CITY OF PORTSMOUTH, NH

MADBURY WTP UPGRADE AND
BELLAMY RESERVOIR IMPROVEMENTS

RESPONSE TO BIDDERS QUESTIONS
AND
ADDENDUM NO. 2
2/13/09

This Response to Bidders' Questions Addendum shall be part of the Contract Documents as provided in the Instructions to Bidders of the referenced project. The following additions to and modifications of the Contract Documents shall be included in, and become a part of any Contract that may be executed for construction of this project. Bidders are instructed to take the following into account in rendering a Bid for the Work.

Please acknowledge receipt of this addendum within your bid, failure to do so may subject a bidder to disqualification.

Pre-Bid Meeting Minutes:

Attached are the Pre-Bid Meeting Minutes.

Response to Bidders' Questions:

2-1. Drawing C-11 shows numerous "PD" lines. The "Yard Pipe Schedule" in Spec. Section 15060 does not list the "PD" designation. The closest designation label in the schedule is "Drains", but this only goes as high as 6" diameter. This "Drains" designation also states the drain lines are to be ductile iron while Drawings C-6 and C-7 call for these lines to be PVC and Drawing C-11 calls for some of these lines to be CPE. Please indicate what the "PD" line materials should be and what kind of joint restraint, if any, there are for these lines.

The PD designation refers to Proposed Drain - refer to the legend on Drawing C-10. They are typically storm drains. There are 2 proposed drains on Drawings C-6 and 7 from the chemical delivery containment area and the main building floor drains that are PVC. Most of the other proposed drains (storm drains) are CPE. These are all gravity drain lines and joint restraints are not necessary. See Addendum 2, Item 2.18.A.

2-2. Please issue Spec. Section 02050. We did not receive a copy with our documents.

Section 02050 – Demolition – This specification is not intended to be included and has been deleted from the Table of Contents as per Addendum 2, Item2-1.A.

2-3. Drawing C-11 calls for a "line stop & cap (typ)" just north and east of MH12. The leader line from this designation does not point to anything in particular. Where is this line stop required? Also, does this term "line stop" mean a true line stop, or is this term used just for capping the "left in place" lines?

It is assumed the question is referring to the note near MH 2, which is pointing to the existing 20" water main into the plant. The existing line will remain live, and there are two tapping sleeves and valves shown to tap off that line and convey the raw water into the new plant. The existing main downstream of these taps needs to be capped after start-up of the new treatment plant, so the remainder of the line to the old plant can be abandoned in place. Since this main is live and cannot be shut down, a line stop was called for. The line stop does refer to a true line stop on the live line. The line stop should be placed between the TS&Vs and the caps shown on the existing 20-inch main.

2-4. Drawings C-11 and I-10 do not match with regard to the finished water valving at the entrance to Existing Clearwell #2. There is not an interconnection on Drawing C-11 that coincides with the two valves (in the vertical) shown just left of the "Clearwell #2" box shown on Drawing I-10.

The valves are correct as shown on Drawing C-11; the interconnection shown on Drawing I-10 has been deleted from the design. See Addendum 2 Item 2-39.

2-5. Where is the one 20" butterfly valve labeled in Table 3 of Spec. Section 15100 "Filtered Water to Clearwell" shown on the plans?

The Filtered Water to Clearwell isolation valve has been deleted from the design. See Addendum 2 Item 2-21.C.

2-6. Where is the one 20" butterfly valve labeled in Table 3 of Spec. Section 15100 "Clearwell Overflow" shown on the plans?

The Clearwell Overflow valve has been deleted from the design. See Addendum 2 Item 2-21.C.

2-7. Where are the four 20" butterfly valves labeled in Table 3 of Spec. Section 15100 "Existing Clearwell Bypass" shown on the plans?

Existing Clearwell Bypass Valves are yard valves shown on Drawing C-11. Three are required, not four. Two are located in the valve vaults which are to be constructed adjacent to the Existing Clearwell (see Clearwell Valves Detail, Drawing C-11). The third valve is located adjacent to the Finished Water Pump station on Drawing C-11. Table 3 in Specification Section 15100 has been updated via Addendum 2. See Item 2-21.C.

2-8. Where are the four 20" butterfly valves labeled in Table 3 of Spec. Section 15100 "Finished Water Line" shown on the plans?

One "Finished Water Line" yard valve is required, not four. The one required valve is shown on Sheet C-11, immediately upstream of the connection to the existing finished water transmission line. Table 3 in Specification Section 15100 has been updated. See Addendum 2 Item 2-21.C.

2-9. Drawing C-11 shows a 20" butterfly valve just before tying into the existing 24" "W" water line. Is this valve on any schedule? It is on the new "Finished Water Pumps" discharge line, but this valve is not shown on P&ID Drawing I-10.

This is the "Finished Water Valve" referenced in Question 8, above. Only one valve, not four, is to be furnished. See Table 3 in Specification Section 15100 as updated via Addendum 2, Item 2-21.C.

2-10. Drawing C-11 calls for 4" underdrain headers in drying beds 1 and 2, and 6" headers in drying beds 3 and 4, while the detail referred to on Drawing C-8 calls for 8" underdrain headers.

See Addendum 2, Items 2-27

2-11. Drawing C-11 calls for 6" HDPE decant headers in drying beds 1, 2, 3, and 4, while the detail referred to on Drawing C-8 calls for 12" ductile headers.

See Addendum 2, Items 2-26 & 2-27

2-12. Drawing C-11 calls for 6" decant lines at the decant boxes out at the drying beds while the detail of the decant weir box referenced on Drawing C-8 calls for a 12" line.

See Addendum 2, Items 2-26 & 2-27

2-13. For specifications that require the engineer to be present for shop testing of various equipment, please advise how many representatives will travel and any costs that will be incurred at the contractor's expense per Spec. Section 01400.

The witnessed shop testing requirements are specified in Section 01300 - Submittals, Paragraph 1.13

2-14. What material should the 4" drain line be made of that is routed from the lab and connects to the 12" "Filter to Waste" line as shown on Drawing M-2? The Pipe Schedule in Spec. Section 15070 does not address this line designation.

4" Drain line provided under the Mechanical Contractor's scope of work shall be of stainless steel construction. Drain will be transitioned to stainless steel at the interface between the Plumbing and Mechanical Contractors' scopes of work as

shown on Drawing M-12. The interior piping schedule has been revised to reflect this. See Addendum 2, Item 2-19.B.

2-15. What material is the 6" "Water" line that is shown on Drawing M-1 at column lines E1?

All piping shown on M-1 east of column line E.9 is buried, below slab piping, and shall be considered Yard Piping. Therefore, per Specification Section 15060, shall be ductile iron; this includes the 6" Water line, 12" Filter to Waste line and 12" Backwash line. All piping shall be transitioned to stainless steel for interior piping. Transition piping will be encased in the wall as per Standard Detail Type-D wall penetration as shown on Drawing M-19. Also, See Addendum 2, Item 2-37 and Question 2.48.

2-16. What is the significance to the numbers inside the brackets that are shown in various "Tag Schedule" charts as seen on the drawings, i.e. Drawings M-4, M-11, and M-20?

The numbers represent valves/instruments which are repeated for several identical process components (e.g., filter control valves for all 6 filters). Specific equipment tags are provided via tag schedules.

2-17. The "Tag Schedule" valve sizes do not match the pipe sizes as seen on Drawing M-4.

The tag schedule on sheet M-4 has been updated. See Addendum 2, Item 2-34.C.

2-18. Table 2 in Spec. Section 15100 calls for the static mixer bypass valves to be 8", while Drawing M-4 shows this line to be 12" size.

Sheet M-4 is correct; Static Mixer isolation valves are to be 12" valves. Specification Section 15100, Table 2 has been updated as per Addendum 2, Item 2-21.B.

2-19. Valve designation "MOV 08 (2)" in the Tag Schedule on Drawing M-4 does not match "size wise" to the valve and piping drawn on the same drawing with this same tag designation.

MOV 08 (2) and MOV 06 (2) have been transposed on the drawing. This is corrected via Addendum 2, Item 2-34 and 2-34.A & B.

2-20. What material are the 30" access manways shown on Drawing M-4?

Sheet M-4 – 30" Manway hatches shall be of FRP construction. See Specification Section 13200 added via Addendum 2, Item2-15.

2-21. What material are the 24" access manways shown on Drawing M-1?

Sheet M-1 – 24" Manway hatches shall be of FRP See Specification Section 13200 added via Addendum 2, Item 2-15.

2-22. Drawing M-4 calls for a valve "MOV 06 (2)" at filter number 4 while the Tag Schedule on the same drawing does not list this valve. However, there is a valve in the Tag Schedule labeled "6" Filtered Water" but it has a tag number of "MOV 08 (2)".

MOV 08 (2) and MOV 06 (2) have been transposed on the drawing. This is corrected via Addendum 2, Item 2-34.A & B.

2-23. Spec. Section 11306-Chemical Resistant Sump Pumps indicates three pumps are to be provided. It also indicates one of the pumps will be installed in the chemical loading station sump. Electrical and mechanical plans do not show the pump, piping, or motor feeds. What is the design intent?

See Addendum 2, Items 2-11 and 12

2-24. Drawing I-6 shows a 6" butterfly valve on the 6" header leading to the DAF recycle pumps. This valve is not shown on the process drawings. Is this valve required?

This valve is required. See Addendum 2, Item2-21.B and 2-33.A.

2-25. Are the 12" filter to waste, 6" water, 12" backwash, and 20" filtered water lines shown on Drawing M-1 considered "yard piping" or "interior piping"? The Pipe Schedules call for different pipe materials in each respective schedule.

The piping shown on Drawings M-1 and M-3 east of column line E.9 is considered yard piping and shall all be of ductile iron construction as per Specification Section 15060. Also, see Questions 2-15 and 2-48.

2-26. Please confirm the intent of Spec. Section 11319 as it relates to field testing. Is the intent to plug in and test the shelf spare and then remove it for storage?

Shelf spare is to be removed from the design. Only two duty pumps are to be provided. See Addendum 2, Item 2-13.A and C

2-27. Spec. Section 11319 indicates davit cranes with electric winches are to be provided. However, there is no electrical circuit to energize the winch.

See Addendum 2, Item 2-13.B.

2-28. Drawing M-5 calls for 4" piping at Blower BL-07001, while Drawing I-9 calls for 5" piping.

Air Scour piping shall be 4" as shown on Drawing M-5. See Addendum 2, Item 2.19.B and 2.38.

2-29. In the specs, several references are made to Spec Section 00880-Supplementary Conditions. However, Spec. Section 00880 is not included in the specifications.

All changes to Section 00710 – General Conditions have been reflected directly in the text of the General Conditions, therefore no Supplementary Conditions are provided. Reference to Section 00880 in the Table of Content is removed via Addendum 2, Item 2-1.

2-30. What material should the 2" drain lines be as a shown on Drawing M-3, Section A?

Drawing M-3, Section A show the 2" Filter Drains. Filter Drains shall be Stainless Steel as per Section 15070 – Appendix A-1.

2-31. What material should the 18" wall pipes be that are called out as "Mixed Water" as shown on Drawing M-12, Section G?

18" wall pipes into the flocculators shall be stainless steel. "Mixed Water" piping has been added to Interior Piping Schedule, Section 15070 – Appendix A-1 via Addendum 2, Item 2-19.B.

2-32. Spec. Section 01025-Titled Measurement and Payment, item 1.06 B.1.e states the Contractor is to provide sludge unit prices on the Bid Form. However, on the Bid Form, unit price item 1-8 states these sludge unit prices are included under the $700,000 allowance amount.

Modification of the bid form has been made to address this. See Addendum 2, Item 2-3.

2-33. Can the bottom elevations of the Existing Sedimentation Basins numbered 1,2 & 3 be given?

The following elevations were provided on Record Plans developed by Wright, Pierce, Barnes, Wyman Engineers dated May, 1976. Field verification of these elevations will be required. For bidding purposes, the following elevations may be assumed:

Sedimentation Basins #1 and #2 have a bottom elevation of 34.0 feet
Sedimentation Basin #3 has a bottom elevation of 32.0 feet

2-34. Can the bottom elevations of the Existing Residuals Drying Beds numbered 1,2 & 3 be given?

No Record Plan information exists for the Residuals Drying Beds; the following elevations are calculated using the surveyed elevations and assumed bed depts. Field verification of these elevations will be required. For bidding purposes, the following elevations may be assumed:

Northernmost Bed = 74.2 feet
Center Bed = 64.0 feet
Southernmost Bed = 69.3 feet

2-35. Can an estimated quantity of Sludge for removal from the Existing Sedimentation Basins be established?

Modification of the bid form has been made to address this. See Addendum 2, Items 2-3 and 2-6.

2-36. Will sludge dewatering be required for the sludge removal from the Sedimentation Basins? If dewatering is required, will it be allowed to be done on site?

Dewatering may be required for sludge removal in the existing sedimentation basins, as well as the existing drying beds. See Addendum 2, Item 2-6.A.

2-37. Can an estimated quantity of residuals from the existing Drying Beds be established?

Modification of the bid form has been made to address this. See Addendum 2, Items 2-3 and 2-6.

2-38. Missing Specification Sections as follows, Please advise

- 02011-Test Pits & Monitoring Wells

  This Section has apparently not been included in all bid sets. It is attached herein with no changes from the original bid set.

- 02050- Demolition

  Reference to the Section in the Table of Contents is to be deleted. See Addendum 2, Item 2-1.

- 02293- Polyethylene Membrane Liner

See Addendum 2, Item 2-9

- 05521- Welded Pipe Railing

  See Addendum 2, Item 2-10

- 17191- Power Conditioners

  See Addendum 2, Item 2-23

2-39. Can the blank space available to write in the Lump Sum Bid Prices on page 00410-4 be increased to allow for writing in a large number?

See Addendum 2, Item 2-3

2-40. Can the unit prices for Item 1-8 Sludge Dewatering and Hauling be established after the bidding process? This will allow the prices to more reasonably reflect the magnitude of the work.

Please see the response to Question 2-37, above.

2-41. Can the lists of proposed subcontractors and suppliers be required 15 days after Bids are opened rather than at the Bid submission deadline as is specified now.

These lists are required with Bid submission as specified.

2-42. Will 2% Final retainage be held in an interest bearing account with the interest paid to the General Contractor

Yes.

2-43. Will building Permit fees be waived by the Town of Madbury?

Building Permit fees will be paid directly by the Owner. See Addendum 2, Item 2-5.C.2.

2-44. The Detail of Sheet C-6 shows yard FTW/WWW Piping to be 24" DIP, however Specification call for 20" DIP

20" DIP was the design intent as listed in the Specifications; See Addendum 2, Item 2-25.

2-45. In case of future pipe diameter discrepancies between plans and specifications, is it safe to assume that the diameter indicated on the plans takes precedence?

No, all discrepancies shall be treated as such and shall be brought to the attention of the Engineer for clarification.

2-46. Division 14 mentions a bridge crane as well as monorail cranes and says to refer to the table at the end of the division 14 specs… but the table only lists two monorails. Is there an additional bridge crane which is missing from Table 14600-1 or is there a mistake in the specs or table referring to a monorail or bridge crane where it should say the opposite?

No bridge cranes are required, only the two monorails and hoists listed in Table 14600-1 are to be provided.

2-47. Reference drawings M-1, M-3, and M-15. Is the below slab piping shown as stainless steel on these drawings intended to be ductile iron?

See Questions 2-25 and 2-48.

2-48. Will concrete encasement of below slab piping be required?

All piping installed below structural slabs is to be concrete encased per Standard Detail – Pipe Encasement 0331607 as shown on Drawing S-31.

2-49. It is our interpretation that piping penetrations thru concrete can be ductile iron wall pipes on exterior wall applications and gal. steel sleeves with linc seals for interior wall and floor penetrations. Can wall pipes be furnished with tapped bolt holes to allow these wall pipes to be installed within the formwork?

Piping penetrations shall be in accordance with Section 15070, Paragraph 2.07 and as shown on the Drawings. Wall sleeves shall only be allowed in dry interior to dry interior pipe transition applications, in which case, linc seals will not be required

Tapped bolt holes will not be allowed on wall pipes.

2-50. Please clarify the painting requirements for both the stainless steel piping per the schedule on spec page 15070- 33. Will the stainless steel pipe be painted?

Stainless Steel piping shall not be painted per Specification 15070.2.12.A.14. Color coding for pipe identification as per Specification Section 15070 shall be achieved with pipe labeling as defined in Section 01080 – Identification Systems.

2-51. Also please clarify the painting required for the carbon steel piping alternate, both interior and exterior, reference spec pages 15060-10 and 15070-23.

Carbon Steel, if used for interior pipe, shall be painted in accordance with Specification 15070.2.14.J. Colors used shall conform to Section 15070,

Appendix A-1. References to 'interior' and 'exterior' within Specification 15070 are specific to the pipe (i.e. interior pipe wall), not the location of the piping.

2-52. Please clarify the required spacing for pipe supports. Spec page 15070- 28 does not agree with the table on drawing M-18.

See Addendum 2, Item 2-19.A.

2-53. Please clarify the wall thicknesses required for the stainless steel piping. The table shown on spec page 15070-33 does not agree with the listings on spec page 15070-11.

See Addendum 2, Item 2-19.B.

2-54. Please clarify the wall thicknesses required for the carbon steel piping alternate. The table on spec page 01025 is not clear. Spec pages 15060-9 and 15070-22 do not agree. The table on page 15070-22 seems to indicate schedule 10 pipe.

The referenced table in Specification 01025 is specific to a bid alternate and is for interior carbon steel piping. Wall thicknesses for all interior carbon steel piping shall be in accordance with Specification 15070.

2-55. Please clarify the material, either gal. carbon steel or stainless steel, to be required for interior flanged joints. The specs are confusing as to which will be used with the gal ductile iron back-up flanges.

Requirements for interior stainless steel piping vary. Specification Section 15070-2.12.A.4 specifies joint/connection requirements for stainless steel piping.

2-56. Please clarify the requirements for interior process piping insulation. Spec 15080 references insulating the raw water in the truck bay? If the interior piping is to be insulated please reference this with the painting requirements.

Reference to the "truck bay area" shall be deleted. See Addendum 2, Item 2-20.A.

All straight lengths of interior process piping shall be insulated as specified in Specification Section 15080 – Paragraph 2.02 – Pipe Insulation Table.

2-57. Please indicate a material specification for the P.A.C. slurry piping.

PAC Slurry piping shall be of PVC construction. This has been included in the Interior Piping Schedule. See Addendum 2, Item 2-19.B.

2-58. The air scour flow control valves are shown as 4" on drawing M-11 and as 8" per the table on spec page 15100-58. Please clarify.

Air scour piping and flow control valves shall be 4" as shown on the Mechanical Drawings. See Addendum 2, Items 2-21.A and 2-38.

2-59. If the enlarged elevation of the cement board panels indicated on Drawing A-7, Detail 2 take precedence over Spec. Section 07640-Fiber Cement Siding, please provide a specification for the more expensive cement board panels.

The elevation on Detail A-7 refers to the work of the Fiber Cement Siding. The elevation is provided for the spacing of the screws. Contractor's statement about "more expensive cement board panels" is unclear. Project scope is for exterior fiber cement siding and exterior cementitious board at parapets as defined in Specification Section 06100 which refers to Specification Section 09250 for material selection.

2-60. What is the elevation of the bottom of the concrete slab at the existing Coagulation basin? Can you provide more information about the existing Coagulation Basin? ie. Roof slab thickness, wall thickness, base slab thickness, interior columns

Structural Record Drawings from the Existing Coagulation Basins are attached for bidders' information.

2-61. On drawing A-8, north side of the building, window details W29 & W16 are indicated. This does not match with what is shown on drawing A-12. Please clarify the type of windows required in that area.

W15 is the correct profile for the window. See Addendum 2, Item 2-31

2-62. Specification Section 11341, Flotation Skimmers and Accessories, indicates that certified shop tests are required, but there is no indication of what should be tested. Please clarify.

No certified shop tests are required.

2-63. Drawing M-11 indicates a hydraulic porta-pac system with an arrow that points to the PAC Feed system. Specification 11360 makes no mention of a porta-pac. Is one required and if so, what function does it serve? Please provide a specification if one is required.

See Addendum 2, Item 2-35.

2-64. There are (3) butterfly valve symbols just to the left of tank T-08001 shown on P & ID drawing I-12. I cannot locate these valves on the process drawing. Please indicate what other drawings these valves are on and what their respective valve tag numbers are.

See Addendum 2, Item 2-40.

2-65. What material is the 12" vent to be made of that is shown on drawing M-15? What material is the 4" vent to be made of that is shown on drawing M-17?

See Addendum 2, Item 2-19.B

2-66. Appendix A for HDXLPE Bulk Storage tanks in Section 13207 is only requiring one NaOH tank. Two are indicated on Drawings M-5 and M-7. Please confirm which is correct.

See Addendum 2, Item 2-17.A

2-67. Specification Section 13207, paragraph 2.06.P indicates that ladders are to be provided for all tanks over five feet in height. Multiple mechanical drawings fail to indicate this on the coagulant day tanks (tagged T-11011 & 11021). Which is correct?

Ladders shall be provided as required per the Specifications.

2-68. Drawing I-6 shows a handwheel operated valve on the bypass line at the strainer STR-05-020 while drawing G-3 shows a motorized valve on this same bypass line. Which valve operator type is correct

See Addendum 2, Item 2-24.A

2-69. Drawing I-6 shows handwheel operated valves on each side of the flow meter on the 4" Waste Washwater Recycle line while drawing G-3 shows only one valve and it is shown as motorized. Which valve type is required?

See Addendum 2, Item 2.24.B

2-70. We assume that the owner is providing and installing the compressed air system as shown on drawings M-5 and blown up on Drawing M-12. This is also shown on I-7. There appear to be no specifications for this system.

See Addendum 2, Item 2-14.A

2-71. Drawing M-15 in conjunction with drawing C-11 shows 9 valves on the lines running from the new clearwell to the existing clearwell on the Finished Water & Filtered Water lines while drawings G-3 & G-4 show 8 valves & 10 valves respectively on these same lines. Which valve count is correct?

Valves shown on Mechanical Drawings are correct.

2-72. Please provide further information on height of Storage Tank Baffles as required by Section 13208, and shown on drawings S-23, S-25 and M-15. Is the intent to

span from the floor to the underside of the deck? Is there any gap at the top of the baffle wall?

See Addendum 2, Item 2-16.

2-73. On drawing H-14, Details 1 and 2 show the primary supply and return lines between the Heat Pumps (HP-1 & HP-2) and Heat Exchangers (HX-1 & HX-2) as 3" pipe. Drawing H-5 and H-6 show the same two lines as 2.5" pipe in plan view. Should 3" or 2.5" pipe be used for this location?

See Addendum 2, Item 2-41.

2-74. Optimum Controls, named in Specification Section 17000 - 1.04, is not bidding. Will additional instrumentation subcontractors be approved?

Optimum Controls has confirmed they are bidding this project. Also, see Addendum 2, Item 2-22.

2-75. We assume that the cost associated with the sludge removal located in the existing Sedimentation Basin Sludge Lagoon 1 as shown on Drawing C-5 will be included in Bid Item 1-8 ($700,000 Sludge Removal Allowance). Is this correct?

See Addendum 2, Items 2-3 and 2-6.

2-76. We propose that the Total Lump Sum Bid Price be changed to read "The Lump Sum Combined Bid for Item 1 and Item 2", as shown in Article 5 of the Bid Form. This would be in the best interest of the Owner. Because Items 1 and 2 are each required to be "stand-alone' prices, the combined price would be less than the sum of the two.

Agreed. See Addendum 2, Item 2-3.

2-77. Bid Form Alternate A- "Delete the Construction of the Residual Drying Beds" as described in the Measurement and Payment Section (01025) includes demolition and other items. We assume that the sludge removed in these Drying Beds will be included under Bid Item1-8(Sludge Removal) and is not to be included in this Alternate A deletion amount. Is this correct?

Yes. Cost associated with dewatering of the sludge in the existing lagoons are <u>not</u> to be included in the proposed Bid Alternate A.

2-78. Specification 13222, paragraph 1.03.C indicates that certified shop testing as specified herein and in the General Conditions is to be done on the troughs and shall be submitted and approved prior to shipment. Paragraph 1.04 continues to state that shop testing shall be as specified in Division 1. What are the specifics

of the factory testing that will be required to be performed to be deemed "acceptable"?

No certified shop tests are required.

2-79. Please clarify the relief valve piping for the Floated Solids Pump discharge as shown on drawing I-11 and not on drawing M-2.

See Addendum 2, Item 2-32.

-- Continued on Next Page --

Modifications to Contract Documents:

Procurement and Contracting Requirements:

Item 2-1. Specifications Table of Contents

A. Delete Table of Contents and replace with revised Table of Contents attached.

Item 2-2. Specification Section 00200 – Instruction to Bidders

A. Paragraph 12.01, in the first sentence, delete the phrase 'Supplementary Conditions' and replace with 'General Conditions'.

Item 2-3. Specification Section 00410 – Bid Form

A. Delete Section in its entirety and replace with the attached Specification Section 00410 – Bid Form.

Item 2-4. Specification Section 00610 – Performance Bond

A. Article 3.1 – Remove strikethrough for entire paragraph. Paragraph shall be included in its original EJCDC document form.

B. Article 3.2, Second Sentence – Remove strikethrough for entire sentence. Sentence shall be included in its original EJCDC document form.

Item 2-5. Specification Section 00710 – General Conditions

A. Paragraph 6.06.B – In the first sentence delete 'the Supplementary Conditions' and replace with 'Paragraph 6.06.B.1'

B. Insert the following after Paragraph 6.06.B

'1. The Contractor shall submit for approval by the Owner, the identity and the qualifications of the Instrumentation and Control Subcontractor. The qualifications and submittal requirements are defined in Specification Section 17000, 1.04.'

C. Paragraph 6.08.A,

1. Delete the following text: 'Unless otherwise provided in the Supplementary Conditions'
2. Insert the following at the end of the first sentence: 'except for all Town of Madbury Building Permits which will be obtained by the Owner.'

Technical Specifications:

Item 2-6. Specification Section 01025 – Measurement and Payment

A. Insert after the first sentence in Paragraph 1.06.B.1.a: 'Dewatering and hauling of sludge from the Existing Sedimentation Basins may also be required and has been included in the estimated quantities provided on the Bid Form in Section 00410.'

B. Insert the following after Paragraph 1.06.B.1.e:

"f. Three separate mobilizations of temporary dewatering equipment shall be included."

C. Paragraph 1.06.B.1 – Delete the following text: '($700,000)'

D. Insert the following after Paragraph 1.06.B.2.a:

"3.) Repair of Freshet Road

Provide full width Reclamation of the road and 3.5" of binder and top course pavement per the requirements of Specification Sections 02251 and 02255. The extent of the work will be at the City of Portsmouth's discretion after consultation with Town of Madbury."

Item 2-7. Specification Section 01010 – Summary of Work

A. Paragraph 1.19 - Insert after "The Contractor shall videotape and photograph the entire project site" the following text: "(including Freshet Road between the site and Route 108)".

Item 2-8. Specification Section 01400 – Quality Control

A. Paragraph 1.05.A.4

1. Delete the word 'water'.
2. Insert after the first sentence 'The Owner shall provide water to the Contractor for testing. The Contractor shall protect and meter the supply per Specification Section 01510 – Temporary Utilities.'

Item 2-9. Specification Section 02593 – Polyethylene Membrane Liner

A. Insert attached Section 02593 – Polyethylene Membrane Liner

Item 2-10. Specification Section 05521 – Welded Pipe Railing

A. Insert attached Section 05521 – Welded Pipe Railing

Item 2-11. Specification Section 11211 – End Suction Centrifugal Pumps

A. Insert attached Section 11211 – End Suction Centrifugal Pumps

Item 2-12. Specification Section 11306 – Chemical Resistant Sump Pumps

A. Delete Specification Section in its entirety and replace with attached Specification Section 11211 – End Suction Centrifugal Pumps

Item 2-13. Specification Section 11319 – Submersible Pumps

A. In Paragraph 1.01.A, delete the following text: 'and one (1) shelf-spare'

B. In Paragraph 2.03.G.3, delete the following text: 'An electric winch shall have 115 VAC, 1 phase AC with 6 feet pendant control and brake.' and replace with: 'A hand winch capable of being drill driven shall be furnished. The winch shall be Thern Model M2, or equal.'

C. In Appendix A – Submersible Pump Schedule, delete the following text: 'and one (1) shelf-spare'

Item 2-14. Specification Section 11376 – Compressed Air System

A. Insert attached Specification Section 11376 – Compressed Air System

Item 2-15. Specification Section 13200 – Fiberglass Manway Covers

A. Insert attached Specification Section 13200 – Fiberglass Manway Covers

Item 2-16. Specification Section 13208 – Storage Tank Baffles

A. In Paragraph 2.02.A.1.a, delete the following "as shown on the Contract Drawings' and replace with 'in the schedule in Appendix A at the end of this Section'

B. In Paragraph 2.02.E

1. In the first sentence, insert the word 'L-shaped' before 'FRP connection flanges'

2. Delete the sentence that begins 'Intermediate support columns and bracing…' and replace with the following:

"The FRP baffle sections shall be held in place by a channel created by two L-shaped brackets installed parallel to one another into which the baffle sections will be slid, and held in place after the final section is installed with a bolted cap provided by the baffle system manufacturer. Baffle walls shall be sized as listed in the schedule in Appendix A at the end of this section"

C. Insert the following after Paragraph 3.03.C:

APPENDIX A

FRP Baffle Wall Schedule		
	Length	Height
1	12'-0"	10'-6"
2	10'-6"	10'-6"
3	10'-6"	10'-6"
4	10'-6"	10'-6"
5	10'-3"	10'-6"
6	10'-3"	10'-6"

Item 2-17. Specification Section 13207 – High Density Cross-Linked Polyethylene Storage Tanks

A. In Appendix A – HDXLPE Bulk Storage Tank Schedule, in the column labeled 'Sodium Hydroxide', delete and replace the following items:

	To be deleted:	**To be inserted**
Quantity	One (1)	Two (2)
Required Capacity	2,742 gallons	1,400 gallons
Max. Diameter	7.5'	5.3'
Max. Height	12.0'	10.0'

Item 2-18. Specification Section 15060 – Yard Piping

A. Add the following to the "Plan Yard Piping Schedule – Appendix A-1"

Proposed Drain (PD)	CPE or PVC	6" to 24"	Type S/SDR 35	5 psig	Push-On

Item 2-19. Specification Section 15070 – Interior Piping

A. Delete Section 3.01.C.2-Support Spacing in its entirety and replace with the following:

"Spacing of pipe supports shall be as specified on the Drawings

B. Delete the Plant "Interior Pipe Schedule, Appendix A-1" in its entirety from Section 15070, Page 15070-32 and 33 and replace with the following:

Plant Interior Pipe Schedule - Appendix A-1

SERVICE	MATERIAL	NOMINAL DIAMETER	MINIMUM WALL THICKNESS	JOINT/ WORKING PRESSURE	FED. STD. 595B COLOR
Air Scour (Outside Filter)	Stainless Steel	4" and 6"	See Specification	10 psi	Dark Green 34062 with Yellow 33591 Bands
Air Scour (Inside Filter)	Stainless Steel	4"	See Specification	10 psi	Dark Green 34062 with Yellow 33591 Bands
Backwash Water	Stainless Steel	8" and 12"	See Specification	110 psi	Dark Blue 35102
Coagulant	PVC	To 3"	Schedule 80	150 psi	Orange 32300
Compressed Air	Copper*	1"	Type K	190 psi	Dark Green 34062
DAF Recycle (Upstream of Saturator)	Stainless Steel	4"-6"	See Specification	150 psi	Aqua 35275
DAF Recycle (Downstream of Saturator)	Stainless Steel	6"	See Specification	150 psi	Olive Green 34257
Dilution Water	Copper*	1"	Type K	180 psi	Olive Green 34257
Filter to Waste	Stainless Steel	6" and 12"	See Specification	5 psi	Light Brown 30227
Floated Water	Stainless Steel	10" and 20"	See Specification	40 psi	Aqua 35257
Flocculator Inlet Pipes (Mixed Water)	Stainless Steel	18"	See Specification	5 psi	N/A
Filtered Water	Stainless Steel	8" to 20"	See Specification	15 psi	Blue 35200
Floated Solids	Ductile Iron	3" and 4"	C 150	20 psi	Dark Brown 30070
Finished Water	Stainless Steel	12" and 20"	See Specification	110 psi	Dark Blue 35102
Instrument Drains	PVC	To 3"	Schedule 80	20 psi	Light Brown 20227
Spray Bars (DAF Tanks and Channel)	PVC	To 2"	Schedule 80	150 psi	Aqua 35257
PAC Slurry Piping	PVC	2"	Schedule 80	150 psi	Black 36044

SERVICE	MATERIAL	NOMINAL DIAMETER	MINIMUM WALL THICKNESS	JOINT/ WORKING PRESSURE	FED. STD. 595B COLOR
Polymer	CPVC	1”	Schedule 80	150 psi	Orange 32300 with Green 34193 Bands
Raw Water	Stainless Steel	12”	See Specification	50 psi	Olive Green 34257
Raw Water Overflow	Ductile Iron	20”	C 150	5 psi	None Exposed
Sample Piping	PVC	1”	Schedule 80	45 psi	**
Service Water	Copper*	To 4”	Type K	150 psi	Olive Green 34257
Sodium Hydroxide	CPVC	To 3”	Schedule 80.	150 psi	Yellow 33591 with Green 34193 Bands
Sodium Hypochlorite	PVC	To 3”	Schedule 80	150 psi	Yellow 33591
Sample Sump Pump Discharge	PVC	To 2”	Schedule 80	150 psi	Light Brown 30227
Lab Drain	Stainless Steel	4”	See Specification	150 psi	Light Brown 30227
Tank Drains	Ductile Iron	Various	C 150	30 psi	None Exposed
Tank Vents	PVC	Various	Schedule 80	Atmospheric	N/A
Filter Drains	Stainless Steel	2”	See Specification	15psi	None Exposed
Chemical Tank Vents	Varies	2”	Schedule 80	5 psi	***
Waste Washwater	Stainless Steel	18”	See Specification	15 psi	Light Brown 30227
FTW/WWW Recycle	Stainless Steel	4”	See Specification	55 psi	Light Brown 30227

Item 2-20. Specification Section 15080 – Pipe Insulation.

A. The following sentence shall be deleted from Section 1.01:

“Insulate interior raw water piping in the truck bay area.”

Item 2-21. Specification Section 15100 – Valves and Actuators

A. Delete the six (6) valves from Table 1 in Specification Section 15100, page 15100-50 labeled “Air Scour Blowers to Individual Filters” and replace with the following six (6) entries:

Air Scour Blower to Individual Filters	4	Butterfly	07 135	150	Open/Close	30	460/3
Air Scour Blower to Individual Filters	4	Butterfly	07 235	150	Open/Close	30	460/3
Air Scour Blower to Individual Filters	4	Butterfly	07 335	150	Open/Close	30	460/3
Air Scour Blower to Individual Filters	4	Butterfly	07 435	150	Open/Close	30	460/3
Air Scour Blower to Individual Filters	4	Butterfly	07 535	150	Open/Close	30	460/3
Air Scour Blower to Individual Filters	4	Butterfly	07 635	150	Open/Close	30	460/3

B. Delete Table 2 from Specification Section 15100 in its entirety and replace with the following table:

Table 2

Madbury Water Treatment Plant

SCHEDULE OF MANUALLY OPERATED INTERIOR BUTTERFLY VALVES

Service	Valve Size	Valve Type	Quantity	Working Pressure (psig)
Recycled Water Flow Meter Isolation	4	Butterfly	2	150
Static Mixer Bypass	12	Butterfly	2	150
Flocculator Inlet (Mixed Water)	18	Butterfly	3	5
DAF Recycle Header Isolation	6	Butterfly	1	150
DAF Recycled Water Pump Suction	4	Butterfly	3	150
DAF Recycled Water Pump Discharge	4	Butterfly	3	150
Saturator Inlet Isolation	4	Butterfly	2	150
Strainer Isolation	4	Butterfly	2	150
Strainer Bypass	4	Butterfly	1	150
Air Scour Blower Outlet	6	Butterfly	1	150
Back Wash Discharge To Filters	12	Butterfly	1	150
Finished Water Pump Suction	12	Butterfly	4	150
Finished Water Pump Discharge	12	Butterfly	4	150

C. Delete Table 3 from Specification Section 15100 in its entirety and replace with the following table:

Table 3

Madbury Water Treatment Plant

SCHEDULE OF MANUALLY OPERATED YARD BUTTERFLY VALVES

Service	Valve Size	Valve Type	Quantity	Working Pressure (psig)
Raw Water Inlet and Tap	16	Butterfly	2	150
FTW/WWW Pump Discharge	4	Butterfly	2	150
Distribution Valve Vault	20	Butterfly	6	150
Exist Clearwell Bypass	20	Butterfly	3	150
Finished Water Line	20	Butterfly	1	150

Note: All buried valves shall have mechanical joint ends.

D. Table 5 – Schedule of Check Valves – Delete the entry for "DAF Recycled Water" and replace with the following:

DAF Recycled Water	4	Tilted Disc Check	3	150

Item 2-22. Specification 17000 – Control and Information System – Scope and General Requirements

A. Delete Paragraph 1.04 and replace with the following:

1. The Instrumentation and Controls Subcontractor shall have the following minimum qualifications:

a. Shall have at least five years continuous experience in designing, implementing, supplying and supporting instrumentation and control systems for water or wastewater treatment facilities which are comparable to the Instrumentation and Control System in terms of hardware, software, cost and complexity.

b. Shall have manufactured and supported standard lines of digital processing and control equipment and application software continuously for the last five years.

c. Shall have in existence at the time of bid advertisement, an experienced Engineering and technical staff capable of designing, implementing, supplying and supporting the Instrumentation and Control System and handling the submittal and training requirements.

d. Shall provide system hardware components and software packages of fully developed, field proven standardized designs and therefore shall furnish a system which is not a highly unique, custom one-of-a-kind system.

e. Shall have at least three fulltime software programmers each with a minimum of five years experience in operator interface software configuration and hardware application and programming of programmable logic controllers and data highway systems similar to those proposed for this project.

f. Shall provide standard training in general process control applications and in operation, programming and maintenance of the control system and equipment.

g. Shall have a thorough working knowledge of water treatment processes and control philosophy in accordance with standard practices of the water treatment industry.

h. Shall have a demonstrated record of prompt response to field failures.

i. Shall utilize a UL approved panel shop. UL certificates shall be submitted to the Engineer.

j. Shall have a record of prompt shipments in accordance with Contract obligations required for previous projects.

k. Instrumentation and Control System supplier shall be one of the following:
    a. Electrical Installations, Inc., Moultonboro, NH
    b. General Control Systems, Inc., Green Island, NY;
    c. Optimum Controls Corporation, Reading, PA
    d. or approved equal.

2. The prospective I&C Subcontractor shall submit the following information for the Engineer's review and approval:

a. General performance history which shall include:

    a. All municipal or private water or wastewater treatment plant and/or pump station experience within the past 5 years.
    b. Detailed statement of recent experience in the completion of at least three Instrumentation and Control Systems similar in type, size and complexity to that proposed for this project.

b. The detailed statement of experience shall provide a detailed description of each referenced system including:

    a. Block diagram.
    b. Functional description.
    c. Project location.
    d. Date of installation.
    e. Date placed in operation.
    f. Operational availability data.
    g. Name and address of owner and their representative(s).

3. A clear statement describing any deviation from this specification and reasons for such deviations.

Item 2-23. Specification Section 17191 – Power Conditioners

A. Insert attached Specification Section 17191 – Power Conditioners

Drawings:

Item 2-24. Drawing G-3

A. Delete symbol for motorized actuator on butterfly valve downstream of the Waste Washwater flow meter and replace with symbol for manual actuator.

B. Delete symbol for motorized actuator on butterfly valve on DAF strainer (STR-05020) bypass line and replace with symbol for manual actuator.

Item 2-25. Drawing C-6

A. For 'Inset A': Change the text label '24" FTW/WWW' near MH 8 to '20" FTW/WWW'

Item 2-26. Drawing C-8

A. Detail for "Access Ramp – Section B-B": Change the note for "**12**-inch header pipe" on the left side of the detail to "**8**-inch header pipe".

B. Plan View – Typical Residual Drying Bed and Access Ramp – Change the note for "12-inch DI Decant" to "8-inch HDPE Decant".

C. Plan View Decant Weir Box – Change the "12-inch Decant to FTW/WWW tank" to "8-inch Decant to FTW/WWW basin"

Item 2-27. Drawing C-11

A. Change the 4-inch underdrain headers in drying beds 1 and 2 to 8-inch headers.

B. Change the 6-inch underdrain headers in drying beds 3 and 4 to 8-inch headers.

C. Change the 6-inch HDPE Decant from MH7 (through MH 6 and 9) to MH 2118 to 8-inch HDPE Decant.

D. Revise the text indicating the centerline elevation for the 20" DI MJ FW as it enters the new clearwell from '59.00' to '59.83'.

E. Revise the centerline elevation for the 20" MJ DIP FNW as it leaves the new clearwell from '54.5'to '55.33'.

Item 2-28. Drawing C-12

A. In profile, delete the existing MH#4 label that reads:

MH 4 (5'DIA.)
STA 3+60 RT 0.0'
RIM = 67.0±
INV IN = 46.9 (18" RCP)
INV IN = 46.9 (20" DIP NEW)
INV OUT = 46.8 (18" RCP)

And replace with the following:

MH 4 (5'DIA.)
STA 3+60 RT 0.0'
RIM = 67.0±
INV IN = 46.9 (18" RCP)
INV IN = 46.9 (12" DIP NEW)
INV IN = 52.0 (20" DIP NEW)
INV OUT = 46.8 (18" RCP)

Item 2-29. Drawing C-13

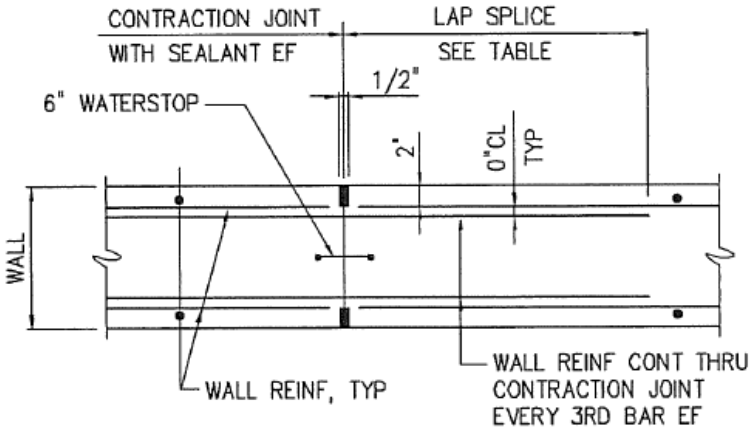
A. Existing Manhole Schedule: Change MH 2118 "New 6-inch DI" to "New 8-inch HDPE"

B. Proposed Drain Manholes:

1. Change MH 7 "6-inch HDPE out to MH 6" to "8-inch HDPE out to MH 6"
2. Change MH 6 "6-inch HDPE in from beds 3&4" to "8-inch HDPE in from beds 3&4" and "6-inch HDPE out to MH 9" to "8-inch HDPE out to MH 9"
3. Change MH 9 "6-inch HDPE in from MH 6" to "8-inch HDPE in from MH6" and "6-inch out to MH 2118" to "8-inch out to MH 2118".

Item 2-30. Drawing S-30

A. Delete following text: "Xref L:\SDETAILS\0331713.dwg" and replace with the detail below:



VERTICAL WALL CONTRACTION JOINT

0331713

Item 2-31. Drawing A-8

A. At Stair No. 9 near column M-2, delete reference to window type W29 and W16 and replace with W15.

Item 2-32. Drawing M-2

A. Delete Detail 1 in its entirety and replace with Detail 1 in attached Sketch M2-SK-01.

Item 2-33. Drawings M-3, M-8, and M-13

A. Furnish 6" butterfly valve on DAF Recycle suction line. Location of valve to be immediately south of column line 4.

Item 2-34. Drawing M-4

A. Delete the text "MOV 06 (2) in the instrument tag bubble located near column lines H between column lines 3 and 4 and replace with "MOV 08 (2)"

B. Delete the text "MOV 08 (2) in the instrument tag bubble located near column lines H between column lines 3 and 4 and replace with "MOV 06 (2)"

C. Delete the Tag Schedule shown on Drawing M-4 in its entirety and replace with the following schedule:

TAG #	PIPE OR TANK LOCATION TAG DESCRIPTION	TYPE	FILTER NO. 1	FILTER NO. 2	FILTER NO. 3	FILTER NO. 4	FILTER NO. 5	FILTER NO. 6
MOV 06 (1)	10" FLOATED WATER BUTTERFLY VALVE MOTOR OPERATED	MOV	06 110	06 210	06 310	06 410	06 510	06 610
MOV 08 (1)	18" WASTE WASHWATER BUTTERFLY VALVE MOTOR OPERATED	MOV	08 120	08 220	08 320	08 420	08 520	08 620
MOV 06 (2)	10" FILTERED WATER BUTTERFLY VALVE MOTOR OPERATED	MOV	06 115	06 215	06 315	06 415	06 515	06 615
MOV 08 (2)	6" FILTER TO WASTE BUTTERFLY VALVE MOTOER OPERATED	MOV	08 125	08 225	08 325	08 425	08 525	08 625
PDT 06 (3)	FILTER & FILTERED WATER PRESSURE DIFFERENTIAL TRANSMITTER	PDT	06 116	06 126	06 136	06 146	06 156	06 166
AE 06 (5) (NOTE)	10" FILTERED WATER TURBIDIMETER ANALYZER ELEMENT	AE	06 113	06 123	06 133	06 143	06 153	06 163
FE 06 (7) (NOTE)	10" FILTERED WATER FLOW METER ELEMENT	FE	06 110	06 120	06 130	06 140	06 150	06 160
MOV 07 (2)	4" AIR SCOUR DROP PIPE BUTTERFLY VALVE MOTOR OPERATED	MOV	07 135	07 235	07 335	07 435	07 535	07 635

NOTE: TRANSMITTER EQUIPMENT SHOWN ON DWG M-2

Item 2-35. Drawing M-11

A. Delete text 'Hydraulic Porta-Pac System' and associated text leader.

Item 2-36. Drawing M-16

A. In Section C, insert text indicating an invert elevation of 52.5 for the 20" drain.

Item 2-37. Drawing M-19

A. Delete following text:

Type-D WALL PENETRATION
WALL CASTING – BOTH ENDS FLANGED

And replace with:

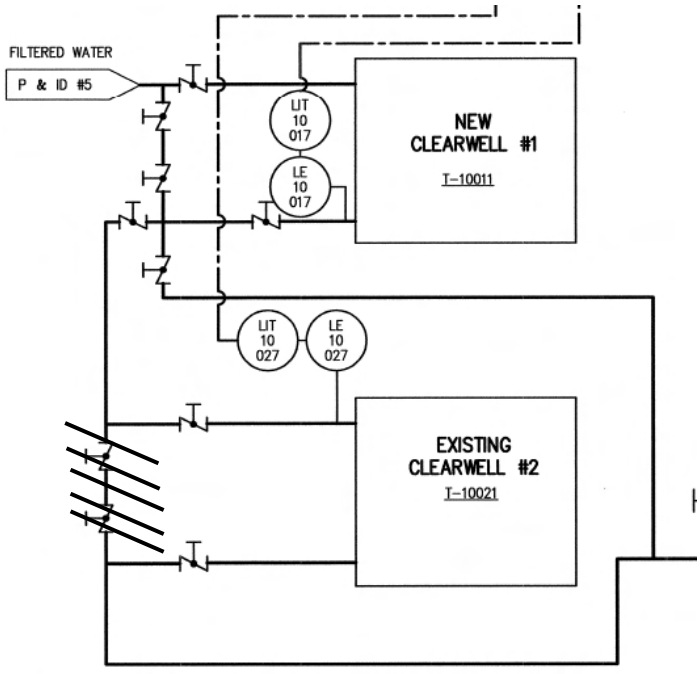
Type-C WALL PENETRATION
WALL CASTING – BOTH ENDS FLANGED

Item 2-38. Drawing I-9

A. Delete references to 5" pipe diameter and replace with 4".

Item 2-39. Drawing I-10

A. Delete the two butterfly valves and associated piping as shown in the figure below.



Item 2-40. Drawing I-12

A. Delete the three butterfly valves show on the WWW, FTW and Lagoon Supernatant lines on the inlet to the Combined Waste Washwater and Filter-to-Waste Tanks.

Item 2-41. Drawing H-14

A. Delete reference to 3" primary supply and return lines between HP-1 & HP-2 and HX-1 & HX-2 and replace with 2-1/2".

-- END –

Attachments:

- Pre-Bid Meeting Minutes
- Structural Record Drawings of Existing Coagulation Basins
- Table of Contents for Specifications (Revised)
- Specification Section 00410 – Bid Form (revised)
- Specification Section 02011 – Test Pits & Monitoring Wells (not included in all bid sets)
- Specification Section 02583 – Polyethylene Membrane Liners (not included in Bid Sets)
- Specification Section 05521 – Welded Pipe Railings (not included in Bid Sets)
- Specification Section 11211 – End Suction Centrifugal Pumps (new section)
- Specification Section 11376 – Compressed Air System (not included in Bid Sets)
- Specification Section 13200 – Fiberglass Manway Covers (not included in Bid Sets)
- Specification Section 17191 – Power Conditioners (not included in Bid Sets)
- Sketch M2-SK-01

Madbury Water Treatment Plant Upgrade
Portsmouth, NH

Minutes of Madbury WTP Upgrade and Reservoir Improvement Pre-Bid Meeting

Place: Madbury WTP and Bellamy Reservoir
Date: Friday, February 6, 2009

Attendees:

City of Portsmouth:	Peter Rice, Steve Scotton, David Allen
Town of Madbury	Marcus Everngam
Hazen and Sawyer:	Matthew Valade, Michael Greeley, Scott Bonett
Underwood Engineers:	Robert Daigle
Interested Bidders:	See Attachment 1

1 Introduction and Project Description

All attendees were required to sign the Pre-Bid conference sign-in sheet (Attachment 1)

P. Rice provided introduction to the Project team members present at the meeting and gave a brief project description for work required at the project site.

M. Valade detailed the main points of the Project Bid Documents as described in the agenda (Attachment 2).

Following a question and answer period the interested bidders were allowed to inspect the WTP site for 20 to 30 minutes. Interested bidders were then given a tour of the Bellamy Reservoir Improvements site.

2 Questions from Meeting Attendees

The Following Questions were asked by meeting attendees for discussion:

A. Project Funding – How much funding has been allocated to the Project?

   P. Rice answered that $25 Million has already been approved for the Project, but that this would also include Engineering Services during Construction. P. Rice provided the Opinion of Cost for the Construction portion of the Project to be approximately $22.5 million.

B. Project Schedule – A meeting attendee questioned the 669 day schedule set forth in the Contract Documents, requesting a 200 day extension be provided via addendum. Asker specifically mentioned the Bid review period as a concern.

   P. Rice commented that no immediate change would be made to the project schedule, noting that the schedule would not start until the Notice to Proceed has been issued. P.

Rice commented that any reasonable request for contract extension will be considered by the City after the Bid is awarded including delays due to winter shut-down, weather, etc.

C. Will water for plant testing during start-up be charged to the contractor, or provided free of charge by the City?

P. Rice commented that he believed the City would not charge for process testing water, but this will need to be confirmed.

Post Meeting Note: This has been addressed through Addendum 2, Item 2-7.

D. How does the contract handle removal of contaminated and hazardous materials and how much removal is expected?

P. Rice answered that the construction site has 3 active drinking water wells and the subsurface conditions are constantly monitored via a monitoring well program. No hazardous excavated material is expected. The only hazardous material on site would be located in the existing filter building, the demolition of which is not a part of this Contract.

E. An attendee asked about the differences between Substantial and Final Completion.

M. Valade directed the asker to the General Conditions where the differences between Substantial and Final Completion are clearly defined

F. An attendee asked about the proposed repairs to Freshet Road, and how any possible repair work would be included in the Bid Alternate

R. Daigle commented that Freshet Rd. is in the jurisdiction of the Town of Madbury and that any damage done by delivery trucks would need to be repaired. An allowance for the repair work between the WTP driveway and NH Route 108 will be provided via addendum and possibly included as a bid alternate.

R. Daigle also commented that it would be prudent for the Contractor to include this section of Freshet Rd on the pre-construction site video that will be conducted as per the terms of the Contract.

Post Meeting Note: This has been addressed in Addendum 2, Items 2-5.D and 2-6

3 Questions from Meeting Attendees – Bellamy

A. An attendee asked about the mowing requirement for Site upkeep.

S. Bonett answered that the mowing component of the Bellamy site work is intended to be a one time mowing/clearing. This single clearing is normally performed by the City yearly. No additional upkeep will be required by the Contractor unless necessary for Construction activities.

B. Grouting requirements for dam repair were not visible due to snow and ice. One potential bidder commented that the black and white pictures provided with the contract

documents were not sufficient to make an accurate bid, and requested that the digital pictures be provided to more accurately estimate this work.

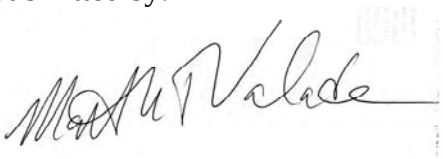
S. Bonnett answered that this may be possible and that any additional info in this regard would be issued via an addendum

C. An attendee questioned where a boat could be launched for Reservoir work.

S. Bonnet mentioned that a boat could be launched on the north side of the reservoir from the proposed staging area. An access road exists from Mill Hill Road to the north side of the reservoir, but some clearing and regrading of the road may be necessary to use this bank of the reservoir as a boat launch.

Public boat launch is available for City use on the South side of the reservoir, further west of the Project site.

Submitted by:



Matthew T. Valade, P.E.
Senior Associate

MTV:mmg

Attachment 1: Pre-Bid Conference Sign-in sheet
Attachment 2: Pre-Bid Meeting Agenda

Attachment 1: Pre-Bid Conference Sign-in sheet

HAZEN AND SAWYER
Environmental Engineers & Scientists

Hazen and Sawyer, P.C.
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603 766-0416
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Madbury Water Treatment Plant and
Reservoir Upgrade Project
Pre-Bid Conference Sign-In
City of Portsmouth, NH

Date: February 6, 2009
Place: Madbury Water Treatment Plant

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Duncan Peterson	D+C Const Co	duncan@dandconstruction.com	781-871-8200
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Chuck Fritz	Electrical Installation	Chuck.Fritz@E.I.-HQ.com	

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Gene Connor	Kinsmen Corp	erconnor@kinsmencorp.net	603 625 9199
Fred Kibble	The Maher Corp.	fkibble@themahercorp.com	781-421-2600
David Dodge	Water Intn	ddodge@worldpath.net	875-7000
John Benham	Pump Systems	JCB@PumpSystemsInc.com	603 934 7100
Tom Rousseau	Ports Corp		603-476-5525 f " " 5106
Heath Todd	Apex Const.	heath@apex-constructioninc.com	(603) 330-3600
Jeff Todd	Apex	Jeff@apex-constructioninc.com	(603) 330-3600
Steve Garland	Jeremy Hill, Exc.		603-968-9694
John Downey	OSI Kontrol	john@osisales.com	781 690 0094
Ed Burns	Waterworks Diving Service	waterworksdiving@hotmail.com	207. 741. 9174
Mike Desrosiers	Brown Industrial Group	Mike@BrownIndustrialGroup.com	207-698-5598
Ralph Dumke	Waterline Industries	Ralph@Waterlineind...	603-474-7477
Vaughan Richardson	Richardson Electrical	vrichardson@RichardsonElectrical.us	603 474-3900
Tom Reis	Substructures	Tom@Substructures.com	603-436-1039

Attachment 2: Pre-Bid Meeting Agenda

PRE BID MEETING AGENDA
Madbury Water Treatment Plant and
Bellamy Reservoir Improvements
for
City of Portsmouth, NH
Department of Public Works
February 6, 2009 – 10:00 AM

1. **Introductions:**

2. **Attendance Roster:**
   a. Sign the attendance sheet

3. **Overview of Work:**
   The work to be performed under this contract consists of, but is not limited to the following:
   a. New 4.0 mgd treatment building, chemical addition, DAF clarification (3 trains) and dual media filtration (6 filters), including the following major equipment
      i. Six flocculators (1/2 hp)
      ii. Three DAF basin skimmers (1/2 hp)
      iii. Two residuals transfer (peristaltic) pumps (5-10 hp)
      iv. DAF recycle system
         1. Two oilless scroll compressors (10 hp)
         2. Three multistage ring section pumps (15 hp)
         3. Two stainless steel saturator pressure vessels
         4. DAF recycle injection nozzles (3 manifolds per tank)
         5. One self cleaning strainer (1/3 hp)
      v. Six Filters
         1. Dual media (sand/anthracite) placement
         2. One air scour blower (30 hp)
      vi. Chemical systems (coagulant, caustic, sodium hydroxide, polymer, PAC)
         1. HDPE chemical storage tanks (5 bulk tanks, 5 day tanks)
         2. Chemical metering pumps (4 diaphragm, 4 peristaltic)
         3. Three polymer blending units
         4. PAC dosing unit
   b. Finished water pump station and new clearwell building
      i. Four finished water/backwash pumps (100 hp)
   c. Backwash equalization tank and recycle flow pump station
      i. Two submersible waste washwater recycle pumps (15 hp)
      ii. Geotextile lined WWW/FTW equalization basin
   d. Site work including;
      i. Excavation, finished grading
      ii. Yard piping construction
      iii. Mill and overlay existing site roadways (bid alternate)
   e. Residuals dewatering beds construction (bid alternate)
   f. Process instrumentation and control system
   g. Reservoir improvements
      i. Intake structure upgrades
      ii. Reservoir aeration system (bid alternate)
      iii. Reservoir flow directing curtain (bid alternate)

4. **Funding:**
    a. Funding is anticipated to be obtained from the NHDES State Water Revolving Loan Fund
    b. Stimulus Package Funds may become available – Additional requirements to Contract may be forthcoming due to Federal requirements
    c. MBE/WBE provisions apply for this project. The Contractor must demonstrate a good faith effort to meet MBE/WBE goals. The NHDES must approve of the DBE procurement efforts prior to contract award. Changes to the Contract must be approved by the NHDES prior to any payment or time extension. MBE/WBE packages must be received within 15 days of bid opening. NHDOT maintains the list of MBE/WBE contractors for the state of New Hampshire. They will approve out of state MBE/WBE's with appropriate documentation.

5. **Bid Opening – Date and Time:**
    a. Sealed Bids for the construction of the Madbury Water Treatment Plant Upgrade and Bellamy Reservoir Improvements will be received by City of Portsmouth at the Office of Purchasing Department, City Hall, 1 Junkins Avenue, Portsmouth, NH, until **2:00 p.m., March 5, 2009**.

6. **Bid Form and additional Required Forms:**
    a. Use forms provided in Contract Documents and Specifications.
    b. The following documents are required to be submitted with any proposal
        i. Bid Form (Section 00410)
        ii. Bidders affidavit of non-collusion (Section 00420)
        iii. Bid Security in the amount of 10% of the maximum amount bid is required either in the form of a certified check or a bid bond (Section 00430)
        iv. Bidder qualification form (Section 00435)
        v. List of proposed Subcontractors
        vi. List of proposed Suppliers

    c. The following forms will be required to be submitted by the successful bidder after the bid opening date
        i. Notice of nondiscrimination in employment (Section 00440)
        ii. Certification of Nonsegregated Facilities (Section 00440)
        iii. Approval of MBE/WBE Utilization (Section 00440)

7. **Contract Time:**
    a. Work must be substantially complete within 669 days of receipt of the Notice to Proceed
    b. Liquidated damages will be in the amount of $1500 for each calendar day of delay from the date established for substantial and/or contract completion.

8. **Items for Early Completion:**
    a. Residual Drying Beds
    b. Reservoir Improvements
    c. Other elements possible, if required for construction sequencing
    d. Partial Substantial completion will be considered as items are integrated into full system per Owner's discretion based on General Conditions

9. Basis of Award:

a. If the Contract is awarded, Owner will award to the Bidder whose Bid is deemed to be in the best interests of the Owner. See Article 19 of the Instruction to Bidders
b. Contract award is contingent upon available funds.
c. The Owner reserves the right to award only Item I (Madbury WTP Work) or Item II (Bellamy Reservoir Work) to the successful bidder based on available funding for the Project. It is NOT the intent of the City to award separate contracts for Items I and II.

10. Addenda:

a. Addenda will be issued as necessary up to seven days prior to bid due date.
b. Technical addenda to be issued as required in response to RFI questions; Non-technical responses to RFI will also be provided.

11. Form of Agreement and General Conditions:

a. EJCDC was used as the basis of the front end documents. Modifications are clearly indicated throughout.
b. No Supplement Conditions (Section 00800) are used. All modifications have been made directly to the General Conditions (Section 00710)
c. Form of Agreement is included in the Contract Documents, refer to Specification Section 00521
d. Construction performance and payment bonds are required, each in the amount of 100% of the contract award.
e. Insurance requirements as per Section 00710 – General Conditions, Article 5.

12. Geotechnical Reports:

a. Geotechnical reports were compiled for both the Madbury WTP site and the Bellamy Reservoir construction site by RW Gillespie and Associates. Both reports are provided in the contract documents as attachments to Section 02010 – Subsurface Conditions.

13. Permits, Fees and Utilities:

a. Contractor is responsible for filing permits, fees, site security, utilities, temporary electricity, water, etc.
b. Addenda will address building permit fee requirements.

14. Payments:

a. Monthly progress payments
b. 10% retainage to be withheld from each payment
c. Upon Substantial Completion, Owner shall make a payment to the Contractor to bring total amount paid to 95% of the Contract amount.
d. Upon Final Completion, Owner shall make a payment to the Contractor to bring total amount paid to 98% of the Contract amount. Final 2% retainage will be held by the Owner for a one year correction period in an interest bearing account, with accrued interest to be paid to the Contractor.

15. Field Engineering:

a. Survey and Reference Points
    i. Owner will provide engineering surveys thought reasonably correct for Contractor to complete the Work. Benchmark locations to be issued by addenda.

ii. Contractor will be responsible for laying out all work, and for protecting all established reference points
iii. See Section 00710 – General Conditions Article 4.05, and Section 01050 – Field Engineering

16. Scheduling Plant Interruptions

a. See Section 01520 – Maintenance of Utility Operations During Construction. The Contractor shall schedule work so as to minimize interruption existing plant operation. This is particularly important with regard to delivery of raw water to the Treatment Plant and delivery of treated water to the City.
b. Plant interruption must be Coordinated through the Engineer and approved by the Owner. Significant prior notice is required and specified so the City can make the necessary preparations.

17. Bid Alternates:

a. Contractors Bid Form must contain bid prices for the following bid alternates:
    i. Delete construction of residuals drying beds
    ii. Delete aeration system at Bellamy Reservoir
    iii. Furnish and install carbon steel piping in lieu of stainless steel piping
    iv. Mill and pavement overlay for all existing roadways
    v. Delete flow directing curtain at the Bellamy Reservoir

18. Management of Construction Waste:

a. Contractor is to follow LEED construction waste management principles
b. At least 50% of waste generated on site to be diverted from landfills.
c. Contractor will be required to file a Waste Management Plan, quarterly progress reports and a final waste report detailing the types and amounts of waste created

19. Freshet Road

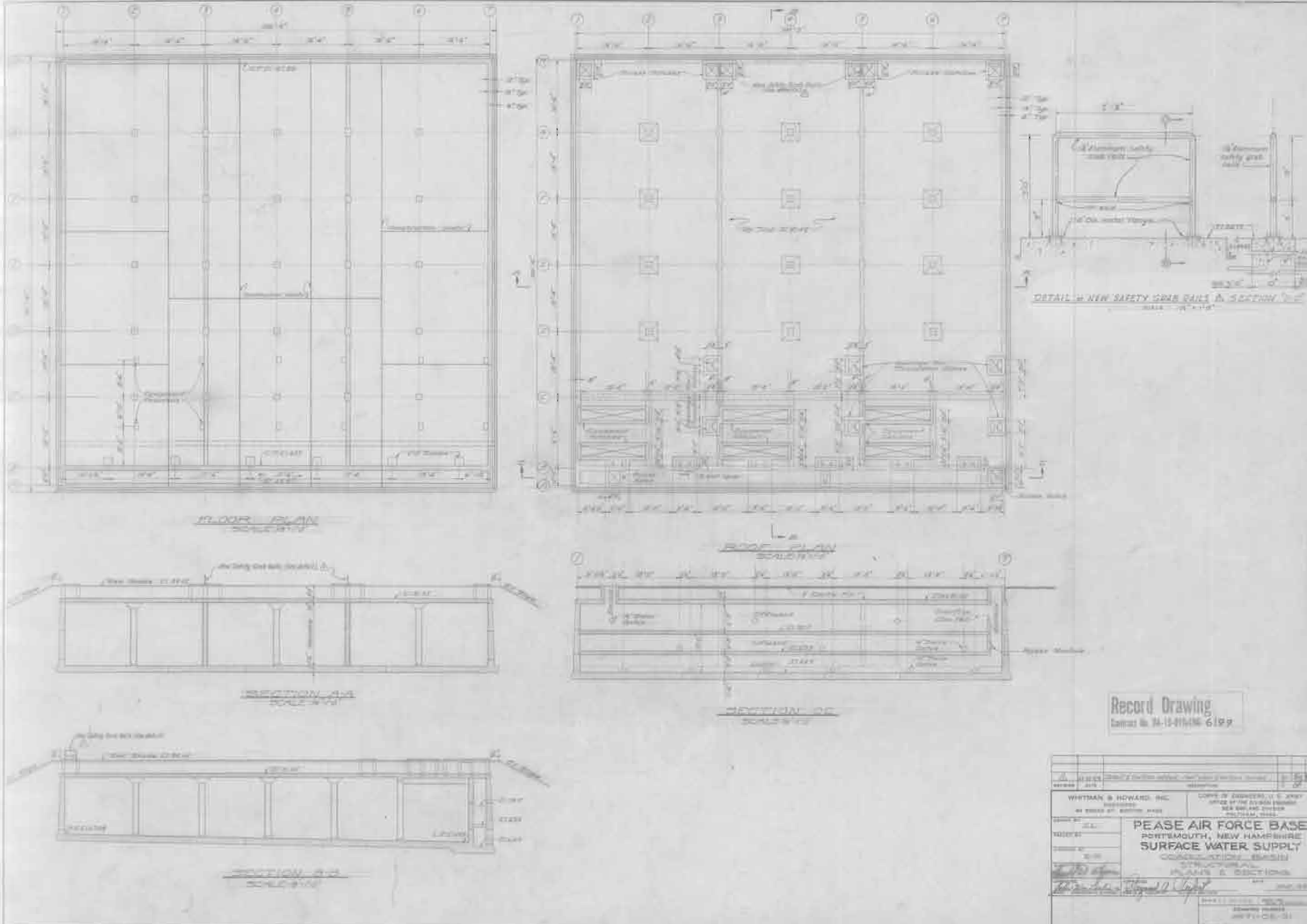
a. Freshet Road is within the jurisdiction of the Town of Madbury. Contractors will be subject to the rules of the Town of Madbury relative to load limits and to season shut down in the Spring. The City of Portsmouth cannot waive these rules.
b. Access for deliveries will be limited to the Route 108 side of Freshet Road (the west end). The Contractor should include a pre-construction video of this section of road and may wish to video tape the entire length of the road as a precaution.
c. A Bid Alternate will be included by addenda to reconstruct Freshet Road if needed. The Bid Alternate is based on Full Width Reclamation of the road and 3.5" of binder and top course pavement. The extent of the work will be at the Owner's discretion after consultation with Town of Madbury. Damage to the Freshet Road east of the WTP will be repaired at the Contractor's expense.

20. Questions from Potential Bidders:

21. Site Tour of Water Treatment Plant Site and Bellamy Reservoir Site:

a. Additional Site Visits, if required, to be arranged through Peter Rice.

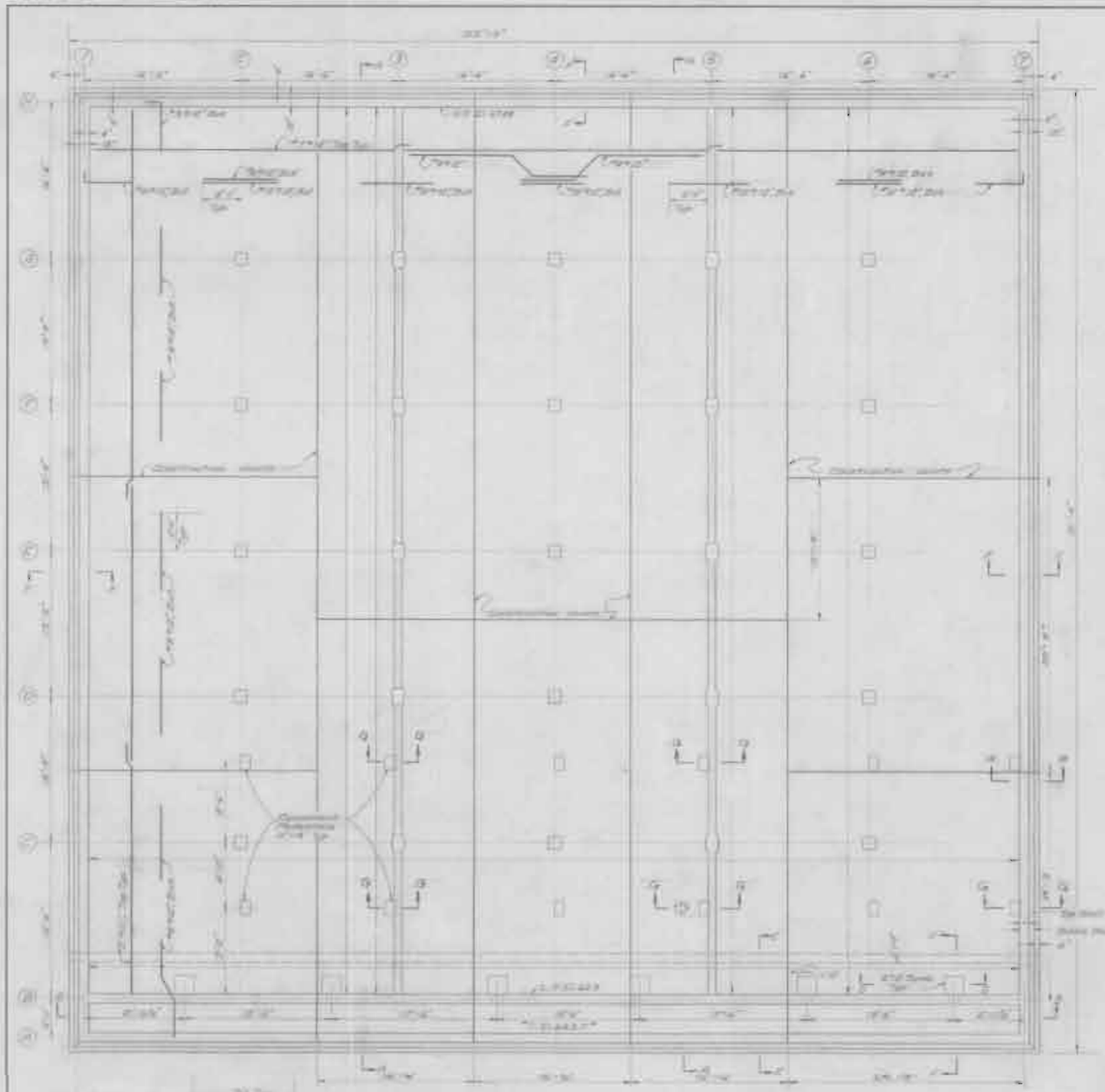
22. Adjourn


FLOOR PLAN
ROOF PLAN
DETAIL of NEW SAFETY GRAB RAILS & SECTION
SECTION A-A
SECTION C-C
SECTION B-B
Record Drawing
WHITMAN & HOWARD, INC.
PEASE AIR FORCE BASE
PORTSMOUTH, NEW HAMPSHIRE
SURFACE WATER SUPPLY
COAGULATION BASIN
STRUCTURAL
PLANS & SECTIONS

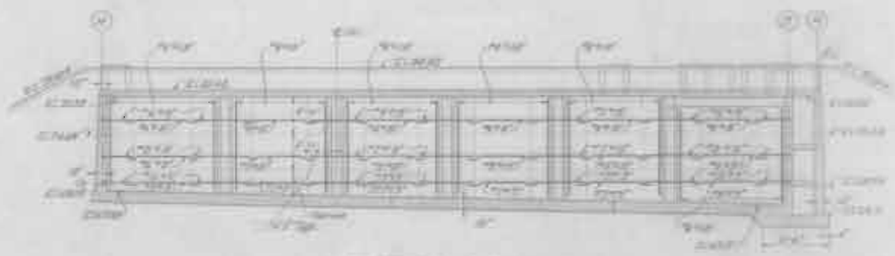
CORPS OF ENGINEERS

U. S. ARMY

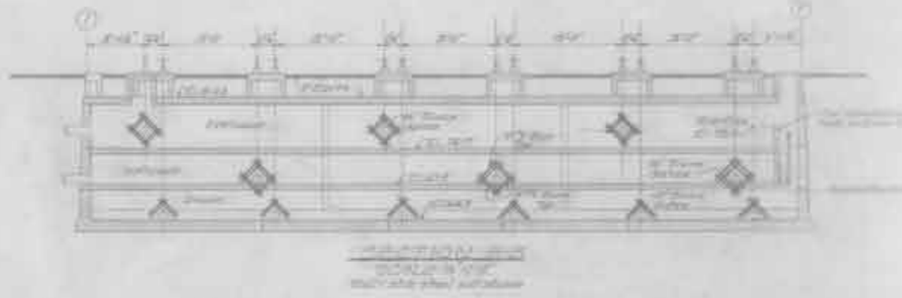
Record Drawing
Contract No. DA-19-015-ENG-6199



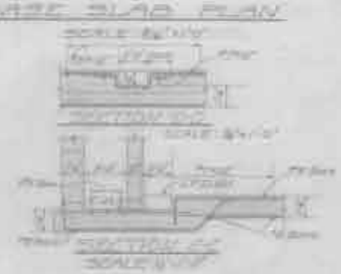
BASE SLAB PLAN

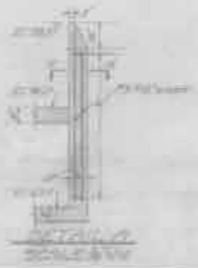


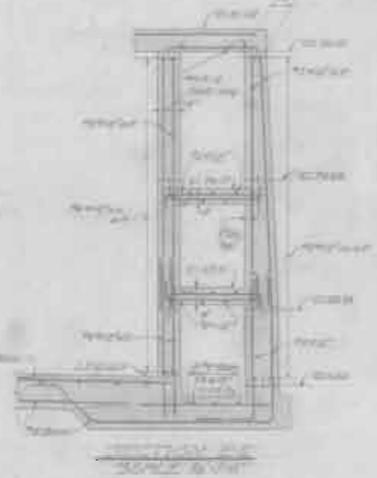
SECTION A-A

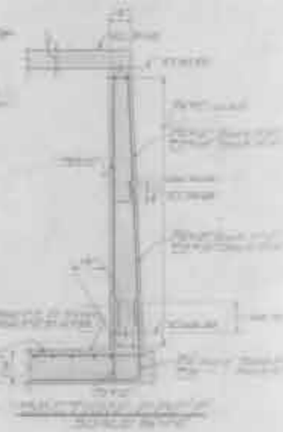


WALL TO SLAB JOINT









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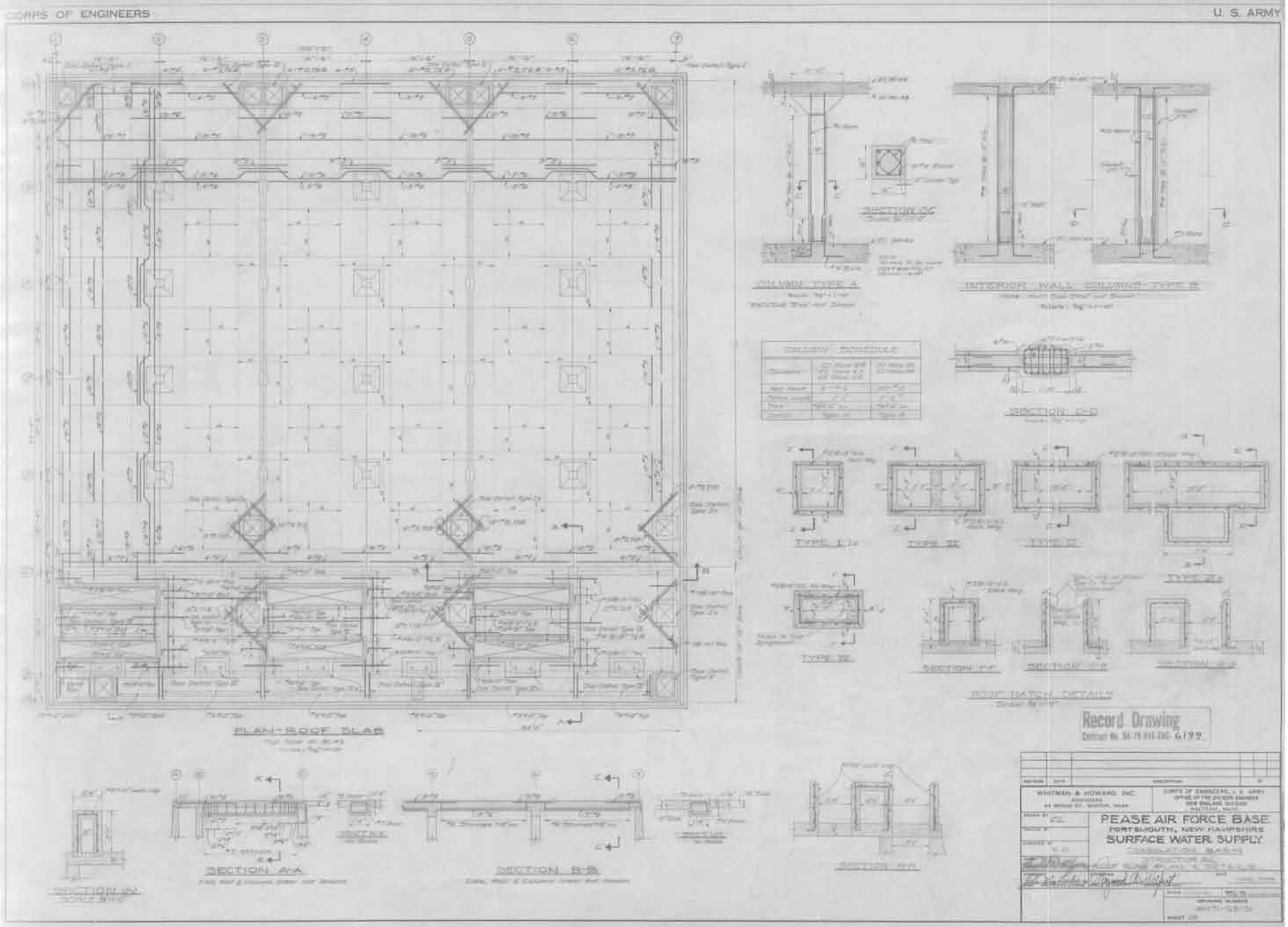
DESIGNED BY: C.L. DRAWN BY: [illegible] CHECKED BY: [illegible] APPROVED BY: [illegible]	PEASE AIR FORCE BASE PORTSMOUTH, NEW HAMPSHIRE SURFACE WATER SUPPLY DISTRIBUTION SYSTEM BASE SLAB PLAN & SECTIONS Edward A. Hurst
	SHEET 23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U. S. ARMY
COLUMN TYPE A
SECTION C-C
INTERIOR WALL COLUMNS TYPE B
COLUMN SCHEDULE
SECTION D-D
TYPE I
TYPE II
TYPE III
TYPE IV
TYPE V
SECTION F-F
SECTION E-E
SECTION G-G
ROOF HATCH DETAILS
PLAN-ROOF SLAB
SECTION A-A
SECTION B-B
SECTION H-H
Record Drawing
6179
WHITMAN & HOWARD, INC.
PEASE AIR FORCE BASE
PORTSMOUTH, NEW HAMPSHIRE
SURFACE WATER SUPPLY

CITY OF PORTSMOUTH
MADBURY WATER TREATMENT PLANT UPGRADE
AND
BELLAMY RESERVOIR IMPROVEMENTS

CONTRACT SPECIFICATIONS

TABLE OF CONTENTS

Comment [M1]: Addendum 2

Comment [M2]: Addendum 2

TABLE OF CONTENTS
(continued)

Comment [M3]: Addendum 2

Comment [M4]: Addendum 2

TABLE OF CONTENTS
(continued)

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Comment [M5]: Addendum 2

Comment [M6]: Addendum 2

Comment [M7]: Addendum 2

Comment [M8]: Addendum 2

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Comment [M9]: Addendum 2

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SECTION 00410

BID FORM

CITY OF PORTSMOUTH, NH
MADBURY WATER TREATMENT PLANT UPGRADE
AND
BELLAMY RESERVOIR IMPROVEMENTS

BID PROPOSAL # 1077
FEBRUARY 2009

TABLE OF ARTICLES

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

FINANCE/PURCHASING DEPARTMENT
CITY HALL
1 JUNKINS AVENUE
PORTSMOUTH, NH 03801
ATTN: PURCHASING CLERK

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, the other related data identified in the Bidding Documents, and the following Addenda, receipt of which is hereby acknowledged.

Addendum No.	Addendum Date
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state and local Laws and Regulations that may affect cost, progress and performance of the Work.

D. Bidder has carefully studied all: reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site (except Underground Facilities) which have been identified in GC-4.02 or SC-4.02.

E. Bidder has obtained and carefully studied (or accepts the consequences for not doing so) all additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying the specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents to be employed by Bidder, and safety precautions and programs incident thereto.

F. Bidder does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price(s) bid and within the times and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports and drawings identified in the Bidding Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Bidding Documents.

I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

J. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work for which this Bid is submitted.

K. Bidder will submit written evidence of its authority to do business in the state where the Project is located not later than the date of its execution of the Agreement.

ARTICLE 4 – FURTHER REPRESENTATIONS

4.01 Bidder further represents that:

A. this Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

A. Lump Sum Bid Price

A lump sum bid price for all items shall be provided. The basis for bid shall be the Total Lump Sum Bid price for all Items, including Unit Price work. See Specification 01025 – Measurement and Payment for a description of the work included in Item I and II. The Owner reserves the right to award only Item I or Item II to the successful bidder based on available funding for the Project.

Lump Sum Bid Price for Item I only:

_____ **$** _____

(Lump Sum Bid Price for Item I to include Item I Unit Price Total from 5.01.B) (words) (numerals)

Lump Sum Bid Price for Item II only

_____ **$** _____

(Lump Sum Bid Price for Item II to include Item II Unit Price Total from 5.01.B) (words) (numerals)

Total Lump Sum Combined Bid Price for Items I and II:

_____ **$** _____

(Total Lump Sum Combined Bid Price does not have to equal the sum of Items I and II) (words) (numerals)

All specified cash allowances and unit price work are included in the price(s) set forth above and have been computed in accordance with Paragraph 11.02 of the General Conditions.

B. Unit Price Bid Price

Item No.	Description		Unit	Estimated Quantity	Bid Unit Price	Bid Price
Item I Unit Prices for Work at Madbury Water Treatment Plant						
1-1	Additional Soil Excavation (See Specification 02220)		CY	50	$_____	$_____
1-2	Additional Rock Excavation (See Specification 02224)		CY	2	$_____	$_____
1-3	Additional Structural Fill (See Specification 02229, 2.01.B.3)		CY	10	$_____	$_____
1-4	Additional Common Fill (See Specification 02229, 2.01.B.5)		CY	10	$_____	$_____
1-5	Additional Reinforcing Steel (See Specification 03200)		Ton	0.5	$_____	$_____
1-6	Additional Class A1 Concrete (See Specification 03300)		CY	10	$_____	$_____
1-7	Additional Control System Programming (See Specification 17000, 3.03)		Hours	80	$_____	$_____
1-8	Sludge Dewatering and Hauling (See Specification 01025, 1.06.B.1)	Mobilization	each	3	$_____	$_____
		Dewatering	Dry Ton	660	$_____	$_____
		Hauling	Wet Ton	5400	$_____	$_____
	Sum of Mobilization, Dewatering and Hauling:					
1-9	Utility Charges (See Specification 16421, 1.06.B.2)		Allowance	N/A	*Allowance*	$ 100,000
1-10	Repair of Freshet Road	Reclamation	SY	8,000	$_____	$_____
		Paving	SY	8,000	$_____	$_____

Total of Item I Bid Prices for Item I Unit Prices (Include in Item I Bid Price and Combined Bid Price in 5.01.A)

_____ **(words)** **$**_____

Item II Unit Prices for Work at Bellamy Reservoir					
2-1	Underwater Excavation and Disposal, Sediment	CY	100	$_____	$_____
2-2	Underwater Excavation and Disposal, Rock	CY	1	$_____	$_____
2-3	Provide Dam Repair - Crack Injection	LF	50	$_____	$_____
2-4	Provide Dam Repair - Spall Repair	CF	45	$_____	$_____
Total of Item II Bid Prices for Item II Unit Prices (Include in Item II Bid Price and Combined Bid Price in 5.01.A):					
_____ **(words)**				**$**_____	

Unit Prices have been computed in accordance with Paragraph 11.03.B of the General Conditions.

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

C. Bid Alternates

Lump sum bid prices shall be provided for the following deduct Alternates, as detailed in Specification 01025 – Measurement and Payment. Alternate prices shall include all labor, materials and overhead and profit to complete the work described. If a bidder determines a deduct Alternate as described will not result in a decrease to the Contract amount, the bidder shall enter 'NO DEDUCT' as the bid price. If a bidder determines an Add Alternate as described will not result in an increase to the Contract amount, the bidder shall enter 'NO ADDER' as the bid price. Bid alternates may or may not be accepted by the Owner. Alternates are listed in order of priority, with Alternate A having the highest priority

Alternate A – Delete Construction of Residual Drying Beds		
Deduct	$_____ (words)	$_____ (numerals)
Alternate B – Delete Reservoir Aeration System		
Deduct	$_____ (words)	$_____ (numerals)
Alternate C – Furnish and Install Carbon Steel Piping in lieu of Stainless Steel Piping		
Deduct	$_____ (words)	$_____ (numerals)
Alternate D – Mill and Pavement Overlay for Existing Roadways		
Add	$_____ (words)	$_____ (numerals)
Alternate E – Delete Reservoir Flow Directing Curtain		
Add	$_____ (words)	$_____ (numerals)

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 14.07.B of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of a Bid Bond conforming to the requirements of Specification Section 00430.
B. List of Proposed Subcontractors
C. List of Proposed Suppliers
D. Required Bidder Qualification Statement with Supporting Data conforming to Section 00435 – Bidders Qualification Statement
E. Affidavit of Non-Collusion (Section 00420)

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

9.01 This Bid submitted by:

If Bidder is:

An Individual

Name (typed or printed): _____

By: _____ (SEAL)
(Individual's signature)

Doing business as: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner -- attach evidence of authority to sign)

Name (typed or printed): _____

A Corporation

Corporation Name: _____ (SEAL)

State of Incorporation: _____
Type (General Business, Professional, Service, Limited Liability):_____

By: _____
(Signature -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____ (CORPORATE SEAL)

Attest _____

Date of Authorization to do business in NEW HAMPSHIRE is _____/_____/_____.

A Joint Venture

Name of Joint Venture: _____

First Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of first joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

Second Joint Venturer Name: _____ (SEAL)

By: _____
(Signature of second joint venture partner -- attach evidence of authority to sign)

Name (typed or printed): _____

Title: _____

(Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above.)

Bidder's Business Address _____

_____

Phone No. _____ Fax No. _____

SUBMITTED on _____, 20_____.

State Contractor License No. _____. (If applicable)

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SECTION 02011

TEST PITS & MONITORING WELLS

PART 1 - GENERAL

1.01 Description

A) Work Included: Excavate test pits and install monitoring wells at the locations to the depths shown on the Drawings and as directed by the Engineer to identify subsurface conditions and/or location of underground utilities.

B) Backfill, compact, and restore the surface of the excavation.

C) The Contractor shall repair damage to any structure, utility, or private or public property damaged during prosecution of this work.

D) The Contractor may, at his expense, perform additional test pit excavation not ordered by the Engineer.

E) Related Work Specified Elsewhere. The following is a list of Sections that note work related to this Section. The list is provided for the Contractor's convenience and is not intended to relieve the Contractor of requirements noted in Sections that are not listed below:

1) Section 02220 –Excavation – Earth

2) Section 02229 – Backfilling, Compaction, Control, & Testing

3) Section 02368 – Sheeting

.

F) Abandon existing monitoring wells where shown on the plans or as directed by the Engineer

1.02 Quality Assurance

A) The entire test pit excavation and monitoring well installation must be supervised by the Engineer.

B) Monitoring well decommissioning to be performed in accordance with Env-Or 610.04, by a licensed New Hampshire water well Contractor holding a valid technical drillers license under RSA 482-B, and observed by the Engineer.

PART 2 - PRODUCTS

2.01 Materials

A) Materials shall be as shown and specified on the Drawings and herein.

B) All materials to be in accordance with NHDES regulations.

C) Well grout may include:

1) Portland cement

2) Cement-bentonite grout – a mixture of Portland cement with 2-10% bentonite clay.

PART 3 - EXECUTION

3.01 Installation

A) Excavate test pits at the locations and to the depths and widths as directed by the Engineer.

B) Obtain information on buried structures and utilities in the vicinity of the test pit.

C) Coordinate work such that all property and structure, and utility owners are aware of the work prior to its commencement.

D) Provide the Engineer with 24 hour notice prior to commencement of the work.

E) Excavated material shall be stored, transported and disposed of as specified in the "Structure Excavation" section of this Division.

F) Install monitoring wells as shown on the Drawings, as directed by the Engineer, and as required by We-600 and Env-Or 704.02.

G) Monitoring wells shall be designed, installed, developed, maintained and decommissioned in accordance with We 100-1000 and the practices described in:

1) “Standards Relating to Environmental Site Characterization”, Second Edition, document identification number ASTM ENVSIT-06, dated 2006; and

2) ASTM ENVSAM-06

H) Monitoring wells shall be constructed, maintained, and decommissioned only by a licensed New Hampshire water well Contractor holding a valid technical drillers license under RSA 482-B

I) Monitoring wells shall be:

1) Developed prior to sampling; and

2) Allowed to equilibrate a minimum of 2 weeks following installation prior to sampling

3.02 Abandonment of Monitoring Wells

A) Monitoring wells shall be constructed, maintained, and decommissioned only by a licensed New Hampshire water well Contractor holding a valid technical drillers license under RSA 482-B.

B) Well decommissioning reports shall be submitted in accordance with We-800 and RSA 482-B:10.

C) Prior to decommissioning, investigate wells to determine construction and evaluate obstructions that might interfere with the filling and sealing process. Remove any obstructions by cleaning out the hole.

D) Abandoned monitoring wells shall be sealed from the bottom to the top by pressure grouting with a tremie line.

E) Abandoned drilled wells shall be sealed by the pressure grout method with the use of a conductor pipe, otherwise known as a tremie pipe, from the bottom of the well to the top with a grout mixture of Portland cement with 2 to 10 percent high solids bentonite clay mixed according to the water-to-cement ratio in the Table below:

Table 604-1 Water-to-cement ratio for mixing cement bentonite grout applicable for use with portland cement class A or B

Percent Bentonite (by weight)	Maximum Mix-Water Requirements Gallons/Sack	Slurry Weight (Density) Pounds/Gallon
0	5.2	15.6
2	6.5	14.7
4	7.8	14.1
6	9.1	13.5
8	10.4	13.1
10		11.7

F) In addition to the requirements above, commercially available premixed bentonite grouts designed for sealing wells may be used.

G) Commercially available premixed bentonite grouts shall be mixed with water according to the manufacturers specifications.

H) Acceptable sealing materials for non-contaminated drilled wells shall include:

1) Portland cement otherwise known as neat cement, mixed with 5 to 6 gallons of clean water per 94 pound bag;

2) Portland cement with 2 to 10 percent high solids bentonite clay mixed according to the water-to-cement ratio in the Table above;

3) Bentonite chips; and

4) Commercially available premixed grouts mixed with water according to the manufacturers specifications

I) Bentonite chips used for sealing 6 inch diameter or larger wells shall be a minimum of 3/8 inch diameter and shall be applied at a rate no greater than the manufacturer's specification.

J) Fill the screen and casing with grout to 5 ft below the proposed structure or finished grade and cut off the casing.

K) All wells shall be abandoned in accordance with the requirements of We-600 and Env-Or 704.02.

3.03 Excavation and Backfill

A) Perform all work in accordance with applicable excavation, backfill, and compaction requirements noted elsewhere in the Contract Documents.

B) Restore the ground surface to it original condition or better in accordance with applicable requirements noted elsewhere in the Contract Documents.

C) Repair damage to any component to the standards and satisfaction of the component owner.

END OF SECTION

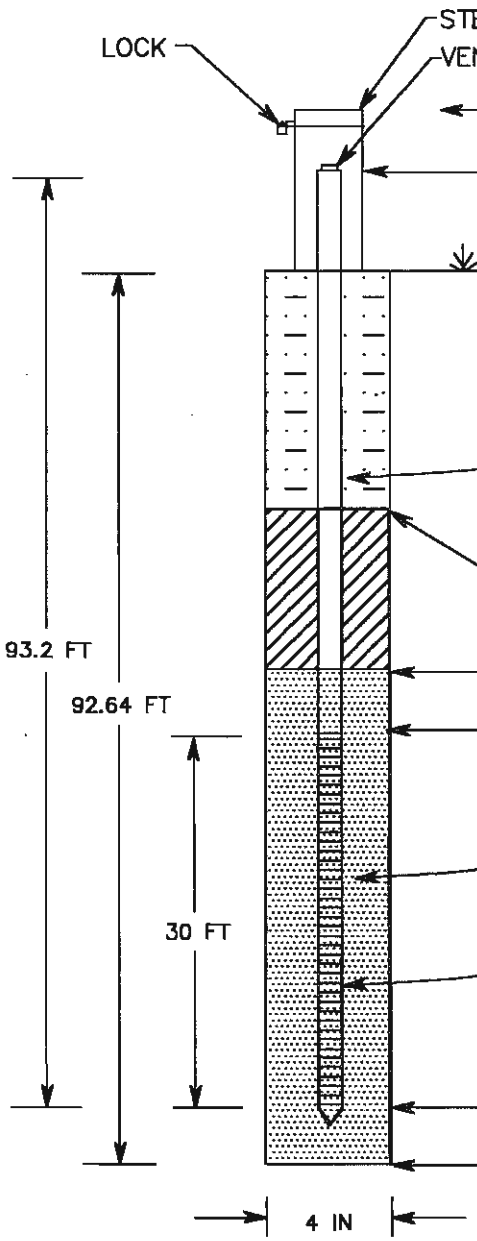
GROUNDWATER MONITORING WELL CONSTRUCTION DETAIL

WELL ID.: MSW-4

DATE: 09/06/00

OBSERVED WATER SURFACE ELEVATION: 1.28 FT

DISTANCE BELOW GROUND: 65.86 FT



CASING	67.96 FT
TOP OF P.V.C.	67.83 FT
GROUND	67.14 FT
RISER TYPE	SCH. 40 PVC
INSIDE DIAMETER	2 IN
TOP OF BENTONITE SEAL	19.0 FT
TOP OF FILTER SAND PACK	9.0 FT
TOP OF SCREEN	4.63 FT
TYPE/SIZE OF SAND	#2 SILICA
TYPE OF SCREEN	SCH. 40 PVC
SIZE OF SLOTS	0.010 IN
INSIDE DIAMETER	2 IN
BOTTOM OF SCREEN	-25.37 FT
BOTTOM OF BORING	-25.5 FT

R.W. GILLESPIE & ASSOCIATES, INC.

PROJECT: DEEP SENTRY WELLS
LOCATION: MADBURY, NEW HAMPSHIRE
PROJECT NO.: 815-07
DESCRIPTION: OVERBURDEN GROUNDWATER MONITORING WELL
DRILLING DATE: 09/06/00

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NO TEXT ON THIS PAGE

TEST BORING LOG: MSW-4

Project: Deep Sentry Wells
Location: New Hampshire
Client: City of Portsmouth
Project No. 815-07

Approximate Surface Elevation: 67'±
Ground Water Depth: 65.8'
Date: 09/06/00

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
0				Topsoil and organic material (12").					
				SAND (SP); medium dense, moist, fine sand with little silt, thin silt seams, stratified, brown.					
5			S-1		20	8 12 17 19			
				SANDY SILT (SM-ML); medium dense, moist to wet, silt with some fine sand, thin sand seams, stratified, brown.					
10			S-2		22	8 8 10 10			
				CLAYEY SILT (ML-CL); loose, moist to wet, clay-silt mixture, trace fine sand, gray.					
15			S-3		24	1 1 2 2			
20				SILTY CLAY (CL); soft, wet, gray.					
25			S-4		24	WOH			
30									

R.W. Gillespie & Associates, Inc.
Portsmouth, NH

TEST BORING LOG: MSW-4

Project: Deep Sentry Wells
Location: New Hampshire
Client: City of Portsmouth

Project No. 815-07

Approximate Surface Elevation: 67'±
Ground Water Depth: 65.8'
Date: 09/06/00

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
35			S-5		24	WOH			
40			S-6	SAND (SP); medium dense, dry, medium to fine sand, trace silt, brown.	8	6 11 13 19			
45									
50			S-7	Grades to coarse fine sand, becomes dense.	14	14 15 20 22			
55				GRAVELLY SAND (SW); dense, moist then wet, coarse to fine sand, coarse to fine gravel, trace silt, trace cobbles, brown.					
60			S-8		NR	12			
65									

R.W. Gillespie & Associates, Inc.
Portsmouth, NH

TEST BORING LOG: MSW-4

Project: Deep Sentry Wells
Location: New Hampshire
Client: City of Portsmouth
Project No. 815-07

Approximate Surface Elevation: 67'±
Ground Water Depth: 65.8'
Date: 09/06/00

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
65 ▽									
70			S-9		10	20 20 18 22			
75									
80			S-10		10	13 12 16 11			
85									
90			S-11		NR				
				Bottom of exploration at 92'; not refusal.					
95									

R.W. Gillespie & Associates, Inc.
Portsmouth, NH

NO TEXT ON THIS PAGE

TEST BORING LOG: MSW-4D

Project: Portsmouth Sentry Well Project
Location: Portsmouth, New Hampshire
Client: City of Portsmouth, New Hampshire

Approximate Surface Elevation: 65.6'
Ground Water Depth: 48'
Date: 02-03-99

Project No. 815-01

DEPTH, FT.	SYMBOL	SAMPLES SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
35		S-8		9	W O H		0	
			GRAVELLY SILTY SAND (SM); very dense, wet, coarse to medium sand, little silt, little gravel, tan-gray.					
40		S-9		NR	10 10 29	39	0	
45		S-10	Trace silt, gray-orange.	NR	13 13 14	27	0	
50		S-11	Some gravel, orange mottles.	9	14 15 26	51	0	
55			Bottom of exploration at 55', no refusal. Monitoring Well Installed.					
60								
65								

R.W. Gillespie & Associates, Inc.
Saco, Maine

TEST BORING LOG: MSW-4D

Project: Portsmouth Sentry Well Project
Location: Portsmouth, New Hampshire
Client: City of Portsmouth, New Hampshire

Approximate Surface Elevation: 65.6'
Ground Water Depth: 48'
Date: 02-03-99

Project No. 815-01

DEPTH, FT.	SYMBOL	SAMPLES / SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
0		S-1	Topsoil and organic materials (0.8').	17	5 5 6	11	0	
			SILTY SAND (SM); medium dense, moist, medium to fine sand, some silt, gray-tan.					
5		S-2	Little silt.	19	8 8 9	17	0	
10		S-3	Becomes wet, mottled orange-gray.	24	7 7 7	14	0	
			SILTY CLAY (CL); soft, gray.					
15		S-4		24	2 1 1	2	0	
20		S-5	Trace to little fine sand.	24	W O H		0	
25		S-6		24	W O H		0	
30		S-7		24	W O H		0	

TEST BORING LOG: MSW-4S

Project: Portsmouth Sentry Well Project
Location: Portsmouth, New Hampshire
Client: City of Portsmouth, New Hampshire

Approximate Surface Elevation: 65.4'
Ground Water Depth: 10' ±
Date: 2-19-99

Project No. 815-01

DEPTH, FT.	SYMBOL	SAMPLES	SAMPLE #	DESCRIPTION OF MATERIAL	SAMPLE RECOVERY, IN.	BLOWS PER 6"	SPT-N BLOWS PER FT.	MOISTURE CONTENT, %	LAB TESTS
0				SILTY SAND (SM); medium dense, moist, medium to fine sand, some silt, gray-tan.					
5									
10 ▽									
				SILTY CLAY (CL-ML); soft, gray.					
15				Bottom of exploration at 13.5, no refusal. Monitoring Well Installed. * No soil samples collected. For soil description see MSW-4 Test Boring Log.					
20									
25									
30									

R.W. Gillespie & Associates, Inc.
Saco, Maine

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SECTION 02593

Comment [M1]: Addendum 2

POLYPROPYLENE MEMBRANE LINER

PART 1 - GENERAL

1.01. Description

A) The Contractor shall provide all necessary labor, tools, equipment, and incidentals required to place, seam, and test a 45 mil thick scrim-reinforced Polypropylene (PP) geomembrane liners in the residuals drying beds and a 60 mil thick scrim-re-enforced polypropylene geomembrane liner in the FTW/WWW basin. Liners for both applications shall be NSF approved for potable water.

B) Related Work Specified Elsewhere

1) Earthwork is specified in Section 02220 and 02229.

1.02. Quality Assurance and Submittal Requirements

A) Warranty

1) Provide a 20-year manufacturer's warranty of the PP geomembrane liner which shall become effective beginning on the date of final acceptance by the Owner and shall remain in effect until the warranty period expires. The manufacturer shall repair or replace on a pro rate basis any material which fails from material degredation in outdoor exposure during the warranty period.

2) The membrane manufacturer and fabricator shall warrant that the materials and factory seams have been provided in accordance with the drawings and specifications and are free of defects in material and workmanship at the time of delivery.

3) The membrane manufacturer shall warrant the weatherability of exposed liners for a period of 20 years.

4) The manufacturer shall warrant the cover material is suitable for use with potable water.

5) The manufacturer, fabricator and installer shall certify that all adhesives and solvents used are suitable for use in potable water reservoirs.

6) The PP Geomembrane Manufacturer shall confirm in writing, that the material to be furnished will be warranted against deterioration due to the effects of ozone,

ultraviolet or other normal weathering on a pro-rata basis for 20 years from the date of completed installation.

7) The PP Geomembrane Manufacturer shall furnish a sample warranty for review and approval during shop drawing submittals.

8) The Contractor shall warranty the geomembrane against defects in installation and workmanship for a period of five (5) years commencing with the date of final acceptance. The warranty shall include the services of qualified service technicians and all materials required for repairs at no expense to the Owner.

B) All work shall be in strict accordance with the project drawings, these specifications and the Fabricator's approved shop drawings.

C) Sufficient material shall be furnished to cover all areas as shown on the drawings including seam areas, anchor trenches and appurtenances as required. The Fabricator/Installer of the liner shall allow for any anticipated or planned shrinkage or wrinkles in the field panels, installing the membrane free of stress or tension.

D) The Fabricator shall be an experienced firm customarily engaged in factory-fabricating individual widths of scrim-reinforced PP roll stock into large panels. The fabricator shall have been in business a minimum of two (2) years and demonstrated previous experience in fabricating a minimum of 5,000,000 square feet (465,000 m^2) of geomembranes by thermal fusion methods.

E) Prior to factory seaming, all roll goods shall be inspected. All factory seams shall be made by thermal fusion methods. All factory seams shall have a minimum scrim-to-scrim overlap of one and one half inches (1½-in.) (3.81 cm) when fabricated. Fabricated seams found to have less than the specified minimum overlap will be rejected. All seams shall be made so that the thermal fusion bond extends fully to the top edge of the sheet so that no loose edges are present on the topside of the sheet.

F) All sheets and seams shall be 100% visually inspected during fabrication. No defective seams or exposed scrim will be allowed. All exposed scrim edges shall be sealed with an approved PP extrudate, or capped with a strip of unreinforced PP. All indicated repairs shall be made by the geomembrane Fabricator before the panels are packaged for shipment.

G) In addition to visual inspection, a 48-in. (1.2 m) sample shall be taken from each factory seam welding unit used in this work at the beginning of every work shift and every four hours of production thereafter. Samples shall be non-destructive, i.e., will not require patching of fabricated panels. Test specimens shall be cut at quarter points from each 48-in. (1.2 m) seam sample (a total of three places) and tested for factory seam strength and peel adhesion. The shear seam strength shall be tested in accordance with ASTM D751, modified method. The peel adhesion shall be tested in

accordance with ASTM D413, modified method. Typical seam values achieved are stated in Part 2 of this specification.

H) A log shall be maintained showing the date, time, panel number and test results. Failure of the material and/or seams to meet all the requirements of these specifications may be cause for rejection of the PP material and/or seams as appropriate. The Fabricator shall provide the test results to the Owner or Engineer upon request.

1.03. Submittals to Engineer

A) The Contractor shall submit the following information:

1) PP Manufacturer, proposed Fabricator and Installer: Name, Address, Phone and Fax. Qualifications of the individuals who will personally be assigned to the project.

2) Quality control and quality assurance plans detailing proposed quality control procedures. As a minimum the plans shall address quality control and quality assurance, delivery, anchorage, and placement of the membrane liner, field seaming, repair of defects, and suitability of soils in contact with membrane.

3) The PP roll goods shall be factory fabricated into large panels. The Fabricator shall furnish a proposed PP geomembrane panel layout that is to be reviewed by the Engineer prior to the installation. The drawings shall show the extent, the direction of factory seams and the size of panels, consistent with the requirements of the project drawings. These details shall include the recommended termination details of the geomembrane. Except for special requirements due to configuration and/or terminating the geomembrane, maximum use of large size panels shall be made to minimize field seaming.

4) Shop drawings showing extent, sizes, and details of the membrane liner, including proposed methods for terminating the liner, field-seam locations, top anchor details and sealing around penetrations, thickness, color, name and technical description of the membrane, field and factory seaming details, including overlays, tolerances and methods of seaming. Except for special requirements due to configuration and/or terminating the membrane liner, maximum use of larger size panels shall be made.

5) Factory testing results, including a log showing the date, time, panel number and test results shall be submitted to the Engineer prior to shipment.

6) Prior to installation of the PP panels, the Fabricator/Installer shall provide the Engineer with the following certification and test reports:

a) Written certification that the material meets all of the requirements of this Section.

b) Written certification that the factory seams were inspected and tested in accordance with this Section.

c) A copy of the ANSI/NSF Standard 61 certification shall be provided for all potable grade materials.

d) Prior to installation of the geomembrane liner, the Contractor shall certify in writing to the Engineer that the receiving surface is acceptable for the installation of the geo-membrane.

e) Manufacturers NSF Certification.

f) All documentation and certifications necessary to confirm that the Contractor, Installer, and Manufacturer are in compliance with the requirements specified herein.

g) Laboratory test results documenting interface friction angle between geomembrane surface and granular material proposed directly above and below flexible membrane cap.

7) Installation data and schedule.

8) Maintenance and repair requirements.

9) Manufacturer's recommendation for installation conditions, including unfavorable weather conditions.

10) Installers QA/QC manual.

11) Upon shipment, the Contractor shall provide the Engineer with the following information:

a) Roll number(s)
b) Anticipated arrival date
c) Identity of motor carrier providing transport
d) Shipping manifest

12) Three working days prior to the arrival of the installation work crew at the site, the Contractor shall so notify the Engineer.

13) During the installation the Contractor shall submit:

a) Daily construction progress reports identifying thermal fusion equipment start-up testing.

b) Subgrade acceptance certifications

c) Daily seaming test records including thermal fusion equipment start-up testing.

d) Daily records of field-seam testing (destructive and non-destructive).

e) Laboratory test results.

14) Within fourteen (14) days of completion of work, the Contractor shall provide:

a) Record Drawings

b) Logs and summary of all laboratory quality control

c) Logs and summary of all field quality control.

d) Certification that the material is complete and complies with the plans and specifications

e) Statement of Warranty

15) Record drawings shall include the following:

a) Panel and seam numbers

b) Roll numbers of each panel

c) Location of destructive tests

d) Location and type of each repair

e) Location and type of each penetration.

f) Submit one reproducible copy and six (6) print copies.

1.04. Contractor and Manufacturer Requirements

A) The installation contractor to perform the work of this specification shall have demonstrated by previous experience his ability to do the work. The required previous experience shall consist of the following:

1) The Contractor shall have successfully installed not less than 10 liners or caps totaling a minimum of 2,000,000 square feet similar in type to that specified herein, now providing satisfactory service in the United States.

2) The Installer shall be approved and/or licensed by the material supplier.

B) The manufacturer of the geomembrane shall have manufactured, fabricated, and supervised the installation of not less than 10,000,000 square feet of PP liners or caps.

C) The geomembrane manufacturer or his approved installation Contractor shall provide the services of a competent field technical representative throughout the installation of the membrane and all appurtenant structures and soils contacting the membrane. The field technical representative shall have personally supervised and directed the installation of a minimum of 2,000,000 square feet of PP lining or cap material.

D) All field seams shall be inspected over their full length in accordance with the Drawings by the installation Contractor or the PP geomembrane manufacturer's technical representative in the presence of the Engineer's representative.

E) All field seams shall be performed by a master seamer with experience with at least one million (1,000,000) sf of reinforced polypropylene geomembrane seaming experience, using the same type of seaming apparatus as that approved for this project. Documentation certifying the master seamer's experience shall be submitted in writing before the performance of any work. The master seamer must be on-site whenever seaming work is being performed.

F) The manufacturer shall furnish certification that the resin used meets the specifications in Section 2.1.

G) Surfaces to be lined shall be smooth and free of all sharp rocks or other sharp objects, vegetation, and stubble. The manufacturer's authorized representative shall certify in writing that the surface on which the PP geomembrane is to be placed is acceptable. Installation of the PP liner shall not commence until this certification is furnished to the Engineer. It shall be the responsibility of the Contractor installing the PP liner to keep the receiving surface in the accepted condition until complete installation of the PP liner is accomplished.

PART 2 - PRODUCTS

2.01. Polypropylene Geomembrane

A) All geomembrane properties shall meet ANSI/NSF 61 and bear NSF label. All material shall meet the requirements of the latest edition of AWWA D130 – Standard for Flexible Membrane Lining and Floating Cover Materials for Potable Water Storage.

B) The geomembrane shall be manufactured from new, first quality resin of the type specified.

C) The material for the FTW/WWW basin shall be resistant to sunlight, ultraviolet light, ozone and other effects of continuous outdoor weathering.

D) Materials shall continue to maintain flexibility over the range of ambient temperature conditions.

E) The geomembrane liner shall meet the following minimum requirements.

PROPERTY	TEST METHOD	SPECIFICATION	
		Typical Value	Typical Value
Gauge (nominal) mils (mm)	--	.045 (1.14)	.060 (1.52)
Plies, reinforcing	--	1	1
Thickness, min. 1) Overall - mil (mm) 2) Over Scrim - mil (mm)	ASTM D-751 Optical Method	.044 (1.12) 12 (0.30)	.057 (1.45) 18 (0.46)
Breaking Strength-fabric min. lbf (kN)	ASTM D-751 Method A	300 (1.34)	325 (1.45)
Low Temp. Flex. ^{o}F (^{o}C)	ASTM D-2136 1/8-in. mandrel, 4 hr. pass	-65 (-54)	-65 (-54)
Puncture Resistance, min. lbs. (kN)	FTMS 101C Method 2031	400 (1.78)	425 (1.89)
Tear Strength, min. lbf (kN)	ASTM D-5884	100 (0.45)	100 (0.45)
Dim. Stability (% chg, max.)	ASTM D-1204 180^{o}F/82^{o}C 1 hr.	-0.5 (-0.5)	-0.5 (-0.5)
Hydrostatic resist. min psi (MPa)	ASTM D-751 Method A, Procedure 1	400 (2.75)	425 (2.93)
Ply Adhesion, min. lbs/in (kN/m)	ASTM D-413 Machine method modified	30 (5.25)	30 (5.25)

Water Absorption max, % wt. chg.	ASTM D-471 30 days @70°F (21°C)	<1%	<1%
ESCR (Env. Stress Crack Resist) min. hrs w/o failure	ASTM D-1693 3000 hours	Not affected by ESC	Not affected by ESC
UV Resistance	ASTM G26 Xenon Arc 80°C/4000 hrs	Pass	Pass
TYPICAL FABRICATED SEAM PROPERTIES**			
Bonded seam strength, min.	ASTM D-751, modified	200 (0.89)	220 (0.98)
Peel Adhesion, min.	ASTM D-413, modified	20 (3.5) or FTB	20 (3.5) or FTB

F) Related Materials

1) Resin used for fusion welding shall be PP manufactured from the same type of resins used in the production of the membrane. In addition, physical properties shall meet or exceed those of the geomembrane.

2) All hardware used in pipe penetrations shall be stainless steel.

3) All plastic, sealants, or gasket materials shall be that recommended by manufacturers.

4) All adhesives, chemical fusion agents, or cleaners used in the fabrication, seaming or installation of the liner shall be as recommended by the membrane manufacturer. There shall be no extractable ingredients that when dissolved in water would exceed applicable drinking water standards.

G) The geomembrane material shall be a 45 or 60 mil thick, as specified on the drawings, scrim-reinforced, Polypropylene as manufactured by Stevens Geomembranes, Holyoke, Mass. Or equal.

H) The geomembrane shall be manufactured by the calendering process, consisting of first quality ingredients, suitably compounded of which PP is the principal resin. The finished compound shall be uniform in color, thickness, size and surface texture.

I) The finished membrane shall consist of two (2) plies of Polypropylene (PP) laminated over one (1) ply of reinforcing scrim.

J) The PP shall fully encapsulate the scrim and shall extend a minimum of 1/8-in. (3.175 mm) beyond the reinforcing scrim roll edges. Exposed fabric along the longitudinal edges of the roll stock shall not be permitted.

K) The finished membrane shall meet or exceed the physical property values as shown in the Table in this specification.

2.02. Delivery, Storage and Handling

A) Each factory-fabricated panel shall be rolled and/or accordion-folded and placed onto a sturdy wooden pallet designed to be moved by a forklift or similar equipment. Each panel shall be given prominent and unique identifying markings indicating the proper direction of unrolling and/or unfolding to facilitate layout and positioning in the field.

B) The panels shall be packaged in heavy cardboard or wood crates fully enclosed and protected to prevent damage during shipment and each crate is to be prominently marked in the same fashion as the panels within.

C) Until needed, packaged factory-fabricated panels shall be stored in their original unopened crates in a dry area off the ground, and protected from the direct heat of the sun, under an opaque, light colored heat reflective cover in a manner that provides a free-flowing air space between the packaged panel and the covering. Pallets should not be stacked.

D) Geomembrane rolls shall have the following information permanently affixed to both the outside and inside of the package:

1) Name and Manufacturer of geomembrane.
2) Date of Manufacture.
3) Roll Number.
4) Size and Thickness of Roll.

PART 3 - EXECUTION

3.01. Preparation

A) The surfaces on which the lining is to be placed shall be maintained in a firm, clean, dry and smooth condition during the lining installation. All earthen reservoir surfaces shall be compacted and smooth graded with anchor trenches provided as required and detailed. All reservoir surfaces shall be free of rocks, roots, gravel, grade stakes or debris that may puncture the PP geomembrane. The subgrade shall be compacted to a minimum of 95% of the dry density (as determined by ASTM D398 Standard Proctor Method). Geotextiles may be used as a cushioning agent. All vegetation, if present, shall be removed and a soil sterilant applied. If groundwater is present within 12-in.

(30 cm) below the surface to be lined, the General Contractor shall dewater the area prior to and during installation of the liner.

B) The location of both the top and bottom of all slopes shall be completed within plus or minus 1 foot (.3 m) of the planned location. The completed subgrade and finished grades shall be within plus or minus 0.1 foot (.03 m) of the specified elevation. Immediately prior to the installation of the PP geomembrane, a complete and detailed inspection of the embankments shall be performed by the Field Engineer, Contractor and the PP geomembrane Installer to determine acceptance of the finished subgrade and elevations. Any erosion or other damage to the base material which has occurred since placement shall be corrected by the Contractor.

C) Verify that geomembrane subgrade has been completed and that all buried piping and appurtenances are in place. Surfaces to be lined shall be smooth, free from all stones, sticks, roots, or debris of any kind that may cause damage or failure of the membrane.

D) Check all subgrades to insure that geomembrane liner will be set at design grade. Regrade as required to promote positive drainage and to prevent any areas where moisture may collect. There shall be no excessive moisture in the subgrade at the time of installation.

3.02. Installation

A) The PP geomembrane shall be placed over the prepared surfaces in such a manner as to insure minimum handling and in accordance with the approved shop drawings. The lining shall be sealed to all concrete structures and other openings in accordance with details shown on the plan and shop drawings. The geomembrane lining shall be closely fitted and sealed around all inlets, outlets and other projections through the lining, using prefabricated fittings where possible as shown in the construction details. Liner sheets, damaged from any cause, shall be removed, repaired or covered with additional sheeting.

B) Only those PP sheets of lining material which can be anchored and seamed together the same day shall be unpackaged and placed into position. In areas where high wind is prevalent, the lining installation should begin on the upwind side of the project and proceed downwind. The leading edge of the liner shall be secured at all times with sandbags sufficient to hold it down during high winds. The leading edges of the liner material left exposed after the day's work shall be anchored to prevent damage or displacement due to wind.

C) Materials, equipment or other items shall not be dragged across the surface of the PP liner or be allowed to slide down slopes on the lining. All parties walking or working on the PP lining material shall wear soft-soled shoes.

D) Installation shall not take place under conditions outside the manufacturer's recommendations, nor when the ambient temperature is below 40 degrees Fahrenheit

or above 90 degrees Fahrenheit or in the presence of precipitation, moisture or winds in access of 10 mph.

E) Pipe penetrations - make penetrations as detailed on drawings or as recommended by manufacturer.

F) The Contractor shall observe the following requirements during installation:

1) No equipment or vehicles will be permitted to come in contact with membrane.

2) Field personal shall not smoke on or in close proximity of membrane.

3) Metal clamps used for handling membrane shall be padded. All tools shall be holstered and shall not be tossed or thrown.

4) Method of handling membrane shall not cause gouges, scratches, crimps or wrinkles in membrane.

5) Adequate loading or sandbags or other acceptable items shall be strategically placed to prevent uplift. Continuous loading is recommended along edges to minimize risk or sudden wind from under membrane.

3.03. Field Seams

A) Lap joints shall be used to seal factory fabricated PP sheets together in the field. The lap joint shall be formed by lapping the edges of the sheets 4- to 6-in. (10-15 cm). The contact surfaces of the sheets shall be wiped clean of all dirt, dust, moisture and other foreign matter. A minimum 1½-in. (3.81 cm) bond shall apply to all field seams.

B) Extreme care should be taken throughout the work to avoid fishmouths, wrinkles, folds or pleats in the seam area. Where fishmouths do occur, they should be slit out far enough from the seam to dissipate them, lapped, seamed together in the lapped area and patched.

C) Any necessary repairs to the PP geomembrane shall be made using an additional piece of the specified PP sheeting applied as stated in 'Repairs' of this specification.

D) Cleanup within the lining compound shall be an ongoing responsibility of the Contractor. Particular care should be taken to ensure that no stones, scrap material, trash, tools or other unwanted items are trapped beneath the geomembrane liner.

E) All field seams shall be made using hot air or hot wedge welding techniques as outlined in Sections 7 and 8 of the EPA Technical Guidance Document: "Inspection Techniques for the Fabrication of Geomembrane Field Seams".

3.04. Inspecting and Testing PP Field Seams

A) Inspection

1) Upon completion of the liner installation, all seams shall be visually inspected for compliance with these specifications. In addition to visual inspection, all field seams shall be checked using an air lance nozzle directed on the upper edge and surface to detect any loose edges or riffles indicating unbonded areas within the seam (per ASTM D4437).

2) On completion of the work, all field seams shall be tightly bonded. Any geomembrane surface showing injury due to scuffing, penetration by foreign objects, or distress from other causes shall be replaced or repaired. All exposed scrim edges shall be sealed with an approved Polypropylene extrudate, or capped with a strip of unreinforced PP.

B) Testing PP Field Seams

1) Test seams are to be made by each seaming crew, at the beginning of the seaming process, and every four (4) hours thereafter, or every time equipment is changed. In addition, random weld samples for shear and peel strength testing shall be taken at locations selected by the Engineer at a frequency of 1 sample per 500 feet of welded seam, or at the option of the Engineer at a minimum of 1 per seam, including patches with a seam length of 100 feet or more.

2) Each seaming crew and the materials they are using must be traceable and identifiable to their test seams. The samples shall be numbered, dated, identified as to the personnel making the seam, and location made by appropriate notes on a print of the panel layout for the project. The completed field seam sample shall measure not less than 14-in. (35.5 cm) in width and 24-in. (61 cm) in length.

3) The field test seams are to be tested for seam shear strength and peel adhesion. Seam shear strength (bonded seam strength) shall be tested in accordance with ASTM D751 as modified in Annex A of ANSI/NSF 54. Peel adhesion shall be tested in accordance with ASTM D413 as modified in Annex A of ANSI/NSF 54. Typical seam values achieved are stated in the Physical Properties Table of this specification. The Contractor shall bear the cost of testing at no additional cost to the Owner. Copies of all test results shall be submitted to the Engineer.

4) If a test seam fails to meet the field seam design specification, then an additional test seam sample shall be made by the same seaming crew, using the same tools, equipment and seaming materials, and retested.

3.05. Repairs

A) Any repairs made to the PP lining shall be patched with the PP lining material. Patches shall be cut with rounded corners and shall extend a minimum of 4-in. (10 cm) in each direction from the damaged area. The entire surface of the patch shall be bonded to the PP lining material. If reinforced patches are used, the cut edges of the patch must be sealed with an approved Polypropylene extrudate.

3.06. Non-Destructive Testing

A) Vacuum Testing

1) A vacuum test box shall be required to test extrusion welds (i.e. patches, etc.). A sudsy solution shall be applied to the test section and the vacuum box placed over the section. Once a tight seal has been established the test section shall be visually examined for a period of not less than ten seconds to determine whether bubbling of the soapy solution is occurring. The vacuum box shall then be moved and the process repeated on the next adjacent section. A minimum of three inches overlap shall be provided between each test section. All locations where bubbling of the sudsy solution was observed shall be clearly marked for repairs with a high visibility marker, and recorded by number on the field test reports. Any failed portion of the seam shall be repaired in accordance with these specifications and re-tested.

2) All seams shall be non-destructively tested by the installation contractor over their full length to verify the integrity of the seam. Non-destructive testing shall be performed concurrently with field seaming. Prefabricated field seams which will be inaccessible after installation, such as those under structures or fastened to penetrations, shall be tested prior to final installation. All non-destructive testing shall be observed and documented by the Engineer.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 05521

Comment [M1]: Addendum 2

WELDED PIPE RAILING

PART 1 - GENERAL

1.01. SECTION INCLUDES

A) This Section describes the general requirements for welded pipe railing for above grade interior use only unless otherwise noted on contract drawings. Welded pipe railing and auxiliary system components shall be provided as specified herein, and shall be located and configured as shown on the Contract Drawings. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install all welded pipe railing.

B) Unless otherwise shown or specified, welded pipe railing shall consist of a system of closed side single rail and vertical baluster rails welded to posts spaced not more than 5 feet - 0 inches on center and a system of handrails supported from adjacent construction by mounting brackets spaced at not more than 5 feet - 0 inches on center.

1) All welded pipe railing system components shall be provided with a hot-dipped galvanized finish after fabrication, and, in addition, painted on Site after alignment and adjustment, with the coating system specified in Section 09900 – Painting unless otherwise noted on contract drawings.

1.02. RELATED SPECIFICATIONS

A) Section 05035 - Galvanizing

B) Section 05502 - Miscellaneous Wrought Metals

C) Section 05561 - Miscellaneous Metal Castings

D) Section 09900 - Painting

1.03. REFERENCES

A) New Hampshire Building Code
B) ASTM A36 - Carbon Structural Steel, Standard Specification for
C) ASTM A47 - Ferritic Malleable Iron Castings, Standard Specification for
D) ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless, Standard Specification for
E) ASTM A90 - Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings, Standard Test Method for

F) ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products, Standard Specificatio for

G) ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware, Standard Specification for

H) ASTM A283 - Low and Intermediate Tensile Strength Carbon Steel Plates, Standard Specification for

I) ASTM A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength, Standard Specification for

J) ASTM A320 - Alloy Steel Bolting Materials for Low-Temperature Service, Standard Specification for

K) ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes, Standard Specification for

L) ASTM A575 - Steel Bars, Carbon, Merchant Quality, M-Grades, Standard Specification for

M) ASTM A780 - Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings, Standard Practice for

N) ASTM B633 - Electrodeposited Coatings of Zinc on Iron and Steel, Standard Specification for

O) ASTM C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink), Standard Specification for

P) ASTM E329 - Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction, Standard Specification for

Q) ASTM E488 - Strength of Anchors in Concrete and Masonry Elements, Standard Test Method for

R) ASTM E548 - General Criteria Used for Evaluating Laboratory Competence, Standard Guide for

S) ASTM E894 - Anchorage of Permanent Metal Railing Systems and Rails for Buildings, Standard Test Method for

T) ASTM E935 - Performance of Permanent Metal Railing Systems and Rails for Buildings, Standard Test Methods for

U) ASTM E985 - Permanent Metal Railing Systems and Rails for Buildings, Standard Specification for

V) ANSI A1264.1 - Safety Requirements for Workplace Floor and Wall Openings, Railings, and Toeboards

W) Code of Federal Regulations, 29 CFR 1910.23 - Guarding Floor and Wall Openings and Holes

X) American Welding Society, AWS Gas Metal Arc Welding, Recommended Practices - C5.6

Y) American Welding Society, AWS D1.1 - Structural Welding Code

1.04. SUBMITTALS

A) The Contractor shall submit the following in accordance with Specification 01300 - Submittals:

B) Samples: Submit for approval the following:

1) Full size sample, 2 foot - 0 inches long, of assembled welded pipe railing system at post and rail intersections with all associated components including typical welded connections, mounted toeboard and sleeve, and handrail complete with mounting brackets all with specified galvanized and painted finishes.

2) Samples will be reviewed by Engineer for color, finish, joinery appearance and workmanship only. Compliance with all other requirements is the responsibility of Contractor.

C) Working Drawings: Submit for approval the following:

1) Drawings for the fabrication and erection of welded pipe railing and handrail system with sizes of members, components and anchorage devices based on specified requirements. Indicate that Working Drawings have been reviewed by the professional engineer preparing, signing and stamping its seal on design calculations and engineering analyses, verifying that the manufacturer's proposed fabrication, installation methods and details adequately translate the results of the design calculations and engineering analyses into the work, before submitting Working Drawings to Engineer for review.

2) Include copies of manufacturer's specifications, standard and custom detail drawings and installation instructions and manufacturer's catalog showing complete selection of standard and custom components, auxiliary system components and miscellaneous accessories for selection by Engineer. Include all plans and elevations identifying the location of all handrail and railings, and details of sections and connections. Show all anchorage items.

3) Profiles of welded pipe railing and handrail system components, and the details of forming, jointing, sections, connection, internal supports, gates, trim, auxiliary system components and accessories. Show details drawn at 1-1/2 inch scale.

4) Calculations for the complete design and engineering analysis of the welded pipe railing and handrail system, auxiliary system components and anchorages, including calculations showing compliance with performance criteria specified, prepared, signed and stamped with the seal of a registered professional engineer licensed to practice in the State of New Hampshire and recognized as an expert in the required work.

D) Maintenance Manuals (O&M Manuals): Upon completion of the installation of the welded pipe railing system submit the following:

1) Product name and manufacturer.

2) Name, address and telephone number of manufacturer and local distributor.

3) Detailed procedures for routine maintenance and cleaning, including recommended cleaning materials, application methods and precautions as to use of materials that may be detrimental to finish when improperly applied.

E) Certification: Submit for approval the following:

1) Furnish certification that laboratory loading tests have been performed on the handrail, railing and anchorage systems verifying compliance with performance criteria specified, and that it conforms to all applicable CFR, ANSI and ASTM requirements for loads and deflections and that the data derived from such tests has been used by the registered professional engineer in the design calculations and engineering analyses of the welded pipe railing and auxiliary system components.

2) Registered professional engineer who prepares, signs and stamps its seal shall provide a written statement confirming responsibility for the design and attesting that the design prepared meets the performance criteria required by the Contract Documents, the requirements of governing authorities having jurisdiction, and conforms to prevailing standards of practice.

1.05. QUALITY ASSURANCE AND QUALIFICATIONS

A) Manufacturer Qualifications:

1) Engage a single fabricator, with undivided responsibility for detailing and performance of the welded pipe railing system.

2) Engage a firm that can show minimum of five years previous successful and documented experience in detailing and fabrication of welded pipe railing systems of scope and type similar to the required work.

3) Materials and fabrication procedures shall be subject to inspection and tests in the mill, shop, and field, conducted by a qualified inspection agency in compliance with ASTM E329 and ASTM E548. Such inspections and tests shall not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

B) Installer Qualifications:

1) Engage a single installer skilled, trained and with successful and documented experience in the installation of welded pipe railing systems and with specific skill and successful experience in the erection of the types of materials required; and who agrees to employ only tradesmen with specific skill and successful experience in this type of work. Submit names and qualification to Engineer along with the following information on a minimum of three successful projects:

   a) Names and telephone numbers of owner, architects or engineers responsible for projects.

   b) Approximate contract cost of the welded pipe railing.

   c) Amount of area installed.

C) Professional Engineer:

1) Engage a registered professional engineer legally qualified to practice in the State of New Hampshire and experienced in providing engineering services of the kind indicated.

2) Responsibilities include, but are not necessarily limited to, the following:

   a) Carefully reviewing system performance and design criteria stated in the Contract Documents.

   b) Preparing written requests for clarification or interpretation of performance or design criteria for submittal to Engineer by Contractor.

   c) Preparing, or supervising the preparation of design calculations, and reviewing and approving related Working Drawings prepared by the welded pipe railing system manufacturer prior to submission to Engineer; testing plan development, and test-result interpretations; and providing comprehensive engineering analyses verifying compliance of the system with the requirements of the Contract Documents.

   d) Signing and sealing all calculations and engineering analyses.

   e) Certifying that:

      1) It has performed the design of the welded pipe railing system in accordance with the performance and design criteria stated in the Contract Documents, and

      2) The said design conforms to all applicable local, state and federal codes, rules and regulations and to the prevailing standards of practice.

D) Testing Agency Qualifications: To qualify for approval, an independent testing agency shall demonstrate to Engineer's satisfaction, based on evaluation of criteria submitted by testing agency, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the work in accordance with ASTM E329 and ASTM E548.

E) Performance Criteria:

1) Maintain the visual design concept shown, and the technical requirements specified, including modules, profiles, alignment of components and requirements for finish.

2) Contractor shall provide welded pipe handrail and railing system that conforms to the Building Code of New Hampshire, ASTM E985 and CFR 29, Part 1910.23, including the 200 pound loading requirement, and including the requirement that specific types of occupancies and sizes of contributing protected areas shall incorporate greater design load resistance into welded pipe railing system, in compliance with ASTM E985, than that specified herein.

a) Completed handrail and railing shall withstand a uniform lateral force of 50 pounds per linear foot and a vertical uniform downward force of 50 pounds per linear foot, both applied simultaneously at the top of the handrail and railing, performance tested in accordance with Test Method A and B of ASTM E935.

b) Intermediate and bottom rails shall withstand simultaneously applied lateral uniform forces of 40 pounds per linear foot and a vertical load of 50 pounds per linear foot, however, lateral and vertical loads on intermediate and bottom railings need not be considered in the detailing and fabrication of posts and anchorages.

c) For railings having solid panels or picket balusters, the panels or picket balusters shall be detailed and fabricated to withstand a uniform lateral load of 50 pounds distributed over any round or square area of one square foot located anywhere within the infill area or a 50 pound per foot penetration cone, performance tested in accordance with Test Method C and D of ASTM E935.

d) Concentrated 200 pound load and uniform force conditions shall not be applied simultaneously.

e) Other pertinent requirements ceded to ANSI A1264.1 by governing authorities having jurisdiction at the Site.

f) Bending stresses shall not exceed 60 percent of the yield stress of the material. Applied loads shall not produce permanent residual deformation in the completed work when loads are removed. Load-deformation data shall be determined in accordance with ASTM E935.

g) Maximum allowable deflections shall be in accordance with ASTM E985.

h) Where computations make it possible to provide the needed information, testing, in compliance with ASTM E935, shall be performed for verification that welded pipe railing system and auxiliary system components comply with specified performance requirements and the requirements of governing authorities having jurisdiction.

3) Thermal Control: Provide adequate expansion within the fabricated system that allows for a thermal expansion and contraction caused by a material temperature range of 140 degrees F to -20 degrees F without warp or bow of system components. Distance between expansion joints shall be based on providing a 1/4 inch wide joint at 70 degrees F which accommodates a movement of 150 percent of the calculated amount of movement for the specified temperature range.

4) Provide expansion joints in handrail and railing system work where systems cross expansion joints in structure.

5) Configuration of all welded pipe handrail and railing systems shall be as shown on the Contract Drawings General Railing and Handrail Sheet. All details shown on the Contract Drawings are typical; similar details apply to similar conditions, unless specifically noted otherwise on the Contract Drawings.

6) Manufacturer is responsible for structural analysis and detailing of welded pipe handrail and railing system. Provide complete structural performance calculations and Working Drawings for all welded pipe handrail and railing members, anchors and all other support system components prepared, signed and stamped with the seal of a registered professional engineer licensed to practice in the State of New Hampshire and recognized as an expert in the specialty involved.

F) Anchors and Supports:

1) Anchorage system shall be structurally analyzed based on results of tests in compliance with ASTM E488 and ASTM E894. Anchors shall be tested for static, seismic, fatigue and shock loadings in series. Static tests shall include tension, shear, flexure and torsion load resistance.

2) When the size, length or load carrying capacity of an anchor bolt, concrete anchor or concrete insert is not shown on the Contract Drawings, provide the size, length and capacity required to carry the design load times a minimum safety factor of

four when installed in cast-in-place concrete and a minimum safety factor of six when installed in unit masonry construction.

3) Sizes shown on the Contract Drawings shall be considered minimum. Increase size to comply with design loadings and minimum safety factors specified.

G) Source Quality Control:

1) Obtain all welded pipe handrail and railing system components, auxiliary system components and accessories from the same manufacturer.

2) Provide qualified welding processes and welding operators in accordance with ANSI/AWS "Structural Welding Code" D1.1, Section 5, Qualification.

3) Provide certification that all welders employed on, or to be employed for, the fabrication of the welded pipe rail system have satisfactorily passed AWS qualification tests within the previous 12 months. Contractor shall ensure that all certification are kept current.

H) Allowable Tolerances:

1) Limit variation of cast-in-place inserts, sleeves and field-drilled holes to the following:

a) Spacing: ± 3/8 inch

b) Alignment: ± 1/4 inch

c) Plumb: ± 1/8 inch

2) Limit variation of completed handrail and railing system alignment to 1/4 inch in 12 feet and 1/16 inch in 3 feet.

3) Set rails horizontal and parallel to rake of steps or ramps to within 1/4 inch in 12 feet.

1.06. PRODUCT DELIVERY, STORAGE AND HANDLING

A) Delivery of Materials:

1) Deliver welded pipe railing and handrail and all accessories dry and undamaged, with manufacturer's protective finish intact, bearing original, intact factory labels.

2) Welded pipe railing system units that are damaged during delivery or while being unloaded, shall not be stored on Site. Remove such units from Site and replace with new, undamaged material.

B) Storage of Materials:

1) Store welded pipe railing and accessory materials in a dry location and in a manner that will protect finish from exposure to sun and condensation; with good air circulation around each piece and with protection from wind blown rain.

2) Store welded pipe railing and accessory materials under tarpaulin covers and in an area protected from dirt, damage, weather and from the construction activities of all Contractors. Do not store outside or allow items to become wet or soiled in any way while on Site.

3) Do not store in contact with concrete, earth or other materials that might cause corrosion, staining, scratching or damage to finish. Do not install system components that become dented, scratched or damaged in any way. Remove such components from Site and replace with new, undamaged material.

C) Handling of Materials:

1) Do not subject welded pipe railing and accessory materials to bending or stress. Do not carry or transport panels in the horizontal (flat) position. Hold panels upright on edge when handling.

2) Do not damage edges or handle material in a manner that will cause scratches, warps or dents.

3) Keep on-site handling to a minimum.

4) Maintain protective covering on railings and handrails. System components that are damaged during installation shall be removed from Site and replaced with new, undamaged material.

1.07. PROJECT CONDITIONS

A) Protection: Protect cast-in-place sleeves and field-drilled holes from debris and water intrusion by use of temporary covers or removable foam inserts that completely fill the cast-in-place sleeve.

B) Coordinate installation of anchorages for handrails and railings. Furnish setting drawings, templates, and installation instructions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in cast-in-place concrete or masonry. Deliver to Site in time for installation.

C) Verify dimensions by taking measurements at the Site without causing delay in the work. Where measurements cannot be taken at the Site without delaying the work, establish dimensions and proceed with fabrication of handrails and railings without Site measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.01. MATERIALS

A) Steel Pipe: ASTM A53, Type F or Type S, Grade A. Provide posts and rails with 1-1/2-inch NPS; standard weight (Schedule 40), minimum.

B) Malleable Iron Castings: Plain pattern type, ASTM A47, Grade 32510 and as specified in General Specification 05561.

C) Steel Plates, Shapes and Bars: ASTM A36.

D) Steel Flanges: ASTM A283, Grade D.

E) Pipe Reinforcing: 1-1/4-inch NPS extra-heavy (Schedule 80) black steel pipe, ASTM A500, Grade A, unless another grade is required by structural loads.

F) Auxiliary System Components and Accessories: Provide all galvanized steel accessories, finished to match posts and rails.

G) Railing Gates:

1) Hinges: Provide two self-closing steel hinges for each railing system gate.

2) Gate Latches and Stops: Provide one latch and stop with rubber bumper and 1-inch diameter plastic knob for each railing system gate.

H) Chain, Snaps and Eyebolts: Provide oblong 0.250-inch welded link, Type 316 stainless steel chain weighing 57 pounds per cubic foot, each link 1-1/8-inch by 7/16-inch. Provide stainless steel eye bolts, 1/4-inch stainless steel threaded quick links and heavy-duty swivel snaps with spring loaded latch.

I) Toeboards:

1) Provide toeboards of same material and finish as railings for railings around openings, platforms, balconies and other areas shown on the Contract Drawings. Fabricate to the dimensions and details shown.

2) Securely fasten toeboard in place with not more than 1/4-inch clearance above floor level. Provide for thermal expansion and contraction in toeboards over the

entire range of temperatures specified. Thermal movement shall not cause warping or buckling of toeboards.

3) Toeboards shall meet requirements of 29 CFR, Part 1910.23, Section (e).

4) Toeboards shall follow curvature of welded pipe railing. Where welded pipe railing system is shown to have curved contours at corners, or other locations, the toeboard shall likewise be curved to follow line of welded pipe railing system.

J) Brackets, Flanges, Sleeves: ASTM A283; steel brackets, flanges, sleeves and anchors for railing posts and for handrail supports. Components shall be in accordance with manufacturer's recommendations.

K) Removable Railing Post Sleeves: Furnish Type 316 stainless steel post sleeves for removable railing sections. Size post sleeves for snug fit to avoid removable railing lateral movement. Provide Teflon inserts to fill annular space between sleeve and post with top cover flange flush with top of mounting surface.

L) Concealed Connector Sleeves: Schedule 40, hot-dipped galvanized steel, 5-inches long. Outside diameter of connectors shall match inside diameter of railing.

M) Non-Shrink, Non-Metallic Grout: As specified below:

1) Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and is recommended by the manufacturer for exterior use.

2) Pre-mixed, factory-packaged, non-staining, non-corrosive, non-gaseous, cementitious grout, complying with ASTM C1107, requiring only the addition of water at the Site.

N) Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrode as recommended by manufacturer of metal to be welded and as required for strength and compatibility of finished items.

O) Bolts and Studs: As specified below:

1) Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated, and capable of complying with performance criteria specified.

a) Provide plated fasteners for anchoring made of carbon steel, ASTM B633, Class Fe/Zn 25, electrodepositied zinc coating.

b) 1/2-inch diameter, 2-inch embedment length minimum, unless greater diameter or embedment is required by structural analysis.

c) Powder driven "pin" and "stud" type fasteners will not be approved.

2) Fasteners for Interconnecting Handrail and Railing Components: Use fasteners fabricated from the same basic metal as fastened metal. Do not use metals that are corrosive or incompatible with materials joined.

a) Provide concealed fasteners for interconnecting handrail and railing components and for attaching them to other work, unless exposed fasteners are unavoidable.

b) Provide Phillips flat-head machine screws for exposed fasteners.

2.02. FABRICATION AND SHOP ASSEMBLY

A) Fabricate handrails and railing to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish and anchorage, but not less than that required to support structural loads.

B) Preassemble items in the shop to the greatest extent possible, so as to minimize field splicing and assembly of units at the Site. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1) Railing hall be assembled in sections as long as practicable. Posts shall be connected to flanges and fittings by welding. Surfaces of butt joints shall be ground smooth and square to obtain flush and tight joints undetectable from surrounding finish on all surfaces of the pipe.

2) On-site welding shall not be permitted.

C) Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Fabricate all corners without the use of fittings. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work. Provide 4-inch outside radius.

1) Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail or railing components.

D) Cope intersections of rails and posts; weld joints. Butt weld end-to-end joints of railings or use welding connectors. Lower rails shall be coped and welded to the posts. Fabricate joints to be watertight.

1) Components shall be coped at perpendicular and skew connections to provide close fit.

E) Cut, reinforce and tap components to receive finish hardware, screws, and similar items.

F) Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges and ease exposed edges to a radius of approximately 1/32 inch.

G) Provide for expansion and contraction in the railing system. Locate adequate number of control joints so that each joint does not have to move more than 1/16 inch plus or minus from each side of joint.

H) Provide wall returns at ends of wall-mounted handrails. Close end returns, unless clearance between end of handrail and wall is 1/4 inch or less.

1) Close ends of handrail and railing members with prefabricated end fittings.

I) Chains shall be provided across openings in pipe railings where shown, specified or required. One end of each chain shall be attached to a 1/4-inch eyebolt in the post and the other end shall be attached by means of an approved heavy bronze swivel eye snap hook to a similar eyebolt in the opposite post.

J) Weep Holes:

1) Provide 15/64 inch diameter weep holes at the lowest possible point on all railing system posts and along the bottom side of railing system rails.

2) Provide pressure relief holes at closed ends of handrails and railings.

2.03. WELDING AND GALVANIZING

A) Welding shall comply with the requirements of AWSC and BCP.

B) Provide uniform, tight and dense welds, uniformly ground smooth and blended so no roughness shows after finishing, and without visible transition to metal surfaces so that welded surface matches contours of adjoining surfaces.

1) Welded joints shall be continuous, and made watertight.

C) Galvanizing: All welded pipe railing system components shall be galvanized in conformance with Section 05035, after all fabrication is completed.

1) Galvanize all welded pipe railing system components in accordance with ASTM A123. Provide minimum of 1.25 ounces of zinc per square foot of surface, when tested in accordance with ASTM A90.

2) Galvanize steel and iron hardware in accordance with ASTM A153.

3) Pregalvanized pipe with zinc-rich paint is not approved and shall not be submitted to Engineer.

2.04. PAINTING

A) Painting: In addition to galvanizing, all welded pipe railing system components shall be painted in conformance with Section 09900.

B) Galvanized (Zinc-Coated) Surfaces: Prepare all galvanized surfaces for painting by lightly sanding with 60-80 mesh sandpaper or by light whipblasting.

C) Prime all galvanized surfaces in the shop with primer paint compatible with paint finish system specified in Section 09900.

1) Stripe paint edges, corners, crevices, bolts, and welds.

PART 3 - EXECUTION

3.01. INSPECTION

A) The Contractor shall examine the alignment of the substrate and conditions under which the welded pipe railing system work is to be performed and notify Engineer in writing of unsatisfactory conditions. Do not proceed with the welded pipe railing system work until unsatisfactory conditions have been corrected in a manner acceptable to Engineer.

B) Verify to Engineer gage of welded pipe railing posts and rails brought to the Site by actual measurement of on-Site material in the presence of Engineer.

3.02. FASTENING TO IN-PLACE CONSTRUCTION

A) Provide anchorage devices and fasteners where necessary for securing handrails and railing items to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts and other connectors as required. Use devices and fasteners that are compatible with installed material.

B) Flanged fittings shall be secured to steel and iron work with nuts, bolts and washers; to hollow tile with toggle bolts and to other masonry with expansion bolts. Flanges shall be set in neat Portland cement grout.

C) Provide end posts and railing returns at 16 inches on each side of structural expansion joints. Expansion joints shall be located at the post nearest the expansion joint in the structure upon which the railing is placed.

D) Field dowel connections shall be located at posts.

3.03. CUTTING, FITTING AND PLACEMENT

A) Perform cutting, drilling and fitting required for installation in the shop. Set the work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.

1) Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2) Fit exposed connections accurately together to form tight hairline joints. Field welding will not be permitted.

3) Seal recessed holes of exposed locking screws using a plastic cement filler colored to match final paint finish of handrail and railing.

B) Anchor posts in concrete by means of sleeves set and anchored into the concrete floor slab. Provide closure secured to the bottom of the sleeve. Unless otherwise shown, after the posts have been inserted into the sleeves, fill the annular space between posts and sleeves solid with non-shrink, non- metallic grout as specified. Crown grout and slope it to drain away from posts.

C) Anchor posts to steel with stringer or support flanges, angle type or floor type as required by conditions, shop connected to posts and bolted to the steel supporting members.

D) Handrails supported from walls, partitions and similar construction shall be supported by brackets located within 18 inches of handrail terminations and by intermediate brackets located at points spaced not more than 5 feet on centers. Drill wall plate portion of the bracket to receive one bolt, unless otherwise shown for concealed anchorage. Provide flush-type wall return fittings with the same projection as that shown for wall brackets. Secure wall brackets and wall return fittings to building construction as follows:

1) For concrete and solid masonry anchorage, use bolt anchor expansion shields and lag bolts.

2) For hollow masonry anchorage, use toggle bolts having square heads.

E) Side mount posts by fastening them securely in brackets attached to steel or concrete fascia as shown, and in complete accordance with manufacturer's approved Working Drawings.

F) Permanent splice connections shall be made using manufacturer's recommended minimum 5 inch long steel connector sleeves and in accordance with manufacturer's instructions. Make all splices as near as possible to posts but not exceeding 12 inches from the nearest post. Tight press fit all connections make at the Site and install in accordance with approved Working Drawings.

G) Space posts 5 feet on centers unless otherwise shown on the Contract Drawings. At walkways and other locations where welded pipe railing system is provided on each side, locate railing system posts aligned opposite each other and with the same on center spacing.

H) Expansion Joints: Provide slip joints with internal sleeve extending 2 inches minimum beyond joint on each side. Construct expansion joints as for field splices except fasten internal sleeve securely to one side of rail assembly. Locate joints within 6 inches of posts. Submit proposed locations of expansion joints to Engineer.

I) Provide hinged railing sections where shown on the Contract Drawings. Furnish hinges and latch for connection to adjacent railing.

3.04. FIELD TESTING

A) An anchor testing program shall be established based on ASTM E488 and ASTM E894. Perform tension, shear, flexure, and shock loading resistance tests.

1) Test a minimum of one anchor for every three posts and one anchor for every three railing supports.

2) Based on initial results of testing, test additional anchors in order to verify that design safety factors have been provided by anchor installation.

B) Anchors: Suitable equipment shall be used to perform tests required to verify correct installation of anchors and provide proof loads on anchors installed at the Site in accordance with ASTM E488 and ASTM E894.

C) The Contractor shall provide a field report on anchor testing results to Engineer, in compliance with ASTM E488 and ASTM E894, for final approval of welded pipe

railing system along with recommendations for remedial work required to bring anchors up to load resistance requirements specified and required by governing authorities having jurisdiction.

3.05. ALIGNMENT AND ADJUSTMENT

A) Adjust railings prior to securing in place, to ensure proper matching at butting joints and correct alignment throughout their length. Plumb posts in each direction.

3.06. CLEANING AND REPAIRING

A) Cleaning:

1) Remove all stains, dirt, grease or other substances by washing railings thoroughly using clean water and soap; rinse with clean water.

2) Do not use acid solution, steel wool or other harsh abrasive.

3) If stains remain after washing, remove finish paint and reapply in compliance with the paint manufacturer's application requirements.

B) Immediately after erection, touch-up abraded areas of shop primer paint.

C) Repair damaged zinc coating by cleaning the area and removing defective coating. Repair in compliance with ASTM A780, and for compatibility with paint system specified in Section 09900.

D) Restore finishes so no evidence remains of correction work. Items that cannot be successfully repaired at the Site shall be returned to the shop; make alterations and refinish entire unit, or provide new units.

E) Protect welded pipe railing system from damage by the work of all contractors. Remove defective welded railing system components immediately upon discovery of damage, and replace with material that meets specification requirements, so that all welded pipe railing system components will be without damage or surface blemish at the time of Substantial Completion.

END OF SECTION

NO TEXT ON THIS PAGE

SECTION 11211

Comment [M1]: Inserted by Addendum 2

END SUCTION CENTRIFUGAL PUMPS

PART 1 - GENERAL

1.01 Work Included

A. The Contractor shall furnish, install, adjust, field test and place in satisfactory operation one (1) end suction pumps for installation adjacent to one (1) analyzer collection sumps as described in this specification and shown on the Contract Drawings.

B. The equipment shall be furnished complete with all accessories, discharge piping, special tools, spare parts, and all other appurtenances as specified or as may be required for a complete installation.

1.02 Related Work

A.	Division 1	-	General Requirements
B.	Division 5	-	Metals
C.	Section 09900	-	Painting
D.	Section 15070	-	Interior Piping
E.	Section 15100	-	Valves, Actuators, and Strainers
F.	Division 16	-	Electrical
G.	Division 17	-	Instrumentation

1.03 Manufacturers

The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns.

Equipment shall be designed, constructed and installed in accordance with the best practices of the trade, and shall operate satisfactorily when installed as shown on the Contract Drawings.

To ensure that all the equipment is properly coordinated and will function in accordance with the intent of these specifications, the Contractor shall obtain all the equipment specified

herein from the pump manufacturer in who shall be vested unit responsibility for the proper function of the pumps and motors as shown and specified. However, the Contractor shall retain ultimate responsibility under this contract for equipment coordination, installation, operation, and guarantee.

End suction pumps shall be manufactured by Aurora, Peerless, Goulds, or equal, and supplied with automatic on-off liquid level control switches.

1.04 Quality Assurance

Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

1. Standards of the Hydraulic Institute.

2. NEC, National Electric Code.

3. NEMA, Standards of National Electrical Manufacturers Association.

4. IEEE, Institute of Electrical and Electronic Engineers.

5. AFBMA, Anti-Friction Bearing Manufacturers Association.

6. ANSI, American National Standard Institute.

1.05 Submittals

Submittals shall be in accordance with the requirements of Division 1. Submittals shall include but not be limited to the following:

- Shop Drawings
- Operation and Maintenance Manuals
- Spare Parts List
- Special Tools List

A. Shop Drawings

Shop drawings shall include but not be limited to the following:

1. Equipment specifications and data sheets identifying all materials used and methods of fabrication.

2. Complete assembly, layout, and installation drawings with clearly marked dimensions, anchor bolts and grouting requirements.

3. Pump characteristic curves.

4. Motor nameplate data as specified in Section 16481 - Electric Motors.

5. Weights of all component parts, assembled weight of units and approximate total shipping weight.

6. Motor speed-torque curves from zero speed to full load speed.

7. Example equipment nameplate data sheet.

8. Interconnecting wiring diagrams.

9. List of recommended lubricants.

B. Operations and Maintenance Manuals

The Contractor shall submit operation and maintenance manuals in accordance with the procedures and requirements set forth in the General Conditions and Division 1.

1.06 Storage and Protection

Pumps and accessories shall be stored and protected in accordance with the manufacturer's recommendations and the requirements of Division 1.

1.07 Identification

Each unit of equipment shall have a corrosion resistant tag or nameplate, securely affixed in a conspicuous place identifying manufacturer's name or trademark and such other information as the manufacturer may consider necessary, or as specified, for complete identification.

1.08 Lubricants

The manufacturer shall submit a list with a minimum of four manufacturers standard lubricants which may be used interchangeably for each type of lubricant required. If the manufacturer has a preferred lubricant for each type required, this should be indicated.

PART 2 - PRODUCTS

2.01 Pumps

A. Operating Requirements

Operating requirements for the end suction pump(s) shall be as shown in Appendix A – End Suction Pump Schedule. The end suction pumps shall be Aurora Series 320, Peerless C610A, Goulds 3642, or equal.

B. Materials for Construction

Pump case and frame shall be of cast iron. Impeller and case shall be of bronze. Shaft seal shall be 303 stainless steel. Suction sleeve shall be Buna-N.

C. Motors

Motors shall be designed and manufactured in accordance with the standards of NEMA and shall have the following characteristics:

120 volt, 1 phase
1/3 horsepower
1750 rpm

E. Level Control Switches

An adjustable float switch arrangement shall be provided to start and stop the pump as follows (based on depth of water):

- Approximately 12" depth - start the pump on rising level.

- Approximately 6" depth - stop the pump on falling level.

The float switch shall be mounted in the sump.

In addition, a second adjustable float switch shall be provided with dry contracts to provided a remote alarm signal to indicate high water level in the sump. Initially this switch shall be set a 20" depth.

The pumps shall be provided with float switch control which includes: "pump on", "pump on standby", "pump off" and "high water level alarm" level controls. Control panel shall be provided by the pump manufacturer.

2.02 Analyzer Instruments Collection Sumps

Furnish and install analyzer instrument collection sumps as shown on the Contract Drawings. Each analyzer sump shall be a plastic tank, and shall be high density polyethylene, cylindrical, rugged and self-supporting, with chemical and impact resistance. Capacity of the tank shall be 75 gallons, diameter 30 inches, height 24 inches. The tank shall be Chem-Tainer Model 3024AA or equal. End suction pumps shall be located in adjacent to the analyzer sumps where shown on the Contract Drawings. A fitting shall be provided in the analyzer sump to connect the end suction pump. End suction pumps and accessories shall be in accordance with Section 2.01.

2.03 Tools, Supplies and Spare Parts

Furnish all special tools necessary to disassemble, service, repair and adjust the equipment.

The following spare parts shall be furnished:

One (1) complete pump and motor.

Two (2) sets of seal "O" rings for each pump.

Two (2) sets of gaskets for all gasketed parts for each pump.

Others as recommended by equipment manufacturers.

Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

Parts shall be completely identified with a numerical system to facilitate parts inventory control and stocking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number. Spare parts shall be packed in individual, suitable containers clearly labeled with the part number, name, quantity, and the pump for which they are intended.

Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.

2.03 Controls

A. The Contractor shall provide one NEMA 4X control panel, with all components mounted in a single enclosure. All the components shall be located and furnished in conformance with Division 16 and as shown in the Drawings.

B. Wire the control panel with input and output (control and signals) connections terminating on a terminal block and including the following:

1. Motor run indicator light.
2. Hand-off-Auto switch.
3. Motor starter.
4. Elapsed time meter.

PART 3 - EXECUTION

3.01 Equipment Installation

Installation shall be in strict accordance with Division 1 and the respective manufacturer's instructions and recommendations. Installation shall include furnishing any required oil and grease in accordance with the manufacturer's recommendations. Anchor bolts shall be stainless steel and shall be set by the Contractor in accordance with the manufacturer's recommendations and approved shop drawings.

3.02 Surface Preparation and Painting

Pumps shall be primed and finish painted at the factory, in accordance with the requirements of Section 09900, with finish color selected by the Engineer. For each color provide two pints of additional paint for field touch-up of damaged finishes, and repair damaged finishes to the satisfaction of the Engineer.

3.03 Cleaning

Prior to acceptance of the work of this Section, thoroughly clean all installed materials, equipment, and related areas in accordance with Section 01700 - Contract Closeout.

3.04 Inspection and Testing

A. Field Pump Tests

1. Field tests shall conform to the Sections 01400, 01600, 01650 and 01700 and as specified herein.

2. Each pump shall be tested at maximum rated speed for at least four points on the pump curve for capacity, head and electric power input. The rated motor nameplate current and power shall not be exceeded at any point within the specified range. Vibration readings shall be taken when directed by the Engineer and the results recorded.

B. Services of the Manufacturer's Representative

1. Furnish the services of a factory representative for a minimum of one (1) day during the installation phase of the equipment. The factory representative shall have full knowledge and experience in the installation of the type of equipment being installed.

2. Furnish the services of a factory representative for a minimum of one (1) day who has complete knowledge of proper operation start- up procedure and maintenance requirements to inspect the final installation and supervise a test run of the equipment.

3. Furnish the services of a factory representative for a minimum of one (1) day who has complete knowledge of the operational and maintenance requirements of the system. The factory representative shall instruct the Owner's personnel in the proper operation of the equipment.

3.05 End Suction Pump Schedule – Appendix A

Location:	**Pipe Gallery**
I.D.:	P-06013
Rated Capacity, gpm:	20 gpm
Rated Head, Feet:	15 TDH
Maximum RPM:	1,750 rpm
Voltage:	120/1
Horsepower:	1/3

END OF SECTION

SECTION 11376

Comment [M1]: Addendum 2

COMPRESSED AIR SYSTEM

PART 1 - GENERAL

1.01. Work Included

A) The Contractor shall furnish, install, test, and place into satisfactory operation the compressed air system as shown on the Contract Drawings and as specified herein.

1.02. Related Specifications

A) Division 1 – General Requirements

B) Section 09900 – Painting

C) Section 15070 – Interior Piping

D) Section 15100 – Valves and Actuators

E) Division 16 – Electrical

F) Section 16481 – Electric Motors

G) Division 17 - Instrumentation

1.03. References

A) American Society of Mechanical Engineers (ASME)

1) ASME Boiler and Pressure Vessel Code – Sections VIII and IX

B) National Electrical Manufacturers Association (NEMA)

C) Occupational Safety and Health Administration (OSHA)

D) Clean Air Act (CAA)

E) Compressed Air and Gas Institute – Pneumatics/Europe (CAGI-PNEUROP)

F) American Society for Testing Materials (ASTM)

1) ASTM A48 – Standard Specification for Gray Iron Castings.

G) Underwriters Laboratories (UL)

1) UL 94HP1 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances.

H) Standards of the Hydraulic Institute

I) National Electric Code (NEC)

J) Institute of Electrical and Electronic Engineers (IEEE)

K) Anti-Friction Bearing Manufacturers Association (AFBMA)

L) American National Standards Institute (ANSI)

1.04. System Description

A) The compressed air system to be furnished and installed under this Specification shall include the following equipment components:

1) Two (2) oil-free air compressor systems.

2) One (1) air receiver.

3) Two (2) particulate filters

4) Two (2) coalescing filters.

5) One (1) Heatless Compressed Air Dryer

6) Instrumentation and control equipment as specified herein.

B) The provision of the above equipment shall include all related equipment specified, shown on the Drawings, or needed for a complete installation.

C) All piping, valves and drains needed for the above equipment shall be provided under this Specification. Interconnecting piping and valves (between the various equipment components) shall be provided under appropriate Detailed Specifications of Division 15 (not this Specification).

D) The pressure gauges to be mounted on the air receivers shall be provided under appropriate Detailed Specifications of Division 17 (not this Specification).

E) The air preparation systems provided under this Specification shall supply air to the dissolved air flotation system.

1.05. Submittals

A) In accordance with the procedures and requirements set forth in the General Conditions and in applicable provisions of Division 1, the Contractor shall obtain from the equipment manufacturer and shall submit the following:

1) Working Drawings.

2) Operation and Maintenance Manuals.

3) Lists of Spare Parts, Special Tools and Supplies.

4) Reports of Certified Shop Tests.

5) Reports of Field Tests.

6) Certification of welder qualifications (for the air receivers), in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.

B) Working drawings shall include, but not be limited to, the following:

1) Equipment specifications and data sheets, with identification of all materials used and methods of fabrication.

2) Complete assembly, layout, installation, and shop drawings, with clearly marked dimensions.

3) Equipment cross-section drawings.

4) Manufacturer's delivery, storage, and handling requirements.

5) Manufacturer's installation instructions and recommendations.

6) Weights of equipment component parts, assembled weight of equipment, and total shipping weight.

7) Comprehensive schematic diagrams showing the wiring for each electrical or electro-mechanical equipment item, as well as interconnecting and point-to-point field wiring diagrams.

8) Painting details.

9) Equipment nameplate data.

10) Documentation for instrumentation and control equipment provided under this Specification, said documentation to conform to the requirements specified under Division 17 – Instrumentation.

11) Submittals specified in Section 16481 – Electric Motors.

12) Evidence of manufacturer experience and of the successful operation in other facilities of equipment similar to that proposed for this project, as specified herein and in the General Conditions.

13) A certified statement from the manufacturer that the equipment to be provided satisfies the noise level provisions specified herein.

C) Operation and maintenance manuals shall conform to the requirements set forth in the General Conditions and Division 1.

D) Spare parts lists shall indicate sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" shall not be acceptable.

E) Reports of certified shop tests shall be submitted as specified herein and in the General Conditions. No equipment shall be shipped from its place of manufacture before the certified shop test reports have been approved by the Engineer.

1) Prior notification of shop tests shall be submitted for all equipment, shall be as specified in the General Conditions, and shall include, but not limited to, a description of the proposed testing facilities and procedures.

F) Reports of field tests shall be submitted as specified herein, in the General Conditions, and in Division 1.

1) Prior notification of field tests shall be submitted for all equipment as specified in Division 1, and shall include, but not be limited to, a description of the proposed testing procedures.

G) Other applicable submittals, as required elsewhere in the Contract Documents.

1.06. Quality Assurance

A) In addition to the requirements for the approval of materials and manufacturers specified in the General Conditions, the following provisions shall pertain to the work under this Specification:

1) The Contractor shall require that the manufacturer of the air compressors be responsible for the integration and compatibility of all equipment components provided under this Specification. Complete compressed air system shall be

assembled and fitted together on the manufacturer's premises as part of the shop tests required under this Specification.

1.07. Equipment Identification

A) The Contractor shall provide corrosion-resistant nameplates, securely affixed in a conspicuous place, on each item of equipment. Nameplates shall bear the manufacturer's name or trademark and such other information as is specified or deemed necessary by the manufacturer to complete the identification. Nameplate numbering shall be as specified or shown on the Contract Drawings; the Engineer may change or supplement such numbering at the time of or at any time before the approval of working drawings.

1.08. Manufacturer's Representative

A) The Contractor shall provide the services of a qualified manufacturer's representative to: assist in the installation of the equipment; check the installation before the equipment is placed into operation; assist in the performance of field tests; assist in the start-up of the equipment; and train the plant operations and maintenance staff in the care, operation, and maintenance of the equipment. The services provided shall be in accordance with the requirements of the General Conditions and Division 1.

B) The Contractor shall provide the services of the manufacturer's representative at such times and for such durations of time as are needed to perform the tasks required of the representative, as listed in Article 1.08.A above. At a minimum, the services of the manufacturer's representative shall be provided as indicated herein below. The number of visits indicated below shall be understood as referring to the total required services for the lot of equipment provided under this Specification.

1) Installation: 2 visits.

2) Field Testing: 2 visits.

3) Start-up: 1 visit.

4) Training: 1 visit.

1.09. Surface Preparation and Painting

A) Compressors, receiving tank, and motors shall be primed and finish painted at the factory, in accordance with the requirements of Section 09900, and with finish color selected by the Engineer. For each color, provide four pints of additional paint for field touch-up of damaged finishes, and repair damaged finishes to the satisfaction of the Engineer.

1.10. Delivery, Storage, and Handling

A) The Contractor shall deliver, store, and handle the equipment and materials provided under this Specification as specified in Section 01600 –Materials and Equipment.

1.11. Shop Tests

A) Certified shop tests shall be performed for all equipment provided under this Specification, as specified in the General Conditions.

1) Certified shop tests for motors shall be performed as specified in Section 16481 – Electric Motors.

2) Certified shop tests for instrumentation and controls shall be performed as specified in Division 17 - Instrumentation.

B) In addition to the shop test requirements specified in Article 1.11.A, the following shop tests shall be performed and certified:

1) The compressors shall be run at varying pressures. Curves shall be developed to demonstrate the following: pressure versus flow (scfm); pressure versus brake horsepower.

PART 2 - PRODUCTS

2.01. Manufacturers

A) The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns. Compressed air system shall be manufactured by Atlas Copco, Inc., Powerex or approved equal. The manufacturer shall be required to present to the Engineer satisfactory evidence of at least 10 different installations of similar equipment installed and performing satisfactorily in accordance with these specifications, each for at least five (5) years.

2.02. Air Compressors

A) The compressed air supply system shall supply oil-fee compressed air using two (2) 100 % capacity compressed air supply systems (one duty, one standby) each sized for all three dissolved air flotation clarifiers as detailed below.

B) The compressors shall be oil-free, air-cooled, scroll type compressors. The compressors shall be provided with equipment to allow lead-lag operation. Each compressor shall supply air to a vertical ASME stamped air receiver complete with pressure gauge, isolation valve and automatic drain valve. There shall be no lubricants in the

compression chamber. The compressor bearings shall each have a minimum life of 30,000 hours.

C) Each compressed air supply system shall be capable of delivering 22.5 scfm (must be converted to acfm) at 65 degrees Fahrenheit, and 1 ATM of free air at a full-load discharge pressure of 125 psig. The compressors shall be capable of delivering the rated capacity at worst-case ambient temperatures of 55 and 104 degrees Fahrenheit. The capacity of the compressors shall be measured in accordance with CAGI-PNEUROP Test Code PN2CPTC2 at the full working load of 125 psig. The compressors shall be capable of continuous, 24 hour per day, full-flow operation at the rated capacity and discharge pressure.

D) Each of the compressor packages shall include the following: drive motor, cooling system, inlet air filter, load, moisture separators, safety valves and devices, compressed air discharge check valve, instrumentation, sound dampening enclosure, common base frame with forklift slots, and necessary particulate and coalescing filters. Each of the compressors shall also include an integral local control panel (LCP).

E) The drive motors shall conform to the requirements of Section 16481 – Electric Motors. The motors shall be horizontal, TEFC, 5 HP, Class F, 3600 rpm, rated for 480 Volt, 60 Hz, 3 phase supply with a service factor of 1.15. There shall be two units comprising the total 10 HP compressed air system. The motors shall start unloaded at all times and shall instantly unload coming to a rest unloaded when the compressor is shut down. The maximum horsepower requirement shall not exceed the nameplate motor horsepower by more than 10 percent. The drive motor bearings shall have a minimum life of 30,000 hours.

F) Provide an aftercooler. The aftercooler shall be of the air cooled type, capable of cooling the compressed air to within 16 degrees of the ambient air temperature and furnished with an automatic condensate trap.

G) Provide an air cooled integrated refrigerated air dryer with bypass. Unit shall be piped and wired inside the compressor cabinet. The air dryer shall be charged with R134A refrigerant. The microprocessor shall have a built-in dewpoint monitor that will alarm when the dewpoint rises above 50 degrees F. Bypass is for removal of dryer without an interruption of the compressed air.

H) An intake air filter shall be provided on each compressor. The filter shall be of the replaceable dry type, capable of removing at least 99% percent of particulates with a mean diameter of 5 micron or larger. The element shall not shed fibers in the air being filtered.

I) The sound dampening enclosure shall enclose the entire compressor package. The enclosure shall be equipped with removable doors to enable easy and convenient access for maintenance. The compressor and the sound dampening enclosure shall be designed

such that the noise level from the compressor package does not exceed 76 dBA at a distance of three feet.

J) The common base frame shall support all components of the air compression system. The frame shall be made of steel and shall be equipped with forklift access holes for easy transport of the package.

K) Pressure transmitters shall be furnished and installed under this Specification on the air receivers specified herein below. These pressure transmitters shall conform to the requirements in Division 17 – Instrumentation.

L) Each of the compressors shall be equipped with the following integral instrumentation:

1) Compressed air discharge pressure gauges.

2) Compressed air discharge pressure transmitter.

3) Compressed air discharge temperature gauges.

4) Compressed air discharge temperature transmitter.

2.03. Air Compressor Controls

A) Each air compression system shall be provided with an integral local control panel (LCP) that shall include all equipment (hardware and software) needed to operate the system (both locally and remotely).

1) The LCP shall conform to the requirements specified herein and in Division 17 – Instrumentation. The LCP enclosure shall be rated NEMA 12.

2) All electrical and electro-mechanical equipment provided under this Specification (including, but not limited to, motors, instrumentation and controls) shall be connected to the LCP and shall be powered, controlled, and monitored, as applicable, by the LCP.

3) The LCP shall include complete motor control equipment, conforming to the requirements in Division 17 – Instrumentation, including, but not limited to: combination breaker – NEMA rated starters, control transformers, motor current and thermal overload protection systems, circuit breakers, H-O-A selector switches, pilot lights, 3 phase monitor relay, terminal strips, grounding, and operator interface terminal (OIT). Direct on-line motor starter shall be provided fir the compressor drive motors. A large mushroom-type emergency stop button shall be provided.

4) The LCP shall be factory-wired (both internally and with respect to all equipment connected to the LCP). The complete panel shall be U.L. 508 listed.

5) The LCP control strategy shall be as follows:

   a) The system shall be shut down and re-started as needed to keep the compressed air discharge pressure between a minimum setpoint value and a maximum setpoint value. Both values shall be adjustable at the LCP operator interface terminal; initial setpoint values shall be 110 psig (minimum) and 115 psig (maximum). The LCP shall activate the unloading valve to protect the compressor drive motor from surges. The LCP shall coordinate the operation of the load and unload valves.

   b) The air compression system shall be equipped to start against an existing line pressure. When the maximum setpoint value for the compressed air discharge pressure is reached, the inlet valve shall close and the compressor shall run in an unloaded condition. An adjustable timer shall be provided in the LCP to shut down the compressor if it runs in the unloaded condition for a predetermined length of time. The system shall automatically restart when the compressed air discharge pressure falls to the minimum setpoint value.

6) The LCP shall be equipped with the safety features, functions and interlocks specified herein and recommended by the manufacturer.

   a) Control interlocks shall include at a minimum:

      i) High compressed air discharge pressure shutdown provided with time delay relay.

      ii) High compressed air temperature shutdown.

      iii) Motor overload shutdowns (for compressor and cooling fan).

      iv) Main starter failure.

      v) Emergency stop button shutdown.

   b) Safety features, functions and interlocks shall be in effect regardless of the settings of either the “local/remote” or “man/off/auto” selector switches.

   c) The LCP shall provide detection of malfunctions and shall shut down the compressor as needed to protect the air compression system. LCP controls shall prevent operation of the compressor when the controls are defective, failed or de-energized.

   d) Depression of the emergency stop button shall shut down the air compression system regardless of the settings of either the “local/remote” or “man/off/auto”

selector switches. The emergency shutdown procedure shall be as recommended by the manufacturer.

7) The LCP shall be equipped with the following displays on the operator interface terminal:

   a) Compressed air discharge pressure.

   b) Compressed air discharge temperature.

   c) Minimum and maximum compressed air discharge pressures entered at the LCP operator interface terminal.

   d) Selector switch indication (local/remote).

   e) Selector switch indication (man/off/auto).

   f) Status indications (off/running loaded).

   g) Hour count of total running time.

8) The LCP shall be equipped with a critical alarm annunciator panel and with a buzzer that shall activate upon the occurrence of a critical alarm. (A buzzer cancel switch shall also be provided.) Critical alarms shall be provided for all system shutdowns, including the following events:

   a) High compressed air discharge pressure shutdown.

   b) Motor overload shutdown.

   c) Emergency stop button shutdown.

   d) Inlet filter low suction pressure shutdown.

   e) Other system shutdowns, as recommended by the manufacturer.

9) Warning indications shall be displayed on the LCP's OIT. Warning indications shall be provided for the following events:

   a) High compressed air discharge pressure.

   b) High compressed air temperature.

   c) Service requirements (as recommended by manufacturer).

10) The LCP shall be provided with the following dry contacts for external use:

a) Compressor Status

b) Compressor Fail

c) Temp and Pressure Alarms

2.04. Air Receivers

A) The air receiver provided under this Specification shall be a vertical ASME stamped steel tank mounted on a steel base, with a capacity of 200 US gallons.

B) The air receivers shall be designed and fabricated in accordance with Section VIII of the ASME Boiler and Pressure Vessel Code, and shall be UL-approved. The receivers shall be suitable for a working pressure of 200 psig.

C) Each air receiver shall be provided with the following equipment under this Specification:

1) Integral pressure safety relief valve, rated to 110 percent of the maximum system pressure, and capable of relieving the net delivery of both compressors. The valve shall conform to the requirements specified in Section 15100 – Valves and Actuators, but shall be furnished and installed under this Section.

2) Automatic, electronic drain valve and assembly. Unit shall be self-actuating requiring only a 115V power supply. (Power supply shall be via the plant's central electrical system.) Unit shall employ a stainless steel float to trip a relay that opens and closes the drain valve. Assemblies employing a timed release may be used, provided the drain duration time and frequency are easily adjustable.

3) Manual drain valve and assembly.

D) Each receiver shall be equipped with a 0-200 psig pressure gauge. This pressure gauge is specified in, and will be provided under, Division 17 – Instrumentation (not this Specification). The receivers shall be manufactured with the necessary connections for these gauges.

2.05. Particulate Filters

A) Two (2) particulate filters shall be provided in parallel air feed lines.

B) Each filter shall be of the replaceable cartridge type, and shall be designed for an air flow rate of 50 scfm at a pressure of 125 psig. The filters shall be capable of removing

particles to 1 micron and 99.9 percent efficiency at the design flow rate and pressure. The filters shall be suitable for oil-free condensate.

C) Each filter shall be equipped with an automatic drain valve and assembly. The assembly shall be fully self-actuating, requiring only a 115V power supply. The unit shall employ a stainless steel float that rises when condensate has collected. The rising and lowering action of the float shall open and close the drain valve. Drain assemblies employing a timed release may be used, provided the drain duration time and frequency are easily adjustable.

D) A differential pressure switch and two pressure gauges, capable of reading pressure from 0 to 150 psig, shall be provided across each of the two sets of particulate and coalescing filters as shown on the Drawings. These differential pressure switches and pressure gauges shall conform to the requirements specified in Division 17 – Instrumentation.

2.06. Coalescing Filters

A) Two (2) coalescing filters shall be provided, in parallel air feed lines.

B) Each filter shall be of the replaceable cartridge type, and shall be designed for an air flow rate of 50 scfm at a pressure of 125 psig. The filter shall be capable of removing particles to 0.01 micron 99.9 percent efficiency at the design flow rate and pressure.

C) Each filter shall be equipped with an automatic drain valve and assembly. The assembly shall be fully self-actuating, requiring only a 115V power supply. The unit shall employ a stainless steel float that rises when condensate has collected. The rising and lowering action of the float shall open and close the drain valve. Drain assemblies employing a timed release may be used, provided the drain duration time and frequency are easily adjustable.

2.07. Heatless Air Dryer

A) One (1) heatless air dryer shall be provided for a secondary air feed routed to the PAC system.

B) The air dryer shall be designed to dry a maximum air flow of 2 scfm at 80 psi. Use shall be intermittent, flow shall be required for 5 seconds every 15 minutes.

C) Air Dryer shall require a maximum of a 120V power supply

2.08. Spare Parts, Special Tools, and Supplies

A) The Contractor shall provide spare parts for the equipment provided under this Specification, as specified herein and in Section 01700 – Contract Closeout.

1) The spare parts provided shall include:

a) Four (4) compressor air filters.

b) One (1) filter cartridge for the particulate filters.

c) One (1) filter cartridge for the coalescing filters.

d) Two (2) complete sets of Seals, Gaskets and O-Rings.

e) Spare parts for the instrumentation provided under this Specification shall be as specified in Division 17 – Instrumentation.

f) Spare parts recommended by the equipment manufacturer for two (2) years of normal equipment operation (but not including spare parts already listed above).

B) The Contractor shall provide such special tools and appliances as may be needed to adjust, operate, maintain or repair the equipment furnished under this Specification, as specified in the General Conditions and in Section 01700 – Contract Closeout.

PART 3 -EXECUTION

3.01. Installation

A) Installation of equipment and materials provided under this Specification shall be in accordance with the manufacturer's recommendations, the approved working drawings, and the requirements specified in Division 1. Type 316 stainless steel anchor bolts (and related hardware, including, but not limited to, nuts and washers) shall be included in the supply of the equipment provided under this Specification, and shall be installed by the Contractor in accordance with the equipment manufacturer's instructions.

3.02. Cleaning

A) Prior to acceptance of the work of this section, thoroughly clean all installed materials, equipment and related areas in accordance with Section 01700 - Contract Closeout.

3.03. Field Testing

A) Preliminary and final field tests shall be performed for all equipment provided under this Specification, as specified in the General Conditions and Division 1.

1) Field tests for motors shall be performed as specified in Section 16481 – Electric Motors.

2) Field tests for instrumentation and controls shall be performed as specified in Division 17 – Instrumentation.

B) Additional requirements for the preliminary field testing of the equipment provided under this Specification are as follows:

1) The compressors, receivers, and air filters shall be tested as a system. The system shall demonstrate 48 hours of trouble free operation after which all protective devices shall be tripped individually to verify proper response by all system components.

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SECTION 13200

Comment [M1]: Addendum 2

FIBERGLASS MANWAY COVERS

PART 1 - GENERAL

1.01. Work Included

A) The Contractor shall furnish, install, adjust, test and place in satisfactory operation the fiberglass manway covers as shown on the Contract Drawings and specified herein.

B) The manway covers shall be constructed of fiberglass reinforced plastic.

C) The covers shall be suitable for all naturally occurring corrosive conditions to store products which are compatible with the resin system used in the corrosion barrier.

1.02. Related Work

A) Division 1 - General Requirements

B) Division 5 - Metals

C) Section 15070 - Interior Piping

D) Division 16 - Electrical

E) Division 17 - Instrumentation

1.03. Submittals

A) Submittals shall be made in accordance with the requirements of Division 1. In addition, submit shop drawings of all layouts in plan and section including dimensions, weights, and construction details. Also submit information on type of resin and reinforcement used and their manufacturers for each service.

1.04. Quality Assurance

A) The equipment covered by these specifications is intended to be standard equipment of proven performance as manufactured by reputable concerns.

1.05. Storage and Protection

A) All equipment under this Section shall be stored and protected in accordance with the manufacturer's recommendations and the requirements of Division 1.

PART 2 - PRODUCTS

2.01. General

A) All parts of the manway covers furnished shall be amply designed and constructed for the maximum stresses occurring during fabrication, transport, and continuous use at maximum capacity as indicated in Appendix A at the end of this Section. Materials and resins used in the fabrication of the manway covers shall be compatible with the chemical service of each tank as indicated in Appendix A.

2.02. Manufacturer

A) The manway covers shall be manufactured by An-Cor Industrial Plastics, R.L. Industries, Inc., Ershigs, Inc., or equal.

2.03. Fabrication

A) All fiberglass reinforced plastic manway covers shall be filament wound and/or contact molded and shall conform to requirements of ASTM Specifications D3299-88 and/or D4097-88. The manway cover shall be one continuous piece.

B) All covers shall be 24-inch diameter flanged manways for access into the tanks as indicated in Appendix A. Flanged manways shall be gasketed with a material suitable for the material service unless otherwise noted. Manways shall be provided with type 316 stainless steel bolts, nuts and washers for all services, unless otherwise noted. All manway covers shall be provided with a handle to allow for easy lifting.

2.04. Quality Control

A) Process and quality control shall be constantly monitored and manufacturer must maintain manufacturing and quality control records for each manway cover.

B) The first layer surface shall be clean, smooth and uninterrupted with no cracks, or crazes.

C) No foreign matter large enough to reach the surface of the first layer is permitted.

D) The exterior surface of the cover shall exhibit good workmanship; smooth and uniform with no exposed fibers, sharp projections or uncoated sanded areas. The exterior surface shall be properly cured.

2.05. Materials

A) A polyester or vinylester resin of a premium commercial grade shall be used, and

recommended by the cover manufacturer for the intended service from corrosion test data or from the manufacturer's experience with related environments.

1) A final coat of the recommended resin shall be applied to the manway covers, to ensure that the covers are free from crazes or cracks.

B) The reinforcing material shall be a commercial grade of glass fiber having a coupling agent which shall provide a suitable bond between the glass reinforcement and the resin and shall be suitable for the fabrication method used. The reinforcing material shall be comparable to that used to generate corrosion resistance.

C) The laminate comprising the manway cover shall consist of a corrosion - resistant barrier comprised of an inner surface, interior layer, and a structural layer.

1) Inner Surface - The inner surface exposed to the chemical environment shall be a resin-rich layer 0.10 to 0.020 in thick, reinforced with a suitable glass fiber surface mat or with a synthetic fiber surface mat, as recommended by the resin manufacturer for the intended service.

2) Interior Layer - The inner surface layer exposed to the corrosive environment shall be followed with a layer composed of resin,reinforced only with noncontinuous glass-fiber strands applied in a minimum total of 3 oz/ft^2. The combined thickness of the inner surface and interior layer shall not be less than 0.10 in.

a) Glass content of the inner liner and the interior combined shall be 27%"5% by weight.

b) The degree of cure of the laminate shall be such as to exhibit a Barcol hardness on the inner surface of at least 90% of the resin manufacturer's minimum specified hardness for the cured laminate.

D) Structural Layer

1) Filament Wound Structural Layer - Subsequent reinforcement shall be continuous-strand roving of commercial grade of E-type glass fiber with a sizing that is chemically compatible with the resin system used. Glass content of this filament-wound structural layer shall be 50 to 80% weight. Only those constructions evaluated for design properties shall be used.

2) Contact Molded Structural Layer - Subsequent reinforcement shall be comprised of 1.5 oz/ft^2 chopped strand mat or equivalent weight of chopped roving, or shall be comprised of chopped strand mat or chopped roving and such additional number of alternating plies of 24 oz/yd^2 woven roving to a thickness as required to meet the physical properties that are used for the design. Each successive ply or pass of reinforcement shall be well-rolled prior to the application of additional

reinforcement. Where woven roving is used, chopped strand glass reinforcement shall be used as alternating and final layers. All woven roving and chopped strand shall be overlapped. Laps in subsequent layers shall be staggered at least 2.25 in. from laps in the preceding layer.

3) Ultraviolet absorption agent of 0.025 Tinnuvin P or equal shall be added to the resin throughout the outer structural wall.

E) The manway cover fabricator shall submit certified cover design calculations stamped by a Professional Engineer.

2.06. Tools, Supplies, and Spare Parts

A) Furnish all special tools necessary to install, disassemble, service, and repair the equipment.

B) The following spare parts shall be furnished:

1) One (1) manway gasket for each cover.

C) Spare parts lists, included with the shop drawing submittal shall indicate specific sizes, quantities, and part numbers of the items to be furnished. Terms such as "1 lot of packing material" are not acceptable.

D) Parts shall be completely identified with a numerical system to facilitate parts inventory control and stroking. Each part shall be properly identified by a separate number. Those parts which are identical for more than one size, shall have the same parts number. Spare parts shall be packed in individual, suitable containers clearly labeled with the part number; name, quantity, and the equipment for which they are intended.

E) Spare parts shall be delivered at the same time as the equipment to which they pertain. The Contractor shall properly store and safeguard such spare parts until completion of the work, at which time they shall be delivered to the Owner.

PART 3 - EXECUTION

3.01. Handling and Installation

A) Manway covers shall be handled and installed in accordance with the manufacturer's instructions. Covers shall be protected by covering during construction of building structure.

3.02. Cleaning

A) Prior to acceptance of the work of this section, thoroughly clean all installed materials,

equipment and related areas in accordance with Section 01700 - Contract Closeout.

3.03. Inspection and Testing

A) Shop Tests

1) Manway covers are to be tested for the degree of surface cure using Barcol hardness and acetone sensitivity methods according to ASTM Specification D3299-88 or D4097-88.

2) Manway covers are to be visually inspected for laminate quality and workmanship according to ASTM Specification D3299-88 or D4097-88.

3) Eight (8) certified copies of the test and inspection reports shall be furnished to the Engineer. Reports shall be submitted prior to shipment. No equipment shall be shipped to the site until the Engineer approves, in writing, that the reports are acceptable.

B) Field Tests

1) After the covers have been installed, the associated tank shall be filled with water up to the overflow. At this time covers shall be hydrostatically tested for watertightness. Any tank which shows any leakage during the tests shall be satisfactorily repaired or replaced and retested. No cover will be accepted unless it is completely watertight.

-END OF SECTION-

Appendix A

Tank Name/Number	Number of Manway Covers	Nominal Liquid Stored	Maximum Water in Tank
Filter Box (T-06011 through T-06061)	6	Floated Water	17.5 feet
Floated Solids Transfer Tank (T-10001)	1	Aluminum Hydroxide Solids	N/A

SECTION 17191

Comment [M1]: Addendum 2

POWER CONDITIONERS

PART 1 - GENERAL

1.01 The Requirement

A) The Contractor shall furnish, test, install and place in satisfactory operation all power conditioners, with all spare parts, accessories, and appurtenances as herein specified and as shown on the Drawings.

B) All power conditioners shall be mounted within consoles or control panels containing the associated digital equipment unless otherwise specified or shown on the Drawings.

C) One power conditioner shall be provided for each PLC cabinet provided under this Contract.

1.02 Related Work Specified Elsewhere

A) Section 17000 - Control and Information System Scope and General Requirements

B) Section 17100 - Control and Information System Hardware, General

C) Section 17120 - Programmable Logic Controllers

PART 2 - EQUIPMENT

2.01 Power Conditioners

A) Each power conditioner shall be sized to match the maximum power requirements of the associated digital equipment, control panel power supplies and accessories.

B) Each power conditioner shall meet the following requirements:

1) Input voltage shall be 120 VAC, single phase, 60 Hz.

2) Voltage regulation shall be 3% for line changes of +10%/-20%.

3) Total harmonic distortion shall be less than 3% of RMS.

4) Ambient operating temperature shall be from -20°C to 50°C.

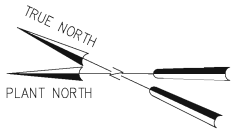
C) Power conditioners shall be Sola Model MCR, or equal.

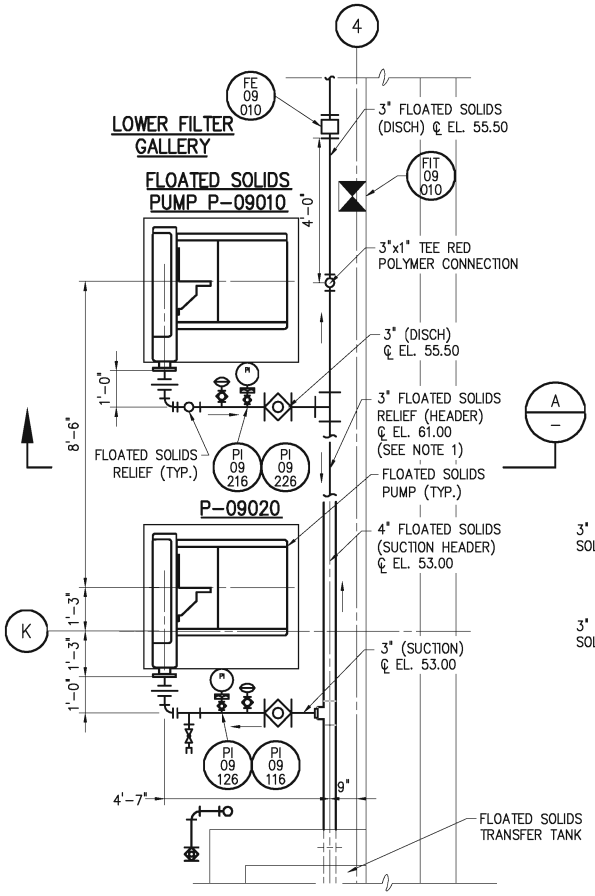
PART 3 - EXECUTION

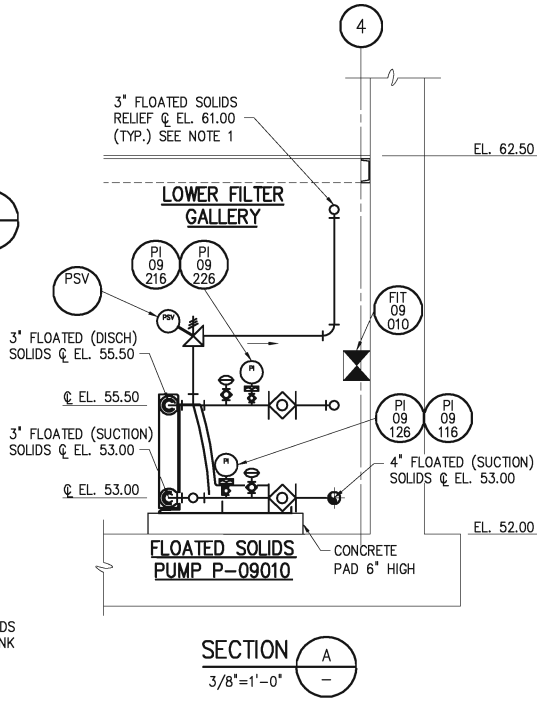
3.01 Requirements

A) Refer to Section 17000.

END OF SECTION







FLOATED SOLIDS PUMPS ENLARGED PLAN

DETAIL 1
3/8"=1'-0"

NOTE:
1. 3" FLOATED SOLIDS RELIEF HEADER ℄ EL. 61.00 SHALL TERMINATE AT THE INSIDE FACE OF THE FLOATED SOLIDS TRANSFER TANK USING TYPE "A" WALL PENETRATION.

3/8"=1'-0"

12" 0 1 2 4'

HAZEN AND SAWYER
Environmental Engineers & Scientists
HAZEN AND SAWYER, P.C.
155 FLEET STREET, PORTSMOUTH, N.H. 03801

CITY OF PORTSMOUTH

MADBURY WTP UPGRADE
AND
BELLAMY RESERVOIR IMPROVEMENTS

FLOATED SOLIDS SYSTEM RELIEF PIPING LAYOUT

PROJ. NO. 09572-000	ADDENDUM NO. 2
SKETCH BY: C. BROWN	REF. DWG. NO. M-2
DATE: FEB. 13 2009	SKETCH NO. M2-SK-01

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