OHIO DEPARTMENT OF TRANSPORTATION

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ODOT's Tait Station Dam Removal: Leveraging Public Partnerships with Watershed Management Goals

May 10, 2019

Ohio Stormwater Conference
Sharonville Convention Center
Session F1C, Room: 103
Sharonville, Ohio

Presentation Outline

OUTLINE

- ✓ Project Background
- ✓ Project Need
- ✓ Goals and Objectives
- ✓ Project Partnership
- ✓ Project Funding and Mitigation
- ✓ Design and Permitting
- ✓ Construction
- ✓ Monitoring and Performance Evaluation

Why ODOT Involvement

- ODOT stream mitigation need in the Lower Great Miami Watershed
- Tait Station Dam identified as a candidate for removal
- Cost-benefit analysis showed dam removal costs cheaper than in-lieu fee by >$500,000.00
- ODOT's full delivery mitigation task order utilized

Project Background

Why Tait Station Dam needs to be removed?

- Barrier to aquatic life and recreational boating
- Maintenance liability for Miami Conservancy District (MCD)
- Significant large woody debris disposal and costs
- Public health & safety hazard
- Watershed Action Plan Impairment

Project Background

- Tait Station c. 1935 (Dayton Power and Light)
- Dam was constructed to provide cooling water intake source to support power plant production
- Power plant decommissioned in 1983
- Ownership of dam transferred to Miami Conservancy District in 1990
    - MCD's "*Mistake by the Intake*"
- Planning and grant applications to remove the dam started in 2014 (MCD)
- Dam no longer provides any beneficial public use.
- Dam does NOT provide any flood control purpose

Project Purpose and Need

- ODOT has stream mitigation need in this watershed (2,678 LF for the BUT-73/177 Improvement Project)
- Tait Station Dam has become a barrier to aquatic and recreational uses of the GMR
- Aquatic and recreations impairments have been noted by numerous public agencies (Ohio EPA, 1995 and 2010)
- Maintenance liability to Miami Conservancy District (MCD, 2015)
- Large Woody Debris disposal and costs have increased
- Public Health and Safety Hazard
    - Recent fatalities on similar low head dams in Hamilton and Miamisburg. *Note*: *These are also in process of being removed*

Project Goals and Objectives

Project Goal:

- To remove the Tait Station Dam and its associated infrastructure such that ecological lift is fully and functionally returned to the GMR within the area of the river channel (formerly) pooled under the influence of the Tait Station Dam.

Project Objectives:

- Demonstrate that the Project will provide over >2,678 LF of stream mitigation credits to satisfy ODOT's current mitigation need in the Lower GMR Watershed
- Meet or exceed Ohio EPA's use attainment status (WWH) for the GMR within the Project limits
- Improve water quality by reestablishment of riffle/pool complexes within Project limits
- Improve river ecology by rehabilitation of aquatic habitat for macroinvertebrates, fish, and unionid mussel species
- Restore habitat features and riparian buffers, to the degree practicable, by reestablishment of floodplain connectivity and/or adjacent wetlands

Project Goals and Objectives

Project Objectives (Continued):

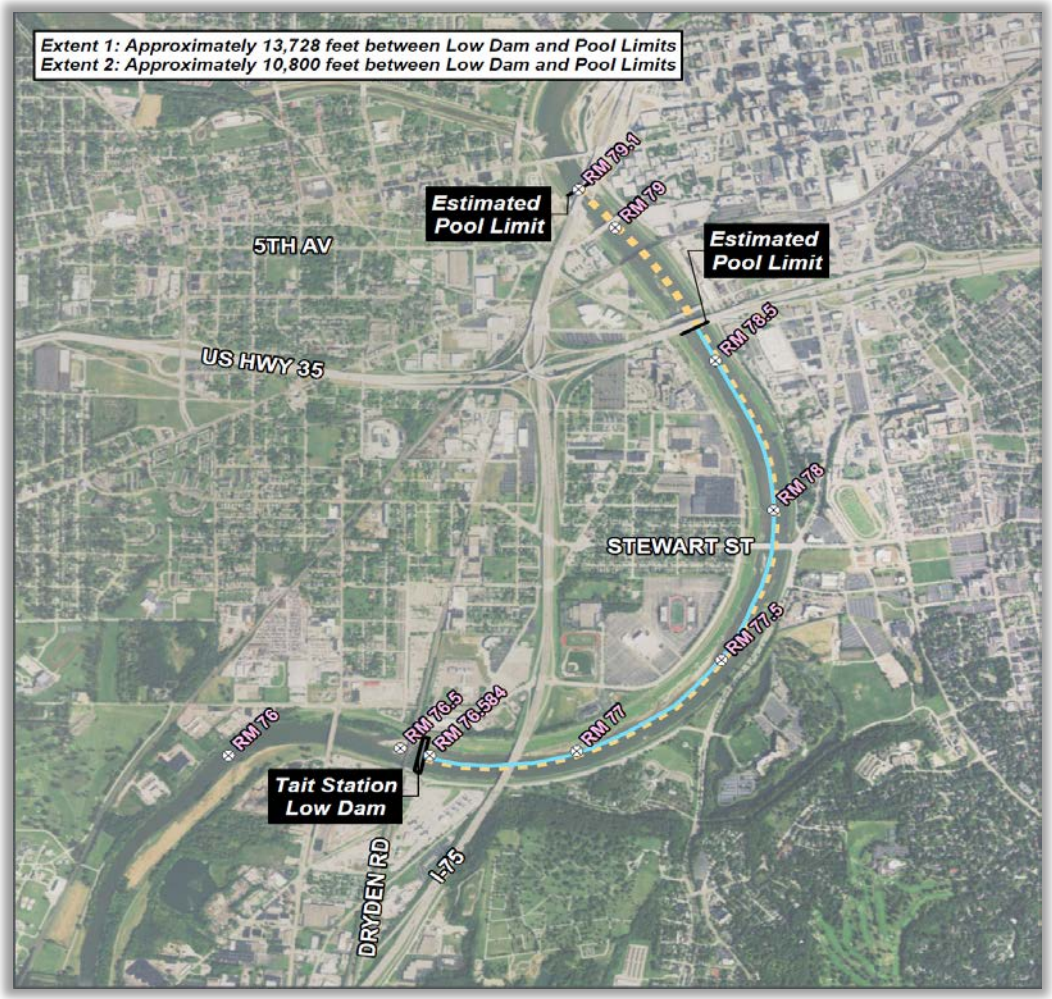
- Provide education and outreach opportunities for stakeholders to improve public awareness regarding the value of the GMR and its aquatic resources
- Obviate maintenance needs for Project stakeholders, namely MCD
- Eliminate a clear and present threat to public safety for those who enjoy recreational use of the GMR.
- Protect existing transportation infrastructure and other known utilities near Tait Station Dam

Project Partnership –

No one can do it alone!

- **ODOT** – Project Funding, Design, Permitting, Engineering and Construction
- **MCD** – Technical Support, Background Data, Site Access, Funding and Resolutions
- **City of Dayton, Department of Water** – Utility Coordination, Utility Relocation
- **DP&L** – Utility Coordination, Site Access, Transmission Tower Access for webcam
- **University of Dayton** - Monitoring

Potential Mitigation Credits



Project Update (September 2018)

- Design Complete (Nov 2017)
- All Permits Received (Dec 2017)
- 9,471 Stream Mitigation Credits received (Jan 2018)
  - **ILF Market Value of $2.46M**
    - **$260 / LF (Credit)**
  - **PRM Total Project Cost is ~$1.75M**
    - **$185 / LF (Credit)**
- Pooled Mitigation – Extra Credits > $500K for State of Ohio
- Construction / Restoration (July 2018) **IN PROGESS**

Table 1 – Revised Estimated Stream Mitigation Credits

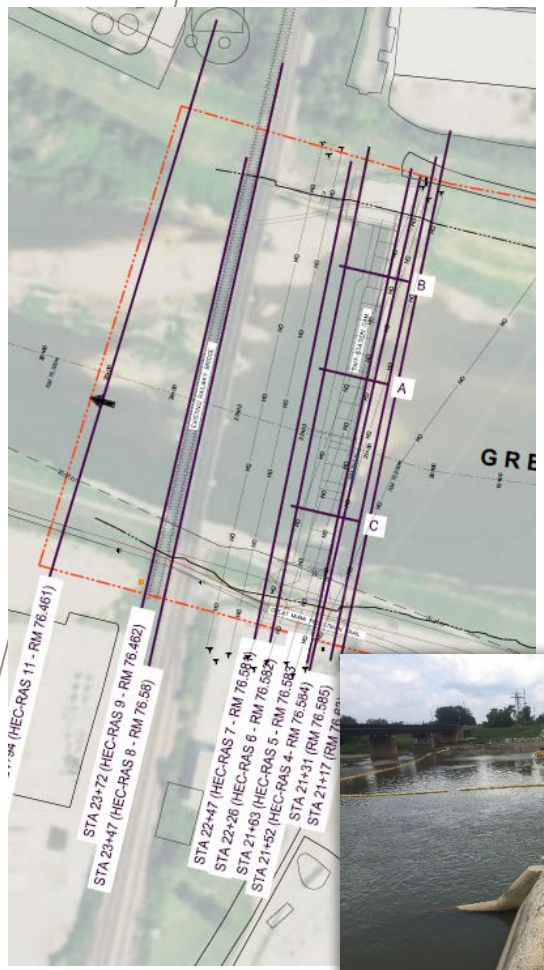
Mitigation Project (Credits)	Ohio EPA RM (Start / Stop)	Credit Unit (LF)	Credit Ratio	Credits
Type 1, Activity Level 2 (active work zone)	(77.45 - 77.75)	1,584	1.50 : 1	2,376
Type 1, Activity Level 4 (pool reduction only)	(77.75 - 79.50)	9,460	0.75 : 1	7,095
TOTAL				**9,471**

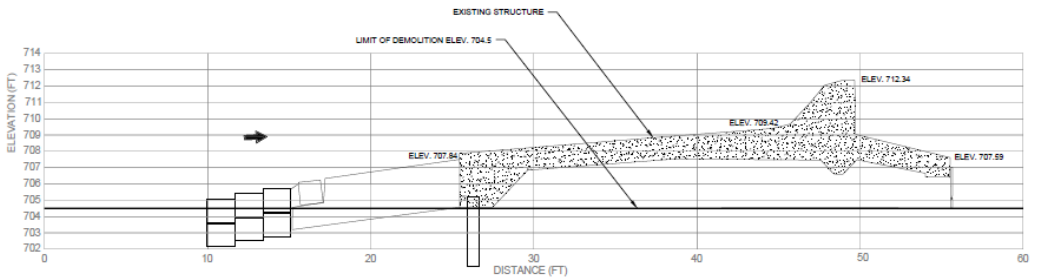
Permitting and NEPA Compliance

- **Ecological and Waterway Permitting**
  - Corps – Section 404 Permit (Dec 2017)
  - USFWS – Section 7 Coordination (March 2017)
  - OHPO – Section 106 Coordination (Jan 2016)
  - NEPA C-1 Categorical Exclusion (July 2017)
  - Floodplain Coordination (March 2017)
  - Ohio EPA - Contaminated Sediments (Feb 2017)
  - Ohio EPA NPDES CGP (May 2018)

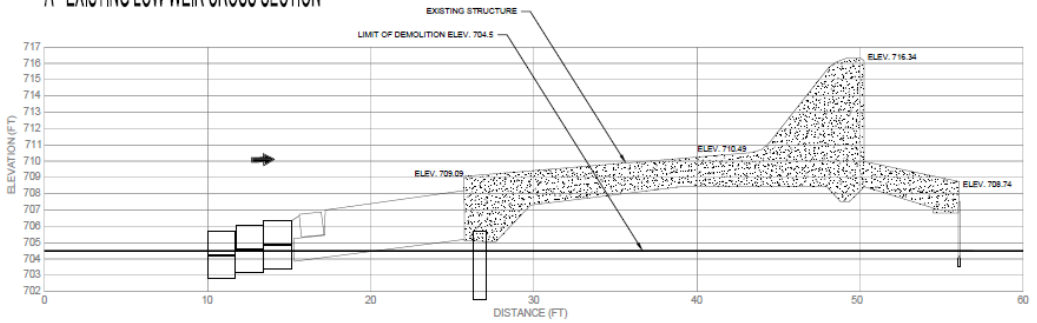
Modeling and Design

Modeling and Design

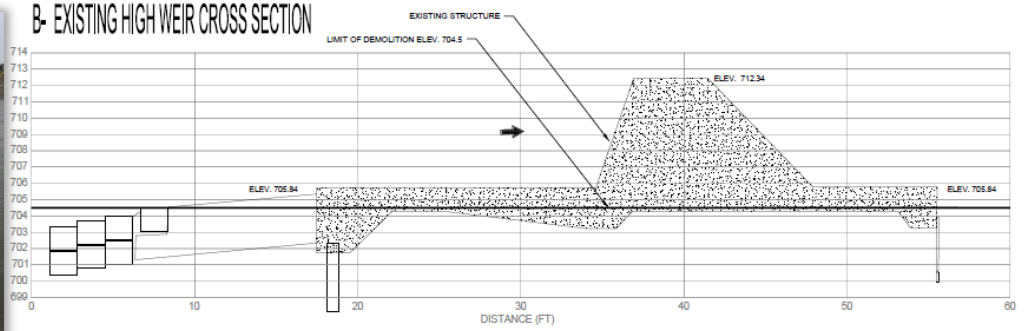




A- EXISTING LOW WEIR CROSS SECTION

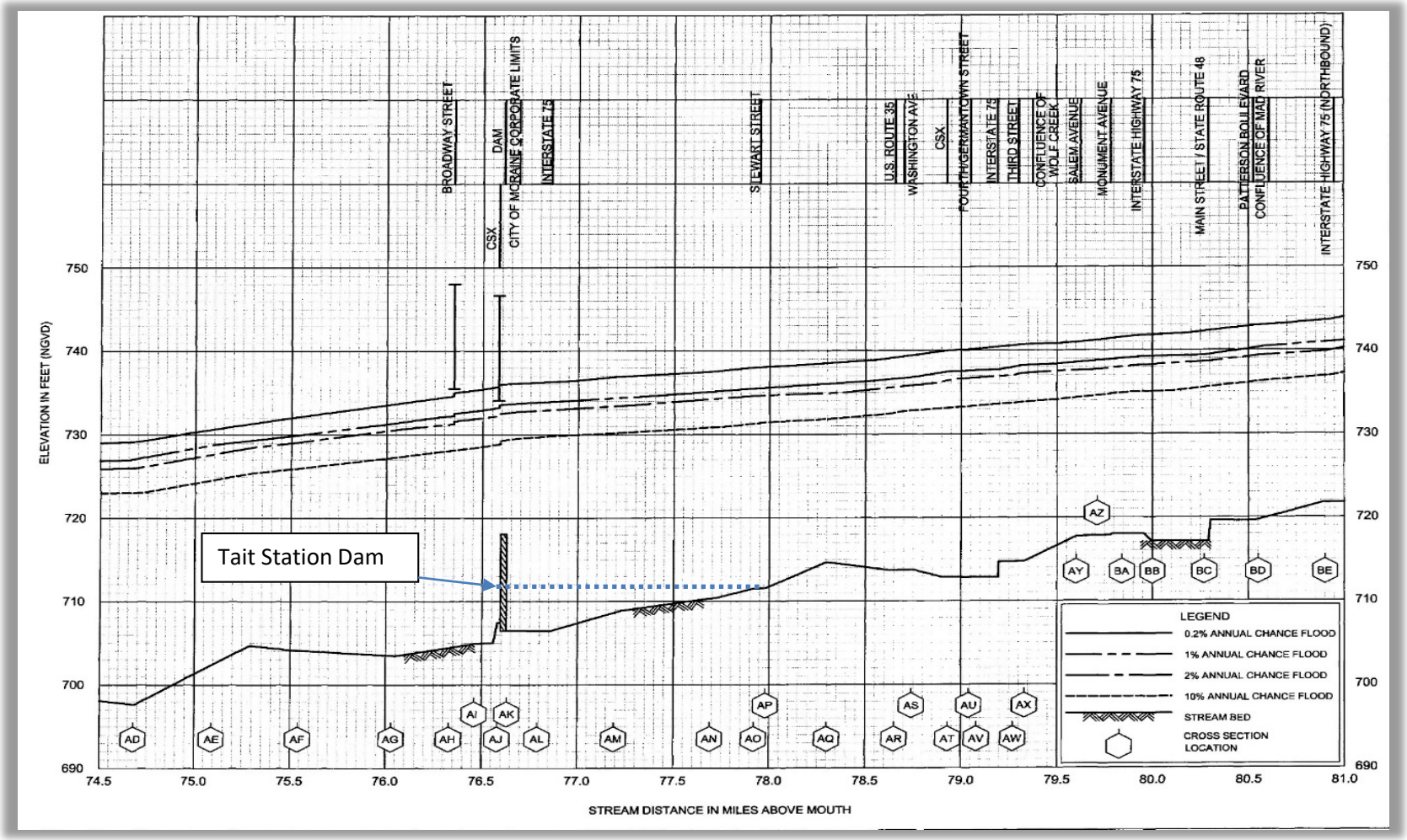


B- EXISTING HIGH WEIR CROSS SECTION



C- EXISTING BUTTRESS / STOP LOG CROSS SECTION

Modeling and Design



Great Miami River Discharges

Table 1: Discharges used within the Tait Station project model (HEC-RAS) and their sources (*=matches FIS).

	Discharges (cfs)		
Recurrence Interval	Conceptual[1] (2014)	Map Modernization[2] (2015)	USGS Gage 03270500
Annual Mean			2680
Inner berm flow			9,000
1.5 year (bankfull)			22,000
2 year	33,000		
5 year	46,500		
10 year	56,000*	56,000*	
1959 Flood		62,000	
25 year	67,000	64,250	
50 year	78000*	78000*	
100 year	86000*	86000*	
500 year		107,000*	
OPF	120,000	120,000	

[1]Burgress and Niple
[2]Stantec

Modeling and Design

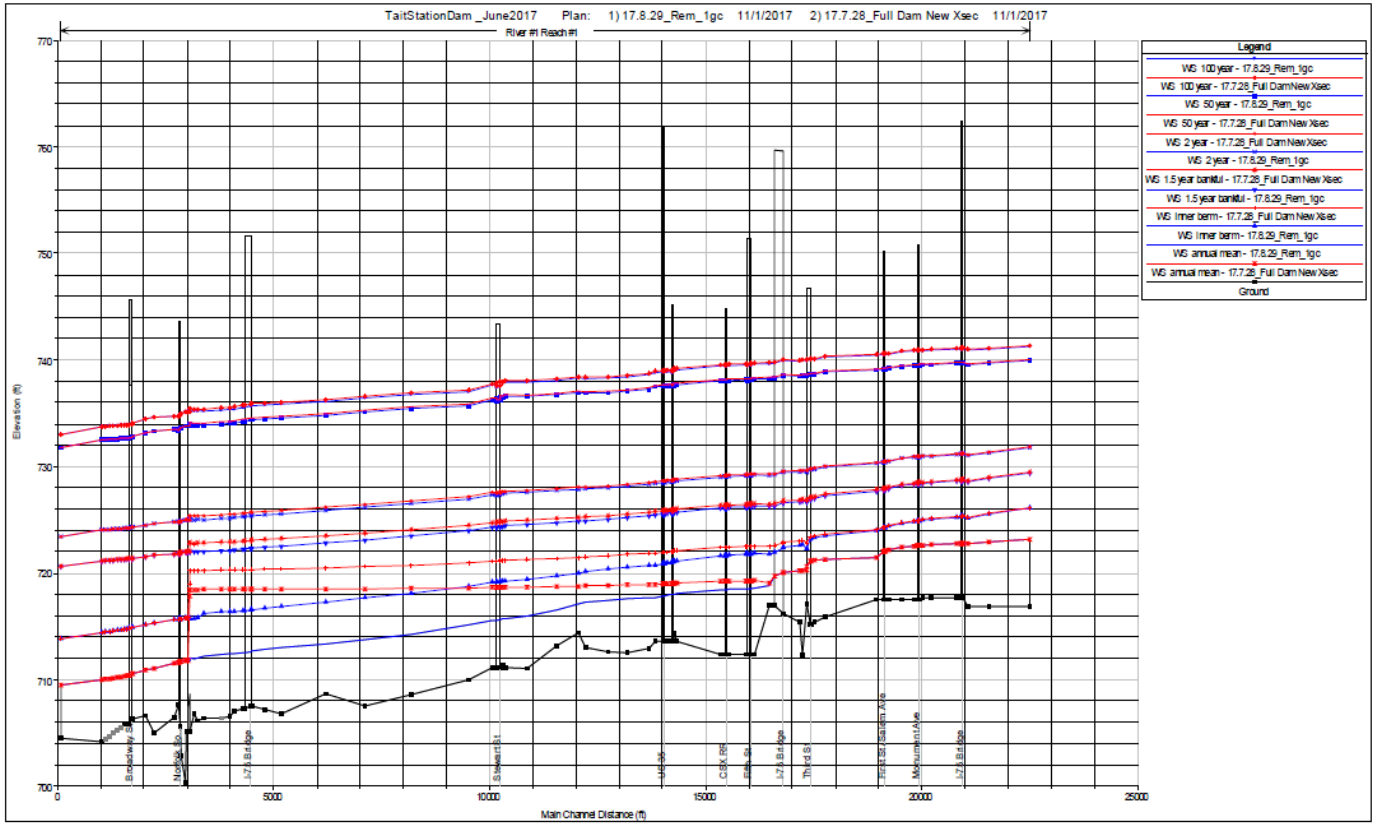


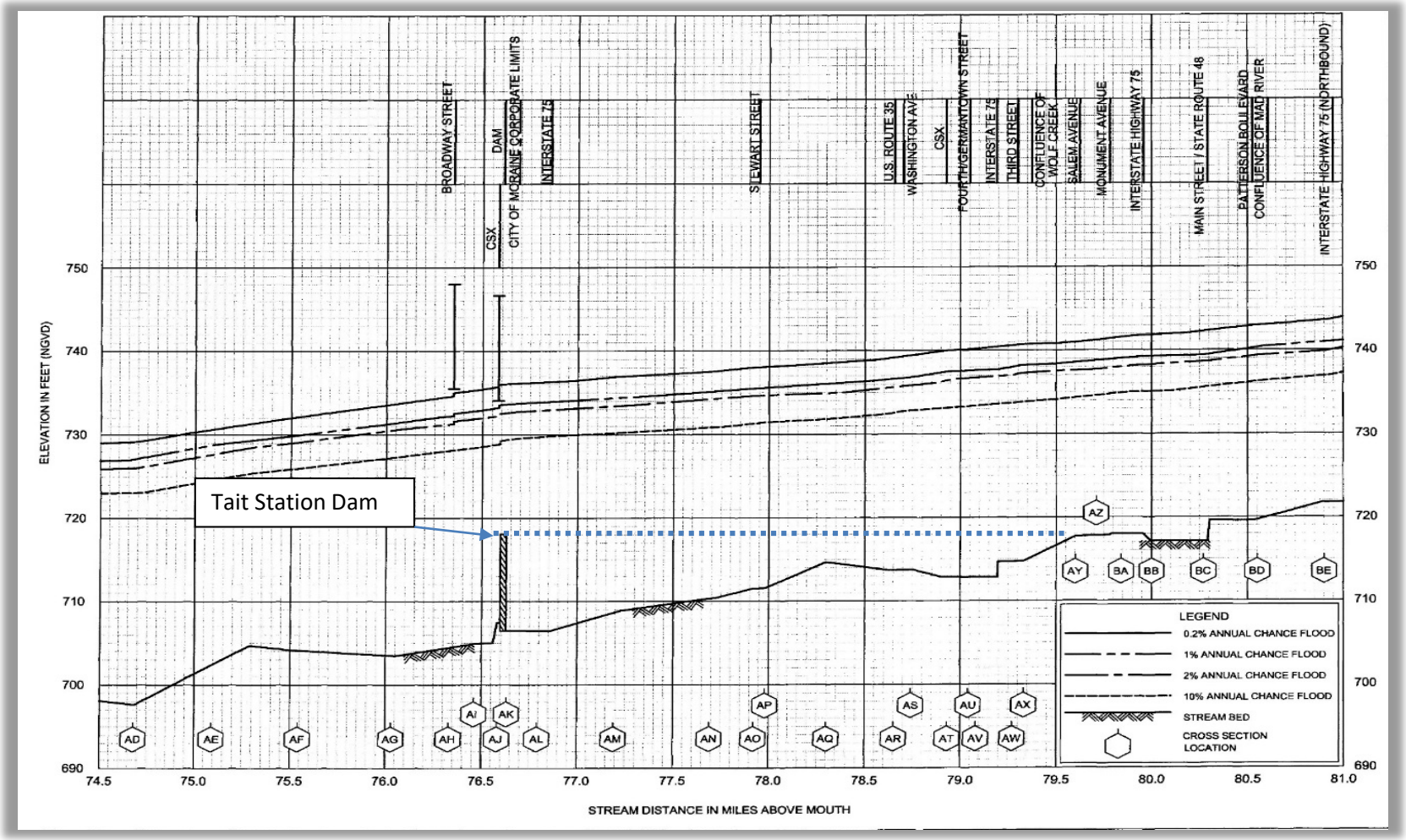
Figure 2. HEC-RAS profile showing select water surface profiles for the Full Dam and the Dam Removed with Grade Control. Results show that the dam pool extends upstream to near the Third Street Bridge.

HEC-RAS Model

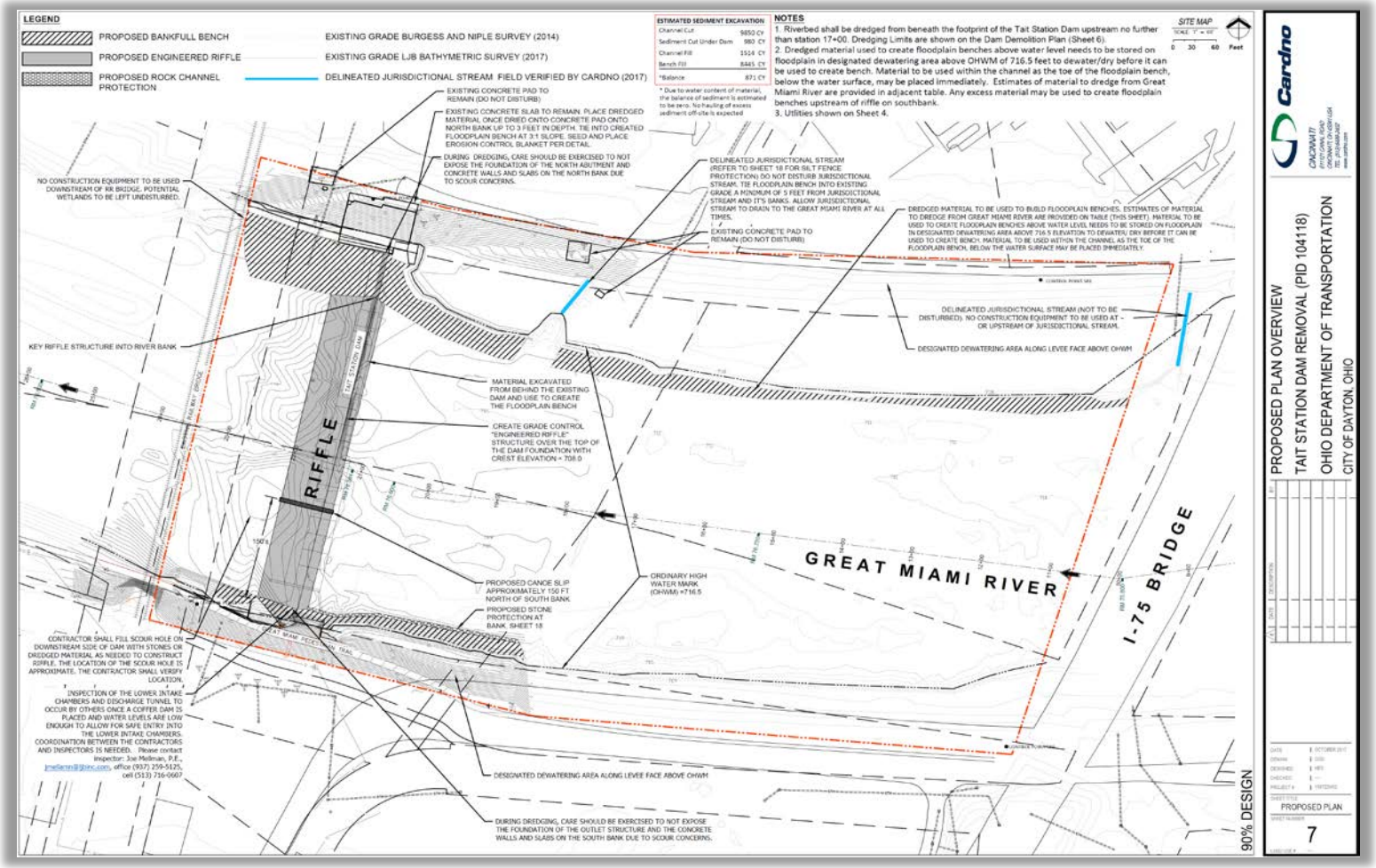
Combination of:

- Existing models (FEMA HEC-2),
- Additional field surveys
- Calibrated with 20 additional cross sections and a longitudinal profile

Modeling and Design

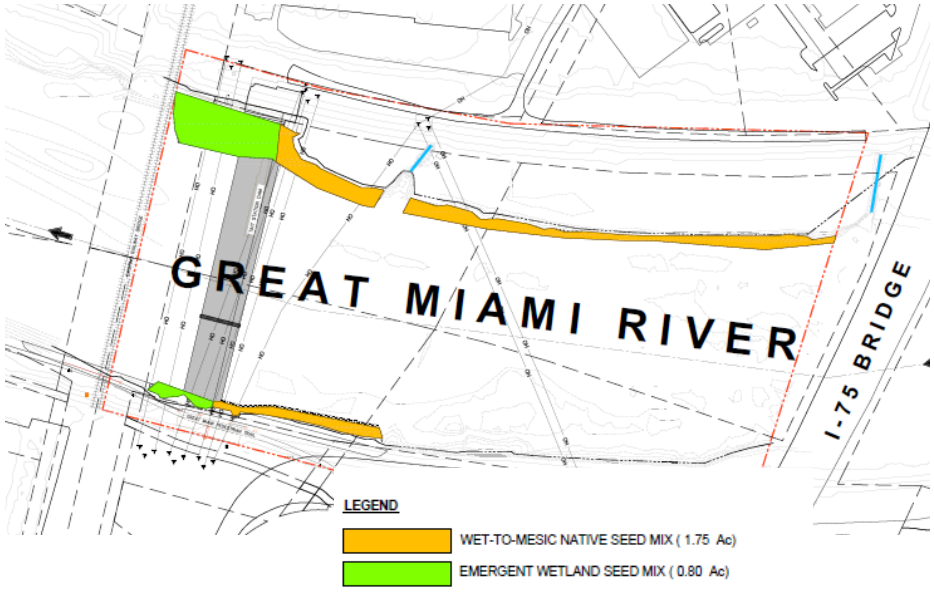


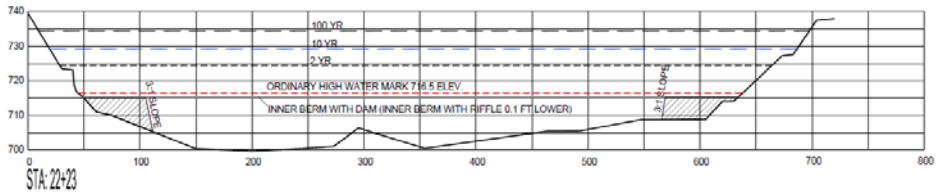
Modeling and Design



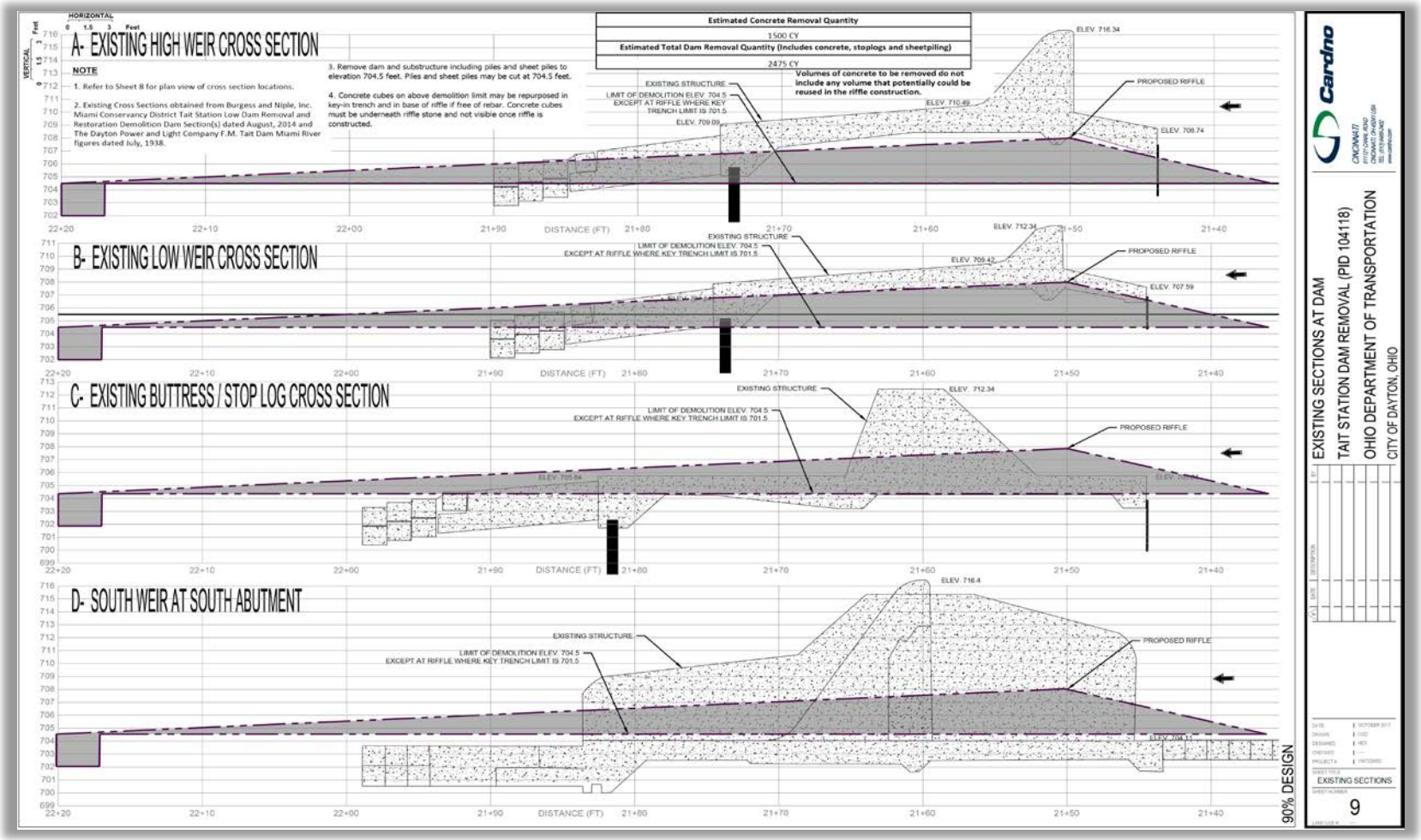
Modeling and Design

- Creating floodplain benches with stone toe protection





Modeling and Design



Modeling and Design

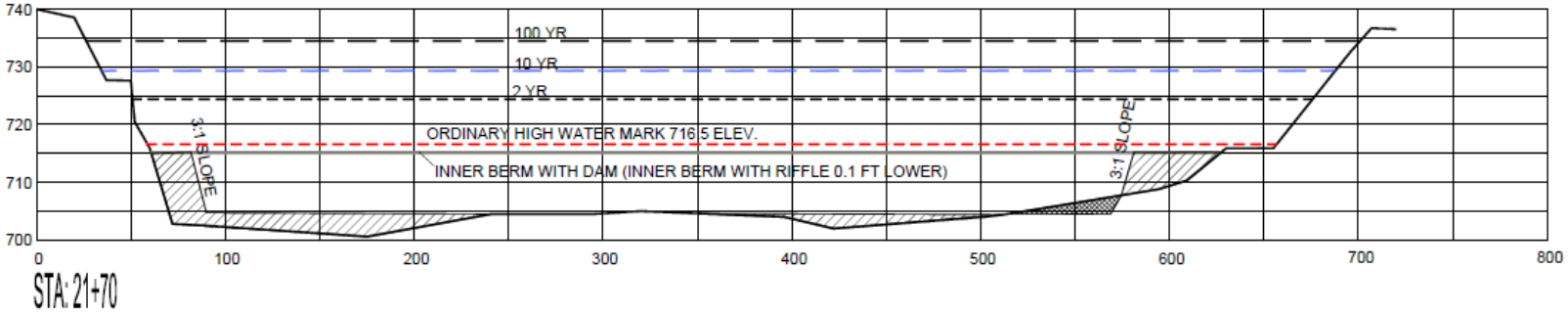
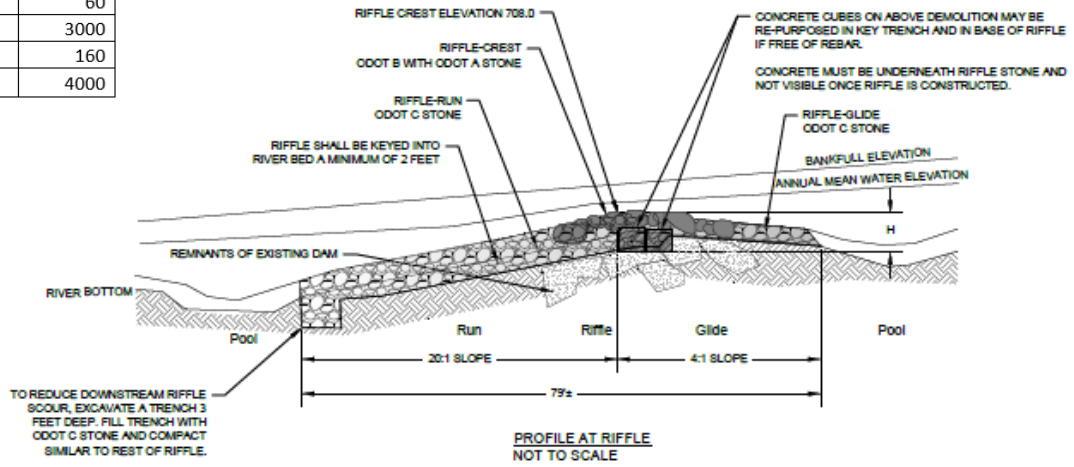


Table 2: Riffle dimensions and ODOT rock type quantities for each section of the riffle

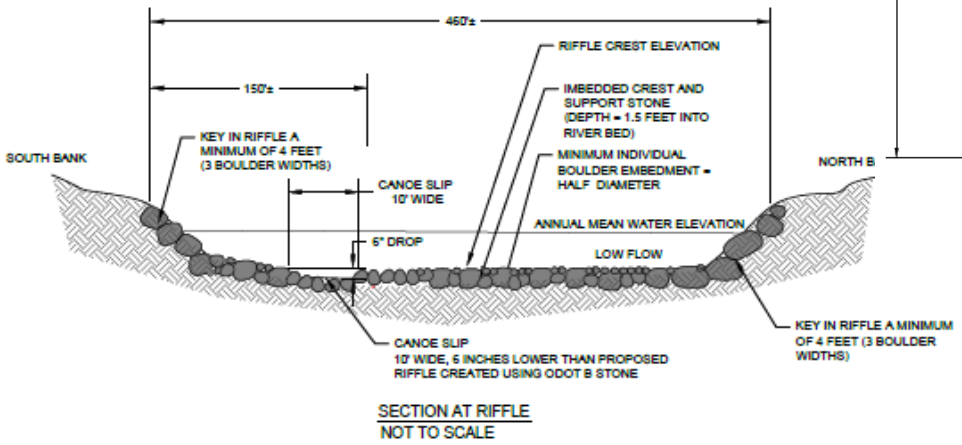
Riffle	L (ft)	W (ft)	Size	d85	d50	Qty (CY)
Glide Stone	14	460	ODOT C	18in	12in	540
Crest Stone	6	460	ODOT B	24in	18in	240
Habitat Enhancement	3	460	ODOT A	30 in	24in	60
Run Stone	76	460	ODOT C	18in	12in	3000
Key Trench	3	460	ODOT C	18in	12in	160
Riffle Dimensions	90	460				4000

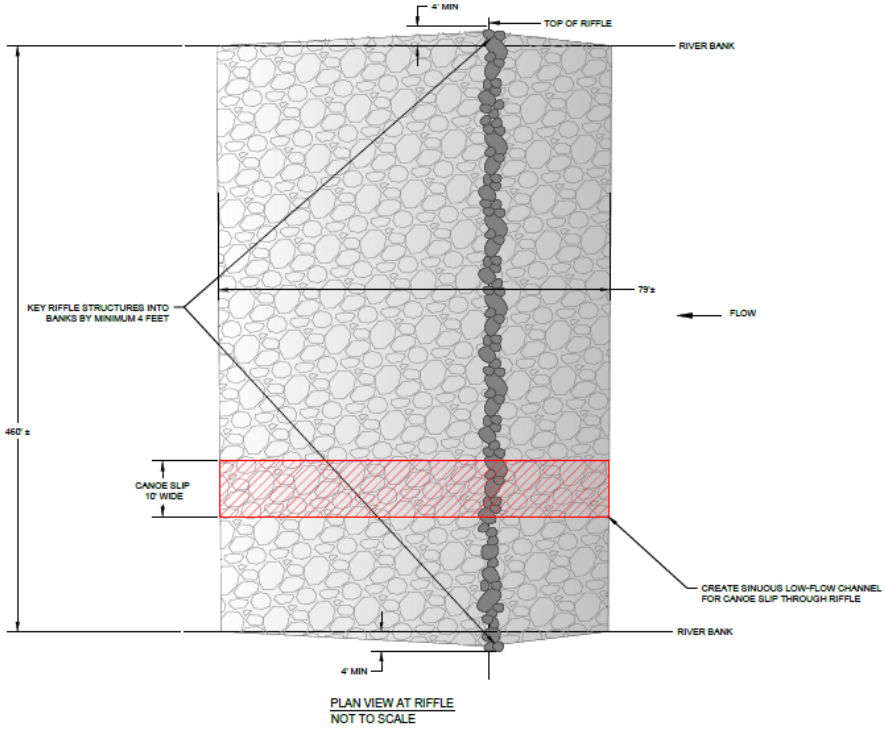


Modeling and Design

Special considerations

- Canoe and Kayak passage

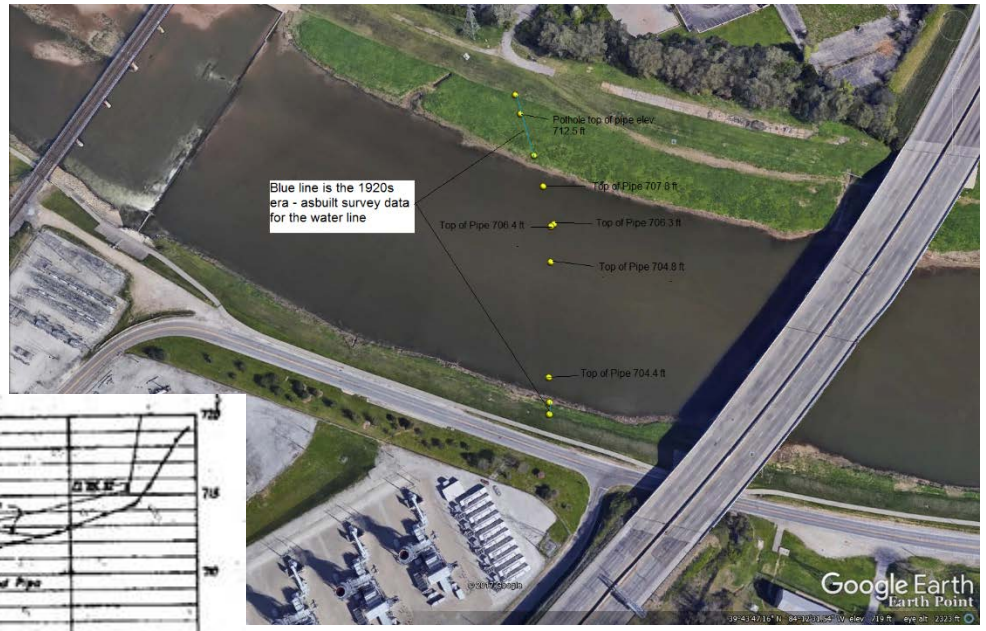


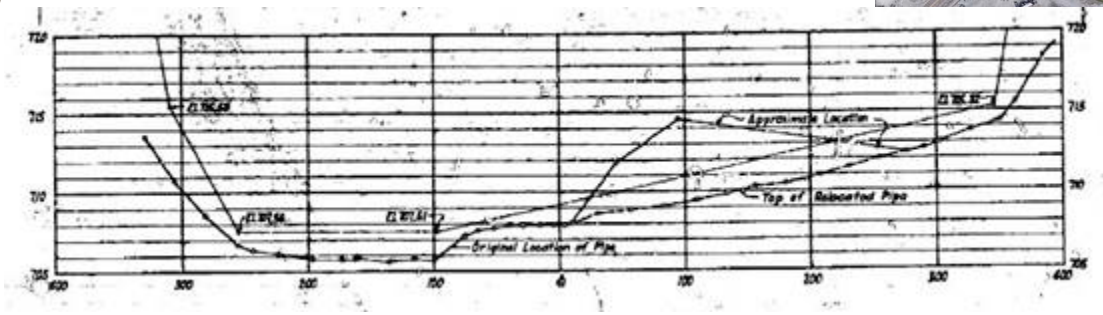


Modeling and Design

Special considerations

- Water main located upstream of dam

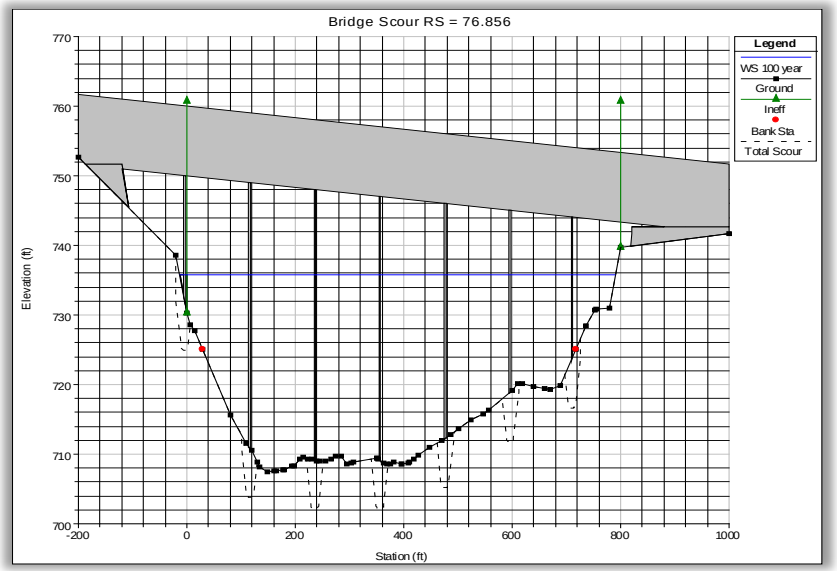


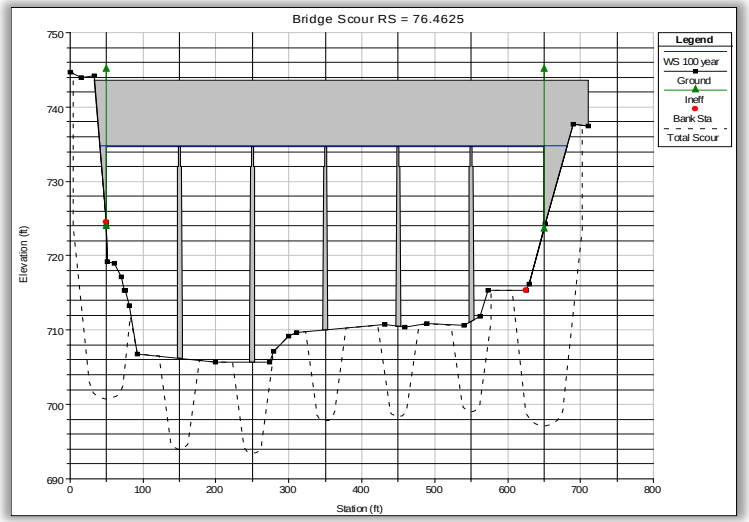


Modeling and Design

Special considerations

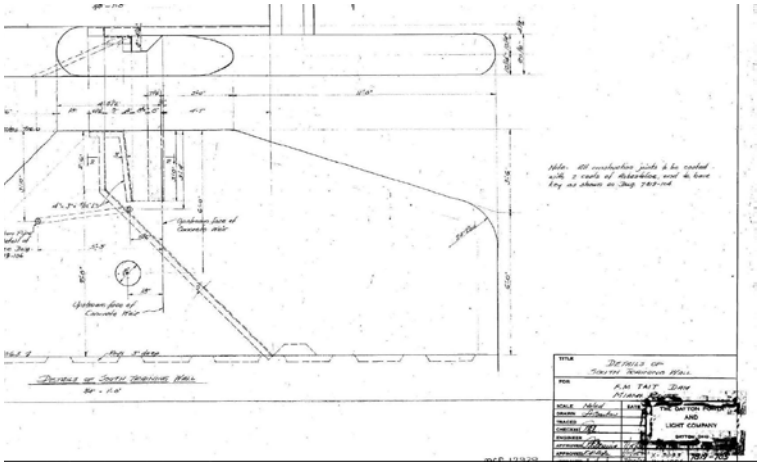
- Scour model suggests very little change between full dam, existing dam and dam removed conditions

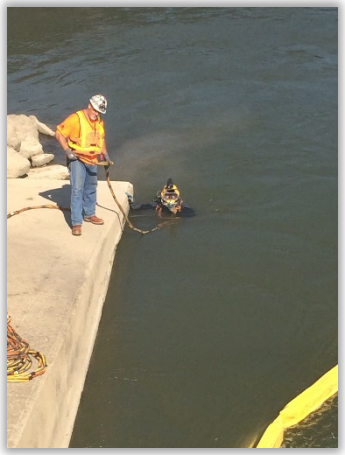




Additional Concerns

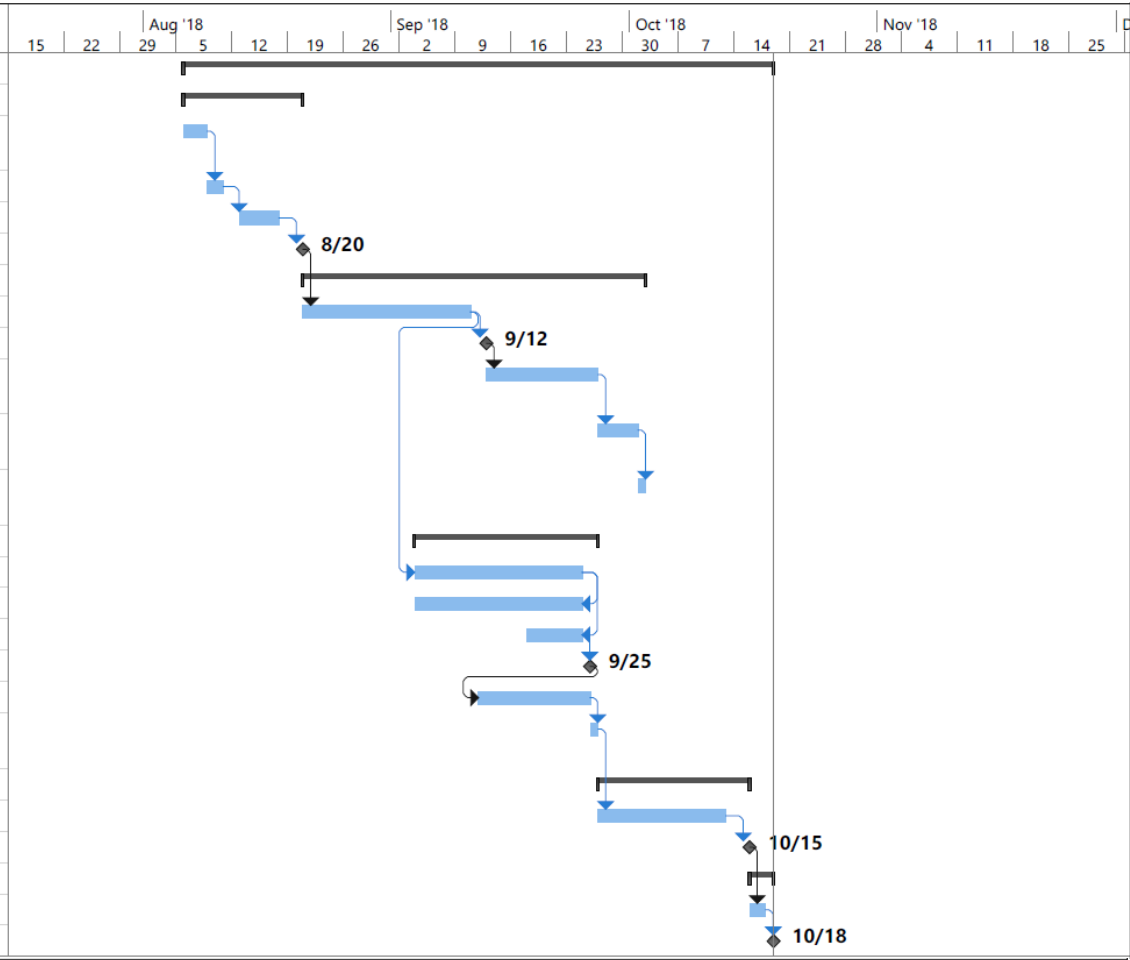
- **Mussel beds / Mussel salvage**
- **Changes since original (2016-17) Surveys**
- **Asbestos**
- **N&S Railroad**
- **Legacy DP&L Intake Structures**





Construction Schedule

ID	Task Name	Duration	Start	Finish
1	**Dam Removal Project**	**54 days**	**Mon 8/6/18**	**Thu 10/18/18**
2	**Project Activities**	**11 days**	**Mon 8/6/18**	**Mon 8/20/18**
3	Construction Mobilization & Temporary Access	3 days	Mon 8/6/18	Wed 8/8/18
4	Erosion Control Installation	2 days	Thu 8/9/18	Fri 8/10/18
5	Turbidity Curtain	5 days	Mon 8/13/18	Fri 8/17/18
6	Weather Delay	1 day	Mon 8/20/18	Mon 8/20/18
7	**Sediment Management**	**31 days**	**Tue 8/21/18**	**Tue 10/2/18**
8	Native Sediment Dredging	15 days	Tue 8/21/18	Mon 9/10/18
9	Weather Delay	2 days	Tue 9/11/18	Wed 9/12/18
10	Sediment Placement on Bank Full Benches	10 days	Thu 9/13/18	Wed 9/26/18
11	Sediment Placement for Channel Fill	3 days	Thu 9/27/18	Mon 10/1/18
12	South Bank Rock Toe Protection	1 day	Tue 10/2/18	Tue 10/2/18
13	**Dam Removal**	**17 days**	**Tue 9/4/18**	**Wed 9/26/18**
14	Dam Demolition	15 days	Tue 9/4/18	Mon 9/24/18
15	Causeway Construction	15 days	Tue 9/4/18	Mon 9/24/18
16	Sheet Piling Removal	5 days	Tue 9/18/18	Mon 9/24/18
17	Weather Delay	1 day	Tue 9/25/18	Tue 9/25/18
18	Concrete Hauling - Off Site	10 days	Wed 9/12/18	Tue 9/25/18
19	Debris Management & Disposal	1 day	Wed 9/26/18	Wed 9/26/18
20	**Riffle Construction**	**13 days**	**Thu 9/27/18**	**Mon 10/15/18**
21	Riffle Installation	12 days	Thu 9/27/18	Fri 10/12/18
22	Weather Delay	1 day	Mon 10/15/18	Mon 10/15/18
23	**Project Close-out**	**3 days**	**Tue 10/16/18**	**Thu 10/18/18**
24	Erosion Control Removal	2 days	Tue 10/16/18	Wed 10/17/18
25	Demobilization	1 day	Thu 10/18/18	Thu 10/18/18



Project Schedule
Date: Wed 4/18/18

Task
Split
Milestone
Summary
Project Summary
Inactive Task
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Deadline
Progress
Manual Progress

Construction – Stop Log Removal

Construction – Sediment Dredging

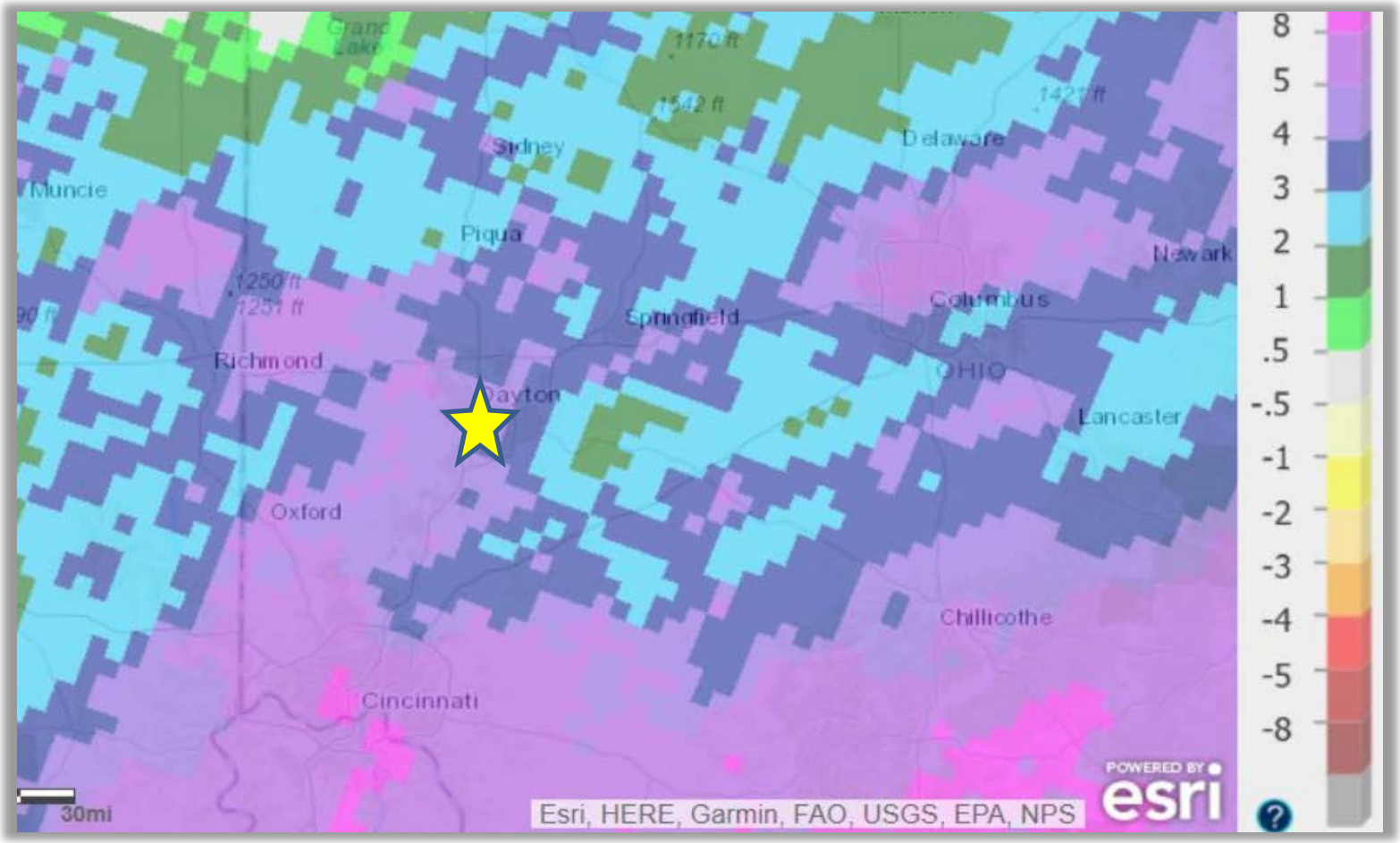
Construction – North Bank (RDB) Reestablishment

Construction – Mussel Salvage

Construction – Causeway (Constructed Riffle)

September Flood (Tropical Storm Gordon)

Sept 2018 Precipitation - Inches Above Annual Mean NWS



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Construction – Dam Demolition

Construction – Safety Stand Down

Construction – Dam Demolition

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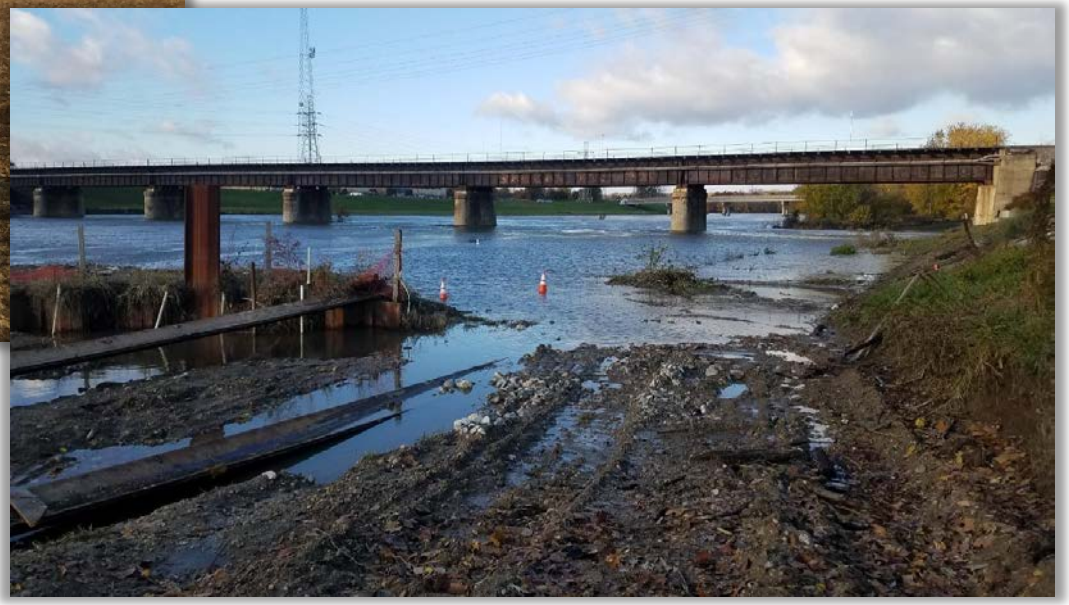
Construction – South (LDB) Bank Reestablishment

Construction – North (RDB) Bank Reestablishment

Construction – North (RDB) Bank Reestablishment

Levee Repairs and Stabilization



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Substantial Completion (Nov-December 2018)

Before and After

Mitigation Monitoring

The annual mitigation monitoring services are expected to include the following major subtasks to be performed by ODOT (Cardno):

- Hydrology and Physical Habitat Monitoring Locations:
  - Ten (10) monitoring stations shall be established within the proposed project area, with one taken every 1,000 linear feet upstream of the dam location.
  - Data collected at each monitoring station shall include assessments of hydrology and physical habitat (Qualitative Habitat Evaluation Index [QHEI] scores).
- Biological Monitoring Locations:
  - Two (2) monitoring stations shall be established within the proposed project area, one taken immediately above the dam removal at River Mile (RM) 77.5 and the other at the U.S. Route 35/Washington Street Bridge at RM 79.5.
  - Data collected at each monitoring station shall include assessments of biology (Index of Biotic Integrity [IBI] and Modified Index of Well Being [MIwb] scores) for boat sites.

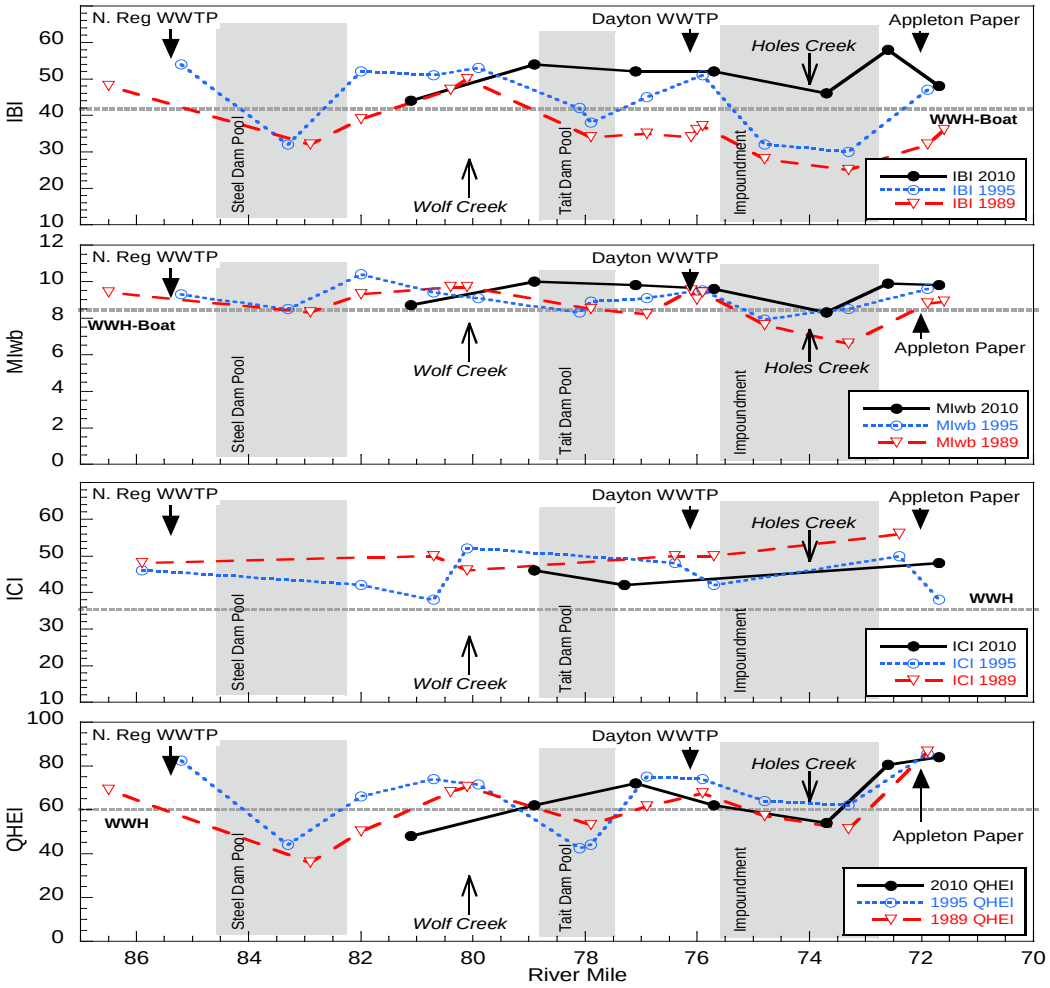
Mitigation Monitoring

Table 3. Ohio EPA Biological Condition of GMR - Upstream of Tait Station Dam (RM 76.6)

Year	USGS RM	Narrative Location (OEPA RM[1])	Lat / Long	QHEI	IBI / Miwb	ICI
1995	76.7	Ust. Tait Dam; Impounded (77.65[1,2])	39.731289 -84.199856	44.0	38 / 8.9	n/a
1995	77.2	Ust. I-75 / adj. Carillon Blvd; Impounded (78.1)	39.72930 -84.20930	42.5	42 / 8.3	n/a

Summarized from "*Biological and Water Quality Study of the Middle and Lower Great Miami River and Selected Tributaries, Volume 1*" Ohio EPA, 1997. Red font indicates MWH. [1]*Note: OEPA RMs presented in 1995 study are consistently off by a factor of +0.9 compared to USGS RM & FEMA FIS.* [2]*Note: The OEPA station previously identified as RM 77.1, ust. Tait Dam, is in fact located at RM 77.65 (aka USGS RM 76.7)*

Mitigation Monitoring – QHEI *v* IBI *v* MIwb



Success Criteria

By the end of the 5-YR monitoring period,

- The restored segment of the Tait Station Dam Pool of the Great Miami River shall achieve full attainment of Warmwater Habitat (WWH) status.
- QHEI scores shall achieve a minimum average of greater than or equal to 60.0, indicative of WWH.
- Two (2) IBI scores upstream of the dam shall be no less than 45.0, indicative of WWH.
- Two (2) MI(wb) scores upstream of the dam shall be no less than 8.5, indicative of WWH.
- Project shall use only Ohio native, non-woody species to seed disturbed riparian areas along the Great Miami River. A minimum of 80% relative aerial coverage of native species, including volunteer native vegetation, shall be established.
- The restored floodplain benches inside the Miami Conservancy District levees, between the dam removal site and the upstream Interstate 75 bridge over the Great Miami River, shall have no more than 10% relative aerial coverage of invasive species.
- Post-construction monitoring shall include data to ensure the authorized activity results in net increases in aquatic resource functions and services as compared to pre-construction data.

“For Those About to Rock” AC/DC, 1981

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Questions

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