Rehabilitation of West Main Street Culvert and Shirley Street Bridge

Town of Ayer

November 22, 2016

Hoyle, Tanner & Associates, Inc.

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Agenda

Outline

- Introductions
- Project Goals and Objectives
- Existing Conditions Review
- Design Considerations
- Alternatives Analysis
- Funding
- Next Steps
- Questions

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Project Goals and Objectives

Overview

- Identify Alternatives for Repair, Replacement, or Rehabilitation of Shirley Street and West Main Street Bridges.
- Engineering Study and Analysis of Viable Alternatives and Combinations
- Prepare a Preliminary Design Report and Decision Matrix to allow the Town to make informed decision on the preferred alternative.

Existing Conditions
West Main Street

- **West Main Street over Nonacoicus Brook**
  - Variable span length – maximum 10’
  - Stone, masonry, & concrete abutments
  - Poor-to-severe condition (HTA August, 2015 Report)
    - Scour at inlet end
    - Loss of mortar from joints
    - Spalling of concrete facing
    - Abutment cracking
    - Misaligned with brook
    - Utilities in bridge opening

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Existing Conditions
West Main Street

- Existing Curb-to-Curb Pavement Width is 35’
- Eastbound Sidewalk Discontinuity
  - Mid-Block Crossing Just West of the Bridge
  - Non Compliant ADA Wheelchair Ramps
- Lack of Bicycle Accommodations

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Existing Conditions
Shirley Street

- **Shirley Street over Nonacoicus Brook**
  - Maximum span approx. 11.5’
  - Stone & masonry abutments
  - Closed Summer 2014
  - Poor-to-severe condition (MassDOT Inspection)
    - Section loss on steel beams
    - Unstable abutments and wingwalls
    - Severe embankment erosion
  - Complete replacement or removal necessary

Existing Conditions
Shirley Street

- Inconsistent Pavement Width
- Bridge Currently Closed
- No Pedestrian Accommodations

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Design Considerations

- Structure Service Life
- Environmental Compliance & Hydraulics
- Utility Accommodation
- Bridge Aesthetics
- Roadway Improvements
- Traffic Management (During Construction)
- Project Costs vs. Benefits
  - ✓ Bridge Replacement Decision Matrix

Design Considerations

Environmental Compliance & Hydraulics

- **Structure Span Length & Hydraulic Opening**
  - **Environmental Considerations**
    - ✓ ***Openness Ratio***
    - ✓ ***Stream Crossing Guidelines***
    - ✓ ***BioMap 2 Zone***
- **Hydraulic Considerations**
  - **Analyze hydraulic performance of both structures**
  - **Structure sizing not hydraulically controlled**
    - ✓ ***Tailwater from Nashua River***

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Design Considerations

Utility Accommodation

- **Underground Utilities**
  - Water, Sewer, Gas, Telecom
- **Overhead Utilities**
  - Temporary relocation likely

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Design Considerations
Bridge Aesthetics

Concrete Formliner

Concrete Bridge Rail

Powder Coated Steel Bridge Rail

Design Considerations
Project Alternatives

- **West Main Street Bridge**
  - Complete Replacement
    - *Complete Road Closure with Detour*

      OR
    - *Maintain Traffic with Phased Construction*

- **Shirley Street Bridge**
  - Complete Replacement

    OR
  - Temporary Bridge for Traffic Control

    (w/ Bridge Removal and stream restoration)

    OR
  - No Improvements (“Do Nothing”)

Examples

Rigid Frame Construction

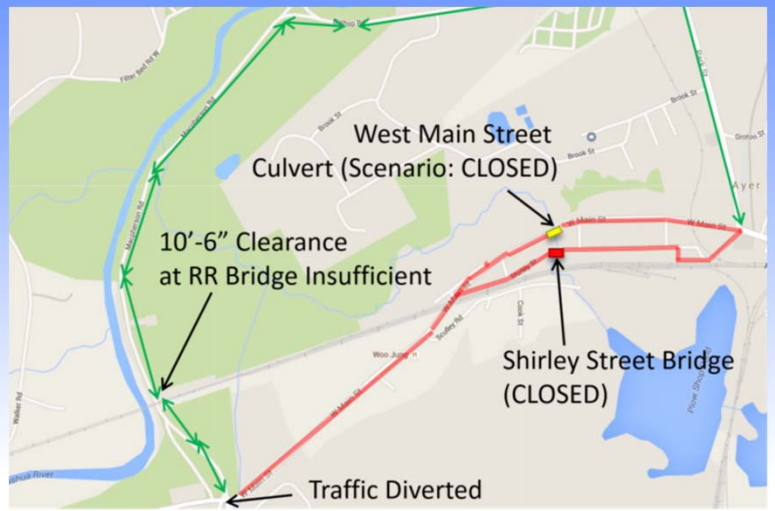
Examples

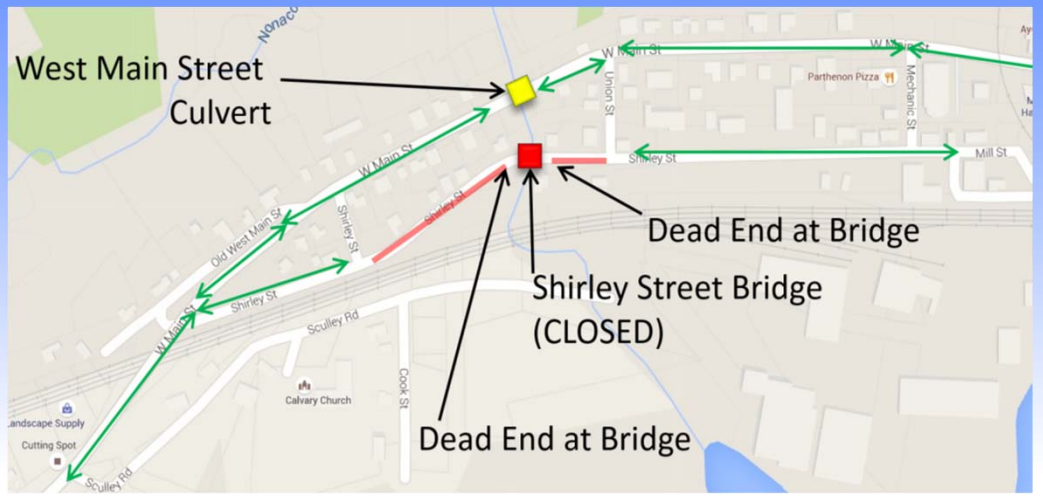
Similar Rigid Frame Bridges

Design Considerations

Traffic Management

- Traffic Accommodation During Construction
- Alternatives Being Considered:
  - Scenario 1 – West Main / Shirley Closed (Detours Required)
    - Park Street to Macpherson Rd / Barnum Rd to Jackson Road (South)
  - Scenario 2 - Closure of West Main Street for Replacement
  - Scenario 3 - Phased Construction of West Main Street Bridge





Design Considerations

Roadway Improvements

- **West Main Street Bridge**
  - Compliance with Complete Streets
    - *Pedestrian and Bicycle Accommodations*
  - Upgrade of Drainage System
  - Roadside Safety Features
  - Upgraded Signs and Pavement Markings

- **Shirley Street Bridge**
  - Pavement Rehabilitation
    - *Consistent Cross Section*
    - *Dead End Treatment*

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Roadway Improvements – Complete Streets

➢ West Main St. Bridge – Conceptual Layout

Alternatives Analysis

Bridge Replacement Decision Matrix

Alternative	West Main Street	Shirley Street	Advantages	Disadvantages	Cost
1	Rigid Frame – 28’ Span via Phased Construction	Complete Removal with Stream Restoration	• Removal of Shirley Street hydraulic constriction • Does not require the use of Shirley Street for a detour	• Signalized alternating one way traffic on West Main Street • Need to accommodate existing Shirley Street gas line • Challenging phased construction	$$$
2	Rigid Frame – 28’ Span via Phased Construction	Do Nothing	• Least amount of capital expenditure for Shirley Street • Does not require the use of Shirley Street for a detour	• Signalized alternating one way traffic on West Main Street • Maintains Shirley Street hydraulic constriction • Challenging phased construction	$$
3	Rigid Frame – 28’ Span via Complete Roadway Closure	Box Culvert – 20’ Span	• Two new structures with 75 year service life • Shorter West Main Street construction duration • Improved hydraulic capacity at Shirley Street	• Potential heavy traffic flow on Shirley street during West Main construction • Cost of construction for two new permanent bridges	$$$$
4	Rigid Frame – 28’ Span via Complete Roadway Closure	Temporary Bridge with Stream Restoration after West Main Street Construction is Complete	• Shorter West Main Street construction duration • Removal of Shirley Street hydraulic constriction	• Need to accommodate existing Shirley Street gas line • Potential heavy traffic flow on Shirley street during West Main construction	$

Municipal Small Bridge Program

Funding

- Recently signed legislation by Baker Administration.
- $50M appropriation over next 5 years.
- Targets municipally owned bridges spanning 10’ to 20’ that do not qualify for Federal Aid.
- Municipalities are eligible for $500,000 per year for design, construction, preservation, reconstruction and repair or improvement
- Town has submitted application for these bridges.

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Complete Streets Funding

- Include pedestrian / bicycle accommodation components into the Town's Prioritization Plan.

- Up to $400k available for eligible projects
  - Bike Lanes / Sharrows
  - Sidewalks
  - ADA Compliant Ramps

Next Steps

- **Anticipated Schedule**
  - **BOS Meeting – September, 2016**
  - **Public Input Meeting – November, 2016**
  - **Draft Preliminary Design Report – December, 2016**
  - **Present Draft Findings to BOS- January, 2017**
  - **Final Report – Spring 2017**
  - **Final Design – Summer 2017**

QUESTIONS?