York Street Sewer Pump Station and Connecticut River Crossing

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DOC
ESTABLISHED 1879

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NEWEA 2020
Boston, MA
January 29, 2020

Outline

- Project Background
- Design Alternatives Analysis
- Recommended Design Refinement
- Construction Update

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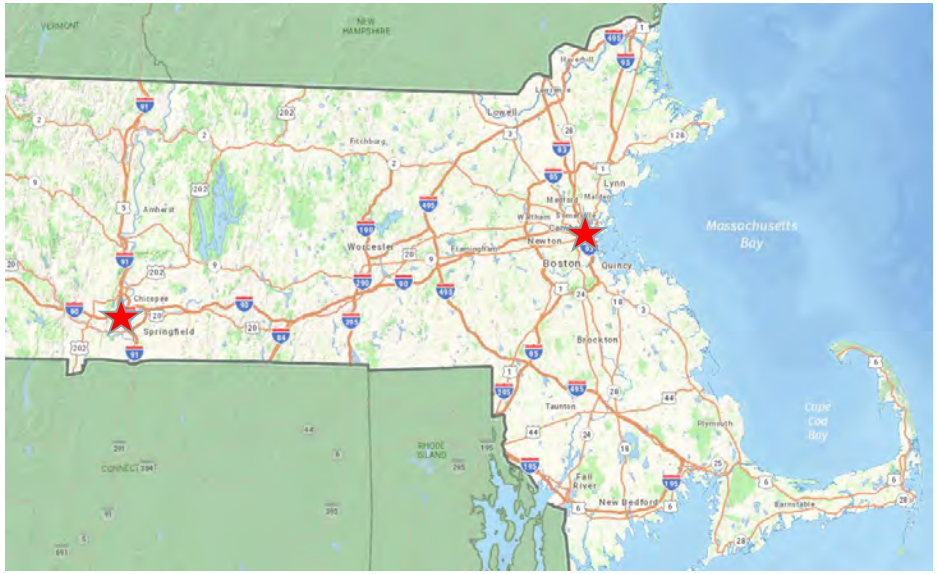
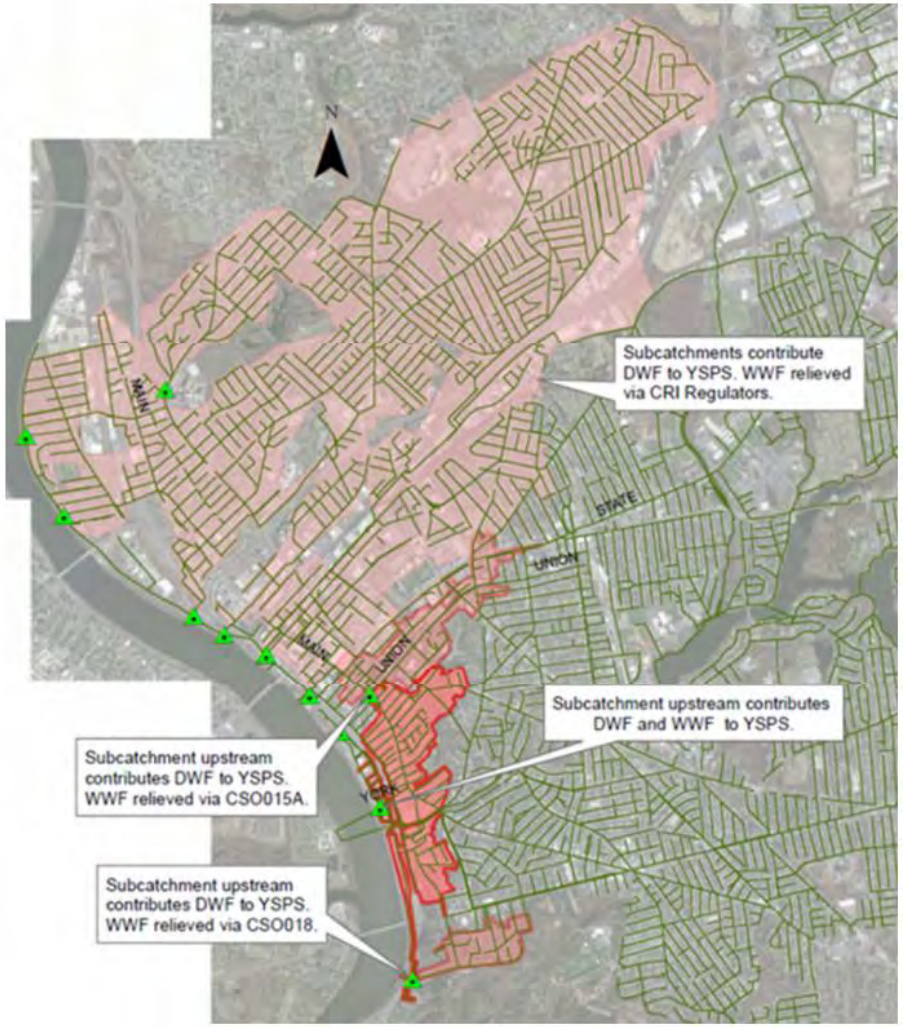
Project Location in Springfield, MA





- Springfield Water and Sewer Commission (SWSC)
- Two collection systems
  - Main Intercepting Sewer
  - Connecticut River Interceptor

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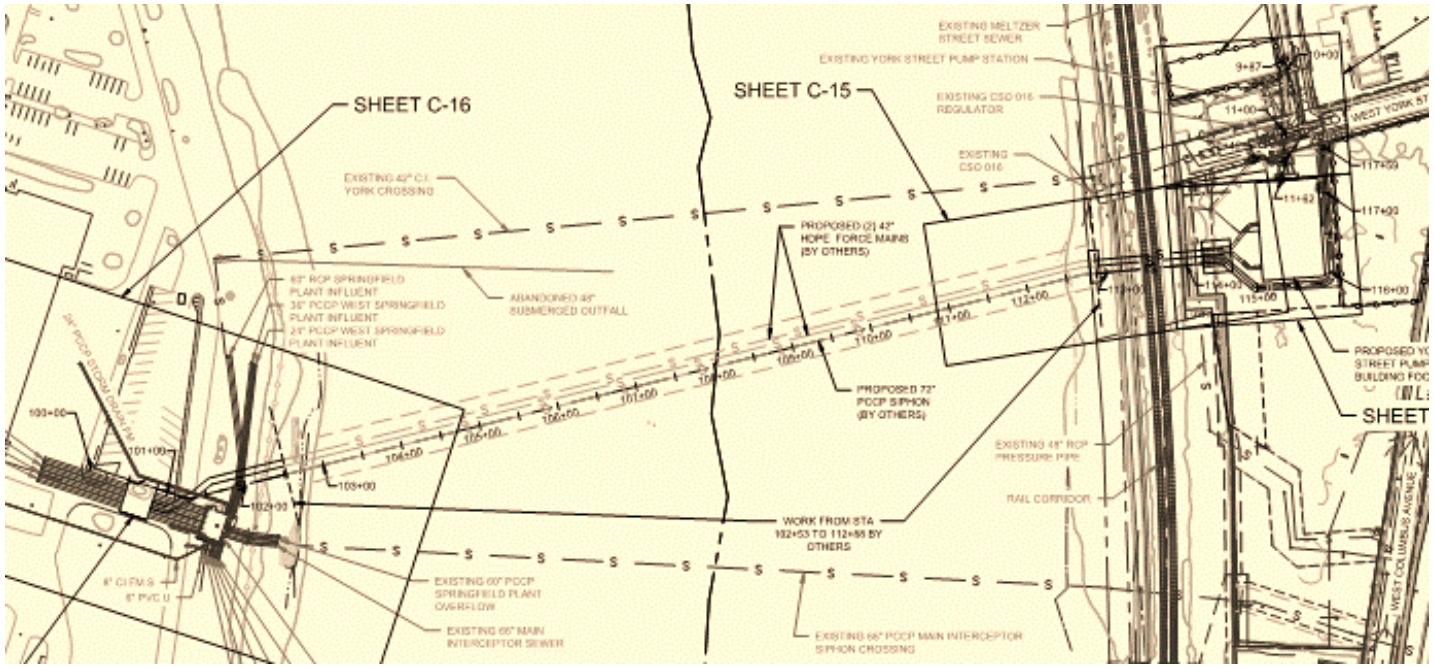
Project Drivers & Statement

- Phase 2 of SWSC's Integrated Wastewater Plan (IWP)
- Implementation of the IWP is driven by Administrative Order from MassDEP, Phase 2 deadline of December 2022
- The project must:
  - Meet IWP Phase 2 CSO Frequency and Volume reduction goals
    - *Expanded capacity of York Street Pump Station, from its current capacity of 34 MGD;*
    - *New sewer pipeline crossing of the Connecticut River from the York Street Pump Station vicinity to the SRWTF Influent Structure;*
  - Provide cross-river conveyance redundancy



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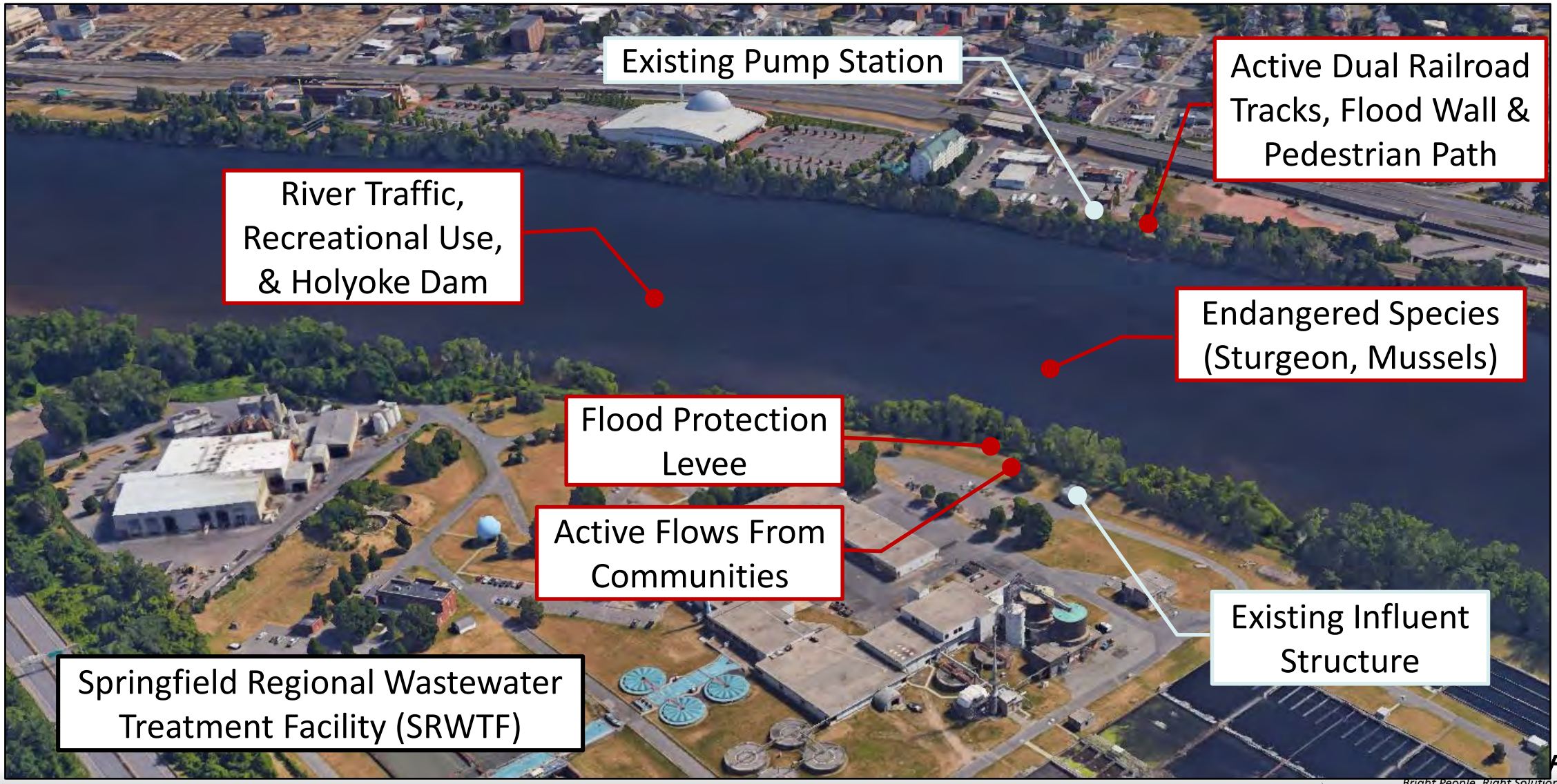
Existing Site Conditions Along Connecticut River



Design Alternatives

Name	Description	With existing MIS crossing down, conveyance capability to SRWTF (after Ph3 Locust Transfer) (MIS Crossing NOT operational)	Crossing Number/Size	Existing 42-in DIP CRI crossing (Rehab or Abandon?)	With one future CRI crossing down, conveyance capability to SRWTF from CRI[1] (MIS Crossing operational)
IWP Phase 2 Plan	62 MGD East Side Pumping + force main crossing(s)	62 MGD CRI/MIS flows	single 54-in barrel pumped	Rehab in future phase	45 MGD(+/-) + All MIS flows
			twin ~36-in barrels pumped	Rehab in future phase	62 MGD + All MIS flows
			twin ~36-in barrels pumped	Abandon in future phase	45 MGD(+/-) + All MIS flows
Modified Plan (West side pumping)	62 MGD West Side Pumping + gravity crossing(s)	62 MGD CRI/MIS flows	single 54-in barrel gravity	Abandon in future phase	0 MGD + All MIS flows
			twin ~42-in barrels gravity	Abandon in future phase	35 MGD(+/-) + All MIS flows
Modified Plan (East side with bigger crossing)	62 MGD East Side Pumping + single FM sized for all CRI + MIS flows.[2]	62 MGD CRI + All MIS flows	single 96-in barrel pumped	Rehab in future phase	35 MGD(+/-) + All MIS flows
Modified Plan (East side including MIS redundant crossing)	62 MGD East Side Pumping + force main crossing(s) + MIS gravity siphon crossing	62 MGD CRI + All MIS flows	single 54-in CRI barrel pumped + 72-in MIS gravity siphon	Rehab in future phase	45 MGD(+/-) + All MIS flows
			twin ~36-in CRI barrels pumped + 72-in MIS gravity siphon	Rehab in future phase	62 MGD + All MIS flows
			twin ~36-in CRI barrels pumped + 72-in MIS gravity siphon	Abandon in future phase	45 MGD(+/-) + All MIS flows

- Pump Station on east or west side?
- One or multiple pipes in crossing?
- Force mains or gravity crossing?

- Nine high level alternatives – 69 feasible permutations of method and scope that met objectives!

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River Crossing Alternatives – Open Cut w/ Cofferdams

Advantages
-Flexibility
-Construction Risk Management
-Competitive bidding
-Cost
-Staging
-Traffic impacts

Disadvantages
-River Impacts
-Permitting requirements
-Contaminated soils disposal

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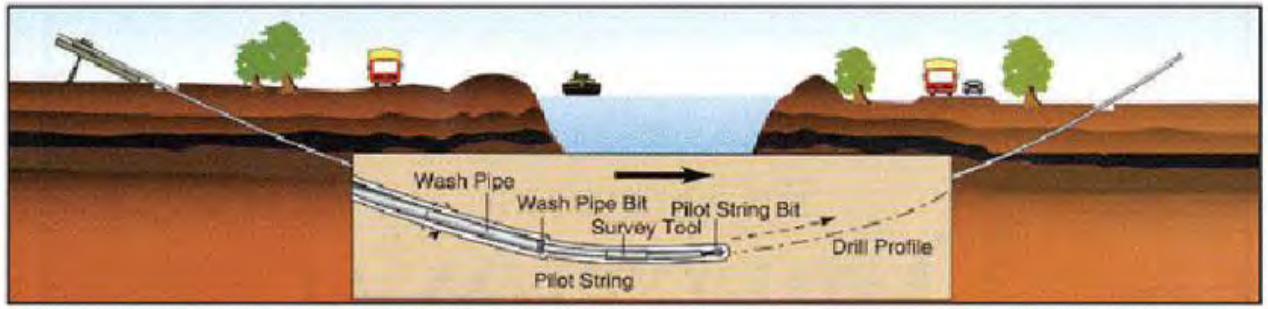
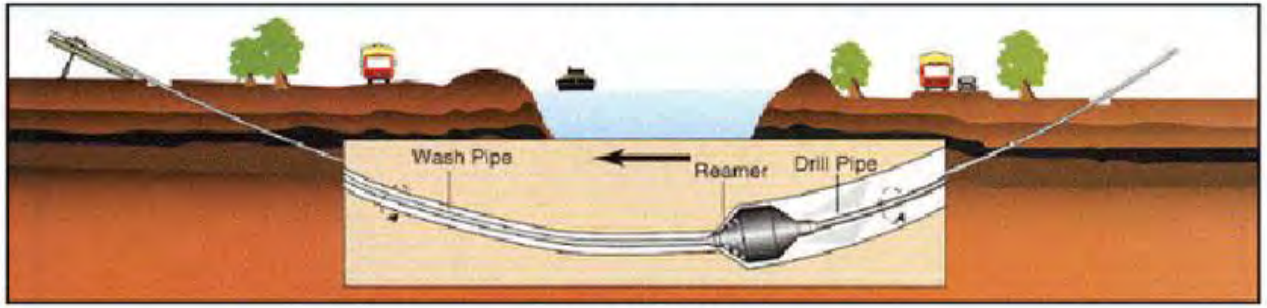
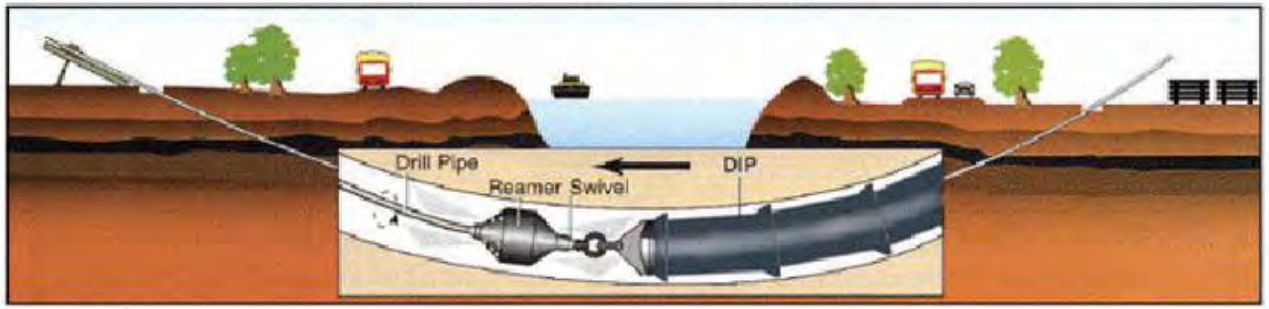
River Crossing Alternatives – Horizontal Directional Drilling



PILOT HOLE



PRE-REAMING



PULL-BACK

Advantages

-River Impact

-Permitting Requirements

-Production Rate

-Competitive bidding

Disadvantages

-Constructability

-Construction Risk

-Multiple crossings require multiple bores

-Maximum drill diameter

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River Crossing Alternatives – Tunneling

Advantages
-River Impact
-Production Rate
-Staging

Disadvantages
-Cost
-Construction Risk
-Site Conflicts
-Competitive Bidding

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Ranking of Design Alternatives

MIS Flows	CRI Flows	PS Location (CRI only)	Crossing Construction Method	Exist PS function	
72" Siphon	(2) 36" FM	East Side	Open Cut	Rehab for Flood Control	62
72" Siphon	54" FM	East Side	Open Cut	Rehab for Flood Control	62
-	(2) 36" FM	East Side	Open Cut	Rehab for Flood Control	62
-	54" FM	East Side	Open Cut	Rehab for Flood Control	62
72" Siphon	(2) ~42" Gravity Sewer	West Side	Open Cut	Rehab for Flood Control	62
72" Siphon	~54" Gravity Sewer	West Side	Open Cut	Rehab for Flood Control	62
72" Siphon	(2) 36" FM	East Side	Open Cut	Refit for 62 MGD + Flood Control	no
96" Siphon		East Side	Open Cut	Rehab for Flood Control	62
72" Siphon	54" FM	East Side	Open Cut	Refit for 62 MGD + Flood Control	no
-	~54" Gravity Sewer	West Side	Open Cut	Rehab for Flood Control	62
-	(2) ~42" Gravity Sewer	West Side	Open Cut	Rehab for Flood Control	62
-	54" FM	East Side	Tunnel	Rehab for Flood Control	62
-	(2) 36" FM	East Side	Open Cut	Refit for 62 MGD + Flood Control	no
-	54" FM	East Side	Open Cut	Refit for 62 MGD + Flood Control	no
-	(2) 36" FM	East Side	HDD	Rehab for Flood Control	62
96" Siphon		East Side	Open Cut	Refit for 62 MGD + Flood Control	no

Capital Cost	
Civil	Risk Management
Geotechnical	
Construction	
Impact to river navigation	Constructability
Utility\Site conflicts	
Contractor Experience	
Future flexibility in capacity	Operations and Maintenance
Waste stream management	
Flexibility\access for future inspection and rehabilitation	

Construction Duration	
Permitting Complexity	
Laydown space requirements	
Disturbance of contaminated soil, groundwater, sediment	Environmental Impact
River water quality	
Fish and Wildlife	
Impact to Pedestrian\ Recreational access during construction	Community impacts
Traffic disruption	
Construction noise\ light\ dust impacts	
Crossing Subtotal	

Ranking of Design Alternatives

- A pump station on the east side is less costly, both in terms of capital and energy and is simpler to construct.
- Construction of a new pump station allows for greater flexibility, a greater certainty of design life, simpler construction, easier maintenance, but is more costly.

MIS Flows	CRI Flows	PS Location (CRI Only)	Crossing Construction Method	Exist PS Function	New PS Function	Crossing Subtotal	Pump Station Subtotal	Total
72" Siphon	(2) 36" FM	East Side	Open Cut	Rehab for Flood Control	62 MGD	3.68	3.91	7.59
72" Siphon	54" FM	East Side	Open Cut	Rehab for Flood Control	62 MGD	3.64	3.91	7.55
-	(2) 36" FM	East Side	Open Cut	Rehab for Flood Control	62 MGD	3.60	3.91	7.51
-	54" FM	East Side	Open Cut	Rehab for Flood Control	62 MGD	3.52	3.91	7.43
72" Siphon	(2) 42" Gravity Sewer	West Side	Open Cut	Rehab for Flood Control	62 MGD	3.64	3.65	7.29
72" Siphon	54" Gravity Sewer	West Side	Open Cut	Rehab for Flood Control	62 MGD	3.61	3.65	7.26

- Tunnel crossings is more risky, less flexible in design and construction, and more expensive than open cut crossings.
- An additional 72-inch diameter pipeline for MIS flows provides greater overall combined sewer redundancy and capacity to the SRWTF.
- Multiple CRI pipelines provide better hydraulic performance, greater flexibility, and provide operation and maintenance benefits.

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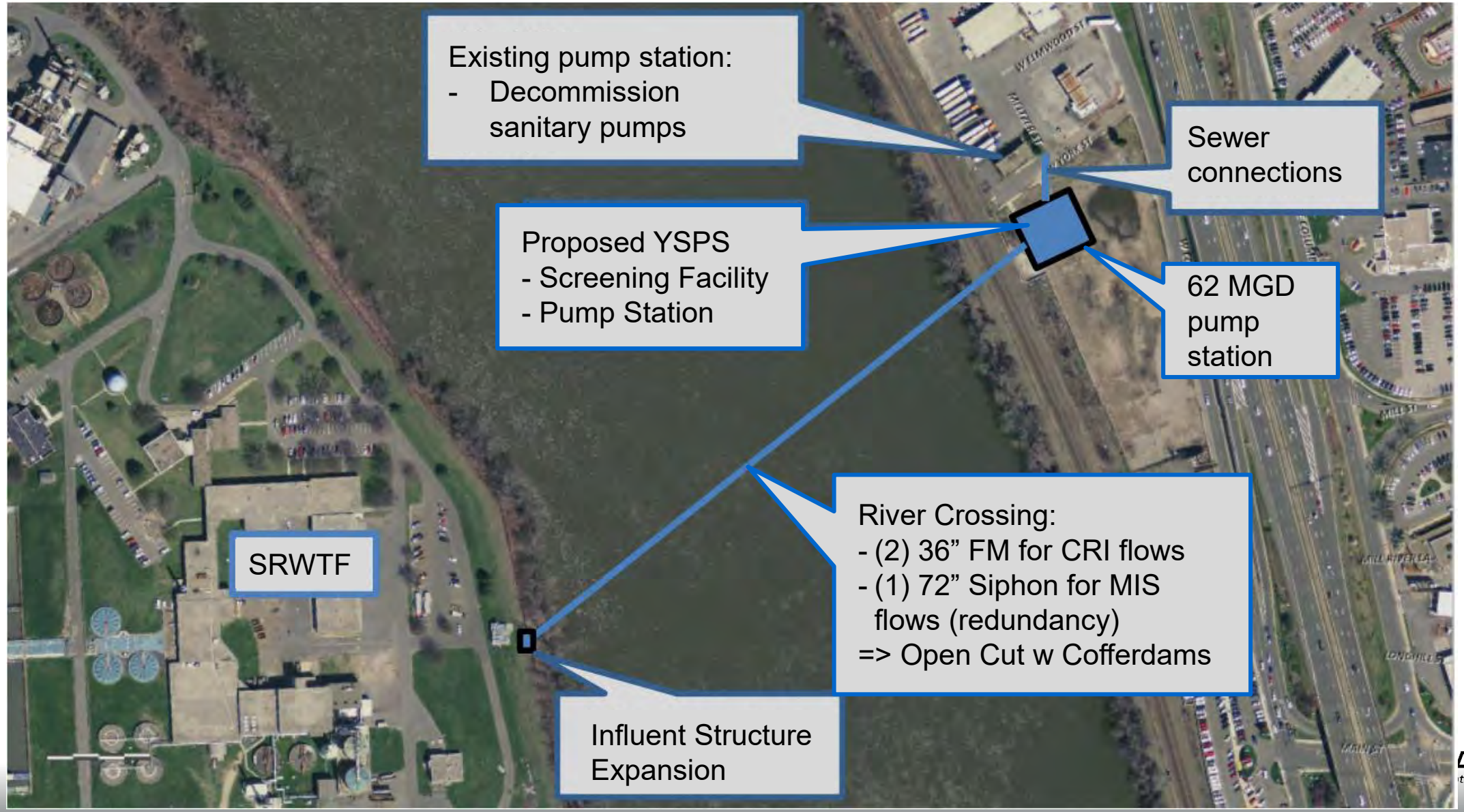
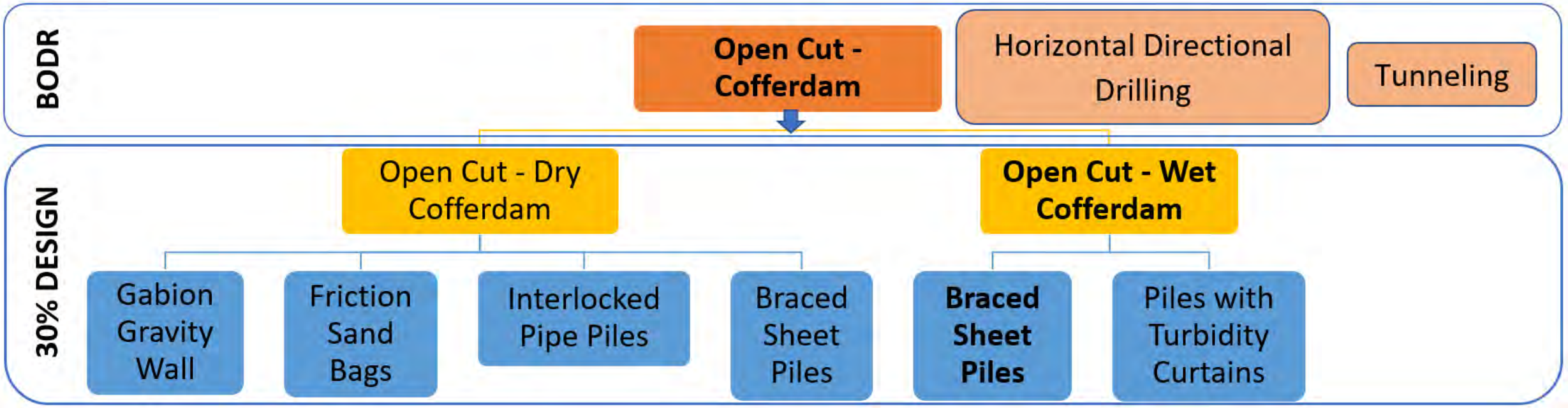
Recommended Alternative – Open Cut



River Crossing Refinement

Cofferdam Approach



1. Geotechnical Conditions
2. Structural Assessment
3. Regulatory and Environmental Considerations

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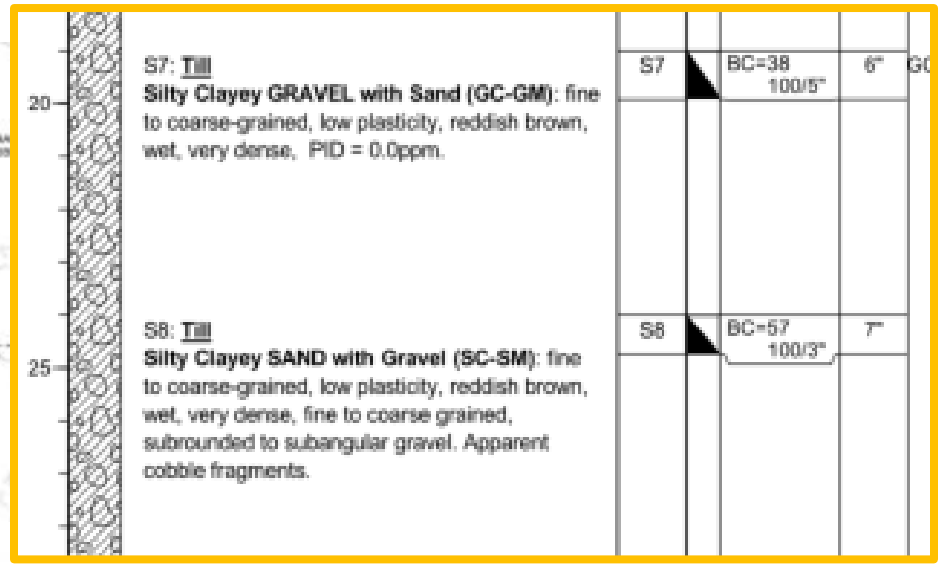
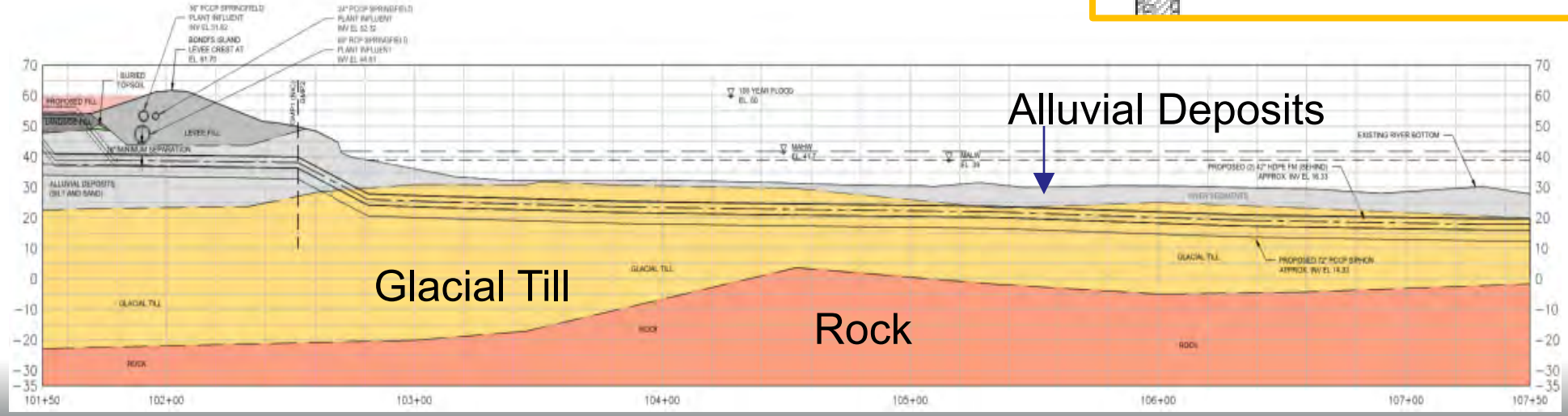
River Crossing Refinement

Geotechnical Condition





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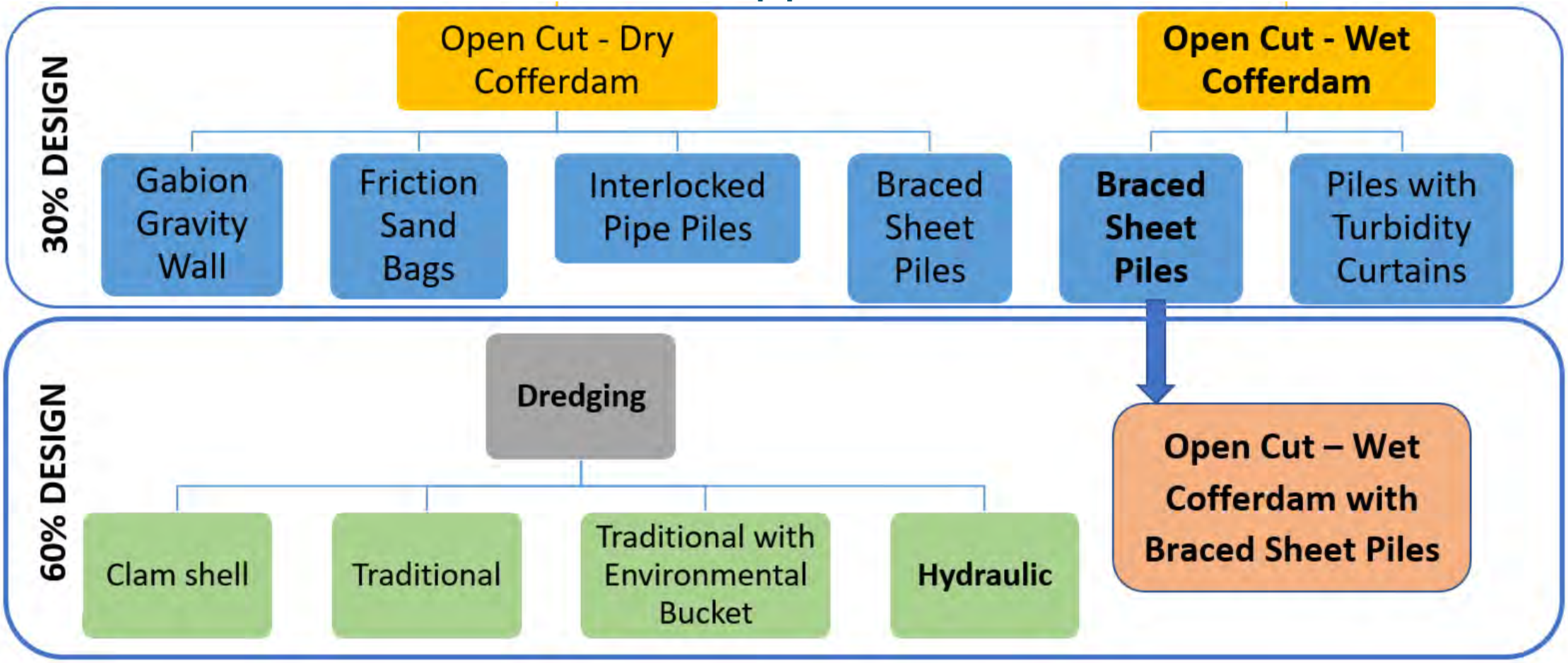
River Crossing Refinement

Other Approaches



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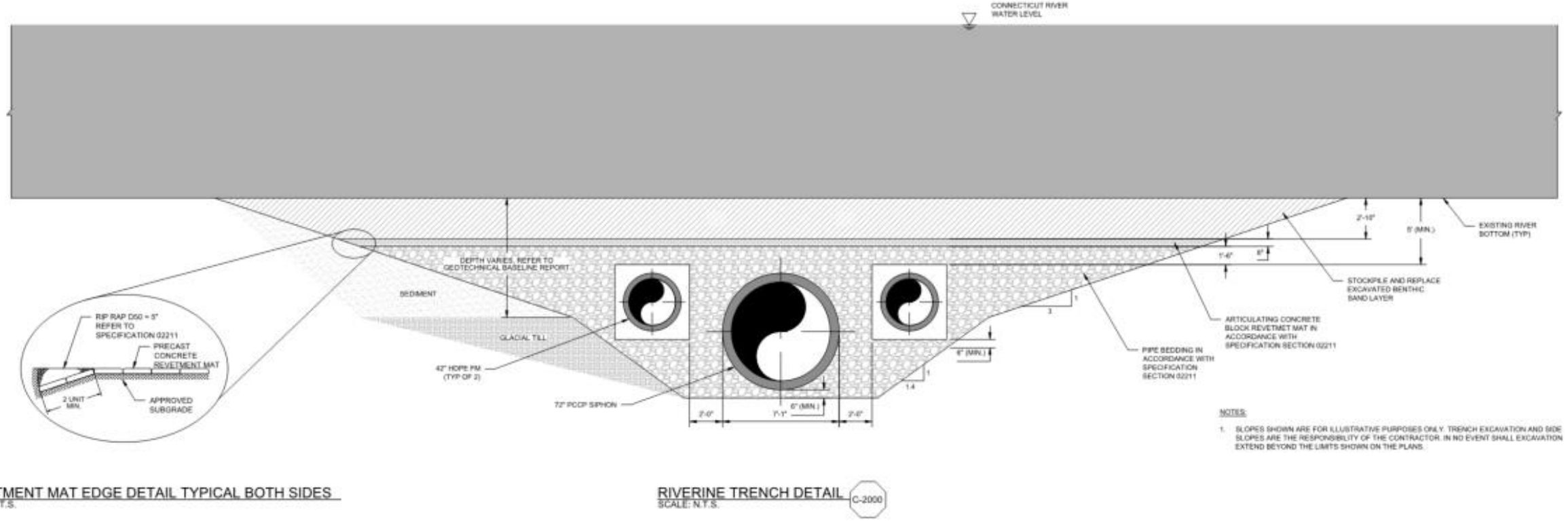
River Crossing Refinement

Final Design: Dredged Crossing



REVETMENT MAT EDGE DETAIL TYPICAL BOTH SIDES
SCALE: N.T.S.

RIVERINE TRENCH DETAIL C-2000
SCALE: N.T.S.

- ✓ Geotechnical Conditions
- ✓ Structural Assessment
- ✓ Regulatory and Environmental Considerations

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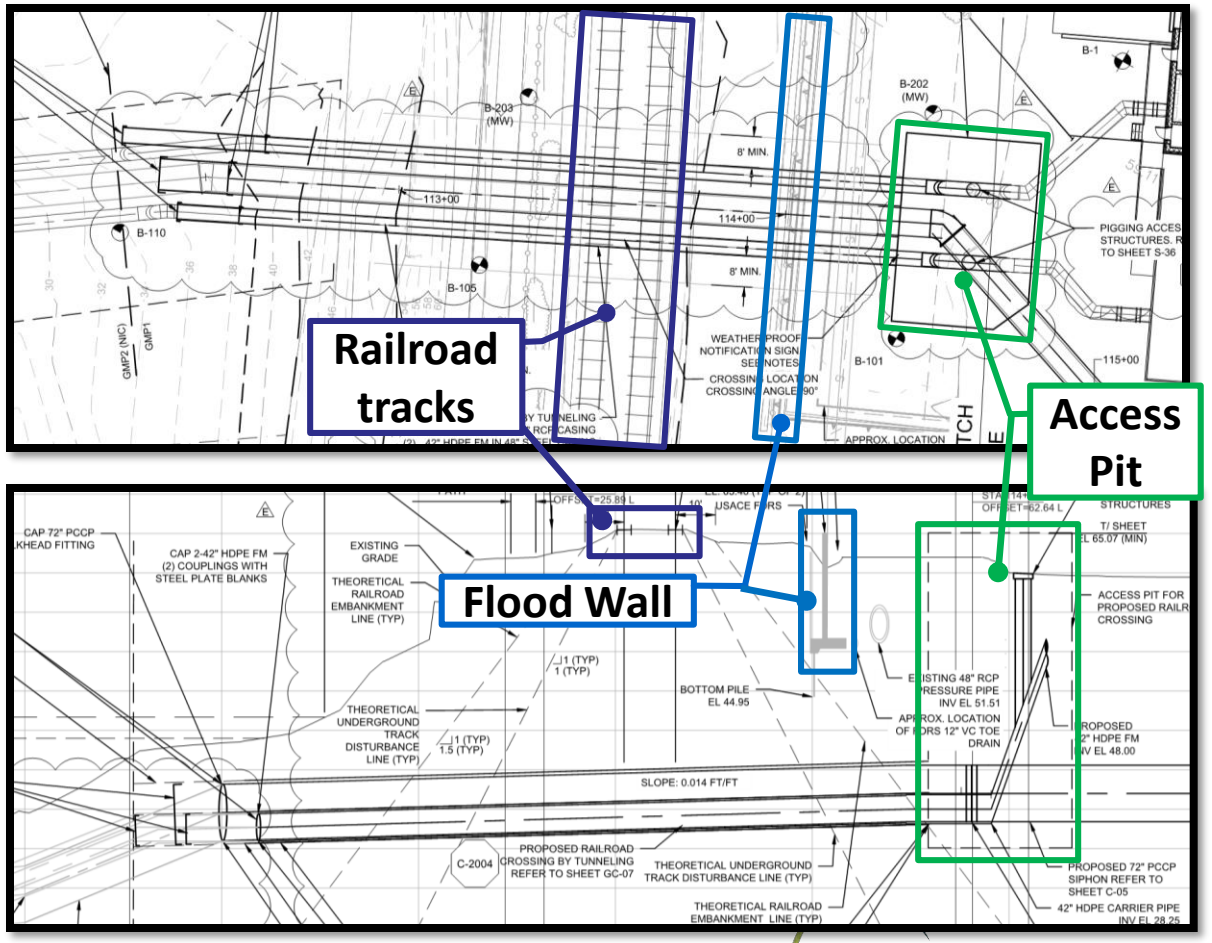
Railroad and Flood Wall Crossing

Final Design: Micro-tunneling



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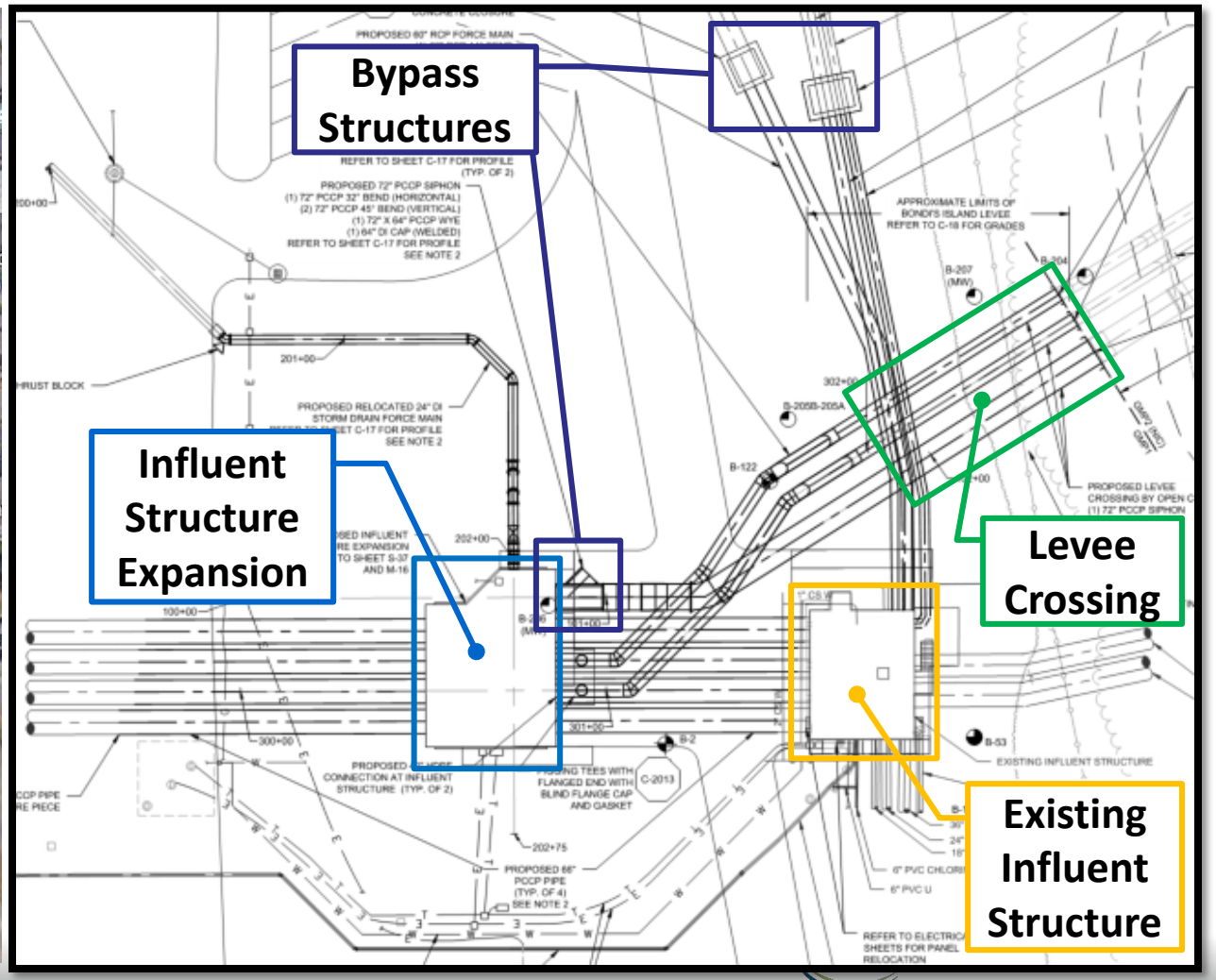
Influent Structure Expansion & Levee Crossing

Final Design: Open Cut with Bypass



Status of Project

- Project was bid under Chapter 149A (Construction Manager at Risk alternate delivery method)
- Project bid in two phases:
  - GMP1 – York Street Sewer Pump Station and Springfield Regional Wastewater Treatment Facility
    - *Construction on-going through May 2021*
  - GMP2 – Connecticut River Sewer Force Mains and Interceptor Crossing
    - *Currently in proposal phase – received*
    - *Anticipated Award – February 13, 2020*
    - *Construction anticipated to begin – May 2020*
- Project to be fully completed by December 2021

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Construction – January 22, 2020

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Acknowledgements

Springfield Water and Sewer Commission
Joshua Schimmel, Executive Director
William Fuqua, Director of Wastewater Operations

Daniel O'Connoll's Sons (CMaR)

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