Five Centennial Drive
Peabody, MA 01960-7985
tel: 978-532-1900 fax: 978-977-0100
www.westonandsampson.com

Hingham, MA
Project No. 2160126

June 21, 2016

Mr. Randy Sylvester
Superintendent of Public Works
Town of Hingham
25 Bare Cove Park Drive
Hingham, MA 02043

Evaluation of Three of the Town's Wastewater Pump Stations

Dear Mr. Sylvester:

On February 26, 2016, Sal Ferrara and Michael Paulin from our office visited three (3) of the town's wastewater pump stations to perform evaluations. This report contains the evaluations of the three (3) pump stations. Below is an index of information contained in this report:

Section 1 – Broad Cove Pump Station Evaluation

Section 2 – Walton Cove Pump Station Evaluation

Section 3 – Greenbush Pump Station Evaluation

Section 4 – Recommended Capital Improvements and Estimated Costs Summary

Pump station evaluation logs, including photographs from the site visits, are included at the end of each Section.

We are pleased to provide this service to you. If you have any questions or would like to discuss the observations and recommendations made in the report, please call me at (978) 532-1900 ext. 2409 or e-mail me at pedersens@wseinc.com.

Sincerely,

Weston & Sampson

Steven K. Pedersen, PE
Project Manager

Broad Cove Pump Station
Installed 1958

Description

The Broad Cove Pump Station is one of the oldest pump stations in town and is the most vital, because it services the entire Crow Point area, including the flow from the Greenbush Pump Station, the Town Brook Pump Station, the Bel Air Pump Station, and the Walton Cove Pump Station. The Broad Cove Pump Station discharges flow approximately 4,200 linear feet via a 15-inch reinforced concrete (RC) force main to an 18-inch RC gravity sewer in Lincoln Street (Route 3A) at the intersection of Shipyard Drive for conveyance to the MWRA pump station on Route 3A at Stodders Neck.

The Broad Cove Pump Station is a centrifugal type station with a custom 3-level building. The three (3) pumps are located on the bottom level, with the Motor Control Center (MCC) located on the top level. The motors for Pump No. 2 and Pump No. 3 are also located on the top level with drive shafts to the pumps on the lower level, while the motor for Pump No. 1 is mounted on the pump in the lower level.

As part of the pump station evaluation, it was brought to our attention that the force main for the Broad Cove Pump Station has experienced numerous breaks over time and is in need of improvements. Potential solutions to the aging force main include replacement, slip lining, and pipe bursting of the existing force main. In addition to the age of the force main, other issues that may be contributing to the force main breaks are the hydraulic effects of the force main connection from the Bradley Woods Pump Station and potential unsuitable material beneath the force main pipe from initial installation.

The following activities were performed at this station:

1. Exterior Inspection.

2. Inspection of Electrical Panels, Breakers, and Control Panels.

3. Miscellaneous Inspection and Operation:
    - Pumps and Motors
    - Check and Gate Valves
    - Mechanical Piping
    - Standby Generator
    - Wet well walls and Interior

The following is a list of deficiencies identified during the evaluation:

Wet Well-

1. Pump No. 1 is currently offline and has been for more than 10 years, which has resulted in the discharge piping for this pump to become clogged with solids. Based on discussions with the Town, a break in the force main occurred following the first usage of this pump, raising concerns that the force main could not withstand the pressure generated by this pump. We recommend pulling the pump, rebuilding it, and installing a variable frequency drive (VFD) to control it. At the same time, the discharge piping will need to be cleaned out or replaced (see further discussion on discharge piping below).

2. Pump No. 2 and Pump No. 3 currently utilize reduced voltage starters, which are inefficient. We recommend installing VFD's to control them with increased efficiency.

3. Suction piping through the wet well wall appears to be deteriorating. We recommend testing the pipe for structural integrity and replacing, if necessary. This would require coring new pipe through the wet well wall structure.

4. Lighting is deteriorated and inefficient. We recommend installation of new energy efficient lighting.

5. There is no channel grinder in the wet well, we recommend installing one to help reduce clogging of the pumps. In addition, we recommend that a new hatch be installed outside the building on the wet well cement roof, for easy access to the channel grinder.

Pump Room-

1. The triplex level controller is not user friendly and does not work properly. We recommend replacing the controller with a digital level controller and a submersible transducer in the wet well.

2. Pump suction/discharge piping and valves:

    a) Pump suction and discharge gate valves are deteriorated and no longer operate properly. Pump No. 2 gate discharge gate valve is leaking. We recommend that the valves be replaced with new valves.

    b) Suction and discharge piping for Pump No. 2 and Pump No. 3 are severely deteriorated. Suction and discharge piping for Pump No. 1 is not as severely deteriorated but is currently clogged with solids due to extended inactivity of Pump No. 1 (see discussion above). We recommend replacing all of the pump piping inside the pump room.

c) There is currently no discharge gate valve to isolate the force main. We recommend installing a new 8-inch gate valve on the discharge piping, in the pump room after Pump No. 2 and Pump No. 3, but prior to Pump No. 1.

d) In order to replace the valves and piping detailed above, as well as install a new gate valve on the force main to isolate the force main, bypass pumping will be required. Therefore we recommend that all of this work be performed at the same time to minimize the number of times that the existing equipment and station is taken out of service.

e) In conjunction with the recommended piping and valve replacement discussed above and the associated by-pass pumping required, we recommend that a new, permanent bypass be installed, to provide the station with a means of safely transferring flows into the system while allowing for repairs or general maintenance of the pump station equipment, if necessary. The bypass would consist of a new wye structure and gate valve on the existing force main (approximately 16 feet below grade), with a new gate valve and bypass riser to above grade (see attached detail).

3. Lighting is deteriorated and inefficient. We recommend installation of new energy efficient lighting.

4. The sump pump in pump room is piped with schedule 40 PVC, but schedule 80 PVC or copper pipe is recommended. We recommend re-piping with Schedule 80 PVC or copper pipe, including a new check valve.

Estimated Costs –

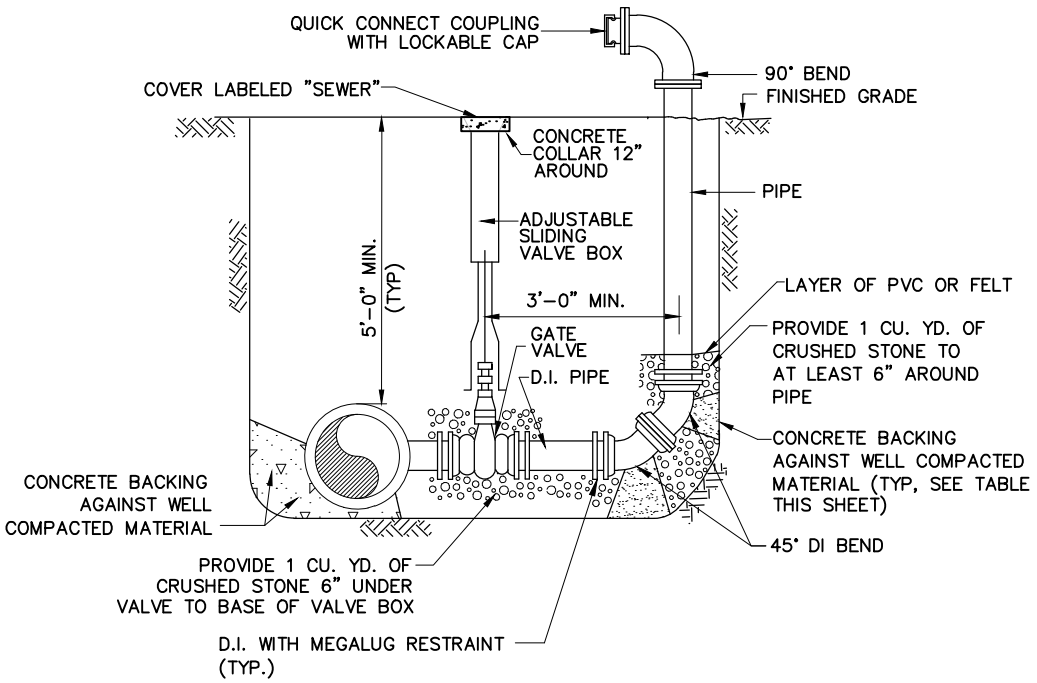
The following table displays the recommended improvements and their estimated costs. We recommend that the improvements are completed as soon as funding is available.

Recommended Capital Improvements and Estimated Costs
Broad Cove Pump Station

Observation	Recommendation	Estimated Cost (1)
Wet Well –		
Pump No. 1 currently offline	Pull pump, rebuild and install variable frequency drive	$15,000
Pump No. 2 and Pump No. 3 currently started by reduced voltage starters; inefficient	Install variable frequency drives	$25,000
Suction stubs from wet well to pump appear to be in poor condition	Test pipe for structural integrity: Replace if needed	$5,000
Lighting is deteriorated/inefficient	Install new energy efficient lighting	$3,000
No channel grinder in wet well	Install channel grinder, including new hatch outside the building on wet well cement roof for easy access	$80,000
Pump Room –		
Triplex level controller not user friendly/does not work properly	Replace w/digital level controller and submersible transducer	$15,000
Pump suction and discharge gate valves are deteriorated/do not operate properly	Replace w/new valves	Included Below
No discharge gate to isolate force main	Install new 8" gate valve on discharge piping in station after Pump No. 2 and Pump No. 3	Included Below
Suction and discharge piping on Pump No. 2 and Pump No. 3 are severely deteriorated; and on Pump No. 3 clogged	Replace all station piping in pump room	$200,000 (includes bypass pumping)

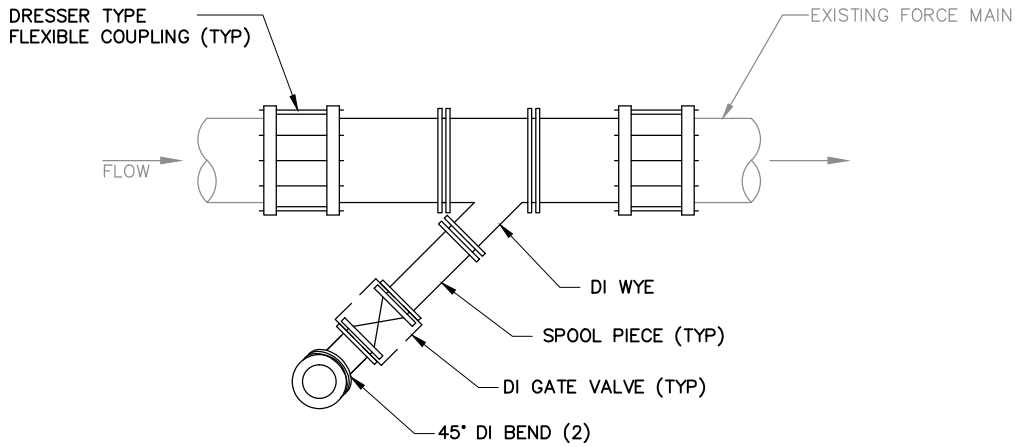
Observation	**Recommendation**	**Estimated Cost (1)**
No bypass options for pump station	Install new permanent force main bypass structure outside the building, adjacent to Route 3A	$30,000
Lighting is deteriorated/inefficient	Install new energy efficient lighting	$5,000
Sump pump in pump room piped with schedule 40 PVC	Re-pipe with schedule 80 PVC or copper pipe: New check valve	$3,000
	Subtotal -	$381,000
	15% Contingencies -	$58,000
	Total -	**$439,000**

(1) Includes labor and installation.
(2) Contingency values were rounded for budgetary estimate purposes.



FORCE MAIN BYPASS DISCHARGE DETAIL

N.T.S.



FORCEMAIN BYPASS DISCHARGE PLAN VIEW

N.T.S.

FIGURE 1

TOWN OF HINGHAM, MASSACHUSETTS

EVALUATION OF THREE OF THE TOWN'S WASTEWATER PUMP STATIONS

FORCE MAIN BYPASS DETAILS

SCALE: N.T.S.

O:\Hingham, MA\Pump Station Evaluations\Report\PS Bypass.dwg

Five Centennial Drive, Peabody, MA 01960-7985

Tel: (978) 532-1900

Fax: (978) 977-0100

PUMP STATION EVALUATION REPORT

DATE/TIME: Friday, February, 26, 2016

TECHNICIAN(S): Sal Ferrara

JOB NAME: Broad Cove Pump Station

Owner: Town of Hingham

STATION NAME: Broad Cove Sewer Pump Station

LOCATION: Hingham, MA

ENGINEER: Weston & Sampson

PEOPLE PRESENT AT EVALUATION:

Sal Ferrara (Weston & Sampson)

Mike Paulin (Weston & Sampson)

STATION LAYOUT: Large custom building. 3 pumps in lower level. MCC and controls on top level. Pumps 2 and 3 motors on top level with drive shafts to pumps in lower level Pump 1 has motor mounted on pump.

Note: See Photos

LIQUID BEING PUMPED: Sewerage

COMMENTS:

MOTOR # 1

MANUFACTURER: US Motor

MODEL NUMBER: 405VPZ TEFC

SERIAL NUMBER: G515-3703

VOLTAGE: 480 PHASE: 3 AMPS: 87

HORSEPOWER: 75 HERTZ: 60

CONDITION OF CABLE JACKET: GOOD X FAIR _____ POOR _____

GROUND RESISTANCE? N/A

SUPPLY VOLTAGE: L1:L2 480 L2:L3 480 L3:L1 480

AMPERAGE PUMP MOTOR:

(BLACK)L1: _____ (RED)L2: _____ (WHITE)L3: _____

RPM: 1175 TYPE: _____ SERVICE FACTOR: _____

PUMP # 1

MANUFACTURER/TYPE: PECO Pump

MODEL NUMBER: 5281818

SERIAL NUMBER: 97R4079301

RUNNING TIME METER (hours): 4439

CONDITION OF EQUIPMENT: GOOD: _____ FAIR: _____ POOR: X

WET WELL SIZE: N/A

FLOW TEST: START LEVEL: _____ FINISH LEVEL: _____

MOTOR # 2

MANUFACTURER: Allis Chalmers

MODEL NUMBER: 7-5140-78886-1-1 Two Speed Motor

SERIAL NUMBER: 653CO3J3

VOLTAGE: 480 PHASE: 3 AMPS: 89/53

HORSEPOWER: 75/42 HERTZ:

CONDITION OF CABLE JACKET: GOOD X FAIR POOR

GROUND RESISTANCE?

SUPPLY VOLTAGE: L1:L2 480 L2:L3 480 L3:L1 480

RPM: 1175/885 TYPE: SERVICE FACTOR:

PUMP # 2

MANUFACTURER/TYPE: Xylem Pump

MODEL NUMBER: 200

SERIAL NUMBER: 01-0860-

RUNNING TIME METER (hours): N/A

CONDITION OF EQUIPMENT: GOOD: X FAIR: POOR:

WET WELL SIZE:

START LEVEL: FINISH LEVEL:

MOTOR # 3

MANUFACTURER: US Electric Motor

MODEL NUMBER: 444VP Two Speed Motor

SERIAL NUMBER: 9906296-776 R2134230

VOLTAGE: 480 PHASE: 3 AMPS: 97/59

HORSEPOWER: 75/42 HERTZ:

CONDITION OF CABLE JACKET: GOOD X FAIR POOR

GROUND RESISTANCE?

SUPPLY VOLTAGE: L1:L2 480 L2:L3 480 L3:L1 480

RPM: 1175/885 TYPE: SERVICE FACTOR:

PUMP # 2

MANUFACTURER/TYPE: Xylem Pump

MODEL NUMBER: 200

SERIAL NUMBER: 01-0860-76929

RUNNING TIME METER (hours): N/A

PUMP CONTROL PANEL

MANUFACTURER: Triplex Bubbler/Digital controller

MODEL NUMBER: N/A

TYPE: Triplex AMP RATING: 10

OVERLOAD TYPE: Breakers / GE Reduced Voltage Starters

SIZE: 75 HP AMP RATING: 150

DO PROTECTIVE DEVICES COMPLY WITH PUMP MOTOR AMP RATING?: Yes

MOTOR STARTERS/VFD (S): GE Reduced Voltage Starters

ALL WIRES LABELED (TAGGED)?: Yes

ALARMS:

HIGH WATER: X PUMP FAIL: X

LOW WATER: X MOISTURE:

TEMPERATURE: X OTHER:

TYPE:

MOTOR CONTROL CENTER (MCC) (IF APPLICABLE)

MANUFACTURER: GE 880 Line Motor Control

SERIAL NUMBER: GE 800

MAIN: 400 amp-

VOLTAGE: 480 AMPERAGE: 400 PHASE: 3

LAYOUT DESCRIPTION: Stand Up Motor Control Unit. Built in reduced voltage starters for all three pumps.

STAND-BY GENERATOR (IF APPLICABLE)

GENERATOR

MANUFACTURER: Kohler

MODEL NUMBER: 100RDZ081

SERIAL NUMBER: 327589

RATING:

AUTOMATIC TRANSFER SWITCH

MANUFACTURER: ASCO

MODEL NUMBER: ASCO 400

SERIAL NUMBER: 300

DATA WITH GENERATOR RUNNING

RPM: VOLTS AMPS

FREQUENCY 60 (HERTZ) OIL TEMP N/A (DEGREES)

OIL PRESSURE (psi) WATER TEMP (DEGREES)

RUN TIME 358 (HOURS)

LEAKS OR UNUSUAL ACTIVITY, DESCRIBE: Generator is clean.

ADDITIONAL COMMENTS:

MISCELLANEOUS EQUIPMENT

UNIT HEATER

MANUFACTURER: Functioning.

VENTILATION SYSTEM

MANUFACTURER: Squirrel cage blower. Original equipment

SUMP PUMP

MANUFACTURER: Working sump pump

MISCELLANEOUS EQUIPMENT (CONTINUED)

TELEMETRY

DESCRIBE SYSTEM: Hart alarm System / Mission Cellular based alarm monitoring system

FINAL CHECK

ARE PUMPS INSTALLED PROPERLY? Yes

DO CHECK VALVES OPERATE CORRECTLY? Yes

DO GATE VALVES OPERATE CORRECTLY? No. All the gated are deteriorated and need to be replaced.

NOISE LEVEL: HIGH MEDIUM X LOW

LEAKS? No leaks found

WETWELL

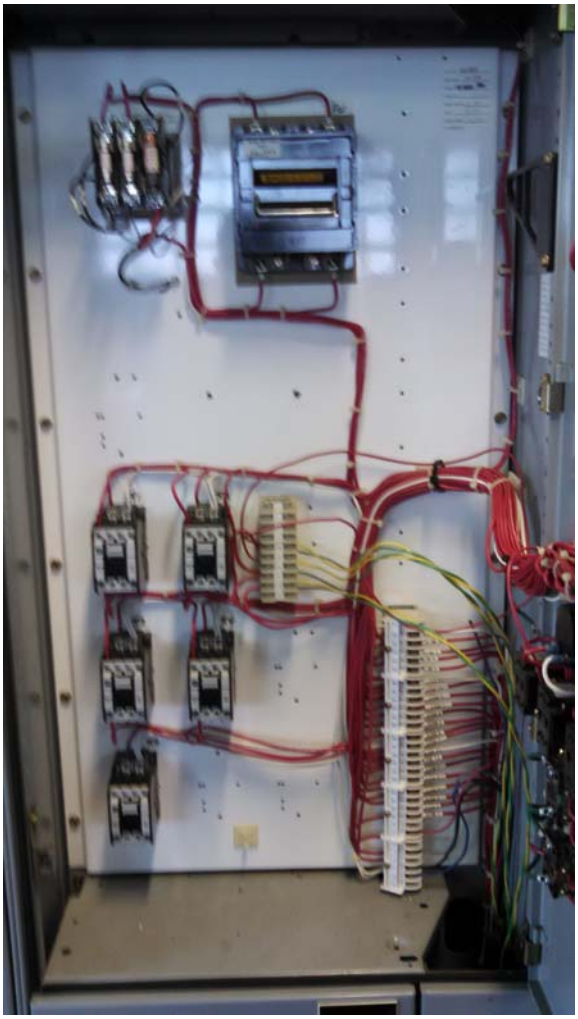
CONDITION OF WALLS, ETC.

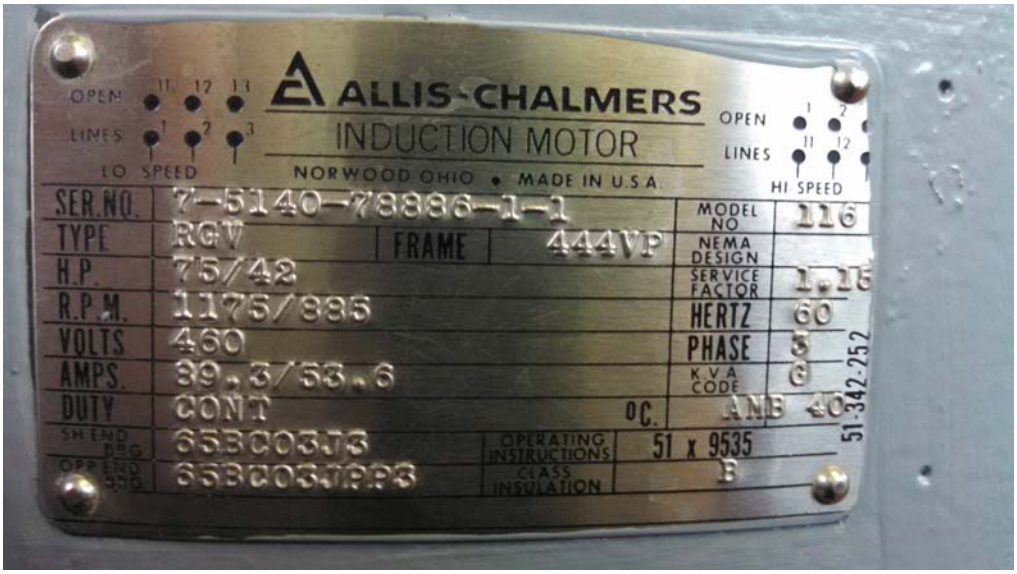
- N/A

ADDITONAL COMMENTS:

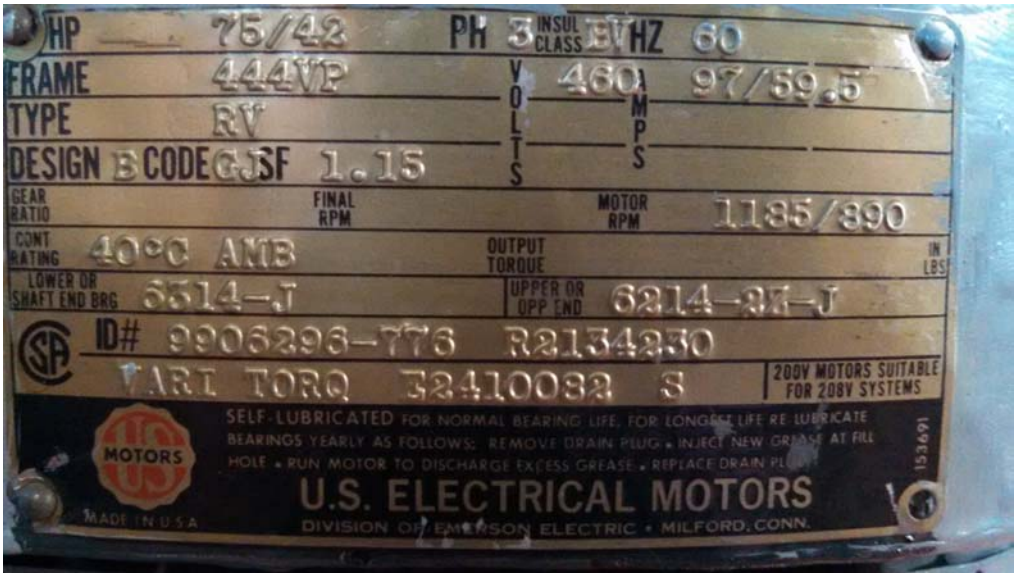
- Pump # 1 is currently off line. Recommend pulling the pump, rebuilding it and installing a variable frequency drives to control it.
- Pumps 2 and 2 are currently started by reduced voltage starters. This is not efficient. We recommend installing variable frequency drives to control them.
- The triplex level controller is not very user friendly and does not work properly. We recommend replacing with a digital level controller and a submersible transducer in the wet well.
- The pump suction and discharge gate valves are deteriorated and do not operate properly. We recommend they be replaced with new valves.
- The pump Discharge and discharge gate valves are deteriorated and do not operate properly. We recommend they be replaced with new valves.
- Currently there is no discharge gate to isolate the force main. We recommend installing a new 8" gate valve on the force main in the pump station after pumps 2 and 3. Once the new gate is installed, the gates for pumps 1 and 2 can be replaced without shutting and draining the force main back. Pump #1 will need to be put back on line as well.
- The suction and discharge piping on pumps 2 and 3 is severely deteriorated. We recommend replacing all the pump piping in the station.
- Suction stubs from the wet well to the pump look to be in worse condition than all other piping. We recommend testing the pipe for structural integrity. Replace if needed. This would require stubbing new pipe through wet well wall structure.
- We recommend installing a channel grinder in the wet well. This will help reduce the clogging in the pumps.
- We recommend a new hatch be installed outside the building on wet well cement roof for easy access to the channel grinder.
- Lighting in the wet well and pump room are deteriorated and inefficient. We recommend install new energy efficient lighting.
- Sump pump in pump room is piped with schedule 40 PVC pipe. We recommend re piping with Schedule 80 PVC or copper pipe. New check valve as well.

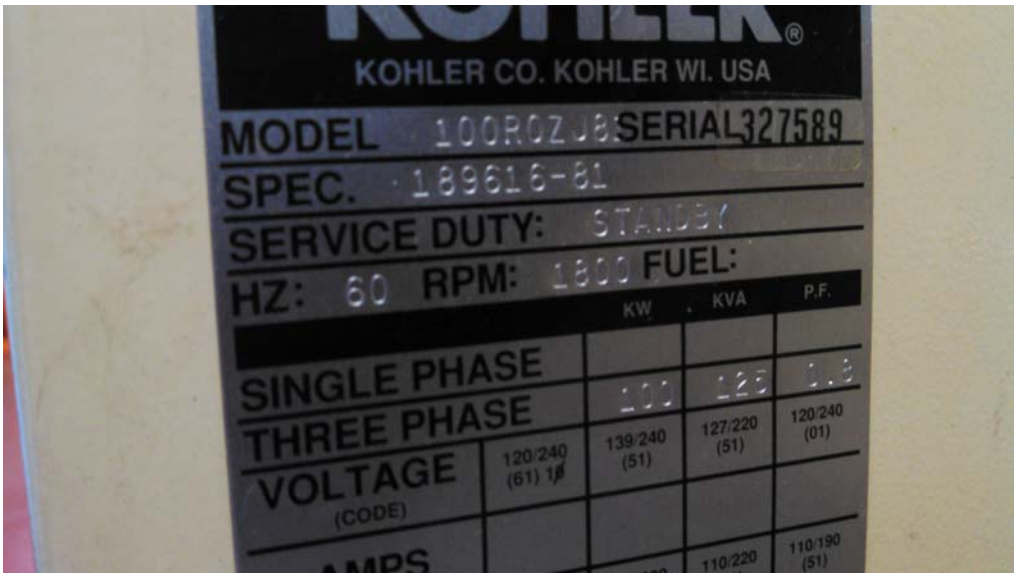

DIGITAL CONTROL CORPORATION
TRIPLEX PUMP CONTROLLER MODEL 9967




ALLIS-CHALMERS
INDUCTION MOTOR
NORWOOD OHIO • MADE IN U.S.A.
OPEN 11 12 13
LINES 1 2 3
LO SPEED
OPEN 1 2
LINES 11 12
HI SPEED
SER.NO. 7-5140-78886-1-1
MODEL NO. 116
TYPE RGV
FRAME 444VP
NEMA DESIGN
H.P. 75/42
SERVICE FACTOR 1.15
R.P.M. 1175/885
HERTZ 60
VOLTS 460
PHASE 3
AMPS. 89.3/53.6
KVA CODE G
DUTY CONT
°C. AMB 40
SH END BRG 65BC03J3
OPP END BRG 65BC03JPP3
OPERATING INSTRUCTIONS 51 x 9535
CLASS INSULATION B
51-342-252


000 Line Motor Control


HP 75/42
PH 3
INSUL CLASS B
HZ 60
FRAME 444VP
VOLTS 460
AMPS 97/59.5
TYPE RV
DESIGN B CODE G SF 1.15
GEAR RATIO
FINAL RPM
MOTOR RPM 1185/890
CONT RATING 40°C AMB
OUTPUT TORQUE
IN LBS
LOWER OR SHAFT END BRG 6314-J
UPPER OR OPP END 6214-2Z-J
ID# 9906296-776 R2134230
VARI TORQ 32410082 S
200V MOTORS SUITABLE FOR 208V SYSTEMS
SELF-LUBRICATED FOR NORMAL BEARING LIFE. FOR LONGER LIFE RE LUBRICATE
BEARINGS YEARLY AS FOLLOWS: REMOVE DRAIN PLUG • INJECT NEW GREASE AT FILL
HOLE • RUN MOTOR TO DISCHARGE EXCESS GREASE • REPLACE DRAIN PLUG
MOTORS
MADE IN U.S.A.
U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC • MILFORD, CONN.
153691

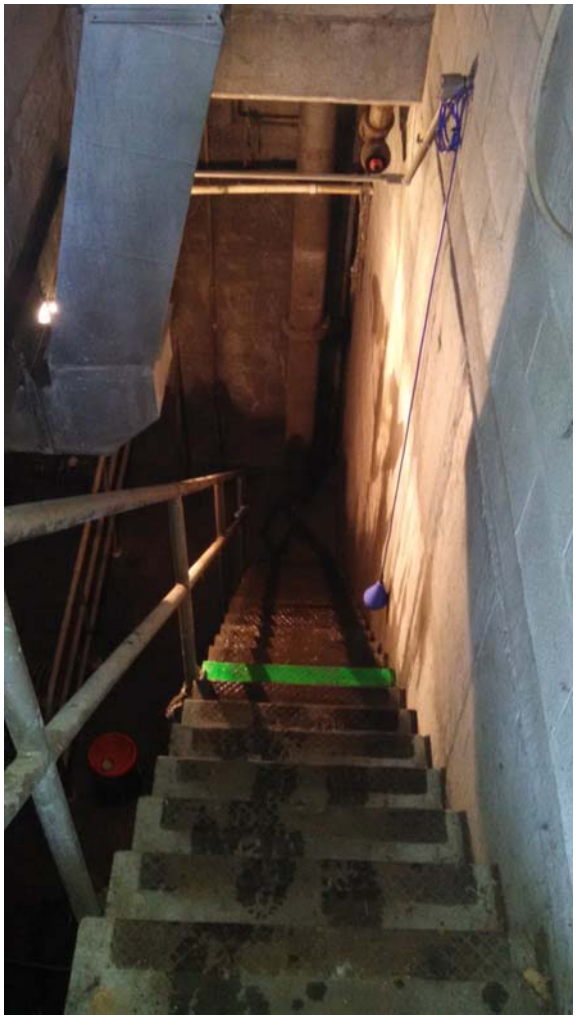

KOHLER CO. KOHLER WI. USA
MODEL 100ROZJ8 SERIAL 327589
SPEC. 189616-81
SERVICE DUTY: STANDBY
HZ: 60 RPM: 1800 FUEL:
KW
KVA
P.F.
SINGLE PHASE
THREE PHASE
100
125
0.8
VOLTAGE
(CODE)
120/240
(61) 1Ø
139/240
(51)
127/220
(51)
120/240
(01)
110/220
110/190
(51)

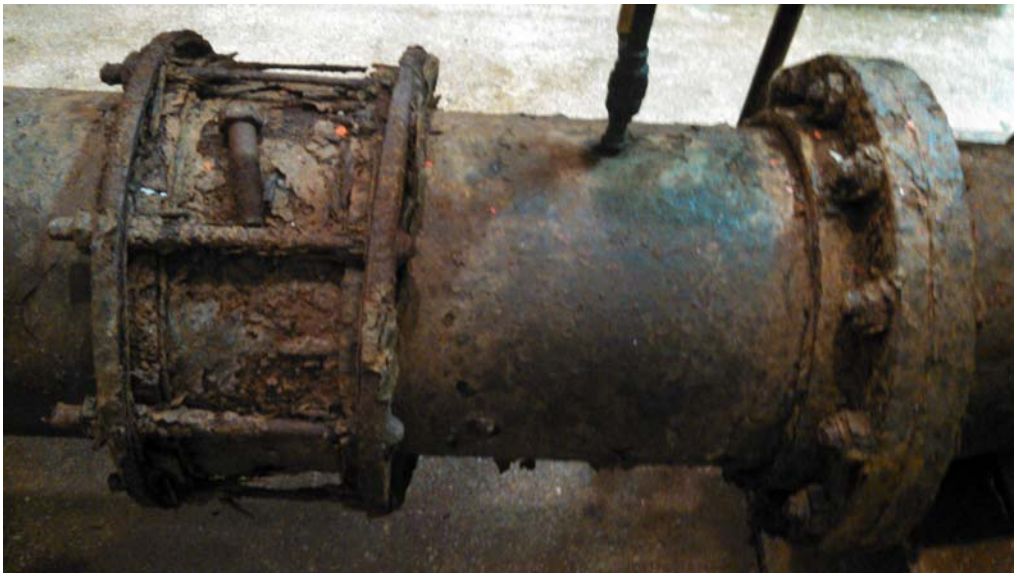

DFM 5.1
GREYLINE
DFM 5.1
Doppler
Flow Meter
GREYLINE


BAR
100xkPa
psi


PREMIUM EFFICIENCY MOTOR
U.S. ELECTRICAL MOTORS


FLYGT
xylem
MILWAUKEE, WI USA
GPM 2500
RPM 1170
Model Number 200
Max. Field Hydrotest Pressure 115 PSI
Year 2014
ASSEMBLED IN U.S.A.
FLYGT
xylem





Walton Cove Pump Station
Installed Circa 1961

Description

The Walton Cove Pump Station is a centrifugal type station with a custom 3-level building, with the pumps and controls located on one side of the building and the wet well on the other side. The two (2) pumps are located on the bottom level, with the Controls on the top level, including the standby generator.

The Walton Cove Pump Station services the north end of Crow point along Downer Avenue, as well as the west side of the hill roads that include Whiton Avenue, Jarvis Avenue, Cushing Avenue, and Merrill Streets. The Walton Cove Pump Station discharges flow approximately 800 linear feet via an 8-inch cast iron (CI) force main to a 10-inch gravity sewer in Downer Avenue, which conveys flows to the Broad Cove Pump Station.

The following activities were performed at this station:

1. Exterior Inspection.

2. Inspection of Electrical Panels, Breakers, and Control Panels.

3. Miscellaneous Inspection and Operation:
   - Pumps and Motors
   - Check and Gate Valves
   - Mechanical Piping
   - Wet well walls and Interior
   - Standby Generator

The following is a list of deficiencies identified during the evaluation:

Wet Well –

1. Pump No. 1 and Pump No. 2 currently utilize soft starters and solid state contactors, which are inefficient. We recommend installing VFD's to control them with increased efficiency.

2. Lighting is deteriorated and inefficient. We recommend installation of new energy efficient lighting.

3. We could not enter the wet well without setting up confined space equipment. Top side inspection showed signs of corrosion and deterioration. We recommend a proper entry and evaluation of the wet well structure and valve systems be scheduled.

Pump Room –

1. Pump shafts are exposed, creating a hazard while pumps are running. We recommend that safety cages be installed on the shafts.

2. Triplex Level Controller is not user friendly and does not work properly. We recommend replacing the controller with a digital level controller and a submersible transducer in the wet well.

3. Pump suction and discharge gate valves are deteriorated and do not operate properly. We recommend that the valves be replaced with new valves.

4. Both pump check valves slam when pumps shut down. We recommend that the valves be replaced with new air cushion check valves.

5. Suction pipe from wet well to Pump No. 2 is in disrepair. We recommend this pipe be repaired.

6. The lower level of pump room shows signs of mold on the walls. We recommend that a commercial dehumidifier be installed.

7. Lighting is deteriorated and inefficient. We recommend the installation of new energy efficient lighting.

8. The sump pump in pump room is piped with schedule 40 PVC, but schedule 80 PVC or copper pipe is recommended. We recommend re-piping with Schedule 80 PVC or copper pipe, including a new check valve.

9. The control/generator room exhaust fan is too small and inadequate for its intended use. We recommend replacing it with a proper ventilation system.

Estimated Costs –

The following table displays the recommended improvements and their estimated costs. We recommend that the improvements are completed as soon as funding is available.

Recommended Capital Improvements and Estimated Costs
Walton Cove Pump Station

Observation	Recommendation	Estimated Cost (1)
Wet Well -		
Pump No. 1 and Pump No. 2 currently started by soft starter and solid state contactor - inefficient	Install variable frequency drives	$15,000
Lighting is deteriorated/inefficient	Install new energy efficient lighting	$3,000
Pump Room -		
Exposed pump shafts	Install safety cages	$3,000
Triplex level controller not user friendly/does not work properly	Replace w/digital level controller and submersible transducer	$15,000
Pump suction and discharge gate valves are deteriorated/do not operate properly.	Replace w/new valves	$25,000
Both pump check valves slam when pumps shut down.	Install air cushion check valve	$15,000
Suction pipe from wet well to Pump No. 2 needs repair.	Repair suction piping	$5,000
Lower level of pump room shows signs of mold	Install commercial humidifier	$3,000
Lighting is deteriorated and inefficient	Install new energy efficient lighting	$5,000

Observation	Recommendation	Estimated Cost (1)
Sump pump in pump room piped with schedule 40 PVC	Re-pipe w/ schedule 80 PVC or copper pipe: New check valve	$3,000
Control/generator room exhaust fan is too small and inadequate for station	Replace w/ proper ventilation system	$5,000
	Subtotal -	$97,000
	15% Contingencies -	$15,000
	Total -	**$112,000**

(1) Includes labor and installation.

(2) Contingency values were rounded for budgetary estimate purposes.

Five Centennial Drive, Peabody, MA 01960-7985

Tel: (978) 532-1900

Fax: (978) 977-0100

PUMP STATION EVALUATION REPORT

DATE/TIME: Friday, February, 26, 2016

TECHNICIAN(S): Sal Ferrara

JOB NAME: Walton Cove Pump Statiom

Owner: Town of Hingham

STATION NAME: Walton Cove Sewer Pump Station

LOCATION: Hingham MA

ENGINEER: Weston & Sampson

PEOPLE PRESENT AT EVALUATION:

Sal Ferrara (Weston & Sampson)

Mike Paulin (Weston & Sampson)

STATION LAYOUT: Custom Building. Controls and pumps on one side. Wet well on the other side. Duplex Pump System. Generator in building. Pump room three levels.

Note: See Photos

LIQUID BEING PUMPED: Sewerage

COMMENTS:

MOTOR # 1

MANUFACTURER: Westinghouse

MODEL NUMBER: 6808224653

SERIAL NUMBER: 6808224653

VOLTAGE: 230/460 PHASE: 3 AMPS: 51/25

HORSEPOWER: 20 HERTZ: 60

CONDITION OF CABLE JACKET: GOOD FAIR X POOR

GROUND RESISTANCE? Normal

SUPPLY VOLTAGE: L1:L2 480 L2:L3 480 L3:L1 480

AMPERAGE PUMP MOTOR:

(BLACK)L1: 19 (RED)L2: 19 (WHITE)L3: 19

RPM: 1165 TYPE: SERVICE FACTOR:

PUMP # 1

MANUFACTURER/TYPE: Chicago Pump

MODEL NUMBER: VOS OS6 850 GPM @ 50' head

SERIAL NUMBER: 9810122

RUNNING TIME METER (hours): 15327

CONDITION OF EQUIPMENT: GOOD: FAIR: X POOR:

WET WELL SIZE:

FLOW TEST: START LEVEL: FINISH LEVEL:

MOTOR # 2

MANUFACTURER: Westinghouse

MODEL NUMBER: 6808224653

SERIAL NUMBER: 6808224653

VOLTAGE: 460 PHASE: 3 AMPS: 51/25

HORSEPOWER: 20 HERTZ: 60

CONDITION OF CABLE JACKET: GOOD FAIR X POOR

GROUND RESISTANCE? Normal

SUPPLY VOLTAGE: L1:L2 480 L2:L3 480 L3:L1 480

AMPERAGE PUMP MOTOR:

(BLACK)L1: 21 (RED)L2: 20 (WHITE)L3: 21

RPM: 1165 TYPE: SERVICE FACTOR:

PUMP # 2

MANUFACTURER/TYPE: Chicago Pump

MODEL NUMBER: VOS OS6 850 GPM @ 50' head

SERIAL NUMBER: 9810121

RUNNING TIME METER (hours): 10833

CONDITION OF EQUIPMENT: GOOD: X FAIR: POOR:

WET WELL SIZE _:

START LEVEL: FINISH LEVEL:

PUMP CONTROL PANEL

MANUFACTURER: Duplex Bubbler Panel

MODEL NUMBER: N/A

TYPE: Duplex AMP RATING: 20

OVERLOAD TYPE: Breakers / Soft Starters

SIZE: AMP RATING: 50

DO PROTECTIVE DEVICES COMPLY WITH PUMP MOTOR AMP RATING?: yes

MOTOR STARTERS/VFD (S): Cutler Hammer/Eaton Soft Starter and C-H solid state starter

ALL WIRES LABELED (TAGGED)?: Yes

ALARMS:

HIGH WATER: X PUMP FAIL: X

LOW WATER: X MOISTURE:

TEMPERATURE: OTHER:

TYPE:

MOTOR CONTROL CENTER (MCC) (IF APPLICABLE)

MANUFACTURER: N/A

SERIAL NUMBER:

MAIN: 200 Amp 480 Volts

TRANSFORMER: 480 to 240/120

VOLTAGE: AMPERAGE: PHASE:

LAYOUT DESCRIPTION: 480 volt load center. 240/120 Volt load center. Motor contactors in separate enclosures.

LIQUID LEVEL CONTROLS

MANUFACTURER: Duplex Bubbler Panel

MODEL NUMBER: N/A

FLOAT SWITCHES: Yes Back Up

IF BUBBLER SYSTEM, DESCRIBE: Small fish tank compressor bubbler system

LEVEL CONTROL COMPRESSOR

MANUFACTURER: N/A

COMMENTS: Should be replaced with Digital controls and submersible level transducer.

STAND-BY GENERATOR (IF APPLICABLE)

ENGINE

MANUFACTURER: Kohler

MODEL NUMBER: 45RZG

SERIAL NUMBER: 2108404

GENERATOR

MANUFACTURER: Kohler

MODEL NUMBER: 45RZG

SERIAL NUMBER: 2108404

RATING:

AUTOMATIC TRANSFER SWITCH

MANUFACTURER: Russell Electric

MODEL NUMBER: N/A

SERIAL NUMBER: N/A

DATA WITH GENERATOR RUNNING

RPM: VOLTS AMPS

FREQUENCY 60 (HERTZ) OIL TEMP N/A (DEGREES)

OIL PRESSURE (psi) WATER TEMP (DEGREES)

RUN TIME 172 (HOURS)

LEAKS OR UNUSUAL ACTIVITY, DESCRIBE: Generator is clean.

ADDITIONAL COMMENTS:

MISCELLANEOUS EQUIPMENT

UNIT HEATER

MANUFACTURER: N/A Original Equipment

RATING AMP:_____ VOLT:_____

VENTILATION SYSTEM

MANUFACTURER: N/A. Original equipment. Ventilation system is under sized for the station.

SUMP PUMP

MANUFACTURER: N/A Sump pump is working

MISCELLANEOUS EQUIPMENT (CONTINUED)

TELEMETRY

DESCRIBE SYSTEM: Hart Alarm/Mission monitoring and alarm unit.

FINAL CHECK

ARE PUMPS INSTALLED PROPERLY? Yes

DO CHECK VALVES OPERATE CORRECTLY? N/A

NOISE LEVEL: HIGH_____ MEDIUM X LOW_____

LEAKS? Discharge gate valve leak.

WETWELL

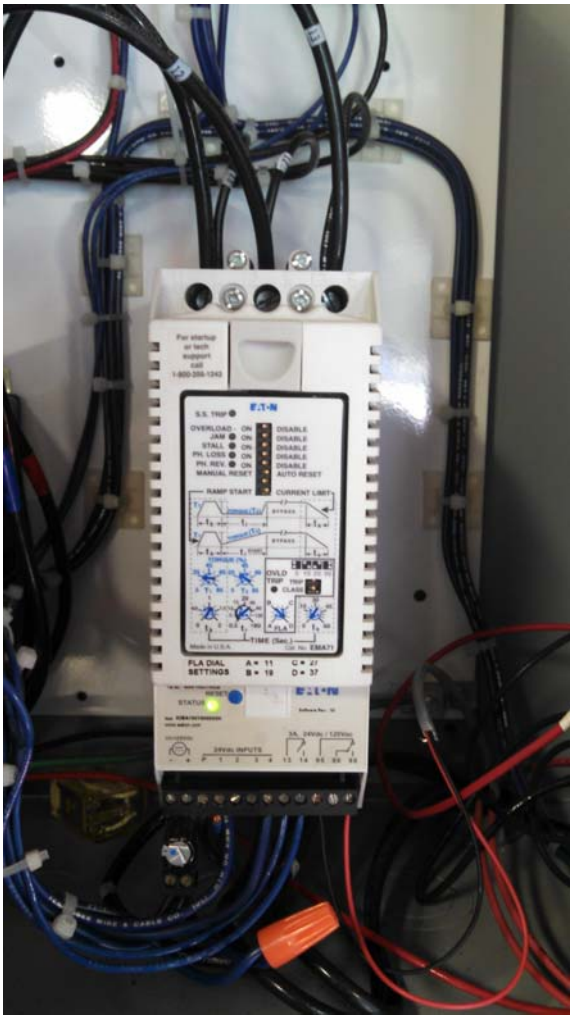
CONDITION OF WALLS, ETC.: Could not enter into wet well. Looks very corroded and deteriorated.

ADDITONAL COMMENTS:

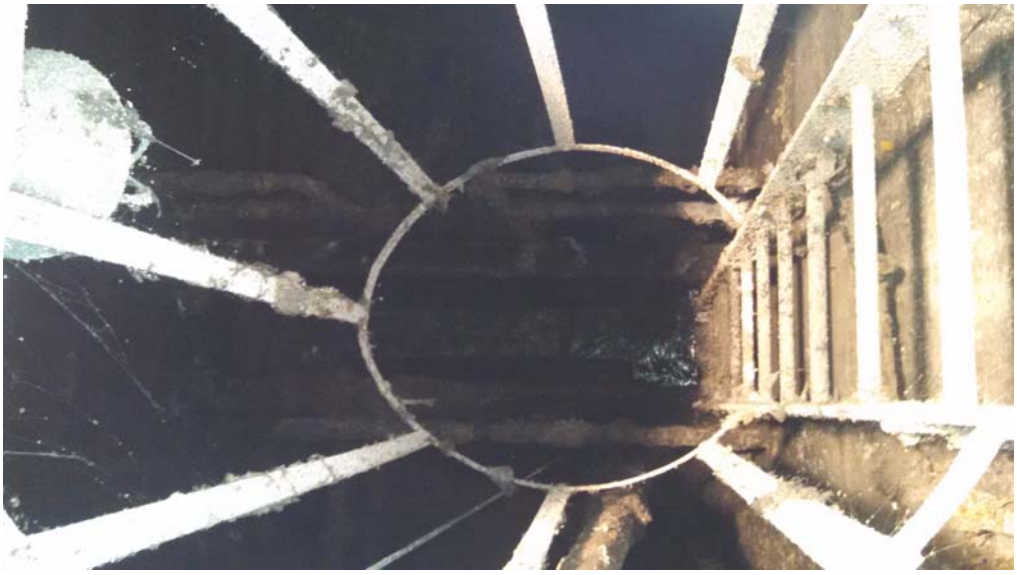
- Pumps 1 and 2 are currently started by soft starter and solid state contactor. This is not efficient. We recommend installing variable frequency drives to control them.
- We recommend installing safety cages around the pump shafts. Currently the shafts are exposed and create a hazard while the pumps are running.
- The triplex level controller is not very user friendly and does not work properly. We recommend replacing with a digital level controller and a submersible transducer in the wet well.
- The pump suction and discharge gate valves are deteriorated and do not operate properly. We recommend they be replaced with new valves.
- The pump Discharge and discharge gate valves are deteriorated and do not operate properly. We recommend they be replaced with new valves.
- Both pump check valves are slamming when pumps shut down. We recommend air cushion check valve be installed to eliminate the water hammer.
- Suction pipe from the wet well to the pump #2 need to be repaired.
- We could not enter the wet well without setting up confined space equipment. We recommend a proper entry and evaluation of the wet well structure and valve systems.
- Lower level of the pump room has signs of molding on the walls. We recommend a commercial dehumidifier be installed to eliminate mold.
- Lighting in the wet well and pump room are deteriorated and inefficient. We recommend install new energy efficient lighting.
- Sump pump in pump room is piped with schedule 40 PVC pipe. We recommend re piping with Schedule 80 PVC or copper pipe. New check valve as well.
- Control/Generator room exhaust fan is too small and inadequate for the station. We recommend replacing with the proper ventilation system.


Russelectric
Russelectric Inc.
South Shore Park
Hingham, Mass. 02043
"Don't Be Left In The Dark"
NE
Lamp

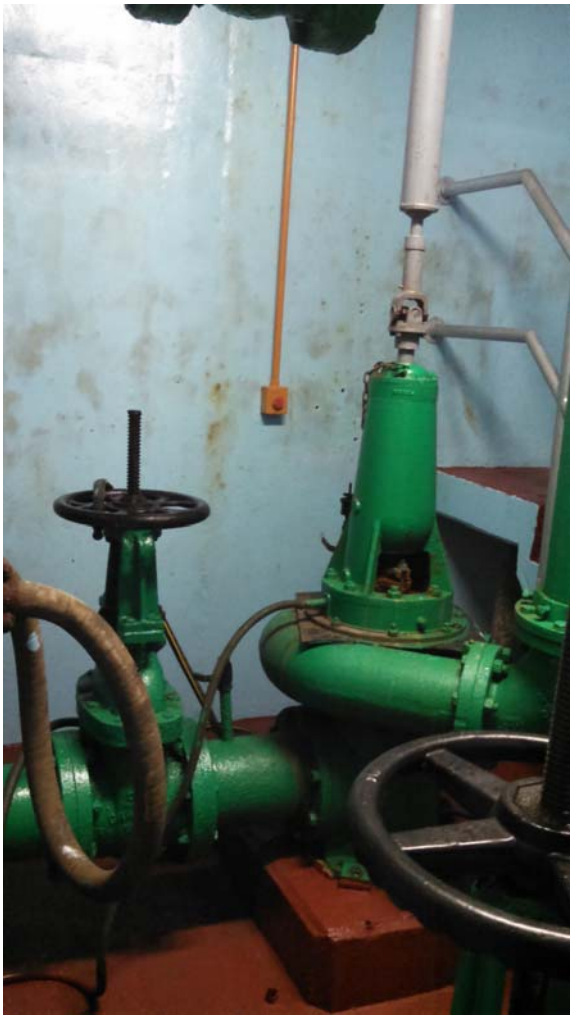

PHASE
CYCLES HZ
KVA CODE
SERIAL
HORSEPOWER
RPM
TIME HRS.
INS. CL.
INS. CODE
SER. FAC.
NEMA DES.
FRAME
MAX.AMB.
MODEL
VOLTS
230/460
AMPS.
51.8/25.9
USER OR CATALOG NUMBER
LOWER VOLTAGE LINE
MOTOR STYLE
DRIVE OR LOWER BRG
OPP. DRIVE OR UPPER BRG
HIGHER VOLTAGE LINE
Westinghouse

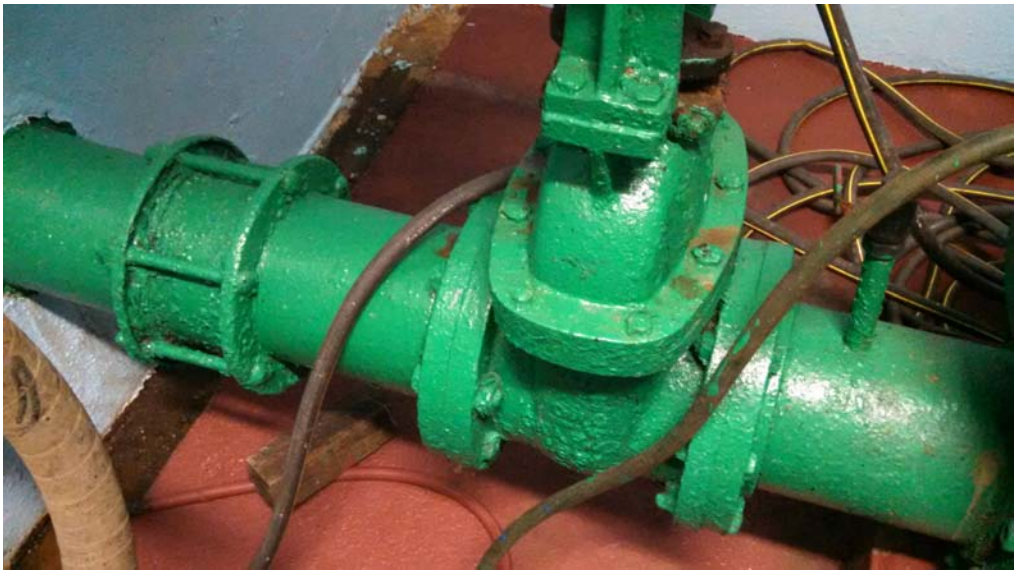

E-T-N
S.S. TRIP
OVERLOAD
JAM
STALL
PH. LOSS
PH. REV.
MANUAL RESET
DISABLE
AUTO RESET
RAMP START
CURRENT LIMIT
TIME (Sec.)
FLA DIAL SETTINGS
A = 11
B = 19
C = 47
D = 37
STATUS
RESET

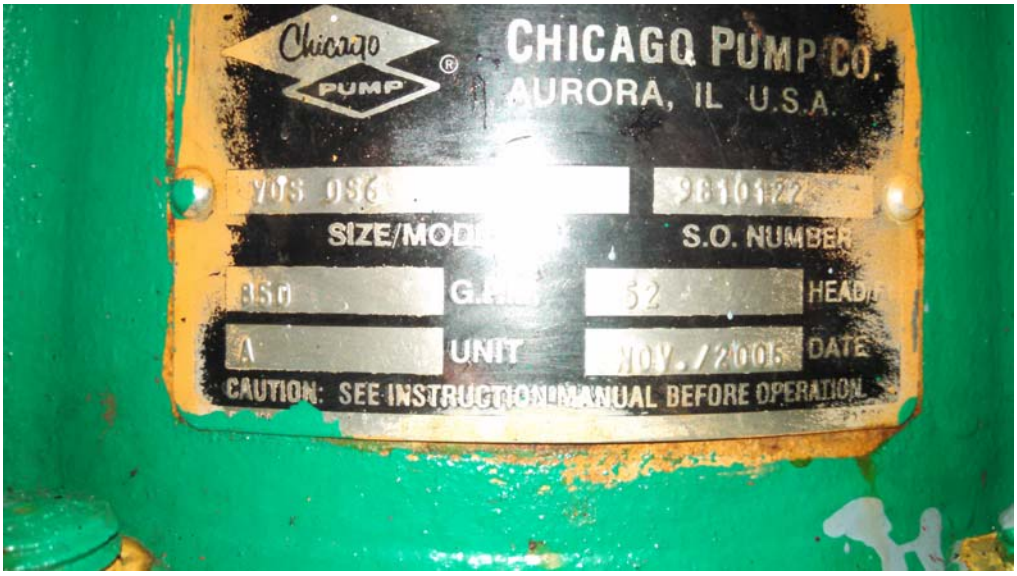

1-20-16
SELECTOR
SWITCH
21V4550




CD 100E
Ebac






Chicago PUMP
CHICAGO PUMP CO.
AURORA, IL U.S.A.
S.O. NUMBER
UNIT
CAUTION: SEE INSTRUCTION MANUAL BEFORE OPERATION

Greenbush Pump Station
Installed Circa 2003

Description

The Greenbush Pump Station is a submersible type station with an outdoor, stand-alone enclosure. The two (2) pumps are located below grade, inside the precast concrete wet well.

The Greenbush Pump Station receives flow from the Town Brook/Mill Street Pump Station. The Greenbush Pump Station discharges flow approximately 900 linear feet to an 18-inch gravity sewer in Lincoln Street, which conveys flows to the Broad Cove Pump Station.

The following activities were performed at this station:

1. Exterior Inspection.

2. Inspection of Electrical Panels, Breakers, and Control Panels.

3. Miscellaneous Inspection and Operation:
   - Pumps and Motors
   - Check and Gate Valves
   - Mechanical Piping
   - Wet well walls and Interior
   - Standby Generator

The following is a list of deficiencies identified during the evaluation:

Wet Well –

1. The pump station experiences very high flows, causing the pumps to run excessively. The high flows are likely primarily due to infiltration/inflow (I/I). We recommend further evaluation of the flows and surrounding sewers.

2. The existing aluminum hatch is not water tight. We recommend that a new watertight hatch be installed.
3. Odors have been an issue at this pump station. Currently, the Town utilizes a black, rubber mat over the wet well hatch to reduce odor complaints from nearby/adjacent properties. The new watertight hatch in conjunction with a charcoal filter over the wet well vent may eliminate the need for the existing rubber mat.

Estimated Costs –

The following table displays the recommended improvements and their estimated costs. We recommend that the improvements are completed as soon as funding is available.

Recommended Capital Improvements and Estimated Costs
Greenbush Pump Station

Observation	**Recommendation**	**Estimated Cost (1)**
Wet Well -		
Aluminum hatch not water tight	Install new watertight hatch	$10,000
	Subtotal -	$10,000
	15% Contingencies -	$2,000
	Total (Short Term) -	**$12,000**

(1) Includes labor and installation.
(2) Contingency values were rounded for budgetary estimate purposes.

Five Centennial Drive, Peabody, MA 01960-7985

Tel: (978) 532-1900

Fax: (978) 977-0100

PUMP STATION EVALUATION REPORT

DATE/TIME: Friday, February, 26, 2016

TECHNiCIAN(S): Sal Ferrara

JOB NAME: Greenbush Pump Station

Owner: Town of Hingham

STATION NAME: Greenbush Sewer Pump Station

LOCATION: Hingham MA

ENGINEER: Weston & Sampson

PEOPLE PRESENT AT EVALUATION:

Sal Ferrara (Weston & Sampson)

Mike Paulin (Weston & Sampson)

STATION LAYOUT: Flygt Submersible pumps. Stand-alone enclosure outdoor.

Note: See Photos

LIQUID BEING PUMPED: Sewerage

COMMENTS:

PUMP # 1

MANUFACTURER/TYPE: Flygt

MODEL NUMBER: 3153.095-148005

SERIAL NUMBER: 3153.095-0218

VOLTAGE: 480 PHASE: 3 AMPS: 26

HORSEPOWER: 20 HERTZ: 60

RUNNING TIME METER (hours): 2308

CONDITION OF EQUIPMENT: GOOD: FAIR: X POOR:

WET WELL SIZE:

FLOW TEST: START LEVEL: FINISH LEVEL:

MANUFACTURER/TYPE: Flygt

MODEL NUMBER: 3153.095-148005

SERIAL NUMBER: 3153.095-02187

VOLTAGE: 480 PHASE: 3 AMPS: 26

HORSEPOWER: 20 HERTZ: 60

RUNNING TIME METER (hours): 2308

CONDITION OF EQUIPMENT: GOOD: FAIR: X POOR:

WET WELL SIZE:

START LEVEL: FINISH LEVEL:

PUMP CONTROL PANEL

MANUFACTURER: Flygt/WAJA Controls

MODEL NUMBER: Flygt/WAJA Controls

TYPE: Duplex AMP RATING: 100

OVERLOAD TYPE: Breakers / Soft Starters

SIZE: 50 AMP RATING: 50

DO PROTECTIVE DEVICES COMPLY WITH PUMP MOTOR AMP RATING?: Yes

MOTOR STARTERS/VFD (S): Square D Electronic Soft Starters

ALL WIRES LABELED (TAGGED)?: Yes

ALARMS:

HIGH WATER: X PUMP FAIL: X

LOW WATER: X MOISTURE:

TEMPERATURE: OTHER:

TYPE:

MOTOR CONTROL CENTER (MCC) (IF APPLICABLE)

MANUFACTURER: N/A

LIQUID LEVEL CONTROLS

MANUFACTURER: Flygt Multi Trode Controller

MODEL NUMBER: MT2-PC

FLOAT SWITCHES: Level Stick

UNIT HEATER

MANUFACTURER: 500 Watt Hoffman

RATING AMP: VOLT:

VENTILATION SYSTEM

MANUFACTURER: N/A

MISCELLANEOUS EQUIPMENT (CONTINUED)

TELEMETRY

DESCRIBE SYSTEM: Hart Alarm/Mission Alarm Monitoring system

FINAL CHECK

ARE PUMPS INSTALLED PROPERLY? Yes

DO CHECK VALVES OPERATE CORRECTLY? Yes

NOISE LEVEL: HIGH MEDIUM LOW X

LEAKS? No leaks found

WETWELL

CONDITION OF WALLS, ETC.: Minimal grease build up. Minor corrosion to aluminum grating and rails. No cleaning needed at this time.

ADDITONAL COMMENTS:

- Very high flows in wet well. Mostly I/I. Recommend further evaluation.
- Pumps run excessively. The control panel is in good condition.
- The existing aluminum hatch is not water tight. A new water tight hatch should be installed.
- Currently the City has a black rubber matt over the wet well hatch to reduce the odor complaints. A new water tight hatch and a charcoal odor filter over the wet well vent may eliminate the need for the rubber matt. We recommend trying this approach.


400 VOLTS


FLYGT
Made in Sweden
Xylem Water Solutions
Manufacturing AB
3153.095-1480005
3153.095-0218
433
3~60Hz 14.9kW-20hp 1755rpm S1
Max 40°C
YSER460/Y//230V26/52A
cosφ 0.83
TP111 cl.H IEC60034-1 IP68 20m L
217Kg
6306800


56 LEONARD STREET UNIT #8
FOXBOROUGH, MA 02035
WAJA ASSOCIATES
PROJECT:
PUMPING SYSTEMS, INC.
MBTA / GREENBUSH
HINGHAM, MA
TAG = PCP (PUMP CONTROL PANEL)
REFERENCE WAJA DRAWING NUMBERS:
4244W-PCP-ENCL-1 THROUGH 4244W-E6 (9 DRAWINGS)
ENCLOSURE = TYPE 1
SYSTEM VOLTAGE
POWER = 480VAC, 3 PHASE
CONTROL = 120VAC, 1 PHASE
UL-698A
INTRINSICALLY SAFE BARRIER RELAY
PHOENIX CONTACT # 2835781;
PROVIDES INTRINSICALLY SAFE CIRCUIT EXTENSIONS
FOR USE IN CLASS 1, DIV 1, GROUP D
HAZARDOUS LOCATIONS WHEN CONNECTED
PER INSTALLATION INSTRUCTIONS # TNR 9009332-00 / 07.01
FIELD CONNECTION DATA
INTRINSICALLY SAFE BARRIER RELAY (FLOATS):
PHOENIX CONTACT # 2835781;
WIRE RANGE = 1 #24 - 1 #14 AWG
SCREW TIGHTENING TORQUE = 4.4 - 5.3 IN. LBS.
INTRINSICALLY SAFE BARRIER RELAY
MULTITRODE # MTISB-10
PROVIDES INTRINSICALLY SAFE CIRCUIT EXTENSIONS
FOR USE IN CLASS 1, DIV 1, GROUP D
HAZARDOUS LOCATIONS WHEN CONNECTED
PER INSTALLATION INSTRUCTIONS:
DRAWINGS # 9317, REV.4, DATED 4-94,
TITLE: INTRINSICALLY SAFE BARRIER INSTALLATION SHEETS 1 to 8
FIELD CONNECTION DATA
MULTITRODE #MTISB-10
INTRINSICALLY SAFE BARRIER RELAY:
WIRE RANGE = 1 #28 - 1 #12 AWG
SCREW TIGHTENING TORQUE = 4.4 IN. LBS.
FIELD CONNECTION DATA
SOFT START "T" TERMINALS: / SQ. D CO. # ATS48032Y:
WIRE RANGE = UP TO MAX #8 AWG
SCREW TIGHTENING TORQUE = .26 IN. LBS.
TERMINAL BLOCKS / SQ. D CO. # 9080-GR6:
WIRE RANGE = 1 # 6, 1-4 #16, 1 #10, 1-3 #18
WIRE RANGE = 1-3 #12, 1-8 #20, 1-4 #14 & 1-10 #22 AWG

Capital Improvements and Estimated Costs Summary

Pump Station/Description	**Estimated Cost**
Broad Cove	$439,000
Walton Cove	$112,000
Greenbush	$12,000
Total	***$563,000***

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