EMH&T

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Floodplain Study/CLOMR Application
Scioto River

Project:
Scioto Mile
City of Columbus, Ohio

September 2008

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Engineers | Surveyors | Planners | Scientists

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A legacy of **experience**. A reputation for **excellence**.

Scioto Mile
Floodplain Study/CLOMR Application
Scioto River, City of Columbus, Ohio
September 2008

1.0 INTRODUCTION

The Scioto River is a FEMA studied stream with calculated base-flood elevations and floodway limits. In accordance with 44 CFR, Part 65.12 of the National Flood Insurance Program (NFIP) Regulations, the purpose of this study is to provide an analysis of the existing and proposed conditions 100-year floodplain and floodway, in order to evaluate the changes that will be caused by development (encroachment) in the Scioto River regulatory floodway, associated with the proposed Scioto Mile project. This study also considers the proposed Rich St Bridge (including west bank riverwalk), the demolition of the existing Town St Bridge, and the recent reconstruction of the Main St Bridge. MT-2 CLOMR application forms are included in Appendix E.

The Scioto Mile project, an expansion of Bicentennial Park (John W. Galbreath Park) and related Civic Center Drive improvements, is an important component of the downtown riverfront revitalization plans. The enclosed analysis shows that the proposed Scioto Mile floodplain encroachment, in conjunction with the Rich Street Bridge construction and Town Street Bridge demolition, will not cause an adverse impact to 100-year floodplain and floodway elevations. The reconstruction of the Main St Bridge does not cause any increases to Base Flood Elevations (BFEs).

The enclosed modeling begins at FEMA lettered cross-section AG (247.5), just upstream of the Penn Central Railroad Bridge (Structure #6 Penn Central Railroad Bridge, Crossing #1, as listed in the Effective Model) and extends approximately 4,460 feet to FEMA lettered cross-section AK (252.5), just upstream of another Railroad Bridge (Structure #11 Penn Central Railroad Bridge, Crossing #2, as listed in the Effective Model). Hydraulic modeling from the approved Main St Bridge reconstruction project (provided by DLZ Ohio, Inc.) and hydraulic modeling for the proposed Rich Street Bridge construction project (provided by Burgess & Niple, Inc.) have been combined and utilized in the enclosed analysis. Refer to the floodplain workmap in Appendix C for a schematic of the proposed project and cross-section locations. The geometric data used in each of the enclosed models is based on the NGVD29, in keeping with the original published data. However, the proposed development plans for the Scioto Mile are based on NAVD88; therefore a conversion factor is required to compare the calculated flood elevations to the proposed development plan. The conversion formula is: NGVD29 – 0.60 = NAVD88

2.0 AVAILABLE DATA

The project site is shown on the Franklin County, Ohio and Incorporated Areas Flood Insurance Rate Map (FIRM) number 39049C0309K, dated June 17, 2008. Excerpts from the FEMA published Flood Insurance Study (FIS), dated June 17, 2008, are included in Appendix A, including the Floodway Data Table, Flood Profile, and FIRM.

The approved Main Street Bridge reconstruction project hydraulic report, dated November 2004, was provided by DLZ Ohio, Inc. and has been integrated into the EMH&T analysis from cross-section 247.5 (AG) through cross-section 249.74.

The proposed Rich Street Bridge project hydraulic report, dated January 21, 2008, was provided by Burgess & Niple, Inc. (B&N) and has been integrated into the EMH&T analysis from cross-section 249.78 through cross-section 251.1. Both of the provided hydraulic models are in HEC-RAS format and are based on the 2004 FIS revision which incorporated the USACE (Huntington District) modeling of their West Columbus Local Protection Project (WCLPP), also referred to as the Columbus Floodwall.

3.0 HYDROLOGIC ANALYSIS

A hydrologic analysis is not required for this study. The peak flow rates used in the hydraulic model are based on those published by FEMA. Table 1 illustrates the published flows for each flood profile.

TABLE 1
Peak Flood Discharge Values
In Studied Reach (Cross-Sections 247.5 – 252.5)

10-yr	50-yr	100-yr	500-yr	Floodway
36,800 cfs	62,100 cfs	75,000 cfs	114,000 cfs	75,000 cfs

4.0 HYDRAULIC ANALYSIS

The published floodplain analysis of the Scioto River was most recently performed by Fuller, Mossbarger, Scott and May Engineers (now part of Stantec Engineers) for the U.S. Army Corps of Engineers, using the USACE HEC-RAS hydraulic computer program. DLZ utilized the effective model to design and analyze the Main Street Bridge reconstruction project. B&N utilized the published model to design and analyze the proposed Rich Street Bridge construction project and west bank riverwalk. EMH&T combined the DLZ and B&N studies and included additional information to reflect the proposed Scioto Mile encroachments. Table 2 summarizes the location of added and modified cross-sections and their origin. Table 5 provides a list of the HEC-RAS filenames for each level of modeling described below.

<u>Duplicate Effective Model</u>
The Effective model, dated July 2001, was obtained from the Corps of Engineers. The published FIS results were exactly duplicated by running the Effective model with HEC-RAS v2.2 (the native version of the published FIS model). The Effective model was then run, making no modifications or additions, with HEC-RAS v4.0, producing dissimilar results. The dissimilar results were all increases to flood elevations within a range of approximately 0.20 – 0.25 feet (vertical) which propagate through the entire reach (Downstream Reach) of the Duplicate Effective model. The primary reason for the dissimilar results appears to be related to be how each version of HEC-RAS computes flood elevations at the two low-head dams in the effective model (Downstream Reach), downstream of the project area.

Corrected Effective Model
EMH&T combined the DLZ Existing Conditions model (old Main St Bridge) with the B&N Existing Conditions model (no Rich St Bridge, old Town St Bridge) and added cross sections 250.0 and 249.76 to create a Corrected Effective model that integrates the most recent topographic information available, including bathymetric survey and topographic survey from DLZ associated with the Main St reconstruction project and topographic survey from EMH&T associated with the Scioto Mile project.

Starting water elevations for each of the studied profiles in the EMHT Corrected Effective model are based on the Duplicate Effective elevations, as determined using HEC-RAS v4.0. Contraction and expansion coefficients at each of the added/modified cross sections are 0.3 and 0.5, respectively, in keeping with the precedent in the Effective Model and reflecting the contracted/confined nature of the Scioto River floodplain within the studied reach. Manning's n-values were duplicated at each of the added/modified cross sections in accordance with adjacent cross section n-values found in the Effective Model.

Several B&N cross-sections had to be renamed in the EMHT Corrected Effective model because of naming conflicts with cross-sections in the overlapping DLZ study. Table 2 identifies the source of each cross-section in the EMHT model and includes their original name designations and letters. B&N cross-section 249.51 was eliminated from the EMHT models because of redundancy with the DLZ study.

Revised Existing Conditions Model
The Revised Existing Conditions model is based on the EMH&T Corrected Effective model described above. The only difference between the two models is the incorporation of the new geometry of the Main St Bridge. The Main St Bridge reconstruction project is nearly complete, with the effective hydraulic components of the replacement bridge in place. Information reflecting the reconstructed bridge in this model is taken from the City-approved DLZ Project conditions model. No as-built measurements of the bridge are included in the EMH&T Revised Existing model. Results of this level of modeling show that the new Main St Bridge does not cause any rise to flood elevations, thus a CLOMR was not required prior to City approval and building permits. The Revised Existing model becomes the most complete baseline condition for comparison of changes shown in the Project condition model described below.

Project Conditions Model
The EMH&T Project Conditions model integrates B&N's proposed Rich St Bridge and west bank riverwalk, the proposed Scioto Mile floodway fill, and the removal of the existing Town St Bridge, showing the combined effect of each of these projects. Contraction and expansion coefficients were left unchanged from the Corrected model, as they already reflect customary values for bridge sections. Manning's n-values were left unchanged from the Corrected model, as vegetative and erosion control conditions along the improvement areas are expected to compare to existing conditions after completion of the project. Refer to the floodplain workmaps in Appendix C for a graphical representation of the proposed Scioto Mile grading/encroachment and the location of the proposed Rich St Bridge. Appendix D contains the proposed bridge plans.

TABLE 2
Cross-Section Summary

Cross-Section Name	Original Cross-Section Name	Letter Designation	Comment
252.5		AK	CLOMR Study Limit
252.4		(Railroad)	
252.2		(Railroad)	
252.1			
251.5		AJ	
251.4		(Broad St)	
251.21		(Broad St)	
251.2			
251.1			
250.5		AI	
250.49			
250.4		(Town St)	
250.2		(Town St)	
250.1			
250.0			Added by EMHT*
249.9			Modified by B&N*
249.8		(Rich St)	Modified by B&N*
249.79	249.7 (B&N)	(Rich St)	Modified by B&N*
249.78	249.6 (B&N)		Modified by B&N*
249.76			Added by EMHT*
249.74	249.55 (B&N)		Added by DLZ*
249.73	249.52 (B&N)		Added by DLZ*
249.5		AH	Modified by DLZ*
249.4		(Main St)	Modified by DLZ*
249.2		(Main St)	Modified by DLZ*
249.1			Modified by DLZ*
249			Added by DLZ*
248.5			
248.4		(Low Head Dam)	
248.2		(Low Head Dam)	
248.1			
247.5		AG	CLOMR Study Limit

*** Modified or Added in Corrected Effective Model**

5.0 RESULTS

The results of the HEC-RAS modeling contained within this report are summarized in Table Nos. 3 and 4. The Project Conditions 100-year floodplain elevations are higher and lower than the Revised Existing Conditions 100-year floodplain elevations, however, comparing only FEMA lettered cross-sections in the Revised Existing model to the Proposed model shows no increases resulting from the proposed improvements. The whole-scale flood elevation increases in the

Corrected Effective model are a result of internal calculation changes between different versions of the HEC-RAS program, primarily in the way that each version processes calculations for the modeled low-head dams.

The floodplain workmap in Appendix C shows the graphical location of the studied cross-sections and illustrates the existing and proposed topographic information that was utilized in this study. A CD-ROM with the electronic copy of each of the referenced models and workmaps is included in Appendix E at the rear of this report.

This analysis demonstrates that the proposed Scioto Mile floodway grading and the proposed Rich St Bridge and west bank riverwalk construction projects will not cause an increase in 100-year flood elevations at the FIS lettered cross-sections, when also considering the removal of the existing Town St Bridge.

As first described in the B&N study report, the EMH&T models also show a slight increase to 100-year flood elevations at non-FIS reporting sections between the Main St Bridge and the existing Town St Bridge. These increases, summarized in Table Nos. 3 and 4, are confined to the stream corridor by an existing certified levee/floodwall on the west bank and an existing retaining wall on the east bank, each extending well above the proposed 100-year flood elevations. As such, no existing structures or properties will be adversely impacted by the slight increases.

TABLE 3
Summary Comparison of Calculated Base (100-year) Flood Elevations (NGVD29)
Scioto River

1	2	3	4	5	6	7	8	9	10
X-Section	**Published FIS (ft)**	**Duplicate Effective Model v2.2 (ft)**	**Elevation Change* (ft)**	**Duplicate Effective Model v4.0 (ft)**	**Corrected Effective Model (ft)**	**Revised Existing Model (ft)**	**Project Model (ft)**	**Elevation Change** (ft)**	**Comments**
252.5	720.1	720.12	0.18	720.30	720.61	720.60	720.60	0	AK
252.4		720.24	0.18	720.42	720.73	720.72	720.72	0	
252.3 BR U		720.20	0.18	720.38	720.68	720.67	720.67	0	Railroad (ex)
252.3 BR D		720.19	0.18	720.37	720.67	720.66	720.66	0	Railroad (ex)
252.2		720.21	0.18	720.39	720.70	720.69	720.69	0	
252.1		720.22	0.17	720.39	720.70	720.69	720.69	0	
251.5	720.0	719.96	0.19	720.15	720.47	720.45	720.45	0	AJ
251.4		719.57	0.20	719.77	720.10	720.09	720.09	0	

TABLE 3 (Continued)

X-Section	Published FIS (ft)	Duplicate Effective Model v2.2 (ft)	Elevation Change* (ft)	Duplicate Effective Model v4.0 (ft)	Corrected Effective Model (ft)	Revised Existing Model (ft)	Project Model (ft)	Elevation Change** (ft)	Comments
251.3 BR U		719.02	0.20	719.22	719.56	719.55	719.55	0	Broad St (ex)
251.3 BR D		718.85	0.20	719.05	719.40	719.38	719.39	0.01	Broad St (ex)
251.21		719.05	0.20	719.25	719.59	719.58	719.58	0	
251.2		719.09	0.19	719.28	719.63	719.62	719.62	0	
251.1		719.00	0.20	719.20	719.55	719.54	719.54	0	
250.5	718.5	718.52	0.22	718.74	719.11	719.10	719.10	0	AI
250.49					719.11	719.10	719.10	0	
250.4		718.48	0.22	718.70	719.08	719.07	719.03	-0.04	
250.3 BR U		718.07	0.23	718.30	718.69	718.67			Town St (ex)
250.3 BR D		717.98	0.23	718.21	718.60	718.59			Town St (ex)
250.2		718.13	0.23	718.36	718.75	718.73	718.95	0.22	
250.1		718.10	0.23	718.33	718.72	718.71	718.89	0.18	
250					718.61	718.60	718.74	0.14	
249.9					718.48	718.47	718.64	0.17	
249.8					718.44	718.43	718.51	0.08	
249.795 BR U							718.25		Rich St (prop)
249.795 BR D							718.20		Rich St (prop)
249.79					718.26	718.25	718.28	0.03	
249.78					718.20	718.19	718.23	0.04	
249.76					718.26	718.24	718.18	-0.06	
249.74					718.23	718.21	718.15	-0.06	
249.73					718.18	718.16	718.16	0	
249.5	717.8	717.83	0.24	718.07	718.19	718.17	718.17	0	AH
249.4		717.66	0.25	717.91	718.00	717.99	717.99	0	
249.3 BR U		717.31	0.24	717.55	717.62	717.59	717.59	0	Main St (ex)
249.3 BR D		717.20	0.25	717.45	717.51	717.49	717.49	0	Main St (ex)
249.2		717.33	0.25	717.58	717.64	717.64	717.64	0	
249.1		717.37	0.24	717.61	717.59	717.59	717.59	0	
249					717.54	717.54	717.54	0	
248.5		717.42	0.25	717.67	717.67	717.67	717.67	0	
248.4		717.41	0.25	717.66	717.66	717.66	717.66	0	
248.3		Inline Weir		Inl Struct	Inl Struct	Inl Struct	Inl Struct		Low-head Dam
248.2		716.93	0.20	717.13	717.13	717.13	717.13	0	
248.1		716.93	0.20	717.13	717.13	717.13	717.13	0	
247.5	716.7	716.74	0.20	716.94	716.94	716.94	716.94	0	AG

* Comparison of HEC-RAS v2.2 and HEC-RAS v4.0; no other modifications or additions

**Comparison of Project and Revised Existing Conditions models.

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TABLE 4
Summary Comparison of Calculated FLOODWAY Elevations (NGVD29)
Scioto River

1	2	3	4	5	6	7	8	9	10
X-Section	**Published FIS (ft)**	**Duplicate Effective Model v2.2 (ft)**	**Elevation Change* (ft)**	**Duplicate Effective Model v4.0 (ft)**	**Corrected Effective Model (ft)**	**Revised Existing Model (ft)**	**Project Model (ft)**	**Elevation Change** (ft)**	**Comments**
252.5	720.5	720.46	0.42	720.88	721.15	721.13	721.11	-0.02	AK
252.4		720.57	0.42	720.99	721.26	721.24	721.22	-0.02	
252.3 BR U		720.53	0.42	720.95	721.21	721.19	721.17	-0.02	Railroad (ex)
252.3 BR D		720.52	0.42	720.94	721.20	721.18	721.16	-0.02	Railroad (ex)
252.2		720.55	0.41	720.96	721.23	721.21	721.19	-0.02	
252.1		720.55	0.42	720.97	721.23	721.21	721.19	-0.02	
251.5	720.3	720.25	0.43	720.68	720.96	720.93	720.91	-0.02	AJ
251.4		719.92	0.45	720.37	720.66	720.63	720.61	-0.02	
251.3 BR U		719.37	0.46	719.83	720.13	720.10	720.08	-0.02	Broad St (ex)
251.3 BR D		719.21	0.47	719.68	719.97	719.95	719.93	-0.02	Broad St (ex)
251.21		719.40	0.47	719.87	720.17	720.14	720.12	-0.02	
251.2		719.44	0.47	719.91	720.20	720.18	720.15	-0.03	
251.1		719.36	0.47	719.83	720.13	720.10	720.08	-0.02	
250.5	718.9	718.91	0.51	719.42	719.74	719.71	719.69	-0.02	AI
250.49					719.74	719.71	719.69	-0.02	
250.4		718.87	0.52	719.39	719.71	719.68	719.62	-0.06	
250.3 BR U		718.48	0.52	719.00	719.32	719.29			Town St (ex)
250.3 BR D		718.39	0.52	718.91	719.24	719.21			Town St (ex)
250.2		718.53	0.53	719.06	719.38	719.36	719.54	0.18	
250.1		718.50	0.53	719.03	719.36	719.33	719.49	0.16	
250					719.26	719.23	719.36	0.13	
249.9					719.14	719.11	719.26	0.15	
249.8					719.11	719.08	719.14	0.06	
249.795 BR U							718.91		Rich St (prop)
249.795 BR D							718.86		Rich St (prop)
249.79					718.94	718.91	718.94	0.03	
249.78					718.89	718.86	718.90	0.04	
249.76					718.94	718.91	718.85	-0.06	
249.74					718.92	718.89	718.83	-0.06	
249.73					718.87	718.84	718.84	0	
249.5	718.2	718.24	0.55	718.79	718.87	718.84	718.84	0	AH
249.4		717.90	0.57	718.47	718.55	718.52	718.52	0	
249.3 BR U		717.74	0.32	718.06	718.11	718.09	718.09	0	Main St (ex)
249.3 BR D		717.64	0.40	718.04	718.09	718.07	718.07	0	Main St (ex)

TABLE 4 (Continued)

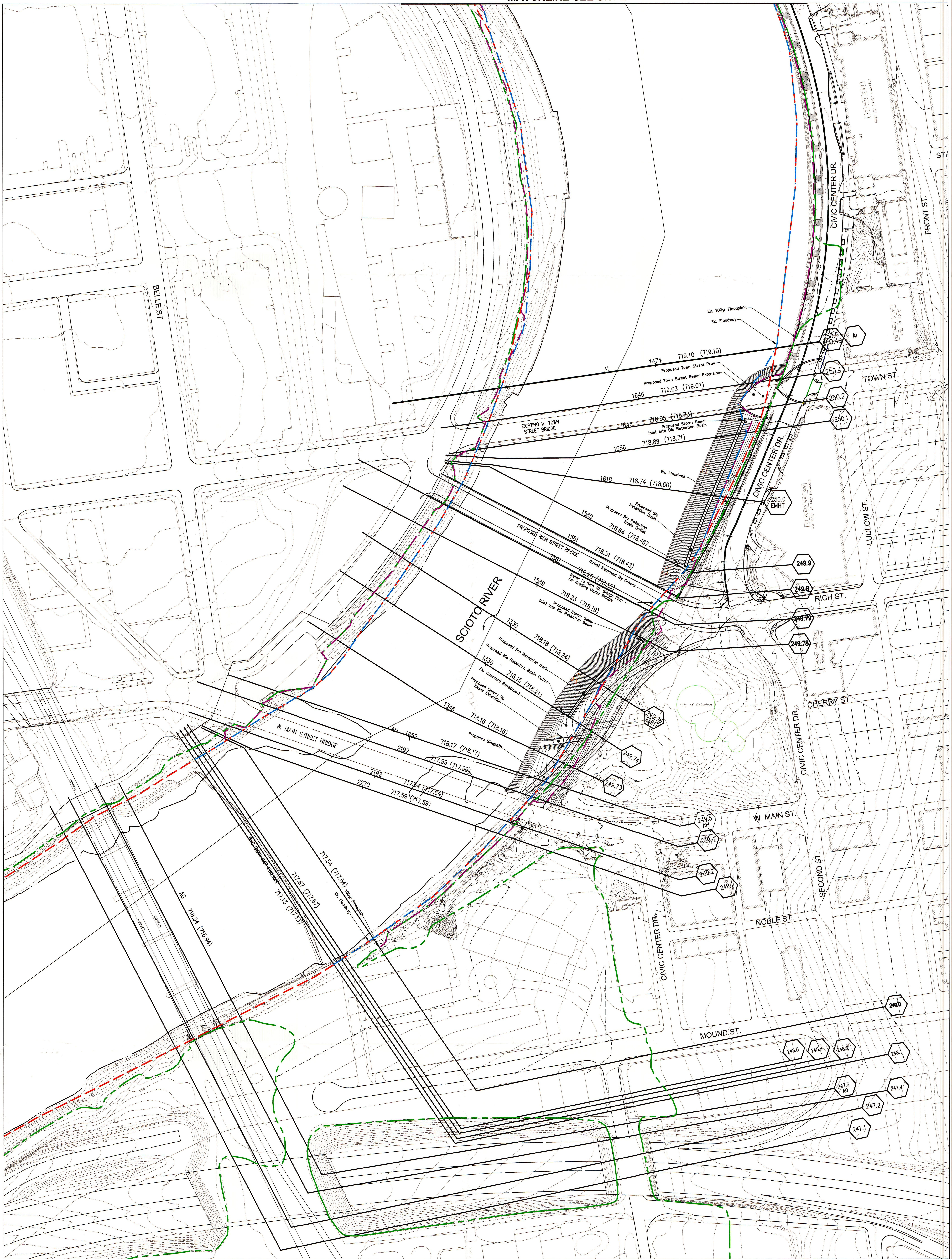
X-Section	Published FIS (ft)	Duplicate Effective Model v2.2 (ft)	Elevation Change* (ft)	Duplicate Effective Model v4.0 (ft)	Corrected Effective Model (ft)	Revised Existing Model (ft)	Project Model (ft)	Elevation Change** (ft)	Comments
249.2		717.76	0.40	718.16	718.20	718.20	718.20	0	
249.1		717.80	0.41	718.21	718.19	718.19	718.19	0	
249					718.14	718.14	718.14	0	
248.5		717.86	0.40	718.26	718.26	718.26	718.26	0	
248.4		717.85	0.40	718.25	718.25	718.25	718.25	0	
248.3		Inline Weir		Inl Struct	Inl Struct	Inl Struct	Inl Struct		Low-head Dam
248.2		717.46	0.28	717.74	717.74	717.74	717.74	0	
248.1		717.46	0.28	717.74	717.74	717.74	717.74	0	
247.5	717.3	717.26	0.29	717.55	717.55	717.55	717.55	0	AG

* Comparison of HEC-RAS v2.2 and HEC-RAS v4.0; no other modifications or additions
**Comparison of Project and Revised Existing Conditions models.

TABLE 5
Summary of HEC-RAS Filenames

Model	Project	Plan	Geometry	Flow
Duplicate Effective	SM-CLOMR.prj	*.p03	*.g01	*.f01
Corrected Effective	SM-CLOMR.prj	*.p06	*.g05	*.f01
Revised Existing	SM-CLOMR.prj	*.p07	*.g06	*.f01
Proposed Project	SM-CLOMR.prj	*.p10	*.g09	*.f01

MATCHLINE SEE SHT 2



LEGEND

Effective FEMA Floodway Limits

Effective FEMA 100 yr. Floodplain Limits

Revised Floodway

Revised 100 yr. Floodplain Limits

NGVD 1929
Revised Existing Conditions 100-year Flood Elevations

250 718.74 (718.59)

Horizontal Station Control = 0' (Except where noted)

HEC-RAS Cross Section

NGVD 1929
Proposed Conditions 100-year Flood Elevations

NOTES:

- Base topographic information is based on Franklin County Auditor GIS and EMH&T survey (Scioto Mile only).
- Vertical Datum based on NGVD 1929.

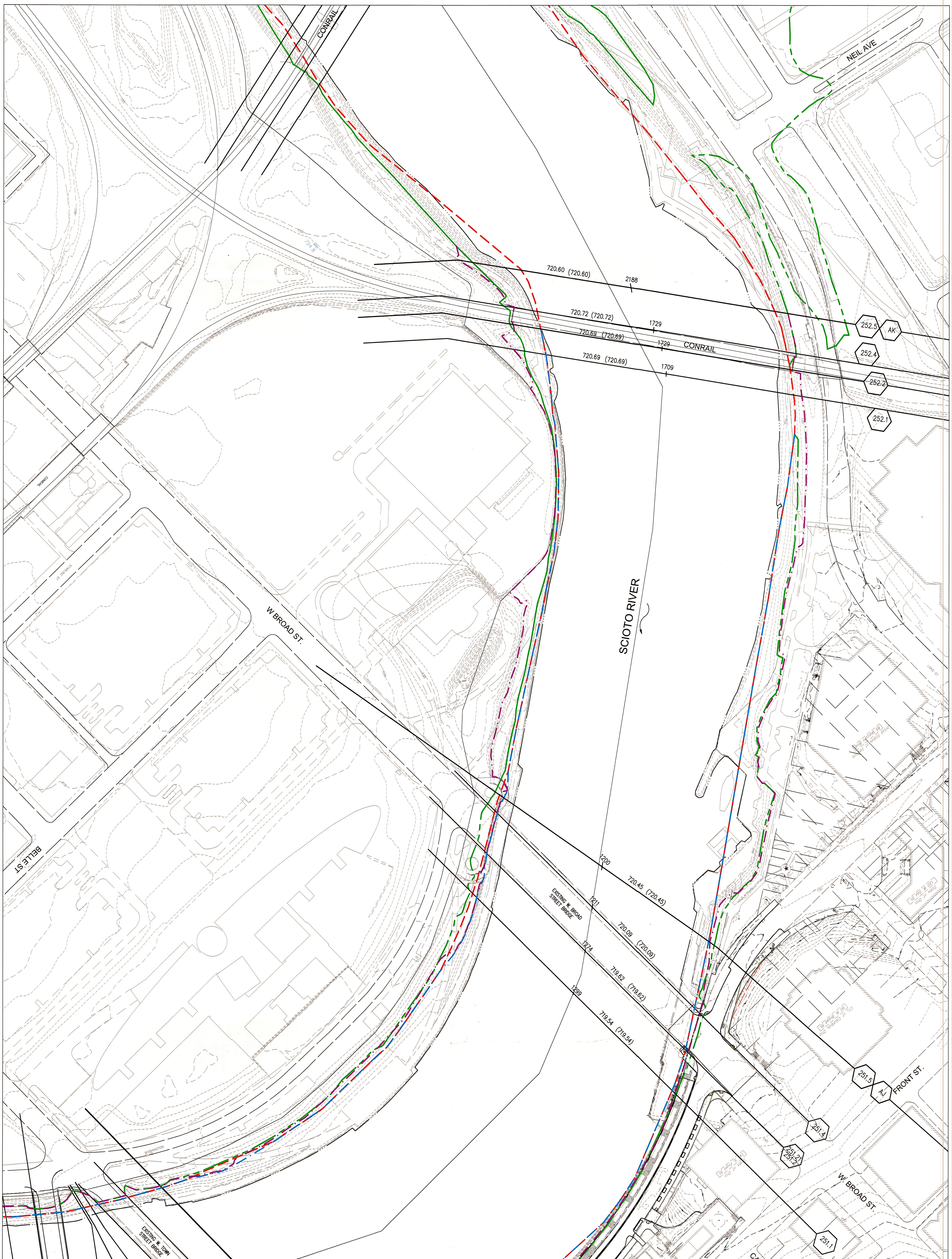
By ______________________ Professional Engineer ____________ Date

CITY OF COLUMBUS, OHIO
FLOODPLAIN WORKMAP
FOR
SCIOTO MILE CLOMR

EXHIBIT NO. 1

EMH&T
Evans, Mechwart, Hambleton & Tilton, Inc.
Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500 Fax: 614.775.4800
M C M X X V I

Date:	SEPTEMBER 2008
Scale:	1"=100'
Job No:	2008-1625
Sheet:	1 of 2



MATCHLINE SEE SHT 2

LEGEND

Effective FEMA Floodway Limits

Effective FEMA 100 yr. Floodplain Limits

Revised Floodway

Revised 100 yr. Floodplain Limits

NGVD 1929
Revised Existing Conditions 100-year
Flood Elevations

Horizontal Station Control = 0'
(Except where noted)

250 — 718.74 (718.59) — *HEC-RAS Cross Section*

NGVD 1929
Proposed Conditions 100-year
Flood Elevations

NOTES:

- Base topographic information is based on Franklin County Auditor GIS and EMH&T survey (Scioto Mile only).
- Vertical Datum based on NGVD 1929.

By ____________________ Professional Engineer ____________ Date

CITY OF COLUMBUS, OHIO
FLOODPLAIN WORKMAP
FOR
SCIOTO MILE CLOMR

EXHIBIT NO. 1

EMH&T
Evans, Mechwart, Hambleton & Tilton, Inc.
Engineers • Surveyors • Planners • Scientists
5500 New Albany Road, Columbus, OH 43054
Phone: 614.775.4500 Fax: 614.775.4800

M C M X X V I

Date:	SEPTEMBER 2008
Scale:	1"=100'
Job No:	2008-1625
Sheet:	2 of 2

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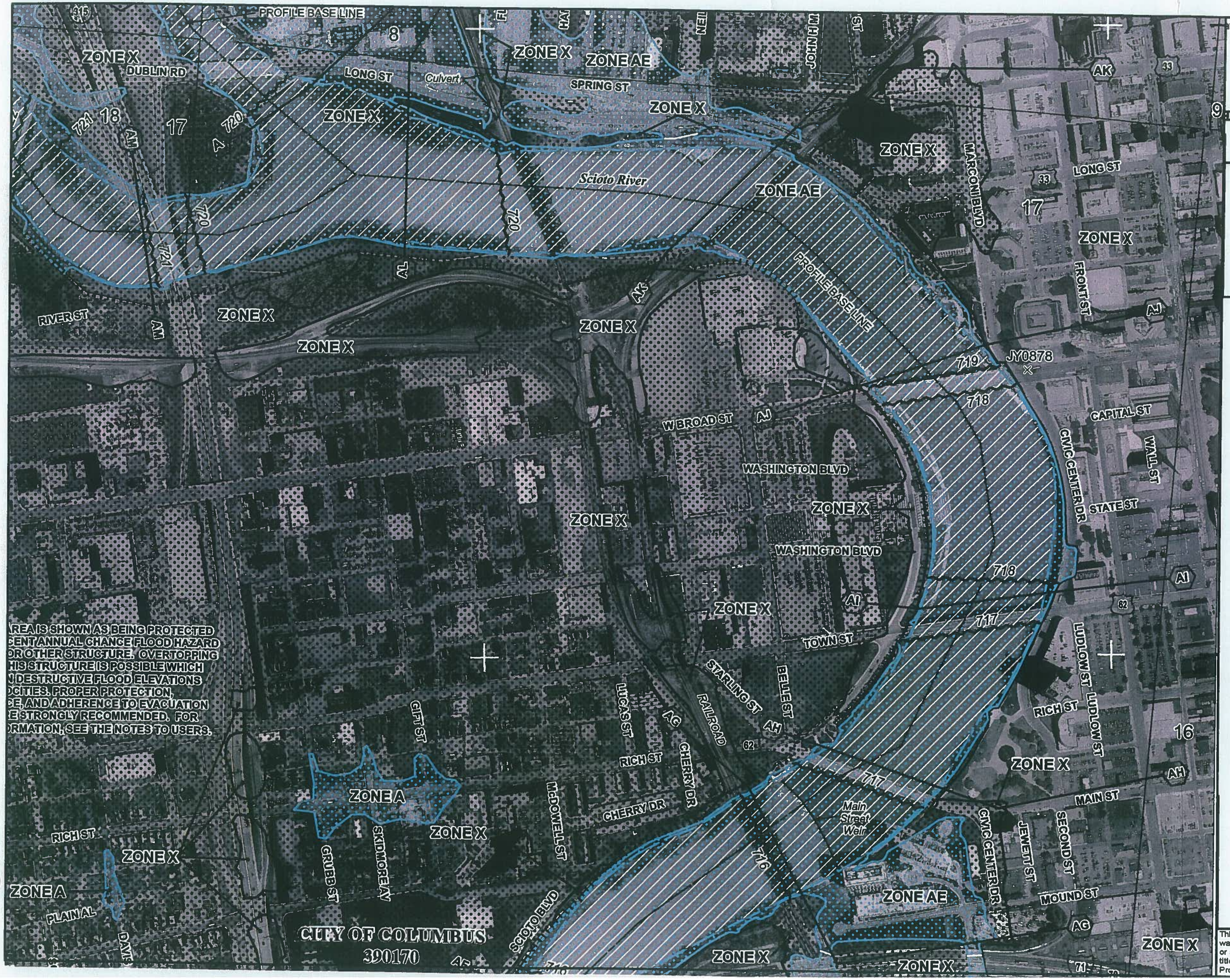
APPENDIX A:

Published FIS Information



tional Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 500 1000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0309K

FIRM

FLOOD INSURANCE RATE MAP

FRANKLIN COUNTY, OHIO

AND INCORPORATED AREAS

PANEL 309 OF 465

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLUMBUS, CITY OF	390170	0309	K
FRANKLIN COUNTY	390167	0309	K

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 39049C0309K

MAP REVISED JUNE 17, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FLOOD INSURANCE STUDY

VOLUME 1 of 4

FRANKLIN COUNTY, OHIO
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BEXLEY, CITY OF	390168
BRICE, VILLAGE OF	390898
CANAL WINCHESTER, VILLAGE OF	390169
COLUMBUS, CITY OF	390170
DUBLIN, CITY OF	390673
FRANKLIN COUNTY (UNINCORPORATED AREAS)	390167
GAHANNA, CITY OF	390171
GRANDVIEW HEIGHTS, CITY OF	390172
GROVE CITY, CITY OF	390173
GROVEPORT, VILLAGE OF	390174
HARRISBURG, VILLAGE OF	390897
HILLIARD, CITY OF	390175
LOCKBOURNE, VILLAGE OF	390691
MARBLE CLIFF, VILLAGE OF	390896
*MINERVA PARK, VILLAGE OF	390791
NEW ALBANY, VILLAGE OF	390895
OBETZ, VILLAGE OF	390176
REYNOLDSBURG, CITY OF	390177
RIVERLEA, VILLAGE OF	390692
UPPER ARLINGTON, CITY OF	390178
URBANCREST, VILLAGE OF	390893

COMMUNITY NAME	COMMUNITY NUMBER
VALLEYVIEW, VILLAGE OF	390669
WESTERVILLE, CITY OF	390179
WHITEHALL, CITY OF	390180
WORTHINGTON, CITY OF	390181

Franklin County

* NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED WITHIN COMMUNITY

REVISED:
June 17, 2008

Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
39049CV001A

Table 7. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cfs)			
		10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance
At confluence of Sugar Run	10.4	1,220	2,210	2,760	4,520
Scioto Big Run					
At confluence with Scioto River	24.9	3,200	5,800	7,300	12,000
Approximately 4.35 miles US of confluence	16.2	2,380	3,910	4,750	7,320
Approximately 6.25 miles US of	13.3	1,025	1,875	2,300	6,000
Approximately 8.83 miles US of confluence	2.8	325	610	720	1,300
Scioto River					
Just DS of Big Walnut Creek	2,266.0	47,600	74,500	86,600	122,500
Just US of mouth of Big Walnut Creek	1,709.0	39,000	63,500	76,600	110,500
At gaging station at Columbus	1,629.0	37,000	60,400	72,900	108,500
Just US of confluence of Olentangy River	1,076.0	29,600	48,500	58,300	85,500
At gaging station below O'Shaughnessy Dam near Dublin	980.0	27,000	43,400	52,300	77,900
Synder Run					
At confluence with Barnes Ditch	1.1	405	605	698	999
South Fork Dry Run					
At Hague Avenue	3.30	1,443	2,043	2,376	3,295
AT CONRAIL	2.73	1,072	1,542	1,789	2,443
South Fork Georges Creek					
At confluence with Georges Creek	5.2	1,200	2,225	2,800	4,900
South Fork Indian Run					
At confluence with Indian Run	5.69	950	1,490	1,750	2,370
At confluence of Tri-County Ditch	4.27	566	861	991	1,422
Just US of Tri-County Ditch	2.40	364	557	611	925
Spring Run					
Just US of Dempsey Road	6.97	*	*	1,850	*
Just US of confluence of unnamed tributary	5.04	*	*	1,410	*
Just US of Walnut Street	4.04	*	*	1,410	*
Just US of Countyline Road	3.32	*	*	1,020	*
Sugar Run					
At confluence with Rocky Fork, Creek	4.69	960	1,770	2,240	3,700
Swisher Creek					
At confluence with Blacklick Creek	2.0	*	*	1,020	*
Sycamore Run					
At confluence with Rocky Fork Creek	1.7	590	960	1,100	1,260
At Larry Lane	1.3	310	540	620	770

Table 8. Summary of Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Hellbranch Run	0.035-0.040	0.045-0.065
McCoy Ditch	0.035-0.040	0.045-0.065
Indian Run	0.025-0.050	0.055-0.100
North Fork Indian Run	0.025-0.050	0.055-0.100
Lisle Ditch	0.035-0.040	0.060-0.070
Little Darby Creek	0.045-0.060	0.053-0.079
Little Walnut Creek	0.030-0.050	0.030-0.080
Marsh Run	0.030-0.048	0.030-0.080
Martin Grove Ditch	0.042-0.083	0.041-0.076
Mason Run	0.035-0.054	0.043-0.090
Molcomb Ditch	0.035-0.050	0.045-0.150
Mulberry Run	0.040-0.075	0.030-0.075
West Water Run	0.020-0.045	0.004-0.080
Olentangy River	0.032-0.062	0.025-0.138
Orders & Wallace Ditch	0.012-0.048	0.060-0.078
Patzer Ditch	0.040-0.045	0.050-0.065
Plum Run	0.040	0.045-0.080
Plum Run Tributary	0.040	0.045-0.080
Powell Ditch	0.045-0.050	0.070-0.075
Rhodes Ditch	0.040-0.051	0.080-0.100
Rocky Fork Creek	0.020-0.040	0.045-0.080
Scioto Big Run	0.027-0.071	0.031-0.127
Scioto River	0.018-0.062	0.040-0.118
Scioto River Divided Flow Reach	*	0.040-0.118
Snyder Run	0.030-0.055	0.080-0.120
South Fork Dry Run	0.015-0.060	0.080-0.120
South Fork Georges Creek	0.015-0.030	0.040-0.050
South Fork Indian Run	0.035-0.055	0.060-0.100
Spring Run	0.030-0.065	0.028-0.100
Sugar Run	0.035-0.045	0.040-0.080
Swisher Creek	0.065	0.095
Sycamore Run	0.030-0.065	0.030-0.100
Tri-County Ditch	0.040-0.055	0.065-0.150
Tudor Ditch	0.020-0.060	0.060-0.120
Turkey Run	0.004-0.055	0.055-0.150
Tussing-Bachman Ditch	0.030-0.050	0.030-0.100
Bush Ditch	0.013-0.080	0.030-0.100
Utzinger Ditch	0.040-0.060	0.070-0.120
Georges Greek Overland Flow	0.045-0.050	0.045-0.050

* Data not available

Cross-sections for Tussing-Bachman Ditch and Bush Ditch were field surveyed by the ODNR. Cross-sections for Georges Creek Overland Flow were determined using topographic maps (Reference 27).

Water surface elevations of floods of the selected recurrence intervals were determined using the USACE HEC-2 step-backwater computer program

(Reference 26). Starting water surface elevations for Tussing-Bachman Ditch and Bush Ditch were determined using the slope/area method. Starting water surface elevations for Georges Creek Overland Flow were determined using critical depth.

Roughness factors for Tussing-Bachman Ditch and Bush Ditch were chosen by engineering judgment and were based on field inspection of the channel and floodplain areas. Roughness factors for Georges Creek Overland Flow were determined by photographs of the channel and floodplain areas.

In the City of Dublin, cross-sections for Indian Run, North Fork Indian Run, South Fork Indian Run, Cosgray Ditch, and Billingsley Ditch were obtained from aerial photographs and photogrammetric methods (Reference 35).

The USGS step-backwater computer programs E431 or J635 were used to determine water surface profiles for Indian, North Fork Indian, and South Fork Indian Runs and Billingsley, Clover Groff, Cosgray, Faust County (within Hilliard), and Molcomb Ditches (References 39 and 42). Topographic information provided by Evans, Mechwart, Hambleton & Tilton, Inc., was included in the hydraulic analyses for North Fork Indian Run at several cross-sections (Reference 43).

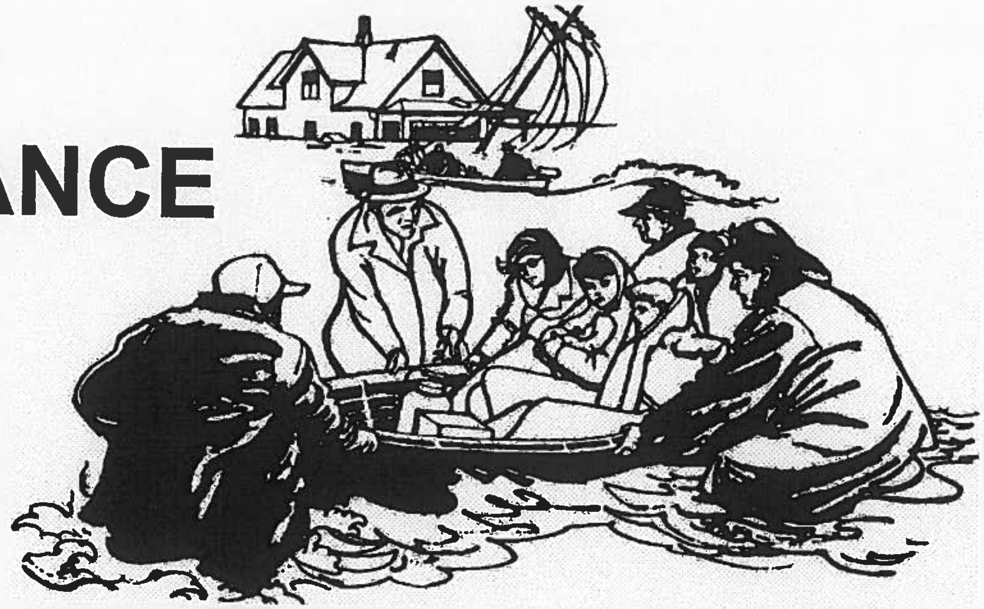
Burgess & Niple, Ltd., reviewed and revised the hydraulic analysis for the Scioto River to correct several inconsistencies in the initial HEC-2 step-backwater computer program to reflect actual field conditions. Burgess & Niple, Ltd., reviewed city records and field surveys for the Water Works Intake Dam and found that the crest elevation of 714.0 feet modeled in the initial HEC-2 model was incorrect. They revised the cross-section for the dam in the HEC-2 model to reflect the correct crest elevation of 709.8 feet. In addition, Burgess & Niple, Ltd., revised several cross-sections to alter channel bank stations to reflect actual field conditions.

For the March 2004, revision, the Scioto River analysis converted the previous HEC-2 model for the Scioto River to HEC-RAS, updated the structures in the previous model, and calculated the floodway and floodplain limits for the 1 percent-annual-chance flood. The goal of the HEC-RAS model conversion and development was to update the structures within the model and to evaluate the impact of the new floodwall constructed for the West Columbus Local Protection Project. Where possible, structure data were updated with construction plans or other data obtained from the Ohio Department of Transportation (References 44 and 45). Hydraulic parameters for the HEC-RAS model were derived from the previous HEC-2 model.

The North Fork Indian Run analysis converted the previous E431 data to HEC-2 and HEC-RAS, updated the structures in the previous models, and updated the topography used to delineate the flood boundaries.

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and floodplain areas. Table 5 shows the ranges of the channel and overbank roughness factors (Manning's "n") used in the hydraulic computations for all streams studied by detailed methods.

FLOOD INSURANCE STUDY



VOLUME 2 of 4

FRANKLIN COUNTY, OHIO
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
BEXLEY, CITY OF	390168
BRICE, VILLAGE OF	390898
CANAL WINCHESTER, VILLAGE OF	390169
COLUMBUS, CITY OF	390170
DUBLIN, CITY OF	390673
FRANKLIN COUNTY (UNINCORPORATED AREAS)	390167
GAHANNA, CITY OF	390171
GRANDVIEW HEIGHTS, CITY OF	390172
GROVE CITY, CITY OF	390173
GROVEPORT, VILLAGE OF	390174
HARRISBURG, VILLAGE OF	390897
HILLIARD, CITY OF	390175
LOCKBOURNE, VILLAGE OF	390691
MARBLE CLIFF, VILLAGE OF	390896
*MINERVA PARK, VILLAGE OF	390791
NEW ALBANY, VILLAGE OF	390895
OBETZ, VILLAGE OF	390176
REYNOLDSBURG, CITY OF	390177
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* NO SPECIAL FLOOD HAZARD AREAS IDENTIFIED WITHIN COMMUNITY

REVISED:
June 17, 2008

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
39049CV002A

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD) (Feet NGVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	WIDTH REDUCED FROM PRIOR STUDY	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
Scioto River									
AA 241.5	128.391	509		13,929	5.4	711.8 712.4	711.8	712.5 713.1	0.7
AB 242.5	128.849	572		16,520	4.5	713.3 713.9	713.3	714.0 714.6	0.7
AC 243.5	128.993	515		14,846	5.1	713.5 714.1	713.5	714.1 714.7	0.6
AD 244	129.353	1,096		26,157	2.9	714.1 714.7	714.1	714.8 715.4	0.7
AE 245	129.795	515		13,690	5.5	714.4 715.0	714.4	715.0 715.6	0.6
AF 246.5	130.205	522		14,240	5.3	715.6 716.2	715.6	716.1 716.7	0.5
AG 247.5	130.448	569		13,919	5.4	716.1 716.7	716.1	716.7 717.3	0.6
AH 249.5	130.579	617		12,933	5.8	717.2 717.8	717.2	717.6 718.2	0.4
AI 250.5	130.767	645		12,067	6.2	717.9 718.5	717.9	718.3 718.9	0.4
AJ 251.5	131.009	598		14,710	5.1	719.4 720.0	719.4	719.7 720.3	0.3
AK 252.5	131.292	584		12,512	6.0	719.5 720.1	719.5	719.9 720.5	0.4
AL 253.6	131.601	660		15,182	5.0	720.4 721.0	720.4	720.7 721.3	0.3
AM 254.5	131.850	433		8,106	7.0	720.8 721.4	720.8	721.1 721.7	0.3
AN 255.9	132.226	299		6,723	8.5	723.2 723.8	723.2	723.4 724.0	0.2
AO 258	133.220	211		4,459	9.4	725.1 725.7	725.1	725.5 726.1	0.4
AP	133.568	270		10,931	5.2	727.9 728.5	727.9	728.2 728.8	0.3
AQ	133.329	314		6,922	8.2	730.5 731.1	730.5	730.8 731.4	0.3
AR	134.582	279		6,836	8.3	731.8 732.4	731.8	732.3 732.9	0.5
AS	134.986	285		5,574	10.2	732.9	732.9	733.3 733.9	0.4
AT	135.374	577		16,231	3.5	735.8	735.8	736.2	0.4
AU	135.918	231		5,637	10.1	736.4	736.4	736.8	0.4
AV	136.076	310		7,930	7.2	738.3	738.3	738.9	0.6
AW	136.769	336		6,471	8.8	741.6	741.6	742.3	0.7
AX	136.865	664		7,995	7.1	743.2	743.2	743.7	0.5
AY	137.346	380		8,921	6.4	745.3	745.3	746.1	0.8
AZ	137.829	514		11	5.4	747.7	747.7	748.1	0.4

[1]Miles above mouth

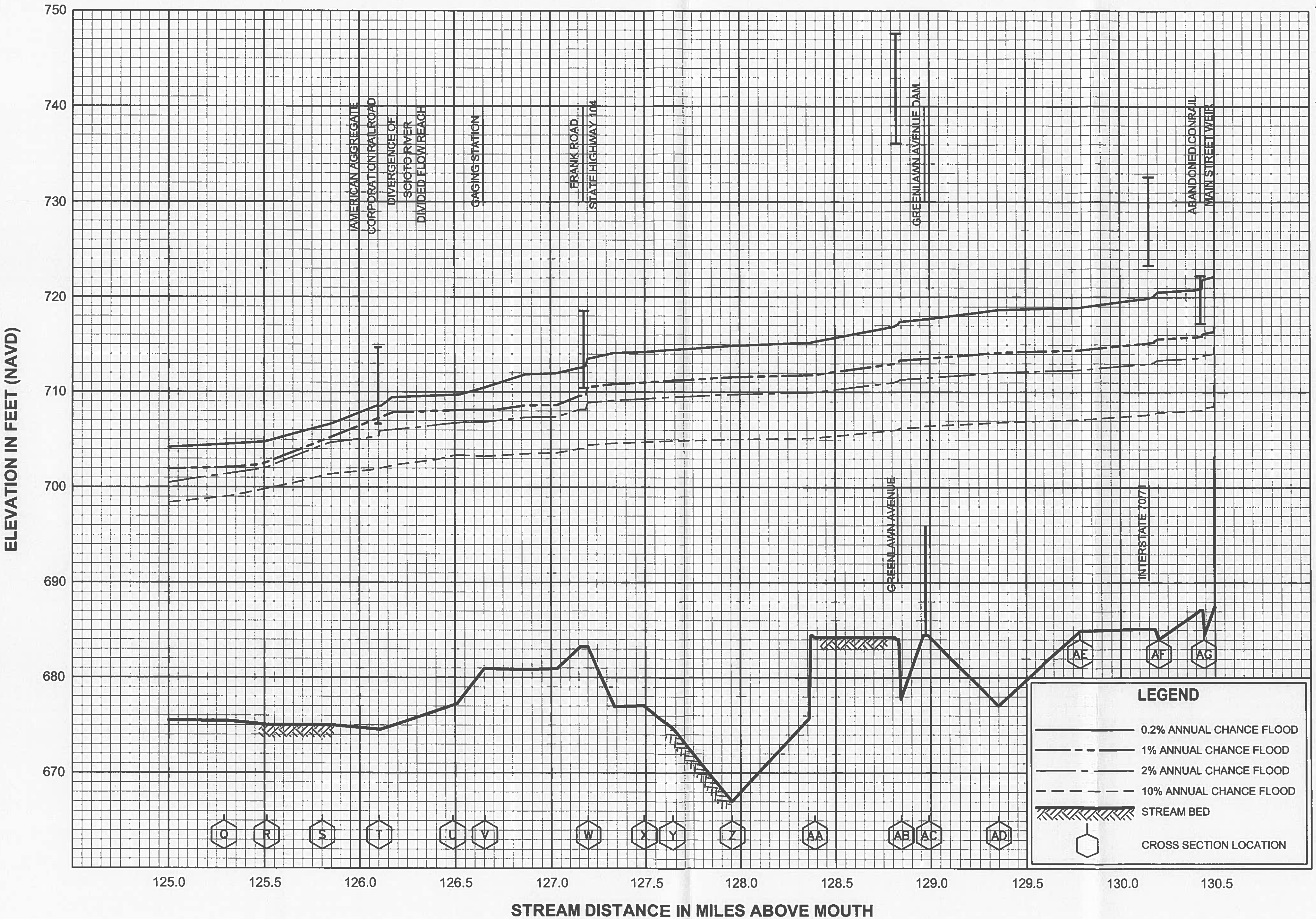
Table 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

FRANKLIN COUNTY, OHIO
AND INCORPORATED AREAS

FLOODWAY DATA

Scioto River



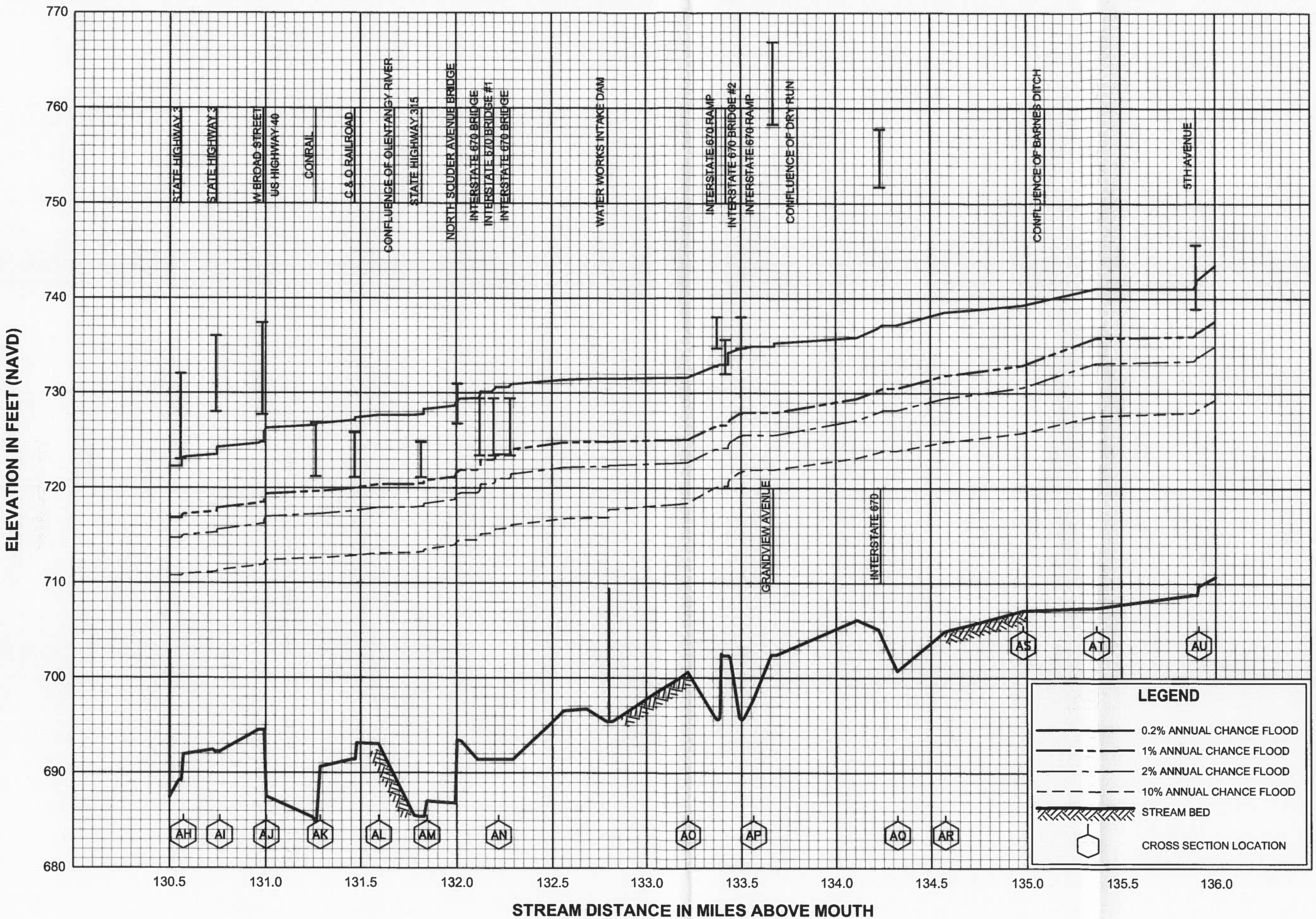
FLOOD PROFILES

SCIOTO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

FRANKLIN COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

SCIOTO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

FRANKLIN COUNTY, OH

AND INCORPORATED AREAS

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A legacy of **experience.** A reputation for **excellence.**

APPENDIX B:

HEC-RAS Model Output

Duplicate Effective
v2.2

9-4-08

HEC-RAS Plan: Scioto River River: Scioto River Reach: Downstream Reach

Reach	River Sta	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	252.5	720.12		720.75	581.36	3499.55	70837.91	682.53		1959.40	2416.60	
Downstream Reach	252.5	720.46	0.33	721.07	583.72	3542.45	70786.90	670.66	1853.65	1959.40	2416.60	2558.35
Downstream Reach	252.4	720.24		720.66	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.4	720.57	0.33	720.98	582.20		75000.00		1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR U	720.20		720.66	556.89		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR U	720.53	0.33	720.98	507.89		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR D	720.19		720.65	556.88		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR D	720.52	0.33	720.97	509.98		75000.00			1437.90	2020.10	
Downstream Reach	252.2	720.22		720.64	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.2	720.55	0.33	720.95	582.20		75000.00		1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.1	720.22		720.61	632.13		74987.89	12.11		1404.80	2031.40	
Downstream Reach	252.1	720.55	0.33	720.93	632.13		74986.09	13.92	1402.19	1404.80	2031.40	2040.09
Downstream Reach	251.5	719.96		720.34	695.57	1670.22	73328.78	1.00		894.10	1504.90	
Downstream Reach	251.5	720.25	0.28	720.65	598.09		75000.00		896.20	894.10	1504.90	1494.29
Downstream Reach	251.4	719.57		720.29	590.63		75000.00			900.99	1521.06	
Downstream Reach	251.4	719.92	0.34	720.61	591.40		75000.00		859.09	900.99	1521.06	1526.06
Downstream Reach	251.3 BR U	719.02		720.16	356.00		75000.00			900.99	1521.06	
Downstream Reach	251.3 BR U	719.37	0.35	720.48	349.44		75000.00			900.99	1521.06	
Downstream Reach	251.3 BR D	718.85		720.00	358.97		75000.00			900.99	1521.06	
Downstream Reach	251.3 BR D	719.21	0.36	720.33	352.51		75000.00			900.99	1521.06	
Downstream Reach	251.21	719.05		719.80	589.45		75000.00			900.99	1521.06	
Downstream Reach	251.21	719.40	0.35	720.13	580.07		75000.00		938.37	900.99	1521.06	1607.94
Downstream Reach	251.2	719.09		719.76	620.56		75000.00			947.80	1600.50	
Downstream Reach	251.2	719.44	0.35	720.09	621.40		75000.00		938.37	947.80	1600.50	1607.94
Downstream Reach	251.1	719.00		719.72	595.96	3.76	74986.04	10.20		1002.30	1595.10	
Downstream Reach	251.1	719.36	0.36	720.05	596.05	4.01	74985.39	10.60	997.58	1002.30	1595.10	1614.30
Downstream Reach	250.5	718.52		719.15	651.26	198.07	74679.17	122.76		1175.90	1792.80	
Downstream Reach	250.5	718.91	0.39	719.51	645.06	203.29	74664.93	131.79	1161.07	1175.90	1792.80	1814.49
Downstream Reach	250.4	718.48		719.11	634.99		75000.00			1320.60	1973.60	
Downstream Reach	250.4	718.88	0.39	719.48	635.60		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR U	718.07		719.02	423.05		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR U	718.48	0.40	719.39	410.77		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR D	717.98		718.93	425.06		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR D	718.39	0.41	719.31	413.79		75000.00			1320.60	1973.60	
Downstream Reach	250.2	718.13		718.79	634.44		75000.00			1320.60	1973.60	
Downstream Reach	250.2	718.53	0.40	719.16	635.07		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.1	718.10		718.76	649.84	97.25	74746.98	155.77		1351.10	1972.30	
Downstream Reach	250.1	718.50	0.40	719.14	641.47	105.91	74780.96	113.13	1290.89	1351.10	1972.30	1979.80
Downstream Reach	249.5	717.83		718.39	655.64	916.26	73321.13	762.61		1578.50	2128.40	
Downstream Reach	249.5	718.24	0.42	718.79	616.53	973.59	73725.21	301.20	1525.80	1578.50	2128.40	2147.46
Downstream Reach	249.4	717.66		718.33	626.52		75000.00			1844.80	2556.00	
Downstream Reach	249.4	717.90	0.23	718.69	545.70		75000.00		1785.04	1844.80	2556.00	2423.62
Downstream Reach	249.3 BR U	717.31		718.25	331.20		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR U	717.74	0.43	718.65	318.09		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR D	717.20		718.15	334.33		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR D	717.64	0.44	718.56	321.11		75000.00			1844.80	2556.00	
Downstream Reach	249.2	717.33		718.02	624.98		75000.00			1844.80	2556.00	
Downstream Reach	249.2	717.76	0.43	718.44	593.65		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.1	717.37		717.94	636.58	527.02	74254.30	218.68		1977.00	2581.00	
Downstream Reach	249.1	717.80	0.44	718.35	637.05	537.96	74233.40	228.64	1934.91	1977.00	2581.00	2611.46
Downstream Reach	248.5	717.42		717.78	740.71	338.65	74295.59	365.75		2161.00	2699.00	
Downstream Reach	248.5	717.86	0.43	718.20	580.84	180.30	74455.27	364.43	2144.73	2161.00	2699.00	2725.57
Downstream Reach	248.4	717.41		717.78	739.76	472.30	73872.23	655.47		2170.80	2692.80	
Downstream Reach	248.4	717.85	0.43	718.20	581.17	360.34	73942.59	697.08	2149.64	2170.80	2692.80	2730.81
Downstream Reach	248.3	Inline Weir										
Downstream Reach	248.2	716.93		717.31	711.79	404.75	73977.41	617.85		2170.80	2692.80	
Downstream Reach	248.2	717.46	0.53	717.82	581.58	363.65	73974.12	662.23	2147.78	2170.80	2692.80	2729.36
Downstream Reach	248.1	716.93		717.30	721.61	274.18	74390.53	335.28		2161.00	2699.00	

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v2.2

9-4-08

HEC-RAS Plan: Scioto River River: Scioto River Reach: Downstream Reach (Continued)

Reach	River Sta	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
		(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Downstream Reach	248.1	717.46	0.53	717.82	581.98	161.42	74473.44	365.14	2146.55	2161.00	2699.00	2728.53
Downstream Reach	247.5	716.74		717.22	652.65	2159.31	71456.11	1384.59		2386.10	2870.80	
Downstream Reach	247.5	717.26	0.52	717.73	569.10	1415.66	72136.02	1448.33	2354.13	2386.10	2870.80	2925.39

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9-4-08

HEC-RAS Plan: Scioto River River: Scioto River Reach: Downstream Reach

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	252.5	100-Year	720.30		720.92	582.61	3522.25	70810.85	666.90		1959.40	2416.60	
Downstream Reach	252.5	Floodway	720.88	0.58	721.47	583.98	3641.82	70678.01	680.17	1853.65	1959.40	2416.60	2558.35
Downstream Reach	252.4	100-Year	720.42		720.83	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.4	Floodway	720.99	0.57	721.39	582.20		75000.00		1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR U	100-Year	720.38		720.83	537.45		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR U	Floodway	720.95	0.57	721.38	451.59		75000.00		1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR D	100-Year	720.37		720.82	540.32		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR D	Floodway	720.94	0.57	721.37	452.60		75000.00		1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.2	100-Year	720.39		720.81	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.2	Floodway	720.96	0.57	721.36	582.20		75000.00		1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.1	100-Year	720.39		720.78	632.13		74986.92	13.08		1404.80	2031.40	
Downstream Reach	252.1	Floodway	720.97	0.57	721.34	634.75	0.03	74983.79	16.18	1402.19	1404.80	2031.40	2040.09
Downstream Reach	251.5	100-Year	720.15		720.52	696.13	1696.01	73302.97	1.01		894.10	1504.90	
Downstream Reach	251.5	Floodway	720.68	0.53	721.07	598.09		75000.00		896.20	894.10	1504.90	1494.29
Downstream Reach	251.4	100-Year	719.77		720.47	591.07		75000.00			901.00	1521.06	
Downstream Reach	251.4	Floodway	720.37	0.60	721.03	592.42		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR U	100-Year	719.22		720.34	352.31		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR U	Floodway	719.83	0.62	720.90	340.68		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR D	100-Year	719.05		720.19	355.44		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR D	Floodway	719.68	0.63	720.76	343.69		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.21	100-Year	719.25		719.99	589.90		75000.00			901.00	1521.06	
Downstream Reach	251.21	Floodway	719.87	0.62	720.57	580.14		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.2	100-Year	719.28		719.95	621.03		75000.00			947.80	1600.50	
Downstream Reach	251.2	Floodway	719.91	0.62	720.53	622.50		75000.00		938.37	947.80	1600.50	1607.94
Downstream Reach	251.1	100-Year	719.20		719.91	596.01	3.90	74985.68	10.42		1002.30	1595.10	
Downstream Reach	251.1	Floodway	719.83	0.63	720.49	596.18	4.34	74984.52	11.14	997.58	1002.30	1595.10	1614.30
Downstream Reach	250.5	100-Year	718.74		719.35	652.07	206.88	74665.30	127.82		1175.90	1792.80	
Downstream Reach	250.5	Floodway	719.42	0.68	719.99	645.73	217.18	74638.97	143.85	1161.07	1175.90	1792.80	1814.49
Downstream Reach	250.4	100-Year	718.70		719.32	635.33		75000.00			1320.60	1973.60	
Downstream Reach	250.4	Floodway	719.39	0.69	719.96	636.41		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR U	100-Year	718.30		719.23	416.60		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR U	Floodway	719.00	0.70	719.87	391.18		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR D	100-Year	718.21		719.14	419.30		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR D	Floodway	718.91	0.70	719.79	394.39		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.2	100-Year	718.36		719.00	634.79		75000.00			1320.60	1973.60	
Downstream Reach	250.2	Floodway	719.06	0.70	719.65	635.89		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.1	100-Year	718.33		718.97	650.37	102.09	74734.98	162.93		1351.10	1972.30	
Downstream Reach	250.1	Floodway	719.03	0.70	719.63	642.21	117.49	74764.46	118.05	1290.89	1351.10	1972.30	1979.80
Downstream Reach	249.5	100-Year	718.07		718.61	657.44	940.07	73276.27	783.65		1578.50	2128.40	
Downstream Reach	249.5	Floodway	718.79	0.72	719.31	616.54	1043.47	73651.43	305.10	1525.80	1578.50	2128.40	2147.46
Downstream Reach	249.4	100-Year	717.91		718.56	627.67		75000.00			1844.80	2556.00	
Downstream Reach	249.4	Floodway	718.47	0.56	719.22	547.27		75000.00		1785.04	1844.80	2556.00	2423.62
Downstream Reach	249.3 BR U	100-Year	717.55		718.48	323.83		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR U	Floodway	718.06	0.51	719.12	291.74		75000.00		1785.04	1844.80	2556.00	2423.62
Downstream Reach	249.3 BR D	100-Year	717.45		718.38	326.89		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR D	Floodway	718.04	0.59	718.94	308.93		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.2	100-Year	717.58		718.25	626.12		75000.00			1844.80	2556.00	
Downstream Reach	249.2	Floodway	718.16	0.59	718.82	594.77		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.1	100-Year	717.61		718.17	636.84	533.26	74242.45	224.28		1977.00	2581.00	
Downstream Reach	249.1	Floodway	718.21	0.60	718.73	637.50	547.56	74214.49	237.95	1934.91	1977.00	2581.00	2611.46
Downstream Reach	248.5	100-Year	717.67		718.02	748.52	375.14	74243.57	381.29		2161.00	2699.00	
Downstream Reach	248.5	Floodway	718.26	0.59	718.60	580.84	189.22	74429.22	381.56	2144.73	2161.00	2699.00	2725.57
Downstream Reach	248.4	100-Year	717.66		718.01	748.50	511.59	73813.63	674.79		2170.80	2692.80	
Downstream Reach	248.4	Floodway	718.25	0.59	718.59	581.17	372.60	73903.40	724.00	2149.64	2170.80	2692.80	2730.81
Downstream Reach	248.3		Inl Struct										
Downstream Reach	248.2	100-Year	717.13		717.50	729.56	430.24	73936.67	633.08		2170.80	2692.80	
Downstream Reach	248.2	Floodway	717.74	0.62	718.10	581.58	373.82	73945.52	680.65	2147.78	2170.80	2692.80	2729.36
Downstream Reach	248.1	100-Year	717.13		717.49	731.27	298.23	74354.47	347.30		2161.00	2699.00	
Downstream Reach	248.1	Floodway	717.74	0.61	718.09	581.98	166.90	74453.76	379.34	2146.55	2161.00	2699.00	2728.53
Downstream Reach	247.5	100-Year	716.94		717.41	654.66	2200.38	71396.98	1402.65		2386.10	2870.80	

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HEC-RAS Plan: Scioto River River: Scioto River Reach: Downstream Reach (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Downstream Reach	247.5	Floodway	717.55	0.61	718.01	569.87	1426.28	72097.83	1475.90	2354.13	2386.10	2870.80	2925.39

Corrected Effective

9-4-08

HEC-RAS Plan: Corr EMHT River: Scioto River Reach: Downstream Reach

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	252.5	100-Year	720.61		721.21	584.06	3575.22	70750.56	674.22		1959.40	2416.60	
Downstream Reach	252.5	Floodway	721.15	0.54	721.72	584.06	3704.77	70609.20	686.03	1853.65	1959.40	2416.60	2558.35
Downstream Reach	252.4	100-Year	720.73		721.13	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.4	Floodway	721.26	0.53	721.64	601.68		74759.20	240.81	1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR U	100-Year	720.68		721.12	480.52		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR U	Floodway	721.21	0.53	721.64	406.97		74793.30	206.70	1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR D	100-Year	720.67		721.11	482.67		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR D	Floodway	721.20	0.53	721.63	407.92		74783.12	216.88	1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.2	100-Year	720.70		721.10	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.2	Floodway	721.23	0.53	721.61	598.50		74772.97	227.03	1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.1	100-Year	720.70		721.08	632.14		74985.25	14.75		1404.80	2031.40	
Downstream Reach	252.1	Floodway	721.23	0.53	721.59	634.75	0.23	74982.16	17.61	1402.19	1404.80	2031.40	2040.09
Downstream Reach	251.5	100-Year	720.47		720.82	697.09	1740.57	73258.39	1.04		894.10	1504.90	
Downstream Reach	251.5	Floodway	720.96	0.49	721.34	598.09		75000.00		896.20	894.10	1504.90	1494.29
Downstream Reach	251.4	100-Year	720.10		720.78	591.82		75000.00			901.00	1521.06	
Downstream Reach	251.4	Floodway	720.66	0.56	721.30	593.07		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR U	100-Year	719.56		720.65	345.93		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR U	Floodway	720.13	0.57	721.17	333.57		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR D	100-Year	719.40		720.50	348.94		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR D	Floodway	719.97	0.58	721.03	337.50		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.21	100-Year	719.59		720.31	590.87		75000.00			901.00	1521.06	
Downstream Reach	251.21	Floodway	720.17	0.57	720.84	580.18		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.2	100-Year	719.63		720.27	621.85		75000.00			947.80	1600.50	
Downstream Reach	251.2	Floodway	720.20	0.57	720.80	623.20		75000.00		938.37	947.80	1600.50	1607.94
Downstream Reach	251.1	100-Year	719.55		720.23	596.11	4.14	74985.04	10.82		1002.30	1595.10	
Downstream Reach	251.1	Floodway	720.13	0.58	720.77	596.26	4.55	74983.97	11.48	997.58	1002.30	1595.10	1614.30
Downstream Reach	250.5	100-Year	719.11		719.71	653.45	222.30	74641.06	136.64		1175.90	1792.80	
Downstream Reach	250.5	Floodway	719.74	0.62	720.29	646.15	225.47	74622.98	151.56	1161.07	1175.90	1792.80	1814.49
Downstream Reach	250.49	100-Year	719.11		719.71	653.45	222.29	74641.09	136.63		1175.90	1792.80	
Downstream Reach	250.49	Floodway	719.74	0.62	720.29	654.22	253.18	74595.31	151.50	1153.00	1175.90	1792.80	1814.00
Downstream Reach	250.4	100-Year	719.08		719.68	635.93		75000.00			1320.60	1973.60	
Downstream Reach	250.4	Floodway	719.71	0.63	720.26	636.91		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR U	100-Year	718.69		719.58	403.10		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR U	Floodway	719.32	0.63	720.17	378.63		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR D	100-Year	718.60		719.50	406.20		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR D	Floodway	719.24	0.64	720.10	381.74		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.2	100-Year	718.75		719.36	635.40		75000.00			1320.60	1973.60	
Downstream Reach	250.2	Floodway	719.38	0.64	719.96	636.40		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.1	100-Year	718.72		719.34	651.60	110.53	74714.13	175.35		1351.10	1972.30	
Downstream Reach	250.1	Floodway	719.36	0.64	719.93	642.67	124.88	74754.22	120.90	1290.89	1351.10	1972.30	1979.80
Downstream Reach	250	100-Year	718.61		719.28	624.28	109.20	74709.07	181.73		1316.65	1910.85	
Downstream Reach	250	Floodway	719.26	0.65	719.89	626.34	123.77	74672.11	204.13	1273.00	1316.65	1910.85	1953.00
Downstream Reach	249.9	100-Year	718.48		719.23	594.29	0.01	74709.68	290.31		1282.20	1649.40	
Downstream Reach	249.9	Floodway	719.14	0.66	719.84	596.27	0.01	74671.16	328.83	1229.00	1282.20	1849.40	1901.00
Downstream Reach	249.8	100-Year	718.44		719.19	594.17	0.01	74711.97	288.02		1282.20	1649.40	
Downstream Reach	249.8	Floodway	719.11	0.67	719.80	596.17	0.01	74673.27	326.72	1229.00	1282.20	1849.40	1901.00
Downstream Reach	249.79	100-Year	718.26		719.12	553.85	0.04	74709.86	290.11		1322.00	1849.40	
Downstream Reach	249.79	Floodway	718.94	0.68	719.74	555.89	0.04	74668.77	331.19	1249.00	1322.00	1849.40	1921.00
Downstream Reach	249.78	100-Year	718.20		719.08	577.86	810.24	73900.23	289.53		1332.80	1849.40	
Downstream Reach	249.78	Floodway	718.89	0.69	719.70	581.58	862.28	73806.54	331.18	1255.00	1332.80	1849.40	1927.00
Downstream Reach	249.76	100-Year	718.26		718.89	602.35		75000.00			1011.79	1652.20	
Downstream Reach	249.76	Floodway	718.94	0.69	719.54	606.94		75000.00		1004.00	1011.79	1652.20	1659.00
Downstream Reach	249.74	100-Year	718.23		718.83	603.39		75000.00			1011.27	1660.39	
Downstream Reach	249.74	Floodway	718.92	0.69	719.48	615.13		75000.00		1008.00	1011.27	1660.39	1663.00
Downstream Reach	249.73	100-Year	718.18		718.77	613.91		75000.00			1022.66	1664.94	
Downstream Reach	249.73	Floodway	718.87	0.69	719.42	617.27		75000.00		1016.00	1022.66	1664.94	1671.00
Downstream Reach	249.5	100-Year	718.19		718.69	663.48		75000.00			1501.70	2202.50	
Downstream Reach	249.5	Floodway	718.87	0.69	719.36	622.46		75000.00		1525.00	1501.70	2202.50	2147.46
Downstream Reach	249.4	100-Year	718.00		718.63	628.96		75000.00			1844.80	2556.00	
Downstream Reach	249.4	Floodway	718.55	0.55	719.27	547.78		75000.00		1785.04	1844.80	2556.00	2423.62

Corrected Effective

9-4-08

HEC-RAS Plan: Corr EMHT River: Scioto River Reach: Downstream Reach (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	249.3 BR U	100-Year	717.62		718.55	322.55		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR U	Floodway	718.11	0.49	719.17	290.82		75000.00		1785.04	1844.80	2556.00	2423.62
Downstream Reach	249.3 BR D	100-Year	717.51		718.45	325.79		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR D	Floodway	718.09	0.57	718.99	307.91		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.2	100-Year	717.64		718.29	627.26		75000.00			1844.80	2556.00	
Downstream Reach	249.2	Floodway	718.20	0.57	718.85	595.19		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.1	100-Year	717.59		718.27	625.09	597.02	73464.51	938.47		1977.00	2534.20	
Downstream Reach	249.1	Floodway	718.19	0.60	718.82	627.34	611.79	73387.22	1000.99	1934.91	1977.00	2534.20	2611.46
Downstream Reach	249	100-Year	717.54		718.19	621.85		75000.00			1.48	646.69	
Downstream Reach	249	Floodway	718.14	0.60	718.75	624.22		75000.00		10.00	1.48	646.69	638.00
Downstream Reach	248.5	100-Year	717.67		718.02	748.52	375.14	74243.57	381.29		2161.00	2699.00	
Downstream Reach	248.5	Floodway	718.26	0.59	718.60	580.84	189.22	74429.22	381.56	2144.73	2161.00	2699.00	2725.57
Downstream Reach	248.4	100-Year	717.66		718.01	748.50	511.59	73813.63	674.79		2170.80	2692.80	
Downstream Reach	248.4	Floodway	718.25	0.59	718.59	581.17	372.60	73903.40	724.00	2149.64	2170.80	2692.80	2730.81
Downstream Reach	248.3		Inl Struct										
Downstream Reach	248.2	100-Year	717.13		717.50	729.56	430.24	73936.67	633.08		2170.80	2692.80	
Downstream Reach	248.2	Floodway	717.74	0.62	718.10	581.56	373.82	73945.52	680.65	2147.78	2170.80	2692.80	2729.36
Downstream Reach	248.1	100-Year	717.13		717.49	731.27	298.23	74354.47	347.30		2161.00	2699.00	
Downstream Reach	248.1	Floodway	717.74	0.61	718.09	581.98	166.90	74453.76	379.34	2146.55	2161.00	2699.00	2728.53
Downstream Reach	247.5	100-Year	716.94		717.41	654.66	2200.38	71396.98	1402.65		2386.10	2870.80	
Downstream Reach	247.5	Floodway	717.55	0.61	718.01	569.87	1426.28	72097.83	1475.90	2354.13	2386.10	2870.80	2925.39

Revised Existing

9-4-08

HEC-RAS Plan: Rev Ex River: Scioto River Reach: Downstream Reach

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	252.5	100-Year	720.60		721.20	584.06	3572.55	70753.50	673.96		1959.40	2416.60	
Downstream Reach	252.5	Floodway	721.13	0.53	721.70	584.05	3699.49	70614.98	685.53	1853.65	1959.40	2416.60	2558.35
Downstream Reach	252.4	100-Year	720.72		721.12	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.4	Floodway	721.24	0.52	721.62	601.67		74759.74	240.26	1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR U	100-Year	720.67		721.11	482.48		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR U	Floodway	721.19	0.52	721.62	409.43		74793.39	206.61	1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR D	100-Year	720.66		721.10	484.64		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR D	Floodway	721.18	0.52	721.60	410.38		74783.32	216.68	1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.2	100-Year	720.69		721.09	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.2	Floodway	721.21	0.52	721.59	598.50		74773.38	226.62	1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.1	100-Year	720.69		721.07	632.14		74985.31	14.69		1404.80	2031.40	
Downstream Reach	252.1	Floodway	721.21	0.52	721.57	634.75	0.21	74982.30	17.49	1402.19	1404.80	2031.40	2040.09
Downstream Reach	251.5	100-Year	720.45		720.81	697.06	1738.99	73259.98	1.04		894.10	1504.90	
Downstream Reach	251.5	Floodway	720.93	0.48	721.32	596.09		75000.00		896.20	894.10	1504.90	1494.29
Downstream Reach	251.4	100-Year	720.09		720.76	591.79		75000.00			901.00	1521.06	
Downstream Reach	251.4	Floodway	720.63	0.54	721.27	593.02		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR U	100-Year	719.55		720.64	346.15		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR U	Floodway	720.10	0.56	721.15	334.32		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR D	100-Year	719.38		720.49	349.17		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR D	Floodway	719.95	0.56	721.01	338.09		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.21	100-Year	719.58		720.29	590.65		75000.00			901.00	1521.06	
Downstream Reach	251.21	Floodway	720.14	0.56	720.82	580.17		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.2	100-Year	719.62		720.26	621.82		75000.00			947.80	1600.50	
Downstream Reach	251.2	Floodway	720.18	0.56	720.78	623.14		75000.00		938.37	947.80	1600.50	1607.94
Downstream Reach	251.1	100-Year	719.54		720.22	596.10	4.13	74985.06	10.81		1002.30	1595.10	
Downstream Reach	251.1	Floodway	720.10	0.56	720.74	596.25	4.53	74984.02	11.45	997.58	1002.30	1595.10	1614.30
Downstream Reach	250.5	100-Year	719.10		719.70	653.40	221.76	74641.92	136.32		1175.90	1792.80	
Downstream Reach	250.5	Floodway	719.71	0.61	720.27	646.12	224.78	74624.30	150.91	1161.07	1175.90	1792.80	1814.49
Downstream Reach	250.49	100-Year	719.10		719.70	653.40	221.74	74641.95	136.31		1175.90	1792.80	
Downstream Reach	250.49	Floodway	719.71	0.61	720.27	654.19	251.88	74597.27	150.85	1153.00	1175.90	1792.80	1814.00
Downstream Reach	250.4	100-Year	719.07		719.66	635.91		75000.00			1320.60	1973.60	
Downstream Reach	250.4	Floodway	719.68	0.61	720.24	636.86		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR U	100-Year	718.67		719.57	403.60		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR U	Floodway	719.29	0.62	720.15	379.68		75000.00		1329.91	1320.60	1973.60	1998.92
Downstream Reach	250.3 BR D	100-Year	718.59		719.49	406.70		75000.00			1320.60	1973.60	
Downstream Reach	250.3 BR D	Floodway	719.21	0.63	720.07	382.80		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.2	100-Year	718.73		719.35	635.38		75000.00			1320.60	1973.60	
Downstream Reach	250.2	Floodway	719.36	0.62	719.93	636.35		75000.00		1307.12	1320.60	1973.60	1988.91
Downstream Reach	250.1	100-Year	718.71		719.32	651.56	110.23	74714.87	174.90		1351.10	1972.30	
Downstream Reach	250.1	Floodway	719.33	0.62	719.91	642.63	124.26	74755.06	120.67	1290.89	1351.10	1972.30	1979.80
Downstream Reach	250	100-Year	718.60		719.27	624.24	108.89	74709.85	181.26		1316.65	1910.85	
Downstream Reach	250	Floodway	719.23	0.64	719.86	626.25	123.13	74673.72	203.15	1273.00	1316.65	1910.85	1953.00
Downstream Reach	249.9	100-Year	718.47		719.21	594.25	0.01	74710.48	289.50		1282.20	1849.40	
Downstream Reach	249.9	Floodway	719.11	0.65	719.81	596.19	0.01	74672.84	327.14	1229.00	1282.20	1849.40	1901.00
Downstream Reach	249.8	100-Year	718.43		719.18	594.13	0.01	74712.78	287.20		1282.20	1849.40	
Downstream Reach	249.8	Floodway	719.08	0.65	719.78	596.06	0.01	74674.96	325.03	1229.00	1282.20	1849.40	1901.00
Downstream Reach	249.79	100-Year	718.25		719.11	553.81	0.04	74710.72	289.24		1322.00	1849.40	
Downstream Reach	249.79	Floodway	718.91	0.67	719.71	555.80	0.04	74670.57	329.39	1249.00	1322.00	1849.40	1921.00
Downstream Reach	249.78	100-Year	718.19		719.06	577.78	809.12	73902.23	288.66		1332.80	1849.40	
Downstream Reach	249.78	Floodway	718.86	0.67	719.67	581.42	860.04	73810.60	329.36	1255.00	1332.80	1849.40	1927.00
Downstream Reach	249.76	100-Year	718.24		718.88	602.24		75000.00			1011.79	1652.20	
Downstream Reach	249.76	Floodway	718.91	0.67	719.51	606.79		75000.00		1004.00	1011.79	1652.20	1659.00
Downstream Reach	249.74	100-Year	718.21		718.82	603.31		75000.00			1011.27	1660.39	
Downstream Reach	249.74	Floodway	718.89	0.67	719.45	614.98		75000.00		1008.00	1011.27	1660.39	1663.00
Downstream Reach	249.73	100-Year	718.16		718.75	613.84		75000.00			1022.66	1664.94	
Downstream Reach	249.73	Floodway	718.84	0.68	719.39	617.13		75000.00		1016.00	1022.66	1664.94	1671.00
Downstream Reach	249.5	100-Year	718.17		718.68	663.37		75000.00			1501.70	2202.50	
Downstream Reach	249.5	Floodway	718.84	0.67	719.33	622.46		75000.00		1525.00	1501.70	2202.50	2147.46
Downstream Reach	249.4	100-Year	717.99		718.62	628.54		75000.00			1844.80	2556.00	
Downstream Reach	249.4	Floodway	718.52	0.54	719.25	547.39		75000.00		1785.04	1844.80	2556.00	2423.62

Revised Existing

9-4-08

HEC-RAS Plan: Rev Ex River: Scioto River Reach: Downstream Reach (Continued)

Reach	River Sta	Profile	W.S. Elev	Prof Delta WS	E.G. Elev	Top Wdth Act	Q Left	Q Channel	Q Right	Enc Sta L	Ch Sta L	Ch Sta R	Enc Sta R
			(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)
Downstream Reach	249.3 BR U	100-Year	717.59		718.53	386.82		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR U	Floodway	718.09	0.50	719.14	352.09		75000.00		1785.04	1844.80	2556.00	2423.62
Downstream Reach	249.3 BR D	100-Year	717.49		718.44	393.58		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR D	Floodway	718.07	0.58	718.98	353.05		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.2	100-Year	717.64		718.29	626.91		75000.00			1844.80	2556.00	
Downstream Reach	249.2	Floodway	718.20	0.57	718.85	594.85		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.1	100-Year	717.59		718.27	625.09	597.02	73464.51	938.47		1977.00	2534.20	
Downstream Reach	249.1	Floodway	718.19	0.60	718.82	627.34	611.79	73387.22	1000.99	1934.91	1977.00	2534.20	2611.46
Downstream Reach	249	100-Year	717.54		718.19	621.85		75000.00			1.48	646.69	
Downstream Reach	249	Floodway	718.14	0.60	718.75	624.22		75000.00		10.00	1.48	646.69	638.00
Downstream Reach	248.5	100-Year	717.67		718.02	748.52	375.14	74243.57	381.29		2161.00	2699.00	
Downstream Reach	248.5	Floodway	718.26	0.59	718.60	580.84	189.22	74429.22	381.56	2144.73	2161.00	2699.00	2725.57
Downstream Reach	248.4	100-Year	717.66		718.01	748.50	511.59	73813.63	674.79		2170.80	2692.80	
Downstream Reach	248.4	Floodway	718.25	0.59	718.59	581.17	372.60	73903.40	724.00	2149.64	2170.80	2692.80	2730.81
Downstream Reach	248.3		Inl Struct										
Downstream Reach	248.2	100-Year	717.13		717.50	729.56	430.24	73936.67	633.08		2170.80	2692.80	
Downstream Reach	248.2	Floodway	717.74	0.62	718.10	581.58	373.82	73945.52	680.65	2147.78	2170.80	2692.80	2729.36
Downstream Reach	248.1	100-Year	717.13		717.49	731.27	298.23	74354.47	347.30		2161.00	2699.00	
Downstream Reach	248.1	Floodway	717.74	0.61	718.09	581.98	166.90	74453.76	379.34	2146.55	2161.00	2699.00	2728.53
Downstream Reach	247.5	100-Year	716.94		717.41	654.66	2200.38	71396.98	1402.65		2386.10	2870.80	
Downstream Reach	247.5	Floodway	717.55	0.61	718.01	569.87	1426.28	72097.83	1475.90	2354.13	2386.10	2870.80	2925.39

Project

9-4-08

HEC-RAS Plan: Proj ScMI River: Scioto River Reach: Downstream Reach

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	252.5	100-Year	720.60		721.20	584.06	3572.66	70753.37	673.97		1959.40	2416.60	
Downstream Reach	252.5	Floodway	721.11	0.51	721.68	584.05	3694.87	70620.03	685.10	1853.65	1959.40	2416.60	2558.35
Downstream Reach	252.4	100-Year	720.72		721.12	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.4	Floodway	721.22	0.50	721.60	601.67		74760.22	239.78	1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR U	100-Year	720.67		721.11	482.39		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR U	Floodway	721.17	0.50	721.60	411.58		74793.46	206.54	1399.74	1437.90	2020.10	2055.39
Downstream Reach	252.3 BR D	100-Year	720.66		721.10	484.55		75000.00			1437.90	2020.10	
Downstream Reach	252.3 BR D	Floodway	721.16	0.50	721.58	412.53		74783.49	216.51	1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.2	100-Year	720.69		721.09	582.20		75000.00			1437.90	2020.10	
Downstream Reach	252.2	Floodway	721.19	0.50	721.57	596.50		74773.74	226.26	1386.55	1437.90	2020.10	2036.40
Downstream Reach	252.1	100-Year	720.69		721.07	632.14		74985.30	14.69		1404.80	2031.40	
Downstream Reach	252.1	Floodway	721.19	0.50	721.55	634.76	0.19	74982.42	17.39	1402.19	1404.80	2031.40	2040.09
Downstream Reach	251.5	100-Year	720.45		720.81	697.06	1739.06	73259.91	1.04		894.10	1504.90	
Downstream Reach	251.5	Floodway	720.91	0.46	721.30	598.09		75000.00		896.20	894.10	1504.90	1494.29
Downstream Reach	251.4	100-Year	720.09		720.77	591.79		75000.00			901.00	1521.06	
Downstream Reach	251.4	Floodway	720.61	0.52	721.25	592.97		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR U	100-Year	719.55		720.64	346.14		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR U	Floodway	720.08	0.53	721.13	334.87		75000.00		859.09	901.00	1521.06	1526.06
Downstream Reach	251.3 BR D	100-Year	719.39		720.49	349.16		75000.00			901.00	1521.06	
Downstream Reach	251.3 BR D	Floodway	719.93	0.54	720.99	338.61		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.21	100-Year	719.58		720.29	590.65		75000.00			901.00	1521.06	
Downstream Reach	251.21	Floodway	720.12	0.54	720.80	580.17		75000.00		938.37	901.00	1521.06	1607.94
Downstream Reach	251.2	100-Year	719.62		720.26	621.82		75000.00			947.80	1600.50	
Downstream Reach	251.2	Floodway	720.15	0.54	720.76	623.09		75000.00		938.37	947.80	1600.50	1607.94
Downstream Reach	251.1	100-Year	719.54		720.22	596.10	4.13	74985.06	10.81		1002.30	1595.10	
Downstream Reach	251.1	Floodway	720.08	0.54	720.72	596.25	4.51	74984.05	11.43	997.58	1002.30	1595.10	1614.30
Downstream Reach	250.5	100-Year	719.10		719.70	653.40	221.78	74641.89	136.33		1175.90	1792.80	
Downstream Reach	250.5	Floodway	719.69	0.58	720.25	646.09	224.18	74625.49	150.33	1161.07	1175.90	1792.80	1814.49
Downstream Reach	250.49	100-Year	719.10		719.70	653.40	221.76	74641.91	136.33		1175.90	1792.80	
Downstream Reach	250.49	Floodway	719.69	0.58	720.25	654.16	250.73	74599.00	150.28	1153.00	1175.90	1792.80	1814.00
Downstream Reach	250.4	100-Year	719.03		719.66	610.44		75000.00			1362.00	1973.60	
Downstream Reach	250.4	Floodway	719.62	0.59	720.21	610.50		75000.00		1329.91	1362.00	1973.60	1998.92
Downstream Reach	250.2	100-Year	718.95		719.61	608.43		75000.00			1364.00	1973.60	
Downstream Reach	250.2	Floodway	719.54	0.60	720.17	608.49		75000.00		1307.12	1364.00	1973.80	1988.91
Downstream Reach	250.1	100-Year	718.89		719.58	639.25		73015.76	1984.24		1299.00	1932.00	
Downstream Reach	250.1	Floodway	719.49	0.61	720.14	639.96		72970.45	2029.55	1290.89	1299.00	1932.00	1979.80
Downstream Reach	250	100-Year	718.74		719.52	591.22		72980.96	2019.04		1299.00	1876.00	
Downstream Reach	250	Floodway	719.36	0.62	720.08	593.90		72912.00	2088.00	1273.00	1299.00	1876.00	1953.00
Downstream Reach	249.9	100-Year	718.64		719.46	575.91		72944.71	2055.29		1268.00	1820.00	
Downstream Reach	249.9	Floodway	719.26	0.63	720.03	577.72		72873.96	2126.04	1229.00	1268.00	1820.00	1901.00
Downstream Reach	249.8	100-Year	718.51		719.39	544.00		73081.45	1918.54		1316.00	1819.50	
Downstream Reach	249.8	Floodway	719.14	0.64	719.97	544.00		73030.15	1969.86	1229.00	1316.00	1819.50	1901.00
Downstream Reach	249.795 BR U	100-Year	718.25		719.33	492.00		72359.67	2640.33		1316.00	1819.50	
Downstream Reach	249.795 BR U	Floodway	718.91	0.66	719.92	492.00		72269.42	2730.57	1229.00	1316.00	1819.50	1901.00
Downstream Reach	249.795 BR D	100-Year	718.20		719.23	508.00		73021.59	1978.40		1300.00	1826.70	
Downstream Reach	249.795 BR D	Floodway	718.86	0.66	719.82	508.00		72951.73	2048.27	1249.00	1300.00	1826.70	1921.00
Downstream Reach	249.79	100-Year	718.28		719.14	560.00		73565.91	1434.09		1300.00	1826.70	
Downstream Reach	249.79	Floodway	718.94	0.66	719.74	560.00		73524.70	1476.30	1249.00	1300.00	1826.70	1921.00
Downstream Reach	249.78	100-Year	718.23		719.10	612.47		73721.23	1278.77		1195.00	1829.10	
Downstream Reach	249.78	Floodway	718.90	0.67	719.70	620.22		73642.98	1357.01	1255.00	1195.00	1829.10	1927.00
Downstream Reach	249.76	100-Year	718.18		718.99	555.84		73803.48	1196.53		1009.00	1576.75	
Downstream Reach	249.76	Floodway	718.85	0.67	719.61	563.19		73700.71	1299.29	1004.00	1009.00	1576.75	1659.00
Downstream Reach	249.74	100-Year	718.15		718.90	620.06		74498.65	501.35		1001.00	1608.23	
Downstream Reach	249.74	Floodway	718.83	0.68	719.53	618.91		74391.23	608.78	1008.00	1001.00	1608.23	1663.00
Downstream Reach	249.73	100-Year	718.16		718.76	639.33		75000.00			989.00	1664.94	
Downstream Reach	249.73	Floodway	718.84	0.68	719.40	639.06		75000.00		1016.00	989.00	1664.94	1671.00
Downstream Reach	249.5	100-Year	718.17		718.68	663.37		75000.00			1501.70	2202.50	
Downstream Reach	249.5	Floodway	718.84	0.67	719.33	622.46		75000.00		1525.00	1501.70	2202.50	2147.46
Downstream Reach	249.4	100-Year	717.99		718.62	628.54		75000.00			1844.80	2556.00	
Downstream Reach	249.4	Floodway	718.52	0.54	719.25	547.39		75000.00		1785.04	1844.80	2556.00	2423.62
Downstream Reach	249.3 BR U	100-Year	717.59		718.53	386.62		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR U	Floodway	718.09	0.50	719.14	352.09		75000.00		1785.04	1844.80	2556.00	2423.62

Project

9-4-08

HEC-RAS Plan: Proj ScMi River: Scioto River Reach: Downstream Reach (Continued)

Reach	River Sta	Profile	W.S. Elev (ft)	Prof Delta WS (ft)	E.G. Elev (ft)	Top Wdth Act (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Enc Sta L (ft)	Ch Sta L (ft)	Ch Sta R (ft)	Enc Sta R (ft)
Downstream Reach	249.3 BR D	100-Year	717.49		718.44	393.58		75000.00			1844.80	2556.00	
Downstream Reach	249.3 BR D	Floodway	718.07	0.58	718.98	353.05		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.2	100-Year	717.64		718.29	626.91		75000.00			1844.80	2556.00	
Downstream Reach	249.2	Floodway	718.20	0.57	718.85	594.85		75000.00		1808.14	1844.80	2556.00	2471.96
Downstream Reach	249.1	100-Year	717.59		718.27	625.09	597.02	73464.51	938.47		1977.00	2534.20	
Downstream Reach	249.1	Floodway	718.19	0.60	718.82	627.34	611.79	73387.22	1000.99	1934.91	1977.00	2534.20	2611.46
Downstream Reach	249	100-Year	717.54		718.19	821.86		75000.00			1.48	646.69	
Downstream Reach	249	Floodway	718.14	0.60	718.75	824.22		75000.00		10.00	1.48	646.69	638.00
Downstream Reach	248.5	100-Year	717.67		718.02	748.52	375.14	74243.57	381.29		2161.00	2699.00	
Downstream Reach	248.5	Floodway	718.26	0.59	718.80	580.84	189.22	74429.22	381.56	2144.73	2161.00	2699.00	2725.57
Downstream Reach	248.4	100-Year	717.66		718.01	748.50	511.59	73613.83	874.79		2170.80	2692.80	
Downstream Reach	248.4	Floodway	718.25	0.59	718.59	581.17	372.60	73903.40	724.00	2149.64	2170.80	2692.80	2730.81
Downstream Reach	248.3		Inl Struct										
Downstream Reach	248.2	100-Year	717.13		717.50	729.56	430.24	73936.67	633.08		2170.80	2692.80	
Downstream Reach	248.2	Floodway	717.74	0.62	718.10	561.58	373.82	73945.52	680.65	2147.78	2170.80	2692.80	2729.36
Downstream Reach	248.1	100-Year	717.13		717.49	731.27	298.23	74354.47	347.30		2161.00	2699.00	
Downstream Reach	248.1	Floodway	717.74	0.61	718.09	561.98	166.90	74453.76	379.34	2146.55	2161.00	2699.00	2728.53
Downstream Reach	247.5	100-Year	716.94		717.41	654.66	2200.38	71396.98	1402.65		2386.10	2870.80	
Downstream Reach	247.5	Floodway	717.55	0.61	718.01	569.67	1426.28	72097.83	1475.90	2354.13	2386.10	2870.80	2925.39

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APPENDIX C:

Floodplain Workmaps

EMH&T

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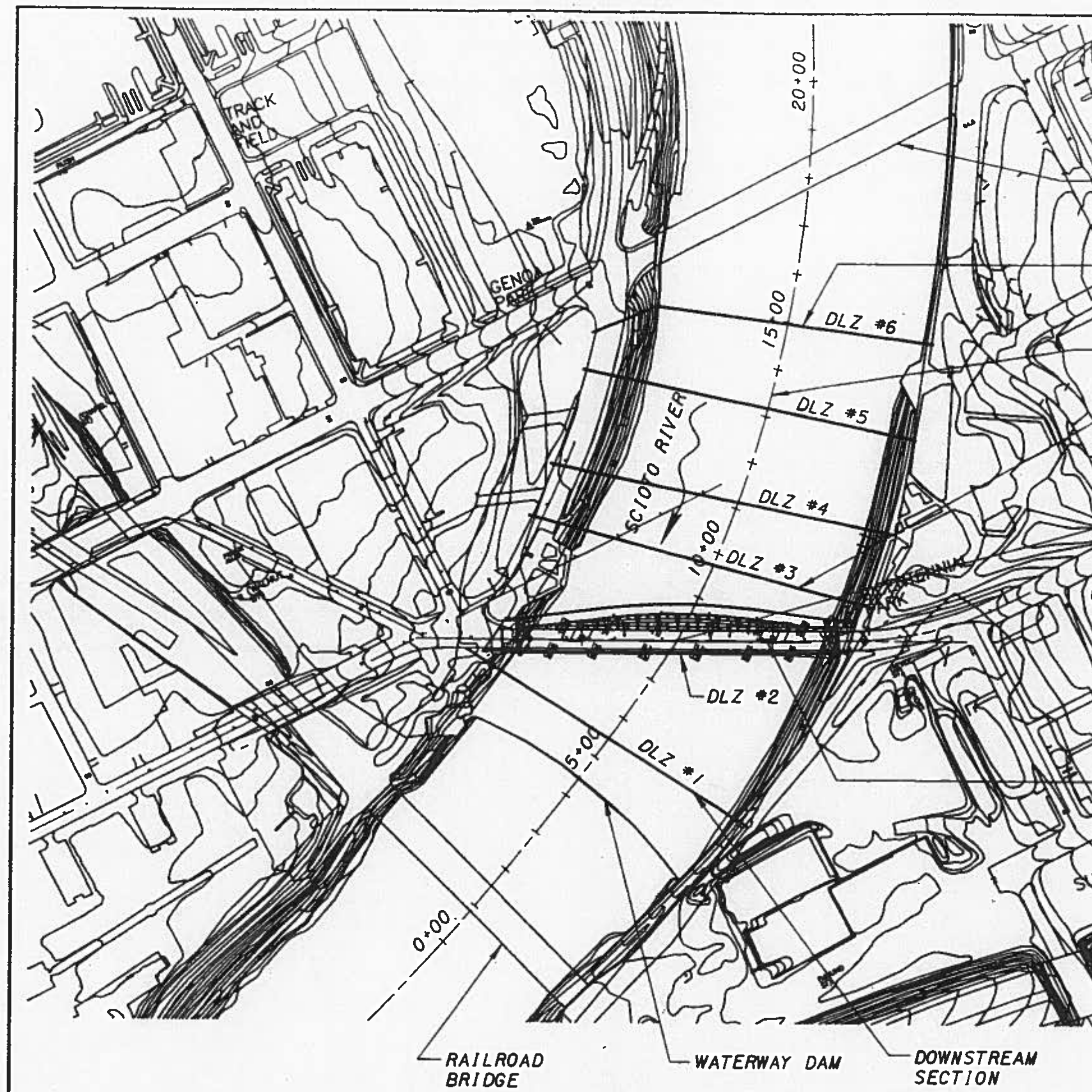
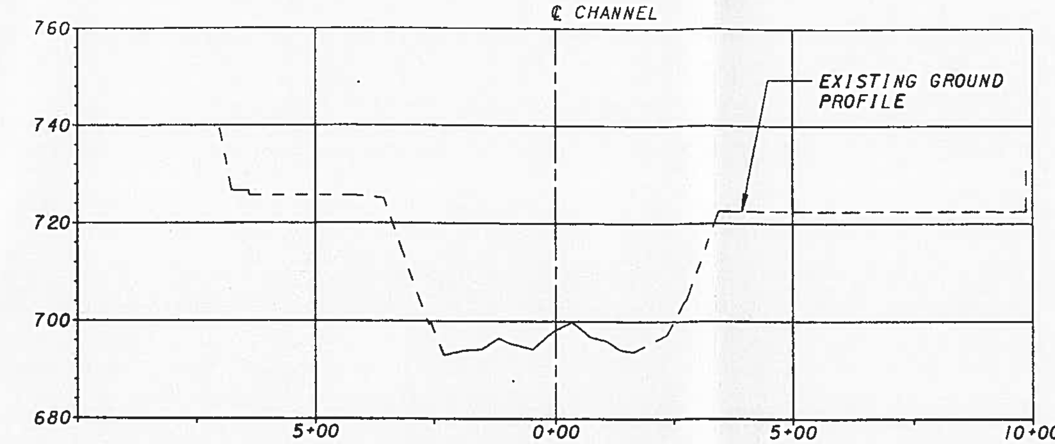
APPENDIX D:

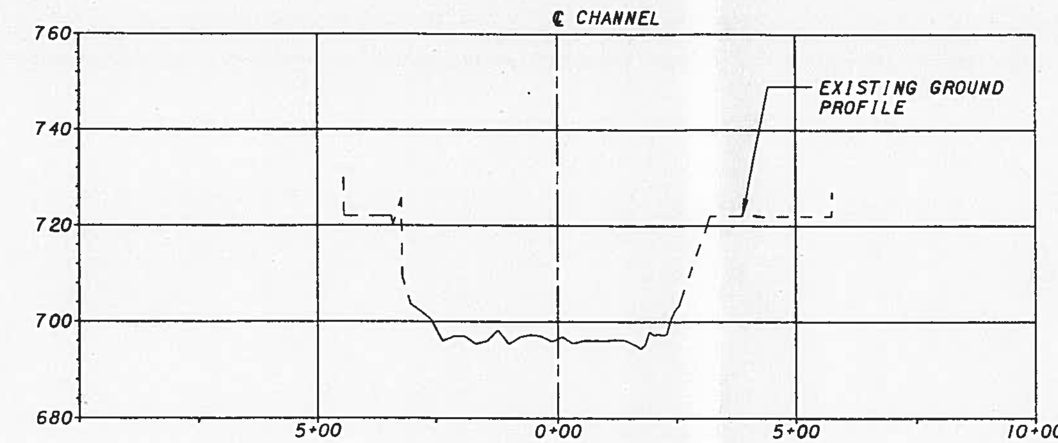
Bridge Plans



PLAN



UPSTREAM SECTION



DOWNSTREAM SECTION

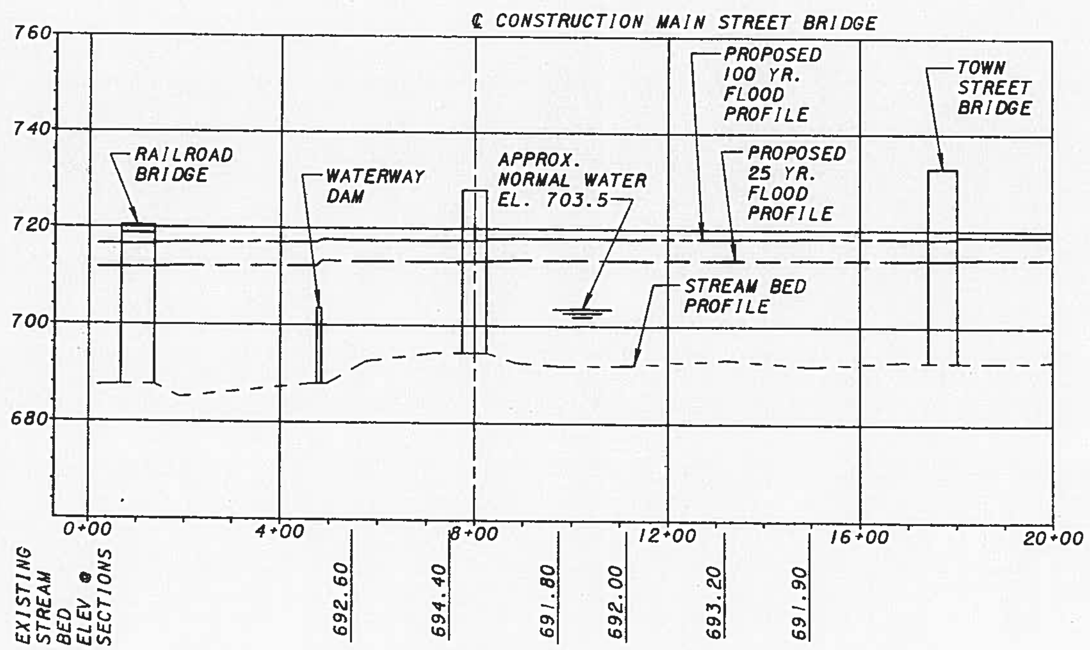
SITE DESCRIPTION

THE SCIOTO RIVER FLOWS THROUGH THE CITY OF COLUMBUS. THIS PORTION OF THE RIVER IS LOCATED IN THE VICINITY OF THE DOWNTOWN AREA. THE RIVER HAS BEEN CHANNELIZED WITH PREPARED SIDE SLOPES. THERE IS NO FLOODPLAIN OR NATURAL OVERBANKS.

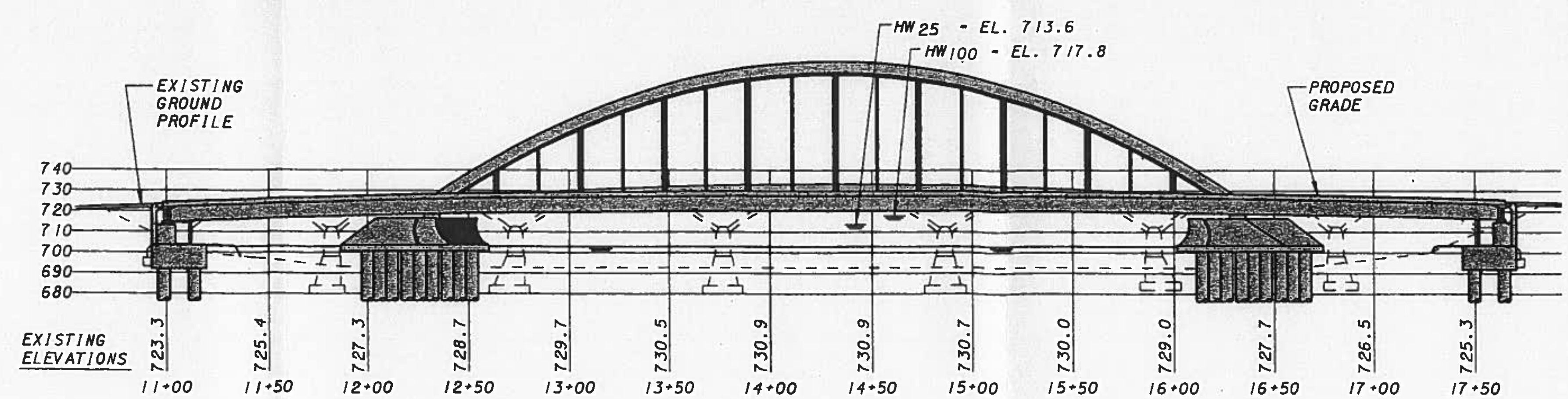
DOWNSTREAM OF THE PROJECT SITE IS A LOW HEAD DAM THAT CONTROLS THE NORMAL RIVER LEVEL AT THE MAIN STREET BRIDGE. DURING HIGH WATER CONDITIONS, THE RIVER WILL INUNDATE WALKING PATHS THAT HAVE BEEN CONSTRUCTED ALONG THE WATER'S EDGE. DURING WINTER, A THIN SHEET OF ICE WILL DEVELOP.

NOTE:
ALL STATIONS AND ELEVATIONS ARE IN FEET. ELEVATIONS ARE REFERENCED TO THE NGVD29 DATUM.

HYDRAULIC DATA	
DRAINAGE AREA: 1620 SQ.MI. EXISTING BRIDGE AREA: 11,300 SQ. FEET PROPOSED BRIDGE AREA: 11,200 SQ. FEET MAX. CLEARANCE (100 YR) - 2.7 FEET AVG. CLEARANCE BETWEEN PIERS (100 YR) - 2.3 FEET	
DESIGN YEAR	
Q25 - 50,000 CFS HW25 - 713.6 FT. V25 - 6.7 FPS	Q100 - 72,900 CFS HW100 - 717.8 FT. V100 - 7.7 FPS



PROFILE ALONG BASELINE OF SCIOTO RIVER



PROFILE ALONG CENTERLINE OF BRIDGE

HNTB
DLZ
6121 HUNTLEY ROAD • COLUMBUS, OHIO 43229

REVIEWED DOR	DATE 07-18-05
STRUCTURE FILE NUMBER 2503220	
DRAWN RTP	REVISED
DESIGNED MPC	CHECKED MPC

FRANKLIN COUNTY
STA. 10+94.70
STA. 17+69.24

SUPPLEMENTAL SITE PLAN
BRIDGE NO. FRA-62-1411
MAIN STREET OVER SCIOTO RIVER

FRA-62-14.11
PID 77467

1934 DR. E

M:\proj\0121\1511\01\S wings\rd625o1.dwg, 10/25/2005 11:05:48 AM, RTP

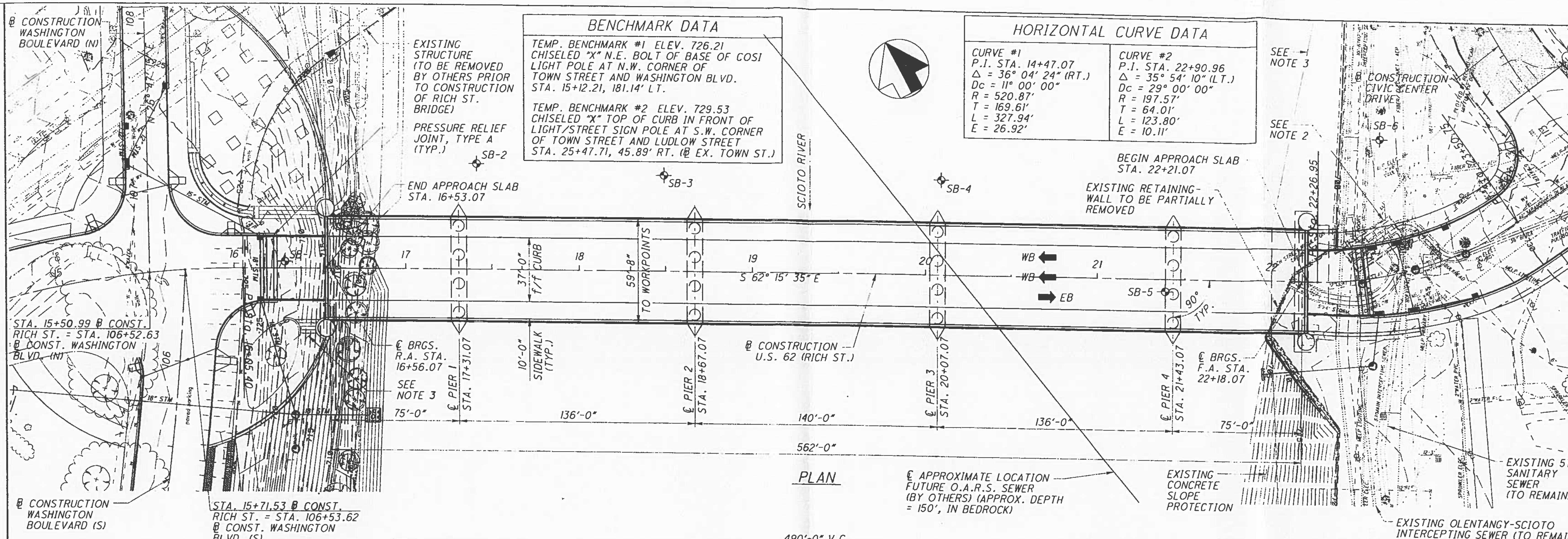
BENCHMARK DATA

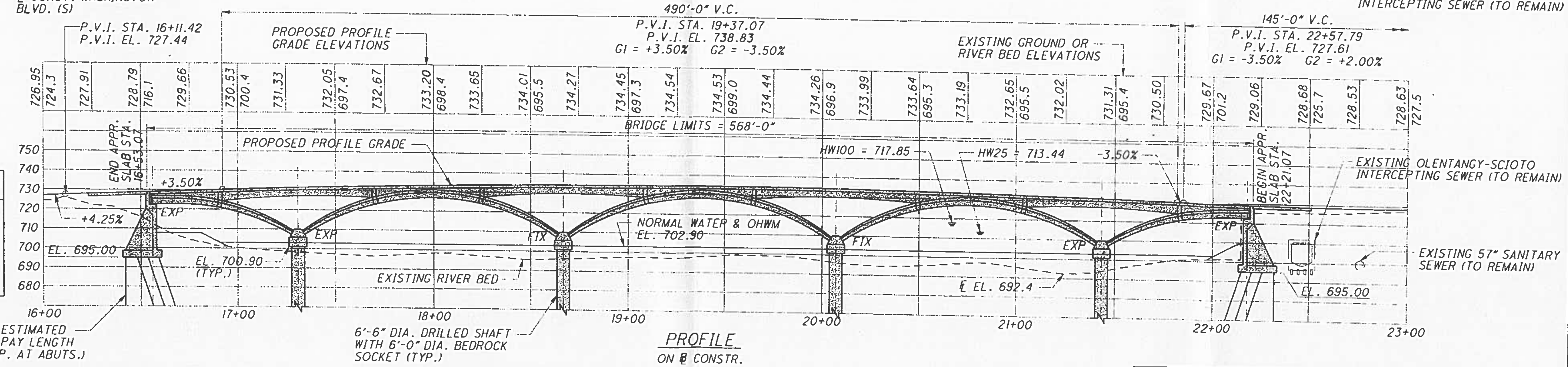
TEMP. BENCHMARK #1 ELEV. 726.21
CHISELED "X" N.E. BOLT OF BASE OF COSI LIGHT POLE AT N.W. CORNER OF TOWN STREET AND WASHINGTON BLVD.
STA. 15+12.21, 181.14' LT.

TEMP. BENCHMARK #2 ELEV. 729.53
CHISELED "X" TOP OF CURB IN FRONT OF LIGHT/STREET SIGN POLE AT S.W. CORNER OF TOWN STREET AND LUDLOW STREET
STA. 25+47.71, 45.89' RT. (℄ EX. TOWN ST.)

HORIZONTAL CURVE DATA

CURVE #1	CURVE #2
P.I. STA. 14+47.07	P.I. STA. 22+90.96
Δ = 36° 04' 24" (RT.)	Δ = 35° 54' 10" (LT.)
Dc = 11° 00' 00"	Dc = 29° 00' 00"
R = 520.87'	R = 197.57'
T = 169.61'	T = 64.01'
L = 327.94'	L = 123.80'
E = 26.92'	E = 10.11'





LEGEND

⌖ SOIL BORING LOCATION
EXP = EXPANSION BEARINGS
FIX = FIXED BEARINGS

HYDRAULIC DATA

DRAINAGE AREA = 1,610 SQ. MI.
Q25 = 51,000 CFS
V25 = 6.5 FPS
Q100 = 75,000 CFS
V100 = 7.3 FPS
THE LOWEST ARCH APEX CLEARS HW25 BY 9.31 FEET.

NOTES

1. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS AND GRADING PLAN.
2. DISPOSITION OF OSIS RICH ST. REGULATOR CHAMBER AND OVERFLOW YET TO BE DETERMINED BY CITY OF COLUMBUS.
3. GRADING AND TOE OF SLOPE LOCATION AT FORWARD ABUTMENT YET TO BE DETERMINED BY ADJACENT SCIOTO MILE PROJECT. SEE LANDSCAPE PLANS FOR GRADING AT REAR ABUTMENT.
4. SEE ROADWAY PLANS FOR ADDITIONAL UTILITY INFORMATION AND DISPOSITIONS.
5. ANTICIPATED TEMPORARY CONSTRUCTION ACCESS (CAUSEWAY) FILL QUANTITIES:
   PLAN AREA = 0.82 ACRES
   VOLUME BELOW OHWM = 10,900 CU YD
6. SEE HYDRAULIC REPORT FOR SUPPLEMENTAL SITE PLAN.

SOIL BORING INFORMATION

BORING #	STATION	OFFSET	APPROX. TOP OF WEATHERED SHALE BEDROCK ELEV.	APPROX. TOP OF LIMESTONE BEDROCK ELEV.
SB-1	16+29.63	3.96' LT.	658.7	*
SB-2	17+41.53	60.85' LT.	661.4	632.9
SB-3	18+49.21	55.17' LT.	663.3	633.8
SB-4	20+09.13	54.77' LT.	662.3	634.3
SB-5	21+38.45	7.07' RT.	665.5	634.8
SB-6	22+86.32	77.90' LT.	656.9	*

* LIMESTONE BEDROCK WAS NOT ENCOUNTERED IN BORINGS SB-1 AND SB-6

DESIGN TRAFFIC

2010 ADT = 9850	2010 ADTT = 296
2030 ADT = 14,410	2030 ADTT = 432

EXISTING STRUCTURE

TYPE: EARTH FILLED CONCRETE SPANDREL ARCH
SPANS: 78'-0", 88'-0", 97'-0", 105'-0", 97'-0", 88'-0", 78'-0" (CLEAR SPANS ±)
ROADWAY: 40'-0"± f/f CURB, 8'-2"± SIDEWALKS (LT. & RT.)
ORIGINAL DESIGN LOADING: (2) - 60 TON STREET CARS & 25 TON TRUCKS
SKEW: 30°± LEFT FORWARD
WEARING SURFACE: ASPHALT CONCRETE
APPROACH SLABS: NONE
ALIGNMENT: TANGENT
STRUCTURE FILE NUMBER: 2503697
DATE BUILT: 1918 REHABILITATED: 1960

PROPOSED STRUCTURE

TYPE: PRECAST AND POST-TENSIONED CONCRETE RIB ARCH ON REINFORCED CONCRETE PIERS AND ABUTMENTS
SPANS: 75'-0", 136'-0", 140'-0", 136'-0", 75'-0" c/c BEARINGS
ROADWAY: 37'-0" f/f CURB, 10'-0" SIDEWALKS (LT. & RT.)
DESIGN LOADING: HS25 AND ALTERNATE MILITARY LOADING
FUTURE WEARING SURFACE LOADING: 10 PSF
SKEW: NONE
WEARING SURFACE: 1½" MICRO-SILICA MODIFIED CONCRETE
APPROACH SLABS: AS-1-81 MODIFIED (30' LONG)
ALIGNMENT: TANGENT
CROWN: 3/16"/FT.
COORDINATES: LATITUDE N 39° 57' 28"
LONGITUDE W 83° 00' 18"

BURGESS & NIPLE
5085 Reed Road
Columbus, Ohio 43220

DESIGNED	DRAWN	REVIEWED	DATE
BES	AAA/JMK	JCS	12/07
CHECKED	REVISED	STRUCTURE FILE NUMBER	
TMB		2503689	

FRANKLIN COUNTY
STA. 16+53.07
STA. 22+21.07

SITE PLAN
BRIDGE NO. FRA-62D-0130
RICH STREET OVER SCIOTO RIVER

FRA-62D-1.22
PID No. 17831

$sp00l$tot
$sp001_R
$total$

...\sheets\062_0130CSP001.dgn 1/18/2008 1:22:18 PM

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APPENDIX E:

MT-2 CLOMR Application Forms
CD-ROM Data Disk

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

OVERVIEW & CONCURRENCE FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1 hour per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, 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.**

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
Ex: 480301 480287	City of Katy Harris County	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
390170	City of Columbus	OH	39049C	0309K	06/17/08

2. a. Flooding Source: Scioto River

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

   ☐ Alluvial fan ☐ Lakes ☐ Other (Attach Description)

3. Project Name/Identifier: Scioto Mile

4. FEMA zone designations affected: AE, X (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)

C. REVIEW FEE

Has the review fee for the appropriate request category been included?	☒ Yes	Fee amount: $4,400
	☐ 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:	Company:	
Mailing Address:	Daytime Telephone No.:	Fax No.:
	E-Mail Address:	
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 requirement that no fill be placed in the regulatory floodway, and that all necessary Federal, State, and local permits have been, or in the case of a conditional LOMR, will be obtained. In addition, we have determined that the land and any existing or proposed structures to be removed from the SFHA are or will be reasonably safe from flooding as defined in 44CFR 65.2(c), and that we have available upon request by FEMA, all analyses and documentation used to make this determination.

Community Official's Name and Title: Paul Freedman	Community Name: City of Columbus	
Mailing Address: Department of Development 757 Carolyn Ave, Columbus, OH 43224	Daytime Telephone No.: 614-645-0704	Fax No.: 614-645-2463
	E-Mail Address: PMFreedman@Columbus.gov	
Community Official's Signature (required): Paul Freedman	Date: 9/24/08	

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 data. All documents submitted in support of this request are correct to the best of my knowledge. All analyses have been performed correctly and in accordance with sound engineering practices. All project works are designed in accordance with sound engineering practices to provide protection from the 1% annual chance flood. If "as-built" conditions data/plan provided, then the structure(s) has been built according to the plans being certified, is in place, and is fully functioning. 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: Glenn N. Heistand	License No.: E-63812	Expiration Date: 12/31/08
Company Name: EMH&T	Telephone No.: 614-775-4500	Fax No.: 614-775-4880
Signature: Glenn N. Heistand		Date: 9-4-08

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

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

STATE OF OHIO
GLENN N. HEISTAND
E-63812
REGISTERED PROFESSIONAL ENGINEER

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Flooding Source: Scioto River
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)

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

☐ Statistical Analysis of Gage Records
☐ Precipitation/Runoff Model
☐ 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

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

B. HYDRAULICS

1. <u>Reach to be Revised</u>

	Description	Cross Section	Water-Surface Elevations (ft.) Effective	Proposed/Revised
Downstream Limit	Lettered Section AG	247.5	716.74	716.94
Upstream Limit	Lettered Section AK	252.5	720.12	720.60

2. <u>Hydraulic Method/Model Used</u>

HEC-RAS

B. HYDRAULICS (CONTINUED)

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. These review programs may help verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. **These tools do not replace engineering judgment.** CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/plan/prevent/fhm/frm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. Review of your submittal and resolution of valid modeling discrepancies may result in reduced review time.

4. Models Submitted

Models Submitted	Natural Run		Floodway Run		Datum
Duplicate Effective Model*	File Name: SM-CLOMR	Plan Name:	File Name: SM-CLOMR	Plan Name:	NGVD
Corrected Effective Model*	File Name: SM-CLOMR	Plan Name:	File Name: SM-CLOMR	Plan Name:	NGVD
Existing or Pre-Project Conditions Model	File Name: SM-CLOMR	Plan Name:	File Name: SM-CLOMR	Plan Name:	NGVD
Revised or Post-Project Conditions Model	File Name: SM-CLOMR	Plan Name:	File Name: SM-CLOMR	Plan Name:	NGVD
Other - (attach description)	File Name:	Plan Name:	File Name:	Plan Name:	____

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

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

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

☒ Digital Mapping (GIS/CADD) Data Submitted

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

☒ 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.
      - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot.

   b. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☐ No
      If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.

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

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

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

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

4. For LOMR/CLOMR requests, does this request have the potential to impact an endangered species? ☐ Yes ☒ No

   If Yes, please submit documentation to the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). Section 9 of the ESA prohibits anyone from "taking" or harming an endangered species. If an action might harm an endangered species, a permit is required from U.S. Fish and Wildlife Service or National Marine Fisheries Service under Section 10 of the 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.

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

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY

RIVERINE STRUCTURES FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

Flooding Source: Scioto River
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/Basin ....complete Section D
Levee/Floodwall ....complete Section E
Sediment Transport........complete Section F (if required)

Description Of Structure

1. **Name of Structure: Main Street Bridge**

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

   Location of Structure: Approximately 280 feet upstream of existing low-head dam

   Downstream Limit/Cross Section: 249.2

   Upstream Limit/Cross Section: 249.4

2. **Name of Structure: Rich Street Bridge**

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

   Location of Structure: Approximately 650 feet upstream of existing Main Street Bridge

   Downstream Limit/Cross Section: 249.79

   Upstream Limit/Cross Section: 249.8

3. **Name of Structure: Town Street Bridge**

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

   Location of Structure: Approximately 980 feet upstream of existing Main Street Bridge

   Downstream Limit/Cross Section: 250.2

   Upstream Limit/Cross Section: 250.4

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

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

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

2. Drawing Checklist

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

3. Hydraulic Considerations

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

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

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

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

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

4. Sediment Transport Considerations

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

C. BRIDGE/CULVERT

Flooding Source: Scioto River

Name of Structure: Main Street Bridge

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)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☒ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

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

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. Accessory Structures

The channelization includes (check one):

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

2. Drawing Checklist

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

3. Hydraulic Considerations

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

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

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

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

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

4. Sediment Transport Considerations

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

C. BRIDGE/CULVERT

Flooding Source: Scioto River

Name of Structure: Rich Street Bridge

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)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

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

B. CHANNELIZATION

Flooding Source:

Name of Structure:

1. <u>Accessory Structures</u>

The channelization includes (check one):

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

2. <u>Drawing Checklist</u>

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

3. <u>Hydraulic Considerations</u>

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

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

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

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

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

4. <u>Sediment Transport Considerations</u>

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

C. BRIDGE/CULVERT

Flooding Source: Scioto River

Name of Structure: Town Street Bridge

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)
- ☐ Shape (culverts only)
- ☐ Material
- ☐ Beveling or Rounding
- ☐ Wing Wall Angle
- ☐ Skew Angle
- ☒ Distances Between Cross Sections
- ☐ Erosion Protection
- ☒ Low Chord Elevations – Upstream and Downstream
- ☒ Top of Road Elevations – Upstream and Downstream
- ☐ Structure Invert Elevations – Upstream and Downstream
- ☒ Stream Invert Elevations – Upstream and Downstream
- ☒ Cross-Section Locations

4. Sediment Transport Considerations

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

D. DAM/BASIN

Flooding Source:

Name of Structure:

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

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

   Name of the agency or organization:

3. The Dam was permitted as (check one):

   a. ☐ Federal Dam ☐ State Dam

   Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

   Permit or ID number Permitting Agency or Organization

   b. ☐ Local Government Dam ☐ Private Dam

   Provided related drawings, specification and supporting design information.

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

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

   Was the dam/basin designed using critical duration storm?

   ☐ Yes, provide supporting documentation with your completed Form 2.

   ☐ No, provide a written explanation and justification for not using the critical duration storm.

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

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

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

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

<u>Stillwater Elevation Behind the Dam</u>

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

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

E. LEVEE/FLOODWALL

1. System Elements

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

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

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

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

   c. Structural Type (check one):

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

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

      ☐ Yes ☐ No

      If Yes, by which agency?

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

      1. Plan of the levee embankment and floodwall structures. Sheet Numbers:
      2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers:
      3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers:
      4. A layout detail for the embankment protection measures. Sheet Numbers:
      5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers:

2. Freeboard

   a. The minimum freeboard provided above the BFE is:

      Riverine

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

      Coastal

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

      2.0 feet above the 1%-annual-chance stillwater surge elevation ☐ Yes ☐ No

2. Freeboard (continued)

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

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

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

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

3. Closures

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

If opening exists, list all closures:

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

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

Note: Geotechnical and geologic data

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

4. Embankment Protection

a. The maximum levee slope landside is:

b. The maximum levee slope floodside is:

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

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

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

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

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

E. LEVEE/FLOODWALL (CONTINUED)

4. Embankment Protection (continued)

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

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

   Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

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

   ☐ Overall height: Sta. ; height ft.

   ☐ Limiting foundation soil strength:

   Sta. , depth to

   strength ϕ = degrees, c = psf

   slope: SS = (h) to (v)

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

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

   c. Summary of stability analysis results:

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

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

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

   If Yes, describe methodology used:

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

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

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

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

   Attach engineering analysis to support construction plans.

6. Floodwall And Foundation Stability

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

☐ UBC (1988) or ☐ Other (specify):

b. Stability analysis submitted provides for:

☐ Overturning ☐ Sliding If not, explain:

c. Loading included in the analyses were:

☐ Lateral earth @ P_A = psf; P_p = psf

☐ Surcharge-Slope @ , ☐ surface psf

☐ Wind @ P_w = psf

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

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

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

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

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

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

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

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

e. Foundation bearing strength for each soil type:

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

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

Attach engineering analysis to support construction plans.

7. Settlement

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

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

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

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

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

Attach engineering analysis to support construction plans.

8. Interior Drainage

a. Specify size of each interior watershed:

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

b. Relationships Established

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

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

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

e. Which flooding conditions were analyzed?

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

If No for any of the above, attach explanation.

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

If No, attach explanation.

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

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

8. Interior Drainage (continued)

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

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

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

Will the operation be automatic? ☐ Yes ☐ No

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

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

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

9. Other Design Criteria

a. The following items have been addressed as stated:

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

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

Attach supporting documentation

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

Attach supporting documentation

d. Sediment Transport Considerations:

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

E. LEVEE/FLOODWALL (CONTINUED)

10. Operational Plan And Criteria

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

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

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

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

11. Maintenance Plan

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

12. Operations and Maintenance Plan

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

F. SEDIMENT TRANSPORT

Flooding Source: No indication from historical records that sediment transport can affect the BFE.

Name of Structure:

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

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

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

Sediment transport rate (percent concentration by volume)

Method used to estimate sediment transport:

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

Method used to estimate scour and/or deposition:

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

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