

April 5, 2021

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Riviera Beach Utility Special District
600 West Blue Heron Blvd
Riviera Beach, FL 33404

Re: Riviera Beach Utility Special District (District)
Filter Rehabilitation Phase 1 Proposal

Brown and Caldwell recently completed their cursory inspection of the District's filtration system and prepared a Technical Memorandum (TM) that listed numerous deficiencies. The TM found that the filters are not functioning properly and cannot reliably meet treated water turbidity goals. The TM recommended additional inspections and evaluations as well as several physical improvements to the filters, delineated as Phase 1 and Phase 2 Improvements. Phase 1 Improvements include immediate improvements for repair of four (4) filters in the North Filter Bank to place them back in proper service as soon as possible and based on the findings discovered during the initial rehabilitation, potentially rehabilitate the other four (4) filters in the North Filter Bank, in a similar fashion. Phase 1 work will also include additional inspections/evaluations necessary to clearly define the Phase 2 Improvements, to correct the deficiencies in all the filters for improved operation, control and monitoring of the filters.

Per the District's request, Globaltech is providing this proposal to provide the Filter Rehabilitation Phase 1 Improvements. The Phase 1 filter rehabilitation work will be performed on Filters 10 and 12 first, as they are currently out of service. After Filters 10 and 12 are placed back into service, two (2) additional filters in the North Filter Bank will be rehabilitated in the same fashion. The anticipated work will include the following:

- 1) North Filter Bank Filter Rehabilitation
 - a) Remove the existing media and gravel in two (2) filters. Inspect the existing Leopold Clay Tile underdrains with the underdrain vendor and, if damaged, determine the feasibility of making field repairs and make them if appropriate.
 - b) Drill out any clogged underdrain orifices.
 - c) Probe the existing underdrain upper plenum through the underdrain orifices, with an endoscope, to examine for accumulated media inside the underdrain. Remove the base elbow from one filter in the filter gallery to inspect the under drain from below and inspect the inside of the filter valves. If accumulations are present, attempt to flush out the accumulations. Use an endoscope to examine the lower plenum of the first few rows of the underdrain as access will allow.
 - d) Remove the surface sweeps. Cut and re-thread the sweep down pipe so that the refurbished sweeps are situated above the filter bed. The filter sweeps will not be reinstalled until after the filter media installation has been completed.
 - e) Order new sweeps for four (4) of the North Filter bank filters (16 sweeps). The new sweeps will be installed under the Phase 1 Contract. However, these sweeps will not arrive in time for the first four (4) refurbished filters to be placed into service, therefore the sweeps for the first four



- (4) filters will be repaired to the best extent possible. If the sweep cannot be adequately repaired, then the sweep connection will be blanked off until the new sweeps arrive and additional sweeps will be ordered and installed under the Allowance.
- f) Order and install new sweep bearings and sweep nozzles for four (4) filters.
 - g) Order six (6) new replacement troughs. This is one quarter of the total number of troughs in the North Filter Bank. The new troughs will not arrive in time for first four (4) refurbished filters to be placed into service, therefore the existing troughs will be repaired and leveled so they can be placed back into proper service as soon as possible. The repaired/damaged troughs (if necessary) will be replaced with the new troughs after the troughs arrive.
 - h) Replace the trough support piping (galvanized) in kind.
 - i) Repair damaged sections of the trough (fiberglass repair and new aluminum stabilizer bars).
 - j) Repair and modify the trough supports to properly support the troughs. Level and secure the troughs.
 - k) Prior to placing the new filter media, subject the underdrain to a backwash test at the peak backwash rate (not to exceed 19 gpm/ft²) with the underdrain manufacturer present. Record any leaks, structural stability problems or any nonuniformity of distribution. Determine the feasibility of any repairs to address the issues found during the backwash test and perform the repairs as appropriate.
 - l) Install new gravel, sand and anthracite. This proposal is based on the following media specifications and depths. The new media will meet media is in conformance with ANSI/NSF 61 and AWWA B 100 standards and shall be as follows:
 - i) Anthracite coal 20" deep. Specific gravity of 1.55 +/- 0.05, effective size of 1.00 mm +/- 0.05. Uniformity coefficient no more than 1.4.
 - ii) Silica sand 12" deep. Specific gravity of 2.60 +/- 0.05. Effective size 0.50 mm +/- 0.05, Uniformity coefficient no more than 1.4.
 - iii) Bottom gravel layer: 3" deep, size ½"-3/4"
 - iv) Second gravel layer: 3" deep, size ¼"-1/2"
 - v) Third layer gravel: 3" deep, size 1/8"-1/4"
 - vi) Top layer gravel: 4" deep, 1/16"-1/8"
 - m) Disinfect the filters and place them back into service.
 - n) Repeat for two other filters in the North Filter Bank. Only one base elbow will be removed for inspection purposes.
 - o) Provide a TM summarizing the existing conditions observed on these four filters, and the resulting performance achieved after rehabilitation. The TM will include recommendations for rehabilitation of the other four filters in the North Filter Bank. If the recommendations do not deviate from the approach used to rehabilitate the first four (4) filters, then the rest of the North Filter Bank filters should be similarly rehabilitated. The media for these filters may be purchased at the same time as the initial filter media purchase, but it should not be delivered until it is clear what the recommended filter rehabilitation will be in the TM and what the likely rehabilitation schedule will be.
 - p) Assuming the TM shows that the underdrains in the North Filter Bank are in either good condition, or an easily repairable condition, order new filter media and rehabilitate the remaining four (4) filters in the North Filter Bank.
- 2) South Filter Bank Work



- a) Remove the media from one of the out of service filters. Conduct a detailed inspection with the Leopold factory representative. Confirm filter dimensions. Remove the blind flange in the filter gallery to observe the underdrain from below and inspect the filter valves from the inside. Clean the resulting water and debris from the filter gallery.
 - b) After confirming the exact type/model of the existing underdrain in the South Filter Bank, remove the existing Leopold polyethylene underdrain (with IMS cap) from the one filter (Filter No. 5, the same filter that is being inspected) and install a new similar Leopold polyethylene underdrain with IMS cap. Water blast and clean the filter after the old underdrain has been removed but before the new underdrain is installed.
 - c) In Filter No. 5, perform minor concrete repair work, level and anchor the troughs and replace deteriorated small diameter PVC/galvanized piping and supports in the South Bank Filter.
 - d) Grout and anchor the new underdrain in the South Bank Filter (Filter No. 5). Arrange for the Leopold Filter Representative to conduct an on-site inspection and issue a Certificate of Proper Installation.
 - e) Install new media in the rehabilitated South Bank Filter (Filter No. 5), generally matching the filter media installation specifications being used for the North Bank Filters, except that no gravel will be used.
 - f) Evaluate options for underdrain replacement and whether to continue to use air scour for backwash or replace it with a sweep system.
 - g) Prepare a TM summarizing the findings from the filter inspection and include recommendations for underdrain replacement and an evaluation of whether to continue using an air scour for backwash or to transition to a surface sweep system.
- 3) Filter Controls and Air Release Valves
- a) Modify the instrument sensor piping on all the filter instruments to include a valved discharge line to manually vent accumulated air near the high spot in the tubing. Material shall match existing. This will be done for all filter instruments and rate of flow controllers, the stripping tower flow meter, the WTP discharge flow meter, the flow meter feeding Softeners 1/2 and the backwash rate of flow controller.
 - b) Inspect the condition of the filter instruments (level detectors, turbidity meters, pressure sensors) and the filter control valves with the equipment vendors. Prepare a TM with a summary of the condition of this equipment and recommendations for rehabilitation or replacement.
 - c) Relocate the backwash rate of flow controller to outside the electrical room wall.
 - d) Install new pipe tapping saddles and high-volume air release valves (designed for vertical turbine pump use) on one of the transfer pumps and on the transfer pump line as it exits the high service pump building.

A. SCOPE

The proposed scope of work generally described below is to be performed by the Design-Build Entity (Globaltech):

- Prepare and submit drawings showing the scope of the work.
- Remove the filter media using a vac-truck and dispose of it offsite.
- Repair troughs and trough supports. Replace trough support piping (galvanized).
- Clean top of underdrains and inspect. Note deficiencies, make minor repairs as appropriate.



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- If warranted, and in consultation with the District, remove the base elbow in the filter gallery (temporarily support the horizontal piping), inspect the underdrain lower plenum and flush water through the filter onto the filter gallery floor and out the filter gallery door. Inspect the interior condition of the filter effluent and backwash valves. Cleanup the flushing water/deposits and reinstall the base elbow.
 - Backwash underdrains at peak backwash rate. Check for issues. Clean top of underdrain.
 - Cover filter underdrain with plastic and plywood.
 - Pressure wash interior of filter at 5,000 psi. Remove resulting debris.
 - Mark the various media depths on all the walls and check for level.
 - Install the gravel layers to the depths marked on the walls. The first gravel layer will be placed by hand. Backwash after all the gravel has been placed until clear.
 - After the first layer of gravel has been placed. The workers will avoid stepping directly on the media and will use boards when they need to walk on the filter bed.
 - Place 6-1/2 inches of silica sand and backwash a minimum of three (3) times. Skim off the top 1/2".
 - Place 6-1/2 inches of silica sand and backwash a minimum of three (3) times. Skim off the top 1/2".
 - Install 10-1/2 inches of anthracite. Backwash and skim off the top 1/2". Dispose of the skimmings.
 - Install 10-1/2 inches of anthracite. Backwash and skim off the top 1/2". Dispose of the skimmings.
 - Install and level the sweeps so that they rotate in a horizontal plane without wobble or vibration.
 - Disinfect the filters and place them back into service.
 - Submit Record Drawings
 - Remove media and inspect one of the South Bank Filters.
 - Replace the underdrain and install new media in one of the South Bank Filters. Media installation shall be similar to as done in the North bank Filters.
 - Inspect filter instrumentation and control valves with the equipment vendors.
 - Modify instrument sensor tubing to include a manual air release near the tubing high points.
 - Prepare and submit the Technical Memorandum(s).

ASSUMPTIONS

1. This work will not require any permitting.
2. Plant staff is responsible for operating existing valves and electrical equipment.
3. New anchors and support structures (if needed) shall be 316 stainless steel.
4. District is responsible for bacteriological testing of the filters.
5. The recycle ponds and recycle pumps can accommodate at least four (4) filter backwashings at peak backwash rate for 30 minutes each per day. This maximum situation could occur for up to four (4) days in a row.
6. Painting is not included in the scope of this proposal.
7. The scope for replacement of the underdrain in Filter No. 5 assumes that the existing air header is within design level tolerances and does not need to be modified or replaced. It also does not include breaking out the existing concrete fill layer at the bottom of the filter.

B. COSTS

The costs for the proposed scope of work shall not exceed the Lump Sum Price of **\$2,134,691.94**. A cost



breakdown of the Lump Sum Price is attached. The costs include an allowance of **\$300,000**. The allowance will be used for unforeseen conditions and/or work beyond the scope of this proposal. The allowance shall not be accessed without prior written permission of the District.

Potential allowance charges could include the following:

- Up to 7 additional filter underdrain inspections/flushing from below: \$22,620/filter.
- Up to 4 additional trough replacements: \$14,257/trough.
- Up to 16 additional sweep replacements: \$6,846/sweep.
- Filter valve and instrumentation replacement: Cost unknown at this time.
- Significant concrete repairs: Cost unknown at this time.
- Significant underdrain repairs: Cost unknown at this time.
- Management of the PLC/SCADA System Improvements contractor (CC Controls) in regards to expediting their inspections and implementation of their improvements.
- Electrical evaluation of the backwash blower system.

C. PROJECT SCHEDULE

Globaltech will begin work immediately following approval of this proposal. It is anticipated that rehabilitation of the first four filters can be completed within 8 weeks, assuming a 4 -week delivery time on the media.

Should you have questions or need additional information about this project please feel free to call me at 561-997-6433. Thank you for your consideration.

Sincerely Yours,

David Schuman, P.E.
Vice-President of Engineering
Globaltech, Inc.