

**BIOSOLIDS DEWATERING FACILITY AND CARBON BUILDING
ROCHESTER, NH**

ADDENDUM NO. 2

To be considered as part of the contract drawings and specification for the Biosolids Dewatering Facility and Carbon Building.

SPECIFICATIONS

1. **DELETE** the Table of Contents in its entirety and **REPLACE** with the Table of Contents Addendum 2, attached.

The purpose of this change is to revise the Table of Contents to match revisions herein.

2. In Specification Section C-200, **DELETE** Paragraph 24.05 in its entirety and **REPLACE** with the following:

“24.05 Guidance for USDOL conformance procedures is available using the following link:
<https://www.dol.gov/whd/govcontracts/pwr/Tab7.pdf>”

The purpose of this change is provide the correct link to the information.

3. **DELETE** Specification Section C-410 and **REPLACE** with Specification C-410 Addendum 2, attached.

The purpose of this change is to include the foundation support piling for the Base Bid and Bid Alternate No. 1 as bids item and adjust the bid form.

4. In Specification Section C-510, **DELETE** Paragraph 4.02 in its entirety and **REPLACE** with the following:

4.02 The Work will be substantially completed on or before **October 16, 2020** and completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **November 20, 2020.**”

The purpose of this change is to adjust the project completion dates.

5. In Specification Section C-800, Part C, Section D-2.1, Page 1, Links for More Information, **DELETE** the first bullet in its entirety and **REPLACE** with:

“U.S.DOL Prevailing Wage Resources Book -
<https://www.dol.gov/whd/govcontracts/pwr/Tab7.pdf>”

The purpose of this change is provide the correct link to the information.

6. **DELETE** Specification Section 01 11 01 and **REPLACE** with Specification Section 01 11 01 Addendum 2, attached.

The purpose of this change is to modify the project milestone dates.

7. **DELETE** Specification Section 01 20 05 and **REPLACE** with Section 01 20 05 Addendum 2, attached.

The purpose of this change is to adjust Measurement and Payment to match Specification C-410 Addendum 2.

8. **INSERT** Specification Section 08 11 16, Aluminum Doors and Frames, attached.
9. **INSERT** Specification Section 08 33 23, Overhead Coiling Doors, attached.
10. **INSERT** Specification Section 12 35 53, Wood Casework, attached.

The Purpose of these changes is to include specification sections not provided in the original bid package.

11. Specification Section 40 05 02.23:

- a. Page 2, under Component: Pipe, **DELETE** reference to “CGRV” for Class 53 Ductile Iron and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- b. Page 2, under Component: Fittings, **DELETE** reference to “CGRV” for 250 psi and 350 psi Ductile Iron and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- c. Page 3, under Component: Grooved Coupling, **DELETE** this line in its entirety.

12. Specification Section 40 05 02.43

- a. Page 3, under Component: Pipe, **DELETE** reference to “CGRV” for Class 53 DI and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- b. Page 4, under Component: Fittings, **DELETE** reference to “CGRV” for 250 psi and 350 psi Ductile Iron and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- c. Page 5, under Component: Grooved Coupling, **DELETE** this line in its entirety.

13. Specification Section 40 05 02.53

- a. Page 2, under Component: Pipe, **DELETE** reference to “CGRV” for Class 53 DI and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- b. Page 3, under Component: Fittings, **DELETE** reference to “CGRV” for 250 psi and 350 psi Ductile Iron and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- c. Page 4, under Component: Grooved Coupling, **DELETE** this line in its entirety.

14. Specification Section 40 05 02.89

- d. Page 2, under Component: Pipe, **DELETE** reference to “FLG, CGRV” for Thk. Class 53 Ductile Iron and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.

- e. Page 3, under Component: Fittings, **DELETE** reference to “FLG, CGRV” for 250 psi Ductile Iron, and **REPLACE** with “RMJ, RPO (buried), FLG (exposed)”.
- f. Page 3, under Component: Grooved Coupling, **DELETE** this line in its entirety.

The purpose of these changes is to remove grooved coupling and fittings for exposed ductile iron pipe and replace with flanged fittings.

- 15. In Specification Section 43 23 80.11, **ADD** the following after Paragraph 2.06.E.k:
 - 1. Seals manufactured by a named pump manufacturer that exceed the above requirements are acceptable.

The purpose of this change is to allow seals manufactured by named pump manufacturers to be used.

- 16. **DELETE** Specification Section 43 41 43.13, High Density Crosslinked Polyethylene Tanks, and **REPLACE** with Specification Section 43 41 43.13 Addendum 2, attached.
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DRAWINGS

- A. **DELETE** Drawing C-004 and **REPLACE** with Drawing C-004 Addendum 2, attached.

The purpose of this change is to include a double leaf gate on the access road and to indicate the work on this drawing is to be included in Bid Alternate No. 1.

- B. On Drawing C-007, **DELETE** reference to “8” *WAS-DP* and **REPLACE** with “6” *WAS-DP*.

The purpose of this change is to correct the pipe size for the WAS-DI.

- C. On Drawing A-911, **RELABEL** Key Note 1 to Key Note 2 and **RELABEL** Key Note 2 to Key Note 1.

The purpose of this change is to correct the note labels.

- D. On Drawing D-711, **DELETE** layout of Internal Recycle Pump No. 1 and **REPLACE** with Sketch D-711 Addendum 2, attached.

The purpose of this change is to revise the pump layout to reflect actual field conditions.

- E. On Drawing D-711, **DELETE** reference to “Internal Recycle Pump No. 1” on the plan and in General Note 3 and **REPLACE** with “Intermediate Lift Pump No. 1”

The purpose of this change is to correct the tag name for the pump.

- F. On Drawing D-711, **DELETE** General Note 2. **RENUMBER** notes 3, 4 and 5 as 2, 3 and 4 respectively.

The purpose of this change is to delete the VFDs from the new WAS pumps.

- G. **DELETE** Drawing E-700 and **REPLACE** with Drawing E-700 Addendum 2, attached.
H. **DELETE** Drawing E-701 and **REPLACE** with Drawing E-701 Addendum 2, attached.
I. **DELETE** Drawing E-702 and **REPLACE** with Drawing E-702 Addendum 2, attached.
J. **DELETE** Drawing E-802 and **REPLACE** with Drawing E-802 Addendum 2, attached.
K. **DELETE** Drawing E-805 and **REPLACE** with Drawing E-805 Addendum 2, attached.
L. **DELETE** Drawing E-904 and **REPLACE** with Drawing E-904 Addendum 2, attached.
M. **DELETE** Drawing E-910 and **REPLACE** with Drawing E-910 Addendum 2, attached.

The purpose of these changes is to delete the VFDs on the new WAS pumps and include VFDs on the new Carbon Solution Pump Mix System (Specification Section 43 24 72) and Sludge Pump Mixing System (Specification Section 43 24 73).

N. On Drawing I-700, **CHANGE** VFDs, valves and instruments from BOLD (new) line type to LIGHT line type (existing).

The purpose of this change is to show VFDs, valves and instruments being reused from existing pumps.

O. Delete Drawing I-960 and Replace with Drawing I-960 Addendum 2, attached.

The purpose of this change is to clarify piping and valves to be installed for Future Screw Press No. 3.

QUESTIONS

- Q-1. Please confirm if Base Bid Item #5, excavation of unsuitable materials, should include the cost to haul and dispose off site in the unit price.
- A-1. The cost for the disposal of excavated unsuitable materials shall be included in Bid Item No. 6 (Base Bid) and Bid Item No. 10 (Bid Alternate No. 1). All unsuitable materials excavated shall be disposed of offsite at a location determined by the bidder. Refer to Addendum 2, Item No. 3 and Item No. 7.
- Q-2. Please confirm that there are (15) new bollards to be furnished and installed on C-005.
- A-2. There are four bollards shown on C-005, with Note 6 callout. The other points are spot elevations.
- Q-3. Detail 5 on S-921 (called out on S-913) shows an FRP grating and embedded angle to be 'by others'. Who supplies and installs this? If it is the GC, what is the thickness?
- A-3. FRP grating and embedment angle is designated for design by others. GC designs, supplies and installs all FRP materials. Reference Sheet S-002, RFP notes as well as specification sections 06 71 10 Fiberglass Reinforced Products and Fabrications, and 06 74 13 Fiberglass Reinforced Gratings. Size FRP embed angle as required for the thickness of grating
- Q-4. On S-913, the FRP stairs, platforms, and railings for the screw presses are called out as 'by others'. Who supplies and installs this? If it is the GC, what are the dimensions required?
- A-4. FRP stairs, platforms, and railings are designated for design by others. GC designs, supplies and installs all FRP materials. Reference Sheet S-002, RFP notes as well as specification sections 06 71 10 Fiberglass Reinforced Products and Fabrications, and 06 74 13 Fiberglass Reinforced Gratings. Coordinate dimensions with architectural drawings.
- Q-5. On S-913, there are exterior and interior metal stair systems labeled as 'by others'. Who supplies and installs these?
- A-5. Exterior stairs, platforms, and railings are designated for design by others. GC designs, supplies and installs all materials. Reference specification sections 05 51 10 Pre-Engineered Aluminum Stairs. Interior steel and concrete pan stairs, platforms, and railings are designated for design by others. Reference Sheet S-002, Structural Steel note 16 as well as specification sections 05 51 00 Metal Stairs, 05 52 00 Steel Railings, 03 20 00 Concrete Reinforcing, and 03 30 00 Cast-In-Place Concrete. Coordinate dimensions with architectural drawings.

- Q-6. On S-910, the interior columns are shown to be set in a 6" depression with cast-in-place anchor bolts. Considering that this slab is to be placed all at once, it will be difficult and expensive to accurately locate these bolts in the center of this large concrete placement. Can an epoxy bolt be used in lieu of the headed anchors?
- A-6. Reference Sheet S-002, Structural Steel note 8 as well as specification section 05 05 20 Anchor Bolts. Paragraph 3.03 Adhesive Anchor Bolts. Anchor bolts are required to be set with a template. The slab depression shall be formed. The formwork shall incorporate an anchor bolt template as appropriate. Adhesive anchors shall not be substituted for cast-in-place anchor bolts where subject to high temperature and chemicals as noted.
- Q-7. On S-925, there are several details relative to the precast roof panels that include the words 'by others'. What material is 'by others' and who is responsible for furnishing and installing it?
- A-7. Pre-engineered Pre-cast Pre-stressed hollow and solid concrete plank panels and embedment plate is designated for design by others. GC designs, supplies and installs all pre-cast concrete panel materials. Reference Sheet S-001, Precast Concrete notes as well as specification section 03 41 00 Structural Precast Concrete.
- Q-8. On S-917, the pump station plan and section include the words 'by others' for the precast tanks. What material is 'by others', and who is responsible for furnishing and installing it?
- A-8. Pre-engineered Pre-cast concrete tanks and connections are designated for design by others. GC designs, supplies and installs all pre-cast concrete tank materials. Reference Sheet S-001, Precast Concrete notes as well as specification section 03 41 00 Structural Precast Concrete.
- Q-9. Detail 7 on S-924 (called out on S-913) shows an FRP grate and embedded angle to be 'by others'. Who supplies and installs this? If it is the GC, what is the thickness?
- A-9. FRP grating and embedment angle is designated for design by others. GC designs, supplies and installs all FRP materials. Reference Sheet S-002, RFP notes as well as specification sections 06 71 10 Fiberglass Reinforced Products and Fabrications, and 06 74 13 Fiberglass Reinforced Gratings. Size FRP embed angle as required for the thickness of grating.
- Q-10. Please confirm that the 6' x 6' hatch shown in the schedule in specification 05 54 20 is to be located just inside of door DDB-3 where a square is shown on sheet A-911.
- A-10. The hatch shown in the schedule is to be located where described.
- Q-11. On S-916, the monorail beam is called out to be 'by others'. Who supplies and installs this?

- A-11. Monorail beam, columns, and connections are designated for design by others. GC designs, supplies and installs all Monorail beams, columns, and connection materials.
- Q-12. The hatch schedule in specification 05 54 20 does not include the roof hatch shown as keynote 4 on A-913. Please specify type/ size required. Also, another hatch seems to be shown to the northeast of this hatch – please clarify what this is.
- A-12. The roof hatches are specified on Section “07 71 00 Roof Specialties”, subparagraph “2.02 Roof Hatches”.
- Q-13. Please clarify that the key notes 1 & 2 on A-911 are reversed, i.e., the roof access ladder is tag #1 and ITP is tag #2.
- A-13. The key notes are reversed in this Sheet (A-911), the symbol with #2 pointing to the translucent panel should read #1; and the symbol pointing to the Roof Access Ladder should read #2. Refer to Addendum 2, Item C.
- Q-14. Specification 43 05 13 section 2.02 requires 2” drains to be incorporated into the equipment pads. These drains are to be routed to floor drainage system below the finished floor. The equipment that is being installed and set as part of this project is installed on equipment pads on concrete floors that are pitched to floor drains. Are equipment pad drains required where equipment is installed in areas that have finished floors pitched to the sub-slab floor drainage system anyway?
- A-14. Yes, equipment drains are required for all new construction.
- Q-15. New WAS pumps shown on D-711 and D-712 are shown with new equipment pads. Do these pads require 2” drains to the existing floor drain system? This will require removal of the concrete slab to trench the equipment pad drains to the nearest sub-slab drainage piping.
- A-15. No, equipment drains are not required for areas of construction in existing buildings.
- Q-16. Does the existing Internal Recycle Pump No. 1 equipment pad need to be demolished and replaced to suit the installation of the salvaged WAS pump? If so, does a sub-slab equipment drain need to be installed to the existing floor drain system?
- A-16. The existing pump pad may be reused, modified as required to accept the salvaged equipment.
- Q-17. Drawing C-007 shows the DI WAS piping to be 8” between the existing mechanical building and proposed dewatering building. Drawings D-711 and I-700 indicate this same piping to be 6”. Please clarify the correct size.

- A-17. DI WAS piping shall be 6-inch. Refer to Addendum 2, Item B.
- Q-18. On drawing C-004 the site fencing is shown to cross the plant access road. Please confirm if a double leaf swing gate is required?
- A-18. A double leaf swing gate will be required. Refer to Addendum 2, Item A.
- Q-19. Drawing D-711 requires that the existing internal recycle pump No. 1 to be demolished and replaced with a salvaged WAS pump in note #3. Is the existing pump to be demolished actually intermediate lift pump #1? There is another pump labeled internal recycle pump #1 further down the row of pumps.
- A-19. Yes, the pump to be demolished is Intermediate Lift Pump No. 1. Refer to Addendum 2, Item D and E.
- Q-20. The D-711 plan piping and section 2 on D-712 existing intermediate lift pumps suction/discharge piping do not appear to match the actual pump configurations at the plant. (Picture is attached to this RFI that show the different actual conditions in this area). The actual pumps at the plant appear to have suction/discharge piping similar to the "Stand-By Pump" that is adjacent to intermediate lift pump #2 (as shown on D-711). Our interpretation is that we are to make the necessary modifications to the existing intermediate lift pump #1 suction/discharge piping to match the connections for the salvaged WAS pump that is to be installed in this location. There is more piping work required than what is indicated on the plans. Please confirm.
- A-20. Refer to Addendum 2, Item No. D for corrected pump layout.
- Q-21. Specification 40 05 45 requires pre-coiled mechanically attached pipe markers. The existing plant piping appears to have black stenciled pipe labels on different colored backgrounds or adhesive labels. Please confirm that the plant requires mechanically attached pre-coiled pipe markers and not stenciled or adhesive labels and flow arrows.
- A-21. Provide pipe markers as specified in Section 40 05 45.
- Q-22. Project plans show ductile iron piping in the process areas to be flanged. Specifications 40 05 02.23, 40 05 02.43, and 40 05 02.53 appear to require grooved end piping and fittings for ductile iron. Please confirm that ductile iron piping is to be flanged above grade for process systems.
- A-22. Ductile iron piping is to be flanged above grade. Refer to Addendum 2, Item No. 11,12, 13 and 14 for specification revisions.
- Q-23. Specifications 40 05 02.43 and 40 05 02.53 list two types of internal coatings for ductile iron pipe—epoxy and cement lined—for multiple systems (SPD, BWW, TKD, S, DECANT, FIL, LAGOON, OF, WAS, SSC). Please confirm the ductile

iron internal lining type for each system.

A-23. Ductile iron pipe shall be cement lined.

Q-24. Specifications 40 05 02.23, 40 05 02.43, and 40 05 02.53 list multiple external coatings for ductile iron pipe. The coating types listed appear to apply to buried ductile iron systems. Please confirm which external coating system is required for buried ductile iron.

A-24. Buried ductile iron pipe shall be asphaltic coated.

Q-25. Specifications 40 05 02.23, 40 05 02.43, and 40 05 02.53 external coatings for ductile iron pipe do not appear applicable to above grade ductile iron. The existing above ground ductile iron piping in process areas appears to be painted. Please confirm interior uninsulated ductile iron and ferrous metals should be coated in accordance with Specification 09 90 00.

A-25. Exposed ductile iron pipe shall be coated in accordance with Specification 09 90 00.

Q-26. Drawing I-960 shows future filtrate drain piping in phantom (future) from the filtrate header to Screw Press 3, including the 2" sample plug valve and 2" drain. D-911 and D-921 show the 2" sample plug valve with a note to route sample piping to the sample sink. Please confirm that the ductile iron filtrate piping is to be supplied up to the future screw press as shown on D-911. In addition, please confirm that the sample piping and drain piping for the future screw press are also to be provided.

A-26. Refer to revised Drawing I-960 Addendum 2, Item O.

Q-27. Note 3 on D-711 calls out to reuse the existing pump VFD, instrumentation, and valves. I-700 shows new gauges and isolation valves on the repurposed WAS pump relocated to the Internal Recycle Pump #1 (believed to be Intermediate Pump #1). Please confirm that new pressure gauges and isolation valves are required.

A-27. VFD, instruments and gauges shall be reused per Note 3, Drawing D-711. Refer to Addendum 2, Item N

Q-28. Drawing E-701 has a note at the top of the drawing that the work shown is included in bid alternate #1. The replacement of the pumps and relocation of one existing WAS pump is included in the base bid (i.e. there is no note on D-711 or D-712 indicating otherwise). Please confirm that the VFD work and wiring shown on E-701 is part of the base bid.

A-28. Delete reference to Bid Alternate No. 1. This work shall be completed under the Base Bid. Refer to Addendum 2, Item H.

Q-29. Please identify who is responsible for reprogramming and testing the existing Internal Recycle Pump #1 (believed to be Intermediate Pump #1) VFD once the

repurposed WAS pump is installed in this space.

- A-29. Work associated with reprogramming the VFD will be completed by the City's Integrator, Wilson Controls.
- Q-30. Drawing D-922 key note 8 requires manual ball valves for the filtrate sampling connection. The note also reads "2-FLT-DI" for the piping designation, implying that the sample piping should be ductile iron. Drawing I-960 shows plug valve designations for the sample valve. Specification 40 05 02.53 appears to allow S80 PVC for filtrate piping 3" and smaller. Please confirm that manual ball valves are acceptable and that the 2" sample piping off the 6" ductile iron filtrate lines can be S80 PVC.
- A-30. Manual ball valves and SCH80 PVC are acceptable for filtrate drain sampling lines.
- Q-31. Specification 40 05 02.53 allows for multiple types of external coatings on ductile iron piping. Please confirm which coating is required for ductile iron piping installed in the sludge holding tanks both above liquid level and submerged.
- A-31. Piping in the sludge holding tanks shall be coated in accordance with Specification Section 09 90 00, Coating System E-1.
- Q-32. Note 8 on S-910 indicates that no control joints should be provided in the base mat. Is the purpose of this note to exclude post-placement sawcut relief joints or is this inferring the 100'x 100' and 660 CY base mat must be placed in one pour? The accurate placement of wall keyways, sump pits, and column anchor bolts in the middle of this large slab would be very expensive in a single-placement. Can the 18" and 24" slabs be split into 3 sections each to limit shrinkage problems since there will be a sloped topping slab on the entire mat (except where it is backfilled to grade)?
- A-32. Note 8 on S-910 is intended to eliminate post-placement of sawcut relief joints for concrete shrinkage control. Construction joints are anticipated and acceptable depending on the location and joint details. Selected contractor should prepare concrete lift drawings per 03 30 00 Cast-in-Place Concrete specification section 1.04.A.10. Plan should be submitted for review by the engineering team prior to submitting reinforcing submittals and accessories. Construction joints layout and will require keyway, water stops, reinforcing splice development, and etc. at a minimum.
- Q-33. Drawing C-006 shows work associated with bid alternate #1. According to drawing C-006 and spec section 01 20 05-5, Para. G: "The work of this section shall be measured on a lump sum basis based on the amount of work performed for the construction of the carbon storage building. The payable quantity will be for the percentage of work performed and shall include all the work as shown in the contract documents: mobilization, demolition, sheeting and pilling, construction of

new building, new equipment supply and installation, HVAC, electrical, equipment startup, systems training, demobilization, and closeout". The paving and grading plan on drawing C-004 shows a lot more work associated with the construction on the carbon building. Please confirm that all site work shown on drawing C-004 is to be included in bid alternate #1.

- A-33. All work shown on C-004 and C-006 shall be included in Bid Alternate No. 1. Refer to Addendum 2, Item A.
- Q-34. Specification 033000 Cast-in-Place Concrete, paragraph 1.04 Submittals, line A.4.g; requires shrinkage test results for liquid retaining structures. Please provide the acceptable test result ranges and criteria.
- A-34. Provide shrinkage test results for each proposed concrete mix design per ASTM C157 Length Change of Hardened Concrete. Per ACI 350, shrinkage requirements are 0.03% to 0.04% for liquid retaining structures. See also Water tightness testing and repair criterion per specification 03 33 00 section 3.20 for additional in-situ shrinkage testing requirements.
- Q-35. Please provide the loam thickness required in restored areas of the site.
- A-35. Per Specification Section 32 90 00, Paragraph 3.01.A., loam thickness shall be a minimum of 6 inches, compacted.
- Q-36. Structural foundation sections show backfill of structures using natural soil OR controlled fill. Is the native site soil acceptable for use when backfilling foundations? If not, please provide controlled fill specifications as well as how far from foundations the controlled fill is to be placed (i.e. distance away from foundation wall).
- A-36. Sheet S-001, Foundation notes 2 & 3. Refer to the Nobis geotechnical engineering report respective to the Carbon/Dewatering buildings for common and structural fill requirements. Imported structural fill shall be used within the zone of influence for bearing footings, slabs, walls, tanks, and settlement sensitive structures. Structural fill should be used 4 feet beyond the plan footprint projection of the structure bearing foundation dimension and extend vertically at a 2 to 1 horizontal to vertical slope. Excavated onsite soil may be selectively reused as common fill provided it is free of deleterious material, the maximum particle size is limited to 8 inches, and it can be adequately compacted. Common fill is not acceptable for use with backfilling foundations

END OF ADDENDUM 2

BY ORDER CITY OF ROCHESTER, NH

ADDENDUM NO. 2

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ADDENDUM NO. 2

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ADDENDUM NO. 2

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APPENDIX B	PROPOSED CARBON BUILDING GEOTECH REPORT

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**C-410
BID FORM**

Biosolids Dewatering Facility and Carbon Building

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ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

***City of Rochester, NH
31 Wakefield Street
Rochester, NH 03867***

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, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

<u>Addendum No.</u>	<u>Addendum, Date</u>
_____	_____
_____	_____
_____	_____
_____	_____

- B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

- E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, 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 given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.
- I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies 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 collusive 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 engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:
 - 1. "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 BASE BID ITEMS

- A. Bidder acknowledges the following Work will be considered as the Base Bid.
 - Construction of the Biosolids Dewatering Facility
 - Base Bid items shall include all surface restoration work and incidental work in the above locations.
- B. Bidder acknowledges the following Work will be considered as Bid Alternate No. 1:
 - Construction of the Carbon Building
 - Base Bid items shall include all surface restoration work and incidental work in the above locations.
- C. Bidder acknowledges the following Work will be considered as Bid Alternate No. 2:
 - Compliance with Clean Water State Revolving Fund requirements as detailed in Section C-800, Part C.
- D. Bidder acknowledges the following Work will be considered as Bid Alternate No. 3:
 - Provide equipment named in Specification Section 43 23 51 .11.
- E. Bidder acknowledges the following Work will be considered as Bid Alternate No. 4 and 5:
 - Provide a Rotamix system as specified in Specification Sections 43 23 72 and 43 23 73 as manufactured by Vaughan Company.

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

BASE BID

Bid Item No.	Description	Item Quantity	Units	Unit Price	Total Value of Item (\$)
1	Construct Biosolids Dewatering System	1	LS		
2	Install H-Pile Foundation Support System	10,000*	VF		
3	Additional PLC Programming by Huber Technology	2	Days		
4	Additional Travel Cost by Huber Technology	1	LS		
5	I&C Programming and Hardware by Wilson Controls	1	LS		
6	Excavation of Unsuitable Materials	100*	CY		
7	Additional Crushed Stone Backfill	100*	CY		
Total Base Bid		\$			

*Estimated quantity for comparison of bids.

BID ALTERNATE No 1 – Construct Carbon Storage Building

Bid Alt 1 Bid Item No.	Description	Item Quantity	Units	Unit Price	Total Value of Item (\$)
8	Construct Carbon Storage Building	1	LS		
9	Install H-Pile Foundation Support System	5,000*	VF		
10	I&C Programming and Hardware by Wilson Controls	1	LS		
11	Excavation of Unsuitable Materials	100*	CY		
12	Additional Crushed Stone Backfill	100*	CY		
Total Bid Alternate No. 1		\$			

*Estimated quantity for comparison of bids.

For Bid Alternates 2, 3, 4 and 5, include the word, "ADD" in the ADD/DEDUCT Column if the Bid Alternate is an increase in the bid price or include the word, "DEDUCT" in the ADD/DEDUCT column if the Bid Alternate is a reduction in the bid price.

Bid Alternate No. 2 – Specification Section C-800, Part C, CWSRF Requirements

The following Bid Alternate No. 2 cost is inclusive of Specification Section C-800, Part C, CWSRF Requirements, Pages D2.1 through D7.16 and including Attachment A and Attachment B of Part C.

Bid Alt 2 Bid Item No.	Description	Item Quantity	Units	Add / Deduct	Total Value of Item (\$)
13	Comply with Specification Section C-800, Part C, CWSRF requirements for Base Bid (Bid Items 1 through 6)	1	LS		
14	Comply with Specification Section C-800, Part C, CWSRF requirements for Bid Alternate No. 1 (Bid Items 7 and 8)	1	LS		

4 and 5, referenced and indicate the name of the manufacturer in the "ALT MANUFACTURER" Column.

Bid Alternate No. 3 – Specification Section 43 23 51.11

For Bid Alternate 3, provide the *incremental* ADD or DEDUCT cost to supply equipment from a manufacturer named in Specification Section 43 23 51.11. The incremental cost is the cost to provide equipment from a named manufacturer minus the cost of the equipment carried in the base bid. If the result is a positive number, the incremental cost will be an ADD and if the result is a negative number, the incremental cost will be a DEDUCT.

Provide the name of the manufacturer carried in the base bid:

Provide the name of the manufacturer named in Specification Section 43 23 51.11 that Bid Alternate No. 3 is based on:

Bid Alt 3 Bid Item No.	Description	Item Quantity	Units	Add / Deduct	Incremental Cost (\$)
15	Provide equipment from manufacturer named in Specification Section 43 23 51 .11	1	LS		

Bid Alternate No. 4 – Specification Section 43 24 72

For Bid Alternate 4, provide the *incremental* ADD or DEDUCT cost to supply a Rotamix system as specified from Vaughan Company. The incremental cost is the cost to provide equipment from Vaughan Company minus the cost of the equipment carried in the base bid. If the result is a positive number, the incremental cost will be an ADD and if the result is a negative number, the incremental cost will be a DEDUCT.

Provide the name of the manufacturer carried in the base bid:

Bid Alt 4 Bid Item No.	Description	Item Quantity	Units	Add / Deduct	Incremental Cost (\$)
16	Provide Rotamix equipment as manufactured by Vaughan Company for equipment specified in Specification Section 43 23 72	1	LS		

Bid Alternate No. 5 – Specification Section 43 23 73

For Bid Alternate 5, provide the *incremental* ADD or DEDUCT cost to supply a Rotamix system as specified from Vaughan Company. The incremental cost is the cost to provide equipment from Vaughan Company minus the cost of the equipment carried in the base bid. If the result is a positive number, the incremental cost will be an ADD and if the result is a negative number, the incremental cost will be a DEDUCT.

Provide the name of the manufacturer carried in the base bid:

Bid Alt 5 Bid Item No.	Description	Item Quantity	Units	Add / Deduct	Incremental Cost (\$)
17	Provide Rotamix equipment as manufactured by Vaughan Company for equipment specified in Specification Section 43 23 73	1	LS		

BASIS OF AWARD

The bid, if awarded, will be awarded to the lowest responsible bidder based on the base bid price alone or the base bid price plus any combination of Bid Alternates 1 through 5 that the Owner selects.

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the **Base Bid** portion of Work will be substantially complete on or before **October 16, 2020**, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **November 20, 2020**.
- 6.02 Bidder agrees that the **Bid Alternate** portion of Work will be substantially complete on or before **October 16, 2020**, and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before **November 20, 2020**.
- 6.03 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The BIDDER hereby certifies, by checking the boxes below, that the following documents are included with this bid proposal:
- DBE Subcontractor Utilization Form (EPA Form 6100-4) – Bid Alternate No. 2
 - DBE Subcontractor Performance Forms (EPA Form 6100-3) **Submit one form for each DBE subcontractor** – Bid Alternate No. 2
 - Bidder's **American Iron and Steel** acknowledgement - Bid Alternate No. 2

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Addendum No. 2

- Required Bid security;
- List of Proposed Subcontractors;
- List of Proposed Suppliers;
- List of Project References;
- Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids; and
- Required Bidder Qualification Statement with supporting data.

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

BIDDER: *[Indicate correct name of bidding entity]*

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

Required Bidder Qualification Statement

The Bidder shall state below what works of a similar character to that of the proposed contract he has performed, and provide such references as will enable the Owner to judge his experience, skill, and business standing.

All questions must be answered and the data given must be clear and comprehensive. This statement must be notarized. If necessary, add separate sheets.

1. Name of Bidder.
2. Permanent Main Office address.
3. When organized?
4. Where incorporated?
5. Is bidder registered with the Secretary of the State to do business in New Hampshire?
6. For how many years has your firm engaged in the contracting business under its present name?
Also state names and dates of previous firm names, if any.
7. Contracts on hand. (Schedule these, showing gross amount of each contract and the approximate anticipated dates of completion.)
8. General character of work performed by your company.
9. Have you ever failed to complete any work awarded you in the scheduled contract time, including approved time extensions? ___(Yes) ___(No).
If so, where and why?
10. Have you ever defaulted on a contract? ___(Yes) ___(No).
If so, where and why?
11. Have you ever had liquidated damages assessed on a contract? ____ (Yes) ____ (No).
If so, where and why?

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Addendum No. 2

12. List the more important contracts recently executed by your company, stating approximate cost for each, and the month and year completed.

13. List your major equipment available for this contract.

14. List your key personnel such as Project Superintendent and foreman available for this contract.

15. List any subcontractors whom you would expect to use for the following (unless this work is to be done by your own organization):
 - a. Civil Engineering _____
 - b. Paving _____
 - c. Other work _____

16. With what banks and bonding/surety companies do you conduct business?

Bank: _____

Bank Reference Name: _____

Bank Reference Phone Number: _____

Bonding/Surety Company: _____

Bonding/Surety Company Reference Name: _____

Bonding/Surety Company Phone Number: _____

Do you grant the Engineer permission to contact this (these) institutions? ___(Yes) ___(No)

NOTE: Bidders may be required to furnish their latest financial statement as part of the award process.

Respectfully submitted:

_____	_____
Signature	Address
_____	_____
Title	Date

_____ Being duly sworn, deposes and says that he is

_____ of _____
(Name of Organization)

and that the answers to the foregoing questions and all statements contained therein are true and correct.

Sworn to before me this _____ day of _____, 20 _____

Notary Public

My commission expires _____

(Seal - If BID is by Corporation)

ATTEST: _____

SECTION 01 11 01

CONTRACT TIME

PART 1 – GENERAL

1.01 SCOPE OF WORK

The Contractor shall be responsible for the scheduling, managing, and executing the Work as described in Section 01 11 00 in accordance with the requirements of this Section.

1.02 COMPLETION DATE SCHEDULE

Time for completion (days) of the entire contract as specified and accepted shall be 387 consecutive calendar days from issuance of the Notice to Proceed (NTP).

1.03 SPECIFIC DATE SCHEDULE

The following schedule contains dates which shall be adhered to and are the last acceptable date unless modified in writing between the Owner and Contractor.

<u>Activity</u>	<u>Date</u>
Bid Opening	5/16/19
Award Contract	7/15/19
Issue Notice to Proceed (NTP)	7/17/19
Final Commissioning and Training	10/16/20
Project End	11/20/20

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01 20 05
MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 SCOPE

A. MEASUREMENT AND PAYMENT

Bid Items shall be lump sums or unit prices as indicated, complete and paid for on the basis of percentage of completion, or quantities of work performed as specified herein and in accordance with paragraph 1.05.

1.02 PAYMENT

A consistent Payment application form shall be used by the Contractor to request payment. The application for payment shall be submitted at the end of each month and shall cover work completed in the preceding month time period.

1.03 DESCRIPTION OF BID ITEMS

A. GENERAL

- 1. Bid Items are presented to indicate major categories of the work for purposes of comparative bid analyses and payment breakdown for monthly progress payments. Bid Items are not intended to be exclusive descriptions of work categories and the Contractor shall determine and include in its pricing all materials, labor, and equipment necessary to complete each Bid Item (work phase) as shown and specified.
- 2. Measurement and payment for the Base Bid work will be based on the portion of the work completed and accepted at the lump sum bid cost or unit prices.
- 3. PAYMENT ITEMS

<u>ITEM</u>	<u>DESCRIPTION</u>
<u>BASE BID</u>	
1.	Construction of the Biosolids Dewatering System
2.	Install H-Pile Foundation Support System
3.	Additional PLC Programming by Huber Technology as Directed by the Engineer
4.	Additional Travel Costs by Huber Technology as Directed by the Engineer
5.	IC Programming and Hardware by Owner Selected Vendor Wilson Controls, Lee, NH
6.	Excavation of Unsuitable Materials as Directed by the Engineer
7.	Additional Crushed Stone Backfill as Directed by the Engineer

ITEM DESCRIPTION

BID ALTERNATE No. 1

- 8. Construction of the Carbon Storage Building
- 9. Install H-Pile Foundation Support System
- 10. IC Programming and Hardware by Owner Selected Vendor Wilson Controls, Lee, NH
- 11. Excavation of Unsuitable Materials
- 12. Additional Crushed Stone Backfill

ITEM DESCRIPTION

BID ALTERNATE No. 2

- 13. Comply with Specification Section C-800, Part C, CWSRF requirements for Base Bid.
- 14. Comply with Specification Section C-800, Part C, CWSRF requirements for Bid Alternate No. 1.

ITEM DESCRIPTION

BID ALTERNATE No. 3

- 15. Provide equipment from manufacturer named in Specification Section 43 23 51.11

ITEM DESCRIPTION

BID ALTERNATE No. 4

- 16. Provide Rotamix equipment as manufactured by Vaughan Company for equipment specified in Specification Section 43 23 72

ITEM DESCRIPTION

BID ALTERNATE No. 5

- 17. Provide Rotamix equipment as manufactured by Vaughan Company for equipment specified in Specification Section 43 23 73

1.04 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

The methods of measurement and basis of payment for the Payment Items listed above are specified in the following section.

BASE BID

<u>A. BID ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
1	Construct Biosolids Dewatering System	Lump Sum

- 1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the amount of work performed for the construction of the biosolids dewatering system. The payable quantity will be for the percentage of work performed and shall include all the work as shown in the Contract Documents: mobilization, demolition, sheeting and piling, construction of

new building, new equipment supply and installation, installation of Owner purchased equipment, HVAC, electrical, equipment startup, systems training, demobilization, and closeout.

2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 1. - "**Dewatering System Replacement**".

B. BID ITEM	DESCRIPTION	PAY UNIT
2	Install H-Pile Foundation Support System	Unit Price per Vertical Foot

1. Measurement: The Work of this section shall be measured on a unit basis. The payable quantity will be for each vertical foot (or fraction there of) of H-Pile installed for the Base Bid.
2. Payment: Payment shall be made on a vertical foot basis. The Work of this section shall be paid for at the Unit Price under Bid Item No. 2.- "Install H-Pile Foundation Support System".

C. BID ITEM	DESCRIPTION	PAY UNIT
3	Additional PLC Programming By Huber Technologies	Unit Price per Day

3. Measurement: The Work of this section shall be measured on a unit basis. The payable quantity will be for each full day of work (or fraction there of) performed by Huber Technology PLC programming staff that was not originally included in their pre-purchased equipment.
4. Payment: Payment shall be made on a daily basis for PLC Programming staff from Huber Technology to make changes to the system controls. The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 3.- "**Additional PLC Programming by Huber Technology**".

D. BID ITEM	DESCRIPTION	PAY UNIT
4	Additional Travel Costs by Huber Technology	Lump Sump

1. Measurement: The Work of this section shall be measured on a lump sum basis. Payment under this item shall constitute full compensation for all Huber Technology staff travel costs related PLC programming. This work shall include, but not be limited to airfare, lodging, mileage/ rental care, food.
2. Payment: Payment shall be made for travel costs incurred by Huber Technology programming personnel. The Work of this section shall be paid for under Bid Item No. 4. - "**Additional Travel Costs by Huber Technology**".

E. BID ITEM	DESCRIPTION	PAY UNIT
5	I&C Programming and Hardware By Owner Selected Vendor: Wilson Controls, Lee, NH	Lump Sum

1. Measurement: The Work of this section shall be measured based on a Lump Sum basis. Payment under this item shall constitute full compensation for all work involved and all labor, materials, equipment, and incidentals required to complete the I&C related work.
2. Payment: Payment shall be made for. The Work of this section shall be paid for under Bid Item No. 5. - **"I&C Programming and Hardware by Owner Selected Vendor: Wilson Controls, Lee, NH"**.

F. BID ITEM	DESCRIPTION	PAY UNIT
6	Excavation of Unsuitable Materials	Unit Price

1. Measurement: The Work of this section shall be measured based on a unit price per cubic yard basis. Payment under this item shall constitute full compensation for all work involved and all labor, materials, equipment, and incidentals required to excavate unsuitable materials, as directed by the Engineer and dispose of excavated unsuitable materials off site.
2. Payment: Payment shall be made for. The Work of this section shall be paid for under Bid Item No. 6. - **"Excavation of Unsuitable Materials"**.

G. BID ITEM	DESCRIPTION	PAY UNIT
7	Additional Crushed Stone Backfill	Unit Price

1. Measurement: The Work of this section shall be measured based on a unit price per cubic yard basis. Payment under this item shall constitute full compensation for all work involved and all labor, materials, equipment, and incidentals required to install additional crushed stone backfill, as directed by the Engineer.
2. Payment: Payment shall be made for. The Work of this section shall be paid for under Bid Item No. 7. - **"Additional Crushed Stone Backfill"**.

BID ALTERNATE NO. 1

H. BID ITEM	DESCRIPTION	PAY UNIT
8	Construction of the Carbon Storage Building	Lump Sum

1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the amount of work performed for the construction of the carbon storage building. The payable quantity will be for the percentage of work performed and shall include all the work as shown in the Contract Documents: mobilization, demolition, sheeting and piling, construction of new building, new equipment supply and installation, HVAC, electrical, equipment startup, systems training, demobilization, and closeout.
2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 8. - "**Construction of Carbon Storage Building**".

I. BID ITEM	DESCRIPTION	PAY UNIT
9	Install H-Pile Foundation Support System	Unit Price per Vertical Foot

5. Measurement: The Work of this section shall be measured on a unit basis. The payable quantity will be for each vertical foot (or fraction there of) of H-Pile installed for Bid Alternate No. 1.
6. Payment: Payment shall be made on a vertical foot basis. The Work of this section shall be paid for at the Unit Price under Bid Item No. 9.- "Install H-Pile Foundation Support System".

J. BID ITEM	DESCRIPTION	PAY UNIT
10	I&C Programming and Hardware By Owner Selected Vendor: Wilson Controls, Lee, NH	Lump Sum

1. Measurement: The Work of this section shall be measured based on a Lump Sum basis. Payment under this item shall constitute full compensation for all work involved and all labor, materials, equipment, and incidentals required to complete the I&C related work.
2. Payment: Payment shall be made for. The Work of this section shall be paid for under Bid Item No. 10. - "**I&C Programming and Hardware by Owner Selected Vendor: Wilson Controls, Lee, NH**".

F. BID ITEM	DESCRIPTION	PAY UNIT
11	Excavation of Unsuitable Materials	Unit Price

3. Measurement: The Work of this section shall be measured based on a unit price per cubic yard basis. Payment under this item shall constitute full compensation for all work involved and all labor, materials, equipment, and incidentals required to excavate unsuitable materials, as directed by the Engineer and dispose of excavated unsuitable materials off site.
4. Payment: Payment shall be made for. The Work of this section shall be paid for under Bid Item No. 11. - **“Excavation of Unsuitable Materials”**.

G. BID ITEM	DESCRIPTION	PAY UNIT
12	Additional Crushed Stone Backfill	Unit Price

3. Measurement: The Work of this section shall be measured based on a unit price per cubic yard basis. Payment under this item shall constitute full compensation for all work involved and all labor, materials, equipment, and incidentals required to install additional crushed stone backfill, as directed by the Engineer.
4. Payment: Payment shall be made for. The Work of this section shall be paid for under Bid Item No. 12. - **“Additional Crushed Stone Backfill”**.

BID ALTERNATE NO. 2

I. BID ITEM	DESCRIPTION	PAY UNIT
13	Comply with CWSRF Requirements for Base Bid	Lump Sum

1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the bid price to comply with Specification Section C-800, Part C, CWSRF requirements.
2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 13. - "Comply with CWSRF Requirements for Base Bid".

J. BID ITEM	DESCRIPTION	PAY UNIT
14	Comply with CWSRF Requirements for Bid Alternate No. 1	Lump Sum

1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the bid price to comply with Specification Section C-800, Part C, CWSRF requirements.
2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 14. - "Comply with CWSRF Requirements for Bid Alternate No. 1".

BID ALTERNATE NO. 3

<u>K. BID ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
15	Provide Equipment From Named Manufacturer in Specification Section 43 23 51.11	Lump Sum

1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the *incremental* bid price to provide equipment from a manufacturer named in Specification Section 43 23 51.11..
2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 15 - "Provide Equipment from a Manufacturer Named in Specification Section 43 23 51.11". The incremental cost shall be the cost difference between the cost of the equipment manufactured by a manufacturer named in Specification Section 43 23 51.11 less the cost carried for equipment in the base bid.

BID ALTERNATE NO. 4

<u>L. BID ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
16	Provide Rotamix Equipment as Manufactured by Vaughan Company for Equipment Specified in Specification Section 43 23 72	Lump Sum

1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the *incremental* bid price to provide a Rotamix system from Vaughan Company for equipment specified in Specification Section 43 23 72.
2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 16 - "Provide Rotamix Equipment as Manufactured by Vaughan Company for Equipment Specified in Specification Section 43 23 72". The incremental cost shall be the cost difference between the cost of the equipment manufactured by Vaughan Company less the cost carried for equipment in the base bid.

BID ALTERNATE NO. 5

<u>M. BID ITEM</u>	<u>DESCRIPTION</u>	<u>PAY UNIT</u>
17	Provide Rotamix Equipment as Manufactured by Vaughan Company for Equipment Specified in Specification Section 43 23 73	Lump Sum

1. Measurement: The Work of this section shall be measured on a Lump Sum basis based on the *incremental* bid price to provide a Rotamix system from Vaughan Company for equipment specified in Specification Section 43 23 73.
2. Payment: The Work of this section shall be paid for at the Lump Sum price under Bid Item No. 17 - "Provide Rotamix Equipment as Manufactured by Vaughan Company for Equipment Specified in Specification Section 43 23 73". The incremental cost shall be the cost difference between the cost of the equipment manufactured by Vaughan Company less the cost carried for equipment in the base bid.

1.05 CONTRACTOR'S COST BREAKDOWN

Rochester, NH WWTF - Biosolids Dewatering Facility
149870

Measurement and Payment
01 20 05 - 7

- A. For work to be performed for a lump sum amount, the Contractor shall submit a cost breakdown to the Owner and Engineer prior to the first payment and within ten (10) days after Notice to Proceed. The cost breakdown, as agreed upon by the Contractor and the Engineer, shall be used for preparing future estimates for partial payments to the Contractor, and shall list the major items of work with a cost fairly apportioned to each item. Mobilization, overhead, bond, insurance, other general costs and profit shall be prorated to each item so that the total of the prices for all items equal the lump sum price. At the discretion of the Engineer, mobilization, bond and insurance costs may be provided for separately if accompanied by invoices to verify actual expenses. The cost breakdown shall not be considered in determining payment or credit for additional or deleted work.
- B. The cost breakdown shall be generally in the same format as the Contract Specifications divisions and subdivisions, with major items of work listed individually. The cost breakdown shall be by structure, civil, landscaping, or other logical division of work. The cost breakdown for architectural, structural, mechanical, and electrical work shall include separate items for identifiable portions of the structures. The cost breakdown shall include separate allowances for any testing and startup work required. Measurable approximate quantities of work performed by the Contractor or its subcontractors shall be provided. For quantities that are the sum total of several individual quantities, backup summaries shall be provided which list the individual descriptions and quantities. These summaries then will be used to determine the quantities of work in place in subsequent partial payment requests.
- C. The above is a statement of the intent of the Contract Documents to provide a moderate level of detail, acceptable to the Engineer, to allow a fair and reasonable estimate to be made of the value of work installed. The detail of the cost breakdown must be sufficient to provide timely processing of the monthly partial payment request.
- D. The cost breakdown will be subject to the approval of the Engineer, and upon request, the Contractor shall substantiate the cost for any or all items and provide additional level of detail, including quantities of work. The cost breakdown shall be sufficiently detailed to permit its use by the Engineer as one of the bases for evaluating requests for payments. The Engineer shall be the sole judge of the adequacy of the cost breakdown.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 08 11 16

ALUMINUM DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope:
 - 1. Provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install all aluminum doors and frames Work.
 - 2. The extent of aluminum doors and frames Work is shown.
 - 3. The types of aluminum doors and frames Work required includes, but is not necessarily limited to, the following:
 - a. Flush doors and frames.
 - b. Transom.
 - c. Miscellaneous accessories and fasteners.

- B. Coordination:
 - 1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the aluminum doors and frames Work.

- C. Related Sections:
 - 1. Section 04 22 24 - Unit Masonry Construction.
 - 2. Section 06 10 53 - Rough Carpentry.
 - 3. Section 07 92 00 - Joint Sealants.
 - 4. Section 08 71 00 - Finish Hardware.
 - 5. Section 08 81 00 - Glass and Glazing.
 - 6. Section 10 20 00 - Louvers and Vents.

1.02 REFERENCES

- A. Standards referenced in this Section or referenced in Product Performance Standard are listed below:
 - 1. AA DAF 45, Designation System for Aluminum Finishes.
 - 2. AAMA 701.1, Standard for Sliding Weatherstripping.
 - 3. ASTM D 522, Test Methods for Mandrel Bend Test of Attached Organic Coatings.
 - 4. ASTM D 523, Test Method for Specular Gloss.
 - 5. ASTM D 968, Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
 - 6. ASTM D 2244, Practice for Calculation of Color Tolerances and Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
 - 7. NAAMM Hardware Location for Custom Hollow Metal Doors.
 - 8. NAAMM Metal Finishes Manual.
 - 9. SSPCPaint 12 Cold Applied Asphalt Mastic (Extra Thick Film).

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:

1. Provide aluminum doors, transom and frames manufactured by a single firm specializing in the production of this type of Work. Manufacturer shall have a minimum of five years of experience in the production of aluminum doors and frames and shall be able to show evidence of satisfactory operation in at least five installations.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of the component manufacturer from a single aluminum doors and frames manufacturer.
2. The aluminum doors and frames manufacturer to review and approve or to prepare all Shop Drawings and other submittals for all components furnished under this Section.
3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall assembly by the aluminum doors and frames manufacturer.

1.04 SUBMITTALS

A. Samples:

1. Samples of each required aluminum finish, on 12-inch long extrusions or 6-inch square sheets, of the alloys to be used for the Work. Where normal color and texture variations are to be expected, include two or more units in each sample, to show the range of such variations.
2. Samples shall be reviewed by ENGINEER for color and texture only. Compliance with other requirements is the exclusive responsibility of CONTRACTOR.

B. Shop Drawings:

1. Copies of manufacturer's fabrication and installation drawings of aluminum doors and frames. Include details of each frame type, elevations of each door type, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, details of joints and connections. Show all door and frame reinforcements.
2. Provide a schedule of doors and frames using same reference numbers for details and openings as those shown.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work.
2. Deliver aluminum doors and frames cartoned or crated to provide protection during transit and job storage.

- B. Storage and Protection:
 - 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 - 2. Store doors and frames at the Site under cover. Place units up off the floors in a manner that will prevent corrosion and damage. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber. If the cardboard wrapper on the door becomes wet, remove the carton immediately. Provide a 1/4-inch space between stacked doors to promote air circulation.

- C. Acceptance at Site:
 - 1. All boxes, crates and packages shall be inspected by CONTRACTOR upon delivery to the Site. CONTRACTOR shall notify ENGINEER, in writing, if any loss or damage exists to equipment or components. Replace loss and repair damage to new condition in accordance with manufacturer's instructions.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Aluminum Extrusions: Provide aluminum Alloy 6063-T5 Or approved equal for properties of strength (not less than 22,000 psi ultimate tensile strength), corrosion resistance, abrasion resistance, application of required finish, and control of color.

- B. Aluminum Sheets:
 - 1. Provide aluminum Alloy 5005-H14, Or approved equal, for properties of strength corrosion resistance, abrasion resistance, application of required finish, and control of color.
 - 2. Provide textured sheet to match existing for exposed faces of doors and panels, except as otherwise specified.

- C. Fasteners: Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened.
 - 1. For exposed fasteners (if any), provide Phillips flat-head screws with finish matching the item fastened.
 - 2. Do not use exposed fasteners, except where unavoidable for the assembly of units, and unavoidable for the application of hardware. Provide only concealed screws in glazing stops.

- D. Reinforcement and Brackets: Manufacturer's standard formed or fabricated aluminum units, of shapes, plates or bars.

- E. Inserts: For required anchorage into concrete or masonry work, furnish inserts of 12-gauge steel stainless steel after fabrication.

- F. Expansion Anchor Devices: Stainless steel, drilled-in, expansion bolt anchors.

- G. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPCPaint 12, compounded for 30-mil thickness per coat.

2.02 FABRICATION

A. General:

1. Sizes and Profiles: The required sizes for door and frame units and the profile requirements are shown. Variable dimensions for profiles (if any) are shown along with maximum and minimum dimensions as required to achieve design requirements and coordination with other work.
2. The details shown are based upon standard details by one or more manufacturers. Similar details by other manufacturers will be acceptable, provided they comply with the size requirements, and with minimum/maximum profile requirements as shown.

B. Flush Type Aluminum Doors:

1. Provide tubular frames members with minimum wall thickness of 1/8-inch, fabricated with reinforced mechanical or welded joints in accordance with manufacturer's standard fabrication methods. Limit edge exposure and face molding exposure to 0.50-inch maximum width.
2. Fabricate flush doors with cores laminated between two sheets of 0.040-inch thick aluminum laminated to 1/8-inch thick oil-tempered hardboard with epoxy adhesive to form a door thickness of 1-3/4-inch and of a true 5-ply construction.
3. Provide cores of 20 percent phenolic resin-impregnated honeycomb material 80 lbs. per 3,000 sq. ft. ream, (7/16-inch cells) laminated with an epoxy adhesive between two sheets of 1/8-inch thick tempered hardboard.
 - a. Exterior Doors: Provide insulated core complying with local energy code.
4. Provide transom frames of the same material, finish, thickness and gauge as the door and frame material.
5. Products and Manufacturers: Provide one of the following:
 - a. Series 100BE Door and frame by Cline Aluminum Doors Incorporated.
 - b. Model SL-16 Door and Frame by Special-Lite Incorporated.
 - c. Or approved equal.

2.03 HARDWARE

- A. Flush Doors: Refer to Section 08710, Door Hardware, and to the frame, door and hardware schedules and details, for the furnishing and installing of hardware items. Hardware templates only will be furnished to the manufacturer for the fabrication of door and frames to receive hardware not supplied by door manufacturer.

- B. Hardware Installation: Cut, reinforce, drill and tap frames and doors as required to receive hardware, except do not drill and tap for surface-mounted items until the time of installation. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners, wherever possible.

2.04 ALUMINUM FINISHES

- A. General:
 - 1. Preparation: After fabrication of doors and frames, but before lamination of panels, prepare the aluminum surfaces for finishing in accordance with the aluminum producer's recommendations and standards of the finisher or processor. Process all components of each assembly simultaneously to attain complete uniformity of color.
 - 2. Samples:
 - a. Comply with industry standard colors and texture samples. Establish Samples of the required finish, for ENGINEER's acceptance, prior to fabrication of the Work. ENGINEER reserves the right to reject material finishes with objectionable variations from the established samples.
 - b. Prepare samples on extrusions and sheets of the exact alloys to be used for the Work, and show range of natural variations to be expected in finished Work, by duplicate samples of varying color and texture.
- B. Anodized Finishes: NAAMM AA-M10-C22-A42, (minimum thickness of 0.7- mils), Dark Bronze.

PART 3 - EXECUTION

3.01 INSPECTION

- A. CONTRACTOR shall examine the substrate and conditions under which aluminum doors and frames Work are to be installed and notify ENGINEER, in writing, of any conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.02 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for the installation of aluminum doors and frames.
- B. Set units plumb, level and true to line, without warp or rack of frames, doors or panels. Anchor securely in place. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.03 ADJUSTMENT AND CLEANING

- A. Clean aluminum surfaces promptly after installation of frames and doors. Remove excess glazing and sealant compounds, dirt and other substances.
- B. Where protective coating has been supplied, remove coating completely as soon as the completion of construction activities no longer requires its retention.
- C. CONTRACTOR shall provide protective treatment and other precautions required as recommended by manufacturer, through the remainder of the construction period, to ensure that doors and frames will be without damage or deterioration (other than normal weathering) at the time of Final Acceptance.

+ + END OF SECTION + +

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to furnish and install overhead coiling doors.
2. Extent of overhead coiling doors is shown.
3. Types of products required include:
 - a. Aluminum, very high cycle, heavy-duty, overhead coiling doors with insulated slats and full perimeter weather-stripping.
 - b. Fire-resistance-rated, fusible link operated galvanized steel, overhead coiling doors with chain hoist operation.
 - c. Manual operators.
 - d. Chain operators.
 - e. Electric operators and chain operators, control stations, starters, safety edge devices and similar and associated components with all power and control connections, including disconnect switches.
 - f. Angles, brackets, hoods and supports.
 - g. Inserts and anchoring devices.
 - h. Miscellaneous materials and accessories for complete, functional system.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items that must be installed with or before overhead coiling door Work.

C. Related Sections:

1. Section 09900, Painting.

1.02 REFERENCES

A. Standards referenced in this Section or referenced in Product Performance Standard are:

1. AAMA 611, Voluntary Standards for Anodized Architectural Aluminum.
2. AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
3. ANSI A250.4, Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors.
4. ANSI A250.8, Recommended Specifications for Standard Steel Doors and Frames.

5. ASTM A36/A36M, Specification for Carbon Structural Steel.
6. ASTM A653/A653M, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
7. ASTM B209, Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
8. ASTM E84, Test Method for Surface Burning Characteristics of Building Materials.
9. ASTM E90, Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
10. ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure.
11. NEMA MG 1, Motors and Generators.
12. NFPA 70, National Electrical Code.
13. NFPA 80, Standard for Fire Doors and Fire Windows.
14. SEI/ASCE 7, Minimum Design Loads for Buildings and Other Structures.
15. UBC Standard 7-2, Fire Tests of Door Assemblies.
16. UL 10B, Fire Tests of Door Assemblies.
17. UL, Building Materials Directory.
18. UL 10B, Fire Tests of Door Assemblies.
19. U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.03 DEFINITIONS

A. Operating Cycle: One complete cycle of an overhead coiling door or fire-resistance-rated overhead coiling door begins in closed position. Door is then moved to open position and back to closed position.

B. Listed and Labeled: Per NFPA 70, Article 100.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Supplier Qualifications: Suppliers shall have a minimum of five years experience producing substantially similar products to those required and shall be able to document at least five installations in satisfactory operation for at least five years.
2. Installer Qualifications:
 - a. Retain a single installer for all overhead coiling door Work, with documented and successful experience in type of Work required, and who is authorized representative of overhead coiling door manufacturer for installing and maintaining products required. Installer shall employ only tradesmen with successful experience in type of Work required.
 - b. References: Provide names and telephone numbers of architects or engineers as applicable, and owner's representatives for at least three successful projects performed by proposed installer, similar to the Work required for this Project.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of component Supplier from one overhead coiling door manufacturer.
 2. Overhead coiling door Supplier shall review and approve or to prepare all Shop Drawings and submittals for all products provided under this Section.
 3. Components shall be suitable for specified service conditions and be integrated into overall assembly by overhead coiling door Supplier.
- C. Testing Agency Qualifications: The 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 in accordance with ASTM E 329 and ASTM E 330, without delaying the Work.
- D. Source Quality Control:
1. Provide overhead coiling door products from a manufacturer who will provide test certificates for published fire, sound, hurricane and structural data covering systems designed and constructed according to its published specifications.
- E. Regulatory Requirements:
1. Comply with requirements of codes listed in Section 01 99 99, References.
 2. Fire Resistance:
 - a. Wherever a fire-resistance-rated classification is shown or scheduled for overhead coiling doors (three-hour, 1.5-hour, and similar designations) provide overhead coiling fire door assemblies that have been fire tested, rated and labeled in accordance with NFPA 80 and requirements established by UL 10B.
 - b. Provide each fire-resistance-rated overhead coiling door with a metal UL label documenting fire resistance rating in hours of duration of exposure to fire and letter designation of location for which assembly is designed.
 - c. Temperature-Rise Limit: Where indicated, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after 30 minutes of standard fire-test exposure.
 - d. Smoke Control: Where indicated, provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to UBC Standard 7-2; with maximum air-leakage rate of 3.0 cfm/sq. ft.of door opening at 0.10 inch wgfor both ambient and elevated temperature tests.
 3. Sound-Retardant Doors: Assemblies that have been fabricated and tested to control the passage of sound and have minimum certified STC rating according to ASTM E 413.
 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

5. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.05 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Drawings showing all components and their assembly, all with accurate dimensions. Include details at frames, elevations of each overhead coiling door design type, details of construction and conditions at openings.
- b. Complete interconnecting wiring diagrams for power, signal and control systems indicating all system operating components and control station wiring required for complete, operational system complying with Specifications. Define and differentiate between components that are furnished and installed as part of overhead coiling door Work; both at the Site and in the factory, and those that must be furnished, or installed, as part of the Work under other Sections.

2. Product Data:

- a. Manufacturer's specifications and data sheets, roughing-in diagrams, and installation instructions for each type and size of overhead coiling door.
- b. Include manufacturer's data on operators, operating instructions and maintenance data. Indicate by transmittal form that installer has received a copy of diagrams and installation instructions.
- c. Electric operator and other operating system component specifications indicating compliance with Specifications. Provide motor nameplate data and ratings; characteristics, mounting arrangements, size and location of all items.
- d. Information describing fire-release system, including testing and resetting instructions.

3. Delegated-Design:

- a. For overhead coiling grilles indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- b. Detail fabrication and assembly of seismic restraints.
- c. Include a summary of forces and loads on walls and jambs.

4. Samples:

- a. Specified galvanized, primed painted steel finish on 12-inch by 12-inch panel of insulated flat slats identical to those that will be used in the Work. Provide

sample of full depth of door, demonstrating slat insulation and thermal-break feature. ENGINEER's review will be to determine acceptability of finish only.

- B. Informational Submittals: Submit the following:
1. Certificates:
 - a. Provide Certificates of Labeled Construction for fire resistance-rated overhead coiling doors based on UL approval.
 2. Design Data:
 - a. Calculations showing that detailing and fabrication of components complies with structural performance specified.
 3. Supplier Instructions:
 - a. Provide manufacturer instructions for handling and installing specified products.
 - b. Setting drawings; summary of loads on walls, jambs and structural elements; templates; and instructions and directions for installation of inserts and anchorage devices, furnished by overhead coiling door Supplier and installed under other Sections of these Specifications.
 4. Site Quality Control Submittals:
 - a. Provide report of all operating tests, problems encountered, and corrective actions implemented. Document successful completion of field operating test for all products.
 - b. Provide report of each visit to Site by Supplier's representative.
 - c. Manufacturer Reports: Provide report of each visit to Site by Supplier's representative.
 5. Qualifications Statements:
 - a. Supplier.
 - b. Installer.
- C. Closeout Submittals: Submit the following:
1. Operation and Maintenance Data:
 - a. Provide complete operation and maintenance manuals, including test reports, maintenance data and schedules, description of operation, and information on recommended spare parts.
 - b. Provide operation and maintenance manuals per Section 01781, Operation and Maintenance Data.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling and Unloading:

1. Deliver products to Site to ensure uninterrupted progress of the Work. Deliver anchorage devices to be embedded in concrete in ample time to prevent delaying the Work.
 2. Deliver products to Site suitably crated, braced, and protected against distortion and damage during transit and unloading. Label all parts to comply with approved Shop Drawings and submittals.
 3. Upon delivery, inspect products for damage. Notify ENGINEER in writing of loss or damage to products. Replace loss and repair damage to new condition in accordance with manufacturer's instructions. Minor damage may be repaired provided finished items are equal in all respects to new items and acceptable to ENGINEER; otherwise, remove and replace damaged items.
- B. Storage and Protection:
1. Store materials to allow easy access for inspection and identification. Keep all material off ground using pallets, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
 2. Store doors and frames under cover.
 3. Place units up off floor in manner that prevents rust and damage.
 4. Avoid using non-vented plastic or canvas shelters.

PART 2- PRODUCTS

2.01 SYSTEM PERFORMANCE

- A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
1. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
- B. Design Criteria:
1. Structural: Overhead coiling door components shall be capable of resistance to these loads:
 - a. Wind Loading: Provide resistance to both positive and negative wind pressure loading of 25 pounds per square foot acting over entire plane of door curtain slats.
 - b. Basic Wind Speed: 95mph.
 - c. Importance Factor: 1.15.

- d. Exposure Category: C.
 - 2. Dead Loading: Provide resistance to deformation of door components caused by effects of gravity loads.
 - 3. Applied loadings shall not cause short-term or permanent deformation of system components. Doors shall remain operable and undamaged during and after application of specified wind pressure loading.
 - 4. Windborne-Debris-Impact-Resistance Performance: Provide impact-protective overhead coiling doors that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.
 - 5. Large Missile Test: For overhead coiling doors located within 30 feet of grade.
 - 6. Small Missile Test: For overhead coiling doors located more than 30 feet above grade.
- C. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
 - 1. Helically-Wound Torsion Springs: Provide Very-High-Cycle design capable of performing for 100,000 operational cycles. Provide non-resettable electric counters for overhead coiling doors.
 - 2. Electric Operators and Controls:
 - a. Operator systems shall be constructed so that motor can be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
 - b. Operators shall be constructed for 100,000 service-free, operating cycles.
 - c. Fixtures shall be listed and labeled as specified.
 - 3. Manual Push-Up Operation: Counterbalance mechanism shall function so that required lift or pull for door operation does not exceed 25 pounds.
 - 4. Chain Hoist Operation: Reduction roller chain and sprocket drive or suitable gearing, mounted on counterbalance shaft, shall operate with a maximum 35 pounds of pulling force.

2.02 MANUFACTURERS

- A. Non-fire Resistance-Rated Overhead Coiling Doors:
 - 1. Products and Manufacturers: Provide products of one of the following:
 - a. Thermiser ESD20 Insulated Rolling Service Doors, by Cornell Iron Works, Incorporated.
 - b. FMW Insulated Service Doors by The Cookson Company.

- c. Or equal.

2.03 MATERIALS

A. Door Curtain:

1. Door Curtain Slats: Fabricate door curtain of flat, interlocking slats, designed in compliance with structural performance criteria specified, but not less than 18-gauge back and front panels, of continuous length for width of door, without splices.
2. Unless otherwise shown or specified, provide double-panel flat slats, as follows:
 - a. Aluminum Doors Slats: ASTM B209 sheets, alloy and temper standard with the manufacturer for type of use and finish specified.
 - b. Slat Size and Features: 3/4-inches by three inches; pressure filled, foamed-in-place polyisocyanurate plastic insulation with minimum resistance to thermal flow (R) value of 6.25 and UL Tested Flame Spread of 75 maximum according to ASTM E84; thermal-break construction.
 - c. Interior Curtain Slat Facing: Same as exterior curtain slats.
 - d. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
 - e. Fire-Rated Insulation: Fill slats for insulated doors with mineral wool insulation complying with maximum flame-spread and smoke-developed indexes of 0 and 0, respectively, according to ASTM E 84. STC rating: 27, ASTM E90; R-value of 5.3
3. Endlocks: Heavy malleable iron castings, galvanized after casting. Secured to curtain slats with two galvanized rivets. Provide endlocks on alternate curtain slats for curtain alignment and resistance against lateral movement.
4. Windlocks: Heavy malleable iron castings, galvanized after casting, and secured to curtain slats with three galvanized rivets. Space windlocks 2.0 feet on centers on both edges of curtain, or as required to comply with structural performance criteria specified.
5. Bottom Bar: Consisting of two galvanized steel angles, each not less than 1.5 inches by 1.5 inches by 1/8-inch thick.

B. Curtain Jamb Guides:

1. Fabricate curtain jamb guides of steel shapes with sufficient depth and strength to retain curtain against specified wind loading. Build-up units with minimum 1/4-inch

thick steel sections complying with ASTM A36/A36M. Slot bolt holes for track adjustment.

2. Secure continuous wall angle to wall framing by 3/8-inch minimum diameter bolts at not more than 2.6 feet on centers, unless otherwise recommended by door manufacturer. Extend wall angles above door opening head to support coil brackets, unless otherwise shown. Place and locate anchor bolts on exterior wall guides so that they are concealed when door is closed.
 3. Provide removable stops on guides to prevent over-travel of curtain, and a continuous bar for holding windlocks, if any.
- C. Vision Panel Glazing: Manufacturer's standard clear glazing, fabricated from transparent acrylic sheet or fire-protection rated glass as required for type of door; set in glazing channel secured to curtain slats.
- D. Weather Seals:
1. Provide replaceable, compressible, and adjustable natural rubber or neoprene rubber weather-stripping for exterior doors. Secure weather seals with continuous metal pressure bars. At door heads, use a 1/8-inch thick replaceable, continuous sheet secured to inside of curtain coil hood. At door jambs, use a 1/8-inch thick continuous strip secured to exterior side of jamb guide.
 2. Provide double guide weather-stripping that, when tested at 1.30 pounds per square foot pressure differential, allows maximum of 3.75 cubic feet per minute air infiltration per linear foot of overhead coiling door perimeter.
 3. Provide weather-stripping continuously around all perimeter edges of door including hood baffle, astragal and guide weather-stripping.
- E. Counterbalancing Mechanism:
1. Counterbalance doors by an adjustable-tension, steel helical torsion spring, mounted around steel shaft, mounted in spring barrel, and connected to door curtain with required barrel rings. Use grease-sealed ball bearings or self-lubricating graphite bearings for rotating members.
 2. Counterbalance Barrel:
 - a. Fabricate spring barrel of hot-formed structural quality carbon-steel, welded or seamless pipe, of sufficient diameter and wall thickness to support roll-up of curtain without distorting slats and limiting barrel deflection to no more than 0.03-inch per foot of span under full load.
 - b. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance the weight of curtain with uniform adjustment accessible from outside barrel. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.

- c. Fabricate torsion rod for counterbalance shaft of case-hardened steel, of required size to hold fixed spring ends and carry torsional load.
3. Brackets: Provide mounting brackets of manufacturer's standard design, either cast-iron or cold-rolled steel plate with bell-mouth guide groove for curtain.
- F. Weather and Waterproof Hoods:
1. Form to entirely enclose coiled curtain and operating mechanism at opening head, and act as weather seal. Contour to suit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sag.
 2. Aluminum: 0.040-inch-thick aluminum sheet complying with ASTM B 209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.
 3. Provide flame baffle controlled by fusible link closing against coil when under fire exposure.

2.04 ACCESSORIES

- A. Automatic Closing:
1. Provide automatic closing device and viscous fluid-type speed governor, complying with requirements of NFPA 80, operating when activated by temperature rise and melting of 165 degrees F replaceable fusible links on both sides of wall of door opening. Melting of single fusible link shall be sufficient to commence sequence of closing door.
 2. Construct governor unit to be inoperative during normal door operations but, when engaged, limits speed of closing door to less than 2.0 feet per second. Design release mechanism for ordinary resetting.
 3. Fabricate unit to permit manual lifting of curtain for emergency exit after automatic closing, with curtain returning to the closed position when released.
- B. Safety Stop Lock Bearings: Provide overhead coiling doors with safety stop lock bearings that will stop downward travel of overhead coiling door upon sensing a sudden, rapid acceleration of pipe shaft.
- C. Electric Door Operators:
1. General: Provide electric door operator assembly of size and capacity recommended and provided by overhead coiling door manufacturer; complete with electric motor and factory-pre-wired motor controls, including reversing starter, gear reduction unit, solenoid operated brake, clutch, remote control stations, and control devices and wiring complying with requirements of NFPA 70. Magnetic reversing starter shall be of internal type with thermal overload protection and reset button.

2. Provide operators and electric accessories suitable for use in NFPA 70, Class I, Division 1, Group D Hazardous Locations.
3. Provide hand-operated disconnect or mechanism for automatically engaging sprocket and chain operator and releasing brake for emergency manual operation. Mount disconnect and operator to be accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
4. Operator system shall be provided so that motor can be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
5. Door Operator Type:
 - a. Provide wall or bracket-mounted door operator units consisting of electric motor, a worm gear running-in-oil primary drive from motor to reduction gear box, chain or worm gear drive from reduction box to gear wheel mounted on counterbalance shaft, and quick-clutch disconnect-release for manual operation.
 - b. Provide motor, clutch, and drive assembly of horsepower and design as determined by door manufacturer for size of door required and as specified.
6. Electric Motors:
 - a. Provide high-starting torque, reversible, continuous-duty; Class A insulated electric motors, complying with NEMA MG1, with overload protection.
 - b. Size to start, accelerate, and operate door in either direction, from all intermediate positions, at not less than eight inches or more than twelve inches per second without exceeding nameplate ratings or considering service factor.
 - c. Provide motors rated for 480 volt three phase three wire.
 - d. Provide open-drip proof type, and controller with NEMA Type 12 enclosure, unless otherwise shown or specified.
 - e. Provide totally enclosed, non-ventilated or fan-cooled motors, waterproof electric motors, fitted with a plugged drain, and controller with NEMA Type 4X enclosure in corrosive and wet environments or spaces.
 - f. Provide explosion-proof electric motors, and controller with NEMA Type 7 enclosure, fitted with UL approved drain and breather, certified and labeled to comply with UL Standards in Class I Div 1 or Div 2 environments and spaces.
 - g. Provide adjustable limit switches, rotary-type, driven by time chain and interlocked with motor controls set to automatically stop door at fully opened and closed positions. Geared limit switches shall contain spare set of contacts.
7. Remote Control Station:

- a. Unless otherwise shown, provide momentary-contact, three-button control station with push button controls labeled, "OPEN","CLOSE", and "STOP". Provide at all interior door locations unless otherwise noted.
 - b. Provide NEMA Type 7 remote control station enclosure in Class I Div 1 or Div 2 environments and spaces.
 - c. Provide NEMA Type 4X remote control station enclosure in corrosive and wet environments or spaces.
8. Safety Edge Device:
- a. Provide each door with pneumatic safety air switch, extending full width of door bottom, located within an U-shaped neoprene or rubber astragal mounted to bottom door rail.
 - b. Unit shall operate such that contact with switch before fully closing will immediately change air chamber pressure sending signal from air switch to electric motor, that will stop downward travel and reverse door direction to fully opened position.
 - c. Connect to control circuit through retracting safety cord with cable reels provided for each electric operating door.
 - d. Compressible strip shall serve as a weatherseal along bottom of door.
 - e. Safety edge shall be acceptable for use in NFPA 70 Class I, Division 1 locations.
9. Obstruction Detection Devices:
- a. Provide each motorized door with external automatic safety sensor able to protect full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
 - b. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - c. Provide self-monitoring sensor designed to interface with door operator control circuit to detect damage to, or disconnection of, sensor device. When self-monitoring feature is activated, door operates to close only with constant pressure on close button.
- D. Manual Door Operators:
- 1. Provide manual operator system (as a redundant means) including chain hoist, to operate the door in case of power failure.

2.05 ALUMINUM FINISHES

- A. Bronze Anodic Finish: NAAMM AA-M10-C22-A41, (Minimum thickness of 0.7 mils.) Dark Bronze

PART 3 – EXECUTION

3.01 INSPECTION

- A. Examine substrates and conditions under which overhead coiling doors are to be installed and notify ENGINEER of conditions detrimental to proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.02 INSTALLATION

- B. Install, wire, connect and adjust doors, motors, starters, control stations, limit and safety switches and other electrical accessories and connections required, per manufacturer's written instructions, approved Shop Drawings and submittals, and the Contract Documents.
- C. Install fire-resistance-rated overhead coiling doors in compliance with NFPA 80.
- D. Lubricate bearings and sliding parts and adjust mechanism so moving parts operate smoothly and are free of warp, twist, or distortion and fit watertight for door's entire perimeter.
- E. Adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment. Test door closing when activated by detector or alarm connected fire-release system. Reset door-closing mechanism after successful test.
- F. Repair damaged products and restore finish to match manufacturer's original finish.

3.03 FIELD QUALITY CONTROL

- A. Tests: Perform operating tests on all products at the Site following installation of products, including controls. Should tests indicate malfunction, make necessary repairs and adjustments. Repeat tests and adjustments until, in opinion of ENGINEER, installation is complete and products are functioning properly and are ready for permanent operation.
- B. Supplier's Services:
 - 1. Provide services of factory-trained representative of Supplier for installation supervision, start-up, operation testing, and training of OWNER's operating and maintenance personnel. Representative shall make at least 3 visits to the Site with at least 2 hours on-Site per visit (excluding travel time). First visit shall be to assist in installing products. Subsequent visits shall be for checking completed installation, start-up and training. Supplier's representative shall test-operate system in presence of ENGINEER and verify that each overhead coiling door conforms to requirements. Supplier's representative shall revisit Site as often as necessary until all installation is entirely satisfactory.
 - 2. Costs, including travel, lodging, meals and incidentals, for Supplier's representative's visits shall be at no additional cost to OWNER.

+ + END OF SECTION + +

SECTION 12 35 53**WOOD CASEWORK****PART 1 GENERAL****1.01 DESCRIPTION****A. Scope:**

1. Provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install all wood casework, including tops, ledges, support structures and all related items.

B. Coordination:

1. Review installation procedures under other Sections and coordinate installation of items that must be installed with or before wood casework.

C. Related Sections:

1. Section 04 22 24 - Unit Masonry Construction.
2. Section 06 10 53 - Rough Carpentry.

1.02 REFERENCES**A. Standards referenced in this Section are:**

1. SEFA 3 – Scientific Equipment and Furniture Association.
2. SEFA 8 – Scientific Equipment and Furniture Association.
3. NFPA 30 – National Fire Protection Association.
4. NFPA 40 – National Fire Protection Association.
5. UL – Underwriters Laboratory.
6. ANSI/HPVA HP-1 1994 – Harwood Plywood

1.03 QUALITY ASSURANCE**A. Component Supply and Compatibility:**

1. Provide all wood casework, tops, and related components from same manufacturer.

B. General Performance:

1. Provide certification that wood casework shall meet the performance requirements described in SEFA 8.

C. Competence:

1. The approved woodwork manufacturer must have an experience for doing satisfactory work on time and shall have successfully completed comparable work. The Engineer reserves the right to approve the woodwork manufacturer selected to furnish all of the woodwork.

D. Measurements:

1. Take field measurements and check dimensions for all cabinet and millwork which are to conform to the building for fit between finished work of other trades. Be responsible for final fit of millwork in all its details when work is in place. Drawing dimensions shall not be taken as final.

1.04 SUBMITTALS REQUIREMENTS

A. Action Submittals:

1. Product Data:

- a. Catalog data, including cutaway views, construction features, dimensional data, technical specifications which define exactly all materials, gauge, details and construction, etc.
- b. Shop drawings showing layout of plans, elevations and details of construction of material thicknesses, methods of joinery, anchorage of cabinets, finishes, colors, and provisions for equipment.

1.05 DELIVERY AND STORAGE

B. Protection:

1. Use all means necessary to protect the materials of this section before, during, and after installation and to protect the work and materials of all other trades.

C. Delivery and Storage:

1. Deliver materials to the job site and store in a safe, dry place. Provide heat in cold weather to prevent swelling and shrinking of woodwork.

1.06 WARRANTY

- A. Provide manufacturer's written warranty, running to the benefit of Owner, agreeing to correct, or at option of Owner, remove or replace components of the products specified in this Section found to have defect in material and workmanship during a period of one year after the date of Substantial Completion.

PART 2 PRODUCTS

2.01 WOOD CASEWORK

A. Material:

1. General:

- a. Material shall be selected so that the finished installation shall provide an attractive and harmonious appearance. All exterior casework surfaces exposed to view after installation, and cabinet interior surfaces, shall be Red Oak.

B. Solid Woods:

1. All solid woods shall be carefully and thoroughly air-dried, then kiln dried in humidity controlled kilns to a moisture content of 4-1/2%. All kiln dried lumber shall then be

tempered to a moisture content of 6% before use. This moisture content shall be maintained throughout production.

C. Plywood:

1. All plywood shall be hardwood plywood. Softwoods such as Fir or Pine are not permitted.
2. Veneer Core or Combination Plywood
 - a. Plywood shall be minimum 7-ply (3/4") veneer core plywood or 7-ply (3/4") combination core plywood and shall be compliant with ANSI/HPVA HP-1 2004.

D. Bending:

1. Plywood panels shall be edge banded as specified with 3mm hardwood edgebanding to match the plywood veneer.

E. Hardboard:

1. Hardboard shall be a wood fiber/resinous combination formed with heat and pressure into sheets providing a hard, smooth surface.

F. Hardware and Trim:

1. Drawer and door pulls shall be mounted on 4" centers, offering a comfortable hand grip, and be securely fastened to doors and drawers. They shall be manufactured from:
 - a. 3/8" diameter stainless steel rod with a brushed satin finish.

G. Hinges:

1. Hinges shall be the five (5) knuckle, satin finish stainless steel, institutional, offset type for all swinging doors. Hinges shall be 2-3/4" long, and secured to cabinet and doors with flathead screws, so applied to withstand a weight load of 150 lbs. minimum.

H. Locks:

1. Locks shall be a pin tumbler with heavy duty interchangeable cylinder. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers. Locks shall have capacity of at least 1000 primary key changes, and the capacity to be Masterkeyed, Grand-masterkeyed, Sub-masterkeyed, and Mason Keyed.

I. Roller Catches:

1. Roller Catches shall have a spring-loaded polyethylene roller and a steel strike plate

J. Elbow Catches:

1. Elbow catches and strike plates shall be cast aluminum with bronze finish

K. Drawer Slides:

1. Drawer slides shall be zinc plated, cold rolled steel, full extension, linear ball bearing slides rated at 100 pounds minimum. The drawer shall be removable without the use of tools.

- L. Dowels:
 - 1. Dowels used to join frames and panels shall be fluted hardwood not less than 8mm in diameter.
- M. Shelf Support Clips:
 - 1. Shelf support clips shall be twin pin type for mounting on interior of cabinet end panels. Clips shall be corrosion resistant and shall retain shelves from accidental removal and tipping. Shelves shall be adjustable on 32mm centers. Surface mounted metal support strips and clips subject to corrosion are not acceptable.
- N. Manufacturer:
 - 1. Products and Manufactures:
 - a. Kewaunee Scientific Corporation; Wood cabinet “Signature Series”, Style-5 (Contemporary Full Overlay).
 - b. Collegedale Inc.
 - c. Or approved equal.

2.02 WORKSURFACES

- A. Material:
 - 1. Kemresin Epoxy Resin Tops.
 - a. Top thickness: 1 inch.
 - b. Backsplash height: 4 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions under which portable fire protection equipment will be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Engineer.

3.02 INSTALLATION

- A. Preparation: Prior to beginning installation of casework, check and verify that no irregularities exist that would affect quality of execution of work specified.
- B. Coordination: Coordinate the work of the Section with the schedule and other requirements of other work being performed in the area at the same time and the general construction work.
- C. Performance:
 - 1. Casework
 - a. Set casework components plumb, square, and straight with no distortion and securely anchor to building structure. Shim as required using concealed shims.

- b. Screw continuous cabinets together with joints flush, tight and uniform, and with alignment of adjacent units within 1/16" tolerance.
 - c. Secure wall cabinets to solid supporting material.
 - d. Abut top edge surfaces in one true plane. Provide flush joints not to exceed 1/8" between top units.
2. Worksurfaces:
- a. Where required due to field conditions, scribe to abutting surfaces.
 - b. Only factory prepared field joints, located per approved shop drawings, shall be permitted. Secure the joints in the field, where practical, in the same manner as in the factory.
 - c. Secure worksurfaces to casework and equipment components with materials and procedures recommended by the manufacturer.
- D. Adjust and Clean:
- 1. Repair or remove and replace defective work, as directed by owner and/or his representative upon completion of installation.
 - 2. Adjust doors, drawers and other moving or operating parts to function smoothly.
 - 3. Clean shop finished casework; touch up as required.
 - 4. Clean worksurfaces and leave them free of all grease and streaks.
 - 5. Casework to be left broom clean and orderly.
- E. Protection:
- 1. Provide reasonable protective measures to prevent casework and equipment from being exposed to other construction activity.
 - 2. Advise Engineer of procedures and precautions for protection of material, installed laboratory casework and fixtures from damage by work of other trades.

END OF SECTION

SECTION 43 41 43.13
HIGH DENSITY CROSSLINKED POLYETHYLENE TANKS

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. This section specifies crosslinked high-density polyethylene tanks for chemical storage.

B. Type:

1. Unless otherwise specified, tanks shall be circular cross-section, vertical, complete with piping outlets, drains, overflows, and anchoring system. Covered tanks shall be vented, and where specified, tanks shall be provided with entrance manways, level indicators, and exterior coating.

C. Equipment List:

Item	Equipment No.
Carbon Storage Tank 1	T8101
Carbon Storage Tank 2	T8102
Carbon Storage Tank 3	T8203
Carbon Storage Tank 4	T8204

D. Design Requirements:

1. Physical Characteristics: Chemical storage tanks provided under this section shall have the following characteristics:

Equipment number ^{1,2}	T8101, T8102, T8203, T8204
Type ³	CD
Nominal diameter, ft	143"
Nominal height, ⁴ ft	173"
Liquid depth, ft	150"
Nominal capacity, gallons	10000 gallons
Manway: ⁵	
• Mounting ⁶	TM
• Diameter, inches	24"
•	
• Color	Natural

Notes:

1. All tanks shall be provided with molded flange full drain fitting. (IMFO)
2. CD = closed, domed top; CF = closed, flat top; OIF = open, internal flange; OEF = open, external flange; FLR = flat lid removable; FLH = flat lid hinged.
3. Nominal height of domed top tanks is the dimension measured along the straight cylindrical portion of the tank and does not include the rounded end.
4. Unless otherwise specified, manways shall be integrally molded with the tank.

5. *TM = top mount; TSM = top and side mount.*

2. Operating Conditions: Chemical storage tanks provided under this section shall be suitable for the following operating conditions:

Equipment number	T8101, T8102, T8203, T8204
Chemical stored	acetic acid
Concentration, percent	20%
Unit weight, lb/gal	8.74
Design specific gravity	1.90)
Solution pH	2.5
Maximum fluid temperature, deg. F	not flammable
Minimum fluid temperature, deg. F	50
Minimum ambient air temperature, deg. F	50

1.02 QUALITY ASSURANCE

A. References:

1. This section contains references to the following documents. They are a part of this section as specified and modified. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of conflict between the requirements of this section and those of the listed documents, the requirements of this section shall prevail.
2. Unless otherwise specified, references to documents shall mean the documents in effect at the time of Advertisement for Bids or Invitation to Bid (or on the effective date of the Agreement if there were no Bids). If referenced documents have been discontinued by the issuing organization, references to those documents shall mean the replacement documents issued or otherwise identified by that organization or, if there are no replacement documents, the last version of the document before it was discontinued. Where document dates are given in the following listing, references to those documents shall mean the specific document version associated with that date, regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

Reference	Title
ANSI A58.1	Minimum Design Loads for Buildings and Other Structures
ASTM C177	Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus
ASTM D638	Tensile Properties of Plastics
ASTM D746	Brittleness Temperature of Plastics and Elastomers by Impact
ASTM C273	Shear Properties in Flatwise Plane of Flat Sandwich Constructions or Sandwich Cores
ASTM D1505	Density of Plastics by the Density Gradient Technique
ASTM D1525	Vicat Softening Temperature of Plastics
ASTM D1621	Compressive Properties of Rigid Cellular Plastics

Reference	Title
ASTM D1622	Apparent Density of Rigid Cellular Plastics
ASTM D1623	Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
ASTM D1693	Environmental Stress-Cracking of Ethylene Plastics
ASTM D2126	Response of Rigid Cellular Plastics to Thermal and Humid Aging
ASTM D2842	Water absorption of Rigid Cellular Plastics
ASTM D2856	Open Cell Content of Rigid Cellular Plastics by the Air Pycnometer
ASTM E84	Surface Burning Characteristics of Building Materials
NEMA ICS 6	Enclosures for Industrial Control and Systems
Phillips Chemical Technical Bulletin SSL-193	Impact and Gel Testing
UBC	Uniform Building Code

B. Factory Test:

- Following fabrication the tanks, including factory applied pipe outlet fittings, shall be hydraulically tested with water. Test methods may include filling the tanks with standpipes, raising the maximum water surface approximately 6 feet higher than the normal maximum tank level. The test duration shall be 24 hours with proof of acceptance being an affidavit signed by the factory inspector. Following successful testing, the tank shall be emptied and dried prior to shipment.

C. Manufacturer's Warranty:

- The tank shall be warranted for 5 years full (non-prorated) to be free of defects in material and workmanship.

D. Manufacturer's Experience:

- The tank manufacturer shall have a record of at least ten installations during the previous 5 years for the tank sizes specified. The manufacturer must be capable of providing names of users and specific locations which can be visibly inspected.

E. Unit Responsibility:

- The Contractor shall assign unit responsibility as specified in Section 43 05 11-1.02 Unit Responsibility to the tank manufacturer for all equipment specified in this section and for the chemical solution tank mixers specified in Section 43 24 72

1.03 SUBMITTALS

A. The following information shall be provided in accordance with Section 01 33 00:

- A copy of this specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks (✓) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Construction Manager shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the

specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

2. Certificate of Unit Responsibility attesting that the Contractor has assigned, and that the manufacturer accepts, unit responsibility in accordance with the requirements of this Section and Section 43 05 11-1.02 Unit Responsibility. No other submittal material will be reviewed until the certificate has been received and found to be in conformance with these requirements.
3. Tank manufacturer's data and dimensions showing locations of all openings, location of level sensors, seismic support structure and anchoring system details, and location of tank accessories.
4. Details on outlet fittings, flexible connections, and vent and level indicator.
5. Manufacturer's experience required in paragraph 1.02 Manufacturer's Experience.
6. Insulation data, name of insulation contractor, and insulation contractor credentials.

1.04 ENVIRONMENTAL CONDITIONS

- A. The carbon storage tanks will be located in the Carbon Building which will be maintained to temperatures range from 50 F to 68 F.

PART 2 PRODUCTS

2.01 ACCEPTABLE PRODUCTS

- A. The tanks specified in this section shall be manufactured by Poly Processing, or approved equal, modified to provide the specified features.

2.02 TANKS

- A. The tanks provided under this specification shall be constructed of high-density crosslinked polyethylene using a rotationally molded fabrication process. Resin used in the tank shall be equal to Exxon-Mobil Paxon 7000 Series and shall contain a long term ultraviolet stabilizer. The tank material shall meet or exceed the following nominal test properties:

ASTM Test	Parameter	Value
ASTM D1505	Density, gms/cc	0.930-0.933

Molded Properties	Test Based On	Typical Values	Unit
Tensile Strength at Yield	ASTM D 638	2,700	Psi
Tensile Elongation at Break	ASTM D 638	600	%
Flexural Modulus	ASTM D 790	87,000	psi
1% Secant	PROCEDURE B		
Impact Strength @ -40 °C	ARM		
1/8" (3.17 mm) thickness		74	ft-lbs.
1/4" (6.35 mm) thickness		184	ft-lbs.
Environmental Stress Crack Resistance	ASTM D 1693 Condition A		
	100% Igepal	F ₀ > 1,000	hr
	10% Igepal	F ₀ > 1,000	hr
Deflection Temperature	ASTM D 648		
@ 66 psi (455 KPa)		142	°F
@ 264 psi (1820 KPa)		99	°F

- B. The tanks shall be designed for 1.9 Specific Gravity using a hoop stress value of no greater than 600 psi at 100° F, with a safety factor of no less than 2, using the Barlow Formula for calculating wall thickness. For applications in excess of 100° F design conditions, lower values for the design hoop stress shall be used.
- C. The tank manufacturer shall provide a certificate attesting that the tank materials meet or exceed the test properties specified above. Such certificates shall be signed by an officer of the manufacturer's corporation and shall be notarized.

2.03 TANK FITTINGS

- A. Tank fittings shall be according to the fitting schedule below. Gasket material shall be EPDM.

Fitting Schedule

Equipment No.	Fitting type ¹
1. Fill line	UBD-SS
2. Overflow	BF-SS
3. Tank drain	Same connection as outlet to pump
4. Vent	MV-SS
5. Outlet to pump	IMFO
6. Pipe supports	As directed by the Tank Manufacturer.
7. Spare	UBD-SS
8. PRV overflow	UBD-SS (Include blind flange for T8101 and T 8203)
9. Level Element	UBD-SS (Coordinate with Insurment manufacturer prior to fabrication)

Fitting Schedule

Equipment No.	Fitting type ¹
10. Mixing Nozzle	CFSS

Notes

¹Refer to drawings for fitting size and location. Legend for abbreviations:

UBD-SS: Universal ball dome fitting with 316SS studs and Epdm gaskets

MV-SS: Made vertical type fitting with 316SS studs and Epdm gaskets

BF-SS: Bolted flange fitting with 316SS studs and Epdm gaskets

IMFO: Integrally molded flange.

CFSS: Custom fabricated 316 Stainless Steel fitting with 316SS studs and Epdm gaskets

UBD-SS & MV-SS: All dome fittings shall be flanged Universal Ball Dome style or made vertical through dome style. There shall be a single 150 Lb. ANSI PVC flange a ¼" gasket attached to the outside tank wall. The flange shall be bolted to the tank from the inside with a minimum of four (4) ½" diameter all thread bolts with bolt heads encapsulated in polyethylene. The encapsulation shall be a minimum 2" in diameter x .75" thick and fully cover the bolt head and a minimum of ¼" of the threads closest to the bolt head. Each bolt shall have a ¼" gasket which is on the inside of the tank.

BF-SS: All fittings which are below the liquid level shall be bolted-flange style. There shall be a single 150 Lb. ANSI PVC flange and a ¼" gasket attached to the outside tank wall. The flange shall be bolted to the tank from the inside with a minimum of four (4) ½" diameter all thread bolts with bolt heads encapsulated in polyethylene. The encapsulation shall be a minimum 2" in diameter x .75" thick and fully cover the bolt head and a minimum of ¼" of the threads closest to the bolt head. Each bolt shall have a ¼" gasket which is on the inside of the tank.

CFSS: Custom fabricated 316 stainless steel fitting designed to be used with the Vaughan mixing nozzle.

IMFO: The IMFO shall be located at the bottom of the sidewall and allow the tank to be fully drained. The IMFO shall be integrally molded into the tank during the molding process. The IMFO shall be seamless, flanged, and manufactured from the same material as the tank. Inserts are not acceptable. A PVC companion flange assembly with a split back-up ring, bolts, and gasket shall be provided.

FRP LADDERS: Provide FRP ladders with platform as shown on the drawings.

Each bulk tank shall have a 24" top manway with Xlpe foam gasket. Manway shall be vapor tight. Physical opening of the manway shall be 24".

2.04 SAFETY SIGNS

- A. Each tank inlet and tank outlet shall be clearly marked with hazardous material warning signs, 10 inches by 14 inches in size. Each sign shall have the words "DANGER" and the name of the chemical stored, printed in large block letters and mounted directly adjacent to the tank outlet and tank inlet. Each entry manway shall be provided with a sign ("DANGER-CONFINED SPACE-HAZARDOUS ATMOSPHERE"). Signs shall comply with Section 10 14 00, modified as specified herein.

2.05 FLEXIBLE CONNECTION

- A. Each tank pipe connection shall be supplied with flexible connection to allow for tank movement. Piping shall be supported prior to connection to flexible connection per the flexible connection manufacturer. The flexible connections shall be provided by the tank manufacturer and shall be compatible with the chemical being stored. Expansion joints shall be constructed of PTFE.

2.06 LIFTING LUGS

- A. Each tank shall be provided with 4 integrally molded lifting lugs to allow for appropriate installation.

2.07 PRODUCT DATA

- A. The following information shall be provided in accordance with Section 01 33 00:
 - 1. Applicable operation and maintenance information as specified in Section 01 78 23.
 - 2. Signed affidavit by the tank manufacturer indicating that the tank was successfully factory tested as specified in paragraph 1.02 Factory Test.
 - 3. Copy of manufacturer's warranty specified in paragraph 1.02 Manufacturer's Warranty.
 - 4. Certification of tank material test data as specified in paragraph 2.02.
 - 5. Signed affidavit that the heat tracing has been tested. All test results shall be submitted with the affidavit.
 - 6. Manufacturer's recommendations for installation.
 - 7. Installation Certification Section 43 05 11-Form A specified in paragraph 3.01 Tanks.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Tanks:
 - 1. The tanks shall be installed as specified and in accordance with the manufacturer's written instructions. Prior to being placed in service, tank installations shall be checked by a factory-trained representative of the manufacturer, who shall fill out and submit the Installation Certificate Form 43 05 11-A specified in Section 01 99 90.

3.02 FIELD TESTING

- A. Field testing shall be in accordance with requirements in Section 01 45 20 and as specified herein. Each tank shall be field tested by filling entire contents with water and monitoring the tank as well as all fitting connections for at least 24 hours. Any leaks shall be corrected by the manufacturer's representative prior to acceptance. Following successful field tank testing, the tank shall be completely emptied and dried.

3.03 SAFETY

- A. Appropriate sections of the safety precautions outlined by Cellular Plastics Division of the SPI, the NFPA, OSHA, and the material manufacturers shall be followed. All personnel shall be familiar with the hazards involved in the use of equipment and materials on the project and the proper techniques and procedures to safely handle and apply the materials.

END OF SECTION