

IMPROVING PUMP STATION RESILIENCE

WARWICK SEWER AUTHORITY (WSA)

CITY OF WARWICK, RI

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IMPROVING PUMP STATION RESILIENCE

AGENDA

PROJECT BACKGROUND

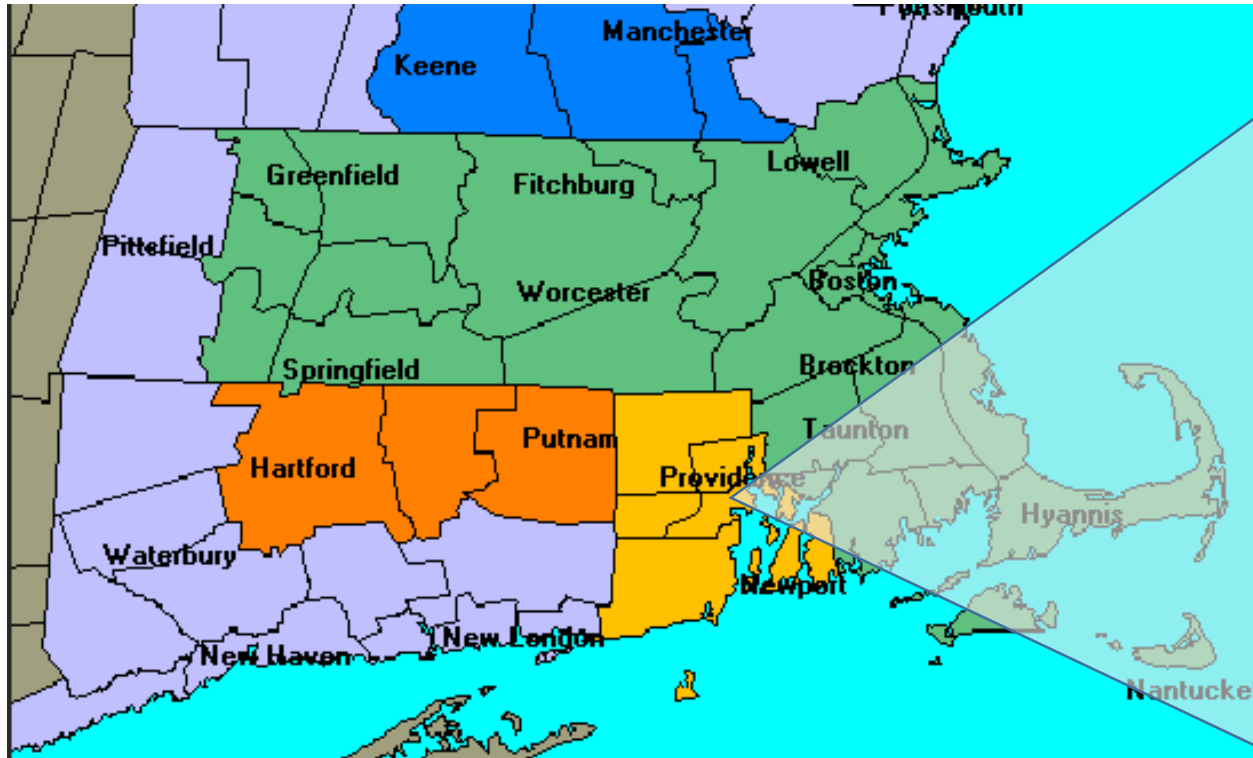
PUMP STATION ASSESSMENTS

PUMP STATION IMPROVEMENTS

DESIGN/CONSTRUCTION OF UPGRADES

IMPROVING PUMP STATION RESILIENCE

Location of Warwick, RI



IMPROVING PUMP STATION RESILIENCE

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

IMPROVING PUMP STATION RESILIENCE

Location of Pump Stations



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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

IMPROVING PUMP STATION RESILIENCE

East Natick I Pump Station – 0.29 MGD

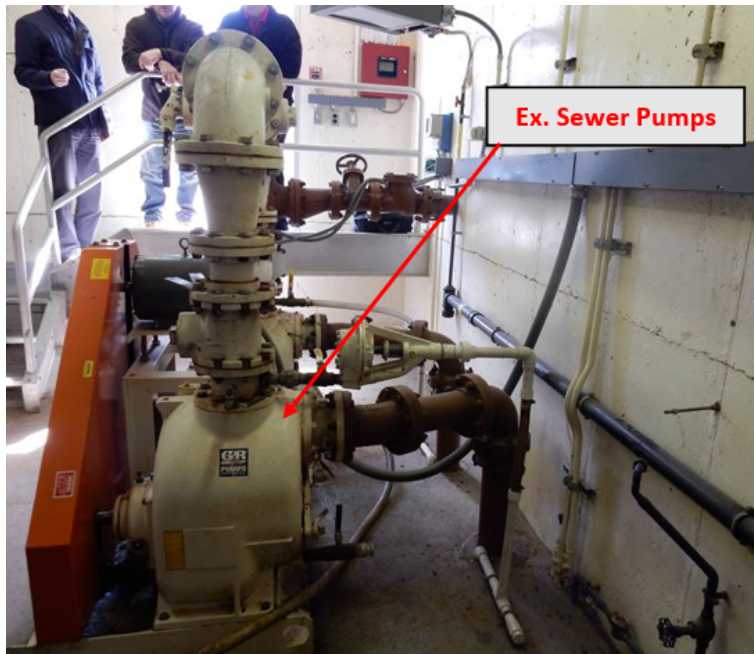
- Single level pre-cast concrete structure w/ brick veneer & gable roof
- Houses 2 Gorman-Rupp sewer pumps , 25 KW natural gas generator, controls & electrical equipment
- Separate wet well adjacent to building



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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



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East Natick I Pump Station (cont'd)

Recommended upgrades included:

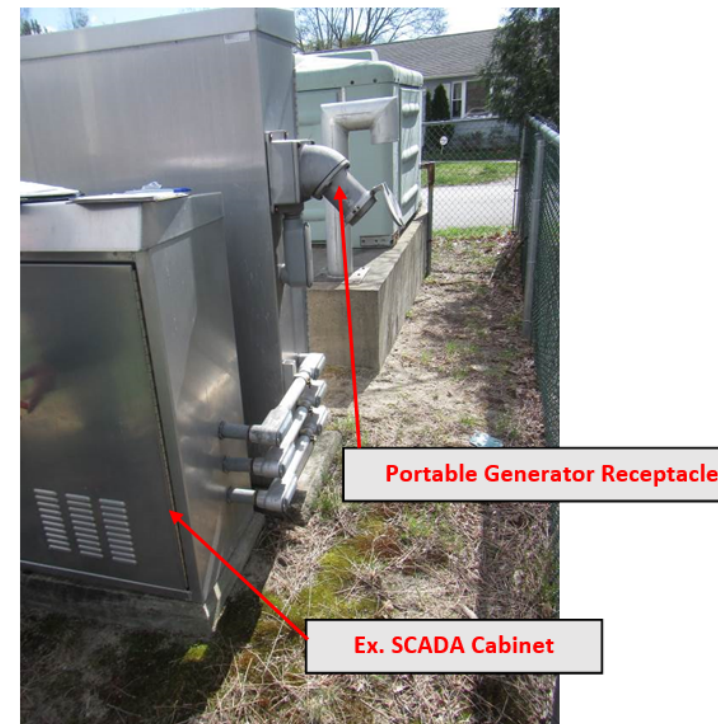
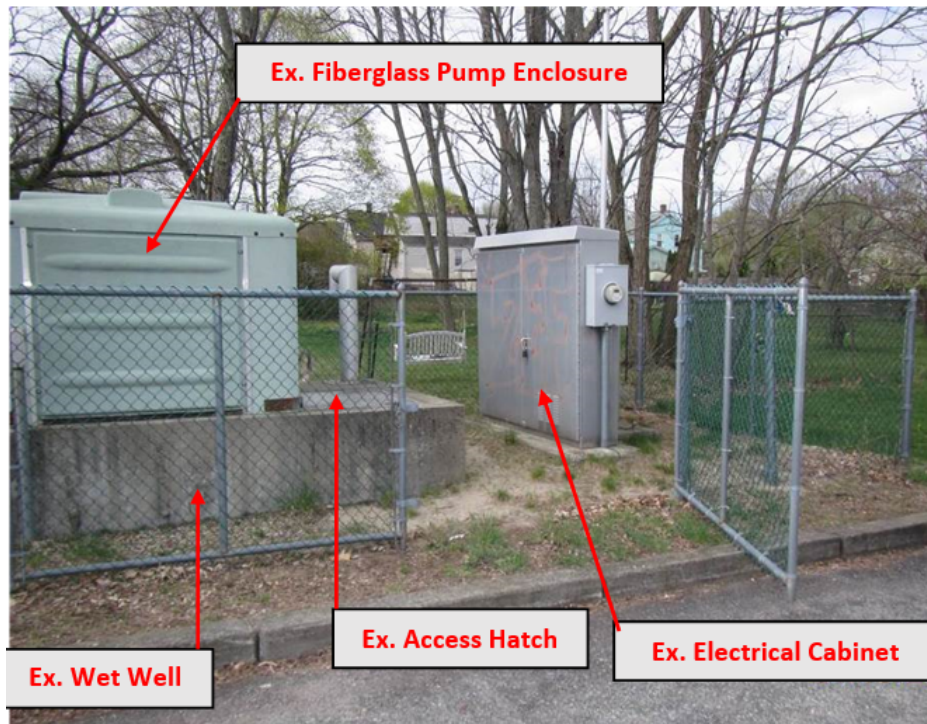
- ❖ Raising intake/exhaust louvers 1 foot above high water mark
- ❖ Relocate existing electrical meter & disconnect to station interior
- ❖ Install modular flood-tight barrier for station entrance door
- ❖ Install check valve on drain line into wet well
- ❖ Estimated cost = \$66,000



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East Natick II Pump Station – 0.14 MGD

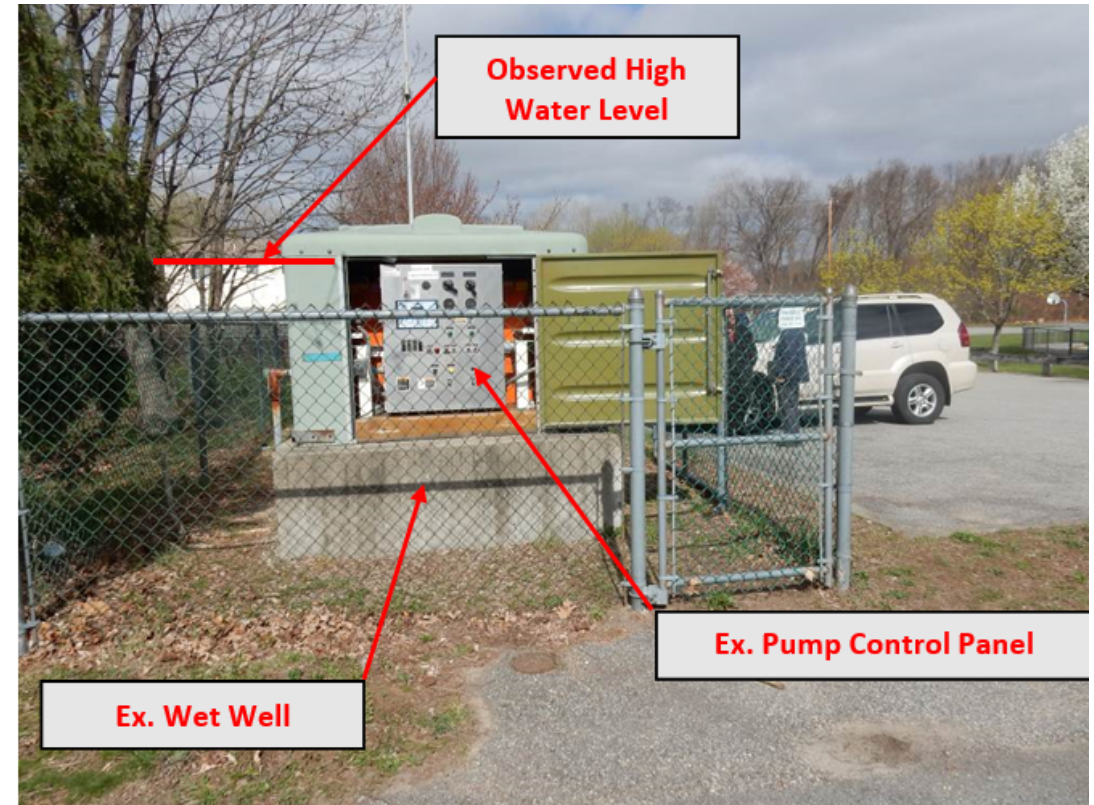
- Duplex Gorman-Rupp package pump system w/ above-grade fiberglass enclosure
- 10' X 6' X 14' Deep concrete wet well
- Pad-mounted electrical and SCADA cabinet adjacent to wet well



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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



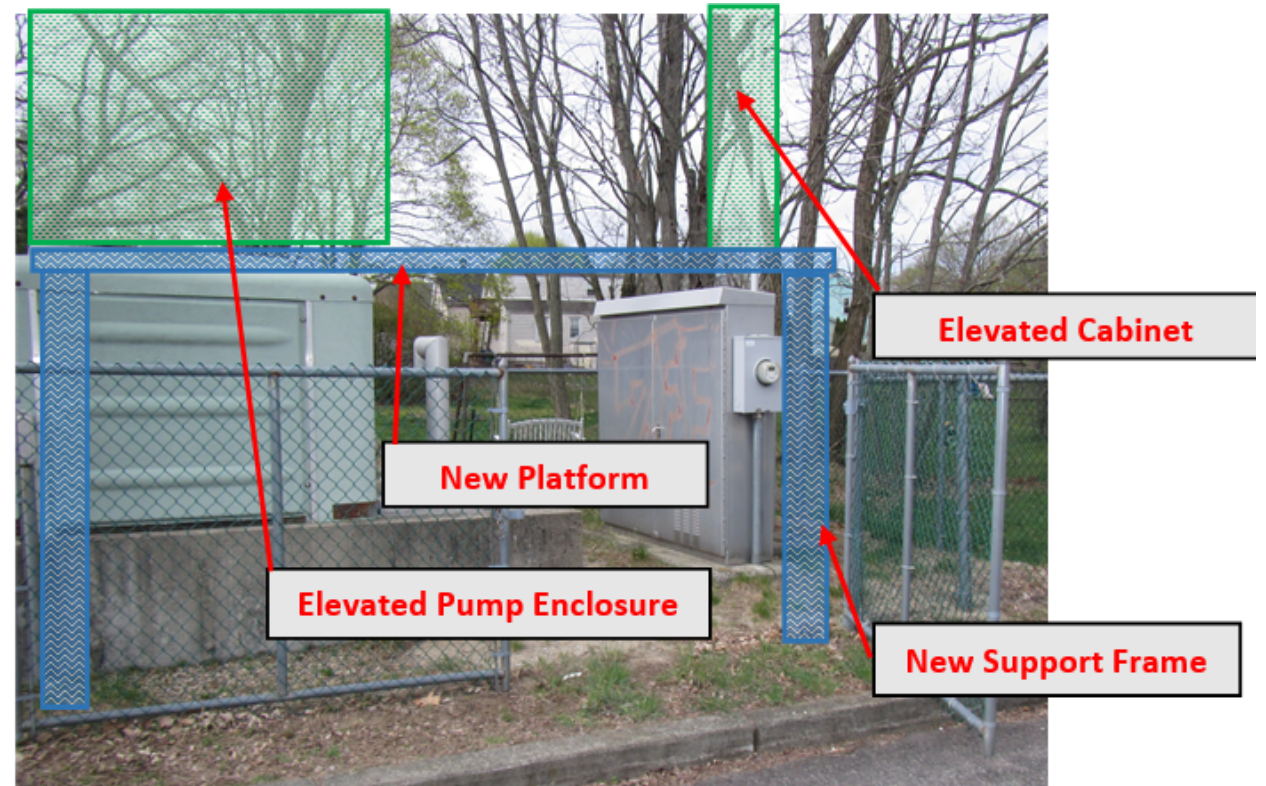
IMPROVING PUMP STATION RESILIENCE

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



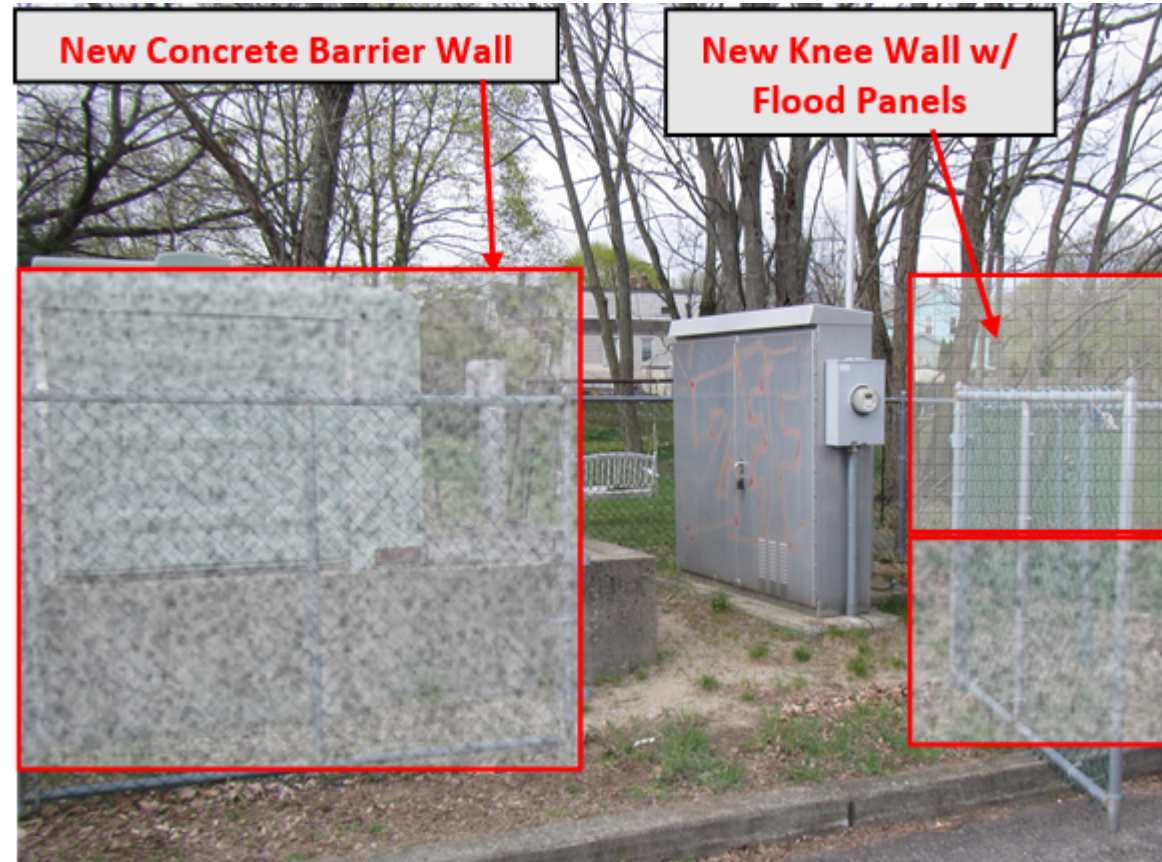
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East Natick II Pump Station (cont'd)

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



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East Natick II Pump Station (cont'd)

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

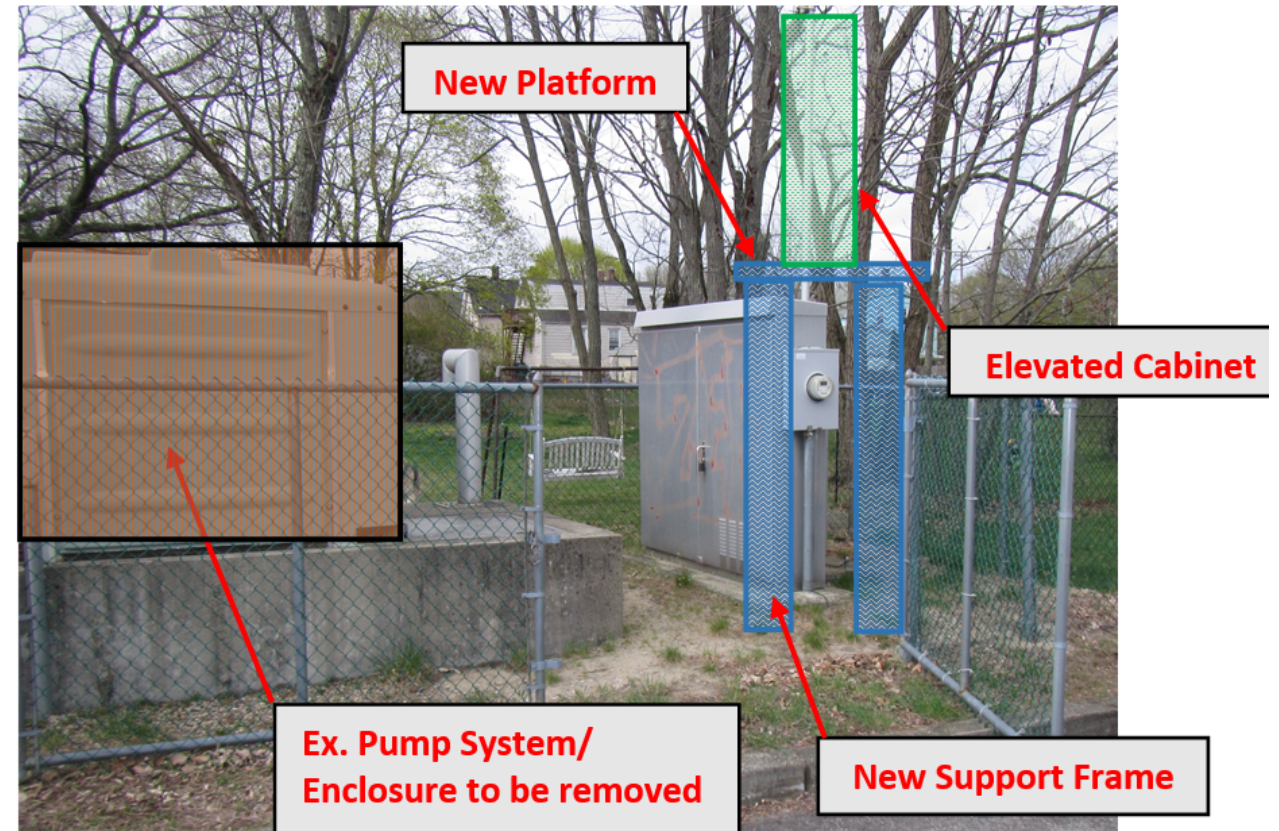
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East Natick II Pump Station (cont'd)

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

Benefits/Issues:

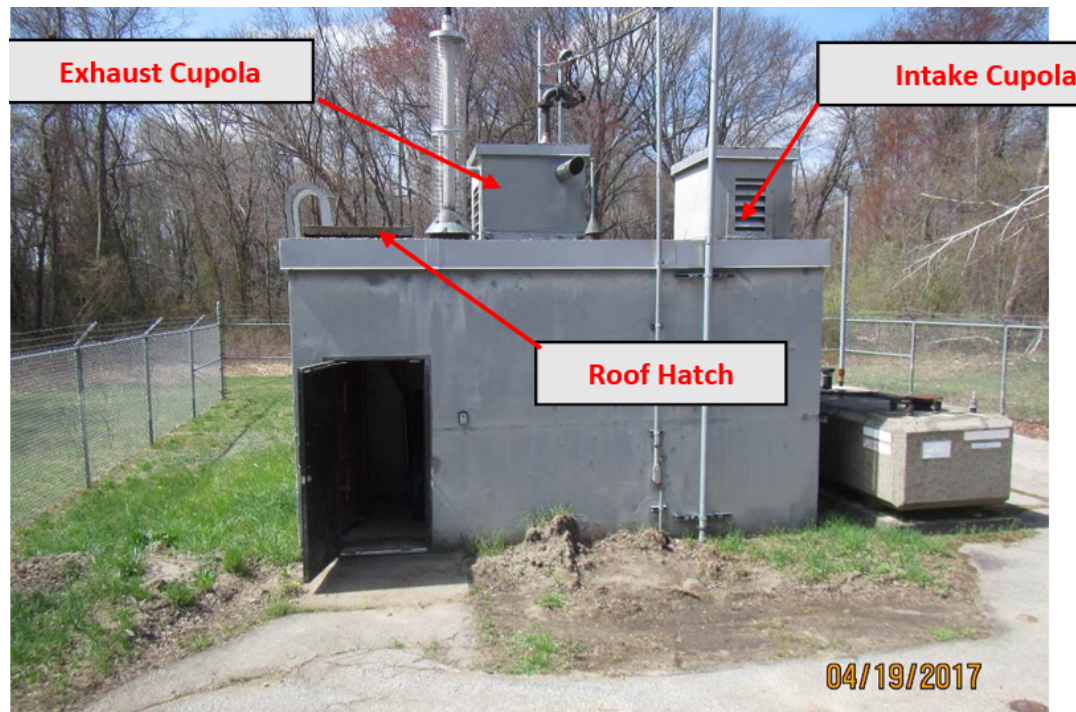
- ❖ Critical components protected
- ❖ New pumps can be installed w/in ex. wet well
- ❖ Minimal site impacts
- ❖ Will require temporary bypass
- ❖ Estimated cost - \$215,000
- ❖ WSA elected this option



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Knight Street Pump Station – 0.79 MGD

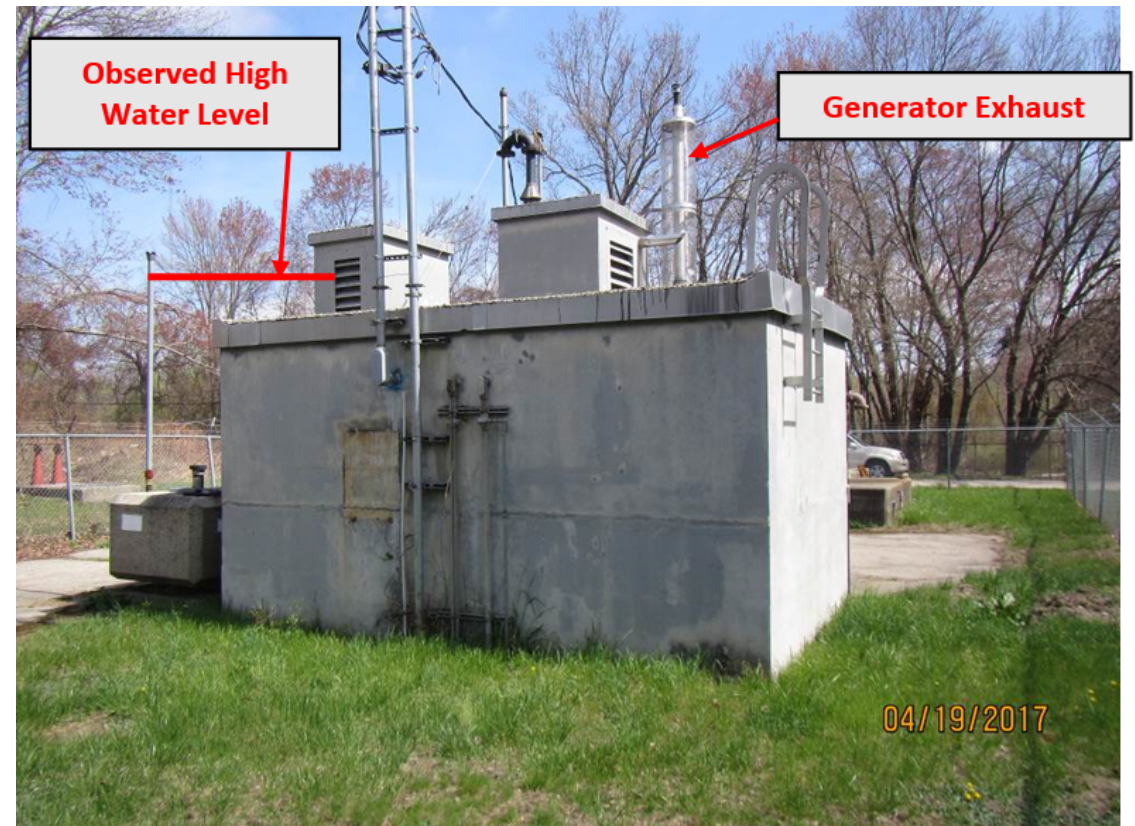
- Multi-level pre-cast concrete building w/ electrical & control equipment on 1st floor
- Lower level houses (2) Fairbanks Morse centrifugal sewer pumps & 25 KW generator
- Roof level includes intake/exhaust cupolas & hatch



IMPROVING PUMP STATION RESILIENCE

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'

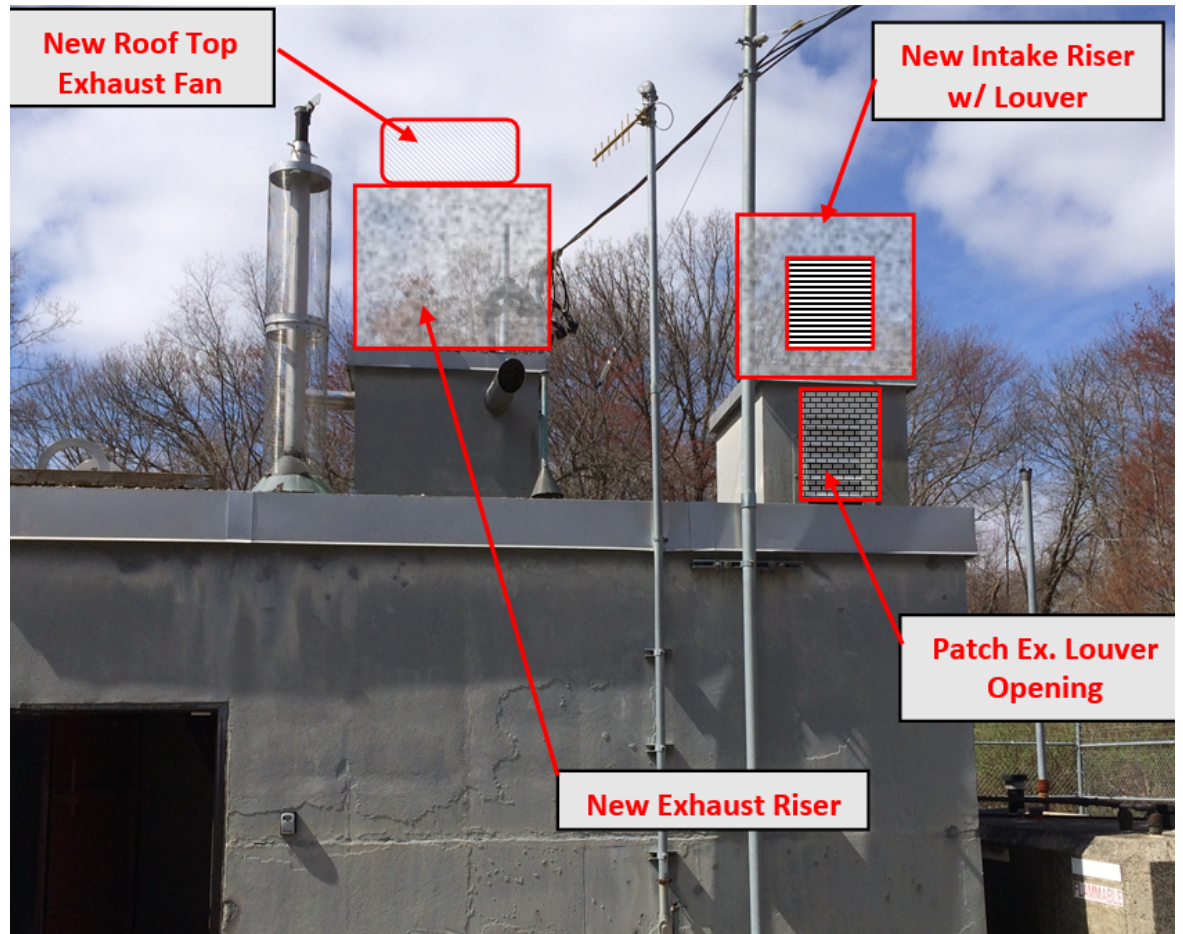


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Knight Street Pump Station (cont'd)

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



IMPROVING PUMP STATION RESILIENCE

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

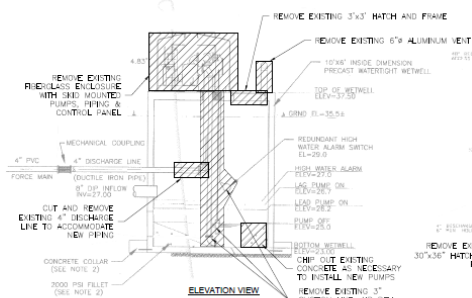
IMPROVING PUMP STATION RESILIENCE DESIGN/CONSTRUCTION OF UPGRADES (cont'd)

EAST NATICK II PS



TEMPORARY BYPASS PUMP PLAN
SCALE: 1"=50'-0"

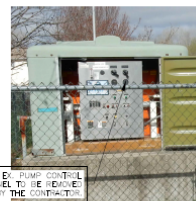
- | | |
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| <p>DEFINITION NOTES:</p> <ol style="list-style-type: none"> CONTRACTOR SHALL REMOVE AND DISPOSE OF THE EXISTING PUMP EQUIPMENT, INCLUDING THE INTERIOR PIPING AND VALVES, MECHANICAL AND RELATED COMPONENTS AS SHOWN ON THE DRAWINGS IN ACCORDANCE WITH SECTION 02500. THE TWO EXISTING 3 HP PUMPS, MOTORS AND CONTROL PANEL SHALL BE REMOVED AND SALVAGED AS SPECIFIED IN SECTION 02500. EX. CONTROL EQUIPMENT SHALL BE RELOCATED TO THE NEW ABOVE GROUND ENCLOSURE. SEE SHEET E-2. SEVERAL COMPONENTS WITHIN THE EX. ELECTRICAL CABINET SHALL BE RELOCATED TO THE NEW ABOVE GROUND ENCLOSURE. SEE SHEET E-2. CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING PIPING AND ELECTRICAL WORK AS REQUIRED TO CONDUCT THE DEMOLITION OF THE EXISTING PUMP SYSTEM. CONTRACTOR SHALL BE RESPONSIBLE FOR RECONNECTING SERVICES TO THE NEW PUMP SYSTEM. REFER TO SECTION 02500 OF THE SPECIFICATIONS FOR ADDITIONAL DETAIL AND REQUIREMENTS. | <p>GENERAL NOTES:</p> <ol style="list-style-type: none"> WASTEWATER DURING CONSTRUCTION SHALL BE COLLECTED BY THE CONTRACTOR AND DISPOSED OF BY THE CITY OF EAST NATICK. CONTRACTOR SHALL BE RESPONSIBLE FOR DISCONNECTING PIPING AND ELECTRICAL WORK AS REQUIRED TO CONDUCT THE DEMOLITION OF THE EXISTING PUMP SYSTEM. CONTRACTOR SHALL BE RESPONSIBLE FOR RECONNECTING SERVICES TO THE NEW PUMP SYSTEM. REFER TO SECTION 02500 OF THE SPECIFICATIONS FOR ADDITIONAL DETAIL AND REQUIREMENTS. UNLESS OTHERWISE NOTED, ALL MATERIALS SHALL BE AS SHOWN ON THE DRAWINGS. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION. ALL STRUCTURAL STEEL SHALL BE ASTM A502 GRADE 50 KSI. ALL STRUCTURAL STEEL SHALL BE GALVANIZED. FIELD WELDS SHALL BE TOUCHED UP AFTER WELDING WITH GALVANIZED PAINT. |
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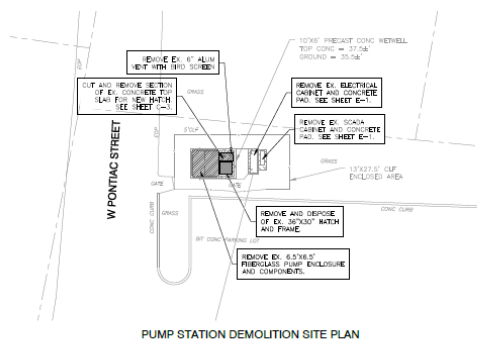
PUMP STATION DEMOLITION
SCALE: NTS



EX. FIBERGLASS PUMP SKID ENCLOSURE
SCALE: NTS

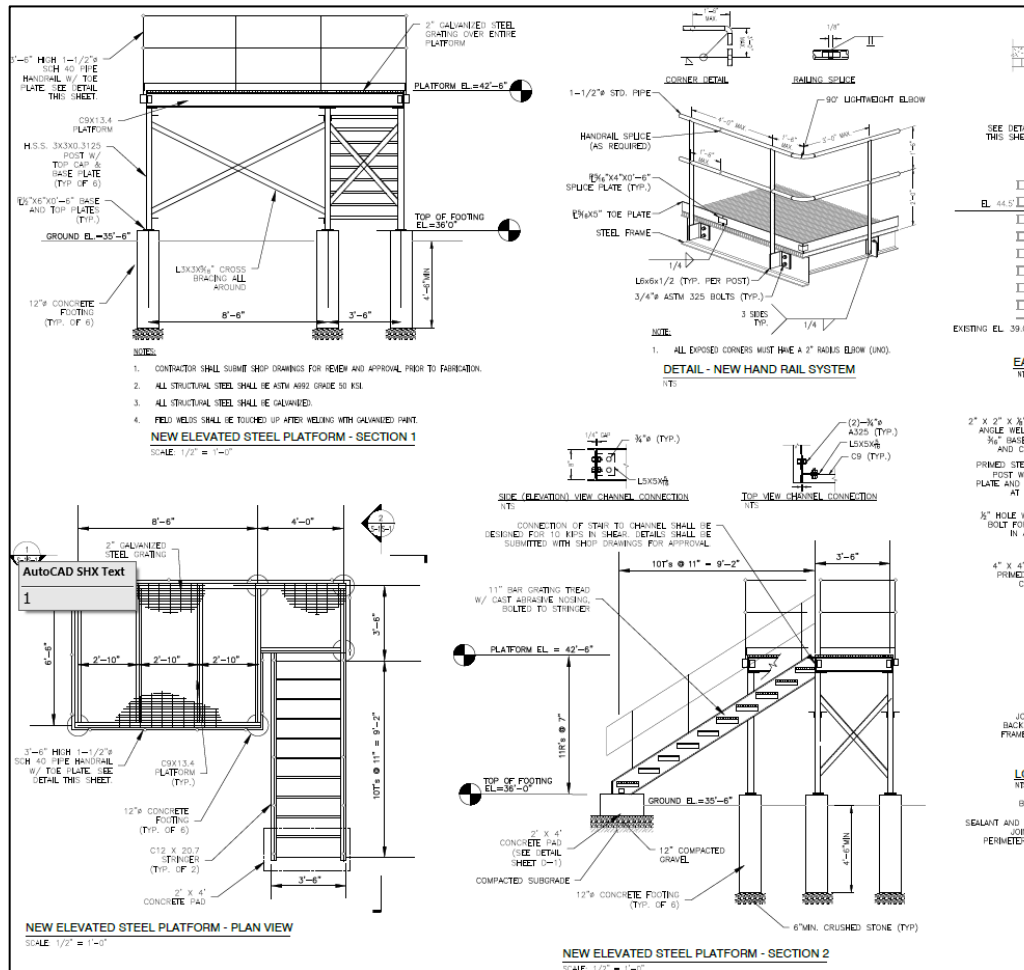


VIEW OF EX. CONTROL PANEL SIDE
SCALE: NTS

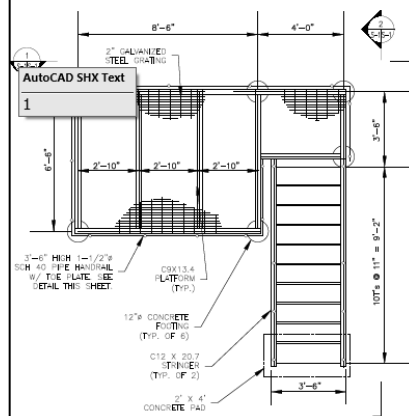


PUMP STATION DEMOLITION SITE PLAN
SCALE: 1"=10'

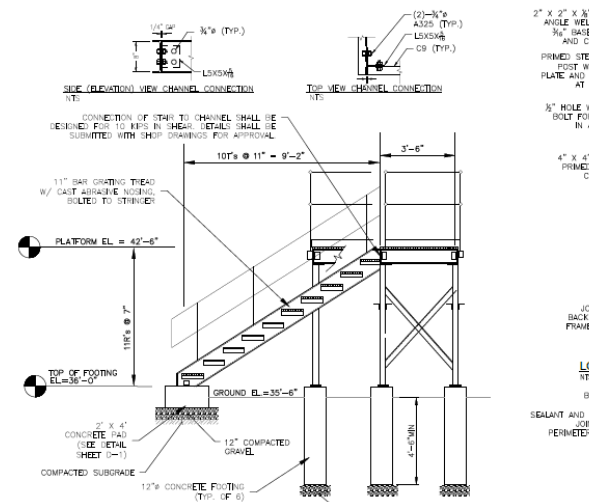
EAST NATICK II PS



NEW ELEVATED STEEL PLATFORM - SECTION 1
SCALE: 1/2" = 1'-0"



NEW ELEVATED STEEL PLATFORM - PLAN VIEW
SCALE: 1/2" = 1'-0"



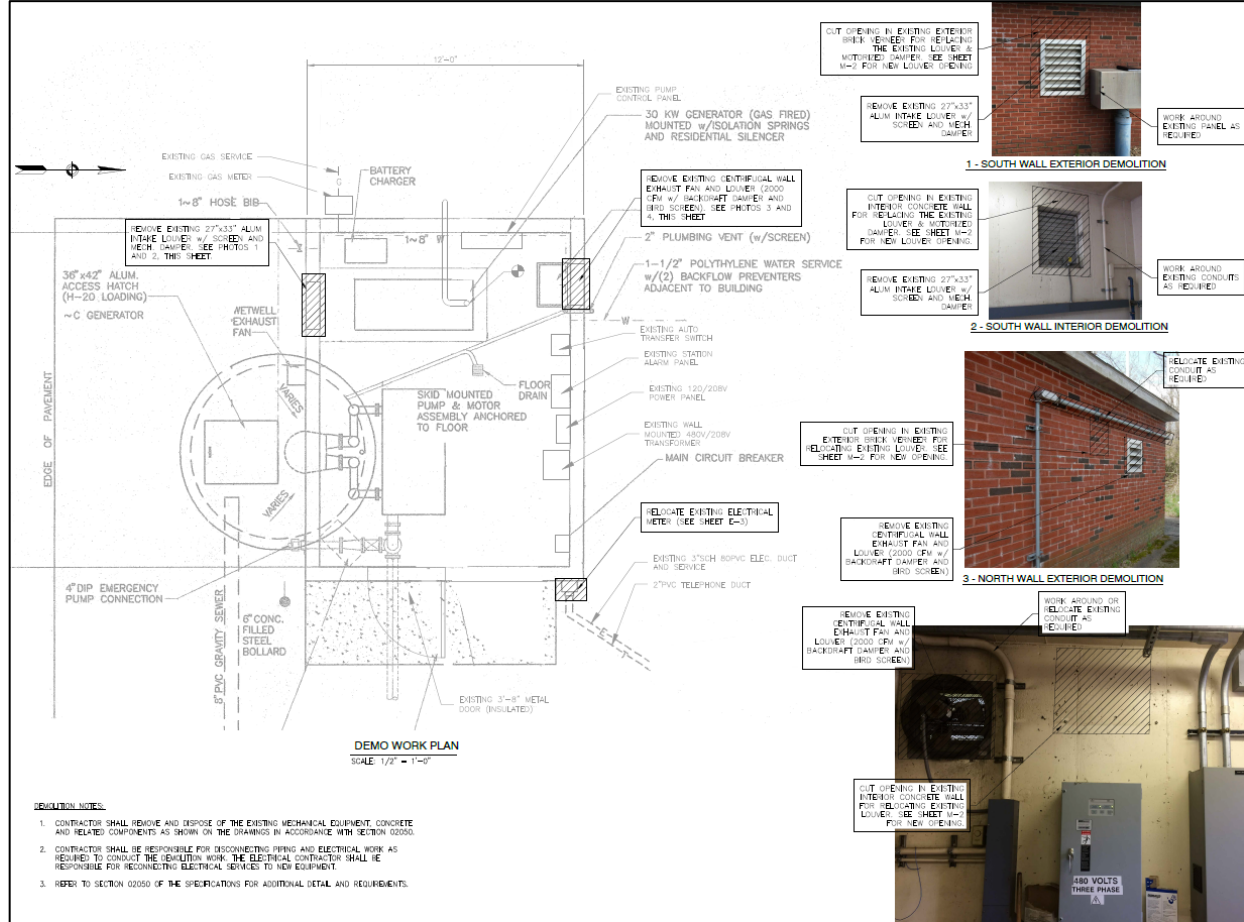
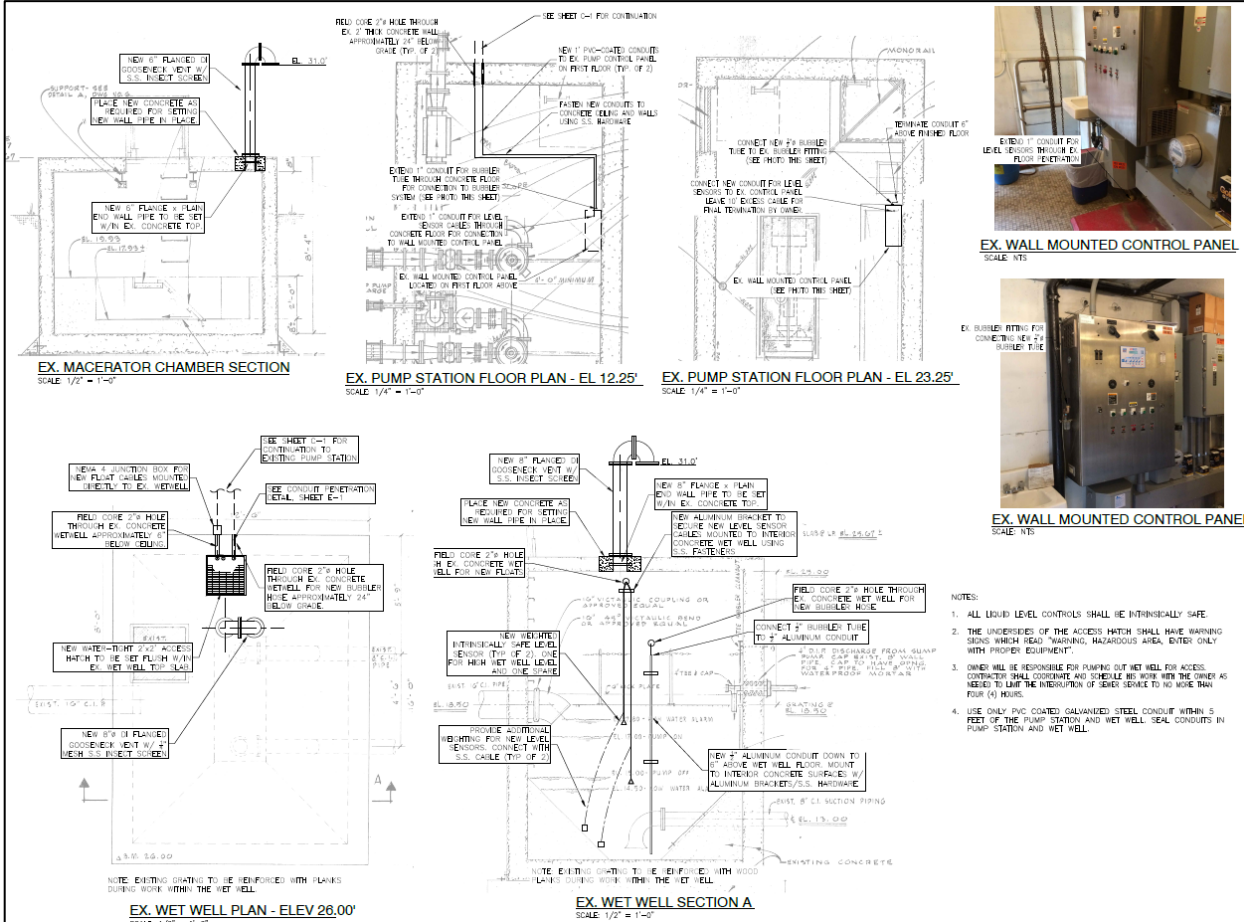
NEW ELEVATED STEEL PLATFORM - SECTION 2
SCALE: 1/2" = 1'-0"

IMPROVING PUMP STATION RESILIENCE

DESIGN/CONSTRUCTION OF UPGRADES (cont'd)

KNIGHT ST PS

EAST NATICK I PS



IMPROVING PUMP STATION RESILIENCE

DESIGN/CONSTRUCTION OF UPGRADES (cont'd)



Exterior View of Relocated Intake Louver (East Natick I PS)



Interior View of Relocated Intake Louver (East Natick I PS)

IMPROVING PUMP STATION RESILIENCE

DESIGN/CONSTRUCTION OF UPGRADES (cont'd)



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



New Door Flood Barrier Channels (East Natick I PS)

IMPROVING PUMP STATION RESILIENCE

DESIGN/CONSTRUCTION OF UPGRADES (cont'd)



New Bypass Manhole & Force Main @ Knight St PS



New Wet Well Access Hatch @ Knight St PS

IMPROVING PUMP STATION RESILIENCE

DESIGN/CONSTRUCTION OF UPGRADES (cont'd)



Elevated Steel Platform @ East Natick II PS



New Submersible Pumps @ East Natick II PS