



ADDENDUM No. 1

AWTP Filter Underdrain Replacement

MACON, GEORGIA

DATE: September 28, 2026

To: All Bidders

This addendum forms a part of the Contract Documents and modifies the original Specifications and Contract Documents as noted below. Acknowledge receipt of this addendum in the space provided on the Bid Form. Failure to do so may result in disqualification of the bidder.

SPECIFICATION REPLACEMENT

Attached to this Addendum is the revised SECTION 466123 – FILTER UNDERDRAIN SYSTEM. The revised version addresses incorrect measurements. Please replace the version in the contracts with this new version.

No fee adjustment shall be made for a failure to understand, or for a misinterpretation of the contract documents.

Attachment(s):

Revised SECTION 4666123 – Filter Underdrain System

REQUIRED CONFIRMATION OF RECEIPT:

Acknowledge receipt of this addendum by return e-mail and as required on the Bid form
*“Section 00300-4” of the contract documents.

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FILTER UNDERDRAIN SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. There shall be furnished a filter underdrain system for a total of **four (4)** filters each having two (2) cells. Filter underdrain systems shall be installed as shown on the Contract Drawings. The underdrain system shall include from a single source all items, materials, fasteners, and sealants within the filter cell to collect filtered water, uniformly distribute backwash air and water, retain the filter media, and to retain, support, and seal the filter underdrain system to make it complete and operable.
- B. Each filter cell is **35 feet wide by 19 feet long** as shown on the Contract Drawings.
- C. The filter underdrain system shall be designed to avoid localized areas of excessive backwash flow that may cause mounding or other deleterious disturbance of the filter media.
- D. The filter underdrain system will be designed to accommodate a maximum internal pressure of **7 psi** and deliver the specified underdrain performance without leaking the specified filter media into the underdrain system. The entire filter underdrain system shall be designed to withstand, with a prudent safety factor, intermittent operation, or continuous 24 hour per day operation.
- E. The ability to efficiently repair the filter underdrain system if that becomes necessary is a key aspect of this project. Anchorage and assembly must be designed so that all elements of the filter underdrain system can be removed for repairs and/or cleaning and reinstalled without damaging any stainless steel filter underdrain system components, concrete, or grout.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. PIPING AND VALVESDivision 2
- B. CONCRETEDivision 3
- C. AIR SCOUR BLOWERSDivision 11
- D. FILTER BACKWASH TROUGHSDivision 11

- E. FILTER MEDIA.....Division 13
- F. FILTER CONTROLS.....Division 13

1.03 PROCESS REQUIREMENTS

- A. The filter underdrain system will support a dual media bed cleaned by water backwash, air scour, or a combination of the two. The intent of this specification is to obtain a filter underdrain capable of being an integral part of a complete filter system that will effectively remove turbidity, have long filter run times, and have low backwash water requirements.
- B. Design parameters are as follows:
 - Maximum filtration rate..... 4 gpm/ft²
 - Maximum backwash rate 22 gpm/ft²
 - Design underdrain system air scour air pressure drop 1.5 psig (excludes static head)
 - Maximum air scour rate 4 scfm/ft²
 - Sand media depth above the underdrain laterals..... 12 inches
 - Granular activated carbon media depth 48 inches

1.04 REFERENCE STANDARDS

- A. ASTM A312 - American Society for Testing and Materials - Pipe Specifications
- B. ASTM A380 5.3 - American Society for Testing and Materials – Mechanical Descaling
- C. ASTM A240 American Society for Testing and Materials - Stainless Steel Material Specifications
- D. AWS B2.1 - American Welding Society – Specification for Resistance Welding for Aerospace Applications
- E. AWS D1.3 - American Welding Society - Structural Welding Code Sheet Steel
- F. AWS D1.6 - American Welding Society – Structural Welding Code Stainless Steel
- G. AWS D9.1 - American Welding Society – Sheet Metal Welding Code
- H. AWS D17.2 - American Welding Society – Specification for Resistance Welding – Spot Welding by Machine

- I. AWS G2.1 - American Welding Society – Guide for the Joining of Wrought Nickel-based Alloys
- J. AWWA B100 - American Water Works Association - Standards for Filter Media
- K. AWWA C653 – Disinfection of Water Treatment Plants
- L. NSF/ANSI 61 - National Sanitation Foundation/American National Standards Institute - Drinking Water System Components – Health Effects

1.05 QUALITY ASSURANCE

- A. The filter underdrain system shall be designed to ensure long-term functional stability in terms of its operating characteristics. Under customary filter operating and environmental conditions, the filter underdrain system shall be resistant to changes in head loss, flow uniformity, corrosion, and any other effects which would in time cause loss of efficiency or effectiveness of its operation.
- B. All components that comprise the filter underdrain system shall be designed and furnished by a single manufacturer. The manufacturer shall be responsible for the compatibility of all underdrain components. In addition, the manufacturer must be regularly engaged in the manufacture of similar filtration equipment.
- C. Lateral orifice sizing and spacing must be verified with sizing calculations done specifically for this project. If requested by the Owner or Engineer, a factory backwash distribution test must be performed to verify that the underdrain lateral orifice configuration used for this project is able distribute backwash flow within the specified variance of $\pm 3\%$. The Owner and Engineer will be given two weeks' notice in advance of finalizing orifice sizing and they may elect to schedule witness factory backwash distribution testing at their discretion. A written report presenting factory backwash testing results will be forwarded to the Engineer.
- D. The manufacturer of the filter underdrain system will modify its standard equipment to meet the minimum values specified for dimensions, design, and intent of this specification.
- E. All welding shall be performed in accordance the previously listed codes and specifications. Welding shall be in accordance with qualified Welding Procedure Specifications (WPS) with Procedure Qualification Records (PQR) and Welder Performance Qualifications (WPQ) records maintained and available for review.
- F. In order to ensure that a consistent level of quality is maintained with appropriate record keeping and corrective action procedures, all welding must be performed

in a facility that is ISO 9001 certified. No riveted or wedge wire construction is allowed.

- G. The manufacturer must have regularly been involved in providing filter underdrain systems for a period of five (5) years with valid reference projects installed in at least ten (10) separate sites. Valid references for fulfilling this requirement must use a stainless steel product **identical** to the product being offered for this project and projects must be of a size and scope of work that allows performance to be reasonably compared to this project.
- H. The filter underdrain system will be manufactured by AWI (ANTHRATECH) U.S. INC. of Salt Lake City, Utah.
- I. Identifying a manufacturer by name in these specifications indicates that the manufacturer is regularly engaged in the manufacture of filter underdrain systems. The Engineer has not reviewed manufacturer product offerings in detail and makes no representation regarding the ability of manufacturers identified by name in these specifications to provide a product that meets these specifications. The appearance of a manufacturer's name in these specifications in no way relieves the manufacturer from the obligation to provide a product that meets the detailed requirements of these specifications.
- J. All named ~~or equal manufacturers~~ must be in full compliance with the specification. The contractor shall provide, in writing, a line-by-line comparison to the specification and any exceptions taken. These exceptions shall be included as part of the shop drawing submittal clearly indicating full compliance with and/or deviation from each paragraph in this section. It shall be the sole responsibility and discretion of the approving authority, if any deviation is acceptable or rejected.

1.06 CONTRACTOR'S SUBMITTALS

- A. The Contractor shall submit complete shop drawings of all equipment furnished including cut sheets describing purchased sub-components with the specific sub-components used for this project properly highlighted. All submitted information must include a certification that the submittal describes exactly the equipment to be provided and substitutions subsequent to submittal approval will not be accepted.
- B. The Contractor shall submit for approval a minimum of the following information:
 - Detailed general arrangement drawings showing the filter underdrain system configuration, and sufficient information describing the underdrain components to determine compliance with the specifications.

- Structural calculations verifying the underdrain system anchorage.
 - Detailed installation instructions specific for this project.
 - Field testing procedures for this project.
- C. Submittal information must be stamped by a Registered Professional Engineer regularly employed by the underdrain system manufacturer.

1.07 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance manuals shall be provided by the equipment manufacturer at least two weeks prior to shipment of all major equipment components. Manuals shall be submitted electronically in bookmarked Adobe Acrobat format.
- B. As a minimum the manual shall contain:
- General arrangement drawings.
 - General arrangement detail drawings.
 - A complete bill of materials for the equipment.
 - Safety data sheets for all items of equipment purchased from other manufacturers.
 - Installation and maintenance instructions for the specific equipment including the assembly sequence, maintenance items, storage instructions, and troubleshooting checkpoints.

1.08 PRODUCT HANDLING AND STORAGE

- A. All components must be crated and adequately marked for ease of assembly.
- B. The filter underdrain system shall be installed immediately upon receipt from the manufacturer or stored in strict conformance with storage recommendations provided by the manufacturer in the operations and maintenance manual.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The filter underdrain system shall include a series of laterals acting as pressure vessels and analyzable as such.
- B. The laterals must compensate for water velocity and momentum changes during backwashing operations by varying the size of the orifices along the lateral length. The height of the laterals shall not exceed **7 inches**.

- C. The filter underdrain system shall be designed to sustain an operating differential pressure of 10 psi across the laterals and remain fully functional.

2.02 LATERALS

- A. Laterals shall be one-piece cross-section containing two separate, isolated compartments and an integral stainless steel bottom to provide structural rigidity and preclude having to try to seal laterals to the filter floor. In order to minimize wave action during air scouring resulting in deleterious movement of filter media and excessive instantaneous structural loads, laterals must be designed to preclude wave action by having completely separate dedicated conduits for air and water. The water conduit must make provisions to vent any air which might be trapped in the backwash piping during backwashing operations.
- B. Laterals must be evenly spaced across the filters on nominal 12 inch centers but in no case will the center-to-center spacing exceed 12 and 1/2 inches. The centerline of laterals adjacent to a wall may not be more than 6 and 1/2 inches from the wall. Laterals will extend to within a nominal distance of 3 inches from the filter wall to all points along the ends of the lateral to allow for unevenness of the filter walls and/or floor. If necessary, lateral ends will be mitered to maintain this nominal distance. All laterals will be fabricated to be flat to within 0.03 inches per lineal foot of underdrain lateral.
- C. Separate orifices shall be provided down the length of the filter underdrain system laterals with one set of orifices controlling the distribution of air and another set of orifices controlling the distribution of water. Orifices controlling the flow of backwash water must be custom sized specifically for this project such that their diameter varies down the length of the underdrain lateral insuring even distribution of backwash flow. Orifice sizing and spacing must be designed such that the laterals can distribute backwash water with a maximum variance of $\pm 3\%$.
- D. Media retaining slots shall be 0.25 millimeters (+/- 0.05 mm) and shall be integrally fabricated with the laterals to support filter media without the need for filter gravel while allowing passage of water for filtered water collection and backwashing. In order to ensure that filter media does not pass through an inadvertently flared slot, slots may not be burned/laser cut. Media retention slots that are manufactured separate from the laterals and then mechanically attached to the lateral will not be allowed because of their propensity to separate from the laterals during air scouring.
- E. In order to maintain the structural integrity of the underdrain system and prevent misalignment of lateral segments during filter operations, all connections between lateral segments must but made with bolted and gasketed flanges. Lateral ends will be fully sealed with an end cap that is welded in place.

- F. Laterals will be designed with sufficient structural integrity that no modulation of air scour airflow is required to protect them.

2.03 BACKWASH FEED CONFIGURATION

- A. Filtered water is collected and backwash water is distributed via a 24 inch wide flume. The filter underdrain system shall include filter underdrain laterals designed to span the flume with separate conduits for distribution of backwash water and air scour air, hydrostatic testing of the underdrain, and testing of the entire system for air and water distribution.
- B. Each lateral will have an integral seal plate where the lateral spans the flume. The seal plate will seal to the floor on either side of the flume. Each lateral seal plate will bolt and seal to the adjacent lateral.
- C. Flume seal plates will include an orifice for each lateral to control the flow of backwash water to the lateral and an air connection with an orifice specifically for the air conduit in that lateral. Orifices will be designed to ensure that the water and air are metered in proportion to the area of the filter that the lateral services.
- D. Underdrain laterals will be sealed using a natural sponge rubber NSF61 compliant gasket installed with an appropriate sealant.

The filter underdrain system anchorage must be capable of sustaining the structural imposed by a vertical upward load of 1,600 pounds per square foot applied at the filter flume.

2.04 AIR SCOUR CONFIGURATION

- A. Each lateral will include an air connection specifically for the air conduit in that lateral. The air connection will include an orifice to ensure that the air is metered in proportion to the area of the filter that the lateral services.
- B. Connections between the air header and underdrain laterals will be made using NSF61 compliant reinforced hose held in place with type 316 stainless steel clamps.

2.05 AIR SCOUR PIPING

Properly sized air scour piping as shown on the Contract Drawings shall be supplied to provide air for scouring to each lateral.

All air feed piping and air conduits must be sized such that air flow velocities are kept below 100 feet per second at the design maximum air scour rate.

Air shall exit the bottom of the header to prevent wave action and loss of effective cross-sectional area in the air header.

The air header shall be constructed of type 316L stainless steel and shall be schedule 10 minimum.

2.06 STRUCTURAL REQUIREMENTS

- A. The entire underdrain system must remain operational when exposed to a design difference in pressure of 10 psi between the pressure inside the underdrain system and the pressure outside of the underdrain system. This design pressure is based upon a 10 psi pressure differential applied to a fully plugged underdrain system.
- B. Anchorage to the floor will be accomplished through the use of adhesive type anchor bolts with hold down clamps. Primary floor anchor bolts around the flume will not be less than $\frac{1}{2}$ inch in diameter. Secondary floor anchors for the laterals away from the flume will not be less than $\frac{1}{2}$ in diameter.
- C. Adhesive anchor bolts must be set according to instructions provided by the manufacturer using adhesives supplied by HILTI.
- D. Anchorage to walls will be accomplished through the use of wedge anchors. Wall anchors will not be less than $\frac{1}{2}$ inch in diameter.
- E. Grout may be used only for the purposes of leveling and/or providing a smooth sealing surface. Due to its inherent weaknesses and history of contributing to filter underdrain failures, grout placed in tension may not be relied upon in any way to contribute to structural integrity when developing structural calculations.
- F. All anchors must be torqued according to the manufacturer's recommendations using a torque wrench.

2.07 MATERIALS

- A. All fabricated items inside the filters will be constructed from 316L stainless steel material.
- B. All fasteners inside the filters will be constructed from 316 stainless steel.
- C. All attachments and connection points shall be properly sealed to prevent media leakage.
- D. The manufacturer will supply all materials necessary for properly installing anchors according to HILTI instructions including:
 - Anchor bolts
 - Adhesive
 - Adhesive applicators

- Hole brushes
 - Hole brush handles
- E. All sealed connections will be gasketed. Gaskets will be installed with a sealant provided by the manufacturer to insure a proper seal.
- F. All fabricated stainless steel will be passivated according to the ASTM 380 standard for mechanical descaling.
- G. All materials in contact with water must be certified to NSF 61.
- H. A reasonable amount of surplus hardware, sealant, and gasket materials are supplied to assure sufficient material to complete the assembly and installation.
- 2% more anchor bolts than the quantity shown on the manufacturer's drawings
 - 2% more assembly bolts than the quantity shown on the manufacturer's drawings
 - 2% more sealant than is needed for installation as shown on the manufacturer's drawings
 - 2% more gasket material than is shown on the manufacturer's drawings

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The underdrains shall be installed in accordance with the manufacturer's recommendations as approved by the Engineer.
- B. Prior to installation of the underdrain system, the Contractor shall vacuum clean all surfaces that might come in contact with the filtered water or backwash water. Backwashing will be performed until the backwash circuit is clean to a degree acceptable to the underdrain system manufacturer.
- C. Following media placement, the media shall be thoroughly washed and cleaned in accordance with recommendations from the filter media supplier.
- D. Prior to installation of filter media, a field service representative employed directly by the underdrain system manufacturer shall inspect the filter underdrain system, make necessary final adjustments, and certify the equipment ready for operation.
- E. Field welding will not be allowed unless permission is granted by the Engineer for the express purpose of making repairs after the underdrain system components have arrived on site.

3.02 SERVICE

- A. The equipment manufacturer shall supply a factory trained field service representative to inspect installation of the filter underdrains. In addition, the field service representative shall instruct the owner's personnel in the proper operation and maintenance of the filter underdrains. Installation supervision described in these specifications can be accomplished in 12 days of service delivered in 3 separate trips; therefore, the manufacturer must provide these service days and trips.
- B. Qualified field service representatives must have a minimum of three (3) years of experience installing the specific filter underdrain product provided for this project
- C. At the start of the filter underdrain installation process, a field service representative employed by the filter underdrain manufacturer will inspect the first filter and filter underdrain components to be installed in it to verify that the filter has been properly cleaned and the filter underdrain components are prepared for installation instructing the installing contractor's personnel in what to observe and document. The field service representative will train the personnel performing the installation of the filter underdrain system in the proper procedures for installation.
- D. The Contractor shall take all necessary precautions recommended by the filter underdrain manufacturer to ensure that the backwash system and air piping are completely clean and free of any debris, dirt, or other foreign materials which could clog the underdrain system or interfere with flow. Backwash air and water piping shall be thoroughly flushed clean. Cleaning of the first filter to be installed shall take place in the presence of the manufacturer's field service representative to establish the level of cleanliness required.
- E. A qualified field service representative employed by the filter underdrain manufacturer will supervise installation of at least a portion the first filter underdrain system to ensure that proper installation procedures are being followed. Upon completion of installation of the filter underdrain systems, the field service representative will provide a full and complete test report for each test performed. Completion of the filter underdrain system installation process is signified by a signed certification indicating that the filter underdrain systems are properly installed, the filter underdrain warranty is in force, and the filter underdrain systems are ready to be put into service.
- F. Service by a representative of the filter underdrain manufacturer who is not a direct, full time employee of the filter underdrain manufacturer is not acceptable.

3.03 FILTER UNDERDRAIN WARRANTY

- A. The filter underdrain manufacturer's warranty will extend for a period of five (5) years from the date that the document certifying that the filter underdrains are properly installed is signed. The filter underdrain warranty will cover the cost of the following items:
- Repair or replacement at the sole discretion of the filter underdrain system manufacturer of any failed filter underdrains, fasteners, and appurtenances supplied by the filter underdrain manufacturer.
 - Any movement or removal of filter media necessary to effect needed repairs.
 - Removal of any filter underdrain components and appurtenances which have failed to provide proper service including any required demolition.
 - Reinstallation of repaired or replaced filter underdrains.
 - Reinstallation of any filter media removed for the purpose of the covered warranty work.
- B. The filter underdrain manufacturer will guarantee the functional integrity of the filter underdrains and underdrain system when that system is subjected to operating differential pressures up to **7 psi** as measured in the feed piping which supplies backwash water to the filter underdrains. (This statement should be interpreted to mean that with all of the media retention slots plugged a static head of **16 feet** can be applied to the filter underdrain system without the filter underdrain system sustaining damage.) This guarantee does not apply to damage caused by water hammer events.
- C. The filter underdrain manufacturer is not responsible for the concrete to which the filter underdrain system is attached under the terms of this warranty. The filter underdrain manufacturer will not be responsible if contaminated backwash water causes the underdrains to plug with the result that differential pressures are in excess of the specified design pressure. System operating pressures within the filter underdrains will be continuously monitored and recorded by the user.
- D. The filter underdrain manufacturer will pay the cost of all warranty related repairs as defined by the filter underdrain system manufacturer and the Owner will not be required to pay for any of the warranty-related activities identified in this warranty statement. The Owner will be responsible for providing a nearby laydown area for the storage of filter media removed during any warranty related activities as well as any utilities required to perform the warranty work.

3.04 PERFORMANCE DEMONSTRATION TEST

- A. After start-up and prior to final acceptance, the Contractor shall conduct an Engineer witnessed performance demonstration tests on the filter underdrains in one of the filters selected by the Engineer.
- B. ¹Uniformity of backwash water distribution for one filter shall be confirmed to be within the allowed variance of $\pm 3\%$ by isolating and sealing four (4) separate minimum two thirds of a square foot segments of the filter and directly measuring the rate of flow in each segment. Measurement in each segment will be accomplished by timing the rate of liquid level rise within the segment. Pressure measured inside a filter underdrain is not proportionate to the key backwash flow parameter. As a result, measurement of pressure in an attempt to infer backwash rate of flow is not acceptable.
- C. After even distribution of backwash flow has been established and visually confirmed and before the filter media is put into the filter, the filter underdrain system shall be tested for uniform air scour distribution and combined air scour water backwash distribution. For the air distribution test, the filter cell shall be flooded to a level approximately 6 to 9 inches above the top of the underdrain. The air flow rate shall be slowly increased to the specified air only rate, and sustained for approximately 2 minutes while visual observations are made. While continuing to air scour at the specified air scour rate, backwash water will be introduced into the filter at a backwash rate of 4 to 8 gpm/ft² in conjunction with the air while the level in the filters rises to the bottom of the filter troughs. Within seconds of the introduction of air for air scouring and throughout the test, the surface of the filter will appear stable with uniform agitation and no evidence of dead spots or surging. The test shall be witnessed and certified by a manufacturer's field service representative.
- D. The testing protocol to be executed by the manufacturer will be submitted for approval to the Engineer. Test procedures shall be submitted to the Engineer for approval with submittal drawings. Tests will be scheduled with the Engineer at least two (2) weeks prior to the planned test date.

¹ Backwash performance testing in the field to verify that the key task of a filter underdrain system – even distribution of backwash water flow when backwashing – is accomplished can be a valuable confirmation that an Owner is obtaining the performance specified. Almost all filters can be tested no matter what the underdrain configuration. The limitation is that there is not enough room in very small filters to install the test apparatus. Backwash testing does come at a cost that includes service representative time and shipment of testing apparatus. For small projects, the cost of testing can make up a disproportionately large proportion of the overall project cost. AWI suggests that the cost of backwash performance testing is readily justified for projects with filter underdrain systems covering roughly 1,000 square feet or more of filter area. If the designer feels that backwash performance testing is not required, delete Item C. from Section 3.04.

- E. The field service representative shall submit to the Engineer a written report stating that the filter underdrain systems have been checked and are suitable for operation.
- F. Inspection by a representative of the manufacturer who is not a direct, full time employee of the manufacturer is not acceptable.

END OF SECTION 46 61 23