2. Primary Clarifiers

    a. Perform modifications to the primary clarifiers such that the work on one primary clarifier is complete, tested, and accepted prior to commencing the work associated with the second primary clarifier.

    b. Perform cleaning and television inspection of the 18-inch pipes from the Headworks Building to the primary clarifiers in accordance with Sections 02955 and 02958, and Drawing Sheet C-101. This work shall be performed concurrent with clarifier mechanical equipment installation while the clarifier is offline so that inlet piping can be drained and inspected in the dry.

3. Pump Chamber No. 1

    a. Surface preparation and recoating of primary clarifier effluent pipe in Pump Chamber No. 1 shall be done prior to installation of new primary sludge pumps and all new piping. Contractor shall coordinate the timing of work and provide environmental controls to meet the requirements of the specified coating system under section 09900.

4. Primary Sludge Pumps

    a. The existing primary sludge pumping system shall not be out of service for more than 8 hours at a time. Perform modifications to the primary sludge pumps such that the work on one pump is complete, tested, and accepted prior to commencing the work associated on the second pump.

5. Mixed Sludge Pumps

    a. The existing mixed sludge pumping system shall not be out of service for more than 8 hours at a time. Perform modifications to the mixed sludge pumps such that the work on one pump is complete, tested, and accepted prior to commencing the work associated with the second pump.

6. Waste Sludge Pumps

    a. The existing waste sludge pumping system shall not be out of service for more than 8 hours at a time. Perform modifications to the waste sludge pumps such that the work on one pump is complete, tested, and accepted prior to commencing the work associated with the second pump.

7. Gravity Thickeners

    a. Perform modifications to the gravity thickeners such that the work on one gravity thickener is complete, tested, and accepted prior to commencing the work associated with the second gravity thickener.

8. Biological Aerated Filters

    a. Work on the Biological Aerated Filters shall not be scheduled during the nitrogen removal season required by the Town's NPDES permit (May 1st through October 31st

showing the proposed locations and shall include on-site traffic modifications and temporary utilities as may be applicable.

END OF SECTION

SECTION 13223

BAF AND DNF FILTER REHABILITATION

PART 1 GENERAL

1.1 SUMMARY

A. Section includes

1. Silica sand filter media

2. Gravel media

3. Filter disassembly and reassembly

B. Work on the three (3) Biological Aerated Filters (BAFs) shall be included in the Base Bid.

C. Work on the three (3) Denitrification Filters (DNFs) shall be included in Bid Alternate No. 1.

1.2 REFERENCES

A. ANSI/AWWA B100ï 01 or latest editionï AWWA Standard for Granular Filter Material

1.3 SYSTEM DESCRIPTION

A. Each of the six filters is 9ô6ò wide by 22ô8ò long.

B. Provide gravel media in each filter arranged in five layers, each placed separately.

1. The gravel layers shall be sized as indicated in the following table:

Gravel Layers

	BAF	**DNF**
Layer #1 (Bottom)	8-in	4-in
Layer #2	7-in	2-in
Layer #3	7-in	4-in
Layer #4	7-in	4-in
Layer #5 (Top)	7-in	4-in

C. Sand media shall be provided in each filter to a depth of 9ô-0ò for each BAF filter and 7ô-0ò for each DNF filter after backwashing, leveling and draining. This depth shall be measured from the top of the gravel support layer (Layer # 5). Furnish sufficient extra sand for losses during removal or installation.

D. The Owner intends to fully bypass flow around the Biological Aerated Filters and Denitrification Filters during construction to give the Contractor full access to all six filters at the same time. Before a filter can be returned to service, satisfactory bacteriological and VOC tests must be completed.

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C. Provide extra sand media as required to replace sand media lost during installation. The depth of extra sand replaced is generally one inch or less for previous replacement projects.

2.4 FILTER PARTS

A. The filter manufacturer shall furnish the following filter parts as follows:

1. Spare underdrain T-Blocks (5) in case any are damaged during the removal process

2. Spare air laterals (2) in case any are damaged during the removal.

3. All new air lateral supports

PART 3 EXECUTION

3.1 GENERAL

A. No internal combustion engines will be allowed in the treatment plant building to complete any part of the Work.

B. To the extent practical, the Contractorôs operations shall not interfere with the Ownerôs normal operational activities of the plant.

C. The Contractor shall employ temporary means to limit the entrance of precipitation or cold air at doorways that must be held open as part of this Work.

D. The Contractor shall install all equipment supplied by the filter manufacturer. Install equipment in accordance with the drawings and the manufacturerôs instructions.

E. A certificate from the equipment manufacturer stating that the installation of their equipment is satisfactory, that the equipment is ready for operation, and that the operating personnel have been received instruction in the operation and maintenance of the system shall be submitted prior to final acceptance.

3.2 MANUFACTURERôS FIELD SERVICES

A. The filter manufacturer shall provide the services of a field service representative for a total of five (5) days in two (2) trips for the purpose of instructing and assisting the Contractor and the Owner's personnel in the handling, installation, start-up, and proper operation of the process and equipment.

B. The manufacturerôs representative shall conduct the performance testing, as specified herein, in the presence of the Engineer.

C.

A. Work shall include media and gravel removal, media and gravel disposal, remove and clean the underdrain components, re-install underdrain components, install new gravel and media.

B. Contractor shall remove filter trough and reinstall level at existing elevation.

3.4 FILTER DISASSEMBLY AND REASSEMBLY

A. The Owner will take equipment out of service.

B. Contractor shall disassemble and reinstall the equipment in accordance with the filter manufacturerôs instructions. Contractor must provide submittals of the manufacturerôs most recent instructions.

C. Underdrain blocks and air laterals are to be stored on site during filter rehabilitation, protected from damage at a location to be coordinated with the Owner.

3.5 FILTER DISASSEMBLY PROCEDURES

A. Remove all sand and gravel from the filter in accordance with Section 3.6 and/or filter manufacturerôs instructions. Vacuum trucks are normally used for this procedure. Dispose of all material.

B. Pressure wash the walls removing any biological growth

C. Start removing the underdrain blocks and stack them on top of the other section of underdrain. During underdrain block disassembly, grout at 1 or 2 blocks may need to be knocked-out and replaced to start block removal. Remainder of blocks should be removable with grout in place.

D. Start removing the air laterals. After enough are removed, stack the block in an open area.

E. Remove the remainder of the block and air laterals stacking the block in one area.

F. Remove the stainless-steel supports from the ends of the air laterals, replace them if necessary.

G. Pressure wash the block to remove any residual biology or growth.

H. Flush the air laterals from the inside. Verify all the holes are clear. Verify no growth has occurred inside these pipes.

I. Check openings in air header to make sure there is no growth inside. If so, use a wet vac to try to and remove as much material as possible using a flexible connection. Consider water flushing the whole air header.

J. Verify that all gaps between the sump cover plates are clear. Check in between the gaps into the sump to determine if any debris or growth is inside the sump. If so, remove one or more sump covers and clean the sump.

K. Re-install any sump covers removed. These are stainless steel covers welded in place.

L. Clean filter floor of all debris.

3.6 FILTER REBUILD PROCEDURES

A. After cleaning, securely re-weld any removed sump covers level with the floor.

B. Lubricate air lateral threads with Teflon thread lubricant or tape and reinstall air laterals with orifice holes pointing down and top punch marks up. Do not use anti seize compounds as they are too slippery and do not give a good indication of when the pipes are getting too tight. Tighten pipes to about 100 ft-lbs. Stainless steel conducts heat poorly. Thirty minutes after initial tightening, recheck all pipe torques as threaded areas that may have heated and swelled and may have loosened after cooling off.

C. Re-install cleaned underdrain blocks using the block pattern drawing (M301) and description (M300) in the O&M provided by DeNora.

D. Install grout in any damaged areas. Sometimes grout is removed or damaged when block is first removed.

E. Mark walls with chalk lines for installing gravel layers. Refer to M303. Follow M300 for proper gravel installation techniques. M303 and M300 to be provided by DeNora.

F. Install media in accordance with Section 3.8 and/or filter manufacturerȿs instructions. Refer to M303 to be provided by DeNora.

G. After installation is complete, fill the filter from the bottom to prevent silt from the new sand or gravel from being washed down into the filter underdrain and clearwell.

H. Backwash the filter to remove silica dust fines until water is clear during the air/water cycle.

3.7 MEDIA REMOVAL

A. Filter walls and piping within filters shall be washed and rinsed with clean water prior to removing media to remove all loose and adhered material.

B. Remove all sand and gravel media from each filter.

C. Rinse walls and piping to remove any remaining loose materials.

D. Safety: Filter entering and egress shall be accomplished by using portable ladders provided by the Contractor. Confined space entry procedures should be utilized compliant with OSHA Standard 1910.146.

E. Contractor shall properly dispose of all gravel and sand media off site. No media may be re-used in this project.

3.8 MEDIA DELIVERY

A. Bags, su[illegible] bag[illegible]r bu[illegible] deliv[illegible]s a[illegible] acceptab[illegible] fo[illegible]liver[illegible] of [illegible] Bags must be [illegible] as specifi[illegible](f)7[illegible]

2. Thoroughly clean and disinfect filter tanks and all filter components including underdrain system and plenum, washwater troughs, and piping before any filter media is placed and keep clean throughout entire operation. Remove and dispose of media contaminated in any way and replace with clean media.

3. Mark level lines on one wall of each filter at finish surface elevations of each media layer.

4. Level sand media by hand if necessary to within plus or minus 2 inches of the appropriate mark prior to backwashing.

5. Transport and place media carefully to prevent contamination of any sort. The Contractor is cautioned against the handling of any agent or material that may be considered a pollutant to the public water supply. The media shall be protected from contamination from hydrocarbons, oils, gasoline, salts, solvents, etc. during transport and delivery operations.

6. Do not walk directly on filter media. Work from boards so that the material below cannot become damaged or mixed.

7. Sand media installation shall conform to the requirements of AWWA B100.

B. Installation of gravel media:

1. Carefully place gravel media in layers (one layer for each gradation) with the coarsest media on the bottom and increasingly fine working upward. Bring the surface of each layer to the proper elevation and level prior to placing the next layer.

2. The bottom layer of gravel shall be carefully placed to avoid damaging the filter underdrain system.

3. Contractor shall take care not to disturb the graded gravel, especially if air is present in the underdrain. Any gravel that becomes disturbed by the wash shall be removed and replaced with clean material of the proper type and size.

C. Installation of sand media:

1. Place silica sand media as required to bring the sand surface to the proper elevation. Finished media depth shall be as specified in Paragraph 1.3.

2. Backwash bed for at least 30 minutes and utilize multiple backwashes to clean the media if requested by the Manufacturerôs representative or Engineer. Coordinate with underdrain manufacturer, media manufacturer, and Engineer to

unit to demonstrate its ability to operate continuously without leakage, binding, or stalling, and to perform to its specified functions satisfactorily.

B. Working under the direction of the manufacturer, the Contractor shall perform field tests on the equipment, including air pattern test conducted after air lateral installation and the final backwash.

C. All defects and defective equipment shall be corrected promptly or replaced at no additional cost to the Owner.

D.