLOW CHANNEL (EXCEPT AT TRANSITIONS INTO AND OUT OF DIVERSION STRUCTURE CULVERTS AND DROP STRUCTURES)

LOW FLOW CST ℄ GEOMETRY

PT #	PT DESC	RADIUS	STA/OFFSET	NORTHING	EASTING
115	PI		180+87.44, 0.00	931632.95	531646.27
116	PC		181+22.12, 1.76 L	931667.64	531644.71
	PI	400.00	181+46.14, 2.98 L	931691.66	531643.63
	PT		181+70.13, 1.32 L	931715.64	531645.44
117	PC		182+02.52, 0.93 R	931748.02	531647.88
	PI	425.00	182+29.66, 2.81 R	931775.15	531649.93
	PT		182+56.82, 1.22 R	931802.32	531648.49
118	PI		182+77.64, 0.00	931823.15	531647.40
119	PI		183+67.64, 0.00	931913.14	531647.91
120	PC		183+79.99, 0.76 L	931925.50	531647.21
	PI	425.00	184+04.97, 2.30 L	931950.49	531645.82
	PT		184+29.94, 0.71 L	931975.45	531647.54
121	PC		184+47.59, 0.42 R	931993.09	531648.76
	PI	400.00	184+68.83, 1.77 R	932014.32	531650.23
	PT		184+90.09, 0.86 R	932035.59	531649.43
122	PI		185+10.08, 0.00	932055.58	531648.69
123	PI		186+00.08, 0.00	932145.58	531649.18
124	PC		186+11.71, 1.39 R	932157.21	531650.64
	PI	600.00	186+86.17, 10.28 R	932231.62	531659.94
	PT		187+60.53, 0.58 R	932306.03	531650.64
125	PC		187+77.62, 1.65 L	932323.12	531648.50
	PI	550.00	188+39.42, 9.72 L	932384.97	531640.78
	PT		189+01.46, 3.76 L	932446.98	531647.08
126	PI		189+40.50, 0.00	932486.00	531651.05
127	PI		190+30.50, 0.00	932575.99	531651.55
128	PC		191+37.59, 5.43 L	932683.11	531646.71
	PI	700.00	191+74.85, 7.31 L	932720.39	531645.03
	PT		192+12.11, 5.23 L	932757.63	531647.31
129	PC		194+11.68, 5.93 R	932957.14	531659.57
	PI	400.00	194+38.63, 7.44 R	932984.08	531661.23
	PT		194+65.54, 5.32 R	933011.00	531659.25
130	PC		196+34.57, 8.05 L	933180.10	531646.82
	PI	500.00	196+64.28, 10.40 L	933209.82	531644.63
	PT		196+94.07, 9.20 L	933239.60	531645.99
131	PI		199+30.49, 0.00	933475.97	531656.80
132	PI		200+20.49, 0.00	933565.96	531657.93
133	PC		200+89.06, 4.10 L	933634.58	531654.70
	PI	700.00	201+26.04, 6.31 L	933671.58	531652.95
	PT		201+63.04, 4.60 L	933708.56	531655.12
134	PI		202+62.86, 0.00	933808.32	531660.98
135	PC		202+65.37, 0.00	933810.82	531661.01
	PI	360.00	203+91.44, 21.44 R	933936.88	531662.60
	PT		205+07.91, 0.00	934036.39	531585.19

NOTE

SEE DWG NO G4 FOR LOCATION OF POINTS (11)&(12) AND NIC CENTERLINE.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

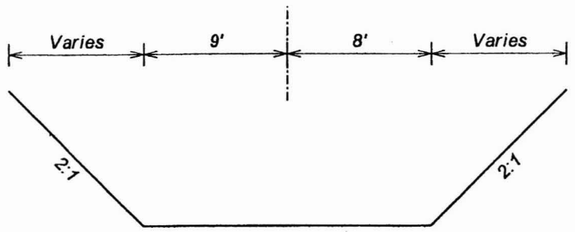
19148 Barry J. Ling — Dec. 8 2006 — ARIZONA, U.S.A.

KIRKHAM MICHAEL

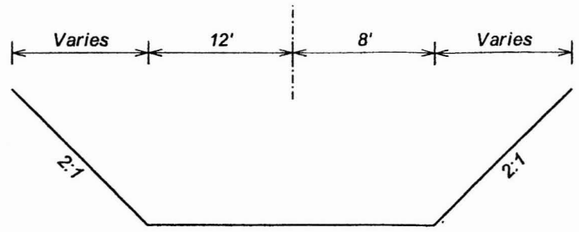
DRAWING NO. G6

GEOMETRIC SHEET

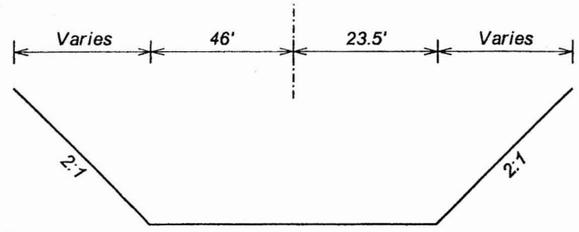
SHEET OF 06 56



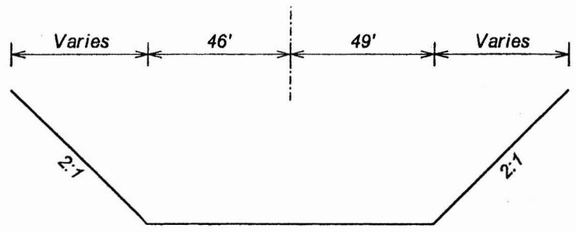
SECTION @ STA 539+00
NIC SOUTH INTERIM CHANNELIZATION
NTS



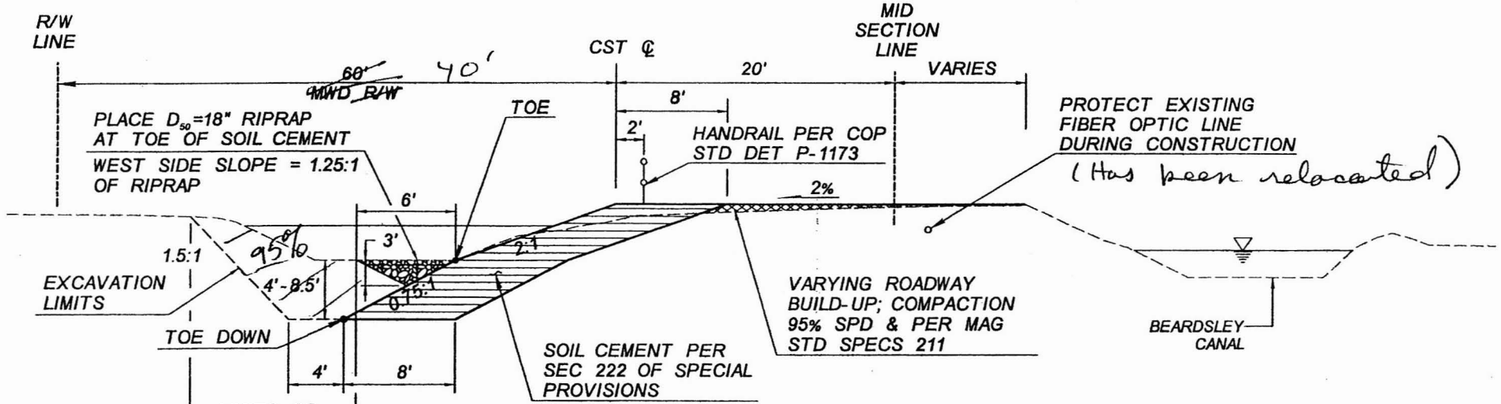
SECTION @ STA 545+00
NIC SOUTH INTERIM CHANNELIZATION
NTS



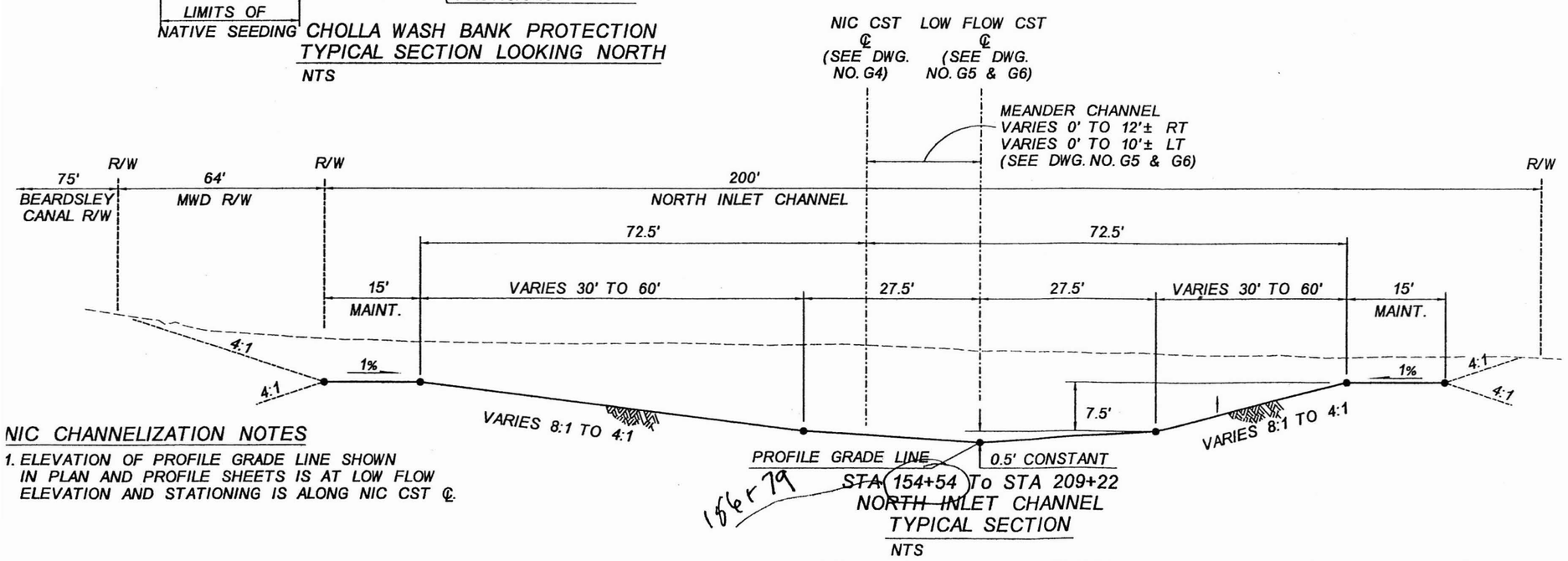
SECTION @ STA 548+00
NIC SOUTH INTERIM CHANNELIZATION
NTS



SECTION @ STA 549+15.91
NIC SOUTH INTERIM CHANNELIZATION
NTS



CHOLLA WASH BANK PROTECTION
TYPICAL SECTION LOOKING NORTH
NTS



STA 154+54 To STA 209+22
NORTH INLET CHANNEL
TYPICAL SECTION
NTS

NIC CHANNELIZATION NOTES

1. ELEVATION OF PROFILE GRADE LINE SHOWN IN PLAN AND PROFILE SHEETS IS AT LOW FLOW ELEVATION AND STATIONING IS ALONG NIC CST ℄.

NIC SOUTH INTERIM CHANNELIZATION NOTES

1. SEE DWG NO C6 FOR LOCATION OF INTERSECTION OF CONSTRUCTION CENTERLINE AND NORTHERN AVENUE CENTERLINE
2. ALL TYPICAL SECTIONS ARE LOOKING NORTH UNLESS NOTED OTHERWISE
3. SEE DWG NO C6 FOR CHANNEL LAYOUT FROM STA 547+00 TO NORTHERN AVENUE
4. TRANSITION OF CHANNEL BOTTOM WIDTHS SHALL BE UNIFORM BETWEEN SECTIONS AT LOCATIONS SHOWN

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

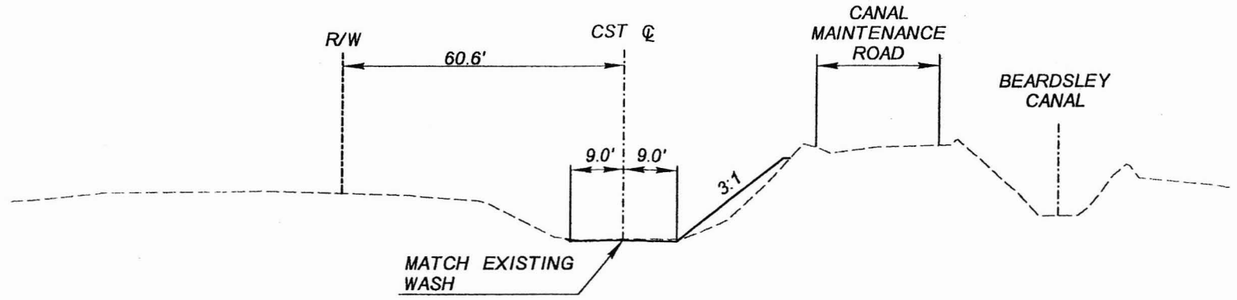
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

19148 Barry J. Ling — 2/24/06

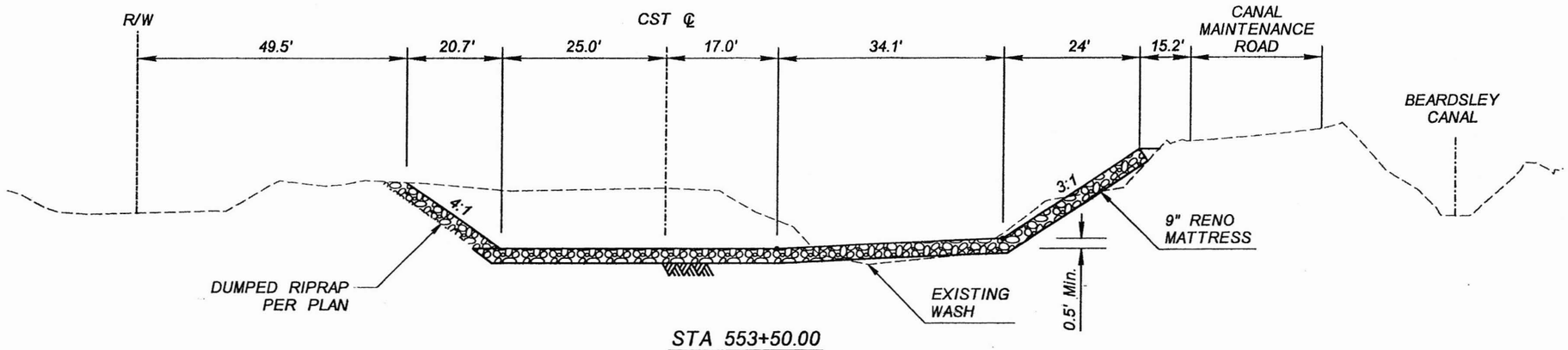
KIRKHAM MICHAEL

DRAWING NO.	TYPICAL SECTIONS	SHEET OF
G7		07 56

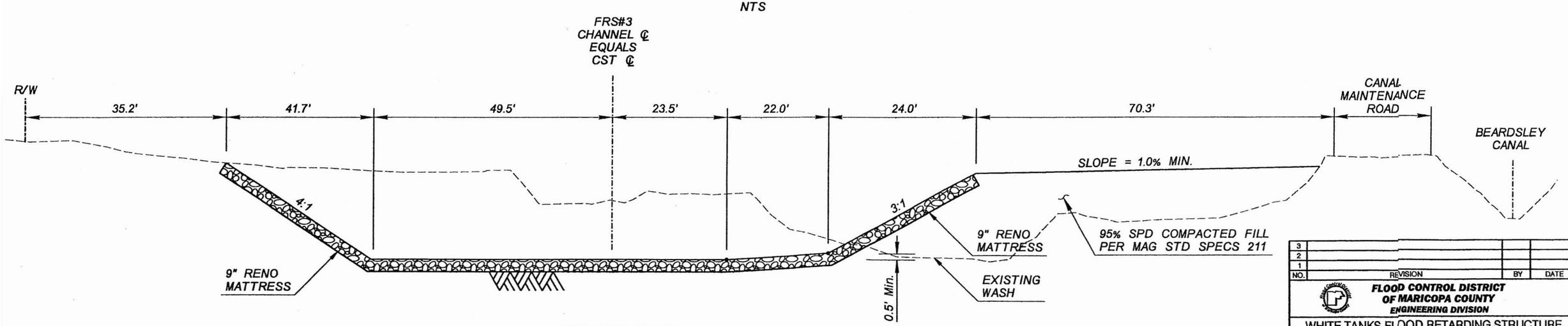


STA 555+24.00
NTS

NOTE:
SEE "WASH LOW FLOW CHANNEL" TABLE, DWG NO C6 FOR POINTS AND ELEVATIONS



STA 553+50.00
NTS



STA 550+70.00
NTS

CROSS SECTIONS
BEARDSLEY CANAL WASH
LOW FLOW CHANNELIZATION
NORTH OF NORTHERN AVENUE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

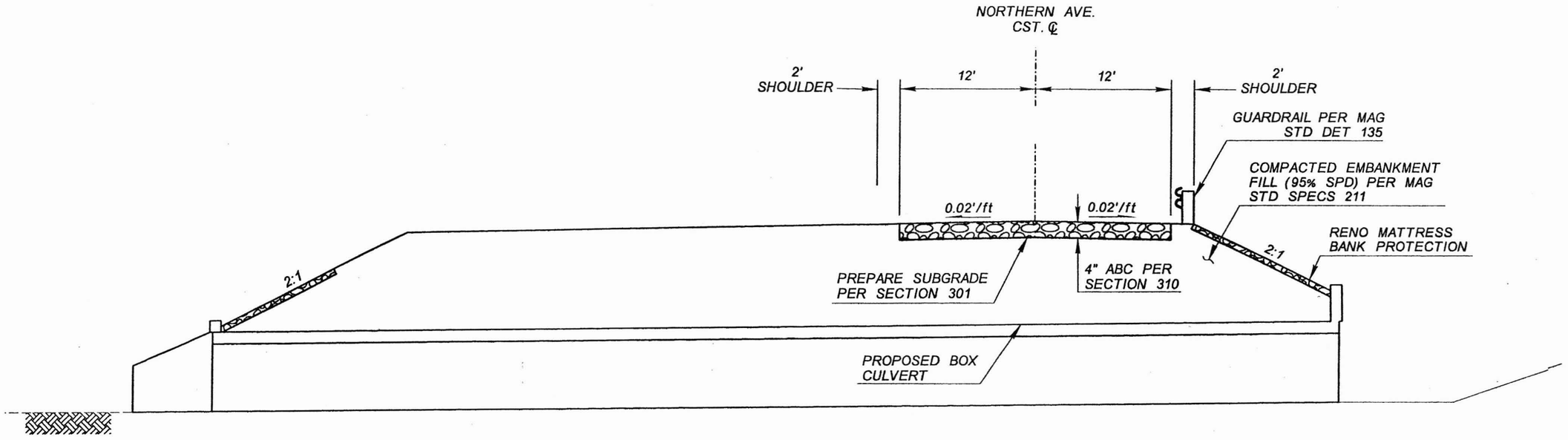
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. G8

TYPICAL SECTIONS

SHEET OF 08 56



NORTHERN AVE
TYPICAL ROADWAY SECTION
FOR PROFILE ADJUSTMENT

NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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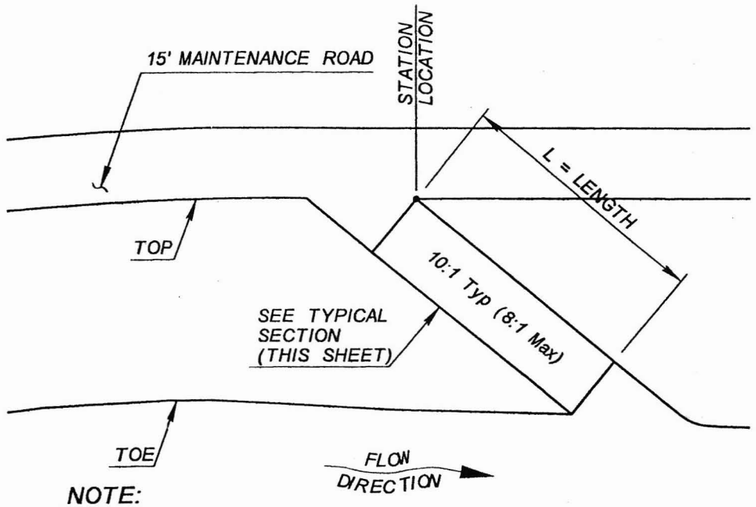
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

Barry J. Ling — 11248 — Arizona, U.S.A.

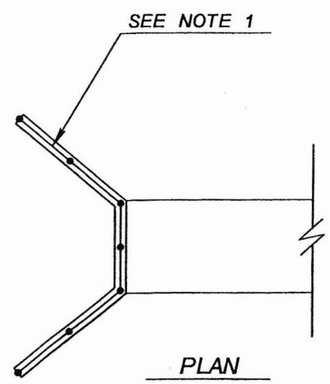
KIRKHAM MICHAEL

DRAWING NO.	TYPICAL SECTIONS	SHEET OF
G9		09 56

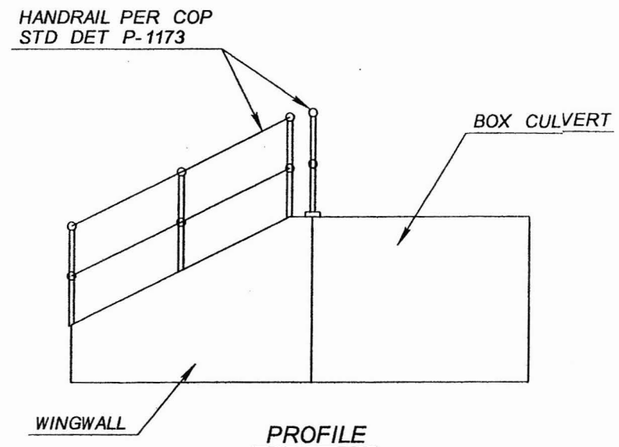


NOTE:
SEE PLAN/PROFILE SHEETS FOR MAINTENANCE RAMP LOCATION.

MAINTENANCE RAMP DETAIL
NTS



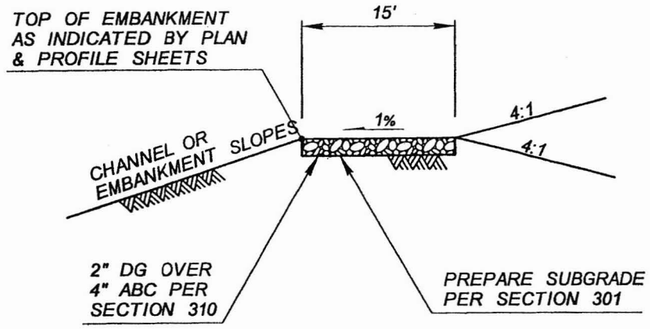
PLAN



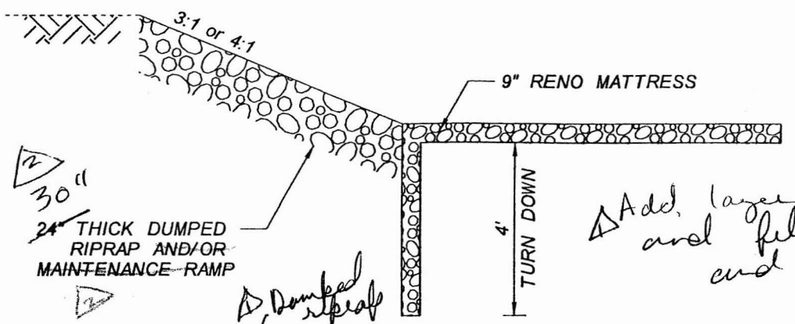
PROFILE

NOTE:
1. HANDRAIL TO EXTEND ACROSS HEADWALL AND DOWN TO ENDS OF WINGWALLS
2. ALL HANDRAIL TO BE PAINTED PER SPECIAL PROVISIONS.

BOX CULVERT
WINGWALL RAILING DETAIL
NTS



TYPICAL SECTION -
MAINTENANCE ROAD
NTS



Add a filter fabric under the 30" thick dumped riprap.
Add layer of 6" thick gravel bedding and filter fabric under Reno Mattress and behind turndown.

STA 550+00 To STA 555+24
RENO MATTRESS/RIP-RAP/~~MAINT. RAMP~~ TURNDOWN DETAIL (TYP. ALL LOCATIONS)
NTS

NOTE:
TURN DOWN IS REQUIRED AT ALL EDGES OF RENO MATTRESSES INTERFACING WITH MAINTENANCE ROADS (2" DG over 4" ABC), DUMPED RIP-RAP (24" THICK), OR EXISTING GROUND. TURN DOWN IS NOT REQUIRED AT TOP OF SLOPE, OR AT EDGE OF CONCRETE STRUCTURE.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
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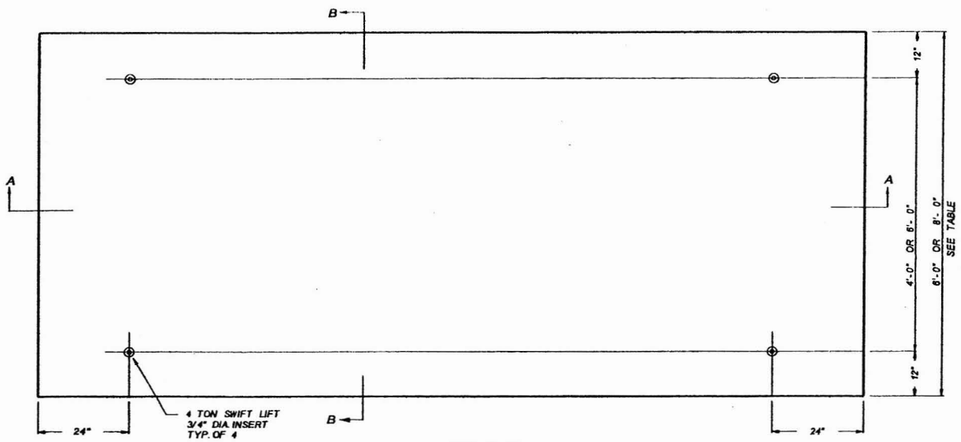
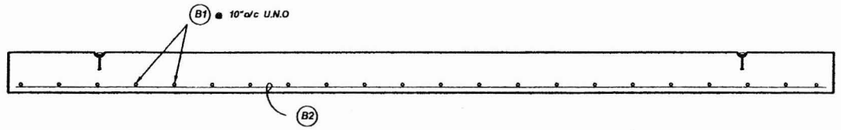
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

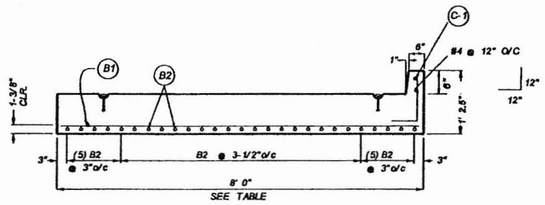
DRAWING NO. D1 | MISCELLANEOUS DETAILS | SHEET OF 10 56



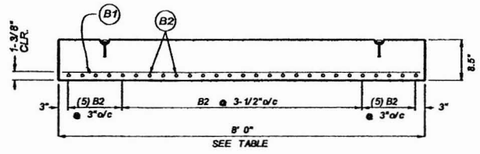
TOP PLAN



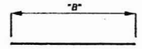
SECTION A-A



SECTION B-B W/ CURB



SECTION B-B W/O CURB



REBAR

6 FOOT WIDTH

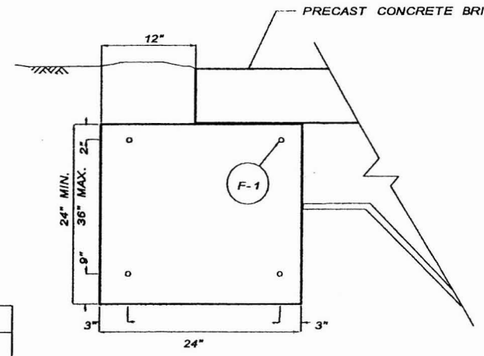
"A" DIM.	DSG.	BAR SIZE	BAR QUAN.	"B" DIM.	DSG.	BAR SIZE	BAR QUAN.	"B" DIM.	DSG.	BAR SIZE	BAR QUAN.	"B" DIM.
10' - 0"	B-1	#5	12	5' - 6"	B-2	#6	21	9' - 6"	C-1	#4	1	9' - 6"
11' - 0"	B-1	#5	13	5' - 6"	B-2	#6	21	10' - 6"	C-1	#4	1	10' - 6"
12' - 0"	B-1	#5	14	5' - 6"	B-2	#6	21	11' - 6"	C-1	#4	1	11' - 6"
13' - 0"	B-1	#5	16	5' - 6"	B-2	#6	21	12' - 6"	C-1	#4	1	12' - 6"
14' - 0"	B-1	#5	17	5' - 6"	B-2	#6	21	13' - 6"	C-1	#4	1	13' - 6"
15' - 0"	B-1	#5	18	5' - 6"	B-2	#6	21	14' - 6"	C-1	#4	1	14' - 6"
16' - 0"	B-1	#5	19	5' - 6"	B-2	#6	21	15' - 6"	C-1	#4	1	15' - 6"
17' - 0"	B-1	#5	20	5' - 6"	B-2	#6	21	16' - 6"	C-1	#4	1	16' - 6"
18' - 0"	B-1	#5	22	5' - 6"	B-2	#6	21	17' - 6"	C-1	#4	1	17' - 6"

8 FOOT WIDTH

"A" DIM.	DSG.	BAR SIZE	BAR QUAN.	"B" DIM.	DSG.	BAR SIZE	BAR QUAN.	"B" DIM.	DSG.	BAR SIZE	BAR QUAN.	"B" DIM.
10' - 0"	B-1	#5	12	7' - 6"	B-2	#6	28	9' - 6"	C-1	#4	1	9' - 6"
11' - 0"	B-1	#5	13	7' - 6"	B-2	#6	28	10' - 6"	C-1	#4	1	10' - 6"
12' - 0"	B-1	#5	14	7' - 6"	B-2	#6	28	11' - 6"	C-1	#4	1	11' - 6"
13' - 0"	B-1	#5	16	7' - 6"	B-2	#6	28	12' - 6"	C-1	#4	1	12' - 6"
14' - 0"	B-1	#5	17	7' - 6"	B-2	#6	28	13' - 6"	C-1	#4	1	13' - 6"
15' - 0"	B-1	#5	18	7' - 6"	B-2	#6	28	14' - 6"	C-1	#4	1	14' - 6"
16' - 0"	B-1	#5	19	7' - 6"	B-2	#6	28	15' - 6"	C-1	#4	1	15' - 6"
17' - 0"	B-1	#5	20	7' - 6"	B-2	#6	28	16' - 6"	C-1	#4	1	16' - 6"
18' - 0"	B-1	#5	22	7' - 6"	B-2	#6	28	17' - 6"	C-1	#4	1	17' - 7"

REIN. BAR (EA.) FOOTING

BRIDGE WIDTH	DSG.	BAR SIZE	QUAN.	LENGTH
12' - 0"	F-1	#4	4	11' - 6"
16' - 0"	F-1	#4	4	15' - 6"
18' - 0"	F-1	#4	4	17' - 6"
20' - 0"	F-1	#4	4	19' - 6"



BRIDGE FOOTING

NOTE:

PRECAST BRIDGE DETAILS SHOWN ARE AS PROVIDED BY PRE-CAST MFG. CO. CONTRACTOR IS TO PROVIDE SHOP DRAWINGS AND STRUCTURAL CAD CALCULATIONS APPROVED BY A REGISTERED ENGINEER IN THE STATE OF ARIZONA FOR A BRIDGE AS SHOWN ON DRAWINGS OR AN APPROVED EQUAL.

REINF. DESIGNED FOR 18' - 0" SPAN

DESIGN CRITERIA:

LIVE LOAD — H-20 TRUCK LOADING; 2 - 24,000 LBS. @ 4' - 0" o/c

MINIMUM SOIL BEARING CAPACITY: — 2500 P.S.F.

DESIGN SPECS:

CONCRETE COMPRESSIVE STRENGTH SHALL BE BASED ON 28 DAY TEST AGE AND SHALL REACH F'c OF 4500 P.S.I.

REINFORCING STEEL GRADE 60 — 60,000 P.S.I.

DESIGN CODES:

AMERICAN CONCRETE INSTITUTE (ACI) 318-99

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) HB-15TH EDITION

GENERAL NOTES:

ALL REINF. STEEL TO HAVE 1-3/8" COVER UNLESS OTHERWISE NOTED.

REVISIONS

PRE-CAST MFG. CO.
301 W. BROADWAY, PHOENIX, ARIZONA 85066
(602) 276-4341
FAX, (602) 276-2907

TITLE: PRECAST BRIDGE SEGMENT

DWN: JIM MARTIN	DWG. NO. BRDG
DATE: 10 - 27 - 03	REF. NO.
SCALE: N.T.S.	SHT: 1 OF 1

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

Barry J. Ling 19146 — Date Signed — Expires — Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. D2

MISCELLANEOUS DETAILS

SHEET OF 11 56

QUANTITY SUMMARY

NORTH INLET CHANNEL

BID No.	DESCRIPTION	UNIT	SHEET NUMBERS C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	TOTAL QUANTITY
215-1	NIC SOUTH INTERIM CHANNEL EXCAVATION	CY				260	5071	9293											14,624
215-2	NIC CHANNEL EXCAVATION (SEE TOTAL)	CY							19,833	39,667	39,667	39,667	39,667	39,667	19,833				238,001
215-3	BEARDSLEY CANAL WASH EXCAVATION	CY						7,073											7,073
220-1	PLAIN DUMPED RIP RAP D^{50} = 18" W/ FILTER FABRIC	CY						~~550~~ 1,464	⚠			~~840~~ ~~1,050~~ 0	⚠			200	~~113~~ 141		~~1,723~~ ~~2,855~~ 1,805 ⚠ ⚠
221-1	9" RENO MATTRESS BANK PROTECTION	SY						~~6,750~~ ~~5,597~~ 6,181	~~2474~~ 2,228						~~1080~~ 1,217				~~10,001~~ ~~8,758~~ 9,626
222-1	SOIL CEMENT BANK PROTECTION AT CHOLLA WASH	CY														3,045	1322		4,367
336-1	ASPHALT PAVEMENT REPLACEMENT	SY													318				318
336-2	NEW SURVEY MARKER (MAG STD DET 120)	EA						1		1	1				1				4
344-1 310-1	DECOMPOSED GRANITE ROAD SURFACE; DG (2") OVER ABC (4") (O&M ACCESS ROADS & RAMPS)	SY						438	1,467	3,000	3,000	2,667	3,000	2,667	1,337			809	18,385
350-1 & 2	REMOVE BEARDSLEY CANAL	LF							226						194				420
350-3	REMOVE BEARDSLEY LATERAL 9 CANAL	LF													240				240
350-4	REMOVE 2-60" CMPs AT NORTHERN AVENUE	LS						1											1
350-5	REMOVE ASPHALT PAVEMENT AT OLIVE AVE	SY													318				318
350-6	REMOVE CANAL MAINT ROAD GATES	EA							1						2				3
350-7	REMOVE/REPLACE FRS#3 CHANNEL GATE	EA							1										1
415-1	GUARDRAIL (MAG STD DET 135)	LF																106	106
430-1	NATIVE SEEDING	AC							0.57	2.79	2.79	1.69	2.53	2.69	1.20	0.28	0.28		14.82
505-1	SIDE WEIR INLET TO DIVERSION CULVERT AT OLIVE AVENUE	LS													1				1
* 505-2	OUTLET HEADWALL, WINGWALLS & APRON FOR DIVERSION CULVERT AT OLIVE AVENUE	LS													1				1
505-3	DIVERSION CULVERT AT OLIVE AVENUE 2-10x5 RCBC	LF													331				331
* 505-4	RCBC DIVERSION CULVERT, INLET & OUTLET HEADWALLS, WINGWALLS & OUTLET APRON AT NORTHERN AVENUE 3-10'x5'x392.5'	LS							1										1
505-5	INLET STRUCTURE TO WASH CULVERT AT NORTHERN AVENUE	EA							1										1
* 505-6	RCBC WASH CULVERT, OUTLET HEADWALL, WINGWALLS & APRON AT NORTHERN AVENUE 4-12'x6'x117'	LS						1											1
505-7	BEARDSLEY CANAL REPLACEMENT LINING AT OLIVE AVENUE	LF													194				194
505-8	LATERAL 9 CANAL REPLACEMENT LINING AT OLIVE AVENUE	LF													240				240
505-9	BEARDSLEY CANAL LINING AT NORTHERN AVENUE	LF							226										226
⚠ 505-10	PRECAST SLAB CROSSING OVER TURNOUT AT OLIVE AVENUE	EA													1				1
507-1	DROP STRUCTURE (H=6.25')	EA								1									1
507-2	DROP STRUCTURE (H=4.50')	EA									1	1							2
507-3	DROP STRUCTURE (H=3.50')	EA										3	2						5
520-1	HANDRAIL PER COP DET P-1173	LF						185	152						201	600	300		1438
520-2	CANAL SECURITY GATE	EA							1						2				3
NPI	MAINTENANCE RAMPS	EA						2		1	1	3	2	1					10
NPI	FILL CONSTRUCTION	CY						2,900	1,360						250			382	4,892

NOTES: (1) INCREASE TOP SLAB THICKNESS ON ADOT STANDARD DETAILS**. CLEAR COVER TO BE 1-1/2" ON BOTTOM REINFORCEMENT IN TOP SLAB.
(2) OUTLET HEADWALL, WINGWALLS AND APRON PER ADOT STD. B-04.10 & B-06.10.

FOR INFO ONLY

NO.	REVISION	BY	DATE
3			
⚠	REVISE QUANTITIES AND ADD ITEM		4-25-08
⚠	CHANGE RENO MAT AND RIPRAP QUANTITY		4-25-08

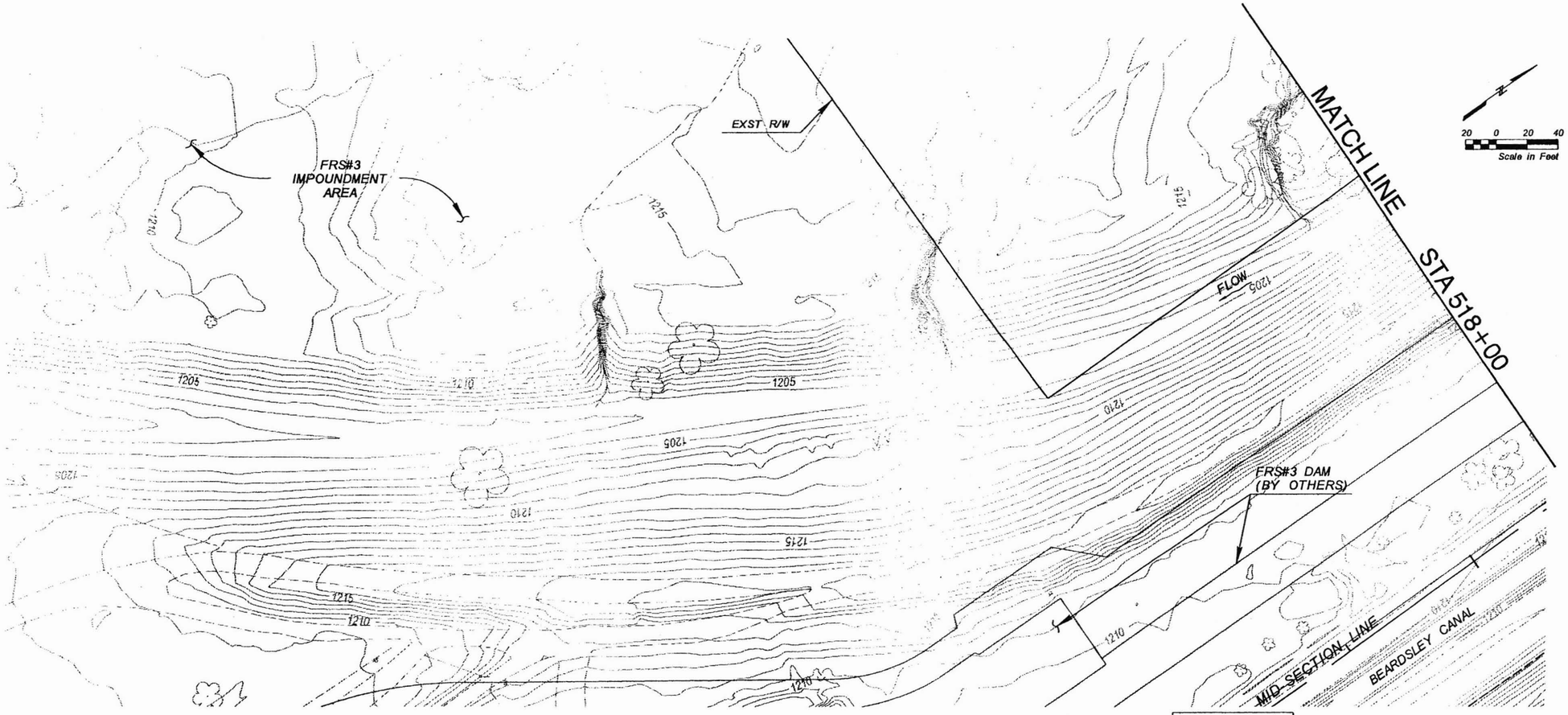
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

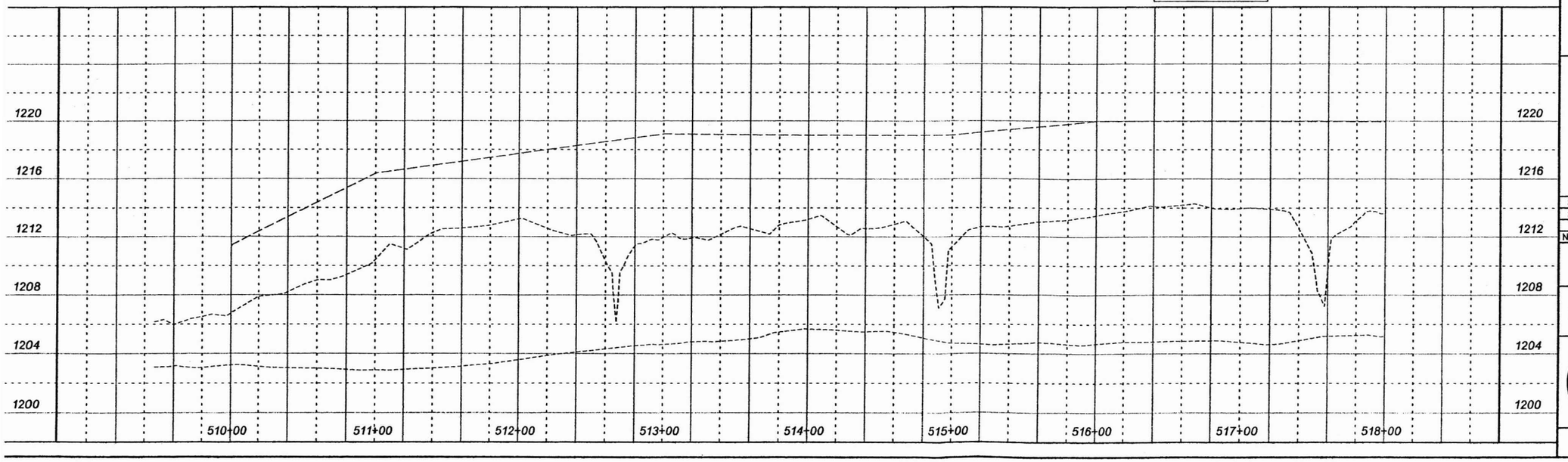
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/06
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. Q1 | QUANTITY SUMMARY SHEET | SHEET OF 12 56

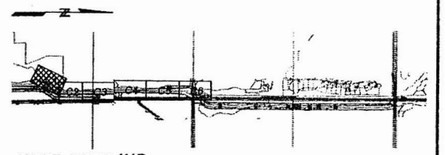


TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE



CONSTRUCT

NOTE:
DRAWINGS C1-C3 ARE FOR INFORMATION, ONLY. FUTURE CHANNEL IMPROVEMENTS WILL BE CONSTRUCTED WITH THE NIC SOUTH PROJECT.



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

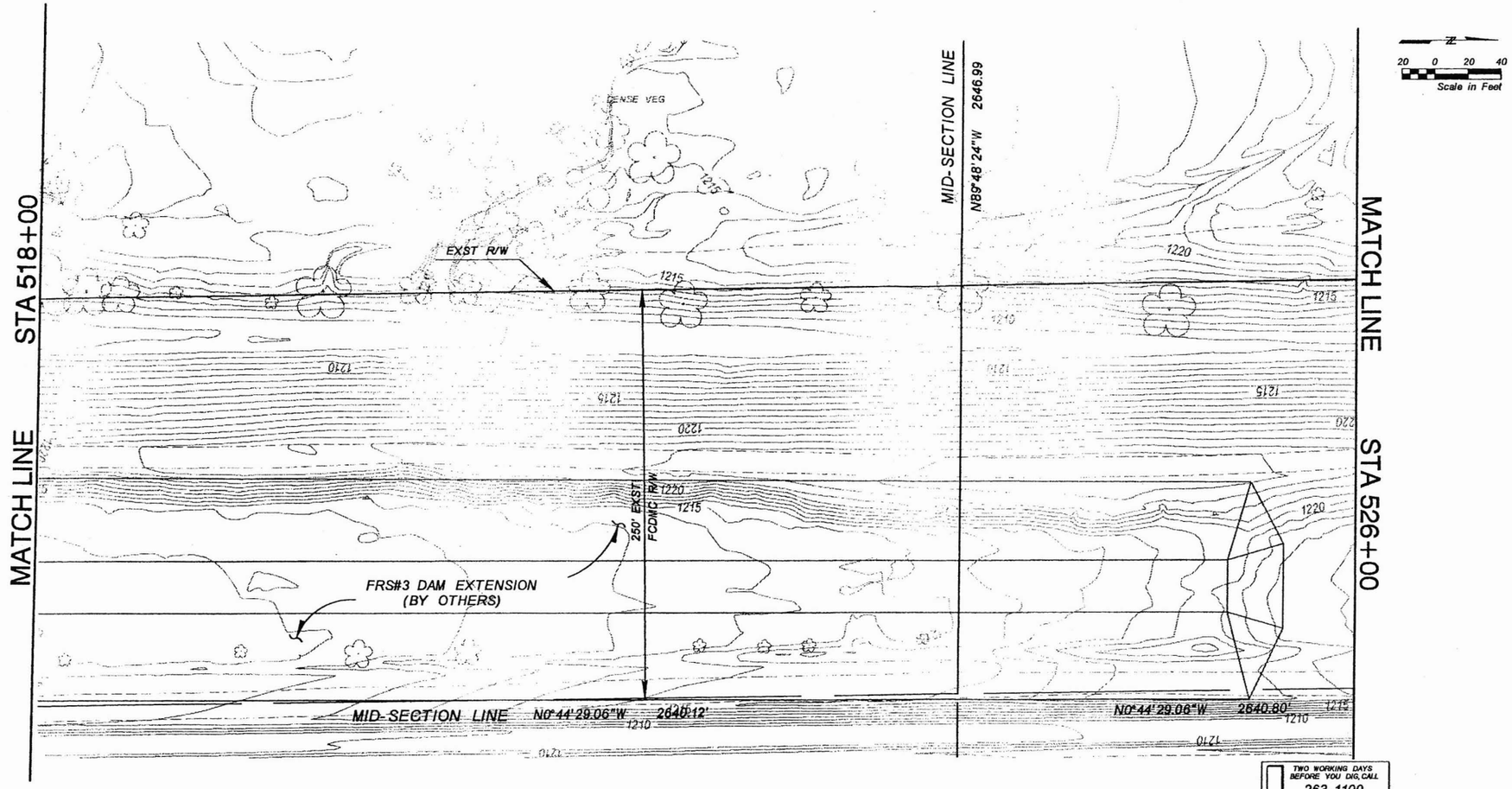
	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

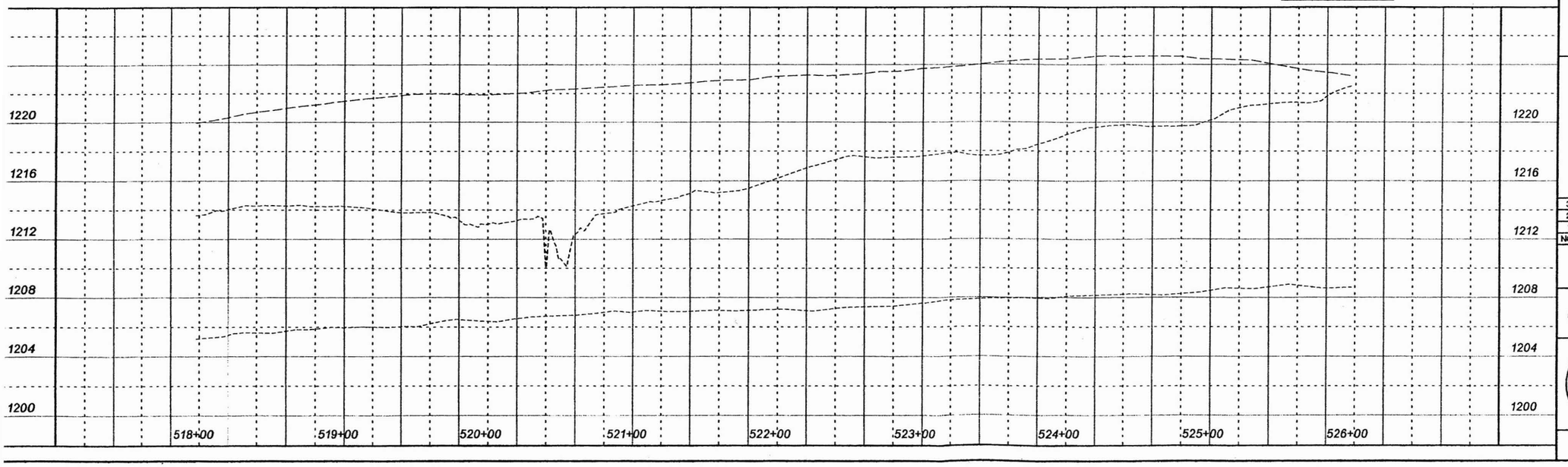
DRAWING NO. C1

PLAN AND PROFILE
STA 509+50 TO STA 518+00

SHEET OF 13 56



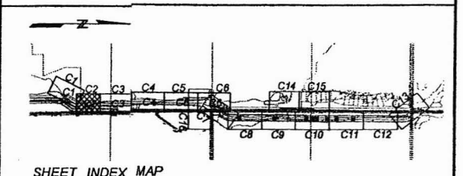
TWO WORKING DAYS BEFORE YOU DIG, CALL 263-1100 BLUE STAKE



CONSTRUCT

NOTE:

DRAWINGS C1-C3 ARE FOR INFORMATION, ONLY. FUTURE CHANNEL IMPROVEMENTS WILL BE CONSTRUCTED WITH THE NIC SOUTH PROJECT.



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

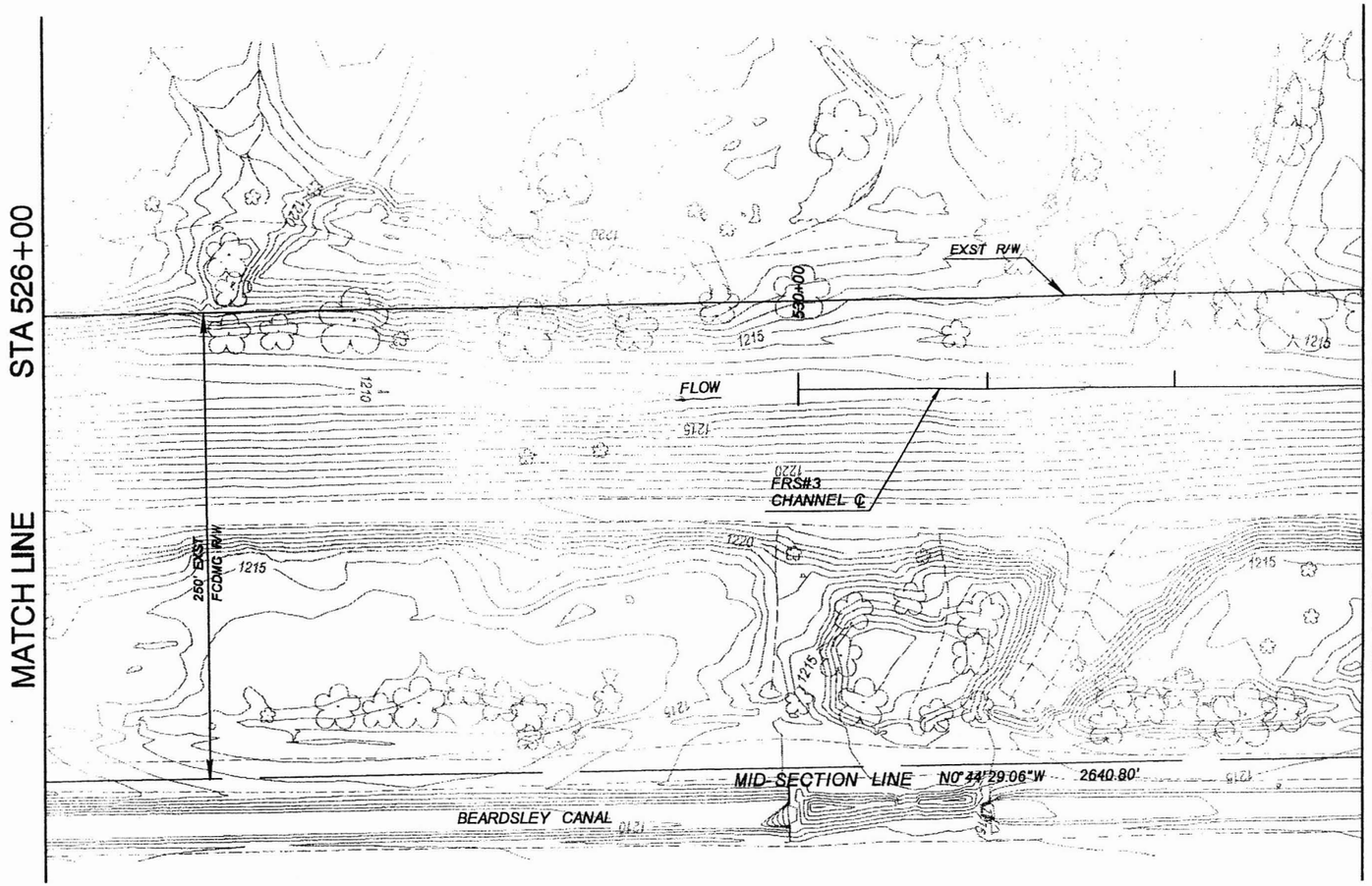
Barry J. Ling 19146 — 04 x 30 — ARIZONA, U.S.A.

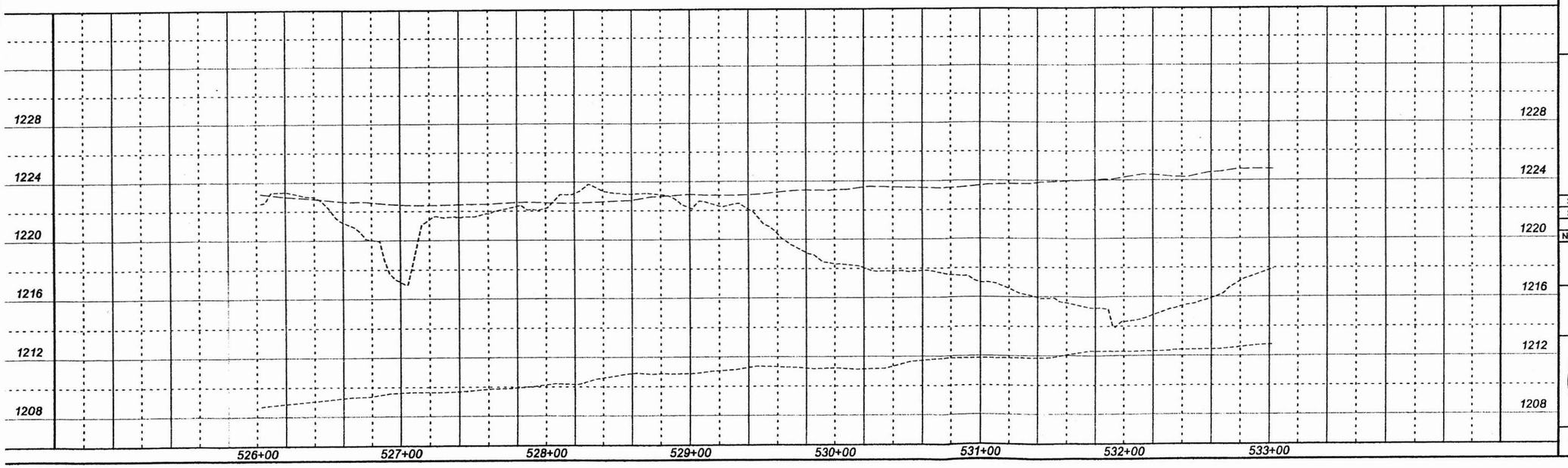
KIRKHAM MICHAEL

DRAWING NO. C2

PLAN AND PROFILE STA 518+00 TO STA 526+00

SHEET OF 14 56



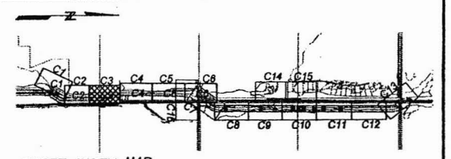


20 0 20 40
Scale in Feet

CONSTRUCT

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

NOTE:
DRAWINGS C1-C3 ARE FOR INFORMATION, ONLY. FUTURE CHANNEL IMPROVEMENTS WILL BE CONSTRUCTED WITH THE NIC SOUTH PROJECT.



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

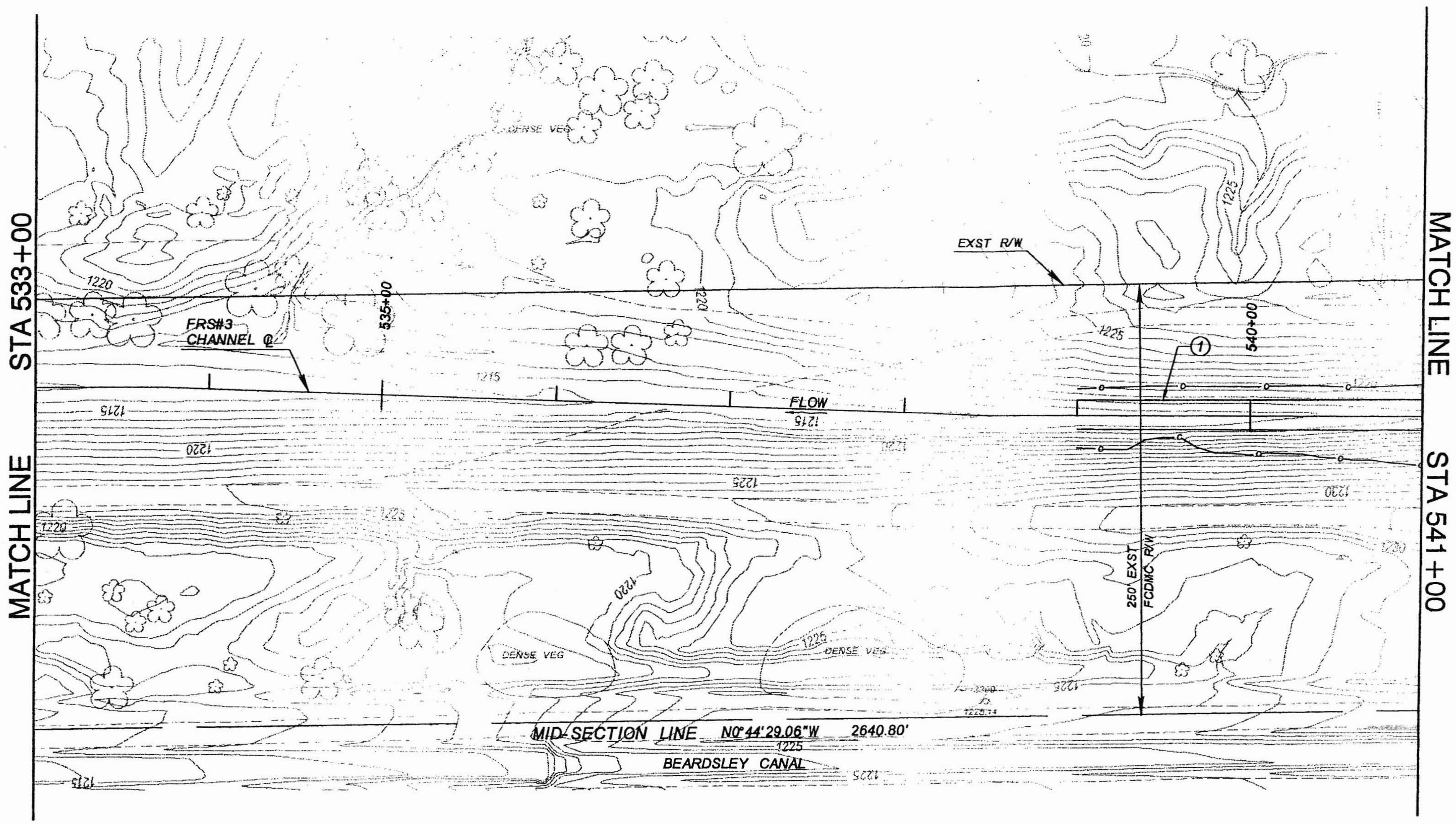
9146 Barry J. Ling — 3-31-07 — ARIZONA, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. C3

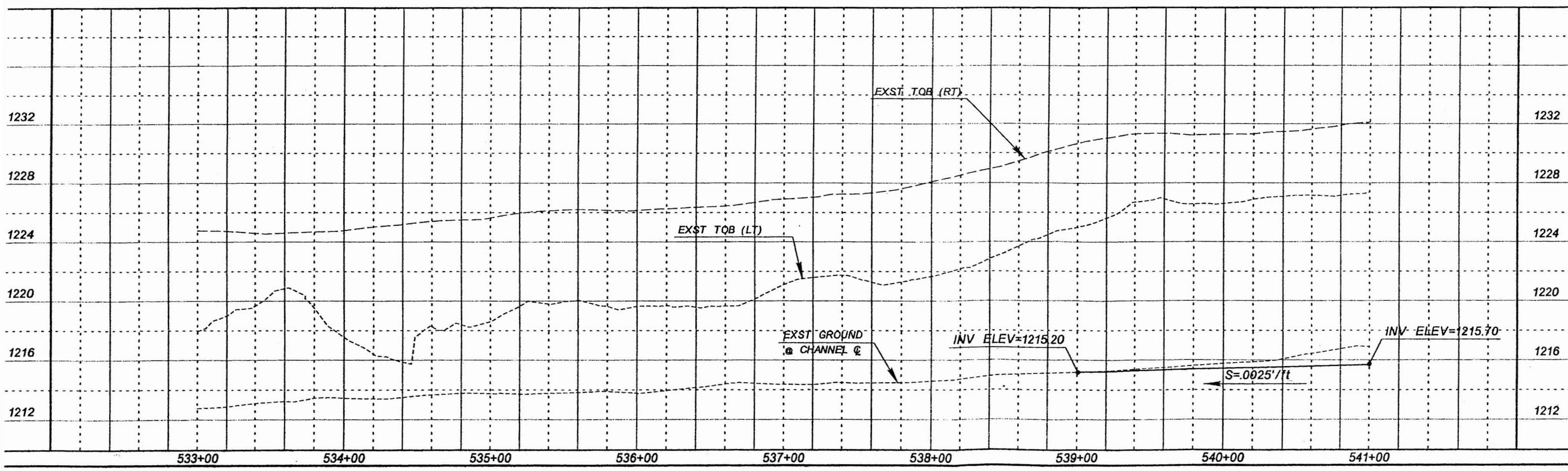
PLAN AND PROFILE STA 526+00 TO STA 533+00

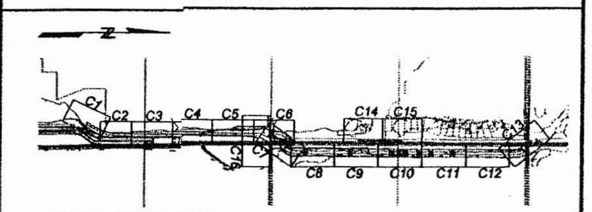
SHEET OF 15 56



CONSTRUCT

(1) NIC SOUTH INTERIM CHANNEL EXCAVATION PER SECTIONS DWG NO G7, X-SECTIONS DWG NO XS01-XS02 & DETAILS THIS SHEET — 260 CY





SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
1			

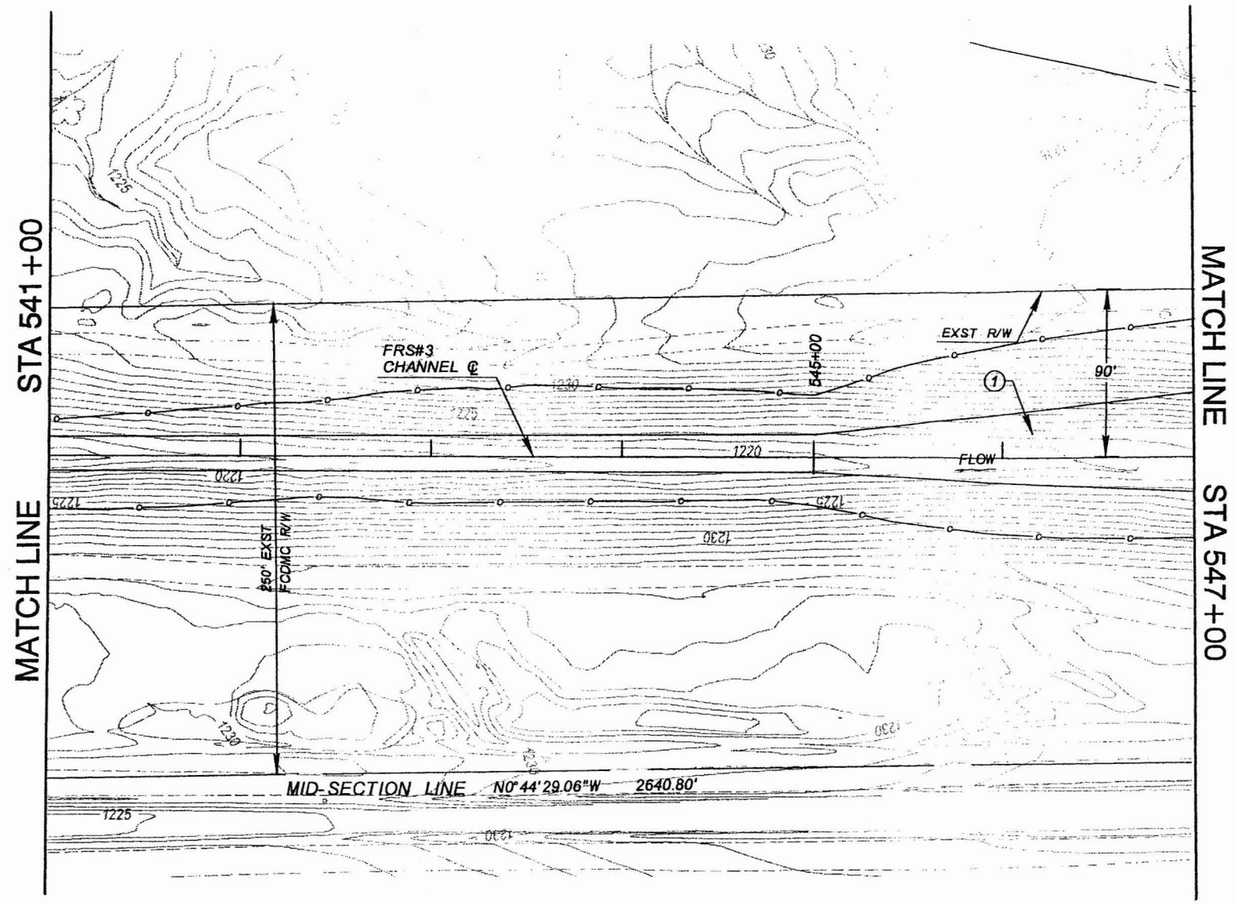
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

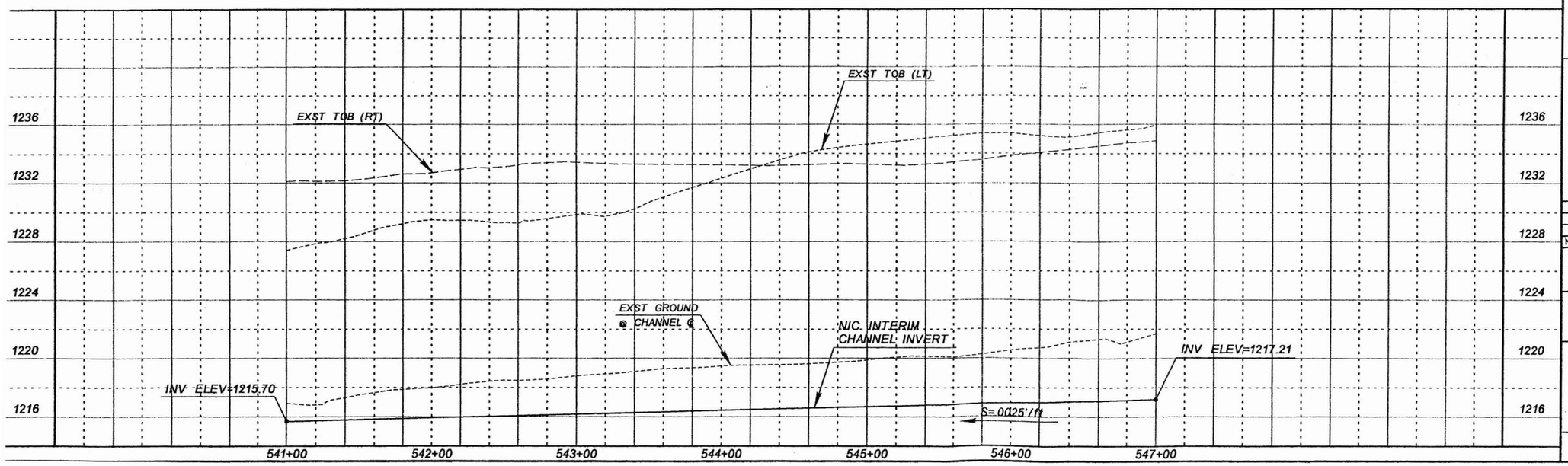
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

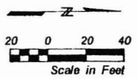
	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
C4	PLAN AND PROFILE STA 533+00 TO STA 541+00	16 56



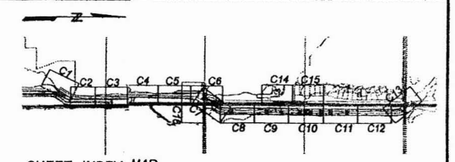




TWO WORKING DAYS BEFORE YOU DIG, CALL 263-1100 BLUE STAKE

CONSTRUCT

(1)	NIC SOUTH INTERIM CHANNEL EXCAVATION PER SECTIONS DWG NO G7, X-SECTIONS DWG NO XS01-XS02 & DETAILS THIS SHEET	5,071 CY



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

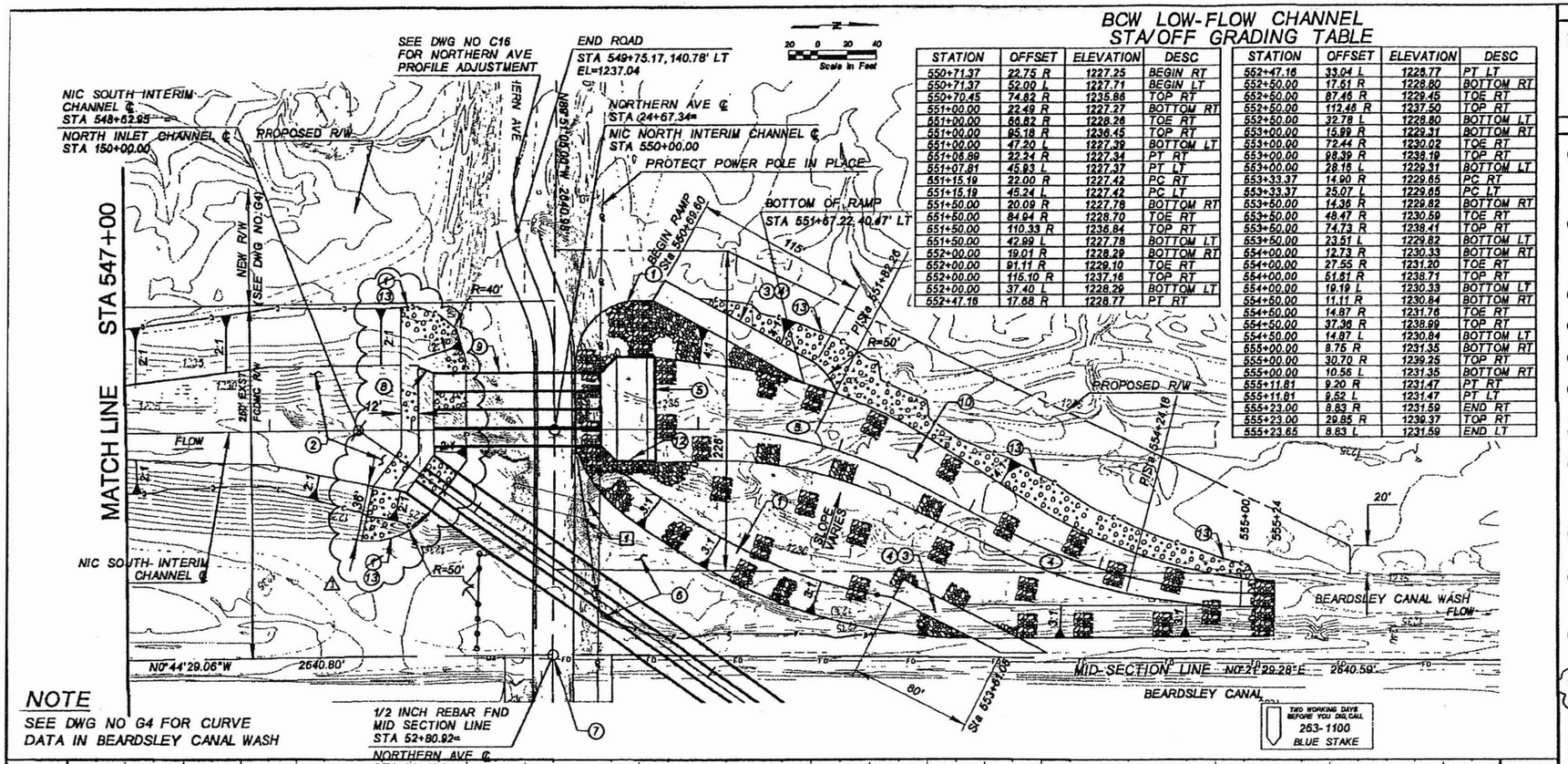
	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. C5

PLAN AND PROFILE STA 541+00 TO STA 547+00

SHEET OF 17 56



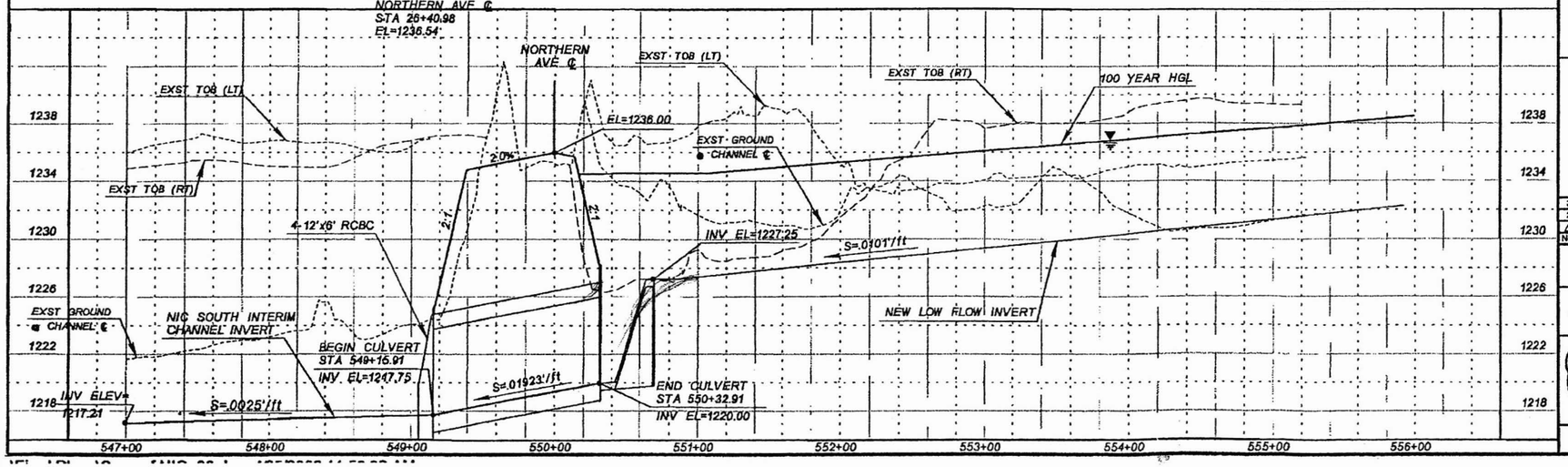
BCW LOW-FLOW CHANNEL STA/OFF GRADING TABLE

STATION	OFFSET	ELEVATION	DESC
550+71.37	22.75 R	1227.25	BEGIN RT
550+71.37	52.00 L	1227.71	BEGIN LT
550+70.45	74.82 R	1235.86	TOP RT
551+00.00	22.49 R	1227.27	BOTTOM RT
551+00.00	66.82 R	1228.26	TOE RT
551+00.00	85.18 R	1236.45	TOP RT
551+00.00	47.20 L	1227.39	BOTTOM LT
551+06.89	22.24 R	1227.34	PT RT
551+07.81	45.93 L	1227.37	PT LT
551+15.19	22.00 R	1227.42	PC RT
551+15.19	45.24 L	1227.42	PC LT
551+50.00	20.09 R	1227.78	BOTTOM RT
551+50.00	84.94 R	1228.70	TOE RT
551+50.00	110.33 R	1236.84	TOP RT
551+50.00	42.99 L	1227.78	BOTTOM LT
552+00.00	19.01 R	1228.29	BOTTOM RT
552+00.00	91.11 R	1229.10	TOE RT
552+00.00	116.10 R	1237.16	TOP RT
552+00.00	37.40 L	1228.29	BOTTOM LT
552+47.16	17.68 R	1228.77	PT RT

STATION	OFFSET	ELEVATION	DESC
552+47.16	33.04 L	1228.77	PT LT
552+50.00	17.51 R	1228.80	BOTTOM RT
552+50.00	87.46 R	1229.45	TOE RT
552+50.00	112.46 R	1237.50	TOP RT
552+50.00	32.78 L	1228.80	BOTTOM LT
553+00.00	15.99 R	1229.31	BOTTOM RT
553+00.00	72.44 R	1230.02	TOE RT
553+00.00	98.39 R	1238.19	TOP RT
553+00.00	28.16 L	1229.31	BOTTOM LT
553+33.37	14.90 R	1229.65	PC RT
553+33.37	25.07 L	1229.65	PC LT
553+50.00	14.36 R	1229.82	BOTTOM RT
553+50.00	48.47 R	1230.59	TOE RT
553+50.00	74.73 R	1238.41	TOP RT
553+50.00	23.51 L	1229.82	BOTTOM LT
554+00.00	12.73 R	1230.33	BOTTOM RT
554+00.00	27.55 R	1231.20	TOE RT
554+00.00	51.81 R	1238.71	TOP RT
554+00.00	19.19 L	1230.33	BOTTOM LT
554+50.00	11.11 R	1230.84	BOTTOM RT
554+50.00	14.87 R	1231.76	TOE RT
554+50.00	37.36 R	1238.99	TOP RT
554+50.00	14.87 L	1230.84	BOTTOM LT
555+00.00	8.75 R	1231.35	BOTTOM RT
555+00.00	30.70 R	1239.25	TOP RT
555+00.00	10.56 L	1231.35	BOTTOM RT
555+11.81	9.20 R	1231.47	PT RT
555+11.81	9.52 L	1231.47	PT LT
555+23.00	8.83 R	1231.59	END RT
555+23.00	29.85 R	1239.37	TOP RT
555+23.65	8.83 L	1231.59	END LT

NOTE

SEE DWG NO G4 FOR CURVE DATA IN BEARDSLEY CANAL WASH

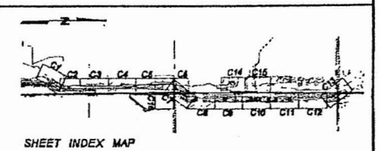


REMOVE

[1] REMOVE 2-60" CMPs

CONSTRUCT

(1)	9" RENO MATTRESS BANK PROTECTION TO LIMITS SHOWN IN PLAN, PER TYP SECTIONS, DWG NO G7&G8 & TURNDOWN DETAIL, DWG NO D1	~~6,71~~ 5,507 SY
(2)	NIC SOUTH INTERIM CHANNEL EXCAVATION PER SECTIONS DWG NO G7, X-SECTIONS DWG NO XS01-XS02 & DETAILS THIS SHEET	9,293 C
(3)	O&M RAMP PER DET DWG NO. D1	2 EA
(4)	O&M ROAD PER TYPICAL SECTION DWG NO. D1	438 SY
(5)	DROP INLET PER DETAILS DWG NO.'S ST4 & ST5	1 EA
(6)	COMPACTED FILL/EMBANKMENT PER TYPICAL SECTION (550+69) DWG NO G6 (NPI)	2900 CY
(7)	NEW SURVEY MARKER PER MAG STD DETAIL 120-2, TYPE 'D'	1 EA
(8)	OUTLET HEADWALL & WINGWALL PER ADOT STD DET NO B-04.10, 2:1 SLOPE, 0° SKEW & OUTLET APRON PER ADOT STD DETAIL B-06.10, AND DRAWING ST-6	1 EA
(9)	4-12'x6'x117' RCBC PER ADOT STD DETAIL B-02.40, AND DRAWING ST-6 (MODIFIED FROM 8' TO 6' HEIGHT)	1 EA
(10)	BEARDSLEY CANAL WASH LOW FLOW EXCAVATION PER TYPICAL SECTIONS DWG NO G8 & PER DETAILS THIS SHEET	7073 CY
(12)	HANDRAIL PER COP STD DET P-1173 AND PER DETAIL DWG NO D1 PAINT PER SPECIFICATIONS	185 LF
(13)	DUMPED RIPRAP D50=18" 30" THICK W/ FILTER FABRIC	~~550~~ CY 1464



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
1	CHANGE RENO MAT TO RIPRAP		4-25-08

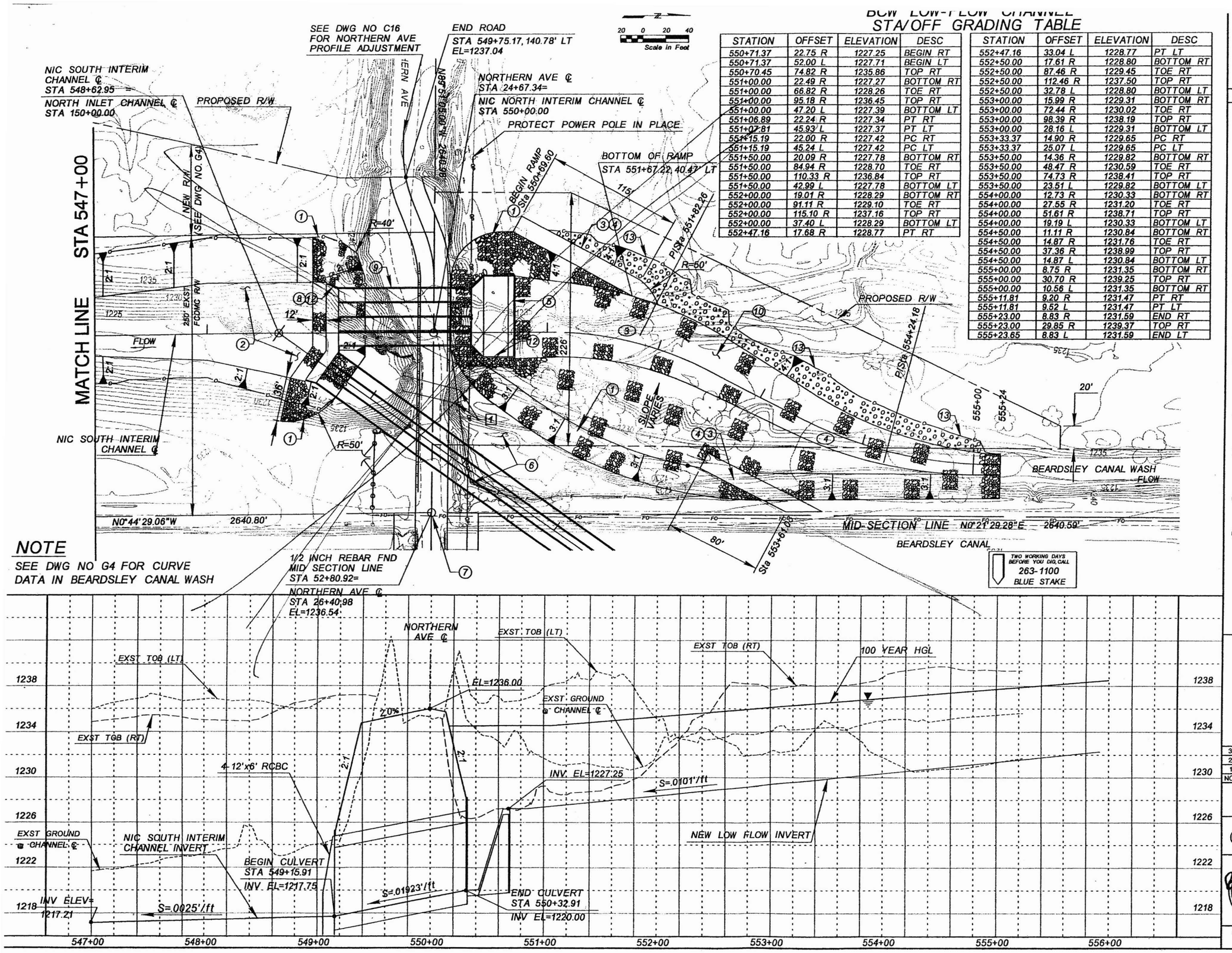
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO.	PLAN AND PROFILE	SHEET OF
C6	STA 547+00 TO STA 556+00	18 56



BOW LOW-FLOW CHANNEL STA/OFF GRADING TABLE

STATION	OFFSET	ELEVATION	DESC
550+71.37	22.75 R	1227.25	BEGIN RT
550+71.37	52.00 L	1227.71	BEGIN LT
550+70.45	74.82 R	1235.86	TOP RT
551+00.00	22.49 R	1227.27	BOTTOM RT
551+00.00	66.82 R	1228.26	TOE RT
551+00.00	95.18 R	1236.45	TOP RT
551+00.00	47.20 L	1227.39	BOTTOM LT
551+06.89	22.24 R	1227.34	PT RT
551+07.81	45.93 L	1227.37	PT LT
551+15.19	22.00 R	1227.42	PC RT
551+15.19	45.24 L	1227.42	PC LT
551+50.00	20.09 R	1227.78	BOTTOM RT
551+50.00	84.94 R	1228.70	TOE RT
551+50.00	110.33 R	1236.84	TOP RT
551+50.00	42.99 L	1227.78	BOTTOM LT
552+00.00	19.01 R	1228.29	BOTTOM RT
552+00.00	91.11 R	1229.10	TOE RT
552+00.00	115.10 R	1237.16	TOP RT
552+00.00	37.40 L	1228.29	BOTTOM LT
552+47.16	17.68 R	1228.77	PT RT
552+47.16	33.04 L	1228.77	PT LT
552+50.00	17.61 R	1228.80	BOTTOM RT
552+50.00	87.46 R	1229.45	TOE RT
552+50.00	112.46 R	1237.50	TOP RT
552+50.00	32.78 L	1228.80	BOTTOM LT
553+00.00	15.99 R	1229.31	BOTTOM RT
553+00.00	72.44 R	1230.02	TOE RT
553+00.00	98.39 R	1238.19	TOP RT
553+00.00	28.16 L	1229.31	BOTTOM LT
553+33.37	14.90 R	1229.65	PC RT
553+33.37	25.07 L	1229.65	PC LT
553+50.00	14.36 R	1229.82	BOTTOM RT
553+50.00	48.47 R	1230.59	TOE RT
553+50.00	74.73 R	1238.41	TOP RT
553+50.00	23.51 L	1229.82	BOTTOM LT
554+00.00	12.73 R	1230.33	BOTTOM RT
554+00.00	27.55 R	1231.20	TOE RT
554+00.00	51.61 R	1238.71	TOP RT
554+00.00	19.19 L	1230.33	BOTTOM LT
554+50.00	11.11 R	1230.84	BOTTOM RT
554+50.00	14.87 R	1231.76	TOE RT
554+50.00	37.36 R	1238.99	TOP RT
554+50.00	14.87 L	1230.84	BOTTOM LT
555+00.00	8.75 R	1231.35	BOTTOM RT
555+00.00	30.70 R	1239.25	TOP RT
555+00.00	10.56 L	1231.35	BOTTOM RT
555+11.81	9.20 R	1231.47	PT RT
555+11.81	9.52 L	1231.47	PT LT
555+23.00	8.83 R	1231.59	END RT
555+23.00	29.85 R	1239.37	TOP RT
555+23.65	8.83 L	1231.59	END LT

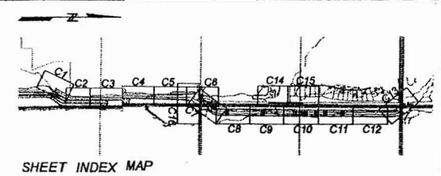
NOTE

SEE DWG NO G4 FOR CURVE DATA IN BEARDSLEY CANAL WASH

1	REMOVE 2-60" CMPs	LS

CONSTRUCT

(1)	9" RENO MATTRESS BANK PROTECTION TO LIMITS SHOWN IN PLAN, PER TYP SECTIONS, DWG NO G7&G8 & TURNDOWN DETAIL, DWG NO D1	6,750 SY
(2)	NIC SOUTH INTERIM CHANNEL EXCAVATION PER SECTIONS DWG NO G7, X-SECTIONS DWG NO XS01-XS02 & DETAILS THIS SHEET	9,293 CY
(3)	O&M RAMP PER DET DWG NO. D1	2 EA
(4)	O&M ROAD PER TYPICAL SECTION DWG NO. D1	438 SY
(5)	DROP INLET PER DETAILS DWG NO.'S ST4 & ST5	1 EA
(6)	COMPACTED FILL/EMBANKMENT PER TYPICAL SECTION (550+69) DWG NO G6 (NPI)	2900 CY
(7)	NEW SURVEY MARKER PER MAG STD DETAIL 120-2, TYPE 'D'	1 EA
(8)	OUTLET HEADWALL & WINGWALL PER ADOT STD DET NO B-04.10, 2:1 SLOPE, 0° SKEW & OUTLET APRON PER ADOT STD DETAIL B-06.10, AND DRAWING ST-6	1 EA
(9)	4-12'x6'x117' RCBC PER ADOT STD DETAIL B-02.40, AND DRAWING ST-6 (MODIFIED FROM 8' TO 6' HEIGHT)	1 EA
(10)	BEARDSLEY CANAL WASH LOW FLOW EXCAVATION PER TYPICAL SECTIONS DWG NO G8 & PER DETAILS THIS SHEET	7073 CY
(12)	HANDRAIL PER COP STD DET P-1173 AND PER DETAIL DWG. NO. D1. PAINT PER SPECIFICATIONS.	185 LF
(13)	DUMPED RIPRAP D50=18" 24" THICK W/ FILTER FABRIC	550 CY



SHEET INDEX MAP

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

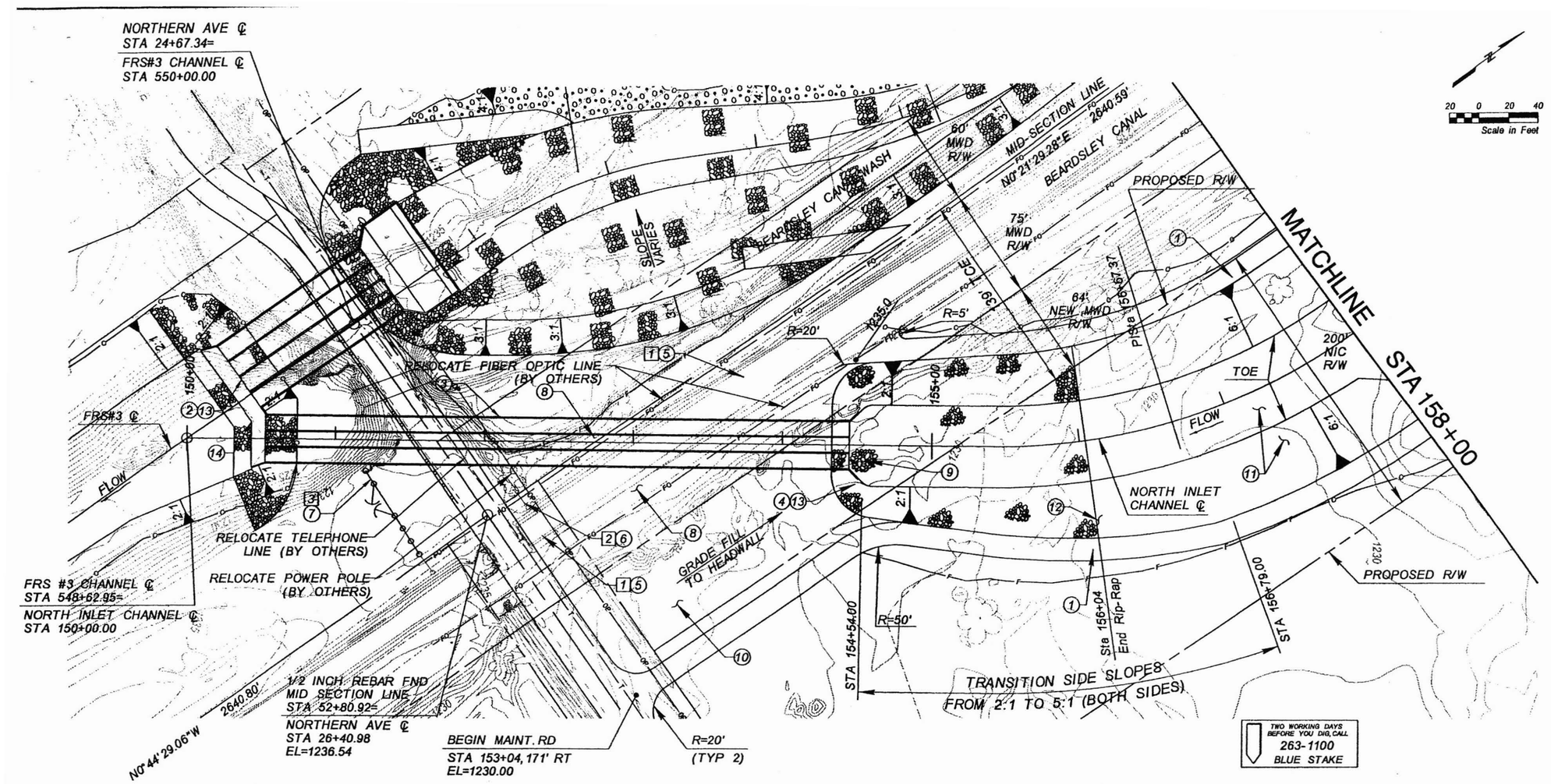
Barry J. Ling 16748 — 1/31/06

KIRKHAM MICHAEL

DRAWING NO. C6

PLAN AND PROFILE STA 547+00 TO STA 556+00

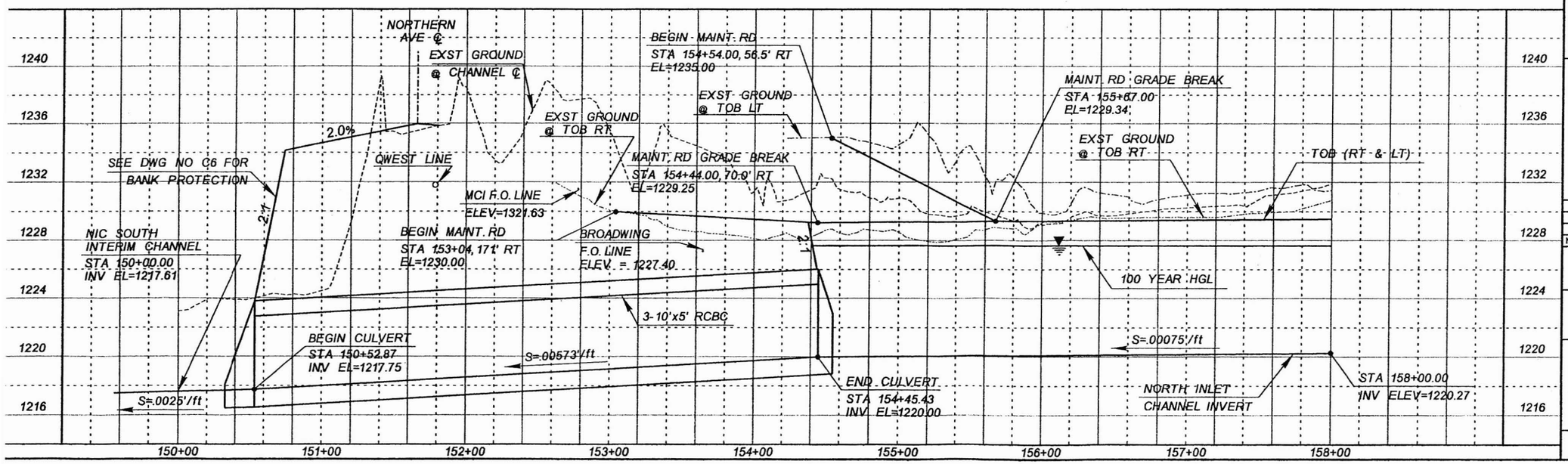
SHEET OF 18 58

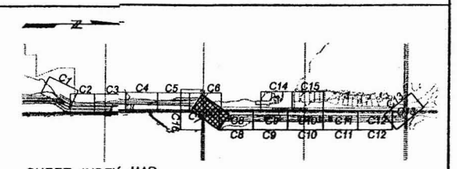


[1]	REMOVE BEARDSLEY CANAL	226 LF
[2]	REMOVE CANAL MAINT ROAD GATE	1 EA
[3]	REMOVE WEST END OF FRS#3 CHANNEL ACCESS GATE	1 EA

CONSTRUCT

(1)	O&M ROAD PER TYPICAL SECTION DWG NO D1	1467 SY
(2)	OUTLET HEADWALL & WINGWALLS PER ADOT STD DET NO B-04.10, 2:1 SLOPE, 0° SKEW & OUTLET APRON PER ADOT STD DET B-06.10 WITH INCREASE OF TOP SLAB THICKNESS 1/2" CLEAR COVER TO BE 1-1/2" ON BOTTOM REINFORCEMENT IN TOP SLAB	1 EA
(3)	3-10'x5'x392.5' RCBC PER ADOT STD DET B-02.30	1 EA
(4)	INLET HEADWALL & WINGWALLS PER ADOT STD DET NO B-04.30, 2:1 SLOPE, 0° SKEW	1 EA
(5)	REPLACE BEARDSLEY CANAL LINING PER MWD CANAL REPLACEMENT DETAILS (SHEETS 59-60)	226 LF
(6)	NEW CANAL SECURITY GATE	1 EA
(7)	REPLACE FRS#3 CHANNEL ACCESS GATE	1 EA
(8)	RECONSTRUCT CANAL MAINT ROADS TO ORIGINAL CONDITION (SEE CANAL REPLACEMENT DETAILS, SHEETS 59-60)	N/A
(9)	9" RENO MATTRESS BANK PROTECTION PER LIMITS SHOWN THIS SHEET	2171 SY
(10)	COMPACTED EMBANKMENT FILL BETWEEN CANAL MAINT RD & NEW CHANNEL MAINT RD (NPI)	1360 CY
(11)	NATIVE SEEDING	0.57 AC
(12)	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO G7 & PER CROSS SECTION DWG NO XS07 & XS13	19,833 CY
(13)	HANDRAIL PER COP STD DET P-1173 (SEE DET DWG NO D1)	152 LF
(14)	CONJOINED HEADWALL/WINGWALL & OUTLET APRON PER DETAILS, DRAWING No. ST6	





SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

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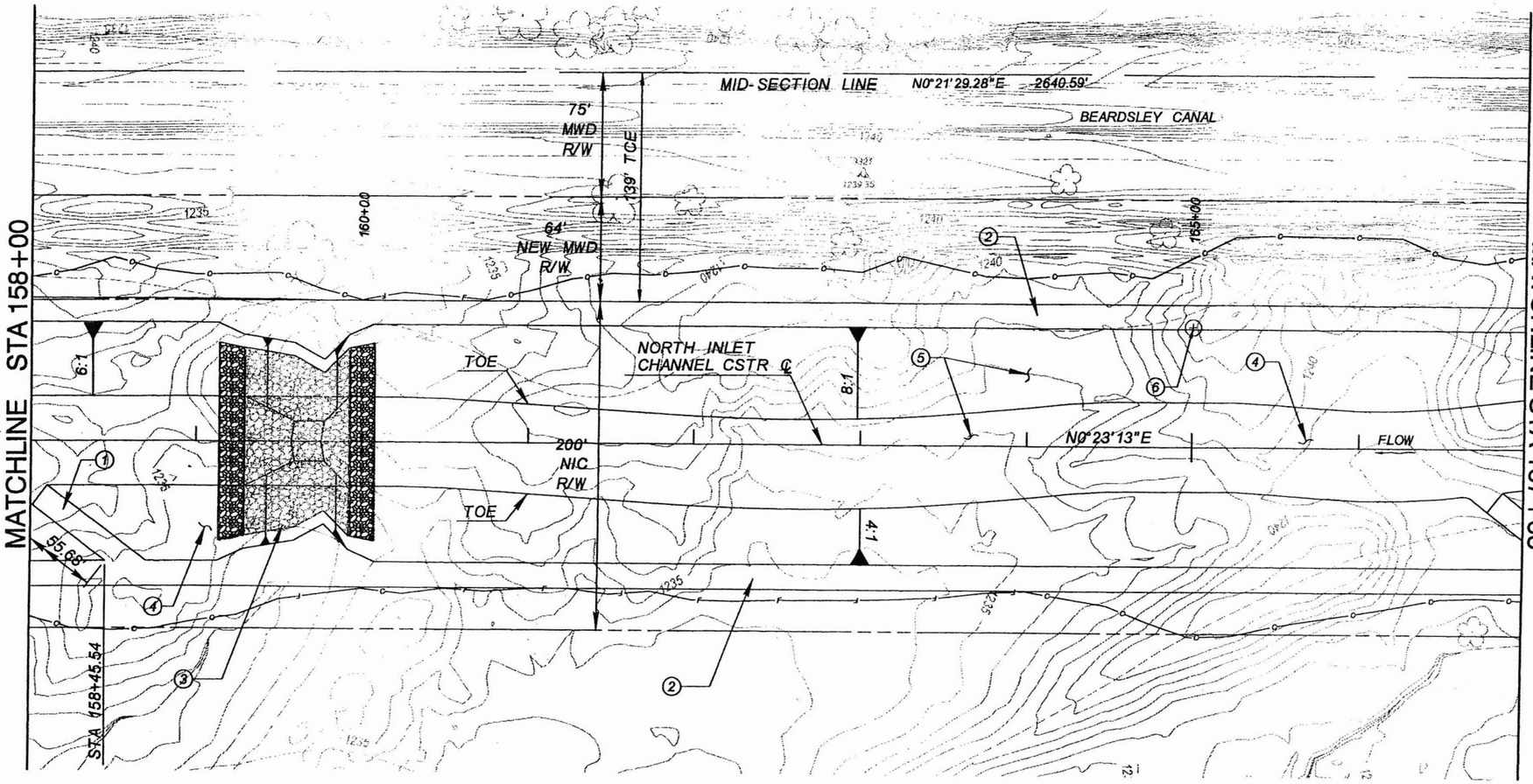
Barry J. Ling 19148 ARIZONA, U.S.A.

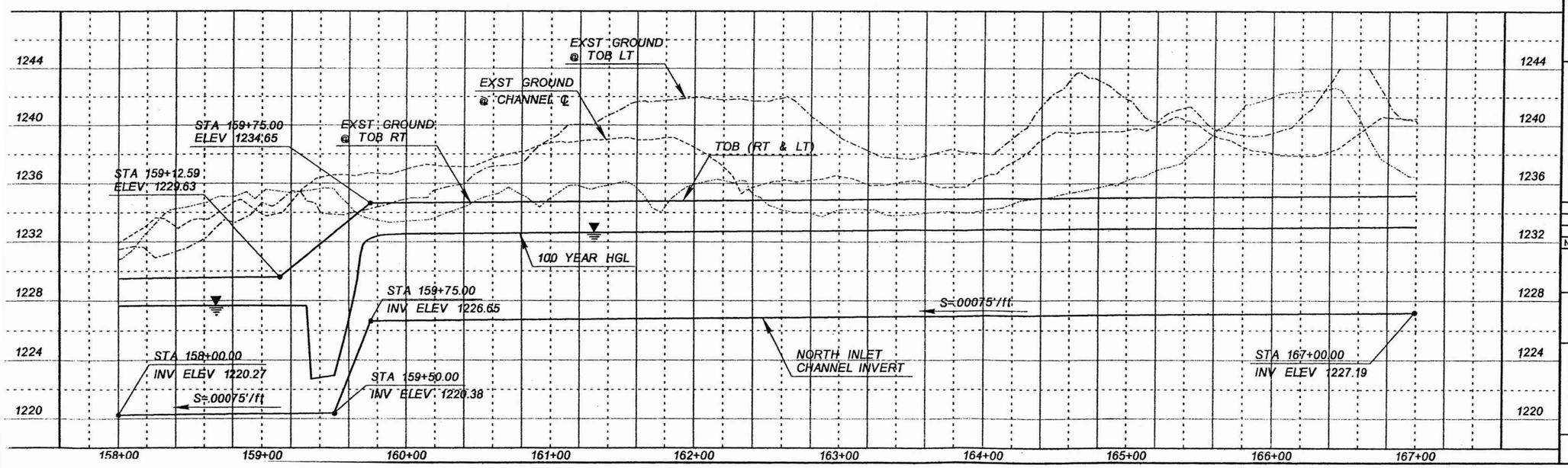
KIRKHAM MICHAEL

DRAWING NO. C7

PLAN AND PROFILE STA 150+00 TO STA 158+00

SHEET OF 19 56





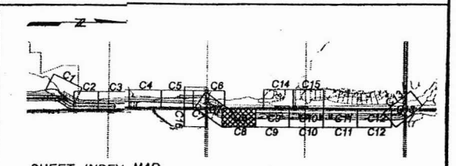
N

20 0 20 40
Scale in Feet

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

CONSTRUCT

(1)	O&M RAMP PER DET DWG NO D1	1 EA
(2)	O&M ROAD PER TYPICAL SECTION DWG NO D1	3000 SY
(3)	DROP STRUCTURE PER DETAILS ON DWG NO'S DS1-DS3 & PER PLAN/PROFILE THIS SHEET	1 EA
(4)	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP. SECTION DWG NO. G7 & PER CROSS SECTION DWG NOS XS07-XS13	39,667 CY
(5)	NATIVE SEEDING	2.79 AC
(6)	NEW SURVEY MARKER PER MAG STD. DETAIL 120-2, TYPE D @ STA 165, 73.5' LT	1 EA



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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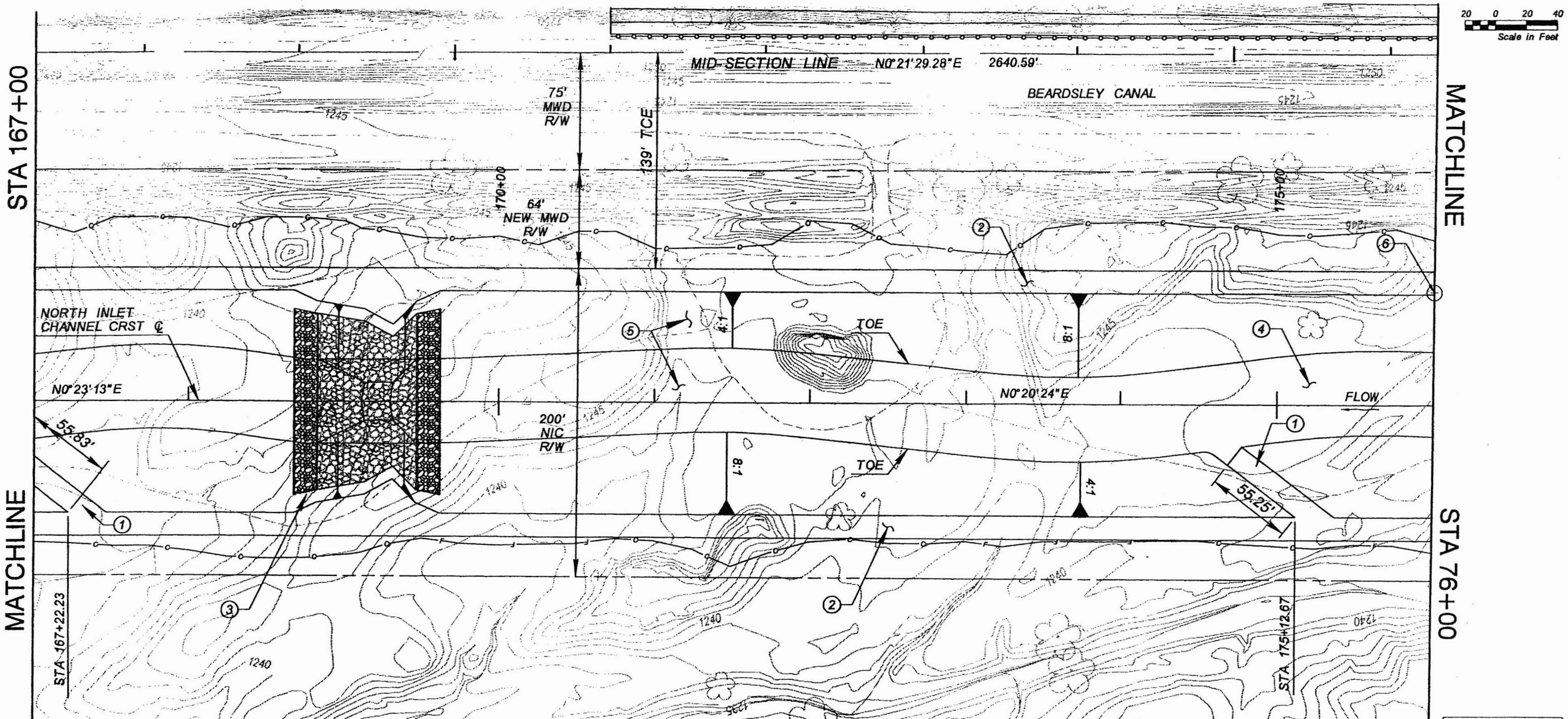
KIRKHAM MICHAEL

DRAWING NO. C8

PLAN AND PROFILE STA 158+00 TO STA 167+00

SHEET OF 20 56

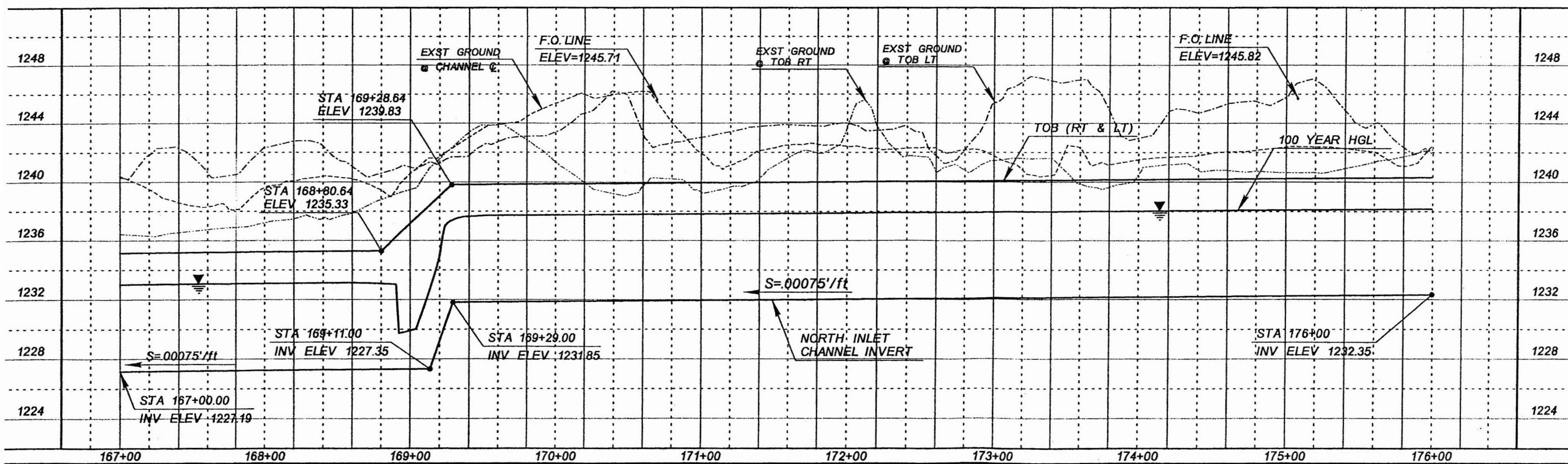


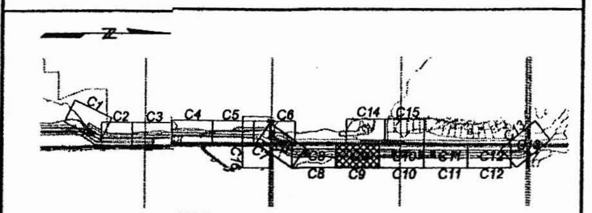
20 0 20 40
Scale in Feet

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

CONSTRUCT

①	O&M RAMP PER DET DWG NO D2	1 EA
②	O&M ROAD PER TYPICAL SECTION DWG NO D2	3000 SY
③	DROP STRUCTURE PER DETAILS ON DWG NO'S DS1-DS3 & PER PLAN/PROFILE THIS SHEET	1 EA
④	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP. SECTION DWG NO. G7 & PER CROSS SECTION DWG NOS XS07-XS13	39,667 CY
⑤	NATIVE SEEDING	2.79 AC
⑥	NEW SURVEY MARKER PER MAG STD. DETAIL 120-2, TYPE D @ STA 176, 73.5' LT	1 EA





SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

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DESIGNED	JKK	10/05
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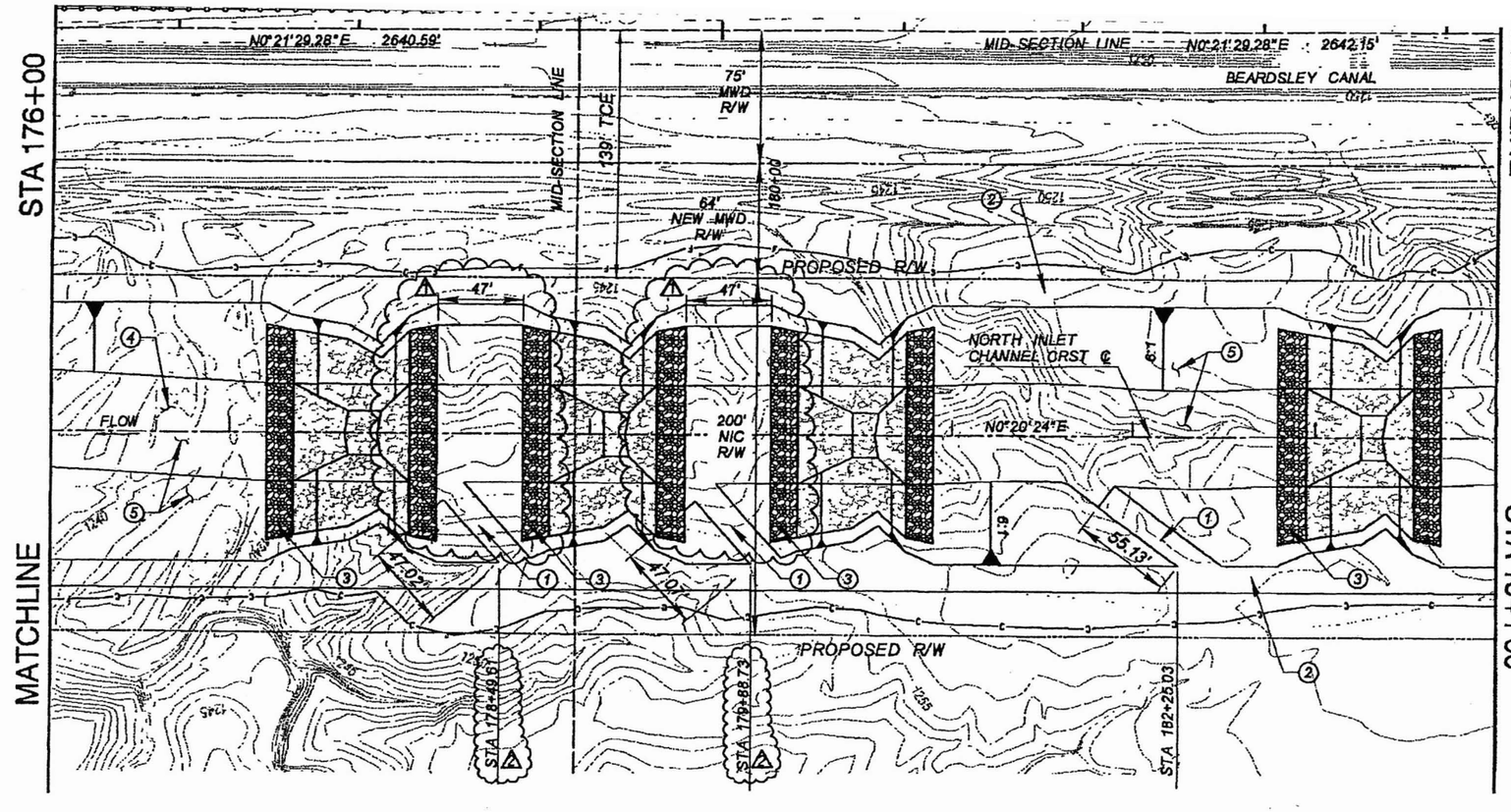
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
C9	PLAN AND PROFILE STA 167+00 TO STA 176+00	21 56

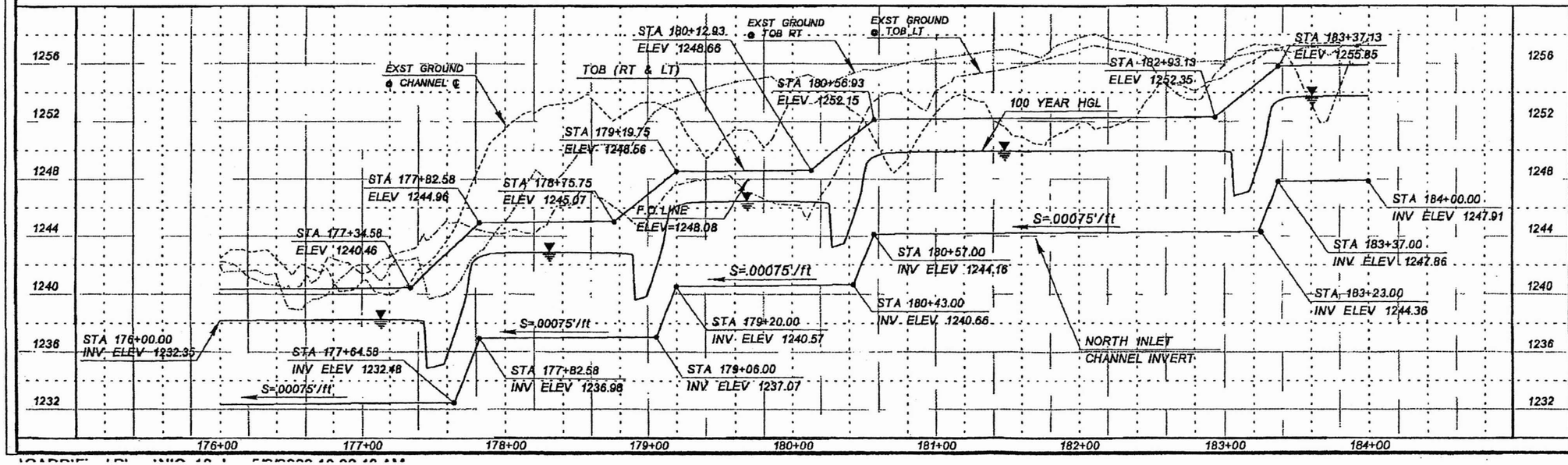


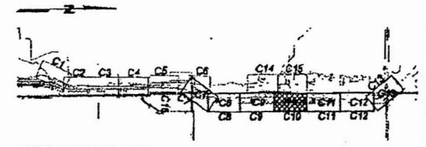
Scale in Feet

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

CONSTRUCT

(1)	O&M RAMP PER DET DWG NO D1	3 EA
(2)	O&M ROAD PER TYPICAL SECTION DWG NO D1	2667 SY
(3)	DROP STRUCTURE PER DETAILS ON DWG NO'S DS1-DS3 & PER PLAN/PROFILE THIS SHEET	4 EA
(4)	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP. SECTION DWG NO. G7 & PER CROSS SECTION DWG NOS XS07-XS13	39,567 CY
(5)	NATIVE SEEDING	1.69 AC
(6)	~~DUMPED RIP RAP, D_{50}=18" & 24" THICK W/ FILTER FABRIC BETWEEN DROP STRUCTURES~~	~~840 CY~~





SHEET INDEX MAP

NO.	REVISION	BY	DATE
8			
7	RELOCATE RAMPS		5-1-06
6	REMOVE RIPRAP		5-1-06

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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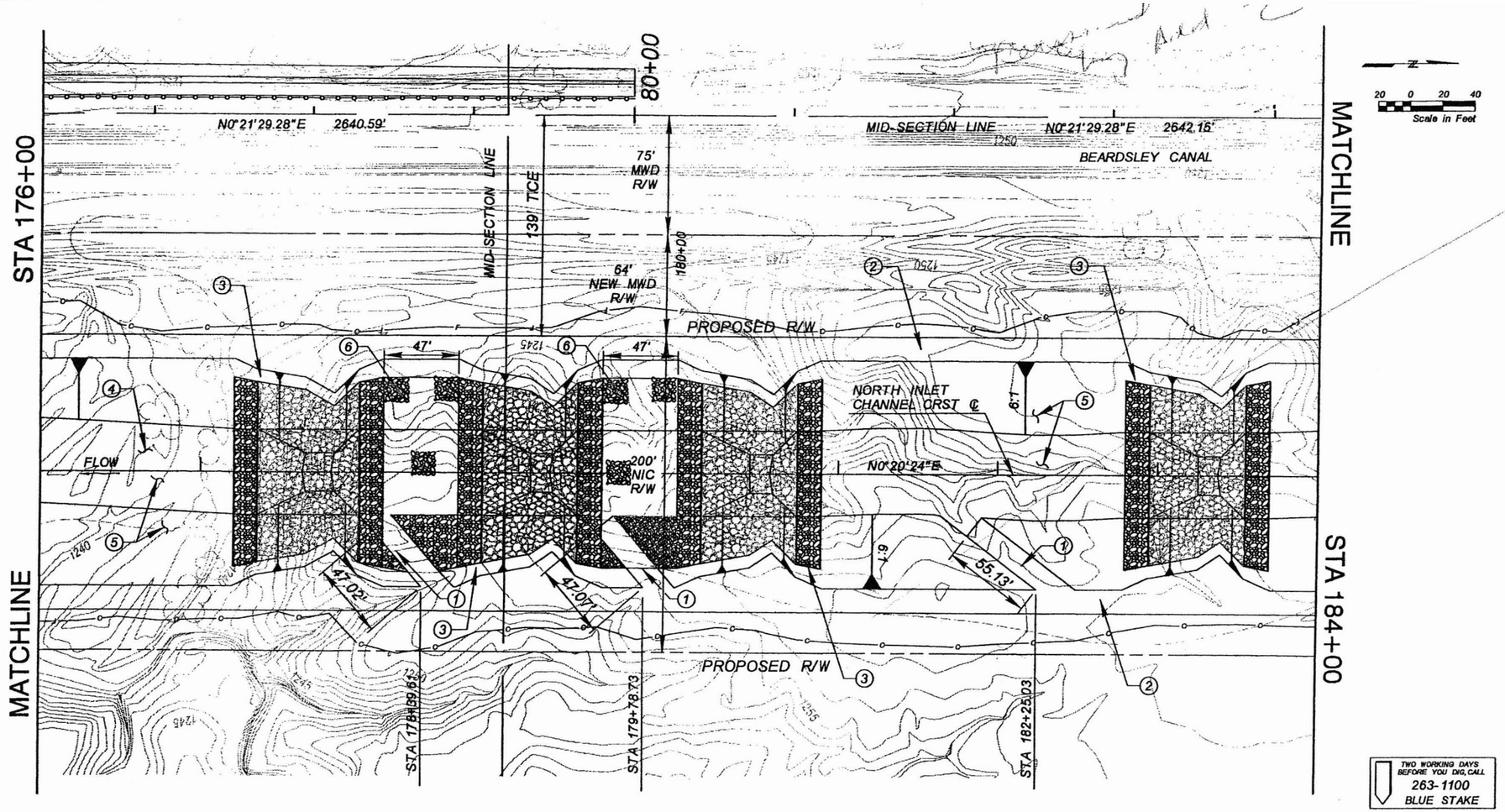
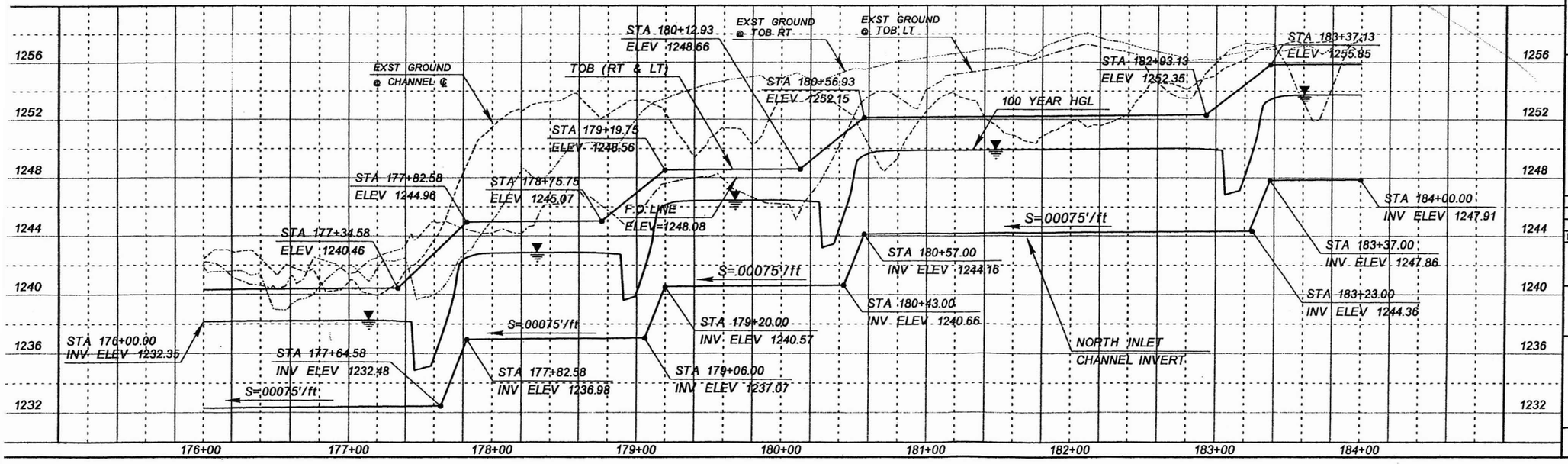
KIRKHAM MICHAEL

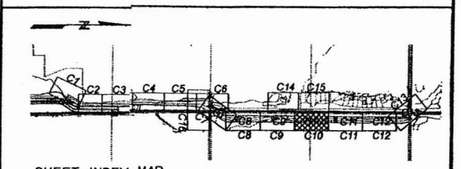
DRAWING NO.	PLAN AND PROFILE	SHEET OF
C10	STA 167+00 TO STA 176+00	22 56



CONSTRUCT

(1)	O&M RAMP PER DET DWG NO D1	3 EA
(2)	O&M ROAD PER TYPICAL SECTION DWG NO D1	2667 SY
(3)	DROP STRUCTURE PER DETAILS ON DWG NO'S DS1-DS3 & PER PLAN/PROFILE THIS SHEET	4 EA
(4)	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP. SECTION DWG NO. G7 & PER CROSS SECTION DWG NOS XS07-XS13	39,667 CY
(5)	NATIVE SEEDING	1.69 AC
(6)	DUMPED RIP-RAP, D_{50}=18" & ~~24"~~ 30" THICK W/ FILTER FABRIC BETWEEN DROP STRUCTURES	~~840~~ 1050 CY





SHEET INDEX MAP

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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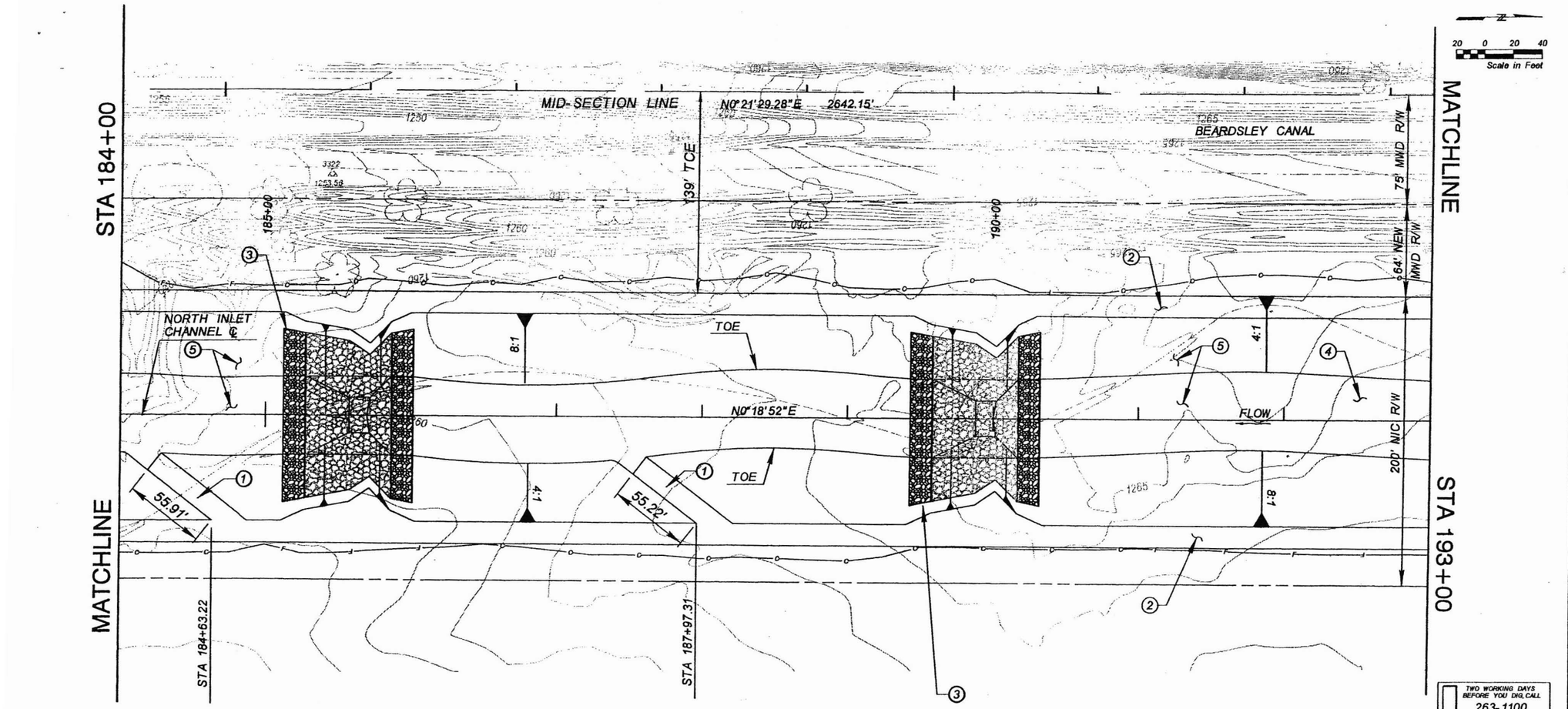
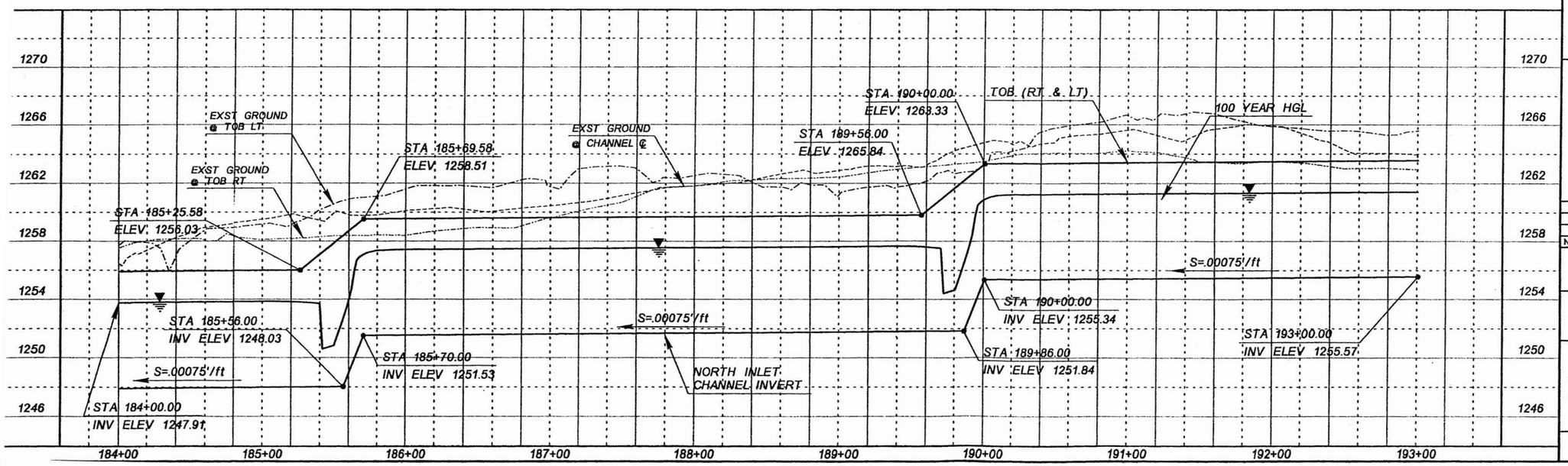
KIRKHAM MICHAEL

DRAWING NO. C10

PLAN AND PROFILE STA 167+00 TO STA 176+00

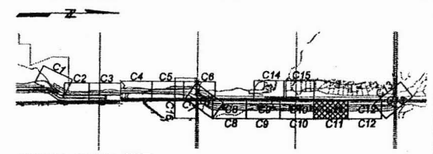
SHEET OF 22 56





CONSTRUCT

(1)	O&M RAMP PER DET DWG NO D1	2 EA
(2)	O&M ROAD PER TYPICAL SECTION DWG NO D1	3000 SY
(3)	DROP STRUCTURE PER DETAILS ON DWG NO'S DS1-DS3 & PER PLAN/PROFILE THIS SHEET	2 EA
(4)	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP. SECTION DWG NO. G7 & PER CROSS SECTION DWG NOS XS07-XS13	39,667 CY
(5)	NATIVE SEEDING	2.53 AC



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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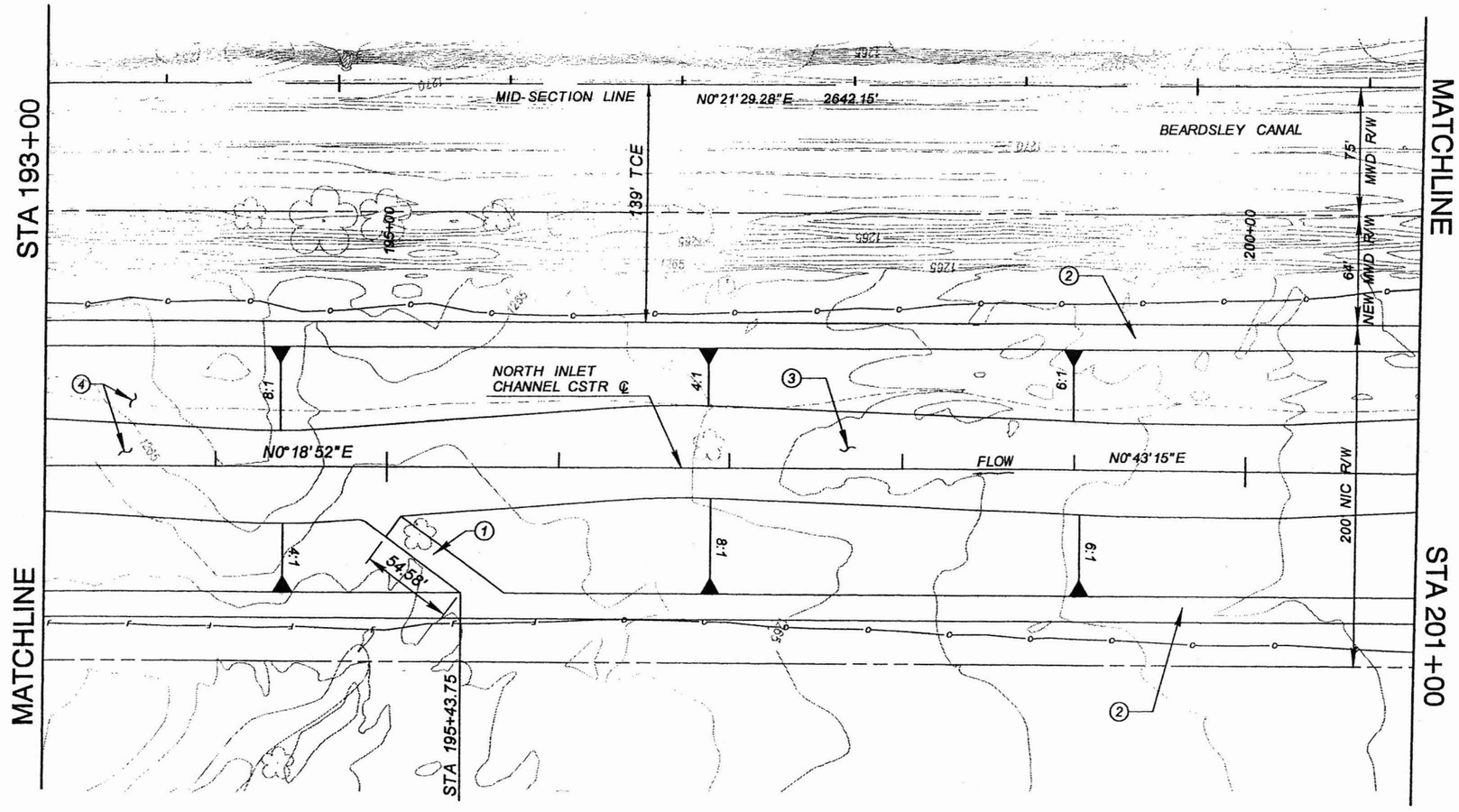
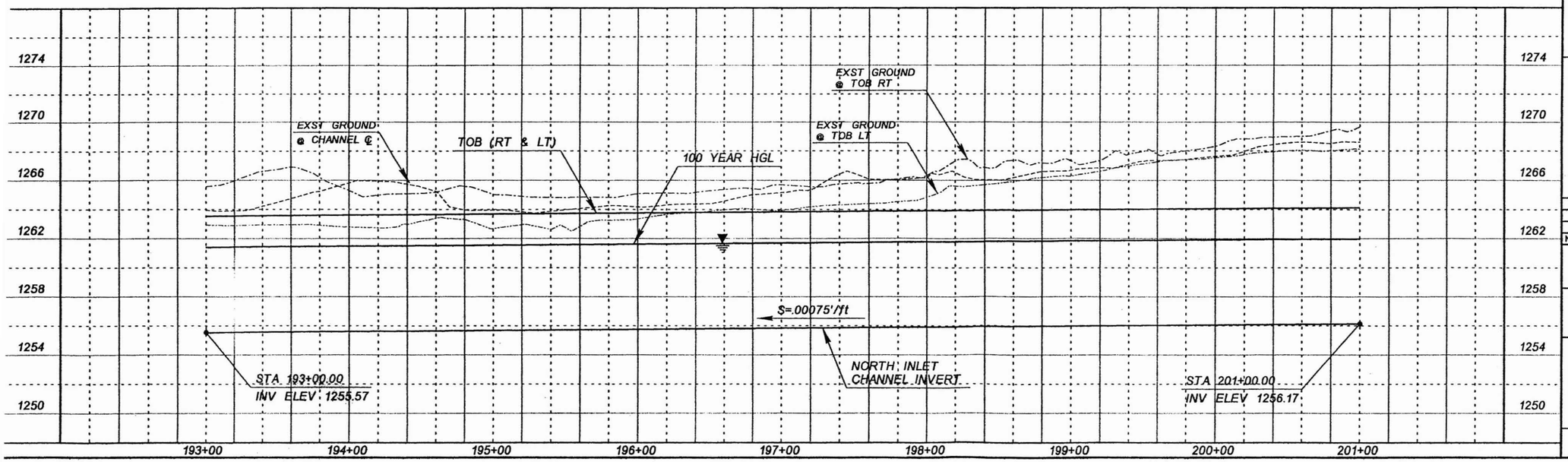
KIRKHAM MICHAEL

DRAWING NO. C11

PLAN AND PROFILE STA 184+00 TO STA 193+00

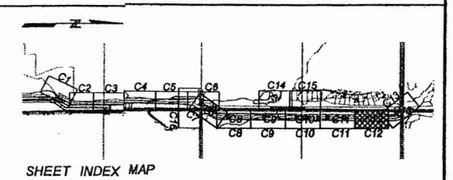
SHEET OF 23 56





CONSTRUCT

(1)	O&M RAMP PER DET DWG NO D1	1 EA
(2)	O&M ROAD PER TYPICAL SECTION DWG NO D1	2667 SY
(3)	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP. SECTION DWG NO. G7 & PER CROSS SECTION DWG NOS XS07-XS13	39,667 CY
(4)	NATIVE SEEDING	2.69 AC



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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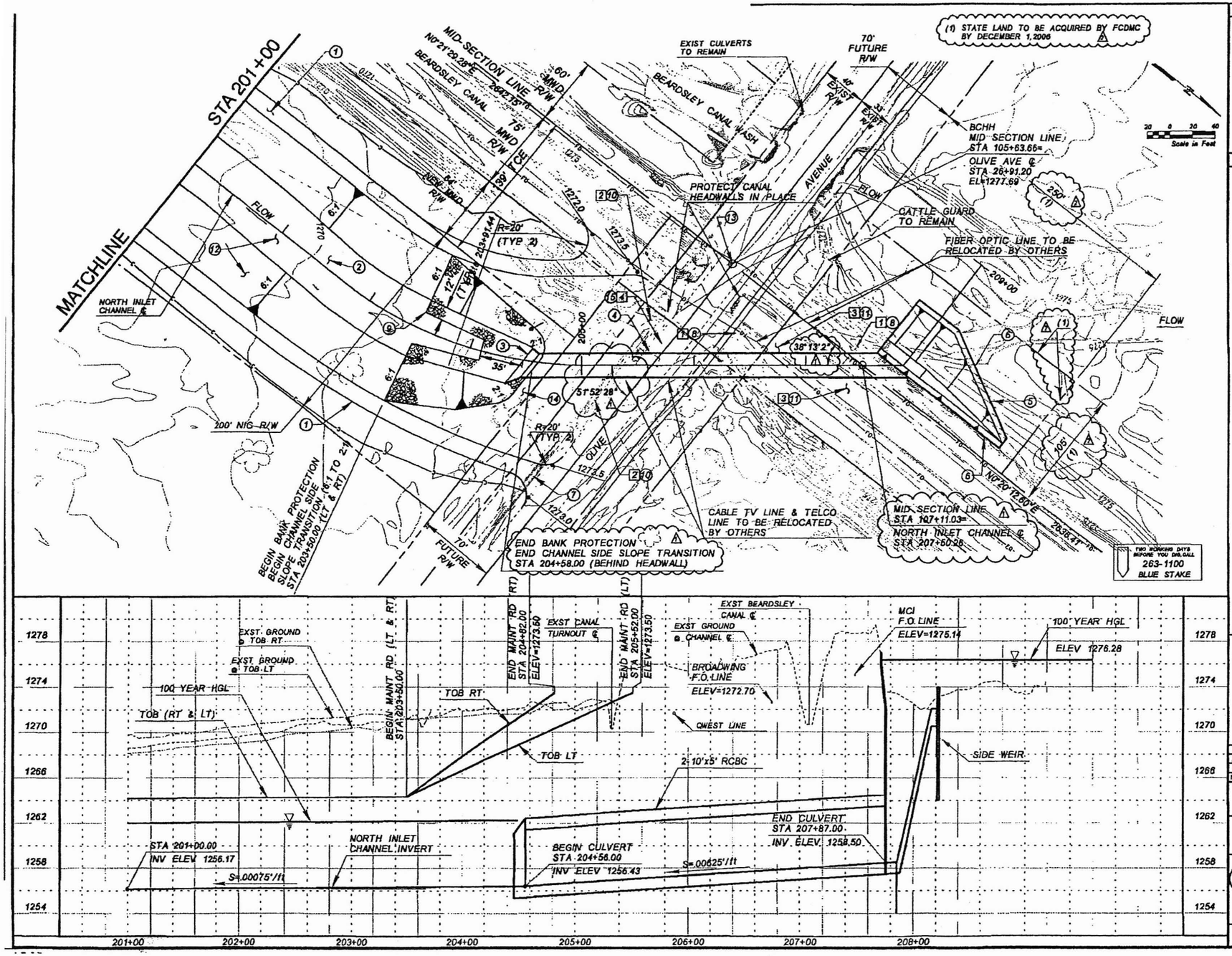
KIRKHAM MICHAEL

DRAWING NO. C12

PLAN AND PROFILE STA 193+00 TO STA 201+00

SHEET OF 24 58

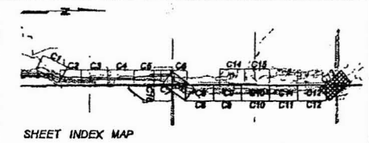


REMOVE

1	REMOVE CANAL MAINT ROAD GATE	2 E
2	REMOVE LATERAL 9 CANAL LINING	240 LF
3	REMOVE BEARDSLEY CANAL LINING	194 LF
4	SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT	318 SY

CONSTRUCT

1	O&M ROAD PER TYPICAL SECTION DWG NO. D1	1337 SY
2	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO. G7 & PER CROSS SECTION DWG NO.S XS11 & XS12	19,833 CY
3	OUTLET HEADWALL & WING WALLS PER ADOT STD NO B-04.50, 2:1 SLOPE, 40° SKEW AND OUTLET APRON PER ADOT STD NO B-06.10	1 EA
4	2-10'x5' RCBC PER ADOT STD NO B-02.20, TABLE II WITH INCREASE OF TOP SLAB THICKNESS 1/2" CLEAR COVER TO BE 1-1/2" ON BOTTOM REINFORCEMENT IN TOP SLAB	331 LF
5	SIDE WEIR/DROP INLET STRUCTURE PER DETAILS DWG NO.'S ST1-ST3	1 EA
6	HANDRAIL PER COP STD DET P-1173	201 LF
7	PRE-CAST SLAB CROSSING WITH NO CURB PER DET DWG NO. D2 LENGTH=18', WIDTH=16' (2) 8' SLABS. CENTER OVER TURNOUT CANAL	1 EA
8	NEW CANAL SECURITY GATE	2 EA
9	9" RENO MATTRESS BANK PROTECTION PER LIMITS SHOWN THIS SHEET	1080 SY
10	REPLACE LATERAL 9 CANAL LINING PER MWD CANAL REPLACEMENT DETAILS	240 LF
11	REPLACE BEARDSLEY CANAL PER MWD CANAL REPLACEMENT DETAILS (SHEETS 61-62)	194 LF
12	NATIVE SEEDING	1.20 AC
13	NEW SURVEY MARKER PER MAG STD DET 120-2, TYPE 'E'	1 EA
14	COMPACTED EMBANKMENT FILL B/W HEADWALL & TURNOUT CANAL (NPI)	250 CY
15	REPLACE ASPHALT PAVEMENT PER MAG STD. 200, TYPE "A" WITH 2 LAYERS ASPHALT OVER 12" ABC	318 SY



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2	REV R/W DESCRIPTION		04-25-06
1	ADD SKEW ANGLE, REV STATIONS		04-25-06

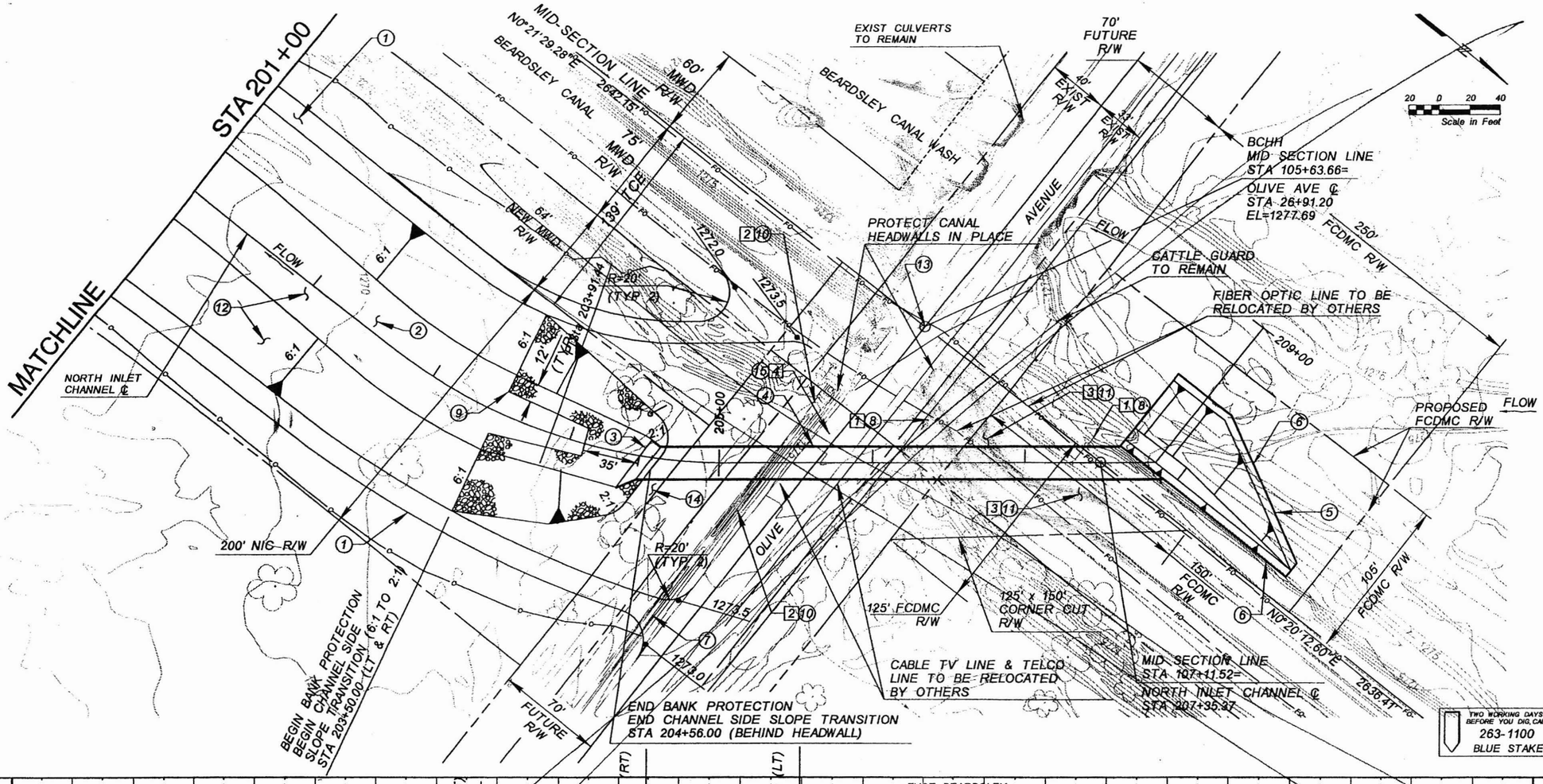
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
C13	PLAN AND PROFILE STA 201+00 TO STA 209+00	25 55

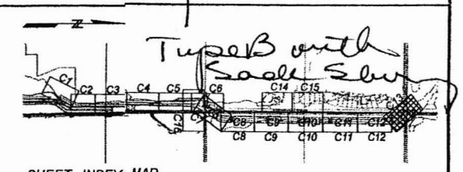


REMOVE

1	REMOVE CANAL MAINT ROAD GATE	2 EA
2	REMOVE LATERAL 9 CANAL LINING	240 LF
3	REMOVE BEARDSLEY CANAL LINING	194 LF
4	SAWCUT & REMOVE EXISTING ASPHALT PAVEMENT	318 SY

CONSTRUCT

1	O&M ROAD PER TYPICAL SECTION DWG NO. D1	1337 SY
2	NIC CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO. G7 & PER CROSS SECTION DWG NO.S XS11 & XS12	19,833 CY
3	OUTLET HEADWALL & WING WALLS PER ADOT STD NO B-04.50, 2:1 SLOPE, 40° SKEW AND OUTLET APRON PER ADOT STD NO B-06.10	1 EA
4	2-10'x5' RCBC PER ADOT STD NO B-02.20, TABLE II WITH INCREASE OF TOP SLAB THICKNESS 1/2" CLEAR COVER TO BE 1-1/2" ON BOTTOM REINFORCEMENT IN TOP SLAB	331 LF
5	SIDE WEIR/DROP INLET STRUCTURE PER DETAILS DWG NO.'S ST1-ST3	1 EA
6	HANDRAIL PER COP STD DET P-1173	201 LF
7	PRE-CAST SLAB CROSSING WITH NO CURB PER DET DWG NO. D2 LENGTH=18', WIDTH=16' (2) 8' SLABS. CENTER OVER TURNOUT CANAL	1 EA
8	NEW CANAL SECURITY GATE	2 EA
9	9" RENO MATTRESS BANK PROTECTION PER LIMITS SHOWN THIS SHEET	1080 SY
10	REPLACE LATERAL 9 CANAL LINING PER MWD CANAL REPLACEMENT DETAILS	240 LF
11	REPLACE BEARDSLEY CANAL PER MWD CANAL REPLACEMENT DETAILS (SHEETS 61-62)	194 LF
12	NATIVE SEEDING	1.20 AC
13	NEW SURVEY MARKER PER MAG STD DET 120-2, TYPE 'E'	1 EA
14	COMPACTED EMBANKMENT FILL B/W HEADWALL & TURNOUT CANAL (NPI)	250 CY
15	REPLACE ASPHALT PAVEMENT PER MAG STD. 200 TYPE "A" WITH 2 LAYERS ASPHALT OVER 12" ABC	318 SY



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

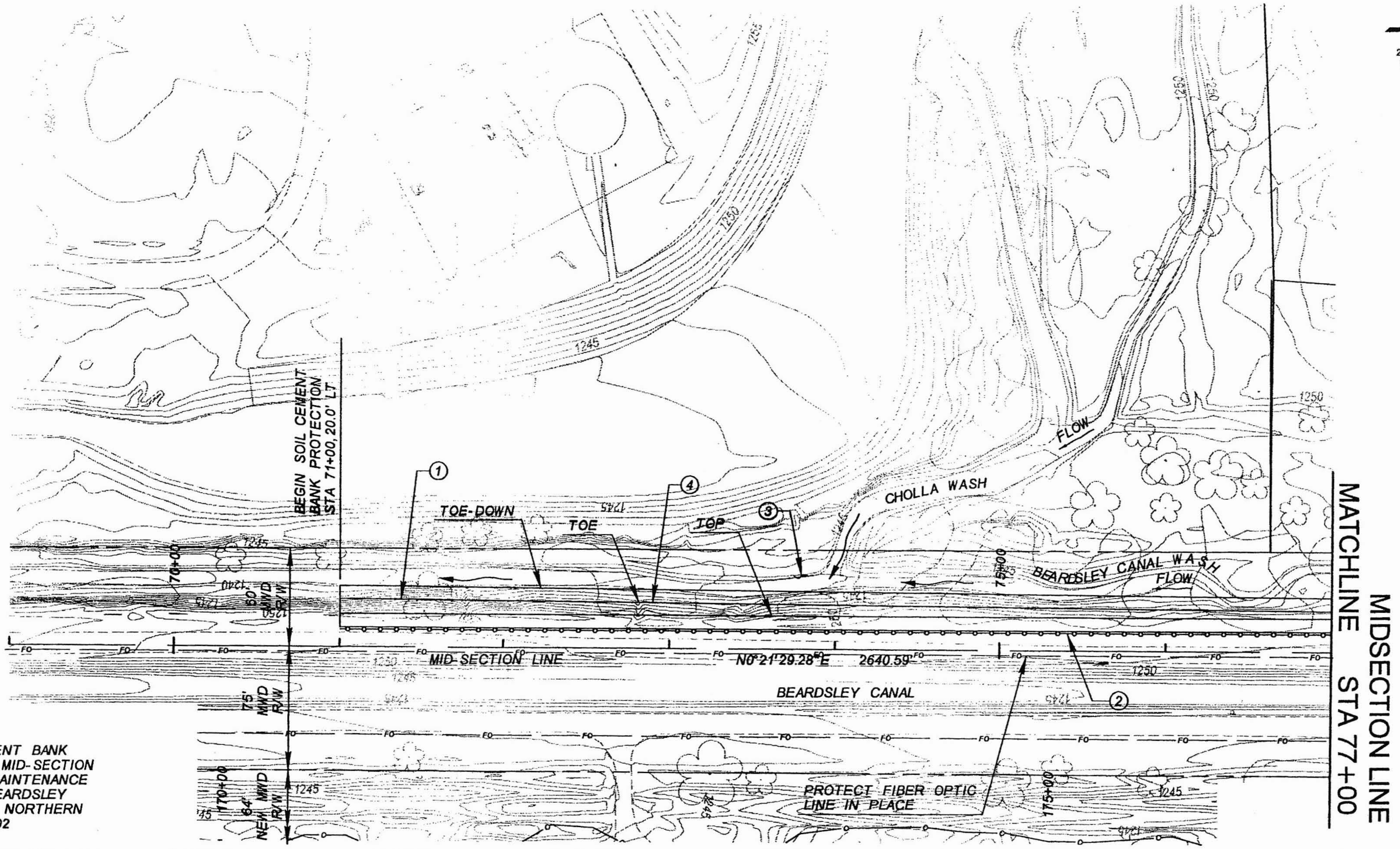
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	JKK	10/05
DRAWN	JB/JP	10/05
CHECKED	BJL	01/06

Barry J. Ling 12346 — 06 Sept 06 — Arizona, U.S.A.

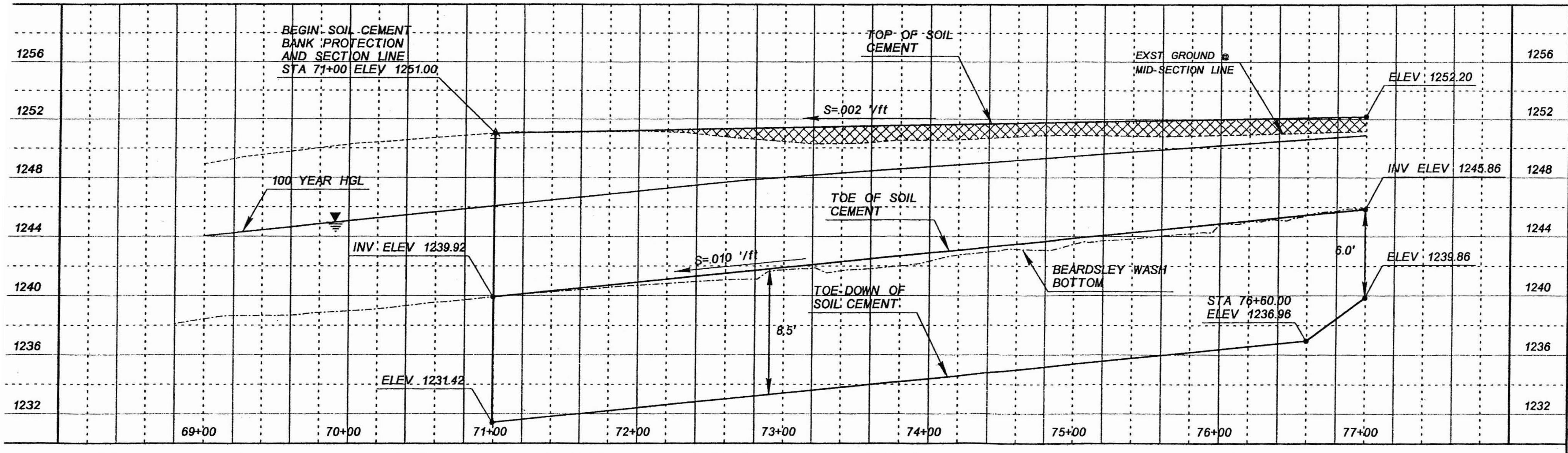
KIRKHAM MICHAEL

DRAWING NO.	PLAN AND PROFILE	SHEET OF
C13	STA 201+00 TO STA 209+00	25 58

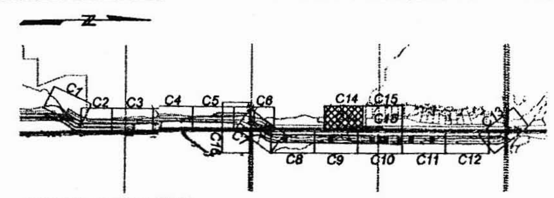


NOTE

STATIONING FOR SOIL CEMENT BANK PROTECTION IS BASED ON MID-SECTION LINE WHICH RUNS ALONG MAINTENANCE ROAD OF WEST SIDE OF BEARDSLEY CANAL; INTERSECTION WITH NORTHERN AVENUE IS STATION 52+80.92 (SEE DWG NO C6)



CONSTRUCT	
(1) SOIL CEMENT BANK PROTECTION PER TYP SECTION, DWG NO G7	3045 CY
(2) HANDRAIL PER COP STD DET P-1173	600 LF
(3) NATIVE SEEDING	0.28 AC
(4) DUMPED RIP-RAP D_{50}=18" AT TOE PER DWG NO G7	200 CY



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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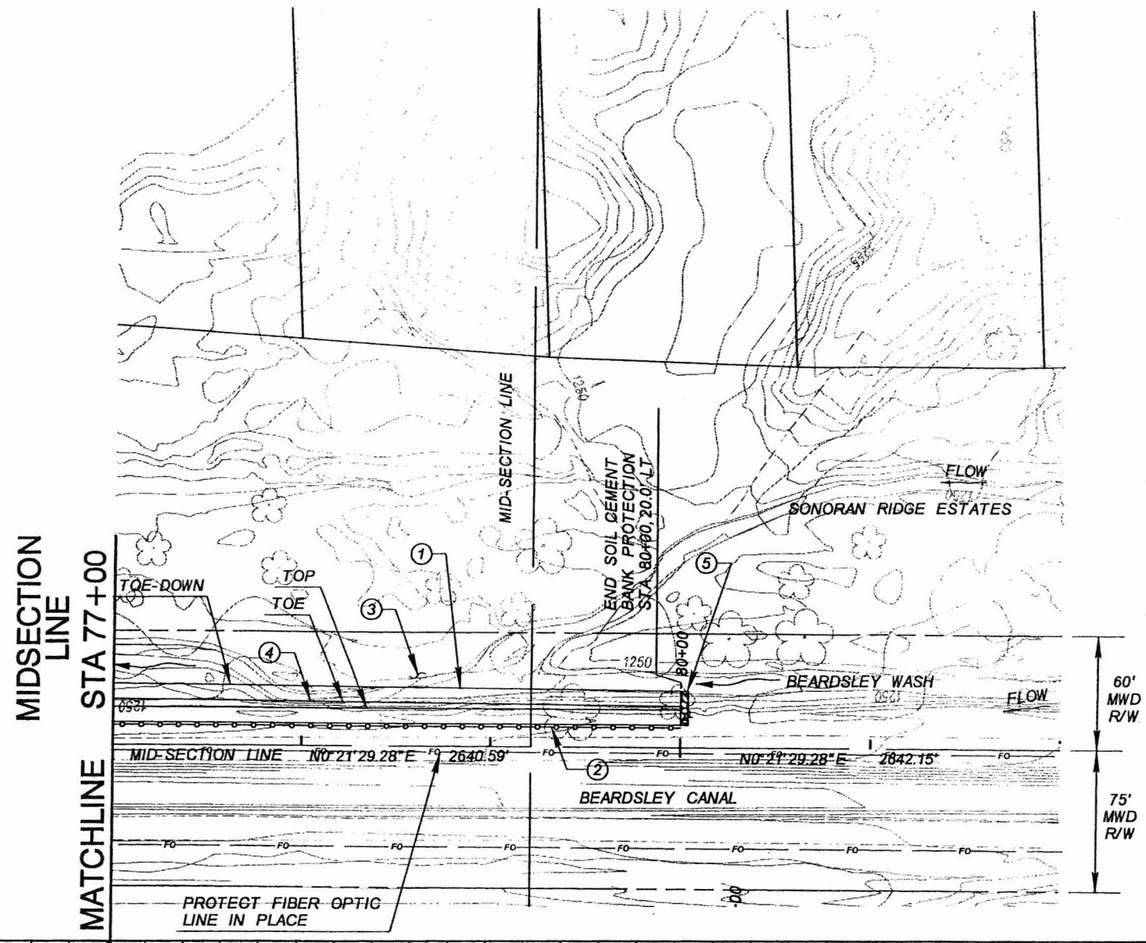
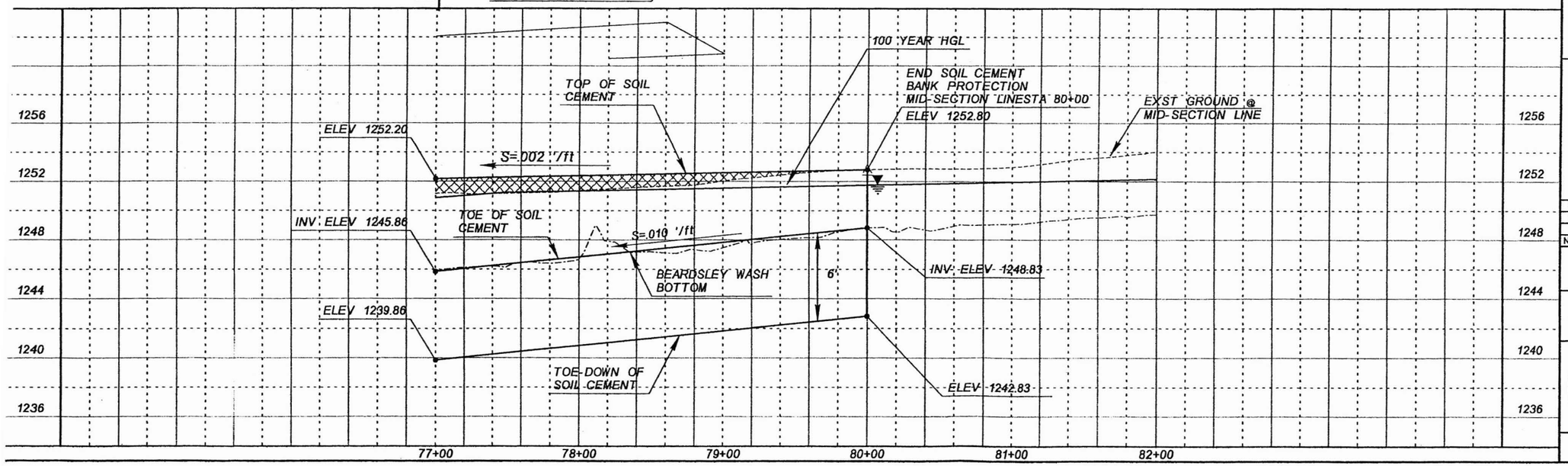
KIRKHAM MICHAEL

DRAWING NO.		SHEET	OF
C14	PLAN AND PROFILE SOIL CEMENT BANK PROTECTION	26	56





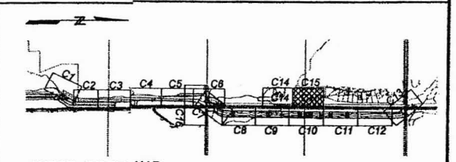
NOTE

STATIONING FOR SOIL CEMENT BANK PROTECTION IS BASED ON MID-SECTION LINE WHICH RUNS ALONG THE MAINTENANCE ROAD ON THE WEST SIDE OF THE BEARDSLEY CANAL; INTERSECTION WITH NORTHERN AVENUE IS STATION 52+80.92 (SEE DWG NO C6)

20 0 20 40
Scale in Feet

CONSTRUCT

(1)	SOIL CEMENT BANK PROTECTION PER TYP SECTION, DWG NO G7	1322 CY
(2)	HANDRAIL PER COP STD DET P-1173	300 LF
(3)	NATIVE SEEDING	0.28 AC
(4)	DUMPED RIP-RAP D_{50}=18" AT TOE PER DWG NO G7	100 CY
(5)	DUMPED 5' WIDE RIP-RAP D_{50}=18" AT U.S. EDGE OF SOIL CEMENT SLOPE PROJECTION	~~33~~ 41 CY



SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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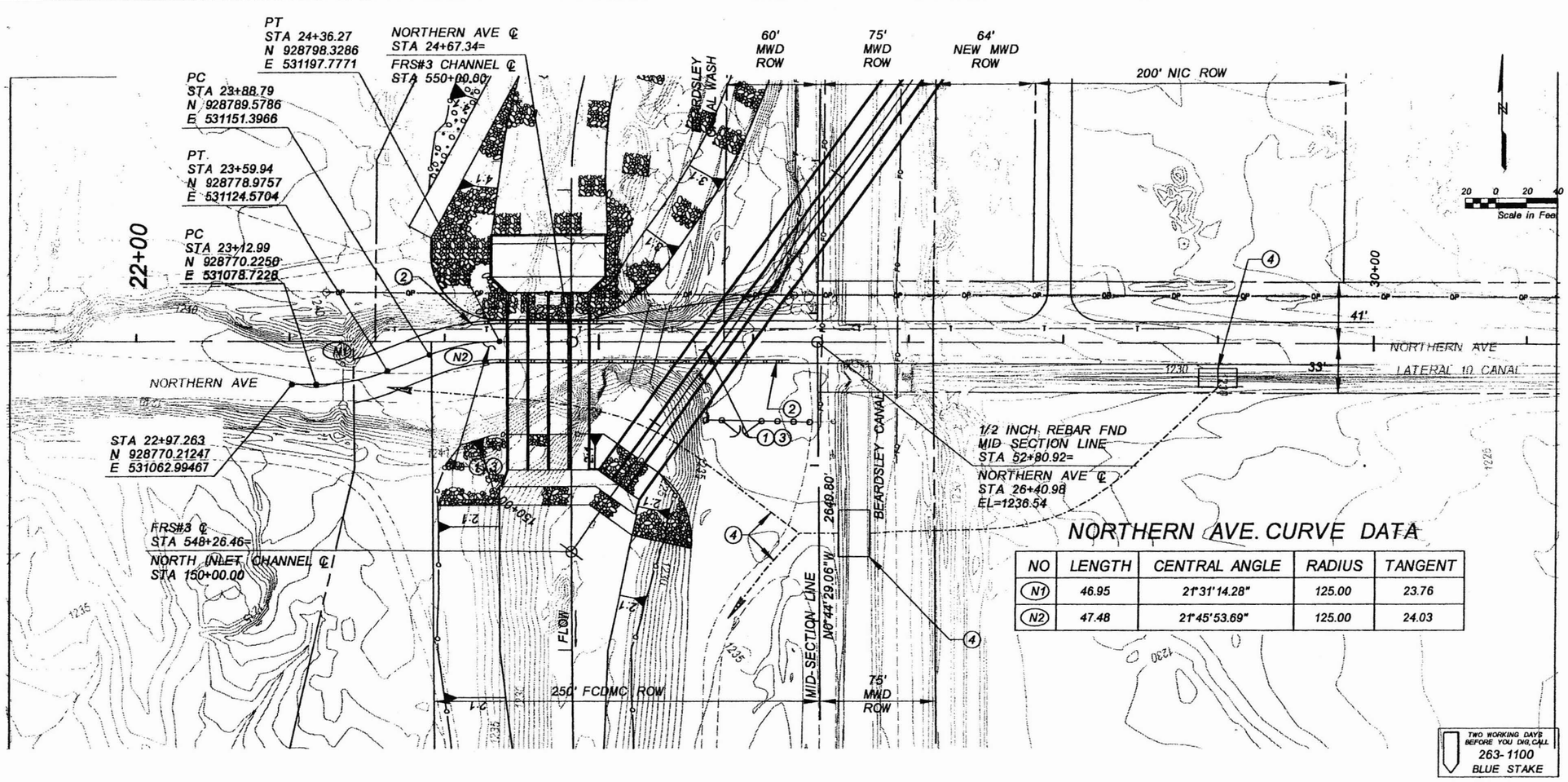
Barry J. Ling 19148 REGISTERED PROFESSIONAL ENGINEER ARIZONA U.S.A.

KIRKHAM MICHAEL

DRAWING NO. C15

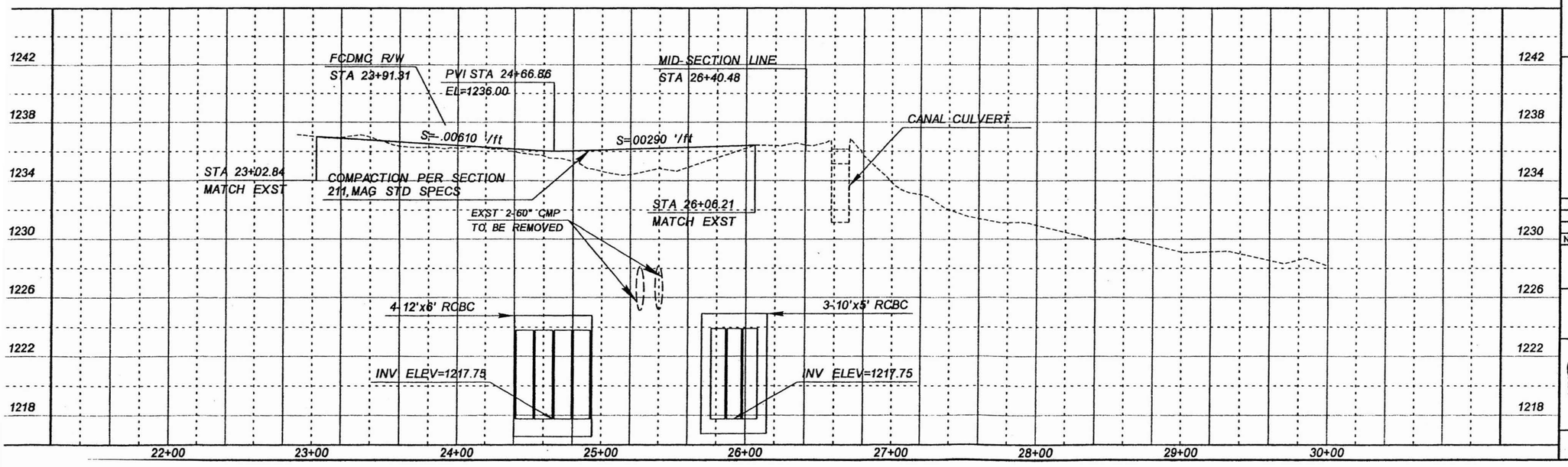
PLAN AND PROFILE SOIL CEMENT BANK PROTECTION

SHEET OF 27 56



NORTHERN AVE. CURVE DATA

NO	LENGTH	CENTRAL ANGLE	RADIUS	TANGENT
(N1)	46.95	21°31'14.28"	125.00	23.76
(N2)	47.48	21°45'53.69"	125.00	24.03



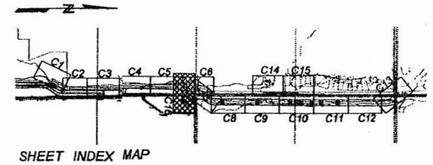
CONSTRUCT

(1) COMPACTED ROADWAY EMBANKMENT PER TYP SECTION, DWG NO G9 (NPI) — 382 CY

(2) GUARDRAIL WITH STANDARD FLARED END SECTIONS PER MAG STD DET 135
STA 24+10.15 LT-STA 25+16.40 LT — 106.25 LF

(3) 4" ABC ROAD SURFACE — 809 SY

(4) PROVIDE DETOUR FOR NORTHERN AVENUE TRAFFIC TO INCLUDE TEMPORARY BRIDGES OVER BEARDSLEY CANAL and LATERAL 10 CANAL. FR#3 CONTRACTOR WILL ALSO USE DETOUR. BRIDGES TO BE DESIGNED FOR HS-20 LOADING. DETOUR ROADS TO BE DESIGNED TO ACCOMODATE SEMI-TRACTOR TRAILER VEHICLES. CONTRACTOR TO MAINTAIN DETOUR TO WEST FOR NORTHERN AVENUE TRAFFIC.



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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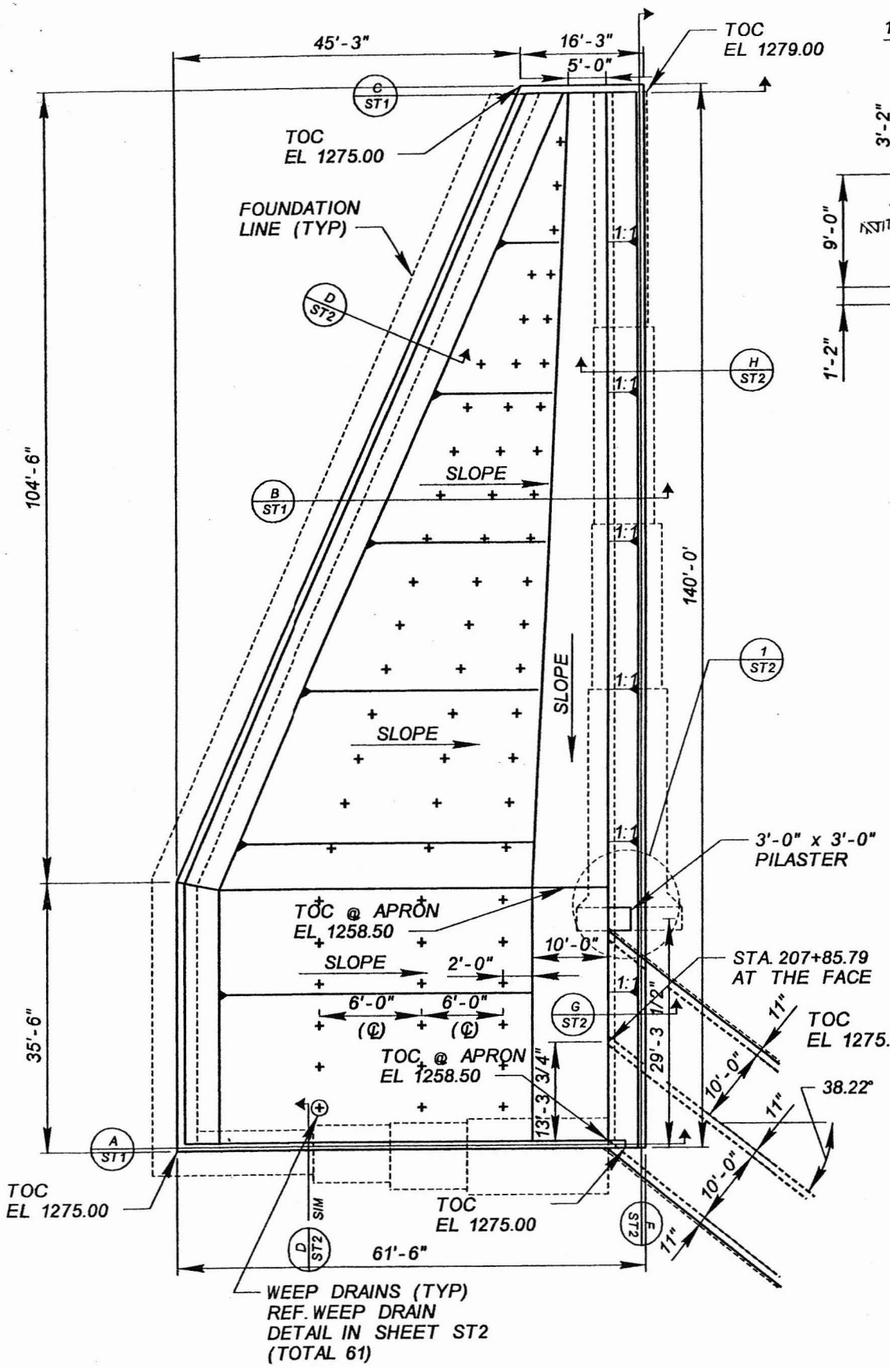
10146 Barry J. Ling — Expires 3/31/06 — ARIZONA, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. C16

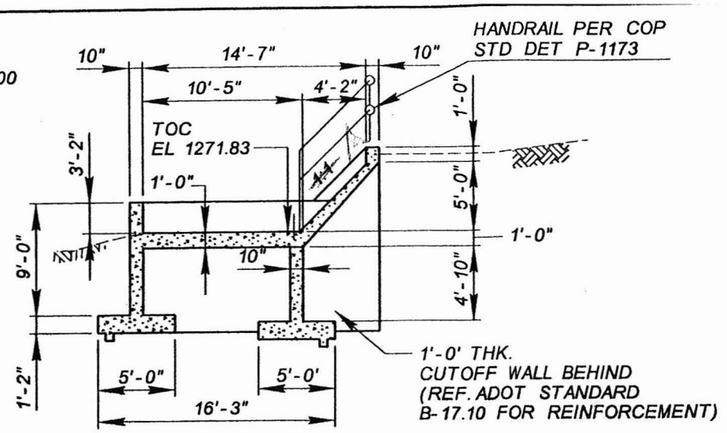
NORTHERN AVENUE PROFILE ADJUSTMENT

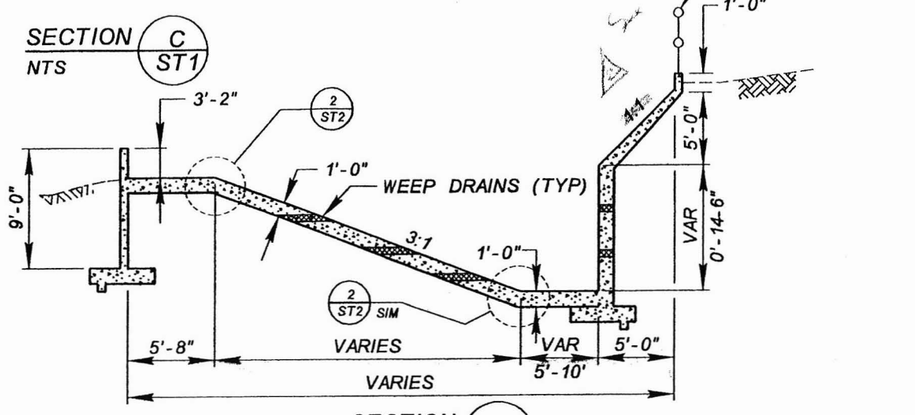
SHEET OF 28 56



WEIR STRUCTURE DETAIL

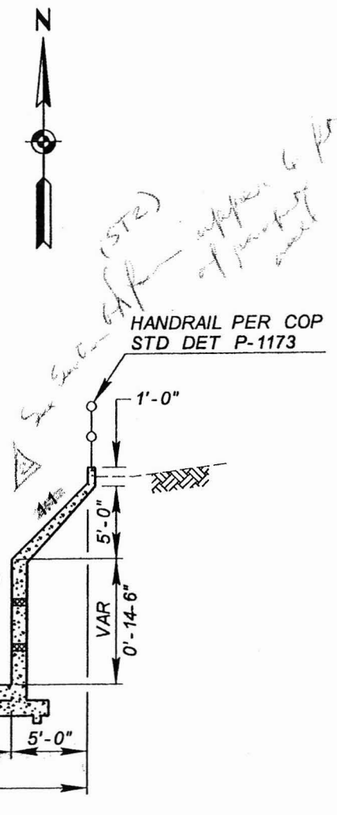
NTS

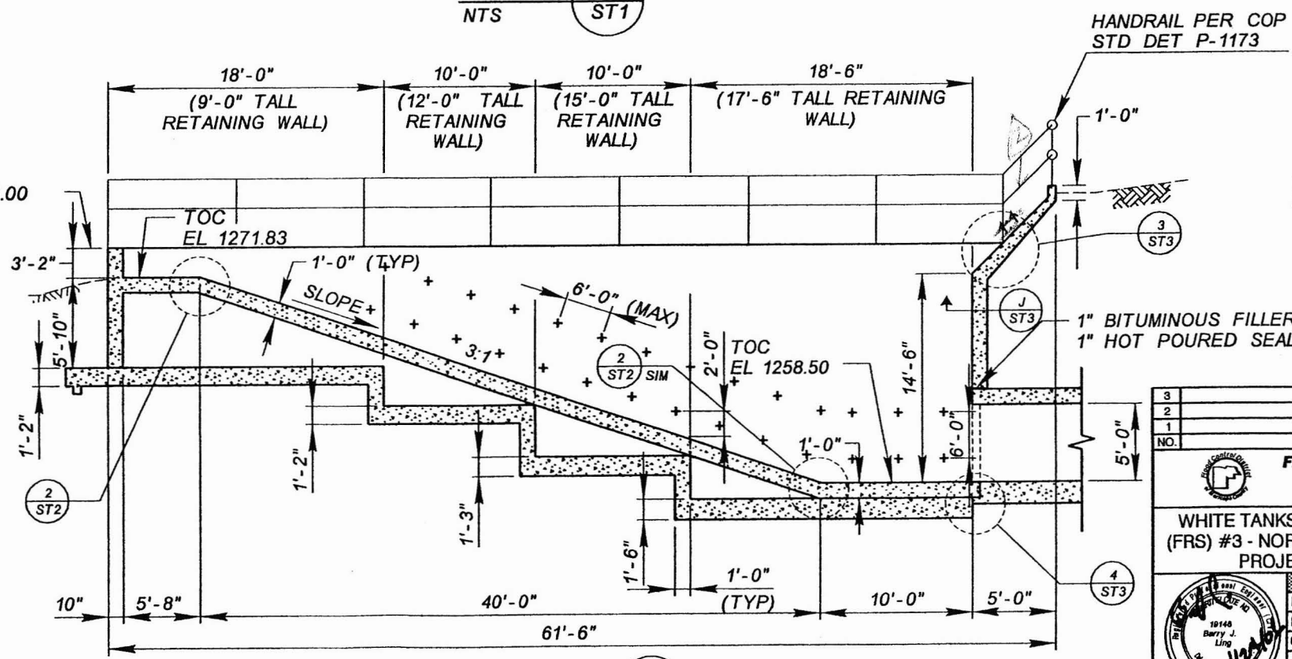




SECTION B ST1

NTS





SECTION A ST1

NTS

GENERAL NOTES:

1. ALL GENERAL NOTES IN ADOT STANDARD B-18.10 ARE APPLICABLE FOR THESE SHEETS.
2. FOR RETAINING WALL REINF. AND SIZE, REF. ADOT STANDARD B-18.20. USE TABLE FOR CASE II-LEVEL FILL WITH 2' SURCHARGE.
3. ALL EXPOSED VERTICAL SURFACES TO BE FORMED USING CHISELED LIMESTONE A FORM LINER #166A BY SCOTT SYSTEMS OR EQUIVALENT.
4. BEFORE POURING CONCRETE FOR RETAINING WALLS OVER THE CULVERT OPENING, CULVERT ROOF SHALL BE SUPPORTED WITH TEMPORARY SUPPORTS.
5. REFER TO ADOT STANDARD B-06.20, B-06.30 AND B-06.40 FOR APRON REINFORCEMENT.
6. FOR FOOTING STEP DETAIL REFER TO ADOT STANDARD DETAIL IN B-18.50.
7. ALL REINFORCING STEEL HAVE 2 INCH CLEAR COVER UNLESS NOTED OTHERWISE.

STRESS
CLASS 'S' CONCRETE.....f'c = 3000 psi
GRADE 40 REINFORCING STEEL.....fs = 20000 psi
GRADE 60 REINFORCING STEEL.....fs = 24000 psi

8. SEE SECTION D/ST1 FOR APRON REINFORCING.

LEGEND

TOC = TOP OF CONCRETE
SIM = SIMILAR

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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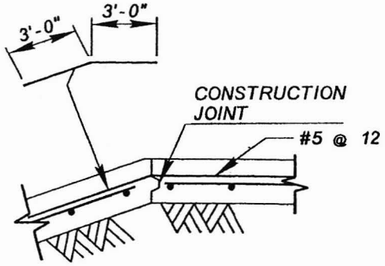
KIRKHAM MICHAEL

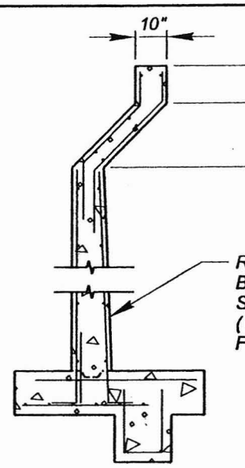
DRAWING NO. ST1

SIDE WEIR STRUCTURE DETAILS

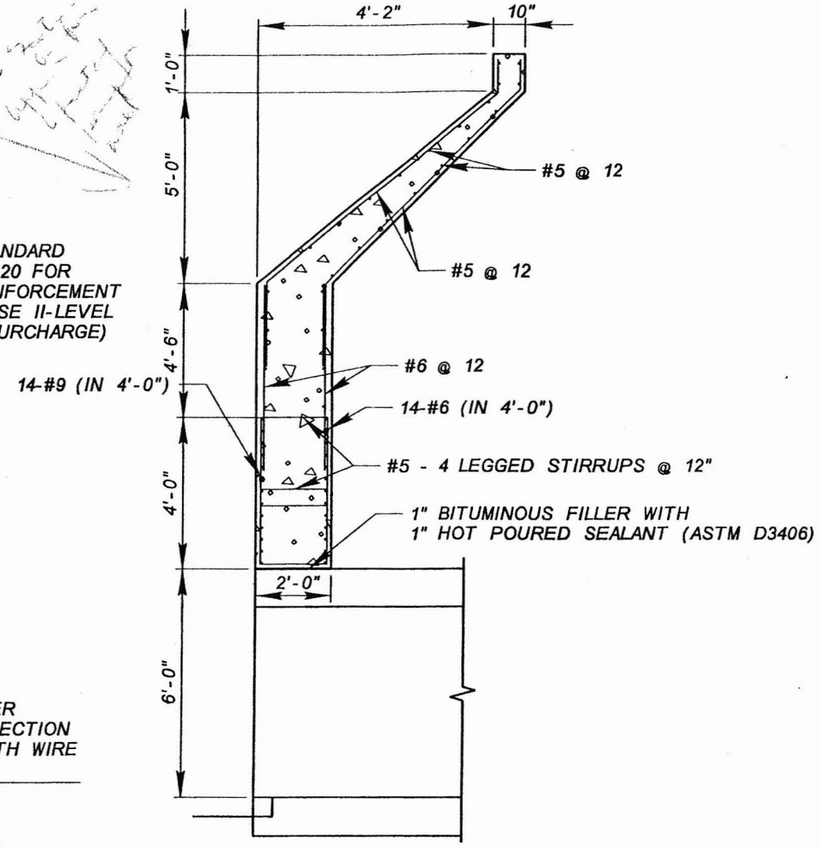
SHEET OF 29 56



DETAIL 2 / ST1
NTS



SECTION H / ST1
NTS



SECTION G / ST1
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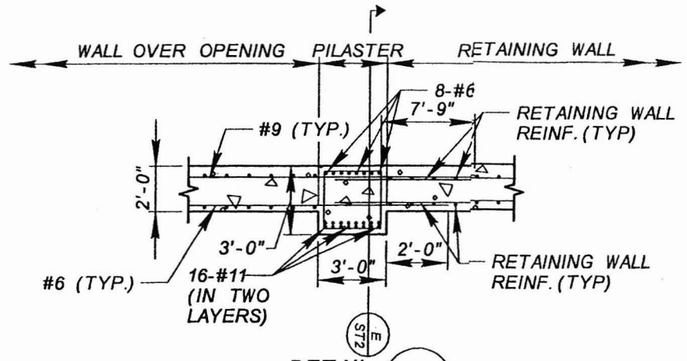
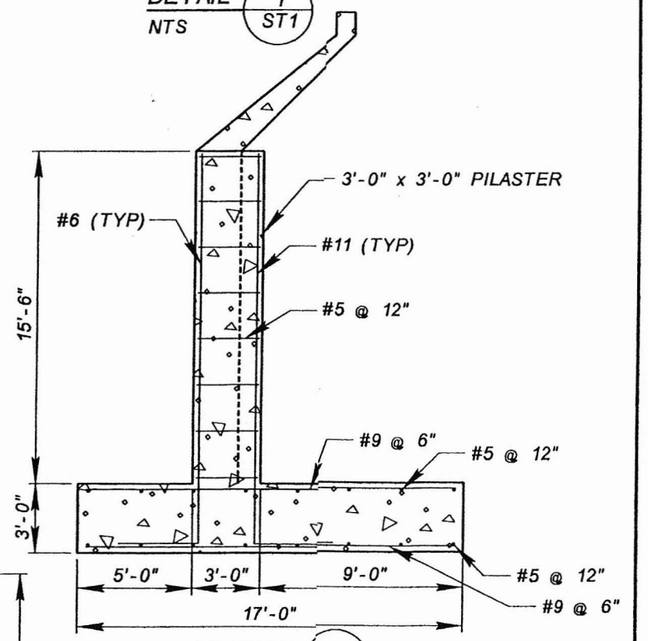


DETAIL 1 / ST1
NTS



SECTION E / ST2
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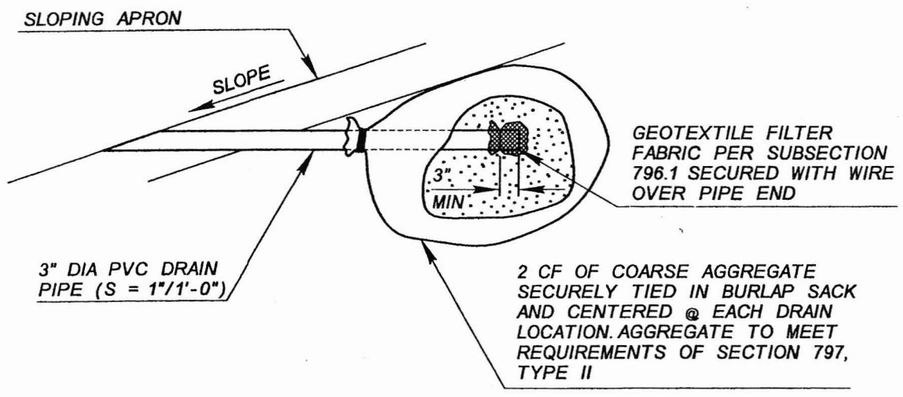
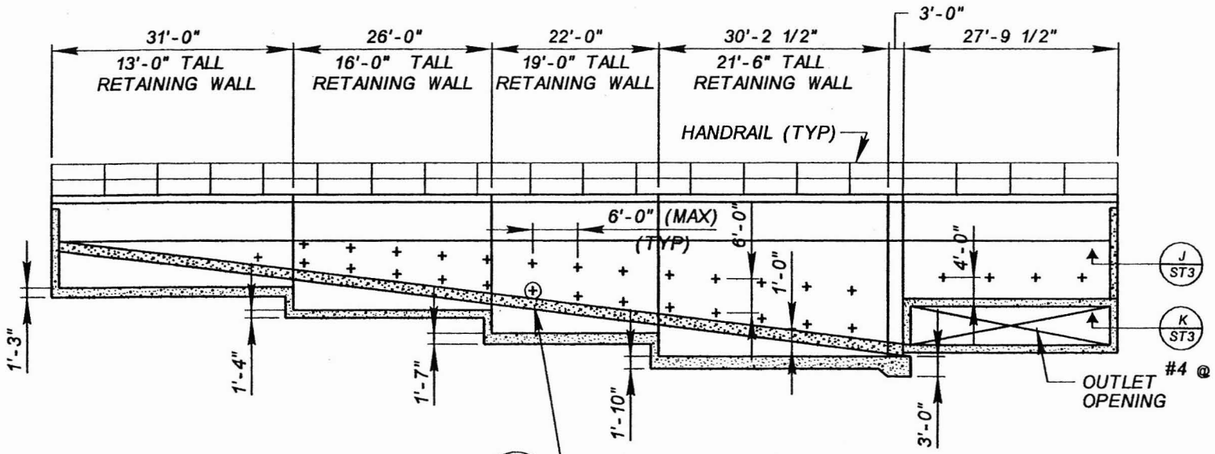
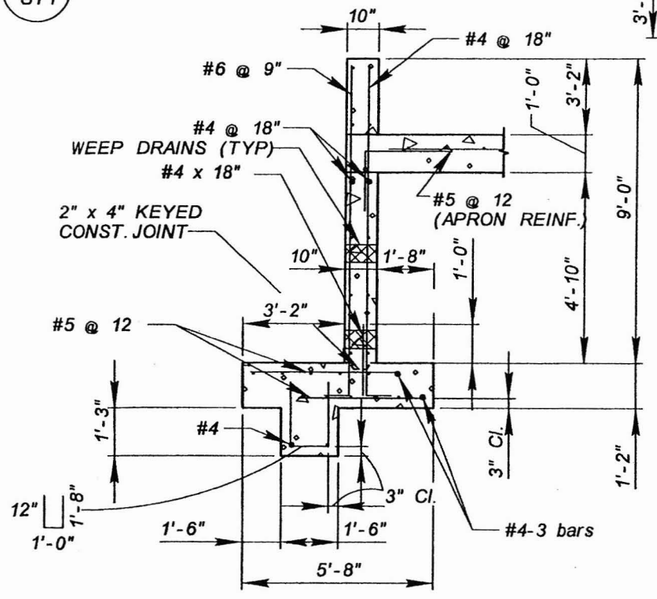


WEEP DRAIN DETAIL
NTS



SECTION F / ST1
NTS



SECTION D / ST1
NTS

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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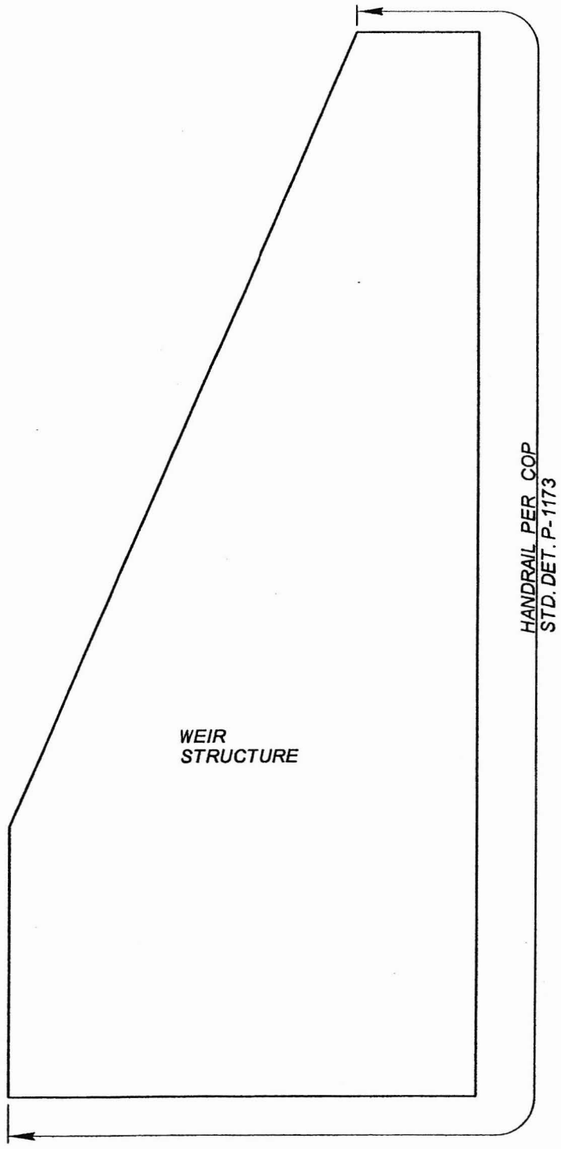
KIRKHAM MICHAEL

DRAWING NO. ST2

SIDE WEIR STRUCTURE DETAILS

SHEET OF 30 56



HANDRAIL LOCATION
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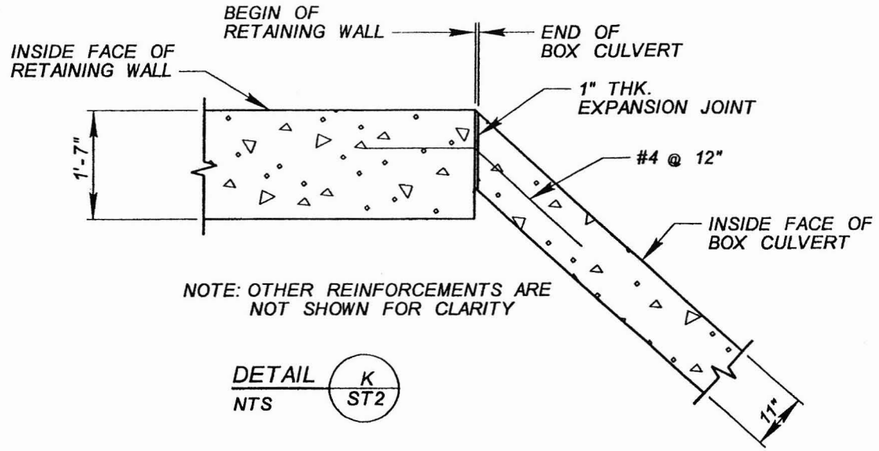
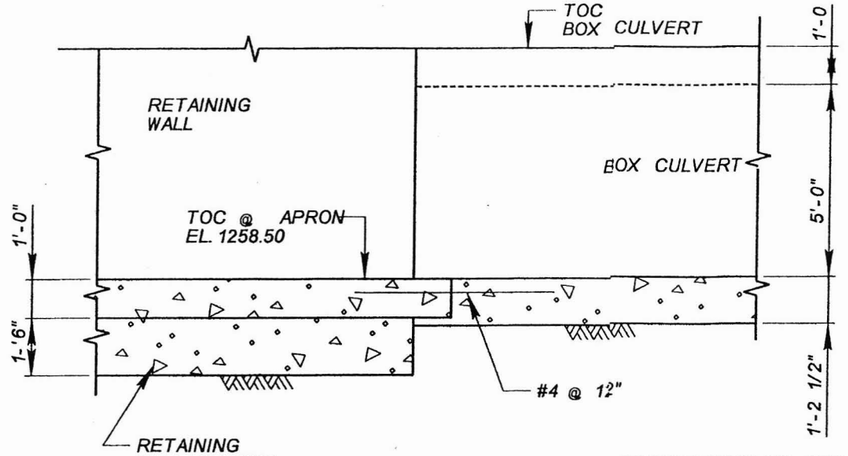
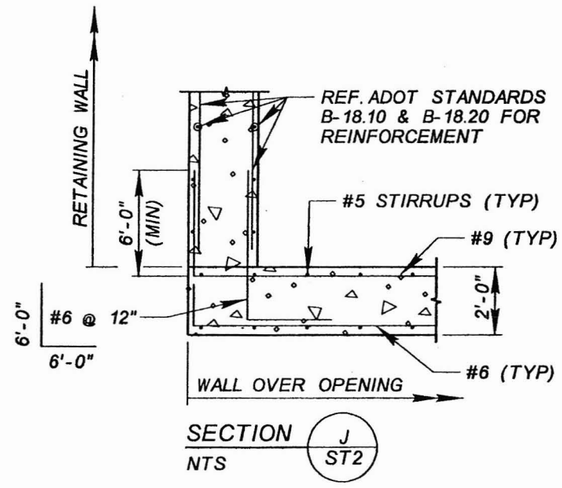


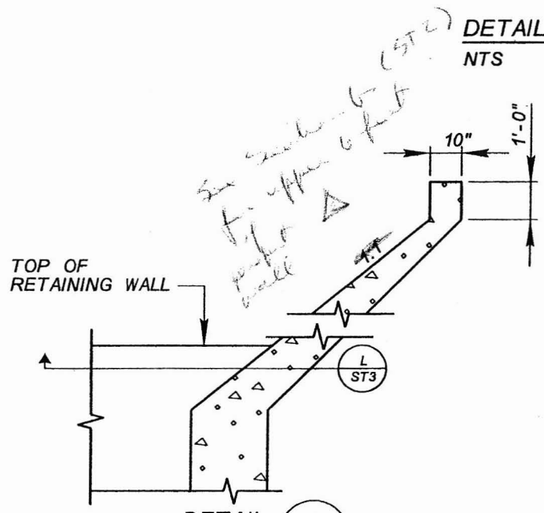
DETAIL K / ST2
NTS



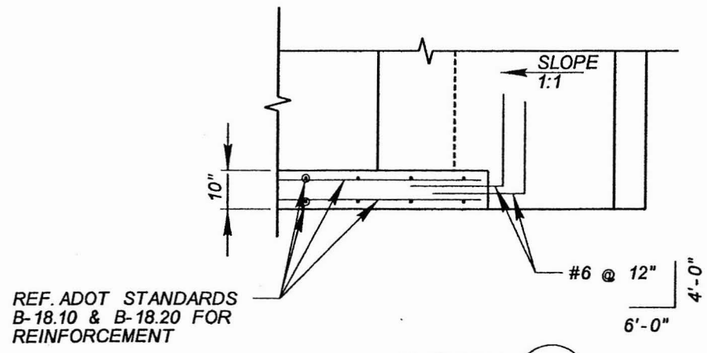


SECTION J / ST2
NTS

DETAIL 4 / ST1
NTS



DETAIL 3 / ST1
NTS



SECTION L / ST3
NTS

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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
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(FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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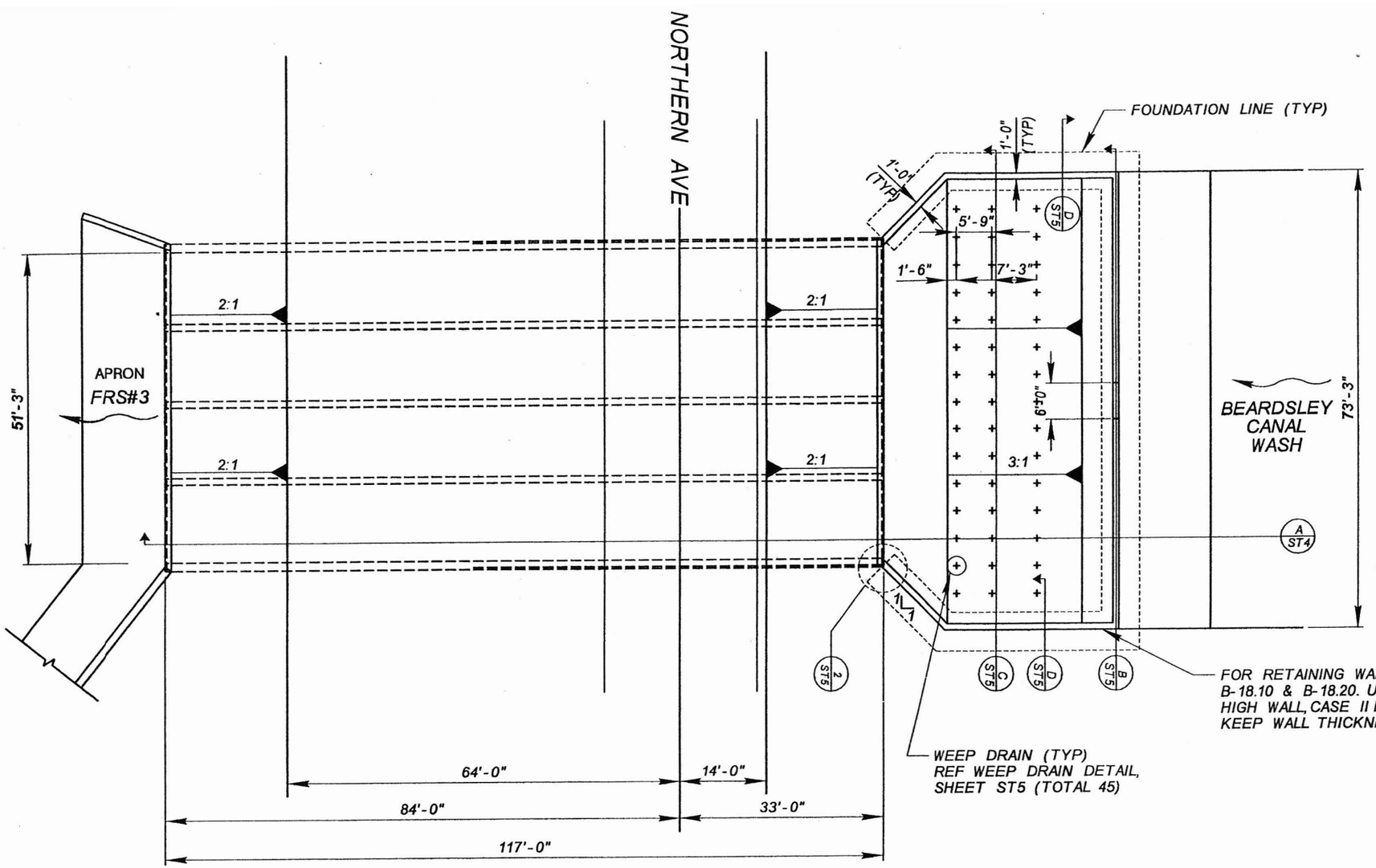
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO.	SIDE WEIR STRUCTURE DETAILS	SHEET OF
ST3		31 56



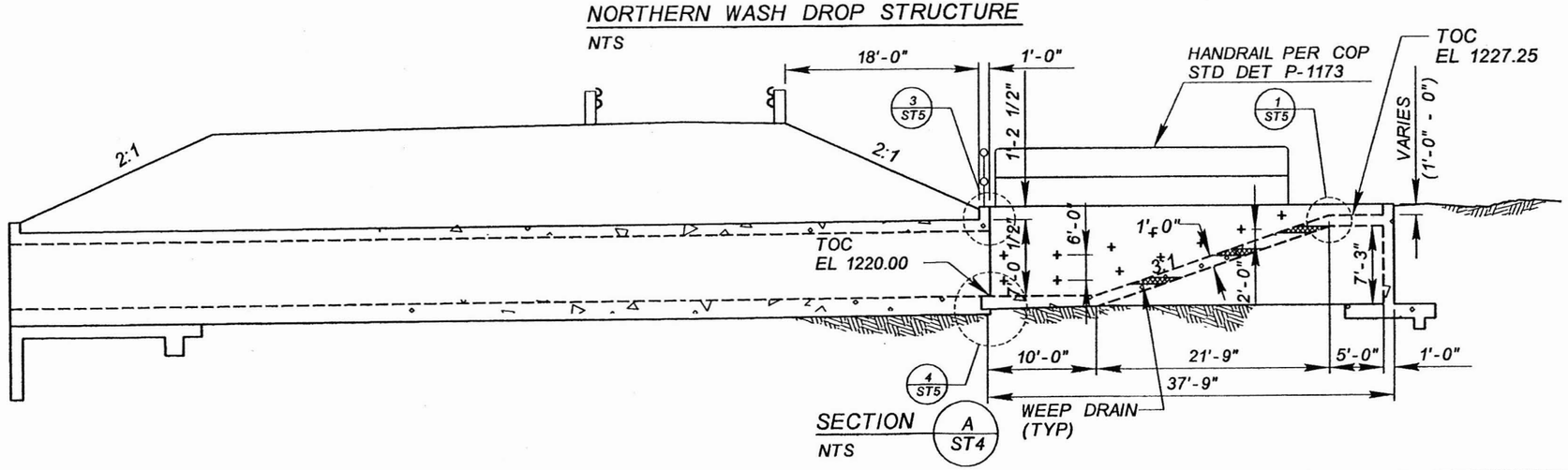
GENERAL NOTES

1. ALL GENERAL NOTES IN ADOT STANDARD B-18.10 ARE APPLICABLE FOR THESE SHEETS. INCREASE TOP SLAB THICKNESS 1/2". CLEAR COVER TO BE 1-1/2" ON BOTTOM REINFORCEMENT IN TOP SLAB.
2. ALL EXPOSED VERTICAL SURFACES TO BE FORMED USING CHISELED LIMESTONE A FORM LINER #166A BY SCOTT SYSTEMS OR EQUIVALENT.
3. FOR FOOTING STEP DETAIL REFER TO ADOT STANDARD DETAIL IN B-18.50.
4. ALL REINFORCING STEEL HAVE 2 INCH CLEAR COVER UNLESS NOTED OTHERWISE.

   STRESS
   CLASS 'S' CONCRETE.....f'c = 3000 psi
   GRADE 40 REINFORCING STEEL.....fs = 20000 psi
   GRADE 60 REINFORCING STEEL.....fs = 24000 psi
5. SEE SECTION D/ST5 FOR APRON REINFORCEMENT.

NORTHERN WASH DROP STRUCTURE

NTS



SECTION A ST4

NTS

LEGEND

TOC = TOP OF CONCRETE

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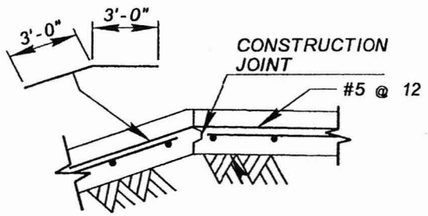
KIRKHAM MICHAEL

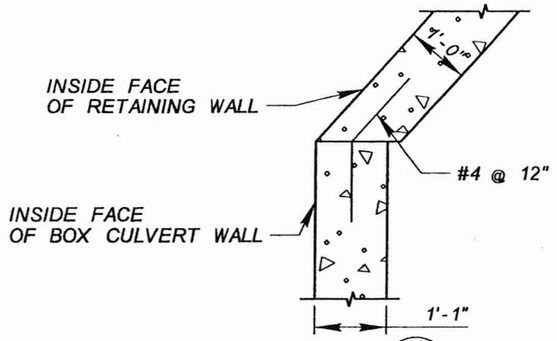
DRAWING NO. ST4

BCW CULVERT INLET DETAIL

SHEET OF 32 56



DETAIL 1 / ST4
NTS



DETAIL 2 / ST4
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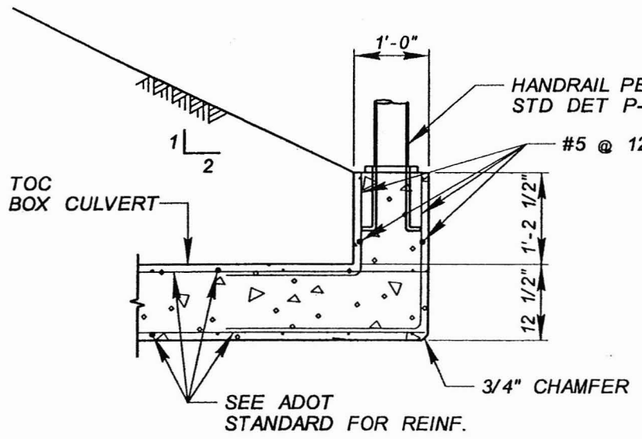
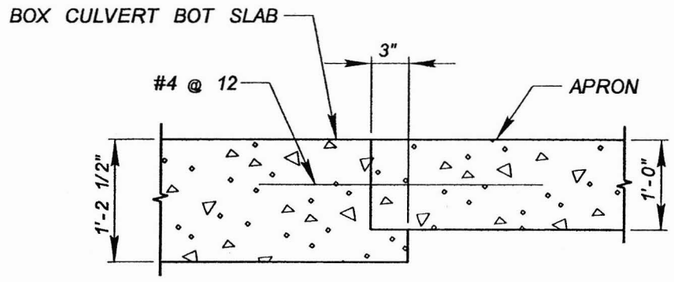
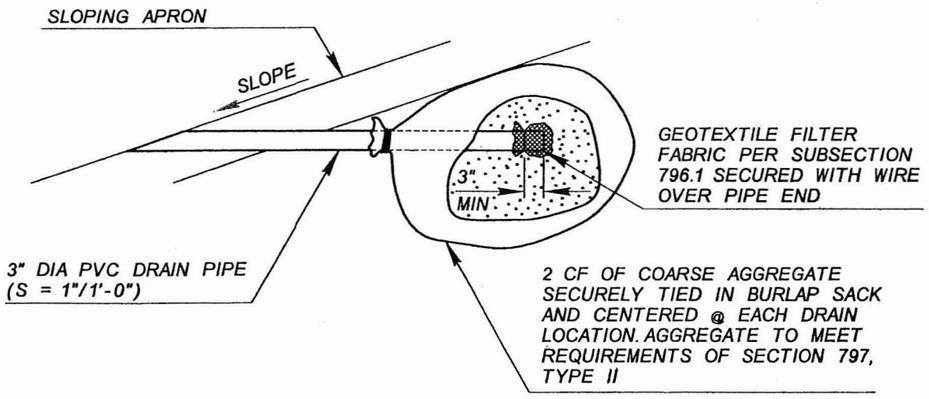


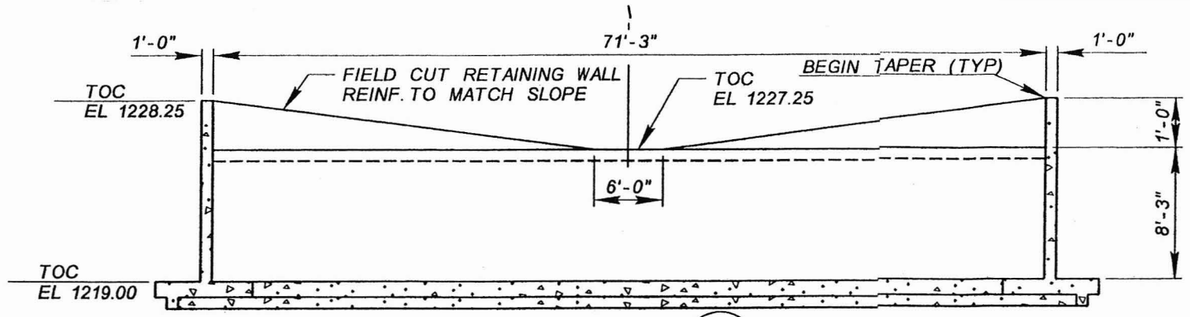
SECTION 3 / ST4
NTS



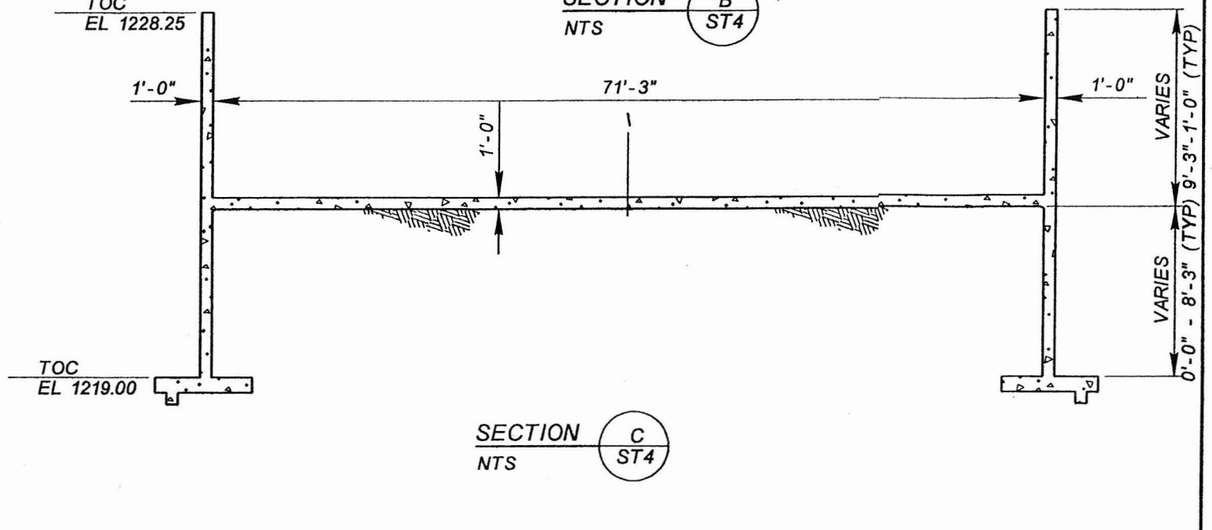
SECTION 4 / ST4
NTS



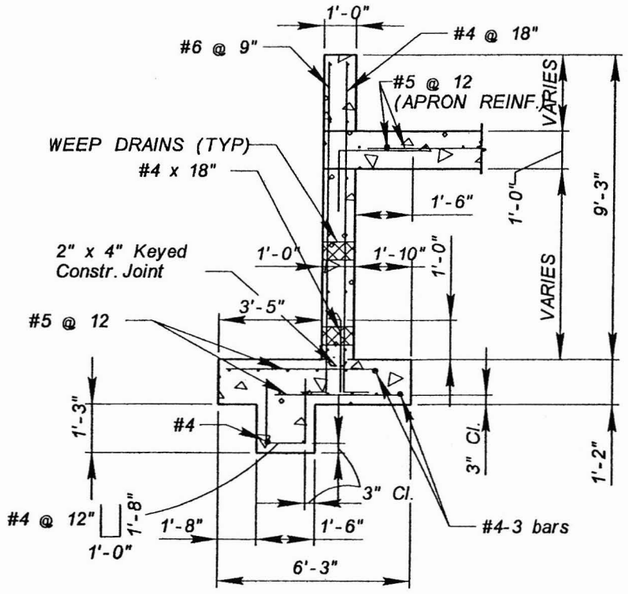
WEEP DRAIN DETAIL
NTS



SECTION B / ST4
NTS



SECTION C / ST4
NTS



SECTION D / ST4
NTS

LEGEND

TOC = TOP OF CONCRETE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

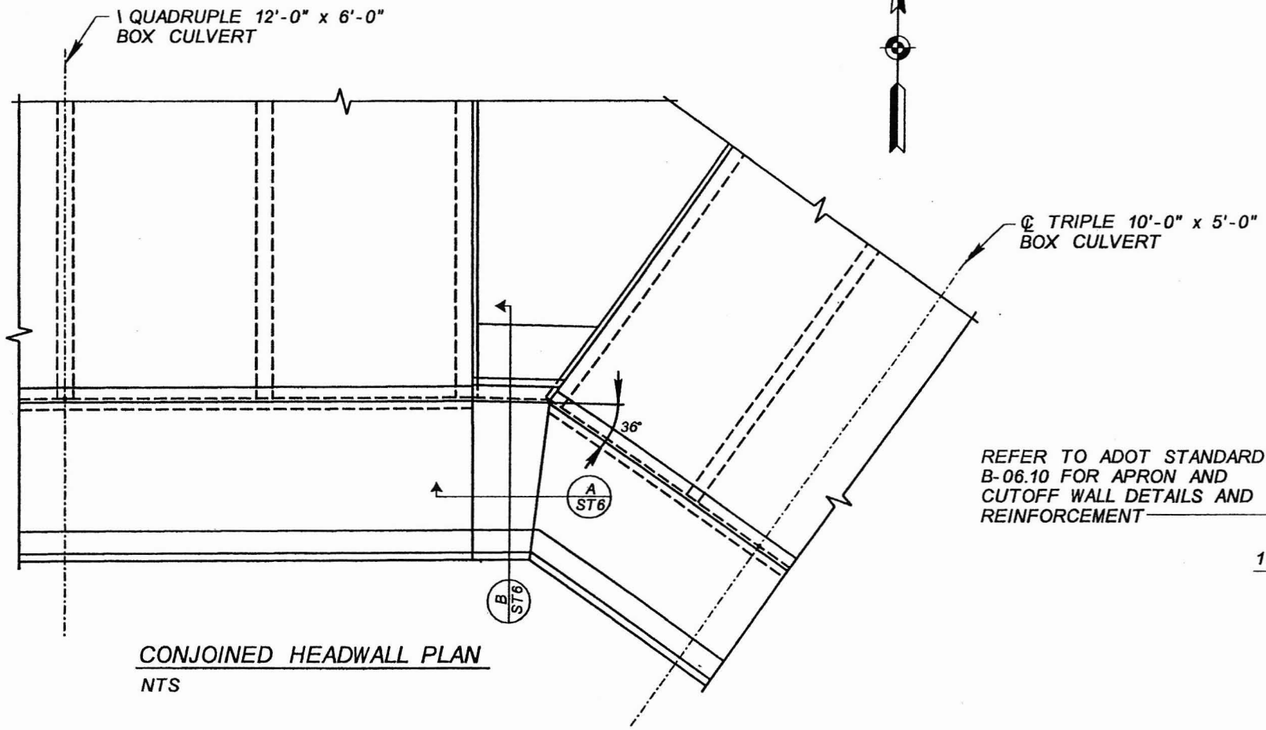
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. ST5

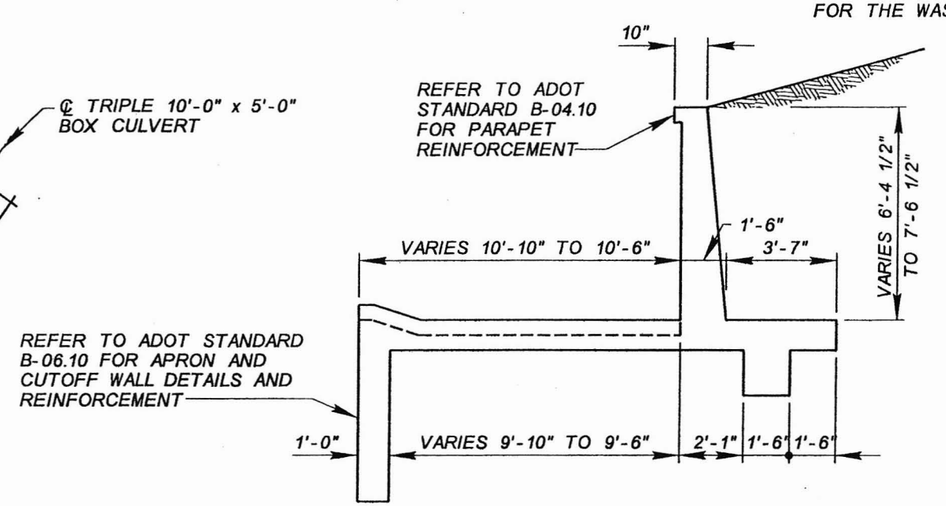
BCW CULVERT INLET DETAIL

SHEET OF 33 56



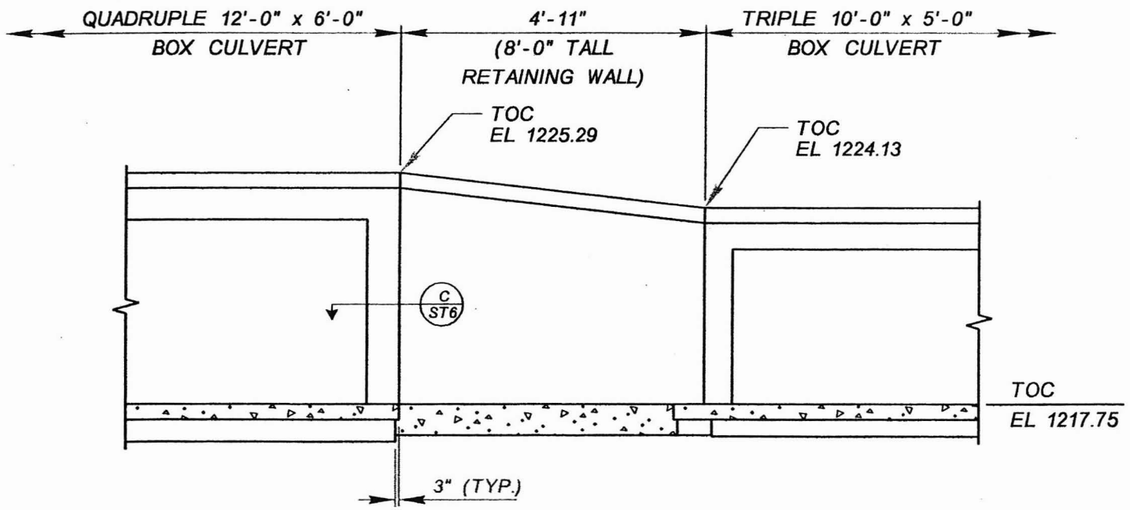
CONJOINED HEADWALL PLAN

NTS



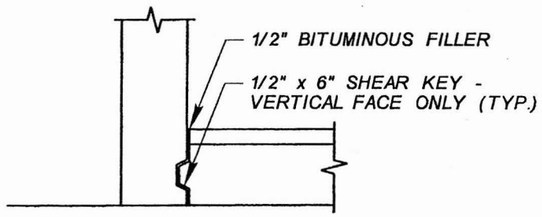
SECTION B ST6

NTS



SECTION A ST6

NTS



SECTION C ST6

NTS

GENERAL NOTES

1. ALL GENERAL NOTES IN ADOT STANDARD B-18.10 ARE APPLICABLE FOR THIS SHEET.
2. FOR RETAINING WALL REINFORCING AND SIZE, REF. ADOT STANDARD B-18.10 & B-18.30. USE TABLE FOR CASE III-2:1 SLOPING FILL.
3. CONJOINED HEADWALL WILL NOT BE MEASURED SEPARATELY FOR PAYMENT BUT WILL BE CONSIDERED PART OF THE LUMPSUM BID ITEMS FOR THE WASH CULVERT.

LEGEND

TOC = TOP OF CONCRETE

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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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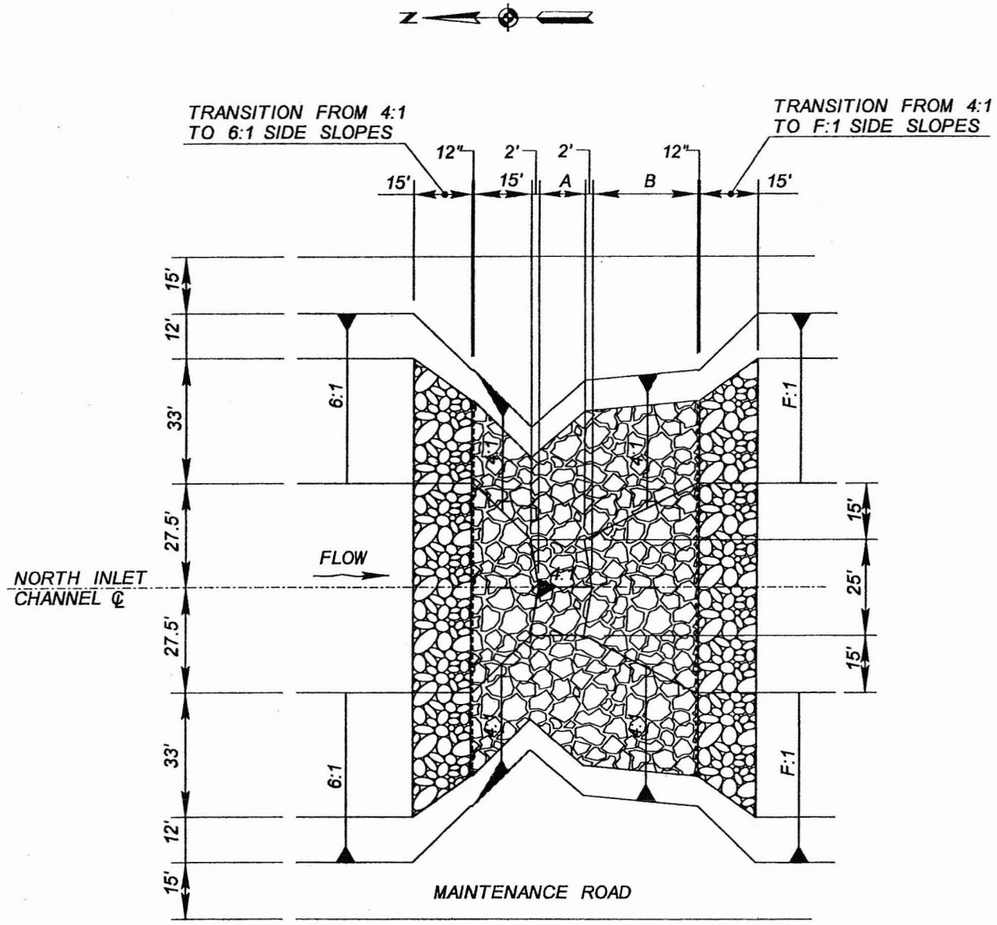
KIRKHAM MICHAEL

DRAWING NO. ST6

CONJOINED WINGWALL AND OUTLET APRON DETAIL

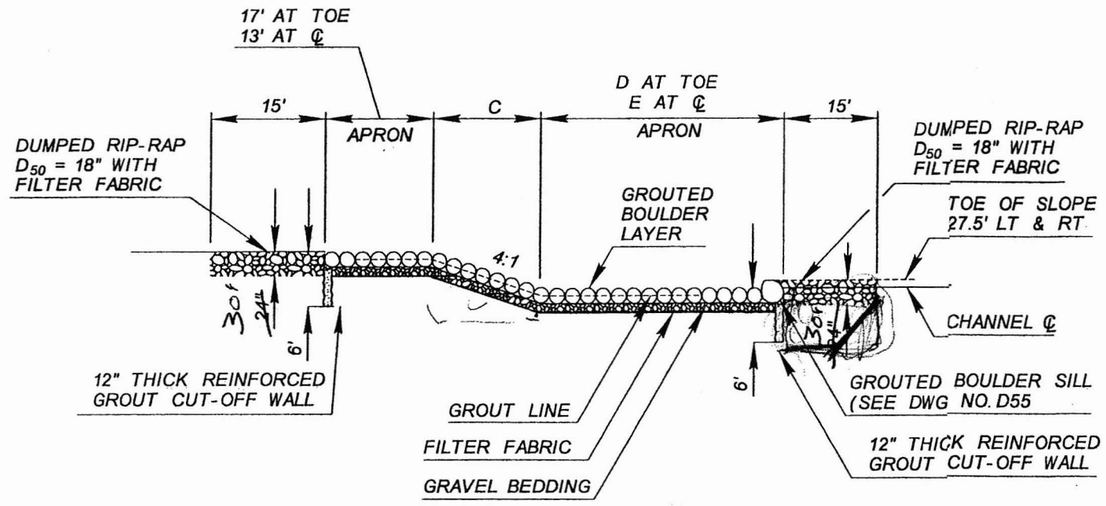
SHEET OF 34 56



DROP STRUCTURE PLAN
NTS

PLAN/PROFILE DIMENSIONS PER DROP STRUCTURE HEIGHT

HEIGHT OF STRUCTURE	A	B	C	D	E	F
3.50' DROP STRUCTURE	12'	28'	14'	30'	28'	6
4.50' DROP STRUCTURE	16'	29'	18'	31'	29'	6
6.25' DROP STRUCTURE	23'	34'	25'	36'	34'	5



DROP STRUCTURE PROFILE
NTS

NOTE:

1. SEE DWG. No. DS3 FOR GENERAL DETAILS AND NOTES
2. BOULDER SIZE FOR DROP STRUCTURE:
   6.25' DROP: 36"-ON SLOPES & APRONS/48" ON SILL
   4.50' DROP: 30"-ON SLOPES & APRONS/42" ON SILL
   3.50' DROP: 24"-ON SLOPES & APRONS/36" ON SILL
3. BOULDER SIZE MAY VARY A MAXIMUM OF 6" OF THE NOMINAL BOULDER SIZE (SEE SPECIAL PROVISIONS SEC 220)

NO.	REVISION	BY	DATE
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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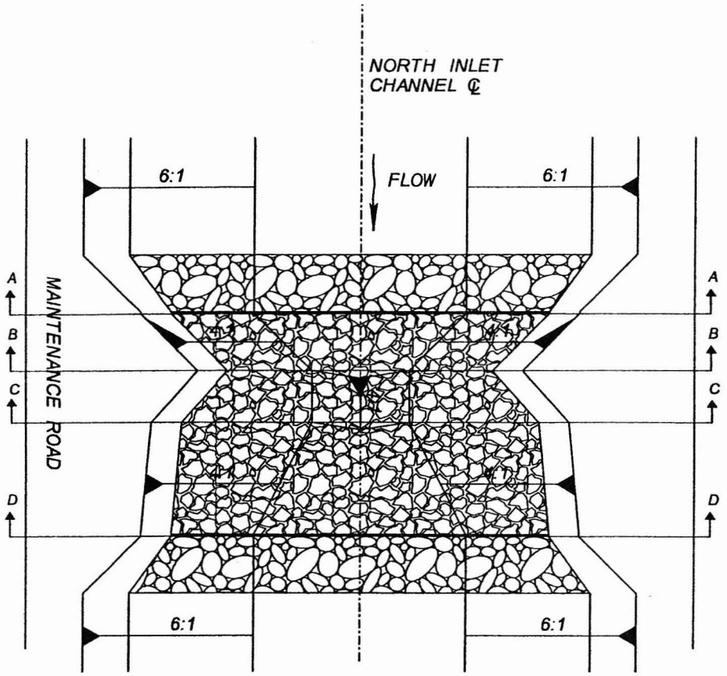
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

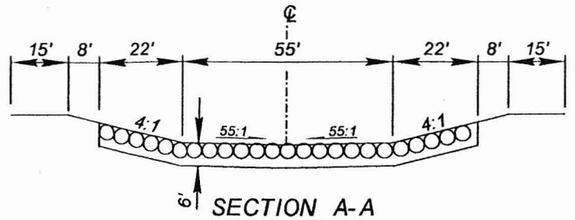
DRAWING NO. DS1

DROP STRUCTURE DETAILS

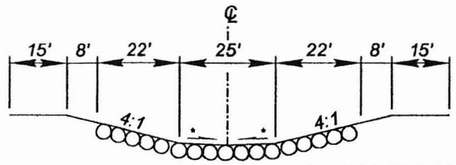
SHEET OF 35 56



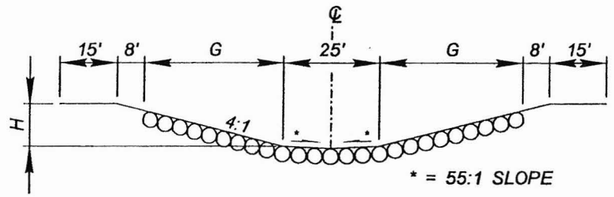
DROP STRUCTURE PLAN
NTS



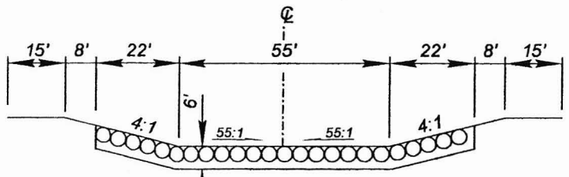
SECTION A-A
NTS



SECTION B-B
NTS



SECTION C-C
NTS



SECTION D-D
NTS

CROSS-SECTION DIMENSIONS PER DROP STRUCTURE HEIGHT

HEIGHT OF STRUCTURE	G	H
3.50' DROP STRUCTURE	36'	9.88'
4.50' DROP STRUCTURE	40'	10.33'
6.25' DROP STRUCTURE	47'	11.75'

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2			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

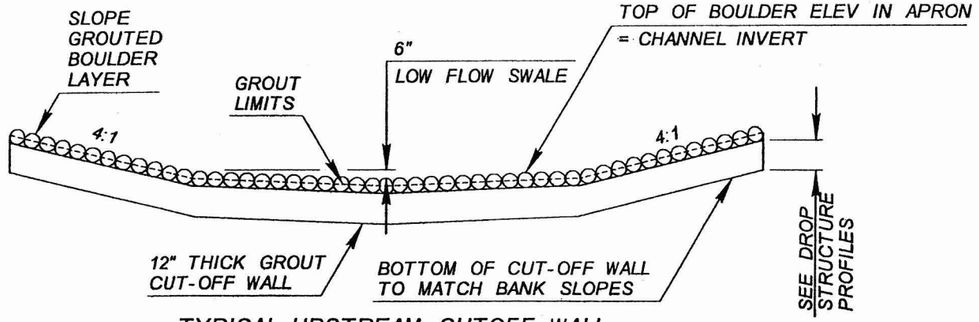
Barry J. Ling 12946 — Expires 9-30-06 — Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. DS2

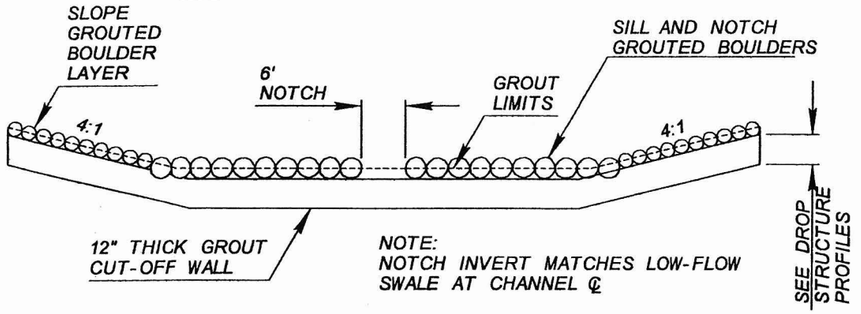
DROP STRUCTURE DETAILS

SHEET OF 36 56



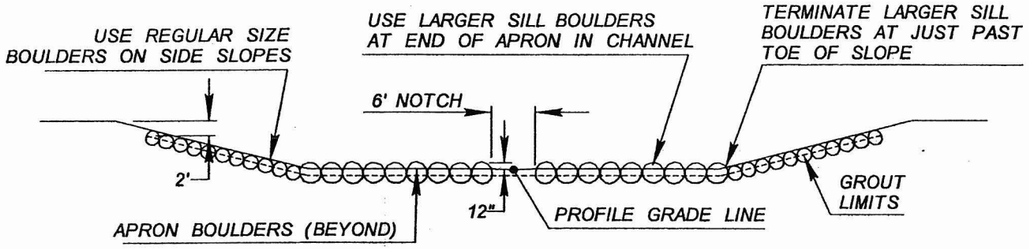
TYPICAL UPSTREAM CUTOFF WALL

NTS



TYPICAL DOWNSTREAM CUTOFF WALL

NTS

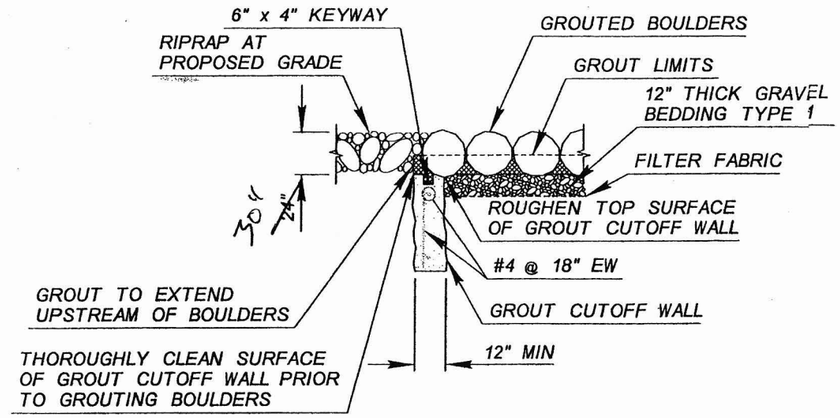


APRON SILL DETAIL

NTS

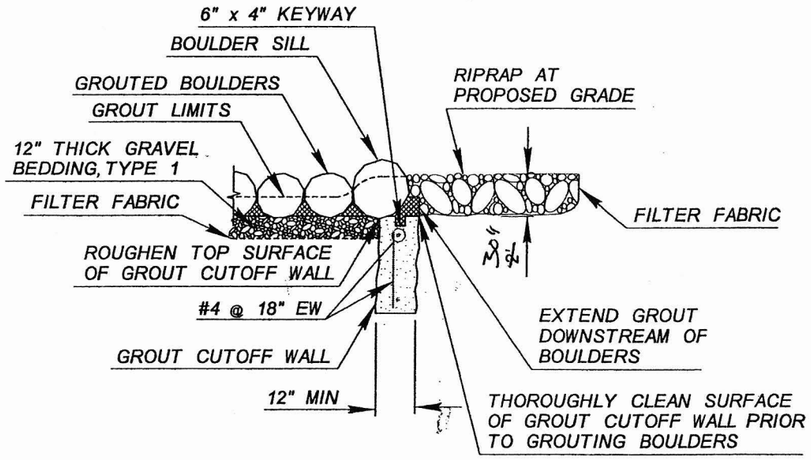
NOTES:

1. SEE SPECIAL PROVISIONS SECTIONS 220 AND 507 FOR MATERIAL AND OTHER REQUIREMENTS.
2. SUBGRADE ELEVATION FOR ALL DROPS AND APRONS SHALL BE NOMINAL BOULDER DIAMETER LOWER THAN FINISHED ELEVATIONS PROVIDED ON DETAIL SHEETS.
3. GROUT LAYER FOR BOULDERS IN ALL DROPS AND APRONS SHALL BE A MINIMUM 12" THICK.
4. ALL DUMPED RIPRAP LAYERS ARE ~~24"~~ 30" THICK UNLESS NOTED OTHERWISE.



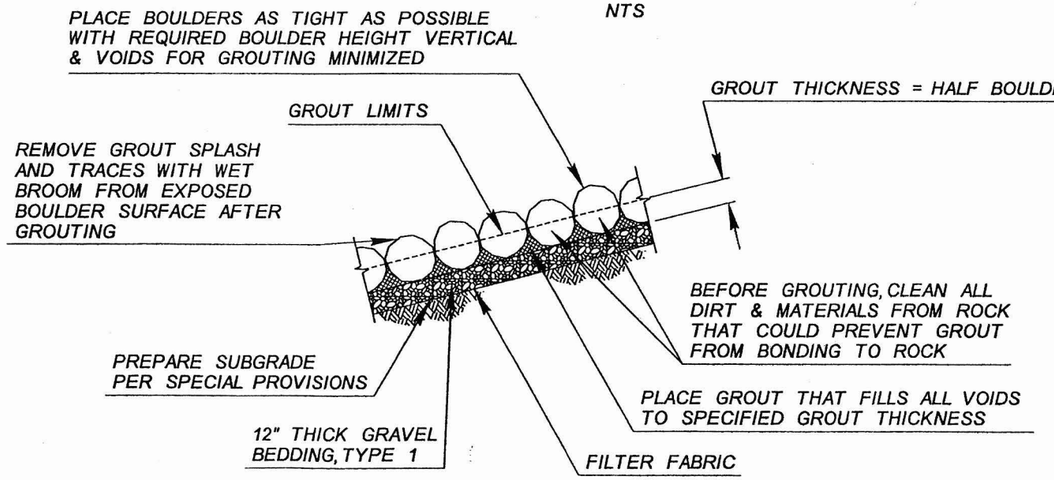
UPSTREAM CUTOFF WALL DETAIL

NTS



DOWNSTREAM CUTOFF WALL DETAIL

NTS



GROUTED BOULDER PLACEMENT DETAIL

NTS (REFER TO SPECIAL PROVISIONS)

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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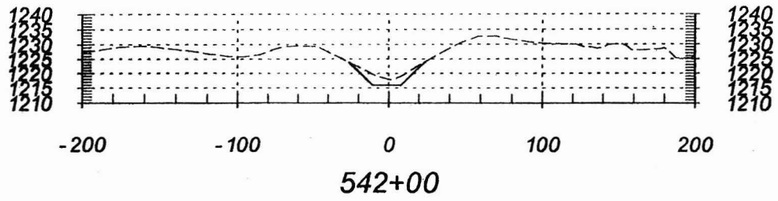
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. DS3

DROP STRUCTURE DETAILS

SHEET OF 37 56



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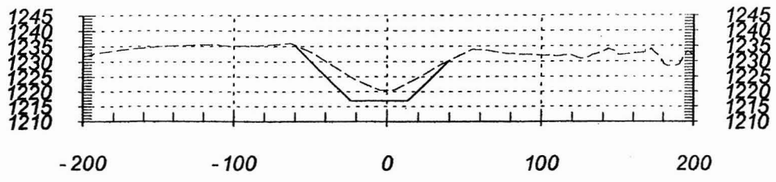

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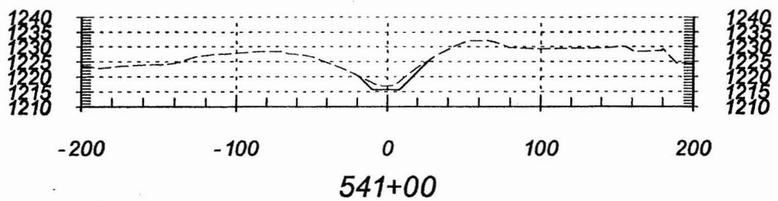

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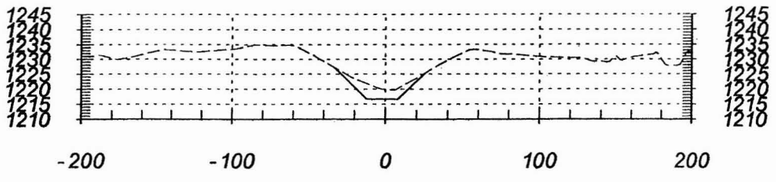

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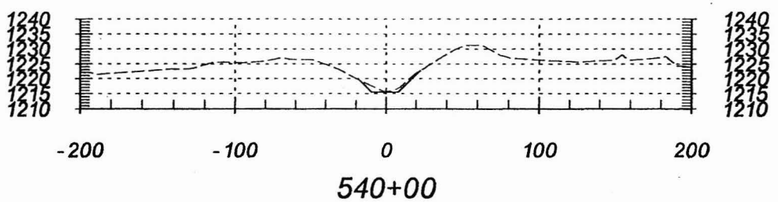

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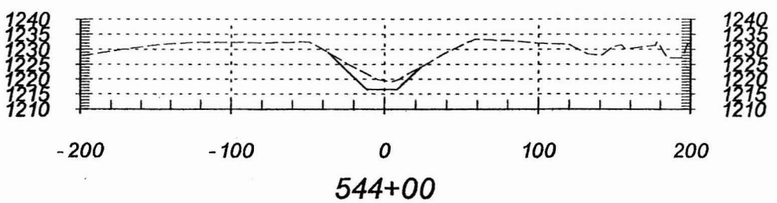

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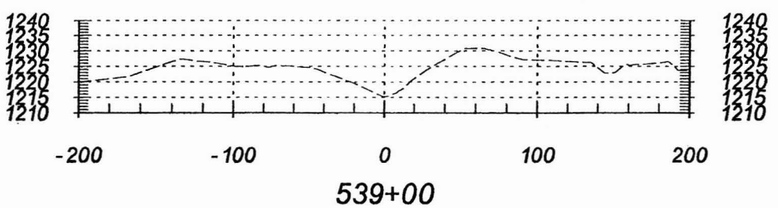

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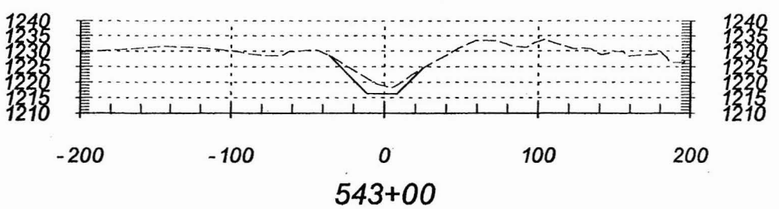

543+00

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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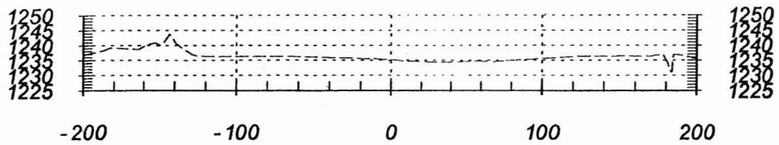
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. XS01

NIC SOUTH INTERIM CHANNEL CROSS SECTIONS

SHEET OF 47 58



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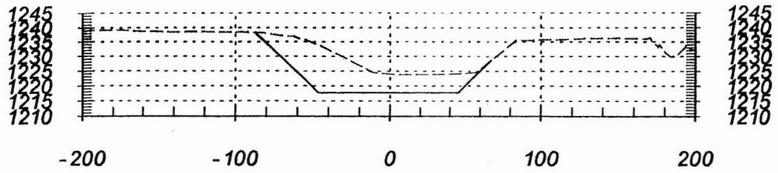

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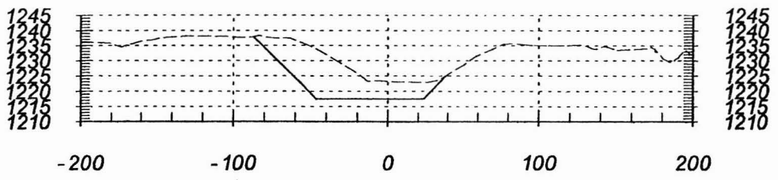

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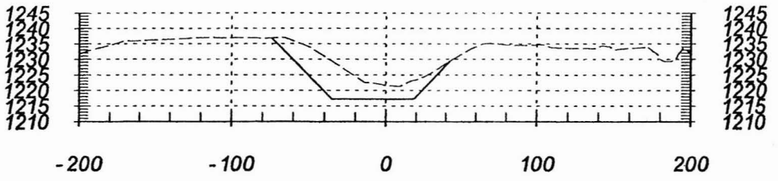

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NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
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CHECKED	BJL	01/06

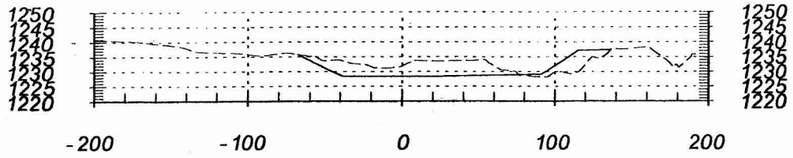
Registered Professional Engineer — Barry J. Ling — 19148 — Date Signed 1/26/06 — Arizona, U.S.A.

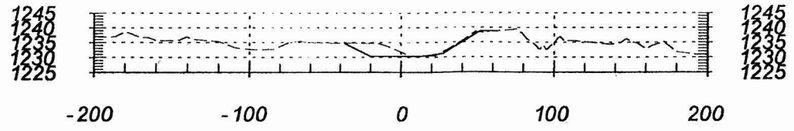
KIRKHAM MICHAEL

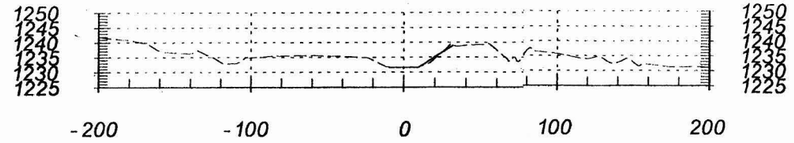
DRAWING NO. XS02

NIC SOUTH INTERIM CHANNEL CROSS SECTIONS

SHEET OF 48 56







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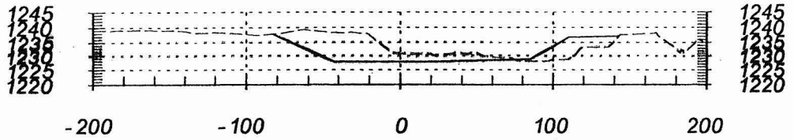

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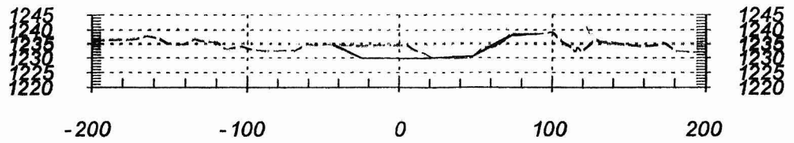

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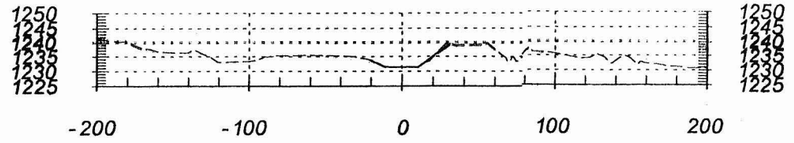

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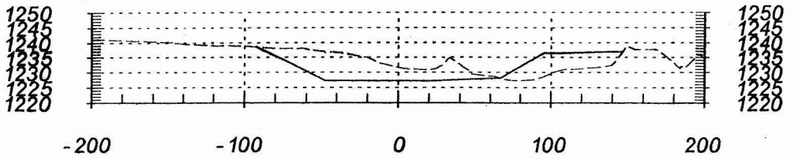

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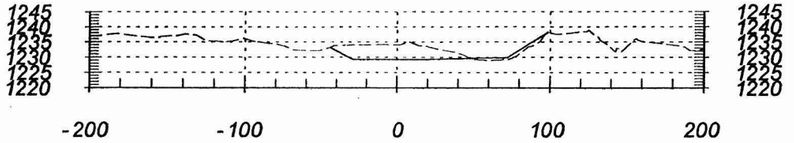

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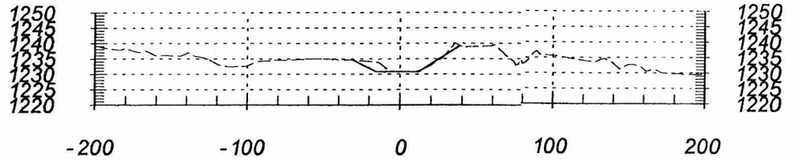

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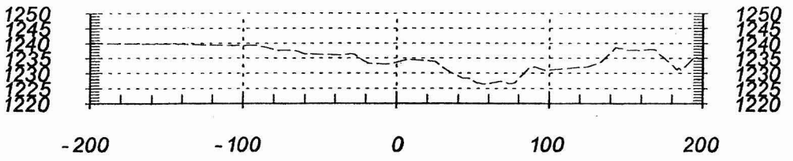

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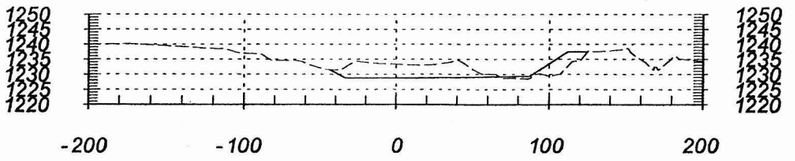

554+50

550+50

552+50

NO.	REVISION	BY	DATE
3			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

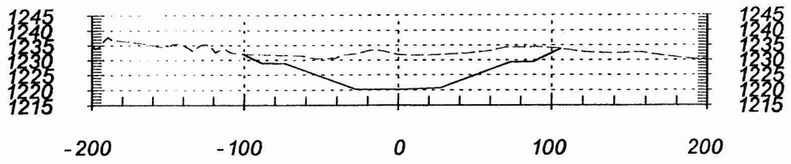
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. XS03

NORTHERN WASH CROSS SECTIONS

SHEET OF 49 56



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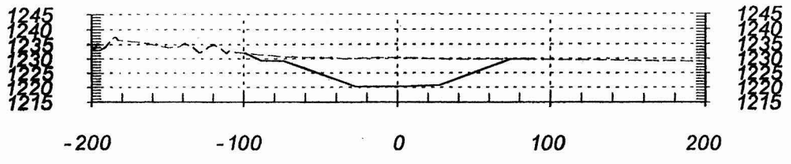

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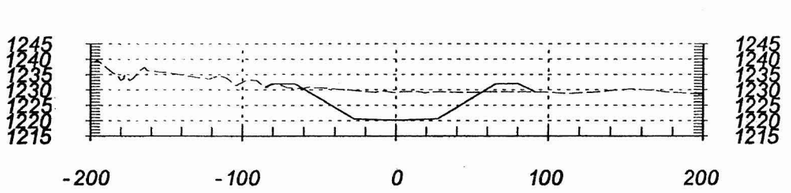

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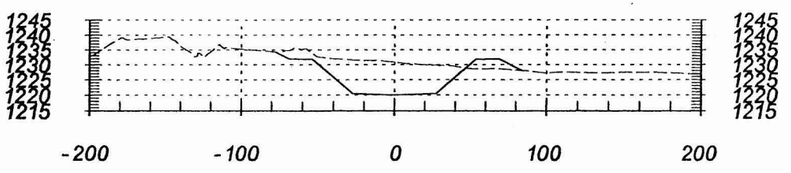

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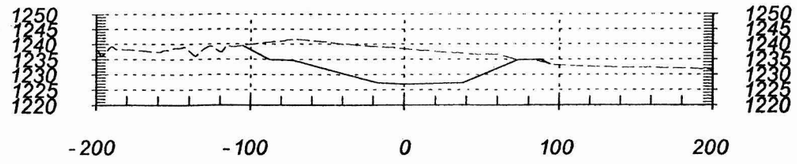

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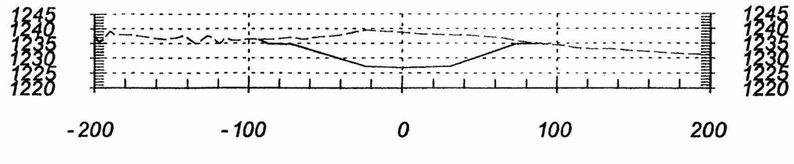

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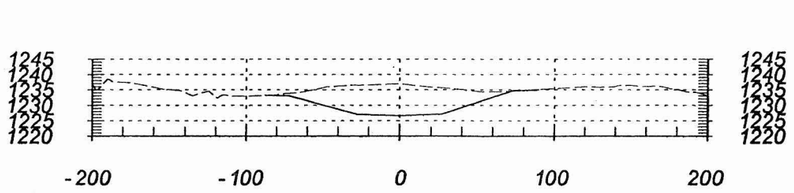

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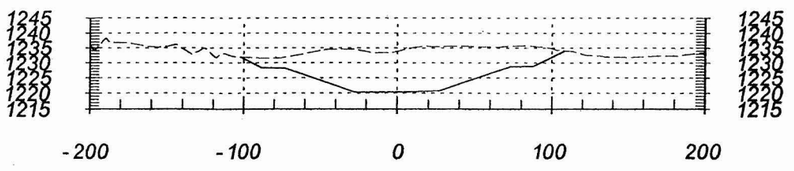


159+00

NO.	REVISION	BY	DATE
3			
2			
1			

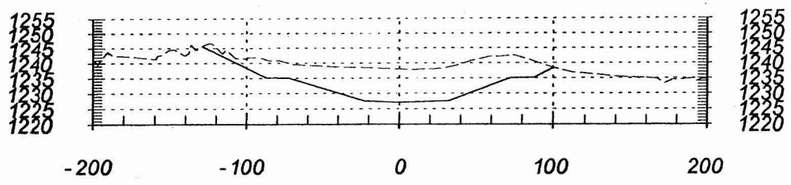
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO.	NORTH INLET CHANNEL CROSS SECTIONS	SHEET OF
XS04		50 56



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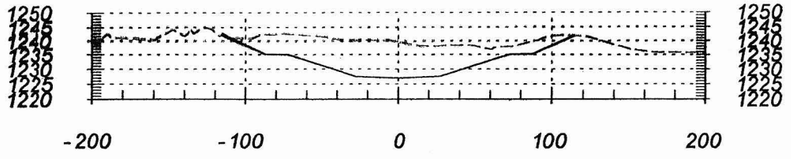

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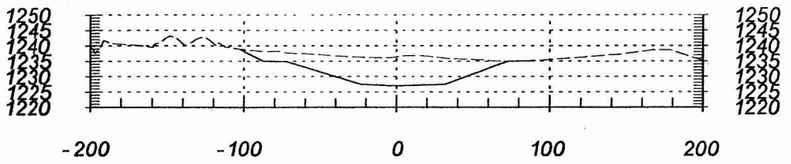

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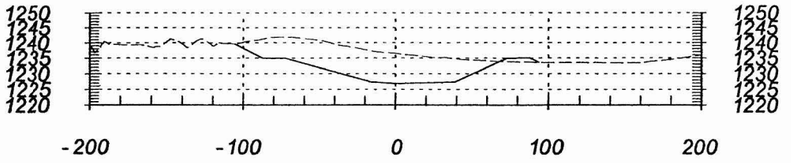

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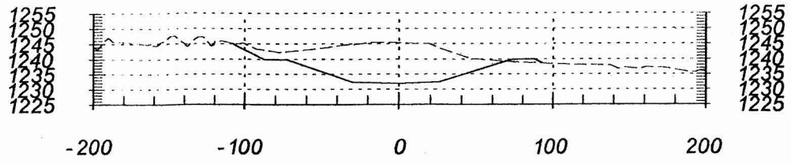

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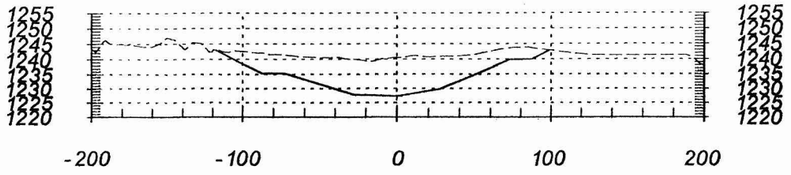

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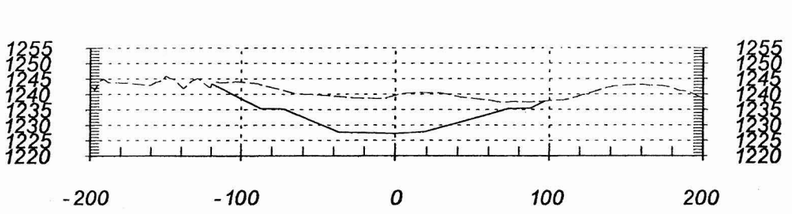

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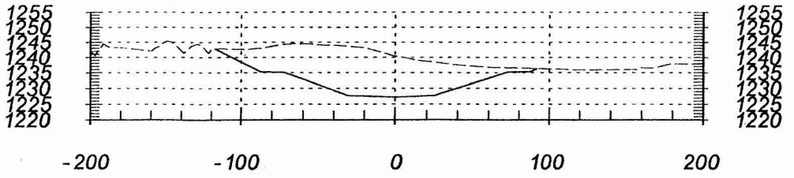

167+00

NO.	REVISION	BY	DATE
3			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

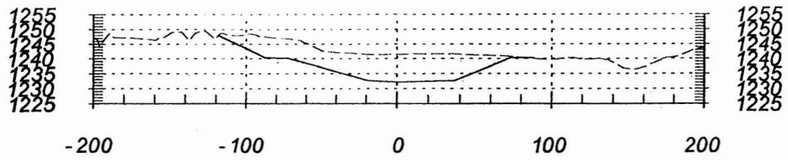
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

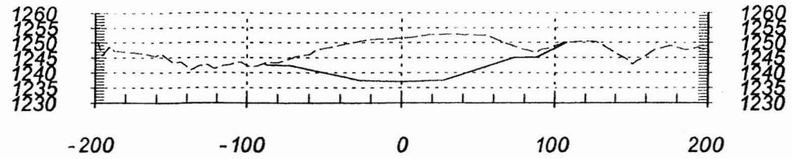
KIRKHAM MICHAEL

DRAWING NO. XS05

NORTH INLET CHANNEL CROSS SECTIONS

SHEET OF 51 56





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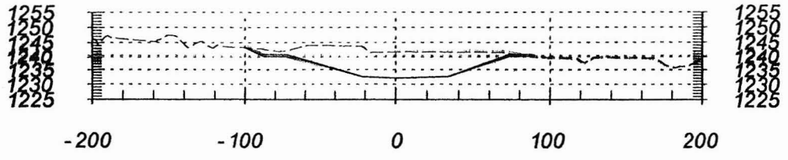

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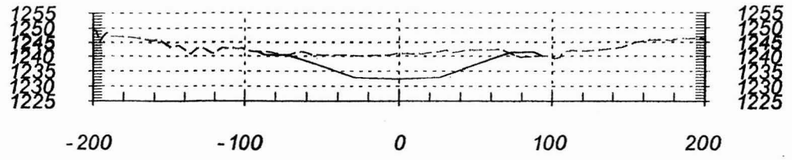

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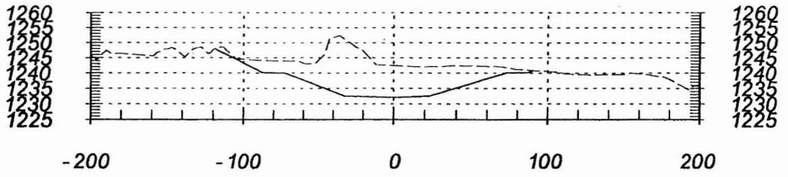

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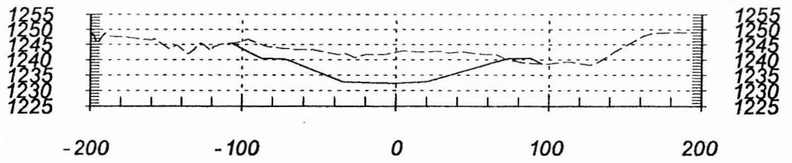

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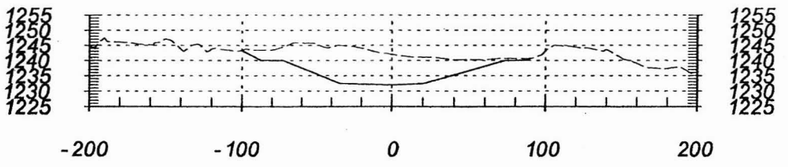

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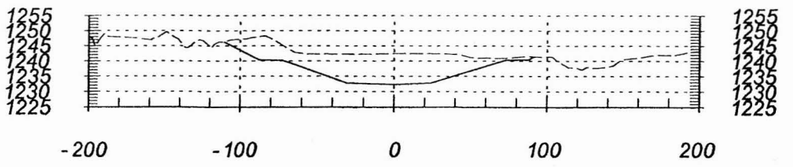

171+00

175+00

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

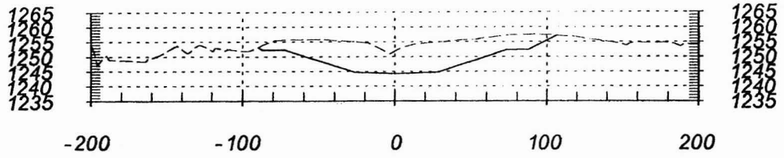
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. XS06

NORTH INLET CHANNEL CROSS SECTIONS

SHEET OF 52 56



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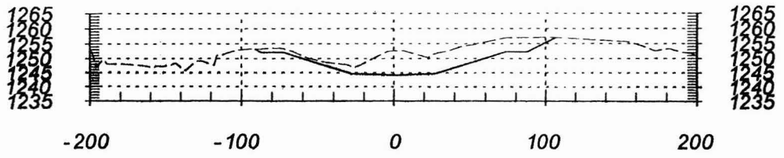

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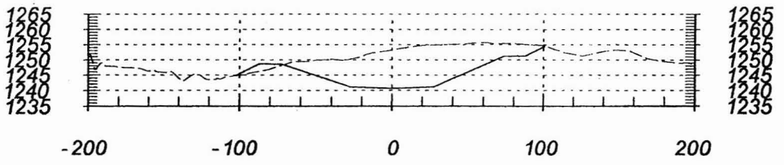

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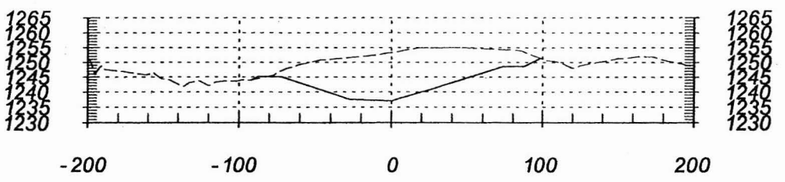

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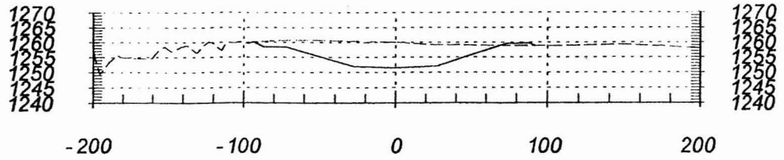

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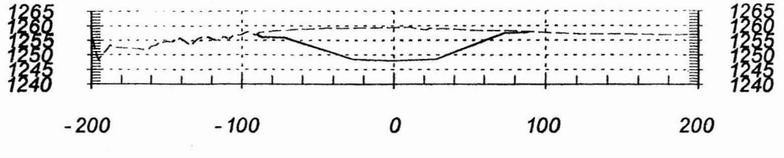

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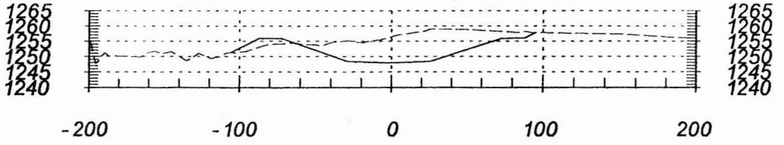

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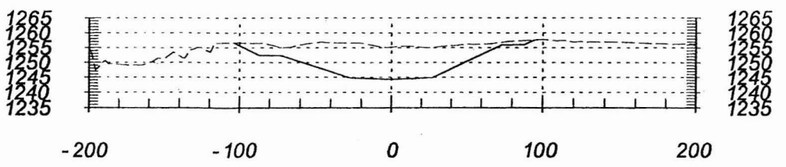

183+00

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

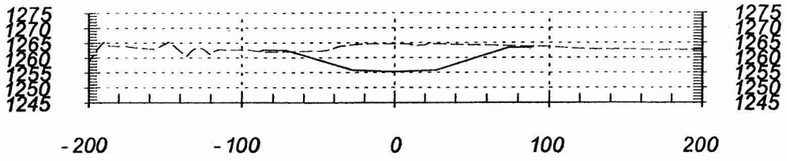
	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

KIRKHAM MICHAEL

DRAWING NO. XS07

NORTH INLET CHANNEL CROSS SECTIONS

SHEET OF 53 56



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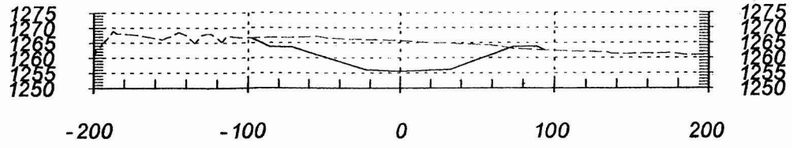

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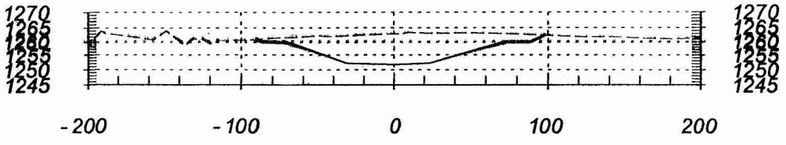

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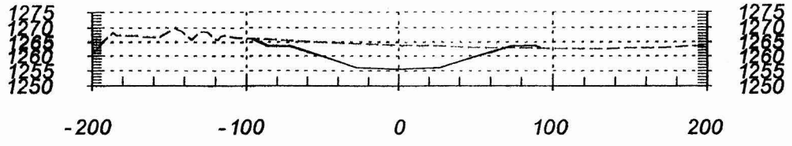

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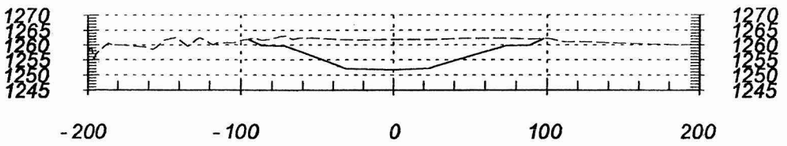

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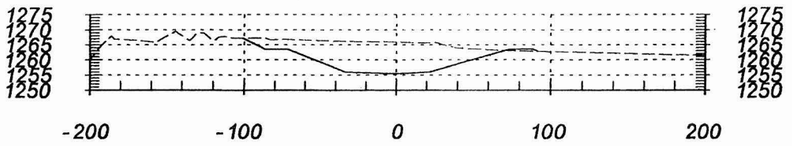

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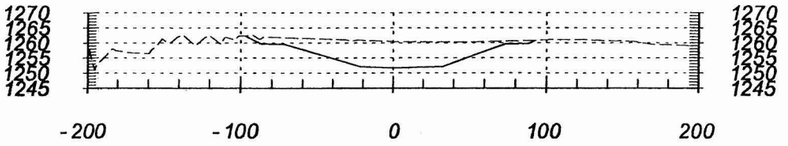

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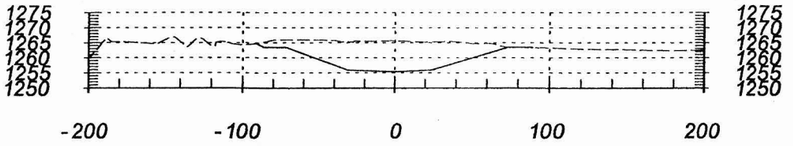

191+00

NO.	REVISION	BY	DATE
3			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

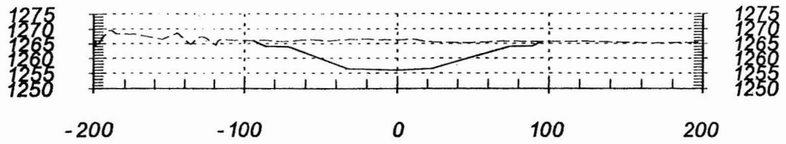
Barry J. Ling 19148 — 1/23/06

KIRKHAM MICHAEL

DRAWING NO. XS08

NORTH INLET CHANNEL CROSS SECTIONS

SHEET OF 54 56



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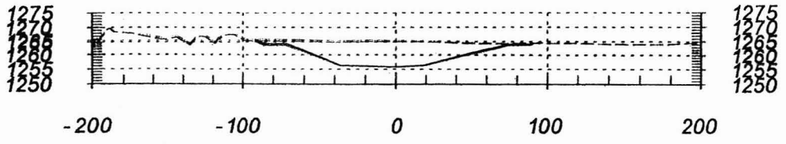

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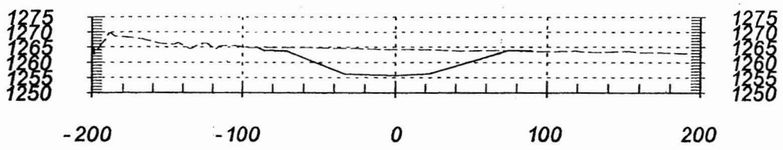

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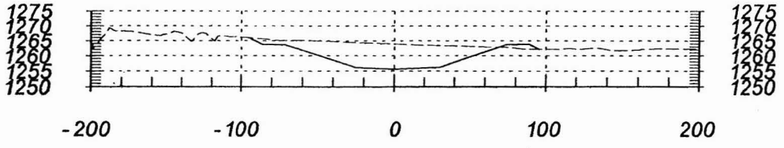

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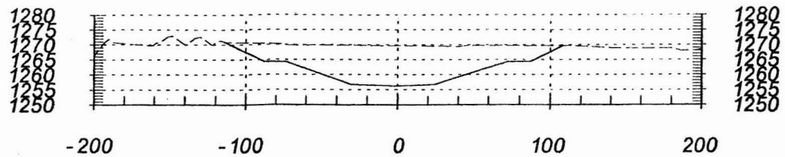

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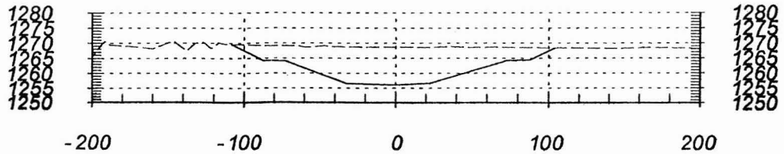

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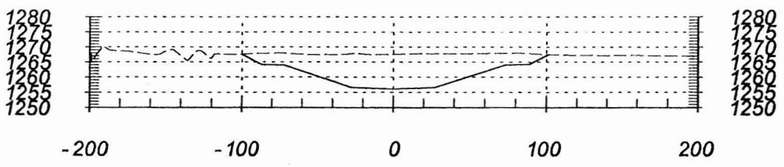

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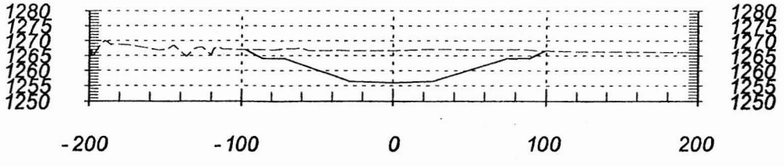

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NO.	REVISION	BY	DATE
3			
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
PROJECT CONTROL No. 470-04-31

	BY	DATE
DESIGNED	ACC/JKK	06/05
DRAWN	JB/JP	06/05
CHECKED	BJL	01/06

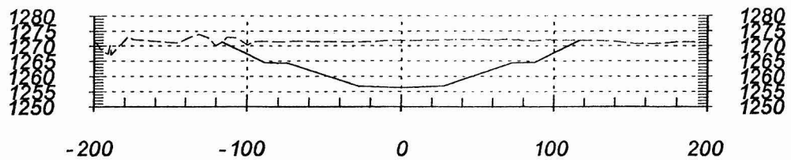
Barry J. Ling, 14148, Date Signed, Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. XS09

NORTH INLET CHANNEL CROSS SECTIONS

SHEET 55 OF 58



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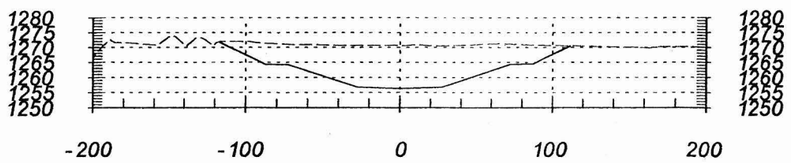

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NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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Barry J. Lim, 19148, Registered Professional Engineer, State of Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. XS10

NORTH INLET CHANNEL CROSS SECTIONS

SHEET 56 OF 56

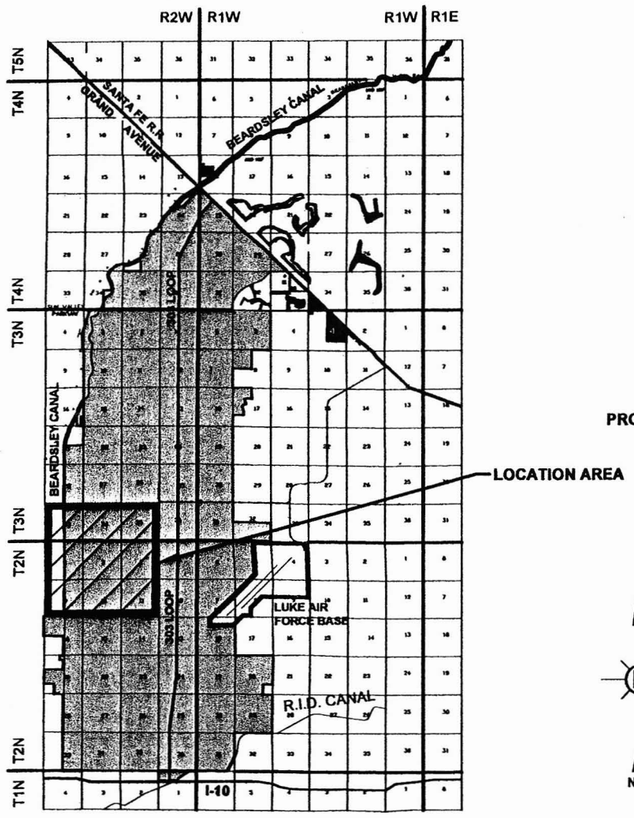
APPENDIX A

MARICOPA WATER DISTRICT

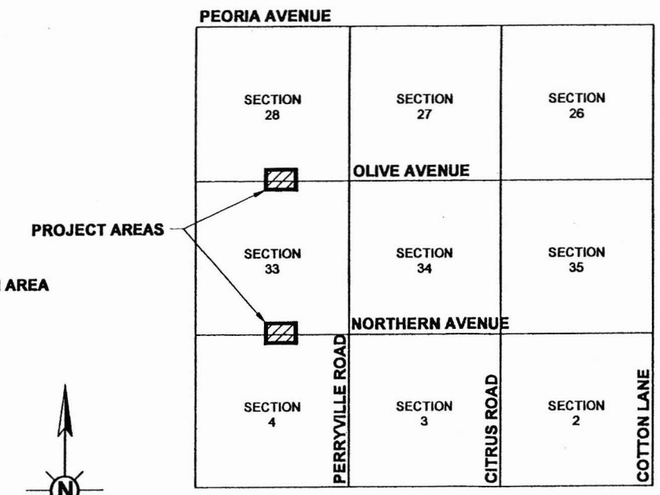
FINAL SUBMITTAL
JANUARY 2006

MARICOPA WATER DISTRICT
MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING IMPROVEMENTS

PROJECT PLANS
MARICOPA COUNTY, ARIZONA



MWD DISTRICT MAP
MARICOPA COUNTY



LOCATION MAP
PHOENIX METROPOLITAN, ARIZONA
T2N, R2W

APPROVED BY:

MARICOPA WATER DISTRICT
GLEN VORTHERMS, P.E.

SHEET INDEX

DWG ID	SHEET NO.	DESCRIPTION
G-1	1	COVER, LOCATION MAPS & SHEET INDEX
G-2	2	CONSTRUCTION / GENERAL NOTES AND DETAIL DESIGNATIONS
P-1	3	IMPROVEMENTS AT NORTHERN AVE TYP. LINING SECTION & BOX CULVERT SECTION
P-2	4	IMPROVEMENTS AT NORTHERN AVE TRANSITION PLAN & CANAL SECTION
P-3	5	IMPROVEMENTS AT OLIVE AVE TYP. LINING SECTION & BOX CULVERT SECTION
P-4	6	IMPROVEMENTS AT OLIVE AVE TRANSITION PLAN & CANAL SECTION
P-5	7	LATERAL 9 LINING REPLACEMENT DETAILS
D-1	8	CANAL LINING DETAILS
D-2	9	TRANSVERSE JOINT AND CANAL SECURITY GATE DETAILS
D-3	10	50" FLOW MEASUREMENT STRUCTURE
D-4	11	50" FLOW MEASUREMENT STRUCTURE STAFF GAUGE

CONTRACT FCD 2005C019

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2121 W. UNIVERSITY DRIVE,SUITE 123
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WWW.DAVEYCAIRO.COM

Registered Professional Engineer (Civil) CERTIFICATE NO. 35878 GEORGE J. CAIRO Date Signed 1/31/2006 ARIZONA U.S.A.

DESIGNED BY:	D. LONG
DRAWN BY:	R. RILEY
APPROVED BY:	G. CAIRO
DRAWING:	MWD-99
PLOT DATE:	1 - 3 - 2006

MARICOPA WATER DISTRICT
P.O. BOX 900
WADDELL, ARIZONA 85355
(623) 546-8266

MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING REPLACEMENT

COVER, LOCATION MAPS & SHEET INDEX

G - 1
SHEET 01 OF 11

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MARICOPA WATER DISTRICT (MWD) GENERAL NOTES

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE MOST CURRENT MARICOPA ASSOCIATION OF GOVERNMENTS (M.A.G.) UNIFORM STANDARD SPECIFICATIONS AND DETAILS.
2. CONTACT, NOTIFICATION AND COORDINATION WITH MARICOPA WATER DISTRICT SHALL BE MADE WITH MARICOPA WATER DISTRICT'S ADMINISTRATION OFFICE AT (623) 546-8266.
3. ALL SHOP DRAWINGS WILL REQUIRE MARICOPA WATER DISTRICT'S APPROVAL BEFORE CONSTRUCTION CAN BEGIN.
4. ALL IRRIGATION STRUCTURES SHALL BE CAST-IN-PLACE REINFORCE CONCRETE AND SHALL HAVE A WALL THICKNESS OF EIGHT INCHES UNLESS NOTED OTHERWISE.
5. ALL COMPACTION AND BACKFILL SHALL CONFORM TO THE MARICOPA COUNTY SPECIAL PROVISIONS AND THE MARICOPA ASSOCIATION OF GOVERNMENTS SPECIFICATIONS AND STANDARD DETAILS AND LATEST REVISIONS.
6. THE CONTRACTOR IS RESPONSIBLE FOR THE FINAL GRADE ADJUSTMENTS FOR ALL IRRIGATION STRUCTURES AND MANHOLES TO THE SATISFACTION OF MARICOPA WATER DISTRICT.
7. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY MARICOPA WATER DISTRICT PERMITS, RIGHT-OF-ENTRY AND APPROVALS PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR SHALL NOTIFY MARICOPA WATER DISTRICT IN WRITING AT LEAST SEVENTY-TWO (72) HOURS IN ADVANCE OF ANY CONSTRUCTION.
9. THE CONTRACTOR SHALL CONTACT AND COORDINATE WITH MARICOPA WATER DISTRICT FOR THE "DRY-UP" OF EXISTING IRRIGATION FACILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION. IT WILL BE MARICOPA WATER DISTRICT'S SOLE DETERMINATION OF THE TIME AND DURATION OF THIS "DRY-UP" PERIOD.
10. THE CONTRACTOR SHALL CONTACT AND COORDINATE WITH MARICOPA WATER DISTRICT FOR THE REMOVAL OF EXISTING IRRIGATION FACILITIES PRIOR TO THE BEGINNING OF CONSTRUCTION.
11. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING AND COORDINATING WITH MARICOPA WATER DISTRICT FOR THE INSPECTION OF ALL CONSTRUCTION WORK.
12. ALL CONSTRUCTION WORK IS SUBJECT TO MARICOPA WATER DISTRICT'S INSPECTION AND APPROVAL. CONSTRUCTION WORK CONCEALED WITHOUT INSPECTION BY MARICOPA WATER DISTRICT SHALL BE SUBJECT TO EXPOSURE AT THE CONTRACTOR'S EXPENSE.
13. AS-BUILT PLANS AND CERTIFICATIONS SHALL BE PROVIDED TO MARICOPA WATER DISTRICT UPON COMPLETION OF CONSTRUCTION.
14. AS-BUILT PLANS OF MARICOPA WATER DISTRICT'S FACILITIES SHALL BE REFLECTED ON THE CORRESPONDING AS-BUILT PAVING AND WATER IMPROVEMENT PLANS WHERE APPLICABLE.
15. IF A CONFLICT IN NOTES ON THIS DESIGN PLAN IS IDENTIFIED, THE MWD GENERAL NOTES SHALL SUPERSEDE ANY OTHER NOTES.

CONSTRUCTION NOTES

GENERAL

1. THE CONTRACTOR SHALL OBTAIN ALL PERMITS THAT ARE REQUIRED BY ALL LEVELS OF REGULATORY AGENCIES PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL COMPLY WITH ALL SAFETY REQUIREMENTS ESTABLISHED BY ALL LEVELS OF REGULATORY AGENCIES DURING THE ENTIRE PERIOD OF THE CONSTRUCTION.
3. THE CONTRACTOR SHALL OBTAIN THE APPROVAL OF THE TRAFFIC CONTROL PLANS FROM GOVERNING AUTHORITIES AND ENFORCED THE APPROVED TRAFFIC CONTROL PLAN DURING THE ENTIRE PERIOD OF CONSTRUCTION.
4. ANY WORK PERFORMED WITHOUT THE APPROVAL OF THE DISTRICT AND/OR ALL WORK AND MATERIAL NOT IN CONFORMANCE WITH THE PLANS AND SPECIFICATIONS IS SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
5. AN APPROVED SET OF PLANS SHALL BE MAINTAINED AT THE JOB SITE AT ALL TIMES THAT WORK IS IN PROGRESS. DEVIATION FROM THE PLANS SHALL NOT BE ALLOWED WITHOUT THE DISTRICT'S APPROVAL.
6. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MANAGE ROADWAY DUST, AND TAKE WHATEVER MEASURES ARE NECESSARY TO INSURE THAT ALL ROADS ARE MAINTAINED IN A CLEAN, MUD- AND DUST-FREE CONDITION AT ALL TIMES.

PAINTING AND COATING

1. EXPOSED METAL INCLUDING PIPE, FITTINGS, VALVES, STRAP ANCHORS, VALVE AND PIPE SUPPORTS, AND SIMILAR ITEMS NOT OTHERWISE COVERED, SHALL BE PAINTED AS FOLLOWS:

A. EXPOSED DUCTILE IRON SURFACES THAT HAVE BEEN COATED WITH COALTAR VARNISH SHALL BE GIVEN ONE (1) COAT OF TNEMEC 20-1255 POTA-POX PRIMER (SAND BEIGE) APPLIED AT A RATE THAT WILL PROVIDE A MINIMUM DRY FILM THICKNESS OF FOUR (4) TO SIX (6) MILS.

B. EXPOSED GALVANIZED STEEL SURFACES SHALL BE SOLVENT WASHED FOLLOWED BY ONE (1) COAT OF TNEMEC 20-1255 POTA-POX PRIMER (SAND BEIGE) APPLIED AT A RATE THAT WILL PROVIDE A MINIMUM DRY FILM THICKNESS OF FOUR (4) TO SIX (6) MILS.

C. BARE FERROUS METAL SURFACES SHALL BE GIVEN ONE (1) COAT OF TNEMEC 20-1255 POTA-POX PRIMER (SAND BEIGE) APPLIED AT A RATE THAT WILL PROVIDE A MINIMUM DRY FILM THICKNESS OF FOUR (4) TO SIX (6) MILS.

2. NON EXPOSED METALS:

A. BEFORE BACKFILLING, ALL COUPLINGS, BOLTS, NUTS, ANCHOR BOLTS AND RODS, AND ALL NON-EXPOSED STEEL SHALL RECEIVE ONE (1) BRUSH COAT OF TNEMEC 46H-413 HI-BUILD TNEME-TAR COAL TAR EPOXY APPLIED AT A RATE THAT WILL PROVIDE A MINIMUM DRY FILM THICKNESS OF NOT LESS THAN TWENTY (20) MILS. THE COATING SHALL BE WITHOUT FLAW WHEN COVERED WITH BACKFILL.

B. IN ADDITION TO COATING AS REQUIRED UNDER 2.A ABOVE, ALL BURIED DUCTILE IRON PIPE SHALL BE WRAPPED WITH POLYWRAP CONFORMING TO M.A.G. STANDARD SPECIFICATIONS SECTION 610.5.

DRAWING DESIGNATION

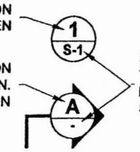
C-2 (DISCIPLINE (SEE TABLE) — DRAWING NUMBER)

LETTER	DISCIPLINE
C	CIVIL
DX	STANDARD DETAILS (X=DISCIPLINE)
E	ELECTRICAL
G	GENERAL
P	PIPING PLAN
SP	SITE PLAN

SECTION AND DETAIL STANDARDS:

DETAIL (NUMERAL) DESIGNATION ON DRAWING WHERE DETAIL IS TAKEN

SECTION (LETTER) DESIGNATION ON DRAWING WHERE SECTION IS TAKEN. ARROW INDICATES DIRECTION OF SECTION



SHEET NUMBER (OR LINE IF TAKEN AND SHOWN ON SAME DRAWING) ON DRAWING WHERE SECTION OR DETAIL IS SHOWN.

STANDARD DETAILS DESIGNATION:

STANDARD DETAIL DESIGNATION (NUMERIAL) — 512 — SHOWN ON STANDARD DETAIL DRAWING (SEE NOTE)

STANDARD DETAIL AS SHOWN 512 ARE INTENDED TO BE TYPICAL AND SHALL APPLY TO ALL SIMILAR SITUATIONS OCCURING ON THE PROJECT, WHETHER OR NOT THEY ARE KEYED IN EACH LOCATION. CONSULT THE ENGINEER FOR REVIEW PRIOR TO CONSTRUCTION.

SCREENING:

SCREENED ELEMENTS ON AREA MAPPING REPRESENT EXISTING FACILITIES OR ELEVATIONS.

SCREENED BACKGROUNDS ON OTHER DRAWINGS CAN REPRESENT EXISTING FACILITIES OR FACILITIES TO BE CONSTRUCTED UNDER THIS CONTRACT, WHICH, IF DRAWN IN SOLID LINES, WOULD OBSCURE THE PARTICULAR DETAILS BEING SHOWN. CONSULT THE ENGINEER IF SCREENING OF ANY ELEMENT IS NOT SELF-EXPLANATORY.

NOTE:

FOR ABBREVIATIONS NOT LISTED IN THIS STANDARD LIST, SEE "ABBREVIATIONS FOR USE ON DRAWINGS AND TEXT", PUBLISHED BY THE AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

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DAVEY-CAIRO ENGINEERING, INC.
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WWW.DAVEYCAIRO.COM

Registered Professional Engineer (Civil) CERTIFICATE NO. 35878 GEORGE J. CAIRO Date Signed 1/31/2006 ARIZONA, U.S.A.

DESIGNED BY:	D. LONG
DRAWN BY:	R. RILEY
APPROVED BY:	G. CAIRO
DRAWING:	MWD-99
PLOT DATE:	1 - 3 - 2006

MWD
MARICOPA WATER DISTRICT
P.O. BOX 900
WADDELL, ARIZONA 85355
(623) 546-8266

MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING REPLACEMENT

CONSTRUCTION, GENERAL NOTES, AND DETAIL DESIGNATIONS

G - 2
SHEET 02 OF 11

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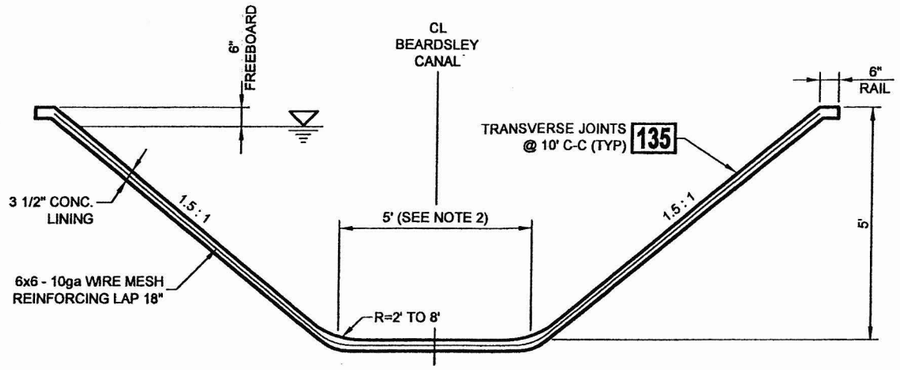

LINING SECTION
N.T.S.

NOTES:

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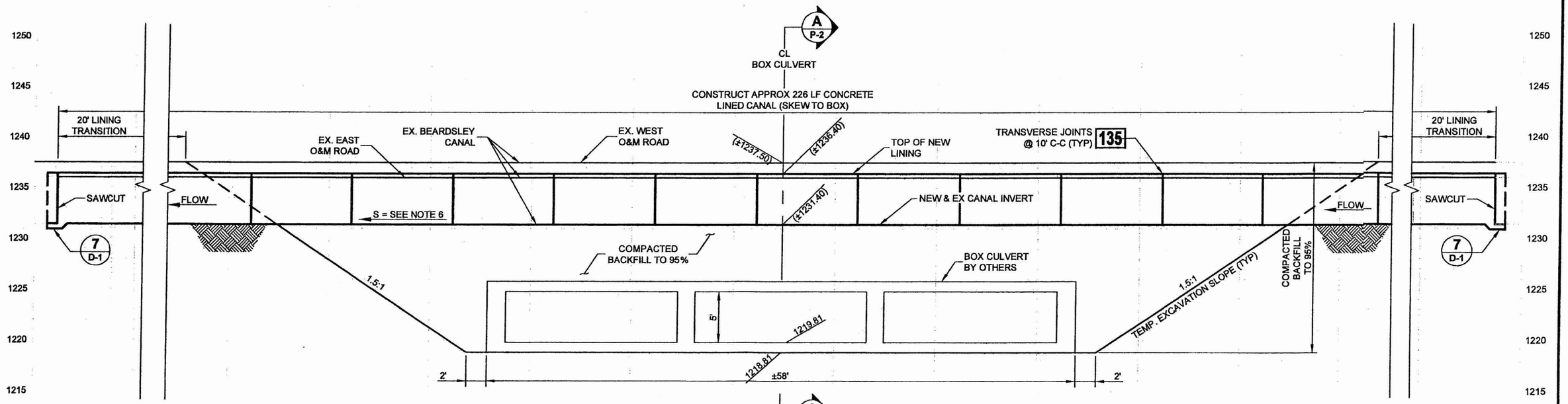
2. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND FIELD CONFORM TO MATCH EXISTING AS APPROVED BY MWD.
3. TRANSVERSE JOINTS ON BEARDSLEY CANAL REPLACEMENT SECTION SHALL BE PER DETAIL 135 SHEET D-2.
4. EXACT LIMITS OF LINING REMOVAL AND REPLACEMENT WILL BE BASED ON ACTUAL EXCAVATION LIMITS AND APPROVED BY MWD.
5. ESTIMATED BOX INVERT AT INTERSECTION OF BOX CULVERT CL AND CANAL CL. VIEW IS SOUTHWEST.
6. NEW CANAL INVERT ELEVATIONS AND SLOPE SHALL MATCH EXISTING FIELD VERIFIED INVERTS AND SLOPE.



BOX CULVERT SECTION
N.T.S.

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Registered Professional Engineer (Civil) CERTIFICATE NO. 35878 GEORGE J. CAIRO Date Signed 1/31/2006 ARIZONA U.S.A.

DESIGNED BY:	D. LONG
DRAWN BY:	R. RILEY
APPROVED BY:	G. CAIRO
DRAWING:	MWD-99
PLOT DATE:	1 - 3 - 2006

MWD
MARICOPA WATER DISTRICT
P.O. BOX 900
WADDELL, ARIZONA 85355
(623) 546-8266

MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING REPLACEMENT

IMPROVEMENTS AT NORTHERN AVENUE
TYP LINING SECTION AND BOX CULVERT SECTION

P - 1
SHEET 03 OF 11

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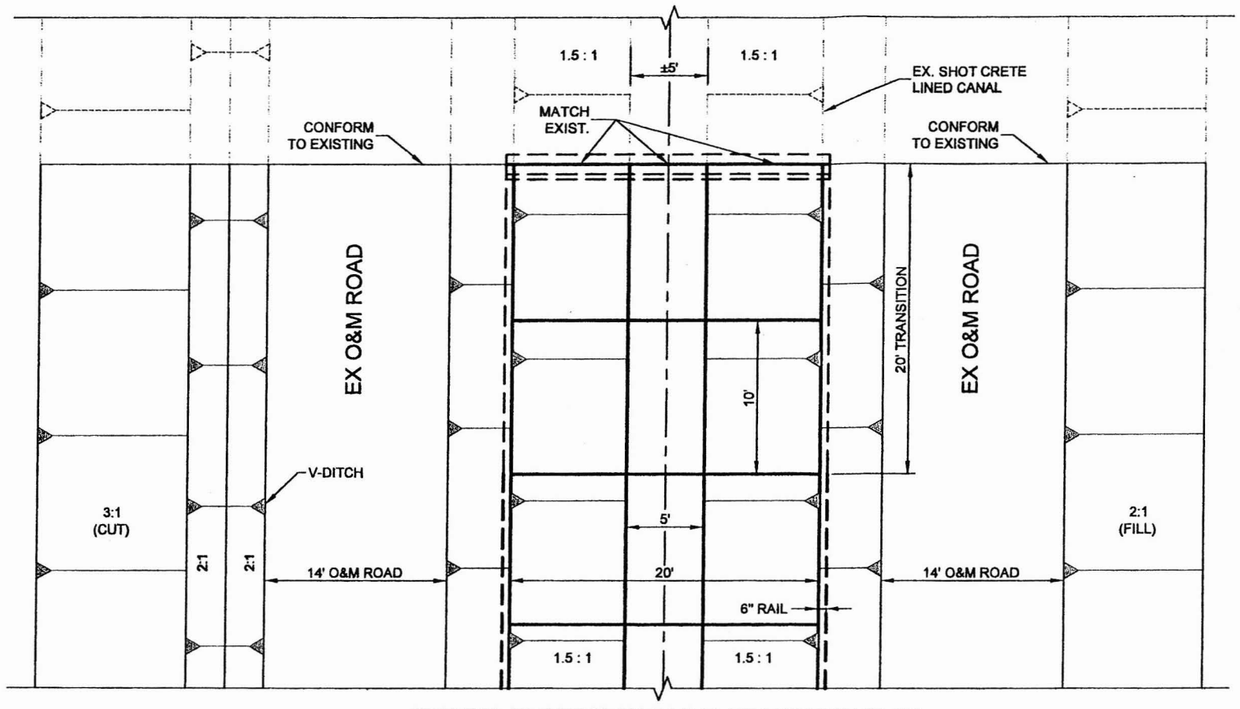
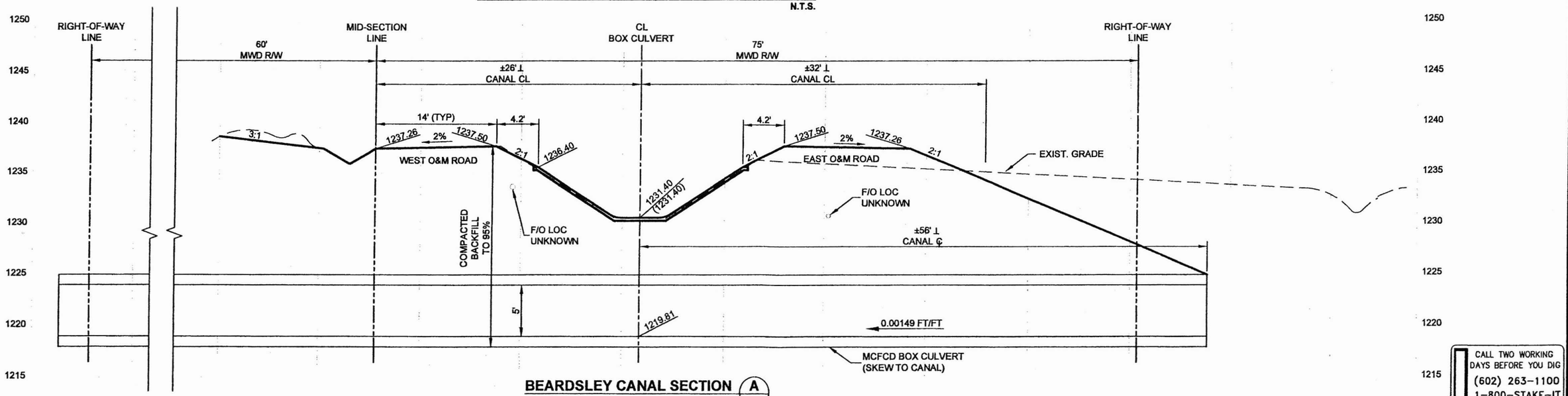


TYPICAL BEARDSLEY CANAL TRANSITION PLAN

N.T.S.

NOTE:

1. CATCH LINE LOCATIONS FOR BOTH CUT AND FILL WILL BE BASED ON FINISHED GRADE ELEVATIONS, REFER TO BOX CULVERT PLANS.



BEARDSLEY CANAL SECTION (A)

(LOOKING NORTH) N.T.S. (-)

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DESIGNED BY:	D. LONG
DRAWN BY:	R. RILEY
APPROVED BY:	G. CAIRO
DRAWING:	MWD-99
PLOT DATE:	1 - 3 - 2006

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MARICOPA COUNTY FLOOD CONTROL DISTRICT

BEARDSLEY CANAL LINING REPLACEMENT

IMPROVEMENTS AT NORTHERN AVENUE

TRANSITION PLAN AND CANAL SECTION

P - 2

SHEET 04 OF 11

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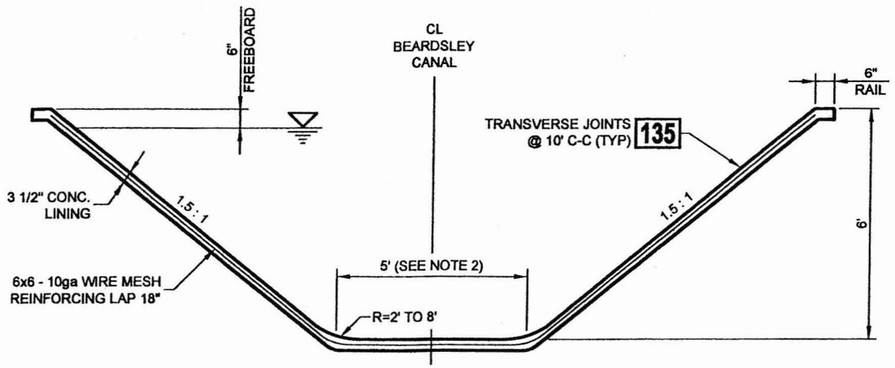

LINING SECTION
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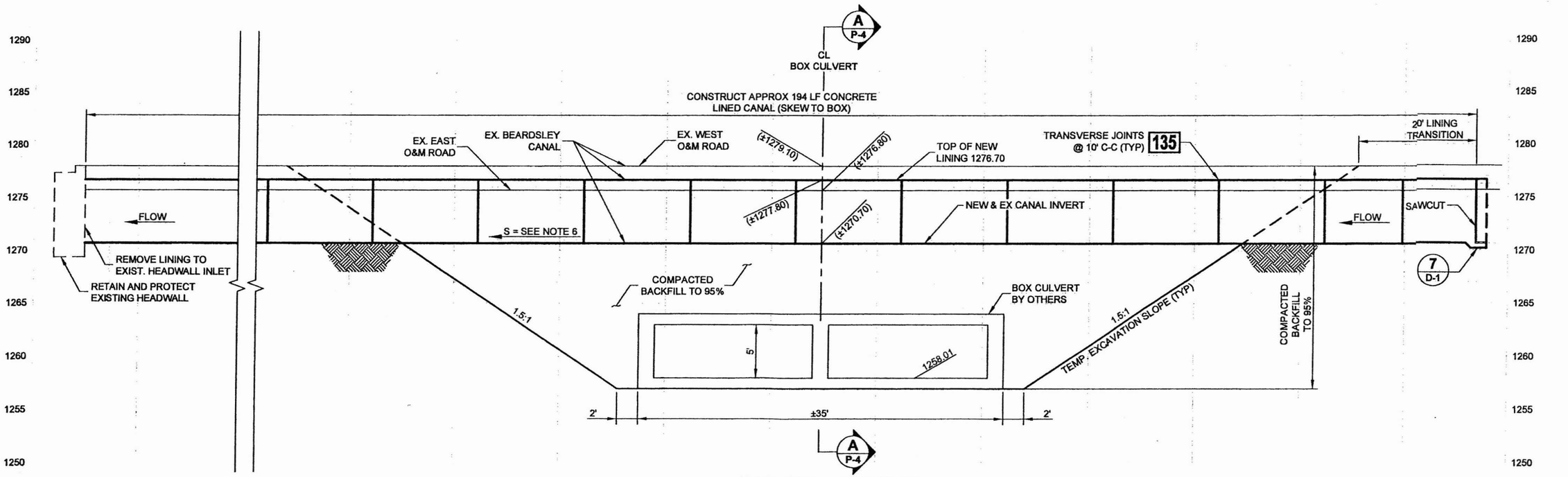

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(623) 546-8266

MARICOPA COUNTY FLOOD CONTROL DISTRICT

BEARDSLEY CANAL LINING REPLACEMENT

IMPROVEMENTS AT OLIVE AVENUE

TYP LINING SECTION AND BOX CULVERT SECTION

P - 3

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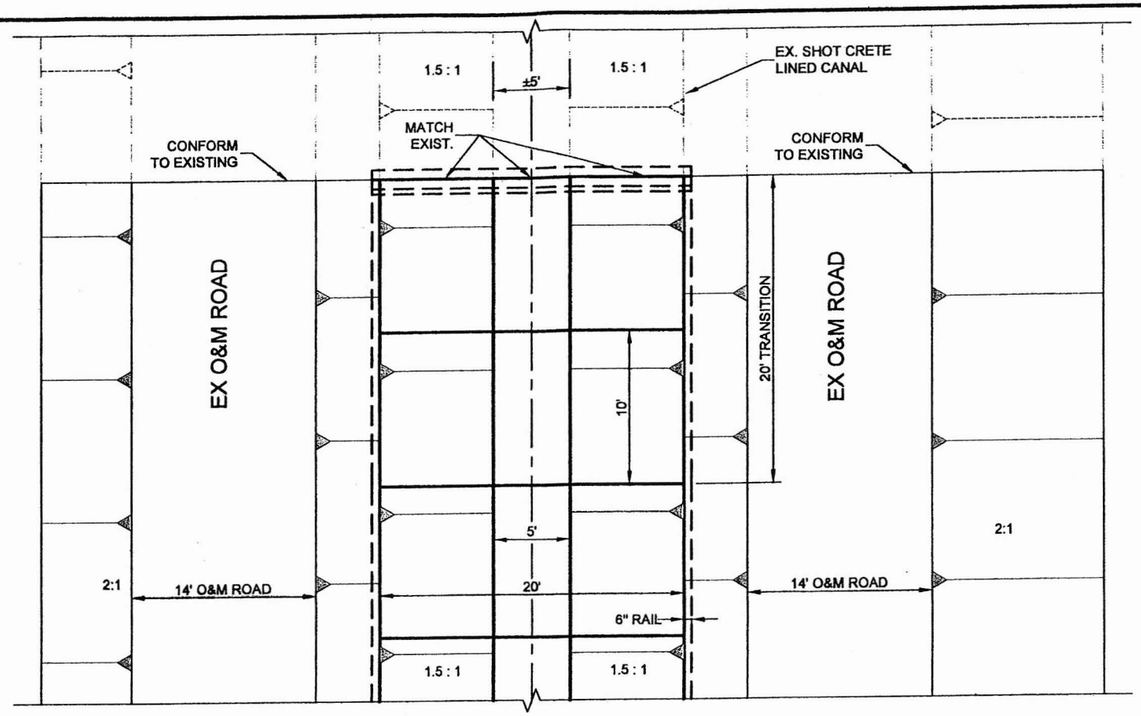
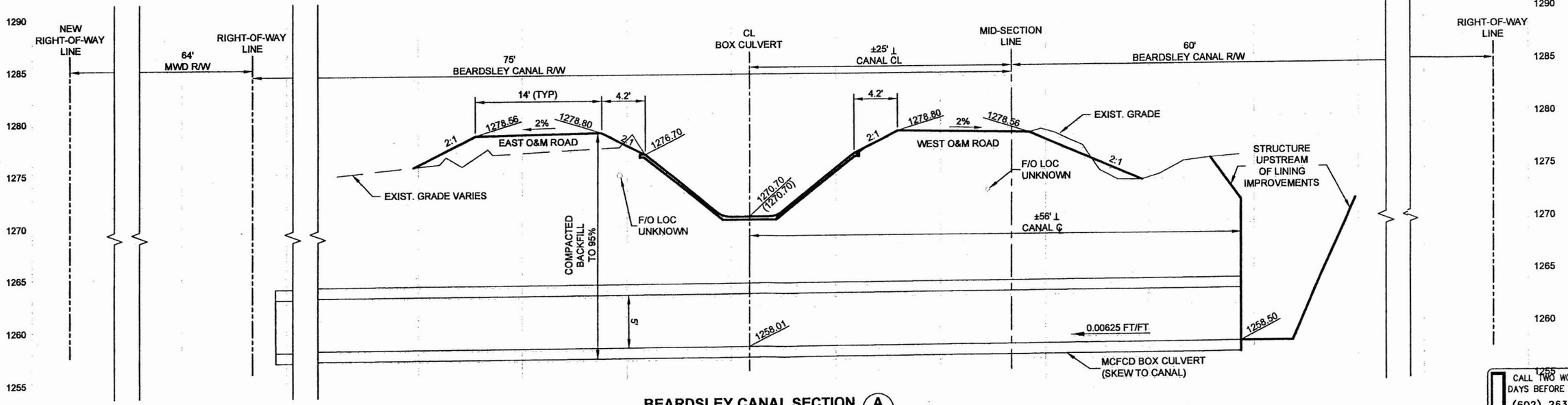


TYPICAL BEARDSLEY CANAL TRANSITION PLAN
N.T.S.

NOTE:

1. CATCH LINE LOCATIONS FOR BOTH CUT AND FILL WILL BE BASED ON FINISHED GRADE ELEVATIONS, REFER TO BOX CULVERT PLANS.



BEARDSLEY CANAL SECTION (A)
(LOOKING SOUTH) N.T.S.

CALL TWO WORKING DAYS BEFORE YOU DIG
(602) 263-1100
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(OUTSIDE MARICOPA COUNTY)

REV.	DATE	REVISION DESCRIPTION	BY

DAVEY-CAIRO ENGINEERING, INC.
2121 W. UNIVERSITY DRIVE,SUITE 123
TEMPE, ARIZONA 85281-7282
WWW.DAVEYCAIRO.COM

Registered Professional Engineer (Civil) CERTIFICATE NO. 35878 GEORGE J. CAIRO Date Signed 1/3/2006 ARIZONA U.S.A.

DESIGNED BY:	D. LONG
DRAWN BY:	R. RILEY
APPROVED BY:	G. CAIRO
DRAWING:	MWD-99
PLOT DATE:	1 - 3 - 2006

MARICOPA WATER DISTRICT
P.O. BOX 900
WADDELL, ARIZONA 85355
(623) 546-8266

MARICOPA COUNTY FLOOD CONTROL DISTRICT

BEARDSLEY CANAL LINING REPLACEMENT

IMPROVEMENTS AT OLIVE AVENUE

TRANSITION PLAN AND CANAL SECTION

P - 4

SHEET 06 OF 11

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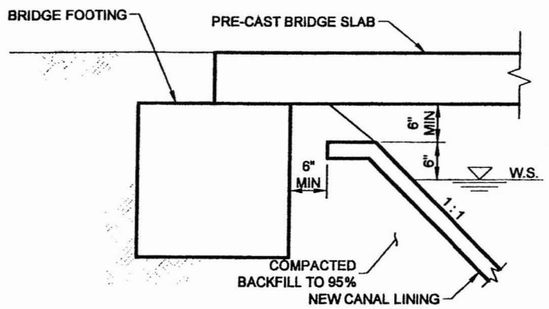
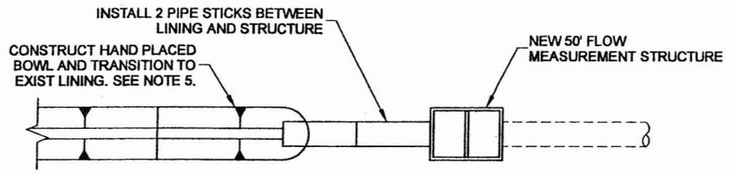
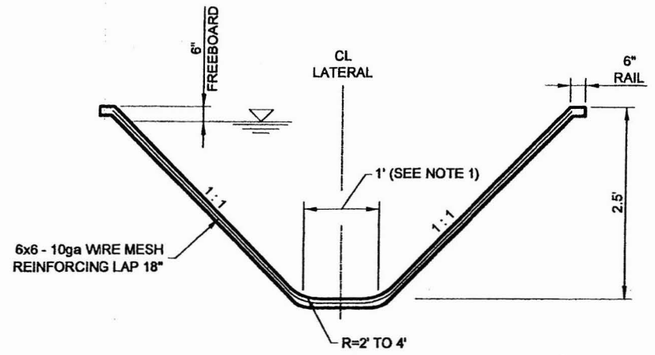


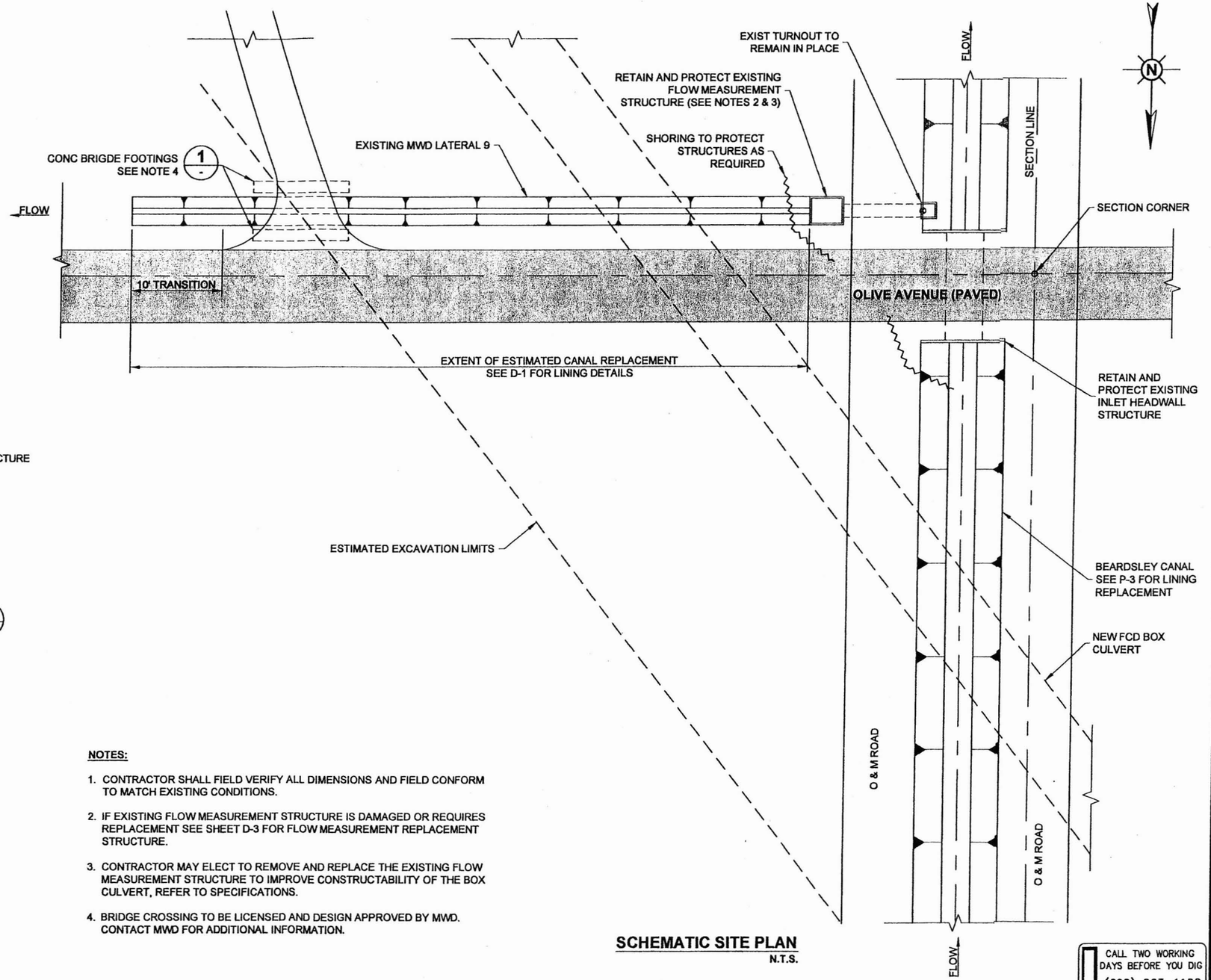
BRIDGE AND FOOTING CANAL CLEARANCE (1/-)
N.T.S.



FLOW MEASUREMENT STRUCTURE CONNECTION TO LINING (2/-)
N.T.S.



LATERAL 9 LINING SECTION
N.T.S.



SCHEMATIC SITE PLAN
N.T.S.

NOTES:

1. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND FIELD CONFORM TO MATCH EXISTING CONDITIONS.
2. IF EXISTING FLOW MEASUREMENT STRUCTURE IS DAMAGED OR REQUIRES REPLACEMENT SEE SHEET D-3 FOR FLOW MEASUREMENT REPLACEMENT STRUCTURE.
3. CONTRACTOR MAY ELECT TO REMOVE AND REPLACE THE EXISTING FLOW MEASUREMENT STRUCTURE TO IMPROVE CONSTRUCTABILITY OF THE BOX CULVERT, REFER TO SPECIFICATIONS.
4. BRIDGE CROSSING TO BE LICENSED AND DESIGN APPROVED BY MWD. CONTACT MWD FOR ADDITIONAL INFORMATION.

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MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING REPLACEMENT

LATERAL 9 LINING REPLACEMENT DETAILS

P - 5
SHEET 07 OF 11

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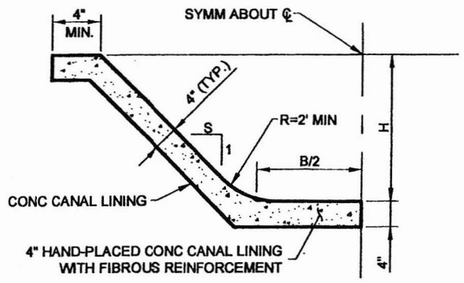
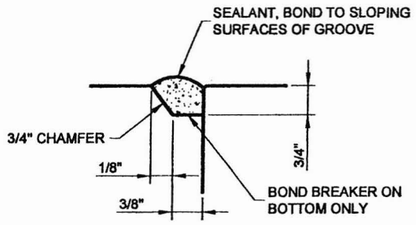
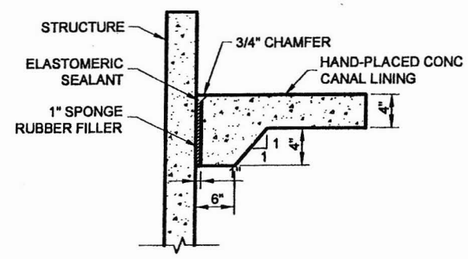


NOTE: SEE PLANS FOR S, B AND H DIMENSION.

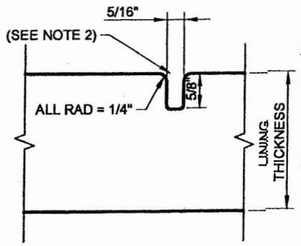
TYPICAL HAND-PLACED CONC CANAL LINING (1) N.T.S.



CONTROL SEALANT JOINT (2) N.T.S.



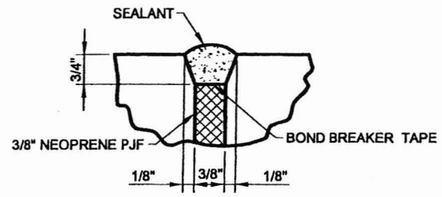
EXPANSION JOINT DETAIL (3) N.T.S.



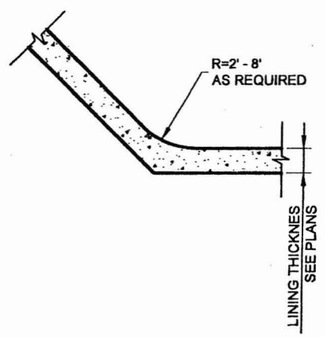
NOTES

1. CONTRACTION JOINT IN CONCRETE LINING SHALL BE PLACED TRANSVERSE AT 10 FOOT INTERVALS.
2. CONTRACTOR SHALL USE A TEMPLATE APPROVED BY THE ENGINEER TO CONSTRUCT TRANSVERSE CONTRACTION JOINTS.

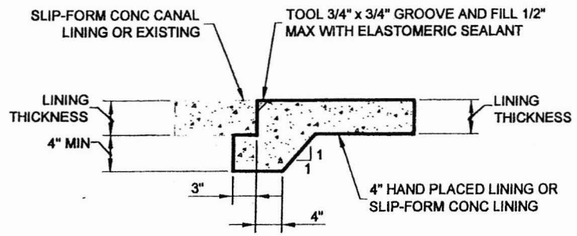
CONSTRUCTION JOINT DETAIL (4) N.T.S.



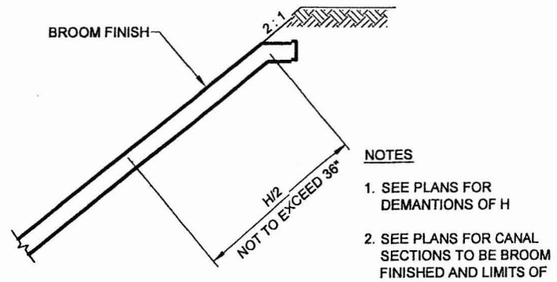
EXPANSION SEALANT JOINT (5) N.T.S.



LINING DETAIL (6) N.T.S.



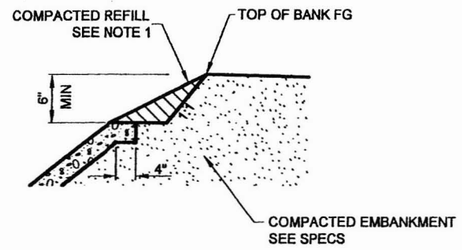
JOINT FOR EXIST TO NEW LATERAL AND DITCH CONNECTION (7) N.T.S.



NOTES

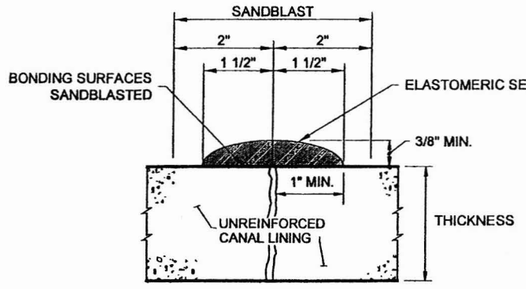
1. SEE PLANS FOR DEMANTIONS OF H
2. SEE PLANS FOR CANAL SECTIONS TO BE BROOM FINISHED AND LIMITS OF INSTALLATION

CONCRETE FINISH DETAIL (8) N.T.S.



NOTES:
1. OVER EXCAVATION IS PERMITTED IF NEEDED TO ACCOMMODATE LINING.

CANAL RAIL REFILL (9) N.T.S.



NOTES:

1) CONTRACTOR TO SANDBLAST SURFACES.
2) IMMEDIATELY PRIOR TO SEALANT APPLICATION, THE CONCRETE SHALL BE BLASTED WITH OIL-FREE COMPRESSED AIR TO REMOVE RESIDUE, DUST, DIRT AND DEBRIS.
3) CONCRETE AND AMBIENT TEMPERATURE SHALL BE A MINIMUM OF 50° F.
4) SEE SPECIFICATIONS FOR EXTRUDING AND TOOLING ELASTOMERIC SEALER.

CAP SEAL FOR RANDOM CRACKS (10) N.T.S.

NOTES

THIS IS A STANDARD DETAIL SHEET AND NOT ALL DETAILS ARE REQUIRED. SEE PLANS FOR SPECIFIC INSTALLATIONS.

IRRIGATION CANAL LINING DETAILS 103 N.T.S.

CALL TWO WORKING DAYS BEFORE YOU DIG
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REV.	DATE	REVISION DESCRIPTION	BY

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TEMPE, ARIZONA 85281-7282
WWW.DAVEYCAIRO.COM

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DESIGNED BY:	D. LONG
DRAWN BY:	R. RILEY
APPROVED BY:	G. CAIRO
DRAWING:	MWD-99
PLOT DATE:	1 - 3 - 2006

MWD
MARICOPA WATER DISTRICT
P.O. BOX 900
WADDELL, ARIZONA 85355
(623) 546-8266

MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING REPLACEMENT

IRRIGATION CANAL LINING DETAILS

D - 1
SHEET 08 OF 11

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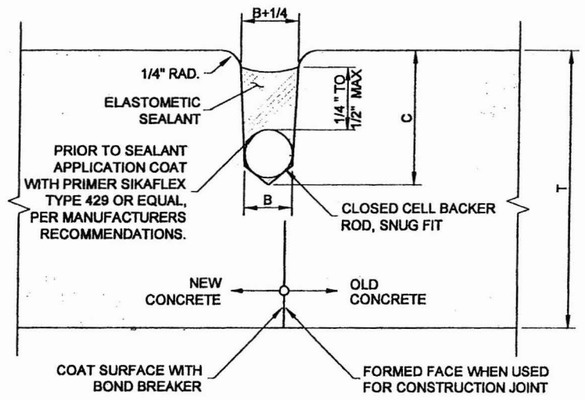
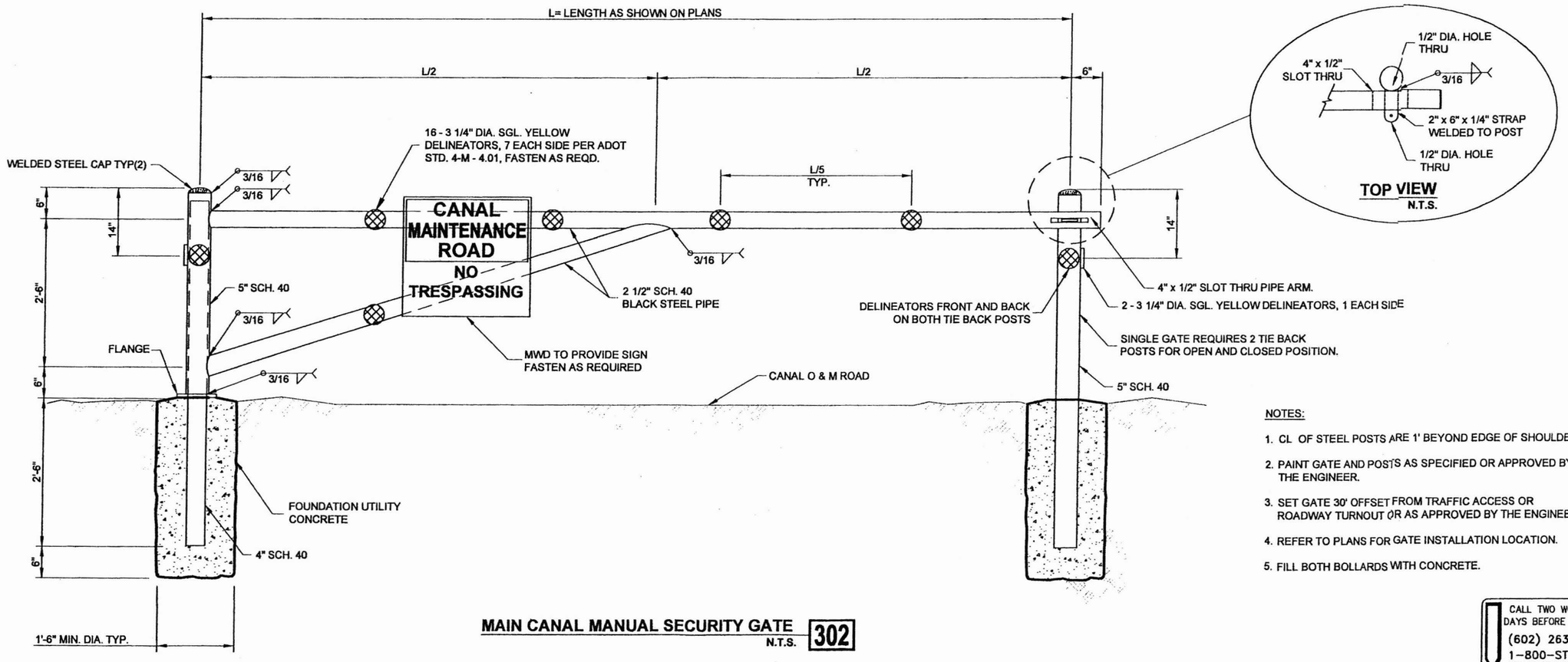


JOINT GROOVE DIMENSIONS			
T (IN)	B (IN)	C (IN)	APPROXIMATE GROOVE SPACING CENTER TO CENTER
2 1/2	1/4 to 3/8	3/4 to 7/8	10' - 0"
3	3/8 to 1/2	1 to 1 1/8	12'-0" to 15'-0"
3 1/2	3/8 to 1/2	1 1/8 to 1 1/4	12'-0" to 15'-0"
4	3/8 to 1/2	1 1/4 to 1 3/8	12'-0" to 15'-0"

NOTES:

1. B AND C SHOW ALLOWABLE RANGE.
2. CONTRACTION JOINT DETAIL SHALL BE PROVIDED FOR CONCRETE LINING CONSTRUCTION JOINTS AND WHERE SHOWN OR AS DIRECTED TO REPLACE IMPROPERLY INSTALLED PLASTIC WATERSTOP. JOINT MAY BE SAW CUT APPROXIMATELY AS SHOWN WHEN USED FOR REPAIR.
3. HEIGHT OF ELASTOMERIC SEALANT SHALL BE LESS THAN WIDTH OF JOINT.

TRANSVERSE CONSTRUCTION JOINT
N.T.S. **135**



NOTES:

1. CL OF STEEL POSTS ARE 1' BEYOND EDGE OF SHOULDER.
2. PAINT GATE AND POSTS AS SPECIFIED OR APPROVED BY THE ENGINEER.
3. SET GATE 30' OFFSET FROM TRAFFIC ACCESS OR ROADWAY TURNOUT OR AS APPROVED BY THE ENGINEER.
4. REFER TO PLANS FOR GATE INSTALLATION LOCATION.
5. FILL BOTH BOLLARDS WITH CONCRETE.

MAIN CANAL MANUAL SECURITY GATE
N.T.S. **302**

CALL TWO WORKING DAYS BEFORE YOU DIG
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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

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WADDELL, ARIZONA 85355
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MARICOPA COUNTY FLOOD CONTROL DISTRICT

BEARDSLEY CANAL LINING REPLACEMENT

TRANSVERSE JOINT AND CANAL SECURITY GATE DETAIL

D - 2

SHEET 09 OF 11

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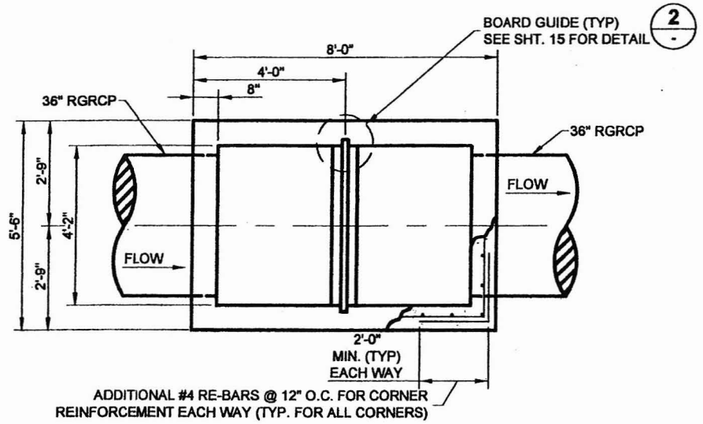
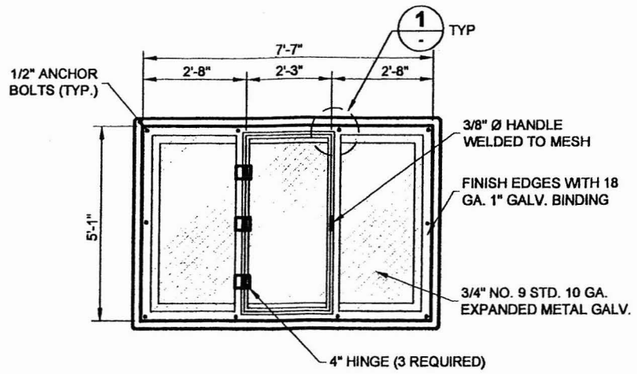
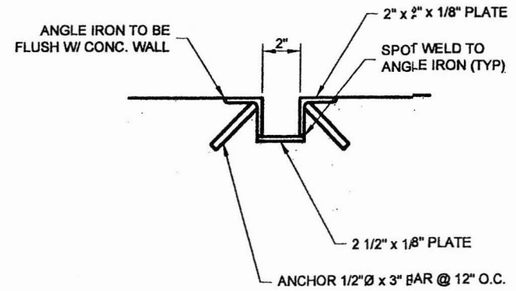


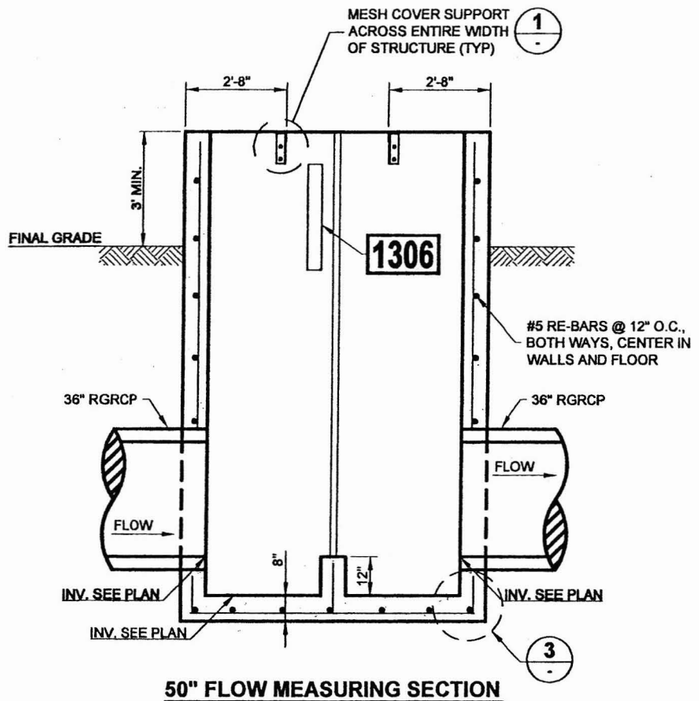
50" FLOW MEASURING STRUCTURE PLAN
N.T.S.



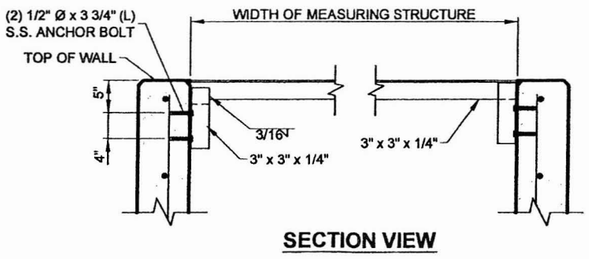
50" FLOW MEASURING STRUCTURE MESH COVER
N.T.S.



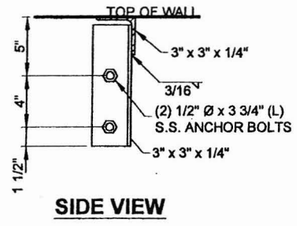
GROOVE SLOT DETAIL (2 / -)
N.T.S.



50" FLOW MEASURING SECTION
N.T.S.

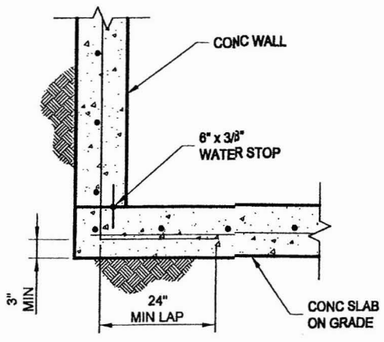


SECTION VIEW



SIDE VIEW

MESH COVER SUPPORT (1 / -)
N.T.S.



CONC CONNECTION (3 / -)
N.T.S.

50" FLOW MEASUREMENT STRUCTURE 1736
N.T.S.

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(OUTSIDE MARICOPA COUNTY)

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P.O. BOX 900
WADDELL, ARIZONA 85355
(623) 546-8266

MARICOPA COUNTY
FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING
REPLACEMENT

50' FLOW
MEASUREMENT
STRUCTURE

D - 3

SHEET
10 OF 11

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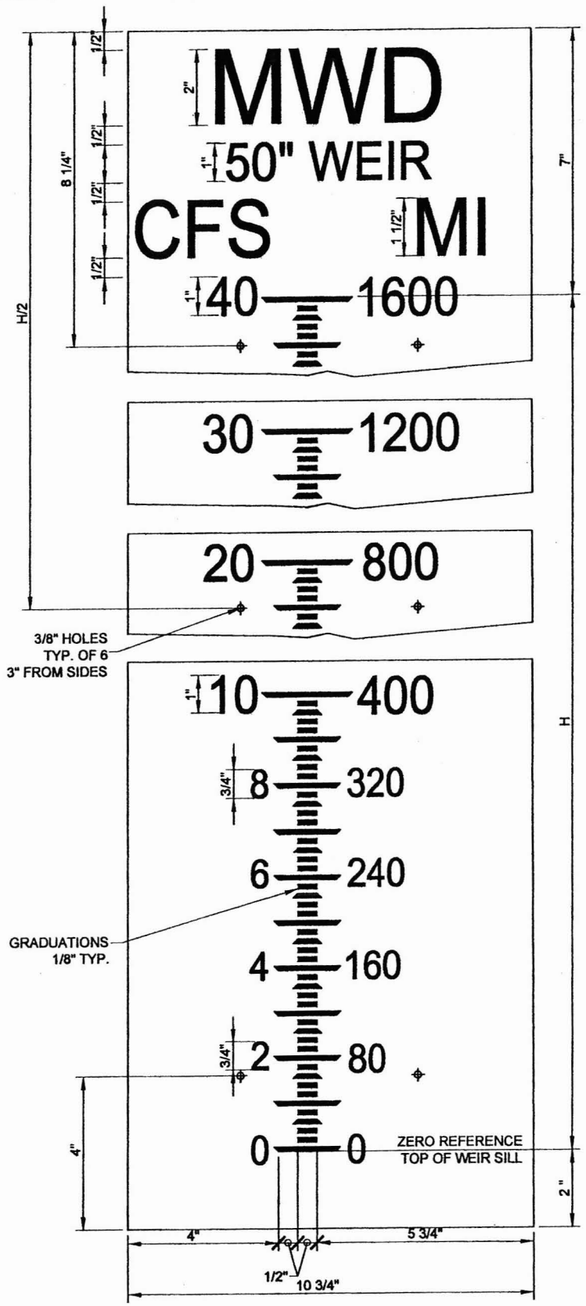
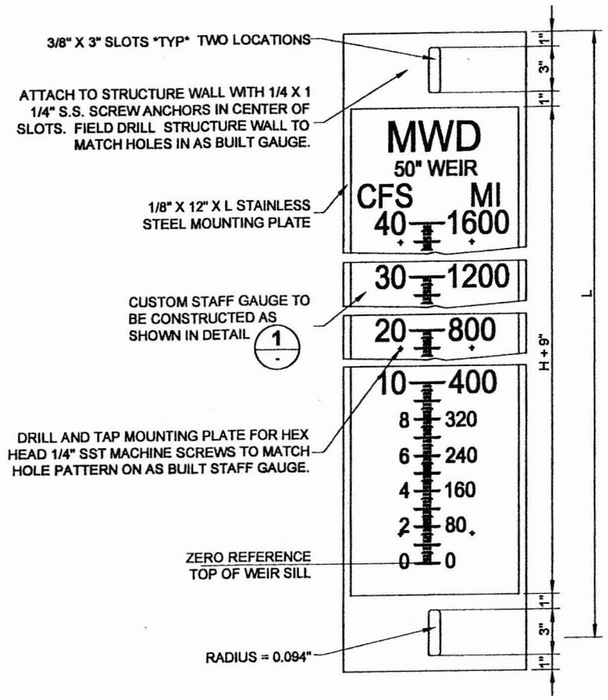


ENAMELED WEIR GAUGE (1)
N.T.S.



SYMBOLS:

F - FLOW
H - HEIGHT ABOVE WEIR SILL
L - LENGTH, DEPENDENT ON LENGTH OF GAUGE NEEDED

STAFF GAUGE
N.T.S.

50" FLOW MEASUREMENT STRUCTURE		
LOCATION OF FLOW MEASUREMENT LINES ON WEIR GAUGE		
F (CFS)	F (MI)	H (FT)
0	0	0.00
2	80	0.28
4	160	0.44
6	240	0.58
8	320	0.71
10	400	0.83
12	480	0.94
14	560	1.04
16	640	1.14
18	720	1.24
20	800	1.33
22	880	1.43
24	960	1.52
26	1040	1.60
28	1120	1.69
30	1200	1.77
32	1280	1.86
34	1360	1.94
36	1440	2.02
38	1520	2.10
40	1600	2.18

CFS - CUBIC FEET PER SECOND
MI - MINER'S INCHES
FT - FEET

NOTES:

1) STAFF GAUGES TO BE MADE OF NO. 18 GAUGE (U.S. STANDARD) MILD STEEL PLATE AND TO BE COVERED WITH VITREOUS ENAMEL WITH A MINIMUM THICKNESS OF 12 MILS ON NUMERAL SIDE AND 3 MILS ON THE REVERSE SIDE AND ON EDGES WHERE PLATE HAS BEEN CUT, PUNCHED, OR DRILLED.
2) ALL CUTTING, DRILLING, AND PUNCHING OF THE PLATES SHALL BE COMPLETED BEFORE THE VITREOUS ENAMEL IS APPLIED.
3) THE FACE OF THE GAUGE SHALL BE BRIGHT WHITE AND ALL NUMERALS AND GRADUATIONS SHALL BE BLACK.
4) GRADUATIONS SHALL BE SHARP AND ACCURATE TO THE DIMENSIONS SHOWN.
5) FOLLOWING CONSTRUCTION, ALL STAFF GAUGE CALIBRATION DATA INCLUDED IN THIS TABLE MUST BE VERIFIED.
6) POSITION ZERO REFERENCE ON STAFF GAUGE EXACTLY LEVEL WITH TOP OF WEIR SILL.

50" FLOW MEASUREMENT STRUCTURE STAFF GAUGE N.T.S. **1306**

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MARICOPA COUNTY FLOOD CONTROL DISTRICT
BEARDSLEY CANAL LINING REPLACEMENT

50" FLOW MEASURMENT STRUCTURE STAFF GAUGE

D - 4
SHEET 11 OF 11

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EXHIBIT B2

North Inlet Channel Improvements – Phase II

EXHIBIT B2

North Inlet Channel Improvements – Phase II

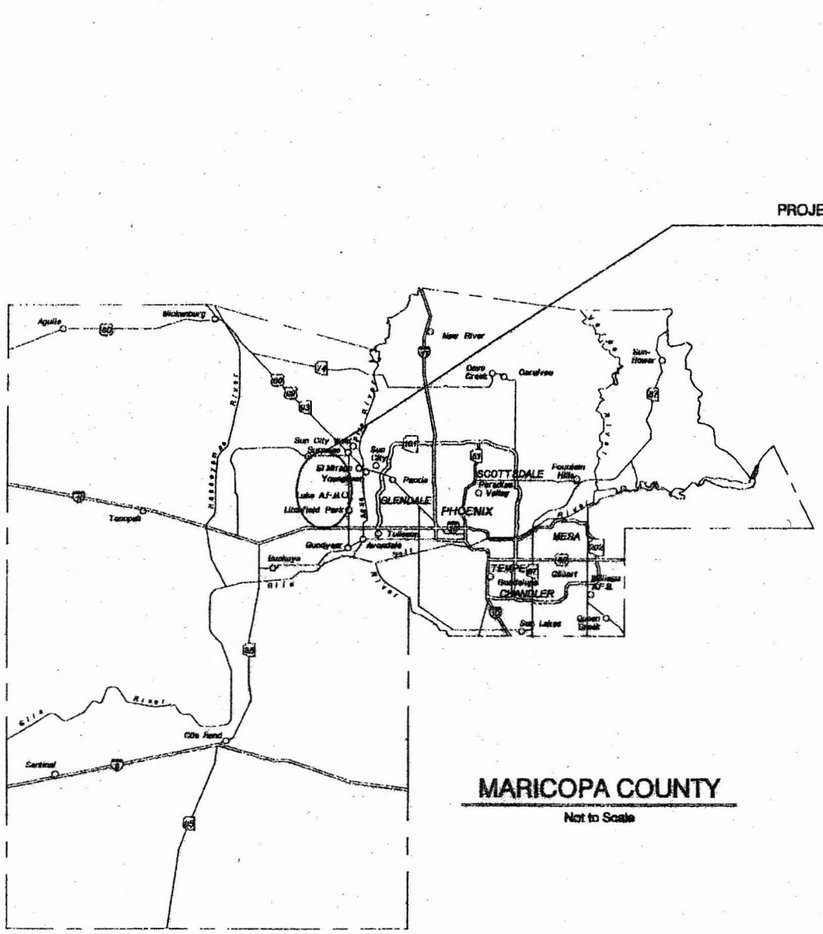
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

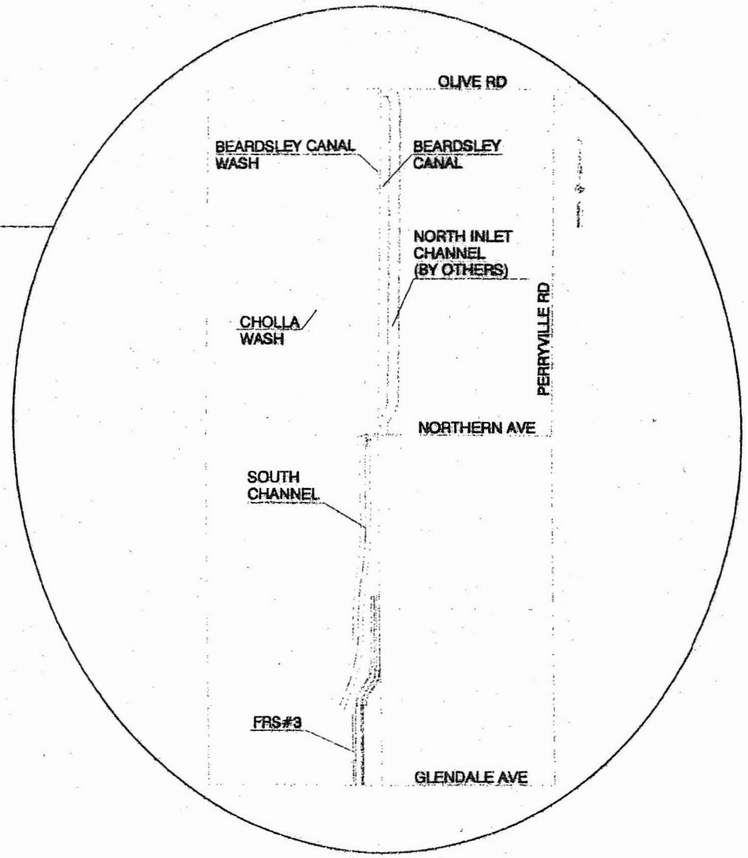
IN COOPERATION WITH MARICOPA COUNTY MUNICIPAL WATER CONSERVATION DISTRICT NO 1

PLANS FOR THE CONSTRUCTION OF

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3
NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL

PCN 470.04.31
FCD CONTRACT NO. 2007C021





KIRKHAM MICHAEL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ISSUE RECOMMENDED BY:

PROJECT MANAGER — DATE: 6-7-07

ISSUED FOR PUBLIC BIDDING BY:

CHIEF ENGINEER & GENERAL MANAGER

JAMES R. SWEENEY
GENERAL MANAGER, MARICOPA COUNTY MUNICIPAL WATER CONSERVATION DISTRICT NO. 1

DATE: 6/8/07

DATE

BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT

FULTON BROCK - CHAIRMAN

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

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

IN COOPERATION WITH MARICOPA COUNTY MUNICIPAL WATER CONSERVATION DISTRICT NO 1

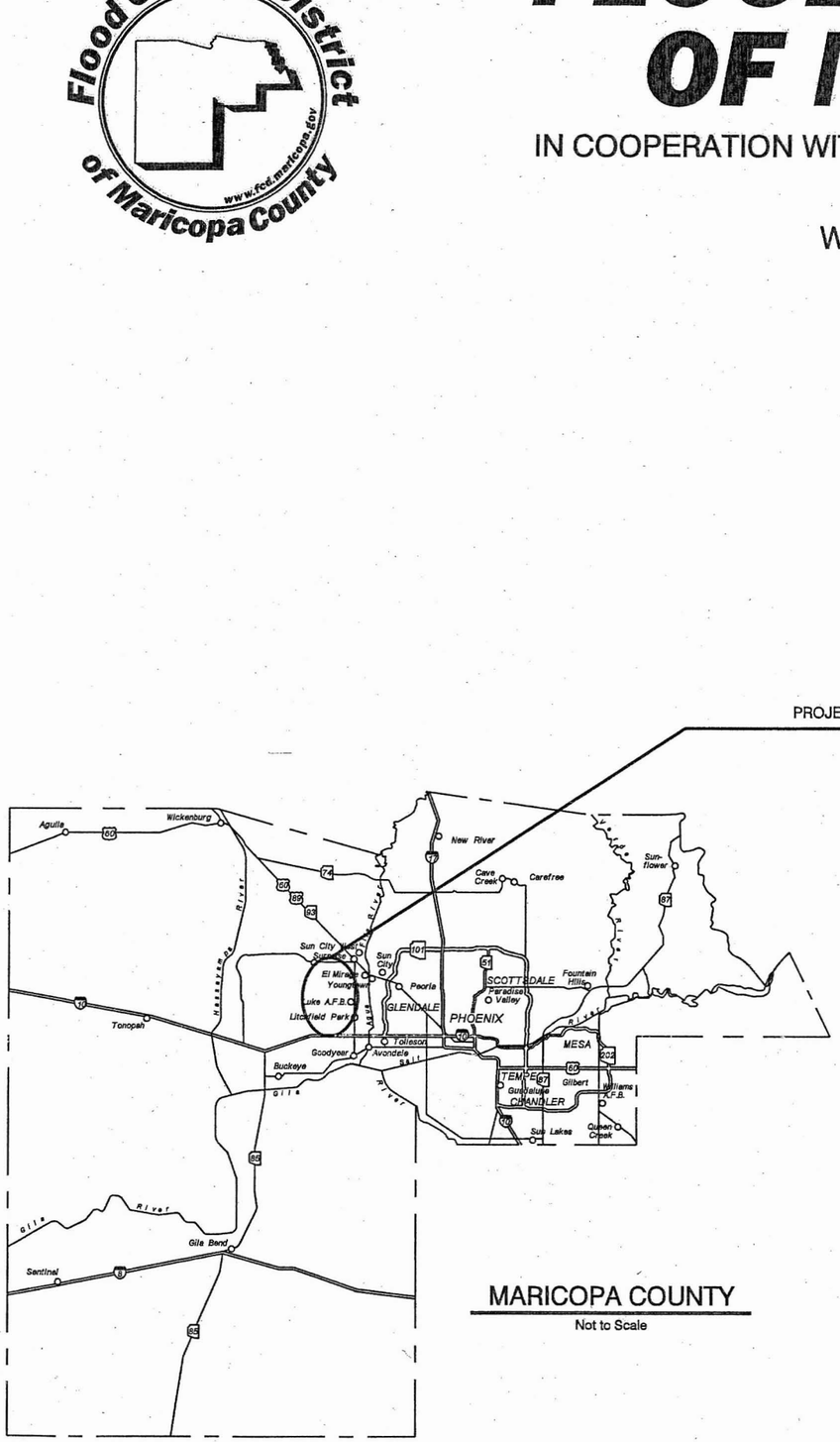
PLANS FOR THE CONSTRUCTION OF

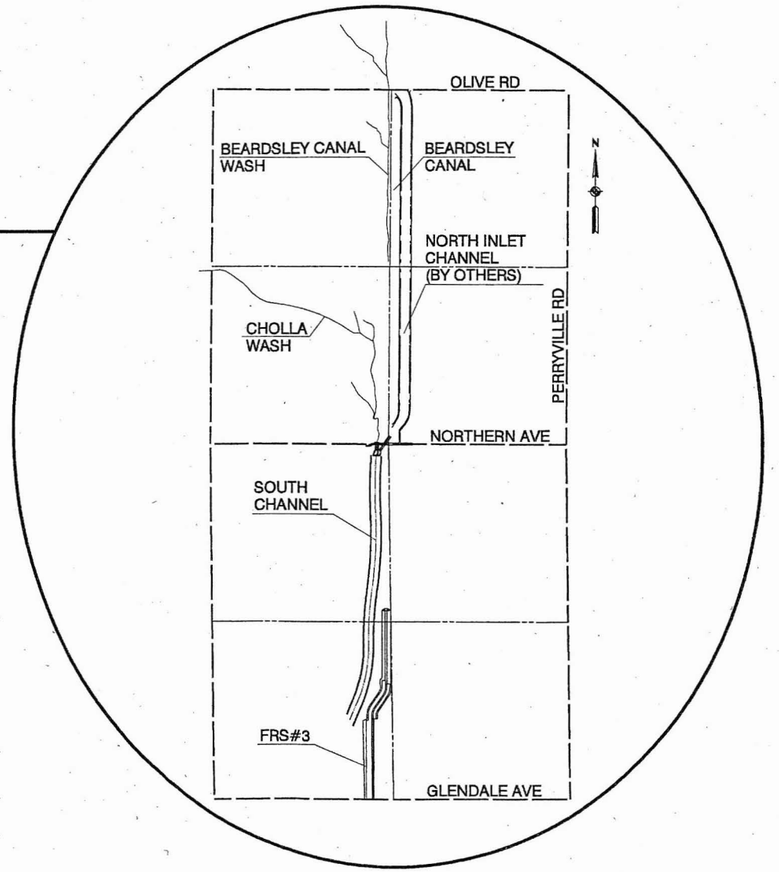
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3
NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL

PCN 470.04.31
FCD CONTRACT NO. 2007C021

FLOOD CONTROL DISTRICT
RECEIVED
JUN 05 '07

CH & GM	FINANCE
PIO	LANDS
ADMIN	O & M
REG	P & PM
ENG	PLE
CONTRACTS	
ROUTING	BAO





KIRKHAM MICHAEL
9201 North 25th Avenue - Suite 150
Phoenix, AZ 85021 (602)944-6564 Fax (602) 944-6592

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

ISSUE RECOMMENDED BY:

PROJECT MANAGER — DATE

ISSUED FOR PUBLIC BIDDING BY:

CHIEF ENGINEER & GENERAL MANAGER

JAMES R. SWEENEY
GENERAL MANAGER, MARICOPA COUNTY MUNICIPAL WATER CONSERVATION DISTRICT NO. 1

DATE — DATE

BOARD OF DIRECTORS OF THE FLOOD CONTROL DISTRICT

DON STAPLEY - CHAIRMAN

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

Legend

- BENCHMARK
- EXISTING SURVEY MONUMENT (BRASS CAP FLUSH)
- EXISTING SURVEY MONUMENT (BRASS CAP IN MANHOLE)
- EXISTING COMBINED CURB & GUTTER MAG
- DET 220 TYPE "A" EXISTING DITCH
- IR — EXISTING IRRIGATION LINE (NOTE - PRIVATE OR RWCD)
- EXISTING IRRIGATION STRUCTURE
- EXISTING IRRIGATION STANDPIPE
- W — EXISTING WATER LINE
- EXISTING FIRE HYDRANT
- EXISTING WATER METER & BOX
- EXISTING WATER VALVE
- SS — EXISTING SEWER LINE
- EXISTING MANHOLE
- SD — EXISTING STORM DRAIN
- EF — EXISTING EFFLUENT LINE
- TV — EXISTING UNDERGROUND CABLE TELEVISION
- E — EXISTING UNDERGROUND ELECTRIC
- 4D — EXISTING UNDERGROUND TELEPHONE DUCTS (SPECIFY NUMBER)
- G — EXISTING GAS LINE
- T — EXISTING UNDERGROUND TELEPHONE CABLE
- EXISTING TELEPHONE RISER
- EXISTING STREET SIGN
- STOP — EXISTING STOP SIGN
- EXISTING TRAFFIC SIGN
- EXISTING UTILITY POLE
- EXISTING WIRE FENCE
- EXISTING WOOD FENCE
- EXISTING CHAIN LINK FENCE
- GATE W/ POSTS
- MAIL BOX
- DOWN ANCHOR
- STREET LIGHT
- EASEMENT LINE
- EXISTING OR NEW R/W LINE
- PAVEMENT CENTER LINE AND OR MONUMENT LINE (℄ AND/OR ▯)
- C — CUT LINE
- F — FILL LINE
- GT — GEOTEXTILE BARRIER
- NEW WIRE FENCE
- 2 — BORING HOLE/NUMBER (SEE SPECIAL PROVISIONS)
- TREE

UTILITY NOTIFICATION

COMPANY	CONTACT	PHONE NUMBER
WATER UTILITY OF GREATER BUCKEYE	JACK MEISTER	(523) 386-4252 (602) 224-0711
BROADWING COMMUNICATIONS	NORMAN GARCIA	(512) 742-3827
QWEST	MATTHEW PHILLIPS	(602) 203-5873
MCI	PETE PHILLIPS/DAVE JORDON	(303) 214-7101 & (602) 241-6408
SOUTHWEST GAS	JEAN PACHECO	(602) 484-5277
APS	BOBBY GARZA	(602) 371-7989
COX COMMUNICATIONS	PHIL MASTERS	(623) 594-0505
MWD	CAROL URAINE	(623) 546-8266

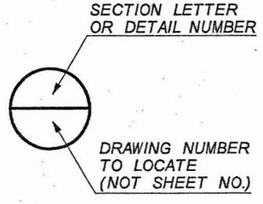
ABBREVIATIONS

℄	CENTERLINE
CSTR	CONSTRUCTION
DESC	DESCRIPTION
EQ	EQUAL
EXST	EXISTING
FOC	FIBRE OPTIC CABLE
OHE	OVERHEAD ELECTRIC
PG	PAGE
P/L	PROPERTY LINE
PRV	PRIVATE
R/W	RIGHT-OF-WAY
SPG	SPACING
UGT	UNDERGROUND TELEPHONE CABLE
TW	TOP OF WALL
TN	TOP OF NUT
MAG	MARICOPA ASSOCIATION OF GOVERNMENTS
EXPJT	EXPANSION JOINT
ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
PROP	PROPOSED
TOB	TOP OF BANK
SIC	SOUTH INLET CHANNEL
BCW	BEARDSLEY CANAL WASH
SRE	SONORAN RIDGE ESTATES
SWD	SIDEWASH DROP STRUCTURES

General Notes

1. ALL CONSTRUCTION TO BE PERFORMED ACCORDING TO APPLICABLE MAG STANDARD DETAILS AND MAG SPECIFICATIONS, INCLUDING REVISIONS 1998 THROUGH 2006, UNLESS OTHERWISE NOTED.
2. FACILITIES WHICH ARE NOT SPECIFICALLY LOCATED WITH ACTUAL HORIZONTAL AND VERTICAL CONTROLS ARE APPROXIMATE AND ARE SHOWN TO THE BEST AVAILABLE INFORMATION.
3. EXISTING UTILITIES AND OTHER FACILITIES HAVE BEEN PLACED ON THE PLANS FROM FIELD SURVEYS, EXISTING MAPS AND OTHER CURRENT PLANS WITHIN THE AREA OF THIS PROJECT. THE CONTRACTOR WILL DETERMINE THE EXACT LOCATION AND/OR ELEVATION OF EXISTING UTILITIES WHICH PERTAIN TO AND AFFECT THE CONSTRUCTION OF THIS PROJECT.
4. TWO (2) WORKING DAYS PRIOR TO EXCAVATING, THE CONTRACTOR SHALL CALL FOR BLUE STAKES AT THE BLUE STAKE CENTER (PHONE: 602-263-1100).
5. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PRIOR TO CONSTRUCTION.
6. ANY WORK PERFORMED WITHOUT THE APPROVAL OF THE FLOOD CONTROL DISTRICT AND/OR THE ENGINEER AND ALL WORK AND MATERIALS NOT IN CONFORMANCE WITH THE SPECIFICATIONS ARE SUBJECT TO REMOVAL AND REPLACEMENT AT THE CONTRACTOR'S EXPENSE.
7. THE ENGINEER WILL DETERMINE THE NUMBER AND LOCATION OF THE REQUIRED COMPACTION TESTS FOR STRUCTURAL BACK FILL.
8. ALIGNMENT AND PROFILE OF MAINTENANCE ROAD SHOWN ON THE PLANS IS APPROXIMATE. THE LOCATION AND PROFILE WILL BE ADJUSTED IN THE FIELD BY THE ENGINEER AFTER THE CONTRACTOR STAKES OUT THE ALIGNMENT SHOWN ON THE PLANS TO MISS EXISTING VEGETATION AND MATCH SURROUNDING TERRAIN.
9. THE AREA TO BE CLEARED AND GRUBBED SHALL BE STAKED OUT IN ADVANCE. ANY VARIATIONS WILL BE SUBJECT TO THE APPROVAL OF THE ENGINEER.
10. BEFORE BEGINNING ANY WORK, THE CONTRACTOR WILL DETERMINE ACCURACY OF BENCHMARK INFORMATION PROVIDED AND WILL SET ANY TEMPORARY BENCHMARKS NEEDED FOR CONSTRUCTION OF THIS PROJECT.
11. CONTRACTOR WILL LOCATE 1/2" REBAR FND AT NORTHERN AVENUE AND MIDSECTION LINE AND PROVIDE A TEMPORARY BENCHMARK BASED ON THIS POINT THAT CAN REMAIN IN PLACE DURING CONSTRUCTION OF THE ENTIRE PROJECT.
12. PRIOR TO FINAL APPROVAL AND ACCEPTANCE OF THE WORK, THE CONTRACTOR WILL BE REQUIRED TO CLEAN ADJACENT (OFF-PROJECT) ROADWAYS USED DURING THE COURSE OF CONSTRUCTION. SEE SUPPLEMENTAL GENERAL CONDITIONS, SECTION 107.9 FOR CLEANING OF STREETS DURING CONSTRUCTION.
13. AREA WITHIN CUT/FILL LINE SHOWN ON THE PLANS SHALL BE CLEARED, GRUBBED, GRADED AND HYDROSEEDED AS DESCRIBED IN THE SPECIAL PROVISIONS.
14. THE DISTURBED AREA BETWEEN THE CUT/FILL LINE AND THE RIGHT OF WAY LINE SHALL BE OVER SEEDED AS DESCRIBED IN THE SPECIAL PROVISION.
15. ALL WORK SHALL BE PERFORMED WITHIN FCDMC RIGHT OF WAY. CONTRACTOR TO LOCATE RIGHT OF WAY PRIOR TO CONSTRUCTION BEGINNING.

DRAWING NO	TITLE	SHEET NO
G1	COVER SHEET & VICINITY MAP	1
G2	GENERAL NOTES & INDEX	2
G4-G5	GEOMETRIC SHEETS	3-4
G6	TYPICAL SECTIONS	5
DT1	MISCELLANEOUS DETAILS	6
Q1	QUANTITY SUMMARY SHEET	7
C1-C5	PLAN & PROFILE SHEETS	8-12
ST1-ST4	OUTLET DROP STRUCTURE STRUCTURAL DETAILS	13-16
DS1	RIP RAP DROP STRUCTURE DETAILS	17
DS3-DS5	GROUTED BOULDER OUTLET DROP STRUCTURE	18-20
DS6	SIDEWASH DROP STRUCTURE DETAILS	21
DS7	GATE DETAIL	22
DS8-DS10	BOULDER PLACEMENT DETAILS	23-25
XS1-XS11	CROSS SECTIONS	26-36
	SURVEY CONTROL SHEET	



DETAIL REFERENCE

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

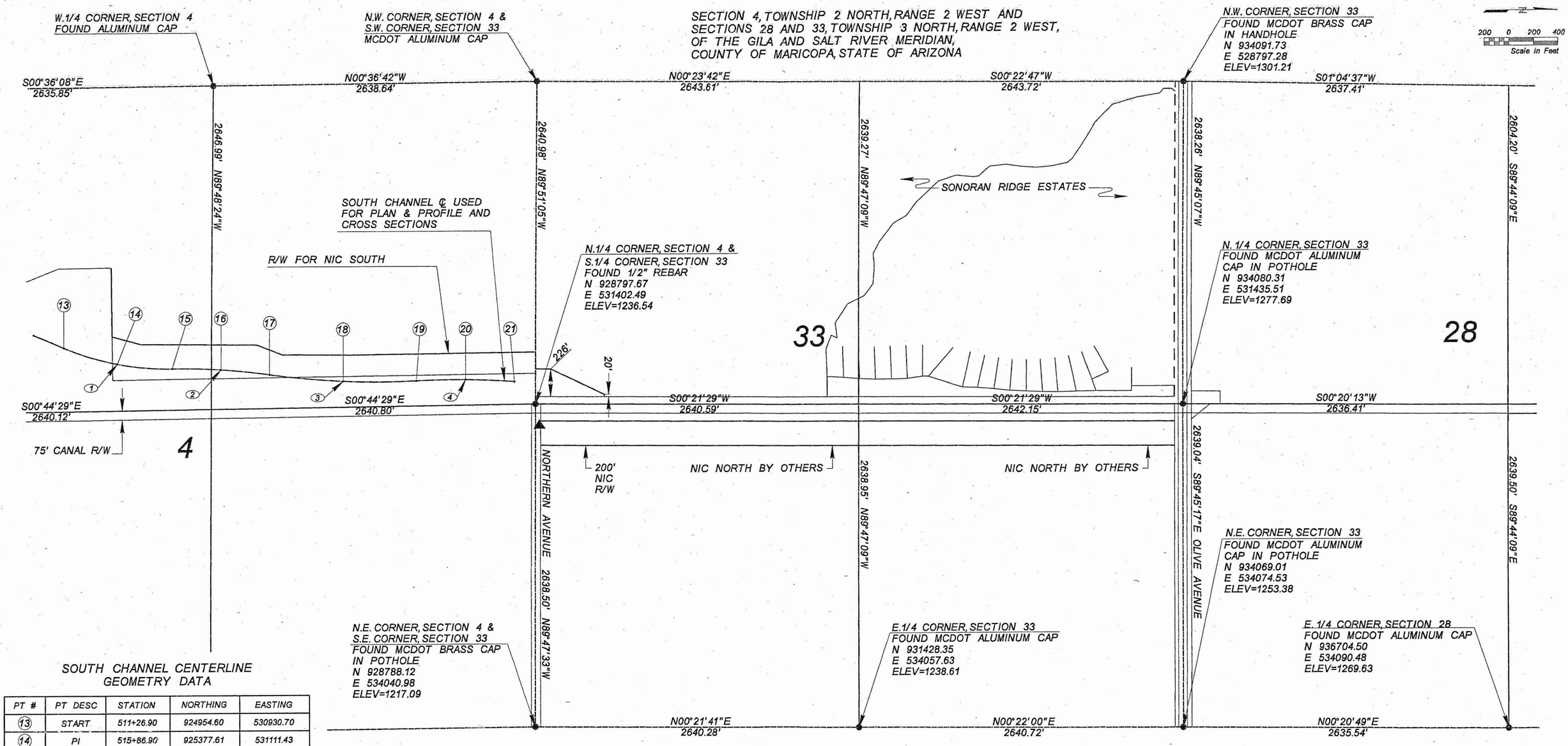
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

Registered Professional Engineer — 19146 — Barry J. Ling — 04/07 — Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO.		SHEET
G2	GENERAL NOTES & INDEX	2 36

SECTION 4, TOWNSHIP 2 NORTH, RANGE 2 WEST AND
SECTIONS 28 AND 33, TOWNSHIP 3 NORTH, RANGE 2 WEST,
OF THE GILA AND SALT RIVER MERIDIAN,
COUNTY OF MARICOPA, STATE OF ARIZONA



SOUTH CHANNEL CENTERLINE GEOMETRY DATA

PT #	PT DESC	STATION	NORTHING	EASTING
13	START	511+26.90	924954.60	530930.70
14	PI	515+86.90	925377.61	531111.43
15	PRC	520+33.41	925837.56	531104.48
16	PI	524+33.41	926237.52	531098.43
17	PRC	528+31.76	926633.49	531155.03
18	PI	534+31.76	927227.46	531239.92
19	PRC	540+28.08	927826.71	531209.92
20	PI	544+28.08	928226.21	531189.92
21	END	548+27.08	928625.16	531218.76

CURVE DATA

NO	LENGTH	CENTRAL ANGLE	RADIUS	TANGENT
1	906.51	24°00'00"	2164.13	460.00
2	798.35	9°00'00"	5082.48	400.00
3	1196.31	11°00'00"	6231.24	600.00
4	799.00	7°00'00"	6539.94	400.00

BASIS OF SURVEY

THE COORDINATES SHOWN ARE
US STATE PLANE 1983 (AT GROUND)
ZONE IS ARIZONA CENTRAL 0202
DATUM IS NAD 1983 (CONUS)
GEOID MODEL IS GEOID99 (CONUS)
THE PROJECT LOCATION USED IS A
CEI CONTROL POINT # 5000

LATITUDE=33°33'05.44869"
LONGITUDE=112°28'13.25470"
HEIGHT=1141.647

GROUND NORTHING=928752.397
GROUND EASTING=531387.997
ELEV=1234.665

THE GRID TO GROUND SCALE FACTOR USED IS
1.0001228150

▲ PROJECT BENCHMARK J265
N=928828.31, E=531580.08, Elev=1231.05

4" BRASS CAP IN A CONCRETE MONUMENT
STAMPED J 265 1948

VERTICAL DATUM NAVD88
(USED GDACS NFS CONTROL POINTS)

NOTE:
ADDITIONAL VERTICAL AND HORIZONTAL CONTROL POINTS ARE SHOWN ON RECORD OF SURVEY DATED 10-22-04 BY CONSULTANT ENGINEERING INC. (CEI) ATTACHED TO THESE DRAWINGS.

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

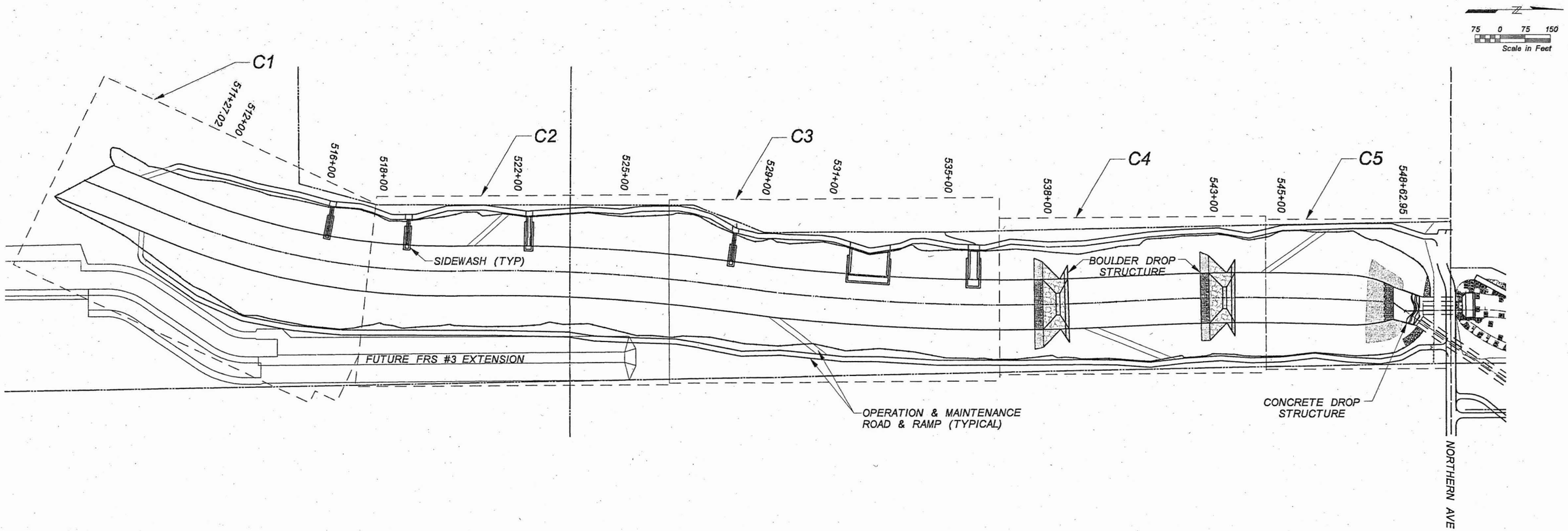
19146 Barry J. Ling — Expires 9/30/07 — ARIZONA, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. G4

GEOMETRIC SHEET

SHEET 3 3



NOTES

1. STATION AND OFFSET ARE BASED OFF SOUTH CHANNEL CONSTRUCTION CENTERLINE. SEE DWG NO G4 FOR GEOMETRIC LAYOUT.

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

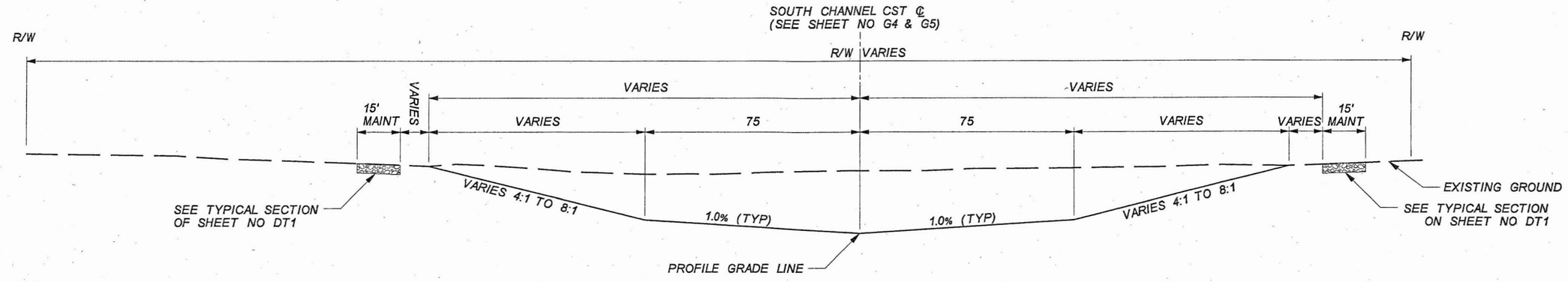
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

Registered Professional Engineer 19148 Barry J. Ling Date Signed 04/07/07 ARIZONA, U.S.A.

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO.		SHEET OF
G5	GEOMETRIC SHEET	4 36



STA 508+55.54 TO STA 548+27.08
SOUTH CHANNEL TYPICAL SECTION

NTS

NIC SOUTH INTERIM CHANNELIZATION NOTES

1. ALL TYPICAL SECTIONS ARE LOOKING NORTH UNLESS NOTED OTHERWISE
2. TRANSITION OF CHANNEL BOTTOM WIDTHS SHALL BE UNIFORM BETWEEN SECTIONS AT LOCATIONS SHOWN

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
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Registered Professional Engineer — Barry J. Ling — Date Signed — Arizona, U.S.A.

	BY	DATE
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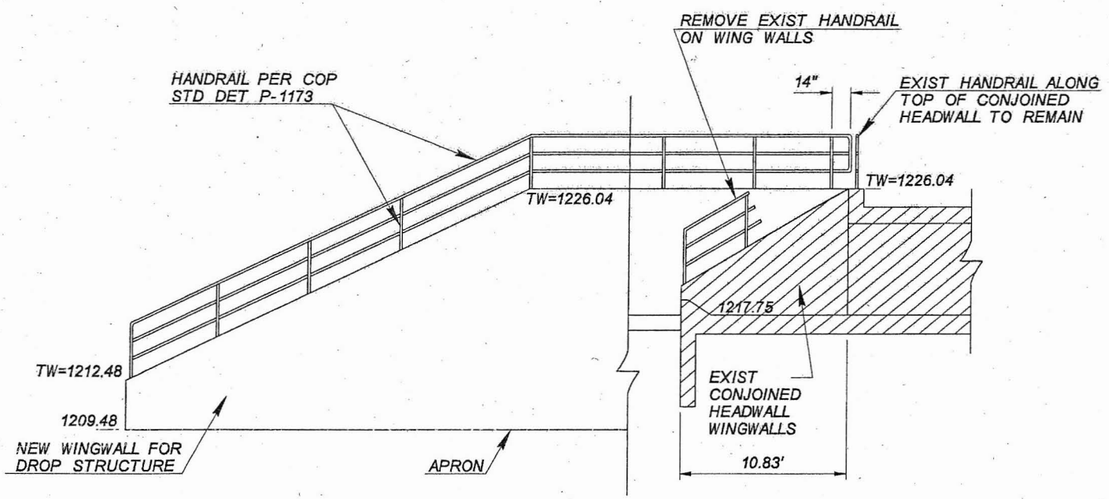
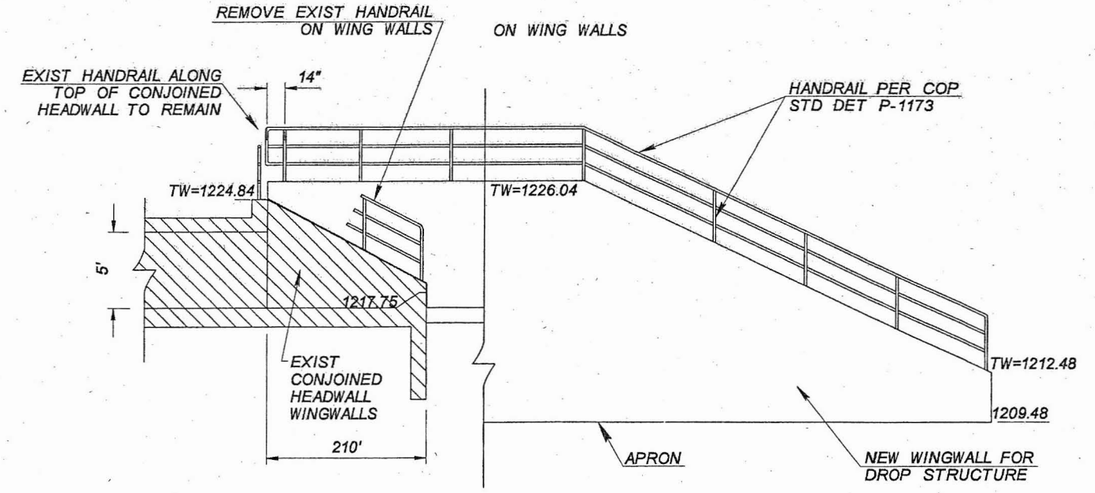
CHECKED	BJL	04/07

KIRKHAM MICHAEL

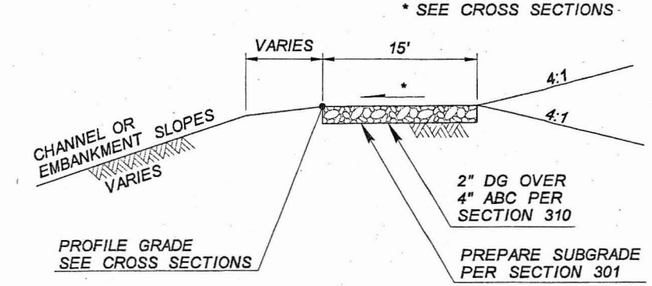
DRAWING NO.		SHEET O
G6	TYPICAL SECTIONS	5 36



PROFILE - DROP STRUCTURE WINGWALL RAILING DETAIL
WEST SIDE
NTS



PROFILE - DROP STRUCTURE WINGWALL RAILING DETAIL
EAST SIDE
NTS

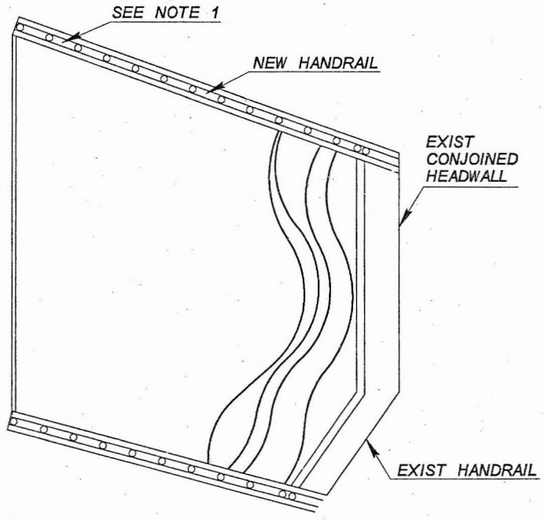


NOTE:
ALL MAINTENANCE ROADS WILL HAVE A MINIMUM 20' RADIUS ON ALL CURVES.
SEE NOTE 8 ON G2.

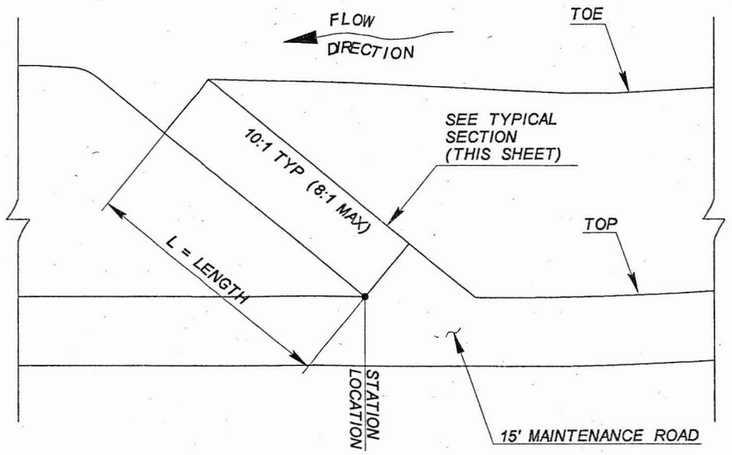
TYPICAL SECTION - MAINTENANCE ROAD
NTS

NOTES:

1. HANDRAIL TO EXTEND TO ENDS OF WINGWALLS
2. ALL HANDRAIL TO BE PAINTED PER SPECIAL PROVISIONS.
3. SEE DRAWINGS DS1 - DS2 FOR DROP STRUCTURE DIMENSIONS AND DRAWINGS ST1 - ST3 FOR STRUCTURE DETAILS
4. HANDRAIL COLOR TO MATCH NIC NORTH



CONCRETE DROP STRUCTURE PLAN



NOTE:
SEE PLAN/PROFILE SHEETS FOR MAINTENANCE RAMP LOCATIONS.

MAINTENANCE RAMP PLAN
NTS

NO.	REVISION	BY	DATE
3			
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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
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CHECKED	BJL	04/07

19148 Barry J. Ling

KIRKHAM MICHAEL

DRAWING NO. DT1

MISCELLANEOUS DETAILS

SHEET C
6 3

QUANTITY SUMMARY
SOUTH CHANNEL

BID No.	DESCRIPTION	UNIT	SHEET NUMBERS C1	C2	C3	C4	C5	TOTAL QUANTITY
201-1	CLEARING & GRUBBING	LS	-	-	-	-	-	1
215-1	NIC SOUTH CHANNEL EXCAVATION	CY	74082	113244	131819	136130	88787	544062
220-1	PLAIN DUMPED RIP RAP (D_{50}=18")	CY	-	-	-	-	2332	2332
220-2	PLACEMENT OF STOCKPILED DUMPED RIP RAP (D_{50}=18")	CY	-	-	-	-	380	380
310-1	ABC (4") (O&M ACCESS ROADS & RAMPS)	SY	2523	3269	4066	3488	2189	15535
344-1	DECOMPOSED GRANITE ROAD SURFACE	SY	2523	3269	4066	3488	2189	15535
344-2	NEW SURVEY MARKER	EA		1	1			2
350-1	REMOVAL, STORAGE AND REINSTALLATION OF EXISTING FRS#3 GATE	EA	-	-	-	-	1	1
350-2	REMOVAL AND DISPOSAL OF INERT MATERIAL ALLOWANCE	TON	-	-	-	-	-	50
350-3	REMOVAL AND DISPOSAL OF NON-INERT MATERIAL ALLOWANCE	TON	-	-	-	-	-	10
401-1	TRAFFIC CONTROL	LS	-	-	-	-	-	1
430-1	NATIVE SEEDING - MIX A	AC	6.3	6.9	7.3	5.9	4.1	30.5
430-2	NATIVE SEEDING - MIX B	AC	0.8	1.5	2.2	0.9	0.8	6.2
505-1	CONCRETE DROP STRUCTURE AT NORTHERN AVENUE	LS	-	-	-	-	1	1
507-1	DROP STRUCTURE (H=3.0')	EA	-	-	-	2	-	2
507-2	SIDEWASH DROP STRUCTURE NO. 2	EA	1	-	-	-	-	1
507-3	SIDEWASH DROP STRUCTURE NO. 3	EA	-	1	-	-	-	1
507-4	SIDEWASH DROP STRUCTURE NO. 4	EA	-	1	-	-	-	1
507-5	SIDEWASH DROP STRUCTURE NO. 5	EA	-	-	1	-	-	1
507-6	SIDEWASH DROP STRUCTURE NO. 6	EA	-	-	1	-	-	1
507-7	SIDEWASH DROP STRUCTURE NO. 7	EA	-	-	1	-	-	1
507-8	ADDITIONAL AESTHETIC BOULDERS OUTSIDE OF STRUCTURES	LS	-	-	-	-	-	1
520-1	HANDRAIL	LF	-	-	-	-	171	171
520-2	MAINTENANCE ROAD SECURITY GATE	EA	-	-	-	-	1	1

NO.	REVISION	BY	DATE
3			
2			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
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CHECKED	BJL	04/07

Registered Professional Engineer — Barry J. Ling — Date Signed — Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. Q1

QUANTITY SUMMARY SHEET

SHEET 0 7 36

NOTE:
MIX B SEEDING TO COVER ONLY THE DISTURBED AREA ALONG THE MAINTENANCE ROAD IN THE FRS#3 AREA

508+55.54
510+00
515+00
517+50
MATCHLINE STA 517+50

MIX B SEEDING TYPICAL
MIX A SEEDING TYPICAL
R/W
N 925532.15
E 530908.25
N 925217.70
E 530844.13
N 925138.84
E 530820.10
N 925046.27
E 530799.74
N 924986.60
E 530784.20
N 924959.33
E 530784.86
N 925447.06
E 530900.88
N 925348.20
E 530872.82
N 924867.89
E 530813.39
N 924889.56
E 530822.34
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N 925039.01
E 531180.67
N 925177.30
E 531242.52
N 925324.98
E 531273.46
N 925474.65
E 531286.71

SOUTH CHANNEL ℄
FLOW
FRS#3 IMPOUNDMENT AREA
150' BW
TOP OF SLOPE
EXST FRS#3 DAM
FRS#3 DAM EXTENSION (BY OTHERS)
MID-SECTION LINE S 0°44'29" E

6:1
8:1
7:1

Scale in Feet: 20 0 20 40

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

EXST GROUND @ LT BANK
EXST GROUND @ RT BANK
EXST GROUND @ CHANNEL ℄
100. YR. HGL
BEGIN SOUTH CHANNEL STA 508+55.54 INV ELEV = 1200.50
S=0.0055'/ft
STA 511+26.90 Elev 1202.00
SOUTH CHANNEL INVERT
S=0.0004'/ft
STA 517+50 INV ELEV = 1202.26

1216
1212
1208
1204
1200

509+00 510+00 511+00 512+00 513+00 514+00 515+00 516+00 517+00

REMOVE

CONSTRUCT

(1)	O&M ROAD PER TYPICAL SECTION DWG NO DT1	2318	SY
(2)	SOUTH CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO G6 AND PER CROSS SECTION DWG NO'S XS1 - XS3	74082	CY
(3)	NATIVE SEEDING - MIX A	6.3	AC
	NATIVE SEEDING - MIX B	0.8	AC
(4)	CONTRACTOR TO EXTEND EXCAVATION DOWNSTREAM 300' ± TO WORK SIDESLOPES AND BOTTOM INTO NATURAL CONTOURS WITHOUT CAUSING A FLOW RESTRICTION		
(5)	SWD2 - GROUTED BOULDER DROP STRUCTURE PER DETAIL ON DWG NO DS6	1	EA
(12)	O&M RAMP PER DETAIL DWG NO. DT1	205	SY

C1

SHEET INDEX MAP

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO.	PLAN AND PROFILE	SHEET O
C1	STA 507+65 TO STA 517+50	8 36

N 925624.34
E 530941.22

N 925698.30
E 530941.29

MIX B SEEDING TYPICAL

N 925904.09
E 530914.84

N 925980.65
E 530933.69

N 926037.17
E 530932.91

R/W

N 926214.97
E 530922.51

N 926311.80
E 530929.17

N 926373.73
E 530921.33

520+00

525+00

N 925961.21
E 530930.82

N 925791.09
E 530916.18

N 925676.45
E 530941.27

N 925849.35
E 531029.38

N 925872.26
E 531029.18

MID-SECTION LINE
N 0°89'48"24"W
2646.98'

MATCH LINE STA 517+50

MATCH LINE STA 526+50

MIX A SEEDING TYPICAL

DENSE VEG

150' BW

SOUTH CHANNEL ℄

FLOW

MIX B SEEDING TYPICAL

N 925697.38
E 531288.82

N 925930.93
E 531291.04

N 926155.41
E 531297.37

N 926231.57
E 531309.49

N 926342.40
E 531315.45

MIX B SEEDING TYPICAL

NOTE:
MIX B SEEDING TO COVER ONLY THE DISTURBED AREA ALONG THE MAINTENANCE ROAD IN THE FRS#3 AREA

FRS#3 DAM EXTENSION (BY OTHERS)

MID-SECTION LINE S 0°44'29"E 2640.12'

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

N
20 0 20 40
Scale in Feet

EXST GROUND @ LT BANK

EXST GROUND @ RT BANK

EXST GROUND @ CHANNEL ℄

100 YR HGL

STA 517+50
INV ELEV = 1202.26

SOUTH CHANNEL INVERT

S=0.0004'/ft

STA 526+50
INV ELEV = 1202.62

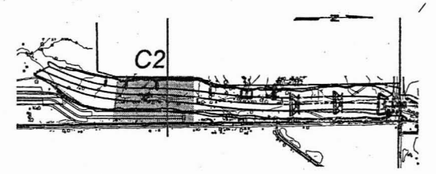
1224
1220
1216
1212
1208
1204
1200

518+00 519+00 520+00 521+00 522+00 523+00 524+00 525+00 526+00

☐ REMOVE ☐

◯ CONSTRUCT ◯

(1)	O&M ROAD PER TYPICAL SECTION DWG NO DT1	3024	SY
(2)	SOUTH CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO G6 AND PER CROSS SECTION DWG NO'S XS3 - XS5	113244	CY
(3)	NATIVE SEEDING - MIX A NATIVE SEEDING - MIX B	6.9 1.5	AC AC
(7)	SWD3 - GROUTED BOULDER DROP STRUCTURE PER DETAIL ON DWG NO DS6	1	EA
(8)	SWD4 - GROUTED BOULDER DROP STRUCTURE PER DETAIL ON DWG NO DS6	1	EA
(12)	O&M RAMP PER DETAIL DWG NO. DT1	245	SY
(24)	NEW SURVEY MARKER PER MAG STD DETAIL 120-2, TYPE "D" AT STA 523+00, 190' LT	1	EA



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
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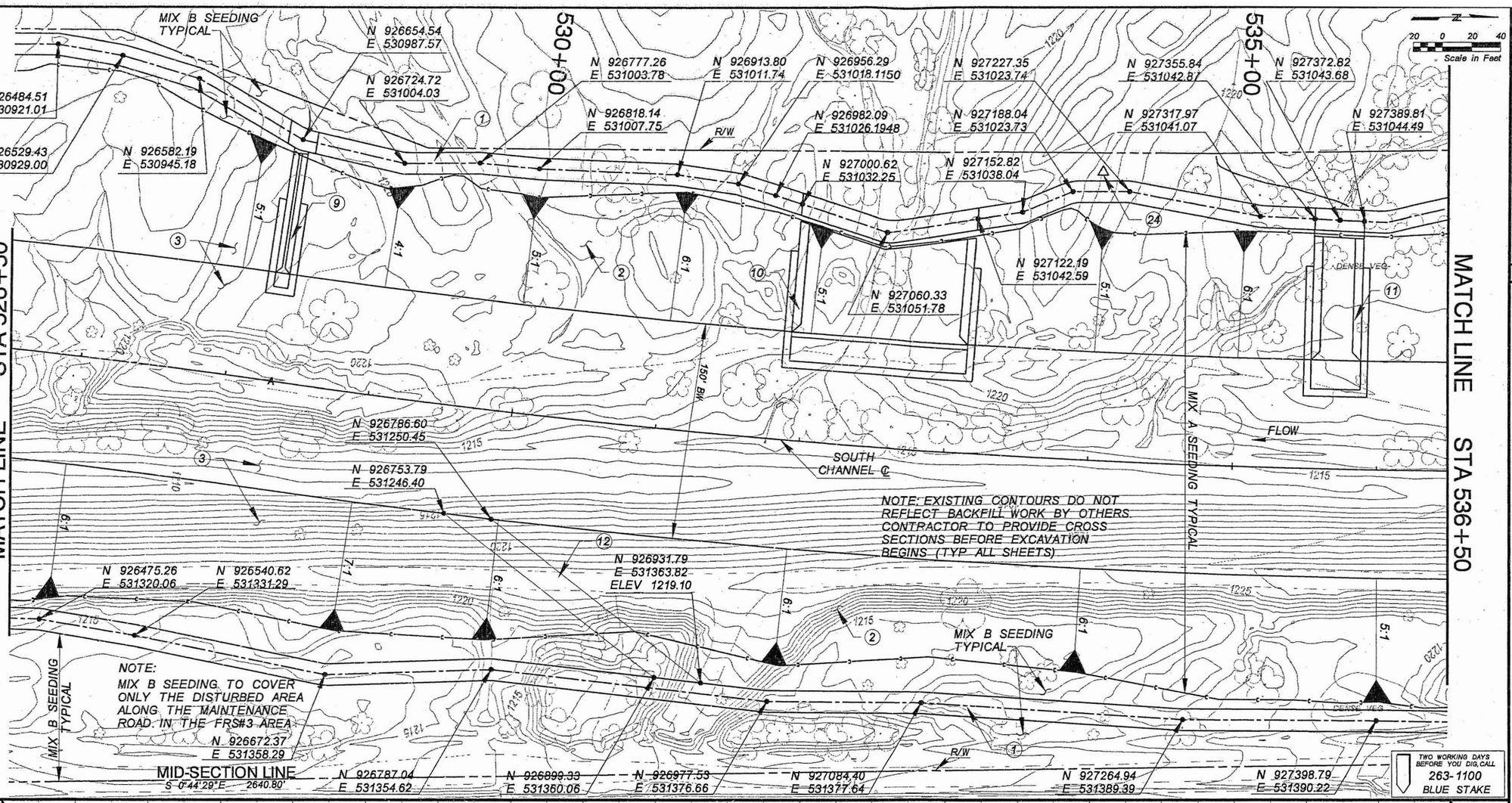
19146 Barry J. Ling — 04-8-07 — ARIZONA, U.S.A.

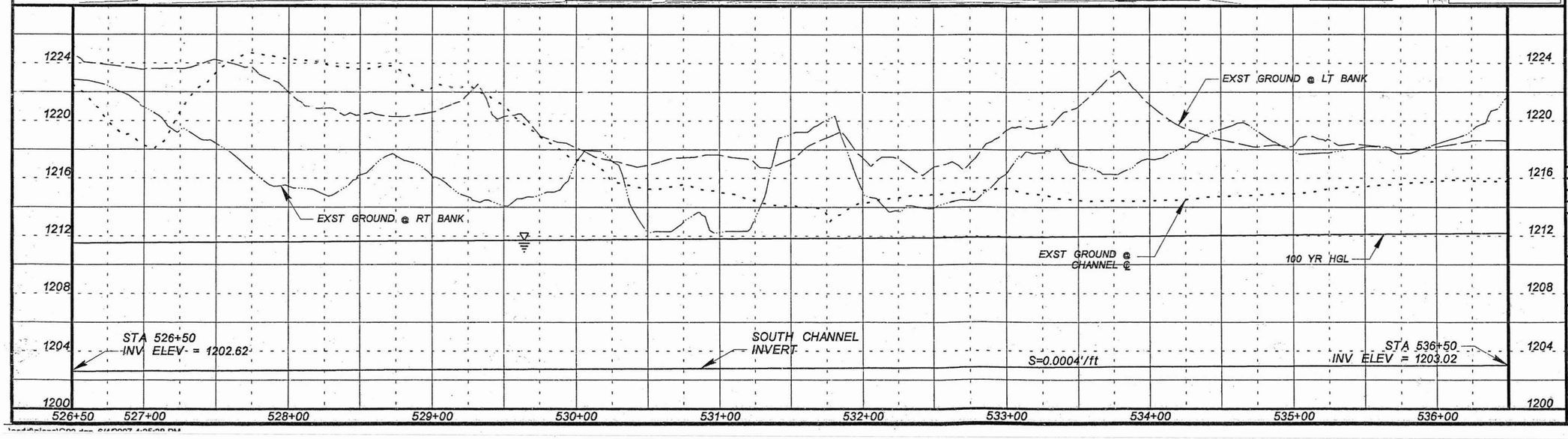
KIRKHAM MICHAEL

DRAWING NO. C2

PLAN AND PROFILE
STA 517+50 TO STA 526+50

SHEET NO 9 36

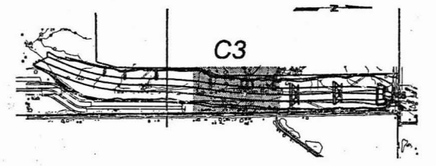




REMOVE

CONSTRUCT

(1)	O&M ROAD PER TYPICAL SECTION DWG NO DT1	3718	SY
(2)	SOUTH CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO G6 AND PER CROSS SECTION DWG NO'S XS6 -XS8	131819	CY
(3)	NATIVE SEEDING - MIX A NATIVE SEEDING - MIX B	7.3 2.2	AC AC
(9)	SWD5 - GROUTED BOULDER DROP STRUCTURE PER DETAIL DWG NO DS6	1	EA
(10)	SWD6 - GROUTED BOULDER DROP STRUCTURE PER DETAIL DWG NO DS6	1	EA
(11)	SWD7 - GROUTED BOULDER DROP STRUCTURE PER DETAIL DWG NO DS6	1	EA
(12)	O&M RAMP PER DETAIL DWG NO DT1	348	SY
(24)	NEW SURVEY MARKER PER MAG STD DETAIL 120-2, TYPE "D" AT STA 534+00, 200' LT	1	EA



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

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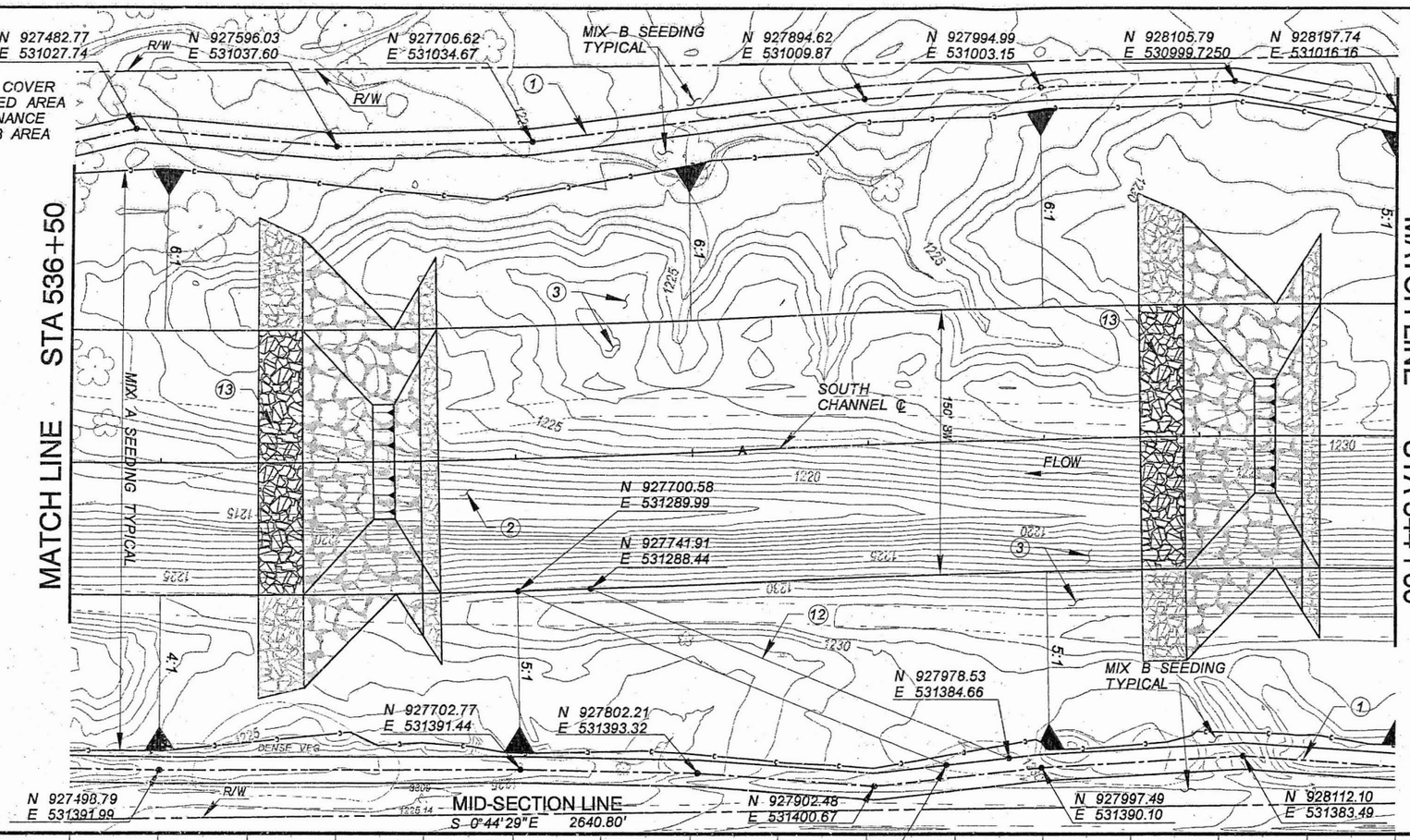
KIRKHAM MICHAEL

DRAWING NO. C3

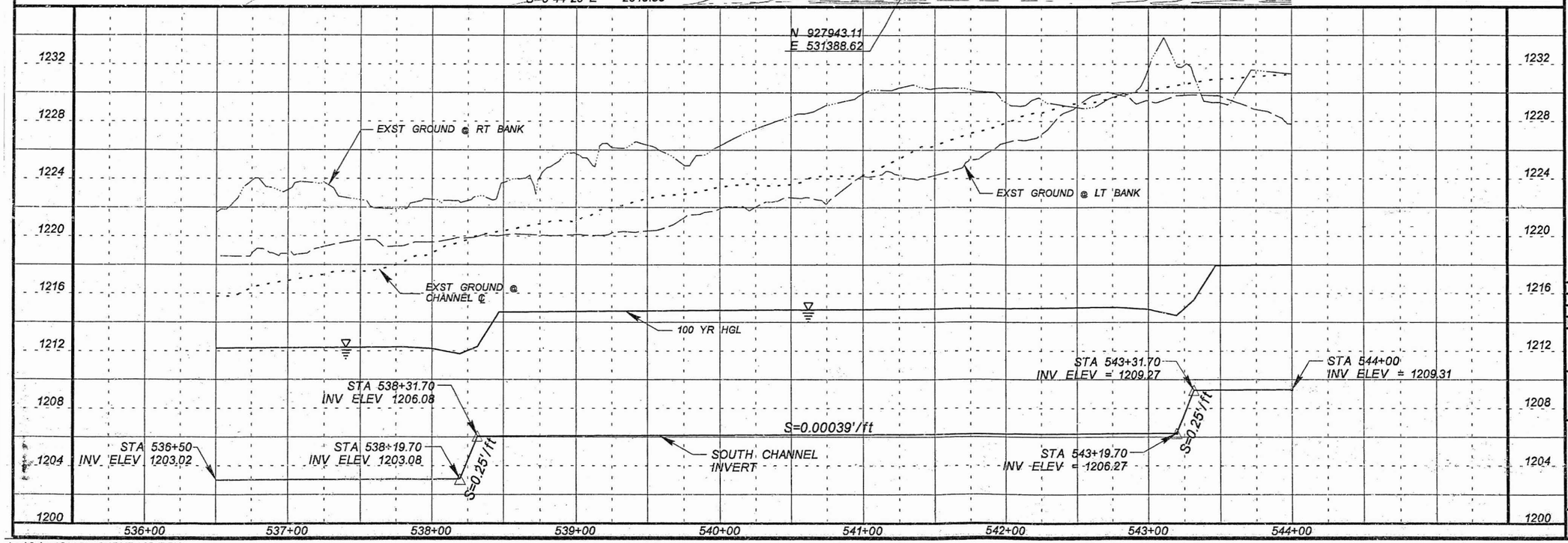
PLAN AND PROFILE STA 526+50 TO STA 536+50

SHEET C 10 36

NOTE:
MIX B SEEDING TO COVER ONLY THE DISTURBED AREA ALONG THE MAINTENANCE ROAD IN THE FRS#3 AREA



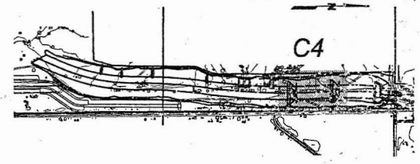
TWO WORKING DAYS BEFORE YOU DIG, CALL 263-1100 BLUE STAKE



REMOVE

CONSTRUCT

(1)	O&M ROAD PER TYPICAL SECTION DWG NO DT1	2999	SY
(2)	SOUTH CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO G6 AND PER CROSS SECTION DWG NO'S XS8 - XS10	136130	CY
(3)	NATIVE SEEDING - MIX A NATIVE SEEDING - MIX B	5.9 0.9	AC AC
(12)	O&M RAMP PER DETAIL DWG NO DT1	489	SY
(13)	DROP STRUCTURE PER DETAILS ON DWG NO'S DS3, DS4, DS5 AND PER PLAN/PROFILE THIS SHEET	2	EA



SHEET INDEX MAP

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
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CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO.	PLAN AND PROFILE STA 536+50 TO STA 544+50	SHEET
C4		11 3

NOTE:
MIX B SEEDING TO COVER ONLY THE DISTURBED AREA ALONG THE MAINTENANCE ROAD IN THE FRS#3 AREA

N 928298.48
E 530993.45

N 928411.94
E 530998.98

N 928439.47
E 530998.40

N 928510.19
E 530989.62

N 928621.90
E 530989.89

N 928718.30
E 531021.44

N 928770.32
E 531021.44

N 928787.51
E 531353.49

N 928704.60
E 531354.26

N 928602.17
E 531392.91

N 928494.86
E 531389.74

N 928433.63
E 531382.32

N 928392.81
E 531376.76

N 928263.03
E 531388.90

N 928256.58
E 531127.64

N 928231.70
E 531127.21

MATCH LINE STA 544+00

MATCH LINE STA 550+00

MIX A SEEDING TYPICAL

MIX B SEEDING TYPICAL

MIX B SEEDING TYPICAL

SEE SHEET DS1 FOR DETAILS

SOUTH CHANNEL ℄

FLOW

NORTHERN AVE

20' R

SECTION LINE

MID-SECTION LINE
S 0°44'29"E 2640.80'

N 926204.00
E 531389.97

N 928298.80
E 531387.58

N 928585.82
E 531395.58

N 928647.10
E 531385.31

EXST GROUND @ LT BANK

EXST GROUND @ RT BANK

EXST GROUND @ CHANNEL ℄

EXST NORTHERN AVE ELEV = 1236.0

TOP OF WALL ELEV = 1226.04

EXST RCB @ NORTHERN AVE

100 YR HGL

STA 544+00
INV ELEV 1209.31

S=0.0004'/ft

SOUTH CHANNEL INVERT

BEGIN DROP STRUCTURE
STA 548+27.08
INV ELEV = 1209.48

END OF EXST APRON
STA 549+05.08
ELEV = 1217.75

= STA 548+62.95 SOUTH CHANNEL
= STA 548+62.95 BEARDSLEY WASH
= 150+00 NORTH INLET CHANNEL (NIC)

1238
1234
1230
1226
1222
1218
1214
1210
1206

544+00 545+00 546+00 547+00 548+00 549+00 550+00 551+00

N
20 0 20 40
Scale in Feet

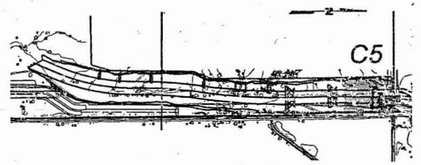
TWO WORKING DAYS BEFORE YOU DIG, CALL 263-1100 BLUE STAKE

REMOVE

1	REMOVE 18" RIPRAP AND STOCKPILE FOR REUSE PER DETAIL DS1	380	CY
2	REMOVE FRS # 3 ACCESS GATE AND STORE	1	EA
3	REMOVE EXISTING HANDRAIL (NPI)	28	LF

CONSTRUCT

(1)	O&M ROAD PER TYPICAL SECTION DWG NO DT1	1816	SY
(2)	SOUTH CHANNEL EXCAVATION PER LIMITS SHOWN, PER TYP SECTION DWG NO G6 AND PER CROSS SECTION DWG NO'S XS10 - XS11	88737	CY
(3)	NATIVE SEEDING - MIX A NATIVE SEEDING - MIX B	4.1 0.8	AC AC
(12)	O&M RAMP PER DETAIL DWG NO DT1	373	SY
(14)	RE-INSTALL 30" STOCKPILED D_{50} 18" RIPRAP WITH FILTER FABRIC ON ALL SLOPES GREATER THAN 4:1 AROUND STRUCTURES	380	SY
(15)	HANDRAIL PER COP STD DETAIL P-1173 AND PER DETAIL DWG NO DT1 PAINT PER SPECIFICATIONS	171	LF
(16)	RE-INSTALL FRS #3 ACCESS GATE	1	EA
(19)	30" DUMPED RIPRAP D_{50} = 18" WITH FILTER FABRIC	1734	CY
(20)	OUTLET DROP STRUCTURE PER DETAILS DWG NO'S ST1 TO ST4	1	EA
(21)	INSTALL NEW GATE WEST SIDE O&M ROAD PER DETAIL DS-2	1	EA
(22)	EXTEND EARTH BERM TO NEW GATE (NOT A PAY ITEM)		
(23)	5.5' DUMPED RIPRAP D_{50} =18" WITH FILTER FABRIC	598	CY



SHEET INDEX MAP

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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
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KIRKHAM MICHAEL

DRAWING NO.	PLAN AND PROFILE	SHEET OF
C5	STA 544+50 TO STA 550+00	12 36

RIPRAP

D ST2

83'-0"

WINGWALL

HEAVY BROOM FINISH PERPENDICULAR TO WEST WINGWALL

47'-0"

WEEP HOLES @ 6'-0" CC

70'±

EXISTING RIPRAP

C ST2

BEGIN 5.5' RIP RAP AT STA. 548+00.00

#5 @ 8" (TOP) EACH DIRECTION
#5 @ 1'-0" (BOTTOM) EACH DIRECTION. SEE DETAIL THIS SHEET.

98'-0"

STA 548+27.08

CONCRETE APRON

EXST APRON

4-12X6 RCB

A ST4

SEE DETAIL SHEET ST3

FLOW

G ST4

51'-0"

STA 548+62.95
= STA 150+00.00 NIC

HEAVY BROOM FINISH TO MATCH CONTOURS ON STEPS

DUMPED RIPRAP
D_{50}'=18"

WINGWALL

B ST4

3-10X5 RCB

70'±

63'-0"

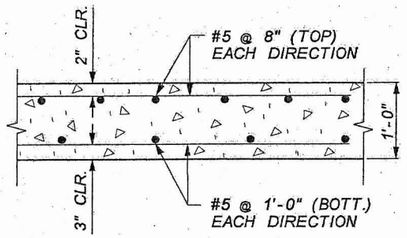
E ST2

FLOW

RIPRAP

EXISTING RIPRAP

DROP STRUCTURE PLAN
NTS



CONCRETE APRON
NTS

FOR EXPANSION AND CONSTRUCTION JOINT DETAIL SEE SHEET ST4

GENERAL NOTES:

1. ALL GENERAL NOTES IN ADOT STANDARD B-18.10 ARE APPLICABLE FOR THESE SHEETS.

2. FOR RETAINING WALL REINF. AND SIZE, REF. ADOT STANDARD B-18.20. USE TABLE FOR CASE III-SLOPING FILL.

3. FORMLINER TO BE USED ON ALL EXPOSED VERTICAL SURFACES. SEE SPECIAL PROVISIONS.

4. REFER TO ADOT STANDARD B-06.20, B-06.30 AND B-06.40 FOR EXISTING APRON REINFORCEMENT.

5. ALL REINFORCING STEEL HAVE 2 INCH CLEAR COVER UNLESS NOTED OTHERWISE.

STRESS
CLASS 'S' CONCRETE.....f'c = 3000 psi
GRADE 60 REINFORCING STEEL.....fs = 24000 psi

6. THE SOILS BENEATH THE CONCRETE DROP STRUCTURE (INCLUDING THE WINGWALL FOUNDATION AND THE CONCRETE SLAB) SHALL BE REMOVED AND RECOMPACTED TO AN ELEVATION OF 1205.00 AND BE RECOMPACTED TO 95% IN ACCORDANCE WITH ASTM D 698-00 AT A MOISTURE CONTENT WITHIN 2% OF OPTIMUM.

7. PROVIDE 3/4" CHAMFER ON ALL EXPOSED EDGES. PER MAG STD 505-2.

NO.	REVISION	BY	DATE
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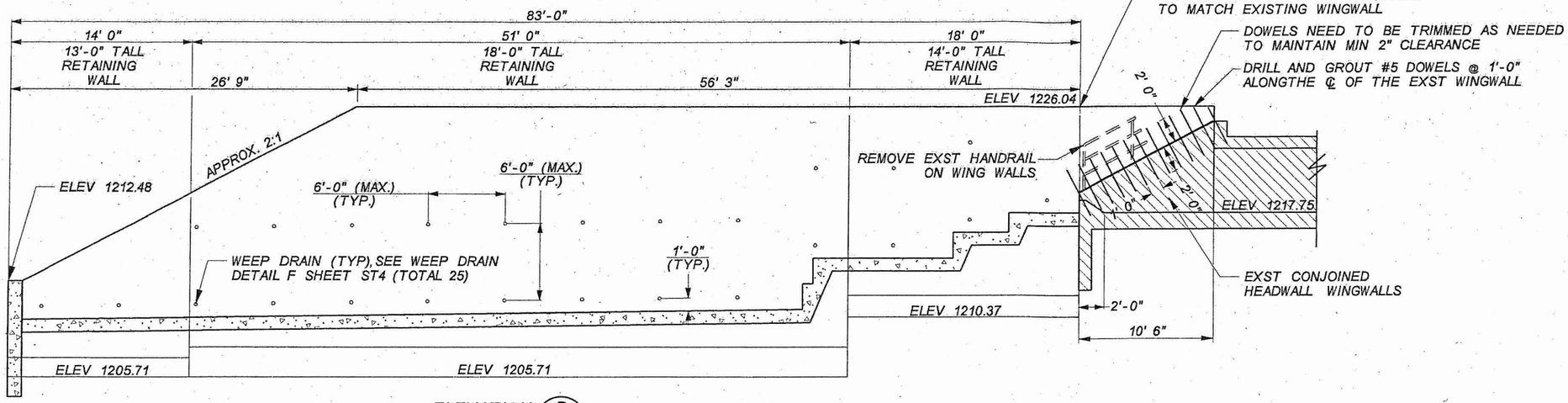
KIRKHAM MICHAEL

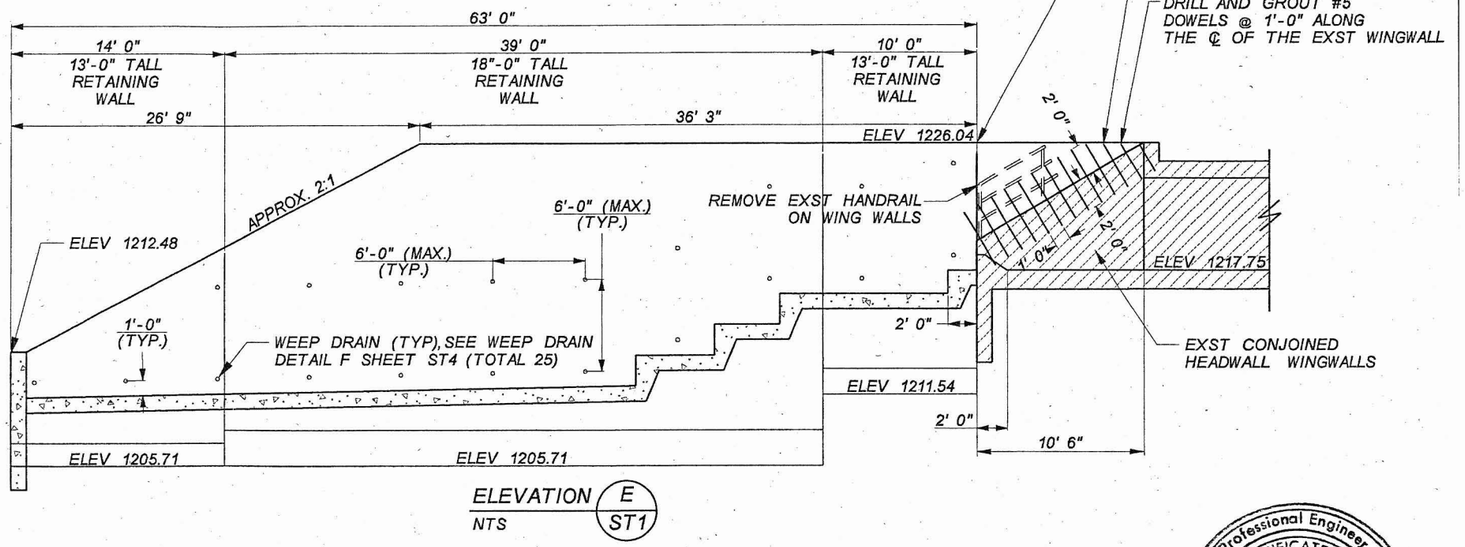
DRAWING NO. ST1

OUTLET DROP STRUCTURE

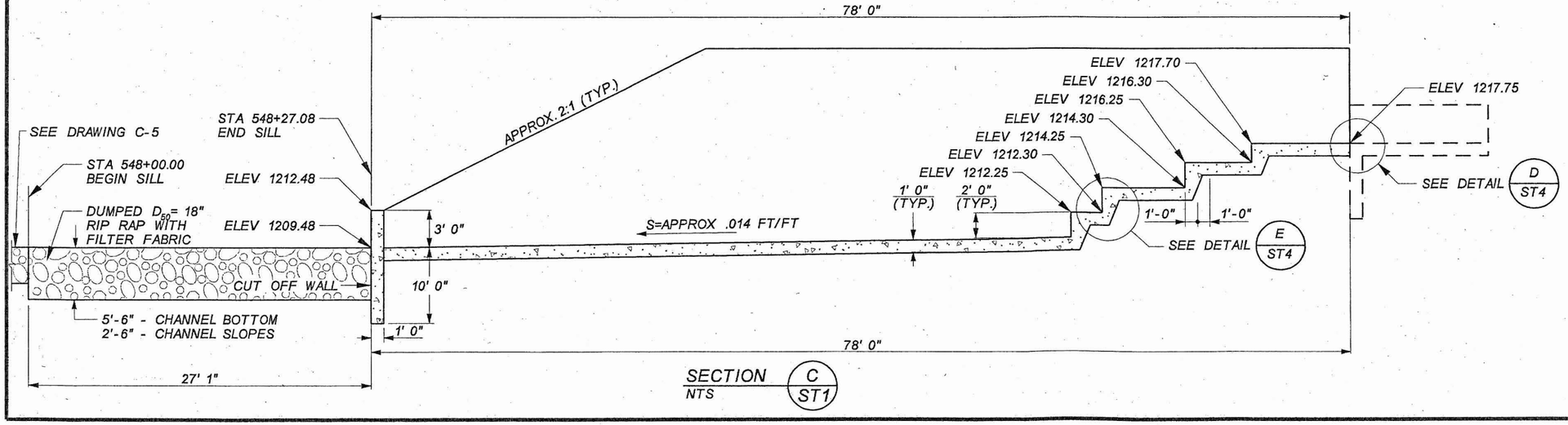
SHEET 13 36



ELEVATION D / ST1
NTS



ELEVATION E / ST1
NTS



SECTION C / ST1
NTS

Registered Professional Engineer (Structural)
CERTIFICATE NO.
21987
STEVEN D. KNEIP
Date Signed 6-1-07
ARIZONA, U.S.A.

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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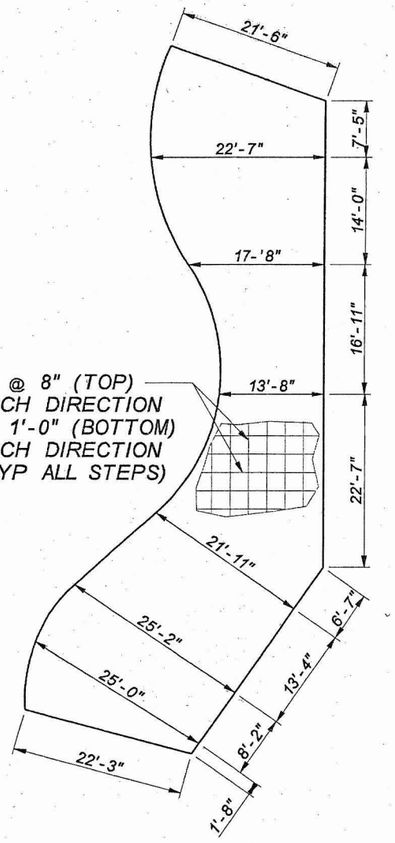
KIRKHAM MICHAEL

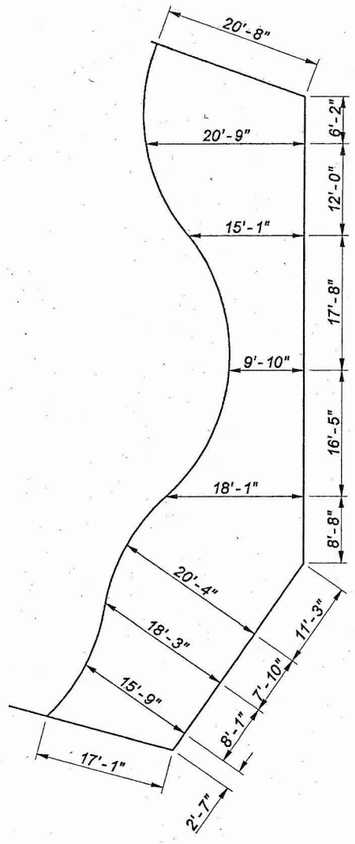
DRAWING NO. ST2

OUTLET DROP STRUCTURE

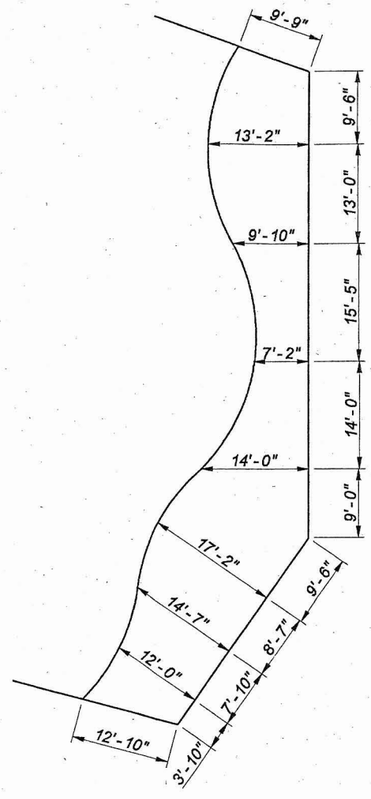
SHEET OF 14 36



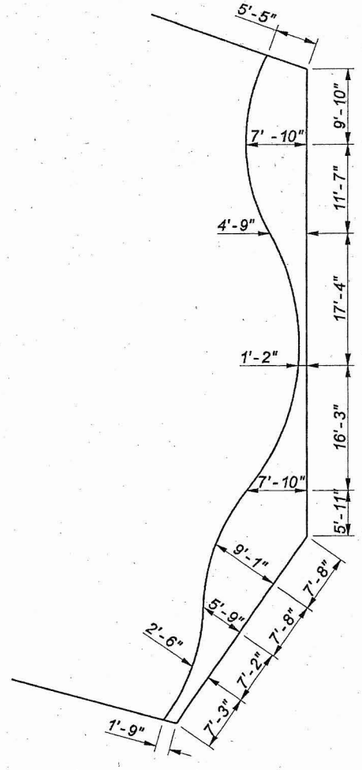
STEP D



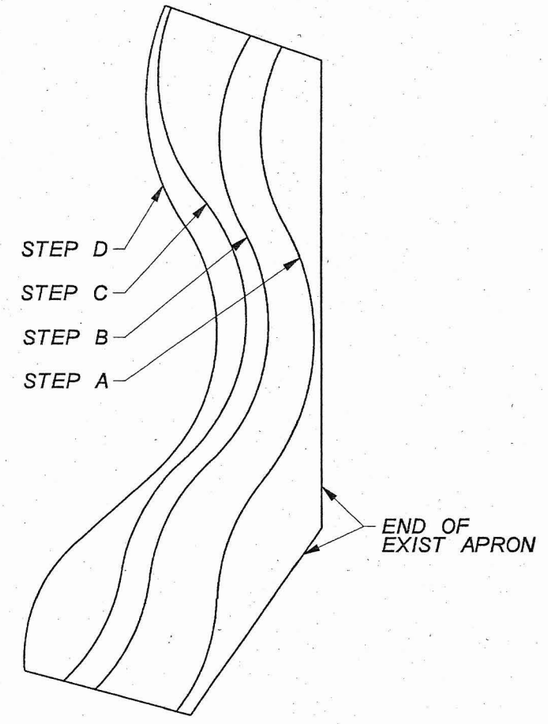
STEP C



STEP B



STEP A



STEP A-D

DROP STRUCTURE STEP DETAIL

NTS

NOTE: STEPS TO BE CONSTRUCTED USING SMOOTH CURVILINEAR LINES WITH DIMENSIONS SHOWN ABOVE.

Registered Professional Engineer (Structural)
CERTIFICATE NO.
21987
STEVEN D.
KNEIP
Date Signed 6-1-...
ARIZONA, U.S.A.

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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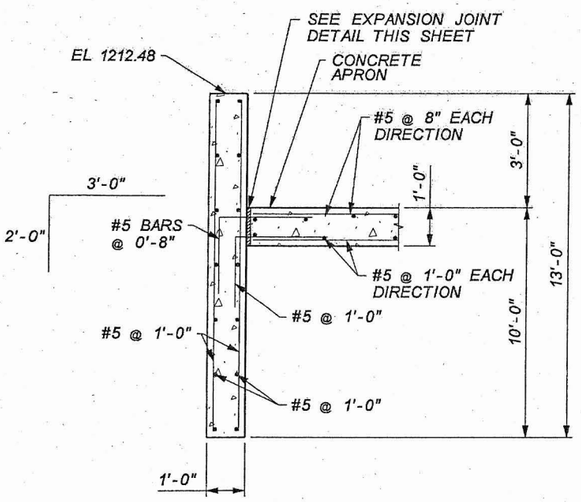
KIRKHAM MICHAEL

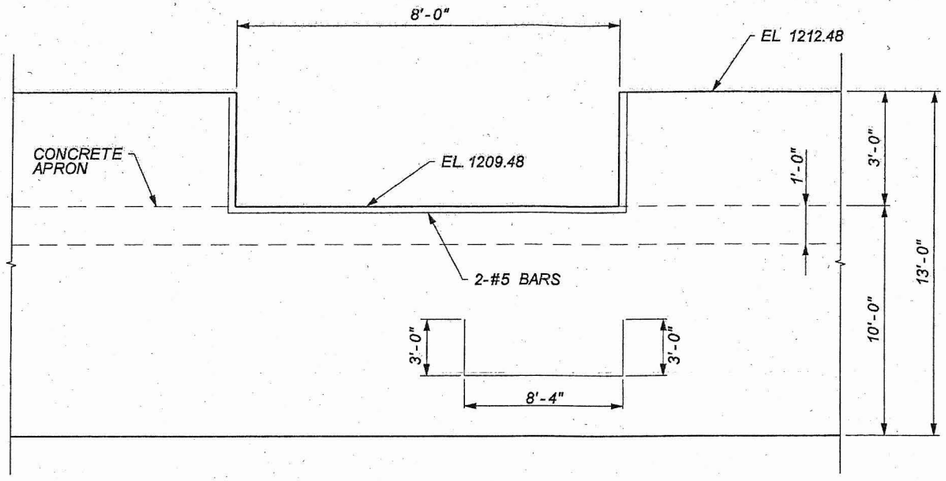
DRAWING NO. ST3

OUTLET DROP STRUCTURE

SHEET O 15 36



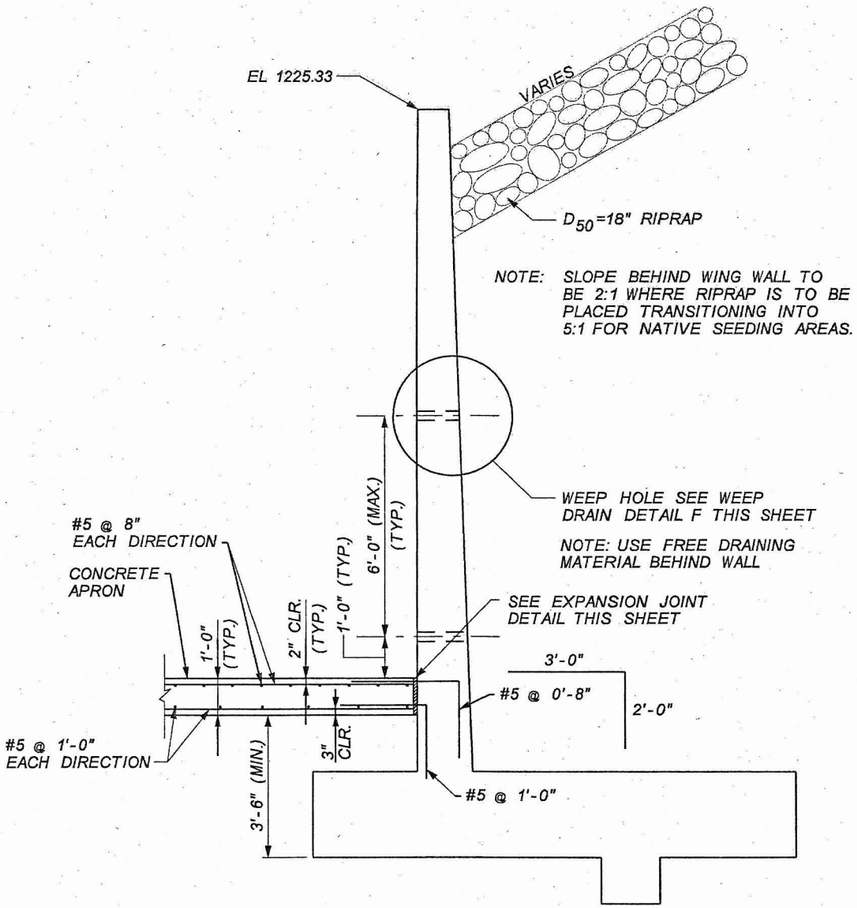
SECTION G / ST1
NTS



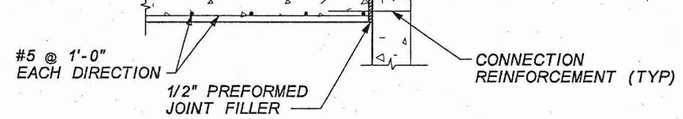
NOTE: TRIM HORIZONTAL AND VERTICAL CURTAIN WALL REINFORCMENT IN THIS AREA.

CURTAIN WALL

ELEVATION A / ST1
NTS

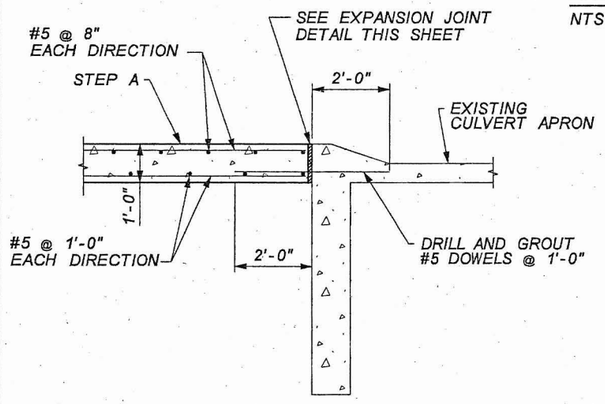


SECTION B / ST1
NTS

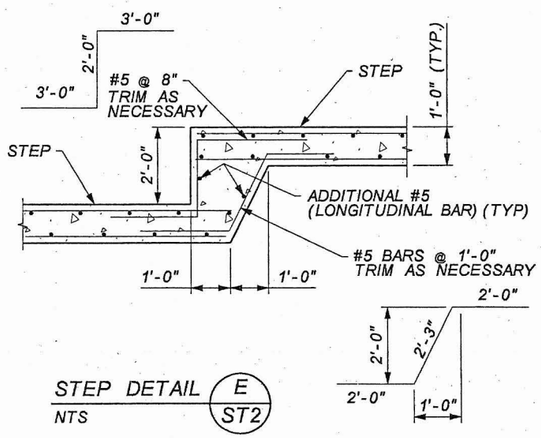


EXPANSION JOINT
NTS

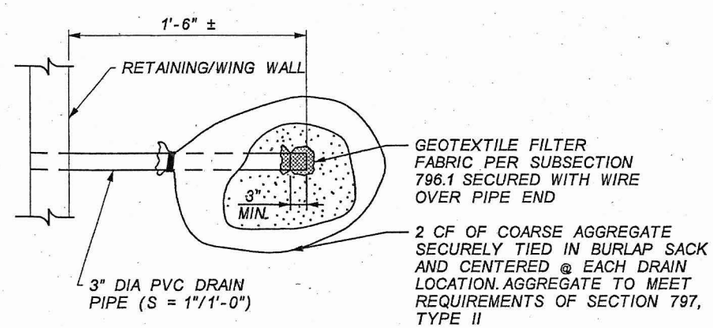
CONSTRUCTION JOINT
(SPACE @ 30'-0" TO 50'-0" EACH DIRECTION)



APRON CONNECTION DETAIL D / ST2
NTS



STEP DETAIL E / ST2
NTS



WEEP DRAIN DETAIL F
NTS

Registered Professional Engineer (State of Arizona)
CERTIFICATE NO. 21987
STEVEN D. KNEIP
Date Signed 6-1-07
ARIZONA, U.S.A.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO. ST4

OUTLET DROP STRUCTURE

SHEET O 16 36

N 928564.9064
E 531088.4506
Elev 1224.0

N 928590.9209
E 531108.8426
Elev 1224.0

N 928614.2949
E 531123.9620
Elev 1224.0

N 928642.4348
E 531141.8287
Elev 1224.0

N 928655.3115
E 531159.3886
Elev 1224.0

R=20'

STA 22+52.51
N 928614.2949
E 531123.9620
Elev 12
BEGIN NORTHERN
AVE ROAD SURFACE

23+00

STA
N 928776.4294
E 531021.9822
Elev 12
BEGIN WEST
MAINTENANCE ROAD

CURVE
N3

15.3363°

PC
N 928770.7578
E 531067.3457
Elev 12

STA 23+41.13
N 928772.5667
E 531102.7938
ELEV 12
END NORTHERN AVE
ROAD SURFACE

24+00

CURVE N3

△ = 15 20' 10.68"
L = 33.36'
R = 125'
T = 16.383'

1225

1235

9:1

30" DUMPED RIP RAP
D_{50}=18" WITH FILTER FABRIC

1215

1220

N 928598.16
E 531158.41
Elev 1209.46

REMOVE AND
STOCKPILE
380 CY OF
D_{50} = 18" RIPRAP

N 928727.0556
E 531136.9801
Elev 1236.0

N 928735.7596
E 531175.8897
Elev 1236.0

N 928714.8394
E 531202.7002
Elev 1225.0

N 928736.2570
E 531202.7737
Elev 1236.0

N 928551.9437
E 531143.7556
Elev 1210.2

STA 547+50

SEE
DETAIL 1

N 928652.5429
E 531180.5872
Elev 1224.0

SOUTH
CHANNEL ℄

N 928625.1650
E 531218.7577
Elev 1209.48

5.5' DUMPED
RIP RAP D_{50}=18"
WITH FILTER FABRIC

FLOW

N 928598.16
E 531216.86
Elev 1209.46

N 928548.2551
E 531213.6542
Elev 1209.45

EXISTING RIPRAP
TO REMAIN

N 928544.5216
E 531284.3454
Elev 1210.2

SEE
DETAIL 2

N 928652.9109
E 531277.6453
Elev 1224.0

25+00

2:1

30" DUMPED RIP RAP
D_{50}=18" WITH FILTER FABRIC

N 928598.16
E 531276.31
Elev 1209.46

N 928647.3792
E 531300.9266
Elev 1224.0

N 928696.5763
E 531290.2119
Elev 1225.0

N 928714.5497
E 531302.9285
Elev 1236.0

N 928546.7623
E 531339.7112
Elev 1224.0

N 928619.6331
E 531327.8463
Elev 1224.0

1220

4:1

1225

N 928701.2344
E 531321.6379
Elev 1236.0

N 928695.8734
E 531326.0331
Elev 1235.0

N 928675.6234
E 531313.6299
Elev 1225.0

N 928664.1276
E 531351.0980
Elev 1234.4

N 928578.1884
E 531336.6488
Elev 1224.0

N 928652.3554
E 531328.6775
Elev 1225.0

MID-SECTION LINE
S 0°44'29"E 2640.80'

N 928625.5070
E 531170.7469
Elev 1209.48

N 928625.1650
E 531171.6866
Elev 1209.48

N 928625.1650
E 531269.1658
Elev 1209.48

N 928624.9009
E 531270.1531
Elev 1209.48

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
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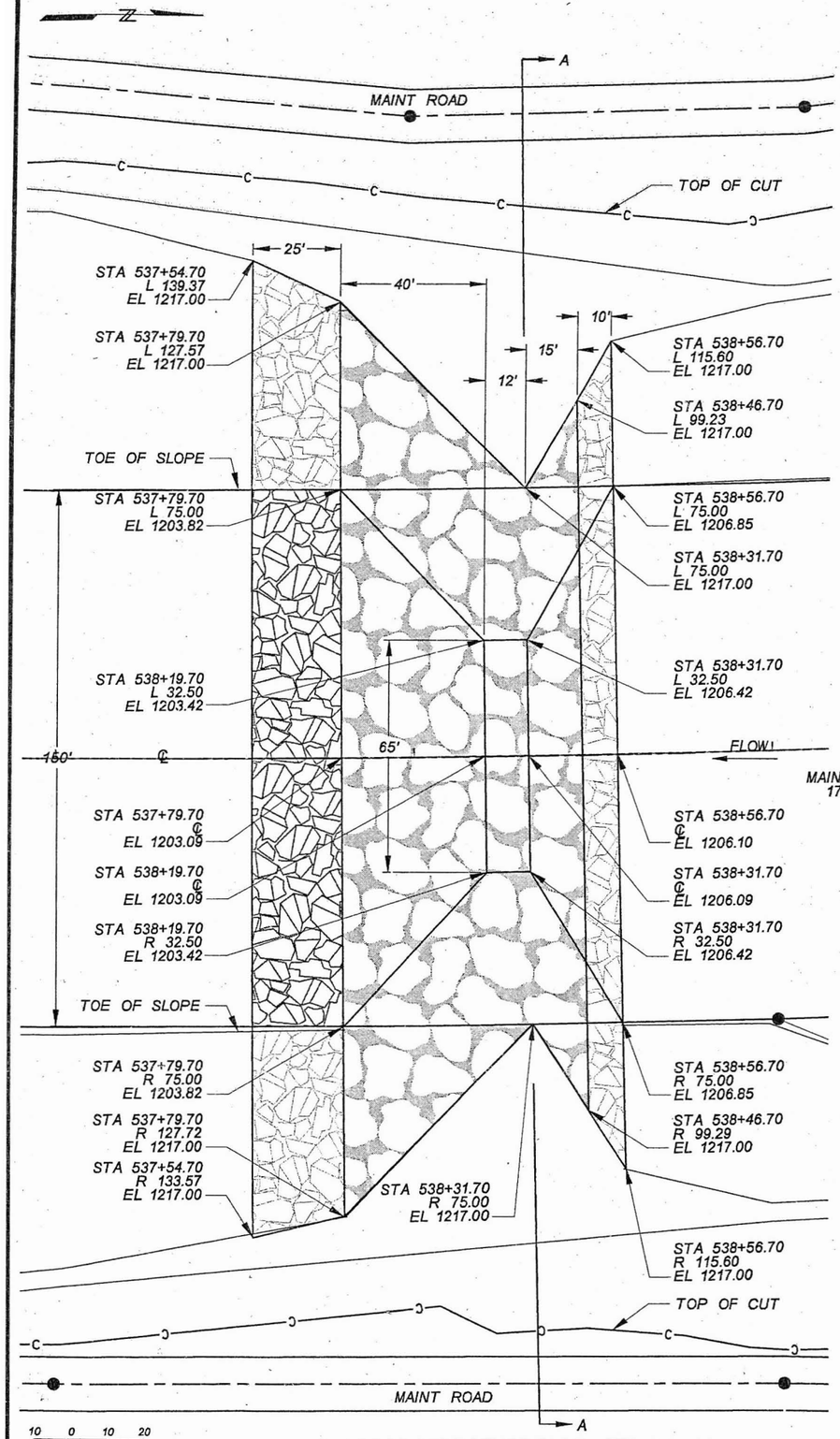
CHECKED	BJL	04/07

KIRKHAM MICHAEL

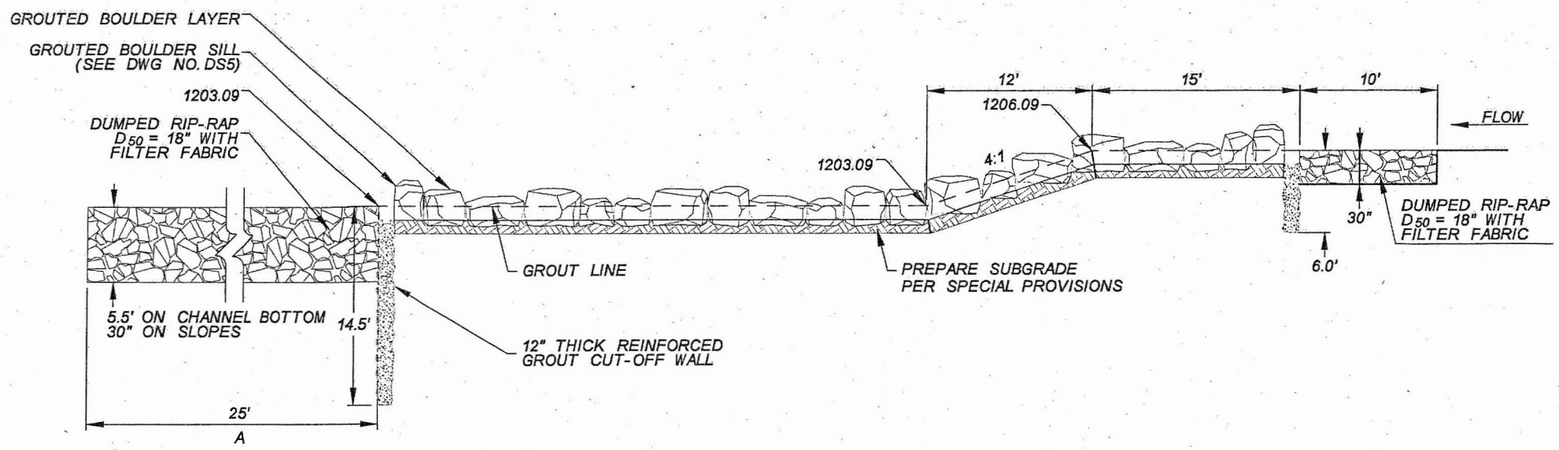
DRAWING NO. DS1

RIP RAP DETAIL

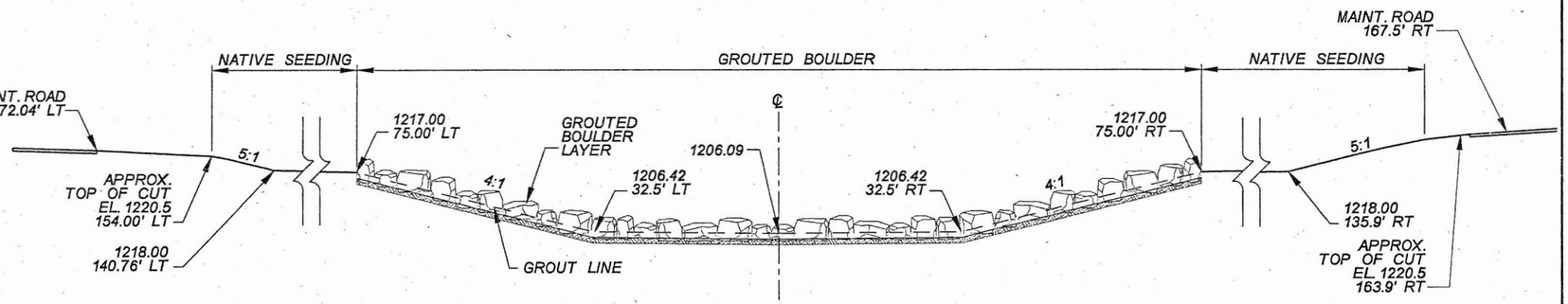
SHEET C
17 3



3'-0" DROP STRUCTURE PLAN - STA 538+19.7
NTS



3'-0" DROP STRUCTURE PROFILE
NTS



SECTION A
NTS

NOTES:

1. SEE DWG. NO. DS5 FOR GENERAL DETAILS AND NOTES
2. SEE DWG DS-8 FOR LANDSCAPING BOULDER LAYOUT DETAILS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

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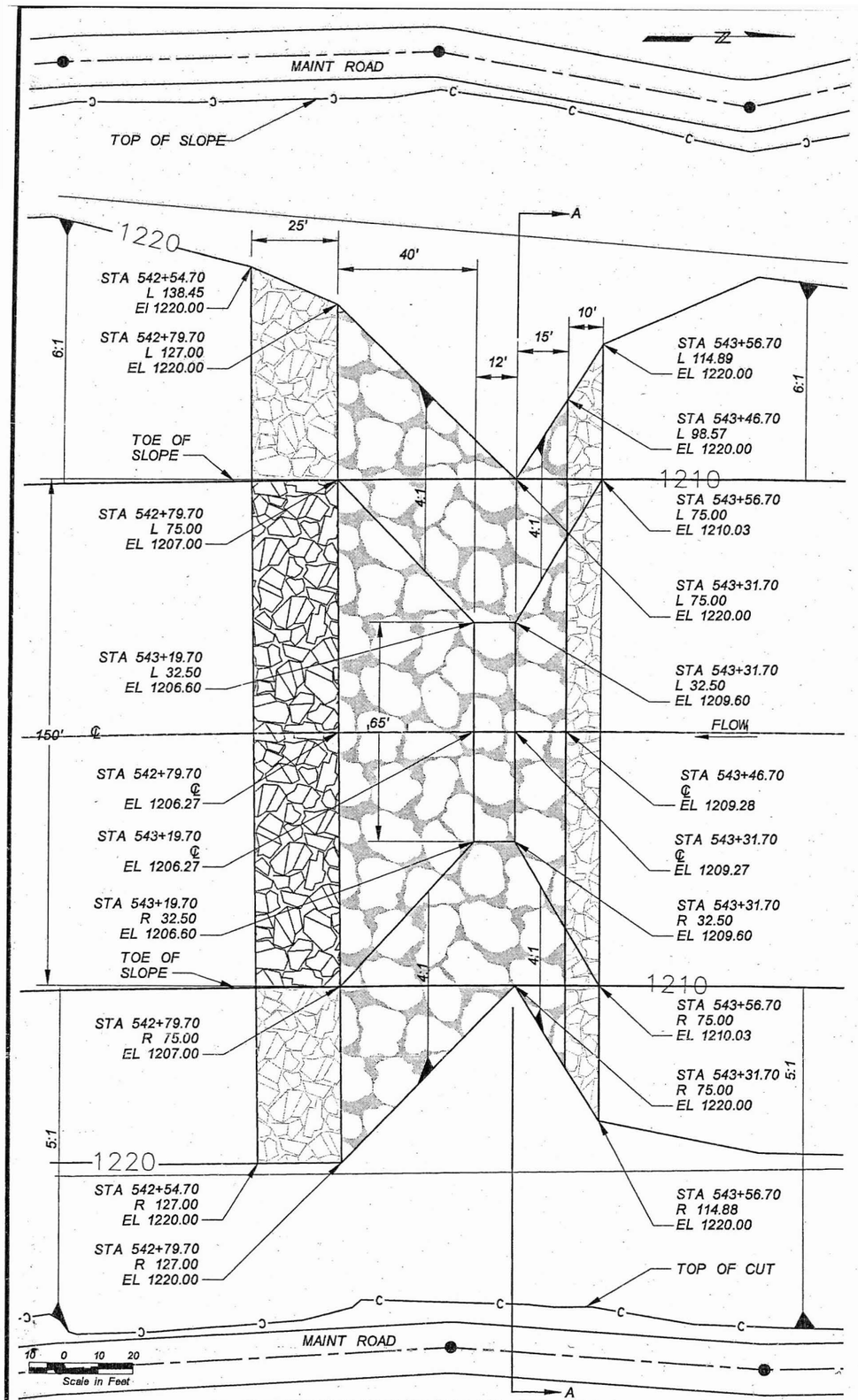
19148 Barry J. Ling 04-30-07 ARIZONA, U.S.A.

KIRKHAM MICHAEL

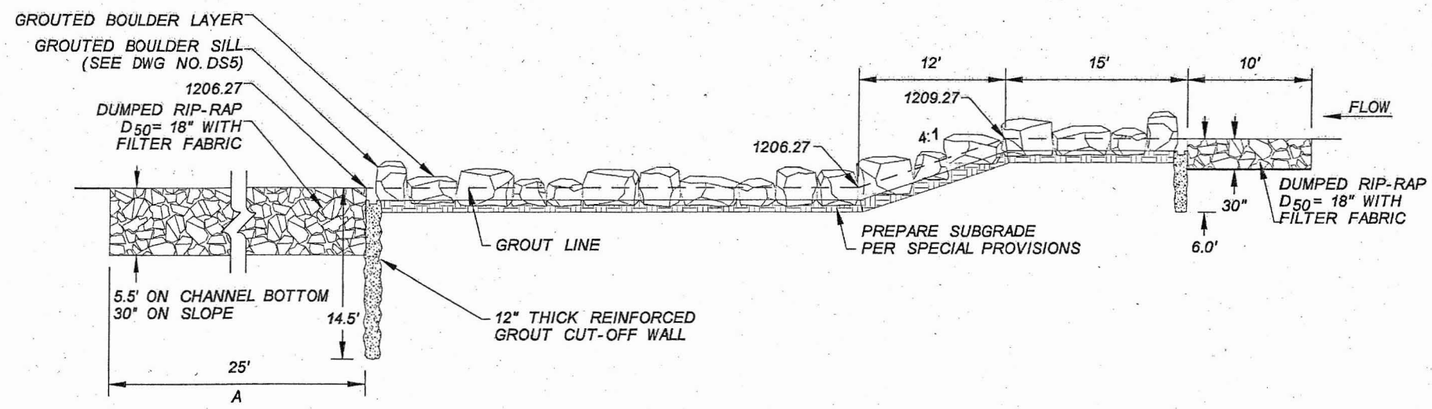
DRAWING NO. DS3

GROUTED BOULDER DROP STRUCTURE DETAILS

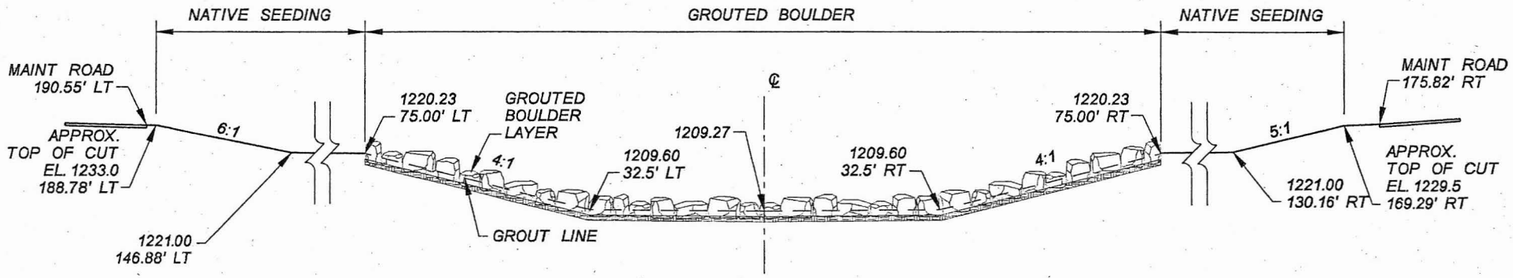
SHEET OF 18 36



NTS **3'-0" DROP STRUCTURE PLAN - STA 543+19.7**



3'-0" DROP STRUCTURE PROFILE
NTS



SECTION A
NTS

NOTES:

1. SEE DWG. NO. DS5 FOR GENERAL DETAILS AND NOTES
2. SEE DWG DS-8 FOR LANDSCAPING BOULDER LAYOUT DETAILS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
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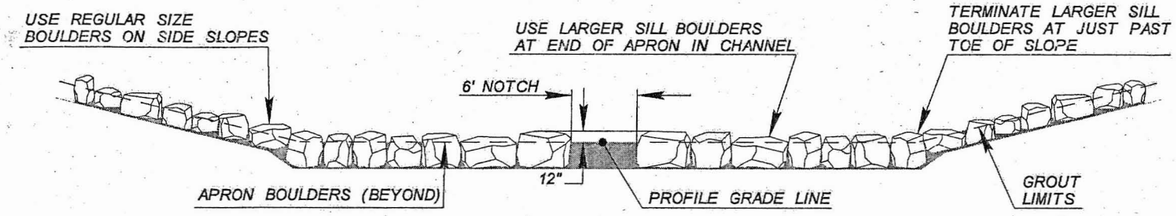
CHECKED	BJL	04/07

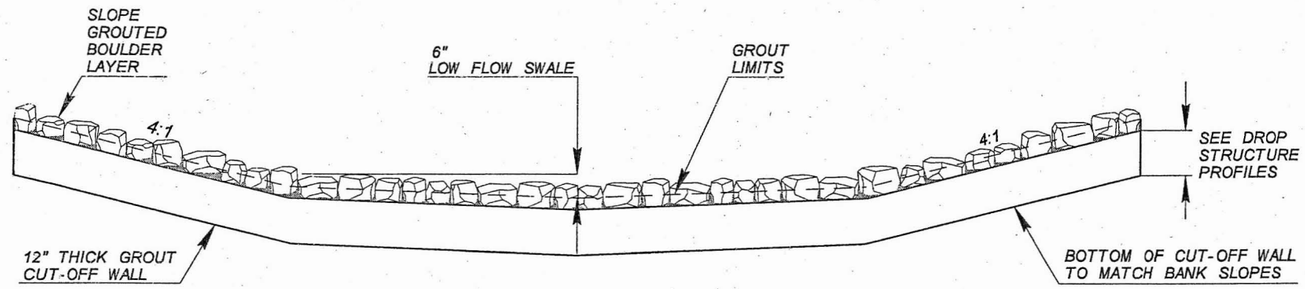
19148 Barry J. Ling — 26 APR 07 — IOWA, U.S.A.

KIRKHAM MICHAEL

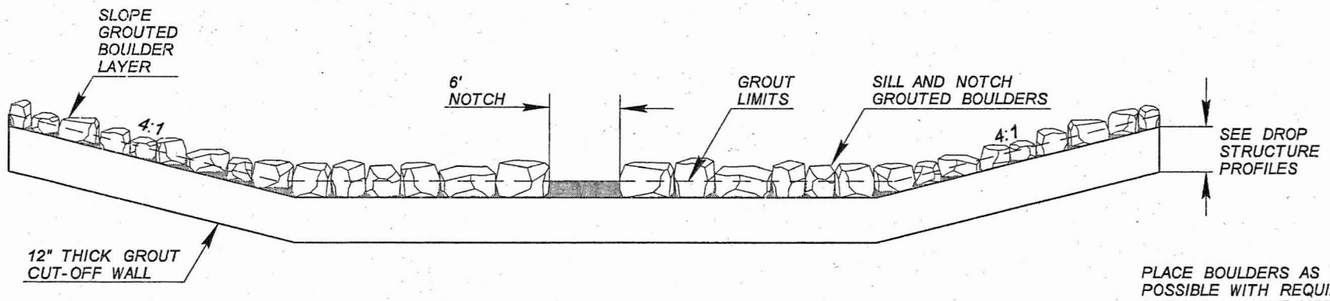
DRAWING NO.		SHEET OF
DS4	GROUTED BOULDER DROP STRUCTURE DETAILS	19 36



APRON SILL DETAIL
NTS

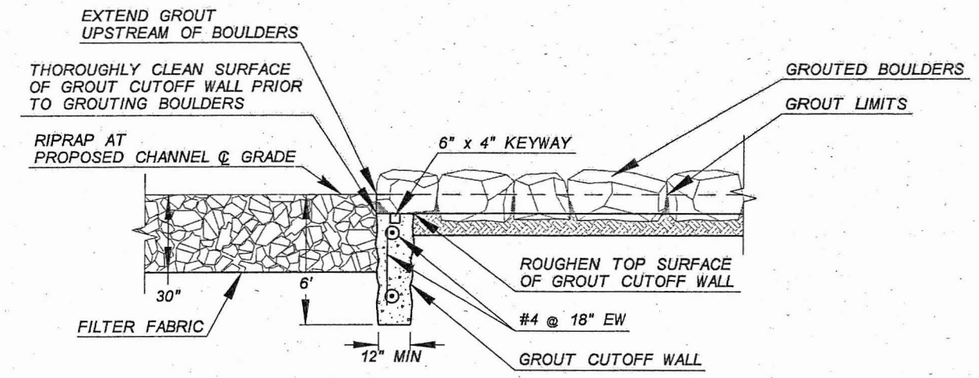


TYPICAL UPSTREAM CUTOFF WALL
NTS

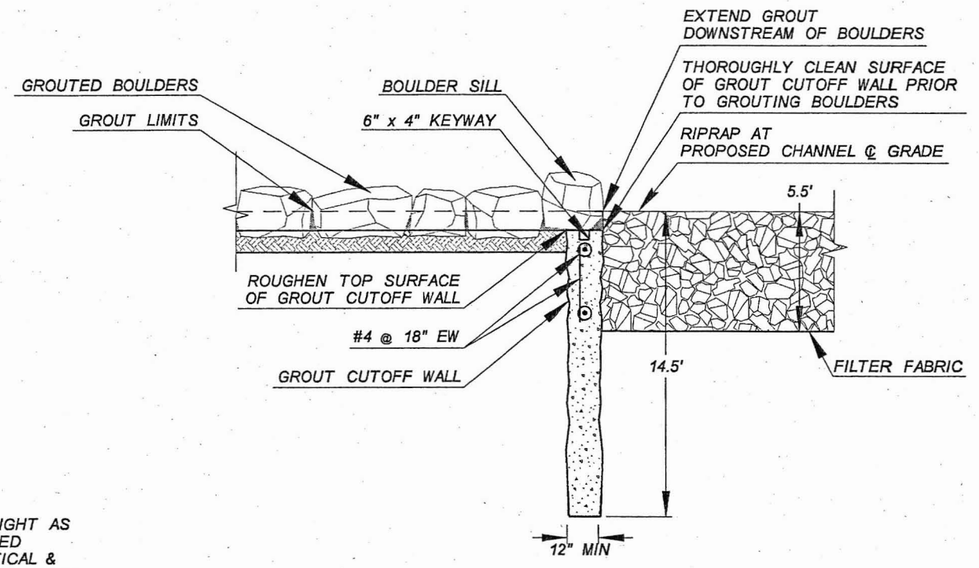


NOTE:
NOTCH INVERT MATCHES LOW-FLOW SWALE AT CHANNEL ℄

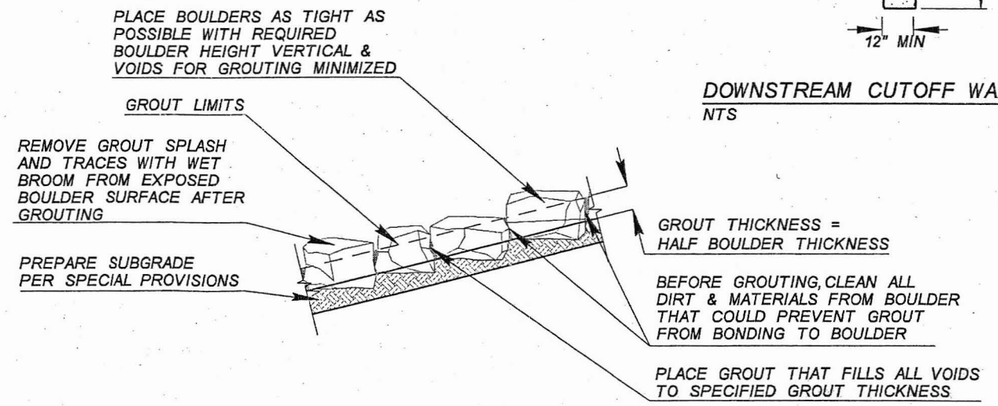
TYPICAL DOWNSTREAM CUTOFF WALL
NTS



UPSTREAM CUTOFF WALL DETAIL
NTS



DOWNSTREAM CUTOFF WALL DETAIL
NTS



GROUTED BOULDER PLACEMENT DETAIL
NTS (REFER TO SPECIAL PROVISIONS)

NOTES:

1. SEE DWG. NO. DS5 FOR GENERAL DETAILS AND NOTES
2. BOULDER SIZE FOR DROP STRUCTURE: 3.00' DROP: 24"-ON SLOPES & APRONS/42" ON SILL
3. BOULDER SIZE MAY VARY A MAXIMUM OF 6" OF THE NOMINAL BOULDER SIZE (SEE SPECIAL PROVISIONS SEC 220)
4. TOP SURFACE OF BOULDER PLACED WITH BROADEST FACE UP AND HORIZONTAL
5. THE DESIGN INTENT IS TO PLACE THE BOULDERS SO AS TO PRESENT A STEPPED STRUCTURE SURFACE RATHER THAN A SLOPED SURFACE
6. SEE SPECIAL PROVISIONS SECTIONS 220 AND 507 FOR MATERIAL AND OTHER REQUIREMENTS
7. SUBGRADE ELEVATION FOR ALL DROPS AND APRONS SHALL BE NOMINAL BOULDER DIAMETER LOWER THAN FINISHED ELEVATIONS PROVIDED ON DETAIL SHEETS
8. GROUT LAYER FOR BOULDERS IN ALL DROPS AND APRONS SHALL BE A MINIMUM 12" THICK

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
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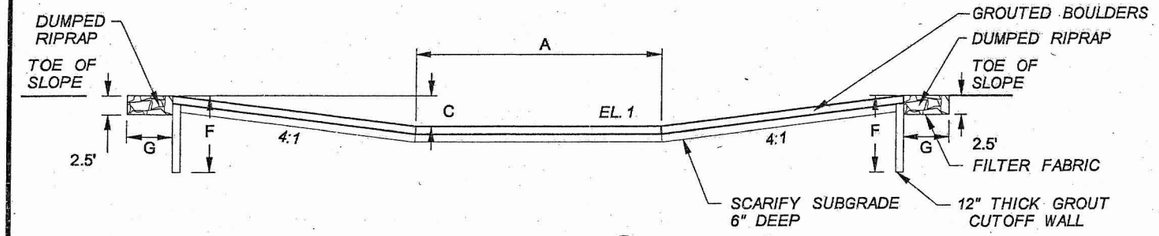
CHECKED	BJL	04/07

KIRKHAM MICHAEL

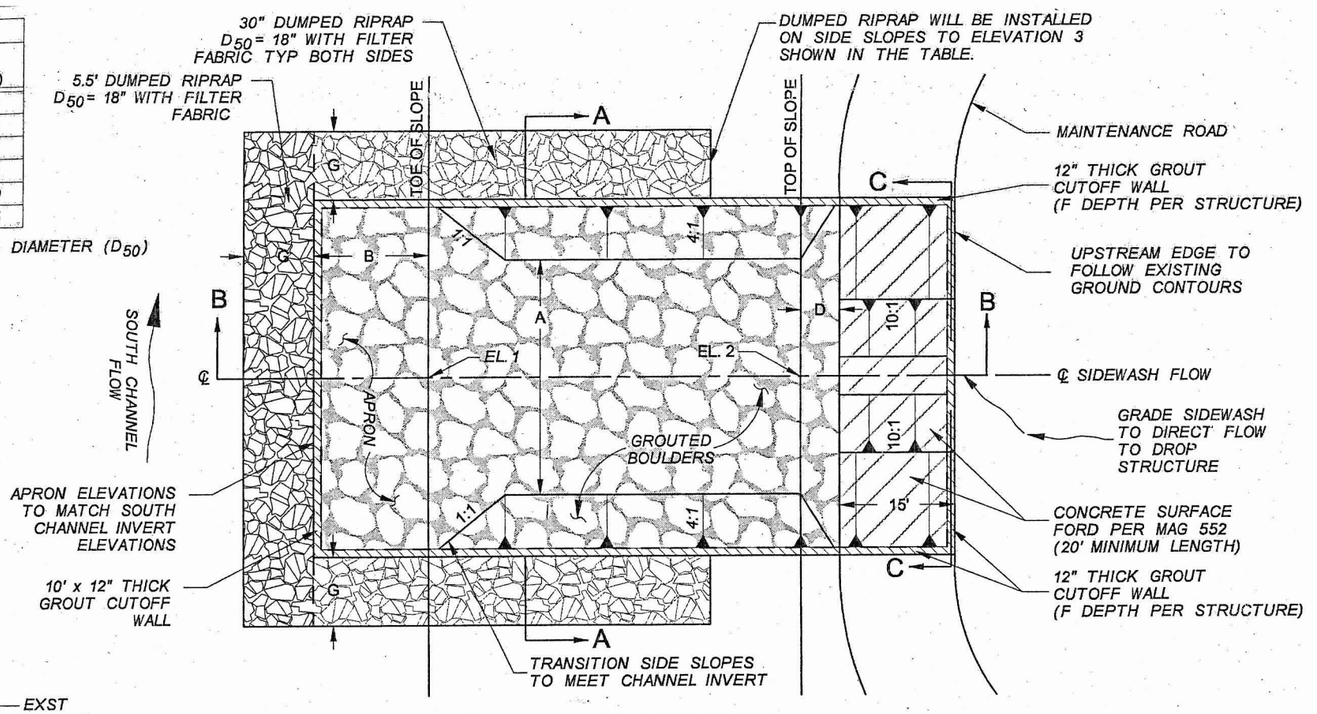
DRAWING NO.		SHEET O
DS5	GROUTED BOULDER DROP STRUCTURE DETAILS	20 36

SIDEWASH				ELEVATIONS			DIMENSIONS						
AREA ID	℄ STA	AREA (AC)	Q_{100} (CFS)	1 (FT)	2 (FT)	3 (FT)	A (FT)	B (FT)	C (FT)	D (FT)	* DIA (IN)	F (FT)	G (FT)
SWD2	516+10	1.80	7.00	1202.02	1216.50	1212.96	2	5.00	1.00	0	18	6.0	5.0
SWD3	518+62	4.60	15.30	1202.30	1215.00	1213.15	2	10.00	1.00	1.0	18	6.0	6.0
SWD4	522+29	16.20	46.00	1202.45	1214.70	1213.47	8	10.00	1.00	3.0	18	6.0	9.0
SWD5	528+29	3.50	13.10	1202.70	1219.60	1213.92	2	10.00	1.00	1.0	18	6.0	6.0
SWD6	532+50	723.20	1000.00	1202.86	1215.10	1214.23	110	20.00	1.50	5.0	36	10.0	17.0
SWD7	535+70	160.00	222.00	1202.99	1217.00	1214.50	22	20.00	1.50	5.0	24	10.0	13.5

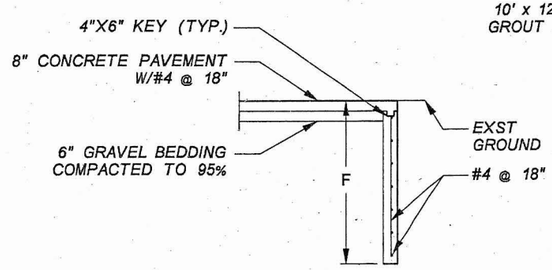
* GROUTED BOULDER DIAMETER (D_{50})



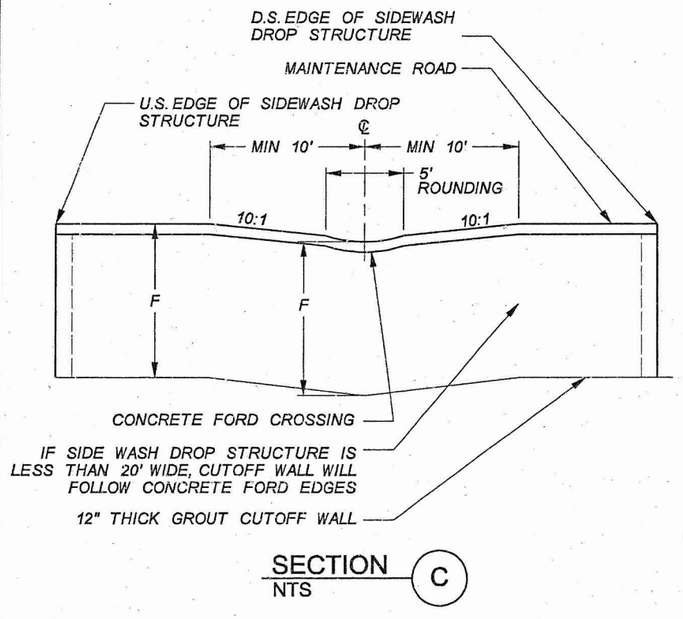
SECTION A
NTS



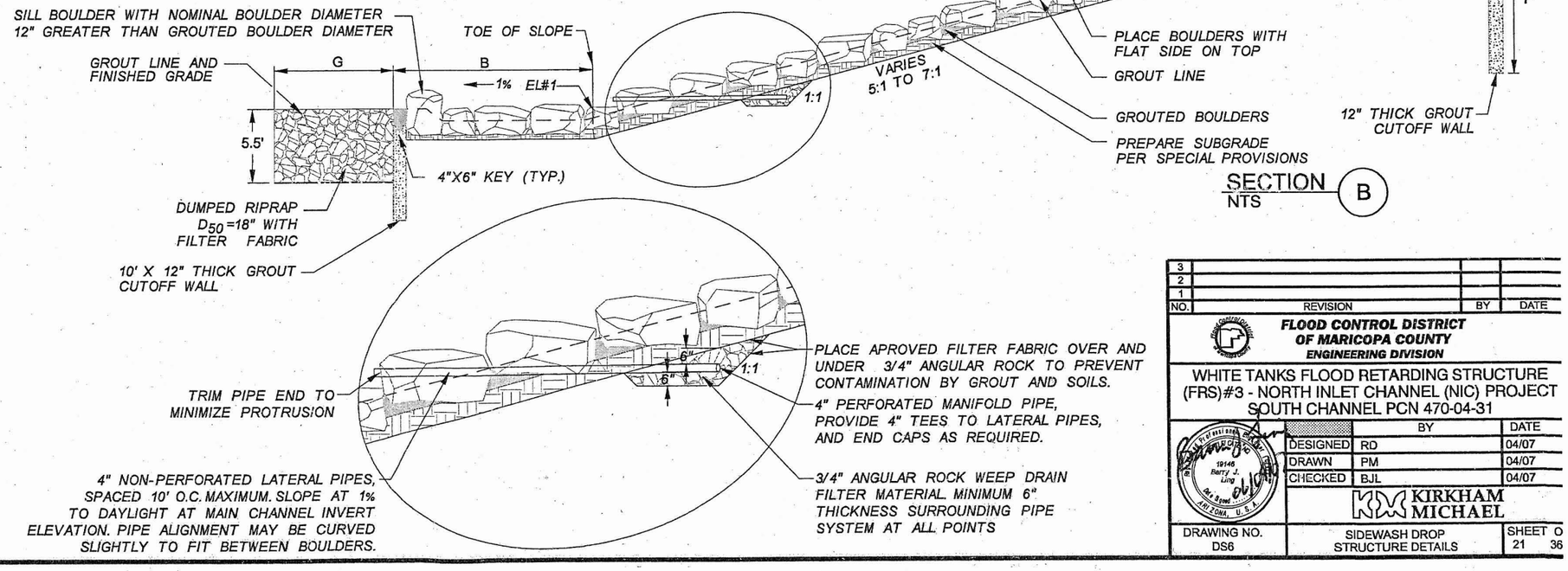
DROP STRUCTURE PLAN
NTS



CONCRETE CURB AND CUTOFF WALL AT UPSTREAM END
NTS



SECTION C
NTS



SECTION B
NTS

NOTES:

1. CONCRETE FORD TO BE BUILT PER MAG STD. NO. 552, AS MODIFIED BY SECTION B.
2. FOR SIDEWASH DROP STRUCTURES LESS THAN 20' IN WIDTH, CONSTRUCT MIN. 20' CONC. FORD.
3. FOR SIDEWASH DROP STRUCTURES GREATER THAN 20' WIDE, CONSTRUCT 20' FORD AND EXTEND CONCRETE SURFACING FROM UPSTREAM EDGE TO DOWNSTREAM EDGE OF WASH.
4. NOTES ON SHEET DS5 APPLY TO THE SIDEWASH STRUCTURES AS WELL.
5. SEE DWG. NO. DS9 AND DS10 FOR LANDSCAPING BOULDER LAYOUT DETAILS

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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SOUTH CHANNEL PCN 470-04-31

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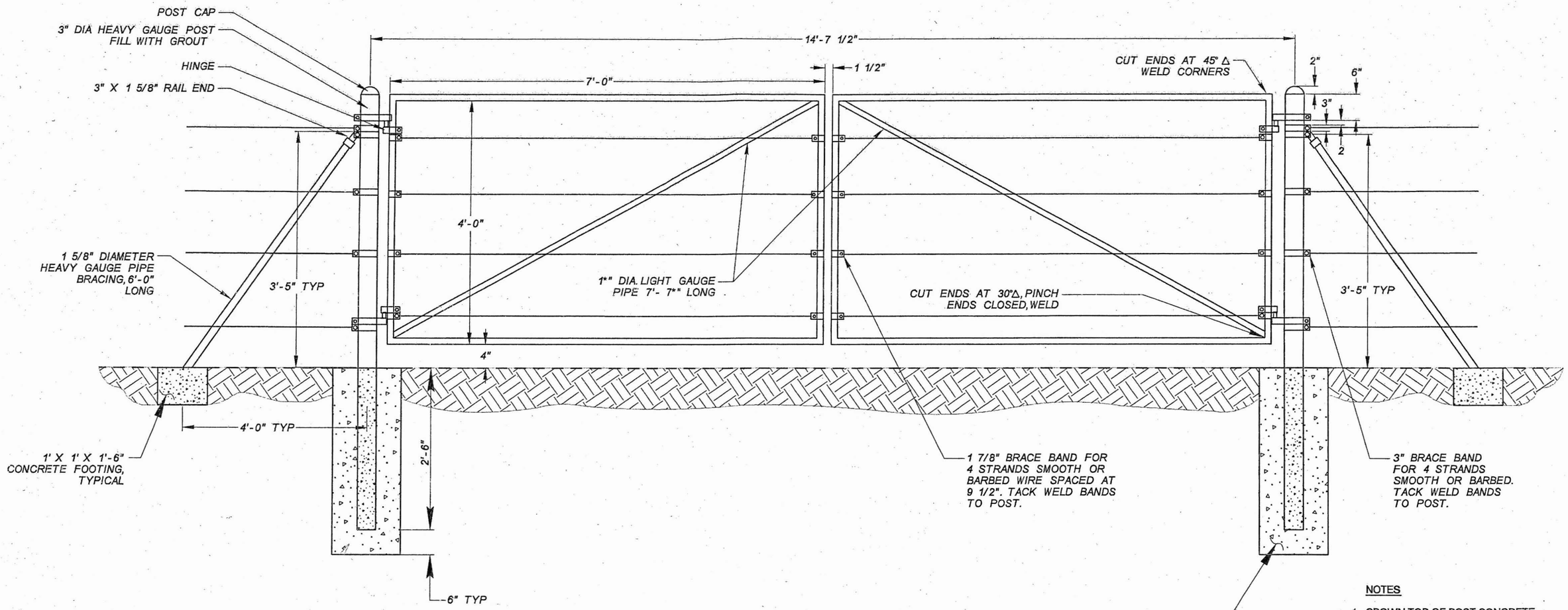
KIRKHAM MICHAEL

DRAWING NO. DS6

SIDEWASH DROP STRUCTURE DETAILS

SHEET O 21 36



SWING GATE DETAIL

NTS

NOTES

1. CROWN TOP OF POST CONCRETE TO SHED WATER
2. GATE POSTS TO BE ROUND AS SHOWN INSTEAD OF SHAPES SHOWN IN ADOT C-12.10.

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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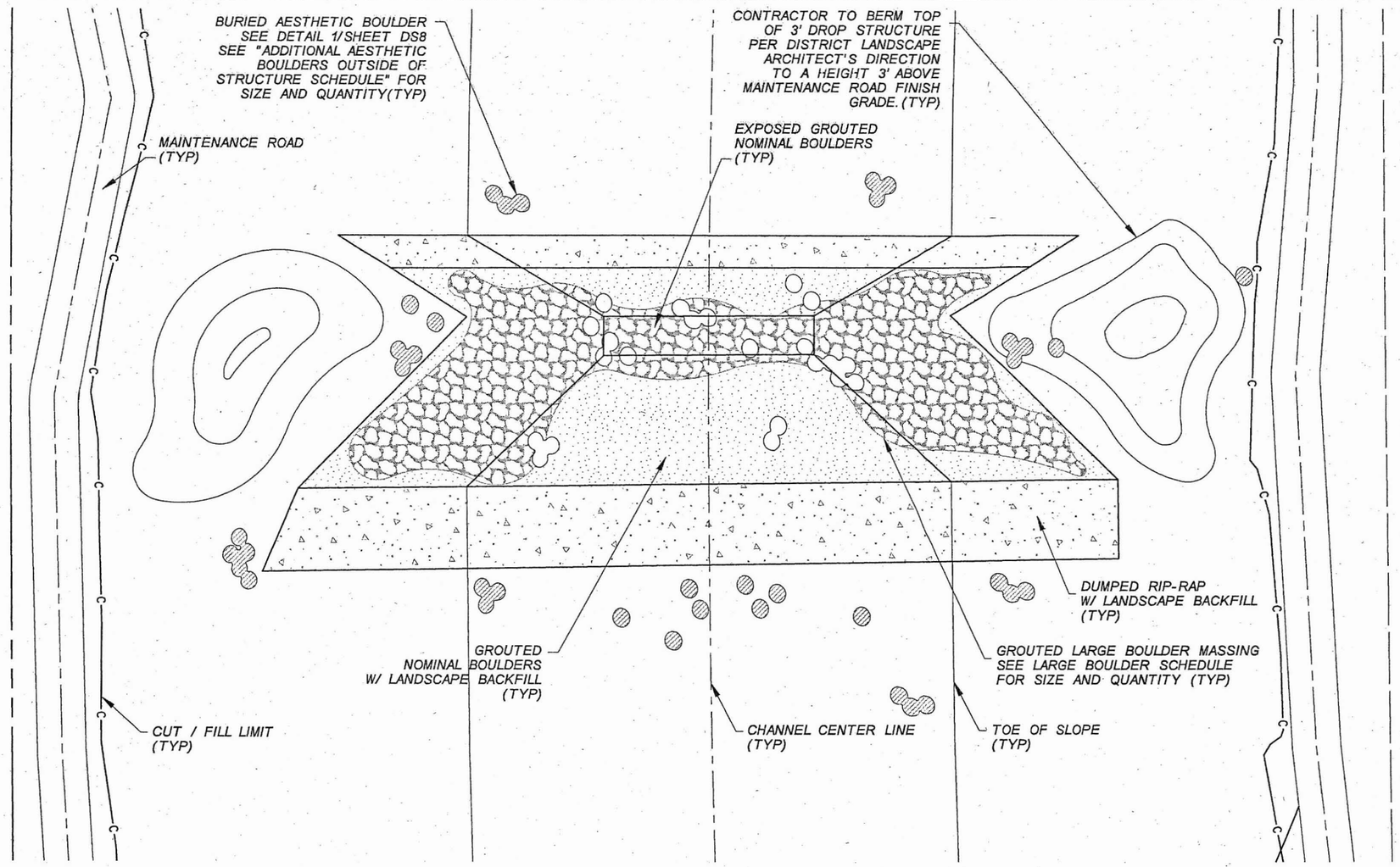
KIRKHAM MICHAEL

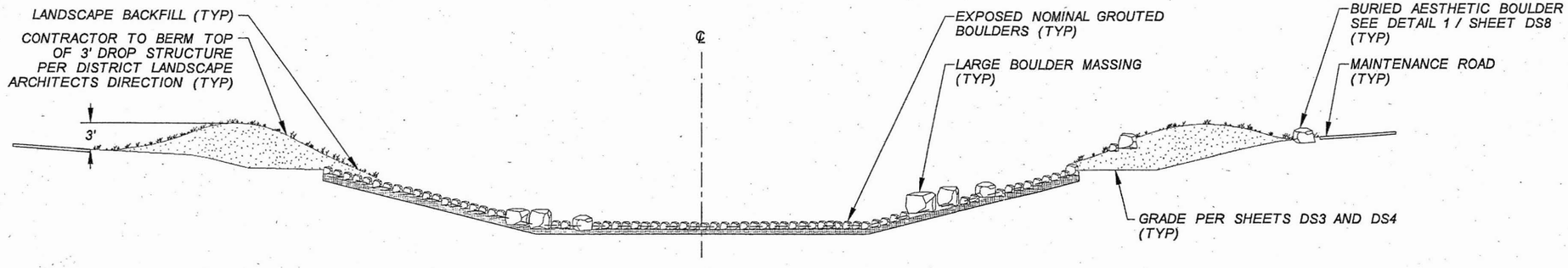
DRAWING NO. DS7

GATE DETAIL

SHEET O 22 36



3' GROUTED BOULDER DROP STRUCTURE-BOULDER PLACEMENT PLAN
NTS (REFER TO SHEETS DS3 AND DS4)

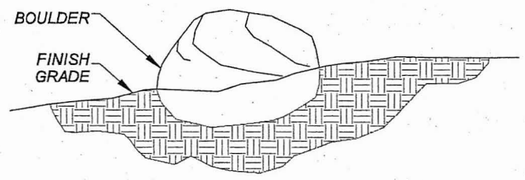


3' GROUTED BOULDER DROP STRUCTURE-BOULDER PLACEMENT SECTION
NTS (REFER TO SHEETS DS3, DS4, AND DS5)

NOTES:
1. CONSTRUCT GROUTED 3' DROP STRUCCTURES ACCORDING TO DROP STRUCTURE DETAILS AND SPECIFICATIONS. SEE SHEETS DS3, DS4, AND DS5 FOR TECHNICAL CONSTRUCTION DETAILS. IN THE EVENT OF A CONTRADICTION BETWEEN THE BOULDER LAYOUT DETAILS AND THE TECHNICAL DETAILS AND SPECIFICATIONS, THE TECHNICAL DETAILS AND SPECIFICATIONS SHALL TAKE PRECEDENCE.
2. PLACE BOULDERS ACCORDING TO DISTRICT LANDSCAPE REPRESENTATIVE'S DIRECTION.
3. SIZE NOMINAL BOULDERS PER TECHNICAL PLANS AND SPECIFICATIONS.
4. SIZE LARGE BOULDERS PER LARGE BOULDER SCHEDULE.
5. SIZE AESTHETIC BOULDERS PER "ADDITIONAL AESTHETIC BOULDERS OUTSIDE OF STRUCTURES" SCHEDULE AND PLACE OUTSIDE OF GROUT AROUND THE 3' DROP STRUCTURES, AS DIRECTED BY DISTRICT LANDSCAPE REPRESENTATIVE.
6. LANDSCAPE BACKFILL SHALL FULLY COVER DUMPED RIP-RAP AND NOMINAL BOULDERS WHERE DESIGNATED TO A MINIMUM DEPTH OF 6" AT 85% COMPACTION.
7. PROVIDE LANDSCAPE BACKFILL BERMS WHERE INDICATED AND AS DIRECTED BY THE DISTRICT LANDSCAPE REPRESENTATIVE TO A HEIGHT OF 3' ABOVE MAINTENANCE ROAD FINISHED GRADE.
8. EDGE OF LANDSCAPE BACKFILL SHALL ABUT TO LARGE BOULDERS OR BE FEATHERED INTO EXPOSED NOMINAL BOULDERS.
9. FINAL BOULDER, BERMING, AND LANDSCAPE BACKFILL PLACEMENT TO BE APPROVED BY DISTRICT LANDSCAPE REPRESENTATIVE.
10. LANDSCAPE BACKFILL AND BERMS SHALL BE PREPARED AND HYDROSEEDED PER SECTION 430.3 OF THE SPECIAL PROVISIONS.

LARGE BOULDER SCHEDULE		
BOULDER TYPE	SIZE	QTY PER STRUCTURE
LARGE BOULDERS	+/- 42"	16
LARGE BOULDERS	+/- 54"	21

ADDITIONAL AESTHETIC BOULDERS OUTSIDE OF STRUCTURES-SCHEDULE		
BOULDER TYPE	SIZE	QTY PER STRUCTURE
LANDSCAPE BOULDERS	+/- 42"	24
LANDSCAPE BOULDERS	+/- 54"	9



NOTES:
1. BURY UP TO SHADOW LINE OF BOULDER TO CREATE A NATURAL IMPRESSION.
2. LOCATE BOULDER BEST SIDE UP OR PER DISTRICT LANDSCAPE REPRESENTATIVE'S DIRECTION.
3. SIZE BOULDER ACCORDING TO BOULDER SCHEDULE.
4. BOULDER TO BE FREE AND CLEAN OF CONCRETE, PAINT, ETC...
5. FINAL BOULDER PLACEMENT TO BE APPROVED BY DISTRICT'S LANDSCAPE REPRESENTATIVE.

(1) DETAIL-BURIED LARGE BOULDER
NTS

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

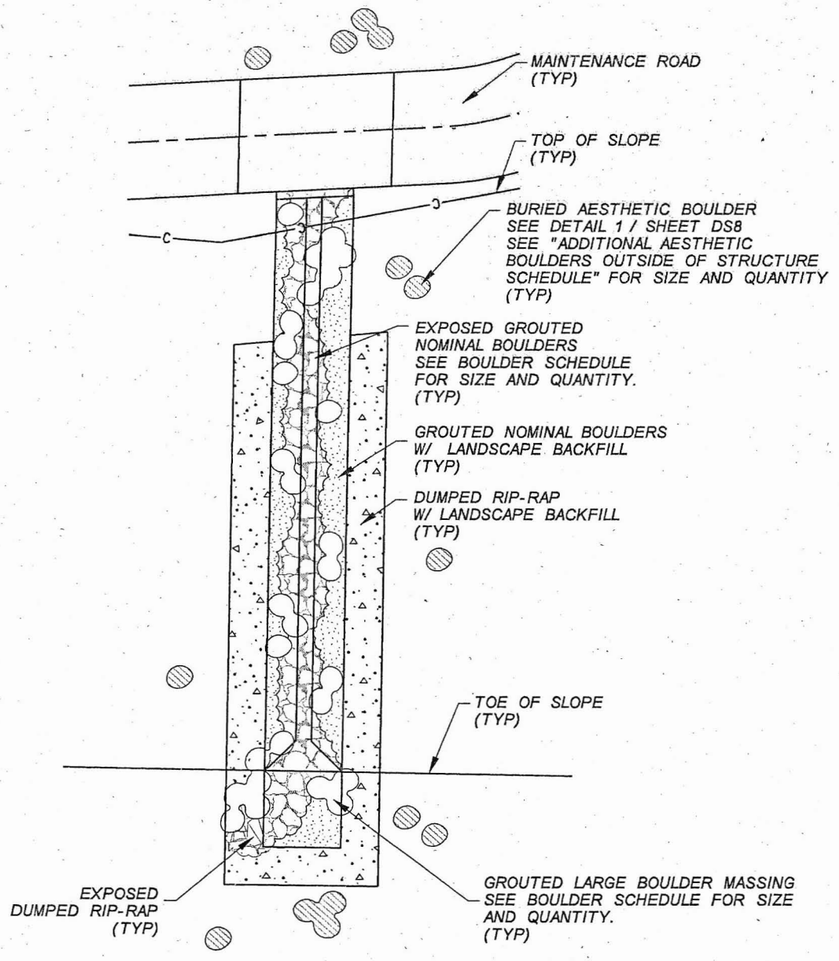
WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	JJG	2/15/07
DRAWN	JJG	4/17/07
CHECKED	SCP	4/17/07

DRAWING NO. DS8

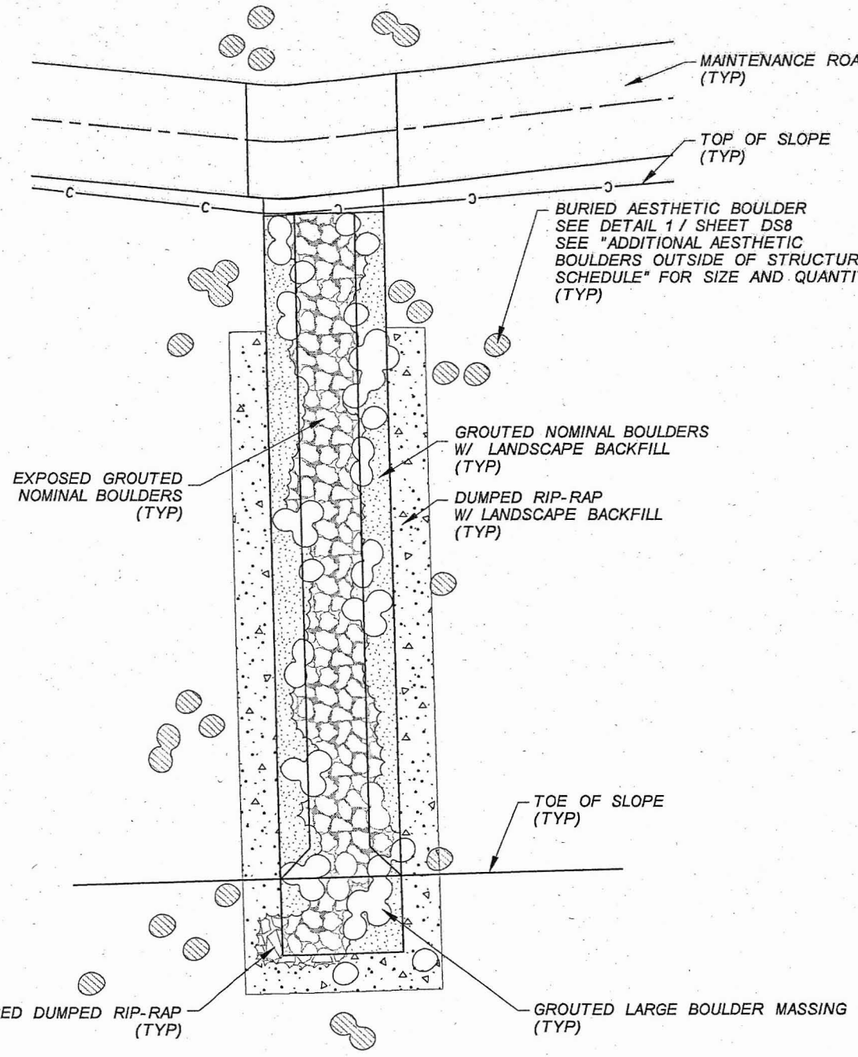
3' DROP STRUCTURE BOULDER LAYOUT DETAILS

SHEET 01 23 36



SIDEWASHES 2,3,& 5 -BOULDER LAYOUT PLAN

NTS



SIDEWASH 4-BOULDER LAYOUT PLAN

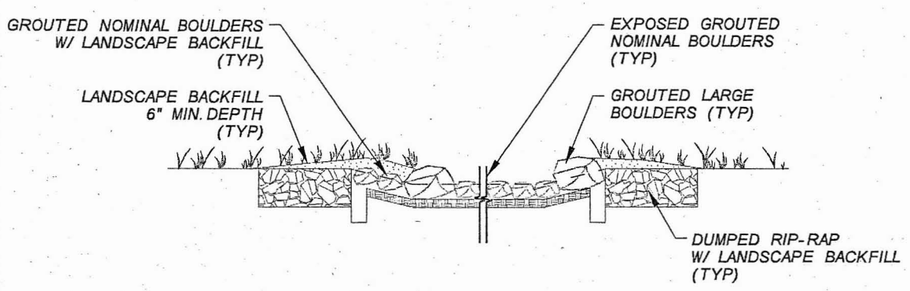
NTS

NOTES:

1. CONSTRUCT SIDEWASH DROP STRUCTURES ACCORDING TO SIDEWASH DROP STRUCTURE DETAILS AND SPECIFICATIONS. SEE SHEET DS6 FOR SIDEWASH DIMENSIONS AND CONSTRUCTION DETAILS. IN THE EVENT OF A CONTRADICTION BETWEEN THE BOULDER PLACEMENT DETAILS AND THE SIDEWASH DROP STRUCTURE DETAILS AND SPECIFICATIONS, THE SIDEWASH DROP STRUCTURE DETAILS AND SPECIFICATIONS SHALL TAKE PRECEDENCE.
2. PLACE BOULDERS ACCORDING TO DISTRICT LANDSCAPE REPRESENTATIVE'S DIRECTION.
3. SIZE BOULDERS ACCORDING TO BOULDER SCHEDULE.
4. PLACE LANDSCAPE BOULDERS AROUND SIDEWASH PER DETAIL 1, SHEET DS8, AS DIRECTED BY DISTRICT LANDSCAPE REPRESENTATIVE.
5. LANDSCAPE BACKFILL SHALL FULLY COVER DUMPED RIP-RAP AND NOMINAL BOULDERS WHERE DESIGNATED TO A MINIMUM DEPTH OF 6" AT 85% COMPACTION.
6. EDGE OF LANDSCAPE BACKFILL SHALL ABUT TO LARGE BOULDERS OR BE FEATHERED INTO EXPOSED NOMINAL BOULDERS.
7. FINAL BOULDER AND LANDSCAPE BACKFILL PLACEMENT TO BE APPROVED BY DISTRICT LANDSCAPE REPRESENTATIVE.
8. LANDSCAPE BACKFILL SHALL BE HYDROSEEDED PER SECTION 430.3 OF THE SPECIAL PROVISIONS.

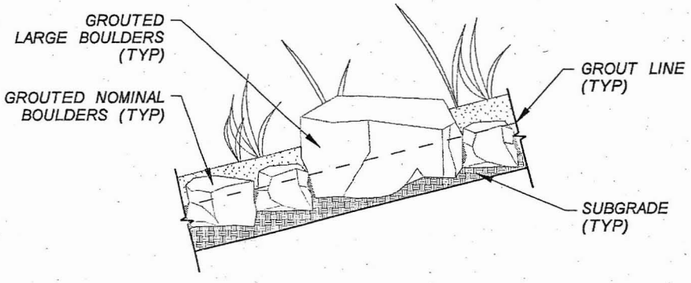
BOULDER SCHEDULE			
SIDEWASH NUMBER	BOULDER TYPE	SIZE	QTY
2	NOMINAL BOULDERS	18" +/- 6"	AS REQ'D
	LARGE BOULDERS	+/- 36"	30
3	NOMINAL BOULDERS	18" +/- 6"	AS REQ'D
	LARGE BOULDERS	+/- 36"	30
4	NOMINAL BOULDERS	18" +/- 6"	AS REQ'D
	LARGE BOULDERS	+/- 36"	44
5	NOMINAL BOULDERS	18" +/- 6"	AS REQ'D
	LARGE BOULDERS	+/- 36"	30
6	NOMINAL BOULDERS	36" +/- 6"	AS REQ'D
	LARGE BOULDERS	+/- 54"	63
7	NOMINAL BOULDERS	24" +/- 6"	AS REQ'D
	LARGE BOULDERS	+/- 48"	42

ADDITIONAL AESTHETIC BOULDERS OUTSIDE OF STRUCTURE- SCHEDULE			
SIDEWASH NUMBER	BOULDER TYPE	SIZE	QTY
2	LANDSCAPE BOULDERS	+/- 36"	12
3	LANDSCAPE BOULDERS	+/- 36"	12
4	LANDSCAPE BOULDERS	+/- 36"	21
5	LANDSCAPE BOULDERS	+/- 36"	12
6	LANDSCAPE BOULDERS	+/- 54"	27
7	LANDSCAPE BOULDERS	+/- 48"	18



SIDEWASHES 2-5, 7 -BOULDER LAYOUT SECTION

NTS (REFER TO SECTION A, SHEET DS6)



GROUTED BOULDERS WITH LANDSCAPE BACKFILL

NTS (REFER TO SECTION B, SHEET DS6)

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT SOUTH CHANNEL PCN 470-04-31

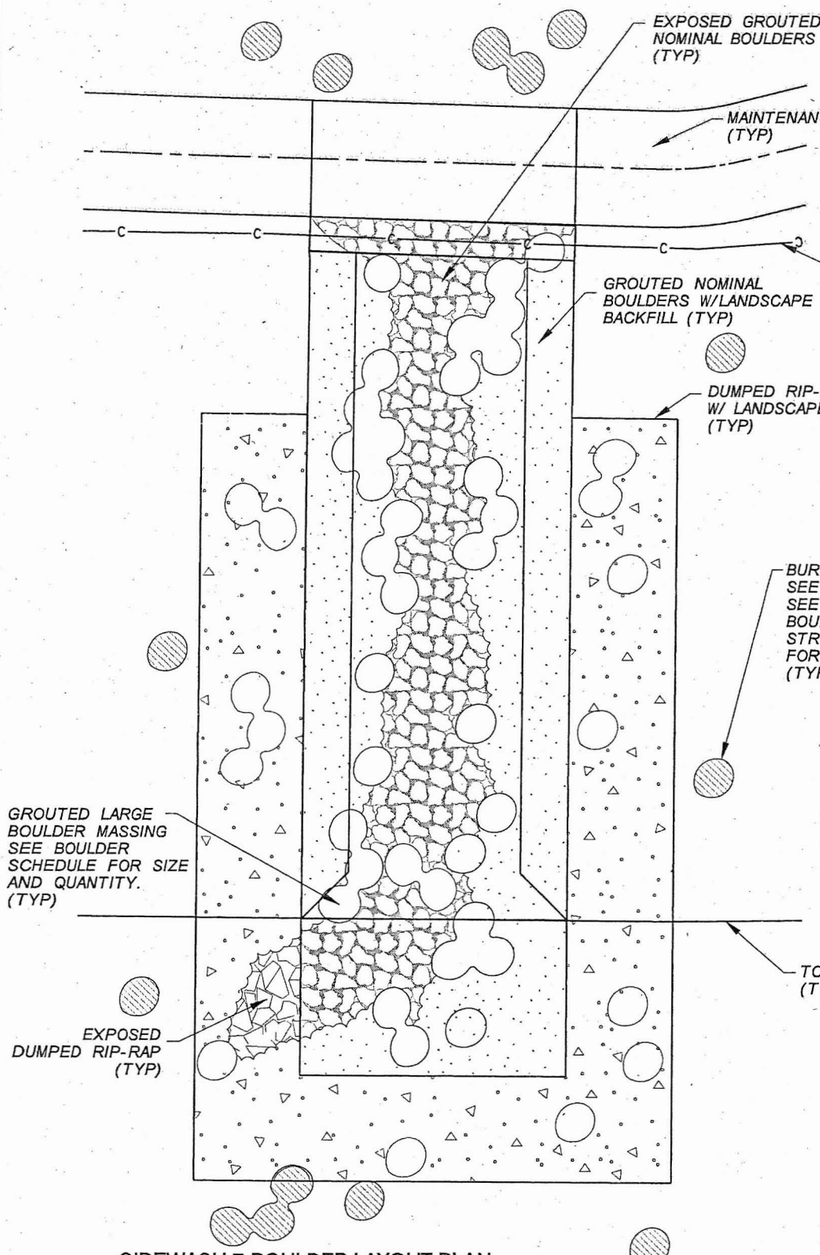
	BY	DATE
DESIGNED	JJG	2/15/07
DRAWN	JJG	4/17/07
CHECKED	SCP	4/17/07

SCOTT C. PETERS, 20840, Date Signed, ARIZONA, U.S.A.

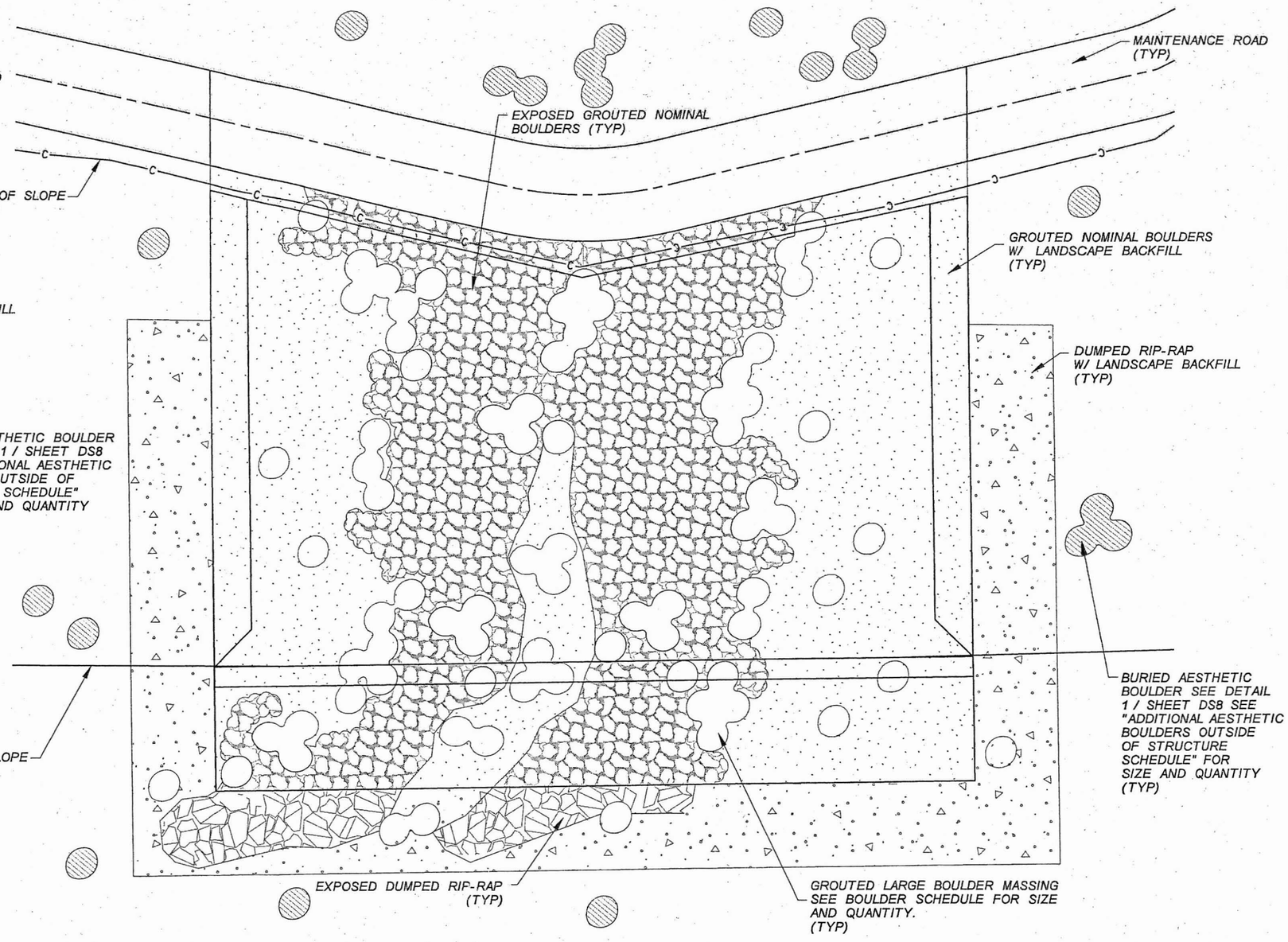
DRAWING NO. DS9

SW2-SW5 BOULDER PLACEMENT DETAILS

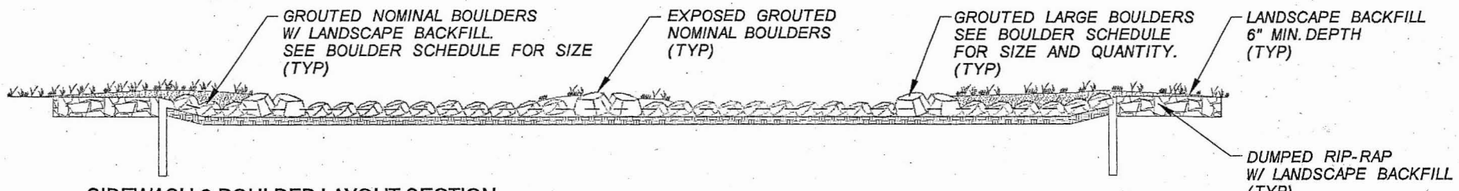
SHEET C 24 36



SIDEWASH 7-BOULDER LAYOUT PLAN
NTS



SIDEWASH 6-BOULDER LAYOUT PLAN
NTS



SIDEWASH 6-BOULDER LAYOUT SECTION
NTS (REFER TO SECTION A, SHEET DS6)

NOTES:
1. CONSTRUCT SIDEWASH DROP STRUCTURES ACCORDING TO SIDEWASH DROP STRUCTURE DETAILS AND SPECIFICATIONS. SEE SHEET DS6 FOR SIDEWASH DIMENSIONS AND CONSTRUCTION DETAILS. IN THE EVENT OF A CONTRADICTION BETWEEN THE BOULDER PLACEMENT DETAILS AND THE SIDEWASH DROP BOULDER PLACEMENT DETAILS AND SPECIFICATIONS, THE SIDEWASH DROP STRUCTURE DETAILS AND SPECIFICATIONS SHALL TAKE PRECEDENCE.
2. PLACE BOULDERS ACCORDING TO DISTRICT LANDSCAPE REPRESENTATIVE'S DIRECTION.
3. SEE SHEET DS9 FOR OTHER SIDEWASH BOULDER PLACEMENT NOTES AND DETAILS.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT SOUTH CHANNEL PCN 470-04-31

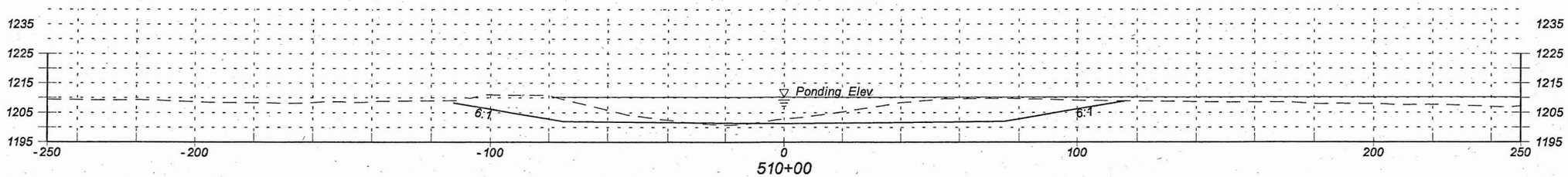
	BY	DATE
DESIGNED	JJG	2/15/07
DRAWN	JJG	4/17/07
CHECKED	SCP	4/17/07

SCOTT C. PETERS — 16645 — REGISTERED LAND SURVEYOR — ARIZONA, U.S.A.

DRAWING NO. DS10

SW6 AND SW7 BOULDER PLACEMENT DETAILS

SHEET 0 25 36



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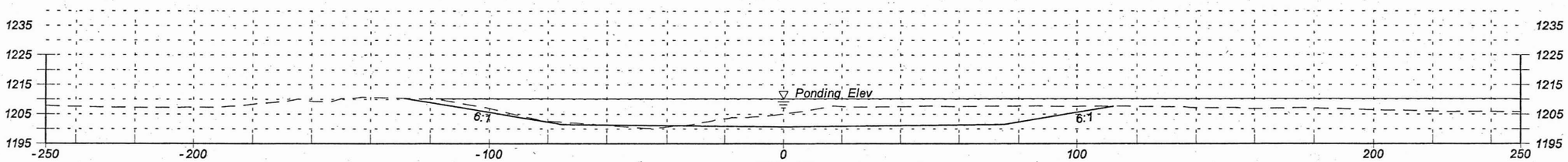

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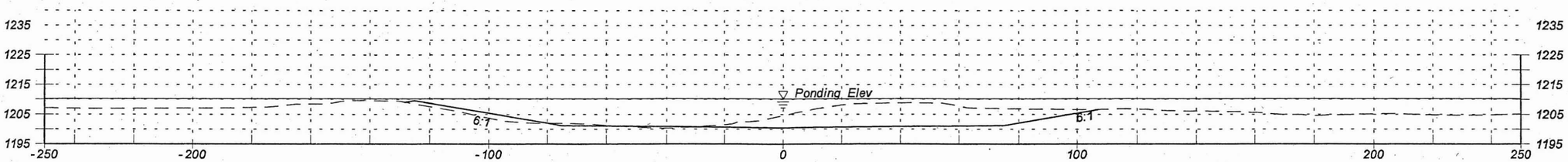


508+60

NOTE:
CONTRACTOR IS TO PROVIDE CROSS-SECTIONS OF EXISTING SURFACE BEFORE EXCAVATION BEGINS IN ORDER TO RECALCULATE EARTHWORK QUANTITIES AND ESTABLISH ELEVATIONS IN AREAS OF REMOVE AND REPLACE UNSUITABLE MATERIAL. AREAS OF BACKFILL PLACED ON THE EAST SIDE OF THE CHANNEL BY OTHERS, IS NOT REFLECTED ON THESE CROSS-SECTIONS.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

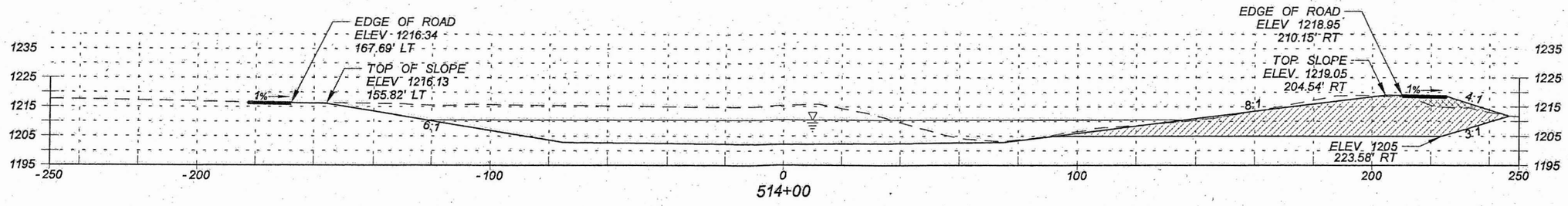
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO. XS1

CROSS SECTIONS

SHEET C
26 3



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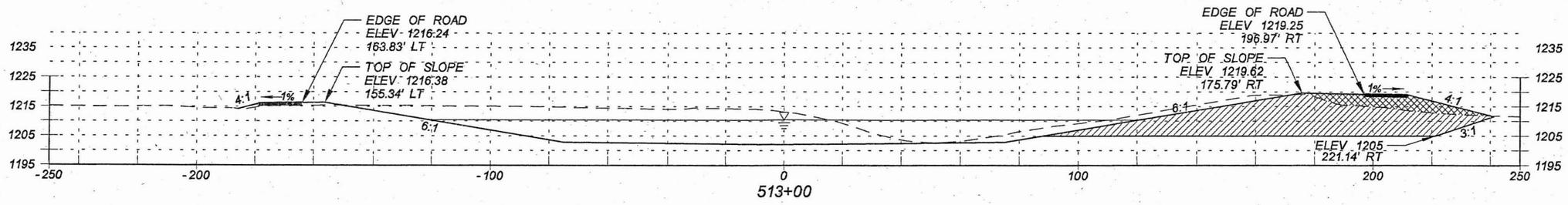

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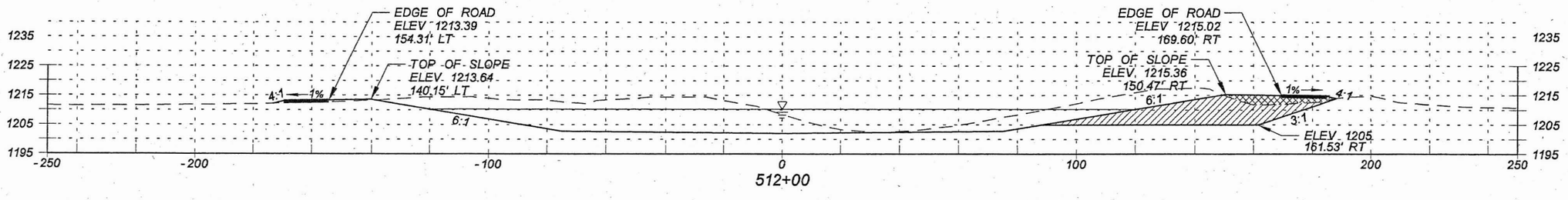

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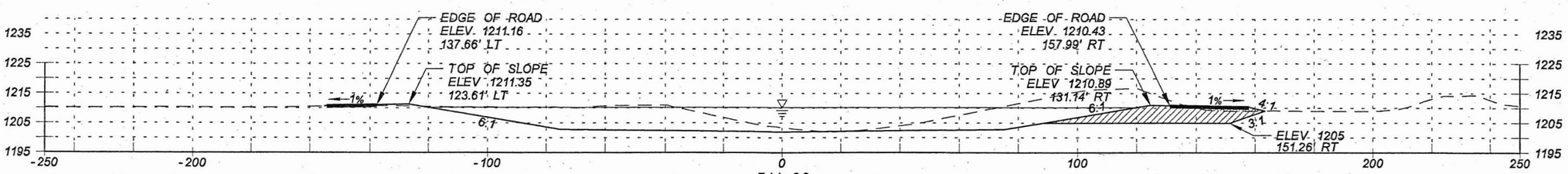


511+00

LEGEND

COMPACTED FILL

REMOVE & REPLACE UNSUITABLE MATERIAL

NOTE:
LOCATION, ELEVATION AND SLOPE OF OPERATIONS AND MAINTENANCE ROAD IS APPROXIMATE. SEE NOTE 8 ON SHEET G2.

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

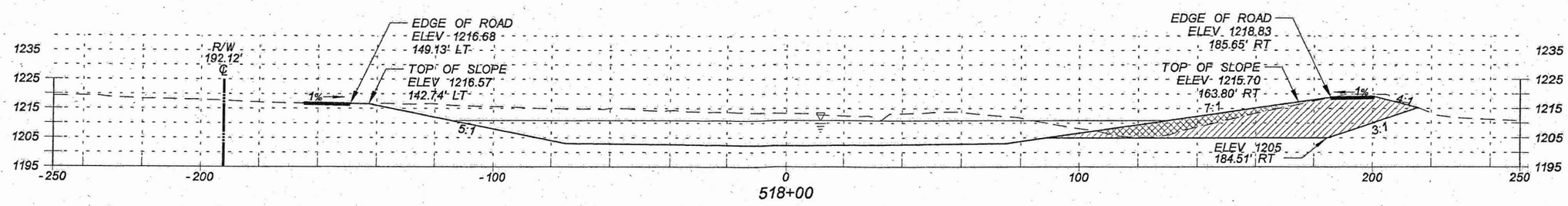
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO. XS2

CROSS SECTIONS

SHEET G 27 3



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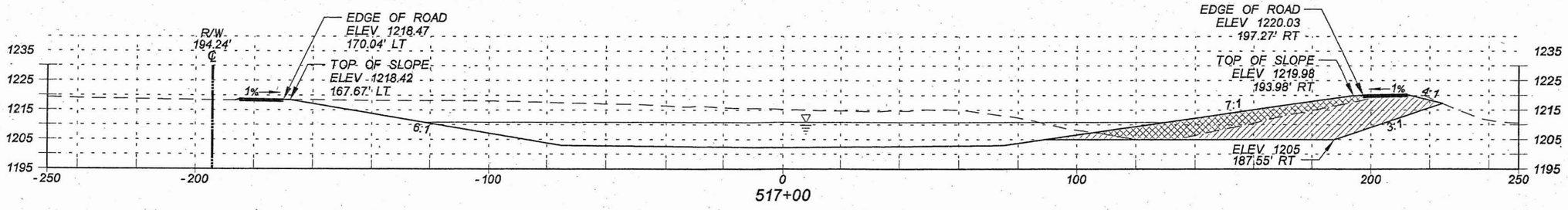

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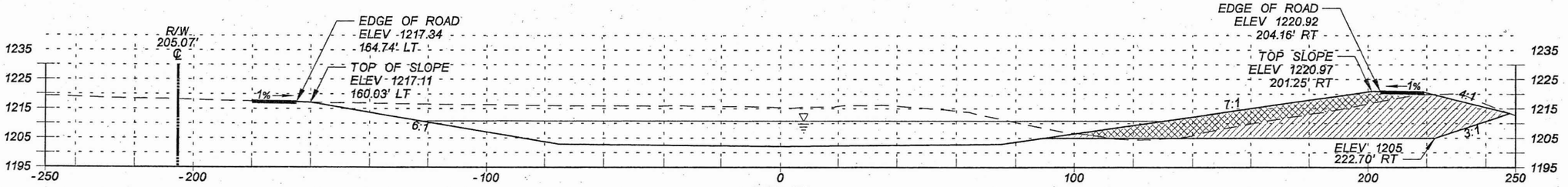

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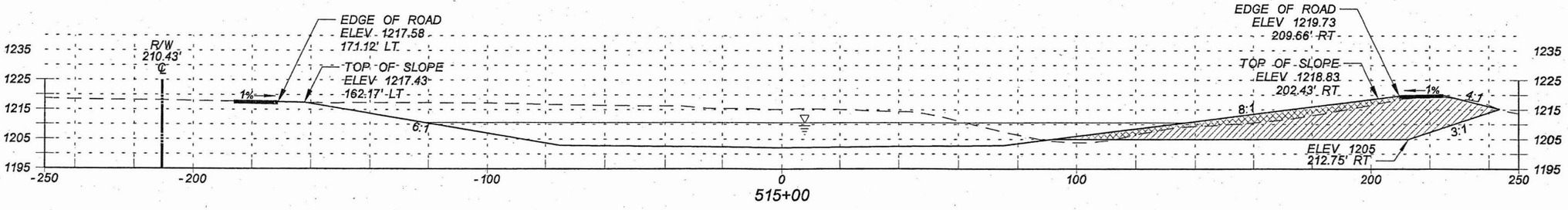


515+00

LEGEND

COMPACTED FILL

REMOVE & REPLACE UNSUITABLE MATERIAL

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

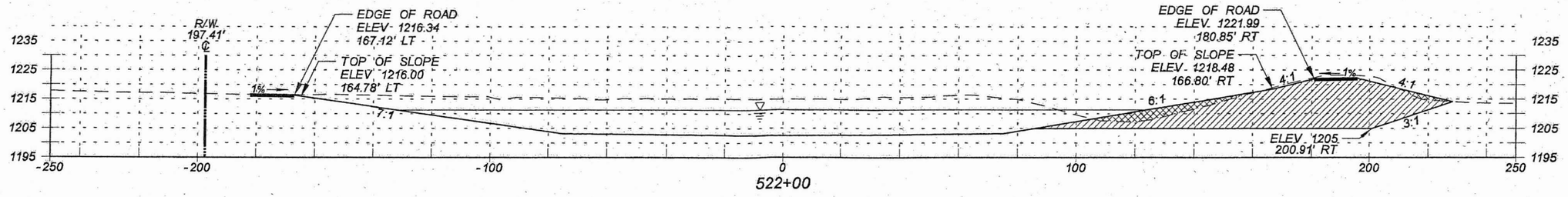
19148 Barry J. Ling — 06-30-07 — PROFESSIONAL ENGINEER — ARIZONA, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. XS3

CROSS SECTIONS

SHEET 28 3



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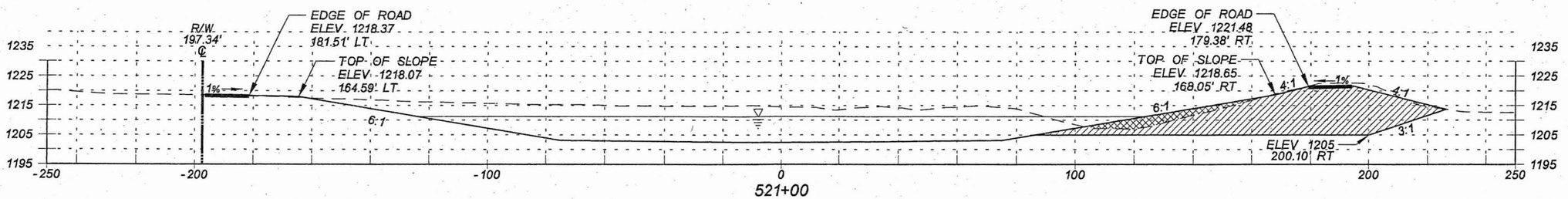

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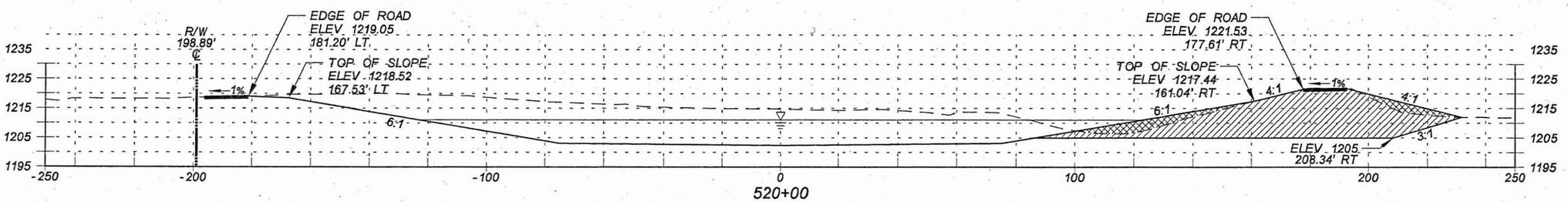

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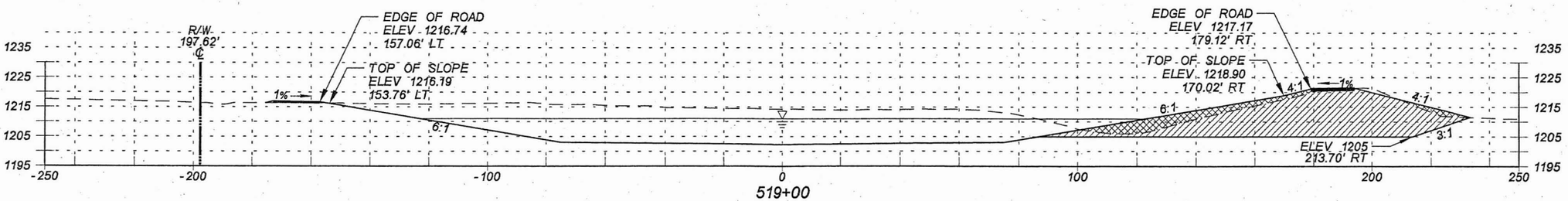

519+00

LEGEND

COMPACTED FILL

REMOVE & REPLACE UNSUITABLE MATERIAL

NO.	REVISION	BY	DATE
3			
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

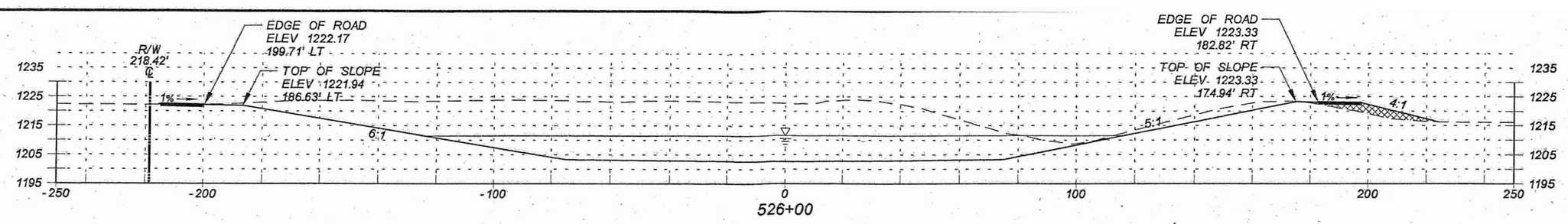
19148 Barry J. Ling — Date Signed 06/07/07 — ARIZONA, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. XS4

CROSS SECTIONS

SHEET C
29 36



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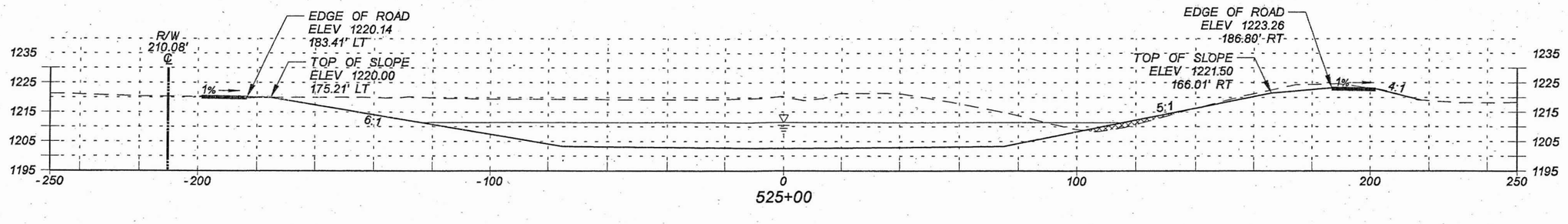

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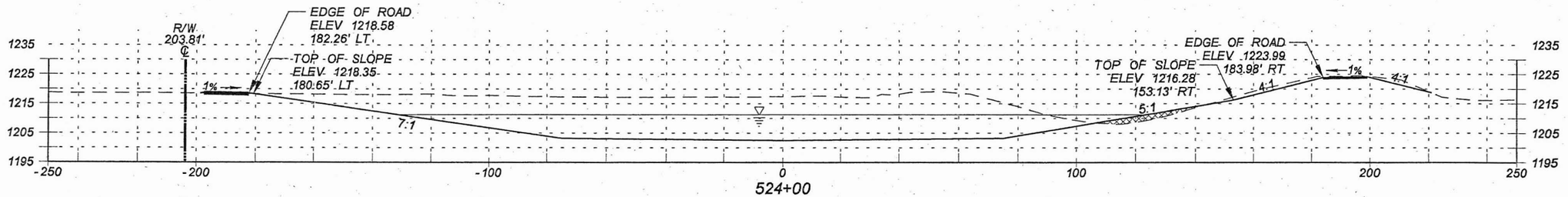

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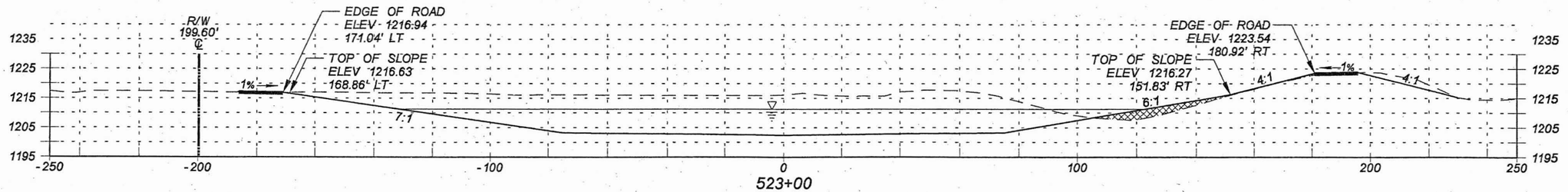

523+00

LEGEND

COMPACTED FILL

REMOVE & REPLACE UNSUITABLE MATERIAL

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

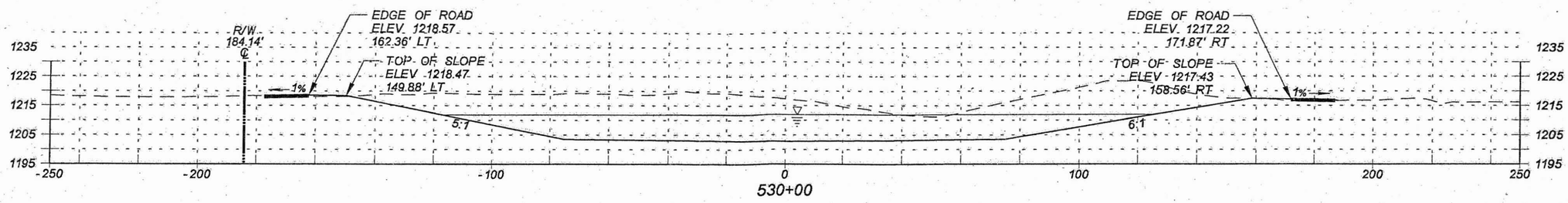
19146 Barry J. Ling — Expires 09-30-07 — Date Signed — Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. XS5

CROSS SECTIONS

SHEET C 30 36



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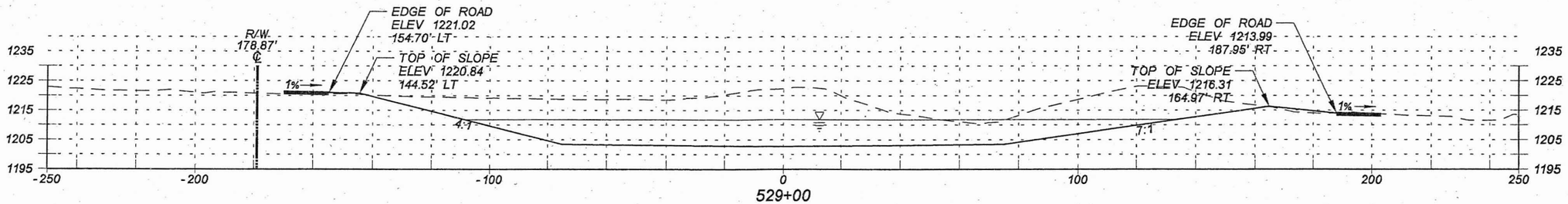

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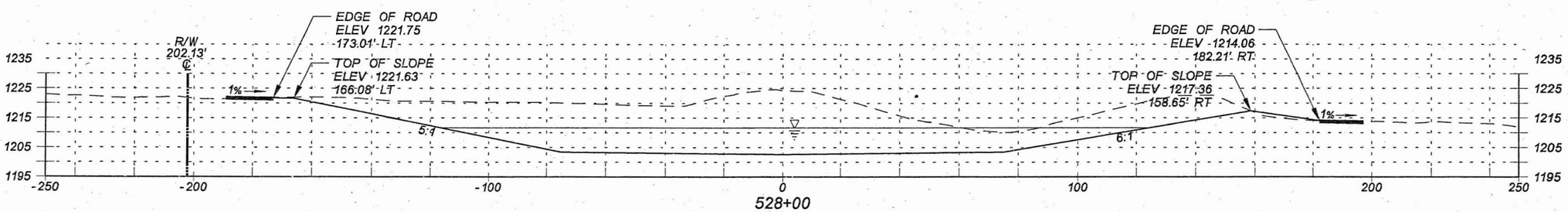

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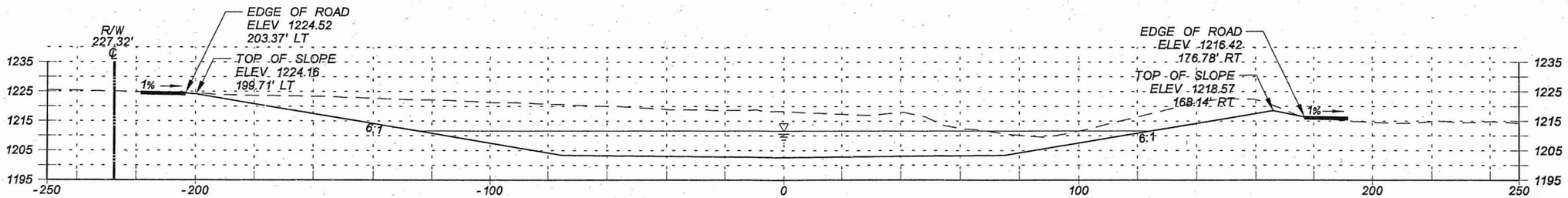

527+00

NO.	REVISION	BY	DATE
3			
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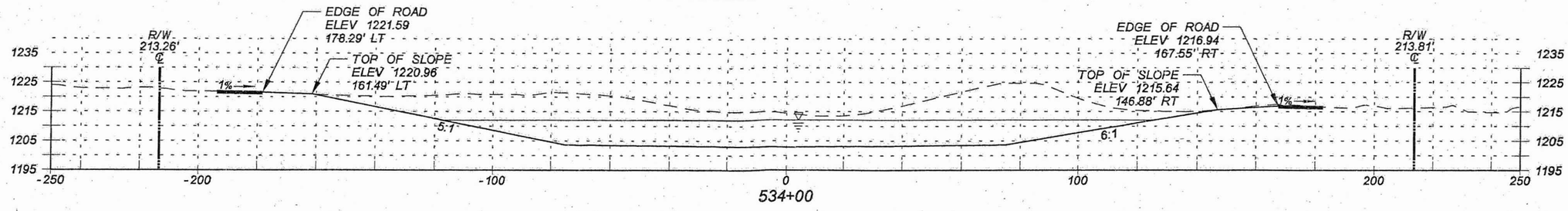
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO.		SHEET O
XS6	CROSS SECTIONS	31 36



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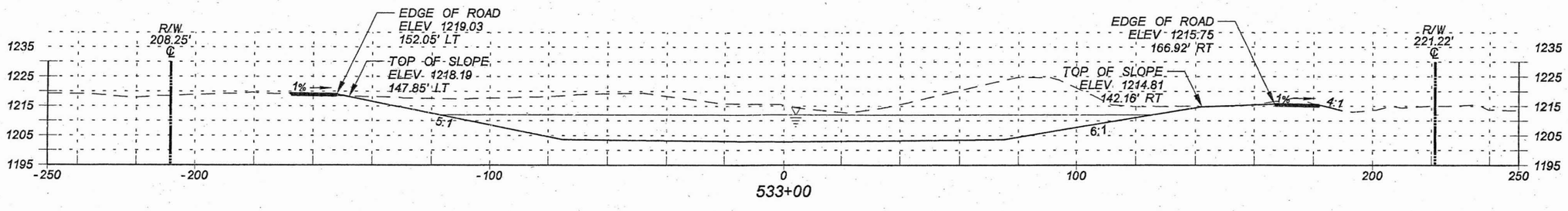
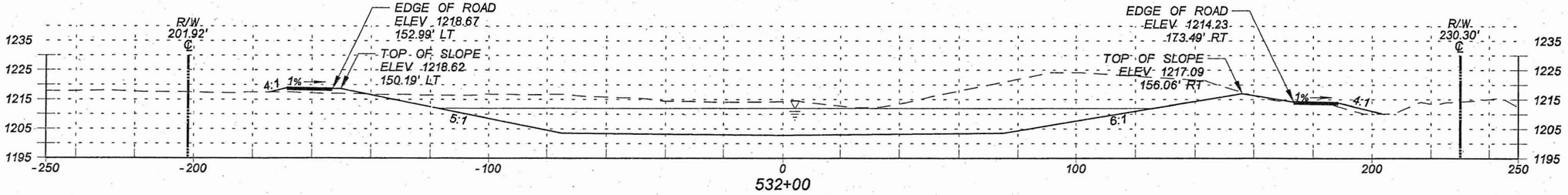


533+00



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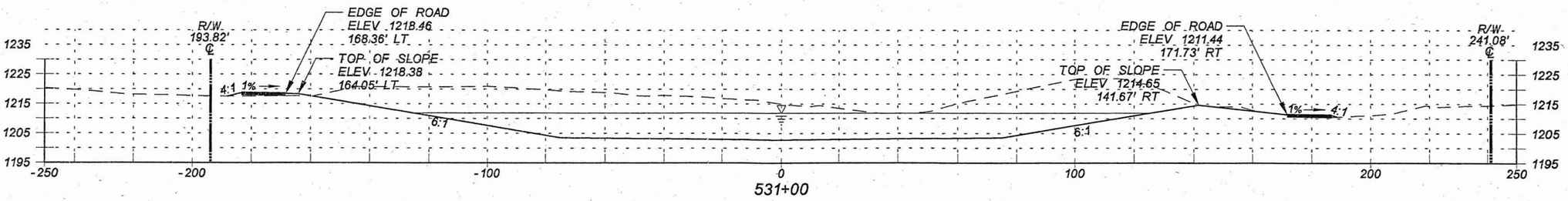


531+00

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

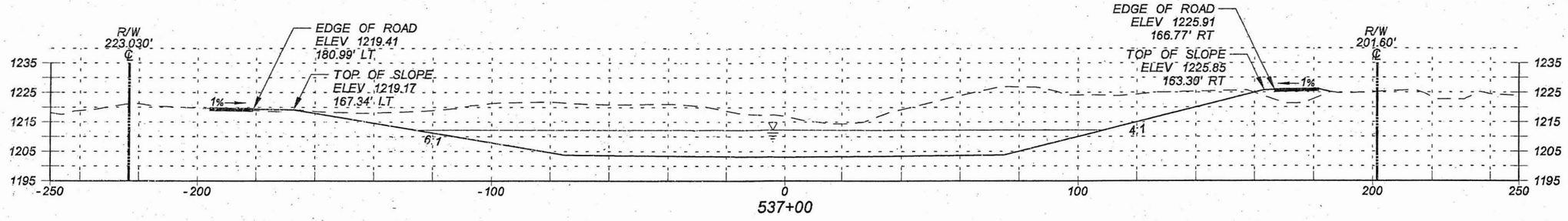
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO. XS7

CROSS SECTIONS

SHEET C
32 36



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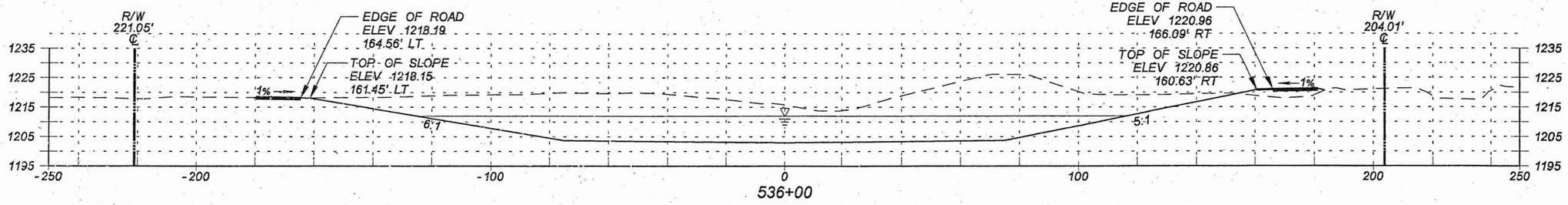

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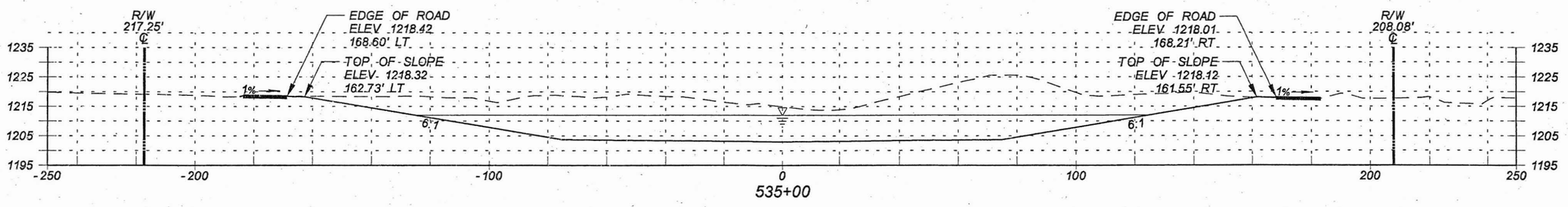


535+00

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NiC) PROJECT SOUTH CHANNEL. PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

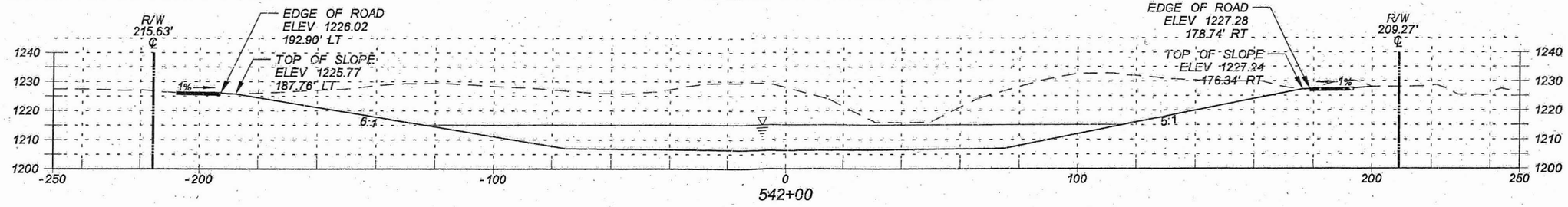
10146 Barry J. Ling 04/07 Date Signed — Arizona, U.S.A.

KIRKHAM MICHAEL

DRAWING NO. XS8

CROSS SECTIONS

SHEET O 33 36



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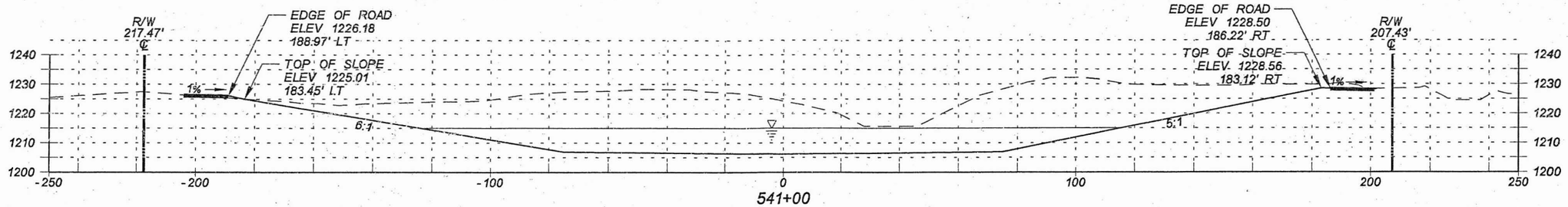

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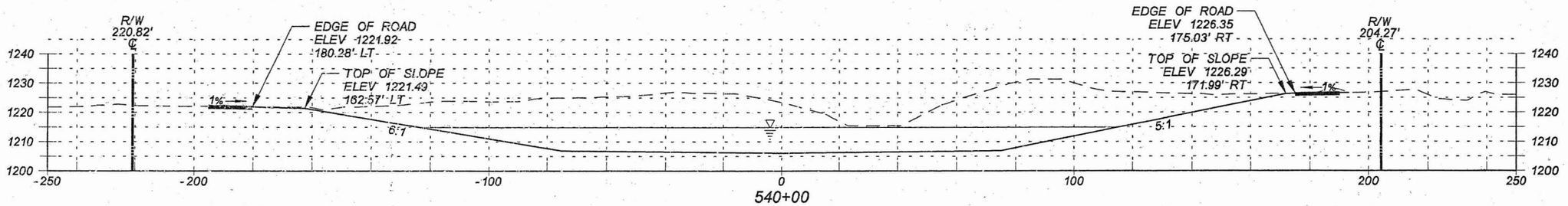

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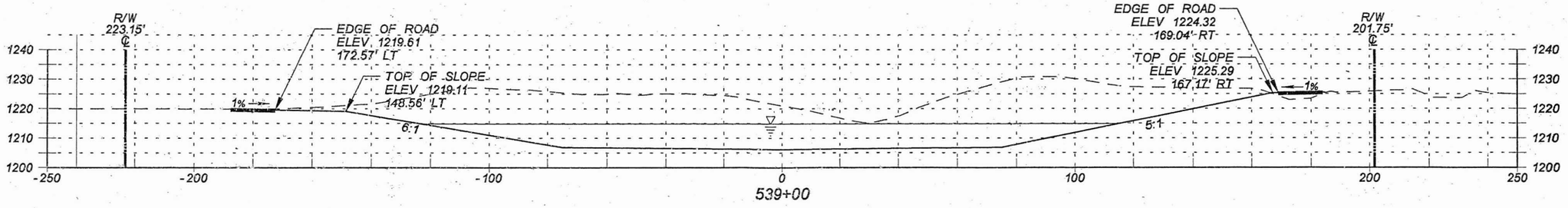


539+00

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

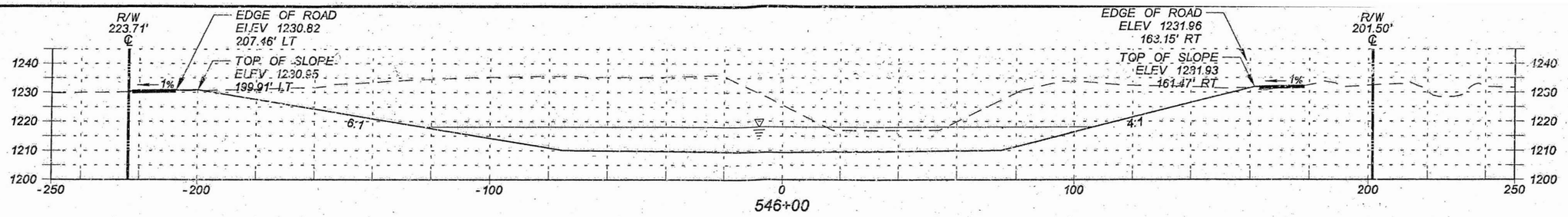
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO. XS9

CROSS SECTIONS

SHEET 0 34 36



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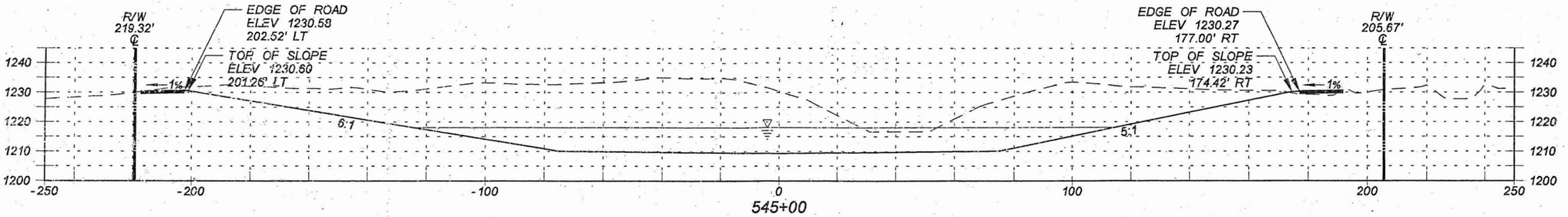

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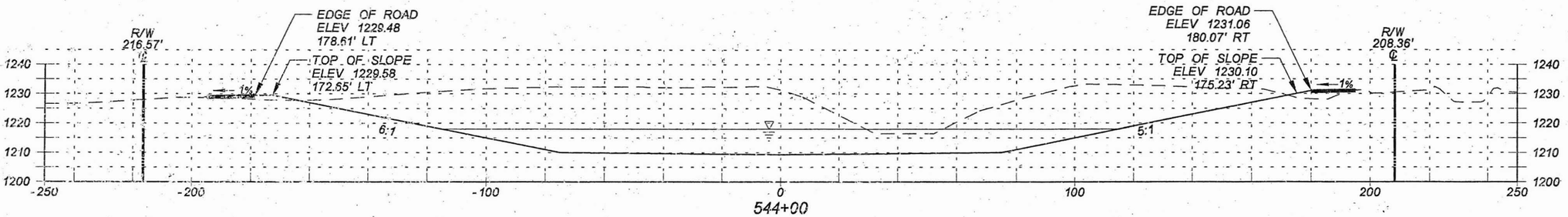


544+00

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS)#3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

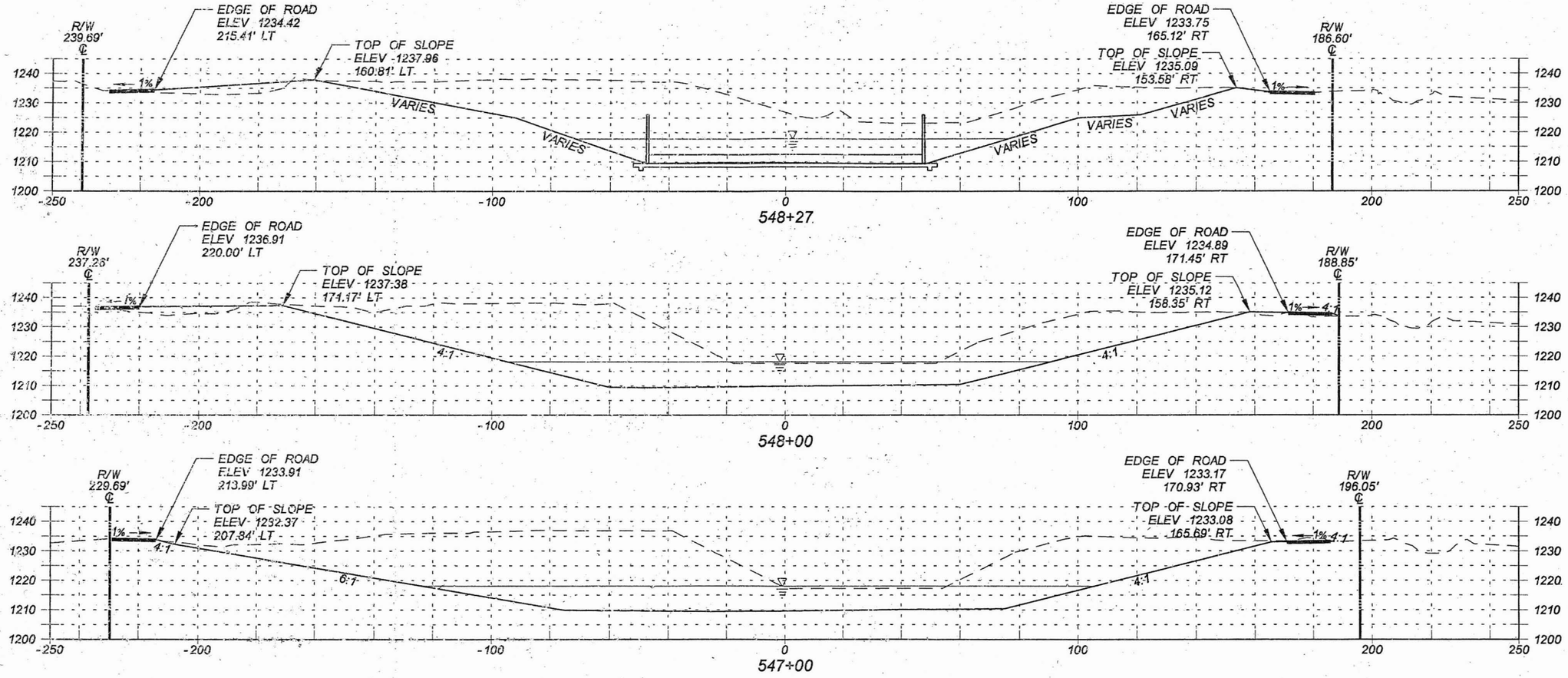
	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJH	04/07

KIRKHAM MICHAEL

DRAWING NO. XS10

CROSS SECTIONS

SHEET 0[illegible]
35 36



NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FLOOD RETARDING STRUCTURE (FRS) #3 - NORTH INLET CHANNEL (NIC) PROJECT
SOUTH CHANNEL PCN 470-04-31

	BY	DATE
DESIGNED	RD	04/07
DRAWN	PM	04/07
CHECKED	BJL	04/07

KIRKHAM MICHAEL

DRAWING NO.		SHEET O
XS11	CROSS SECTIONS	36 36

RESULTS OF SURVEY

OF SECTION 4, TOWNSHIP 2 NORTH, RANGE 2 WEST, AND SECTIONS 28 AND 33, TOWNSHIP 3 NORTH, RANGE 2 WEST, OF THE GILA AND SALT RIVER BASELINE AND MERIDIAN, COUNTY OF MARICOPA, STATE OF ARIZONA.

OWNER: MARICOPA COUNTY FLOOD CONTROL DISTRICT

BASIS OF SURVEY NOTES:

OUR BASIS OF BEARINGS IS DETERMINED BY MARICOPA COUNTY GEODETIC DENSIFICATION AND CADASTRAL SURVEY PLSS SUBDIVISION RECORD OF SURVEY RECORDED IN BOOK 652, PAGE 22, MARICOPA COUNTY RECORDERS OFFICE.

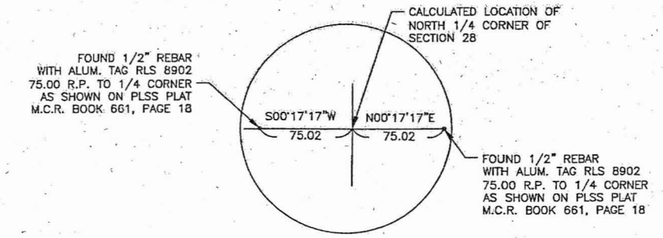
THE CONTROL POINT ELEVATIONS SHOWN ON THIS SURVEY FOLLOWED BY '*' ARE BENCHMARK QUALITY WHOSE ELEVATIONS WERE DETERMINED BY DIFFERENTIAL LEVELING. ANY ELEVATIONS SHOWN WITHOUT THE '*' ARE GPS QUALITY ONLY AND ARE NOT INTENDED TO BE USED AS BENCHMARKS.

THE COORDINATES SHOWN ON THIS SURVEY ARE U.S. STATE PLANE 1983 (AT GROUND)
ZONE IS ARIZONA CENTRAL 0202
DATUM IS NAD 1983 (CONUS)
GEOID MODEL IS GEOID99 (CONUS)
THE PROJECT LOCATION USED IS A CEI CONTROL POINT # 5000

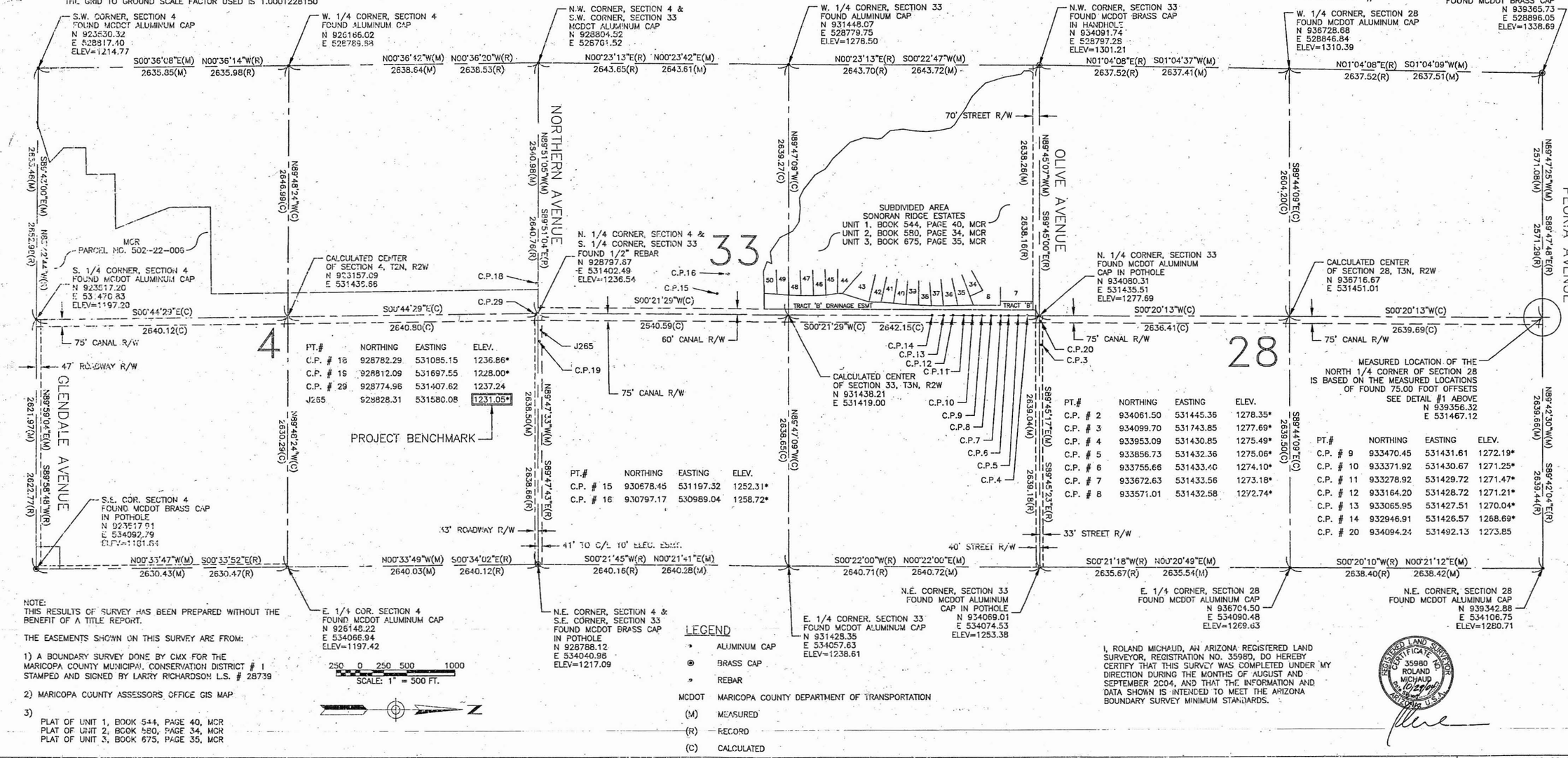
LATITUDE = 33°33'05.44869"
LONGITUDE = 112°28'13.25470"
HEIGHT= 1141.647

GROUND NORTHING = 928752.397
GROUND EASTING = 531387.997
ELEV = 1234.665

THE GRID TO GROUND SCALE FACTOR USED IS 1.0001228150



DETAIL # 1



PT.#	NORTHING	EASTING	ELEV.
C.P. # 18	928782.29	531085.15	1236.86*
C.P. # 19	928812.09	531697.55	1228.00*
C.P. # 29	928774.96	531407.62	1237.24
J265	929828.31	531580.08	1231.05*

PROJECT BENCHMARK

PT.#	NORTHING	EASTING	ELEV.
C.P. # 15	930678.45	531197.32	1252.31*
C.P. # 16	930797.17	530989.04	1258.72*

PT.#	NORTHING	EASTING	ELEV.
C.P. # 2	934061.50	531445.36	1278.35*
C.P. # 3	934099.70	531743.85	1277.69*
C.P. # 4	933953.09	531430.85	1275.49*
C.P. # 5	933856.73	531432.36	1275.06*
C.P. # 6	933755.66	531433.40	1274.10*
C.P. # 7	933672.63	531433.56	1273.18*
C.P. # 8	933571.01	531432.58	1272.74*

MEASURED LOCATION OF THE NORTH 1/4 CORNER OF SECTION 28 IS BASED ON THE MEASURED LOCATIONS OF FOUND 75.00 FOOT OFFSETS SEE DETAIL #1 ABOVE
N 939356.32
E 531467.12

PT.#	NORTHING	EASTING	ELEV.
C.P. # 9	933470.45	531431.61	1272.19*
C.P. # 10	933371.92	531430.67	1271.25*
C.P. # 11	933278.92	531429.72	1271.47*
C.P. # 12	933164.20	531428.72	1271.21*
C.P. # 13	933065.95	531427.51	1270.04*
C.P. # 14	932946.91	531426.57	1268.69*
C.P. # 20	934094.24	531492.13	1273.85

NOTE:
THIS RESULTS OF SURVEY HAS BEEN PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT.

THE EASEMENTS SHOWN ON THIS SURVEY ARE FROM:

1) A BOUNDARY SURVEY DONE BY CMX FOR THE MARICOPA COUNTY MUNICIPAL CONSERVATION DISTRICT # 1 STAMPED AND SIGNED BY LARRY RICHARDSON L.S. # 28739

2) MARICOPA COUNTY ASSESSORS OFFICE GIS MAP

3)
PLAT OF UNIT 1, BOOK 544, PAGE 40, MCR
PLAT OF UNIT 2, BOOK 580, PAGE 34, MCR
PLAT OF UNIT 3, BOOK 675, PAGE 35, MCR

LEGEND

- ALUMINUM CAP
- BRASS CAP
- REBAR
- MCDOT MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
- (M) MEASURED
- (R) RECORD
- (C) CALCULATED

I, ROLAND MICHAUD, AN ARIZONA REGISTERED LAND SURVEYOR, REGISTRATION NO. 35980, DO HEREBY CERTIFY THAT THIS SURVEY WAS COMPLETED UNDER MY DIRECTION DURING THE MONTHS OF AUGUST AND SEPTEMBER 2004, AND THAT THE INFORMATION AND DATA SHOWN IS INTENDED TO MEET THE ARIZONA BOUNDARY SURVEY MINIMUM STANDARDS.

REGISTERED LAND SURVEYOR CERTIFICATE NO. 35980 ROLAND MICHAUD 10/26/04 ARIZONA U.S.A.

DATE	REVISIONS
10-22-04	ADDED COORDINATES AND BASIS OF SURVEY NOTE

CEI Consultant Engineering, Inc.

CONSULTANT ENGINEERING, INC.
3404 W. CHERYL DRIVE
PHOENIX, ARIZONA
602-866-5090

RECORD OF SURVEY
FOR
KIRKHAM-MICHAEL

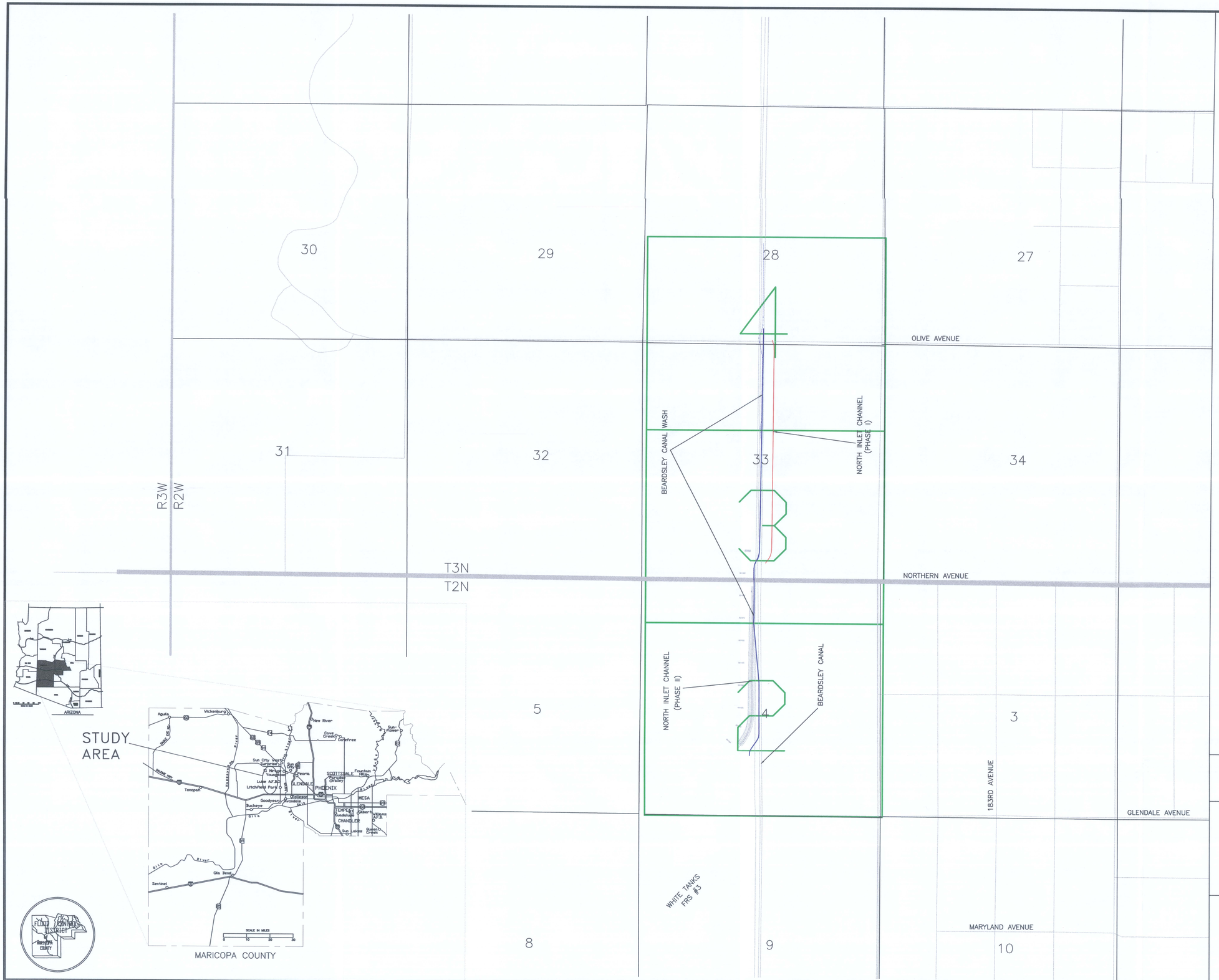
DATE	10-22-04
SCALE	1" = 40'
DRAWN BY	AFS
APPROVED BY	RM
C.E.I. JOB #	5050-240
SHEET	1 OF 1

EXHIBIT C

Study Work Maps

EXHIBIT C1

Beardsley Canal Wash



LEGEND

SECTION BOUNDARY

STUDY REACH AND REACH ID — Beardsley Canal Wash, North Inlet Channel

ROAD — Northern Avenue

SHEET OUTLINE AND NUMBER — 2

NOTES

1. HORIZONTAL PROJECTION IS ARIZONA STATE PLANE CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983.
2. ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988. (NAVD88= NGVD29 +1.78)

STATEMENT OF PROFESSIONAL REGISTRATION

THE CLOMR WORK MAPS WERE PREPARED UNDER MY DIRECT SUPERVISION USING FEMA APPROVED HYDROLOGY AND 1-FOOT CONTOUR MAPPING PROVIDED BY FCDMC. PROJECT BENCHMARKS AND CONTROL POINTS SURVEY DATA WERE SURVEYED BY CONSULTANT ENGINEERING INC.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS BEARDSLEY CANAL WASH

W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

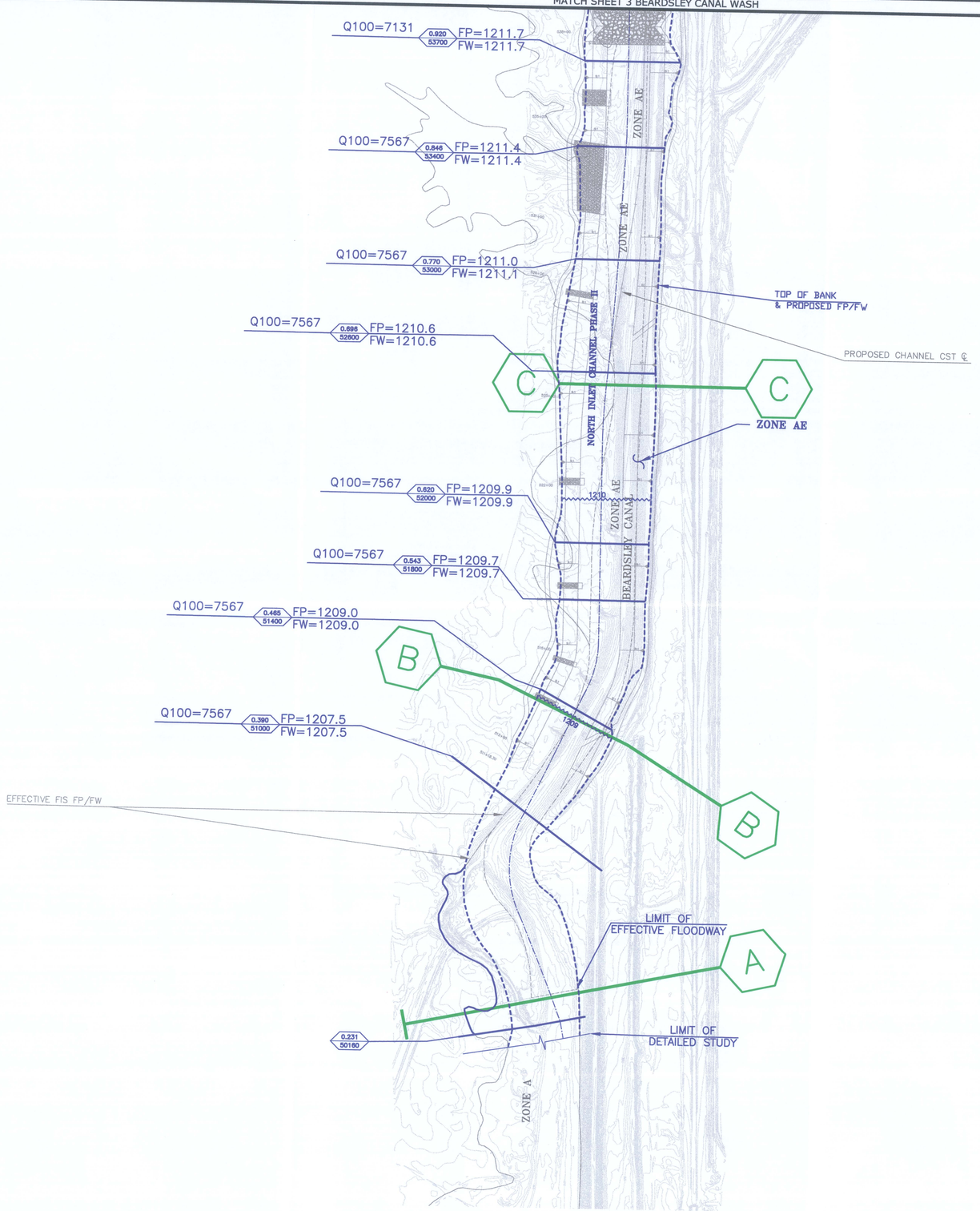
WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION • TRAFFIC
WATER / WASTEWATER • SURVEYING
CONSTRUCTION MANAGEMENT
(602) 335-8500
PHOENIX • MESA • TUCSON
IN ASSOCIATION WITH

EXHIBIT C - STUDY WORK MAPS
C1 BEARDSLEY CANAL WASH

WP#42284.02 SHEET 1 OF 4

H:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\TDN\CD_October08\AutoCad\BCW\DESIGN\ NIC-SHEET01.dwg

MATCH SHEET 3 BEARDSLEY CANAL WASH



LEGEND

100-YR FEMA FLOODPLAIN BOUNDARY	
100-YR FEMA FLOODWAY BOUNDARY	
EFFECTIVE FIRM CROSS-SECTIONS	
EFFECTIVE FIRM CROSS-SECTION ID	I
100-YR FLOODPLAIN BOUNDARY (PROPOSED CONDITION, DATED 2007)	
100-YR FLOODWAY (PROPOSED CONDITION, DATED 2007)	
CROSS SECTION NUMBER	0.390 / 51000
FEMA ZONE DESIGNATIONS	ZONE AE
BASE FLOOD ELEVATION	1213
100 YR PEAK DISCHARGE =7567(cubic feet per second)	Q100=7567
FLOODPLAIN WATER SURFACE ELEVATION = 1212	FP=1212.0
FLOODWAY WATER SURFACE ELEVATION = 1212	FW=1212.0
HYDRAULIC BASELINE/FLOW LINE	
CORPORATE LIMITS	Corporate Limits
COUNTY BOUNDARY	County Boundary
SECTION BOUNDARY	12 | 7 / 13 | 18

NOTES

NOTE: ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.

NOTE: NAVD88 = NGVD29 +1.78

ELEVATION REFERENCE MARKS

GEODETIC DENSIFICATION CADASTRAL SURVEY (GDACS)

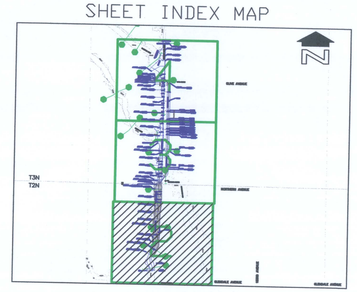
Project Benchmark	Point Marker	NAD 83 Northing (feet)	NAD 83 Easting (feet)	NAVD 88 Elevation (feet)
J265	⊕	928828.31	531580.08	1231.05

(Coordinates shifted South 114' and West 65' due to surface coordinates versus grid-projection coordinates)

(Not Shown, Outside Boundary of Sheet)

(Additional Project Benchmarks and Control Points are shown on Record of Survey dated 10-22-04 by Consulting Engineering Inc. CEI)
(Point Located on Sheet 3 of 4 North Inlet Channel Improvements)

SHEET INDEX MAP



200' 0' 200' 400'
SCALE: 1"= 200 FEET
CONTOUR INTERVAL = 1 FOOT

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS
BEARDSLEY CANAL WASH
W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

Registered Professional Engineer (Civil)
CERTIFICATE NO.
24999
JEFFREY R. MINCH
Date Signed
ARIZONA, U.S.A.
EXPIRES 09-30-09

WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
CONSTRUCTION MANAGEMENT
(602) 335-8000
PHOENIX • MESA • TUCSON

EXHIBIT C - STUDY WORK MAPS
C1 BEARDSLEY CANAL WASH

SHEET 2 OF 4

H:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\TDN\CD_October08\AutoCad\BCW\DESIGN\ FCD_Revised_NIC-SHEETS_2-4.dwg - Oct 29,2008

MATCH SHEET 4 BEARDSLEY CANAL WASH

CHOLLA WASH
ZONE AE

B

Q100=1115 | 1.692 / 58400 | FP=1252.4 FW=1252.4

Q100=1115 | 1.616 / 58000 | FP=1251.8 FW=1251.9

EFFECTIVE FEMA FP/FW

Limit of Detailed Study

ZONE AE

BEARDSLEY CANAL WASH

TOP OF BANK & PROPOSED FP/FW

PROPOSED CHANNEL CST ℄

Q100=5679 | 1.566 / 57137.91 | FP=1251.3 FW=1251.4

Q100=5679 | 1.466 / 56682.91 | FP=1248.4 FW=1249.2

A

ZONE AE

Q100=5679 | 1.388 / 56252.91 | FP=1243.3 FW=1244.2

ZONE AE

NORTH INLET CHANNEL PHASE I

Q100=5679 | 1.313 / 55857.91 | FP=1240.6 FW=1241.0

PROPOSED FP/FW

Q100=5679 | 1.237 / 55452.91 | FP=1238.3 FW=1238.3

ZONE AE

Q100=5679 | 1.173 / 55117.91 | FP=1234.0 FW=1234.0

Q100=5679 | 1.159 / 55042.81 | FP=1234.6 FW=1234.6

Q100=5679 | 1.148 / 54805.08 | FP=1222.7 FW=1222.7

J265

NORTHERN AVENUE

T3N

T2N

Q100=7131 | 1.124 / 54827 | FP=1218.0 FW=1218.0

Q100=7131 | 1.074 / 54600 | FP=1218.1 FW=1218.1

D

ZONE AE

PERRYVILLE ROAD WASH

TOP OF BANK & PROPOSED FP/FW

PROPOSED CHANNEL CST

Q100=7131 | 0.998 / 54200 | FP=1215.0 FW=1215.0

NORTH INLET CHANNEL PHASE II

MATCH SHEET 2 BEARDSLEY CANAL WASH

Q100=1600 | 183+67.14 | FP=1253.7 FW=1253.7

Q100=1600 | 182+80.14 | FP=1250.0 FW=1250.0

Q100=1600 | 180+86.94 | FP=1249.9 FW=1249.9

Q100=1600 | 179+99.94 | FP=1246.5 FW=1246.5

Q100=1600 | 179+49.76 | FP=1246.5 FW=1246.5

Q100=1600 | 178+62.76 | FP=1242.9 FW=1242.9

Q100=1600 | 178+12.59 | FP=1242.9 FW=1242.9

Q100=1600 | 177+20.59 | FP=1238.3 FW=1238.3

E

Q100=1600 | 169+59.23 | FP=1237.7 FW=1237.7

Q100=1600 | 168+67.23 | FP=1233.2 FW=1233.2

ZONE AE

Q100=1600 | 160+05.09 | FP=1232.5 FW=1232.5

K

Q100=1600 | 159+01.09 | FP=1227.2 FW=1227.2

ZONE AE

LEGEND

100-YR FEMA FLOODPLAIN BOUNDARY	
100-YR FEMA FLOODWAY BOUNDARY	
EFFECTIVE FIRM CROSS-SECTIONS	
EFFECTIVE FIRM CROSS-SECTION ID	E
100-YR FLOODPLAIN BOUNDARY (PROPOSED CONDITION, DATED 2007)	
100-YR FLOODWAY (PROPOSED CONDITION, DATED 2007)	
CROSS SECTION	1.313 / 55857.91
FEMA ZONE DESIGNATIONS	ZONE AE
BASE FLOOD ELEVATION	1241
100 YR PEAK DISCHARGE =1600(cubic feet per second)	Q100=1600
FLOODPLAIN WATER SURFACE ELEVATION = 1238.3	FP=1238.3
FLOODWAY WATER SURFACE ELEVATION = 1238.3	FW=1238.3
HYDRAULIC BASELINE/FLOW LINE	
CORPORATE LIMITS	Corporate Limits
COUNTY BOUNDARY	County Boundary
SECTION BOUNDARY	12 | 7 / 13 | 18

NOTES

NOTE: ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.

NOTE: NAVD88 = NGVD29 +1.78

ELEVATION REFERENCE MARKS

GEODETIC DENSIFICATION CADASTRAL SURVEY (GDACS) CONTROL STATIONS

Project Benchmark	Point Marker	NAD 83 Northing (feet)	NAD 83 Easting (feet)	NAVD 88 Elevation (feet)
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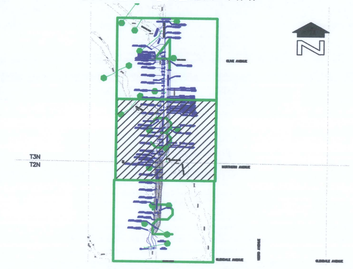
(Coordinates shifted South 114' and West 65' due to surface coordinates versus grid-projection coordinates)

(Additional Project Benchmarks and Control Points are shown on Record of Survey dated 10-22-04 by Consulting Engineering Inc. CEI) (Point Located on Sheet 3 of 4 North Inlet Channel Improvements)

SHEET INDEX MAP



200' 0' 200' 400'

SCALE: 1"= 200 FEET
CONTOUR INTERVAL = 1 FOOT

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS BEARDSLEY CANAL WASH

W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

Registered Professional Engineer (Civil) 24999 JEFFREY R. MINCH Date Signed (4-30-09) Arizona, U.S.A.

EXPIRES 09-30-09

WOOD/PATEL
LAND DEVELOPMENT • WATER RESOURCES
TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
CONSTRUCTION MANAGEMENT
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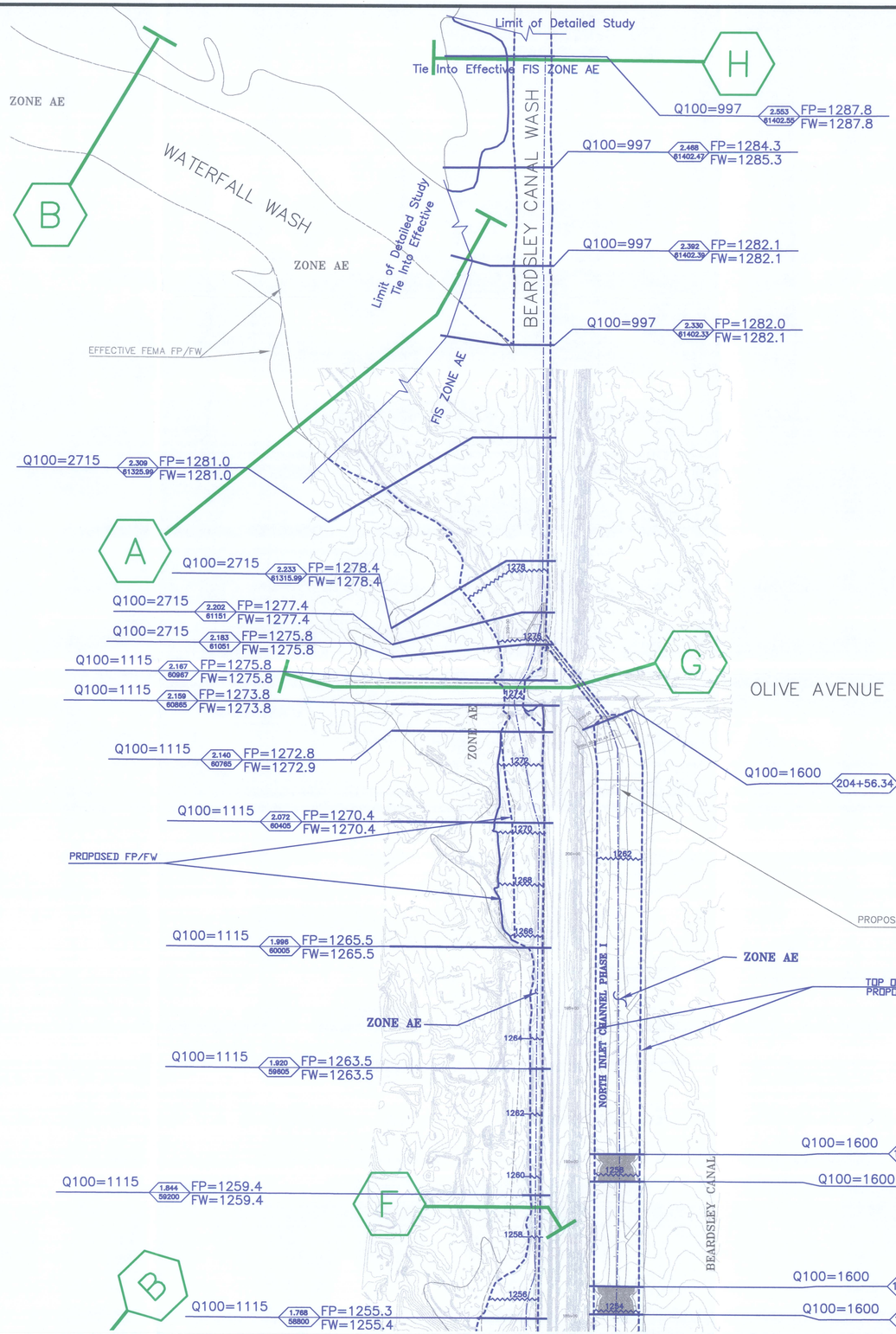
EXHIBIT C - STUDY WORK MAPS
C1 BEARDSLEY CANAL WASH

W:\2004Projects\042284.02_North Inlet Channel CLOMR\CLOMR\TDN\CD_October08\AutoCad\BCW\DESIGN\ FCD_Revised_NIC-SHEETS_2-4.dwg



LEGEND

100-YR FEMA FLOODPLAIN BOUNDARY	
100-YR FEMA FLOODWAY BOUNDARY	
EFFECTIVE FIRM CROSS-SECTIONS	
EFFECTIVE FIRM CROSS-SECTION ID	A
100-YR FLOODPLAIN BOUNDARY (PROPOSED CONDITION, DATED 2007)	
100-YR FLOODWAY (PROPOSED CONDITION, DATED 2007)	
CROSS SECTION	2.309 / 1325.99
FEMA ZONE DESIGNATIONS	ZONE AE
BASE FLOOD ELEVATION	1280
FLOODPLAIN WATER SURFACE ELEVATION = 1238.3	FP=1238.3
FLOODWAY WATER SURFACE ELEVATION = 1238.3	FW=1238.3
100 YR PEAK DISCHARGE =1600(cubic feet per second)	Q100=1600
HYDRAULIC BASELINE/FLOW LINE	
CORPORATE LIMITS	Corporate Limits
COUNTY BOUNDARY	County Boundary
SECTION BOUNDARY	12 | 7 / 13 | 18

NOTES

NOTE: ALL ELEVATIONS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988.

NOTE: NAVD88 = NGVD29 +1.78

ELEVATION REFERENCE MARKS

GEODETIC DENSIFICATION CADASTRAL SURVEY (GDACS) CONTROL STATIONS

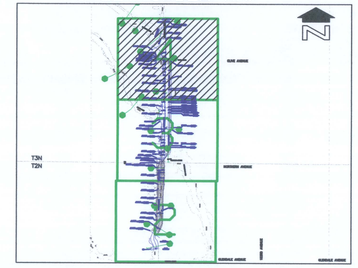
Project Benchmark	Point Marker	NAD 83 Northing (feet)	NAD 83 Easting (feet)	NAVD 88 Elevation (feet)
J265	⌖	928828.31	531580.08	1231.05

(Coordinates shifted South 114' and West 65' due to surface coordinates versus grid-projection coordinates)

(Not Shown, Outside Boundary of Sheet)

(Additional Project Benchmarks and Control Points are shown on Record of Survey dated 10-22-04 by Consulting Engineering Inc. CEI) (Point Located on Sheet 3 of 4 North Inlet Channel Improvements)

SHEET INDEX MAP



200' 0' 200' 400'

SCALE: 1" = 200 FEET
CONTOUR INTERVAL = 1 FOOT

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS BEARDSLEY CANAL WASH

W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

Registered Professional Engineer (Civil) CERTIFICATE NO. 24999 JEFFREY R. MINCH Date Signed ARIZONA, U.S.A.

EXPIRES 09-30-09

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EXHIBIT C - STUDY WORK MAPS
C1 BEARDSLEY CANAL WASH

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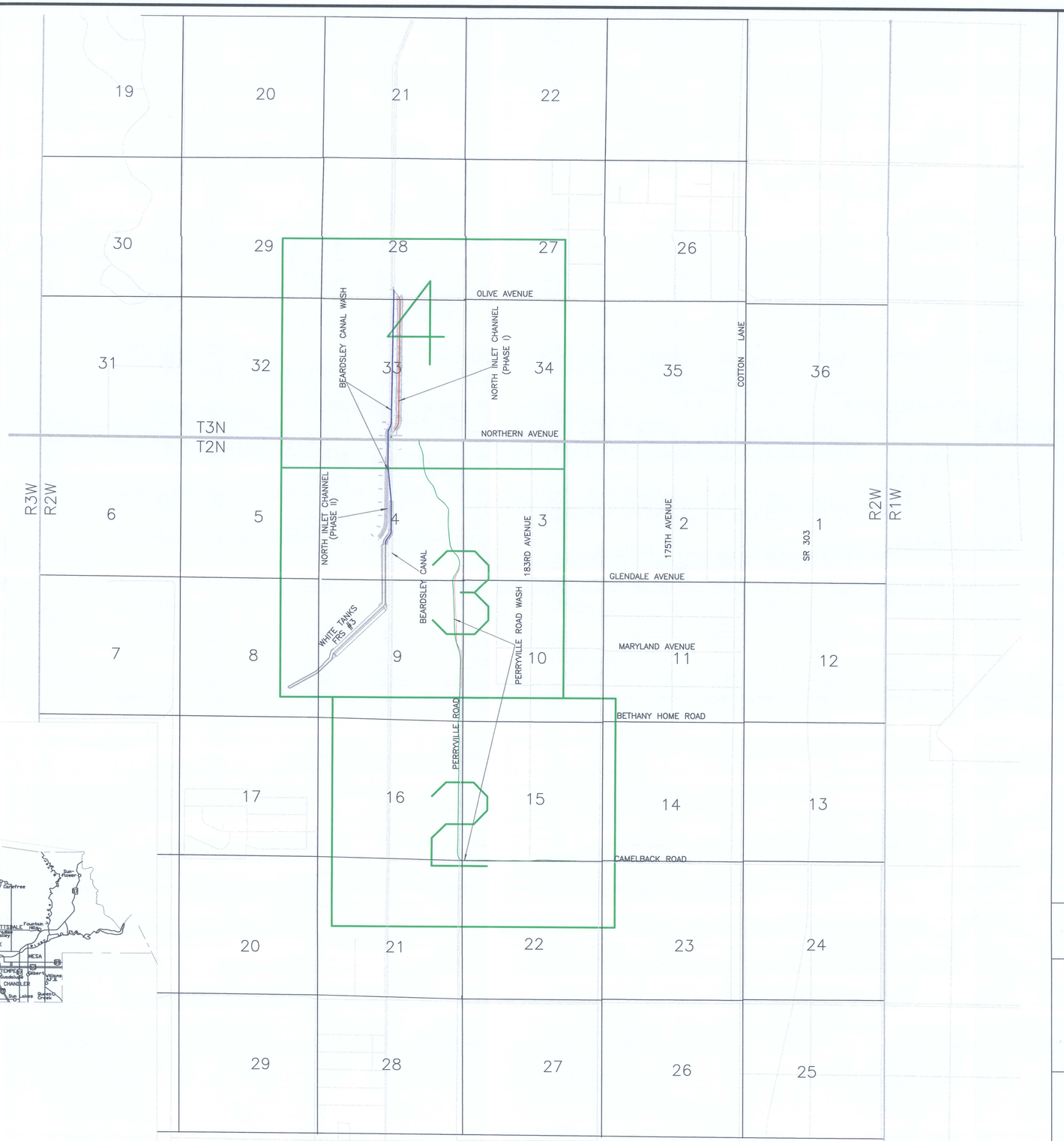
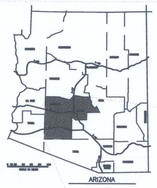
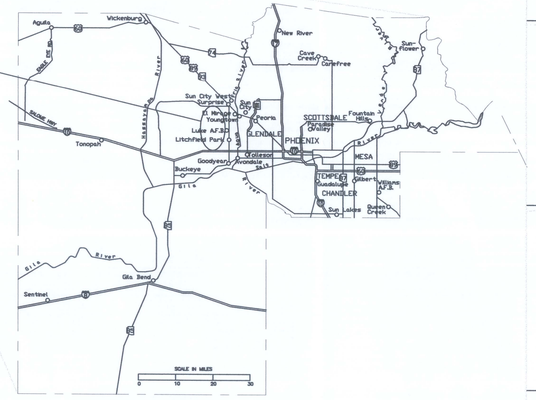
EXHIBIT C2

Perryville Road Wash





STUDY AREA



MARICOPA COUNTY

LEGEND

SECTION BOUNDARY

STUDY REACH AND REACH ID
PERRYVILLE ROAD WASH
NORTH INLET CHANNEL
BEARDSLEY CANAL WASH

ROAD — NORTHERN AVENUE

SHEET OUTLINE AND NUMBER — 2

NOTES

1. HORIZONTAL PROJECTION IS ARIZONA STATE PLANE CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983.
2. ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929. (NAVD88=NGVD29 +1.78)

STATEMENT OF PROFESSIONAL REGISTRATION

THE CLOMR WORK MAPS WERE PREPARED UNDER MY DIRECT SUPERVISION USING FEMA APPROVED HYDROLOGY AND URS SURVEYED CROSS SECTION DATA.

SCALE
2000' 0' 2000' 4000'

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS
PERRYVILLE ROAD WASH
W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
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EXHIBIT C - STUDY WORK MAPS
C2 PERRYVILLE ROAD WASH

WP# 042284.02 SHEET 1 OF 4

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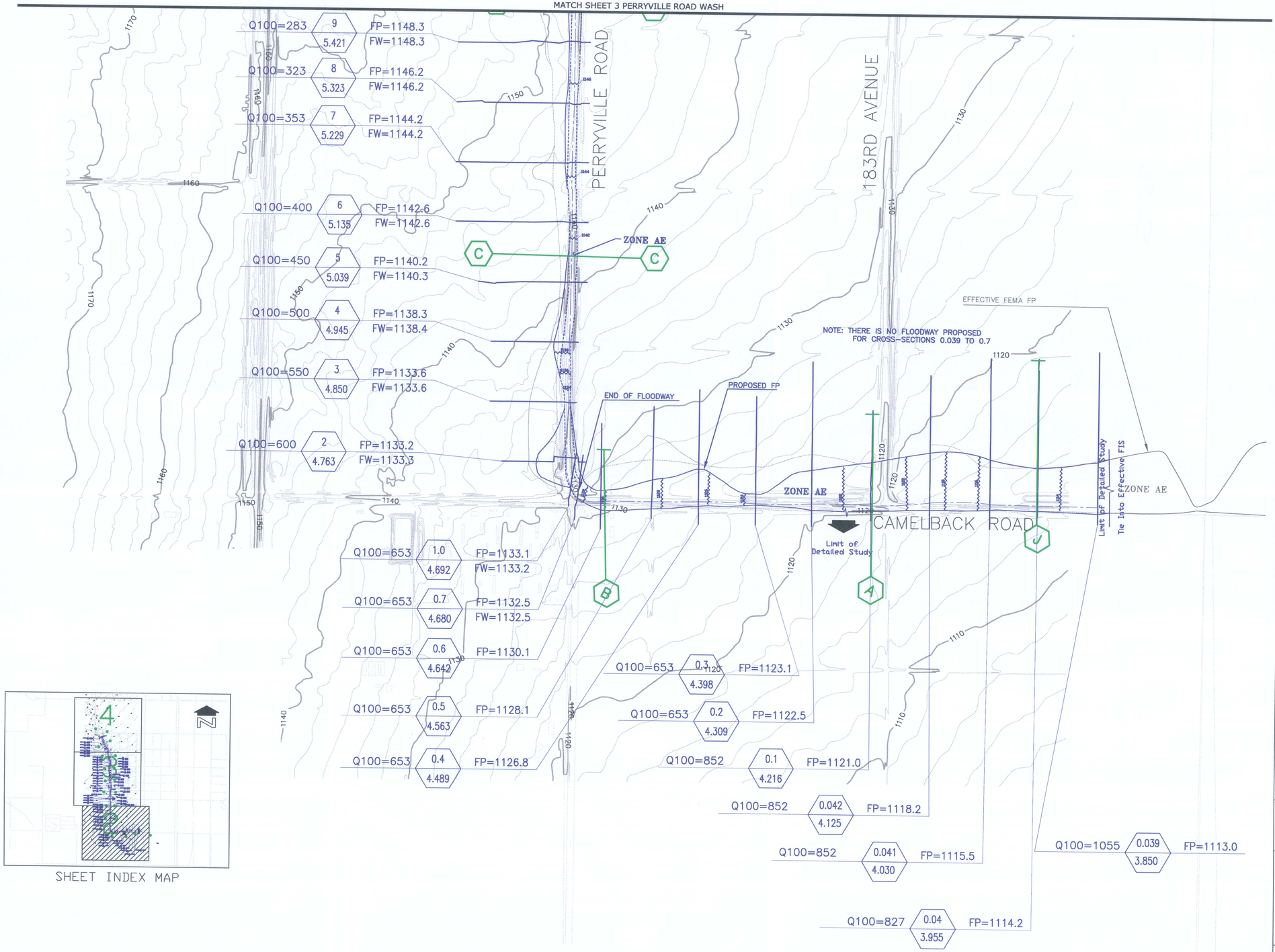
MATCH SHEET 3 PERRYVILLE ROAD WASH



SHEET INDEX MAP

LEGEND

100-YR FEMA FLOODPLAIN BOUNDARY	
100-YR FEMA FLOODWAY BOUNDARY	
EFFECTIVE FIRM CROSS-SECTIONS	
EFFECTIVE FIRM CROSS-SECTION ID	J
100-YR FLOODPLAIN BOUNDARY (PROPOSED CONDITION, DATED 2007)	
100-YR FLOODWAY (PROPOSED CONDITION, DATED 2007)	
CROSS SECTION NUMBER	0.3 / 4,388
FEMA ZONE DESIGNATIONS	ZONE AE
BASE FLOOD ELEVATION	1213
100 YR PEAK DISCHARGE =653 (cubic feet per second)	Q100=653
FLOODPLAIN WATER SURFACE ELEVATION = 1212	FP=1212.0
FLOODWAY WATER SURFACE ELEVATION = 1212	FW=1212.0
HYDRAULIC BASELINE/FLOW LINE	
CORPORATE LIMITS	Corporate Limits
COUNTY BOUNDARY	County Boundary
SECTION BOUNDARY	12 | 7 / 13 | 18
FLOW DIVERSION	

NOTES

1. ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929
2. ALL NORTHING AND EASTING MARKS ARE IN NAD83 STATE PLANE COORDINATE SYSTEM
3. NAVD88 = NGVD29 +1.78
4. ALL FLOODPLAIN AND FLOODWAY DELINEATIONS ARE BASED ON CROSS SECTIONS FIELD-SURVEYED BY URS (2001).
5. BACKGROUND TOPOGRAPHIC MAPPING BASED ON 1989 AERIAL PHOTOGRAPHY.

ELEVATION REFERENCE FOR HYDRAULIC CROSS SECTIONS BY URS, 2001

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
102	1160.249	1/2" REBAR IN HAND HOLE AT INTERSECTION OF GLENDALE AVE. AND CITRUS RD.
103	1129.523	2" I.P. IN A.C. POTHOLE AT INTERSECTION OF CITRUS RD. AND BETHANY HOME RD.
3962	1154.430	1" IRON ROD IN POTHOLE, AT CENTERLINE OF BETHANY HOME RD., PERRYVILLE RD. ALIGNMENT, ± 18' WEST OF N-S GATE
4310	1218.212	1/2" REBAR WITH YELLOW LS CAP IN POTHOLE, AT INTERSECTION OF PERRYVILLE RD. AND NORTHERN AVE.
6051	1198.07	1" I.P. IN POTHOLE, AT ± 75' SOUTH OF ORANGEWOOD LN., SOUTH BOUND LANE OF PERRYVILLE RD.
5570	1183.055	BRASS CAP IN POTHOLE AT INTERSECTION OF PERRYVILLE RD. AND GLENDALE AVE.
4642	1164.100	MON. NAIL FLUSH/TEXAS SPIKE AT ± 18' WEST OF WEST EDGE C.L.D. AT PROD. OF CENTERLINE OF MARYLAND AVE. FROM EAST AT PERRYVILLE RD.

N

400' 0' 400' 800'

SCALE: 1" = 400 FEET
CONTOUR INTERVAL = 1 FOOT

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS PERRYVILLE ROAD WASH

W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

Registered Professional Engineer (Civil) 24999 JEFFREY R. MINCH Date Signed 9-30-09 ARIZONA, U.S.A.

EXPIRES 09-30-09

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EXHIBIT C - STUDY WORK MAPS
C2 PERRYVILLE ROAD WASH

WP# 042284.02 SHEET 2 OF 4

MATCH SHEET 4 PERRYVILLE ROAD WASH

Q100=525 | 29 | 7.145 | FP=1197.0 FW=1197.3

Q100=550 | 28 | 7.059 | FP=1194.1 FW=1194.8

Q100=575 | 27 | 6.974 | FP=1190.3 FW=1190.9

Q100=600 | 26 | 6.893 | FP=1185.7 FW=1186.0

Q100=625 | 25 | 6.820 | FP=1183.2

Q100=650 | 24 | 6.763 | FP=1181.7

Q100=671 | 23 | 6.697 | FP=1180.3

Q100=690 | 22 | 6.663 | FP=1179.8

Q100=700 | 21 | 6.569 | FP=1176.6

Q100=710 | 20 | 6.473 | FP=1173.6

Q100=720 | 19 | 6.382 | FP=1171.2

Q100=730 | 18 | 6.277 | FP=1169.2

Q100=738 | 17 | 6.193 | FP=1168.0

Q100=800 | 16 | 6.102 | FP=1166.2

Q100=850 | 15 | 6.007 | FP=1161.8

Q100=920 | 14 | 5.913 | FP=1160.2

Q100=1054 | 13 | 5.818 | FP=1156.3

Q100=204 | 12.4 | 5.711 | FP=1155.0

Q100=37 | 12.2 | 5.694 | FP=1155.0

Q100=133 | 11.8 | 5.675 | FP=1152.2

Q100=183 | 11 | 5.605 | FP=1151.0

Q100=233 | 10 | 5.520 | FP=1149.7 FW=1149.7

PROPOSED FP/FW

Q100=625 | 25 | 6.820 | FP=1183.0 FW=1183.3

Q100=650 | 24 | 6.763 | FP=1181.4 FW=1181.7

Q100=671 | 23 | 6.697 | FP=1179.9 FW=1180.3

Q100=690 | 22 | 6.663 | FP=1179.7 FW=1179.8

Q100=700 | 21 | 6.569 | FP=1176.6 FW=1176.6

Q100=710 | 20 | 6.473 | FP=1173.5 FW=1173.7

Q100=720 | 19 | 6.382 | FP=1170.6 FW=1171.2

Q100=730 | 18 | 6.277 | FP=1168.2 FW=1169.0

Q100=738 | 17 | 6.193 | FP=1167.4 FW=1168.2

Q100=800 | 16 | 6.102 | FP=1166.2 FW=1166.6

Q100=850 | 15 | 6.007 | FP=1161.7 FW=1162.5

Q100=920 | 14 | 5.913 | FP=1160.2 FW=1160.9

Q100=1054 | 13 | 5.818 | FP=1156.3 FW=1156.4

Q100=204 | 12.4 | 5.711 | FP=1155.0 FW=1155.0

Q100=37 | 12.2 | 5.694 | FP=1155.0 FW=1155.0

Q100=133 | 11.8 | 5.675 | FP=1152.2 FW=1152.2

Q100=183 | 11 | 5.605 | FP=1151.0 FW=1151.1

183RD AVE

GLENDALE AVENUE

MARYLAND AVENUE

BETHANY HOME ROAD

PERRYVILLE ROAD

Perryville Road Wash

GUTTER LINE AT LEVEE

ZONE AE

WITH-LEVEE ELEVATIONS ON THIS SIDE

WITHOUT-LEVEE ELEVATIONS ON THIS SIDE

SHEET INDEX MAP

MATCH SHEET 2 PERRYVILLE ROAD WASH

LEGEND

- 100-YR FEMA FLOODPLAIN BOUNDARY
- 100-YR FEMA FLOODWAY BOUNDARY
- EFFECTIVE FIRM CROSS-SECTIONS
- EFFECTIVE FIRM CROSS-SECTION ID (G)
- 100-YR FLOODPLAIN BOUNDARY (PROPOSED CONDITION, DATED 2007)
- 100-YR FLOODWAY (PROPOSED CONDITION, DATED 2007)
- CROSS SECTION NUMBER (21 / 6.569)
- FEMA ZONE DESIGNATIONS: ZONE AE
- BASE FLOOD ELEVATION: 1220
- 100 YR PEAK DISCHARGE =625(cubic feet per second): Q100=625
- FLOODPLAIN WATER SURFACE ELEVATION = 1223.1: FP=1223.1
- FLOODWAY WATER SURFACE ELEVATION = 1223.2: FW=1223.2
- HYDRAULIC BASELINE/FLOW LINE
- GUTTER LINE AT LEVEE
- CORPORATE LIMITS: Corporate Limits
- COUNTY BOUNDARY: County Boundary
- SECTION BOUNDARY: 12 | 7 / 13 | 18
- FLOW DIVERSION

NOTES

1. ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929
2. ALL NORTHING AND EASTING MARKS ARE IN NAD83 STATE PLANE COORDINATE SYSTEM
3. NAVD88 = NGVD29 +1.78
4. ALL FLOODPLAIN AND FLOODWAY DELINEATIONS ARE BASED ON CROSS SECTIONS FIELD-SURVEYED BY URS (2001).
5. BACKGROUND TOPOGRAPHIC MAPPING BASED ON 1989 AERIAL PHOTOGRAPHY.

ELEVATION REFERENCE FOR HYDRAULIC CROSS SECTIONS BY URS, 2001

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
102	1160.249	1/2" REBAR IN HAND HOLE AT INTERSECTION OF GLENDALE AVE. AND CITRUS RD.
103	1129.523	2" I.P. IN A.C. POTHOLE AT INTERSECTION OF CITRUS RD. AND BETHANY HOME RD.
3962	1154.430	1" IRON ROD IN POTHOLE, AT CENTERLINE OF BETHANY HOME RD., PERRYVILLE RD. ALIGNMENT, ± 18' WEST OF N-S GATE
4310	1218.212	1/2" REBAR WITH YELLOW LS CAP IN POTHOLE, AT INTERSECTION OF PERRYVILLE RD. AND NORTHERN AVE.
6051	1198.07	1" I.P. IN POTHOLE, AT ± 75' SOUTH OF ORANGEWOOD LN., SOUTH BOUND LANE OF PERRYVILLE RD.
5570	1183.055	BRASS CAP IN POTHOLE AT INTERSECTION OF PERRYVILLE RD. AND GLENDALE AVE.
4642	1164.100	MON. NAIL FLUSH/TEXAS SPIKE AT ± 18' WEST OF WEST EDGE C.L.D. AT PROD. OF CENTERLINE OF MARYLAND AVE. FROM EAST AT PERRYVILLE RD.

400' 0' 400' 800'

SCALE: 1" = 400 FEET

CONTOUR INTERVAL = 1 FOOT

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS PERRYVILLE ROAD WASH

W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

Registered Professional Engineer (Civil) — JEFFREY R. MINCH — 24999 — Date Signed 10-24-09 — ARIZONA, U.S.A.

EXPIRES 09-30-09

WOOD/PATEL
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EXHIBIT C - STUDY WORK MAPS
C2 PERRYVILLE ROAD WASH

WP# 042284.02 SHEET 3 OF 4

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SHEET INDEX MAP

OLIVE AVENUE

NORTHERN AVENUE

BEARDSLEY CANAL

PERRYVILLE ROAD

ZONE AE

Limit of Detailed Study

EFFECTIVE FEMA FP/FW

PROPOSED FP/FW

Q100=340 — 34 / 7.608 — FP=1212.8 / FW=1212.9

Q100=380 — 33 / 7.513 — FP=1211.2 / FW=1211.4

Q100=420 — 32 / 7.413 — FP=1206.8 / FW=1207.7

Q100=460 — 31 / 7.325 — FP=1203.7 / FW=1204.2

Q100=500 — 30 / 7.228 — FP=1199.6 / FW=1199.8

MATCH SHEET 3 PERRYVILLE ROAD WASH

LEGEND

100-YR FEMA FLOODPLAIN BOUNDARY	
100-YR FEMA FLOODWAY BOUNDARY	
EFFECTIVE FIRM CROSS-SECTIONS	
EFFECTIVE FIRM CROSS-SECTION ID	J
100-YR FLOODPLAIN BOUNDARY (PROPOSED CONDITION, DATED 2007)	
100-YR FLOODWAY (PROPOSED CONDITION, DATED 2007)	
CROSS SECTION NUMBER	41 / 8,273
FEMA ZONE DESIGNATIONS	ZONE AE
BASE FLOOD ELEVATION	1213
100 YR PEAK DISCHARGE =100(cubic feet per second)	Q100=100
FLOODPLAIN WATER SURFACE ELEVATION = 1212	FP=1212.0
FLOODWAY WATER SURFACE ELEVATION = 1212	FW=1212.0
HYDRAULIC BASELINE/FLOW LINE	
CORPORATE LIMITS	Corporate Limits
COUNTY BOUNDARY	County Boundary
SECTION BOUNDARY	12 | 7 / 13 | 18
FLOW DIVERSION	

NOTES

1. ALL ELEVATIONS ARE BASED ON NATIONAL GEODETIC VERTICAL DATUM OF 1929
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3. NAVD88 = NGVD29 +1.78
4. ALL FLOODPLAIN AND FLOODWAY DELINEATIONS ARE BASED ON CROSS SECTIONS FIELD-SURVEYED BY URS (2001).
5. BACKGROUND TOPOGRAPHIC MAPPING BASED ON 1989 AERIAL PHOTOGRAPHY.

ELEVATION REFERENCE FOR HYDRAULIC CROSS SECTIONS BY URS, 2001

I.D. NUMBER	ELEVATION (FT)	DESCRIPTION/LOCATION
102	1160.249	1/2" REBAR IN HAND HOLE AT INTERSECTION OF GLENDALE AVE. AND CITRUS RD.
103	1129.523	2" I.P. IN A.C. POTHOLE AT INTERSECTION OF CITRUS RD. AND BETHANY HOME RD.
3962	1154.430	1" IRON ROD IN POTHOLE, AT CENTERLINE OF BETHANY HOME RD., PERRYVILLE RD. ALIGNMENT, ± 18' WEST OF N-S GATE
4310	1218.212	1/2" REBAR WITH YELLOW LS CAP IN POTHOLE, AT INTERSECTION OF PERRYVILLE RD. AND NORTHERN AVE.
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5570	1183.055	BRASS CAP IN POTHOLE AT INTERSECTION OF PERRYVILLE RD. AND GLENDALE AVE.
4642	1164.100	MON. NAIL FLUSH/TEXAS SPIKE AT ± 18' WEST OF WEST EDGE C.L.D. AT PROD. OF CENTERLINE OF MARYLAND AVE. FROM EAST AT PERRYVILLE RD.

400' 0' 400' 800'

SCALE: 1"= 400 FEET

CONTOUR INTERVAL = 1 FOOT

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

NORTH INLET CHANNEL IMPROVEMENTS PERRYVILLE ROAD WASH

W.T. #3 CLOMR
FCD 2004C045
ASSIGNMENT NO. 2
OCTOBER 2008

Registered Professional Engineer (Civil) — 24999 — JEFFREY R. MINCH — Date Signed — ARIZONA, U.S.A.

EXPIRES 09-30-09

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IN ASSOCIATION WITH

EXHIBIT C - STUDY WORK MAPS
C2 PERRYVILLE ROAD WASH

WP# 042284.02 SHEET 4 OF 4

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EXHIBIT D

Annotated FIRM Panels

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3176 (central Arizona)*. The **horizontal datum** was *NAD83, GRS80 spheroid*. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the *National Geodetic Vertical Datum of 1929*. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address.

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(310) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:6000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

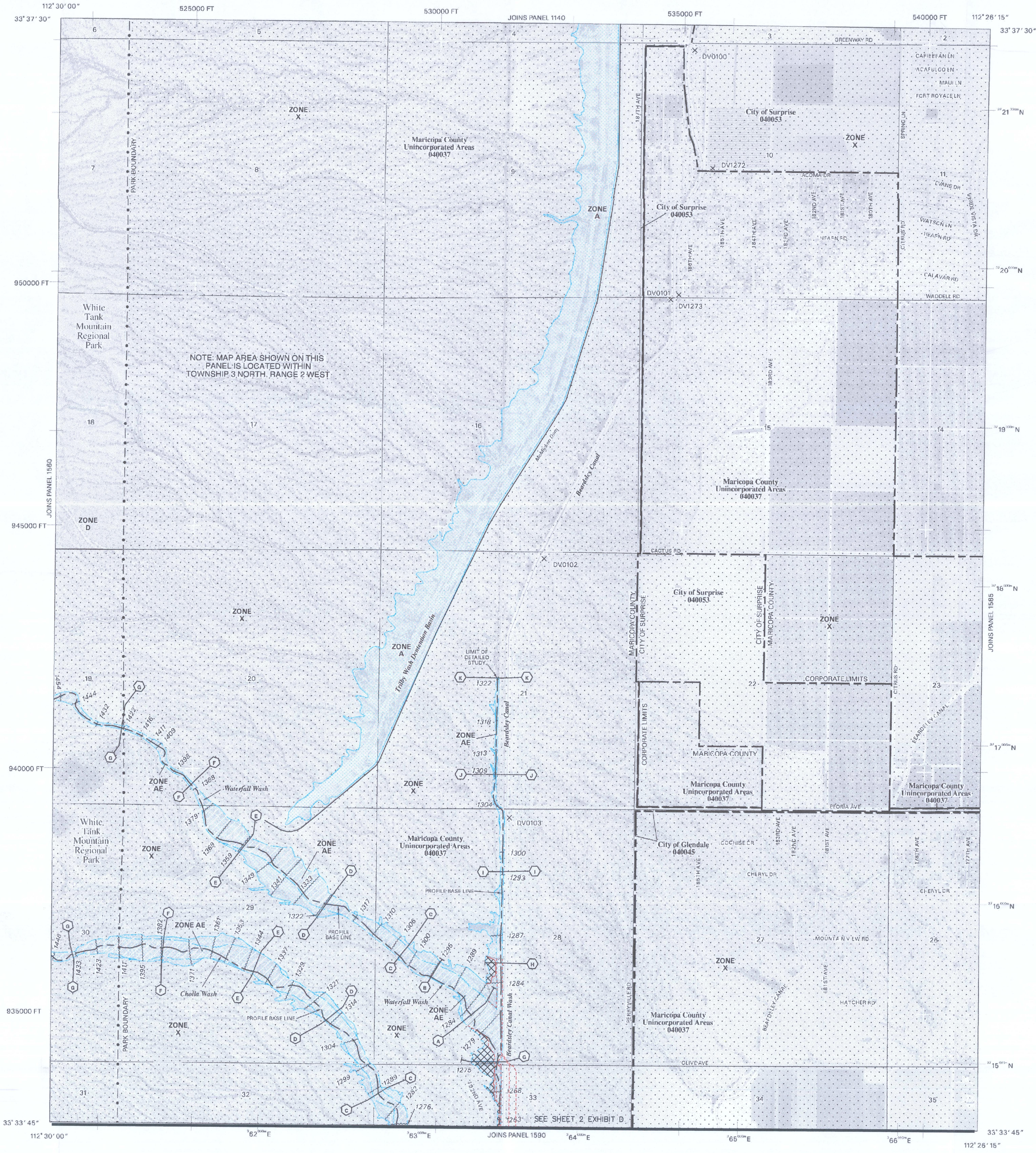
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMAMAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

LEGEND FOR ANNOTATION

100-YR FLOODPLAIN BOUNDARY

100-YR FLOODWAY BOUNDARY

AREA TO BE REMOVED FROM ZONE AE



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

~~~513~~~ Base Flood Elevation line and value; elevation in feet*

(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

(A)—(A) Cross section line

(2)—(2) Transect line

112°07'08", 33°25'41" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.

76 E 1000-meter Universal Transverse Mercator grid tick values zone 12.

875000 FT 5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)

×DV2313 Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 River Mile

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1988

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

September 4, 1991, September 30, 1995, July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change zone designations, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1580H

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

PANEL 1580 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GLENDALE, CITY OF	040045	1580	H
MARICOPA COUNTY	040037	1580	H
SURPRISE, CITY OF	040053	1580	H

EXHIBIT D

ANNOTATED FIRM PANEL 1 OF 2

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

04013C1580H

MAP REVISED

SEPTEMBER 30, 2005

Federal Emergency Management Agency

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NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was *Arizona State Plane Zone 3176 (central Arizona)*. The **horizontal datum** was *NAD83, GRS80 spheroid*. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the *National Geodetic Vertical Datum of 1929*. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(310) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from multiple sources. Base map files were provided in digital format by Maricopa County. Orthophoto images were produced at a scale of 1:5000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMAMAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

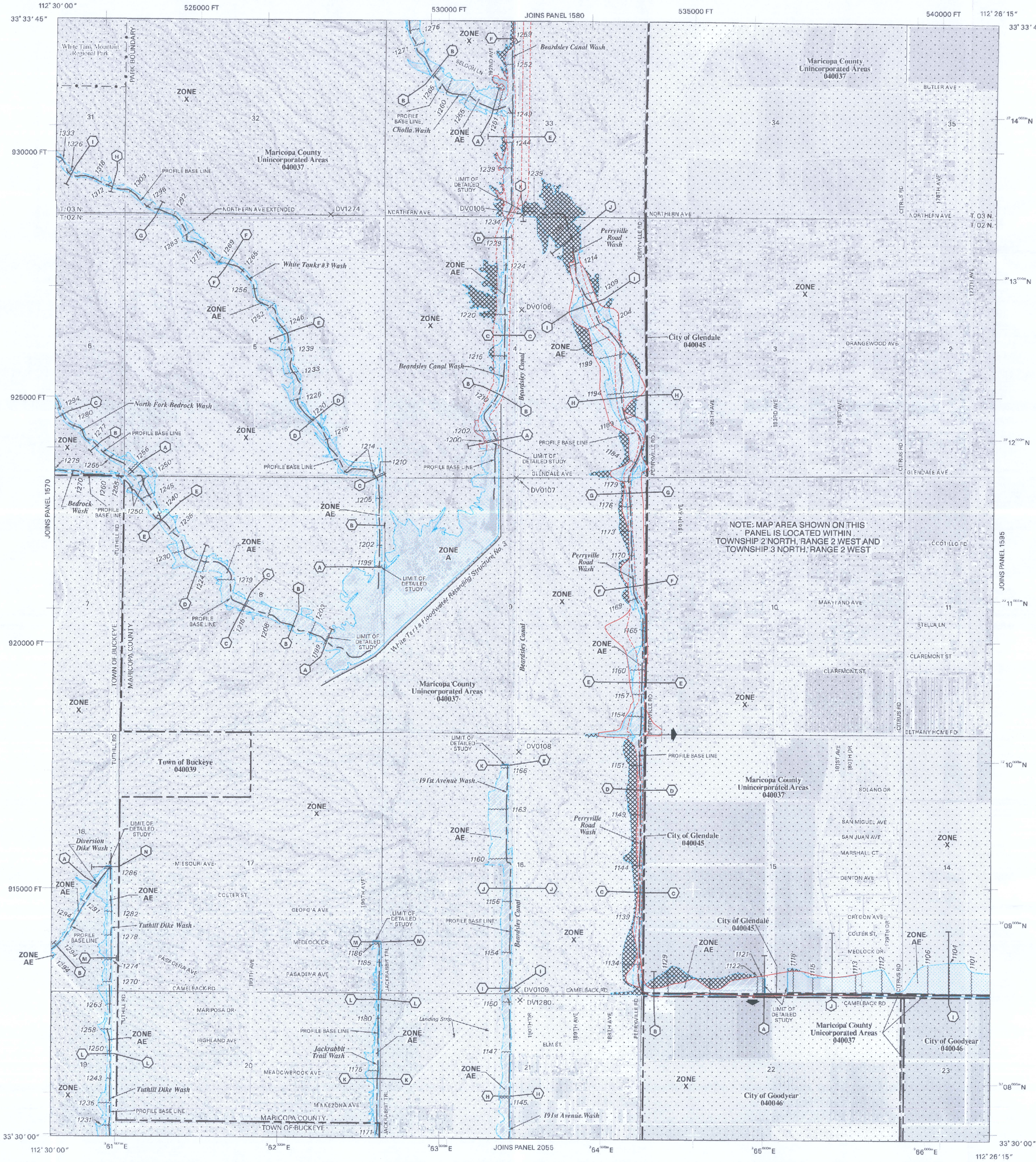
LEGEND FOR ANNOTATION

100-YR FLOODPLAIN BOUNDARY

100-YR FLOODWAY BOUNDARY

AREA TO BE REMOVED FROM ZONE AE

FLOW DIVERSION



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

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FLOODWAY AREAS IN ZONE AE

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OTHER AREAS

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COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
* * * * * * * * * *	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
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* Referenced to the National Geodetic Vertical Datum of 1929

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875000 FT	5000-foot grid tick values: Arizona State Plane coordinate system, central zone (FIPSZONE 3176) NAD83 (Transverse Mercator)
×DV2313	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1988

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

September 4, 1991, September 30, 1995, July 19, 2001

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MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1590H

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

PANEL 1590 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BUCKEYE, TOWN OF	040039	1590	H
GLENDALE, CITY OF	040045	1590	H
GOODYEAR, CITY OF	040046	1590	H
MARICOPA COUNTY	040037	1590	H

EXHIBIT D

ANNOTATED FIRM PANEL 2 OF 2

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
04013C1590H

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

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