PUBLIC PRESENTATION
CENTER STREET OVER HARRY BROOK

Prepared for the Town of Goffstown, NH

April 24, 2023

QUANTUM CONSTRUCTION CONSULTANTS, LLC
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WHO WE ARE

- **Civil and Structural Engineering Firm Located in Concord, NH**
- **Specializing in Municipal Bridge and Roadway Design**
- **Experienced with NHDOT Bridge Aid Process**
- **Success With Similar Bridge Replacement Projects**

Presented by:
Anna Giraldi & Rick Wolf

MUNICIPAL BRIDGES | STATE FUNDING

NHDOT Bureau of Planning & Community Assistance

- Program averages $6.8 million per year with an average project cost of $900K,
- Funding Source: 80% NHDOT / 20% Town of Goffstown
- New projects are currently programming in FY 2032

MUNICIPALLY MANAGED BRIDGE AID PROCESS

- Funding Approval & QBS Selection of Consultant
- **Engineering Study**
- Preliminary Plans Specifications & Estimate (PPS&E)
- Final Plans Specifications & Estimate (PS&E)
- Bid Phase FY 2025 for Center Street
- Reimbursement of Design Costs (80%)
- Advancement of Construction Cost (40%)
- Construction Engineering Contract with Different
- Engineering Firm
- Final Reimbursement (Balance of 80% of Total Project Cost)

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- **Scoping Session**
  - Establish Project Purpose and Need

    - **Purpose:** The purpose of this project is to correct the structural and hydraulic deficiencies and provide safe, year-round, vehicular travel on Center Street.

    - **Need:** This project is needed because the Corrugated Metal Plate Arch (CMP) has corrosion at the invert and the hydraulic connectivity is poor. The CMP is not on the Municipal Red List, but has an E-2 posting.

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- **Design Criteria**
  - NHDOT Bridge Design Manual
  - NHDOT Highway Design Manual
  - NHDOT Standard Specifications for Road & Bridge Construction
  - AASHTO LRFD Bridge Design Specifications
  - Manual on Uniform Traffic Control Devices
  - AASHTO Geometric Design of Highways and Streets

Town would like Accelerated Bridge Construction (ABC) during School Summer Break

MUNICIPALLY MANAGED BRIDGE AID PROCESS

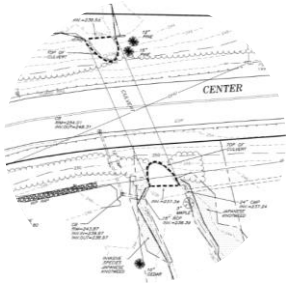
ENGINEERING STUDY: CENTER STREET OVER HARRY BROOK

- Scoping Session
- Design Criteria
- **Existing Conditions**
    - 18-foot span CMP
    - Built in 1972
    - Corrosion of the CMP invert
    - Poor hydraulic connectivity
    - Bridge approach rail ends are substandard

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- **Hydrologic & Hydraulic Analyses**
  - Determine flows for various flood events
  - Determine water surface elevations at flood events
  - Determine stream velocities
  - 1 foot hydraulic clearance to underside of superstructure during 50-year flood event
  - Check clearance at 100-year flood event
  - Existing culvert does meet the NHDOT required criteria, but does so with high water velocities



MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- **Soil Borings**
    - B1 - Sand and Gravel (Fill)/Glacial Till
    - B2 - Sand and Gravel (Fill)/Glacial Till/Bedrock

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- **Bridge Replacement Study**
    - Do-Nothing or No-Build Alternative
    - Does not improve hydraulic capacity or resolve poor hydraulic connectivity
    - Poses a public safety issue as the bridge/culvert will continue to deteriorate

BRIDGE OPTIONS:

CENTER STREET
OVER
HARRY BROOK

Precast Concrete Arch Bridge on Precast Concrete Pedestal Walls

The most economical solution with ABC approach
Construction cost - $3,658,000

Precast NEXT Beam Bridge on Precast Concrete Abutments

Construction cost - $6,242,000

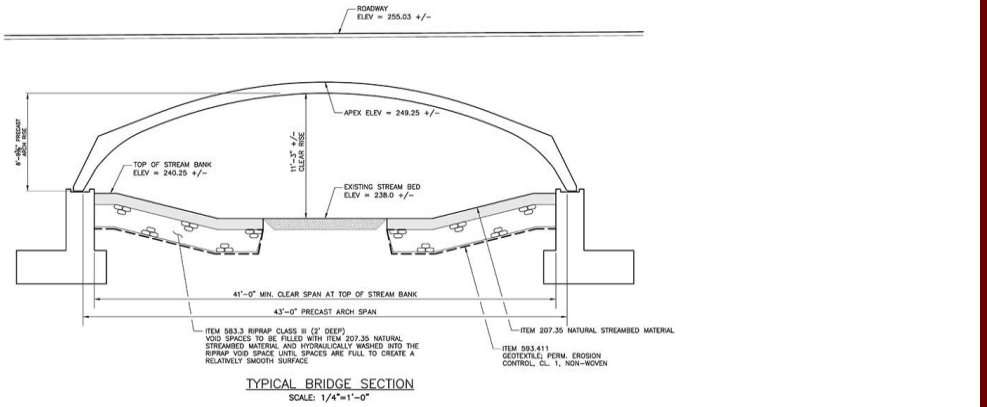
Steel Girder Bridge on Precast Concrete Abutments

Construction cost - $6,716,000

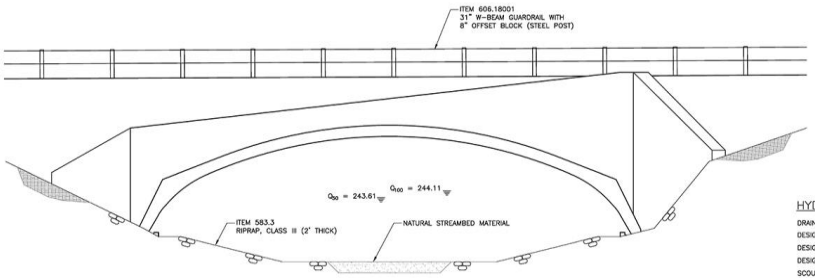
RECOMMENDED BRIDGE REPLACEMENT

Precast Concrete Arch on Precast Concrete Pedestal Walls

Center Street



TYPICAL BRIDGE SECTION
SCALE: 1/4"=1'-0"



DOWNSTREAM ELEVATION
SCALE: 1/4"=1'-0"

HYDRAULIC DATA:

DRAINAGE AREA:	7.83 SQ.MI.
DESIGN FLOOD DISCHARGE (50 YR):	1039 CFS
DESIGN FLOOD ELEVATION (50 YR):	243.61 FT
DESIGN FLOOD VELOCITY (50 YR):	6.08 FPS
SCOUR CHECK DISCHARGE (500 YR):	1340 CFS
ANTICIPATED DEPTH OF SCOUR (100 YR):	14.2 FT
ANTICIPATED DEPTH OF SCOUR (500 YR):	14.8 FT
BRIDGE FULL WATERWAY OPENING PERP. TO RIVER:	326 SF

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

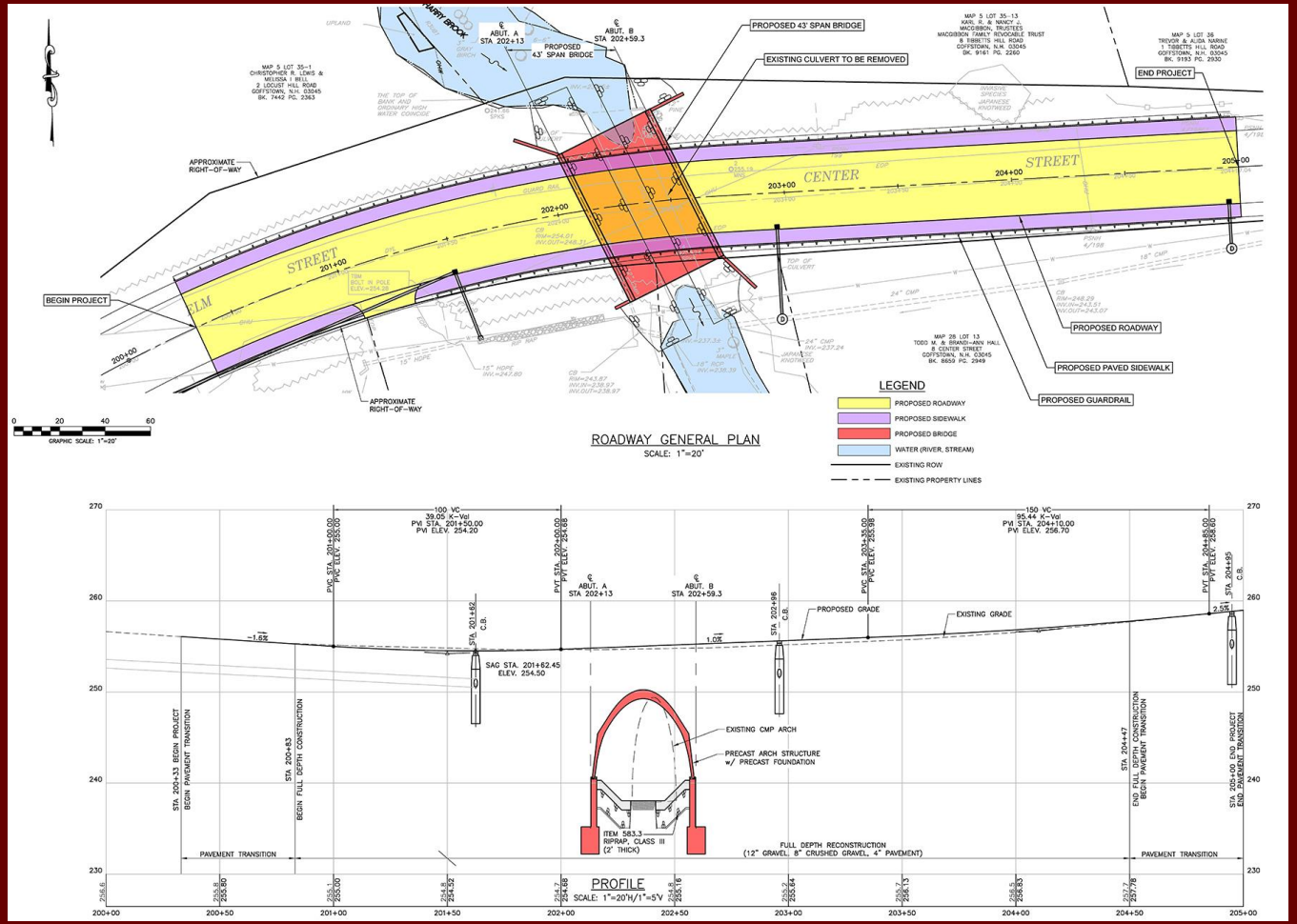
- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- **Traffic Control - Road Closed with Temporary Off-Site Detour Road**
    - Approximate 9 week Construction Period during school summer break

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- Traffic Control, Road Closure, Detour Plan
- **Roadway Alignment**

Center Street



MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- Traffic Control, Road Closure, Detour Plan
- Roadway Alignment
- **Environmental & Cultural Resources Considerations**
    - NHDES Standard Dredge and Fill Wetlands Permit required
    - No Endangered or Threatened Species will be impacted
    - The existing bridge/culvert is not considered historical

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- Traffic Control, Road Closure, Detour Plan
- Environmental & Cultural Resource Considerations
- **Right of Way / Easements**

Right of Way / Easements

- Project impacts abutters
- Easements will be required
- Easement plans will be developed by QCC
- The Town will negotiate permanent and temporary easements with the affected property owners

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- Traffic Control, Road Closure, Detour Plan
- Environmental & Cultural Resource Considerations
- Right of Way / Easements
- **Construction Cost Estimate - $3,658,000 Bridge Option I**

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- Traffic Control, Road Closure, Detour Plan
- Environmental & Cultural Resource Considerations
- Right of Way / Easements
- Construction Cost Estimate
- **Public Information Meeting**

MUNICIPALLY MANAGED BRIDGE AID PROCESS

ENGINEERING STUDY

- Scoping Session
- Design Criteria
- Existing Conditions
- Hydrologic & Hydraulic Analyses → Bridge Geometry
- Soil Borings
- Bridge Type Study
- Traffic Control, Road Closure, Detour Plan
- Environmental & Cultural Resource Considerations
- Right of Way / Easements
- Construction Cost Estimate
- Public Information Meeting
- **Engineering Study Report**

PREFERRED ALTERNATIVE & RECOMMENDATIONS

- Bridge replacement with a 43-foot precast concrete arch on precast concrete pedestal walls
- Roadway alignments similar to existing alignment with off-site roadway detour
- Fastest construction time
- Lowest cost during construction and over the lifespan of the bridge

Recommendations:

- Complete Final Design and permitting of projects
- Request NHDOT reimbursement

MUNICIPALLY MANAGED BRIDGE AID PROCESS

SCHEDULE

- Complete design in 2024
- Start Construction in 2026

BRIDGE PROJECTS SIMILAR TO RECOMMENDED OPTION

Questions?

THANK YOU

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