IMPROVING PUMP STATION RESILIENCE

WARWICK SEWER AUTHORITY (WSA)
CITY OF WARWICK, RI

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AGENDA

PROJECT BACKGROUND
PUMP STATION ASSESSMENTS
PUMP STATION IMPROVEMENTS
DESIGN/CONSTRUCTION OF UPGRADES
IMPROVING PUMP STATION RESILIENCE

Location of Warwick, RI
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Project Background

• WSA owns & operates 48 pump stations w/in Warwick
• March 2010 – nationally declared flood disaster struck the City
• Several major WSA assets along the Pawtuxet River sustained significant damage including:
  - 7.7 MGD Wastewater Treatment Facility
  - Knight Street PS, East Natick I PS & East Natick II PS
• Pump stations located w/in 100 yr flood zone of river
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Location of Pump Stations

- EAST NATICK II PS
- EAST NATICK 1 PS
- KNIGHT STREET PS
- PAWTUXET RIVER
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March 2010 Flood Event

EAST NATICK I PS  EAST NATICK II PS  KNIGHT STREET PS
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Project Funding

- Three flooded pump stations located w/in low-to-moderate income area
- Congress appropriated $100 M in CDBG-DR grants to assist areas affected by March 2010 storms
- Funds allocated and administered through HUD
- WSA worked with City’s Office of Housing & Community Development office to prepare the application and supporting documentation
- WSA received approval for a CDBG-DR grant to fund the project
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Project Assessment

WSA retained Dewberry to conduct initial assessment of the 3 pump stations to:

- Review existing station conditions w/ WSA staff
- Identify points of entries that would need to be flood-protected
- Recommend flood-hardening measures that could be effectively implemented
- Develop cost estimates to secure CDBG-DR grant for constructing the project
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East Natick I Pump Station – 0.29 MGD

• Single level pre-cast concrete structure w/ brick veneer & gable roof
• Houses 2 Gorman-Rupp sewer pumps, 25 KW natural gas generator, controls & electrical equipment
• Separate wet well adjacent to building
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East Natick I Pump Station (cont’d)

- Station located within flood zone AE (100 year flood elev. = 37.5’)
- Sill elevation of entrance door approximately 39.8’
- Interior finish floor elevation is about 4’ below grade
Recommended upgrades included:

- Raising intake/exhaust louvers 1 foot above high water mark
- Relocate existing electrical meter & disconnect to station interior
- Install modular flood-tight barrier for station entrance door
- Install check valve on drain line into wet well
- Estimated cost = $66,000
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East Natick II Pump Station – 0.14 MGD

- Duplex Gorman-Rupp package pump system w/ above-grade fiberglass enclosure
- 10’ X 6’ X 14’ Deep concrete wet well
- Pad-mounted electrical and SCADA cabinet adjacent to wet well
East Natick II Pump Station (cont’d)

- Station located within flood zone AE (100 year flood elev. = 37.5’)
- Top of wet well elevation = 37.5’
- Evaluated several options for protecting station
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East Natick II Pump Station (cont’d)

Option 1 – Raising ex. pump system and controls above observed high water level

Benefits/Issues:

- Critical components above flood level
- Additional 5’ lift requires ex. pump system to be replaced
- Potential for suction lines to freeze
- Large platform would be aesthetically unpleasing to the neighborhood
- Estimated cost = $254,000
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East Natick II Pump Station (cont’d)

Option 2 – Constructing modular/permanent 7’ wall around station perimeter

Benefits/Issues:
- Critical components protected
- Ex. pump system remains in place
- Need sump pump system w/in enclosed area
- 7’ concrete wall would be aesthetically unpleasing to the neighborhood
- Still need to raise electrical/SCADA cabinets about 1’
- Estimated cost = $220,000
Option 3 – Constructing an enclosed shelter/building around station

Benefits/Issues:

- Critical components protected
- Ex. pump system remains in place
- Enclosing ex. wet well w/in new bldg. results in Class I Div 2 hazardous area
- Components w/in new bldg. to comply w/ applicable NFPA 820/NEMA
- Estimated cost = $383,000
- Removed option from consideration
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East Natick II Pump Station (cont’d)

Option 4 – Replace ex. pump system w/ submersible pumps & elevate electrical/control equipment

Benefits/Issues:

- Critical components protected
- New pumps can be installed w/in ex. wet well
- Minimal site impacts
- Will require temporary bypass
- Estimated cost - $215,000
- WSA elected this option
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Knight Street Pump Station – 0.79 MGD

- Multi-level pre-cast concrete building w/ electrical & control equipment on 1st floor
- Lower level houses (2) Fairbanks Morse centrifugal sewer pumps & 25 KW generator
- Roof level includes intake/exhaust cupolas & hatch
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Knight Street Pump Station (cont’d)

• Station located within flood zone AE (100 year flood elev. = 27.5’)
• 1st floor elevation = 23.5’
• Roof elevation = 32.25’
Recommended upgrades included:

- Raising intake/exhaust louvers w/in cupolas by 3 feet
- Replace ex. exhaust fan w/in cupola
- Replace roof hatch w/ flood tight hatch
- Install station bypass for emergency
- Install new access hatch on wet well roof
- Estimated cost = $112,000
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DESIGN/CONSTRUCTION OF UPGRADES

• Dewberry completed design of recommended upgrades in December 2017
• Estimated construction cost: $450,000
• WSA secured the CDBG-DR grant from the City of Warwick
• Project was bid in January 2018, awarded in March 2018
• Construction bid = $406,500
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DESIGN/CONSTRUCTION OF UPGRADES (cont’d)

EAST NATICK II PS

EAST NATICK II PS
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DESIGN/CONSTRUCTION OF UPGRADES (cont’d)

KNIGHT ST PS

EAST NATICK I PS
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DESIGN/CONSTRUCTION OF UPGRADES (cont’d)
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DESIGN/CONSTRUCTION OF UPGRADES (cont’d)

New Electrical Service w/ Weatherhead (East Natick I PS)

New Door Flood Barrier Channels (East Natick I PS)
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DESIGN/CONSTRUCTION OF UPGRADES (cont’d)

New Bypass Manhole & Force Main @ Knight St PS

New Wet Well Access Hatch @ Knight St PS
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DESIGN/CONSTRUCTION OF UPGRADES (cont’d)

- Elevated Steel Platform @ East Natick II PS
- New Submersible Pumps @ East Natick II PS