

County Engineers Association of Ohio

2017 Ohio Storm Water Management & Drainage Conference



**Floodplain Coordination, H&H Analysis, and
Environmental Clearance for a Proposed Bridge over the
National and State Scenic River, Big Darby Creek, in
Franklin County, Ohio**

Today's Presentation



- Introduction
 - Jamie Bumgarner, Mead & Hunt
 - Chantil Milam, Lawhon and Associates
- Floodplain Coordination
- Hydrologic and Hydraulic Analysis
- Environmental Clearance
- Questions

About Mead & Hunt



- Engineering and architectural firm founded in 1900
- Employee-owned
- Award-winning firm and projects

National & Neighborly

- Multi-disciplinary with 32 offices nationwide
- Local office in Columbus with 18 employees



Visit us at: meadhunt.com

Mead&Hunt

About Lawhon & Associates

- Environmental Documents
 - NEPA documents
 - Section 4(f) and 6(f)
- Cultural Resources
 - Archaeology
 - History/Architecture
 - HABS/HAER

About Lawhon & Associates

- Ecological Resources
 - Wetland Delineations
 - Endangered Species/Habitat Surveys
 - Waterway Permitting (Section 404/401)
 - Mussel Surveys

- Environmental Site Assessment
 - ESA Screening, Phase I and II
 - Remedial Action

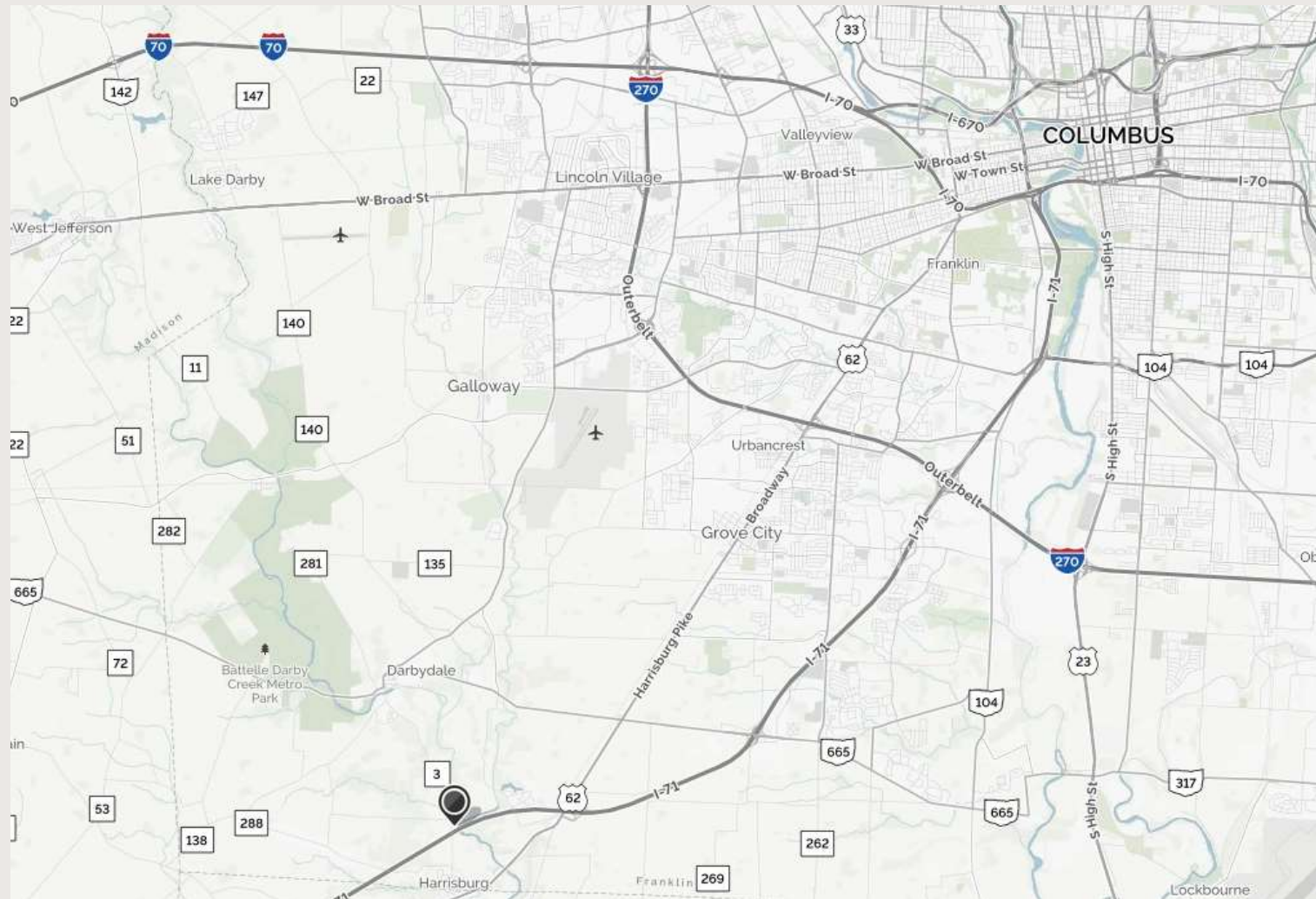
About Lawhon & Associates

- Hazardous Building Materials
 - Asbestos, lead, mercury
- Traffic Planning and Safety Studies
- Indoor Air Quality

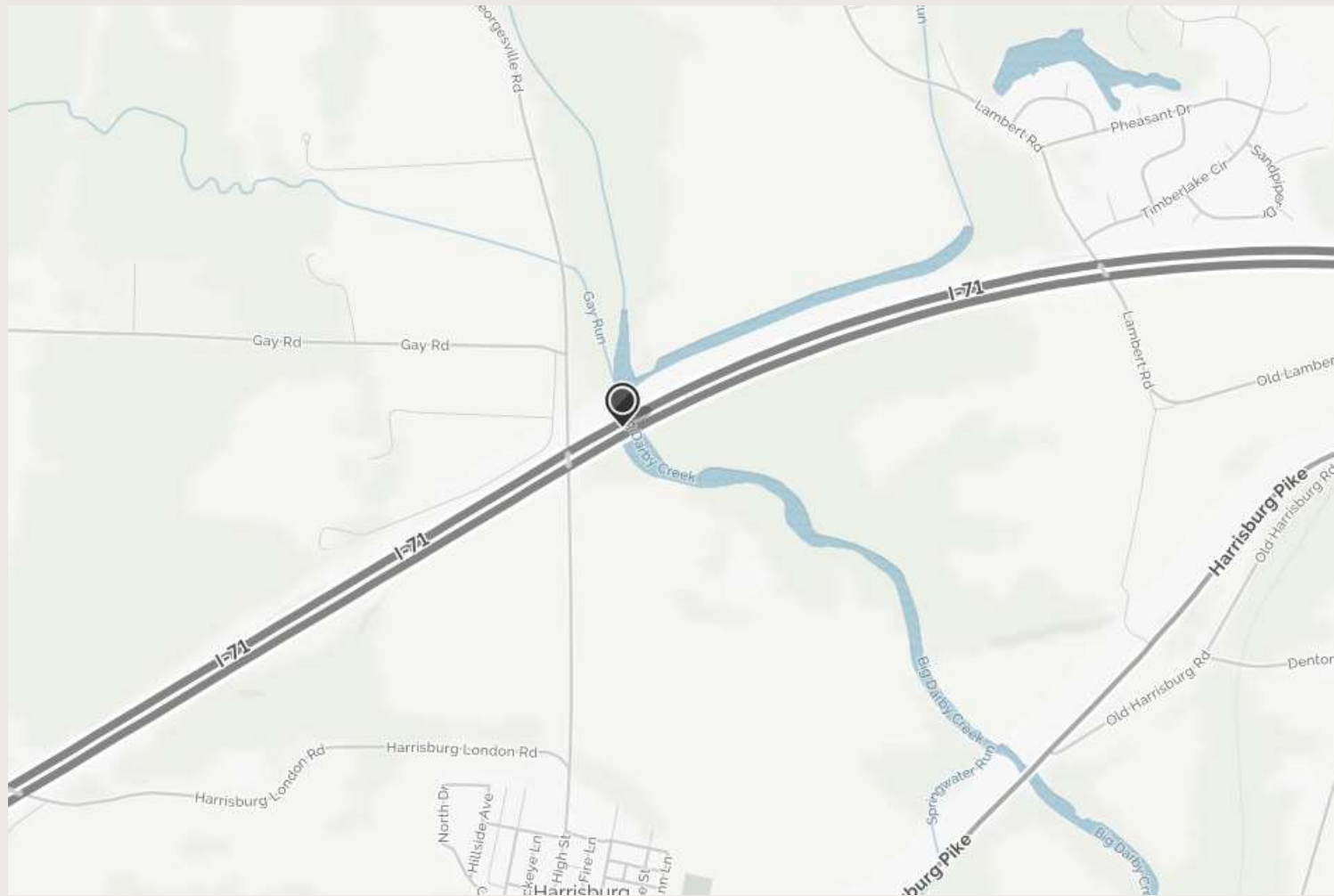
Project Overview

- ODOT Interstate 71 Improvement Project
- Three Bridge Alternatives Developed
 - One Span, Two Span, Three Span
- Impacts to National Scenic River
- Coordination with multiple agencies including:
 - ODOT
 - FHWA
 - NPS
 - ODNR
 - USFWS
 - Metroparks
 - OhioEPA
 - USACE

Project Location



Project Location



H&H Analysis

FLOOD INSURANCE STUDY



VOLUME 1 of 4

FRANKLIN COUNTY, OHIO AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER	COMMUNITY NAME	COMMUNITY NUMBER
BEXLEY, CITY OF	390166	VALLEYVIEW, VILLAGE OF	390485
BRUCE, VILLAGE OF	390592	WESTERVILLE, CITY OF	390178
CANAL WINCHESTER, VILLAGE OF	390149	WINTERHALL, CITY OF	390180
COLUMBUS, CITY OF	390176	WORTHINGTON, CITY OF	390181
DURHAM, CITY OF	390173		
FRANKLIN COUNTY (UNINCORPORATED AREAS)	390187		
GAHANNA, CITY OF	390171		
GRANDVIEW HEIGHTS, CITY OF	390171		
GROVE CITY, CITY OF	390171		
GROVEPORT, VILLAGE OF	390174		
HARRISBURG, VILLAGE OF	390897		
HILLIARD, CITY OF	390171		
LOCKBOURNE, VILLAGE OF	390891		
MARBLE CREST, VILLAGE OF	390896		
MENNERVA PARK, VILLAGE OF	390794		
NEW ALBANY, VILLAGE OF	390899		
ORFEL, VILLAGE OF	390178		
REYNOLDSBURG, CITY OF	390177		
SEVEREA, VILLAGE OF	390892		
UPPER ARLINGTON, CITY OF	390178		
URBANCREST, VILLAGE OF	390891		

Franklin County



* NO SPECIAL FLOOD HAZARD AREAS
IDENTIFIED WITHIN COMMUNITY

REVISED:
June 16 2011



Federal Emergency Management Agency
FLOOD INSURANCE STUDY NUMBER
39049C0383K

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0383K

FIRM

FLOOD INSURANCE RATE MAP

FRANKLIN COUNTY,
OHIO

AND INCORPORATED AREAS

PANEL 383 OF 465

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
FRANKLIN COUNTY	390167	0383	K
HARRISBURG, VILLAGE OF	390897	0383	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.



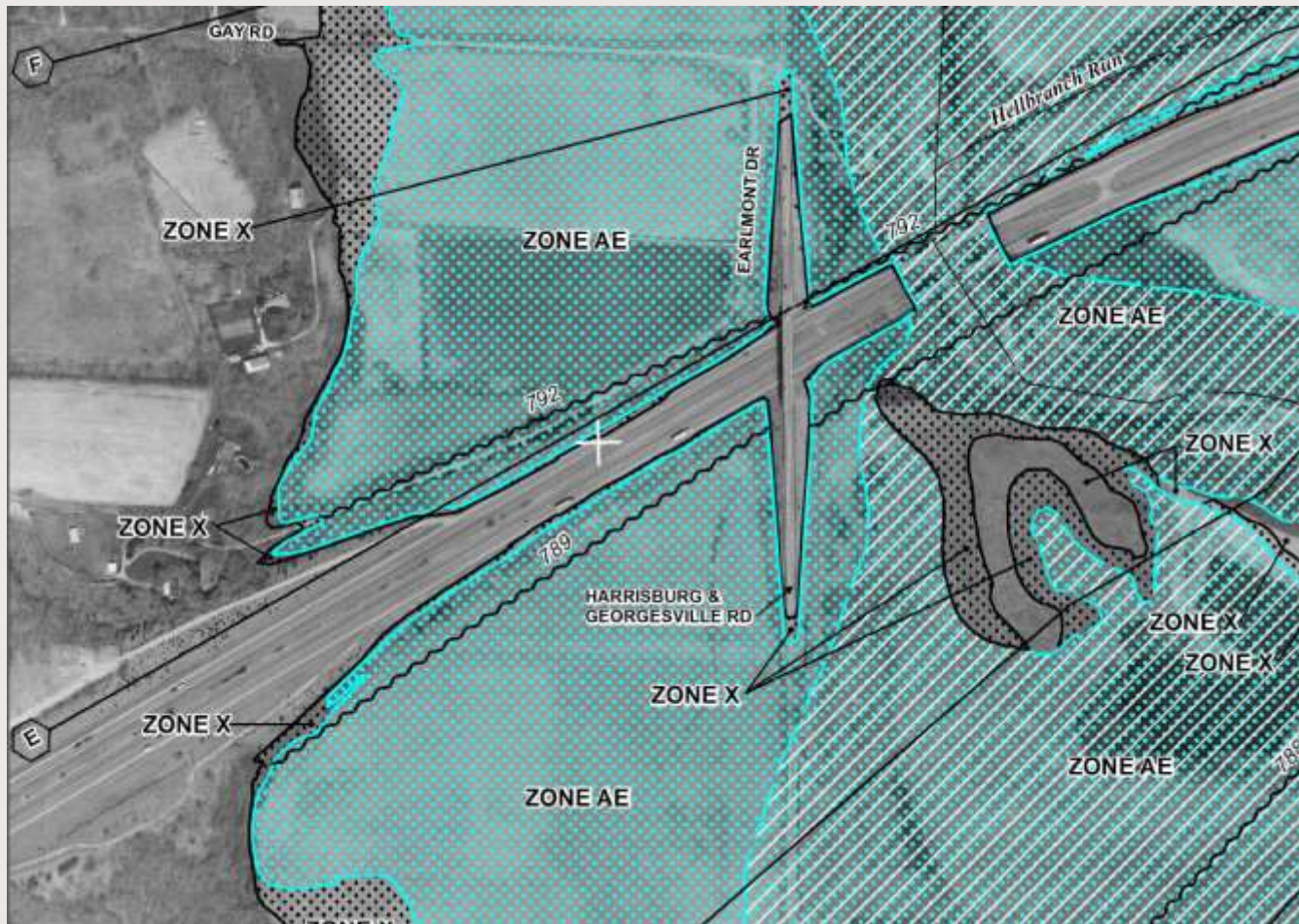
MAP NUMBER
39049C0383K

MAP REVISED
JUNE 17, 2008

Federal Emergency Management Agency

H&H Analysis

- FEMA Zone AE - An area inundated by 1% annual chance flooding, for which BFEs have been determined.



H&H Analysis

- Regulatory Floodway

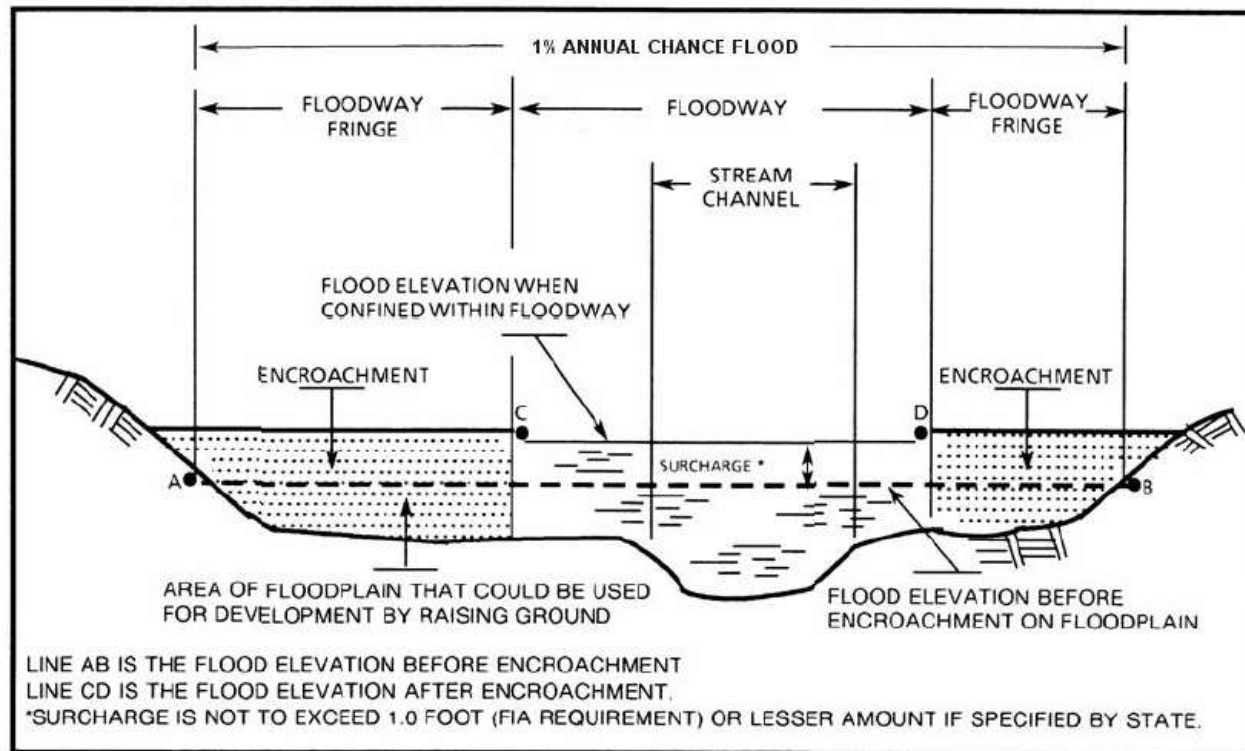


Figure 1. Floodway Schematic

H&H Analysis

- Administered by Franklin County Development and Planning Department
- No increase in Base Flood Elevations (BFE) Permitted
 - ZERO - 0.00' increase permitted
 - Unless CLOMR or LOMR

H&H Analysis

- ODOT Self-Permit Process
 - Location and Design Manual, Volume 2
 - Zone AE requires documentation through the ODOT self-permit process, coordination with FEMA, ODNR, and the Local Floodplain Coordinator
 - Hydraulic Calculations
 - Letter of Compliance
 - No-Rise Certification

H&H Analysis

- Duplicate Effective Model
 - Copy of the hydraulic analysis used in the effective FIS
 - aka Effective Model

- Corrective Effective Model
 - Add or Delete cross sections to model the bridge
 - Other corrections, such as adjustments for Datum

H&H Analysis

NGVD29. With the finalization of the NAVD88, many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between communities.

- $\text{NAVD88} = \text{NGVD29} - 0.60 \text{ feet}$

H&H Analysis

- Existing Model
 - Surveyed Cross Sections added
- Proposed Model
 - Proposed Bridge model

H&H Analysis

- Obtain Effective Model
 - FEMA
 - Franklin County
 - ODOT
 - ODNR
 - USACE
 - Others
- Ideally, HEC-RAS Model or HEC-2 Model
- No electronic model was available
- HEC-2 Input provided by FEMA in PDF

H&H Analysis

Big Darby Creek

H&H Analysis

T1	BIG DARBY CREEK FRANKLIN CO D. FIS 1977												
T2	BIG DARBY SECTIONS 1 THRU 84 MILE 23.644 TO 46.865												
T3	BIG DARBY CREEK RUN 15												
J1	-10	6										783.	
J2	1		-1			0.856							
J3	38	42	1	2	4		3	13	14	15	43		
J3	10	53	54	202	150	696							
NC	0.08	0.07	0.045	0.1	0.5								
QT	9.	58000.	38000.	38000.	30800.	17800.							
NH	9	.080	428.0	.045	530.0	.080	632.0	.050	1940.0	.060			
NH2050.0		.045	2090.0	.060	4550.0	.065	6100.0	.075	6890.0	0.			
ET				5.4									
X1	1.0	65.	428.0	527.0	0.	0.	0.						
GR 853.0		0.	840.0	167.0	842.0	277.0	771.0	428.0	769.0	436.0			
GR 769.0		519.0	771.0	527.0	771.5	530.0	775.0	551.0	772.0	569.0			
GR 781.0		600.0	781.0	620.0	781.0	632.0	781.0	800.0	781.0	1000.0			
GR 781.0		1200.0	781.0	1400.0	781.0	1600.0	781.0	1800.0	781.0	1940.0			
GR 781.0		2000.0	781.0	2050.0	781.0	2090.0	781.0	2200.0	781.0	2400.0			
GR 781.0		2730.0	795.0	2731.0	795.0	2820.0	781.0	2820.0	781.0	3100.0			
GR 781.0		3290.0	795.0	3291.0	795.0	3340.0	781.0	3341.0	781.0	3500.0			
GR 781.0		3710.0	786.0	3761.0	786.0	3830.0	786.0	3860.0	786.0	4100.0			
GR 786.0		4300.0	786.0	4410.0	790.0	4493.0	790.4	4550.0	791.0	4622.0			
GR 792.0		4849.0	793.0	4916.0	793.0	4925.0	793.0	4950.0	823.0	4951.0			
GR 820.0		5450.0	793.0	5451.0	793.0	5470.0	820.0	5471.0	815.0	5950.0			
GR 793.0		5951.0	793.0	6100.0	793.0	6210.0	794.0	6218.0	794.0	6348.0			
GR 793.0		6546.0	794.0	6721.0	793.0	6730.0	793.0	6885.0	794.0	6890.0			
NH	13	.080	330.0	.050	1372.0	.060	1435.0	.045	1470.0	.050			
NH1495.0		.045	1607.0	.080	1750.0	.050	2230.0	.075	2489.0	.055			
NH2630.0		.055	2860.0	.050	4300.0	.065	7488.0	0.	0.	0.			
X1	2.0	92.	1435.0	1605.0	1584.00	1584.00	1584.00						
GR 857.0		0.	842.0	38.0	843.0	46.0	843.0	60.0	844.0	76.0			
GR 846.0		103.0	816.0	204.0	788.6	330.0	784.0	351.0	782.0	554.0			
GR 781.0		861.0	779.0	1265.0	779.0	1372.0	779.0	1382.0	779.0	1406.0			
GR 772.0		1435.0	770.0	1443.0	770.0	1459.0	772.0	1467.0	772.2	1470.0			
GR 773.0		1483.0	772.0	1495.0	770.0	1503.0	770.0	1597.0	772.0	1605.0			
GR 776.0		1607.0	782.0	1610.0	782.0	1750.0	782.0	1900.0	782.0	2100.0			
GR 782.0		2230.0	782.0	2300.0	782.0	2460.0	792.0	2489.0	792.0	2524.0			
GR 791.0		2556.0	786.0	2570.0	786.0	2615.0	781.0	2630.0	781.0	2858.0			
GR 786.0		2860.0	786.0	3200.0	786.0	3400.0	786.0	3600.0	786.0	3800.0			
GR 786.0		4000.0	786.0	4100.0	800.0	4101.0	800.0	4170.0	786.0	4171.0			
GR 786.0		4300.0	786.0	4370.0	788.0	4407.0	793.0	4521.0	793.0	4550.0			
GR 793.0		4750.0	810.0	4751.0	810.0	4830.0	793.0	4831.0	793.0	4870.0			
GR 794.0		4876.0	794.0	5075.0	794.0	5170.0	824.0	5171.0	827.0	6005.0			
GR 798.0		6006.0	798.0	6044.5	828.0	6045.0	835.0	6268.0	805.0	6270.0			
GR 805.0		6281.0	835.0	6281.0	830.0	6442.0	800.0	6442.0	800.0	6454.0			
GR 830.0		6454.0	826.0	6624.0	796.0	6624.0	796.0	6632.0	826.0	6633.0			
GR 827.0		6781.0	797.0	6781.0	797.0	6796.0	809.0	6860.0	809.0	6869.0			
GR 833.0		6940.0	837.0	6960.0	851.0	6960.0	851.0	7009.0	836.0	7010.0			
GR 833.0		7252.0	831.0	7488.0	0.	0.	0.	0.	0.	0.			
NH	10	.075	530.0	.055	1725.0	.070	2008.0	.045	2139.0	.068			
NH2753.0		.055	2980.0	.045	3020.0	.055	3190.0	.050	4750.0	.065			
NH7789.0		0.	0.	0.	0.	0.	0.	0.	0.	0.			
X1	3.1	72	3008.0	3170.0	804.73	804.73	804.73						

H&H Analysis

22-NOV-89 09:33:05

PAGE 1

 RELEASE DATE NOV 22 1989
 RELEASE TIME 09:33:05
 RELEASE BY 00:01:00,00,00,00

WASHINGTON DC
 10 YEAR FLOOR PROFILE
 DISTRICT CREEK

11	12	13	14	15	16	17	18	19	20	21	22
01	ICHECK	INC	MINY	EDIR	DIET	PIETIC	EVINE	0	VSAL	FO	
02	UPFOR	IPLOT	REFE	XEDV	XEDCH	IN	ALIC	IN	GRATY	ITRACH	
03	1.000	0.000	-1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
04	100.000	0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
05	0.120	0.120	0.000	0.100	0.100	0.000	0.000	0.000	0.000	0.000	
06	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
07	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
08	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
09	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
13	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
14	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
15	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
16	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
17	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
19	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
20	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
21	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
22	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

H&H Analysis

T1 BIG DARBY CREEK FRANKLIN CO D. FIS 1977													
T2 BIG DARBY SECTIONS 1 THRU 84 MILE 23.644 TO 46.865													
T3 BIG DARBY CREEK RUN 15													
J1	-10	6											
J2	1		-1			0.856						783.	
J3	38	42	1	2	4		3	13	14	15	43		
J3	10	53	54	202	150	696							
NC	0.08	0.07	0.045	0.1	0.5								
QT	9.	58000.	38000.	38000.	30800.	17800.							
NH	9	.080	428.0	.045	530.0	.080	632.0	.050	1940.0	.060			
NH2050.0		.045	2090.0	.060	4550.0	.065	6100.0	.075	6890.0	0.			
ET				5.4									
X1	1.0	65.	428.0	527.0	0.	0.	0.						
GR	853.0	0.	840.0	167.0	842.0	277.0	771.0	428.0	769.0	436.0			
GR	769.0	519.0	771.0	527.0	771.5	530.0	775.0	551.0	772.0	569.0			
GR	781.0	600.0	781.0	620.0	781.0	632.0	781.0	800.0	781.0	1000.0			
GR	781.0	1200.0	781.0	1400.0	781.0	1600.0	781.0	1800.0	781.0	1940.0			
GR	781.0	2000.0	781.0	2050.0	781.0	2090.0	781.0	2200.0	781.0	2400.0			
GR	781.0	2730.0	795.0	2731.0	795.0	2820.0	781.0	2820.0	781.0	3100.0			
GR	781.0	3290.0	795.0	3291.0	795.0	3340.0	781.0	3341.0	781.0	3500.0			
GR	781.0	3710.0	786.0	3761.0	786.0	3830.0	786.0	3860.0	786.0	4100.0			
GR	786.0	4300.0	786.0	4410.0	790.0	4493.0	790.4	4550.0	791.0	4622.0			
GR	792.0	4849.0	793.0	4916.0	793.0	4925.0	793.0	4950.0	823.0	4951.0			
GR	820.0	5450.0	793.0	5451.0	793.0	5470.0	820.0	5471.0	815.0	5950.0			
GR	793.0	5951.0	793.0	6100.0	793.0	6210.0	794.0	6218.0	794.0	6348.0			
GR	793.0	6546.0	794.0	6721.0	793.0	6730.0	793.0	6885.0	794.0	6890.0			
NH	13	.080	330.0	.050	1372.0	.060	1435.0	.045	1470.0	.050			
NH1495.0		.045	1607.0	.080	1750.0	.050	2230.0	.075	2489.0	.055			
NH2630.0		.055	2860.0	.050	4300.0	.065	7488.0	0.	0.	0.			
X1	2.0	92.	1435.0	1605.0	1584.00	1584.00	1584.00						
GR	857.0	0.	842.0	38.0	843.0	46.0	843.0	60.0	844.0	76.0			
GR	846.0	103.0	816.0	204.0	788.6	330.0	784.0	351.0	782.0	554.0			
GR	781.0	861.0	779.0	1265.0	779.0	1372.0	779.0	1382.0	779.0	1406.0			
GR	772.0	1435.0	770.0	1443.0	770.0	1459.0	772.0	1467.0	772.2	1470.0			
GR	773.0	1483.0	772.0	1495.0	770.0	1503.0	770.0	1597.0	772.0	1605.0			
GR	776.0	1607.0	782.0	1610.0	782.0	1750.0	782.0	1900.0	782.0	2100.0			
GR	782.0	2230.0	782.0	2300.0	782.0	2460.0	792.0	2489.0	792.0	2524.0			
GR	791.0	2556.0	786.0	2570.0	786.0	2615.0	781.0	2630.0	781.0	2858.0			
GR	786.0	2860.0	786.0	3200.0	786.0	3400.0	786.0	3600.0	786.0	3800.0			
GR	786.0	4000.0	786.0	4100.0	800.0	4101.0	800.0	4170.0	786.0	4171.0			
GR	786.0	4300.0	786.0	4370.0	788.0	4407.0	793.0	4521.0	793.0	4550.0			
GR	793.0	4750.0	810.0	4751.0	810.0	4830.0	793.0	4831.0	793.0	4870.0			
GR	794.0	4876.0	794.0	5075.0	794.0	5170.0	824.0	5171.0	827.0	6005.0			
GR	798.0	6006.0	798.0	6044.5	828.0	6045.0	835.0	6268.0	805.0	6270.0			
GR	805.0	6281.0	835.0	6281.0	830.0	6442.0	800.0	6442.0	800.0	6454.0			
GR	830.0	6454.0	826.0	6624.0	796.0	6624.0	796.0	6632.0	826.0	6633.0			
GR	827.0	6781.0	797.0	6781.0	797.0	6796.0	809.0	6860.0	809.0	6869.0			
GR	833.0	6940.0	837.0	6960.0	851.0	6960.0	851.0	7009.0	836.0	7010.0			
GR	833.0	7252.0	831.0	7488.0	0.	0.	0.	0.	0.	0.			
NH	10	.075	530.0	.055	1725.0	.070	2008.0	.045	2139.0	.068			
NH2753.0		.055	2980.0	.045	3020.0	.055	3190.0	.050	4750.0	.065			
NH7789.0		0.	0.	0.	0.	0.	0.	0.	0.	0.			
X1	3.1	72	3008.0	3170.0	3008.0	3008.0	3008.0						

H&H Analysis

BigDarby.dat - Notepad

File Edit Format View Help

T1 MEAD & HUNT FRANKLIN CO. OH FIS

T2 FILENAME: BigDarby.DAT

T3 DATE: 02/25/14

J1	-10.	2.	0.	0.	.000	.00	0.	0.	783.000	.000
J2	1.00	.000	-1.000	.000	.000	.856	.000	.000	.000	.000
J3	38.0	42.0	1.000	2.000	4.000	3.000	13.000	14.000	15.000	43.000
J3	10.0	53.0	54.0	202.0	150.0	696.0	0.0	0.0	0.0	0.0
J3	200									
NC	0.08	0.07	0.045	.10	.30	.000	.000	.000	.000	.000
QT	5.00	58000.0	38000.0	38000.0	30800.0	17800.0	0.0	0.0	.000	.000
NH	9.00	0.08	428.00	0.045	530.0	.080	632.0	.050	1940.0	.060
NH2050.0	0.045	2090.00	0.060	4550.0	0.065	6100.0	.075	6890.0	.000	.000
ET	0.00	.000	.00	5.4	0.0	.00	0.0	0.0	0.0	.000

*
* CROSS SECTION A
*

X1	1.0	65.0	428.0	527.0	0.0	0.0	0.0	.000	.000	.000
GR	853.0	0.0	840.0	167.0	842.0	277.0	771.0	428.0	769.0	436.0
GR	769.0	519.0	771.0	527.0	771.5	530.0	775.0	551.0	772.0	569.0
GR	781.0	600.0	781.0	620.0	781.0	632.0	781.0	800.0	781.0	1000.0
GR	781.0	1200.0	781.0	1400.0	781.0	1600.0	781.0	1800.0	781.0	1940.0
GR	781.0	2000.0	781.0	2050.0	781.0	2090.0	781.0	2200.0	781.0	2400.0
GR	781.0	2730.0	795.0	2731.0	795.0	2820.0	781.0	2820.0	781.0	3100.0
GR	781.0	3290.0	795.0	3291.0	795.0	3340.0	781.0	3341.0	781.0	3500.0
GR	781.0	3710.0	786.0	3761.0	786.0	3830.0	786.0	3860.0	786.0	4100.0
GR	786.0	4300.0	786.0	4410.0	790.0	4493.0	790.4	4550.0	791.0	4622.0
GR	792.0	4849.0	793.0	4916.0	793.0	4925.0	793.0	4950.0	823.0	4951.0
GR	820.0	5450.0	793.0	5451.0	793.0	5470.0	820.0	5471.0	815.0	5950.0
GR	793.0	5951.0	793.0	6100.0	793.0	6210.0	794.0	6218.0	794.0	6348.0
GR	793.0	6546.0	794.0	6721.0	793.0	6730.0	793.0	6885.0	794.0	6890.0
NH	13.0	0.080	330.0	.050	1372.0	.060	1435.0	.045	1470.0	.050
NH1495.0	.045	1607.0	.080	1750.0	.050	2230.0	.075	2489.0	.055	.055
NH2630.0	.055	2860.0	.050	4300.0	.065	7488.0	0.0	0.0	0.0	0.0

*
* CROSS SECTION
*

X1	2.0	92.0	1435.0	1605.0	1584.0	1584.0	1584.0			
GR	857.0	0.	842.0	38.0	843.0	46.0	843.0	60.0	844.0	76.0
GR	846.0	103.0	816.0	204.0	788.6	330.0	784.0	351.0	782.0	554.0
GR	781.0	861.0	779.0	1265.0	779.0	1372.0	779.0	1382.0	779.0	1406.0
GR	772.0	1435.0	770.0	1443.0	770.0	1459.0	772.0	1467.0	772.2	1470.0

H&H Analysis

```
BigDarby.out - Notepad
File Edit Format View Help
1 *****
* WATER SURFACE PROFILES *
* VERSION OF SEPTEMBER 1988 *
* ERROR: 01 *
* UPDATED: 16 FEBRUARY 1989 *
* RUN DATE 2/25/14 TIME 18:33:48 *
*****

* U.S. ARMY CORPS OF ENGINEERS *
* THE HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET, SUITE D *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*****

      X  X  XXXXXX  XXXX      XXXX
      X  X  X      X  X      X
      X  X  X      X  X      X
      XXXXXX  XXXX  X      XXXX
      X  X  X      X  X      X
      X  X  X      X  X      X
      X  X  XXXXXX  XXXX      XXXXXX

END OF BANNER
1 2/25/14 18:33:48 PAGE 1

THIS RUN EXECUTED 2/25/14 18:33:48

*****
HEC2 RELEASE DATED SEPT 88
*****

T1 MEAD & HUNT FRANKLIN CO. OH FIS
T2 FILENAME: BigDarby.DAT
T3 DATE: 02/25/14

J1 ICHECK INQ NINV IDIR STRT METRIC HVINS Q WSEL FQ
-10. 2. 0. 0. .000 .00 .0 0. 783.000 .000

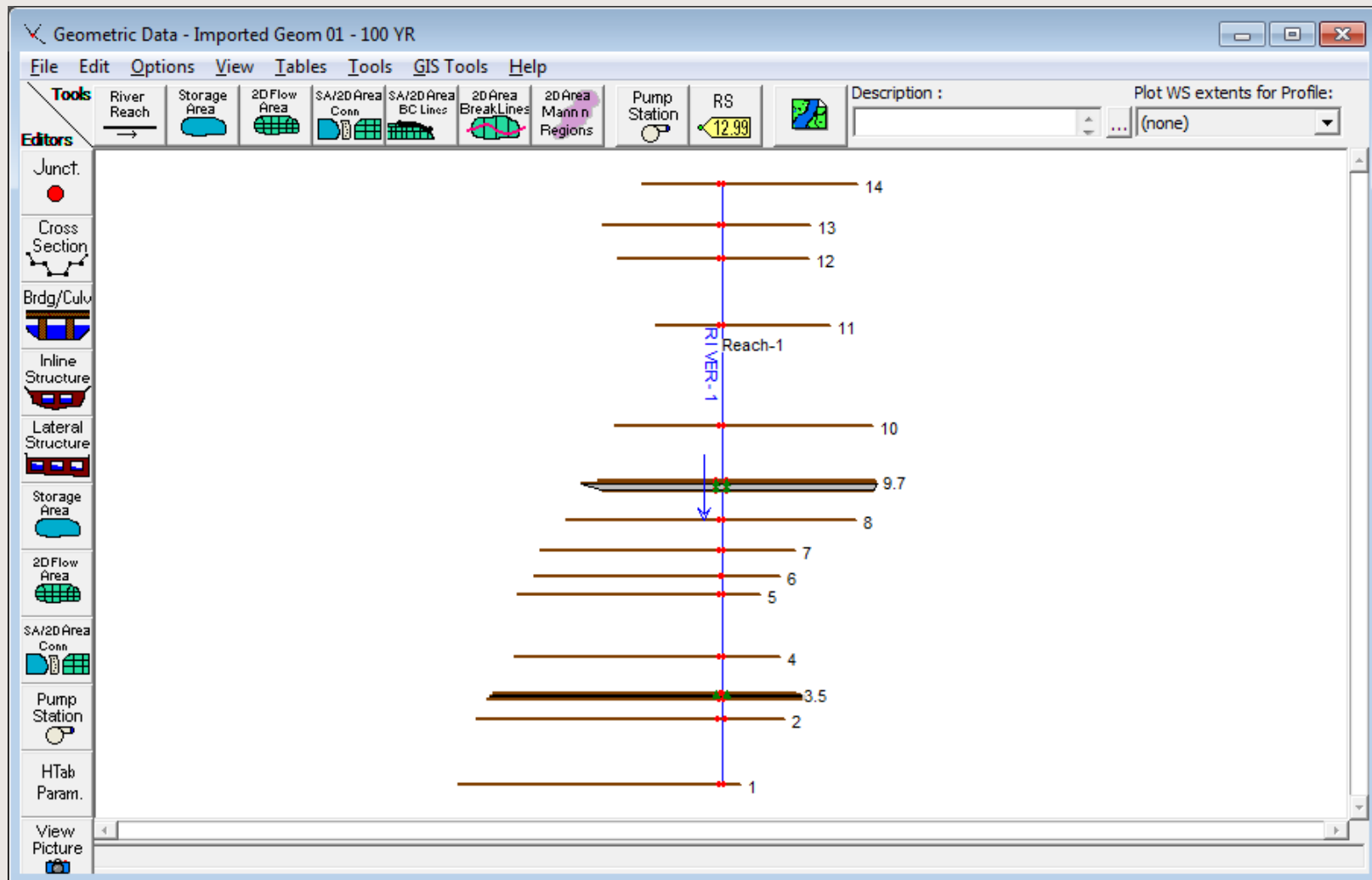
J2 NPROF IPLOT PRFVS XSECV XSECH FN ALLDC IBW CHNIM ITRACE
1.00 .000 -1.000 .000 .000 .856 .000 .000 .000 .000
```

H&H Analysis

■ Common HEC-2 Errors

- First challenge is getting the HEC-2 to run
- Filename must be 8 characters or less
- All fields must be filled out and right justified
- Comments must be made using an *
- After getting it to run, match the model output to the published FIS data table
- There were several versions of HEC-2
 - 1971
 - 1976
 - 1988
 - 1991
 - 1995 – Windows version named HEC-RAS

H&H Analysis



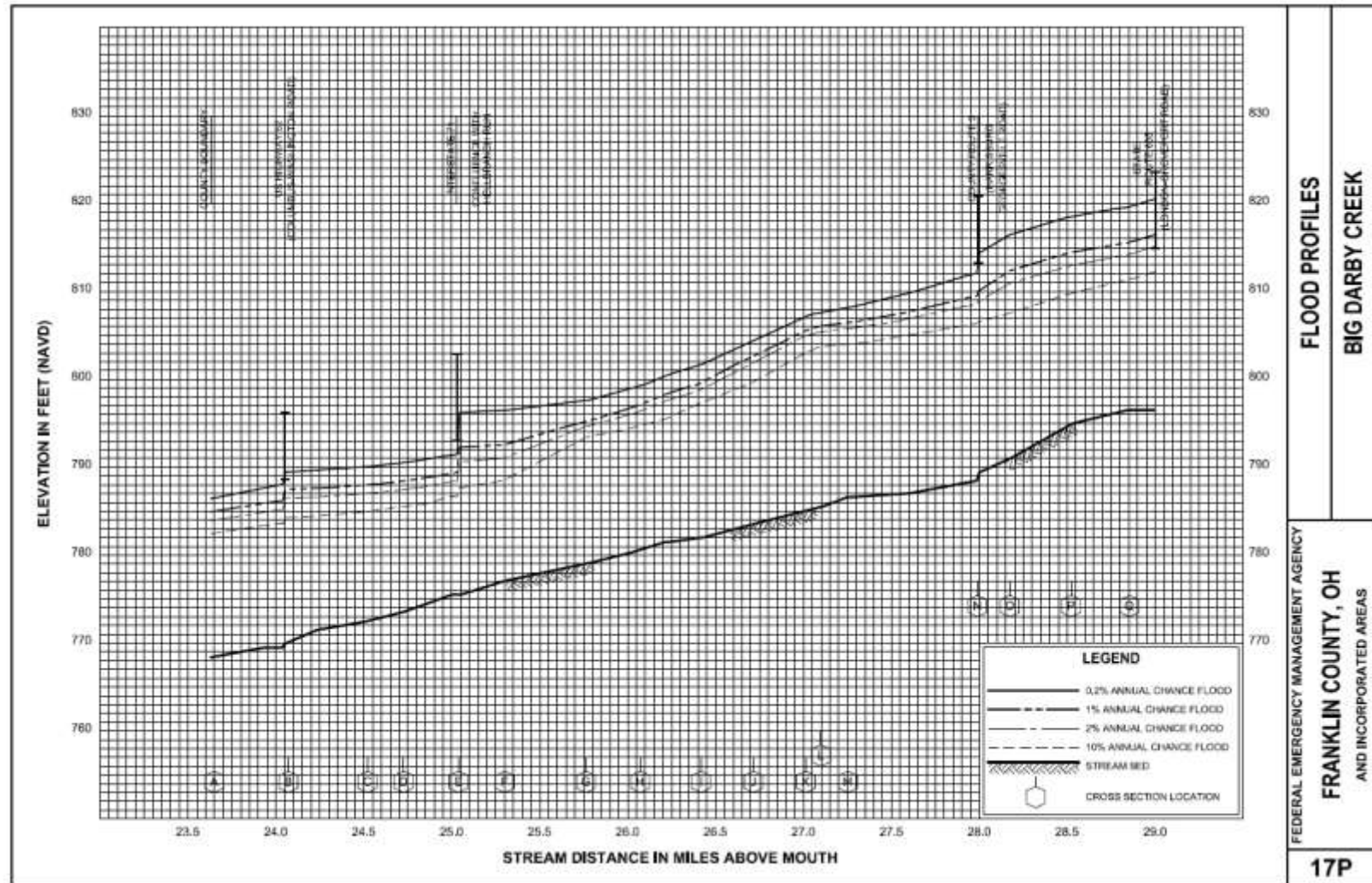
H&H Analysis

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
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)
Big Darby Creek									
A	23.644	2,700		14,687	2.6	784.9	784.9	785.4	0.5
B	24.065	3,541		28,674	1.3	787.4	787.4	787.9	0.5
C	24.522	2,985		18,048	2.1	787.9	787.9	788.4	0.5
D	24.727	2,670		16,581	2.3	788.3	788.3	788.8	0.5
E	25.044	2,847		21,707	1.8	792.1	792.1	792.3	0.2
F	25.298	3,555		16,588	1.1	792.4	792.4	792.6	0.2
G	25.765	1,889		10,229	3.5	794.9	794.9	795.4	0.5
H	26.073	1,288		8,024	4.5	797.0	797.0	797.5	0.5
I	26.415	1,708		9,365	3.9	799.4	799.4	799.9	0.5
J	26.712	2,192		7,850	4.6	802.3	802.3	802.8	0.5
K	27.008	2,146		11,141	3.2	805.3	805.3	805.7	0.4
M	27.104	2,795		15,013	2.4	805.9	805.9	806.3	0.4
N	27.253	2,322		12,705	2.8	806.2	806.2	806.6	0.4
O	27.997	365		4,183	8.5	809.7	809.7	810.1	0.4
P	28.173	564		6,376	5.6	812.3	812.3	812.8	0.5
Q	28.534	1,240		11,906	3.0	814.3	814.3	814.7	0.4
R	29.012	393		4,731	7.5	816.2	816.2	816.4	0.2
S	29.310	1,466		11,152	3.2	818.8	818.8	819.0	0.2
T	29.791	1,862		13,461	2.6	820.9	820.9	821.2	0.3
U	30.089	1,525		12,877	2.8	821.8	821.8	822.2	0.4
V	30.398	827		4,569	7.8	822.6	822.6	822.8	0.2
W	30.688	957		8,254	4.3	826.8	826.8	827.3	0.5
X	30.995	1,299		13,643	2.6	828.2	828.2	828.7	0.5
Y	31.180	984		11,152	3.2	828.7	828.7	829.2	0.5
Z	31.487	679		7,543	4.7	829.5	829.5	830.0	0.5

¹Miles above mouth

Table 9	FEDERAL EMERGENCY MANAGEMENT AGENCY FRANKLIN COUNTY, OHIO AND INCORPORATED AREAS	FLOODWAY DATA
		Big Darby Creek

H&H Analysis



Flood Hazard Evaluation

Section	FEMA Lettered Section	FEMA FIS NAVD88 Datum	FEMA FIS NGVD29 Datum	Duplicate Effective HEC-2 NGVD29 Datum	Duplicate Effective HEC-RAS NGVD29 Datum	Corrected Effective HEC-RAS NAVD88 Datum	Existing Conditions HEC-RAS NAVD88 Datum	Proposed Two Span 307' Face to Face	Difference*
1	A	784.9	785.5	785.50	785.50	784.90	784.90	784.90	0.00
2	-			786.41	786.42	785.82	785.82	785.82	0.00
3.1	-			786.64	786.66	786.06	786.06	786.06	0.00
3.2	-			786.64	786.63	786.03	786.03	786.03	0.00
Bridge over Harrisburg Road									
3.4	-			787.81	788.28	787.87	787.87	787.87	0.00
3.5	B	787.4	788.0	787.83	788.28	787.87	787.87	787.87	0.00
4	-			787.95	788.38	787.96	787.96	787.96	0.00
5	C	787.9	788.5	788.34	788.71	788.26	788.26	788.26	0.00
6	-			788.52	788.87	788.41	788.41	788.41	0.00
7	D	788.3	788.9	788.82	789.13	788.65	788.65	788.65	0.00
8	-			789.19	789.45	788.94	788.94	788.94	0.00
9.1	-			789.71	789.89	789.94	790.02	790.01	-0.01
9.2	-			789.24	789.44				
Bridge over Big Darby Creek									
9.6	-			789.78	789.87				0.00
9.7	E	792.1	792.7	792.71	792.75	792.31	791.22	791.04	-0.18
10	F	792.4	793.0	793.02	793.07	794.06	793.60	793.55	-0.05
11	G	794.9	795.5	795.54	795.67	795.51	795.38	795.37	-0.01
12	H	797.0	797.6	797.55	797.64	797.10	797.08	797.07	-0.01
13	-			798.78	798.88	798.31	798.30	798.30	0.00
14	I	799.4	800.0	800.03	800.10	799.51	799.50	799.50	0.00

* Difference = Proposed Conditions - Existing Conditions

Floodplain Coordination



Hydrology and Hydraulics (H&H) Report

[Stage One]



ODOT District 6
FRA-71-0.00
PID No. 93496
FRA-071-0153L/R
Over Big Darby Creek
Franklin County, Ohio

H&H Report prepared by



4700 Lakehurst Court
Suite 110
Columbus, OH 43016

www.meadhunt.com

Floodplain Coordination

Form LD-50
Revised January 2015

No-Rise Certification

This is to certify that I am a qualified licensed professional engineer in the State of Ohio. It is to further certify that the attached analysis supports the fact that the proposed Roadway project:

FRA-71-0.00, PID No. 93496 in the floodway will not increase the
(Name of Project)

Base Flood Elevation (100-year flood), floodway elevation, or floodway widths on

Big Darby Creek at published sections in the Flood Insurance
(Name of Stream)

Study for Franklin County, Ohio and Incorporated Areas, dated June 16, 2011
(Name of Community)

and will not increase the Base Flood Elevations (100-year flood), floodway elevations, or floodway widths at unpublished cross-sections in the vicinity of the proposed roadway project.

Engineer's Name: James A. Bumgarner, Jr.

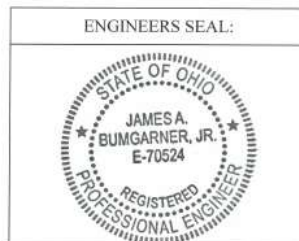
Signature: *James A. Bumgarner, Jr.* Date: February 20, 2015

Phone Number: 681-313-4608 E-MAIL: jamie.bumgarner@meadhunt.com

Agency/Firm: ODOT/Mead & Hunt

Address: 4700 Lakehurst Court, Suite 110

City: Columbus State: Ohio Zip Code: 43016



Environmental Clearance for New Bridge over Big Darby Creek

2017 CEAO Storm Water and Drainage Conference
March 7, 2017

Presented by:



Chantil Milam
Lawhon & Associates, Inc.
1441 King Avenue
Columbus, Ohio 43212
614.481.8600

Project Background

Project Development:

- ✓ **2013** – Started Environmental Studies and Completed Feasibility Study
- ✓ **2014**- Structure Type Study Completed, Preliminary Design
- ✓ **2015**- Preliminary Design Complete, Environmental Technical Studies Complete, Biological Assessment (BA) Prepared
- ✓ **2016**- Detailed Design Complete, Biological Opinion (BO) Issued by USFWS
- ✓ **2017**- Final Design, Environmental Document Approval, Waterway Permitting, Mussel Survey
- ✓ **2018**- Begin Construction



Alternatives for I-71

Interstate 71

Alternative 1: Two lanes in each direction south of US-62 interchange and three lanes north of US-62 using the two lane bridge over Big Darby Creek.

Alternative 2: Two lanes in each direction south of US-62 interchange and three lanes north of US-62 widening to a three lane bridge over Big Darby Creek.

Alternative 3: Widening to three lanes in each direction throughout the entire project length, which would include widening to a three lane bridge over Big Darby Creek.

***Alternative 3 was chosen as the Preferred Alternative for the project. This alternative was the only alternative that fully meets the project's goals.**



Alternatives for Big Darby Bridges

Big Darby Creek Bridges

Bridge Alternative 1:

- Single span bridge
- No piers
- Would require I-71 to be raised up by 6 feet and Harrisburg-Georgesville Road to be raised up by 4 feet.

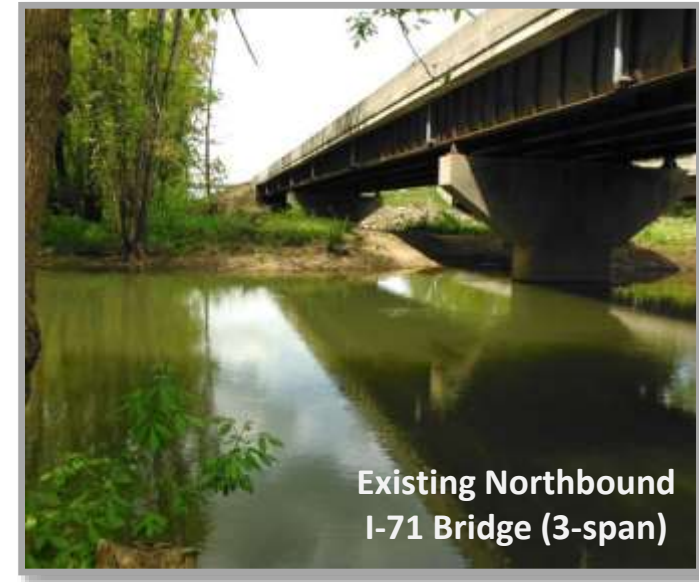
Bridge Alternative 2:

- 2- span bridge
- New piers to be located on the island. No piers in the stream channel.

Bridge Alternative 3:

- 3- span bridge
- New piers would be located within the stream channel (similar to existing conditions).

*** Bridge Alternative 2 was chosen as the Preferred Alternative for the project.**



Existing Northbound
I-71 Bridge (3-span)

Ecological Process- Step 1

Level 2 Ecological Survey

- ✓ Alternatives presented in report
- ✓ 10 wetlands and 16 streams identified
- ✓ High Quality ecological resource (Big Darby Creek)
- ✓ Section 7(a) Supplemental Package required and included within ESR
 - Detailed discussion about project BMPs was needed as a part of the package.



Ecological Process- Step 2

Initiate Agency Coordination

- ✓ Coordination with multiple agencies including: ODOT, NPS, ODNR, USFWS, Columbus Metro Parks, Ohio EPA, USACE



Ecological Process- Step 3

1. Agency Coordination Responses

- 12 pages of comments received

2. Preparation of Biological Assessment (BA)

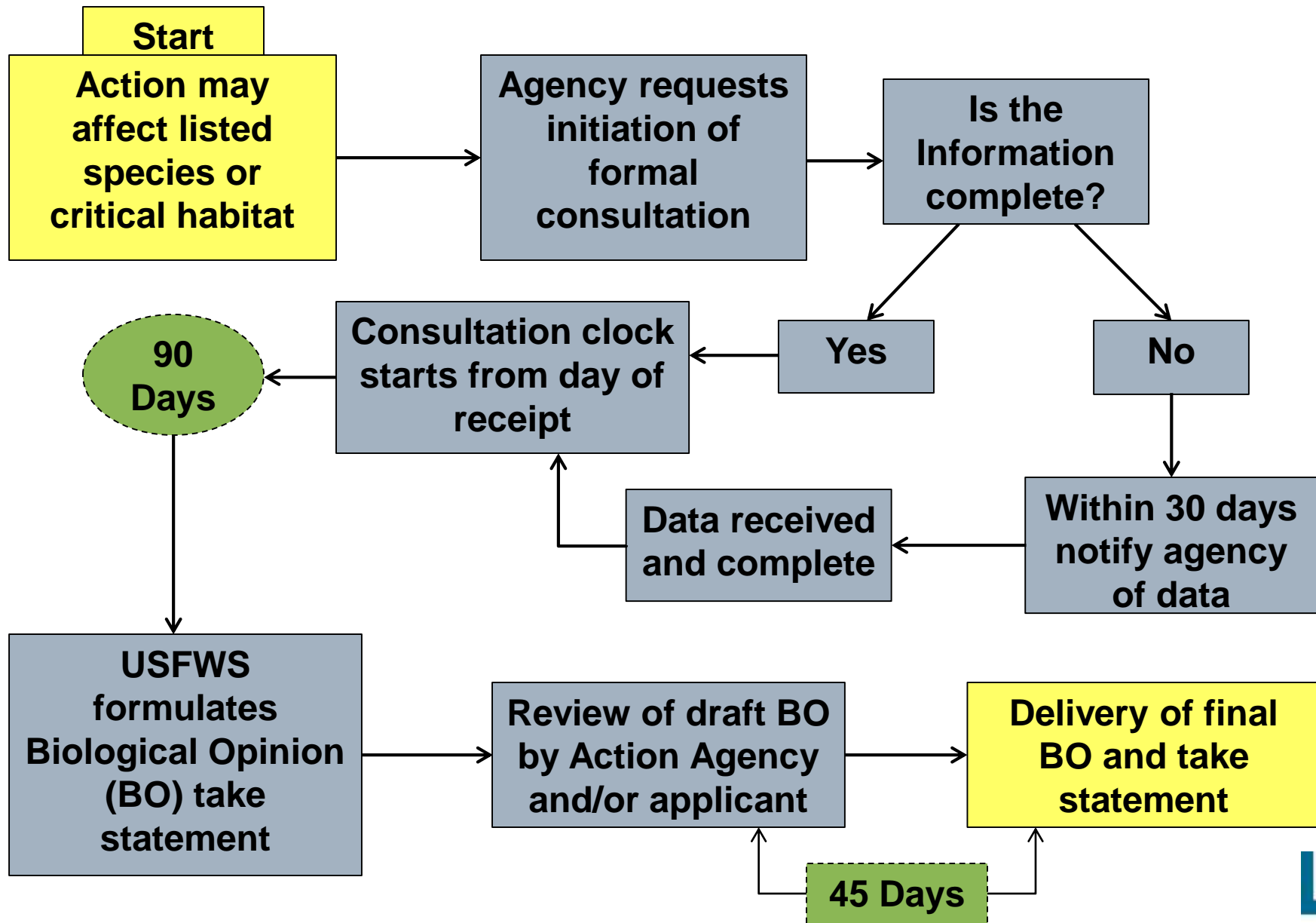
- Section 7 Endangered Species Act
- Required because of potential impacts to Federally Listed mussel species

3. Development of Environmental Commitments

- What can the project team commit to?
 - Lots of separate meetings with project team
 - Lead to detailed discussions about project construction phasing
- To date 43 Ecological Environmental Commitments have been developed



BA & BO Process



Ecological Process- Step 4

- **Biological Opinion (BO) is received**
 - March 2016
 - More environmental commitments!

- **Draft and Finalize Environmental Commitments**
 - Some of these will be plan notes

- **Waterway Permitting**
 - Individual 404/401 and Isolated Wetland Permits needed
 - Section 7(a) will be finalized with issuance of permit from USACE
 - Permitting will take approximately 9-12 months



Ecological Process- Step 5

And We're Almost There....

- **NEPA Document Approval**
 - Spring 2017
- **Mussel Survey and Relocation**
 - Summer 2017
- **Environmental Commitments Monitoring**
 - This process will be initiated during construction



Questions and Contact Information

Questions?



Jamie Bumgarner, PE

Mead & Hunt

Department Manager, Vice President

jamie.bumgarner@meadhunt.com

Chantil Milam

Lawhon & Associates, Inc.

Sr. Environmental Scientist, Project Manager

cmilam@lawhon-assoc.com