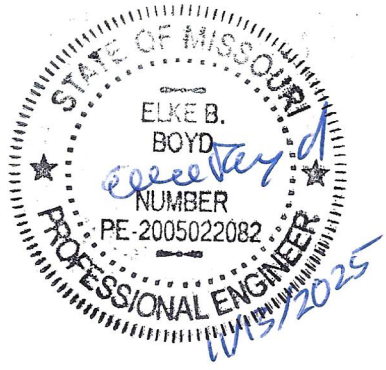
SECTION 00 20 01

ADDENDUM NUMBER 1

The revisions hereby supersede any and all data with which they may conflict as indicated in the specifications and related documents issued in the original set or prior addenda. Each trade is responsible for changes in its work caused by changes in the work of other trades. This addendum is a part of and shall be attached to the original set of specifications for the work.



ITEM 1 - PROJECT INFORMATION

1.01	Date of Addendum:	November 12, 2025
1.02	Owner:	Boone County Regional Sewer District
1.03	Owner's Project Number:	08-2025
1.04	Engineer:	Lochmueller Group
1.05	Engineer's Project Number:	524-1025-01W-Phase 2
1.06	Project:	Hartburg WWTF - Treatment Upgrades

ITEM 2 - TO PROSPECTIVE BIDDERS:

2.01 This Addendum forms a part of the Contract Documents and modifies the Bidding Documents dated November 3, 2025 with amendments and additions noted below.

2.02 Bidder is to acknowledge receipt of this Addendum in the space provided in the Bid Form. Failure to do so may disqualify the Bidder.

2.03 This addendum consists of 40 pages and the following drawings:

A. Hartsburg WWTF - Treatment Upgrades, Sheets 1 through 9 (full set).

ITEM 3 - CHANGES TO PRIOR ADDENDA:

3.02 Changes to Addendum number: N/A

ITEM 4 - CHANGES TO THE PROJECT MANUAL, PROCUREMENT AND/OR CONTRACT REQUIREMENTS AND TECHNICAL SPECIFICATIONS:

4.01 Changes to Document Section: C111 - Advertisement for Bids:

A. Replace the Advertisement for Bids with the attached Advertisement for Bids. The change consists of splitting the Base Bid into a Base Bid and Alternate Bid in the project description.

4.02 Changes to Document Section: C200 - Instruction to Bidders for Construction Contract:

A. Replace Article 13, Paragraph 13.02.B with the following Paragraph 13.02.B:

B. In the comparison of Bids, alternates will be applied in the same order of priority as listed in the Bid Form or as otherwise most advantageous for the project.

4.03 Changes to Document Section: C410 - Bid Form for Construction Contract

A. Replace the Bid Form with the attached Bid Form. The change consists of splitting the Base Bid into a Base Bid and Alternate Bid.

4.04 Changes to Document Section: C520 - Agreement Between Owner and Contractor for Construction Contract

A. Replace the Agreement with the attached Agreement. The change consists of splitting the Base Bid into a Base Bid and Alternate Bid.

4.05 Changes to Document Section: C550 - Notice to Proceed

A. Replace the Notice to Proceed with the attached Notice to Proceed. The change consists of splitting the Base Bid into a Base Bid and Alternate Bid.

4.06 Changes to Document Section: Section 01 10 00 - Summary

A. Add a new Paragraph 1.4.F directly following Paragraph 1.4.E:
   F. Prior to Contract Award, submit to the Owner a list of all equipment and gross vehicle weights (empty and loaded) Bidder intends to transport across the Katy Trail. This information will be submitted by the Owner to the Missouri Department of Natural Resources for the trail use permit.

4.07 Changes to Document Section: Section 43 11 10 - Aeration Equipment

A. Replace Paragraph 2.6.A.8 with the following Paragraph 2.6.A.8:
   8. Motor power requirements: 1 hp, 240 V, 1-phase, 60 Hz (VFD compatible), NEMA premium efficiency meeting NEMA MG1 Part 31 if running on VFD.

B. Replace Paragraph 2.7.D.1 with the following Paragraph 2.7.D.1:
   1. 240 V, 1-phase service.

4.08 Changes to Document Section: Section 46 61 23 - Gravity Filters

A. Replace Section 46 61 23 with the attached Section 46 61 23. The change consists of changing from 3-phase to 1-phase blower motors.

4.09 Changes to Document Section: Section 46 61 23 - Gravity Filters - Attachment

A. Replace Section 46 61 23 - Attachment with the attached Section 46 61 23 - Attachment. The change consists of changing from 3-phase to 1-phase blower motors.

ITEM 5 - CHANGES TO THE DRAWINGS:

5.01 Changes to Drawing:

A. Replace the entire set, Sheets 1 through 9, with the attached set, Sheets 1 through 9. The changes consist of renumbering of Alternates and revising the flowmeter location.

ITEM 6 - GENERAL CLARIFICATIONS: N/A

ITEM 7 - ATTACHMENTS:

7.01 Revised Advertisement for Bids

7.02 Revised Bid Form for Construction Contract.

7.03 Revised Agreement Between Owner and Contractor for Construction Contract.

7.04 Revised Notice to Proceed.

7.05 Revised Section 46 61 23 - Gravity Filters.

7.06 Revised Section 46 61 23 - Gravity Filters - Attachment.

7.07 Revised Drawings, entire set.

END OF SECTION 00 20 01

ADVERTISEMENT FOR BIDS

Boone County Regional Sewer District (BCRSD)
1314 North 7th Street, Columbia, MO 65201
Hartsburg WWTF - Treatment Upgrades

General Notice

The BCRSD (Owner) is requesting Bids for the construction of the following Project:

Hartsburg WWTF - Treatment Upgrades
Owner's Project Number: 08-2025
Engineer's Project Number: 524-1025-01W - Phase 2

Bids for the construction of the Project will be received at the **office of the BCRSD** located at 1314 North 7th Street, Columbia MO 65201, until **Wednesday, December 3, 2025** at **2:00 PM** local time. At that time the Bids received will be publicly opened and read aloud.

The Project includes the following Work

The Base Bid consists of acquisition of gravel filter equipment for the Village of Hartsburg 2-cell wastewater lagoon. Alternates include acquisition of aeration equipment, replacement of the existing aeration system and installation of the filter, site fencing, repair of valve boxes, adjustment of the outfall pipe and installation of a flow meter.

Obtaining the Bidding Documents

Information and Bidding Documents for the Project can be found at the following designated website:

https://www.adsplanroom.net

Bidding Documents may be viewed at no cost. Hardcopies or downloads may be obtained from the designated website for a non-refundable fee. Prospective Bidders are **required** to register with the designated website as a plan holder, even if Bidding Documents are obtained from a plan room or source other than the designated website in either electronic or paper format. The designated website will be updated periodically with addenda, lists of registered plan holders, reports, and other information relevant to submitting a Bid for the Project. All official notifications, addenda, and other Bidding Documents will be offered only through the designated website. Neither Owner nor Engineer will be responsible for Bidding Documents, including addenda, if any, obtained from sources other than the designated website.

Pre-bid Conference

A pre-bid conference for the Project will be held on **Wednesday, November 19, 2025** at **11:00 AM** at **the office of the BCRSD. A virtual option will be available** by visiting www.bcrsd.com and clicking on the "Bids and Public Notices" tab. Information for virtual attendance can be found by clicking the link for this project**.** Attendance at the pre-bid conference is encouraged but not required. The conference will be followed by an optional tour of the Site.

Instructions to Bidders.

For all further requirements regarding bid submittal, qualifications, procedures, and contract award, refer to the Instructions to Bidders that are included in the Bidding Documents.

This Advertisement is issued by:

Owner: BCRSD
By: Jesse Stephens, PE
Title: Facilities Engineering Manager and Interim Executive Director
Date: Monday, November 3, 2025

BID FORM FOR CONSTRUCTION CONTRACT

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

ARTICLE 1—OWNER AND BIDDER

1.01 This Bid is submitted to: Boone County Regional Sewer District, located at 1314 North 7th Street, Columbia MO 65201.

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

ARTICLE 2—ATTACHMENTS TO THIS BID

2.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;

B. List of Proposed Subcontractors;

C. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such authority within the time for acceptance of Bids;

D. Contractor's license number as evidence of Bidder's State Contractor's License or a covenant by Bidder to obtain said license within the time for acceptance of Bids; and

E. Required Bidder Qualification Statement with supporting data.

ARTICLE 3—BASIS OF BID—LUMP SUM BID AND UNIT PRICES

3.01 *Unit Price Bids*

A. **Base Bid - Major Filter Equipment Procurement** - Bidder will perform the following Work at the indicated unit prices:

Base Bid - Major Filter Equipment Procurement					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Bid Unit Price**	**Bid Amount**
1	SAGR Filter and Controls, Equipment	LS	1	$	$
2	Contractor's Procurement Cost	LS	1	$	$
Base Bid - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

B. **Alternate 1 Bid - Major Aeration Equipment Procurement** - Bidder will perform the following Work at the additional indicated unit prices:

Alternate 1 - Major Aeration Equipment Procurement					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Bid Unit Price**	**Bid Amount**
3	Nexom Lagoon Aeration Equipment	LS	1	$	$
4	1Ph Aerzen Blower and VFD, Equipment	EA	3	$	$
5	Contractor's Procurement Cost	LS	1	$	$
Alternate 1 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

C. **Alternate 2 Bid - Installation of Major Equipment** - Bidder will perform the following Work at the additional indicated unit prices:

Alternate 2 - Installation of Major Equipment					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Bid Unit Price**	**Bid Amount**
6	Mobilization/Demobilization	LS	1	$	$
7	Site Clearing, Fence Removal, Access Ctrl	LS	1	$	$
8	Filter Earthwork	CY	185	$	$
9	Filter Non-Woven Geotextile, 8 oz	SF	1,780	$	$
10	Filter HPDE Liner, 60 mil	SF	1,320	$	$
11	Filter Uniform Graded Clean Rock	TN	182	$	$
12	Filter Insulating Wood Chips	CY	20	$	$
13	Filter Wall Framing & Sheathing	SF	800	$	$
14	Filter System Installation	LS	1	$	$
15	Filter Precast Level Control Manhole, 48 in	EA	2	$	$
16	Sewer Yard Piping, 6" DIP	LF	45	$	$
17	Sewer Gate Valve, 6" DIP	EA	3	$	$
18	Air Yard Piping, 4" HDPE DR11	LF	205	$	$

19	Miscellaneous Power and Electric Items	LS	1	$	$
20	Concrete Blower Pad	SF	30	$	$
21	Blower Building Piping and Valves	LS	1	$	$
22	Blower Installation	LS	1	$	$
23	Lagoon Aeration Installation	LS	1	$	$
24	Gravel Drive	SY	132	$	$
25	Seeding and Site Restoration	LS	1	$	$
Alternate 2 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

D. **Alternate 3 Bid - Site Fencing** - Bidder will perform the following Work at the additional indicated unit prices:

Alternate 3 - Site Fencing					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Bid Unit Price**	**Bid Amount**
26	Woven Wire Fence with Barbed Wire	LF	86	$	$
27	6-Bar Gate, 12' wide	LS	2	$	$
Alternate 3 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

E. **Alternate 4 Bid - Outfall Piping** - Bidder will perform the following Work at the additional indicated unit prices:

Alternate 4 - Outfall Piping and Flowmeter					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Bid Unit Price**	**Bid Amount**
28	Repair broken transfer pipe valve box	EA	2	$	$
29	Relay outfall pipe, complete	LS	1	$	$
30	Ultrasonic Cartridge Flowmeter	LS	1	$	$
Alternate 4 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

F. Bidder acknowledges that:

1. each Bid Unit Price includes an amount considered by Bidder to be adequate to cover Contractor's overhead and profit for each separately identified item, and

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

ARTICLE 4—TIME OF COMPLETION

4.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

4.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 5—BIDDER'S ACKNOWLEDGEMENTS: ACCEPTANCE PERIOD, INSTRUCTIONS, AND RECEIPT OF ADDENDA

5.01 *Bid Acceptance Period*

A. This Bid will remain subject to acceptance for 60 days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

5.02 *Instructions to Bidders*

A. Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security.

5.03 *Receipt of Addenda*

A. Bidder hereby acknowledges receipt of the following Addenda:

Addendum Number	Addendum Date

ARTICLE 6—BIDDER'S REPRESENTATIONS AND CERTIFICATIONS

6.01 *Bidder's Representations*

A. In submitting this Bid, Bidder represents the following:

1. Bidder has examined and carefully studied the Bidding Documents, including Addenda.

2. Bidder has visited the Site, conducted a thorough examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Bidder is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Bidder has carefully studied the reports of explorations and tests of subsurface conditions at or adjacent to the Site and the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

5. Bidder has carefully studied the reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, with respect to Technical Data in such reports and drawings.

6. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, if selected as Contractor; and (c) Bidder's (Contractor's) safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Bidder agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

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

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

10. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. The submission of this Bid constitutes an incontrovertible representation by Bidder that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

6.02 *Bidder's Certifications*

A. The Bidder certifies the following:

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

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

3. Bidder has not solicited or induced any individual or entity to refrain from bidding.

4. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 6.02.A:

a. Corrupt practice means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process.

b. Fraudulent practice means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition.

c. Collusive practice means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels.

d. Coercive practice means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

BIDDER hereby submits this Bid as set forth above:

Bidder:

_____

(typed or printed name of organization)

By: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

If Bidder is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.

Attest: _____

(individual's signature)

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Date: _____

(typed or printed)

Address for giving notices:

_____

_____

Bidder's Contact:

Name: _____

(typed or printed)

Title: _____

(typed or printed)

Phone: _____

Email: _____

Address: _____

_____

_____

Bidder's Contractor License No.: (if applicable) _____

AGREEMENT BETWEEN OWNER AND CONTRACTOR FOR CONSTRUCTION CONTRACT (STIPULATED PRICE)

This Agreement is by and between **Boone County Regional Sewer District ("Owner")** and _____ _____ **("Contractor")**.

Terms used in this Agreement have the meanings stated in the General Conditions and the Supplementary Conditions.

Owner and Contractor hereby agree as follows:

ARTICLE 1—WORK

1.01 Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

A. Replacement of the aeration system for the Village of Hartsburg 2-cell wastewater lagoon and addition of an aerated gravel filter system. The project is split as follows:

1. The Base Bid consists of procurement of the aerated gravel filter equipment.
2. Alternate 1 consists of procurement of the lagoon aeration equipment and blowers.
3. Alternate 2 consists of installation of the aerated gravel filter and aeration equipment.
4. Alternate 3 consists of partial site fencing.
5. Alternate 4 consists of reinstallation of the outfall pipe, addition of a flowmeter and repair of two valve boxes.

ARTICLE 2—THE PROJECT

2.01 The Project, of which the Work under the Contract Documents is a part, is generally described as follows**:**

Hartsburg WWTF - Treatment Upgrades
0.5 miles SE of 2nd St & Katy Trail Intersection
Hartsburg, MO 65039

ARTICLE 3—ENGINEER

3.01 The Owner has retained Lochmueller Group ("Engineer") to act as Owner's representative, assume all duties and responsibilities of Engineer, and have the rights and authority assigned to Engineer in the Contract.

3.02 The part of the Project that pertains to the Work has been designed by Engineer.

ARTICLE 4—CONTRACT TIMES

4.01 *Time is of the Essence*

A. All time limits for Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

4.02 *Contract Times: Dates*

A. The Work for each Milestone will be substantially complete on or before the following dates:

1. Milestone 1: **June 1, 2026**.

    a. Base Bid - Major Filter Equipment Procurement, and

    b. Alternate 1: Major Aeration Equipment Procurement

    c. For Milestone 1, Substantial Completion has been achieved once proof of the complete equipment order has been presented to the Owner.

2. Milestone 2: Alternate 2 - Installation of Major Equipment: **September 30, 2026**.

3. Milestone 3, as awarded: **September 30, 2026**.

    a. Alternate 3 - Site Fencing, and

    b. Alternate 4 - Outfall Piping and Flowmeter

B. The Work for each Milestone will be ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the following dates:

1. Milestone 1: **June 15, 2026**.

    a. Base Bid - Major Filter Equipment Procurement, and

    b. Alternate 1: Major Aeration Equipment Procurement

    c. For Milestone 1, Readiness for Final Payment has been achieved once the complete equipment order has been received and stored onsite or as approved by the Owner.

2. Milestone 2: Alternate 1 - Installation of Major Equipment: **October 30, 2026**.

3. Milestone 3, as awarded: **October 30, 2026**.

    a. Alternate 3 - Site Fencing, and

    b. Alternate 4 - Outfall Piping and Flowmeter

4.03 *Liquidated Damages*

A. Contractor and Owner recognize that time is of the essence as stated in Paragraph 4.01 above and that Owner will suffer financial and other losses if the Work is not completed and Milestones not achieved within the Contract Times, as duly modified. The parties also recognize the delays, expense, and difficulties involved in proving, in a legal or arbitration proceeding, the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):

1. *Substantial Completion:* Contractor shall pay Owner **one thousand dollars ($1,000)** for each day that expires after the time (as duly adjusted pursuant to the Contract) specified

above for Substantial Completion of any Milestone, until the Work is substantially complete.

c. Liquidated damages for failing to timely attain Substantial Completion for each Milestone are not additive, and will not be imposed concurrently.

2. *Completion of Remaining Work:* After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Times (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, as applicable for each Milestone, Contractor shall pay Owner **five hundred dollars ($500)** for each day that expires after such time until the Work is completed and ready for final payment.

a. Liquidated damages for failing to timely attain final completion for each Milestone are not additive, and will not be imposed concurrently.

3. *Overlap of Substantial and Final Completion*: Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive, and will not be imposed concurrently.

a. During periods when the Work under more than one Milestone has not been completed within the Contract Times, as duly modified, only the liquidated damages for the Milestone subject to the highest dollar amount are assessed.

B. If Owner recovers liquidated damages for a delay in completion by Contractor, then such liquidated damages are Owner's sole and exclusive remedy for such delay, and Owner is precluded from recovering any other damages, whether actual, direct, excess, or consequential, for such delay, except for special damages (if any) specified in this Agreement.

ARTICLE 5—CONTRACT PRICE

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the amounts that follow, subject to adjustment under the Contract:

A. For all Unit Price Work, an amount equal to the sum of the extended prices (established for each separately identified item of Unit Price Work by multiplying the unit price times the actual quantity of that item).

Base Bid - Major Filter Equipment Procurement					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
1	SAGR Filter and Controls, Equipment	LS	1	$	$
2	Contractor's Procurement Cost	LS	1	$	$
Base Bid - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

Total of all Base Bid Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities): $ _____ [words] _____ .

Alternate 1 - Major Aeration Equipment Procurement					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
3	Nexom Lagoon Aeration Equipment	LS	1	$	$
4	1Ph Aerzen Blower and VFD, Equipment	EA	3	$	$
5	Contractor's Procurement Cost	LS	1	$	$
Alternate 1 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

Total of all Alternate 1 Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities): $ _____ [words] _____ .

Alternate 2 - Installation of Major Equipment					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Unit Price**
6	Mobilization/Demobilization	LS	1	$	$
7	Site Clearing, Fence Removal, Access Ctrl	LS	1	$	$
8	Filter Earthwork	CY	185	$	$
9	Filter Non-Woven Geotextile, 8 oz	SF	1,780	$	$
10	Filter HPDE Liner, 60 mil	SF	1,320	$	$
11	Filter Uniform Graded Clean Rock	TN	182	$	$
12	Filter Insulating Wood Chips	CY	20	$	$
13	Filter Wall Framing & Sheathing	SF	800	$	$
14	Filter System Installation	LS	1	$	$
15	Filter Precast Level Control Manhole, 48 in	EA	2	$	$
16	Sewer Yard Piping, 6" DIP	LF	45	$	$
17	Sewer Gate Valve, 6" DIP	EA	3	$	$
18	Air Yard Piping, 4" HDPE DR11	LF	205	$	$

19	Miscellaneous Power and Electric Items	LS	1	$	$
20	Concrete Blower Pad	SF	30	$	$
21	Blower Building Piping and Valves	LS	1	$	$
22	Blower Installation	LS	1	$	$
23	Lagoon Aeration Installation	LS	1	$	$
24	Gravel Drive	SY	132	$	$
25	Seeding and Site Restoration	LS	1	$	$
Alternate 1 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

Total of all Alternate 2 Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities): $ _____ [words] _____.

Alternate 3 - Site Fencing					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
26	Woven Wire Fence with Barbed Wire	LF	86	$	$
27	Iron Gate, 12' wide	LS	2	$	$
Alternate 2 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

Total of all Alternate 2 Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities): $ _____ [words] _____.

Alternate 4 - Outfall Piping and Flowmeter					
Item No.	**Description**	**Unit**	**Estimated Quantity**	**Unit Price**	**Extended Price**
28	Repair broken transfer pipe valve box	EA	2	$	$
29	Relay outfall pipe, complete	LS	1	$	$
30	Flowmeter, complete	LS	1	$	$
Alternate 3 - Total of all Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities)					**$**

Total of all Alternate 4 Extended Prices for Unit Price Work (subject to final adjustment based on actual quantities): $ [words] .

The extended prices for Unit Price Work set forth as of the Effective Date of the Contract are based on estimated quantities. As provided in Paragraph 13.03 of the General Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer.

ARTICLE 6—PAYMENT PROCEDURES

6.01 *Submittal and Processing of Payments*

A. Contractor shall submit Applications for Payment in accordance with Article 15 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

6.02 *Progress Payments; Retainage*

A. Owner shall make progress payments on the basis of Contractor's Applications for Payment on or about the [ordinal number] day of each month during performance of the Work as provided in Paragraph 6.02.A.1 below, provided that such Applications for Payment have been submitted in a timely manner and otherwise meet the requirements of the Contract. All such payments will be measured by the Schedule of Values established as provided in the General Conditions (and in the case of Unit Price Work based on the number of units completed) or, in the event there is no Schedule of Values, as provided elsewhere in the Contract.

1. Prior to Substantial Completion of each Milestone, progress payments will be made in an amount equal to the percentage indicated below but, in each case, less the aggregate of payments previously made and less such amounts as Owner may withhold, including but not limited to liquidated damages, in accordance with the Contract.

a. Ninety (90) percent of the value of the Work completed (with the balance being retainage).

1) If seventy five (75) percent or more of the Work has been completed, as determined by Engineer, and if the character and progress of the Work have been

satisfactory to Owner and Engineer, then as long as the character and progress of the Work remain satisfactory to Owner and Engineer, there will be no additional retainage.

b. One hundred (100) percent of cost of materials and equipment not incorporated in the Work, but securely stored on site or per Owner's instructions, with paid receipts presented with Application for Payment.

B. Upon Substantial Completion, Owner shall pay an amount sufficient to increase total payments to Contractor to one hundred (100) percent of the Work completed, less such amounts set off by Owner pursuant to Paragraph 15.01.E of the General Conditions, and less two hundred (200) percent of Engineer's estimate of the value of Work to be completed or corrected as shown on the punch list of items to be completed or corrected prior to final payment.

6.03 *Final Payment*

A. Upon final completion and acceptance of the Work, Owner shall pay the remainder of the Contract Price in accordance with Paragraph 15.06 of the General Conditions.

6.04 *Consent of Surety*

A. Owner will not make final payment, or return or release retainage at Substantial Completion or any other time, unless Contractor submits written consent of the surety to such payment, return, or release.

6.05 *Interest*

A. All amounts not paid when due will bear interest at the rate of five **(5)** percent per annum.

ARTICLE 7—CONTRACT DOCUMENTS

7.01 *Contents*

A. The Contract Documents consist of all of the following:

1. This Agreement.
2. Bonds:
    a. Performance bond (together with power of attorney).
    b. Payment bond (together with power of attorney).
3. General Conditions.
4. Supplementary Conditions.
5. Specifications as listed in the table of contents of the project manual (copy of list attached).
6. Drawings (not attached but incorporated by reference) consisting of **nine (9)** sheets with each sheet bearing the following general title: **Hartsburg WWTF - Treatment Upgrades**.
7. Addenda (numbers [number] to [number], inclusive).
8. The following which may be delivered or issued on or after the Effective Date of the Contract and are not attached hereto:

a. Notice to Proceed.

b. Work Change Directives.

c. Change Orders.

d. Field Orders.

e. Warranty Bond, if any.

B. The Contract Documents listed in Paragraph 7.01.A are attached to this Agreement (except as expressly noted otherwise above).

C. There are no Contract Documents other than those listed above in this Article 7.

D. The Contract Documents may only be amended, modified, or supplemented as provided in the Contract.

ARTICLE 8—REPRESENTATIONS, CERTIFICATIONS, AND STIPULATIONS

8.01 *Contractor's Representations*

A. In order to induce Owner to enter into this Contract, Contractor makes the following representations:

1. Contractor has examined and carefully studied the Contract Documents, including Addenda.

2. Contractor has visited the Site, conducted a thorough visual examination of the Site and adjacent areas, and become familiar with the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

3. Contractor is familiar with all Laws and Regulations that may affect cost, progress, and performance of the Work.

4. Contractor has carefully studied the drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary Conditions, with respect to the Technical Data in such reports and drawings.

6. Contractor has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Technical Data identified in the Supplementary Conditions or by definition, with respect to the effect of such information, observations, and Technical Data on (a) the cost, progress, and performance of the Work; (b) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (c) Contractor's safety precautions and programs.

7. Based on the information and observations referred to in the preceding paragraph, Contractor agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.

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

9. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and of discrepancies between Site conditions and the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

10. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

11. Contractor's entry into this Contract constitutes an incontrovertible representation by Contractor that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

8.02 *Contractor's Certifications*

A. Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 8.02:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process or in the Contract execution;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

8.03 *Standard General Conditions*

A. Owner stipulates that if the General Conditions that are made a part of this Contract are EJCDC® C-700, Standard General Conditions for the Construction Contract (2018), published by the Engineers Joint Contract Documents Committee, and if Owner is the party that has furnished said General Conditions, then Owner has plainly shown all modifications to the standard wording of such published document to the Contractor, through a process such as highlighting or "track changes" (redline/strikeout), or in the Supplementary Conditions.

IN WITNESS WHEREOF, Owner and Contractor have signed this Agreement.

This Agreement will be effective on [date on which Contract becomes effective] (which is the Effective Date of the Contract).

Owner:	Contractor:
_____	_____
(typed or printed name of organization)	*(typed or printed name of organization)*
By: _____	By: _____
(individual's signature)	*(individual's signature)*
Date: _____	Date: _____
(date signed)	*(date signed)*
Name: _____	Name: _____
(typed or printed)	*(typed or printed)*
Title: _____	Title: _____
(typed or printed)	*(typed or printed)*
	*(If **[Type of Entity]** is a corporation, a partnership, or a joint venture, attach evidence of authority to sign.)*
Attest: _____	Attest: _____
(individual's signature)	*(individual's signature)*
Title: _____	Title: _____
(typed or printed)	*(typed or printed)*
Address for giving notices:	Address for giving notices:
_____	_____
_____	_____
_____	_____
Designated Representative:	Designated Representative:
Name: _____	Name: _____
(typed or printed)	*(typed or printed)*
Title: _____	Title: _____
(typed or printed)	*(typed or printed)*
Address:	Address:
_____	_____
_____	_____
_____	_____
Phone: _____	Phone: _____
Email: _____	Email: _____
(If Owner is a corporation, attach evidence of authority to sign. If Owner is a public body, attach evidence of authority to sign and resolution or other documents authorizing execution of this Agreement.)	License No.: _____
	(where applicable)
	State: _____

NOTICE TO PROCEED

Owner:	Boone County Regional Sewer District	Owner's Project No.:	08-2025
Engineer:	Lochmueller Group	Engineer's Project No.:	524-1025-01W
Contractor:		Contractor's Project No.:	
Project:	Hartsburg WWTF - Treatment Upgrades		
Contract Name:	Hartsburg WWTF - Treatment Upgrades		
Effective Date of Contract:			

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on [date Contract Times are to start] pursuant to Paragraph 4.01 of the General Conditions.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work will be done at the Site prior to such date.

In accordance with the Agreement:

The date by which Substantial Completion for each Milestone must be achieved is as follows:

1. Milestone 1: Base Bid and Alternate 1, as awarded: **June 1, 2026.**
2. Milestone 2: Alternate 2, as awarded: **September 30, 2026**.
3. Milestone 3: Alternate 3 and Alternate 4, as awarded: **September 30, 2026.**

The date by which readiness for final payment must be achieved is as follows

1. Milestone 1: Base Bid and Alternate 1, as awarded: **June 15, 2026.**
2. Milestone 2: Alternate 2, as awarded: **October 30, 2026**.
3. Milestone 3: Alternate 3 and Alternate 4, as awarded: **October 30, 2026.**

Before starting any Work at the Site, Contractor must comply with the following:

Coordinate with the Boone County Regional Sewer District for access to the Site and continued operations of the wastewater treatment facility.

Owner:	**Boone County Regional Sewer District**
By *(signature)*:	
Name *(printed)*:	
Title:	
Date Issued:	

Copy: Engineer

SECTION 46 61 23
GRAVITY FILTERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Aerated granular aggregate-media filter and accessories.
   1. Filter process design criteria and requirements.
   2. Process equipment and piping for aeration system within the filter bed.
   3. Process equipment and piping for influent distribution/effluent collection system within the filter bed.
   4. Positive displacement air supply blowers, accessories.
   5. Blower control panel w/VFD drives (common panel with Lagoon blowers).
   6. Civil Works/Materials for filter bed construction. NOTE: All civil works/materials for filter bed construction to be supplied and installed by General Contractor.

B. Related Requirements:
   1. Section 06 10 00 - Rough Carpentry
   2. Section 31 23 16.13 - Trenching
   3. Section 31 05 19.13 - Geotextiles for Earthwork
   4. Section 43 11 33.10 - Aeration Equipment – This section is directly related to this Gravity Filters Section.
   5. Sections 46 61 23A - Gravity Filters - Attachment: Manufacturer's and Contractor's Scope Listing.
   6. Section 46 61 23.10 - Geomembrane Liner

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Treatment and Aeration System Major Components:
   1. Basis of Measurement: Lumps Sum or Unit Price, per Bid Item.
   2. Basis of Payment: Cost of equipment paid to Manufacturer.
   3. Refer to Attachment to this Section for a breakdown of Manufacturer supplied items.

B. Treatment and Aeration System Major Components Procurement:
   1. Basis of Measurement: Lumps Sum, per Bid Item.
   2. Basis of Payment: Contractor's cost of procurement.

C. Treatment and Aeration System Accessory Material, Equipment and Installation:
   1. Basis of Measurement: Unit Prices, per Bid Items.
   2. Basis of Payment: Contractor's cost of procurement, equipment, materials and installation.
   3. Refer to Attachment to this Section for a breakdown of Contractor supplied items.

1.3 REFERENCE STANDARDS

A. American Society for Testing and Materials International:
   1. ASTM C88: Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   2. ASTM C131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
   3. ASTM D1997: Standard Test Method for Laboratory Determination of the Fiber Content of Peat and Organic Soils by Dry Mass.
   4. ASTM D3034: Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   5. ASTM D3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
   6. ASTM D 6928: Standard Test Method for Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus.

B. The National Electrical Manufacturers Association
   1. NEMA MG1 - Motors and Generators

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit manufacturer's Product Data for system materials and component equipment.

C. Shop Drawings:
   1. Indicate system materials and component equipment.
   2. Submit installation and anchoring requirements, fasteners, and other details.

D. Manufacturer's Certificate: Certify that filters meet or exceed specified requirements.

E. Manufacturer's Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.

F. Source Quality-Control Submittals: Indicate results of factory tests and inspections.

G. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

H. Manufacturer Reports: Indicate that equipment has been installed according to manufacturer's instructions.

1.5 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout procedures.

B. Project Record Documents: Record actual location of installed gravity filter.

C. Operation and Maintenance Data: Submit maintenance instructions for equipment and accessories.

1.6 QUALITY ASSURANCE

A. Perform Work according to referenced industry standards.

B. All equipment specified in the Wastewater Treatment System Package shall be supplied as a complete package, from one supplier (unless specifically noted otherwise in the specifications), in order to unify responsibility for the system warranty, performance, and proper operation.

1.7 QUALIFICATIONS AND EXPERIENCE

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum five years' experience.

B. The supplier shall have experience in the design, manufacturing, supplying, and commissioning of equipment of the type specified.

C. Submit a list of a minimum of four (4) full scale filter installations of similar scope and design in cold climate (minimum four months of ice cover conditions) following wastewater treatment lagoons, having been in operation for not less than 3 years. Information required for each installation shall include:
   1. Name and location of facility, including operator contact information, engineer contact information, and owner contact information.
   2. Design flows, organic loading, and effluent requirements.
   3. Operating data including effluent quality.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Deliver materials in manufacturer's packaging including application instructions.

C. Inspection: Accept materials on-Site in original packaging and inspect for damage.

D. Store materials according to manufacturer's instructions.

1.9 EXISTING CONDITIONS

A. Field Measurements:
   1. Verify field measurements prior to fabrication.
   2. Indicate field measurements on Shop Drawings.

1.10 INSURANCE REQUIREMENTS

A. System Supplier shall maintain a minimum $1,000,000 Errors and Omissions insurance policy acceptable to the client.

1.11 WARRANTY

A. The System Supplier shall provide written warranties against defects in materials and workmanship for a period of 24 months after substantial completion for the system.
   1. The cost for removal (disposal) and reinstallation of any defective parts during the warranty period shall be fully born by the responsibility of the Owner.
   2. The Supplier shall repair or replace defective parts without charge to the Owner.

1.12 PERFORMANCE AND DESIGN CRITERIA

A. System Design Values:
   1. Design Average Daily Flow: 8,000 gpd.
   2. Maximum Daily Flow: 14,400 gpd.
   3. Minimum Influent Temperature: 33 degrees F.
   4. Flow Conditions: Continuous.

B. Filter Influent Design Values:
   1. $CBOD_5$: 2.3 lb/day
   2. Total Suspended Solids: 3.0 lb/d.
   3. Total Kjeldahl Nitrogen: 2.3 lb/day

C. Filter Effluent Design Values:
   1. $CBOD_5$ (monthly average): <30 mg/L
   2. Total Suspended Solids (monthly average): <30 mg/L
   3. Total Ammonia – N (monthly average): <0.6/2.1 mg/L (summer/winter)

D. Basin Design Criteria:
   1. It is entirely the responsibility of the Supplier to verify all design parameters, and basin design dimensions based on design values.
   2. Basin sizing, geometry, and gravel bed design shall be based on aggregate bed depth, retention time, influent loading rates, influent temperature, maximum frontal loading flux rate, and required nitrification rates.
      a. The volumetric design shall be based on TKN loading.
      b. The organic loading flux rate shall be based on the influent mass organic loading and the cross-sectional area at the influent end of the bed.
   3. Insulation layer design:
      a. Design depth of the insulating layer shall be based on local climate conditions and minimum average temperatures.
      b. Minimum insulation layer of 9” shall be provided.

E. Distribution & Collection Design Criteria:
   1. Influent distribution system:

a. There shall be two influent distribution points within each train of the system, which shall be fed using the step-feed process to establish sufficient nitrifying biomass within the bed for cold climate nitrification.
b. The influent distribution piping shall be designed to ensure flow distribution across the width of the bed.
c. Pipe size, orifice size and spacing shall be designed based on maximum monthly flows.

2. Effluent collection system:
a. Collection system shall be designed to collect effluent across the width of the bed.
b. Collection system shall be sized based on maximum monthly flows.

F. Aeration Design Criteria:
1. Aeration design factors:
a. Alpha: 0.70
b. Beta: 0.95
c. Theta: 1.024
d. Site Elevation: 569 ft
e. Maximum water temperature: 67 °F
f. Minimum water temperature: 33 °F
2. Aeration system shall be designed to transfer a minimum of 1.5 lbs of dissolved oxygen per 1 lb of $CBOD_5$ applied at normal operating conditions and 4.57 lbs of dissolved oxygen per 1 lb of TKN entering the filter system.
3. The average dissolved oxygen content shall be not less than 3.0 mg/L in the aggregate layer.
4. Air distribution within the filter bed shall be designed to match the projected oxygen demand. The design diffuser distribution is critical to ensure that nitrification occurs throughout the bed.
5. Submit complete design calculations and results of Standard Oxygen Transfer Efficiency (SOTE) tests conducted by an independent laboratory within a bed that contains aggregates that are similar in size to the specified gradations.

G. Reliability and Redundancy Criteria
1. A minimum dual train system is required. Each train in the system must have two feed zones: one at the front-end of the system, and one at the mid-point of the system with the ability to step-feed filter influent for biomass control.

PART 2 - PRODUCTS

2.1 AERATED GRANULAR AGGREGATE-MEDIA FILTERS

A. Basis of Design
1. The design drawings, system layout, equipment selection, etc. have been based on the OPTAER system. The pre-selected Wastewater Treatment System Package consists of multiple processes as designed and supplied by Nexom Inc.
2. The system was pre-selected by the Engineer to best meet the overall design requirements for this application.
3. Approved system is the OPTAER SAGR® system as manufactured and supplied by:
Nexom Inc.

Winnipeg, Manitoba
Telephone: 888-426-8180
kevin.esau@nexom.com

4. Components specified herein shall be supplied by one supplier and shall be of the manufacturer's latest design.
5. Under no circumstances will a system consisting of parts compiled and assembled by a manufacturer's representative or distributor be accepted.
6. Substitutions: Engineer approved equal. NOTE: All costs of evaluation and redesign associated with change of system or manufacturer to be paid by General Contractor.

B. General Layout/Arrangement
1. The SAGR (submerged attached growth reactor) is a tertiary wastewater process that provides year-round nitrification with prolonged cold water temperatures. The SAGR process can be utilized for nitrification following any secondary treatment processes including aerated or facultative lagoons. (See also specification section "Civil Works – General Arrangement" for additional overview.)
2. All process equipment within the SAGR basin shall be the OPTAER SAGR system as designed and manufactured/supplied by Nexom Inc. as a total system.
3. All civil works specified in this section (including but not limited to aggregate, protective fabric, HDPE liner, insulating material, and sacrificial wood) shall be provided by the General Contractor.

C. Aeration Pipe and Appurtenances
1. High-Density Polyethylene (HDPE) Pipe: butt-fused joints, 3" and larger.
2. The polyethylene pipe shall be PE3408, or PE3608, or PE4710, and conform to the requirements of ASTM D3350.
3. Minimum DR requirements shall be the more stringent of the following:
   a. for buried piping: DR17 for heavy traffic areas; DR21 for light traffic areas; DR26 for non-traffic areas.
   b. for other piping: DR17 for 4" piping, DR21 for 6" piping, DR26 for 8" and larger.
4. Minimum aeration header/lateral pipe size: 3" diameter
5. Flange assemblies: Polyethylene stub end manufactured to match the pipe, with ductile iron slip-on flange (out-of water) or stainless steel slip-on flange (in-water).
6. Provide saddles, tees, reducers, and other fittings required for the installation shown.
7. Feeder Tubing
   a. Feeder tubing used as the connection between the aeration tubing and the manifold pipe shall be SDR11 HDPE (black) Ultraviolet resistant tubing.
   b. Socket-fused couplers, fittings used for feeder tubing 1" and smaller

D. Aeration Diffusers
1. Aeration Tubing
   a. LINEAR aeration diffusers shall be suitable for direct bury (up to 15' depth) within granular media
   b. Diffuser air releases shall require 0.5 to 3 psi more than hydrostatic pressure to ensure pattern uniformity. Diffuser air release back pressure will vary with airflow per orifice.
   c. Internal diffuser friction loss shall be lower than the orifice pressure drop.
   d. Aeration diffusers shall be able to accommodate a bottom variation of +/- 4" without compromising the aeration distribution.

E. Influent Distribution and Effluent Collection
   1. Plastic Pipe
      a. Type PSM Polyvinyl Chloride (PVC): to ASTM D3034 CSA-B182.2.
      b. Standard Dimensional Ratio (SDR): 35
      c. Gasket and integral bell system
      d. Drilled orifices (as sized by the system supplier) to provide uniform flow distribution
   2. Distribution/Collection Chamber System
      a. Chamber system shall include any fittings, etc. to create a complete and functional system.
      b. Chamber modifications as required to provide horizontal and vertical flow distribution.

F. Aeration Blowers
   1. Blower unit(s): Rotary positive displacement type; meeting the following performance requirements (as per SAGR system supplier design):
      a. Maximum inlet temperature: 104 °F
      b. Relative humidity: 50%
      c. Normal pressure: 5.2 psi
      d. Maximum pressure: 9.2 psi (intermittent)
      e. Design Airflow: 26 SCFM.
      f. Normal blower operating RPM shall be less than 90% of maximum blower RPM
      g. Maximum noise level: 65 dBa (1 meter distance, free field measurement)
      h. Motor power requirements: 5 hp, 240 V, 1-phase, 60 Hz (VFD compatible), NEMA premium efficiency meeting NEMA MG1 Part 31 if running on VFD
      i. Number of units: 2 (1 operating, 1 common standby, each blower shall provide 100% of the required airflow. Standby blower shall also act as standby blower for lagoon aeration).
   2. Provide sound attenuating enclosures as required to meet the noise requirements, with mechanical cooling fans.
   3. Blowers shall have automatic belt tensioning: motor mounted on swing frame where tensioning is accomplished by the motor weight.
   4. Provide inlet filter assemblies, filter restrictor gauges, inlet/discharge silencers, check valves, pressure relief valves, pressure gauges, temperature gauges, temperature switches, flexible inlet and discharge piping couplers, etc. as required for a complete installation.
   5. Blower isolation butterfly valves shall be supplied as part of the metal piping discharge manifold.
   6. Spare Parts
      a. Provide one (1) spare air intake filter and one (1) v-belt set for each blower.
      b. Provide blower oil for first two (2) years of operation.
   7. Acceptable manufacturer: Aerzen
   8. Standby blower for the SAGR Aeration system shall also act as standby blower for Lagoon aeration system.

G. Aeration Blower Control Panel
   1. One (1) integrated aeration control panel shall be designed to control both the Lagoon Aeration Blowers and the SAGR Aeration Blowers.
   2. Control panel shall be furnished by the aeration equipment supplier and be factory assembled as a complete, fully wired and tested package.
   3. Refer to Section 43 11 33.10 - Aeration Equipment for Aeration Blower Control Panel details.

H. Civil Works by Contractor

1. All civil works specified in this section (including but not limited to aggregate, protective fabric, HDPE liner, insulating material, and sacrificial wood) shall be provided by the General Contractor.

I. Civil Works – General Arrangement

1. The SAGR is a clean gravel bed with horizontal chambers at the front end of the system to distribute the secondary wastewater flow across the width of the cell, and horizontal collection chambers at the end of the system treatment zones.
2. The basin is constructed with perimeter "sacrificial" walls to provide vertical side-slopes. The walls are not intended to provide a water-tight seal nor provide structural support. The walls provide a means to keep the backfill separated from the granular bed. An HDPE liner along the bottom and sides of each basin provides the watertight seal.
3. Influent splitting structure is located at the front of the system to divide flow equally between treatment zones. Effluent hydraulic control structure is located at the back end of the system to maintain a constant water level in the SAGR bed by the use of an overflow pipe, weirs, stop-logs, etc.
4. Shallow buried air supply headers run from the blowers to the SAGR bed. Aeration distribution headers are located on top of the SAGR bed within the insulation layer. LINEAR aeration throughout the floor of the SAGR provides aerobic conditions that are required for nitrification.
5. The aggregate bed is covered with a layer of wood chips (or other approved insulating material) to prevent the bed from freezing during extreme winter conditions.
6. A protective fabric layer is placed between the bottom and sides of the basin and the aggregate layer, and the top of the basin between the granular layer and the insulating layer.

J. Civil Works - Aggregate

1. Aggregate shall be of igneous, sedimentary or similar insoluble material origin.
   a. The aggregate shall be free from dust, sand, silt, clay, and organic matter.
   b. The aggregate shall be considered unsuitable, if it contains soft, thin, elongated, or laminated materials that break up when alternately frozen and thawed or wetted and dried.
   c. The aggregate shall be considered unsuitable, if it contains deleterious materials, even though particle sizes are within the limits of the gradation sizes required.
   d. Approval shall be obtained from the Engineer as to the proposed source and type of aggregate to be used.
2. Aggregate sieve analysis
   a. Aggregate sieve analysis shall meet the following specifications:

Sieve Size (inches)	Percent Passing
2	100
1 1/2	95 - 100
1	40 – 100
3/4	5 – 80
1/2	0 – 30
3/8	0 – 4
1/4	0 – 1

   b. All aggregate samples to be washed to determine fines as part of sieve analysis.
   c. Aggregate may need to be washed as part of aggregate production to meet fines specifications.

3. The aggregate shall also comply with the following test results:

Test	Maximum Value	ASTM Ref.
Abrasion	35% Loss	C 131
Soundness	8% Loss	C 88
Micro-Deval	25% Loss	D 6928

4. Quality control and aggregate testing
   a. Initial Testing: Complete testing for gradation, abrasion, soundness, and micro-Deval prior to start of production.
   b. Testing during production: Gradation testing during production shall include a minimum of one (1) gradation test per 250 cubic yards of material produced.
   c. Testing during hauling operations: The contractor shall include as part of a quality assurance program additional gradation testing during hauling. Complete a minimum of ten (10) gradation tests at intervals of approximately 10% of hauled material to site.
   d. All testing results must be submitted to the Engineer in a timely manner.
5. Sampling
   a. Do not sample from outside of stockpile where rain may clean aggregate and where segregation may occur.
   b. At the Engineers request, allow Engineer to take independent sample for testing.
6. Preliminary review of the aggregate as represented in the test results shall not constitute general acceptance of all or any material in a deposit or source of supply. The Engineer has the right to request additional testing if there are any concerns with any proposed aggregate. The Engineer shall have the final authority in approving or rejecting aggregate.
7. Aggregate not meeting the specifications shall be rejected. If material found to be unsuitable has already been placed into the SAGR beds, the material shall be removed and replaced by the Contractor. Any damage to process equipment or contract schedule delays resulting from removal of rejected aggregate shall be the full responsibility of the Contractor.

K. Civil Works - Protective Fabric
   1. Provide Geotextile Fabric as specified in Section 31 05 19.13 Geotextiles for Earthwork.
   2. The fabric shall be a non-woven, needle punched, polypropylene fabric.
      a. minimum weight shall be 7 ounces per square yard.
      b. minimum grab tensile strength of at least 180 pounds.

L. Civil Works - HDPE Liner
   1. Provide HDPE liner as show on the plans and as specified in Section 46 61 23.10 Geomembrane Liner.
   2. Liner manufacturer shall provide pipe boots for pipe penetrations through the liner as shown on the plans.

M. Civil Works - Insulating Material Options
   1. Wood chips
      a. Wood chips shall be generally uniform in size
      b. Wood chips containing large quantities of sawdust (fines) will NOT be acceptable.
      c. A sample of material for approval by Engineer is required prior to the use of wood chips.
   2. Peat Mulch (alternate insulating material)
      a. Peat mulch shall be uniform throughout and have a minimum of 33% fiber content as per ASTM D1997.

b. At the time of delivery, the peat mulch shall be in an air-dried condition (moisture content 25 to 75% by mass).
c. Other peaty soils lacking fiber will NOT be acceptable.
d. A sample for approval by Engineer is required prior to the use of peat mulch.

N. Civil Works - Sacrificial Wood Walls
1. Perimeter walls
a. Wood studs: Studs shall be minimum 2x6, spaced at maximum 24” centers. Provide single bottom plate and double top plate.
b. Sheathing: minimum 3/4” plywood. Sheathing is required on one side of stud only (inside of SAGR beds).
2. Provide temporary bracing as required during construction/backfill

2.2 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Certificate of Compliance: When fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

3.2 GENERAL

A. Install gravity filter components according to manufacturer's instructions.

B. The General Contractor shall install all supplied components in accordance with the manufacturer’s instructions and in conformance with submitted shop drawings.

C. The installer of the filter and aeration system shall supply all materials, tools, equipment, and services necessary to install the complete system.

D. The site shall be kept in a neat and orderly manner throughout the duration of the system installation.

E. All civil works related to the filter, as specified in this section (including but not limited to aggregate, protective fabric, HDPE liner, insulating material, and sacrificial wood), shall be provided and installed by the General Contractor.

3.3 AERATION PIPING INSTALLATION

A. The General Contractor shall provide equipment for excavation and backfill for all shallow buried aeration headers. Backfill buried piping with select native excavated material. Backfill buried piping under building foundation or roadways with base course gravel.

B. The General Contractor shall accurately excavate to the correct grades allowing for sand bedding if/where required. Trench bottom shall be smooth, straight, and free of large rocks. Support piping on undisturbed material along its entire length.

C. The General Contractor shall provide sufficient labor and equipment to install all aeration header piping and accessories. Install buried piping to the extent shown on the drawings using open-cut trench method.

D. The General Contractor shall supply and install all air valves, main air header piping, blower intake/discharge piping, and fittings as necessary to complete the aeration system as shown on the plans.

E. Join HDPE pipe and fittings using the butt-fusion method in accordance with the pipe manufacturer's instructions, and under the supervision of certified fusion technologists.

F. Keep piping, during the progress of the Work and on completion, free from obstructions and thoroughly clean. Remove foreign material from the pipelines and ensure lines are free from leaks. Remove and replace any defective sections.

G. Install HDPE lateral piping at flange connection locations as shown on the drawings.

3.4 FILTER AERATION DIFFUSER INSTALLATION

A. The General Contractor shall provide sufficient labor and equipment to install all aeration diffuser piping and accessories within the filter bed.

B. Install diffusers and feeder tubing at locations as shown on the drawings. LINEAR diffusers shall be installed at the bottom of the bed, above the protective fabric layer, prior to granular placement.

C. Care shall be taken not to kink or twist tubing during installation.

D. Ensure that during aggregate placement the diffuser lines remain aligned and are not displaced.

E. Keep diffusers, during the progress of the work and on completion, free from obstructions and thoroughly clean. Remove foreign material from the lines

3.5 BLOWER AND RELATED PIPING INSTALLATION

A. The General Contractor shall provide sufficient labor and equipment to install all blower and related intake/discharge piping.

B. Install blower units on concrete bases in accordance with the manufacturer's instructions.

C. Install one intake filter in each air intake assembly upon system start-up; leave the remaining spare for each blower in the Blower Building for the Owner's future use.

D. Blower control panel shall be provided by aeration system Supplier. Installation of panel, including all electrical connections, related wiring, hookup of blowers, sensors, control wiring, etc. shall be by the General Contractor.

3.6 FILTER DISTRIBUTION & COLLECTION PIPING INSTALLATION (WITHIN CELL)

A. The General Contractor shall provide sufficient labor and equipment to install all distribution and collection piping within the filter beds.

B. The effluent collection chambers shall be located near the bottom of the bed within the granular layer. The effluent collection chambers shall be installed prior to any aggregate placement.

C. The influent distribution piping shall be located near the top of the bed within the granular media layer. Influent distribution piping and associated distribution chambers shall be installed prior to final aggregate placement.

D. Influent and effluent chambers/piping shall be installed to elevations shown in the Contract Drawings.

3.7 FILTER AGGREGATE & INSULATING MATERIAL PLACEMENT

A. The General Contractor shall provide sufficient labor and equipment to supply, deliver, and place the aggregate and insulating layer within the filter bed.

B. An authorized representative of the filter designer/supplier shall be on site during critical stages of aggregate placement. Sole purpose of inspection is to ensure that bottom laid equipment is not damaged during initial rock placement.

C. It is absolutely essential that clean aggregate be used and that no dirt or dust enter the aggregate during its storage, transport and placement. The aggregate substrates for the filter cells are water flow media and great care must be taken to prevent contamination by dust and dirt.

D. The finished granular surfaces of the cells shall have no grade. The aggregate layer shall be level to ensure a final thickness meeting the design elevation.

E. The insulating material shall be placed on the protective fabric, over the aggregate bed media, in a single lift to the specified design depth within acceptable tolerances. Spreading mulch to the required depth shall be done by hand or with low ground pressure tracked vehicles.

3.8 BASIN CONSTRUCTION

A. The General Contractor shall provide sufficient labor and equipment to supply materials for the construction of filter basins, including sacrificial walls, HDPE liner, and protective fabric.

B. Supply and install sacrificial wood walls as shown on the plans. Provide temporary bracing as required during construction and aggregate placement.

C. Supply and install HDPE liner, pipe boots, etc. as shown on the plans.

D. Protective fabric shall be installed on the bottom and sides of the basin prior to aggregate installation, and at the top of the granular media once the media has been installed to the required elevation and leveled.

3.9 SEQUENCE OF CONSTRUCTION (FILTER MANUFACTURER RECOMMENDED)

A. All process equipment within the filter basin(s) shall be provided by the system Supplier and installed by the system Supplier.

B. All civil works specified in this section (including but not limited to aggregate, protective fabric, HDPE liner, insulating material, and sacrificial wood) shall be provided and installed by the General Contractor.

C. In order to facilitate the filter construction, the following is the recommended sequence of events to occur during construction phase:

1. Basin Construction (General Contractor)
    a. Civil works/earthworks required to excavate and shape filter bed to required depth/dimensions as shown on the drawings.
    b. The finished floor shall be flat and level prior to proceeding with any other work.
2. Wood Framed Walls (General Contractor)
    a. Construction of wood framed “sacrificial” walls around perimeter of each filter cell.
    b. Sheathing material installed on inside of wall.
    c. Temporary supports as required to keep wall secure and vertical during construction
3. Impermeable Liner (General Contractor)
    a. Installation of impermeable liner within each filter cell.
    b. Installation of all pipe penetrations, boots, etc.
4. Protective Fabric (General Contractor)
    a. Installation of the protective fabric layer along bottom and sides of each filter cell.
5. Effluent Collection (System Supplier)
    a. Installation of effluent collection chambers (infiltration chambers) on bottom of cell.
6. Aeration Equipment (System Supplier)
    a. Installation of bottom laid diffuser tubing.
    b. Installation of HDPE in-basin distribution manifolds and HDPE vertical feeder piping.
    c. Connection of aeration lines to distribution manifolds on each side of cell.
7. Granular/Aggregate (General Contractor)
    a. Placement of granular material up to bottom level of influent distribution chambers (to elevations shown on drawings).
    b. Vertical aeration feeder piping to be temporarily supported to top/edge of wall to minimize movement during aggregate placement.
    c. Care must be taken during this stage to not disturb the aeration lines.
    d. Granular shall be placed parallel to the direction of the tubing and placed in such a way as to prevent damage to the tubing.

e. Backfilling around the outside perimeter of walls should take place at the same rate as granular placement to avoid shifting of the sacrificial walls.
f. Granular placement at influent distribution piping locations to be coordinated with multiple infiltration chamber placement. Granular to be placed in lifts equal to chamber height at distribution piping locations.

8. Influent Distribution (System Supplier)
   a. Installation of orifice drilled piping and protective chambers on granular material near the top of the filter bed (or to elevations shown on the drawings).
9. Granular/Aggregate (General Contractor)
   a. Final placement of granular material to finished grade.
   b. The finished granular surfaces of the cells shall be level and at the design elevation.
   c. The aggregate placed may naturally settle and compact and may require "topping up" to ensure a final thickness meeting the design elevation.
10. Protective Fabric (General Contractor)
    a. Installation of the protective fabric on top of the final finished granular level.
    b. Temporary anchoring/ballast may be required prior to placement of insulating layer.
11. Aeration Equipment (System Supplier)
    a. Installation of HDPE aeration supply header on top of granular layer.
    b. Connection of HDPE vertical feeder lines to aeration header.
12. Insulating Layer (General Contractor)
    a. Layer of insulating material wood chips, mulch, etc. placed on top of the fabric layer.
    b. Material shall be placed on the protective fabric, over the aggregate bed media in a single lift to the specified design depth within acceptable tolerances.
    c. Spreading material to the required depth shall be done by hand or with low ground pressure tracked vehicles.

D. This list of events is not intended to be an exhaustive list, but rather a general outline of the sequence of events expected to occur during the SAGR construction. Actual site conditions and/or construction techniques may alter the sequence of events.

3.10 MANUFACTURER'S/SUPPLIER'S FIELD SERVICE

A. The Supplier shall provide services of an experienced, competent, and authorized representative. Multiple trips may be required due to staging of construction.
   1. Inspect equipment covered by these specifications.
   2. Supervise any adjustments and installation checks.
   3. Perform operation checks and tests as outlined below.
   4. Perform start-up and commissioning of the system.

B. Perform air flow rate tests on blowers
   1. Testing shall be performed under full normal lagoon operational conditions.
   2. Verification of airflow shall be obtained by measuring RPM on blower motor and block and correlated with factory generated blower performance curves to obtain airflows.

C. If defects are revealed during testing, the Engineer may issue instructions for removal or correcting defective work and irregularities. If any material, in whole or in part, does not conform to the Specifications or is found to be defective then such material shall be rejected by the Engineer and replaced by the Contractor/Supplier.

3.11 COMMISSIONING

A. Section 01 40 00 - Quality Requirements: Requirements for inspecting and testing.

B. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

C. After installation, inspect and test for proper operation.

D. Equipment Acceptance:
   1. Adjust, repair, modify, or replace components failing to perform as specified, and rerun tests.
   2. Make final adjustments to equipment under direction of manufacturer's representative.

E. Furnish installation certificate from equipment manufacturer's representative attesting equipment has been properly installed and is ready for startup and testing.

F. Filter Supplier shall provide start-up and commissioning for the system including on-site training of the Owner’s operators. A minimum of one (1) trip with one (1) day shall be allowed.

G. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

H. Check the installation of all components and provide a written commissioning report to the Engineer upon completion of installation and commissioning.

3.12 DESIGN AND OPERATION SUPPORT

A. Filter system supplier shall provide operational support for a minimum of one year following commissioning. The support shall include a minimum of one (1) site visits along with establishing full operation and maintenance manuals.

B. Filter system supplier shall analyze water chemistry data (as sampled by the system Operator and as tested by a certified independent lab) for a minimum of one (1) year to ensure the process is operating as designed.

C. Any costs associated with sampling and testing shall be borne by the Owner.

3.13 AMMONIA SUPPLEMENTATION (IF NECESSARY)

A. At the direction of the Engineer, and if requested by the filter system supplier, it may be necessary to supplement the wastewater treatment facility with additional ammonia during startup to encourage growth of nitrifying bacteria in the filter beds.

B. Procedures for ammonia supplementation shall be provided by the filter system supplier only if ammonia supplementation is required.

C. The Contractor shall be responsible for adding batches of ammonia to the system as directed by and in accordance with procedures provided by the filter system supplier for a period of up to one month during initial system operations.

D. The Contractor shall provide a pH meter and temporary pump and hose lengths.

E. The Contractor shall monitor the wastewater treatment facility and communicate with the filter system supplier results of the monitoring tests.

F. In no case shall the ammonia supplementation procedure cause the wastewater treatment facility to become noncompliant with the facility's permitted discharge.

G. Ammonia supplementation, if required, shall be done at no additional expense to the Owner for a period of up to one month.

END OF SECTION 46 61 23

SECTION 46 61 23
GRAVITY FILTERS - ATTACHMENT
(Based on 10/16/25 Manufacturer's Scope of Supply)

MANUFACTURER SCOPE OF SUPPLY

1. GENERAL

A. Technical submittal.
B. Installation support for supplied equipment.
C. Start-up, commissioning, and initial training.
D. 2-years warranty from date of start-up for all in-water aeration system material.
E. Operation & Maintenance Manuals.
F. Record drawings.
G. Shipping to jobsite.

2. LAGOON FLOATING LATERAL AERATION SYSTEM EQUIPMENT

A. All in-water aeration equipment required to make a fully functioning system after the lateral control valve up to and including all in-water components, including but not limited to:
   1. Lateral and diffuser:
      a. Cell 1: 3 laterals with total of 3 diffuser assemblies.
      b. Cell 2: 1 lateral with total of 1 diffuser assembly.
   2. 1.5'' floating HDPE aeration lateral piping, including HDPE flange adapters, backup rings, including SS flange bolts, nuts, washers.
   3. Prefabricated HDPE aeration lateral piping with thermally factory-fused diffuser outlets, shipped in maximum 50' lengths. (Site assembly required).
   4. Fine bubble membrane diffuser assemblies (factory pre-assembled).
   5. 1" flexible feeder piping factory cut to length.
   6. Precast concrete diffuser ballast weights, including cast-in-place support brackets, attachment hardware, etc.
   7. Marine grade diffuser retrieval rope secured to each diffuser ballast assembly, factory cut to length and marked for easy installation.
   8. Lateral end assemblies consisting of HDPE endcaps with integral anchoring system, prefabricated SS support brackets, SS cables, and clamps.
   9. Fixed anchor posts (located on berm near control valves) (concrete piers by others)
   10. Adjustable lateral tension assemblies, counterweights, posts (located on berm at end of lateral) (concrete piers by others).
   11. One (1) complete diffuser assembly as spare.
   12. Allowance of one (1) trip with one (1) day on site for installation inspection/support of materials supplied by manufacturer.
   13. Allowance of one (1) trip with one (1) day on site for start-up, commissioning, training.

3. FILTER AERATION AND IN-BASIN PROCESS EQUIPMENT

A. All process equipment within the filter bed, starting at the filter wall (after the lateral control valve), required to make a fully functioning system including but not limited to:
   1. Aeration Equipment Within Bed:

a. Prefabricated HDPE aeration lateral piping on top of granular layer in filter bed with thermally factory-fused outlet saddles.
b. Required bends, fittings, flange adapters, backup rings, nuts/bolts, etc.
c. FBA® LINEAR air diffuser lines.
d. HDPE feeder lines cut to length, prefabricated HDPE in-basin air distribution manifolds, miscellaneous required fittings.
e. 2" blow-off assemblies, support posts, etc. located within filter bed
f. Prefabricated materials shipped in maximum 50' lengths. (Site assembly including thermal butt-fusion required).

2. Process Piping/Equipment Within Bed
   a. PVC SDR-35 primary and secondary influent distribution piping, clean-out assemblies (drilling of orifices not included). Orifice size and spacing as per manufacturer's shop drawings.
   b. Influent distribution chambers, fittings, end caps.
   c. Effluent collection chambers, fittings, end caps.
3. General
   a. Installation inspection as required during critical rock placement. Sole purpose of inspection is to ensure that process equipment supplied by manufacturer is not damaged during initial rock placement.
   b. Analyze wastewater chemistry data as per specifications
   c. One (1) trip one (1) day onsite for start-up, commissioning, and initial training of all manufacturer-supplied equipment (combined with Lagoon Aeration trip.)

4. AIR SUPPLY SYSTEM

A. All blower equipment required to make a fully functioning system, including but not limited to:
   1. Blower Packages
      a. Three (3) 5 hp positive displacement blower packages (2 operating, 1 common standby).
      b. Each blower package includes:
         i. Sound attenuating enclosures with integrated exhaust fans.
         ii. Complete with integral check valve, PRV, flexible inlet/discharge connectors.
         iii. Factory installed intake filter/silencer, discharge silencer
         iv. Enclosure mounted pressure gauge, temperature gauge, filter maintenance indicator.
         v. High discharge temperature switch.
         vi. PTC thermistor motor protection.
         vii. VFD compatible main drive motors (240 V, 60 Hz, 1-ph).
         viii. Spare parts (belts, intake filters, oil).
   2. Control Panel
      a. One local control panel for all blowers.
      b. UL Listed, NEMA 12 floor-mounted enclosure complete with main disconnect, splitter block, and fused control transformer.
      c. Main breaker.
      d. Three (3) 5 hp 1-phase, 240 V constant torque Danfoss VFD main motor drives with 3% line and 3% load reactors, manually adjusted speed potentiometer.

e. Interlocking mechanical contactors. Panel is designed to only allow 2 blowers to run at any given time.
f. Controls for blower operation and protection including high temperature discharge switch, and motor thermistor protection relays.
g. Panel is designed with capability of integration with future plant PLC, all alarms have external contacts available for remote monitoring (i.e. dialer compatible).
h. Two (2) integrated remote system pressure displays (lagoon/SAGR).
i. Indicator/alarm lights, duty/off/standby switches, elapsed time meter.

TO BE PROVIDED BY CONTRACTOR

1. GENERAL REQUIREMENTS

A. Receiving/off-loading and secure storage of all equipment.
B. Installation of all supplied equipment, including labor and materials.
C. Any civil works for site preparation and restoration.

2. LAGOON & FILTER AERATION SYSTEMS

A. Main aeration headers from blowers to filter. (Buried header from blowers to lagoon is existing.)
B. Air lateral isolation butterfly valves inside building. (Lagoon-side valves are existing.)
C. Main header blow-off assemblies.
D. Concrete piers for all anchor posts.

3. MATERIALS AND CONSTRUCTION REQUIRED FOR THE FILTER

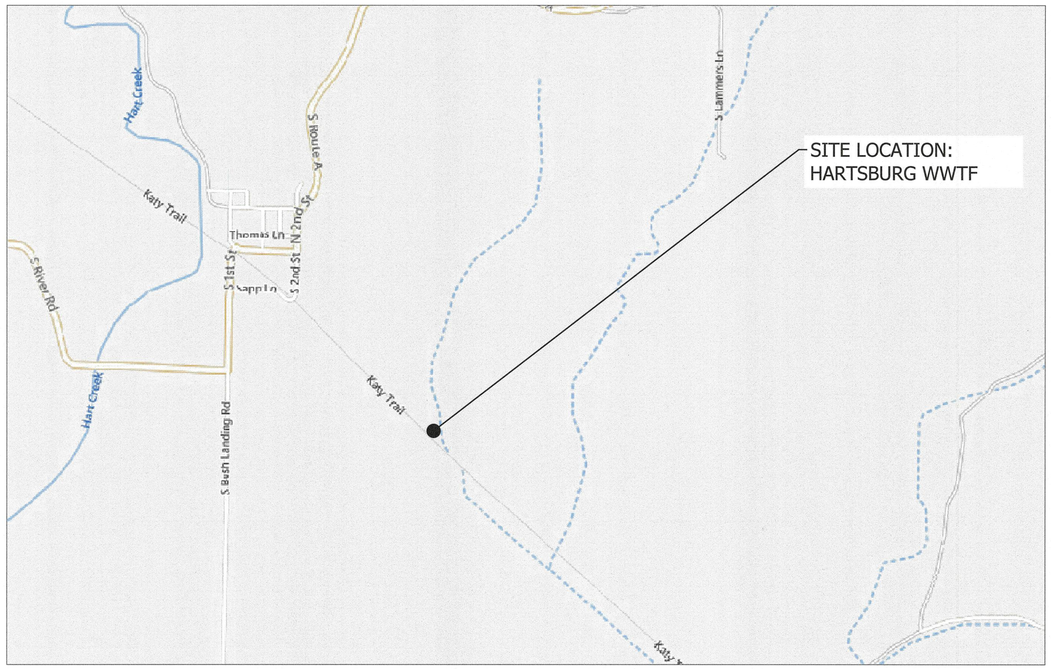
A. Specifically graded granular material (including but not limited to: sourcing, procurement, approvals, quality assurance and quality control).
B. Insulating layer consisting of wood chips or mulch.
C. Wood-constructed “sacrificial” vertical side walls around perimeter of filter cell.
D. Geomembrane liner for filter cell.
E. Pipe penetrations through filter liner, pipe boots as required.
F. Non-woven geotextile protective fabric on bottom and sides of filter cell and between granular and mulch.
G. Filter water level control structures.
H. Yard piping and valves, as shown on the Drawings.

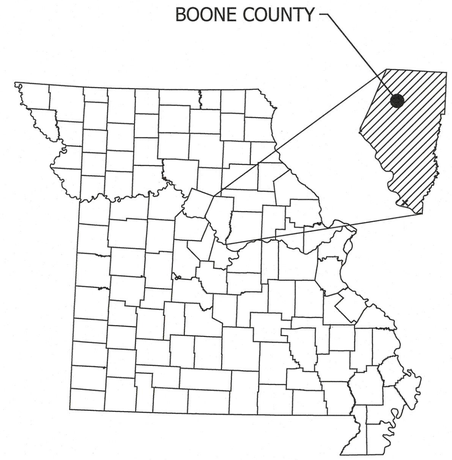
4. BLOWER SYSTEM

A. Anchor bolts, stands, supports as required.
B. Mechanical systems for air piping including but not limited to: blower discharge piping, isolation valves, fittings, supports, etc.
C. Electrical connections, wiring and hookup of blowers and control panel, sensors, control wiring, etc.

END OF SECTION 46 61 23 - ATTACHMENT

HARTSBURG WWTF
TREATMENT UPGRADES
BOONE COUNTY, MO





PROJECT LOCATION SHOWN BY ×

UTILITY OWNERS	UTILITY	CONTACT PERSON
BCRSD	WASTEWATER	JESSE STEPHENS 573-443-2774
AMEREN MISSOURI	ELECTRIC	CHRIS BROWN 573-681-7512
MDNR MISSOURI STATE PARKS	KATY TRAIL	JESSE STEPHENS (BCRSD) 573-443-2774

OWNER
BOONE COUNTY REGIONAL SEWER DISTRICT
1314 N. 7TH STREET
COLUMBIA, MO 65201

FACILITY ADDRESS
HARTSBURG WASTEWATER TREATMENT FACILITY
0.5 MILES SE OF 2ND STREET & KATY TRAIL INTERSECTION
HARTSBURG, MO 65039

NOT TO SCALE

SE¼ OF THE SW¼ OF SECTION 08, TOWNSHIP 45 NORTH, RANGE 12 WEST, 5TH PRINCIPAL MERIDIAN

APPROVED:

STATE OF MISSOURI
ELKE B. BOYD
NUMBER PE-2005022092
PROFESSIONAL ENGINEER
10/29/2025

Elke Boyd

10/29/2025
Date:

REVISIONS		
DATE	REVISION	BY

811 Know what's below. Call before you dig.

BCRSD PROJECT NO. 08-2025
LOCHMUELLER PROJECT NO. 524-1025-01W-PHASE 2

LOCHMUELLER GROUP
820 S Main Street, Suite 207
St. Charles, Missouri 63301
PHONE: 314.621.3395
Contact: Elke Boyd, P.E., BCEE

1

Sheet Index	
Sheet Number	Sheet Title
1	Cover Sheet
2	General Notes & Legend
3	Existing Site Conditions
4	Proposed System Layout (Alternates 2, 3, & 4)
5	Filter & Outfall Details (Alternates 2 & 4)
6	Aeration Details (Alternate 2)
7	Structural & Blower Details (Alternate 2)
8	Alternates 2, 3, & 4 Details
9	Electrical Schedules and Diagrams

BENCH MARK

BM - MISSOURI DEPARTMENT OF TRANSPORTATION VRS NETWORK.

TBM - CHISELED SQUARE ON SOUTHERLY CORNER OF SANITARY FLUME CONCRETE WALL LOCATED 27 FEET NORTHEAST OF THE SOUTHERLY CORNER POST OF THE WOVEN WIRE FENCE AND 77 FEET WEST OF THE SOUTHWESTERLY CORNER OF CONCRETE WALL OF SANITARY ULTRAVIOLET BOX.

ELEVATION = 567.12

SURVEY GENERAL NOTES

1. ACCURATE ELEVATIONS HAVE BEEN SURVEYED AS SHOWN. CONTOURS SHOWN ARE INTERPOLATED BASED ON THESE ELEVATIONS.
2. THIS DOES NOT CONSTITUTE A BOUNDARY SURVEY SUITABLE FOR RECORDING AS DEFINED BY THE CURRENT MISSOURI STANDARDS FOR BOUNDARY SURVEYS.
3. NO TITLE WORK WAS PERFORMED, EASEMENTS AND OTHER SPECIAL CONDITIONS AFFECTING THE PROPERTY MAY NOT BE SHOWN.
4. THE MANHOLE D PIPE (FL IN) HAS A 90 DEGREE BEND TURNED UP VERTICAL. FLOW LINE OF PIPE INTO THE STRUCTURE IS 564.96. TOP OF PIPE (OVERFLOW) IS 567.68

UTILITY NOTES

THE LOCATIONS, SIZES AND MATERIAL TYPES OF UNDERGROUND UTILITIES SHOWN ON THE DRAWINGS, NOT VISIBLE OR APPARENT FROM THE SURFACE, ARE SHOWN IN THEIR APPROXIMATE LOCATIONS FROM A MISSOURI 811 SYSTEM LOCATE, OR UTILITY COMPANY RECORDS AND WERE NOT VERIFIED IN THE FIELD. UNDERGROUND UTILITY SERVICES TO BUILDINGS WERE NOT LOCATED.

FLOODPLAIN NOTE

THIS PROPERTY IS LOCATED IN ZONE "AE" AREAS WITH BASE FLOOD ELEVATION OR DEPTH, ZONE "A" AREAS WITHOUT BASE FLOOD ELEVATION, AND ZONE "X" AREAS DETERMINED TO BE WITHIN THE 0.2% ANNUAL CHANCE FLOODPLAIN, AS SHOWN BY FLOOD INSURANCE RATE MAP NUMBER 29019C0435E, DATED APRIL 19, 2017.

LEGEND

PL	PROPERTY LINE
UE	EXIST. UNDERGROUND ELECTRIC LINE
OE	EXIST. OVERHEAD ELECTRIC LINE
S	EXIST. SANITARY SEWER LINE
FM	EXIST. FORCE MAIN
X	EXIST. FENCE
	EXIST. TREE & BRUSH LINE
	EXIST. DRAINAGE SWALE
	FLOODWAY/PLAIN
750	EXISTING CONTOUR
	EXISTING ANCHOR
	EXISTING RIP-RAP
	IRON
CP#	CONTROL POINT
	EXISTING SANITARY MANHOLE
	EXIST. BOLLARD/WOOD POST
	EXISTING VALVE BOX
	EXISTING AERATOR
567	PROPOSED CONTOUR
	PROPOSED SANITARY SEWER
	PROPOSED SANITARY MANHOLE
	PROPOSED VALVE BOX
	PROPOSED GRAVEL
	PROPOSED FENCE
X	EXISTING FENCE
TOB	TOP OF BERM
BOB	BOTTOM OF BERM
DI	DUCTILE IRON PIPE
FL	FLOW LINE
EM	ELECTRIC METER
TW	TOP OF WALL
UP	UTILITY POLE
UIP	USE IN PLACE
EP	ELECTRIC PANEL

GENERAL NOTES

1. All trenching shall be carried out in accordance with all Federal rules and regulations regarding safe practices.
2. Approximate property lines are shown based on the "Topographic Survey" performed by ES&S and dated August 7, 2025.
3. The Contractor shall provide all barricades & construction signs as required by Local, Federal and State rules and regulations.
4. It shall be the Contractor's sole responsibility to maintain the integrity of all existing utilities, structures, and abutting properties. The cost of any repair or replacement of damaged items shall be borne solely by the Contractor.
5. The Contractor shall coordinate all utility installations and inspections with the appropriate utility company. Advance notice is required before work commencement.
6. The Contractor shall be responsible for establishing and maintaining all temporary sediment and erosion controls.
7. Contractor is responsible for establishing, maintaining and modifying as necessary, sediment and erosion control measures before construction may begin. At a minimum, sediment and erosion control measures shall include perimeter silt fence along downhill side of facility. Contractor shall be responsible for removing any material tracked out onto public road.
8. Any damage to utilities caused by the Contractor's operations shall be the responsibility of the Contractor and the cost of repairs shall be borne by the Contractor at no additional cost to the owner.
9. Support existing utilities which are to remain in place during construction.
10. Coordinate removal of abandoned utilities with the appropriate utility company.
11. All piping shall be ductile iron unless noted otherwise.
12. All exposed concrete edges on walls and equipment pads shall be chamfered 3/4".
13. The engineering information shown on these plans is from studies made in the field and represents the best information available to Lochmueller Group.
14. All grassed area disturbed by the contractor shall be fertilized, seeded, and mulched unless otherwise noted on the plans.
15. All utilities and their connections shall be moved or adjusted by the contractor to fit the new construction unless otherwise noted on the plans.
16. Contractor shall contact utility companies at least three working days, but no more than ten working days, prior to digging by calling Missouri 811.
17. It is the contractor's responsibility to coordinate the adjustment of the various utilities by the respective companies.
18. All roads, driveways, trails, culverts, sidewalks, fences, and landscaping damaged during construction shall be repaired or replaced to equal or better conditions than prior to said damage. The contractor shall bear all related expenses.
19. Any damage to gravel roads, trails, or drives shall be repaired with granular material.
20. All erosion control devices shall be installed in conformity with the Boone County Stormwater Design Manual.
21. All construction shall be in accordance with Boone County Regional Sewer District Standards.
22. The locations of utility mains, structures and service connections plotted on these drawings are approximate only and were obtained from records made available to Lochmueller Group. There may be other existing utility mains, structures and service connections not known to Lochmueller Group and not shown on the drawings. The verification of the existence and the determination of the exact location of the utility mains, structures and service connections shall be the responsibility of the construction contractor(s).
23. Site cleanup shall be on a daily basis.
24. All open excavations shall be protected.
25. Replace any property monuments removed or destroyed by construction. All monuments shall be set by a surveyor licensed in the State of Missouri.
26. Contractor is to coordinate electrical power installation with electrical utility.
27. It is the intention of these plans to comply with the requirements of the Missouri Clean Water Commission.
28. Finish grade all areas to provide efficient and natural drainage and uniform grades. Blend with existing features. Properly dispose of all excess and waste material.
29. The excavation work for this project is unclassified and Contractor is responsible for his own investigations into the type of materials and conditions to be encountered.
30. The Owner has acquired a construction easement for the project. Contractor shall maintain his operations within the limits of the project property and under the terms of the easement agreement. The Katy Trail shall be kept usable by the public at all times.

SURVEY CONTROL POINTS

MODIFIED STATE PLANE COORDINATES
NAD 83, MISSOURI CENTRAL ZONE, NAVD 88, U.S. SURVEY FEET

POINT #	NORTH	EAST	ELEVATION	DESCRIPTION
CP3	1039951.15	1696551.11	568.94	DRILL HOLE
CP4	1039834.54	1696676.19	569.13	DRILL HOLE
CP6	1039710.18	1696726.44	561.54	IRON
CP7	1039909.25	1696479.95	561.22	IRON

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES	EBB

LOCHMUELLER GROUP
820 S Main Street, Suite 207
St. Charles, Missouri 63301
PHONE: 314.621.3395

STATE OF MISSOURI
ELKE B. BOYD
NUMBER PE-2005022082
PROFESSIONAL ENGINEER

RECOMMENDED FOR APPROVAL
Elke Boyd — 10/29/2025 DATE

DESIGNED: EBB DRAWN: PMH
CHECKED: EWS CHECKED: EWS

HARTSBURG WWTF
TREATMENT UPGRADES

GENERAL NOTES
AND LEGEND

SCALE
NTS
CONSULTANT PROJECT NUMBER
524-1025-01W-PHASE 2
SHEET
2

Date: Nov 12, 2025, 10:24am User Name: Paul.Henderson
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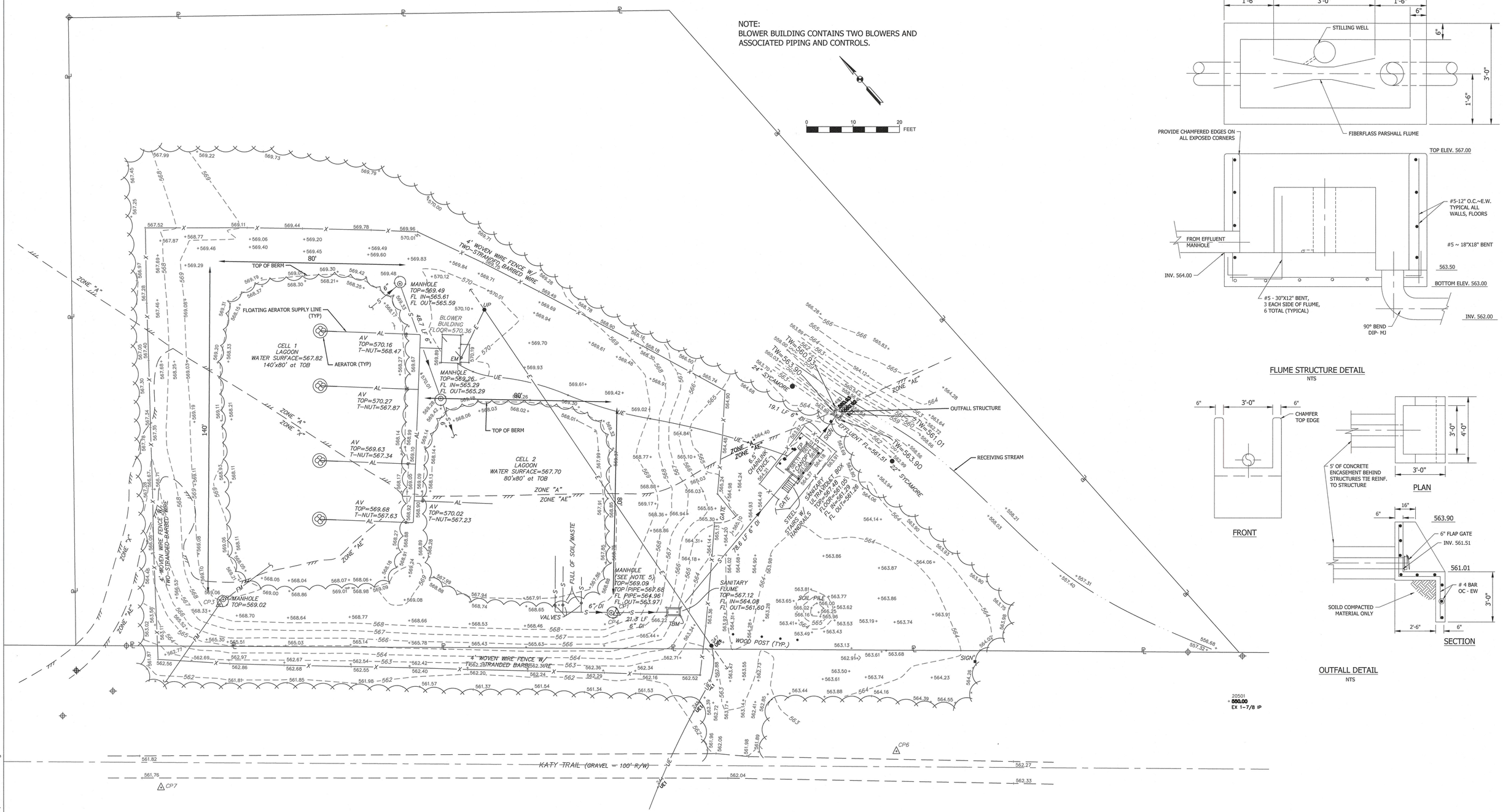
NOTE:
BLOWER BUILDING CONTAINS TWO BLOWERS AND ASSOCIATED PIPING AND CONTROLS.

0 10 20 FEET



FLUME STRUCTURE DETAIL
NTS

OUTFALL DETAIL
NTS

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB

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LOCHMUELLER GROUP
820 S Main Street, Suite 207
St. Charles, Missouri 63301
PHONE: 314.621.3395

STATE OF MISSOURI
ELKE B. BOYD
NUMBER PE-2005022082
PROFESSIONAL ENGINEER

RECOMMENDED FOR APPROVAL	Elke Boyd	10/29/2025 DATE	
DESIGNED: EBB	DRAWN: PMH		
CHECKED: EWS	CHECKED: EWS		

HARTSBURG WWTF
TREATMENT UPGRADES

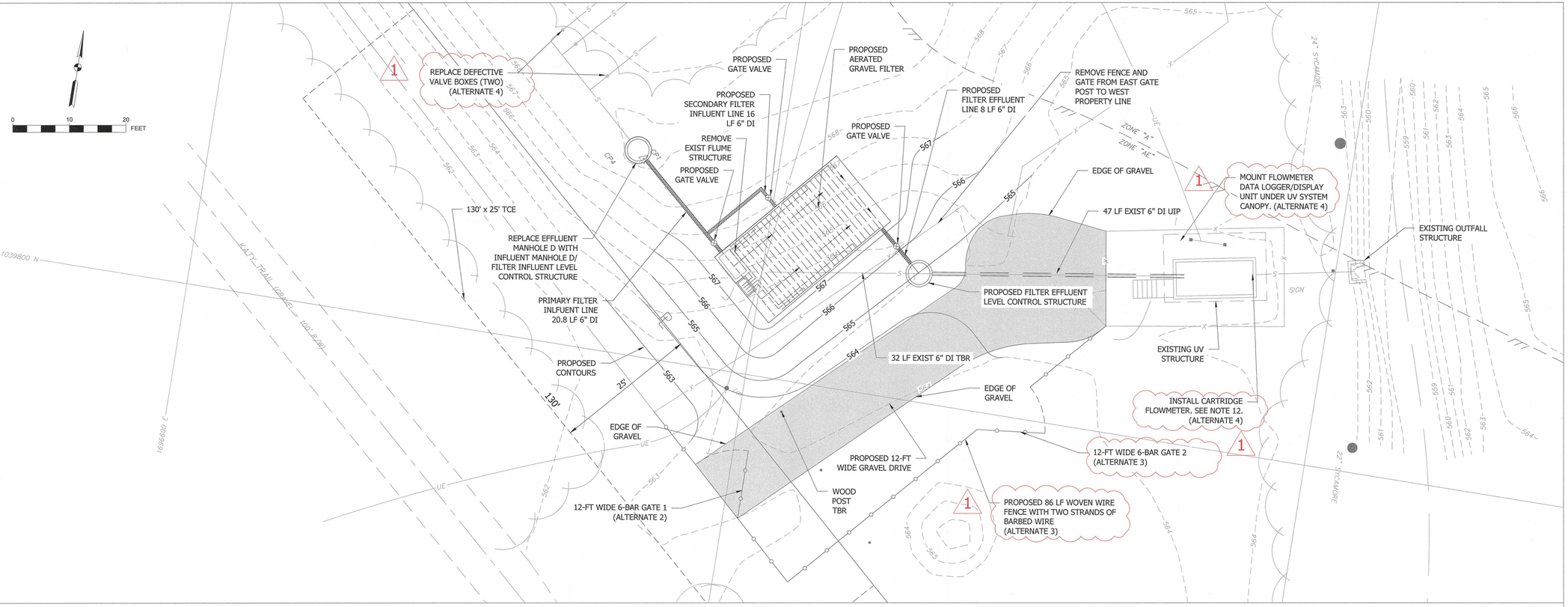
EXISTING
SITE CONDITIONS

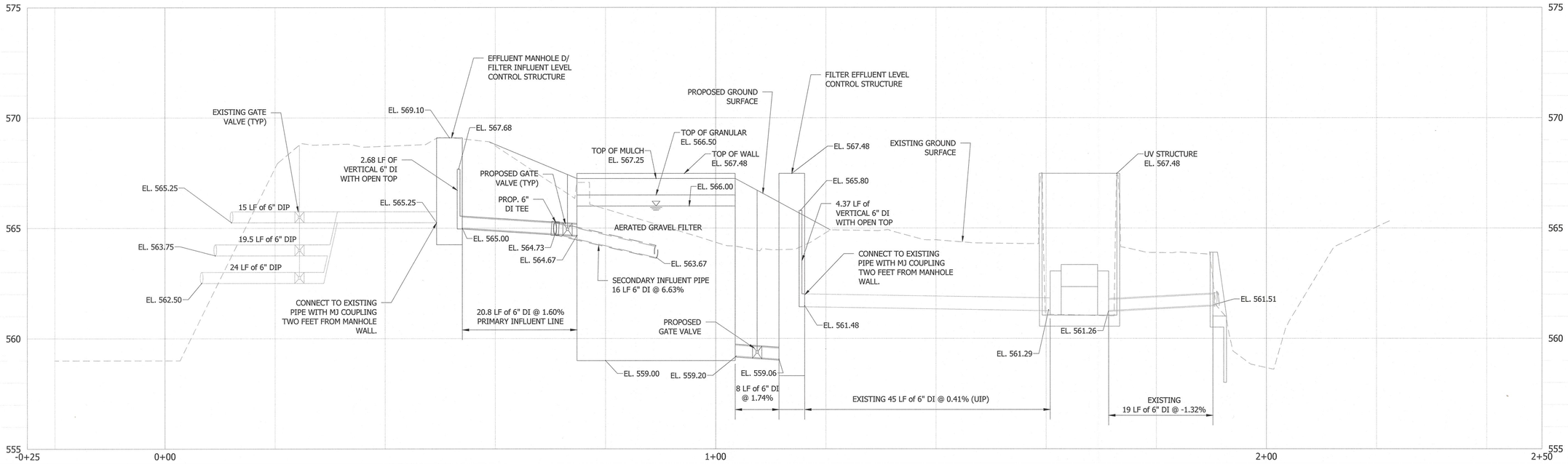
SCALE
1" = 20'
CONSULTANT PROJECT NUMBER
524-1025-01W-PHASE 2
SHEET
3

Date: Nov 12, 2025, 10:24am User Name: Paul.Henderson
File: X:\Production\Files\2024\524-1025\CAD\Base\WR\524-1025 Base.dwg

NORTHING/EASTING TABLE		
ALTERNATIVE 2	NORTH	EAST
CENTER OF FILTER INFLUENT LEVEL CONTROL STRUCTURE	1039835.94'	1696674.95'
CENTER OF FILTER EFFLUENT LEVEL CONTROL STRUCTURE	1039822.41'	1696727.43'
SOUTH CORNER OF FILTER	1039809.60'	1696702.60'
ALTERNATE 3	NORTH	EAST
SOUTH CORNER OF GATE 1	1039774.74'	1696702.67'
SOUTH CORNER OF GATE 2	1039796.95'	1696741.94'
SOUTH CORNER OF FENCE	1039765.07'	1696713.17'

NOTES:
1. COORDINATE REMOVAL AND STORAGE OF SALVAGEABLE EQUIPMENT WITH THE BCRSD.
2. REMOVE AND DISPOSE OF OBSOLETE YARD PIPING AND EQUIPMENT NOT WANTED BY BCRSD.
3. ALTERNATE 2 - SEE DETAILS ON SHEETS 5 THROUGH 9.
4. ALTERNATE 3 - SEE DETAIL ON SHEET 8.
5. ALTERNATE 4 - SEE DETAILS ON SHEET 5. REFER TO SPECIFICATIONS FOR FLOWMETER REQUIREMENTS.
6. ALTERNATE 4 - RUN FLOWMETER POWER AND DATA CABLES ABOVE SEWER LINE. MOUNT DATA LOGGER/DISPLAY UNIT ADJACENT TO UV SYSTEM POWER FEED. INSTALL FLOWMETER PER SPECIFICATIONS.
7. CONTRACTOR IS TO VERIFY ALL MEASUREMENTS AND DIMENSION PRIOR TO COMMENCING WORK OR ORDERING MATERIALS OR EQUIPMENT.
8. ALL PIPING SHALL BE FREE OF LEAKS AND INSTALLED TRUE AND TO REQUIRED GRADELINES. BOLTED JOINTS SHALL BE PROPERLY TORQUED.
9. VALVE NUTS SHALL BE CENTERED IN VALVES BOXES, OPERATIVE BY A STANDARD VALVE WRENCH AND OPERATE FREELY.
10. CONNECTIONS AND STRUCTURES SHALL BE WATERTIGHT AND INTERIOR SURFACES SLOPED TO AVOID SOLIDS ACCUMULATIONS.
11. DUCTILE IRON PIPES SHALL BE MORTAR LINED. COAT ALL EXPOSED PIPING WITH FIELD COATING OF COAL TAR EPOXY.
12. FLOWMETER TO BE INSTALLED INTO THE UV SYSTEM EFFLUENT PIPE.
13. ESTIMATED CUT: 121 CY. ESTIMATED FILL: 64 CY.





REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES, FLOWMETER LOCATION	EBB

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St. Charles, Missouri 63301
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STATE OF MISSOURI ELKE B. BOYD NUMBER PE-2005022082 PROFESSIONAL ENGINEER

RECOMMENDED FOR APPROVAL: Elke Boyd — 10/29/2025 DATE

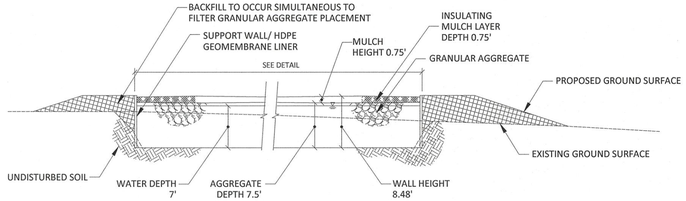
DESIGNED: EBB | DRAWN: PMH | CHECKED: EWS | CHECKED: EWS

HARTSBURG WWTF TREATMENT UPGRADES

1 PROPOSED SYSTEM LAYOUT (ALTERNATES 2, 3 AND 4)

SCALE
H: 1" = 20' - V: 1" = 10'
CONSULTANT PROJECT NUMBER
524-1025-01W-PHASE 2
SHEET
4

Date: Nov 12, 2025, 10:25am User Name: Paul.Henderson
File: X:\Production\Files\2024\524-1025\CAD\Base\WR\524-1025 Base.dwg

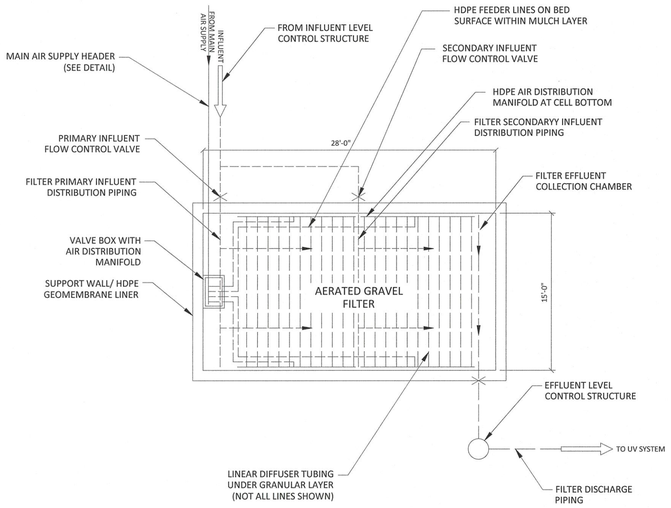


AERATED GRAVEL FILTER CONSTRUCTION

SCALE: N.T.S.

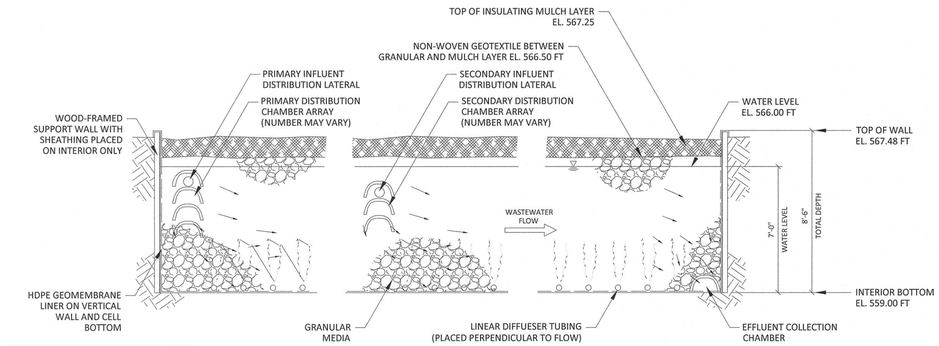
NOTE:

1. REFER TO SPECIFICATIONS FOR MANUFACTURER'S SCOPE OF SUPPLY AND EXCLUSIONS.



PROPOSED AERATED GRAVEL FILTER LAYOUT

SCALE: NTS

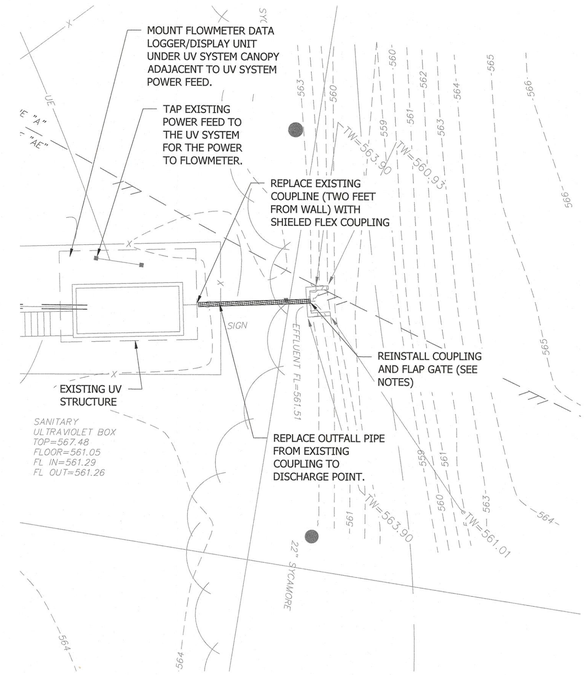


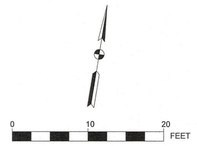
NON-WOVEN GEOTEXTILE BETWEEN HDPE LINER AND GRANULAR LAYER (BOTTOM AND SIDES) AND BETWEEN MULCH LAYER AND GRANULAR LAYER (TOP)

HORIZONTAL FLOW AERATED GRAVEL FILTER - SECTION

SCALE: N.T.S.

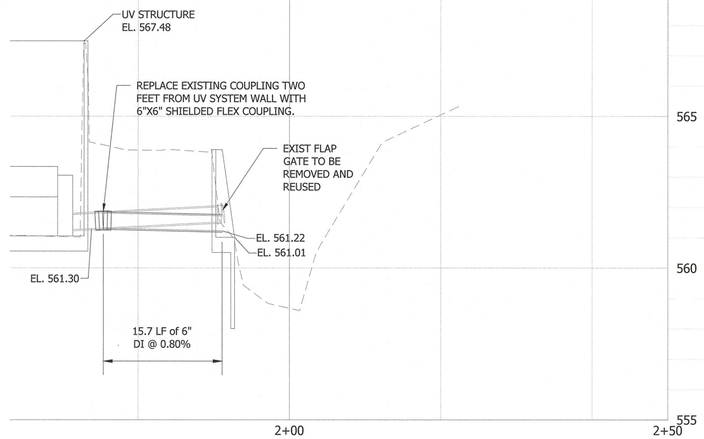
1 ALTERNATE 2





NOTES:

1. ENLARGE EXISTING PIPE PENETRATION IN WALL OF OUTFALL STRUCTURE TO ACCOMODATE PROPOSED SLOPE.
2. EXISTING FLAP GATE AND RESTRAINED COUPLING TO BE REUSED USING NEW FASTENEERS.
3. FIELD ADJUST PIPE SLOPE TO MAINTAIN FREE MOVEMENT OF FLAP GATE WHILE MAINTAINING DOWNWARD SLOPE TO OUTFALL.
4. GROUT AROUND NEW OPENING IN EXISTING CONCRETE OUTFALL STRUCTURE.
5. PROVIDE 5 LF OF CONCRETE PIPE ENCASEMENT BEHIND STRUCTURE AND TIE REINFORCEMENT TO OUTFALL STRUCTURE.



1 ALTERNATE 4

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES	EBB

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STATE OF MISSOURI ELKE B. BOYD NUMBER PE-2005022082 PROFESSIONAL ENGINEER

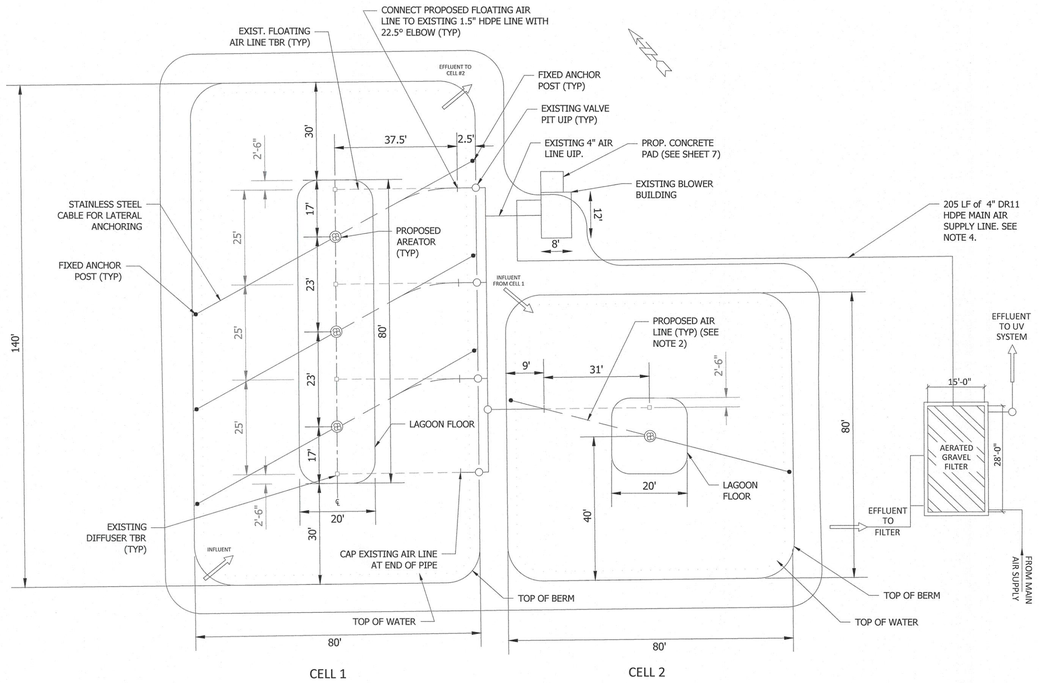
RECOMMENDED FOR APPROVAL	Elke Boyd	10/29/2025 DATE	
DESIGNED: EBB	DRAWN: PMH		
CHECKED: EWS	CHECKED: EWS		

HARTSBURG WWTF
TREATMENT UPGRADES

1 FILTER & OUTFALL DETAILS ALTERNATES 2 & 4

SCALE
H: 1" = 20' - V: 1" = 10'
CONSULTANT PROJECT NUMBER
524-1025-01W-PHASE 2
SHEET
5

Date: Nov 12, 2025, 10:25am User Name: Paul.Henderson
File: X:\Production\Files\2024\524-1025\CAD\Base\WR\524-1025 Base.dwg

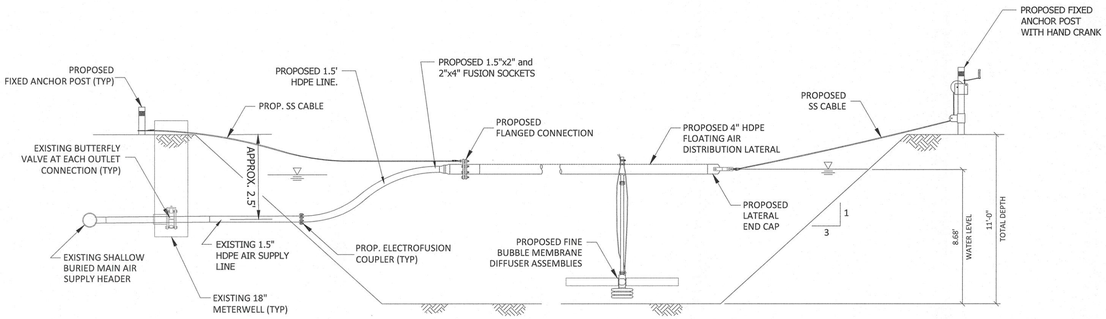


AERATION LAYOUT

NTS

NOTES:

1. REMOVE AND DISPOSE OF EXISTING FLOATING AIR LINES, DIFFUSERS AND WEIGHTS.
2. CONNECT PROPOSED FLOATING AIR LINES INTO EXISTING PIPING DOWNSTREAM OF EXISTING VALVE PITS.
3. PLACE FIXED ANCHOR POSTS SO THAT SS TENSION CABLES FORM STRAIGHT LINE ACROSS THEIR DIFFUSER. PLACE POSTS TWO FEET INTO LAGOON FROM INSIDE TOP OF BERM.
4. INSTALL AIR MAINS IN 18 INCHES DEEP TRENCH.
5. REFER TO SPECIFCATIONS FOR MANUFACTURER'S SCOPE OF SUPPLY AND EXCLUSIONS.



AERATED LAGOON SECTION

SCALE: N.T.S.

NOTE:

1. ALL PROPOSED ITEMS IN SECTION VIEW SUPPLIED BY SYSTEM MANUFACTURER.

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES	EBB

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RECOMMENDED FOR APPROVAL: Elke Boyd — 10/29/2025 DATE

DESIGNED: EBB | DRAWN: PMH

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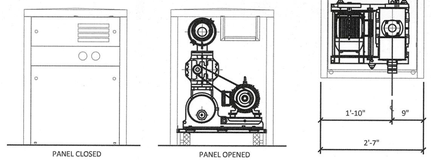
HARTSBURG WWTF
TREATMENT UPGRADES

1 AERATION DETAILS (ALTERNATE 2)

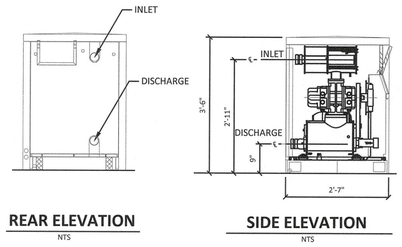
SCALE
NTS
CONSULTANT PROJECT NUMBER
524-1025-01W-PHASE 2
SHEET
6

Performance Data, each blower		
Motor Nameplate Horsepower	5	HP
Estimated Power Consumption	3	BHP
Design Maximum Airflow	48	SCFM
Maximum Operating Pressure	9.2	PSI
Normal Operating Pressure	5.6	PSI
Inlet Temperature	104	oF
Discharge Temperature	180	oF
Blower Speed	3,460	RPM
VFD Frequency	60	Hz
Sound Level	65	dB(A)



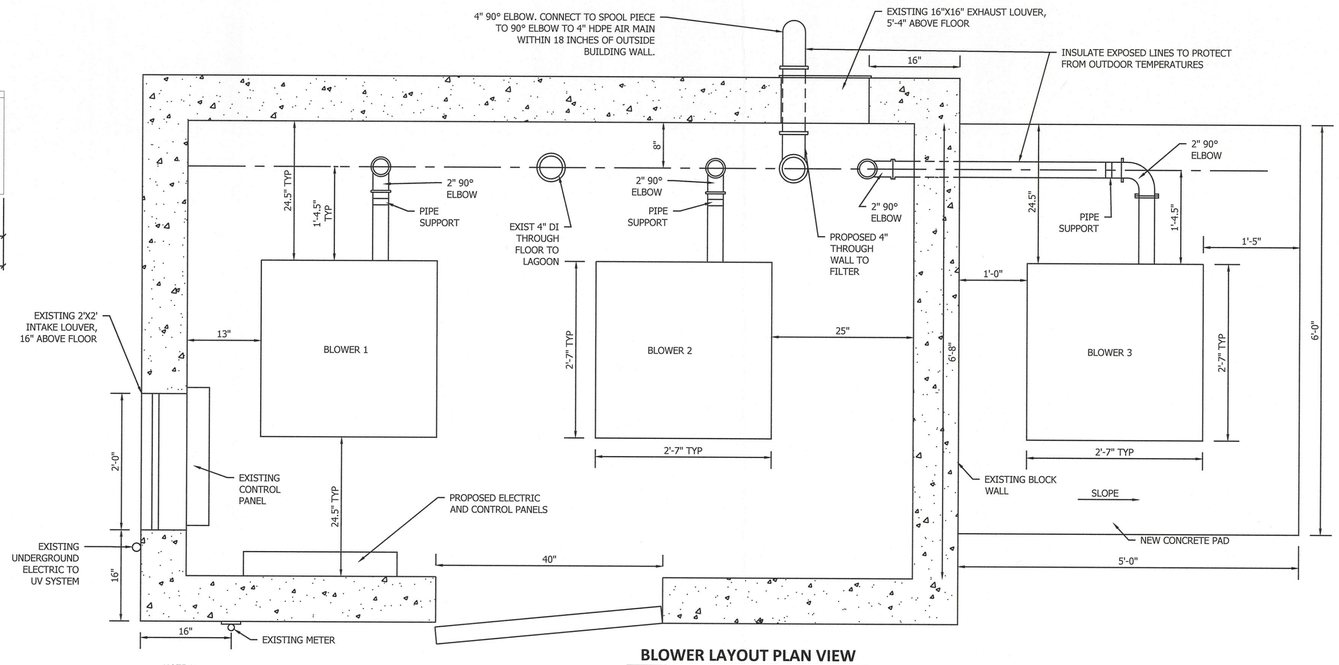
FRONT ELEVATION
NTS

PLAN
NTS



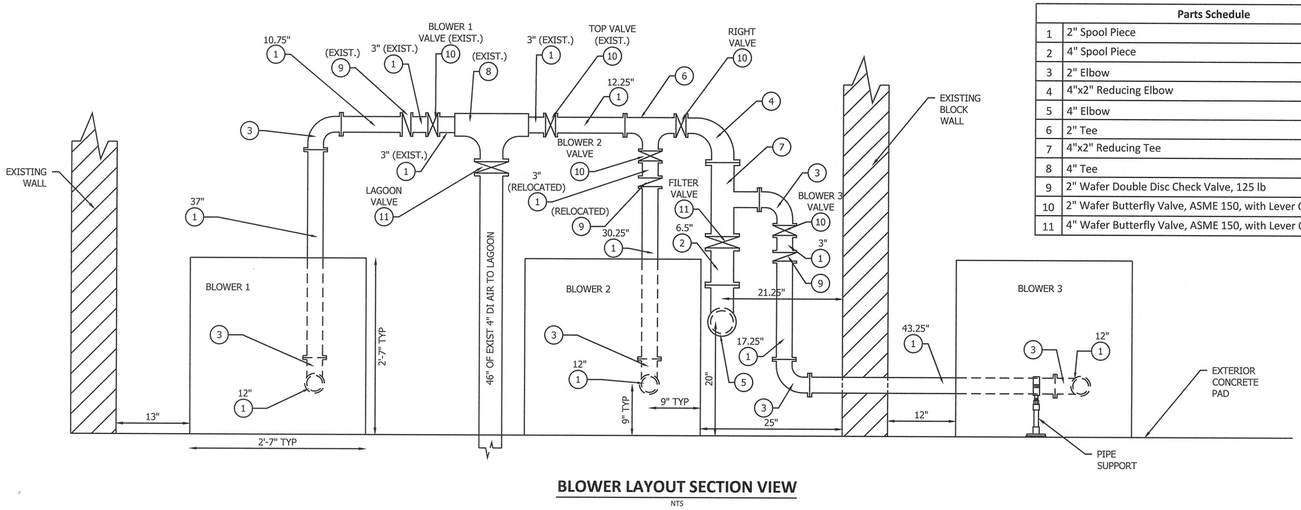
REAR ELEVATION
NTS

SIDE ELEVATION
NTS



BLOWER LAYOUT PLAN VIEW
NTS

NOTE 1:
1. EXISTING BLOWER BUILDING TO BE REUSED.
2. CONTRACTOR REMOVE EXISTING BLOWERS, CONTROL PANEL AND RELATED EQUIPMENT AND STORE ON SITE FOR OWNER.
3. REPLACE THE EXISTING ELECTRICAL PANEL AND UTILITY METER CABINET. SEE ELECTRICAL SHEET FOR DETAILS.
4. SEE TECHNICAL SPECIFCATIONS REGARDING SEQUENCING TO MAINTAIN TREATMENT.
5. REFER TO SPECIFICATIONS FOR MANUFACTURER'S SCOPE OF SUPPLY AND EXCLUSIONS.
6. FILL ALL VOIDS AROUND PIPE WALL PENETRATIONS WITH NON-SHRINK GROUT TO FULL DEPTH OF BLOCKS, FORMING A SMOOTH OUTER SURFACE ON EACH SIDE OF WALL AND PREVENTING THE INTRUSION OF MOISTURE FROM PRECIPITATION.
7. AIR PIPING TO BE BLACK STEEL, SCHEDULE 40.

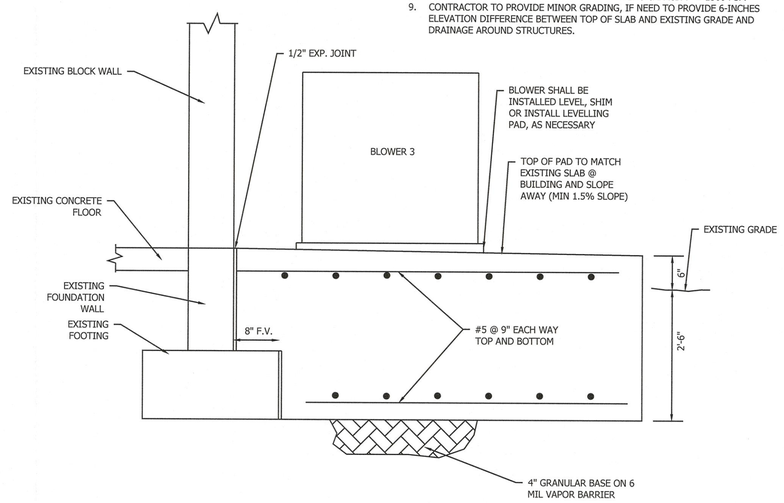


BLOWER LAYOUT SECTION VIEW
NTS

Parts Schedule	
1	2" Spool Piece
2	4" Spool Piece
3	2" Elbow
4	4"x2" Reducing Elbow
5	4" Elbow
6	2" Tee
7	4"x2" Reducing Tee
8	4" Tee
9	2" Wafer Double Disc Check Valve, 125 lb
10	2" Wafer Butterfly Valve, ASME 150, with Lever Operator
11	4" Wafer Butterfly Valve, ASME 150, with Lever Operator

GENERAL CONCRETE PAD NOTES:

1. CONCRETE SHALL HAVE MINIMUM 28-DAY DESIGN STRENGTH, f'c = 4000 psi.
2. CONCRETE SHALL BE AIR ENTRAINED 6% +/- 1%.
3. REINFORCING BARS SHALL BE ASTM A615, GRADE 60,
4. CONCRETE COVER SHALL BE 3" AT BOTTOM OF PAD AND 2" OTHERWISE.
5. COORDINATE ANY NECESSARY PIPING THROUGH CONCRETE PAD.
6. CHAMFER EXPOSED EDGES OF CONCRETE 3/4", UNLESS OTHERWISE NOTED.
7. ALL EXPOSED SURFACES OF CONCRETE SHALL HAVE A RUBBED FINISH.
8. CONTRACTOR TO VERIFY MINIMUM SOIL BEARING CAPACITY = 1500 PSF.
9. CONTRACTOR TO PROVIDE MINOR GRADING, IF NEED TO PROVIDE 6-INCHES ELEVATION DIFFERENCE BETWEEN TOP OF SLAB AND EXISTING GRADE AND DRAINAGE AROUND STRUCTURES.



BLOWER 3 STRUCTURAL SECTION
NTS

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES	EBB

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PHONE: 314.621.3395

STATE OF MISSOURI — ELKE B. BOYD — NUMBER PE-2005022082 — PROFESSIONAL ENGINEER

RECOMMENDED FOR APPROVAL: Elke Boyd — 10/29/2025 DATE

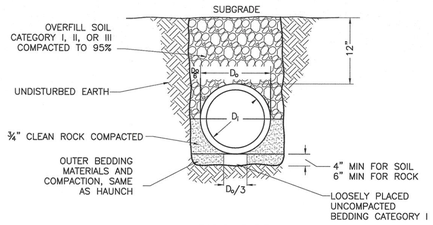
DESIGNED: EBB | DRAWN: PMH | CHECKED: EWS | CHECKED: EWS

HARTSBURG WWTF TREATMENT UPGRADES

1 STRUCTURAL & BLOWER DETAILS (ALTERNATE 2)

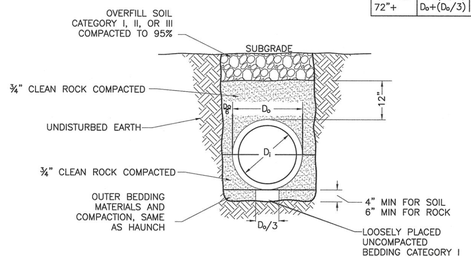
SCALE	NTS
CONSULTANT PROJECT NUMBER	524-1025-01W-PHASE 2
SHEET	7

Date: Nov 12, 2025, 10:25am User Name: Paul.Henderson
File: X:\Production\Files\2024\524-1025\CAD\Base\WR\S24-1025 Base.dwg



RIGID PIPE

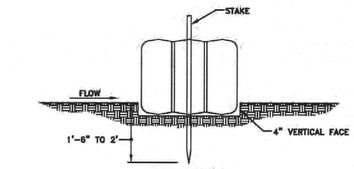
PIPE DIAMETER	PAYLINE/ MIN. TRENCH WIDTH	MAX. TRENCH WIDTH
8"–36"	D_o+12"	D_o+24"
42"–72"	D_o+(D_o/3)	D_o+30"
72"+	D_o+(D_o/3)	D_o+48"



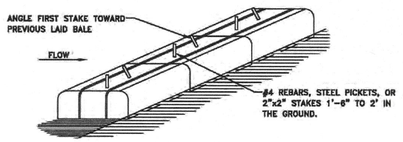
FLEXIBLE PIPE

PIPE EMBEDMENT (ALTERNATE 2 & 4)

1



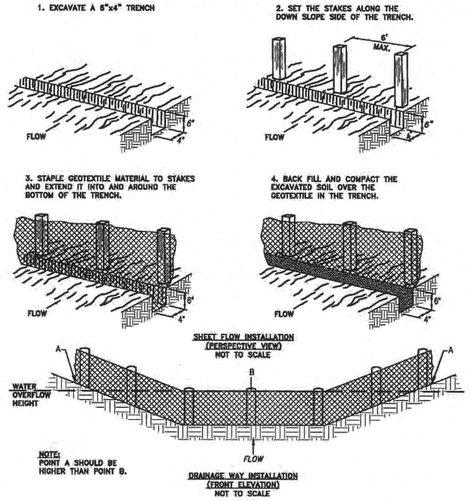
EMBEDDING DETAIL



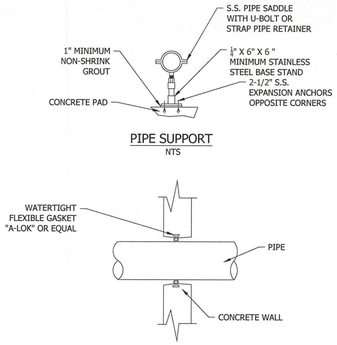
ANCHORING DETAIL

1. BALES SHALL BE PLACED IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF 4".
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY STAKES OR RE-BARS DRIVEN THROUGH THE BALES. THE FIRST STAKE IN EACH BALE SHALL BE ANGLED TOWARD PREVIOUSLY LAID BALE TO FORCE BALES TOGETHER.
4. INSPECTION SHALL BE AT LEAST ONCE A WEEK AND AFTER EACH 1/2" RAIN. REPAIR OR REPLACEMENT SHALL BE MADE PROMPTLY.
5. BALES SHALL BE REMOVED BY THE OWNER WHEN THEY HAVE SERVED THEIR USEFULNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

STRAW BALE DIKE



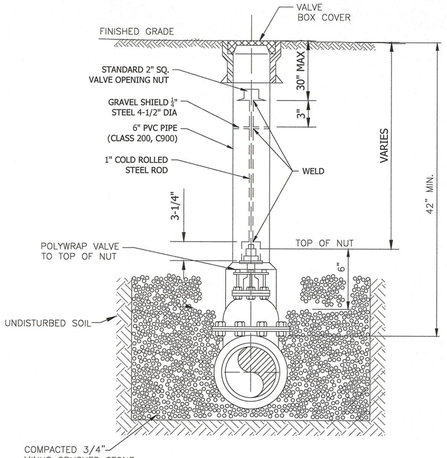
SILT FENCE



PIPE SUPPORT
NTS

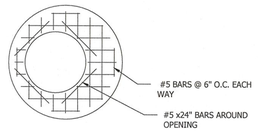
PIPE PENETRATION
NTS

NOTE: THE PIPE GASKET SHALL BE A RUBBER LABERINTH WATERSTOP WITH STAINLESS STEEL CLAMPING BANDS LOCATED AT THE CENTER OF WALL AND THE SPACES BETWEEN PIPE AND WALL COMPLETELY GROUTED WITH FLEXIBLE GROUNT ON OUSIDE OF STRUCTURE ONLY.

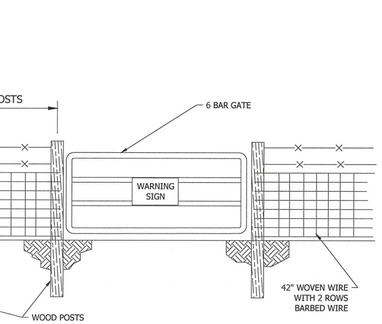


VALVE BOX AND OPERATING NUT EXTENSION DETAIL (ALTERNATE 2)

1

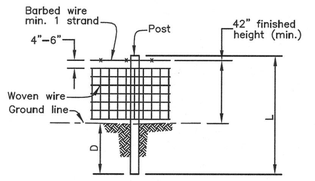


MANHOLE TOP SLAB PLAN



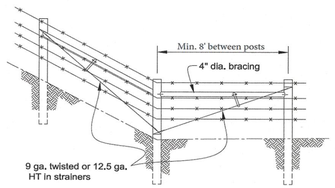
WARNING SIGN DETAIL

1. WARNING SIGN TO BE PLACED ON EACH GATE.
2. WHITE BACKGROUND.
3. RED BLOCK LETTERS -2 ½" HIGH.
4. SIGNS TO BE ⅛" THICK ALUMINUM.
5. FASTEN SIGN TO GATES USING GALVANIZED ½" GALVANIZED U-BOLTS.



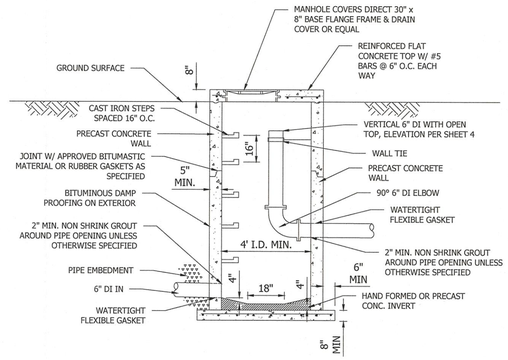
WOVEN WIRE W/ TWO BARB DETAIL

LINE	Wood:	L = 6 ft. min. D = 2 ft. min. Dia. = 3 in. min. *Do not use landscape timbers
CORNER, GATE OR PULL POST	Wood:	Dia. = 5 in. min. D = 3 ft. min. or 30" w/ concrete in 12" dia. hole.
STAPLES:		9 gauge (min), 1 1/2" w/barbs for softwoods and 1" for hardwoods
WOVEN WIRE		Standard: Top and bottom wires shall be 12 1/2 gauge or heavier. Line and stay wires shall be 14 1/2 gauge or heavier. High Tensile: Wire shall be 14 gauge or heavier.



CORNER BRACE

For all horizontal brace members:
Min. of 8' long
Min. 4" diameter treated wood or 2" diameter steel pipe
Place 8' - 12" below top of fence post.
Required at all corners and gates.



NOTE:
1. PRECAST CONCRETE MANHOLES SHALL CONFORM TO ASTM C478 EXCEPT AS MODIFIED BY THE SPECIFICATIONS.
2. BASES NOT BUILT MONOLITHIC WITH BOTTOM SECTION SHALL BE POURED OF 3000 PSI CONCRETE.
3. THE BOTTOM SECTION OF ALL PRECAST MANHOLES NOT BUILT MONOLITHIC WITH THE BASE SHALL BE SET INTO A STEEL REINFORCED POURED CONCRETE BASE A MINIMUM OF 4" (#5 @ 6" E.W.)
4. THE COMPRESSIVE STRENGTH OF CONCRETE USED IN THE CONSTRUCTION OF PRECAST REINFORCED CONCRETE MANHOLES SHALL NOT BE LESS THAN 4000 PSI.
5. MANHOLE JOINTS SHALL BE UNIFORM, PROVIDE COMPATIBLE FIT AND BE FREE HOME HONEYCOMBS OR CHIPS.
6. PLUG ALL LIFT HOLES COVER OUTSIDE WITH BITUMASTIC SEALER.

FENCING DETAILS (ALTERNATE 3)

1

FILTER CONTROL STRUCTURE (ALTERNATE 2)

SEE PROFILE FOR ELEVATIONS

1

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES	EBB

811 Know what's below. Call before you dig.

LOCHMUELLER GROUP
820 S Main Street, Suite 207
St. Charles, Missouri 63301
PHONE: 314.621.3395

STATE OF MISSOURI ELKE B. BOYD NUMBER PE-2005022082 PROFESSIONAL ENGINEER

RECOMMENDED FOR APPROVAL — Elke Boyd — 10/29/2025 DATE

DESIGNED: EBB DRAWN: PMH

CHECKED: EWS CHECKED: EWS

HARTSBURG WWTF TREATMENT UPGRADES

1 ALTERNATES 2, 3, & 4 DETAILS

SCALE
NTS
CONSULTANT PROJECT NUMBER
524-1025-01W-PHASE 2
SHEET
8

Date: Nov 12, 2025, 10:25am User Name: Paul.Henderson
File: X:\Production\Files\2024\524-1025\CAD\Base\WR\524-1025 Base.dwg

EXISTING PANEL SCHEDULE

DESIGNATION: PPL-1 | MAINS TYPE: Circuit Breaker
LOCATION: BLOWER BUILDING | OCPD RATING: 100A
FED FROM: UTILITY | BUS RATING: 125A
VOLTAGE: 240/120V | PANEL MOUNTING: SURFACE (NEMA 1)
PHASE: 1 PHASE, 3 WIRE | MIN. BUS BRACING 22,000 AIC (RMS SYMETRICAL)

WIRING (SEE SCHEDULE)	CKT NO.	LOAD DESCRIPTION	**	KVA	CKT. BKR. AMPS	CKT. BKR. POLE	PHASE A	PHASE B	CKT. BKR. AMPS	CKT. BKR. POLE	KVA	**	LOAD DESCRIPTION	CKT NO.	WIRING (SEE SCHEDULE)
	1	BLOWER #1		2.04	30	2	4.08		30	2	2.04		BLOWER #2	2	
	3			2.04				4.08			2.04			4	
	5	RECEPTACLE, HEATER		0.84	20	1	3.24		60	2	2.40		UV SYSTEM	6	
	7	LIGHTING			20	1		2.40			2.40			8	
							7.32	6.48	TOTAL 13.80						

** NOTES: (G = GFCI, A = AFCI, L = LOCKABLE, S = SHUNT TRIP, GF = GROUND FAULT PROTECTION FOR EQUIPMENT
1 PROVIDE A 30A, 2P CIRCUIT BREAKER AND INSTALL IN EXISTING SPACES. BREAKERS SHALL BE MINIMUM 10kAIC.

LOAD CLASSIFICATION	CONN. LOAD	DEMAND FACTOR	DEMAND LOAD	PANEL TOTALS	
RECEPTACLE (R)	0.84	NEC 220.44	0.84		
LIGHTING (L)	1.20	100%	1.20		
HVAC HEATING (HH)	0.00	NEC 220.60	0.00	CONNECTED LOAD (A):	62.50
HVAC COOLING (HC)	0.00			DEMANDED LOAD (A):	71.75
MOTOR (M)	4.08	100%	4.08	SPARE CAPACITY (0%):	0.00
LARGEST MOTOR (LM)	4.08	125%	5.10		
CONTINUOUS (C)	4.80	125%	6.00	PANEL CURRENT (A):	71.75
NON-CONTINUOUS (N)	0.00	100%	0.00		

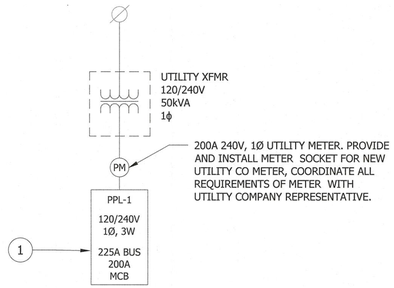
NEW PANEL SCHEDULE

DESIGNATION: PPL-1 | MAINS TYPE: Circuit Breaker
(1) LOCATION: BLOWER BUILDING | OCPD RATING: 200A
FED FROM: UTILITY | BUS RATING: 225A
VOLTAGE: 240/120V | PANEL MOUNTING: SURFACE (NEMA 1)
PHASE: 1 PHASE, 3 WIRE | MIN. BUS BRACING 22,000 AIC (RMS SYMETRICAL)

	WIRING (SEE SCHEDULE)	CKT NO.	LOAD DESCRIPTION	**	KVA	CKT. BKR. AMPS	CKT. BKR. POLE	PHASE A	PHASE B	CKT. BKR. POLE	CKT. BKR. AMPS	KVA	**	LOAD DESCRIPTION	CKT NO.	WIRING (SEE SCHEDULE)	
(2)		1	BLOWER #1		3.36	40	2	3.96		1	20	0.60		RECEPTACLE	2		(3)
		3			3.36				3.96	1	20	0.60		RECEPTACLE	4		(3)
(2)		5	BLOWER #2		3.36	40	2	4.56		1	20	1.20		LIGHTING	6		(3)
		7			3.36				3.60	1	20	0.24		HEATER	8		
(2)		9	BLOWER #3		3.36	40	2	3.36		1	20			SPARE	10		
		11			3.36				3.36	1	20			SPARE	12		
(3)		13	UV SYSTEMS		2.40	60	2	2.40		1	20			SPARE	14		
		15			2.40				2.40	1	20			SPARE	16		
		17	SPARE			20	1	0.00		1	20			SPARE	18		
								14.28	13.32	TOTA 27.60							

** NOTES: (G = GFCI, A = AFCI, L = LOCKABLE, S = SHUNT TRIP, GF = GROUND FAULT PROTECTION FOR EQUIPMENT
1 PROVIDE A 30A, 2P CIRCUIT BREAKER AND INSTALL IN EXISTING SPACES. BREAKERS SHALL BE MINIMUM 10kAIC.

LOAD CLASSIFICATION	CONN. LOAD	DEMAND FACTOR	DEMAND LOAD	PANEL TOTALS	
RECEPTACLE (R)	1.20	NEC 220.44	1.20		
LIGHTING (L)	1.20	100%	1.20		
HVAC HEATING (HH)	0.24	NEC 220.60	0.24	CONNECTED LOAD (A):	115.00
HVAC COOLING (HC)	0.00			DEMANDED LOAD (A):	127.00
MOTOR (M)	13.44	100%	13.44	SPARE CAPACITY (0%):	0.00
LARGEST MOTOR (LM)	6.72	125%	8.40		
CONTINUOUS (C)	4.80	125%	6.00	PANEL CURRENT (A):	127.00
NON-CONTINUOUS (N)	0.00	100%	0.00		



ELECTRICAL ONE-LINE

GENERAL NOTES:

A. ALL UNDERGROUND CONDUIT SHALL BE SCHEDULE 80 PVC BURIED A MINIMUM OF 24" BELOW FINISHED GRADE UNLESS OTHERWISE NOTED.

B. ALL CONDUITS INSTALLED ABOVE GRADE SHALL BE RIGID GALVANIZED UNLESS OTHERWISE NOTED.

C. TRANSITION FROM SCHEDULE 80 PVC TO RIGID GALVANIZED PRIOR TO EMERGING FROM GRADE USING RG ELBOWS.

D. CONTRACTOR TO INSTALL AND COORDINATE NEW UTILITY FEED, NEW METER SOCKET CABINET, AND NEW 200A PANEL. AFTER THE NEW BLOWERS ARE OPERATIONAL AND THE EXISTING CIRCUITS TO REMAIN ARE TRANSFERED OVER TO THE NEW PANEL, DEMO THE EXISTING UTILITY SERVICE AND THE EXISTING 100A PANEL. TURN OVER PANEL TO OWNER.

(#) CODED NOTES:

1. CONTRACTOR TO PROVIDE NEW 200A, 18 CIRCUIT, 120/240V, 1PH, SQUARE D NQ PANELBOARD. PROVIDE AND INSTALL 2" CONDUIT WITH (2) #2/0AWG AND # 4 GND FROM THE UTILITY TRANSFORMER TO THE NEW PANEL. COORDINATE UPGRADED SERVICE REQUEST AND ALL UTILITY REQUIREMENTS WITH THE ELECTRIC UTILITY.

2. CONTRACTOR TO PROVIDE NEW CONDUIT AND WIRE POWER FEED TO THE BLOWER VFDS, 3/4" CONDUIT W/ (2) #8 AWG & #10 GND. INSTALL ALL NECESSARY POWER AND CONTROLS FOR THE BLOWER SYSTEMS.

3. CONTACTOR TO RECONNECT ALL EXISTING EQUIPMENT TO THE NEW PANELBOARD AS NEEDED FOR CONTINUOUS OPERATION. EXTEND CONDUIT AND WIRE AS NECESSARY.

REVISIONS			
DATE	#	REVISION	BY
10/31/25		BID SET	EBB
11/11/25	1	RENUMBER ALTERNATES	EBB

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LOCHMUELLER GROUP
820 S Main Street, Suite 207
St. Charles, Missouri 63301
PHONE: 314.621.3395

STATE OF MISSOURI — ELXE B. BOYD — NUMBER PE-2005022082 — PROFESSIONAL ENGINEER

RECOMMENDED FOR APPROVAL: Christopher Campbell, P.E. — 10/29/2025 DATE

DESIGNED: CRC | DRAWN: KCK
CHECKED: CRC | CHECKED: PEB

HARTSBURG WWTF TREATMENT UPGRADES — 1

ELECTRICAL SCHEDULES AND DIAGRAMS (ALTERNATE 2)

SCALE	NONE
CONSULTANT PROJECT NUMBER	524-1025-01W-PHASE 2
SHEET	9

Date: Nov 12, 2025, 10:24am User Name: Paul.Henderson
File: X:\Production\Files\2024\524-1025\CAD\PlanSet\WR\Electrical.dwg