Report

Hingham, MA

Bradley Woods
Pump Station
Hydraulic Capacity Evaluation

March 2016

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Town of Hingham, Massachusetts
Weston & Sampson Project No. 2160125.A

March 31, 2016

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

Re: Bradley Woods Pump Station Hydraulic Capacity Evaluation

Dear Mr. Sylvester:

On Friday, February 26, 2016, Weston & Sampson personnel conducted a site visit and evaluation of the Bradley Woods Pump Station. This report describes our evaluation of the pump station including the condition of the building structure, generator, wet well, and site; the inspection of electrical control panels and breakers; and the condition and operation of existing pumps, motors, check valves, gate valves, and existing mechanical piping.

The report also includes a pump station capacity analysis (existing pumps and force main) and evaluation of existing flows handled by the station, including hydraulic capacity of gravity sewers associated with a proposed new connection at 319 Lincoln Street (Route 3A). The report provides specific recommendations and estimated costs for short-term capital improvements.

Description

The pump station, originally designed as a pneumatic ejector sewage lift station with two large air compressors, was converted to a submersible pump station in 1989. The station is now a duplex submersible type system that draws wastewater from an adjacent concrete wet well. The cement building structure, with brick exterior, houses the control panels and electrical equipment on one side of the structure, with the wet well on the other side (with separate door/entrance). The station discharges flow approximately 760 linear feet via a 6-inch cast iron (CI) force main adjacent to USS Amesbury Drive, which manifolds into the existing 15-inch reinforced concrete (RC) force main from the Broad Cove Pump Station within SMH 741. From there the 15-inch RC force main runs approximately 1,000 additional feet to an 18-inch RC gravity sewer in Lincoln Street (Route 3A) at the intersection of Shipyard Drive (SMH 16) for conveyance to the MWRA pump station on Route 3A at Stodders Neck.

The Bradley Woods Pump Station receives wastewater flow from all of Subarea 5 as delineated on the Town of Hingham Sanitary Sewer Map. All of the wastewater flow is collected via gravity sewers with the exception of one small ejector pump station on Bayberry Road. The entire tributary area is depicted on Figure 1.

As part of the evaluation, the following activities were performed at the 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

4. Drawdown testing to estimate current pump capacities

5. Instrument survey to verify sewer manhole locations and invert elevations adjacent to USS Amesbury Drive

6. Dye testing of the force main to confirm the discharge location

Photographs from the site visits are included in Appendix A. The pump station evaluation log is included in Appendix B. Record Drawing information is included in Appendix C.

Observations/Recommendations

Since we were unable to secure original design or as-built information, it is unclear how old the pump station is but the 1989 conversion from an ejector station to a submersible station was completed more than 26 years ago and many components are deteriorating and in need of replacement and/or repair. The following is a list of observations and **recommended improvements (identified in bold)**:

- On March 22, 2016, dye testing and investigation of the Bradley Woods Pump Station force main was completed in order to confirm the discharge location. The dye testing confirmed that the force main connects to the existing 15-inch RC force main from the Broad Cove Pump Station. Based on the investigation it was concluded that the force main connection is located within the gravity sewer manhole (SMH 741) at the intersection of USS Amesbury Drive and Lincoln Street (Route 3A), where the 15-inch force main crosses through the inside of the gravity sewer manhole and a 15-inch x 6-inch tee (with valve) was observed.

- The building structure is deteriorated and the wet well side of the building has structural issues as the bricks and blocks are separating. The separations have currently been temporarily sealed with spray foam but **it is recommended that the concrete be re-grouted and the brick face be resurfaced where necessary**.

- The station includes two different make/model pumps in the wet well: Pump No. 1 is a HOMA pump that was installed in 2004 to replace one of the Flygt pumps and Pump No. 2 is a Flygt pump from the 1989 conversion. The Town has no data on these pumps but some information was recovered from the manufacturer's representative as identified in the table below:

Manufacturer	HOMA	Flygt
Model	AMX646-360	CP-3127
Motor	21.5HP; 1160 rpm	10 HP; 1750 rpm
Power	208v; 3-phase; 60Hz	200v; 3-phase; 60 Hz

  Pump curves and other relevant acquired data are included in Appendix D. The actual head losses and resulting system curves and pump capacities vary significantly based on the interconnection of the Broad Cove and Bradley Woods Pump Station force mains.

- The existing 40 kW Kohler standby generator is exposed to the elements and is showing signs of wear, including corrosion, evidence of oil leakage and evidence of mouse activity. The generator is also likely undersized to operate both pumps simultaneously in the event of a lag pump on condition and resulting parallel pump operation. **It is recommended that the generator be replaced with one of sufficient size (kW) to run two pumps simultaneously and that the new generator be housed in a sound attenuated/weather proof enclosure.**

- The station control panel is an aging float controlled system, which is subject to fouling. **It is recommended that a digital controller and submersible level transducer be installed in the wet well for more reliable level readings and compatibility with other municipal installations.**

- Wet well

  - Cement wet well structure appears to be in satisfactory condition.

  - Magnetic flow meter in wet well is deteriorated and not functioning. **It is recommended that a new ultrasonic flow meter be installed with the transducer on the force main outside of the wet well, inside a new meter manhole/vault, and the recorder/totalizer mounted on the inside wall of the pump station building.**

  - **Force main piping, check valves, and gate valves inside the wet well are deteriorated and it is recommended that they be replaced.**

  - Pump rails are stainless steel and appear to be in satisfactory condition. **The upper rail brackets, however, are deteriorated and it is recommended that they be replaced with new stainless steel brackets.**

  - **Lighting inside the wet well is old, deteriorated, and inefficient and it is recommended that they be replaced with energy efficient lighting.**

- **Electrical conduit inside the wet well is deteriorated and it is recommended that it be replaced.**

- Existing trash basket is a maintenance nuisance. **It is recommended that new solids handling or cutter pumps be installed and that the trash basket be removed.**

- No records pertaining to the capacity of the existing pumps were available. Wet well drawdown testing was performed to estimate the current pump capacities (see Table 1).

  - On March 4, 2015, wet well draw-down testing was performed in conjunction with the 2015 Flow Metering Project.
    - The 2015 draw-down tests revealed average pump discharge rates of 560 gpm for Pump No. 1 (range of 488 gpm to 631 gpm) and 438 gpm for Pump No. 2 (range of 412 gpm to 473 gpm). The range of pump discharge rates is assumed to be attributed to the varying head conditions associated with interconnection of the Broad Cove and Bradley Woods Pump Station force mains. The Bradley Woods pumps will encounter higher head losses when the Broad Cove Pump Station is operating, thereby reducing the output of the pumps.
    - The calculated average incoming flow to the wet well during this period was approximately 70 gpm with a range of 42 gpm to 100 gpm. The fairly wide range of incoming flow is likely attributed to the timing of the Bayberry Road pump operation, with higher flows occurring when this pump station is running.

  - On February 26, 2016, additional wet well draw-down testing performed in conjunction with the pump station evaluation revealed current pump discharge rates of 777 gpm for Pump No. 1 and 701 gpm for Pump No. 2, with estimated average incoming flow to the wet well during this period of approximately 230 gpm.
    - Based on the above data, the pump discharge rate was significantly higher in February 2016 than it was in March 2015, which is again assumed to be attributed to the force main interconnection. Based on the higher pumping rates during the 2016 test, it appears as though the Broad Cove Pump Station was not operating during this test.
    - The influent was also higher in February 2016 than March 2015 (230 gpm versus 70 gpm), which could be due to higher than normal groundwater conditions at the time of the recent test but is more likely due to the time of day during which the draw down tests were performed - mid-afternoon (2:00 p.m.) in March 2015 vs. early morning (7:00 a.m.) in February 2016.

  - Based on the draw-down tests performed at the pump station, the pump discharge rates and influent rates were not consistent between the two testing periods (March 2015 and February 2016). Additional testing may be required to better determine these rates, however for the purposes of this report we analyzed the full range of data collected.

- Using all of the draw down test data, the average pumping rates for Pump No. 1 and Pump No. 2 are 614 gpm and 504 gpm respectively.

- Based on the above data, Pump No. 2 is discharging at a lower rate than Pump No. 1. due to the varying make/models of the pumps. **Based on the age and difference of the current pumps and the need for a better means of dealing with solids at the pump station, we recommend the Town consider replacing both pumps at the station with matching cutter-type pumps that will discharge at the desired rate over the range of head conditions.**

- **Based on the significant impacts of the force main interconnection on the hydraulics of the system and the pump capacity as well as the imminent rehabilitation or replacement of the Broad Cove Pump Station force main as a result of multiple breaks and emergency repairs, we recommend that the Town consider re-routing the Bradley Cove Pump Station force main to discharge at SMH 16, where the Broad Cove Pump Station force main currently discharges.** This will eliminate the hydraulic complexities of the interconnected force mains and provide more consistent/reliable pump operation at both Bradley Woods and Broad Cove. Furthermore, it is likely that the interconnection is creating conditions in the Broad Cove force main (i.e. water hammer) that has contributed to the breaching of the force main.

- The station utilizes a Hart phone line alarm monitoring system and also includes a Mission cellular based alarm system. Based on available information from the Mission system for the one-year period of March 6, 2015 through March 4, 2016 (see Appendix E), the average daily pump run time is approximately 154 minutes. Based on the average pumping rates of 614 gpm for Pump No. 1 and 504 gpm for Pump No. 2, the estimated average daily flow currently handled by the station is approximately 85,000 gpd. Based on TR-16, the peak flow to the station is estimated at 493,000 gpd (85,000 X 5.8).

  - The station receives flow via gravity from two separate areas, the Bradley Woods neighborhood and the Lincoln Street/Bradley Park Drive area, with the flows combining at a gravity manhole (SMH 875) just upstream of the wet well.

  - Based on a review of the available mapping for the Bradley Woods neighborhood, there are approximately 100 residential single family homes (Bradley Woods Drive, Hawthorne Road, Bayberry Road, etc.) fronted by the sewer. The average daily flow contributed to the pump station from this neighborhood, including an allowance for I/I based on our previous knowledge of the area, is estimated at 27,500 gpd, with an estimated peak flow of 145,000 gpd.

  - Based on these estimates, and the Mission data detailed above, the Lincoln Street/Bradley Park Drive area (which conveys flows through the gravity sewers adjacent to USS Amesbury Drive) contributes an average daily flow of approximately 56,500 gpd (84,000 – 27,500), with a peak flow of approximately 348,000 gpd (493,000 – 145,000).

- A hydraulic capacity analysis was performed on the gravity sewers between Lincoln Street (Route 3A) and the pump station (adjacent to USS Amesbury Drive), and the gravity sewers from the force main discharge manhole to the MWRA interceptor, using Manning's equation for open channel flow, assuming normal pipe conditions, in order to identify potential capacity deficiencies within these sewers.

    - Hydraulic capacity analysis of the gravity sewers on Lincoln Street (Route 3A) are based on available Record Drawing information (stationing, inverts, etc.). These sewers consist of 18-inch reinforced concrete (RC) pipe. With a theoretical capacity in excess of 3 MGD (see Table 2), the hydraulic capacity of the sewers along Lincoln Street are less critical than the receiving gravity sewers adjacent to USS Amesbury Drive. In addition to the large carrying capacity, the Lincoln Street sewers receive only the force main discharge, which presumably will not change significantly from the current conditions (see further discussion herein).

    - On March 22, 2016 an instrument survey was performed to verify sewer elevations on the downstream gravity receiving sewers from the 319 Lincoln Street service connection to the Bradley Woods Pump Station, adjacent to USS Amesbury Drive. These sewers consist of 8-inch vitrified clay (VC) pipe.

    - See attached Table 2 for length, size, and capacity of sewers evaluated as part of the hydraulic capacity analysis. Based on the analysis, the gravity sewers adjacent to USS Amesbury Drive, just upstream from the pump station, have a limiting capacity of 410,000 gallons per day (gpd) in the flattest section of sewer where the slope is approximately 0.0027, which is less than the industry standard minimum slope of 0.0040 for 8-inch pipe.
        - Minimum recommended slopes are established to maintain velocities in excess of 2 feet per second (fps) in gravity sewers, thereby preventing separation of solids within the pipeline. A slope of 0.0027 provides a velocity of 1.8 fps, slightly below the recommended minimum.

    - Based on the estimated peak flow of approximately 348,000 gpd through the gravity sewers adjacent to USS Amesbury Drive (as detailed above), the gravity sewers just upstream of the pump station have a theoretical remaining capacity for estimated peak flows of approximately 62,000 gpd (410,000 – 348,000).

- Based on the Comprehensive Permit Application for the proposed new connection at 319 Lincoln Street (Avalon Hingham Shipyard II), the facility currently proposes a total of 332 bedrooms (all 1-bedroom, 2-bedroom, and 3-bedroom units combined). Please note that this is down from the original proposal of 450 bedrooms. The maximum daily wastewater flow (based on Title 5 design criteria and the total number of bedrooms) is approximately 36,500 gpd (332 bedrooms X 110 gpd per bedroom). Considering that Title 5 flows are based on approximately 200% of daily water consumption, we have estimated that average daily flows will be approximately 50% of the maximum daily flow, or 18,250 gpd in this case. The peak daily flow for the proposed connection, using a peaking factor of 5.8, is approximately 106,000 gpd.

- Based on the estimated peak existing flow of 348,000 gpd through the gravity sewers adjacent to USS Amesbury Drive detailed above, plus the additional potential future peak daily flow of 106,000 gpd, the total future peak flow through the gravity sewers adjacent to USS Amesbury Drive will be approximately 454,000 gpd, which is slightly higher than the theoretical carrying capacity of 410,000 gpd in the most limiting section of pipeline.
  - Based on the anticipated average daily flow of 74,750 gpd (56,500 + 18,250) through this sewer, the existing sewer could handle a peak flow of approximately 5.5 times the average daily flow (410,000/74,750), which is only slightly below the typical theoretical peaking factor of 5.8 used herein.
  - It should also be noted, that in the unlikely event of temporary surcharging in this system during extreme peak flow periods, there are no service connections along this section of sewer that would be impacted.

- With the additional flows from the proposed new connection at 319 Lincoln Street, the Town may wish to consider that the existing gravity sewers be increased from 8-inch VC pipe to 10-inch PVC pipe. The maximum capacity of a 10-inch pipe at minimum slope (0.0028 ft/ft) is approximately 750,000 gpd, which is sufficient to meet the anticipated peak flows for this area. We do, however, recommend that the Town consider all of the information provided above in making their determination. We have not included this work or the associated costs in our recommendations herein.

  - Please note that during our field investigation of the gravity sewer manholes adjacent to USS Amesbury Drive, the manhole just downstream of Lincoln Street (SMH 1412) appeared to have a significant amount of clear flow, which may be due to infiltration/inflow (I/I). **We recommend that this manhole and the upstream sewers be further investigated and potentially rehabilitated as part of any proposed improvements in this area.**

- With the addition of the Avalon Hingham Shipyard II, the total estimated average daily flow to the Bradley Woods Pump Station is 103,250 gpd (85,000 + 18,250) and the estimated peak flow to the station is approximately 600,000 gpd (103,250 X 5.8) or 415 gpm. Based on this data, **we recommend that the station be equipped with duplex cutter pumps that discharge a minimum of 450 gpm against the highest anticipated total dynamic head (TDH).** A pumping rate of 450 gpm will produce a velocity of approximately 4.8 fps in the existing 6-inch force main, which is in the recommended range of 3 to 5 fps.

Estimated Costs

The following table displays the recommended short-term improvements and their estimated costs, including labor and materials.

Recommendation	**Estimated Cost**
Replace the existing pumps with matching cutter-type pumps	$50,000
Structural repairs to existing building structure	$10,000
Replace level control system with submersible transducer system	$10,000
Replace existing stand-by generator	$50,000
Replace flow meter with new meter and vault	$20,000
Replace wet well piping, valves, brackets	$10,000
Extend 6" FM to gravity discharge manhole	$100,000
Replace lighting inside wet well	$2,500
Replace electrical conduit inside wet well	$2,500
Subtotal	$255,000
15% Contingencies	$38,250
Total	$293,250

Summary

The last significant upgrade to the Bradley Woods Pump Station was completed more than 26 years ago and many of the current components are deteriorating and in need of replacement and/or repair. Connection of the Avalon Hingham Shipyard II to the municipal sewer in USS Amesbury Drive will increase the flows to the pump station by over 20%, further taxing this aging facility. Although the capacity of the incoming gravity sewers will be tested, the bigger concern is the ability of this pump station to continue to function properly and to keep up with incoming flows through all TDH conditions of the complex hydraulic conditions. We recommend that, at a minimum, the above quantified improvements be addressed prior to the addition of significant flow to this critical municipal facility.

Please feel free to contact me or Steven Pedersen if you would like to discuss the observations and recommendations in this report. I may be reached at 978.532.1900 extension 2373.

Very truly yours,

WESTON & SAMPSON ENGINEERS, INC.

Michael E. Paulin, P.E.
Project Manager

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Sewer System

- Manhole
- Cleanout On Force Main
- Cleanout On Low Pressure
- OWS
- Pump Station
- Gravity Main
- Low Pressure Main
- Force Main
- Sub Areas

Bradley Woods PS
Bayberry PS
Shipyard PS
Broad Cove PS
MWRA Station
Beals Cove PS

4
5
6

HOLLY STREET
SYCAMORE LANE
HAWTHORNE ROAD
BRADLEY WOODS DRIVE
BAYBERRY ROAD
LINCOLN STREET
JUNIPER ROAD
BIRCH CIRCLE
USS AMESBURY DRIVE
USS STAYMER DRIVE
FOGG WAY
SHIPYARD DRIVE
ESSINGTON DRIVE
TALBOTS DRIVE
WILLIAM B TERRY DRIVE
CHURCHILL ROAD
BEAL STREET
BACK RIVER ROAD
BEALS COVE ROAD
TUCKERS LANE
HOCKLEY DRIVE
RHODES PLACE
RHODES CIRCLE
FOTTLER ROAD
SQUIRREL HILL LANE
BAKER HILL DRIVE
BRADLEY PARK DRIVE
PARK VIEW DRIVE
SUMMIT DRIVE
HARBOR VIEW DRIVE
BULOW ROAD
BULOW PLACE
THAXTER STREET
BRADLEY HILL ROAD
HILL TOP ROAD
KENTS LANE
PARK VIEW PLACE
DOWNER AVENUE
CROW POINT LANE
BROAD COVE ROAD
CONDITO ROAD
TUPELO ROAD
LANGLEE ROAD
SARAH WAY

475 0 475
Scale In Feet

FIGURE 1

TOWN OF HINGHAM, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

BRADLEY WOODS TRIBUTARY AREA

MARCH 2016 SCALE: NOTED

Weston&Sampson

Path: \\gisdatasrv\GIS\Data\Store\Client\Hingham MA\Project\Bradley Woods PS Eval\Figure 1.mxd User: Ozerekoz Saved: 3/29/2016 4:03:48 PM Opened: 3/29/2016 4:04:13 PM

Table 1

Bradley Woods Pump Station - Wet Well Drawdown Tests
Hingham, MA

WETWELL DRAWDOWN TESTS

LOG

PUMP STATION: Bradley Woods

DATE: Wednesday, March 4, 2015 (Cyle 1-6), 2:00-3:00 p.m.
Friday, February 26, 2016 (Cycle 7-8), 7:00-8:00 a.m.

WEATHER: 40 F, Cloudy (Cycle 1-6)
30 F, Sunny (Cycle 7-8)

BY: Pat Yeo (Cycle 1-6)
Michael Paulin (Cycle 7-8)

WET WELL CHARACTERISTICS

Length, feet	12.5
Width, feet	9
Area, square feet	112.5

		UN- ADJUSTED PUMP RATE				INFLUENT RATE				ADJUSTED
CYCLE NO.	PUMP NO.	START ELEV. feet	STOP ELEV. feet	RUN TIME minutes	PUMP RATE gpm	START ELEV. feet	STOP ELEV. feet	FILL TIME minutes	FILL RATE gpm	PUMP RATE gpm
1	1	12.46	12.99	1.00	446	13.04	12.99	1.00	42.08062	488.1
2	2	12.91	13.30	1.00	328	13.21	13.09	1.00	100.9935	429.2
3	1	13.91	14.54	1.05	505	13.85	13.77	1.25	53.8632	558.8
4	2	12.64	13.08	1.00	370	13.15	13.1	1.00	42.08063	412.4
5	1	13.07	13.71	1.00	539	13.79	13.57	2.00	92.57737	631.2
6	2	13.50	13.99	1.08	381	13.95	13.84	1.00	92.57737	473.4
7	1	11.42	13.50	3.30	531	13.5	12.917	2.00	245.33	776.6
8	2	12.00	12.58	1.00	491	12.417	12.167	1.00	210.4031	701.1

Pump 1 AVG	**505**	**Pump 1 AVG**	**108**	**614**
Pump 2 AVG	**392**	**Pump 2 AVG**	**112**	**504**

Notes:
1. Assume fill rate for pump cycle = fill rate for previous down time.
2. Adjusted pump rate = Un-adjusted rate + Fill rate
3. Pump No. 1 is HOMA and Pump No. 2 is Flygt

O:\Hingham, MA\Bradley Woods Pump Station HCA\Report\[Table 1 - Wetwell Drawdown Tests.xls]Bradley Woods

TABLE 2

BRADLEY WOODS PUMP STATION - HYDRAULIC CAPACITY EVALUATION
HINGHAM, MA

Location	Pipe Size (in)	Pipe Material	Begining Station	Ending Station	Reach. (ft)	Invert In (ft)	Invert Out (ft)	Slope. (ft/ft)	Slope Capacity Max Q (CFS)*	Slope Capacity Max Q (MGD)	Velocity (ft/sec)
USS Amesbury Drive	8	VC	0 + 00	1 + 48.7	148.7	8.09	8.6	0.0035	0.72	0.46	2.06
USS Amesbury Drive	8	VC	1 + 48.7	3 + 56.2	207.5	8.7	9.25	0.0027	0.63	0.41	1.81
USS Amesbury Drive	8	VC	3 + 56.2	5 + 77.2	221	9.35	10.37	0.0047	0.83	0.54	2.38
USS Amesbury Drive	8	VC	5 + 77.2	6 + 82.5	105.3	10.47	10.86	0.0039	0.76	0.49	2.18
Lincoln Street (Route 3A)	18	RC	0 + 24	1 + 58.1	134.1	10.59	9.93	0.0049	7.37	4.75	4.17
Lincoln Street (Route 3A)	18	RC	1 + 58.1	3 + 88.2	230.1	11.19	10.59	0.0026	5.37	3.46	3.04
Lincoln Street (Route 3A)	18	RC	3 + 88.2	6 + 27.7	239.5	12.42	11.19	0.0051	7.52	4.85	4.26
Lincoln Street (Route 3A)	18	RC	6 + 27.7	8 + 62.4	234.7	13.38	12.42	0.004	6.66	4.3	3.77
Lincoln Street (Route 3A)	18	RC	8 + 62.4	8 + 86.4	24	13.53	13.38	0.0062	8.29	5.35	4.69
Lincoln Street (Route 3A)	18	RC	8 + 86.4	9 + 32	45.6	13.7	13.53	0.0034	6.14	3.96	3.48
Lincoln Street (Route 3A)	18	RC	9 + 32	12 + 61	329	15.05	13.7	0.004	6.66	4.3	3.77
Lincoln Street (Route 3A)	18	RC	12 + 61	13 + 22	61	15.16	15.05	0.0018	4.47	2.88	2.53
Lincoln Street (Route 3A)	18	RC	13 + 22	16 + 10	288	16.25	15.16	0.0038	6.49	4.19	3.67
Lincoln Street (Route 3A)	18	RC	16 + 10	18 + 76	266	17.2	16.25	0.0036	6.32	4.08	3.58
Lincoln Street (Route 3A)	18	RC	18 + 76	21 + 90	314	18.8	17.2	0.0050	7.44	4.8	4.21
Lincoln Street (Route 3A)	18	RC	21 + 90	24 + 29	239	20.06	18.8	0.0052	7.59	4.9	4.3
Lincoln Street (Route 3A)	18	RC	24 + 29	27 + 57	328	21.79	20.06	0.0052	7.59	4.9	4.3
Lincoln Street (Route 3A)	18	RC	27 + 57	28 + 71	114	23.96	21.79	0.002	4.71	3.04	2.67
Lincoln Street (Route 3A)	18	RC	28 + 71	32 + 01	330	25.75	23.96	0.0055	7.81	5.04	4.42

Note: Gravity sewer information for Lincoln Street (Route 3A) taken from available Record Drawings; additional "drop-over" manholes have been installed since the original sewer installation, however these manholes do not impact the capacity of the gravity sewer pipes and were therefore not included in this Table/hydraulic capacity analysis

Appendix A – Site Photos



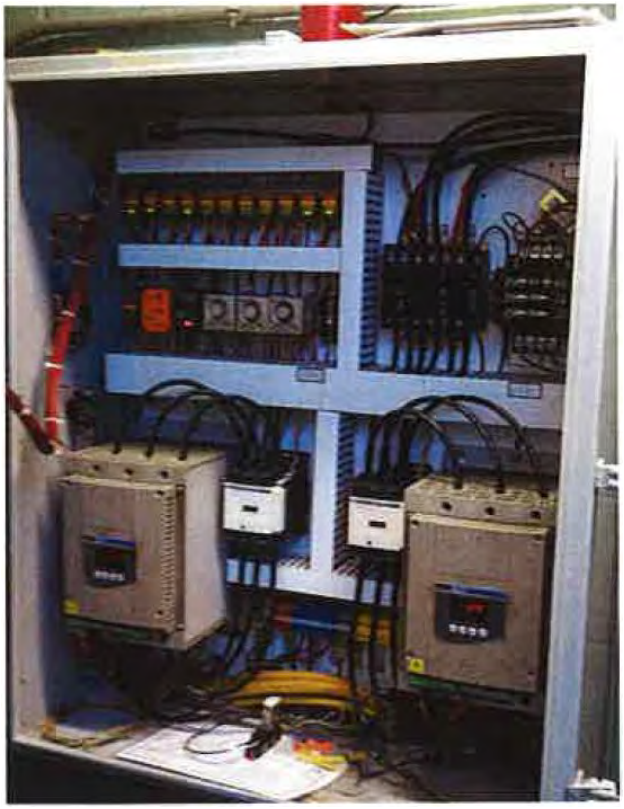
Exterior building (electrical room entrance)



Exterior building (wet well entrance)



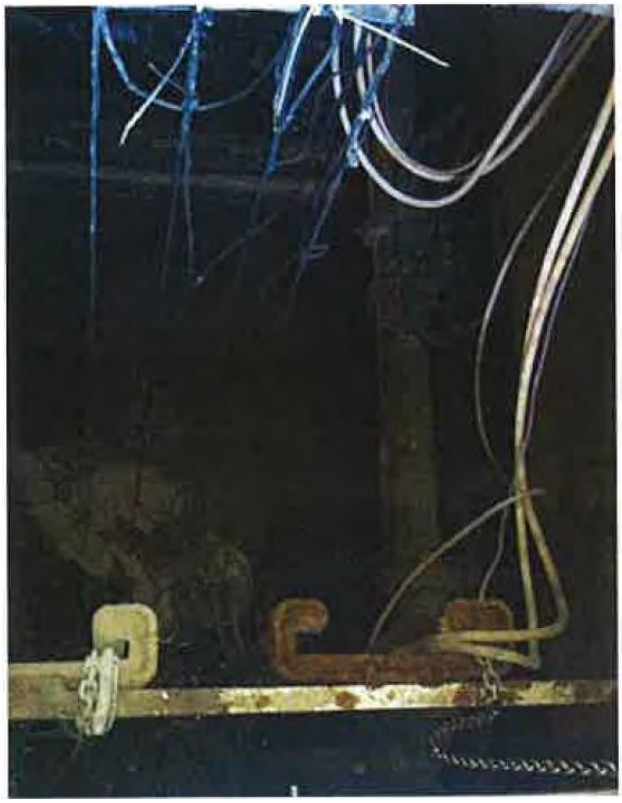
Control Panel



Control Panel Interior



Flow Meter Panel



Wet Well



Wet Well



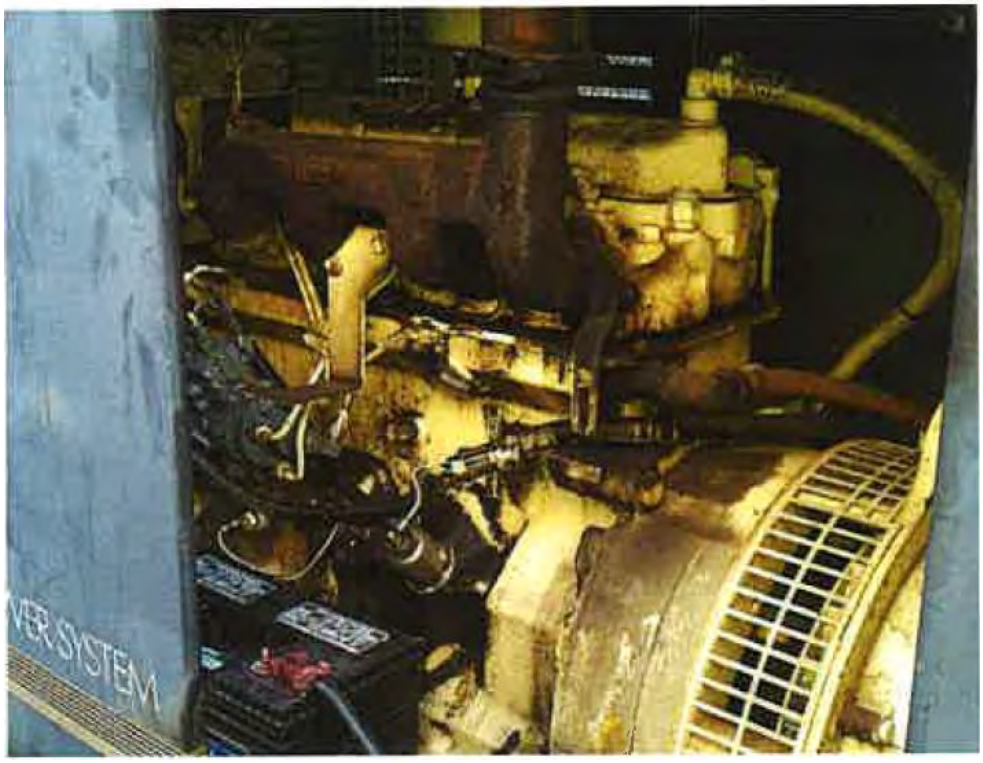
Wet Well Lighting



Deteriorating Structure Walls



Deteriorating Structure Walls



Standy Generator



Standby Generator



Pump Nameplate (HOMA)



Gravity Sewer Manhole 741 (int. Lincoln Street/USS Amesbury Drive)



Force Main Tee/Valve (inside SMH 741)



Discharge Manhole 16 (Lincoln Street)

Appendix B – Evaluation Log

Weston&Sampson
CMR, INC.
CONSTRUCTION / MAINTENANCE / REPAIR

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: Bradley Woods Pump Station

OWNER: Town of Hingham

STATION NAME: Bradley Woods Sewer Pump Station

LOCATION: Hingham MA

ENGINEER: Weston & Sampson

PEOPLE PRESENT AT EVALUATION:

Sal Ferrara (Weston & Sampson)	Steve Dempsey (DPW)
Mike Paulin (Weston & Sampson)	Randy Sylvester (DPW)
Steve Pedersen (Weston & Sampson)	

STATION LAYOUT: Cement/Brick building. One side of the building houses controls panels. Other side is wet well with 2 submersible pumps.

Note: See Photos

LIQUID BEING PUMPED: Sewerage

COMMENTS:

PUMP # 1

MANUFACTURER/TYPE: HOMA Pump

MODEL NUMBER: AMX 646-360/265PU

SERIAL NUMBER: 31473

RUNNING TIME METER (hours): N/A

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

WET WELL SIZE: Approximately 10' X 10' By 20'

FLOW TEST: START LEVEL: _____ FINISH LEVEL: _____

PUMP # 2

MANUFACTURER/TYPE: Flygt Pump

MODEL NUMBER: N/A

SERIAL NUMBER: N/A

RUNNING TIME METER (hours): N/A

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

START LEVEL: _____ FINISH LEVEL: _____

PUMP CONTROL PANEL

MANUFACTURER: Quality Controls Inc.

MODEL NUMBER: 04-301

TYPE: Duplex AMP RATING: 123 FLA

OVERLOAD TYPE: Breakers / Soft Starters

SIZE: N/A AMP RATING: 70

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

MOTOR STARTERS/VFD (S): Square D Altastart 48 Soft Starters

ALL WIRES LABELED (TAGGED)?: Yes

ALARMS:

HIGH WATER: X PUMP FAIL: X

LOW WATER: X MOISTURE: X

TEMPERATURE: OTHER:

STAND-BY GENERATOR (IF APPLICABLE)

ENGINE

MANUFACTURER: Kohler

MODEL NUMBER: 40R0ZJ81

SERIAL NUMBER: 262612

GENERATOR

MANUFACTURER: Kohler

MODEL NUMBER: 189201-81

SERIAL NUMBER: 262612

RATING: 40 KW

AUTOMATIC TRANSFER SWITCH

MANUFACTURER: ASCO

MODEL NUMBER: Series 300

SERIAL NUMBER: N/A

DATA WITH GENERATOR RUNNING

VOLTS 208 AMPS 200

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

OIL PRESSURE N/A (psi) WATER TEMP N/A (DEGREES)

RUN TIME (HOURS)

LEAKS OR UNUSUAL ACTIVITY, DESCRIBE: Generator is original to the station. Showing signs of corrosion and wear.

ADDITIONAL COMMENTS:

MISCELLANEOUS EQUIPMENT

UNIT HEATER

MANUFACTURER: Heater in control room functions.

VENTILATION SYSTEM

MANUFACTURER: N/A

SUMP PUMP

MANUFACTURER: N/A

MISCELLANEOUS EQUIPMENT (CONTINUED)

TELEMETRY

DESCRIBE SYSTEM: Hart Phone line alarm system. Also Mission cellular based alarm 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.

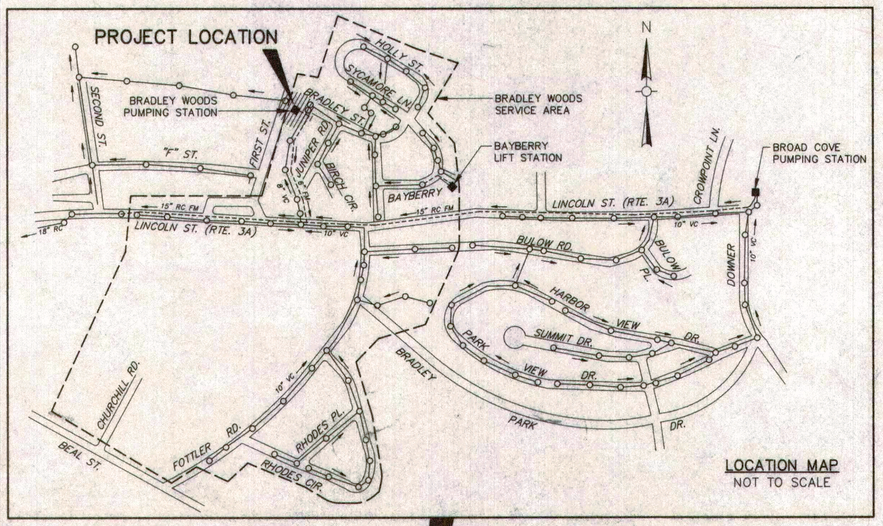
- Wet well cement structure appears to be in satisfactory condition.
- Magnetic flow meter in wet well deteriorated and not functioning.
- Recommend installing new flow meter outside of the wet well. A new force main vault would need to be installed.
- Force main pipe, check valves and gate valves in wet well are deteriorated and should be replaced.
- New stainless steel upper rail brackets should be installed. Rails are okay as they are stainless steel.
- Lighting in wet well is deteriorated and should be upgraded with energy efficient lighting.
- Electrical conduit in wet well is deteriorated and should be replaced.

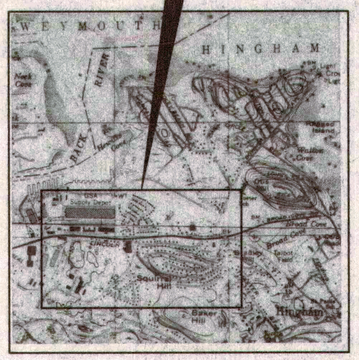
ADDITONAL COMMENTS:

- Building structure is deteriorated and the wet well side of the building has structural issues. The bricks and blocks are separating. The Town has temporarily sealed the separations with spray foam.
- The existing generator is original and showing signs of wear. We recommend upgrading and/or replacing the generator.
- Station control panel is a float controlled system. We recommend installing a digital controller and a submersible level transducer in the wet well.
- There are two different pumps in the wet well. #1 pump is an original HOMA Pump and should be replaced with matching cutter style pump. #2 pump is a Flygt pump. There was no model # information on this pump. We recommend replacing both pumps at the station with matching cutter style pumps.

Appendix C – Record Drawing Information

TOWN OF HINGHAM, MASSACHUSETTS
RENOVATION OF
BRADLEY WOODS PUMPING STATION





LOCUS PLAN
SCALE: 1" = 2112 ft.

DRAWING INDEX

SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	SITE PLAN & NOTES
3	EXISTING PLAN & SECTIONS / DEMOLITION PLAN
4	PROPOSED PUMPING STATION MODIFICATIONS
5	DETAILS / NOTES
6	ELECTRICAL

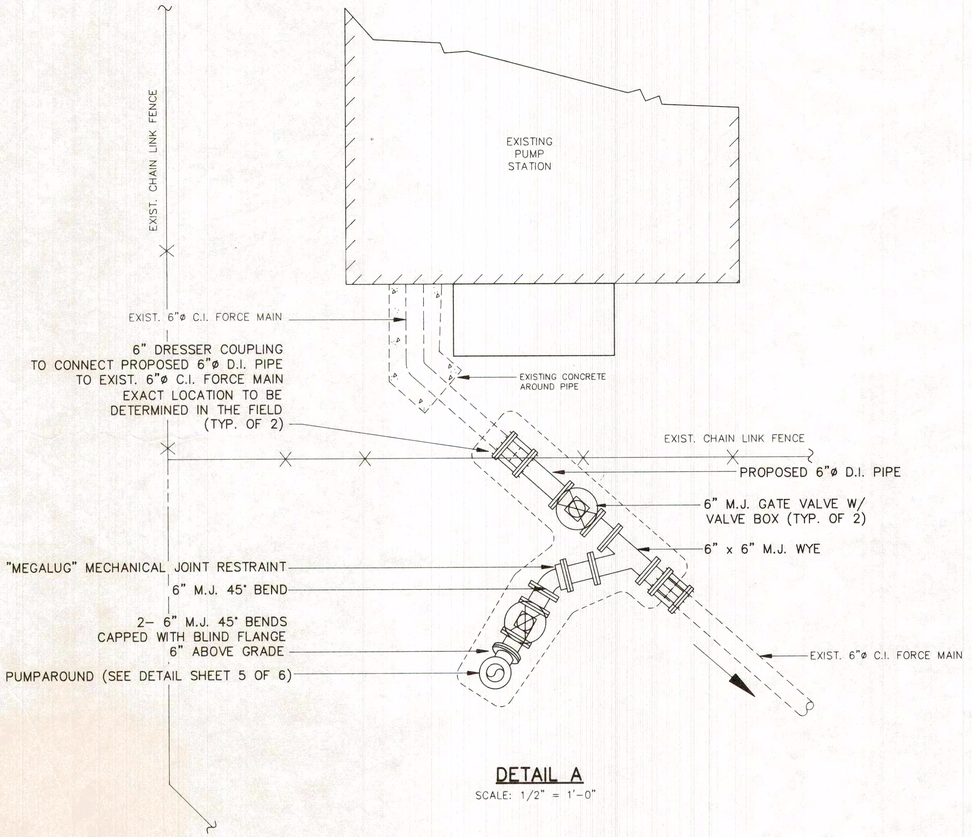
PREPARED FOR:
BOARD OF SEWER COMMISSIONERS
TOWN OF HINGHAM
SEVEN EAST STREET
HINGHAM, MASSACHUSETTS
02043

DESIGN ENGINEER:
LOMBARDO GROUP
A DIVISION OF
DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
46 CHURCH STREET, BOSTON, MA 02116
1835 FOREST DRIVE, ANNAPOLIS, MD 21401

DATE: SEPTEMBER, 1989

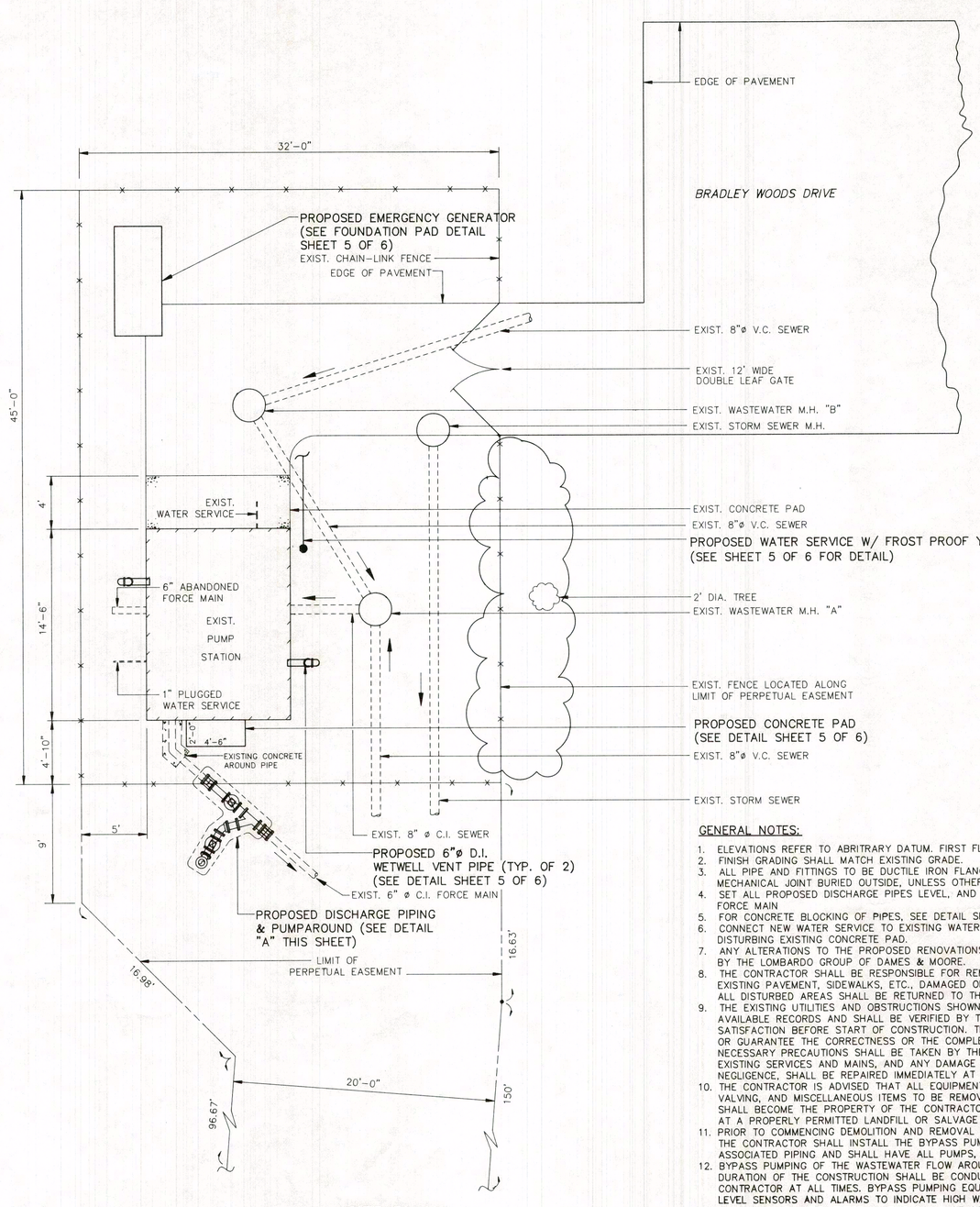
BRADLEY WOODS
JUN 1990
RECORD DRAWING

BWSHT2.DWG



DETAIL A

SCALE: 1/2" = 1'-0"



SITE PLAN

SCALE: 1"= 5'

NOTE:
ALL MECHANICAL JOINTS ARE TO BE RESTRAINED USING "MEGALUG" RESTRAINSTS WHERE SHOWN AND 1/2 INCH TIE-BACK RODS ELSEWHERE.

GENERAL NOTES:

1. ELEVATIONS REFER TO ABRITRARY DATUM. FIRST FLOOR ELEVATION (ASSUME) = 20.18
2. FINISH GRADING SHALL MATCH EXISTING GRADE.
3. ALL PIPE AND FITTINGS TO BE DUCTILE IRON FLANGED PIPE INSIDE THE STRUCTURE, AND MECHANICAL JOINT BURIED OUTSIDE, UNLESS OTHERWISE NOTED.
4. SET ALL PROPOSED DISCHARGE PIPES LEVEL, AND CONNECT TO EXISTING 6" DIA. FORCE MAIN.
5. FOR CONCRETE BLOCKING OF PIPES, SEE DETAIL SHEET No. 5 OF 6.
6. CONNECT NEW WATER SERVICE TO EXISTING WATER SERVICE WITHOUT DISTURBING EXISTING CONCRETE PAD.
7. ANY ALTERATIONS TO THE PROPOSED RENOVATIONS MUST BE APPROVED IN WRITING BY THE LOMBARDO GROUP OF DAMES & MOORE.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING ANY EXISTING PAVEMENT, SIDEWALKS, ETC., DAMAGED OR REMOVED DURING CONSTRUCTION. ALL DISTURBED AREAS SHALL BE RETURNED TO THEIR ORIGINAL CONDITION OR BETTER.
9. THE EXISTING UTILITIES AND OBSTRUCTIONS SHOWN ARE TAKEN FROM THE BEST AVAILABLE RECORDS AND SHALL BE VERIFIED BY THE CONTRACTOR TO HIS OWN SATISFACTION BEFORE START OF CONSTRUCTION. THE OWNER DOES NOT WARRANT OR GUARANTEE THE CORRECTNESS OR THE COMPLETENESS OF THE INFORMATION GIVEN. NECESSARY PRECAUTIONS SHALL BE TAKEN BY THE CONTRACTOR TO PROTECT EXISTING SERVICES AND MAINS, AND ANY DAMAGE TO THEM DUE TO HIS NEGLIGENCE, SHALL BE REPAIRED IMMEDIATELY AT THE CONTRACTORS EXPENSE.
10. THE CONTRACTOR IS ADVISED THAT ALL EQUIPMENT, STRUCTURES, HARDWARE, PIPING, VALVING, AND MISCELLANEOUS ITEMS TO BE REMOVED FROM THE PUMP STATION SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF AT A PROPERLY PERMITTED LANDFILL OR SALVAGE YARD.
11. PRIOR TO COMMENCING DEMOLITION AND REMOVAL WORK INSIDE THE PUMP STATION, THE CONTRACTOR SHALL INSTALL THE BYPASS PUMPAROUND HYDRANT AND ASSOCIATED PIPING AND SHALL HAVE ALL PUMPS, PIPING & OTHER EQUIPMENT AT HAND.
12. BYPASS PUMPING OF THE WASTEWATER FLOW AROUND THE THE STATION DURING THE DURATION OF THE CONSTRUCTION SHALL BE CONDUCTED AND MAINTAINED BY THE CONTRACTOR AT ALL TIMES. BYPASS PUMPING EQUIPMENT SHALL BE EQUIPPED WITH LEVEL SENSORS AND ALARMS TO INDICATE HIGH WATER CONDITIONS, PUMP FAILURE, AND POWER FAILURE. THESE ALARMS SHALL BE CONNECTED TO A COMMON ALARM TO THE POLICE STATION AS PRESENTLY EXISTS. THE CONTRACTOR SHALL PROVIDE MONITORING AND EMERGENCY SERVICE FOR THE BYPASS OPERATION 24 HOURS PER DAY. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A PROPOSED BYPASS PUMPING PLAN FOR APPROVAL, AND RECEIVE SUCH APPROVAL BEFORE COMMENCING OPERATIONS.

RECORD DRAWING

COMMONWEALTH OF MASSACHUSETTS PHO STEPHEN LOMBARDO No. 28130 REGISTERED

J.G.C.	9/89
DRAWN BY	DATE
J.B.D.	9/89
CHECKED	DATE
J.J.J.	9/89
APPROVED	DATE

NO.	REVISION	BY	APP.	DATE
1	RECORD DRAWING	J.G.C.	J.B.D.	6/90

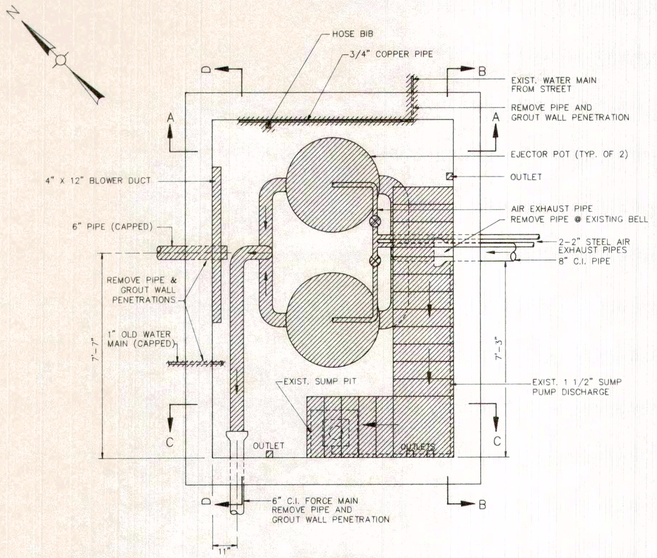
LOMBARDO GROUP
A DIVISION OF
DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
46 CHURCH STREET, BOSTON, MA 02116
1835 FOREST DRIVE, ANNAPOLIS, MD 21401

SITE PLAN

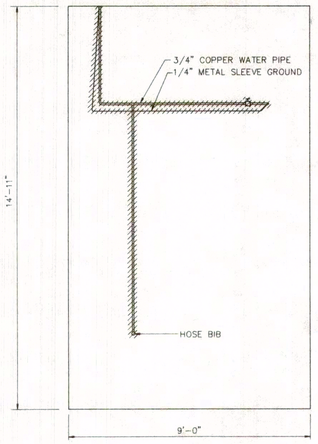
SCALE: AS SHOWN
SHEET NO. 2 OF 6
FILE NO.

RENOVATION OF BRADLEY WOODS PUMPING STATION

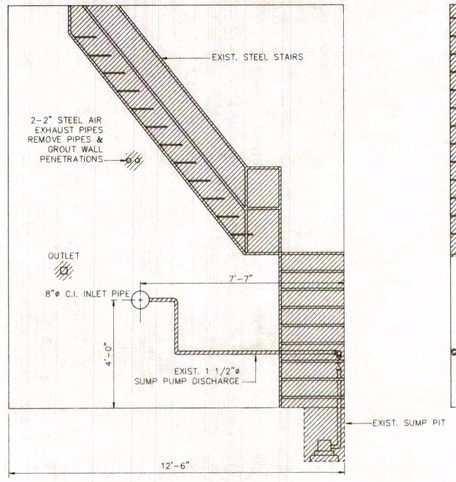
BWSHT3.DWG



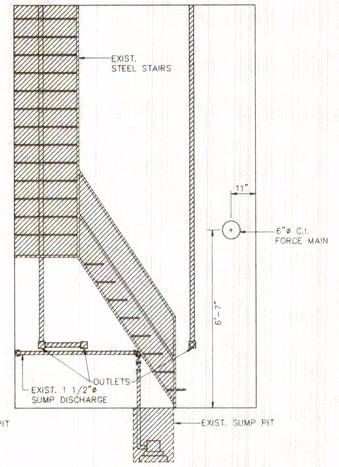
BASEMENT PLAN
SCALE 3/8" = 1'-0"



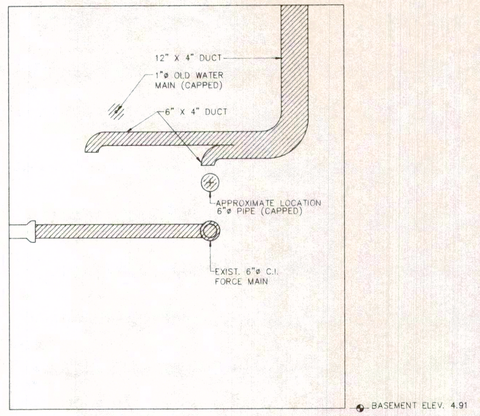
SECTION A-A
SCALE 3/8" = 1'-0"



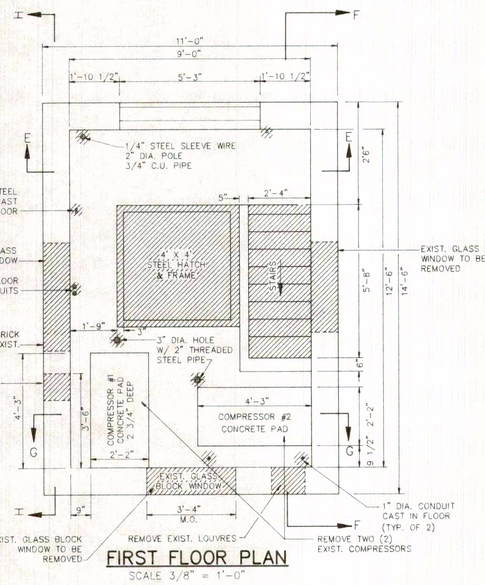
SECTION B-B
SCALE 3/8" = 1'-0"



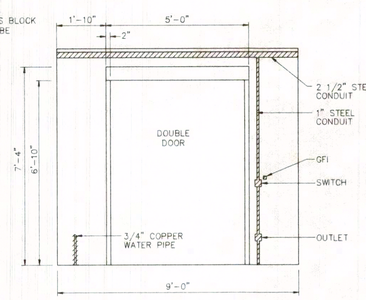
SECTION C-C
SCALE 3/8" = 1'-0"



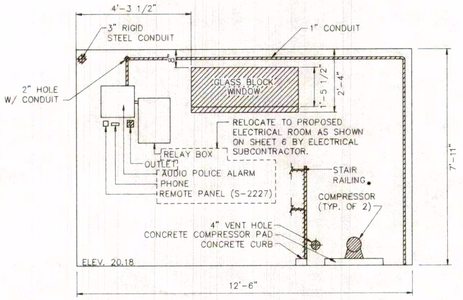
SECTION D-D
SCALE 3/8" = 1'-0"



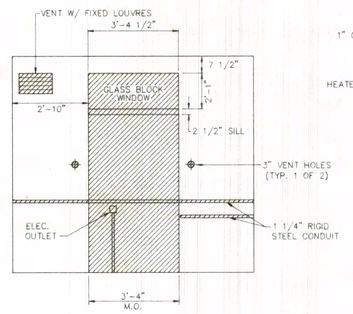
FIRST FLOOR PLAN
SCALE 3/8" = 1'-0"



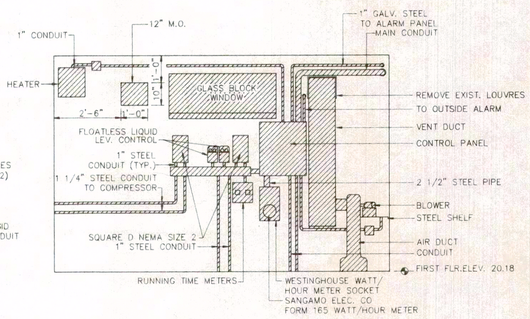
SECTION E-E
SCALE 3/8" = 1'-0"



SECTION F-F
SCALE 3/8" = 1'-0"



SECTION G-G
SCALE 3/8" = 1'-0"



SECTION H-H
SCALE 3/8" = 1'-0"

NOTES:
1. REMOVE ALL SMALL FLOOR PENETRATIONS & GROUT
2. REMOVE WALL PIPES AS SHOWN & GROUT.
3. FOR ALL MASONRY OPENINGS, BREAK HOLE IN EXIST. BRICK WALL AS SHOWN.

▨ EQUIPMENT TO BE REMOVED BY GENERAL CONTRACTOR AND COORDINATED WITH OTHER SUBCONTRACTORS AS NEEDED.

RECORD DRAWING

COMMONWEALTH OF MASSACHUSETTS PIO STEPHEN LOMBARDO No. 28130 REGISTERED PROFESSIONAL ENGINEER

J.G.C.	9/89
DRAWN BY	DATE
J.B.D.	9/89
CHECKED	DATE
APPROVED	DATE

NO.	REVISION	BY	APP.	DATE
1	RECORD DRAWING	JGC	JBD	6/90

LOMBARDO GROUP
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46 CHURCH STREET, BOSTON, MA 02116
1835 FOREST DRIVE, ANNAPOLIS, MD 21401

EXISTING PLAN & SECTION / DEMOLITION PLAN

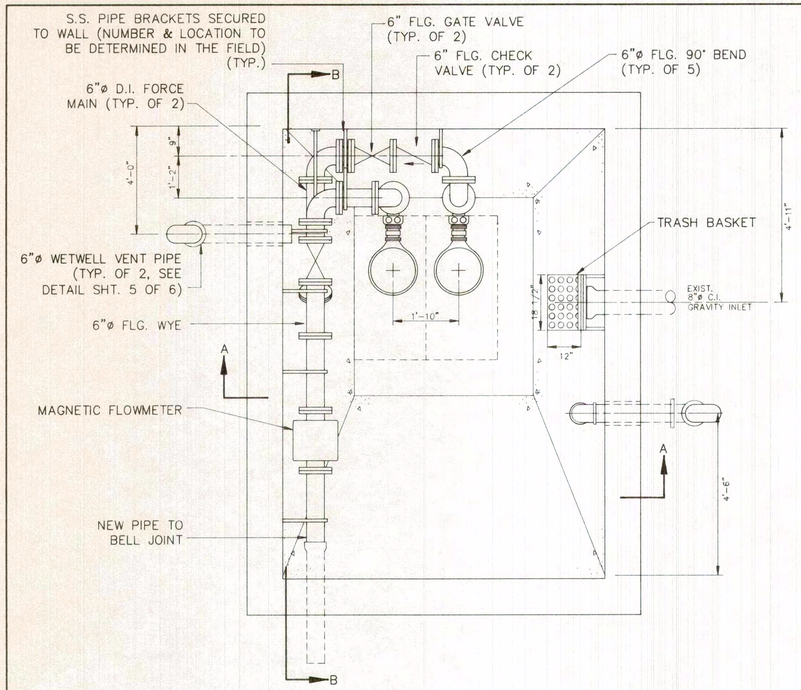
SCALE: AS SHOWN

SHEET NO. 3 OF 6

FILE NO.

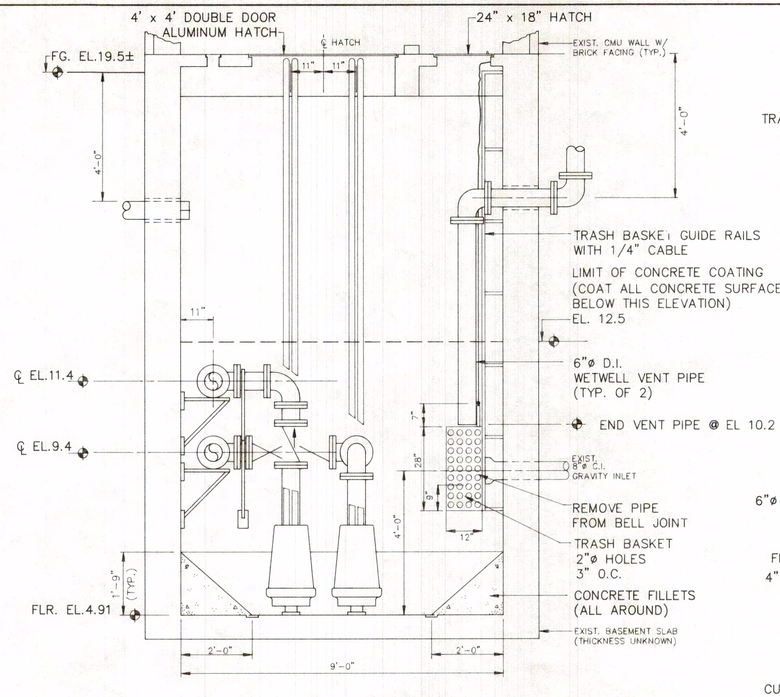
RENOVATION OF
BRADLEY WOODS PUMPING STATION

BWSHT4.DWG



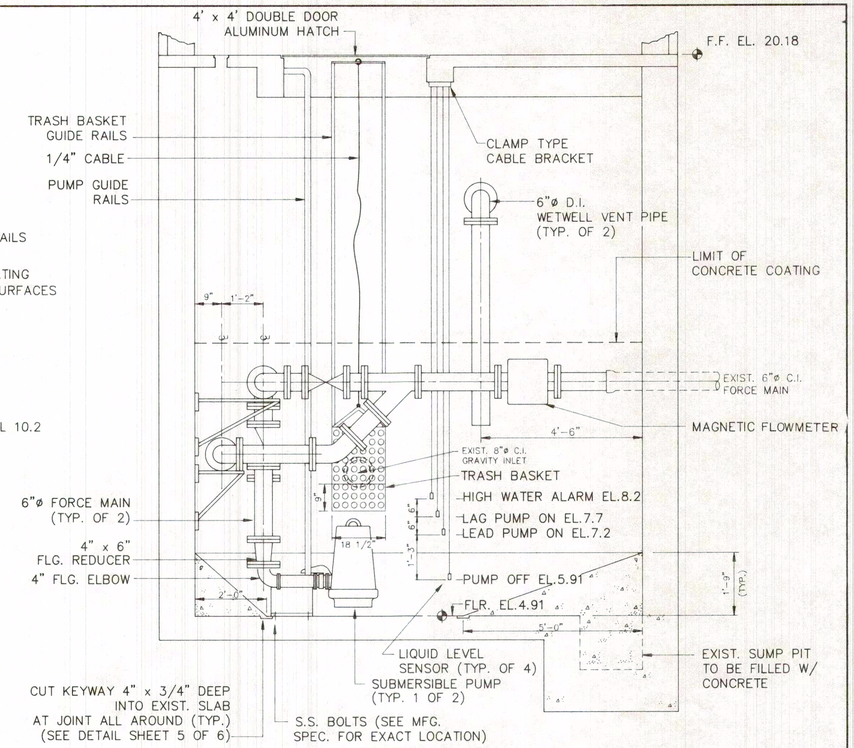
PROPOSED WETWELL PLAN

SCALE: 1/2" = 1'-0"



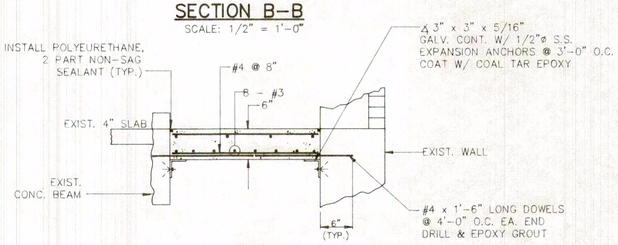
SECTION A–A

SCALE: 1/2" = 1'-0"



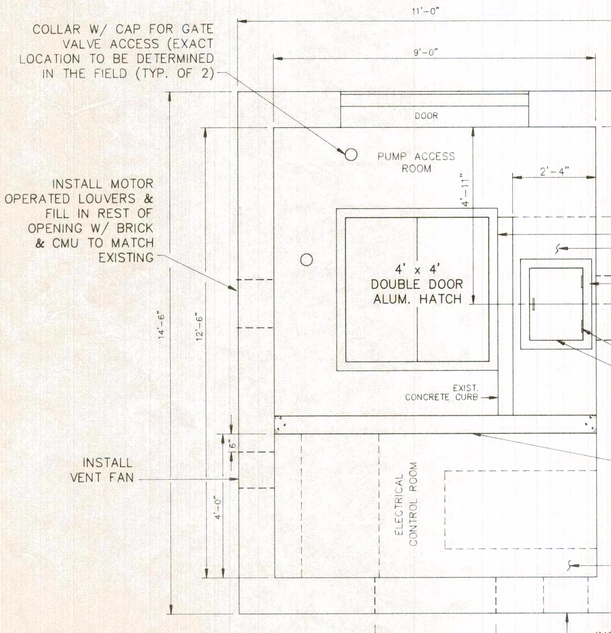
SECTION B–B

SCALE: 1/2" = 1'-0"



SECTION C–C

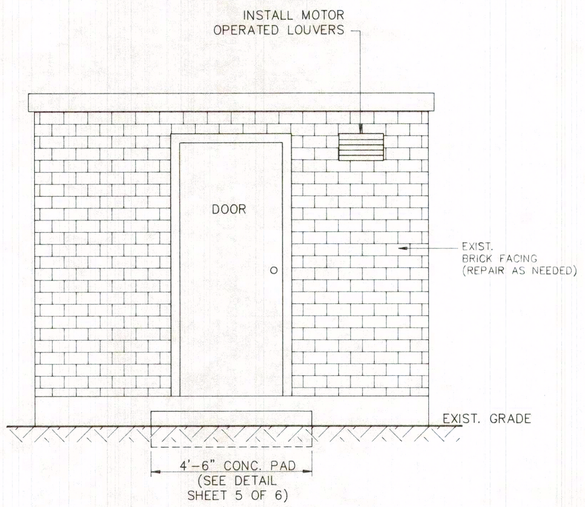
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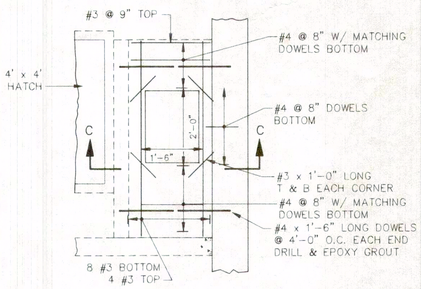


NOTE:
4' x 4' DOUBLE DOOR ALUMINUM HATCH & FRAME SHALL BE INSTALLED IN LOCATION OF OLD 4' x 4' DOUBLE DOOR STEEL HATCH.

PROPOSED FIRST FLOOR PLAN

SCALE: 1/2" = 1'-0"





PLAN
STAIRWELL CONCRETE CLOSURE SLAB

SCALE: 1/2" = 1'-0"

RECORD DRAWING

PIO STEPHEN LOMBARDO No. 28130 REGISTERED PROFESSIONAL ENGINEER

J.G.C.	9/89
DRAWN BY	DATE
J.B.D.	9/89
CHECKED	DATE
J.J.J.	9/89
APPROVED	DATE

NO.	REVISION	BY	APP.	DATE
1	RECORD DRAWING	J.G.C.	J.B.D.	6/90

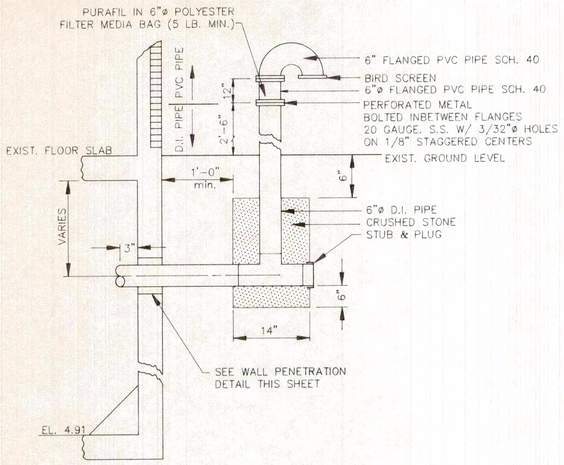
LOMBARDO GROUP
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DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
46 CHURCH STREET, BOSTON, MA 02116
1835 FOREST DRIVE, ANNAPOLIS, MD 21401

PROPOSED PUMPING STATION MODIFICATIONS

SCALE: AS SHOWN
SHEET NO. 4 OF 6
FILE NO.

RENOVATION OF
BRADLEY WOODS PUMPING STATION

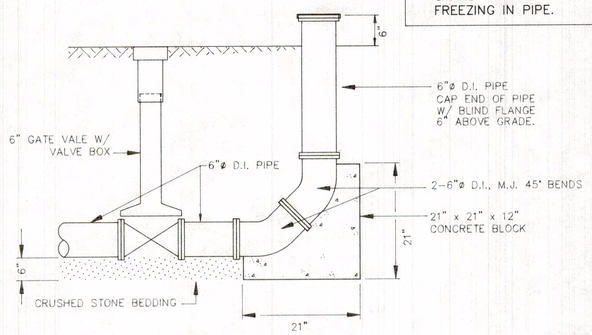
BWDETS.DWG



VENT PIPE / AIR FILTER PENETRATION DETAIL

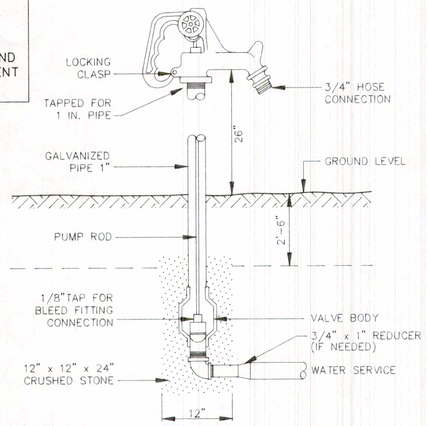
NOT TO SCALE

NOTES:
1. ALL MECHANICAL JOINTS TO BE RESTRAINED USING "MEGALUG" RESTRAINTS OR 1/2" TIE BACK RODS.
2. CONTRACTOR SHALL PUMP LIQUID OUT OF RISER PIPE WHEN PUMPAROUND STAND PIPE IS NOT IN USE TO PREVENT FREEZING IN PIPE.



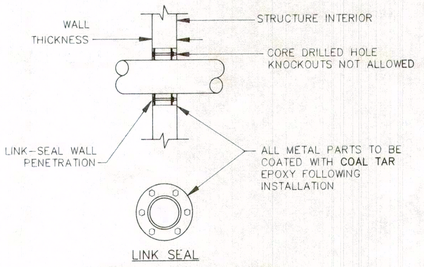
PUMPAROUND STANDPIPE DETAIL

NOT TO SCALE



FROST PROOF YARD HYDRANT

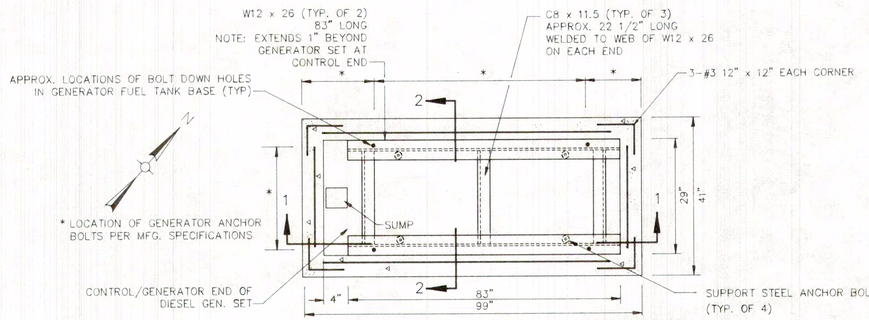
NOT TO SCALE



WALL PENETRATION DETAIL

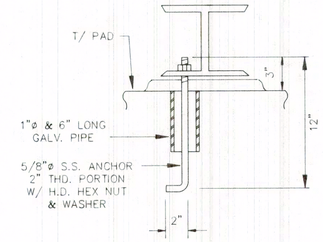
NOT TO SCALE

DIESEL GENERATOR FOUNDATION PAD NOTES:
1. THE SPACE 12 INCHES DEEP BETWEEN THE WALLS OF THE FOUNDATION PAD SHALL BE LEFT OPEN, WITH THE EXCEPTION OF STEEL SUPPORTS FOR THE GENERATOR, TO ALLOW FOR VOLUME TO CONTAIN POTENTIAL FUEL AND/OR OIL SPILLS.
2. THE SUPPORT STEEL FOR THE GENERATOR SHALL BE OF THE SIZE AND SECTION AS RECOMMENDED BY THE MANUFACTURER. THIS STEEL SHALL BE AS SPECIFIED AND ORIENTATED BY THE MANUFACTURER TO PROPERLY SUPPORT THE SKID MOUNTED GENERATOR. THE NUMBER OF ANCHOR BOLTS SHALL BE AS RECOMMENDED BY THE MANUFACTURER TO SUFFICIENTLY ANCHOR THE SUPPORT STEEL.
3. THE CONCRETE FOUNDATION PAD SHALL BE SUITABLY SIZED FOR THE GENERATOR AND WATERPROOF ENCLOSURE. THE PAD SHALL EXTEND BEYOND THE ENCLOSURE ON ALL SIDES WITH A 1 INCH CAMFER AROUND THE PERIMETER.
4. THE WATERPROOF ENCLOSURE SHALL BE SUPPORTED ON AND ANCHORED TO THE TOP OF THE FOUNDATION PAD WALLS.
5. THE CONCRETE FOUNDATION PAD AND WATERPROOF ENCLOSURE SHALL BE ORIENTATED WITH RESPECT TO EACH OTHER SUCH THAT THE SUMP PIT AND DOORS OF THE ENCLOSURE ARE ON THE SAME SIDE AND ARE FACING THE PUMP STATION.
6. THE GENERATOR AND WATERPROOF ENCLOSURE SHALL BE ORIENTATED WITH RESPECT TO EACH OTHER SUCH THAT THERE IS A DOOR IN THE ENCLOSURE WHICH ALLOWS ACCESS TO THE CONTROLS, AND THEY BOTH ARE ON THE SOUTH OR EAST SIDE OF THE PAD.
7. $F'c$ = 3000 P.S.I.



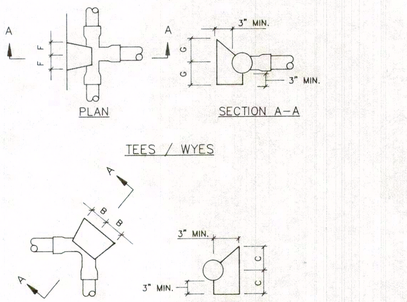
PLAN – DIESEL GEN. FOUNDATION PAD

NOT TO SCALE

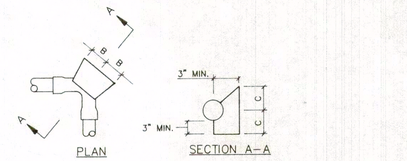


DETAIL A

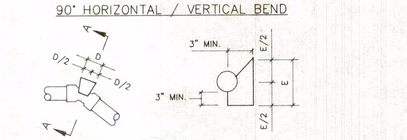
NOT TO SCALE



TEES / WYES



90° HORIZONTAL / VERTICAL BEND



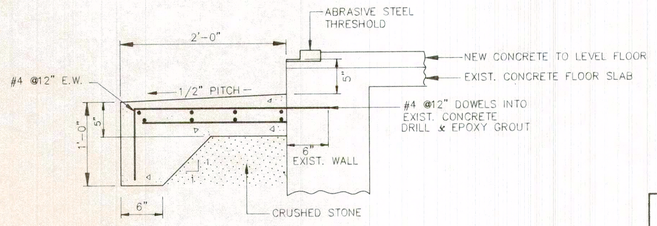
45° HORIZONTAL / VERTICAL BEND

PIPE SIZE	B	C	D	E	F	G
2 1/2"-3"	6"	6"	6"	10"	6"	5"
4"	12"	6"	15"	14"	7"	8"
6"	12"	6"	15"	14"	7"	8"
8"	15"	9"	20"	16"	9"	10"

NOTES:
1. $F'c$ = 3,000 P.S.I.
2. CARRY ALL BEARING SURFACES TO UNDISTRUBED GROUND OR SUBGRADE.
3. BUTTRESS SIZED FOR 160 P.S.I. AND SOIL WITH C = 2,000 P.S.I.
4. PIPES SHALL NOT BE PRESSURIZED, TESTED, OR PLACED IN SERVICE UNTIL A MINIMUM OF 48 HOURS AFTER FORMING CONCRETE.

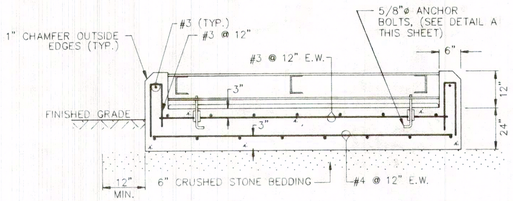
PRESSURE SEWER BLOCKING DETAILS

NOT TO SCALE



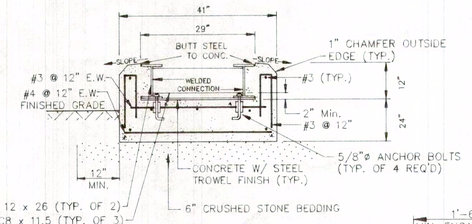
CONCRETE PAD DETAIL

NOT TO SCALE



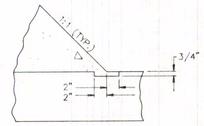
SECTION 1-1

NOT TO SCALE



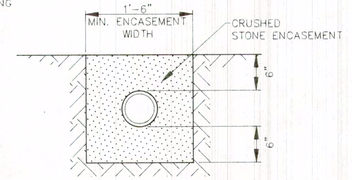
SECTION 2-2

NOT TO SCALE



KEYWAY DETAIL

NOT TO SCALE



PIPE ENCASEMENT DETAIL

NOT TO SCALE

RECORD DRAWING

NO.	REVISION	BY	APP.	DATE
1	RECORD DRAWING	J.G.C.	J.B.D.	6/90

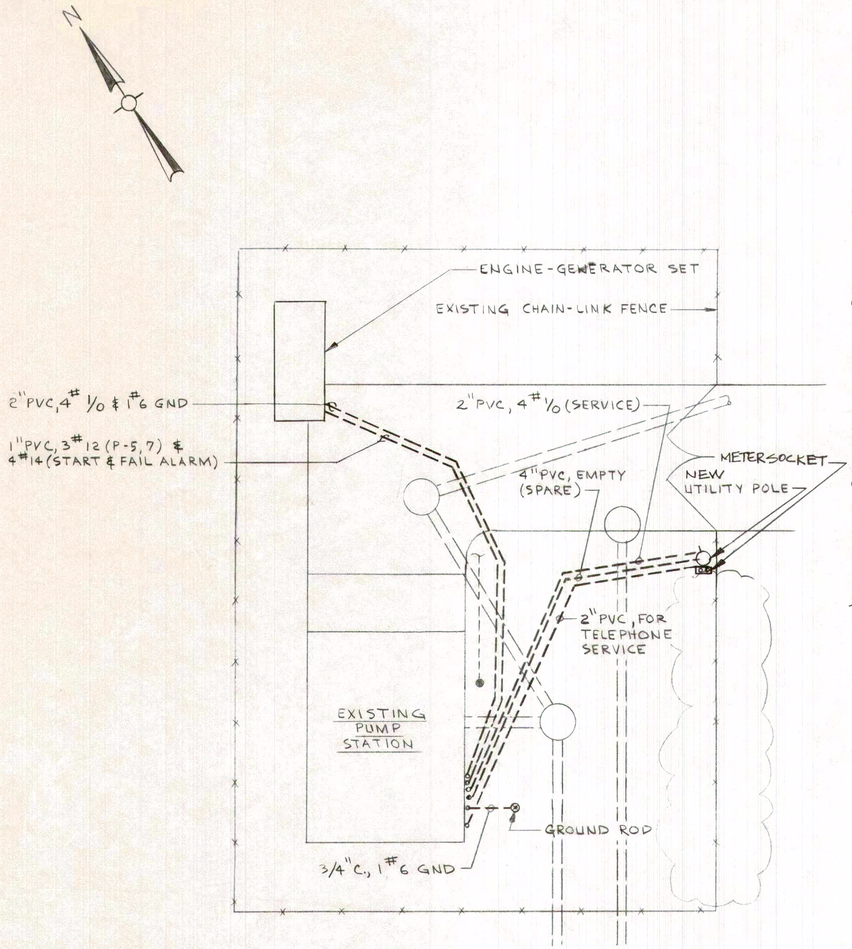
J.G.C. 9/89 DRAWN BY DATE
J.B.D. 9/89 CHECKED DATE
APPROVED DATE

LOMBARDO GROUP
A DIVISION OF
DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
46 CHURCH STREET, BOSTON, MA 02116
1835 FOREST DRIVE, ANNAPOLIS, MD 21401

DETAILS / NOTES

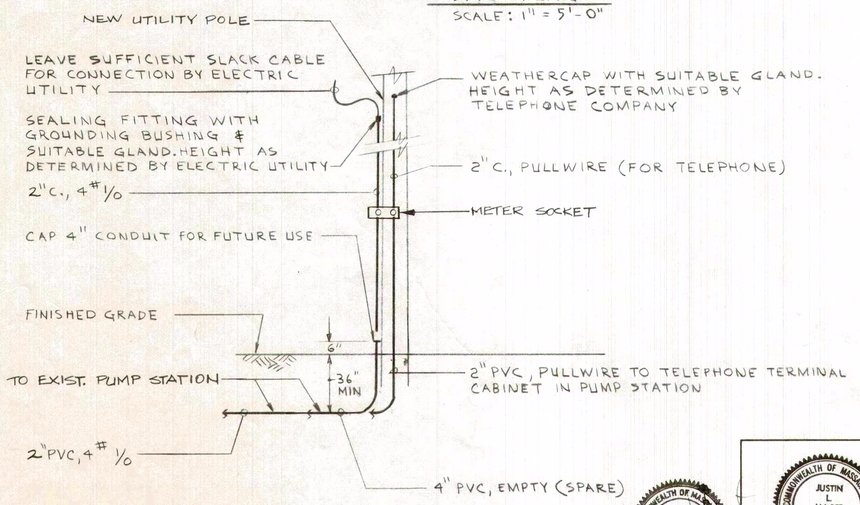
SCALE: AS SHOWN
SHEET NO. 5 OF 6
FILE NO.

RENOVATION OF
BRADLEY WOODS PUMPING STATION



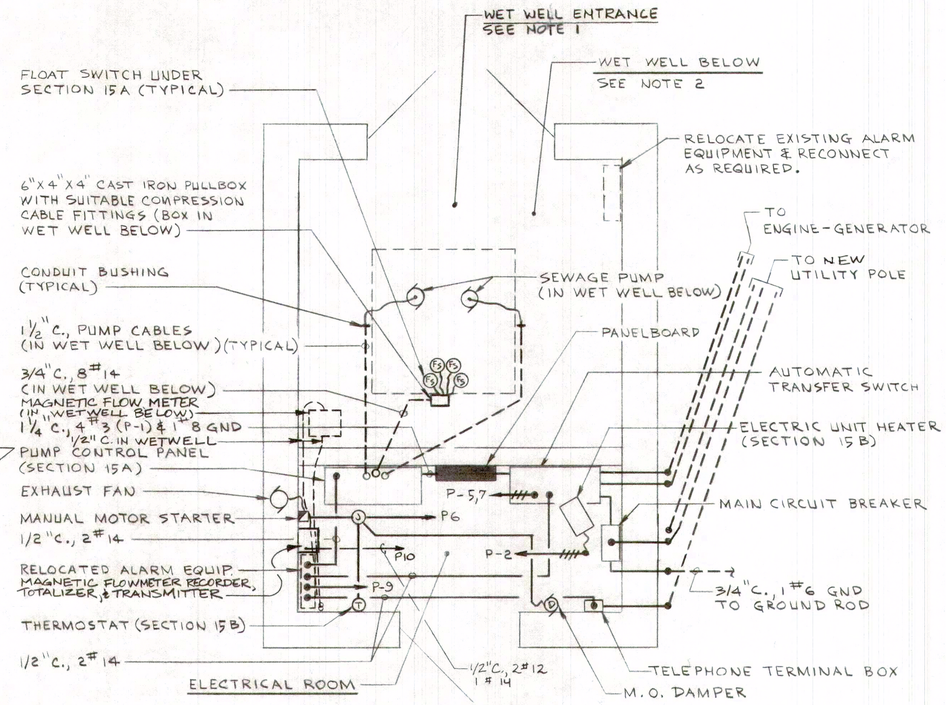
SITE PLAN

SCALE: 1" = 5'-0"



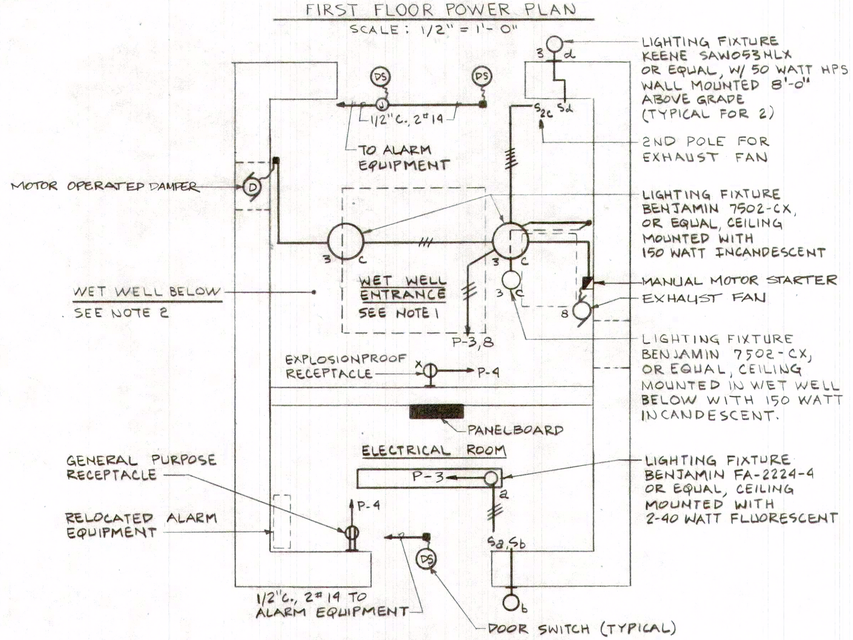
SERVICE POLE DETAIL

NO SCALE



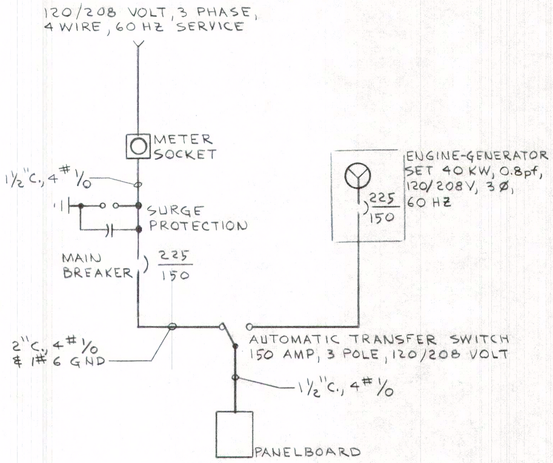
FIRST FLOOR POWER PLAN

SCALE: 1/2" = 1'-0"



FIRST FLOOR LIGHTING PLAN

SCALE: 1/2" = 1'-0"



SINGLE LINE DIAGRAM

PANELBOARD					
SERVICE: 120/208V, 3 PHASE, 4W, 60HZ				200 AMP MAINS	
MOUNTING: SURFACE				150 AMP MAIN CKT BRKR	
CKT NO	EQUIPMENT	LOAD kW	LOAD HP	CKT. BRKR. POLES	CKT. BRKR. TRIP
1	SEWAGE PUMPS		2@10	3	100
2	ELECTRIC UNIT HEATER	3.3		3	20
3	LIGHTING	0.7		1	20
4	RECEPTACLES	0.4		1	20
5	ENGINE HEATER	1.5		1	20
6	EXHAUST FAN - ELECTRICAL ROOM		1/20	1	20
7	BATTERY CHARGER	0.1		1	20
8	EXHAUST FAN - WET WELL		1/6	1	20
9	ALARM SYSTEM	0.1		1	20
10	MAGNETIC FLOW METER, TRANSMITTER & RECORDER			1	20
11	SPARE			1	20
12	SPARE			1	20
13	SPACE			1	-
14	SPACE			1	-

NOTES:

1. ALL INSTALLATIONS, EQUIPMENT, AND MATERIALS IN THE WET WELL ENTRANCE SHALL BE IN ACCORDANCE WITH THE MASSACHUSETTS ELECTRICAL CODE REQUIREMENTS FOR CLASS 1, DIVISION 2, GROUP D HAZARDOUS LOCATIONS.
2. ALL INSTALLATIONS, EQUIPMENT, AND MATERIALS IN THE WET WELL SHALL BE IN ACCORDANCE WITH THE MASSACHUSETTS ELECTRICAL CODE REQUIREMENTS FOR CLASS 1, DIVISION 1, GROUP D HAZARDOUS LOCATIONS.
3. DISCONNECT ALL EXISTING ELECTRICAL EQUIPMENT. REMOVE EXISTING ELECTRIC AND TELEPHONE SERVICES.
4. INSTALL RECEPTACLES 3'-0" ABOVE FLOOR. INSTALL SWITCHES 4'-6" ABOVE FLOOR.

RECORD DRAWING

COMMONWEALTH OF MASSACHUSETTS JUSTIN L. MAGEE No. 25697 REGISTERED PROFESSIONAL ENGINEER

COMMONWEALTH OF MASSACHUSETTS JOHN J. [illegible] No. 26943 REGISTERED PROFESSIONAL ENGINEER

JNAPPI	9/15/89
DRAWN BY	DATE
GAWE	9/15/89
CHECKED	DATE
APPROVED	DATE

NO.	REVISION	BY	APP.	DATE
1	RECORD DRAWING	JGC	JBD	6/90

LOMBARDO GROUP
A DIVISION OF
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46 CHURCH STREET, BOSTON, MA 02116
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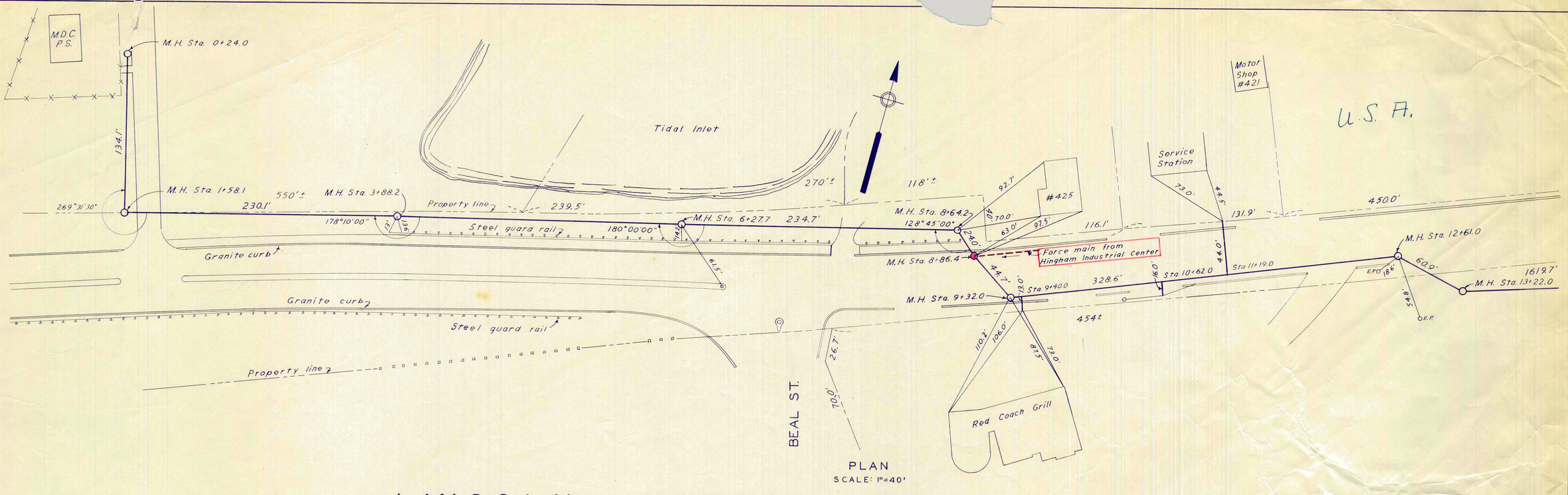
ELECTRICAL

SCALE: AS SHOWN

SHEET NO. 6 OF 6

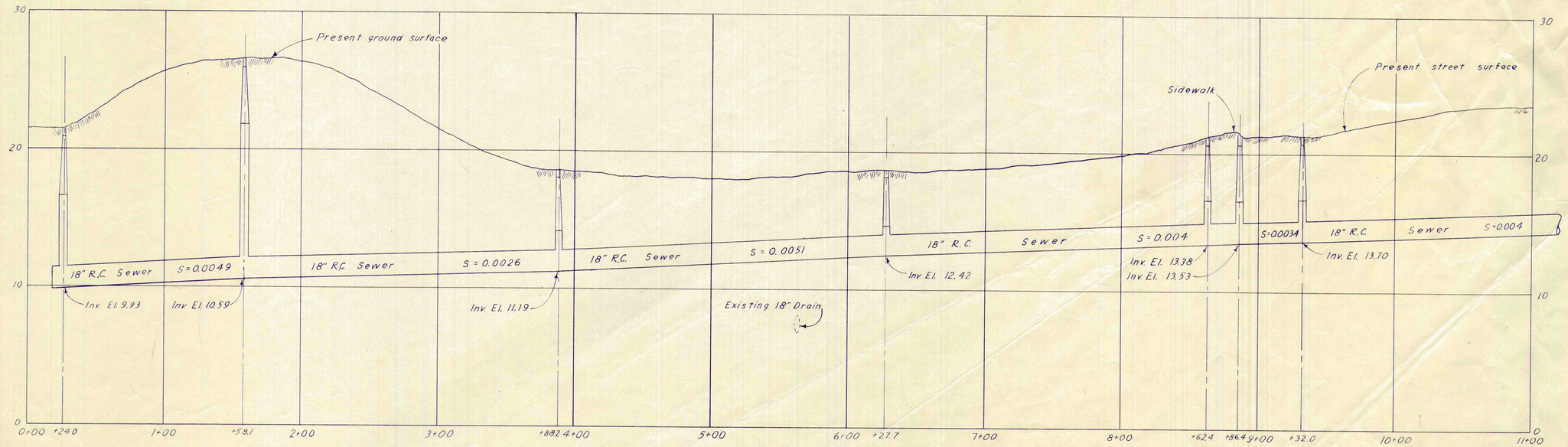
FILE NO.

RENOVATION OF BRADLEY WOODS PUMPING STATION



PLAN
SCALE: 1"=40'

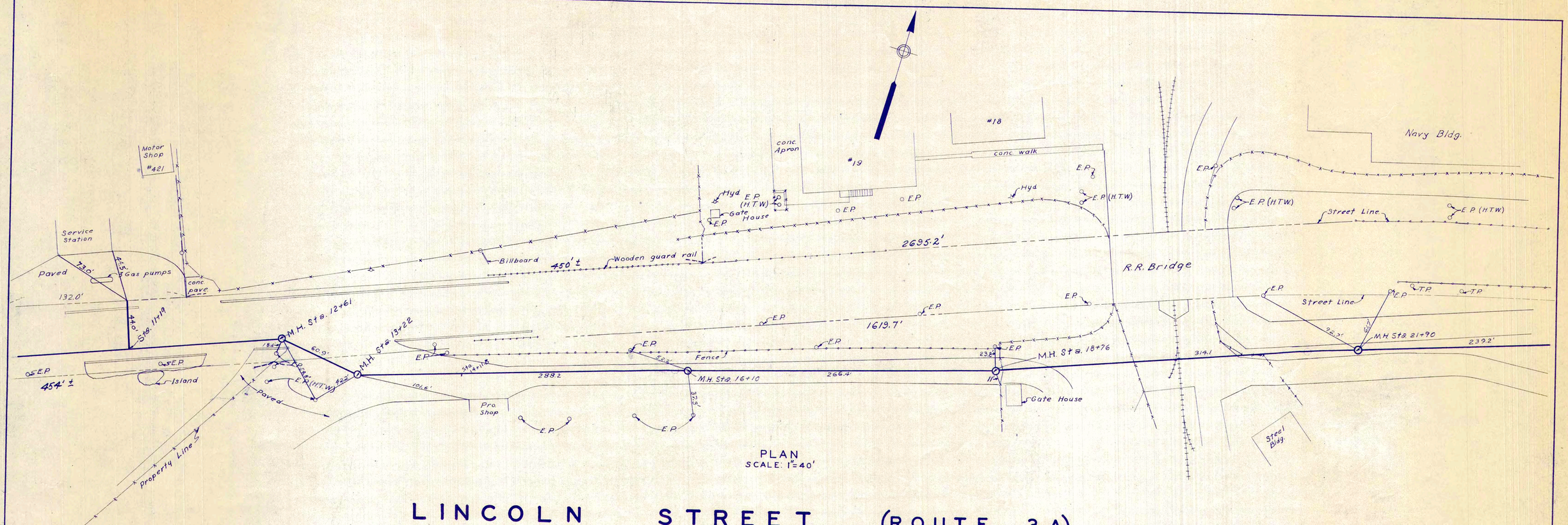
LINCOLN STREET (ROUTE 3A)



PROFILE
SCALE: HOR. 1"=40'
VER. 1"=40'

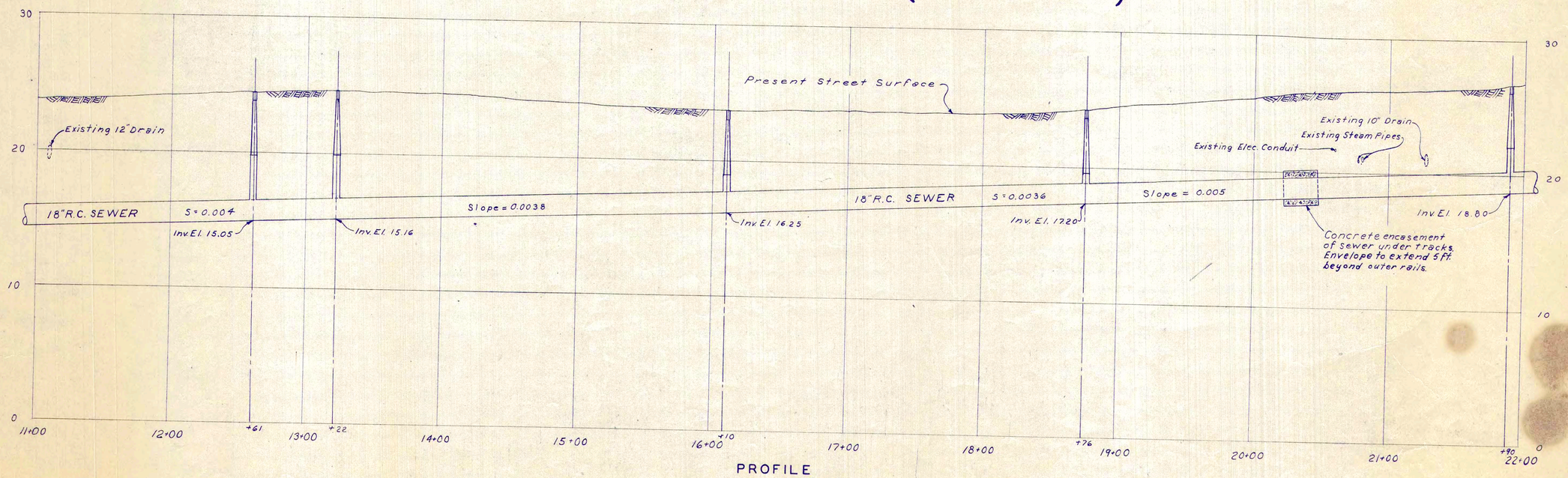
duplicate

TOWN OF HINGHAM, MASS.
SEWER ASSESSMENT PLAN



PLAN
SCALE: 1"=40'

LINCOLN STREET (ROUTE 3A)



PROFILE
SCALE: HOR 1"=40'
VER 1"=4'

TOWN OF HINGHAM, MASS.
SEWER ASSESSMENT PLAN

Bk. 689 Pg. 130

4-26689-1

LINCOLN STREET (ROUTE 3A)
NO. 421 TO EAST OF R.R. BRIDGE

Bldg. 8

Guard House

#349 Lunch Counter

Bldg. 6

Navy Bldgs

2695.2'

o E.P.

o L.P

o E.P.

o E.P.

o Hyd.

chain link fence

Street Line

o 2-E.Ps

conc. walk

conc. curb

M.H. Sta. 28+71

Sta. 29+51

Sta. 30+19

330.2'

Sta. 31+21

M.H. Sta. 32+01

90.5'

M.H. Sta. 8+79

110.9'

M.H. Sta. 27+39

114'

M.H. Sta. 24+29

wooden fence

conc. curb

o E.P.

o E.P.

E.P.

o T.P.

o T.P.

1619.7'

E.P.

61.7'

M.H. Sta. 21+90

239.2'

Sta. 24+50

327.8'

Sta. 26+33

82.3'

101.4'

78.6'

Edge of pavement

School

Paved

Boiler House

U.S.A.

200'

Street Line

100'

663.0'

163'

150'

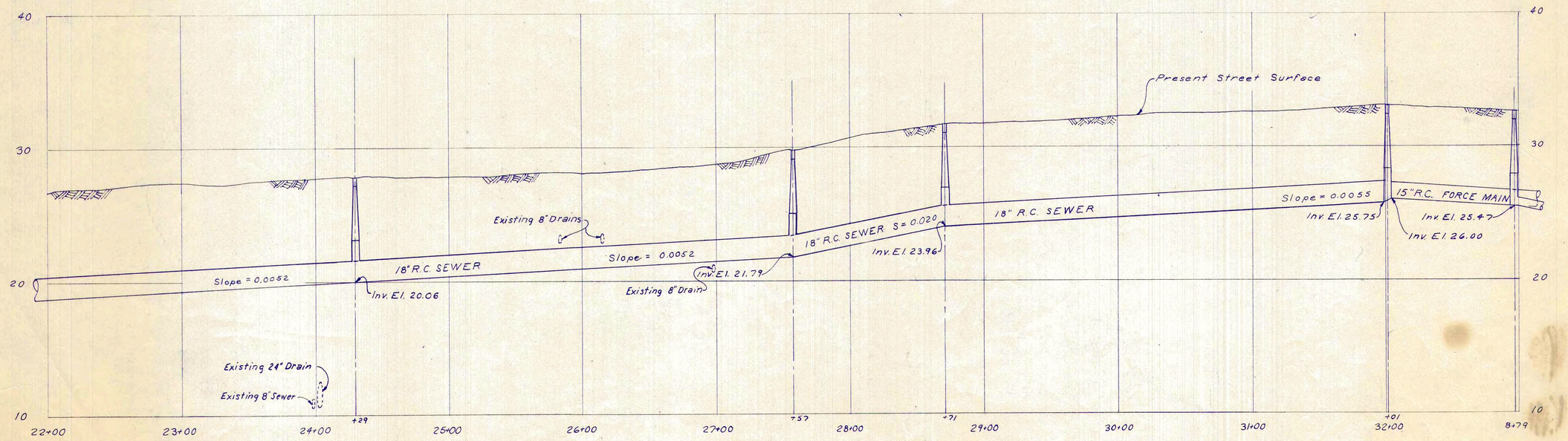
330

BRADLEY PARK DEVELOPMENT

Steel Bldg.

PLAN
SCALE: 1"=40'

LINCOLN STREET (ROUTE 3A)



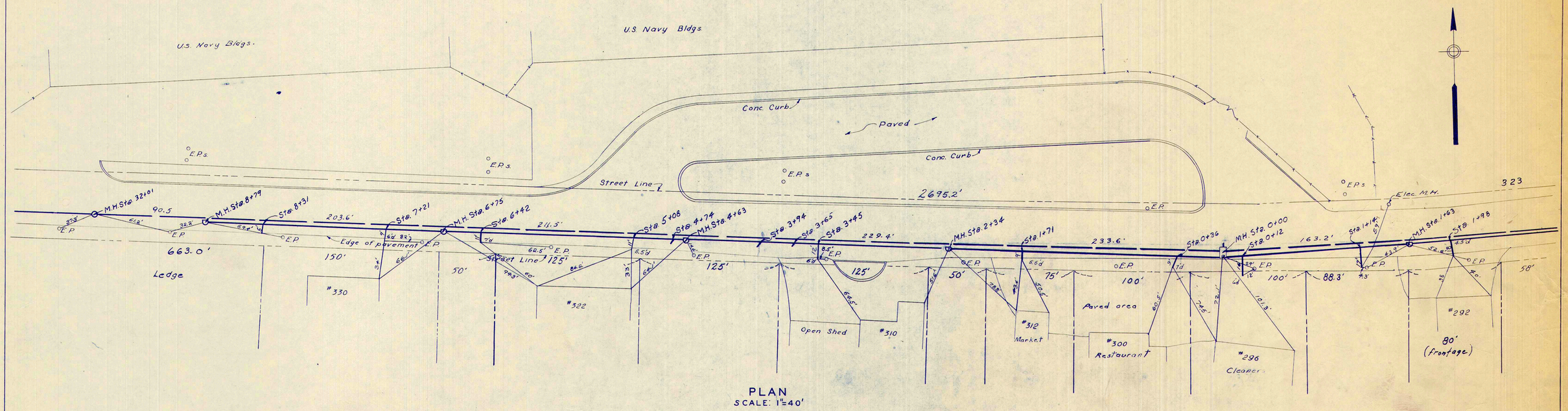
PROFILE
SCALE: HOR. 1"=40'
VER. 1"=4'

TOWN OF HINGHAM, MASS.
SEWER ASSESSMENT PLAN

Bk. 689 Pg. 120

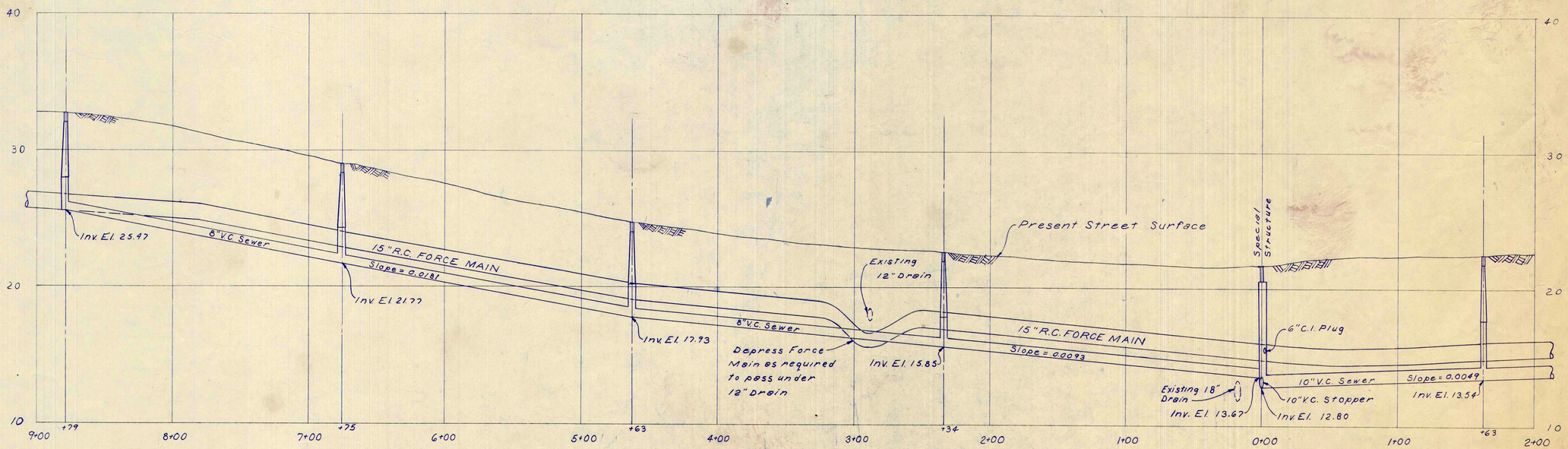
H-26690-1

LINCOLN STREET (ROUTE 3A)
BRADLEY PARK AREA



PLAN
SCALE: 1"=40'

LINCOLN STREET (ROUTE 3A)

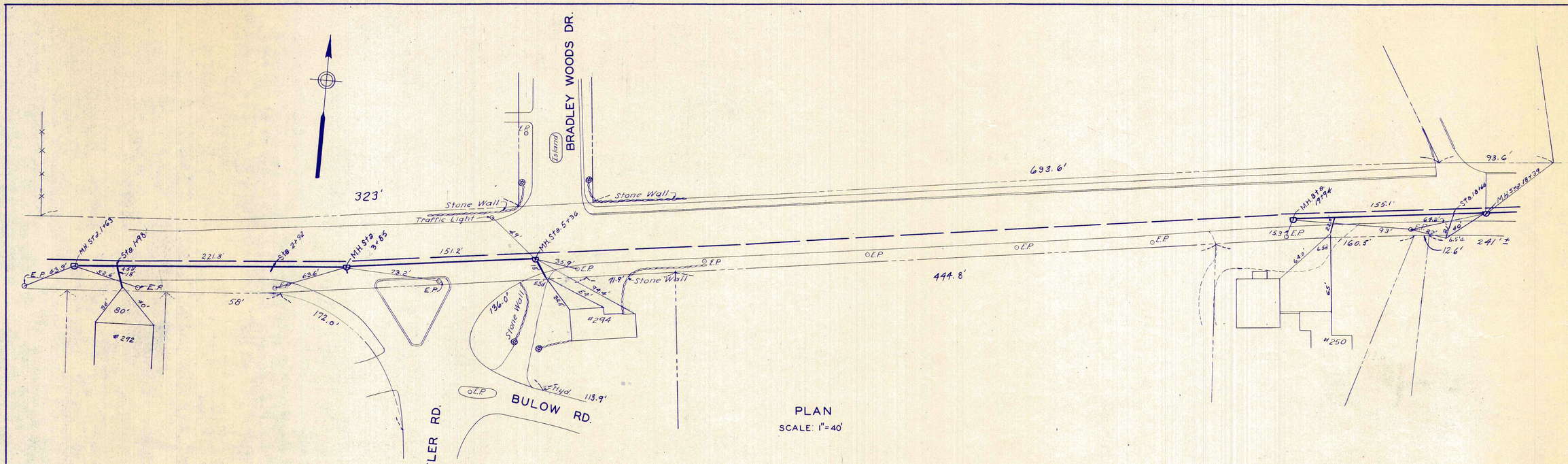


PROFILE
SCALE: HOR. 1"=40'
VER. 1"=4'

TOWN OF HINGHAM, MASS.
SEWER ASSESSMENT PLAN

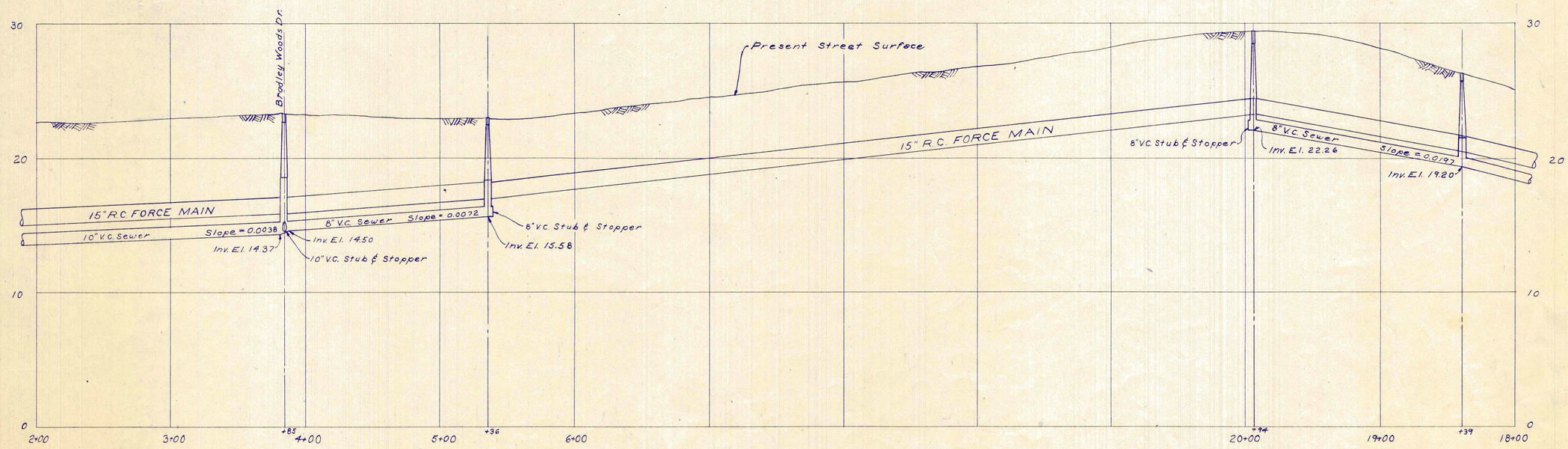
20

LINCOLN STREET (ROUTE 3A)
HOUSE NO. 330 TO HOUSE NO. 292



PLAN
SCALE: 1"=40'

LINCOLN STREET (ROUTE 3A)



PROFILE
SCALE: HOR. 1"= 40'
VER. 1"= 4'

TOWN OF HINGHAM, MASS.
SEWER ASSESSMENT PLAN

Bk 682 Pg 130

H-26692-1

LINCOLN STREET ROUTE (3A)
HOUSE NO. 292 TO HOUSE NO. 250

Appendix D – Pump Information

Paulin, Michael

From: Kennedy, Brendan - Xylem <Brendan.Kennedy@Xyleminc.com>
Sent: Monday, March 28, 2016 4:38 PM
To: Paulin, Michael
Subject: Bradley Woods / Hingham, MA - Flygt Certified Test curves
Attachments: 20160328162622282.pdf

Mike,

Can't believe it but I found it (around 1989). See attached certified test curves for Flygt Model CP3127-461, 10 HP, 3 phase 208 volt submersible pump with duplex control panel. It looks like it was designed for 375gpm at 53ft tdh. Please review and let me know if you have any questions or comments.

Regards,

Brendan Kennedy

Branch Manager

FLYGT Products

Xylem Inc.

78 K Olympia Ave

Woburn, MA 01801
Office: 781-935-6515

Direct: 781-970-0021

Cell: 617-686-6538

Fax: 781-938-0364



Flygt Corporation
78-K Olympia Avenue
Woburn, MA 01801-2036
Tel: (617) 935-6515
Fax: (617) 938-0364

March 15, 1990

Interstate Engineering Corporation
193 Jefferson Avenue
Salem, Massachusetts 01970

Attn: Mr. Joel Leinson

Subj: Bradley Woods Pump Station, Hingham, Massachusetts

Gentlemen:

Enclosed are the eight (8) Flygt Certified Pump Performance Curves for the above project.

If you have any questions, please feel free in contacting us here at Flygt, Woburn.

Sincerely,

Brian McCarthy

Enc.

FLYGT

FLYGT CORPORATION NORWALK, CONN. 06850

CUSTOMER REF. NO.

Interstate Engineering

REP.
Flygt, MA

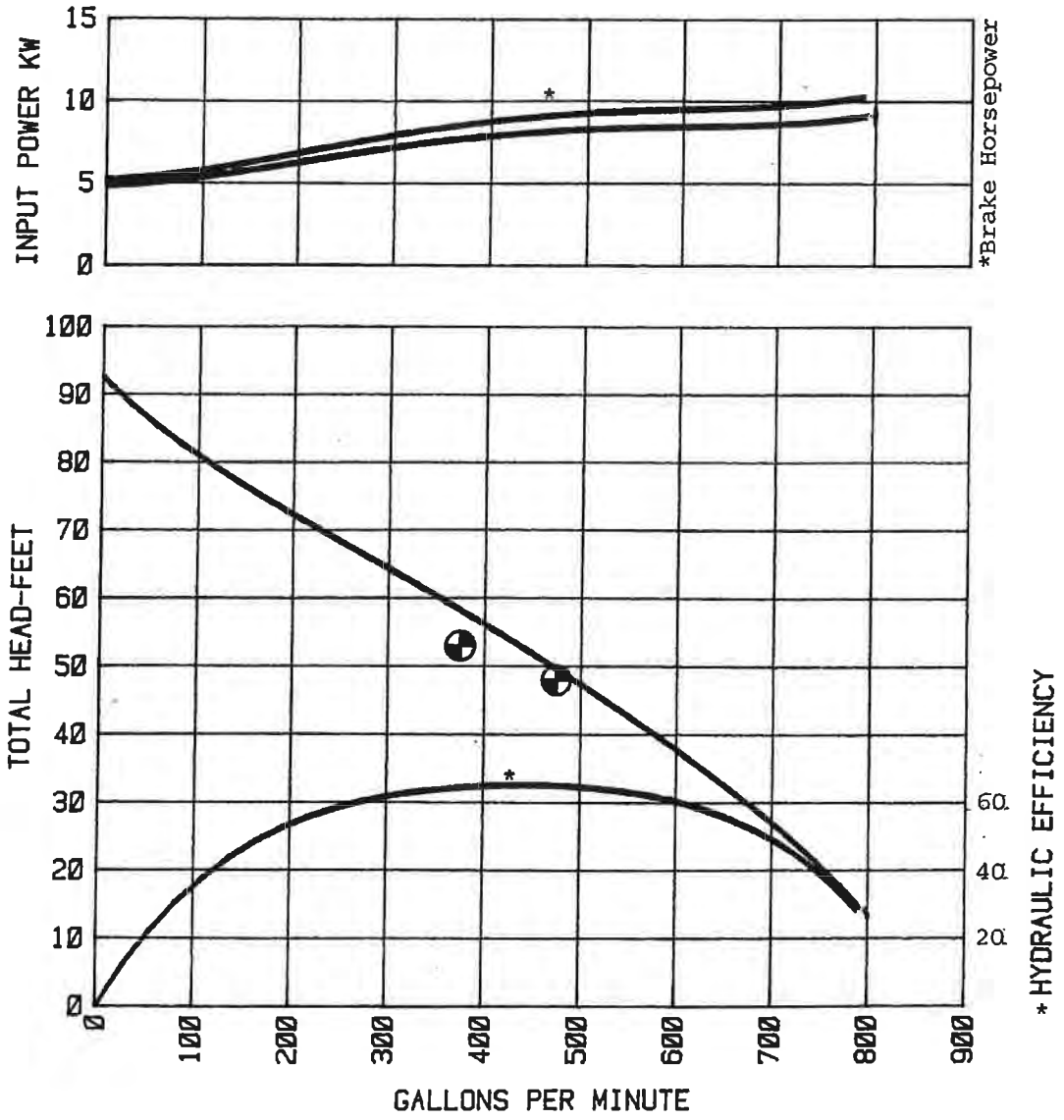
FUS# 070002

CERTIFIED TEST CURVE NO. 7228

SER. NO. 090-8850042	KW 8.8	FLYGT REF. NO. C-60572	
HP 10	PH 3	VOLT. 208	PUMP MODEL CP-3127 / SIZE 4"
RTD. RPM 1750	IMPLR. 461		

CERTIFICATION THIS TEST WAS CONDUCTED AT A FLYGT CORPORATION TEST FACILITY USING CLEAR WATER AT AMBIENT TEMP. (60-80 F.). FLOW, HEAD AND POWER READINGS WERE TAKEN FROM ELECTRONIC METERING EQUIPMENT. ACCURACY OF THE TEST EQUIPMENT CONFIRMED BY PERIODIC CALIBRATIONS.

	TEST BY	PREP. BY	WITNESSED BY
	B.Toole	J.Sweet	
	DATE 2/20/90	DATE 2/22/90	DATE



FLYGT

CUSTOMER REF. NO.

Interstate Engineering

REP.
Flygt, MA

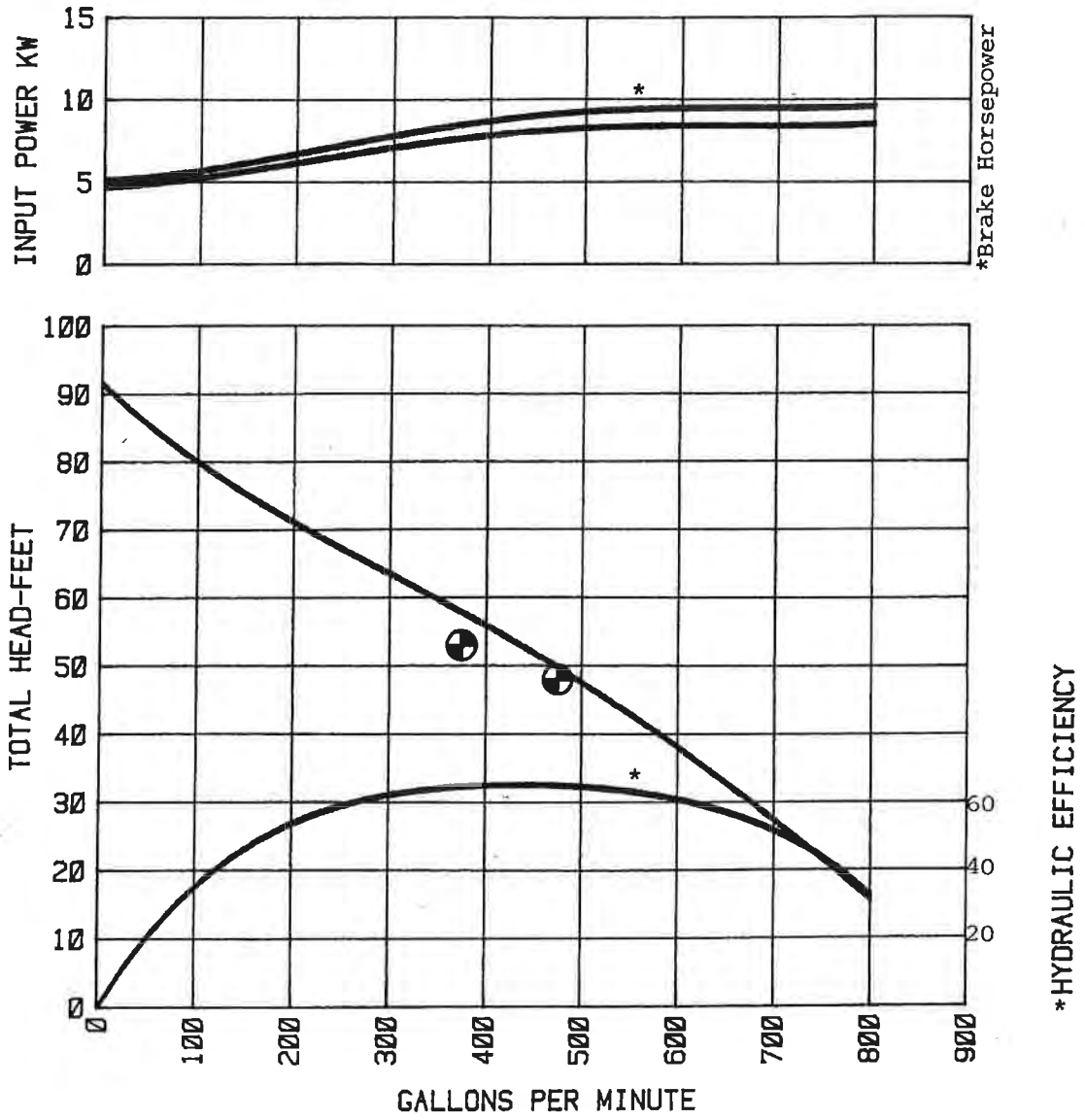
FUS# 070002

CERTIFIED TEST CURVE NO. 7183

SER. NO. 090-8980126	KW 8.8	FLYGT REF. NO. C - 60572	
HP 10	PH 3	VOLT. 208	
RTD. RPM 1750	IMPLR. 461	PUMP MODEL CP-3127	SIZE 4"

CERTIFICATION THIS TEST WAS CONDUCTED AT A FLYGT CORPORATION TEST FACILITY USING CLEAR WATER AT AMBIENT TEMP. (60-80 F.). FLOW, HEAD AND POWER READINGS WERE TAKEN FROM ELECTRONIC METERING EQUIPMENT. ACCURACY OF THE TEST EQUIPMENT CONFIRMED BY PERIODIC CALIBRATIONS.

	TEST BY	PREP. BY	WITNESSED BY
	B.Toole	J.Sweet	
	DATE 2/20/90	DATE 2/22/90	DATE



Paulin, Michael

From: Ryan Sura <rsura@homapump.com>
Sent: Monday, March 28, 2016 4:00 PM
To: Paulin, Michael
Cc: Ray Bahr; Jim Engleman; Dan Regan
Subject: Re: Hingham, MA - Bradley Woods Pump Station
Attachments: AMX646-360-21.5PU.pdf

Paul
Sorry for the delay here. The Serial Number was never recorded in our internal log, so tracking this down too a while! After all of that, I do not have much information available. Below are the original order details:

Pump Serial Number: 31473, 29568
HOMA SO#: 16341 MA
Customer PO#: N/A
Ship Date: 10/20/2004
Model: AMX646-360/21.5PU, 208V
Order QTY: (2)
Design Point: N/A
Accessories: (2) 6" Auto Coupling, (2) External Seal Probes, (2) Cable Change: From Standard Cable to HD Cable

These were jacketed motors, installed in a wet pit system on our guide rail system. The design point is not called out on the Purchase Order.

The hydraulics for this pump are still available. The only change in design since original shipment, is that the Seal Probe (moisture sensor) is not included internally. I have attached a generic data pack for the model, AMX646-360/21.5PU for your review.

For further questions, please contact our distributor, Ray Bahr @ Blake Equipment. His contact info:

Ray.Bahr@bghusa.com
P: (860) 218-1016
M: (860) 986-1072
F: (860) 528-8057
www.blakeequip.com

Thank you!
Ryan Sura

On Mon, Mar 28, 2016 at 10:21 AM, Dan Regan <dregan@homapump.com> wrote:

Dan Regan
Product Engineer
HOMA Pump Technology, Inc

dregan@homapump.com

HOMA

---------- Forwarded message ----------
From: **Paulin, Michael** <paulinm@wseinc.com>
Date: Mon, Mar 28, 2016 at 10:19 AM
Subject: Hingham, MA - Bradley Woods Pump Station
To: "dregan@homapump.com" <dregan@homapump.com>

Dan,

Following up on our brief discussion from this morning, any information that you can provide on the existing pumps at the Bradley Woods Pump Station in Hingham, MA would be greatly appreciated (pump curve, data sheet, order form, etc.). Specifically, we're looking for the design pumping rate and head conditions, as there do not appear to be Record Drawings of this pump station. Attached is a photo of the nameplate data, which appears to read the following:

Model AMX 646-360/265PU

Serial No. 31473

Give me a call with any questions or if you need any additional information.

Thanks so much,

Mike

Michael E. Paulin, P.E.
PROJECT MANAGER

Weston&Sampson®

5 Centennial Drive

Peabody, MA 01960-7985
www.westonandsampson.com

Technical Information

AMX646-360/21,5PU

HOMA PUMPEN MIT SYSTEM

Operating data	
Flow	0 US g.p.m.
Head	0 ft
Shaft power P2	
Pump efficiency	%
Required pump NPSH	
Pumpe type	Single pump
No. of pumps	1
Fluid	Water, clean

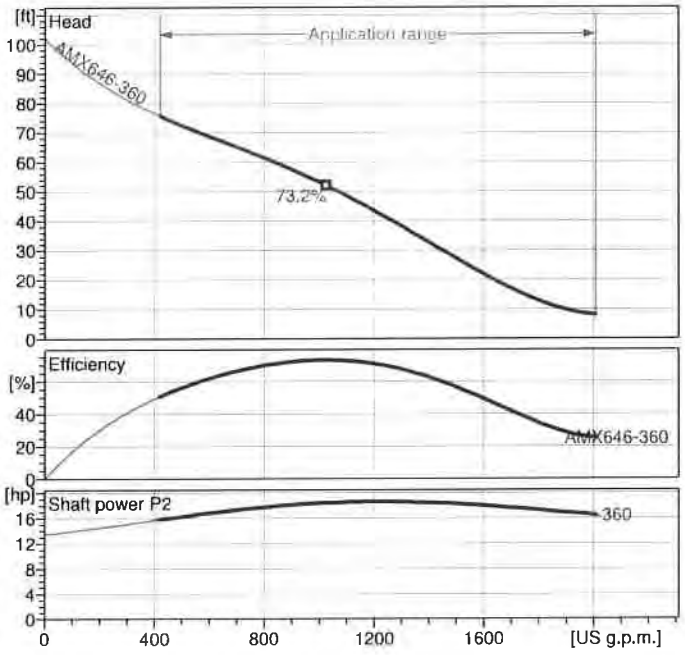
Pump	
Pump Code	AMX646-360/21,5PU
Impeller	Single channel impeller
Impeller size	368 mm
Solid size	100 mm
Discharge port	6" ANSI
Suction port	DN150

Motor	
Rated voltage	208/ 460 V
Frequency	60 Hz
Rated power P2	21.5 hp
Rated speed	1160 rpm
Number of poles	6
Efficiency	86 %
Rated current	69.0 / 30 A
Degree of protection	IP 68

Materials	
Motor housing	Cast Iron ASTM A48;Cl.40B
Impeller	Cast Iron ASTM A48;Cl.40B
Pump housing	Cast Iron ASTM A48;Cl.40B
Wear ring	Bronze ASTM B144
Motor shaft	AISI 430 F Stainless Steel
Bolts	AISI 304 Stainless Steel
Motor jacket	Stainless steel
Elastomeres	Nitrile Rubber

Mechanical seal on motor side	SiC / SiC
Mechanical seal on medium side	SiC / SiC
Lower Bearing	Two angular ball bearings
Upper Bearing	Deep Groove Ball Bearing

Testnorm: **P2>10kW, HI-Standard Grade 2B**
P2<10kW, HI Standard Sect.14.6.3.4.1



Wet well installation with coupling kit (PU, 330...370, FM)
Dimensions in mm [inch], letters see table

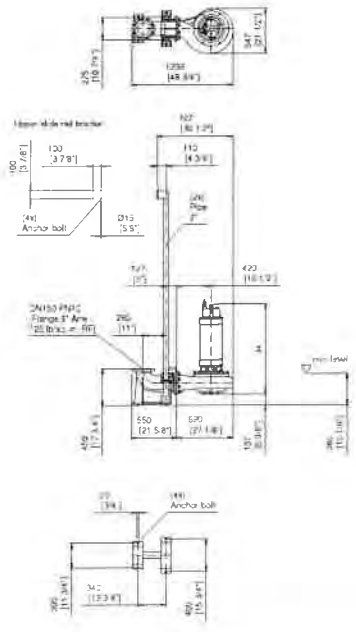


Table Dimensions
(mm)

H	1104.9

2.0.1 - 14.05.2013 (Build 84)

Project	Project no	Created by:	Page: 1	Date: 2016-03-28

Performance Curve

AMX646-360/21,5PU

HOMA
PUMPEN MIT SYSTEM

Impeller

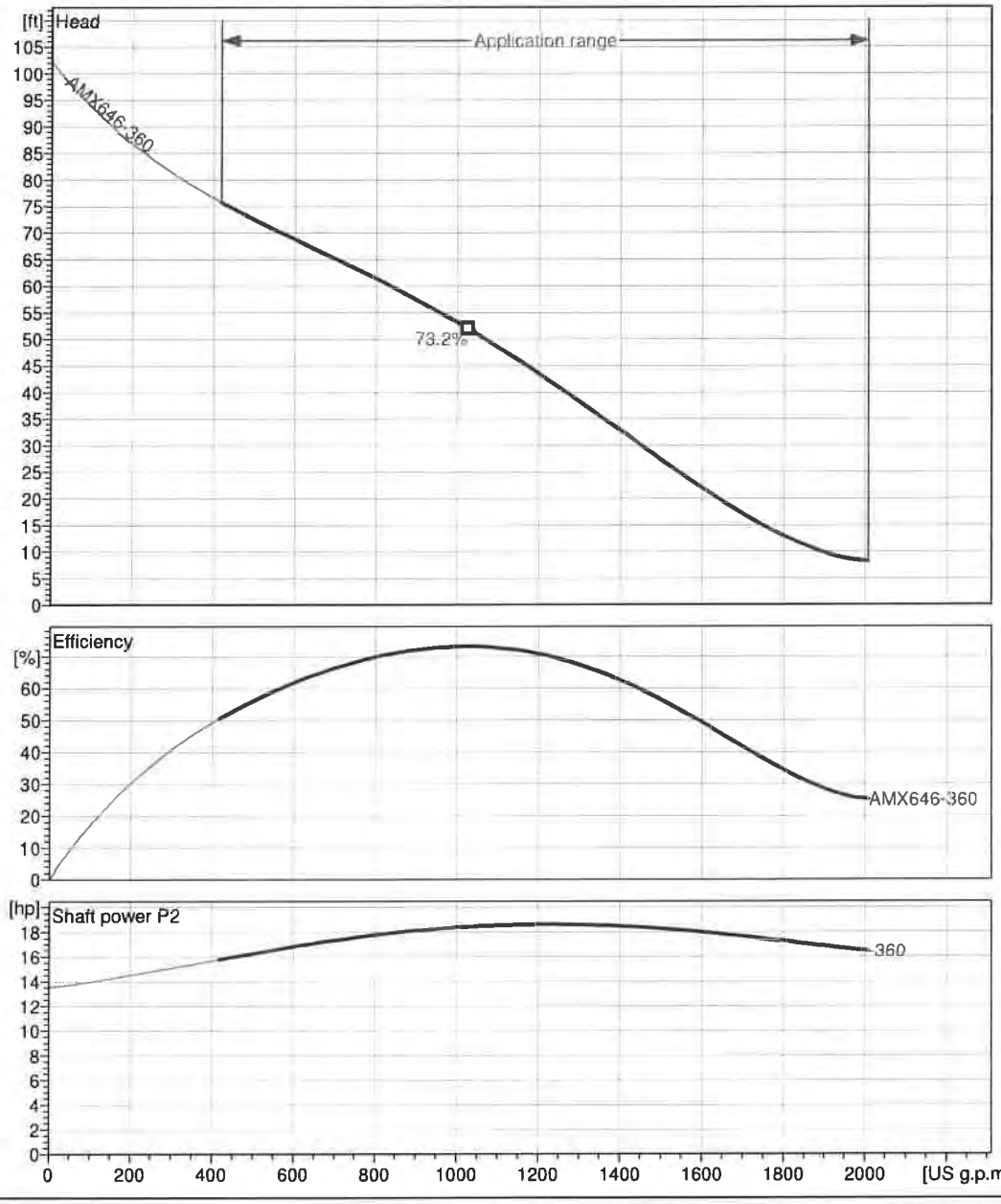
Impeller type:	Solid size Ø:	Max. Ø:	Min. Ø:	Sel. Ø:	
Single channel impeller	100 mm	372 mm	325 mm	368 mm	

Operating data

Speed:	Frequency:	Duty point:	Shaft power P2:	Discharge port:
1160 rpm	**60 Hz**	**Q = 0 US g.p.m. H = 0 ft**		**6" ANSI**

Power data referred to: Water [100%] ; 68 °F; 62.322lb/ft³; 1.0818E-5ft²/s

Testnorm: **P2>10kW, HI-Standard Grade 2B**
P2<10kW, HI Standard Sect.14.6.3.4.1



2.0.1 - 14.05.2013 (Build 84)

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Dimensions

AMX646-360/21,5PU

Wet well installation with coupling kit (PU, 330...370, FM)
Dimensions in mm [inch], letters see table

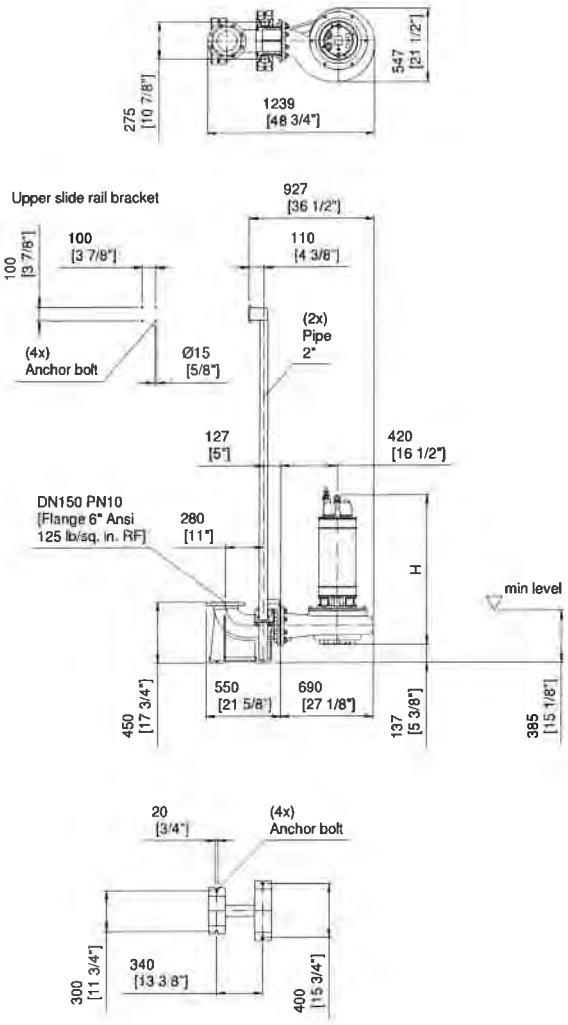


Table Dimensions (mm)

H	1104.9

2.0.1 - 14.05.2013 (Build 84)

Project	Project no.:	Created by:	Page: 3	Date: 2016-03-28

Technical Data

AMX646-360/21,5PU

HOMA
PUMPEN MIT SYSTEM

Operating data					
Flow	**0**	**US g.p.m.**	**Head**	**0**	**ft**
Shaft power P2		**hp**	**Static head**	**0**	**ft**
Pump efficiency		**%**	**Required pump NPSH**		**ft**
Pumpe type	Single pump		No. of pumps	1	
Fluid	Water, clean		Temperature	68	°F
Density	62.32	lb/ft³	Kin. viscosity	1,082E-5	ft²/s

Pump						
Pump Code	AMX646-360/21,5PU		Speed		1160	rpm
Suction port	DN150		Head	Max.	75.8	ft
Discharge port	6" ANSI			Min.	8.2	ft
Impeller type	Single channel impeller		Flow	Max.	2008.2	US g.p.m.
Solid size	100	mm	Pump efficiency max.		73.2	%
Impeller Ø	368	mm	Required rated power max. P2		18.6	hp

Motor						
Motor version	Submersible motor		Insulation class		H	
Motor name	AM204.25P/6/3		Degree of protection		IP 68	
Frequency	60	Hz	Temperature class		T3C	
Rated power P1	24.9	hp	NEMA code		D	
Rated power P2	21.5	hp	Explosion protection			
Rated speed	1160	rpm	Efficiency at % rated power	100%	86	%
Rated voltage	208 / 460 V	3~		75%	87	%
Rated current	69.0 / 30	A		50%	86	%
Starting current, direct starting	255.3 / 111	A	cos phi at % rated power	100%	0.78	
Starting current, star-delta		A		75%	0,73	
Starting mode	Directly			50%	0,62	
Power cable	4G10		Control cable		5G1,5	
Type of power cable	H07RN-F PLUS		Type of control cable		H07RN-F	
Cable length	32.809 ft		Service factor		1.15	
Shaft seal	Mechanical seal on motor side		SiC / SiC			
	Mechanical seal on medium side		SiC / SiC			
Bearing	Lower Bearing		Two angular ball bearings			
	Upper Bearing		Deep Groove Ball Bearing			
Remarks						

Materials / Weight			
Motor housing	Cast Iron ASTM A48;Cl.40B	Bolts	AISI 304 Stainless Steel
Pump housing	Cast Iron ASTM A48;Cl.40B	Elastomeres	Nitrile Rubber
Impeller	Cast Iron ASTM A48;Cl.40B	Motor jacket	Stainless steel
Wear ring	Bronze ASTM B144		
Motor shaft	AISI 430 F Stainless Steel		
Weight aggregat	On demand lb		

Appendix E – Daily Runtime Summary (Mission)

Daily Runtime Summary
Minutes and Gallons

Device : Bradley Woods Pump Station

Time	Pump 1: 614 gpm		Pump 2: 504 gpm		Simultaneous		Total		
	Minutes	**Gallons**	**Minutes**	**Gallons**	**Minutes**	**Gallons**	**Minutes**	**Gallons**	**Daily Runtime**
3/6/2015 0:00	83.4	51228	95.7	48241	59.7	0	238.9	99469	179.1
3/7/2015 0:00	63.3	38836	58.4	29434	0	0	121.7	68269	121.7
3/8/2015 0:00	65.2	40023	61.9	31214	0	0	127.1	71237	127.1
3/9/2015 0:00	73.9	45344	73.4	37002	0	0	147.3	82346	147.3
3/10/2015 0:00	84.5	51863	77.3	38951	0	0	161.8	90813	161.8
3/11/2015 0:00	149.1	91517	169.4	85394	0	0	318.5	176911	318.5
3/12/2015 0:00	176.5	108340	210.4	106050	0	0	386.9	214390	386.9
3/13/2015 0:00	141.4	86830	195	98288	0	0	336.4	185118	336.4
3/14/2015 0:00	164.6	101075	207.4	104521	0	0	372	205596	372
3/15/2015 0:00	206.4	126699	338	170344	0	0	544.3	297043	544.4
3/16/2015 0:00	194.9	119679	292.3	147311	0	0	487.2	266990	487.2
3/17/2015 0:00	221.2	135827	252.4	127184	0	0	473.6	263011	473.6
3/18/2015 0:00	211.9	130127	291.6	146975	0	0	503.6	277102	503.5
3/19/2015 0:00	187.6	115197	223.4	112585	0	0	411	227782	411
3/20/2015 0:00	202	124028	138.8	69964	10.8	0	351.6	193992	340.8
3/21/2015 0:00	117.4	72084	201.8	101690	0	0	319.2	173774	319.2
3/22/2015 0:00	152.5	93645	118.5	59699	0	0	271	153344	271
3/23/2015 0:00	112.3	68942	154.5	77868	0	0	266.8	146810	266.8
3/24/2015 0:00	94.9	58248	160.3	80800	0	0	255.2	139048	255.2
3/25/2015 0:00	111.3	68348	142.3	71719	0	0	253.6	140068	253.6
3/26/2015 0:00	171.8	105485	376.4	189706	0	0	548.2	295191	548.2
3/27/2015 0:00	220.7	135489	1020.6	514391	23.4	0	1264.7	649880	1241.3
3/28/2015 0:00	257	157778	481.5	242659	0	0	738.4	400437	738.5
3/29/2015 0:00	250.8	153961	354.5	178676	0	0	605.3	332637	605.3
3/30/2015 0:00	189.8	116547	333.5	168067	0	0	523.3	284615	523.3
3/31/2015 0:00	223.8	137383	203.2	102396	0	0	426.9	239779	427
4/1/2015 0:00	178	109302	238.4	120145	0	0	416.4	229447	416.4
4/2/2015 0:00	160	98260	270.5	136324	12.8	0	443.3	234584	430.5
4/3/2015 0:00	206.9	127006	298.1	150242	0	0	505	277248	505
4/4/2015 0:00	233.1	143123	304.9	153661	0	0	538	296785	538
4/5/2015 0:00	215.4	132245	240.6	121262	0	0	456	253508	456
4/6/2015 0:00	155	95139	238.4	120145	0	0	393.3	215285	393.4
4/7/2015 0:00	133.1	81713	227.3	114542	0	0	360.4	196256	360.4
4/8/2015 0:00	121	74314	214.7	108200	0	0	335.7	182515	335.7
4/9/2015 0:00	152.7	93727	196.9	99229	0	0	349.5	192956	349.6
4/10/2015 0:00	143.6	88181	215.8	108763	0	0	359.4	196944	359.4
4/11/2015 0:00	141.5	86901	172.9	87116	0	0	314.4	174018	314.4
4/12/2015 0:00	142.9	87741	143.8	72458	0	0	286.7	160199	286.7
4/13/2015 0:00	108.3	66496	174.8	88108	0	0	283.1	154604	283.1
4/14/2015 0:00	109.6	67284	129.5	65285	0	0	239.1	132569	239.1
4/15/2015 0:00	84.3	51770	143.9	72526	0	0	228.2	124296	228.2
4/16/2015 0:00	107.3	65892	98.1	49459	0	0	205.5	115352	205.4
4/17/2015 0:00	84.8	52077	129.3	65176	0	0	214.1	117253	214.1
4/18/2015 0:00	109.8	67387	70.9	35750	0	0	180.7	103137	180.7
4/19/2015 0:00	69.5	42642	104.1	52466	0	0	173.6	95109	173.6
4/20/2015 0:00	86.9	53357	93.8	47284	0	0	180.7	100640	180.7
4/21/2015 0:00	105.2	64593	105.8	53332	0	0	211	117924	211
4/22/2015 0:00	94.8	58228	95.5	48140	0	0	190.4	106368	190.3
4/23/2015 0:00	79.4	48752	115.6	58246	0	0	195	106997	195
4/24/2015 0:00	84.7	51985	98.9	49829	0	0	183.5	101814	183.6
4/25/2015 0:00	77.2	47421	90	45335	0	0	167.2	92756	167.2
4/26/2015 0:00	82.3	50502	91.1	45898	0	0	173.3	96399	173.4
4/27/2015 0:00	81.7	50133	84	42319	0	0	165.6	92452	165.7
4/28/2015 0:00	72.3	44372	94.4	47594	0	0	166.7	91966	166.7

4/29/2015 0:00	74.5	45712	76.7	38632	0	0	151.1	84344	151.2
4/30/2015 0:00	74.6	45815	68.6	34591	0	0	143.3	80406	143.2
5/1/2015 0:00	72.7	44648	63.2	31853	0	0	135.9	76501	135.9
5/2/2015 0:00	66.9	41066	56	28232	0	0	122.9	69299	122.9
5/3/2015 0:00	71.7	44014	63	31760	0	0	134.7	75774	134.7
5/4/2015 0:00	71.2	43686	67.1	33802	0	0	138.2	77488	138.3
5/5/2015 0:00	64.5	39603	59.6	30055	0	0	124.1	69658	124.1
5/6/2015 0:00	58	35622	73	36767	0	0	131	72389	131
5/7/2015 0:00	68.6	42141	49.7	25066	0	0	118.4	67206	118.3
5/8/2015 0:00	57.5	35315	65.4	32936	0	0	122.9	68252	122.9
5/9/2015 0:00	51.6	31662	61.1	30794	0	0	112.7	62456	112.7
5/10/2015 0:00	54	33125	61.3	30887	0	0	115.2	64012	115.3
5/11/2015 0:00	63.2	38805	56.7	28560	0	0	119.9	67365	119.9
5/12/2015 0:00	60.9	37403	61.3	30912	0	0	122.3	68315	122.2
5/13/2015 0:00	68.8	42243	48.7	24562	0	0	117.5	66805	117.5
5/14/2015 0:00	58.3	35776	54.1	27266	0	0	112.4	63042	112.4
5/15/2015 0:00	50.5	31017	60	30232	0	0	110.5	61249	110.5
5/16/2015 0:00	60	36820	48.5	24452	0	0	108.5	61272	108.5
5/17/2015 0:00	53.8	33033	60.4	30442	0	0	114.2	63475	114.2
5/18/2015 0:00	50.3	30864	61.5	30996	0	0	111.8	61860	111.8
5/19/2015 0:00	51.9	31856	60.3	30391	0	0	112.2	62248	112.2
5/20/2015 0:00	62.2	38170	44.6	22478	0	0	106.8	60649	106.8
5/21/2015 0:00	53.2	32675	48.6	24503	0	0	101.8	57178	101.8
5/22/2015 0:00	51.4	31570	48.4	24377	0	0	99.8	55947	99.8
5/23/2015 0:00	38.2	23434	55.6	28014	0	0	93.8	51448	93.8
5/24/2015 0:00	46.7	28694	43.8	22092	0	0	90.6	50786	90.5
5/25/2015 0:00	54.6	33514	45.3	22840	0	0	99.9	56354	99.9
5/26/2015 0:00	49.6	30465	56.9	28652	0	0	106.5	59117	106.5
5/27/2015 0:00	42.4	26013	60.7	30584	0	0	103.1	56598	103.1
5/28/2015 0:00	61.6	37812	43.1	21739	0	0	104.7	59551	104.7
5/29/2015 0:00	46.9	28817	51.2	25813	0	0	98.2	54630	98.1
5/30/2015 0:00	39.9	24488	47	23663	0	0	86.8	48151	86.9
5/31/2015 0:00	56.3	34538	41	20681	0	0	97.3	55218	97.3
6/1/2015 0:00	57.7	35448	52.6	26502	0	0	110.3	61950	110.3
6/2/2015 0:00	70	42980	79.4	40026	0	0	149.4	83006	149.4
6/3/2015 0:00	55.1	33831	84.7	42706	0	0	139.8	76537	139.8
6/4/2015 0:00	54.8	33637	69.5	35028	0	0	124.3	68665	124.3
6/5/2015 0:00	49.7	30536	63.8	32130	0	0	113.5	62666	113.5
6/6/2015 0:00	43.7	26842	62.6	31542	0	0	106.3	58384	106.3
6/7/2015 0:00	47.9	29421	60.9	30710	0	0	108.9	60131	108.8
6/8/2015 0:00	49.4	30332	60.2	30324	0	0	109.6	60656	109.6
6/9/2015 0:00	45.6	27978	66.9	33709	0	0	112.5	61687	112.5
6/10/2015 0:00	48.9	30045	58.3	29375	0	0	107.2	59420	107.2
6/11/2015 0:00	47.9	29411	54	27216	0	0	101.9	56627	101.9
6/12/2015 0:00	54.6	33545	45.2	22772	0	0	99.8	56317	99.8
6/13/2015 0:00	44.2	27149	39.8	20042	0	0	84	47191	84
6/14/2015 0:00	45.8	28101	47.2	23772	0	0	92.9	51873	93
6/15/2015 0:00	54	33156	54	27208	0	0	108	60364	108
6/16/2015 0:00	50.4	30946	53.8	27115	0	0	104.2	58061	104.2
6/17/2015 0:00	48.5	29799	46.9	23638	0	0	95.4	53437	95.4
6/18/2015 0:00	51.5	31621	45.2	22781	0	0	96.7	54402	96.7
6/19/2015 0:00	41.4	25420	52	26191	0	0	93.4	51611	93.4
6/20/2015 0:00	46.5	28531	32.7	16456	0	0	79.1	44986	79.2
6/21/2015 0:00	55.9	34302	70.3	35440	0	0	126.2	69742	126.2
6/22/2015 0:00	58.6	35950	55.9	28190	0	0	114.5	64140	114.5
6/23/2015 0:00	45.4	27845	62.5	31475	0	0	107.8	59320	107.9
6/24/2015 0:00	47.7	29298	54.6	27527	0	0	102.3	56825	102.3
6/25/2015 0:00	43.2	26525	54.7	27544	0	0	97.9	54068	97.9
6/26/2015 0:00	41.6	25532	59	29728	0	0	100.6	55260	100.6
6/27/2015 0:00	35.4	21756	58	29207	0	0	93.4	50963	93.4
6/28/2015 0:00	68.3	41936	96.5	48653	0	0	164.8	90589	164.8
6/29/2015 0:00	58.7	36052	75.6	38102	0	0	134.3	74154	134.3

6/30/2015 0:00	51.6	31652	64.9	32693	0	0	116.4	64345	116.5
7/1/2015 0:00	55.2	33883	72	36280	0	0	127.2	70162	127.2
7/2/2015 0:00	48.2	29585	65.7	33113	0	0	113.9	62697	113.9
7/3/2015 0:00	43.9	26965	56.9	28661	0	0	100.8	55626	100.8
7/4/2015 0:00	40	24529	51.1	25738	0	0	91	50267	91.1
7/5/2015 0:00	42.9	26341	53.4	26905	0	0	96.3	53246	96.3
7/6/2015 0:00	45.1	27702	58.4	29442	0	0	103.5	57144	103.5
7/7/2015 0:00	44.7	27425	55.9	28190	0	0	100.6	55616	100.6
7/8/2015 0:00	43.6	26740	59	29753	0	0	102.6	56493	102.6
7/9/2015 0:00	43.4	26627	54.9	27686	0	0	98.3	54314	98.3
7/10/2015 0:00	68.3	41946	84.2	42445	0	0	152.5	84392	152.5
7/11/2015 0:00	52.2	32041	64.5	32483	0	0	116.6	64523	116.7
7/12/2015 0:00	46.1	28305	60.9	30702	0	0	107	59007	107
7/13/2015 0:00	48.2	29564	62.1	31315	0	0	110.3	60879	110.3
7/14/2015 0:00	46.8	28725	62.7	31618	0	0	109.5	60343	109.5
7/15/2015 0:00	49.3	30270	63.9	32214	0	0	113.2	62484	113.2
7/16/2015 0:00	43.2	26535	60.6	30534	0	0	103.8	57069	103.8
7/17/2015 0:00	42.1	25870	58	29207	0	0	100.1	55077	100.1
7/18/2015 0:00	41.3	25358	54	27191	0	0	95.3	52549	95.3
7/19/2015 0:00	39.5	24263	50.3	25360	0	0	89.8	49623	89.8
7/20/2015 0:00	45.1	27661	58.5	29484	0	0	103.6	57145	103.6
7/21/2015 0:00	40.5	24857	54.6	27502	0	0	95.1	52358	95.1
7/22/2015 0:00	40.2	24683	48.9	24662	0	0	89.1	49345	89.1
7/23/2015 0:00	39.9	24478	52.5	26460	0	0	92.4	50938	92.4
7/24/2015 0:00	36.6	22472	51.8	26099	0	0	88.4	48571	88.4
7/25/2015 0:00	32.1	19689	49.9	25166	0	0	82	44855	82
7/26/2015 0:00	36.6	22493	52	26200	0	0	88.6	48692	88.6
7/27/2015 0:00	38	23301	58	29207	0	0	95.9	52508	96
7/28/2015 0:00	39	23936	57.5	28980	0	0	96.5	52916	96.5
7/29/2015 0:00	39.1	24007	53.5	26956	0	0	92.6	50963	92.6
7/30/2015 0:00	40	24540	57.8	29106	0	0	97.7	53646	97.8
7/31/2015 0:00	36.3	22298	46.8	23587	0	0	83.1	45886	83.1
8/1/2015 0:00	31.2	19136	41.9	21101	0	0	73	40237	73.1
8/2/2015 0:00	35.3	21644	50.2	25318	0	0	85.5	46961	85.5
8/3/2015 0:00	38.8	23823	56.4	28434	0	0	95.2	52257	95.2
8/4/2015 0:00	38.6	23670	54.6	27510	0	0	93.1	51180	93.2
8/5/2015 0:00	38.9	23874	57.6	29022	0	0	96.5	52896	96.5
8/6/2015 0:00	48.9	29994	64.9	32684	0	0	113.7	62678	113.8
8/7/2015 0:00	46.9	28807	60.4	30458	0	0	107.4	59265	107.3
8/8/2015 0:00	43.2	26525	49.6	24990	0	0	92.8	51515	92.8
8/9/2015 0:00	43.8	26914	49.8	25099	0	0	93.6	52013	93.6
8/10/2015 0:00	40.7	24959	46.9	23646	0	0	87.6	48605	87.6
8/11/2015 0:00	39.2	24038	51.1	25746	0	0	90.2	49784	90.3
8/12/2015 0:00	38.7	23762	50.5	25460	0	0	89.2	49222	89.2
8/13/2015 0:00	37.4	22974	48.2	24268	0	0	85.6	47241	85.6
8/14/2015 0:00	37.3	22923	44	22168	0	0	81.3	45090	81.3
8/15/2015 0:00	29.5	18123	44.4	22369	0	0	73.9	40492	73.9
8/16/2015 0:00	36.9	22667	50.1	25259	0	0	87	47926	87
8/17/2015 0:00	37.6	23086	53.9	27157	0	0	91.5	50244	91.5
8/18/2015 0:00	38.9	23874	54.3	27359	0	0	93.2	51233	93.2
8/19/2015 0:00	38.3	23516	51	25679	0	0	89.3	49195	89.3
8/20/2015 0:00	42.1	25819	48.7	24562	0	0	90.8	50380	90.8
8/21/2015 0:00	44	27036	56	28241	0	0	100.1	55277	100
8/22/2015 0:00	32.9	20170	46.4	23386	0	0	79.3	43556	79.3
8/23/2015 0:00	36.7	22524	46.5	23419	0	0	83.2	45943	83.2
8/24/2015 0:00	39.8	24427	49.7	25066	0	0	89.5	49493	89.5
8/25/2015 0:00	37.7	23158	50.3	25334	0	0	88	48492	88
8/26/2015 0:00	36	22073	46.9	23654	0	0	82.9	45728	82.9
8/27/2015 0:00	38.4	23547	51.7	26032	0	0	90	49579	90.1
8/28/2015 0:00	34.4	21142	42.5	21437	0	0	77	42579	76.9
8/29/2015 0:00	31	19034	42.4	21370	0	0	73.4	40404	73.4
8/30/2015 0:00	34.1	20958	50	25200	0	0	84.1	46158	84.1

8/31/2015 0:00	36.4	22329	47.5	23940	0	0	83.9	46269	83.9
9/1/2015 0:00	37.9	23291	43.1	21706	0	0	81	44997	81
9/2/2015 0:00	36	22124	44.2	22277	0	0	80.2	44401	80.2
9/3/2015 0:00	35.3	21644	43.9	22134	0	0	79.2	43778	79.2
9/4/2015 0:00	35.7	21930	43.1	21706	0	0	78.8	43636	78.8
9/5/2015 0:00	32.5	19965	42.9	21605	0	0	75.4	41570	75.4
9/6/2015 0:00	29.1	17857	41.1	20698	0	0	70.2	38555	70.2
9/7/2015 0:00	36.2	22227	49.8	25091	0	0	86	47318	86
9/8/2015 0:00	35.7	21940	52.1	26242	0	0	87.8	48182	87.8
9/9/2015 0:00	36.8	22565	46.4	23369	0	0	83.1	45933	83.2
9/10/2015 0:00	38.1	23373	48	24167	0	0	86	47540	86.1
9/11/2015 0:00	48.9	30035	54.4	27418	0	0	103.3	57452	103.3
9/12/2015 0:00	35.8	21961	44.4	22352	0	0	80.1	44313	80.2
9/13/2015 0:00	44.3	27221	57.2	28846	0	0	101.6	56066	101.5
9/14/2015 0:00	54.6	33494	62.5	31508	0	0	117.1	65002	117.1
9/15/2015 0:00	42.9	26341	53.3	26855	0	0	96.2	53195	96.2
9/16/2015 0:00	42	25768	49.9	25124	0	0	91.8	50892	91.9
9/17/2015 0:00	41.8	25635	48.2	24301	0	0	90	49936	90
9/18/2015 0:00	39.1	23987	46	23184	0	0	85.1	47171	85.1
9/19/2015 0:00	35.7	21940	40.5	20429	0	0	76.3	42369	76.2
9/20/2015 0:00	40.5	24857	45.6	22974	0	0	86.1	47831	86.1
9/21/2015 0:00	39.8	24458	55.3	27880	0	0	95.2	52337	95.1
9/22/2015 0:00	38	23301	45.9	23150	0	0	83.9	46452	83.9
9/23/2015 0:00	38.3	23516	45.1	22739	0	0	83.4	46255	83.4
9/24/2015 0:00	37.5	23045	46.9	23629	0	0	84.4	46675	84.4
9/25/2015 0:00	37.9	23291	44	22168	0	0	81.9	45459	81.9
9/26/2015 0:00	34.4	21132	42	21176	0	0	76.4	42308	76.4
9/27/2015 0:00	44.1	27088	45.2	22789	0	0	89.3	49877	89.3
9/28/2015 0:00	38.1	23393	44.7	22529	0	0	82.8	45922	82.8
9/29/2015 0:00	40.6	24949	46.4	23402	0	0	87.1	48351	87
9/30/2015 0:00	70.6	43328	82.1	41395	0	0	152.7	84723	152.7
10/1/2015 0:00	55.1	33831	64.5	32491	0	0	119.6	66323	119.6
10/2/2015 0:00	48.6	29820	55.1	27762	0	0	103.7	57582	103.7
10/3/2015 0:00	45.2	27753	53.3	26872	0	0	98.5	54624	98.5
10/4/2015 0:00	45.8	28091	58.8	29627	0	0	104.5	57717	104.6
10/5/2015 0:00	45.4	27886	55.7	28048	0	0	101.1	55933	101.1
10/6/2015 0:00	43.6	26750	56.3	28350	0	0	99.8	55100	99.9
10/7/2015 0:00	41.2	25307	51.8	26099	0	0	93	51406	93
10/8/2015 0:00	42.3	25942	47.6	23990	0	0	89.9	49932	89.9
10/9/2015 0:00	41.1	25235	49.2	24772	0	0	90.3	50007	90.3
10/10/2015 0:00	37.7	23138	44.9	22613	0	0	82.6	45750	82.6
10/11/2015 0:00	33.8	20753	44	22184	0	0	77.8	42938	77.8
10/12/2015 0:00	40.9	25113	50.9	25645	0	0	91.8	50758	91.8
10/13/2015 0:00	42.7	26187	55.9	28148	0	0	98.5	54336	98.6
10/14/2015 0:00	40.9	25102	51.1	25763	0	0	92	50865	92
10/15/2015 0:00	39.4	24192	51.7	26074	0	0	91.1	50265	91.1
10/16/2015 0:00	40	24560	51.4	25914	0	0	91.4	50474	91.4
10/17/2015 0:00	37.6	23097	47.5	23940	0	0	85.1	47037	85.1
10/18/2015 0:00	40.6	24918	51.1	25763	0	0	91.7	50681	91.7
10/19/2015 0:00	40.1	24621	49.7	25049	0	0	89.8	49670	89.8
10/20/2015 0:00	38.8	23823	49.1	24721	0	0	87.9	48544	87.9
10/21/2015 0:00	39.4	24192	47.6	23999	0	0	87	48190	87
10/22/2015 0:00	39.1	23987	46.3	23335	0	0	85.4	47322	85.4
10/23/2015 0:00	36.5	22401	48.5	24452	0.1	0	85.1	46853	85
10/24/2015 0:00	35.9	22043	44.1	22243	0	0	80	44286	80
10/25/2015 0:00	37.1	22779	48.6	24469	0	0	85.7	47249	85.7
10/26/2015 0:00	40.4	24826	53.6	26998	0	0	94	51824	94
10/27/2015 0:00	38.2	23424	50.1	25242	0	0	88.2	48666	88.3
10/28/2015 0:00	37.6	23066	49.3	24864	0	0	86.9	47930	86.9
10/29/2015 0:00	44.3	27170	81.8	41219	0	0	126	68388	126.1
10/30/2015 0:00	39.7	24386	58.5	29467	0	0	98.2	53853	98.2
10/31/2015 0:00	42.4	26034	51.2	25822	0	0	93.6	51855	93.6

11/1/2015 0:00	43.9	26934	53.1	26737	0	0	96.9	53671	97
11/2/2015 0:00	40.4	24806	52.3	26342	0	0	92.7	51148	92.7
11/3/2015 0:00	40.8	25051	52.6	26510	0	0	93.4	51562	93.4
11/4/2015 0:00	36.7	22524	50.5	25452	0	0	87.2	47976	87.2
11/5/2015 0:00	41.4	25440	43.8	22050	0	0	85.2	47490	85.2
11/6/2015 0:00	37.9	23260	47.5	23940	0	0	85.4	47200	85.4
11/7/2015 0:00	32.3	19812	46.2	23293	0	0	78.5	43105	78.5
11/8/2015 0:00	38	23332	47.1	23722	0	0	85.1	47054	85.1
11/9/2015 0:00	38.9	23885	48.6	24494	0	0	87.5	48379	87.5
11/10/2015 0:00	36.9	22657	46	23167	0	0	82.9	45824	82.9
11/11/2015 0:00	65.9	40483	81.4	41009	0	0	147.3	81492	147.3
11/12/2015 0:00	52.6	32307	63.7	32096	0	0	116.3	64403	116.3
11/13/2015 0:00	48.3	29636	57.3	28879	0	0	105.6	58515	105.6
11/14/2015 0:00	42.3	25993	50.5	25469	0	0	92.9	51461	92.8
11/15/2015 0:00	44.8	27477	53.8	27107	0	0	98.5	54583	98.6
11/16/2015 0:00	43.6	26781	52.4	26426	0	0	96.1	53207	96
11/17/2015 0:00	44.5	27343	57.5	28972	0	0	102	56315	102
11/18/2015 0:00	42.3	25952	57.5	28988	0	0	99.8	54940	99.8
11/19/2015 0:00	42	25788	52.5	26477	0	0	94.5	52265	94.5
11/20/2015 0:00	53.6	32910	77	38783	0	0	130.6	71693	130.6
11/21/2015 0:00	46	28224	66.2	33340	0	0	112.1	61563	112.2
11/22/2015 0:00	49.1	30127	74.8	37674	0	0	123.8	67801	123.9
11/23/2015 0:00	61.8	37966	90.4	45562	0	0	152.2	83527	152.2
11/24/2015 0:00	55.2	33862	76.2	38396	0	0	131.3	72259	131.4
11/25/2015 0:00	52.5	32225	72.4	36464	0	0	124.8	68689	124.9
11/26/2015 0:00	45.7	28050	67	33743	0	0	112.6	61792	112.7
11/27/2015 0:00	45.4	27865	60.2	30358	0	0	105.6	58223	105.6
11/28/2015 0:00	45.7	28080	62.7	31601	0	0	108.4	59681	108.4
11/29/2015 0:00	49.8	30577	66.8	33650	0	0	116.6	64228	116.6
11/30/2015 0:00	46.3	28449	67.4	33986	0	0	113.8	62435	113.7
12/1/2015 0:00	43.6	26740	61.8	31139	0	0	105.3	57879	105.4
12/2/2015 0:00	47.1	28899	68.8	34684	0	0	115.9	63583	115.9
12/3/2015 0:00	46.1	28285	69	34776	0	0	115.1	63061	115.1
12/4/2015 0:00	43.2	26545	62.5	31475	1	0	106.7	58020	105.7
12/5/2015 0:00	44.2	27108	61.8	31156	0.7	0	106.6	58264	106
12/6/2015 0:00	46.5	28541	59.3	29904	0	0	105.8	58445	105.8
12/7/2015 0:00	46.5	28561	61	30736	0	0	107.5	59297	107.5
12/8/2015 0:00	41.3	25348	65.8	33180	0	0	107.1	58528	107.1
12/9/2015 0:00	40.7	24980	62	31231	0	0	102.7	56211	102.7
12/10/2015 0:00	43.9	26975	55.8	28098	0	0	99.7	55073	99.7
12/11/2015 0:00	37.3	22872	56.3	28392	0	0	93.6	51264	93.6
12/12/2015 0:00	38.4	23598	48.2	24293	0	0	86.6	47891	86.6
12/13/2015 0:00	44	27036	53.5	26964	0	0	97.5	54000	97.5
12/14/2015 0:00	44.5	27303	60.2	30341	0	0	104.7	57643	104.7
12/15/2015 0:00	50.6	31038	63.2	31853	0	0	113.8	62891	113.8
12/16/2015 0:00	48.6	29840	59.1	29795	0	0	107.7	59635	107.7
12/17/2015 0:00	48	29452	60.5	30475	6.2	0	114.6	59927	108.5
12/18/2015 0:00	48	29462	66.5	33533	0	0	114.5	62995	114.5
12/19/2015 0:00	41.6	25522	61.5	30979	0	0	103	56501	103.1
12/20/2015 0:00	43.7	26842	71	35784	0	0	114.7	62626	114.7
12/21/2015 0:00	46.3	28428	74	37313	0	0	120.3	65741	120.3
12/22/2015 0:00	48	29492	72.2	36372	0	0	120.2	65864	120.2
12/23/2015 0:00	48.9	29994	84.2	42412	0	0	133	72406	133.1
12/24/2015 0:00	71.1	43666	104.7	52769	0	0	175.8	96434	175.8
12/25/2015 0:00	58	35612	90.8	45780	0	0	148.8	81392	148.8
12/26/2015 0:00	57.3	35162	88.2	44444	0	0	145.5	79606	145.5
12/27/2015 0:00	57.1	35070	86.9	43806	0	0	144	78876	144
12/28/2015 0:00	58.3	35817	74.8	37674	0	0	133.1	73491	133.1
12/29/2015 0:00	81.5	50051	102.9	51870	0	0	184.4	101921	184.4
12/30/2015 0:00	88.2	54165	116.5	58708	0.1	0	204.8	112873	204.7
12/31/2015 0:00	85.9	52753	113.2	57053	0	0	199.1	109806	199.1
1/1/2016 0:00	77.5	47575	103	51920	0	0	180.5	99495	180.5

1/2/2016 0:00	74.3	45590	102.2	51526	0	0	176.5	97115	176.5
1/3/2016 0:00	74.2	45549	98.4	49602	0	0	172.6	95151	172.6
1/4/2016 0:00	70	42960	90.4	45570	0	0	160.4	88530	160.4
1/5/2016 0:00	63.7	39091	82.3	41471	0	0	146	80562	146
1/6/2016 0:00	59.5	36502	77.1	38850	0	0	136.5	75352	136.6
1/7/2016 0:00	59.3	36420	72.6	36574	0	0	131.9	72994	131.9
1/8/2016 0:00	53.9	33105	73.2	36893	0	0	127.1	69998	127.1
1/9/2016 0:00	51.7	31754	64.5	32491	0	0	116.2	64245	116.2
1/10/2016 0:00	82.7	50788	118.3	59598	0	0	201	110386	201
1/11/2016 0:00	99.2	60878	132.3	66679	0	0	231.5	127557	231.5
1/12/2016 0:00	84.3	51760	112.4	56666	0	0	196.7	108427	196.7
1/13/2016 0:00	78.2	47994	103.9	52366	0	0	182.1	100360	182.1
1/14/2016 0:00	72.7	44617	96	48367	0	0	168.6	92985	168.7
1/15/2016 0:00	67.6	41506	89	44864	0	0	156.6	86371	156.6
1/16/2016 0:00	104.6	64204	136.6	68838	0	0	241.2	133042	241.2
1/17/2016 0:00	111.1	68215	146.3	73744	11.2	0	268.6	141959	257.4
1/18/2016 0:00	102.5	62945	143.7	72433	0	0	246.2	135378	246.2
1/19/2016 0:00	90.7	55669	120.8	60866	0	0	211.4	116536	211.5
1/20/2016 0:00	81.1	49795	105	52937	0	0	186.1	102732	186.1
1/21/2016 0:00	80.4	49366	98.2	49484	0	0	178.6	98850	178.6
1/22/2016 0:00	70	42970	93.9	47334	0	0	163.9	90304	163.9
1/23/2016 0:00	67.5	41465	87	43831	0	0	154.5	85297	154.5
1/24/2016 0:00	65.4	40125	87.5	44075	0	0	152.8	84200	152.9
1/25/2016 0:00	67.4	41363	85.6	43151	0	0	153	84514	153
1/26/2016 0:00	63.3	38836	79.6	40093	0	0	142.8	78929	142.9
1/27/2016 0:00	66.6	40862	86	43327	0	0	152.5	84189	152.6
1/28/2016 0:00	64.4	39531	84.8	42739	0	0	149.2	82271	149.2
1/29/2016 0:00	60.9	37403	78.9	39749	0	0	139.8	77152	139.8
1/30/2016 0:00	59.2	36318	77.3	38968	0	0	136.5	75286	136.5
1/31/2016 0:00	59.6	36594	80	40312	0	0	139.6	76906	139.6
2/1/2016 0:00	65.9	40452	102.4	51584	6.3	0	174.5	92037	168.3
2/2/2016 0:00	55.6	34159	72.2	36372	0	0	127.8	70531	127.8
2/3/2016 0:00	59.5	36533	79.4	40009	0	0	138.9	76542	138.9
2/4/2016 0:00	66.1	40565	86.8	43730	0	0	152.8	84295	152.9
2/5/2016 0:00	85	52159	113.2	57044	0	0	198.1	109204	198.2
2/6/2016 0:00	93.9	57675	122.9	61916	0	0	216.8	119591	216.8
2/7/2016 0:00	92.8	56959	127.9	64470	0	0	220.7	121429	220.7
2/8/2016 0:00	92.8	56969	120.3	60648	0	0	213.1	117617	213.1
2/9/2016 0:00	86.6	53142	113	56927	0	0	199.5	110069	199.6
2/10/2016 0:00	82.6	50686	109.5	55205	0	0	192.1	105891	192.1
2/11/2016 0:00	82	50348	106.3	53550	0	0	188.3	103898	188.3
2/12/2016 0:00	88.3	54226	99.5	50165	0	0	187.9	104391	187.8
2/13/2016 0:00	70.4	43246	88.8	44747	0	0	159.2	87993	159.2
2/14/2016 0:00	66.6	40892	82.9	41782	0	0	149.5	82674	149.5
2/15/2016 0:00	63.9	39214	83.8	42244	0	0	147.7	81458	147.7
2/16/2016 0:00	125	76750	170.1	85739	0	0	295.1	162489	295.1
2/17/2016 0:00	168.9	103725	232.8	117306	0	0	401.7	221031	401.7
2/18/2016 0:00	132	81068	175.6	88494	0	0	307.6	169562	307.6
2/19/2016 0:00	62.2	38191	82.7	41681	0	0	144.9	79872	144.9
2/20/2016 0:00	98.9	60714	112.6	56734	0	0	211.5	117448	211.5
2/21/2016 0:00	90.4	55485	125.4	63193	0	0	215.8	118678	215.8
2/22/2016 0:00	86.8	53265	117	58951	0	0	203.7	112216	203.8
2/23/2016 0:00	81.7	50174	111.4	56154	0	0	193.1	106328	193.1
2/24/2016 0:00	84.2	51709	127.2	64117	0	0	211.4	115826	211.4
2/25/2016 0:00	152.5	93625	235.4	118658	0.1	0	388	212283	387.9
2/26/2016 0:00	136.8	83995	197	99296	0.2	0	334	183292	333.8
2/27/2016 0:00	116	71214	159.4	80354	0	0	275.4	151568	275.4
2/28/2016 0:00	106.4	65350	142.4	71753	0	0	248.8	137103	248.8
2/29/2016 0:00	103	63211	128.5	64772	0	0	231.5	127984	231.5
3/1/2016 0:00	89.4	54902	125.6	63319	0	0	215.1	118221	215
3/2/2016 0:00	91.2	56017	118.6	59774	0	0	209.8	115792	209.8
3/3/2016 0:00	83.5	51238	111.5	56196	0	0	195	107434	195

3/4/2016 0:00	83.8	51443	104.8	52819	0	0	188.6	104262	188.6
3/5/2016 0:00	71.8	44065	101.1	50963	0	0	172.9	95028	172.9
3/6/2016 0:00	76.6	47053	99.5	50156	0	0	176.2	97209	176.1
3/7/2016 0:00	72.1	44280	95.1	47905	0	0	167.2	92185	167.2
3/8/2016 0:00	68.4	41987	88.3	44503	0	0	156.7	86491	156.7
3/9/2016 0:00	64	39296	90.3	45503	0	0	154.3	84799	154.3
3/10/2016 0:00	62.2	38191	85.9	43285	0	0	148.1	81476	148.1
3/11/2016 0:00	55.7	34190	78.8	39715	0	0	134.5	73905	134.5
3/12/2016 0:00	52.2	32030	74.6	37582	0	0	126.7	69612	126.8
3/13/2016 0:00	97.8	60059	67.1	33827	0	0	164.9	93886	164.9
3/14/2016 0:00	52.7	32327	79.1	39883	0	0	131.8	72210	131.8

Average Daily Runtime: **153.8**

Average Daily Flow: **84840**