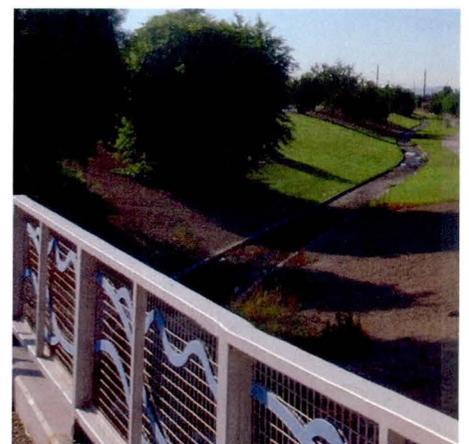
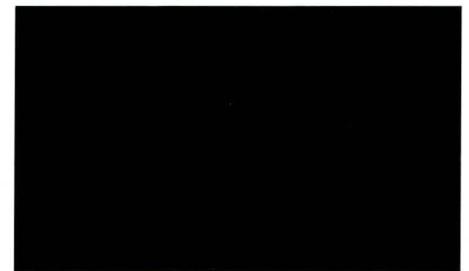
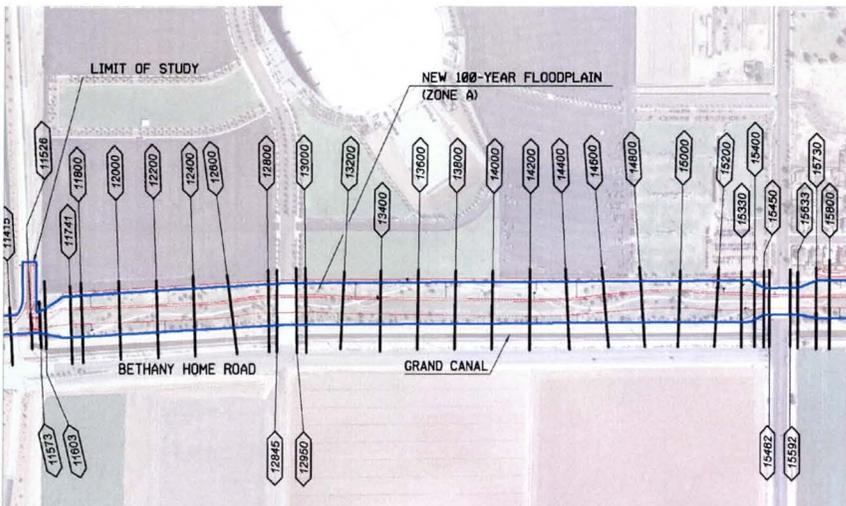
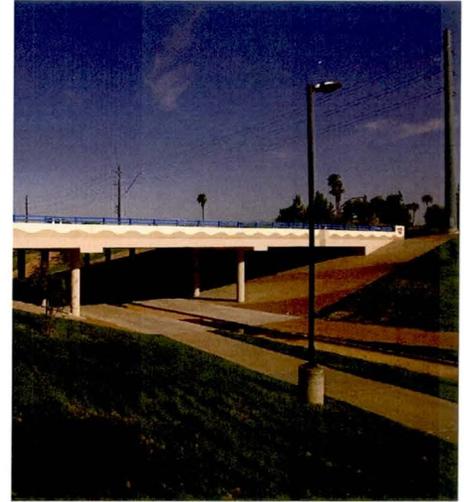




Bethany Home Outfall Channel
Glendale, Phoenix & Unincorporated Maricopa County, Arizona

Letter of Map Revision Technical Data Notebook

REVISED JUNE 2013



Submitted by:

WOOD/PATEL
MISSION: CLIENT SERVICE™

**BETHANY HOME OUTFALL CHANNEL
(BETHANY HOME/GRAND CANAL FLOOD CONTROL PROJECT)
GLENDALE, PHOENIX AND
UNINCORPORATED MARICOPA COUNTY, ARIZONA**

**LETTER OF MAP REVISION
TECHNICAL DATA NOTEBOOK**

Revised June 2013

Prepared For: **Flood Control District of Maricopa County**
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EXPIRES: 9/30/15

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Appendix F	Erosion and Sediment Transportation Analyses Supporting Documentation (All erosion & sediment transport documentation is provided within the approved CLOMR in Exhibit 4 CD)

EXHIBITS

Exhibit 1	HEC-1 Schematic with LOMR Updates
Exhibit 2	As-Built Construction Plans
Exhibit 3	Annotated FIRM Panels
Exhibit 4	CD



EXPIRES: 9/30/15

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1.0 INTRODUCTION

The following Technical Data Notebook (TDN) was prepared for the Flood Control District of Maricopa County, Arizona (FCDMC) and is formatted to meet Arizona Department of Water Resources (ADWR) State Standard 1, dated August 2012.

1.1 Purpose of Study

The purpose of this study is to provide documentation for the Federal Emergency Management Agency (FEMA) to issue a Letter of Map Revision (LOMR) for the Bethany Home Outfall Channel (BHOC) project. This LOMR follows the previously submitted and approved *Bethany Home Outfall Channel Technical Data Notebook Conditional Letter of Map Revision (CLOMR)*, FEMA Case No.: 03-09-0640R) and is intended to meet the conditions of the CLOMR approval letter. The project is also referred to as the Bethany Home/Grand Canal Flood Control Project (BH/GC FCP). The documentation provided herein includes new hydrology, hydraulics and floodplain delineations.

1.2 Authority for Study

The FCDMC contracted with Wood, Patel & Associates (Wood/Patel) to develop this LOMR. The Project Manager for the FCDMC is Mr. Jeff Shelton, P.E. The contract number for the project is FCD 2012C008. The Wood/Patel Project Manager is Jeffrey R. Minch, P.E. The FCDMC is located at 2801 West Durango Street, Phoenix, Arizona 85009, (602) 506-1501.

1.3 Location of Study

The project is located in the West Valley of the Phoenix Metropolitan area. The contributing watershed to the project is mostly urbanized and includes portions of the Cities of Peoria, Glendale, Phoenix and Unincorporated Maricopa County.

The project is specifically located within or along Sections 8 - 17, and 24 of Township 2 North, Range 1 East and Sections 7, 18, 19 and 30 of Township 2 North, Range 2 East of the Gila and Salt River Baseline and Meridian. A Project Location Map is provided as Figure 1. A Vicinity Map is provided as Figure 2.

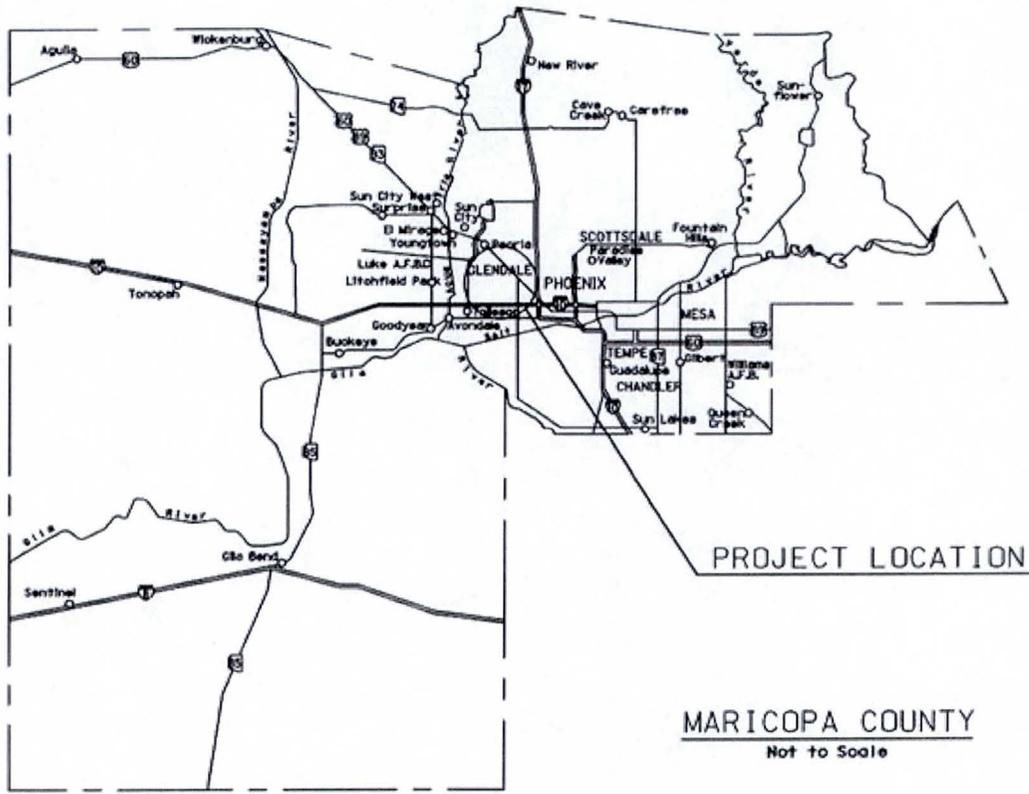


Figure 1. Location Map



Figure 2. Vicinity Map

1.4 Project Background

In February 1997, the FCDMC completed the Maryvale Area Drainage Master Study (ADMS). The purpose of the study was to identify and locate the flood prone areas within the study boundary. The study area was approximately 100 square miles in size and included portions of the cities of Peoria, Glendale, Avondale, Tolleson, Phoenix, and unincorporated Maricopa County, Arizona. The study limits encompassed an area from Interstate 10 (I-10) on the south to the Arizona Canal on the north, and from Interstate 17 (I-17) on the east to the Agua Fria and New Rivers on the west. One of the flood prone areas that was identified was along the north and east bank of the Grand Canal.

A second study, the Maryvale Area Floodplain Mitigation Study, was completed in November 1997 for the FCDMC. The purpose of this study was to identify and evaluate feasible mitigation options for each of the flood prone areas identified in the initial study. After identifying and evaluating the mitigation options, the most viable options were recommended for further evaluation. A drainage feature along the north and east side of the Grand Canal was identified as the option to be evaluated further for mitigating flooding adjacent to the Grand Canal. This drainage feature, which outlets into the New River at the Bethany Home Road alignment, was referred to as the Bethany Home Outfall Channel.

DMJM+HARRIS, under contract with the Arizona Department of Transportation (ADOT), developed the preliminary design for the Agua Fria Freeway (Loop 101) from Northern Avenue to I-10. During the preliminary plan development, it was identified that the freeway would have to be protected from off-site overland flows. The design concept developed to protect the freeway was to intercept and route the 100-year off-site flows south to the Grand Canal alignment. The Bethany Home Outfall Channel Phase I was proposed to parallel the Grand Canal from approximately the 97th Avenue alignment west to the New River.

An Intergovernmental Agreement (IGA) was developed between ADOT and the FCDMC in 1998. This document defined that the State designs and construct the BHOC, Phase I from the Loop 101 Freeway to the New River. The document further stated that the BHOC would be constructed at a capacity that will serve the freeway drainage as well as

potential floodwaters from the surrounding region. The FCDMC funded the additional costs incurred by the State for right-of-way, design, construction, engineering and additional structures associated with enlarging the BHOC, to convey the additional flows.

1.5 Project Purpose and Need

The Grand Canal is a large irrigation channel with banks that are raised several feet above adjacent ground in some locations. In general, there is no natural watercourse that defines the existing floodplain. During large storm events, water ponds along the north and east bank of the Grand Canal and floods adjacent properties. The Grand Canal also conveys a significant quantity of stormwater during major storms resulting in breaching of the canal banks and downstream flooding. This flooding was not a problem when the area was farmland, but as the area developed, it has resulted in the flooding of homes and businesses adjacent to the canal. Examples of typical flooding are provided on the following pages.

FEMA has designated a floodplain containing approximately 598 structures along the north side of the Grand Canal between Camelback Road and 67th Avenue. Property owners who mortgage or refinance a home/business in this floodplain are required to pay flood insurance. The FCDMC and the City of Phoenix, Arizona constructed the Sunset Detention Basin to help reduce local flooding in the area of 64th Avenue and Indian School Road.



Photo 1 – August 17, 1963, 71st Avenue at the Grand Canal



Photo 2 – July 25, 1992, Campbell Avenue at 71st Avenue



Photo 3 – July 25, 1992, Stormwater Overtopping Grand Canal



Photo 4 – July 25, 1992, 75th Avenue, North of Camelback Road

In June of 1999, the FCDMC initiated the Bethany Home/Grand Canal Flood Control Project (BH/GC FCP) in cooperation with the Cities of Glendale and Phoenix to define and design the recommended solution based on public input.

The BH/GC FCP Pre-Design Study developed alternatives and a recommended solution to minimize flooding adjacent to and north of the Grand Canal. The project limits were located between the Loop 101 Freeway, at approximately 97th Avenue and the Bethany Home Road alignment, to the Sunset Detention Basin at Indian School Road and 64th Avenue. In addition, storm drain construction was studied along Bethany Home Road, Missouri Avenue, and Camelback Road between the Grand Canal and 59th Avenue. Subsequent to this Pre-Design Study, storm drain systems within Bethany Home Road and Camelback Road have been designed to alleviate local flooding. The Camelback Road storm drain had been constructed. The Bethany Home Road storm drain has not been constructed due to budget constraints.

The BHOC project was completed in 2010 and now serves as a linear park and drainage system. The BHOC system safely conveys the anticipated 100-year peak flows that reach the system. A storm drain system within Camelback Road from 59th Avenue to the BHOC project was completed in 2011. This storm drain system helps mitigate flooding along the Camelback Road corridor. The above referenced Glendale storm drain system in Bethany Home Road has not been constructed to date.

Upon completion of the Pre-Design Study, the FCDMC, the City of Phoenix and the City of Glendale developed an IGA that defines all responsibilities and commitments regarding the cost sharing, final design, construction and maintenance of the project. The IGA between the different government agencies is provided in Appendix B.

1.6 Methodology

Since the publishing of the CLOMR, the hydrology in the BHOC area has been updated in the *Glendale Area Stormwater Management Plan Hydrology Report*, dated February 2011. This study utilized the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph

Package computer program to calculate the peak discharges for the 100-year, 24-hour and 6-hour storm events. Additional hydrologic updates reflecting current conditions to the HEC-1 model are performed in this LOMR.

The hydraulics portion of the study utilized the U.S. Army Corps of Engineers HEC-RAS computer program (unsteady flow analysis) to determine an approximate Zone A floodplain along a majority of the BHOC project. The Sunset Basin Zone A floodplain was determined from HEC-1.

1.7 Acknowledgements

The preparation of this LOMR document for the Bethany Home Outfall Channel project could not have been completed without the input and review of a few key individuals. We would like to thank the following individuals at the FCDMC: Mr. Amir Motamedi, Mr. Jeff Shelton, and Mr. Richard Waskowsky. The Wood/Patel project team who prepared this document consisted of: Jeff Minch and Darren Forstie.

1.8 Summary of Results

The floodplain delineation presented herein, for the BHOC project, results in the removal of the regulatory FEMA 100-year Zone A floodplain from existing homes and businesses and the addition of Zone A floodplain within the BHOC project where no current FEMA floodplain exists. This study provides supporting documentation of the new 100-year floodplain approximately 6.4 miles in length along the Grand Canal and the Bethany Home Road alignment from the New River to 63rd Avenue.

2.0 ADWR/FEMA FORMS AND LOCAL GOVERNMENT/ADWR ABSTRACTS

This section of the report is documented for submittal to FEMA.

Study Documentation Abstract for FEMA Submittals		Initial	Restudy	CLOMR	LOMR	X
2.1.1	Date Study Accepted					
2.1.2	Study Contractor Contact(s) Address Phone Internal Reference Number	Wood, Patel & Associates, Inc. Jeffrey R. Minch, P.E. 2051 Northern Avenue, Suite 100 Phoenix, Arizona 85021 (602) 335-8500 Fax (602) 335-8580 WP# 123818.02				
2.1.3	FEMA Technical Review Contractor Contact(s) Address Phone Internal Reference Number	LOMC Clearinghouse Attention: LOMR Manager 6730 Santa Barbara Court Elkridge, Maryland 21075 Phone: (877) 336-2627				
2.1.4	FEMA Regional Reviewer Phone	N/A				
2.1.5	State Technical Reviewer Phone	Arizona Department of Water Resources (602) 417-2445				
2.1.6	Local Technical Reviewer Phone	Flood Control District of Maricopa County (602) 506-1501				
2.1.7	Reach Description	Bethany Home Outfall Channel, New River to 63 rd Ave.				
2.1.8	Topographic Map Information	Kenney Aerial Mapping Inc., 1-foot contour map at a scale of 1 inch = 20 feet.				
2.1.9	Unique Conditions and Problems	None				
2.1.10	Coordination of Peak Discharge	Refined hydrology for 100-year discharges				

2.1 FEMA Forms

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.

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 is 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 is used for revision requests that involve new or proposed channelization, bridges/culverts, dams, and/or levees/floodwalls.

Completed forms 1 through 3 for the BHOC project are provided on the following pages.

U.S. DEPARTMENT OF HOMELAND SECURITY
 FEDERAL EMERGENCY MANAGEMENT AGENCY
OVERVIEW & CONCURRENCE FORM

*O.M.B No. 1660-0016
 Expires February 28, 2014*

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 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 it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). 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.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

- CLOMR: A letter from DHS-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 DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

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
Example: 480301	City of Katy	TX	48473C	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040037	Maricopa County, Unincorporated Areas of	AZ	04013C	1620H	09/30/05
040037	Maricopa County, Unincorporated Areas of	AZ	04013C	1640F	09/30/05

2. a. Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County.

- b. Types of Flooding: Riverine Coastal Shallow Flooding (e.g., Zones AO and AH)
 Alluvial fan Lakes Other (Attach Description)

3. Project Name/Identifier: Bethany Home Outfall Channel

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

5. Basis for Request and Type of Revision:

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

- Physical Change Improved Methodology/Data Regulatory Floodway Revision Base Map Changes
 Coastal Analysis Hydraulic Analysis Hydrologic Analysis Corrections
 Weir-Dam Changes Levee Certification Alluvial Fan Analysis Natural Changes
 New Topographic Data Other (Attach Description)

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

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

Form Name and (Number)

Required if ...

- | | |
|---|---|
| <input checked="" type="checkbox"/> Riverine Hydrology and Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations |
| <input checked="" type="checkbox"/> Riverine Structures Form (Form 3) | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| <input type="checkbox"/> Coastal Analysis Form (Form 4) | New or revised coastal elevations |
| <input type="checkbox"/> Coastal Structures Form (Form 5) | Addition/revision of coastal structure |
| <input type="checkbox"/> Alluvial Fan Flooding Form (Form 6) | Flood control measures on alluvial fans |



EXPIRES: 9-30-12

U.S. DEPARTMENT OF HOMELAND SECURITY
 FEDERAL EMERGENCY MANAGEMENT AGENCY
OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
 Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 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 it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). 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.**

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AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

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ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

- CLOMR: A letter from DHS-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 DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

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
Example: 480301 480287	City of Katy Harris County	TX TX	48473C 48201C	0005D 0220G	02/08/83 09/28/90
040045	City of Glendale	AZ	04013C	1620H	09/30/05
040045	City of Glendale	AZ	04013C	1640F	09/30/05

2. a. Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County.

- b. Types of Flooding: Riverine Coastal Shallow Flooding (e.g., Zones AO and AH)
 Alluvial fan Lakes Other (Attach Description)

3. Project Name/Identifier: Bethany Home Outfall Channel

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

5. Basis for Request and Type of Revision:

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

- Physical Change Improved Methodology/Data Regulatory Floodway Revision Base Map Changes
 Coastal Analysis Hydraulic Analysis Hydrologic Analysis Corrections
 Weir-Dam Changes Levee Certification Alluvial Fan Analysis Natural Changes
 New Topographic Data 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 structures (check all that apply)

Structures: Channelization Levee/Floodwall Bridge/Culvert
 Dam Fill Other (Attach Description)

6. Documentation of ESA compliance is submitted (required to initiate CLOMR review). Please refer to the instructions for more information.

C. REVIEW FEE

Has the review fee for the appropriate request category been included? Yes Fee amount: \$5000.00
 No, Attach Explanation

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

D. SIGNATURE

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

Name: Jeffery C. Shelton	Company: Flood Control District of Maricopa Cnty	
Mailing Address: 2801 West Durango Street Phoenix, Arizona 85009	Daytime Telephone No.: 602-506-1501	Fax No.: 602-506-4601
	E-Mail Address: jefferyshelton@mail.maricopa.gov	
Signature of Requester (required):		Date:

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 requirements for when fill is 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. For Conditional LOMR requests, the applicant has documented Endangered Species Act (ESA) compliance to FEMA prior to FEMA's review of the Conditional LOMR application. For LOMR requests, I acknowledge that compliance with Sections 9 and 10 of the ESA has been achieved independently of FEMA's process. For actions authorized, funded, or being carried out by Federal or State agencies, documentation from the agency showing its compliance with Section 7(a)(2) of the ESA will be submitted. 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: Greg Rodzenko, P.E., Acting City Engineer		Community Name: City of Glendale
Mailing Address: 5850 W Glendale Ave. Suite 330 Glendale, AZ 85301	Daytime Telephone No.: 623-930-3630	Fax No.: 623-915-2689
	E-Mail Address: grodzenko@glendaleaz.com	
Community Official's Signature (required):		Date:

CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR

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

Certifier's Name: Jeffrey R. Minch, P.E.	License No.: 24999	Expiration Date: 09/30/12
Company Name: Wood, Patel & Associates, Inc.	Telephone No.: 602-335-8500	Fax No.: 602-335-8580
Signature: 	Date: 8/30/12	E-Mail Address: jminch@woodpatel.com

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

Form Name and (Number)

Required if ...

- | | |
|---|---|
| <input checked="" type="checkbox"/> Riverine Hydrology and Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations |
| <input checked="" type="checkbox"/> Riverine Structures Form (Form 3) | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| <input type="checkbox"/> Coastal Analysis Form (Form 4) | New or revised coastal elevations |
| <input type="checkbox"/> Coastal Structures Form (Form 5) | Addition/revision of coastal structure |
| <input type="checkbox"/> Alluvial Fan Flooding Form (Form 6) | Flood control measures on alluvial fans |



EXPIRES: 9-30-12

U.S. DEPARTMENT OF HOMELAND SECURITY
 FEDERAL EMERGENCY MANAGEMENT AGENCY
OVERVIEW & CONCURRENCE FORM

*O.M.B No. 1660-0016
 Expires February 28, 2014*

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 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 it displays a valid OMB control number. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20958-3005, Paperwork Reduction Project (1660-0016). 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.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a (NFIP) Flood Insurance Rate Maps (FIRM).

A. REQUESTED RESPONSE FROM DHS-FEMA

This request is for a (check one):

- CLOMR: A letter from DHS-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 DHS-FEMA officially revising the current NFIP map to show the changes to floodplains, regulatory floodway or flood elevations. (See 44 CFR Ch. 1, Parts 60, 65 & 72)

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
Example: 480301	City of Katy	TX	48473C	0005D	02/08/83
480287	Harris County	TX	48201C	0220G	09/28/90
040051	City of Phoenix	AZ	04013C	1640F	09/30/05
040051	City of Phoenix	AZ	04013C	2105F	09/30/05

2. a. Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County.

- b. Types of Flooding: Riverine Coastal Shallow Flooding (e.g., Zones AO and AH)
- Alluvial fan Lakes Other (Attach Description)

3. Project Name/Identifier: Bethany Home Outfall Channel

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

5. Basis for Request and Type of Revision:

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

- Physical Change Improved Methodology/Data Regulatory Floodway Revision Base Map Changes
- Coastal Analysis Hydraulic Analysis Hydrologic Analysis Corrections
- Weir-Dam Changes Levee Certification Alluvial Fan Analysis Natural Changes
- New Topographic Data Other (Attach Description)

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

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

Form Name and (Number)

Required if ...

- | | |
|---|---|
| <input checked="" type="checkbox"/> Riverine Hydrology and Hydraulics Form (Form 2) | New or revised discharges or water-surface elevations |
| <input checked="" type="checkbox"/> Riverine Structures Form (Form 3) | Channel is modified, addition/revision of bridge/culverts, addition/revision of levee/floodwall, addition/revision of dam |
| <input type="checkbox"/> Coastal Analysis Form (Form 4) | New or revised coastal elevations |
| <input type="checkbox"/> Coastal Structures Form (Form 5) | Addition/revision of coastal structure |
| <input type="checkbox"/> Alluvial Fan Flooding Form (Form 6) | Flood control measures on alluvial fans |



EXPIRES: 9-30-12

U.S. DEPARTMENT OF HOMELAND SECURITY
 FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE HYDROLOGY & HYDRAULICS FORM

*O.M.B No. 1660-0016
 Expires February 28, 2014*

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 3.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, 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, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington VA 20958-3005, Paperwork Reduction Project (1660-0016). 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.**

PRIVACY ACT STATEMENT

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PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program (NFIP); Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County.

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 B)
 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.)	Effective/FIS (cfs)	Revised (cfs)
Sunset Basin	7	N/A	214
Camelback Rd	14	N/A	1528
83 rd Avenue	24	N/A	2240
Confluence with New River	47	N/A	4227

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

- Statistical Analysis of Gage Records
 Precipitation/Runoff Model → Specify Model: HEC-1
 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.

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

Is the hydrology for the revised flooding source(s) affected by sediment transport? Yes No

If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation..

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.)	
			Effective	Proposed/Revised
Downstream Limit*	<u>New River Confluence</u>	<u>4641</u>	<u>N/A</u>	<u>N/A</u>
Upstream Limit*	<u>West of 67th Ave</u>	<u>35200</u>	<u>N/A</u>	<u>N/A</u>

*Proposed/Revised elevations must tie-into the Effective elevations within 0.5 foot at the downstream and upstream limits of revision.

2. Hydraulic Method/Model Used: HEC-RAS, Version 4.1.0

3. Pre-Submittal Review of Hydraulic Models*
 DHS-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. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS.

4.

<u>Models Submitted</u>	<u>Natural Run</u>		<u>Floodway Run</u>		<u>Datum</u>
	File Name:	Plan Name:	File Name:	Plan Name:	
Duplicate Effective Model*					
Corrected Effective Model*	File Name:	Plan Name:	File Name:	Plan Name:	
Existing or Pre-Project Conditions Model	File Name:	Plan Name:	File Name:	Plan Name:	
Revised or Post-Project Conditions Model	File Name: BHOC_LOMR_24hr	Plan Name: BHOC LOMR	File Name: N/A	Plan Name:	NGVD 29
Other - (attach description)	File Name: BHOC_LOMR_6hr	Plan Name: BHOC LOMR	File Name: N/A	Plan Name:	NGVD 29

* For details, refer to the corresponding section of the instructions.

Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic work 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.).

Digital Mapping (GIS/CADD) Data Submitted (preferred)

Topographic Information: contour mapping from construction plans/as-builts

Source: Kenney Aerial Mapping Inc. Date: 1999

Accuracy: one-foot contour interval const. grade mapping

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**, at the same scale as the original, 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 on revision.

Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? Yes No
- a. 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 compared to pre-project conditions.
 - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot compared to pre-project conditions.
- b. Does this LOMR request cause increase in the BFE and/or SFHA compared with the effective BFEs and/or SFHA? Yes No
If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notifications can be found in the MT-2 Form 2 Instructions.
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 established. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)
4. For CLOMR requests, please submit documentation to FEMA and the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA).

For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA. Please see the MT-2 instructions for more detail.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE STRUCTURES FORM

O.M.B. NO. 1660-0016
Expires February 28, 2014

PAPERWORK BURDEN DISCLOSURE NOTICE

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, Department of Homeland Security, Federal Emergency Management Agency, 1800 South Bell Street, Arlington, VA 20598-3005, Paperwork Reduction Project (1660-0016). 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.**

PRIVACY ACT STATEMENT

AUTHORITY: The National Flood Insurance Act of 1968, Public Law 90-448, as amended by the Flood Disaster Protection Act of 1973, Public Law 93-234.

PRINCIPAL PURPOSE(S): This information is being collected for the purpose of determining an applicant's eligibility to request changes to National Flood Insurance Program (NFIP) Flood Insurance Rate Maps (FIRM).

ROUTINE USE(S): The information on this form may be disclosed as generally permitted under 5 U.S.C § 552a(b) of the Privacy Act of 1974, as amended. This includes using this information as necessary and authorized by the routine uses published in DHS/FEMA/NFIP/LOMA-1 National Flood Insurance Program; Letter of Map Amendment (LOMA) February 15, 2006, 71 FR 7990.

DISCLOSURE: The disclosure of information on this form is voluntary; however, failure to provide the information requested may delay or prevent FEMA from processing a determination regarding a requested change to a NFIP Flood Insurance Rate Maps (FIRM).

Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County

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 Modeled Structure

1. Name of Structure: Bethany Home Outfall Channel (BHOC)
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: New River Confluence to 67th Avenue
Downstream Limit/Cross Section: 4641
Upstream Limit/Cross Section: 35200
2. Name of Structure: 107th Avenue Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 107th Avenue
Downstream Limit/Cross Section: 4801
Upstream Limit/Cross Section: 4872
3. Name of Structure: Grand Canal Wasteway Culvert
Type (check one) Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 103rd Aveune
Downstream Limit/Cross Section: 7751
Upstream Limit/Cross Section: 7945

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE STRUCTURES FORM

O.M.B. NO. 1660-0016
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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 Modeled Structure

1. Name of Structure: 99th Avenue Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 99th Avenue
Downstream Limit/Cross Section: 10185
Upstream Limit/Cross Section: 10310
2. Name of Structure: 97th Avenue SRP Flume Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 97th Avenue
Downstream Limit/Cross Section: 11573
Upstream Limit/Cross Section: 11603
3. Name of Structure: 95th Avenue Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 95th Avenue
Downstream Limit/Cross Section: 12845
Upstream Limit/Cross Section: 12950

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

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Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County

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 Modeled Structure

1. Name of Structure: 91st Avenue Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 91st Avenue and SRP Flume
Downstream Limit/Cross Section: 15482
Upstream Limit/Cross Section: 15592
2. Name of Structure: Grand Canal Crossing Culvert
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 88th Avenue
Downstream Limit/Cross Section: 17676
Upstream Limit/Cross Section: 17817
3. Name of Structure: 83rd Avenue Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 83rd Avenue
Downstream Limit/Cross Section: 21160
Upstream Limit/Cross Section: 21266

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE STRUCTURES FORM

O.M.B. NO. 1660-0016
Expires February 28, 2014

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Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County

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 Modeled Structure

1. Name of Structure: Bethany Home Road Culvert

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

Location of Structure: East of 83rd Ave under Bethany Home Road

Downstream Limit/Cross Section: 21755

Upstream Limit/Cross Section: 22301

2. Name of Structure: Glendale Park Culvert

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

Location of Structure: South of Bethany Home Road to northwest of 75th Ave and Camelback Road

Downstream Limit/Cross Section: 22367

Upstream Limit/Cross Section: 28307

3. Name of Structure: 75th Avenue and Camelback Road Culvert

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

Location of Structure: 75th Ave and Camelback Road

Downstream Limit/Cross Section: 28358

Upstream Limit/Cross Section: 29059

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

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Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County

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 Modeled Structure

1. Name of Structure: 75th Ave to 73rd Ave Concrete Rectangular Channel
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 75th Avenue to 73rd Avenue
Downstream Limit/Cross Section: 29059
Upstream Limit/Cross Section: 30227
2. Name of Structure: 73rd Ave Pedestrian Bridge
Type (check one): Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 73rd Avenue
Downstream Limit/Cross Section: 30187
Upstream Limit/Cross Section: 30205
3. Name of Structure: 71st Avenue Pedestrian Bridge
Type (check one) Channelization Bridge/Culvert Levee/Floodwall Dam
Location of Structure: 71st Avenue
Downstream Limit/Cross Section: 32491
Upstream Limit/Cross Section: 32509

NOTE: FOR MORE STRUCTURES, ATTACH ADDITIONAL PAGES AS NEEDED.

B. CHANNELIZATION

Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County

Name of Structure: Bethany Home Outfall Channel (BHOC)

1. Hydraulic Considerations

The channel was designed to carry _____ (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): _____

2. Channel Design Plans

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

3. Accessory Structures

The channelization includes (check one):

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

4. Sediment Transport Considerations

Are the hydraulics of the channel affected by sediment transport? 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.

C. BRIDGE/CULVERT

Flooding Source: Contributing watershed from Phoenix, Glendale, and unincorporated areas of Maricopa County

Name of Structure: This section applies to all structures previously listed

1. This revision reflects (check one):

- Bridge/culvert not modeled in the FIS
- Modified bridge/culvert previously modeled in the FIS
- Revised 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) Distances Between Cross Sections
- Shape (culverts only) Erosion Protection
- Material Low Chord Elevations – Upstream and Downstream
- Beveling or Rounding Top of Road Elevations – Upstream and Downstream
- Wing Wall Angle Structure Invert Elevations – Upstream and Downstream
- Skew Angle Stream Invert Elevations – Upstream and Downstream
- Cross-Section Locations

4. Sediment Transport Considerations

Are the hydraulics of the structure affected by sediment transport? Yes No

If Yes, then fill out Section F (Sediment Transport) of Form 3. If no, then attach an explanation.

3.0 MAPPING AND SURVEY INFORMATION

3.1 Field Survey Information

The field survey information remains unchanged from the approved CLOMR. The initial field survey to set the ground control, establish Elevation Reference Marks (ERM's), and set panels for the aerial mapping was performed by Tetra Tech, Inc. (formerly Collins-Pina Engineering, Inc.). The initial survey was supplemented by Aztec Engineering (AZTEC) which included partial topographic surveys of the Grand Canal and as-built topography of the existing concrete lined channel along the Loop 101. The Aztec supplemental survey was completed and sealed by Mr. Norman L. Smith, R.L.S. in August 2001. The supporting field survey notes are provided within the approved CLOMR in Appendix B.

3.2 Mapping

The mapping is unchanged from the CLOMR submittal. Aerial strip mapping was developed for the BHOC corridor along the Grand Canal from the Loop 101 to approximately 63rd Avenue; Missouri Avenue from the Grand Canal to 59th Avenue; and Camelback Road from the Grand Canal to 59th Avenue. This mapping is the basis of the construction as-built plans as provided under Exhibit 2. Kenney Aerial Mapping Inc. as a sub-consultant to Tetra Tech Inc. developed the aerial mapping at a scale of 1" = 20'.

The horizontal datum for the mapping is based on the North American Datum of 1983 (NAD 83) State Plane Coordinate System, Arizona Central Zone, as published by the Arizona Department of Transportation. Coordinates for the horizontal control are ground coordinates based on a scale factor of 1.00016.

The vertical datum is based on the National Geodetic Vertical Datum of 1929 (NGVD 29) which is the same datum used by the Salt River Valley Water Users Association [Salt River Project (SRP)] for the Grand Canal and irrigation lateral system. The conversion factor from NGVD 29 to the North American Vertical Datum of 1988 (NAVD 88) is +1.9098.

The final survey and mapping product exceeds the standards for Flood Insurance Study (FIS) mapping requirements defined by the Guidelines and Specifications for Flood Hazard Mapping Partners (April 2003)

4.0 HYDROLOGY

4.1 Method Description

The hydrology for this LOMR has been updated from the hydrology utilized in the approved CLOMR. In February of 2011, The *Glendale Area Stormwater Management Plan (GASMP) Hydrology Report* was finalized and published by Kimely-Horn and Associates for the FCDMC and the City of Glendale. In this study, the Maryvale ADMS Watershed which encompasses the BHOC project was updated. The hydrology update utilized the U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package computer program to calculate peak discharges for the 100-year, 6-hour and 24-hour storm events. Some of the updates include new precipitation data (NOAA Atlas 14), land use changes, and the inclusion of drainage facilities that have been constructed.

Based on the as-built conditions of the BHOC project, the Maryvale ADMS HEC-1 models (6-hour & 24-hour) from the GASMP were updated as part of this LOMR. The updates include:

- The addition of the constructed Camelback Road storm drain;
- Updating the Sunset Basin storage routing per the as-built conditions;
- Modifying the Indian School storm drain connection to the 67th Ave. storm drain;
- And removing all routing within the BHOC project (See Section 4.5).

The Camelback Road storm drain was constructed from 59th Avenue to the BHOC project. Additional details on specific HEC-1 updates made by Wood/Patel and Associates are described in the HEC-1 models. The updated HEC-1 models are provided in Appendix D. The HEC-1 models are named MV6E100U.DAT and MV24E100U.DAT for the 6-hour and 24-hour storms.

4.2 Parameter Estimation

4.2.1 Drainage Area Boundaries

The watershed area for the Maryvale ADMS encompasses approximately 100 square miles. Figure 3 illustrates the limits of the watershed studied for the Maryvale ADMS. The BHOC project is located approximately in the middle of this study watershed and parallels the north and east side of the Grand Canal from approximately the New River to 63rd Avenue.

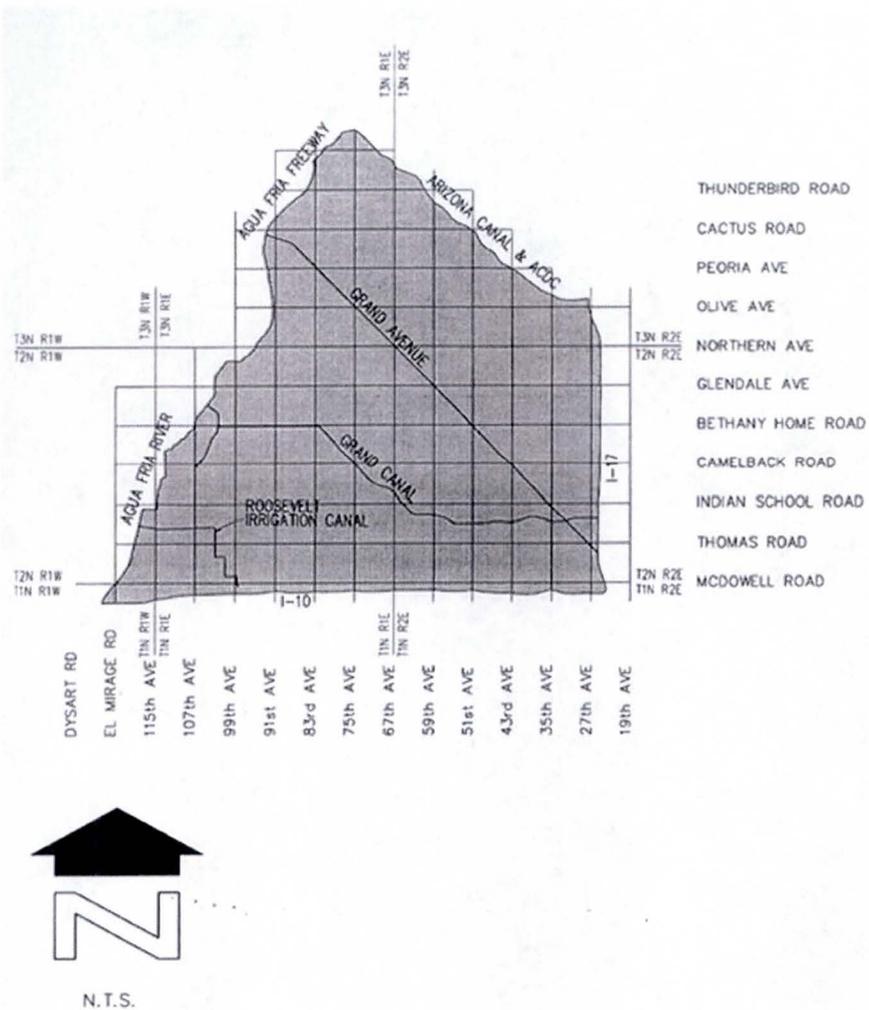


Figure 3. Maryvale ADMS Study Area

4.2.2 Watershed Work Maps

HEC-1 schematic exhibits for the watershed with the LOMR updates are provided in Exhibit 1. The entire supporting hydrologic analyses including digital files for the GASMP is provided in Appendix D. The hydrologic analysis for the Maryvale ADMS which defines the sub-basin boundaries and concentration points; time-of-concentration; hydrograph routing paths; and soils boundaries are documented in the GASMP report.

4.2.3 Gage Data

This section is not applicable to this study.

4.2.4 Statistical Parameters

This section is not applicable to this study.

4.2.5 Precipitation

The National Oceanic and Atmospheric Administration (NOAA) Atlas 14 defines the rainfall data used in the GASMP Maryvale ADMS HEC-1 models. The return period point precipitation values for the watershed are summarized in the Table 1.

Table 1. Return Period Point Precipitation Values

Duration	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
5-Min	0.261	0.354	0.425	0.519	0.593	0.667
10-Min	0.397	0.538	0.646	0.791	0.902	1.015
15-Min	0.492	0.667	0.801	0.980	1.118	1.258
30-Min	0.662	0.899	1.079	1.320	1.506	1.695
1-Hr	0.820	1.112	1.336	1.634	1.864	2.097
2-Hr	0.927	1.240	1.479	1.803	2.050	2.307
3-Hr	0.972	1.279	1.522	1.858	2.126	2.406
6-Hr	1.146	1.469	1.725	2.076	2.351	2.638
12-Hr	1.274	1.614	1.881	2.241	2.516	2.801
24-Hr	1.453	1.883	2.222	2.691	3.063	3.450

The FCDMC has researched historical flooding within the study watershed and documented the following storm events:

Table 2. Historical Storm Event Precipitation and Durations

Date	Precipitation Depth (inches)	Duration
August 16 & 17, 1963	5.2	6 hours
September 13, 1966	2.2	1 day
September 4 – 6, 1970	1.7	1 day
September 3, 1990	2.3	3 hours
July 23 & 24, 1992	3.8	7 hours

Numerous photographs are available from the FCDMC documenting these flood events. In addition, the Corps of Engineers documented the rainfall depths and flooding limits as a result of the 1963 flood within the watershed.

4.2.6 Physical Parameters

The physical parameters used in the hydrologic modeling for the study watershed are documented in the GASMP.

As part of the BHOC Reach D design phase, Olsson Associates (Olsson) designed an outlet system for the Sunset Basin from the basin to 67th Avenue. Olsson developed a stage-storage rating curve based on the improvements to Sunset Basin and the outlet system as documented in the *Final Design Report Bethany Home/Grand Canal Flood Control Project, Bethany Home Outfall Channel – Reach D, 67th Avenue to Indian School Road*, dated September 19, 2008. The outlet system was constructed in 2010 per the design. This stage-storage rating curve as developed by Olsson was used in updating the GASMP Maryvale ADMS HEC-1 models for this LOMR. This stage-storage rating curve was also used to map the approximate Zone A floodplain within Sunset Basin as discussed in Section 4.5.1. The Olsson documentation of the stage-storage rating curve development is provided in Appendix E3.

4.3 Problems Encountered During the Study

No specific problems were encountered during the study.

4.4 Calibration

Calibration of the original hydrologic model is documented in the GASMP.

4.5 Final Results

4.5.1 Hydrologic Analysis Results

As stated in Section 1.6 and discussed further in Section 5.0, the BHOC project was hydraulically evaluated using HEC-RAS unsteady flow analysis. Using this modeling technique, inflow hydrographs along the length of the BHOC project were inserted into HEC-RAS. HEC-RAS performed the hydrograph routing.

Therefore, the routing within HEC-1 for the BHOC project was removed as part of this LOMR. The removal of the routings creates “hanging” hydrographs which can prevent the HEC-1 model from executing. Therefore, “dummy” combines were inserted to combine the “hanging” hydrographs. The “dummy” combines are named “NUL” followed by the nearest north-south street alignment (i.e. NUL99).

The HEC-RAS models establish the discharge at each cross-section corresponding to the maximum water-surface elevation. Section 5.0 presents these results. Table 3 below summarizes the peak discharge at each inflow hydrograph into the BHOC system.

Table 3. Summary of BHOC Inflow Hydrographs, 100-Year Peak Discharges

Approx. Location	Hydrograph Inflow ID	Inflow to HEC-RAS River Station ID	100-year Peak Flow (cfs)	
			6-hour	24-hour
	C, R, B, D		MV6E100U.dat	MV24E100U.dat
67th Ave	D63	35200	159	121
71st Ave	CGC75	32169	921	953
74th Ave	DPCB75	29135	498	498
75th Ave	DWGC83	28332	575	632
79th Ave	CGC83	24701	346	282
82nd Ave	DWBH91	21715	413	525
83rd Ave	CBH91	21144	915	844
91st Ave	CBHLO	15450	1096	1366
97th Ave/SR101	BH99	10855	147	84
99th Ave	CBHRI	10045	45	43
103rd Ave	BHNR	7654	160	132

C= Concentration Point, R = Route, B = Sub-basin ID, D = Diversion,

The Sunset Basin and storm drain system outlet were modeled in HEC-1 using a stage-storage routing routine. This stage-storage rating curve used in this route was defined by Olsson & Assoc. as discussed in Section 4.2.6. The storage route defines the storage volume, elevation, and discharge for a range of basin depths. The executed HEC-1 models define the storage basin discharge. Using this discharge, the storage basin water-surface elevation was interpolated based on the storage rating curve. The higher water-surface elevation of the 6-hour and 24-hour storm events defines the Zone A floodplain delineation. Table 4 shows the Sunset Basin floodplain water-surface elevation interpolated from the stage-storage rating curve.

Table 4. Sunset Basin Interpolated Water-Surface Elevation

PA63		Interpolated per HEC-1 output			
Storage Routing		100-year, 6-hour		100-year, 24-hour	
SQ	SE	SQ	SE	SQ	SE
0	1085.0				
6	1086.0				
10	1086.5				
20	1087.3				
30	1089.6				
40	1092.4				
40.4	1092.5				
294	1097.3	214.0	1095.7	176.0	1095.0
333	1098.1				
381	1098.4				
630	1100.3				

4.5.2 Verification of Results

No specific verification of results was performed with this study.

5.0 HYDRAULICS

5.1 Method Description

During large storm events, water ponds along the north and east bank of the Grand Canal and floods adjacent properties. The BHOC system collects and conveys this storm water using a combination of detention basins, channels, box culverts and storm drain systems.

The hydraulic analysis was prepared utilizing the U.S. Army Corps of Engineers (Corps), Hydrologic Engineering Center, HEC-RAS River Analysis System. The computer program used for the hydraulic analyses is Version 4.1.0 dated January 2010. The LOMR models operate in the unsteady flow analysis. HEC-RAS utilizes UNET, a one dimensional unsteady flow model developed by Barkau (1985) in partnership with the Corps Hydrologic Engineering Center, to solve the one-dimensional Saint-Venant equations of unsteady flow.

Two HEC-RAS models were developed to model the discharges from the 100-year, 6-hour and 24-hour storm events. The HEC-RAS models extend from New River to 67th Avenue. The numerical solutions of the Saint-Venant equations require the definition of the hydraulic conditions at the most upstream and downstream locations of the study reach. The upstream boundary condition for each model is the hydrograph (6-hour or 24-hour) discharging from Sunset Basin. The internal boundary conditions are hydrographs from HEC-1 (6-hour or 24-hour) that intersect the BHOC system between New River and 67th Avenue. The downstream boundary condition is defined by normal depth. The hydraulic analysis assumes a 100-year design frequency for BHOC and a 10-year storm frequency for New River. The water-surface elevation for the most downstream cross-section in each HEC-RAS model is above the 10-year water-surface elevation in New River thus making this assumption valid.

5.2 Work Maps

The proposed floodplain maps were developed using aerial photography provided by the FCDMC. The proposed floodplain limits were developed with the aid of channel design contours and detailed topographic mapping (i.e., 1"=20' with a contour interval of one

foot) prepared by Kenney Aerial Mapping as documented in Section 3.2. The channel design contours match the as-built conditions and thus are sufficient for floodplain mapping. The floodplain mapping was delineated as Zone A using the maximum water-surface elevation between the 6-hour and 24-hour HEC-RAS models. In all areas where the floodplain is contained within the channel the floodplain was delineated to the channel top of banks in order to preserve the channel conveyance integrity from modification without a detailed analysis. A floodway was not delineated for this project. The full size 11x17 work maps are at a scale of 1"=500' and are included at the end of Section 5.

The BHOC as-built construction plans from the New River to 63rd Avenue are provided in Exhibit 2. Cross-section identifiers from approximately 97th Avenue to 67th Ave (Phase II) are based on the respective project construction centerline station with the addition of 10,000. West of 97th Avenue to New River (Phase I), the cross section identifiers are based on the stationing at 97th Avenue and subtracted by the channel reach length in a cumulative manner. The thalweg is the profile grade line of the constructed conveyance system for each respective project. Water-surface elevations at each cross-section are not illustrated on the work maps since the proposed floodplain is Zone A and is contained within the constructed facility except in 3 areas:

- Overtopping of channel right bank upstream and downstream of the 71st Avenue pedestrian bridge;
- Overtopping of channel right bank east of 72nd Avenue;
- Overtopping of channel right bank in area around 73rd Avenue.

The floodplain overtopping in these areas extend into the adjacent streets but does not encroach into any existing structures.

5.2.1 Inlet Ponding Floodplain

Inlets were constructed within the linear park along Grand Canal between Bethany Home Road and Camelback Road to capture and convey runoff into the BHOC culvert system. Several of the major inlets were evaluated to determine ponding depths. The ponding was delineated as Zone A floodplain. The hydrology and hydraulic analyses use the same methodology as the

design of the inlets as documented in the *Design Data Report Final Submittal Bethany Home/Grand Canal Flood Control Project, Bethany Home Outfall Channel – Reach C, 83rd Avenue to 73rd Avenue*, dated October 2005 and prepared by DMJM Harris. The discharge to each inlet was determined using a combination of the Rational Method and flows from the updated Maryvale ADMS HEC-1 Models. The ponding depths were determined using weir and orifice calculations. Table 5 below summarizes the inlet flows and ponding depths. Appendix E.3 provides an excerpt from the above referenced design report describing the inlet hydrology and hydraulic methodology. The calculations supporting Table 5 are also included in Appendix E.3.

Table 5. Inlet Ponding Hydraulic Summary

Inlet Station	Total Flow (cfs)	Inlet Flow (cfs)	Inlet Ponding Depth (ft)	Inlet Elev	W.S.E.
123+47	525	525	3	1081.0	1084.0
140+97	291	47	3.4	1085.2	1088.6
142+07		244	3.8	1084.8	
148+22	158	13	4.4	1085.6	1090.0
151+52		10	2.7	1087.3	
152+19		9	2.1	1087.9	
155+06		89	2	1088.0	
155+99		37	2.2	1087.8	

Notes:

W.S.E. = water-surface elevation

5.3 Parameter Estimation

5.3.1 Roughness Coefficients

The roughness coefficients are unchanged from the approved CLOMR. The approved CLOMR documents the roughness coefficients along the BHOC project. This documentation is provided within the CLOMR in Appendix B.

5.3.2 Expansion and Contraction Coefficients

Normal expansion and contraction coefficients of 0.1 and 0.3 are used throughout the study limits. For the entrance and exit from bridges and box culverts, gradual vertical wall transitions or uniform trapezoidal sections were constructed thus the loss coefficients were not modified.

5.4 Cross-Section Description

Cross-sections for the study were located at 200 foot intervals on average. Additional cross-sections were added at bridges and changes in profile grade. Furthermore, due to the unstable nature of the unsteady flow analysis, densely interpolated cross sections were implemented at some locations to provide computational stability. These locations are generally at significant channel drops. The interpolated cross sections are not used in the floodplain mapping and thus are not displayed on the work maps. Cross-sections were oriented perpendicular to the direction of flow.

5.5 Modeling Considerations

5.5.1 Hydraulic Jump and Drop Analysis

Hydraulic jumps and drop analysis was performed in the approved CLOMR. The hydraulic jump potential and the drop locations remain unchanged from the approved CLOMR with the exception of one drop. In the CLOMR model, a drop was proposed at approximately 82nd Avenue at the outlet of the Glendale Park box culvert. This drop was re-located and constructed at the inlet end of the 75th Avenue and Camelback Road culvert. The floodplain limits were not adjusted to account for the potential hydraulic jump since the floodplain is mapped to the channel top of bank.

5.5.2 Sunset Basin Outlet System

The most upstream HEC-RAS cross section (35200) is at the Sunset Basin outlet system. The water-surface elevation for this LOMR is above the water-surface elevation assumed in the hydraulic design of the Sunset Basin outlet system done by Olsson as documented in the *Final Design Report Bethany Home/Grand Canal Flood Control Project, Bethany Home Outfall Channel – Reach D, 67th Avenue to Indian School Road*. However, the LOMR water-surface elevation is within the tolerances defined by Olsson in the hydraulic design. An excerpt from the above referenced report documenting Olsson's design of the Sunset Basin outlet system is provided in Appendix E3.

5.5.3 Bridges and Culverts

The following structures were constructed across the BHOC system:

1. 107th Avenue: 3 span box culvert bridge
2. Grand Canal Wasteway: 5-8'x7' concrete box culvert
3. 99th Avenue: 3 span slab bridge
4. Loop 101 Structures: clear span channel
5. 97st Avenue SRP Flume: 3 span slab bridge
6. 95th Avenue: 4 span slab bridge
7. 91st Avenue & SRP Flume: 3 span slab bridge
8. Grand Canal at the 87th Avenue Alignment: 6-10'x5' box culvert
9. 83rd Avenue: 3 span slab bridge
10. Grand Canal at the 82nd Avenue Alignment: 3-10'x8' box culvert
11. Grand Canal Linear Park Box Culvert (East of the 82nd Avenue Alignment to approximately 75th Avenue and Camelback Road): 2-9'x9' box culvert.
12. 75th Avenue and Camelback Road: 2-102" pipe culvert
13. 73rd Avenue: 2-12'x10' Pedestrian box culvert bridge
14. 71st Avenue: 3-10'x8' Pedestrian box culvert bridge

The bridge crossings were hydraulically analyzed using one or a combination of the following low-flow methods available in the HEC-RAS computer program:

- Energy (Standard Step)
- Momentum
- Yarnell (Class A only)

The highest energy solution is the one reported in the results section of this document. The as-built construction plans with the structures listed above are provided in Exhibit 2.

5.5.4 Levees and Dikes

No levees or dikes are proposed as part of this project. However, at the channel confluence with the New River, the banks of the channel match into the existing New River levee system designed for the U.S. Army Corps of Engineers Standard Project Flood.

5.5.5 Islands and Flow Splits

There are no islands or flow splits associated with the design of this facility.

5.5.6 Ineffective Flow Areas

In the few areas where the floodplain overtops the right channel bank, ineffective flow was utilized if the overtopped area did not provided active conveyance.

5.5.7 Supercritical Flow

No specific assumptions for supercritical flow were made in this study. The HEC-RAS hydraulic analysis was performed using a mixed flow regime. In the areas of supercritical flow, the critical or subcritical depth solutions are contained within the channel banks and proposed floodplain limits.

5.6 Floodway Modeling

Floodway modeling was not performed as part of this study. Proposed encroachments into the floodplain will be evaluated on a case-by-case basis by the FCDMC, ADOT and the Cities of Phoenix and Glendale.

5.7 Problems Encountered During the Study

5.7.1 Special Problems and Solutions

No special problems were encountered during this study.

5.7.2 Model Warning and Error Messages

There are a number of warning messages generated by the HEC-RAS computer program for the hydraulic analysis of the project. These warnings do not affect the accuracy of the results and are intended to alert the user of any conditions outside of the expected norm.

5.8 Calibration

There was no special calibration effort made as part of this study. There is no gage data or physical measurements to compare any results from the HEC-RAS analyses.

5.9 Final Results

5.9.1 Hydraulic Analysis Results

Tables 5 and 6 provide a summary of the hydraulic analysis results.

5.9.2 Verification of Results

There was not specific verification of results made as a part of this study.

5.9.3 HIS Submittal

Wood/Patel made an HIS Submittal to the FCDMC in May of 2013. The submittal included GIS shape files for the floodplain, cross sections, and flood base line. It also included report files for the HEC-RAS models, a project data dbf file, and a project mapping dbf file. The HIS submittal digital files are provided as part of Exhibit 4.

Table 6a. Summary of Hydraulic Analysis Results
100-year, 6-hour HEC-RAS model (BHOC_LOMR_6hr.prj)

HEC-RAS Plan: LOMR River: BHOC Reach A-D Reach: Reach A-D Profile: Max WS (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach A-D	21160	2149.43	1064.92	1074.12		1074.31	0.000137	3.48	617.89	105.35	0.25
Reach A-D	21144	2149.43	1064.89	1074.11		1074.30	0.001065	3.45	622.79	105.84	0.25
Reach A-D	21075	3058.21	1064.79	1073.76		1074.04	0.001709	4.24	721.60	129.99	0.32
Reach A-D	21000	3055.88	1064.68	1073.58		1073.90	0.002038	4.55	672.19	123.69	0.34
Reach A-D	20800	3055.32	1064.38	1073.22		1073.50	0.001881	4.26	716.60	137.22	0.33
Reach A-D	20600	3052.59	1064.07	1072.86		1073.14	0.001803	4.22	723.22	136.46	0.32
Reach A-D	20400	3049.79	1063.77	1072.51		1072.78	0.001788	4.16	733.23	140.38	0.32
Reach A-D	20200	3048.16	1063.47	1072.16		1072.42	0.001768	4.12	740.26	143.03	0.32
Reach A-D	20000	3046.67	1063.17	1071.81		1072.07	0.001764	4.10	743.69	144.57	0.32
Reach A-D	19800	3044.58	1062.87	1071.44		1071.71	0.001834	4.15	734.45	144.06	0.32
Reach A-D	19600	3044.10	1062.57	1071.09		1071.35	0.001776	4.05	751.18	149.40	0.32
Reach A-D	19400	3043.45	1062.27	1070.66		1070.96	0.002106	4.40	691.84	137.69	0.35
Reach A-D	19200	3042.13	1062.00	1070.24		1070.54	0.002106	4.35	699.70	142.66	0.35
Reach A-D	19000	3041.80	1061.66	1069.88		1070.14	0.001857	4.08	746.03	152.10	0.32
Reach A-D	18800	3041.59	1061.36	1069.19		1069.63	0.003241	5.34	569.96	117.23	0.43
Reach A-D	18600	3039.48	1061.06	1068.37		1068.89	0.004202	5.80	523.96	115.67	0.48
Reach A-D	18400	3038.35	1060.76	1067.52		1068.17	0.002946	6.49	468.45	123.30	0.59
Reach A-D	18200	3038.00	1060.46	1067.23		1067.68	0.001944	5.42	560.20	141.83	0.48
Reach A-D	18000	3037.11	1060.16	1066.44		1067.15	0.003419	6.75	449.68	124.72	0.63
Reach A-D	17872	3035.79	1059.96	1065.38		1066.59	0.006371	8.81	344.59	101.94	0.84
Reach A-D	17829	3035.98	1059.89	1064.99	1064.89	1066.46	0.002390	9.73	311.92	97.79	0.96
Reach A-D	17817	3036.13	1058.17	1066.87		1067.33	0.000259	5.40	562.27	64.62	0.32
Reach A-D	17815	Culvert									
Reach A-D	17676	3032.29	1058.05	1064.56		1065.36	0.002230	7.21	420.32	64.62	0.50
Reach A-D	17660	3033.38	1057.29	1064.81		1065.32	0.001435	5.78	525.24	94.28	0.43
Reach A-D	17600	3033.38	1057.27	1064.79		1065.24	0.001303	5.40	562.18	104.54	0.41
Reach A-D	17400	3033.45	1057.11	1064.59		1064.99	0.001206	5.07	598.06	115.83	0.39
Reach A-D	17200	3031.93	1056.90	1064.33		1064.74	0.001266	5.16	587.34	114.92	0.40
Reach A-D	17000	3030.42	1056.79	1064.04		1064.48	0.001366	5.31	570.96	113.49	0.42
Reach A-D	16800	3030.04	1056.63	1063.75		1064.20	0.001451	5.41	560.35	113.41	0.43
Reach A-D	16600	3029.67	1056.44	1063.41		1063.89	0.001618	5.59	541.63	113.19	0.45
Reach A-D	16400	3029.49	1056.31	1063.21		1063.59	0.001391	4.99	607.38	135.10	0.41
Reach A-D	16200	3029.30	1056.15	1062.95		1063.32	0.001369	4.82	628.18	145.64	0.41
Reach A-D	16000	3029.20	1055.99	1062.56		1063.01	0.001703	5.35	565.79	132.04	0.46
Reach A-D	15800	3029.15	1055.83	1062.19		1062.65	0.001882	5.46	554.47	134.93	0.47
Reach A-D	15730	3028.95	1055.77	1061.93		1062.50	0.002480	6.04	501.53	129.36	0.54
Reach A-D	15633	3028.67	1055.49	1061.67		1062.34	0.000752	6.55	462.24	110.26	0.56
Reach A-D	15592	3028.66	1053.97	1061.97	1058.41	1062.32	0.000258	4.74	638.89	109.40	0.35
Reach A-D	15591	Bridge									
Reach A-D	15482	3028.52	1053.57	1061.57		1061.94	0.000277	4.85	624.88	109.26	0.36
Reach A-D	15450	3028.45	1053.57	1061.52		1061.91	0.001096	5.06	597.96	107.54	0.38
Reach A-D	15400	4104.21	1053.46	1060.92		1061.53	0.002163	6.24	658.03	125.60	0.48
Reach A-D	15330	4106.88	1053.30	1061.02		1061.40	0.001338	4.97	826.26	155.57	0.38
Reach A-D	15200	4105.03	1053.16	1060.82		1061.22	0.001516	5.09	806.48	161.04	0.40
Reach A-D	15000	4102.69	1052.85	1060.55		1060.93	0.001356	4.96	826.59	157.35	0.38
Reach A-D	14800	4092.08	1052.70	1060.07		1060.59	0.002086	5.78	708.50	148.53	0.47
Reach A-D	14600	4091.30	1052.47	1059.88		1060.24	0.001360	4.80	851.70	171.17	0.38
Reach A-D	14400	4086.29	1052.20	1059.64		1059.99	0.001109	4.74	862.30	175.05	0.38
Reach A-D	14200	4084.41	1052.02	1059.45		1059.78	0.001049	4.58	891.61	182.85	0.37
Reach A-D	14000	4080.32	1051.79	1059.21		1059.56	0.001172	4.75	859.29	181.33	0.38
Reach A-D	13800	4075.49	1051.56	1059.00		1059.33	0.001064	4.66	874.52	176.98	0.37
Reach A-D	13600	4073.16	1051.33	1058.77		1059.11	0.001111	4.69	868.66	179.82	0.38
Reach A-D	13400	4071.72	1051.10	1058.60		1058.91	0.000984	4.47	911.75	184.96	0.35
Reach A-D	13200	4066.72	1050.88	1058.36		1058.69	0.001190	4.62	881.03	178.41	0.37
Reach A-D	13000	4065.92	1050.64	1058.11		1058.45	0.001219	4.63	878.75	180.39	0.37
Reach A-D	12950	4064.92	1050.53	1058.08	1055.12	1058.41	0.000197	4.59	885.96	181.10	0.37
Reach A-D	12900	Bridge									
Reach A-D	12845	4065.99	1050.29	1058.08		1058.39	0.000182	4.47	910.50	183.43	0.35
Reach A-D	12800	4063.94	1050.42	1058.05		1058.36	0.001105	4.46	911.88	184.10	0.35
Reach A-D	12600	4063.76	1050.19	1057.83		1058.14	0.001092	4.45	914.10	183.52	0.35
Reach A-D	12400	4062.88	1049.97	1057.59		1057.91	0.001132	4.58	886.25	174.94	0.36

HEC-RAS Plan: LOMR River: BHO Reach A-D Reach: Reach A-D Profile: Max WS (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach A-D	12200	4061.88	1049.74	1057.39		1057.69	0.001086	4.45	912.37	182.29	0.35
Reach A-D	12000	4061.92	1049.50	1057.18		1057.49	0.000934	4.46	910.75	178.16	0.35
Reach A-D	11800	4061.49	1049.28	1056.96		1057.30	0.001017	4.68	867.75	168.11	0.36
Reach A-D	11741	4061.78	1049.22	1056.94		1057.26	0.000272	4.55	893.55	172.53	0.35
Reach A-D	11603	4061.04	1048.81	1056.12	1054.27	1057.17	0.000803	8.21	494.61	86.67	0.61
Reach A-D	11588	Bridge									
Reach A-D	11573	4060.95	1048.81	1055.75		1056.93	0.000963	8.72	465.83	85.62	0.66
Reach A-D	11526	4060.77	1048.81	1055.86		1056.89	0.000807	8.15	498.29	88.68	0.61
Reach A-D	11415	4061.14	1048.64	1055.67		1056.80	0.000908	8.51	477.22	87.09	0.64
Reach A-D	11255	4060.66	1048.11	1055.20		1056.36	0.000924	8.65	469.33	84.35	0.65
Reach A-D	10855	4060.44	1047.84	1054.70		1055.96	0.001045	9.02	450.12	83.43	0.68
Reach A-D	10455	4078.96	1047.56	1053.92		1055.46	0.001402	9.97	408.97	81.44	0.78
Reach A-D	10310	4078.36	1047.46	1053.50	1052.97	1055.26	0.001704	10.65	383.07	80.15	0.86
Reach A-D	10239	Bridge									
Reach A-D	10185	4080.38	1047.38	1052.98	1052.89	1055.11	0.002269	11.72	348.27	78.39	0.98
Reach A-D	10045	4080.19	1047.05	1052.70	1052.56	1054.78	0.002188	11.57	352.51	78.61	0.96
Reach A-D	9654	4085.10	1046.20	1051.79	1051.72	1053.94	0.002287	11.75	347.62	78.36	0.98
Reach A-D	9254	4084.77	1045.33	1050.85	1050.85	1053.06	0.002394	11.93	342.38	78.10	1.00
Reach A-D	8854	4084.43	1044.46	1049.85	1049.98	1052.20	0.002629	12.31	331.87	77.56	1.05
Reach A-D	8454	4084.11	1043.58	1048.71	1049.10	1051.37	0.003179	13.11	311.62	76.50	1.14
Reach A-D	8054	4083.81	1042.71	1047.07	1048.23	1051.08	0.005897	16.06	254.33	73.45	1.52
Reach A-D	7969	4083.74	1042.52	1046.15	1047.64	1051.29	0.007959	18.18	224.57	61.86	1.68
Reach A-D	7945	4083.72	1035.75	1047.55		1048.56	0.000504	8.07	505.88	42.94	0.41
Reach A-D	7856	Culvert									
Reach A-D	7751	4081.78	1035.10	1042.97		1044.32	0.000998	9.33	437.72	73.72	0.67
Reach A-D	7654	4081.65	1035.00	1042.88		1044.22	0.000995	9.32	438.16	73.74	0.67
Reach A-D	7454	4086.37	1034.80	1042.66		1044.02	0.001004	9.35	437.12	73.69	0.68
Reach A-D	7054	4085.33	1034.40	1042.26		1043.62	0.001004	9.35	437.12	73.69	0.68
Reach A-D	6654	4083.86	1034.00	1041.86		1043.22	0.001003	9.34	437.13	73.69	0.68
Reach A-D	6254	4083.26	1033.60	1041.46		1042.82	0.001002	9.34	437.13	73.69	0.68
Reach A-D	5854	4082.71	1033.20	1041.06		1042.42	0.001002	9.34	437.20	73.69	0.68
Reach A-D	5454	4082.10	1032.80	1040.66		1042.02	0.001002	9.34	437.12	73.69	0.68
Reach A-D	5054	4082.17	1032.40	1040.26		1041.62	0.001002	9.34	437.05	73.68	0.68
Reach A-D	4872	4082.00	1032.22	1040.08	1038.52	1041.43	0.001005	9.35	436.69	73.66	0.68
Reach A-D	4829	Bridge									
Reach A-D	4801	4082.14	1032.15	1038.12	1038.45	1040.91	0.002862	13.41	304.52	66.10	1.10
Reach A-D	4691	4082.06	1031.81	1037.31		1038.29	0.001315	7.95	513.32	130.09	0.71
Reach A-D	4676	4082.15	1031.90	1037.32		1038.27	0.001292	7.82	522.04	135.07	0.70
Reach A-D	4661	4082.05	1031.75	1037.58		1038.26	0.000820	6.59	619.80	145.41	0.56
Reach A-D	4641	4082.00	1031.66	1037.54	1036.44	1038.24	0.000999	6.71	608.26	161.52	0.61

Table 6b. Summary of Hydraulic Analysis Results
100-year, 24-hour HEC-RAS model (BHOC_LOMR_24hr.prj)

HEC-RAS Plan: LOMR River: BHOC Reach A-D Reach: Reach A-D Profile: Max WS (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach A-D	21160	2230.47	1064.92	1074.11		1074.32	0.000147	3.61	617.58	105.33	0.26
Reach A-D	21144	2229.57	1064.89	1074.11		1074.31	0.001147	3.58	622.48	105.81	0.26
Reach A-D	21075	3070.62	1064.79	1073.78		1074.06	0.001708	4.24	723.93	130.19	0.32
Reach A-D	21000	3068.81	1064.68	1073.59		1073.92	0.002041	4.55	674.43	124.10	0.34
Reach A-D	20800	3066.57	1064.38	1073.24		1073.52	0.001877	4.26	719.06	137.42	0.33
Reach A-D	20600	3065.72	1064.07	1072.88		1073.15	0.001802	4.22	725.67	136.67	0.32
Reach A-D	20400	3063.46	1063.77	1072.53		1072.80	0.001788	4.16	735.75	140.60	0.32
Reach A-D	20200	3062.78	1063.47	1072.18		1072.44	0.001768	4.12	742.85	143.26	0.32
Reach A-D	20000	3061.35	1063.17	1071.83		1072.09	0.001763	4.10	746.45	144.82	0.32
Reach A-D	19800	3060.55	1062.87	1071.46		1071.73	0.001835	4.15	737.17	144.31	0.32
Reach A-D	19600	3059.38	1062.57	1071.11		1071.37	0.001775	4.06	754.01	149.66	0.32
Reach A-D	19400	3058.66	1062.27	1070.68		1070.98	0.002107	4.41	694.31	137.92	0.35
Reach A-D	19200	3057.95	1062.00	1070.26		1070.56	0.002107	4.35	702.26	142.90	0.35
Reach A-D	19000	3057.62	1061.66	1069.90		1070.16	0.001858	4.08	748.76	152.35	0.32
Reach A-D	18800	3056.79	1061.36	1069.21		1069.65	0.003241	5.34	572.06	117.42	0.43
Reach A-D	18600	3056.29	1061.06	1068.38		1068.91	0.004207	5.81	525.83	115.86	0.48
Reach A-D	18400	3054.97	1060.76	1067.54		1068.19	0.002936	6.49	470.80	123.52	0.59
Reach A-D	18200	3054.82	1060.46	1067.25		1067.71	0.001937	5.42	563.18	142.18	0.48
Reach A-D	18000	3053.59	1060.16	1066.47		1067.18	0.003378	6.74	453.30	125.08	0.62
Reach A-D	17872	3052.57	1059.96	1065.46		1066.62	0.006064	8.67	352.16	102.88	0.83
Reach A-D	17829	3052.39	1059.89	1065.07		1066.48	0.002256	9.55	319.68	98.79	0.94
Reach A-D	17817	3052.85	1058.17	1066.96		1067.41	0.000255	5.38	567.63	64.62	0.32
Reach A-D	17815	Culvert									
Reach A-D	17676	3049.32	1058.05	1064.61		1065.41	0.002199	7.20	423.75	64.62	0.50
Reach A-D	17660	3049.86	1057.29	1064.86		1065.37	0.001410	5.75	530.34	94.56	0.43
Reach A-D	17600	3050.41	1057.27	1064.85		1065.29	0.001279	5.37	568.05	104.91	0.41
Reach A-D	17400	3049.65	1057.11	1064.65		1065.05	0.001178	5.04	605.26	116.34	0.39
Reach A-D	17200	3048.82	1056.90	1064.40		1064.81	0.001232	5.12	595.41	115.50	0.40
Reach A-D	17000	3048.55	1056.79	1064.12		1064.55	0.001321	5.26	580.08	114.15	0.41
Reach A-D	16800	3048.45	1056.63	1063.84		1064.28	0.001392	5.34	570.94	114.18	0.42
Reach A-D	16600	3048.36	1056.44	1063.52		1063.99	0.001534	5.50	554.24	114.14	0.44
Reach A-D	16400	3048.19	1056.31	1063.33		1063.70	0.001301	4.88	624.91	136.67	0.40
Reach A-D	16200	3047.80	1056.15	1063.11		1063.45	0.001257	4.68	650.64	147.82	0.39
Reach A-D	16000	3046.61	1055.99	1062.76		1063.17	0.001520	5.15	591.63	134.44	0.43
Reach A-D	15800	3043.93	1055.83	1062.44		1062.85	0.001604	5.17	589.16	138.31	0.44
Reach A-D	15730	3041.19	1055.77	1062.24		1062.72	0.002099	5.61	542.15	137.91	0.50
Reach A-D	15633	3036.82	1055.49	1062.02		1062.59	0.000601	6.06	500.97	113.56	0.51
Reach A-D	15592	3041.44	1053.97	1062.26	1058.41	1062.58	0.000227	4.54	670.23	111.31	0.33
Reach A-D	15591	Bridge									
Reach A-D	15482	3038.81	1053.57	1061.88		1062.21	0.000240	4.62	658.28	111.23	0.33
Reach A-D	15450	3037.83	1053.57	1061.83		1062.19	0.000943	4.81	631.75	109.70	0.35
Reach A-D	15400	4355.75	1053.46	1061.12		1061.76	0.002186	6.37	683.45	127.26	0.48
Reach A-D	15330	4359.63	1053.30	1061.23		1061.63	0.001349	5.07	859.15	157.75	0.38
Reach A-D	15200	4355.38	1053.16	1061.03		1061.44	0.001512	5.18	840.68	163.08	0.40
Reach A-D	15000	4353.37	1052.85	1060.76		1061.16	0.001365	5.06	859.89	159.62	0.38
Reach A-D	14800	4333.11	1052.70	1060.28		1060.81	0.002073	5.86	739.82	151.16	0.47
Reach A-D	14600	4319.71	1052.47	1060.10		1060.47	0.001342	4.86	889.33	174.04	0.38
Reach A-D	14400	4299.00	1052.20	1059.87		1060.22	0.001082	4.77	901.85	178.09	0.37
Reach A-D	14200	4284.78	1052.02	1059.69		1060.01	0.001007	4.58	934.74	185.76	0.36
Reach A-D	14000	4263.10	1051.79	1059.45		1059.80	0.001103	4.71	904.86	184.61	0.38
Reach A-D	13800	4246.88	1051.56	1059.26		1059.59	0.000997	4.61	921.74	180.63	0.36
Reach A-D	13600	4228.14	1051.33	1059.05		1059.38	0.001075	4.59	921.24	192.26	0.37
Reach A-D	13400	4220.40	1051.10	1058.89		1059.18	0.000896	4.37	966.35	189.01	0.34
Reach A-D	13200	4213.65	1050.88	1058.67		1058.99	0.001070	4.49	938.48	182.90	0.35
Reach A-D	13000	4207.16	1050.64	1058.47		1058.77	0.001071	4.46	942.96	185.54	0.35
Reach A-D	12950	4206.39	1050.53	1058.44	1055.19	1058.74	0.000173	4.42	951.17	186.32	0.34
Reach A-D	12900	Bridge									
Reach A-D	12845	4206.14	1050.29	1058.43		1058.72	0.000160	4.31	976.92	188.70	0.33
Reach A-D	12800	4204.66	1050.42	1058.41		1058.70	0.000969	4.29	979.32	189.45	0.33
Reach A-D	12600	4203.53	1050.19	1058.22		1058.51	0.000941	4.26	987.55	189.29	0.33
Reach A-D	12400	4201.23	1049.97	1058.02		1058.32	0.000958	4.36	963.24	180.69	0.33

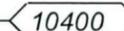
HEC-RAS Plan: LOMR River: BHOC Reach A-D Reach: Reach A-D Profile: Max WS (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach A-D	12200	4199.81	1049.74	1057.86		1058.13	0.000898	4.20	1000.02	189.07	0.32
Reach A-D	12000	4200.62	1049.50	1057.69		1057.97	0.000759	4.19	1003.69	184.94	0.32
Reach A-D	11800	4200.43	1049.28	1057.51		1057.81	0.000809	4.36	963.46	174.94	0.33
Reach A-D	11741	4200.44	1049.22	1057.50		1057.78	0.000216	4.23	992.87	179.71	0.32
Reach A-D	11603	4200.26	1048.81	1056.83	1054.38	1057.71	0.000606	7.54	557.21	89.66	0.53
Reach A-D	11588	Bridge									
Reach A-D	11573	4200.04	1048.81	1055.87		1057.08	0.000964	8.82	476.31	86.14	0.66
Reach A-D	11526	4200.06	1048.81	1055.98		1057.04	0.000809	8.25	509.40	89.18	0.61
Reach A-D	11415	4200.05	1048.64	1055.79		1056.94	0.000910	8.61	487.87	87.61	0.64
Reach A-D	11255	4199.40	1048.11	1055.31		1056.51	0.000930	8.77	479.05	84.81	0.65
Reach A-D	10855	4197.14	1047.84	1054.80		1056.10	0.001054	9.14	458.98	83.86	0.69
Reach A-D	10455	4218.71	1047.56	1054.01		1055.60	0.001424	10.14	416.15	81.79	0.79
Reach A-D	10310	4218.74	1047.46	1053.57	1053.08	1055.40	0.001739	10.84	389.17	80.45	0.87
Reach A-D	10239	Bridge									
Reach A-D	10185	4218.96	1047.38	1053.08	1053.00	1055.26	0.002270	11.85	356.05	78.79	0.98
Reach A-D	10045	4218.89	1047.05	1052.80	1052.67	1054.93	0.002193	11.71	360.15	79.00	0.97
Reach A-D	9654	4223.84	1046.20	1051.89	1051.83	1054.08	0.002290	11.89	355.32	78.76	0.99
Reach A-D	9254	4223.89	1045.33	1050.95	1050.95	1053.21	0.002396	12.07	349.97	78.48	1.01
Reach A-D	8854	4224.01	1044.46	1049.95	1050.09	1052.35	0.002630	12.45	339.33	77.94	1.05
Reach A-D	8454	4223.84	1043.58	1048.81	1049.21	1051.52	0.003162	13.23	319.21	76.90	1.14
Reach A-D	8054	4223.80	1042.71	1047.20	1048.34	1051.18	0.005625	16.00	264.06	73.98	1.49
Reach A-D	7969	4154.25	1042.52	1046.36	1047.70	1051.11	0.006872	17.48	237.69	61.87	1.57
Reach A-D	7945	4146.53	1035.75	1047.78		1048.79	0.000492	8.04	515.80	42.94	0.41
Reach A-D	7856	Culvert									
Reach A-D	7751	4223.65	1035.10	1043.12		1044.49	0.000995	9.41	448.68	74.31	0.68
Reach A-D	7654	4223.62	1035.00	1043.02		1044.40	0.000992	9.40	449.12	74.34	0.67
Reach A-D	7454	4228.84	1034.80	1042.81		1044.19	0.001001	9.43	448.22	74.29	0.68
Reach A-D	7054	4228.65	1034.40	1042.41		1043.79	0.001000	9.43	448.22	74.29	0.68
Reach A-D	6654	4228.49	1034.00	1042.01		1043.39	0.001001	9.44	448.15	74.28	0.68
Reach A-D	6254	4228.24	1033.60	1041.61		1042.99	0.001001	9.43	448.15	74.28	0.68
Reach A-D	5854	4228.07	1033.20	1041.21		1042.59	0.001001	9.43	448.16	74.28	0.68
Reach A-D	5454	4227.94	1032.80	1040.81		1042.19	0.001001	9.43	448.15	74.28	0.68
Reach A-D	5054	4227.82	1032.40	1040.41		1041.79	0.001001	9.44	448.08	74.28	0.68
Reach A-D	4872	4227.73	1032.22	1040.23	1038.64	1041.61	0.001003	9.44	447.71	74.26	0.68
Reach A-D	4829	Bridge									
Reach A-D	4801	4227.83	1032.15	1038.21	1038.57	1041.08	0.002891	13.60	310.82	66.48	1.11
Reach A-D	4691	4227.66	1031.81	1037.38		1038.40	0.001338	8.10	521.92	130.35	0.71
Reach A-D	4676	4227.69	1031.90	1037.39		1038.38	0.001311	7.96	531.23	135.37	0.71
Reach A-D	4661	4227.76	1031.75	1037.66		1038.36	0.000830	6.70	631.30	145.76	0.57
Reach A-D	4641	4227.77	1031.66	1037.62	1036.50	1038.34	0.001000	6.80	621.68	161.85	0.61

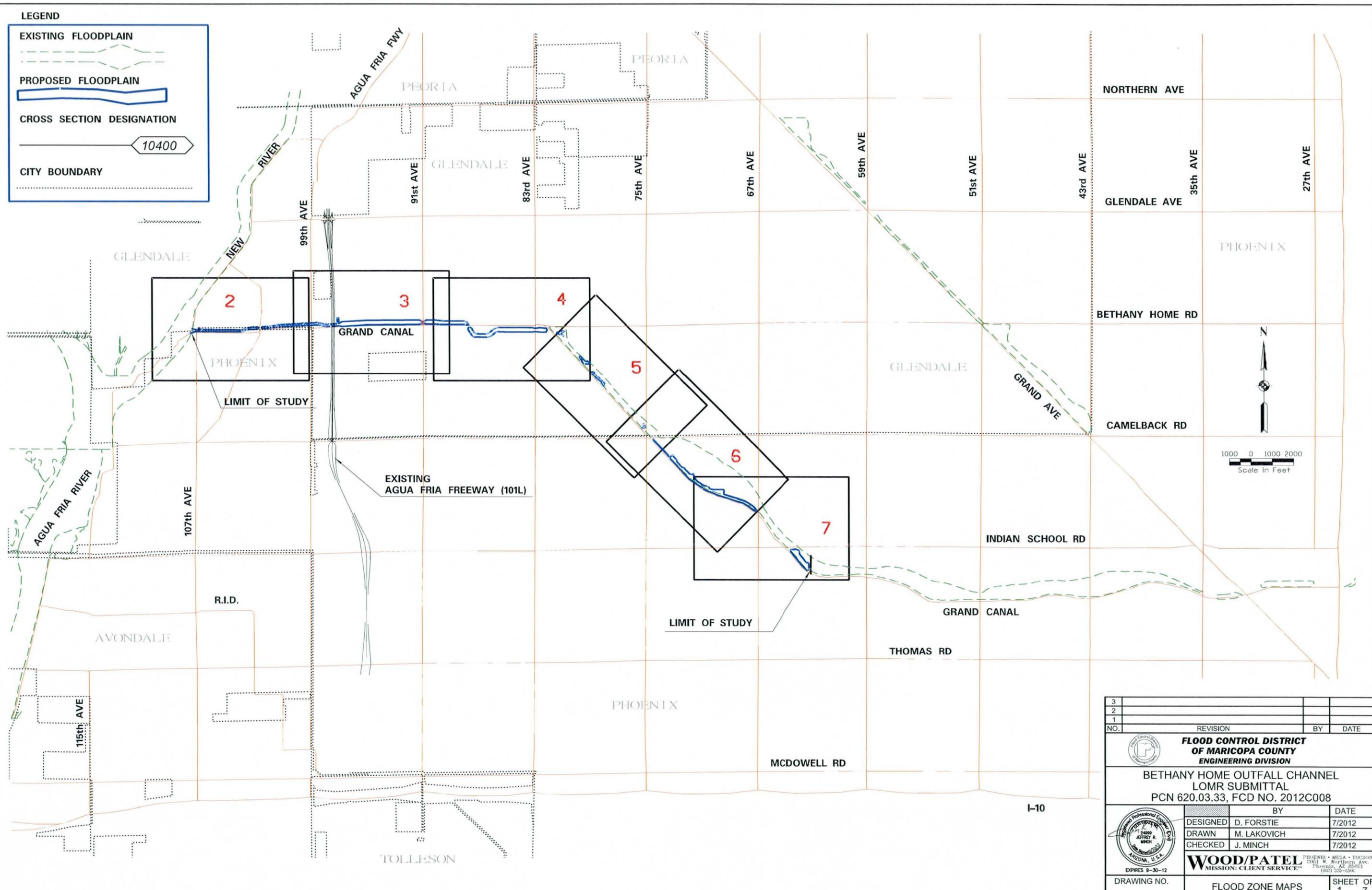
LEGEND

EXISTING FLOODPLAIN

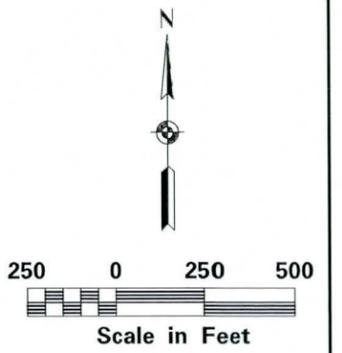
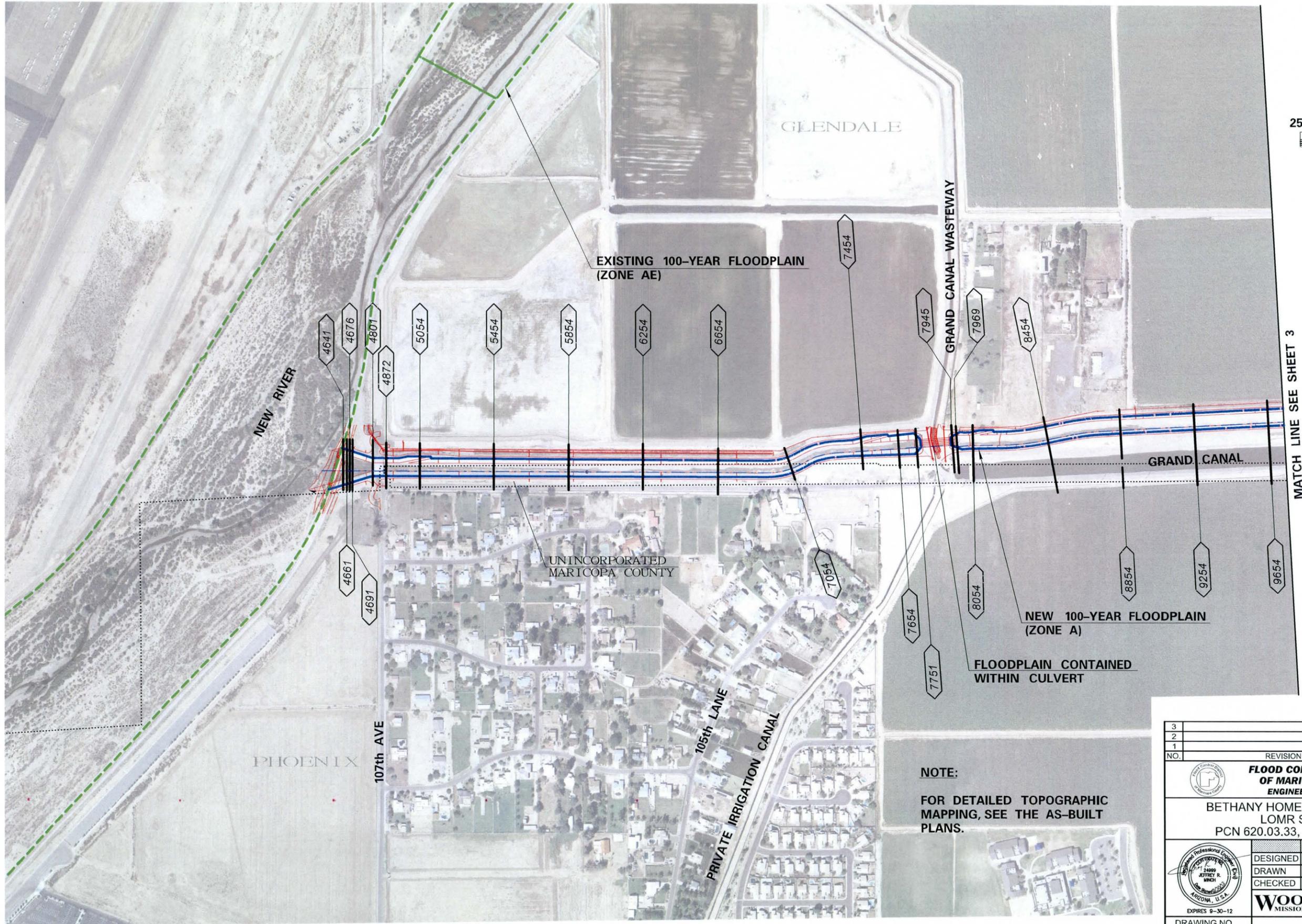

PROPOSED FLOODPLAIN


CROSS SECTION DESIGNATION


CITY BOUNDARY

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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
		BY	DATE
	DESIGNED	D. FORSTIE	7/2012
	DRAWN	M. LAKOVICH	7/2012
	CHECKED	J. MINCH	7/2012
		WOOD/PATEL <small>PHOENIX • MESA • TUCSON</small> <small>2051 W. Northern Ave.</small> <small>Phoenix, AZ 85021</small> <small>(602) 200-6500</small>	
DRAWING NO.	FLOOD ZONE MAPS		SHEET OF
			1 / 7



EXISTING 100-YEAR FLOODPLAIN
(ZONE AE)

GRAND CANAL WASTEWAY

GRAND CANAL

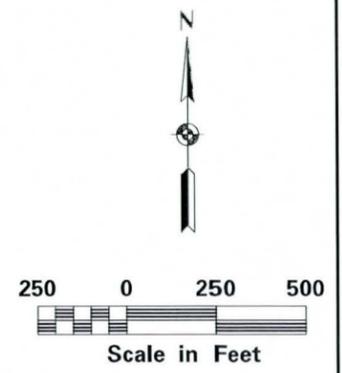
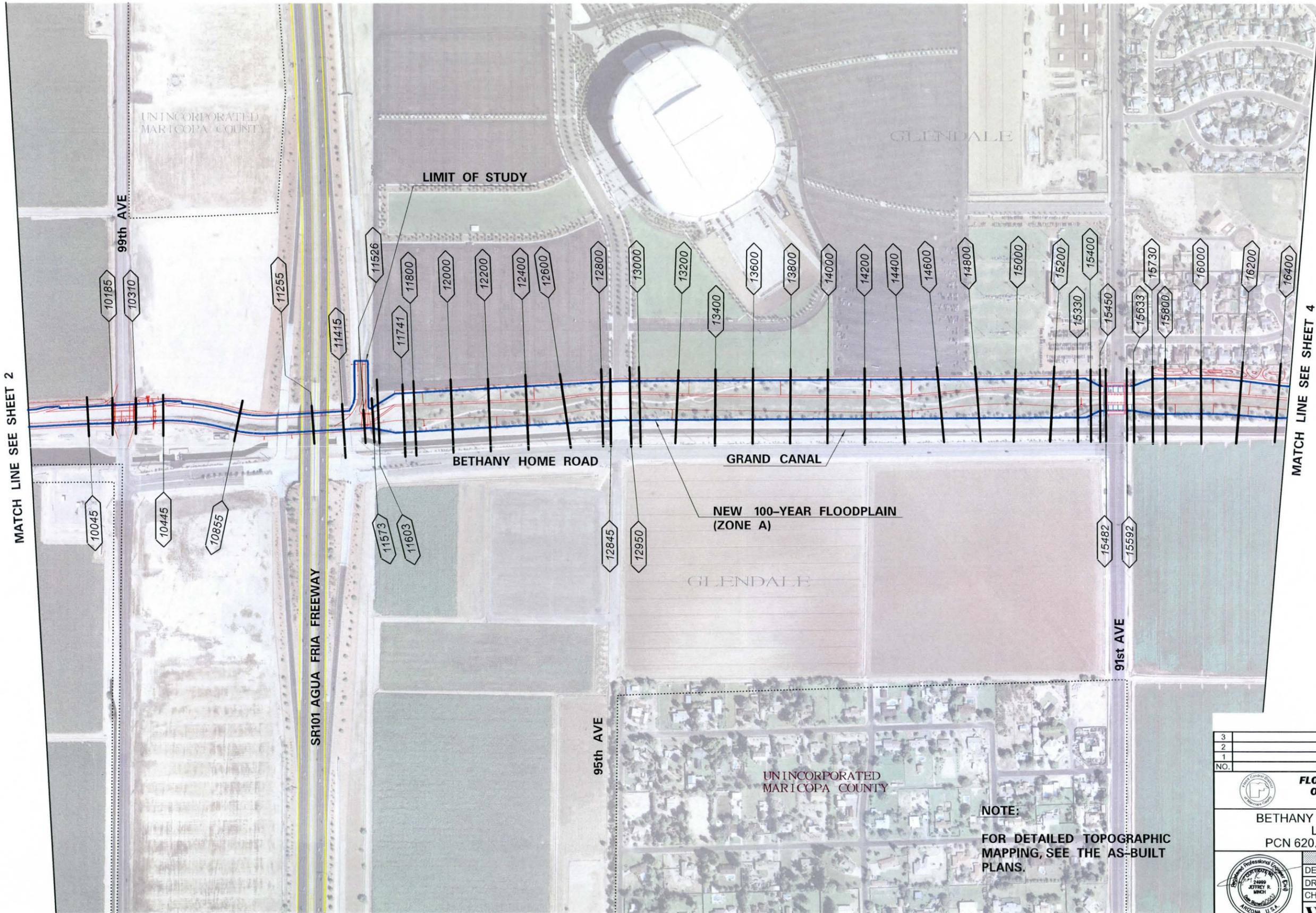
NEW 100-YEAR FLOODPLAIN
(ZONE A)

FLOODPLAIN CONTAINED
WITHIN CULVERT

MATCH LINE SEE SHEET 3

NOTE:
FOR DETAILED TOPOGRAPHIC
MAPPING, SEE THE AS-BUILT
PLANS.

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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
	DESIGNED	D. FORSTIE	7/2012
	DRAWN	M. LAKOVICH	7/2012
	CHECKED	J. MINCH	7/2012
	BY		DATE
	D. FORSTIE		7/2012
 WOOD/PATEL MISSION: CLIENT SERVICE™ <small>PHOENIX • MESA • TUCSON 2061 W. Northbelt Ave. Phoenix, AZ 85021 (602) 336-1500</small>			
DRAWING NO.	FLOOD ZONE MAPS		SHEET OF 2 7

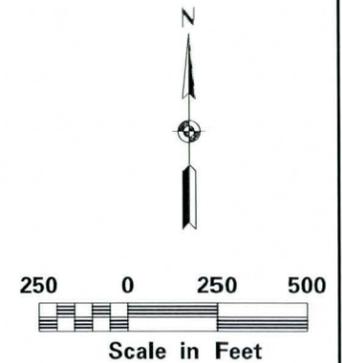
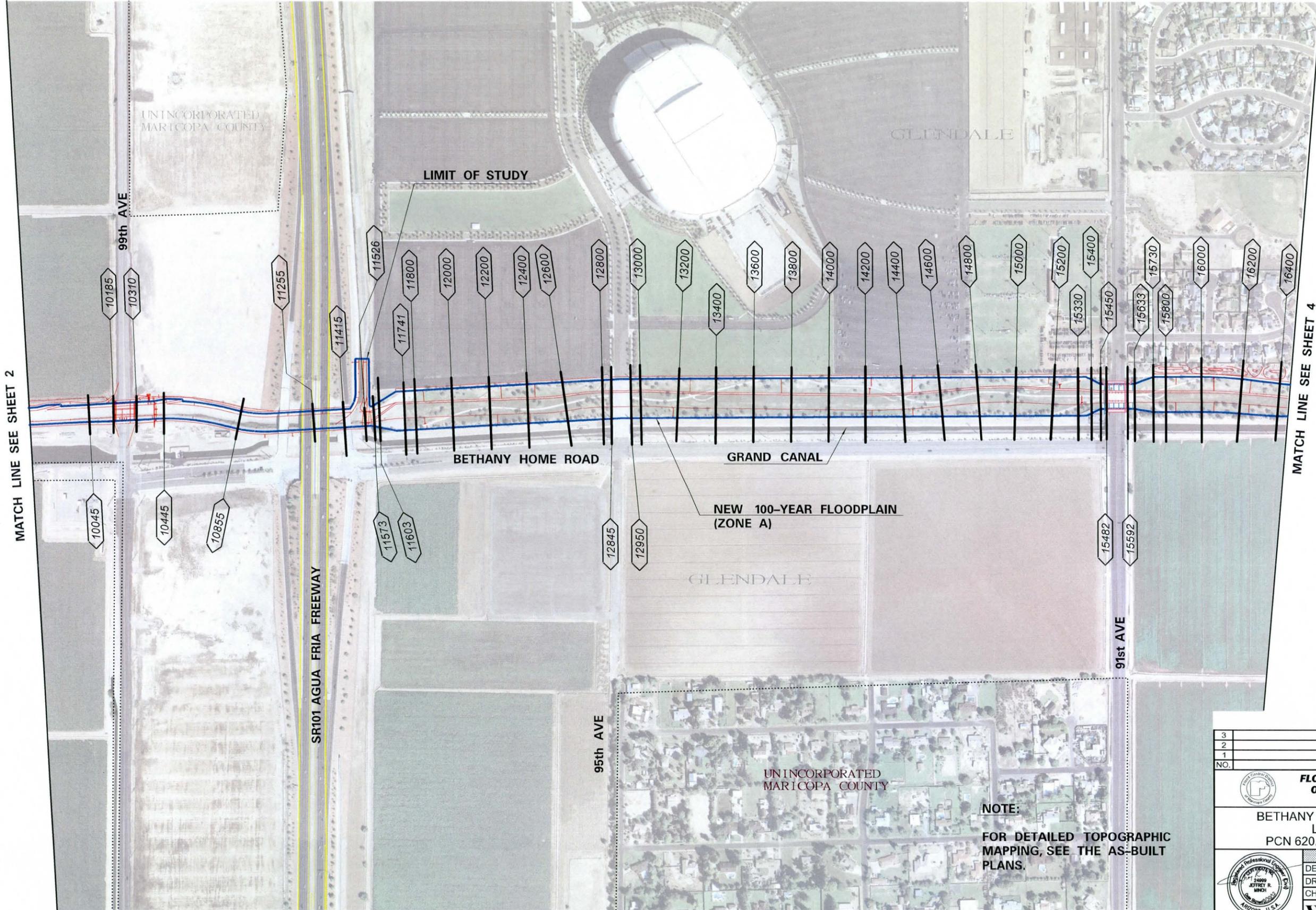


MATCH LINE SEE SHEET 2

MATCH LINE SEE SHEET 4

NOTE:
FOR DETAILED TOPOGRAPHIC
MAPPING, SEE THE AS-BUILT
PLANS.

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NO.	REVISION	BY	DATE
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
	DESIGNED	D. FORSTIE	7/2012
	DRAWN	M. LAKOVICH	7/2012
	CHECKED	J. MINCH	7/2012
	BY		DATE
WOOD/PATEL MISSION: CLIENT SERVICE™			
DRAWING NO.		FLOOD ZONE MAPS	
		SHEET OF 3 7	

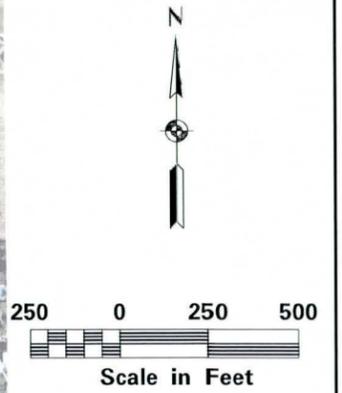
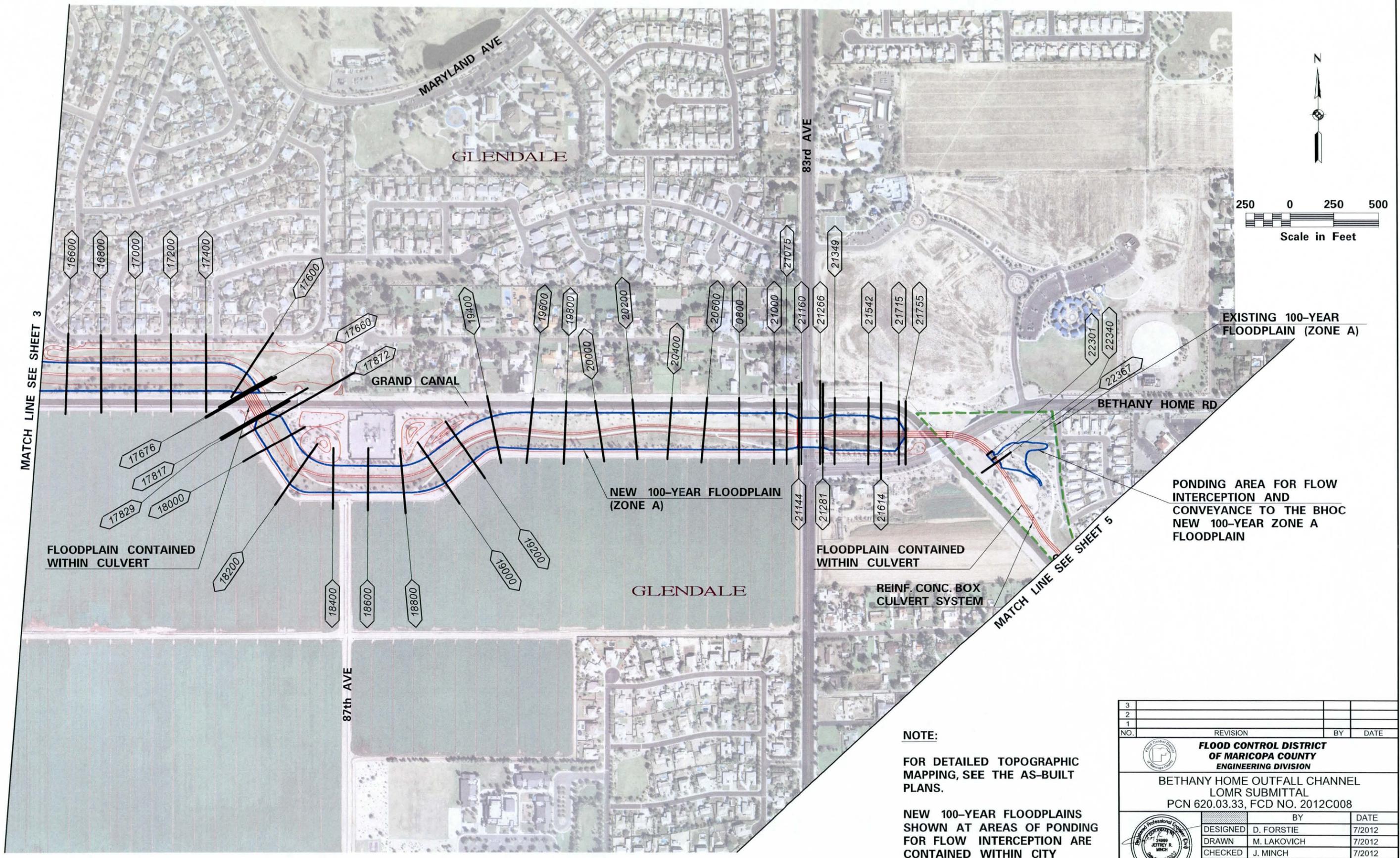


MATCH LINE SEE SHEET 2

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NOTE:
FOR DETAILED TOPOGRAPHIC
MAPPING, SEE THE AS-BUILT
PLANS.

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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
	DESIGNED	D. FORSTIE	7/2012
	DRAWN	M. LAKOVICH	7/2012
	CHECKED	J. MINCH	7/2012
	BY		DATE
 WOOD/PATEL ENGINEERING			
DRAWING NO.		FLOOD ZONE MAPS	SHEET OF 3 7



MATCH LINE SEE SHEET 3

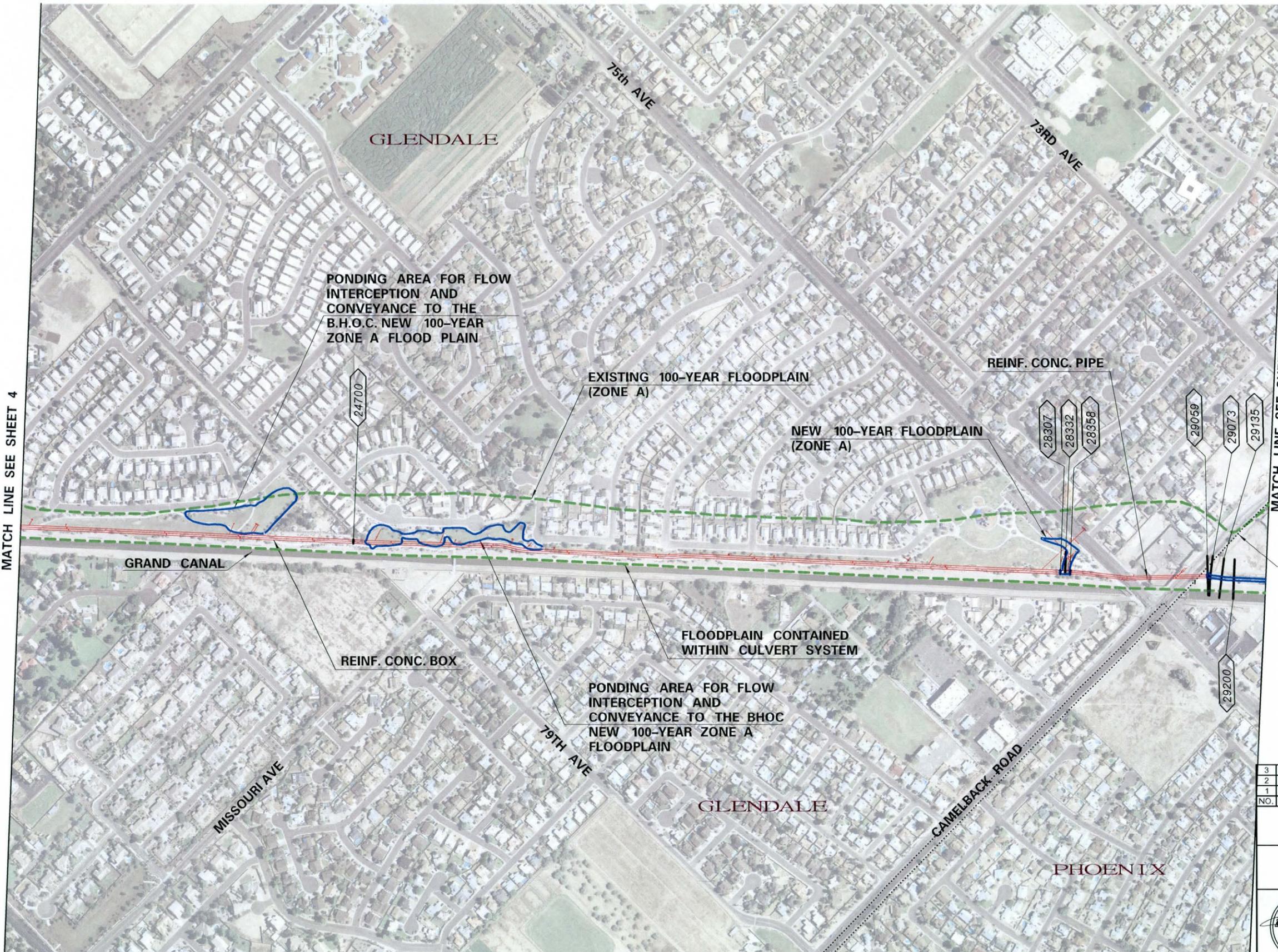
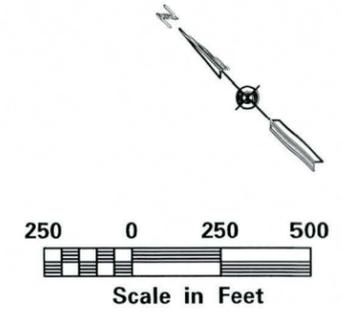
MATCH LINE SEE SHEET 5

NOTE:
 FOR DETAILED TOPOGRAPHIC MAPPING, SEE THE AS-BUILT PLANS.
 NEW 100-YEAR FLOODPLAINS SHOWN AT AREAS OF PONDING FOR FLOW INTERCEPTION ARE CONTAINED WITHIN CITY OWNED PARK PROPERTIES.

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NO.	REVISION	BY	DATE
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
	DESIGNED	D. FORSTIE	7/2012
	DRAWN	M. LAKOVICH	7/2012
	CHECKED	J. MINCH	7/2012
	BY		DATE
WOOD/PATEL MISSION: CLIENT SERVICE™ <small>PHOENIX • MESA • TUCSON 2061 W. Northshore Ave. Phoenix, AZ 85021 (602) 355-6000</small>			
DRAWING NO.	FLOOD ZONE MAPS		SHEET OF 4 7

MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 6



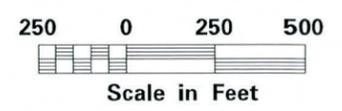
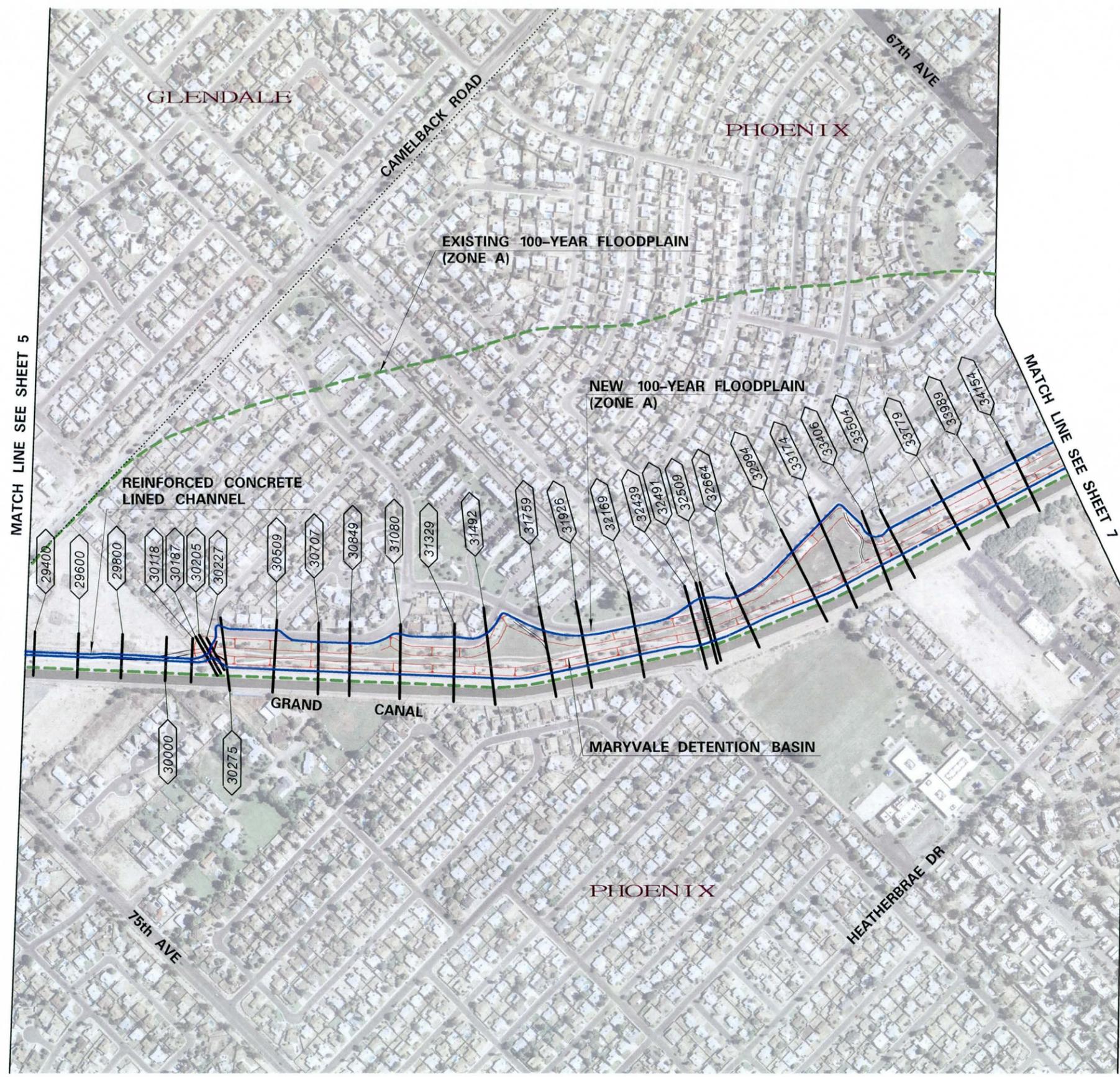
CAMELBACK ROAD STORM DRAIN

NOTE:

FOR DETAILED TOPOGRAPHIC MAPPING, SEE THE AS-BUILT PLANS.

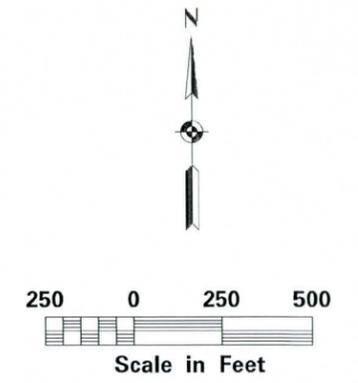
NEW 100-YEAR FLOODPLAINS SHOWN AT AREAS OF PONDING FOR FLOW INTERCEPTION ARE CONTAINED WITHIN CITY OWNED PARK PROPERTIES.

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NO.	REVISION	BY	DATE
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p>			
<p>BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008</p>			
	DESIGNED	D. FORSTIE	7/2012
	DRAWN	M. LAKOVICH	7/2012
	CHECKED	J. MINCH	7/2012
	BY		DATE
DRAWING NO.		FLOOD ZONE MAPS	
		SHEET OF 5 7	



NOTE:
FOR DETAILED TOPOGRAPHIC
MAPPING, SEE THE AS-BUILT
PLANS.

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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
		BY	DATE
		D. FORSTIE	7/2012
		M. LAKOVICH	7/2012
		J. MINCH	7/2012
			
		WOOD/PATEL PHOENIX • MESA • TUCSON <small>3041 W. Northern Ave. Phoenix, AZ 85021 (602) 328-6500</small>	
DRAWING NO.	FLOOD ZONE MAPS		SHEET OF 6 7



NOTE:
FOR DETAILED TOPOGRAPHIC MAPPING, SEE THE AS-BUILT PLANS.

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NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BETHANY HOME OUTFALL CHANNEL LOMR SUBMITTAL PCN 620.03.33, FCD NO. 2012C008			
		BY	DATE
		D. FORSTIE	7/2012
		M. LAKOVICH	7/2012
		J. MINCH	7/2012
			
		WOOD/PATEL MISSION: CLIENT SERVICE™ <small>PHOENIX • MESA • TUCSON 2061 W. NORTHWEST AVE. PHOENIX, AZ 85021 (602) 300-1500</small>	
DRAWING NO.	FLOOD ZONE MAPS		SHEET OF 7 7

6.0 EROSION AND SEDIMENT TRANSPORT

The erosion analysis performed as part of the approved CLOMR remains valid in the now constructed project. This analysis is provided within the CLOMR in Appendix B. Sediment transport modeling was not performed as part of this study.

7.0 DRAFT FIS REPORT DATA

7.1 Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs)			
		10-Year	50-Year	100-Year	500-Year
Bethany Home Outfall Channel					
New River Confluence at the Bethany Home Road alignment	47	-- ¹	-- ¹	4,228	-- ¹
99 th Ave at the Grand Canal	47	-- ¹	-- ¹	4,225	-- ¹
Agua Fria Freeway (101L) at the Grand Canal	46	-- ¹	-- ¹	4,200	-- ¹
91 st Avenue at the Grand Canal	31	-- ¹	-- ¹	3,048	-- ¹
83 rd Avenue at the Grand Canal	24	-- ¹	-- ¹	2,240	-- ¹
Camelback Road at the Grand Canal	14	-- ¹	-- ¹	1,528	-- ¹
Indian School Road at the Grand Canal	7	-- ¹	-- ¹	214	-- ¹

--¹ – Not computed

The peak discharges in the table above are based on the unsteady HEC-RAS hydrograph routing maximum peak discharge at the noted locations.

7.2 Floodway Data

This LOMR defines the project Zone A floodplain, thus no floodway data is defined.

7.3 Annotated Flood Insurance Rate Maps

Annotated flood insurance rate maps (FIRM) were developed and are provided in Exhibit 3.

7.4 Flood Profiles

This LOMR defines Zone A floodplain, thus no flood profiles were generated.

APPENDIX A
REFERENCES

1. DMJM Harris, "Bethany Home Outfall Channel FCD Contract No. 98-46 Technical Data Notebook Conditional Letter of Map Revision (CLOMR)," Volume 1 &2, January 2003
2. Arizona Department of Water Resources, "State Standard 1 Instructions for Organizing and Submitting Technical Support Data Notebooks for Flood Studies," August 2012.
3. Arizona Department of Water Resources, Flood Warning and Dam Safety Section, "Requirement for Floodplain and Floodway Delineation in Riverine Environments – State Standard 2-96," July 1996.
4. Arizona Department of Water Resources, Flood Warning and Dam Safety Section, "Requirement for Floodplain and Floodway Delineation in Riverine Environments – State Standard Attachment SSA2-96," July 1996.
5. Arizona Department of Water Resources, Flood Warning and Dam Safety Section, "Floodplain Hydraulic Modeling – State Standard 9-02," July 2002.
6. Chow, Ven Te, Ph.D., Open Channel Hydraulics, McGraw-Hill Book Company, New York-Toronto-London, 1959.
7. Federal Emergency Management Agency (FEMA), "Guidelines and Specifications for Flood Hazard Mapping Partners," April 2003.
8. Flood Control District of Maricopa County, "Drainage Design Manual for Maricopa County Volume I, Hydrology," January 1995.
9. Flood Control District of Maricopa County, "Drainage Design Manual for Maricopa County Volume II, Hydraulics," January 1996.
10. Flood Control District of Maricopa County, "Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona," Prepared by the U. S. Geological Survey, Water Resources Division, April 1991.
11. Flood Control District of Maricopa County, "Bethany Home/Grand Canal Flood Control Project, Pre-Design Study," Contract FCD No. 98-46, Prepared by DMJM+HARRIS, Inc., September 2000.
12. Kimely-Horn & Associates, "Glendale Area Stormwater Management Plan Hydrology Report, Volumes 1-3" February 2011.
13. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Computer Program," Version 4.1, January 2010.
14. U. S. Department of Transportation, Federal Highway Administration, "Hydraulic Design of Highway Culverts," Hydraulic Design Series No. 5, September, 1985.
15. U. S. Department of Transportation, Federal Highway Administration, "Hydraulic Design of Energy Dissipators for Culverts and Channels," Hydraulic Engineering Circular No. 14, September 1983.
16. Olsson & Associates, "Final Design Report Bethany Home/Grand Canal Flood Control Project, Bethany Home Outfall Channel – Reach D, 67th Avenue to Indian School Road," September 19, 2008

APPENDIX B

GENERAL DOCUMENTATION AND CORRESPONDENCE

B.1 – MEETING MINUTES

WOOD/PATEL

MEETING MINUTES

Date Prepared: June 11, 2012

MEETING DATE: June 7, 2012
1:30 p.m. – 3:30 p.m.

LOCATION: Wood, Patel & Associates

PROJECT: Bethany Home Outfall Channel Letter of Map Revision Application
Contract FCD 2012C008

WP PROJ. #: 123808.02

SUBJECT: Kick-Off Meeting

ATTENDEES: Jeff Shelton, Richard Waskowsky (FCDMC); Jeff Minch, Darren Forstie (Wood/Patel)

The following meeting minutes set forth our understanding of the discussions and decisions made at this meeting. If you have any questions, additions, or comments please contact the author immediately at (602) 335-8500. If we do not hear from you within 10 days, we will assume that our understandings are the same. We are proceeding based upon the contents of these meeting minutes.

Prepared by: Darren Forstie

Action items are noted in bold italics.

The purpose of this meeting was to kick-off the project and discuss project goals and opportunities.

I. INTRODUCTIONS

The meeting attendees made self-introductions.

II. PROJECT SCHEDULE

A. Changes to the schedule were discussed. The following schedule tasks were updated based on discussion:

- Task 1 – Coordination
- Task 6 – Hydrology
- Task 8 – Digital Date
- Task 9 – District/FEMA Submittal

The updated schedule is attached.

III. PROJECT OVERVIEW

A. Scope of Work

- Public Involvement: District noted public involvement is ongoing and provided Wood/Patel with a draft public study notification letter. The District will also be preparing the legal advertisement for the study.
- Data Collection: *District to provide available Design Reports and digital hydrology and hydraulic data for Reach C.* (District provided this data on 6/8/12)

B. Hydrology

- Surface Flow Routing: *Wood/Patel to evaluate the HEC-1 model routing at 75th Avenue.*
- Hydrographs Combine: Wood/Patel to reconfigure the HEC-1 model to more accurately combine the hydrographs at 75th Avenue. *Wood/Patel will review the hydrology in the Design Report for Reach C.*
- “Worst Case” Discharge: Wood/Patel confirmed with the District that the higher of the 100-year, 6-hour or 24-hour discharge will be used for the hydraulic modeling.
- Sunset Basin: *Wood/Patel to model the asbuilt conditions of this basin in the HEC-1 model.* The District mentioned the Design Report for Reach D developed a hydrologic model that incorporated the Sunset Basin outfall. This hydrology accounts for the basin updated stage storage relationship and the outlet geometry.
- Camelback Storm Drain: *Wood/Patel to evaluate the Pre-Design diversions vs. the Future Conditions Camelback Storm Drain Diversions for the Glendale Storm Water Master Plan.*

C. Floodplain Delineation & Mapping Topography

- Floodplain Mapping Topo: Discussion took place regarding the mapping to be displayed on the workmaps. The approach agreed upon is as follows. The existing ground mapping developed for the BHOC design project will be used for the existing ground outside the BHOC channel. Within the BHOC channel, the design contours will be used as the asbuilt contours as long as the asbuilt closely matches the design. Re-evaluation of this approach will occur during the floodplain delineation phase.
- Discussion occurred regarding if floodplain mapping of the ponding at drainage inlets should be done. If the BHOC channel contains the 100-year flow, the District may prefer to not delineate floodplain at the drainage inlets. If the BHOC channel does not contain the 100-year flow, the District may prefer to delineate floodplain at the drainage inlets. However, it was agreed to evaluate this further during the floodplain mapping phase.

D. Asbuilt Conditions

- Sunset Basin: No new discussion.
- Inlet Design & Locations: The District discussed different inlets & locations observed in the field.

IV. PROJECT ADMINISTRATION

- A. Project lines of communication: All correspondence should include Jeff Minch, Jeff Shelton, and Richard Waskowsky.
- B. Next Project Meeting: Meeting scheduled for June 28, 2012 at Wood/Patel.

V. OTHER ISSUES

None

If you have any corrections or additions to the minutes of this meeting, please contact Jeff Minch by email jminch@woodpatel.com or phone at (602) 335-8577.

Distribution: Attendees, Project file

Attachments: Meeting Agenda, Updated Project Schedule, Draft Study Notification Letter

W:\2012Projects\123818.02_BHOC_LOMR\Project Support\Admin\Meetings\123818.02 Kick-Off Meeting Minutes.doc

AGENDA

Bethany Home Outfall Channel Letter of Map Revision Application

Project Kickoff Meeting

Wood, Patel & Associates, Thunderbird Conf Room (1:30 to 2:30 p.m.)

Contract FCD 2012C008

June 7, 2012

I. INTRODUCTIONS

- A. FCDMC Project Team
- B. Consultant Team: Wood, Patel & Associates, Inc.

II. PROJECT SCHEDULE

- A. Review of Updated Draft Project Schedule
 - Hydrologic Submittal & Concurrence
 - Floodplain Progress Submittal
 - Pre-Final Submittal
 - Final Deliverables

III. PROJECT OVERVIEW

- A. Scope of Work
 - Public Involvement (District)
 - Data Collection (current progress)
- B. Hydrology
 - Surface Flow Routing
 - Hydrographs Combine
 - "Worst Case" Discharges
- C. Floodplain Delineation & Mapping Topography
 - Floodplain Mapping Topo
- D. Asbuilt Conditions
 - Sunset Basin
 - Inlet Design & Locations?

IV. PROJECT ADMINISTRATION

- A. Project lines of communication
- B. Next Project Meeting

V. OTHER ISSUES

BHOC LOMR Project Schedule

					2012				
Task	Duration	Start	Finish	% Complete	May	June	July	August	September
Notice to Proceed	1 day	5/21/12	5/21/12	100%	▽				
Project Kick-off Meeting	1 day	6/7/12	6/7/12	100%		▽			
Task 1 - Coordination	52 days	6/28/12	8/18/12	25%			◇	◇	◇
Task 2 - Public Involvement - (FCDMC)	102 days	5/21/12	8/31/12	25%	■				
Task 3 - Data Collection	26 days	5/21/12	6/15/12	75%	■				
Task 4 - Topographic Mapping	1 day	4/23/12	4/23/12	100%					
Task 5 - Field Survey (OPTIONAL)									
Task 6 - Hydrology *	32 days	5/29/12	6/29/12	10%	■		★		
District Hydrologic Concurrence	8 days	6/29/12	7/6/12	0%			■		
Task 7 - Floodplain Delineation	50 days	6/29/12	8/17/12	0%			■		★
Floodplain Progress Submittal to District (GIS)	1 day	7/27/12	7/27/12	0%				▽	
Pre-Final Submittal to District (Entire TDN)	1 day	8/17/12	8/17/12	0%					▽
Task 8 - Digital Data	1 day	8/29/12	8/29/12	0%					▽
Task 9 - District/FEMA Submittal (Final Deliverables)	1 days	8/29/12	8/29/12	0%					▽

Legend

- ▽ One Time Occurrence
- ◇ Recurring Task
- Task By Wood/Patel
- Task By Others
- ★ Project Milestone
- * Critical Task



Flood Control District of Maricopa County

Board of Directors
Fulton Brock, District 1
Don Stapely, 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

Vea el reverso de la página para la traducción en española

June 28, 2012

Re: 5577 N 78TH DR, Parcel Number 10207456

Dear Resident:

For more than 50 years, the Flood Control District of Maricopa County (District) has provided regional flood control services to County residents to reduce their risks of injury, death, and property damage from flooding. In continuing that effort the District has contracted with Wood, Patel & Associates, Inc. to draw a more precise floodplain along the Grand Canal and Bethany Home Outfall Channel (BHOC) between 63rd Avenue and 83rd Avenue in the cities of Glendale and Phoenix. The delineation re-study will revise the floodplain boundaries which are used by the Federal Emergency Management Agency (FEMA) to determine flood insurance rates.

Based on Maricopa County Assessor's Office records your property at the address above is either located in or near the existing floodplain in this area.

The BHOC was a collaborative effort between the District, Arizona Department of Transportation (ADOT), City of Phoenix, and City of Glendale to reduce flooding hazards along the north side of the Grand Canal in the Sunset Knoll and Holiday Park neighborhoods of west Phoenix and the Missouri Park neighborhood of south Glendale. The project was planned to be built in six phases, and includes grass and concrete-lined channels, box culverts, bridges, stormwater detention basins, and underground storm drain systems. Five of the six phases were completed between 2000 and 2011. The last phase to be constructed is the Bethany Home Road (from 79th to 59th avenues) storm drain. Due to current funding constraints the Bethany Home Road storm drain design and construction schedule is delayed for an extended period of time.

This floodplain delineation study will allow some residents to enjoy the flood hazard reduction benefits of the BHOC project now while the Bethany Home Road storm drain is delayed. The results of this study may not remove the entire flooding hazard as planned with the original BHOC project design. The full flood protection benefits will be realized when the last phase of the project is completed. There may be a need to re-delineate this floodplain again after the Bethany Home Road storm drain is built.

This letter is intended to inform you of the start of this study. You also have an opportunity to participate in the study by informing the District of local flooding problems in the area.

If you wish to receive floodplain information for your parcel(s), report flooding issues, or have any general questions regarding the study, please contact Jeff Shelton at the contact information below.

Jeff Shelton, P.E., Senior Civil Engineer
Direct: (602) 506-4486
FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

Estimado Propietario:

Por más de cincuenta años, Flood Control District of Maricopa County (Distrito) ha proveído servicios regionales de control de inundaciones a los residentes del Condado para reducir sus riesgos de lesiones, muerte y daños de propiedad debido a inundaciones. Para continuar con este esfuerzo, el Distrito ha contratado a Wood, Patel & Associates, Inc. para delinear un área de inundación más preciso a lo largo del Gran Canal y el Bethany Home Outfall Channel (BHOC) entre las Avenidas 63 y 83 en las ciudades de Glendale y Phoenix. El nuevo estudio de delineación revisará los límites de las áreas de inundación que fueron usados por la Federal Emergency Management Agency (FEMA) para determinar las tarifas de seguro para inundaciones.

Basados en los registros del Maricopa County Assessor's Office, su propiedad se encuentra ubicada en o cerca de la delineación de la zona de inundación existente en este área.

El BHOC fue un esfuerzo de colaboración entre el Distrito, el Arizona Department of Transportation (ADOT), la Ciudad de Phoenix y la Ciudad de Glendale para reducir el peligro de inundaciones a lo largo del lado norte del Gran Canal en los vecindarios de Sunset Knoll y Holiday Park en el oeste de Phoenix y el vecindario de Missouri Park en el sur de Glendale. El proyecto se había planeado para ser construido en seis fases e incluye canales forrados de pasto y concreto, alcantarillado de cajón, puentes, pozas de detención para agua de tormentas y sistemas de drenaje subterráneos de inundaciones. Cinco de las seis fases fueron terminadas entre 2000 y 2011. La última fase para ser construida es el alcantarillado de Bethany Home Road (de la Avenida 79 a la Avenida 59). Debido a las limitaciones de financiamiento actuales el diseño y construcción del alcantarillado para tormenta de la Bethany Home Road se ha retrasado por un largo periodo de tiempo.

Este estudio de delineación de zonas de inundación permitirá a algunos residentes disfrutar ahora los beneficios de reducción de peligros de inundaciones del proyecto BHOC mientras el proyecto de alcantarillado de Bethany Home Road es retrasado. Los resultados de este estudio tal vez no eliminen totalmente el peligro de inundaciones como se planeaba con el diseño del proyecto BHOC original. La protección completa contra inundaciones será realizada cuando la última fase del proyecto sea terminada. Tal vez haya la necesidad de nuevamente delinear esta área de inundaciones después de que se construya el drenaje de alcantarillado de Bethany Home Road.

El propósito de esta carta es para informarle del comienzo de este estudio. También tiene usted la oportunidad de participar en el estudio informando al Distrito de problemas de inundaciones locales de su área.

Si desea usted recibir información acerca de la delineación de las áreas de inundación para su parcela, infórmenos acerca de problemas de inundación, o si tiene usted preguntas en general relacionadas con el Bethany Home Outfall Channel, por favor comuníquese con la persona que habla español cuyo nombre aparece al pie de página.

Ana Gorbenko
Floodplain Management and Services Division
Linea Directa: (602) 506-4696
Oficina: (602) 506-1501
ang@mail.maricopa.gov

WOOD/PATEL

MEETING MINUTES

Date Prepared: July 16, 2012

MEETING DATE: July 11, 2012
9:00 a.m. – 10:00 a.m.

LOCATION: Wood, Patel & Associates

PROJECT: Bethany Home Outfall Channel Letter of Map Revision Application
Contract FCD 2012C008

WP PROJ. #: 123808.02

SUBJECT: July Progress Meeting

ATTENDEES: Jeff Shelton, Richard Waskowsky (FCDMC); Jeff Minch, Darren Forstie (Wood/Patel)

The following meeting minutes set forth our understanding of the discussions and decisions made at this meeting. If you have any questions, additions, or comments please contact the author immediately at (602) 335-8500. If we do not hear from you within 10 days, we will assume that our understandings are the same. We are proceeding based upon the contents of these meeting minutes.

Prepared by: Darren Forstie

Action items are noted in bold italics.

The purpose of this meeting was to discuss project hydrology, hydraulics, and current progress.

I. PROJECT STATUS

- A. Data Collection: The data collection task is essentially complete. The District plans to review the Camelback Storm Drain as-built construction plans.
- B. Hydrology:
 - a. Comments Review – Wood/Patel concurred with the comments from the District and will revise the hydrologic models and spreadsheet per the comments. The comment resolution form is attached.
 - b. Flow Comparison – Some of the flows developed in the LOMR may be larger than the flows used in the BHOC CLOMR. Impacts of the higher flows will be evaluated during the hydraulic modeling phase.
 - c. Re-submit Model – Wood/Patel will re-submit the hydrologic models for the District's review and concurrence.
- C. Hydraulics
 - a. Culvert Routing vs. Lid – Wood/Patel will evaluate both options in HEC-RAS. Per the meeting discussions, the culvert routine method appears to be more appropriate for this project.
 - b. Weir Modeling Approach (Sunset Basin) – Wood/Patel will evaluate the Sunset Basin outfall system modeling prepared by Olsson Assoc. to determine if this modeling can be used in the BHOC LOMR hydraulics.

II. PROJECT SCHEDULE

- A. The project is on schedule. A draft hydraulic model submittal is schedule for July 27th. Wood/Patel will arrange a progress meeting to coincide with this submittal.

III. PROJECT ADMINISTRATION

No new discussion.

IV. OTHER ISSUES

None

V. ACTION ITEMS

Wood/Patel will review the HEC-1 schematic exhibits and request aerial and street line work from the District if needed.

If you have any corrections or additions to the minutes of this meeting, please contact Jeff Minch by email jminch@woodpatel.com or phone at (602) 335-8577.

Distribution: Attendees, Project file

Attachments: Meeting Agenda, Updated Project Schedule, Hydrology Comparison Table, Comment Resolution Spreadsheet, Sign-in sheet

W:\2012Projects\123818.02_BHOC_LOMR\Project Support\Admin\Meetings\123818.02 Progress Meeting Minutes_7.11.12.doc

WOOD/PATEL

DRAFT MEETING MINUTES

Date Prepared: July 30, 2012

MEETING DATE: July 30, 2012
10:00 a.m. – 12:00 p.m.

LOCATION: Wood, Patel & Associates

PROJECT: Bethany Home Outfall Channel Letter of Map Revision Application
Contract FCD 2012C008

WP PROJ. #: 123808.02

SUBJECT: Progress Meeting

ATTENDEES: Jeff Shelton, Richard Waskowsky (FCDMC); Jeff Minch, Darren Forstie (Wood/Patel)

The following meeting minutes set forth our understanding of the discussions and decisions made at this meeting. If you have any questions, additions, or comments please contact the author immediately at (602) 335-8500. If we do not hear from you within 10 days, we will assume that our understandings are the same. We are proceeding based upon the contents of these meeting minutes.

Prepared by: Darren Forstie

Action items are noted in bold italics.

The purpose of this meeting was to finalize project hydrology, discuss hydraulics and current progress.

I. PROJECT STATUS

- A. Data Collection: The asbuilt construction plans of the Bethany Home Road traffic interchange ramps at the SR101 are needed for the TDN and potentially the hydraulic modeling. **Wood/Patel will visit ADOT and obtain the asbuilt plans.** The 95th Avenue bridge over BHOC has been constructed subsequent to the BHOC asbuilt plans. **The District will contact the City of Glendale to obtain the 95th Avenue bridge asbuilts.** Wood/Patel noted they have obtained some of the BHOC Reach D digital base files which will be referenced into the workmaps. It was noted that the project mapping does not illustrate all improvements in the BHOC areas including the SR101 and on/off ramps. Mapping that reflects all the current improvement does not believe to exist.
- B. Hydrology:
- Comments Review – Wood/Patel concurred with comments 1 and 2 from the District and will revise the hydrologic models per the comments. The 3rd comment will be disregarded as agreed upon in this meeting.
 - Re-submit Final Model – **Wood/Patel will re-submit the hydrologic models to the District this week.**
- C. Hydraulics
- a. Capacity constraints & backwater impacts – Wood/Patel explained how the hydrologic flows are being applied to the hydraulic model, in a downstream to upstream fashion. The District agreed to this approach. Wood/Patel illustrated the breakout and backwater impacts due to higher flow than the system design flow at Camelback Road and BHOC. **Wood/Patel**

hydraulically modeled these higher flows and the resulting flow breakout and will further refine the breakout based on meeting discussions and provide the hydraulic model to the District.

- b. Sunset Basin Flood Delineation approach – Due to the backwater impacts from the Camelback Road and BHOC area, the Sunset Basin hydrology and hydraulics will be examined after the downstream breakout/spilt flow area is better resolved.

II. PROJECT SCHEDULE

- A. A TDN pre-final submittal is scheduled for August 17. Communication prior to the TDN submittal will be over the phone; specifically in regards to the hydraulic modeling.

III. PROJECT ADMINISTRATION

No new discussion.

IV. OTHER ISSUES

None

V. ACTION ITEMS

No further action items than already stated above.

If you have any corrections or additions to the minutes of this meeting, please contact Jeff Minch by email jminch@woodpatel.com or phone at (602) 335-8577.

Distribution: Attendees, Project file

Attachments: Meeting Agenda, Comment Resolution Spreadsheet, Sign-in sheet

W:\2012Projects\123818.02_BHOC_LOMR\Project Support\Admin\Meetings\123818.02 Progress Meeting Minutes_7.30.12.doc

AGENDA

**Bethany Home Outfall Channel
Letter of Map Revision Application**
Wood, Patel & Associates, Cactus Conference Room
2nd floor (10:00 to 12:00 p.m.)
Contract FCD 2012C008
July 30, 2012

I. PROJECT STATUS

- A. Data Collection
 - Bethany Home Road Traffic Interchange Ramps
 - 95th Ave Bridge
 - Reach D line work (grading, Sunset Basin outlet system)
 - Updated topographic mapping as a background to the work maps
- B. Hydrology
 - Comments Review (HC card areas)
 - Flow Comparison
 - Re-submit Final Model
- C. Hydraulics
 - Capacity constraints & backwater impacts
 - Sunset Basin Flood Delineation approach
- D. Work Maps
 - Level of detail (include alignment, grading, etc.?)

II. PROJECT SCHEDULE

- A. Next Submittal – 8/17 TDN Pre-Final Submittal
- B. Next Meeting - TBD

III. PROJECT ADMINISTRATION

IV. OTHER ISSUES

V. ACTION ITEMS

Hydrologic Submittal Review Comments

Line No.	Reviewer	Sht/Pg/Item	Drawing No.	Code	Comment	Response
1	Jeff Shelton/Richard Waskowsky	HEC-1 Comment	NA	A	At the top of the models, the the description of Wood Patel's revisions says, "The new HC card areas are from the BHOC Reach D HEC-1 model (BHGC07.dat)." This needs to be corrected to say that the HC card areas are from the GASWP future model.	
2	Jeff Shelton/Richard Waskowsky	HEC-1 Comment	NA	A	At concentration point CBH91, the HC card area should be 30.45 sq. miles rather than 30.54 sq. miles for both the 6 and 24 hour models. The 30.45 number is from the Glendale Area SWMP report tables. The Glendale Area WMP models also have 30.54 sq. miles. It is assumed that there was a typo between the Glendale Area SWMP report and models.	
3	Jeff Shelton/Richard Waskowsky	HEC-1 Comment	NA	D	At CP67IS, it is recommended to use 13% of the area from CGC67 in addition to the 10% of the area from CISGC. The 13% is calculated by the ratio of 120 cfs (diverted) to the 939 cfs (6-hour peak) at CGC67. Please update the models and the Areas Contributing to Combination Points for Areal Reduction table.	Per the agreement from the 7/30/12 progress meeting with the District, no action is recommended on this comment.

A - Will Revise
 B - Consultant to Evaluate
 C - FCDMC/Agencies to Evaluate
 D - Recommend No Further Action
 E - General comment no response required



BHOC LOMR Application
63th Avenue to New River
Contract FCD 2012C008

Progress Meeting
Date: Monday, July 30, 2012, 10:00 - 12:00 pm
Location: Wood/Patel

Meeting Sign in Sheet

<u>Present</u>	<u>Name</u>	<u>Organization</u>	<u>Phone</u>	<u>Email</u>
Agency Representatives				
<i>JS</i>	Jeff Shelton	Flood Control District of Maricopa County (FCDMC)	602-506-1501	jefferyshelton@mail.maricopa.gov
<i>RMW</i>	Richard Waskowsky	Flood Control District of Maricopa County (FCDMC)	602-506-4113	rmw@mail.maricopa.gov
Consultant Team				
<i>JMinch</i>	Jeff Minch	Wood/Patel	602-335-8577	jminch@woodpatel.com
<i>DF</i>	Darren Forstie	Wood/Patel	602-335-8577	dforstie@woodpatel.com

B.2 – CLOMR AND APPROVAL LETTER

(CLOMR is provided in Exhibit 4 CD)



Federal Emergency Management Agency

Washington, D.C. 20472

JAN 06 2004

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 03-09-0640R

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

Community: Maricopa County, AZ
Community No.: 040037

104

Dear Mr. Brock:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) comment on the effects that a proposed project would have on the effective Flood Insurance Rate Map (FIRM) 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 March 5, 2003, Mr. Michael Duncan, P.E., CFM, Senior Civil Engineer, Flood Delineation Branch, Flood Control District of Maricopa County, requested that FEMA evaluate the effects that an updated detailed hydrologic analysis, updated detailed and approximate hydraulic analyses, updated topographic information, and the proposed Bethany Home Outfall Channel (BHOC) project along the north and east side of Grand Canal from the confluence with the New River to 63rd Avenue would have on the flood hazard information shown on the effective FIRM and FIS report. The BHOC project includes an existing concrete-lined trapezoidal channel that runs parallel to Grand Canal from the New River to the Agua Fria Freeway (Loop 101) and the existing Sunset Detention Basin at the intersection of Indian School Road and 64th Avenue. Proposed project elements will include channelization from the Agua Fria Freeway to approximately 600 feet upstream of 83rd Avenue; a concrete-lined rectangular channel from just upstream to approximately 1,200 feet upstream of Camelback Road; concrete box culverts; conveyance facilities; storm drains; an offline detention basin at 87th Avenue; and the Maryvale Detention Basin at 67th Avenue.

All data required to complete our review of this request for a Conditional Letter of Map Revision (CLOMR) were submitted with letters from Mr. Jeffrey R. Minch, P.E, Project Manager, DMJM+Harris, and Mr. Duncan.

Because this revision request also affects the Cities of Glendale and Phoenix, separate CLOMRs for those communities were 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, dated January 17, 2003, 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 on the drawings entitled "Bethany Home Outfall Channel SR 101L to 83RD Avenue," dated September 2002, and "Bethany Home Outfall Channel, Phase II," dated December 2002, and as described in the submitted Technical Data Notebook entitled "Bethany Home Outfall Channel, Conditional Letter of Map Revision," Volumes I and II, dated January 2003, all prepared by DMJM+Harris, and the data listed below are received, a revision to the FIRM would be warranted.

As a result of the proposed project, Special Flood Hazard Areas (SFHAs), areas that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), will be

added along Grand Canal from approximately 200 feet upstream of 99th Avenue to approximately 100 feet upstream of 91st 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.

- 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 conceptual 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, together with a topographic work map showing the revised floodplain boundaries, must be submitted with Form 2.

- Effective September 1, 2002, 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 \$3,800 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. The payment must be forwarded to the following address:

Federal Emergency Management Agency
 Fee-Charge System Administrator
 P.O. Box 3173
 Merrifield, VA 22116-3173

- As-built plans, certified by a registered professional engineer, of all proposed project elements
- Community acknowledgment of the map revision request
- An officially adopted maintenance and operation plan for the detention basins. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.

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 culverts 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, Federal Insurance and Mitigation Division of FEMA in Oakland, California, at (510) 627-7103. 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,

MHL to Lynn

Max H. Yuan, P.E., Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

Enclosures

cc: The Honorable Elaine Scruggs
Mayor, City of Glendale

The Honorable Skip Rinasza
Mayor, City of Phoenix

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

Mr. Larry Broyles, P.E.
City Engineer
City of Glendale

Hasan Mushtaq, Ph.D., P.E., CFM
Floodplain Manager
Street Transportation Department
City of Phoenix

Ms. Shanna Yager
Principal
Floodplain Administration
Flood Control District of Maricopa County

Ms. Lynn M. Thomas, P.E.
Branch Manager
Floodplain Management
Flood Control District of Maricopa County

Mr. Michael Duncan, P.E., CFM
Senior Civil Engineer
Flood Delineation Branch
Flood Control District of Maricopa County

Mr. Brian Cosson
NFIP Coordinator
Arizona Department of Water Resources

B.3 – OTHER DOCUMENTATION

To: Darren Forstie; Jeff Minch
Subject: FW: BHOC LOMR - Status Update

Include in TDN

From: Jeffery Shelton - FCDX
Sent: Tuesday, August 14, 2012 8:47 AM
To: 'Rodzenko, Greg'; Michael Duncan - FCDX; Hasan Mushtaq (hasan.mushtaq@phoenix.gov)
Cc: Amir Motamedi - FCDX; Richard M. Waskowsky - FCDX
Subject: RE: BHOC LOMR - Status Update

The difference was about 8 feet, but that's still a bunch. The differential has been eliminated because we are effectively using an unsteady HEC-RAS model to replace the BHOC step calculations in the HEC-1 model. This is fair because they are both using the same hydrographs. The elevation in Maryvale Basin now is around 1093. HEC-1 being a series of discrete calculations can produce unrealistic, disconnected results. HEC-RAS, on the other hand, connects the system through back waster calculations. The first steady state HEC-RAS was using unrealistic results from the BHOC step calculations in HEC-1.

Jeff

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

From: Rodzenko, Greg [<mailto:GRodzenko@GLENDALEAZ.com>]
Sent: Monday, August 13, 2012 6:01 PM
To: Jeffery Shelton - FCDX; Michael Duncan - FCDX; Hasan Mushtaq (hasan.mushtaq@phoenix.gov)
Cc: Amir Motamedi - FCDX; Richard M. Waskowsky - FCDX
Subject: RE: BHOC LOMR - Status Update

....and so what kind of a differential in elevation is showing up now? For a relatively small amount of water (this isn't the Yukon River), 12' is a bunch.....

Greg

Greg Rodzenko P.E.

Acting City Engineer
5850 W. Glendale Ave.
Glendale, AZ 85301
623-930-3623
grodzenko@glendaleaz.com

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Monday, August 13, 2012 2:04 PM
To: Michael Duncan - FCDX; Hasan Mushtaq (hasan.mushtaq@phoenix.gov); Rodzenko, Greg
Cc: Amir Motamedi - FCDX; Richard M. Waskowsky - FCDX
Subject: BHOC LOMR - Status Update

Mike, Hasan and Greg,

For BHOC LOMR we have the hydrology updated and complete and are using an unsteady state HEC-RAS model for the floodplain modeling. It looks like we might have containment most everywhere. We are also looking into mapping floodplains from the inlets along the long culvert.

The first draft hydraulics model was a steady state HEC-RAS model. It had quite a lot of back water from the long culvert between 75th and 83rd Avenues. The water surface elevation calculated from that model produced an elevation in the Maryvale Basin of around 1095. The HEC-1 routing through the same basin produced a water surface of around 1087. Richard and had some issues with that large of a difference. He produced an unsteady HEC-RAS model that showed some promising results. We gave it to the consultant, and that is what we are going with now. Actually, I am reviewing their refined version right now. We should be able to meet our scheduled goal of having a pre-final Technical Data Notebook submittal by this Friday if I can give them feedback on this model by the end of the day.

Thanks,
Jeff

Darren Forstie

From: Jeffery Shelton - FCDX <JefferyShelton@mail.maricopa.gov>
Sent: Wednesday, August 15, 2012 3:41 PM
To: Hasan Mushtaq (hasan.mushtaq@phoenix.gov); Greg Rodzenko (grodzenko@glendaleaz.com)
Cc: Jeff Minch; Darren Forstie; Richard M. Waskowsky - FCDX; Amir Motamedi - FCDX
Subject: BHOC LOMR - Operations and Maintenance Documents for FEMA
Attachments: BHOC-IntergovernmentalAgreement.pdf

Greg and Hasan,

In order to satisfy one of the stipulations of the CLOMR FEMA approved for BHOC we need documents that contain the following information.

“An officially adopted maintenance and operation plan for the detention basins. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished.”

I had intended to use the BHOC IGA for this purpose, and I may still. It, more or less, meets the criteria. It does not explicitly name the community official who will be responsible for O and M activities. My question for both of you is do you have any documentation that would better meet FEMA’s criteria? I have attached the BHOC LOMR for your information. The highlighted sections are most relevant.

Thanks,
Jeff

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

To: Darren Forstie; Jeff Minch
Subject: FW: BHOC LOMR Progress Submittal

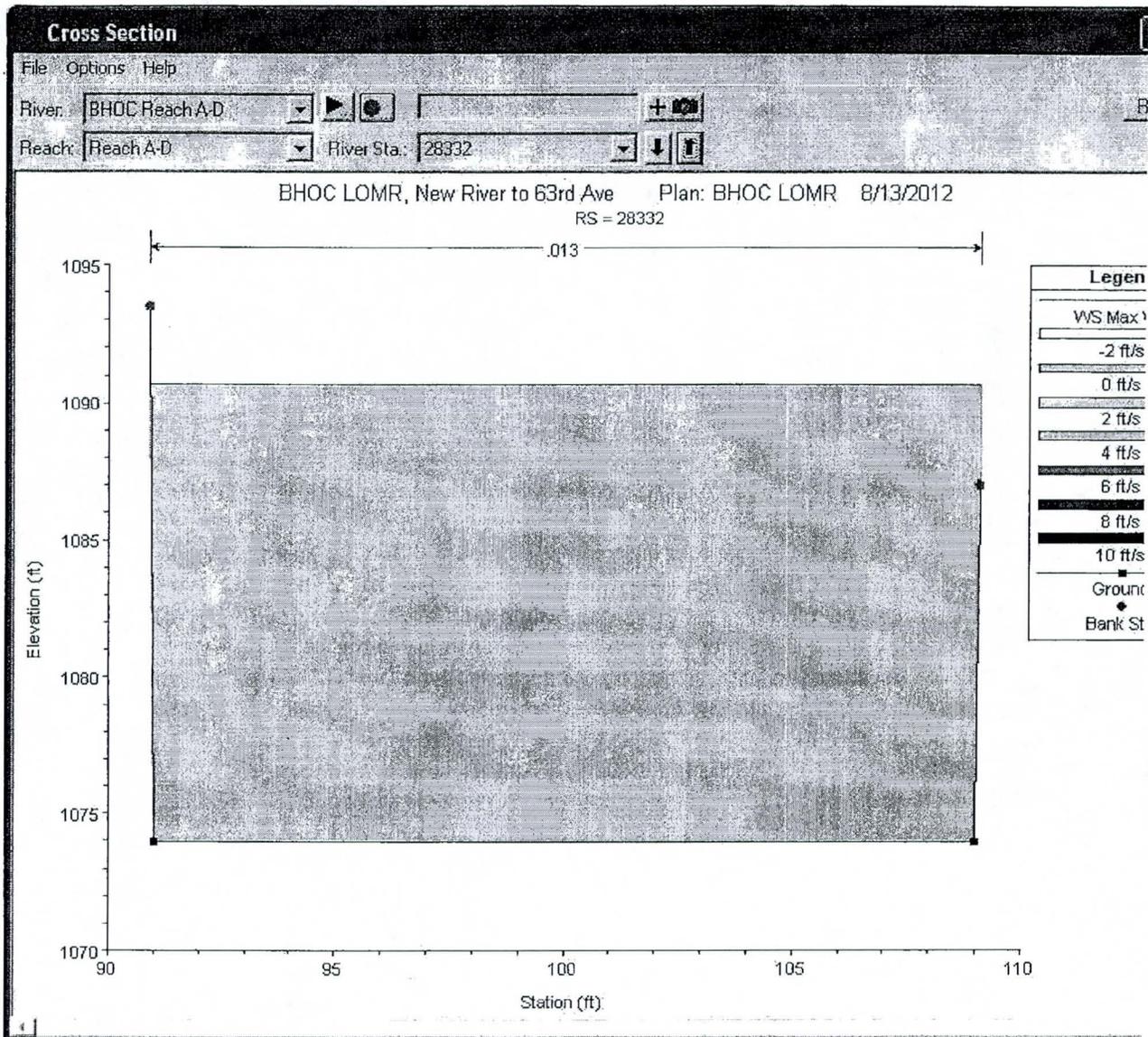
Include in TDN.

From: Jeffery Shelton - FCDX
Sent: Tuesday, August 14, 2012 10:05 AM
To: 'Jeff Minch'; Darren Forstie (dforstie@woodpatel.com)
Cc: Richard M. Waskowsky - FCDX; Gabriela Griffin; Amir Motamedi - FCDX
Subject: RE: BHOC LOMR Progress Submittal

Jeff and Darren,

Richard and I have consolidated our input for the progress submittal. I have listed our suggestions below.

1. Put a note in the HEC-1 model at each computation point that has an input hydrograph for the unsteady HEC-RAS model. The note should read something to the effect of, "The hydrograph at the computation point was extracted and routed through unsteady HEC-RAS model xxxxx.pj. This HEC-RAS model extends from 67th Avenue to the Agua Fria River and was sent to FEMA to remap the floodplain along the Bethany Home Outfall Channel."
2. Wood/Patel notes such as this one, "added combination on 06/12 and split Route RWGC83 into two routes called RWG83A and RWG83B. The route lengths were divided equally" after NUL75 need to be removed along where BHOC computation steps use to be.
3. I think it would be a good idea to call out the HEC-1 inflow station ID's in the HEC-RAS cross section description boxes.
4. Add right overbank for 28332 to meet ground. Use ineffective flow area for this overbank. This will show containment.



5. The unsteady model now runs much better. However, the water surface profile upstream of 75th Ave and Camelback appears strange at time August 2 0720. It would be good if the possible instability could be removed. However, the model runs well with only four iteration warnings and the output hydrographs do not show instabilities. Therefore, if the profile at 0720 can't be corrected, the model should be okay.
6. The interpolated cross sections between 4691 and 4801 get a little weird with the baffle block climbing up the side slope. Maybe cutting the baffle block at XS station 130.26 would fix it.

Other Guidance:

We've discussed or email two other issues that I can recall. First, the discharge table and Floodway Data table for the TDN. I thought the discharge table might be an issue because initially I thought we might keep the HEC-1 model with BHOC routings included. Darren and I were discussing this. Now, I think the HEC-1 as submitted will work and is easier to understand with a few more notes of course. I don't believe we will be doing a Floodway Data Table. Richard and I have discussed it and think that all the floodplains should be Zone A. Second, we would like to recalculate two inlets between 75th and 83rd Avenues. The Reach C design

Darren Forstie

From: Jeffery Shelton - FCDX <JefferyShelton@mail.maricopa.gov>
Sent: Wednesday, August 01, 2012 5:59 PM
To: Darren Forstie; Richard M. Waskowsky - FCDX
Cc: Jeff Minch; 123818.02 FCDMC On-Call Bethany Outfall Channel - LOMR
Subject: RE: BHOCLOMR, volume check of breakout

Hi Darren,

We've been working on some different approaches. Richard has developed an unsteady HEC-RAS that he will send you in the morning. I think this would be a good time to discuss things over the phone. If you are available, we would like to give you a call around 9:00 or 9:30 to go over what we both have. Let me know if one of those times works for you or not.

Thanks,
Jeff

From: Darren Forstie [<mailto:dforstie@WoodPatel.com>]
Sent: Wednesday, August 01, 2012 5:03 PM
To: Jeffery Shelton - FCDX; Richard M. Waskowsky - FCDX
Cc: Jeff Minch; 123818.02 FCDMC On-Call Bethany Outfall Channel - LOMR
Subject: RE: BHOCLOMR, volume check of breakout

See attached for latest progress.

I developed a HEC-RAS reach for the park segment west of 75th Ave in order to develop a breakout rating curve to be used in RAS. It turns out that backwater impacts within the park segment appear to influence the weir breakout in the main RAS model.

Additional storage volume is created within the Maryvale segment with the higher and deeper flows. I ran multiple profiles to generate a storage rating curve and updated SRGC75 in HEC-1. This lowered the flows somewhat. The attached HEC-1 also includes the updates made to diversion DWGC83 per last email.

So currently, the high W.S.E. within the Maryvale basin is approx. 1096.5. I believe we are stuck more or less with this wse. Therefore, I believe my next step is to revise the HEC-1 model rating curve for Sunset Basin. Any thoughts?

Please call if you wish to discuss further or need more info.

Thanks.
Darren

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Tuesday, July 31, 2012 3:57 PM
To: Darren Forstie
Cc: Jeff Minch; 123818.02 FCDMC On-Call Bethany Outfall Channel - LOMR
Subject: RE: BHOCLOMR, volume check of breakout

OK, thanks.

From: Darren Forstie [<mailto:dforstie@WoodPatel.com>]
Sent: Tuesday, July 31, 2012 3:53 PM
To: Jeffery Shelton - FCDX
Cc: Jeff Minch; 123818.02 FCDMC On-Call Bethany Outfall Channel - LOMR
Subject: BHOC LOMR, volume check of breakout

Jeff, Richard,

I did the volume check of the park diversion at 75th Ave & Camelback Road. See attached 24-hr HEC-1 model.

Park diversion is DNPARK.

So based on a 300cfs flow diversion, it appears the volume is roughly 260 ac-ft.

This volume is very large considering the Maryvale Basin reach has a volume of roughly 110 ac-ft at full capacity.

Therefore, it appears we need to address the breakout flow as a flow vs. a volume.

Please let me know if you find a different result.

Thanks.

Darren Forstie, P.E., CFM, Project Engineer
Wood/Patel – *Mission: Client Service*TM
Direct: (602) 335-8516 / Office: (602) 335-8500
Email: dforstie@woodpatel.com

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The Best of Arizona Business
ARIZONA



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Darren Forstie

From: Jeffery Shelton - FCDX <JefferyShelton@mail.maricopa.gov>
Sent: Tuesday, July 31, 2012 1:27 PM
To: Darren Forstie
Cc: Jeff Minch; Richard M. Waskowsky - FCDX; Amir Motamedi - FCDX
Subject: BHOC LOMR - Hydrology Revision Upstream of 75th Ave.
Attachments: Sfms904012073112470.pdf

Darren,

Richard and I have been looking at hydrology trying to understand how a 1000 cfs arrives just west of 75th Ave. We are thinking that diversion DWGC83 should be put back to the split that was calculated in GASWMP. I've attached a sketch for reference. This makes sense for a few reasons. First, RWG83C, which routes flow across 75th Ave. is a 50 ROW routing. The discharge is about 1125 cfs. In reality, all of the flow in the streets in this area will be carrying some depth of flow less than a foot. The split make sense because the flow is more distributed. Second, I don't see how Camelback is a barrier keeping DWGC83 from splitting flow to basin SRGC75 south of Camelback.

Bringing DWGC83 back will bring more water to basin SRGC75. That basin currently has a calculated water surface in HEC-1 of about 1086.75. Our HEC-RAS model suggests that the WSE in that basin should be around 1095 from a back water calculation. I assume basin SRGC75 was sized to include this split. At any rate, if the split is not valid, there is a rather large disconnect at the basin that needs to worked on.

I'll give you a call to discuss.

Thanks,
Jeff

From: dob@mail.maricopa.gov [<mailto:dob@mail.maricopa.gov>]
Sent: Tuesday, July 31, 2012 12:47 PM
To: Jeffery Shelton - FCDX
Subject: Message from fms9040

Darren Forstie

From: Jeffery Shelton - FCDX <JefferyShelton@mail.maricopa.gov>
Sent: Thursday, May 24, 2012 6:29 PM
To: Jeff Minch; Darren Forstie
Cc: Richard M. Waskowsky - FCDX
Subject: BHOC LOMR - Data Review

Jeff and Darren,

There are hand written notes of the as-built differences on the disk I dropped off today. Those notes don't capture the changes that occurred between the CLOMR report and the design plans. Below is a list of the differences between the HEC-RAS model in the CLOMR and the HEC-RAS model we need to create.

Changes that need to be made to the HEC-RAS model:

Reach C – change 2-12'x8' CB to 2-9'x9' CB per as-builts/plans (Camelback to Bethany Home Rd.)
Reach C – change 2-8'x7' CB to 2-102" RCP per as-builts/plans (at 75th Ave.)
Reach D – change 8'x7' CB to 3-60" RCP (Sunset Basin outlet to just north of Indian School Rd.)
Reach D – change 8'x7' CB to 1-96" RCP (just north of Indian School Rd. to basin west of 67th Ave.)
Reach D - discuss including junction weir at 67th Ave. The 96' RCP slopes back to Sunset basin from 67th Ave. The weir is a grade break of sorts.

Changes that need to be made to the HEC-1 models:

The models we will use as base models from the Glendale Area Stormwater Management Plan are: MV6E100.DAT and MV24E100.DAT.

The Scope of Work includes modifying these models to include the Camelback Road storm drain from the future conditions model in the same report and analyzing the modeling for 75th Avenue. In addition to that we need to replace the stage, storage, discharge, and some routing cards for Sunset Basin. The model we are copying from is from the Final Design Report for Reach D (also on the disk I dropped off today). These are the HEC-1 ID's to switch: Replace SRISGC with PA63 and RDC1B from BHGC00D7.DAT.

I need to investigate the future conditions models from the Glendale Area Stormwater Management Plan next week. I will likely contact Darren next week and send an email of what I've found.

Thanks,
Jeff

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

File

Agenda Activity	Action	Agenda Number	C-69-03-019-2-00
Department	Flood Control District		
Category	Flood Control District		
Contact	Scott Vogel	Phone 602-506-4771	Continued from
Return to	Wanett Maxwell	Phone 602-506-4433	
Location	FLOOD CONTROL OFFICE BLDG		

Action Requested:

Approve intergovernmental agreement (IGA) FCD 2002A003 among the Flood Control District of Maricopa County (District), the City of Glendale (Glendale), and the City of Phoenix (Phoenix) for cost sharing the construction and construction management, and for operation and maintenance of the Bethany Home Outfall Channel Project, Phase II, (Project) (Project 620 - Maryvale ADMP)

The Project is estimated to cost \$37,800,000 for which the IGA provides for a 50% District cost share (estimated @ \$18,900,000), approximately 25% Glendale cost share (estimated @ \$9,350,000), and approximately 25% Phoenix cost share (estimated @ \$9,550,000) Any non-flood control improvements shall be funded by the requesting City. The IGA provides for Glendale and Phoenix to be responsible for operation and maintenance of the constructed Project within their respective city limits. Also approve amending the District's current 5-year CIP by increasing the Maryvale Area Drainage Master Plan (project #620) in FY 2006/07 by \$1,500,000 00, and decreasing the Project Reserve in FY 2006/07 by \$1,500,000 00. This reallocation results in a next zero impact in the current 5-year CIP.

Complete description of action requested:

The District completed the Glendale-Peoria Area Drainage Master Plan (1987) and the Maryvale Area Drainage Master Study Floodplain Mitigation Study (1997). These studies identified flooding problems in the Maryvale area, in the City of Phoenix, and south Glendale, and recommended the Project as the solution to these problems.

The Project includes an Outfall Channel along the Grand Canal from 64th Avenue to the Agua Fria Freeway, designed for a 100-year storm event, and a storm drain in Camelback Road, designed for a 10-year storm event. The Project should remove a Federal Emergency Management Agency (FEMA) delineated floodplain from approximately 745 homes, prevent overtopping of the Grand Canal and additional flooding during a 100-year storm event and provide a drainage outfall for downtown Glendale. The design and rights-of-way acquisition for the first reach of the Outfall Channel are currently being completed. This project is located in Districts 4 and 5.

PERFORMANCE INFORMATION

Program Flood Protection

Activity Flood Hazard Remediation

Performance Measure Percentage of Capital Projects completed

Anticipated Results Provide citizens of Glendale and Phoenix with 100-year event protection

Goal Achievement Reduce risk to loss of life and property damage to citizens of Glendale and Phoenix

Expenditure Impact by FY(s)

FY 02/03 \$5,300,000 00 estimated; FY 03/04 \$7,700,000 00 estimated,

FY 04/05 \$1,100,000 00 estimated, FY 05/06 \$4,700,000 00 estimated,

FY 06/07 \$6,500,000 00 estimated, FY 07/08 \$4,300,000 00 estimated,

FY 08/09 \$2,500,000 00 estimated, FY 09/10 \$5,700,000 00 estimated.

This totals \$37,800,000 00

Approval of the agenda item constitutes a CIP budget adjustment in that the approved budgeted amount in Fiscal Year 2006/2007 will change as a result. The change will be an increase in budgeted spending of \$1,500,000 00, which will be offset by a like amount reduction in the District's CIP Contingency in Fiscal Year 2006/2007.

Routing: Meeting Date: 10/02/2002		
Legend X=Pending A=Approved R=Rejected		
LEGAL	MATL MNGT	OMB
A	A	A

(A) F-1

When Recorded Return to
Contracts Branch
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

Intergovernmental Agreement
for the
Construction, Construction Management, Operation and Maintenance
of the
Bethany Home Outfall Channel
from
the Agua Fria Freeway to 64th Avenue, including the Camelback Road Storm Drain
Among the
Flood Control District of Maricopa County
the
City of Glendale
and the
City of Phoenix

IGA FCD2002A003

Agenda Item: C-69-03-019-2-00

This Agreement is entered into by and between the Flood Control District of Maricopa County, a municipal corporation and political subdivision of the State of Arizona, acting by and through its Board of Directors hereinafter called the DISTRICT, the City of Glendale, Arizona, a municipal corporation, acting by and through its City Manager, hereinafter called GLENDALE, and the City of Phoenix, Arizona, a municipal corporation acting by and through its City Manager, hereinafter called PHOENIX

This Agreement shall become effective as of the date it has been executed by all parties

DATE FILED WITH MARICOPA COUNTY RECORDER _____

STATUTORY AUTHORIZATION

- 1 The DISTRICT is empowered by Arizona Revised Statutes Section 48-3603, as revised, to enter into this Agreement and has authorized the undersigned to execute this Agreement on behalf of the DISTRICT
- 2 GLENDALE is empowered by Arizona Revised Statutes 11-952, as amended, to enter into this Agreement, and has authorized the undersigned to execute this Agreement on behalf of GLENDALE

When Recorded Return to
Contracts Branch
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009-6399

103995

Intergovernmental Agreement
for the
Construction, Construction Management, Operation and Maintenance
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IGA FCD2002A003

Agenda Item: C-69-03-019-2-00

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This Agreement shall become effective as of the date it has been executed by all parties

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STATUTORY AUTHORIZATION

- 1 The DISTRICT is empowered by Arizona Revised Statutes Section 48-3603, as revised, to enter into this Agreement and has authorized the undersigned to execute this Agreement on behalf of the DISTRICT
- 2 GLENDALE is empowered by Arizona Revised Statutes 11-952, as amended, to enter into this Agreement, and has authorized the undersigned to execute this Agreement on behalf of GLENDALE

- 3 PHOENIX is empowered by Arizona Revised Statutes 11-952, as amended, and Article II, Chapter II, Section 2 of the Phoenix City Charter to enter into this Agreement and has authorized the undersigned to execute this Agreement on behalf of PHOENIX

BACKGROUND

- 4 The DISTRICT completed the Glendale – Peoria Area Drainage Master Plan in 1987 and the Maryvale Area Drainage Master Study (ADMS) Floodplain Mitigation Study in 1997. These studies recommended solutions to the flooding problems in the Maryvale area of the City of Phoenix and in south Glendale.
- 5 Some of the recommended solutions from the studies have been implemented, including storm drains in Cactus Road, Olive Avenue, Butler Drive, Northern Avenue, Orangewood Avenue, Glendale Avenue, and associated detention basins. Also, the Bethany Home Outfall Channel, Phase I has been constructed by the Arizona Department of Transportation (ADOT) and the DISTRICT along the Bethany Home Road alignment from the Agua Fria Freeway to New River.
- 6 Other future components of the recommended solutions have been further refined through a Pre-Design Study completed in September 2000. These include
 - 6.1 An Outfall Channel along the Grand Canal from 64th Avenue to the Agua Fria Freeway, with adjacent detention basins west of 67th Avenue and west of 87th Avenue. The Outfall Channel and detention basins are facilities to be designed for a 100-year storm event. Additionally, a storm drain designed for a 10-year storm event has been identified in Camelback Road, extending from 59th Avenue to the Outfall Channel (at 75th Avenue). These improvements are hereinafter referred to as the "PROJECT," and are depicted on Exhibit "A." The DISTRICT, GLENDALE, and PHOENIX, hereinafter referred to as the PROJECT PARTNERS, desire to jointly implement the PROJECT.
- 7 The PROJECT, along with the Bethany Home Road Storm Drain, should remove approximately 745 homes and an estimated 4,000 residents from a floodplain delineated by the Federal Emergency Management Agency, north of the Grand Canal between 64th Avenue and 75th Avenue. Several hundred homes south of the Grand Canal will also benefit, should the Grand Canal overtop in a major storm event. Future storm drain connections will be accommodated to drain storm water from downtown Glendale and floodplains northeast of Grand Avenue. The PROJECT conveys 100-year storm flows to the New River from an approximately 38 square mile area bounded by the Arizona Canal, the Grand Canal, the Agua Fria Freeway (Loop 101), and approximately 51st Avenue.
- 8 The Board of Directors (Board) of the DISTRICT, in Resolution FCD 97-10 and IGA FCD 98006, authorized the participation of the DISTRICT with ADOT in cost sharing the construction of the Bethany Home Outfall Channel from the New River to the Agua Fria Freeway. The project involved the construction of 1 ¼ miles of the Outfall Channel, providing a drainage outfall to the New River for the Agua Fria Freeway and capacity for storm water from the PROJECT.
- 9 The Board, under Resolutions FCD 98-12 and FCD 98-12A, authorized the negotiation of intergovernmental agreements (IGAs), the design and preparation of construction documents, and the acquisition of rights-of-way for the PROJECT.
- 10 The PROJECT PARTNERS, under IGA FCD2000A013, agreed to the cost share and responsibilities for the pre-design, design, and rights-of-way acquisition for the PROJECT.

PURPOSE OF THE AGREEMENT

- 11 The purpose of this Intergovernmental Agreement is to identify and define the responsibilities of the PROJECT PARTNERS for cost sharing, construction, construction management, operation and maintenance of the PROJECT

TERMS OF AGREEMENT

- 12 The PROJECT PARTNERS shall share, as described in this Agreement, in the PROJECT construction and construction management cost, hereinafter referred to as the PROJECT COST, estimated to be \$37,800,000
- 12.1 Construction management shall be assigned a value of eight percent (8%) of the actual construction cost of the PROJECT plus actual costs for materials testing and survey work associated with construction management
- 12.2 The PROJECT COST shall include landscaping and aesthetic features as allowed by the DISTRICT's "Policy for the Aesthetic Treatment and Landscaping of Flood Control Projects" (Policy). Additional landscape features and park amenities, if compatible with the PROJECT function, may be included in the PROJECT construction at the request of GLENDALE and/or PHOENIX, with the additional construction and construction management cost being solely at GLENDALE's and/or PHOENIX's expense
- 12.3 The PROJECT PARTNERS shall closely coordinate budgeted funds for the PROJECT. The timing of the PROJECT construction and reimbursements will be based on the availability of the PROJECT PARTNERS' budgeted funds
- 12.4 Construction and construction management of the box culvert crossing at Indian School Road, hereinafter called the Indian School Road Crossing, is part of the PROJECT, but shall be cost shared by PHOENIX and the DISTRICT, and not GLENDALE, as identified below. Construction and construction management of the Indian School Road Crossing is estimated to cost \$400,000
- 13 The PROJECT construction may be phased, in which case, the PROJECT PARTNERS' responsibilities identified in this Agreement shall be phased accordingly, including, but not limited to, invoicing and payments, transfer of land rights, and accepting operation and maintenance responsibilities
- 13.1 The anticipated phases, in order of implementation, are as follows
- Reach A: 97th Avenue Alignment to east of 83rd Avenue
 - Reach B: 73rd Avenue to 67th Avenue
 - Reach C: East of 83rd Avenue to 73rd Avenue
 - Reach D: 67th Avenue to 64th Avenue
 - Reach E: Camelback Road Storm Drain
- 14 The DISTRICT shall
- 14.1 Fund 50% of the PROJECT COST, estimated to be \$37,800,000, making the DISTRICT's estimated share \$18,900,000

- 14 1 1 The construction of the PROJECT may be phased, therefore the invoices to GLENDALE and PHOENIX, and payment of the cost share by GLENDALE and PHOENIX, will be phased accordingly
- 14 2 Coordinate with GLENDALE and PHOENIX for the relocation of conflicting utilities within their respective rights-of-way without prior rights, to be relocated prior to construction of the PROJECT, at the owner's expense
- 14 3 Serve as lead agency for construction and construction management of the PROJECT
- 14 4 Upon award of a contract for construction of each phase of the PROJECT, invoice GLENDALE and PHOENIX for one-half of their respective share of the estimated PROJECT COST for that phase
- 14 4 1 For those construction change orders resulting from specific requests and/or actions of a PROJECT PARTNER, and not included as a feature of the PROJECT, the actual construction cost shall be funded solely by that PROJECT PARTNER, plus 8% for construction management
- 14 4 2 Non-flood control features, if compatible with the PROJECT function, may be included in the PROJECT at the request of a PROJECT PARTNER, solely at the PROJECT PARTNER's expense, plus 8% of the actual construction cost for construction management
- 14 4 3 Landscaping, aesthetic features and park amenities, in addition to that allowed by the DISTRICT's Landscape and Aesthetic Policy, if compatible with the PROJECT function, may be included in the PROJECT construction at the request of GLENDALE and/or PHOENIX, the additional construction and construction management cost being solely at GLENDALE's and/or PHOENIX's expense
- 14 5 Upon completion of construction for each phase of the PROJECT, prepare a final accounting including change orders, and invoice GLENDALE and PHOENIX for the remainder of their respective share of the PROJECT COST for that phase The DISTRICT may invoice the PROJECT PARTNER requesting a non-flood control or landscaping feature, covered by 14 4 2 or 14 4 3, separately for each feature upon completion and acceptance of that feature
- 14 6 Participate in the final inspection of each phase of the constructed PROJECT with the PROJECT PARTNERS
- 14 7 Transfer fee and/or easement land rights acquired by the DISTRICT and necessary for the PROJECT to GLENDALE for those portions of the PROJECT within the GLENDALE jurisdictional limits, including the Outfall Channel from 40 feet south of the Camelback Road monument line, west to the Agua Fria Freeway and including the Camelback Road Storm Drain
- 14 8 Transfer fee and/or easement land rights acquired by the DISTRICT and necessary for the PROJECT to PHOENIX for those portions of the PROJECT within the PHOENIX jurisdictional limits, including the Outfall Channel from 40 feet south of the Camelback Road monument line, east to the Sunset Detention Basin, near 64th Avenue and Indian School Road
- 14 9 The DISTRICT may participate with GLENDALE and PHOENIX in an annual inspection of the PROJECT Any deficiencies relating to flood control that can be corrected by the responsible PROJECT PARTNER using available resources shall be corrected within sixty (60) calendar days If

the responsible PROJECT PARTNER has not taken corrective action within this time, the DISTRICT reserves the right to perform the corrective action, and will invoice the responsible PROJECT PARTNER for all actual costs incurred by the DISTRICT

14 10 The DISTRICT reserves the right to review and comment on the design and/or construction of any future changes or modifications to the PROJECT

15 GLENDALE shall

15 1 Fund 25% of the PROJECT COST for all features of the PROJECT except the Indian School Road Crossing. The PROJECT COST is estimated to be \$37,800,000, making GLENDALE's estimated share \$9,350,000. GLENDALE shall also fund the construction cost of any non-flood control or landscaping and aesthetic features requested by GLENDALE that exceed the DISTRICT's Policy, plus 8% for construction management.

15 1 1 Pay to the DISTRICT one-half of GLENDALE's estimated share of the PROJECT COST for each phase of the PROJECT, upon the DISTRICT's awarding a construction contract for that phase, and within 30 days of receipt of an invoice.

15 1 2 Pay to the DISTRICT the remainder of GLENDALE's share of the PROJECT COST for each phase of the PROJECT, upon completion of that phase of the PROJECT construction, and within 30 days of receipt of an invoice. Pay to the DISTRICT within 30 days of receipt of an invoice for work requested by GLENDALE under the provisions of 14 4 2 or 14 4 3.

15 1 3 GLENDALE's funding will be provided from bond monies.

15 2 Require and coordinate the relocation of all conflicting utilities within GLENDALE's rights-of-way without prior rights, to be relocated prior to construction of the PROJECT, at the owner's cost.

15 3 Participate in all public involvement activities for the PROJECT.

15 4 Be responsible for, and assume ownership, liability, operation and maintenance of the PROJECT within the jurisdictional limits of GLENDALE as described in 14 7, following completion of each phase of construction.

15 4 1 The operation and maintenance responsibility for the PROJECT includes removal of trash, debris, sediment, and vegetation from the facilities, electricity and other operation costs for the facilities, aesthetics maintenance and vandalism repair. GLENDALE is also responsible for structural maintenance and repair of the facilities, including project reconstruction and replacement and associated costs.

15 4 2 GLENDALE shall be responsible to schedule and invite the DISTRICT to participate in an annual inspection of the PROJECT. Any deficiencies relating to flood control that can be corrected by GLENDALE using available resources shall be corrected within sixty (60) calendar days. If GLENDALE has not taken corrective action within this time the DISTRICT reserves the right to perform the corrective action and GLENDALE shall reimburse the DISTRICT for all actual costs incurred by the DISTRICT within thirty (30) calendar days of receipt of an invoice from the DISTRICT.

15 5 Obtain DISTRICT review and comment on the design and/or construction of any future changes or modifications to the PROJECT and resolve and/or incorporate the DISTRICT's comments into the future PROJECT modification

16 PHOENIX shall

16 1 Fund 25% of the PROJECT COST for all features of the PROJECT except the Indian School Road Crossing, for which PHOENIX shall fund 50% The PROJECT COST is estimated to be \$37,800,000, making PHOENIX's estimated share \$9,550,000 PHOENIX shall also fund the construction cost of non-flood control or landscaping and aesthetic features requested by PHOENIX that exceed the DISTRICT's Policy, plus 8% for construction management

16 1 1 Pay to the DISTRICT one half of PHOENIX's estimated share of the PROJECT COST for each phase of the PROJECT, upon the DISTRICT's awarding a construction contract for that phase, and within 30 days of receipt of an invoice

16 1 2 Pay to the DISTRICT the remainder of PHOENIX's share of the PROJECT COST for each phase of the PROJECT, upon completion of that phase of the PROJECT construction, and within 30 days of receipt of an invoice Pay to the DISTRICT within 30 days of receipt of an invoice for work requested by PHOENIX under the provisions of 14 4 2 or 14 4 3

16 1 3 PHOENIX's funding will be provided from bond monies The approved PHOENIX bond program of 2001 will provide PHOENIX's funding for Reaches A and B, as defined in paragraph 13 I Construction of Phases C, D, and E will be based on the availability of funds A PHOENIX bond program is planned for 2006

16 2 Require and coordinate the relocation of all conflicting utilities within PHOENIX's rights-of-way without prior rights, to be relocated prior to construction of the PROJECT, at the owner's cost

16 3 Participate in all public involvement activities located in Phoenix for the PROJECT

16 4 Be responsible for, and assume ownership, liability, operation and maintenance of the PROJECT within the jurisdictional limits of PHOENIX as described in 14 8, following completion of each phase of construction

16 4 1 The operation and maintenance of the PROJECT by PHOENIX will conform to the PHOENIX Street Maintenance Division Policy and Procedure 4 14 PHOENIX is also responsible for repair or replacement as necessary of all features or structures of the PROJECT at no cost to the other PROJECT PARTNERS

16 4 2. PHOENIX shall be responsible to schedule and invite the DISTRICT to participate in an annual inspection of the PROJECT Any deficiencies relating to flood control that can be corrected by PHOENIX using available resources shall be corrected within sixty (60) calendar days If PHOENIX has not taken corrective action within this time the DISTRICT reserves the right to perform the corrective action and PHOENIX shall reimburse the DISTRICT for all actual costs incurred by the DISTRICT within thirty (30) calendar days of receipt of an invoice from the DISTRICT

- 16.5 Obtain DISTRICT review and comment on the design and/or construction of any future changes or modifications to the PROJECT and resolve and/or incorporate the DISTRICT's comments into the future PROJECT modification
- 17 Any permits required for the PROJECT shall be issued by the appropriate party to this Agreement at no cost to the PROJECT
- 18 Any party to this Agreement may with mutual written agreement of all parties delegate responsibilities to another party. Any delegation, however, shall not relieve the delegating party of its original responsibilities as defined herein
- 19 In the case of any dispute over any items in this Agreement, the parties agree to use their best efforts and enter into good faith negotiations to resolve the disputed matters. However, this shall not limit the rights of the parties to seek any remedies provided by law.
- 20 All parties to this Agreement shall take reasonable and necessary actions within their authority to ensure that only storm water is discharged into the PROJECT, and that such discharges into the PROJECT comply with best management practices at the point of discharge and with any applicable requirements under the Clean Water Act, National Pollutant Discharge Elimination System (NPDES), or any other applicable discharge requirements, including any permit requirements
- 21 Each party to this Agreement (indemnitor) shall, to the extent permissible by law, indemnify, defend and save harmless the others (indemnitees) including agents, officers, directors, governors and employees thereof, from and against any loss or expense incurred as a result of any claim or suit of any nature whatsoever, which arises out of indemnitor's negligent or wrongful acts or omissions pursuant to this Agreement. Such indemnification obligation shall encompass any personal injury, death or property damages resulting from the indemnitor's negligent or wrongful acts or omissions, as well as reasonable attorney's fees, court costs, and other expenses relating to the defense against claims or litigation, incurred by the indemnitee. Indemnitee shall be liable for their own negligence or wrongful acts as provided by law
- 22 All notices or demands upon any party to this Agreement shall be in writing and shall be delivered in person or sent by mail addressed as follows

Flood Control District of Maricopa County
Chief Engineer and General Manager
2801 West Durango Street
Phoenix, AZ 85009-6399

City of Glendale
City Engineer
5850 West Glendale Avenue
Glendale, AZ 85301

City of Phoenix
Street Transportation Director
200 West Washington Street, 5th Floor
Phoenix, AZ 85003

- 23 Each party to this Agreement will pay for and not seek reimbursement for its own personnel and administrative costs associated with this PROJECT, including but not limited to the following unless specifically identified otherwise in this Agreement design, rights-of-way acquisition, inspection, public involvement, permitting, management and administration, and operation and maintenance
- 24 This Agreement shall expire fifty (50) years from the date of recording with the County Recorder or upon completion of the PROJECT and after all funding obligations and reimbursements have been satisfied in accordance with this Agreement, whichever is the first to occur. However, by mutual written agreement of all parties, this Agreement may be amended or terminated. The operation and maintenance provisions of this Agreement shall survive the expiration of this Agreement.
- 25 This Agreement is subject to cancellation by any party pursuant to the provisions of Arizona Revised Statutes Section 38-511.
- 26 Attached to this Agreement or contained herein are the written determinations by the appropriate attorneys for the parties to this Agreement that these agencies are authorized under the laws of the State of Arizona to enter into this Agreement and that it is in proper form.
- 27 If legislation is enacted after the effective date of this Agreement that changes the relationship or structure of one or more parties to this Agreement, the parties agree that this Agreement shall be renegotiated at the written request of any party.

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
A Municipal Corporation

Recommended by

11/5/02 7/17/02
Michael S Ellegood, P E Date
Chief Engineer and General Manager

Approved and Accepted

By Don Stegley
Chairman, Board of Directors

Attest

By Janet A. Causey 10/2/02
Clerk of the Board Date

The foregoing Intergovernmental Agreement IGA FCD 2002A003 has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned General Counsel, who has determined that it is in proper form and within the powers and authority granted to the Flood Control District of Maricopa County under the laws of the State of Arizona

Julie M. Lemmon 9/16/02
General Counsel Date

CITY OF GLENDALE

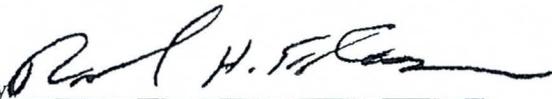
CITY OF GLENDALE, a Municipal Corporation
Ed Beasley, City Manager

 9/23/02
Ed Beasley Date
City Manager

Attest

 9/24/02
By Paula Date
City Clerk

The foregoing Intergovernmental Agreement IGA FCD 2002A003 has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned attorney who has determined that it is in proper form and within the power and authority granted to the City of Glendale under the laws of the State of Arizona


By Paul H. S. [unclear] Date 9/19/02
City Attorney

CITY OF PHOENIX

CITY OF PHOENIX, a Municipal Corporation
Frank Fairbanks, City Manager

By Thomas E Callow 8-13-02
Thomas E Callow, P E Date
Street Transportation Director

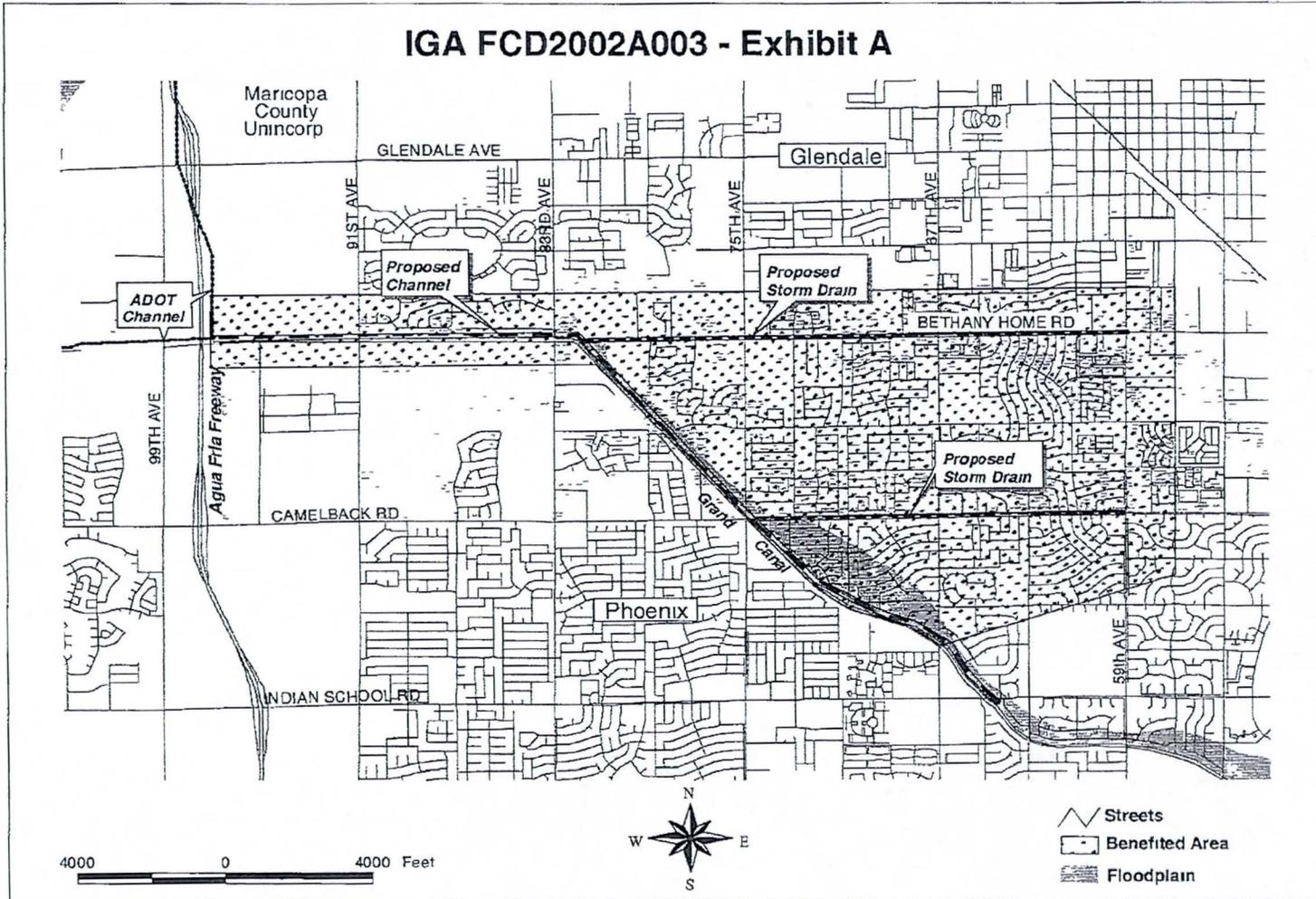
Attest

By Vicky Niel 9/16/02
City Clerk Date

The foregoing Intergovernmental Agreement IGA FCD 2002A003 has been reviewed pursuant to Arizona Revised Statutes 11-952, as amended, by the undersigned attorney who has determined that it is in proper form and within the power and authority granted to the City of Phoenix under the laws of the State of Arizona

By William D. Rock
ACTING City Attorney Date
WR

IGA FCD2002A003 - Exhibit A



B.4 – FEMA LOMR Review Correspondence

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Thursday, October 04, 2012 9:10 AM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov
Subject: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Mr. Minch:

We have received your request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for the City of Phoenix, the City of Glendale, and Maricopa County, AZ. This e-mail is being sent to officially acknowledge the receipt of your request 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.

The case number assigned to your request is 12-09-3189P, and the project identifier is Bethany Home Outfall Channel.

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 request.

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Information eXchange (FMIX), 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 request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Jeff Minch
Sent: Thursday, October 04, 2012 9:21 AM
To: 'Weidmann, Sloane'
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Gabriela Griffin
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Mr. Weidmann,

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Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

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From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Thursday, October 04, 2012 9:10 AM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov
Subject: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Jeff Minch
Sent: Thursday, October 04, 2012 9:38 AM
To: 'Weidmann, Sloane'
Cc: jefferyshelton@mail.maricopa.gov
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required
Attachments: COG-signedOandC.PDF

Hello Mr. Weidmann,

I just noticed that the City Engineer for the City of Glendale signed the Flood Control District of Maricopa County community acknowledgement form (attached). The FCDMC's project manager, Jeff Shelton, will follow up with the Glendale City Engineer and e-mail you a PDF of the signed community acknowledgement form for the City of Glendale. Thanks.

Jeff

From: Weidmann, Sloane [mailto:SWeidmann@mbakercorp.com]
Sent: Thursday, October 04, 2012 9:23 AM
To: Jeff Minch
Cc: tsp@mail.maricopa.gov; hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Gabriela Griffin
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Do you have community acknowledgment from the City of Glendale?

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Thursday, October 04, 2012 10:21 AM
To: Weidmann, Sloane
Cc: tsp@mail.maricopa.gov; hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Gabriela Griffin
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Mr. Weidmann,

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Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

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From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]

Sent: Thursday, October 04, 2012 9:10 AM

To: Jeff Minch

Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov

Subject: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Mr. Minch:

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If additional information is not required, we will issue a final letter of determination within 90 days of receiving your request.

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Information eXchange (FMIX), 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 request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Wednesday, December 05, 2012 11:45 AM
To: 'Weidmann, Sloane'
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Sloane,

We would like to pay the additional fee and process it as two LOMRs. I will start working on the check. Let me know when you have the second case number so I can reference it in a letter with the check.

Thanks,
Jeff

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Wednesday, December 05, 2012 7:54 AM
To: Jeffery Shelton - FCDX
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

The extent of this revision is too large to be processed as a LOMR. In order to process it as a LOMR we would have to split it into two LOMRs, however that would require an additional processing fee (\$5000). As it stands now it will need to be a PMR. Let me know how you would like to proceed.

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Friday, October 05, 2012 2:28 PM
To: Weidmann, Sloane
Cc: Jeff Minch (jminch@WoodPatel.com)
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

City of Glendale's community acknowledgment form is attached.

Thanks,

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Thursday, October 04, 2012 9:23 AM
To: Jeff Minch
Cc: Tim Phillips - FCDX; hasan.mushtaq@phoenix.gov; Jeffery Shelton - FCDX; Gabriela Griffin

Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Do you have community acknowledgment from the City of Glendale?

From: Jeff Minch [<mailto:jminch@WoodPatel.com>]

Sent: Thursday, October 04, 2012 10:21 AM

To: Weidmann, Sloane

Cc: tsp@mail.maricopa.gov; hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Gabriela Griffin

Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Mr. Weidmann,

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Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
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From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]

Sent: Thursday, October 04, 2012 9:10 AM

To: Jeff Minch

Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov

Subject: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Monday, October 08, 2012 7:44 AM
To: Jeff Minch; Jeffery Shelton - FCDX
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Thank you

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Friday, October 05, 2012 3:12 PM
To: Jeffery Shelton - FCDX; Weidmann, Sloane
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Jeff,

Thank you for the quick follow up!

Jeff

From: Jeffery Shelton - FCDX [mailto:JefferyShelton@mail.maricopa.gov]
Sent: Friday, October 05, 2012 1:28 PM
To: Weidmann, Sloane
Cc: Jeff Minch
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

City of Glendale's community acknowledgment form is attached.

Thanks,

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
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From: Weidmann, Sloane [mailto:SWeidmann@mbakercorp.com]
Sent: Thursday, October 04, 2012 9:23 AM
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Do you have community acknowledgment from the City of Glendale?

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Sent: Thursday, October 04, 2012 10:21 AM
To: Weidmann, Sloane
Cc: tsp@mail.maricopa.gov; hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Gabriela Griffin
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Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

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Sent: Thursday, October 04, 2012 9:10 AM
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Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov
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Please be assured we will do our best to respond to all inquiries in a timely manner.

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116

sweidmann@mbakercorp.com

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Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Wednesday, December 05, 2012 2:14 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required
Attachments: 12-5-12 316-AD.pdf
Follow Up Flag: Follow up
Flag Status: Completed

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas.

We have reviewed your request and determined that additional data are required to complete our review. The attached letter describes the data needed to continue reviewing your request. This e-mail replaces the paper copy of the letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

If we do not receive all data items outlined in the attached letter within 90 days of the date of this e-mail, 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 current fee schedule is available on the FEMA web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1 877 FEMA MAP (1 877 336 2627). If you have specific questions concerning your request, please contact the case reviewer using the information listed below, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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NATIONAL FLOOD INSURANCE PROGRAM

FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

December 5, 2012

Mr. Jeffrey R. Minch, P.E.
Project Manager
Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, AZ 85021

IN REPLY REFER TO:
Case No.: 12-09-3189P
Communities: Maricopa County,
City of Glendale,
and City of Phoenix
Community Nos.: 040037, 040045, and 040051

316-AD

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Bethany Home Outfall Channel
Flooding Source:	Grand Canal
FIRM Panel(s) Affected:	04013C1620H, 04013C1640F, and 04013C2105F

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 available on the FEMA website at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304 PH: 1-877-FEMA MAP

BakerAECOM, under contract with the FEDERAL EMERGENCY MANAGEMENT AGENCY, is a
Production and Technical Services Contractor for the National Flood Insurance Program

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/fees 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 Information eXchange (FMIX), toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact your case reviewer, Mrs. Sloane Weidmann, by e-mail at sweidmann@mbakercorp.com or by telephone at (720) 514-1116, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

Sincerely,



Syed Qayum, CFM
LOMR Technical Manager
BakerAECOM

Enclosure

cc: Mr. Jeffery C. Shelton, P.E.
Senior Civil Engineer
Flood Control District of Maricopa County

Mr. Timothy S. Phillips, P.E.
Chief Engineer and General Manager
Maricopa County

Mr. Greg Rodzenko, P.E.
Acting City Engineer
City of Glendale

Mr. Hasan Mushtaq, P.E., PhD, CFM
Floodplain Manager
City of Phoenix



NATIONAL FLOOD INSURANCE PROGRAM
FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

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

Case No.: 12-09-3189P

Requester: Mr. Jeffrey R. Minch, P.E.

Communities: Maricopa County, City of Glendale,
and City of Phoenix

Community Nos.: 040037, 040045, and 040051

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

1. As required on page 10 of the instructions for the MT-2 application/certification forms (copy enclosed), please provide a copy of the duplicate effective model for the New River, or explain why this is not necessary. This may be 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 downstream of the revised reach.
2. In addition to submitting the above-mentioned duplicate effective model, please submit an existing conditions hydraulic model to show the effects of the increased flow from the Grand Canal, or explain why this is not necessary.
3. An officially adopted maintenance and operation plan for the Sunset Detention Basin. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished. Because the Sunset Detention Basin uses flood storage to reduce downstream discharge values, the plan also must include documentation that the flood storage in this impoundment is dedicated for flood-control purposes.
4. Please submit documentation of the notification to property owners who will be affected by any widening/shifting of the base (1-percent-annual-chance) floodplain along the Grand Canal.

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

LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304 PH: 1-877-FEMA MAP

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Production and Technical Services Contractor for the National Flood Insurance Program**

Jeff Minch

From: Jeff Minch
Sent: Thursday, December 06, 2012 10:07 PM
To: 'Weidmann, Sloane'
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph; Greg Rodzenko (grodzenko@glendaleaz.com); Gabriela Griffin
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Ms. Weidmann,

We are in receipt of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) additional data request and will follow up as requested prior to the 90 day deadline. I apologize for the delayed response. I was out of the office most of yesterday and out of town all day today. We look forward to working with you on this important LOMR for the Flood Control District of Maricopa County, the City of Phoenix, and the City of Glendale. Thank you for your timely review.

Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

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From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Wednesday, December 05, 2012 2:14 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas.

We have reviewed your request and determined that additional data are required to complete our review. The attached letter describes the data needed to continue reviewing your request. This e-mail replaces the paper copy of the letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

If we do not receive all data items outlined in the attached letter within 90 days of the date of this e-mail, 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 current fee schedule is available on the FEMA web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1 877 FEMA MAP (1 877 336 2627). If you have specific questions concerning your request, please contact the case reviewer using the information listed below, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Friday, December 07, 2012 2:57 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 13-09-0598P) – Response Required

Follow Up Flag: Follow up
Flag Status: Completed

Dear Mr. Minch:

We have received your request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for the City of Phoenix, the City of Glendale, and Maricopa County, AZ. This e-mail is being sent to officially acknowledge the receipt of your request 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.

The case number assigned to your request is 12-09-3189P, and the project identifier is Bethany Home Outfall Channel Lower Reach.

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 request.

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Information eXchange (FMIX), 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 request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Jeff Minch
Sent: Monday, December 10, 2012 10:25 AM
To: 'Weidmann, Sloane'
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph; Greg Rodzenko (grodzenko@glendaleaz.com); Gabriela Griffin
Subject: RE: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 13-09-0598P) – Response Required

Dear Ms. Weidmann,

This e-mail is acknowledgement of receipt of the Letter of Map Revision (LOMR) request for the Bethany Home Outfall Channel Lower Reach. If there is anything I can do to assist with the clarifying the data submitted, please do not hesitate to call or e-mail. We look forward to working with you on this important LOMR for the Flood Control District of Maricopa County, City of Phoenix, and the City of Glendale.

Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

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From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Friday, December 07, 2012 2:57 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: REVISION Request Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 13-09-0598P) – Response Required

Dear Mr. Minch:

We have received your request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for the City of Phoenix, the City of Glendale, and Maricopa County, AZ. This e-mail is being sent to officially acknowledge the receipt of your request 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.

The case number assigned to your request is 12-09-3189P, and the project identifier is Bethany Home Outfall Channel Lower Reach.

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 request.

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Information eXchange (FMIX), 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 request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Kenneth Akoh-Arrey <KAkoh-Arrey@azdot.gov>
Sent: Wednesday, December 19, 2012 4:03 PM
To: Jeffery Shelton - FCDX
Cc: Annette Riley
Subject: BHOC LOMR Consent Letter Sign-off by ADOT
Attachments: BHOC LOMR Consent Letter.pdf

Dear Mr. Shelton,

I have completed review of the LOMR submitted to FEMA by your agency for review and have signed the consent letter and reattached it herewith for your use.

I would like to comment that based on agreements and IGAs that laid the foundation for the BHOC project as a channel with flood control utility there is no change in its functionality by calling it or designating it what it is – a floodplain. From the IGA the relationships between the parties remain the same and there are no issues that I can recognized to be introduced by this LOMR step; thus my consent. If anything, however, changes that requires ADOT's notification, please do not fail to keep us posted as well. Thank you.

Sincerely,

Ken Akoh-Arrey, PE

*Chief Drainage Engineer, Manager
Arizona Dept. of Transportation
Roadway Engineering Group
205 S. 17th Ave. Phoenix, AZ 85007, MD 634E
Tel (602) 712-8660
Fax (602) 712-3161*

Please visit our Website at: http://www.azdot.gov/Highways/Roadway_Engineering/Drainage_Design/index.asp

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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 13, 2012

Kenneth Akoh-Arrey, P.E.
Chief Drainage Engineer, Manager
Arizona Department of Transportation
205 S. 17th Ave.
Phoenix, AZ 85007, MD 634E

Re: Notification of 1% (100-year) annual chance floodplain on ADOT parcels: 102-01-010N, 102-60-032B, 102-60-030B, 102-60-002S near Loop 101, Bethany Home Road, and 99th Avenue

Dear Mr. Akoh-Arrey:

The Flood Insurance Rate Map (FIRM) for a community depicts land which has been determined to be subject to a 1% (100-year) or greater chance of flooding in any given year. The FIRM is used to determine flood insurance rates and to help the community with floodplain management.

The Flood Control District of Maricopa County is applying for a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency (DHS-FEMA) on behalf of the City of Phoenix, City of Glendale, and citizens of Maricopa County to revise FIRM 04013G1620H for the Cities of Glendale and Phoenix, Arizona along the Bethany Home Outfall Channel. The Flood Control District of Maricopa County is proposing to revise the FIRM to reflect the Bethany Home Outfall Channel.

The revision to the FIRM will result in mapping the 1% annual chance (Zone A) floodplain for Bethany Home Outfall Channel on the parcels referred to in the subject line. The maximum width of 110 feet occurs between Loop 101 and 99th Avenue. In most areas the floodplain is about 95 feet wide.

We would like to obtain your acceptance of revision of the 1% annual chance (Zone A) floodplain on your property at the parcels referred to in the subject line. Please sign and date a copy of this letter to signify your acceptance and return it to Jeff Shelton via email at jefferyshelton@mail.maricopa.gov by December 27th, 2012.

Kenneth Akoh-Arrey, P.E.
Page 2 of 2
December 13, 2012

If you have any questions or concerns about the proposed changes to the FIRM or its effects on your property, you may contact me at 602-506-4486 or my email address.

Sincerely,



Jeff Shelton, P.E.
Senior Civil Engineer

I, Arizona Department of Transportation Representative, accept the re-delineation of the 1% annual chance floodplain as described above.



Property Owner/Representative Name

12/19/2012
Date

Enclosure (via FTP): Bethany Home Outfall Channel Letter of Map Revision Technical Data Notebook

cc: Amir M. Motamedi, P.E., Hydrology and Hydraulics Branch Manager

Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Thursday, December 20, 2012 8:30 AM
To: 'Kenneth Akoh-Arrey'
Cc: Annette Riley; Amir Motamedi - FCDX
Subject: RE: BHOC LOMR Consent Letter Sign-off by ADOT

Thank you, and I agree with you assessment. We decided to include this portion of the BHOC project in the submittal to FEMA so we could have continuity in our modeling and mapping.

We will continue to send you notifications as required.

Jeff

From: Kenneth Akoh-Arrey [<mailto:KAkoh-Arrey@azdot.gov>]
Sent: Wednesday, December 19, 2012 4:03 PM
To: Jeffery Shelton - FCDX
Cc: Annette Riley
Subject: BHOC LOMR Consent Letter Sign-off by ADOT

Dear Mr. Shelton,

I have completed review of the LOMR submitted to FEMA by your agency for review and have signed the consent letter and reattached it herewith for your use.

I would like to comment that based on agreements and IGAs that laid the foundation for the BHOC project as a channel with flood control utility there is no change in its functionality by calling it or designating it what it is – a floodplain. From the IGA the relationships between the parties remain the same and there are no issues that I can recognize to be introduced by this LOMR step; thus my consent. If anything, however, changes that requires ADOT's notification, please do not fail to keep us posted as well. Thank you.

Sincerely,

Ken Akoh-Arrey, PE
*Chief Drainage Engineer, Manager
Arizona Dept. of Transportation
Roadway Engineering Group
205 S. 17th Ave. Phoenix, AZ 85007, MD 634E
Tel (602) 712-8660
Fax (602) 712-3161*

Please visit our Website at: http://www.azdot.gov/Highways/Roadway_Engineering/Drainage_Design/index.asp

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Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Thursday, December 20, 2012 3:22 PM
To: Jeff Minch (jminch@WoodPatel.com)
Cc: Darren Forstie (dforstie@woodpatel.com); Richard M. Waskowsky - FCDX
Subject: FW: BHOC LOMR Consent Letter Sign-off by ADOT
Attachments: BHOC LOMR Consent Letter.pdf

Jeff,

Attached is ADOT's notification and acceptance of the floodplain. Getting an acceptance signature should shorten the appeal period and move the effective date earlier on the calendar. This with my statement, "I found the only other property owner other than Phoenix, Glendale and FCDMC was ADOT" should satisfy issue #4.

Let me know if you have any questions.

Thanks,
Jeff

From: Kenneth Akoh-Arrey [<mailto:KAkoh-Arrey@azdot.gov>]
Sent: Wednesday, December 19, 2012 4:03 PM
To: Jeffery Shelton - FCDX
Cc: Annette Riley
Subject: BHOC LOMR Consent Letter Sign-off by ADOT

Dear Mr. Shelton,

I have completed review of the LOMR submitted to FEMA by your agency for review and have signed the consent letter and reattached it herewith for your use.

I would like to comment that based on agreements and IGAs that laid the foundation for the BHOC project as a channel with flood control utility there is no change in its functionality by calling it or designating it what it is – a floodplain. From the IGA the relationships between the parties remain the same and there are no issues that I can recognize to be introduced by this LOMR step; thus my consent. If anything, however, changes that require ADOT's notification, please do not fail to keep us posted as well. Thank you.

Sincerely,

Ken Akoh-Arrey, PE
Chief Drainage Engineer, Manager
Arizona Dept. of Transportation
Roadway Engineering Group
205 S. 17th Ave. Phoenix, AZ 85007, MD 634E
Tel (602) 712-8660
Fax (602) 712-3161

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Flood Control District of Maricopa County

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Don Stapley, District 2
Andrew Kunasek, District 3
Max Wilson, District 4
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www.fcd.maricopa.gov

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

December 13, 2012

Kenneth Akoh-Arrey, P.E.
Chief Drainage Engineer, Manager
Arizona Department of Transportation
205 S. 17th Ave.
Phoenix, AZ 85007, MD 634E

Re: Notification of 1% (100-year) annual chance floodplain on ADOT parcels: 102-01-010N, 102-60-032B, 102-60-030B, 102-60-002S near Loop 101, Bethany Home Road, and 99th Avenue

Dear Mr. Akoh-Arrey:

The Flood Insurance Rate Map (FIRM) for a community depicts land which has been determined to be subject to a 1% (100-year) or greater chance of flooding in any given year. The FIRM is used to determine flood insurance rates and to help the community with floodplain management.

The Flood Control District of Maricopa County is applying for a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency (DHS-FEMA) on behalf of the City of Phoenix, City of Glendale, and citizens of Maricopa County to revise FIRM 04013C1620H for the Cities of Glendale and Phoenix, Arizona along the Bethany Home Outfall Channel. The Flood Control District of Maricopa County is proposing to revise the FIRM to reflect the Bethany Home Outfall Channel.

The revision to the FIRM will result in mapping the 1% annual chance (Zone A) floodplain for Bethany Home Outfall Channel on the parcels referred to in the subject line. The maximum width of 110 feet occurs between Loop 101 and 99th Avenue. In most areas the floodplain is about 95 feet wide.

We would like to obtain your acceptance of revision of the 1% annual chance (Zone A) floodplain on your property at the parcels referred to in the subject line. Please sign and date a copy of this letter to signify your acceptance and return it to Jeff Shelton via email at jefferyshelton@mail.maricopa.gov by December 27th, 2012.

Kenneth Akoh-Arrey, P.E.
Page 2 of 2
December 13, 2012

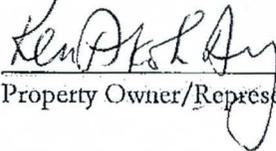
If you have any questions or concerns about the proposed changes to the FIRM or its effects on your property, you may contact me at 602-506-4486 or my email address.

Sincerely,



Jeff Shelton, P.E.
Senior Civil Engineer

I, Arizona Department of Transportation Representative, accept the re-delineation of the 1% annual chance floodplain as described above.



Property Owner/Representative Name

12/19/2012
Date

Enclosure (via FTP): Bethany Home Outfall Channel Letter of Map Revision Technical Data Notebook

cc: Amir M. Motamedi, P.E., Hydrology and Hydraulics Branch Manager

Jeff Minch

From: Jeffery Shelton - FCDX <JefferyShelton@mail.maricopa.gov>
Sent: Thursday, December 20, 2012 3:22 PM
To: Jeff Minch
Cc: Darren Forstie; Richard M. Waskowsky - FCDX
Subject: FW: BHOC LOMR Consent Letter Sign-off by ADOT
Attachments: BHOC LOMR Consent Letter.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Jeff,

Attached is ADOT's notification and acceptance of the floodplain. Getting an acceptance signature should shorten the appeal period and move the effective date earlier on the calendar. This with my statement, "I found the only other property owner other than Phoenix, Glendale and FCDMC was ADOT" should satisfy issue #4.

Let me know if you have any questions.
Thanks,
Jeff

From: Kenneth Akoh-Arrey [<mailto:KAkoh-Arrey@azdot.gov>]
Sent: Wednesday, December 19, 2012 4:03 PM
To: Jeffery Shelton - FCDX
Cc: Annette Riley
Subject: BHOC LOMR Consent Letter Sign-off by ADOT

Dear Mr. Shelton,
I have completed review of the LOMR submitted to FEMA by your agency for review and have signed the consent letter and reattached it herewith for your use.

I would like to comment that based on agreements and IGAs that laid the foundation for the BHOC project as a channel with flood control utility there is no change in its functionality by calling it or designating it what it is – a floodplain. From the IGA the relationships between the parties remain the same and there are no issues that I can recognize to be introduced by this LOMR step; thus my consent. If anything, however, changes that require ADOT's notification, please do not fail to keep us posted as well. Thank you.

Sincerely,

Ken Akoh-Arrey, PE
Chief Drainage Engineer, Manager
Arizona Dept. of Transportation
Roadway Engineering Group
205 S. 17th Ave. Phoenix, AZ 85007, MD 634E
Tel (602) 712-8660
Fax (602) 712-3161

Please visit our Website at: http://www.azdot.gov/Highways/Roadway_Engineering/Drainage_Design/index.asp



Flood Control District of Maricopa County

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Max Wilson, District 4
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Phone: 602-506-1501
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December 13, 2012

Kenneth Akoh-Arrey, P.E.
Chief Drainage Engineer, Manager
Arizona Department of Transportation
205 S. 17th Ave.
Phoenix, AZ 85007, MD 634E

Re: Notification of 1% (100-year) annual chance floodplain on ADOT parcels: 102-01-010N, 102-60-032B, 102-60-030B, 102-60-002S near Loop 101, Bethany Home Road, and 99th Avenue

Dear Mr. Akoh-Arrey:

The Flood Insurance Rate Map (FIRM) for a community depicts land which has been determined to be subject to a 1% (100-year) or greater chance of flooding in any given year. The FIRM is used to determine flood insurance rates and to help the community with floodplain management.

The Flood Control District of Maricopa County is applying for a Letter of Map Revision (LOMR) from the Federal Emergency Management Agency (DHS-FEMA) on behalf of the City of Phoenix, City of Glendale, and citizens of Maricopa County to revise FIRM 04013C1620H for the Cities of Glendale and Phoenix, Arizona along the Bethany Home Outfall Channel. The Flood Control District of Maricopa County is proposing to revise the FIRM to reflect the Bethany Home Outfall Channel.

The revision to the FIRM will result in mapping the 1% annual chance (Zone A) floodplain for Bethany Home Outfall Channel on the parcels referred to in the subject line. The maximum width of 110 feet occurs between Loop 101 and 99th Avenue. In most areas the floodplain is about 95 feet wide.

We would like to obtain your acceptance of revision of the 1% annual chance (Zone A) floodplain on your property at the parcels referred to in the subject line. Please sign and date a copy of this letter to signify your acceptance and return it to Jeff Shelton via email at jefferyshelton@mail.maricopa.gov by December 27th, 2012.

Kenneth Akoh-Arrey, P.E.
Page 2 of 2
December 13, 2012

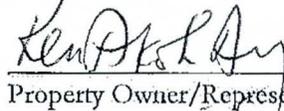
If you have any questions or concerns about the proposed changes to the FIRM or its effects on your property, you may contact me at 602-506-4486 or my email address.

Sincerely,



Jeff Shelton, P.E.
Senior Civil Engineer

I, Arizona Department of Transportation Representative, accept the re-delineation of the 1% annual chance floodplain as described above.



Property Owner/Representative Name

12/19/2012
Date

Enclosure (via FTP): Bethany Home Outfall Channel Letter of Map Revision Technical Data Notebook

cc: Amir M. Motamedi, P.E., Hydrology and Hydraulics Branch Manager

Jeff Minch

From: hasan.mushtaq@phoenix.gov
Sent: Wednesday, January 02, 2013 10:48 AM
To: Jeffery Shelton - FCDX
Subject: Re: BHOC LOMR (Case Numbers 12-09-3189P and 13-09-0598P) - O & M Plan for Sunset Basin
Attachments: DOC010213.pdf

Here it is. Sorry, for the delay.

Thanks.

Hasan Mushtaq, P.E., Ph.D., CFM

Planning, Design, & Programming Division
Street Transportation Department
200 W. Washington Street
Phoenix, Arizona 85003-1611
602.262.4026 (W), 602.262.7322 (F)
hasan.mushtaq@phoenix.gov

Jeffery Shelton - FCDX
<JefferyShelton@mail.maricopa.gov>

12/28/2012 10:56 AM

To: Hasan Mushtaq/STR/PHX@PHXENT
cc
Subject: BHOC LOMR (Case Numbers 12-09-3189P and 13-09-0598P) - O & M Plan for Sunset Basin

Hasan,

This is just a reminder. I left a message on your phone some time back. You returned the call and said that you had an O & M package we could use for Sunset Basin. I have not yet received that package from you. This is with regard to a FEMA review comment we received on the BHOC LOMR application. Let me know you need more background information.

By the way, there are two case numbers for this LOMR application because it was too large to fit within a single LOMR revision area. We, FCDMC, paid an addition review fee to have it processed as two LOMRs instead of a PMR.

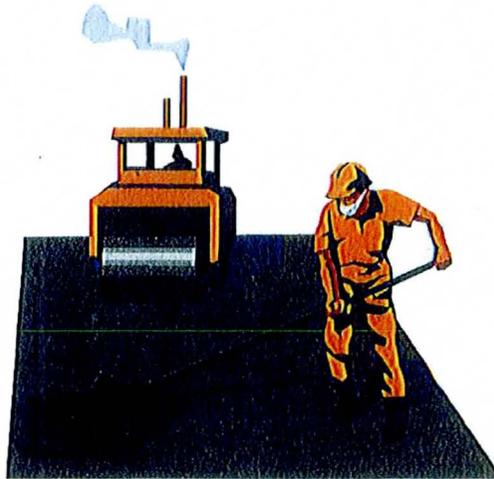
Thanks,
Jeff

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

Street Maintenance Division

Policy and Procedures

Manual



(Latest Revisions 6/2000)



CITY OF PHOENIX

**STREET MAINTENANCE DIVISION
POLICY AND PROCEDURE**

410

1 of 1

NUMBER

MAINTENANCE OF DRAINAGE FACILITIES

6-7-00
REV

12-2-92
ISSUE DATE

SUBJECT

PURPOSE

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

POLICY

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

PROCEDURE

- The Street Maintenance Drainage Foreman is responsible for visually inspecting each drainage facility in their section on a monthly basis.
- The Drainage Foreman shall schedule the cleaning as needed, but is not to exceed the established service levels, unless it is determined that allowing it to exist could become an obstruction to drainage.
- The established service levels are as follows:
 - a) Man-made Drainage Easements shall be inspected on a monthly basis and cleaned if necessary.
 - b) Dedicated Natural Washes shall be inspected on a monthly basis and debris removed twice a year.
 - c) Non-dedicated Natural Washes shall be inspected twice a year and the adjacent property owner notified to clean as needed. If the property owner fails to remove the debris from the wash, the Foreman shall inform the Street Maintenance Field Investigator who will follow up by notifying NIH Zoning Enforcement.
 - d) Man-made Detention Basins shall be inspected on a monthly basis and cleaned when necessary.
 - e) Storm Drainage Inlets shall be inspected on a monthly basis and cleaned when necessary.
 - f) Storm Drainage Catch Basins, Syphons and Drywells shall be cleaned on a monthly basis. The section equipped with the vacuums shall schedule these accordingly.

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

Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Wednesday, January 02, 2013 11:02 AM
To: Jeff Minch (jminch@WoodPatel.com); Darren Forstie (dforstie@woodpatel.com)
Cc: Richard M. Waskowsky - FCDX
Subject: FW: BHOC LOMR (Case Numbers 12-09-3189P and 13-09-0598P) - O & M Plan for Sunset Basin
Attachments: DOC010213.pdf

Jeff,

Hasan sent me the City of Phoenix O & M Plan for drainage facilities (see attached). This should satisfy FEMA issue # 3. We need to have a status meeting this month. Please find a date and time that work for you Darren and call me to coordinate schedules. Richard and I will plan on driving to your office for the meeting.

Thanks,
Jeff

From: hasan.mushtaq@phoenix.gov [<mailto:hasan.mushtaq@phoenix.gov>]
Sent: Wednesday, January 02, 2013 10:48 AM
To: Jeffery Shelton - FCDX
Subject: Re: BHOC LOMR (Case Numbers 12-09-3189P and 13-09-0598P) - O & M Plan for Sunset Basin

Here it is. Sorry, for the delay.

Thanks.

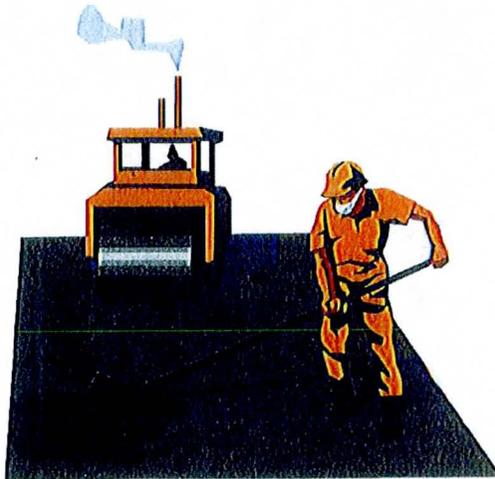
Hasan Mushtaq, P.E., Ph.D., CFM

Planning, Design, & Programming Division
Street Transportation Department
200 W. Washington Street
Phoenix, Arizona 85003-1611
602.262.4026 (W), 602.262.7322 (F)
hasan.mushtaq@phoenix.gov

Street Maintenance Division

Policy and Procedures

Manual



(Latest Revisions 6/2000)



CITY OF PHOENIX

**STREET MAINTENANCE DIVISION
POLICY AND PROCEDURE**

410

1 of 1

NUMBER

MAINTENANCE OF DRAINAGE FACILITIES

6-7-00
REV

12-2-92
ISSUE DATE

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 - f) Storm Drainage Catch Basins, Syphons and Drywells shall be cleaned on a monthly basis. The section equipped with the vectors shall schedule these accordingly.

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

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Thursday, January 03, 2013 7:31 AM
To: Jeff Minch
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

I am available today and tomorrow 6am -3pm

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Wednesday, January 02, 2013 1:12 PM
To: Weidmann, Sloane
Cc: Darren Forstie
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Sloane,

Sorry I missed your call last week. Do you have availability this week to discuss the first two additional data request items? Let me know what time works for you. Thanks.

Jeff

From: Jeff Minch
Sent: Wednesday, December 26, 2012 8:48 PM
To: 'Weidmann, Sloane'
Cc: Darren Forstie
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Sloane,

I received your voice mail this morning. Thank you for returning my call. I am out of the office until January 2nd. Can we reschedule our conference call then? Let me know what time works for you. Thanks.

Jeff

From: Jeff Minch
Sent: Friday, December 21, 2012 11:27 AM
To: Weidmann, Sloane
Cc: Darren Forstie
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Sloane,

Would you be available this afternoon to discuss the first two additional data request items? I would like to clarify so we get you the information you are requesting. If this afternoon does not work, when would be a better time to schedule? Thanks.

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal

Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

ELECTRONIC CORRESPONDENCE NOTICE: Please see <http://www.woodpatel.com/policy> for policies regarding this transmission.

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Monday, December 10, 2012 5:25 PM
To: Weidmann, Sloane
Cc: Jeff Minch; Darren Forstie; Richard M. Waskowsky - FCDX
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Sloane,

We provided documentation we thought would satisfy the officially adopted maintenance and operation plan requirement from the CLOMR acceptance letter (included in Appendix B.2) and also referred to in your December 5th letter under issue number 3. That documentation is in Appendix B.3 “Other Documentation.” We could have titled that appendix a little better given the amount of data we provided. The first 9 pages of that appendix are pertinent project email. Pages 10 through 24 are an intergovernmental agreement (IGA) between the Flood Control District of Maricopa County, the City of Glendale, and the City of Phoenix. The agreement describes the responsible parties for cost sharing of the construction and operations and maintenance of the Bethany Home Outfall Channel facility. The Sunset Detention Basin is a project element included in this IGA. Pages 17 and 18 have highlighted sections that describe operations and maintenance responsibilities. Pages 21, 22, and 23 contain the signatures of the three community officials.

Please let us know if this IGA satisfies issue number 3. I’ve carbon copied the consultants who produced the TDN report, Jeff Minch and Darren Forstie. Richard Waskowsky is with the Flood Control District of Maricopa County. Jeff Minch will call you in the next few days to make sure he understands what to do to resolve the remaining issues.

Thanks,
Jeff

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Wednesday, December 05, 2012 2:14 PM
To: jminch@woodpatel.com
Cc: Tim Phillips - FCDX; hasan.mushtaq@phoenix.gov; Jeffery Shelton - FCDX; Kuechenmeister, Joseph
Subject: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security’s Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas.

We have reviewed your request and determined that additional data are required to complete our review. The attached letter describes the data needed to continue reviewing your request. This e-mail replaces the paper copy of the letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

If we do not receive all data items outlined in the attached letter within 90 days of the date of this e-mail, 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 current fee schedule is available on the FEMA web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1 877 FEMA MAP (1 877 336 2627). If you have specific questions concerning your request, please contact the case reviewer using the information listed below, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Jeff Minch

From: Jeff Minch
Sent: Friday, January 11, 2013 11:11 AM
To: 'Weidmann, Sloane'
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph; Gabriela Griffin
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required
Attachments: BHOC LOMR Additional Data Request Case Nos 12-09-3189P, 13-09-0598P.pdf

Dear Ms. Weidmann,

Please find attached the additional data requested for the referenced Bethany Home Outfall Channel LOMR (Case Numbers 12-09-3189P and 13-09-0598P). If you have any questions or require additional information, please call or e-mail. Thank you for your assistance on this project.

Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

ELECTRONIC CORRESPONDENCE NOTICE: Please see <http://www.woodpatel.com/policy> for policies regarding this transmission.

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Wednesday, December 05, 2012 2:14 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas.

We have reviewed your request and determined that additional data are required to complete our review. The attached letter describes the data needed to continue reviewing your request. This e-mail replaces the paper copy of the letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

If we do not receive all data items outlined in the attached letter within 90 days of the date of this e-mail, 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 current fee schedule is available on the FEMA web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1 877 FEMA MAP (1 877 336 2627). If you have specific questions concerning your request, please contact the case reviewer using the information listed below, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

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Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
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.
Kenneth L. Knickerbocker, P.E., R.L.S.

January 10, 2012

Ms. Sloane Weidmann
Michael Baker, Jr., Inc.
FEMA Production and Technical Services Contractor
165 South Union Blvd
Suite 200
Lakewood, Colorado 80228

Phone: (720) 514-1116

Email: sweidmann@mbakercorp.com

Re: **Bethany Home Outfall Channel**
Letter of Map Revision (LOMR)
FEMA Additional Data Request
Case No.: 12-09-3189P and 13-09-0598P
Communities: Maricopa County, City of Glendale, City of Phoenix, AZ
Community Nos.: 040037, 040045, 040051
WP# 123818.02

Dear Ms. Sloane:

Wood, Patel & Associates, Inc. (Wood/Patel) has compiled the additional data as requested for the Bethany Home Outfall Channel (BHOC) LOMR. The additional data provided is summarized below based on the additional data request letter (enclosed) and phone conversation with Ms. Sloan Weidmann on January 3, 2013.

Item 1—As required on page 10 of the instructions for the MT-2 application/certification forms (copy enclosed), please provide a copy of the duplicate effective model for the New River, or explain why this is not necessary. This may be 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 downstream of the revised reach.

The New River watershed in the vicinity of the BHOC confluence is controlled by three upstream dams: New River Dam, Adobe Dam and Cave Creek Dam. Based on the US Army Corps of Engineers' *Gila River Basin, New River and Phoenix City Streams, Arizona, Design Memorandum No. 2, Hydrology, Part 2, 1982*; the uncontrolled watershed downstream of these dams is approximately 124 square miles. The BHOC project contributing watershed is estimated to be 47 square miles. The ratio of the contributing watersheds is approximately 0.38.

Referencing FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners, November 2009 (pg. C-35)*; the assumption of coincident peaks may be appropriate if all of the following are true:

- The ratio of the drainage areas lies between 0.6 and 1.4;
- The arrival times of flood peaks are similar for the two combining watersheds; and
- The likelihood of both watersheds being covered by the storm being modeled is high.

Bethany Home Outfall Channel LOMR
Case No. 12-09-3189P and 13-09-0598P
WP# 123818.02

Since none of the coincident peak conditions are considered applicable, the guidelines indicate the starting downstream water-surface-elevations (WSE) could be computed using normal depth calculations. The BHOC LOMR hydraulic analysis assumes a normal depth boundary condition at the New River.

In addition, the New River channelization (downstream of the BHOC confluence to the Agua Fria River) was designed to convey a Standard Project Flood (SPF) of 69,000 cfs. The *Final Design Report, Camelback Ranch Levee – North, Glendale Airport Levee, 1998* documents that the project was actually designed to convey 71,300 cfs with three feet of freeboard which is much larger than the 100-year discharge (41,000 cfs). Therefore, the New River floodplain delineation downstream of the BHOC confluence is still valid.

Item 2—In addition to submitting the above-mentioned duplicate effective model, please submit an existing conditions hydraulic model to show the effects of the increased flow from the Grand Canal, or explain why this is not necessary.

It is not believed to be necessary to evaluate the potential for increased flows in the New River (see the response to item 1).

Item 3— An officially adopted maintenance and operation plan for the Sunset Detention Basin. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished. Because the Sunset Detention Basin uses flood storage to reduce downstream discharge values, the plan also must include documentation that the flood storage in this impoundment is dedicated for flood-control purposes.

The LOMR provides an intergovernmental agreement (IGA) between the Flood Control District of Maricopa, the City of Glendale, and the City of Phoenix in Appendix B.3 (pages 10 – 24). The agreement describes the responsible parties for cost sharing of the construction, operations and maintenance of the BHOC facility (pages 17 and 18 have highlighted sections that describe operations and maintenance responsibilities). Pages 21, 22, and 23 contain the signatures of the three community officials. Additionally, attached is the City of Phoenix's *Street Maintenance Division Policy and Procedures Manual* that describes maintenance procedures for man-made detention basins. The Sunset Detention Basin is within the City of Phoenix and is covered under this manual.

Item 4—Please submit documentation of the notification to property owners who will be affected by any widening/shifting of the base (1-percent-annual-chance) floodplain along the Grand Canal.

The Arizona Department of Transportation (ADOT) owns a portion of the BHOC from the SR 101 right-of-way to the outfall with New River. Attached is a notification letter and email from ADOT with their consent of the proposed base floodplain. All property owners in the revised floodplain have been notified.

Ms. Sloane Weidmann
Michael Baker, Jr., Inc.
Bethany Home Outfall Channel LOMR
Case No. 12-09-3189P and 13-09-0598P
WP# 123818.02

January 10, 2013
Page 3 of 3

We appreciate the opportunity to discuss these comments in advance of providing the requested additional data and look forward to working with you to complete the approval of this LOMR application. Copies of the referenced documents can be provided upon request. If I can be of further assistance on this project, please do not hesitate to contact me at 602-335-8577.

Sincerely,

Wood, Patel & Associates, Inc.



Jeffrey R. Minch, P.E.
Vice President/Principal

JRM/gg



EXPIRES: 9/30/15

Enclosures: Additional Data Request Letter, City of Phoenix's *Street Maintenance Division Policy and Procedures Manual*, ADOT email and notification letter.

c: Mr. Jeffery C. Shelton, P.E.
Senior Civil Engineer
Flood Control District of Maricopa County

Mr. Timothy S. Phillips, P.E.
Chief Engineer and General Manager
Maricopa County

Mr. Greg Rodzenko, P.E.
Acting City Engineer
City of Glendale

Mr. Hasan Mushtaq, P.E., PhD, CFM
Floodplain Manager
City of Phoenix



NATIONAL FLOOD INSURANCE PROGRAM

FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

December 5, 2012

Mr. Jeffrey R. Minch, P.E.
Project Manager
Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, AZ 85021

IN REPLY REFER TO:
Case No.: 12-09-3189P
Communities: Maricopa County,
City of Glendale,
and City of Phoenix
Community Nos.: 040037, 040045, and 040051

316-AD

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas. Pertinent information about the request is listed below.

Identifier:	Bethany Home Outfall Channel
Flooding Source:	Grand Canal
FIRM Panel(s) Affected:	04013C1620H, 04013C1640F, and 04013C2105F

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 available on the FEMA website at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304 PH: 1-877-FEMA MAP

BakerAECOM, under contract with the FEDERAL EMERGENCY MANAGEMENT AGENCY, is a
Production and Technical Services Contractor for the National Flood Insurance Program

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/fees 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 Information eXchange (FMIX), toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact your case reviewer, Mrs. Sloane Weidmann, by e-mail at sweidmann@mbakercorp.com or by telephone at (720) 514-1116, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

Sincerely,



Syed Qayum, CFM
LOMR Technical Manager
BakerAECOM

Enclosure

cc: Mr. Jeffery C. Shelton, P.E.
Senior Civil Engineer
Flood Control District of Maricopa County

Mr. Timothy S. Phillips, P.E.
Chief Engineer and General Manager
Maricopa County

Mr. Greg Rodzenko, P.E.
Acting City Engineer
City of Glendale

Mr. Hasan Mushtaq, P.E., PhD, CFM
Floodplain Manager
City of Phoenix



NATIONAL FLOOD INSURANCE PROGRAM

FEMA PRODUCTION AND TECHNICAL SERVICES CONTRACTOR

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

Case No.: 12-09-3189P

Requester: Mr. Jeffrey R. Minch, P.E.

Communities: Maricopa County, City of Glendale,
and City of Phoenix

Community Nos.: 040037, 040045, and 040051

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

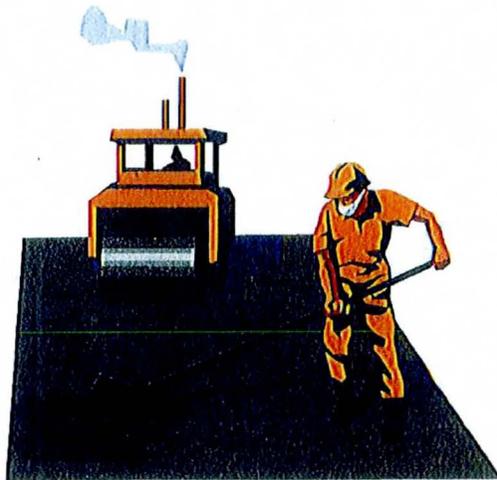
1. As required on page 10 of the instructions for the MT-2 application/certification forms (copy enclosed), please provide a copy of the duplicate effective model for the New River, or explain why this is not necessary. This may be required to ensure that the effective model's input data has been transferred 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 downstream of the revised reach.
2. In addition to submitting the above-mentioned duplicate effective model, please submit an existing conditions hydraulic model to show the effects of the increased flow from the Grand Canal, or explain why this is not necessary.
3. An officially adopted maintenance and operation plan for the Sunset Detention Basin. This plan, which may be in the form of a written statement from the community Chief Executive Officer, an ordinance, or other legislation, must describe the nature of the maintenance activities, the frequency with which they will be performed, and the title of the local community official who will be responsible for ensuring that the maintenance activities are accomplished. Because the Sunset Detention Basin uses flood storage to reduce downstream discharge values, the plan also must include documentation that the flood storage in this impoundment is dedicated for flood-control purposes.
4. Please submit documentation of the notification to property owners who will be affected by any widening/shifting of the base (1-percent-annual-chance) floodplain along the Grand Canal.

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

LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304 PH: 1-877-FEMA MAP

**BakerAECOM, under contract with the FEDERAL EMERGENCY MANAGEMENT AGENCY, is a
Production and Technical Services Contractor for the National Flood Insurance Program**

Street Maintenance Division
Policy and Procedures
Manual



(Latest Revisions 6/2000)



CITY OF PHOENIX

**STREET MAINTENANCE DIVISION
POLICY AND PROCEDURE**

410

1 of 1

NUMBER

MAINTENANCE OF DRAINAGE FACILITIES

6-7-00
REV

12-2-92
ISSUE DATE

SUBJECT

PURPOSE

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

POLICY

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

PROCEDURE

- The Street Maintenance Drainage Foreman is responsible for visually inspecting each drainage facility in their section on a monthly basis.
- The Drainage Foreman shall schedule the cleaning as needed, but is not to exceed the established service levels, unless it is determined that allowing it to exist could become an obstruction to drainage.
- The established service levels are as follows:
 - a) Man-made Drainage Easements shall be inspected on a monthly basis and cleaned if necessary.
 - b) Dedicated Natural Washes shall be inspected on a monthly basis and debris removed twice a year.
 - c) Non-dedicated Natural Washes shall be inspected twice a year and the adjacent property owner notified to clean as needed. If the property owner fails to remove the debris from the wash, the Foreman shall inform the Street Maintenance Field Investigator who will follow up by notifying NIH Zoning Enforcement.
 - d) Man-made Detention Basins shall be inspected on a monthly basis and cleaned when necessary.
 - e) Storm Drainage Inlets shall be inspected on a monthly basis and cleaned when necessary.
 - f) Storm Drainage Catch Basins, Syphons and Drywells shall be cleaned on a monthly basis. The section equipped with the vacuums shall schedule these accordingly.

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

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Monday, January 14, 2013 2:05 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: ADDITIONAL DATA Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Follow Up Flag: Follow up
Flag Status: Completed

Dear Mr. Minch:

We have received your recent submittal of data, in response to our letter dated December 5, 2012, requesting information for the above-referenced Case Number (12-09-3189P). This case number is for a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the flood hazard information on the applicable National Flood Insurance Program (NFIP) map for the City of Phoenix, 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.

The project identifier assigned to your request is Bethany Home Outfall Channel.

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 January 11, 2013.

If you have general questions about your request, FEMA policy, or the NFIP, please call the FEMA Map Information eXchange (FMIX), 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 request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 South Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.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.

Jeff Minch

From: Jeff Minch
Sent: Wednesday, January 16, 2013 6:10 PM
To: 'Weidmann, Sloane'
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; Greg Rodzenko (groddenko@glendaleaz.com); jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph; Gabriela Griffin
Subject: RE: ADDITIONAL DATA Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Ms. Weidmann,

This e-mail is acknowledgement of your receipt of the additional data submitted for Case Numbers 12-09-3189P and 13-09-0598 for the Bethany Home Outfall Channel. If there is anything I can do to assist with clarifying the additional data submitted or if you would like an electronic copy of the documents referenced in the letter, please do not hesitate to call or e-mail. Thank you for your assistance on this important LOMR for the Flood Control District of Maricopa County, City of Phoenix, and the City of Glendale.

Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

ELECTRONIC CORRESPONDENCE NOTICE: Please see <http://www.woodpatel.com/policy> for policies regarding this transmission.

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Monday, January 14, 2013 2:05 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: ADDITIONAL DATA Received – City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

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

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 South Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.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.

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Friday, February 01, 2013 7:37 AM
To: Jeff Minch
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

No need to call. What you have submitted will suffice.

Thanks!

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Thursday, January 31, 2013 6:43 PM
To: Weidmann, Sloane
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Sloane,

I received your voice mail today. I have attached a couple of pictures and the as-built channel plan and profile for your reference. The channel penetrates the levee and maintains the top of levee elevation. I will call Friday to discuss any additional questions you may have. Thanks.

Jeff

From: Jeff Minch
Sent: Wednesday, January 30, 2013 3:57 PM
To: 'Weidmann, Sloane'
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Hello Sloane,

I left a voice message for you to call. I am not sure I understand your question. The New River levee is in place and has been for a number of years. Please see the attached Google earth image. Please call and we can discuss in further detail. Thanks.

Jeff

From: Weidmann, Sloane [mailto:SWeidmann@mbakercorp.com]
Sent: Wednesday, January 30, 2013 12:30 PM
To: Jeff Minch
Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

What has happened to the Levee along the New River where the outfall channel enters?

From: Jeff Minch [mailto:jminch@WoodPatel.com]
Sent: Friday, January 11, 2013 11:11 AM
To: Weidmann, Sloane
Cc: tsp@mail.maricopa.gov; hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph; Gabriela Griffin

Subject: RE: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Ms. Weidmann,

Please find attached the additional data requested for the referenced Bethany Home Outfall Channel LOMR (Case Numbers 12-09-3189P and 13-09-0598P). If you have any questions or require additional information, please call or e-mail. Thank you for your assistance on this project.

Regards,

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

ELECTRONIC CORRESPONDENCE NOTICE: Please see <http://www.woodpatel.com/policy> for policies regarding this transmission.

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Wednesday, December 05, 2012 2:14 PM
To: Jeff Minch
Cc: 'tsp@mail.maricopa.gov' (tsp@mail.maricopa.gov); hasan.mushtaq@phoenix.gov; jefferyshelton@mail.maricopa.gov; Kuechenmeister, Joseph
Subject: Additional Data Required for the City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Number 12-09-3189P) – Response Required

Dear Mr. Minch:

This responds to your request dated September 21, 2012, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for Maricopa County, Arizona and Incorporated Areas.

We have reviewed your request and determined that additional data are required to complete our review. The attached letter describes the data needed to continue reviewing your request. This e-mail replaces the paper copy of the letters previously issued by FEMA. We ask that you please respond directly to this e-mail to verify that it has been received.

If we do not receive all data items outlined in the attached letter within 90 days of the date of this e-mail, 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 current fee schedule is available on the FEMA web site at http://www.fema.gov/plan/prevent/fhm/frm_fees.shtm for your information.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program, please call the FEMA Map Information eXchange (FMIX), toll free, at 1 877 FEMA MAP (1 877 336 2627). If you have specific questions concerning your request, please contact the case reviewer using the information listed below, or the Revisions Coordinator for your request, Mr. Joseph Kuechenmeister, P.E., CFM, at jkuechenmeister@mbakercorp.com or at (720) 479-3181.

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

Thank you,

Sloane Weidmann
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Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Wednesday, February 06, 2013 10:20 AM
To: Jeffery Shelton - FCDX
Subject: RE: City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Numbers 12-09-3189P and 13-09-0598P) – Preliminary Floodplain GIS

yes

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Wednesday, February 06, 2013 9:50 AM
To: Weidmann, Sloane
Cc: Richard M. Waskowsky - FCDX
Subject: City of Phoenix, City of Glendale, and Maricopa County, AZ (Case Numbers 12-09-3189P and 13-09-0598P) – Preliminary Floodplain GIS

Mrs. Weidmann:

After we have resolved all comments and moved to the mapping phase, could you send me your draft of the GIS floodplain so we can review them before they are finalized? We would like to give it a quick review to see that it matches our work map floodplains.

Thanks,
Jeff

Jeff Shelton, P.E., Senior Civil Engineer
Flood Control District of Maricopa County
2801 W. Durango Street
Phoenix, Arizona 85009

Direct: (602) 506-4486
Fax: (602) 506-4601
FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Thursday, March 07, 2013 6:54 AM
To: Jeffery Shelton - FCDX
Subject: 12-09-3189P and 13-09-0598P annotation
Attachments: S_FIRM_PAN.dbf; S_FIRM_PAN.prj; S_FIRM_PAN.sbn; S_FIRM_PAN.sbx; S_FIRM_PAN.shp;
S_FIRM_PAN.shp.xml; S_FIRM_PAN.shx; S_FLD_HAZ_AR.dbf; S_FLD_HAZ_AR.prj;
S_FLD_HAZ_AR.shp; S_FLD_HAZ_AR.shx; S_FLD_HAZ_LN.dbf; S_FLD_HAZ_LN.prj;
S_FLD_HAZ_LN.shp; S_FLD_HAZ_LN.shx; S_GEN_STRUCT.dbf; S_GEN_STRUCT.prj;
S_GEN_STRUCT.shp; S_GEN_STRUCT.shx; S_LOMR.dbf; S_LOMR.prj; S_LOMR.sbn;
S_LOMR.sbx; S_LOMR.shp; S_LOMR.shp.xml; S_LOMR.shx; S_WTR_LN.dbf; S_WTR_LN.prj;
S_WTR_LN.shp; S_WTR_LN.shx

I had our GIS group included the three affected panels and clipped everything to that area. They also included the general structures and water lines in addition to the flood lines and areas. Please let me know if you need anything else.

Thank you,
Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Thursday, March 07, 2013 9:52 AM
To: 'Weidmann, Sloane'
Subject: RE: 12-09-3189P and 13-09-0598P annotation
Attachments: S_FLD_HAZ_LN_shifted.shx; ExampleWithAerial.pdf; FCDMC_BHOC_floodplain.dbf; FCDMC_BHOC_floodplain.sbn; FCDMC_BHOC_floodplain.sbx; FCDMC_BHOC_floodplain.shp; FCDMC_BHOC_floodplain.shx; S_FLD_HAZ_LN_shifted.dbf; S_FLD_HAZ_LN_shifted.prj; S_FLD_HAZ_LN_shifted.sbn; S_FLD_HAZ_LN_shifted.sbx; S_FLD_HAZ_LN_shifted.shp

Hi Sloane,

Well, I'm glad I asked for the files. They are not at the same location as our floodplains. The .dxf files I sent you did not have a projection. That was my oversight. They are, however, at the correct location relative to our aerial photography (see attached ExampleWithAerial.pdf). The orange line is your floodplain and the blue line is ours. I've attached shapefiles for both of these lines so you have a reference to the correct location. If you assign the correct projection to our floodplain, the blue line, it will project to your floodplain exactly. So, unfortunately, to be correct your floodplain with the right projection needs to be moved to the blue line.

Call if you would like to discuss. Thanks for letting me review this.

Jeff

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Thursday, March 07, 2013 6:54 AM
To: Jeffery Shelton - FCDX
Subject: 12-09-3189P and 13-09-0598P annotation

I had our GIS group included the three affected panels and clipped everything to that area. They also included the general structures and water lines in addition to the flood lines and areas. Please let me know if you need anything else.

Thank you,
Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com



Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Thursday, March 07, 2013 10:07 AM
To: 'Weidmann, Sloane'
Cc: Amir Motamedi - FCDX
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Sloane,

I'm having our consultant convert the .dxf to a shapefile with projection to save you some work. He'll get that to me by the end of the day.

Thanks,
Jeff

From: Jeffery Shelton - FCDX
Sent: Thursday, March 07, 2013 9:52 AM
To: 'Weidmann, Sloane'
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Hi Sloane,

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Call if you would like to discuss. Thanks for letting me review this.

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Sent: Thursday, March 07, 2013 6:54 AM
To: Jeffery Shelton - FCDX
Subject: 12-09-3189P and 13-09-0598P annotation

I had our GIS group included the three affected panels and clipped everything to that area. They also included the general structures and water lines in addition to the flood lines and areas. Please let me know if you need anything else.

Thank you,
Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Monday, March 11, 2013 8:13 AM
To: 'Weidmann, Sloane'
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Sorry, I didn't get back to you last week. I said that the consultant would get the converted line work back to me by the end of the day on the 7th. They ran into mapping issues where the converted mapping didn't match the aerial photo at a few isolated locations. They are making those small changes and should have it to me today.

Hope I am not holding you up too much.

Thanks,
Jeff

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Thursday, March 07, 2013 6:54 AM
To: Jeffery Shelton - FCDX
Subject: 12-09-3189P and 13-09-0598P annotation

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Sloane Weidmann
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Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

Jeff Minch

From: Jeffery Shelton - FCDX
Sent: Tuesday, March 19, 2013 9:55 AM
To: 'Weidmann, Sloane'
Subject: RE: 12-09-3189P and 13-09-0598P annotation

They look accurate. Thank you.

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Tuesday, March 19, 2013 8:23 AM
To: Jeffery Shelton - FCDX
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Here are the revised shapefiles. Let me know if they look accurate.

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Monday, March 18, 2013 10:36 AM
To: Weidmann, Sloane
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Were you able to retrieve the files from the eftp I sent Wednesday?

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Wednesday, March 13, 2013 7:55 AM
To: Jeffery Shelton - FCDX
Subject: RE: 12-09-3189P and 13-09-0598P annotation

I tried renaming the zip file, but it did not work. Can you eftp me the file?

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Monday, March 11, 2013 5:22 PM
To: Weidmann, Sloane
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Sloane,

Here are the floodplains at the correct location and projection. I've attached three pdf's of where the mapping was corrected. Give me a call if you would like to discuss. (rename shp BHOC 3.7.13.txt to shp BHOC 3.7.13.zip)

Thanks,
Jeff

From: Jeffery Shelton - FCDX
Sent: Monday, March 11, 2013 8:13 AM
To: 'Weidmann, Sloane'
Subject: RE: 12-09-3189P and 13-09-0598P annotation

Sorry, I didn't get back to you last week. I said that the consultant would get the converted line work back to me by the end of the day on the 7th. They ran into mapping issues where the converted mapping didn't match the aerial photo at a few isolated locations. They are making those small changes and should have it to me today.

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Jeff

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Sent: Thursday, March 07, 2013 6:54 AM

To: Jeffery Shelton - FCDX

Subject: 12-09-3189P and 13-09-0598P annotation

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Sloane Weidmann
FEMA Production and Technical Services Contractor
165 Union Blvd., Suite 200
Lakewood, CO 80228
(720) 514-1116
sweidmann@mbakercorp.com

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Friday, April 05, 2013 8:13 AM
To: Jeffery Shelton - FCDX
Subject: RE: LOMR 12-09-3189P
Attachments: 12-09-3189P-040037-CL.pdf; 12-09-3189P-040037-102D.pdf

Here are pdfs. Let me know if you need the hard copies. I will send the other communities as well in separate e-mails.

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Thursday, April 04, 2013 4:50 PM
To: Weidmann, Sloane
Subject: RE: LOMR 12-09-3189P

Hi Sloane, still no sign of 12-09-3189P.

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Tuesday, April 02, 2013 11:38 AM
To: Jeffery Shelton - FCDX
Subject: RE: LOMR 12-09-3189P

You should have already received it as it was mailed on 3/25/2013. 13-09-0598P was mailed o 3/27/2013. Let me know if you do not receive 12-09-3189P within the next couple of days.

From: Jeffery Shelton - FCDX [JefferyShelton@mail.maricopa.gov]
Sent: Tuesday, April 02, 2013 12:33 PM
To: Weidmann, Sloane
Cc: Jeff Minch (jminch@WoodPatel.com); Richard M. Waskowsky - FCDX
Subject: LOMR 12-09-3189P

Sloane,
We received LOMR 13-09-0598P, thank you. When can we expect to see LOMR 12-09-3189P?
Jeff

Jeff Shelton, P.E. | Senior Civil Engineer | Engineering Division | Flood Control District of Maricopa County
Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov



Federal Emergency Management Agency

Washington, D.C. 20472

March 21, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:

Case No.: 12-09-3189P
Follows Conditional
Case No.: 03-09-0640R
Community Name: Maricopa County, AZ
Community No.: 040037
Effective Date of
This Revision: **August 2, 2013**

Dear Mr. Kunasek:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable Jerry Weiers
Mayor, City of Glendale

Mr. Timothy S. Phillips, P.E.
Chief Engineer and General Manager
Maricopa County

Mr. Jeffery C. Shelton
Flood Control District of Maricopa County

Follows Conditional Case No.: 03-09-0640R



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Maricopa County Arizona (Unincorporated Areas)	BRIDGE CHANNELIZATION CULVERT DETENTION BASIN	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040037		
IDENTIFIER	Bethany Home Outfall Channel Downstream Revision	APPROXIMATE LATITUDE & LONGITUDE: 33.523, -112.257 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 04013C1620H DATE: September 30, 2005		NO REVISION TO THE FLOOD INSURANCE STUDY REPORT	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Bethany Home Outfall Channel - from the confluence with the New River to approximately 550 feet upstream of 83rd Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Bethany Home Outfall Channel	Zone X (shaded)	Zone A	YES	NONE

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040045 **Name:** City of Glendale, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1620H DATE: September 30, 2005
TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure 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 ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

A handwritten signature in black ink, appearing to read "Siamak Esfandiary".

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We are processing an updated countywide FIRM and FIS report for Maricopa County, Arizona, and its incorporated areas. This FIRM and FIS report, which include flood hazard information for your community, are projected to become effective in October 2013. Therefore, we will not incorporate the modifications made by this LOMR into the new FIRM and FIS report before they become effective, and the modifications made by this LOMR will be superseded when the new FIRM and FIS report become effective. After the effective date, we will issue a letter to reissue the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

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Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

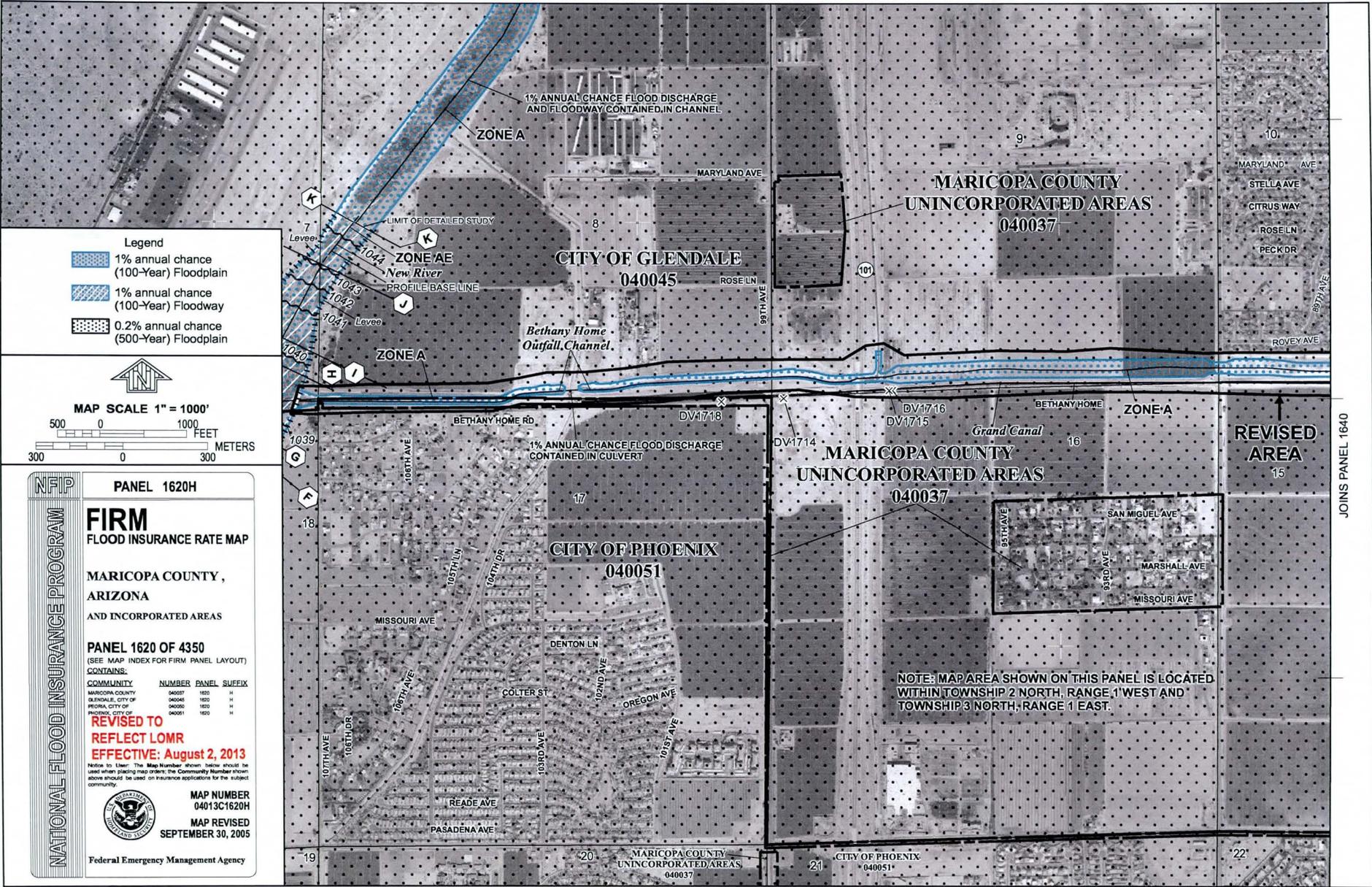
LOCAL NEWSPAPER Name: *The Arizona Business Gazette*
 Dates: March 28, 2013 and April 4, 2013

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

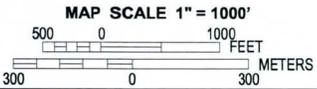
A handwritten signature in blue ink, appearing to read "Siamak Esfandiary".

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Legend

- 1% annual chance (100-Year) Floodplain
- 1% annual chance (100-Year) Floodway
- 0.2% annual chance (500-Year) Floodplain



NFP

PANEL 1620H

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS

PANEL 1620 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL SUFFIX
MARICOPA COUNTY	040037	1620 H
GLENDALE, CITY OF	040045	1620 H
PHOENIX, CITY OF	040051	1620 H

REVISED TO REFLECT LOMR EFFECTIVE: August 2, 2013

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 04013C1620H
MAP REVISED SEPTEMBER 30, 2005

Federal Emergency Management Agency

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

CITY OF GLENDALE
040045

CITY OF PHOENIX
040051

MARICOPA COUNTY
UNINCORPORATED AREAS
040037

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 1 WEST AND TOWNSHIP 3 NORTH, RANGE 1 EAST.

JOINS PANEL 1640

Jeff Minch

From: Weidmann, Sloane <SWeidmann@mbakercorp.com>
Sent: Friday, April 05, 2013 8:24 AM
To: Jeff Minch
Subject: FW: LOMR 12-09-3189P
Attachments: 12-09-3189P-040037-CL.pdf; 12-09-3189P-040037-102D.pdf; 12-09-3189P-040045-CL.pdf; 12-09-3189P-040045-102D.pdf

Here is a copy of the final determination for 12-09-3189P. Let me know if you need a hard copy.

Thank you,

Sloane Weidmann
FEMA Production and Technical Services Contractor
165 S. Union Blvd., Suite 200
Lakewood, CO 80228
720-514-1116
sweidmann@mbakercorp.com

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Friday, April 05, 2013 9:16 AM
To: Weidmann, Sloane
Subject: RE: LOMR 12-09-3189P

Yes. Our consultant Jeff Minch hasn't received 12-09-3189P either. We both received 13-09-0598P.

From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Friday, April 05, 2013 7:04 AM
To: Jeffery Shelton - FCDX
Subject: RE: LOMR 12-09-3189P

Is this your correct mailing address?

Mr. Jeffery C. Shelton
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, AZ 85009

From: Jeffery Shelton - FCDX [<mailto:JefferyShelton@mail.maricopa.gov>]
Sent: Thursday, April 04, 2013 4:50 PM
To: Weidmann, Sloane
Subject: RE: LOMR 12-09-3189P

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From: Weidmann, Sloane [<mailto:SWeidmann@mbakercorp.com>]
Sent: Tuesday, April 02, 2013 11:38 AM
To: Jeffery Shelton - FCDX
Subject: RE: LOMR 12-09-3189P

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Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

Jeff Minch

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Sent: Friday, April 05, 2013 8:50 AM
Subject: RE: LOMR 12-09-3189P

Hello Sloane,

Thank you for a copy of the final determination. No hard copy is necessary. It was a pleasure working with you on this LOMR. Thank you again for your assistance and timely response!

Jeff

Jeffrey R. Minch, P.E., Vice President/Principal
Wood/Patel – Mission: Client Service™
Direct: (602) 335-8577 / Cell: (602) 695-5487
Email: jminch@woodpatel.com

ELECTRONIC CORRESPONDENCE NOTICE: Please see <http://www.woodpatel.com/policy> for policies regarding this transmission.

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Direct: (602) 506-4486 | Fax: (602) 506-4601 | FCDMC Main: (602) 506-1501
jefferyshelton@mail.maricopa.gov

B.5 – FEMA LOMRs



Federal Emergency Management Agency

Washington, D.C. 20472

March 21, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:

Case No.: 12-09-3189P
Follows Conditional
Case No.: 03-09-0640R
Community Name: Maricopa County, AZ
Community No.: 040037
Effective Date of
This Revision: **August 2, 2013**

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Sincerely,

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable Jerry Weiers
Mayor, City of Glendale

Mr. Timothy S. Phillips, P.E.
Chief Engineer and General Manager
Maricopa County

Mr. Jeffery C. Shelton
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Follows Conditional Case No.: 03-09-0640R



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

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IDENTIFIER	Bethany Home Outfall Channel Downstream Revision	APPROXIMATE LATITUDE & LONGITUDE: 33.523, -112.257 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
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Enclosures reflect changes to flooding sources affected by this revision.

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Bethany Home Outfall Channel - from the confluence with the New River to approximately 550 feet upstream of 83rd Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Bethany Home Outfall Channel	Zone X (shaded)	Zone A	YES	NONE

* BFEs - Base Flood Elevations

DETERMINATION

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Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.BKR.12093189P.H20 102-D



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040045 **Name:** City of Glendale, Arizona

AFFECTED MAP PANELS

TYPE: FIRM* NO.: 04013C1620H DATE: September 30, 2005
TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005

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Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
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We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We are processing an updated countywide FIRM and FIS report for Maricopa County, Arizona, and its incorporated areas. This FIRM and FIS report, which include flood hazard information for your community, are projected to become effective in October 2013. Therefore, we will not incorporate the modifications made by this LOMR into the new FIRM and FIS report before they become effective, and the modifications made by this LOMR will be superseded when the new FIRM and FIS report become effective. After the effective date, we will issue a letter to reissue the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

A handwritten signature in black ink, appearing to read "Siamak Esfandiary".

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

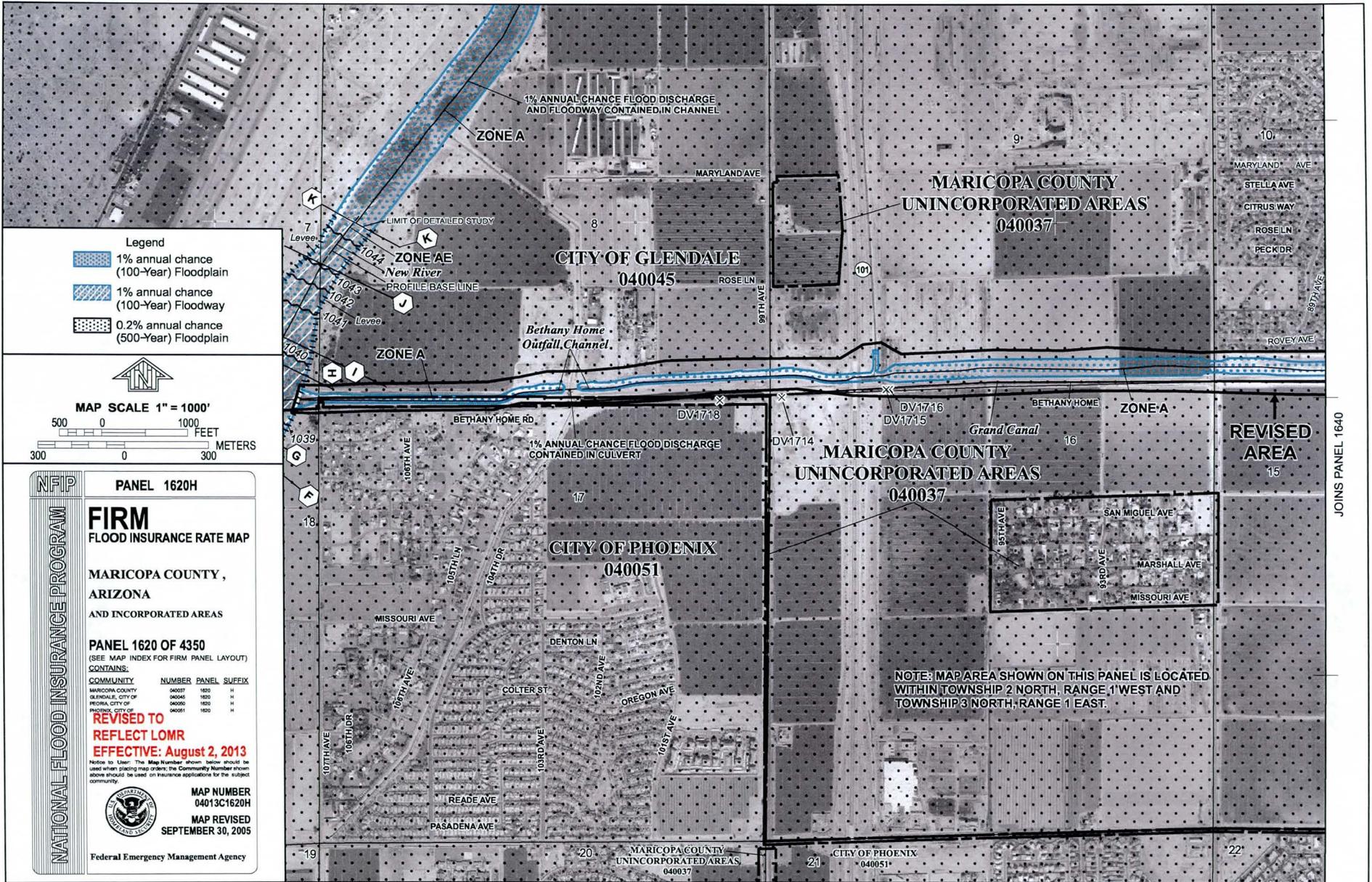
LOCAL NEWSPAPER Name: *The Arizona Business Gazette*
 Dates: March 28, 2013 and April 4, 2013

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

A handwritten signature in blue ink, appearing to read "Siamak Esfandiary".

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



JOINS PANEL 1640

Legend

- 1% annual chance (100-Year) Floodplain
- 1% annual chance (100-Year) Floodway
- 0.2% annual chance (500-Year) Floodplain

MAP SCALE 1" = 1000'

500 0 1000 FEET

300 0 300 METERS

NFP

PANEL 1620H

FIRM FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 1620 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1620	H
GLENDALE, CITY OF	040045	1620	H
PHOENIX, CITY OF	040051	1620	H

REVISED TO REFLECT LOMR EFFECTIVE: August 2, 2013

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

MAP NUMBER 04013C1620H

MAP REVISED SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 1 WEST AND TOWNSHIP 3 NORTH, RANGE 1 EAST.



Federal Emergency Management Agency

Washington, D.C. 20472

March 21, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Jerry Weiers
Mayor, City of Glendale
5850 West Glendale Avenue
Glendale, AZ 85301

IN REPLY REFER TO:

Case No.: 12-09-3189P
Follows Conditional Case No.: 03-09-0640R
Community Name: City of Glendale, AZ
Community No.: 040045
Effective Date of
This Revision: **August 2, 2013**

Dear Mayor Weiers:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable Andy Kunasek
Chairman, Maricopa County
Board of Supervisors

Mr. Greg Rodzenko, P.E.
Acting City Engineer

Mr. Jeffery C. Shelton
Senior Civil Engineer
Flood Control District of Maricopa County

Follows Conditional Case No.: 03-09-0640R



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Glendale Maricopa County Arizona	BRIDGE CHANNELIZATION CULVERT	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040045		
IDENTIFIER	Bethany Home Outfall Channel Downstream Revision	APPROXIMATE LATITUDE & LONGITUDE: 33.523, -112.257 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM*	NO.: 04013C1640F	DATE: September 30, 2005	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM*	NO.: 04013C1620H	DATE: September 30, 2005	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Bethany Home Outfall Channel - from the confluence with the New River to approximately 550 feet upstream of 83rd Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Bethany Home Outfall Channel	Zone X (shaded)	Zone A	YES	NONE

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.BKR.12093189P.H20 102-D



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040037 **Name:** Maricopa County, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1620H DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure 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 ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

A handwritten signature in black ink, appearing to read "Siamak Esfandiary".

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

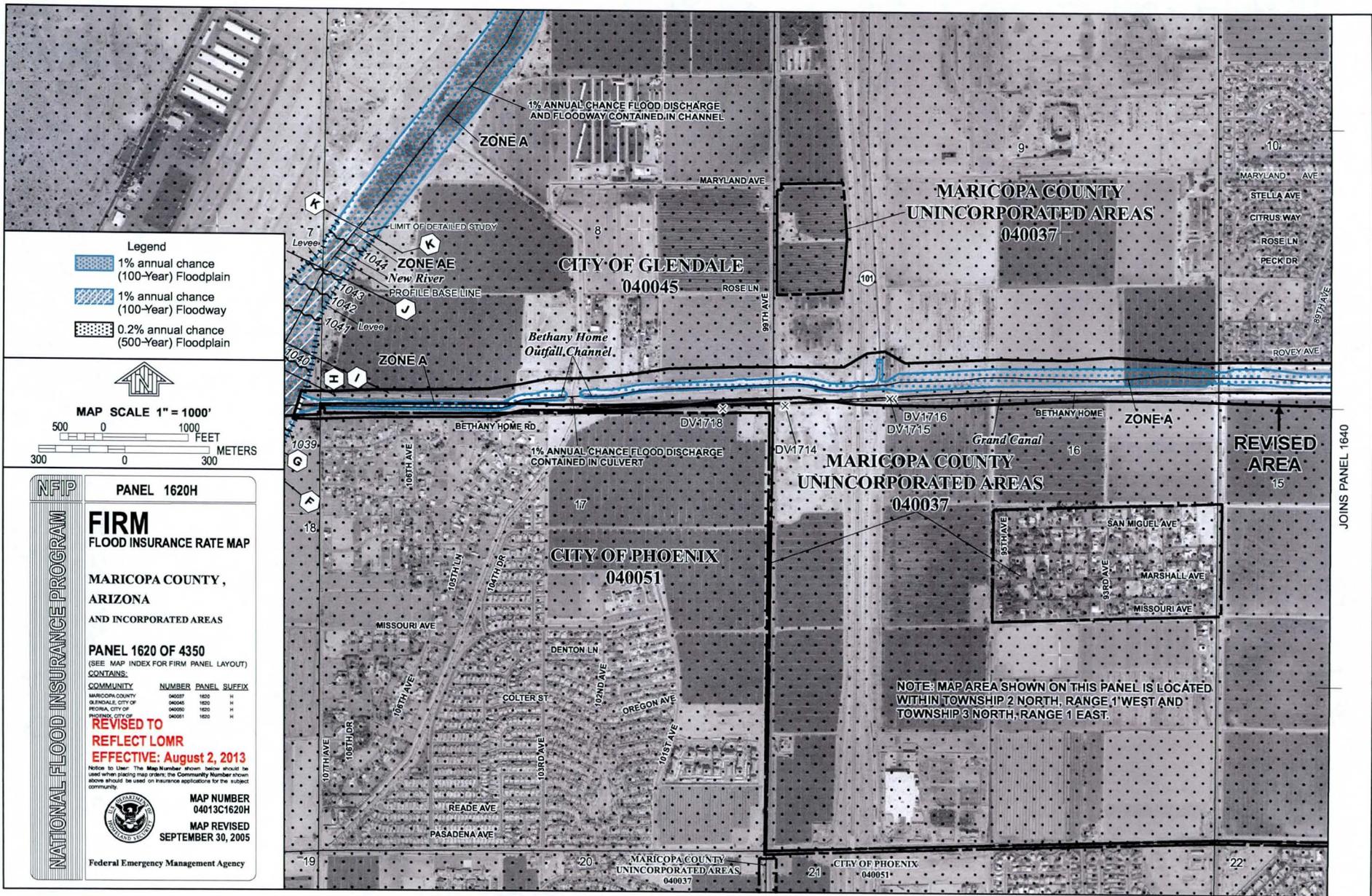
We are processing an updated countywide FIRM and FIS report for Maricopa County, Arizona, and its incorporated areas. This FIRM and FIS report, which include flood hazard information for your community, are projected to become effective in October 2013. Therefore, we will not incorporate the modifications made by this LOMR into the new FIRM and FIS report before they become effective, and the modifications made by this LOMR will be superseded when the new FIRM and FIS report become effective. After the effective date, we will issue a letter to reissue the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

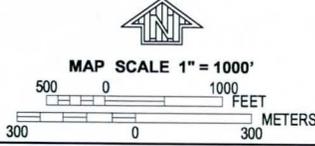
A handwritten signature in black ink, appearing to read "Siamak Esfandiary".

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.BKR.12093189P.H20 102-D



- Legend**
- 1% annual chance (100-Year) Floodplain
 - 1% annual chance (100-Year) Floodway
 - 0.2% annual chance (500-Year) Floodplain



NFP
PANEL 1620H

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 1620 OF 4350
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1620	H
GLENDALE CITY OF	040045	1620	H
PHOENIX CITY OF	040051	1620	H
SCOTTSDALE CITY OF	040050	1620	H
TEMPE CITY OF	040051	1620	H

REVISED TO REFLECT LOMR
EFFECTIVE: August 2, 2013

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
 04013C1620H

MAP REVISED
 SEPTEMBER 30, 2005

Federal Emergency Management Agency

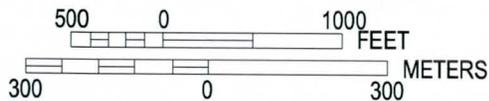
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 1 WEST AND TOWNSHIP 3 NORTH, RANGE 1 EAST.

JOINS PANEL 1640

- Legend
-  1% annual chance (100-Year) Floodplain
 -  1% annual chance (100-Year) Floodway
 -  0.2% annual chance (500-Year) Floodplain



MAP SCALE 1" = 1000'



NFIP

PANEL 1640F

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA
AND INCORPORATED AREAS

PANEL 1640 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1640	F
GLENDALE, CITY OF	040045	1640	F
PEORIA, CITY OF	040050	1640	F
PHOENIX, CITY OF	040051	1640	F

**REVISED TO
REFLECT LOMR
EFFECTIVE: August 2, 2013**

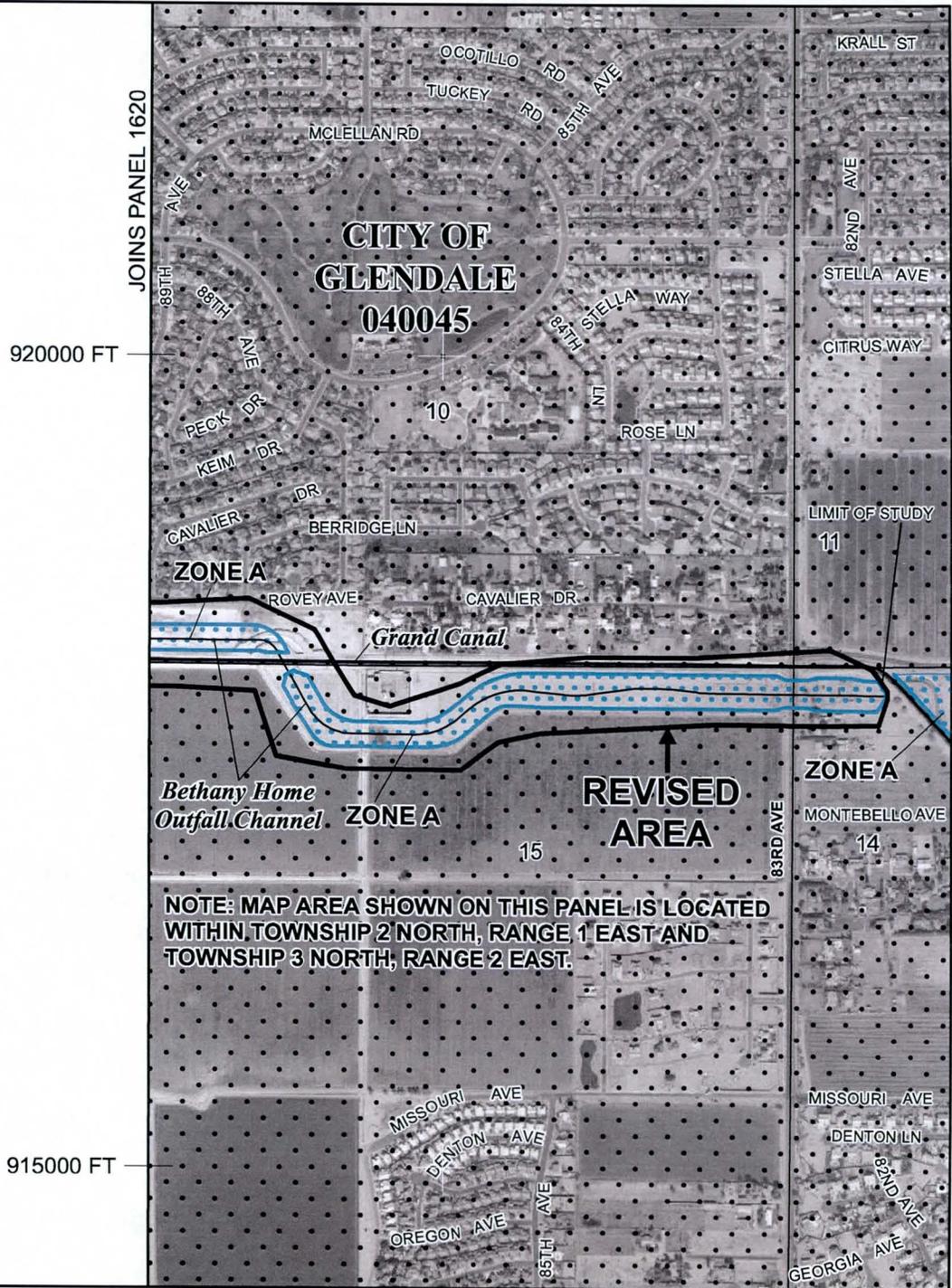
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
04013C1640F

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency





Federal Emergency Management Agency

Washington, D.C. 20472

March 26, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors
301 West Jefferson, 10th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:

Case No.: 13-09-0598P
Follows Conditional Case No.: 03-09-0640R
Community Name: Maricopa County, AZ
Community No.: 040037
Effective Date of
This Revision: **August 9, 2013**

Dear Mr. Kunasek:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Beth A Norton

Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable Jerry Weiers
Mayor, City of Glendale

Mr. Jeffery C. Shelton
Flood Control District of Maricopa County

The Honorable Greg Stanton
Mayor, City of Phoenix
Mayor's Office

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

Mr. Timothy S. Phillips, P.E.
Chief Engineer and General Manager
Maricopa County

RECEIVED
APR 01 2013
WOOD/PATEL

Follows Conditional Case No.: 03-09-0640R



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Maricopa County Arizona (Unincorporated Areas)	CHANNELIZATION CULVERT DETENTION BASIN	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040037		
IDENTIFIER	Bethany Home Outfall Channel Upstream Revision	APPROXIMATE LATITUDE & LONGITUDE: 33.499, -112.203 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM*	NO.: 04013C1640F DATE: September 30, 2005	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT	

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Bethany Home Outfall Channel - from approximately 550 feet upstream of 83rd Avenue to just upstream of 63rd Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Bethany Home Outfall Channel	Zone A	Zone A	NONE	YES

* BFES - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040045 **Name:** City of Glendale, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

CID Number: 040051 **Name:** City of Phoenix, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005
TYPE: FIRM* NO.: 04013C2105F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure 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 ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We are processing an updated countywide FIRM and FIS report for Maricopa County, Arizona, and its incorporated areas. This FIRM and FIS report, which include flood hazard information for your community, are projected to become effective in October 2013. Therefore, we will not incorporate the modifications made by this LOMR into the new FIRM and FIS report before they become effective, and the modifications made by this LOMR will be superseded when the new FIRM and FIS report become effective. After the effective date, we will issue a letter to reissue the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

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Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

March 26, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Jerry Weiers
Mayor, City of Glendale
5850 West Glendale Avenue
Glendale, AZ 85301

IN REPLY REFER TO:

Case No.: 13-09-0598P
Follows Conditional Case No.: 03-09-0640R
Community Name: City of Glendale, AZ
Community No.: 040045
Effective Date of
This Revision: **August 9, 2013**

Dear Mayor Weiers:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors

The Honorable Greg Stanton
Mayor, City of Phoenix
Mayor's Office

Mr. Greg Rodzenko, P.E.
Acting City Engineer
City of Glendale

Mr. Jeffery C. Shelton
Senior Civil Engineer
Flood Control District of Maricopa County

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

Follows Conditional Case No.: 03-09-0640R



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT**

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Glendale Maricopa County Arizona	CHANNELIZATION CULVERT DETENTION BASIN	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040045		
IDENTIFIER	Bethany Home Outfall Channel Upstream Revision	APPROXIMATE LATITUDE & LONGITUDE: 33.499, -112.203 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005		NO REVISION TO THE FLOOD INSURANCE STUDY REPORT	

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Bethany Home Outfall Channel - from approximately 550 feet upstream of 83rd Avenue to just upstream of 63rd Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Bethany Home Outfall Channel	Zone A	Zone A	YES	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040037 **Name:** Maricopa County, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

CID Number: 040051 **Name:** City of Phoenix, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005
TYPE: FIRM* NO.: 04013C2105F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.


Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure 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 ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We are processing an updated countywide FIRM and FIS report for Maricopa County, Arizona, and its incorporated areas. This FIRM and FIS report, which include flood hazard information for your community, are projected to become effective in October 2013. Therefore, we will not incorporate the modifications made by this LOMR into the new FIRM and FIS report before they become effective, and the modifications made by this LOMR will be superseded when the new FIRM and FIS report become effective. After the effective date, we will issue a letter to reissue the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

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Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

March 26, 2013

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Greg Stanton
Mayor, City of Phoenix
Mayor's Office
200 West Washington Street, 11th Floor
Phoenix, AZ 85003

IN REPLY REFER TO:

Case No.: 13-09-0598P
Follows Conditional
Case No.: 03-09-0640R
Community Name: City of Phoenix, AZ
Community No.: 040051
Effective Date of
This Revision: **August 9, 2013**

Dear Mayor Stanton:

The Flood Insurance Rate Map for your community has been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Oakland, California, at (510) 627-7175, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Beth A Norton

Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

For: Luis Rodriguez, P.E., Chief
Engineering Management Branch
Federal Insurance and Mitigation Administration

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map

cc: The Honorable Andy Kunasek
Chairman, Maricopa County Board of Supervisors

The Honorable Jerry Weiers
Mayor, City of Glendale

Dr. Hasan Mushtaq, P.E., Ph.D., CFM
Floodplain Administrator
City of Phoenix

Mr. Jeffery C. Shelton
Senior Civil Engineer
Flood Control District of Maricopa County

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

Follows Conditional Case No.: 03-09-0640R



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Phoenix Maricopa County Arizona	CHANNELIZATION CULVERT DETENTION BASIN	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 040051		
IDENTIFIER	Bethany Home Outfall Channel Upstream Revision	APPROXIMATE LATITUDE & LONGITUDE: 33.499, -112.203 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM*	NO.: 04013C2105F	NO REVISION TO THE FLOOD INSURANCE STUDY REPORT	
TYPE: FIRM*	NO.: 04013C1640F		
DATE: September 30, 2005			
DATE: September 30, 2005			

Enclosures reflect changes to flooding sources affected by this revision.

* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Bethany Home Outfall Channel - from approximately 550 feet upstream of 83rd Avenue to just upstream of 63rd Avenue

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Bethany Home Outfall Channel	Zone A	Zone A	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

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Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

132942 PT202.BKR.13090598P.H20 102-D



Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

CID Number: 040037 **Name:** Maricopa County, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

CID Number: 040045 **Name:** City of Glendale, Arizona

AFFECTED MAP PANELS

AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT

TYPE: FIRM* NO.: 04013C1640F DATE: September 30, 2005

NO REVISION TO THE FLOOD INSURANCE STUDY REPORT

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.


Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

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COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

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Engineering Management Branch
Federal Insurance and Mitigation Administration



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

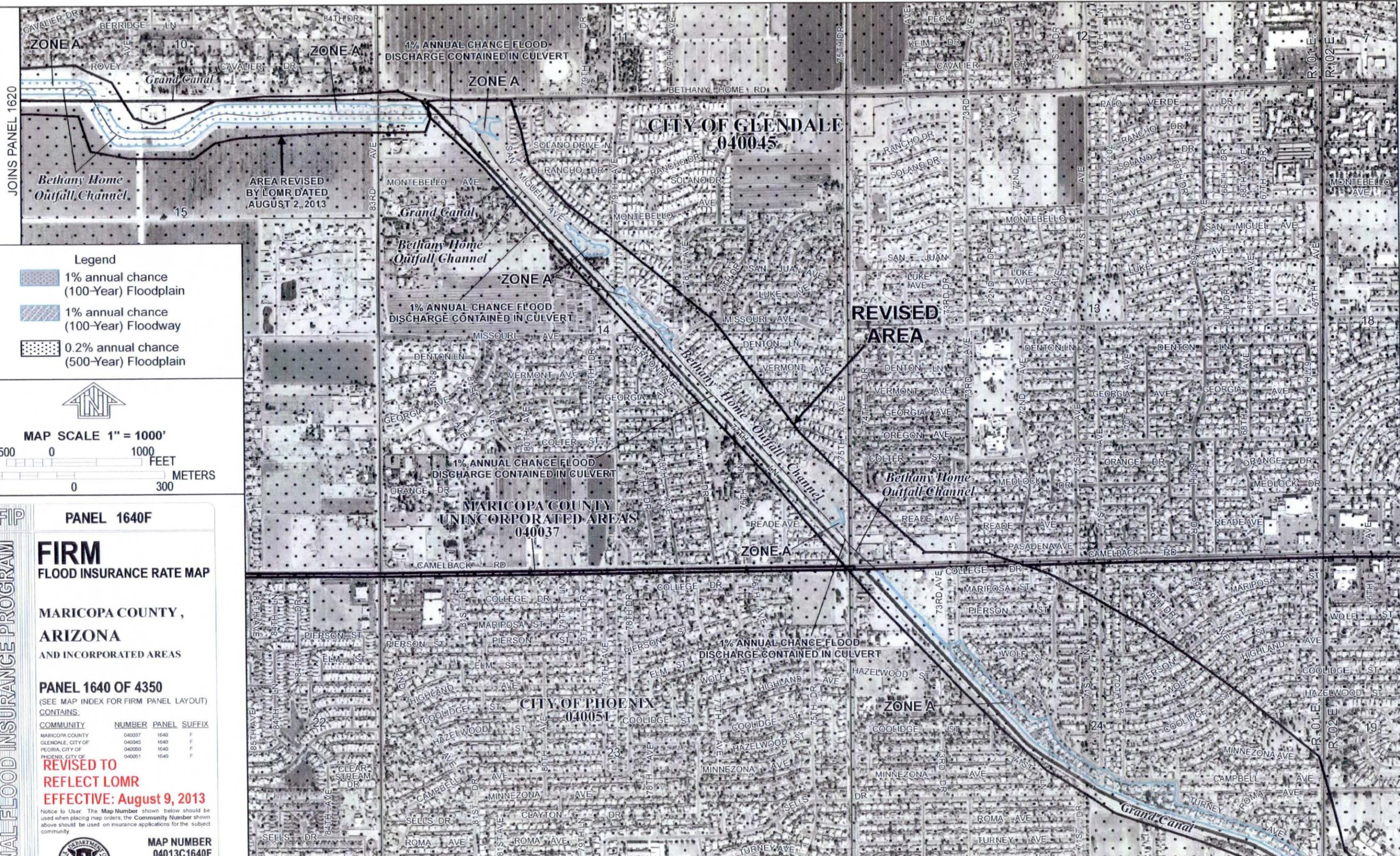
Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We are processing an updated countywide FIRM and FIS report for Maricopa County, Arizona, and its incorporated areas. This FIRM and FIS report, which include flood hazard information for your community, are projected to become effective in October 2013. Therefore, we will not incorporate the modifications made by this LOMR into the new FIRM and FIS report before they become effective, and the modifications made by this LOMR will be superseded when the new FIRM and FIS report become effective. After the effective date, we will issue a letter to reissue the modifications made by this LOMR and revise the newly effective FIRM and FIS report.

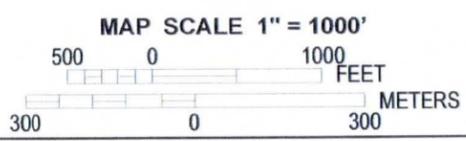
This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 847 South Pickett Street, Alexandria, VA 22304-4605. Additional Information about the NFIP is available on our website at <http://www.fema.gov/business/nfip>.

Siamak Esfandiary, Ph.D., P.E., Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration



JOINS PANEL 1620

- Legend**
- 1% annual chance (100-Year) Floodplain
 - 1% annual chance (100-Year) Floodway
 - 0.2% annual chance (500-Year) Floodplain



NATIONAL FLOOD INSURANCE PROGRAM

NFIP PANEL 1640F

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 1640 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT) CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	1640	F
GLENDALE CITY OF	040045	1640	F
PHOENIX CITY OF	040050	1640	F
PHOENIX CITY OF	040051	1640	F

REVISED TO REFLECT LOMR EFFECTIVE: August 9, 2013

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.

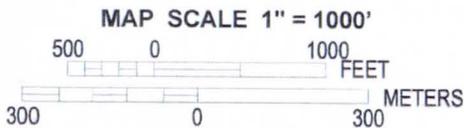
MAP NUMBER 04013C1640F
MAP REVISED SEPTEMBER 30, 2005

Federal Emergency Management Agency

385°00m E 386°00m E 387°00m E 388°00m E

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 2 NORTH, RANGE 1 EAST AND TOWNSHIP 3 NORTH, RANGE 2 EAST.

- Legend**
-  1% annual chance (100-Year) Floodplain
 -  1% annual chance (100-Year) Floodway
 -  0.2% annual chance (500-Year) Floodplain



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 1 NORTH, RANGE 1 EAST AND TOWNSHIP 2 NORTH, RANGE 2 EAST.

JOINS PANEL 1640 615000 FT

NFIP

PANEL 2105F

NATIONAL FLOOD INSURANCE PROGRAM

FIRM FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

PANEL 2105 OF 4350
(SEE MAP INDEX FOR FIRM PANEL LAYOUT) CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2105	F
PHOENIX, CITY OF	040051	2105	F
TOLLESON, CITY OF	040065	2105	F

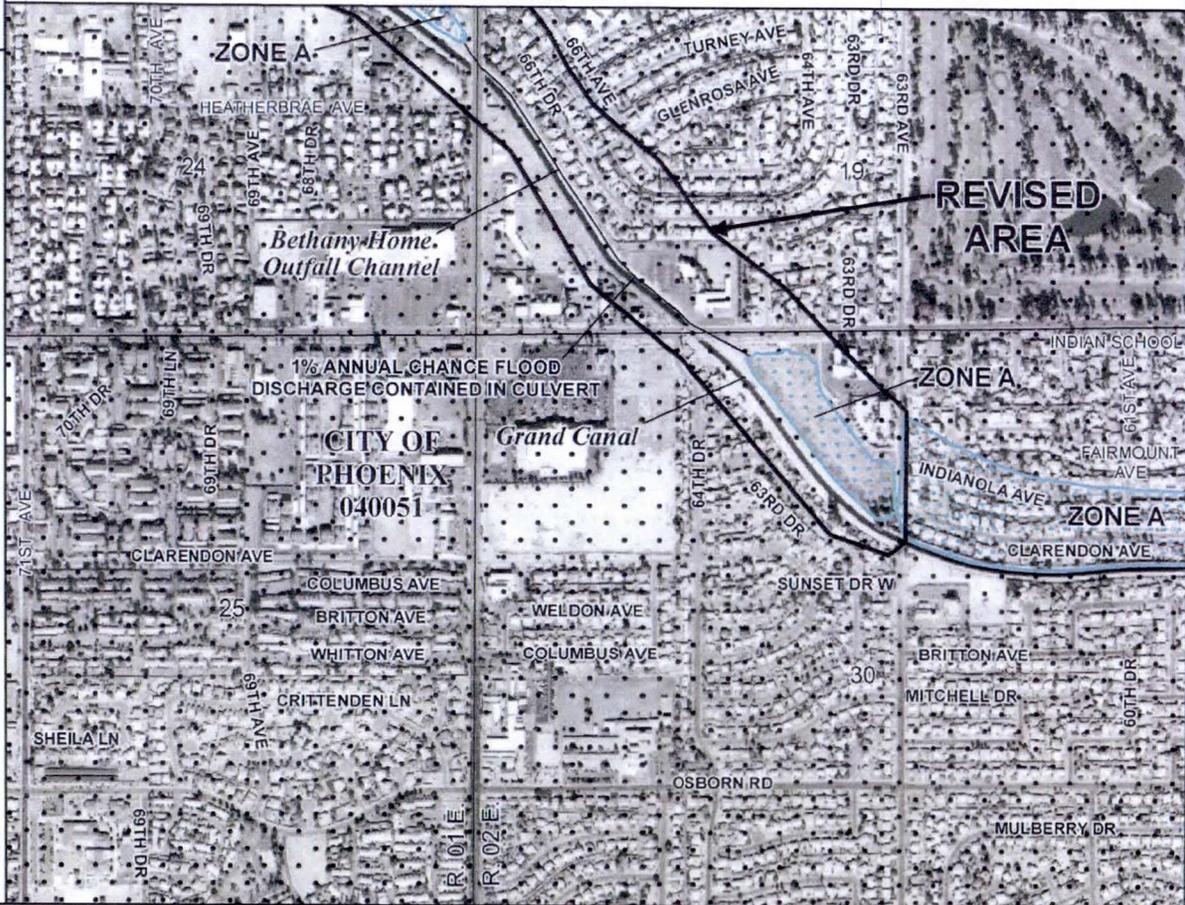
REVISED TO REFLECT LOMR EFFECTIVE: August 9, 2013

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 04013C2105F
MAP REVISED SEPTEMBER 30, 2005

Federal Emergency Management Agency



APPENDIX C

SURVEY FIELD NOTES

(The Sunset Basin survey is provided in Exhibit 4 CD. All other survey data is provided within the approved CLOMR in Exhibit 4 CD)

APPENDIX D

HYDROLOGIC ANALYSIS SUPPORTING DOCUMENTATION

D.1 – LOMR UPDATED HEC-1 MODELS

100-YEAR, 6-HOUR (MVE6100.DAT)
100-YEAR, 24-HOUR (MVE24100U.DAT)

(HEC-1 Models provided digitally in Exhibit 4 CD)

D.2 – GASMP HYDROLOGY REPORT

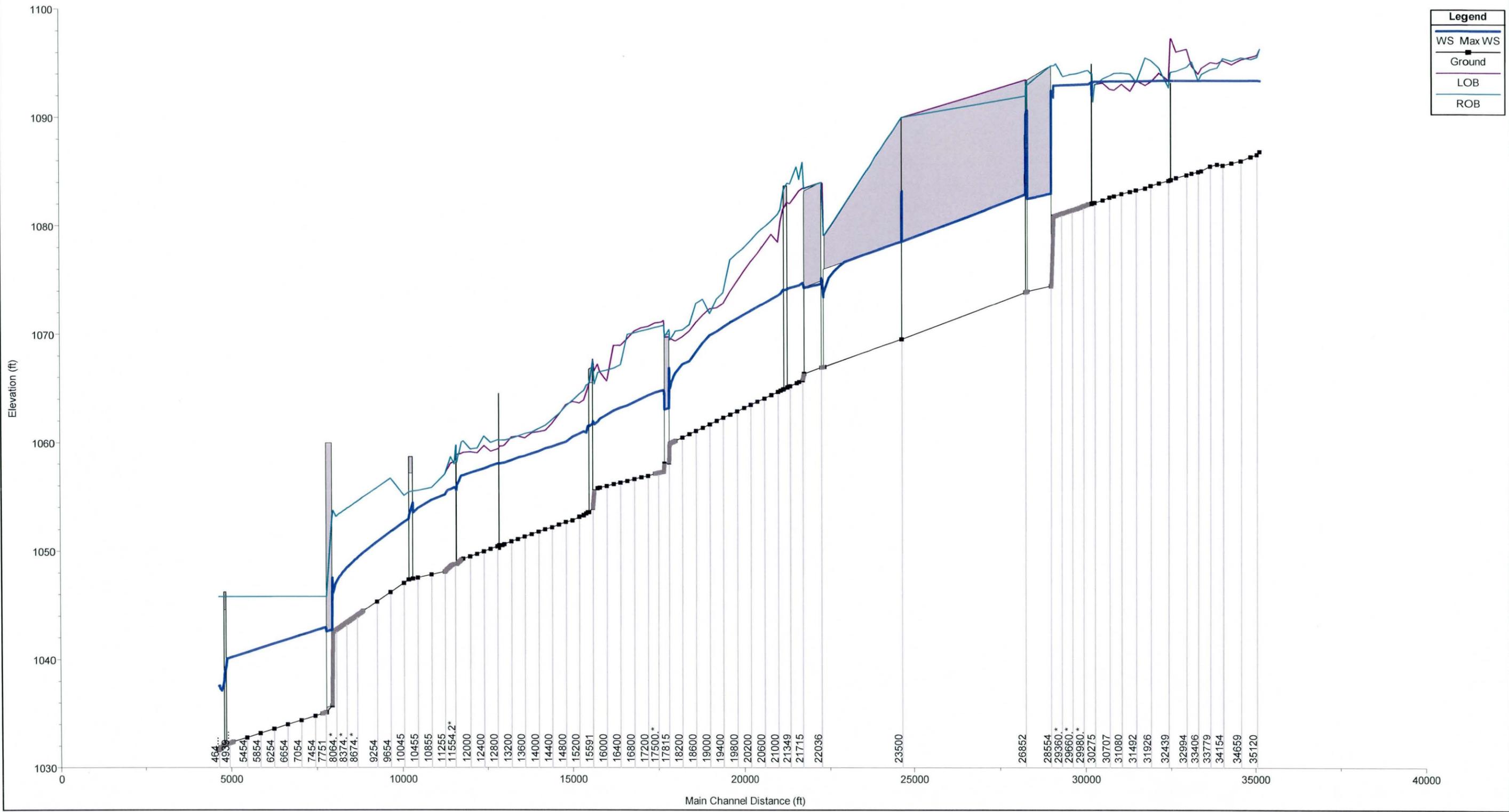
(GASMP Hydrology Report is provided in Exhibit 4 CD)

APPENDIX E

HYDRAULIC ANALYSIS SUPPORTING DOCUMENTATION

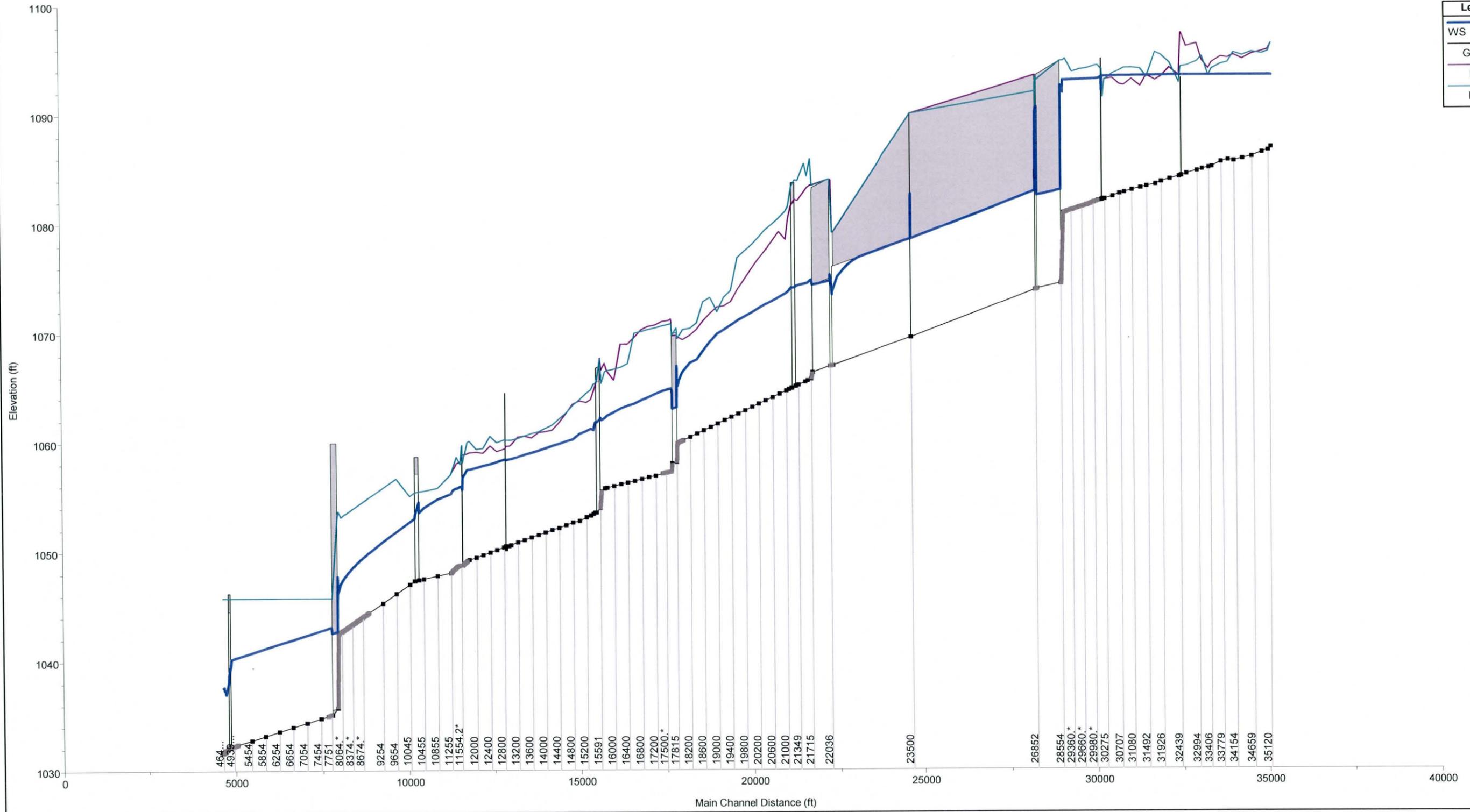
E.1 – HEC-RAS PROFILES

BHOC LOMR, New River to 63rd Ave Plan: BHOC LOMR 8/21/2012
 BHOC_LOMR_6hr.prj



Legend	
WS Max WS	(Blue line)
Ground	(Black line with square markers)
LOB	(Purple line)
ROB	(Cyan line)

464...
 4939...
 5454
 5854
 6254
 6654
 7054
 7454
 7751
 8064*
 8374*
 8674*
 9254
 9654
 10045
 10455
 10855
 11255
 11554.2*
 12000
 12400
 12800
 13200
 13600
 14000
 14400
 14800
 15200
 15591
 16000
 16400
 16800
 17200
 17500*
 17815
 18200
 18600
 19000
 19400
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 20200
 20600
 21000
 21349
 21715
 22036
 23500
 26852
 28554
 29360*
 29660*
 29980*
 30275
 30707
 31080
 31492
 31926
 32439
 32994
 33406
 33779
 34154
 34659
 35120



E.2 – CROSS SECTION PLOTS

(Cross Section plots are provided in Exhibit 4 CD)

E.3 – HYDRAULIC CALCULATIONS

B.1 Discharge through Storm Drain



Storm Drain Hydraulics

The BHOC Reach D storm drain system was analyzed as two systems, one upstream of the weir structure used to determine the head over the weir and one downstream of the weir structure to determine the depth of the submerged weir. Different combinations of weir lengths, pipe sizes, and pipe types were used for the hydraulic analysis.

The proposed storm drain system hydraulically connects Sunset Basin with Maryvale Basin. The system comprises of four components: Inlet, transition, weir, and outlet structures connected with concrete pipes. Figure 1 below provides the schematic diagram of the proposed storm drain system for the BHOC Reach D project.

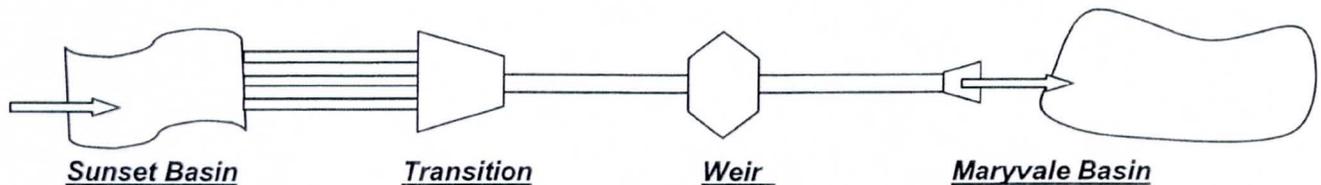


Figure 1 Schematic Diagram of Proposed Storm Drain System for BHOC Reach D

Calculation Procedure: (Storm Drain System Upstream of the weir using 96" Concrete pipe)

Step: 1 Flow over the weir

The flow over the weir was computed using the Broad-crested Weir Equation for various weir lengths of 14, 18, 20, and 22 ft. The equation for a broad-crested weir is

$$Q = CLH^{3/2} \quad (1)$$

Where,

Q = Flow over weir, in cfs

C = Weir coefficient, based on weir width and weir head

L = Length of the weir, in ft

H = Head over the weir crest, in ft

The total energy head above the weir crest is the combination of potential energy (H) and the approaching velocity head (H_v).

$$H_{Total} = H + H_v \quad (2a)$$

$$H_v = \frac{V^2}{2g} \quad (2b)$$

The flow over the weir was analyzed assuming the crest elevation of the weir is equal to the water surface elevation (WSE) at the Maryvale Detention Basin (MDB). This WSE was obtained from the latest HEC-RAS model received from the FCDMC for the Reach B Design. The model indicated a WSE of 1092.45 at the MDB. The weir coefficient 'C' is a function of the crest breadth and head and was obtained from a hydraulic manual.

The elevation from the HEC-1 rating table (SE Card) for the sunset basin routing was used to determine the head over the weir. Column (a) SE Elevation in Table 1 shows the elevations from the HEC-1 model used for head calculation over the weir. Column (b) is the elevation head over the weir and is computed by subtracting 1092.45 from column (a). Equation (1) was used to compute the discharge, which was used in StormCAD to determine the approaching velocity at the weir. Equation (2b) above was then used to calculate the velocity head in column (c). Column (d) is the total head over the weir including elevation head and velocity head.

Table: 1

Weir Crest: 1092.45 ft								
(a) SE Elevation	(b) H (ft)	(c) Velocity Head (ft)	(d) Total Head (ft)	(e) C	(f) Weir Length L (ft)	(g) Q _{weir} (cfs)	(h) Total Q	(i) US HGL
1092.50	0.05	0.00	0.05	2.37	22	0.6	55.6	1092.5
1094.64	2.19	0.16	2.35	2.67	22	210.9	265.9	1096.70 (interpolated)
1094.80	2.35	0.20	2.55	2.67	22	239.2	294.2	1097.27
1095.00	2.55	0.27	2.82	2.67	22	278.2	333.2	1098.14
1095.22	2.77	0.37	3.14	2.66	22	325.6	380.6	1098.38
1095.80	3.35	1.15	4.50	2.74	22	575.4	630.4	1100.25

- (a) Elevation from HEC- 1 model
- (b) Head over weir elevation of 1092.45
- (c) Velocity head at the weir
- (d) Total Head Col. (2)+Col.(3)
- (e) Weir coefficient based on head and crest width
- (f) Length of weir
- (g) Flow over broad-crested weir based on $Q=CLH^{1.5}$
- (h) Total Q at Sunset Basin, adding 55 cfs to Q in (g)
- (i) Upstream HGL elevation from StormCAD, using elev. from (a) as tailwater

Step: 2 Water surface elevation determination at Sunset Basin.

The hydraulic grade line was determined from the weir location back to the Sunset Basin using StormCAD. Setting column (a) SE Elevation from the above table as the tailwater depth for the model, the hydraulic grade line at Sunset Basin was determined for each corresponding flow from column (g) through the storm drain system, shown in column (i) in Table 1.

The HEC-1 rating table (**SQ Card**) and (**SE card**) was revised using Column (h) Q and Column (i) US HGL from Table 1 and the model was run to determine the routing through the basin. The result shows a total of 266 cfs routed through Sunset Basin, with 55 cfs going into the existing storm drain along Indian School Rd and 211 cfs flowing into the new storm drain. The water surface elevation at the Sunset Basin was interpolated from Table 1 to be 1096.70 for a discharge of 266 cfs. The SE elevation in column (a) was interpolated to be 1094.64 for a weir flow of 211 cfs. This corresponds to a head of 2.19' over the weir. The StormCAD model was ran again using a discharge of 211 cfs and 1094.64 as the tailwater elevation. This resulted in a hydraulic grade line of 1096.57 at Sunset Basin, which is in agreement with the 1096.70 interpolated values. When the 0.12' loss through the trash rack was added, the final WSE at Sunset Basin was computed to be 1096.69. The outfall elevation at Sunset basin was determined to be 1097.83 based on survey data. This results in 1.14' of freeboard at the Sunset Basin. This process was repeated for weir lengths of 18' and 20'.

Step: 3 Storm Drain System Downstream of the weir using 96" Concrete Pipe

The downstream storm drain system is from the weir structure to the Maryvale Basin. The hydraulic grade line for the downstream storm drain system was determined using StormCAD. The proposed conflict structure for the 36" irrigation lateral was also considered during storm drain analysis. A junction was placed at the location where the 36" irrigation lateral crosses the storm drain to account for the losses through the structure.

The StormCAD model was ran using a discharge of 211 cfs and 1092.45 as the tailwater elevation. This resulted in an HGL of 1092.79 at the upstream end of the storm drain system (at the weir structure). The submerged ratio for the broad-crested weir was computed (head downstream/head upstream = $0.34/2.19 = 0.15$) and determined to be below the threshold limit of 0.66 to 0.85. This indicates the downstream storm drain segment with the conflict structure will not adversely impact the WSE of the upstream storm drain system.



BETHANY HOME OUTFALL CHANNEL-REACH D DESIGN
FCD PROJECT NO. 2006C027
 Hydraulic Calculations

Strom Drain Size: 96"
 Weir Crest: 1092.45 ft

$\phi = 96''$, $L = 22'$

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SE Elevation	H (ft)	Velocity Head (ft)	Total Head (ft)	C	L (ft)	Q_{weir} (cfs)	Total Q	US HGL
1092.50	0.05	0.00	0.05	2.37	22	0.6	55.6	1092.5
1094.64	2.19	0.16	2.35	2.67	22	210.9	265.9	1096.70
1094.80	2.35	0.20	2.55	2.67	22	239.2	294.2	1097.27
1095.00	2.55	0.27	2.82	2.67	22	278.2	333.2	1098.14
1095.22	2.77	0.37	3.14	2.66	22	325.6	380.6	1098.38
1095.80	3.35	1.15	4.50	2.74	22	575.4	630.4	1100.25

(interpolated)

- (1) Elevation from HEC- 1 model
- (2) Head over weir elevation of 1092.45
- (3) Velocity head at the weir
- (4) Total Head Col. (2)+Col.(3)
- (5) Weir coefficient based on head and crest width
- (6) Length of weir
- (7) Flow over broad-crested weir based on $Q=CLH^{1.5}$
- (8) Total Q at Sunset Basin, adding 55 cfs to Q in (7)
- (9) Upstream HGL elevation from StormCAD, using elev. from (1) as tailwater

HEC-1 Rating Table for Sunset Basin

SV	0	0.93	2.05	4.79	15.29	30.43	31.05	62.09	69.2	71.3	86.8
SQ	0	6	10	20	30	40	40.4	294.2	333.2	380.6	630.4
SE	1085	1086	1086.5	1087.3	1089.6	1092.4	1092.5	1097.27	1098.14	1098.38	1100.25

HEC-1 Results

Basin ID	Q
PA63	266
D63S	55
D63	211

Comments

Route through Sunset Basin
 Divert to existing Storm Drain at Indian School RD
 Flow in new Storm Drain

WSE at Q=266 cfs: 1096.57 ft (from StormCAD)
 Velocity head through trash rack (50% clogged) 0.12
 WSE at Sunset Basin 1096.69
 Outfall Elevation of Sunset Basin: 1097.83 ft
 Freeboard at Sunset Basin: 1.14 ft



BETHANY HOME OUTFALL CHANNEL-REACH D DESIGN
FCD PROJECT NO. 2006C027
 Hydraulic Calculations

Weir Crest: 1092.45 ft

$\phi = 90''$, $L = 20'$

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SE Elevation	Elevation Head (ft)	Velocity Head (ft)	Total Head (ft)	C	L (ft)	Q _{weir} (cfs)	Total Q	US HGL
1092.50	0.05	0.00	0.05	2.37	20	0.5		1092.5
1094.80	2.35	0.13	2.48	2.66	20	207.8	262.8	1097.11
1094.79	2.34	0.16	2.50	2.67	20	207.0	262.0	1097.43 (Interpolated)
1095.22	2.77	0.21	2.98	2.66	20	273.7	328.7	1098.52
1098.00	5.55	1.98	7.53	2.88	20	1190.2	1245.2	1107.75
1100.80	8.35	6.76	15.11	2.88	20	3383.1	3438.1	1176.74

- (1) Elevation from HEC model
- (2) Head over weir elevation of 1092.45
- (3) Velocity head at the weir
- (4) Total Head Col. (2)+Col.(3)
- (5) Weir coefficient based on head and crest width
- (6) Length of weir
- (7) Flow over broad-crested weir based on $Q=CLH^{1.5}$
- (8) Total Q at Sunset Basin, adding 55 cfs to Q in (5)
- (9) Upstream HGL elevation from StormCAD, using elev. from (1) as tailwater

HEC-1 Rating Table for Sunset Basin

SV	0	0.8	1.8	4.3	13.8	28	28.6	58.13	69.5	83.3	85.0
SQ	0	6	10	20	30	40	40.4	262.8	328.7	1245	3438
SE	1085	1086	1086.5	1087.3	1089.6	1092.4	1092.5	1097.11	1098.52	1107.75	1176.74

HEC-1 Results

Basin ID	Q	Comments
PA63	262	Route through Sunset Basin
D63S	55	Divert to existing Storm Drain at Indian School RD
D63	207	Flow in new Storm Drain

WSE at Q=270 cfs: 1097.38 ft (from StormCAD)
 Velocity head through trash rack (50% clogged) 0.12
 WSE at Sunset Basin 1097.50
 Outfall Elevation of Sunset Basin: 1097.83 ft
 Freeboard at Sunset Basin: 0.33 ft



BETHANY HOME OUTFALL CHANNEL-REACH D DESIGN
FCD PROJECT NO. 2006C027
 Hydraulic Calculations

Weir Crest: 1092.45 ft

$\phi = 96''$, $L = 20'$

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
SE Elevation	Elevation Head (ft)	Velocity Head (ft)	Total Head (ft)	C	L (ft)	Q _{weir} (cfs)	Total Q	US HGL
1092.50	0.05	0.00	0.05	2.37	20	0.5		1092.5
1094.80	2.35	0.13	2.48	2.66	20	207.8	262.8	1096.77
1094.85	2.40	0.16	2.56	2.67	20	215.0	270.0	1096.94
1095.22	2.77	0.21	2.98	2.66	20	273.7	328.7	1098.52
1098.00	5.55	1.98	7.53	2.88	20	1190.2	1245.2	1107.75
1100.80	8.35	6.76	15.11	2.88	20	3383.1	3438.1	1176.74

(Interpolated)

- (1) Elevation from HEC model
- (2) Head over weir elevation of 1092.45
- (3) Velocity head at the weir
- (4) Total Head Col. (2)+Col.(3)
- (5) Weir coefficient based on head and crest width
- (6) Length of weir
- (7) Flow over broad-crested weir based on $Q=CLH^{1.5}$
- (8) Total Q at Sunset Basin, adding 55 cfs to Q in (5)
- (9) Upstream HGL elevation from StormCAD, using elev. from (1) as tailwater

HEC-1 Rating Table for Sunset Basin

SV	0	0.8	1.8	4.3	13.8	28	28.6	55.59	69.5	83.3	85.0
SQ	0	6	10	20	30	40	40.4	262.8	328.7	1245	3438
SE	1085	1086	1086.5	1087.3	1089.6	1092.4	1092.5	1096.77	1098.52	1107.75	1176.74

HEC-1 Results

<u>Basin ID</u>	<u>Q</u>	<u>Comments</u>
PA63	270	Route through Sunset Basin
D63S	55	Divert to existing Storm Drain at Indian School RD
D63	215	Flow in new Storm Drain

WSE at Q=270 cfs: 1096.96 ft (from StormCAD)
 Velocity head through trash rack (50% clogged) 0.12
 WSE at Sunset Basin 1097.08
 Outfall Elevation of Sunset Basin: 1097.83 ft
 Freeboard at Sunset Basin: 0.75 ft

Broad-Crested Weir

$$Q = C_{BCW} LH^{1.5}$$

Where: Q = discharge in cfs
 C_{BCW} = broad-crested weir coefficient (2.34 – 3.32)
 L = broad-crested weir length in ft
 H = head above weir crest in ft

See Table F-2 for C Values as a function of weir crest breadth and head.

Broad-Crested Weir Coefficient C Values as a Function of Weir Crest

Broad-Crested Weir Coefficient C Values as a function of Weir Crest Breadth and Head (coefficient has units of ft ^{0.5} /sec).											
Head (ft)	Breadth of Crest of Weir (ft)										
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	4.00	5.00	10.00	15.00
0.2	2.80	2.75	2.69	2.62	2.54	2.48	2.44	2.38	2.34	2.49	2.68
0.4	2.92	2.80	2.72	2.64	2.61	2.60	2.58	2.54	2.50	2.56	2.70
0.6	3.08	2.89	2.75	2.64	2.61	2.60	2.68	2.69	2.70	2.70	2.70
0.8	3.30	3.04	2.85	2.68	5.60	2.60	2.678	2.68	2.68	2.69	2.64
1.0	3.32	3.14	2.98	2.75	2.66	2.64	2.65	2.67	2.68	2.68	2.63
1.2	3.32	3.20	3.08	2.86	2.70	2.65	2.64	2.67	2.66	2.69	2.64
1.4	3.32	3.26	3.20	2.92	2.77	2.68	2.64	2.65	2.65	2.67	2.64
1.6	3.32	3.29	3.28	3.07	2.89	2.75	0.68	2.66	2.65	2.64	2.63
1.8	3.32	3.32	3.31	3.07	2.88	2.74	2.68	2.66	2.65	2.64	2.63
2.0	3.32	3.31	3.30	3.03	2.85	2.76	2.72	2.68	2.65	2.64	2.63
2.5	3.32	3.32	3.31	3.28	3.07	2.89	2.81	2.72	2.67	2.64	2.63
3.0	3.32	3.32	3.32	3.32	3.20	3.05	2.92	2.73	2.66	2.64	2.63
3.5	3.32	3.32	3.32	3.32	3.32	3.19	2.97	2.76	2.68	2.64	2.63
4.0	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.70	2.64	2.63
4.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.74	2.64	2.63
5.0	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.64	2.63
5.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.64	2.63

F.2. References

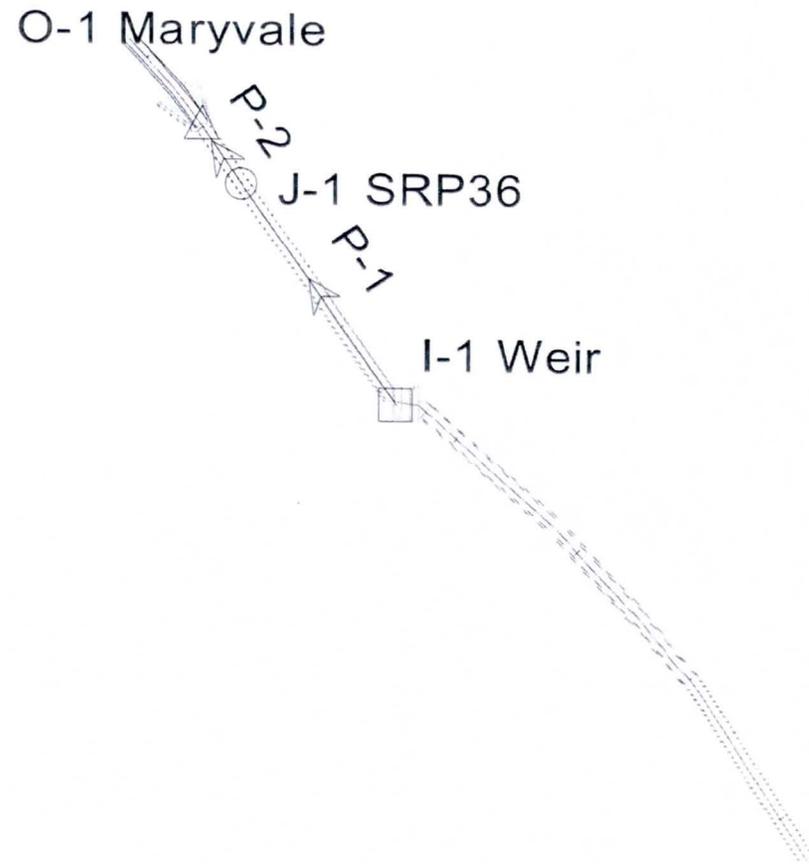
Rajaratnam, N. 1989. Hydraulics of culvert fishways III: slotted-weir culvert fishways. Canadian Journal of Civil Engineering. 16:3:375-383.

Rajaratnam, N. and C. Katopodis. 1990. Hydraulics of culvert fishways III: weir baffle culvert fishways. Canadian Journal of Civil Engineering. Vol. 17: 4:558-568.

Shoemaker, R.H.. 1956. Hydraulics of box culverts with fish-ladder baffles. Proceedings of the 35th Annual Meeting, Highway Research Board, Engineering Experiment Station, Oregon State College. Report No. 53.

WDFW (Washington Department of Fish and Wildlife). 2003. Design of Road Culverts for Fish Passage. May 2003.

Scenario: BHOC-D Storm Drain- Down Stream With SRP Structure (K=0.4)



Calculation Results Summary

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 Scenario: BHOC-D Storm Drain- Down Stream With SRP Structure (K=0.4)

>>>> Info: Subsurface Network Rooted by: O-1 Maryvale
 >>>> Info: Subsurface Analysis iterations: 1
 >>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1 Weir	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1 Maryvale

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-2	1	96 inch	Circular	58.00	211.00	5.38	1,092.50	1,092.45
P-1	1	96 inch	Circular	142.00	211.00	5.85	1,092.79	1,092.70

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1 Maryvale	211.00	1,097.00	1,092.45	1,092.45
J-1 SRP36	211.00	1,097.50	1,092.70	1,092.50
I-1 Weir	211.00	1,098.00	1,092.89	1,092.79

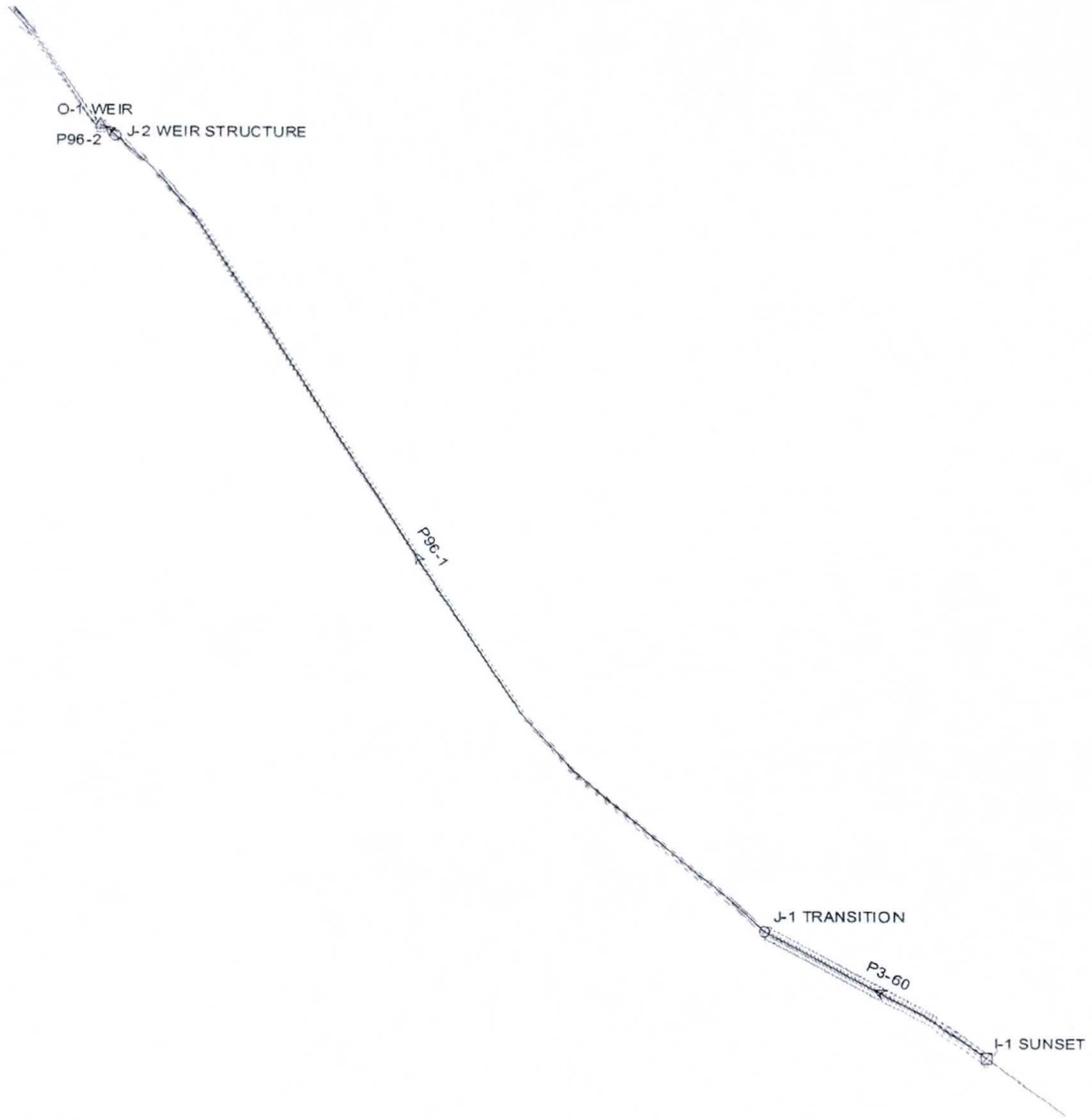
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Scenario: BHOC-D Storm Drain- Down Stream With SRP Structure (K=0.4)

Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Velocity Out (ft/s)	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P-1	I-1 Weir	J-1 SRP36	211.00	142.00	0.000845	96 inch	0.013	5.44	265.13	1,087.05	1,086.93	1,098.00	1,097.50	2.95	2.57	1,092.79	1,092.70
P-2	J-1 SRP36	O-1 Maryvale	211.00	58.00	0.000690	96 inch	0.013	5.66	239.51	1,086.93	1,086.89	1,097.50	1,097.00	2.57	2.11	1,092.50	1,092.45

Scenario: BHOC-D Storm Drain Upstream Structure



Calculation Results Summary

Scenario: BHOC-D Storm Drain Upstream Structure

>>>> Info: Subsurface Network Rooted by: O-1 WEIR
 >>>> Info: Subsurface Analysis iterations: 1
 >>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1 SUNSET	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1 WEIR

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P96-2	1	96 inch	Circular	1.00	211.00	4.20	1,094.64	1,094.64
P96-1	1	96 inch	Circular	1,894.00	211.00	4.20	1,095.91	1,094.90
P3-60	3	60 inch	Circular	453.00	211.00	3.58	1,096.53	1,096.20

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1 WEIR	211.00	1,098.00	1,094.64	1,094.64
J-2 WEIR STRUCTURE	211.00	1,098.00	1,094.90	1,094.64
J-1 TRANSITION	211.00	1,097.50	1,096.20	1,095.91
I-1 SUNSET	211.00	1,100.00	1,096.57	1,096.53

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Scenario: BHOC-D Storm Drain Upstream Structure

Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Velocity Out (ft/s)	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upsream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P3-60	I-1 SUNSE	J-1 TRANSIT	211.00	453.00	-0.000508	60 inch	0.013	3.58	-176.05	1,085.00	1,085.23	1,100.00	1,097.50	10.00	7.27	1,096.53	1,096.20
P96-1	J-1 TRAN	J-2 WEIR ST	211.00	894.00	-0.000950	96 inch	0.013	4.21	-281.16	1,085.23	1,087.03	1,097.50	1,098.00	4.27	2.97	1,095.91	1,094.90
P96-2	J-2 WEIR	O-1 WEIR	211.00	1.00	0.000000	96 inch	0.013	4.27	0.00	1,087.03	1,087.03	1,098.00	1,098.00	2.97	2.97	1,094.64	1,094.64

Head loss through the storm drain system

The head losses in the storm drain system were computed for three different structures, namely the **inlet**, **transition**, and **weir** structure. Methods for determining the head losses were selected from the FCDMC's *Drainage Design Manual Volume II* and the FHWA's *HEC-22 Manual*. Friction loss in the storm drain pipe was considered in the StormCAD model with Manning's roughness coefficient of $n = 0.013$.

Inlet Structure:

A beveled edge inlet type was designed as an inlet structure for the storm drain system. Adding bevels to the square-edged inlet increases capacity by 5 to 20 percent. Thus, an entrance loss coefficient of 0.2 is considered for the beveled edge inlet structure based on Table 5.3 of the *Drainage Design Manual Volume II*.

Transition Structure:

A storm drain transition is a structure of varying cross-section designed to provide smooth flow between two conduits. A transition is usually required to change conduit size, to change type of conduit, or to avoid obstructions. The transition structure for the BHOC Reach D storm drain system has three 60-inch concrete pipes transitioning into a 96-inch concrete pipe as shown in Figure 2 below. Three different types of losses were computed at the transition structure, including, A. Exit loss, B. Transition loss, and C. Entrance loss.

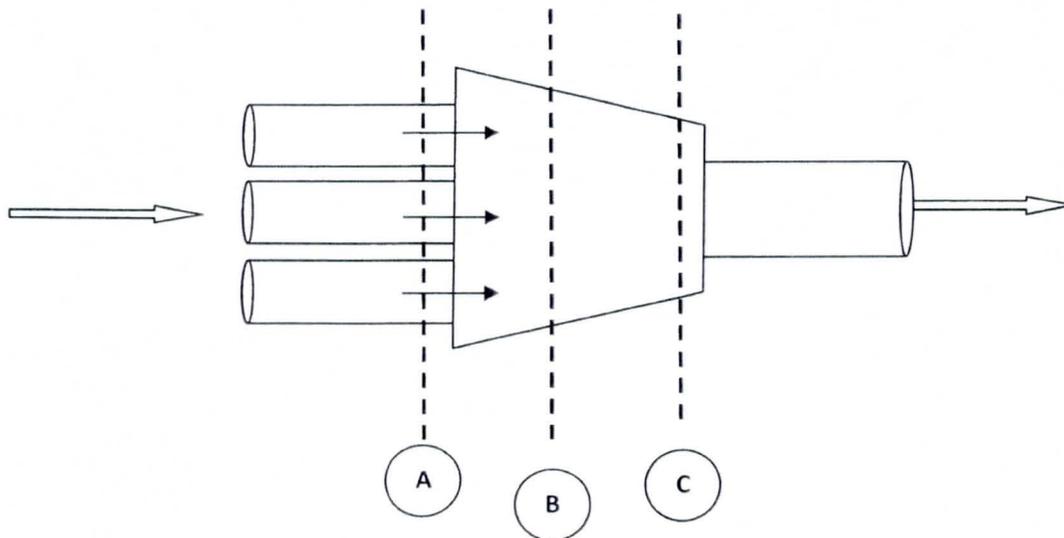


Figure 2: Transition Structure

Sample calculations for transition loss are computed below:

TABLE 5.1
ENTRANCE LOSS COEFFICIENTS
OUTLET CONTROL, FULL OR PARTLY FULL ENTRANCE HEAD LOSS
 (USDOT, FHWA, HDS-5, 1985)

Type of Structure and Design of Entrance	Coefficient, K_e
Pipe, Concrete	
Projecting from fill, socket end (groove-end)	0.2
Projecting from fill, square cut end	0.5
Headwall or headwall and wingwalls	
Socket end of pipe (groove-end)	0.2
Square-edge	0.5
Rounded (radius = $1/12 D$)	0.2
Mitered to conform to fill slope	0.7
End-Section conforming to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side- or slope-tapered inlet	0.2
Pipe, or Pipe-Arch, Corrugated Metal	
Projecting from fill (no headwall)	0.9
Headwall or headwall and wingwalls square-edge	0.5
Mitered to conform to fill slope, paved or unpaved slope	0.7
End-Section conforming to fill slope	0.5
Beveled edges, 33.7° or 45° bevels	0.2
Side- or slope-tapered inlet	0.2
Box, Reinforced Concrete	
Headwall parallel to embankment (no wingwalls)	
Square-edged on 3 edges	0.5
Rounded on 3 edges to radius of $1/12$ barrel dimension, or beveled on sides	0.2
Wingwalls at 30° to 75° to barrel	
Square-edged at crown	0.4
Crown edge rounded to radius of $1/12$ barrel dimension, or beveled top edge	0.2
Wingwalls at 10° to 25° to barrel	
Square-edged at crown	0.5
Wingwalls parallel (extension of sides)	
Square-edged at crown	0.7
Side- or slope-tapered inlet	0.2

- A) Exit Loss: The exit loss is a function of the change in velocity at the outlet of the pipe.
The exit loss is expressed as:

$$H_o = \left(\frac{V_A^2}{2g} - \frac{V_B^2}{2g} \right)$$

Where,

V_A = average velocity in ft/sec

V_B = channel velocity downstream of outlet in ft/sec

Please refer to the calculation sheet attached:

Exit loss at sec-A

For weir length 22 ft and storm drain pipe size 96" dia standard flow (100-year) through storm drain is 211 cfs **

thus, velocity at Section-A for $Q_{100} = 218 \text{ cfs}$

$$V_A = 3.58 \text{ ft/sec}$$

Velocity at section-B

$$V_B = \frac{Q_{100}}{A_B}$$

Where,

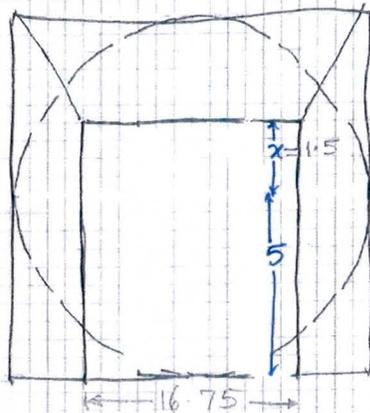
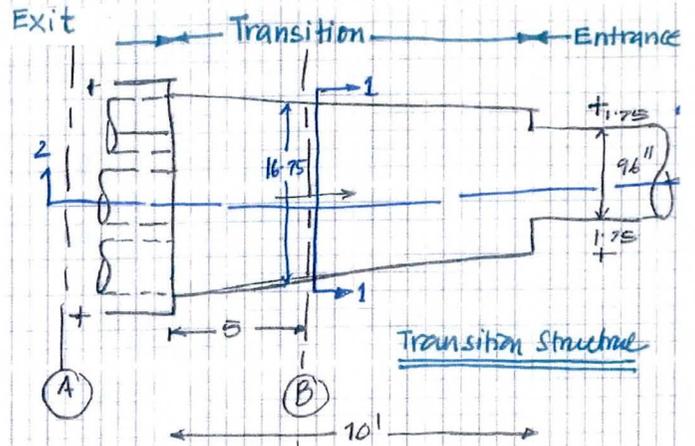
$A_B =$ area of transition structure at section-B

$$\therefore A_B = 16.75 \times (5 + 1.5)$$

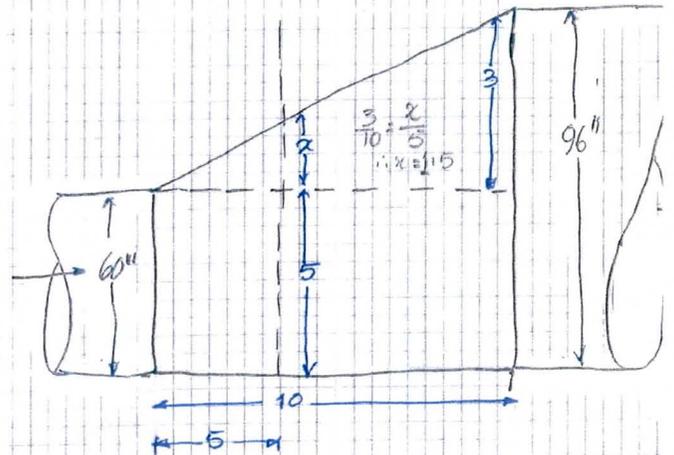
$$= 108.87 \text{ ft}^2$$

$$V_B = \frac{211}{108.87}$$

$$= 1.94 \text{ ft/sec}$$



Section 1-1

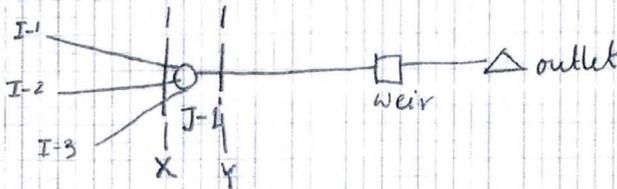


SECTION-2-2

Exit Head loss (H_0) at $Q_{100} = 218 \text{ cfs}$.

$$H_0 = \left(\frac{V_A^2 - V_B^2}{2g} \right)$$
$$= \left[\frac{(3.58)^2 - (1.98)^2}{2 \times 32.2} \right] = 0.14 \text{ ft}$$

Computing standard head loss-coefficient from storm CAD, for head loss of 0.14 ft, at junction J-1



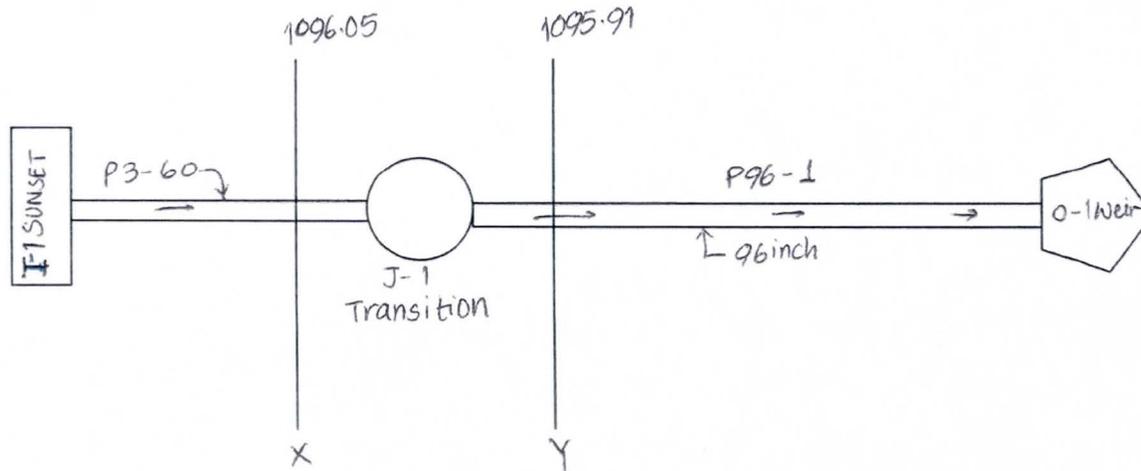
With standard headloss-co-efficient at ^{junction} J-1 = 0.5 & $Q_{100} = 211 \text{ cfs}$ the loss in head from section X to section-Y is 0.14 ft^{**}, which matches above exit head loss (H_0) calculation. Thus, exit head loss coefficient of "0.5" is considered at Junction-1 for stormCAD Model.

** Please refer attached storm CAD output to compute head loss at junction J-1 when head loss co-efficient of 0.5 is used at junction-1.

Scenario: BHOC-D Storm Drain Upstream Structure

Pipe Report

Label	Upstream Node	Downstream Node	Total System Flow (cfs)	Length (ft)	Constructed Slope (ft/ft)	Section Size	Mannings n	Velocity Out (ft/s)	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Upstream Ground Elevation (ft)	Downstream Ground Elevation (ft)	Upstream Cover (ft)	Downstream Cover (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
P3-60	I-1 SUNSET	J-1 TRANSIT	211.00	453.00	-0.000508	60 inch	0.013	3.58	-176.05	1,085.00	1,085.23	1,100.00	1,097.50	10.00	7.27	1,096.38	1,096.05
P96-1	J-1 TRANSIT	J-2 WEIR ST	211.00	894.00	-0.000950	96 inch	0.013	4.21	-281.16	1,085.23	1,087.03	1,097.50	1,098.00	4.27	2.97	1,095.91	1,094.90
P96-2	J-2 WEIR	O-1 WEIR	211.00	1.00	0.000000	96 inch	0.013	4.27	0.00	1,087.03	1,087.03	1,098.00	1,098.00	2.97	2.97	1,094.64	1,094.64



Note: Calculation done considering exit loss coeff only.

B) Transition Loss: A transition is a location where a conduit changes size. Transition includes expansion, contraction, or both. For gradual contractions, it has been observed that $K_c = 0.5K_e$. Typical values of K_e for gradual expansion are shown in the tables below. The angle of cone that forms the transition is defined in Figure 3 below.

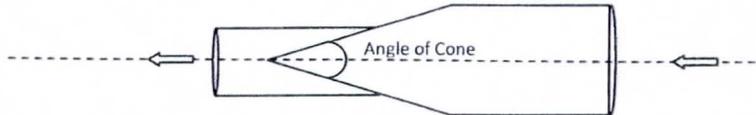


Figure 3: Angle of cone for pipe diameter changes

K_e = expansion coefficient
 K_c = contraction coefficient

Table 7-4a. Typical Values for K_e for Gradual Enlargement of Pipes in Non-Pressure Flow.

D_2/D_1	Angle of Cone						
	10°	20°	45°	60°	90°	120°	180°
1.5	0.17	0.40	1.06	1.21	1.14	1.07	1.00
3	0.17	0.40	.86	1.02	1.06	1.04	1.00

Table 7-4b. Typical Values of K_c for Sudden Pipe Contractions.

D_2/D_1	K_c
0.2	0.5
0.4	0.4
0.6	0.3
0.8	0.1
1.0	0.0

D_2/D_1 = Ratio of diameter of smaller pipe to large pipe. (Source: Reference 8)

Table 7-4d. Values of K_e for Determining Loss of Head due to Gradual Enlargement in Pipes.

D_2/D_1	Angle of Cone										
	2°	6°	10°	15°	20°	25°	30°	35°	40°	50°	60°
1.1	0.01	0.01	0.03	0.05	0.10	0.13	0.16	0.18	0.19	0.21	0.23
1.2	0.02	0.02	0.04	0.09	0.16	0.21	0.25	0.29	0.31	0.35	0.37
1.4	0.02	0.03	0.06	0.12	0.23	0.30	0.36	0.41	0.44	0.50	0.53
1.6	0.03	0.04	0.07	0.14	0.26	0.35	0.42	0.47	0.51	0.57	0.61
1.8	0.03	0.04	0.07	0.15	0.28	0.37	0.44	0.50	0.54	0.61	0.65
2.0	0.03	0.04	0.07	0.16	0.29	0.38	0.46	0.52	0.56	0.63	0.68
2.5	0.03	0.04	0.08	0.16	0.30	0.39	0.48	0.54	0.58	0.65	0.70
3.0	0.03	0.04	0.08	0.16	0.31	0.40	0.48	0.55	0.59	0.66	0.71
inf	0.03	0.05	0.08	0.16	0.31	0.40	0.49	0.46	0.60	0.67	0.72

D_2/D_1 = ratio of diameter of larger pipe to diameter of smaller pipe
 Angle of cone is the angle in degrees between the sides of the tapering section (Source: Reference 8)

Transition loss:-

" K_c " contraction coefficient for gradual contraction

$$K_c = 0.5 K_e$$

for design discharge $Q_{100} = 218$ cfs the storm drain pipe will be under pressure flow.

Considering transition structure to be 10ft long, angle of cone $\alpha = 55^\circ$, and $D_2/D_1 = 1.9$

therefore, from Table

value of " K_e " for corresponding values of cone angle $\alpha = 55^\circ$ and $D_2/D_1 = 1.9$ is "0.68".

where, # D_2/D_1 = ratio of diameter of large pipe to diameter of smaller pipe

Angle of cone is the angle in degree between the sides of the tapered section

$$\therefore K_c = 0.5 \times 0.68 \\ = 0.35$$

c) Entrance Loss:- Beveled edge 96" storm drain was assumed at the transition structure. Therefore, the entrance loss coefficient of 0.2 was used as an entrance loss.

$$\therefore \text{Head loss Coefficient at Transition Structure} = \text{Head loss Coefficient at Exit} + \text{transition} + \text{Entr} \\ \text{(Sec-A)} \quad \text{(Sec-B)} \quad \text{(Sec-C)} \\ = 0.5 + 0.35 + 0.2$$

$$= 1.05$$

MOLSSON
ASSOCIATES

PROJECT:

project no.:

drawn by:

date:

page of

standard head loss coefficient of 1.05 is used at junction J-1 in storm CAD Model

C) Entrance Loss: A beveled edge was designed at the face of the 96" storm drain pipe at the transition structure, thus the entrance loss coefficient of 0.2 was considered.

Weir Structure:

Exit loss is the major loss that takes place at the weir structure. Please refer to the hand calculations for detail.

Exit Loss Calculation at Weir Structure.

Entrance Loss Calc

The entrance loss coefficient of 0.2 was used assuming beveled edge entrance.

Exit Loss Calc

$$Q_A = Q_B = 211 \text{ cfs}$$

$$V_A = 4.21 \text{ ft/sec}$$

Head loss

$$H_o = \frac{V_A^2 - V_B^2}{2 \times g}$$

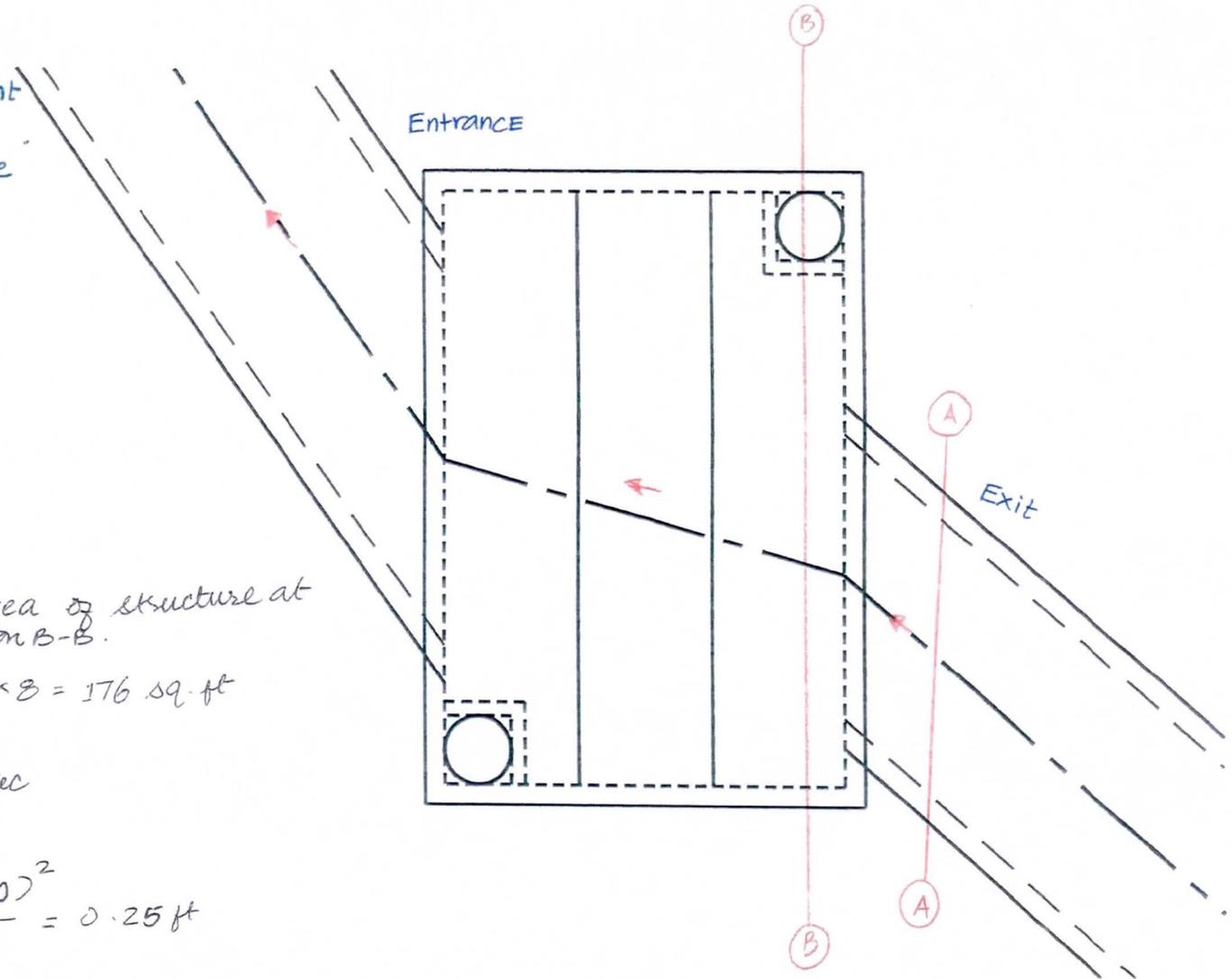
$$V_B = \frac{Q_B}{A_B}$$

A_B = x-Area of structure at section B-B.

$$A_B = 22 \times 8 = 176 \text{ sq. ft}$$

$$V_B = \frac{211}{176} = 1.20 \text{ ft/sec}$$

$$H_o = \frac{(4.21)^2 - (1.20)^2}{2 \times 32.2} = 0.25 \text{ ft}$$



∴ At design discharge ($Q = 211 \text{ cfs}$) head loss at weir structure (Junction-2) is 0.25 ft considering "0.9" standard head loss Coefficient.

1" = 6'

INLET PONDING HYDRAULIC CALCULATIONS

Design Data Report

Final Submittal

October 2005

Bethany Home/Grand Canal Flood Control Project

Bethany Home Outfall Channel – Reach C
83rd Avenue to 73rd Avenue

Project No. 2004C 055, PCN No. 620 03 32

Prepared for:

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
Project No. 98-46

Prepared in Cooperation with:

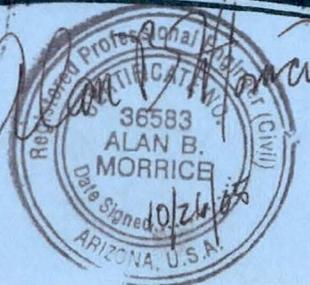
The City of Phoenix
200 West Washington
Phoenix, Arizona 85003

Prepared by:

DMJM Harris
2777 East Camelback Road, Suite 200
Phoenix, Arizona 85016
Project No. 6063

Prepared in Cooperation with:

The City of Glendale
5850 West Glendale Avenue
Glendale, Arizona 85301



DMJM HARRIS

2777 East Camelback Road, Suite 200
Phoenix, Arizona 85016-4302
Tel: (602) 337-2777
Fax: (602) 337-2624

MEMORANDUM

To:	Jeff R. Minch, P.E.	Date:	Tuesday, December 7, 2004
From:	Alan B. Morrice, P.E.	Subject:	Bethany Home Outfall Channel - Reach B & C Hydrologic Calculations for Local Inflows

I. INTRODUCTION

Since the completion of the Bethany Home / Grand Canal Flood Control Project (BH/GC FCP) Pre-Design Study, several hydrologic parameters were examined and refined with the final design of Phase 2 of the Bethany Home Outfall Channel (BHOC) and the Conditional Letter of Map Revision (CLOMR). The refined hydrologic (HEC-1) model developed for the CLOMR submittal reflected overall final design conditions for the entire BHOC project. For the remaining phases of final design, the comprehensive hydrologic model has to be integrated with more detailed local drainage area delineations so that the peak flows for each individual inflow location to the BHOC can be estimated. Since most of these smaller local drainage areas are less than 160 acres, the Rational Method was utilized in combination with the results of the HEC-1 model.

II. LOCAL SUB-BASIN RUNOFF ESTIMATION

To aid in the delineation of the numerous local sub-basins adjacent to BHOC - Reaches B & C, topographic mapping that was available was acquired. The available mapping included the detailed mapping along the project corridor combined with the aerial mapping from the Maryvale Area Drainage Master Study (ADMS). Since this mapping did not reflect current development conditions, it was supplemented with property lines as shown on County assessor maps and with field reconnaissance. For Reach B, from Camelback Road to 67th Avenue, seven drainage basins were delineated corresponding to each inflow location to the BHOC. For Reach C, from 83rd Avenue to 75th Avenue, thirteen local sub-basins were delineated which corresponded to each of the BHOC inflow locations. These local individual sub-basins ranged in size from 1.2 to 114 acres. The land use for both reaches was predominantly medium density residential. Peak flow rates were calculated with the Rational Method using the Flood Control District of Maricopa County's (FCDMC) Drainage Design Management System for Windows (DDMSW) software. Peak flow rates were calculated for each local sub-basin for various frequency storms. However, the 100-year storm is of primary importance for this project. Where no additional flow was diverted in these basins from outlying watersheds, these local peak flow values will be used for design.

III. DIVERTED RUNOFF FROM OUTER WATERSHEDS

As presented in the final hydrologic model for the BHOC CLOMR submittal, diversions from streets frequently occurred at arterial intersections and also at mid-mile locations. The street diversions occurring at the mid-mile

locations represented the accumulative diversions along that entire length of street within that particular sub-basin. One task of this project was to use the hydrologic model results and to distribute the diverted flow into components so that it could be combined with the runoff from the various smaller local sub-basins. At some locations, such as at known low points, it was not necessary to distribute the diverted flow along the roadway segment. For this project, these street diversions were integrated with the local sub-basin runoff in various manners based upon the conditions present in the field. Each of the street diversion distribution techniques shall be discussed individually.

Reach C

Along Bethany Home Road, between 83rd and 75th Avenues, the hydrologic model presented a peak flow of 133 cfs that is diverted south while the remaining (532 cfs) is routed west. The southern diversion combines with runoff from the local sub-basin C10. A future storm drain is proposed which will also convey 802 cfs to the west into the BHOC.

Along 75th Avenue, between Bethany Home and Camelback Roads, runoff is primarily contained within the road right-of-way until it approaches the southern portion of the segment where it overflows to the west into the Glendale Park at a low point in the road. The low point occurs since 75th Avenue rises over the Grand Canal near Camelback Road. The hydrologic model reflects a peak discharge of 339 cfs that is diverted west at this location.

Reach B

Along Camelback Road, between 75th Avenue and 67th Avenue, the hydrologic model depicts a peak discharge of 239 cfs that is diverted south. The distribution of this flow along Camelback and into the local sub-basins was done in the same manner as the ADMS, primarily based upon the right-of-way width of the intersecting residential and collector streets.

Along 67th Avenue, between Camelback Road and the Grand Canal, a similar condition exists as with 75th Avenue where a low point occurs north of the canal. However, due to the relative grades of the intersecting streets, some runoff is diverted west prior to reaching the low point north of the Grand Canal. The hydrologic model indicates that 144 cfs is diverted south onto 67th Avenue at Camelback Road and a total of 523 cfs is diverted west between Camelback Road and the canal. As mentioned earlier, the majority of this runoff that is diverted west will occur at the low point. For the purposes of this study, it was assumed that the upper basin diversion would be consistent with the rating in the ADMS for the discharge (144 cfs) which is approximately 49 percent. Also, it was assumed that the runoff that is diverted west will generally be replaced with an equitable amount of runoff coming from the east as we continue south. The remaining diverted runoff for this segment (239 cfs) will discharge west at the low point north of the Grand Canal.

IV. COMBINED TOTAL RUNOFF TO BHOC

The peak flows presented in the hydrologic model for the two main sub-basins which include the local drainage basins for Reaches B and C (24-21N and 14-21E) were reviewed. It was noticed that the runoff for each of these sub-basin combination points, C2421N and C1421E, were significantly lower than the simple addition of the peak flow rates that were combined. This is due to the timing of the peaks of the hydrographs in that they differed by over an hour. For each of these sub-basins, the ratio of the concentration point peak flow to the sum of the combined peak flow was calculated. These ratios were 0.59 and 0.76 for basins 24-21N (Reach B) and 14-21E (Reach C), respectively. These same ratios, for their respective reaches, were applied to the combined flows that involved local sub-basins and diverted street flows. This reduced peak was compared to both the

local basin peak and the diverted peak flow and whichever of the three values was greatest is recommended for design. The following table presents the selected final peak discharges. The Drainage Basin Maps enclosed with this memorandum presents the various local sub-basins as well as concentration points for the combined discharges.

Sub Basin	Concentration Point	100-Year Peak Flow (cfs)
Street	CP1	532
Storm Drain (future)	CP2	802
C02		12
C04		41
C06		37
C08		8
	CP3	234
C12		34
C14		33
C16		128
C18		37
C20		40
C22		64
C24		7
C26		29
C28		13
	CP4	339
Street	CP5	187
Storm Drain (future)	CP6	501
	CP7	92
	CP8	83
	CP9A	374
	CP10	153
	CP9B	520
B08		24
B10		24
	CP11	239

Sub-basin peak flows do not reflect any combination with diverted street flow from outlying watersheds. Concentration point CP9B is the combination of CP9A and CP10 and was only calculated as a potential scenario for design purposes.

For locations along the project where very minimal drainage areas were involved although some flow interception was necessary, peak flow rates were not calculated. For these locations, engineering judgment was utilized for appropriate inlet sizing.

Bethany Home Outfall Channel - Reaches B & C

Flood Control District of Maricopa County

Peak Flow Summary

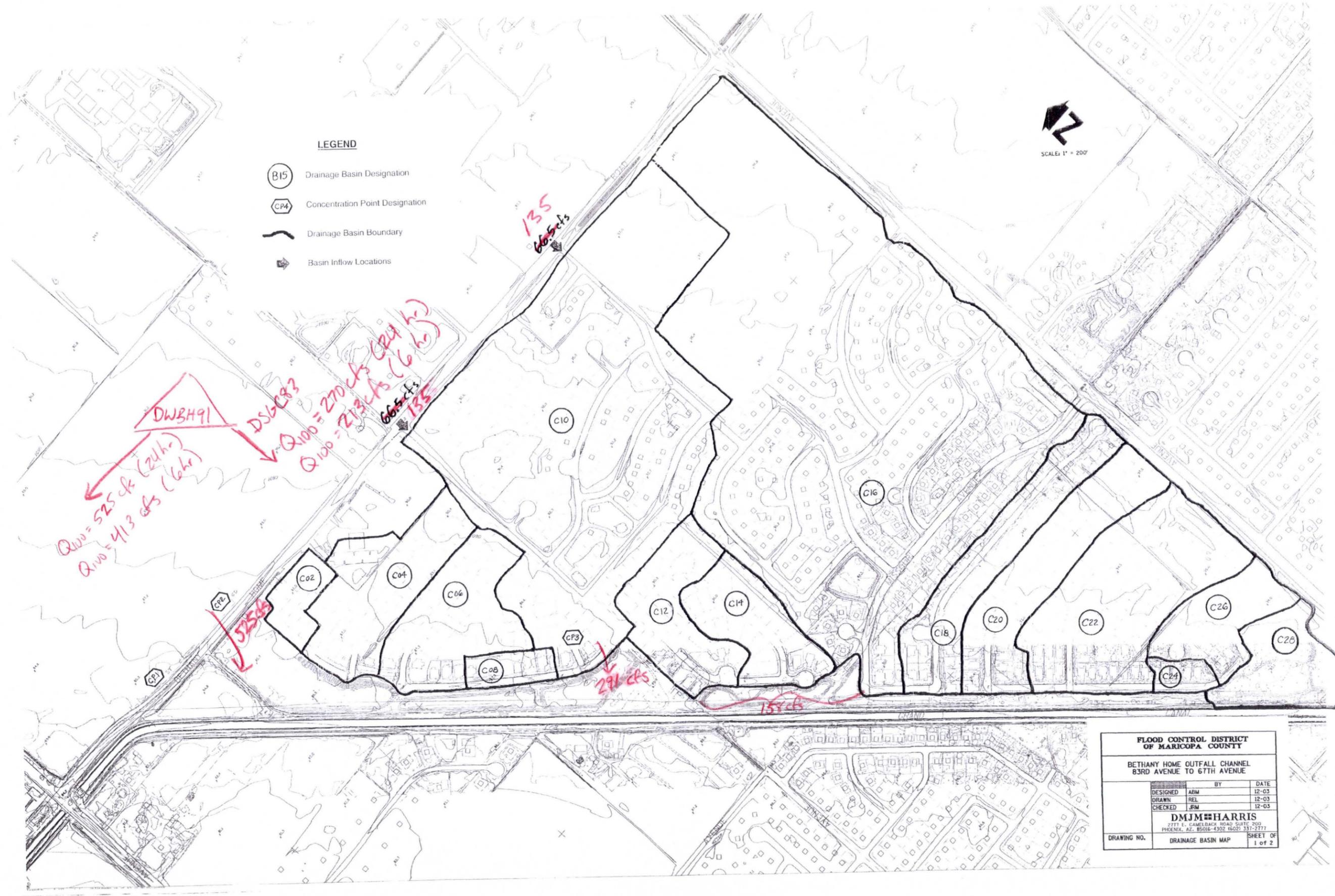
Sub Basin	Concentration Point	Area (acres)	Q ₂ (cfs)	Q ₁₀ (cfs)	Q ₁₀₀ (cfs)	HEC-1 Diverted Basin Inflow * (cfs)	Subtotal (cfs)	Reduction Factor	Combined 100 Year Peak Flow (cfs)	Selected 100- Year Peak Flow (cfs)
Street	CP1									532*
Storm Drain	CP2									802*
C02		2.30	3	6	12					12
C04		9.50	9	19	41					41
C06		8.90	9	17	37					37
C08		1.90	2	4	8					8
C10		55.40	37	77	175	113	270	383	291	175
	CP3				175	133	308	0.76	234	234
C12		7.40	9	16	34					34
C14		6.60	9	16	33					33
C16		86.00	26	56	128	150				128
C18		9.70	9	17	37					37
C20		10.40	9	18	40					40
C22		16.40	15	30	64					64
C24		1.20	2	4	7					7
C26		5.60	8	14	29					29
C28		6.40	4	6	13					13
C26+C28		12.00	12	20	42					42
	CP4									339*
Street	CP5									187*
Storm Drain	CP6									501*
B02		24.80	21	42	92					92
	CP7				92	54.3	146	0.59	86	92
B04		25.10	18	36	83					83
	CP8				83	54.3	137	0.59	81	83
B06		114.20	74	156	361					361
	CP9A				361	272.8	634	0.59	374	374
B07		31.80	27	54	118					118
	CP10				118	141.8	260	0.59	153	153
B6 + B7		146.00	104	209	467					467
	CP9B***				467	413.9	881	0.59	520	520
B08		6.70	5	11	24					24
B10		5.90	6	12	24					24
B12		4.30	7	12	25					25
	CP11				25	239.4	264	0.59	156	239**

Note: The selected 100-Year Peak Flow is the highest of either the Rational sub-basin flow (Q₁₀₀), the Diverted Basin Flow, or the Combined Peak Flow.

* Peak Flow Rates as presented in the CLOMR hydrologic (HEC-1) model.

** Flow may spill into BHOC right-of-way prior to reaching the road low point.

*** CP9B is the combination of CP10 and CP9A assuming all flows reach the low point at 71st Avenue.



LEGEND

- B15 Drainage Basin Designation
- CP4 Concentration Point Designation
- Drainage Basin Boundary
- ➔ Basin Inflow Locations



DWB3H91
Q100 = 525 cfs (24h)
Q100 = 413 cfs (6hr)
D56C83
Q100 = 270 cfs (24h)
Q100 = 213 cfs (6hr)

135
66 cfs

66 cfs
135

291 cfs

157 cfs

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY		
BETHANY HOME OUTFALL CHANNEL 83RD AVENUE TO 67TH AVENUE		
	BY	DATE
DESIGNED	ABM	12-03
DRAWN	REL	12-03
CHECKED	JRM	12-03
DMJM#HARRIS 2777 E. CAMELBACK ROAD SUITE 200 PHOENIX, AZ 85016-4302 (602) 337-2777		
DRAWING NO.	DRAINAGE BASIN MAP	SHEET OF 1 of 2

RATIONAL FOR WINDOWS

Flood Control District of Maricopa County Rational Method

Project Information

Project Name: **Project Description:**
Drainage Point: C10 **Location:** BHOC Sta 142+07

Drainage Basin Data

Water Course Length: 3400.00 ft **Basin Area:** 55.400 acres
High Elevation: 1097.00 ft **Low Elevation:** 1089.40 ft
Average Slope: 0.0022 ft/ft **Roughness, Kb:** 0.0291 (A)
10-Year Runoff Coefficient: 0.400
10-Year 6 Hour Rainfall Depth: 1.80 inches

Hydrological Summary Table

Parameter	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Q (cfs)	27	40	49	72	93	113
C	0.400	0.400	0.400	0.440	0.480	0.500
Tc (min)	37.8	32.4	29.9	27.0	25.3	23.8
i (in/hr)	1.2	1.8	2.2	2.9	3.5	4.1

Computed by: .
Wednesday, August 29, 2012 2:19:43 p

File: W:\2012Projects\123818.02_BHOC_LOMR\Hydro\Rational\Local OffSite Rational.rat

RATIONAL FOR WINDOWS

Flood Control District of Maricopa County Rational Method

Project Information

Project Name: **Project Description:**
Drainage Point: C12-16 **Location:** BHOC Sta 155+00

Drainage Basin Data

Water Course Length: 3700.00 ft **Basin Area:** 100.000 acres
High Elevation: 1099.00 ft **Low Elevation:** 1089.00 ft
Average Slope: 0.0027 ft/ft **Roughness, Kb:** 0.0275 (A)
10-Year Runoff Coefficient: 0.300
10-Year 6 Hour Rainfall Depth: 1.80 inches

Hydrological Summary Table

Parameter	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Q (cfs)	38	57	70	100	129	158
C	0.300	0.300	0.300	0.330	0.360	0.375
Tc (min)	35.4	30.5	28.2	25.4	23.9	22.4
i (in/hr)	1.3	1.9	2.3	3.0	3.6	4.2

Computed by: ,
Wednesday, August 29, 2012 2:19:43 p

File: W:\2012Projects\123818.02_BHOC_LOMR\Hydro\Rational\Local OffSite Rational.rat

Table 5

Inlet Station	Total Flow (cfs)	Inlet Flow (cfs)	Inlet Ponding Depth (ft)	Inlet Elev	W.S.E.
123+47	525	525	3	1081.0	1084.0
140+97	291	47	3.4	1085.2	1088.6
142+07		244	3.8	1084.8	
148+22	158	13	4.4	1085.6	1090.0
151+52		10	2.7	1087.3	
152+19		9	2.1	1087.9	
155+06		89	2	1088.0	
155+99		37	2.2	1087.8	

Notes:

W.S.E. = water-surface elevation

Worksheet for Trap Chan Opening Sta 123+47

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00400	ft/ft
Left Side Slope	4.00	ft/ft (H:V)
Right Side Slope	4.00	ft/ft (H:V)
Bottom Width	22.00	ft
Discharge	525.00	ft ³ /s

Results

Normal Depth	2.96	ft
Flow Area	100.29	ft ²
Wetted Perimeter	46.43	ft
Hydraulic Radius	2.16	ft
Top Width	45.70	ft
Critical Depth	2.26	ft
Critical Slope	0.01109	ft/ft
Velocity	5.23	ft/s
Velocity Head	0.43	ft
Specific Energy	3.39	ft
Froude Number	0.62	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.96	ft
Critical Depth	2.26	ft
Channel Slope	0.00400	ft/ft

Worksheet for Trap Chan Opening Sta 123+47

GVF Output Data

Critical Slope

0.01109 ft/ft

Weir/Orifice Flow Capacities of Multiple Grate Inlet

Project : BHOC LOMR

Date 08/29/12

Location: Linear Park, Sta 140+97

Total Flow = 291 cfs

Flow to this Inlet = 47 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f = \text{clogging factor} = 0.5$

10 Grates (MAG 540-2)

P = 13.9 ft

P = Perimeter of Catchbasin

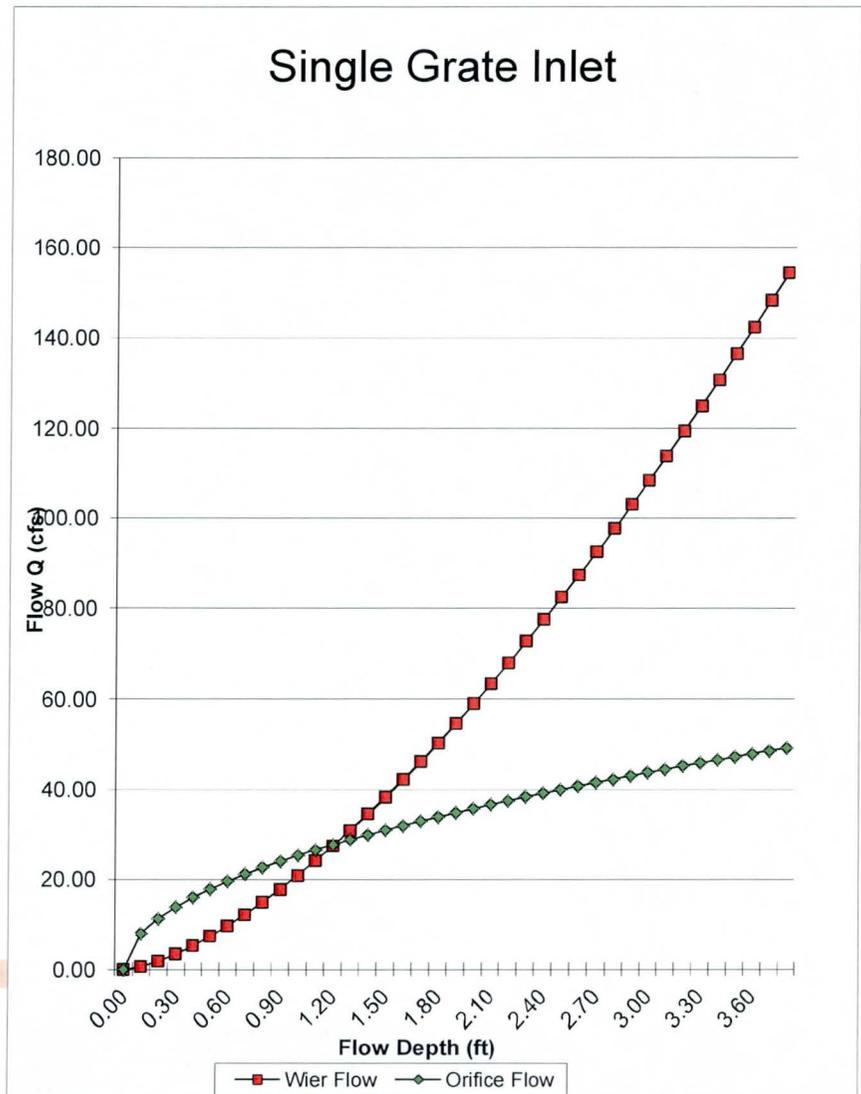
A = 9.4 sq.ft.

A = Total area of grate minus

area of longitudinal & lateral bars

Depth (ft) Weir Qi (cfs) Orifice Qi (cfs)

Depth (ft)	Weir Qi (cfs)	Orifice Qi (cfs)
0.00	0.00	0.00
0.10	0.66	7.99
0.20	1.86	11.30
0.30	3.43	13.84
0.40	5.27	15.98
0.50	7.37	17.87
0.60	9.69	19.57
0.70	12.21	21.14
0.80	14.92	22.60
0.90	17.80	23.97
1.00	20.85	25.27
1.10	24.05	26.50
1.20	27.41	27.68
1.30	30.90	28.81
1.40	34.54	29.90
1.50	38.30	30.95
1.60	42.20	31.97
1.70	46.21	32.95
1.80	50.35	33.90
1.90	54.61	34.83
2.00	58.97	35.74
2.10	63.45	36.62
2.20	68.04	37.48
2.30	72.73	38.32
2.40	77.52	39.15
2.50	82.42	39.96
2.60	87.41	40.75
2.70	92.50	41.52
2.80	97.69	42.29
2.90	102.97	43.03
3.00	108.34	43.77
3.10	113.80	44.49
3.20	119.35	45.21
3.30	124.99	45.91
3.40	130.71	46.60
3.50	136.52	47.28
3.60	142.42	47.95
3.70	148.39	48.61
3.80	154.45	49.26



Weir/Orifice Flow Capacities of Multiple Grate Inlet

Project : BHOC LOMR

Date 08/29/12

Location: Linear Park, Sta 142+07

Total Flow = 291 cfs

Flow to this Inlet = 244 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f = \text{clogging factor} = 0.5$

10 Grates (MAG 540-2)

P = 45.4 ft

P = Perimeter of Catchbasin

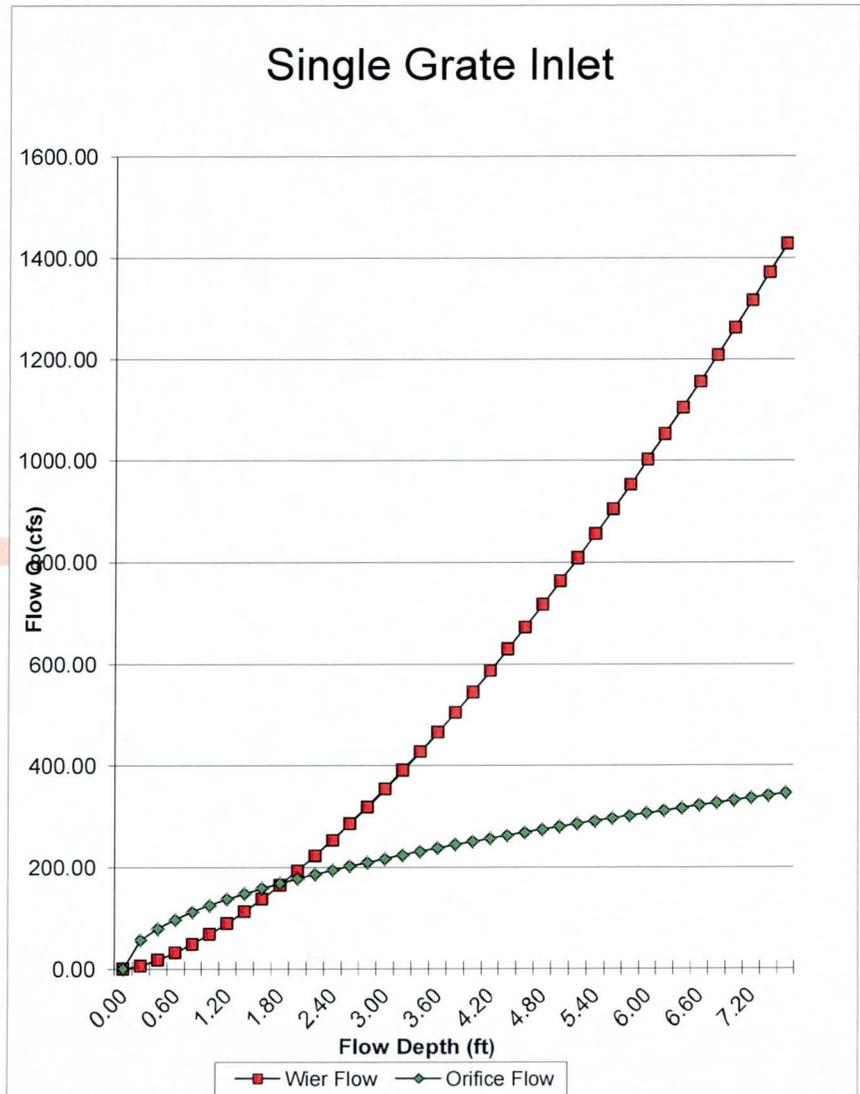
A = 46.6 sq.ft.

A = Total area of grate minus

area of longitudinal & lateral bars

Weir Orifice
Depth (ft) Qi (cfs) Qi (cfs)

Depth (ft)	Qi (cfs)	Qi (cfs)
0.00	0.00	0.00
0.20	6.10	56.03
0.40	17.24	79.23
0.60	31.67	97.04
0.80	48.76	112.05
1.00	68.15	125.28
1.20	89.58	137.23
1.40	112.88	148.23
1.60	137.92	158.47
1.80	164.57	168.08
2.00	192.74	177.17
2.20	222.37	185.82
2.40	253.37	194.08
2.60	285.69	202.00
2.80	319.28	209.63
3.00	354.09	216.99
3.20	390.08	224.10
3.40	427.22	231.00
3.60	465.47	237.70
3.80	504.79	244.21
4.00	545.16	250.56
4.20	586.55	256.74
4.40	628.95	262.78
4.60	672.31	268.69
4.80	716.63	274.47
5.00	761.88	280.13
5.20	808.05	285.68
5.40	855.12	291.12
5.60	903.06	296.46
5.80	951.87	301.71
6.00	1001.52	306.87
6.20	1052.01	311.94
6.40	1103.33	316.93
6.60	1155.45	321.84
6.80	1208.36	326.68
7.00	1262.06	331.45
7.20	1316.54	336.16
7.40	1371.77	340.79
7.60	1427.76	345.37



Weir/Orifice Flow Capacities of Single Grate Inlet

Project : BHOC LOMR

Date #####

Location: Linear Park, Sta 148+22

Total Flow = 158 cfs

Flow to this Inlet = 12.7 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f =$ clogging factor = 0.5

Single Grate (MAG 539)

P = 6.25 ft

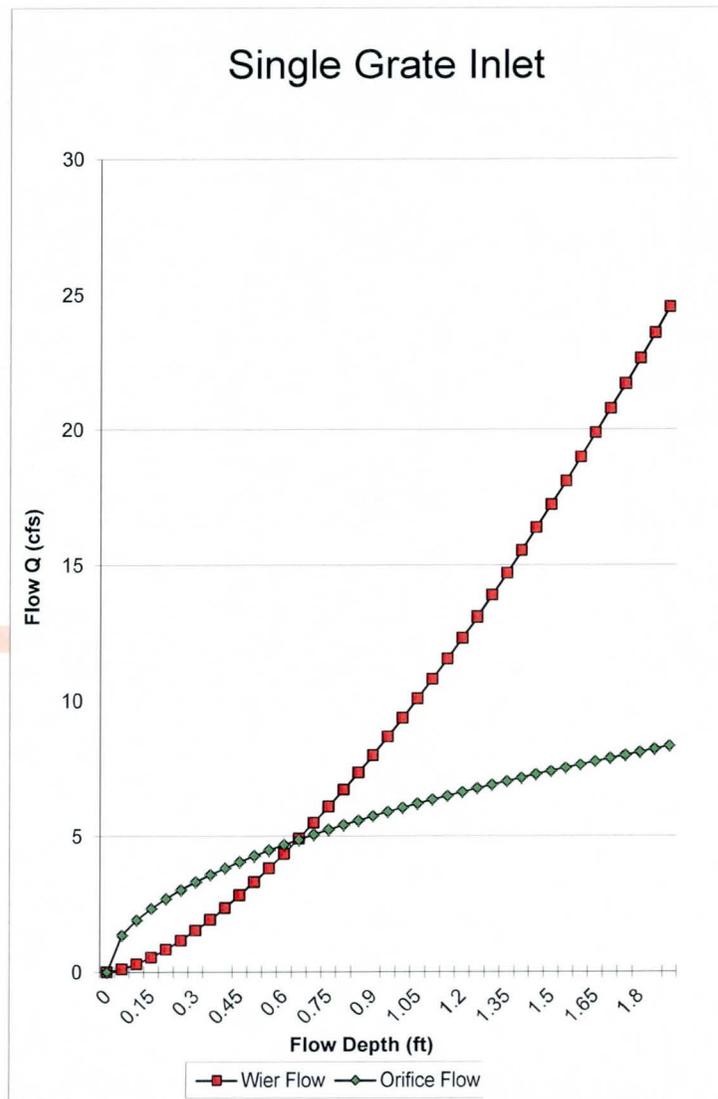
A = 2.25 sq.ft.

Weir Orifice

P = Perimeter of Catchbasin

A = Total area of grate minus area of longitudinal & lateral bars

Depth (ft)	Qi (cfs)	Qi (cfs)
0.00	0.00	0.00
0.20	0.84	2.71
0.40	2.37	3.83
0.60	4.36	4.69
0.80	6.71	5.41
1.00	9.38	6.05
1.20	12.32	6.63
1.40	15.53	7.16
1.60	18.97	7.65
1.80	22.64	8.12
2.00	26.52	8.55
2.20	30.59	8.97
2.40	34.86	9.37
2.60	39.30	9.75
2.80	43.92	10.12
3.00	48.71	10.48
3.20	53.67	10.82
3.40	58.77	11.15
3.60	64.04	11.48
3.80	69.45	11.79
4.00	75.00	12.10
4.20	80.69	12.40
4.40	86.53	12.69
4.60	92.49	12.97
4.80	98.59	13.25
5.00	104.82	13.53
5.20	111.17	13.79
5.40	117.64	14.06
5.60	124.24	14.31
5.80	130.95	14.57
6.00	137.78	14.82
6.20	144.73	15.06
6.40	151.79	15.30
6.60	158.96	15.54
6.80	166.24	15.77
7.00	173.63	16.00
7.20	181.12	16.23
7.40	188.72	16.45
7.60	196.42	16.68



Weir/Orifice Flow Capacities of Single Gate Inlet

Project : BHOCL LOMR

Date #####

Location: Linear Park, Sta 151+52

Total Flow = 158 cfs

Flow to this Inlet = 9.9 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f =$ clogging factor = 0.5

Single Gate (MAG 539)

P = 6.25 ft

A = 2.25 sq.ft.

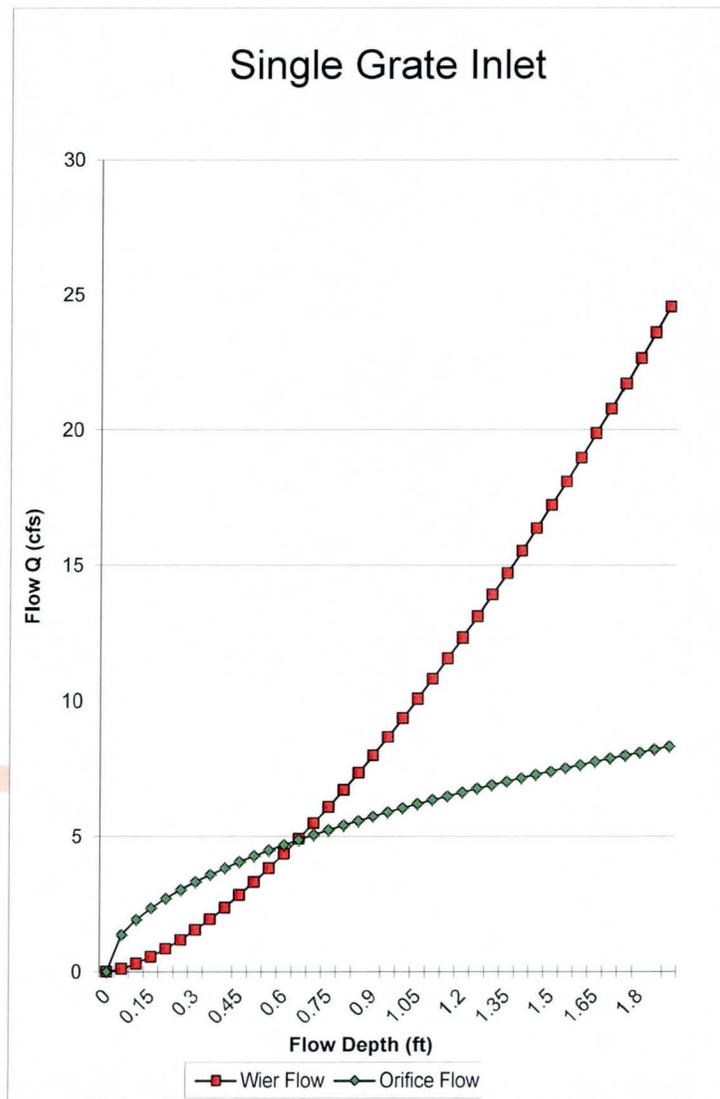
Weir Orifice

P = Perimeter of Catchbasin

A = Total area of grate minus area of longitudinal & lateral bars

Depth (ft) Q_i (cfs) Q_i (cfs)

0.00	0.00	0.00
0.10	0.30	1.91
0.20	0.84	2.71
0.30	1.54	3.31
0.40	2.37	3.83
0.50	3.31	4.28
0.60	4.36	4.69
0.70	5.49	5.06
0.80	6.71	5.41
0.90	8.00	5.74
1.00	9.38	6.05
1.10	10.82	6.34
1.20	12.32	6.63
1.30	13.90	6.90
1.40	15.53	7.16
1.50	17.22	7.41
1.60	18.97	7.65
1.70	20.78	7.89
1.80	22.64	8.12
1.90	24.55	8.34
2.00	26.52	8.55
2.10	28.53	8.77
2.20	30.59	8.97
2.30	32.70	9.17
2.40	34.86	9.37
2.50	37.06	9.56
2.60	39.30	9.75
2.70	41.59	9.94
2.80	43.92	10.12
2.90	46.30	10.30
3.00	48.71	10.48
3.10	51.17	10.65
3.20	53.67	10.82
3.30	56.20	10.99
3.40	58.77	11.15
3.50	61.39	11.32
3.60	64.04	11.48
3.70	66.72	11.64
3.80	69.45	11.79



Weir/Orifice Flow Capacities of Single Gate Inlet

Project : BHOC LOMR

Date #####

Location: Linear Park, Sta 152+19

Total Flow = 158 cfs

Flow to this Inlet = 8.8 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f = \text{clogging factor} = 0.5$

Single Gate (MAG 539)

P = 6.25 ft

A = 2.25 sq.ft.

Weir Orifice

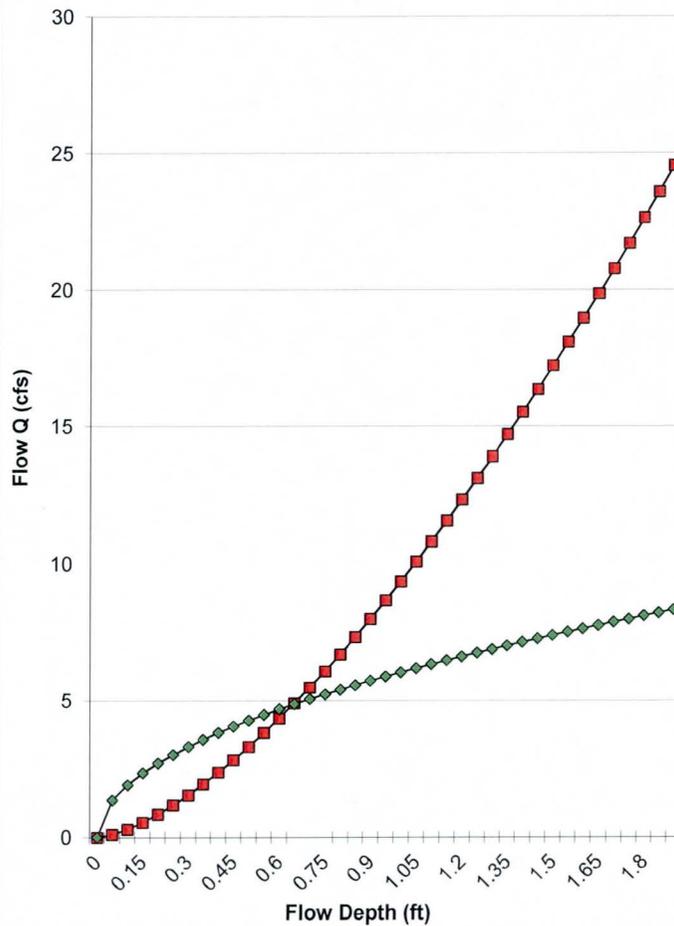
Depth (ft) Q_i (cfs) Q_i (cfs)

0.00	0.00	0.00
0.10	0.30	1.91
0.20	0.84	2.71
0.30	1.54	3.31
0.40	2.37	3.83
0.50	3.31	4.28
0.60	4.36	4.69
0.70	5.49	5.06
0.80	6.71	5.41
0.90	8.00	5.74
1.00	9.38	6.05
1.10	10.82	6.34
1.20	12.32	6.63
1.30	13.90	6.90
1.40	15.53	7.16
1.50	17.22	7.41
1.60	18.97	7.65
1.70	20.78	7.89
1.80	22.64	8.12
1.90	24.55	8.34
2.00	26.52	8.55
2.10	28.53	8.77
2.20	30.59	8.97
2.30	32.70	9.17
2.40	34.86	9.37
2.50	37.06	9.56
2.60	39.30	9.75
2.70	41.59	9.94
2.80	43.92	10.12
2.90	46.30	10.30
3.00	48.71	10.48
3.10	51.17	10.65
3.20	53.67	10.82
3.30	56.20	10.99
3.40	58.77	11.15
3.50	61.39	11.32
3.60	64.04	11.48
3.70	66.72	11.64

P = Perimeter of Catchbasin

A = Total area of grate minus area of longitudinal & lateral bars

Single Gate Inlet



Weir/Orifice Flow Capacities of Multiple Grate Inlet

Project : BHOC LOMR

Date 08/22/12

Location: Linear Park, Sta 155+06

Total Flow = 158 cfs

Flow to this Inlet = 88.6 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f =$ clogging factor = 0.5

5 Grates (MAG 540-2)

P = 25.7 ft

P = Perimeter of Catchbasin

A = 23.3 sq.ft.

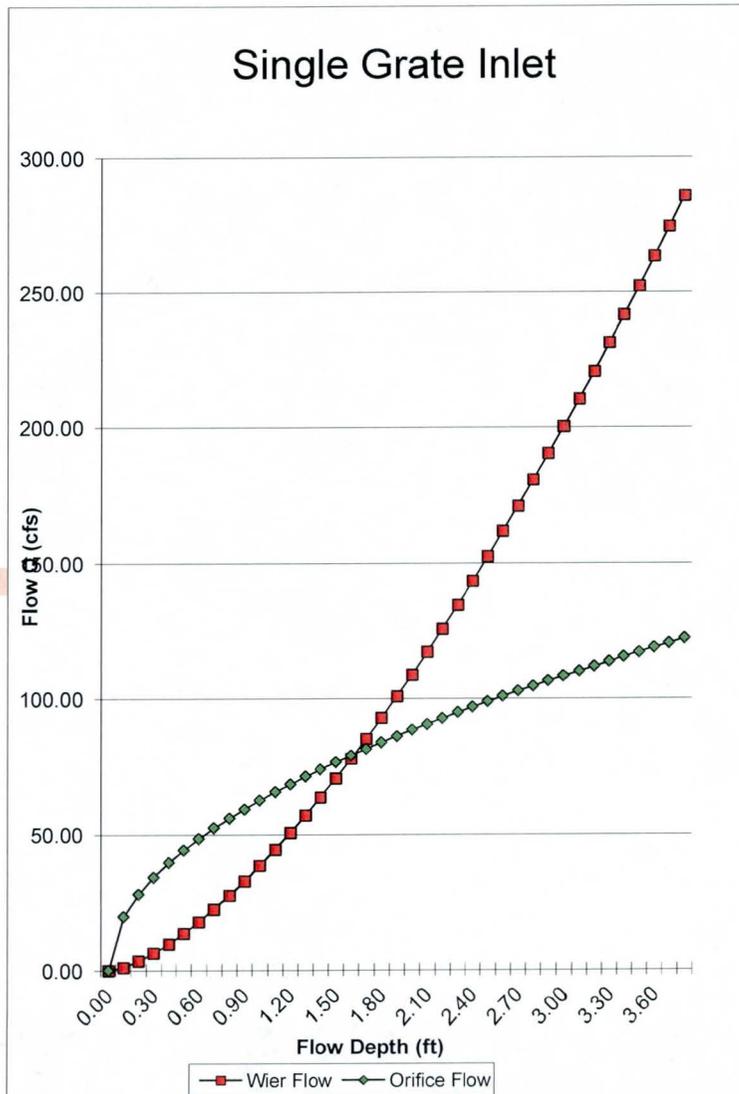
A = Total area of grate minus

Weir Orifice

area of longitudinal & lateral bars

Depth (ft) Qi (cfs) Qi (cfs)

Depth (ft)	Qi (cfs)	Qi (cfs)
0.00	0.00	0.00
0.10	1.22	19.81
0.20	3.45	28.01
0.30	6.33	34.31
0.40	9.75	39.62
0.50	13.63	44.29
0.60	17.92	48.52
0.70	22.58	52.41
0.80	27.58	56.03
0.90	32.91	59.42
1.00	38.55	62.64
1.10	44.47	65.70
1.20	50.68	68.62
1.30	57.14	71.42
1.40	63.86	74.12
1.50	70.82	76.72
1.60	78.02	79.23
1.70	85.45	81.67
1.80	93.10	84.04
1.90	100.96	86.34
2.00	109.04	88.58
2.10	117.31	90.77
2.20	125.79	92.91
2.30	134.47	95.00
2.40	143.33	97.04
2.50	152.38	99.04
2.60	161.62	101.00
2.70	171.03	102.93
2.80	180.62	104.81
2.90	190.38	106.67
3.00	200.31	108.49
3.10	210.41	110.29
3.20	220.67	112.05
3.30	231.10	113.79
3.40	241.68	115.50
3.50	252.42	117.19
3.60	263.32	118.85
3.70	274.36	120.49
3.80	285.56	122.11



Weir/Orifice Flow Capacities of Multiple Grate Inlet

Project : BHOC LOMR

Date 08/22/12

Location: Linear Park, Sta 155+99

Total Flow = 158 cfs

Flow to this Inlet = 37.2 cfs

Weir EQ. $Q_i = C_w P d^{1.5} (C_f)$ Orifice EQ. $Q_i = C_o A (2gd)^{0.5} (C_f)$

Where: $C_w = 3.0$, $C_o = 0.67$, and $C_f =$ clogging factor = 0.5

2 Grates (MAG 540-2)

P = 13.9 ft

P = Perimeter of Catchbasin

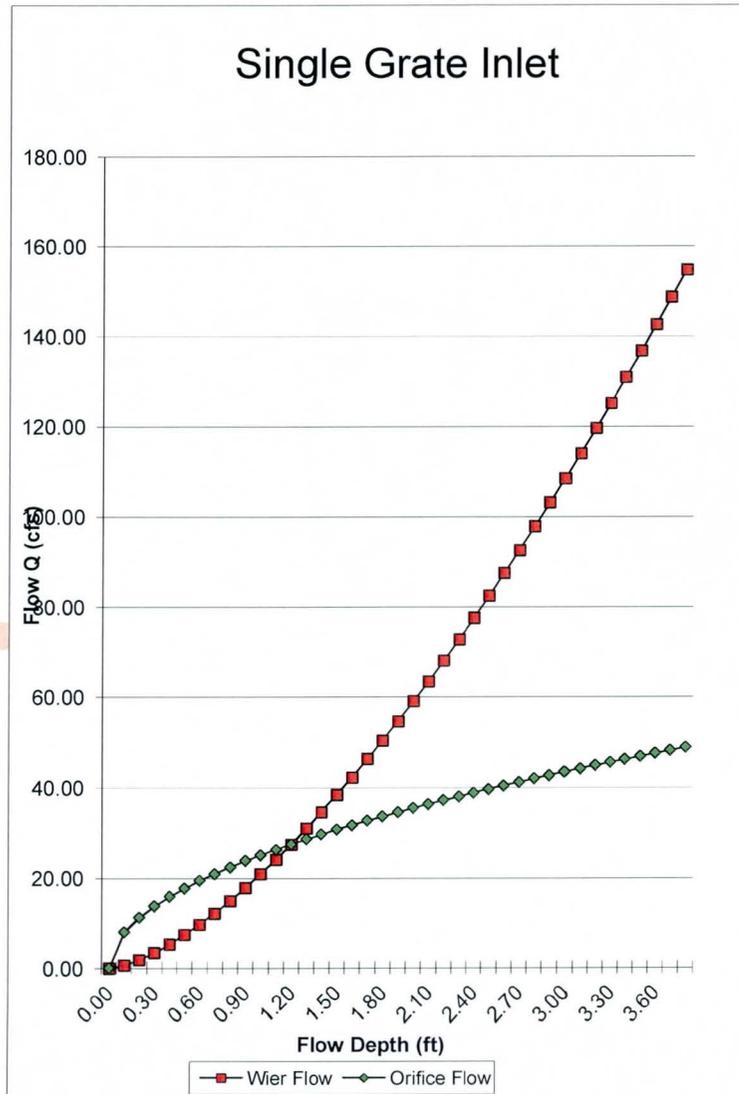
A = 9.3 sq.ft.

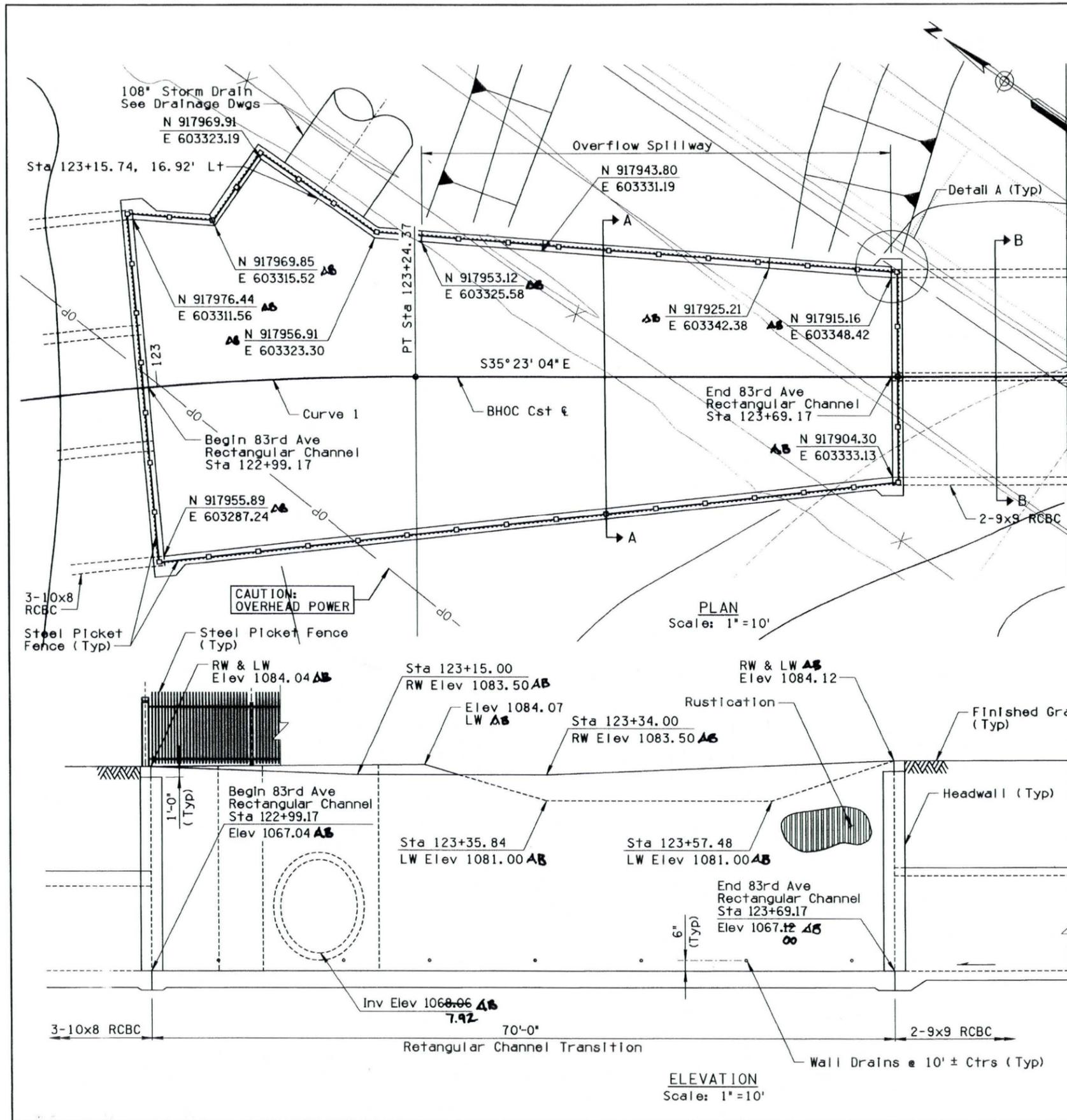
A = Total area of grate minus

area of longitudinal & lateral bars

Weir Orifice
Depth (ft) Qi (cfs) Qi (cfs)

Depth (ft)	Qi (cfs)	Qi (cfs)
0.00	0.00	0.00
0.10	0.66	7.92
0.20	1.87	11.21
0.30	3.43	13.72
0.40	5.29	15.85
0.50	7.39	17.72
0.60	9.71	19.41
0.70	12.24	20.96
0.80	14.95	22.41
0.90	17.84	23.77
1.00	20.90	25.06
1.10	24.11	26.28
1.20	27.47	27.45
1.30	30.97	28.57
1.40	34.61	29.65
1.50	38.39	30.69
1.60	42.29	31.69
1.70	46.31	32.67
1.80	50.46	33.62
1.90	54.72	34.54
2.00	59.10	35.43
2.10	63.59	36.31
2.20	68.18	37.16
2.30	72.88	38.00
2.40	77.69	38.82
2.50	82.59	39.62
2.60	87.60	40.40
2.70	92.70	41.17
2.80	97.90	41.93
2.90	103.19	42.67
3.00	108.57	43.40
3.10	114.05	44.11
3.20	119.61	44.82
3.30	125.26	45.52
3.40	131.00	46.20
3.50	136.82	46.87
3.60	142.72	47.54
3.70	148.71	48.20
3.80	154.78	48.84





APPROXIMATE QUANTITIES				
ITEM	STRUCTURAL EXCAVATION (CY)	STRUCTURE BACKFILL (CY)	Class 'S' f' c= 3500 PSI CONCRETE (CY)	REINFORCING STEEL (LB)
Rectangular Channel	1,550	300	240	27,510
Headwalls	—	50	20	3,675

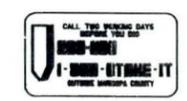
Steel Picket Fence.....201 FT
 Rustication.....780 SF
 Concrete Painting.....3,000 SF

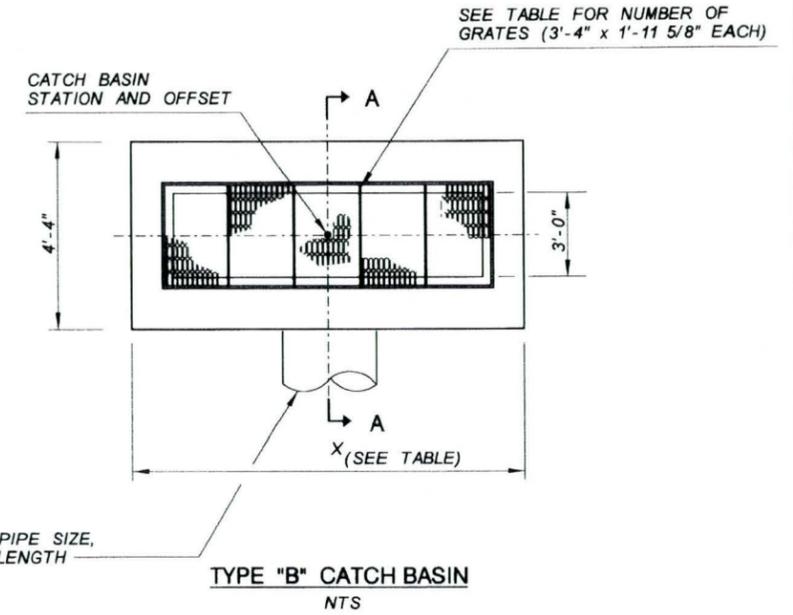
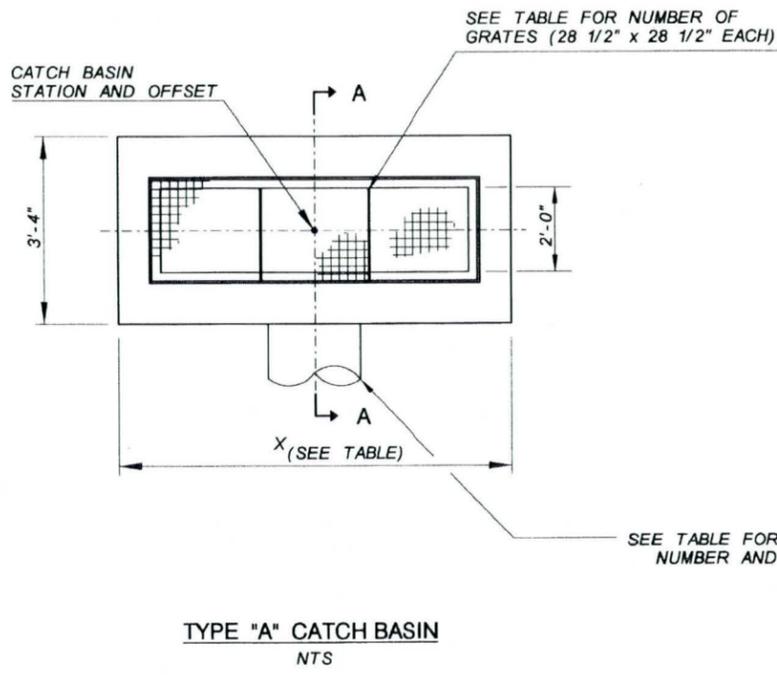
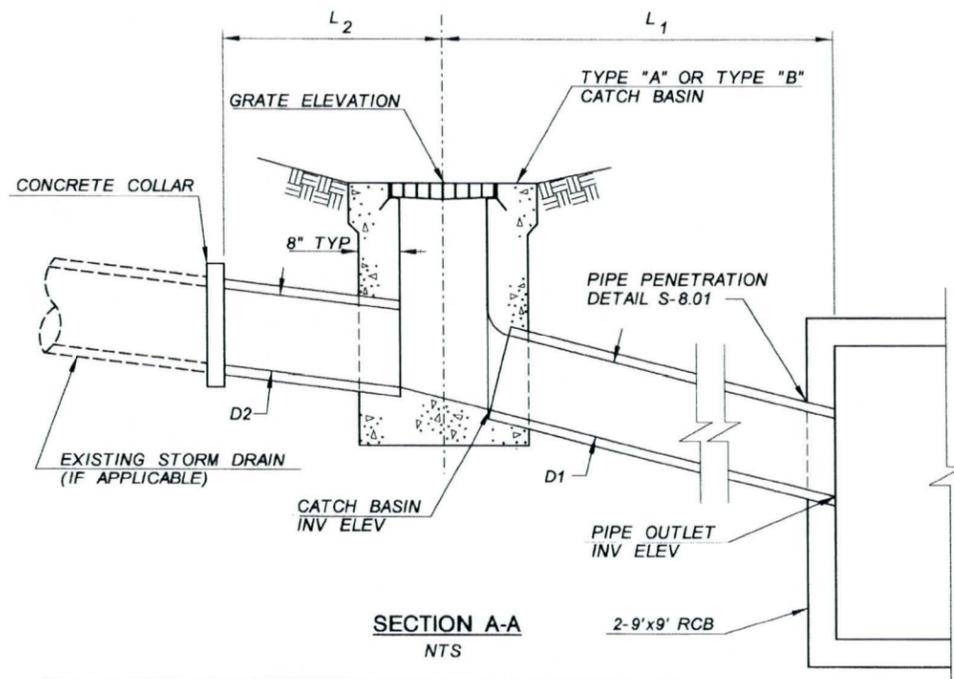
CURVE 1
 PC Sta 120+39.86
 PI Sta 121+93.83
 PT Sta 123+24.37
 $\Delta = 54^\circ 20' 13''$ Rt
 D= 19° 5' 55"
 R= 300.00'
 L= 284.51'
 T= 153.97'

- NOTES:**
1. For Section A-A, See Dwg S-1.03.
 2. For Steel Picket Fence Details, See Dwg S-1.05.
 3. For Headwall Details, See Dwg S-1.06.
 4. For Section B-B, See Dwg S-2.01.
 5. For Pipe Penetration Details, See Dwg S-1.04.
 6. For Detail A, See Dwg S-1.03.
 7. For Wall Drain Details, See ADOT Std B-19.10.
 8. For Rustication, See Dwg S-1.08.

NEW DRAWING

3			
2			
1	83RD AVE ADDITIONS (ADDENDUM NO. 1)	SEO	11-06
NO.	REVISION	BY	DATE
 FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION			
BETHANY HOME OUTFALL CHANNEL REACH C PCN NO. 620 03 32			
	DESIGNED	SEO	6/05
	DRAWN	BAM	6/05
	CHECKED	CAL	6/05
 DMJM HARRIS 2777 E. CAMELBACK ROAD SUITE 200 PHOENIX, AZ, 85016-4302 (602) 337-2777			
DRAWING NO.	83rd AVENUE RECTANGULAR CHANNEL PLAN, ELEVATION AND QUANTITIES	SHEET OF	45A 148





GENERAL NOTES:

1. TYPE A CATCH BASINS SHALL BE SINGLE OR MULTIPLE VERSIONS OF THE TYPE "G" CATCH BASIN - MAG STANDARD DETAIL NO.537 WITH GRATES AS PRESENTED IN MAG DETAIL NO. 539.
2. TYPE B CATCH BASINS SHALL BE SINGLE OR MULTIPLE VERSIONS OF THE TYPE "F" (MODIFIED) CATCH BASIN - MAG STANDARD DETAIL NO.535 (MODIFIED) WITH FRAME AND EF-1 GRATES AS PRESENTED IN MAG DETAIL NO. 540-2.
3. ALL CATCH BASINS SHALL HAVE REINFORCING BARS OF NO.4, 12" CENTER TO CENTER BOTH WAYS AND HAVE 1-1/2" CLEAR TO INSIDE OF WALLS. SEE MAG STD SECT 727.
4. ALL CONCRETE SHALL BE CLASS "A", PER MAG STD SECT 727.

DETAIL D4

CATCH BASINS							PIPES										
BASIN STATION (FT.)	OFFSET LEFT (FT.)	CATCH BASIN TYPE	NUMBER OF GRATES	BASIN WIDTH X (FT.)	GRATE ELEVATION (FT.)	BASIN INV. ELEV. (FT.)	LENGTHS		DIAMETERS		OUTLET STATION (FT.)	OFFSET LEFT (FT.)	OUTLET INV. ELEV (FT.)				
							L1 (FT.)	L2 (FT.)	D1 (IN.)	D2 (IN.)							
AB 123+97.24	6.0	92.07	1.3	A	2	8.08	1080.64	1.4	1076.66	.8	45	N/A	24	N/A	123+51.21	101.57	1073.66
AB 123+74.31	3.0	170.60	6.1	A	2	8.08	1081.10	0.5	1076.48	0.5	11	N/A	18	N/A	123+62.34	167.75	1073.46
AB 130+65.10	4.0	40.32	2.9	B	4	12.33	1085.00	4.8	1077.38	7.05	32	N/A	48	N/A	130+51.74	9.38	1069.04
AB 132+40.81		21.48	8.7	A	1	5.71	1083.00	4.0	1078.45	6.0	11	N/A	18	N/A	132+35.56	9.38	1074.62
AB 140+96.35	7.0	64.75	5.4	B	2	8.33	1085.20		1080.16	7.60	58	N/A	24	N/A	140+72.85	9.38	1075.08
AB 142+10.34	7.0	4.5	66.10	B	10	24.33	1084.80		1070.35	7.65	67	N/A	54	N/A	141+74.32	9.38	1070.70
AB 148+24.50	2.0	27.52		A	1	5.71	1087.00	5.6	1088.00	77.0	16	42	24	24	148+12.81	9.38	1075.43
AB 151+50.26	2.0	24.00	30.3	A	1	5.71	1087.00	3	1083.60	6	15	56	24	24	151+45.25	9.38	1076.34
AB 152+22.97	1.9	25.40	9.2	A	1	5.71	1087.63	9	1083.05	5.0	23	N/A	18	N/A	152+16.32	9.38	1076.00
AB 155+04.14	6.0	44.62	3.8	B	5	14.33	1087.70	8.0	1082.36		35	N/A	36	N/A	154+93.48	9.38	1073.22
AB 155+98.74		25.04	3	B	2	8.33	1086.44	7.8	1082.44	1	34	N/A	36	N/A	154+99.44	9.38	1073.22
AB 157+28.00	7.0	19.86		B	3	10.33	1087.75		1082.75	0.7	23	18	30	12	155+80.51	9.38	1076.03
AB 160+74.00	6.0	10.40	20.0	B	3	10.33	1088.00	7.9	1082.75	1.8	11	N/A	30	N/A	157+20.74	9.38	1076.40
AB 163+94.40	3	14.30	5.8	A	1	5.71	1089.00		1086.00	3.0	9	N/A	30	N/A	160+69.77	9.38	1076.88
AB 166+13.94	0	14.27	6.5	B	4	12.33	1089.00	3	1082.70	4.4	5	N/A	18	N/A	163+89.88	9.38	1078.25
AB 168+44.33		10.20	7.9	A	1	5.71	1089.00	6	1086.00	6	5	N/A	36	N/A	166+09.87	9.38	1075.00
AB 174+31.81		19.88	1	A	1	5.71	1089.00	70.0	1086.00	5.9	9	N/A	18	N/A	168+38.74	9.38	1078.76
AB 176+57.23		47.39	6.7	B	2	8.33	1092.40	6.5	1088.40	3.2	11	N/A	18	N/A	174+24.18	9.38	1079.44
AB 183+63.46		16.97		A	1	5.71	1093.00		1085.00	9.2	43	N/A	30	N/A	176+33.88	9.38	1078.68
AB 184+02.55	2	10.7	7.3	A	1	5.71	1093.00	.2	1088.04	.3	5	N/A	18	N/A	183+63.38	16.00	1078.52
											19	N/A	12	N/A	183+83.58	108.22	1087.91

*NOTE: CONNECT TO EXISTING PIPE

3				
2				
1				
NO.	REVISION	BY	DATE	
<p>FLOOD CONTROL DISTRICT OF MARICOPA COUNTY ENGINEERING DIVISION</p> <p>BETHANY HOME OUTFALL CHANNEL REACH C PCN NO. 620 03 32</p>				
		DESIGNED	ABM	8/05
		DRAWN	JRR	8/05
		CHECKED	SB	8/05
<p>DMJM HARRIS 2777 E. CAMELBACK ROAD SUITE 200 PHOENIX, AZ 85016-4302 (602) 337-2777</p>				
DRAWING NO.	D-1.03	INLET DETAIL	SHEET OF 42 148	

APPENDIX F

**EROSION AND SEDIMENT TRANSPORT ANALYSES SUPPORTING
DOCUMENTATION**

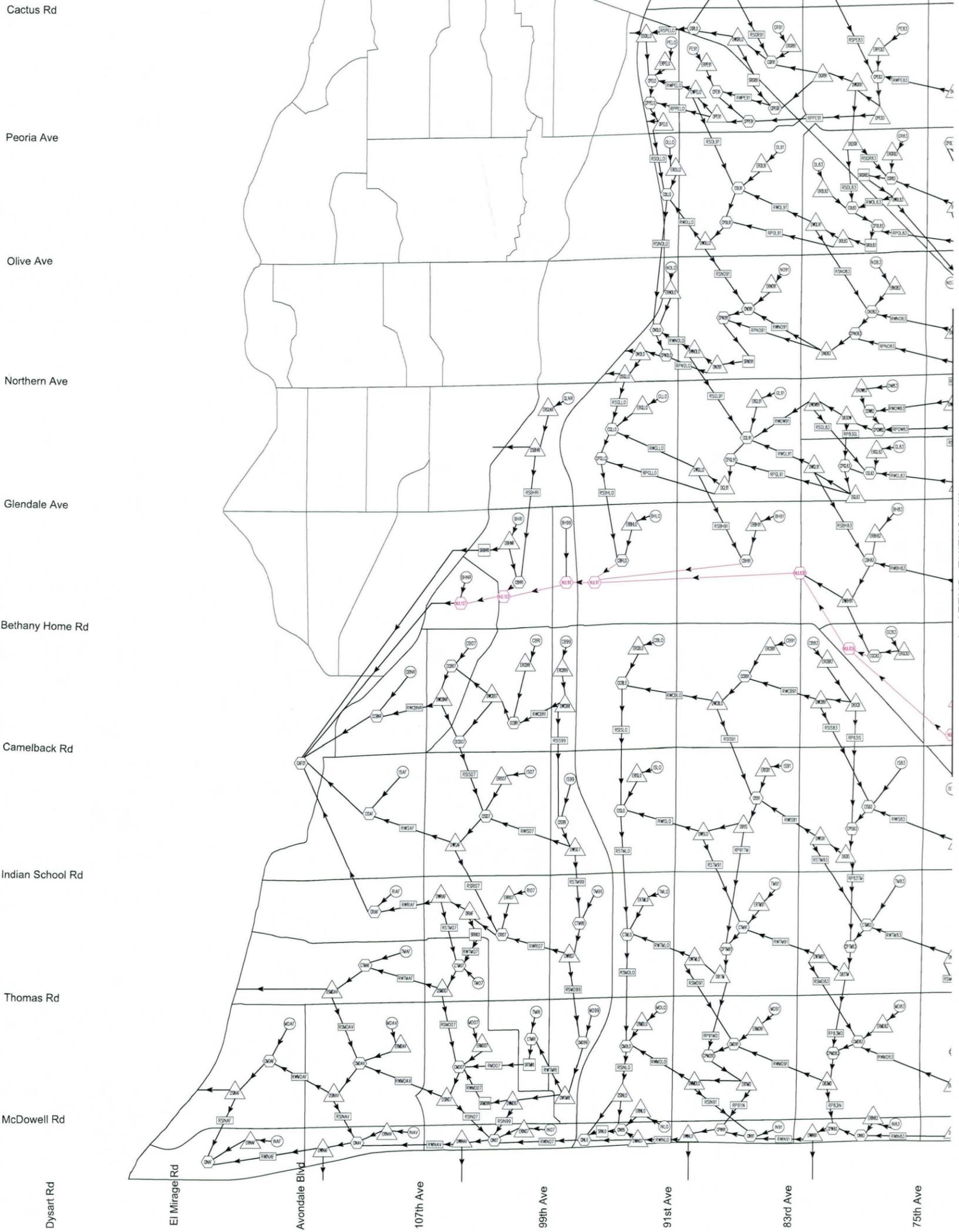
(All erosion & sediment transport documentation is provided within the approved
CLOMR in Exhibit 4 CD)

EXHIBIT 1

HEC-1 SCHEMATIC WITH LOMR UPDATES

MATCHLINE SHEET 2

MATCHLINE SHEET 4



LEGEND

← FLOW DIRECTION	SUBBASIN BOUNDARY
○ STORAGE ROUTE	▭ SUBBASINS OUTSIDE MARYVALE WATERSHED
△ SUBBASIN	▭ MARYVALE SUBBASINS WITHIN MARYVALE WATERSHED
▽ DIVERT	
▭ ROUTE	
○ COMBINATION POINT	

0 1,000 2,000 4,000

← BETHANY HOME OUTFALL CHANNEL LOMR HEC-1 UDPATES (MAGENTA COLOR)
 WOOD, PATEL & ASSOC., AUGUST 2012

1 OF 4
 DRAWING NAME
 EXHIBIT 1

PROJECT NO.
 091910009

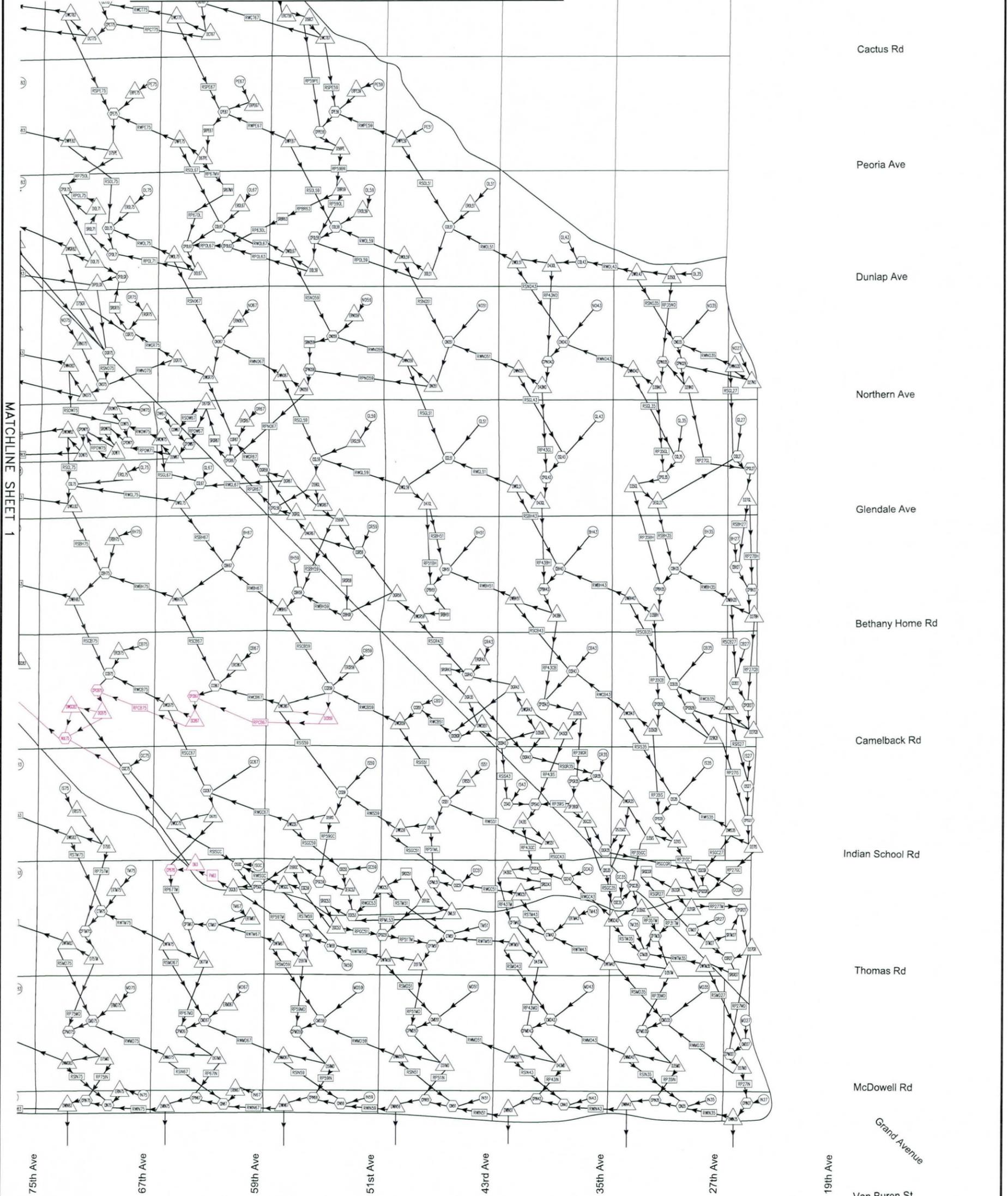
**CITY OF GLENDALE
 GLENDALE AREA STORMWATER
 MANAGEMENT PLAN
 MARYVALE EXISTING HEC-1 SCHEMATIC**

SCALE (H): 2000'
 SCALE (V): NONE
 DESIGNED BY: LAT
 DRAWN BY: LAT
 CHECKED BY: MAF
 DATE: 3/18/2010

**Kimley-Horn
 and Associates, Inc.**
 © 2012 KIMLEY-HORN AND ASSOCIATES, INC.
 7878 North 16th Street, Suite 300
 Phoenix, Arizona 85020 (602) 944-5500

NO.	REVISION	BY	DATE	APPR.

MATCHLINE SHEET 3



MATCHLINE SHEET 1

← (Magenta symbol) → BETHANY HOME OUTFALL CHANNEL LOMR HEC-1 UPDATES (MAGENTA COLOR)
 WOOD, PATEL & ASSOC., AUGUST 2012

LEGEND

- ← FLOW DIRECTION
- SMOR STORAGE ROUTE
- NAF SUBBASIN
- TRM DIVERT
- RWNAF ROUTE
- DNF COMBINATION POINT

SUBBASIN BOUNDARY

- SUBBASINS OUTSIDE MARYVALE WATERSHED
- MARYVALE SUBBASINS WITHIN MARYVALE WATERSHED

0 1,000 2,000 4,000

4 OF 4

PROJECT NO.
091910009
DRAWING NAME
EXHIBIT 1

**CITY OF GLENDALE
 GLENDALE AREA STORMWATER
 MANAGEMENT PLAN
 MARYVALE EXISTING HEC-1 SCHEMATIC**

SCALE (H): 2000'
 SCALE (V): NONE
 DESIGNED BY: LAT
 DRAWN BY: LAT
 CHECKED BY: MAF
 DATE: 3/18/2010

**Kimley-Horn
 and Associates, Inc.**
 © 2012 KIMLEY-HORN AND ASSOCIATES, INC.
 7878 North 16th Street, Suite 300
 Phoenix, Arizona 85020 (602) 944-5500

NO.	REVISION	BY	DATE	APPR.

EXHIBIT 2

AS-BUILT CONSTRUCTION PLANS

(As-built construction plans are provided in Exhibit 4 CD)

EXHIBIT 3

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 updates 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 FIRMA. Users should be aware that BFEs shown on the FIRMA 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 FIRMA for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only to landward of 0.0 National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRMA 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 FIRMA.

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 the 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 FIRMA for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRMA.

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
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on the 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 FIRMA 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.

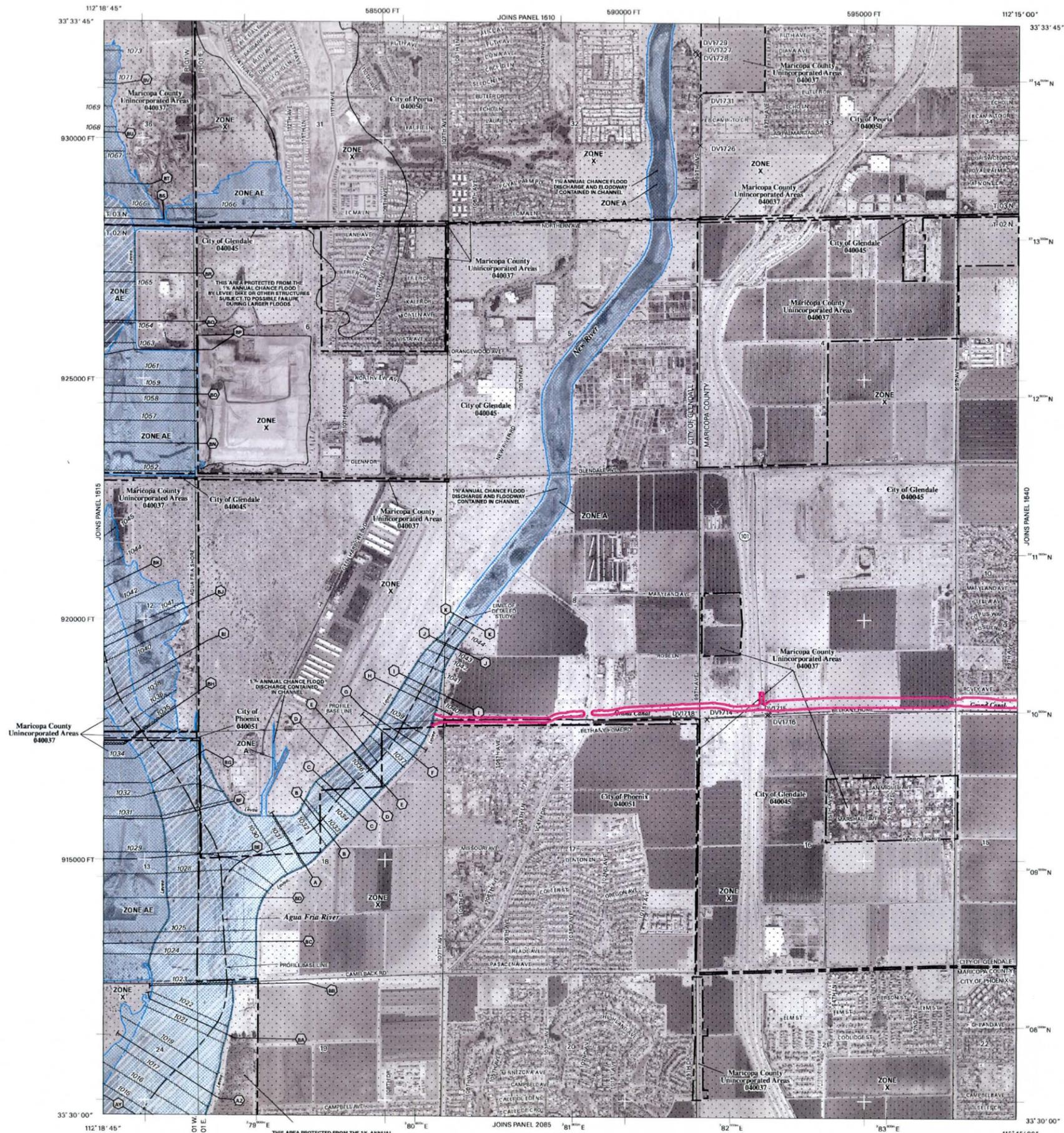
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRMA for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRMA may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contain 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 the FIRMA. 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
Proposed Floodplain

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, AV, 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 ponds); 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 sheet flow, 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 discontinued. Zone AE indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE AV** 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 boundary 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 average areas less than 1 square mile; and areas protected by levees from 1% annual chance flood
- 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 of existing Special Flood Hazard Area Zones, and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 813 Bench mark (see explanation in Notes to Users section of the FIS report)
- 818877 Base Flood Elevation on value where uniform within zone; elevation in feet

* Referenced to the National Geodetic Vertical Datum of 1929

⊕ ⊕ Cross section line
⊖ ⊖ Transsect 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 500-foot grid tick values; Arizona State Plane coordinate system, central zone (FIPS-ZONE 3176) NAD83 (Transverse Mercator)

⊗ DV2313 Bench mark (see explanation in Notes to Users section of the FIS report)

* MLS River Mile

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
April 16, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 29, 1989; September 4, 1991; 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
300 0 300 600
FEET
METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1620H

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

PANEL 1620 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GLendale, CITY OF	040045	1620	H
MARICOPA COUNTY	040037	1620	H
PHOENIX, CITY OF	040051	1620	H
PHOENIX, CITY OF	040051	1620	H

Annotated FIRMA Panel 1620H

Notice to User: This map information should be used when placing map orders. The Community Map Repository office should be used for insurance applications for the subject community.

MAP NUMBER
04013C1620H

MAP REVISED
SEPTEMBER 30, 2005

Federal Emergency Management Agency

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 the 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, NGA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 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) 713-2242, 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.

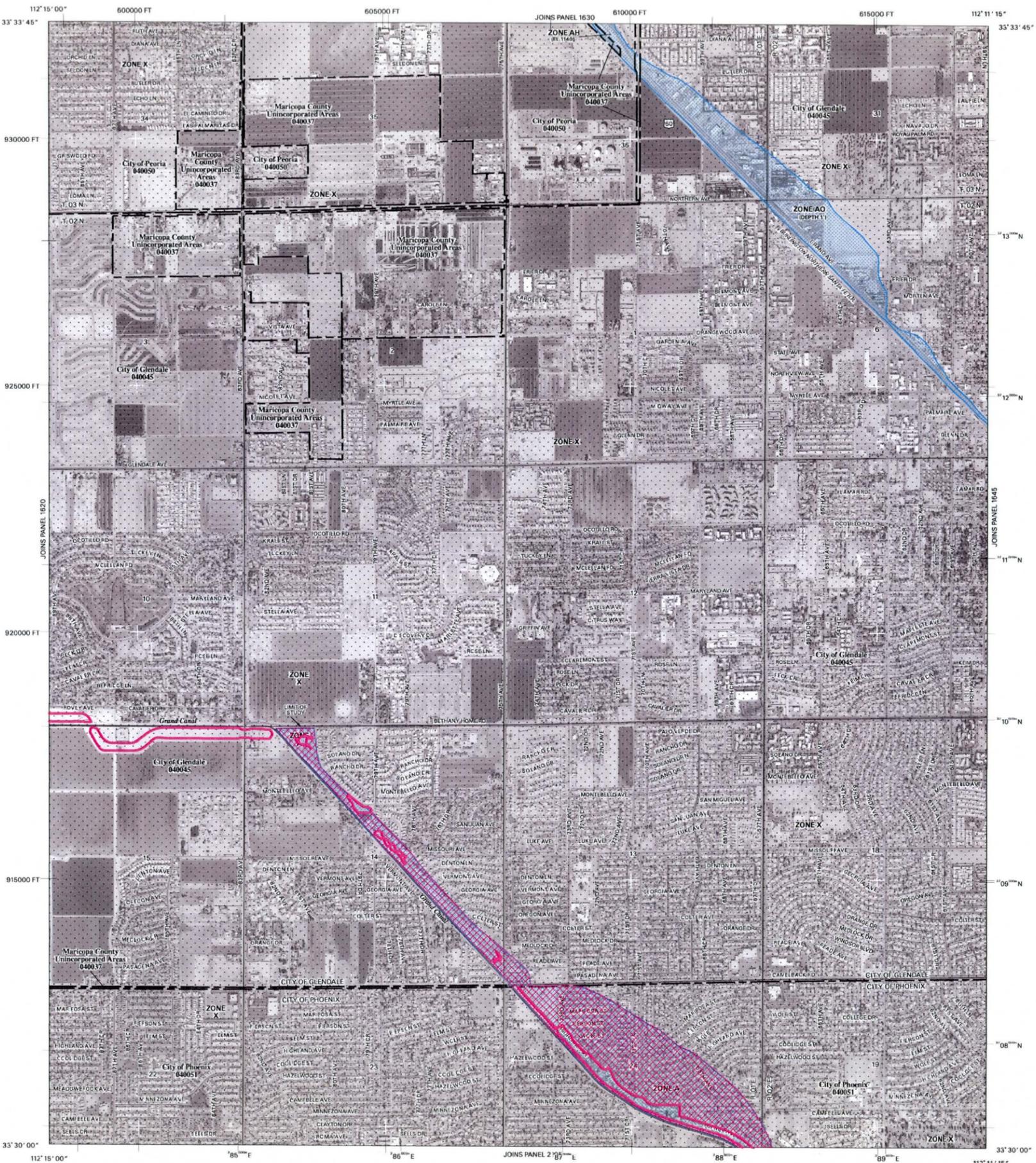
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If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMAMAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.



LEGEND

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% or chance of being equalled 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, AO, AR, AV, 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 ponds); 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 sheet flow, Base Flood Elevations are determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a levee or other flood control system that was subsequently destroyed. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE AV 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

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary of existing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities

Base Flood Elevation line and value, elevation in feet

Base Flood Elevation value where uniform within cross-section in feet

* Referenced to the National Geodetic Vertical Datum of 1929

A Cross section line

B Transect line

112° 07' 08", 33° 25' 41" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere.

76 1600-meter Universal Transverse Mercator grid tick value, zone 12

875000 FT 500-foot grid tick value; Arizona State Plane coordinate system, central zone (FIPS ZONE 3176) NAD83 (Transverse Mercator)

02V2313 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M.S. River Mile

MAP REPOSITORY

Refer to Repositories Listing on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

April 15, 1998

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

July 19, 2001

September 30, 2005 - to update corporate limits, to change Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to change 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

Legend

Proposed Floodplain

Floodplain to be Removed

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1640F

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

PANEL 1640 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	PANEL	SUFFIX
GENERAL CITY OF	040041	1640	F
MARICOPA COUNTY	040007	1640	F
PHOENIX CITY OF	040002	1640	F
PHOENIX CITY OF	040001	1640	F

Annotated FIRM Panel 1640F

Notice to User: This Map Amendment should be used when placing map orders. The Community Map History table should be used to determine if flood insurance is available in this community.

MAP NUMBER 04013C1640F

MAP REVISED SEPTEMBER 30, 2005

Federal Emergency Management Agency

NOTES TO USERS

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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 to landward of 0.0 National Geospatial 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 the 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 Geospatial 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 Geospatial Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geospatial Survey website at <http://www.ngs.noaa.gov> or contact the National Geospatial Survey at the following address:

Spatial Reference System Division
National Geospatial Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 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 Geospatial Survey at (801) 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. Orthographic images were produced at a scale of 1:8000 using HARN for control. Aerial photography is dated December 2000 to December 2002.

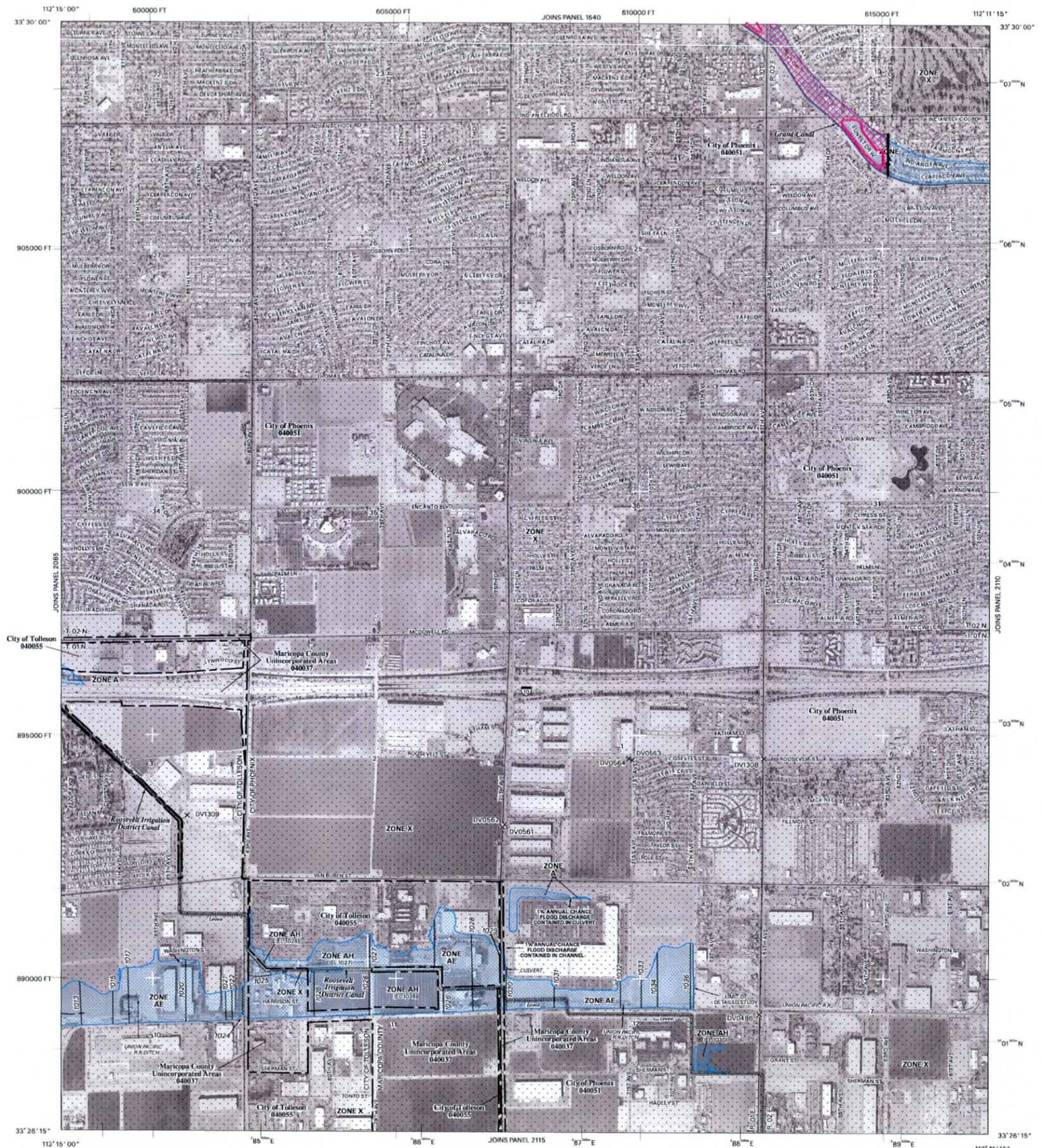
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contain 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 the 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

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, X, V, and YE. 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.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently abandoned. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE AR1 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 YE 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
- Base Flood Elevation line and value; elevation in feet
- Base Flood Elevation value where uniform within zone; elevation in feet

* Referenced to the National Geospatial Vertical Datum of 1929

(A) (A) Cross section line

(2) (2) Truncated line

112° 07' 08" 33° 25' 41" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83); Western Hemisphere

76° 00' 00" 1000-meter Universal Transverse Mercator grid tick values; zone 32

875000 FT 5000-foot grid tick values; Arizona State Plane coordinate system, central zone (FIPS ZONE 3176) NAD83 (Transverse Mercator)

X0V2313 Bench mark (see explanation in Notes to Users section of this FIRM cover)

* M15 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

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 1-800-638-6625.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

Legend

Proposed Floodplain

Floodplain to be Removed

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2105F

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

PANEL 2105 OF 4350

(SEE MAP INDEX FOR FIRM PANEL LAYOUTS)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2105	F
PHOENIX, CITY OF	040051	2105	F
TOLLESON, CITY OF	040055	2105	F

Annotated FIRM Panel 2105F

Notes to User: The Map Repository below should be used when placing map orders. The Community Number shown above should be used in insurance applications for the subject community.

MAP NUMBER 04013C2105F

MAP REVISED

SEPTEMBER 30, 2005

Federal Emergency Management Agency

EXHIBIT 4

CD