Standard Form of Request for Qualifications

This **REQUEST FOR QUALIFICATIONS** ("RFQ") from the Owner named below invites the submittal of a Statement of Qualifications ("SOQ") from firms interested in providing design-build services for the Project described below. By submitting an SOQ, the Offeror represents that it has carefully read the terms and conditions of this RFQ and all attachments and Addenda and agrees to be bound by them. This RFQ is not an offer to enter into a contract, but merely a solicitation of persons interested in submitting an SOQ to the Owner for the Project.

OWNER:
Water and Sewer Authority of Cabarrus County
232 Davidson Highway
Concord, North Carolina, 28027

PROJECT:
Professional Services for the Progressive Design-Build of the Muddy Creek Wastewater Treatment Plant Expansion to 0.66 MGD

OWNER CONTACT PERSON:
Offerors shall submit the SOQ to:

Thomas Hahn, PE
232 Davidson Highway
Concord, North Carolina 28027
704.786.1783 ext. 228
t.hahn@wsacc.org

SOQ DUE DATE AND TIME
Offeror's SOQ shall be submitted no later than: 2:00 PM, January 27, 2026.

Submit four (4) printed copies and one USB with the SOQ in PDF format in a sealed envelope.

All SOQs must be submitted pursuant to the instructions below. It is the Offeror's sole responsibility to ensure that the SOQ is delivered in the manner required by this RFQ by the Due Date and Time. WSACC has the right to reject any SOQs not properly delivered.

SECTION 1: OWNER DESCRIPTION

1.1 General

The Water and Sewer Authority of Cabarrus County (WSACC) provides wastewater transportation and treatment service to its member jurisdictions within the County and Charlotte Water. Those public wastewater systems include the City of Concord, City of Kannapolis, Town of Harrisburg, Town of Mt. Pleasant, and Charlotte Water. Each of these organizations operates as an independent utility but is a direct customer to WSACC, who transports their wastewater to its facilities for treatment and disposal. WSACC operates two wastewater treatment facilities. The Rocky River Regional WWTP is located south of Concord and has a permitted capacity of 30.0 million gallons per day (MGD). The Muddy Creek WWTP is located south of Midland and has a permitted capacity of 0.3 MGD.

1.2 Funding/Authority

WSACC has established a Capital Project Fund for the project with sufficient funds allocated for the project. Funding will come from State appropriation funds that WSACC received.

SECTION 2: OVERVIEW OF PROJECT

2.1 General

In anticipation of future growth in its service area, the Water and Sewer Authority of Cabarrus County (WSACC) has elected to expand the Muddy Creek Wastewater Treatment Plant (WWTP) from its current capacity of 0.3 million gallons per day (MGD) to 0.66 MGD due to increased flows.

2.2 Project Objectives

- Establish a collaborative relationship between WSACC and the Design-Build Team to deliver high-quality design and construction on time and within WSACC's budget.
- Maintain a safe, injury free work site.
- WSACC desires to have completed the design, permitting, and construction for this project by December 2028.

2.3 Scope of Work

See Exhibit A for the Project Scope of Work.

2.4 Estimated Budget

The estimated budget for the Scope of Work referenced in Section 2.3 and as further set forth in Exhibit C is currently $21,320,000. Cost information, cost assumptions, and internal estimating basis contained within the Preliminary Engineering Report found in Exhibit C are informational only and do not constitute a binding project budget.

2.5 Project Performance Requirements

See Exhibit B for the Project's Performance Requirements. Exhibit B outlines anticipated Project Performance Requirements for the Progressive Design-Build Contract, provided solely for reference and transparency regarding Phase 1 and Phase 2 expectations after selection. These requirements do not require Offerors to submit technical concepts or design solutions during the RFQ phase, as they will be collaboratively refined in Phase 1.

2.6 Project Procurement Schedule

The following is the Project Procurement Schedule. WSACC reserves the right to modify the Project Procurement Schedule via Addenda issued prior to the date set forth below.

Date (Eastern Time)	Activity
December 18, 2025	Issue RFQ
January 6, 2026 at 2:00 PM	In-person Project Information Meeting (optional)
January 20, 2026	Last Date to Submit Questions Regarding the RFQ
January 27, 2026 at 2:00 PM	SOQ Due Date

February 10, 2026	Notification of Short-Listed Offerors
February 24, 2026	Interviews with Short-Listed Offerors
March 3, 2026	Notification of Preferred Offeror

2.7 Definitions

2.7.1 Business Day: Any day on which WSACC is open for regularly conducted business.

2.7.2 Confidential Individual Meetings: There will be no Confidential Individual Meetings.

2.7.3 Design-Builder: The entity with the prime design-build contract with WSACC.

2.7.4 Design-Build Team: All entities listed by the Design-Builder as providing services or construction on the Project. The Design-Builder is not required to list all members of the Design-Build Team in the SOQ. Members of the Design-Build Team may also be referred to as "Team Members."

2.7.5 Design Excellence: Design Excellence is achieved with memorable design solutions that exceed WSACC's vision and defined functional requirements; include state of the art structures and facilities that are high performance and sustainable; and possess a holistic awareness that considers context, site, and the environment.

2.7.6 Key Team Member: Individuals who will be assigned to the Project who play an important role in the design, construction, or management of the Project.

2.7.7 Phase 1: Design and preconstruction activities conducted in support of developing a Phase 2 contract price.

2.7.8 Phase 2: All project activities conducted per the contract price agreement to construct, test, and commission the project.

2.7.9 Procurement: WSACC's process for selecting a Design-Build Team for this Project.

2.7.10 Procurement Documents: All documents issued by WSACC in connection with the Procurement or Project.

2.7.11 Projects of Similar Scope and Complexity: Projects that had completion dates within the last five years and that have many or all of the following characteristics:

a. Projects of a similar size and budget that include design and construction of municipal wastewater treatment works located in the southeastern United States.

b. Projects that utilize an integrated delivery method that require strong coordination and integration of the design and construction professionals and early involvement of the construction professionals during design;

c. Projects where the Design-Builder was selected prior to the establishment of the final price and schedule and where the Design-Builder collaborated with WSACC to develop the final price and schedule.

2.7.12 Request for Proposal (RFP): There will not be an RFP process. WSACC intends to negotiate a contract with the Design-Build firm selected from the SOQ evaluation.

SECTION 3: PROCUREMENT PROCESS

3.1 General Information

3.1.1 Compliance with Legal Requirements

This Procurement will be in accordance with NCGS 143-128 and all applicable federal, state, and local laws, and WSACC policies and procedures.

3.1.2 Conflict of Interest and Communications with the Owner

a. Consultants who assisted WSACC in the RFQ preparations may not propose or participate on any Design-Build Team on this Project.

b. Offerors are required to conduct the preparation of their SOQs with professional integrity and free of lobbying activities. Communication with WSACC regarding this Project shall be via email or regular mail only and directed to the following Owner's Representatives: Thomas Hahn. Do not communicate about the Project or the Procurement with any other WSACC employees, representatives, or consultants. Communication with other WSACC employees, representatives, or consultants regarding the Procurement may cause the firm involved to be disqualified from submitting under this Procurement. Any verified allegation that a responding Offeror or Team Member or an agent or consultant of the foregoing has made such contact or attempted to influence the evaluation, ranking, and/or selection of short-listed Offerors may be the cause for WSACC to disqualify the Offeror team from submitting an SOQ, to disqualify the Team Member from participating in the Procurement, and/or to discontinue any further consideration of such Offeror or Team Member.

c. Following WSACC's approval of the Short-Listed Offerors, WSACC anticipates that certain communications and contacts will be permitted. The RFQ and/or other written communications from WSACC will set forth the rules and parameters of such permitted contacts and communications. To the extent any Offeror intends at any time to initiate contact with the general public regarding the Project, the nature of such intended contact and the substance thereof must be approved in writing by WSACC prior to the commencement of such activities.

3.1.3 Expenses of Offeror and Payment of Stipend

WSACC accepts no liability for the costs and expenses incurred by firms in responding to this Procurement. Each Offeror that enters into the Procurement process shall prepare the required materials and the SOQ at its own expense and with the express understanding that the Offeror cannot make any claims whatsoever for reimbursement from WSACC for the costs and expenses associated with the process, even in the event WSACC cancels this Project or rejects all SOQs.

3.1.4 Public Disclosure

All documentation and submittals provided to WSACC may be considered public documents under applicable laws and may be subject to disclosure. Offerors recognize and agree that WSACC will not be responsible or liable in any way for any losses that the Offeror may suffer from the lawful disclosure of information or materials to third parties.

Any materials requested to be treated as confidential documents, proprietary information, or trade secrets must be clearly identified and readily separable from the balance of the SOQ. Such designations will not necessarily be conclusive, and Offerors may be required to justify why such material should not, upon written request, be disclosed by WSACC under the applicable public records act. WSACC will endeavor to provide at least two (2) Business Days' notice of a public records request for material submitted pursuant to this Procurement. Offerors must respond to the notice in writing with any objection to the production of the documents within two (2) Business Days of receipt of the notice. All costs incurred by Offerors associated with any public records request are the responsibility of the Offerors.

3.1.5 Protest Procedures

The protest procedures applicable to the Procurement are as follows:

a. All Protests will be directed to: Thomas Hahn, PE, 232 Davidson Highway, Concord, North Carolina 28027, 704.786.1783 ext. 228, t.hahn@wsacc.org.

b. Any Protest based on the form or content of the Procurement documents, which is or should have been apparent prior to the date established for submittal of the SOQ, will not be considered if received by the person set forth above later than ten (10) calendar days prior to the specified submittal date.

c. Protests based on any other circumstances must be received by the person noted above within five (5) business days from the date the Offeror or Short-Listed Offeror was notified of any selection decision; however, in no event will a protest be considered if all SOQs are rejected or if the Protest is received after award of the Contract.

d. To be considered, a Protest shall be in writing and shall include: (1) the name, street address, and email address of the aggrieved party; (2) the name of the Project for which the Protest is submitted; (3) a detailed description of the specific grounds for the Protest and any supporting legal and/or

factual documentation; and (4) the specific ruling or relief requested.

e. In computing any period of time prescribed by this procedure, the day of the act or event from which the designated period of time begins to run shall not be included. The last day of the period shall be included. Any document received after the close of regular business hours (8:00 a.m. to 5:00 p.m.) shall be deemed received the following Business Day.

f. By submitting an SOQ in response to this Procurement, the Offeror acknowledges that it has reviewed and acquainted itself with the protest procedures herein and agrees to be bound by such procedures as a condition of submitting an SOQ.

3.1.6 Identification of Projects

For each Project identified in the SOQ, provide the following information. The information required in this section should be provided in a separate table for the identified Projects. The identification of Projects will not be evaluated separately. Rather, the Projects will be evaluated in the context of the criteria set forth in Section 5.3.

a. Name of Project;

b. Owner/Customer;

c. Location of Project (include address);

d. Description of the delivery method and integration of design and construction, identifying the firm(s) role as a prime consultant, subconsultant, contractor, subcontractor, or other;

e. Project description and applicability and relevance of the referenced Project to the evaluation criteria for this Project;

f. Name of each Key Team Member who is proposed for this Project who played a significant role on the Project example, including a description of their Project responsibilities and functions;

g. The initial contract price, the final contract price, and an explanation for any difference between the two amounts;

h. The initial date scheduled for substantial completion, the actual date of substantial completion, and an explanation for any difference between the two dates; and

i. Project contact of the owner or customer (current address, e-mail, and phone number) who can verify the characteristics of the submitted Project example.

3.2 Owner Rights and Procurement Conditions

3.2.1 WSACC reserves without limitation, and may exercise at its sole discretion, the following rights and conditions with regard to this Procurement process:

a. To cancel the Procurement process and reject any and all SOQs;

b. To waive any informality or irregularity;

c. To revise the Procurement Documents and Schedule via an Addendum;

d. To reject any Offeror that submits an incomplete or inadequate response or is not responsive to the requirements of this RFQ;

e. To require confirmation of information furnished by an Offeror, require additional information from an Offeror concerning its SOQ and require additional evidence of qualifications to perform the work described in this RFQ;

f. To provide clarifications or conduct discussions, at any time, with one or more Offerors;

g. To contact references who are not listed in the Offeror's SOQs and investigate statements on the SOQs and/or qualification of the Offeror and any firms or individuals identified in the SOQ;

h. To consider Alternative Technical Concepts and/or approaches identified by Offerors;

i. To take any action affecting the RFQ process or the Project that is determined to be in

WSACC's best interests; and

j. Approve or disapprove of the use of particular Subconsultants, Subcontractors, or Key Team Members and/or substitutions and/or changes to Subconsultants, Subcontractors, or Key Team Members from those identified in the SOQ. Such approval or disapproval shall not be unreasonably exercised.

3.3 Outline of the Procurement Process

3.3.1 Request for Qualifications (RFQ).

a. This RFQ invites firms to submit SOQs describing in detail their technical, management, and financial qualifications to design, permit, construct, commission, and close out the Project. The issuance of this RFQ is the first phase of the Procurement process.

b. Offerors are invited to participate in an optional, in-person Project Information Meeting. The Project Information Meeting will take place on January 6th, 2026 at 2:00 PM at 6400 Breezy Lane Concord NC 28025. The Project Information Meeting will be an opportunity for Offerors to learn more about the Project.

c. Offerors will submit their SOQ and other deliverables required pursuant to this Procurement at the time and in the manner set forth in this RFQ and any Addenda. WSACC will not consider SOQ or other deliverables that are submitted after the Time set forth in the RFQ. Offerors are solely responsible for making sure that WSACC receives the SOQ in a timely fashion.

d. WSACC will evaluate the information submitted by each Offeror to 1) determine whether the Offeror meets the mandatory minimum requirements and 2) evaluate the SOQ provided by each Offeror pursuant to the evaluation system described below. Any Offeror who fails to meet the mandatory minimum requirements set forth in this SOQ will be deemed non-responsive and will not be considered further by WSACC in this Procurement.

e. All SOQs will be evaluated in accordance solely with the criteria established in the RFQ and any Addenda issued thereto. The evaluation criteria are listed below, including the relative weight or importance given to each criterion.

f. Not more than three responsive and responsible firms will be selected as Short-Listed Offerors. Only those firms that have been short-listed will be invited to participate in an interview.

g. Design-Build Team Members and individual Key Team Members will be used as a basis for selection. Neither the Offeror nor Team Members that are submitted to WSACC as part of the SOQ may substitute a listed consultant, subconsultant or subcontractor, or any individual listed as a Key Team Member. If a change becomes necessary, WSACC will re-evaluate the SOQ, and may result in a change to the evaluation and ranking of the Offeror.

3.3.2 Request for Proposal (RFP), Confidential Individual Meetings & Selection Process

There will not be an RFP process. WSACC intends to negotiate a scope and fee for services with the selected Design-Build Team.

3.3.3 Price Proposal

There will not be an RFP process. WSACC intends to negotiate a scope and fee for services with the selected Design-Build Team.

3.3.4 Evaluation and Ranking of Offerors

In the evaluation and ranking of Offerors, WSACC will consider the information submitted in the SOQ including reference checks, as well as the meetings with the Offerors with respect to the evaluation criteria set forth in the RFQ. The result of the evaluation will be a comparative ranking of Offerors.

For the purpose of selecting and evaluating Offerors, the evaluation criteria will be given the following relative weights:

Criteria	Weight
Team Organization (Section 5.3.1)	10%
Qualifications and Experience of Key Personnel (Section 5.3.2)	40%
Demonstrated Past Performance with Successful Projects of Similar Scope and Complexity (Section 5.3.3)	30%
Delivery Approach (Section 5.3.4)	20%
Interviews with Short-Listed Offerors	Not Scored

3.4 Contract Format

WSACC will enter into negotiations for the Design-Build Agreement with the Preferred Offeror. The Design-Build Agreement is anticipated to utilize the Design-Build Institute of America Progressive Design-Build Agreement for Water and Wastewater Projects, Form Number 545, and the DBIA Standard Form of General Conditions of Contract Between WSACC and Design-Builder, Form Number 535.

SECTION 4: SOQ DOCUMENTATION REQUIREMENTS

4.1. SOQ Format Requirements

The SOQs shall comply with the following format requirements:

4.1.1 SOQs shall be formatted in searchable .pdf format.

4.1.2 The body of the SOQ shall be organized in accordance with the Evaluation Criteria.

4.1.3 The body of the SOQ, when printed, shall be limited to a maximum of thirty (30) single-sided pages.

a. The **only** documentation that is **not** included in the page count is the following:

i. Letter of interest or cover letter;

ii. Statement of Offeror's Ability to Provide a Proposal Bond, or Performance and Payment Bond;

iii. Statement of Offeror's Ability to Meet WSACC's Insurance Requirements;

iv. Resumes of Key Team Members;

v. Divider tabs, provided that they contain no substantive content; and

vi. Cover pages, provided that they contain no substantive content.

b. **SOQs that exceed the page limit may be rejected.** WSACC, at its sole discretion, reserves the right to remove pages from the sections of any non-conforming SOQ submittals to bring each non-conforming SOQ submittal within the page count requirement.

c. A "page" shall be defined as one single-sided piece of paper that has words, charts, tables, pictures, or graphics. Pages shall be 8.5 x 11 inches.

d. The font shall be no smaller than 10 point.

4.2 SOQ Organization

SOQs shall consist of the following parts:

4.2.1 Letter of Interest

4.2.2 Minimum Qualifications

a. Statement of Offeror's Ability to Provide Performance and Payment Bond. (See Section 5.2.1)

b. Statement of Offeror's Ability to Meet the Owner's Insurance Requirements. (See Section 5.2.2)

4.2.3 Technical & Management Qualifications

a. Team Organization (See Section 5.3.1)

b. Qualifications and Experience of Key Personnel (See Section 5.3.2)

c. Demonstrated Past Performance with Successful Projects of Similar Scope and Complexity (See Section 5.3.3)

d. Delivery Approach (See Section 5.3.4)

SECTION 5: SOQ EVALUATION CRITERIA AND SUBMITTAL INFORMATION

5.1 Letter of Interest (No points)

The SOQ must include a cover letter containing the name, address, telephone number, fax number, and e-mail address of the Offeror and the principal contact person. The Letter of Interest shall also include the following: (1) name, address, telephone number, fax number, and e-mail address for all listed consultants, subconsultants and/or subcontractors for the Project; and (2) the type of firm or organization (corporation, partnership, joint venture, etc.) that will serve as the prime contracting party. The letter of interest may be a maximum of two (2) pages.

5.2 Minimum Qualifications

5.2.1 Statement of Offeror's Ability to Provide Performance and Payment Bond (Pass/Fail)

As a **mandatory minimum requirement,** the Offeror must have the ability to obtain a performance and payment bond in the amount of $22,000,000. Offeror shall provide a letter signed by an authorized representative of Offeror's surety company (or agent) confirming that the Offeror can meet this minimum requirement. Any Offeror who fails to meet this mandatory minimum requirement will be considered non-responsive and will not be considered further by WSACC in this Procurement process. The surety shall be a company authorized to conduct business in the state where the Project is located. Letters indicating "unlimited" bonding capability are not acceptable.

5.2.2 Statement of Offeror's Ability to Meet the Owner's Insurance Requirements. (Pass/Fail)

As a **mandatory minimum requirement,** the Offeror must document that it has the ability to meet WSACC minimum insurance requirements which include liability limits not less than statutory for workers compensation and $1,000,000 each occurrence for employer's liability. Commercial General Liability of not less than $1,000,000 combined single limit for each occurrence and $1,000,000 general aggregate for bodily injury and property damage. Umbrella Liability limits of not less than $4,000,000 combined single limit for each occurrence and $4,000,000 general aggregate for bodily injury and property damage. Comprehensive Automobile Liability of no less than $1,000,000 combined single limit for each occurrence for bodily injury and property damage. Any Offeror who fails to meet this mandatory minimum requirement will be considered to be non-responsive and will not be considered further by WSACC in this Procurement. The insurer shall be a company authorized to conduct business in the state where the Project is located.

5.3 Technical and Management Qualifications

The SOQ shall demonstrate the Design-Build Team's ability to undertake the Project by providing the following technical and management qualifications of the Offeror, Team Members, and individual Key Team Members. The Offeror is responsible for ensuring that contact information contained in their referenced Project profiles is correct. The inability to contact a reference may have a detrimental impact on the evaluating qualifications.

Emphasis will be placed on past performance and expertise in performing substantive work on projects that are of Similar Scope and Complexity, as described in the definitions above. WSACC reserves the right to award more points to projects that have more of the characteristics set forth in the definition of Projects of Similar Scope and Complexity. WSACC also reserves the right to award more points to successful projects in which the Offeror, Team Members, and/or individual Key Team Members had substantial responsibility for their respective scopes of work.

The SOQ will be evaluated on the following technical and management qualifications:

5.3.1 Team Organization

a. Describe the corporate structure of the Design-Builder and all Team Members. If the prime Design-Builder is a Joint Venture, all Joint Venture partners must have functional responsibilities for the

Project. Describe the duties of each Joint Venture partner.

b. Discuss how the Design-Builder has used this entity structure or similar entity structure to deliver similar projects, lessons learned from those projects, and benefits of the structure to WSACC and this project.

c. Provide an organization chart (showing Team Members, Key Team Members and their firm affiliation) for all phases of the Project from design through final acceptance and warranty and maintenance period. Be certain to identify specific individuals for key functions and show interrelationships and reporting hierarchy. Note whether individuals are performing multiple functions. At a minimum, identify the Key Team Members performing the functions identified below. To the extent that the Design-Builder has additional Key Team Members on their team, the Design-Builder should include those individuals.

i. Person responsible for the overall management of the Project and design-build contract;

ii. Designer of Record;

iii. Person responsible for overall construction management;

iv. Person responsible for on-site field supervision and direction and construction (Superintendent);

v. Person responsible for safety;

vi. Person responsible for quality assurance;

vii. Person responsible for cost controls and budgeting;

viii. Person responsible for scheduling; and

ix. Person responsible for systems testing, configuration, and commissioning.

5.3.2 Qualifications and Experience of Key Personnel

a. Provide a resume for all Key Team Members. Resumes should be no longer than 1 page and should include the following information:

i. Description of the individual's proposed Project role;

ii. Identification of employer and number of years employed by the firm;

iii. Educational background, professional licenses, and/or certifications;

iv. Experience relevant to their proposed role on the Project and how their past performance on previous projects will benefit this Project;

v. Up to three references (current e-mail and phone number) who can verify the Key Team Members' experience relevant to their proposed role on the Project; and

vi. Based on the information available to the Design-Builder, proposed percentage of time that the Design-Builder intends to assign this individual to the Project.

5.3.3 Demonstrated Past Performance with Successful Projects of Similar Scope and Complexity

a. Describe the Team's past performance in successfully managing Projects of Similar Scope and Complexity. For each project identified in the SOQ, provide the information outlined in Section 3.1.6.

b. Describe the Team's past performance in successfully managing Progressive Design-Build or collaborative delivery projects.

c. Describe the Team's past performance in developing integrated design and construction schedules for Projects of Similar Scope and Complexity. Include descriptions of Design-Builder's past performance in the following areas:

i. Past performance in managing the design process;

ii. Past performance permitting Projects of Similar Scope and Complexity; and

iii. Past performance with construction management and construction of Projects of Similar Scope and Complexity.

d. Describe the Team's past performance in developing and/or managing costs.

e. Describe the software used by the Team for design services.

f. Describe the Team's past performance working together and/or describe the steps the Team has taken to promote integration and a collaborative working environment. Include a description of any issues or problems that arose on the projects and how those issues or problems were resolved. WSACC reserves the right to award more points to those teams who have worked together in a collaborative delivery model.

5.3.4 Delivery Approach

a. Describe the Team's anticipated approach for delivering this project regarding management approach, collaboration strategies, workshop and meeting coordination techniques, and understanding of the Progressive Design-Build process.

b. Include in the narrative the Team's approach to the following:

i. Sequencing construction activities to maximize efficiency and minimize impact on WSACC;

ii. Assessing whether the Design-Builder has achieved performance requirements;

iii. Change orders; and

iv. Configuration, commissioning, and testing Projects of Similar Scope and Complexity.

5.3.5 Interviews with Short-Listed Offerors

a. Short-Listed Offerors will be invited to interview with WSACC regarding the Project and WSACC's objectives and concerns. Although the interviews will not be scored separately as part of the SOQ Evaluation, WSACC will incorporate information provided by Short-Listed Offerors during the interviews into scoring of the criteria described in this RFQ as applicable. The Short-Listed Offerors are expected to participate in the interviews. Any Short-Listed Offeror who fails to attend the interview will be deemed non-responsive and will not be considered further by WSACC in this Procurement.

b. At a minimum, the following Key Team Members should be present for the interview:

i. Person responsible for the overall management of the Project and design-build contract;

ii. Designer of Record; and

iii. Person responsible for overall construction management.

SECTION 6: LIST OF ATTACHMENTS

1. Exhibit A Project Scope of Work
2. Exhibit B Performance Criteria (Reference Only)
3. Exhibit C Muddy Creek WWTP Expansion to 0.66 MGD Preliminary Engineering Report (Reference Only)
4. Exhibit D Executive Summary from the Expansion Alternatives Analysis for Muddy Creek Wastewater Treatment Plant (WWTP) Technical Memorandum No. 16 (Reference only).

Exhibit A
Project Scope of Work

The Water and Sewer Authority of Cabarrus County (WSACC) is undertaking an expansion of its Muddy Creek Wastewater Treatment Plant. WSACC initially performed an Alternatives Analysis for various viable options to expand the Muddy Creek Wastewater Treatment Plant. The Executive Summary from that Alternatives Analysis effort (Exhibit D) is attached for reference. Moving forward from the Alternatives Analysis effort, WSACC has identified various components of work needed to achieve the expansion program goals as listed below. These work items were identified in Exhibit C "Muddy Creek WWTP Expansion to 0.66 MGD Preliminary Engineering Report," prepared by Brown and Caldwell as part of their Wastewater Treatment Facilities Plan and PER project.

WSACC currently operates the Muddy Creek WWTP under existing NPDES permit limits for 0.3 MGD. WSACC also has an NPDES permit limits page for 1.0 MGD. WSACC recently requested an intermediate NPDES permit limits page for 0.66 MGD, and is awaiting delivery of that permit limits page and/or any associated questions from NC Department of Environmental Quality (DEQ) personnel. The Design-Build team will need to work with WSACC and appropriate state and local permitting agencies to produce further documentation required for permitting the project and to obtain all associated permits required for the project.

The work is anticipated to include, but will not be limited to, modifications and/or upgrades to the following process areas at the Muddy Creek WWTP as further developed as part of the conceptual design and as described in Exhibit C:

- Influent Pumping Station (IPS)
- Headworks
- Flow Equalization (EQ)
- Biological Treatment
- Filtration
- Disinfection
- Effluent Flow Measurement
- Sludge Holding

WSACC recognizes that the approach described in the attached PER represents one proposed solution to provide expansion of the Muddy Creek WWTP from 0.3 MGD to 0.66 MGD. Following selection of the Design-Build team for this project, WSACC is open to further discussion and development of any changes to the approach proposed in the PER which would lead to improved schedule and reduced costs for the project overall, along with any changes to the approach proposed in the PER which would lead to improvements in operations and maintenance at the facility.

Exhibit B
Performance Requirements
(Reference Only)

1.0 General

This Exhibit describes the anticipated Project Performance Requirements for the Progressive Design-Build Contract. These requirements are included for general information only and are not intended to require proposers to submit technical concepts or design solutions as part of the RFQ.

No preliminary design concept, or technical work product is requested or required during the RFQ phase. Performance requirements will be refined collaboratively during Phase 1 of the Progressive Design-Build Contract.

This Exhibit is intended solely for reference and transparency regarding anticipated Phase 1 and Phase 2 expectations following selection and award.

2.0 Project Intent

The intent of the Project is to increase the treatment capacity of the Muddy Creek Wastewater Treatment Plant to a maximum month flow of 0.66 MGD while maintaining full regulatory compliance, continuous operation, and future expandability.

These performance-based requirements establish project outcomes only, and do not prescribe methods, means, or technical approaches.

3.0 Performance Outcomes

Upon completion of Phase 2 and commissioning, the Project shall:

1. Provide continuous wastewater treatment service meeting NPDES permit limits.
2. Treat a Maximum Month Flow of 0.66 MGD.
3. Manage Peak Equalized Flow through the process up to approximately 1.78 MGD.
4. Achieve required effluent quality under seasonal conditions.
5. Maintain uninterrupted operations during construction.
6. Allow for future capacity expansion to 1.0 MGD without major reconstruction.

4.0 Future Phased Expansion

The completed improvements must accommodate future expansion of the facility to 1.0 MGD, including space allocation and utility provisions necessary to support future capacity, without requiring rework of completed facilities. Design-Builder will validate specific provisions during Phase 1.

5.0 Reliability and Maintainability Objectives

The facility shall be capable of operating in compliance with applicable regulatory requirements while maintaining firm capacity for key components.

Performance objectives include, without limitation:

- Redundancy consistent with NC reliability expectations

- Maintainability of all major process units
- Ability to isolate equipment without treatment interruption

The Design-Builder will confirm specific redundancy and maintainability provisions during Phase 1 validation.

6.0 Operational Performance

Following commissioning, facilities must:

1. Provide automated and manual control capabilities
2. Maintain regulatory compliance under varying flow and loading conditions
3. Support efficient operations and operator access
4. Achieve reliable process performance consistent with validated design assumptions

7.0 Construction Sequencing Intent

The intent of the Project is to maintain continuous plant operation throughout construction. Design-Builder will be required during Phase 1 to develop:

- Construction sequencing concepts
- Operational continuity strategies
- Commissioning and startup plans

No such information is required at RFQ stage.

8.0 Commissioning and Validation Intent

During Phase 1, the Design-Builder will prepare and validate technical concepts, equipment selection, commissioning plans, startup requirements, performance testing protocols, and long-term operational performance objectives.

No proposer response to commissioning approach is required at RFQ stage.

9.0 Innovation Objectives

Design-Builder may propose alternative means, methods, innovations, or process enhancements during Phase 1 that achieve equal or greater performance while reducing lifecycle cost or improving operational efficiency.

No proposer response to innovation concepts is required at RFQ stage.

10.0 Phase 1 Deliverables (anticipated)

During Phase 1, the following deliverables will be collaboratively developed:

- Basis of Design
- Design Development submittals
- Validation Report
- Commissioning plan
- Cost model
- Risk register
- Permitting strategy

Deliverables are informational at this stage and not for RFQ response.

(END OF EXHIBIT B)

Exhibit C
Muddy Creek WWTP Expansion to 0.66 MGD Preliminary Engineering Report
(Reference Only)

This Preliminary Engineering Report is provided for general background only and does not represent a final scope or design. No proposer response or technical solution is required at this RFQ stage. Cost information, cost assumptions, and internal estimating basis contained within the Preliminary Engineering Report are informational only and do not constitute a binding project budget. Appendix D (Detailed Construction Cost Estimate) is removed from the version included here.

Muddy Creek WWTP Expansion to 0.66 MGD
Preliminary Engineering Report

Prepared for
Water and Sewer Authority of Cabarrus County
Concord, North Carolina
November 21, 2025

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List of Abbreviations

AACE	Association for the Advancement of Cost Engineering International
AASHTO	American Association of State Highway and Transportation Officials
ABAC	Ammonia Based Aeration Control
BC	Brown and Caldwell
BMP	Best Management Practices
DAFT	Dissolved Air Flotation Thickener
DO	Dissolved Oxygen
EDI	Energy Dissipating Inlet
EQ	Equalization
ESC	Erosion and Sedimentation Control
ft	Feet
HDPE	High-Density Polyethylene
HMI	Human Machine Interface
HOA	HAND-OFF-AUTO
HP	Horsepower
HRT	Hydraulic Retention Time
ISS	Inert Suspended Solids
IMLR	Internal Mixed Liquor Recycle
lb	Pounds
LCP	Local Control Panel
MCC	Motor Control Center
MDP	Main Distribution Panelboard
MG	Million Gallons
MGD	Million Gallons per Day
mg/L	Milligrams per liter
MH	Manhole
ML	Mixed Liquor
MLSS	Mixed Liquor Suspended Solids
mm	Millimeters
MMF	Maximum Monthly Flow
MPS	Main Pump Station
MCWWTP	Muddy Creek Wastewater Treatment Plant
NCDEMLR	North Carolina Department of Energy, Mineral, and Land Resources
NCDOT	North Carolina Department of Transportation
NCDEQ	North Carolina Department of Environmental Quality
NEF	Nitrification Enhancement Facility
NPDES	National Pollutant Discharge Elimination System (NPDES)
NPW	Non-Potable Water
OIT	Operator Interface Terminal
OTR	Oxygen Transfer Rate
OUR	Oxygen Uptake Rate
PC	Primary Clarifier
PHF	Peak Hourly Flow
PLCs	Programmable Logic Controllers
PS	Pump Station
RAS	Return Activated Sludge
RAS PS	Return Activated Sludge Pump Station
RRRWWTP	Rocky River Regional Wastewater Treatment Plant
SC	Secondary Clarifier
SCADA	Supervisory Control and Data Acquisition
SHT	Sludge Holding Tank
SRT	Solids Retention Time
SS	Stainless Steel
SWD	Side Water Depth
TKN	Total Kjeldahl Nitrogen
TM	Technical Memorandum
TP	Total Phosphorus
TSM	Technical Standards Manual
TSS	Total Suspended Solids
VCP	Vendor Control Panel
VFD	Variable Frequency Drive
VSS	Volatile Suspended Solids
WAS	Waste Activated Sludge
WSACC	Water and Sewer Authority of Cabarrus County
WQv	Water Quality volume

Executive Summary

This Preliminary Engineering Report (PER) presents the conceptual design for the expansion of the Muddy Creek Wastewater Treatment Plant (MCWWTP) to 0.66 million gallons per day (MGD) on a maximum month flow (MMF) basis. Alternatives for plant expansion were evaluated in *Draft TM No. 16 Expansion Alternatives Analysis for MCWWTP* by Brown and Caldwell (BC) dated July 11, 2025. Alternative #1a was selected, with the modification that the EQ basin design will be from Alternative #2. Aeration basins with conventional activated sludge will be used for biological treatment.

Modifications and/or upgrades to the following process areas were further developed as part of the conceptual design and are discussed in this PER.

- Influent Pumping Station (IPS)
- Headworks
- Flow Equalization (EQ)
- Biological Treatment
- Filtration
- Disinfection
- Effluent Flow Measurement
- Sludge Holding

The updated opinion of probable construction costs (Class 4) for the expansion is summarized in Table ES-1.

Table ES-1. Preliminary Opinion of Probable Construction Costs for the MCWWTP Expansion to 0.66 MGD MMF (2025-dollar values)

Process Area	15 Percent Preliminary Design Costs
Influent Pump Station	$2,200,000
Headworks	$730,000
EQ Basins	$1,720,000
Aeration	$9,000,000
Filtration	$1,560,000
Secondary Clarifier Flow Distribution Box	$510,000
Disinfection	$4,000
Effluent Flow Measurement	$470,000
Electrical and Instrumentation	Included in Process Areas
Site Development	$2,430,000
Construction Subtotal	**$18,580,000**
Preconstruction (5% of OPCC)	$930,000
Engineering (12% of OPCC)	$2,230,000
Total	**$21,740,000**

Contingency of 30% is included in each line item by process area. See detailed cost estimate in Attachment D for other cost markup.

Section 1

Project Description and Background

The Water and Sewer Authority of Cabarrus County (WSACC) owns and operates the Muddy Creek Wastewater Treatment Plant (MCWWTP) located at 14655 Hopewell Church Road, Midland, NC 28107. The facility is currently permitted to treat 0.3 million gallons per day (MGD) of wastewater generated on a maximum monthly flow (MMF) basis and has an effluent limits page for 1 MGD already included in its National Pollution Discharge Elimination System (NPDES) operating permit. Due to increasing flows, the plant requires expansion, so its capacity will be increased to 0.66 MGD MMF. Expansion alternatives were evaluated and discussed in *TM No. 16 Expansion Alternatives Analysis for Muddy Creek Wastewater Treatment Plant*. This Preliminary Engineering Report (PER) discusses the preliminary design of the selected alternative following that effort. All design choices are pursuant with North Carolina reliability standards (see *Minimum Design Criteria for NPDES Wastewater Treatment Facilities* from the NC DEQ).

Processes at the MCWWTP include influent pumping and screening, flow equalization, activated sludge biological treatment, secondary clarification, filtration, and UV disinfection prior to discharge to the Rocky River. Previous reports (refer to TMs *No. 4 – Influent Flows and Loads Analysis and Projections*, *No. 7 – Capacity Analysis, and No. 16 – Alternatives Analysis*) prepared as part of the WWTP Facilities Plan and PER project by Brown and Caldwell have concluded that the MCWWTP requires the addition of new processes and upgrades to meet this expanded flow. From *TM No. 16 Alternatives Analysis,* Alternative #1a was chosen as the recommended alternative with major improvements as follows:

- Construction of a new IPS adjacent to and hydraulically connected with the existing IPS, which should be maintained with some modifications.
- Addition of a second rotary drum screen to the Headworks.
- Construction of a second 180,000-gallon EQ tank.
- Construction of two parallel conventional activated sludge aeration basins with diffused aeration, with space for a future third.
- Installation of two new disk filter units identical to the existing three.
- Installation of a third parallel UV bank identical to the existing two.
- Removal of the existing effluent measurement 60-degree V-notch weir and replacement with a larger 90-degree V-notch weir.
- Conversion of the existing aeration basins to sludge holding tanks. The existing aeration blowers will continue to provide coarse bubble mixing air to the converted aeration basins.
- The existing secondary clarifiers, RAS pumps, WAS pumps, plant drain pump station, as well as the existing caustic soda storage and feed have sufficient capacity for this expansion. Therefore, they will remain unaffected other than modifying their controls and the piping to and from them, as needed.

Section 2

Basis of Design Loading and Process Modeling

2.1 Modeled Flows and Pollutant Loads

Design influent flows and loads for the MCWWTP were obtained using a combination of historical data and the 2022 Master Plan flow projections. The influent flows and loads basis of design for expansion to 0.45, 0.6, and 1 MGD were provided in TM *No. 4 – Influent Flows and Loads Analysis and Projections*. TM *No. 16 – Alternatives Analysis* Alternative #1a recommended that the two parallel treatment trains be sized to handle 0.33 MGD each (0.66 MGD total) so that in the future a third identical train can be added to bring the plant capacity to 1 MGD. Therefore, an influent flows and loads basis of design for expansion to 0.66 MGD, developed using the same approach as described in TM No. 4, are presented in Table 2-1 and Table 2-2.

Table 2-1. Basis of Design Flow for 0.66 MGD MMF

Flow Condition	Value
Peak Hour Flow (PHF) [a]	3.16
Peak Day Flow (PDF) [a]	1.89
Peak Equalized Flow (PEF)	1.78
Maximum Week Flow (MWF)	1.32
Maximum Month Flow (MMF)	0.66
Annual Average Daily Flow (AADF)	0.47
Minimum Day Flow (MDF)	0.17

[a] *Based on 2-year storm interval projections (B&V, 2022) instead of using historical peaking factors.*

Table 2-2. 0.66 MGD Pollutant Loads and Concentrations

Pollutant	Annual Average Load (lb/d)	Annual Average Concentration (mg/L)	Max Month Load (lb/d)	Max Month Concentration (mg/L)
COD	2,611	664	3,770	685
BOD5	1,052	268	1,519	276
TSS	1,119	285	1,616	294
TAN	158	40.2	173	31.4

2.2 Process Model

A calibrated BioWin™ biological process model for the MCWWTP was developed using historical data from the most recent three years of historical data, as described in *TM No. 6 Biological Process Modeling for MCWWTP*. The calibrated model was used to evaluate treatment capacity and future expansion alternatives.

The calibrated model was used as a basis for the alternatives analysis, but with the modifications for the selected alternative of conventional activated sludge in a Modified Ludzack-Ettinger (MLE) process, including the addition of two anoxic zones and internal mixed liquor recycle (IMLR), as well as separation of the aerated zone into three distinct zones. Figure 2-1 shows the MCWWTP BioWin flow schematic. Basin sizes and other design criteria are listed in Table 2-3. The two trains were modeled as a single train in BioWin. The aerobic solids retention time (SRT) was based on the critical SRT for nitrification during cold weather.

The MCWWTP currently adds caustic soda (sodium hydroxide) for alkalinity control, and while some alkalinity recovery is expected from denitrification in the MLE process, 25% strength sodium hydroxide was still used in the model to maintain effluent pH at current levels.

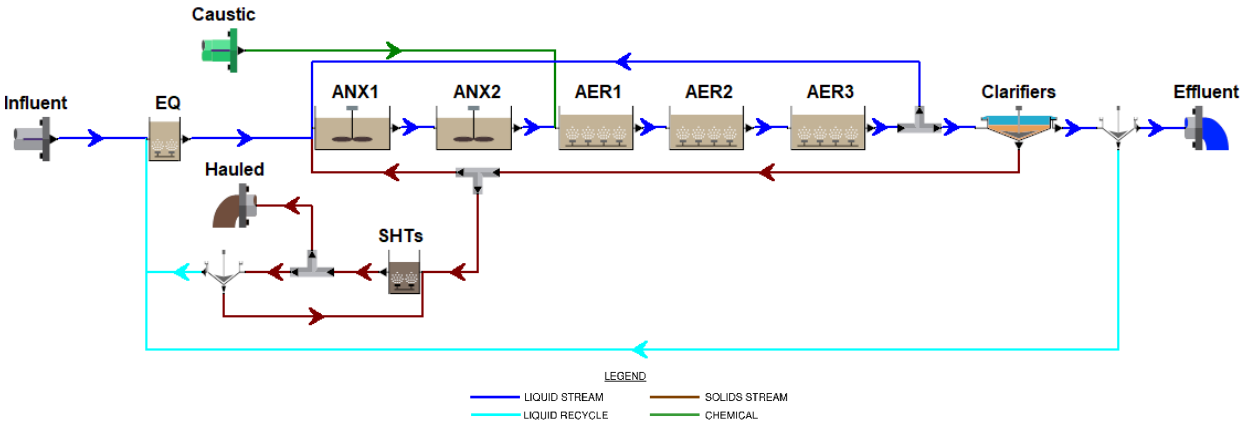

Figure 2-1. MCWWTP BioWin flow schematic for the MLE process.

Table 2-3. Design Criteria for BioWin Process Model

Parameter	Value
Anoxic Zone 1 and 2 Volume (each), MG	0.18
Aerobic Zone 1, 2, and 3 Volume (each), MG	0.27
Average Temperature, °C	20
Minimum Month Temperature, °C	10
Maximum Month Temperature, °C	30
IMLR, % of Q	300
RAS, % of Q	66
Aerobic SRT, days	10
Aerobic Zone DO, mg/L	2.0

Steady-state simulations of the plant operation were performed using the basis of design flows and loads for 0.66 MGD, for both average and max month conditions. Basins were sized based on the target aerobic SRT and targeting a maximum month MLSS under 3,500 mg/L to maintain existing secondary clarifier capacity as discussed in TM *No. 7 – Capacity Analysis*. Maximum month MLSS requirements were verified with the maximum month simulation at cold weather. Maximum month aeration demand was estimated using the maximum month simulation at warm weather. Predicted effluent for all modeled conditions in the MLE process are presented in Table 2-4.

Table 2-4. Model-predicted Effluent Quality

Parameter	Max Month (Warm Weather)	Max Month (Cold Weather)	Annual Average
Ammonia, mg N/L	0.1	0.5	0.1
Nitrate, mg N/L	5.3	4.6	8.1
Nitrite, mg N/L	0.0	0.3	0.0
Total N, mg N/L	7.1	7.1	10.1
Total P, mg P/L	1.1	0.6	2.8
Total Suspended Solids, mg/L	1.6	1.8	1.2
Total COD, mg/L	33	34	30
pH	6.65	6.65	6.65
Alkalinity, mg $CaCO_3$/L	101	120	111

2.3 Aeration Requirements

To estimate the aeration requirements of the activated sludge system with diffused air, a DO set-point of 2 mg/L was assumed in each aerobic zone for all modeled conditions. The biological process model predicts the oxygen uptake rate (OUR) and required oxygen transfer rate (OTR), which are then used to estimate required air flows and number of diffusers. The predicted OUR and OTR values are provided in Table 2-5 for Aeration Basins No. 1 and 2. The estimated air flows and diffusers based on these values are provided in Section 5.4. Note the actual design air flows and number of diffusers will be determined during detailed design as they are dependent on diffuser type and manufacturer recommended diffuser densities.

Table 2-5. Aeration Basins No. 1-2 Aeration Requirements

Aeration Basin No. 1 and 2	Aerobic Zone 1	Aerobic Zone 2	Aerobic Zone 3
Average OUR, mg-O_2/L-h	25.4	15.0	9.63
Maximum Month OUR, mg-O_2/L-h	36.2	18.2	14.1
Peak Day OUR, mg-O_2/L-h	66.0	38.9	25.0
Average OTR, lb-O_2/d	942	534	343
Maximum Month OTR, lb-O_2/d	1,340	647	501
Peak Day OTR, lb-O_2/d	2,450	1,390	892
Average SOTE, %	35.3	36.3	38.0

2.4 Solids Production

Waste activated sludge (WAS) is sent to sludge holding tanks (SHTs) mixed using coarse bubble aeration and manually decanted to thicken the solids. Thickened WAS (TWAS) is hauled to the RRRWWTP for further processing. It is assumed this process will continue after the expansion upgrades. The SHTs were represented in BioWin as aerobic digesters followed by solids separation to represent manual decanting, as described in TM *No. 6 – Process Modeling*. TWAS flow and solids capture were adjusted to target 3% total solids in TWAS and TSS between 500 – 1,000 mg/L in the decant stream, consistent with TM No. 6. Table 2-6 shows the estimated solids production for each model simulation.

Table 2-6. Model-predicted Solids Production

Parameter	Max Month (Warm Weather)	Max Month (Cold Weather)	Average
WAS Solids, lb/d	1,396	1,524	1,042
Thickened Solids, lb/d	1,131	1,243	764

Section 3

Process Flow and Hydraulic Profile

3.1 Liquid Stream Process Flow

The process flow path at MCWWTP will remain mostly the same in the expansion to 0.66 MGD. See drawing G-000-301 in Appendix A. Minor changes to the process flow path include:

- New parallel influent force main from IPS to Headworks
- Upsizing and rerouting of Aeration Basin influent and effluent piping to the new Aeration Basins
- Addition of Secondary Clarifier Flow Distribution Box to evenly split flow between secondary clarifiers

3.2 Hydraulic Profile

The hydraulic profile from the 2018 plant upgrade to 0.3 MGD was updated to reflect the process area upgrades included for the expansion of MCWWTP to 0.66 MGD. Water surface elevations were established at the maximum monthly flow of 0.66 MGD and the peak hourly flow of 1.78 MGD downstream of flow equalization. The hydraulic profile was created with one aeration basin, one secondary clarifier, one filter, and one UV disinfection unit offline.

The hydraulic model showed that at the peak flow of 1.78 MGD and 100-year flood elevation in the Rocky River, the UV disinfection channels had less than the required 1 foot of freeboard, so wall extensions will be welded to the existing UV channels to provide sufficient freeboard.

The hydraulic profile is shown in drawing G-000-501.

Section 4

Site Development

4.1 Existing Site Description

The MCWWTP is located in the southern part of Cabarrus County, with an entrance off Hopewell Church Road. The entrance drive on the northwest side of the property is bordered by a mix of residential and undeveloped properties. The Rocky River borders the property to the southeast and Muddy Creek borders the property to the northeast.

4.2 Proposed Structures and Drives

New structures are planned as part of the MCWWTP expansion. All additions are described below and shown on the civil site plan drawings in Appendix A.

4.2.1 Influent Pump Station Area

The existing Influent Pump Station is located northeast of the WWTP. A second valve vault and wet well will be added. The existing valve vault will be demolished and relocated to make room for the new valve vault. A diversion box will be constructed on the 21-inch influent sewer to divert flow between the two wet wells and allow wet well isolation using slide gates. The top of the diversion box will be above the floodplain elevation to prevent floodwaters from entering. Aluminum stairs will allow access to the top of the structure.

4.2.2 Rotary Drum Screen No. 2

Rotary Drum Screen No. 2 will be installed adjacent to the existing rotary drum screen and will be identical in size and type. The existing concrete slab on grade and elevated platform that houses the existing rotary drum screen will be extended to accommodate the new screen.

4.2.3 EQ Basin No. 2

EQ Basin No. 2 will be constructed south of the existing EQ basin. The existing grade in this area has a general slope down of 8H:1V (12%), which results in the need for fill (see Section 4.4). Existing vegetation in the area will need to be cleared to accommodate the tank location and grading. The location also interferes with the existing gravel road, requiring a slight reroute of the road around the northwest side of EQ Basin No. 2. The location was chosen due to its proximity to the existing EQ basin, its ability to retain a 75-foot offset from the property line per the Cabarrus County vegetation buffer, and its distance from the 100-yr floodplain to allow enough space to tie back to existing grade before encroaching in the floodplain. There are geotechnical considerations that will need to be evaluated during detailed design. Refer to Section 4.9.2 for additional information regarding these considerations.

4.2.4 Aeration Basin, Splitter Box, and Blowers

The proposed aeration basin will include two process trains and will be constructed on the west side of the WWTP. A splitter box will be constructed on the north side of the basin and a concrete slab on grade blower pad will be constructed on the east side. A short gravel road will extend from the

existing gravel road north of the administration building to the splitter box. The area for these structures will require clearing of vegetation and minor grading as described in Section 4.4. Additional area will be cleared west of the basin to reserve space for a future, third train. Aluminum stairs will be provided to access a walkway between the splitter box and aeration basin.

4.2.5 Secondary Clarifier Flow Distribution Box

The concrete Secondary Clarifier Flow Distribution Box (SCFDB) will be constructed in the grassy slope on the north side of the existing secondary clarifiers. The SCFDB is in the same location as the existing sidewalk and will require shifting the sidewalk to the east. Aluminum stairs will be added from this shifted sidewalk to the top of the splitter box for access to the structure.

4.2.6 Filters No. 4 and 5

Two new filters will be constructed south of the three existing filters. The existing concrete pad will be extended to accommodate the new filters. Filter No. 4 will share a raised metal access platform with existing Filter No. 3, while Filter No. 5 will require a new platform. Minor grading improvements in the area will be required as described in Section 4.4. These grading improvements will interfere with the existing fence, requiring it to be replaced.

4.2.7 UV Bank No. 3

The proposed UV bank will be constructed to the west of the existing UV banks in the space where one was located previously but has since been removed. The canopy for the UV banks will need to be extended to fully cover UV Bank No. 3.

4.2.8 Existing Aeration Basins – Converted to Sludge Holding Tanks

Existing Aeration Basins No. 1 through 4 are located in the middle of the WWTP. These tanks will remain and will be converted to Sludge Holding Tanks Nos. 5 through 8 with modifications to the existing piping. The existing blowers mounted on a slab on grade to the west of the existing aeration tanks will remain and be used to provide mixing air to the converted tanks.

4.3 Proposed Yard Piping

To facilitate the expansion, there will be yard piping modifications to multiple process areas. Each of the new pipe installations and modifications shall follow WSACC technical standards and specifications. Above and below ground large diameter process piping will generally be ductile iron. The aeration air pipe will be 304 stainless steel. Stormwater piping will be reinforced concrete. Yard piping is shown on the civil drawings located in Appendix A.

4.3.1 Influent Pump Station Area

The proposed diversion box will be a constructed doghouse structure around the existing 21-inch influent sewer and will hydraulically connect the new wet well with the existing wet well. The relocation of the existing valve vault will require temporary bypassing as described in Section 8.1. A proposed 8-inch force main from the new wet well will parallel the existing 8-inch force main to the rotary drum screens. The two force mains will be manifolded together upstream of the rotary drum screens.

4.3.2 Rotary Drum Screen No. 2

The new rotary drum screen will be manifolded together with the existing rotary drum screen and the manual screen bypass. All screens will receive flow from the dual 8-inch force mains from the Influent Pump Station. Similarly, the existing and new screen effluents will combine to flow to the EQ basins.

4.3.3 EQ Basin No. 2

All flow from the rotary drum screens will be routed to existing EQ Basin No. 1. Flow will reach EQ Basin No. 2 by being hydraulically connected to EQ Basin No. 1 through their 8-inch drains. In EQ Basin No. 1, a section of the floor will be cut and the drain bored underneath the tank to make a connection in the floor. A 12-inch overflow pipe will be routed from EQ Basin No. 2 and connect to the 12-inch overflow pipe of EQ Basin No. 1. The 8-inch drains from the two EQ basins will also connect to the overflow pipe network that discharges into MH-12. New 6-inch aeration piping for EQ Basin No. 2 will connect to the existing aeration piping for EQ Basin No. 1.

The section of the plant drain system which conveys overflow from the EQ Basins back to the IPS should be modeled during detailed design to confirm surcharging of manholes will not occur. If hydraulic modeling shows that surcharging will occur, improvements should be made to adequately convey the overflow.

4.3.4 Aeration Basin, Splitter Box, and Blowers

The 10-inch force main from EQ Tank No. 1 to the existing aeration basins will be capped and rerouted to the new splitter box at the new aeration basin. Similarly, the 4-inch RAS pipe from the existing clarifiers to the existing aeration basins will be capped and rerouted to the new splitter box at the new aeration basin. The two flows will combine in the new splitter box and be distributed to each aeration train through a cutthroat flume and 10-inch pipe. Effluent from the aeration basin will be conveyed through a 16-inch ML pipe to the new secondary clarifier flow distribution box. Each aeration train will each have a 4-inch drain that will combine outside the basin and tie to the nearest plant drain manhole (MH 1). The rim elevation of MH 1 will be raised to match the existing plant drain manhole elevations since MH 1 has had overflow issues in the past. Aeration air piping for the basin will be routed above ground from the blowers through a 12-inch main header pipe.

4.3.5 Secondary Clarifier Flow Distribution Box

The Secondary Clarifier Flow Distribution Box (SCFDB) will be a constructed doghouse structure around the two existing 12-inch lines that feed the existing clarifiers. Upstream of the SCFDB, the existing pipe from the aeration basins will be cut, capped, and abandoned in place. A new 16-inch ML pipe from the aeration basin effluent channel will convey flow to the SCFDB. During a short shutdown, the pipe inside the SCFDB will be cut allowing flow to convey through the cutthroat flumes and split to respective secondary clarifiers. A 12-inch ML pipe for future SC No. 3 will be installed and capped outside of the SCFDB.

4.3.6 Filters No. 4 and 5

Proposed Filters No. 4 and 5 will have piping configurations identical to the existing filters. Stubouts adjacent to Filter No. 5 will be provided for a future sixth filter. The proposed influent, effluent, and drain lines will be connected to the existing main lines.

WSACC has reported difficulty balancing flows to individual filters using the 6 inch butterfly valves upstream of each filter. During detailed design, a solution to better balance flows to the filters should be investigated which may include a flow splitting structure.

4.3.7 UV Bank No. 3

UV Bank No. 3 will have an identical piping configuration to the existing UV banks and will tie into the existing UV pipe network.

4.3.8 Sludge Holding Tanks No. 5-8

There will be piping modifications for the newly converted Sludge Holding Tanks No. 5-8. First, as discussed in Section 4.3.4, the 10-inch influent line will be capped and rerouted. Additionally, the 4-inch RAS connection to the 10-inch influent line will be capped and all this pipe will be abandoned. Also as described in Section 4.3.4, the 4-inch RAS line from the clarifiers will be capped and rerouted. However, the remaining 4-inch RAS line to the sludge holding tanks will be converted to a 4-inch WAS line by manifolding it to the existing 4-inch WAS line. New 4-inch WAS piping will be constructed to connect the newly converted sludge holding tanks to the existing sludge holding tanks and sludge unloading station. Lastly, as discussed in Section 4.3.5, the 12-inch clarifier influent line from these tanks will be capped and abandoned.

4.4 Proposed Grading

The site will be graded to minimize ponding and promote drainage away from structures and off-site or towards the two existing stormwater inlets. The minimum and maximum grades for drainage as identified in Table 4-1 will be applied to new construction.

Table 4-1. Design Grading

Description	Grading Design Criteria
Roadways, longitudinal	Minimum 0.3% Maximum 8.0%
Roadways, transverse	Minimum0.3% Maximum 2.0%
Curb and gutter valley	Minimum 0.3% Maximum 8.0%
Walks, transverse	Minimum 0.3% Maximum 2.0%
Walks, longitudinal	Minimum 0.3% Maximum 5.0%
Concrete landings	Minimum 0.3% Maximum 2.0%
Unimproved (grass) areas	Minimum 1.0% Maximum 50%

More extensive grading will be completed at the EQ basins, aeration basin, and filters and are described below. Table 4-2 shows the estimated earthwork quantities.

The location of EQ Basin No. 2 is on a hill with a general slope down of 8H:1V (12%). The top of slab for EQ Basin No. 2 must be set at the top of this hill to match elevations with the existing EQ Basin No. 1 so that the content of the two basins will equalize. In addition to this constraint, a 15-foot offset around EQ Basin No. 2 will be required to provide adequate space for prestressing the EQ

basin during construction. These constraints will require fill to raise grade. Proposed grade will tie back at a 3H:1V slope to meet existing grade before reaching the 100-yr floodplain.

At the new aeration basin, fill will be needed to raise grade to at least one foot above the footing. Grade will tie back to existing grade at a 4H:1V slope before reaching the existing ditch to the east.

The filters will extend on the existing concrete area south off of a sloped area. Fill will be needed to raise the grade to the same elevation as the existing filters. A 2H:1V slope will be needed to tie back to existing grade before the existing ditch to the south. The existing fence will be removed and replaced to accommodate this grading.

Table 4-2. Earthwork Quantities

Description	Cut (cubic yards)	Fill (cubic yards)	Net (cubic yards)
Diversion Box	-67	0	-67
Valve Vault No. 2	-12	0	-12
IPS Wetwell No. 2	-45	0	-45
EQ Basin No. 2	0	+2,238	+2,238
Aeration Basin	-1,620	+55	-1,565
Aeration Basin Splitter Box	-37	0	-37
Secondary Clarifier Flow Distribution Box	-41	0	-41
Filters	0	+64	+64
Total	**-1,822**	**+2,357**	**+535**

Earthwork quantities in Table 4-2 shown that 535 cubic yards of fill will be needed. During detailed design, measures to reduce this required fill will be evaluated, such as reducing fill slopes on the Aeration Basin or borrowing soil from another location on site.

4.5 Stormwater Management

4.5.1 Existing Stormwater Features

The existing stormwater features at the site consist of two separate inlets with a single pipe that convey runoff away from the facility.

4.5.2 Proposed Drainage and Stormwater Conveyance

The location of EQ Tank No. 2 will conflict with the headwall from the existing 15-inch stormwater pipe. A manhole will be installed on the existing 15-inch pipe to route the stormwater around the new EQ tank. The stormwater will discharge through a new headwall into a rip rap lined ditch that will flow at the toe of the slope from EQ Basin No. 2. No other permanent stormwater features are proposed. All other areas of the site will be graded to convey runoff off-site.

4.5.3 Stormwater Requirements

Cabarrus County defaults to NC DEMLR for Phase 2 post-construction stormwater permitting. According to NC DEMLR codes and regulations, the site must comply with the requirements in rule 15A NCAC 02H .1017. Based on this rule, the MCWWTP site is considered low density due to its impervious area being below 24 percent (see Table 4-3). The low density requirements given in rule

15A NCAC 02H .1003(2) will be followed, which require sites to limit unvegetated conveyances, promote vegetated conveyances, and promote dispersed flow.

Table 4-3. Site Percent Impervious

Description	Value
Existing Impervious Area	0.95 acres
Proposed Impervious Area	0.07 acres
Site Parcel Area	17.62 acres
Existing Percent Impervious	5.39%
Proposed Percent Impervious	5.79%

Since low density sites have limited impervious areas and lower flows, stormwater control measures (SCMs) are not required. All additional runoff generated from the proposed impervious area will be routed to the two existing stormwater inlets or directly off-site.

4.6 Hazardous Spill Containment

Areas with the potential for hazardous spills are not proposed and will not be impacted by the improvements for this project.

4.7 Wetlands/Waters of the United States

There is no indication of wetlands being present within the area of the proposed improvements. A simple wetlands reconnaissance will be performed during design to confirm this. In the unlikely case that a wetland is identified within the proposed site, a complete delineation will be performed.

4.8 Other Considerations

4.8.1 Site Considerations

The following will need to be considered for the MCWWTP Expansion:

- Maintain access for WSACC staff to the MCWWTP site and processes that need to function concurrently throughout construction (which may include temporary asphalt or gravel drives for access).
- Maintain access for caustic deliveries by tanker truck.
- Rehabilitate and/or relocate portions of the site impacted by construction (e.g. gravel drive around EQ Basin No. 2, stormwater pipe at EQ Basin No. 2, sidewalk at the SCFDB).
- Construct new yard piping and structures to avoid existing utilities to the degree feasible or relocate existing utilities as needed.
- Manage stormwater runoff through vegetated conveyances in accordance with the NC DEMLR regulations.
- Maintain all site security measures around the site and install permanent or temporary fence if required.
- Ensure the influent pump station work accounts for flood elevations and stream buffer requirements.

4.8.2 Ground Stabilization and Preparation for EQ Tank No. 2

Due to the existing grade and required tank elevation, the foundation of EQ Basin No. 2 will require up to 10 feet of fill. This will result in the need for stringent compaction requirements of the new fill to avoid settlement and prevent cracking and damage to the proposed basin. The existing soil will also need to be analyzed prior to construction to ensure no settlement occurs from the additional loads. In addition to these compaction considerations, the EQ basin is constructed on an existing slope which presents the risk of sliding and the formation of failure surfaces. A global stability check will need to be performed to ensure the slope is stable and resists sliding. Geotechnical borings and a geotechnical report will be prepared during design to evaluate the subsurface conditions (soil and groundwater) to complete both of these analyses.

4.8.3 Differential Settlement Considerations

Proposed piping to and from structures could experience stresses and loads from differential settlement. To mitigate this, couplings or pipe joints allowing vertical deflection will be installed on pipe just outside of the structures to accommodate consolidation and settling.

4.8.4 Floodplain Considerations

Cabarrus County requires the development of a Floodplain Management Plan and engineering study for any development within the special flood hazard area (100-year floodplain). Based on the anticipated layout of the new facilities, the influent pump station (which includes a new diversion box, valve vault, and IPS wet well) is within the 100-year floodplain. During detailed design, the Floodplain Management Plan and permitting for this construction will be developed.

Section 5

Process Area Upgrades

5.1 Influent Pump Station

An additional wet well and pumps will be added to increase influent pumping capacity at MCWWTP. The Influent Pump Station (IPS) at MCWWTP pumps raw influent from the collection system into the plant. The existing pump station features two 30 horsepower (HP) wet submersible chopper pumps each rated for 1.05 MGD at 76 feet total dynamic head (TDH). As discussed in *TM No. 16 Expansion Alternatives Analysis for MCWWTP*, the IPS must be capable of conveying a peak flow of 3.16 MGD with the largest pump offline (firm capacity). To accomplish this, a second identical wet well will be constructed, featuring two submersible pumps identical to the existing. A second valve vault will be constructed, as well as a second 8-inch force main leading from the new wet well to the new rotary drum screen. The existing valve vault will be demolished and repositioned to make room for the valve vault of the new pump station. The two wet wells (new and existing) will be hydraulically connected using a new flow diversion box. This box will be built around the existing 21-inch influent sewer and contain manual slide gates to isolate each wet well.

It should be noted that IPS pumps currently have the option to bypass headworks and EQ, and pump directly to the aeration basins. This feature is preserved in the new design. By closing the plug valves on the headworks influent stand pipes, and opening the bypass plug valve, IPS pumps will be able to deliver at least the peak equalized flow (1.78 MGD) to the Aeration Basin Splitter Box. Flows greater than this should not be bypassed because it could overwhelm downstream treatment processes, which are sized for peak equalized flow.

A hydraulic model was created using Applied Flow Technology's (AFT) Fathom software to confirm the proposed IPS pumps can provide required firm capacity of 3.16 MGD to the headworks. A goal of the modelling was to determine whether the impeller and motor sizes of the existing Vaughan SE4S submersible chopper pumps are adequate. The model showed that the 4-pump configuration can provide the required capacity, but that both the motors and impellers of the pumps will have to be upsized. Existing impellers will be upsized from 10.6 inches to 11.3 inches and the 30 HP motors will be replaced with 40 HP motors. It should be noted that for the future plant upgrade to 1 MGD, impellers and motors will have to be upsized again to 11.8-inches and 50 HP, respectively, but no new IPS structure would be needed. The expanded IPS design criteria are presented in Table 5-1.

Table 5-1. IPS Design Criteria

Parameter	Value
Number of Pumps	4 (2 existing + 2 new)
Type	Submersible chopper pumps
Pump Power	40 HP
Impeller Diameter	11.3"
Drive Type	Variable Speed
Wet Well Diameter	6 feet
Forcemain Diameter	8 inches

The model output (flowrate and total dynamic head [THD]) for the proposed IPS pumps (11.3-inch impellers, 40 HP motors) is shown in Table 5-2. The model depicts the firm capacity scenario with one pump out of service (3 pumps operating). The rated (firm) capacity of the IPS will be 3.84 MGD.

Table 5-2. IPS AFT Fathom Model Output

Firm Scenario[1] (Pump 3 out of service)	Output			
	Low System Head Condition[2]		High System Head Condition[3]	
	Flow (MGD)	TDH (ft)	Flow (MGD)	TDH (ft)
Pump No. 1	1.36	86.6	1.23	90.2
Pump No. 2	1.39	85.9	1.25	89.6
Pump No. 4	1.50	82.5	1.36	86.7
Firm Station Capacity[1]	4.25		3.84	

1. *Firm capacity based on three pumps in operation (Pumps 1, 2, and 4) at 100% speed. Pump 3, which shares a wet well and forcemain with pump 4, is out of service.*
2. *Low system head corresponds to wet well HWL (WSE = 448.5 feet) and best-case (low) headloss coefficients for straight pipe. This condition is also known as the runout condition for a pump.*
3. *High system head corresponds to a wet well LWL (WSE = 443.5 feet) and worst-case (high) headloss coefficients for straight pipe. This condition is typically used as the rated condition for a pump.*

WSACC has reported significant accumulation of debris at the manual barscreens of the existing Aeration Basins which requires raking at least twice per day. It is suspected that the chopper pumps in the IPS macerate material to a size which passes through the rotary drum screen. Although the flow path will change and flow will be conveyed from the EQ Basin No. 1 to the new aeration basin, the potential for small sized particles to accumulate in the processes downstream of the rotary drum screen would be exacerbated since manual screening would be eliminated at the old aeration basins. During detailed design, the IPS pump technology should be evaluated to determine if chopper pumps should remain or switch to wet pit submersible pumps.

5.1.1 Influent Pump Station Control Narrative

Control of the new expanded IPS will mimic the controls of the existing IPS. Similar to existing pumps 1 and 2, new pumps 3 and 4 will have VFDs for controlling pump speed. Pumps will normally be operated to maintain a level setpoint. Since the wet wells are hydraulically connected, they will operate as a combined system, rather than independently.

Each pump will be provided with SCADA automatic control, local manual control, and SCADA manual control. Local PLC control will automatically modulate the speed of one or more pumps to maintain the wet well level setpoint. Local manual control will allow an operator at the pump to manually input pump speed. SCADA manual control will allow an operator to remotely input pump speed.

Individual pump operation will follow a typical variable speed pump control strategy:

- Level control will be provided via pressure transducer and float switch for low and high-level alarms. The two wet wells will be hydraulically interconnected and their water levels equalized. Level elements in each wet well will control the number and speed of the operating pumps. The upstream gates will be used to isolate a wet well to drain it and perform any necessary maintenance, while the other wet well remains in service.
- The number and speed of pumps will vary to maintain the operator adjustable level setpoints in the wet well. The operator will have the ability to choose which pumps will be the lead and lag as all four pumps will have the capability of being selected as either.

- Each pump will have a minimum speed set point in the respective VFD to prevent pump operation outside its recommended operating range. When a pump is called to start, it shall start at maximum speed and then reduce speed to maintain the level setpoint as required.
- Each pump will have a Local/Off/Remote manual hand switch.

5.2 Headworks

A new rotary drum screen will be added to the headworks to increase screening capacity at MCWWTP. The existing headworks consists of a single 6 mm rotary drum screen with a manual bar screen bypass. The mechanical screen is tank-mounted on an elevated metal platform adjacent to the existing EQ basin and has a hydraulic capacity of 1.85 MGD. Like the IPS, the headworks must handle a peak flow of 3.16 MGD at the 0.66 MGD MMF rating with one unit out of service. To increase screening capacity the existing metal platform will be extended and a duplicate rotary drum screen will be installed, doubling the mechanical screening capacity to 3.7 MGD. When considering the peak flow with one unit out of service, either of the two new rotary drum screens or the manual screen with passive bypass can serve as the unit out of service.

The new Drum Screen No. 2 will be manifolded together with the existing Drum Screen No. 1 and manual screens on their influent and effluent sides. There will be upstream isolation and cross connection valves on the incoming force mains to take units out of service, as needed. The new Drum Screen No. 2 will receive flow from the IPS via the dual 8-inch force mains and both drum screens will discharge into EQ Basin No. 1 via the existing pipe at the top of the EQ Basin wall. During detailed design, vehicle tracking for approach to the platform and clearance during dumpster pickup will be checked. A fabricated wye below each screen chute may be required to combine screenings into a common dumpster. Design criteria for the new rotary drum screen are presented in Table 5-3.

Table 5-3. Headworks Design Criteria

Parameter	Value
Rotary Drum Screen	
Number of Units	1 New 1 Existing
Screen Type	Perforated Plate
Opening Size	6 mm
Hydraulic Capacity, each	1.85 MGD @ 300 mg/L TSS
Drive Size	1.5 HP
Manual Bar Screen Bypass	
Number of Units	1 Existing
Width	24 in
Bar Spacing	1 in

5.2.1 Headworks Control Narrative

The rotary drum screens will operate automatically, with cleaning and wash modes triggered on time intervals. Screening begins when water level rises above the start level float and ceases if water level goes below the float. A warning light is activated if the level rises above the high level float.

The bypass structure is connected directly upstream of either drum screen. If the water level gets too high, it will back up and overtop the 26-inch bypass weir in the bypass channel and flow through the manual bar screen.

5.3 Flow Equalization

A new 180,000-gallon capacity EQ basin, hydraulically connected to the existing, will be constructed south of the existing EQ basin No. 1. This will bring the total EQ capacity at MCWWTP to 280,000 gallons. The new EQ Basin No. 2 will be pre-stressed concrete construction, with an open top and stairs leading to an observation platform. The top of wall and finished floor elevations will match existing EQ Basin No. 1. Although the newer basin is oversized for 0.66 MGD MMF (sized for 1 MGD MMF instead of 0.66 MGD), it was selected in *TM 16 – Alternative Analysis for MCWWTP* because it will make expanding the plant to 1 MGD simpler and more economical in the future.

The volume of EQ provided will reduce the PHF of 3.16 MGD at the 0.66 MGD condition to a peak equalized flow (PEF) of 1.78 MGD for downstream processes. Incoming flow will be conveyed from the headworks to existing EQ Basin No. 1. EQ Basin No. 1 will be hydraulically connected to the new EQ Basin No. 2 through their 8-inch drain pipes that will be manifolded together.

The Ten States Standards discuss the need to maintain a minimum concentration of 1.0 milligram per liter (mg/L) of dissolved oxygen (DO) by aeration. Air supply rates should be a minimum of 1.25 cubic feet per minute (cfm)/1,000 gallons. While the usable volume of the basins when they are inline is 210,000 gallons (due to the LWL where the pumps cut off), the total volume is 280,000 gallons. This equates to a maximum total airflow requirement of 350 scfm. Two existing positive displacement blowers each provide 454 inlet cubic feet per minute (icfm). This provides adequate capacity with one blower offline, so no new EQ blowers are required. However, the age of these blowers should be considered as they were installed in 2010 and may be due for replacement. Design criteria for the EQ Basins are presented in Table 5-4.

Table 5-4. EQ Design Criteria

Parameter	Value
Equalization Basin No. 1 (EXISTING)	
Diameter	38 feet
Sidewater Depth	12 feet
Total Volume	100,000 gal
Usable Volume when inline	75,000 gal
Diffuser Type	Coarse bubble
Equalization Basin No. 2 (NEW)	
Diameter	51 feet
Sidewater Depth	12 feet
Total Volume	180,000 gal
Usable Volume when inline	135,000 gal
Diffuser Type	Coarse bubble
Number of Diffusers	48
Equalization Blowers	
Minimum Air Requirement	1.25 cfm/1,000 gallons

Table 5-4. EQ Design Criteria	
Parameter	Value
Total Air Requirement	350 SCFM
Number of Blowers	2 (existing)
Blower Type	Positive displacement
Capacity, each	454 ICFM
Drive Size, each	20 HP

EQ Pumps No. 3 and 4, submersible pumps each rated for 1.05 MGD, will remain in service. Existing EQ Pumps No. 1 and 2 (capacity 0.38 MGD, each) will be removed, and in their place a single submersible pump sized identical to EQ Pumps No. 3 and 4 (Flygt NP 3127) will be installed. See Table 5-5 for EQ pump design criteria. The firm capacity of the pumping arrangement will be 2.1 MGD, compared to the maximum required output of 1.78 MGD PDF.

Table 5-5. EQ Pumps Design Criteria	
Parameter	Value
Number of Pumps	1 New 2 Existing
Type	Submersible, non-clog
Capacity, each	1.05 MGD @ 30 feet TDH
Motor Size	10 HP
Drive Type	Variable Speed

A hydraulic model was created using Applied Flow Technology's (AFT) Fathom software to confirm the proposed EQ pumps can provide the required firm capacity of 1.78 MGD. The goal of the modelling was to determine whether the impeller and motor sizes of the existing Flygt NP 3127 submersible pumps are adequate for this expansion. The modelling revealed that the 3-pump configuration can provide the required capacity without any upsizing of the impellers or motors. It should be noted that for the future plant upgrade to 1 MGD, a fourth identical sized pump must be added.

The Fathom model output for the proposed EQ pumps as presented in Table 5-6 shows that the rated (firm) capacity with one pump out of services is 2.06 MGD.

Table 5-6. EQ Pumps AFT Fathom Model Output				
Firm Scenario[1] (Pump 2 out of service)	Output			
	Low System Head Condition[2]		High System Head Condition[3]	
	Flow (MGD)	TDH (ft)	Flow (MGD)	TDH (ft)
EQ Pump No. 3	1.34	19.1	1.03	24.1
EQ Pump No. 4	1.34	19.1	1.03	24.1
Firm Station Capacity[1]	2.68		2.06	

1. *Firm capacity based on two pumps in operation (Pumps 3 and 4) at 100% speed. Pump 2 is out of service.*
2. *Low system head corresponds to EQ HWL (WSE = 504 feet) and best-case (low) headloss coefficients for straight pipe. This condition is also known as the runout condition for a pump.*
3. *High system head corresponds to EQ LWL (WSE = 494 feet) and worst-case (high) headloss coefficients for straight pipe. This condition is typically used as the rated condition for a pump.*

5.3.1 Flow EQ Control Narrative

EQ Basins No. 1 and No. 2 will be hydraulically connected through their floors, so will functionally serve as one combined EQ basin. EQ at MCWWTP is in-line to the plant flow path, such that during normal operations all plant flow will pass through EQ.

Pumps in EQ Basin No. 1 will continue to operate on VFDs. Pumps will send flow downstream to biological treatment based on an operator-adjustable flow setpoint, not to exceed 1.78 MGD. Flow will be measured by a magnetic flow meter at the Aeration Basin Splitter Box. The number and speed of pumps will vary to maintain the operator adjustable setpoint. Each pump will have a minimum speed set point in the respective variable frequency drive (VFD) to prevent pump operation outside its recommended operating range.

High- and low-level alarm float switches are also included in EQ Basin No. 1. When water level drops below the LWL, pumps will automatically shut off to prevent dry run conditions. When water level exceeds the HWL an alarm will register. If water level continues to rise, it will spill over into the basins' overflow standpipes and be routed back to the IPS.

5.4 Biological Treatment

5.4.1 Aeration Basin

The existing aeration basins will be repurposed to sludge holding. Two new conventional activated sludge aeration trains will be constructed on the western side of the plant, each rated for 0.33 MGD MMF. The aeration trains will have five 'zones' each, two anoxic followed by three aerobic, and will operate in a Modified Ludzack-Ettinger (MLE) configuration. This is a similar process configuration to the RRRWWTP after the Phase 4 expansion is complete. A third parallel train may be added to the new MCWWTP basin in the future to increase plant capacity to 1 MGD. With a future third train, additional process equipment will be required. The following equipment, sized similarly to this expansion, will be required:

- One process blower
- Two medium speed submersible mixers
- One IMLR pump
- Aerobic Zone diffuser grids

The two anoxic zones in both trains will each have a submersible mixer. Each of the three aerated zones will have fine bubble membrane disc diffuser grids installed on the basin slabs. The diffusers will be in a tapered configuration where zone 1 will have the highest diffuser density as the highest oxygen demand is at the front end of the train. The diffuser density will decrease through cells 2 and 3. Three new rotary screw blowers will be installed to provide process air to the aerated zones. See Table 5-7.

Table 5-7. Aeration Basin Design Criteria

Parameter	Anoxic Zone 1	Anoxic Zone 2	Aerobic Zone 1	Aerobic Zone 2	Aerobic Zone 3
Number of Trains	2				
Zone Volume per Train (MG)	0.09	0.09	0.09	0.09	0.09
Side Water Depth (ft)	18.25	18.25	18.25	18.25	18.25

Table 5-7. Aeration Basin Design Criteria					
Parameter	Anoxic Zone 1	Anoxic Zone 2	Aerobic Zone 1	Aerobic Zone 2	Aerobic Zone 3
Average Airflow per Train (scfm)	N/A		121	51	40
Max Month Airflow per Train (scfm)	N/A		200	68	44
Proposed Number of Diffusers per Zone	N/A		224	95	55
Number of Mixers per Zone	1		N/A		
Number of Blowers	N/A		3 (2 duty + 1 standby)		
Blower Design Operating Point	N/A		312 scfm @ 9.6 psig		
Blower Power (HP)	N/A		50		
Mixer Power (HP)	4.7		N/A		

5.4.2 IMLR and RAS Pumping

Internal mixed liquor recycle (IMLR) will be returned from aerobic zone 3 to anoxic zone 1 to promote denitrification in each train. Typically, in an MLE process configuration IMLR is recycled at a rate of up to 300 percent of the plant forward MMF (influent or effluent). For the new 0.66 MGD MMF, this equates to 1.98 MGD, split by two pumps, one in each train. IMLR pumping will be provided by horizontal axial flow pumps. This type of pump is ideal for the low-head conditions associated with IMLR pumping. One shelf spare IMLR pump will be provided. Preliminary design criteria for the IMLR pumps are presented in Table 5-8.

Table 5-8. IMLR Pumps Design Criteria	
Parameter	Value
Number	2
Type	Horizontal Axial Flow
Rated Capacity, each	0.99 MGD or 687.5 gpm
TDH	5.9 ft
Drive size, each	12 HP

RAS pumps are sized for total maximum pumping rate of 100 percent of the MMF or 0.66 MGD. While it was initially anticipated in *TM 16 – Expansion Alternatives Analysis for MCWWTP* that a fourth RAS pump would be needed, hydraulic modeling in AFT Fathom has since confirmed that the three existing pumps have adequate capacity to meet 0.66 MGD. A fourth RAS pump will be needed for the future expansion to 1.0 MGD. RAS is currently manifolded with the influent pipe upstream of the existing aeration basins to provide mixing prior to entering the aeration basins, where it is suspected that increased pressure in the manifold causes RAS pumps to backup on their curve and limits flow capacity.

The Fathom model output for the existing RAS pumps is shown in Table 5-9. The model depicts the firm capacity scenario where two of the three pumps would be online pumping to the new Aeration Basin. The rated (firm) capacity of the RAS pump according to the model is 0.85 MGD.

Table 5-9. RAS Pumps AFT Fathom Model Output				
Firm Scenario[1] (Pump 2 out of service)	Output			
	Low System Head Condition[2]		High System Head Condition[3]	
	Flow (MGD)	TDH (ft)	Flow (MGD)	TDH (ft)
RAS Pump No. 2	0.46	27.3	0.43	27.7
RAS Pump No. 3	0.44	27.5	0.42	27.8
Firm Station Capacity[1]	0.9		0.85	

Notes:

1. *Firm capacity based on two pumps in operation (Pumps 2 and 2) at 100% speed. Pump 1 is out of service.*
2. *Low system head condition uses best-case (low) headloss coefficients for straight pipe. This condition is also known as the runout condition for a pump.*
3. *High system head condition uses worst-case (high) headloss coefficients for straight pipe. This condition is typically used as the rated condition for a pump.*

In addition to the RAS pumps, the existing WAS pumps and secondary clarifiers will be maintained with no changes since they have adequate capacity for the expanded 0.66 MGD WWTP. The only anticipated change is having their yard piping connected to the new aeration basin.

5.4.2.1 IMLR and RAS Pumping Control Narrative

The IMLR pumps will be controlled to maintain a set concentration of nitrate in the anoxic zone of the MLE process. Periodic operator sampling to verify NO_x-N concentrations in the first anoxic zone should be performed and IMLR speed should be manually adjusted accordingly to achieve a target NO_x-N concentration of 1-2 mg/L. NO_x-N sensors are not recommended due to cost of the sensors and size of the MCWWTP.

The three existing RAS pumps will continue to operate on VFDs. RAS pumps will have an operator adjustable setpoint, which is normally set to match 50 or 60 percent of influent flow, but will be controlled to maintain minimum sludge blankets in the clarifiers.

5.4.3 Chemical Storage and Feed

The chemical storage and feed area is located on the northeast corner of the existing aeration basins and will remain. As part of the expansion and to maintain caustic dosing during bypassing of the Headworks and EQ Basins from the IPS to the Aeration Basin Splitter Box, caustic soda will be fed to MH 12 and conveyed through the 8" PD to the IPS.

Based on the calibrated biological process model at increased flows of 0.66 and 1 MGD with maximum month loadings, the required caustic addition is 110 and 175 gpd, respectively. This equates to an approximate storage capacity of 73 and 38 days, respectively.

The existing chemical feed pumps (Table 5-10) have sufficient capacity to meet the increased chemical addition requirements while maintaining redundancy.

Table 5-10. Existing Chemical Storage and Feed Design Criteria	
Parameter	Value
Storage Volume (existing)	6,600 gallons
Number of Feed Pumps	2
Pump Type	Peristaltic
Capacity, total	16.5 gph

Table 5-10. Existing Chemical Storage and Feed Design Criteria	
Parameter	Value
Capacity, total	396 gpd
Maximum Discharge Pressure	110 psi

5.4.3.1 Chemical Storage and Feed Control Narrative

Primary control of caustic feed should be based on EQ effluent pump flowrate, with option to dose based off plant effluent flow measured at the effluent monitoring box in the event EQ is being bypassed.

One existing chemical feed pump will be duty, with one standby. Two ½-inch discharge hoses from each pump inside a carrier pipe will deliver caustic to EQ Basin No. 1. A third spare hose will be added to the carrier pipe for backup. Caustic will be dosed to maintain a target alkalinity concentration in the treated effluent. Daily sample checks will determine any adjustments needed to the alkalinity dose delivered.

5.4.4 Aeration and Secondary Clarifier Splitter Boxes

New splitter boxes will be constructed to evenly distribute flow to the new aeration trains and to the existing Secondary Clarifiers from the new Aeration Basins. The Aeration Basin Splitter Box will be located upstream of the new aeration basin. The Secondary Clarifier Flow Distribution Box will be located upstream of the existing secondary clarifiers. Each box will contain three cutthroat flumes with isolation slide gates for flow splitting. However, only two flumes in each box will be in operation at the 0.66 MGD rating. The third flumes will be brought online during the future plant upgrade to 1 MGD, when a third aeration train and third secondary clarifier are constructed. The effluent pipe from each flume designated as future will be capped for future connection.

The cutthroat flumes in the Aeration Basin Splitter Box and Secondary Clarifier Flow Distribution Box must be sized to pass peak equalized flow plus RAS. This equates to 1.22 MGD max flow per flume. The required cutthroat flume dimensions for this flow are 36” L x 8” W. See Table 5-11 for splitter box design criteria.

Table 5-11. Splitter Box Design Criteria	
Parameter	Value
Number of Splitter Boxes	2 (aeration, secondaries)
Number of Flumes per Box	3
Type	Cutthroat
Throat size	8 inches
Capacity, each flume	1.89 MGD

5.4.5 Aeration Process Control

To provide operational stability in the secondary treatment system, an automated aeration control system will be provided. The aeration system will operate based on DO to control the airflow to the Aeration Basin. Control loops will control airflow and control valve positions to maintain a DO setpoint within the trains.

Aeration control will have multiple modes of operation depending on the desired operation as follows:

1. Mode 1 – DO Control
   Each aeration zone will have a DO sensor. In automatic DO control mode, the user will enter a target DO setpoint and the DO control loop will output an airflow setpoint to the airflow and valve position controller. An initial DO setpoint of 2 mg/L is common in DO control mode to ensure complete nitrification. Blower speed with increase or decrease to maintain operator selectable air header pressure setpoint. Header pressure will vary resulting from control valve modulation. Figure 5-1 shows a typical DO control loop configuration.

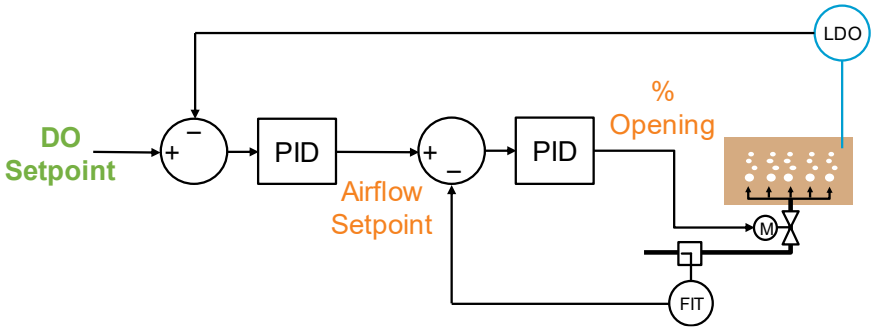

Figure 5-1. Typical DO Control Loop

2. Mode 2 – Airflow Control
   Each aeration zone will be controlled using an airflow meter and control valve. When operating in airflow mode, the user will input an airflow setpoint and the control loop will adjust valve position to maintain the airflow setpoint based on the airflow meter. This mode of operation will mainly serve as a backup when automatic DO control is not available.
3. Mode 3 – Manual Valve Control
   Each aeration zone will be controlled using a control valve. When operating in manual valve control mode, the user will input a valve position setpoint and the control loop will adjust valve position to achieve the valve position setpoint based on position feedback from the valve. This mode of operation will mainly serve as a backup when automatic DO or airflow control are not available.

Figure 5-2 shows the proposed general location of instruments typical of each Aeration Basin.

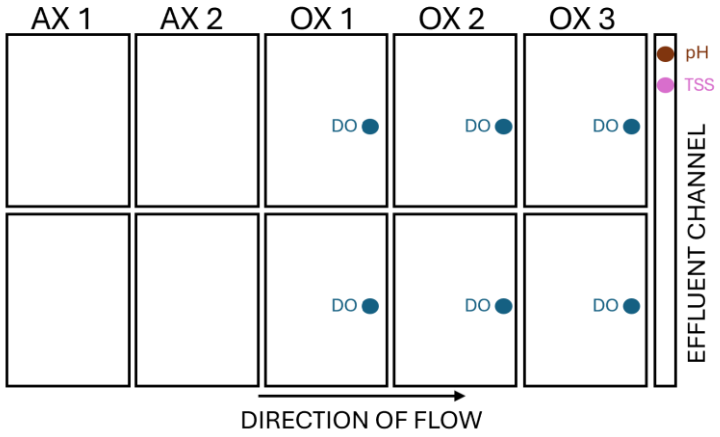

Figure 5-2. Proposed Location of Instruments for Aeration Basins

5.5 Filtration

Additional filters will be installed to increase filtration capacity at MCWWTP. Secondary effluent flows by gravity to filtration at MCWWTP via a 12-inch filter influent pipe. Two new cloth-disk filter units will be installed, sized identically to the three existing units, bringing the total number of filter units to five. The existing slab on grade must be extended and new pipe installed to accommodate two new filters. Filter No. 4 will share a raised metal access platform with existing Filter No. 3, while Filter No. 5 will have a new platform.

Each filter has a dedicated 2 HP backwash pump that performs backwashing and settled solids removal. A 0.33 HP drive on each unit functions to rotate the filter disks for cleaning during the backwash cycle. Both solids and backwash water are discharged to the plant drain, which leads to the plant drain pump station.

The peak treatable capacity of each filter is 0.449 MGD, meaning the total peak capacity of the five filters is 2.24 MGD, compared to the peak equalized flow of 1.78 MGD or capacity needed. Per reliability standards, the filters must be able to hydraulically pass the design peak flow with one unit out of service. The maximum hydraulic capacity of each filter is 0.553 MGD. Therefore, with one unit out of service, the filters can hydraulically pass 2.21 MGD, which is larger than the design peak flow of 1.78 MGD. Filtration design criteria are presented in Table 5-12.

Table 5-12. Filtration Design Criteria

Parameter	Value
Cloth Disk Filtration Units	
Number of Units	2 New 3 Existing
Number of Disks per Unit	6
Filter Pore Size	10 microns
Drive Size, each Unit	0.33 HP
Peak Treatable Capacity, each	0.449 MGD
Peak Treatable Capacity, total	2.24 MGD
Peak Hydraulic Capacity, each	0.553 MGD
Peak Hydraulic Capacity, total (firm)	2.21 MGD
Backwash Pumps	
Number	2 New 3 Existing
Type	Horizontal, Self-Priming
Suction Size	2 in
Discharge Size	2 in
Capacity, each	130 gpm
TDH	23.2 ft
Drive size, each	2 HP
Drive speed	Variable

5.5.1 Filtration Control Narrative

The Aqua MiniDisk filter system can operate under three modes: Filtration, Backwash, and Solids Wasting. A vendor-provided control panel with PLC controls automatic operation and monitoring of all process modes. As particulates are deposited on the disk media, the pressure required to drive water through the media increases and water level in the filter basin rises. Upon reaching a level set point, the PLC initiates the backwash mode to clean the disk media. Backwashing may also be initiated by a timer setpoint.

When backwash mode is initiated, the filter drive begins to rotate the filter disks. Each disk has suction shoes firmly pressed to either side of it that are connected to the backwash pump. As the filter disk rotates, the backwash pump draws filtrate backwards through the dirty filter and into the shoe, cleaning the filter. After backwashing, the same pump removes solids that have settled to the bottom of the filter basin through solids collection ports. The filter remains in operation during Backwash and Solids Wasting modes. Both solids and backwash water are discharged to the plant drain, which leads to the plant drain pump station.

5.6 Disinfection

An additional channel will be added to the UV treatment system at MCWWTP to increase disinfection capacity. The current MCWWTP disinfection system consists of two parallel stainless-steel channels each containing one bank of UV lamps with a UV dose of 30 millijoules per square centimeter (mJ/cm^2). Each channel has a capacity of 1.05 MGD, for a peak capacity of 2.1 MGD. UV disinfection requires a redundant unit, and since the current 1.05 MGD firm capacity is lower than the 1.78 MGD peak equalized flow, a third UV channel sized identical to the existing two will be added. This will increase the firm disinfection capacity to 2.1 MGD. UV disinfection design criteria are presented in Table 5-13.

Table 5-13. UV Disinfection Design Criteria

Parameter	Value
Number of Channels	1 New 2 Existing
Banks per Channel	1
UV Transmittance at 253.6 nm	65%
UV Dose	30 mJ/cm^2
Hydraulic Capacity	
Average (each)	1.05 MGD
Firm (combined units)	2.1 MGD

5.6.1 Disinfection Control Narrative

The influent flow rate, UV transmittance (UVT), and UV intensity are all used to determine and adjust the UV dose. UVT is measured in the influent channel and UV intensity is measured near the center of each UV bank. The UV dose is automatically maintained greater than or equal to the targeted UV dose by adjusting the lamp power from 50-100% as well as the number of UV banks in operation. The UV controller also adjusts bank runtime to ensure all the UV lamps are equally used.

5.7 Effluent Monitoring Box

The existing 60-degree v-notch weir plate in the effluent monitoring box is undersized for the peak flow of 1.78 MGD, so the weir plate will be removed and a new 90-degree v-notch weir plate made of stainless steel will be installed in its place. This weir plate will be sized for the future 1 MGD MMF condition. At 1 MGD MMF the peak equalized flow to the effluent box will be equal to the PDF or 2.47 MGD. Therefore, this weir will be sized to measure 2.47 MGD.

Due to the dimensions of the effluent monitoring box, the new weir will operate under 'partially contracted' conditions at higher flows. This is a condition where flow over the weir is not free from sidewall effects of the influent channel. This changes the calculations used to determine flow over the weir and can result in a slight loss in measurement accuracy. However, according to Bos (1989), the loss of accuracy will only be 1-2% (compared to <1% for a fully contracted weir), which is acceptable.

5.8 Sludge Holding Tanks

WAS is currently sent to four cylindrical 7,600-gallon aerated sludge holding tanks (SHTs) located at the end of the existing aeration basins, where it is thickened by decanting using telescoping valves. Approximately once per week, decanted sludge is trucked by septic haulers to RRRWWTP for further treatment. As part of the detailed design, the potential of utilizing tanker haulers to transport sludge, which would require a pump out system at the SHTs, should be investigated and implemented if feasible.

Sludge storage volume will be increased after this expansion. The existing aeration basins will be repurposed to aerated sludge holding tanks and renumbered to SHT No. 5-8. This will increase the total SHT volume from 30,400 to 280,400 gallons. The existing SHTs will be paired with and hydraulically connected to the new SHTs via a pipe from the existing flange connection located on the converted Aeration Basins. Additional interconnects will be added at a lower elevation to allow draining SHT No. 5-8 using the sludge loadout setup of the existing SHT No. 1-4. The existing SHT No. 1 will be paired with new SHT No. 5, SHT No. 2 with new SHT No. 6, SHT No. 3 with new SHT No. 7, and SHT No. 4 with new SHT No. 8, creating four SHT trains. While it is not anticipated that this whole volume will be immediately used, this provides operational flexibility for sludge storage and hauling operation.

New interconnections will allow WAS to be conveyed to SHT No. 5-8 through pipe that currently feeds RAS into the forcemain from EQ Basin No. 1 to the Aeration Basins. Decanting will take place in the existing SHT No. 1-4 by utilizing the existing manual telescoping valves that can be raised and lowered to decant SHTs to the desired level.

The existing aeration blowers will continue to provide coarse bubble mixing air to the converted aeration basins. The aeration requirement for aerated solids storage is 30 SCFM/1,000 cubic feet per Ten State Standards, meaning 1,124 SCFM mixing air would be needed to keep solids in suspension if all eight tanks were full. The existing blowers have a firm capacity of 1,400 SCFM. The existing instrumentation will remain to monitor the aeration of the repurposed sludge holding tanks. See Table 5-14 for SHT design criteria.

Table 5-14. Sludge Holding Design Criteria	
Parameter	**Value**
Sludge Holding Tanks	
Number of Units	4 New/Converted (SHT No. 5-8) 4 Existing (SHT No. 1 -4)
Volume, each	SHT No. 1-4: 7,600 gal SHT No. 5-8: 62,500 gal
Volume, each	SHT No. 1-4: 1,015 ft^3 SHT No. 5-8: 8,355 ft^3
Diffuser Type	Coarse bubble
Air Requirement	30 SCFM/1,000 ft^3
Total Maximum Air Requirement, assuming all tanks are full	1,124 SCFM
Blowers (Existing)	
Number of Units	5 Existing
Type	Positive displacement
Capacity, each	3 @ 450 SCFM 2 @ 250 SCFM
Motor Power	3 @ 25 HP 2 @ 10 HP
Capacity, total (Firm)	1,850 SCFM (1,400 SCFM)

As part of the design-build project for the MCWWTP Expansion, the existing aeration basins should be taken offline one at a time to perform a condition assessment of internal mechanical equipment, instrumentation, and steel tank. The structure of the steel tank should be inspected inside and out and repair/recoat as appropriate. The age and operation of existing instrumentation on the aeration basins is poor and should be considered for replacement and standardization with the RRRWWTP. The design build team should incorporate recommended improvements into the design.

Section 6

Electrical Improvements

This section of the PER describes the electrical systems to be implemented. The design criteria for the power distribution system at MCWWTP will address the improvements for expansion to 0.66 MGD and future expansion to 1 MGD. These systems will be connected to the existing 480/277V distribution system at the WWTP as described below. The existing standby generators capacity will be evaluated during detailed design for the additional load requirements.

6.1 Codes and Standards

The work covered by this section will conform to the following codes and standards:

- 2020 National Electrical Code (NFPA 70)
- 2024 National Electrical Code Standards for Electrical Safety in the Workplace (NFPA 70E)
- Underwriter's Laboratories, Inc. (UL)
- National Electrical Manufacturers Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- American National Standards Institute (ANSI)
- American Society for Testing Materials (ASTM)

6.2 General Design Criteria

The electrical design will conform to industry standards and Codes. It will also incorporate WSACC standards. Electrical systems and equipment specifications are planned to follow project specifications used for RRRWWTP Phase 3 and 4 Expansion. The electrical design will be generally developed as described below:

6.2.1 Area Classifications

In general, process and outdoor areas will be considered wet, damp and corrosive requiring NEMA 4X rated equipment and devices. Indoor-conditioned spaces will require NEMA 1 rated equipment and devices. Control panels containing digital devices and controllers will be specified to be NEMA 12 for additional protection.

Classified areas will be defined by NFPA 820, and this project will include classified areas; therefore, equipment that is installed in these areas will be listed for use in classified areas as required by NFPA 70.

6.2.2 Electrical Safety

The electrical design and bid documents for this project will be designed to comply with the requirements of NFPA 70. Electrical design and bid documents will be submitted to the Authority Having Jurisdiction (AHJ), understood to be Cabarrus County, NC. Applicable equipment will include an arc flash warning label. An arc flash risk analysis will be performed during construction to reflect installed conditions. Analysis and labeling will be specified to meet the current NFPA 70E standards.

Equipment will be provided as needed with local disconnect switches or provisions for lockout per NFPA 70.

6.3 Existing Electrical Distribution System

The primary electrical service for MCWWTP is provided through a single utility feed connected to three banked 75kVA single-phase pole-mounted transformers, with a primary rating of 12.47/7.2kV and with a secondary of 480/277V, with a total combined capacity of 225kVA. Duke Energy serves as the facility's electric utility provider. The main site distribution operates on a 480/277V, 3-phase, 4-wire system and includes two independent standby diesel generators, which supply separate sections of the plant's distribution system when normal power is unavailable. In 2018, the site's electrical distribution system was upgraded. As a result, the diesel generators are configured to support electrical distribution independently during loss of normal utility power.

A review of MCWWTP's power usage was conducted for the period spanning January 2024 through December 2024. Throughout this timeframe, the plant recorded an average power consumption of 65.04 kW/hr, with a peak demand reaching 69.83 kW/hr. Applying a power factor of 0.85, these figures correspond to an apparent power usage of 76.52 kVA and 82.15 kVA, respectively. The total connected load at present is approximately 416.94 kW and with a power factor of 0.85 the apparent power is 490.52 kVA. For the most part, the plant's existing electrical distribution system is approximately at 20% utilization.

The following distribution equipment was installed, all rated at 480/277V, 3-phase, and in a 4-wire configuration:

- Main Service Switchboard (MSB) with a bus rating of 800A, and main lug only (MLO)
- Automatic Transfer Switch (ATS) rated at 400A
- Distribution Switchboard (DSB) rated at 400A, with MLO
- Standby Diesel Generator rated at 275kW, equipped with a 600A main circuit breaker (MCB)
- A bank of three single-phase pole-mounted transformers, including a meter and current transformer (CT) enclosure, provided and installed by Duke Energy.

The above equipment (MSB, ATS, and DSB) is located east of the Administration Building under an aluminum canopy and installed on a concrete pad in proximity to the 275kW diesel generator. The Utility supplies power to the MSB. The MSB is service entrance rated and powers MDP (Main Distribution Panelboard) in the Administrative building and DSB via two feeder breakers. MSB powers the DSB via 400A rated ATS. The ATS also receives standby power from the diesel generator mentioned above. The following major areas receive 480V power via the DSB:

- Influent Pump Station
- Clarifier Area
- Equalization Basin Pump Control Panel
- Inclined Drum Screen Control Panel

In the Administration Building's Electrical Room, a stand-alone MCB rated 400A receives power from the MSB and powers the MDP rated 400A, MLO via 400A ATS. The ATS also receives standby power from a 150kW standby diesel generator. The MDP supplies power to the following equipment all rated at 480/277V, 3-phase, and in a 4-wire configuration:

- MCC1 Motor Control Center (MCC) is rated at 600A, MLO
- PP Power Panel rated at 600A, MLO
- Pair of Heat Pumps for the Administration Building

- TRNSF 1 Transformer 25kVA
- TRNSF 2 Transformer 25kVA
- PCM-PC1 Power Center 15kVA
- PCM-PC2 Power Center 15kVA
- PCM-PC4 Power Center 15kVA

The ATS located in the Electrical Room receives its primary power from the stand-alone MCB, with standby power provided by a 150kW diesel generator equipped with a 160A trip rating/400A frame MCB is located outside to the west of the Administration Building. The ATS distributes power to the MDP switchboard, which in turn supplies MCC1 and PP. MDP, MCC1, and PP deliver 480/277V power to all areas not expressly identified as being supplied by the DSB.

It is important to note that the primary electrical distribution system at this site does not utilize a Main-Tie-Main (redundant) configuration for feeders. Redundancy is limited to the standby power systems, which include generators and their associated ATS. This provided redundancy for the normal source; however, redundancy does not extend beyond these systems into the distribution system.

Additionally, most process locations are equipped with various panelboards rated at 240/120V or a mini-power center of the same rating, and vendor-supplied control panels. These vendor control panels contain Programmable Logic Controllers (PLC), input/output devices, and motor controllers including both variable frequency drives (VFDs) and motor starters.

6.4 Proposed Electrical Design Component Descriptions

6.4.1 Proposed Electrical Distribution

The existing electrical utility for the site is utilized at approximately 20% of its 225KVA capacity. The new connected load is approximately 422KVA. Upgrades will involve coordination with the electrical utility provider to replace the existing pole-mounted transformers with a likely one pad-mounted 500KVA transformer to accommodate additional connected loads due to facility expansion. The underground feeders from the utility pole to the existing CT enclosure and meter will be replaced, and a new ductbank will be installed from the CT enclosure to a new 800A service entrance rated ATS (ATS-1). ATS-1 will receive standby power from a new 425kW generator. The existing diesel generators and associated automatic transfer switches will be removed to consolidate main power distribution through a new 480V, 800A main lug only (MLO) Main Distribution Board (MSB-1). Additional evaluation of the electrical distribution system will be done during detail design to better evaluate the load and operational requirements for the facility.

6.4.2 Influent Pump Station

The Influent Pump Station (PS) will be upgraded by replacing the two existing influent pumps in the existing wet well. The existing pumps are 30 HP submersible pumps, they will be upgraded to 40 HP. The existing pumps are powered from an existing motor control panel that receives power from the MSB. Additionally, a new wet well will be built adjacent to the existing wet well. This wet well will have two new 40 HP submersible pumps. The new electrical distribution design for this area incorporates a walk-in electrical enclosure. This enclosure will be located outside the 100-year flood plain, at an approximate distance of 100 feet from the wet well area. It will contain the new switchboard, VFDs, and panel board with its associated step-down transformer. The existing panel PS:CP, will also be relocated to this enclosure as part of the design. The power supply for this electrical enclosure will be routed from MSB-1 through a new ductbank in addition to the existing ductbank. See Table 6-1 for

preliminary design parameters and electrical equipment specifications. Each new stand-alone VFD will have a hardwire connection with the existing local control panel PS:CP. The pump operation for this area will be three pumps operating duty with one standby. Demolition in this area will include the existing local disconnect, wireway tap configuration, mini power center, and the existing motor control panel.

Table 6-1. Influent Pump Station Design Criteria

Parameter	Value
Major Load Requirements	2-40 HP – new Influent pumps, replace existing 2-30 HP Influent pumps with 2-40 HP pumps
Stand-alone VFDs	Each new pump will have a stand-alone VFD. This will allow for speed control of the pump based on operational demand.
Walk-in Electrical Enclosure	Will be climate controlled and house all associated electrical equipment.
SWBD-IPS	Provides 480V, 3P power. The new switchboard will centralize load distribution and improve over safety for personnel
Lighting panelboard with 30KVA stepdown transformer	Provides 208/120V power for misc. loads at the wet well and the electrical enclosure.

6.4.3 Headworks

The Headworks will be upgraded by the addition of a manufacturer packaged rotary drum screen including a vendor provided control panel that will supply power and control for the rotary drum screen. The existing rotary drum screen will remain. The rotary drum screen and control panel will be located on a new metal platform near the existing platform. See Table 6-2 for a summary of preliminary design criteria and electrical equipment. I/O for VCP-02012 will be from the existing local control panel labeled EQ:CP named Headworks Main Pump Control PLC Panel. For power distribution to the control panel of the rotary drum screen a new electrical feeder in ductbank is required from the DSB.

Table 6-2. Headworks Design Criteria

Parameter	Value
Major Load Requirements	1-1.5 HP – Rotary Drum Screen
Existing Switchboard	480V power for the control panel will come from the DSB.
VCP-02012	1 – vendor control panel

6.4.4 Flow Equalization

The EQ area will be upgraded with the installation of one new pump tagged as EQ pump 2. EQ pump 2 will be a 10 HP pump and will operate in a similar manner to the existing EQ pumps 3 and 4 located in this area. Two smaller EQ pumps, each rated at 5 HP, will be removed as part of this modification. These changes will necessitate updates to the EQ and Headworks Main Pump Control PLC Panel. Table 6-3 provides a summary of preliminary design criteria and electrical equipment. The addition of new I/O for this control panel is not anticipated, however this will be evaluated during detailed design. No new power distribution is required as these new pumps will be powered from the existing EQ and Headworks Main Pump Control PLC Panel.

Table 6-3. Flow Equalization Design Criteria	
Parameter	**Value**
Major Load Requirements	1-10 HP – new EQ Pump, Tagged EQ Pump 2
Major Load Requirements	2-5 HP – existing EQ Pumps (removed)
Existing Motor Control Panel	Modifications to the existing EQ and Headworks Main pump control PLC Panel are required. The removal of the existing VFDs, breakers, and filters associated with the two 5 HP pumps. This will allow for the new VFD, bypass starter, breaker, and filters associated with the new 10 HP pump. An evaluation of the panel's existing cooling system is necessary to accommodate changes in heat load resulting from the addition and removal of equipment.

As part of the planned upgrades, a new EQ Basin will be constructed. This basin has two instruments to monitor water levels, with their I/O hardwired to EQ:CP. Additionally, the electrical design for the basin includes the installation of lighting on both the stairway and the observation platform located at the top of the basin. The planned instruments for this area are all loop-powered.

6.4.5 Aeration Basin

The existing aeration basins will be decommissioned and converted for use as sludge holding tanks. A new conventional activated sludge aeration basin with two trains is planned for construction on the western side of the facility. Each basin is designed with five zones: two anoxic zones followed by three aerobic zones. The design includes provisions for an additional, parallel third train to increase future capacity. The new aeration basins will have various electrical loads, as detailed in Table 6-4. Power to this location requires the installation of a new ductbank with new electrical feeders from MSB-1.

Power distribution additions for this area are as follows:

- A new walk-in electrical enclosure which will house all new electrical distribution equipment.
- A new motor control center (MCC-AB) to consolidate the motor controllers for this area and 480V electrical distribution loads.
- A new stepdown transformer and 208/120V lighting panelboard
- Lighting fixtures will be installed along the walkways and stairways of the structure, accompanied by the placement of convenience receptacles throughout the walkways.
- The future equipment identified in Section 5.4.1 has been included in the calculation of MCC-AB bus capacity. Additional analysis will occur during the detailed design phase.

I/O from this area will reside in a new local control panel LCP-04020 located inside the walk-in enclosure. LCP-04020 will use fiber optics to connect to the existing control panel WWTP:CP located in the Administration Building.

Table 6-4. Aeration Basin Design Criteria	
Parameter	**Value**
Major Load Requirements	3-50 HP – new Aeration Blowers, two duty and one standby operation
Major Load Requirements	4-4.7 HP – new Mixer, all duty operation
Major Load Requirements	2-12 HP – new IMLR Pumps, both duty operation
Walk-in Electrical Enclosure	Will be climate controlled and house all associated electrical equipment.

Table 6-4. Aeration Basin Design Criteria	
Parameter	Value
MCC-AB	Provides 480V, 3P power. The new MCC will centralize load distribution and improve over safety for personnel
Lighting panelboard with 30KVA stepdown transformer	Provides 208/120V power for misc. loads at the AB.

6.4.6 Filtration

Two additional filters will be installed to increase filtration capacity. The new cloth-disk filter will be positioned adjacent to the existing units. Filter packages will include a vendor control panels for monitoring and control. Power supply for these packaged filter units will be provided from MCC-AB. The three existing filters are powered from Panel PP located in the main electrical room. Motor loads for the filters are powered via the vendor control panels. In addition, area lighting and 120V convenience receptacles will be required to support the new filters. A new mini-power center will also be required to supply power for 120V loads and instrumentation within the filter and UV system area.

Table 6-5. Filtration Design Criteria	
Parameter	Value
Major Load Requirements	2-vendor packaged filtering systems with each having a control panel
MCC-AB	480V power for the control panels tagged FLT-06014 and FLT-06015
MCC-AB	480V power for new mini-power center. Rated for 240/120V secondary side. Tagged PCM-PC5

6.4.7 Disinfection

An additional UV channel will be constructed to increase disinfection capacity. The existing system comprises two parallel stainless-steel channels, each equipped with a bank of UV lamps. The new UV channel will require the installation of dedicated 120V receptacles for both the lamp banks and monitoring equipment. Power for this system will be from the same mini-power center mentioned in Section 6.4.6

Table 6-6. Disinfection Design Criteria	
Parameter	Value
Major Load Requirements	1-Vendor packaged UV system with monitoring
New mini-power center	120V required for monitoring and UV lamp banks

6.4.8 Solids Handling

There is no new electrical design elements planned for this area. The existing instrumentation will remain in the old aeration basins to monitor the dissolved oxygen of new SHTs No. 5-8, new instrumentation is deemed necessary as discussed in Section 5.8.

Section 7

Instrumentation and Control (I&C) Improvements

7.1 Codes and Standards

The instrumentation and control components of the Project will be generally designed in accordance with the following codes and standards:

- International Society of Automation (ISA)
- Institute of Electrical and Electronics Engineers (IEEE)
- American National Standards Institute (ANSI)
- Underwriters Laboratories, Inc. (UL)
- National Electrical Manufacturers Association (NEMA)
- National Fire Protection Association (NFPA)
- National Electrical Code (NEC)
- NEMA ICS 1 – General Standards for Industrial Control and Systems
- UL508A/UL698A- Industrial Control Panels

Where reference is made to one of the above standards the revision in effect at the time of bid opening shall apply.

7.2 Existing I&C System

The existing I&C system consists of programmable logic controllers (PLCs) and field instruments located at various process areas at the facility. The existing SCADA software platform is RSView32 Studio by Rockwell. The existing area PLCs and operator interface terminal (OITs) are Allen-Bradley. There are several SLC 5/05 and MicroLogix PLCs in areas such as the admin building, IPS, and disc filters. The existing terminal server is RSView32 client server. Plant communication network consists of a one-pair fiber-optic that connects each process area to SCADA. The SCADA system data and communications are secured and accessible onsite and offsite.

7.3 Proposed I&C System

The existing PLC software for each process area will be modified to integrate new equipment. Legacy products such as SLC 5/05 and MicroLogix should be considered for upgrade to CompactLogix PLCs. The client will provide existing PLC software to implement modifications. The communication network will be expanded to include connections to new process equipment. Upgrade to FactoryTalk should also be considered since RSView 32 is a legacy product by Rockwell. New hardware listed below and upgrades to new SCADA graphics for respective process areas will be included. Control narratives for each process have been included in previous sections for respective process areas.

New vendor-packaged PLCs with OITs, HMI displays, and additional process area PLCs will be integrated into communication network. Vendor-packaged control systems that contain PLCs will be networked into SCADA system for monitoring and control of these packages.

Existing PLCs and workstations will remain. All new equipment status signals and new field instrument signals will be communicated to SCADA. In the Influent Pump Station, existing pump station control panel PS:CP will have four networked connections to four pump VFD panels. In Headworks area, new vendor control panel VCP-02012 will be connected to existing EQ:CP. Existing EQ:CP in EQ basin remains and will be modified for removal of two existing VFDs and addition of one new VFD. New LCP-04020 in new aeration basin controlling equipment in Aeration Trains 1 and 2 will be networked to SCADA. Three new aeration blower packages will have networked connections to existing WTTP:CP. Two new filter packages will have networked connections to existing DF:RIO. Table 7-1 summarizes proposed I&C improvements for each respective process area.

Table 7-1. MCC and Control Panel Improvements

Process Area	MCC/Control Panel	New/Existing
Influent Pump Station	PS-CP	Existing
	VFD-01011	New
	VFD-01012	New
	VFD-01013	New
	VFD-01014	New
Headworks	VCP-02012	New
EQ Basins	EQ:CP	Existing
Aeration Basins	MCC-AB	New
	LCP-04020	New
Aeration Blowers	VCP-04031	New
	VCP-04032	
	VCP-04033	
Filtration	VCP-06014	New
	VCP-06015	

7.3.1 Influent Pump Station

Influent pump station will have existing control panel PS:CP and four new VFD panels VFD-01011, VFD-01012, VFD-01013 and VFD-01014. VFD-01011 and VFD-01012 are for existing wet well. VFD-01013 and VFD-01014 are for new wet well. Each pump VFD can be controlled in Local Manual, Remote Manual or Remote Auto mode. In Local Manual, pump VFD start, stop and speed adjustment will be controlled via VFD interface panel. In Remote Manual mode, pump VFD start, stop and speed adjustment will be controlled via software selector switches. In Remote Auto mode, VFD-01011 and VFD-01012 will be controlled based on signal from level transmitter LIT-01011 with float switches LSL-01011, LSH-01011 and LSHH-01011 as back-up. Similarly, VFD-01013 and VFD-01014 will be controlled by signal from level transmitter LIT-01012 with float switches LSL-01012, LSH-01012 and LSHH-01012 as back-up. Additionally, Lead/Lag alternation will take place after each cycle when in Remote Auto mode.

7.3.2 Headworks

Headworks area will have a new vendor-packaged control panel VCP-02012. This control panel controls rotary drum screen DS-02012 and associated solenoid valves SV-02012-1 and SV-02012-2. This control panel operates in Local Manual mode and Local Auto mode. In Local Auto mode, drum screen is controlled by timed sequence. Flow transmitter FIT-02012 monitors flow to drum screen and sends signal to EQ:CP and SCADA for remote monitoring.

7.3.3 EQ Basins

There is one existing control panel EQ:CP that houses four pump VFDs and four pump motor starters. Two of four existing EQ pumps and associated VFDs will be removed. One new EQ pump P-03012 and VFD-03012 will be added. Each pump can be selected to be controlled by its VFD or motor starter via VFD Bypass switch.

When selected for VFD control, each pump VFD can be controlled in Local Manual, Remote Manual or Remote Auto mode. In Local Manual, VFD start, stop and speed adjustment will be controlled via VFD interface panel. In Remote Manual mode, VFD start, stop and speed adjustment will be controlled via software selector switches. In Remote Auto mode, VFDs will be controlled based on flow setpoint using FIT-03011 signal as feedback. Lead/Lag/Lag-Lag alternation will take place after each cycle when in Remote Auto mode.

When VFD Bypass is selected, each pump will be controlled by its motor starter. Once started, pump will run continuously at constant speed until commanded to stop.

New EQ basin T-03012 will have flow transmitter FIT-03012, level transmitter LIT-03012, and level float switch LSHH-03012. These instrument signals will be sent to EQ:CP and SCADA for monitoring.

7.3.4 Aeration Basins

A new aeration basin with two identical aeration trains will be added. Each train will include two mixers, one IMLR pump, three air control valves, and field instruments. All mixers will be constant-speed while IMLR pump will be controlled by VFD. All mixer motor starters and IMLR pump VFDs will reside in new MCC-AB. IMLR pumps and control valves can operate in Local Manual, Remote Manual, and Remote Auto mode, while mixers operate in Local Manual and Remote Manual mode only. In Remote Manual or Remote Auto mode, mixers, IMLR pumps, and control valves will be controlled by LCP-04020. The following control strategies for train 1 will also apply to train 2.

Train 1 mixers MX-04011 and MX-04012 operate in Local Manual or Remote Manual mode. In Local Manual mode, these mixers will start and stop via selector switches. In Remote Manual mode, these mixers will start and stop based on software switches. Once started, they will run at constant speed until commanded to stop.

Train 1 IMLR pump P-04011 is variable-speed pump controlled by VFD-04011. IMLR pump can be controlled in Local Manual or Remote Manual mode. In Local Manual, pump VFD start, stop and speed adjustment will be controlled via VFD interface panel. In Remote Manual mode, pump VFD start, stop and speed adjustment will be controlled via software selector switches.

Air flow to each aerobic zone in train 1 is controlled by modulating valves CV-04011, CV-04012 and CV-04013. In Local Manual mode, these valves will open and close via their respective actuator Open/Stop/Close selector switches. In Remote Manual mode, these valves will open and close via software switches. In Remote Auto mode, these control valves will be modulated to maintain DO level setpoint set by operator.

7.3.5 Aeration Blowers

Three new vendor-provided blower packages will be added. Each blower package includes vendor control panel, blower, and field instruments. These blowers are variable-speed controlled by their respective VFDs. Each blower can be operated in Local Manual, Remote Manual or Remote Auto mode. The following control strategy for blower B-04031 will also apply to blowers B-04032 and B-04033.

In Local Manual mode, B-04031 start, stop and speed adjustment will be controlled by VCP-04031. In Remote Manual mode, B-04031 start, stop and speed adjustment will be controlled via software switches. In Remote Auto mode, blower speed is controlled to maintain blower discharge pressure setpoint set by operator. Lead/Lag/Lag-Lag alternation will take place after each cycle when in Remote Auto mode.

7.3.6 Filtration

Two new vendor-provided filter packages will be added. Each filter package includes cloth disk filter, control valves, pump, control panel, level float switches, pressure transmitter and pressure gauges. Filter and pump will run at constant speed and can be operated in Local Manual or Local Auto mode. In Local Manual mode, filter FLT-06014 and pump P-06014 will start and stop via their respective selector switches located on control panel VCP-06014. In Local Auto mode, filter FLT-06014, pump P-06014 and control valves are controlled based on level float switches. Control for Filter No. 5 will be the same as Filter No. 4.

Section 8

Maintenance of Plant Operation and Schedule

8.1 Maintenance of Plant Operation

Construction of the upgrades to MCWWTP for expansion to 0.66 MGD will require coordination between the Contractor, Engineer, and WSACC staff to maintain proper treatment and meet effluent discharge limits throughout the duration of the construction.

Upgrades to certain process areas will require more sequencing than others, most notably the IPS. A diversion box will be constructed around the incoming 21-inch sewer upstream of the existing IPS with a new 21-inch pipe installed towards the new IPS. Before work on the existing and new IPS begins, the headworks expansion and new parallel 8-inch force main from IPS to headworks could be constructed. After this, temporary IPS bypass pumping will be installed to pump from the upstream sewer manhole to the bypass connection on the existing IPS force main. With the existing IPS bypassed, relocation of the existing valve vault can begin (see drawing DD-010-101 in Appendix A). The new valve vault for the existing IPS Pumps No. 1 and 2 will then be connected to the new force main. At the same time, the doghoused pipe inside the diversion box can be cut and removed and the two wet well isolation gates can be installed. At this point, the existing IPS can be brought back online, and construction on the new IPS wet well and vault for Pumps No. 3 and No. 4 can begin. The remaining 21-inch pipe from the diversion box to the new IPS wet well can also be completed new. A short process shutdown will allow connecting the new IPS valve vault to the dual force mains and bringing the new IPS online.

The existing EQ basin will need to be drained to modify its drain. While the EQ basin is out of service, the headworks and EQ will be temporarily bypassed. All plant flow will be pumped directly from the IPS to the aeration basins using existing headworks/EQ bypass piping. Modifications to the existing EQ basin drain piping should not take too long but preferably, this should take place while the existing aeration basins are still online and while the new aeration basin is being constructed. This will protect the new aeration basin from being filled with unscreened wastewater.

Construction of the expanded headworks, filters, UV, new aeration basins, splitter boxes, and associated piping can be performed during normal plant operation. Afterwards, only short service interruptions will be required to connect the new equipment to the main plant flow path. Once the new aeration basin is connected, the existing aeration basins will be drained to the IPS and their mixed liquor will be sent to the new aeration basin to start up that new process.

After the existing aeration basins are drained, modifications to convert them to Sludge Holding Tanks No. 5-8 can begin. This will include interconnecting them with the existing SHTs.

Electrical improvements to the MCWWTP will likely require multiple short duration shutdowns, with some potential longer duration shutdowns. During shutdowns impacting the UV area, generators should be used to maintain disinfection of effluent. EQ should be used as much as possible to attenuate influent flow until power is restored to downstream processes. As the design progresses more detailed MOPO for these shutdowns will be considered.

8.2 Schedule

Following completion of the WWTP Facilities Plan and PER, WSACC will issue a request for qualifications (RFQ) to procure the services of a design builder. It is anticipated that a contract with the new design-builder will be awarded as early as January 2026.Preconstruction services, including design, will begin in early 2026 and be completed by the end of that calendar year. After the design is advanced to a 60 percent level or more, construction can begin potentially at the beginning of October 2026, first with clearing and excavation. Construction would be completed in 24 months, around October 2028.

Section 9

Opinion of Probable Construction Cost

9.1 Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 4 estimate. Class 4 estimate is defined as a Planning Level or Design Technical Feasibility Estimate. Typically, engineering is from 1 to 15 percent complete. Class 4 estimates are used to prepare planning level cost scopes or to evaluate alternatives in design conditions and form the base work for the Class 3 Project Budget or Funding Estimate.

Expected accuracy for Class 4 estimates typically range from -30 to +50 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

9.2 Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes, and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs and anticipated productivity adjustments to labor and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of Sage Construction and Real Estate 300 estimating software engine (formerly Timberline) using RS Means database, historical project data, the latest vendor and material cost information, and other costs specific to the project location.

9.3 Opinion of Probable Construction Cost

Table 9-1 presents the opinion of probable construction cost by process area for the proposed upgrades. Appendix D includes the detailed cost estimate developed as part of this preliminary design. For comparison, the costs developed during the Alternatives Analysis are also provided.

Table 9-1. Opinion of Probable Construction Cost for the MCWWTP Expansion to 0.66 MGD MMF		
Process Area	Costs from Alternatives Analysis	15 Percent Preliminary Design Costs
Influent Pump Station	$1,350,000	$2,200,000
Headworks	$500,000	$730,000
EQ Basins	$1,060,000	$1,720,000
Aeration	$3,840,000	$9,000,000
Filtration	$1,090,000	$1,560,000
Disinfection	$220,000	$510,000
Effluent Flow Measurement	$53,000	$4,000
Diversion Boxes	Included in Aeration	$470,000
Electrical and Instrumentation	$2,880,000	Included in Process Areas
Site Development	$1,350,000	$2,430,000
Construction Subtotal	**$15,320,000**	**$18,580,000**
Preconstruction (5% of OPCC)	$770,000	$930,000
Engineering (12% of OPCC)	$2,760,000	$2,230,000
Total	**$18,840,000**	**$21,740,000**

Appendix A: 15% Conceptual Design Drawing Set

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CONCORD, NORTH CAROLINA

MUDDY CREEK WASTEWATER TREATMENT PLANT EXPANSION TO 0.66 MGD

14655 Hopewell Church Rd, Midland, NC 28107

PROJECT LOCATION
MUDDY CREEK WASTEWATER TREATMENT PLANT
14655 HOPEWELL CHURCH RD, MIDLAND, NC 28107

VICINITY MAP

AUGUST 2025

PRELIMINARY - NOT FOR CONSTRUCTION

PREPARED BY:

Brown AND Caldwell

Environmental Engineering and Consulting

309 East Morehead Street, Suite 220, Charlotte, NC 28202 (704) 358-7204

North Carolina Board of Examiners for Engineers and Surveyors License No: F-0785

BC PROJECT NO: 193209

REVISIONS		
REV	DATE	DESCRIPTION

GENERAL

DRAWING NUMBER

G-000-001

DRAWING INDEX

GENERAL		
1	G-000-001	COVER SHEET
2	G-000-002	INDEX OF DRAWINGS
3	G-000-301	PROCESS FLOW DIAGRAM
4	G-000-302	PROCESS FLOW DIAGRAM - UNITS OFFLINE
5	G-000-501	HYDRAULIC PROFILE
CIVIL		
6	C-000-100	EXISTING SITE PLAN
7	C-000-200	SITE PLAN
8	C-000-300	GRADING AND DRAINAGE PLAN
9	C-000-400	YARD PIPING PLAN
10	C-000-500	INFLUENT PUMP STATION CIVIL PLANS
PROCESS MECHANICAL		
10	DD-010-101	INFLUENT PUMP STATION DEMOLITION PLAN
11	D-010-101	INFLUENT PUMP STATION PLAN
12	DD-020-101	HEADWORKS & EQ 1 DEMOLITION PLAN
13	D-020-101	HEADWORKS & EQ 1 LOWER LEVEL PLAN
14	D-020-102	HEADWORKS & EQ 1 UPPER LEVEL PLAN
15	D-030-101	EQUALIZATION BASIN 2 LOWER LEVEL PLAN
16	D-040-101	AERATION BASINS SPLITTER BOX PLAN AND SECTION
17	D-040-102	AERATION BASINS LOWER LEVEL PLAN
18	D-040-103	AERATION BASINS UPPER LEVEL PLAN
19	D-040-104	AERATION BASINS BLOWERS PLAN AND SECTIONS
20	D-040-301	AERATION BASINS SECTIONS
21	D-050-101	SECONDARY CLARIFIER FLOW DISTRIBUTION BOX
22	D-060-101	FILTRATION AND UV LOWER LEVEL PLAN
23	D-060-102	FILTRATION AND UV UPPER LEVEL PLAN
25	D-080-101	EFFLUENT MONITORING BOX PLAN
26	DD-090-101	EXISTING AERATION BASINS DEMOLITION PLAN
27	D-090-101	SLUDGE HOLDING TANKS NOS 5-8
INSTRUMENTATION		
28	I-000-001	SYMBOLS AND IDENTIFICATION SYSTEMS 1
29	I-000-002	SYMBOLS AND IDENTIFICATION SYSTEMS 2
30	I-000-003	SYMBOLS AND IDENTIFICATION SYSTEMS 3
31	I-000-004	SYMBOLS AND IDENTIFICATION SYSTEMS 4
32	I-010-601	INFLUENT PUMP STATION P&ID
33	I-020-601	HEADWORKS P&ID
34	I-030-601	EQUALIZATION BASINS P&ID
35	I-040-601	AERATION BASINS SPLITTER BOX P&ID
36	I-040-602	AERATION BASINS P&ID
37	I-040-603	AERATION BASINS BLOWERS P&ID
38	I-050-601	SECONDARY CLARIFIER FLOW DISTRIBUTION BOX P&ID
39	I-060-601	FILTRATION P&ID
40	I-070-601	UV DISINFECTION P&ID
41	I-080-601	EFFLUENT MONITORING BOX P&ID
ELECTRICAL		
42	E-000-100	OVERALL SITE PLAN
43	ED-001-501	SITE ONE LINE DIAGRAM 1
44	ED-001-502	SITE ONE LINE DIAGRAM 2
45	E-001-501	SITE ONE LINE DIAGRAM 1
46	E-001-502	SITE ONE LINE DIAGRAM 2
47	E-001-503	SITE ONE LINE DIAGRAM 3
48	E-001-504	INFLUENT PUMP STATION ONE LINE DIAGRAM
49	E-001-505	AERATION BASIN ONE LINE DIAGRAM

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

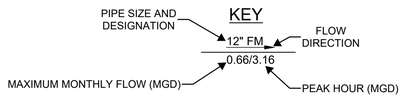
DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:
FILENAME
BC PROJECT NUMBER
CLIENT PROJECT NUMBER
PROCESS

INDEX OF DRAWINGS

DRAWING NUMBER
G-000-002

PIPE DESIGNATIONS

RS	RAW SEWAGE
SRS	SCREENED RAW SEWAGE
ML	MIXED LIQUOR
SCE	SECONDARY CLARIFIER EFFLUENT
FE	FILTER EFFLUENT
UVE	UV EFFLUENT
CAE	CASCADE AERATOR EFFLUENT
RAS	RETURN ACTIVATED SLUDGE
WAS	WASTE ACTIVATED SLUDGE

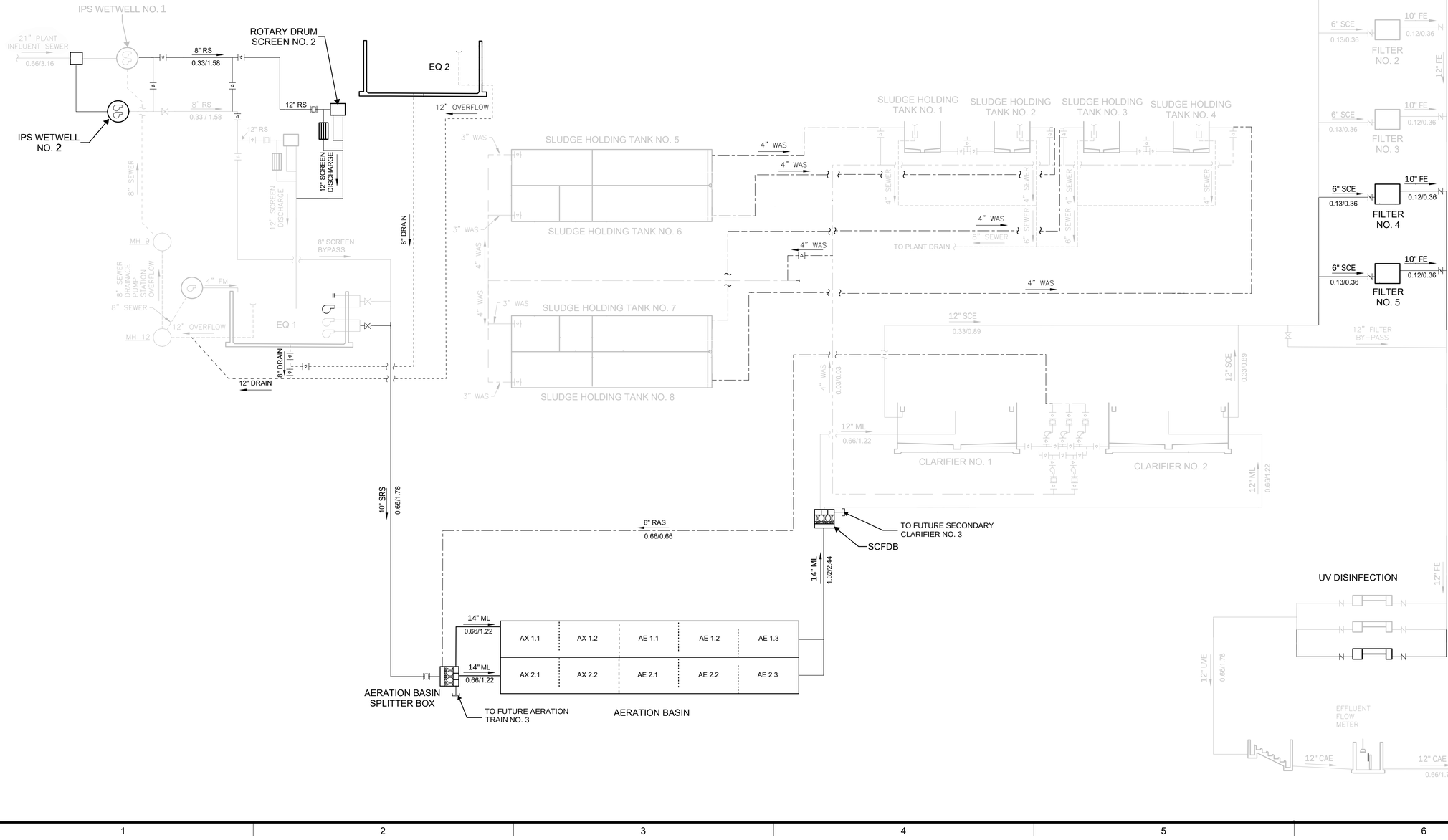


LINE TYPES

- LIQUID PROCESS FLOW
- SOLIDS PROCESS FLOW
- DRAINAGE/OVERFLOW

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WWTP 0.30 MGD EXPANSION, DATED OCTOBER 2019.
2. INTERNAL MIXED LIQUOR RECYCLE (IMLR) IS INTERNAL TO EACH AERATION TRAIN. NOT SHOWN ON THIS PFD.



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CHECKED:
APPROVED:
FILENAME
BC PROJECT NUMBER
CLIENT PROJECT NUMBER

GENERAL

PROCESS FLOW DIAGRAM

DRAWING NUMBER
G-000-301

PIPE DESIGNATIONS

RS	RAW SEWAGE
SRS	SCREENED RAW SEWAGE
ML	MIXED LIQUOR
SCE	SECONDARY CLARIFIER EFFLUENT
FE	FILTER EFFLUENT
UVE	UV EFFLUENT
CAE	CASCADE AERATOR EFFLUENT
RAS	RETURN ACTIVATED SLUDGE
WAS	WASTE ACTIVATED SLUDGE

KEY

PIPE SIZE AND DESIGNATION — 12" FM — FLOW DIRECTION

3.16 — PEAK HOUR (MGD)

LINE TYPES

- LIQUID PROCESS FLOW
- SOLIDS PROCESS FLOW
- DRAINAGE/OVERFLOW

GENERAL NOTES:

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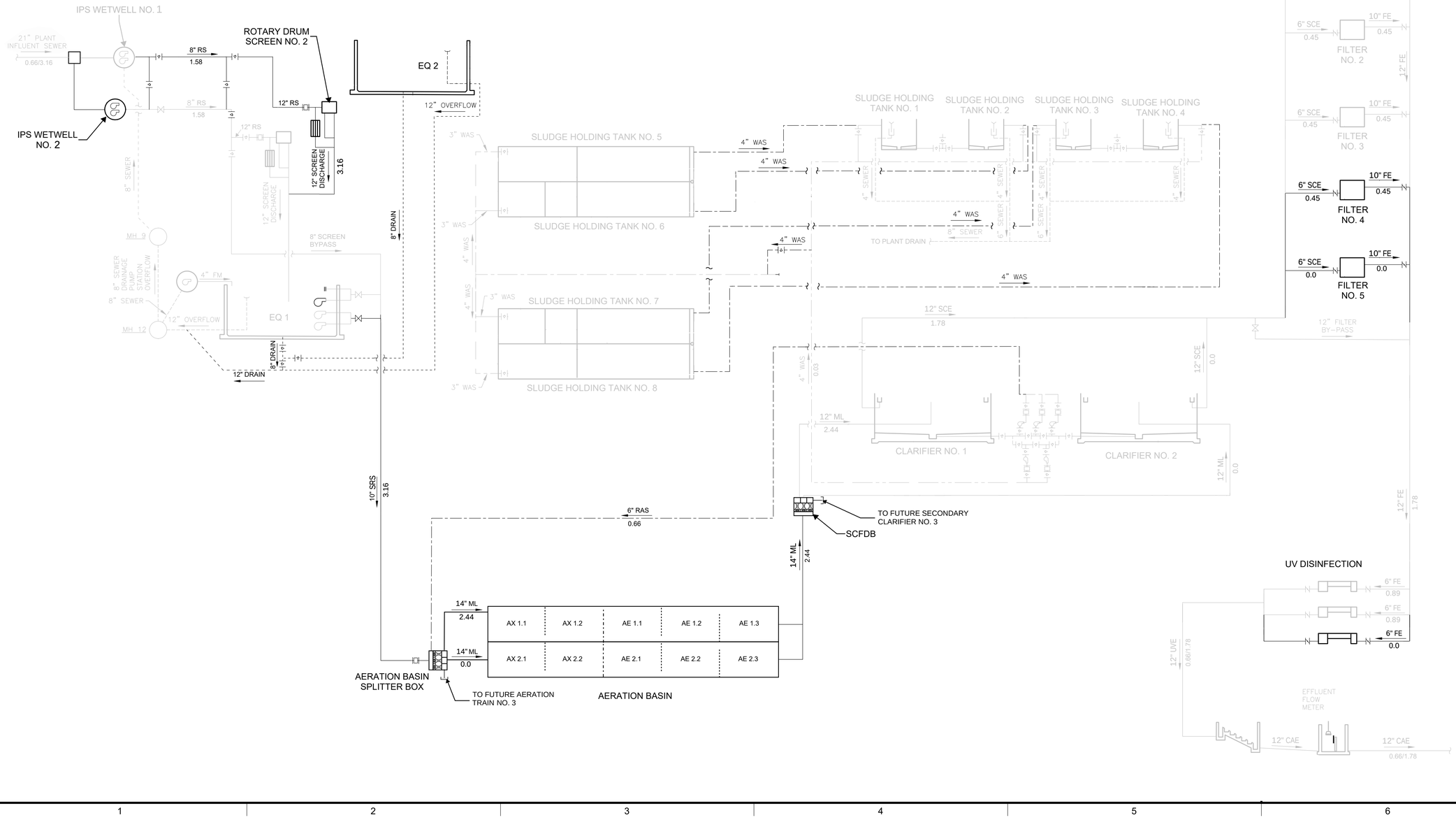
2. INTERNAL MIXED LIQUOR RECYCLE (IMLR) IS INTERNAL TO EACH AERATION TRAIN. NOT SHOWN ON THIS PFD.
3. ONE TRAIN IN EACH PROCESS IS OFFLINE TO SHOW PLANT FLOWS DURING FIRM CAPACITY CONDITION.



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WWTP FACILITIES PLAN AND PER

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REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

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CHECKED:
APPROVED:
FILENAME
BC PROJECT NUMBER
CLIENT PROJECT NUMBER

GENERAL

PROCESS FLOW DIAGRAM - UNITS OFFLINE

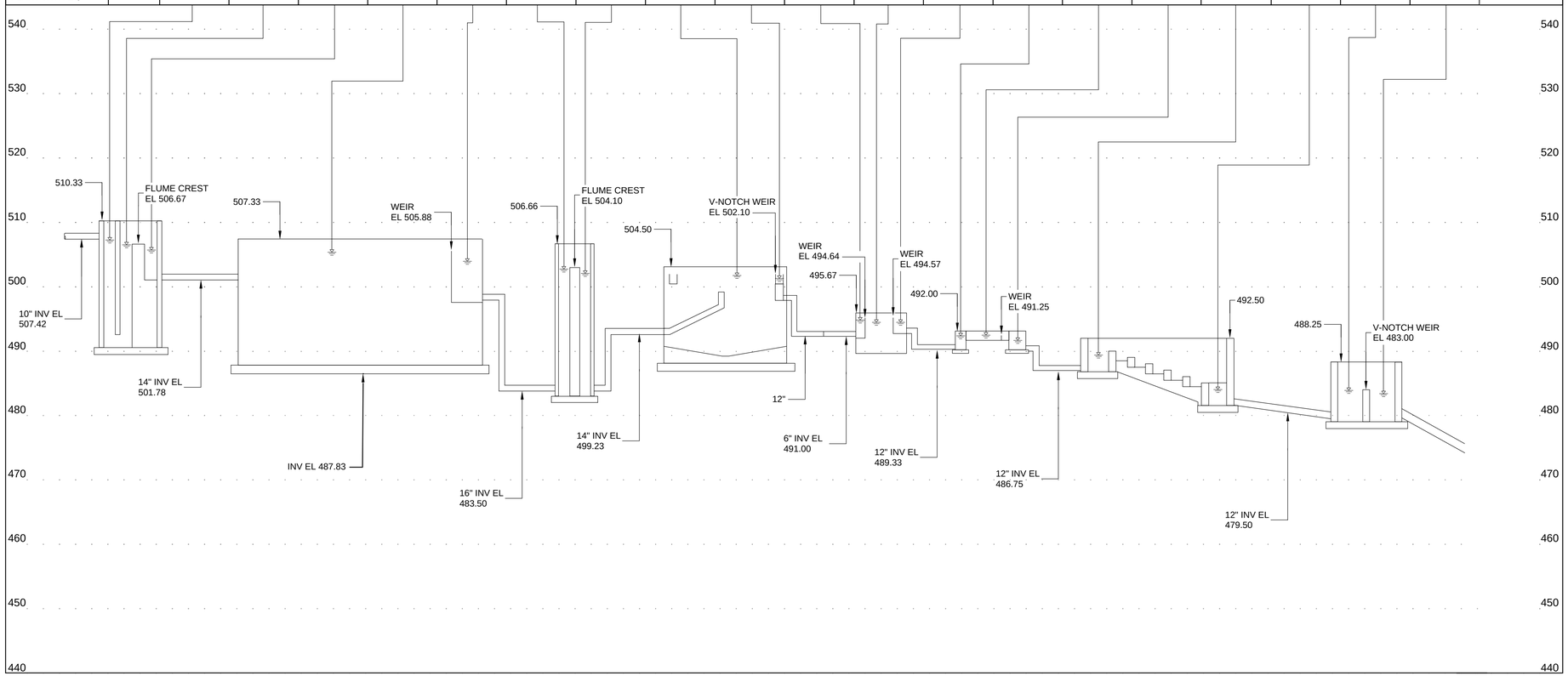
DRAWING NUMBER
G-000-302

GENERAL NOTES:

1. HYDRAULIC PROFILE CREATED WITH THE FOLLOWING TREATMENT UNITS OFFLINE:
   - AERATION BASIN 2
   - SECONDARY CLARIFER 1
   - FILTER 5
   - UV DISINFECTION 3

KEYNOTES:

CONDITION	FLOW	AERATION BASIN SPLITTER BOX			AERATION BASINS 1 & 2		SECONDARY CLARIFIERS FLOW DISTRIBUTION BOX		SECONDARY CLARIFIERS 1 & 2		FILTERS 1, 2, 3, 4, & 5			UV DISINFECTION 1, 2, & 3			CASCADE AERATOR		EFFLUENT MONITORING BOX		
MAXIMUM MONTHLY FLOW	0.66 MGD	507.33	507.33	506.07	506.01	504.85	504.76	502.81	502.54	501.31	494.79	493.89	493.01	491.44	491.43	490.28	490.22	484.18	483.87	479.82	
PEAK FLOW TO PLANT WITH EQ	1.78 MGD	507.80	507.79	506.51	506.08	505.85	505.22	504.45	502.56	501.47	494.93	493.89	493.09	491.58	491.58	490.84	490.41	486.50	484.30	480.11	



HYDRAULIC PROFILE

SCALE: NONE

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
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CHECKED:
APPROVED:

FILENAME

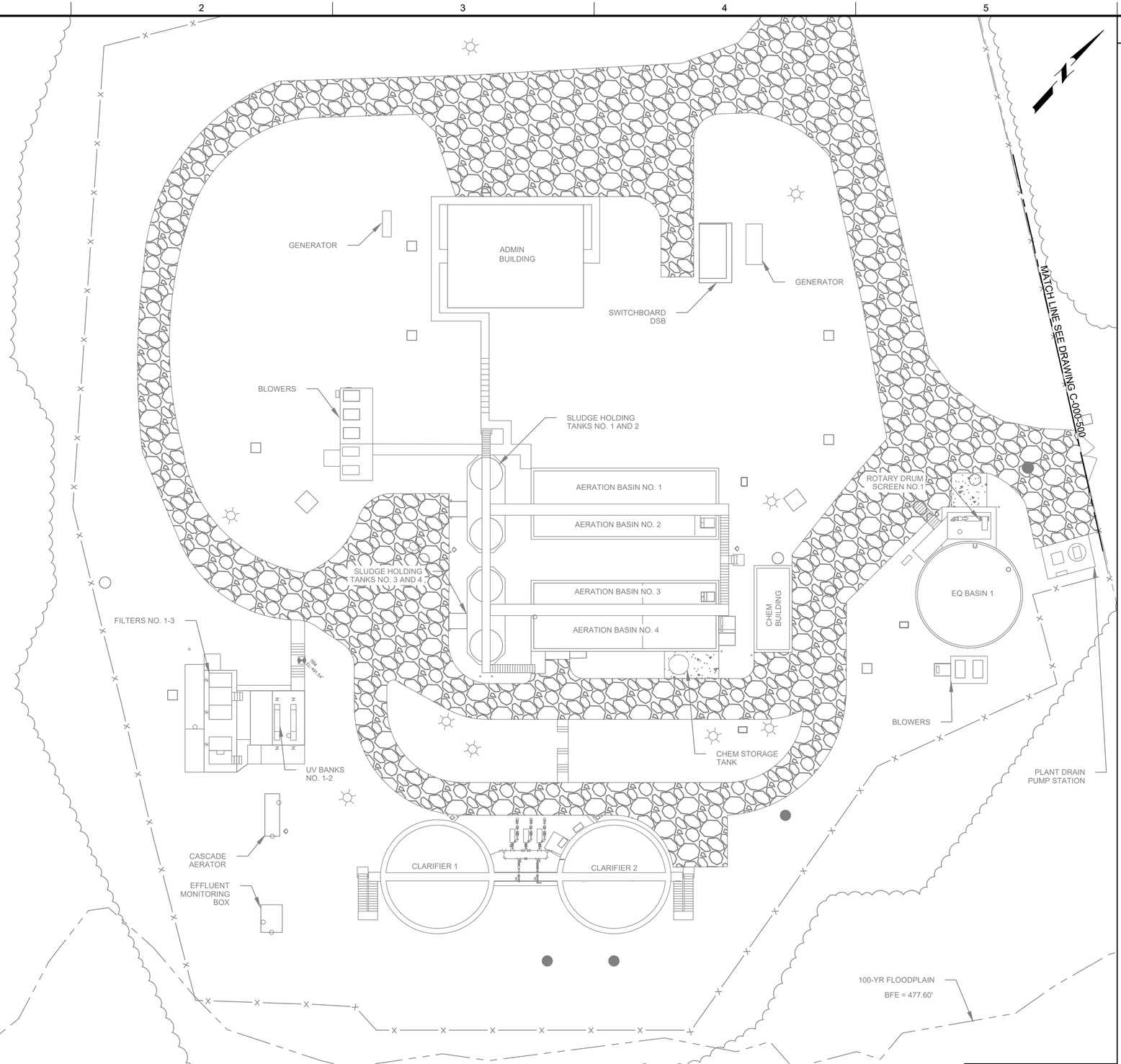
BC PROJECT NUMBER

CLIENT PROJECT NUMBER

GENERAL

HYDRAULIC PROFILE

DRAWING NUMBER
G-000-501



GENERAL NOTES

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SCALE

0 20' 40'

SCALE: 1" = 20'

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	S. KENNEY
DRAWN:	K. PRICE
CHECKED:	D. WRIGHT
CHECKED:	K. DEVENDORF
APPROVED:	D.WRIGHT

FILENAME
C-000-100.DWG

BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

CIVIL

EXISTING SITE PLAN

DRAWING NUMBER
C-000-100

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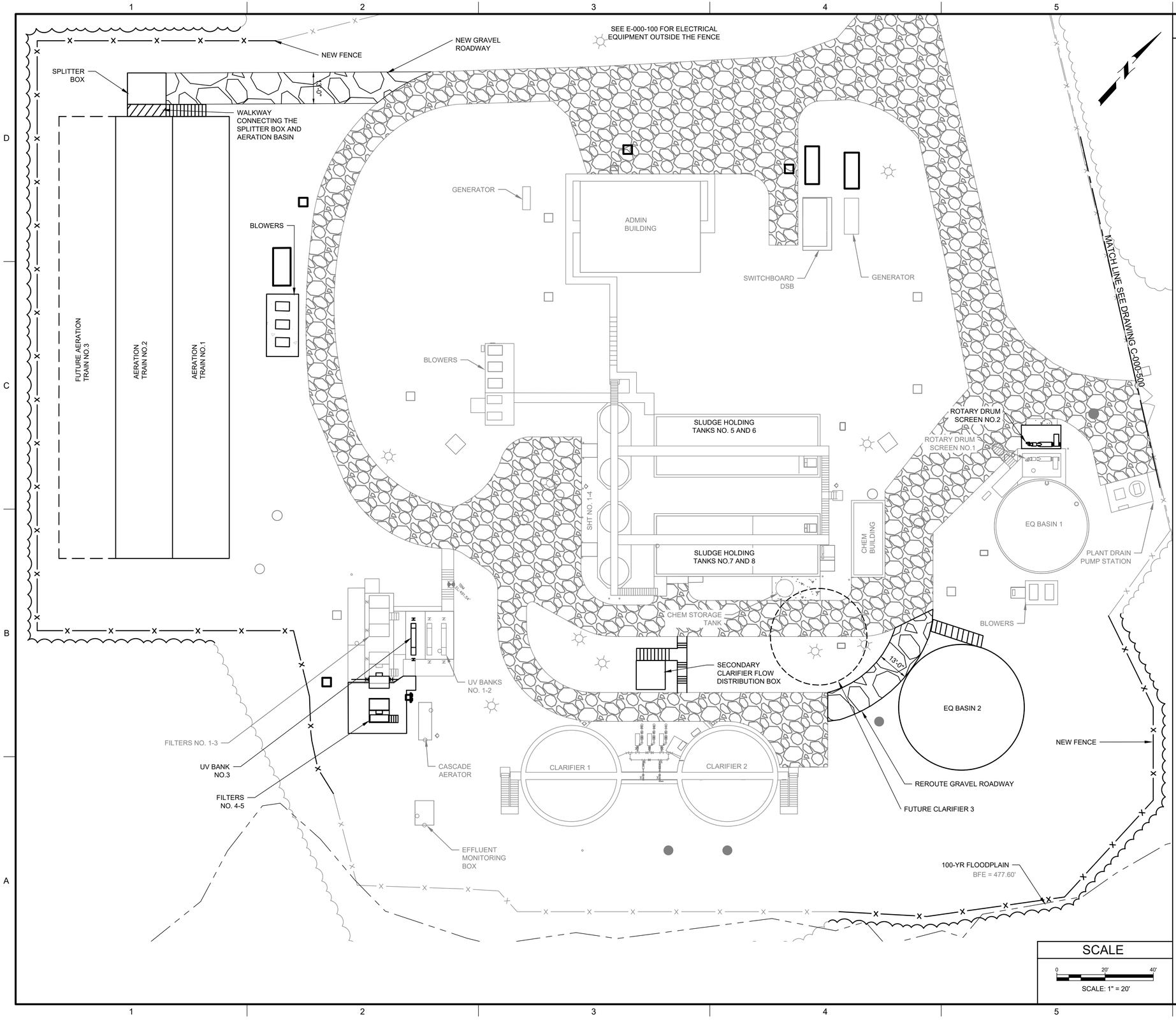
WSACC Logo.jpg



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SCALE

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	S. KENNEY
DRAWN:	K. PRICE
CHECKED:	D. WRIGHT
CHECKED:	K. DEVENDORF
APPROVED:	D.WRIGHT

FILENAME
C-000-200.DWG

BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

CIVIL

SITE PLAN

DRAWING NUMBER
C-000-200

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SEE E-000-100 FOR ELECTRICAL EQUIPMENT OUTSIDE THE FENCE

SPLITTER BOX

FUTURE AERATION TRAIN NO.3

AERATION TRAIN NO.2

AERATION TRAIN NO.1

BLOWERS

GENERATOR

ADMIN BUILDING

SWITCHBOARD DSB

GENERATOR

MATCH LINE SEE DRAWING C-000-500

INLET 2
RIM = 490.86'
INV OUT = 487.58'

INLET 1
RIM = 493.06'
INV OUT = 489.70'

SLUDGE HOLDING TANKS NO. 5 AND 6

SLUDGE HOLDING TANKS NO.7 AND 8

SHT NO. 1-4

CHEM BUILDING

CHEM STORAGE TANK

15" STORM

STD

ROTARY DRUM SCREEN NO.2

ROTARY DRUM SCREEN NO.1

EQ BASIN 1

PLANT DRAIN PUMP STATION

BLOWERS

15" STORM

INV: 487.41'

SECONDARY CLARIFIER FLOW DISTRIBUTION BOX

UV BANKS NO. 1-2

FUTURE CLARIFIER 3

EQ BASIN 2

INV: 481.51'

UV BANK NO.3

CASCADE AERATOR

CLARIFIER 1

CLARIFIER 2

FILTERS NO. 4-5

EXISTING FENCING TO BE REMOVED AND REPLACED FOLLOWING REGRADING

EFFLUENT MONITORING BOX

100-YR FLOODPLAIN
BFE = 477.60'

SCALE

0 20' 40'

SCALE: 1" = 20'

GENERAL NOTES

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WWTP 0.30 MGD EXPANSION, DATED OCTOBER 2019.

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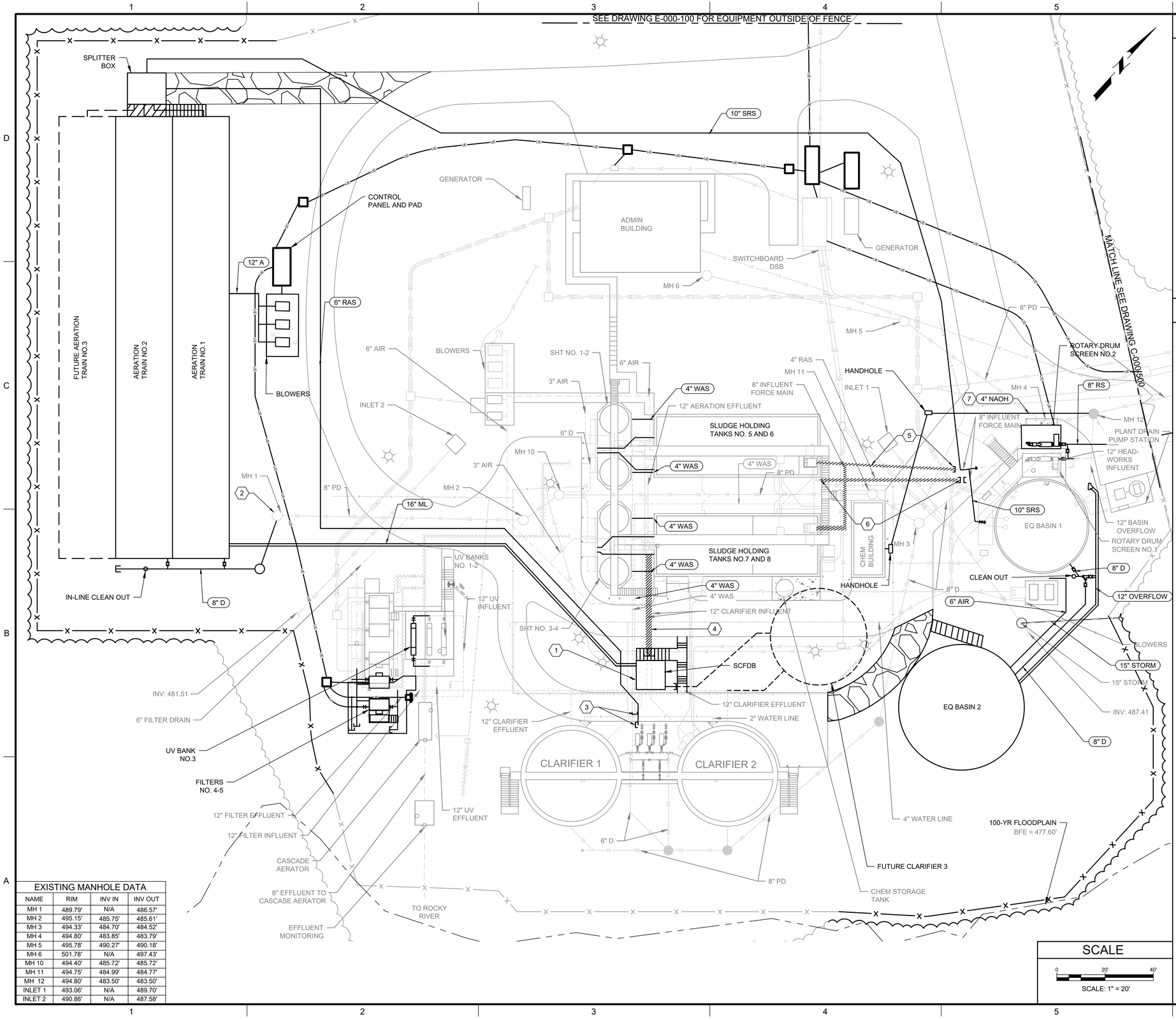
DESIGNED:	S. KENNEY
DRAWN:	K. PRICE
CHECKED:	D. WRIGHT
CHECKED:	K. DEVENDORF
APPROVED:	D.WRIGHT
FILENAME	C-000-300.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

CIVIL

PROPOSED SITE PLAN

DRAWING NUMBER
C-000-300



EXISTING MANHOLE DATA			
NAME	RIM	INV IN	INV OUT
MH 1	489.79'	N/A	486.57'
MH 2	495.15'	485.75'	485.61'
MH 3	494.33'	484.70'	484.52'
MH 4	494.80'	483.85'	483.79'
MH 5	495.78'	490.27'	490.18'
MH 6	501.78'	N/A	497.43'
MH 10	494.40'	485.72'	485.72'
MH 11	494.75'	484.99'	484.77'
MH 12	494.80'	483.50'	483.50'
INLET 1	493.06'	N/A	489.70'
INLET 2	490.86'	N/A	487.58'

SCALE

0 20' 40'

SCALE: 1" = 20'

GENERAL NOTES

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WWTP 0.30 MGD EXPANSION, DATED OCTOBER 2019.

KEYNOTES

1. MANIFOLD THE EXISTING 4" RAS AND 4" WAS TOGETHER BY INSTALLING A TEE ON EACH LINE AND CONNECTING THEM WITH A VALVE IN THE MIDDLE.
2. THE RIM OF MH 1 SHALL BE RAISED TO EL 495.00' TO MORE CLOSELY MATCH THE ELEVATION OF OTHER PLANT DRAIN MANHOLES TO PREVENT OVERFLOWS AT MH1.
3. DEMOLISH SECTION OF EXISTING 4" RAS FORCE MAIN AND CAP. RAS FROM THE CLARIFIERS WILL BE DIRECTED TO THE NEW AERATION BASIN. REFER TO KEYNOTE 1 FOR REPURPOSING THE REMAINING SECTION OF THE 4" RAS FORCE MAIN TO THE NORTH
4. ABANDON EXISTING DUAL 12" CLARIFIER INFLUENT PIPES IN PLACE
5. EXISTING 8" AERATION BASIN INFLUENT FORCE MAIN SHALL BE REROUTED TO THE NEW AERATION BASIN. THE REMAINING FORCE MAIN TO THE EXISTING AERATION BASINS SHALL BE CAPPED WHERE IT IS REROUTED AND AT THE EXISTING BASINS AND ABANDONED IN PLACE
6. EXISTING 4" RAS FORCE MAIN SHALL BE CAPPED AT THE CONNECTION TO THE FORCE MAIN FROM THE EQ BASINS. THE VALVE BETWEEN THE EXISTING AERATION BASINS SHALL BE CLOSED AND REMAIN CLOSED.
7. 4" CONTAINMENT PIPE WITH THREE (3) 1/2" CARRIER PIPE WITH SODIUM HYDROXIDE (NAOH).

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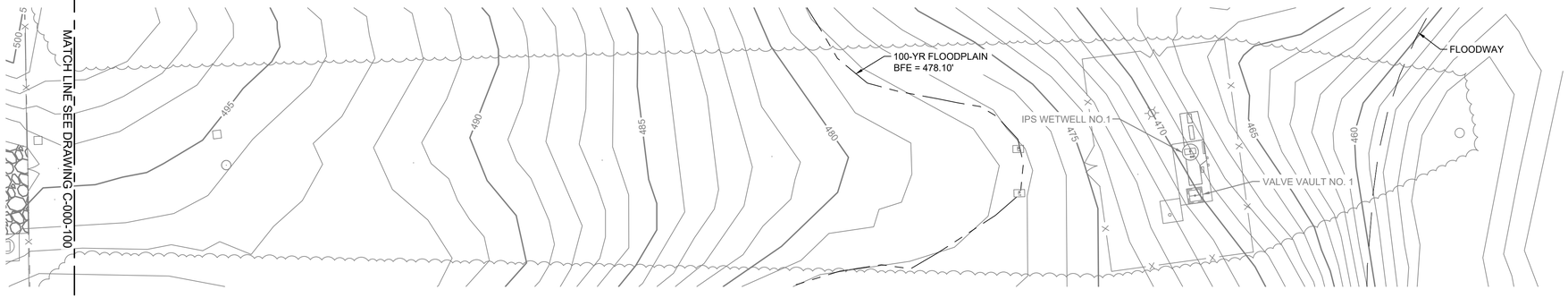
FILENAME	C-000-400.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

CIVIL

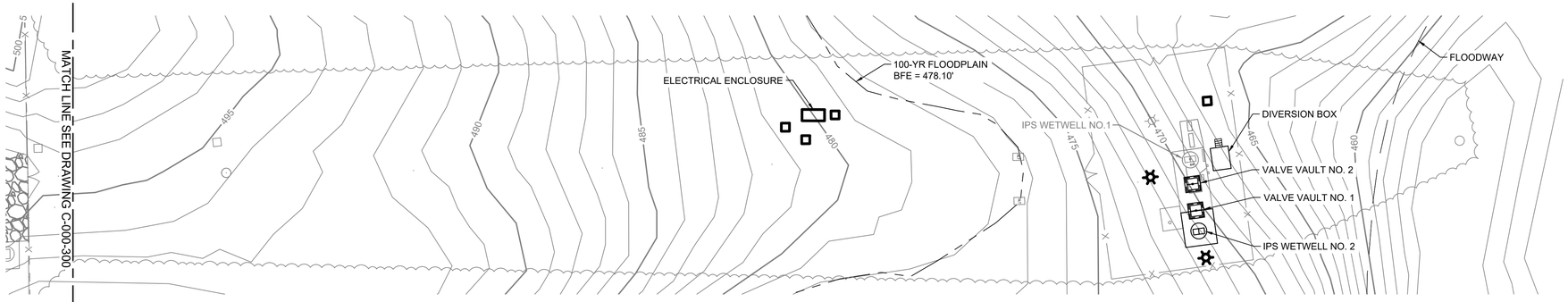
YARD PIPING PLAN

DRAWING NUMBER

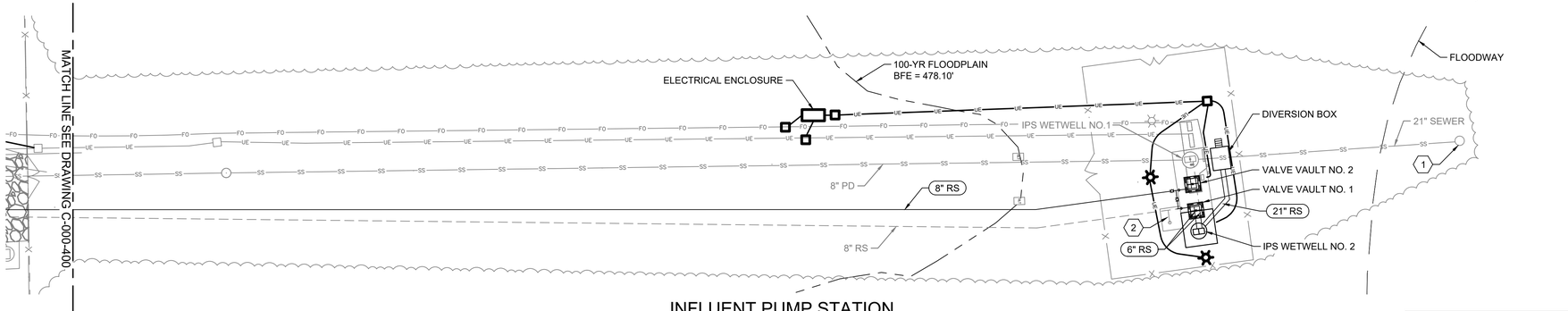
C-000-400



INFLUENT PUMP STATION
EXISTING SITE PLAN
SCALE: 1" = 30'



INFLUENT PUMP STATION
PROPOSED SITE PLAN
SCALE: 1" = 30'



INFLUENT PUMP STATION
YARD PIPING PLAN
SCALE: 1" = 30'

SCALE

0 30' 60'

SCALE: 1" = 30'

GENERAL NOTES

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WWTP 0.30 MGD EXPANSION, DATED OCTOBER 2019.

KEYNOTES

1 FOR CONSTRUCTING STRUCTURES AT THE INFLUENT PUMP STATION, FLOW MAY BE BYPASSED FROM THE EXISTING MANHOLE TO THE EXISTING FORCE MAIN BYPASS CONNECTION (SEE KEYNOTE 2).

2 EXISTING BYPASS CONNECTION.

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	S. KENNEY
DRAWN:	K. PRICE
CHECKED:	D. WRIGHT
CHECKED:	K. DEVENDORF
APPROVED:	D.WRIGHT
FILENAME	C-000-500.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

CIVIL

INFLUENT PUMP STATION CIVIL PLANS

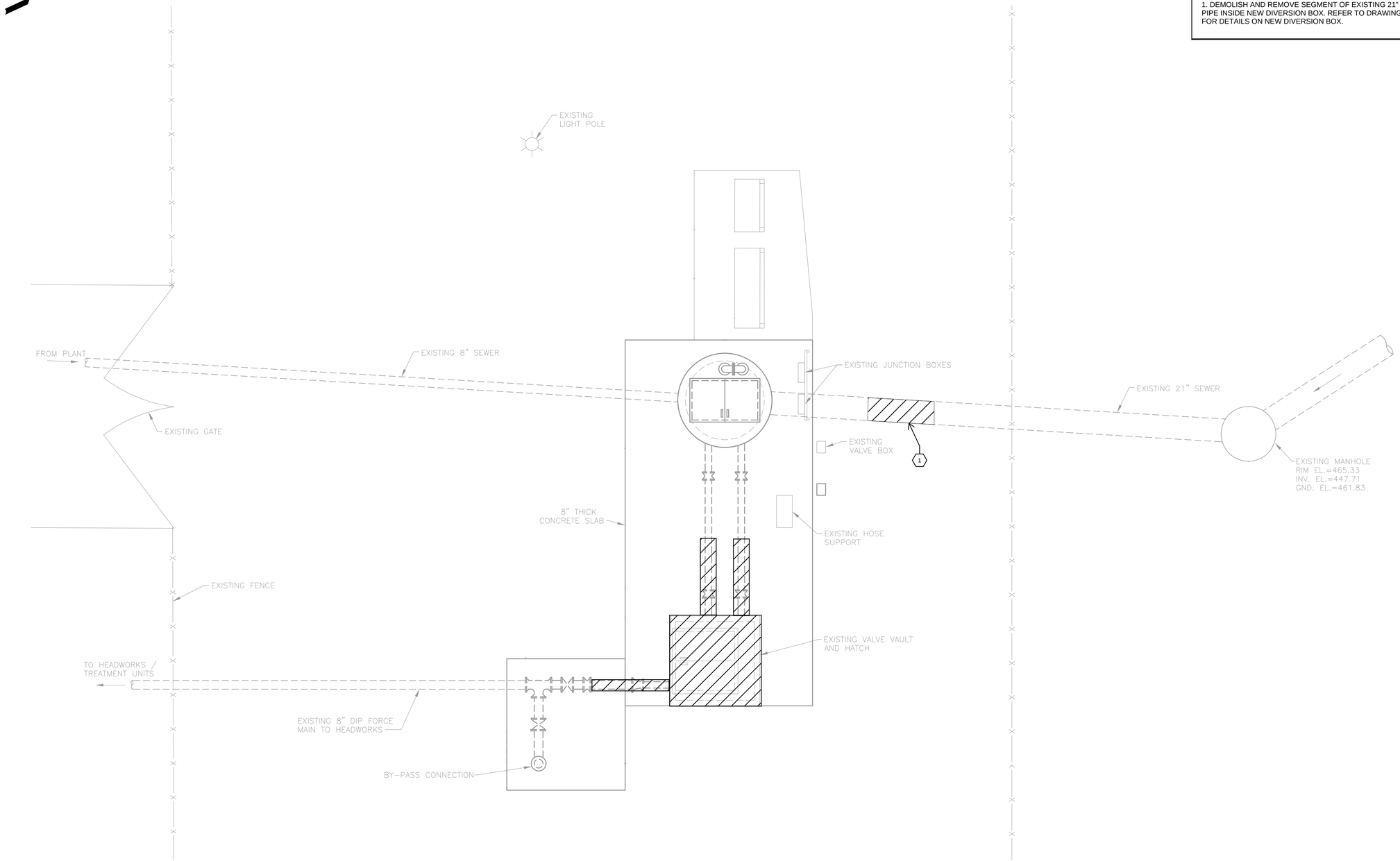
DRAWING NUMBER
C-000-500

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1. DEMOLISH AND REMOVE SEGMENT OF EXISTING 21" SEWER PIPE INSIDE NEW DIVERSION BOX. REFER TO DRAWING D-10-101 FOR DETAILS ON NEW DIVERSION BOX.



DEMOLITION PLAN

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

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

INFLUENT PUMP STATION DEMOLITION PLAN

DRAWING NUMBER

DD-010-101

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1. EXISTING BYPASS CONNECTION.

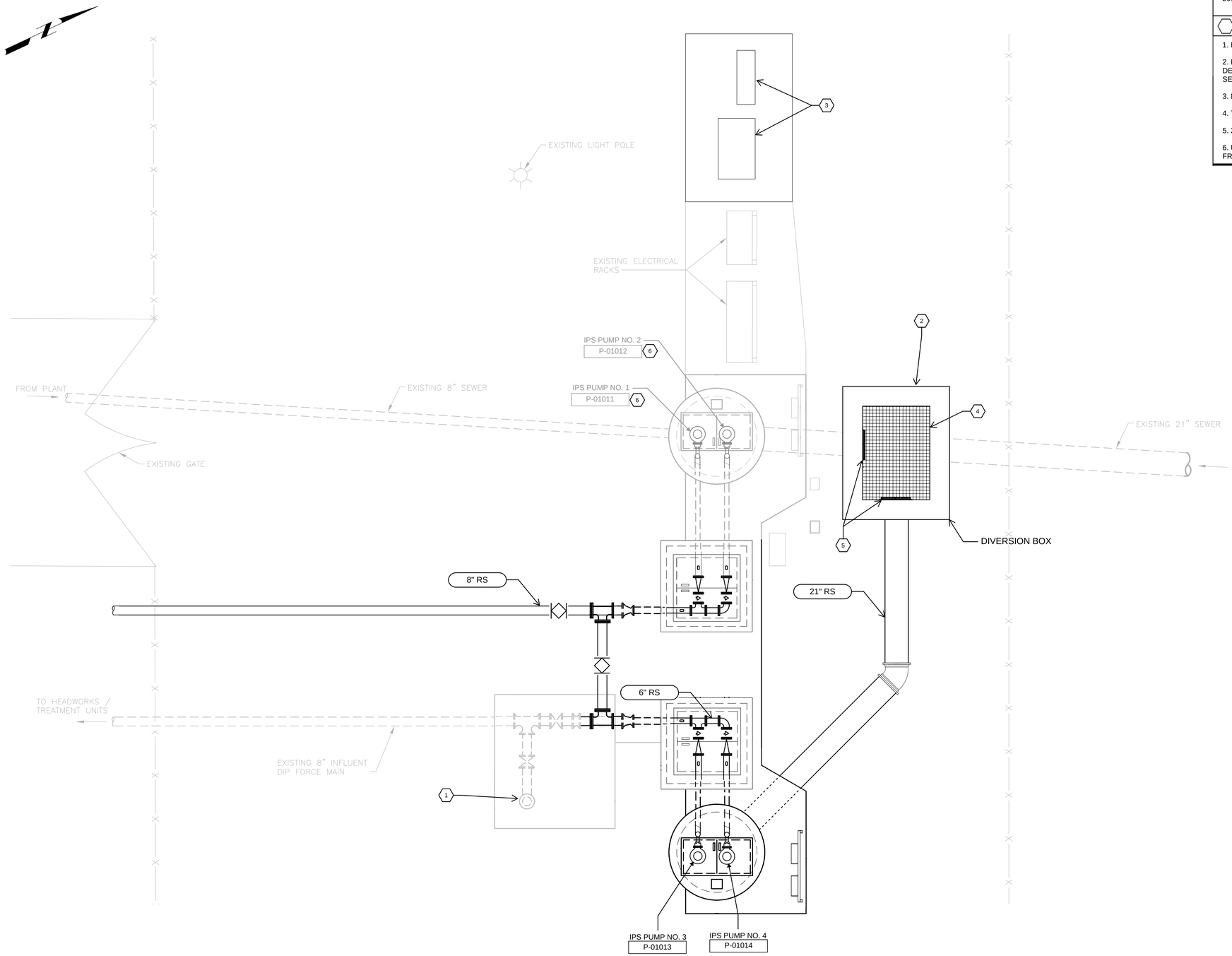
2. PERFORM BYPASS PUMPING AROUND DIVERSION BOX TO DEMOLISH INTERIOR PIPE AND INSTALL SLIDE GATES ON 21" SEWER.

3. NEW ELECTRICAL BOXES. SEE DRAWING E-000-100.

4. TOP GRATING.

5. 21" MANUAL SLIDE GATES.

6. UPSIZE IMPELLERS FROM 10.6" TO 11.3". UPSIZE MOTORS FROM 30 HP TO 40 HP.



PLAN VIEW

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

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

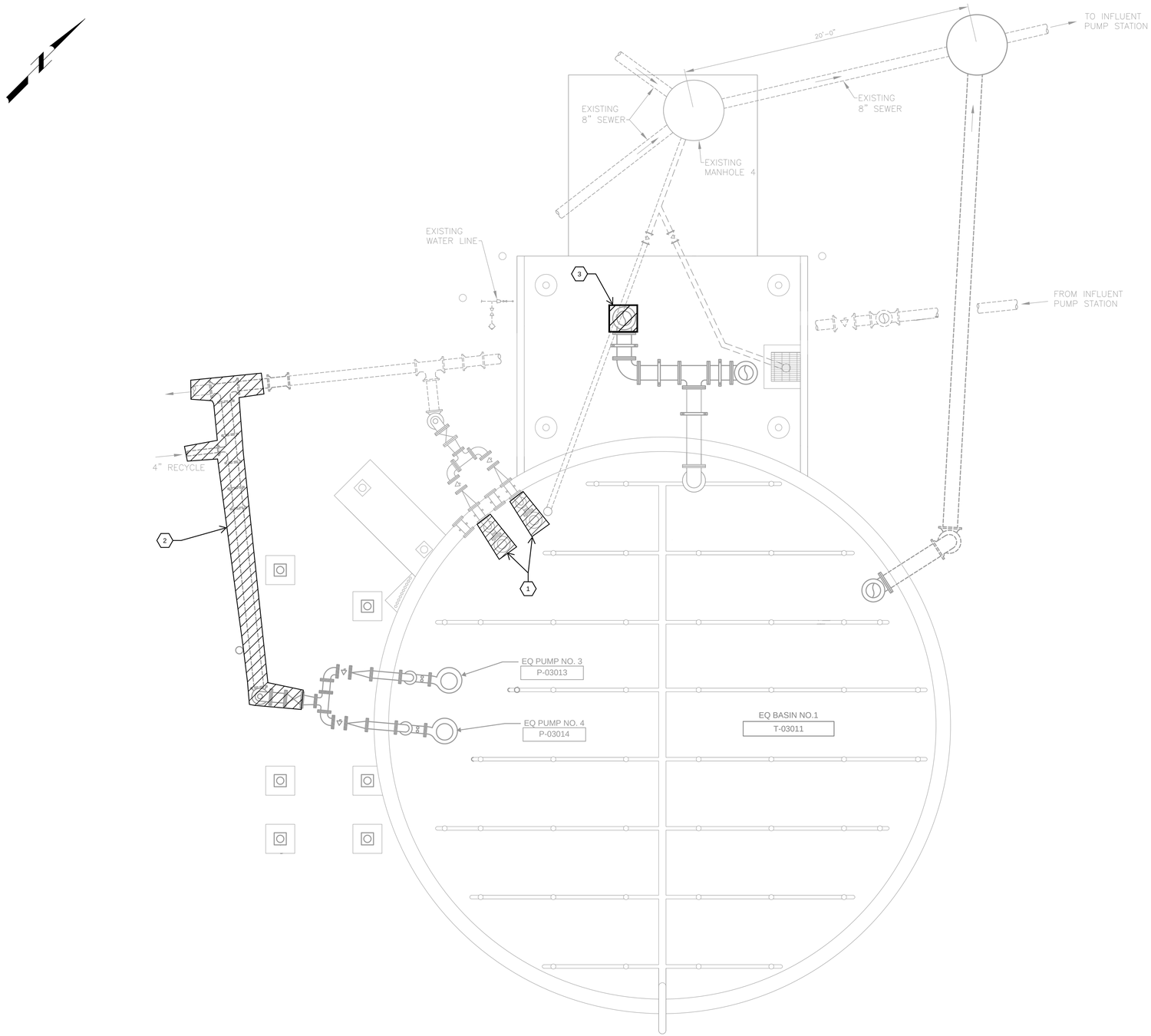
BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

INFLUENT PUMP STATION PLAN

DRAWING NUMBER
D-010-101



DEMOLITION PLAN

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

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1. DEMOLISH EXISTING EQ PUMPS 1 AND 2.
2. SEE CIVIL DRAWINGS FOR CONTINUATION OF PIPE DEMOLITION.
3. DEMOLISH EXISTING FLANGED 90 DEGREE BEND.

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

HEADWORKS & EQ 1 DEMOLITION PLAN

DRAWING NUMBER
DD-020-101

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

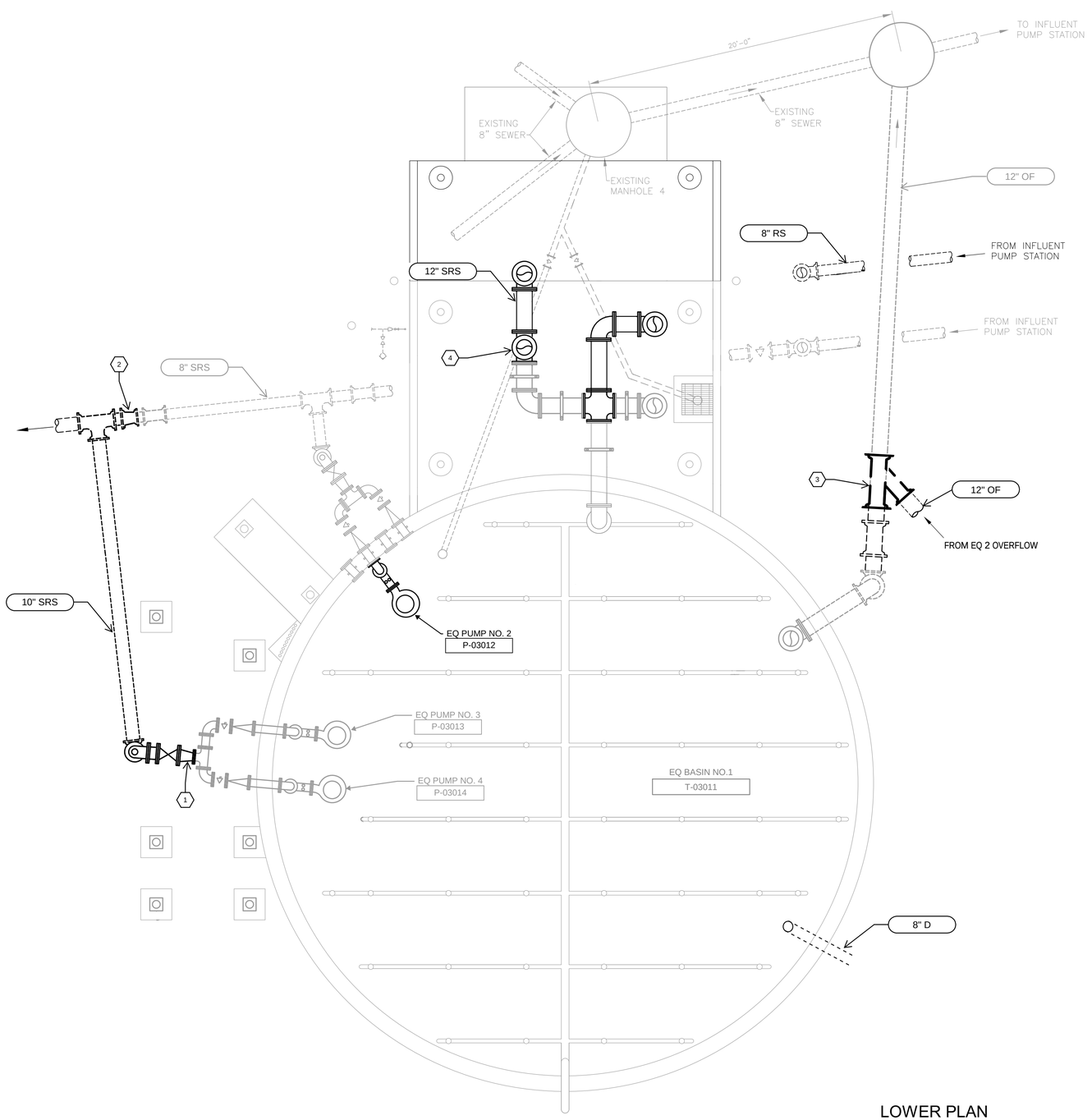
KEYNOTES:

1. 10" x 4" REDUCER

2. 10" X 8" REDUCER

3. CUT 12" WYE INTO EXISTING EQ 1 OVERFLOW PIPE TO CONNECT EQ 2 OVERFLOW.

4. REMOVE EXISTING 90 DEGREE BEND AND INSTALL NEW 12" TEE. CONNECT TO EXISTING FLANGE.



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

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

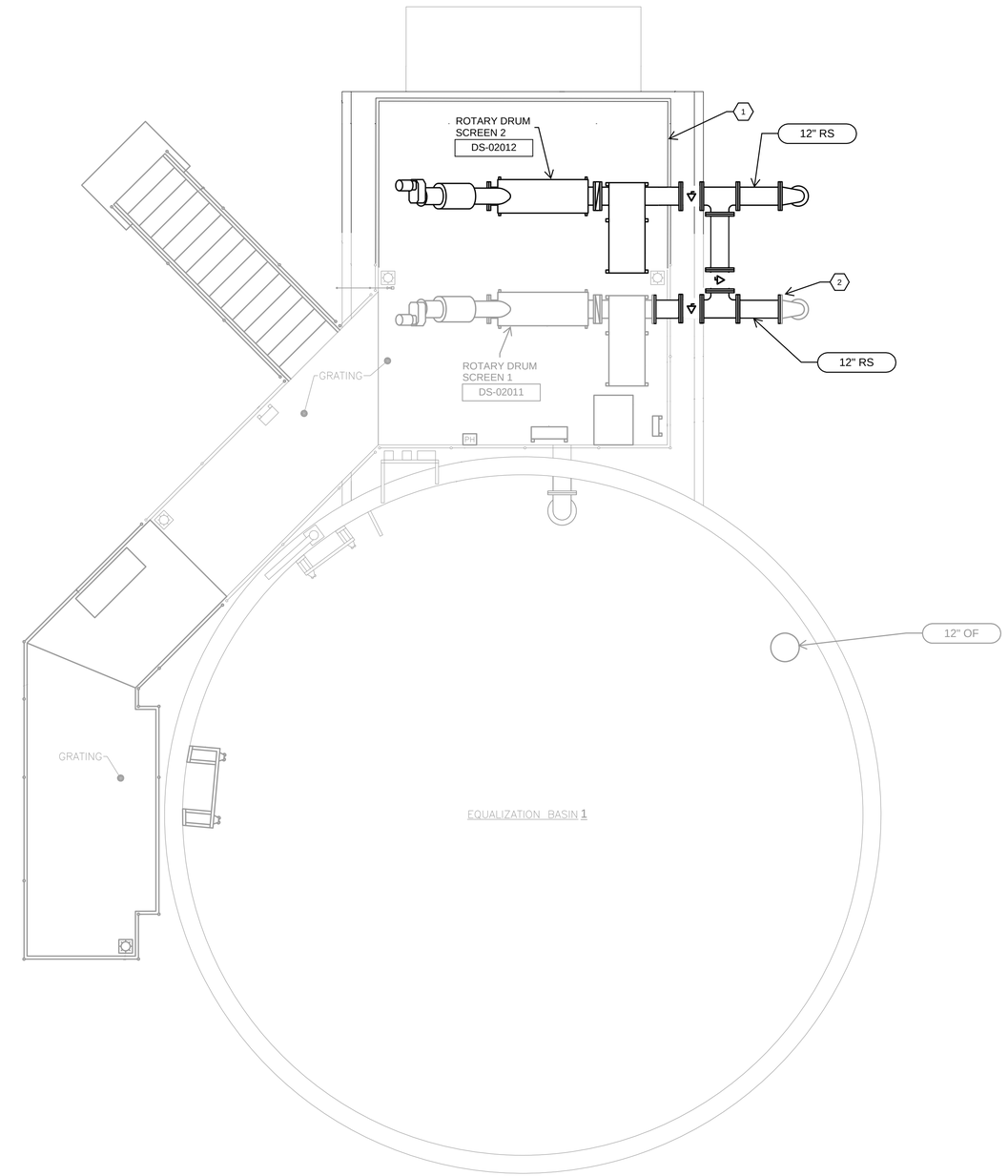
BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

HEADWORKS & EQ 1 LOWER LEVEL PLAN

DRAWING NUMBER
D-020-101



UPPER PLAN

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

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1. MODIFY AND EXTEND PLATFORM TO ACCOMMODATE SECOND DRUM SCREEN

2. CONNECT TO EXISTING REDUCING ELBOW FLANGE.

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

HEADWORKS & EQ 1 UPPER LEVEL PLAN

DRAWING NUMBER

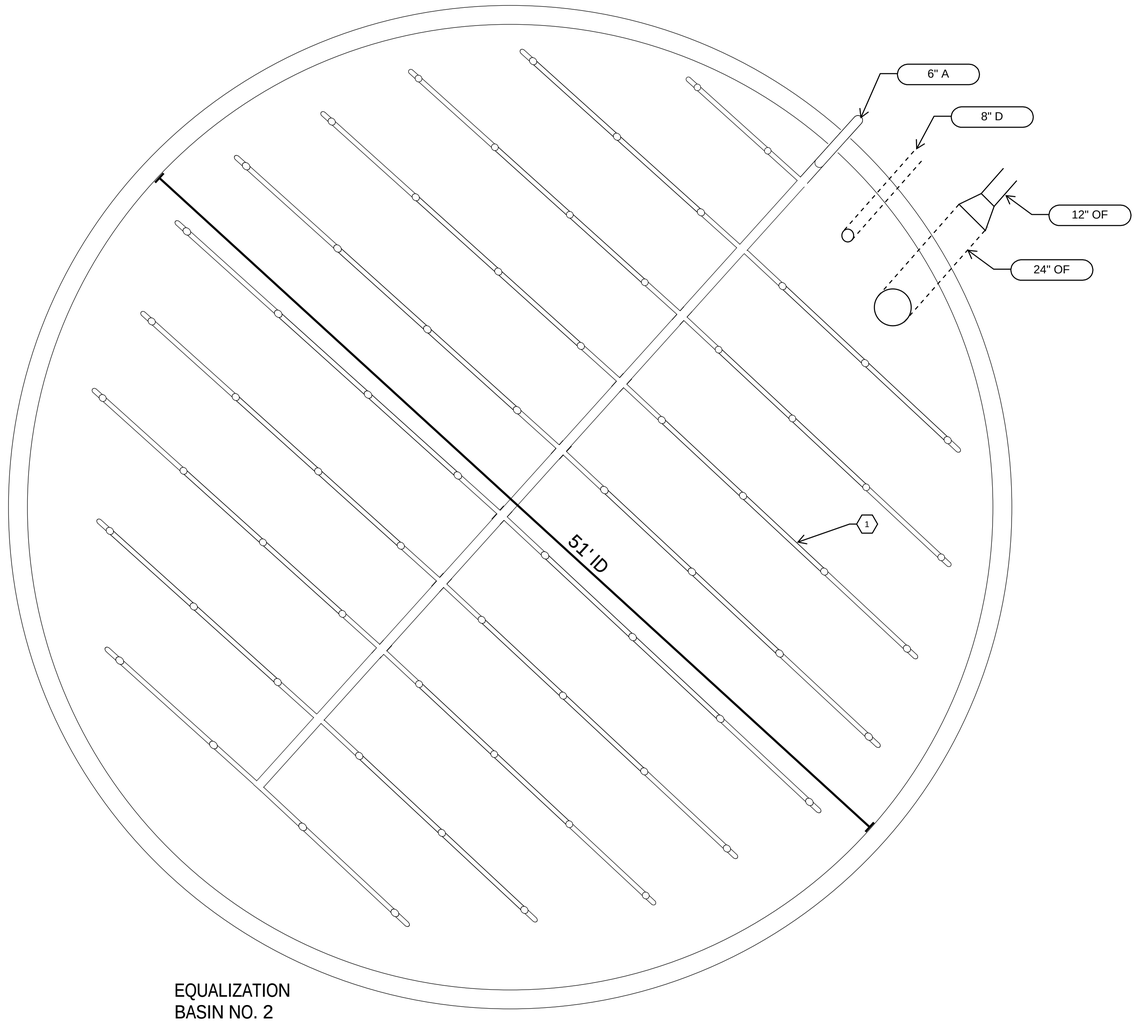
D-020-102

GENERAL NOTES:

1. BASIN WILL HAVE STAIRS LEADING TO AN OBSERVATION PLATFORM. SEE CIVIL DRAWINGS FOR DEPICTION OF STAIRS.

KEYNOTES:

1. COURSE BUBBLE DIFFUSERS AND MANIFOLD PIPING.



EQUALIZATION
BASIN NO. 2

LOWER PLAN

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

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WWTP FACILITIES
PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES
AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

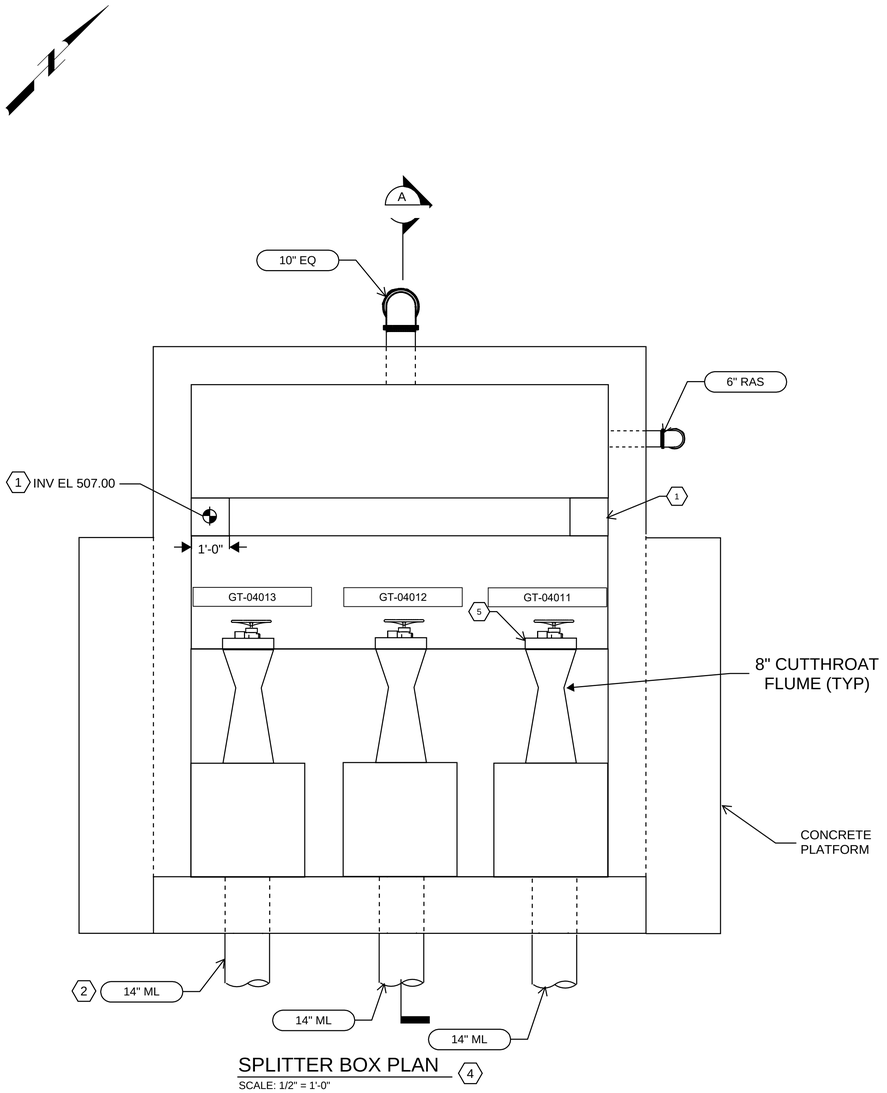
BC PROJECT NUMBER

CLIENT PROJECT NUMBER

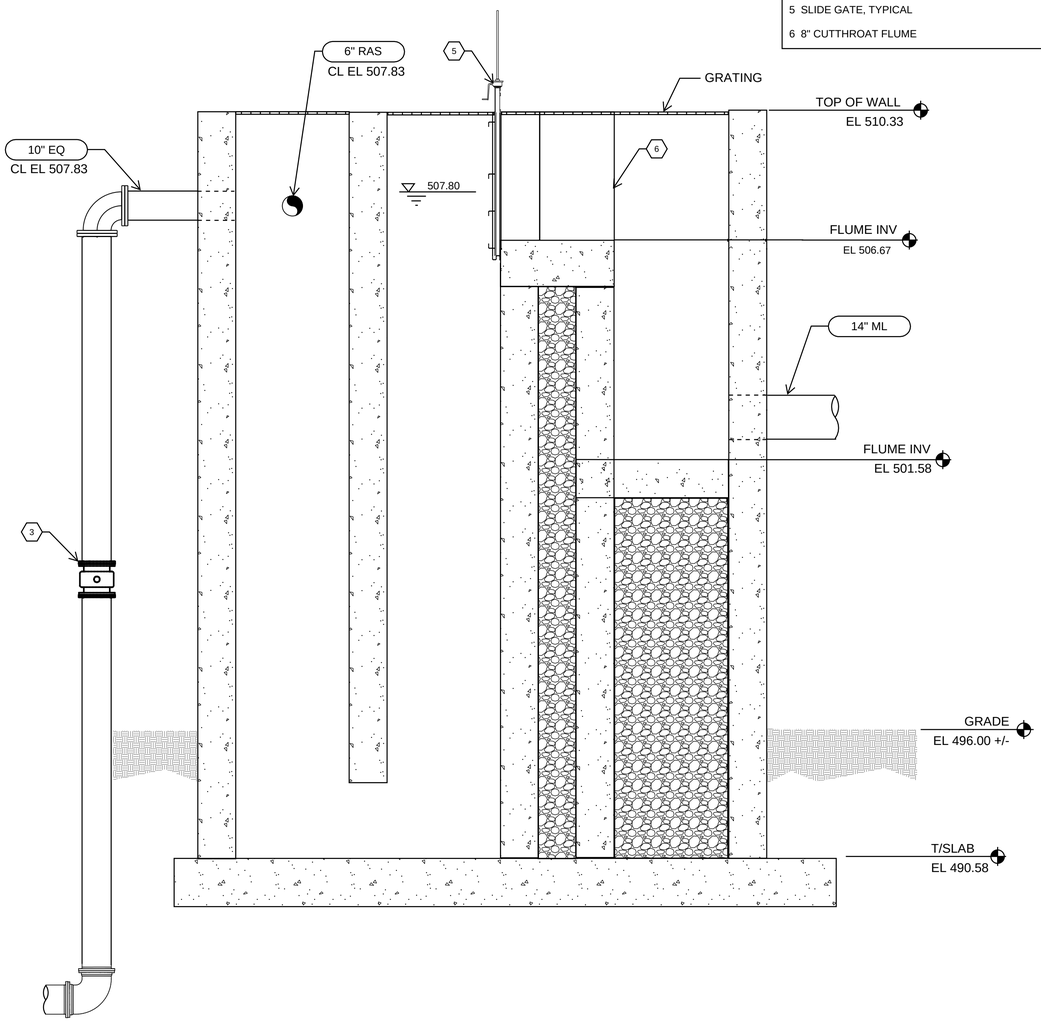
PROCESS

EQUALIZATION
BASIN 2
LOWER LEVEL
PLAN

DRAWING NUMBER
D-030-101



SPLITTER BOX PLAN (4)
SCALE: 1/2" = 1'-0"



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

GENERAL NOTES:

1 REFER TO CIVIL DRAWINGS FOR SPLITTER BOX ACCESS STAIRS

KEYNOTES:

1 1' WIDE SCUM WEIR

2 PLUG 10" ML LINE TO FUTURE AERATION BASIN TRAIN 3

3 FLOW METER

4 GRATING NOT SHOWN FOR CLARITY

5 SLIDE GATE, TYPICAL

6 8" CUTTHROAT FLUME

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:
FILENAME
BC PROJECT NUMBER
CLIENT PROJECT NUMBER
PROCESS

AERATION BASIN SPLITTER BOX PLAN AND SECTION

DRAWING NUMBER
D-040-101

GENERAL NOTES:

1 REFER TO CIVIL DRAWINGS FOR PIPE CONTINUATIONS

KEYNOTES:

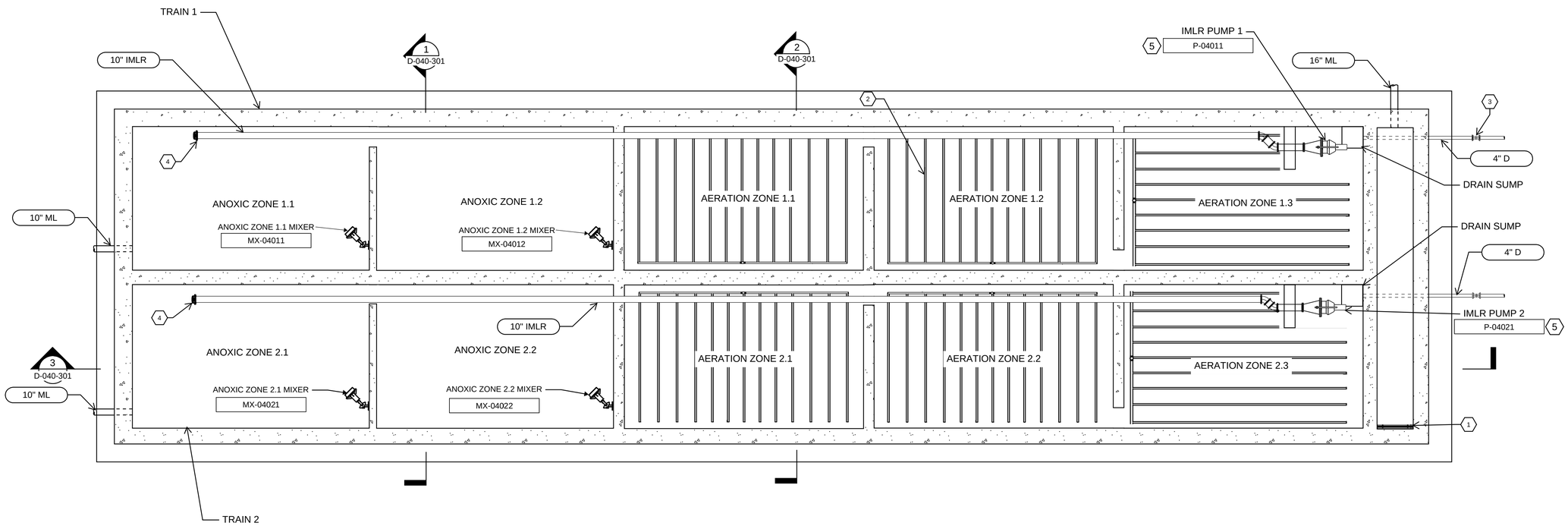
1 STOP LOGS FOR ISOLATION OF EFFLUENT CHANNEL FOR FUTURE CONSTRUCTION OF AERATION TRAIN 3. STOP LOGS NOT IN PLACE DURING NORMAL OPERATION

2 FINE BUBBLE DIFFUSER GRID, TYPICAL

3 4" PLUG VALVE

4 ADJUSTABLE WEIGHT TYPE FLAP GATE ON DISCHARGE END OF MIXED LIQUOR RECIRCULATION PIPING

5 COORDINATE LOCATION OF GUIDE MAST WITH FLEXIBLE MEMBRANE DIFFUSER LAYOUT



AERATION BASIN LOWER LEVEL PLAN

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

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

AERATION BASIN LOWER LEVEL PLAN

DRAWING NUMBER
D-040-102

GENERAL NOTES:

1 REFER TO CIVIL DRAWINGS FOR PIPE CONTINUATIONS

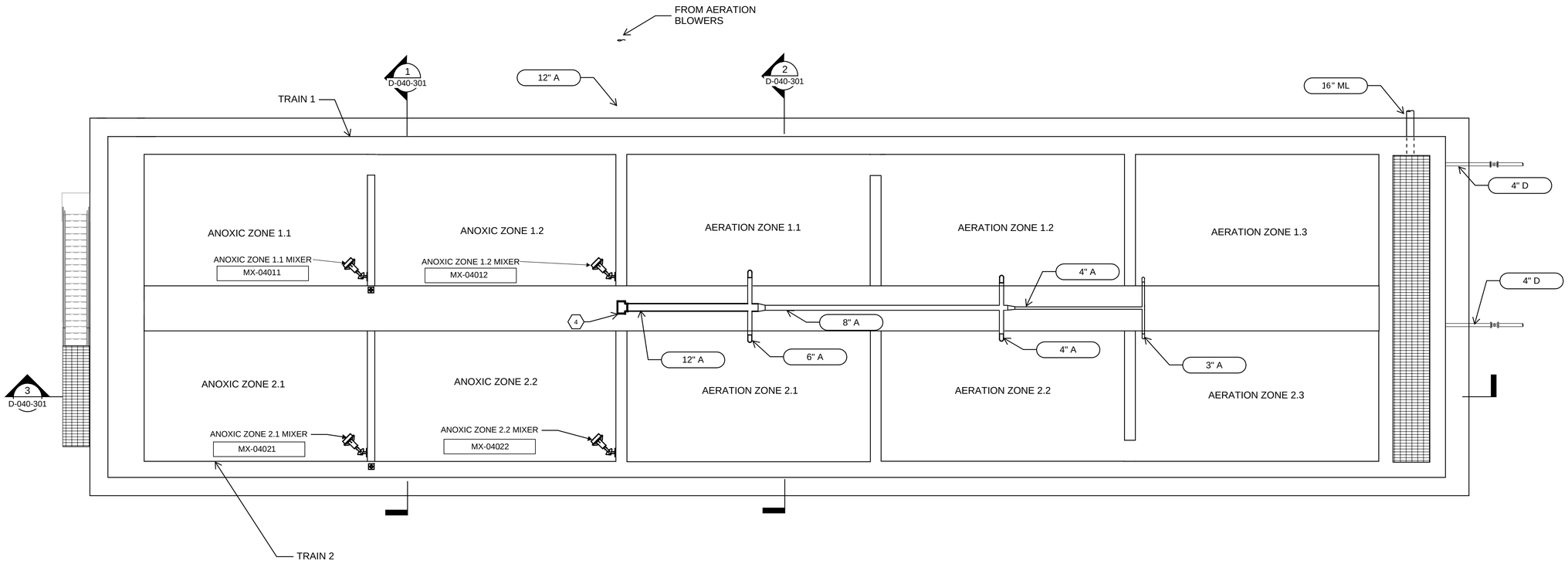
KEYNOTES:

1 STOP LOGS FOR ISOLATION OF EFFLUENT CHANNEL FOR FUTURE CONSTRUCTION OF AERATION TRAIN 3. STOP LOGS NOT IN PLACE DURING NORMAL OPERATION

2 FINE BUBBLE DIFFUSER GRID, TYPICAL

3 4" PLUG VALVE

4 BLIND FLANGE



AERATION BASIN UPPER LEVEL PLAN

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

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

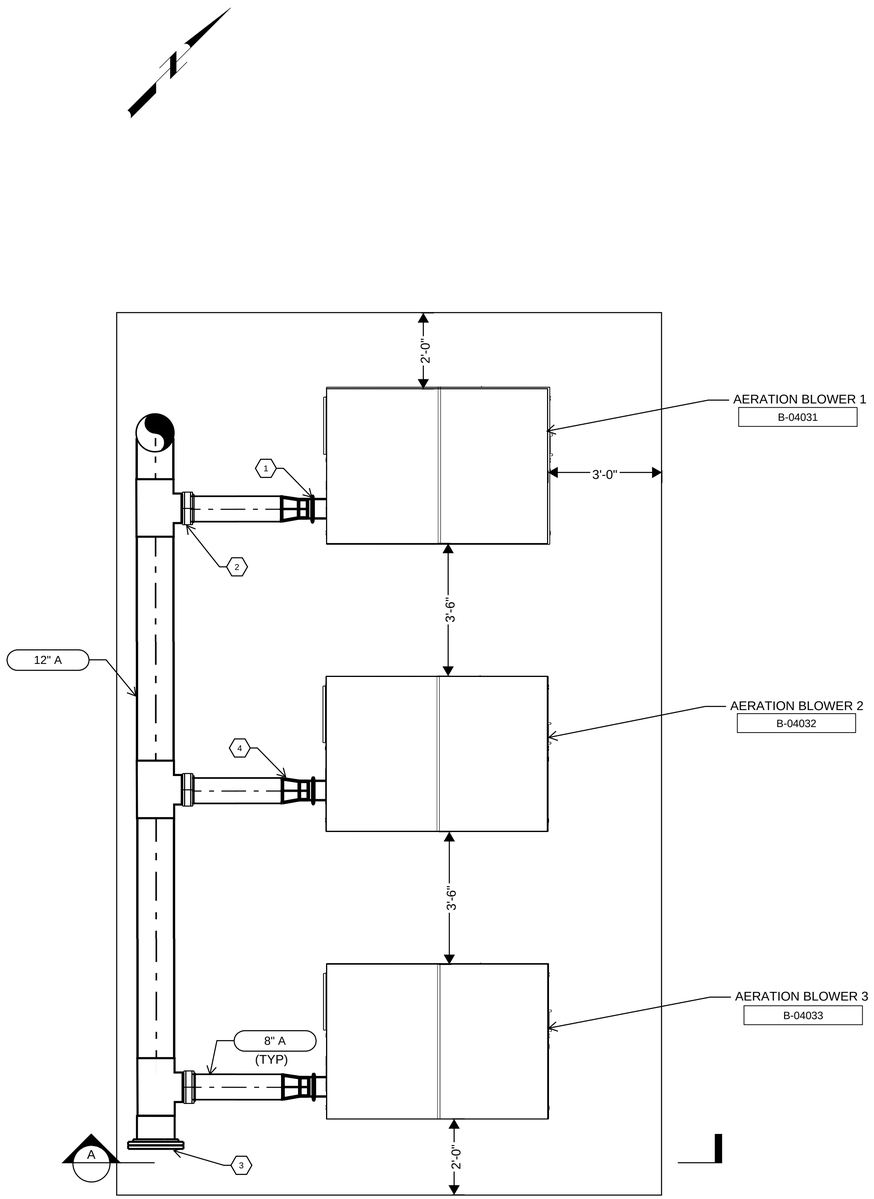
BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

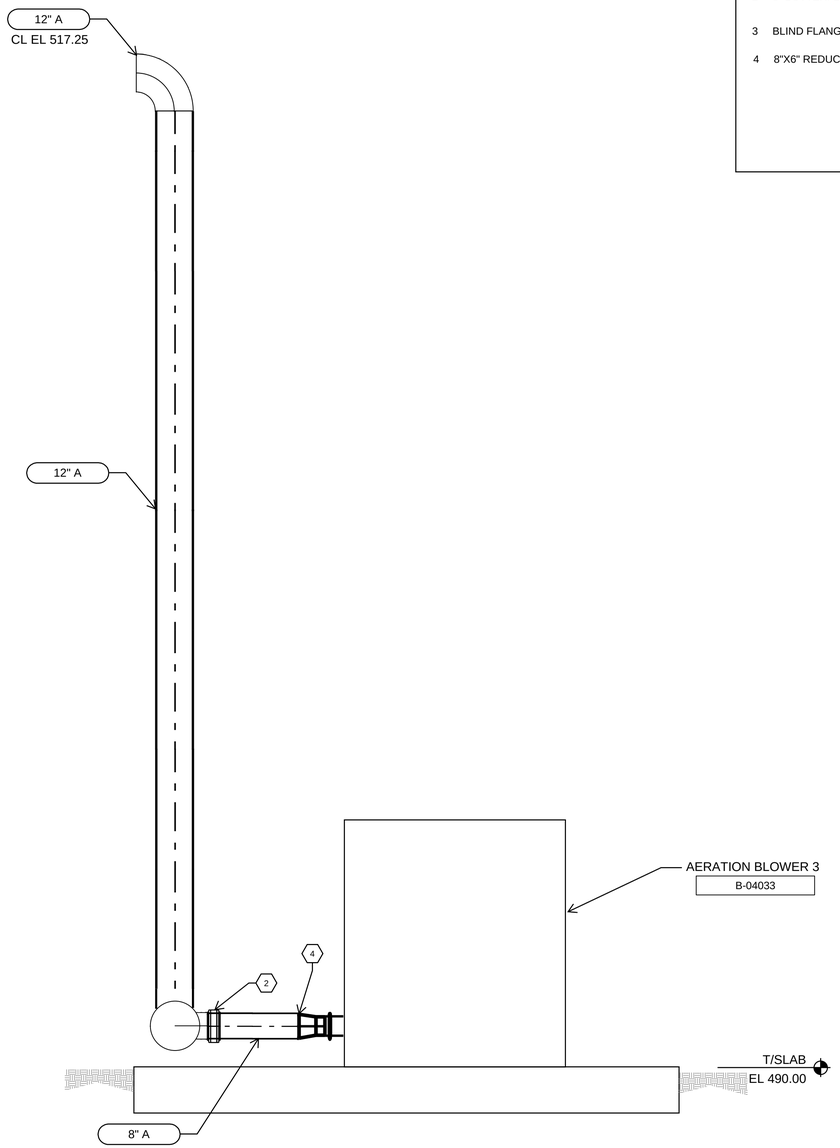
AERATION BASIN UPPER LEVEL PLAN

DRAWING NUMBER
D-040-103



AERATION BLOWERS PLAN

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



1 AERATION BLOWERS SECTION 1

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

GENERAL NOTES:

1. INSULATE AIR PIPING FOR PERSONNEL PROTECTION TO 8-FEET ABOVE SLAB.

KEYNOTES:

1 EXPANSION COUPLING BY BLOWER MANUFACTURER

2 8" BUTTERFLY VALVE

3 BLIND FLANGE

4 8"X6" REDUCER

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WWTP FACILITIES PLAN AND PER

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REV	DATE	DESCRIPTION

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CHECKED:
CHECKED:
APPROVED:

FILENAME

BC PROJECT NUMBER

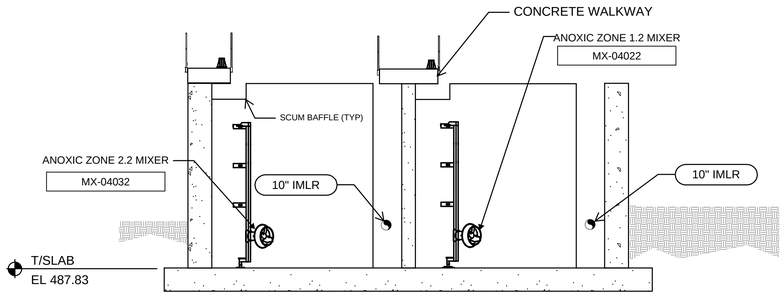
CLIENT PROJECT NUMBER

PROCESS

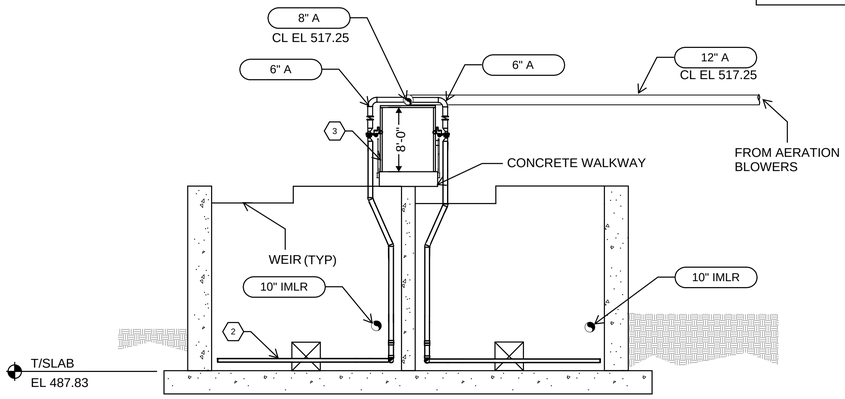
AERATION BASIN BLOWERS PLANS AND SECTIONS

DRAWING NUMBER

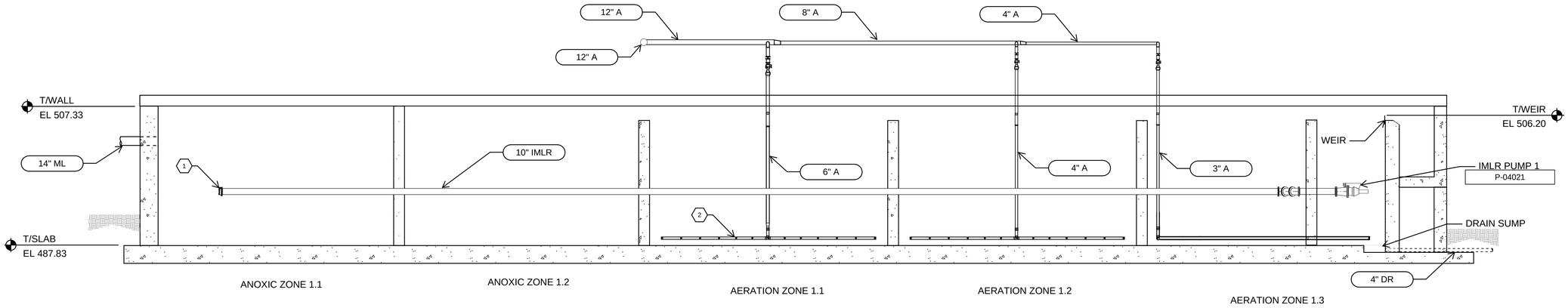
D-040-104



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



2 SECTION
SCALE: 1/8" = 1'-0"



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

GENERAL NOTES:

KEYNOTES:

1 ADJUSTABLE WEIGHT TYPE FLAP GATE ON DISCHARGE END OF MIXED LIQUOR RECIRCULATION PIPING

2 DIFFUSER GRID, TYPICAL

3 PIPE SUPPORT

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WWTP FACILITIES PLAN AND PER

REVISIONS

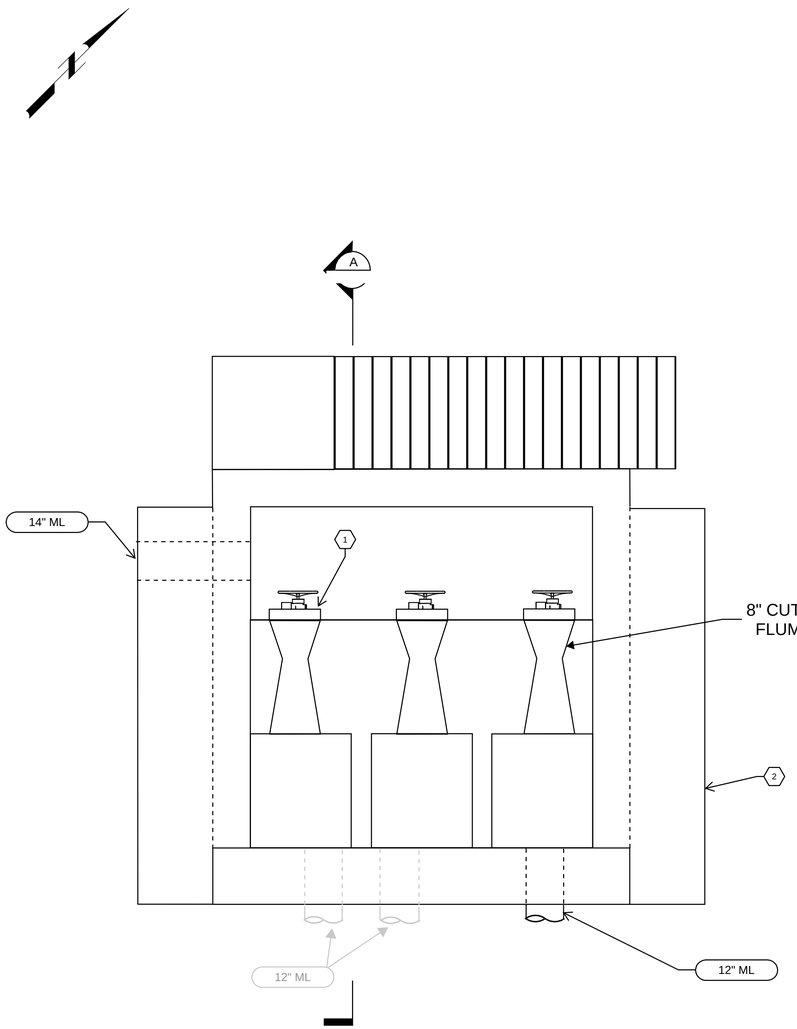
REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:
FILENAME
BC PROJECT NUMBER
CLIENT PROJECT NUMBER
PROCESS

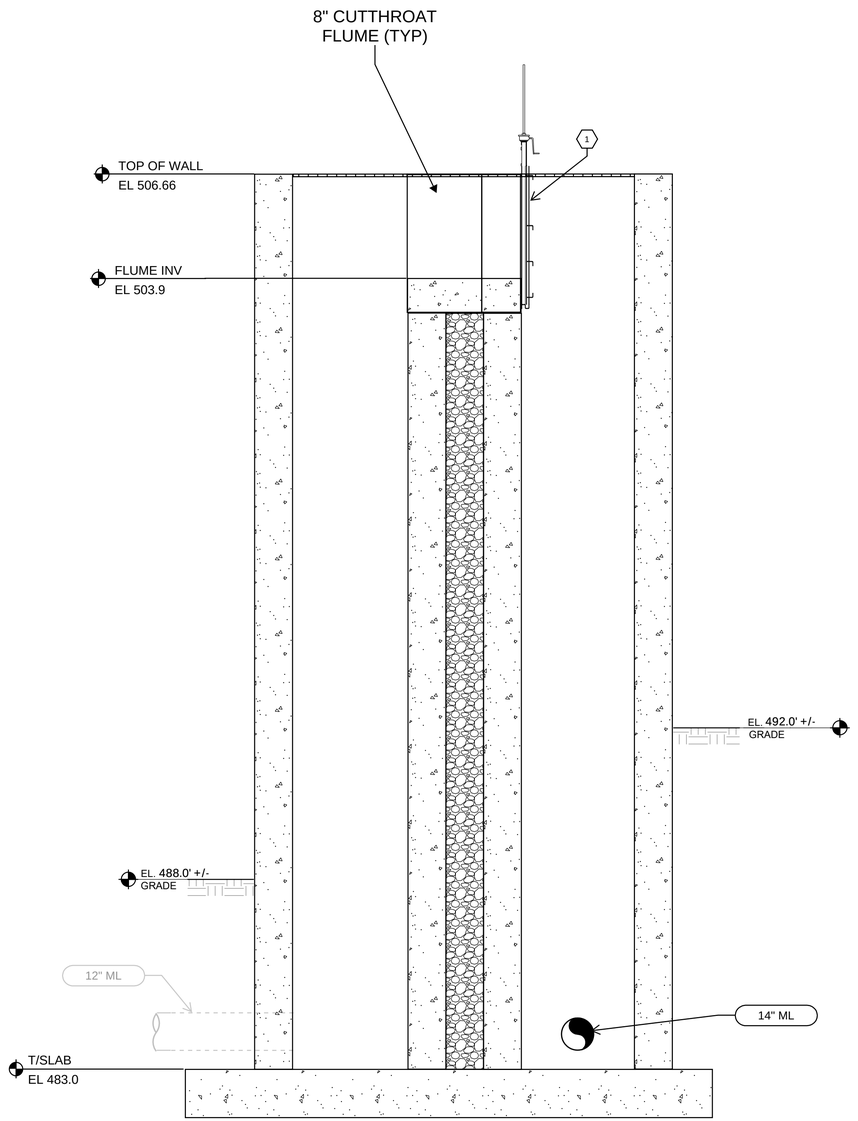
AERATION BASIN - SECTIONS

DRAWING NUMBER
D-040-301



FLOW DISTRIBUTION BOX UPPER LEVEL PLAN

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



SPLITTER BOX SECTION

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

GENERAL NOTES:

KEYNOTES:

1. SLIDE GATE FOR FLUME OPENING (TYP).
2. TOP PLATFORM EXTENSION.

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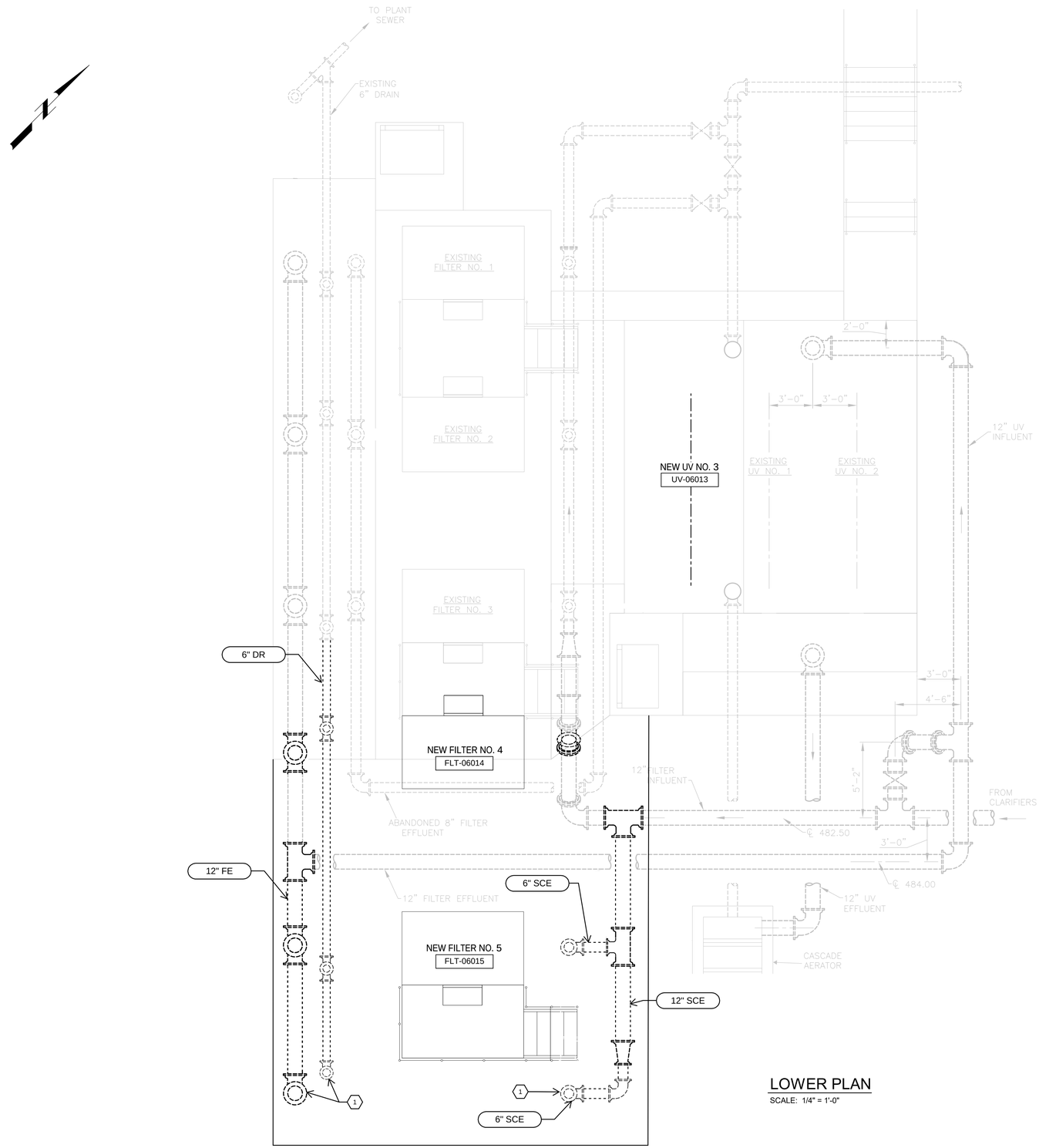
APPROVED:
FILENAME
BC PROJECT NUMBER
CLIENT PROJECT NUMBER
PROCESS

SECONDARY CLARIFIER FLOW DISTRIBUTION BOX

DRAWING NUMBER
D-050-101



LOWER PLAN

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

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1. CONNECTIONS FOR FUTURE FILTER NO. 6. CAP WITH BLIND FLANGES.

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WWTP FACILITIES PLAN AND PER

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REV	DATE	DESCRIPTION

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CHECKED:
APPROVED:

FILENAME

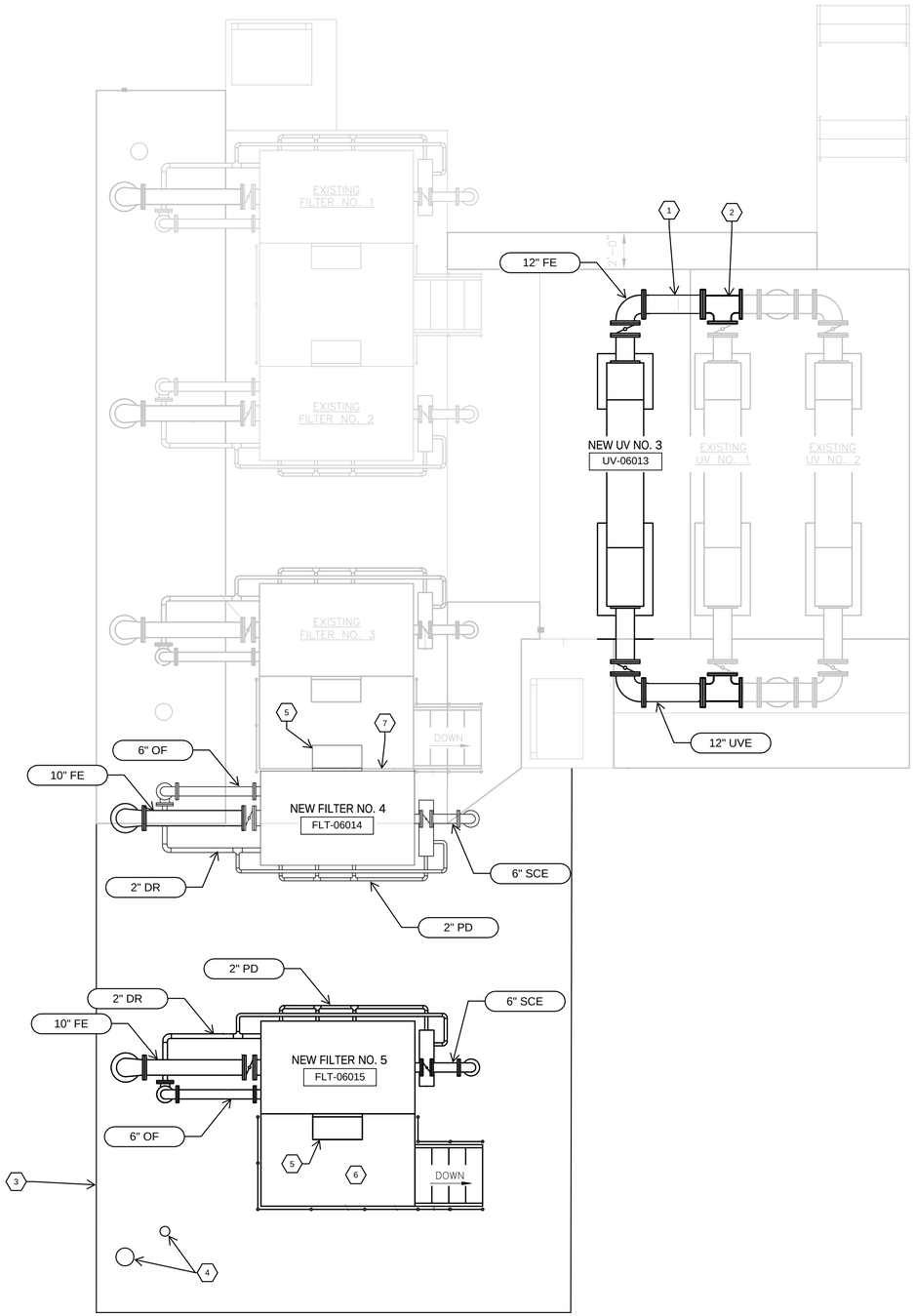
BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

FILTERS AND UV - LOWER LEVEL PLAN

DRAWING NUMBER
D-060-101



UPPER PLAN

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

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1. HEAT TRACE AND INSULATE NEW PIPE.
2. CONNECT TEE TO EXISTING FLANGES.
3. CONCRETE SLAB ON GRADE.
4. DRAIN CONNECTIONS FOR FUTURE FILTER NO. 6. CAP WITH BLIND FLANGE.
5. NEW FILTER CONTROL PANEL.
6. NEW ELEVATED METAL ACCESS PLATFORM.
7. REMOVE EXISTING HANDRAILING.

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:
DRAWN:
CHECKED:
CHECKED:
APPROVED:

FILENAME

BC PROJECT NUMBER

CLIENT PROJECT NUMBER

PROCESS

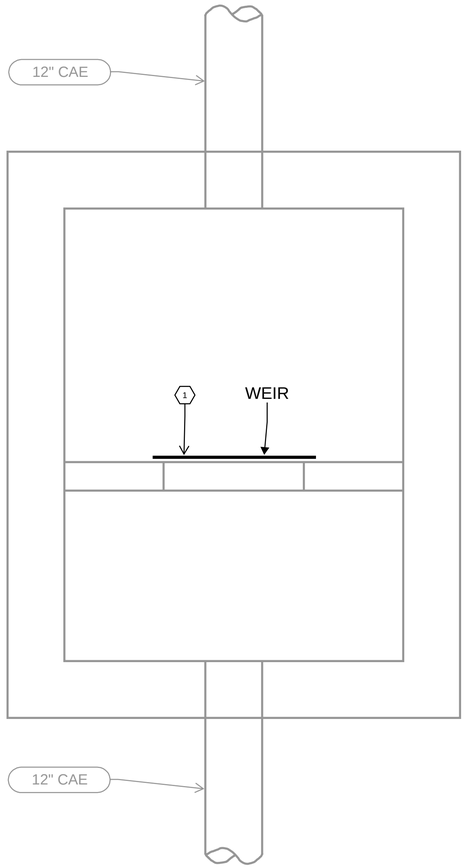
FILTERS AND UV - UPPER LEVEL PLAN

DRAWING NUMBER
D-060-102

GENERAL NOTES:

KEYNOTES:

1. REPLACE EXISTING V-NOTCH WEIR WITH 90 DEGREE V-NOTCH WEIR.



PLAN VIEW
SCALE: 3/4" = 1'-0"

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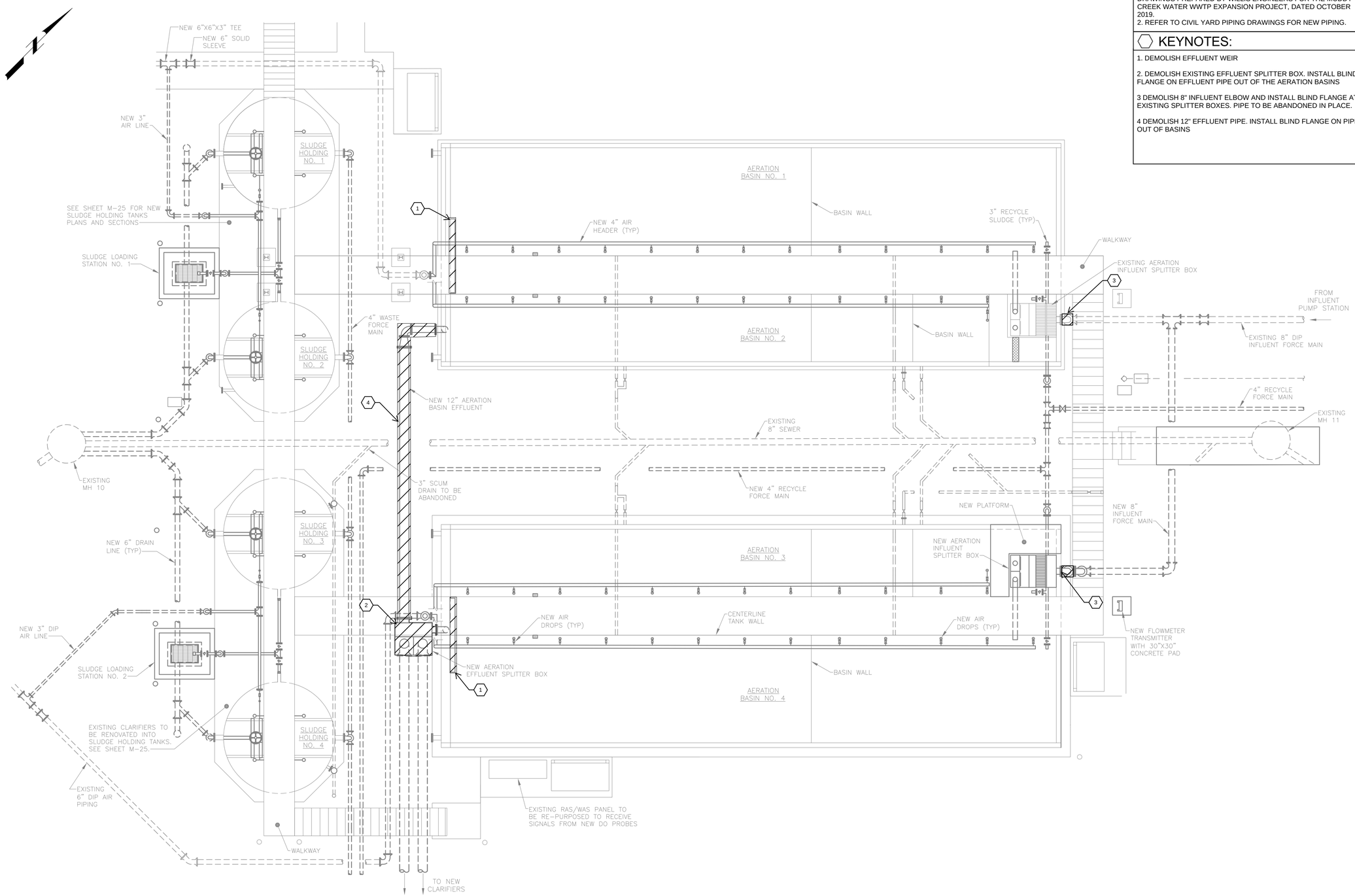
CLIENT PROJECT NUMBER

PROCESS

EFFLUENT MONITORING BOX PLAN

DRAWING NUMBER
D-080-101



EXISTING AERATION BASINS DEMOLITION PLAN

SCALE: NTS

GENERAL NOTES:

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.
2. REFER TO CIVIL YARD PIPING DRAWINGS FOR NEW PIPING.

KEYNOTES:

1. DEMOLISH EFFLUENT WEIR

2. DEMOLISH EXISTING EFFLUENT SPLITTER BOX. INSTALL BLIND FLANGE ON EFFLUENT PIPE OUT OF THE AERATION BASINS

3 DEMOLISH 8" INFLUENT ELBOW AND INSTALL BLIND FLANGE AT EXISTING SPLITTER BOXES. PIPE TO BE ABANDONED IN PLACE.

4 DEMOLISH 12" EFFLUENT PIPE. INSTALL BLIND FLANGE ON PIPE OUT OF BASINS

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CLIENT PROJECT NUMBER

PROCESS

EXISTING AERATION BASIN DEMOLITION PLAN

DRAWING NUMBER
DD-090-101

GENERAL NOTES:

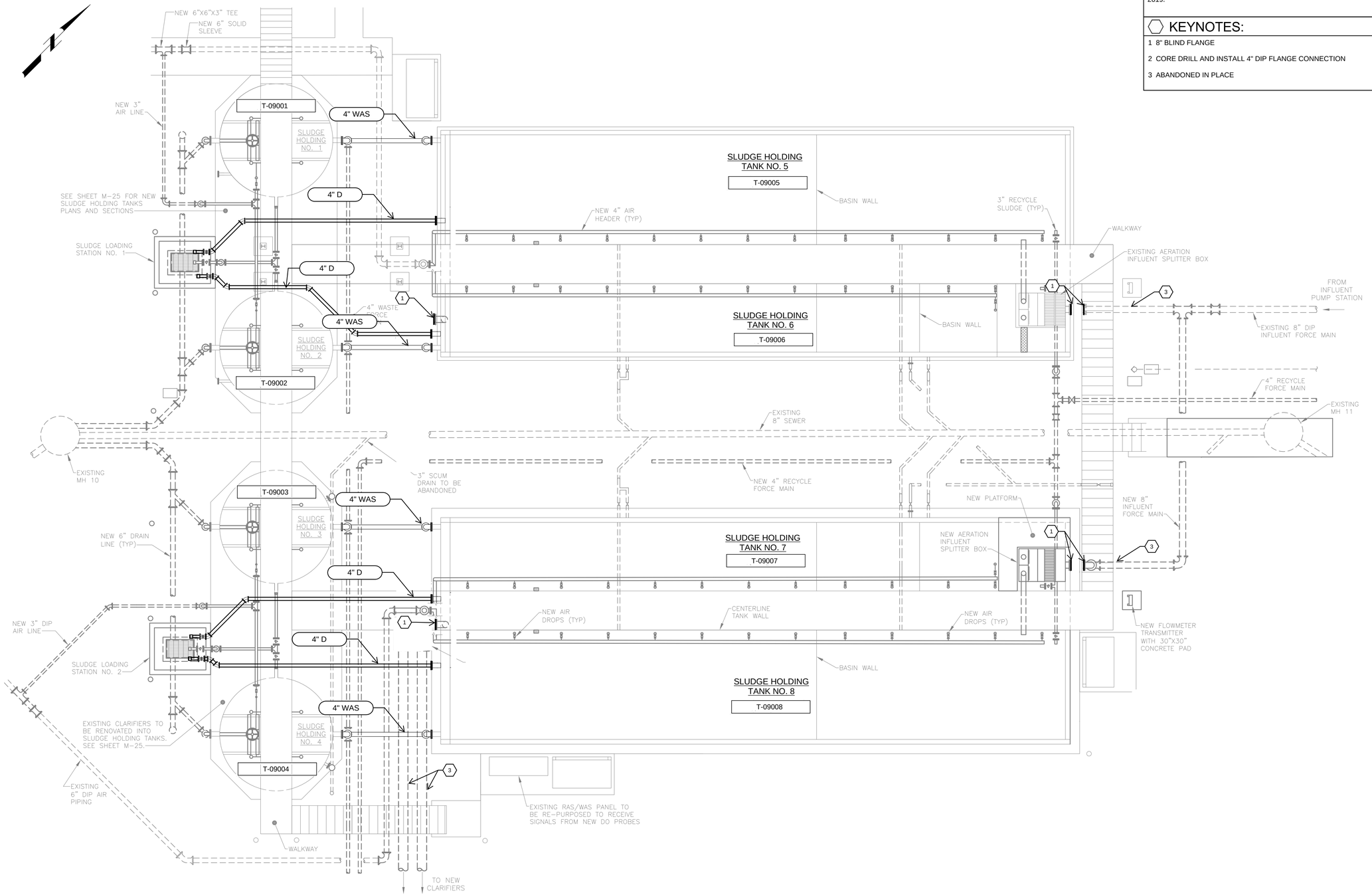
1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WATER WWTP EXPANSION PROJECT, DATED OCTOBER 2019.

KEYNOTES:

1 8" BLIND FLANGE

2 CORE DRILL AND INSTALL 4" DIP FLANGE CONNECTION

3 ABANDONED IN PLACE



SLUDGE HOLDING TANKS NOS 5-8 PLAN

SCALE: NTS

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PROCESS

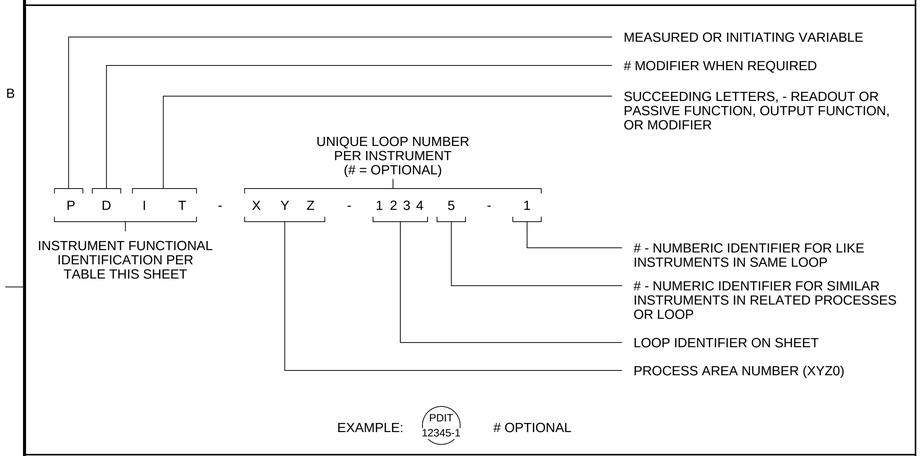
SLUDGE HOLDING TANKS NOS. 5-8

DRAWING NUMBER
D-090-101

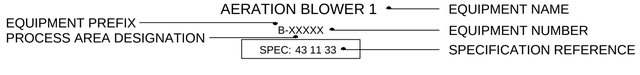
FUNCTIONAL IDENTIFICATION

VARIABLE	MEASURED OR INITIATING VARIABLE DESCRIPTION	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSE
D	DENSITY, SPECIFIC GRAVITY	DIFFERENTIAL			DEVIATION
E	VOLTAGE, SOLENOID		PRIMARY ELEMENT		
F	FLOW, FLOW RATE	RATIO			
G	FIRE, SMOKE		GLASS		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER		SCAN		
K	TIME, SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE, HUMIDITY, MOTION	MOMENTARY			MIDDLE, INTERMEDIATE
N	EQUIPMENT STATUS				
O	DISSOLVED OXYGEN		ORIFICE		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		RUN
S	SPEED, FREQUENCY	SAFETY		SWITCH	STOP
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE, TORQUE		WELL, PROBE		
X	UNCLASSIFIED	X AXIS			
Y	EVENT, STATE OR PRESENCE	Y AXIS		AUXILIARY DEVICES	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

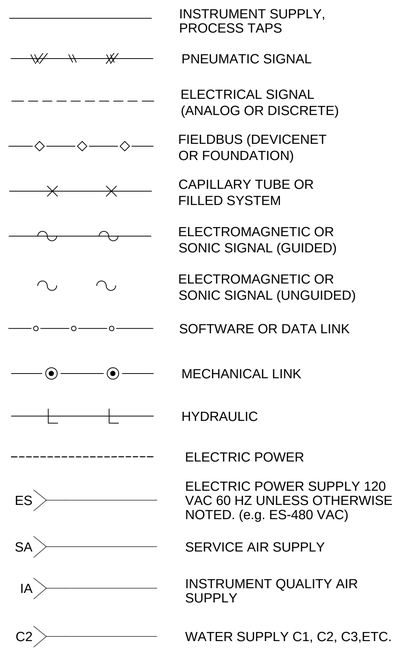
INSTRUMENT TAG AND LOOP IDENTIFICATION



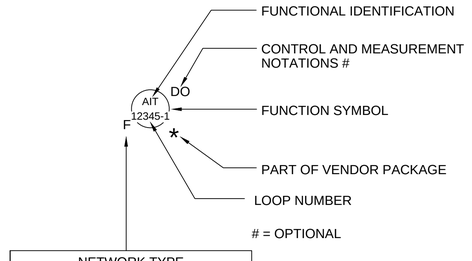
EQUIPMENT IDENTIFICATION SYSTEM



INSTRUMENT SIGNAL LINES

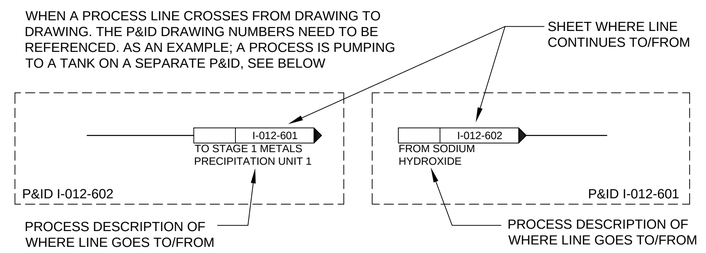


TYPICAL INSTRUMENT IDENTIFICATION

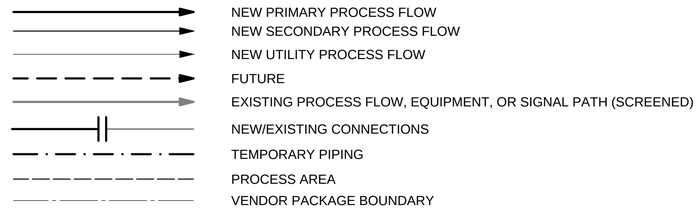


NETWORK TYPE	
F	FOUNDATION FIELDBUS
D	DEVICENET
E	ETHERNET
P	PROFIBUS
PN	PROFINET
M-RTU	MODBUS RTU
M-TCP	MODBUS TCP
CIP	CONTROL INDUSTRIAL PROTOCOL
E-SNMP	SIMPLE NETWORK MANAGEMENT PROTOCOL

PROCESS AND SIGNAL CROSS REFERENCE SYSTEM



PROCESS LINES



CONTROL AND MEASUREMENT NOTATIONS

ACK	ACKNOWLEDGE	NH4	AMMONIUM
AM	AUTO/MAN	NIA	NOT IN AUTO
BYP	BYPASS	NOx	NITRITE + NITRATE
CL	CLOSE		
CL2	CHLORINE	OCA	OPEN/CLOSE/AUTO
CMAT	COMPUTER/MANUAL/AUTO/TRACKING	OCP	PURGE VALVE OP/CL/PC
COMB	COMBUSTIBLE GAS	OL	OVERLOAD
CP	CONTROL POWER	OP	OPEN
COND	CONDUCTIVITY	OSC/LP	OPEN/STOP/CLOSE WITH LOCAL/REMOTE SELECT
DEC	DECREASE		
DO	DISSOLVED OXYGEN	PA	PAUSE
ESP	EMERGENCY STOP	PAL	LOW PRESSURE
		PB	PUSH BUTTON
FWD	FORWARD	pH	pH
F/R	FORWARD/REVERSE	POT	POTENTIOMETER
F/S	FAST/SLOW		
HLOA	HIGH/LOW/OFF/AUTO	RDY	READY
HOA	HAND/OFF/AUTO	REV	REVERSE
HOAL	HAND/OFF/AUTO/LOCAL	RNG	RUNNING
HOR	HAND/OFF/REMOTE	ROF	REVERSE/OFF/FORWARD
INC	INCREASE	RST	RESET
JOA	JOG/OFF/AUTO	SO2	SULFUR DIOXIDE
LL	LEAD/LAG	SP	STOP
LOR	LOCAL/OFF/REMOTE	ST	START
LOS	LOCKOUT STOP	TCP	TEST/CLOSE/PC
L/R	LOCAL/REMOTE	T/S	TEST/NORMAL/SILENCE
M/A LS	MAN/AUTO LOADING STATION	TBL	TROUBLE
		TSS	TOTAL SUSPENDED SOLIDS

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2. SYMBOLS ARE ARRANGED ON SPECIFIC DRAWINGS AND IN CATEGORIES FOR CONVENIENCE ONLY; SYMBOLS MAY BE USED ON ANY OF THE CONTRACT DRAWINGS.
3. TYPICAL LOOPS SHOULD BE REVIEWED IN CONJUNCTION WITH THE PROJECT SPECIFICATIONS AND CONTROL REQUIREMENTS. THESE LOOPS MAY INCLUDE TYPICAL SIGNALS, CONTROLS AND PANELS. REVIEW CLOSELY THE TYPICAL REFERENCE TO ACCOUNT FOR THE EXTENT OF THE TYPICAL LOOP.
4. P&IDS DO NOT SHOW ALL COMPONENTS FOR THE CONTROL SYSTEM AND CONTROL PANELS, SCADA AND VENDOR SYSTEM SPECIFICATIONS SHALL BE CLOSELY REVIEWED BY THE SYSTEM INTEGRATOR (SI) AND VENDORS FOR ADDITIONAL/SPECIFIC COMPONENTS, CONTROLS AND REQUIREMENTS. COORDINATION BETWEEN THE P&IDS AND SPECIFICATIONS IS REQUIRED.
5. PROCESS AND INSTRUMENTATION DIAGRAMS (P&IDS) ARE NOT INTENDED TO PROVIDE DETAILED AND COMPREHENSIVE PIPING DRAWINGS. PROCESS (D SHEETS) AND OTHER APPLICABLE DISCIPLINE SPECIFIC DRAWINGS SHOULD BE REFERENCED TO SPECIFIC PIPING ELEMENTS, ADDITIONAL EQUIPMENT, DEVICES AND COMPONENTS.

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	N. DOAN
DRAWN:	J. SABIC
CHECKED:	N. DOAN
CHECKED:	B. DICKERSON
APPROVED:	B. DICKERSON

FILENAME
I-000-001.DWG

BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

INSTRUMENTATION

SYMBOLS AND IDENTIFICATION SYSTEMS 1

DRAWING NUMBER
I-000-001

MISCELLANEOUS SYMBOLS

- MCC (MOTOR CONTROL/STARTER)
- PURGE OR FLUSHING DEVICE
- RESET FOR LATCH-TYPE OPERATOR
- SEAL WATER CONTROL UNIT
- INTERLOCKING OR CONTROL FUNCTION
- INTRINSIC SAFETY BARRIER
- DISCRETE INPUT
- DISCRETE OUTPUT
- ANALOG INPUT
- ANALOG OUTPUT
- CAMERA (CCTV)
- VFD — VARIABLE FREQUENCY DRIVE
- VSD — VARIABLE SPEED DRIVE
- HEAT TRACE (T, 120V, ES)

ACTUATORS/MOTORS/POWER

- ASD — ADJUSTABLE SPEED DRIVE (MECHANICAL)
- ROTARY PISTON ACTUATORS, VALVE OR GATE
- LINEAR PISTON ACTUATORS, VALVE OR GATE
- SOLENOID ACTUATOR, VALVE
- MANUAL OR HAND ACTUATOR, VALVE OR GATE (OR BLANK)
- MOTOR (ACTUATOR, VALVE, GATE OR EQUIPMENT)
- ENGINE
- EJECTOR, PNEUMATIC
- GENERATOR

PRIMARY ELEMENT SYMBOLS

- ORIFICE PLATE
- VENTURI OR FLOW TUBE
- NOZZLE FLOW
- PITOT TUBE
- PROPELLER OR TURBINE METER
- FLUME
- WEIR
- VARIABLE AREA FLOW INDICATOR (ROTAMETER) — OR — FI
- DIAPHRAGM SEAL
- IN-LINE ANNULAR SEAL
- MAGNETIC FLOWMETER
- SONIC FLOWMETER (DOPPLER OR TRANSIT TIME)
- POSITIVE DISPLACEMENT METER
- THERMAL FLOW ELEMENT
- VORTEX FLOW ELEMENT
- CORIOLIS FLOW ELEMENT
- FLOAT LEVEL ELEMENT
- ULTRASONIC LEVEL ELEMENT
- BUBBLER LEVEL TUBE
- SUBMERSIBLE LEVEL TRANSMITTER
- RADAR LEVEL ELEMENT
- ANNUBAR, PITOT TUBE
- AVERAGING PITOT TUBE

VALVES

NORMALLY OPEN	NORMALLY CLOSED
GATE VALVE	
PLUG VALVE	
BALL VALVE	
GLOBE VALVE	
NEEDLE VALVE	
KNIFE GATE VALVE	
DIAPHRAGM VALVE	
BUTTERFLY VALVE	
ANGLE VALVE	
THREE WAY VALVE	
FOUR WAY VALVE	
FLOAT VALVE	
PINCH VALVE	
BALANCING COCK	
THERMOSTATICALLY CONTROLLED VALVE	

- DOUBLE LEAF CHECK VALVE
- CHECK VALVE
- BALL CHECK VALVE
- PUMP DISCHARGE VALVE
- GAUGE OR ROOT VALVE
- PRESSURE AND VACUUM RELIEF VALVE
- VACUUM RELIEF VALVE
- PRESSURE RELIEF VALVE
- IN-LINE SPRING LOADED RELIEF VALVE
- PRESSURE REGULATING VALVE (SELF-CONTAINED)
- BACK PRESSURE REGULATING VALVE (SELF-CONTAINED)
- FUSIBLE LINK
- SOLENOID VALVE
- DIAPHRAGM OPERATED VALVE
- PRESSURE BALANCE OPERATED VALVE
- MOTOR OPERATED VALVE
- MOTOR OPERATED VALVE, MODULATING
- PISTON OPERATED VALVE

NOTE: USE VALVE BODY SYMBOL TO MATCH TYPE OF VALVE.

- TELESCOPING VALVE
- MUD VALVE
- ANTI SIPHON VALVE
- LIFT CHECK VALVE
- BRAIDED FLEX CONNECTOR

FUNCTION SYMBOLS

- SHARED DISPLAY, PROCESS CONTROL SYSTEM
- SOFTWARE FUNCTIONALITY
- FIELD OR PANEL DEVICE

LOCATION AND ACCESSIBILITY MODIFIERS FOR FUNCTION SYMBOLS

- STAND ALONE DEVICE, OPERATOR ACCESSIBLE
- LOCATED ON FRONT OF PANEL OR CONSOLE, OPERATOR ACCESSIBLE
- LOCATED IN REAR OF PANEL OR CONSOLE, OPERATOR INACCESSIBLE

INSTRUMENTATION SYMBOLS

- INTEGRAL INSTRUMENT — PRIMARY ELEMENT SYMBOL
- CLOSE COUPLED INSTRUMENT — PRIMARY ELEMENT SYMBOL
- SEPARATE OR REMOTE MOUNTED INSTRUMENT — PRIMARY ELEMENT SYMBOL
- MULTI VARIABLE INSTRUMENT
- SEPARATE OR REMOTE MOUNTED INSTRUMENT — PRIMARY ELEMENT SYMBOL — FLANGE OR ELEMENT TAPS
- SEPARATE OR REMOTE MOUNTED INSTRUMENT — PRIMARY ELEMENT SYMBOL — PIPE TAPS
- SEPARATE OR REMOTE MOUNTED INSTRUMENT — PRIMARY ELEMENT SYMBOL — COMBINATION TAPS
- SINGLE VARIABLE INSTRUMENT

SLIDE AND SLUICE GATES

NORMALLY OPEN		NORMALLY CLOSED
	FLAP GATE	
NO	BUTTERFLY GATE	NC
	STOP GATE	
	SLIDE GATE	
	SLUICE GATE	

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CHECKED:	B. DICKERSON
APPROVED:	B. DICKERSON
FILENAME	I-000-002.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

INSTRUMENTATION

SYMBOLS AND IDENTIFICATION SYSTEMS 2

DRAWING NUMBER
I-000-002

PUMPS

- PUMP, CENTRIFUGAL
- PUMP, SCREW
- PUMP, DIAGHRAGM
- PUMP, GEAR
- PUMP, METERING
- PUMP, PERISTALTIC
- PUMP, PROGRESSING CAVITY
- PUMP, ROTARY LOBE
- PUMP, SUBMERSIBLE
- PUMP, JET
- PUMP, VERTICAL
- PUMP, DIAGHRAGM
- PUMP, PISTON

BLOWERS/COMPRESSORS

- BLOWER OR CENTRIFUGAL FAN
- BLOWER OR COMPRESSOR, LIQUID RING
- BLOWER OR COMPRESSOR, ROTARY LOBE
- COMPRESSOR, ROTARY SCREW
- COMPRESSOR, ROTARY SLIDING VANE
- COMPRESSOR, PISTON

PIPE LINE DEVICES

- TRAP
- SEDIMENT TRAP
- GAS DRIP TRAP
- SEPARATOR/ DRYER
- PIPELINE FILTER
- RUPTURE DISK (VACUUM RELIEF)
- RUPTURE DISK (PRESSURE RELIEF)
- CONNECTION BETWEEN NEW AND EXISTING PIPING
- UNION
- QUICK CONNECTOR
- CAP OR PLUG
- BLIND FLANGE
- FLEX CONNECTOR
- FABRIC EXPANSION JOINT
- EQUIPMENT CONNECTION FITTING
- VENT TO ROOF
- VENT
- STEAM VENT
- AUTOMATIC VENT
- MANUAL VENT
- STRAINERS
- FOOT VALVE
- AIR SEPARATOR
- DRAIN
- DRAIN VALVE
- CALIBRATION CHAMBER
- PULSATION DAMPENER
- INJECTOR
- FLAME TRAP
- FLAME TRAP WITH THERMO SHUTOFF ASSEMBLY
- FLAME CHECK
- SAMPLING AND FLUSHING CONNECTIONS
- SUCTION DIFFUSER
- TEMPERATURE WELL
- FLOW STRAIGHTENING VANES
- PRESSURE REDUCING ASSEMBLY
- AMMONIA UNION
- DAMPER
- SIGHT GLASS
- PIG LAUNCHER/ RECEIVER
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- FLEX COUPLING

HVAC RELATED

- FAN, INLINE
- CHILLER
- FILTER OR FILTER-SILENCER INLET AIR
- BOILER
- CHILLER

MIXERS

- MIXER
- DRAFT TUBE MIXER
- MIXER, INLINE STATIC

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CHECKED:	N. DOAN
CHECKED:	B. DICKERSON
APPROVED:	B. DICKERSON
FILENAME	I-000-003.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

INSTRUMENTATION

SYMBOLS AND IDENTIFICATION SYSTEMS 3

DRAWING NUMBER

I-000-003

SCREENINGS/CONVEYORS

SCREEN, FINE OR BAR

SCREEN, ROTARY OVERFLOW

CLASSIFIER OR GRIT WASHER

CONVEYOR

HYDROCYCLONE

SCREENINGS PRESS

GRIT SEPARATOR

GRIT CYCLONE

VORTEX TYPE GRIT SEPARATOR

MISC. EQUIPMENT

SILENCER

REDUCED PRESSURE BACKFLOW PREVENTER

BURNER, WASTE GAS

HEAT TRACE

DIFFUSER HEADER SPRAY NOZZLES

MIST ELIMINATOR

SAMPLER

JET NOZZLE

SPRAY NOZZLE

RECEIVER OR PRESSURE VESSEL

TANK, NON-PRESSURE TYPE

TANK, DOUBLE-WALLED

MOTORIZED STRAINER

ULTRAVIOLET BANK

TRUCK

SLUDGE, SCUM AND SOLIDS EQUIPMENT

GRINDER — INLINE GRINDER

HOPPER (OR)

SUBMERGED LAUNDER

BAFFLE

SUBMERGED ORIFICE WITH V-NOTCH WEIR

LAUNDER AND WEIR

SCUM TIPPING TROUGH

HELICAL SKIMMER

CENTRIFUGE

SLUDGE SCRAPER

FINE BUBBLE DIFFUSERS

COARSE BUBBLE DIFFUSERS

CHAIN AND FLIGHT COLLECTOR (CROSS)

CHAIN AND FLIGHT COLLECTOR (LONGITUDINAL)

GRAVITY BELT THICKENER

CIRCULAR CENTER FEED COLLECTOR MECHANISM

SLUDGE DEWATERING SCREW PRESS

HEAT EXCHANGERS

SHELL AND TUBE HEAT EXCHANGER

HEAT EXCHANGER PLATE TYPE

HEAT EXCHANGER SPIRAL TYPE

HEAT EXCHANGER STRAIGHT TUBE TYPE

HEAT EXCHANGER U-TUBE TYPE

BELT FILTER PRESS

ROTATING DRUM THICKENER

DISSOLVED AIR FLOTATION THICKENER (DAFT)

SECONDARY CLARIFIER

GRAVITY THICKENER

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North Carolina Board of Examiners for Engineers and Surveyors License No. F-0785

PRELIMINARY - NOT FOR CONSTRUCTION

WSACC
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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	N. DOAN
DRAWN:	J. SABIC
CHECKED:	N. DOAN
CHECKED:	B. DICKERSON
APPROVED:	B. DICKERSON

FILENAME
I-000-004.DWG

BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

INSTRUMENTATION

SYMBOLS AND IDENTIFICATION SYSTEMS 4

DRAWING NUMBER
I-000-004

TYP OF 2 | 1/2/ALT | NIA | HOA | TYP OF 4 | FAULT | OO

LAL 01012 | LAH 01012 | LAHH 01012 | LI 01012 | HS 01012 | TAH 01013 | MAH 01013 | NL 01013 | HS 01013 | SC 01013 | SI 01013 | UA 01013 | YL 01013 | II 01013

SCADA

PS:CP

TYP OF 4

TAH 01013 | MAH 01013 | NL 01013 | HS 01013-1 (LOR) | HS 01013-2 (RST) | SC 01013 | SI 01013 | UA 01013 | YL 01013 (OO) | II 01013

480V

TSH 01013 * | MSH 01013 *

SKC 01013

VFD-01013

LSHH 01012 | LIT 01012 | LSH 01012 | LSL 01012 | LE 01012

LOOP 01014 IS TYPICAL OF LOOP 01013

6" V

21" RS

6" RS

6" RS

TE 01013 | ME 01013 | M

TE 01014 | ME 01014 | M

P-01013

P-01014

2" D

PI 01013

PI 01014

PI 01010-2

6"X8"

6" RS

VALVE VAULT

BYPASS CONNECTION

8" RS

RS

I-020-601

TO DRUM SCREEN NO.1

8" RS

LOOP 01011/01012 IS TYPICAL OF LOOP 01013

LSHH 01011 | LIT 01011 | LSH 01011 | LSL 01011 | LE 01011

6" V

6" RS

6" RS

TE 01011 | ME 01011 | M

TE 01012 | ME 01012 | M

P-01011

P-01012

2" D

PI 01011

PI 01012

PI 01010-1

6"X8"

6" RS

VALVE VAULT

8" RS

RS

I-020-601

TO DRUM SCREEN NO.2

RS
FROM COLLECTION NETWORK

21" RS

21" RS

SPLITTER BOX

RS
FROM MH 9

8" RS

IPS PUMP 3	IPS PUMP 4	IPS PUMP 1	IPS PUMP 2
P-01013	P-01014	P-01011	P-01012
SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX

KEYNOTES:

INTERLOCK NOTES:

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DRAWN:	J. SABIC
CHECKED:	N. DOAN
CHECKED:	B. DICKERSON
APPROVED:	B. DICKERSON
FILENAME	I-010-601.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

INSTRUMENTATION

INFLUENT PUMP STATION P&ID

DRAWING NUMBER
I-010-601

TYPICAL OF 2

SCADA

EQ: CP

FI 02011 — UA 02011 — NIA NL 02011-1 — RNG YL 02011-1 — ES YL 02011-2 — LAH 03011

CP-1 (480V, ES)
- POWER ON YL 02011-1
- LAH 02011-1
- SCREEN HOA HS 02011-3
- SCREEN FOR HS 02011-4
- OIT
- RESET HS 02011-1
- ES HS 02011-2
- SCREEN RNG YL 02011-2
- SCREEN FAULT UA 02011-1
- PRESS ZONE WASH HOA HS 02011-5
- WASH HOA HS 02011-6

NPW — 1" NPW — FROM YARD HYDRANT

SV-02011-2 — SV-02011-1 — LAH 02011

ES — FIT 02011 — FE 02011

8" RS — 12" RS — 12" RS — 12" SRS

STATIONARY BYPASS WEIR — MANUAL BAR SCREEN BYPASS

DS-02011

DUMPSTER

12" SRS — SRS . I-030-601 TO EQ BASIN NO.1

RS — 8" RS — FROM IPS PUMPS 3 & 4 — HEADWORKS/EQ BYPASS — 8" RS — RS . I-030-601 TO EQ EFFLUENT PIPING

12" RS

TYPICAL OF LOOP CP-1

VCP-02012 (480V, ES)
- POWER ON YL 02012-1
- LAH 02012-1
- SCREEN HOA HS 02012-3
- SCREEN FOR HS 02012-4
- OIT
- RESET HS 02012-1
- ES HS 02012-2
- SCREEN RNG YL 02012-2
- SCREEN FAULT UA 02012-1
- PRESS ZONE WASH HOA HS 02012-5
- WASH HOA HS 02012-6

NPW — 1" NPW — FROM YARD HYDRANT

SV-02012-2 — SV-02012-1 — LAH 02012

TYPICAL OF LOOP 02011

ES — FIT 02012 — FE 02012

RS — 8" RS — FROM IPS PUMPS 1 & 2 — 12" RS — 12" SRS

DUMPSTER

DS-02012

DRUM SCREEN NO.1
DS-02011
SPEC: XX XX XX

DRUM SCREEN NO.2
DS-02012
SPEC: XX XX XX

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FILENAME I-020-601.DWG
BC PROJECT NUMBER 158720
CLIENT PROJECT NUMBER

INSTRUMENTATION

HEADWORKS COARSE SCREENING P&ID

DRAWING NUMBER
I-020-601

SCADA

EQ:CP

FI 03012 | FI 03011 | LIT 03012 | LAHH 03012 | LAL 03011 | LAH 03011 | LI 03011 | 1/2/3 ALT HS 03010 | TYP OF 3: TAH 03012, MAH 03012, NIA NL 03012, HOA HS 03012 | TYP OF 3: BYPASS HS 03012-2, NL 03012, HS 03012, O/EN HOA HS 03012-1, SC 03012, SI 03012, UA 03012, FAULT YL 03012, OO NL 03012, JY 03012, TSH 03012 *, MSH 03012 *, SKC 03012

LIT 03012 | LSHH 03012 | LE 03012

6" A

ES | FIT 03012 | ΔT | FE 03012

T-03012

FIT 03011 | ΔT | FE 03011

A — 6" A — FROM EXISTING EQ BLOWERS

8" D | 12" OF

LSH 03011 | LSL 03011 | LIT 03011 | LE 03011

PD — 4" PD — FROM PDPS

SRS — 12" SRS — FROM DRUM SCREENS

TYPICAL OF LOOP 03012 | TE 03014 | ME 03014 | M | P-03014

TYPICAL OF LOOP 03012 | TE 03013 | ME 03013 | M | P-03013

6" RS | TE 03012 | ME 03012 | M | P-03012

6" RS | 10" SRS | 10" SRS | SRS | I-040-601 | TO AB SPLITTER BOX

6" RS | 12" OF | OF | TO MH-12

T-03011 | 8" D | KN: CLEANOUT CONNECTION | 12" D | 4" D | D | TO MH-12

EQ BASIN NO.2	EQ BASIN NO.1	EQ PUMP NO.4	EQ PUMP NO.3	EQ PUMP NO.2
T-03012	T-03011	P-03014	P-03013	P-03012
SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX

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BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

INSTRUMENTATION

EQUALIZATON BASINS P&ID

DRAWING NUMBER
I-030-601

SCADA

FI 04010

FI 04010

LCP-04020

1/2" SHC
FROM CAUSTIC PUMPS

1/2" SHC
FROM CAUSTIC PUMPS

ES
FIT 04010
FE 04010
M

I-030-601
10" EQE
FROM EQ PUMPS

RAS
6" RAS
FROM RAS PUMPS

NC

14" ML
I-050-601
TO AERATION TRAIN 1

14" ML
I-050-601
TO AERATION TRAIN 2

TO FUTURE
AERATION TRAIN 3

AERATION BASIN SPLITTER BOX

CUTTHROAT FLUME 1 ISOLATION GATE
GT-04011
SPEC: XX XX XX

CUTTHROAT FLUME 2 ISOLATION GATE
GT-04012
SPEC: XX XX XX

CUTTHROAT FLUME 3 ISOLATION GATE
GT-04013
SPEC: XX XX XX

KEYNOTES:

INTERLOCK NOTES:

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BC PROJECT NUMBER
158720
CLIENT PROJECT NUMBER

INSTRUMENTATION

AERATION BASIN SPLITTER BOX P&ID

DRAWING NUMBER
I-040-601

TYP OF 2

SCADA

WWTP:CP

LCP-04021

TAH 04021 | MAH 04021 | NIA NL 04021 | HOA HS 04021 | FAULT UA 04021 | OO YL 04021 | FIC 04021 | DO AIC 04021 | HS 04024 | NIA ZI 04021 | NIA NL 04021 | OCA HS 04021 | DO AI 04022-2 | II 04021 | TAH 04021 | MAH 04021 | NIA NL 04021 | HOA HS 04021 | FAULT UA 04021 | OO YL 04021 | SC 04021 | SI 04021 | pH AI 04024-1 | TSS AI 04024-2

FC 04021 | AC 04021 | ZC 04021

TAH 04021 | MAH 04021 | NL 04021 | HS 04021 O/EN | HS 04021-1 RST | UA 04021 | YL 04021 OO | II 04021 | TAH 04021 | MAH 04021 | NL 04021 | HS 04021 O/EN | UA 04021 | HS 04021-1 RST | YL 04021 OO | SC 04021 | SI 04021

TSH 04021 | MSH 04021 | JY 04021 | TSH 04021 | MSH 04021 | SKC 04021

AERATION TRAIN 1 (TYPICAL OF AERATION TRAIN 2)

A . I-040-603
FROM AERATION BLOWERS 1-3

12" A | 6" A | 6" A | 8" A | 4" A | 4" A | 4" A | 3" A | 3" A

ES | FIT 04021 | ΔT | FE 04021
ES | FIT 04022 | ΔT | FE 04022
ES | FIT 04023 | ΔT | FE 04023

LOOP 04022 IS TYPICAL OF LOOP 04021

LOOP 04023 IS TYPICAL OF LOOP 04022

ZC 04021 | HS 04021-1 OSC | ZT 04021 | HS 04021-2 L/R | M 480V ES | CV-04021
ZC 04022 | HS 04022-1 OSC | ZT 04022 | HS 04022-2 L/R | M 480V ES | CV-04022
ZC 04023 | HS 04023-1 OSC | ZT 04023 | HS 04023-2 L/R | M 480V ES | CV-04023

4" A | 3" A | 2" A

AIT 04021 DO ES | AE 04021 DO
AIT 04022 DO ES | AE 04022 DO
AIT 04023 DO ES | AE 04023 DO

ES | AIT 04024 pH/TSS | 2
AE 04024-1 pH | AE 04024-2 TSS

HS 04021-1 LOR | HS 04021-2 SS | HS 04021-3 ESP
LCS-04021

HS 04022-1 LOR | HS 04022-2 SS | HS 04022-3 ESP
LCS-04022

ML . I-040-601
FROM SPLITTER BOX

10" ML

TSH 04021 | MSH 04021 M
TSH 04022 | MSH 04022 M

10" IMLR

TE 04021 | ME 04021 M

14" ML

. I-050-601
TO SECONDARY CLARIFIER FLOW DISTRIBUTION BOX

EFFLUENT CHANNEL 1

4" DR

. TO PLANT DRAIN

ANOXIC ZONE 2.1 | ANOXIC ZONE 2.2 | AEROBIC ZONE 2.1 | AEROBIC ZONE 2.2 | AEROBIC ZONE 2.3

ANOXIC ZONE 2.1 MIXER	ANOXIC ZONE 2.2 MIXER	AEROBIC ZONE 2.1 CONTROL VALVE	AEROBIC ZONE 2.2 CONTROL VALVE	AEROBIC ZONE 2.3 CONTROL VALVE	IMLR PUMP 1
MX-04021	MX-04022	CV-04021	CV-04022	CV-04023	P-04021
SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX	SPEC: XX XX XX

GENERAL NOTES:

KEYNOTES:

1. EFFLUENT CHANNEL IS COMMON FOR BOTH TRAINS.
2. ANALYZER AIT-04024 TO BE COMMON CONTROLLER FOR PROBES AE-04024-1 AND AE-04024-2. THE CONTROLLER WILL OUTPUT A 4-20mA SIGNAL FOR EACH ELEMENT. THIS CONTROLLER CONFIGURATION IS TYPICAL FOR INSTRUMENTS IN THE RESPECTIVE TRAIN.

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WWTP FACILITIES PLAN AND PER

REVISIONS

REV	DATE	DESCRIPTION

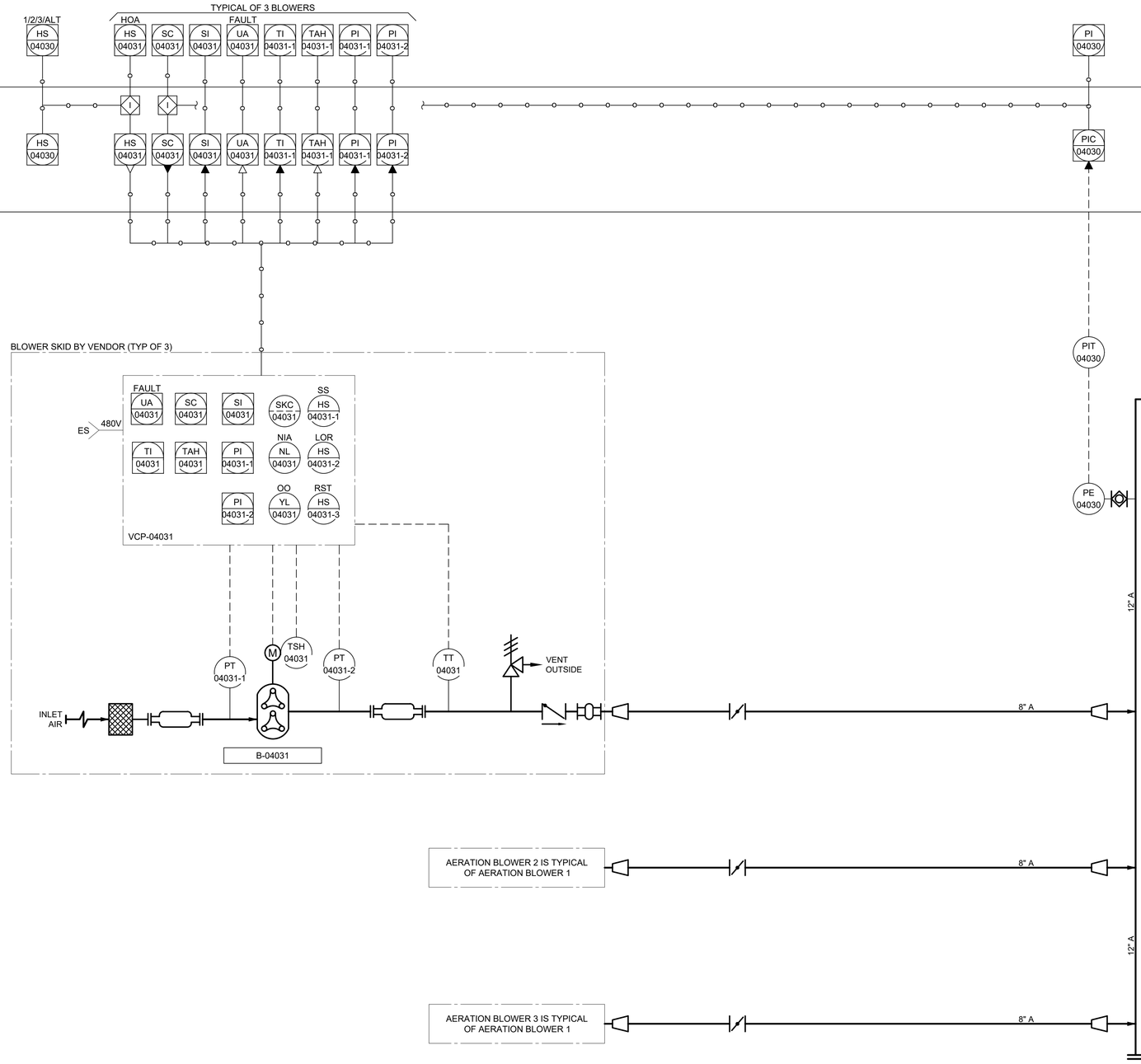
LINE IS 2 INCHES AT FULL SIZE

DESIGNED: N. DOAN
DRAWN: J. SABIC
CHECKED: N. DOAN
CHECKED: B. DICKERSON
APPROVED: B. DICKERSON
FILENAME I-040-602.DWG
BC PROJECT NUMBER 158720
CLIENT PROJECT NUMBER

INSTRUMENTATION

AERATION BASINS P&ID

DRAWING NUMBER
I-040-602



AERATION BLOWER 1 — B-04031 — SPEC: XX XX XX

AERATION BLOWER 2 — B-04032 — SPEC: XX XX XX

AERATION BLOWER 3 — B-04033 — SPEC: XX XX XX

KEYNOTES:

INTERLOCK NOTES:

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FILENAME
I-040-603.DWG

BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

INSTRUMENTATION

AERATION BASINS BLOWERS P&ID

DRAWING NUMBER
I-040-603

SCADA

PLC-XXX

KEYNOTES:

INTERLOCK NOTES:

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ML
I-040-602
FROM AERATION BASINS

12" ML

NC

SECONDARY CLARIFIER FLOW DISTRIBUTION BOX

TO FUTURE SECONDARY CLARIFIER NO. 3

12" ML
ML
TO SECONDARY CLARIFIER NO. 1

12" ML
ML
TO SECONDARY CLARIFIER NO. 2

CUTTHROAT FLUME 1 ISOLATION GATE
GT-05011
SPEC: XX XX XX

CUTTHROAT FLUME 2 ISOLATION GATE
GT-05012
SPEC: XX XX XX

CUTTHROAT FLUME 3 ISOLATION GATE
GT-05013
SPEC: XX XX XX

WWTP FACILITIES PLAN AND PER

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CHECKED: B. DICKERSON
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FILENAME
I-050-601.DWG
BC PROJECT NUMBER
158720
CLIENT PROJECT NUMBER

INSTRUMENTATION

SECONDARY CLARIFIER FLOW DISTRIBUTION BOX P&ID

DRAWING NUMBER
I-050-601

TYPICAL OF 2

FILTER MOTOR NIA	FILTER MOTOR RNG	BACKWASH PUMP MOTOR NIA	BACKWASH PUMP MOTOR RNG			
NL 06014-1	YL 06014-1	NL 06014-2	YL 06014-2	PI 06014-1	PI 06014-2	LAHH 03011

SCADA

DF: RIO

VENDOR PACKAGE (TYP OF 2)

ES 480V

FILTER MOTOR		BACKWASH PUMP	
HOA	OO	HOA	OO
HS 06014-1	YL 06014-1	HS 06014-2	YL 06014-2

VCP-06014

LSHH 06010
LSH 06010
LSL 06010

PIT 06014
PI 06014-1
PI 06014-2

2" PD

P-06014

SCE
FROM SECONDARY CLARIFIERS

12" SCE
6" SCE

FILTER BASIN

FLT-06014

6" OF
10" FE
3" DR

12" FE
6" DR

DR . I-XXX-XXX
TO UV DISINFECTION

DR . I-XXX-XXX
TO PLANT DRAIN

6" SCE

FLT-06015
TYPICAL OF LOOP 06014

6" SCE
SCE
TO EXISTING FILTERS NO. 1-3

CLOTH FILTER 4 AND 5
FLT-06014
FLT-06015

SPEC: XX XX XX

BACKWASH PUMP 4 AND 5
P-06014
P-06015

SPEC: XX XX XX

KEYNOTES:

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CLIENT PROJECT NUMBER

INSTRUMENTATION

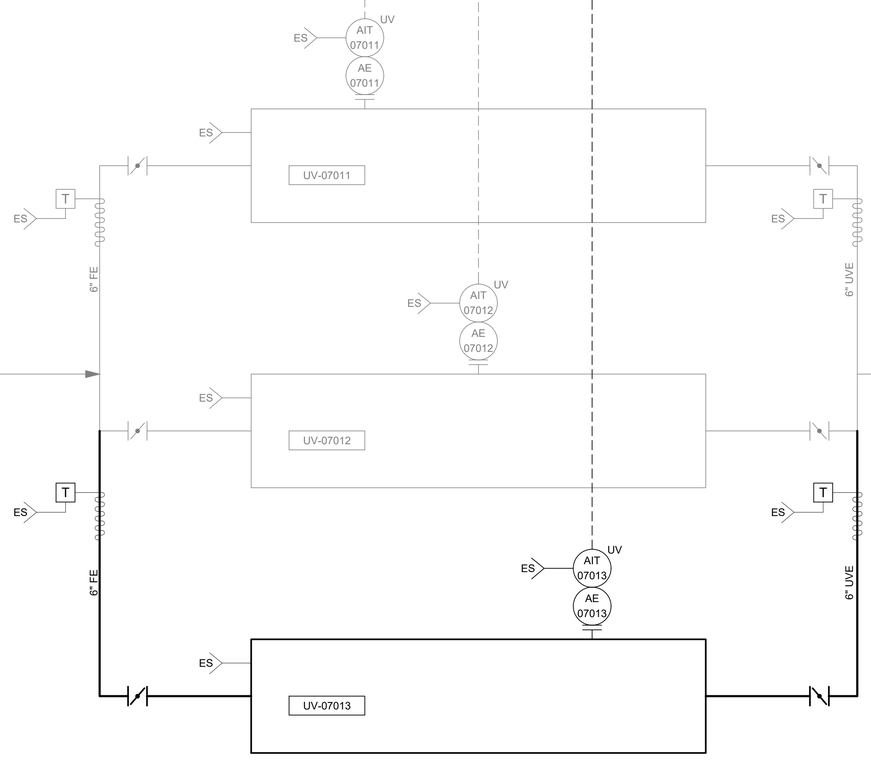
FILTRATION P&ID

DRAWING NUMBER
I-060-601

SCADA

AI 07011 | AI 07012 | AI 07013

DF: RIO



UV DISINFECTION CHANNEL #1 — UV-07011 — SPEC: XX XX XX

UV DISINFECTION CHANNEL #2 — UV-07012 — SPEC: XX XX XX

UV DISINFECTION CHANNEL #3 — UV-07013 — SPEC: XX XX XX

KEYNOTES:

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UV DISINFECTION P&ID

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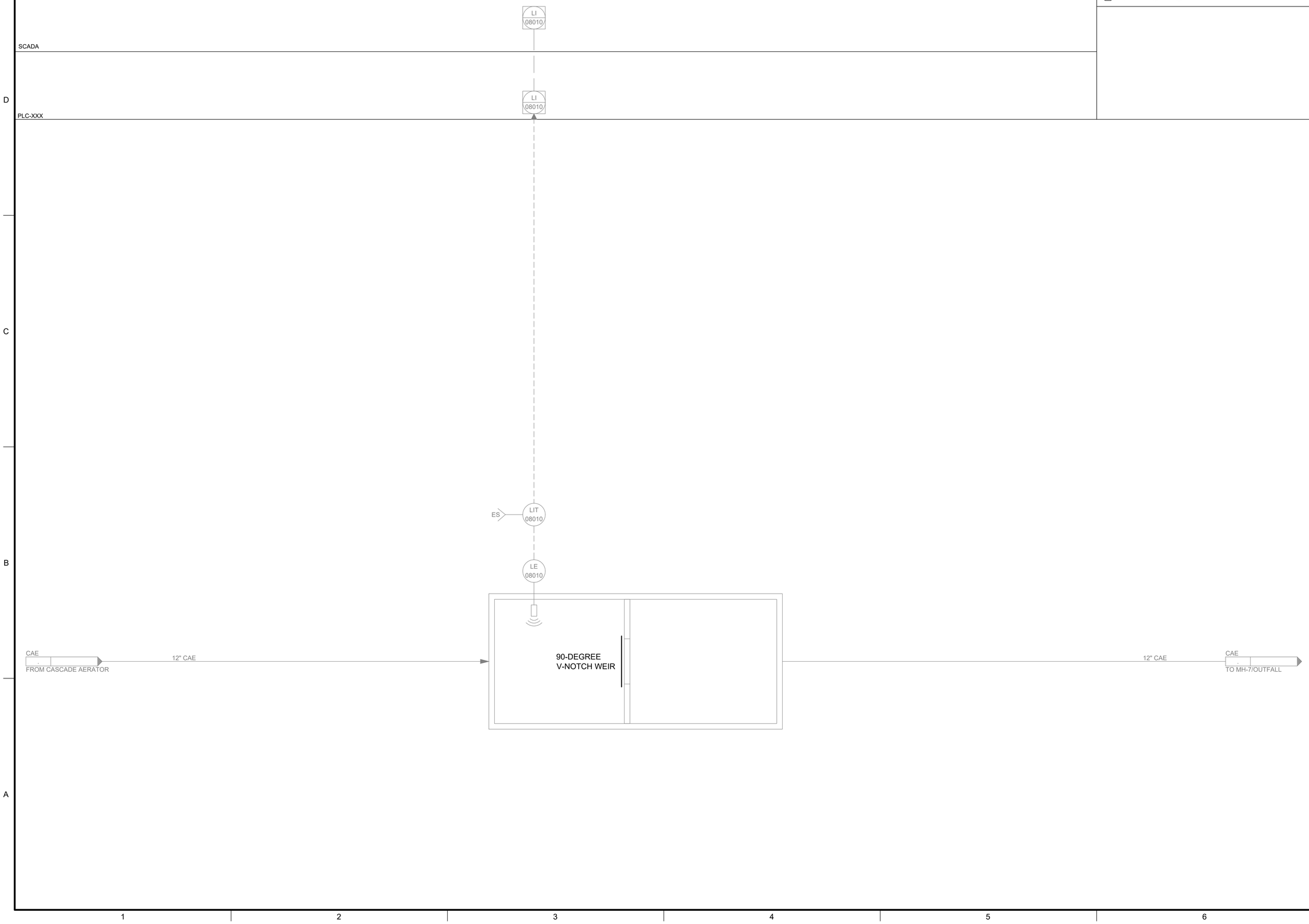

KEYNOTES:

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FILENAME
I-080-601.DWG

BC PROJECT NUMBER
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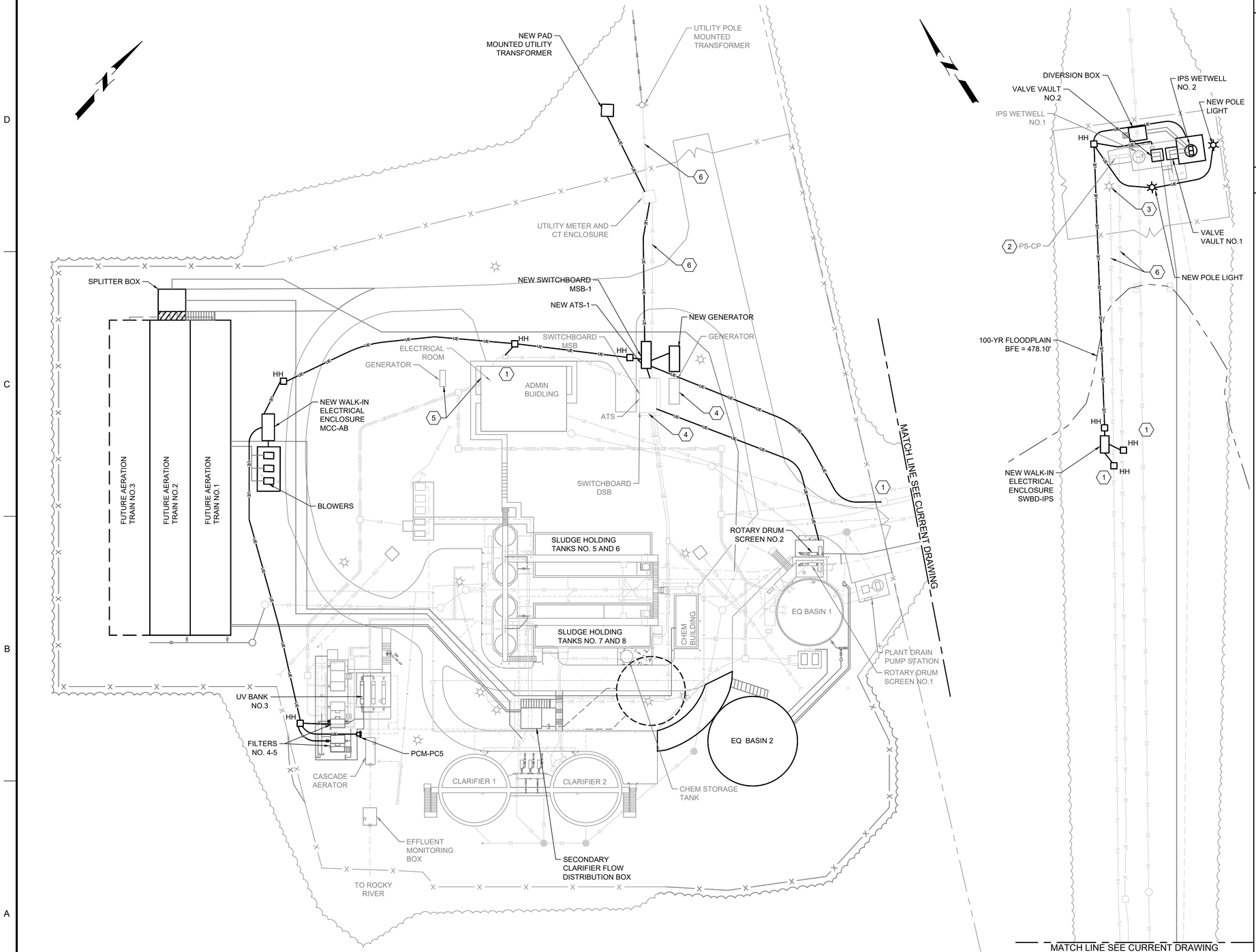
CLIENT PROJECT NUMBER

INSTRUMENTATION

EFFLUENT MONITORING BOX P&ID

DRAWING NUMBER
I-080-601

Path: C:\USERS\GALVAREZ\DOCUMENTS\ACCDOCS\BC ACC PROJECT HUB\107245 - WWTP FACILITIES PLAN AND PER\PROJECT FILES\300 DESIGN\CAD\012 INSHEETS
FILENAME: I-080-601.DWG PLOT DATE: 8/28/2025 10:07 PM CAD USER: GABRIEL ALVAREZ
WSACC Logo.jpg



GENERAL NOTES

1. DRAWINGS WERE CREATED FROM BACKGROUND RECORD DRAWINGS PREPARED BY WILLIS ENGINEERS FOR THE MUDDY CREEK WWTP 0.30 MGD EXPANSION, DATED OCTOBER 2019.
2. THE DUCTBANK ROUTES INDICATED ARE PRELIMINARY AND WILL BE SUBJECT TO EVALUATION DURING THE DETAILED DESIGN PHASE.
3. THE LOCATIONS OF NEW ELECTRICAL DISTRIBUTION EQUIPMENT INDICATED ARE PRELIMINARY AND WILL BE ASSESSED FURTHER DURING THE DETAILED DESIGN PHASE.

KEYNOTES

1 INTERCEPT EXISTING DUCTBANK.

2 EXISTING PS-CP IS RELOCATED TO NEW WALK-IN ELECTRICAL ENCLOSURE FOR IPS.

3 EXISTING LIGHT POLE AND FIXTURE DEMOLISHED.

4 EXISTING MSB, ATS, AND GENERATOR DEMOLISHED.

5 EXISTING ATS IN ELECTRICAL ROOM AND GENERATOR DEMOLISHED.

6 DUCTBANK ABANDONED IN PLACE.

SCALE

0 30' 60'

SCALE: 1" = 30'

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REVISIONS

REV	DATE	DESCRIPTION

LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	S. MCELROY
DRAWN:	K. PRICE
CHECKED:	B. DICKERSON
CHECKED:	G. NANA
APPROVED:	G. NANA

FILENAME
E-000-100.DWG

BC PROJECT NUMBER
158720

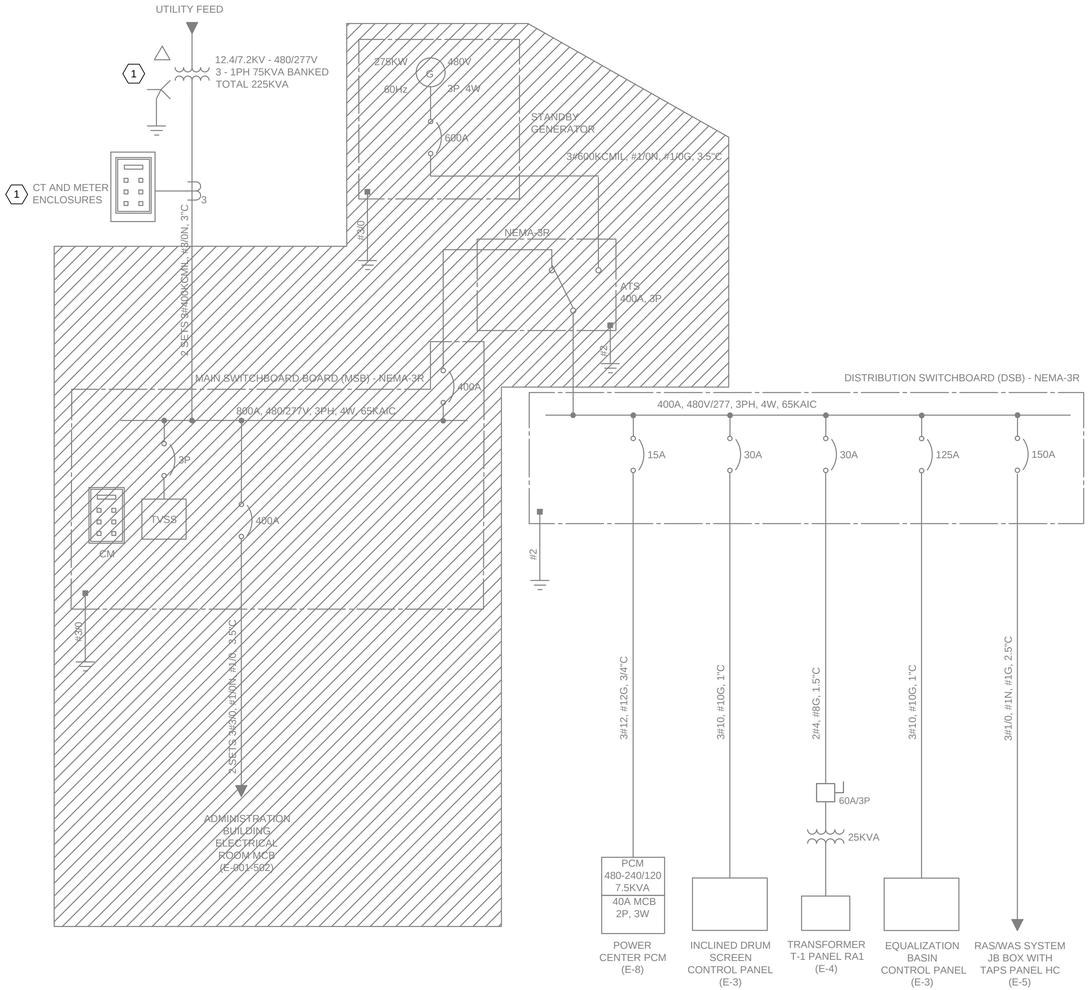
CLIENT PROJECT NUMBER

ELECTRICAL

OVERALL SITE PLAN

DRAWING NUMBER
E-000-100

Path: C:\USERS\DWRIGHT\DC\ACCDOCS\BC ACC PROJECT HUB\107245 - WWTP FACILITIES PLAN AND PER\PROJECT FILES\300 DESIGN\CAD\011 E\SHEETS FILENAME: E-000-100.DWG PLOT DATE: 8/29/2025 11:14 AM CAD USER: DANIEL WRIGHT



KEY NOTES:

1 THE EXISTING UTILITY SERVICE WILL REQUIRE REPLACEMENT. COORDINATION WITH THE UTILITY PROVIDER WILL BE DONE DURING DETAILED DESIGN.

Brown AND Caldwell
ENVIRONMENTAL ENGINEERING AND CONSULTING
309 East Morehead Street, Suite 220, Charlotte, NC 28202
(704) 358-7204
North Carolina Board of Examiners for Engineers and Surveyors License No. F-0785

PRELIMINARY - NOT FOR CONSTRUCTION

WSACC
ISO 14001:2004 ◆ NC Star Public Sector ◆ OHSAS 18001:2007

WWTP FACILITIES PLAN AND PER

REVISIONS

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#	#	#

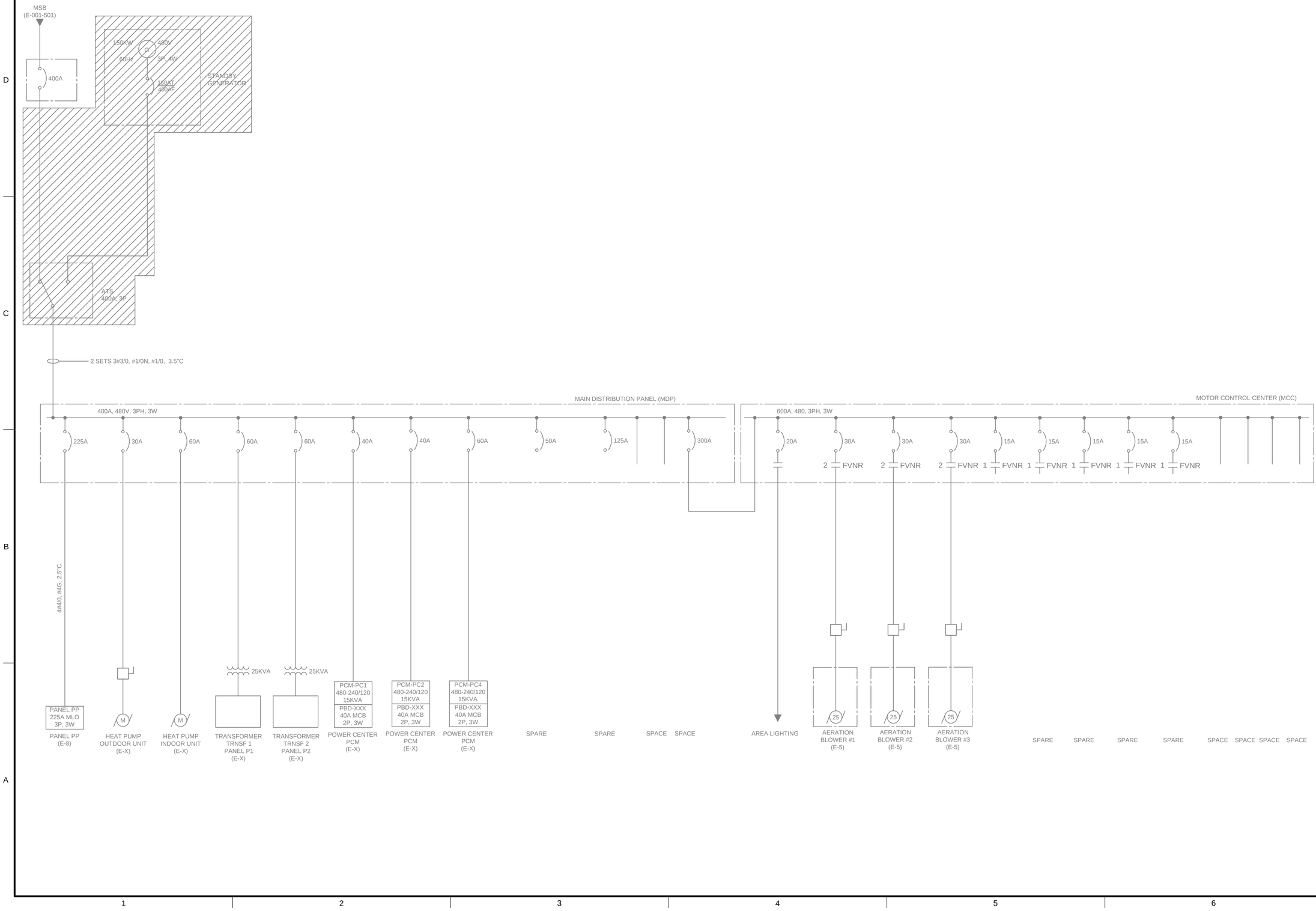
LINE IS 2 INCHES AT FULL SIZE

DESIGNED: S. MCELROY
DRAWN: K. PALMER
CHECKED: G. NANA
CHECKED: B. DICKERSON
APPROVED: G. NANA
FILENAME ED-001-501.DWG
BC PROJECT NUMBER 158720
CLIENT PROJECT NUMBER

ELECTRICAL

SITE ONE LINE DIAGRAM 1

DRAWING NUMBER
ED-001-501



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DESIGNED: S. MCELROY
DRAWN: K. PALMER
CHECKED: G. NANA
CHECKED: B. DICKERSON
APPROVED: G. NANA

FILENAME
ED-001-502.DWG

BC PROJECT NUMBER
158720

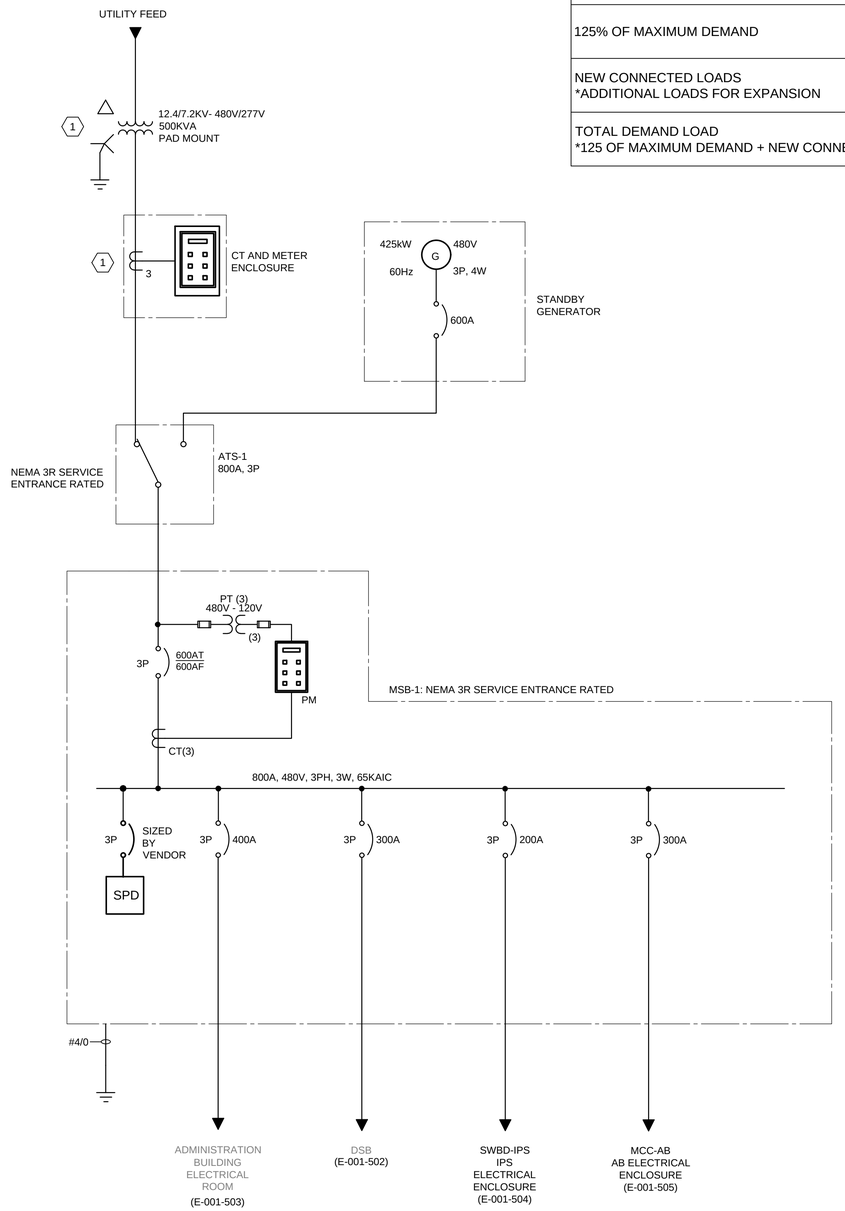
CLIENT PROJECT NUMBER

ELECTRICAL

SITE ONE LINE DIAGRAM 2

DRAWING NUMBER
ED-001-502

DEMAND LOAD SUMMARY	
MAXIMUM DEMAND *MAX DEMAND BASED ON UTILITY BILLING JAN. 2024 TO DEC. 2024	82.15 KVA
125% OF MAXIMUM DEMAND	102.69 KVA
NEW CONNECTED LOADS *ADDITIONAL LOADS FOR EXPANSION	422.34 KVA
TOTAL DEMAND LOAD *125 OF MAXIMUM DEMAND + NEW CONNECTED LOADS	525.03 KVA



GENERAL NOTES:

1. THE BREAKER SIZES PROVIDED ARE ESTIMATES AND NEED FURTHER ASSESSMENT DURING THE DETAILED DESIGN PHASE.

KEY NOTES:

1 NEW LARGE ELECTRICAL UTILITY FEED IS REQUIRED. COORDINATION WITH UTILITY PROVIDE WILL BE DONE DURING DETAILED DESIGN.

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LINE IS 2 INCHES AT FULL SIZE

DESIGNED:	S. MCELROY
DRAWN:	K. PALMER
CHECKED:	G. NANA
CHECKED:	B. DICKERSON
APPROVED:	G. NANA
FILENAME	E-001-501.DWG
BC PROJECT NUMBER	158720
CLIENT PROJECT NUMBER	

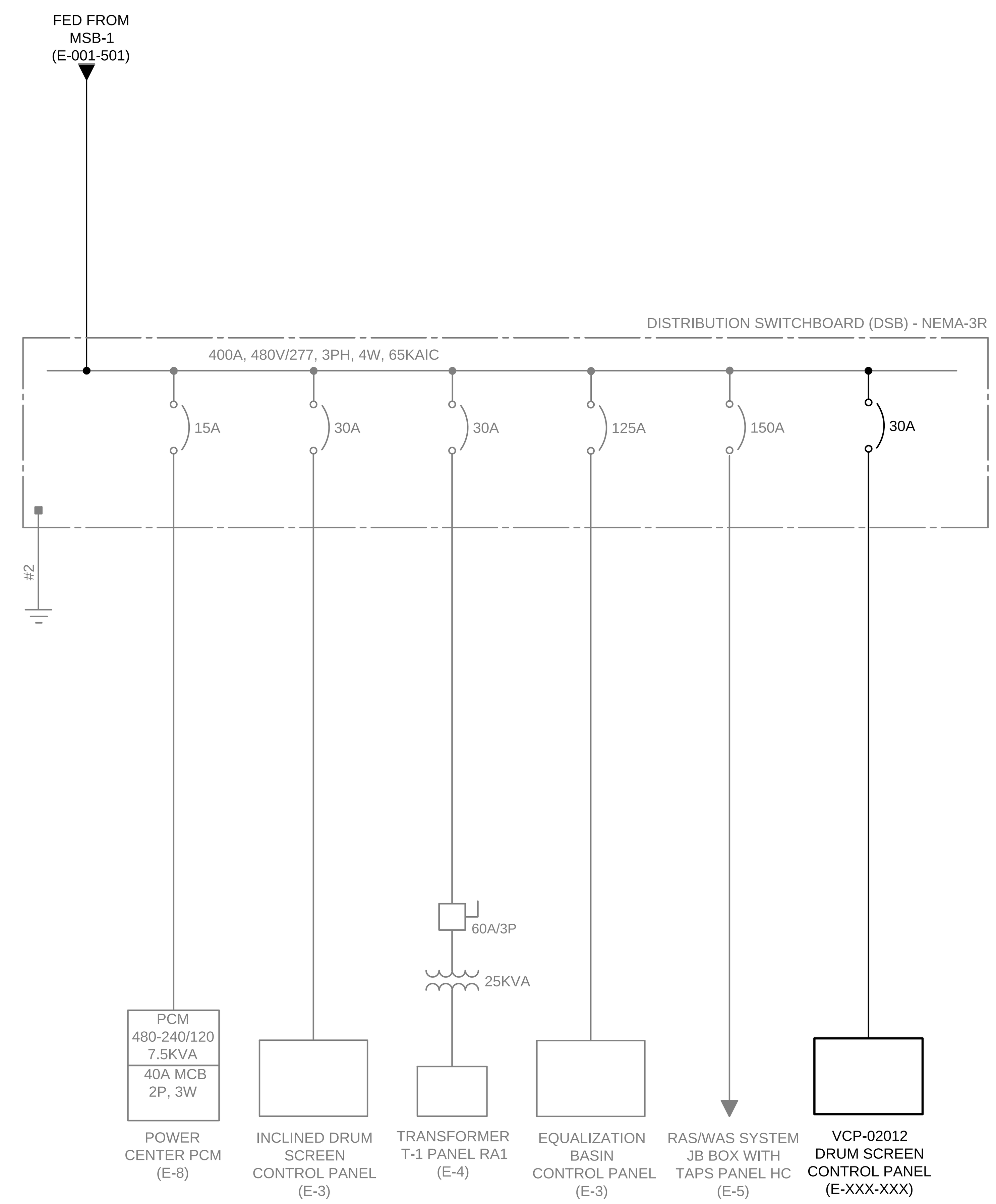
ELECTRICAL

SITE ONE LINE DIAGRAM 1

DRAWING NUMBER
E-001-501

GENERAL NOTES:

1. THE BREAKER SIZES PROVIDED ARE ESTIMATES AND NEED FURTHER ASSESSMENT DURING THE DETAILED DESIGN PHASE.



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WWTP FACILITIES PLAN AND PER

REVISIONS

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LINE IS 2 INCHES AT FULL SIZE

DESIGNED: S. MCELROY
DRAWN: K. PALMER
CHECKED: G. NANA
CHECKED: B. DICKERSON
APPROVED: G. NANA

FILENAME
E-001-502.DWG

BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

ELECTRICAL

SITE ONE LINE DIAGRAM 2

DRAWING NUMBER
E-001-502

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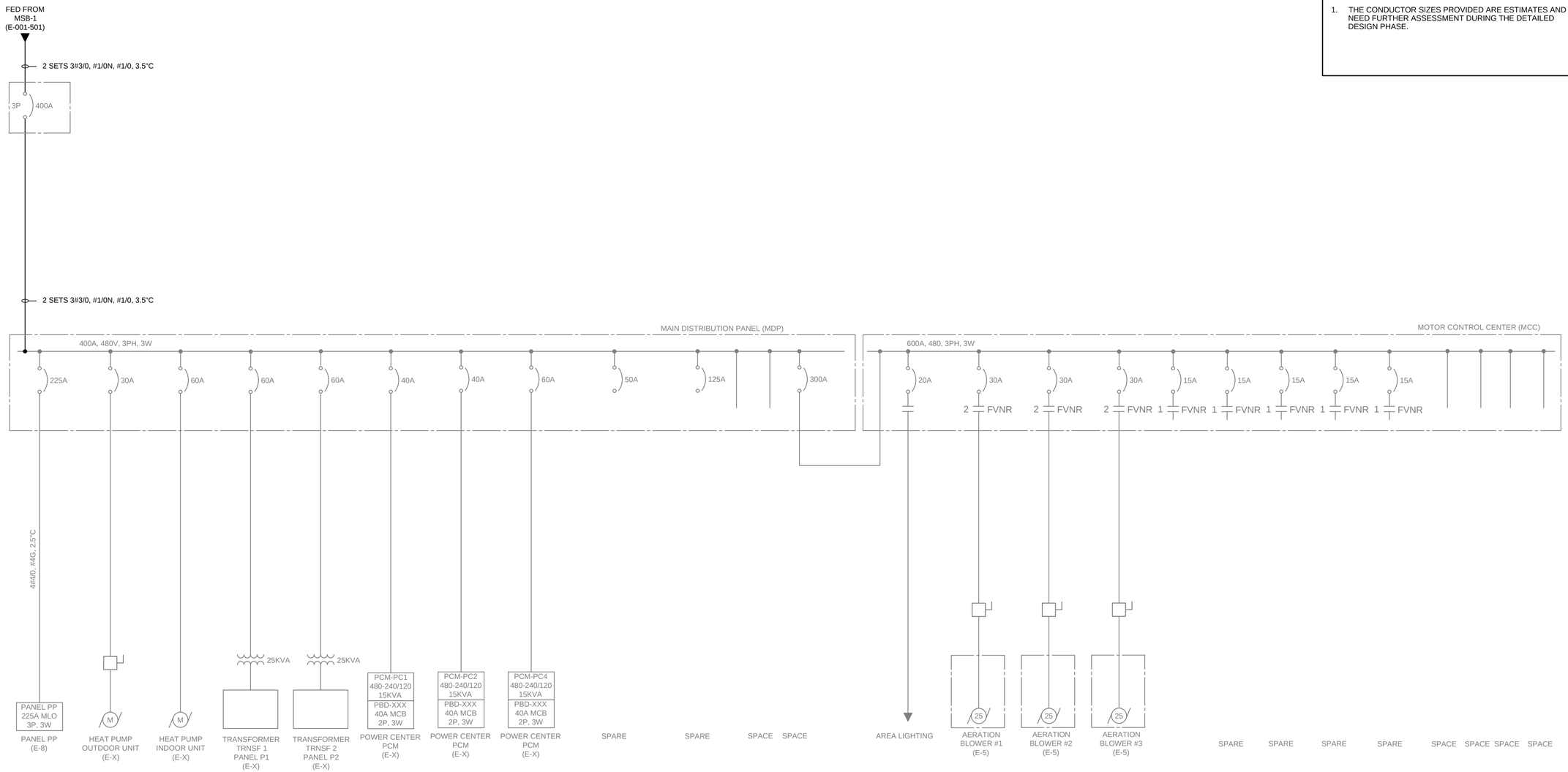
WSACC Logo.jpg

GENERAL NOTES:

1. THE CONDUCTOR SIZES PROVIDED ARE ESTIMATES AND NEED FURTHER ASSESSMENT DURING THE DETAILED DESIGN PHASE.



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WWTP FACILITIES PLAN AND PER

REVISIONS

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LINE IS 2 INCHES AT FULL SIZE

DESIGNED: S. MCELROY
DRAWN: K. PALMER
CHECKED: G. NANA
CHECKED: B. DICKERSON
APPROVED: G. NANA

FILENAME
E-001-503.DWG

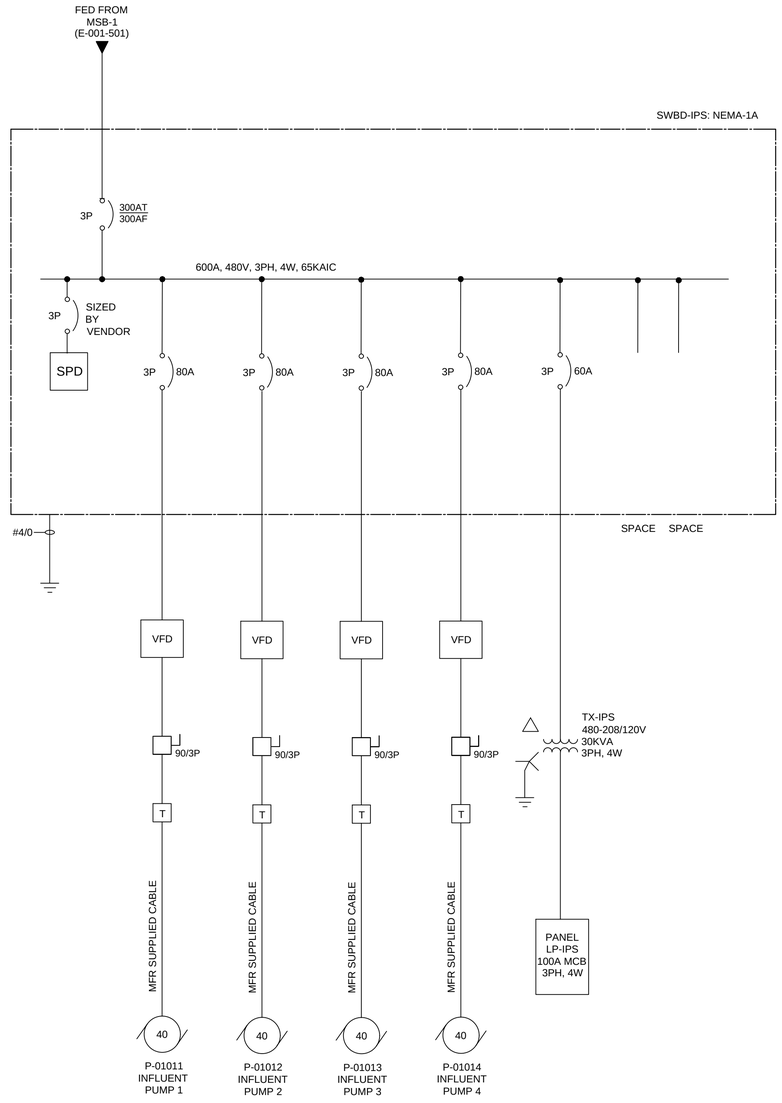
BC PROJECT NUMBER
158720

CLIENT PROJECT NUMBER

ELECTRICAL

SITE ONE LINE DIAGRAM 3

DRAWING NUMBER
E-001-503



GENERAL NOTES:

1. THE BREAKER SIZES PROVIDED ARE ESTIMATES AND NEED FURTHER ASSESSMENT DURING THE DETAILED DESIGN PHASE.
2. SWBD-IPS, TX-IPS, VFDS AND PANELBOARD LP-IPS IS LOCATED INSIDE A NEW WALK-IN ELECTRICAL ENCLOSURE.

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WWTP FACILITIES PLAN AND PER

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DESIGNED: S. MCELROY
DRAWN: K. PALMER
CHECKED: G. NANA
CHECKED: B. DICKERSON
APPROVED: G. NANA

FILENAME
E-001-504.DWG
BC PROJECT NUMBER
158720
CLIENT PROJECT NUMBER

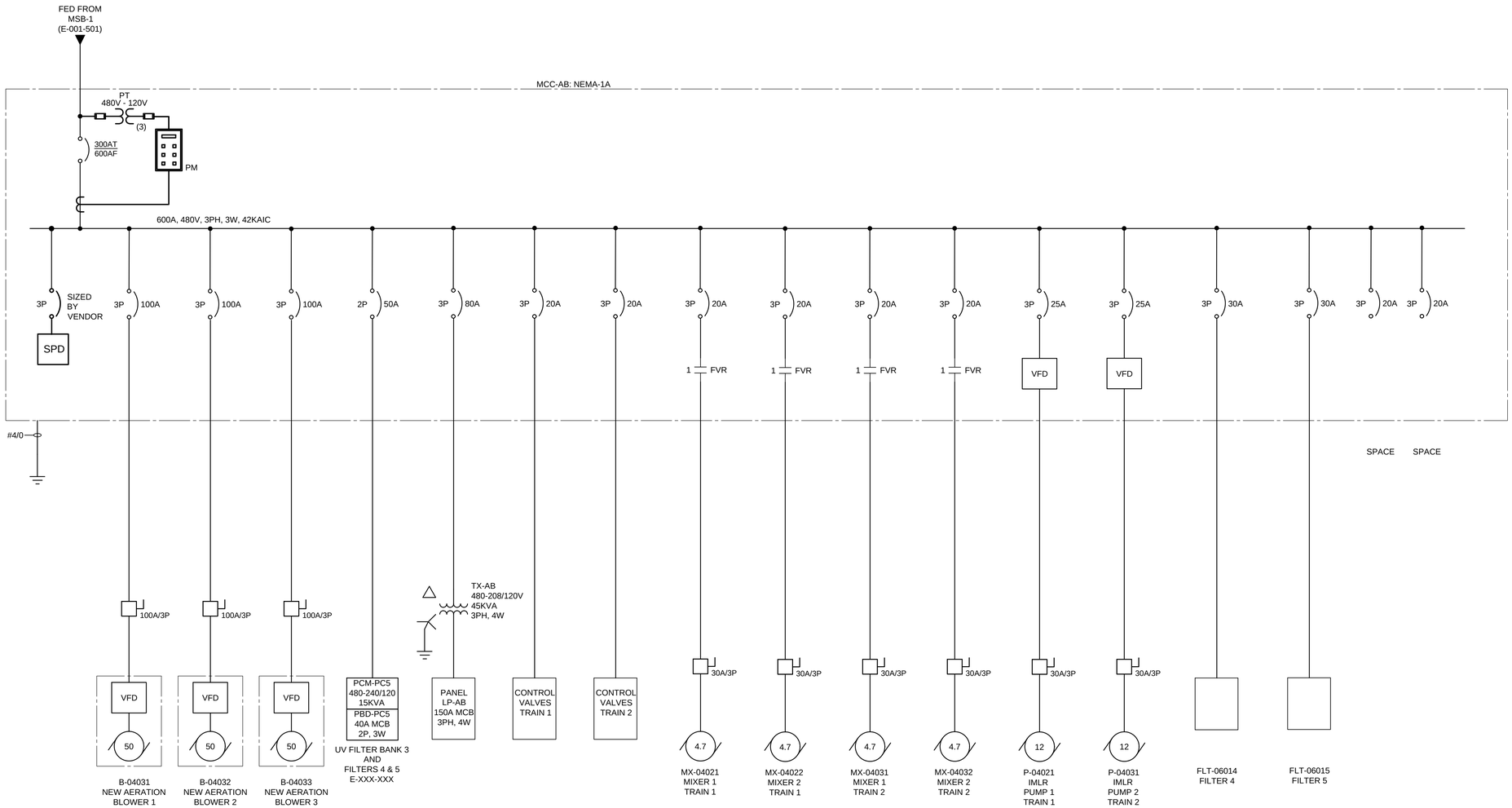
ELECTRICAL

INFLUENT PUMP STATION ONE LINE DIAGRAM

DRAWING NUMBER
E-001-504

GENERAL NOTES:

1. THE BREAKER AND SIZES PROVIDED ARE ESTIMATES AND NEED FURTHER ASSESSMENT DURING THE DETAILED DESIGN PHASE.
2. MCC-AB, TX-AB AND LP-AB IS LOCATED INSIDE A NEW WALK-IN ELECTRICAL ENCLOSURE.



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WWTP FACILITIES PLAN AND PER

REVISIONS

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LINE IS 2 INCHES AT FULL SIZE

DESIGNED: S. MCELROY
DRAWN: K. PALMER
CHECKED: G. NANA
CHECKED: B. DICKERSON
APPROVED: G. NANA
FILENAME
E-001-505.DWG
BC PROJECT NUMBER
158720
CLIENT PROJECT NUMBER

ELECTRICAL

AERATION BASIN ONE LINE DIAGRAM

DRAWING NUMBER
E-001-505

Appendix B: Select Vendor Proposals

TEMPLETON & ASSOCIATES
EQUIPMENT SALES
A FERGUSON COMPANY
www.Templeton-Associates.com

DATE: 4/16/25
TO: SAM ADLER
RE: MICHAEL SUTHERLAND
ENGINEER: BROWN & CALDWELL
EQUIPMENT: VAUGHAN CHOPPER PUMPS

IN ACCORDANCE WITH THE TERMS AND CONDITIONS CONTAINED HEREIN, TEMPLETON & ASSOCIATES IS PLEASED QUOTE THE FOLLOWING:

1. Influent Pumps: 730 GPM @76' TDH
   - (2) Vaughan Model SE4S-106 Submersible Chopper Pump
   - (2) Spark Proof Guide Rail System
   - (1) Set Spare Parts
   - (1) Factory Services
2. Plant Drain Pumps: 208 GPM @33' TDH
   - (1) Vaughan Model S#G-065 Submersible Chopper Pump
   - (1) Spark Proof Guide Rail System
   - (1) Set Spare Parts
   - (1) Factory Services

Per Vaughan Quote # 55672

TOTAL COST OF EQUIPMENT ITEM 1-2: $137,902.00

NOTES:
1. The above pricing includes (_2_) days of field/start-up services.
2. Submittals are available _4-6_ Weeks after receiving an acceptable order. The estimated lead time for the equipment is _18-20_ weeks after release to production.
3. Freight included. Partial shipments are subject to additional freight charges.

Other notes as applicable

Templeton Attn: Michael Project: Muddy Creek WWTP Expansion	**Quote Number: 55672** Dated: 4/15/25 Page 1 of 10

DUE TO CONTINUED PRICING INSTABILITIES IN MOTORS, METALS AND CASTINGS ALL PRICING BEYOND 30 DAYS MUST BE VERIFIED PRIOR TO PLACING AN ORDER.

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL

Influent Pumps: 730 GPM @ 76' TDH

1 2 ea Vaughan Model SE4S-106 Submersible Chopper Pump consisting of:

Casing and Backplate, cast ductile iron, with 4" ANSI CL 125 discharge flange.
Impeller, Cutter Bar, Cutter Nut and Upper Cutter, cast steel, heat treated to minimum Rockwell C60.
Shaft, heat treated steel.
Elastomers, Buna-N
Drive, 30 HP, 1750 RPM, 460 volt, 3 phase, 60 Hz, 1.0 SF, *Inverter Duty*, Explosion Proof (Class 1, Group C & D) 15 minute in air duty submersible motor with tandem mechanical seals, moisture sensors, internal thermostats, and *60 feet of power and control cable.*
Premium Pump Finish: Solvent wash, sandblast and coat with minimum 30 MDFT Tnemec Perma-Shield PL Series 431 epoxy. Motor furnished with motor manufacturer's standard paint for submersible applications.
Pump Monitor Relay for mounting in customer control panel to supply seal leakage and over temperature alarms for submersible motor.

2 2 ea Spark Proof Guide Rail System consisting of:

4" Base Elbow, cast ductile iron.
4" Guide Bracket, cast non-sparking aluminum bronze.
(2) Intermediate Stiffener Brackets, 316 stainless steel located every 10 feet.
Top Mounting and Chain Holder Bracket, 316 stainless steel.

3 1 set Spare Parts consisting of:

One set total of the following: one set of motor bearings and one set of motor mechanical seals.

SUBMITTALS & CONTRACT REVIEW:	STANDARD SUBMITTALS AND INITIAL CONTRACT REVIEW TIME IS 4 - 6 WEEKS (6 - 8 WEEKS FOR CHECK MARK SUBMITTALS) AFTER RECEIPT OF ORDER AND ALL REQUESTED PROJECT INFORMATION DOCUMENTS. SUBMITTALS WILL NOT BE PROVIDED UNTIL ALL REQUESTED PROJECT INFORMATION DOCUMENTS ARE RECEIVED BY VAUGHAN CO. ALONG WITH AT LEAST A 90% SPECIFICATION.
CFD REPORTS:	ESTIMATED 4 – 6 WEEKS AFTER SUBMITTALS ARE TRANSMITTED.
PRODUCTION TIME:	ESTIMATED 18 TO 20 WEEKS AFTER RECEIPT OF APPROVED SUBMITTAL, RELEASE TO PRODUCTION AND EXECUTED PURCHASE ORDER. ESTIMATED SHIP DATES ARE SUBJECT TO CHANGE DEPENDENT ON MOTOR AVAILABLILTY. VAUGHAN CO. WILL ARRANGE SHIPMENT UPON THE RECEIPT OF APPROVED FACTORY TESTS, IF APPLICABLE.
FOB:	DESTINATION VIA BEST WAY
TERMS:	CONTINGENT OF CREDIT APPROVAL
EXPIRATION:	QUOTATION VALID FOR 30 DAYS. IF EQUIPMENT IS NOT RELEASED TO PRODUCTION WITHIN 180 DAYS FROM RECEIPT OF PO, A PRICE INCREASE WILL BE IMPLEMENTED.

jsf

Templeton Attn: Michael Project: Muddy Creek WWTP Expansion	**Quote Number: 55672** Dated: 4/15/25 Page 2 of 10

DUE TO CONTINUED PRICING INSTABILITIES IN MOTORS, METALS AND CASTINGS ALL PRICING BEYOND 30 DAYS MUST BE VERIFIED PRIOR TO PLACING AN ORDER.

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL

4 1 set Factory Services consisting of:

Factory Performance Testing.
Factory Hydrostatic Testing.
Factory Wet Run Vibration Testing.
Factory Submerged Run with meggar before and after.
One Set of Pump Overhaul Tools.
Factory Submittals
One (1) electronic copy of preliminary submittal.
Up to (8) hardcopies of approved submittals on 20 lbs. 8 ½" x 11" letter size paper in standard Three (3) Ring Binder.
Factory O&M Manuals
One (1) electronic copy of preliminary submittal.
Up to Eight (8) hardcopies of approved submittals on 20 lbs. 8 ½" x 11" letter size paper in standard Three (3) Ring Binder, two (2) CDs (if requested), and one (1) flash drive (if requested)
(O&M Manuals only include information on Vaughan supplied equipment).

Plant Drain Pumps: 208 GPM @ 33' TDH

5 1 ea Vaughan Model S3G-065 Submersible Chopper Pump consisting of:

Casing, cast ductile iron with 3" ANSI CL 125 discharge flange.
Impeller, Cutter Bar, Cutter Nut and Upper Cutter, cast steel, heat treated to minimum Rockwell C60.
Mechanical Seal, cartridge type with ductile iron gland, Viton O-rings, silicon carbide faces, and integral stainless steel sleeve as manufactured by Vaughan.
Bearings, oil bath lubricated with minimum 100,000-hour L-10 bearing life.
Bearing Housing, cast ductile iron with piloted motor mount.

SUBMITTALS & CONTRACT REVIEW:	STANDARD SUBMITTALS AND INITIAL CONTRACT REVIEW TIME IS 4 - 6 WEEKS (6 - 8 WEEKS FOR CHECK MARK SUBMITTALS) AFTER RECEIPT OF ORDER AND ALL REQUESTED PROJECT INFORMATION DOCUMENTS. SUBMITTALS WILL NOT BE PROVIDED UNTIL ALL REQUESTED PROJECT INFORMATION DOCUMENTS ARE RECEIVED BY VAUGHAN CO. ALONG WITH AT LEAST A 90% SPECIFICATION.
CFD REPORTS:	ESTIMATED 4 – 6 WEEKS AFTER SUBMITTALS ARE TRANSMITTED.
PRODUCTION TIME:	ESTIMATED 18 TO 20 WEEKS AFTER RECEIPT OF APPROVED SUBMITTAL, RELEASE TO PRODUCTION AND EXECUTED PURCHASE ORDER. ESTIMATED SHIP DATES ARE SUBJECT TO CHANGE DEPENDENT ON MOTOR AVAILABLILTY. VAUGHAN CO. WILL ARRANGE SHIPMENT UPON THE RECEIPT OF APPROVED FACTORY TESTS, IF APPLICABLE.
FOB:	DESTINATION VIA BEST WAY
TERMS:	CONTINGENT OF CREDIT APPROVAL
EXPIRATION:	QUOTATION VALID FOR 30 DAYS. IF EQUIPMENT IS NOT RELEASED TO PRODUCTION WITHIN 180 DAYS FROM RECEIPT OF PO, A PRICE INCREASE WILL BE IMPLEMENTED.

jsf

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL

Automatic Oil Level Monitor, PVC plastic reservoir with 120V switch, *intrinsically safe relay, and 50 ft. of hose*.
Shaft, heat treated steel.
Elastomers, Buna-N
Drive, 5 HP, 1750 RPM, 460 volt, 3 phase, 60 Hz, 1.15 SF, Explosion Proof (Class 1, Group C & D) 15 minute in air duty submersible motor with tandem mechanical seals, moisture sensors, internal thermostats, and *60 feet of power and control cable.*
Premium Pump Finish: Solvent wash, sandblast and coat with minimum 30 MDFT Tnemec Perma-Shield PL Series 431 epoxy. Motor furnished with motor manufacturer's standard paint for submersible applications.
Pump Monitor Relay for mounting in customer control panel to supply seal leakage and over temperature alarms for submersible motor.

6 1 ea Spark Proof Guide Rail System consisting of:

3" Base Elbow, cast ductile iron.
3" Guide Bracket, cast non-sparking aluminum bronze.
(2) Intermediate Stiffener Brackets, 316 stainless steel located every 10 feet.
Top Mounting and Chain Holder Bracket, 316 stainless steel.

7 1 set Spare Parts consisting of:

One set total of the following: one set of motor bearings and one set of motor mechanical seals.

8 1 set Factory Services consisting of:

Factory Pump Performance Testing.
Factory Hydrostatic Testing.
Factory Wet Run Vibration Testing.
Factory Submerged Run with meggar before and after.

SUBMITTALS & CONTRACT REVIEW:	STANDARD SUBMITTALS AND INITIAL CONTRACT REVIEW TIME IS 4 - 6 WEEKS (6 - 8 WEEKS FOR CHECK MARK SUBMITTALS) AFTER RECEIPT OF ORDER AND ALL REQUESTED PROJECT INFORMATION DOCUMENTS. SUBMITTALS WILL NOT BE PROVIDED UNTIL ALL REQUESTED PROJECT INFORMATION DOCUMENTS ARE RECEIVED BY VAUGHAN CO. ALONG WITH AT LEAST A 90% SPECIFICATION.
CFD REPORTS:	ESTIMATED 4 – 6 WEEKS AFTER SUBMITTALS ARE TRANSMITTED.
PRODUCTION TIME:	ESTIMATED 18 TO 20 WEEKS AFTER RECEIPT OF APPROVED SUBMITTAL, RELEASE TO PRODUCTION AND EXECUTED PURCHASE ORDER. ESTIMATED SHIP DATES ARE SUBJECT TO CHANGE DEPENDENT ON MOTOR AVAILABLILTY. VAUGHAN CO. WILL ARRANGE SHIPMENT UPON THE RECEIPT OF APPROVED FACTORY TESTS, IF APPLICABLE.
FOB:	DESTINATION VIA BEST WAY
TERMS:	CONTINGENT OF CREDIT APPROVAL
EXPIRATION:	QUOTATION VALID FOR 30 DAYS. IF EQUIPMENT IS NOT RELEASED TO PRODUCTION WITHIN 180 DAYS FROM RECEIPT OF PO, A PRICE INCREASE WILL BE IMPLEMENTED.

jsf

DUE TO CONTINUED PRICING INSTABILITIES IN MOTORS, METALS AND CASTINGS ALL PRICING BEYOND 30 DAYS MUST BE VERIFIED PRIOR TO PLACING AN ORDER.

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL

One Set of Pump Overhaul Tools.
Factory Submittals
One (1) electronic copy of preliminary submittal.
Up to (8) hardcopies of approved submittals on 20 lbs. 8 ½" x 11" letter size paper in standard Three (3) Ring Binder.
Factory O&M Manuals
One (1) electronic copy of preliminary submittal.
Up to Eight (8) hardcopies of approved submittals on 20 lbs. 8 ½" x 11" letter size paper in standard Three (3) Ring Binder, two (2) CDs (if requested), and one (1) flash drive (if requested)
(O&M Manuals only include information on Vaughan supplied equipment).

Freight included. Partial shipments are subject to additional freight charges

Applicable Vaughan Pre-Start-up Check Lists are to be completed and submitted prior to scheduling On-Site Startup with an Authorized Vaughan Representative. Start-up activities are limited to the applicable Vaughan Start-up and Certification Check Lists and Vaughan supplied equipment. Vaughan start-up excludes installation, field testing, tools, appurtenances, instrumentation, and video recording.

NOTE:
THE FOLLOWING ITEMS ARE NOT INCLUDED IN THIS QUOTATION. IF REQUIRED, PLEASE CONTACT YOUR LOCAL VAUGHAN REPRESENTATIVE FOR PRICING AND AVAILABILITY:
UNLESS NOTED OTHERWISE, VAUGHAN'S STANDARD WARRANTY APPLIES.

- *CONSTANT TORQUE* VFD'S FOR THE INFLUENT PUMPS, CONTROL PANELS, LOCAL CONTROL STATIONS, LEVEL CONTROLS, OR ANY OTHER ELECTRICAL OR INSTRUMENTATION ITEM NOT SPECIFICALLY CALLED OUT HEREIN.
- PRESSURE GAUGES, SWITCHES, VALVES AND OTHER SPECIALTIES NOT SPECIFICALLY CALLED OUT HEREIN.

SUBMITTALS & CONTRACT REVIEW:	STANDARD SUBMITTALS AND INITIAL CONTRACT REVIEW TIME IS 4 - 6 WEEKS (6 - 8 WEEKS FOR CHECK MARK SUBMITTALS) AFTER RECEIPT OF ORDER AND ALL REQUESTED PROJECT INFORMATION DOCUMENTS. SUBMITTALS WILL NOT BE PROVIDED UNTIL ALL REQUESTED PROJECT INFORMATION DOCUMENTS ARE RECEIVED BY VAUGHAN CO. ALONG WITH AT LEAST A 90% SPECIFICATION.
CFD REPORTS:	ESTIMATED 4 – 6 WEEKS AFTER SUBMITTALS ARE TRANSMITTED.
PRODUCTION TIME:	ESTIMATED 18 TO 20 WEEKS AFTER RECEIPT OF APPROVED SUBMITTAL, RELEASE TO PRODUCTION AND EXECUTED PURCHASE ORDER. ESTIMATED SHIP DATES ARE SUBJECT TO CHANGE DEPENDENT ON MOTOR AVAILABLILTY. VAUGHAN CO. WILL ARRANGE SHIPMENT UPON THE RECEIPT OF APPROVED FACTORY TESTS, IF APPLICABLE.
FOB:	DESTINATION VIA BEST WAY
TERMS:	CONTINGENT OF CREDIT APPROVAL
EXPIRATION:	QUOTATION VALID FOR 30 DAYS. IF EQUIPMENT IS NOT RELEASED TO PRODUCTION WITHIN 180 DAYS FROM RECEIPT OF PO, A PRICE INCREASE WILL BE IMPLEMENTED.

jsf

Templeton Attn: Michael Project: Muddy Creek WWTP Expansion	**Quote Number: 55672** Dated: 4/15/25 Page 5 of 10

DUE TO CONTINUED PRICING INSTABILITIES IN MOTORS, METALS AND CASTINGS ALL PRICING BEYOND 30 DAYS MUST BE VERIFIED PRIOR TO PLACING AN ORDER.

ITEM	QTY	UNIT	DESCRIPTION	UNIT PRICE	TOTAL

- SPECIAL COATINGS OTHER THAN THOSE QUOTED.
- FACTORY NPSHr TEST AND NOISE TESTS.
- LATERAL, TORSIONAL, OR STRUCTURAL DYNAMIC ANALYSIS; FACTORY AND FIELD BUMP TESTING; OR ANY OTHER TESTING OR CALCULATION NOT SPECIFICALLY CALLED OUT HEREIN.
- EQUIPMENT, LABOR, MATERIAL AND PERSONNEL REQUIRED TO PERFORM FIELD TESTING OF PUMPS.
- SPECIAL MOTOR SPECIFICATIONS OTHER THAN THOSE SPECIFICALLY CALLED OUT HEREIN.
- FACTORY MOTOR TESTS.
- ADDITIONAL LUBRICANTS OTHER THAN THOSE CONTAINED WITHIN THE PUMP.
- ANCHOR BOLTS AND SEISMIC CALCULATIONS.
- ACCESS HATCH COVERS.
- PUMP LIFTING HOISTS.
- 2 INCH SCHEDULE 40 PIPE RAILS FOR GUIDERAILS.
- LIFTING CABLES, CHAINS, AND SAFETY HOOKS.
- STARTUP BY MANUFACTURER'S REPRESENTATIVE.

Industry: Municipal

Customer Signature Date Vaughan Co., Inc.

SUBMITTALS & CONTRACT REVIEW:	STANDARD SUBMITTALS AND INITIAL CONTRACT REVIEW TIME IS 4 - 6 WEEKS (6 - 8 WEEKS FOR CHECK MARK SUBMITTALS) AFTER RECEIPT OF ORDER AND ALL REQUESTED PROJECT INFORMATION DOCUMENTS. SUBMITTALS WILL NOT BE PROVIDED UNTIL ALL REQUESTED PROJECT INFORMATION DOCUMENTS ARE RECEIVED BY VAUGHAN CO. ALONG WITH AT LEAST A 90% SPECIFICATION.
CFD REPORTS:	ESTIMATED 4 – 6 WEEKS AFTER SUBMITTALS ARE TRANSMITTED.
PRODUCTION TIME:	ESTIMATED 18 TO 20 WEEKS AFTER RECEIPT OF APPROVED SUBMITTAL, RELEASE TO PRODUCTION AND EXECUTED PURCHASE ORDER. ESTIMATED SHIP DATES ARE SUBJECT TO CHANGE DEPENDENT ON MOTOR AVAILABLILTY. VAUGHAN CO. WILL ARRANGE SHIPMENT UPON THE RECEIPT OF APPROVED FACTORY TESTS, IF APPLICABLE.
FOB:	DESTINATION VIA BEST WAY
TERMS:	CONTINGENT OF CREDIT APPROVAL
EXPIRATION:	QUOTATION VALID FOR 30 DAYS. IF EQUIPMENT IS NOT RELEASED TO PRODUCTION WITHIN 180 DAYS FROM RECEIPT OF PO, A PRICE INCREASE WILL BE IMPLEMENTED.

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Unmatched Reliability
Vaughan®

PRODUCT WARRANTY, TERMS & CONDITIONS FOR SALES MADE BY VAUGHAN CO., INC.

1. **GENERAL:** The Terms & Conditions herein established by Vaughan Co., Inc. ("us", "we", "our") as may be amended by us from time to time ("Terms and Conditions") apply to all dealings with our potential and actual customers ("you" and "your"), whether made by you or us, for any solicitation, submission, inquiry, offer, request or arrangement (a "Communication") or sale by us with respect to goods we sell ("Product(s)"). Written authorization is only valid if executed by an authorized officer of Vaughan Co.
2. **SCOPE OF SUPPLY:** Scope of supply will be limited to accepted quotation or approved submittals, if required.
3. **ACCEPTANCE OF ORDERS:** No Communication is binding on us unless written authorization is obtained by an authorized officer of Vaughan Co. Any sample provided by us is not part of an Accepted Order.
4. **SUBMITTALS:** Drawings and submittals for approval will typically be supplied four to six (4-6) weeks from the receipt of the order in pdf format. Vaughan will not be responsible for damages, fees or charges for any additional submittal reviews that were not the fault of Vaughan.
5. **PRODUCTION TIME:** Vaughan's production time will begin after complete submittal approval, release to production, execution of the purchase order and receipt of progress payments, if applicable. Production time excludes time to approve test results.
6. **NO CANCELLATION:** Accepted Orders cannot be cancelled or modified, in whole or in part, without our prior written consent, which consent may be withheld or subject to conditions and reasonable charges we may impose. Any custom ordered parts cannot be cancelled without full payment.
7. **DEFAULT:** If Buyer defaults on the contract, Vaughan shall have the right to be cancel the contract in part or whole. Buyer shall be responsible for reasonable termination charges up to the total agreement value. The termination charge is at Vaughan's discretion dependent upon the percentage of the Agreement price reflecting the percentage of the work fabricated prior to the default plus actual direct costs resulting from default, including cancellation charges directly associated with costs for items that are in production at time of cancellation.
8. **PRICE INCREASE:** Price of Product(s) is subject to increase if equipment is not released to production within six months from the date Vaughan receives the initial purchase order from you.
9. **TAXES:** All prices are subject to all applicable sales and use taxes and any other taxes now or hereafter imposed and/or levied by any governmental authority with respect to the sale of the Product(s) ("Applicable Taxes"). Customers located in states where Vaughan is registered for sales tax sales must pay sales tax on all orders delivered or picked up within said state unless Vaughan Co. has in its possession an accurate and current resale or exemption certificate or other acceptable alternate document on file for your company and/or project. If you have a certificate on file with Vaughan Co., please indicate on the purchase order if tax is to be applied or not at the time of the order. Our failure to charge or collect Applicable Taxes when due shall not relieve you of your obligation for its payment. Regardless of any other payment terms, all Applicable Taxes are due net 30 days from the invoice date.
10. **PAYMENT TERMS:** Terms of sale will be shown on each invoice or purchase order, and it is agreed that invoices will be paid in full when due. Standard payment terms for projects covered by a project payment bond that extends coverage to Vaughan Co. are as follows:

    10% upon submittal approval;
    10% prior to shipment of equipment;
    75% net 30 from shipment of equipment;
    5% due at the earlier of startup or 120 days from shipment of equipment.

    However, Vaughan may at their discretion alter these percentages on a case by case basis. Projects that are not covered by a project payment bond, or payment bonds that do not extend coverage to Vaughan Co., must be 100% prepaid in advance of shipment. Payment is not subject to hold-backs or contingent upon the Buyer receiving payment from the Owner. If payment in full on any invoice is not received when due, or if your credit worthiness is deemed unsatisfactory by us at any time, we may take, without incurring any liability, one or more of the following actions: (a) impose a service charge at the rate that is the lesser of (i) 1.5% per month or (ii) the maximum rate allowed by applicable law, on any amount past due commencing from the date of such invoice, (b) modify or accelerate payments terms, (c) withhold delivery of Product(s) under any Accepted Order not yet shipped and/or delay, recall or reclaim shipments of Product(s) en route to you or delivered until arrangements satisfactory to us are made to secure payment for any outstanding invoice and for all open Accepted Orders and/or (d) file a lien or bond claim for any unpaid labor or material.
11. **RETAINAGE:** Retainage, if applicable, is limited to 5% of the total Accepted Order price less any applicable taxes and is due at the earlier of start-up or 10 days upon owner's acceptance, however, retainage shall not exceed 120 days from the shipment of equipment.
12. **FREIGHT:** Unless otherwise stated in the purchase order or quote, freight for a single shipment is included. Additional freight cost for split-shipments will be the responsibility of the Buyer. Buyer is responsible for providing complete shipping information and requirements including, but not limited to residential delivery, lift gates, limited access, advance notice, construction/jobsite, etc. Failure to provide accurate information may result in additional shipping fees. Those fees are the responsibility of the Buyer and will be billed accordingly
13. **DATE OF SHIPMENT:** Shipment dates are approximate and subject to change based upon Product(s) availability, production schedules, and other prevailing conditions. Shipment date is contingent upon the receipt of approved submittals, execution of purchase order, receipt of progress payments and approved factory tests, if applicable. You must accept delivery after approval of submittals, production time and factory test approval or issue us a change to the Accepted Order that must be accepted by us in writing. . If Vaughan does not receive approval to ship equipment within 30 days from the submission of factory tests, Buyer will pay Vaughan $100 per day for storage of equipment.
14. **LONG TERM STORAGE:** We will hold Product(s) in long term storage contingent upon payment of full purchase order price less retainage. Long term storage duration, fees, and any other considerations will be evaluated on a case by case basis.
15. **YOUR ACCEPTANCE OF PRODUCT(S):** You are responsible to promptly inspect Product(s) delivered and notify us within five (5) calendar days following receipt of the Product(s) for which a claim is filed of any shortages, visible material defects or non-conformance of the Product(s) with the Accepted Order. Products not rejected during said period will be deemed accepted. If the equipment is damaged during transport that was arranged by Vaughan, Vaughan will file the claim with the freight carrier. Any damages will be limited to the amounts recovered by Vaughan from the freight carrier.
16. **TITLE AND RISK OF LOSS:** Title to and risk of loss will pass from Vaughan to Buyer upon delivery of equipment, but not prior thereto.
17. **RETURNS:** Product(s) may not be returned for any reason without authorization by us. Please refer to the "Returned Goods Authorization Policy" for further information on returns.
18. **WARRANTY:** Vaughan Company, Inc. (Vaughan Co.) warrants to the original purchaser/end user (Purchaser) all pumps and pump parts manufactured by Vaughan Co. to be free from defects in workmanship or material for a period of twelve (12) months from date of startup, not to exceed eighteen (18) months from the date of shipment from Vaughan Co. Startup data must be submitted to Vaughan Co. within 30 days of startup. If Purchaser fails to submit startup data within 30 days of startup, then Vaughan, in its sole discretion, may elect to void this warranty at any time. Purchaser must contact Vaughan Co. prior to commencing any repair attempts, or. removing pump or parts from service. If Purchaser fails to contact Vaughan Co. prior to commencing any repair attempts or removing pumps or parts from service, then Vaughan, in its sole discretion, may elect to void this warranty at any time. If during said warranty period, any pump or pump parts manufactured by Vaughan Co. prove to be defective in workmanship or material under normal use and service, and if such pump or pump parts are returned to Vaughan Co.'s factory at Montesano, WA, or to a Vaughan authorized Service Facility, as directed by Vaughan Co., transportation charges prepaid, and if the pump or pump parts are found to be defective in workmanship or material, they will be replaced or repaired by Vaughan Co. free of charge. Products repaired or replaced from the Vaughan Co. factory or a Vaughan authorized Service Facility under this warranty will be returned freight prepaid. Vaughan Co. shall not be responsible for the cost of pump or part removal and/or re-installation. All warranty claims must be submitted in writing to Vaughan Co. not later than thirty (30) days after warranty breach occurrence. The original warranty length shall not be extended with respect to pumps or parts repaired or replaced by Vaughan Co. under this Warranty. This Warranty is voided as to pumps or parts

repaired/replaced by other than Vaughan Co. or its duly authorized representatives. Vaughan Co. shall not be liable for consequential damages of any kind, including, but not limited to, claims for property damage, personal injury, attorneys' fees, lost profits, loss of use, liability of Purchaser to customers, loss of goodwill, interest on money withheld by customers, damages related to third party claims, travel expenses, rented equipment, third party contractor's fees, or unauthorized repair service or parts. The Purchaser, by acceptance of delivery, assumes all liability for the consequences of the use or misuse of Vaughan Co. products by the Purchaser, its employees or others. Equipment and accessories purchased by Vaughan Co. from outside sources which are incorporated into any Vaughan pump or any pump part are warranted only to the extent of and by the original manufacturer's warranty or guarantee, if any, which warranty, if appropriate, will be assigned by Vaughan Co. to the Purchaser. It is Purchaser's responsibility to consult the applicable product documentation for specific warranty information. Specific product documentation is available upon request. Any warranty shall be void if the total contract amount is not paid in full. Vaughan Co. neither assumes, nor authorizes any person or company to assume for it, any other obligation in connection with the sale of its equipment with the exception of a valid Vaughan "Performance Guarantee" or "Extended Warranty," if applicable. Any other enlargement or modification of this warranty by a representative or other selling agent shall not be legally binding on Vaughan Co. Warranty eligibility determination is at Vaughan Co.'s sole discretion. Warranty Limitations: This warranty shall not apply to any pump or pump part which has been subjected to or been damaged by any of the following non-exclusive list of causes; Misuse, abuse, accident, negligence, operated in the dashed portion of the published pump curves, used in a manner contrary to Vaughan's printed instructions, defective power supply, improper electrical protection, improper storage, faulty installation, maintenance, or repair, wear caused by pumping abrasive or corrosive fluids or by cavitation, dissatisfaction due to buyer's remorse, damages incurred during transportation, damages incurred during installation or maintenance. ***THIS IS VAUGHAN CO.'S SOLE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WHICH ARE HEREBY EXCLUDED INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.*** This warranty is void if payment in full is not made in accordance with the invoice terms.

19. **FORCE MAJEURE:** Vaughan shall have no liability in respect of failure to deliver or perform or delay in delivering or performing any obligations due to causes such as fire, earthquakes, flooding or other natural disasters, failure of our supplier to deliver on time, war, acts or threats of terrorism, strikes and any other circumstance outside the reasonable control of Vaughan.
20. **DAMAGES:** Vaughan is not responsible for any damages due to delays, special, indirect, consequential or punitive damages.
21. **BACK CHARGES:** You shall not charge Vaughan back charges without first receiving written approval from an authorized officer of Vaughan Co.
22. **COLLECTION CHARGES:** You shall pay all costs and expenses, including without limitation reasonable attorneys' fees and administrative charges, we incur in endeavoring to protect our rights arising out of your failure to perform your obligations to us, including without limitation any attempt to collect any amount you owe us.
23. **CONFIDENTIALITY:** Buyer shall take reasonable efforts to maintain as confidential, such items marked or identified as such by Vaughan. Such confidential information shall not include information which may have been provided to Vaughan in connection with this Agreement. All devices, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data, software and other documents or information prepared or disclosed by Vaughan, and all related intellectual property rights, shall remain Vaughan's property. Vaughan grants Buyer and Owner a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the work. Buyer shall not disclose any such material to third parties without Vaughan's prior written consent
24. **EAR COMPLIANCE:** If Product(s) are exported by us, we provide the following statement: "these commodities, technology or software were exported from the United States in accordance with the export Administration Regulations. Diversion contrary to U.S. law is prohibited."
25. **GOVERNING LAW:** The transactions between you and us are made in Washington State, shall be governed by the laws of Washington State, and you agree to submit exclusively to jurisdiction and venue of such state with respect to any dispute arising out of any transaction between you and us. **YOU AND WE KNOWINGLY, VOLUNTARILY AND INTENTIONALLY WAIVE THE RIGHT TO TRIAL BY JURY IN ANY ACTION OR PROCEEDING ARISING OUT OF ANY SUCH DISPUTE.**
26. **DISPUTES:** Any claim or dispute between Vaughan and Buyer, arising out of or relating to either's obligations to the other under this Contract, shall, if possible, be resolved by negotiation between Vaughan's and Buyer's designated representatives. Vaughan and Buyer each commit to seeking resolution of such matters in an amicable, professional and expeditious manner so as to avoid unnecessary losses, delays and disruptions to the Work. If a matter cannot be resolved by the parties' designated on-site representatives, the following dispute resolution procedure shall apply:
    i. No later than thirty (30) days after the designated representatives fail to reach agreement, representatives from executive management of Seller and Contractor shall attempt to resolve the matter.
    ii. If resolution cannot be reached by the parties' executive managers, no later than thirty (30) days after the executive managers fail to reach agreement, the parties shall submit the dispute to non-binding mediation. The parties shall select a mediator that is mutually acceptable. The location of the mediation shall be in County wherein the project is located.
    iii. If resolution cannot be reached by the parties through mediation, within thirty (30) days after the mediation has concluded, either party may file a demand for arbitration. Such arbitration shall be administered by the American Arbitration Association ("AAA") in accordance with its Construction Industry Arbitration Rules. Judgment on the award rendered by the arbitrator(s) may be entered in any court having jurisdiction thereof.
27. **NO RIGHT OF SET-OFF:** Each Accepted Order constitutes a separate and distinct contract when accepted by us and you may not withhold payment for an invoice or offset same, in whole or in part, against sums you claim are due you by us with respect to another Accepted Order, invoice or for any other cause or reason whatsoever.
28. **INDEMNITY CLAUSE:** Any indemnification shall not include claims of, or damages resulting from the negligence, gross negligence, or willful, wanton or intentional misconduct of the parties indemnified hereunder. To the extent that conditions, acts, activities or conduct involve the contributory negligence or misconduct of you or other third parties, liability will be apportioned between the parties according to comparative fault. Buyer shall indemnify Vaughan for any claims or damages resulting from the negligence, gross negligence, or willful, wanton or intentional misconduct by the Buyer, Owner, their officers, directors, employees, agents and/or consultants.
29. **OUR RIGHTS ARE NOT EXCLUSIVE:** Our rights hereunder are in addition to and not in lieu of any other rights and remedies available to us at law or in equity.
30. **NOTICES:** All notices of claims or disputes given by either you or us with respect to any Communication, Accepted Order or these Terms & Conditions shall be in writing and sent by (a) first class mail with a copy by certified mail, return receipt requested, postage pre-paid, or (b) overnight delivery service, charges prepaid, and address as follows: (i) if intended for us, to our address to which a Communications was sent or an Accepted Order was placed, and (ii) if to you, at your address last known to us. Notice will be effective the first business day after notice is sent.
31. **NO OTHER TERMS ACCEPTED:** No terms or conditions, other than these Terms and Conditions, shall apply to any Accepted Order and no agreement or understanding in any way adding to or otherwise modifying these Terms and Conditions shall be binding on us unless set forth in writing and signed by an officer of Vaughan Co. Vaughan Co. is only bound to the terms of the contract/agreement/purchase order between Vaughan and Buyer. The Buyer's Prime Contract with an Owner shall not affect the contract between Vaughan and Buyer unless specifically accepted in writing by an authorized officer of Vaughan Co.
32. **COUNTERPARTS:** This Agreement may be executed in counterpart, and may be executed by way of facsimile, email or electronic signature, and if so, shall be considered an original.
33. **MISCELLANEOUS:** No waiver of any rights or remedies shall be binding on us unless set forth in a written waiver signed by us. We do not give up any of our rights or remedies if we fail or delay in seeking a

remedy or if we accept a payment while there is a breach by you. Any such waiver, delay or failure by us on one occasion shall not be deemed a waiver by us of any future default by you or of any future right or remedy available to us. The Section, Paragraph and other heading in these Terms & Conditions are for convenience of reference only and shall not limit or otherwise affect the meaning of any provision contained in these Terms and Conditions. The invalidity of enforceability of any provision in these Terms and conditions shall in no way effect the validity or enforceability of any other provision.

VAUGHAN CO., INC. PRODUCT WARRANTY

Vaughan Company, Inc. (Vaughan Co.) warrants to the original purchaser/end user (Purchaser) all pumps and pump parts manufactured by Vaughan Co. to be free from defects in workmanship or material for a period of twelve (12) months from date of startup, not to exceed eighteen (18) months from the date of shipment from Vaughan Co. Startup data must be submitted to Vaughan Co. within 30 days of startup. If Purchaser fails to submit startup data within 30 days of startup, then Vaughan, in its sole discretion, may elect to void this warranty at any time. Purchaser must contact Vaughan Co. prior to commencing any repair attempts, or removing pump or parts from service. If Purchaser fails to contact Vaughan Co. prior to commencing any repair attempts or removing pumps or parts from service, then Vaughan, in its sole discretion, may elect to void this warranty at any time.

If during said warranty period, any pump or pump parts manufactured by Vaughan Co. prove to be defective in workmanship or material under normal use and service, and if such pump or pump parts are returned to Vaughan Co.'s factory at Montesano, WA, or to a Vaughan authorized Service Facility, as directed by Vaughan Co., transportation charges prepaid, and if the pump or pump parts are found to be defective in workmanship or material, they will be replaced or repaired by Vaughan Co. free of charge. Products repaired or replaced from the Vaughan Co. factory or a Vaughan authorized Service Facility under this warranty will be returned freight prepaid. Vaughan Co. shall not be responsible for the cost of pump or part removal and/or re-installation.

All warranty claims must be submitted in writing to Vaughan Co. not later than thirty (30) days after warranty breach occurrence. The original warranty length shall not be extended with respect to pumps or parts repaired or replaced by Vaughan Co. under this Warranty. This Warranty is voided as to pumps or parts repaired/replaced by other than Vaughan Co. or its duly authorized representatives.

Vaughan Co. shall not be liable for consequential damages of any kind, including, but not limited to, claims for property damage, personal injury, attorneys' fees, lost profits, loss of use, liability of Purchaser to customers, loss of goodwill, interest on money withheld by customers, damages related to third party claims, travel expenses, rented equipment, third party contractor's fees, or unauthorized repair service or parts. The Purchaser, by acceptance of delivery, assumes all liability for the consequences of the use or misuse of Vaughan Co. products by the Purchaser, its employees or others.

Equipment and accessories purchased by Vaughan Co. from outside sources which are incorporated into any Vaughan pump or any pump part are warranted only to the extent of and by the original manufacturer's warranty or guarantee, if any, which warranty, if appropriate, will be assigned by Vaughan Co. to the Purchaser. It is Purchaser's responsibility to consult the applicable product documentation for specific warranty information. Specific product documentation is available upon request.
Any warranty shall be void if the total contract amount is not paid in full.

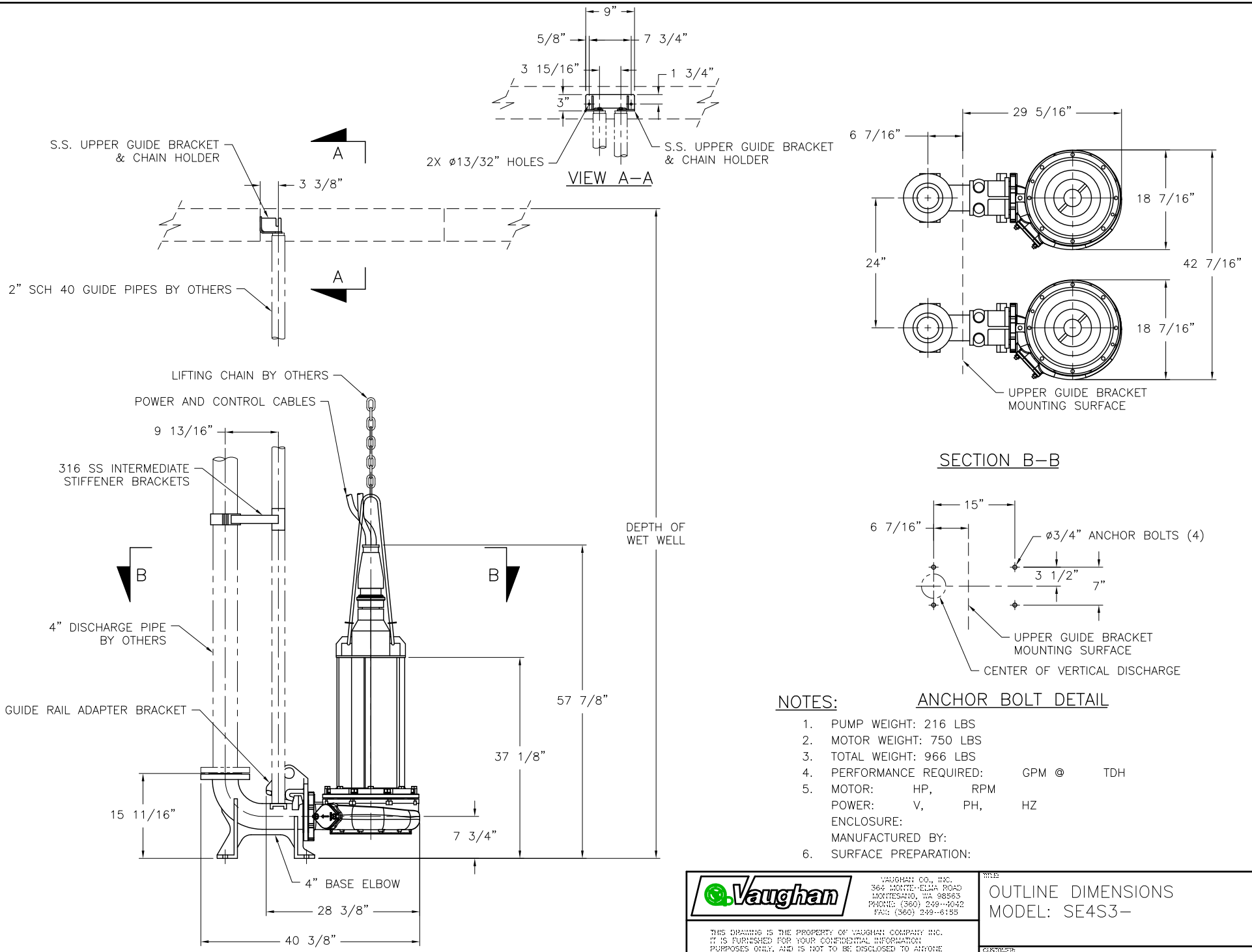
Vaughan Co. neither assumes, nor authorizes any person or company to assume for it, any other obligation in connection with the sale of its equipment with the exception of a valid Vaughan "Performance Guarantee" or "Extended Warranty," if applicable. Any other enlargement or modification of this warranty by a representative or other selling agent shall not be legally binding on Vaughan Co.

Warranty eligibility determination is at Vaughan Co.'s sole discretion.

Warranty Limitations:
This warranty shall not apply to any pump or pump part which has been subjected to or been damaged by any of the following non-exclusive list of causes:

- Misuse
- Abuse
- Accident
- Negligence
- Operated in the dashed portion of the published pump curves
- Used in a manner contrary to Vaughan's printed instructions
- Defective power supply
- Improper electrical protection
- Improper storage
- Faulty installation, maintenance, or repair
- Wear caused by pumping abrasive or corrosive fluids or by cavitation
- Dissatisfaction due to buyer's remorse
- Damages incurred during transportation
- Damages incurred during installation or maintenance

THIS IS VAUGHAN CO.'S SOLE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, WHICH ARE HEREBY EXCLUDED INCLUDING IN PARTICULAR ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.



ANCHOR BOLT DETAIL

NOTES:

1. PUMP WEIGHT: 216 LBS
2. MOTOR WEIGHT: 750 LBS
3. TOTAL WEIGHT: 966 LBS
4. PERFORMANCE REQUIRED: GPM @ TDH
5. MOTOR: HP, RPM
   POWER: V, PH, HZ
   ENCLOSURE:
   MANUFACTURED BY:
6. SURFACE PREPARATION:

Vaughan

VAUGHAN CO., INC.
364 MONTE-ELMA ROAD
MONTESANO, WA 98563
PHONE: (360) 249-4042
FAX: (360) 249-6155

TITLE: OUTLINE DIMENSIONS
MODEL: SE4S3–

CUSTOMER:

VAUGHAN SALES ENGR: LOCATION:

JOB ORDER NUMBER: DATE: VAUGHAN QUOTATION NUMBER:

PERFORMANCE CURVE - SE4S3-460V-106

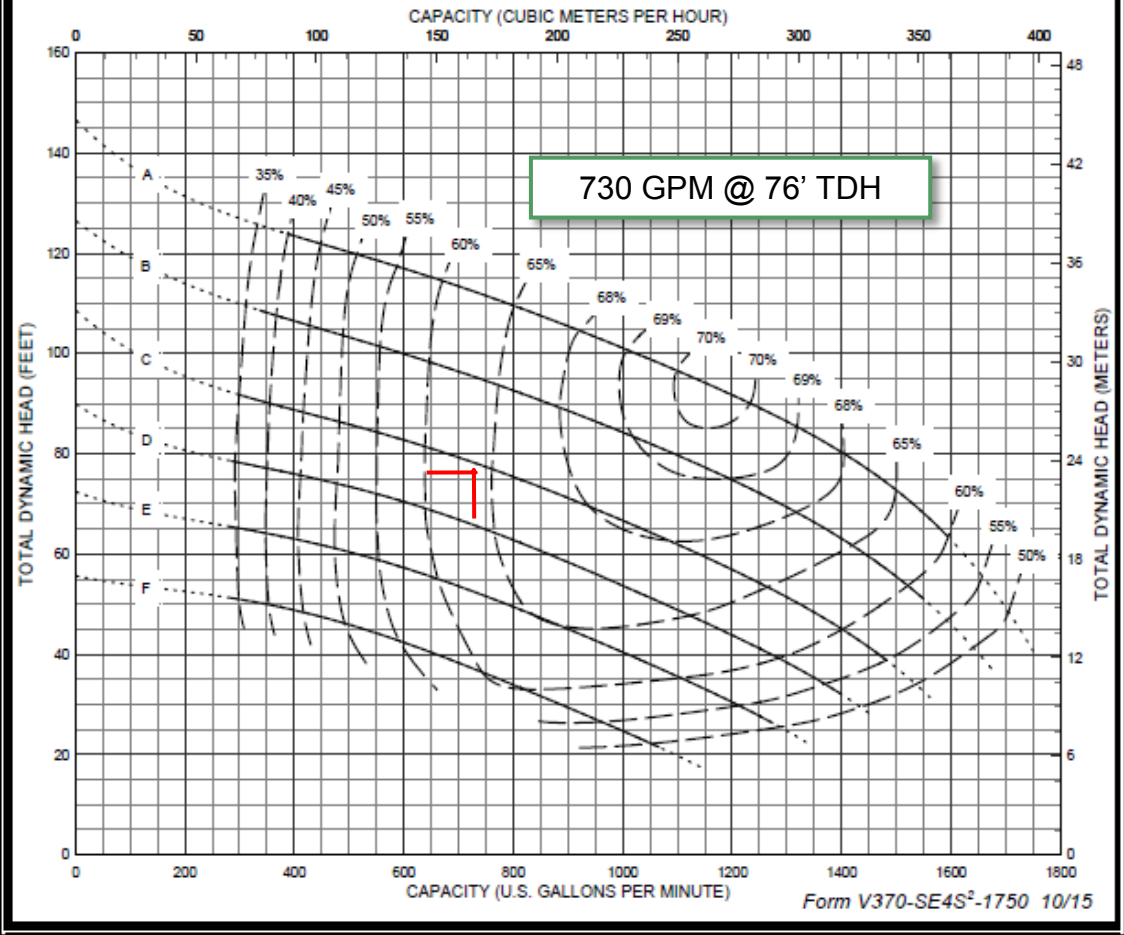
Unmatched Reliability
Vaughan®
Chopper
PERFORMANCE CURVE

Models:
SE4S

Back-Pull-Out Casing
3-Blade Impeller
4" Discharge

CURVE	POWER (HP/KW)	SPEED (RPM)	IMPELLER DIAMETER
A	50 / 37	1770	11.80" (300 mm)
B	40 / 30	1740	11.30" (287 mm)
C	30 / 22	1750	10.60" (269 mm)
D	25 / 18.5	1760	10.00" (254 mm)
E	20 / 15	1740	9.50" (241 mm)
F	15 / 11	1745	8.80" (224 mm)

DO NOT OPERATE PUMP IN DOTTED PORTION OF CURVES. PUMPS MAY EXCEED HP SHOWN IF OPERATED IN DOTTED PORTION OF CURVE. CURVES ARE SUBJECT TO CHANGE WITHOUT NOTICE. EFFICIENCIES SHOWN ARE NOMINAL BOWL. GUARANTEED MINIMUM EFFICIENCIES PER H.I. LEVEL A.



Form V370-SE4S²-1750 10/15

Unmatched Reliability

Vaughan®

Chopper

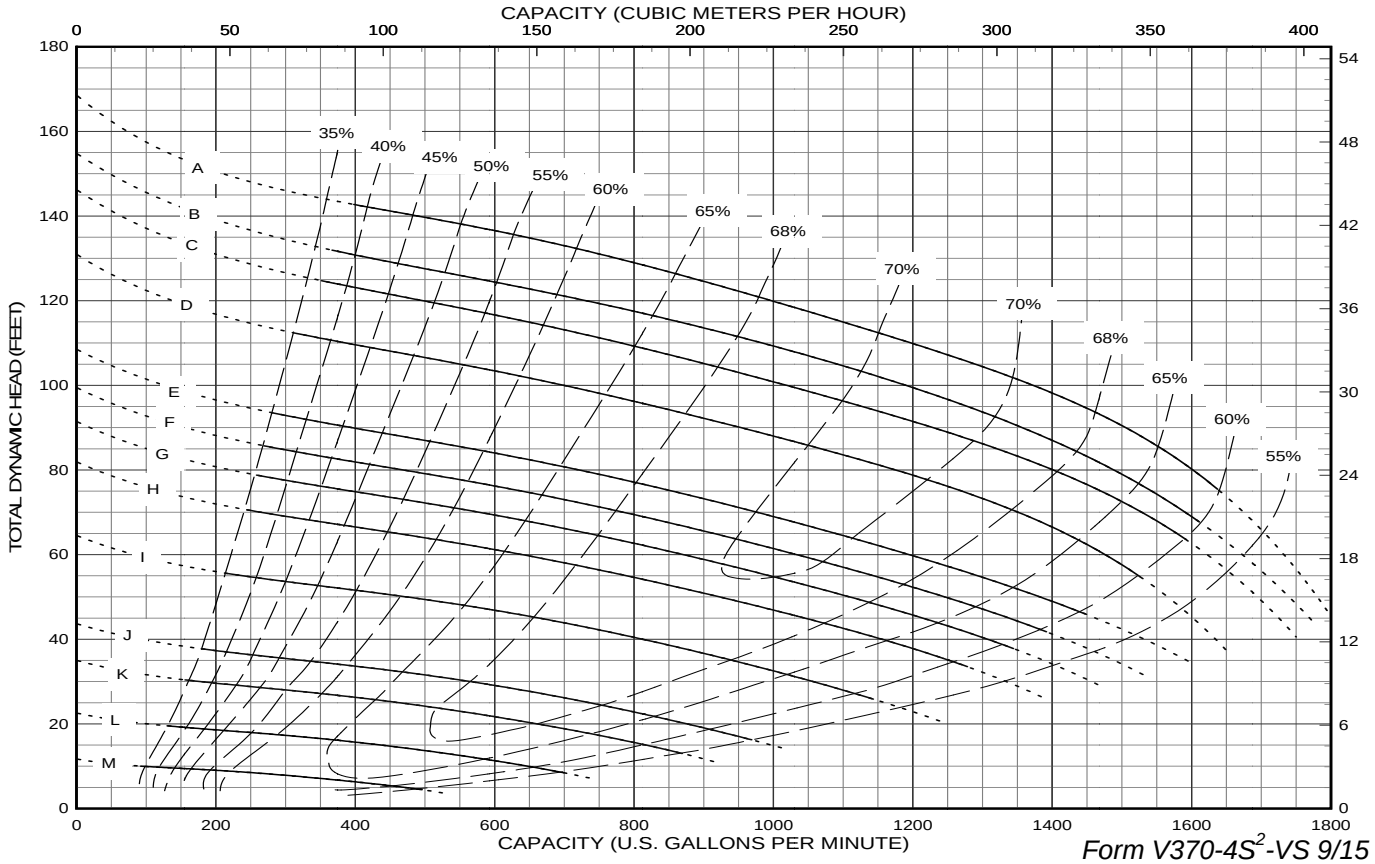
PERFORMANCE CURVE

Models:
HE4S6
PE4S6
SE4S

Back-Pull-Out Casing
3-Blade Impeller
4” Discharge
6” Suction

CURVE	POWER (HP/KW)	SPEED (RPM)	IMPELLER DIAMETER
A	60 / 45	1900	11.80” (300 mm)
B	50 / 37	1825	11.80” (300 mm)
C	50 / 37	1770	11.80” (300 mm)
D	40 / 30	1675	11.80” (300 mm)
E	30 / 22	1525	11.80” (300 mm)
F	30 / 22	1460	11.80” (300 mm)
G	25 / 18.5	1400	11.80” (300 mm)
H	20 / 15	1325	11.80” (300 mm)
I	15 / 11	1180	11.80” (300 mm)
J	10 / 7.5	970	11.80” (300 mm)
K	7.5 / 5.5	870	11.80” (300 mm)
L	5 / 4	700	11.80” (300 mm)
M	5 / 4	500	11.80” (300 mm)

DO NOT OPERATE PUMP IN DOTTED PORTION OF CURVES. PUMPS MAY EXCEED HP SHOWN IF OPERATED IN DOTTED PORTION OF CURVE. CURVES ARE SUBJECT TO CHANGE WITHOUT NOTICE. EFFICIENCIES SHOWN ARE NOMINAL BOWL. GUARANTEED MINIMUM EFFICIENCIES PER H.I. LEVEL A.



Pump Performance Datasheet

Customer	:	Quote number	: 1118500
Customer reference	:	Size	: SE4S - Trim Dia
Item number	: 001	Stages	: 1
Service	:	Based on curve number	: E4S-1750-TD
Quantity	: 1	Date last saved	: 15 Apr 2025 2:33 PM

Operating Conditions

Flow, rated	: 730.0 USgpm
Differential head / pressure, rated (requested)	: 76.00 ft
Differential head / pressure, rated (actual)	: 77.86 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed criteria	: Synchronous
Speed, rated	: 1750 rpm
Impeller diameter, rated	: 10.60 in
Impeller diameter, maximum	: 11.80 in
Impeller diameter, minimum	: 8.80 in
Efficiency	: 63.64 %
NPSH required / margin required	: - / 0.00 ft
Ns (imp. eye flow) / Nss (imp. eye flow)	: 1,988 / 6,645 US Units
MCSF	: 357.0 USgpm
Head, maximum, rated diameter	: 107.7 ft
Head rise to shutoff	: 38.28 %
Flow, best eff. point	: 1,023.2 USgpm
Flow ratio, rated / BEP	: 71.35 %
Diameter ratio (rated / max)	: 89.83 %
Head ratio (rated dia / max dia)	: 71.98 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

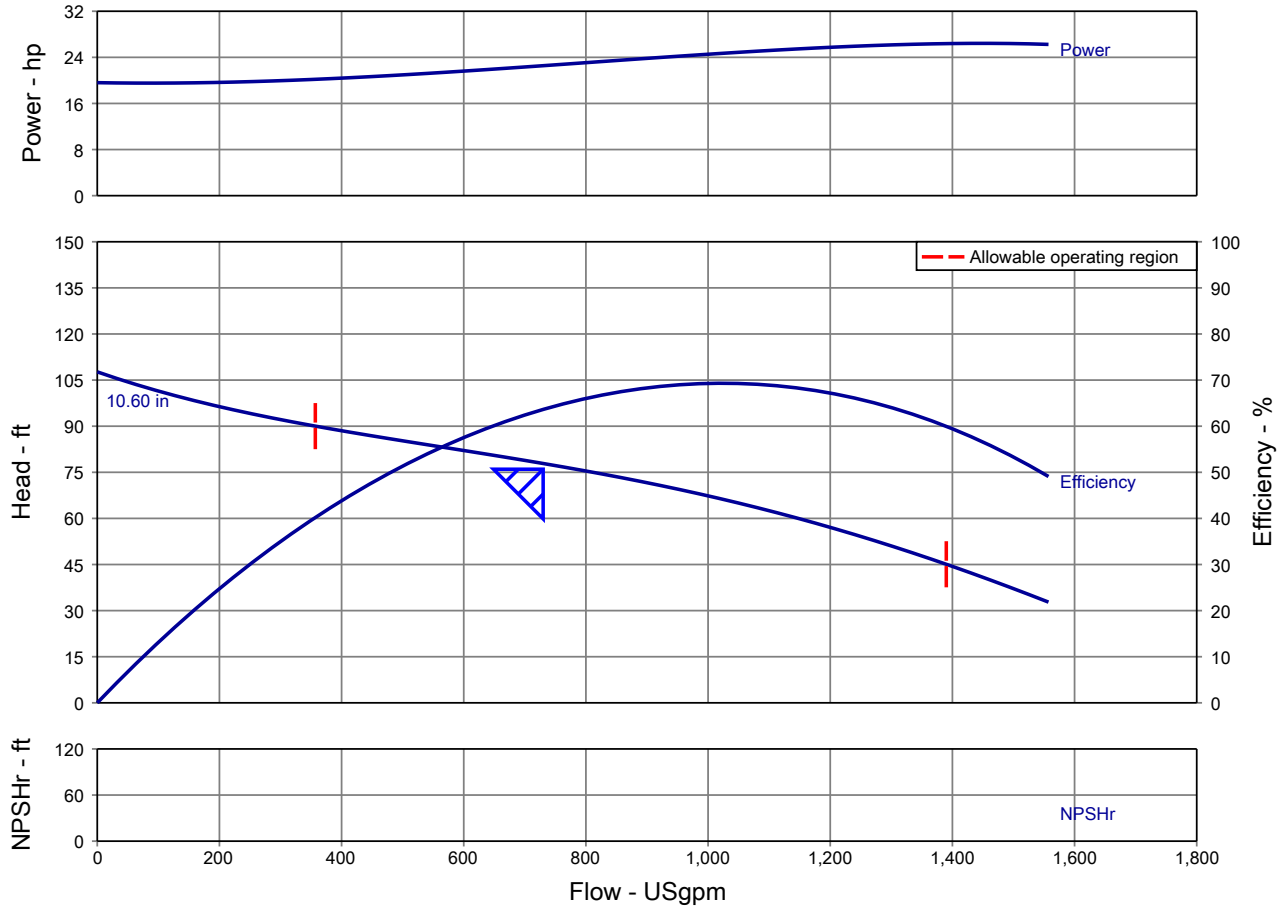
Material selected	: Standard

Pressure Data

Maximum working pressure	: 46.60 psi.g
Maximum allowable working pressure	: 150.0 psi.g
Maximum allowable suction pressure	: 100.0 psi.g
Hydrostatic test pressure	: 0.00 psi.g

Driver & Power Data (@Max density)

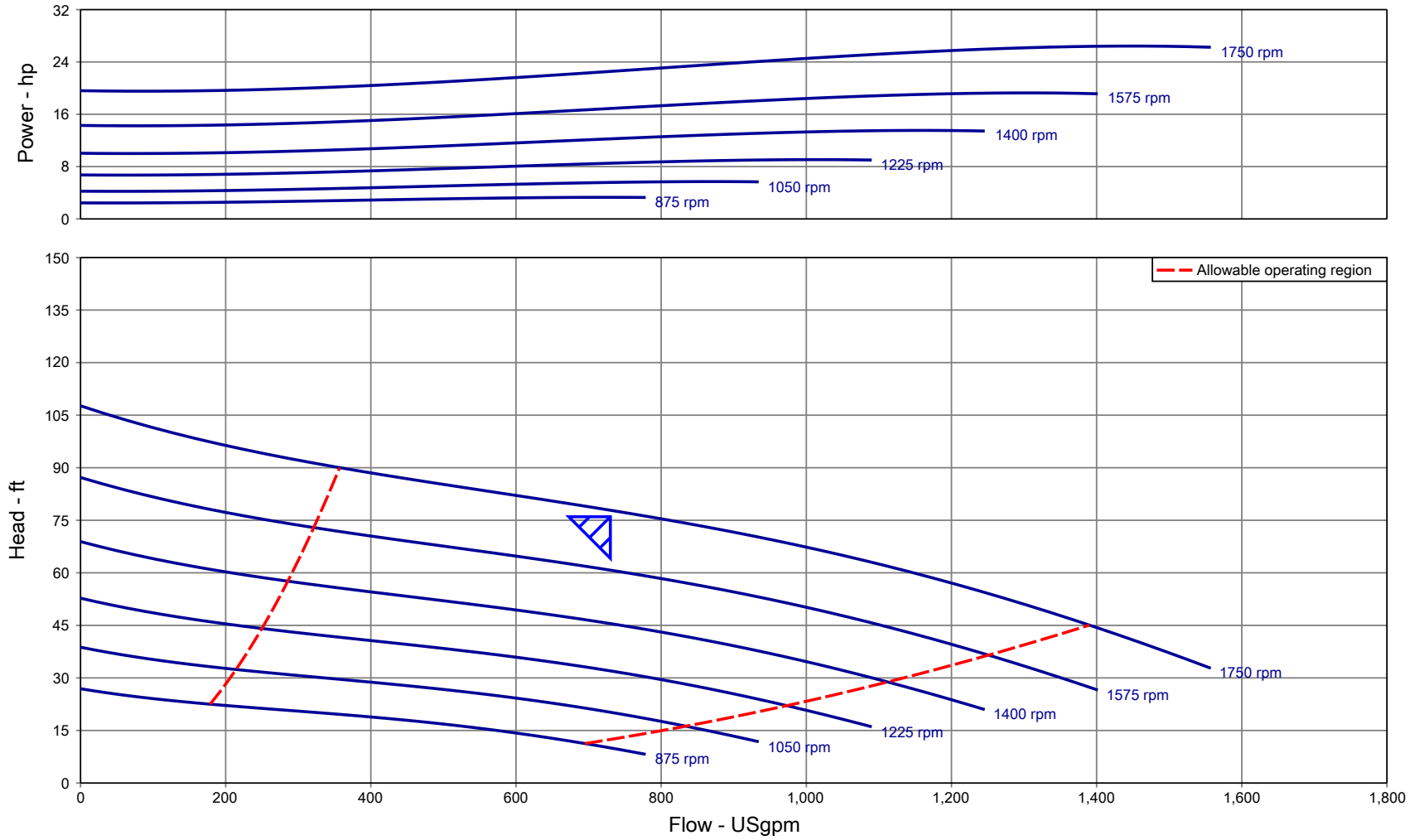
Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, rated	: 22.55 hp
Power, maximum, rated diameter	: 26.43 hp
Minimum recommended motor rating	: 30.00 hp / 22.37 kW



Customer :
End user :

Multi-Speed Performance Curve

Vaughan Quotation System 24.6.5



Item number	: 001	Size	: SE4S - Trim Dia	Flow, rated	: 730.0 USgpm
Service	:	Stages	: 1	Differential head / pressure, rated	: 76.00 ft
Quantity	: 1	Efficiency	: 63.64 %	Speed, rated	: 1750 rpm
Quote number	: 1118500	Power, rated	: 22.55 hp	Impeller diameter, rated	: 10.60 in
Based on curve number	: E4S-1750-TD	NPSH required	: - ft	Fluid density, rated / max	: 1.000 / 1.000 SG
		Site Supply Frequency	: 60 Hz	Viscosity	: 1.00 cP
Date last saved	: 15 Apr 2025 2:33 PM	Nominal speed	: 1780 rpm	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Vaughan Company, Inc. · 364 Monte-Elma Road · Montesano , WA 98563
phone: 1-888-249-CHOP · fax: 1-360-249-6155 · Chopperpumps.com

TEMPLETON & ASSOCIATES' TERMS and CONDITIONS

1. FOB shipping point, freight included.
2. Anchor Bolts/Anchor bolt design not included.
3. Only those items of equipment specifically mentioned above are included in this proposal.
4. No taxes are included in the quoted price. Any applicable sales taxes must be added to the PO prior to acceptance. If the project is tax exempt, please include the applicable tax-exempt forms with the PO.
5. Price quoted will remain firm for a period of 30 days from date of proposal.
6. Progress payments may be required as part of the purchase order.
7. This proposal is subject to the Manufacturer's standard warranty clauses and Terms and Conditions.
8. Payment terms are 100% net 30 days upon receipt of equipment.
9. TAES reserves the right to adjust its prices to reflect the impact of any new or increased tariffs affecting TAES's cost at the time of shipment. TAES will provide notice of any such adjustments along with applicable documentation supporting the price change.
10. Damages are limited to the value of the order and in no event shall Seller be liable for special, incidental, consequential, punitive, statutory, liquidated, or indirect damages, including but not limited to loss of profit, revenues, capital, business opportunity or downtime costs, arising out of the sale of products and/or services to buyer. This limitation shall apply regardless if the claimed damages arise from breach of contract, breach of warranty, tort, strict liability, or any other legal theory.
11. Seller shall maintain all insurance as required by law and shall not allow such coverage to lapse. Seller agrees to maintain Worker's Compensation coverage as required by applicable state law, commercial general liability coverage, including product liability coverage, and automobile liability coverage with limits commensurate with its scope of work. All such coverage can be met through a standard, umbrella, or any combination of policies thereof. At any time, Buyer may request certificate of insurance indicating coverage in effect and Buyer shall be named as additional insured.

An order may be placed for the equipment covered in this proposal by signing in the space provided below and returning one signed copy, or by issuing your purchase order to:

Ferguson Enterprises, LLC d/b/a Templeton & Associates Equipment Sales
4324 Brogdon Exchange, Suwanee, GA 30024

and indicating on your order that it is an acceptance of this proposal.

Submitted By: TEMPLETON & ASSOCIATES EQUIPMENT SALES

_____
Michael Sutherland

Accepted By: _____
Signature

_____
Printed Name with Title

_____
Company

Date: _____

SCOPE OF SUPPLY

Muddy Creek, NC

HUBER Micro Strainer ROTAMAT® Ro9 500/6

Represented by:
Premier Water
Rob Kelley
(704) 907-5474
rob@premier-water.com

Regional Sales Director:
Steve Frank
704-330-9378
Steve.Frank@hhusa.net

Project Number:	523749
Revision:	0
Date:	4/17/2025

HUBER Technology, Inc.
1009 Airlie Pkwy, Denver, NC 28037
704-949-1010 | www.huber-technology.com

Design Information

Technical Data		
Peak Waste Water Design Flow (Total)	**1.85**	**MGD**
Flow Per Unit	**1.85**	**MGD**
Calculated Clear Water Flow	**2.5**	**MGD**
Maximum Waste Water Flow Capacity (Per unit)	**2.2**	**MGD**
Maximum Allowable Upstream Water Level at 35 Degrees	**25.787**	**inch**
TSS Concentration	**300**	**mg/L**
Screen Type	**Perforated Plate**	**-**
Screen Basket Spacing	**6**	**mm**
Screen Basket Diameter	**500**	**mm**
Screen Length	**3752**	**mm**
Screen Height	**1743**	**mm**
Tank Width	**20**	**inch**
Installation type	**Tank**	**-**
Screen Angle	**35**	**°**
Support Structure	**Tank integrated**	**-**
Motor Power	**1.5**	**hp**
Wash Water consumption	**14**	**gpm**
Wash Water Pressure	**60**	**psi**

Equipment Details

Model	HUBER Micro Strainer ROTAMAT® Ro9 500/6
Quantity	1
Material	304L stainless steel construction; pickled and passivated in acid bath
Press Zone	One (1) solenoid valves for compaction zone, 1-inch, 120 VAC, 2-way, Class 1 Division 1, Brass body
Screen wash/spray bar	One (1) solenoid valves for spraybar/screenings wash, 1-inch, 120 VAC, 2-way, Class 1 Division 1, Brass body
Motor Data	1.5 HP, 480 VAC, 3ph, 60 Hz, S.F. 1.15, Class 1 Division 1
Supports	304L Stainless Steel Construction
Anchor Bolts	M12, 316L, Included
Level Instrumentation	Float
Discharge Chute	304L stainless steel
Screenings Bagger	Paxxo Longofill continuous bagging system to abate odors and to seal dewatered screenings
Heat Tracing	Self-regulating, C1D2, minimum temperature: -13 deg F (-25 deg C) , auger and manifold, discharge chute, tank
Bypass Tank	304L SS Bypass Tank prior to Ro9 tank included

Controls	Main Control Panel
Power Supply: 480VAC-3PH-60HZ	
Panel Classification: NONE	
Panel Location: Not specified	
1 - Enclosure, NEMA 4X, 304 Stainless Steel w/ 3-pt Latch	
1 - Enclosure, Heater w/ Thermostat	
1 - Enclosure Corrosion Inhibitor	
1 - Main Disconnect, Non-Fused w/Through the Door Handle	
1 - Motor Starter, Reversing, with Overload Relay and Branch Circuit Protection	
[1.5 HP - Max, Screen]	
1 - Motor Current Monitor	
1 - Surge Protection, 120VAC	
1 - Phase Failure Relay	
1 - Control Power Transformer, 480-120VAC	

Controls	Main Control Panel (Cont.)
1 - Programmable Logic Controller, AB Micro 850 w/ Ethernet and Required IO	
1 - Operator Interface Unit, AB PanelView 800, 4" Color Touchscreen	
1 - 24VDC Power Supply	
1 - Elapsed Time Meter - On OIU	
1 - Lot, Circuit Breakers, 120VAC: [As Required]	
1 - Lot, Pilot Lights, LED Type: [As Required]	
1 - Lot, Push Buttons: [As Required]	
1 - Lot, Selector Switches: [As Required]	
1 - Lot, Control Relays, Socket Type: [As Required]	
1 - Lot, Terminal Blocks: [As Required]	
0 - Lot, Intrinsically Safe Barrier: [None]	
1 - Lot, Dry Contacts: [Running, Fault, High Level]	
1 - UL Label	
Dual Float Switch Level Control Package, Including:	
- (2) Float Switch, Non-Mercury w/ 100' Cable	
- Dual Channel Barrier Relay	
Heat Tracing Package, Including:	
- (1) Heat Tracing Circuit - 15amp MAX	
- (1) Control Power Transformer, 304SS	
- (1) NEMA 4X, Thermostat	

Freight and Startup Services	
2 days and 1 trip	Startup services for installation inspection and startup supervision.
Freight to jobsite.	

Pricing

Equipment	Model	Quantity	Pricing
HUBER Micro Strainer	ROTAMAT® Ro9 500/6	1	Included
HUBER Bypass Tank	-	1	Included
HUBER Control Panel		1	Included
Freight and Startup Services		As described above	Included
TOTAL:			$158,600

This proposal has been reviewed for accuracy and approved for issue by: GG

Project Clarifications

For the SECTION equipment, HUBER is offering our well-proven HUBER Micro Strainer ROTAMAT® Ro9 500/6. HUBER's offering is designed to meet the performance requirements and intent of the specification. HUBER's equipment differs in construction from the specification, including (but not limited to) the following:

General Comments

- Please note, HUBER did not receive specifications or plans at the time of this proposal and has proposed the above scope based on the previous project HUBER did for the same site in 2018 (order number 13005916).
- Please note, as this firm pricing was given on a shorter lead time than standard, HUBER reserves the right to update pricing if required.
- Please note, the screenings Discharge Chute Maximum Length: 1500mm
- Please note, all washwater piping, and any necessary pipe heat tracing, to the HUBER equipment is to be supplied by others. Contractor shall connect water piping at the HUBER supplied washwater distributor.
- Please note, a duplicate control panel has been supplied, and HUBER has assume controls to be installed in a covered, non-classified, air-conditioned environment. If, due to information received after bid, HUBER determines that additional panel protection (i.e. sun shield, AC) is necessary for warranty, HUBER will issue a change order for the required amount.
- Please note, HUBER control panels are not designed to be installed in environments where Hydrogen Sulfide (H2S) is present. HUBER makes no warranty for control panels installed in environments containing H2S, and recommends these devices be installed in indoor temperature controlled environments whenever possible.
- Please note, equipment heat tracing, if selected, will include insulation and heating of the screen washwater manifold, along with insulation and heating of the rising auger tube.
- Please note, HUBER has provided their Ro9 500/6 screen in a tank-mounted configuration, with flange sizing shown on the HUBER proposal. The Contractor is responsible for all piping to and from the HUBER screen tank flanges. The Contractor is to ensure that there is free flow out of the tank via gravity, without backpressure caused by piping constrictions downstream.

General Notes

1. HUBER Scope of Supply is based on the information contained within this proposal
2. All electrical interconnections, motor disconnects, wirings, junction boxes, and terminations between the equipment and electrical components are to be provided by installing contractor.
3. Any item not specifically listed is not considered part of this scope of supply. Please contact the HUBER Technology representative listed for further clarification.
4. A fully functioning and programmed HMI/PLC will be delivered to site. Screens and symbols used on the HMI are based on HUBER's standard unless otherwise noted. Software licenses for the PLC/HMI program will not be included in this scope of supply unless stated otherwise. These items are available for additional price adder upon request.
5. The Control Panel is based on the specification provided and inclusive to meet the requirements of a Vendor designed panel, whereas the components and the factory testing of the panel will meet HUBER's requirements for function and warranty. Additional requirements or sections of the specification to meet local authority requirements or control panels designs unrelated to the equipment section, including special labeling, testing, or integration have not been included.
6. HUBER Technology, Inc. is offering the equipment and associated performance guarantees based on information available at the time of the issuance date. Information not made available to HUBER, whether HUBER is asking for specific information or not, which could affect the performance of the equipment might void warranty and performance guarantees.
7. HUBER's standard submittal documents, programming, testing procedure and O&M documentation are included.
8. All piping to and from the equipment is to be supplied by the installing contractor.

HUBER TECHNOLOGY, INC.

STANDARD PURCHASE ORDER

ALL TERMS AND CONDITIONS ARE PART OF THIS PURCHASE ORDER ("Purchase Order")

PROJECT: Muddy Creek, NC
JOB NUMBER: 523749

CUSTOMER CONTACT INFORMATION
EMAIL: _____
PHONE: _____
FACSMILE: _____

CUSTOMER BILLING ADDRESS (PLEASE FILL):

_____
_____
_____

SITE SHIPPING ADDRESS (PLEASE FILL):

_____
_____
_____

ACCEPTED: _____
Buyer

BY: _____
Title

DATE: _____

_____
HUBER Technology, Inc.

_____
Title

_____

THIS PURCHASE ORDER IS SUBJECT TO BINDING ARBITRATION
SIGN AND RETURN WITHIN 5 BUSINESS DAYS

HUBER TECHNOLOGY, INC. STANDARD TERMS AND CONDITIONS OF SALE

1. ENTIRE AGREEMENT/ORDERS.

Unless otherwise noted in Exhibit A of the Proposal, this Proposal is dependent and expressly conditioned upon Purchaser's acceptance of the attached HUBER Technology, Inc. (hereinafter "HUBER") Standard Terms and Conditions of Sale dated 4/17/2025

This agreement (the "Agreement") is between HUBER Technology, Inc., its subsidiaries and its affiliates (collectively "HUBER") and Purchaser. No order for HUBER's goods or services shall be binding upon HUBER until acknowledged in writing by HUBER. Such written acknowledgement and these Standard Terms and Conditions of Sale (the "Terms and Conditions") constitute the entire agreement between HUBER and Purchaser. Any purchase order, offer or counter-offer made by Purchaser before or after HUBER's written acknowledgement is rejected and all documents exchanged prior to HUBER's written acknowledgement are merely preliminary negotiations and not part of any agreement between the parties. For example, orders submitted on Purchaser's own purchase order forms modifying, adding to, contrary to, or inconsistent with these Terms and Conditions are expressly rejected and of no force or effect and acceptance is expressly made conditional upon assent to these terms. In no event will HUBER be deemed to have in any way changed, enlarged or modified its liabilities or obligations as fixed by these Terms and Conditions including, without limitation, situations in which HUBER satisfies an order submitted on Purchaser's own purchase order form. No other terms or conditions or modification of these terms shall be binding upon HUBER unless specifically accepted in writing by an Officer of HUBER. Merely signing a purchase order or other document as a condition of payment shall not be deemed a specific acceptance of terms therein by HUBER.

Purchaser shall have been deemed to agree to these Terms and Conditions upon the earlier of acceptance of HUBER's quotation, acceptance of delivery of the goods or services or the issuance of a purchase order to HUBER.

2. Scope of Supply/Work and Ancillary Equipment

This Proposal includes only those items specifically mentioned in the equipment descriptions. Any items which may be necessary for the operation of the equipment, but are not specifically mentioned HUBER's Scope of Supply, such as motors, drives, controls, or supports, are to be supplied via additional quotation separate from this offering.

HUBER will use HUBER products or HUBER standards and colors whenever possible unless specifically called out in the quotation.

Any deviations from the HUBER standard mechanical and electrical specifications must be discussed with HUBER and agreed upon. If HUBER mechanical and electrical specifications are changed, performance of HUBER equipment may be affected. HUBER reserves the right to charge additional costs to the equipment price for any non-standard mechanical and electrical components required by the Purchaser and not explicitly stated in HUBER's scope of supply in the form of a Change Order and as stated below under Article 9 Submittals.

3. Exclusions Include:

- Financing
- Cranes and/or lifting devices
- Unloading and/or storage of equipment on job site
- Foundation design and engineering (HUBER will only furnish equipment drawings and data)
- Utilities for erection, installation and operation
- Gauges and instrumentation not specifically described in HUBER scope of supply
- Interconnecting wiring, conduit, piping, tubing, valves, fittings, etc. between the equipment and other equipment and/or control devices and control panel.

- Tools, oil, grease, grease gun, dumpster(s), or bin(s).
- All other items not specifically described in HUBER scope of supply

4. Abrasion or Corrosive Materials

All of HUBER's machines, control panels, and systems are manufactured from 304L or 316L grade stainless steel. Purchaser expressly acknowledges that HUBER has no control over the environment or materials where the HUBER equipment will be installed. The environment or materials the equipment may be exposed to may be abrasive or corrosive. This Proposal makes no representation or warranties concerning the service life of the equipment against such abrasion or corrosion. The concentration of chloride and hydrogen sulfide (H2S) in the equipment operating environment shall be kept below the following values:

- Maximum Chloride for V2A (304, 304L)* 100mg/L
- Maximum Chloride for V4A (316L, 316Ti)* 400mg/L
- Maximum Chloride for V4A (316L, 316Ti)** 250mg/L
- pH Value of the Wastewater/Washwater >6.5
- Iron Content in Washwater <0.50mg/L

*no hydrogen sulphide in the area of the stainless steel

** with a maximum hydrogen sulphide content of 6 ppm (H2S levels must be less than 6ppm in the area of all electronics and controls)

Tin plated copper wiring is recommended for all customer field wiring installations

Machines made from 316 grade stainless steel are available at an additional price for extremely harsh operating environments upon request.

5. PRICES.

Prices are in U.S. Dollars unless noted otherwise. Until acceptance of a purchase order is acknowledged in writing by HUBER, all prices are subject to change. Written quotations expire thirty (30) calendar days from the date of quotation unless specified otherwise. After expiration of validity HUBER reserves the right to adjust pricing to take into account any significant increases in material costs such as steel, stainless steel finished products, stainless steel coil, etc. The determination to increase pricing to do increased material costs is within HUBER's sole discretion. Due to the current volatility of raw materials and shipping HUBER cannot guarantee to hold prices beyond the validity date. HUBER therefore reserves the right to adjust our pricing based on applicable price indexes at time of order. Verbal quotations are non-binding on HUBER. Quoted prices do not include sales, excise, municipal, state or any other government taxes. All taxes and other governmental charges upon the production, manufacture, distribution, sale or use of goods or services to the extent required or not forbidden by law to be collected by HUBER from Purchaser, shall be paid by Purchaser to HUBER unless Purchaser furnishes HUBER with exemption certificates acceptable to the relevant taxing authorities. Price does not include installation or building modifications. Typographical and/or clerical errors made by HUBER are subject to correction.

If Purchaser causes or requests delays in manufacture or shipment beyond six (6) months from acceptance of Purchase Order, HUBER shall have the right to increase price based on any actual escalation in labor, material, overhead, and component costs. HUBER also reserves the right to charge Purchaser for any direct costs, reasonable storage costs caused by such delays and a finance charge of 1.5% of the Contract value per month.

6. TERMS OF PAYMENT.

Invoices are net thirty (30) days from the date of invoice, unless specified otherwise and approved in writing by HUBER. In the event that the purchase order between Purchaser and HUBER requires partial payments to be made by Purchaser, Purchaser shall pay those required amounts in a timely manner or HUBER will be permitted to suspend, without penalty or liability of any kind, delivery of future goods and services to the Purchaser and terminate any agreement between the parties, even though partial payment for such undelivered goods or services may have already been received by HUBER. At any time prior to or after the commencement of delivery or work pursuant to the Agreement, HUBER may request that Purchaser provide reasonable documentation demonstrating that Purchaser has the ability to perform all payment obligations specified herein.

Progress payments are as follows:

- 20% upon delivery of submittals (net 30 days)
- 75% upon delivery of equipment (net 30 days)
- 5 % upon startup of equipment (net 30 days)

Past due accounts will bear interest at the rate of 1.5% per month of the invoiced amount. All invoices are payable in U.S. dollars, unless specified otherwise and approved by HUBER in writing. Acceptance of bank drafts, checks or other form of payment shall be subject to immediate collection of the full face amount thereof. HUBER may, at its discretion, impose a transaction fee on payments processed via wire transfer or by Letter of Credit.

HUBER reserves the right at any time to suspend credit or to change credit terms provided herein when in its sole opinion the financial condition of Purchaser so warrants. In such case, in addition to any other remedies provided herein or by law, HUBER may request cash payment or satisfactory security from Purchaser prior to shipment of goods.

In the event of nonpayment of an invoice when due, and without prejudice to other lawful remedies, HUBER shall have the right, without penalty or liability of any kind, to suspend further work or the delivery of future goods under this Agreement and terminate this Agreement or any other agreement with Purchaser until such invoice is paid in full; provided, however, that if such invoice remains unpaid for more than five (5) days after written demand by HUBER, HUBER may terminate this Agreement without penalty and recover all damages as a result of Purchaser's Breach.

7. RETAINAGE.

There shall be no retainage under this Agreement.

8. TAXES AND OTHER CHARGES.

The prices for Goods and/or Services do not include any sales, use or other taxes or charges payable to state or local authorities. In addition to HUBER's invoice price or quote price, Purchaser is also responsible for payment of any use-tax, sales tax, excise tax, VAT tax, duty, custom, inspection or testing fee, and/or any other fee, tax, or charge imposed by governmental or non-governmental authority arising from the Goods and/or Services provided by HUBER. Purchaser is responsible for and bears the risk of establishment of a valid exemption from any fee, tax, or charge. In the event HUBER is required to pay any of the fees, taxes, or charges listed in this paragraph, Purchaser herewith agrees to immediately reimburse HUBER for this cost, or in lieu of such payment by HUBER, Purchaser agrees to timely provide an exemption certificate or other comparable document to the entity or authority imposing said fee, tax and/or charge. In the event that any tariffs, taxes, or import duties are imposed between the goods purchased to the time of shipment, the cost of these charges will be passed on to the Purchaser. If the Purchaser does not accept the additional costs or if the Purchaser is unable to fulfill these payment obligations, HUBER reserves the right to cancel the order and issue a refund on invoices paid up to the time of cancellation. Purchaser further agrees to waive any and all claims regarding the reasonableness of such payment and will be liable to HUBER for reasonable attorneys' fees and/or court costs incurred by HUBER as a result of Purchaser's failure to pay the charges listed in this paragraph.

Purchase Orders

All Purchase Orders are to be faxed or mailed to:

HUBER Technology, Inc.
1009 Airlie Pkwy
Denver, NC 28037
Phone: (704) 949-1010
Fax: (704) 949-1020

All Purchase Orders are subject to acceptance by HUBER and acceptance of HUBER's Standard Terms and Conditions.

9. Submittals

HUBER will provide documentation to the Purchaser per the following schedule:

- An electronic copy of the Submittals will be provided via HUBER Share 4-6 weeks after acceptance of a written purchase order.
- Operation & Maintenance (O&M) manuals will be provided electronically via HUBER Share prior to equipment startup.
- Printed hard copies of the submittals and/or O&M manuals are available at an additional cost.

CHANGES TO DELIVERY DATE MAY RESULT IF THESE ITEMS ARE NOT ADDRESSED (If applicable).

- All necessary information including, but not limited to, up-to-date layouts, technical specifications, prints and pertinent specifications. These must be in AutoCAD DWG, DXF, IGES or STEP format and be supplied within 1 Week (5 business days) of P.O. receipt, or equipment prices and delivery may be impacted. A more specific date will be set upon the Seller's acknowledgment of the Buyer's order, and is subject to Seller's timely receipt of all conformed drawings, specification, and other information necessary for the design, manufacture, and factory witness test of the machine or product, if applicable. Seller shall not be liable to the buyer for any loss or damage direct or consequential due to any delay in delivery.
- Submittals: Submittals to be provided within 4-6 weeks of the executed PO and receipt of all required technical information. After receipt of the approval submittal(s), they must be approved as is, or changes noted, and signed by the buyer. The buyer must return the signed approval submittal(s) to HUBER Technology within 4 weeks (20 business days) of receipt. HUBER Technology will exercise its knowledge and experience by performing an internal design review, bypassing a customer review process. This requirement may be required if the delivery date is to be achieved. Any changes in the process after purchase order is issued may result in a later delivery date, change order, or an addendum to the proposal. All changes must appear in writing using HUBER Technology C.O. (Change Order) form and signed by a representative of both HUBER Technology and the buyer before any changes can be made.
- Timing:
- Project schedule is based upon the following: HUBER Submission of Approval Submittals to be within 4-6 weeks of executed PO and Customer approval or changes noted on Approval Submittal within 4 weeks (20 business days) of Submittal receipt.
- In cases where changes or comments are noted, HUBER to supply resubmittal within 4 weeks (20 business days) of receipt of comments. Customer approval or changes noted on Approval Submittal within 2 weeks (10 business days) of Submittal receipt.
- Any delays in the above approvals can impact overall project timing. HUBER Technology reserves the right to adjust project schedule based on customer delays to these milestones. Please note, each day late can result in up to a 2 day delay to project delivery. [Example: Submittal comments received 9 weeks after receipt (5 weeks (25 work days) past the due date) can result in up to a 10 week (50 work day) shift to the delivery schedule.]
- Delays in customer milestones exceeding 6 weeks are subject to re-quote. NOTE: Changes or comments not captured in the scope may require a change order and can impact project schedule and cost. If submittals are not finally approved within 6 months of initial submission, this order is subject to change order for increase cost if necessary.
- Any delay in the above-referenced process that is not solely due to the Seller's omissions and errors shall not be a basis for delay damages. Seller expressly reserves the right to increase costs and charge for costs relating to any delays not solely attributable for the Seller in the submittal process.

10. Project Management

HUBER will assigned a Project Manager for the duration of the contract. Project Management services are included in this package and are as follows:

- Main point of contact for communication, for submittals, and shall make adjustments at their discretion.
- Provision of a complete critical path project schedule for HUBER equipment
- Coordination with HUBER manufacturing on materials procurement and fabrication to and with HUBER shipping/logistics to ensure HUBER commitments are maintained.
- No contractual warranty or indemnity relating to any service performed by Project Manager is extended to HUBER, nor are any Project Managers authorized to bind HUBER with any oral representations or statements in conflict with this Agreement.

11. PURCHASER CANCELLATION

If at any time prior to delivery of equipment, the Purchaser terminates this Agreement and/or refuses delivery, HUBER shall be entitled to receive all costs incurred during the design and manufacturing of the equipment, all costs and expenses incurred in disposing of the equipment, all costs resulting from the cancellation of any agreements with relevant suppliers and all anticipated overhead and profit on the equipment outlined in the Agreement.

12. DELIVERY.

HUBER shall not be liable for any damage as a result of any non-delivery or delay, including, without limitation, an act of God; act of Purchaser; act of HUBER embargo; other government act, regulation or request; fire; accident; strike; war; boycott; slowdown; riot; or delay in transportation or inability to obtain necessary labor, materials, or manufacturing facilities. HUBER will use its best efforts to meet promised delivery dates, but under no circumstances shall HUBER be liable for any direct, or indirect, consequential, incidental, liquidated or other damages for delay in delivery.

Purchaser will notify HUBER within thirty (30) days after order acceptance of the scheduled delivery date. If Purchaser does not notify, a delivery date of six (6) months, unless otherwise specified by HUBER, after notice to proceed and/or approval of submittals is agreed. For any delays by Purchaser after commencement of manufacturing, a finance charge of 1.5 % per month of the contract value will be assessed to Purchaser.

HUBER reserves the right to substitute suitable alternative materials and components where necessary.

Where the services are to be performed on Purchaser's premises, Purchaser agrees to provide HUBER on a timely basis with such access, machine downtime, utilities and equipment as HUBER shall reasonably require in order to perform the services in accordance with the Agreement. If Purchaser fails to perform its obligations or shall fail to perform them in a timely manner, Purchaser acknowledges and agrees that HUBER shall be entitled to delay performance of the services, without penalty or liability of any kind, until such time as Purchaser has complied in all respects with its obligations and to increase the price for the services to reflect any increased cost to Huber caused by Purchaser's failure to perform or late performance.

If delivery is delayed or deferred by Purchaser beyond the scheduled date, payment shall be due in full when HUBER is prepared to ship the goods or perform the services. The goods may thereafter, at HUBER's option, be stored at the risk and expense of Purchaser. If HUBER undertakes storage of the equipment, the Purchaser shall pay an additional $0.70 per sf. ft. of space and an additional weekly value for each week storage continues as outlined below:

Total P.O Value	Value added storage fees
≤ $50,000	$175
$50,001-$100,000	$340
$100,001-$250,000	$625
$250,001-$500,000	$1,350
$500,001-$1,000,000	$2,700
>$1,000,000	Calculated per project

All amounts outlined above for storage shall be billed to the Purchaser at the time it is willing and able to accept delivery of the equipment. The storage fee shall be due upon receipt of the HUBER invoice and is a condition precedent to delivery of the equipment.

HUBER may at certain times provide goods or services to Purchaser prior to the issuance, delivery and acceptance of a corresponding purchase order. In such cases, these Terms and Conditions shall apply to such transactions and Purchaser shall be deemed to have accepted such Terms and Conditions upon HUBER's delivery of goods or performance of services.

13. GOODS ACCEPTANCE.

It is HUBER's intent to deliver complete orders in good condition to the final destination dictated by the Purchaser. All equipment and components delivered to the receiving location must be duly inspected upon receipt. Any visible damages must be noted on way-bill and followed up with a full inspection within a period of seven (7) days from delivery date. If a written report is not submitted to HUBER within this period it is assumed that the equipment was received in good condition, meets the specifications of the purchase order, constitutes unqualified acceptance by the Purchaser, and Purchaser waives any rights to rejection or remediation of delivered equipment.

14. FIELD SERVICE.

"Field Service" refers to the services of a Huber factory-trained representative at the site of end-use for installation inspection, start-up, observation and operator training. "Field Service" refers also to any subsequent investigations of warranty issues, operational difficulties, Purchaser complaints, or requests for post-warranty service. Purchaser acknowledges that HUBER Field Service representatives shall make all arrangements necessary with labor unions for their presence on the site. No contractual warranty or indemnity relating to Field Service is extended by HUBER, nor are its Field Service representatives authorized to bind HUBER with any oral representations or statements in conflict with or addition to the governing contract terms or any manual or instructions provided by HUBER. This paragraph shall apply to any and all initial and subsequent Field Service provided by HUBER relating to the Goods sold to the Purchaser. Any field service work performed at site after expiration of the initial warranty period is warranted for sixty (60) days after the work has been completed.

An authorized HUBER Service Technician will be scheduled to provide start-up and commission assistance. To meet demand, HUBER may, at its sole discretion, source from an available international network of authorized technicians. HUBER is able to quote additional installation, start-up supervision, and training, which is not specifically included in the scope of supply, at the Purchaser's written request. For such additional services Purchaser shall pay $1,240 per day plus expenses, for eight (8) hours per day.

- At the request of the Purchaser, overtime service will be provided at a rate of 1.5 times the regular rate for weekdays, and 2.0 times the regular rate for weekends and/or holidays.
- "Expenses" are defined as the costs of travel from HUBER's location to the point of installation and return; together with accommodation and living expenses during the start-up period of field service. HUBER will make all reasonable efforts to provide a HUBER Representative located within North America. However, some circumstances will require travel from Europe.
- Charges for all time involved will be invoiced. The full net invoice is payable within thirty (30) days of receipt by Purchaser.
- In the event of on-site delays which are beyond HUBER's control, including proper installation, training and start-up, additional charges will be invoiced ($155/hour, plus expenses).
- Please note that once startup services are scheduled, this time is reserved exclusively for that service(s). Cancellation and/or rescheduling prior to the scheduled dates are subject to airline change fee(s) plus the differences in the cost for the new airline ticket(s) and any additional expenses that may occur (including hotel cancellation fees and airline agent fees).

HUBER requires clients to maintain at least one employee or site representative onsite whenever a HUBER representative may be required to work. This includes the commencement of work after normal business operation hours. It is the responsibility of site employee and or site representative to maintain all regulated safety standards and requirements for the project site. If a site representative or site employee is unable to remain on site after hours, HUBER Representatives will stop all work at that time to return when a site representative or employee is available to be on site. Furthermore, if a HUBER Representative encounters an unsafe work environment that HUBER Representative is required to stop all work and report the unsafe items to the site representative and stand by until these items are deemed safe for work to continue. As the schedule for work commencement is set prior to the start of work any travel changes and or additional hours needed to complete the approved scope due to delay or stoppage of work caused by actions or lack of action from the site representative of will require a change order and will be billed accordingly.

15. SHIPMENT/RISK OF LOSS.

Freight is delivered with duty paid (D.D.P.) to Job site. HUBER will use commercially reasonable efforts to meet delivery dates stated in advance of actual shipment of goods or performance of services, but in no event shall such quoted delivery dates be deemed to represent fixed or guaranteed delivery dates. Under no circumstances will HUBER be liable for any direct, or indirect, consequential, incidental, liquidated or other damages for delay in delivery.

HUBER will make commercially reasonable efforts to maintain the following schedule:

- Equipment delivery 26-36 weeks after approved submittals or notice to proceed.
- Operation & Maintenance (O&M) manuals will be provided electronically via HUBER Share prior to equipment startup. Printed hard copies of the O&M manuals are available at an additional cost.
- For any delays in delivery which are beyond HUBER's responsibility, a finance charge of 1.5% of the contract value per month and all direct Costs incurred as a result of the delay will be due and payable to HUBER upon request/invoice. Under no circumstances, shall HUBER be liable for any direct, or indirect, consequential, incidental, liquidated, or other damages for delay in delivery.

Method and route of shipment will be at the discretion of HUBER unless specified otherwise by Purchaser and agreed by HUBER, and any additional expense of the method or route of shipment specified by Purchaser shall be borne by Purchaser. Claims for shortage or other quantity errors must be made in writing to HUBER within seven (7) days after receipt of shipment. Failure to give such notice shall constitute unqualified acceptance and a waiver of all such claims by Purchaser.

HUBER, in its sole discretion, may accommodate Purchaser requests for delivery of goods in installments if such requests are confirmed in writing by HUBER. Such installment deliveries, when separately invoiced, shall be paid for when due per invoice without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Purchaser of its obligations to accept remaining deliveries.

16. GOVERNMENT STANDARDS.

HUBER applies quality standards in our manufactured equipment that are designed to meet and comply with federal government occupational safety, noise, sanitation and health standards. The Purchaser is solely responsible for compliance of the equipment and its operation with any state or local laws, codes, ordinances, or regulations, unless otherwise specified by HUBER in its proposal.

17. LIMITED WARRANTY.

HUBER warrants that the equipment and components furnished will be free from defects in workmanship and materials and perform the general process function intended, solely under the conditions defined by HUBER for a period of (a) twelve (12) months from completion of installation, start-up or owner acceptance of the equipment assuming the equipment is accepted by the owner within 6 months of delivery or (b) eighteen (18) months from the date of delivery to Purchaser, whichever date comes first. HUBER will replace, modify or repair, at its sole option, any such defective component or equipment at no charge provided that HUBER is notified promptly in writing of any claimed defect. If requested by HUBER, any such defective part or component shall be returned to HUBER, freight prepaid. HUBER will provide on-site Field Service when reasonably assured of payment therefore if this warranty does not apply or when such service is required in its judgments. This warranty does not apply to any defect or malfunction arising out of failure to store, install, operate or maintain the equipment in accordance with instructions by HUBER. Warranty shall be voided for any misuse of equipment; operation under conditions other than those defined by HUBER in its operation and maintenance (O&M) manuals for said equipment, or gross operator negligence. Any unauthorized modification or alteration of the equipment or repair or replacement of components may void this warranty, at the sole option of HUBER. For any billable repairs completed outside of the initial warranty period, a sixty (60) day guarantee on work performed and parts supplied will apply.

HUBER MAKES NO OTHER WARRANTY, EXPRESS OR IMPLIED, WITH REGARD TO THE DESIGN, SALE, MERCHANTABILITY OR FITNESS OF THE GOODS FOR A PARTICULAR PURPOSE OR USE EXCEPT AS EXPRESSLY SET FORTH IN HUBER'S TERMS AND CONDITIONS. HUBER IS NOT SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES ARISING OUT OF BREACH OF CONTRACT OR WARRANTY, TORT CLAIMS INCLUDING NEGLIGENCE, GROSS NEGLIGENCE AND STRICT LIABILITY, OR ANY OTHER THEORIES OF LAW. HUBER IS UNDER NO EVENT LIABLE FOR ANY SPECIFIC, INDIRECT, INCIDENTAL OR CONSEQUENTIAL LOSS, DAMAGES, EXPENSE, INJURY, DISMEMBERMENT, OR DEATH OF ANY KIND WHATSOEVER.

18. EXCLUSIVE REMEDIES.

Purchaser acknowledges that its sole and exclusive remedies for breach of the Limited Warranty shall be replacement or repair by HUBER of any defective part or component, and payment of the reasonable out of pocket costs incurred in connection with replacement or repair if such costs are approved in advance by HUBER, or refund of 80% of the purchase price if HUBER, in its sole discretion, concludes the equipment cannot be repaired or replaced. This remedy excludes any other direct, indirect, consequential, incidental, special or other form of damages. It also excludes any extraordinary costs for removal or re-installation of HUBER equipment, such as crane rental, structural alteration, or demolition, necessitated by building design or configuration.

19. LIMITATION OF LIABILITY/INDEMNITY.

HUBER's liability on any claim other than Limited Warranty claim as outlined in Paragraph 18, including but not limited to any loss or damage arising out of any transactions under this Agreement or from the performance or breach thereof or connected with any goods or services supplied hereunder, or the sale, resale, operation or use of goods, whether based on agreement, tort (including negligence) or other grounds, shall not exceed 10% of the purchase price of such goods or services or part thereof involved in the claim, regardless of cause or fault. This limitation of liability and remedies reflects a deliberate and bargained-for allocation of risks between HUBER and Purchaser and constitutes the basis of the parties' bargain, without which HUBER would not have agreed to the price or terms of this transaction. **EXCEPT FOR A CLAIM UNDER THE LIMITED WARRANTY DURING THE WARRANTY PERIOD, IN NO EVENT SHALL SELLER'S AGGREGATE LIABILITY ARISING OUT OF OR RELATED TO THIS AGREEMENT, WHETHER ARISING OUT OF OR RELATED TO BREACH OF CONTRACT, TORT (INCLUDING NEGLIGENCE) OR OTHERWISE, EXCEED 10% OF THE PURCHASE PRICE.**

HUBER SHALL NOT IN ANY EVENT BE LIABLE WHETHER AS A RESULT OF BREACH OF AGREEMENT, WARRANTY, TORT (INCLUDING NEGLIGENCE) OR OTHER GROUNDS FOR INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR REVENUE, LOSS OF USE OF GOODS OR ASSOCIATED PRODUCTS, BUSINESS INTERRUPTION, COST OF CAPITAL, COST OF SUBSTITUTE GOODS, FACILITIES OR SERVICES, DOWNTIME COSTS, OR CLAIMS OF PURCHASERS OF PURCHASER FOR SUCH DAMAGE. In addition, if HUBER furnishes Purchaser with advice or other assistance regarding any goods or services supplied hereunder, or any system or equipment in which any such goods may be installed, and which is not required pursuant to this transaction, the furnishing of the advice or assistance will not subject HUBER to any liability, whether based on agreement, warranty, tort (including negligence) or other grounds.

In the event Purchaser modifies HUBER goods or incorporates HUBER goods into another product or component part, Purchaser agrees to hold harmless and indemnify Huber from any and all claims, liabilities, losses, costs and expenses (including reasonable attorneys' fees) involving personal injury or property damage. Purchaser also agrees to hold harmless and indemnify HUBER from any patent or other intellectual property claims related to (i) any HUBER goods made in accordance with Purchaser's designs or specifications; or (ii) the use of any drawings provided to HUBER by Purchaser for use in the manufacture, production or assembly of such goods.

20. TITLE.

Notwithstanding delivery, installation or start-up, title to all equipment furnished shall remain solely with HUBER until the full purchase price is paid by Purchaser. Until such time, HUBER may enter the premises where such equipment is then located and repossess and remove such equipment by any lawful means as this is the property of HUBER Technology. Purchaser agrees to do all acts deemed necessary or desirable or requested by HUBER to maintain HUBER's rights in, and title to such equipment.

21. WAIVER.

The failure of Huber to insist in any one or more instances, upon the performance of any of the Terms and Conditions as set forth herein or the failure of HUBER to exercise any of its rights hereunder shall not be construed as a waiver or relinquishment of any such terms, conditions or rights and shall not effect HUBER's right to insist on strict performance and compliance with regard to any future performance of these Terms and Conditions.

22. CHOICE OF LAW.

This Contract shall be exclusively governed by the laws of the State of North Carolina, without regard to its conflict of law provisions. HUBER and Purchaser further consent to the exclusive personal jurisdiction of any applicable court, in the county of Lincoln, North Carolina for any legal action or proceeding brought to enforce, construe or interpret these Terms and Conditions. Venue is proper only in the North Carolina Superior Court of Lincoln County. Each party hereto irrevocably submits to the jurisdiction of each court in each such action or proceeding.

23. DISPUTE RESOLUTION/ATTORNEYS' FEES.

Any controversy or claim arising out of or relating to this Contract or its breach shall be settled by arbitration conducted in Denver, North Carolina in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association and North Carolina law and judgment on the award rendered by the arbitrator(s) may be entered in any court of competent jurisdiction. The arbitrator shall award attorneys' fees, costs, witness costs, expert witness fees, arbitrator compensation, arbitrator fees, exhibit fees, travel costs and other amounts deemed reasonable to the prevailing party as defined by North Carolina General Statute §44A et al.

24. ASSIGNMENT, WAIVER, ENTIRE AGREEMENT, SEVERABILITY.

Neither party shall assign or delegate any of its rights or obligations under this Agreement without the prior written consent of the other party, which such consent shall not be unreasonably withheld, except that either party may assign or delegate its rights or obligations hereunder to an Affiliate without the other party's consent. As used herein, the term "Affiliate" shall mean any entity that directly or indirectly through one or more intermediaries, controls or is controlled by, or is under common control with the entity specified. Huber may terminate this Agreement upon written notice to Purchaser without any further liability to Purchaser if there is a change of control of Purchaser. The Agreement constitutes the entire agreement between the parties with respect to its subject matter, and supersedes all prior oral or written representations or agreements by the parties with respect to the subject matter of this Agreement. Neither the Agreement nor any of its provisions may be modified, amended or waived, whether orally, through the parties' course of performance, course of dealing or course of conduct, or manifested in any other way, unless in writing and signed by an authorized officer of Huber. It is the express intention of the parties that such requirement for written modifications, amendments or waivers be strictly enforced notwithstanding judicial precedent or statutory provisions to the contrary. Any provision found invalid or unenforceable will not affect the validity or enforceability of any other provision and the invalid provision may be judicially modified to the extent enforceable.

SANITAIRE

a xylem brand

Diffused Aeration Equipment

for

Muddy Creek WWTP

Aeration

Sanitaire #761532

July 30, 2025

sp C:\USERS\SPLEVIN\XYLEM INC\OPPORTUNITIES SITE - 00761532\2025.07.28 Aeration Setup_Muddy Creek_761532.aer

Sanitaire Aeration Design Inputs for: Muddy Creek WWTP

Tank Geometry

2 Trains each Consisting of: 3

Parameter	Units	Pass 1
Parallel Reactors		1
Pass Process		Aerobic
SWD	ft	18.0
Submergence	ft	17.2
Volume	ft^3	35,856.0
Reactor Geometry:		Rect
Length	ft	99.6
Width	ft	20.0

Oxygen/Air Distribution

	Zone	1	2	3
	Pass	1	1	1
Peak Day SOR		61.0%	25.0%	14.0%
Avg SOR		61.0%	25.0%	14.0%

Oxygenation

Parameter	Units	Peak Day SOR	Avg SOR
No. Trains Operating		1	1
Oxygen Requirement	lb/day	4,841.0-S	2,004.0-S

Standard Oxygen Correction Factor Parameters

Parameter	Units	Peak Day SOR	Avg SOR
Site Elevation	FASL	496	496
Ambient Pressure	PSIA	14.46	14.46
Water Temperature	°C	***20***	20

Notes:

Bold, Italicized text indicate assumptions made by Sanitaire

A - Indicates Actual (AOR) Requirement.

S - Indicates Standard Condition (SOR) Oxygen requirement.

If the AOR/SOR parameter is not given, then its value will be evaluated later if suitable alpha, beta, D.O., theta, pressure, and temperature data is supplied.

Round tanks are evaluated as rectangular tanks diameter equal to length and equal surface area.

Annular tanks are evaluated as rectangular tanks of width equal to the annular width and equal surface area.

Sanitaire Project Name: Muddy Creek WWTP
Sanitaire Project #761532
Design Summary

		Operating Point & O2 Distribution	
	Units	Peak Day SOR Peak Day SOR	Avg SOR Avg SOR
No. Trains in Operation		1	1
No. Grids in Operation		3	3
No. Operating Diffusers		374	374
SOR	lb/day	4,841	2,084
SOTE	%	35.1	39.2
Total Air Rate	scfm	550.5	212.1
Min.Diffuser Air Rate	scfm/diff.	1.46	0.54
Max. Diffuser Air Rate	scfm/diff.	1.49	0.72
Static Pressure	psig	7.44	7.44
Diffuser DWP @ Min Air	psig	0.52	0.44
Diffuser DWP @ Max Air	psig	0.52	0.45
Pressure @ Top of Dropleg	psig	8.1	7.92
Est. Blower Efficiency		70%	70%
Est. Motor Efficiency		90%	90%
Shaft Power	Bhp	24.60	9.30
Est. Motor Electrical Load	kW	20.39	7.71
Est. Standard Aeration Efficiency	#SOR/BHP-hr	8.20	9.34

Notes:

(1) Design air is the maximum of process air or mixing air

(2) Delivered oxygen based on design air

(3) Brake Horsepower based on adiabatic compression, 70% mechanical efficiency and 0.30 psi lineloss

(4) Performance based on diffuser density (At/Ad), submergence, and diffuser unit air flow.

(5) Diffuser Air Flow based on Active Valve Modulation

(6) Blower Pressure Capability also requires consideration of:
blower and the aeration assembly dropleg connections.
Design Manual (EPA/625/1-89/023), WEF Manual of Practice FD-13, and other
Fine Pore systems regardless of supplier or type of diffuser element.
C. Increased diffuser submergence during Peak Flow conditions.

(7) Air Flow defined at 20°C

(8) Fine Mixing air based on 0.06 scfm/ft²

Sanitaire Project Name: Muddy Creek WWTP
Sanitaire Project #761532
Consulting Engineer:
Operating Condition: Peak Day SOR
Oxygen Distribution: Peak Day SOR

Aeration System Design

Parameter	Units	Zone 1	Zone 2	Zone 3	Totals/Overall
Pass		1	1	1	
SWD	ft	18.00	18.00	18.00	
Subm	ft	17.19	17.19	17.19	
Volume	ft³	11,952.0	11,952.0	11,952.0	35,856.0
No. Parallel Tanks		1	1	1	
No. Trains in Operation		1	1	1	
Grid Count		1	1	1	3
Dropleg Diameter	inches	4	4	4	
At/Ad		7.229958262	17.04748053	29.44564819	
Diffuser Density	% Floor	13.83%	5.87%	3.40%	
Diffusers/Grid		224	95	55	374

Oxygen Transfer

Diffuser Type		SSII-9G	SSII-9G	SSII-9G	
Alpha					
Beta					
Theta					
D.O.	mg/l				
Water Temp	°C	20	20	20	
AOR/SOR					
Oxygen Distribution	%/Zone	61.0%	25.0%	14.0%	100.0%
AOR	lb/day				
SOR	lb/day	2,952.0	1,210.0	679.0	4,841.0
Air Rate (7)	scfm				

Performance

Mixing Criteria	scfm/ft²	0.06	0.06	0.06	
Safety Factor	%				
Mixing Air (8)	scfm	39.8	39.8	39.8	
Process Air (for SOR)	scfm	328.0	140.3	82.2	
Design Air (1,7)	scfm	328.0	140.3	82.2	550.5
Diffuser Air Rate	scfm/Diff.	1.46	1.48	1.49	1.47
Delivered SOR	lb/day	2,952.0	1,210.0	679.0	4,841.0
Delivered SOTE	%	35.9%	34.4%	33.0%	35.1%
Pressure @ Top of Dropleg	psig	8.10	8.06	8.06	8.10
Shaft Power	Bhp	14.7	6.2	3.7	24.6

Notes:

(1) Design air is the maximum of process air or mixing air

(2) Delivered oxygen based on design air

(3) Brake Horsepower based on adiabatic compression, 70% mechanical efficiency and 0.30 psi lineloss

(4) Performance based on diffuser density (At/Ad), submergence, and diffuser unit air flow.

(5) Diffuser Air Flow based on Active Valve Modulation

(6) Blower Pressure Capability also requires consideration of:

A. The Air Main headloss (piping, fittings, valves, instrumentation, etc.) between the blower and the aeration assembly dropleg connections.

B. Potential for increased headloss resulting from diffuser fouling and/or aging. Please refer to the US EPA Fine Pore Design Manual (EPA/625/1-89/023), WEF Manual of Practice FD-13, and other technical publications for a detailed discussion on this subject. Note that this headloss consideration relates to all Fine Pore systems regardless of supplier or type of diffuser element.

C. Increased diffuser submergence during Peak Flow conditions.

(7) Air Flow defined at 20°C

(8) Fine Mixing air based on 0.06 scfm/ft²

Sanitaire Project Name: Muddy Creek WWTP
Sanitaire Project #761532
Consulting Engineer:
Operating Condition: Avg SOR
Oxygen Distribution: Avg SOR

Aeration System Design

Parameter	Units	Zone 1	Zone 2	Zone 3	Totals/Overall
Pass		1	1	1	
SWD	ft	18.00	18.00	18.00	
Subm	ft	17.19	17.19	17.19	
Volume	ft³	11,952.0	11,952.0	11,952.0	35,856.0
No. Parallel Tanks		1	1	1	
No. Trains in Operation		1	1	1	
Grid Count		1	1	1	3
Dropleg Diameter	inches	4	4	4	
At/Ad		7.229958262	17.04748053	29.44564819	
Diffuser Density	% Floor	13.83%	5.87%	3.40%	
Diffusers/Grid		224	95	55	374

Oxygen Transfer

Diffuser Type		SSII-9G	SSII-9G	SSII-9G	
Alpha					
Beta					
Theta					
D.O.	mg/l				
Water Temp	°C	20	20	20	
AOR/SOR					
Oxygen Distribution	%/Zone	61.0%	25.0%	14.0%	100.0%
AOR	lb/day				
SOR	lb/day	1,222.0	501.0	281.0	2,004.0
Air Rate (7)	scfm				

Performance

Mixing Criteria	scfm/ft²	0.06	0.06	0.06	
Safety Factor	%				
Mixing Air (8)	scfm	39.8	39.8	39.8	
Process Air (for SOR)	scfm	120.8	51.4	29.9	
Design Air (1,7)	scfm	120.8	51.4	39.8	212.1
Diffuser Air Rate	scfm/Diff.	0.54	0.54	0.72	0.57
Delivered SOR	lb/day	1,222.0	501.0	361.2	2,084.2
Delivered SOTE	%	40.4%	38.9%	36.2%	39.2%
Pressure @ Top of Dropleg	psig	7.90	7.89	7.92	7.92
Shaft Power	Bhp	5.3	2.2	1.7	9.3

Notes:

(1) Design air is the maximum of process air or mixing air

(2) Delivered oxygen based on design air

(3) Brake Horsepower based on adiabatic compression, 70% mechanical efficiency and 0.30 psi lineloss

(4) Performance based on diffuser density (At/Ad), submergence, and diffuser unit air flow.

(5) Diffuser Air Flow based on Active Valve Modulation

(6) Blower Pressure Capability also requires consideration of:

A. The Air Main headloss (piping, fittings, valves, instrumentation, etc.) between the blower and the aeration assembly dropleg connections.

B. Potential for increased headloss resulting from diffuser fouling and/or aging. Please refer to the US EPA Fine Pore Design Manual (EPA/625/1-89/023), WEF Manual of Practice FD-13, and other technical publications for a detailed discussion on this subject. Note that this headloss consideration relates to all Fine Pore systems regardless of supplier or type of diffuser element.

C. Increased diffuser submergence during Peak Flow conditions.

(7) Air Flow defined at 20°C

(8) Fine Mixing air based on 0.06 scfm/ft²

Sanitaire Project Name: Muddy Creek WWTP
Sanitaire Project #761532
Headloss Summary by System Operating Point
Consulting Engineer:
Operating Condition: Peak Day SOR
Oxygen Distribution: Peak Day SOR

Grid Design

	Units	Grid 1	Grid 2	Grid 3
Diffuser Count		224	95	55
Dropleg Diameter	inches	4	4	4
Line Count		8	5	5
Line Spacing	ft	2.25	3.67	3.67
Manifold Diameter	inches	4	4	4
Manifold Length	ft	15.75	14.67	14.67
Header Length	ft	29.75	27.83	27.42
Manifold Location		End	End	End
Manifold Elevation		Inline	Inline	Inline
Dropleg Location		End	End	End
Header Orientation		Length	Length	Length

Grid Pressure

Grid Air Flow	scfm	328.0	140.3	82.2
Diffuser Air Flow	scfm	1.46	1.48	1.49
Submergence	ft	17.19	17.19	17.19
Orifice Diameter	inches	13/64	13/64	13/64
Static Header Pressure Differential in Assembly	psig	2.07E-02	3.25E-03	1.12E-03
Average Header Pressure in Assembly	PSI	8.05	8.05	8.05
A: Average Headloss from Top of Dropleg To Headers	PSI	5.67E-02	9.77E-03	3.36E-03
B: Diffuser Orifice Headloss	psi	8.99E-02	9.14E-02	9.37E-02
C: Diffuser Dynamic Wet Pressure	psi	5.16E-01	5.17E-01	5.18E-01
D: Static Pressure	psig	7.44	7.44	7.44
Total Pressure Required at Top of Dropleg (A+B+C+D)	psig	8.10	8.06	8.06
Friction Headloss (A+B)	PSI	1.47E-01	1.01E-01	9.70E-02

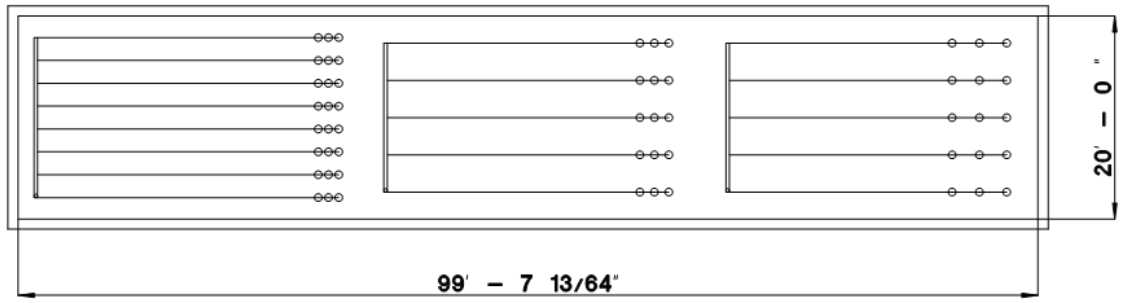
Sanitaire Project Name: Muddy Creek WWTP
Sanitaire Project #761532
Headloss Summary by System Operating Point
Consulting Engineer:
Operating Condition: Avg SOR
Oxygen Distribution: Avg SOR

Grid Design

	Units	Grid 1	Grid 2	Grid 3
Diffuser Count		224	95	55
Dropleg Diameter	inches	4	4	4
Line Count		8	5	5
Line Spacing	ft	2.25	3.67	3.67
Manifold Diameter	inches	4	4	4
Manifold Length	ft	15.75	14.67	14.67
Header Length	ft	29.75	27.83	27.42
Manifold Location		End	End	End
Manifold Elevation		Inline	Inline	Inline
Dropleg Location		End	End	End
Header Orientation		Length	Length	Length

Grid Pressure

Grid Air Flow	scfm	120.8	51.4	39.8
Diffuser Air Flow	scfm	0.54	0.54	0.72
Submergence	ft	17.19	17.19	17.19
Orifice Diameter	inches	13/64	13/64	13/64
Static Header Pressure Differential in Assembly	psig	2.84E-03	4.39E-04	2.64E-04
Average Header Pressure in Assembly	PSI	7.89	7.89	7.92
A: Average Headloss from Top of Dropleg To Headers	PSI	7.75E-03	1.32E-03	7.93E-04
B: Diffuser Orifice Headloss	psi	1.17E-02	1.18E-02	2.14E-02
C: Diffuser Dynamic Wet Pressure	psi	4.39E-01	4.39E-01	4.54E-01
D: Static Pressure	psig	7.44	7.44	7.44
Total Pressure Required at Top of Dropleg (A+B+C+D)	psig	7.90	7.89	7.92
Friction Headloss (A+B)	PSI	1.94E-02	1.31E-02	2.22E-02



Single Train Information

Grid No	Grid Count	Drop Leg ∅"	Header Count	Header Spc,ft.	Header Len,ft.	Discs/ Grid	At/ Ad	Discs/ Train
1	1	4	8	2.25	29.75	224	7.23	224
2	1	4	5	3.67	27.83	95	17.05	95
3	1	4	5	3.67	27.42	55	29.45	55

Total Discs/Train 374

Note: Some headers may be omitted for clarity

PRELIMINARY - THIS DRAWING IS NOT INTENDED FOR CONTRACT DOCUMENTS, SUBMITTALS OR CONSTRUCTION

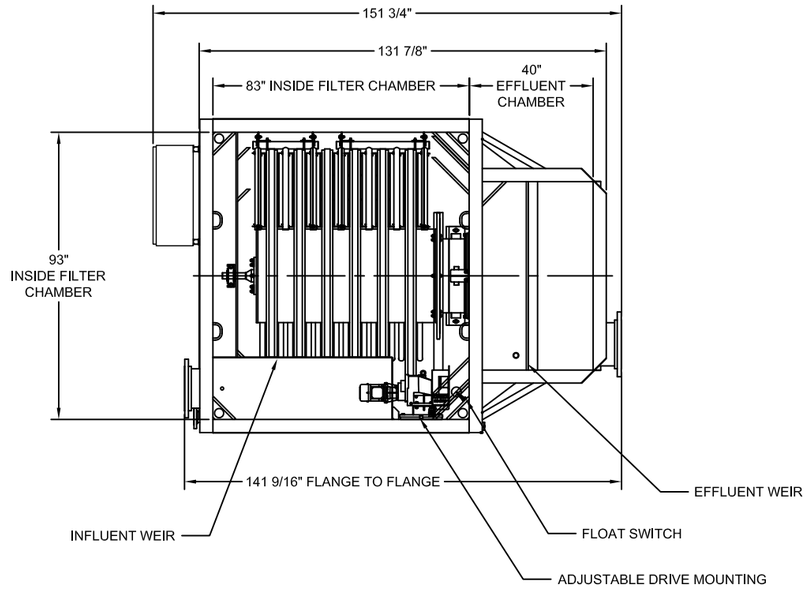
Sanitaire a xylem brand MILWAUKEE, WISCONSIN 53204	CUST NO. DWG NO.	THIS DRAWING IS THE PROPERTY OF XYLEM AND IS SUBMITTED IN CONFIDENCE. IT IS NOT TO BE DISCLOSED, USED OR DUPLICATED WITHOUT PERMISSION OF XYLEM.	Muddy Creek WWTP 9" Disc Aeration System	DRAWN BY: sp CHKD BY APPVD BY	DATE: 7/30/25 DATE DATE	MODEL	JOB: 761532 SHEET

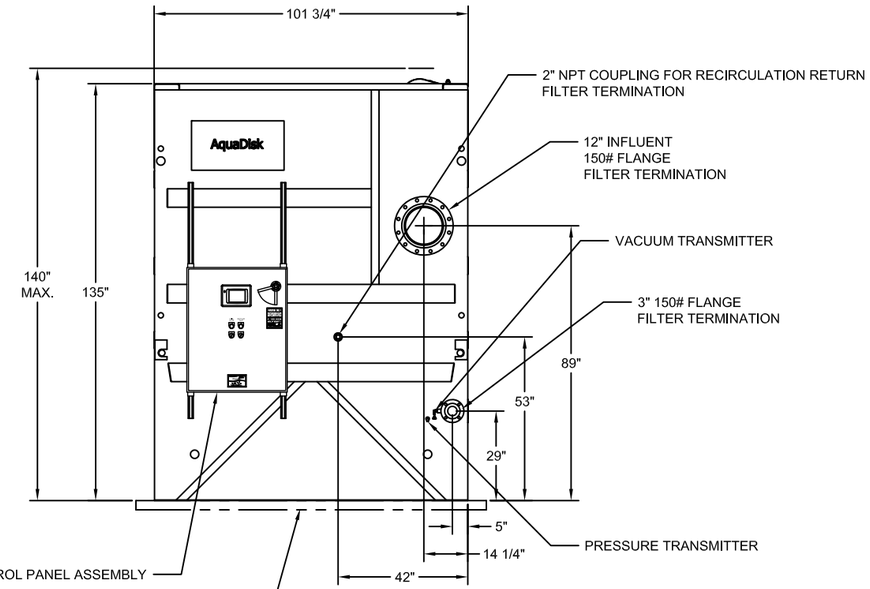
1. IF FREEZING IS A CONCERN AQUA-AEROBIC SYSTEMS RECOMMENDS THE FILTERS BE PLACED IN A HEATED BUILDING. IF A BUILDING IS NOT PROVIDED, ANY NECESSARY PROTECTION, INCLUDING BUT NOT LIMITED TO, HEAT TRACING AND INSULATION OF PUMPS AND PIPING, AS WELL AS PROTECTION AGAINST INTERNAL TANK FREEZING, SHALL BE PROVIDED BY THE INSTALLING CONTRACTOR.

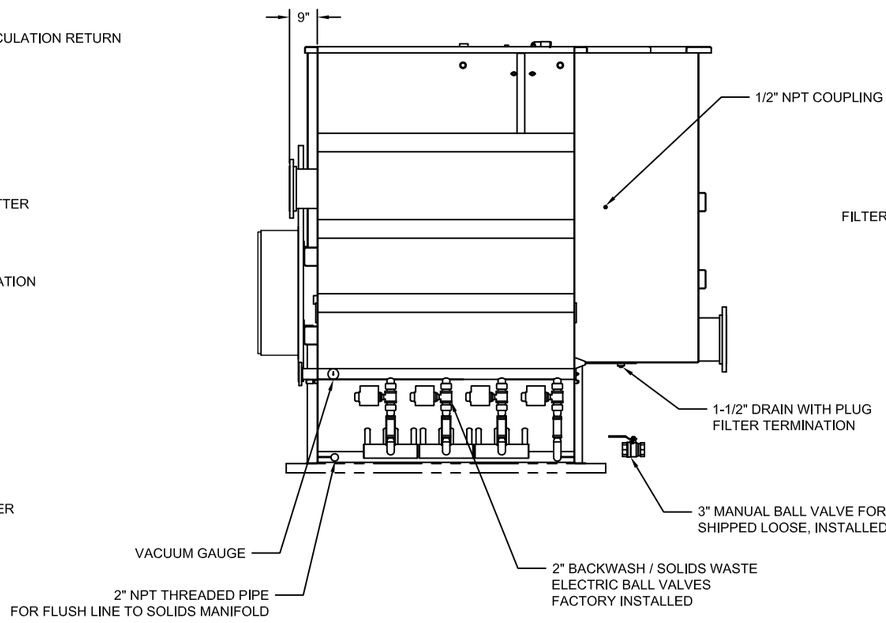
2. THE FILTER CONTROL PANEL IS SHOWN IN THE STANDARD LOCATION. IF THE FILTER IS LOCATED OUTSIDE, THE CONTROL PANEL MAY BE RELOCATED TO THE SIDE OF THE FILTER FACING NORTH, TO LIMIT EXPOSING THE H.M.I. TO DIRECT SUNLIGHT.

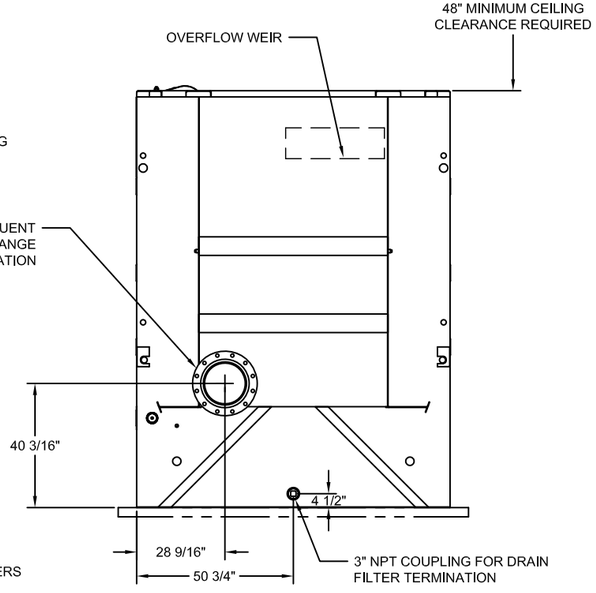
3. THE GRAPHIC ELEMENTS OF THIS COMPUTER GENERATED DRAWING ARE DRAWN FULL SIZE. THE DIMENSIONS ARE ASSOCIATIVE. IF THE SIZE OF THE GRAPHIC ELEMENTS IS CHANGED THE DIMENSIONS WILL NOT BE CORRECT.

4. AN INFLUENT VALVE IS REQUIRED FOR ISOLATION / MAINTENANCE OF THE FILTER UNIT. THE INFLUENT VALVE SHALL BE PROVIDED BY OTHERS AND INSTALLED BY OTHERS.









NOT FOR CONSTRUCTION

DRY WT (LBS)	OPER. WT. (LBS)
9,500	40,500

JOB NAME:					
JOB LOCATION:					
REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION	

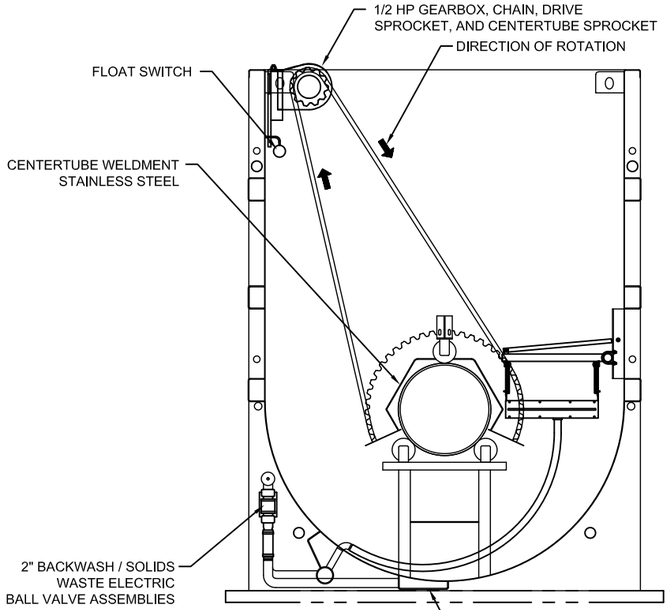
AQUA-AEROBIC SYSTEMS, INC.

DO NOT SCALE DRAWING

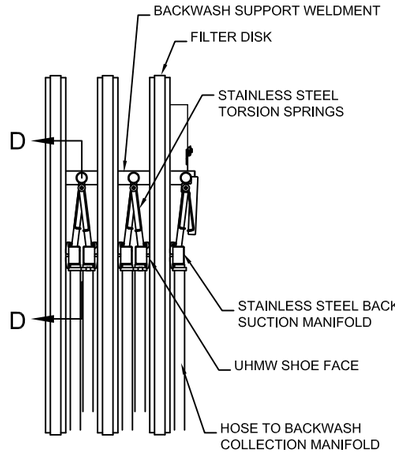
UNLESS OTHERWISE SPECIFIED
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

MATERIAL:
SIMILAR TO:
TYPE:
DRAWN BY: SLT — DATE: 3-29-2011
CHECKED BY: — DATE:
WEIGHT: — SHEET: 1 OF 4

DRAWING NAME: AQUADISK FILTER MODEL ADFSP-54 X 6E-PC - RH
DRAWING NUMBER: 2801910
SCALE:
SIZE: D



SECTION A-A



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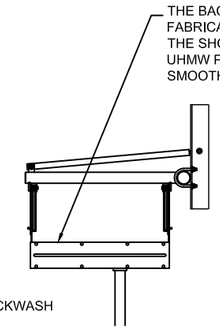

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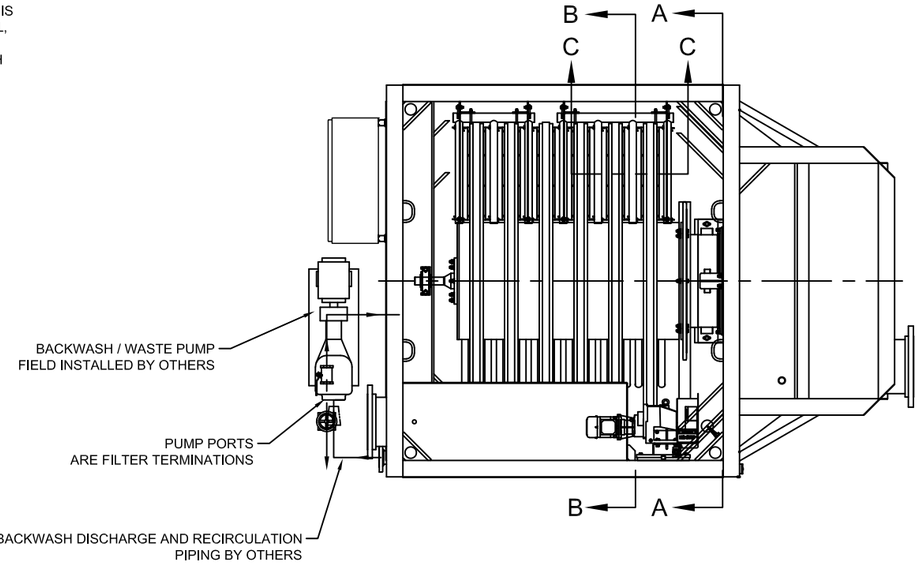

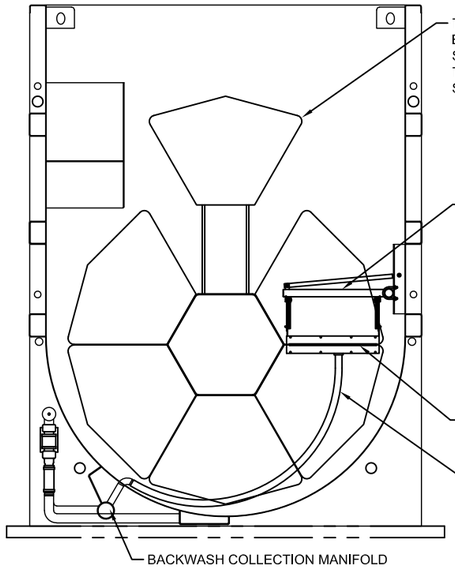

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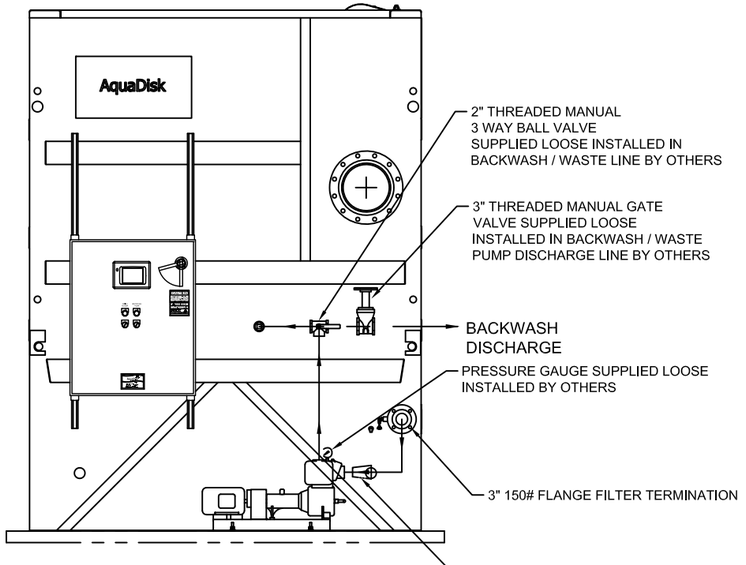
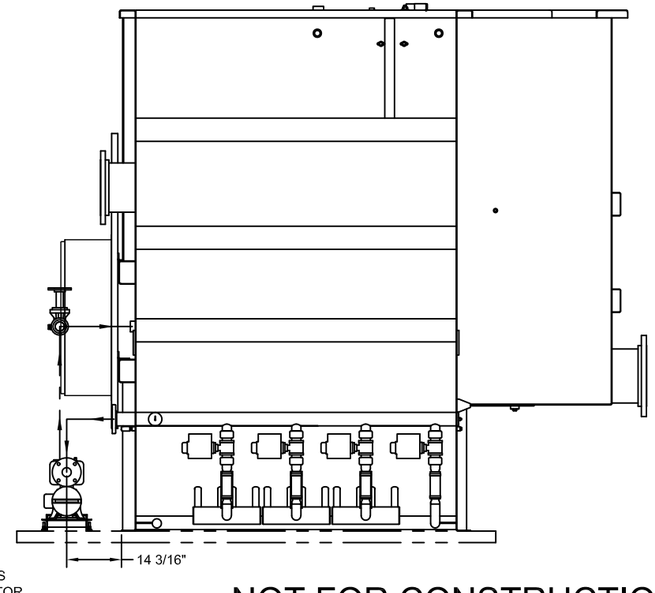




NOT FOR CONSTRUCTION

1 ALL EXTERNAL PIPING AND FITTINGS SHALL BE PROVIDED BY OTHERS ACTUAL PIPING LAYOUT AND PUMP LOCATION TO BE DETERMINED BY OTHERS WHEN THREADED OR WELDED PIPE IS USED IN LIEU OF FLANGED PIPE, UNIONS SHALL BE USED AT EACH PUMP AND VALVE CONNECTION TO FACILITATE SERVICE.

2 2 H.P. BACKWASH / WASTE PUMP CONNECTIONS ARE 2" N.P.T. BACKWASH / WASTE PIPING IS 3" DIAMETER. 3" TO 2" CONCENTRIC REDUCER FITTINGS SHALL BE PROVIDED AND INSTALLED BY OTHERS AT EACH PUMP PORT.

3 THE BACKWASH / WASTE PUMP CAPABILITIES ARE AS FOLLOWS:

- HORSEPOWER: 2 HP
- FLOW: 130 GPM
- TOTAL DYNAMIC HEAD: 23.2 FT
- ALLOWABLE DISCHARGE HEAD, AFTER FILTER LOSSES: 12 FT

FOR INSTALLATIONS THAT REQUIRE MORE DISCHARGE HEAD, ALTERNATIVE PUMPS ARE AVAILABLE. PLEASE CONSULT ENGINEERING TO VERIFY THE SUITABILITY OF THE DISCHARGE PIPING OR FOR SPECIAL PUMP REQUIREMENTS.

REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

JOB NAME:
JOB LOCATION:

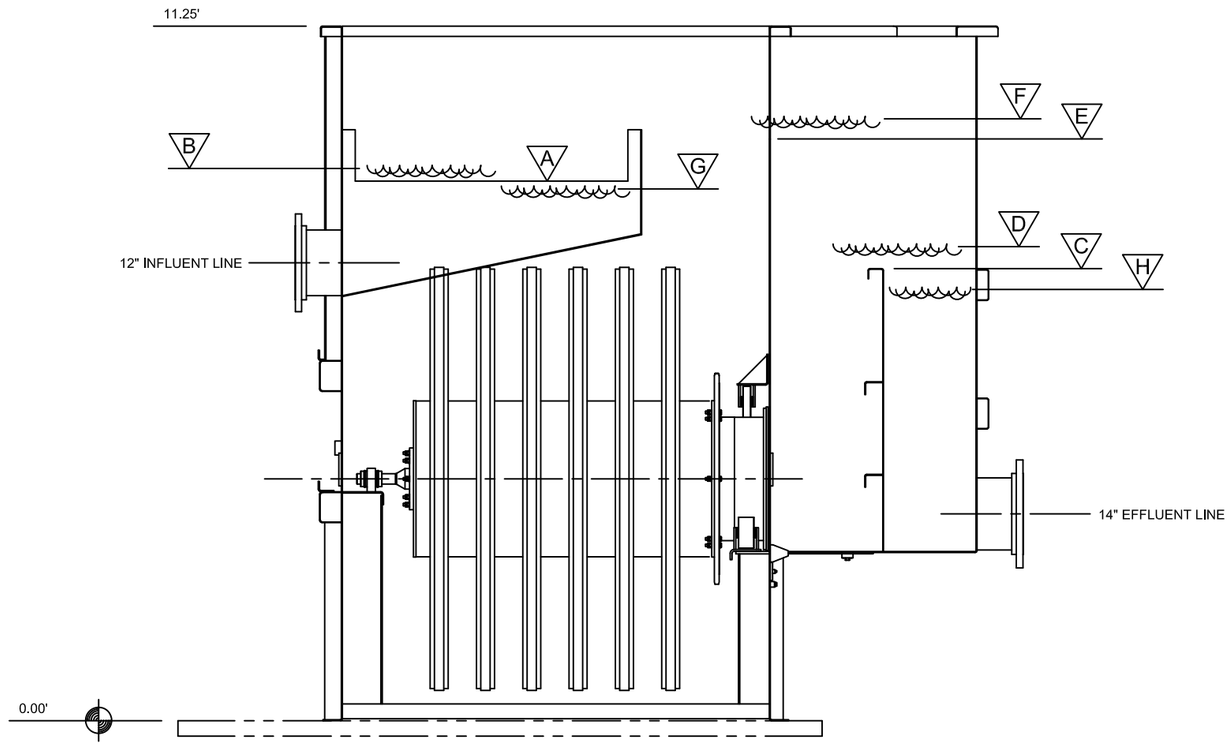
AQUA-AEROBIC SYSTEMS, INC.

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

MATERIAL:
SIMILAR TO:
TYPE:
DRAWN BY: SLT
DATE: 3-29-2011
CHECKED BY:
DATE:
WEIGHT:
SHEET: 2 OF 4

DRAWING NAME: AQUADISK FILTER MODEL ADFSP-54 X 6E-PC - RH
DRAWING NUMBER: 2801910
SCALE:
SIZE: D



ELEVATION

A	8.74'	INFLUENT WEIR ELEVATION
B	9.03'	NAPPE OVER INFLUENT WEIR AVERAGE FLOW
	9.20'	NAPPE OVER INFLUENT WEIR MAXIMUM FLOW
C	7.32'	EFFLUENT WEIR ELEVATION
D	7.59'	NAPPE OVER EFFLUENT WEIR AVERAGE FLOW
	7.74'	NAPPE OVER EFFLUENT WEIR MAXIMUM FLOW
E	9.42'	OVERFLOW WEIR ELEVATION
F	9.82'	NAPPE OVER OVERFLOW WEIR AVERAGE FLOW
	10.06'	NAPPE OVER OVERFLOW WEIR MAXIMUM FLOW
G	8.70'	BACKWASH INITIATE LEVEL
H	6.82'	MAXIMUM AVAILABLE LIQUID LEVEL FOR EFFLUENT CONVEYANCE

HYDRAULIC PROFILE

BASED UPON AVERAGE FLOW RATE OF 3.25 GPM PER SQUARE FOOT (1.5 MGD)
BASED UPON MAXIMUM FLOW RATE OF 6.5 GPM PER SQUARE FOOT (3.0 MGD)

WEIR LENGTHS

INFLUENT = 4.42'
EFFLUENT = 5.08'
OVERFLOW = 2.67'

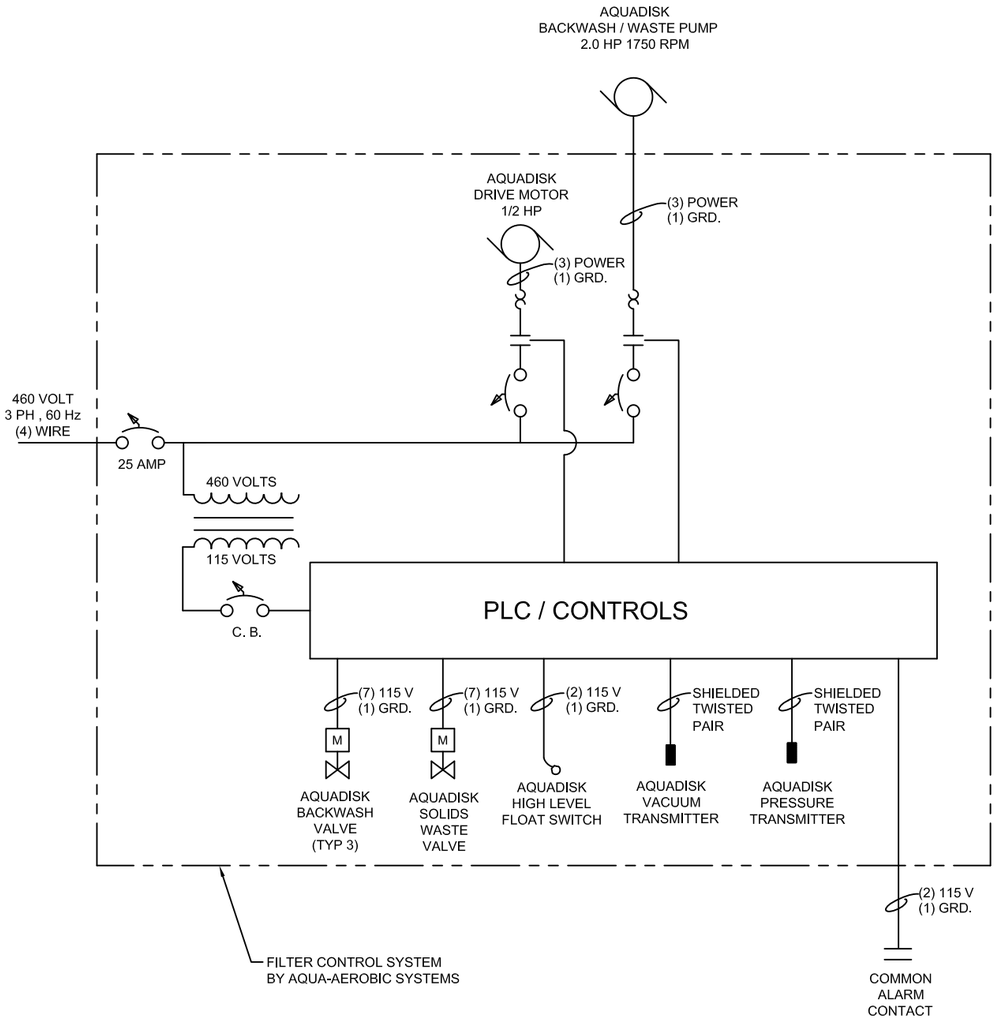
NOT FOR CONSTRUCTION

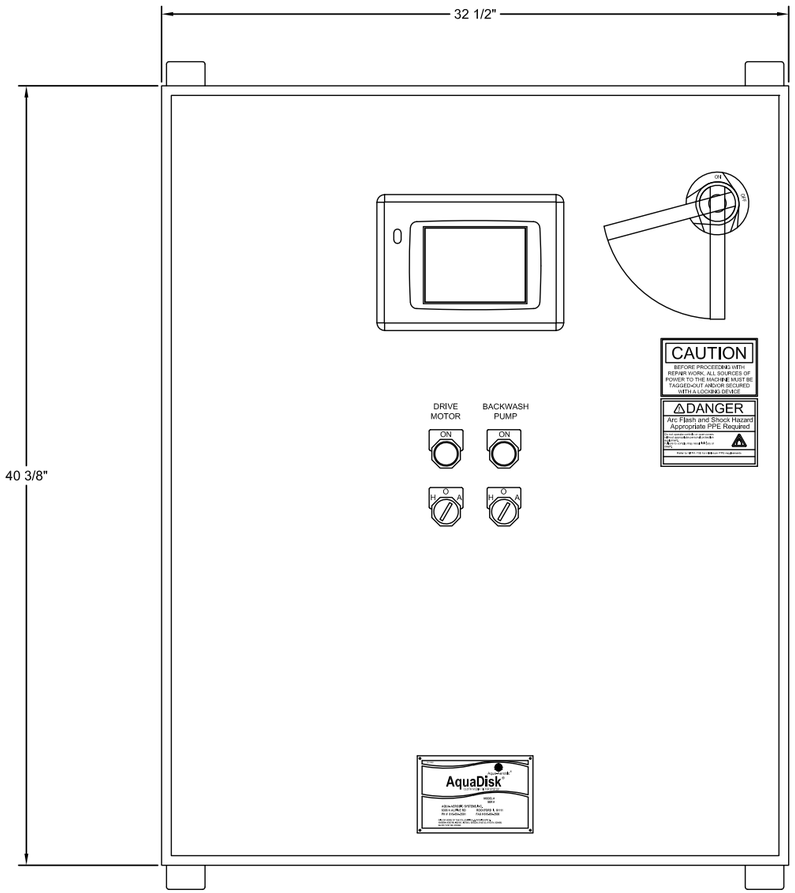
JOB NAME:					AQUA-AEROBIC SYSTEMS, INC.
JOB LOCATION:					
					DO NOT SCALE DRAWING
					UNLESS OTHERWISE SPECIFIED: FRACTIONAL DIMENSIONS +/- 1/16; ALL TWO PLACE DECIMALS +/- 0.010; ALL THREE PLACE DECIMALS +/- 0.005; ALL ANGLES +/- 1/2°; ANSI
					MATERIAL:
					SIMILAR TO:
					TYPE:
					DRAWN BY: SLT — DATE: 3-29-2011
					CHECKED BY: — DATE:
REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION	WEIGHT: — SHEET: 3 OF 4
DRAWING NAME: AQUADISK FILTER MODEL ADFSP-54 X 6E-PC - RH					DRAWING NUMBER: 2801910 — SCALE: — SIZE: D

SYMBOL KEY

	MOTOR		CIRCUIT BREAKER		ELECTRICAL DISCONNECT	VFD	VARIABLE FREQUENCY DRIVE		TRANSDUCER		STARTER CONTACTOR
M	MOTOR OPERATED VALVE		TRANSFORMER		MOTOR OVERLOAD	P	PNEUMATIC OPERATED VALVE		FUSE		FLOAT SWITCH

NOTE: SOME SYMBOLS MAY NOT BE APPLICABLE





1 CONTROL PANEL
ENCLOSURE NEMA 4X WALL MOUNTED TYPE FIBERGLASS
FACTORY ASSEMBLED ON THE FILTER, DISASSEMBLED AND SHIPPED LOOSE.
REASSEMBLED ON-SITE BY CONTRACTOR.
IF THE FILTER IS LOCATED OUTSIDE, THE CONTROL PANEL
MAY BE RELOCATED TO THE SIDE OF THE FILTER
FACING NORTH TO LIMIT THE H.M.I. EXPOSURE TO DIRECT SUNLIGHT.

2 STANDARD CONTROL PANEL SIZE
40" HEIGHT X 32" WIDE X 12" DEEP

3 (1) CONTROL PANEL PER FILTER

NOT FOR CONSTRUCTION

JOB NAME:
JOB LOCATION:

AQUA-AEROBIC SYSTEMS, INC.

DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
FRACTIONAL DIMENSIONS +/- 1/16
ALL TWO PLACE DECIMALS +/- 0.010
ALL THREE PLACE DECIMALS +/- 0.005
ALL ANGLES +/- 1/2°
ANSI

MATERIAL:
SIMILAR TO:
TYPE:
DRAWN BY: SLT DATE: 3-29-2011
CHECKED BY: DATE:
WEIGHT: SHEET: 4 OF 4

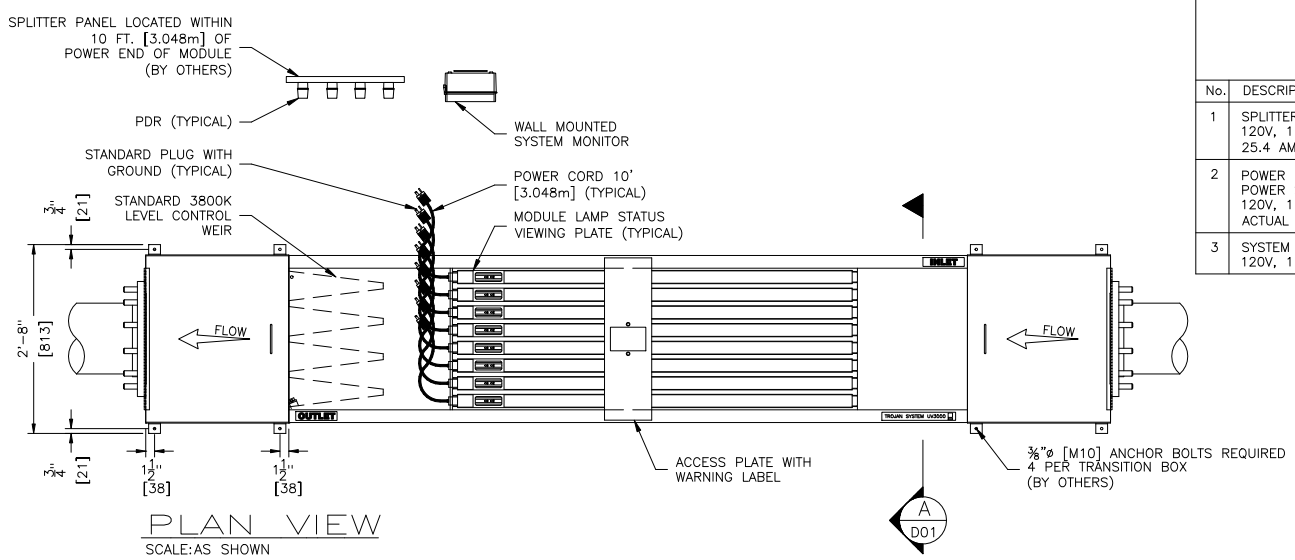
REV	ERN / ECO	DATE	BY	REVISION DESCRIPTION

DRAWING NAME: AQUADISK FILTER MODEL ADFSP-54 X 6E-PC - RH
DRAWING NUMBER: 2801910
SCALE:
SIZE: D

TROJAN UV3000™ PTP

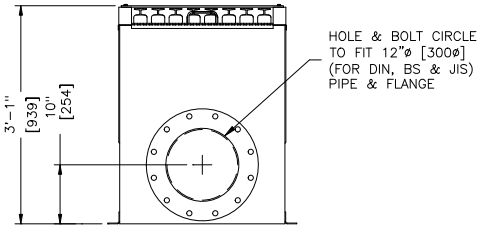
EQUIPMENT INTERCONNECTIONS

No.	DESCRIPTION	FROM	TO
1	SPLITTER PANEL POWER SUPPLY 120V, 1 PHASE, 2 WIRE, ACTUAL DRAW 25.4 AMPS / SPLITTER PANEL	DISTRIBUTION PANEL (DP) (NOT SHOWN) (BY OTHERS)	SPLITTER PANEL (BY OTHERS)
2	POWER DISTRIBUTION RECEPTACLE (PDR) POWER SUPPLY 120V, 1 PHASE, 2 WIRE, ACTUAL DRAW 6.3 AMPS / PDR	SPLITTER PANEL (BY OTHERS)	PDR
3	SYSTEM MONITOR POWER SUPPLY 120V, 1 PHASE, 2 WIRE, 5 AMPS	DP (NOT SHOWN) (BY OTHERS)	SYSTEM MONITOR



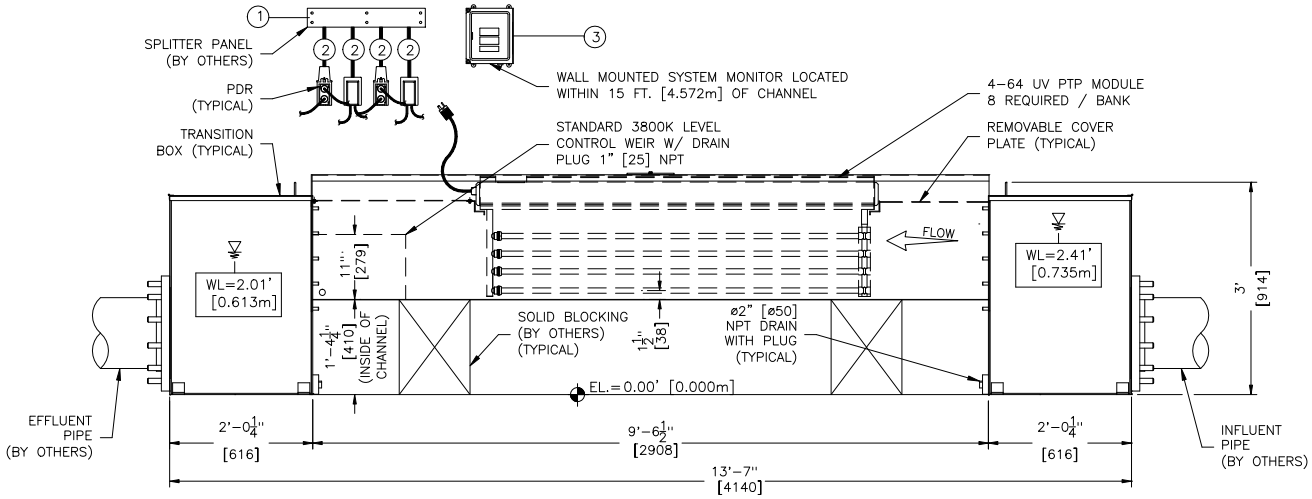
PLAN VIEW

SCALE:AS SHOWN



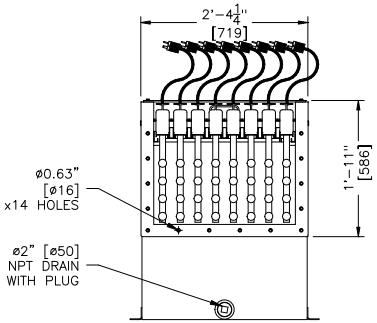
END VIEW (TYPICAL)

SCALE:AS SHOWN



FRONT VIEW

SCALE:AS SHOWN



A D01 SECTION

SCALE:AS SHOWN

NOTE: PDR, SPLITTER PANEL (BY OTHERS) AND SYSTEM MONITOR NOT SHOWN FOR CLARITY

NOTES:

: DO NOT SLOPE CHANNEL FLOOR.
: CHANNEL WIDTH & DEPTH MUST BE KEPT WITHIN A TOLERANCE OF + OR – ¼" [6].
: ANCHOR BOLTS ARE NOT SUPPLIED BY TROJAN TECHNOLOGIES.
: BOLTS, WASHERS & NUTS FOR CONNECTION OF CHANNEL TO TRANSITION BOXES ARE PROVIDED BY TROJAN TECHNOLOGIES.
: SYSTEM CONDUIT, WIRING, DISTRIBUTION PANELS & INTERCONNECTIONS BY OTHERS.
: ELECTRICAL REQUIREMENTS SHOWN ARE TO SUPPLY TROJAN UV EQUIPMENT ONLY. ELECTRICAL INRUSH FACTOR TO BE ADDED AS PER LOCAL CODE.
: ANY EXTRA OUTLETS NOT BEING USED BY TROJAN EQUIPMENT HAVE NOT BEEN INCLUDED IN THE INTERCONNECT AMPERAGE.
: CONTRACTOR TO REVIEW ALL TROJAN TECHNOLOGIES INSTALLATION INSTRUCTIONS PRIOR TO EQUIPMENT INSTALLATION.
: ACCESS IS REQUIRED FOR MODULE REMOVAL – NOTE THE CHANNEL WIDTH AND ENSURE ADEQUATE ACCESS IS PROVIDED TO ALL MODULES.
: DO NOT ENCASE THE STEEL CHANNEL IN CONCRETE.
: [ ] INDICATES MILLIMETERS UNLESS OTHERWISE SPECIFIED.

MULTIPLE CHANNELS IN PARALLEL (OPTION):

: ADDITIONAL UNITS CAN BE INSTALLED PARALLEL TO THE UNIT SHOWN.
: ACCESS BETWEEN EVERY 2 PARALLEL CHANNELS IS REQUIRED FOR MODULE REMOVAL – NOTE THE CHANNEL WIDTH AND ENSURE ADEQUATE ACCESS IS PROVIDED BETWEEN TRANSITION BOXES AND CHANNELS.
: ACCESS BETWEEN A MAXIMUM OF 2 CHANNELS IS NOT REQUIRED FOR MODULE REMOVAL. TRANSITION BOXES CAN BE INSTALLED ADJACENT TO EACH OTHER.

TROJANUV

DESCRIPTION: LAYOUT, UV3000PTP–UV3800K 1 CHANNEL 1 BANK 4 LAMPS WEIR	STANDARD DRAWING NO. 3M0520
DRAWN BY : LZ/JM/SPM	DATE : 12JN21
CHECKED BY : SAH	DATE : 12JN22
APPROVED BY : CAP	DATE : 12JN22
SCALE (8½x11) : NOT TO SCALE	LOG NUMBER : N/A
	REFERENCE NO. N/A
	DWG NO. D01 / REV. D

Appendix C: Equipment List

MAJOR EQUIPMENT LIST					
Equipment	**Process Area**	**Existing/Replace/New**	**Connected Load (HP)**	**Duty Load (HP)**	**Duty/ Stby**
Influent Pump Station					
IPS Pump No. 1	Influent Pump Station	Existing	40	40	Duty
IPS Pump No. 2	Influent Pump Station	Existing	40	40	Duty
IPS Pump No. 3	Influent Pump Station	New	40	40	Duty
IPS Pump No. 4	Influent Pump Station	New	40		Standby
Headworks					
Rotary Drum Screen No. 1	Headworks	Existing	1.5	1.5	Duty
Rotary Drum Screen No. 2	Headworks	New	1.5	1.5	Duty
Equalization					
EQ Blower No. 1	Equalization	Existing	20	20	Duty
EQ Blower No. 2	Equalization	Existing	20		Standby
EQ Pump No. 2	Equalization	New	10	10	Duty
EQ Pump No. 3	Equalization	Existing	10	10	Duty
EQ Pump No. 4	Equalization	Existing	10		Standby
Biological Process					
Aeration Blower No. 1	Biological Process	New	50	50	Duty
Aeration Blower No. 2	Biological Process	New	50	50	Duty
Aeration Blower No. 3	Biological Process	New	50		Standby
Anoxic Zone Mixer No. 1	Biological Process	New	4.7	4.7	Duty
Anoxic Zone Mixer No. 2	Biological Process	New	4.7	4.7	Duty
Anoxic Zone Mixer No. 3	Biological Process	New	4.7	4.7	Duty
Anoxic Zone Mixer No. 4	Biological Process	New	4.7	4.7	Duty
IMLR Pump No. 1	Biological Process	New	12	12	Duty
IMLR Pump No. 2	Biological Process	New	12	12	Duty
Secondary Clarifiers					
SC No. 1 Mechanism	Secondary Clarifiers	Existing	0.5	0.5	Duty
SC No. 2 Mechanism	Secondary Clarifiers	Existing	0.5	0.5	Duty
RAS Pumping					
RAS Pump No. 1	RAS Pumping	Existing	10	10	Duty
RAS Pump No. 2	RAS Pumping	Existing	10	10	Duty
RAS Pump No. 3	RAS Pumping	Existing	10		Standby
WAS Pumping					
WAS Pump No. 1	WAS Pumping	Existing	5	5	Duty
WAS Pump No. 2	WAS Pumping	Existing	5		Standby
Filtration					
Filter Unit No. 1	Filtration	Existing	0.33	0.33	Duty
Filter Unit No. 2	Filtration	Existing	0.33	0.33	Duty
Filter Unit No. 3	Filtration	Existing	0.33	0.33	Duty
Filter Unit No. 4	Filtration	New	0.33	0.33	Duty
Filter Unit No. 5	Filtration	New	0.33	0.33	Duty
Filter No. 1 Backwash Pump	Filtration	Existing	2	2	Duty
Filter No. 2 Backwash Pump	Filtration	Existing	2	2	Duty
Filter No. 3 Backwash Pump	Filtration	Existing	2	2	Duty
Filter No. 4 Backwash Pump	Filtration	New	2	2	Duty
Filter No. 5 Backwash Pump	Filtration	New	2	2	Duty
Sludge Holding					
Existing Blower No. 1	Sludge Holding	Existing	25	25	Duty
Existing Blower No. 2	Sludge Holding	Existing	25	25	Duty
Existing Blower No. 3	Sludge Holding	Existing	25		Standy
Existing Blower No. 4	Sludge Holding	Existing	10	10	Duty
Existing Blower No. 5	Sludge Holding	Existing	10		Standby
Plant Drainage Pumping					
Plant Drainage Pump No. 1	Plant Drainage Pumping	Existing	5	5	Duty

Exhibit D
Executive Summary from the Expansion Alternatives Analysis for Muddy Creek Wastewater Treatment Plant (WWTP) Technical Memorandum No. 16
(Reference only)

Executive Summary

This Technical Memorandum (TM) evaluates six different treatment alternatives for the expansion of the Muddy Creek Wastewater Treatment Plant (MCWWTP) beyond 0.3 million gallons per day (MGD) on a maximum monthly flow (MMF) basis. The alternatives are flow based and include expansions to 0.6 and 1.0 MGD. Of these, one alternative was selected as the most suitable in meeting the project objectives and will be developed further to a 15-percent level conceptual design as part of the next phase of this project.

Process capacities and alternative expansion concepts discussed in this TM were developed in previous TMs and workshops as part of this project and in collaboration with Water and Sewer Authority of Cabarrus County (WSACC) staff.

Process Areas and Options

Expansion of the MCWWTP beyond 0.3 MGD will for the most part follow the existing liquid and solids treatment train as follows:

- Influent pumping with expansion of the Influent Pump Station (IPS) as needed
- Headworks screening and grit removal (grit removal for 1 MGD alternatives)
- Flow equalization with sufficient storage volume to reduce the peak hourly flow (PHF) down to the peak daily flow (PDF)
- Secondary treatment expansion with either a new conventional activated sludge (CAS) system, oxidation ditch, or aerobic granular sludge (AGS)
- Filtration with cloth disk filters
- Ultraviolet (UV) disinfection
- Effluent flow measurement with V-notch weir or Parshall flume
- Plant Drain Pump Station improvements

Six expansion alternatives are presented in this TM, mainly based around the secondary treatment process technologies (sub alternatives a, b, and c). They are organized by flow rating, where Alternative #1 corresponds to the 0.6 MGD expansion and Alternative #2 corresponds to the 1.0 MGD expansion. The list of alternatives is as follows:

- **Alternative #1a** – 0.6 MGD, Conventional Activated Sludge
- **Alternative #1b** – 0.6 MGD, Oxidation Ditch
- **Alternative #1c** – 0.6 MGD, Aerobic Granular Sludge
- **Alternative #2a** – 1.0 MGD, Conventional Activated Sludge
- **Alternative #2b** – 1.0 MGD, Oxidation Ditch
- **Alternative #2c** – 1.0 MGD, Aerobic Granular Sludge

Table 1 summarizes the expansion alternatives and lists construction costs, Operation and Maintenance (O&M) costs, and net present value (NPV) for each. Construction costs are escalated to the midpoint of construction year 2027. Engineering costs for permitting, design, and construction administration are included. NPV analysis assumes a 20-year analysis period and 4% discount rate.

Table 1. Summary of Alternatives for Expansion of MCWWTP to 0.6 or 1.0 MGD						
Process Area	**Alternative #1a**	**Alternative #1b**	**Alternative #1c**	**Alternative #2a**	**Alternative #2b**	**Alternative #2c**
Influent Pump Station	Duplicate existing IPS			New IPS with coarse screens		
Headworks	Duplicate existing rotary drum screen			New headworks with fine screens and grit removal		
Flow Equalization (EQ)	Add 2nd EQ tank with 80,000-gal capacity	Add 2nd EQ tank with 80,000-gal capacity	Add 2nd EQ tank with 80,000-gal capacity	Add 2nd EQ tank with 135,000-gal capacity	Add 2nd EQ tank with 135,000-gal capacity	Add 2nd EQ tank with 135,000-gal capacity
Chemical Feed (Alkalinity)	No improvements			No improvements		
Biological Process	New conventional activated sludge	New oxidation ditch	New aerobic granular sludge	New conventional activated sludge	New oxidation ditch	New aerobic granular sludge
Secondary Clarifiers	No improvements	No improvements	Repurpose SCs as post-EQ	Add 3rd secondary clarifier	Add 3rd secondary clarifier	Repurpose SCs as post-EQ
Return Activated Sludge (RAS) Pumping	No improvements	No improvements	Not required	Add fourth RAS pump	Add fourth RAS pump	Not required
Waste Activated Sludge (WAS) Pumping	No improvements	No improvements	New sludge transfer pump included with AGS package	No improvements	No improvements	New sludge transfer pumps included with AGS package
Filtration	Add fourth and fifth identical filter units			Demolish three existing units, install two new 3 MGD 6-disk units		
UV Disinfection	Add 3rd identical parallel bank			Demolish existing, install new two channel system supplying dose of 90 mJ/cm^2		
Effluent Flow Measurement	Add 2nd identical V-notch weir in parallel			Abandon existing effluent box and weir, install new 9-in Parshall flume		
Cascade Aerator	No improvements			No improvements		
Sludge Holding Tanks (SHTs)	Utilize existing ABs as additional sludge holding	Utilize existing ABs as additional sludge holding	Utilize existing ABs as sludge buffer tanks. Repurpose SHTs as sludge buffer tanks.	Utilize existing ABs as additional sludge holding	Utilize existing ABs as additional sludge holding	Utilize existing ABs as sludge buffer tanks. Repurpose SHTs as sludge buffer tanks.
Plant Drain Pump Station	No improvements			Add 2nd duplicate pump		
Backup Power Generator	Replace existing (2) generators with single new generator of the same total capacity of 425 kW			Add a 2nd 425 kW engine generator		
Construction Cost	$18,845,000	$20,320,000	$22,767,000	$40,346,000	$45,254,000	$46,357,000
Annual Electricity and Caustic Soda Cost	$167,624	$178,055	$167,037	$242,530	$273,412	$246,893
20-year NPV Cost (in year 2025)	$18,770,000	$20,203,000	$22,193,000	$38,605,000	$43,302,000	$43,924,000

Preliminary site plans and process flow diagrams were developed for these alternatives to better define the scope of work and facilitate cost estimating. These are provided as attachments to this TM.

Table 2 summarizes the advantages and disadvantages of the MCWWTP expansion alternatives.

Table 2. Advantages and Disadvantages of the Different MCWWTP Expansion Alternatives

Alternative	Advantages	Disadvantages
#1a. 0.6 MGD and #2a. 1.0 MGD Conventional Activated Sludge	• Status quo (similar to operation at RRRWWTP) • Some nitrogen removal	• Internal mixed liquor recycle pumping • New biological nutrient removal (BNR) basin and aeration system • Diffuser maintenance required
#1b. 0.6 MGD and #2b. 1.0 MGD Oxidation Ditch	• Some nitrogen removal • Simple operation and maintenance • internal mixed liquor recycle (IMLR) is passive within oxidation ditch, controlled by gate (no pumping)	• Sludge settleability is not as good as CAS • Aeration not as efficient as fine bubble • Highest footprint
#1c. 0.6 MGD and #2c. 1.0 MGD Aerobic Granular Sludge	• Nitrogen and phosphorus removal • Small footprint • No secondary clarifiers or RAS pumping	• Newer technology • Requires retrofit of existing Secondary Clarifiers • Batch fed system

Recommended Alternative

WSACC and Brown and Caldwell met multiple times in May and June 2025 to discuss these alternatives before selecting Alternative #1a with some variations as the recommended alternative to be further developed in a Preliminary Engineering Report. The main reasons for selection are economic and WSACC's familiarity with the CAS technology that is currently implemented at the MCWWTP and RRRWWTP. This alternative will be rated for 0.66 MGD MMF since the biological process will be sized for this flow. The equalization basin will be sized for the volume needed for the 1 MGD MMF alternative to make it easier and less costly to expand to 1 MGD in the future. The return activated sludge (RAS) pumping needs to be investigated further since recent feedback suggests that the existing pumps have difficulty meeting current capacity demands.

Section 1: Project Introduction and Background

1.1 Background

The Water and Sewer Authority of Cabarrus County (WSACC) owns and operates the Muddy Creek Wastewater Treatment Plant (MCWWTP) located at 14655 Hopewell Church Road, Midland, North Carolina 28107. The facility is currently permitted to treat 0.3 million gallons per day (MGD) of wastewater generated on a maximum monthly flow (MMF) basis and has an effluent limits page for 1 MGD already included in its National Pollution Discharge Elimination System (NPDES) operating permit. Effluent permit limits are summarized in Table and Table 4. Due to increasing flows, the plant requires expansion, and its capacity will be increased to either 0.6 or 1.0 MGD.

Technical Memorandum (TM) No. 7 Capacity Analysis for Muddy Creek Wastewater Treatment Plant by Brown and Caldwell (BC) dated February 2025 discusses the existing facility capacities and sets the premise for the expansion alternatives presented in this TM.