

Marshall Hydroelectric Project Disposition Study

City of Marshall

June 19, 2017

Agenda

- 1 Existing Conditions
- 2 Description of Alternatives
- 3 Cost of Alternatives
- 4 Funding Opportunities

1 Existing Conditions

Dam has structural and hydraulic issues

2012 FERC Inspection

Structural

- Internal Erosion and Piping in Island Embankment
- Stability safety factor is too low

Hydraulic

- Inadequate discharge capacity at maximum flood



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SURVEY DATUM: NAVD83

Revision	By	App'd	Date

Issued	By	App'd	Date

Rev	Issue	Permit	As-Built	Condition	Drawn	Check	Scale	Date

Permit-Seed

Client/Project
CITY OF MARSHALL

Marshall Hydroelectric Disposition Study
Marshall, Michigan

Title
TOPOGRAPHY & EXISTING CONDITIONS

Project No.	Scale	Sheet	Revision
2075138800			
Drawing No.			

Figure A.3

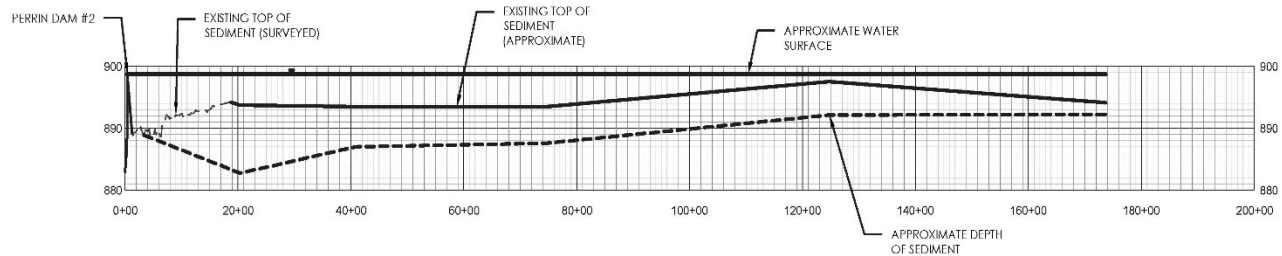
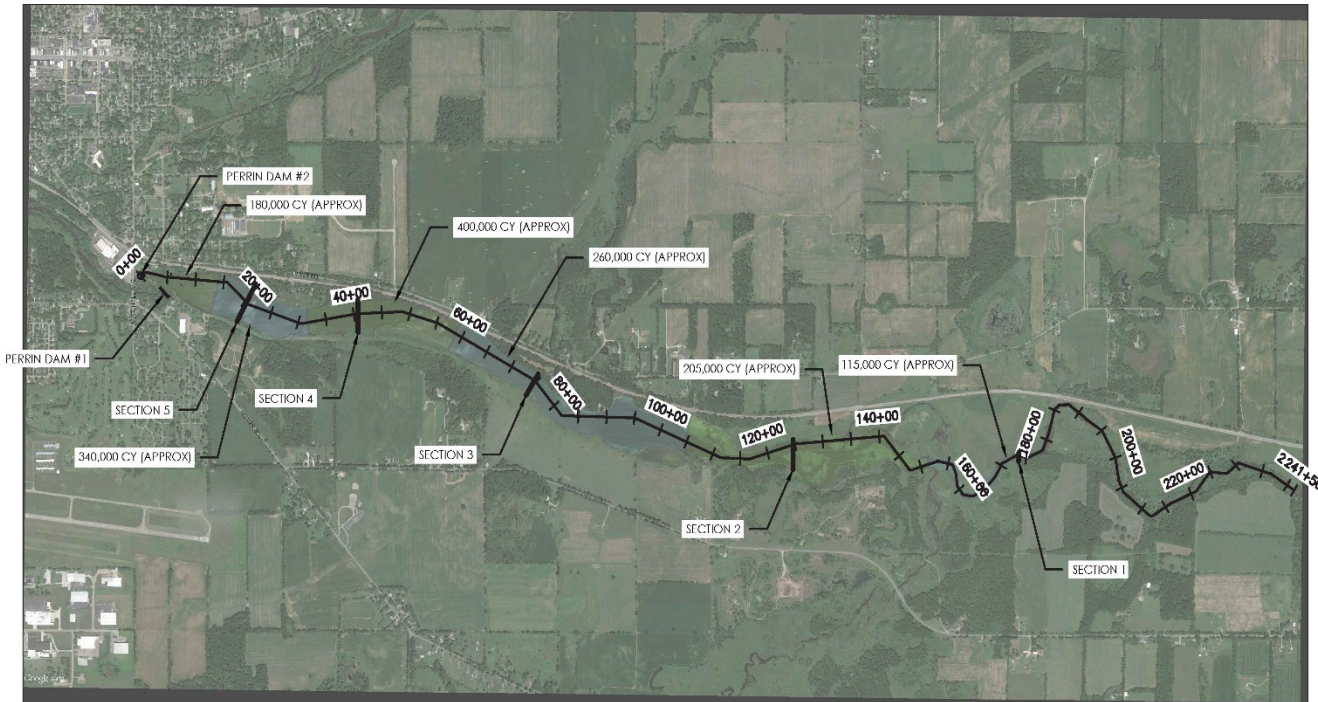




Sediment Quality

Volume (2016)

- Estimated 1.5 million cubic yards behind dam.



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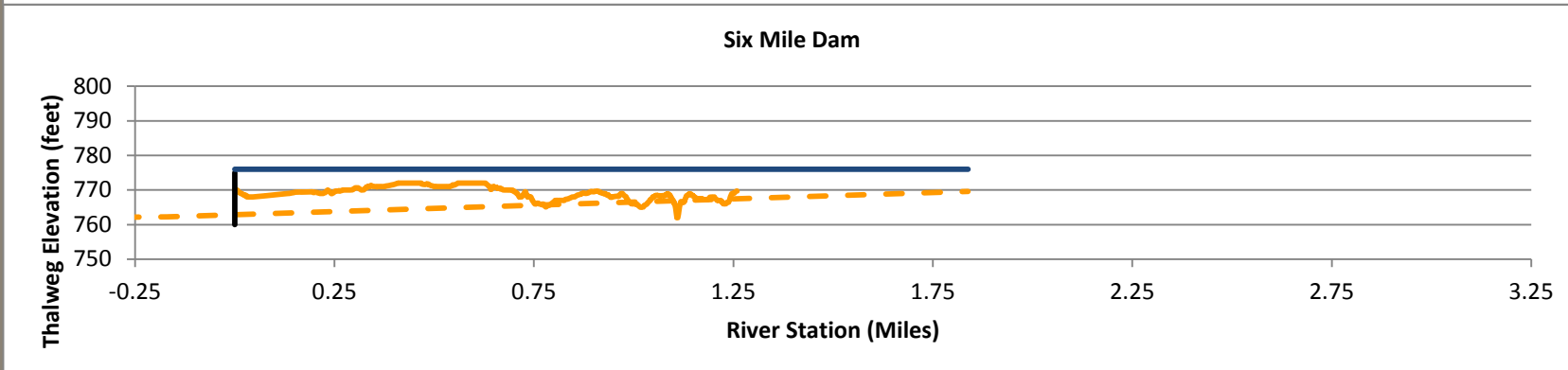
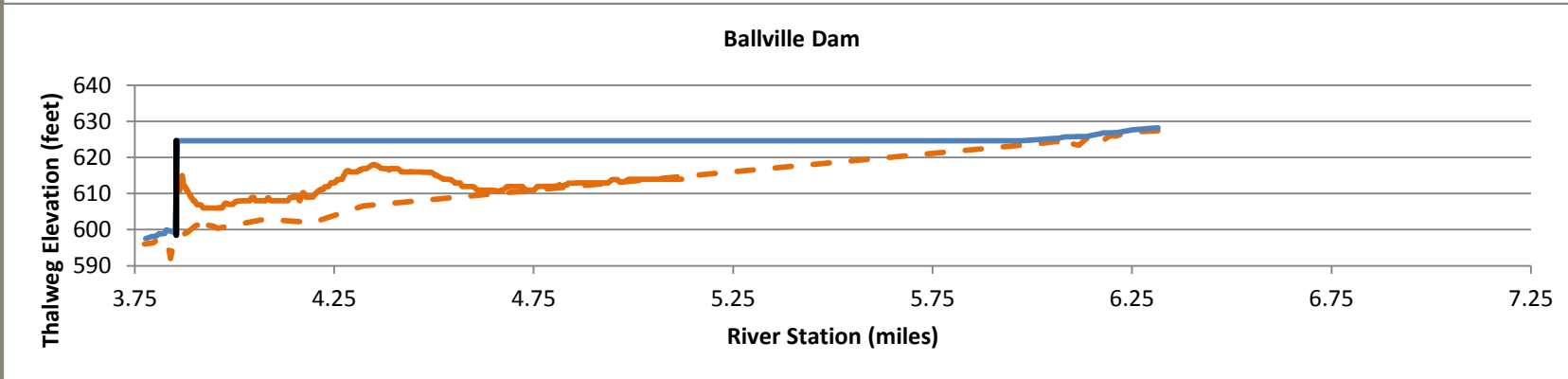
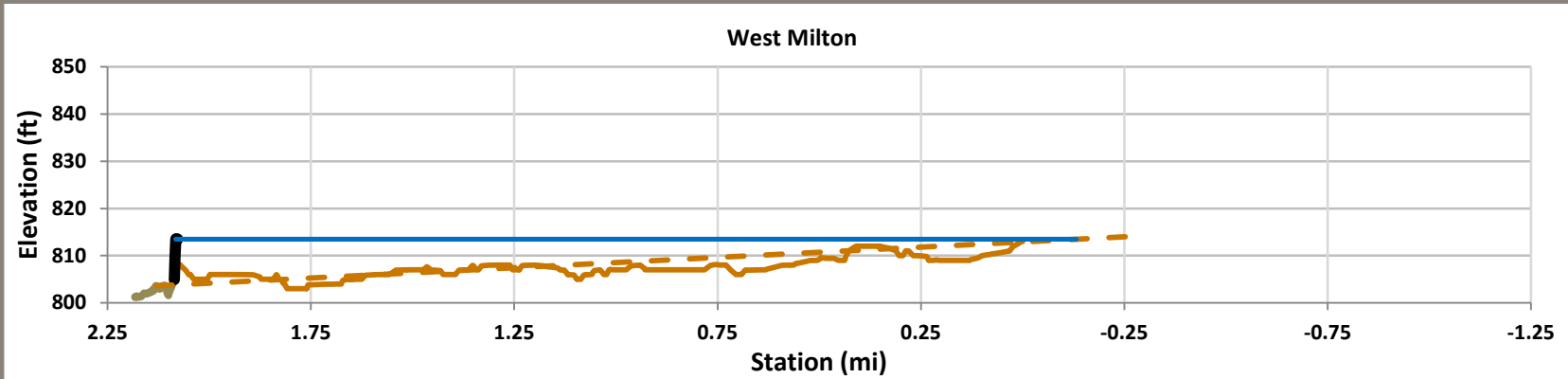
Client/Project
City of Marshall Michigan
Perrin Dam Disposition Study

Drawing No.

Title

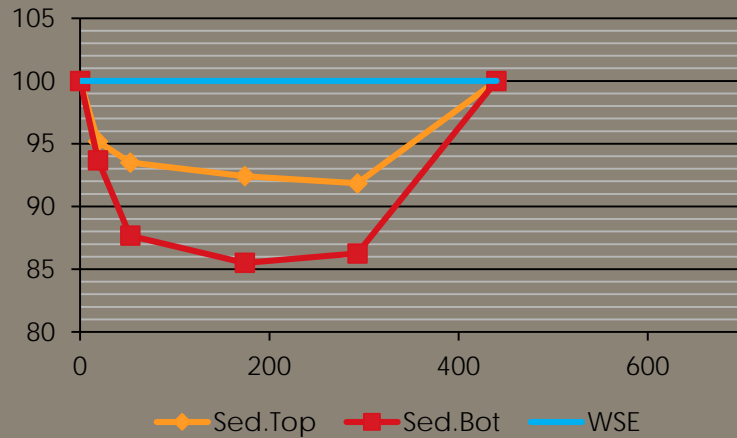
Existing Conditions

Sediment management - volume

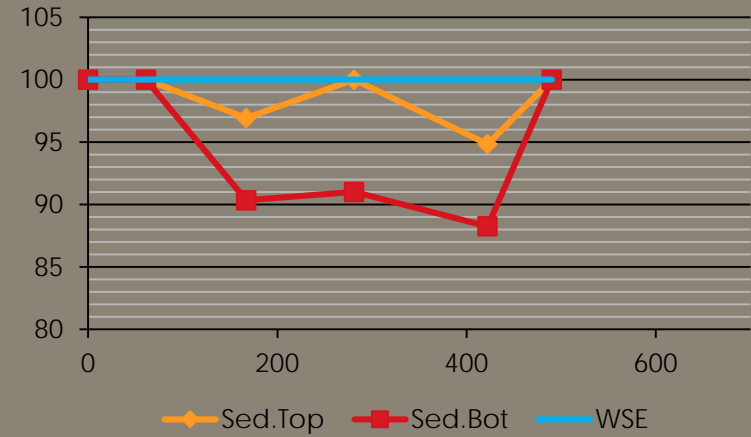


Sediment management - volume

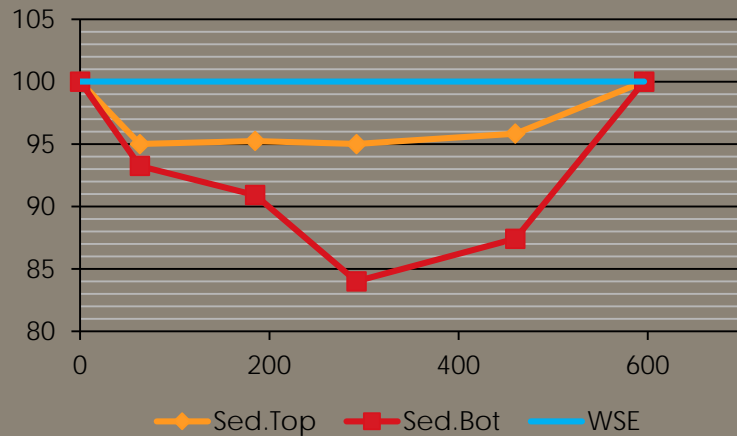
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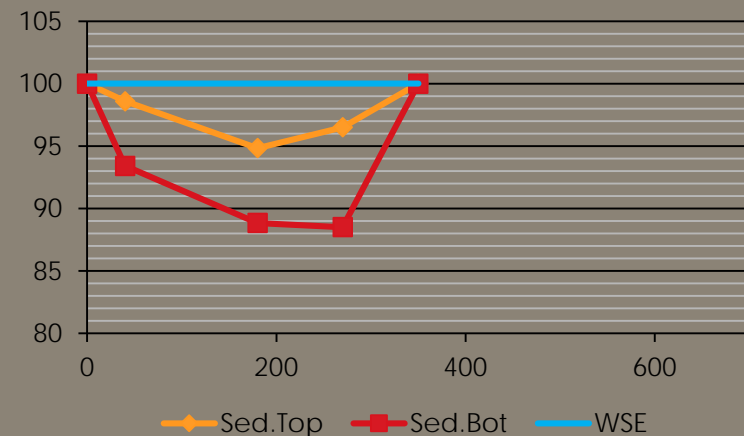
Section 4



Section 5



Section 3



Sediment Quality

Chemistry (2012, 2013, 2014 and 2016)

- No PCBs above detection limits.
- Most metals exceeded minimum level of expected impact (Threshold Effect Concentration - TEC).
- Many metals exceeded level of probable impact (Probable Effect Concentration - PEC).
- Most samples exceeded TEC for polynuclear aromatic hydrocarbons (PAHs).

Sediment Quality

Chemistry (2012, 2013, 2014 and 2016)

- Most samples exceeded PEC for PAHs.
- Arsenic and Cadmium exceeded residential drinking water standards (Drinking Water Protection Criteria - DWPC).
- Arsenic and benzo(a)pyrene exceeded direct contact criteria (DCC).

Sediment Quality

AREAS FOR MORE STUDY

- More samples needed.
- Toxicity and other testing needed.

Sediment Management Chemistry



Historic

- Built in 1892 and 1893. 3rd oldest continuously operating hydro-plant in country.
- Site is eligible for National Register of Historic Places.
- Recommended to have archeologist on site during excavation in embankment.

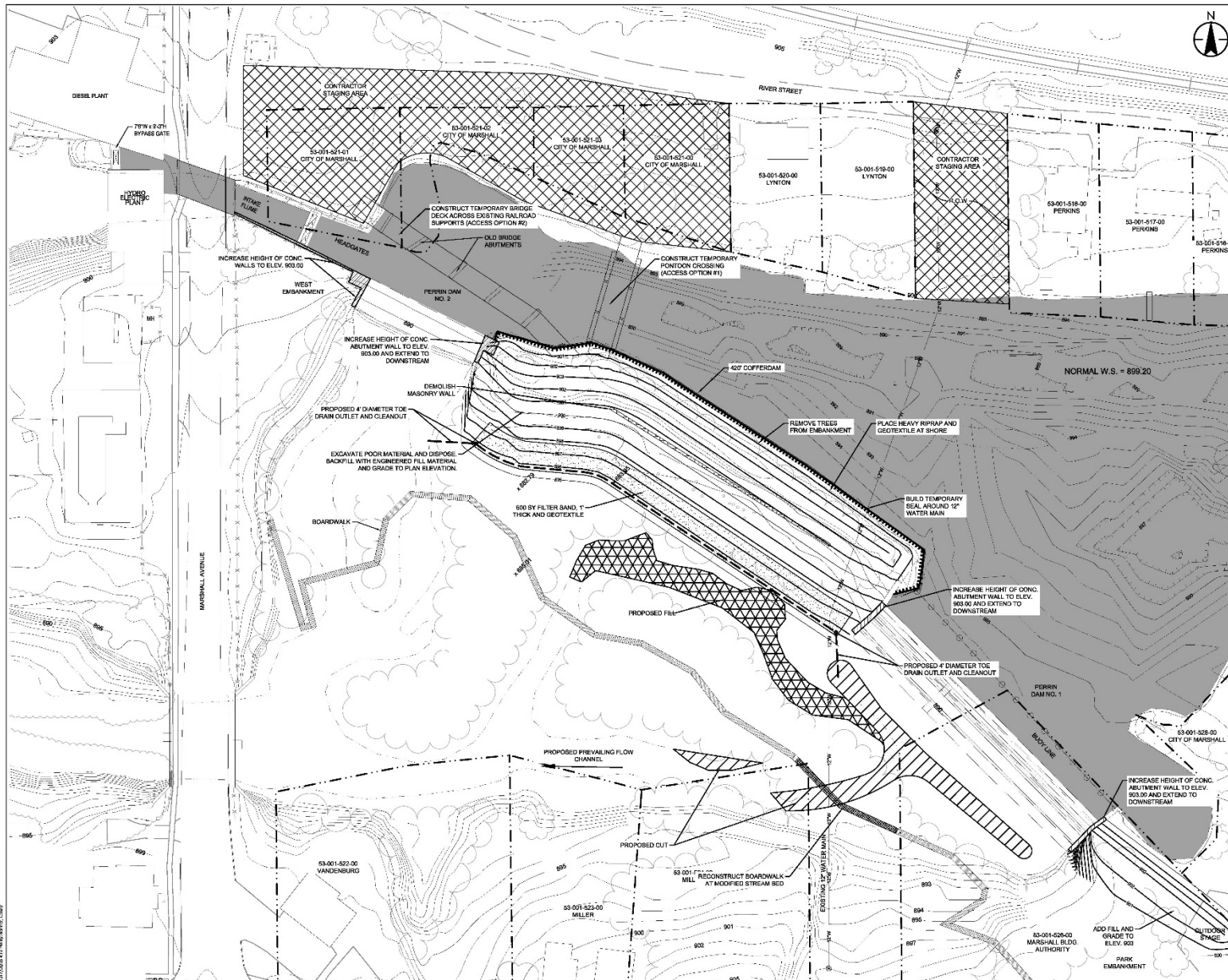
2 Alternatives Investigated

Three alternatives

Alternatives

- Repair Dam – with Cofferdam
- Repair Dam – Drawing Down Impoundment
- Remove Dam

Repair with cofferdam



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SURVEY DATUM: NAVD83

Revision

Issued

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CITY OF MARSHALL

MARSHALL HYDROELECTRIC DISPOSITION STUDY

Marshall, Michigan

Title

COFFERDAM - ALTERNATIVE 1

Project No.

2075136800

Drawing No.

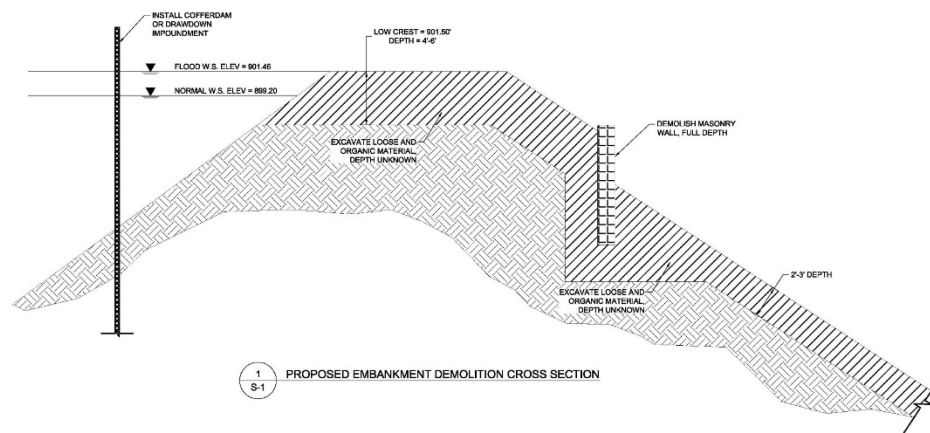
Sheet

Revision

Scale

0 30' 60'

Figure D.1



1
S-1 PROPOSED EMBANKMENT DEMOLITION CROSS SECTION

Revision

Issued

Revised

Permit-Seed

Client/Project

CITY OF MARSHALL

MARSHALL HYDROELECTRIC DISPOSITION STUDY

Marshall, Michigan

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ISLAND EMBANKMENT

CROSS SECTIONS

Project No.

2075138800

Scale

NOT TO SCALE

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Sheet

Revision

Figure D.2

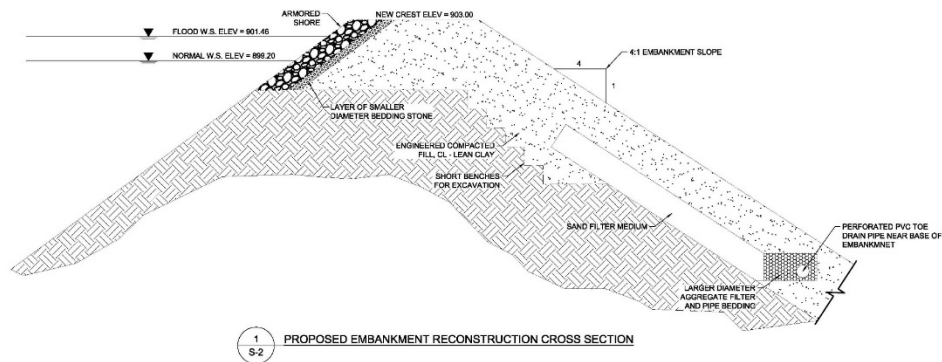


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No. Name:	EXHIBIT D.2 & D.3 EMBARKMENT	SECTION	OWNER	P&M	17.06.01
		Own	Chgt.	Disc.	FRANK

Permit-Sea

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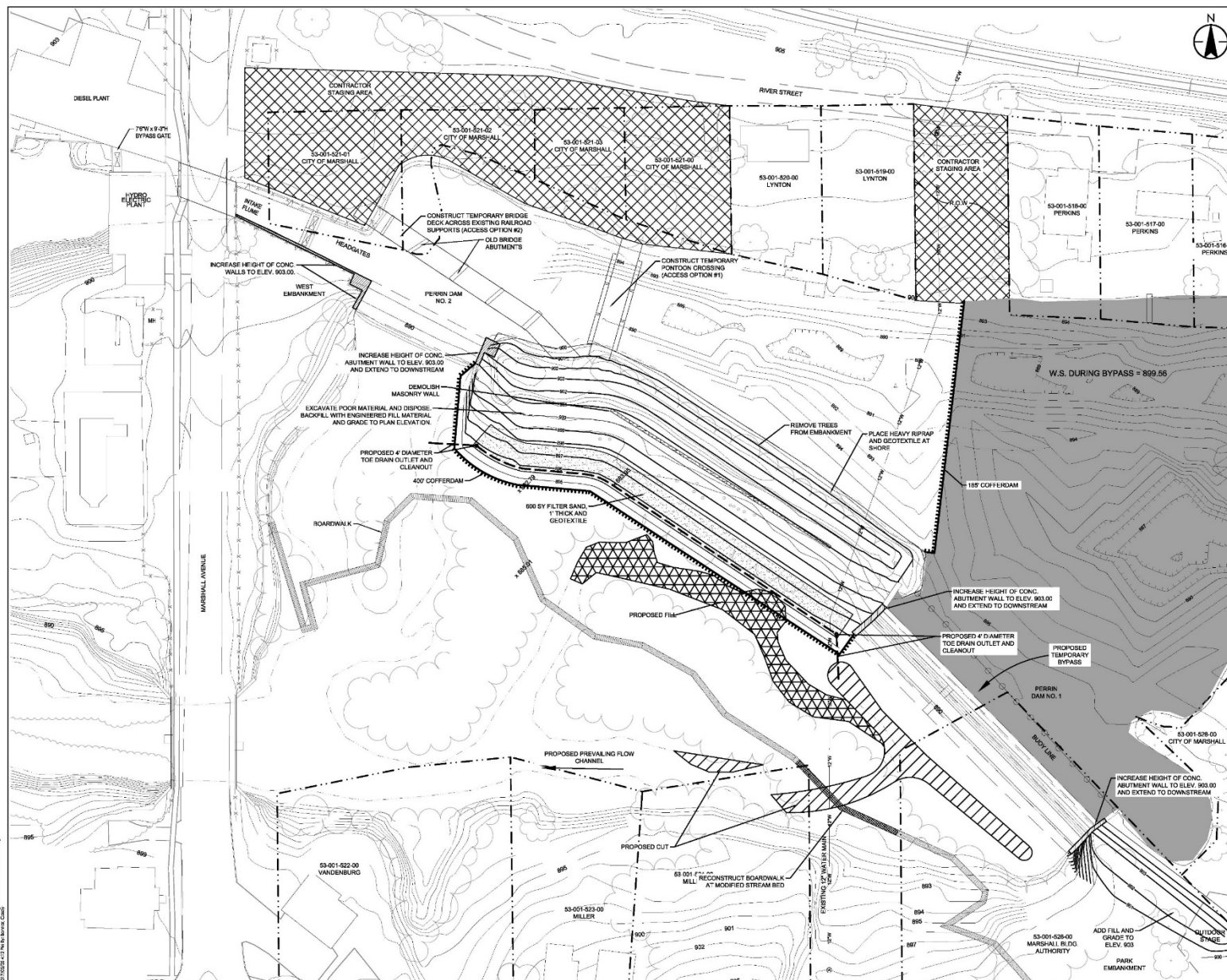
MARSHALL HYDROELECTRIC DISPOSITION STUDY

Marshall, Michigan

Title
ISLAND EMBANKMENT
CROSS SECTIONS

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Figure D.3



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File No.: EXHIBIT D-4, COFFEE/CAM ALT. 2, DANIELA	PJN	PJN	17.06.0
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Permit-Seq

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MARSHALL HYDROELECTRIC DISPOSITION STUDY

Marshall, Michigan

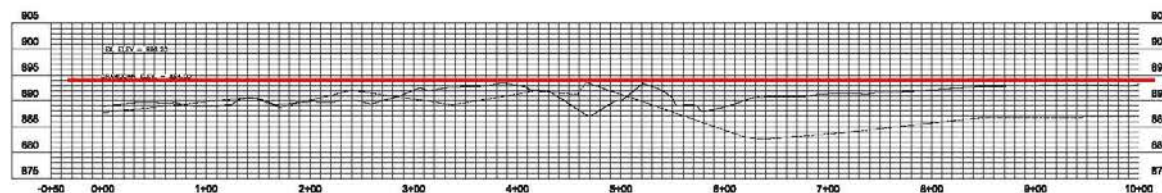
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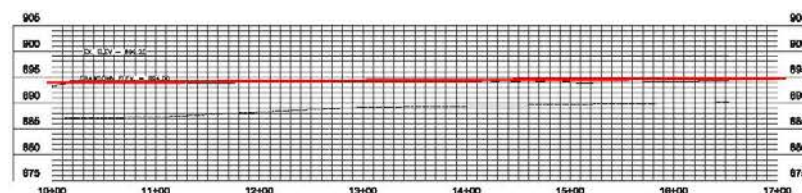
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2075136800		
Drawing No.	Sheet	Revision

Figure D.4

Repair with drawdown



400' upstream



1100' upstream

TOTAL IMPOUNDMENT LENGTH > 3 miles

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

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PERM: _____ Date: _____

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CITY OF MARSHALL
PERLIN DAM DISPOSAL STUDY
Marshall, Michigan
Title _____

Project No. 2075138800
Drawing No. S-04
Scale 0 50 100
Sheet 1 of 2
Revision 0

Dam Removal

3 Cost

Repair with Cofferdam

\$2.2 Million

Repair with Drawdown
\$22 Million

Dam Removal

\$45 Million to \$99 Million

4 Funding Opportunities

Potential Funding Sources

Funding Source	Program	Due	Max. Funding	Comments
MDNR	Dam Management Grant Program (DMGP)	November	All available funding (typically \$1-2M)	10% match
NOAA	Open Rivers Initiative	n/a	\$3M	Has not been funded since 2011
USFWS	Fish Passage Program	August	Varies (no upper limit)	1:1 match
MDNR	Aquatic Habitat Grant Program (AHGP)	October	All available funding (typically <\$1M)	Usually for post-dam removal restoration (10% match)
EPA/USFWS/ NRCS	Various habitat restoration grants	Varies	\$50-150K	
MDEQ	Nonpoint Source Grant Program	August	All available funding (typically \$2-3M)	Typically funds upland BMPs but may consider in-stream projects benefitting water quality
EPA	Great Lakes Restoration Initiative	varies	Varies (typically \$0.5-1M)	Priorities vary
Great Lakes Fishery Trust	Habitat Protection and Restoration	March	<\$500K	Typically, \$50-250K
U.S. Army Corps	WRDA Continuing Authorities Programs (Sec. 206 Aquatic Ecosystem Restoration)	Before October	\$5M	Funding levels vary annually; 35% local cost share; long slow process
Private foundations	Various grants	On-going	<\$500K	Can often cover public education and involvement
MDEQ	State Revolving Fund	July	Varies	Low interest 20-30 year loans

Possible Funding Scenarios

Alternative	Cost Opinion	Assumed Funding Breakdown	
		Grant	Match from City
Repair with Cofferdam	\$2.2 Million	\$200,000	\$ 2.0 Million
Repair with Drawdown	\$22 Million	\$200,000	\$22 Million
Remove Dam (LOW)	\$45 Million	\$1,000,000	\$44 Million
Remove Dam (HIGH)	\$99 Million	\$1,000,000	\$98 Million

Questions?