

# Referendum 2024

Harbor Pump Station, Davis Landing Bridge and Cousin's Island Safety Way

August 1, 2024

Steven S. Johnson, P.E., Town Engineer



# Referendum Proposal

CRITICAL FINANCIAL NEED FOR THREE  
LARGE CAPITAL PROJECTS IN TOWN:

- HARBOR SEWER PUMP STATION REPLACEMENT
- DAVIS LANDING BRIDGE REPLACEMENT
- COUSIN'S ISLAND WALKWAY REPLACEMENT

# Request is to move a referendum warrant forward to the November ballot for citizen consideration in the amount of \$10,500,000.

- ▶ Tonight's presentation will touch on the project need, work scopes and estimated project budgets only;
- ▶ Financial information, such as debt service, budget impacts and financial schedules will be presented and discussed at future meetings;
- ▶ The Town Manager and Finance Director are working with our financial partners to develop this key fiduciary information, and it will be available soon.



## Harbor Sewer Pump Station Replacement Project

Existing pump station located on Lafayette Street just east of Pleasant Street.

# System Background

- ▶ Harbor is the largest of over 30 pump stations the Town owns and is one of the oldest; constructed in 1967 with new pumps installed in 1992;
- ▶ The Harbor pump station conveys 85% of the Town's sewer flow and is the only location that provides grit removal from the flow;
- ▶ This station is a dry well/wet well configuration and has three (3) pumps, two being 50 HP pumps and one 40 HP pump;
- ▶ The maximum pumping capacity of the station is 3,090 GPM;
- ▶ Discharge flow from the station is conveyed to the wastewater plant through two force mains, one 12" diameter pipe and one 14" diameter pipe;
- ▶ The station has been well maintained over its life, but is no longer code compliant; will require significant structural repairs and is at the end of its service life;
- ▶ Additionally, grit removal is inefficient and poorly designed allowing downstream grit impacts and requiring unusually high operational maintenance needs.

# Key project considerations

- ▶ Address grit removal;
- ▶ Provide for less operational maintenance and cleaning frequency;
- ▶ Improve safety of the site;
- ▶ Meet required building and safety code;
- ▶ Embrace industry best practices for pump station design and operation;
- ▶ Ensure long term viability of this critical pumping station for environmental protection and permit requirements.

# Grit Removal-the basics!

- ▶ Grit is inorganic material that does not break down during the treatment process and must be manually removed. Includes rocks, sand, coffee grounds, broken glass, eggshells, bone particles, etc.
- ▶ Grit is abrasive and if not removed, impacts downstream systems and operations;
- ▶ Grit is introduced through laundry, disposal units, broken pipes and manhole cover infiltration.
- ▶ Grit is removed through pipe cleaning, pump station wet well cleaning and via a cyclone separator at Harbor.





# Impacts of grit

- ▶ Grit wears on down stream pipes, pumps, valves and fittings;
- ▶ Grit settles in the aeration basin and requires removal;
- ▶ Grit causes unscheduled maintenance and repair at a significant cost;
- ▶ Grit can cause environmental impacts through pipe wear.



# Living in a gritty world...

Wastewater plant cast iron housing worn through by grit...  
and we have many other examples.





# Harbor Pump Station

# Concept Plan Process

- ▶ Town retained Wright-Pierce Engineers (W-P) of Topsham to perform an analysis of the station and develop conceptual design alternatives and associated costs;
- ▶ W-P performed site visits, evaluated Yarmouth's flow and system data, reviewed operational needs from employees, evaluated current best design and operational practices, evaluated current building code requirements and reviewed Yarmouth's current permitted status;
- ▶ Yarmouth staff performed site visits to other municipalities to review different pump station configurations and types including submersible type pump stations as well as review of different grit removal systems;
- ▶ Key considerations of plan:
  - ▶ Provide for long term solution to grit issue, i.e. improving efficiency of removal, handling and transportation of grit for 100% of the flow;
  - ▶ Provide for system degradation at the plant headworks;
  - ▶ Provide for long term solution to the pump station condition and inefficiencies, with an eye on improved safety and maintenance criteria;
  - ▶ Investigate current industry design standards for pumping stations.

# Report Alternatives

- ▶ Five alternatives:
  - ▶ Do nothing, although not a serious option in this case;
  - ▶ 1: Comprehensive upgrade of existing pump station;
  - ▶ 2: Comprehensive upgrade of existing pump station and relocate grit removal to the wastewater plant;
  - ▶ 3: Demolish existing pump station and replace with new submersible station and relocate grit removal to the wastewater plant;
  - ▶ 4: Retrofit and reuse existing below grade infrastructure with new submersible station and relocate grit removal to the wastewater plant.

# Alternative 1: Comprehensive upgrade to the existing pump station

- ▶ Includes comprehensive upgrade to the building envelope, pump replacement including motors and controls, repairs to grit tank, channels and wet well. Includes a new backup generator, electrical service and HVAC system to meet code.
- ▶ Alternative would not address grit deficiencies as well as operational and safety concerns; two critical project requirements.
- ▶ This alternative was the lowest cost option while essentially the status quo.

## Alternative 2: Provide a comprehensive upgrade to the existing pump station and relocate grit removal to the wastewater plant.

- ▶ Includes comprehensive upgrades to the building envelope along with demolition of the existing grit removal infrastructure and converting the mechanical room to a new mechanical/electrical room. This will provide new equipment and improved operational cost of the code required HVAC system;
- ▶ Option maintains the existing wet well/dry well configuration while replacing the pumps, controls and electrical infrastructure similar to Alternative 1;
- ▶ Option provides for new aerated grit removal system with clamshell handling equipment at the wastewater plant as well as improvements to the headworks. This will provide more efficient grit removal for 100% of the flow and will greatly simplify grit handling and transportation.
- ▶ Option will not address all of the safety and operational concerns of the dry well/wet well configuration.

### Alternative 3: Demolish the existing pump station in its entirety and replace with a new submersible pump station. Grit removal would be relocated to the wastewater plant.

- ▶ This alternative would provide by-pass pumping during construction and the full demolition of the existing pump station. A new wet well, valve vault and flow splitter structure would be installed including new submersible pumps, rails and valving. A new small wood framed building for the electrical service and controls would be installed as well as a new back up generator. Grit removal would be relocated to the wastewater plant as in Alternative 2.
- ▶ This option provides the required operational, code and safety improvements as well as addresses the grit issue, however this was the most expensive option by a significant margin.

Alternative 4: Demolish the existing above grade infrastructure and reconfigure/reuse the below grade wet well and dry well converting to a submersible pump and valve vault configuration. Grit removal would be relocated to the wastewater plant as in Alternatives 2 and 3.

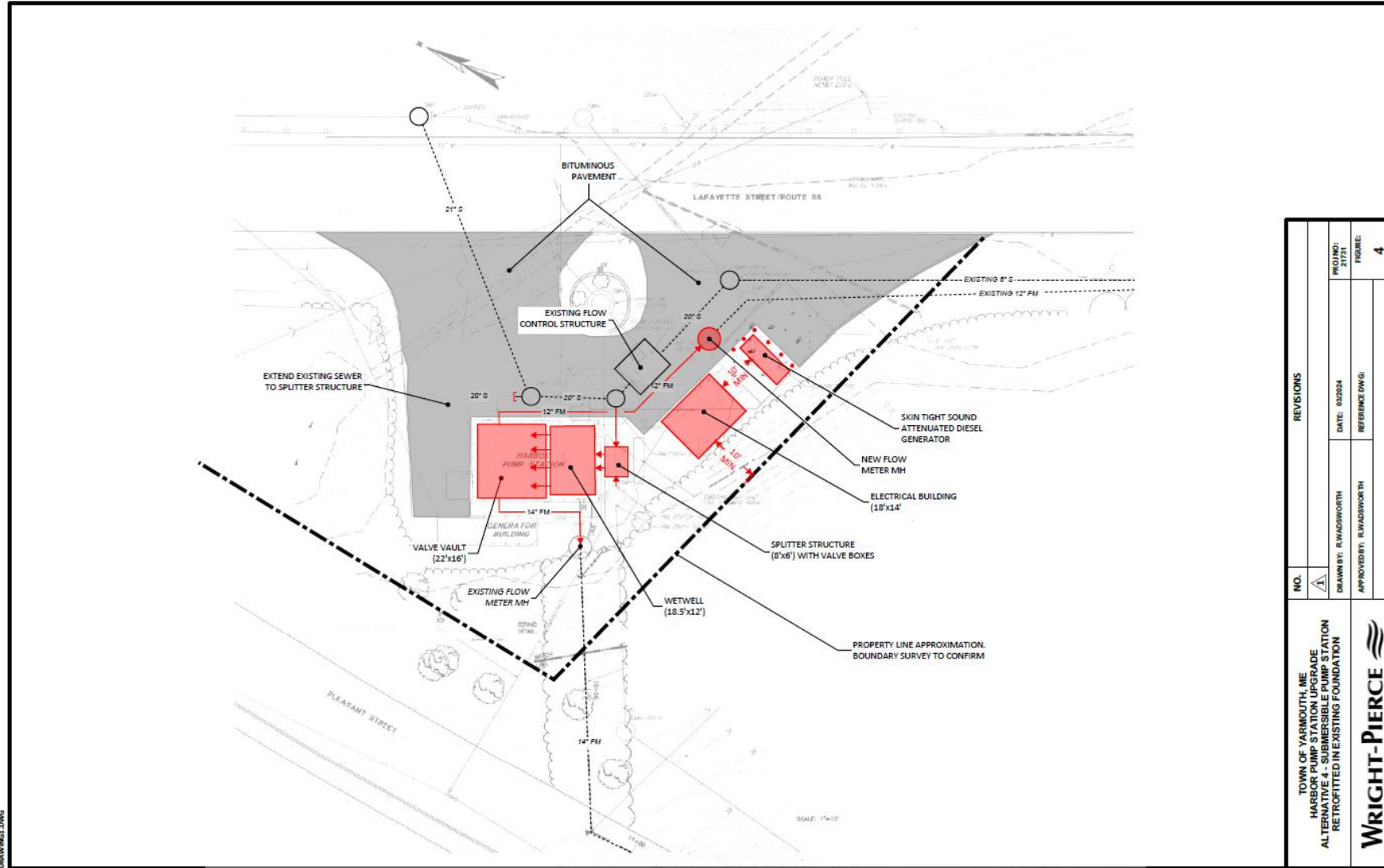
- ▶ This alternative would provide much reduced by-pass pumping during construction and the reconfiguration of existing pump station to a submersible station using the existing below grade infrastructure, at a significant cost savings.
- ▶ The existing dry well would be retained, improved, and converted to a wet well. The existing wet well would be filled and converted to a valve vault and flow splitter structure would be installed. This option would also include new submersible pumps, rails and valving. A new small wood framed building for the electrical service and controls would be installed as well as a new back up generator. Grit removal would be relocated to the wastewater plant as in Alternative 2 and 3.
- ▶ This alternative addresses all the key design parameters at a significant savings over Alternative 3 and is the selected alternative.



# Alternative Costs

	<b>Alternative 1</b>	<b>Alternative 2</b>	<b>Alternative 3</b>	<b>Alternative 4</b>
Pump Station	\$4,000,000	\$3,500,000	\$5,500,000	\$4,000,000
Headworks	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
Grit System	N/A	\$2,000,000	\$2,000,000	\$2,000,000
<b>Total Project</b>	<b>\$5,000,000</b>	<b>\$6,500,000</b>	<b>\$8,500,000</b>	<b>\$7,000,000</b>

# Recommended Alternative 4



NO.		REVISIONS	
DRAWN BY: R. WADSWORTH		DATE: 03/2024	
APPROVED BY: R. WADSWORTH		REFERENCE DWG.	
PROJECT NO: 21731		FIGURE: 4	

TOWN OF YARMOUTH, ME  
HARBOR PUMP STATION UPGRADE  
ALTERNATIVE 4 - SUBMERSIBLE PUMP STATION  
RETROFITTED IN EXISTING FOUNDATION

**WRIGHT-PIERCE**



## Davis Landing Bridge Replacement Project

Existing Bridge located on East Main Street southwest of Granite Street

# Project Background

- ▶ Town owned bridge that carries East Main Street over Pratt's Brook;
- ▶ Bridge was constructed in 1936 with minor capital work performed since;
- ▶ The span is 15 feet with a maximum structure length of 19 feet;
- ▶ State law assigns ownership of bridges with a span of less than 20 feet to the Town;
- ▶ MDOT is responsible for inspecting their bridges and significant local spans at least every two years. Inspections occur more frequently for structures where the conditions or site issues require additional oversight;
- ▶ MDOT has the authority to post a bridge with a maximum allowable vehicle load or even close a bridge to traffic should conditions require it.
- ▶ Davis Landing bridge is inspected every year due to its poor condition although it currently maintains its full load rating.

# Existing Conditions

- ▶ Davis Landing Bridge was last inspected by MDOT on October 11, 2023;
- ▶ Its ratings ranged from 3 (serious condition) for the substructure to 5 (Fair Condition) for the deck and superstructure. These ratings are on a scale of 10;
- ▶ The bottom bridge deck has areas of exposed reinforcing steel and heavy map cracking;
- ▶ The concrete wingwalls exhibit heavy spall and section loss;
- ▶ One wingwall has large cracks and has rotated about a foot from plumb;
- ▶ There are large voids and cracks in and beneath the abutments;
- ▶ The approach guardrails and transitions do not meet safety standards;
- ▶ Generally, the bridge is at the end of its service life.

# Existing Condition Photos: bridge deck

Note map cracking and exposed rebar



# Southwest Wingwall:

Note vertical crack and rotation of the wingwall.



Southeast Wingwall: note heavy section loss due to spalling and wingwall overhang.





Southwest Wingwall: close up view of vertical crack and abutment shift of about two feet.

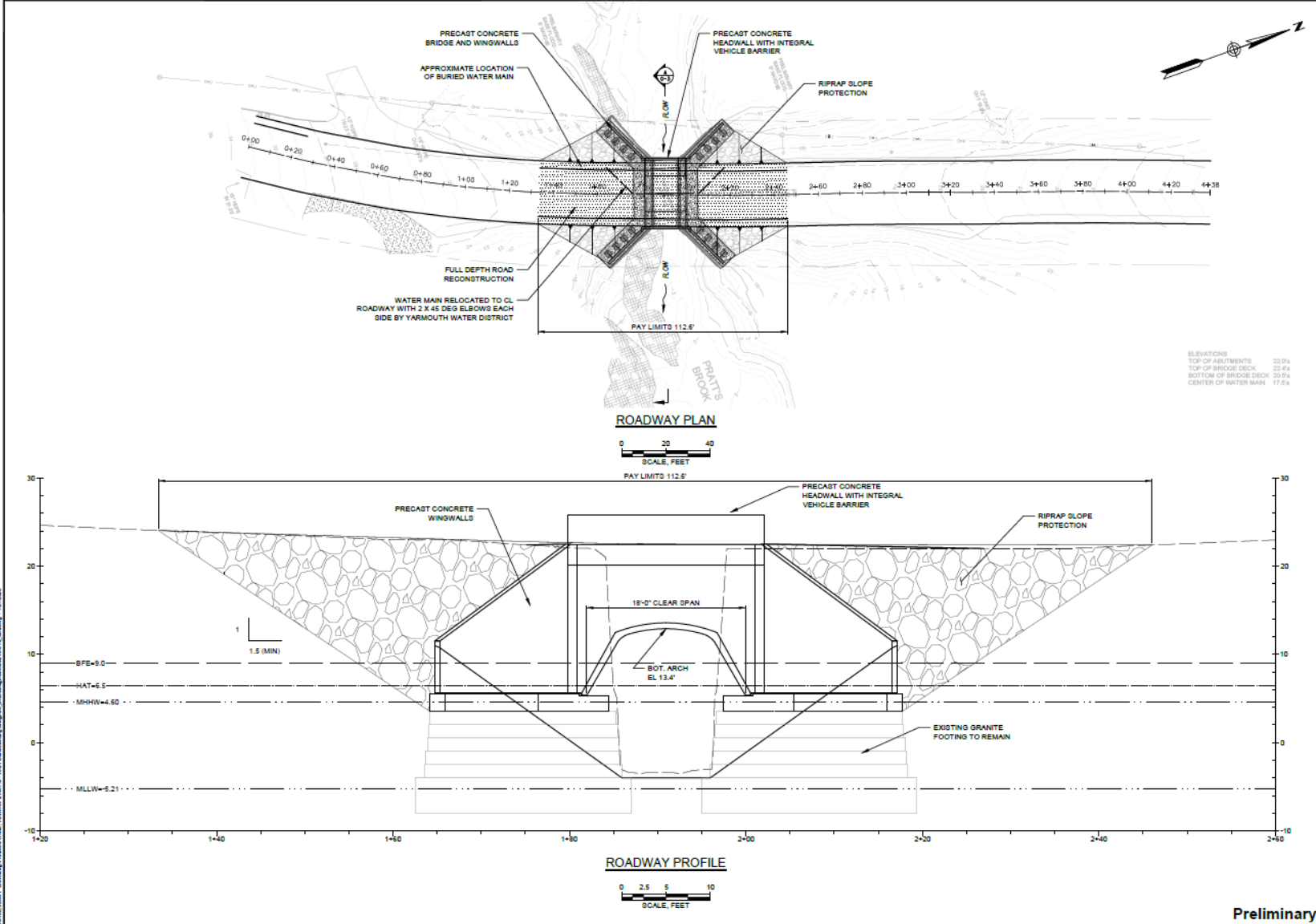




# Concept Plan

- ▶ The Town retained GEI Consultants of Portland to develop construction documents and opinion of probable cost for the replacement of the bridge;
- ▶ The Town and GEI worked with MDOT, Army Corps of Engineers (ACOE), US Coast Guard and stakeholders to develop a cost-effective replacement option for the bridge;
- ▶ The recommended plan is to replace the existing bridge with a pre-cast concrete arch structure and pre-cast concrete headwall with integral vehicle barrier;
- ▶ Project anticipates repairing and reusing the existing granite abutment structure saving cost and time as well as minimizing the amount of in-water work;
- ▶ The proposed bridge width is 28' 8" and a span length of 18' 0";
- ▶ Work will include adjustment of an existing water main.

# Proposed Plan and Profile view



TOWN OF YARMOUTH  
200 MAIN STREET  
YARMOUTH, ME

**DAVIS LANDING BRIDGE  
REPLACEMENT**  
EAST MAIN STREET  
YARMOUTH, MAINE 04096

P/E No.:  
Approved:  
Checked:  
Drawn: JLD  
Designed: BJB  
GEI Project: 2104779

Attention:  
If this scale bar does not measure 1" then drawing is not original scale.

NO	DATE	ISSUES/REVISION	APP

SHEET NAME

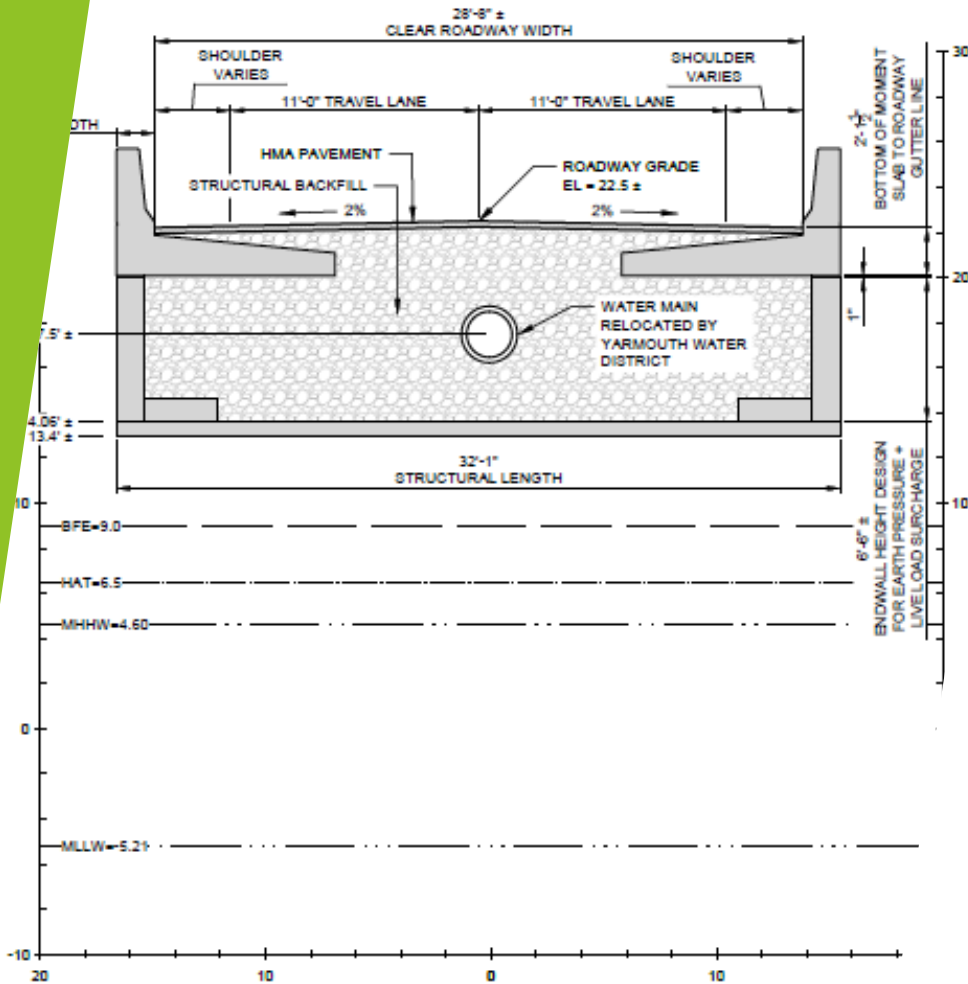
PROPOSED PLAN & PROFILE

SHEET NO.

C-2

Preliminary

# Proposed Cross Section view



**BRIDGE TRANSVERSE SECTION**



- ▶ Bridge requires fill above the pre-cast arch to achieve grade and to allow relocation of water main in a more typical installation.
- ▶ Pre-cast gravity headwalls and vehicle barriers provide required support and protection to users.

# Project Cost

GEI developed an Opinion of Probable Cost (OPC) for the bridge replacement and is estimated to be \$1,500,000;

Includes construction costs, Construction Engineering (CE) costs, a contingency at 10% in 2024 dollars as well as escalation costs for projected construction in 2026 construction season.



# Cousin's Island Safety Way

On and off-road pedestrian  
route on Cousin's Street.

# Project Background

- ▶ The safety way is a heavily used pedestrian walkway on Cousin's Street that starts at Sandy Point Beach and ends at Wharf Road;
- ▶ The walkway was constructed several decades ago and is intended to provide a safe and convenient route for pedestrians along the axis of Cousin Island to connect to the Snodgrass Bridge;
- ▶ There has been minimal capital maintenance to the walkway over the years and the existing infrastructure is in poor condition throughout its length;
- ▶ Additionally, the walkway does not meet current Americans with Disabilities Act (ADA) or Town standards;
- ▶ The walkway is narrow, out of shape with non-standard cross slope and has serious defects. There are no crosswalks providing safe access to streets along the sidewalk corridor.



# Existing Conditions





# Existing Conditions



# Existing Conditions

# Concept Plan

The Town has developed a schematic concept for replacement of the walkway

Includes reconstruction of the walkway to the required standards including

- Six-foot wide bituminous walkway in the same general alignment and meeting ADA standards;
- Installation of new crosswalks and signage at all intersections to serve side streets;
- Installation of new curb and drainage infrastructure as required;
- Revegetation of all disturbed areas as required.



# Project Concept

# Proposed Program

- ▶ Project will include soliciting survey and engineering proposals for final design, including development of construction documents, public outreach and Town staff coordination;
- ▶ Solicit bid proposals for the project construction and provide construction engineering for the project delivery;
- ▶ Anticipated construction during 2026 construction season.





# Project Cost

- ▶ Staff has developed an Opinion of Probable Cost for the project, estimated at \$2,000,000;
- ▶ Work includes:
  - ▶ Entire project scope from Sandy Point to Wharf Road;
  - ▶ Construction including a 20% contingency;
  - ▶ Engineering and Survey at 10% of the construction cost;
  - ▶ An allowance for ledge removal to install drainage;
  - ▶ An escalator anticipating construction in 2026



**YARMOUTH**  
MAINE

## Questions?

- ▶ Steven S. Johnson, P.E.
- ▶ Town Engineer