# Bridge St. Pump Station & Force Main

HOYLE TANNER

# Bridge St. Pump Station & Force Main

## Need for Project:

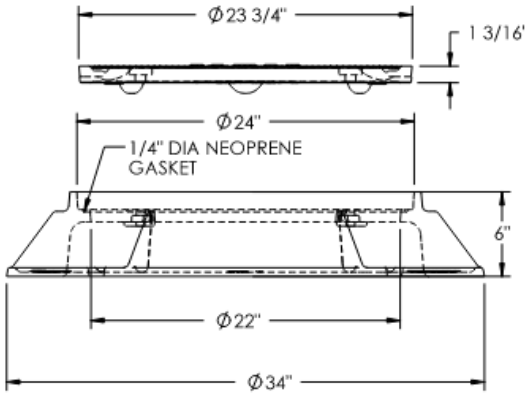
1. Pump Station:
- Sited within the floodplain, experiences frequent flooding
- Originally manufactured 75+ years old

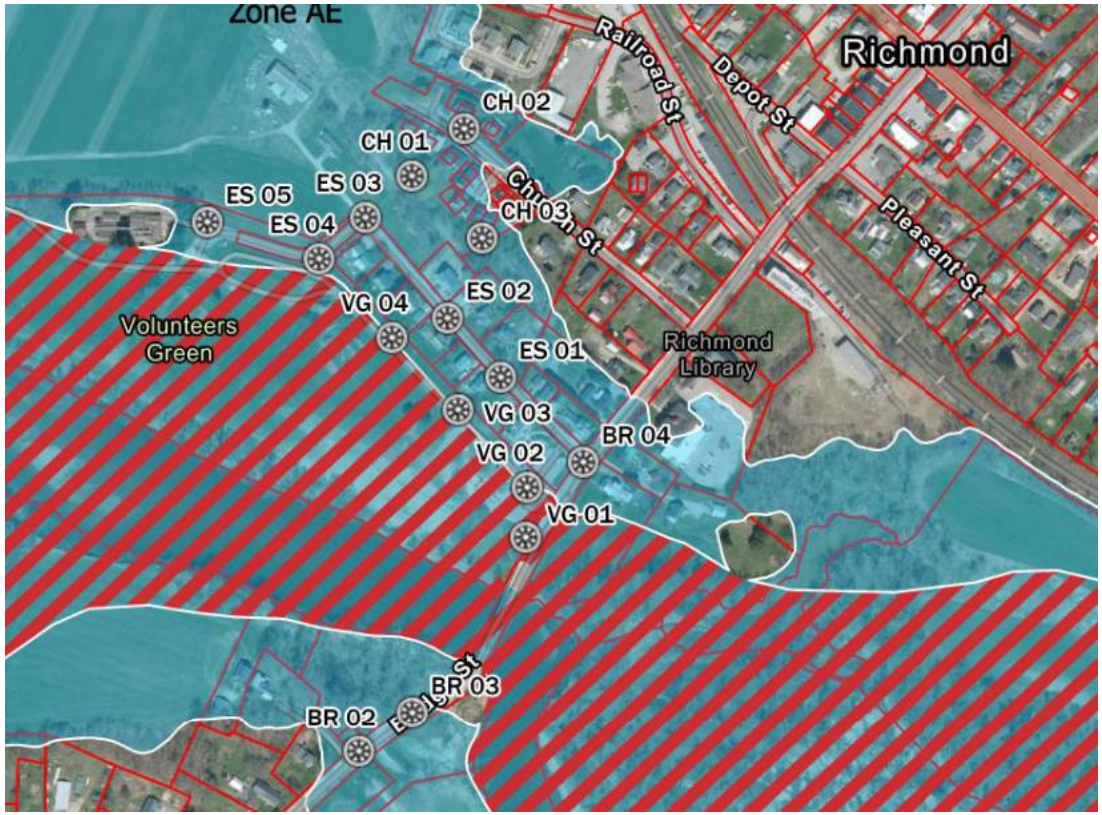
2. Force Main:
- Exposed to Winooski River floodwaters
- Has sustained damage from previous floods

3. Sewer Manholes:
-Installed in the floodplain, are not watertight

# Proposed Solution: Manhole Covers

- Replace manhole covers located within 100-year flood plain with replacement watertight covers
- Utilize a neoprene gasket and can be bolted down



# Identifying the Problem: Force Main

Primary Concern:

- Existing force main's current elevation is below the 100-year flood plain:
  - FEMA 100-Year Floodplain = 310.30
  - FEMA 500-Year Floodplain = 313.90
  - Approximate Existing FM = 309.19 (top of pipe)

Proposed Solutions:

- Increase elevation away from floodplain elevations
- Restore/Replace jacket, insulation, hangers
- Replace pipe with new, appropriately hydraulically sized FM

# Bridge St. Pump Station – Upgrade Location Alternatives


**Location 0:**
430 Bridge Street
(Existing Site)

**Location 1:**
457 Bridge Street

**Location 5:**
401 Bridge Street

# Bridge St. Pump Station – Upgrade Design Parameters

| Design Parameter | Criteria |
|---|---|
| **Current Average Daily Flow** | 9,267 gpd |
| **Future Buildout Average Daily Flow** | 19,978 gpd |
| **Pump Discharge Rate** | 58 gpm |
| **Total Dynamic Head** | 33-57 feet |
| **Force Main Pipe Sizing (varies by pump selection)** | 3” to 4”<br>(SDR9 or SDR11) |
| **Force Main Length (varies by location)** | 740-1,100 feet |
| **Velocity of Pumped Flow (varies by location and pump selection)** | 2.97 – 3.58<br>feet per second |
| **Wet Well Diameter/Depth (varies by location)** | 5 feet / 18-29 feet |

# Bridge St. Pump Station – Location #0

- Replace pump station at existing location
- Upgrade will necessitate the use of a raised platform and generator
- Very challenging site

<u>Environmentally Sensitive Areas of Concern:</u>

- Within a Vermont River Corridor
- Within a VSWI Class 2 Wetland
- Within the FEMA Special Flood Hazard Area

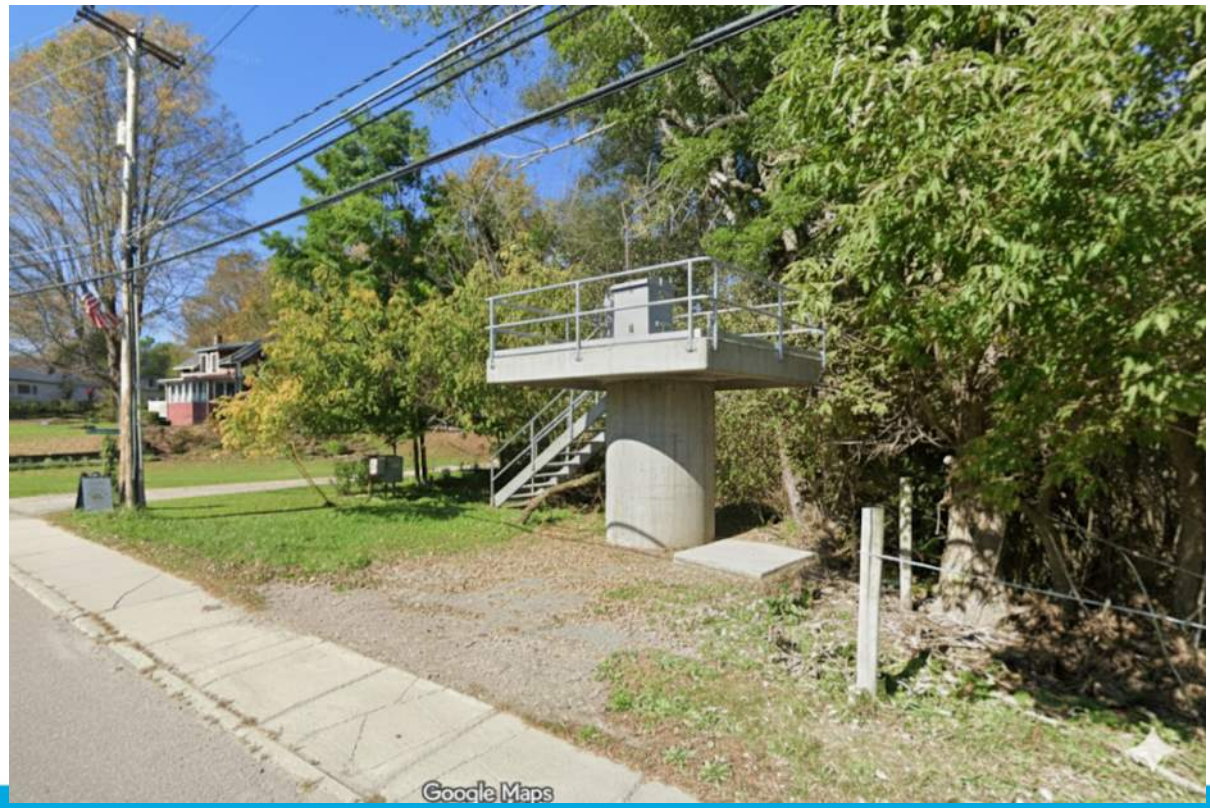
# Bridge St. Pump Station & Force Main

Engineer's Opinion of Estimated Costs

| | Cost |
|---|---|
| **Wet Well & Pumping Equipment*** | $206,200 |
| **Valve Vault** | $90,600 |
| **Electrical** | $123,400 |
| **Site Work & Misc. (includes SMH Upgrades)** | $355,800 |
| **Force Main** | $505,200 |
| **Subtotal** | **$1,281,200** |
| Contractor's Markup | $397,100 |
| Tariffs & Inflation Factor | $167,900 |
| **Construction Total** | **$1,846,200** |
| Contingency (30%) | $553,900 |
| Engineering | $297,081 |
| Legal | $18,500 |
| **Project Total** | **$2,716,000** |

* These are the costs associated with the HOMA pump.

## Concept Rendering:



# Bridge St. Pump Station – Location #1

- Across Bridge Street from existing pump station
- Also will require a (bit shorter) raised platform with a permanent generator
- Improved construction conditions

<u>Environmentally Sensitive Areas of Concern:</u>

- Within a VSWI Class 2 Wetland Buffer
- Within Vermont River Corridor
- Within the FEMA Special Flood Hazard Area

# Bridge St. Pump Station & Force Main

Engineer's Opinion of Estimated Costs

| | Cost |
|---|---|
| **Wet Well & Pumping Equipment*** | $215,300 |
| **Valve Vault** | $90,600 |
| **Electrical** | $123,400 |
| **Site Work & Misc. (includes SMH Upgrades)** | $230,100 |
| **Force Main** | $516,800 |
| **Subtotal** | **$1,176,200** |
| Contractor Markup | $364,600 |
| Tariffs | $154,100 |
| **Construction Total** | **$1,694,900** |
| Contingency | $508,500 |
| Engineering | $280,381 |
| Legal | $17,000 |
| **Total** | **$2,501,000** |

* These are the costs associated with the HOMA pump.

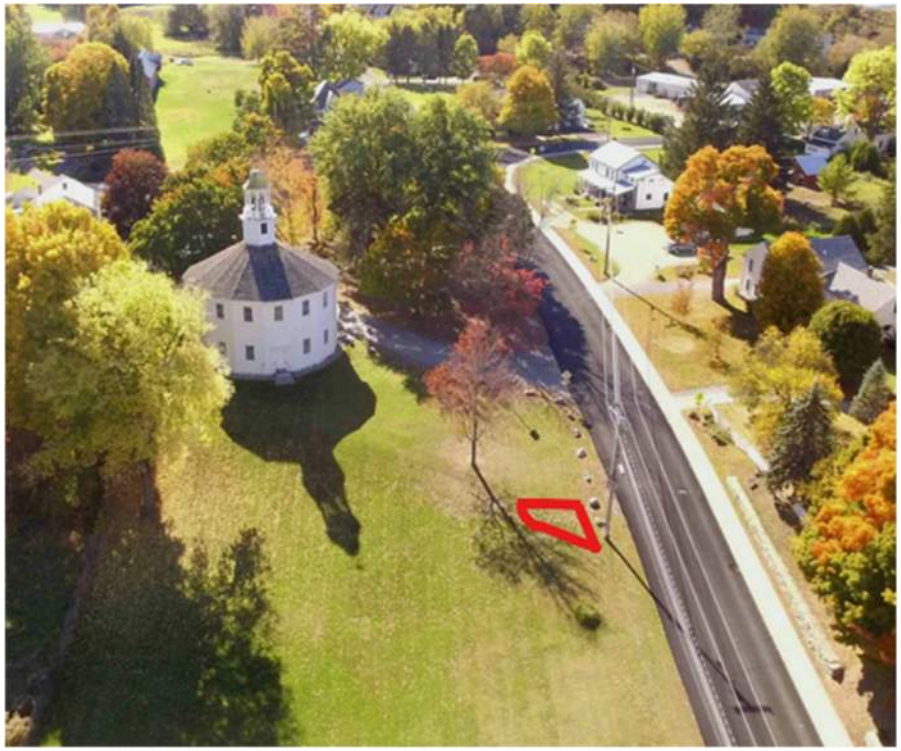
## Concept Rendering:

# Bridge St. Pump Station – Location #5

- Outside of Vermont Wetlands
- Outside of FEMA Special Flood Hazard Area
- No longer a need for raised platform, nor a standby generator required
- Pump station hatch will be close to grade: 6” visible above grade
- Vegetation / fencing can used for screening as needed
- Control panel: can be installed near utility pole, or run conduit and install behind church
- Will require deep excavation alongside the roadway – significant shoring or sheeting likely required

Environmentally Sensitive Areas of Concern:

- Within Vermont River Corridor



# Bridge St. Pump Station & Force Main

Engineer's Opinion of Estimated Costs

| | Cost |
|---|---|
| **Wet Well & Pumping Equipment*** | $307,400 |
| **Valve Vault** | $90,600 |
| **Electrical** | $65,000 |
| **Site Work & Misc. (includes SMH Upgrades)** | $334,000 |
| **Force Main** | $562,400 |
| **Subtotal** | **$1,359,400** |
| Contractor Markup | $421,500 |
| Tariffs | $178,100 |
| **Construction Total** | **$1,959,000** |
| Contingency | $587,700 |
| Engineering | $309,281 |
| Legal | $19,600 |
| **Total** | **$2,876,000** |

* These are the costs associated with the HOMA pump.

## Concept Rendering:

# Bridge St. Pump Station – Location Comparison

| | Location 0 | Location 1 | Location 5 |
|---|---|---|---|
| **Estimated Project Cost** | **$2.7M** | **$2.5M** | **$2.9M** |
| **Permitting Concerns** | Wetlands, Wetlands Buffer & River Corridor | Wetlands Buffer & River Corridor | River Corridor |
| **Within FEMA 100-Yr Flood Zone?** | X | X | |
| **Elevated Platform and Generator required** | X<br>~9’ tall | X<br>~6.5’ tall | |
| **Potential Impacts to Richmond** | | Reduced parking/ recreation space | Closest to the Round Church |
| **Directly Accessible to Operators during 100- or 500-year flood events** | | | X |