



**ADDENDUM NO. 1
ISSUED: JUNE 6, 2024**

**PROJECT: CITY OF ABILENE
GRIMES WTP IMPROVEMENTS
CONTRACT NO. 1 – FILTER MEDIA REPLACEMENT / ABILENE PROJECT
No. CB-2450**

BID DATE: JUNE 12, 2024

The following changes and/or additions shall be made to the Plans, Specifications, and Contract Documents for the above referenced project. Bidder shall acknowledge receipt of this Addendum by signing below and returning this Addendum with the Bid.

GENERAL:

1. Site visits will be made available if requested. Contractor must notify Plant Operator at (325) 676-6429 to schedule site visit.

CONTRACT DOCUMENTS:

1. The number of working days has been changed from 120 to **180**.

SPECIFICATIONS:

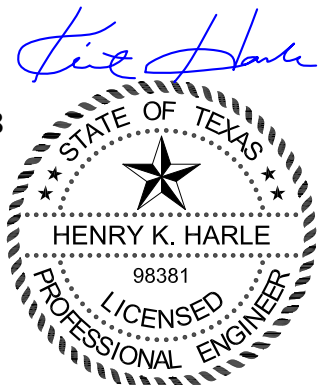
1. Section 13 22 06 FILTER MEDIA: Item 2.1 SUPPORT GRAVEL has been revised. The attached version of Section 13 22 06 FILTER MEDIA shall replace the version included in the contract documents.
2. Section 13 22 06 FILTER MEDIA: Item 2.4 ACCEPTABLE SUPPLIERS
Carbonfilt, LLC. shall be considered an approved supplier.

Bidder's Acknowledgment

Date

Prepared by:

**JACOB | MARTIN
TBPE Firm No. 2448**



06/06/2024

SECTION 13 22 06 - FILTER MEDIA

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work Included
 - 1. Remove and dispose of the existing support gravel and filter media in seven filters as shown on the Contract Drawings and as specified herein. The original design media depths for Filters 1, 3, 5 and 7 consisted of approximately 12 inches of support gravel, 10 inches of sand and 16 inches of anthracite. The original design media depths for Filters 4, 6, and 8 consisted of approximately 13 inches of anthracite and 16 inches of sand. Each filter has two cells; with each cell having an approximate area of 364.5 square feet. The total area of each filter is approximately 729 square feet. The filter media can be properly disposed at local landfills, which are approximately eight (8) miles away from the project site. All disposal and hauloff fees are the responsibility of the CONTRACTOR.
 - 2. Install new media in each of the filters shown on the Contract Drawings and as specified herein. The final media depths in each of the filters shall match the original design media depths for each filter.
- B. Related Sections:
 - 1. Section 01 09 01 - Disinfection of Potable Water Piping, Tanks and Filters

1.2 REFERENCE STANDARDS

- ASTM E11 - Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves; 2017.
- AWWA B100 - Standard for Granular Filter Material; 2009.
- NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

1.3 QUALITY ASSURANCE

- A. Material testing of new filter media shall be performed by an OWNER-approved independent testing laboratory employed by the CONTRACTOR.
- B. Submit a representative sample of each type and size of new filter material along with certified test results from an independent laboratory for approval before each shipment of media from the point of manufacture, as specified in Article 1.04 of this section. After approval, all shipments shall meet the specifications. Approved samples shall meet the requirements of AWWA B100, including all addenda.
- C. Field samples and testing shall be performed in accordance with the requirements of AWWA B100. See Article 3.4
- D. The certified test results shall be submitted by an independent laboratory not less than 14 days prior to shipment of the media.
- E. The supplier of the filter media shall provide for review and approval media installation instructions.

1.4 SUBMITTALS

- A. Samples of the representative filter media and certified test results shall be submitted to the ENGINEER not less than 14 days prior to shipment of the media from the point of manufacture.
- B. Separate sets of samples shall be taken from actual lots of material to be supplied to the OWNER.
- C. The certified test results shall cover all physical, gradation, size, and chemical characteristics specified herein. All tests shall be made in accordance with Test Procedures as described in AWWA B100.
- D. Submit additional samples and test results as required by the ENGINEER.
- E. Sample amounts shall be as follows:
 - 1. Sand 1/2 gallon sealed in a properly labeled container.
 - 2. Anthracite 1/2 gallon sealed in a properly labeled container

- F. Submit qualifications of the independent testing laboratory for approval.
- G. Submit on the proposed media disposal site for existing media.
- H. Submit proper documentation showing NSF 61 certification of all filter media to be supplied.
- I. Submit media installation instructions from the media supplier including washing and skimming requirements and procedures.

1.5 PRODUCT HANDLING, STORAGE AND DELIVERY

- A. Place or store all filter media only in staging areas designated and approved by OWNER and ENGINEER.
- B. Conveying of the new filter media by compressed air through duets, pipes or hose will not be permitted.
- C. Placement of filter media in the filters shall comply in all respects with the AWWA B100, except as modified or supplemented herein.

PART 2 PRODUCTS

2.1 SUPPORT GRAVEL

- A. Quality:
 - 1. Support gravel shall consist of a minimum of 12 inches of high density particles that are either round or equi-dimensional in shape. The gravel shall possess sufficient strength and hardness to resist degradation during handling and use, be substantially free of deleterious materials, and exceed the minimum specific gravity requirement.
 - 2. Support gravel shall have a specific gravity of not less than 3.8, meaning that at least 95 percent of the material shall have a specific gravity of 3.8 or higher.
 - 3. Not more than two percent by dry weight of the particles shall be flat or elongated to the extent that the longest axis of a circumscribing rectangular prism exceeds five times the shortest axis.
 - 4. The gravel shall be visibly free of clay, shale, or organic impurities.
- B. Size:
 - 1. Filter media support gravel shall be provided in the particle ranges and layer thicknesses stated in AWWA B100, Appendix D, Table D.1 for underdrain orifice size of 0.25 in.

2.2 FILTER SAND

- A. Quality:
 - 1. The filter sand shall be silica sand composed of hard, durable, uncoated grains. The filter sand shall be thoroughly washed, screened, and free of clay, loam, dust, dirt, organic matter, and other foreign material.
 - 2. The acid solubility of the filter sand shall not exceed 2.5 percent.
 - 3. The specific gravity of the filter sand shall not be less than 2.50.
 - 4. Not more than 1 percent by weight of the filter sand shall be flat or micaceous particles. Flat shall be defined as a ratio of the longest axis to the shortest axis of the circumscribing rectangular prism for a particle of sand media that exceeds 5.
- B. Size:
 - 1. The silica sand shall meet the following requirements:
 - a. Effective (10 percent) size (mm) 0.45 to 0.55.
 - b. Uniformity Coefficient - 1.50 before and after skimming.
 - 2. The particle size distribution shall be determined by screening through standard sieves, Tyler square root of 2 series or equivalent U.S. series. The percent sizes shall be determined from a plot, on semilog or probability paper, of the percentages of the material passing each sieve against the rated opening of the sieve or the equivalent diameter of the grains. Sieve dimensions shall conform to ASTM E11 and Table B.1 of the Appendix to AWWA B100.
 - 3. The percent size shall be defined as the size of the theoretical opening of a sieve through which that percentage of the media, by weight, will pass. For example, if the size distribution of the sand particles is such that 10 percent of the sample is finer than 0.50

- millimeters, the sand shall be said to have a 10 percent size of 0.50 millimeters.
4. The uniformity coefficient is the ratio of the 60 percent size to the 10 percent size of the filter sand.
 5. The installed filter sand shall be in compliance with the specifications when, after hydraulic classification in place by backwashing and removal of the finer material by skimming, the media meets the physical, gradation and size characteristics specified herein.
 6. Sufficient excess sand media shall be provided by the CONTRACTOR to anticipate the skimming requirement, such that after skimming is completed to the specified criteria, the media is at the depth indicated on the Drawings.
- C. Packaging:
1. Filter sand shall be packaged in 1-1/2 ton ultraviolet resistant polyethylene bags (super sacks with bottom pour spout) on pallets. Each bag of material shall be clearly marked with the following information: Effective size, uniformity coefficient, source, date of bagging, and the lot or stockpile identification.

2.3 ANTHRACITE COAL

- A. Anthracite coal shall be furnished to provide a total depth as shown on the Plans. Anthracite coal shall be worked, screened, and hydraulically graded No. 1-1/2 coal media with an effective size of 0.95mm to 1.05mm, a uniformity coefficient of less than 1.60, and a specific gravity of less than 1.60.
- B. Coal media shall be composed of hard durable grains and shall be free as commercially possible of iron sulfides, clay, shale, or extraneous dirt. Solubility in 40% HCL shall be negligible. Solubility in one percent (1%) hot (190 °F) sodium hydroxide solution shall be less than two percent (2%) by weight.
- C. At least eight percent (8%) excess material of the total bid volume shall be furnished to replace possible losses due to on-site processing during installation and removal of fines during initial backwashing.

2.4 ACCEPTABLE SUPPLIERS

- A. Unifilt Corporation
P.O. Box 88
Fombell, PA 16123
(724) 758-3833; 1-800-223-2882
- B. Northern Filter Media/MCM
2509 Pettibone
Muscatine, IA 52761
(563) 263-2711
- C. Xylem Water Solutions USA, Inc. (Leopold)
108 Tomlinson Drive Suite 400
Zelienople, PA 16063
724-504-0366
- D. Oglebay Norton
P.O. Box429
Brady, Texas 76825
800-858-4123, 915-597-0721
- E. Carbonfilt, LLC
20385 Grazie Place
Venice, FL 43293
239-784-5421

PART 3 EXECUTION

3.1 GENERAL

- A. Sequence the removal, replacement, and installation of filter media in accordance with AWWA B100.

3.2 FILTER MEDIA REMOVAL

- A. Remove existing gravel, sand and anthracite from the existing filters. Methods used shall not damage the existing filter units, wash water troughs, handrail, access ladders (if any), level probes nor any other structural, electrical, instrumentation, architectural, and mechanical appurtenances of the filters.

3.3 FILTER MEDIA INSTALLATION

- A. General:
 - 1. Filter media washing:
 - a. Plant staff shall operate all filter backwash controls when washing the new filter media installed in the filter basins.
 - b. The CONTRACTOR is responsible for scheduling filter media washing through the OWNER with plant operations. Plant operations shall govern scheduling the use of the backwash system. The CONTRACTOR is responsible for this coordination to avoid delays to his schedule.
 - c. Filter media washing will be allowed as determined by the ENGINEER so as not to interrupt operation of the plant. At no time shall the plant's recycle basin or wash water ponds overflow from the media washing operations. Filter media washing shall be terminated before reaching a liquid level that would affect plant operations regardless of the status of the media washing operation;
 - d. The CONTRACTOR is responsible for ensuring that water from the media washing operation is directed to the recycle basin and does not flow to the storm drain/sewer system.
 - 2. Before placing any filter media:
 - a. Verify that all openings of the underdrain porous plates are open and free of obstructions, and that the area around the filter underdrains is swept and vacuumed clean.
 - b. Remove all debris from filters.
 - c. Thoroughly wash down all parts of the filter units with clear water.
 - d. Maintain the cleanliness of the filters throughout the media placement operation.
 - e. The underdrain system shall have passed the specified structural integrity and flow distribution testing before any media are placed. The underdrain is considered to have passed these tests upon the ENGINEER's acceptance of the test results
 - 3. Prevent contamination during transporting and placing the filter media. Any filter media which have become contaminated, either before or after placement in the filters, shall be removed and replaced with new or washed and cleaned material in a manner approved by the ENGINEER.
 - 4. Each layer of filter media shall be brought up to the required elevation and made level over the entire filter bed area. The placement of each layer of sand and anthracite shall be approved by the ENGINEER before the next layer is placed.
 - 5. Do not damage any equipment or piping in the filter units
 - 6. Workers shall not stand or walk directly on the filter materials. The workers shall walk on plywood mats that will sustain their weight without displacing the material (minimum dimensions 2 feet by 2 feet by 1/2 inch thickness).
 - 7. The filter may be flooded with water to use as a leveling gauge for each layer of material.
 - 8. Each media level shall be thoroughly washed and have passed the specified in-place media tests before the next layer is placed. The media is considered to have passed these tests upon the ENGINEER's acceptance of the test results.

9. Place each layer evenly throughout the filter. Do not place in one area and then spread to the rest of the filter.
- B. Filter Sand:
1. Before placing the sand, remove all plywood panels used by the workmen to walk on the media support system or on the filter media. Fill the filters to a water depth 12 to 15 inches above the surface of the filter media support system. The sand shall then be placed into the water in a uniform manner over the entire surface area of the filter. This may require hand placement of the initial layer of filter sand.
 - a. Transport and place the sand carefully to prevent contamination of any sort, and replace sand made dirty before or after placing with clean sand.
 - b. Any evidence witnessed during sand placement that the underdrain has been displaced or damaged shall require the sand to be removed and the underdrain replaced in accordance with the underdrain manufacturer's specific instructions for repairing damage.
 2. The final depth of filter sand shall be as indicated on the Drawings.
 3. After placing the filter sand, backwash the filter at an initial rate of not more than 2 gallons per minute/square foot of filter area (approximately 3 inches per minute rate of rise) and increase the rate gradually over a period of 3 minutes to a maximum rate of 20 gallons per minute/square foot (approximately 27 inches per minute rate of rise). Maintain this maximum rate for no less than 5 minutes. Close the filter backwash rate valve slowly so as to allow for hydraulic media segregation.
 4. Scrape the fine-grained materials from the top surface to remove all material passing a No. 50 sieve (0.295 mm). Dispose of the sand particles removed by scraping.
 5. After the scraping operation is finished add additional filter sand as necessary to bring the top surface to the finished elevation.
 6. Repeat steps 3 through 5 as necessary until a minimum of 1/2 inch of sand has been scraped and removed, and the filter sand is within the size limits specified, as determined by the testing specified herein, and no further discoloration of the backwash water occurs when backwashing the filter.
 7. The installed sand must pass the specified gradation test before the anthracite layer is installed. The media is considered to have passed these tests upon the ENGINEER's acceptance of the test results.
- C. Disinfection:
1. Before the filter anthracite is placed, each filter shall be disinfected by chlorination, as specified in Section 01 09 01 and modified below.
 2. After the filter sand layer has been brought to the specified gradation and thickness, disinfect each filter as follows:
 - a. Inject sufficient chlorine into the wash water to produce a solution having a chlorine concentration of at least 25 mg/L throughout the filter. Introduce sufficient wash water so that all surfaces up to the maximum operating level of the filter will be in contact with the chlorinated water. Hold the chlorinated water for a minimum of 12 hours.
 - b. As an alternative disinfection method, spray all surfaces of the filter box up to the maximum operating level with a solution containing 200 mg/L chlorine. The solution shall remain in contact with the surfaces for a minimum of 30 minutes. Disinfect the remaining portion of the filter with a 25 mg/L chlorine solution for a minimum of 12 hours.
 - c. Prior to placing the filter anthracite, remove chlorine by thorough washing.
 - d. Provide all chlorine required for disinfection.
 - e. Chlorinated water from disinfection operations shall be directed to the recycle basins or wash water ponds, as appropriate.
- D. Filter Anthracite:
1. Anthracite filter media shall not be placed until the filter sand has been skimmed and the final test results accepted by the ENGINEER.
 2. Before placing the anthracite, remove all plywood panels used by the workmen to walk on the sand filter media. Anthracite shall be placed in a manner so as not to disturb the top

- layer of filter sand.
3. Fill the filters to a water depth 12 to 15 inches above the surface of the filter media support system. The anthracite shall then be placed into the water in a uniform manner over the entire surface area of the filter. This may require hand placement of the initial layer of filter anthracite.
 - a. Transport and place the anthracite carefully to prevent contamination of any sort, and replace anthracite made dirty before or after placement with clean anthracite
 4. The final depth of filter anthracite shall be as indicated on the Drawings.
 5. After placing the filter anthracite, backwash the filter at an initial rate of not more than 2 gallons per minute/square foot of filter area (approximately 3 inches per minute rate of rise) and increase the rate gradually over a period of 5 minutes to a maximum rate determined by the ENGINEER. Maintain this maximum rate for no less than 5 minutes. Close the filter backwash rate valve slowly so as to allow for hydraulic media segregation.
 6. The installed anthracite must pass the specified gradation test before final acceptance. The media is considered to have passed these tests upon the ENGINEER's acceptance of the test results.

3.4 FIELD QUALITY CONTROL

A. Tests:

1. General:
 - a. Acid solubility tests, specific gravity tests, and sieve analysis tests shall be made in accordance with Test Procedures as described in AWWA B100.
 - b. The particle size distribution shall be determined by screening through standard sieves, Tyler square root of 2 series, or equivalent U.S. series. The percent sizes shall be determined from a plot on log probability paper of the percentages of the material passing each sieve against the rated opening of the sieve or the equivalent diameter of the grains. Sieve dimensions shall conform to Table B.1 of the Appendix to AWWA B100. Media with a particle size distribution not meeting the specified size and quality values will be subject to rejection.
 - c. Conduct all specified testing and furnish all material, instrumentation, and personnel for conducting tests as specified herein. All costs of such testing shall be borne by the CONTRACTOR. The costs of all work and materials to correct deficiencies revealed during testing, and the costs of retesting, shall be borne by the CONTRACTOR. CONTRACTOR shall give the ENGINEER sufficient advance notice of the testing to enable the ENGINEER to witness the tests.
 - d. Do not place filter media in any filter basin before the ENGINEER has reviewed the media's test results and completed a visual inspection of the media. Any media placed in the filter without the ENGINEER's acceptance shall be subject to rejection.
 - e. Furnish an independent commercial testing laboratory, acceptable to the ENGINEER, to sample, conduct, and certify the tests specified herein.
2. Testing Filter Media:
 - a. Media Manufacturer's Testing: Furnish for the ENGINEER's review and acceptance, certified laboratory tests of the new filter media including the filter sand, and filter anthracite proposed for the filters. These tests shall show the analysis of all specified physical characteristics, gradation and size including acid solubility, shape, specific gravity, and sieve analysis tests. Make the tests upon samples obtained in accordance with the sampling procedures of AWWA B100 which are representative of that proposed to furnish and place in the filters. The filter media shall not be shipped before the ENGINEER has reviewed and accepted the manufacturer's test report of the media to be shipped.
 - b. Storage and Testing of New Filter Media Stored On Site: All filter media at the jobsite shall be stored off the ground, protected from weather, and covered with a suitable membrane to prevent contamination of the media from windblown debris and soil. All filter media is subject to gradation and retesting at the ENGINEER's direction if visual evidence of contamination is observed or suspected. All media shall be pre-

designated for each filter and a representative sample gradation tested by the CONTRACTOR prior to placement in each filter basin.

- c. Testing of Installed Filter Sand: After completion of backwashing and skimming of the filter sand, 3 random samples selected by the ENGINEER shall be taken from each filter by the CONTRACTOR and shall be sieve analyzed for compliance with the Specifications
- d. The CONTRACTOR's testing laboratory shall determine the percent by weight of the flat or micaceous sand media on a minimum of 3 randomly selected 1 gram (0.035-ounce) samples from each filter. The longest and shortest axis of the media particles shall be determined using calipers or a proportional divider. Suspected flat or micaceous particles can be checked by comparing the minimum thickness of the particle as measured at its approximate midpoint with the maximum length dimension.
- e. Testing of Installed Filter Anthracite: After completion of backwashing of the filter anthracite, 3 random samples selected by the ENGINEER shall be taken from each filter by the CONTRACTOR and shall be sieve analyzed for compliance with the Specifications.

3.5 CLEANING

- A. Backwashing: At all times, utilize plant operators, in coordination with the OWNER, to operate all filter controls.
- B. Filter Structure Cleaning: Once all filter testing and skimming operations are completed, remove all debris and media from all backwash drain conduits, troughs, pipelines, and structures.

-- END OF SECTION --

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