ADDENDUM No. 1

Owner: City of Mackinac Island

Project: Wastewater Treatment Plant Improvements, CWSRF #5824-01 Date: June 9, 2023

Engineer: Fleis & VandenBrink Engineering, Inc. Engineer's Project No.: 847245

Construction Manager: F&V Construction Management, Inc. CM's Project No.: 1226

NOTICE TO ALL PROSPECTIVE BIDDERS

SPECIFICATION SECTIONS ISSUED HEREWITH: Section 09 90 00 – Painting and Coating, Section 40 90 01, Supplement B – Input/Output List, Section 43 32 70 – Polymer Blending and Feed Systems Equipment; Appendix C- Part 41 Permit

DRAWING SHEETS ISSUED HEREWITH: 001-G-006, 005-C-104, 005-DD-903, 001-D-001, 001-D-002, 001-D-501, 100-D-101, 100-D-102, 100-D-301, 200-D-102, 200-D-501, 500-D-102, 600-D-101, 008-N-603, 008-N-607, 008-N-608, 008-N-610, 008-N-613

BIDS DUE: until 2:00 p.m. local time, Thursday, June 29, 2022 (UNCHANGED) – ISSUED TO ALL PLANHOLDERS

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This Addendum is a part of the Contract Documents and modifies the previously issued Bidding Documents. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may result in rejection of this Bid.

SPECIFICATION CHANGES:

ITEM NO. 1:

Section 00 11 13 – Advertisement for Bids

1. If prospective bidders would like to visit the project site separately from the pre-bid conferences, the visit must be scheduled with Jack Stack, WWTP Superintendent, at **mobile** (231) 286-5846; **office (906) 847-3278; or email jstack@cityofmi.org**. All participants must provide their own transportation to the site and be accompanied by WWTP staff while onsite for safety reasons.

ITEM NO. 2:

Section 09 90 00 – Painting and Coating

1. Delete this section in its entirety and replace with the attached Section 09 90 00 – Painting and Coating.

ITEM NO. 3:

Section 22 30 00 – Plumbing Equipment

1. Paragraph 2.05.C. add "4. QuantumFlo" to the list of manufacturers.

ITEM NO. 4:

Section 40 90 01, Supplement B – Input/Output List

1. Delete this section in its entirety and replace with the attached 40 90 01, Supplement B – Input/Output List.

ITEM NO. 5:

Section 43 21 36 – Rotary Lobe Pumps

1. Revise Paragraph 1.03.A.2 as follows “Motor: 10 hp maximum”
2. Revise Paragraph 1.03.B.2 as follows “Motor: 10 hp maximum”
3. Revise Paragraph 1.03.D.2 as follows “Motor: 5 hp maximum”
4. Paragraph 2.01.A. add “Swaby LOBELINE” to the list of manufacturers.

ITEM NO. 6:

Section 43 32 70 – Polymer Blending and Feed System

1. Delete this section in its entirety and replace with the attached Section 43 32 70 – Polymer Blending and Feed System.

ITEM NO. 7:

Section 43 41 45 – Fiberglass Reinforced Plastic Tanks

1. Paragraph 2.01.A. Add “EcoVerde Technologies” to the list of manufacturers.

ITEM NO. 8:

Section 46 23 23 – Vortex Grit Removal Equipment

1. Paragraph 2.02.C.3. Delete this paragraph and replace with the following: “The impeller will be a single flat disc plate with four equally spaced vanes fixed to the top side or an impeller with a separate removable cover plate over the storage hopper. These vanes will be inclined back against the flow to create the radial forces necessary to ensure that grit particles fall by gravity to the storage hopper and a gentle upward current to eject light solids from the tank.”
2. Delete Paragraph 2.02.C.4.
3. Paragraph 2.04.D. Delete the last sentence in this paragraph “Stainless steel parallel lamellar plates shall be incorporated into the hopper to increase settling efficiency of the system.”

ITEM NO. 9:

Appendix C - Permits

1. Add the Part 41 Permit for Construction of Wastewater System, No. P41004287 V.1, to the appendix, as attached hereto.

DRAWING CHANGES:

ITEM NO. 10:

Sheet 001-G-006 – Island Access & Freight Route

1. Replace sheet 001-G-006 with the attached revised sheet 001-G-006:
    a. Area has been identified for placement of stone crushing and screening equipment.
    b. Approximate location of nearest hydrant location has been identified.
    c. Notes have been updated to clarify vehicle movement restrictions.

ITEM NO. 11:

Sheet 005-C-104 – Proposed Site Piping Plan

1. Replace sheet 005-C-104 with the attached revised sheet 005-C-104. Revised drain pipe size.

ITEM NO. 12:

Sheet 200-S-101 – Primary Clarifiers Bot of Tank Plan

1. Delete Note 7.
   Clarify: Xypex C-1000 waterproofing admixture is not required in the primary clarifier pipe gallery walls or base slab.

ITEM NO. 13:

Sheet 005-DD-903 – Demolition Photos

1. Replace sheet 005-DD-903 with the attached revised sheet 005-DD-903. Photo descriptions have been revised and demolition notes have been added.

ITEM NO. 14:

Sheet 001-D-001 – Process Flow Diagram

1. Replace sheet 001-D-001 with the attached revised sheet 001-D-001. Layout has been revised to coordinate with process plan and section sheets.

ITEM NO. 15:

Sheet 001-D-002 – Sludge Flow Diagram

1. Replace sheet 001-D-002 with the attached revised sheet 001-D-002. Layout has been revised to coordinate with process plan and section sheets.

ITEM NO. 16:

Sheet 001-D-501 – Details & Schedules

1. Replace sheet 001-D-501 with the attached revised sheet 001-D-501. Valve and slide gate schedules have been revised to coordinate with process plan and section sheets.

ITEM NO. 17:

Sheet 001-D-502 – Details & Schedules

1. Refer to Stop Plate Schedule. Revise 600-SP-01 frame height to be **5'-9"**.

ITEM NO. 18:

Sheet 100-D-101 – Headworks Building Lower Plan

1. Replace sheet 100-D-101 with the attached revised sheet 100-D-101. Routing of 6-inch drain inside the building has been revised.

ITEM NO. 19:

Sheet 100-D-102 – Headworks Building Upper Plan

1. Replace sheet 100-D-102 with the attached revised sheet 100-D-102. Routing of 6-inch drain inside the building has been revised.

ITEM NO. 20:

Sheet 100-D-301 – Headworks Building Sections

1. Replace sheet 100-D-301 with the attached revised sheet 100-D-301. Routing of 6-inch drain inside the building has been revised.

ITEM NO. 21:

Sheet 200-D-101 – Primary Clarifier Lower Plan

1. Valve 205 is currently shown as a gate valve. The valve symbol has been replaced with a plug valve to match the valve schedule.

ITEM NO. 22:

Sheet 200-D-102 – Primary Clarifier Intermediate Plan

1. Replace sheet 200-D-102 with the attached revised sheet 200-D-102. Addition of 1 1/2" sludge sample line. Valve tags 220 and 222 have been swapped to match the process flow diagram.

ITEM NO. 23:

Sheet 200-D-302 – Primary Clarifier Sections

1. Valve tags 220 and 222 have been swapped to match the process flow diagram.

ITEM NO. 24:

Sheet 200-D-501 – Primary Clarifier Details

1. Replace sheet 200-D-501 with the attached revised sheet 200-D-501. Addition of sludge sample detail.

ITEM NO. 25:

Sheet 500-D-102 – Secondary Clarifiers Intermediate Plan

1. Replace sheet 500-D-102 with the attached revised sheet 500-D-102. Addition of 1 1/2" sludge sample line.

ITEM NO. 26:

Sheet 600-D-101 – Process Building Plan

1. Replace sheet 600-D-101 with the attached revised sheet 600-D-101. Access hatch downstream of UV weir has been removed. Grating access panel shall be hinged with lifting handle.

ITEM NO. 27:

Sheet 700-D-103 – Decant Tank Improvements – Lower Plan

1. Valves 731 and 732 are currently shown as gate valves. These valve symbols have been replaced with plug valves to match the valve schedule.

ITEM NO. 28:

Sheet 700-D-303 – Decant Tank Sections

1. Valves 731 and 732 are currently shown as gate valves. These valve symbols have been replaced with plug valves to match the valve schedule.

ITEM NO. 29:

Sheet 008-N-603 – Primary Clarifiers and Sludge Pumping P&ID

1. Replace Sheet 008-N-603 with the attached revised Sheet 008-N-603. Callout was added for:
    a. Secondary solids co-settling feed piping location changed,
    b. Scum piping location changed, no joining with the sludge lines after the flow meter,
    c. Interlocks for pressure switches low on secondary sludge pumps added, in addition to pressure switched high; single dry contacts in pressure switches, statuses wired to SCADA via relay contacts mounted in MCC.

ITEM NO. 30:

Sheet 008-N-607 – MBBR, Rapid Mixing & Flocculation P&ID

1. Replace Sheet 008-N-607 with the attached revised Sheet 008-N-607. Instrument bubble has been added for 300-FE-0000.

ITEM NO. 31:

Sheet 008-N-608 – Secondary Clarifiers and Sludge Pumping P&ID

1. Replace Sheet 008-N-608 with the attached revised Sheet 008-N-608. Callout was added for:
    a. Scum piping location changed, no joining with the sludge lines after the flow meter,
    b. Interlocks for pressure switches low on secondary sludge pumps added, in addition to pressure switched high; single dry contacts in pressure switches, statuses wired to SCADA via relay contacts mounted in MCC.

ITEM NO. 32:

Sheet 008-N-610 – Effluent Pumping P&ID

1. Replace Sheet 008-N-610 with the attached revised Sheet 008-N-610. Drawing changes were made in the title block:
    a. ‘NOT FOR CONSTRUCTION’ text removed,
    b. ‘FEBRUARY 2023’ date replaced with “MAY 2023”.

ITEM NO. 33:

Sheet 008-N-613 – Decant Tanks P&ID

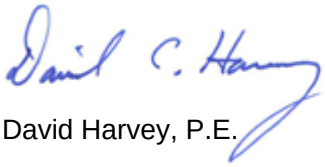
1. Replace Sheet 008-N-613 with the attached revised Sheet 008-N-613. Callout was added for:
    a. Interlocks from pressure switches low on secondary sludge pump added, in addition to pressure switched high; single dry contacts in pressure switches, statuses wired to SCADA via relay contacts mounted in MCC.
    b. Changes in air to decant tanks piping: some piping and butterfly valves shown as existing, second line to decant tank no. 2 added.

CLARIFICATIONS:

1. All spelling errors shall be assumed as corrected. Drawings will not be reissued solely based on correction of spelling errors, nor will spelling errors be called out as addenda items. These spelling corrections will be made in the conformed documents provided to the awarded Contractors.
2. May 31, 2023, Pre-Bid meeting sign in sheet is attached.
3. Contractor is responsible for all costs associated with delivery of equipment and materials to the jobsite. Ferry deliveries can be coordinated with Arnold Freight.
    a. Arnold Freight: Veronica Dobrowolski – (906) 430-0095
4. It's recommended construction equipment/materials be transported as soon as possible during the fall. The Straights of Mackinac, between St. Ignace and Mackinac Island, can ice over and/or restrict freighter traffic as early as mid-December.
5. Bulk material movement for concrete construction, crushing operations, and site-work may be performed using trucks (no trains). Bulk materials for this purpose are defined as aggregates, cement, rebar, cobbles, and other soils. Vehicle movement must be coordinated with the Owner through FVC, and the appropriate permits must be obtained in accordance with the project specifications.
6. Prefabricated construction materials or equipment that exceed either 3000 pounds or 20 feet in length may also be moved by trucks to the construction site. Vehicle movement must be coordinated with the Owner through FVC, and the appropriate permits must be obtained in accordance with the project specifications.
7. All material and equipment that can be moved by dray, less than 3000 pounds or 20 feet in length, must be moved by dray. This includes pallets of material that can be reduced in size or weight to meet these conditions.

Any Revisions to any of the Contract Documents made by this Addendum shall be considered as the same revision to any and all related areas of the Contract Documents not specifically called out in this Addendum.

FLEIS & VANDENBRINK ENGINEERING, INC.



David Harvey, P.E.

Attachments:

- Section 09 90 00 – Painting and Coating
- Section 43 32 70 – Polymer Blending and Feed System
- Section 40 90 01, Supplement B – Input/Output List
- Part 41 Construction Permit
- 001-G-006, 005-C-104, 005-DD-903, 001-D-101, 001-D-002, 001-D-501, 100-D-101, 100-D-102, 100-D-301, 200-D-102, 200-D-501, 500-D-102, 600-D-101, 008-N-603, 008-N-607, 008-N-608, 008-N-610, 008-N-613
- 05/31/2023 Pre-Bid Sign-In Sheet

SECTION 09 90 00
PAINTING AND COATING

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Water Works Association (AWWA):
   a. C203, Coal-Tar Protective Coatings and Linings for Steel Water Pipelines—Enamel and Tape—Hot-Applied.
   b. C209, Cold-Applied Tape Coatings for the Exterior of Special Sections, Connections, and Fittings for Steel Water Pipelines.
   c. C213, Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines.
   d. C214, Tape Coating Systems for the Exterior of Steel Water Pipelines.
2. Environmental Protection Agency (EPA).
3. NACE International (NACE): SP0188, Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.
4. NSF International (NSF): 61, Drinking Water System Components - Health Effects.
5. Occupational Safety and Health Act (OSHA).
6. Research Council on Structural Connections (RCSC): Specification for Structural Joints using High-Strength Bolts.
7. The Society for Protective Coatings (SSPC):
   a. PA 2, Procedure for Determining Conformance to Dry Coating Thickness Requirements.
   b. PA 10, Guide to Safety and Health Requirements for Industrial Painting Projects.
   c. SP 1, Solvent Cleaning.
   d. SP 2, Hand Tool Cleaning.
   e. SP 3, Power Tool Cleaning.
   f. SP 5, White Metal Blast Cleaning.
   g. SP 6, Commercial Blast Cleaning.
   h. SP 7, Joint Surface Preparation Standard Brush-Off Blast Cleaning.
   i. SP 10, Near-White Blast Cleaning.
   j. SP 11, Power Tool Cleaning to Bare Metal.
   k. SP 16, Brush-Off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals.
   l. SP 13, Surface Preparation of Concrete.
   m. Guide 15, Field Methods for Retrieval and Analysis of Soluble Salts on Steel and Other Nonporous Substrates.

1.02 DEFINITIONS

A. Terms used in this section:

1. Coverage: Total minimum dry film thickness in mils or square feet per gallon.
2. FRP: Fiberglass Reinforced Plastic.
3. HCl: Hydrochloric Acid.
4. MDFT: Minimum Dry Film Thickness, mils.
5. MDFTPC: Minimum Dry Film Thickness per Coat, mils.
6. Mil: Thousandth of an inch.
7. PDS: Product Data Sheet.
8. PSDS: Paint System Data Sheet.

9. PVC: Polyvinyl Chloride.
10. SFPG: Square Feet per Gallon.
11. SFPGPC: Square Feet per Gallon per Coat.
12. SP: Surface Preparation.

1.03 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Data Sheets:
      1) For each product, furnish a Product Data Sheet (PDS), the manufacturer's technical data sheets, and paint colors available (where applicable). The PDS form is appended to the end of this section.
      2) For each paint system, furnish a Paint System Data Sheet (PSDS). The PSDS form is appended to the end of this section.
      3) Technical and performance information that demonstrates compliance with specification.
      4) Furnish copies of paint system submittals to the coating applicator.
      5) Indiscriminate submittal of only manufacturer's literature is not acceptable.
   b. Detailed chemical and gradation analysis for each proposed abrasive material.
2. Samples:
   a. Proposed Abrasive Materials: Minimum 5-pound sample for each type.
   b. Reference Panel:
      1) Surface Preparation:
         a) Prior to start of surface preparation, furnish a 4-inch by 4-inch steel panel for each grade of sandblast specified herein, prepared to specified requirements.
         b) Provide panel representative of the steel used; prevent deterioration of surface quality.
         c) Panel to be reference source for inspection upon approval by Engineer.
      2) Paint:
         a) Unless otherwise specified, before painting work is started, prepare minimum 8-inch by 10-inch sample with type of paint and application specified on similar substrate to which paint is to be applied.
         b) Furnish additional samples as required until colors, finishes, and textures are approved.
         c) Approved samples to be the quality standard for final finishes.

B. Informational Submittals:

1. Applicator's Qualification: List of references substantiating experience.
2. Coating manufacturer's Certificate of Compliance, in accordance with Section 01 43 33, Manufacturers' Field Services.
3. Factory Applied Coatings: Manufacturer's certification stating factory applied coating system meets or exceeds requirements specified.
4. Manufacturer's written verification that submitted material is suitable for the intended use.
5. Coating for Faying Surfaces: Manufacturer's test results that show the proposed coating meets the slip resistance requirements of the AISC Specification for Structural Joints using ASTM A325 or ASTM A490 bolts.

6. If the manufacturer of finish coating differs from that of shop primer, provide finish coating manufacturer's written confirmation that materials are compatible.
7. Manufacturer's written instructions and special details for applying each type of paint.

1.04 QUALITY ASSURANCE

A. Applicator Qualifications: Minimum 5 years' experience in application of specified products.

B. Regulatory Requirements:

1. Meet federal, state, and local requirements limiting the emission of volatile organic compounds.
2. Perform surface preparation and painting in accordance with recommendations of the following:
   a. Paint manufacturer's instructions.
   b. SSPC PA 10.
   c. Federal, state, and local agencies having jurisdiction.

C. Mockup:

1. Before proceeding with Work under this section, finish one complete space or item of each color scheme required showing selected colors, finish texture, materials, quality of work, and special details.
2. After Engineer approval, sample spaces or items shall serve as a standard for similar work throughout the Project.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Shipping:

1. Where precoated items are to be shipped to the Site, protect coating from damage. Batten coated items to prevent abrasion.
2. Protect shop painted surfaces during shipment and handling by suitable provisions including padding, blocking, and use of canvas or nylon slings.

B. Storage:

1. Store products in a protected area that is heated or cooled to maintain temperatures within the range recommended by paint manufacturer.
2. Primed surfaces shall not be exposed to weather for more than 2 months before being topcoated, or less time if recommended by coating manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements:

1. Do not apply paint in temperatures or moisture conditions outside of manufacturer's recommended maximum or minimum allowable.
2. Do not perform final abrasive blast cleaning whenever relative humidity exceeds 85 percent, or whenever surface temperature is less than 5 degrees F above dew point of ambient air.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nationally recognized manufacturers of paints and protective coatings who are regularly engaged in the production of such materials for essentially identical service conditions.

B. Minimum of 5 years' verifiable experience in manufacture of specified product.

2.02 ABRASIVE MATERIALS

A. Select abrasive type and size to produce surface profile that meets coating manufacturer's recommendations for specific primer and coating system to be applied.

2.03 PAINT MATERIALS

A. General:

1. Manufacturer's highest quality products suitable for intended service.
2. Compatibility: Only compatible materials from a single manufacturer shall be used in the Work. Particular attention shall be directed to compatibility of primers and finish coats.
3. Thinners, Cleaners, Driers, and Other Additives: As recommended by coating manufacturer.

B. Products:

Product	Definition
Acrylic Latex	Single-component, finish as required
Acrylic Latex (Flat)	Flat latex
Acrylic Sealer	Clear acrylic
Alkyd (Semigloss)	Semigloss alkyd
Alkyd Enamel	Optimum quality, gloss or semigloss finish as required, medium long oil
Alkyd Wood Primer	Flat alkyd
Bituminous Paint	Single-component, coal-tar pitch based
Block Filler	Primer-sealer designed for rough masonry surfaces, 100% acrylic emulsion
Coal-Tar Epoxy	Amine, polyamide, or phenolic epoxy type 70% volume solids minimum, suitable for immersion service
DTM Acrylic Primer	Surface tolerant, direct-to-metal water borne acrylic primer
DTM Acrylic Finish	Surface tolerant, direct-to-metal water borne acrylic finish coat
Elastomeric Polyurethane	100% solids, plural component, spray applied, high build, elastomeric polyurethane coating, suitable for the intended service

Product	Definition
Epoxy Filler/Surfacer	100% solids epoxy trowel grade filler and surfacer, nonshrinking, suitable for application to concrete and masonry. Approved for potable water contact and conforming to NSF 61, where required
Epoxy Nonskid (Aggregated)	Polyamidoamine or amine converted epoxies aggregated; aggregate may be packaged separately
Epoxy Primer—Ferrous Metal	Anticorrosive, converted epoxy primer containing rust-inhibitive pigments
Epoxy Primer—Other	Epoxy primer, high-build, as recommended by coating manufacturer for specific galvanized metal, copper, or nonferrous metal alloy to be coated
Fusion Bonded Coating	100% solids, thermosetting, fusion bonded, dry powder epoxy, suitable for the intended service
TFE Lube or Grease Lube	Tetrafluoroethylene, liquid coating, or open gear grease as supplied by McMaster-Carr Supply Corporation, Elmhurst, IL
High Build Epoxy	Polyamidoamine epoxy, minimum 69% volume solids, capability of 4 to 8 MDFT per coat
Inorganic Zinc Primer	Solvent or water based, having 85% metallic zinc content in the dry film; follow manufacturer's recommendation for topcoating
Latex Primer Sealer	Waterborne vinyl acrylic primer/sealer for interior gypsum board and plaster. Capable of providing uniform seal and suitable for use with specified finish coats
NSF Epoxy	Polyamidoamine epoxy, approved for potable water contact and conforming to NSF 61
Epoxy, High Solids	Polyamidoamine epoxy, 80% volume solids, minimum, suitable for immersion service
Polyurethane Enamel	Two-component, aliphatic or acrylic based polyurethane; high gloss finish
Organic Zinc Rich Primer	Epoxy or moisture cured urethane with 85-percent zinc content in the dry film, meeting the requirements of RCSC Specification for Structural Joints using High Strength Bolts, Class A or Class B, as required.
Rust-Inhibitive Primer	Single-package steel primers with anticorrosive pigment loading
Sanding Sealer	Co-polymer oil, clear, dull luster
Silicone/Silicone Acrylic	Elevated temperature silicone or silicone/acrylic based
Stain, Concrete	Acrylic, water repellant, penetrating stain
Stain, Wood	Satin luster, linseed oil, solid or transparent as required
Varnish	Nonpigmented vehicle based on a variety of resins (alkyd, phenolic, urethane) in gloss, semigloss, or flat finishes, as required
Water Base Epoxy	Two-component, polyamide epoxy emulsion, finish as required

2.04 MIXING

A. Multiple-Component Coatings:

1. Prepare using each component as packaged by paint manufacturer.
2. No partial batches will be permitted.
3. Do not use multiple-component coatings that have been mixed beyond their pot life.
4. Furnish small quantity kits for touchup painting and for painting other small areas.
5. Mix only components specified and furnished by paint manufacturer.
6. Do not intermix additional components for reasons of color or otherwise, even within the same generic type of coating.

B. Colors: Formulate paints with colorants free of lead, lead compounds, or other materials that might be affected by presence of hydrogen sulfide or other gas likely to be present at Site.

2.05 SHOP FINISHES

A. Shop Blast Cleaning: Reference Paragraph, Shop Coating Requirements.

B. Surface Preparation: Provide Engineer minimum 7 days' advance notice to start of shop surface preparation work and coating application work.

C. Shop Coating Requirements:

1. When required by equipment specifications, such equipment shall be primed and finish coated in shop by manufacturer and touched up in field with identical material after installation.
2. Where manufacturer's standard coating is not suitable for intended service condition, Engineer may approve use of a tie-coat to be used between manufacturer's standard coating and specified field finish. In such cases, tie-coat shall be surface tolerant epoxy as recommended by manufacturer of specified field finish coat. Coordinate details of equipment manufacturer's standard coating with field coating manufacturer.

PART 3 EXECUTION

3.01 GENERAL

A. Provide Engineer minimum 7 days' advance notice to start of field surface preparation work and coating application work.

B. Perform the Work only in presence of Engineer unless Engineer grants prior approval to perform the Work in Engineer's absence.

C. Schedule inspection of cleaned surfaces and all coats prior to succeeding coat in advance with Engineer.

3.02 EXAMINATION

A. Factory Finished Items:

1. Schedule inspection with Engineer before repairing damaged factory-finished items delivered to Site.

2. Repair abraded or otherwise damaged areas on factory-finished items as recommended by coating manufacturer. Carefully blend repaired areas into original finish. If required to match colors, provide full finish coat in field.

B. Surface Preparation Verification: Inspect and provide substrate surfaces prepared in accordance with these Specifications and printed directions and recommendations of paint manufacturer whose product is to be applied. The more stringent requirements shall apply.

3.03 PROTECTION OF ITEMS NOT TO BE PAINTED

A. Remove, mask, or otherwise protect hardware, lighting fixtures, switchplates, aluminum surfaces, machined surfaces, couplings, shafts, bearings, nameplates on machinery, and other surfaces not specified elsewhere to be painted.

B. Provide drop cloths to prevent paint materials from falling on or marring adjacent surfaces.

C. Protect working parts of mechanical and electrical equipment from damage during surface preparation and painting process.

D. Mask openings in motors to prevent paint and other materials from entering.

E. Protect surfaces adjacent to or downwind of Work area from overspray.

3.04 SURFACE PREPARATION

A. Field Abrasive Blasting:

1. Perform blasting for items and equipment where specified and as required to restore damaged surfaces previously shop or field blasted and primed or coated.
2. Refer to coating systems for degree of abrasive blasting required.
3. Where the specified degree of surface preparation differs from manufacturer’s recommendations, the more stringent shall apply.

B. Surface Contamination Testing:

1. A surface contamination analysis test shall be performed every 500 square feet by means of Chlor Test CSN Salts or approved equivalent.
2. Surface with chloride levels exceeding 3 µg/square centimeter for submerged surfaces and 5 µg/square centimeter for exposed surfaces shall be treated with a liquid soluble salt remover equivalent to CHLOR*RID (CHLOR*RID International, Chandler, AZ).
3. Follow manufacturer’s recommendations and procedures for the use of this product to remove the surface contamination.

C. Metal Surface Preparation:

1. Where indicated, meet requirements of SSPC Specifications summarized below:
   a. SP 1, Solvent Cleaning: Removal of visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants by cleaning with solvent.
   b. SP 2, Hand Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using nonpower hand tools.

c. SP 3, Power Tool Cleaning: Removal of loose rust, loose mill scale, loose paint, and other loose detrimental foreign matter, using power-assisted hand tools.
d. SP 5, White Metal Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter by blast cleaning.
e. SP 6, Commercial Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 33 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
f. SP 7, Brush-Off Blast Cleaning: Removal of visible rust, oil, grease, soil, dust, loose mill scale, loose rust, and loose coatings. Tightly adherent mill scale, rust, and coating may remain on surface.
g. SP 10, Near-White Blast Cleaning: Removal of visible oil, grease, dust, dirt, mill scale, rust, coatings, oxides, corrosion products, and other foreign matter, except for random staining limited to no more than 5 percent of each unit area of surface which may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings.
h. SP 11, Power Tool Cleaning to Bare Metal: Removal of visible oil, grease, dirt, dust, mill scale, rust, paint, oxide, corrosion products, and other foreign matter using power-assisted hand tools capable of producing suitable surface profile. Slight residues of rust and paint may be left in lower portion of pits if original surface is pitted.
i. SP-16, Brush Blasting of Non-Ferrous Metals: A brush-off blast cleaned non-ferrous metal surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, metal oxides (corrosion products), and other foreign matter. Intact, tightly adherent coating is permitted to remain. A coating is considered tightly adherent if it cannot be removed by lifting with a dull putty knife. Bare metal substrates shall have a minimum profile of 19 micrometers (0.75 mil).

2. The words “solvent cleaning”, “hand tool cleaning”, “wire brushing”, and “blast cleaning”, or similar words of equal intent in these Specifications or in paint manufacturer’s specification refer to the applicable SSPC Specification.
3. Where OSHA or EPA regulations preclude standard abrasive blast cleaning, wet or vacu-blast methods may be required. Coating manufacturers’ recommendations for wet blast additives and first coat application shall apply.
4. Hand tool clean areas that cannot be cleaned by power tool cleaning.
5. Round or chamfer sharp edges and grind smooth burrs, jagged edges, and surface defects.
6. Welds and Adjacent Areas:
   a. Prepare such that there is:
      1) No undercutting or reverse ridges on weld bead.
      2) No weld spatter on or adjacent to weld or any area to be painted.
      3) No sharp peaks or ridges along weld bead.
   b. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.
7. Preblast Cleaning Requirements:
   a. Remove oil, grease, welding fluxes, and other surface contaminants prior to blast cleaning.
   b. Cleaning Methods: Steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
   c. Clean small isolated areas as above or solvent clean with suitable solvent and clean cloth.
8. Blast Cleaning Requirements:

a. Type of Equipment and Speed of Travel: Design to obtain specified degree of cleanliness. Minimum surface preparation is as specified herein and takes precedence over coating manufacturer's recommendations.
b. Select type and size of abrasive to produce surface profile that meets coating manufacturer's recommendations for particular primer to be used.
c. Use only dry blast cleaning methods.
d. Do not reuse abrasive, except for designed recyclable systems.
e. Meet applicable federal, state, and local air pollution and environmental control regulations for blast cleaning, confined space entry (if required), and disposition of spent aggregate and debris.

9. Post-Blast Cleaning and Other Cleaning Requirements:
a. Clean surfaces of dust and residual particles from cleaning operations by dry (no oil or water vapor) air blast cleaning or other method prior to painting. Vacuum clean enclosed areas and other areas where dust settling is a problem and wipe with a tack cloth.
b. Paint surfaces the same day they are blasted. Reblast surfaces that have started to rust before they are painted.

D. Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation:

1. Remove soil, cement spatter, and other surface dirt with appropriate hand or power tools.
2. Brush blast in accordance with SSPC SP 16.
3. Obtain and follow coating manufacturer's recommendations for additional preparation that may be required.

E. Concrete Surface Preparation:

1. Do not begin until 30 days after concrete has been placed.
2. Meet requirements of SSPC SP 13.
3. Remove grease, oil, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent, or other suitable cleaning methods.
4. Brush-off blast clean to remove loose concrete and laitance, and provide a tooth for binding. Upon approval by Engineer, surface may be cleaned by acid etching method. Approval is subject to producing desired profile equivalent to No. 80 grit flint sandpaper. Acid etching of vertical or overhead surfaces shall not be allowed.
5. Secure coating manufacturer's recommendations for additional preparation, if required, for excessive bug holes exposed after blasting.
6. Unless otherwise required for proper adhesion, ensure surfaces are dry prior to painting.

F. Plastic and FRP Surface Preparation:

1. Hand sand plastic surfaces to be coated with medium grit sandpaper to provide tooth for coating system.
2. Large areas may be power sanded or brush-off blasted, provided sufficient controls are employed so surface is roughened without removing excess material.

G. Masonry Surface Preparation:

1. Complete and cure masonry construction for 14 days or more before starting surface preparation work.

2. Remove oil, grease, dirt, salts or other chemicals, loose materials, or other foreign matter by solvent, detergent washing, or other suitable cleaning methods.
3. Clean masonry surfaces of mortar and grout spillage and other surface deposits using one of the following:
    a. Nonmetallic fiber brushes and commercial muriatic acid followed by rinsing with clean water.
    b. Brush-off blasting.
    c. Water blasting.
4. Do not damage masonry mortar joints or adjacent surfaces.
5. Leave surfaces clean and, unless otherwise required for proper adhesion, dry prior to painting.
6. Masonry Surfaces to be Painted: Uniform texture and free of surface imperfections that would impair intended finished appearance.
7. Masonry Surfaces to be Clear Coated: Free of discolorations and uniform in texture after cleaning.

H. Wood Surface Preparation:

1. Replace damaged wood surfaces or repair in a manner acceptable to Engineer prior to start of surface preparation.
2. Solvent clean (mineral spirits) knots and other resinous areas and coat with shellac or other knot sealer, prior to painting. Remove pitch by scraping and wipe clean with mineral spirits or turpentine prior to applying knot sealer.
3. Round sharp edges by light sanding prior to priming.
4. Filler:
    a. Synthetic-based wood putty approved by paint manufacturer for paint system.
    b. For natural finishes, color of wood putty shall match color of finished wood.
    c. Fill holes, cracks, and other surface irregularities flush with surrounding surface and sand smooth.
    d. Apply putty before or after prime coat, depending on compatibility and putty manufacturer’s recommendations.
    e. Use cellulose type putty for stained wood surfaces.
5. Ensure surfaces are clean and dry prior to painting.

I. Gypsum Board Surface Preparation: Typically, new gypsum board surfaces need no special preparation before painting.

1. Surface Finish: Dry, free of dust, dirt, powdery residue, grease, oil, or any other contaminants.

J. Existing Painted Surfaces to be Repainted Surface Preparation:

1. Detergent wash and freshwater rinse.
2. Clean loose, abraded, or damaged coatings to substrate by hand or power tool, SP 2 or SP 3.
3. Feather surrounding intact coating.
4. Apply one spot coat of specified primer to bare areas, overlapping prepared existing coating.
5. Apply one full finish coat of specified primer to entire surface.
6. If an aged, plural-component material is to be topcoated, contact coating manufacturer for additional surface preparation requirements.
7. Application of Cosmetic Coat:
    a. It is assumed that existing coatings have oxidized sufficiently to prevent lifting or peeling when overcoated with paints specified.

b. Check compatibility by application to a small area prior to starting painting.
c. If lifting or other problems occur, request disposition from Engineer.

8. Perform blasting as required to restore damaged surfaces. Materials, equipment, procedures shall meet requirements of SSPC.

3.05 SURFACE CLEANING

A. Brush-off Blast Cleaning:

1. Equipment, procedure, and degree of cleaning shall meet requirements of SSPC SP 7.
2. Abrasive: Either wet or dry blasting sand, grit, or nutshell.
3. Select various surface preparation parameters, such as size and hardness of abrasive, nozzle size, air pressure, and nozzle distance from surface such that surface is cleaned without pitting, chipping, or other damage.
4. Verify parameter selection by blast cleaning a trial area that will not be exposed to view.
5. Engineer will review acceptable trial blast cleaned area and use area as a representative sample of surface preparation.
6. Repair or replace surface damaged by blast cleaning.

B. Acid Etching:

1. After precleaning, spread the following solution by brush or plastic sprinkling can: One part commercial muriatic acid reduced by two parts water by volume. Adding acid to water in these proportions gives an approximate 10 percent solution of HCl.
2. Application:
   a. Rate: Approximately 2 gallons per 100 square feet.
   b. Work acid solution into surface by hard-bristled brushes or brooms until complete wetting and coverage is obtained.
   c. Acid will react vigorously for a few minutes, during which time brushing shall be continued.
   d. After bubbling subsides (10 minutes), hose down remaining slurry with high pressure clean water.
   e. Rinse immediately to avoid formation on the surface of salts that are difficult to remove.
   f. Thoroughly rinse to remove any residual acid surface condition that may impair adhesion.
3. Ensure surface is completely dry before application of coating.
4. Apply acid etching to obtain a “grit sandpaper” surface profile. If not, repeat treatment.

C. Solvent Cleaning:

1. Consists of removal of foreign matter such as oil, grease, soil, drawing and cutting compounds, and any other surface contaminants by using solvents, emulsions, cleaning compounds, steam cleaning, or similar materials and methods that involve a solvent or cleaning action.
2. Meet requirements of SSPC SP 1.

3.06 APPLICATION

A. General:

1. The intention of these Specifications is for existing and new**,** interior and exterior wood, masonry, concrete, metal, and submerged metal surfaces to be painted, whether specifically mentioned or not, except as specified otherwise. Do not paint exterior concrete surfaces, unless specifically indicated**.**
2. Extent of Coating (Immersion): Coatings shall be applied to internal vessel and pipe surfaces, nozzle bores, flange gasket sealing surfaces, carbon steel internals, and stainless steel internals, unless otherwise specified.
3. For coatings subject to immersion, obtain full cure for completed system. Consult coatings manufacturer's written instructions for these requirements. Do not immerse coating until completion of curing cycle.
4. Apply coatings in accordance with these Specifications and paint manufacturers' printed recommendations and special details. The more stringent requirements shall apply. Allow sufficient time between coats to assure thorough drying of previously applied paint.
5. Sand wood lightly between coats to achieve required finish.
6. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
7. Fusion Bonded Coatings Method Application: Electrostatic, fluidized bed, or flocking.
8. Coat units or surfaces to be bolted together or joined closely to structures or to one another prior to assembly or installation.
9. Water-Resistant Gypsum Board: Use only solvent type paints and coatings.
10. Keep paint materials sealed when not in use.
11. Where more than one coat is applied within a given system, alternate colors to provide a visual reference showing required number of coats have been applied.

B. Galvanized Metal, Copper, and Nonferrous Metal Alloys:

1. Concealed galvanized, copper, and nonferrous metal alloy surfaces (behind building panels or walls) do not require painting, unless specifically indicated herein.
2. Prepare surface and apply primer in accordance with System No. 10 specification.
3. Apply intermediate and finish coats of the coating system appropriate for the exposure.

C. Porous Surfaces, Such As Concrete and Masonry:

1. Filler/Surfacer: Use coating manufacturer's recommended product to fill air holes, bug holes, and other surface voids or defects.
2. Prime Coat: May be thinned to provide maximum penetration and adhesion.
   a. Type and Amount of Thinning: Determined by paint manufacturer and dependent on surface density and type of coating.
3. Surface Specified to Receive Water Base Coating: Damp, but free of running water, just prior to application of coating.

D. Film Thickness and Coverage:

1. Number of Coats:
   a. Minimum required without regard to coating thickness.
   b. Additional coats may be required to obtain minimum required paint thickness, depending on method of application, differences in manufacturers' products, and atmospheric conditions.
2. Application Thickness:
   a. Do not exceed coating manufacturer's recommendations.
   b. Measure using a wet film thickness gauge to ensure proper coating thickness during application.

3. Film Thickness Measurements and Electrical Inspection of Coated Surfaces:
   a. Perform with properly calibrated instruments.
   b. Recoat and repair as necessary for compliance with specification.
   c. Coats are subject to inspection by Engineer and coating manufacturer's representative.
4. Visually inspect concrete, masonry, nonferrous metal, plastic, and wood surfaces to ensure proper and complete coverage has been attained.
5. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
6. Apply additional coats as required to achieve complete hiding of underlying coats. Hiding shall be so complete that additional coats would not increase the hiding.

3.07 PROTECTIVE COATINGS SYSTEMS AND APPLICATION SCHEDULE

A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

B. As shown in Finish Schedule on Drawings. Additional requirements are included in the Piping Schedule.

C. Not all finishes listed below will be used on this project.

D. System No. 1 Submerged Metal—Potable Water:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning	NSF Epoxy	3 coats, 3 MDFTPC

1. Use on the following items or areas:
   a. Metal surfaces new and existing below a plane 1 foot above the maximum liquid surface; metal surfaces above the maximum liquid surface that are a part of the immersed equipment; surfaces of metallic items, access manholes, gate guides and thimbles, and structural steel that are embedded in concrete; and the following specific surfaces:

E. System No. 2 Submerged Metal—Domestic Sewage:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 5, White Metal Blast Cleaning	Prime in accordance with manufacturer's recommendations	
	Coal-Tar Epoxy -OR- High Build Epoxy	2 coats, 16 MDFT 2 coats, 16 MDFT

1. Use on the following items or areas:
   a. Metal surfaces new and existing below a plane 1 foot above maximum liquid surface, metal surfaces above maximum liquid surface that are a part of immersed equipment, concrete embedded surfaces of metallic items, access manholes, gate guides and thimbles, and structural steel, and the following specific surfaces:

F. System No. 4 Exposed Metal—Highly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer—Ferrous Metal	1 coat, 2.5 MDFT
	High Build Epoxy	1 coat, 4 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
    a. Exposed metal surfaces, new and existing located inside or outside of structures and exposed to weather.

G. System No. 5 Exposed Metal—Mildly Corrosive:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer—Ferrous Metal	1 coat, 2.5 MDFT
	Polyurethane Enamel	1 coat, 3 MDFT

1. Use on the following items or areas:
    a. Exposed metal surfaces, new and existing located inside or outside of structures and exposed to weather or in a highly humid atmosphere, such as pipe galleries and similar areas.

H. System No. 6 Exposed Metal—Atmospheric:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust-Inhibitive Primer	1 coat, 2 MDFT
	Alkyd Enamel	2 coats, 4 MDFT

1. Use on the following items or areas:
    a. Exposed metal surfaces, new and existing located inside or outside of structures or exposed to weather, including metal doors and frames, vents, louvers, exterior metal ductwork, flashing, sheet metalwork and miscellaneous architectural metal trim.
    b. Apply surface preparation and primer to surfaces prior to installation. Finish coats need only be applied to surfaces exposed after completion of construction.

I. System No. 7 Concrete Encased Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Coal-Tar Epoxy	2 coats, 16 MDFT
	High Build Epoxy	

1. Use on the following items or areas:
    a. Use on concrete encased ferrous metals including access manholes, gate guides, and thimbles; and the following specific surfaces:

J. System No. 8 Buried Metal—General:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Standard Hot Coal-Tar Enamel -OR- Coal-Tar Epoxy	AWWA C203 2 coats, 16 MDFT
	For Highly Abrasive Soil, Brackish Water: Tape Coat System	AWWA C214 with Double Outer Wrap

1. Use on the following items or areas:
   a. Buried, belowgrade portions of steel items, except buried stainless steel or ductile iron

K. System No. 10 Galvanized Metal, Copper, and Nonferrous Metal Alloy Conditioning:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Epoxy Primer—Other	As recommended by coating manufacturer Remaining coats as required for exposure

1. Use on the following items or areas:
   a. Galvanized surfaces requiring painting.
   b. After application of System No. 10, apply finish coats as required for exposure.

L. System No. 11 Faying Surfaces of Slip Critical Bolted Connections:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Organic Zinc Rich Primer	1 coat, 3 MDFT

1. Use on faying surfaces of slip critical joints as specified and as shown on Drawings.
2. Provide primer in accordance with RCSC Specification for Structural Joints using High-Strength Bolts.

M. System No. 12 Skid-Resistant—Steel:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Epoxy Primer—Ferrous Metal	1 coat, 2.5 MDFT
	Epoxy Nonskid (Aggregated)	1 coat, 16 MDFT

N. System No. 13 Skid-Resistant—Aluminum and FRP:

Surface Prep.	Paint Material	Min. Coats, Cover

Aluminum: In accordance with Article Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation -OR- FRP: In accordance with Article Plastic and FRP Surface Preparation	Epoxy Nonskid (Aggregated)	1 coat, 16 MDFT

O. System No. 14 High Heat-Resistant—700 Degrees F Maximum:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Inorganic Zinc Primer	1 coat, 2.5 MDFT
	Silicone	1 coat, 2 MDFT

P. System No. 15 Heat-Resistant—425 Degrees F Maximum:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Inorganic Zinc Primer	1 coat, 2.5 MDFT
	Silicone Acrylic (limited colors)	2 coats, 2 MDFT

Q. System No. 16 Elastomeric Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
Concrete: In accordance with Paragraph Concrete Surface Preparation -OR-Masonry: In accordance with Paragraph Masonry Surface Preparation -OR- Steel: SP 5, White Metal Blast Cleaning	Prime in accordance with manufacturer's recommendations	
	Elastomeric Polyurethane	1 coat, 32 SFPG

R. System No. 19a Concrete Exposed Metal Repair Coating—Wastewater:

Surface Prep.	Paint Material	Min. Coats, Cover
Brush blast concrete in accordance with Paragraph Concrete Surface Preparation; blast exposed reinforcing steel to Near White Metal, SSPC SP10. See Note 1.	Amine-cured epoxy, suitable for exposure to primary wastewater, finish color gray.	2 coats, 8 MDFTPC, see Note 2.
Note 1. Surface Preparation Alternative: Mechanical abrade concrete surfaces to meet International Concrete Restoration Association standard 37/32, Concrete Surface Profile No. 3. Mechanically abrade exposed ends of reinforcing steel in accordance with SSPC SP-11. Note 2. Brush out surface voids and irregularities to provide a monolithic film.		

1. On saw-cut concrete surfaces that will not receive new concrete to cover exposed ends of rebar and metal embeds. Or alternately, where approved, over ends of and minimum two inches around ends of exposed metal and rebar in lieu of entire surface.

S. System No. 20 Concrete Tank Lining—Other:

1. Use on the following items or areas:
   a. Concrete surfaces below a plane 1 foot above maximum liquid surface.

T. System No. 21 Skid-Resistant—Concrete:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Epoxy Nonskid (Aggregated)	1 coat, 160 SFPG

U. System No. 27 Aluminum and Dissimilar Metal Insulation:

Surface Prep.	Paint Material	Min. Coats, Cover
Solvent Clean (SP 1)	Prime in accordance with manufacturer's recommendations	
	Bituminous Paint	1 coat, 10 MDFT

1. Use on aluminum surfaces embedded or in contact with concrete.

V. System No. 29A Fusion Bonded, Steel Dowel Coating:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 10, Near-White Blast Cleaning	Fusion Bonded Coating 100% Solids Epoxy	1 or 2 coats, 7 MDFT

Surface Prep.	Paint Material	Min. Coats, Cover
TFE Lube, Shop Applied; Grease Lube Alternative, Field Applied Just Prior to Installation	TFE Lube or Grease Lube	1 coat, as required

1. Use on steel expansion joint dowels as specified in Section 03 15 00, Concrete Joints and Accessories.

W. System No. 30 Moisture-Cure Polyurethane.

X. System No. 31 Direct-to-Metal Acrylic.

3.08 ARCHITECTURAL PAINT SYSTEMS AND APPLICATION SCHEDULE

A. Unless otherwise shown or specified, paint surfaces in accordance with the following application schedule. In the event of discrepancies or omissions in the following, request clarification from Engineer before starting work in question.

B. As shown in Finish Schedule on Drawings. Additional requirements are included in the Piping Schedule.

C. System No. 101 Wood, Stained (Interior or Exterior):

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Wood Surface Preparation	Wood Stain Solid	2 coats, 250 SFPGPC

1. Use on the following items or areas:
   a. Building 700 existing exterior wood trim.

D. System No. 102 Wood, Semigloss (Interior or Exterior):

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Wood Surface Preparation	Alkyd Wood Primer	1 coat, 400 SFPG
	Alkyd (Semigloss)	1 coat, 400 SFPG

E. System No. 106 Galvanized Metal:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Galvanized Metal, Copper, and Nonferrous Metal Alloy Surface Preparation	Manufacturer's Recommended Primer	1 coat, as recommended by manufacturer
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

1. Use on the following items or areas:
   a. Hollow metal frames and doors.

F. System No. 107 Metal Trim and Structural Steel:

Surface Prep.	Paint Material	Min. Coats, Cover
SP 6, Commercial Blast Cleaning	Rust-Inhibitive Primer	1 coat, 2 MDFT
	Alkyd Enamel (Semigloss)	2 coats, 4 MDFT

G. System No. 108 Masonry, Flat:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Acrylic Latex (Flat)	2 coats, 240 SFPGPC

H. System No. 109 Masonry, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

1. Use on the following items or areas:
   a. Building 700 interior masonry walls.

I. System No. 110 Masonry Sealer:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Acrylic Sealer	2 coats, 100 SFPGPC

J. System No. 111 Concrete and Masonry, Stain and Seal:

Surface Prep.	Paint Material	Min. Coats, Cover
Concrete: In accordance with Paragraph Concrete Surface Preparation -OR- Masonry: In accordance with Paragraph Masonry Surface Preparation	Stain, Concrete	2 coats, 250 SFPGPC
	Acrylic Sealer	2 coats, 100 SFPGPC

K. System No. 112 Concrete, Flat:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Acrylic Latex (Flat)	2 coats, 240 SFPGPC

L. System No. 113 Concrete, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Acrylic Latex (Semigloss)	2 coats, 240 SFPGPC

M. System No. 114 Gypsum Board and Plaster, Flat:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Gypsum Board Surface preparation	Latex Primer Sealer	1 coat, 350 SFPG
	Acrylic Latex (Flat)	2 coats, 240 SFPGPC

N. System No. 115 Gypsum Board and Plaster, Semigloss:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Gypsum Board Surface Preparation	Latex Primer/Sealer	1 coat, 350 SFPG
	Acrylic Latex (Semigloss) or Alkyd (Semigloss)	2 coats, 400 SFPGPC

O. System No. 116 Gypsum Board and Plaster, Gloss Epoxy:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Gypsum Board Surface Preparation	Manufacturer's Recommended Primer	1 coat, 350 SFPG
	Water Base Epoxy (Gloss)	1 coat, 250 SFPG

P. System No. 117 Concrete Masonry, Gloss Epoxy:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Masonry Surface Preparation	Block Filler	1 coat, 75 SFPG
	Water Base Epoxy (Gloss)	2 coats, 300 SFPGPC

1. Use on the following items or areas:
   a. Toilet room and shower.

Q. System No. 121 Concrete, Skid-Resistant:

Surface Prep.	Paint Material	Min. Coats, Cover
In accordance with Paragraph Concrete Surface Preparation	Epoxy Nonskid (Aggregated)	1 coat, 160 SFPG

1. Use on the following items or areas:
   a. Toilet room and shower floor.

3.09 COLORS

A. Provide selected by Owner or Engineer**.**

B. Proprietary identification of colors is for identification only. Selected manufacturer may supply matches.

C. Equipment Colors:

1. Equipment includes the machinery or vessel itself plus the structural supports and fasteners and attached electrical conduits.
2. Paint equipment and piping one color as selected.
3. Paint nonsubmerged portions of equipment the same color as the piping it serves, except as itemized below:
   a. Dangerous Parts of Equipment and Machinery: OSHA Orange.
   b. Fire Protection Equipment and Apparatus: OSHA Red.
   c. Radiation Hazards: OSHA Purple.
   d. Physical hazards in normal operating area and energy lockout devices, including, but not limited to, electrical disconnects for equipment and equipment isolation valves in air and liquid lines under pressure: OSHA Yellow.

3.10 FIELD QUALITY CONTROL

A. Testing Equipment:

1. Provide calibrated electronic type dry film thickness gauge to test coating thickness specified in mils.
2. Provide low-voltage wet sponge electrical holiday detector to test completed coating systems, 20 mils dry film thickness or less, except zinc primer, high-build elastomeric coatings, and galvanizing, for pinholes, holidays, and discontinuities, as manufactured by Tinker and Rasor, San Gabriel, CA, Model M-1.
3. Provide high-voltage spark tester to test completed coating systems in excess of 20 mils dry film thickness. Unit as recommended by coating manufacturer.

B. Testing:

1. Thickness and Continuity Testing:
   a. Measure coating thickness specified in mils with a magnetic type, dry film thickness gauge, in accordance with SSPC PA 2. Check each coat for correct millage. Do not make measurement before a minimum of 8 hours after application of coating.
   b. Holiday detect coatings 20 mils thick or less, except zinc primer and galvanizing, with low voltage wet sponge electrical holiday detector in accordance with NACE SP0188.
   c. Holiday detect coatings in excess of 20 mils dry with high voltage spark tester as recommended by coating manufacturer and in accordance with NACE SP0188.
   d. After repaired and recoated areas have dried sufficiently, retest each repaired area. Final tests may also be conducted by Engineer.

C. Inspection: Leave staging and lighting in place until Engineer has inspected surface or coating. Replace staging removed prior to approval by Engineer. Provide additional staging and lighting as requested by Engineer.

D. Unsatisfactory Application:

1. If item has an improper finish color or insufficient film thickness, clean surface and topcoat with specified paint material to obtain specified color and coverage. Obtain specific surface preparation information from coating manufacturer.
2. Evidence of runs, bridges, shiners, laps, or other imperfections is cause for rejection.
3. Repair defects in accordance with written recommendations of coating manufacturer.

E. Damaged Coatings, Pinholes, and Holidays:

1. Hand or power sand visible areas of chipped, peeled, or abraded paint, and feather edges. Follow with primer and finish coat. Depending on extent of repair and appearance, a finish sanding and topcoat may be required.
2. Remove rust and contaminants from metal surface. Provide surface cleanliness and profile in accordance with surface preparation requirements for specified paint system.
3. Feather edges and repair in accordance with recommendations of paint manufacturer.
4. Apply finish coats, including touchup and damage-repair coats in a manner that will present a uniform texture and color-matched appearance.

3.11 MANUFACTURER'S SERVICES

A. In accordance with Section 01 43 33, Manufacturers' Field Services, coating manufacturer's representative shall be present at Site as follows:

1. On first day of application of any coating system.
2. A minimum of two additional Site inspection visits, each for a minimum of 4 hours, in order to provide Manufacturer's Certificate of Proper Installation.
3. As required to resolve field problems attributable to or associated with manufacturer's product.
4. To verify full cure of coating prior to coated surfaces being placed into immersion service.

3.12 CLEANUP

A. Place cloths and waste that might constitute a fire hazard in closed metal containers or destroy at end of each day.

B. Upon completion of the Work, remove staging, scaffolding, and containers from Site or destroy in a legal manner.

C. Remove paint spots, oil, or stains upon adjacent surfaces and floors and leave entire job clean.

END OF SECTION

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
1	001-FIT-0000	001-FI-0000	N/A	008-N-601	Raw Sewage - Flow	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	120V AC	Existing Influent Flow Meter
2	100-SS-0001	100-FC-0001	100-SS-0001	008-N-601	Influent Automatic Sampler - Flow Setpoint	100-CP-001 (Headworks SCADA Panel)	AO	4-20mA	120V AC	
3	100-SS-0001	100-XA-0001	100-SS-0001	008-N-601	Influent Automatic Sampler - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
4	100-LSH-0002	100-LAH-0002	N/A	008-N-601	Headworks Channel - High Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
5	100-FS-0010	100-LAH-0010	100-FS-0010	008-N-601	Fine Screen - High Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From Fine Screen Local Control Panel 100-LCP-0010
6	100-FS-0010	100-YN-0010	100-FS-0010	008-N-601	Fine Screen - In Remote	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From Fine Screen Local Control Panel 100-LCP-0010
7	100-FS-0010	100-MN-0010	100-FS-0010	008-N-601	Fine Screen - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From Fine Screen Local Control Panel 100-LCP-0010
8	100-FS-0010	100-XA-0010	100-FS-0010	008-N-601	Fine Screen - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From Fine Screen Local Control Panel 100-LCP-0010
9	100-FS-0010	100-HAS-0010	100-FS-0010	008-N-601	Fine Screen - E-Stop	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From Fine Screen Local Control Panel 100-LCP-0010
10	100-FS-0010	100-MH-0010	100-FS-0010	008-N-601	Fine Screen - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	To Fine Screen Local Control Panel 100-LCP-0010
11	100-BP-0070	100-PAL-0070	100-BP-0070	008-N-601	Wash Water Booster Pump - Low Pressure	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
12	100-BP-0070	100-XA-0070	100-BP-0070	008-N-601	Wash Water Booster Pump - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
13	100-LSHH-0080	100-LAHH-0080	N/A	008-N-601	Headworks Bldg - Mech. Room Sump High Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
14	100-LCP-0020A	100-HAS-0020A	100-LCP-0020	008-N-602	Grit Removal LCP - E-Stop	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Classifier Equipment Package
15	100-GC-0020	100-MN-0020	100-GC-0020	008-N-602	Grit Classifier - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Classifier Equipment Package
16	100-GC-0020	100-YN-0020	100-GC-0020	008-N-602	Grit Classifier - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Classifier Equipment Package
17	100-GC-0020	100-HAS-0020	100-GC-0020	008-N-602	Grit Classifier - E-Stop	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	Provided with Grit Classifier Equipment Package
18	100-GC-0020	100-XA-0020	100-GC-0020	008-N-602	Grit Classifier - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	Provided with Grit Classifier Equipment Package
19	100-P-0030	100-YN-0030	100-P-0030	008-N-602	Grit Pump - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Pump Equipment Package
20	100-P-0030	100-XA-0030	100-P-0030	008-N-602	Grit Pump - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	Provided with Grit Pump Equipment Package
21	100-P-0030	100-MN-0030	100-P-0030	008-N-602	Grit Pump - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Pump Equipment Package
22	100-P-0030	100-HAS-0030	100-P-0030	008-N-602	Grit Pump - E-Stop	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	Provided with Grit Pump Equipment Package
23	100-GV-0040	100-YN-0040	100-GV-0040	008-N-602	Grit Vortex - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Vortex Equipment Package
24	100-GV-0040	100-XA-0040	100-GV-0040	008-N-602	Grit Vortex - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	Provided with Grit Vortex Equipment Package
25	100-GV-0040	100-MN-0040	100-GV-0040	008-N-602	Grit Vortex - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	Provided with Grit Vortex Equipment Package
26	100-GV-0040	100-HAS-0040	100-GV-0040	008-N-602	Grit Vortex - E-Stop	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	Provided with Grit Vortex Equipment Package
27	100-CON-0050	100-YN-0050	100-CON-0050	008-N-602	Screenings & Grit Conveyor - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
28	100-CON-0050	100-HAS-0050	100-CON-0050	008-N-602	Screenings & Grit Conveyor - E-Stop	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
29	100-CON-0050	100-MH-0050	100-CON-0050	008-N-602	Screenings & Grit Conveyor - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
30	200-FIT-0000	200-FI-0000	N/A	008-N-603	Primary Sludge - Flow to Decant Tanks	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	120V AC	
31	200-FIT-0001	200-FI-0001	N/A	008-N-603	Primary Sludge - Flow - Drain to MBBR	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	120V AC	
32	200-FV-0110A	200-ZIO-0110A	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1A - Opened	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
33	200-FV-0110A	200-ZIC-0110A	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1A - Closed	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
34	200-FV-0110A	200-XA-0110A	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1A - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
35	200-FV-0110A	200-YN-0110A	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1A - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
36	200-FV-0110A	200-VH-0110A	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1A - Open Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
37	200-FV-0110A	200-VL-0110A	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1A - Close Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
38	200-FV-0110B	200-ZIO-0110B	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1B - Opened	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
39	200-FV-0110B	200-ZIC-0110B	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1B - Closed	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
40	200-FV-0110B	200-XA-0110B	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1B - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
41	200-FV-0110B	200-YN-0110B	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1B - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
42	200-FV-0110B	200-VH-0110B	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1B - Open Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
43	200-FV-0110B	200-VL-0110B	200-T-0110	008-N-603	Primary Sludge Drawoff Valve No. 1B - Close Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
44	200-FV-0120A	200-ZIO-0120A	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2A - Opened	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
45	200-FV-0120A	200-ZIC-0120A	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2A - Closed	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
46	200-FV-0120A	200-XA-0120A	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2A - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
47	200-FV-0120A	200-YN-0120A	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2A - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
48	200-FV-0120A	200-VH-0120A	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2A - Open Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
49	200-FV-0120A	200-VL-0120A	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2A - Close Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
50	200-FV-0120B	200-ZIO-0120B	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2B - Opened	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
51	200-FV-0120B	200-ZIC-0120B	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2B - Closed	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
52	200-FV-0120B	200-XA-0120B	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2B - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
53	200-FV-0120B	200-YN-0120B	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2B - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
54	200-FV-0120B	200-VH-0120B	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2B - Open Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
55	200-FV-0120B	200-VL-0120B	200-T-0120	008-N-603	Primary Sludge Drawoff Valve No. 2B - Close Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
56	200-FV-0130A	200-ZIO-0130A	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3A - Opened	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
57	200-FV-0130A	200-ZIC-0130A	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3A - Closed	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
58	200-FV-0130A	200-XA-0130A	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3A - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
59	200-FV-0130A	200-YN-0130A	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3A - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
60	200-FV-0130A	200-VH-0130A	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3A - Open Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
61	200-FV-0130A	200-VL-0130A	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3A - Close Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
62	200-FV-0130B	200-ZIO-0130B	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3B - Opened	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
63	200-FV-0130B	200-ZIC-0130B	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3B - Closed	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
64	200-FV-0130B	200-XA-0130B	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3B - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
65	200-FV-0130B	200-YN-0130B	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3B - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
66	200-FV-0130B	200-VH-0130B	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3B - Open Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
67	200-FV-0130B	200-VL-0130B	200-T-0130	008-N-603	Primary Sludge Drawoff Valve No. 3B - Close Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
67	200-SC-0111	200-YN-0111	200-T-0110	008-N-603	Primary Clarifier No. 1 Sludge Scraper - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
68	200-SC-0111	200-MN-0111	200-T-0110	008-N-603	Primary Clarifier No. 1 Sludge Scraper - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
69	200-SC-0111	200-XA-0111	200-T-0110	008-N-603	Primary Clarifier No. 1 Sludge Scraper - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
70	200-SC-0111	200-NAH-0111	200-T-0110	008-N-603	Primary Clarifier No. 1 Sludge Scraper - High Torque	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
71	200-SC-0111	200-NAHH-0111	200-T-0110	008-N-603	Primary Clarifier No. 1 Sludge Scraper - High Torque Shutdown	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
71	200-SC-0111	200-MH-0111	200-T-0110	008-N-603	Primary Clarifier No. 1 Sludge Scraper - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
71	200-SC-0121	200-YN-0121	200-T-0120	008-N-603	Primary Clarifier No. 2 Sludge Scraper - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
72	200-SC-0121	200-MN-0121	200-T-0120	008-N-603	Primary Clarifier No. 2 Sludge Scraper - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
73	200-SC-0121	200-XA-0121	200-T-0120	008-N-603	Primary Clarifier No. 2 Sludge Scraper - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
74	200-SC-0121	200-NAH-0121	200-T-0120	008-N-603	Primary Clarifier No. 2 Sludge Scraper - High Torque	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
75	200-SC-0121	200-NAHH-0121	200-T-0120	008-N-603	Primary Clarifier No. 2 Sludge Scraper - High Torque Shutdown	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
76	200-SC-0121	200-MH-0121	200-T-0120	008-N-603	Primary Clarifier No. 2 Sludge Scraper - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
77	200-SC-0131	200-YN-0131	200-T-0130	008-N-603	Primary Clarifier No. 3 Sludge Scraper - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
78	200-SC-0131	200-MN-0131	200-T-0130	008-N-603	Primary Clarifier No. 3 Sludge Scraper - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
79	200-SC-0131	200-XA-0131	200-T-0130	008-N-603	Primary Clarifier No. 3 Sludge Scraper - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
80	200-SC-0131	200-NAH-0131	200-T-0130	008-N-603	Primary Clarifier No. 3 Sludge Scraper - High Torque	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
81	200-SC-0131	200-NAHH-0131	200-T-0130	008-N-603	Primary Clarifier No. 3 Sludge Scraper - High Torque Shutdown	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
82	200-SC-0131	200-MH-0131	200-T-0130	008-N-603	Primary Clarifier No. 3 Sludge Scraper - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	
83	200-P-0020	200-YN-0020	200-LCP-0020	008-N-603	Scum Pump - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
84	200-P-0020	200-XA-0020	200-LCP-0020	008-N-603	Scum Pump - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
85	200-P-0020	200-MN-0020	200-LCP-0020	008-N-603	Scum Pump - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
86	200-P-0020	200-LALL-0020	200-LCP-0020	008-N-603	Scum Pump - Low Low Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
87	200-P-0020	200-LAL-0020	200-LCP-0020	008-N-603	Scum Pump - Low Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
88	200-P-0020	200-LAH-0020	200-LCP-0020	008-N-603	Scum Pump - High Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
89	200-P-0020	200-LAHH-0020	200-LCP-0020	008-N-603	Scum Pump - High High Level Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
90	200-P-0020	200-MH-0020	200-LCP-0020	008-N-603	Scum Pump - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NC CONTACT	N/A	
91	200-P-0010A	200-MH-0010A	200-P-0010A	008-N-603	Primary Sludge Pump No. 1 - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	From MCC
92	200-P-0010A	200-YN-0010A	200-P-0010A	008-N-603	Primary Sludge Pump No. 1 - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From MCC
93	200-P-0010A	200-XA-0010A	200-P-0010A	008-N-603	Primary Sludge Pump No. 1 - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From MCC
94	200-P-0010A	200-MN-0010A	200-P-0010A	008-N-603	Primary Sludge Pump No. 1 - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From MCC
95	200-PSL-0011A	200-PAL-0011A	200-P-0110A	008-N-603	Primary Sludge Pump No. 1 - Suction Pressure Low Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
96	200-PSH-0012A	200-PAH-0012A	200-P-0110A	008-N-603	Primary Sludge Pump No. 1 - Discharge Pressure High Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
97	200-P-0010B	200-PAH-0010B	200-P-0010B	008-N-603	Primary Sludge Pump No. 2 - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	From MCC
98	200-P-0010B	200-YN-0010B	200-P-0010B	008-N-603	Primary Sludge Pump No. 2 - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From MCC
99	200-P-0010B	200-XA-0010B	200-P-0010B	008-N-603	Primary Sludge Pump No. 2 - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From MCC
100	200-P-0010B	200-MN-0010B	200-P-0010B	008-N-603	Primary Sludge Pump No. 2 - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From MCC
101	200-PSL-0011B	200-PAL-0011B	200-P-0110B	008-N-603	Primary Sludge Pump No. 2 - Suction Pressure Low Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
102	200-PSH-0012B	200-PAH-0012B	200-P-0110B	008-N-603	Primary Sludge Pump No. 2 - Discharge Pressure High Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
103	200-P-0010C	200-MH-0010C	200-P-0010C	008-N-603	Primary Sludge Pump No. 3 - Run Command	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	From MCC
104	200-P-0010C	200-YN-0010C	200-P-0010C	008-N-603	Primary Sludge Pump No. 3 - Auto	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From MCC
105	200-P-0010C	200-XA-0010C	200-P-0010C	008-N-603	Primary Sludge Pump No. 3 - Fault	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From MCC
106	200-P-0010C	200-MN-0010C	200-P-0010C	008-N-603	Primary Sludge Pump No. 3 - Running	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	From MCC
107	200-PSL-0011C	200-PAL-0011C	200-P-0010C	008-N-603	Primary Sludge Pump No. 3 - Suction Pressure Low Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
108	200-PSH-0012C	200-PAH-0012C	200-P-0010C	008-N-603	Primary Sludge Pump No. 3 - Discharge Pressure High Alarm	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
109	200-LSHH-0030	200-LAHH-0030	200-PS-0030	008-N-603	Pipe Gallery Sump Pump Station - High High Level	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	
110	600-BL-0010A	600-MH-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010A
111	600-BL-0010A	600-YN-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010A
112	600-BL-0010A	600-XW-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Warning	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010A
113	600-BL-0010A	600-MN-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010A
114	600-BL-0010A	600-XA-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010A
115	600-BL-0010A	600-MR-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Remote Reset	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010A
116	600-BL-0010A	600-MP-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Permissive	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010A
117	600-BL-0010A	600-SC-0010A	600-BL-0010A	008-N-604	Aeration Blower No. 1 - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	From 600-LCP-0010A
118	600-BL-0010B	600-MH-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010B
119	600-BL-0010B	600-YN-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010B

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
120	600-BL-0010B	600-XW-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Warning	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010B
121	600-BL-0010B	600-MN-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010B
122	600-BL-0010B	600-XA-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010B
123	600-BL-0010B	600-MR-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Remote Reset	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010B
124	600-BL-0010B	600-MP-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Permissive	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010B
125	600-BL-0010B	600-SC-0010B	600-BL-0010B	008-N-604	Aeration Blower No. 2 - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	From 600-LCP-0010B
126	600-BL-0010C	600-MH-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010C
127	600-BL-0010C	600-YN-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010C
128	600-BL-0010C	600-XW-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Warning	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010C
129	600-BL-0010C	600-MN-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010C
130	600-BL-0010C	600-XA-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010C
131	600-BL-0010C	600-MR-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Remote Reset	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010C
132	600-BL-0010C	600-MP-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Permissive	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010C
133	600-BL-0010C	600-SC-0010C	600-BL-0010C	008-N-604	Aeration Blower No. 3 - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	From 600-LCP-0010C
134	600-BL-0010D	600-MH-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010D
135	600-BL-0010D	600-YN-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010D
136	600-BL-0010D	600-XW-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Warning	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010D
137	600-BL-0010D	600-MN-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From 600-LCP-0010D
138	600-BL-0010D	600-XA-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From 600-LCP-0010D
139	600-BL-0010D	600-MR-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Remote Reset	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010D
140	600-BL-0010D	600-MP-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Permissive	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From 600-LCP-0010D
141	600-BL-0010D	600-SC-0010D	600-BL-0010D	008-N-604	Aeration Blower No. 4 - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	From 600-LCP-0010D
142	100-SRS-0060	100-FI-0060	100-SRS-0060	008-N-605	Septage Receiving Station - Flow	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	120V AC	Provided with Septage Receiving Station Package
143	100-LSH-0002A	100-LAH-0002A	100-CP-001	008-N-605	Headworks Channel - High Level Alarm	100-CP-001 (Headworks SCADA Panel)	DO	NC CONTACT	N/A	Signal from 100-CP-001 to 100-LCP-0060
144	100-AE-0102A	100-AI-0102A	100-GP-0102	008-N-606	Gas Analyzer - O2 Level (Headworks)	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	N/A	From Gas Detection Panel 100-GP-102
145	100-AE-0102B	100-AI-0102B	100-GP-0102	008-N-606	Gas Analyzer - H2S Level (Headworks)	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	N/A	From Gas Detection Panel 100-GP-102
146	100-AE-0103A	100-AI-0103A	100-GP-0102	008-N-606	Gas Analyzer - LEL Level (Headworks)	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	N/A	From Gas Detection Panel 100-GP-102
147	100-AE-0102A	100-AAH-0102A	100-GP-0102	008-N-606	Gas Analyzer - O2 High Level (Headworks)	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From Gas Detection Panel 100-GP-102
148	100-AE-0102B	100-AAH-0102B	100-GP-0102	008-N-606	Gas Analyzer - H2S High Level (Headworks)	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From Gas Detection Panel 100-GP-102
149	100-AE-0103A	100-AAH-0103A	100-GP-0102	008-N-606	Gas Analyzer - LEL High Level (Headworks)	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	N/A	From Gas Detection Panel 100-GP-102
150	100-AIT-0102	100-XA-0102	100-GP-0102	008-N-606	Gas Analyzer (1) - Fault (Headworks)	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	120V AC	From Gas Detection Panel 100-GP-102
151	100-AIT-0103	100-XA-0103	100-GP-0102	008-N-606	Gas Analyzer (2) - Fault (Headworks)	100-CP-001 (Headworks SCADA Panel)	DI	NC CONTACT	120V AC	From Gas Detection Panel 100-GP-102
152	100-OS-0102	100-OS-0102	100-GP-0102	008-N-606	Gas Panel - 'HORN SILENCE' From SCADA (Headworks)	100-CP-001 (Headworks SCADA Panel)	DO	NO CONTACT	N/A	Wired to Gas Detection Panel 100-GP-102
153	100-HS-0102A	100-HS-0102A	100-GP-0102	008-N-606	Gas Panel - 'SILENCE' Button (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	N/A	Wired to Gas Detection Panel 100-GP-102
154	100-HS-0102B	100-HS-0102B	100-GP-0102	008-N-606	Gas Panel - 'SILENCE' Button (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	N/A	Wired to Gas Detection Panel 100-GP-102
155	100-HS-0102C	100-HS-0102C	100-GP-0102	008-N-606	Gas Panel - 'SILENCE' Button (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	N/A	Wired to Gas Detection Panel 100-GP-102
156	100-HS-0102D	100-HS-0102D	100-GP-0102	008-N-606	Gas Panel - 'SILENCE' Button (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	N/A	Wired to Gas Detection Panel 100-GP-102
157	100-YA-0102A	100-YA-0102A	100-GP-0102	008-N-606	Gas Panel - Horn 1 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
158	100-YL-0102A	100-YL-0102A	100-GP-0102	008-N-606	Gas Panel - Strobe 1 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
159	100-YA-0102B	100-YA-0102B	100-GP-0102	008-N-606	Gas Panel - Horn 2 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
160	100-YL-0102B	100-YL-0102B	100-GP-0102	008-N-606	Gas Panel - Strobe 2 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
161	100-YA-0102C	100-YA-0102C	100-GP-0102	008-N-606	Gas Panel - Horn 3 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
162	100-YL-0102C	100-YL-0102C	100-GP-0102	008-N-606	Gas Panel - Strobe 3 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
163	100-YA-0102D	100-YA-0102D	100-GP-0102	008-N-606	Gas Panel - Horn 4 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
164	100-YL-0102D	100-YL-0102D	100-GP-0102	008-N-606	Gas Panel - Strobe 4 (Headworks)	100-GP-0102 (Headworks Gas Panel)	N/A	NO CONTACT	120V AC	Controlled from Gas Detection Panel 100-GP-102
165	100-EF-0001	100-MN-0001	100-EF-01	008-N-606	Exhaust Fan - Running (Building 100)	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
166	100-EF-0002	100-MN-0002	100-EF-02	008-N-606	Exhaust Fan - Running (Building 100)	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
167	100-EF-0003	100-MN-0003	100-EF-03	008-N-606	Exhaust Fan - Running (Building 100)	100-CP-001 (Headworks SCADA Panel)	DI	NO CONTACT	N/A	
168	100-TT-0100	100-TI-0100	N/A	008-N-606	Mechanical & Electrical Room Temperature (Building 100)	100-CP-001 (Headworks SCADA Panel)	AI	4-20mA	N/A	
169	600-EF-0001	600-MN-0001	600-EF-01	008-N-606	Exhaust Fan - Running (Building 600)	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
170	600-EF-0002	600-MN-0002	600-EF-02	008-N-606	Exhaust Fan - Running (Building 600)	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
171	600-EF-0003	600-MN-0003	600-EF-03	008-N-606	Exhaust Fan - Running (Building 600)	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
172	600-EF-0004	600-MN-0004	600-EF-04	008-N-606	Exhaust Fan - Running (Building 600)	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
173	600-TT-0100	600-TI-0100	N/A	008-N-606	Blower Room Temperature (Building 600)	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	
174	600-TT-0101	600-TI-0101	N/A	008-N-606	Mechanical & Electrical Room Temperature (Building 600)	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	
175	900-EF-0001	900-MN-0001	900-EF-01	008-N-606	Exhaust Fan - Running (Building 900)	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
176	900-EF-0002	900-MN-0002	900-EF-02	008-N-606	Exhaust Fan - Running (Building 900)	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
177	900-EF-0003	900-MN-0003	900-EF-03	008-N-606	Exhaust Fan - Running (Building 900)	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
178	900-EF-0004	900-MN-0004	900-EF-04	008-N-606	Exhaust Fan - Running (Building 900)	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
179	300-FIT-0000	300-FI-0000	N/A	008-N-607	Air Flow to MBBR	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
180	300-AIT-0110A	300-AI-0110A	300-T-0110A	008-N-607	MBBR CELL 1A - Dissolved Oxgen Level	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
181	300-AIT-0110A	300-XA-0110A	300-T-0110A	008-N-607	MBBR CELL 1A - Dissolved Oxgen Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
182	300-AIT-0110B	300-AI-0110B	300-T-0110B	008-N-607	MBBR CELL 1B - Dissolved Oxgen Level	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
183	300-AIT-0110B	300-XA-0110B	300-T-0110B	008-N-607	MBBR CELL 1B - Dissolved Oxgen Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
184	300-AIT-0120A	300-AI-0120A	300-T-0120A	008-N-607	MBBR CELL 2A - Dissolved Oxgen Level	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
185	300-AIT-0120A	300-XA-0120A	300-T-0120A	008-N-607	MBBR CELL 2A - Dissolved Oxgen Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
186	300-AIT-0130A	300-AI-0130A	300-T-0130A	008-N-607	MBBR CELL 3A - Dissolved Oxgen Level	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
187	300-AIT-0130A	300-XA-0130A	300-T-0130A	008-N-607	MBBR CELL 3A - Dissolved Oxgen Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
188	300-AIT-0130B	300-AI-0130B	300-T-0130B	008-N-607	MBBR CELL 3B - Dissolved Oxgen Level	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
189	300-AIT-0130B	300-XA-0130B	300-T-0130B	008-N-607	MBBR CELL 3B - Dissolved Oxgen Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
190	300-LSH-0110A	300-LAH-0110A	300-T-0110A	008-N-607	MBBR CELL 1A - High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
191	300-LSH-0110B	300-LAH-0110B	300-T-0110B	008-N-607	MBBR CELL 1B - High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
192	300-LSH-0120A	300-LAH-0120A	300-T-0120A	008-N-607	MBBR CELL 2A - High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
193	300-LSH-0130A	300-LAH-0130A	300-T-0130A	008-N-607	MBBR CELL 3A - High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
194	300-LSH-0130B	300-LAH-0130B	300-T-0130B	008-N-607	MBBR CELL 3B - High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
195	400-MX-0010	400-MH-0010	400-MX-0010	008-N-607	Rapid Mixer - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
196	400-MX-0010	400-YN-0010	400-MX-0010	008-N-607	Rapid Mixer - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
197	400-MX-0010	400-XA-0010	400-MX-0010	008-N-607	Rapid Mixer - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
198	400-MX-0010	400-MN-0010	400-MX-0010	008-N-607	Rapid Mixer - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
199	400-MX-0010	400-SI-0010	400-MX-0010	008-N-607	Rapid Mixer - Speed Indcation	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	
200	400-MX-0010	400-SC-0010	400-MX-0010	008-N-607	Rapid Mixer - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	
201	400-MX-0020	400-MH-0020	300-MX-0020	008-N-607	Flocculation Mixer - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
202	400-MX-0020	400-YN-0020	300-MX-0020	008-N-607	Flocculation Mixer - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
203	400-MX-0020	400-XA-0020	300-MX-0020	008-N-607	Flocculation Mixer - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
204	400-MX-0020	400-MN-0020	300-MX-0020	008-N-607	Flocculation Mixer - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
205	400-MX-0020	400-SI-0020	300-MX-0020	008-N-607	Flocculation Mixer - Speed Indcation	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	
206	400-MX-0020	400-SC-0020	300-MX-0020	008-N-607	Flocculation Mixer - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	
207	500-FV-0110A	500-ZIO-0110A	500-T-0110A	008-N-608	Secondary Sludge Drawoff Valve No. 1A - Opened	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
208	500-FV-0110A	500-ZIC-0110A	500-T-0110A	008-N-608	Secondary Sludge Drawoff Valve No. 1A - Closed	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
209	500-FV-0110A	500-XA-0110A	500-T-0110A	008-N-608	Secondary Sludge Drawoff Valve No. 1A - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
210	500-FV-0110A	500-YN-0110A	500-T-0110A	008-N-608	Secondary Sludge Drawoff Valve No. 1A - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
211	500-FV-0110A	500-VH-0110A	500-T-0110A	008-N-608	Secondary Sludge Drawoff Valve No. 1A - Open Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
212	500-FV-0110A	500-VL-0110A	500-T-0110A	008-N-608	Secondary Sludge Drawoff Valve No. 1A - Close Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
213	500-FV-0110B	500-ZIO-0110B	500-T-0110B	008-N-608	Secondary Sludge Drawoff Valve No. 1B - Opened	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
214	500-FV-0110B	500-ZIC-0110B	500-T-0110B	008-N-608	Secondary Sludge Drawoff Valve No. 1B - Closed	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
215	500-FV-0110B	500-XA-0110B	500-T-0110B	008-N-608	Secondary Sludge Drawoff Valve No. 1B - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
216	500-FV-0110B	500-YN-0110B	500-T-0110B	008-N-608	Secondary Sludge Drawoff Valve No. 1B - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
217	500-FV-0110B	500-VH-0110B	500-T-0110B	008-N-608	Secondary Sludge Drawoff Valve No. 1B - Open Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
218	500-FV-0110B	500-VL-0110B	500-T-0110B	008-N-608	Secondary Sludge Drawoff Valve No. 1B - Close Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
219	500-FV-0120A	500-ZIO-0120A	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2A - Opened	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
220	500-FV-0120A	500-ZIC-0120A	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2A - Closed	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
221	500-FV-0120A	500-XA-0120A	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2A - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
222	500-FV-0120A	500-YN-0120A	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2A - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
223	500-FV-0120A	500-VH-0120A	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2A - Open Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
224	500-FV-0120A	500-VL-0120A	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2A - Close Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
225	500-FV-0120B	500-ZIO-0120B	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2B - Opened	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
226	500-FV-0120B	500-ZIC-0120B	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2B - Closed	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
227	500-FV-0120B	500-XA-0120B	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2B - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
228	500-FV-0120B	500-YN-0120B	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2B - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
229	500-FV-0120B	500-VH-0120B	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2B - Open Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
230	500-FV-0120B	500-VL-0120B	500-T-0120	008-N-608	Secondary Sludge Drawoff Valve No. 2B - Close Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
231	500-FV-0130A	500-ZIO-0130A	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3A - Opened	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
232	500-FV-0130A	500-ZIC-0130A	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3A - Closed	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
233	500-FV-0130A	500-XA-0130A	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3A - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
234	500-FV-0130A	500-YN-0130A	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3A - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
235	500-FV-0130A	500-VH-0130A	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3A - Open Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
236	500-FV-0130A	500-VL-0130A	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3A - Close Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
237	500-FV-0130B	500-ZIO-0130B	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3B - Opened	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
238	500-FV-0130B	500-ZIC-0130B	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3B - Closed	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
239	500-FV-0130B	500-XA-0130B	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3B - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
240	500-FV-0130B	500-YN-0130B	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3B - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
241	500-FV-0130B	500-VH-0130B	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3B - Open Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
242	500-FV-0130B	500-VL-0130B	500-T-0130	008-N-608	Secondary Sludge Drawoff Valve No. 3B - Close Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
242	500-SC-0111A	500-YN-0111A	500-T-0010A	008-N-608	Secondary Clarifier No. 1A Sludge Scraper - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
243	500-SC-0111A	500-MN-0111A	500-T-0010A	008-N-608	Secondary Clarifier No. 1A Sludge Scraper - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
244	500-SC-0111A	500-XA-0111A	500-T-0010A	008-N-608	Secondary Clarifier No. 1A Sludge Scraper - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
245	500-SC-0111A	500-NAH-0111A	500-T-0010A	008-N-608	Secondary Clarifier No. 1A Sludge Scraper - High Torque	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
246	500-SC-0111A	500-NAHH-0111A	500-T-0010A	008-N-608	Secondary Clarifier No. 1A Sludge Scraper - High Torque Shutdown	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
246	500-SC-0111A	500-MH-0111A	500-T-0010A	008-N-608	Secondary Clarifier No. 1A Sludge Scraper - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
246	500-SC-0111B	500-YN-0111B	500-T-0010B	008-N-608	Secondary Clarifier No. 1B Sludge Scraper - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
247	500-SC-0111B	500-MN-0111B	500-T-0010B	008-N-608	Secondary Clarifier No. 1B Sludge Scraper - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
248	500-SC-0111B	500-XA-0111B	500-T-0010B	008-N-608	Secondary Clarifier No. 1B Sludge Scraper - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
249	500-SC-0111B	500-NAH-0111B	500-T-0010A	008-N-608	Secondary Clarifier No. 1B Sludge Scraper - High Torque	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
250	500-SC-0111B	500-NAHH-0111B	500-T-0010A	008-N-608	Secondary Clarifier No. 1B Sludge Scraper - High Torque Shutdown	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
249	500-SC-0111B	500-MH-0111B	500-T-0010B	008-N-608	Secondary Clarifier No. 1B Sludge Scraper - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
250	500-SC-0121	500-YN-0121	500-T-0020	008-N-608	Secondary Clarifier No. 2 Sludge Scraper - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
251	500-SC-0121	500-MN-0121	500-T-0020	008-N-608	Secondary Clarifier No. 2 Sludge Scraper - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
252	500-SC-0121	500-XA-0121	500-T-0020	008-N-608	Secondary Clarifier No. 2 Sludge Scraper - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
253	500-SC-0121	500-NAH-0121	500-T-0020	008-N-608	Secondary Clarifier No. 2 Sludge Scraper - High Torque	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
254	500-SC-0121	500-NAHH-0121	500-T-0020	008-N-608	Secondary Clarifier No. 2 Sludge Scraper - High Torque Shutdown	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
253	500-SC-0121	500-MH-0121	500-T-0020	008-N-608	Secondary Clarifier No. 2 Sludge Scraper - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
254	500-SC-0131	500-YN-0131	500-T-0030	008-N-608	Secondary Clarifier No. 3 Sludge Scraper - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
255	500-SC-0131	500-MN-0131	500-T-0030	008-N-608	Secondary Clarifier No. 3 Sludge Scraper - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
256	500-SC-0131	500-XA-0131	500-T-0030	008-N-608	Secondary Clarifier No. 3 Sludge Scraper - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
257	500-SC-0131	500-NAH-0131	500-T-0030	008-N-608	Secondary Clarifier No. 3 Sludge Scraper - High Torque	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
258	500-SC-0131	500-NAHH-0131	500-T-0030	008-N-608	Secondary Clarifier No. 3 Sludge Scraper - High Torque Shutdown	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
257	500-SC-0131	500-MH-0131	500-T-0030	008-N-608	Secondary Clarifier No. 3 Sludge Scraper - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
259	500-P-0020	500-YN-0020	500-LCP-0020	008-N-608	Scum Pump - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
260	500-P-0020	500-XA-0020	500-LCP-0020	008-N-608	Scum Pump - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
261	500-P-0020	500-MN-0020	500-LCP-0020	008-N-608	Scum Pump - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
262	500-P-0020	500-LALL-0020	500-LCP-0020	008-N-608	Scum Pump - Low Low Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
263	500-P-0020	500-LAL-0020	500-LCP-0020	008-N-608	Scum Pump - Low Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
264	500-P-0020	500-LAH-0020	500-LCP-0020	008-N-608	Scum Pump - High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
265	500-P-0020	500-LAHH-0020	500-LCP-0020	008-N-608	Scum Pump - High High Level Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
266	500-P-0020A	500-MH-0020	500-LCP-0020	008-N-608	Scum Pump - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	
267	500-P-0010A	500-MH-0010A	500-P-0010A	008-N-608	Secondary Sludge Pump No. 1 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From MCC
268	500-P-0010A	500-YN-0010A	500-P-0010A	008-N-608	Secondary Sludge Pump No. 1 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
269	500-P-0010A	500-XA-0010A	500-P-0010A	008-N-608	Secondary Sludge Pump No. 1 - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From MCC
270	500-P-0010A	500-MN-0010A	500-P-0010A	008-N-608	Secondary Sludge Pump No. 1 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
271	500-PSL-0011A	500-PAL-0011A	500-P-0110A	008-N-608	Secondary Sludge Pump No. 1 - Suction Pressure Low Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
272	500-PSH-0012A	500-PAH-0012A	500-P-0110A	008-N-608	Secondary Sludge Pump No. 1 - Discharge Pressure High Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
273	500-P-0010B	500-MH-0010B	500-P-0010B	008-N-608	Secondary Sludge Pump No. 2 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From MCC
274	500-P-0010B	500-YN-0010B	500-P-0010B	008-N-608	Secondary Sludge Pump No. 2 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
275	500-P-0010B	500-XA-0010B	500-P-0010B	008-N-608	Secondary Sludge Pump No. 2 - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From MCC
276	500-P-0010B	500-MN-0010B	500-P-0010B	008-N-608	Secondary Sludge Pump No. 2 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
277	500-PSL-0011B	500-PAL-0011B	500-P-0110B	008-N-608	Secondary Sludge Pump No. 2 - Suction Pressure Low Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
278	500-PSH-0012B	500-PAH-0012B	500-P-0110B	008-N-608	Secondary Sludge Pump No. 2 - Discharge Pressure High Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
279	500-P-0010C	500-MH-0010C	500-P-0010C	008-N-608	Secondary Sludge Pump No. 3 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From MCC
280	500-P-0010C	500-YN-0010C	500-P-0010C	008-N-608	Secondary Sludge Pump No. 3 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
281	500-P-0010C	500-XA-0010C	500-P-0010C	008-N-608	Secondary Sludge Pump No. 3 - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From MCC
282	500-P-0010C	500-MN-0010C	500-P-0010C	008-N-608	Secondary Sludge Pump No. 3 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
283	500-PSL-0011C	500-PAL-0011C	500-P-0010C	008-N-608	Secondary Sludge Pump No. 3 - Suction Pressure Low Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
284	500-PSH-0012C	500-PAH-0012C	500-P-0010C	008-N-608	Secondary Sludge Pump No. 3 - Discharge Pressure High Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
285	500-FIT-0000	500-FI-0000	N/A	008-N-608	Secondary Sludge to Decant Tanks - Flow	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
286	500-FIT-0001	500-FI-0001	N/A	008-N-608	Secondary Sludge - Drain to MBBR - Flow	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	120V AC	
287	500-LSHH-0030	500-LAHH-0030	500-PS-0030	008-N-608	Pipe Gallery Sump Pump Station - High High Level	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
288	600-UV-0020	600-LAL-0020	600-LCP-0020	008-N-609	UV System - Low Level	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From UV Local Control Panel 600-LCP-0020
289	600-UV-0020	600-XA-0020	600-LCP-0020	008-N-609	UV - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From UV Local Control Panel 600-LCP-0020
290	600-UV-0020	600-XB-0020	600-LCP-0020	008-N-609	UV Bank - Lamp Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From UV Local Control Panel 600-LCP-0020
291	600-UV-0020	600-XC-0020	600-LCP-0020	008-N-609	UV Bank - Low Intensity Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From UV Local Control Panel 600-LCP-0020
292	600-UV-0020	600-MN-0020	600-LCP-0020	008-N-609	UV Bank - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From UV Local Control Panel 600-LCP-0020
293	600-UV-0020	600-MH-0020	600-LCP-0020	008-N-609	UV Bank - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From UV Local Control Panel 600-LCP-0020
294	600-UV-0020	600-UI-0020	600-LCP-0020	008-N-609	UV - Lamp Intensity	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	From UV Local Control Panel 600-LCP-0020

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
295	700-FV-0031	700-ZIO-0031	N/A	008-N-610	Effluent Valve No. 1 - Opened	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
296	700-FV-0031	700-ZIC-0031	N/A	008-N-610	Effluent Valve No. 1 - Closed	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
297	700-FV-0031	700-XA-0031	N/A	008-N-610	Effluent Valve No. 1 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	
298	700-FV-0031	700-YN-0031	N/A	008-N-610	Effluent Valve No. 1 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
299	700-FV-0031	700-VH-0031	N/A	008-N-610	Effluent Valve No. 1 - Open Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	
300	700-FV-0031	700-VL-0031	N/A	008-N-610	Effluent Valve No. 1 - Close Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	
301	700-FV-0032	700-ZIO-0032	N/A	008-N-610	Effluent Valve No. 2 - Opened	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
302	700-FV-0032	700-ZIC-0032	N/A	008-N-610	Effluent Valve No. 2 - Closed	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
303	700-FV-0032	700-XA-0032	N/A	008-N-610	Effluent Valve No. 2 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	
304	700-FV-0032	700-YN-0032	N/A	008-N-610	Effluent Valve No. 2 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
305	700-FV-0032	700-VH-0032	N/A	008-N-610	Effluent Valve No. 2 - Open Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	
306	700-FV-0032	700-VL-0032	N/A	008-N-610	Effluent Valve No. 2 - Close Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	
307	700-FV-0033	700-ZIO-0033	N/A	008-N-610	Effluent Valve No. 3 - Opened	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
308	700-FV-0033	700-ZIC-0033	N/A	008-N-610	Effluent Valve No. 3 - Closed	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
309	700-FV-0033	700-XA-0033	N/A	008-N-610	Effluent Valve No. 3 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	
310	700-FV-0033	700-YN-0033	N/A	008-N-610	Effluent Valve No. 3 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	
311	700-FV-0033	700-VH-0033	N/A	008-N-610	Effluent Valve No. 3 - Open Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	
312	700-FV-0033	700-VL-0033	N/A	008-N-610	Effluent Valve No. 3 - Close Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	
313	700-P-0030A	700-MH-0030A	700-P-0030A	008-N-610	Equalization Pump No. 1 - Run Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	From MCC
314	700-P-0030A	700-YN-0030A	700-P-0030A	008-N-610	Equalization Pump No. 1 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
315	700-P-0030A	700-XA-0030A	700-P-0030A	008-N-610	Equalization Pump No. 1 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From MCC
316	700-P-0030A	700-MN-0030A	700-P-0030A	008-N-610	Equalization Pump No. 1 - Running	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
317	700-P-0030B	700-MH-0030B	700-P-0030B	008-N-610	Equalization Pump No. 2 - Run Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	From MCC
318	700-P-0030B	700-YN-0030B	700-P-0030B	008-N-610	Equalization Pump No. 2 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
319	700-P-0030B	700-XA-0030B	700-P-0030B	008-N-610	Equalization Pump No. 2 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From MCC
320	700-P-0030B	700-MN-0030B	700-P-0030B	008-N-610	Equalization Pump No. 2 - Running	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From MCC
321	700-LIT-0002	700-LI-0002	700-T-0000	008-N-610	Effluent Pump Station - Wet Well Level	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	Loop Powered	
322	700-LSH-0002	700-LAH-0002	700-T-0000	008-N-610	Effluent Pump Station - Wet Well High Level Alarm	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	
323	700-LSL-0002	700-LAL-0002	700-T-0000	008-N-610	Effluent Pump Station - Wet Well Low Level Alarm	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	
324	700-P-0010A	700-MH-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Run Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	From VFD installed in MCC
325	700-P-0010A	700-YN-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
326	700-P-0010A	700-XA-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
327	700-P-0010A	700-MN-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Running	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
328	700-P-0010A	700-HAS-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - E-Stop	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
329	700-P-0010A	700-TAH-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - High Temp Alarm	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
330	700-P-0010A	700-II-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Current Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
331	700-P-0010A	700-SI-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Speed Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
332	700-P-0010A	700-SC-0010A	700-P-0010A	008-N-610	Effluent Pump No. 1 - Speed Control	700-CP-001 (Control Building SCADA Panel)	AO	4-20mA	N/A	From VFD installed in MCC
333	700-P-0010B	700-MH-0010B	700-P-0010A	008-N-610	Effluent Pump No. 2 - Run Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	From VFD installed in MCC
334	700-P-0010B	700-YN-0010B	700-P-0010B	008-N-610	Effluent Pump No. 2 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
335	700-P-0010B	700-XA-0010B	700-P-0010B	008-N-610	Effluent Pump No. 2 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
336	700-P-0010B	700-MN-0010B	700-P-0010B	008-N-610	Effluent Pump No. 2 - Running	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
337	700-P-0010B	700-HAS-0010B	700-P-0010A	008-N-610	Effluent Pump No. 2 - E-Stop	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
338	700-P-0010B	700-TAH-0010B	700-P-0010A	008-N-610	Effluent Pump No. 2 - High Temp Alarm	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
339	700-P-0010B	700-II-0010B	700-P-0010A	008-N-610	Effluent Pump No. 2 - Current Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
340	700-P-0010B	700-SI-0010B	700-P-0010B	008-N-610	Effluent Pump No. 2 - Speed Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
341	700-P-0010B	700-SC-0010B	700-P-0010B	008-N-610	Effluent Pump No. 2 - Speed Control	700-CP-001 (Control Building SCADA Panel)	AO	4-20mA	N/A	From VFD installed in MCC
342	700-P-0010C	700-MH-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Run Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	From VFD installed in MCC
343	700-P-0010C	700-YN-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
344	700-P-0010C	700-XA-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
345	700-P-0010C	700-MN-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Running	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
346	700-P-0010C	700-HAS-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - E-Stop	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
347	700-P-0010C	700-TAH-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - High Temp Alarm	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
348	700-P-0010C	700-II-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Current Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
349	700-P-0010C	700-SI-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Speed Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
350	700-P-0010C	700-SC-0010C	700-P-0010C	008-N-610	Effluent Pump No. 3 - Speed Control	700-CP-001 (Control Building SCADA Panel)	AO	4-20mA	N/A	From VFD installed in MCC
351	700-P-0010D	700-MH-0010D	700-P-0010C	008-N-610	Effluent Pump No. 4 - Run Command	700-CP-001 (Control Building SCADA Panel)	DO	NO CONTACT	N/A	From VFD installed in MCC
352	700-P-0010D	700-YN-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - Auto	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
353	700-P-0010D	700-XA-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
354	700-P-0010D	700-MN-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - Running	700-CP-001 (Control Building SCADA Panel)	DI	NO CONTACT	N/A	From VFD installed in MCC
355	700-P-0010D	700-HAS-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - E-Stop	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC

INPUT / OUTPUT LIST										
NO.	DEVICE TAG	SIGNAL TAG	ASSOCIATED EQUIPMENT	P&ID	DESCRIPTION	PANEL	I/O Type	Signal Type	POWER SUPPLY	NOTES
356	700-P-0010D	700-TAH-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - High Temp Alarm	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	From VFD installed in MCC
357	700-P-0010D	700-II-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - Current Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
358	700-P-0010D	700-SI-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - Speed Indcation	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	N/A	From VFD installed in MCC
359	700-P-0010D	700-SC-0010D	700-P-0010D	008-N-610	Effluent Pump No. 4 - Speed Control	700-CP-001 (Control Building SCADA Panel)	AO	4-20mA	N/A	From VFD installed in MCC
360	700-LSHH-0020	700-LAHH-0020	700-PS-0020	008-N-610	Existing Control Building Sump Pump Station - High High Level	~~700-CP-001 (Control Building SCADA Panel)~~ 700-CP-002 (Existing Contr. Bldg SCADA Panel)	DI	NC CONTACT	N/A	Existing **(Revision 2: Panel name changed)**
361	~~700-PS-0020~~	~~700-YN-0020~~	~~700-PS-0020~~	~~008-N-610~~	~~Existing Control Building Sump Pump Station - Auto~~	~~700-CP-001 (Control Building SCADA Panel)~~	~~DI~~	~~NO CONTACT~~	~~N/A~~	~~Existing~~ **(Revision 2: Signal removed)**
362	~~700-PS-0020~~	~~700-XA-0020~~	~~700-PS-0020~~	~~008-N-610~~	~~Existing Control Building Sump Pump Station - Fault~~	~~700-CP-001 (Control Building SCADA Panel)~~	~~DI~~	~~NC CONTACT~~	~~N/A~~	~~Existing~~ **(Revision 2: Signal removed)**
363	~~700-P-0020A~~	~~700-MN-0020A~~	~~700-PS-0020~~	~~008-N-610~~	~~Existing Control Building Sump Pump No. 1 - Running~~	~~700-CP-001 (Control Building SCADA Panel)~~	~~DI~~	~~NO CONTACT~~	~~N/A~~	~~Existing~~ **(Revision 2: Signal removed)**
364	~~700-P-0020B~~	~~700-MN-0020B~~	~~700-PS-0020~~	~~008-N-610~~	~~Existing Control Building Sump Pump No. 2 - Running~~	~~700-CP-001 (Control Building SCADA Panel)~~	~~DI~~	~~NO CONTACT~~	~~N/A~~	~~Existing~~ **(Revision 2: Signal removed)**
365	700-FIT-0000	700-FI-0000	~~700-PS-0020~~ **N/A**	008-N-610	Effluent Pump Station - Total Flow	700-CP-001 (Control Building SCADA Panel)	AI	4-20mA	120V AC	**(Revision 2: Associated equipment changed to N/A)**
366	600-SS-0001	600-FC-0001	600-SS-0001	008-N-609	Effluent Automatic Sampler - Flow Setpoint	700-CP-001 (Control Building SCADA Panel)	AO	4-20mA	120V AC	
367	600-SS-0001	600-XA-0001	600-SS-0001	008-N-609	Effluent Automatic Sampler - Fault	700-CP-001 (Control Building SCADA Panel)	DI	NC CONTACT	N/A	
368	800-LCP-0010A	800-XA-0010A	800-LCP-0010A	008-N-611	Ferric Feed Pump No. 1 - Common Alarm	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DI	NC CONTACT	N/A	From Ferric Feed Local Control Panel 700-LCP-0010A
369	800-LCP-0010A	800-MN-0010A	800-LCP-0010A	008-N-611	Ferric Feed Pump No. 1 - Running	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DI	NO CONTACT	N/A	From Ferric Feed Local Control Panel 700-LCP-0010A
370	800-LCP-0010A	800-MH-0010A	800-LCP-0010A	008-N-611	Ferric Feed Pump No. 1 - Run Command	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DO	NO CONTACT	N/A	From Ferric Feed Local Control Panel 700-LCP-0010A
371	800-LCP-0010A	800-SI-0010A	800-LCP-0010A	008-N-611	Ferric Feed Pump No. 1 - Speed Indication	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	AI	4-20mA	N/A	From Ferric Feed Local Control Panel 700-LCP-0010A
372	800-LCP-0010A	800-SC-0010A	800-LCP-0010A	008-N-611	Ferric Feed Pump No. 1 - Speed Control	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	AO	4-20mA	N/A	From Ferric Feed Local Control Panel 700-LCP-0010A
373	800-LCP-0010B	800-XA-0010B	800-LCP-0010B	008-N-611	Ferric Feed Pump No. 2 - Common Alarm	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DI	NC CONTACT	N/A	From Ferric Feed Local Control Panel 700-LCP-0010B
374	800-LCP-0010B	800-MN-0010B	800-LCP-0010B	008-N-611	Ferric Feed Pump No. 2 - Running	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DI	NO CONTACT	N/A	From Ferric Feed Local Control Panel 700-LCP-0010B
375	800-LCP-0010B	800-MH-0010B	800-LCP-0010B	008-N-611	Ferric Feed Pump No. 2 - Run Command	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DO	NO CONTACT	N/A	From Ferric Feed Local Control Panel 700-LCP-0010B
376	800-LCP-0010B	800-SI-0010B	800-LCP-0010B	008-N-611	Ferric Feed Pump No. 2 - Speed Indication	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	AI	4-20mA	N/A	From Ferric Feed Local Control Panel 700-LCP-0010B
377	800-LCP-0010B	800-SC-0010B	800-LCP-0010B	008-N-611	Ferric Feed Pump No. 2 - Speed Control	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	AO	4-20mA	N/A	From Ferric Feed Local Control Panel 700-LCP-0010B
378	800-LSH-0001	800-LAH-0001	800-CP-001	008-N-611	Ferric Feed System - Containment High Level	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DI	NC CONTACT	N/A	
379	800-LCP-0010	800-YA-0010	800-LCP-0010A	008-N-611	Ferric Feed System - Leak Alarm	00-CP-001 (Ex. Proc. Serv. Bldg SCADA Pane	DI	NC CONTACT	N/A	From Ferric Feed Local Control Panel 800-LCP-0010A
380	800-LCP-0020	800-XA-0020	800-LCP-0020	008-N-612	Polymer Feed System - Common Alarm	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
381	800-MP-0020A	800-YN-0020A	800-LCP-0020	008-N-612	Polymer Feed Pump No. 1 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
382	800-MP-0020A	800-MN-0020A	800-LCP-0020	008-N-612	Polymer Feed Pump No. 1 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
383	800-MP-0020A	800-MH-0020A	800-LCP-0020	008-N-612	Polymer Feed Pump No. 1 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
384	800-MP-0020A	800-SI-0020A	800-LCP-0020	008-N-612	Polymer Feed Pump No. 1 - Speed Indication	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
385	800-MP-0020A	800-SC-0020A	800-LCP-0020	008-N-612	Polymer Feed Pump No. 1 - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
386	800-MP-0020B	800-YN-0020B	800-LCP-0020	008-N-612	Polymer Feed Pump No. 2 - Auto	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
387	800-MP-0020B	800-MN-0020B	800-LCP-0020	008-N-612	Polymer Feed Pump No. 2 - Running	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
388	800-MP-0020B	800-MH-0020B	800-LCP-0020	008-N-612	Polymer Feed Pump No. 2 - Run Command	600-CP-001 (Process Building SCADA Panel)	DO	NO CONTACT	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
389	800-MP-0020B	800-SI-0020B	800-LCP-0020	008-N-612	Polymer Feed Pump No. 2 - Speed Indication	600-CP-001 (Process Building SCADA Panel)	AI	4-20mA	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
390	800-MP-0020B	800-SC-0020B	800-LCP-0020	008-N-612	Polymer Feed Pump No. 2 - Speed Control	600-CP-001 (Process Building SCADA Panel)	AO	4-20mA	N/A	From Polymer Feed Local Control Panel 800-LCP-0020
391	600-BP-0001	600-PAL-0001	600-BP-0001	008-N-612	Wash Water Booster Pump - Low Pressure	600-CP-001 (Process Building SCADA Panel)	DI	NO CONTACT	N/A	
392	600-BP-0001	600-XA-0001	600-BP-0001	008-N-612	Wash Water Booster Pump - Fault	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	
393	800-FS-1001	800-FA-1001	800-F-1001	008-N-612	Polymer Room Eye Wash Station - In Use	600-CP-001 (Process Building SCADA Panel)	DI	NC CONTACT	N/A	

SECTION 43 32 70

POLYMER BLENDING AND FEED SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:
1. This Section includes, but is not necessarily limited to, the furnishing and installation of polymer feed system equipment as indicated on the Drawings, as specified herein, and as necessary for the proper and complete performance of the Work.

B. Related Sections:
1. Documents affecting work of this Section include, but are not necessarily limited to:
a. General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

1.02 DEFINITIONS

A. Abbreviations:
1. NEMA: National Electrical Manufacturers Association.
2. NPT: National Pipe Thread.
3. NTEP: National Type Evaluation Program.
4. NCWM: National Conference on Weights and Measures.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. Polymer feed system (600-M-0020):
1. Neat polymer metering pumps (600-MP-0020A, 600-MP-0020B)
a. Polymer type: Emulsion.
b. Polymer activity: 30 to 75%.
c. Neat polymer flow range: 0.05-1 gph.
d. Dilution water flow range: 30-300 gph.
e. Incoming water pressure: 55-60 psig.
f. Discharge pressure: 5 psig.
g. Pump type: Progressive Cavity.
2. Polymer mixing chamber:
a. Type: Staged Hydro-Mechanical or Hydrodynamic
b. Mixer motor: ½ HP.
c. Pressure rating: 100 psi.
d. Body and impeller material: Stainless Steel.
e. Mechanical seal material: Ceramic, Carbon, Stainless Steel, Viton.
f. Cover material: Clear polycarbonate with stainless steel reinforced flange & discharge.
3. Calibration column: 500 ml.

1.04 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittals.

B. Shop Drawings:
1. Submit for polymer metering pumps and polymer feed accessories.
2. Required information:
a. Name of Manufacturer.

b. Model.
c. Dimensions.
d. Details of construction and installation.
e. Control panel layout, wiring diagram, and bill of material.

C. Operation and maintenance manuals:
1. Submit for polymer metering pumps and polymer feed accessories.
2. Required information:
a. Equipment function, normal operating characteristics and limiting conditions.
b. Assembly, installation, alignment, adjustment and checking instructions.
c. Operating instructions for start-up, routine and normal operating, regulation and control, and shutdown and emergency conditions.
d. Lubrication and maintenance instructions.
e. Guide to "troubleshooting".
f. Parts lists and predicted life of parts subject to wear.
g. Outline, cross-sections, assembly drawings, engineering data and wiring diagrams.
h. Test data and performance curves.

1.05 QUALITY ASSURANCE

A. Qualifications:
1. Fabrication and installation personnel:
a. Trained and experienced in the fabrication and installation of the materials and equipment.
b. Knowledgeable of the design and the reviewed submittals.

1.06 DELIVERY, STORAGE AND HANDLING

A. Receiving and storage:
1. All materials shall be delivered in original, unbroken, brand marked containers or wrapping as applicable.
2. Handle and store materials:
a. In a manner which will prevent:
1) Deterioration or damage.
2) Contamination with foreign matter.
3) Damage by weather or elements.
b. In accordance with Manufacturer's directions.

B. Rejected material and replacements:
1. Reject damaged, deteriorated or contaminated material and immediately remove from the Site.
2. Replace rejected materials with new materials at no additional cost to OWNER.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. VeloDyne.

B. USGI Chemcial Feed.

C. Or equal.

2.02 POLYMER SOLUTION FEED SYSTEM

A. General:
   1. Mounting hardware: Stainless Steel.
   2. Plumbing: Schedule 80 PVC.
   3. Mixing Chamber: PVC, acrylic or clear polycarbonate, stainless steel.
   4. Maximum working pressure of 100 PSIG.

B. Liquid Polymer Pump:
   1. Positive displacement, progressive cavity neat polymer metering pumps for emulsion polymer with variable speed control.
   2. Pumps shall be capable of pumping polymers with apparent viscosities of up to 3,500 centipoise (cps).
   3. Pumping range of pumps for active emulsion polymer shall be 0.05 to 1 gallon per hour
   4. Rotors shall be 316 stainless steel.
   5. Stators shall be Viton.
   6. Pumps shall have a packing type seal.
   7. Pumps and motors shall be direct-coupled to gear reducers.
   8. Variable speed shall be provided by an SCR controller.
   9. Discharge pressure switch and gauge assembly for pump shutdown on high pressure.
   10. Pressure relief valve pumped back to pump suction.
   11. Provide calibration chamber mounted to frame with two full port PVC isolation ball valves with Viton O-Rings for measuring emulsion polymer. Calibration in gallons per hour for full 60 second drawdown and construct of clear PVC. Provide a breather plug in the top of the calibration column designed to allow adequate displacement of air during calibration while preventing water or other foreign material from entering the calibration column.
   12. Provide an optical or thermal type loss of polymer flow sensor.

C. Pump Motor:
   1. Pumps shall be driven by a 0.5 HP, 1750 RPM, 90 VDC wash-down motor with gear reducer.
   2. Wash-down duty, totally enclosed non-ventilated (TENV).

D. Mixing Chamber Assembly:
   1. Provide mixing chamber to mix polymer and water.
   2. Hydro-Mechanical Mixing Chamber:
      a. Provide a hybrid mixing chamber having both non-mechanical and mechanical mixing zones, a non-mechanical mixing chamber with a dilution water booster pump to assure adequate mixing energy is available, or a mechanical mixing chamber. The dilution water booster pump shall have a pressure reducing valve to control the mixing energy and a pressure gauge on the inlet and outlet of the booster pump to measure the boost in water pressure.
      b. Non-mechanical mixing stage shall be able to activate and blend polymer on plant water alone at 30 psi. In addition to the non-mechanical mixing stage, the device shall be capable of producing its mixing energy independent of plant water pressure through a variable speed stainless steel hydro-mechanical mixer. Mixing chambers that rely solely on plant water pressure will not be accepted. Mixing chamber shall have a maximum rated pressure of 100 psi. Provide a pressure relief valve set at 75 psi.
      c. Polymer shall be injected directly into a water jet by means of an injection quill positioned such that the non-mechanical mixing energy is in no way diminished prior to polymer and water contact.
      d. Polymer activation efficiency shall be consistent over the dilution water range.
      e. Both mechanical and non-mechanical mixing zones shall have a transparent cover to view the blending effectiveness.

f. Mixing chamber shall include a Teflon injection quill with Viton seats.
g. Impeller shall be controlled by a SCR motor controller.
h. Motor:
1) Maximum 0.5 HP, 1,750 rpm motor.
2) Wash-down duty motor.
3) Motor shall be direct-coupled to impeller shaft.

3. Hydrodynamic Mixing Chamber
a. A non-mechanical hydrodynamic blending device specifically designed to dilute and activate emulsion, dispersion, and solution type polymer with viscosities up to 75,000 cps. and active contents up to 75%, shall be provided.
b. The liquid polymer activation chamber's mixing energy shall be staged such that it provides for high, non-damaging mixing energy over the full operating range of the system which then dissipates through concentric chambers. The integral water control device, which shall also produce mixing energy by creating a pressure drop across its orifice, shall be constructed of stainless steel and shall be designed to allow orifice replacement without disassembly of any other part of the system. The system shall be designed for use with either potable or non-potable dilution water.
c. A mixing chamber drain valve with 1/2" fitting shall be provided and plumbed to the nearest floor drain. The mixing chamber shall have a maximum rated pressure of 150 psi.
d. Provide a stainless steel, adjustable-range pressure relief valve on mixing chamber with a range of 50 to 175 psi.
e. At no time shall polymer be exposed to excessive shear. System's which are "retention time dependent", a system which is prone to induce insufficient or excessive mixing energy depending on flow rate and the subsequent retention time in the mixing chamber, or which utilize conventional static mixers, mixing blocks, educators or flash mixers, shall not be considered. All components that require periodic maintenance shall be readily accessible.

E. Dilution Water Control System:
1. The dilution water flow rate shall be monitored by a rotameter type flow meter having the range as specified in Part 1 above. Unions or flanges shall be provided on the flow meter to allow easy removal for cleaning.
2. The unit shall have a manual rate control valve for on/off control of total dilution water flow.
3. A differential pressure type low water differential pressure alarm shall be provided. The switch shall be adjustable between 25 and 100 psi. Proof pressure shall be 500 psi minimum. The pressure switch shall be as manufactured by Ashcroft, or equal.
4. Provide a 2 ½'' stainless steel liquid filled pressure gauge to monitor dilution water inlet pressure.

F. System Skid:
1. System frame shall be constructed of rugged 304 stainless steel construction.
2. All piping shall be schedule 80 PVC and rigidly supported.
3. The pump suction shall not exceed 5'' from the bottom of the skid.

2.03 CONTROL PANEL

A. Provide polymer mixing system control panel as shown on the P&ID Drawings and as specified herein. The control panel shall be provided by the manufacturer of the polymer feed system.

B. Control panel shall provide complete control of the manufacturer's polymer feed equipment.

C. Panel:
1. NEMA 4X.

2. Provide main circuit breaker disconnect for 120 VAC power. Panel shall have single 120 VAC power feed.
3. Motor controllers:
   a. Mixing Chamber.
   b. Two (2) polymer metering pumps.
4. Operator Interface – Discrete Selector Switch
   a. System RESET pushbutton.
   b. Pump 1 HAND/OFF/AUTO Selector Switch.
   c. Pump 2 HAND/OFF/AUTO Selector Switch.
   d. Ten-Turn Potentiometer – Meter Pump 1 Control.
   e. Ten-Turn Potentiometer – Meter Pump 2 Control.
   f. Mixer HAND/OFF/AUTO Selector Switch.
   g. One-Turn Potentiometer – Mixer Speed Control.
5. Status/Alarm Indicators:
   a. System Running Indication.
   b. Main Power ON Indication.
   c. LED Display Metering Pump 1 Rate.
   d. LED Display Metering Pump 2 Rate.
   e. Low Water Differential Pressure Alarm.
   f. Low Polymer Flow Alarm.
   g. High Polymer Pump Pressure.
6. Inputs:
   a. Remote Start / Stop Pump 1 (discrete dry contact).
   b. Remote Start / Stop Pump 2 (discrete dry contact).
   c. Pump 1 Pacing Signal based on Process Flow (4-20mA).
   d. Pump 2 Pacing Signal based on Process Flow (4-20mA).
7. Outputs:
   a. System Pump 1/Mixer Running (discrete dry contact).
   b. System Pump 2/Mixer Running (discrete dry contact).
   c. System Pump 1/Mixer Remote Mode (discrete dry contact).
   d. System Pump 2/Mixer Remote Mode (discrete dry contact).
   e. Common Alarm (discrete dry contact).
   f. Polymer Pump 1 Rate (4-20mA)
   g. Polymer Pump 2 Rate (4-20mA)
8. System Operation:
   a. In HAND position, Pump 1 shall run at speed controlled by potentiometer.
   b. In HAND position, Pump 2 shall run at speed controlled by potentiometer
   c. In HAND position, Mixer shall run at speed controlled by potentiometer
   d. In AUTO position, Pump 1 shall start in response to contact from remote PLC, and run at speed controlled by 4-20 signal from PLC.
   e. In AUTO position, Pump 2 shall start in response to contact from remote PLC, and run at speed controlled by 4-20 signal from PLC.
   f. In AUTO position, Mixer shall start whenever Pump 1 or 2 is running, and operate at speed set by potentiometer.

2.04 COATINGS

A. Manufacturer is responsible for surface preparation, priming, and finish coating of ferrous metal components prior to shipment.

B. Provide in accordance with Section 09 96 00 – High Performance Coatings.

C. Stainless steel, bronze, and nonmetallic surfaces shall not be coated.

2.05 SPARE PARTS

A. Provide spare parts necessary to maintain the equipment in service for a period of two years, including but not limited to the parts listed below:
   1. One pressure relief valve.
   2. Two O-Rings.
   3. One injection quill with check valve.

B. Provide special tools required for checking testing, parts replacement, and maintenance.

C. Spare parts shall be suitably packaged and clearly labeled.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install polymer pumps and feed accessories in conformance with:
   1. The submittals reviewed by ENGINEER.
   2. The Manufacturer's recommendations.

B. Materials of construction shall be compatible with the chemical service.

3.02 FIELD QUALITY CONTROL

A. Manufacturer's field service:
   1. Arrange and pay for Manufacturer's service representative to:
      a. Provide the services indicated below.
      b. Minimum onsite time: 1 day.
   2. Schedule the following:
      a. As soon as practicable after installation.
      b. At times approved by ENGINEER and OWNER.
   3. Manufacturer's service representative: Check work.
   4. Promptly make all changes and additions required by Manufacturer's service representative.
   5. Manufacturer's service representative:
      a. Assist in start-up.
      b. Demonstrate operation and maintenance to OWNER's personnel.
      c. Review operation and maintenance manual with OWNER's personnel.
   6. Submit Manufacturer's service representative 's written approval of installation.

3.03 CLEANING

A. Thoroughly clean all installed materials and products and related areas:
   1. Prior to acceptance of the work of this Section.
   2. In accordance with Section 01 74 00 – Cleaning and Waste Management.

END OF SECTION

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

WATER RESOURCES DIVISION

PERMIT FOR CONSTRUCTION OF WASTEWATER SYSTEMS

SITE NAME:	Mackinac Island WWTP
CONTACT NAME:	John Stack
CONTACT PHONE:	(231) 286-5846
CONTACT EMAIL:	jstack@cityofmi.org
PROJECT COUNTY:	Mackinac

PERMIT NUMBER:	P41004287 v. 1
ISSUED DATE:	June 4, 2023
ISSUED TO:	Mackinac Island DPW
PROJECT NAME:	City of Mackinac Island WWTP Improvements
PROJECT LOCATION:	WWTP

APPLICATION SUBMISSION ID: HPT-J9XX-X08GF

REQUIRED NOTIFICATIONS: The permittee shall submit a Construction Startup Notification (just prior to excavation) and a Construction Completion Notification (upon project completion) using the permit schedules in MiEnviro Portal.

☒ If this box is checked, please see the SPECIAL CONDITIONS on page 2.

ISSUED UNDER THE AUTHORITY OF THE DIRECTOR OF THE DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY (EGLE)

Issued By:	Reviewed By:
	[SAME]
Scott W. Richards, PE Environmental Engineer	[SAME]

cc: Dave Harvey, PE – Fleis & Vandenbrink (dharvey@fveng.com)
Valorie White - EGLE WIFFS CWSRF Project Manager (whitev1@michigan.gov)
Allen Burt – Director of Public Works (aburt@cityofmi.org)

GENERAL CONDITIONS

a. This PERMIT only authorizes the construction, alteration, addition, or improvement of the wastewater system as described herein and is issued solely under the authority of Part 41, Sewerage Systems, of Act 451.
b. This PERMIT expires two (2) years after the above date of issuance unless construction starts prior to the expiration date in accordance with R 299.2939(2) of the Part 41 Administrative Rules.
c. Any portion of the herein-described proposed wastewater project constructed prior to the date of issuance is not authorized by this PERMIT and is a violation of Part 41 of Act 451.
d. No sewer shall be placed into service unless and until the outlet sewer has been constructed, tested, and placed into service.
e. Failure to meet any condition of this PERMIT or any requirement of Act 451 constitutes a violation of Act 451.
f. Issuance of this PERMIT does not authorize any violation of federal, state, or local laws or regulations, nor does it obviate the need to obtain other permits or approvals from EGLE or other units of government as required by law.
g. The applicant must provide notice of impending construction to public utilities and comply with the requirements of the Underground Facility Damage Prevention and Safety Act, PA 174 of 2013, as amended (MISS DIG).
h. All earth-changing activities must be conducted in accordance with Part 91, Soil Erosion and Sedimentation Control, of Act 451.
i. All construction activity, including groundwater dewatering, impacting wetlands shall be conducted in accordance with Part 303, Wetlands Protection, of Act 451.
j. If water withdrawal, via dewatering activities, is associated with this project, authorization under Part 327, Great Lakes Preservation, of Act 451, is required for new or increased large quantity withdrawals over 100,000 gallons per day (70 gallons per minute). A Part 327 permit is required for new or increased large quantity withdrawals over 2,000,000 gallons per day.

SPECIAL CONDITIONS

1. There shall be no visible turbidity in the storm water runoff or water from site dewatering operations that is discharged to the surface waters of the State due to construction activity associated with this project.

2. A construction permit for the activities regulated under the provision of the Soil Erosion and Sedimentation Control Act shall be obtained and all control measures shall be installed prior to starting any construction work authorized under this permit.

3. If contaminated soils are encountered, please contact the EGLE RRD UP District Supervisor.

4. This permit only authorizes construction of the sanitary facilities listed herein. This permit does not authorize work in regulated wetland/stream areas. Proper permits must first be obtained from this Department before any work in regulated wetland/stream areas commence.

5. Preliminary Treatment (Bldg 100) electrical equipment / unit heaters shall meet the NEC rated area classification / explosion proof requirements.

6. The manually cleaned bar screen shall be installed 30-45 degrees from horizontal.

7. GFCI electrical outlets are recommended in primary and secondary clarifier sludge pumping rooms. Yard hydrants are recommended to be located adjacent sludge pumping entry ways for more convenient flushing water access.

8. Provide ventilation in the Secondary Sludge pumping room in accordance with Recommended Standards for Wastewater Facilities, 2014 Edition, Section 84.47. Provisions for heating this space are also recommended.

9. Provide primary and secondary sludge sampling facilities in accordance with Recommended Standards for Wastewater Facilities, 2014 Edition, Section 87.15.

10. A basket strainer is recommended on the Ferric Chloride tank fill line. The process draw-off pipe should be at least 10-inches from the bottom of the Ferric Chloride tank to prevent plugging issues. A drain line with isolation valve should be at the lowest point in the tank for sediment removal.

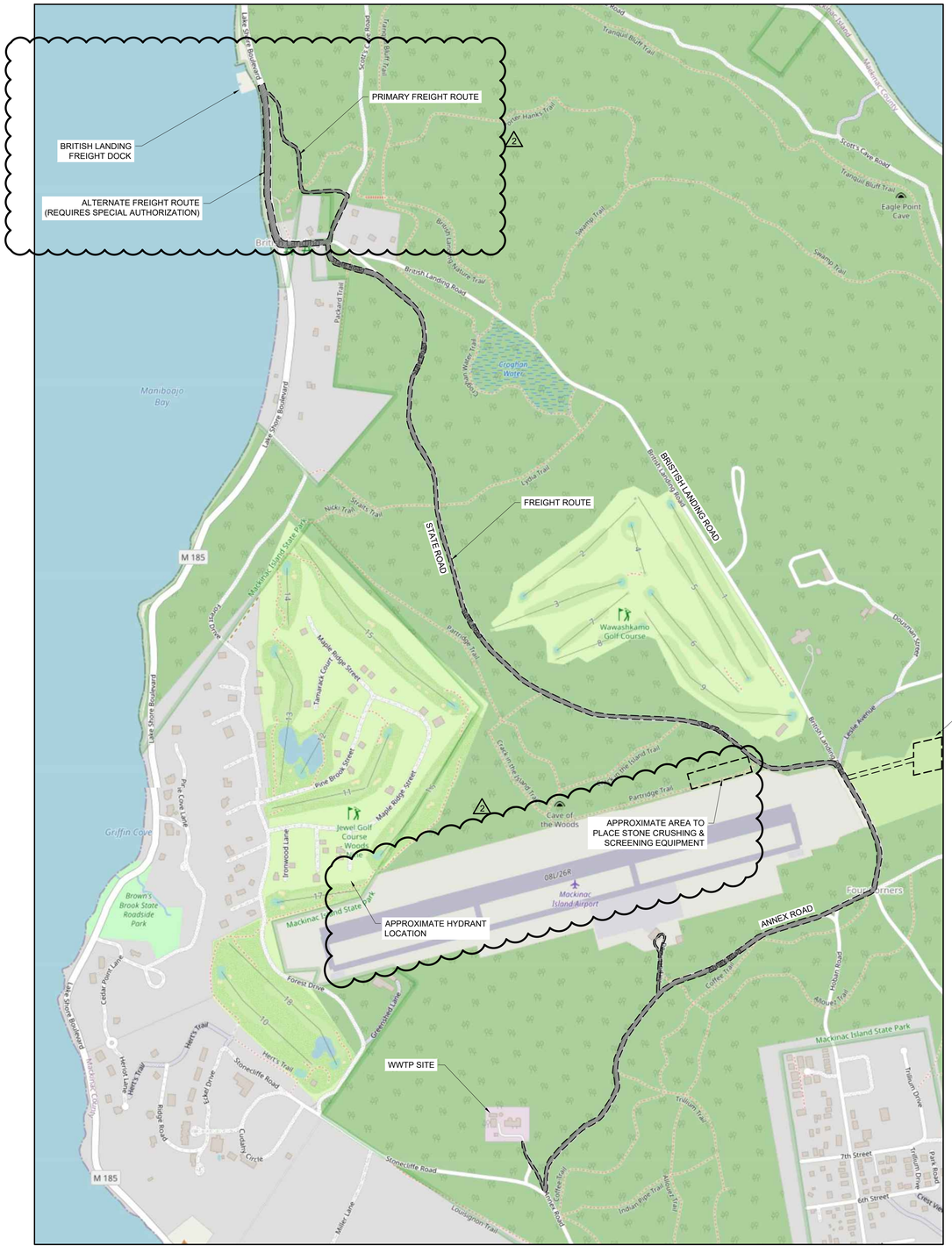
11. It is recommended the UV disinfection quartz sleeve cleaning system be specified alongside the wiper system.

12. It is noted the Part 41 Permit Application cites an ultimate average flow design of 1.54 MGD. The current NPDES Permit No. MI0026751 indicates a design flow of 0.96 MGD was used to determine effluent limitations. Issuance of this Part 41 permit does not authorize an increase in flow or associated mass loading limits. It is acknowledged EGLE Water Resources Division Permits Section is currently working with the Permittee to modify the current NPDES permit and address the increased design flow.

13. Upload as-built record documents in electronic (.pdf) format per the schedule established in MiWaters.

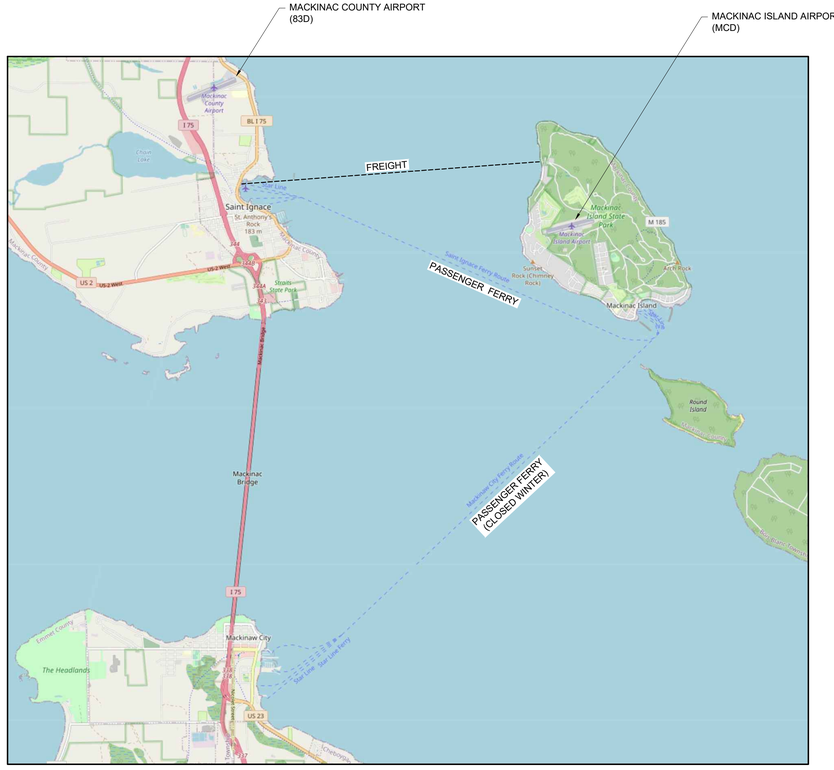
PROPOSED WASTEWATER PROJECT DESCRIPTION

A proposed 1.54 MGD (average flow) facility located at 3134 Stonecliff Rd. including a headworks facility containing screening and grit removal and septage receiving, three primary clarifiers, three MBBR trains (each containing two reactors), rapid mix an flocculation basins with mixers for chemical feed, four secondary clarifiers, ultraviolet disinfection, effluent pump station, effluent equalization, effluent forcemain improvements, and sludge handling processes. New headworks, process and maintenance buildings, as well as upgrades to the existing control building. Electrical, control, and instrumentation upgrades. Additional appurtenances and piping as shown on plans and described in the specifications for the proper operation of the treatment facility to provide a discharge quality in compliance with the facility's discharge permit.



FREIGHT TRANSPORT ROUTE ON ISLAND PLAN

NORTH



ISLAND ACCESS PLAN

NORTH

APPROXIMATE AREA TO PLACE EXCESS CRUSHED STONE

2

NOTES:

1. FREIGHT IS TYPICALLY MOVED BY BOAT TO BRITISH LANDING.
2. PERMITS ARE REQUIRED FROM MICHIGAN STATE HISTORIC PARKS AND CITY OF MACKINAC ISLAND TO MOVE FREIGHT AND VEHICLES TO JOB SITE FROM BRITISH LANDING AND VICE VERSA.
3. MOVEMENT OF CONSTRUCTION RELATED VEHICLES ON CITY/STATE PARK ROADS MUST BE ESCORTED BY CITY VEHICLES. APPROXIMATE DATES FOR SEASONAL TIME RESTRICTIONS ARE AS FOLLOWS:
   a.) SUNDAYS: NO VEHICLE MOVEMENT BEFORE 10:00 a.m.
   b.) SUMMER SEASON: APRIL 15th THROUGH OCTOBER 31st: VEHICLE MOVEMENT 10:00 p.m. TO 6:00 a.m.
   c.) WHILE SCHOOL IS SESSION: NO VEHICLE MOVEMENT 7:45 a.m. TO 8:30 a.m., 12:00 p.m. TO 12:30 p.m., 3:00 p.m. TO 4:00 p.m.
4. CONTRACTORS ARE ENCOURAGED TO MOVE MATERIALS AND EQUIPMENT DURING THE WINTER SEASON.

LOCATION MAP

NORTH

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.
2960 Lucerne Drive SE
Grand Rapids, MI 49546
P: 616.977.1000
F: 616.977.1005

Addendum No. 1	06/2023	DCH
Issued for Bids	05/2023	DCH

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

ISLAND ACCESS & FREIGHT ROUTE

DESIGN TEAM:	PROJ MNGR:	DCH
	DESIGNED BY:	DCH
	DRAWN BY:	DCT
	CHECK BY:	

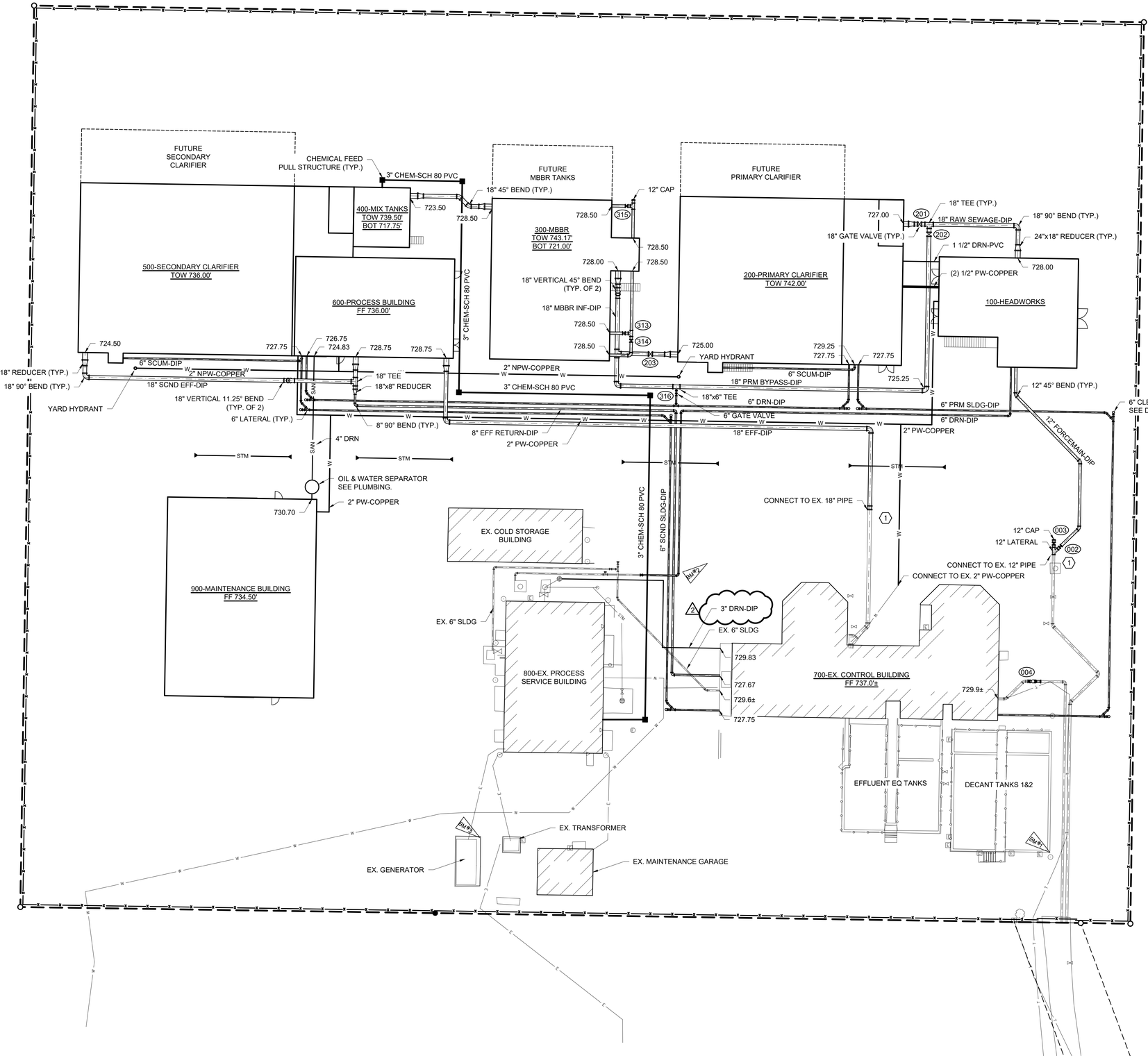
DCH MAY 2023
DRAWING INFORMATION:
847245_001-G-006
060623 nate.sculley

MAY 2023

F&V PROJECT NO.
847245

001-G-006

M:\Proj\847001--849000\847245 Mackinac Island WWTP Design\Civil\Print\847245_001-G-006.dwg — plotted on 6/8/2023 4:31 PM



NORTH

0 20 40
SCALE IN FEET

BENCHMARKS:

WWTP:

BM #1 EL. 738.89'
"X" IN CONC WALL @ SE CORNER AERATION TANKS 3&4
(NAVD88 PER FTC&H 2012 WWTP IMPROVEMENTS PLANS
PROJECT NO. G080509CD)

BM #2 EL. 735.89'
"X" IN CONC WALL @ SW CORNER FINAL CLARIFIER 3
(NAVD88 PER FTC&H 2012 WWTP IMPROVEMENTS PLANS
PROJECT NO. G080509CD)

BM #3 EL. 734.37'
"SQUARE" IN NE COR CONC PAD TO GENERATOR @ SW
CORNER OF PLANT SITE
(NAVD88 PER FTC&H 2012 WWTP IMPROVEMENTS PLANS
PROJECT NO. G080509CD)

DRAWING NOTES:

(#) (SYMBOL DENOTES PLAN NOTE)

1. CONTRACTOR TO FIELD VERIFY INVERT PRIOR TO CONSTRUCTION. REPORT VALUE TO ENGINEER.

GENERAL NOTES:

1. ALL PIPE ELEVATIONS ARE INVERTS, UNLESS NOTED OTHERWISE.
2. LOCATIONS OF ALL EXISTING PIPING ARE BASED ON BEST AVAILABLE RECORDS. EXACT LOCATIONS SHALL BE FIELD VERIFIED WEHRE NECESSARY.

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DESIGN. BUILD. OPERATE.
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Grand Rapids, MI 49546
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Addendum No. 1 06/2023 DCH 2
Issued for Bids 05/2023 DCH 1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

PROPOSED SITE PIPING PLAN

DESIGN TEAM:	PROJ MNGR: DCH
	DESIGNED BY: NRS
	DRAWN BY: DCT
	CHECK BY:

DCH MAY 2023
DRAWING INFORMATION:
847245_005-C-104
060123 lauren.wittmann

MAY 2023

F&V PROJECT NO.
847245

005-C-104

PHOTO 19

005-DD-105

PHOTO DESCRIPTION:

DECANT MECHANISM LOOKING SOUTHWEST. RELOCATE MECHANISM TO PROPOSED DECANT TANK NO. 2

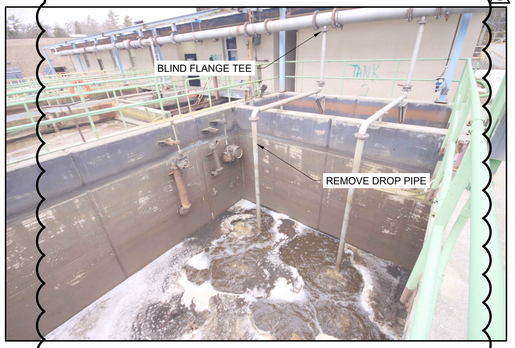

PHOTO 20

005-DD-106

PHOTO DESCRIPTION:

AERATION TANK NO. 3 LOOKING NORTHWEST.

PHOTO 21

005-DD-106

PHOTO DESCRIPTION:

AERATION TANK NO. 4 LOOKING NORTHEAST.

PHOTO 22

005-DD-106

PHOTO DESCRIPTION:

AERATION TANKS NO. 3 & 4 LOOKING SOUTHEAST.

PHOTO 23

005-DD-107

PHOTO DESCRIPTION:

EXISTING FINAL CLARIFIER NO. 1 LOOKING SOUTHEAST. DEMOLISH EQUIPMENT & STRUCTURE.

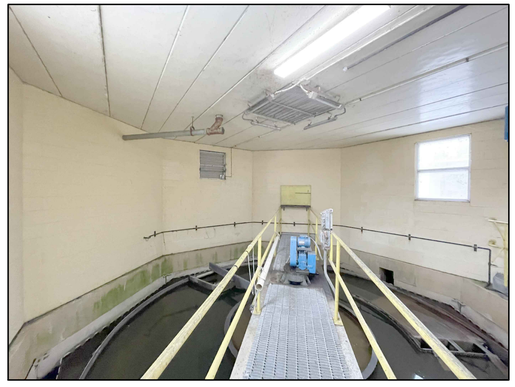

PHOTO 24

005-DD-107

PHOTO DESCRIPTION:

FINAL CLARIFIER NO. 2 LOOKING NORTHEAST. DEMOLISH EQUIPMENT GRATING, ELECTRICAL, & ALL RELATED APPURTENANCES.

PHOTO 25

005-DD-108

PHOTO DESCRIPTION:

FINAL CLARIFIER NO. 3 & 4 SPLITTER WELL LOOKING NORTHEAST. DEMOLISH WEIR (SLIDE) GATES AND SPLITTER WELL IN ITS ENTIRETY.

PHOTO 26

005-DD-108

PHOTO DESCRIPTION:

FINAL CLARIFIER NO. 3 LOOKING NORTHEAST. DEMOLISH IN ITS ENTIRETY.

PHOTO 27

005-DD-108

PHOTO DESCRIPTION:

FINAL CLARIFIER NO. 4 LOOKING NORTHWEST. DEMOLISH IN ITS ENTIRETY.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

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REVISION:

Addendum No. 1	06/2023	DCH
Issued for Bids	05/2023	DCH

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS
DEMOLITION PHOTOS

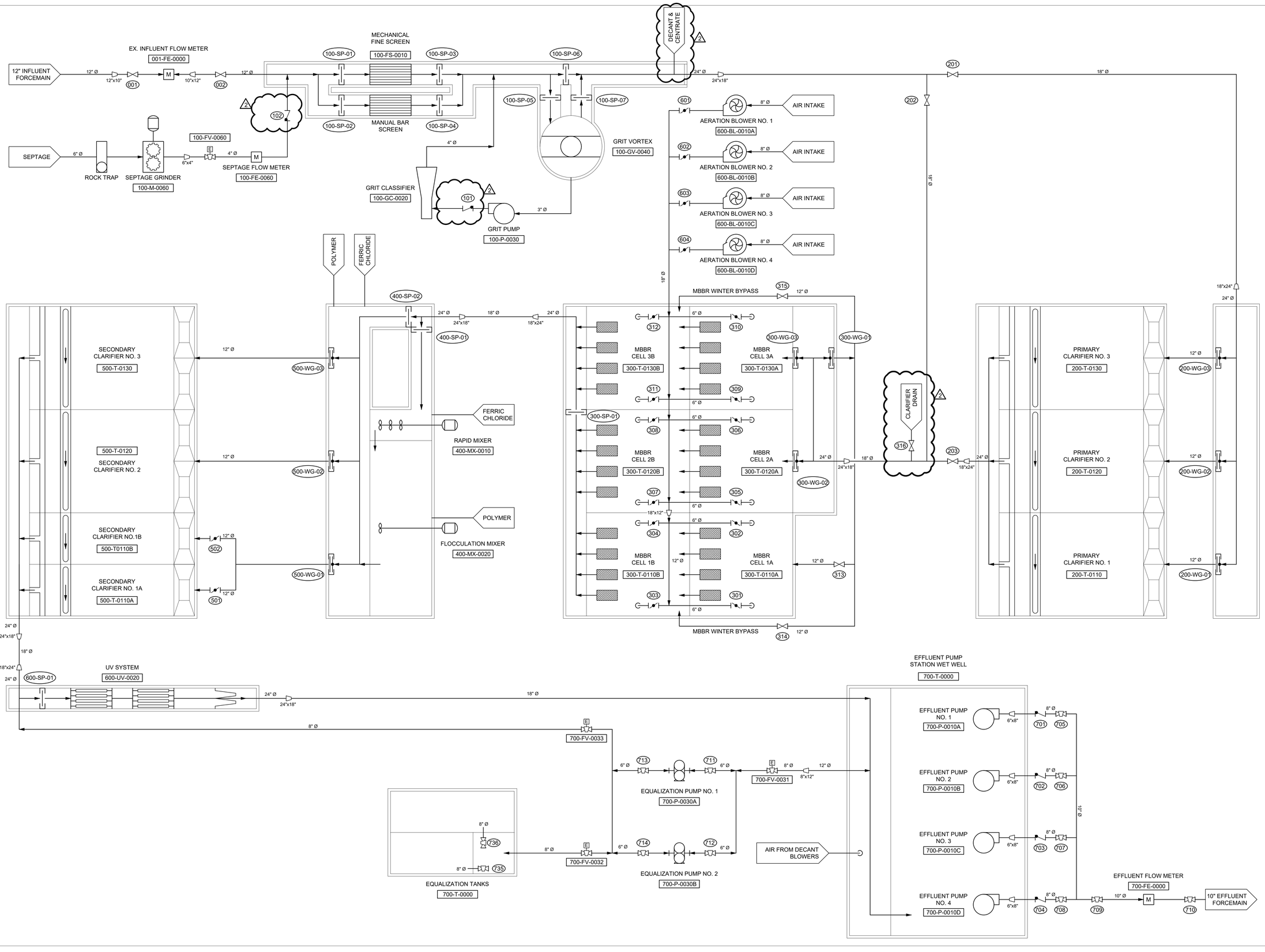
DESIGN TEAM:
PROJ MNGR: DCH
DESIGNED BY: SMW
DRAWN BY: DCT
CHECK BY: DCH
MAY 2023

DRAWING INFORMATION:
847245_005-DD-903
052423 lauren.wittmann

MAY 2023

F&V PROJECT NO.
847245

005-DD-903



FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

2960 Lucerne Drive SE
Grand Rapids, MI 49546
P: 616.977.1000
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REVISION:		
Addendum No. 1	06/2023	DCH 2
Issued for Bids	05/2023	DCH 1

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

PROCESS FLOW DIAGRAM

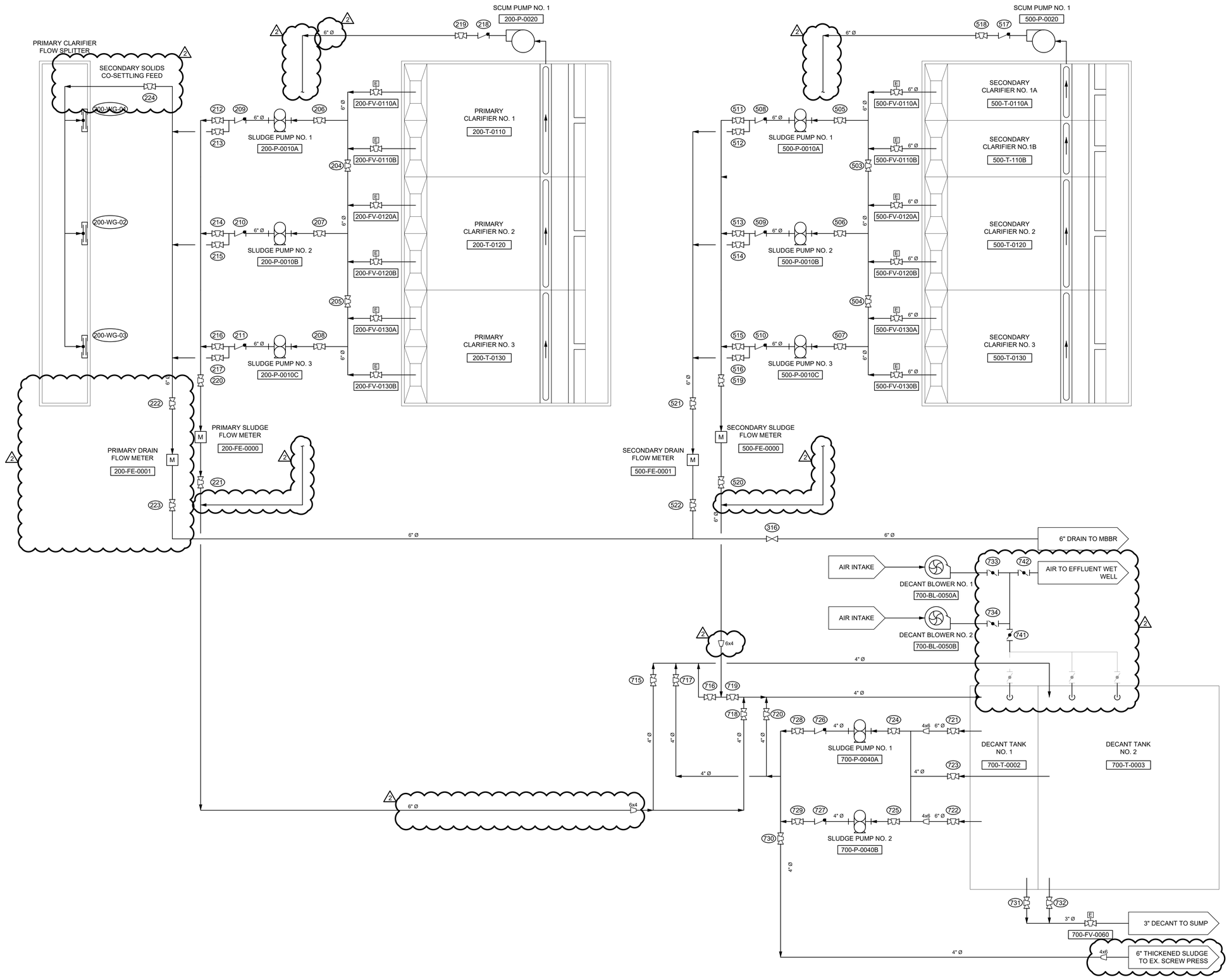
DESIGN TEAM:	PROJ MNGR:	DCH
	DESIGNED BY:	NRS
	DRAWN BY:	NRS
	CHECK BY:	DCH

MAY 2023

DRAWING INFORMATION:
847245_001-D-001
052423 nate.zaki

F&V PROJECT NO.
847245

001-D-001



FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

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Grand Rapids, MI 49546
P: 616.977.1000
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Addendum No. 1	06/2023	DCH
Issued for Bids	05/2023	DCH

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

SLUDGE FLOW DIAGRAM

DESIGN TEAM:		PROJ MNGR:	DCH
		DESIGNED BY:	NRS
		DRAWN BY:	NRS
		CHECK BY:	

DCH MAY 2023

DRAWING INFORMATION:
847245_001-D-002
060123 lauren.wittmann

MAY 2023

F&V PROJECT NO.
847245

001-D-002

VALVE SCHEDULE (3" & LARGER)

TAG	SIZE	TYPE	ACTUATOR	LOCATION	COMMENTS
001	10"	GATE	2" NUT	INFLUENT FORCEMAIN	EXISTING
002	12"	GATE	2" NUT	INFLUENT FORCEMAIN	BURIED WITH VALVE BOX
003	12"	GATE	2" NUT	INFLUENT FORCEMAIN	BURIED WITH VALVE BOX
004	10"	GATE	2" NUT	EFFLUENT FORCEMAIN	BURIED WITH VALVE BOX
005-100	-	-	-	NOT USED	NOT USED
101	3"	CHECK	AS SPECIFIED	GRIT PUMP NO. 1 EFFLUENT	
102	4"	CHECK	AS SPECIFIED	SEPTAGE INFLUENT	
103-200	-	-	-	NOT USED	NOT USED
201	18"	GATE	2" NUT	PRIMARY CLARIFIER INFLUENT	BURIED WITH VALVE BOX
202	18"	GATE	2" NUT	PRIMARY CLARIFIER BYPASS	BURIED WITH VALVE BOX
203	18"	GATE	2" NUT	PRIMARY CLARIFIER EFFLUENT	BURIED WITH VALVE BOX
204	6"	PLUG	LEVER	PRIMARY SLUDGE SUCTION	
205	6"	PLUG	LEVER	PRIMARY SLUDGE SUCTION	
206	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.1 SUCTION	
207	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.2 SUCTION	
208	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.3 SUCTION	
209	6"	CHECK	AS SPECIFIED	PRIMARY SLUDGE PUMP NO.1 DISCHARGE	
210	6"	CHECK	AS SPECIFIED	PRIMARY SLUDGE PUMP NO.2 DISCHARGE	
211	6"	CHECK	AS SPECIFIED	PRIMARY SLUDGE PUMP NO.3 DISCHARGE	
212	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.1 TO DECANT	
213	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.1 TO DRAIN	
214	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.2 TO DECANT	
215	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.2 TO DRAIN	
216	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.3 TO DECANT	
217	6"	PLUG	LEVER	PRIMARY SLUDGE PUMP NO.3 TO DRAIN	
218	6"	CHECK	AS SPECIFIED	PRIMARY SCUM PUMP DISCHARGE	
219	6"	PLUG	CHAINWHEEL	PRIMARY SCUM PUMP DISCHARGE	
220	6"	PLUG	CHAINWHEEL	PRIMARY SLUDGE TO DECANT TANKS	
221	6"	PLUG	CHAINWHEEL	PRIMARY SLUDGE TO DECANT TANKS	
222	6"	PLUG	CHAINWHEEL	PRIMARY CLARIFIER DRAIN	
223	6"	PLUG	CHAINWHEEL	PRIMARY CLARIFIER DRAIN	
224	6"	PLUG	CHAINWHEEL	PRIMARY CLARIFIER DRAIN	
225-300	-	-	-	NOT USED	NOT USED
301	6"	BUTTERFLY	LEVER	MBBR CELL 1A	
302	6"	BUTTERFLY	LEVER	MBBR CELL 1A	
303	6"	BUTTERFLY	LEVER	MBBR CELL 1B	
304	6"	BUTTERFLY	LEVER	MBBR CELL 1B	
305	6"	BUTTERFLY	LEVER	MBBR CELL 2A	
306	6"	BUTTERFLY	LEVER	MBBR CELL 2A	
307	6"	BUTTERFLY	LEVER	MBBR CELL 2B	
308	6"	BUTTERFLY	LEVER	MBBR CELL 2B	
309	6"	BUTTERFLY	LEVER	MBBR CELL 3A	
310	6"	BUTTERFLY	LEVER	MBBR CELL 3A	
311	6"	BUTTERFLY	LEVER	MBBR CELL 3B	
312	6"	BUTTERFLY	LEVER	MBBR CELL 3B	
313	12"	GATE	2" NUT	INFLUENT MBBR CELL 1A	BURIED WITH VALVE BOX
314	12"	GATE	2" NUT	WINTER BYPASS TO MBBR CELL 1B	BURIED WITH VALVE BOX
315	12"	GATE	2" NUT	WINTER BYPASS TO MBBR CELL 3B	BURIED WITH VALVE BOX
316	6"	GATE	2" NUT	DRAIN TO MBBR	BURIED WITH VALVE BOX
317-500	-	-	-	NOT USED	NOT USED
501	12"	PLUG	CHAINWHEEL	SECONDARY CLARIFIER NO.1A INFLUENT	
502	12"	PLUG	CHAINWHEEL	SECONDARY CLARIFIER NO.1B INFLUENT	
503	6"	PLUG	LEVER	SECONDARY SLUDGE SUCTION	
504	6"	PLUG	LEVER	SECONDARY SLUDGE SUCTION	
505	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.1 SUCTION	
506	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.2 SUCTION	
507	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.3 SUCTION	
508	6"	CHECK	AS SPECIFIED	SECONDARY SLUDGE PUMP NO.1 DISCHARGE	
509	6"	CHECK	AS SPECIFIED	SECONDARY SLUDGE PUMP NO.2 DISCHARGE	
510	6"	CHECK	AS SPECIFIED	SECONDARY SLUDGE PUMP NO.3 DISCHARGE	
511	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.1 TO DECANT	
512	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.1 TO DRAIN	
513	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.2 TO DECANT	
514	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.2 TO DRAIN	
515	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.3 TO DECANT	
516	6"	PLUG	LEVER	SECONDARY SLUDGE PUMP NO.3 TO DRAIN	
517	6"	CHECK	AS SPECIFIED	SECONDARY SCUM PUMP NO.1 DISCHARGE	
518	6"	PLUG	CHAINWHEEL	SECONDARY SCUM PUMP NO.1 DISCHARGE	
519	6"	PLUG	CHAINWHEEL	SECONDARY SLUDGE TO DECANT TANKS	
520	6"	PLUG	CHAINWHEEL	SECONDARY SLUDGE TO DECANT TANKS	
521	6"	PLUG	CHAINWHEEL	SECONDARY SOLIDS CO-SETTLING	
522	6"	PLUG	CHAINWHEEL	SECONDARY SOLIDS CO-SETTLING	
523-600	-	-	-	NOT USED	NOT USED

VALVE SCHEDULE (3" & LARGER)

	A	B	C	D	E	F
1	VALVE SCHEDULE (3" & LARGER)					
2	TAG	SIZE	TYPE	ACTUATOR	LOCATION	COMMENTS
3	601	8"	BUTTERFLY	LEVER	AERATION BLOWER NO.1 DISCHARGE	
4	602	8"	BUTTERFLY	LEVER	AERATION BLOWER NO.2 DISCHARGE	
5	603	8"	BUTTERFLY	LEVER	AERATION BLOWER NO.3 DISCHARGE	
6	604	8"	BUTTERFLY	LEVER	AERATION BLOWER NO.4 DISCHARGE	
7	605-700	-	-	-	NOT USED	NOT USED
8	701	8"	CHECK	AS SPECIFIED	EFFLUENT PUMP NO.1 DISCHARGE	
9	702	8"	CHECK	AS SPECIFIED	EFFLUENT PUMP NO.2 DISCHARGE	
10	703	8"	CHECK	AS SPECIFIED	EFFLUENT PUMP NO.3 DISCHARGE	
11	704	8"	CHECK	AS SPECIFIED	EFFLUENT PUMP NO.4 DISCHARGE	
12	705	8"	PLUG	CHAINWHEEL	EFFLUENT PUMP NO.1 DISCHARGE	
13	706	8"	PLUG	CHAINWHEEL	EFFLUENT PUMP NO.2 DISCHARGE	
14	707	8"	PLUG	CHAINWHEEL	EFFLUENT PUMP NO.3 DISCHARGE	
15	708	8"	PLUG	CHAINWHEEL	EFFLUENT PUMP NO.4 DISCHARGE	
16	709	10"	PLUG	CHAINWHEEL	EFFLUENT FORCEMAIN	
17	710	10"	PLUG	CHAINWHEEL	EFFLUENT FORCEMAIN	
18	711	6"	PLUG	LEVER	EQUALIZATION PUMP NO.1	
19	712	6"	PLUG	LEVER	EQUALIZATION PUMP NO.2	
20	713	6"	PLUG	LEVER	EQUALIZATION PUMP NO.1	
21	714	6"	PLUG	LEVER	EQUALIZATION PUMP NO.2	
22	715	4"	PLUG	LEVER	PRIMARY SLUDGE TO DECANT TANK NO.2	
23	716	4"	PLUG	LEVER	SECONDARY SLUDGE TO DECANT TANK NO.2	
24	717	4"	PLUG	LEVER	SLUDGE TRANSFER TO DECANT TANK NO.2	
25	718	4"	PLUG	LEVER	PRIMARY SLUDGE TO DECANT TANK NO.1	
26	719	4"	PLUG	LEVER	SECONDARY SLUDGE TO DECANT TANK NO.1	
27	720	4"	PLUG	LEVER	SLUDGE TRANSFER TO DECANT TANK NO.1	
28	721	6"	PLUG	LEVER	DECANT TANK NO.1 SUCTION	
29	722	6"	PLUG	LEVER	DECANT TANK NO.1 SUCTION	
30	723	4"	PLUG	LEVER	DECANT TANK NO.2 TO SUCTION	
31	724	4"	PLUG	LEVER	SLUDGE PUMP NO.1 SUCTION	
32	725	4"	PLUG	LEVER	SLUDGE PUMP NO.2 SUCTION	
33	726	4"	CHECK	AS SPECIFIED	SLUDGE PUMP NO.1 DISCHARGE	
34	727	4"	CHECK	AS SPECIFIED	SLUDGE PUMP NO.2 DISCHARGE	
35	728	4"	PLUG	LEVER	SLUDGE PUMP NO.1 DISCHARGE	
36	729	4"	PLUG	LEVER	SLUDGE PUMP NO.2 DISCHARGE	
37	730	4"	PLUG	LEVER	SLUDGE TO EX. SCREW PRESS	
38	731	3"	PLUG	LEVER	DECANT TANK TO SUMP	
39	732	3"	PLUG	LEVER	DECANT TANK TO SUMP	
40	733	6"	BUTTERFLY	LEVER	DECANT BLOWER NO.1 DISCHARGE	
41	734	6"	BUTTERFLY	LEVER	DECANT BLOWER NO.2 DISCHARGE	
42	735	8"	PLUG	2" NUT	EQUALIZATION TANKS	EXTENDED OPERATOR
43	736	8"	PLUG	2" NUT	EQUALIZATION TANKS	EXTENDED OPERATOR
44	737	3"	CHECK	AS SPECIFIED	SUMP PUMP NO.1 DISCHARGE	
45	738	3"	PLUG	LEVER	SUMP PUMP NO.1 DISCHARGE	
46	739	3"	CHECK	AS SPECIFIED	SUMP PUMP NO.2 DISCHARGE	
47	740	3"	PLUG	LEVER	SUMP PUMP NO.2 DISCHARGE	
48	741	12"	BUTTERFLY	CHAINWHEEL	AIR PIPING TO DECANT TANKS	
49	742	4"	BUTTERFLY	CHAINWHEEL	AIR PIPING TO EFFLUENT WET WELL	
50	200-FV-0110A	6"	PLUG	ELECTRIC	PRIMARY CLARIFIER NO.1 - SLUDGE	OPEN/CLOSE
51	200-FV-0110B	6"	PLUG	ELECTRIC	PRIMARY CLARIFIER NO.1 - SLUDGE	OPEN/CLOSE
52	200-FV-0120A	6"	PLUG	ELECTRIC	PRIMARY CLARIFIER NO.2 - SLUDGE	OPEN/CLOSE
53	200-FV-0120B	6"	PLUG	ELECTRIC	PRIMARY CLARIFIER NO.2 - SLUDGE	OPEN/CLOSE
54	200-FV-0130A	6"	PLUG	ELECTRIC	PRIMARY CLARIFIER NO.3 - SLUDGE	OPEN/CLOSE
55	200-FV-0130B	6"	PLUG	ELECTRIC	PRIMARY CLARIFIER NO.3 - SLUDGE	OPEN/CLOSE
56	500-FV-0110A	6"	PLUG	ELECTRIC	SECONDARY CLARIFIER NO.1A - SLUDGE	OPEN/CLOSE
57	500-FV-0110B	6"	PLUG	ELECTRIC	SECONDARY CLARIFIER NO.1B - SLUDGE	OPEN/CLOSE
58	500-FV-0120A	6"	PLUG	ELECTRIC	SECONDARY CLARIFIER NO.2 - SLUDGE	OPEN/CLOSE
59	500-FV-0120B	6"	PLUG	ELECTRIC	SECONDARY CLARIFIER NO.2 - SLUDGE	OPEN/CLOSE
60	500-FV-0130A	6"	PLUG	ELECTRIC	SECONDARY CLARIFIER NO.3 - SLUDGE	OPEN/CLOSE
61	500-FV-0130B	6"	PLUG	ELECTRIC	SECONDARY CLARIFIER NO.3 - SLUDGE	OPEN/CLOSE
62	700-FV-0031	8"	PLUG	ELECTRIC	EQUALIZATION PUMPS TO EFFLUENT WET WELL	OPEN/CLOSE
63	700-FV-0032	8"	PLUG	ELECTRIC	EQUALIZATION PUMPS TO EQUALIZATION TANKS	OPEN/CLOSE
64	700-FV-0033	8"	PLUG	ELECTRIC	EQUALIZATION PUMPS TO UV DISINFECTION	OPEN/CLOSE
65	700-FV-0060	3"	PLUG	ELECTRIC	DECANT TANK TO SUMP	OPEN/CLOSE

SCHEDULE NOTES:

1. VALVE SCHEDULE IS PROVIDED FOR CONTRACTOR'S CONVENIENCE. NOT ALL VALVES 3" AND LARGER ARE NECESSARILY LISTED.
2. CONTRACTOR IS RESPONSIBLE FOR ITS OWN TAKE-OFF AND IS RESPONSIBLE TO PROVIDE ALL VALVES AS INDICATED ON THE DRAWINGS.
3. THESE VALVES ARE SHOWN ON THE PROCESS DRAWINGS ONLY AND ARE SPECIFIED IN SECTION 40 05 60 - PROCESS VALVES.

SLIDE GATE SCHEDULE

TAG	SIZE OF GATE		SEATING HEAD	UNSEATING HEAD	MATERIAL	MOUNTING		FRAME	OPENING DIRECTION	ACUTATOR TYPE	STEM	SERVICE	FREQUENCY OF OPERATION
	WIDTH	HEIGHT				LOCATION	FRAME						
200-WG-01	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
200-WG-02	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
200-WG-03	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
300-WG-01	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
300-WG-02	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDHWEEL	RS	OPEN/CLOSE	N/A
300-WG-03	3'-0"	1'-6"	0-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
500-WG-01	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
500-WG-02	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A
500-WG-03	3'-0"	1'-6"	0'-9"	N/A	304 SS	EC	SM	SC	DOWNWARD	HANDWHEEL	RS	OPEN/CLOSE	N/A

KEY:

EP = END OF PIPE
EC = END OF CHANNEL
IC = IN CHANNEL

304 SS = 304 STAINLESS STEEL
316 SS = 316 STAINLESS STEEL
ALUM = ALUMINUM

SM = SURFACE MOUNT
EM = EMBEDDED

SC = SELF CONTAINED
NSC = NON SELF CONTAINED
RS = RISING STEM
NRS = NON RISING STEM

CLASS 1 = 60 STARTS PER HOUR
CLASS 2 = 100 STARTS PER HOUR
CLASS 3 = 600 STARTS PER HOUR
CLASS 4 = 1200 STARTS PER HOUR

ALUMINUM ACCESS HATCH SCHEDULE

TAG	LOCATION	OPENING WIDTH	OPENING LENGTH	FRAME TYPE	DOOR TYPE	SAFETY GRATING	H-20 LOAD RATING	COMMENTS
200-H-1	PRIMARY CLARIFIER SCUM WELL	3'-0"	4'-0"	ANGLE	SINGLE	NO	NO	
200-H-1A	PRIMARY CLARIFIER 1	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
200-H-1B	PRIMARY CLARIFIER 1	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
200-H-2A	PRIMARY CLARIFIER 2	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
200-H-2B	PRIMARY CLARIFIER 2	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
200-H-3A	PRIMARY CLARIFIER 3	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
200-H-3B	PRIMARY CLARIFIER 3	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
300-H-1A1	MBBR CELL 1A	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-1A2	MBBR CELL 1A	2'-0"	2'-0"	ANGLE	SINGLE	NO	NO	
300-H-1A3	MBBR CELL 1A	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-1B1	MBBR CELL 1B	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-1B2	MBBR CELL 1B	2'-0"	2'-0"	ANGLE	SINGLE	NO	NO	
300-H-1B3	MBBR CELL 1B	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-2A1	MBBR CELL 2A	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-2A2	MBBR CELL 2A	2'-0"	2'-0"	ANGLE	SINGLE	NO	NO	
300-H-2A3	MBBR CELL 2A	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-2B1	MBBR CELL 2B	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-2B2	MBBR CELL 2B	2'-0"	2'-0"	ANGLE	SINGLE	NO	NO	
300-H-2B3	MBBR CELL 2B	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-3A1	MBBR CELL3A	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-3A2	MBBR CELL3A	2'-0"	2'-0"	ANGLE	SINGLE	NO	NO	
300-H-3A3	MBBR CELL3A	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-3B1	MBBR CELL 3B	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
300-H-3B2	MBBR CELL 3B	2'-0"	2'-0"	ANGLE	SINGLE	NO	NO	
300-H-3B3	MBBR CELL 3B	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
500-H-1	SECONDARY CLARIFIER SCUM WELL	3'-0"	4'-0"	ANGLE	DOUBLE	NO	NO	
500-H-1A	SECONDARY CLARIFIER 1A	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
500-H-1B	SECONDARY CLARIFIER 1B	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
500-H-2A	SECONDARY CLARIFIER 2	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
500-H-2B	SECONDARY CLARIFIER 2	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
500-H-3A	SECONDARY CLARIFIER 3	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
500-H-3B	SECONDARY CLARIFIER 3	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	
600-H-1	PIPE GALLERY ACCESS	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
700-H-1	EFFLUENT PUMP ACCESS	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
700-H-2	EFFLUENT PUMP ACCESS	4'-0"	6'-0"	ANGLE	DOUBLE	NO	NO	
700-H-3	WET WELL ACCESS	3'-0"	3'-0"	ANGLE	SINGLE	NO	NO	PROVIDE LADDER UP

FRP SOLID COVER HATCH SCHEDULE

TAG	LOCATION	OPENING WIDTH	OPENING LENGTH	COMMENTS
200-AH-1A	PRIMARY CLARIFIER 1	1'-10"	2'-6"	
200-AH-1B	PRIMARY CLARIFIER 1	1'-10"	2'-6"	
200-AH-1C	PRIMARY CLARIFIER 1	1'-10"	1'-10"	
200-AH-1D	PRIMARY CLARIFIER 1	1'-10"	1'-10"	
200-AH-1E	PRIMARY CLARIFIER 1	1'-10"	1'-10"	
200-AH-2A	PRIMARY CLARIFIER 2	1'-10"	2'-6"	
200-AH-2B	PRIMARY CLARIFIER 2	1'-10"	2'-6"	
200-AH-2C	PRIMARY CLARIFIER 2	1'-10"	1'-10"	
200-AH-2D	PRIMARY CLARIFIER 2	1'-10"	1'-10"	
200-AH-2E	PRIMARY CLARIFIER 2	1'-10"	1'-10"	
200-AH-3A	PRIMARY CLARIFIER 3	1'-10"	2'-6"	
200-AH-3B	PRIMARY CLARIFIER 3	1'-10"	2'-6"	
200-AH-3C	PRIMARY CLARIFIER 3	1'-10"	1'-10"	
200-AH-3D	PRIMARY CLARIFIER 3	1'-10"	1'-10"	
200-AH-3E	PRIMARY CLARIFIER 3	1'-10"	1'-10"	
400-AH-1	FLOCCULATION TANK	1'-10"	1'-10"	
400-AH-2	FLOCCULATION TANK	1'-10"	1'-10"	
500-AH-1A1	SECONDARY CLARIFIER 1A	1'-10"	2'-6"	
500-AH-1A2	SECONDARY CLARIFIER 1A	1'-10"	1'-10"	
500-AH-1A3	SECONDARY CLARIFIER 1A	1'-10"	1'-10"	
500-AH-1B1	SECONDARY CLARIFIER 1B	1'-10"	2'-6"	
500-AH-1B2	SECONDARY CLARIFIER 1B	1'-10"	1'-10"	
500-AH-1B3	SECONDARY CLARIFIER 1B	1'-10"	1'-10"	
500-AH-2A	SECONDARY CLARIFIER 2	1'-10"	2'-6"	
500-AH-2B	SECONDARY CLARIFIER 2	1'-10"	2'-6"	
500-AH-2C	SECONDARY CLARIFIER 2	1'-10"	1'-10"	
500-AH-2D	SECONDARY CLARIFIER 2	1'-10"	1'-10"	
500-AH-2E	SECONDARY CLARIFIER 2	1'-10"	1'-10"	
500-AH-3A	SECONDARY CLARIFIER 3	1'-10"	2'-6"	
500-AH-3B	SECONDARY CLARIFIER 3	1'-10"	2'-6"	
500-AH-3C	SECONDARY CLARIFIER 3	1'-10"	1'-10"	
500-AH-3D	SECONDARY CLARIFIER 3	1'-10"	1'-10"	
500-AH-3E	SECONDARY CLARIFIER 3	1'-10"	1'-10"	

FLEIS&VANDENBRINK
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Addendum No. 1 06/2023 DCH 2
Issued for Bids 05/2023 DCH 1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

DETAILS & SCHEDULES

DESIGN TEAM: | PROJ MNGR: DCH | DESIGNED BY: NRS | DRAWN BY: DCT | CHECK BY: DCH

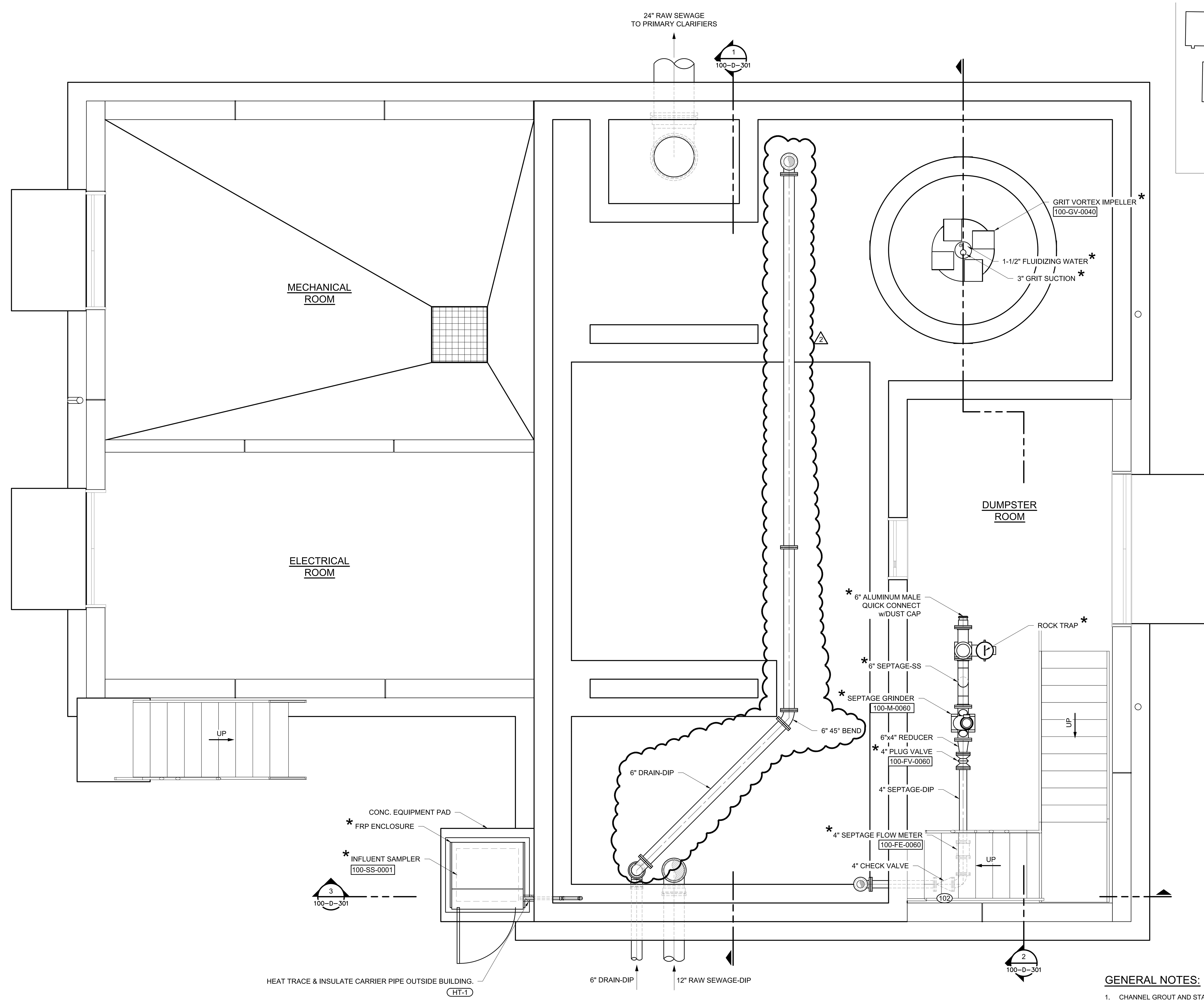
MAY 2023

DRAWING INFORMATION:
847245_001-D-501
052323 nate.sculley

MAY 2023

F&V PROJECT NO.
847245

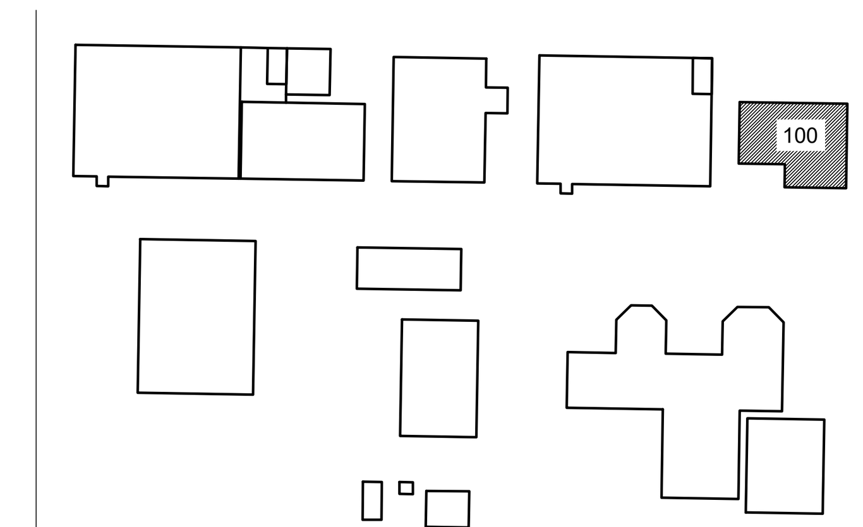
001-D-501



HEADWORKS BUILDING LOWER PLAN

SCALE: 3/8" = 1'-0"

NORTH



KEY PLAN

SCALE: NOT TO SCALE

GENERAL NOTES:

1. CHANNEL GROUT AND STAIRS NOT SHOWN FOR CLARITY.
2. ALL MISCELLANEOUS METALS IN HEADWORKS BUILDING SHALL BE STAINLESS STEEL.

EQUIPMENT NOTES:

HT-1 PROVIDE RAYCHEM BTV1 SELF-REGULATING HEATING CABLES ON (1) 1-1/2" CARRIER PIPE ABOVE GRADE, 5BTV1-CT ON 1" PIPE, JBS-100A POWER KIT FOR EACH PIPE, E-150 END SEALS, GT-66 GLASS TAPE, PS-10 PIPE STRAPS, ELT LABELS, AND ONE AMC-1H THERMOSTAT SERVING HEAT TRACING ON (1) 1-1/2" PIPE. PROVIDE TRYMER 2" POLYISOCYANURATE INSULATION WITH JRA, 0.016 IN. ALUMINUM JACKET OVER ALL HEAT TRACE. ALL HEAT TRACING MATERIALS SHALL BE SUITABLE FOR INSTALLATION IN A CLASS 1, DIVISION 2 AREA.

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REVISION:			
Addendum No. 1	06/2023	DCH	2
Issued for Bids	05/2023	DCH	1

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

HEADWORKS BUILDING LOWER PLAN

DESIGN TEAM: PROJ MNGR: DCH
DESIGNED BY: NRS
DRAWN BY: NRS
CHECK BY:
DCH MAY 2023
DRAWING INFORMATION:
100-D-101
052523 nate.sculley

MAY 2023

F&V PROJECT NO.
847245

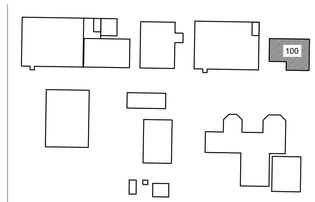
100-D-101

GENERAL NOTES:

1. CHANNEL GROUT AND STAIRS NOT SHOWN FOR CLARITY.
2. ALL GRIT PUMP SUCTION AND DISCHARGE PIPING SHALL BE GLASS LINED DIP.
3. ALL MISCELLANEOUS METALS IN HEADWORKS BUILDING SHALL BE STAINLESS STEEL.

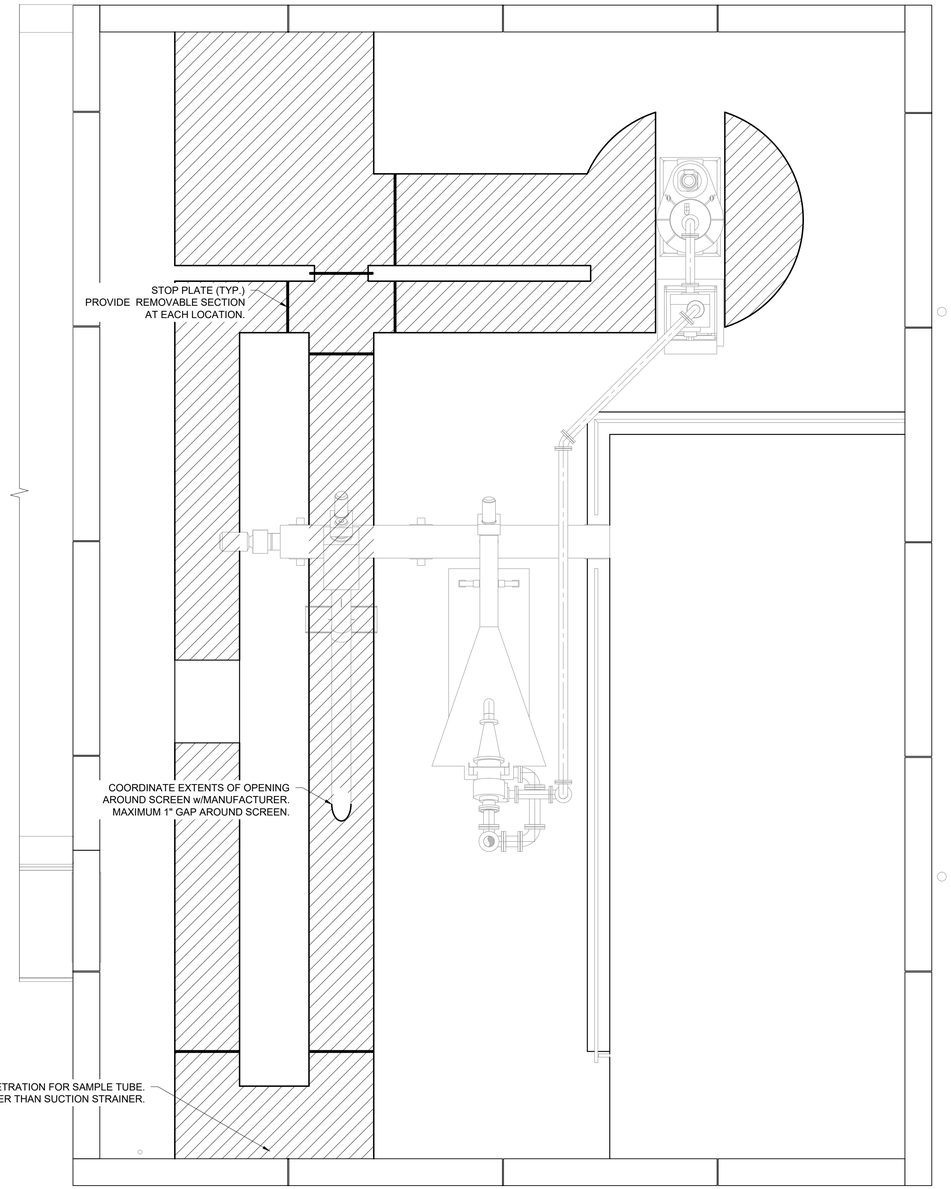
DRAWING NOTES: (#) (SYMBOL DENOTES PLAN NOTE)

1. PROVIDE CONVEYOR OVERFLOW CHUTE TO EXTEND 5' AFF INTO CART PROVIDED BY OWNER. CHUTE MANUFACTURER: SUPERCHUTE (LASALLE, QC, CANADA), YELLOW TELESCOPIC TYPE WITH CHAIN LINKED SECTIONS.



KEY PLAN

SCALE: NOT TO SCALE



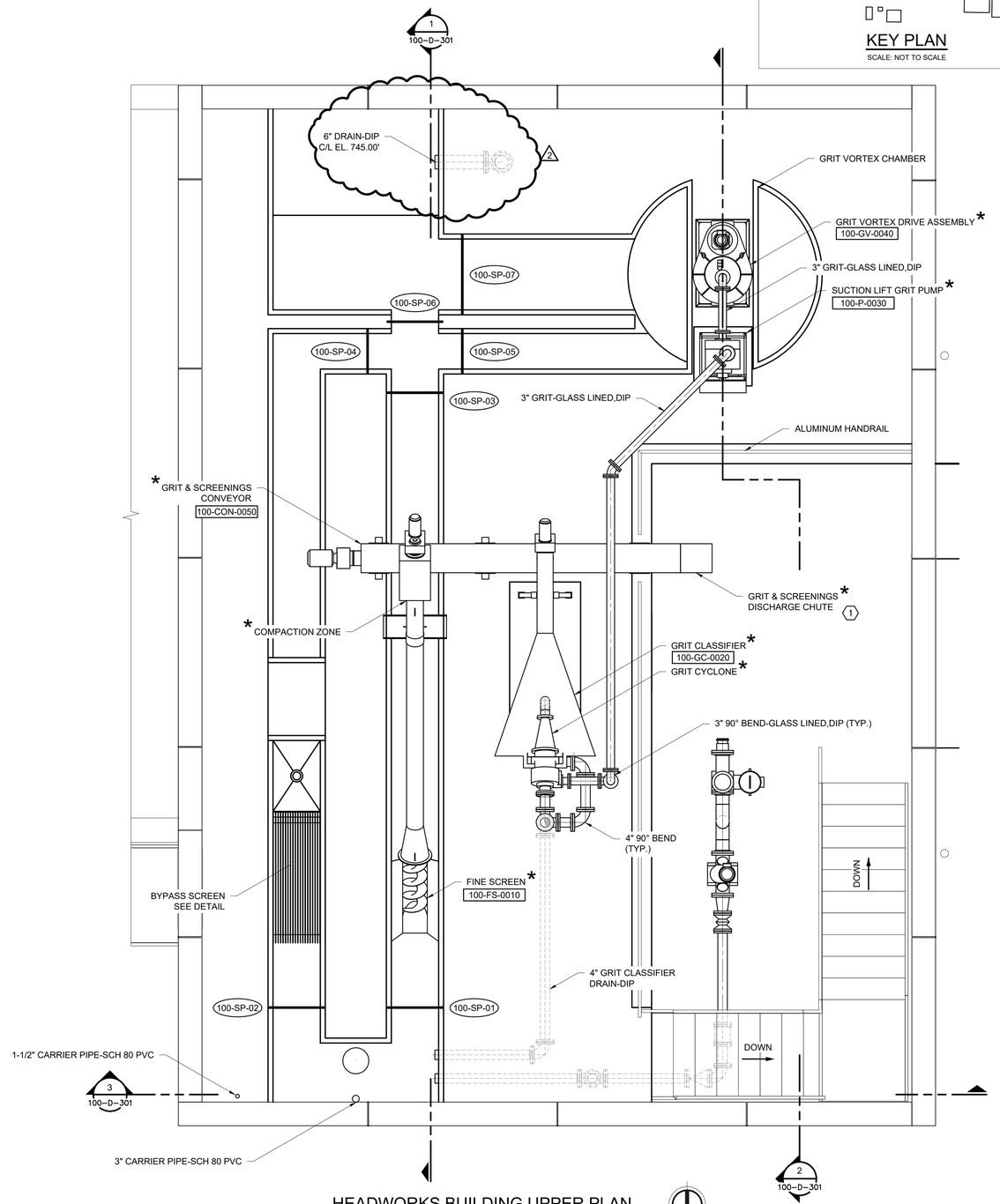
HEADWORKS BUILDING FRP COVER PLAN

SCALE: 3/8" = 1'-0"

NORTH

LEGEND:

FRP SOLID COVERS



HEADWORKS BUILDING UPPER PLAN

SCALE: 3/8" = 1'-0"

NORTH

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Addendum No. 1	06/2023	DCH
Issued for Bids	05/2023	DCH

	2
	1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

HEADWORKS BUILDING UPPER PLAN

DESIGN TEAM:	PROJ MNGR:	DCH
	DESIGNED BY:	NRS
	DRAWN BY:	NRS
	CHECK BY:	

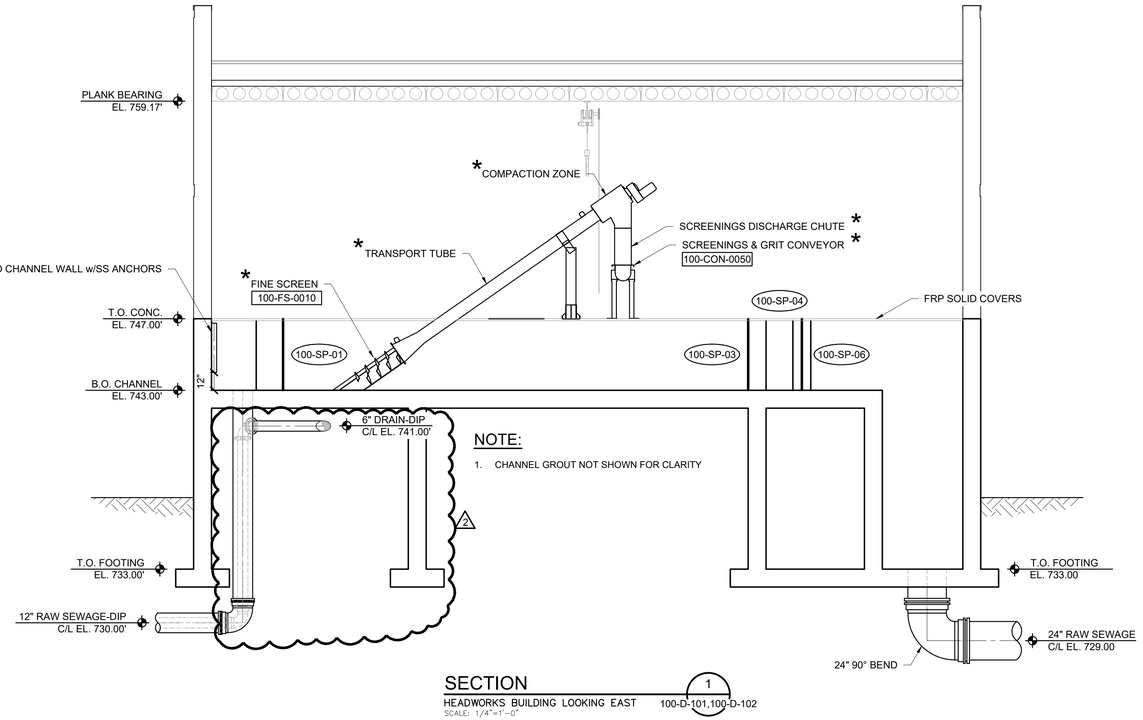
DCH MAY 2023

DRAWING INFORMATION:
100-D-102
052223 nate.sculley

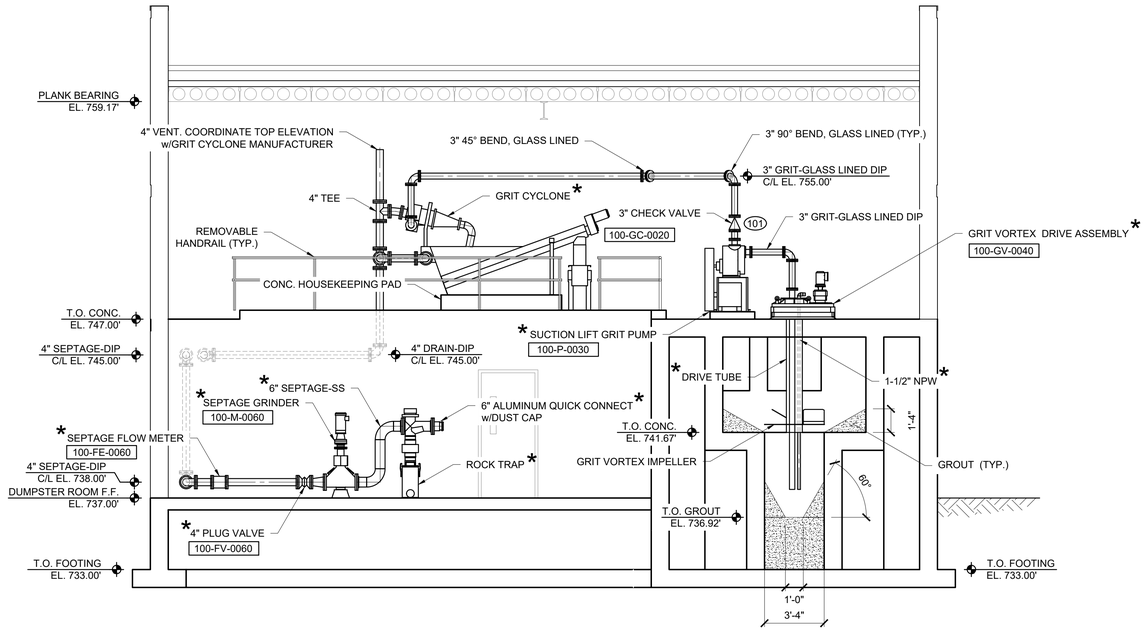
MAY 2023

F&V PROJECT NO.
847245

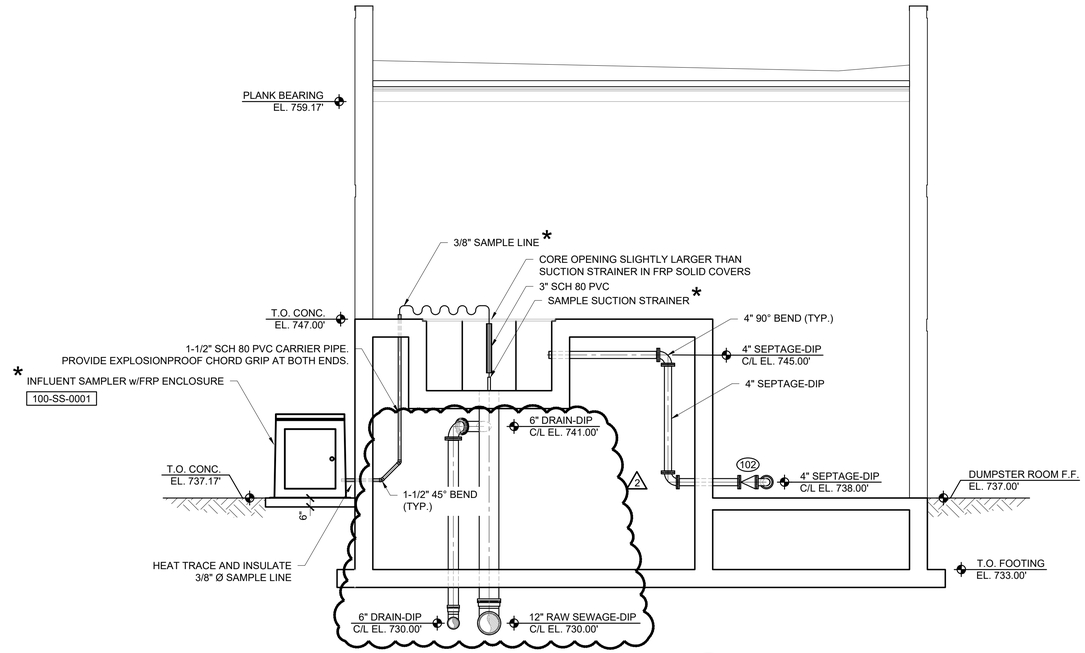
100-D-102



SECTION
HEADWORKS BUILDING LOOKING EAST
SCALE: 1/4"=1'-0"
1 100-D-101,100-D-102



SECTION
DUMPSTER ROOM & GRIT VORTEX LOOKING WEST
SCALE: 1/4"=1'-0"
2 100-D-101,100-D-102



SECTION
DUMPSTER ROOM LOOKING NORTH
SCALE: 1/4"=1'-0"
3 100-D-101,100-D-102

GENERAL NOTES:

1. CHANNEL GROUT AND STAIRS NOT SHOWN FOR CLARITY.
2. ALL GRIT PUMP SUCTION AND DISCHARGE PIPING SHALL BE GLASS LINED DIP.
3. ALL MISCELLANEOUS METALS IN HEADWORKS BUILDING SHALL BE STAINLESS STEEL.

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Addendum No. 1 06/2023 DCH 2
Issued for Bids 05/2023 DCH 1

REVISION:

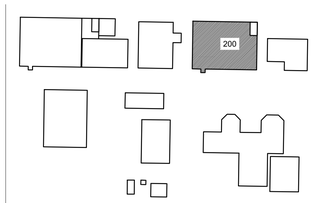
CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

HEADWORKS BUILDING SECTIONS

DESIGN TEAM: PROJ MNGR: DCH
DESIGNED BY: NRS
DRAWN BY: NRS
CHECK BY: DCH
MAY 2023
DRAWING INFORMATION:
100-D-301
052223 nate.sculley

MAY 2023
F&V PROJECT NO.
847245

100-D-301



KEY PLAN

SCALE: NOT TO SCALE

12" MANUAL HANDWHEEL OPERATED ROTATING SCUM PIPE (TYP.)

WALL BRACKET SUPPORTS (TYP.)

EFFLUENT LAUNDER w/WEIR PLATES (TYP.) SUPPORT PER MANUFACTURE'S RECOMMENDATION. SEE DETAIL SHEET 200-D-501 FOR WEIR PLATE LOCATION.

FLIGHT (TYP.)

PRIMARY CLARIFIER NO. 3

PRIMARY CLARIFIER NO.2

PRIMARY CLARIFIER NO.1

UPPER IDLER (TYP.)

RETURN RAIL (TYP.)

HEAD SHAFT SPINDLE (TYP.)

2 / 200-D-301

1 / 200-D-301

4 / 200-D-302

3 / 200-D-302

FLUSHING CONNECTION SEE DETAIL, SHEET 001-D-503

SECONDARY CLARIFIER CO-SETTLING SLUDGE, DIP

224 (HIDDEN)

ROUTE TO SINK. SEE MECHANICAL SHEETS

6" TEE (TYP.)

6" SLUDGE, DIP

1 1/2" DRAWOFF LINE SEE DETAIL, SHEET 200-D-501

220

222

200-FE-0000

200-FE-0001

219 (HIDDEN)

223

221

218

AIR RELEASE VALVE (TYP.)

18" PRIMARY EFFLUENT TO MBBR FLOW SPLITTER

200-P-0020

SCUM PUMP*

6" SCUM, DIP

PRIMARY CLARIFIERS INTERMEDIATE PLAN

SCALE: 1/4" = 1'-0"

NORTH

DRAWING NOTES:

1. ALL SUPPORTS AND ANCHORAGE WITHIN TANKS SHALL BE STAINLESS STEEL OR FRP.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

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Addendum No. 1	06/2023	DCH
Issued for Bids	05/2023	DCH

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

PRIMARY CLARIFIER INTERMEDIATE PLAN

DESIGN TEAM: | PROJ MNGR: DCH | DESIGNED BY: LTW | DRAWN BY: LTW | CHECK BY:

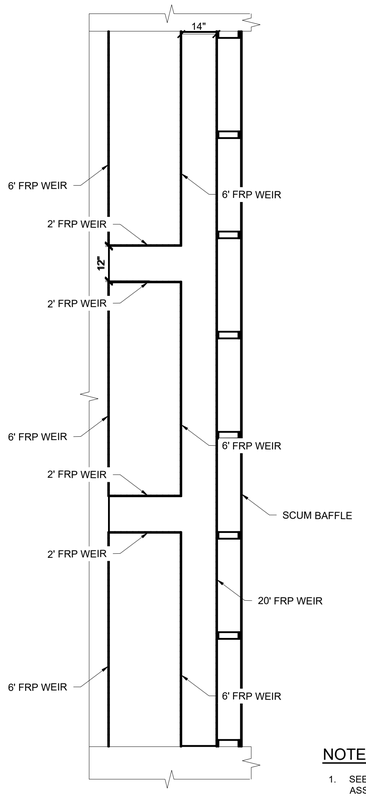
DCH MAY 2023

DRAWING INFORMATION:
200-D-102
060723 lauren.wittmann

MAY 2023

F&V PROJECT NO.
847245

200-D-102



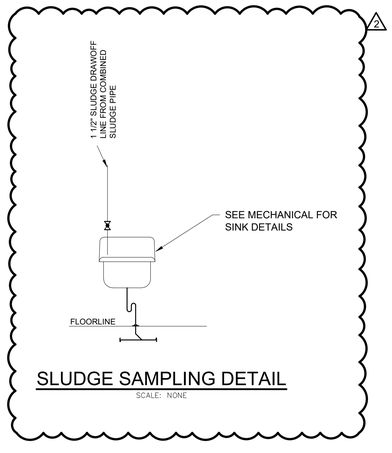
NOTES:

1. SEE SHEET 500-D-501 FOR CLARIFIER EFFLUENT TROUGH ASSEMBLY DETAIL AND WALL MOUNT WEIR DETAIL.

PRIMARY CLARIFIER WEIR LAYOUT (TYP.)

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

NORTH



SLUDGE SAMPLING DETAIL

SCALE: NONE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

2960 Lucerne Drive SE
Grand Rapids, MI 49546
P: 616.977.1000
F: 616.977.1005

REVISION:		
Addendum No. 1	06/2023	DCH 2
Issued for Bids	05/2023	DCH 1

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

PRIMARY CLARIFIER DETAILS

DESIGN TEAM:	PROJ MNGR:	DCH
	DESIGNED BY:	LTW
	DRAWN BY:	LTW
	CHECK BY:	DCH

MAY 2023

DRAWING INFORMATION:
200-D-501
060623 lauren.wittmann

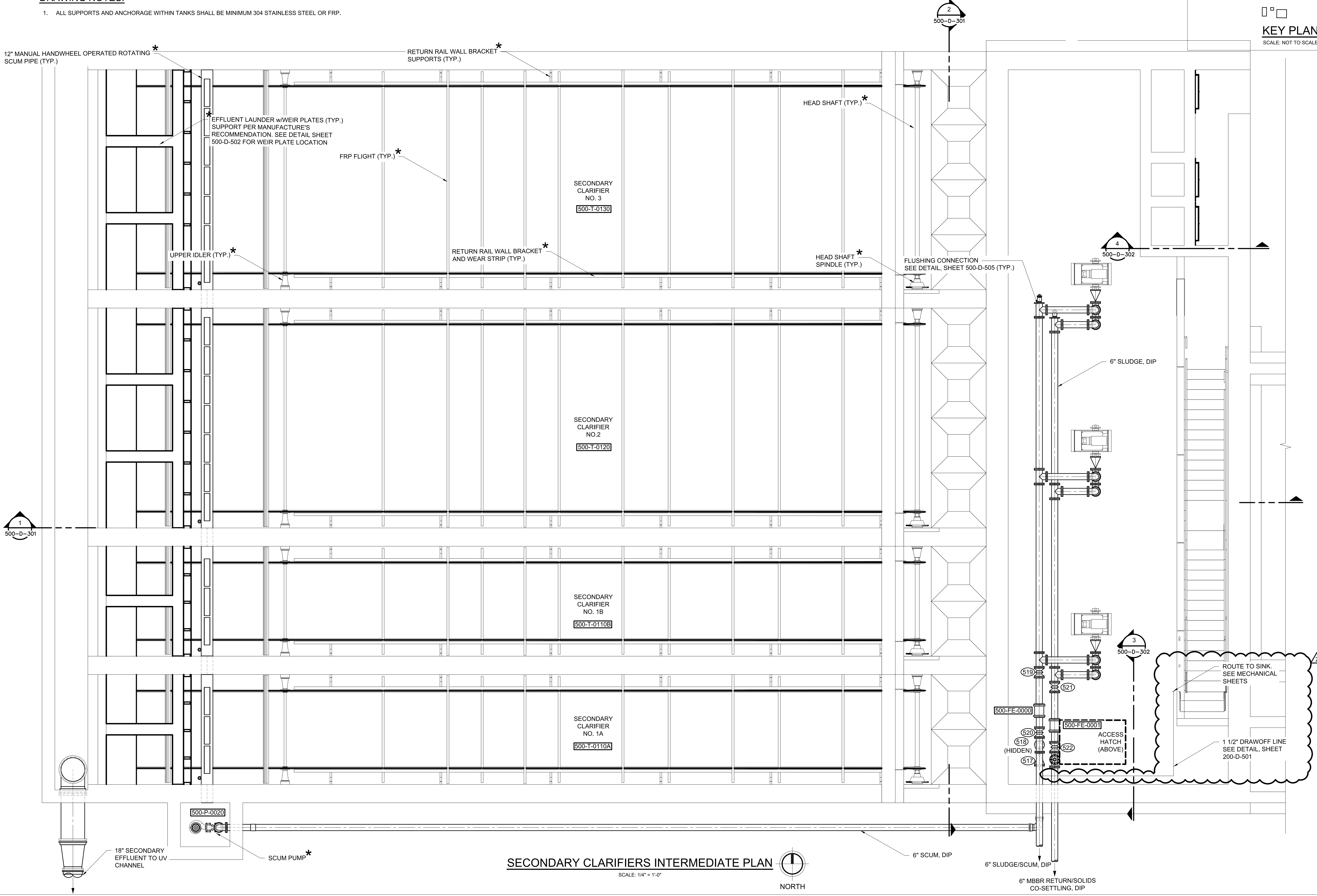
MAY 2023

F&V PROJECT NO.
847245

200-D-501

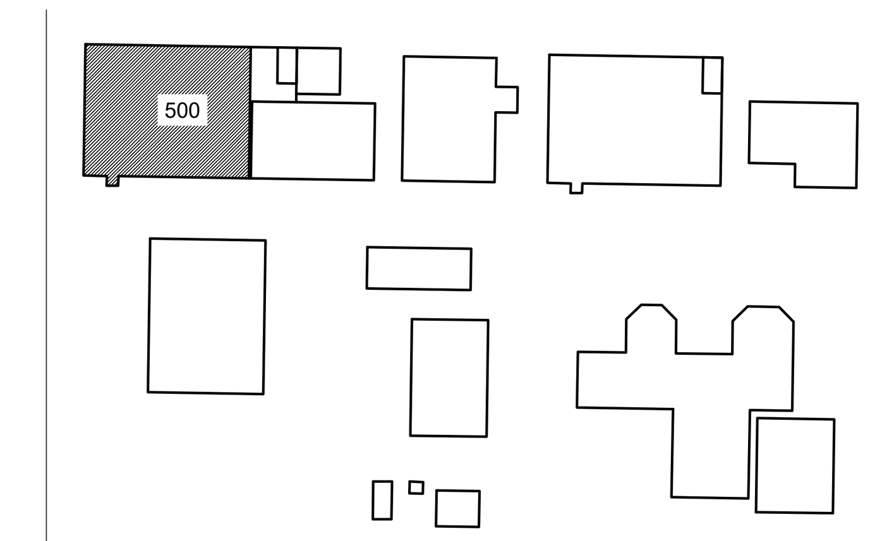
DRAWING NOTES:

1. ALL SUPPORTS AND ANCHORAGE WITHIN TANKS SHALL BE MINIMUM 304 STAINLESS STEEL OR FRP.



SECONDARY CLARIFIERS INTERMEDIATE PLAN

SCALE: 1/4" = 1'-0"



KEY PLAN

SCALE: NOT TO SCALE

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.

2960 Lucerne Drive SE
Grand Rapids, MI 49546
P: 616.977.1000
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Addendum No. 1	06/2023	DCH	2
Issued for Bids	05/2023	DCH	1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

SECONDARY CLARIFIERS INTERMEDIATE PLAN

DESIGN TEAM: PROJ MNGR: DCH
DESIGNED BY: LTW
DRAWN BY: LTW

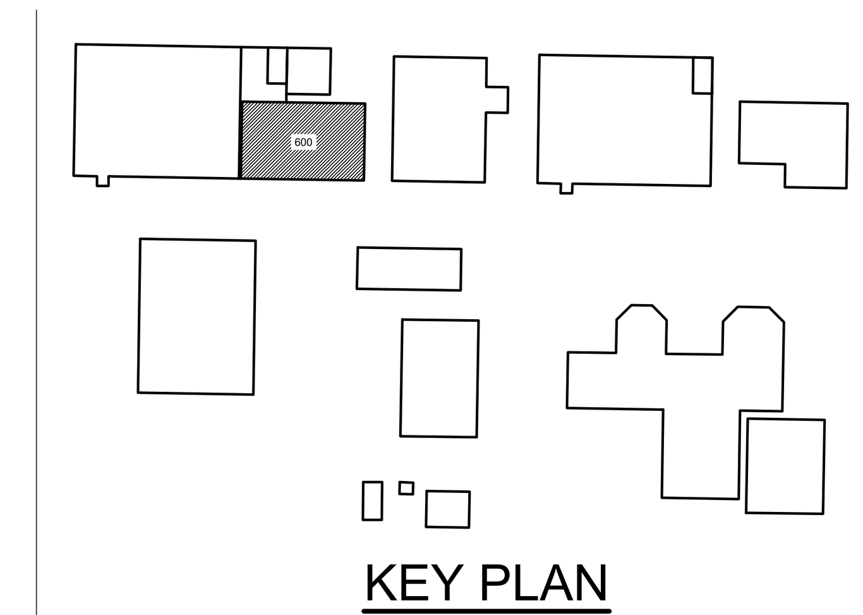
CHECK BY:
DCH MAY 2023

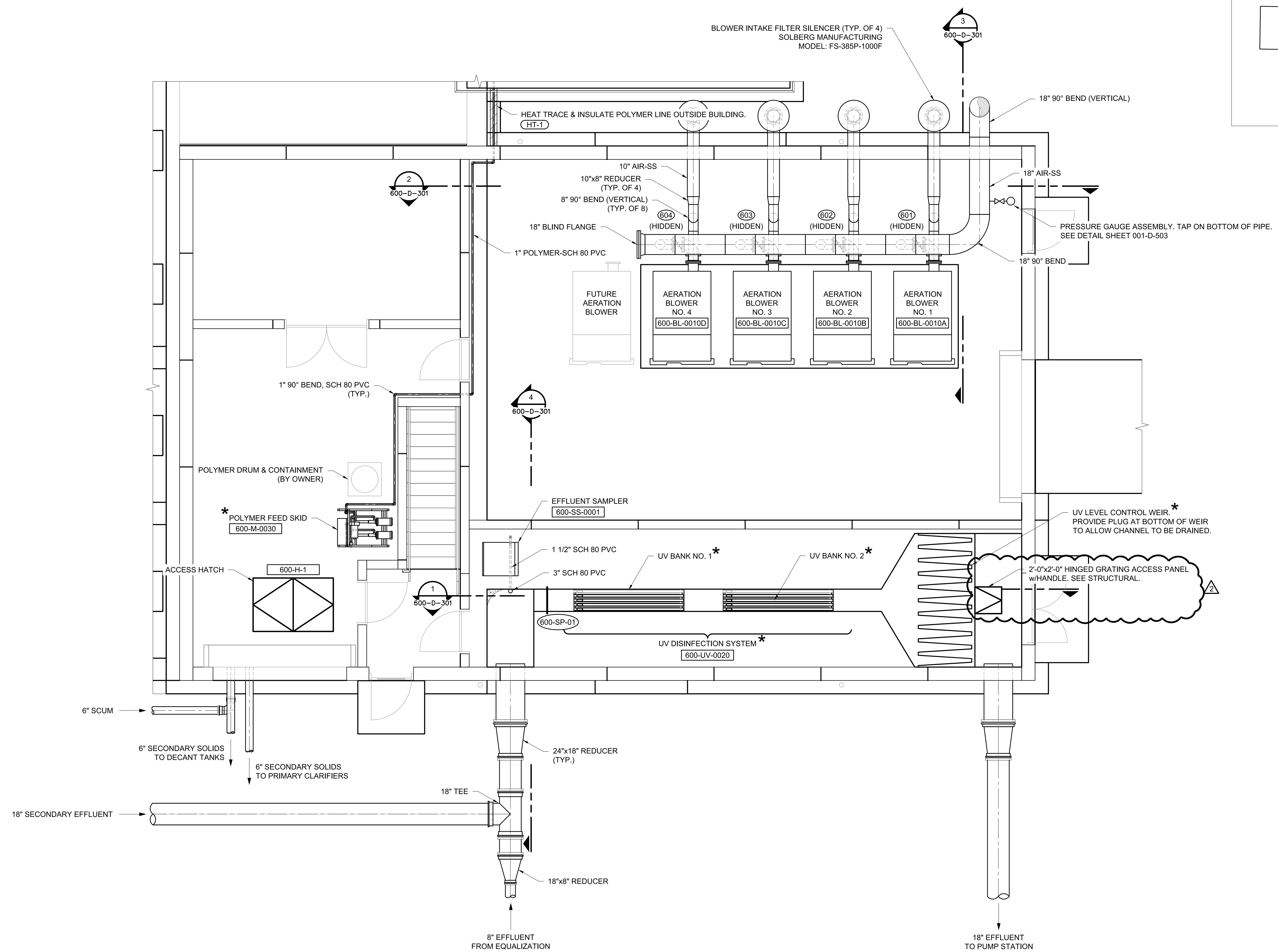
DRAWING INFORMATION:
500-D-102
051923 lauren.wittmann

MAY 2023

F&V PROJECT NO.
847245

500-D-102





PROCESS BUILDING PLAN
SCALE: 1/4" = 1'-0"

NORTH

GENERAL NOTES:

1. ALUMINUM GRATING OVER UV CHANNEL NOT SHOWN FOR CLARITY. SEE STRUCTURAL FOR DETAILS.
2. ACCESS HATCH SCHEDULE LOCATED ON SHEET 001-D-501

EQUIPMENT NOTES:

HT-1 PROVIDE RAYCHEM BTV1 SELF-REGULATING HEATING CABLES ON (1) 1" POLYMER PIPE ABOVE GRADE. 5BTV1-CT ON 1" PIPE, JBS-100A POWER KIT FOR EACH PIPE, E-150 END SEALS, GT-66 GLASS TAPE, PS-10 PIPE STRAPS, ELT LABELS, AND ONE AMC-1H THERMOSTAT SERVICE HEAT TRACING ON (1) 1" PIPE. PROVIDE TRYMER 2" POLYISOCYANURATE INSULATION WITH JRA, 0.016 IN. ALUMINUM JACKET OVER ALL HEAT TRACE. ALL HEAT TRACING MATERIALS SHALL BE SUITABLE FOR INSTALLATION IN A CLASS 1, DIVISION 2 AREA.

FLEIS&VANDENBRINK
DESIGN. BUILD. OPERATE.
2960 Lucerne Drive SE
Grand Rapids, MI 49546
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Revision	Date	By	No.
Addendum No. 1	06/2023	DCH	2
Issued for Bids	05/2023	DCH	1

REVISION:

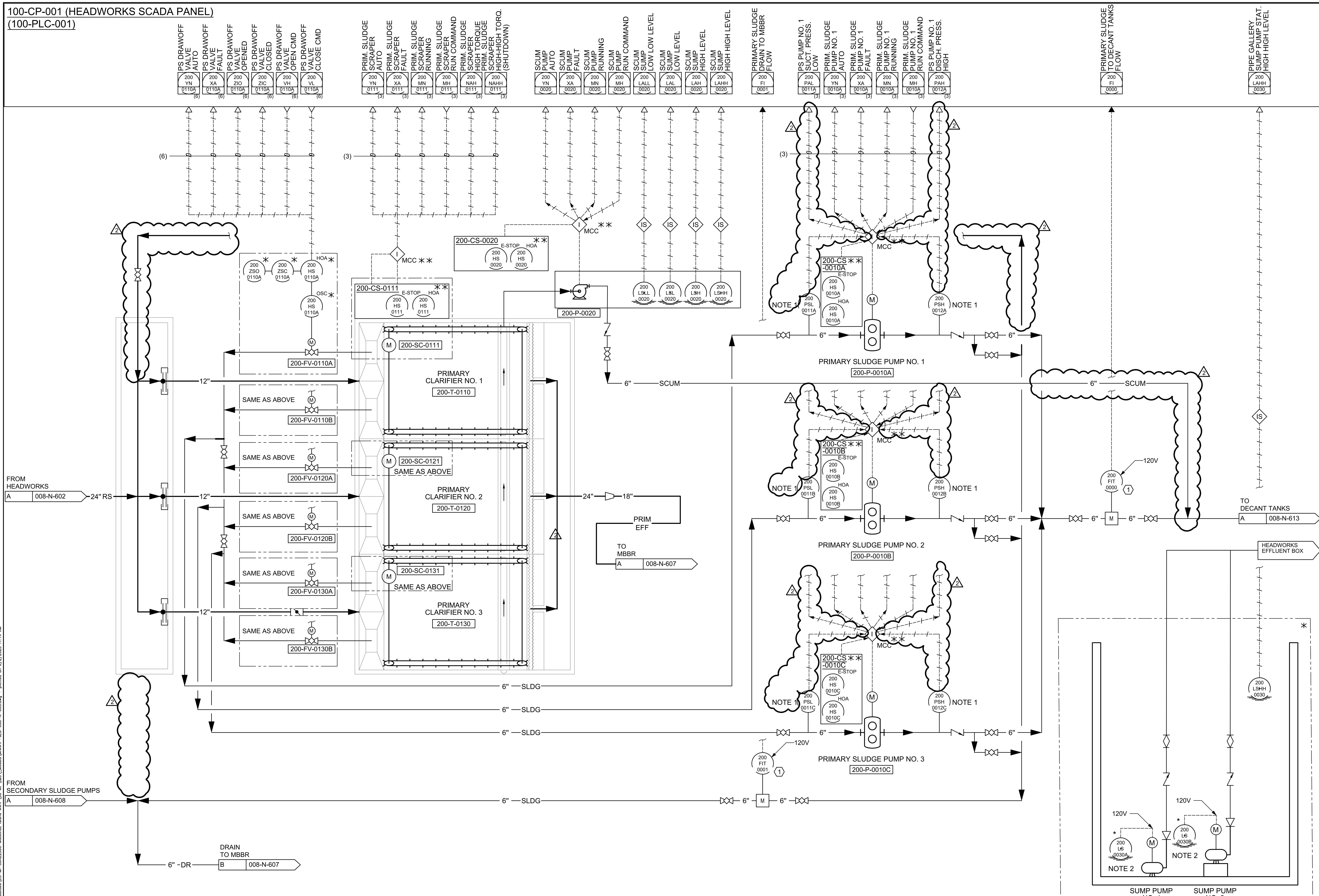
CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

PROCESS BUILDING PLAN

DESIGN TEAM: PROJ MNGR: DCH; DESIGNED BY: NRS; DRAWN BY: JAE
CHECK BY: DCH MAY 2023
DRAWING INFORMATION: 600-D-101
052523 nate.sculley

MAY 2023
F&V PROJECT NO. 847245

600-D-101


100-CP-001 (HEADWORKS SCADA PANEL)
(100-PLC-001)
PS DRAWOFF VALVE AUTO
PS DRAWOFF VALVE FAULT
PS DRAWOFF VALVE OPENED
PS DRAWOFF VALVE CLOSED
PS DRAWOFF VALVE OPEN CMD
PS DRAWOFF VALVE CLOSE CMD
PRIM. SLUDGE SCRAPER AUTO
PRIM. SLUDGE SCRAPER FAULT
PRIM. SLUDGE SCRAPER RUNNING
PRIM. SLUDGE SCRAPER RUN COMMAND
PRIM. SLUDGE SCRAPER HIGH TORQUE
PRIM. SLUDGE SCRAPER HIGH-HIGH TORQ. (SHUTDOWN)
SCUM PUMP AUTO
SCUM PUMP FAULT
SCUM PUMP RUNNING
SCUM PUMP RUN COMMAND
SCUM SUMP LOW LOW LEVEL
SCUM SUMP LOW LEVEL
SCUM SUMP HIGH LEVEL
SCUM SUMP HIGH HIGH LEVEL
PRIMARY SLUDGE DRAIN TO MBBR FLOW
PS PUMP NO. 1 SUCT. PRESS. LOW
PRIM. SLUDGE PUMP NO. 1 AUTO
PRIM. SLUDGE PUMP NO. 1 FAULT
PRIM. SLUDGE PUMP NO. 1 RUNNING
PRIM. SLUDGE PUMP NO. 1 RUN COMMAND
PS PUMP NO. 1 DISCH. PRESS. HIGH
PRIMARY SLUDGE TO DECANT TANKS FLOW
PIPE GALLERY SUMP PUMP STAT. HIGH HIGH LEVEL
200-CS-0020
E-STOP HOA
MCC
200-CS-0111
200-SC-0111
200-SC-0121
200-SC-0131
SAME AS ABOVE
200-FV-0110A
200-FV-0110B
200-FV-0120A
200-FV-0120B
200-FV-0130A
200-FV-0130B
200-P-0020
PRIMARY CLARIFIER NO. 1
200-T-0110
PRIMARY CLARIFIER NO. 2
200-T-0120
PRIMARY CLARIFIER NO. 3
200-T-0130
FROM HEADWORKS
A 008-N-602
24" RS
12"
24" 18"
PRIM EFF
TO MBBR
A 008-N-607
6" SCUM
6" SLDG
200-CS-0010A
200-CS-0010B
200-CS-0010C
NOTE 1
PRIMARY SLUDGE PUMP NO. 1
200-P-0010A
PRIMARY SLUDGE PUMP NO. 2
200-P-0010B
PRIMARY SLUDGE PUMP NO. 3
200-P-0010C
120V
TO DECANT TANKS
A 008-N-613
HEADWORKS EFFLUENT BOX
FROM SECONDARY SLUDGE PUMPS
A 008-N-608
DRAIN TO MBBR
B 008-N-607
6" DR
NOTE 2
SUMP PUMP NO. 1
200-P-0030A
SUMP PUMP NO. 2
200-P-0030B
PIPE GALLERY SUMP PUMP STATION
200-PS-0030

NOTES:

1. SINGLE DRY CONTACT OF THE PRESSURE SWITCH WILL BE HARDWIRED INTERLOCKED TO MCC. THE PRESSURE SWITCH STATUS WILL BE WIRED TO SCADA FOR REMOTE ALARMING FROM MCC.
2. PUMP SUPPLIED WITH INTEGRATED FLOAT SWITCH FOR PUMP, SWITCHING PUMP ON AND OFF.

KEY NOTES:

1. TRANSMITTER IS REMOTE VERSION, MOUNTED IN AN ACCESSIBLE PLACE. MANUFACTURER SUPPLIED CABLE BETWEEN TRANSMITTER AND ELEMENT. CONTRACTOR TO COORDINATE THE CABLE LENGTH WITH MANUFACTURER.

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.

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Jacobs

Addendum No. 1 06/2023 DCH 2
Issued for Bids 05/2023 DCH 1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

PRIMARY CLARIFIERS AND SLUDGE PUMPING P&ID

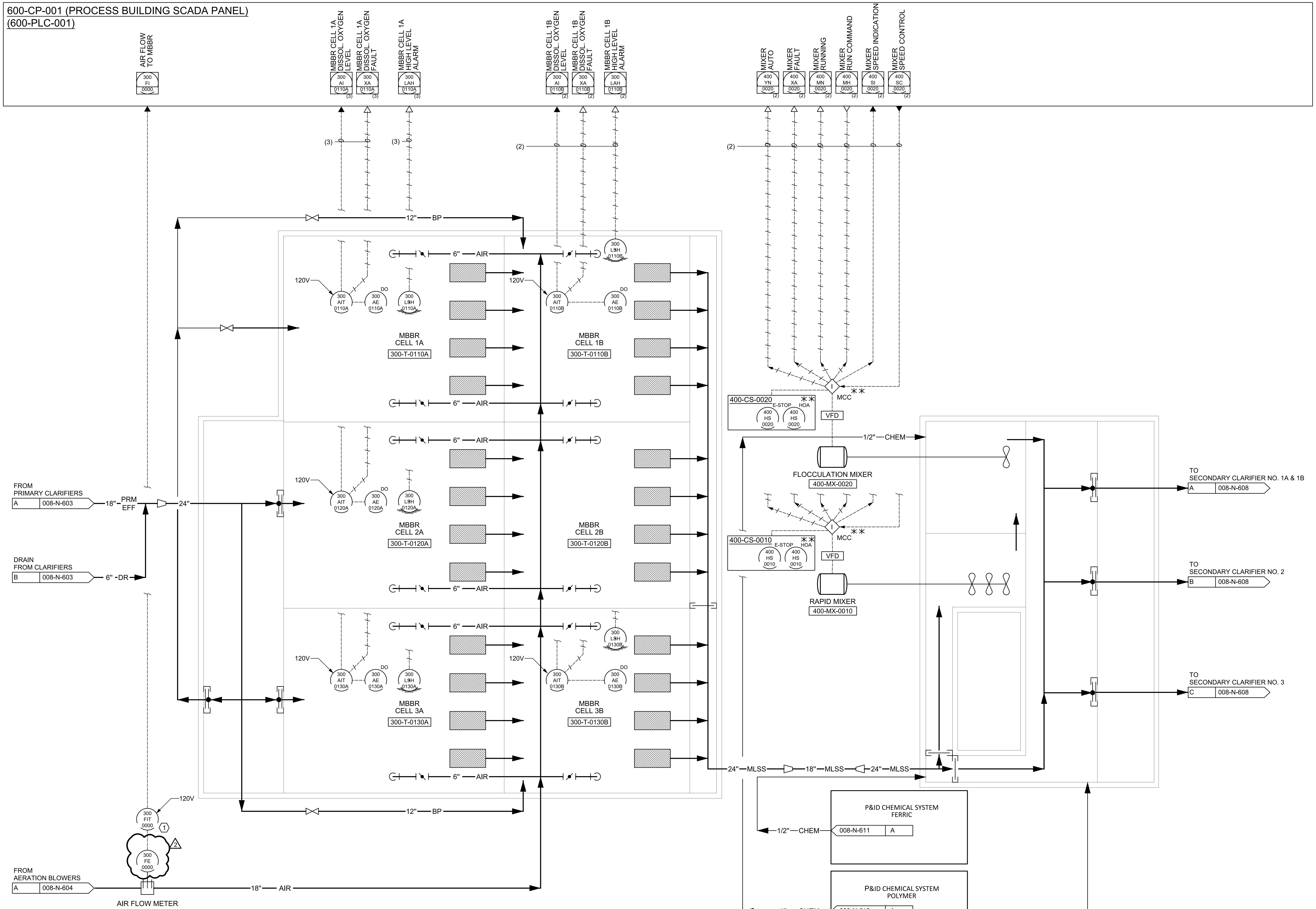
DESIGN TEAM: PROJ MNGR: DCH; DESIGNED BY: AN; DRAWN BY: WK; CHECK BY: IH MAY 2023

DRAWING INFORMATION:

MAY 2023

F&V PROJECT NO. 847245

008-N-603



600-CP-001 (PROCESS BUILDING SCADA PANEL)
(600-PLC-001)
AIR FLOW TO MBBR
MBBR CELL 1A DISSOL. OXYGEN LEVEL
MBBR CELL 1A DISSOL. OXYGEN FAULT
MBBR CELL 1A HIGH LEVEL ALARM
MBBR CELL 1B DISSOL. OXYGEN LEVEL
MBBR CELL 1B DISSOL. OXYGEN FAULT
MBBR CELL 1B HIGH LEVEL ALARM
MIXER AUTO
MIXER FAULT
MIXER RUNNING
MIXER RUN COMMAND
MIXER SPEED INDICATION
MIXER SPEED CONTROL
12" — BP
6" — AIR
120V
DO
MBBR CELL 1A
300-T-0110A
MBBR CELL 1B
300-T-0110B
MBBR CELL 2A
300-T-0120A
MBBR CELL 2B
300-T-0120B
MBBR CELL 3A
300-T-0130A
MBBR CELL 3B
300-T-0130B
FROM PRIMARY CLARIFIERS
A 008-N-603
18" PRM EFF
24"
DRAIN FROM CLARIFIERS
B 008-N-603
6" - DR
FROM AERATION BLOWERS
A 008-N-604
18" — AIR
AIR FLOW METER
300-FE-0000
400-CS-0020
E-STOP HOA
MCC
VFD
1/2" — CHEM
FLOCCULATION MIXER
400-MX-0020
400-CS-0010
RAPID MIXER
400-MX-0010
24" — MLSS
18" — MLSS
24" — MLSS
P&ID CHEMICAL SYSTEM FERRIC
008-N-611 A
1/2" — CHEM
P&ID CHEMICAL SYSTEM POLYMER
008-N-612 A
B 008-N-612
1" — CHEM
TO SECONDARY CLARIFIER NO. 1A & 1B
A 008-N-608
TO SECONDARY CLARIFIER NO. 2
B 008-N-608
TO SECONDARY CLARIFIER NO. 3
C 008-N-608

KEY NOTES:

1. TRANSMITTER IS REMOTE VERSION, MOUNTED IN AN ACCESSIBLE PLACE. MANUFACTURER SUPPLIED CABLE BETWEEN TRANSMITTER AND ELEMENT. CONTRACTOR TO COORDINATE THE CABLE LENGTH WITH MANUFACTURER.

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.

2960 Lucerne Drive SE
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Jacobs

REVISION:

Addendum No. 1	06/2023	DCH	2
Issued for Bids	05/2023	DCH	1

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

MBBR, RAPID MIXING & FLOCCULATION P&ID

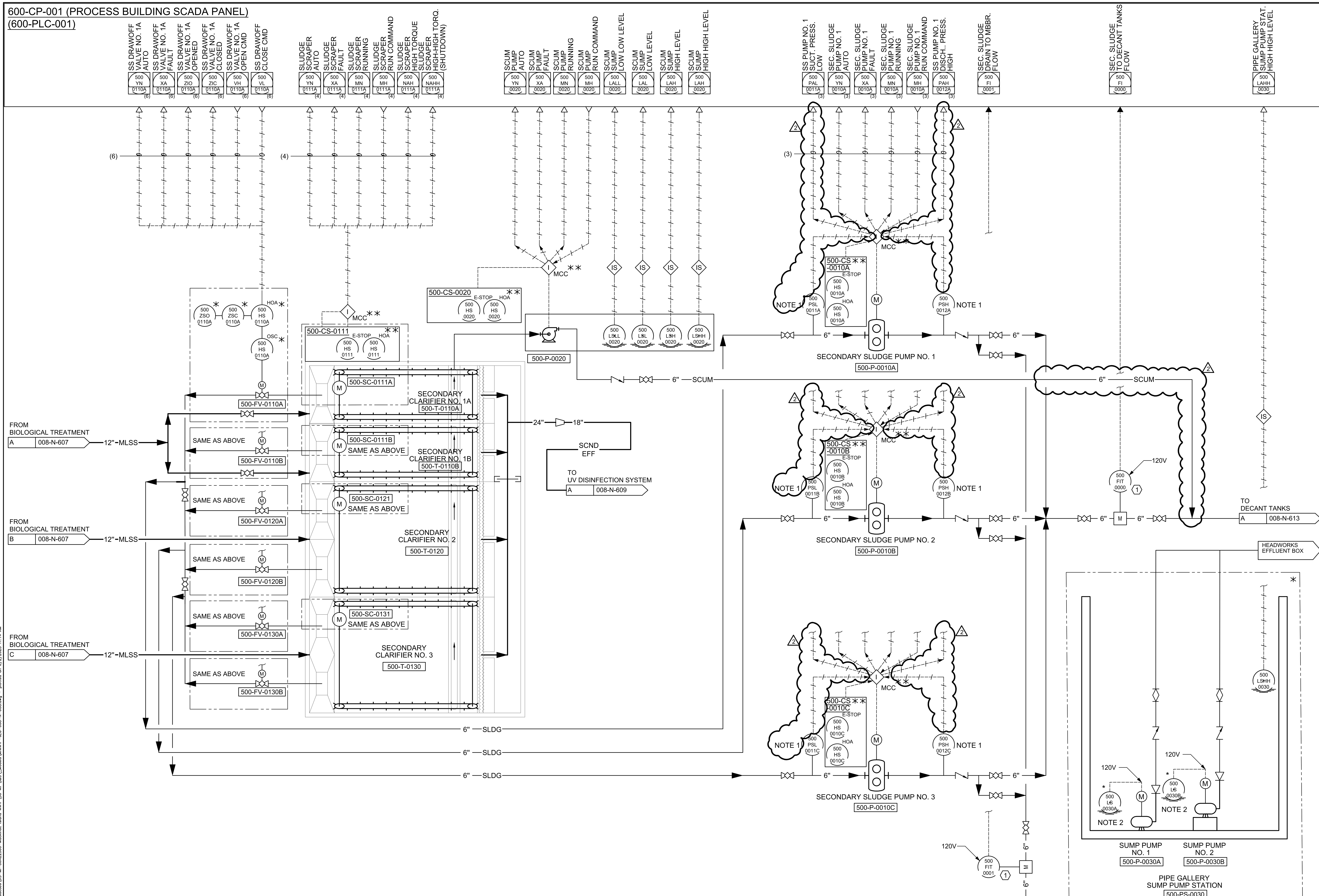
DESIGN TEAM: PROJ MNGR: DCH; DESIGNED BY: AN; DRAWN BY: WK; CHECK BY: IH MAY 2023

DRAWING INFORMATION:

MAY 2023

F&V PROJECT NO. 847245

008-N-607


600-CP-001 (PROCESS BUILDING SCADA PANEL)
(600-PLC-001)
SS DRAWOFF VALVE NO. 1A AUTO
SS DRAWOFF VALVE NO. 1A FAULT
SS DRAWOFF VALVE NO. 1A OPENED
SS DRAWOFF VALVE NO. 1A CLOSED
SS DRAWOFF VALVE NO. 1A OPEN CMD
SS DRAWOFF CLOSE CMD
SLUDGE SCRAPER AUTO
SLUDGE SCRAPER FAULT
SLUDGE SCRAPER RUNNING
SLUDGE SCRAPER RUN COMMAND
SLUDGE SCRAPER HIGH TORQUE
SLUDGE SCRAPER HIGH-HIGH TORQ. (SHUTDOWN)
SCUM PUMP AUTO
SCUM PUMP FAULT
SCUM PUMP RUNNING
SCUM PUMP RUN COMMAND
SCUM SUMP LOW LOW LEVEL
SCUM SUMP LOW LEVEL
SCUM SUMP HIGH LEVEL
SCUM SUMP HIGH HIGH LEVEL
SS PUMP NO. 1 SUCT. PRESS. LOW
SEC. SLUDGE PUMP NO. 1 AUTO
SEC. SLUDGE PUMP NO. 1 FAULT
SEC. SLUDGE PUMP NO. 1 RUNNING
SEC. SLUDGE PUMP NO. 1 RUN COMMAND
SS PUMP NO. 1 DISCH. PRESS. HIGH
SEC. SLUDGE DRAIN TO MBBR. FLOW
SEC. SLUDGE TO DECANT TANKS FLOW
PIPE GALLERY SUMP PUMP STAT. HIGH HIGH LEVEL
MCC
500-CS-0020
E-STOP
HOA
500-CS-0111
500-P-0020
500-SC-0111A
SECONDARY CLARIFIER NO. 1A
500-T-0110A
500-FV-0110A
FROM BIOLOGICAL TREATMENT
A 008-N-607
12"–MLSS
SAME AS ABOVE
500-SC-0111B
SECONDARY CLARIFIER NO. 1B
500-T-0110B
500-FV-0110B
500-SC-0121
SECONDARY CLARIFIER NO. 2
500-T-0120
500-FV-0120A
500-FV-0120B
B 008-N-607
500-SC-0131
SECONDARY CLARIFIER NO. 3
500-T-0130
500-FV-0130A
500-FV-0130B
C 008-N-607
24"
18"
SCND EFF
TO UV DISINFECTION SYSTEM
A 008-N-609
6" SCUM
6" SLDG
500-CS-0010A
500-CS-0010B
500-CS-0010C
NOTE 1
SECONDARY SLUDGE PUMP NO. 1
500-P-0010A
SECONDARY SLUDGE PUMP NO. 2
500-P-0010B
SECONDARY SLUDGE PUMP NO. 3
500-P-0010C
120V
TO DECANT TANKS
A 008-N-613
HEADWORKS EFFLUENT BOX
NOTE 2
SUMP PUMP NO. 1
500-P-0030A
SUMP PUMP NO. 2
500-P-0030B
PIPE GALLERY SUMP PUMP STATION
500-PS-0030
TO PRIMARY CLARIFIERS
A 008-N-603
FLOW SPLITTER

NOTES:

1. SINGLE DRY CONTACT OF THE PRESSURE SWITCH WILL BE HARDWIRED INTERLOCKED TO MCC. THE PRESSURE SWITCH STATUS WILL BE WIRED TO SCADA FOR REMOTE ALARMING FROM MCC.
2. PUMP SUPPLIED WITH INTEGRATED FLOAT SWITCH FOR PUMP, SWITCHING PUMP ON AND OFF.

KEY NOTES:

1. TRANSMITTER IS REMOTE VERSION, MOUNTED IN AN ACCESSIBLE PLACE. MANUFACTURER SUPPLIED CABLE BETWEEN TRANSMITTER AND ELEMENT. CONTRACTOR TO COORDINATE THE CABLE LENGTH WITH MANUFACTURER.

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.
2960 Lucerne Drive SE
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Jacobs

Addendum No. 1 06/2023 DCH 2
Issued for Bids 05/2023 DCH 1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS

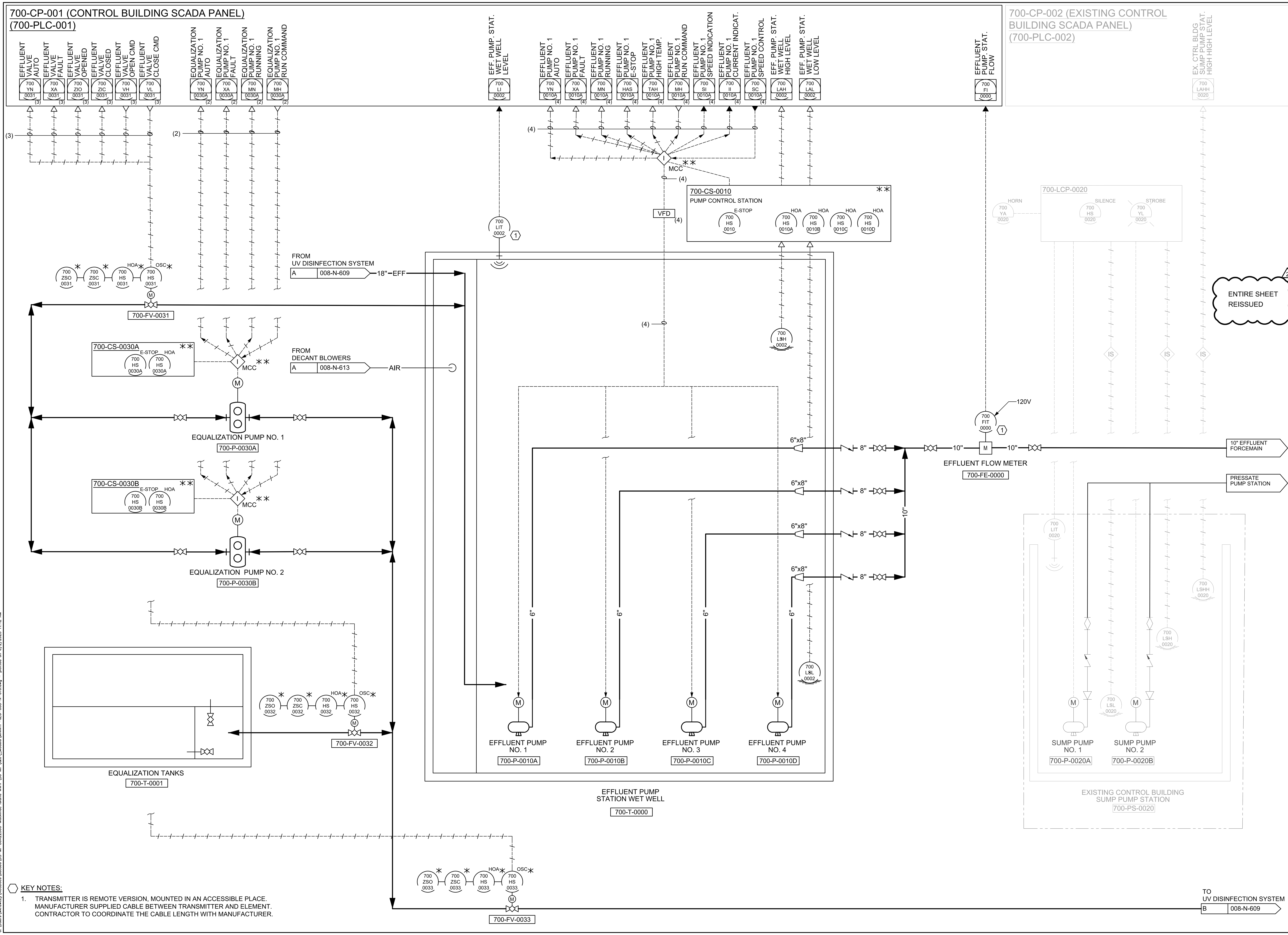
SEC. CLARIFIERS AND SLUDGE PUMPING P&ID

DESIGN TEAM: PROJ MNGR: DCH; DESIGNED BY: AN; DRAWN BY: WK; CHECK BY: IH MAY 2023

DRAWING INFORMATION:

MAY 2023
F&V PROJECT NO. 847245

008-N-608



700-CP-001 (CONTROL BUILDING SCADA PANEL)
(700-PLC-001)
EFFLUENT VALVE AUTO
EFFLUENT VALVE FAULT
EFFLUENT VALVE OPENED
EFFLUENT VALVE CLOSED
EFFLUENT VALVE OPEN CMD
EFFLUENT VALVE CLOSE CMD
EQUALIZATION PUMP NO. 1 AUTO
EQUALIZATION PUMP NO. 1 FAULT
EQUALIZATION PUMP NO. 1 RUNNING
EQUALIZATION PUMP NO. 1 RUN COMMAND
EFF. PUMP. STAT. WET WELL LEVEL
EFFLUENT PUMP NO. 1 AUTO
EFFLUENT PUMP NO. 1 FAULT
EFFLUENT PUMP NO. 1 RUNNING
EFFLUENT PUMP NO. 1 E-STOP
EFFLUENT PUMP NO. 1 HIGH TEMP.
EFFLUENT PUMP NO. 1 RUN COMMAND
EFFLUENT PUMP NO. 1 SPEED INDICATION
EFFLUENT PUMP NO. 1 CURRENT INDICAT.
EFFLUENT PUMP NO. 1 SPEED CONTROL
EFF. PUMP. STAT. WET WELL HIGH LEVEL
EFF. PUMP. STAT. WET WELL LOW LEVEL
EFFLUENT PUMP. STAT. FLOW
700-CP-002 (EXISTING CONTROL BUILDING SCADA PANEL)
(700-PLC-002)
EX. CTRL BLDG SUMP PUMP STAT. HIGH HIGH LEVEL
MCC
VFD
700-CS-0010
PUMP CONTROL STATION
E-STOP
HOA
700-LCP-0020
HORN
SILENCE
STROBE
FROM UV DISINFECTION SYSTEM
A 008-N-609
18"-EFF
FROM DECANT BLOWERS
A 008-N-613
AIR
700-FV-0031
700-CS-0030A
700-CS-0030B
EQUALIZATION PUMP NO. 1
700-P-0030A
EQUALIZATION PUMP NO. 2
700-P-0030B
EQUALIZATION TANKS
700-T-0001
700-FV-0032
700-FV-0033
ENTIRE SHEET REISSUED
120V
EFFLUENT FLOW METER
700-FE-0000
10" EFFLUENT FORCEMAIN
PRESSATE PUMP STATION
6"x8"
8"
10"
6"
EFFLUENT PUMP NO. 1
700-P-0010A
EFFLUENT PUMP NO. 2
700-P-0010B
EFFLUENT PUMP NO. 3
700-P-0010C
EFFLUENT PUMP NO. 4
700-P-0010D
EFFLUENT PUMP STATION WET WELL
700-T-0000
SUMP PUMP NO. 1
700-P-0020A
SUMP PUMP NO. 2
700-P-0020B
EXISTING CONTROL BUILDING SUMP PUMP STATION
700-PS-0020
TO UV DISINFECTION SYSTEM
B 008-N-609

KEY NOTES:

1. TRANSMITTER IS REMOTE VERSION, MOUNTED IN AN ACCESSIBLE PLACE. MANUFACTURER SUPPLIED CABLE BETWEEN TRANSMITTER AND ELEMENT. CONTRACTOR TO COORDINATE THE CABLE LENGTH WITH MANUFACTURER.

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.

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REVISION:		
Addendum No. 1	06/2023	DCH 2
Issued for Bids	05/2023	DCH 1

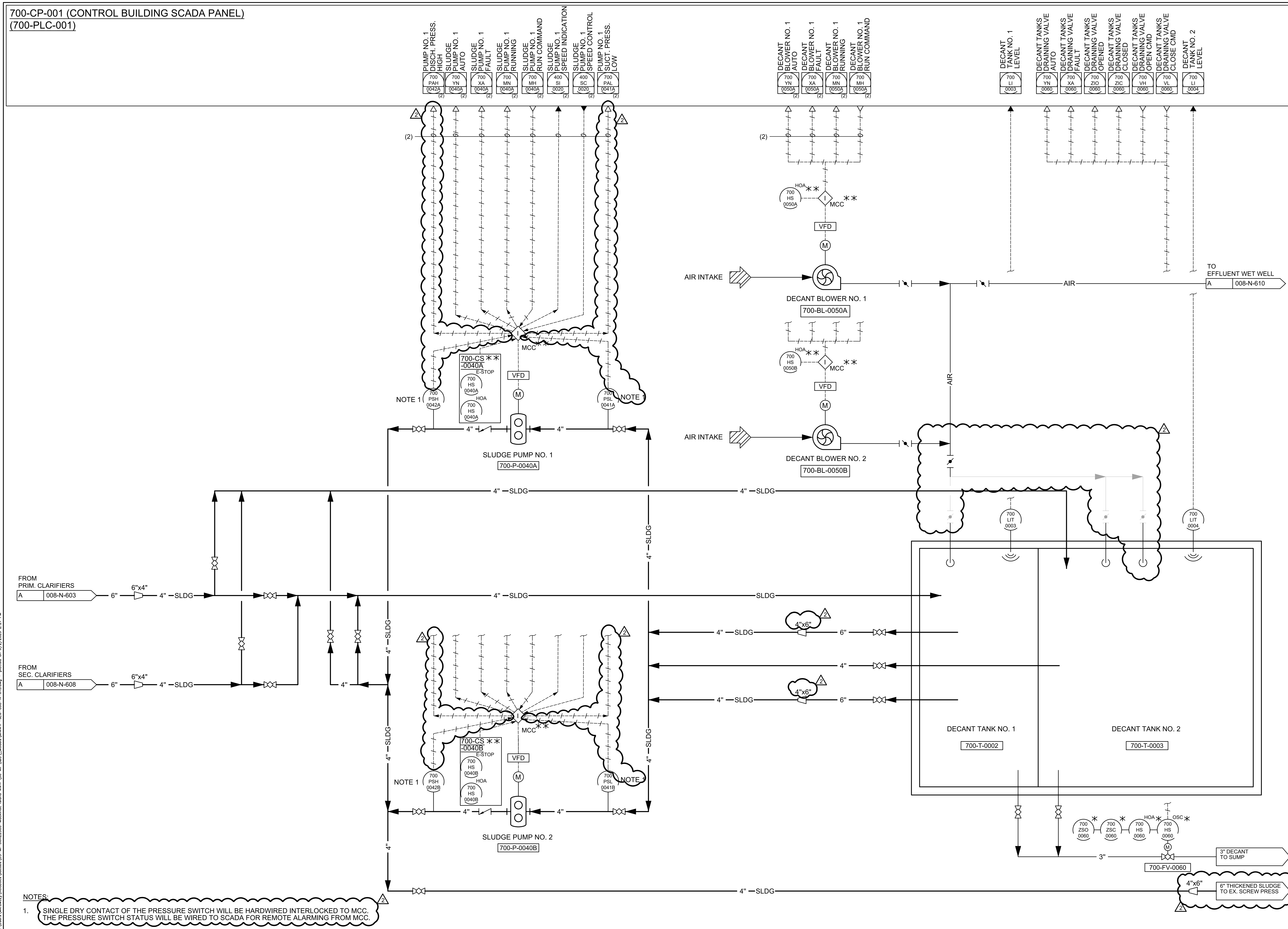
CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS
EFFLUENT PUMPING P&ID

DESIGN TEAM: PROJ MNGR: DCH; DESIGNED BY: AN; DRAWN BY: WK; CHECK BY: IH MAY 2023

DRAWING INFORMATION:

MAY 2023
F&V PROJECT NO. 847245

008-N-610


700-CP-001 (CONTROL BUILDING SCADA PANEL)
(700-PLC-001)
PUMP NO. 1 DISCH. PRESS. HIGH
SLUDGE PUMP NO. 1 AUTO
SLUDGE PUMP NO. 1 FAULT
SLUDGE PUMP NO. 1 RUNNING
SLUDGE PUMP NO. 1 RUN COMMAND
SLUDGE PUMP NO. 1 SPEED INDICATION
SLUDGE PUMP NO. 1 SPEED CONTROL
PUMP NO. 1 SUCT. PRESS. LOW
DECANT BLOWER NO. 1 AUTO
DECANT BLOWER NO. 1 FAULT
DECANT BLOWER NO. 1 RUNNING
DECANT BLOWER NO. 1 RUN COMMAND
DECANT TANK NO. 1 LEVEL
DECANT TANKS DRAINING VALVE AUTO
DECANT TANKS DRAINING VALVE FAULT
DECANT TANKS DRAINING VALVE OPENED
DECANT TANKS DRAINING VALVE CLOSED
DECANT TANKS DRAINING VALVE OPEN CMD
DECANT TANKS DRAINING VALVE CLOSE CMD
DECANT TANK NO. 2 LEVEL
AIR INTAKE
DECANT BLOWER NO. 1
700-BL-0050A
DECANT BLOWER NO. 2
700-BL-0050B
VFD
MCC
HOA
AIR
TO EFFLUENT WET WELL
A 008-N-610
700-CS -0040A
E-STOP
NOTE 1
SLUDGE PUMP NO. 1
700-P-0040A
4" — SLDG
FROM PRIM. CLARIFIERS
A 008-N-603
6"x4"
FROM SEC. CLARIFIERS
A 008-N-608
4"x6"
700-CS -0040B
SLUDGE PUMP NO. 2
700-P-0040B
DECANT TANK NO. 1
700-T-0002
DECANT TANK NO. 2
700-T-0003
OSC
700-FV-0060
3" DECANT TO SUMP
6" THICKENED SLUDGE TO EX. SCREW PRESS
NOTES:
1. SINGLE DRY CONTACT OF THE PRESSURE SWITCH WILL BE HARDWIRED INTERLOCKED TO MCC. THE PRESSURE SWITCH STATUS WILL BE WIRED TO SCADA FOR REMOTE ALARMING FROM MCC.

FLEIS & VANDENBRINK
DESIGN. BUILD. OPERATE.
2960 Lucerne Drive SE
Grand Rapids, MI 49546
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Jacobs

Addendum No. 1 06/2023 DCH 2
Issued for Bids 05/2023 DCH 1

REVISION:

CITY OF MACKINAC ISLAND
MACKINAC COUNTY, MICHIGAN
WWTP IMPROVEMENTS
DECANT TANKS P&ID

DESIGN TEAM: PROJ MNGR: DCH; DESIGNED BY: AN; DRAWN BY: WK; CHECK BY: IH MAY 2023

DRAWING INFORMATION:

MAY 2023

F&V PROJECT NO. 847245

008-N-613

F&V construction
Design-Build | General Contractor | Construction Manager

Pre-Bid Meeting Sign-In Sheet

Project Title: **City of Mackinac Island, CWSRF PDB WWTP Upgrades**

Project No.: **847245** Date: Wednesday, May 31, 2023 Time: **1:00 p.m.** Place: **Council Chamber of City Hall**

7358 Market Street, Mackinac Island, MI 49757

Name	Representing	Telephone	Number of Attendees
Allen Burt AB	Director of Public Works Mackinac Island		1
Neal Liddicoat NL	Project Sponsor City Council- Mackinac Island		1
Jack Stack JS	Wastewater Division Manager Mackinac Island		1
Dennis Dembrowski DD	City Engineer/Building Inspector Mackinac Island		1
Myron Johnson	Mackinac State Historical Commission		1
Dave Harvey DCH	F&V Construction		1
Mark Bratschi MCB	F&V Construction		1
Nate Scully NRS	F&V Engineering	616.405.4085	1
Hannah Barton HB	Soils & Structures	248-568-8841	2
Veronica Dobrowolski VD	Arnold Freight		1

2960 Lucerne Drive SE, Suite 100
Grand Rapids, MI 49546
P: 616.977.4400
F: 616.977.4800
www.fv-construction.com

Todd Conner	J. Ranck	906-203-5141	(1)
Denny Beemer	Windemuller, Inc.	231.346.2642	2
Ron Lammy	Modco Concrete	810.767.8525	4
Greg Streeter ✓	Streeter Bros.	810.743.1399	6
Robert Cole ✓	Dave Cole Decorators, Inc.	616.813.2614	RSC 1
Joe Streeter	Streeter	810 691-2037	
ERIC TAYLOR	Modco	8102170383	
DAMION FRASIER	Modco	810 782 8500	
Martin Knight	Modco	810-577-8460	
JOEL ROSS	Doyle Inc Roofing	231-627-4369	1
Michael DeMaestri	Spence Brothers	989-619-3195	
Tom Lee	Windemuller	231-342-7092	
Chris M.n.d.s	Windemuller	231-590-9075	
CHAD BeLonga	BeLonga Excavating	906-643-7660	
Veronica Dobrowolski	Arnold Freight	9064300095	