

2567.08

October 30, 2020

Mr. David W. Hughes, P.E., Superintendent
Scarborough Sanitary District
415 Black Point Road
Scarborough, ME 04074

Re: ***FINAL* Wet Well Evaluation Report
Pumping Station No. 2 - Pine Point Road
Scarborough, Maine**

Dear Mr. Hughes:

Please find enclosed two hard copies of the ***FINAL* Wet Well Evaluation Report** for the Pump Station No. 2 for your use.

Underwood Engineers thanks you for the opportunity to perform this evaluation for the Scarborough Sanitary District.

Please call us at (603) 230-9898 if you have any questions.

Very truly yours,

UNDERWOOD ENGINEERS, INC.



Stephen Smith, CEng MICE
Senior Project Engineer



W. Steven Clifton, P.E.
Vice President

Encl. (1)

cc: Glen Bellefleur, Chief Operator – Scarborough Sanitary District (w/encl)
Valerie Giguere, P.E. – Underwood Engineers



PUMPING STATION NO. 2

**WET WELL EVALUATION
REPORT**

**SCARBOROUGH SANITARY
DISTRICT
SCARBOROUGH, MAINE**

FINAL

OCTOBER 2020



Portsmouth, New Hampshire
UE #2567

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1. EXECUTIVE SUMMARY

The Scarborough Sanitary District requires an evaluation for the rehabilitation or replacement of Pumping Station No. 2 wet well structure, which is exhibiting severe corrosion from biogenic sulfide attack.

The Scarborough Sanitary District commissioned Underwood Engineers to perform an evaluation of the wet well to include the following:

- Identify how bypass pumping can be accomplished while repair or replacement is performed.
- Identify methods for repair of the wet well.
- Identify concept layout that replaces the existing wet well.

The following is a summary of the conclusions and alternatives resulting from evaluations performed during preparation of this report:

- Provide a permanent facility at the pumping station to allow bypass of the wet well and pumps for any future repair or maintenance. This will be achieved by:
 - Modify the existing 20-inch ductile iron sewer pipe to the wet well and include new piping, fittings, and valve for suction connection of temporary pumps.
 - Modify existing pump discharge piping in the drywell to include new piping, fittings, and valves for exterior discharge connection of temporary pumps.
- For repair alternative, provide a two-part epoxy lining system with 100% solids epoxy modified cementitious mortar base topped with 100% solids modified polymer epoxy. The repair alternative shall include for a new 30-inch access cover and frame. The repair shall be subject to a structural evaluation and testing to verify the existing wet well's structural integrity.
- For replacement alternative of the wet well at the existing location, to include new 10-foot diameter precast concrete structure, new suction piping, 36" x 36" aluminum access cover with safety grate and a new 6-inch vent with replaceable charcoal filter. The interior concrete surfaces shall be coated with a two-part epoxy lining system.
- The conceptual opinion of probable project cost for Year 2020 is shown below:
 - Bypass pumping modifications = \$139,000.
 - Wet Well Repair Alternative = \$170,000.
 - Wet Well Replacement Alternative = \$468,000.

2. BACKGROUND

2.1. Purpose

The Scarborough Sanitary District requires an evaluation for the rehabilitation or replacement of the Pumping Station No. 2 Wet well, which is exhibiting severe corrosion from biogenic sulfide attack.

2.2. Scope of Work

The Scarborough Sanitary District commissioned Underwood Engineers to perform an evaluation of the wet well to determine the costs for repair or replacement options, accordingly the following tasks are to be performed for this evaluation:

- Visit the pumping station and conduct a visual inspection of the wet well.
- Identify how bypass pumping can be accomplished while repair or replacement is performed.
- Identify methods to repair wet well along with costs and conceptual layout.
- Identify concept layout and project costs that replaces the existing wet well.
- Prepare opinion of costs for repair or replacement of wet well.

3. EXISTING CONDITIONS

The Pumping Station No. 2 is a municipal wastewater pumping station operated and maintained by the Scarborough Sanitary District and located at 138 Pine Point Road, Scarborough, Maine (see *Figure 1*). The pumping station was constructed in 1983 and is 37 years old and includes most of the original equipment.



Figure 1 – Site Location Plan

3.1. Pumping Station Overview

The pumping station receives wastewater flow from West Scarborough, Blue Point and Pine Point. Flows from West Scarborough discharge via a 15-inch PVC Sewer and flows from Blue Point and Pine Point discharge via an 8-inch forcemain (from pumping station No. 1) to a sewer manhole located in Pine Point Road. Flows then discharge to the pumping station wet well via a 20-inch DI Sewer approximately 45 feet long. The pumping station 12-inch DI forcemain discharges approximately 11,500 feet to the North-East along the Eastern Trail to a sewer manhole in Eastern Road.

The Pumping Station (see *Figure 2*) consists of a below grade dry well structure with two (2) centrifugal pumps and a separate wet well structure. Access to the pumps is through the Control Building that sits directly on top of the dry well. Refer to *Appendix A* for Pumping Station No. 2 Record Drawings.



Figure 2 – Pumping Station No. 2

3.2. Pumping Station Foundation

The pumping station wet well and dry well (and Control Building above) sit directly on a 27-inch thick reinforced concrete slab that measures 29 feet long by 15 feet 4 inches wide. This concrete slab is supported by twelve (12) structural steel H-piles. The piles are HP12 x 53 and have a width of 12 inches, height of 11.8 inches and a weight of 53 lbs. per linear foot.

The piles would have been driven to obtain a minimum bearing capacity once they reached load bearing subsurface strata. The bearing capacity and depth of the H-pile is not shown on the record drawings.

This foundation design suggests the geotechnical subsurface soil conditions does not have the load bearing capacity which appears consistent with the observed surrounding marsh wetland area in close proximity of the Nonesuch River.

3.3. Wet Well

The pumping station wet well (see *Figure 3*) is a 10 feet diameter precast concrete structure with a depth of 11 feet. Access to the wet well is through a 30-inch diameter cast iron manhole cover with poly steel manhole rungs. The cover is located on a concentric precast concrete riser section which is located on top of the precast concrete wet well structure.



Figure 3 – Wet Well

Two (2) 10-inch suction pipes with 90 degree flared entrances are located at the base of the wet well and connect to the centrifugal pumps in the dry well. The bottom of the wet well also has a 45 degree concrete fillet.

Recent work by the Scarborough Sanitary District includes the addition of a Vapex Nano Odor Control System to treat Hydrogen Sulfide. The unit is located in the Control Building and discharges to the wet well.

3.4. Dry Well

The pumping station dry well (see *Figure 4*) is 10-feet long by 12-feet wide and approximately 16 feet deep precast concrete structure. Access to the dry well is via a 30-inch square floor hatch located in the Control Building with a vertical ladder to the dry well below.



Figure 4 – Dry Well

The dry well includes two pedestal-mounted vertical centrifugal pumps. The suction piping is 10-inch cast iron from the wet well to the pump and includes a 10-inch gate valve for isolation. The pump discharge is 6-inch and increases to 8-inch with an 8-inch check valve and knife gate valve for isolation. The two pump discharges common together with an 8-inch side outlet elbow and includes 8-inch electromagnetic flow meter and increases to 10-inch then 12-inch where it then discharges to the 12-inch cast iron forcemain. The dry well also includes a sump pump, electric unit heater and ventilation ducts.

3.5. Control Building

The Pump Station Control Building (see *Figure 5*) is a CMU block and brick veneer wall construction with a pitched metal standing seam roof.

The Control Building includes the pump control panel and variable frequency drives including the main motor control center and has a floor hatch for access to the pump dry well below. Also located in the building is a Vapex Nano Odor Control System to treat Hydrogen Sulfide (see *Figure 6*).



Figure 5 – Control Building



Figure 6 – Vapex Nano Odor Control System

When the pump station was constructed the Control Building also included the standby generator. This has since been replaced with an exterior generator with just the concrete equipment pad and part of the generator exhaust muffler system remaining.

3.6. Standby Generator

The standby generator (see *Figure 7*) is located to the rear of the Pumping Station Control Building and sits on a reinforced concrete slab on grade. The generator is a Kohler Power Systems with weatherproof enclosure and integral fuel tank.



Figure 7 – Standby Generator

4. WET WELL CONDITION ASSESSMENT

4.1. Description

The wet well has seen extensive Biogenic Sulfide corrosion to the surface of the concrete due to the presence of hydrogen sulfide and formation of sulfuric acid.

The mechanism by which sulfide generation and corrosion occurs is a bacterially mediated process within the submerged portion of the wet well. This process starts with the formation of an anaerobic slime layer where sulfates (SO_4) are reduced by sulfate reducing bacteria which consume the sulfate ion (SO_4) as an oxygen source for the assimilation of organic matter and then forms to dissolved hydrogen sulfide (H_2S aqueous). The wastewater will release the dissolved gas as a free hydrogen sulfide (H_2S) gas into the head space of the wet well.

A sulfur oxidizing bacterium known as Thiobacillus aerobic bacteria typically colonizes on the concrete surfaces in the head space of the wet well. This bacteria oxidizes the hydrogen sulfide (H_2S) to sulfuric acid (H_2SO_4). The sulfuric acid then attacks the matrix of the concrete.

Concrete is typically composed of calcium silicate hydrate, calcium carbonate (CaCO) and unreacted calcium hydroxide ($\text{Ca}(\text{OH})_2$). When sulfuric acid attacks the concrete composition, calcium sulfate (CaSO_4) or gypsum forms as a by-product of the decomposition of the concrete. This is a white mass on concrete surfaces that forms just above the waterline. In addition, another by-product of biogenic sulfide corrosion is the formation of calcium sulfoaluminate hydrate or mineral ettringite which also forms just above the waterline.

The rate and aggressive nature of the biogenic sulfide corrosion in the wet well is attributed by a number of conditions such as low dissolved oxygen, high strength wastewater (i.e. elevated biochemical oxygen demand), long detention times and elevated wastewater temperatures.

4.2. Assessment

A visual inspection from the access cover to the wet well was undertaken and the findings and assessment of the wet well condition are shown as follows.

The cast iron access cover frame is severely corroded with large areas of flaking on the inner portion of the frame. The precast concrete concentric manhole risers have suffered severe corrosion with a complete deterioration and loss of surface cement paste and the underlying coarse aggregate exposed (see *Figure 8*).



Figure 8 – Precast Concrete Concentric Manhole Risers

In the wet well, the wall of the precast concrete structure above the normal water surface elevation has suffered severe corrosion, with a large area of exposed horizontal reinforcing steel, which is also severely corroded and showing corrosion staining through the concrete. (see *Figure 9*).



Figure 9 – Wet Well Wall Corrosion

Also evident in the wet well is the formation of a band of Calcium Sulfate (Gypsum) above the waterline (see **Figure 10**). This is a by-product of the biogenic sulfide corrosion discussed previously in **Section 4.1**.



Figure 10 – Calcium Sulfate Formation

The concrete surface below both the waterline and layer of Calcium Sulfate can be seen to be intact and smooth with no signs of degradation, and in stark contrast to the concrete surface above the normal waterline.

It is clear from the visual inspection the wet well condition is severely corroded and in need of immediate repair or replacement to avoid any further deterioration or catastrophic failure of the structure.

5. RECOMMENDED ALTERNATIVES

5.1. Pumping Station Bypass

The current pipework configuration on the pumping station does not allow for bypass of flows or draining of the forcemain. It should be noted there is a forcemain drain manhole located approximately 460 feet from the pumping station to the east side of the Granite Block culvert. Without the facility to bypass flows makes it difficult for the Sanitary Sewer District to isolate the wet well or the pumps for any repair or maintenance work. Whether a repair or replacement of the wet well is chosen, bypass pumping will be required, and therefore it is recommended a permanent facility to bypass be provided.

To bypass the pumping station (wet well and pumps) a suction and discharge connection will be required to allow connection of temporary bypass pumps. For the suction connection this will need to intercept flows immediately upstream of the wet well structure. It is proposed to modify the incoming 20-inch DI Sewer pipe by providing Tee fittings, plug valve and vertical piping terminating 30 inches above finished grade elevation to allow easy access for connection of the bypass pumps suction hose and level controls (see Drawing SK-1 in *Appendix C*).

For the bypass pump discharge connection, this will need to connect to the main pump station discharge piping. It is proposed to modify the existing piping by removing the existing 12 x 10 inch 90-degree reducing bend, 10-inch spool piece and the 10 x 8-inch reducer. These fittings will be replaced with 12 x 8-inch Tee, 8-inch knife gate valve, 8-inch dismantling joint and 8-inch spool piece to connect to the existing discharge piping. In addition, a 12-inch knife gate valve, 12-inch check valve, 12 x 8-inch 90-degree reducing bend will also be provided. New 8-inch piping will be provided to pass through the control building floor and then out through the wall of the control building to allow exterior connection of the bypass pump discharge hose (see Drawing SK-2 in *Appendix C*).

It is envisioned that installation of the permanent bypass suction/discharge connection will be done during low flows and the use of septic vacuum trucks will be required. The sewer manhole in Pine Point Road where the 15-inch sewer and 8-inch forcemain discharge would be used to intercept the incoming flows. The existing forcemain drain manhole located on the Eastern Trail can be utilized to drain the forcemain. Traffic control measures will be required for managing septic truck vehicle movements.

5.2. Wet Well Repair Alternative

Walls of the wet well need to be prepared and have a concrete repair and coating applied. The coating is a two-part system with epoxy modified cementitious mortar base coat topped with a modified polymer epoxy. The epoxy lining material shall have 100% solids and low permeation to resist hydrogen sulfide (H₂S) and sulfuric acid (H₂SO₄).

Preparation of the concrete should be done in accordance with SSPC-SP13 using sand blasting to remove any loose or deteriorated concrete and any other contaminants. A repair mortar (Tnemec Mortarclad Series 218) then applied to the wall to build the surface back to its original plane. The epoxy liner (Tnemec PermaGlaze Series G435) shall be applied and extend a minimum of 12 inches below the low water level or pump off level.

The exposed reinforcing steel should have the concrete chipped out of each bar so the bars can be cleaned of corrosion. The bars should be coated with a cementitious epoxy resin that includes a corrosion inhibitor (Sika Armatec 110 Epocem). This will need to be applied prior to the epoxy coating allowing for adequate curing time. The epoxy coatings described above should be applied by a preapproved applicator of the coating manufacturer. A list of pre-approved applicators including the concrete repair and lining system specification and data sheets can be found in *Appendix D*. It is also recommended that the 30-inch cast iron access cover be replaced, and then the epoxy liner (Tnemec PermaGlaze Series G435) coating applied to both cover and frame.

Before a repair of the wet well concrete surface, additional testing will be required to determine the structural integrity of the precast concrete structure and verify if this repair alternative is feasible. This would include, but not limited to, the half-cell potential testing (per ASTM C876-15) to identify the extent of corrosion to the reinforcing steel.

5.3. Wet Well Replacement Alternative

For the replacement of the wet well structure it is recommended it is replaced at the same location as the existing wet well. In considering the wet well location there are several physical constraints that compromise the suction piping configuration. These include insufficient space within the dry well and between the wet well and dry well structure and the standby generator is located to the rear of the control building. It should also be noted the foundation for the existing wet well is on piles, and if an alternate location were to be consider further geotechnical testing would be required to determine the foundation requirements for the new wet well.

It is proposed the existing wet well be demolished in its entirety and replaced with a new 10-foot diameter precast concrete structure with new suction piping. A new 36-inch by 36-inch aluminum hatch with safety grate be provided for access to the wet well including a new 6-inch vent with replaceable charcoal filter. The new wet well shall also have the entire interior concrete surfaces coated with a two-part epoxy lining system as mentioned in Section 5.2. See *Appendix E* for the detail of the wet well replacement.

In replacing the wet well at this location, it should be noted the control building floor slab and footing foundation extends beyond the reinforced precast concrete dry well structure. This will need a structural evaluation and require temporary support during construction of the new wet well.

6. OPINION OF PROBABLE PROJECT COSTS

A conceptual opinion of probable cost of construction and total project cost is provided below for the pump station bypass, wet well repair and wet well replacement. The costs presented below are based on preliminary evaluations and assumptions described in this report for the purposes of obtaining conceptual level project costs for comparison of alternatives. These costs are subject to changes pending the timeframe in which the improvements are undertaken or changes in the improvements to the pump station described in this report.

The opinion of cost presented are “best approximations” of the probable cost of the recommended improvements without the benefit of specific design details. As a result, these estimates should be considered, to be within 15-20% of actual probable costs, which is standard in the industry of this stage in the project.

Prior to setting a firm budget for the recommended improvements, the costs should be re-evaluated when firm decisions on the recommended improvements for the pumping station have been made.

6.1. Pumping Station Bypass

Construction	\$69,000
Contractor Overhead & Profit (15%)	\$10,000
Contingency (30%)	\$24,000
Design & Construction Engineering Services	\$36,000
TOTAL PROJECT COST (Year 2020)	\$139,000

Table 1 – Bypass Costs

6.2. Wet Well Repair

Construction	\$84,000
Contractor Overhead & Profit (15%)	\$13,000
Contingency (30%)	\$29,000
Structural Testing Allowance	11,000
Design & Construction Engineering Services	\$44,000
TOTAL PROJECT COST (Year 2020)	\$181,000

Table 2 – Wet Well Repair

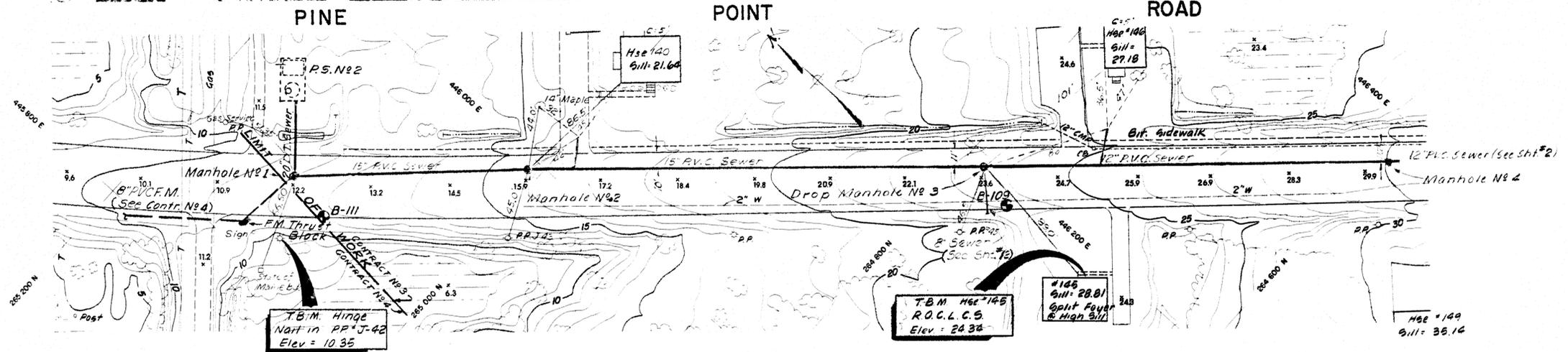
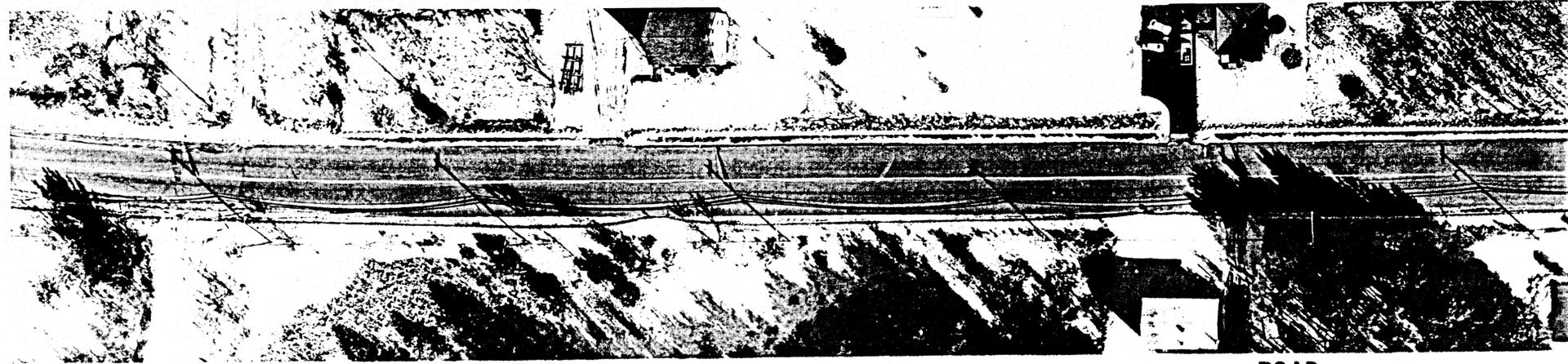
6.3. Wet Well Replacement

Construction	\$232,000
Contractor Overhead & Profit (15%)	\$35,000
Contingency (30%)	\$80,000
Design & Construction Engineering Services	\$121,000
TOTAL PROJECT COST (Year 2020)	\$468,000

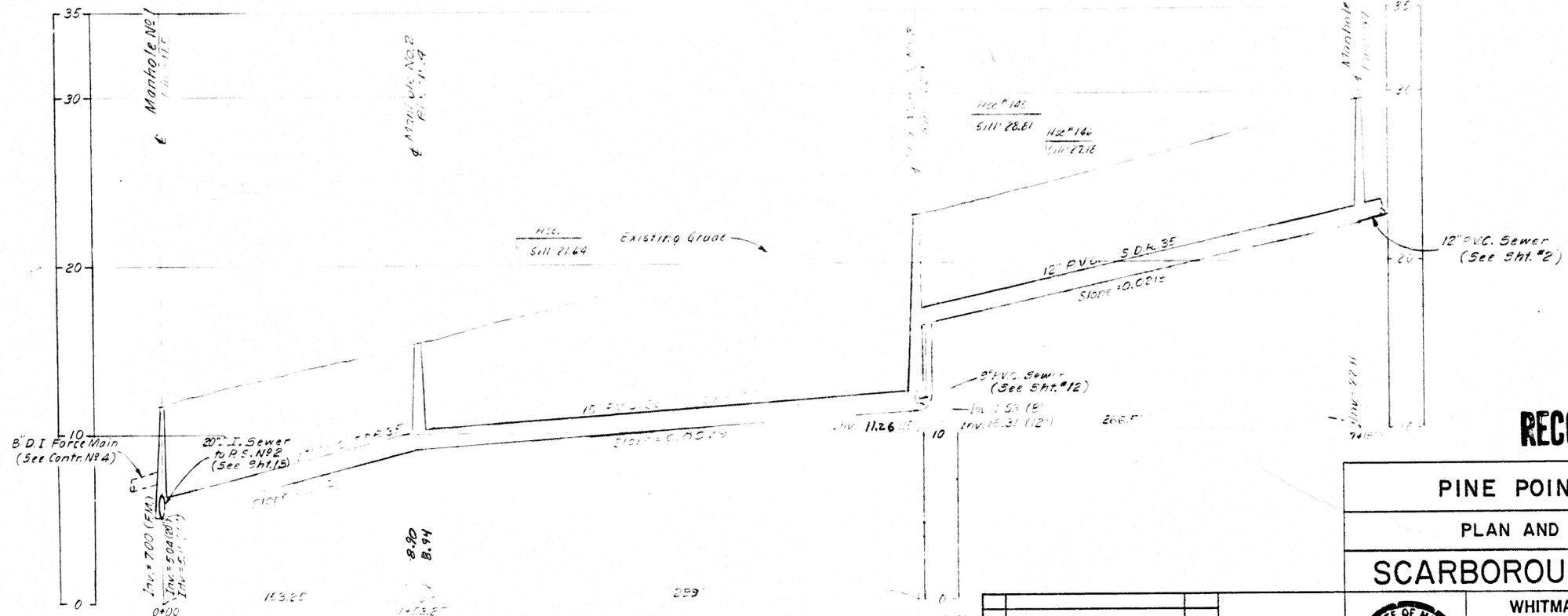
Table 3 – *Wet Well Replacement*



APPENDIX A
Pumping Station No. 2 Record Drawings



PLAN
SCALE: 1" = 40'

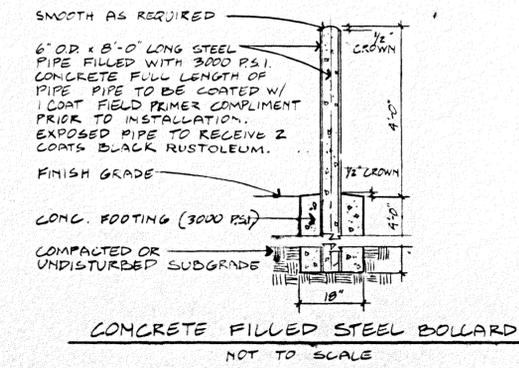
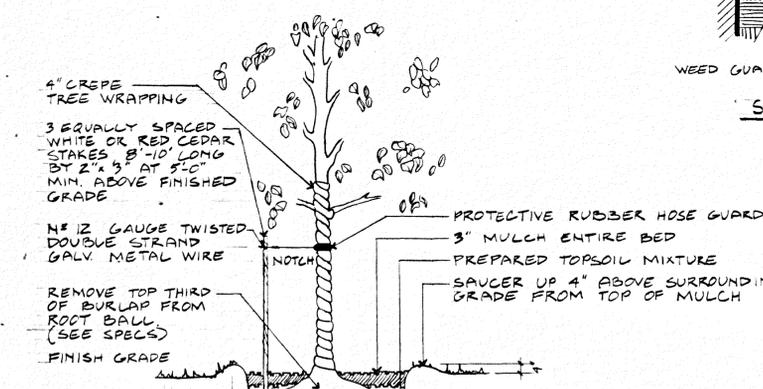
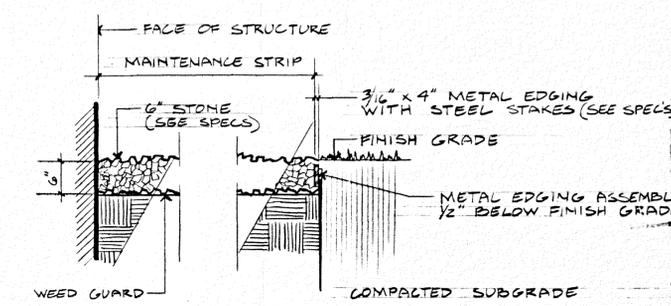
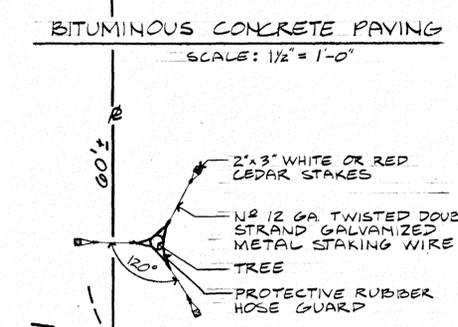
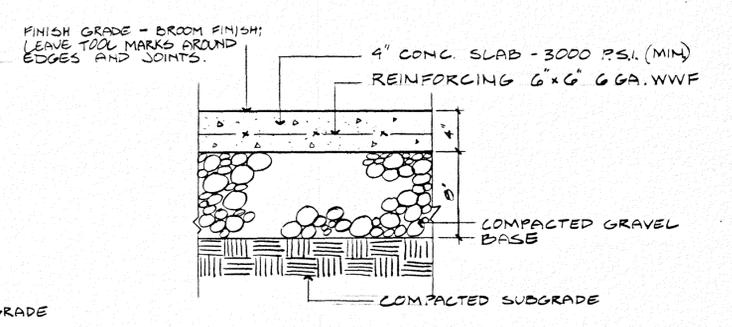
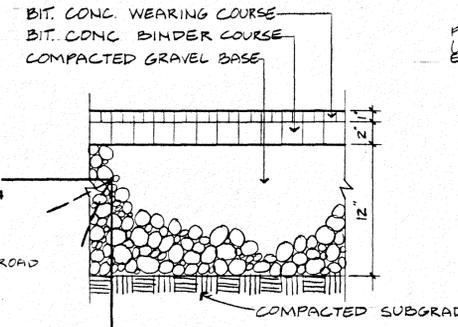
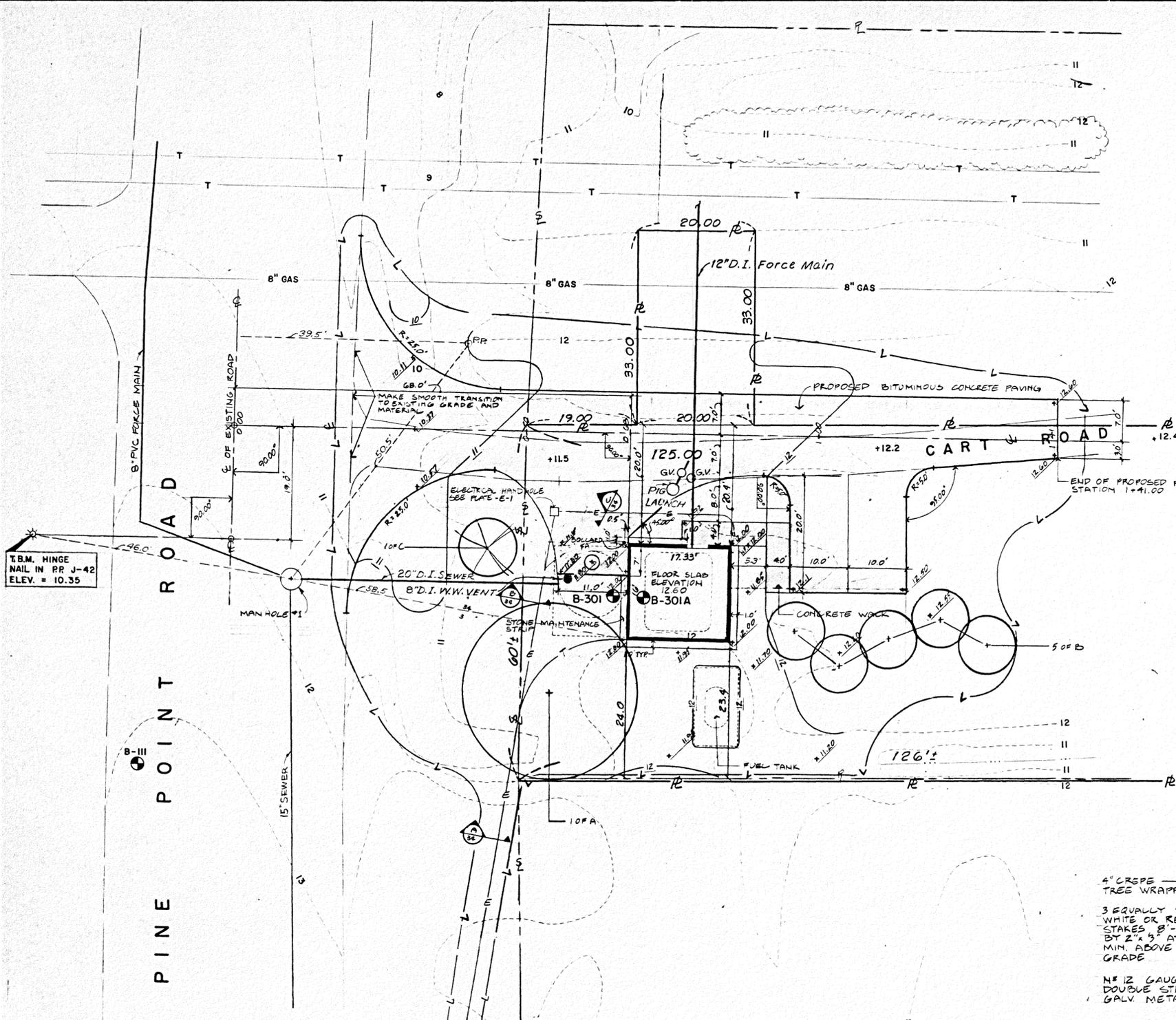


PROFILE
SCALE: HOR. 1" = 40'
VER. 1" = 4'

RECORD PLAN

PINE POINT ROAD																	
PLAN AND PROFILE																	
SCARBOROUGH, MAINE																	
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST WELLESLEY, MASS																	
DESIGNED BY J.E.M.	SCALE AS SHOWN	DATE JUNE, 1980															
DRAWN BY N.C.T.	APPROVED <i>[Signature]</i>	CHECKED BY F.D.D.															
JOB NO. 8-105		SHEET 1 OF 35 SHEETS															
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NO.	DESCRIPTION	DATE															
1	RECORD PLAN	5/83															

EXISTING	LEGEND & ABBREVIATIONS	PROPOSED
- - - -	GENERAL CONDITIONS	- - - -
- - - -	CONTOUR LINE	- - - -
12	SPOT ELEVATION	12
11.5	BORING LOCATION AND NUMBER	B-III
T	TELEPHONE LINE (BURIED)	
	STONE MAINTENANCE STRIP	
	LIMIT OF WORK (CONTRACT LIMIT LINE)	L
	TREE LINE	
	BELOW GRADE STRUCTURE	
	HIGH POINT	H.P.
	LOW POINT	L.P.
	CENTER LINE	C.L.
	PROPERTY LINE	P.L.
	STREET LINE	S.L.
	POWER POLE	P.P.
	ELECTRIC LINE & SECTION INDICATOR	E.L.
	FIRE ALARM (BURIED)	FA



PLANTING SCHEDULE & NOTES

QUAN.	CODE	BOTANICAL NAME	COMMON NAME	SIZE		REMARKS
				HEIGHT	CALIPER	
1	A	TILIA CORDATA	LITTLE LEAF LINDEN	3 1/2'	4"	B+B SELECT SPECIMEN
5	B	ELAEOAGNUS UMBELLATA CARDINAL	AUTUMN ELAEOAGNUS	6'-8'		B+B SELECT HEAVY
1	C	PINUS THUNBERGII	JAPANESE BLACK PINE	3'-4'		B+B SELECT SPECIMEN

1. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL UNDERGROUND UTILITIES. ANY DAMAGE RESULTING FROM HIS NEGLIGENCE WILL NOT INCUR ANY ADDITIONAL EXPENSE UPON THE OWNER.
2. PRIOR TO BIDDING ON THIS SECTION THE CONTRACTOR SHALL ACQUAINT HIMSELF WITH THE SITE AND REPORT ANY DISCREPANCIES, IN WRITING.
3. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION PROCEDURES, MATERIALS AND ALL OTHER REQUIREMENTS OUTLINED BY THE PLANTING SPECIFICATIONS.
4. PREPARATION OF ALL PLANT PITS SHALL CONFORM TO THE DETAILS AND SPECS. OF THIS CONTRACT.
5. SLOW RELEASE FERTILIZER SHALL BE MICROPORE PACKETS (8 YEAR, 4oz. ANALYSIS 10-8-16) MANUFACTURED BY "EESY GROW" SUFFERN, NEW YORK, OR APPROVED EQUAL. THE POLYETHYLENE PERFORATED PACKETS SHALL BE APPLIED AS RECOMMENDED BY THE MANUFACTURER.
6. ALL AREAS WITHIN THE LIMIT OF WORK (CONTRACT LIMIT LINE) THAT ARE NOT PAVED OR DO NOT CONTAIN AN EXPOSED STRUCTURE AND ALL AREAS BEYOND THE LIMIT OF WORK (CONTRACT LIMIT LINE) THAT ARE DISTURBED BY THE CONTRACTOR, ARE TO RECEIVE 6" LOAM AND NATURAL SEED MIXTURE.

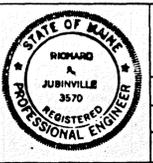
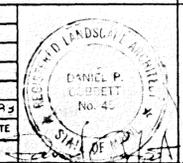
RECORD PLAN

PUMPING STATION No 2

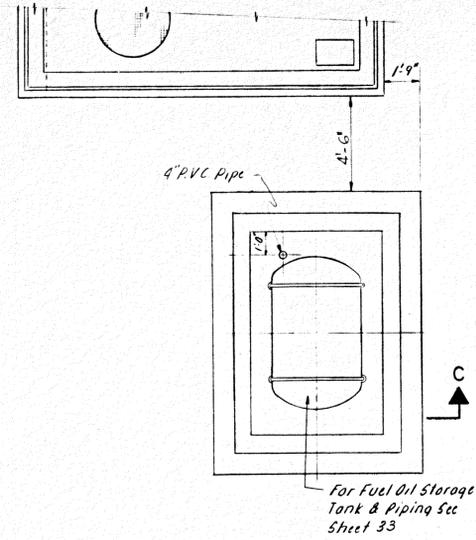
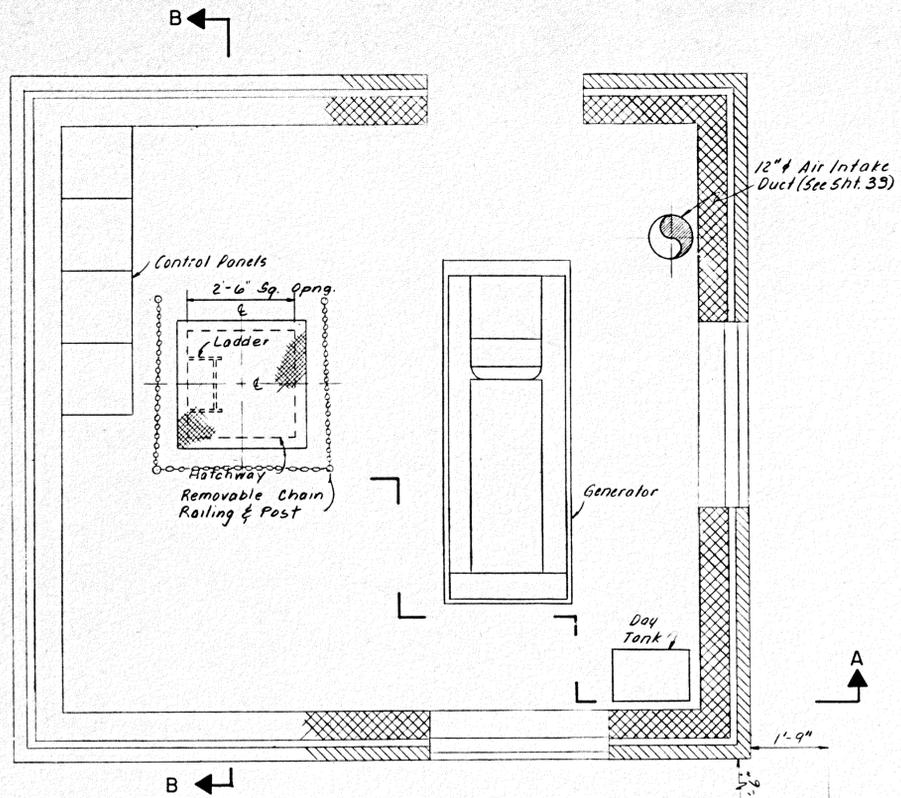
SITE GRADING, LAYOUT, PLANTING & DETAILS

SCARBOROUGH, MAINE

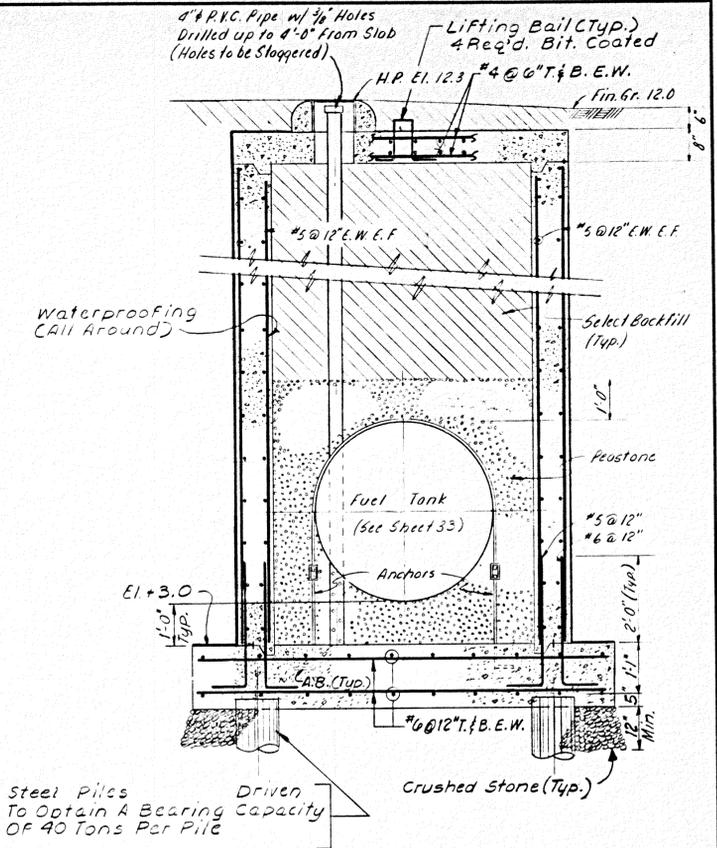
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.	
DESIGNED BY JWH	SCALE 1" = 10'-0"
DRAWN BY JWH	DATE JUNE 1980
CHECKED BY DPC	APPROVED <i>[Signature]</i>
JOB NO. 78-105	SHEET 27 OF 35 SHEETS



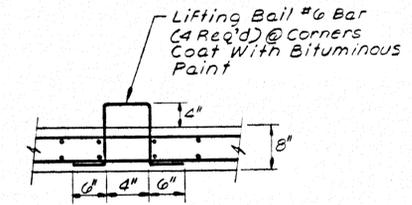
NO.	DESCRIPTION	DATE
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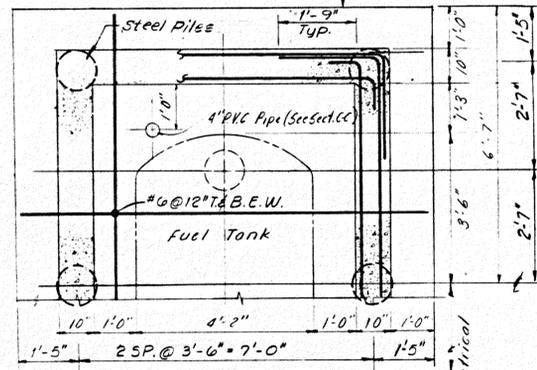
PLAN
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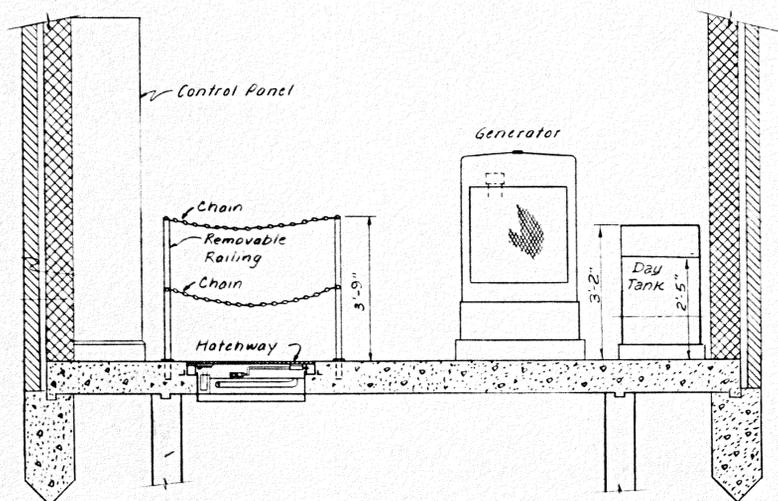
SECTION C-C
SCALE: 1/2" = 1'-0"



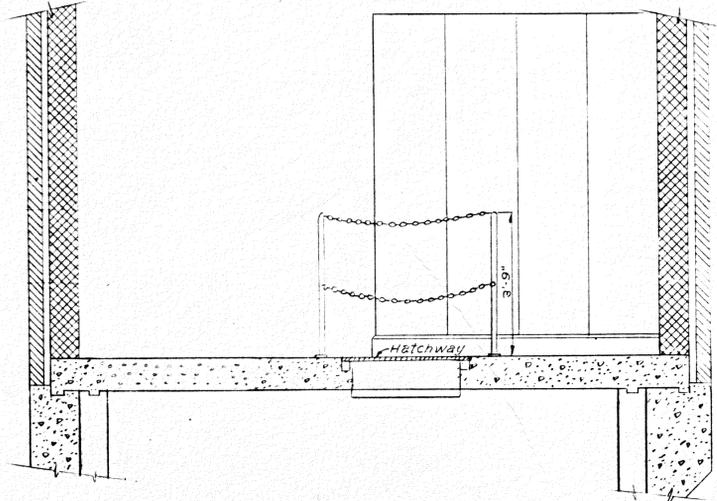
LIFTING BAIL DETAIL
NOT TO SCALE



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



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



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

RECORD PLAN

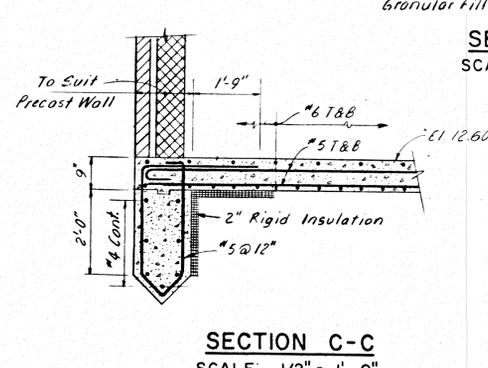
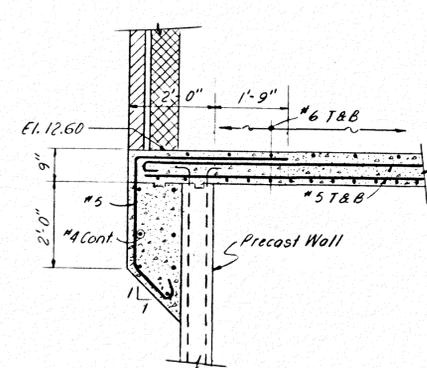
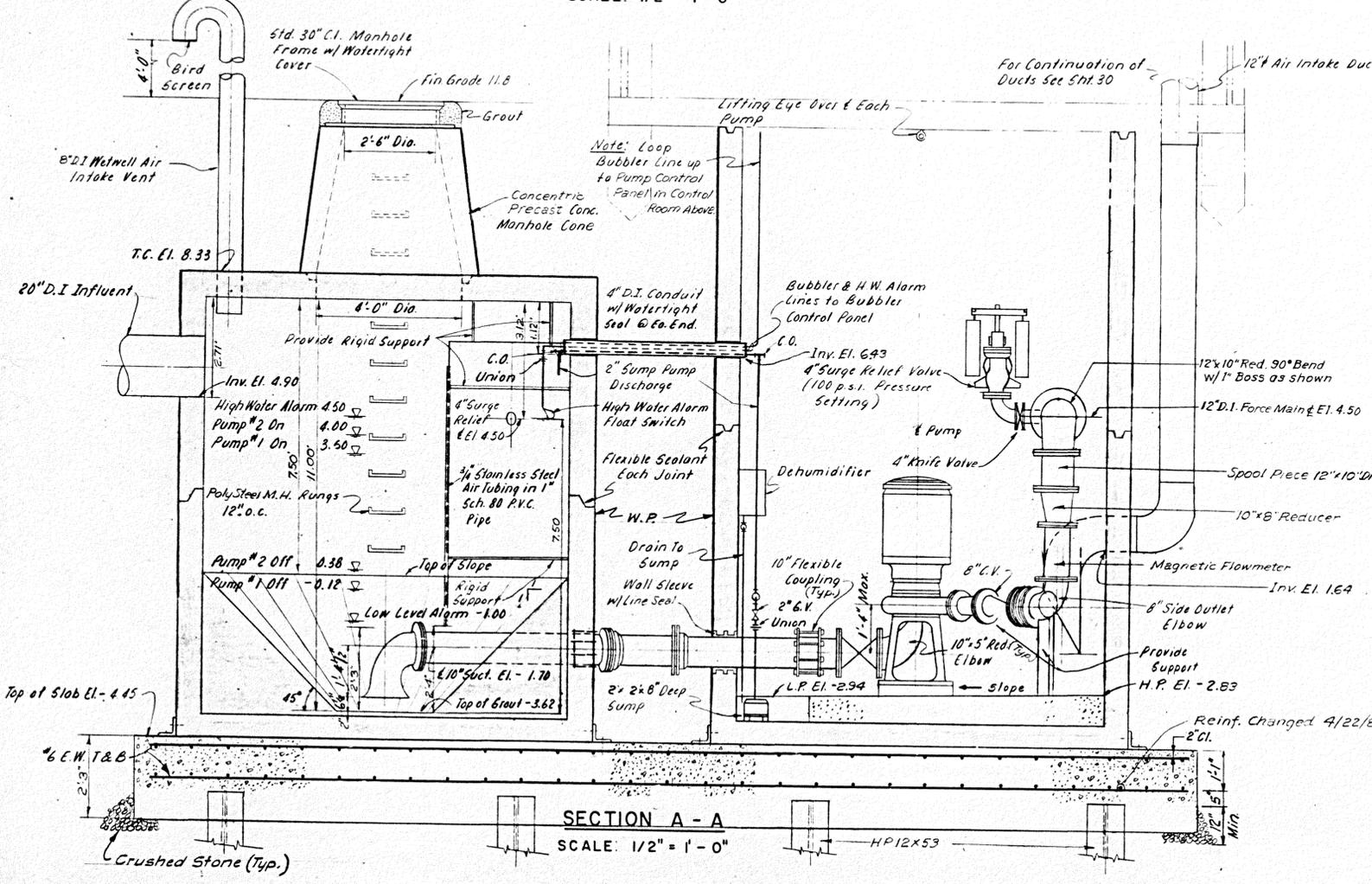
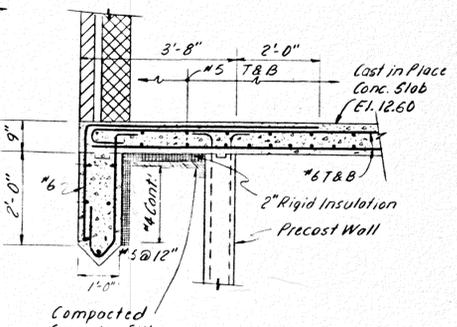
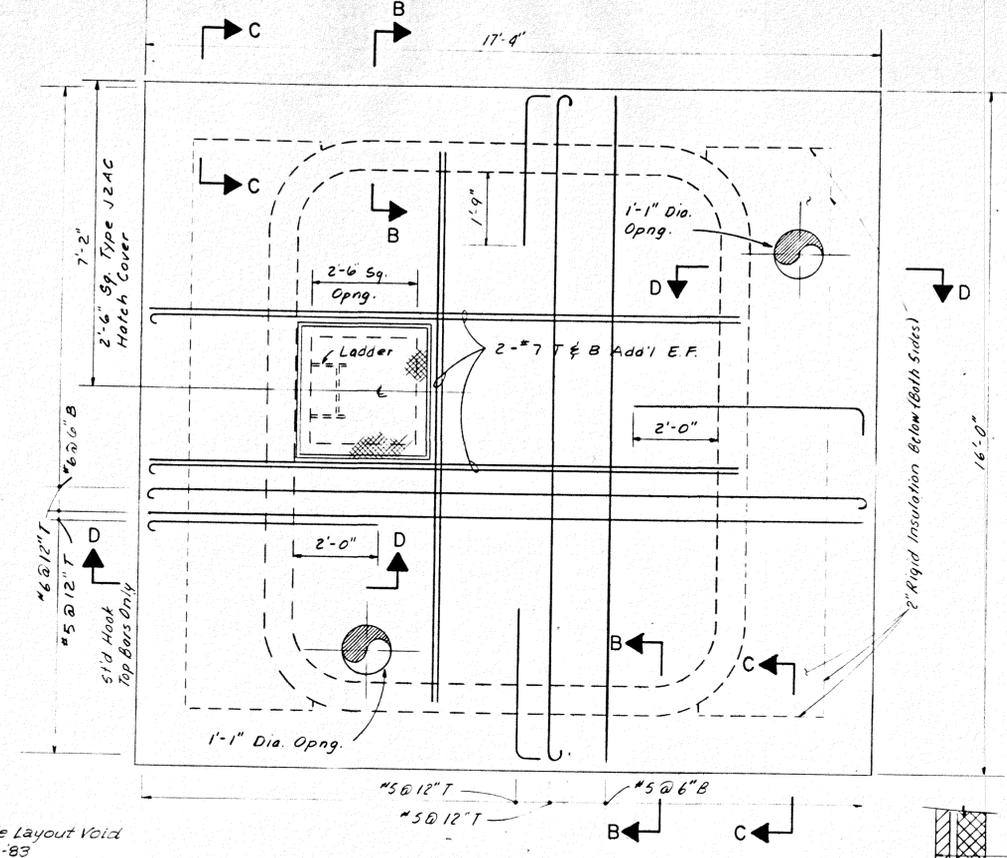
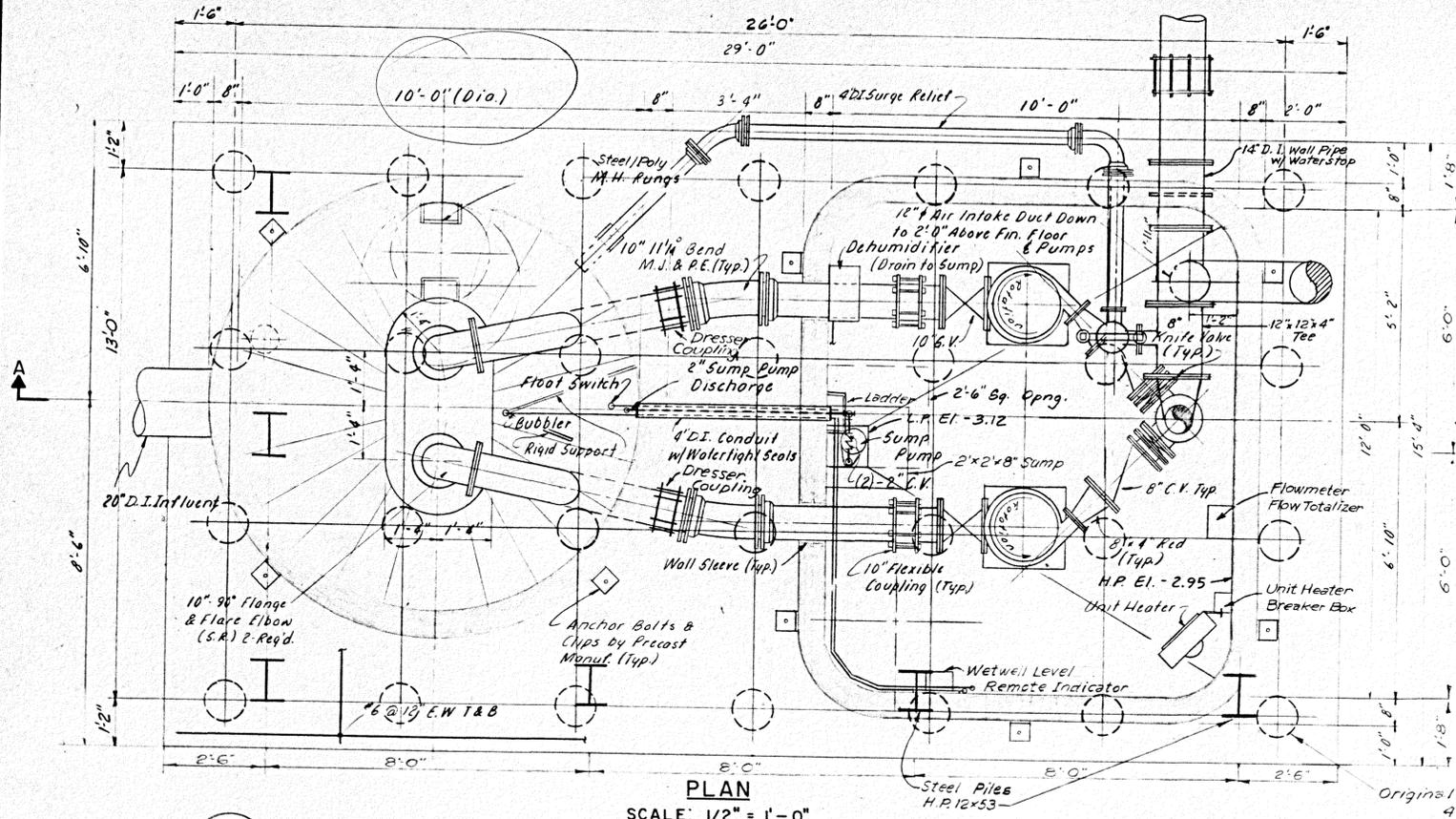
PUMPING STATION No 2
STRUCTURAL AND MECHANICAL
PLANS, SECTIONS AND DETAILS
SCARBOROUGH, MAINE

WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

RICHARD A. JUBINVILLE
3570
REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY J. E. M.	SCALE AS NOTED	DATE JUNE, 1980
DRAWN BY N. C. T.	APPROVED <i>[Signature]</i>	
CHECKED BY J. E. M.	JOB NO. B-105	SHEET 28 OF 35 SHEETS

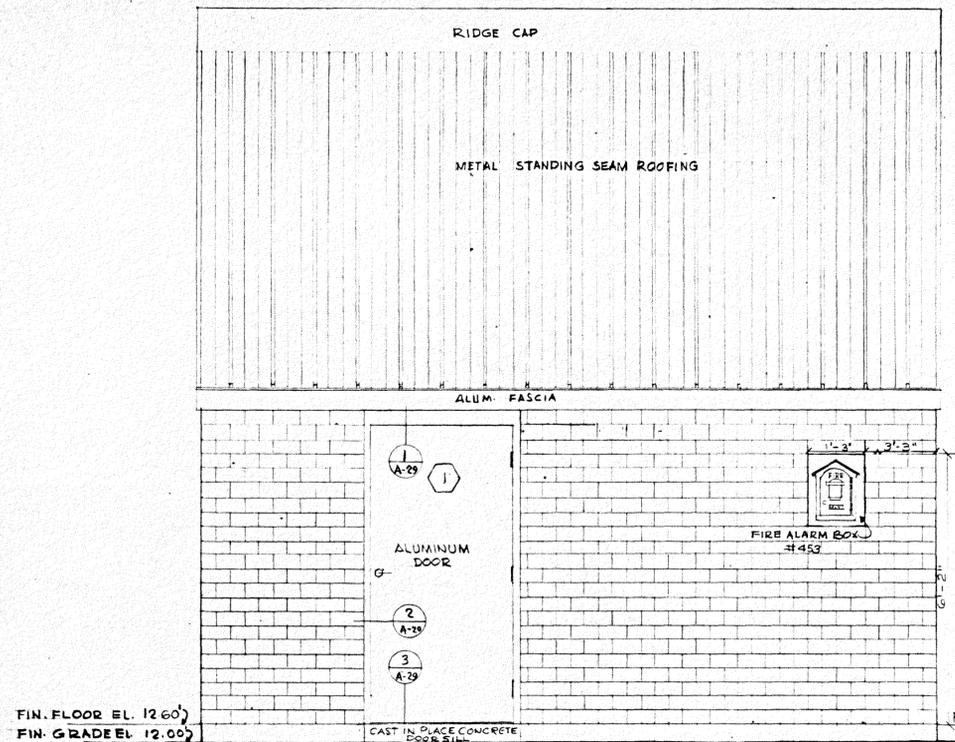
NO.	DESCRIPTION	DATE
1	RECORD PLANS	5/80
	REVISIONS	



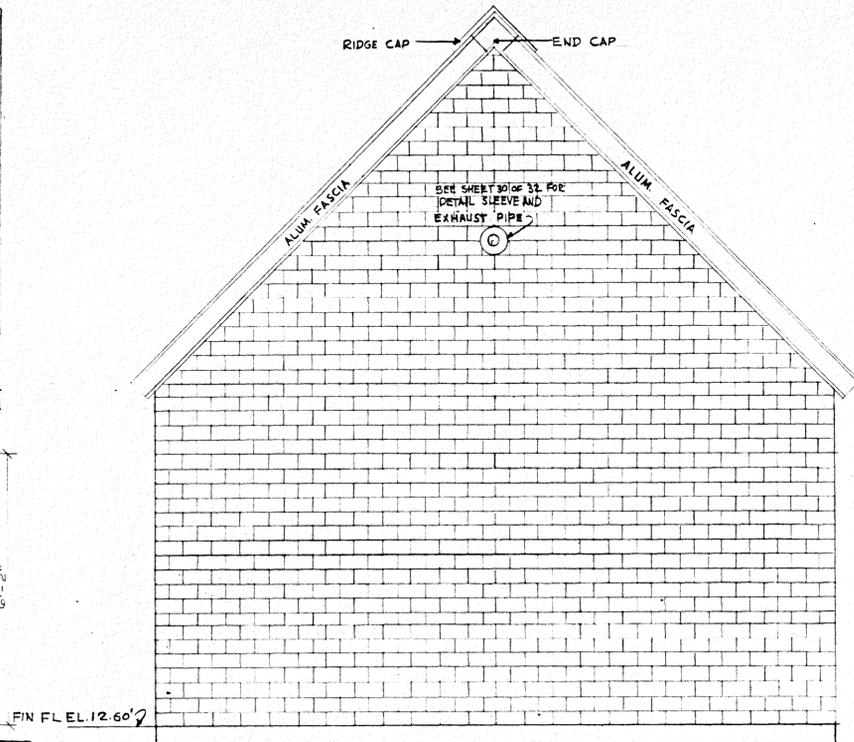
RECORD PLAN

PUMPING STATION N^o 2			
STRUCTURAL AND MECHANICAL PLANS, SECTIONS AND DETAILS			
SCARBOROUGH, MAINE			
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.			
DESIGNED BY J. E. M.	SCALE AS NOTED	DATE JUNE, 1980	
DRAWN BY D. T. C.	APPROVED <i>[Signature]</i>	CHECKED BY J. E. M.	JOB NO. 8-105
NO. DESCRIPTION DATE		SHEET 29 OF 35 SHEETS	

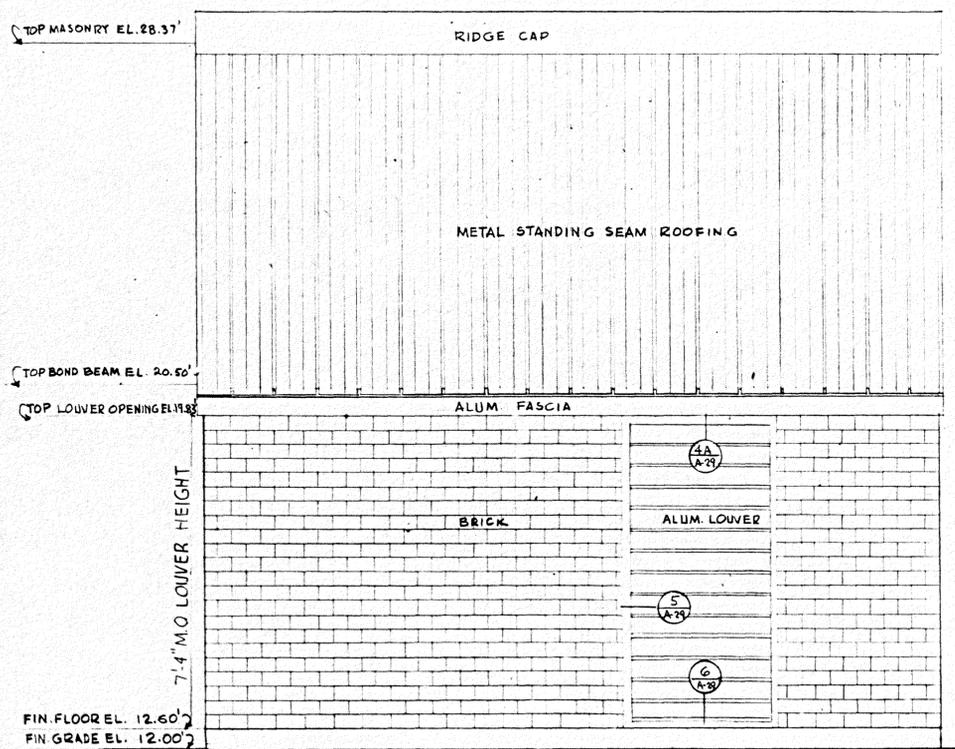
1	RECORD PLAN	5/33



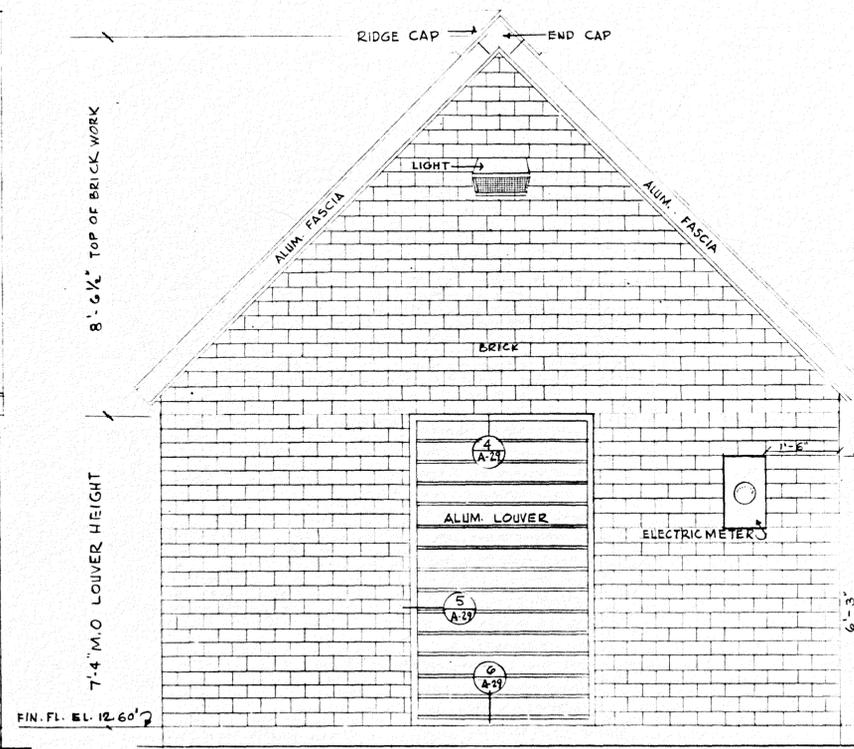
WEST ELEVATION
SCALE: 1/2" = 1'-0"



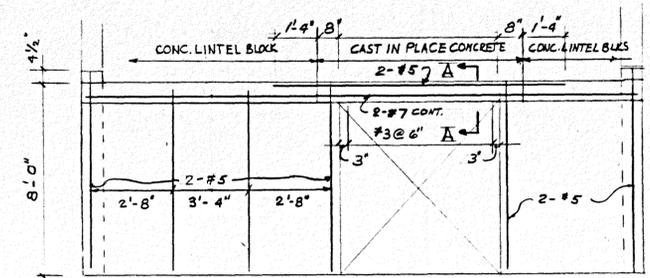
SOUTH ELEVATION
SCALE: 1/2" = 1'-0"



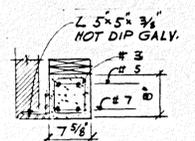
EAST ELEVATION
SCALE: 1/2" = 1'-0"



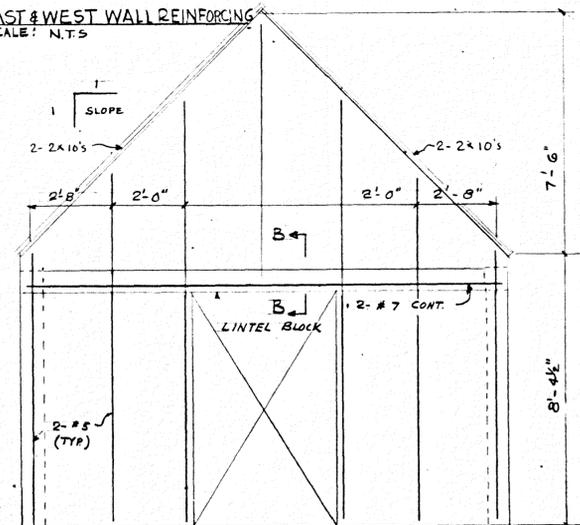
NORTH ELEVATION
SCALE: 1/2" = 1'-0"



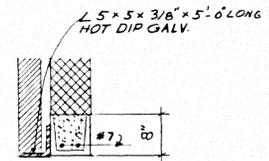
EAST & WEST WALL REINFORCING
SCALE: N.T.S.



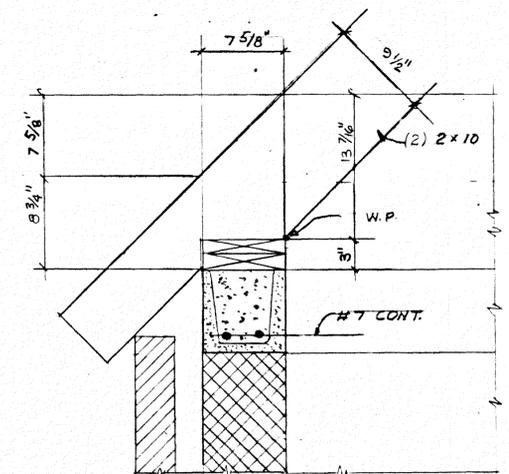
SECTION "A-A"
SCALE: 3/4" = 1'-0"



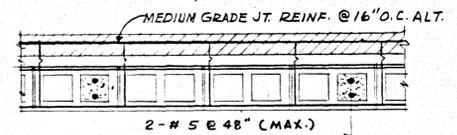
NORTH WALL (SHOWN) SOUTH WALL SIMILAR
SCALE: N.T.S.



SECTION "B-B"
SCALE: 3/4" = 1'-0"



DETAIL WOOD FRAMING @ BOND BEAM
SCALE: 1/2" = 1'-0"



TYPICAL REINFORCING FOR 14" CAVITY WALL
SCALE: 3/4" = 1'-0"

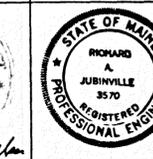
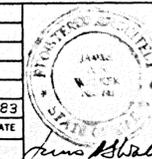
RECORD PLAN

PUMPING STATION No 2

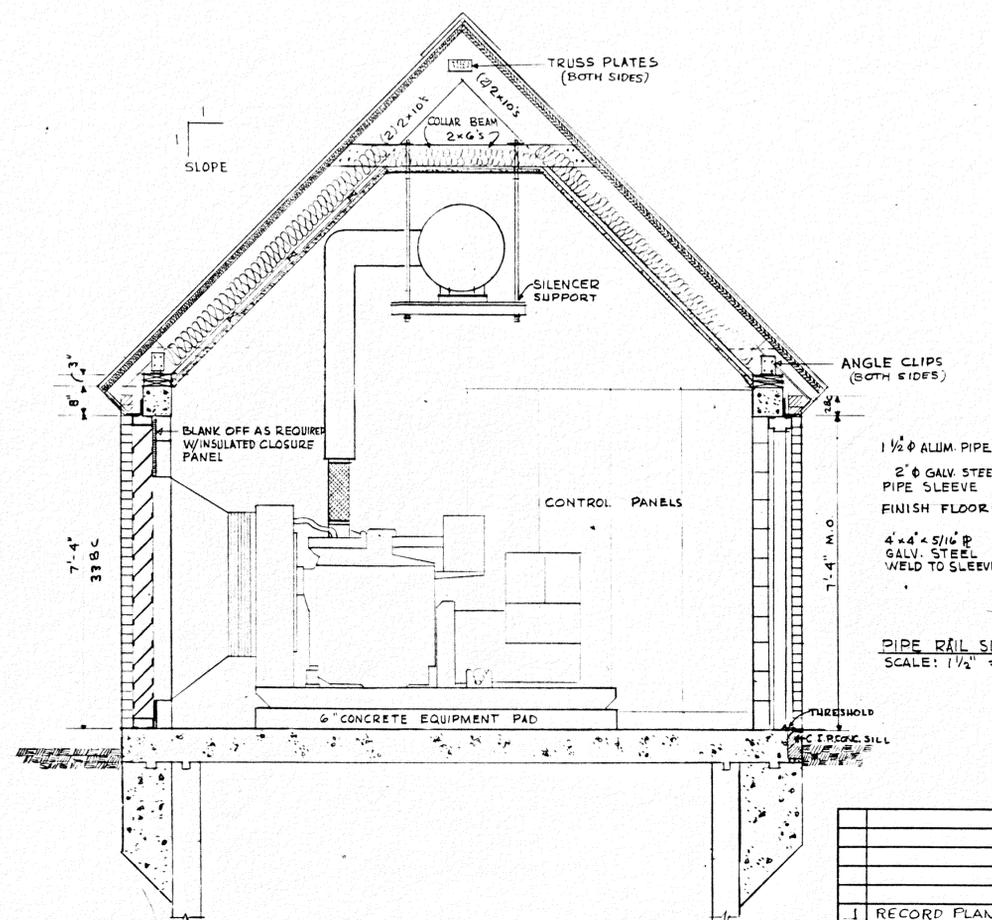
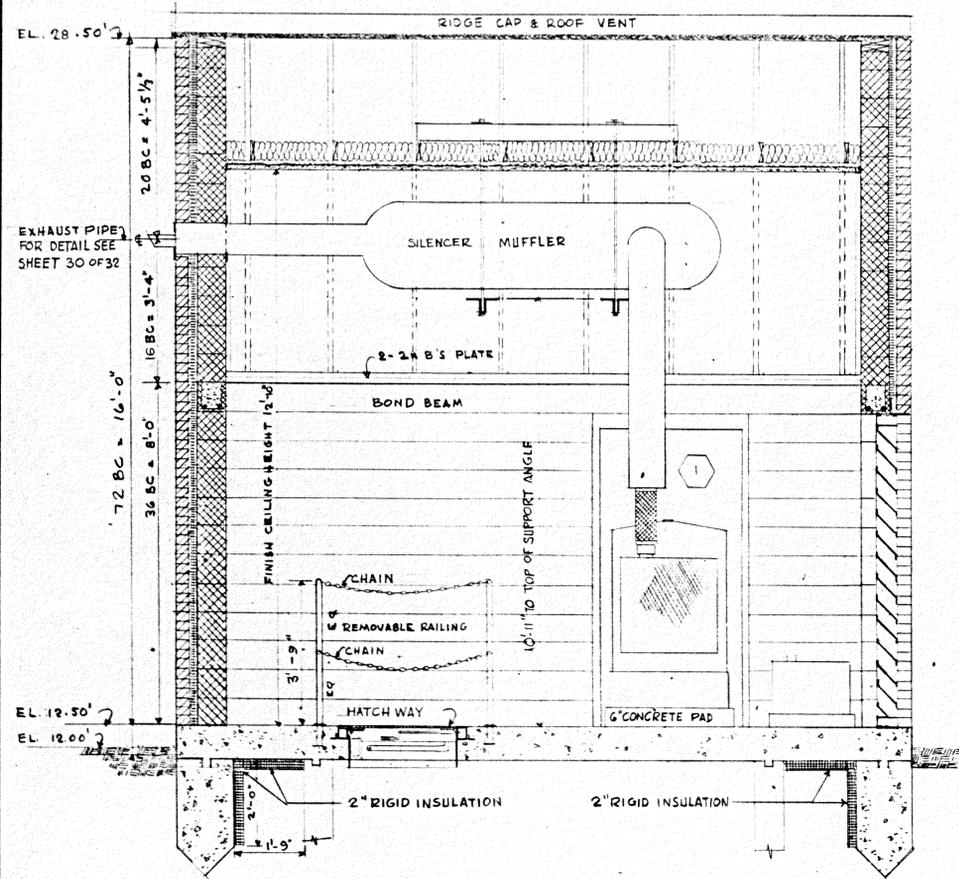
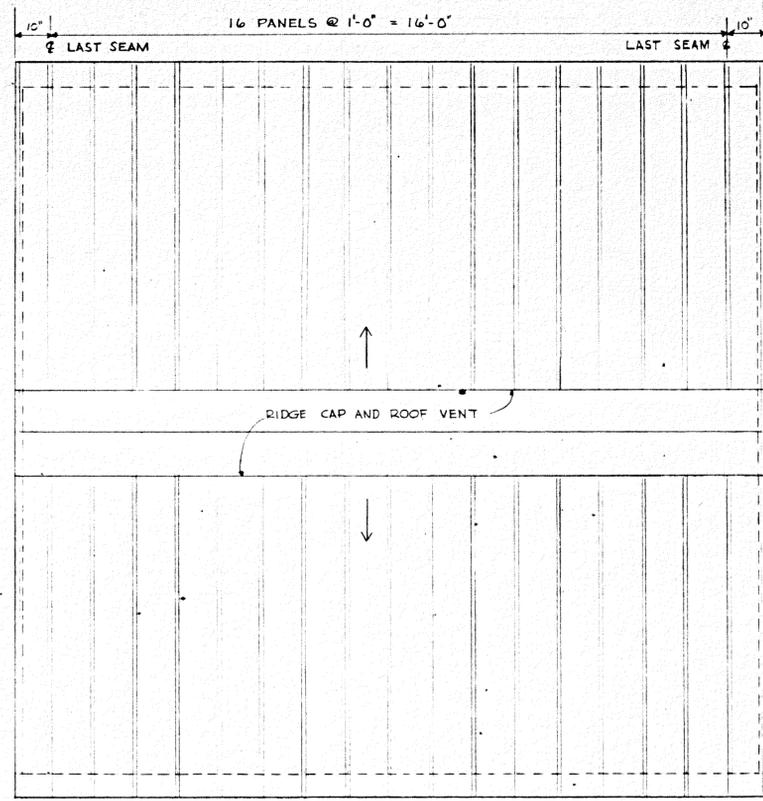
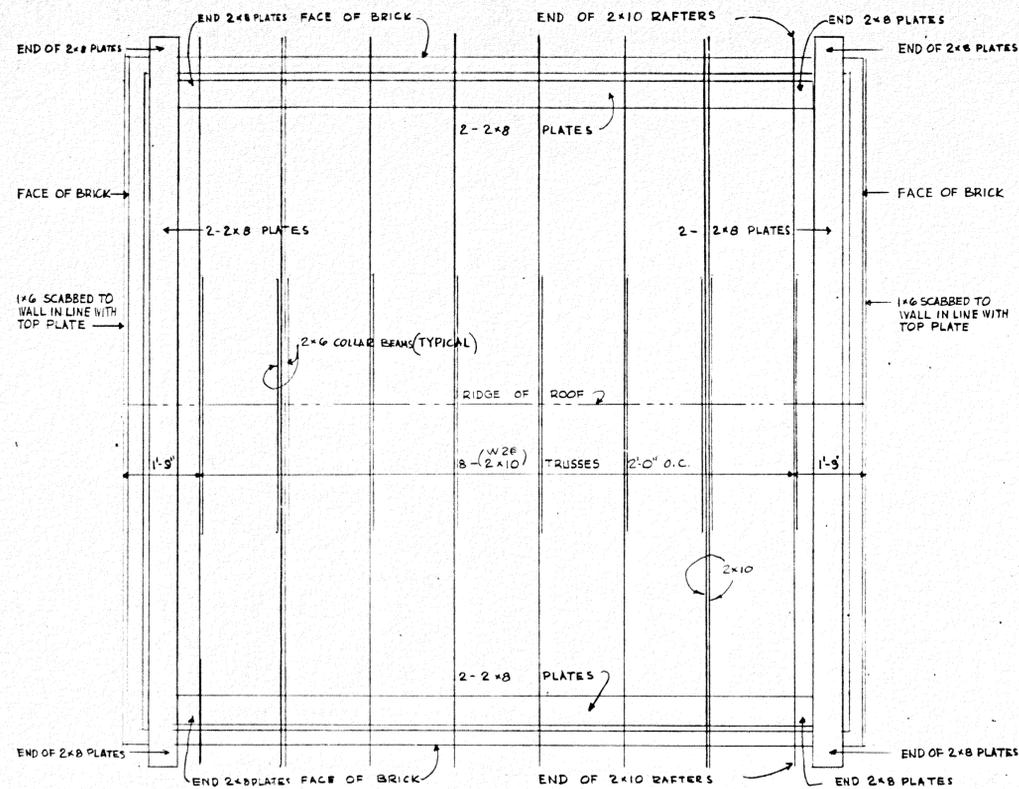
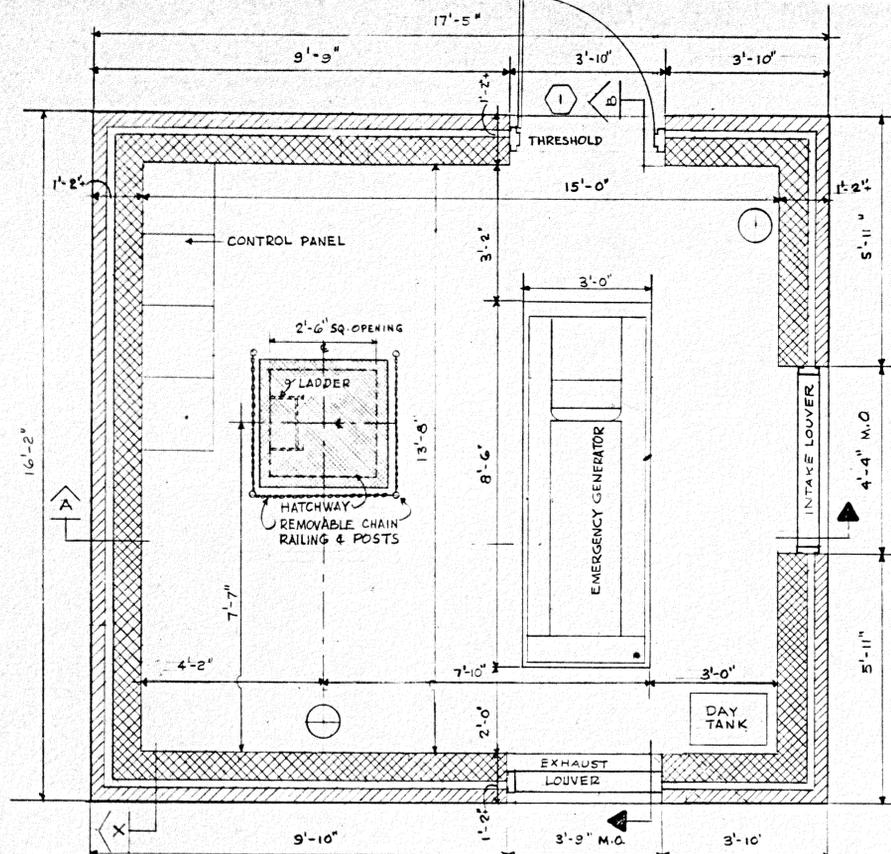
ARCHITECTURAL
ELEVATIONS AND STRUCTURAL DETAILS
SCARBOROUGH, MAINE

WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

NO.	DESCRIPTION	DATE
1	RECORD PLANS	5/83
	REVISIONS	

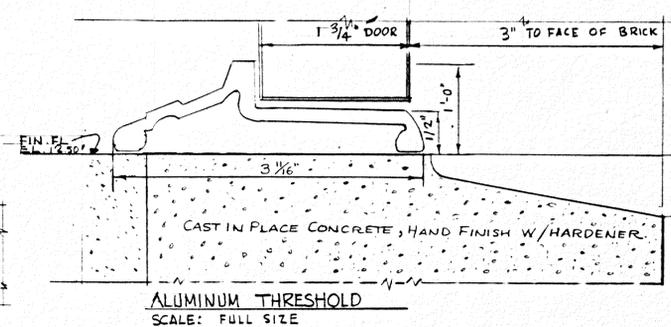


DESIGNED BY	SCALE	DATE
L. E. B.	AS NOTED	JUNE 1980
DRAWN BY	APPROVED	
L. E. B.		
CHECKED BY	JOB NO.	SHEET
L. E. B.	8-105	30 OF 35 SHEETS



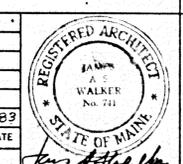
DOOR SCHEDULE								
DOOR NUMBER	LOCATION	OPEN SIZE	MATERIAL	TYPE	HEAD	JAMB	SILL	REMARKS
1	ENTRY	3'-5" x 6'-11"	ALUMINUM	1	A-21	A-23	A-23	PAINT-BRONZE

ROOM FINISH SCHEDULE			
ROOM NUMBER	WALLS	FLOOR	CEILING
	PAINT	HARDENER	PAINT



RECORD PLAN

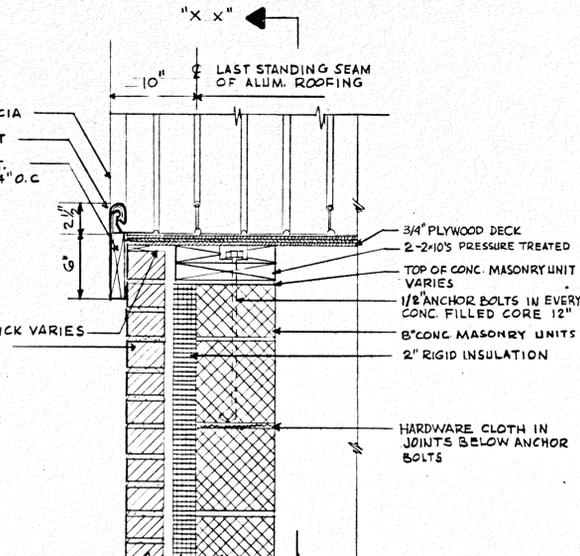
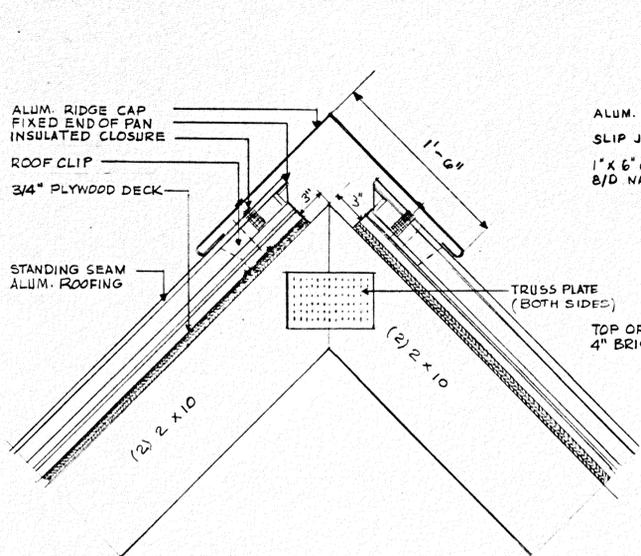
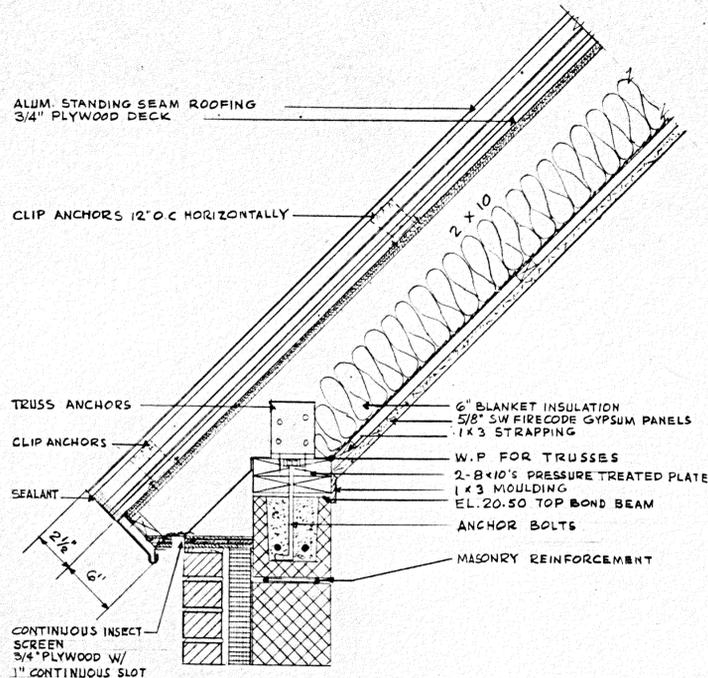
NO.	DESCRIPTION	DATE
1	RECORD PLANS	5/83
	REVISIONS	



PUMPING STATION No 2
ARCHITECTURAL
PLANS, SECTIONS AND SCHEDULES
SCARBOROUGH, MAINE

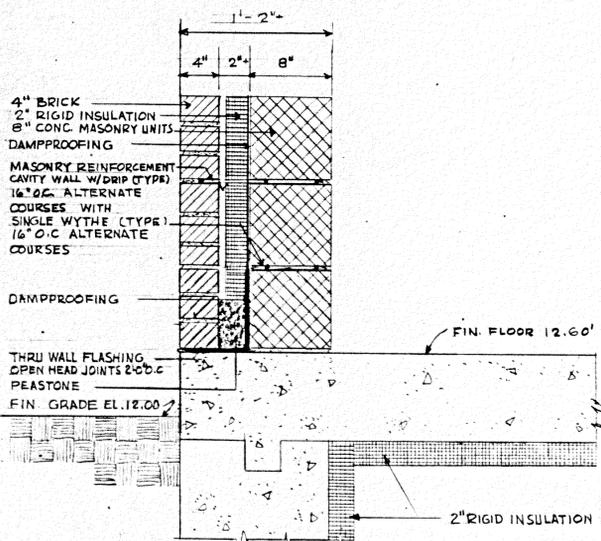
WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

DESIGNED BY L.E.B. SCALE AS NOTED DATE JUNE, 1980
DRAWN BY L.E.B. APPROVED [Signature]
CHECKED BY L.E.B. JOB NO. 8-105 SHEET 31 OF 35 SHEETS

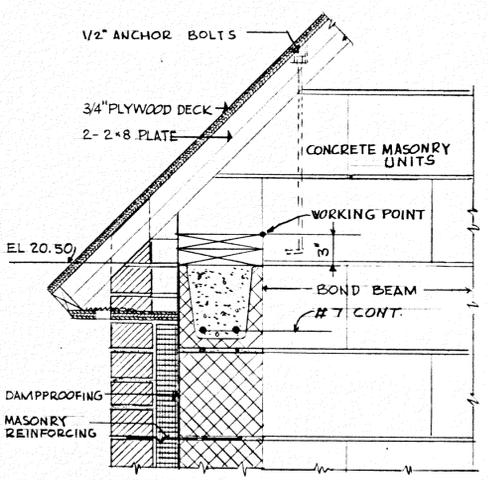


RIDGE CAP AND VENT
SCALE: 1 1/2" = 1'-0"

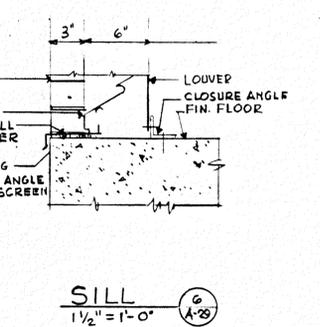
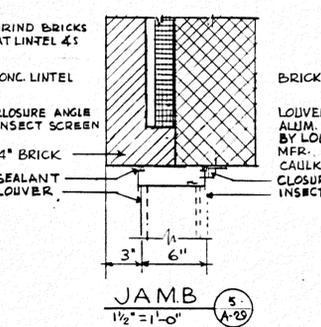
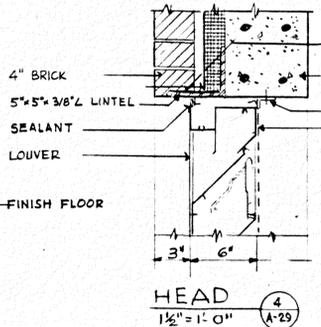
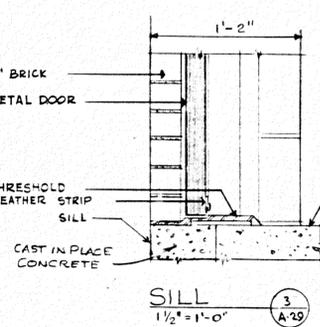
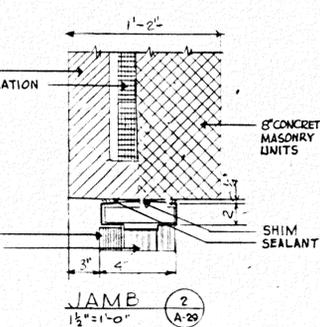
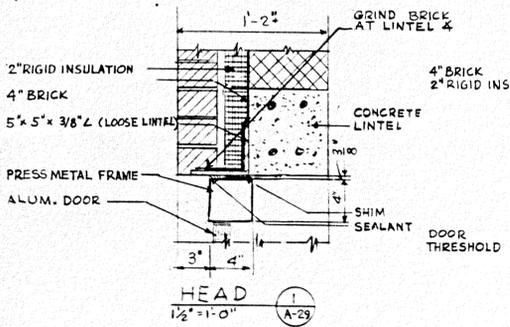
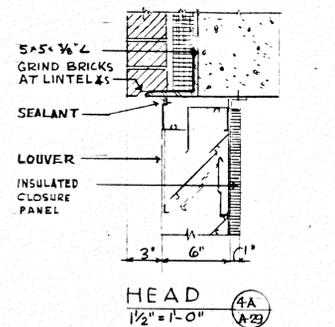
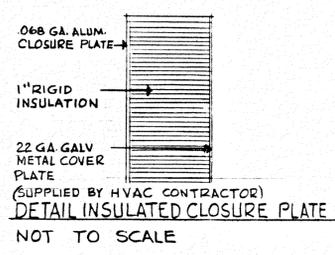
RAKE DETAIL
SCALE: 1 1/2" = 1'-0"



WALL SECTION (TYPICAL) "C-C"
SCALE: 1 1/2" = 1'-0"



DETAIL WOOD FRAMING @ END WALLS "X-X"
SCALE: 1 1/2" = 1'-0"



RECORD PLAN

PUMPING STATION No 2

ARCHITECTURAL
DETAILS

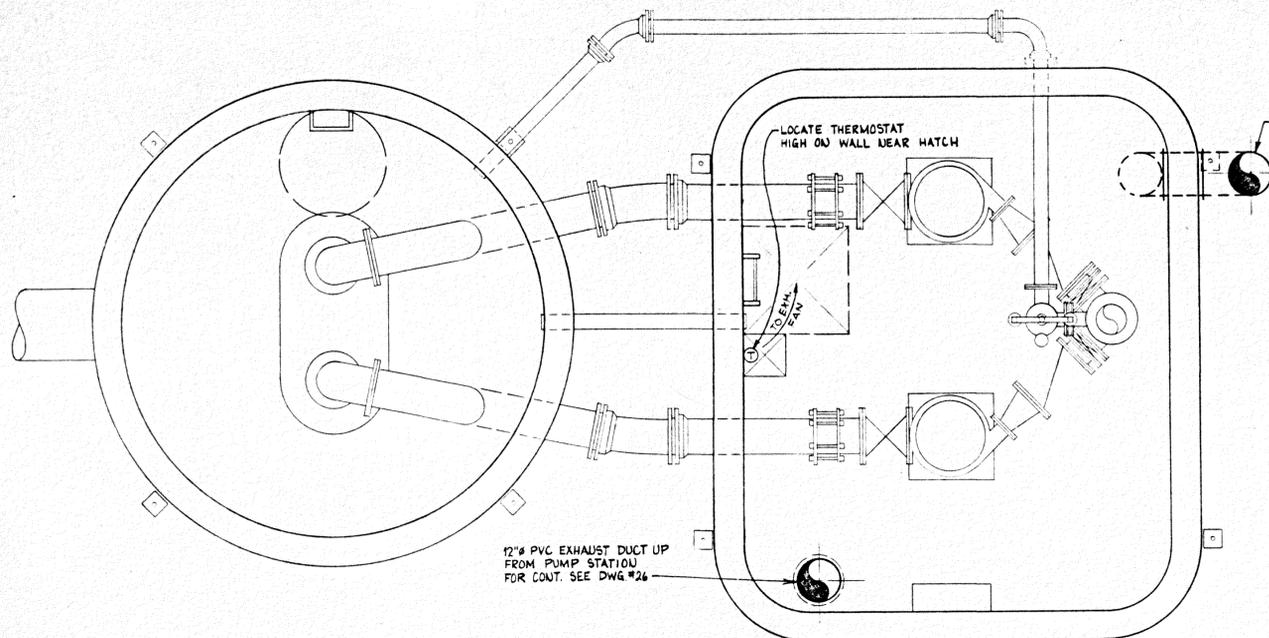
SCARBOROUGH, MAINE

WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

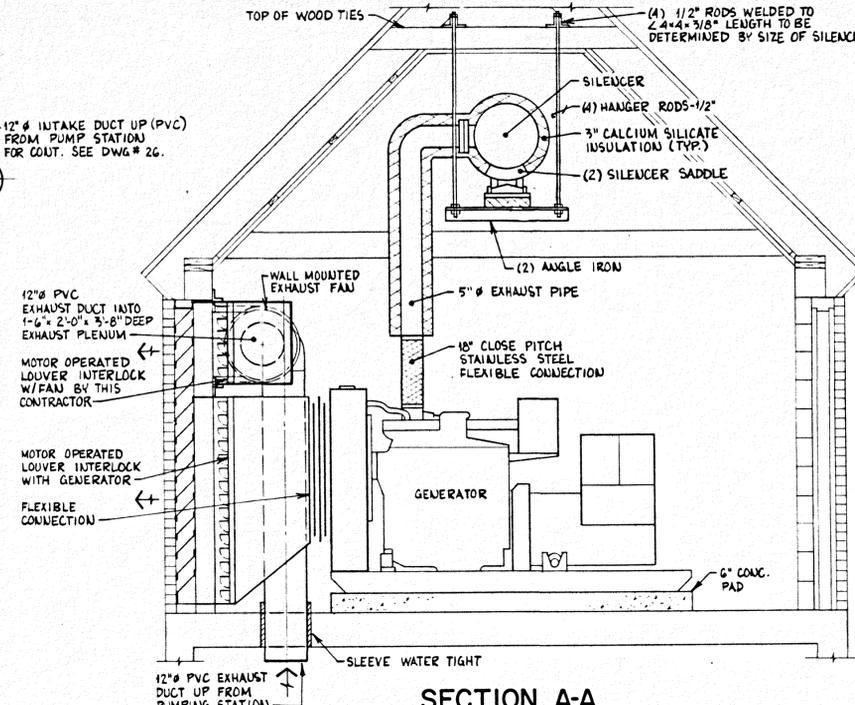
DESIGNED BY L. E. B.	SCALE AS NOTED	DATE JUNE, 1980
DRAWN BY L. E. B.	APPROVED <i>[Signature]</i>	
CHECKED BY L. E. B.	JOB NO. 8-105	SHEET 32 OF 35 SHEETS



NO.	DESCRIPTION	DATE
1	RECORD PLANS	5/83
	REVISIONS	



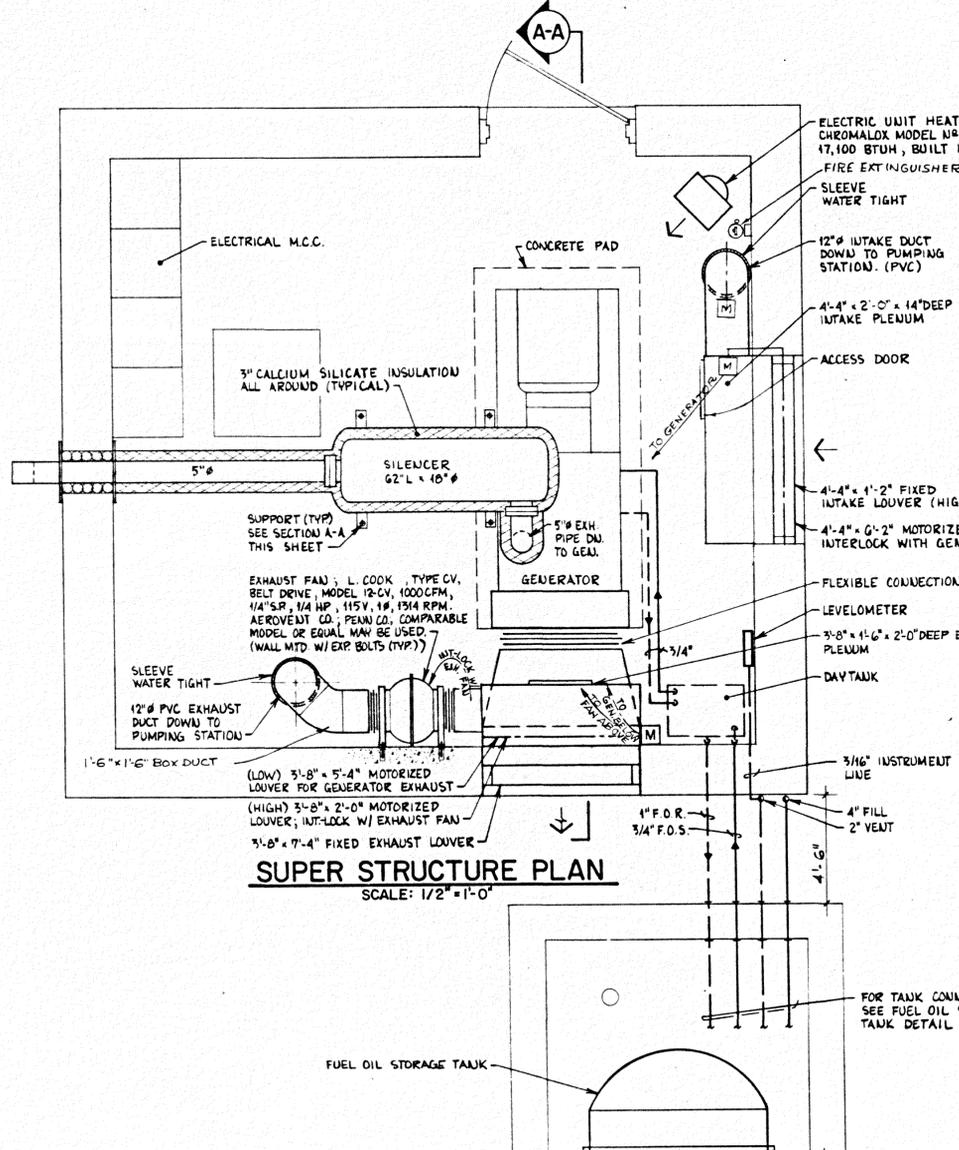
PUMP STATION PLAN
SCALE: 1/2" = 1'-0"



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

NOTES

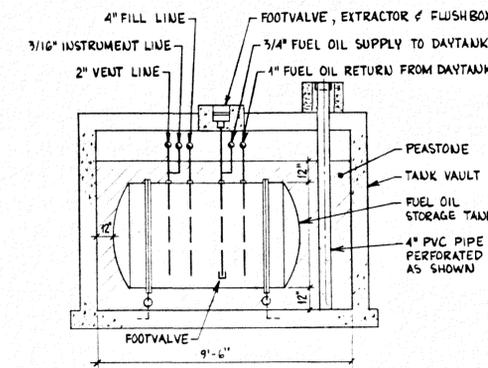
1. THIS CONTRACTOR SHALL COORDINATE AND VERIFY IN THE FIELD, THE EXACT LOCATIONS OF EQUIPMENT TO PROVIDE CLEARANCES, ACCESSIBILITY AND AVOID INTERFERENCE WITH OTHER TRADES OR BUILDING CONDITIONS.
2. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE CORRECTNESS OF THE FIELD INSTALLATION, INCLUDING THE FURNISHING AND INSTALLATION OF ALL NECESSARY SLEEVES AND HANGERS.
3. THERMOSTATS MOUNTED ON EXTERIOR WALLS SHALL BE FURNISHED AND INSTALLED WITH INSULATING PANEL BETWEEN THERMOSTAT AND WALL.



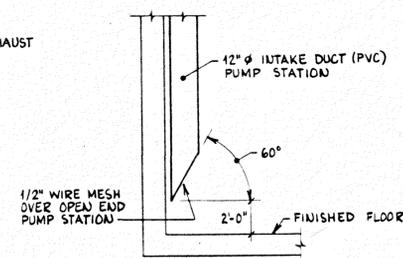
SUPER STRUCTURE PLAN
SCALE: 1/2" = 1'-0"

FUEL OIL NOTES

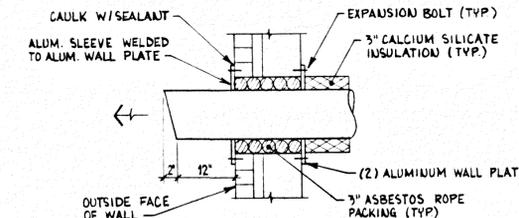
1. FUEL OIL STORAGE TANK : OWENS-CORNING FIBERGLAS, MODEL D-5 550 ; 4'-5/8" DIA. x 6'-0 5/8" LONG. CAROLINA; UNIROVAL; COMPARABLE MODEL OR EQUAL MAY BE USED.
2. FUEL OIL STORAGE TANK & PIPING SHALL BE INSTALLED IN ACCORDANCE WITH UNDERWRITERS LOCAL & STATE REQUIREMENTS.
3. FURNISH & INSTALL FUSIBLE VALVES, CHECK VALVES, DUPLEX STRAINER & ALL OTHER VALVES & EQUIPMENT, NECESSARY & REQUIRED AS DIRECTED BY THE ENGINEER.
4. FOR EXACT LOCATION OF FUEL OIL STORAGE TANK & TANK VAULT SEE SHEET # 2E.
5. FOR TANK VAULT DETAILS SEE DWG. # 2B.



FUEL OIL STORAGE TANK DETAIL
N.T.S.



INTAKE DUCT DETAIL
N.T.S.



EXHAUST PIPE THRU WALL DETAIL
N.T.S.

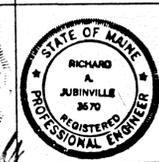
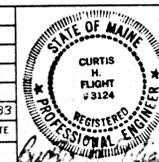
RECORD PLAN

PUMPING STATION № 2
HEATING AND VENTILATION
PLANS, SECTIONS AND DETAILS
SCARBOROUGH, MAINE

WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

DESIGNED BY A A A	SCALE AS NOTED	DATE JUNE 1980
DRAWN BY S E D	APPROVED <i>[Signature]</i>	
CHECKED BY C H F	JOB NO. 8-105	SHEET 33 OF 35 SHEETS

NO.	DESCRIPTION	DATE
1	RECORD PLANS	5/83



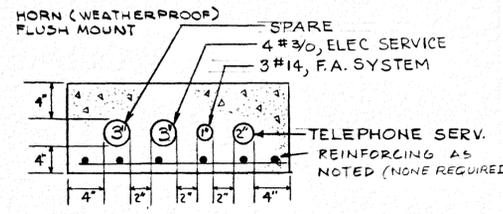
GENERAL LEGEND

- 1' x 4' FLUORESCENT FIXTURE & CEILING OUTLET
"A" DENOTES FIXTURE TYPE, "I" DENOTES CIRCUIT NUMBER
"B" DENOTES CONTROL BY SWITCH &
- WALL OUTLET & INCANDESCENT OR H.I.D. FIXTURE.
NOTATION SAME AS ABOVE.
- EMERGENCY LIGHTING BATTERY UNIT WITH 2 MOUNTED HEADS.
- DUPLEX RECEPTACLE, 125V, 3P, 2W, GROUNDED TYPE, FLUSH MOUNTED.
- JUNCTION BOX, CEILING MOUNTED.
- SINGLE POLE SWITCH
- CODE SIZE CONDUIT WITH 2*12 AWG INSTALLED CONCEALED IN CEILING OR WALL. (SEE SPECS FOR MINIMUM SIZE CONDUIT PERMITTED.)
- SAME AS ABOVE EXCEPT CONDUIT INSTALLED IN FLOOR SLAB CONDUIT PERMITTED.)
- CODE SIZE CONDUIT WITH 2*12 AWG INSTALLED EXPOSED. (SEE SPECS FOR MINIMUM SIZE PERMITTED.)
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- WIRING OTHER THAN #12 IS INDICATED THUS. IN THIS CASE, 3*8 AWG IN 3/4" CONDUIT.
- 3/4" C.E. INDICATES 3/4" CONDUIT-EMPTY
- 225/200 MOLDED CASE AIR CIRCUIT BREAKER. UPPER NUMBER "225" DENOTES FRAME SIZE, LOWER NUMBER "200" DENOTES TRIP SETTING.
- COMBINATION MOTOR CIRCUIT PROTECTOR AND REDUCED VOLTAGE MAGNETIC MOTOR STARTER
- COMBINATION MOTOR CIRCUIT PROTECTOR AND MAGNETIC ACROSS-THE-LINE MOTOR STARTER
- INDICATING LIGHT R=RED, G=GREEN, W=WHITE
- ELAPSED TIME METER
- KILOWATT HOUR METER
- ELECTRIC UNIT HEATER. "5.0" DENOTES KILOWATT RATING.
- CONTACTS, NORMALLY OPEN
- CONTACTS, NORMALLY CLOSED
- NORMALLY OPENING CONTACTS, CLOSE ON DELAY
- MANUAL MOTOR STARTER
- CPT CONTROL POWER TRANSFORMER
- GENERATOR
- MOTOR. "25" DENOTES HORSEPOWER
- DAMPER MOTOR
- FLOAT SWITCH
- LIMIT SWITCH
- HAND-OFF-AUTOMATIC SELECTOR SWITCH
- STOP-LOCKOUT PUSHBUTTON CONTROL STATION.
- LATCHING RELAY
- TIMING RELAY, "TDE" DENOTES TIME DELAY ON ENERGIZATION, "TDD" DENOTES TIME DELAY ON DE-ENERGIZATION.
- CONTROL RELAY.
- HOMERUN TO PANEL LP, CIRCUITS 1 AND 3. DIAGONAL LINES INDICATE THE NUMBER OF NO. 12 CONDUCTORS WHEN MORE THAN TWO.
- FIRE ALARM PULL STATION
- FIRE ALARM HORN AND LIGHT COMBINATION
- FIRE ALARM HEAT DETECTOR 190°F. FIXED TEMPERATURE TYPE.
- POWER FACTOR CORRECTION CAPACITOR (FURNISHED BY PUMP MOTOR MFR. & INSTALL, MOUNTED & WIRED BY CONTRACTOR) (SEE CONTINUATION OF LEGEND THIS SHEET)

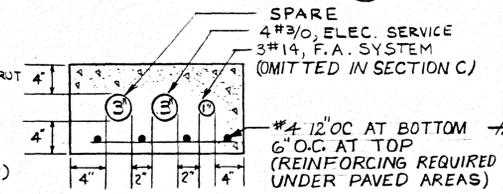
LIGHTING PANEL "LP"				MOUNTING-MCC	
MAIN C B	1 PHASE	240/120V 3 WIRE	SN	APPLICATION	
1	10,000	20%	1	MAIN BREAKER	
2			.54	RECEPTACLES CONTROL ROOM	
3				MAIN BREAKER	
4			1/4 .9	FUEL DAY TANK & BATTERY CHARGER	
5			.15	DAMPER MOTORS	
6			.2	TELEMETRY CABINET	
7			.8	DEHUMIDIFIER	
8			1/8	EXHAUST FAN, PUMP CHAMBER	
9			1/8	BUBBLER CONTROL PANEL	
10				MAGNETIC FLOW METER	
11			.4	ALARM PANEL & SECURITY PANEL	
12			.2	BATTERY CHARGER	
13				FIRE ALARM PANEL (SEE NOTE 5)	
14			1.2	GEN. ENGINE HEATER	
15			1.2	GEN. KEEP WARM SYSTEM	
16				SPARE	
17				LIGHTING CONTROL ROOM	
18				SPARE	

GENERAL LEGEND (CONTINUED)

- MAGNETIC DOOR SWITCH
- LIGHTNING ARRESTER
- SURGE CAPACITOR
- GROUND
- FUSE
- POTENTIAL TRANSFORMER
- CURRENT TRANSFORMER
- VOLTMETER SWITCH
- AMMETER SWITCH
- VOLTMETER
- AMMETER
- TIME SWITCH
- GROUND ROD



SECTION A N.T.S.



SECTION B N.T.S.

NOTES

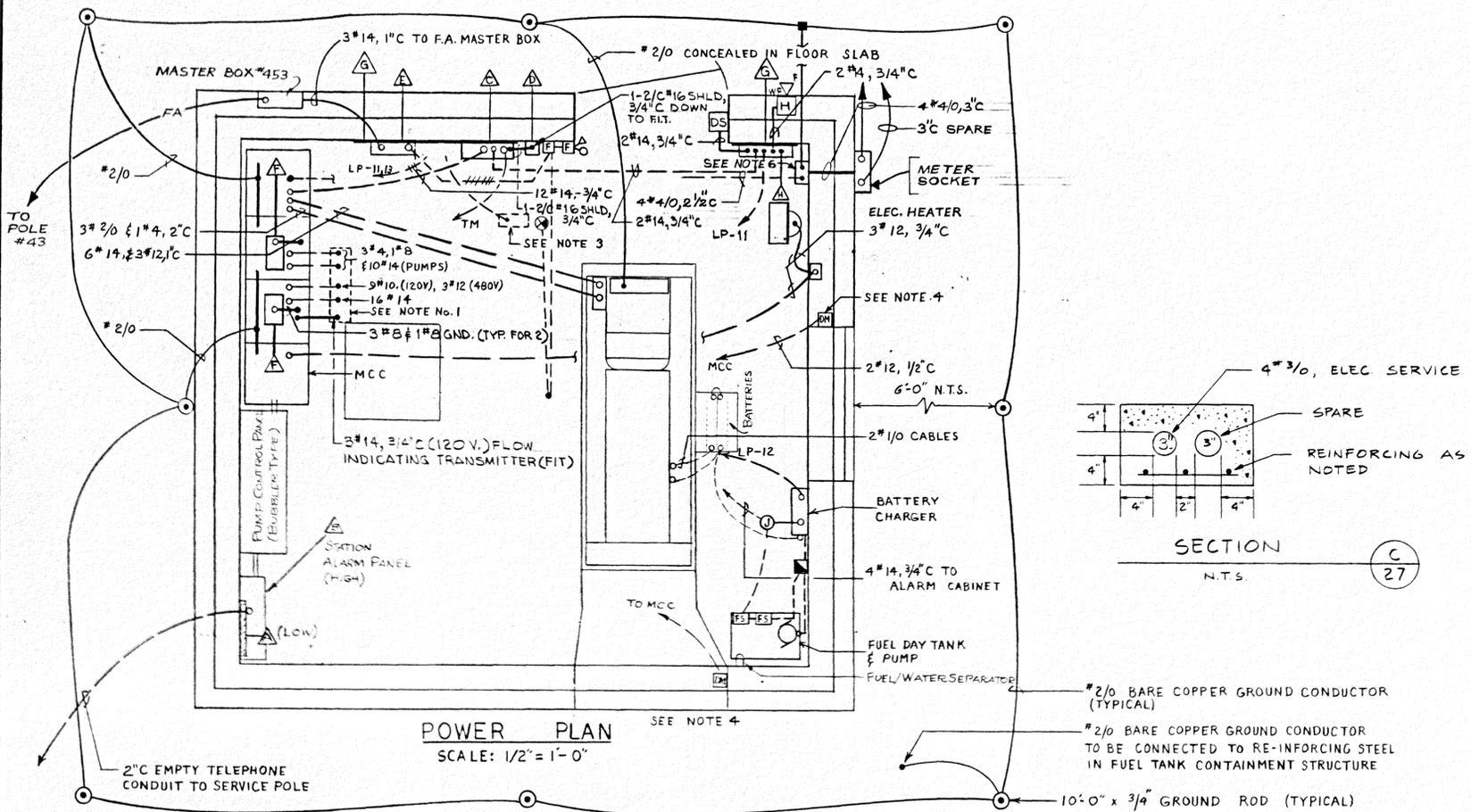
- POWER AND CONTROL SYSTEM TERMINAL CABINET LOCATED IN PUMP CHAMBER. PROVIDE 4-1 1/2" C INSTALLED BETWEEN MCC AND PULL BOX. LOCATE AS TO AVOID CONFLICT WITH HATCH.
- ALL WIRING IN PUMP CHAMBER & BETWEEN PUMP CHAMBER & CONTROL ROOM SHALL BE FURNISHED & INSTALLED BY THE PUMP STATION SUPPLIER.
- CONTROL & SIGNAL SYSTEM TERMINAL CABINETS LOCATED IN PUMP CHAMBER. PROVIDE 3/4" C B #14 BETWEEN SIGNAL SYSTEM J.B., ALARM PANEL AND TERMINAL CABINETS
- INTERLOCK DAMPER MOTOR WITH ENGINE CONTROLS.
- PROVIDE LOCKING HARDWARE. DEVICE TO BE PAINTED RED.
- 200A-3P, 600 VAC, 18,000AIC ENCLOSED CIRCUIT BREAKER WITH FULL NEUTRAL LUG, PROVIDED NEMA1 ENCLOSURE.
- PROVIDE 5/8" MARINE PLYWOOD BACKBOARD SUPPORTED WITH UNI-STRUT STEEL CHANNEL AND PAINT WITH (1) ONE COAT OF PRIMER PAINT AND TWO (2) COATS OF POLYURETHANE PAINT.

EQUIPMENT LEGEND

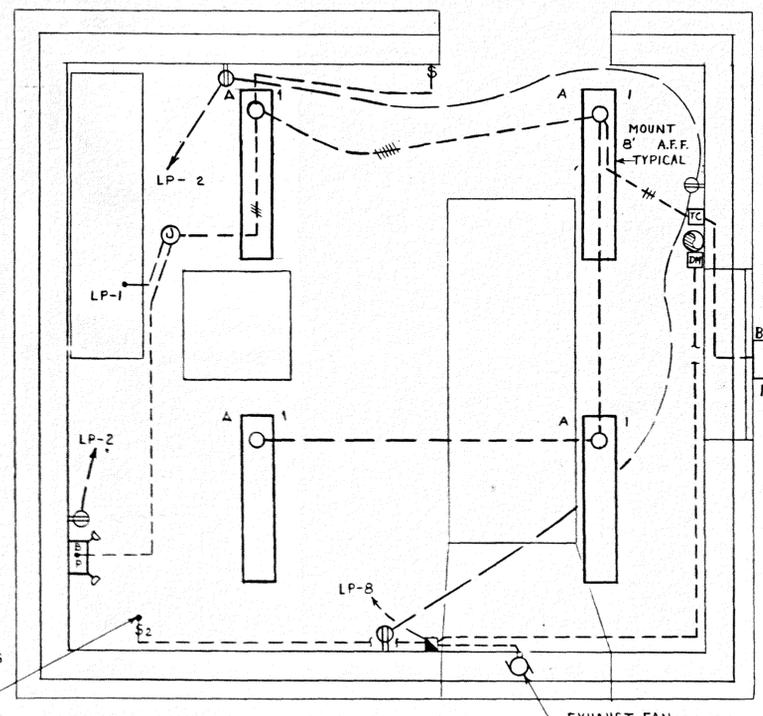
- PLYWOOD BACKBOARD FOR TELEPHONE SERVICE "TM" (SEE NOTE 7)
- ALARM PANEL
- TELEMETRY CABINET (FURNISHED UNDER ANOTHER CONTRACT)
- SIGNAL SYSTEM J.B. FOR FLOW METER SIGNAL
- FIRE ALARM CONTROL PANEL
- POWER FACTOR CORRECTION CAPACITOR
- PLYWOOD BACKBOARD (SEE NOTE 7)
- SECURITY ALARM PANEL

LIGHTING FIXTURE SCHEDULE

FIXTURE TYPE	MANUFACTURER	WATTS	CATALOG No.	FIXTURE			
				TYPE	MTG	LAMP	VOLTS
A	LITHONIA	96	DV240A	FLUOR	CEIL	2-F40RS	120 WET LOCATION
B	MOLDCAST	135	89021-12-BZ-RZ	HPS	WALL	1-BT-25	120 180° BEAM &



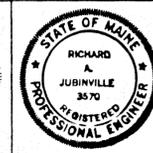
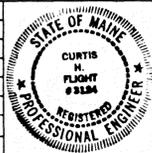
POWER PLAN SCALE: 1/2" = 1'-0"



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

RECORD PLAN

NO.	DESCRIPTION	DATE
1	RECORD PLANS	5/83
	REVISIONS	



PUMPING STATION No 2

ELECTRICAL FLOOR PLANS AND LEGENDS

SCARBOROUGH, MAINE

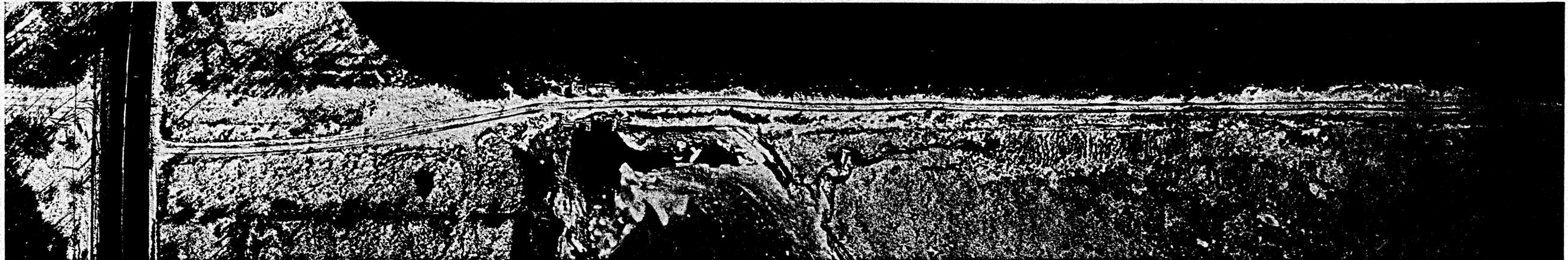
WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

DESIGNED BY R.P.P. SCALE AS NOTED DATE JUNE, 1980

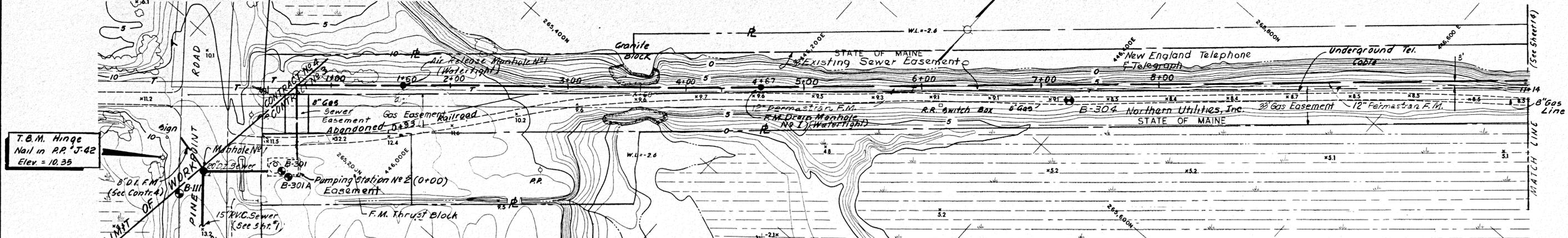
DRAWN BY W.M.U. APPROVED [Signature] DATE

CHECKED BY R.P.P. JOB NO. 8-105 SHEET 34 OF 35 SHEETS

APPENDIX B
Force Main Record Drawings

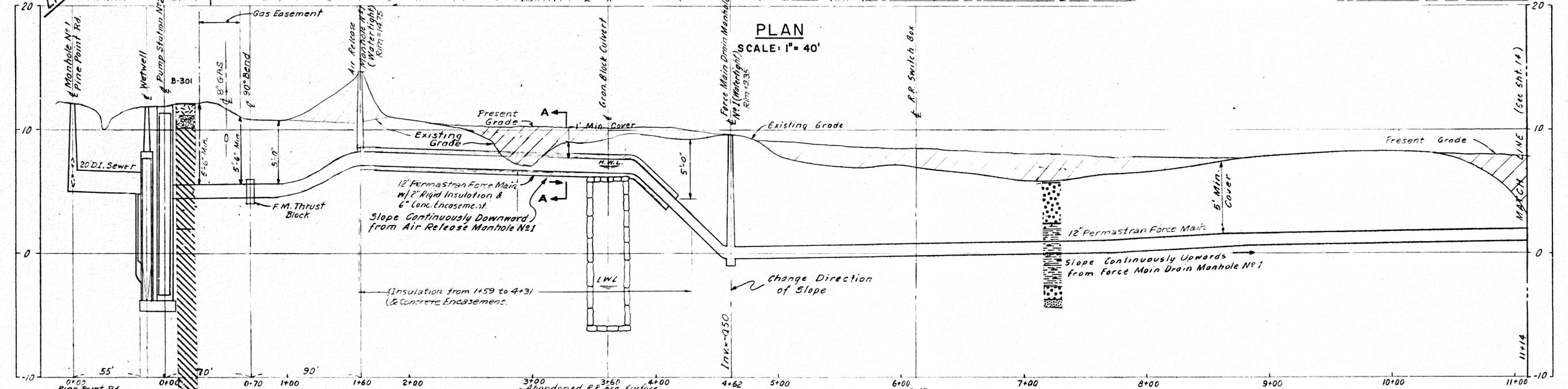


CROSS COUNTRY

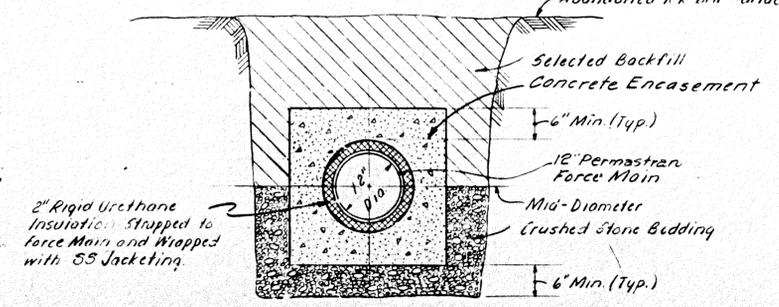


T.B.M. Hinge
Nail in R.R. J-42
Elev. = 10.35

PLAN
SCALE: 1" = 40'



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



SECTION A-A
No Scale

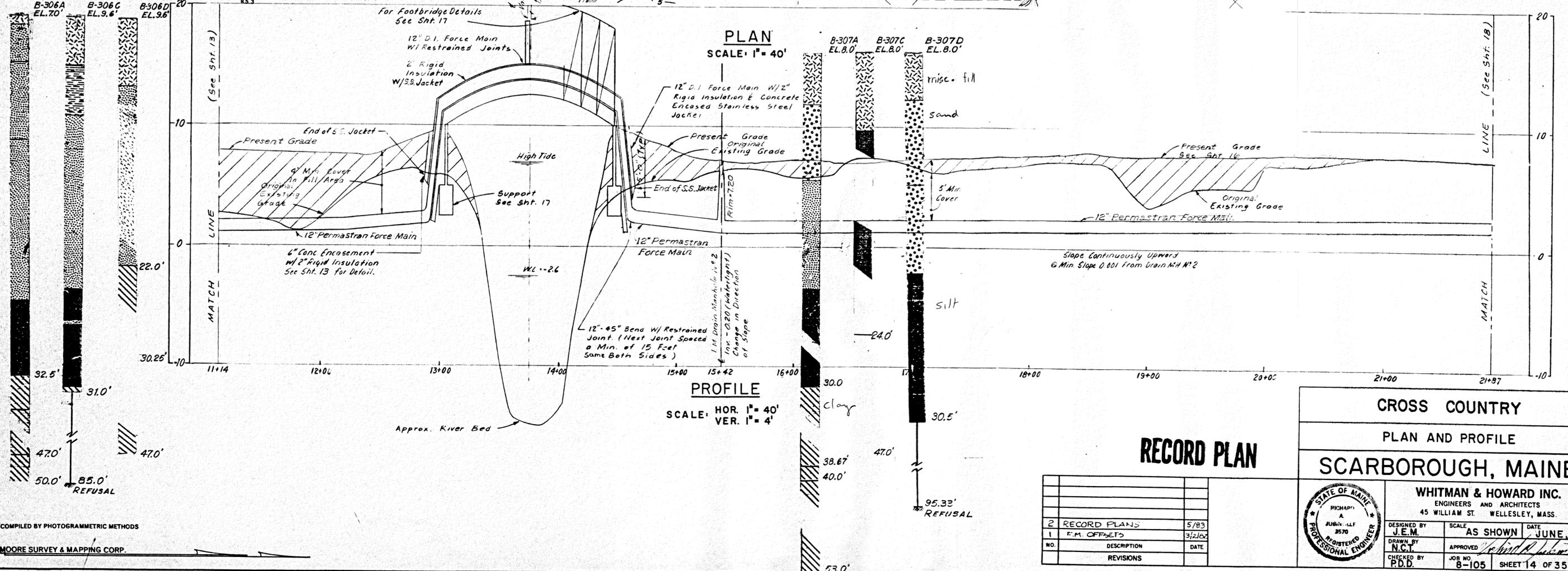
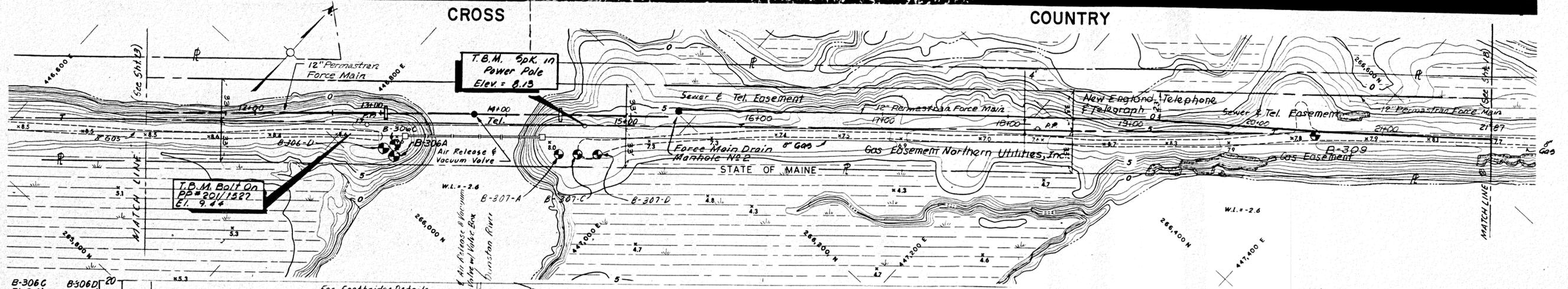
RECORD PLAN

CROSS COUNTRY
PLAN AND PROFILE
SCARBOROUGH, MAINE

WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

DESIGNED BY J.E.M. SCALE AS SHOWN DATE JUNE, 1980
DRAWN BY N.C.T. APPROVED [Signature] DATE 5/2/80
CHECKED BY P.D.D. JOB NO. 8-105 SHEET 13 OF 35 SHEETS

NO.	DESCRIPTION	DATE
2	RECORD PLANS	5/83
1	F.M. OFFSETS	5/2/80
	REVISIONS	



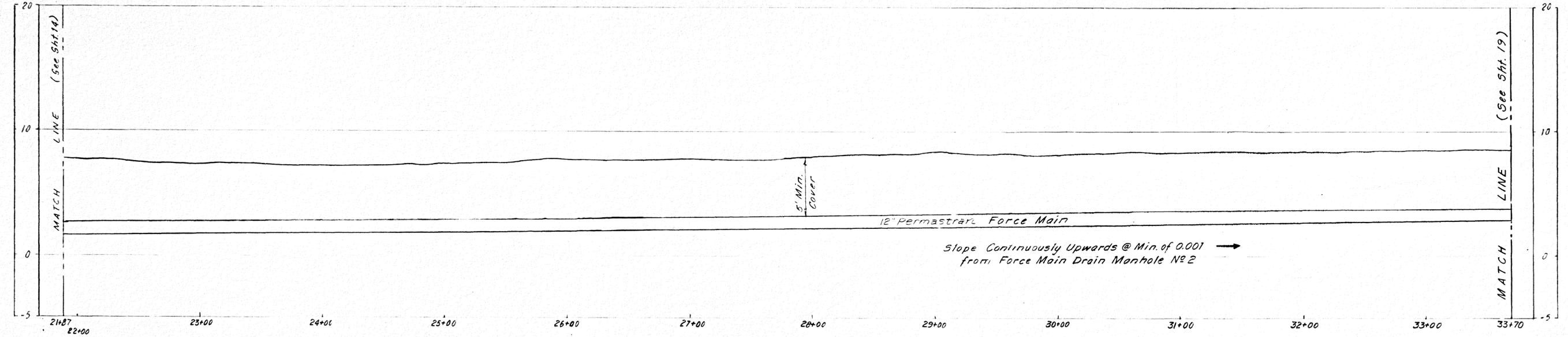
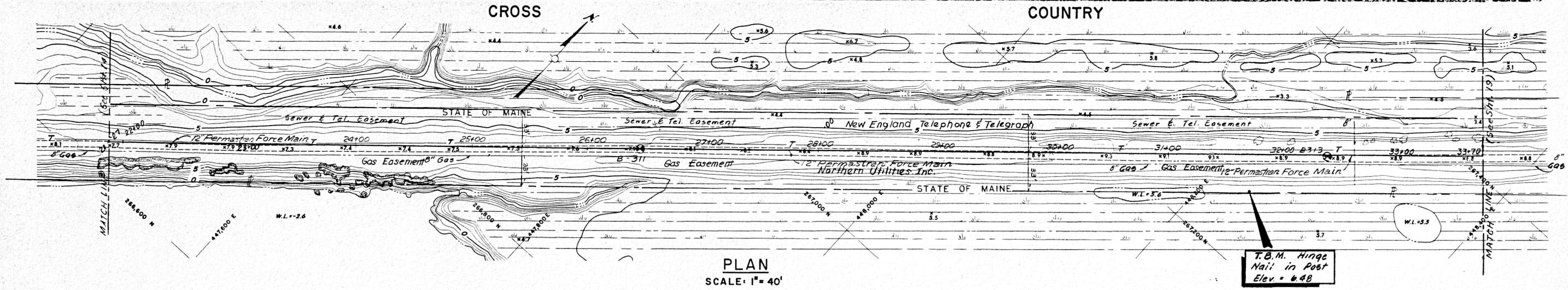
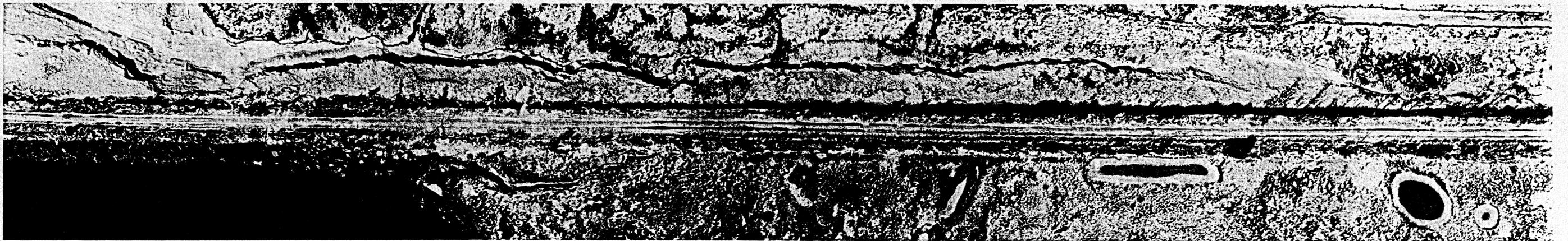
CROSS COUNTRY
PLAN AND PROFILE
SCARBOROUGH, MAINE

RECORD PLAN

2	RECORD PLANS	5/83
1	F.M. OFFSETS	3/21/83
NO.	DESCRIPTION	DATE
	REVISIONS	

WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.		
DESIGNED BY J.E.M.	SCALE AS SHOWN	DATE JUNE 1980
DRAWN BY N.C.T.	APPROVED <i>[Signature]</i>	CHECKED BY P.D.D.
	JOB NO. 8-105	SHEET 14 OF 35 SHEETS

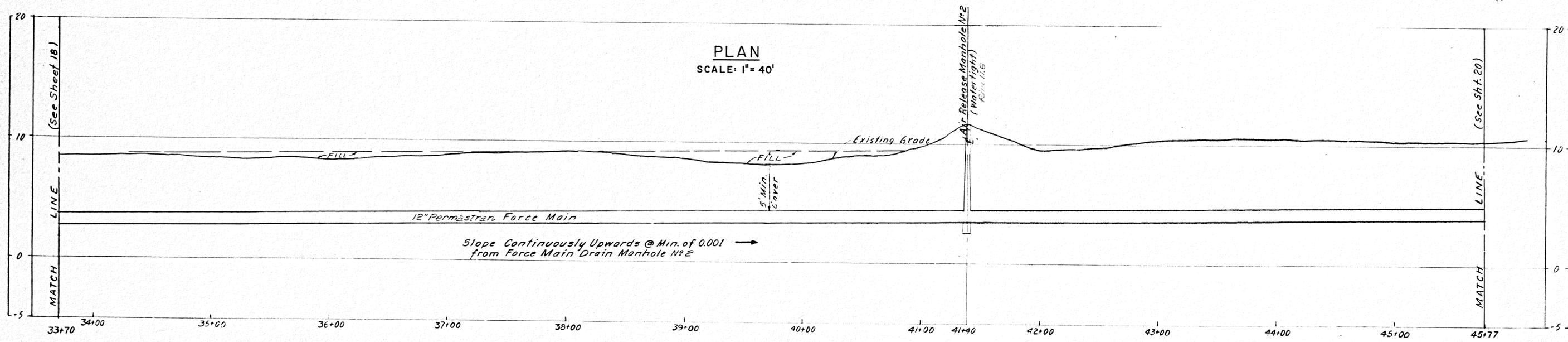
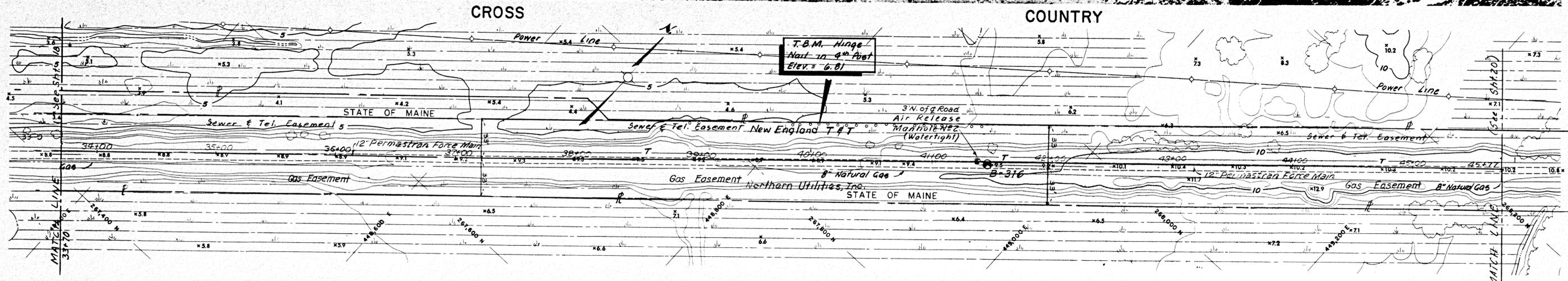
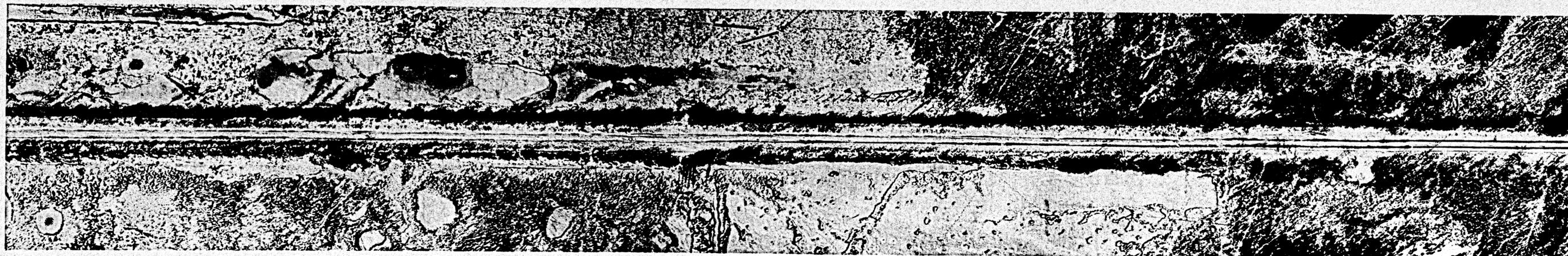
COMPILED BY PHOTOGAMMETRIC METHODS
 MOORE SURVEY & MAPPING CORP.



RECORD PLAN

NO.	DESCRIPTION	DATE
2	RECORD PLANS	5/83
1	F.M. OFFSETS	5/10/82

CROSS COUNTRY			
PLAN AND PROFILE			
SCARBOROUGH, MAINE			
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST WELLESLEY, MASS.			
	DESIGNED BY	SCALE	DATE
	J.E.M.	AS SHOWN	JUNE, 1980
	DRAWN BY	APPROVED	<i>[Signature]</i>
	N.C.T.	CHECKED BY	P.D.D.
JOB NO. 8-105		SHEET 18 OF 35 SHEETS	

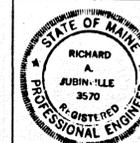


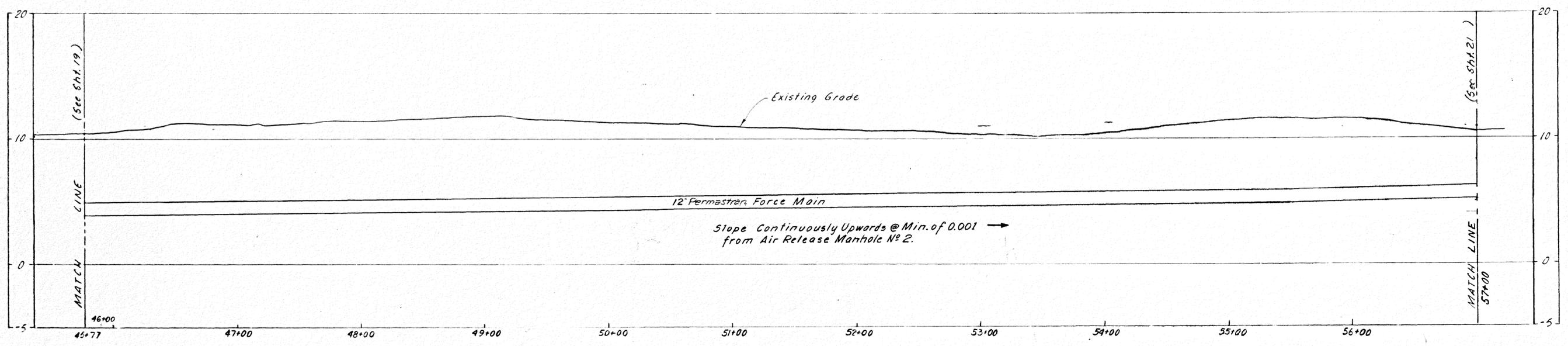
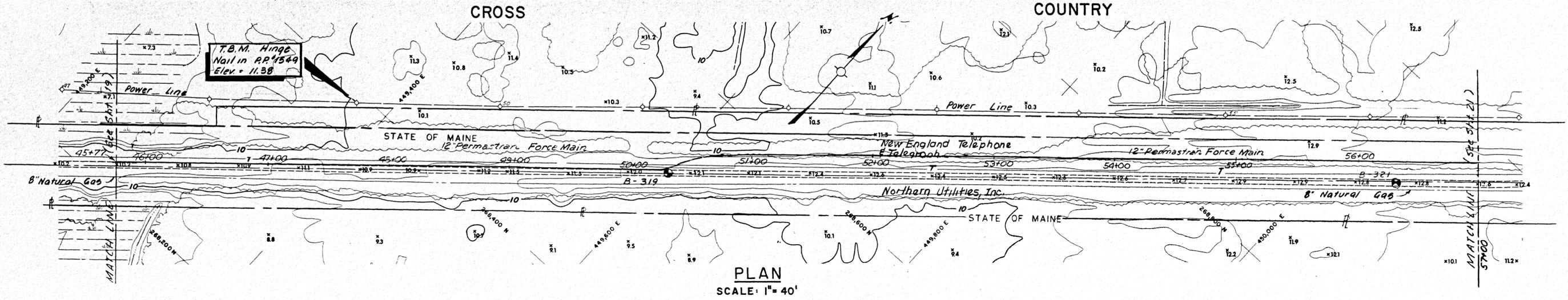
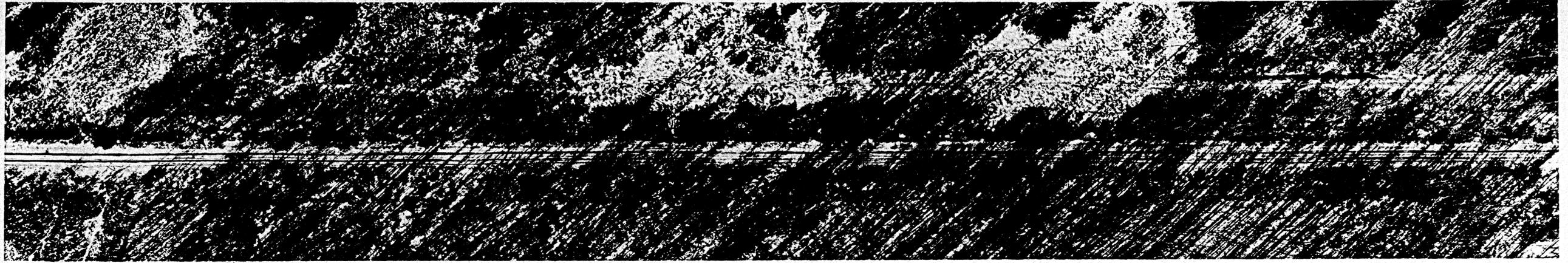
COMPILED BY PHOTOGRAMMETRIC METHODS
 MOORE SURVEY & MAPPING CORP.

NO.	DESCRIPTION	DATE
2	RECORD PLANS	5/83
1	FM. OFFSETS	5/2/82

RECORD PLAN

CROSS COUNTRY			
PLAN AND PROFILE			
SCARBOROUGH, MAINE			
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.			
DESIGNED BY J.E.M.	SCALE AS SHOWN	DATE JUNE, 1980	
DRAWN BY N.C.T.	APPROVED <i>[Signature]</i>	CHECKED BY P.D.D.	JOB NO. 8-105
			SHEET 19 OF 35 SHEETS

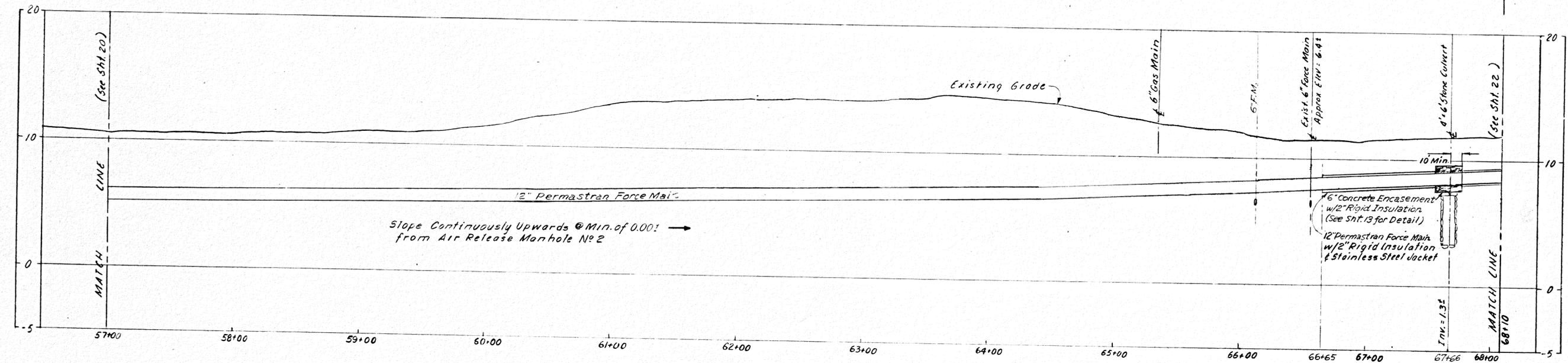
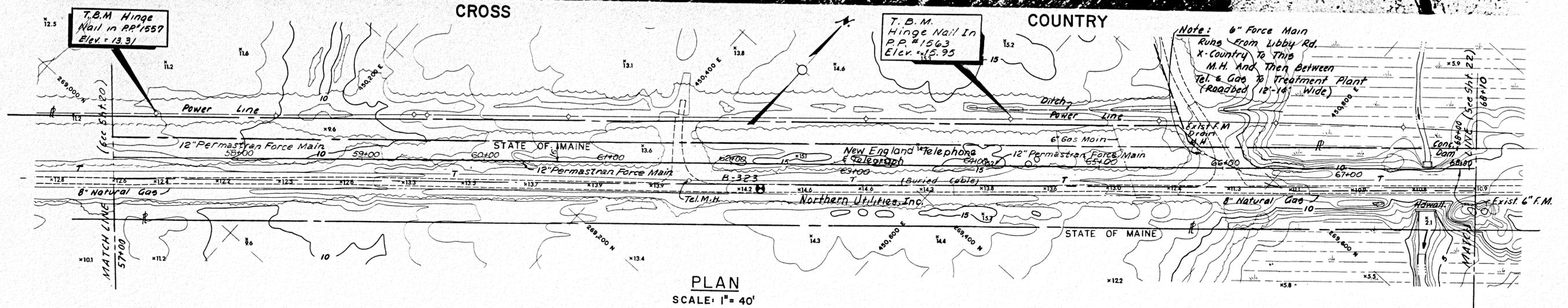




CROSS COUNTRY																															
PLAN AND PROFILE																															
SCARBOROUGH, MAINE																															
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">NO.</td> <td style="width: 60%;">DESCRIPTION</td> <td style="width: 30%;">DATE</td> </tr> <tr> <td>2</td> <td>RECORD PLANS</td> <td>5/83</td> </tr> <tr> <td>1</td> <td>F.M. OFFSETS</td> <td>5/2/82</td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DESCRIPTION	DATE	2	RECORD PLANS	5/83	1	F.M. OFFSETS	5/2/82													<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">DESIGNED BY J.E.M.</td> <td style="width: 30%;">SCALE AS SHOWN</td> <td style="width: 40%;">DATE JUNE, 1980</td> </tr> <tr> <td>DRAWN BY N.C.T.</td> <td colspan="2">APPROVED <i>[Signature]</i></td> </tr> <tr> <td>CHECKED BY P.D.D.</td> <td>JOB NO. B-105</td> <td>SHEET 20 OF 35 SHEETS</td> </tr> </table>	DESIGNED BY J.E.M.	SCALE AS SHOWN	DATE JUNE, 1980	DRAWN BY N.C.T.	APPROVED <i>[Signature]</i>		CHECKED BY P.D.D.	JOB NO. B-105	SHEET 20 OF 35 SHEETS
NO.	DESCRIPTION	DATE																													
2	RECORD PLANS	5/83																													
1	F.M. OFFSETS	5/2/82																													
DESIGNED BY J.E.M.	SCALE AS SHOWN	DATE JUNE, 1980																													
DRAWN BY N.C.T.	APPROVED <i>[Signature]</i>																														
CHECKED BY P.D.D.	JOB NO. B-105	SHEET 20 OF 35 SHEETS																													

RECORD PLAN



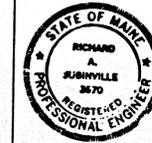


PROFILE
SCALE: HOR. 1" = 40'
VER. 1" = 4'

RECORD PLAN

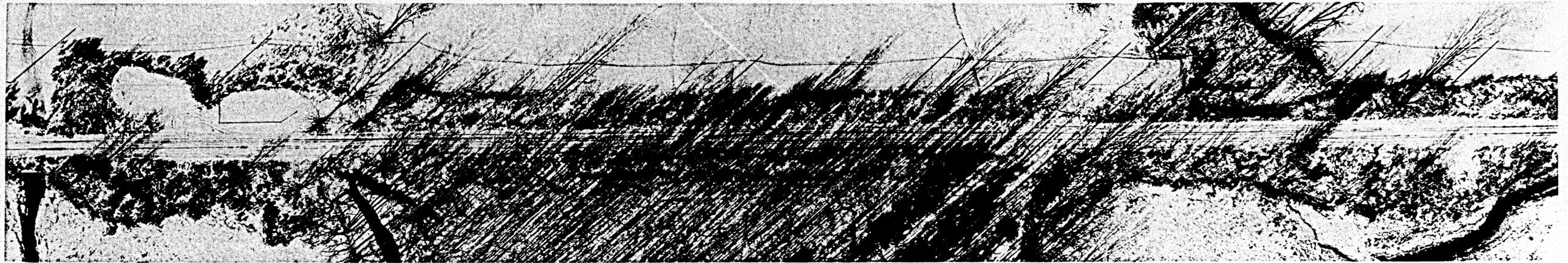
NO.	DESCRIPTION	DATE
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1	F.M. OFFSETS	5/2/82
	REVISIONS	

CROSS COUNTRY
PLAN AND PROFILE
SCARBOROUGH, MAINE



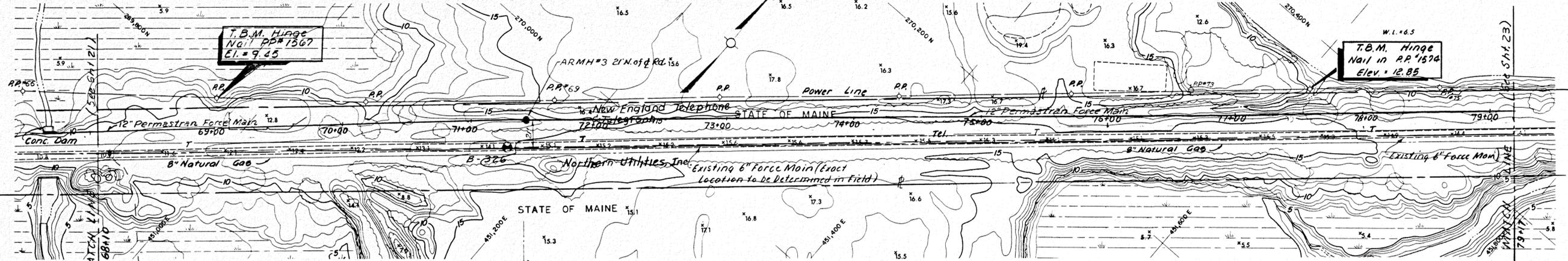
WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST. WELLESLEY, MASS.

DESIGNED BY J.E.M. SCALE AS SHOWN DATE JUNE, 1980
DRAWN BY N.C.T. APPROVED [Signature] [Signature]
CHECKED BY P.D.D. JOB NO. 8-105 SHEET 21 OF 33 SHEETS

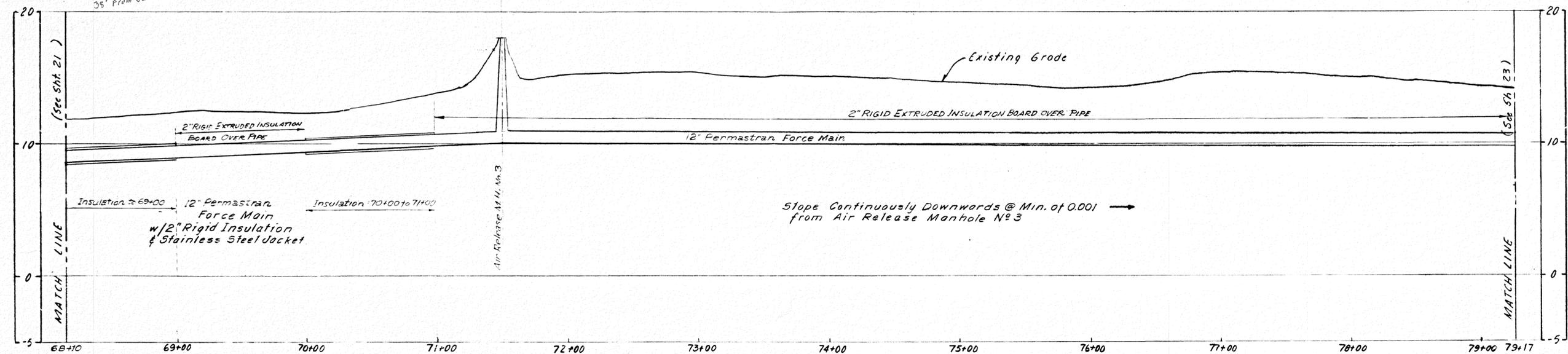


CROSS

COUNTRY



PLAN
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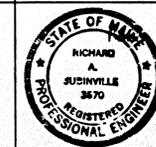


PROFILE
SCALE: HOR. 1" = 40'
VER. 1" = 4'

RECORD PLAN

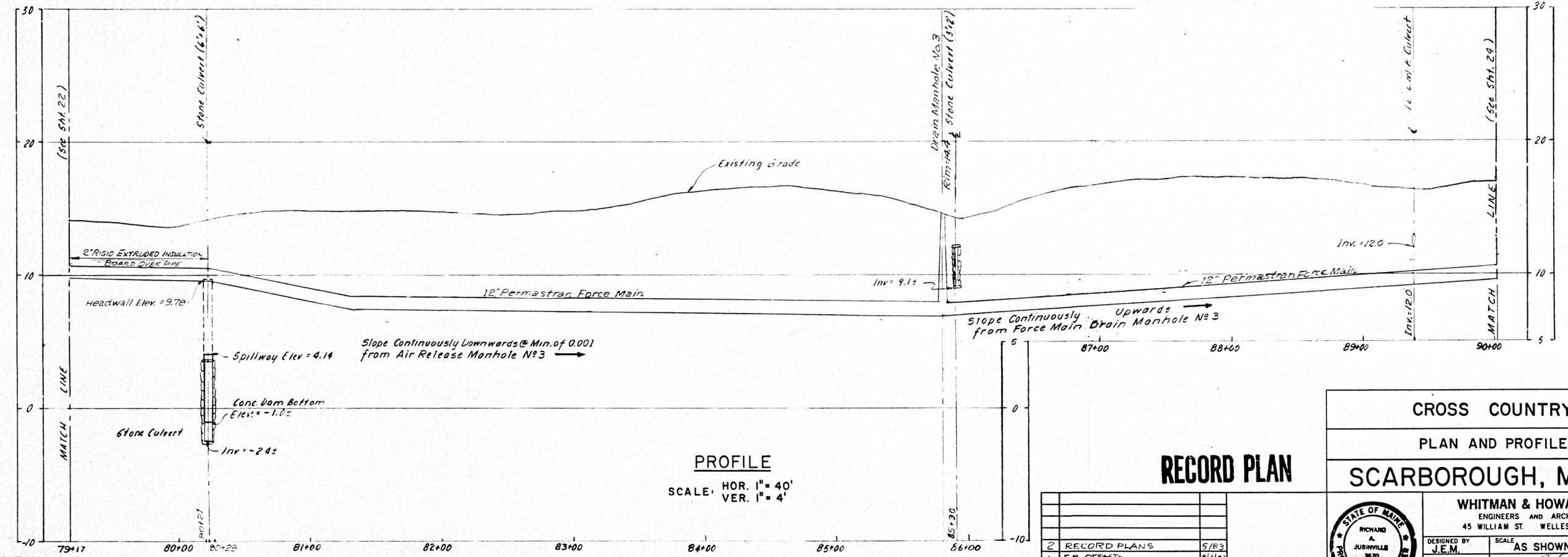
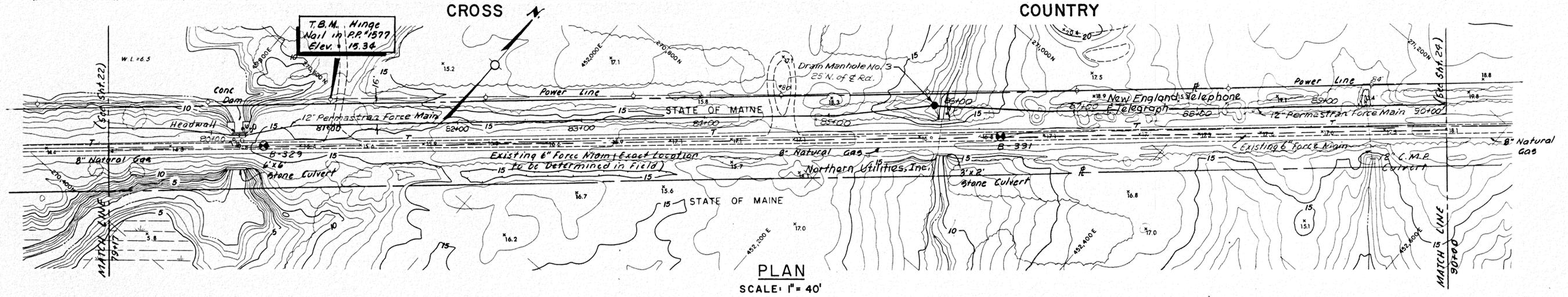
CROSS COUNTRY
PLAN AND PROFILE
SCARBOROUGH, MAINE

NO.	DESCRIPTION	DATE
2	RECORD PLANS	5/83
1	F.M. OFFSETS	5/2/82
	REVISIONS	



WHITMAN & HOWARD INC.
ENGINEERS AND ARCHITECTS
45 WILLIAM ST WELLESLEY, MASS.

DESIGNED BY: J.E.M. SCALE: AS SHOWN DATE: JUNE, 1980
DRAWN BY: N.C.I. APPROVED: [Signature]
CHECKED BY: P.D.D. JOB NO: 8-105 SHEET 22 OF 35 SHEETS



RECORD PLAN

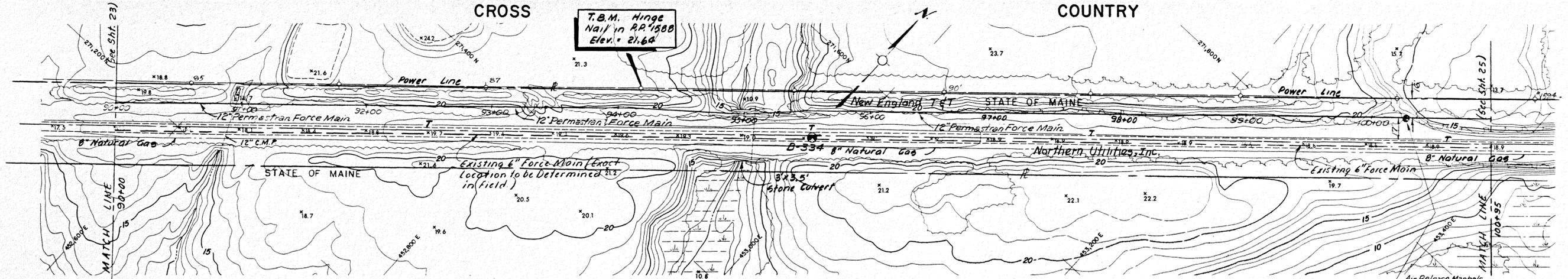
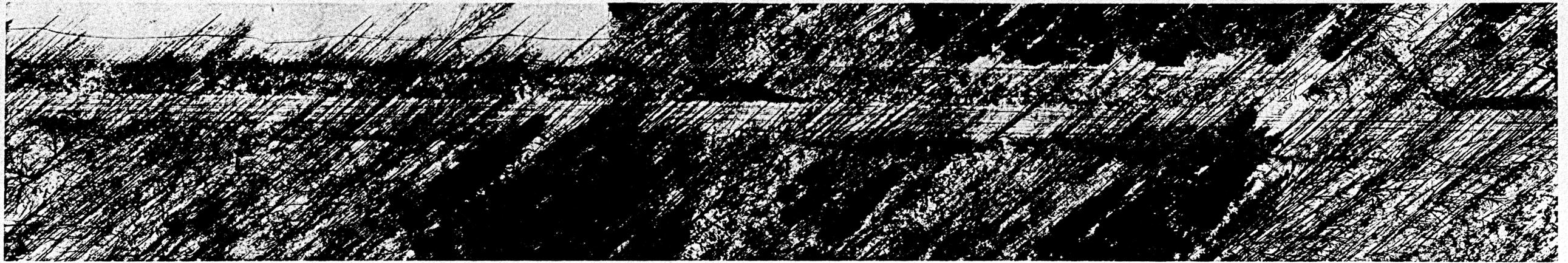
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1	F.M. OFFSETS	3/2/82

CROSS COUNTRY
PLAN AND PROFILE
SCARBOROUGH, MAINE

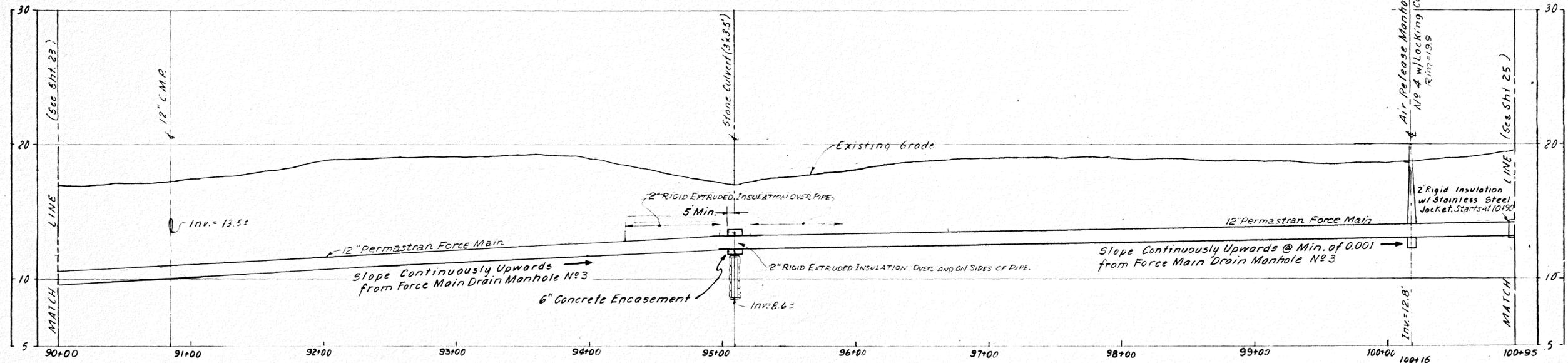
WHITMAN & HOWARD INC.
 ENGINEERS AND ARCHITECTS
 45 WILLIAM ST. WELLESLEY, MASS.

DESIGNED BY: J.E.M. SCALE: AS SHOWN DATE: JUNE, 1980
 DRAWN BY: N.C.T. APPROVED: [Signature]
 CHECKED BY: P.D.D. JOB NO.: 8-105 SHEET 23 OF 35 SHEETS

STATE OF MAINE
 RICHARD A. JUBINVILLE
 REGISTERED PROFESSIONAL ENGINEER



PLAN
SCALE: 1" = 40'

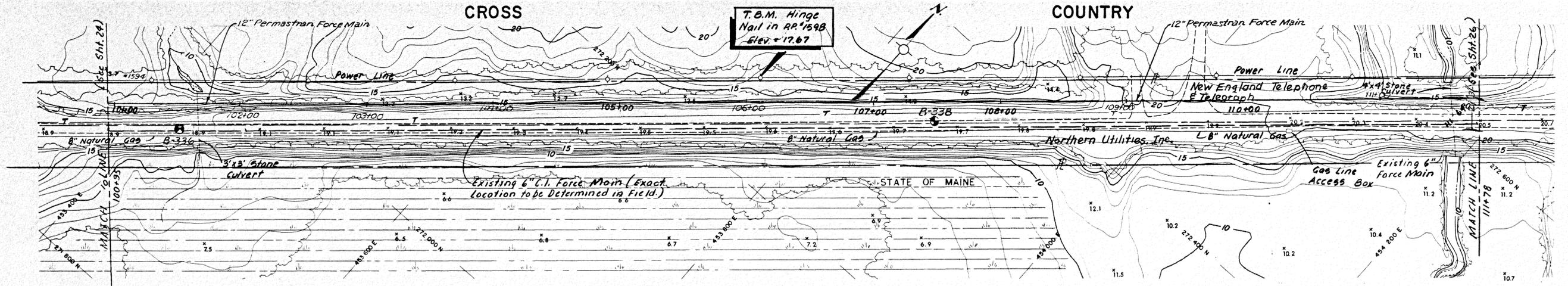


PROFILE
SCALE: HOR. 1" = 40'
VER. 1" = 4'

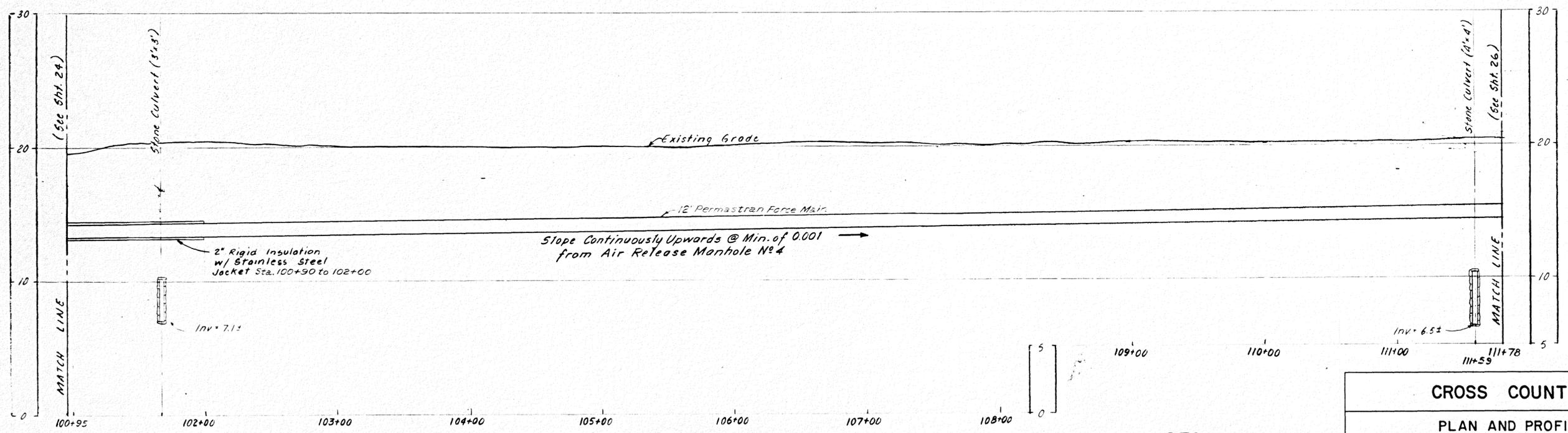
CROSS COUNTRY	
PLAN AND PROFILE	
SCARBOROUGH, MAINE	
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.	
DESIGNED BY J.E.M. N.C.	SCALE AS SHOWN
DATE JUNE, 1980	APPROVED <i>[Signature]</i>
CHECKED BY P.D.D.	JOB NO. 8-105
	SHEET 24 OF 35 SHEETS

RECORD PLANS

NO.	DESCRIPTION	DATE
2	RECORD PLANS	5/83
1	F.M. OFFSETS	5/2/82
	REVISIONS	



12" force main
2 1/3" off Gas Line

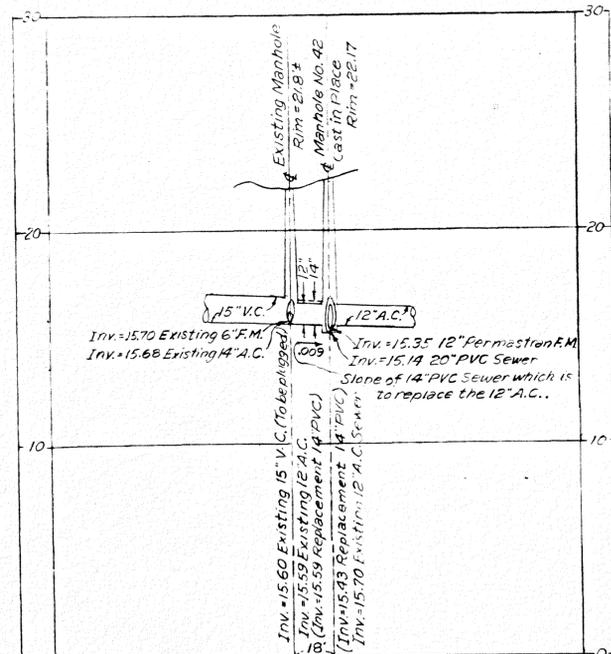
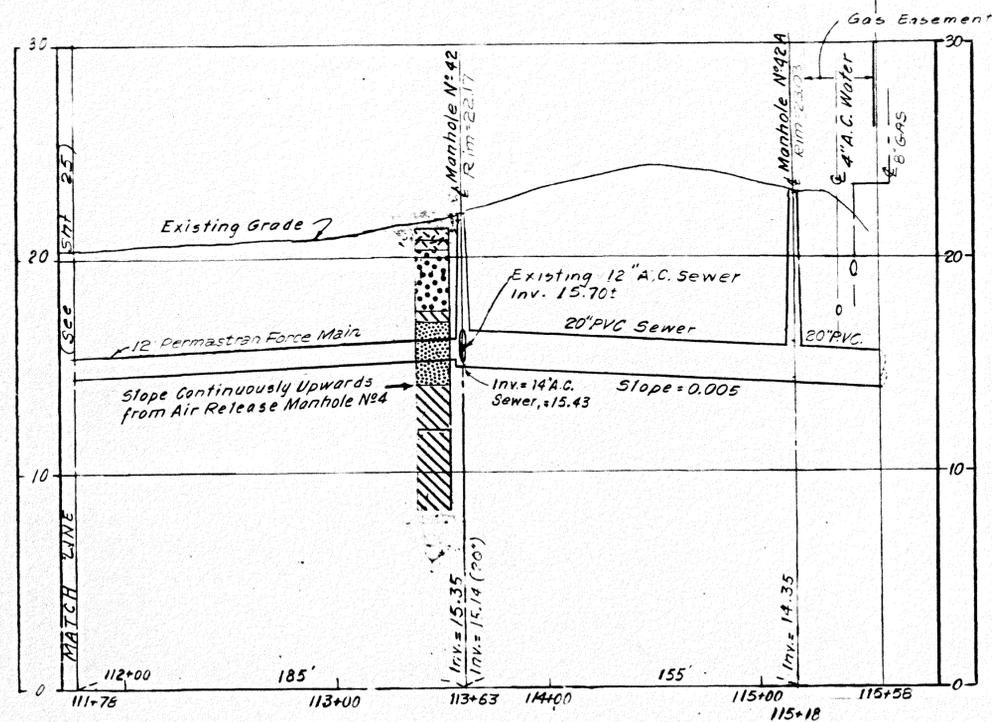
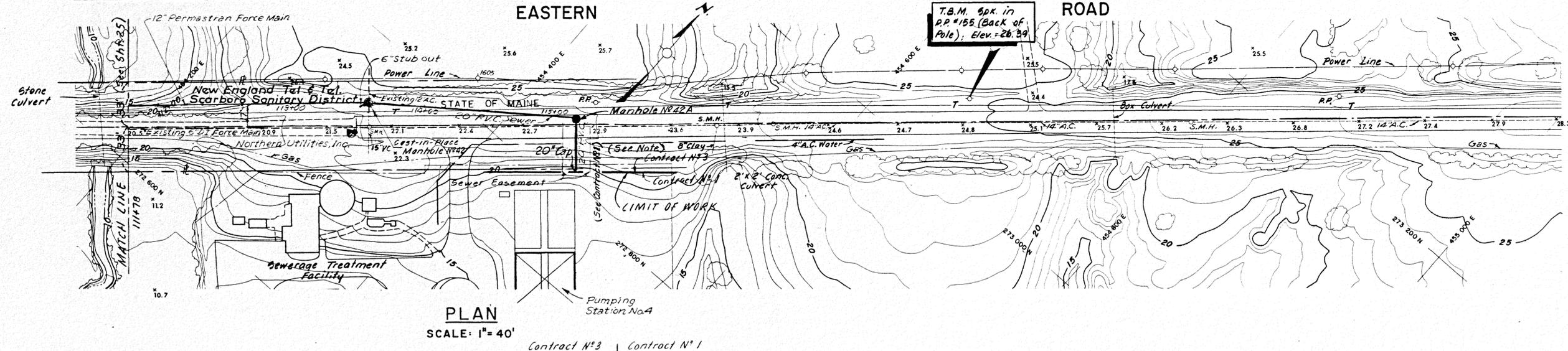


PROFILE
SCALE: HOR. 1" = 40'
VER. 1" = 4'

RECORD PLAN

NO.	DESCRIPTION	DATE
2	RECORD PLANS	5/83
1	F.M. OFFSETS	3/2/82

CROSS COUNTRY	
PLAN AND PROFILE	
SCARBOROUGH, MAINE	
WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.	
DESIGNED BY J.E.M.	SCALE AS SHOWN
DRAWN BY N.C.T.	DATE JUNE, 1980
CHECKED BY P.D.D.	APPROVED <i>[Signature]</i>
JOB NO. 8-105	SHEET 25 OF 35 SHEETS



NOTE:
Existing 12" A.C. Sewer between MH.#42 and Existing Manhole to remain in service. At a later date under another contract, the 12" A.C. Sewer shall be removed and replaced with a 14" PVC Sewer as shown on the plans and the 15" V.C. outlet from the Existing Manhole shall be plugged.

RECORD PLAN

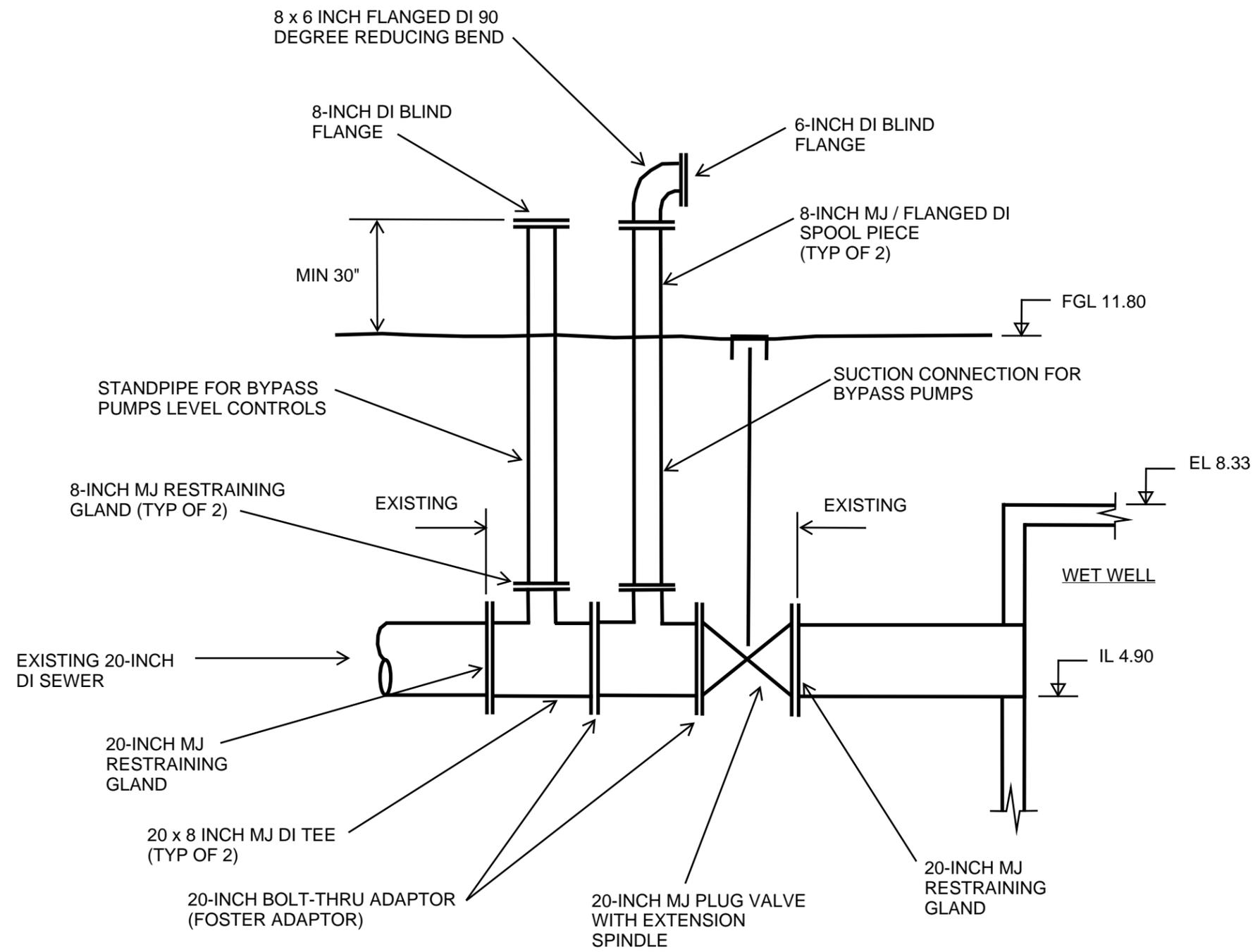
EASTERN ROAD

PLAN AND PROFILE

SCARBOROUGH, MAINE

		WHITMAN & HOWARD INC. ENGINEERS AND ARCHITECTS 45 WILLIAM ST. WELLESLEY, MASS.	
DESIGNED BY J.E.M.	SCALE AS SHOWN	DATE JUNE, 1980	
DRAWN BY N.C.I.	APPROVED <i>[Signature]</i>	CHECKED BY P.D.D.	JOB NO. 8-105
NO. DESCRIPTION DATE		SHEET 26 OF 35 SHEETS	

APPENDIX C
Pumping Station Bypass Details

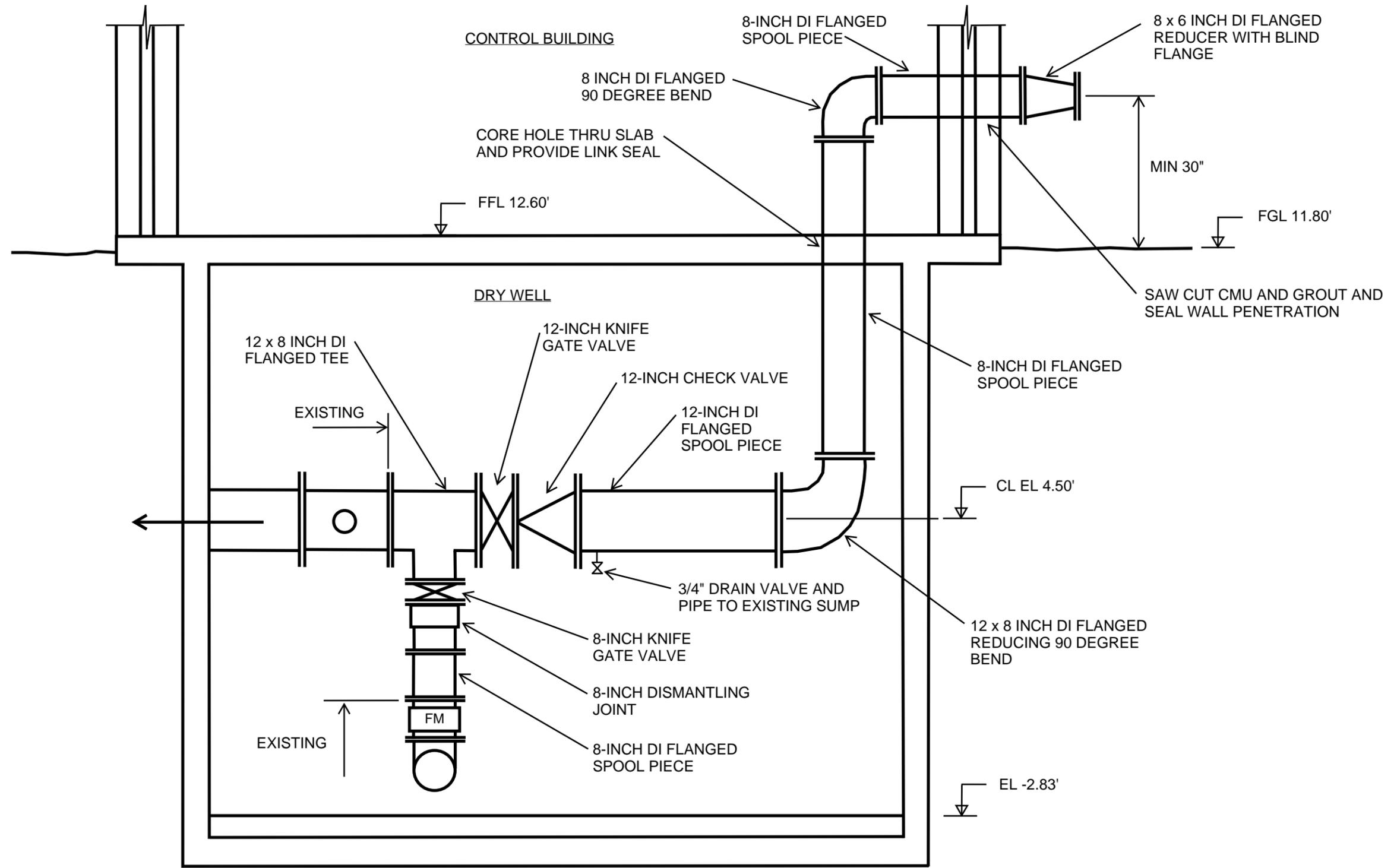


BYPASS PUMPING SUCTION CONNECTION DETAIL

- NOTES:**
1. NOT TO SCALE.
 2. ELEVATIONS TAKEN FROM WHITMAN & HOWARD RECORD DRAWING SHEET 29 OF 35 DATED JUNE 1980.

DATE 09/15/2020	 UNDERWOOD engineers 99 North State Street, Concord, N.H. 03301 Tel. 603-230-9898 Fax. 603-230-9899	PUMPING STATION No. 2 SCARBOROUGH SANITARY DISTRICT PROPOSED BYPASS MODIFICATIONS	FIG.
PROJECT 2567			SK-1

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BYPASS PUMPING DISCHARGE CONNECTION DETAIL

NOTES:
 1. NOT TO SCALE
 2. ELEVATIONS TAKEN FROM WHITMAN & HOWARD RECORD DRAWING SHEET 29 OF 35 DATED JUNE 1980.

DATE	09/15/2020
PROJECT	2567

UNDERWOOD
engineers

99 North State Street, Concord, N.H. 03301
 Tel. 603-230-9898 Fax. 603-230-9899

PUMPING STATION No. 2
 SCARBOROUGH SANITARY DISTRICT
 PROPOSED BYPASS MODIFICATIONS

FIG.
SK-2

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APPENDIX D
Concrete Repair and Lining System

SCARBOROUGH SANITARY DISTRICT
PUMPING STATION No. 2
CONCRETE REPAIR & LINING SYSTEM

Surface Preparation	Verify dryness by testing for moisture with a “plastic tape down test”. Surface Preparation shall be done in accordance with SSPC-SP13. Shot - blast or mechanically abrade the concrete to remove laitance, curing compounds, hardeners, sealers, coatings and other contaminants and to provide surface profile. (Reference ICRI CSP: 5-6 Visual Standards).
Parge Coat	All surfaces to receive full parge coat of Tnemec Series 218/217 Mortar-Clad @ a nominal 1/8 th of an inch, filling all bug holes and cracks to create a void free surface.
1 st Coat	Tnemec Series G435 Perma-Glaze (60-80 mil DFT)
NOTE: Expansion joints and cracks shall be filled and/or covered with a polysulfide sealant product compatible with the interior tank coating as per the coating manufacturer’s recommendations, to prevent leakage from the tank.	

Paint applicator shall be a firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance. Applicators shall provide evidence of at least five (5) locations in which they have applied similar paints and coatings that have successfully weathered for a minimum of five (5) years in a similar environment.

A pre-approved applicator must be used, the following is a list of preapproved applicators:

- a. Knowles Industrial Services Corporation – Gorham, ME (207) 854-1900
- b. Industrial Corrosion Services – Southwick, MA (413) 569-5551
- c. RJ Forbes Painting Contractors, Inc. – Attleboro, MA (508) 226-4858
- d. Keltic X Painting Company – Northboro, MA (860) 377-1558
- e. Van de Graaf Painting – Portland, ME (207) 878-6812
- f. Copia Specialty Contractors – Brewer, ME (207) 989-3082
- g. John W. Egan Company – West Newton (617) 244-6390

PRODUCT DATA SHEET

Sika® Armatec®-110 EpoCem

BONDING PRIMER AND REINFORCEMENT CORROSION PROTECTION

PRODUCT DESCRIPTION

Sika® Armatec®-110 EpoCem is a cementitious epoxy resin compensated 3-component, solvent-free, coating material with corrosion inhibitor, used as bonding primer and reinforcement corrosion protection.

USES

- Suitable in concrete repair as corrosion protection for reinforcement
- Suitable as a bonding primer on mortar, steel, and on placing fresh, plastic concrete to existing hardened concrete
- Protection to reinforcing steel in areas of thin concrete cover

CHARACTERISTICS / ADVANTAGES

- Contains EpoCem® technology - improved bonding agent
- Extended open times for repair mortars
- Excellent adhesion to concrete and steel
- Contains corrosion inhibitor
- Good resistance to water and chloride penetration
- High shear strength
- Long pot life
- Can be brushed on or applied using spray gun
- Can be used exterior on-grade
- Excellent bonding bridge for cement or epoxy based repair mortars
- High strength, unaffected by moisture when cured
- Non-flammable, solvent free

PRODUCT INFORMATION

Chemical Base	Portland cement, epoxy resin, selected aggregates and additives.				
Packaging	Unit	A	B	C	ABC
	3.5 gal (13.2 L)	47.6 oz (1.4 L)	122.1 oz (3.6 L)	46.82 lb (21.3 kg)	A + B in carton, C in bag
	1.65 gal (6.2 L)	22.7 oz (0.67 L)	57.6 oz (1.7 L)	5.5 lb (2.5 kg) (4 bags)	Factory- proportioned units in a pail
Appearance / Color	Component A		White liquid		
	Component B		Colorless liquid		
	Component C		Gray powder		
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging				
Storage Conditions	Store dry at 40–95 °F (4–35 °C)				

Protect Component A and B from freezing. If frozen, discard.
Protect Component C from moisture. If damp, discard.

TECHNICAL INFORMATION

Compressive Strength	3 days	4,500 psi (31.0 MPa)	(ASTM C-109) 73 °F (23 °C) 50 % R.H.
	7 days	6,500 psi (44.8 MPa)	
	28 days	8,500 psi (58.6 MPa)	
Flexural Strength	28 days	1,250 psi (8.6 MPa)	(ASTM C-348) 73 °F (23 °C) 50 % R.H.
Splitting Tensile Strength	28 days	600 psi (4.1 MPa)	(ASTM C-496) 73 °F (23 °C) 50 % R.H.
Tensile Adhesion Strength	Bond of steel reinforcement on concrete		
	Sika® Armatec® 110 EpoCem coated	625 psi (4.3 MPa)	(ASTM C-1583) 73 °F (23 °C) 50 % R.H.
	Epoxy coated	508 psi (3.5 MPa)	
	Plain reinforcement	573 psi (4.0 MPa)	
Slant Shear Strength	Bonding agent properties (14 d. moist cure, plastic to hardened concrete)		
	Wet on wet	2,800 psi (19.3 MPa)	(ASTM C-882) 73 °F (23 °C) 50 % R.H.
	24 hr. open time	2,600 psi (17.9 MPa)	
Permeability to Water Vapor	Control	7.32 x 10 ⁻¹⁰ ft/sec	
	145 psi (10 bar)	8.92 x 10 ⁻¹⁵ ft/sec	
Diffusion Resistance to Water Vapor	μ H ₂ O ~100		
Permeability to CO₂	μ CO ₂ ~14,000		
Corrosion Test	Time-to-Corrosion Study		
	<ul style="list-style-type: none"> Sika® Armatec®-110 EpoCem more than tripled the time to corrosion Reduced corrosion rate by over 40 % 		

APPLICATION INFORMATION

Fresh Mortar Density	A+B+C ~125 lb/ft ³ (~2.0 kg/l)		
Coverage	Bonding agent	80 ft ² /gal (7.4 m ² /l)	
	Corrosion Protection	40 ft ² /gal (3.7 m ² /l)	
(Coverage figures do not include allowance for surface profile and porosity or material waste)			
Layer Thickness		Min. thickness of 1 coat	Coat
	Bonding agent	20 mils	1
	Corrosion Protection	20 mils	2
Product Temperature	65°-75°F (18°-24°C)		
Ambient Air Temperature	40–95 °F (5–35 °C)		
Substrate Temperature	40–95 °F (5–35 °C)		
Pot Life	~ 90 minutes		
Waiting / Recoat Times	Sika repair mortars and non-fast setting concrete can be applied on Sika® Armatec®-110 EpoCem within a maximum time of:		

Temperature	Maximum Waiting Time
80°- 95 °F (26°- 35 °C)	6 hours
65°-79 °F (18°- 26 °C)	12 hours
50°- 64° F (10°- 17° C)	16 hours
40°- 49° F (4°- 9° C)	wet-on-wet

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Concrete

- Free from dust, loose material, surface contamination and materials which reduce bond or prevent suction or wetting by repair materials.
- Delaminated, weak, damaged and deteriorated concrete and where necessary sound concrete shall be removed by suitable means.
- Substrate must be Saturated Surface Dry (SSD) with no standing water.

Steel reinforcement

- Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed by blast cleaning or other means of mechanical abrasion and reinforcement.
- Should be fully exposed and have all corrosion removed.

MIXING

- Sika® Armatec®-110 EpoCem can be mixed with a low-speed (< 250 rpm) electric drill mixer.
- Shake components A and B thoroughly before opening.
- Pour liquid components A and B into a suitable mixing vessel and mix for 30 seconds.
- While still mixing components A and B slowly add powder component C.
- Mix the three components together for a minimum 3 minutes until blend is uniform and free of lumps, minimizing addition of air.
- Mix only the quantity that you can be applied within the pot life.
- DO NOT ADD WATER.

APPLICATION

As reinforcement corrosion protection

- Apply by stiff-bristle brush or spray at 80 ft² /gal.
- Take special care to properly coat the underside of the totally exposed steel.
- Allow coating to dry 2-3 hours at 73 °F, then apply a second coat at the same coverage.
- Allow to dry again before the repair mortar or concrete is applied.
- Pour or place repair within 7 days

As a bonding primer

- Apply using a stiff-bristle brush or broom. To achieve good bond, Sika® Armatec®-110 EpoCem must be applied well into the substrate, filling all pores and ensure complete coverage of all surface irregularities (minimum layer thickness 1/64" (0.5 mm).
- Spray apply with Goldblatt Pattern Pistol or equal equipment.
- Apply the freshly mixed patching mortar or concrete wet on wet, or up to the maximum recommended open time, onto the bonding slurry.

CURING TREATMENT

Sika® Armatec®-110 EpoCem must be protected against contamination and rain until application of the repair mortar.

CLEANING OF TOOLS

Clean all tools and application equipment with water immediately after use. Hardened material can only be mechanically removed.

LIMITATIONS

- Avoid application in direct sun and/or strong wind and/or rain.
- Do not add water.
- Not a vapor barrier.
- Apply only to sound, prepared substrates.
- Not recommended for use with expansive grouts and SikaQuicks
- Use of semi-dry mortars onto Sika® Armatec®-110 EpoCem must be applied "wet on wet"
- When used in overhead applications with hand placed patching mortars, use "wet on wet" for maximum mortar built thickness.
- Substrate profile as specified by the overlay or repair material is still required.
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur® Hi-Mod 32.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

DIRECTIVE 2004/42/CE - LIMITATION OF EMISSIONS OF VOC

A+B+C combined _____ 50 g/l _____

LEGAL DISCLAIMER

- KEEP CONTAINER TIGHTLY CLOSED
- KEEP OUT OF REACH OF CHILDREN
- NOT FOR INTERNAL CONSUMPTION
- FOR INDUSTRIAL USE ONLY
- FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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Product Data Sheet

Sika® Armatec®-110 EpoCem
March 2020, Version 01.02
020302020050000003

SikaArmatec-110EpoCem-en-US-(03-2020)-1-2.pdf





PRODUCT PROFILE

GENERIC DESCRIPTION Cementitious Repair Mortar

COMMON USAGE A single-component, rapid setting, hydraulic cementitious resurfacer used to restore deteriorated concrete surfaces.

COLORS Gray

SPECIAL QUALIFICATIONS Series 217 is acceptable for use on the interior of potable water concrete storage tanks and reservoirs when topcoated with an NSF/ANSI Std. 61 certified protective coating. Contact your Tnemec representative for approved systems and additional information.

COATING SYSTEM

PRIMERS Concrete: Series 217 Bond Coat †
 † A thin bond coat (scrub coat) is required. Refer to the Series 217 MortarCrete *Surface Preparation and Application Guide* or Contact Tnemec Technical Services with questions.

TOPCOATS Series 22, FC22, 27WB, 46H-413, L69, L69F, N69, N69F, V69, V69F, 120, L140, L140F, N140, N140F, V140, V140F, 201, 215, 218, 237SC, 239SC, 434, 435, 436, 446
Note: Series 217 must be mechanically prepared in accordance with SSPC-SP13/NACE 6, ICRI-CSP4-5 surface profile prior to application of recommended topcoats. Shrinkage cracks in the Series 217 may require filling with Series 215 or Series 218 to prevent transfer or telegraphing of any cracks. Contact Tnemec Technical Services for additional information.

SURFACE PREPARATION

REINFORCING STEEL The repair of deteriorated concrete resulting from reinforcing steel corrosion should be in accordance with ICRI Technical Guideline No. 310.1R. Concrete reinforcing steel (rebar) can be primed with Tnemec Series 1 or 69.

CONCRETE Remove all loose materials, deteriorated concrete, laitance, existing coatings, and other bond-inhibiting materials from the surface in accordance with SSPC-SP13/NACE 6, minimum surface profile of ICRI-CSP6.

EDGE CONDITIONING The edges of the patch should be sawcut perpendicular to the surface to a depth of at least 1/4 inch (6 mm). Break out the complete repair area to a minimum depth of 1/4 inch (6 mm) up to the sawed edge to prevent feather edging. Avoid cutting the reinforcing steel.

ALL SURFACES Must be clean and free of oil, grease and other contaminants. Always take precautions to prohibit the surface from becoming contaminated prior to product application.

TECHNICAL DATA

RECOMMENDED DFT **Horizontal/Vertical:** 1/4 inch (6 mm) to 4 inches (102 mm)
Overhead: 1/4 inch (6 mm) to 2 inches (51 mm)

CURING TIME	Temperature	Initial Set	Final Set	To Topcoat
	70°F (21°C)	60 minutes	90 minutes	12 hours

Note: Use Series 211-217 Slow Set additive to extend set times. Refer to Series 211-217 Slow Set product data sheet for information.

VOLATILE ORGANIC COMPOUNDS 0.0 lbs/gallon (0 grams/litre)

NUMBER OF COMPONENTS One: 2.4 gallons/0.3 cu ft (9.0 L) (dry volume) approximately

MIXING RATIO Add 3 to 5 quarts (2.8 to 4.7 L) potable water per 55 lb (23 kg) plant-proportioned, pre-blended unit. Do not mix partial units.

PACKAGING 5 gallon bucket

NET WEIGHT 55 lbs (23 kg)

STORAGE TEMPERATURE Condition product to 65°F-75°F (18°C-24°C) 24 hours before using. Protect from moisture; store in dry environment.

SHELF LIFE 6 months in original, unopened packaging at recommended storage conditions.

HEALTH & SAFETY This product contains chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product.
Keep out of the reach of children.

MORTARCRETE® | SERIES 217

APPLICATION

SPREADING RATE

Prior to application, review the Series 217 MortarCrete *Surface Preparation and Application Guide*. Approximate theoretical spread rate based upon 4 quarts (3.8 L) of water to yield 3.4 gal/0.45 cu ft (12.9 L) unit.

Thickness	0.25 in. (.635 cm)	0.50 in. (1.27 cm)	0.75 in. (1.91 cm)	1.00 in. (2.54 cm)	1.25 in. (3.18 cm)	1.50 in. (3.81 cm)	1.75 in. (4.45 cm)	2.00 in. (5.08 cm)
Coverage	21.6 (2.01 m ²)	10.8 (1.00 m ²)	7.2 (.67 m ²)	5.4 (.50 m ²)	4.32 (.40 m ²)	3.6 (.33 m ²)	3.0 (.28 m ²)	2.7 (.25 m ²)

Thickness	2.25 in. (5.72 cm)	2.50 in. (6.35 cm)	2.75 in. (6.99 cm)	3.00 in. (7.62 cm)	3.25 in. (8.26 cm)	3.50 in. (8.89 cm)	3.75 in. (9.53 cm)	4.00 in. (10.16 cm)
Coverage	2.4 (.22 m ²)	2.2 (.20 m ²)	2.0 (.19 m ²)	1.8 (.17 m ²)	1.7 (.16 m ²)	1.5 (.14 m ²)	1.4 (.13 m ²)	1.3 (.12 m ²)

Note: Application below minimum or above maximum spreading rates may adversely affect product performance.

WORKING TIME

Approximately 20-30 minutes at 75°F (24°C), & 50% R.H. Placement time is dependent on environmental conditions and mixing water/set control amounts. Do not retemper the mortar with additional water. **Note:** Do not wait for bleed water. Finish surface as soon as material condition allows.

MIXING

Remove Series 217 from the 5-gallon plastic pail. Add 3-5 quarts (2.8 to 4.7 L) of potable water to a clean bucket. **Note:** Elevated water temperature can significantly reduce working time. **Note:** For repair of large bugholes, honeycomb and other cavities deeper than the recommended maximum thickness, 15-20 lbs of locally purchased pea gravel (coarse aggregate) can be post-added with 3.0 to 3.5 quarts of water to Series 217, to create "dry-pack" mortar. One half inch to No. 8 size (12.5 mm to 2.36 mm) pea gravel conforming to ASTM C 33 is recommended. Contact your Tnemec representative or Tnemec Technical Services for additional information.

Optional: Depending on the ambient temperature and desired consistency, add up to 3 packets of Series 211-217 Slow Set additive into the mixing water (refer to the Series 211-217 product data sheet). Under mechanical agitation with a slow-speed drill (400-600 rpm) and H-Style (box blade) mixing paddle, slowly sift powder into mixing bucket. Mix 1-4 minutes until fully blended. Avoid extended over-mixing.

APPLICATION

Substrate: Concrete substrate shall be "pre-wet" or dampened with potable water to a Saturated Surface Dry (SSD) condition prior to Series 217 application; the concrete substrate is darkened by water but there is no pooling of water on the concrete.

Bond Coat: Using a masons brush or rubber sponge, work a thin bond coat (scrub coat) of Series 217 into the SSD substrate to ensure intimate contact and to help prevent sloughing or sagging of repair materials on vertical and overhead surfaces.

Mortar: Apply the Series 217 with adequate pressure before the scrub coat dries. Thoroughly consolidate the repair material into the corners of patch and around any exposed reinforcement steel in the repair zone. Full encapsulation of the reinforcement and intimate contact with substrate is important for long-term durability.

Finishing: Do not wait for bleed water. Finish Series 217 by striking off with a straight edge and close with the recommended concrete finishing tools, as conditions allow, to create a smooth, even surface.

CURING

Begin water curing as soon as the surface has lost its moist sheen. Keep exposed surfaces wet for a minimum of 2 hours. The objective of water curing shall be to maintain a continuously wet surface until the product has achieved sufficient strength. When experiencing extended setting times, due to cold temperature or the use of Series 211-217, longer cure times may be required. Contact Tnemec Technical Services for additional information.

APPLICATION EQUIPMENT

Hand troweling can be accomplished using steel concrete finishing trowels, broad knives, rubber floats, wooden floats or plastic floats. Material may be spray transferred using low-pressure grout pumps or high-pressure wet-mix shotcrete equipment. Contact Tnemec Technical Services for additional information.

Spray Application Equipment

Pump	Fluid Line	Spray Gun	Fluid Tips	Fluid Pressure	Atomizing Pressure	Hopper
Graco M680 10:1 Ratio	25' 1" Diameter 10' 3/4" Diameter	Flex Hose	No. 5 Nozzle	300 psi (Adjust as necessary)	Adjust at gun for proper atomization	10 Gallons Stainless Steel

Refer to the operation manual for application instructions. **Atomization air must be dry, the use of an after cooler is recommended.**

TEMPERATURE REQUIREMENT

Minimum substrate and ambient application temperature 45°F (7°C) and rising. Do not apply if expected to fall below this temperature within 24 hours of application.

CLEANUP

Uncured material can be removed with water. Cured material can only be removed mechanically.

WARRANTY & LIMITATION OF SELLER'S LIABILITY: Tnemec Company, Inc. warrants only that its coatings represented herein meet the formulation standards of Tnemec Company, Inc. THE WARRANTY DESCRIBED IN THE ABOVE PARAGRAPH SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. The buyer's sole and exclusive remedy against Tnemec Company, Inc. shall be for replacement of the product in the event a defective condition of the product should be found to exist and the exclusive remedy shall not have failed its essential purpose as long as Tnemec is willing to provide comparable replacement product to the buyer. NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, ENVIRONMENTAL INJURIES OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO THE BUYER. Technical and application information herein is provided for the purpose of establishing a general profile of the coating and proper coating application procedures. Test performance results were obtained in a controlled environment and Tnemec Company makes no claim that these tests or any other tests, accurately represent all environments. As application, environmental and design factors can vary significantly, due care should be exercised in the selection and use of the coating.



PRODUCT PROFILE

GENERIC DESCRIPTION Epoxy Modified Cementitious Mortar

COMMON USAGE A high-performance, aggregate reinforced material for surfacing, patching and filling voids and bugholes in concrete substrates. Generally topcoated with a variety of high-performance epoxies and polyurethanes for use in mild to aggressive exposures.

COLORS Greenish Gray

COATING SYSTEM

PRIMERS **Concrete:** Self-priming
CMU: Self-priming

TOPCOATS Series 1, 20, 22, FC22, 30, 46H-413, 61, 66, L69, N69, 84, 104, 120, L140, N140, 151-1051, 161, 201, 205, 222, 223, 224, 237, 238, 239, 262, 264, 270, 273, 280, 281, 282, 406, 434, 435, 436, 446.
Note: Refer to the applicable topcoat data sheet for color availability and additional information.

SURFACE PREPARATION

Prepare surfaces by method suitable for exposure and service. Refer to the appropriate topcoat product data sheet for specific surface preparation recommendations.

CONCRETE Allow new cast-in-place concrete to cure a minimum of 28 days at 75°F (24°C). Verify concrete dryness in accordance with ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (moisture vapor transmission should not exceed three pounds per 1,000 square feet in a 24 hour period), F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes" (relative humidity should not exceed 80%), or D 4263 "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method" (no moisture present). Prepare concrete surfaces in accordance with NACE No. 6/SSPC-SP13 Joint Surface Preparation Standards and ICRI Technical Guidelines. Abrasive blast, shot-blast, water jet or mechanically abrade concrete surfaces to remove laitance, curing compounds, hardeners, sealers and other contaminants and to provide a minimum ICRI-CSP 5 surface profile. Large cracks, voids and other surface imperfections should be filled with a recommended filler or surfacer.

CMU Allow mortar to cure for 28 days. Level protrusions and mortar spatter.

PAINTED SURFACES Not recommended.

ALL SURFACES Must be clean, dry and free of oil, grease and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS 100% (mixed)

RECOMMENDED DFT **Parge Coat:** 1/16"-1/4" per lift; maximum 1/2" thickness
Feather-edge Capable: 1/32"

CURING TIME

Temperature	To Touch	To Recoat with Itself	To Topcoat
75°F (24°C) & 50% R.H.	3-4 hours	unlimited †	15 hours minimum

† **Note:** When the first application is equal to or greater than 1/4", or the second application is equal to or greater than 1/4", then the maximum recoat window with itself is 2 hours.

VOLATILE ORGANIC COMPOUNDS **Unthinned:** 0.15 lbs/gallon (19 grams/litre)

NUMBER OF COMPONENTS Three—Liquid: Part A and Part B Powder: Part C

PACKAGING KIT CONSIST OF:

	PART A (Liquid)	PART B (Liquid)	PART C (Cement-Sand)	When Mixed
Large Kit	1 gal plastic jug	1 qt can	42.75 lb bag	2.8 gallons (10.6 L)

NET WEIGHT Large Kit: 51.53 lbs (23.37 kg)

STORAGE TEMPERATURE Minimum 40°F (4°C) Maximum 110°F (43°C)
For optimum handling and application characteristics, all material components should be stored or conditioned between 70°F to 90°F (21°C to 32°C) 48 hours prior to use. Protect Parts A & B from freezing; discard if frozen. Protect Part C from moisture; store in dry environment off ground.

TEMPERATURE RESISTANCE (Dry) Continuous 170°F (77°C) Intermittent 200°F (93°C)

SHELF LIFE 12 months at recommended storage temperature.

FLASH POINT - SETA N/A

HEALTH & SAFETY This product contains chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product.
Keep out of the reach of children.

MORTARCLAD™ | SERIES 218

APPLICATION

COVERAGE RATES

Thickness	Large Kit
1/16" (1.6 mm)	72 sq ft (6.7 m ²) theoretical
1/8" (3.1 mm)	36 sq ft (3.3 m ²) theoretical
1/4" (6.4 mm)	18 sq ft (1.7 m ²) theoretical

Allow for application losses due to surface irregularities and substrate porosity.

MIXING

Pour liquid Part B into new empty bucket. Any remaining Part B shall be removed by adding 3-5 ounces of liquid Part A, re-sealing lid and shaking quart can for 5-10 seconds; pour contents into bucket. Add remaining liquid Part A into bucket and blend for 30 seconds. Under agitation, slowly sift Part C powder into the mixed liquids taking care not to deposit entire contents of Part C at once. Mix for two minutes or until the cement-sand is thoroughly wetted and a smooth consistency is achieved. **Important: Do not add additional Part C.**

Note: For repair of large bugholes, honeycomb and other cavities deeper than the recommended maximum thickness, 20-25 lbs of multi-purpose clean sand (conforming to ASTM C 33) or 15-18 lbs of locally purchased pea gravel (coarse aggregate) can be post added to create "dry-pack" mortar. One half inch to No. 8 size (12.5 mm to 2.36 mm) pea gravel conforming to ASTM C 33 is recommended. Contact your Tnemec representative or Tnemec Technical Services for additional information.

THINNING

Normally not required. For low-pressure spray application to transfer the Series 218, may thin up to 6 oz. for large kit. Use only potable water.

POT LIFE

1 hour at 75°F (24°C).

Caution: Thinning with high temperature water will significantly reduce the pot life. For best results, water temperature should not exceed 80°F (27°C).

SUBSTRATE CONDITIONING

The concrete substrate surface should be "pre-wet" or dampened with potable water to a Saturated Surface Dry (SSD) condition; the concrete is darkened by water but there is no pooling of water on the concrete. This can be done by using a Hudson pump-up sprayer or heavy nap roller cover dampened with potable water. **Note:** Do not over saturate the surface.

APPLICATION EQUIPMENT

Mortar Hawk, steel, stiff concrete finishing trowels, broad knives and rubber floats are recommended. For troweling inside and outside corners, the use of a radius or margin trowel is recommended. Material can be transferred to the surface by utilizing hydraulic spray equipment (i.e. WIWA 410 9:1 or 600 12:1 pump) followed by troweling to seal the material. No special ACI 308 curing requirements - ambient cure only. For a smoother finished appearance, trowel licks may be reduced by using a 1/4" nap roller cover lightly dampened with water over the sealed Series 218 material. **Note:** If white liquid is brought to the surface during this process, the Series 218 material is being overworked and/or oversaturated. Overworking or oversaturating the surface may have an adverse effect on the adhesion of subsequent coatings applied. Let Series 218 cure and remove surface deposit using concrete rub brick.

SURFACE TEMPERATURE

Minimum of 45°F (7°C), optimum 65°F to 80°F (18°C to 27°C), maximum of 90°F (32°C). The substrate temperature should be at least 5°F (3°C) above the dew point.

MATERIAL TEMPERATURE

For optimum application, handling and performance, the material temperature during application should be between 70°F and 90°F (21°C and 32°C). Temperature will affect the workability. Cool temperatures increase viscosity and decrease workability. Warm temperatures will decrease viscosity and shorten pot life.

CLEANUP

Flush and clean all equipment immediately after use with warm water.

WARRANTY & LIMITATION OF SELLER'S LIABILITY: Tnemec Company, Inc. warrants only that its coatings represented herein meet the formulation standards of Tnemec Company, Inc. THE WARRANTY DESCRIBED IN THE ABOVE PARAGRAPH SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. The buyer's sole and exclusive remedy against Tnemec Company, Inc. shall be for replacement of the product in the event a defective condition of the product should be found to exist and the exclusive remedy shall not have failed its essential purpose as long as Tnemec is willing to provide comparable replacement product to the buyer. NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, ENVIRONMENTAL INJURIES OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO THE BUYER. Technical and application information herein is provided for the purpose of establishing a general profile of the coating and proper coating application procedures. Test performance results were obtained in a controlled environment and Tnemec Company makes no claim that these tests or any other tests, accurately represent all environments. As application, environmental and design factors can vary significantly, due care should be exercised in the selection and use of the coating.



PERMA-GLAZE SERIES G435

PRODUCT PROFILE

GENERIC DESCRIPTION Modified Polyamine Epoxy

COMMON USAGE A versatile, thick film, 100% solids, abrasion-resistant lining specifically designed for domestic and industrial wastewater immersion and fume environments. Series 435 provides low permeation to H₂S gas, protects against MIC and provides chemical resistance to severe wastewater environments. Contains micro-fiber reinforcement for improved film integrity.

COLORS 5020 Gray, 5023 Beige. **Note:** Epoxies chalk with extended exposure to sunlight.

FINISH Gloss

COATING SYSTEM

SURFACER/FILLER/PATCHER Series 215, 217, 218.

PRIMERS **Steel:** Self-priming or Series L69, L69F, N69, N69F, V69, V69F.
Concrete: Self-priming or Series L69, L69F, N69, N69F, V69, V69F, 201.
Note: Series 435 must be applied to Series L69, L69F, N69, N69F, V69, V69F within 7 days. Scarify the surface with fine abrasive before topcoating if exceeding this maximum recoat window.

INTERMEDIATE Series 434 or 436 (optional)

Note: To minimize pinhole formation in the topcoat, it is recommended that concrete substrates be fully resurfaced and/or primed prior to topcoat application.

SURFACE PREPARATION

Prepare surfaces by method suitable for exposure and service. Refer to the appropriate primer data sheet for specific recommendations.

STEEL SSPC-SP5/NACE 1 White Metal Blast Cleaning with a 3.0 mil minimum angular anchor profile.

CONCRETE Allow new cast-in-place concrete to cure a minimum of 28 days at 75°F (24°C). Verify concrete dryness in accordance with ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (moisture vapor transmission should not exceed three pounds per 1,000 square feet in a 24 hour period), F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes" (relative humidity should not exceed 80%), or D 4263 "Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method" (no moisture present). Prepare concrete surfaces in accordance with NACE No. 6/SSPC-SP13 Joint Surface Preparation Standards and ICRI Technical Guidelines. Abrasive blast, shot-blast, water jet or mechanically abrade concrete surfaces to remove laitance, curing compounds, hardeners, sealers and other contaminants and to provide a minimum ICRI-CSP 5 surface profile. Large cracks, voids and other surface imperfections should be filled with a recommended filler or surfacer.

OTHER SUBSTRATES Contact your Tnemec representative or Tnemec Technical Services.

ALL SURFACES Must be clean, dry and free of oil, grease and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS 100% (mixed)

RECOMMENDED DFT **Steel:** 15.0 to 40.0 mils (380 to 1015 microns) in one or two coats.
Concrete: 30.0 to 40.0 mils (760 to 1015 microns) in one or two coats.
Hi-Build Option: 40.0 to 125.0 mils (1015 to 3175 microns) in one or two coats.
Glaze Coat Option (over Series 434 or 436): 15.0 to 20.0 mils (380 to 510 microns).
Note: Number of coats and thickness requirements will vary with substrate, application method and exposure. Contact your Tnemec representative.

CURING TIME	Temperature	To Touch	Dry Through	To Place in Service	Max. Recoat
	75°F (24°C)	3 hours	14 hours	2 days	7 days
	55°F (13°C)	7 hours	30 hours	3 days	7 days

Note: If more than 7 days have elapsed between coats, the Series 435 coated surface must be mechanically abraded before topcoating. Curing time will vary with surface temperature, air movement, humidity and film thickness. **Note:** Use "To Touch" cure information for minimum recoat times if succeeding coats are spray-applied and "Dry Through" if succeeding topcoats are applied by roller or brush.

VOLATILE ORGANIC COMPOUNDS EPA Method 24
Unthinned: 0.32 lbs/gallon (38 grams/litre)

HAPS 0.1 lbs/gal solids

THEORETICAL COVERAGE 1,604 mil sq ft/gal (39.4 m²/L at 25 microns). See APPLICATION for coverage rates.

NUMBER OF COMPONENTS Two: Part A (Epoxy) and Part B (Amine)

MIXING RATIO By volume: One (Part A) to one (Part B)

	PART A (partial fill)	PART B (partial fill)	When Mixed
Large Kit †	5 gallon pail	5 gallon pail	8 gallons (30.28 L)
Medium Kit	3 gallon pail	6 gallon pail	5 gallons (15.14 L)
Small Kit	1 gallon can	1 gallon can	1 gallon (3.79 L)

† Plural Component application only.

NET WEIGHT PER GALLON 10.85 ± 0.25 lbs (4.92 ± .11 kg) (mixed)

PERMA-GLAZE | SERIES G435

STORAGE TEMPERATURE Minimum 40°F (4°C) Maximum 110°F (43°C)
 For optimum handling and application characteristics, both material components should be stored or conditioned between 70°F and 80°F (21°C and 27°C) 48 hours prior to use.

TEMPERATURE RESISTANCE (Dry) Continuous 275°F (135°C) Intermittent 300°F (149°C)

SHelf LIFE 12 months at recommended storage temperature.

FLASH POINT - SETA Part A: >230°F (110°C) Part B: 184°F (84°C)

HEALTH & SAFETY This product contains chemical ingredients which are considered hazardous. Read container label warning and Safety Data Sheet for important health and safety information prior to the use of this product.
Keep out of the reach of children.

APPLICATION

COVERAGE RATES Before commencing, obtain and thoroughly read the Series 435 Surface Preparation and Application Guide.

	Conventional Build (Spray, Brush or Roller)			Hi-Build (Spray Only)		
	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m ² /Gal)	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m ² /Gal)
Minimum	15.0 (380)	15.0 (380)	107 (10.0)	40.0 (1015)	40.0 (1015)	40 (3.7)
Maximum	40.0 (1015)	40.0 (1015)	40 (3.7)	125.0 (3175)	125.0 (3175)	13 (1.2)

Note: Recommended DFT will depend on substrate condition and system design. Refer to Recommended DFT section on page 1. Allow for overspray and surface irregularities. Film thickness is rounded to the nearest 0.5 mil or 5 microns. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance.

MIXING Mix the entire contents of Part A and Part B separately. Scrape all of the Part A into the Part B using a flexible spatula. Use a variable speed drill with a PS Jiffy blade and mix the blended components for a minimum of two minutes. During the mixing process, scrape the sides and bottom of the container to ensure all of Parts A and B are blended together. Apply the mixed material within pot life limits after agitation. **Note:** A large volume of material will set up quickly if not applied or reduced in volume. **Caution: Do not reseal mixed material. An explosion hazard may be created.** Mixing ratio is one to one by volume.

THINNING **DO NOT THIN**

POT LIFE 25 to 30 minutes at 70°F (21°C) 15 to 20 minutes at 80°F (27°C)
 Material temperatures above 80°F (27°C) will significantly reduce the spray and pot life.

SPRAY LIFE 20 to 25 minutes at 75°F (24°C)
 Flush the pump and lines immediately after spraying.

APPLICATION EQUIPMENT **Airless Spray**

Pump Size	Tip Orifice	Atomizing Pressure	Mat'l Hose ID	Manifold Filter
45:1, 56:1, X50, 68:1 or X60	0.021"-0.025" (533-635 microns)	3400-4000 psi (234-276 bar)	3/8" to 1/2" (9.5 to 12.7 mm)	N/R

Note: Material needs to be gravity fed through a material hopper. Material will not feed through a suction tube.
Roller: Use high quality 3/8" to 1/2" synthetic woven nap roller covers.
Brush: Recommended for small areas only. Use high quality synthetic or nylon bristle brushes.
Plural Component: Please contact your Tnemec representative or Tnemec Technical Service for information.

SURFACE TEMPERATURE Minimum of 50°F (10°C), optimum 65°F to 80°F (18°C to 27°C), maximum of 130°F (54°C). The substrate temperature should be at least 5°F (3°C) above the dew point.

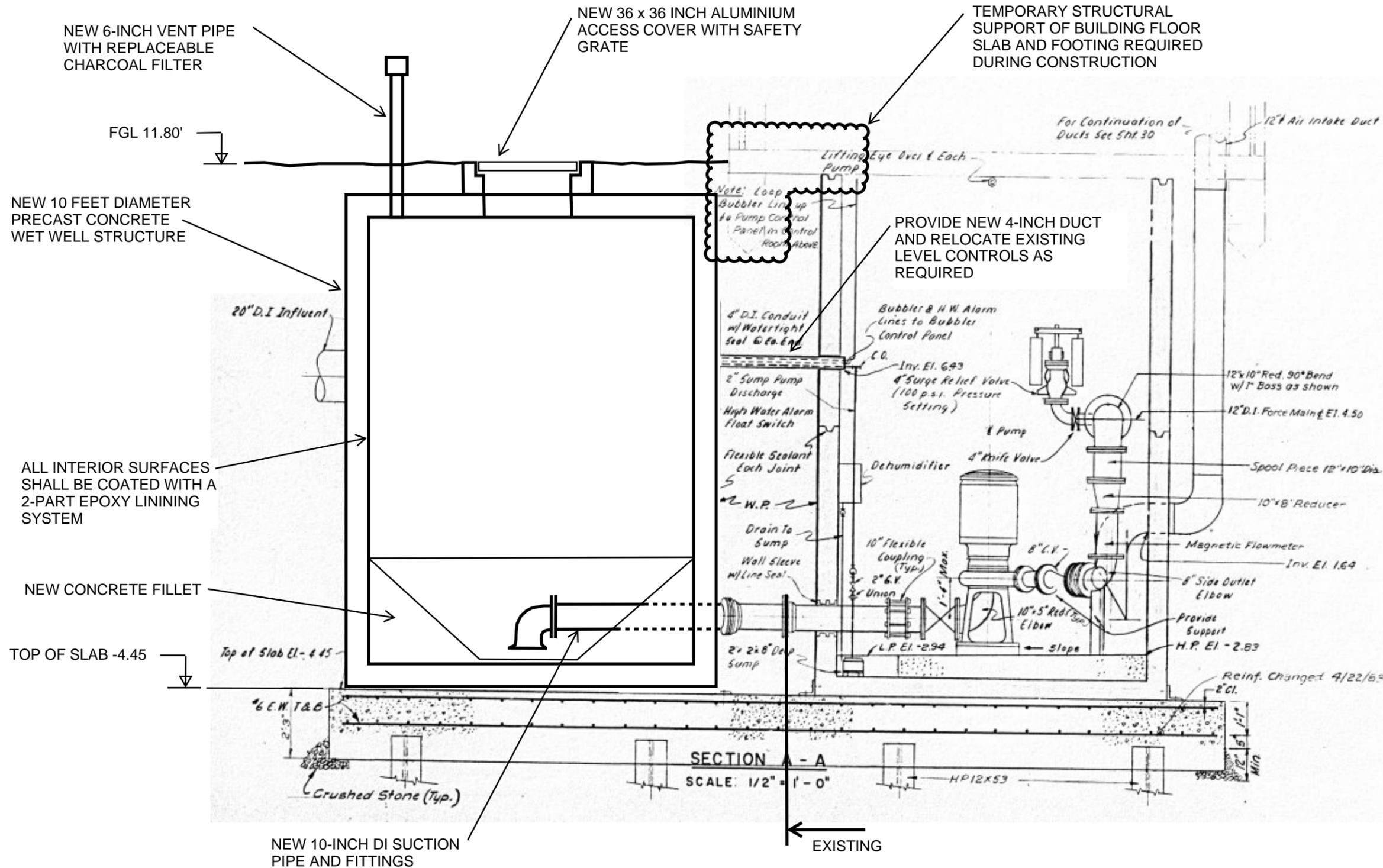
MATERIAL TEMPERATURE For optimum handling and application characteristics, both material components should be stored or conditioned between 70°F and 80°F (21°C and 27°C) 48 hours prior to use. Temperature will affect the workability. Cool temperatures increase viscosity and decrease workability. Warm temperatures will decrease viscosity and shorten the spray and pot life.

HOLIDAY TESTING If required by project specifications, High Voltage Discontinuity (spark) testing shall be performed using a Tinker & Razor AP/W High Voltage Holiday Tester. Contact Tnemec Technical Service for voltage recommendations.

CLEANUP Flush and clean all equipment immediately after use with Tnemec's No. 4 Thinner or MEK.

WARRANTY & LIMITATION OF SELLER'S LIABILITY: Tnemec Company, Inc. warrants only that its coatings represented herein meet the formulation standards of Tnemec Company, Inc. THE WARRANTY DESCRIBED IN THE ABOVE PARAGRAPH SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. The buyer's sole and exclusive remedy against Tnemec Company, Inc. shall be for replacement of the product in the event a defective condition of the product should be found to exist and the exclusive remedy shall not have failed its essential purpose as long as Tnemec is willing to provide comparable replacement product to the buyer. NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, ENVIRONMENTAL INJURIES OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO THE BUYER. Technical and application information herein is provided for the purpose of establishing a general profile of the coating and proper coating application procedures. Test performance results were obtained in a controlled environment and Tnemec Company makes no claim that these tests or any other tests, accurately represent all environments. As application, environmental and design factors can vary significantly, due care should be exercised in the selection and use of the coating.

APPENDIX E
Wet Well Replacement Detail



WET WELL REPLACEMENT DETAIL

- NOTES:
1. NOT TO SCALE.
 2. PUMP STATION SECTION TAKEN FROM WHITMAN & HOWARD RECORD DRAWING SHEET 29 OF 35 DATED JUNE 1980.

DATE	09/15/2020
PROJECT	2567

UNDERWOOD
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PUMPING STATION No. 2
SCARBOROUGH SANITARY DISTRICT
WET WELL REPLACEMENT

FIG.
SK-3

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APPENDIX F
Cost Opinion

