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Technical Memorandum
FINAL

Prepared for: City of Pittsburg

Project Title: Water Treatment Filter Rehabilitation Plan

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Technical Memorandum

Subject: Water Treatment Filter Rehabilitation Plan

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Executive Summary

This Technical Memorandum (TM) describes a plan (Proposed Project) to address deficiencies in the dual-media filters and related piping at the City of Pittsburg (City) water treatment plant (WTP) by installing two new dual-media filters and rehabilitating six of the eight existing filters.

1. City staff directed Brown and Caldwell (BC) to develop a design concept for the Proposed Project to include construction of two new filters immediately south of the existing filters and reconstruction of six of the existing filters. Figure ES-1 shows an aerial view outlining the area for new and rehabilitated filters.
2. Upon completion of the Proposed Project, the WTP capacity would be at least 28 million gallons per day (mgd). All filters will conform to all requirements under the California Waterworks Standards (Title 22, Chapter 16 California Waterworks Standards: Drinking water regulations.
3. Phased early construction and operation of two new 6-mgd filters followed by reconstruction of the existing filters would allow the City to maintain system deliveries during construction with very limited supplemental water purchased from Contra Costa Water District (CCWD).
4. BC developed construction and capital cost estimates for the Proposed Project meeting Association for the Advancement of Cost Engineering International (AACE International) (formerly Association for the Advancement of Cost Estimating International) Class 4 standards. Table ES-1 presents a summary order-of-magnitude-accuracy-level capital estimate (includes construction, engineering, and administrative elements).

Table ES-1. Estimated Capital Costs

Item	Cost (million dollars)	
	Estimate	Likely Cost Range
Proposed Project	30.6M	21.4M – 45.8M

Costs include escalation to midpoint of anticipated construction, assuming a construction start of October 2023 and completion by October 2025.

5. The expected duration for design, bidding, construction, and start up is 48 months. The overall sequence would be construction and start up the two new filters, followed by demolition of the existing 6 filter boxes and filter gallery piping, then reconstruction of the existing 6 filters and filter gallery piping.
6. In summary, the Proposed Project includes:
   a. Constructing two new dual-media filters south of the existing filter complex (existing filters and filter gallery)
   b. Modifying existing yard piping to provide space for the new filter structure and to connect the new filters to existing settled water, filter effluent, and filter backwash piping
   c. Rehabilitating/Reconstructing of six existing filters, including rehabilitation of under slab piping, replacement of above-ground piping and appurtenances, and addition of filter-to-waste piping
   d. Adding air scour systems to both the new and rehabilitated/reconstructed filters
   e. Adding human/machine interfaces (HMI) in lieu of filter consoles, with control integration to the WTP SCADA

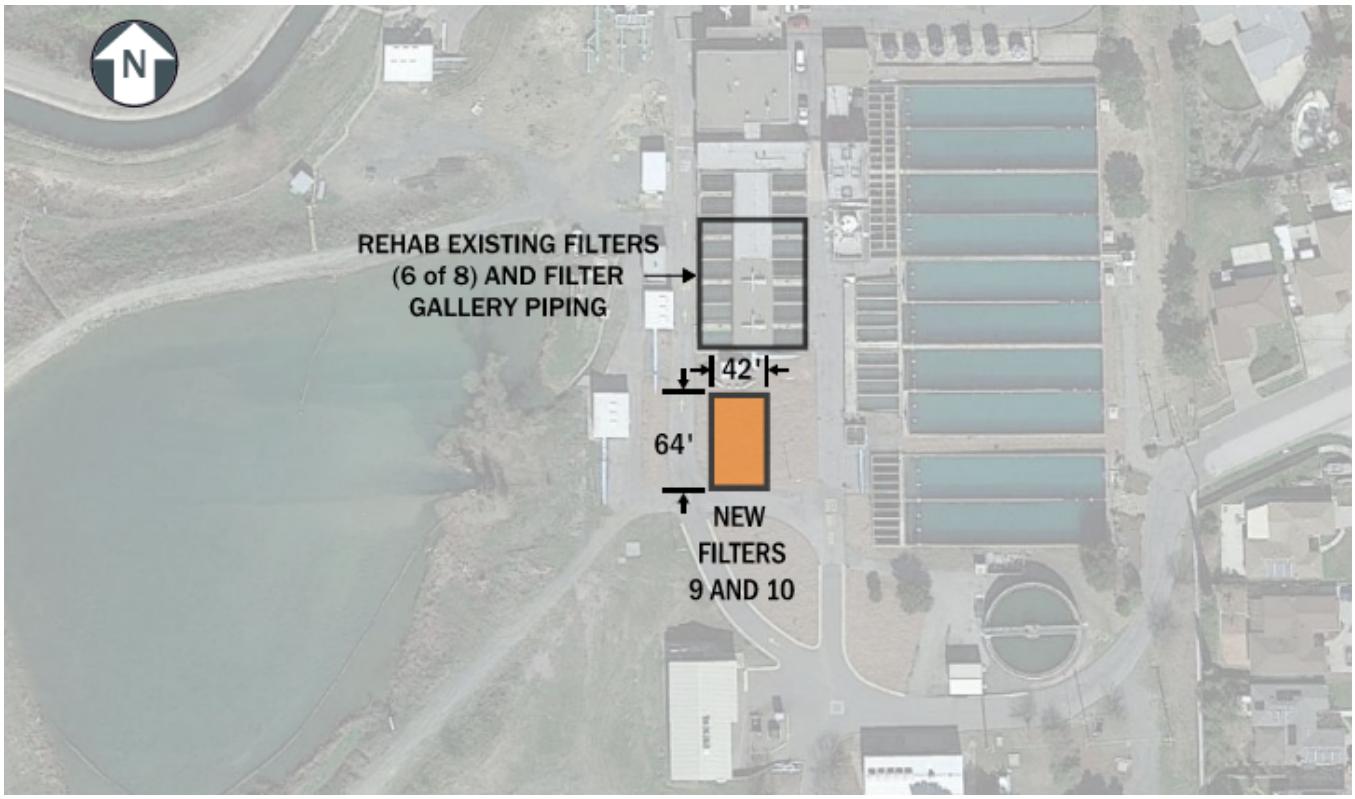

Figure ES-1. Aerial view of existing filter complex and proposed location of new filters 9 and 10

Section 1: Background, Authorization, and Scope of Work

This section presents background about the need for filter rehabilitation at the City WTP, a plan to implement improvements, and a summary of the City authorization and scope of work.

1.1 Background

The City originally constructed the WTP in 1951 with four filters (1,2,3, and 4). In the 1970s, the City expanded the WTP to eight filters by adding filters 5,6,7, and 8. In the late 1980s, the City upgraded and expanded WTP capacity by adding a fifth flocculation/sedimentation unit and other upgrades. In the last decade, the City added chlorine dioxide pre-oxidation and upgraded the sedimentation basins for solids removal, thickening, and drying.

The WTP currently has a capacity of 32 mgd and provides full conventional treatment using pre-oxidation, flash mixing, hydraulic flocculation, sedimentation, and conventional dual media (granular activated carbon [GAC] over sand). The City does not replace the GAC regularly for taste and odor control, so it effectively acts as coarse media. Due to leaky pipes and worn valves and pneumatic operators, the City previously engaged BC to assess the filter gallery piping and valve condition. A condition assessment of the filter gallery piping identified the need to replace all the valves and valve operators. It also identified the 1951 pipes to be in good condition. The 1970s pipes are in poor condition and need replacement soon. BC assumes that lack of quality control and poor welding practices at the time of construction contributed to the current condition of 1970s pipes. The 1970s facilities cannot be replaced without taking the entire filter system out of service

for an extended period. Since the WTP is the primary water source for the City, an extended outage is not feasible because the City does not have access to sufficient finished water from other sources to allow an extended filter system outage. Therefore, the Proposed Project is to add two new filters that can operate independent of the existing filters to allow the WTP to maintain a level of productivity during rehabilitation of 6 of the 8 existing filters This approach will result in minimal plant disruption and costs incurred by the City to purchase water from CCWD to meet any water demand beyond production from the two new filters.

1.1.1 Annual Demands and Seasonal Demand Pattern

BC reviewed total WTP production data from January 2, 2020, through October 31, 2021, to assess seasonal flow patterns. The average daily production rate in calendar year 2020 was 7.87 mgd.

As shown on Figure 1-1, WTP flows typically exceed the average daily production rate before May 1 and remain above average through mid- to late-October. The peak daily WTP production during this period was 12.18 mgd, which occurred on August 16, 2020.

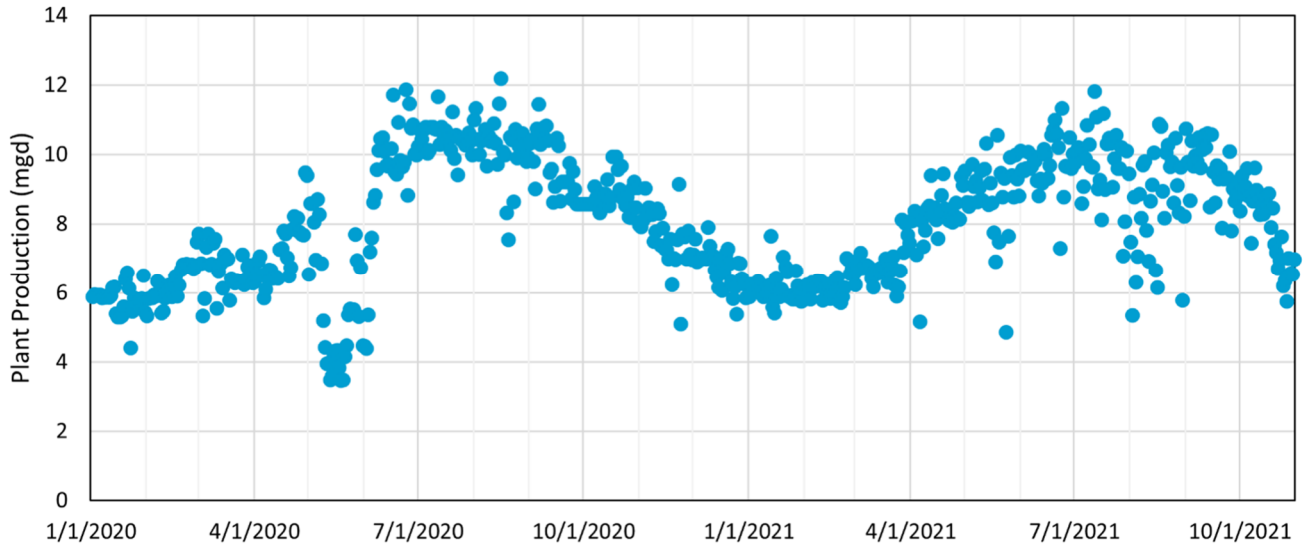

Figure 1-1. Average daily plant production

To better represent water system demands, BC constructed a percentile distribution of WTP production from calendar year 2020. As shown on Figure 1-2, the WTP production data largely follow a normal distribution. Fewer than 5 percent of the days in 2020 required WTP production above 11 mgd, and fewer than 1 percent of the days in 2020 required WTP production above 12 mgd.

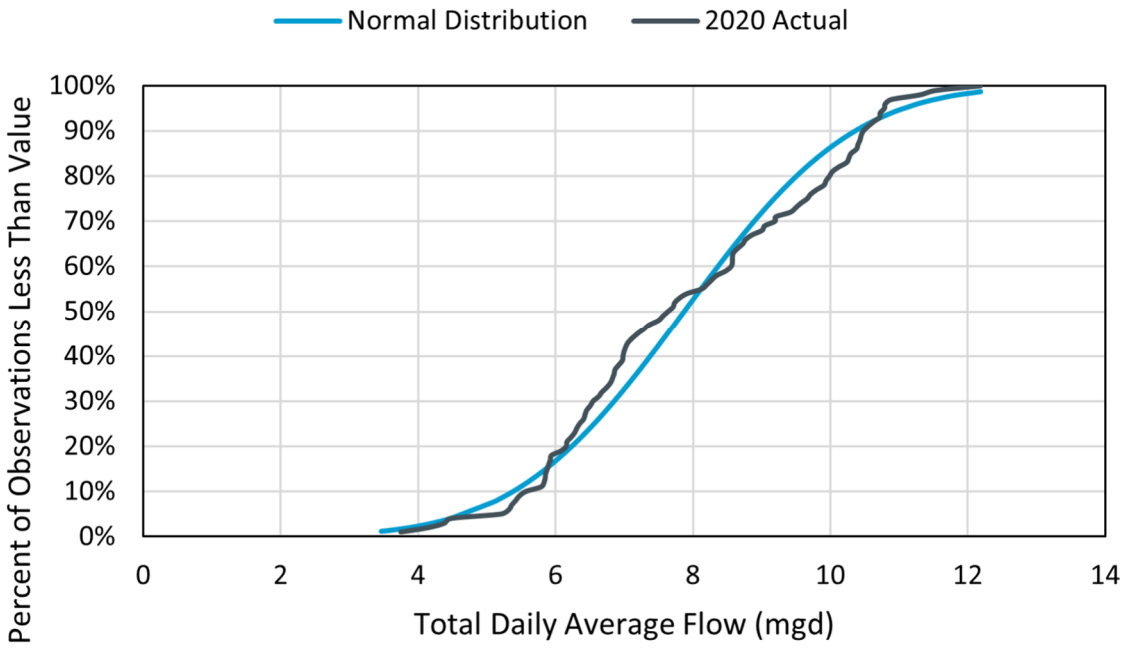

Figure 1-2. Distribution of total daily WTP production during calendar year 2020

Section 2: New Filter Construction and Filter Rehabilitation

This section describes the plans to install two new dual-media filters and rehabilitate up to six of the eight existing dual-media filters.

2.1 Design Criteria

The primary consideration in sizing the new filters is the total daily production that the new filters will provide during rehabilitation of the existing filters, and the corresponding amount of water that the City will purchase from CCWD to make up the difference between the plant production and water system demand during that construction period. This section describes the impact of filter sizing on WTP capacity during and after rehabilitation of the existing filters.

2.1.1 Design WTP Capacity

The existing WTP is rated for 32 mgd. As part of prior work, the City selected 28 mgd as its target for rehabilitated WTP production due to lower projected future maximum-day demands -- even with significant growth. Between the new filters and rehabilitated existing filters, the WTP will have a minimum filtration and thus total production capacity of 28 mgd.

2.1.2 New Filter Capacity

BC reviewed the WTP total daily flow for the year 2020. To estimate the total daily average, BC combined the north clearwell pump station flow plus the south clearwell pump station flow. The City has flow meters on both north and south pump stations. These pump stations (PS) downstream of the filters connect to the storage tanks (reservoirs) and capture the full WTP flow. Note that WTP operations uses up to 4 percent of total flow for filter backwash and minor in-facility water demands (i.e., up to 5 percent of the total plant production, as measured by the combined flow through the north and south PSs, does not enter the distribution system).

BC worked with the City to determine the preferred sizing for the new filters, checking different scenarios for filtration capacities of 8 mgd through 12 mgd. Figure 2-1 presents estimates of purchased water that the City would need under the different scenarios based on actual daily 2020 demand.

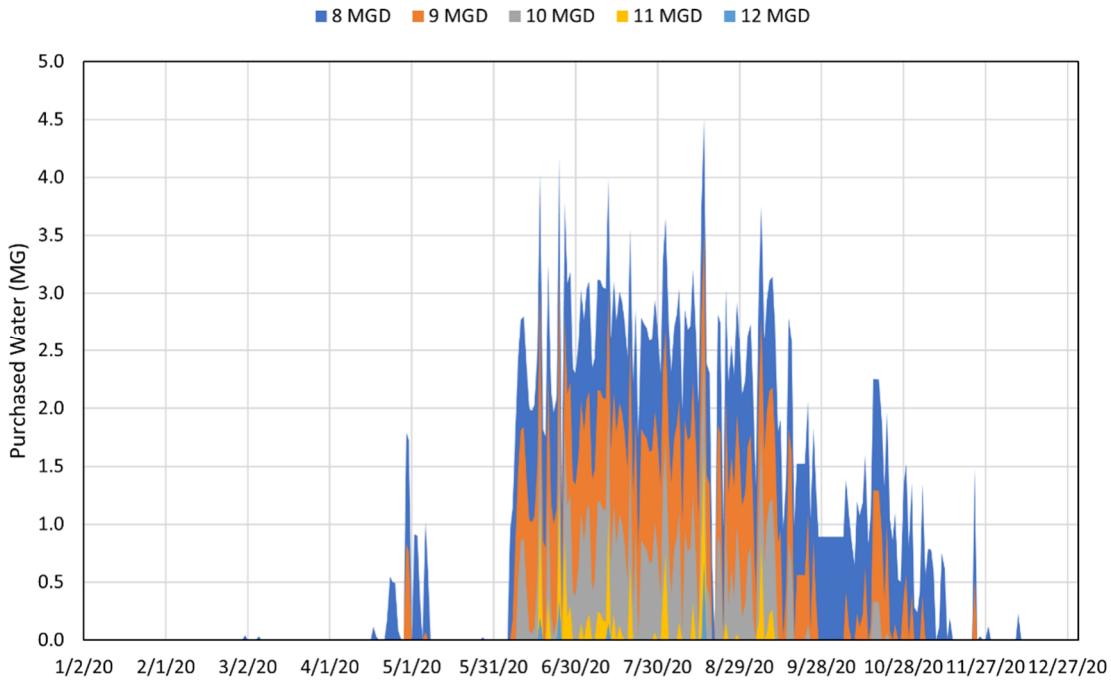

Figure 2-1. Estimated daily projected purchase of CCWD water during construction period based on installed capacity of the new filters

Purchased water estimates shown assume 4 percent of total daily production is used for backwashing plus plant water demands.

Table 2-1 shows that installing a nominal filter capacity of 12 mgd (6 mgd per filter, excluding time out of service for backwashing) would have been sufficient to meet almost all system demands in 2020; if future demand patterns match that of 2020, installing a nominal filter capacity of 12 mgd would allow the City to operate by purchasing only 1 million gallons (MG) from CCWD during the summer months. Therefore, the two new filters have been sized for a nominal filter capacity of 6 mgd per filter (i.e., 12 mgd total), which should allow the City to meet water demands during construction for most days of the year with minimal purchased-water expense.

Table 2-1. Estimated Total Amount of Purchased Water for New Filter Capacity Scenarios During the Filter Rehabilitation Period

Total new filter capacity assuming 2 filters (mgd)	8	9	10	11	12
Total estimated purchased water (MG)[a]	339	186	78	14	1

a. Purchased water estimates determined using 2020 WTP data.

2.1.3 Rehabilitated Filter Capacity

The existing filters have a nominal capacity of 4 mgd/filter based on a filter surface area of 702 square feet (ft^2) (each filter is comprised of two 13-ft by 27-ft cells) and a design filtration rate of 4 gpm/ft^2 (true filtration capacity at the design filtration rate is slightly lower than 4 mgd when accounting for backwashing, etc.) It is anticipated that the rehabilitated filters will have a filtration rate at least that of the existing filters. Because two new filters will be constructed to enable rehabilitation of the existing filters, the City may choose not to rehabilitate all eight of the existing filters. It is anticipated that new construction will abandon Filters 1 and 2 during rehabilitation, which will free space for a potential expansion of WTP office/administration facilities over the existing footprint occupied by those filters.

Depending on the target filtration rates used for the two new filters, the City may choose not to rehabilitate all six of the existing filters. The rehabilitated filters will be dual-GAC/sand-media filters, similar to the existing filter profiles. In California, dual-media filters are allowed to be rated up to 6.0 gpm/ft^2 by rule. If the filters are re-rated for higher filtration rates, the City may find that it can reduce the number of rehabilitated filters to four. See Section 2.4 for further discussion on the capacity of the rehabilitated filters.

2.2 Site Organization and Yard Piping

Based on planning presented herein, the City would construct the new filters, henceforth designated 9 and 10, south of the existing filter complex as shown on Figure 2-2 and Figure 2-3. BC selected this location because it fits well with the WTP's hydraulic profile, could connect easily to existing piping, would require minimal relocation of existing buried utilities, and would allow easy construction while maintaining existing filter operations. Figure 2-4 shows proposed yard piping improvements needed to accommodate this filter location.

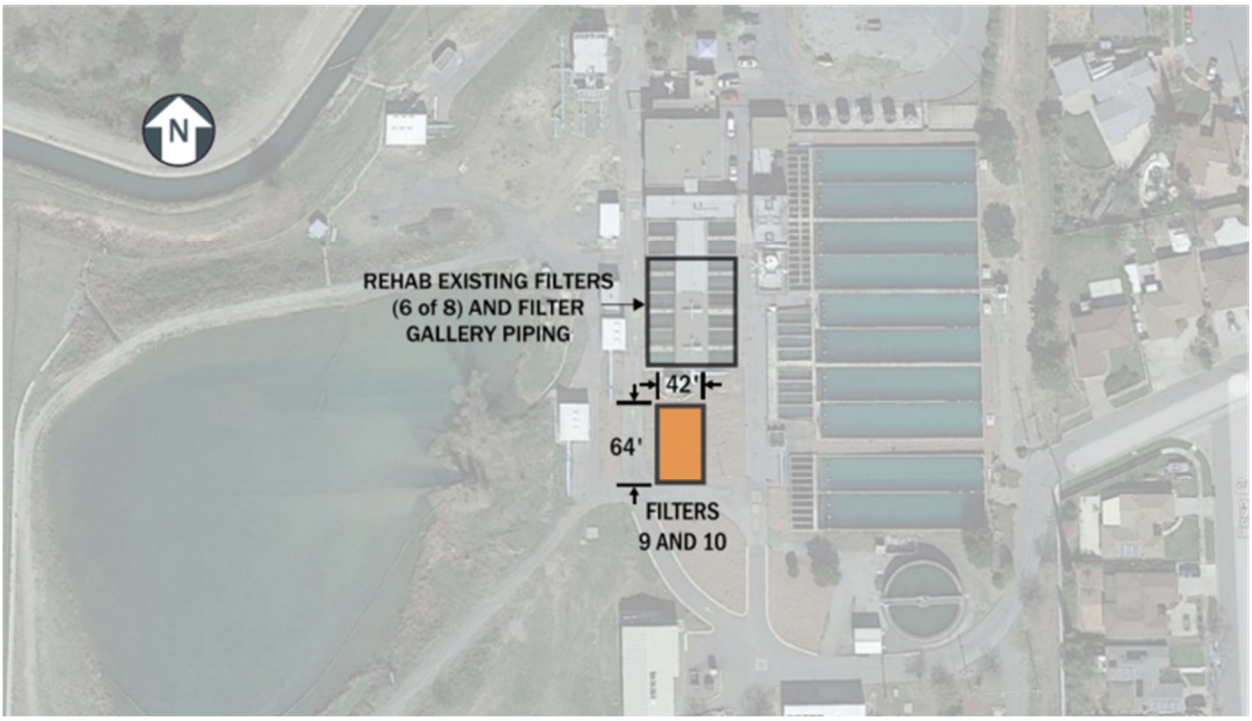

Figure 2-2. Proposed location for filters 9 and 10

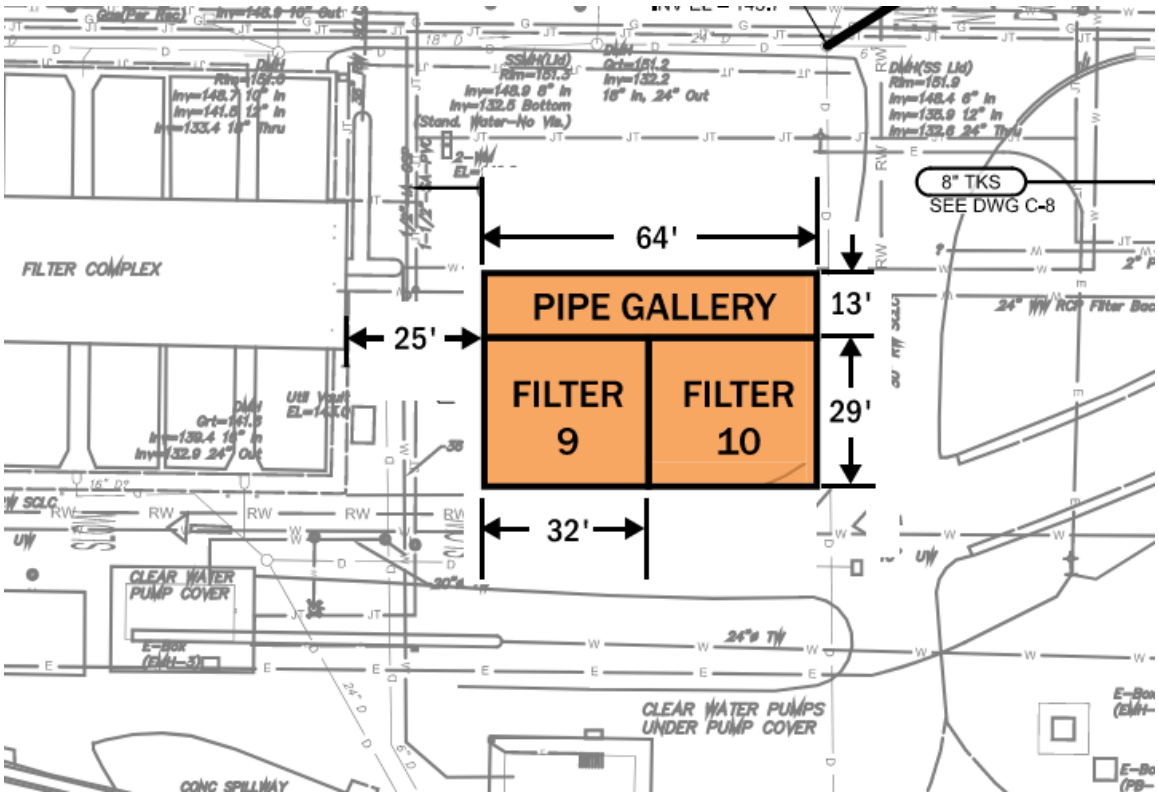

Figure 2-3. Proposed location for filters 9 and 10 overlaid on existing facilities

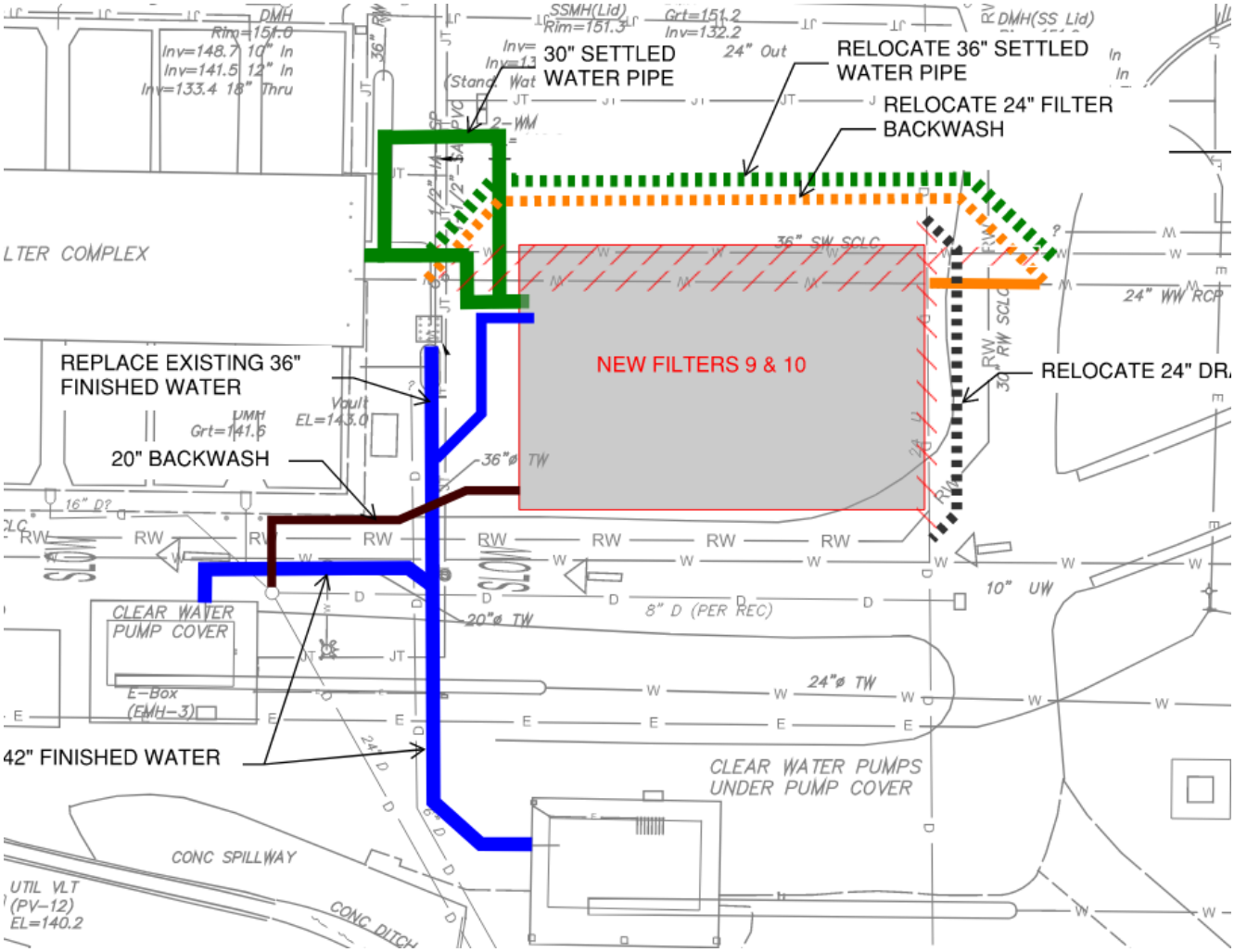

Figure 2-4. Proposed yard piping improvements

Figure 2-4 uses the following colors to identify the corresponding piping services:

- Green: Settled water piping
- Blue: Finished water piping
- Orange: Backwash water supply piping
- Brown: Backwash water drain piping

2.2.1 Existing facilities

The construction of filters 9 and 10 will require relocating the existing 24-inch-diameter reinforced concrete pipe backwash water pipe and 36-inch-diameter cement-mortar-lined-and-coated welded-steel settled water pipe east of filters 9 and 10. New construction will replace the 36-inch-diameter finished water piping from the existing filters to the clearwell pump stations.

2.2.2 Proposed Yard piping

The new filters will connect to:

- New 40-inch settled water piping that connects to both existing 36-inch settled water supply pipes from the sedimentation tanks.
- New 30-inch finished water piping that connects to replaced (and upsized) 42-inch water piping from the existing filter to north and south clearwell pump stations
- New 16-inch backwash supply piping connected to existing 24-inch backwash supply piping
- New 20-inch backwash water drain that connects to existing 24-inch drain piping to the lower pond

2.3 New Filters

As discussed in Section 2.1.2, each of the two new filters will be sized for a nominal filtration capacity of 6 mgd. Assuming a design filtration rate of 5.5 gpm/ft^2, this corresponds to an internal filtration area of 770 ft^2 per filter. For cost estimating purposes, BC assumed that each filter would have a two-cell configuration with internal sizing of 13.75 ft by 28 ft per cell. The filters will operate in parallel. For costing purposes, BC assumed that the pipe gallery will be 12 ft wide and will span the length of the new filters.

While detailed design will determine the granular filter media profile, for cost estimating purposes BC assumed that the new filters will have a dual GAC/sand profile with media depths matching those of the rehabilitated filters. Section 2.4 presents a discussion regarding the rehabilitated filter media profiles.

Because the plant will operate on only two filters during rehabilitation of the existing filters, backwashing operations will have more repercussions to WTP operations than normal when plant flows are high. When WTP flows are low, the filters can be operated below their design filtration rate, and when one filter is taken off-line for backwashing, the filtration rate through the other filter can be increased to minimize impacts to the rest of the plant; however, when plant flows are high and both filters are operating near their design capacity, taking a filter offline for backwashing will cut the flow through the filtration process in half. Given the plant's large sedimentation basin capacity, this reduction in filtration capacity should be reflected through an increase of several inches in the water surface elevations in the sedimentation basins. Water surface elevations in the sedimentation basins would return to normal after the filter completes its backwash; however, if one or more sedimentation basins are offline when this occurs, operations staff should monitor water surface elevations in the remaining basins to avoid overflow.

2.3.1 Electrical and Instrumentation Improvements

The new filters will tie into the existing WTP electrical system. The Proposed Project will add minor new electrical loads for the air scour compressors, filter gallery ventilation, filter controls, and other minor loads. The Proposed Project facilities will be integrated with the WTP SCADA system. The new filters will be controlled via an HMI, which will be used in lieu of traditional filter consoles for filter monitoring and control. After rehabilitation of the existing filters, operations between the new filters and the rehabilitated existing filters will be intertied via SCADA (e.g., interlocks to prevent backwashing more than one filter at a time, etc.)

2.4 Existing Filters Rehabilitation

As discussed in Section 2.1.3, the existing filters each have a dual-cell configuration with a total surface area of 702 ft^2 per filter. Based on review of existing structural drawings, BC has assumed that the City can rehabilitate the filters successfully using a surface treatment epoxy grout, which would not significantly change the interior dimensions of each filter; however, detailed design should include a condition assessment of the filters to determine if the filter gallery and filters require other structural improvements (see Section 5). If the condition assessment identifies additional structural improvements, the interior

dimensions of the existing filters may decrease slightly. For costing purposes, BC has assumed that the interior filter dimensions will not change during rehabilitation.

The existing filters are dual-media filters consisting of 20 inches of GAC over 10 inches of sand (GAC depth incorrectly shown on record drawing provided below). The filters have 12 inches of support gravel over filter block underdrains, as shown on Figure 2-5.

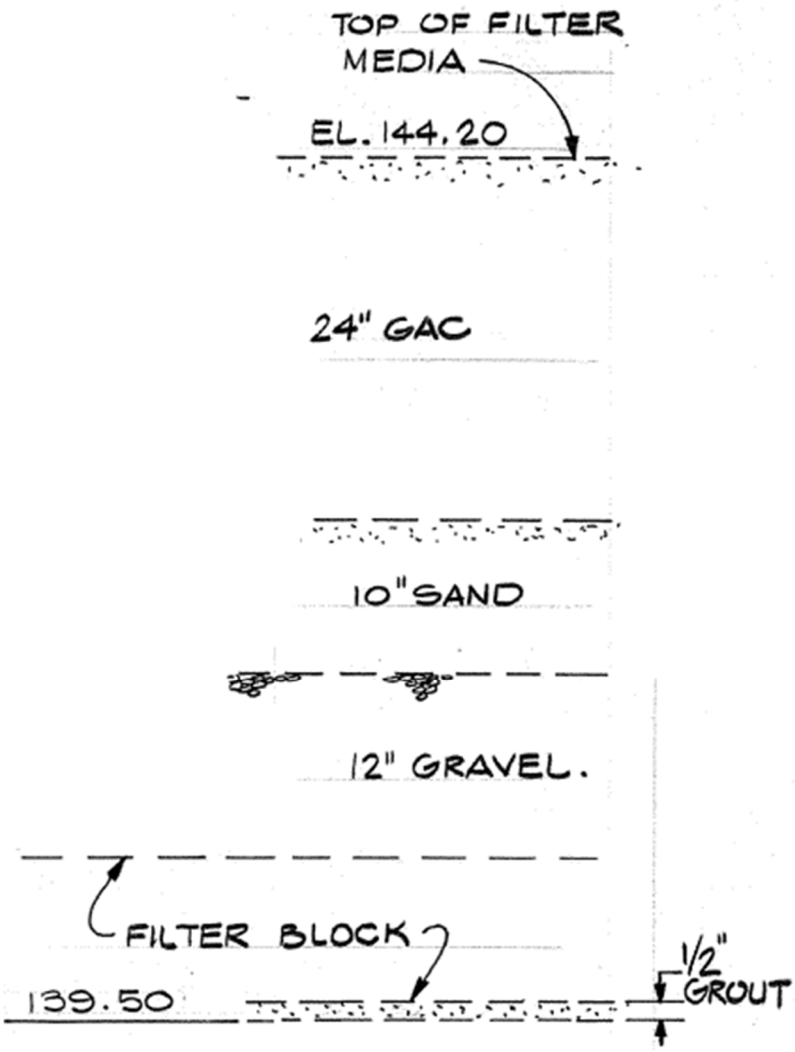

Figure 2-5. Existing filter media profile

When rehabilitating the existing filters, BC recommends replacing the existing filter blocks with a low-profile underdrain system, such as the AWI Phoenix Underdrain Lateral. Not only will this change result in a lower filter underdrain profile (the AWI underdrain is approximately 3 to 5.3 inches tall compared to 10.4 inches for the existing filter blocks), but the AWI system allows placing filter sand directly atop the underdrains, which eliminates the need for gravel support media. This change, in turn, will allow for a deeper GAC layer, which will increase the filters' L/d (Length or depth of the filter bed/effective size or diameter of the media) which will provide for increased particle storage and longer filter runs.

Evaluation during detailed design will set the new filter media profile; however, for costing purposes, BC established a projected media depth based on constraints within the existing filter boxes. Typically, filter media selection allows media expansion such that the expanded media remains below the bottom of the backwash troughs during backwashing; however, because the existing filters feature an atypical backwash trough configuration that is unusually deep (the bottom of the trough is set approximately 3 feet below the top of the trough), maintaining that design convention would constrain new filter installation unreasonably. Therefore, BC set the projected media depth such that the expanded filter media would remain at least 1 foot below the backwash trough weir elevation. We assumed further that the backwash rate would achieve a 50 percent bed expansion during backwashing, which is above the 30 to 40 percent rate typically used in water treatment. Based on these assumptions, the rehabilitated media depth is projected to be 45 inches; 35 inches of GAC over 10 inches of sand. For comparison, based on the effective size of the filter media specified for the 1988 filter improvements (GAC average effective size = 1.0 millimeters [mm], sand average effective size = 0.5 mm), the L/d ratio for the rehabilitated filters would be 1,397 compared to 1,118 for the existing filters (generally, the water industry recommends an L/d ratio above 1,200 for new filters). The increased media depth and corresponding increase in L/d ratio should allow for increased particle storage and longer filter runs.

Based on the current design filtration rate of 4 gpm/ft^2, if six filters are rehabilitated, during construction the nominal WTP filtration capacity will increase to 36 mgd (six rehabilitated filters at 4 mgd/filter plus two new filters at 6 mgd/filter). Given that the City identified a design capacity target of 28 mgd, the City could choose to reduce the number of rehabilitated filters. Rehabilitating four of the existing filters, together with the two new 6-mgd filters, would provide a nominal WTP filtration capacity of 28 mgd at 4 gpm/ft^2. If the average filtration rate for the rehabilitated filters was increased up to 5.5 gpm/ft^2 as allowed by rule without further pilot testing, four rehabilitated filters plus the two new filters would provide 34 mgd of filtration capacity. Operating fewer filters at higher filtration rates is feasible, but final selection depends on WTP operations staff input to help assess potential concerns associated with having fewer filters available during high-demand periods. For costing purposes, BC assumed that the City will rehabilitate six filters, as discussed during the project kickoff meeting; however, the City could reduce project costs by rehabilitating only four of the existing filters while still meeting project capacity goals.

2.4.1 Electrical and Instrumentation Improvements

The rehabilitated filters, along with new appurtenances (e.g., air scour system, etc.), will remain on the existing WTP electrical system. The Proposed Project will add minor new electrical loads for the air scour compressors, filter gallery ventilation, filter controls, and other minor loads. The existing filter consoles will be replaced with HMIs, which will integrate filter operations and monitoring into the WTP SCADA. After rehabilitation of the existing filters, operations between the new filters and the rehabilitated existing filters will be intertied via SCADA (e.g., interlocks to prevent backwashing more than one filter at a time, etc.)

2.5 Existing Pipe Gallery Rehabilitation

Rehabilitation of the existing pipe gallery will include both rehabilitation of existing piping located under the existing flooring slab and replacement of all above-grade piping systems. Additionally, the Proposed Project includes new filter-to-waste piping. Given space constraints and operational concerns detailed in Section 2.5.3, the City could forgo filter-to-waste improvements. This section develops and discusses these activities.

2.5.1 Rehabilitate Existing Pipe Under Slab

Based on available information, BC has based proposed work on in-place rehabilitation of the backwash water pipe (16-inch diameter) and finished water pipe (20-inch to 36-inch diameter) underneath the filter gallery slab. New construction could remove and replace this piping completely, but such an approach would increase the complexity of and costs for work in the filter gallery. Furthermore, the water industry now has technology available for in situ rehabilitation. During detailed design, a condition assessment will identify the required lining system class as defined by American Water Works Association (AWWA) M28 classifications:

- Class I – corrosion protection only
- Class II – adhered, interactive, and semi-structural lining; minimal inherent ring stiffness and dependent on adhesion to pipe wall to prevent collapse if pipe is depressurized
- Class III – interactive and semi-structural lining, sufficient inherent ring stiffness to be self-supporting when depressurized without dependence on adhesion to pipe wall
- Class IV – non-adhered, fully structural system for the renewal of deteriorated or damaged pipe

Class 1 is typically a spray-on liner that is dependent on the structure of the existing pipe. Class II and III are typically adhered to the host pipe but provide some structural improvements; examples include cured-in-place pipe or glass-fiber-reinforced liner. Class IV does not rely on the host pipe and is typically a new pipe inside an existing pipe. As such, Class IV will reduce the capacity of the pipe by reducing the inside diameter. For the purposes of this TM, BC has assumed a Class IV lining system as the rehabilitation method, which would be the most conservative approach. Since two of the existing filters will be abandoned, a reduction in pipe size will be acceptable. A Class IV liner typically requires person entry; however, accessing the piping below the filter gallery slab will be challenging. For this work, BC has assumed construction of an access manhole south of the filter gallery (outside the building).

If the future condition assessment recommends a Class I or II liner, then robotic application is possible. In this case, the pipe can be accessed from the flanged connections within the filter gallery.

2.5.2 Replace Existing Piping Systems

The project involves replace the existing settled water, finished water, and backwash water piping within the filter gallery with cement-mortar-lined welded-steel pipe and simultaneous replacement of all associated appurtenances such as valves, instruments flow controllers, pipe penetrations, and pipe supports.

BC has contacted experienced rehabilitation contractors as well as discussed proposed work with knowledgeable BC staff. Based on that outreach, we have assumed that the contractor will access the filter gallery from the south entrance (double doors). Prior to gallery work, the contractor will clear the area outside the doorway for access and pipe layout. The contractor will temporarily remove the chemical shed and cap the chemical feed system (see Figure 2-6). Related work will demolish the 36-inch-diameter settled water pipe outside the door temporarily and seal pipe ends with flanges. These facilities will be restored upon completion of the filter pipe gallery rehabilitation. This work will enhance access and provide ample working space for filter gallery access.

Figure 2-6. Temporary demolition needed for access to filter gallery during construction

2.5.3 Integration of Filter-to-Waste Provisions

The existing filters have no filter-to-waste piping. Such piping, required for new filter plants per Title 22, Chapter 17, Article 4 §64658.b.8, allows the filtration system to waste the first filtered water, after backwashing a filter, to allow the filter to "ripen." This prevents the ripening peaks in turbidity that occurs after backwashing from entering the filtered water effluent piping.

Although the WTP has operated successfully for its lifetime without filter-to-waste piping, BC evaluated the addition of filter-to-waste piping in case California Water Board's Division of Drinking Water (DDW) requires such piping to be added during rehabilitation of the existing filters. Unfortunately, due to the configuration of existing piping, adding filter-to-waste piping could potentially have unintended operational impacts unless the City decides to move forward with rehabilitating only four filters.

As shown on Figure 2-7, the existing filter effluent piping combines flow from two adjacent filters (i.e., filters 2 and 4) before penetrating the slab to join the filter effluent piping header. The City could retrofit filter-to-waste piping into the existing WTP by replacing the existing 12-inch tee shown on Figure 2-7 with a 12-inch cross. In addition to changing that existing fitting, a new actuated butterfly valve, inverted U, and 16-inch drain piping would be added to route filter-to-waste piping north in the filter complex before penetrating through the wall of abandoned filter 1 to discharge to the existing filter 1 backwash piping that connects to the backwash lagoon located west of the WTP; however, because the existing filter pairs use the same filter effluent piping, plant staff could not maintain the paired filter in service while its partner was in filter-to-waste mode (e.g., filter 2 could not remain in service while filter 4 was in filter-to-waste mode, and vice versa).

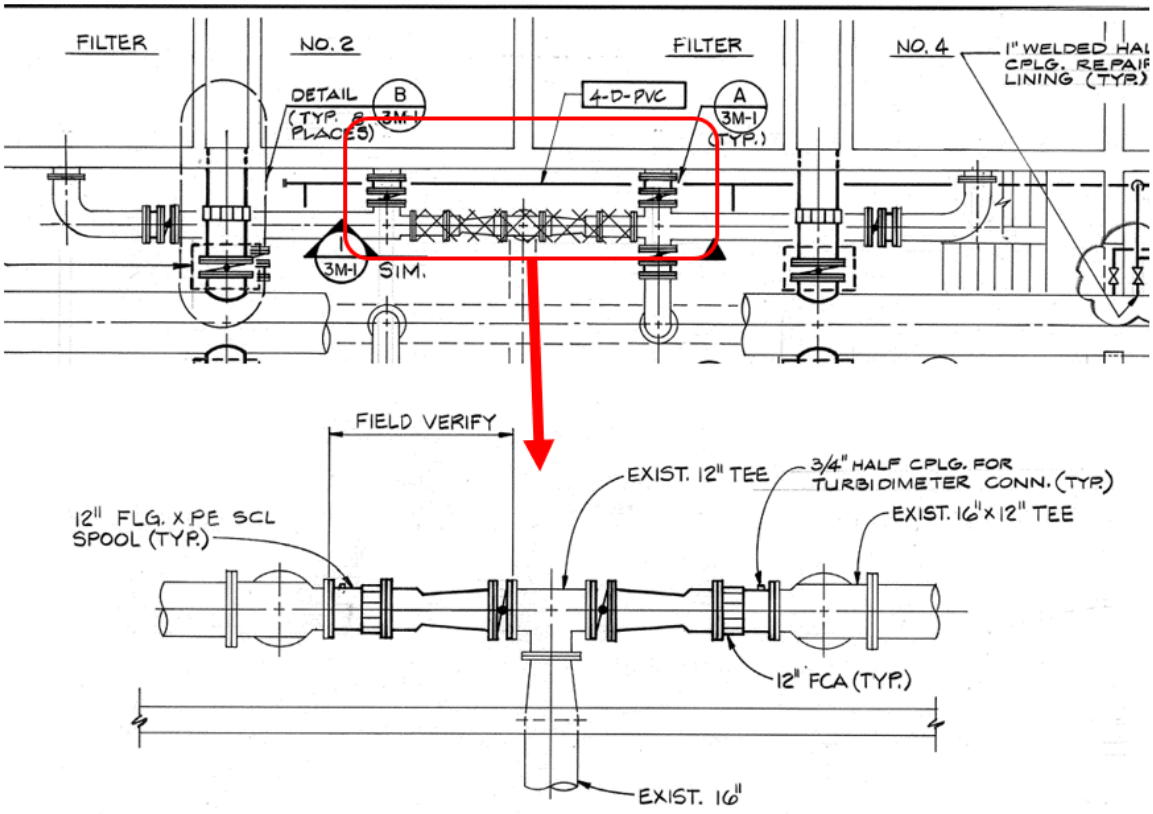

Figure 2-7. Existing filter effluent piping configuration

This concern only would matter if the City selected six filters for rehabilitation. In that case, filters 1 and 2 would be abandoned, and the affected filter pairs would be filters 6 and 8 and filters 5 and 7. If the City decides only to rehabilitate four filters, it could abandon filters 7 and 8 and leave filters 3, 4, 5, and 6 completely independent of each other. In that case, rehabilitation could add filter-to-waste piping without any impacts to filter operations. In all instances, new programming would alter the filter backwash sequencing to account for the filter-to-waste step in the backwash sequence.

Section 3: Capital Cost

This section presents an opinion of probable construction and capital cost including escalation to midpoint of anticipated construction, prepared as an AACE International Class 4 construction cost estimate.

3.1 Assumptions

The following assumptions were made to facilitate costing of the Proposed Project, additional assumptions that may influence project scope and/or capital costs are presented in Section 5.

1. Under slab piping rehabilitation costs assume a Class IV lining. Detailed design will determine the actual lining class of lining.
2. New and rehabilitated filters are assumed to use stainless steel low-profile underdrains to minimize underdrain depth and eliminate the need for support gravel. Underdrain selection will be finalized during detailed design.

3.2 Summary of Estimated Construction and Capital Costs

The expected cost range for the Proposed Project, based on the typical accuracy of a Class 4 estimate, is presented in Table 3-1. A 20 percent cost factor is applied to construction costs to escalate to capital cost. This factor includes engineering, administration, permitting, and other "soft" costs.

Table 3-1. Expected Range of Capital Costs for Proposed Project

Item	Upper Range	Estimated Cost	Lower Range
	50%		-30%
Construction Costs	$38.2M	$25.5M	$17.8M
Capital Costs	$45.8M	$30.6M	$21.4M

A detailed summary of construction costs is presented in Attachment A.

Section 4: Construction, Sequencing, and Maintaining Existing Operation

This section describes the preliminary project schedule, the proposed construction sequence to execute this work, and the plan to maintain water deliveries to the Pittsburg water system during construction.

4.1.1 Preliminary Project Schedule

A preliminary project schedule has been prepared, assuming a total project duration of approximately 40 months. The preliminary schedule is presented in tabular form in Table 4-1, and is shown in Gantt chart format in Attachment B.

Table 4-1. Preliminary Project Schedule for Pittsburg WTP Filter Rehabilitation

Task	Duration
Design	11 months
Bidding	4 months
Contractor mobilization	1 month
Construction of new filters	15 months
Rehab Existing Filters	8 months
Project Closeout	1 month
Total	40 months

4.1.2 Sequence of Construction

Construction sequencing will be key to maintaining plant water delivery while the existing filters are rehabilitated. While the full sequence of construction will be developed as part of detailed design, a preliminary construction sequence is anticipated to include the following activities:

1. Contractor mobilization.
2. Relocate existing pipelines from the new filter construction area and install new filter finished water pipelines.
3. Install tie-in point for the new filter where they connect to the settled water pipeline, backwash water pipeline, and drains to the lower pond.
4. Construct new filters.
5. Extend chemical feeds to the new filters and finished water pipeline.
6. Start up, disinfect, and test new filters. Apply for DDW certification of new filters.
7. Determine if new filters can operate successfully at a loading rate above 6.0 gpm/ ft^2. If testing is successful, apply to DDW for filter re-rating.
8. Take 8 existing filters out of service and abandon filters 1 and 2.
9. Use valving installed in Activity 2 to isolate the existing filters.
10. At the south end of the existing filters, temporarily cap chemical feeds and remove shed over chemical fee area to facilitate access to filter gallery south's end doors.
11. Demolish 6 of 8 existing filter interiors and pipe gallery equipment.
12. Rehabilitate under-floor piping.
13. For filters 3, 4, 5, 6, 7, and 8, reconstruct filter gallery piping and add filter-to-waste and air scour piping.
14. Reconstruct filters 3, 4, 5, 6, 7, and 8, and install AWI filter underdrains and deeper media.
15. Install new electrical and instrumentation/control systems.
16. Reconnect finished water chemical feeds and test.
17. Carry out start up and testing for filters.
18. Apply for DDW certification of reconstructed filters.
19. Complete site cleanup and demobilize the contractor from the site.
20. Prepare record drawings for all construction.

4.1.3 Plan to Maintain Water Deliveries

The construction sequence allows for the construction of the two new filters prior to the rehabilitation of the existing filters and filter gallery. This approach will allow the WTP to operate using the two new filters while the City's contractor rehabilitates the existing system. The two new filters will deliver finished water for most peak maximum day water system demand flows (See Section 2.1.2). The City would then purchase approximately 1 million gallons (MG) of water from CCWD during the summer months to meet peak demands if demand patterns are similar to 2020.

Section 5: Next Steps

This section presents BC's recommendations for this work, along with additional project considerations that could impact the cost estimate presented in Section 3.

5.1 Additional Project Considerations

As part of BC's high-level evaluation of the Proposed Project, several items were identified that need to be further evaluated during design. These items, listed below, could potentially impact the cost estimate, project feasibility, and/or operability. The recommended next steps for these items are further explained in Section 5.2.

Items requiring further evaluation during design include:

1. Number of existing filters to rehab
    a. Allowable filtration rate for rehabilitated filters
2. Filter to waste
3. System hydraulics
4. Structural condition of existing filters
5. Condition and rehabilitation strategy for existing buried and encased piping
6. Filter control system and integration with existing system
7. Soil condition at new tilters

5.2 Recommendations

BC recommends proceeding with a Basis of Design Report (BODR) to develop the concepts within this TM. The BODR should resolve several key issues before proceeding with detailed design.

1. **Filter design flow rate and number of filters to be rehabilitated.** The City could derive potential advantages by reducing the number of rehabilitated filters from six to four; however, this change would reduce the number of filters available, which may have operational impacts. BC recommends that the City evaluate if operations with six total filters (two new filters plus four rehabilitated filters) is acceptable when developing the scope for the filter project. Part of this decision may depend on the City's preferred filtration rate for the rehabilitated filters (i.e., keep the rehabilitated filters at 4 gpm/ft^2 or consider increasing to a maximum filtration rate of up to 5.5 or 6.0 gpm/ft^2). Four existing filters operating at 5.5 gpm/ft^2 in parallel to the two new filters would produce 28 mgd (12 mgd new plus 16 mgd existing). The production rate would decrease only during backwashing.
2. **Filter to waste.** Determine if DDW will require the City to add filter-to-waste provisions when rehabilitating the existing filters. Filter-to-waste piping would require discharge through an air gap to maintain the filtration system's sanitary integrity.
3. **System hydraulics.** Develop system hydraulics in more detail.
4. **Structural condition of existing filters**. Conduct a structural condition assessment of the existing filters. This report and cost estimate does not assume rehabilitating the existing filter to current seismic standards based on a preliminary review of design drawings, but the topic deserves a more in-depth evaluation.
5. **Condition and rehabilitation strategy for existing buried and encased piping.** Conduct a condition assessment of the piping underneath the existing filter gallery slab and the yard piping. This report and cost estimate does not assume a full rehab or replacement of existing yard piping (unless identified on Figure 2-4). This project may require more piping rehab and/or replacement.

6. **Filter control system and integration with existing system.** Filter control strategies were not developed as part of this evaluation. During detailed design, a filter control concept should be developed, and the design of the filter control system should consider integration of the new filters with the rehabilitated existing filters as per the selected filter control concept.
7. **Geotechnical investigation required to study soil condition at new filters.** Conduct a geotechnical report and subsurface investigation during the design phase. This subsurface investigation may impact the design and cost estimate if more geotechnical work and structural support is required.

Note that the cost estimate includes a contingency allowance of 40 percent for some of the unknown conditions described above.

References

Brown and Caldwell, *Water Treatment Filter Replacement Conceptual Plan*, City of Pittsburg, 2021.

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Attachment A: Construction Cost Estimate

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Memorandum

Date: January 07, 2022

To: Claire O'Brien, Walnut Creek

From: Stefani Couch, Sunrise

Reviewed by: William Agster, Denver

Copy to: Damon Roth, Seattle
Divij Sharma, Walnut Creek

Project No.: 157353.002

Subject: WTP Filter Rehab Evaluation
Planning Level
Basis of Estimate of Probable Construction Cost

The Basis of Estimate Report and supporting estimate reports for the subject project are attached. Please call me if you have questions or need additional information.

Enclosures (3):

1. Basis of Estimate Report
2. Summary Estimate
3. Detailed Estimate

Basis of Estimate Report

WTP FILTER REHAB EVALUATION

Introduction

Brown and Caldwell (BC) is pleased to present this opinion of probable construction cost (estimate) prepared for the WTP Filter Rehab Evaluation, Pittsburg Water Treatment Plant, City of Pittsburg, CA.

Estimated Project Costs

Based on the typical accuracy of a Class 4 estimate, the expected range of costs is:

Upper Range	Estimated Cost	Lower Range
50%		-30%
$38,193,000	$25,462,000	$17,823,400

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

Scope of Work

This project consists of the construction of two new filters and the rehabilitation of six existing filters, including all new internal pipes, A53 welded steel in diameters from 16 inches to 40 inches.

Background of this Estimate

There have been no previous estimates prepared by the BC Estimating Department for this project.

The attached estimate of probable construction cost is based on documents dated December 2021, as well as the engineer's quantity take off, received by the Estimating and Scheduling Group (ESG). These documents are described as 0 to 2 percent complete based on the current project progression, additional or

updated scope and/or quantities, and ongoing discussions with the project team. Further information can be found in the detailed estimate reports.

Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 4 estimate. A Class 4 estimate is defined as a Planning Level or Design Technical Feasibility Estimate. Typically, engineering is from 1 to 15 percent complete. Class 4 estimates are used to prepare planning level cost scopes or to evaluate alternatives in design conditions and form the base work for the Class 3 Project Budget or Funding Estimate.

Expected accuracy for Class 4 estimates typically range from -30 to +50 percent, depending on the technological complexity of the project, appropriate reference information and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs and anticipated productivity adjustments to labor and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of Sage Construction and Real Estate 300 estimating software engine (formerly Timberline) using RS Means database, historical project data, the latest vendor and material cost information, and other costs specific to the project location.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel) and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and worker's compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

Local sales tax has been applied to material and equipment rentals. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data.

The contractor's cost for builder's risk, general liability and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost and are added after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's credentials, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.
4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors.

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Trench coverage for yard pipe was assumed to be 5' deep.
2. New manhole in the filter complex rehab, assumed to be 6 ft diameter and 10 ft deep.
3. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.
4. Contractor has complete access for lay-down areas and mobile equipment.
5. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and/or rates contained in the estimating database.
6. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
7. Major equipment costs are based on vendor supplied price quotes obtained by the project design team and/or estimators and on historical pricing of like equipment.
8. Process equipment vendor training using vendors' standard Operations and Maintenance (O&M) material is included in the purchase price of major equipment items where so stated in that quotation.
9. Bulk material quantities are based on manual quantity take-offs.
10. There is enough electrical power to feed the specified equipment. The local power company will supply power and transformers suitable for this facility.
11. Soils are of adequate nature to support the structures. No piles have been included in this estimate.

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project except for the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions.
5. Impacts from COVID-19 including additional labor and management hours required to meet social distancing, personal protection, and cleaning routines, additional costs of protective equipment, supply chain impacts, and material shortages.

Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

1. Sand for media filters - $901,111
2. Misc. Filter equipment - $1,783,221
3. Misc. Pipe for Scour air blowers - $89,161
4. Misc. Demolition allowance - $423,305
5. Electrical - $5,019,270
6. Instrumentation - $3,346,180

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 1. Estimate Markups

Item	Rate (%)
Net Cost Markups	
Labor (employer payroll burden)	15
Materials and process equipment	10
Equipment (construction-related)	10
Subcontractor	10
Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.)	9.25
Material Shipping and Handling	2
Gross Cost Markups	
Contractor General Conditions	15
Start-up, Training and O&M	2
Construction Contingency	40
Builders Risk, Liability and Auto Insurance	2
Performance and Payment Bonds	1.5
Escalation to Midpoint of Construction	11.69

Labor Markup

The labor rates used in the estimate were derived from RS Means latest national average wage rate tables and city cost indexes. These include base rate paid to the laborer plus fringes. A labor burden factor is applied to these such that the final rates include all employer paid taxes. These taxes are FICA (which covers social security plus Medicare), Workers Comp (which varies based on state, employer experience and history) and unemployment insurance. The result is fully loaded labor rates. In addition to the fully loaded labor rate, an overhead and profit markup is applied at the back end of the estimate. This covers payroll and accounting, estimator's wages, home office rent, advertising and owner profit.

Materials and Process Equipment Markup

This markup consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup

This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all the equipment needed for the job, but to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is like the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup

This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Materials, Process Equipment and Construction Equipment)

This is the tax that the contractor must pay according to state and local tax laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

Contractor Startup, Training, and O&M Manuals

This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup and O&M manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and troubleshoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance

This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity and contractor's requirements and history. Instead of using numbers from a select few contractors, we

believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and the contractor's insurability at the time the project is bid.

Material Shipping and Handling

This can range from 2 to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paperwork, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets and bolts that may be missing from the equipment or materials shipped.

Escalation to Midpoint for Labor, Materials and Subcontractors

In addition to contingency, it is customary for projects that will be built over several years to include an escalation to midpoint of anticipated construction to account for the future escalation of labor, material and equipment costs beyond values at the time the estimate is prepared. For this project, the anticipated rate of escalation is 11.69 percent per annum.

The estimated construction time for this project is 25 months, exclusive of unusual weather or site conditions delays. Construction is anticipated to start October 2023 and be completed by October 2025. The escalation factors used in this estimate are calculated from the date of this estimate to the anticipated midpoint of construction which is approximately 33.2 months from the date of this estimate.

Undesigned/Undeveloped Contingency

The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage and area factors, construction contingency can range from 10 to 50 percent.

Performance and Payment Bonds

Based on historical and industry data, this can range from 0.75 to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical record on similar projects, complexity and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.

Estimate Summary Report

1/7/2022 1:55 PM

BC Project Number: 157353.002
Estimate Version Number: V3
Estimate Date: 12/6/21
Lead Estimator: S. Couch

City of Pittsburg

WTP Filter Rehab Evaluation
City of Pittsburg
Planning Level

Estimator	S. Couch
BC Project Manager	Claire O'Brien
BC Office	Walnut Creek
Est Version Number	V3
QA/QC Reviewer	William Agster
QA/QC Review Date	12/2/21
BC Project Number	157353.002

Phase	Description	Gross Total Cost with Markups
01 WTP Filter Rehab Evaluation		
01 New Filters		
01 Excavation		135,884
03 Concrete		383,416
06 Equipment		1,262,903
07 Media		855,951
01 New Filters		2,638,154
02 New Pipe Gallery		
01 Excavation		154,295
03 Concrete		170,820
04 Piping		1,834,318
02 New Pipe Gallery		2,159,433
03 Filter Complex Rehab		
02 Demo		651,973
04 Piping		3,752,581
06 Equipment		3,211,669
07 Media		2,091,512
03 Filter Complex Rehab		9,707,735
04 Yard Pipe		
05 Yard Pipe		2,591,165
04 Yard Pipe		2,591,165
05 Electrical		
08 Electrical		5,019,270
05 Electrical		5,019,270

City of Pittsburg

Phase	Description	Gross Total Cost with Markups
06 Instrumentation		
09 Instrumentation		3,346,180
06 Instrumentation		3,346,180
01 WTP Filter Rehab Evaluation		25,461,938

Estimate Detail Report

1/7/2022 1:50 PM

BC Project Number: 157353.002
Estimate Version Number: V3
Estimate Date: 12/6/21
Lead Estimator: S. Couch

City of Pittsburg

WTP Filter Rehab Evaluation
City of Pittsburg
Planning Level

Estimator	S. Couch
BC Project Manager	Claire O'Brien
BC Office	Walnut Creek
Est Version Number	V3
QA/QC Reviewer	William Agster
QA/QC Review Date	12/2/21
BC Project Number	157353.002

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
01 WTP Filter Rehab Evaluation											
01 New Filters											
01 Excavation											
31290 Structure Excavation - 77' L x 36' W x 6' D											
31-23-16.42	Excavating, bulk bank measure, in sheeting or cofferdam, with all other equipment, minimum	4400	1,196.44	bcy	8.09	7.79	-	-	-	15.88	18,997
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	60.00	ecy	2.89	0.16	-	-	-	3.05	183
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	209.30	lcy	12.10	1.47	25.50	-	-	39.07	8,177
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	180.00	ecy	2.89	0.16	-	-	-	3.05	549
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	460.51	lcy	12.10	1.47	25.50	-	-	39.07	17,992
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	400.44	ecy	2.89	0.16	-	-	-	3.05	1,221
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	1,196.44	bcy	0.62	0.41	-	-	-	1.04	1,241
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	1,495.56	lcy	4.82	4.73	-	-	-	9.55	14,281
	Structure Excavation - 77' L x 36' W x 6' D		**1,196.44**	**cy**	**23.06**	**15.02**	**14.28**			**52.36**	**62,642**
	01 Excavation										**62,642**
03 Concrete											
03330 Slab on Grade - 18" thick - 924 SF - Filter 9											
03-21-10.60	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0600	2.57	ton	1,416.79	-	1,250.00	-	-	2,666.79	6,846
03-21-10.60	Reinforcing in place, unloading & sorting, add to above - slabs	2005	2.57	ton	54.59	5.98	-	-	-	60.58	156
03-21-10.60	Reinforcing in place, crane cost for handling, add to above, slabs	2215	2.57	ton	59.34	6.51	-	-	-	65.85	169
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	56.47	cy	-	-	133.00	-	-	133.00	7,510
03-31-05.70	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	4650	56.47	cy	26.19	2.64	-	-	-	28.82	1,628
03-35-29.30	Concrete finishing, floors, monolithic, screed, float and broom finish	0150	924.00	sf	1.02	-	-	-	-	1.02	938
03-39-13.50	Curing, sprayed membrane curing compound	0300	9.24	csf	12.16	-	12.20	-	-	24.36	225
03-35-29.30	Concrete finishing, floor, hardener, non-metallic, medium service, 0.75 psf, add	2350	924.00	sf	0.87	-	0.21	-	-	1.08	995

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
	Slab on Grade - 18" thick - 924 SF - Filter 9		**51.33**	**cy**	**141.42**	**3.52**	**214.79**			**359.73**	**18,466**
03330 Slab on Grade - 18" thick - 924 SF - Filter 10											
03-21-10.60	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0600	2.57	ton	1,416.79	-	1,250.00	-	-	2,666.79	6,846
03-21-10.60	Reinforcing in place, unloading & sorting, add to above - slabs	2005	2.57	ton	54.59	5.98	-	-	-	60.58	156
03-21-10.60	Reinforcing in place, crane cost for handling, add to above, slabs	2215	2.57	ton	59.34	6.51	-	-	-	65.85	169
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	56.47	cy	-	-	133.00	-	-	133.00	7,510
03-31-05.70	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	4650	56.47	cy	26.19	2.64	-	-	-	28.82	1,628
03-35-29.30	Concrete finishing, floors, monolithic, screed, float and broom finish	0150	924.00	sf	1.02	-	-	-	-	1.02	938
03-39-13.50	Curing, sprayed membrane curing compound	0300	9.24	csf	12.16	-	12.20	-	-	24.36	225
03-35-29.30	Concrete finishing, floor, hardener, non-metallic, medium service, 0.75 psf, add	2350	924.00	sf	0.87	-	0.21	-	-	1.08	995
	Slab on Grade - 18" thick - 924 SF - Filter 10		**51.33**	**cy**	**141.42**	**3.52**	**214.79**			**359.73**	**18,466**
03345 CIP Walls (E and W) - 12" Thick - 9.5' High - 31 LF - Filter 9											
03-11-13.85	C.I.P. concrete forms, wall, job built, plywood, over 8' to 16' high, 1 use, includes erecting, bracing, stripping and cleaning	2400	589.00	sfca	14.19	-	4.66	-	-	18.85	11,103
03-15-05.95	Form oil, up to 800 S.F. per gallon, coverage, includes material only	3050	1.57	gal	-	-	21.50	-	-	21.50	34
03-21-10.60	Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0700	1.09	ton	1,086.21	-	1,250.00	-	-	2,336.21	2,549
03-21-10.60	Reinforcing in place, unloading & sorting, add - walls, cols, beams	2010	1.09	ton	54.59	5.99	-	-	-	60.58	66
03-21-10.60	Reinforcing, crane cost for handling, add to above, walls, cols, beams	2225	1.09	ton	59.34	6.51	-	-	-	65.85	72
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	11.45	cy	-	-	133.00	-	-	133.00	1,523
03-31-05.70	Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	5350	11.45	cy	40.37	4.06	-	-	-	44.44	509
03-35-29.60	Finishing: break ties & patch voids (walls, cols or beams)	0010	589.00	sf	1.20	-	0.04	-	-	1.24	733
	CIP Walls (E and W) - 12" Thick - 9.5' High - 31 LF - Filter 9		**10.91**	**cy**	**993.81**	**5.52**	**521.60**			**1,520.93**	**16,589**
03345 CIP Walls (N and S) - 12" Thick - 9.5' High - 84 LF - Filter 9											
03-11-13.85	C.I.P. concrete forms, wall, job built, plywood, over 8' to 16' high, 1 use, includes erecting, bracing, stripping and cleaning	2400	1,596.00	sfca	14.19	-	4.66	-	-	18.85	30,087
03-15-05.95	Form oil, up to 800 S.F. per gallon, coverage, includes material only	3050	4.26	gal	-	-	21.50	-	-	21.50	92

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03345 CIP Walls (N and S) - 12" Thick - 9.5' High - 84 LF - Filter 9											
03-21-10.60	Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0700	2.96	ton	1,086.21	-	1,250.00	-	-	2,336.21	6,906
03-21-10.60	Reinforcing in place, unloading & sorting, add - walls, cols, beams	2010	2.96	ton	54.59	5.98	-	-	-	60.58	179
03-21-10.60	Reinforcing, crane cost for handling, add to above, walls, cols, beams	2225	2.96	ton	59.34	6.51	-	-	-	65.85	195
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	31.03	cy	-	-	133.00	-	-	133.00	4,127
03-31-05.70	Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	5350	31.03	cy	40.37	4.06	-	-	-	44.44	1,379
03-35-29.60	Finishing: break ties & patch voids (walls, cols or beams)	0010	1,596.00	sf	1.20	-	0.04	-	-	1.24	1,985
	CIP Walls (N and S) - 12" Thick - 9.5' High - 84 LF - Filter 9		**29.56**	**cy**	**993.75**	**5.51**	**521.56**			**1,520.82**	**44,949**
03345 CIP Walls (E and W) - 12" Thick - 9.5' High - 31 LF - Filter 10											
03-11-13.85	C.I.P. concrete forms, wall, job built, plywood, over 8' to 16' high, 1 use, includes erecting, bracing, stripping and cleaning	2400	589.00	sfca	14.19	-	4.66	-	-	18.85	11,103
03-15-05.95	Form oil, up to 800 S.F. per gallon, coverage, includes material only	3050	1.57	gal	-	-	21.50	-	-	21.50	34
03-21-10.60	Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0700	1.09	ton	1,086.21	-	1,250.00	-	-	2,336.21	2,549
03-21-10.60	Reinforcing in place, unloading & sorting, add - walls, cols, beams	2010	1.09	ton	54.59	5.99	-	-	-	60.58	66
03-21-10.60	Reinforcing, crane cost for handling, add to above, walls, cols, beams	2225	1.09	ton	59.34	6.51	-	-	-	65.85	72
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	11.45	cy	-	-	133.00	-	-	133.00	1,523
03-31-05.70	Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	5350	11.45	cy	40.37	4.06	-	-	-	44.44	509
03-35-29.60	Finishing: break ties & patch voids (walls, cols or beams)	0010	589.00	sf	1.20	-	0.04	-	-	1.24	733
	CIP Walls (E and W) - 12" Thick - 9.5' High - 31 LF - Filter 10		**10.91**	**cy**	**993.81**	**5.52**	**521.60**			**1,520.93**	**16,589**
03345 CIP Walls (N and S) - 12" Thick - 9.5' High - 112 LF - Filter 10											
03-11-13.85	C.I.P. concrete forms, wall, job built, plywood, over 8' to 16' high, 1 use, includes erecting, bracing, stripping and cleaning	2400	2,128.00	sfca	14.19	-	4.66	-	-	18.85	40,115
03-15-05.95	Form oil, up to 800 S.F. per gallon, coverage, includes material only	3050	5.68	gal	-	-	21.50	-	-	21.50	122
03-21-10.60	Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0700	3.94	ton	1,086.21	-	1,250.00	-	-	2,336.21	9,207
03-21-10.60	Reinforcing in place, unloading & sorting, add - walls, cols, beams	2010	3.94	ton	54.59	5.98	-	-	-	60.58	239
03-21-10.60	Reinforcing, crane cost for handling, add to above, walls, cols, beams	2225	3.94	ton	59.34	6.51	-	-	-	65.85	260

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03345 CIP Walls (N and S) - 12" Thick - 9.5' High - 112 LF - Filter 10											
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	41.38	cy	-	-	133.00	-	-	133.00	5,503
03-31-05.70	Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	5350	41.38	cy	40.37	4.06	-	-	-	44.44	1,839
03-35-29.60	Finishing: break ties & patch voids (walls, cols or beams)	0010	2,128.00	sf	1.20	-	0.04	-	-	1.24	2,647
	CIP Walls (N and S) - 12" Thick - 9.5' High - 112 LF - Filter 10		**39.41**	**cy**	**993.77**	**5.51**	**521.56**			**1,520.84**	**59,932**
	03 Concrete										**174,990**
06 Equipment											
46999 Filters											
46-99-99.99	New large filters - 2 ea - AWI Quote 10/28/21	MISC	1.00	LS	-	-	-		350,000.00	350,000.00	350,000
46-23-23.10	Install Filters	0100	2.00	ea	1,280.34	389.59		-	-	1,669.93	3,340
46-99-99.99	Misc. Filter Equipments - Allowance	MISC	1.00	LS	-	-	200,000.00			200,000.00	200,000
46-06-04.00	Scour Air Blowers	BC-1440	1.00	ea	14,499.04			-	25,000.00	39,499.04	39,499
44-99-99.99	Misc. Pipe for Scour Air Blowers - Allowance	MISC	2.00	EA	-	-	5,000.00		-	5,000.00	10,000
	Filters		**1.00**	**LS**	**17,059.71**	**779.18**	**210,000.00**		**375,000.00**	**602,838.89**	**602,839**
	06 Equipment										**602,839**
07 Media											
31999 New Media - 2 Filters											
31-99-99.99	GAC Media Removal and Disposal - Owners ave. bid tabs - 94 CY / Filter x 2 Filters	MISC	188.00	CY	-	-	-	237.41	-	237.41	44,633
31-99-99.99	Media Replacement GAV - Owners ave. bid tabs - 94 CY / Filter x 2 Filters	MISC	188.00	CY	-	-	-	1,186.71	-	1,186.71	223,101
31-99-99.99	Filter Start-up and Commissioning - Owners ave. bid tabs	MISC	2.00	EA	-	-	-	6,213.88	-	6,213.88	12,428
46-06-00.00	Filter Media - Bag Sand - Allowance	BC-0006	5,064.00	cuft	1.07	0.25	22.02	-	-	23.34	118,196
	New Media - 2 Filters		**6.00**	**ea**	**901.31**	**213.10**	**18,584.88**	**46,693.72**		**66,393.01**	**398,358**
	07 Media										**398,358**
	01 New Filters										**1,238,829**
02 New Pipe Gallery											
01 Excavation											
31290 Structure Excavation - 77' L x 20' W x 9' D											

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
31290 Structure Excavation - 77' L x 20' W x 9' D											
31-23-16.42	Excavating, bulk bank measure, in sheeting or cofferdam, with all other equipment, minimum	4400	1,243.00	bcy	8.09	7.79	-	-	-	15.88	19,737
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	36.00	ecy	2.89	0.16	-	-	-	3.05	110
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	125.58	lcy	12.10	1.47	25.50	-	-	39.07	4,906
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	108.00	ecy	2.89	0.16	-	-	-	3.05	329
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	714.92	lcy	12.10	1.47	25.50	-	-	39.07	27,931
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	621.67	ecy	2.89	0.16	-	-	-	3.05	1,896
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	1,243.00	bcy	0.62	0.41	-	-	-	1.04	1,289
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	1,553.75	lcy	4.82	4.73	-	-	-	9.55	14,837
	Structure Excavation - 77' L x 20' W x 9' D		**1,243.00**	**cy**	**24.70**	**15.20**	**17.24**			**57.15**	**71,036**
	01 Excavation										**71,036**
03 Concrete											
03330 Slab on Grade - 18" thick - 768 SF											
03-21-10.60	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0600	2.13	ton	1,416.79	-	1,250.00	-	-	2,666.79	5,688
03-21-10.60	Reinforcing in place, unloading & sorting, add to above - slabs	2005	2.13	ton	54.59	5.98	-	-	-	60.58	129
03-21-10.60	Reinforcing in place, crane cost for handling, add to above, slabs	2215	2.13	ton	59.34	6.51	-	-	-	65.85	140
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	44.80	cy	-	-	133.00	-	-	133.00	5,958
03-31-05.70	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	4650	44.80	cy	26.19	2.64	-	-	-	28.82	1,291
03-35-29.30	Concrete finishing, floors, monolithic, screed, float and broom finish	0150	768.00	sf	1.02	-	-	-	-	1.02	780
03-39-13.50	Curing, sprayed membrane curing compound	0300	7.68	csf	12.16	-	12.20	-	-	24.36	187
03-35-29.30	Concrete finishing, floor, hardener, non-metallic, medium service, 0.75 psf, add	2350	768.00	sf	0.87	-	0.21	-	-	1.08	827
	Slab on Grade - 18" thick - 768 SF		**42.67**	**cy**	**140.08**	**3.39**	**208.11**			**351.59**	**15,001**
03345 CIP Walls (E) - 12" Thick - 13' High - 62 LF											

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
03345 CIP Walls (E) - 12" Thick - 13' High - 62 LF											
03-11-13.85	C.I.P. concrete forms, wall, job built, plywood, over 8' to 16' high, 1 use, includes erecting, bracing, stripping and cleaning	2400	1,612.00	sfca	14.19	-	4.66	-	-	18.85	30,388
03-15-05.95	Form oil, up to 800 S.F. per gallon, coverage, includes material only	3050	4.30	gal	-	-	21.50	-	-	21.50	92
03-21-10.60	Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0700	2.99	ton	1,086.21	-	1,250.00	-	-	2,336.21	6,974
03-21-10.60	Reinforcing in place, unloading & sorting, add - walls, cols, beams	2010	2.99	ton	54.59	5.98	-	-	-	60.58	181
03-21-10.60	Reinforcing, crane cost for handling, add to above, walls, cols, beams	2225	2.99	ton	59.34	6.51	-	-	-	65.85	197
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	31.34	cy	-	-	133.00	-	-	133.00	4,169
03-31-05.70	Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	5350	31.34	cy	40.37	4.06	-	-	-	44.44	1,393
03-35-29.60	Finishing: break ties & patch voids (walls, cols or beams)	0010	1,612.00	sf	1.20	-	0.04	-	-	1.24	2,005
	CIP Walls (E) - 12" Thick - 13' High - 62 LF		**29.85**	**cy**	**993.73**	**5.51**	**521.53**			**1,520.78**	**45,398**
03345 CIP Walls (N and S) - 12" Thick - 13' High - 24 LF											
03-11-13.85	C.I.P. concrete forms, wall, job built, plywood, over 8' to 16' high, 1 use, includes erecting, bracing, stripping and cleaning	2400	624.00	sfca	14.19	-	4.66	-	-	18.85	11,763
03-15-05.95	Form oil, up to 800 S.F. per gallon, coverage, includes material only	3050	1.66	gal	-	-	21.50	-	-	21.50	36
03-21-10.60	Reinforcing steel, in place, walls, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	0700	1.16	ton	1,086.21	-	1,250.00	-	-	2,336.21	2,701
03-21-10.60	Reinforcing in place, unloading & sorting, add - walls, cols, beams	2010	1.16	ton	54.59	5.99	-	-	-	60.58	70
03-21-10.60	Reinforcing, crane cost for handling, add to above, walls, cols, beams	2225	1.16	ton	59.34	6.51	-	-	-	65.85	76
03-31-05.35	Structural concrete,ready mix,normal weight,4500 psi,includes local aggregate,sand,portland cement and water,excludes all additives and treatments	0350	12.13	cy	-	-	133.00	-	-	133.00	1,614
03-31-05.70	Structural concrete, placing, walls, pumped, 15" thick, includes vibrating, excludes material	5350	12.13	cy	40.37	4.06	-	-	-	44.44	539
03-35-29.60	Finishing: break ties & patch voids (walls, cols or beams)	0010	624.00	sf	1.20	-	0.04	-	-	1.24	776
	CIP Walls (N and S) - 12" Thick - 13' High - 24 LF		**11.56**	**cy**	**993.75**	**5.52**	**521.57**			**1,520.84**	**17,575**
	03 Concrete										**77,975**

04 Piping

33526 Backwash Water Supply Under Slab , HDPE 24" / 16"											
33-14-13.35	Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 16" diameter, SDR 21	0700	15.00	lf	17.65	8.32	21.50	-	-	47.47	712

Phase	Description	Item	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
33526 Backwash Water Supply Under Slab , HDPE 24" / 16"										
33-14-13.35	Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 24" diameter, SDR 21	0900	61.00 lf	31.77	14.97	70.00	-	-	116.74	7,121
33-00-00.01	Utility pipe testing, nondestructive hydraulic pressure test	BC-0011	8.52 hr	75.62	27.57	-	-	-	103.18	879
22-20-03.00	Pipe coupling, sleeve-type, Dresser style, 24"	BC-0226	2.00 ea	955.32	309.39	2,622.67	-	-	3,887.38	7,775
40-05-57.13	Valves-Accessories-Geared Operator-24 Inch (600mm)	A246045000000	8.00 ea	-	-	15,577.11	-	-	15,577.11	124,617
40-05-57.13	Valves-Accessories-Geared Operator-16 Inch (400mm)	A206045000000	14.00 ea	-	-	10,205.69	-	-	10,205.69	142,880
	Backwash Water Supply Under Slab , HDPE 24" / 16"		**76.00 lf**	**62.60**	**24.89**	**3,649.14**			**3,736.63**	**283,984**
40170 Finish Water - WLD Steel Pipe 16"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40/XH 16 Inch (400mm)	A2010020800EA	30.67 lf	-	-	195.59	-	-	195.59	5,998
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40/XH 16 Inch (400mm)	A202112080000	2.00 ea	-	-	1,289.02	-	-	1,289.02	2,578
40-05-24.10	Fitting Butt Weld-CS A53/A106-Reducer 1 Dia-Sch 40/XH 16 Inch (400mm)	A202116080000	2.00 ea	-	-	680.45	-	-	680.45	1,361
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Sch 40/XH 16 Inch (400mm)	A202114080000	2.00 ea	-	-	2,625.18	-	-	2,625.18	5,250
40-05-24.10	Fitting Flanged & Bolted-CS A53/A106-Flange WN-Cls 150 (PN20)-XH/Sch 40 16 Inch (400mm)	A202421026200	1.00 ea	-	-	1,148.03	-	-	1,148.03	1,148
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 16 Inch (400mm)	L203466080000	7.00 ea	204.03	-	-	-	-	204.03	1,428
40-05-64.00	Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 16 Inch (400mm)	A206434016200	5.00 ea	-	-	1,623.83	-	-	1,623.83	8,119
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 16 Inch (400mm)	L204062006200	5.00 ea	346.85	-	-	-	-	346.85	1,734
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L2040020800P1	61.00 lf	58.29	-	-	-	-	58.29	3,556
40-05-05.00	Field Cut & Prep Joint-Sch 40 16 Inch (400mm)	L206064080000	17.00 ea	408.06	-	-	-	-	408.06	6,937
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L205102080000	17.00 ea	554.38	180.37	16.79	-	-	751.54	12,776
40-05-07.00	Pipe Support 16 Inch (400mm)	A206044000000	1.00 ea	121.45	-	55.07	-	-	176.52	177
40-05-07.00	Hanger Rod 16 Inch (400mm)	A206045000000	1.00 ea	58.29	-	357.96	-	-	416.25	416
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 16 Inch (400mm)	A206043000000	2.00 ea	48.58	-	49.57	-	-	98.15	196
40-05-05.00	Field Testing-Hydrotest-Non-Specific 16 Inch (400mm)	L209048000000	61.00 lf	23.32	-	-	-	-	23.32	1,422
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	66.00 mh	82.48	44.17	-	-	-	126.65	8,359
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 16"	BC-0546	1.00 ea	636.88	206.26	2,095.99	-	-	2,939.13	2,939
	Finish Water - WLD Steel Pipe 16"		**61.00 lf**	**505.90**	**101.44**	**448.33**			**1,055.67**	**64,396**
40170 Settled Water - WLD Steel Pipe 40" / 24"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 24 Inch (600mm)	A2410020800EA	14.00 lf	-	-	449.19	-	-	449.19	6,289
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 40 Inch (1000mm)	A4010020800EA	61.00 lf	-	-	825.62	-	-	825.62	50,363
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 40 Inch (1000mm)	L403466080000	3.00 ea	655.82	-	-	-	-	655.82	1,967
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 40 Inch (1000mm)	L404062006200	1.00 ea	1,260.92	-	-	-	-	1,260.92	1,261
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 24 Inch (600mm)	L2440020800P1	14.00 lf	121.25	-	-	-	-	121.25	1,698

Phase	Description	Item	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Settled Water - WLD Steel Pipe 40" / 24"										
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 40 Inch (1000mm)	L4040020800P1	61.00 lf	225.02	-	-	-	-	225.02	13,726
40-05-05.00	Field Cut & Prep Joint-Sch 40 24 Inch (600mm)	L246064080000	1.00 ea	774.25	-	-	-	-	774.25	774
40-05-05.00	Field Cut & Prep Joint-Sch 40 40 Inch (1000mm)	L406064080000	12.00 ea	1,311.63	-	-	-	-	1,311.63	15,740
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 24 Inch (600mm)	L245102080000	1.00 ea	1,200.29	390.51	42.37	-	-	1,633.17	1,633
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 40 Inch (1000mm)	L405102080000	12.00 ea	1,926.06	626.64	81.91	-	-	2,634.61	31,615
40-05-07.00	Pipe Support 40 Inch (1000mm)	A406044000000	1.00 ea	242.90	-	550.70	-	-	793.60	794
40-05-07.00	Hanger Rod 40 Inch (1000mm)	A406045000000	1.00 ea	145.74	-	770.98	-	-	916.72	917
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 24 Inch (600mm)	A246043000000	1.00 ea	48.58	-	60.58	-	-	109.16	109
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 40 Inch (1000mm)	A406043000000	2.00 ea	48.58	-	77.10	-	-	125.68	251
40-05-05.00	Field Testing-Hydrotest-Non-Specific 24 Inch (600mm)	L249048000000	14.00 lf	51.30	-	-	-	-	51.30	718
40-05-05.00	Field Testing-Hydrotest-Non-Specific 40 Inch (1000mm)	L409048000000	61.00 lf	140.88	-	-	-	-	140.88	8,594
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	197.00 mh	82.48	44.17	-	-	-	126.65	24,951
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 40"	BC-0576	2.00 ea	1,451.72	470.16	5,856.03	-	-	7,777.90	15,556
22-20-01.95	Piping, fittings, cross, 40" diameter	BC-2886	2.00 ea	1,483.37		8,938.80	-	-	10,422.17	20,844
40-05-64.00	Valve Flanged & Bolted-Cast Steel-Butterfly-Non-Specific 40 Inch (1000mm)	A406434010000	1.00 ea	-	-	29,086.22	-	-	29,086.22	29,086
40-05-64.00	Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 40 Inch (1050mm)	A426434016200	2.00 ea	-	-	21,840.17	-	-	21,840.17	43,680
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 24"	BC-0561	1.00 ea	955.32	309.39	3,346.30	-	-	4,611.01	4,611
40-05-65.23	Valve Butt Weld-Cast Steel-Check-Cls 150 (PN20) 24 Inch (600mm)	A246135016200	2.00 ea	-	-	21,873.48	-	-	21,873.48	43,747
	Settled Water - WLD Steel Pipe 40" / 24"		**75.00 lf**	**1,231.99**	**238.16**	**2,782.17**			**4,252.31**	**318,924**
40170 Filter to Waste - WLD Steel Pipe 16"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40/XH 16 Inch (400mm)	A2010020800EA	61.00 lf	-	-	195.59	-	-	195.59	11,931
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40/XH 16 Inch (400mm)	A202112080000	2.00 ea	-	-	1,289.02	-	-	1,289.02	2,578
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Sch 40/XH 16 Inch (400mm)	A202114080000	1.00 ea	-	-	2,625.18	-	-	2,625.18	2,625
40-05-24.10	Fitting Flanged & Bolted-CS A53/A106-Flange WN-Cls 150 (PN20)-XH/Sch 40 16 Inch (400mm)	A202421026200	1.00 ea	-	-	1,148.03	-	-	1,148.03	1,148
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 16 Inch (400mm)	L203466080000	4.00 ea	204.03	-	-	-	-	204.03	816
40-05-64.00	Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 12 Inch (300mm)	A186434016200	1.00 ea			707.70			707.70	708
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 16 Inch (400mm)	L204062006200	1.00 ea	346.85	-	-	-	-	346.85	347
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L2040020800P1	61.00 lf	58.29	-	-	-	-	58.29	3,556
40-05-05.00	Field Cut & Prep Joint-Sch 40 16 Inch (400mm)	L206064080000	12.00 ea	408.06	-	-	-	-	408.06	4,897
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L205102080000	12.00 ea	554.38	180.37	16.79	-	-	751.54	9,018
40-05-07.00	Pipe Support 16 Inch (400mm)	A206044000000	1.00 ea	121.45	-	55.07	-	-	176.52	177
40-05-07.00	Hanger Rod 16 Inch (400mm)	A206045000000	1.00 ea	58.29	-	357.96	-	-	416.25	416

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Filter to Waste - WLD Steel Pipe 16"											
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 16 Inch (400mm)	A206043000000	2.00	ea	48.58	-	49.57	-	-	98.15	196
40-05-05.00	Field Testing-Hydrotest-Non-Specific 16 Inch (400mm)	L209048000000	61.00	lf	23.32	-	-	-	-	23.32	1,422
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	66.00	mh	82.48	44.17	-	-	-	126.65	8,359
	Filter to Waste - WLD Steel Pipe 16"		**61.00**	**lf**	**383.79**	**83.27**	**323.01**			**790.08**	**48,195**
40170 Backwash Drain Pipe - WLD Steel Pipe 18" / 20"											
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 18 Inch (450mm)	A2110020800EA	25.00	lf	-	-	274.86	-	-	274.86	6,871
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 20 Inch (500mm)	A2210020800EA	24.50	lf	-	-	322.77	-	-	322.77	7,908
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40 18 Inch (450mm)	A212112080000	8.00	ea	-	-	2,038.28	-	-	2,038.28	16,306
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Sch 40 20 Inch (500mm)	A222114080000	2.00	ea	-	-	5,586.42	-	-	5,586.42	11,173
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 18 Inch (450mm)	L213466080000	8.00	ea	251.15	-	-	-	-	251.15	2,009
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 20 Inch (500mm)	L223466080000	2.00	ea	288.08	-	-	-	-	288.08	576
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 18 Inch (450mm)	L2140020800P1	61.00	lf	74.03	-	-	-	-	74.03	4,516
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 20 Inch (500mm)	L2240020800P1	32.00	lf	86.86	-	-	-	-	86.86	2,780
40-05-05.00	Field Cut & Prep Joint-Sch 40 18 Inch (450mm)	L216064080000	20.00	ea	502.31	-	-	-	-	502.31	10,046
40-05-05.00	Field Cut & Prep Joint-Sch 40 20 Inch (500mm)	L226064080000	8.00	ea	576.15	-	-	-	-	576.15	4,609
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 18 Inch (450mm)	L215102080000	20.00	ea	721.11	234.61	22.80	-	-	978.51	19,570
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 20 Inch (500mm)	L225102080000	8.00	ea	849.36	276.34	27.66	-	-	1,153.35	9,227
40-05-07.00	Pipe Support 18 Inch (450mm)	A216044000000	1.00	ea	121.45	-	55.07	-	-	176.52	177
40-05-07.00	Hanger Rod 18 Inch (450mm)	A216045000000	1.00	ea	58.29	-	385.49	-	-	443.78	444
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 18 Inch (450mm)	A216043000000	2.00	ea	48.58	-	49.57	-	-	98.15	196
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 20 Inch (500mm)	A226043000000	1.00	ea	48.58	-	55.07	-	-	103.65	104
40-05-05.00	Field Testing-Hydrotest-Non-Specific 18 Inch (450mm)	L219048000000	61.00	lf	29.34	-	-	-	-	29.34	1,790
40-05-05.00	Field Testing-Hydrotest-Non-Specific 20 Inch (500mm)	L229048000000	32.00	lf	35.95	-	-	-	-	35.95	1,150
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	127.00	mh	82.48	44.17	-	-	-	126.65	16,085
	Backwash Drain Pipe - WLD Steel Pipe 18" / 20"		**93.00**	**lf**	**639.72**	**134.55**	**468.07**			**1,242.33**	**115,537**
	04 Piping										**831,035**
	02 New Pipe Gallery										**980,045**

03 Filter Complex Rehab

02 Demo

02301 Demo

22-05-05.10	Pipe, metal pipe, 16" thru 20" diameter, selective demolition	2153	225.00	lf	33.05	1.57	-	-	-	34.62	7,790
22-05-05.10	Pipe, metal pipe, 24" thru 26" diameter, selective demolition	2155	50.00	lf	42.07	1.99	-	-	-	44.06	2,203

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
02301 Demo											
22-05-05.10	Pipe, metal pipe, 28" thru 36" diameter, selective demolition	2156	200.00	lf	57.85	2.74	-	-	-	60.59	12,118
31-23-23.19	Loading trucks, AT forklift	BC-0021	72.53	bcy	13.75	7.36	-	-	-	21.11	1,531
31-23-23.20	Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/w/,12 cy truck,cycle 2 miles,20 mph,excld loadng eqpmnt	1430	83.00	lcy	3.35	3.28	-	-	-	6.63	550
02-41-19.20	Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	0100	42.00	ton	-	-	74.00	-	-	74.00	3,108
02-22-04.52	Equipment dismantling/demolition, existing filters	BC-0076	6.00	ea	1,812.38	-	-	-	-	1,812.38	10,874
02-22-04.52	Equipment dismantling/demolition, cut-off and grind down existing anchor bolts	BC-0241	300.00	ea	8.13	0.49	-	-	-	8.62	2,587
09-91-06.41	Coatings & paints, Surface Prep, SSPC-5 Blast Clean, 100% near white, media 11 lbs/sf	BC-0161	13,000.00	sqft	2.73	-		-	-	2.73	35,519
09-91-06.41	Coatings & paints, B & C coating system E-3 (Epoxy, conc, masonry)	BC-0026	13,000.00	sqft	0.79	-	1.42	-	-	2.21	28,690
02-99-99.99	Misc. Demo Allowance	MISC	1.00	LS	-	-	-	200,000.00	-	200,000.00	200,000
	Demo		**475.00**	**ft**	**171.58**	**4.12**	**45.30**	**421.05**		**642.04**	**304,970**
	02 Demo										**304,970**
04 Piping											
33526 Finished Water Pipe Under Slab - HDPE 36" / 20"											
40-05-33.00	Pipe Plain End-HDPE--SDR26 36 Inch (900mm)	A361002a60000	80.00	lf	-	-	255.67	-	-	255.67	20,454
33-14-13.35	Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 20" diameter, SDR 21	0900	40.00	lf	31.77	14.97	70.00	-	-	116.74	4,670
33-00-00.01	Utility pipe testing, nondestructive hydraulic pressure test	BC-0011	11.20	hr	75.62	27.57	-	-	-	103.18	1,156
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 20"	BC-0556	1.00	ea	805.47	260.86	2,896.12	-	-	3,962.45	3,962
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 36"	BC-0571	1.00	ea	1,283.13	415.56	4,965.49	-	-	6,664.18	6,664
40-05-33.00	Fitting Socket Weld-HDPE-Reducer 1 Dia-SDR11 36 Inch (900mm)	A362216a20000	1.00	ea	-	-	3,329.27	-	-	3,329.27	3,329
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	13.00	mh	82.48	44.17	-	-	-	126.65	1,646
33-01-10.21	36" Slipline Pipe Rehabilitation, no lateral cuts	BC-0116	80.00	lf	-	-	-	216.00	-	216.00	17,280
33-01-10.21	20" Slipline Pipe Rehabilitation, no lateral cuts	BC-0096	40.00	lf	-	-	-	126.00	-	126.00	5,040
	Finished Water Pipe Under Slab - HDPE 36" / 20"		**120.00**	**lf**	**43.99**	**17.99**	**287.04**	**186.00**		**535.01**	**64,201**
33526 Backwash Water Supply Pipe Under Slab - HDPE 24" / 16"											
33-14-13.35	Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 16" diameter, SDR 21	0700	30.00	lf	17.65	8.32	21.50	-	-	47.47	1,424
33-14-13.35	Water supply distribution piping, piping HDPE, butt fusion joints, 40' lengths, 24" diameter, SDR 21	0900	120.00	lf	31.77	14.97	70.00	-	-	116.74	14,009

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
33526 Backwash Water Supply Pipe Under Slab - HDPE 24" / 16"											
33-00-00.01	Utility pipe testing, nondestructive hydraulic pressure test	BC-0011	16.80	hr	75.62	27.57	-	-	-	103.18	1,733
22-20-03.00	Pipe coupling, sleeve-type, Dresser style, 24"	BC-0226	2.00	ea	955.32	309.39	2,622.67	-	-	3,887.38	7,775
33-01-10.21	24" Slipline Pipe Rehabilitation, no lateral cuts	BC-0101	120.00	lf	-	-	-	144.00	-	144.00	17,280
33-01-10.21	16" Slipline Pipe Rehabilitation, no lateral cuts	BC-0091	30.00	lf	-	-	-	108.00	-	108.00	3,240
	Backwash Water Supply Pipe Under Slab - HDPE 24" / 16"		**150.00**	**lf**	**50.15**	**20.85**	**95.27**	**136.80**		**303.07**	**45,461**
33635 New Manhole											
33-05-61.10	Storm drainage manholes, frames and covers, concrete, precast, 6' inside diameter, 8' deep, excludes footing, excavation, backfill, frame and cover	1210	1.00	ea	1,814.81	220.53	5,375.00	-	-	7,410.34	7,410
33-05-61.10	Storm drainage manholes, frames and covers, concrete, precast, 6' inside diameter, excludes footing, excavation, backfill, frame and cover, add for depths over 8'	1220	2.00	vlf	226.85	27.57	425.00	-	-	679.42	1,359
33-05-61.10	Storm drainage manholes, frames and covers, precast concrete, 6' diameter manhole, 8" thick top	1500	1.00	ea	259.26	31.50	715.00	-	-	1,005.76	1,006
33-42-33.13	Utility area drain,catch basins manholes catch basins manholes frames and covers,cast iron,heavy traffic,36"diam,1,150lb, excluding footing&excavation	2200	1.00	ea	604.94	73.51	955.00	-	-	1,633.45	1,633
33-42-33.13	Base slab; form, resteel and concrete to 8" thick, avg cost per CY	1525	1.36	cy	241.25	0.72	217.00	-	-	458.97	623
31-23-16.13	Excavate pit, common earth, hyd backhoe, 3/4 CY bucket	X9010	20.37	cy	14.39	7.95	-	-	-	22.34	455
31-23-23.13	Backfill, trench, air tamped compaction, add	2000	3.43	ecy	15.47	5.47	-	-	-	20.93	72
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 3 mile round trip, 2.1 loads/hour, 6 C.Y. dump truck, highway haulers, excludes loading	0150	16.94	lcy	7.53	5.20	-	-	-	12.73	216
	New Manhole		**1.00**	**ea**	**3,933.80**	**650.45**	**8,189.47**			**12,773.72**	**12,774**
40170 Settled Water - WLD Steel Pipe 36" / 24"											
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 24 Inch (600mm)	A2410020800EA	50.00	lf	-	-	449.19	-	-	449.19	22,460
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 36 Inch (900mm)	A3610020800EA	120.00	lf	-	-	741.48	-	-	741.48	88,977
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40 24 Inch (600mm)	A242112080000	8.00	ea	-	-	4,445.66	-	-	4,445.66	35,565
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 24 Inch (600mm)	L243466080000	8.00	ea	387.18	-	-	-	-	387.18	3,097
40-05-65.23	Valve Butt Weld-Cast Steel-Check-Cls 150 (PN20) 24 Inch (600mm)	A246135016200	8.00	ea	-	-	21,873.48	-	-	21,873.48	174,988
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 24"	BC-0561	8.00	ea	955.32	309.39	3,346.30	-	-	4,611.01	36,888
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 24 Inch (600mm)	L244062006200	8.00	ea	463.44	-	-	-	-	463.44	3,708
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 36 Inch (900mm)	L364062006200	1.00	ea	1,024.24	-	-	-	-	1,024.24	1,024
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 24 Inch (600mm)	L2440020800P1	50.00	lf	121.25	-	-	-	-	121.25	6,063
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 36 Inch (900mm)	L3640020800P1	120.00	lf	201.70	-	-	-	-	201.70	24,204
40-05-05.00	Field Cut & Prep Joint-Sch 40 24 Inch (600mm)	L246064080000	37.00	ea	774.25	-	-	-	-	774.25	28,647
40-05-05.00	Field Cut & Prep Joint-Sch 40 36 Inch (900mm)	L366064080000	8.00	ea	1,195.04	-	-	-	-	1,195.04	9,560

Phase	Description	Item	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Settled Water - WLD Steel Pipe 36" / 24"										
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 24 Inch (600mm)	L245102080000	37.00 ea	1,200.29	390.51	42.37	-	-	1,633.17	60,427
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 36 Inch (900mm)	L365102080000	8.00 ea	1,797.81	584.91	73.72	-	-	2,456.44	19,652
40-05-07.00	Pipe Support 24 Inch (600mm)	A246044000000	1.00 ea	174.88	-	82.61	-	-	257.49	257
40-05-07.00	Pipe Support 36 Inch (900mm)	A366044000000	1.00 ea	174.88	-	275.35	-	-	450.23	450
40-05-07.00	Hanger Rod 24 Inch (600mm)	A246045000000	1.00 ea	97.16	-	550.70	-	-	647.86	648
40-05-07.00	Hanger Rod 36 Inch (900mm)	A366045000000	1.00 ea	145.74	-	715.91	-	-	861.65	862
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 24 Inch (600mm)	A246043000000	2.00 ea	48.58	-	60.58	-	-	109.16	218
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 36 Inch (900mm)	A366043000000	5.00 ea	48.58	-	77.10	-	-	125.68	628
40-05-05.00	Field Testing-Hydrotest-Non-Specific 24 Inch (600mm)	L249048000000	50.00 lf	51.30	-	-	-	-	51.30	2,565
40-05-05.00	Field Testing-Hydrotest-Non-Specific 36 Inch (900mm)	L369048000000	120.00 lf	114.26	-	-	-	-	114.26	13,711
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	463.00 mh	82.48	44.17	-	-	-	126.65	58,640
40-05-64.00	Valve Flanged & Bolted-Cast Steel-Butterfly-Cls 150 (PN20) 36 Inch (900mm)	A366434016200	2.00 ea	-	-	14,961.54	-	-	14,961.54	29,923
22-20-01.95	Piping, fittings, cross, 36" diameter	BC-2886	5.00 ea	1,483.36		8,938.80	-	-	10,422.16	52,111
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 36"	BC-0571	3.00 ea	1,283.13	415.56	4,965.49	-	-	6,664.17	19,993
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 36 Inch (900mm)	L363466080000	8.00 ea	597.52	-	-	-	-	597.52	4,780
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 24 Inch (600mm)	L243466080000	8.00 ea	387.18	-	-	-	-	387.18	3,097
40-05-57.13	Valves-Accessories-Geared Operator-24 Inch (600mm)	A246045000000	8.00 ea	-	-	15,577.11	-	-	15,577.11	124,617
	Settled Water - WLD Steel Pipe 36" / 24"		**170.00 lf**	**1,278.12**	**254.72**	**3,336.35**			**4,869.19**	**827,762**
40170 Finished Water - WLD Steel Pipe 16"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40/XH 16 Inch (400mm)	A2010020800EA	185.00 lf	-	-	195.59	-	-	195.59	36,184
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40/XH 16 Inch (400mm)	A202112080000	10.00 ea	-	-	1,289.02	-	-	1,289.02	12,890
40-05-24.10	Fitting Butt Weld-CS A53/A106-Reducer 1 Dia-Sch 40/XH 16 Inch (400mm)	A202116080000	8.00 ea	-	-	680.45	-	-	680.45	5,444
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Sch 40/XH 16 Inch (400mm)	A202114080000	8.00 ea	-	-	2,625.18	-	-	2,625.18	21,001
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 16 Inch (400mm)	L203466080000	26.00 ea	204.03	-	-	-	-	204.03	5,305
40-05-65.23	Valve Butt Weld-Cast Steel-Check-Cls 150 (PN20) 16 Inch (400mm)	A206135016200	8.00 ea	-	-	12,974.95	-	-	12,974.95	103,800
40-05-60.00	Valve Butt Weld-Cast Steel-Other-Cls 150 (PN20) 16 Inch (400mm)	A206138016200	1.00 ea	-	-	14,909.63	-	-	14,909.63	14,910
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 16 Inch (400mm)	L204062006200	9.00 ea	346.85	-	-	-	-	346.85	3,122
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L2040020800P1	185.00 lf	58.29	-	-	-	-	58.29	10,785
40-05-05.00	Field Cut & Prep Joint-Sch 40 16 Inch (400mm)	L206064080000	80.00 ea	408.06	-	-	-	-	408.06	32,645
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L205102080000	80.00 ea	554.38	180.37	16.79	-	-	751.54	60,123
40-05-07.00	Pipe Support 16 Inch (400mm)	A206044000000	3.00 ea	121.45	-	55.07	-	-	176.52	530
40-05-07.00	Hanger Rod 16 Inch (400mm)	A206045000000	3.00 ea	58.29	-	357.96	-	-	416.25	1,249
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 16 Inch (400mm)	A206043000000	7.00 ea	48.58	-	49.56	-	-	98.14	687
40-05-05.00	Field Testing-Hydrotest-Non-Specific 16 Inch (400mm)	L209048000000	185.00 lf	23.32	-	-	-	-	23.32	4,314

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Finished Water - WLD Steel Pipe 16"											
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	272.00	mh	82.48	44.17	-	-	-	126.65	34,450
40-05-57.13	Valves-Accessories-Geared Operator-16 Inch (400mm)	A206045000000	18.00	ea	-	-	10,205.69	-	-	10,205.69	183,702
22-20-03.00	Pipe coupling, FCA, flanged coupling adapter, 16"	BC-0546	6.00	ea	636.88	206.26	2,095.99	-	-	2,939.13	17,635
	Finished Water - WLD Steel Pipe 16"		**185.00**	**lf**	**690.03**	**149.63**	**2,126.68**			**2,966.35**	**548,774**
40170 Filter to Waste - WLD Steel Pipe 16"											
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40/XH 16 Inch (400mm)	A2010020800EA	204.00	lf	-	-	195.59	-	-	195.59	39,900
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40/XH 16 Inch (400mm)	A202112080000	4.00	ea	-	-	1,289.02	-	-	1,289.02	5,156
40-05-24.10	Fitting Butt Weld-CS A53/A106-Reducer 1 Dia-Sch 40/XH 16 Inch (400mm)	A202116080000	4.00	ea	-	-	680.45	-	-	680.45	2,722
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Sch 40/XH 16 Inch (400mm)	A202114080000	4.00	ea	-	-	2,625.18	-	-	2,625.18	10,501
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 16 Inch (400mm)	L203466080000	12.00	ea	204.03	-	-	-	-	204.03	2,448
40-05-65.23	Valve Butt Weld-Cast Steel-Check-Cls 150 (PN20) 16 Inch (400mm)	A206135016200	4.00	ea	-	-	12,974.95	-	-	12,974.95	51,900
40-05-51.00	Pipe Erection-Handle Valves-Metal-Cls 150 (PN20) 16 Inch (400mm)	L204062006200	4.00	ea	346.86	-	-	-	-	346.86	1,387
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L2040020800P1	204.00	lf	58.29	-	-	-	-	58.29	11,892
40-05-05.00	Field Cut & Prep Joint-Sch 40 16 Inch (400mm)	L206064080000	43.00	ea	408.06	-	-	-	-	408.06	17,547
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40/XH 16 Inch (400mm)	L205102080000	43.00	ea	554.38	180.37	16.79	-	-	751.54	32,316
40-05-07.00	Pipe Support 16 Inch (400mm)	A206044000000	3.00	ea	121.45	-	55.07	-	-	176.52	530
40-05-07.00	Hanger Rod 16 Inch (400mm)	A206045000000	3.00	ea	58.29	-	357.96	-	-	416.25	1,249
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 16 Inch (400mm)	A206043000000	8.00	ea	48.58	-	49.56	-	-	98.14	785
40-05-05.00	Field Testing-Hydrotest-Non-Specific 16 Inch (400mm)	L209048000000	204.00	lf	23.32	-	-	-	-	23.32	4,757
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	162.00	mh	82.48	44.17	-	-	-	126.65	20,518
	Filter to Waste - WLD Steel Pipe 16"		**204.00**	**lf**	**373.33**	**73.10**	**551.65**			**998.08**	**203,608**
	04 Piping										**1,702,580**
06 Equipment											
46999 Filters											
46-99-99.99	New large filters - 6 ea - AWI Quote 12/03/2021	MISC	1.00	LS	-	-	-		845,000.00	845,000.00	845,000
46-23-23.10	Install Filters	0100	6.00	ea	1,280.34	389.59		-	-	1,669.93	10,020
46-99-99.99	Misc. Filter Equipments - Allowance	MISC	1.00	LS	-	-	600,000.00			600,000.00	600,000
46-06-04.00	Scour Air Blowers	BC-1440	1.00	ea	14,499.04			-	25,000.00	39,499.04	39,499
44-99-99.99	Misc. Pipe for Scour Air Blowers - Allowance	MISC	6.00	EA	-	-	5,000.00		-	5,000.00	30,000
	Filters		**6.00**	**EA**	**3,696.84**	**389.59**	**105,000.00**		**145,000.00**	**254,086.43**	**1,524,519**
	06 Equipment										**1,524,519**

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
07 Media											
31999 Media Replacement - 6 Filters											
31-99-99.99	GAC Media Removal and Disposal - Owners ave. bid tabs - 76 CY / Filter x 6 Filters	MISC	456.00	CY	-	-	-	237.41	-	237.41	108,259
31-99-99.99	Media Replacement GAV - Owners ave. bid tabs - 76 CY / Filter	MISC	456.00	CY	-	-	-	1,186.71	-	1,186.71	541,140
31-99-99.99	Filter Start-up and Commissioning - Owners ave. bid tabs	MISC	6.00	EA	-	-	-	6,213.88	-	6,213.88	37,283
46-06-00.00	Filter Media - Bag Sand - Allowance	BC-0006	12,288.00	cuft	1.07	0.25	22.02	-	-	23.34	286,807
	Media Replacement - 6 Filters		**6.00**	**ea**	**2,187.07**	**517.10**	**45,096.96**	**114,447.00**		**162,248.13**	**973,489**
	07 Media										**973,489**
	03 Filter Complex Rehab										**4,505,557**
04 Yard Pipe											
05 Yard Pipe											
02301 Demo Relocated Pipe - WLD Steel 30" - 30LF											
02-41-13.33	Minor site demolition, pipe, sewer/water, 27" to 36" diameter, remove, excludes excavation, hauling	3000	30.00	lf	20.80	17.76	-	-	-	38.56	1,157
31-23-23.19	Loading trucks, AT forklift	BC-0021	6.93	bcy	13.75	7.36	-	-	-	21.11	146
31-23-23.20	Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/w/,12 cy truck,cycle 4 miles,20 mph,excld loadng eqpmnt	1432	6.93	lcy	3.86	3.79	-	-	-	7.65	53
02-41-19.20	Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	0100	3.47	ton	-	-	74.00	-	-	74.00	256
	Demo Relocated Pipe - WLD Steel 30" - 30LF		**30.00**	**ft**	**24.87**	**20.34**	**8.55**			**53.76**	**1,613**
02301 Demo Relocated Pipe - WLD Steel 24" - 85LF											
02-41-13.33	Minor site demolition, pipe, sewer/water, 20" to 24" diameter, remove, excludes excavation, hauling	2960	85.00	lf	15.60	13.32	-	-	-	28.92	2,458
31-23-23.19	Loading trucks, AT forklift	BC-0021	7.93	bcy	13.75	7.36	-	-	-	21.11	168
31-23-23.20	Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/w/,12 cy truck,cycle 4 miles,20 mph,excld loadng eqpmnt	1432	7.93	lcy	3.86	3.79	-	-	-	7.65	61
02-41-19.20	Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	0100	3.97	ton	-	-	74.00	-	-	74.00	294
	Demo Relocated Pipe - WLD Steel 24" - 85LF		**85.00**	**ft**	**17.25**	**14.36**	**3.45**			**35.06**	**2,980**
02301 Demo Relocated Pipe - WLD Steel 36" - 90LF											

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
02301 Demo Relocated Pipe - WLD Steel 36" - 90LF											
02-41-13.33	Minor site demolition, pipe, sewer/water, 27" to 36" diameter, remove, excludes excavation, hauling	3000	90.00	lf	20.80	17.76	-	-	-	38.56	3,471
31-23-23.19	Loading trucks, AT forklift	BC-0021	14.61	bcy	13.75	7.36	-	-	-	21.11	308
31-23-23.20	Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/w/,12 cy truck,cycle 4 miles,20 mph,excld loadng eqpmnt	1432	14.61	lcy	3.86	3.79	-	-	-	7.65	112
02-41-19.20	Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	0100	7.30	ton	-	-	74.00	-	-	74.00	540
	Demo Relocated Pipe - WLD Steel 36" - 90LF		**90.00**	**ft**	**23.66**	**19.57**	**6.00**			**49.24**	**4,431**
02301 Demo Relocated Pipe - WLD Steel 42" - 90LF											
02-41-13.33	Minor site demolition, pipe, sewer/water, 27" to 36" diameter, remove, excludes excavation, hauling	3000	90.00	lf	20.80	17.76	-	-	-	38.56	3,471
31-23-23.19	Loading trucks, AT forklift	BC-0021	48.74	bcy	13.75	7.36	-	-	-	21.11	1,029
31-23-23.20	Cycle hlng(,load,travl,unld dump&rtrn) time per cycle,excvt borrw,loose cubic yards,25 min ld/w/,12 cy truck,cycle 4 miles,20 mph,excld loadng eqpmnt	1432	48.74	lcy	3.86	3.79	-	-	-	7.65	373
02-41-19.20	Selective demolition, dump charges, typical urban city, building construction materials, includes tipping fees only	0100	24.37	ton	-	-	74.00	-	-	74.00	1,803
	Demo Relocated Pipe - WLD Steel 42" - 90LF		**90.00**	**ft**	**30.34**	**23.80**	**20.04**			**74.18**	**6,676**
33490 Trench for 24" Relocated WW Filter Backwash - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	100.74	bcy	2.16	1.18	-	-	-	3.34	337
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	3.00	day	-	131.70	-	-	-	131.70	395
31-23-23.19	Trench box, move and reset	BC-0016	6.00	ea	80.93	44.36	-	-	-	125.29	752
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	46.56	lcy	12.10	1.47	25.50	-	-	39.07	1,819
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	40.49	ecy	6.42	0.36	-	-	-	6.78	274
33-05-97.10	Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 2", excludes excavation and backfill	0400	1.00	clf	3.85	-	3.00	-	-	6.85	7
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	57.93	lcy	12.10	1.47	25.50	-	-	39.07	2,263
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	50.37	ecy	2.89	0.16	-	-	-	3.05	154
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	100.74	bcy	0.62	0.41	-	-	-	1.04	105
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	125.93	lcy	4.82	4.73	-	-	-	9.55	1,202

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
33490 Trench for 24" Relocated WW Filter Backwash - 5' cover depth ave.											
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	5.00	day	-	37.65	-	-	-	37.65	188
	Trench for 24" Relocated WW Filter Backwash - 5' cover depth ave.		**85.00**	**lf**	**35.84**	**20.97**	**31.38**			**88.18**	**7,496**
33490 Trench for 36" Relocated Settled Water Piping - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	150.00	bcy	2.16	1.18	-	-	-	3.34	501
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	6.00	day	-	131.70	-	-	-	131.70	790
31-23-23.19	Trench box, move and reset	BC-0016	12.00	ea	80.93	44.36	-	-	-	125.29	1,503
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	68.75	lcy	12.10	1.47	25.50	-	-	39.07	2,686
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	59.78	ecy	6.42	0.36	-	-	-	6.78	405
33-05-97.10	Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 2", excludes excavation and backfill	0400	1.00	clf	3.85	-	3.00	-	-	6.85	7
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	76.67	lcy	12.10	1.47	25.50	-	-	39.07	2,995
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	66.67	ecy	2.89	0.16	-	-	-	3.05	203
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	150.00	bcy	0.62	0.41	-	-	-	1.04	156
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	187.50	lcy	4.82	4.73	-	-	-	9.55	1,790
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	5.00	day	-	37.65	-	-	-	37.65	188
	Trench for 36" Relocated Settled Water Piping - 5' cover depth ave.		**90.00**	**lf**	**51.46**	**32.03**	**41.24**			**124.73**	**11,226**
33490 Trench for 36" Finished Water Piping - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	70.00	bcy	2.16	1.18	-	-	-	3.34	234
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	3.00	day	-	131.70	-	-	-	131.70	395
31-23-23.19	Trench box, move and reset	BC-0016	6.00	ea	80.93	44.36	-	-	-	125.29	752
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	34.19	lcy	12.10	1.47	25.50	-	-	39.07	1,336
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	29.73	ecy	6.42	0.36	-	-	-	6.78	202
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	35.78	lcy	12.10	1.47	25.50	-	-	39.07	1,398
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	31.11	ecy	2.89	0.16	-	-	-	3.05	95

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
33490 Trench for 36" Finished Water Piping - 5' cover depth ave.											
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	70.00	bcy	0.62	0.41	-	-	-	1.04	73
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	87.50	lcy	4.82	4.73	-	-	-	9.55	836
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	1.00	day	-	37.65	-	-	-	37.65	38
	Trench for 36" Finished Water Piping - 5' cover depth ave.		**35.00**	**lf**	**63.69**	**38.37**	**50.98**			**153.04**	**5,356**
33490 Trench for 20" WW Filter Backwash Piping - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	67.68	bcy	2.16	1.18	-	-	-	3.34	226
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	2.00	day	-	131.70	-	-	-	131.70	263
31-23-23.19	Trench box, move and reset	BC-0016	5.00	ea	80.93	44.36	-	-	-	125.29	626
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	31.18	lcy	12.10	1.47	25.50	-	-	39.07	1,218
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	27.12	ecy	6.42	0.36	-	-	-	6.78	184
33-05-97.10	Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 2", excludes excavation and backfill	0400	1.00	clf	3.85	-	3.00	-	-	6.85	7
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	40.61	lcy	12.10	1.47	25.50	-	-	39.07	1,586
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	35.31	ecy	2.89	0.16	-	-	-	3.05	108
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	67.68	bcy	0.62	0.41	-	-	-	1.04	70
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	84.59	lcy	4.82	4.73	-	-	-	9.55	808
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	3.00	day	-	37.65	-	-	-	37.65	113
	Trench for 20" WW Filter Backwash Piping - 5' cover depth ave.		**65.00**	**lf**	**33.06**	**18.88**	**28.21**			**80.15**	**5,210**
33490 Trench for 40" Settled Water Piping - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	120.41	bcy	2.16	1.18	-	-	-	3.34	402
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	4.00	day	-	131.70	-	-	-	131.70	527
31-23-23.19	Trench box, move and reset	BC-0016	8.00	ea	80.93	44.36	-	-	-	125.29	1,002
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	58.70	lcy	12.10	1.47	25.50	-	-	39.07	2,293
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	51.04	ecy	6.42	0.36	-	-	-	6.78	346

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
33490 Trench for 40" Settled Water Piping - 5' cover depth ave.											
33-05-97.10	Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 2", excludes excavation and backfill	0400	1.00	clf	3.85	-	3.00	-	-	6.85	7
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	59.35	lcy	12.10	1.47	25.50	-	-	39.07	2,319
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	51.61	ecy	2.89	0.16	-	-	-	3.05	157
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	120.41	bcy	0.62	0.41	-	-	-	1.04	125
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	150.51	lcy	4.82	4.73	-	-	-	9.55	1,437
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	2.00	day	-	37.65	-	-	-	37.65	75
	Trench for 40" Settled Water Piping - 5' cover depth ave.		**55.00**	**lf**	**65.76**	**37.47**	**54.78**			**158.01**	**8,691**
33490 Trench for 42" Finished Water Piping - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	205.83	bcy	2.16	1.18	-	-	-	3.34	688
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	6.00	day	-	131.70	-	-	-	131.70	790
31-23-23.19	Trench box, move and reset	BC-0016	12.00	ea	80.93	44.36	-	-	-	125.29	1,503
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	100.18	lcy	12.10	1.47	25.50	-	-	39.07	3,914
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	87.11	ecy	6.42	0.36	-	-	-	6.78	590
33-05-97.10	Utility line signs, markers, and flags, underground tape, detectable, reinforced, aluminum foil core, 2", excludes excavation and backfill	0400	1.00	clf	3.85	-	3.00	-	-	6.85	7
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	99.67	lcy	12.10	1.47	25.50	-	-	39.07	3,894
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	86.67	ecy	2.89	0.16	-	-	-	3.05	264
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	205.83	bcy	0.62	0.41	-	-	-	1.04	214
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	257.29	lcy	4.82	4.73	-	-	-	9.55	2,457
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	5.00	day	-	37.65	-	-	-	37.65	188
	Trench for 42" Finished Water Piping - 5' cover depth ave.		**90.00**	**lf**	**66.84**	**37.72**	**56.66**			**161.21**	**14,509**
33490 Trench for 30" Finished Water Piping - 5' cover depth ave.											
31-23-16.13	Excavating, trench or continuous footing, common earth, 1-1/2 C.Y. excavator, 6' to 10' deep, excludes sheeting or dewatering	0610	51.94	bcy	2.16	1.18	-	-	-	3.34	174
01-54-33.40	Rent trench box, 8000 lb., 8' x 16'	7050	2.00	day	-	131.70	-	-	-	131.70	263

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
33490 Trench for 30" Finished Water Piping - 5' cover depth ave.											
31-23-23.19	Trench box, move and reset	BC-0016	4.00	ea	80.93	44.36	-	-	-	125.29	501
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	25.36	lcy	12.10	1.47	25.50	-	-	39.07	991
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, compacting bedding in trench	0500	22.05	ecy	6.42	0.36	-	-	-	6.78	149
31-23-23.16	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	0100	28.11	lcy	12.10	1.47	25.50	-	-	39.07	1,098
31-23-23.23	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	7000	24.44	ecy	2.89	0.16	-	-	-	3.05	75
31-23-23.19	Loading trucks, 2.5 C.Y. bucket, front end loader, wheel mounted	BC-0011	51.94	bcy	0.62	0.41	-	-	-	1.04	54
31-23-23.18	Hauling, excavated or borrow material, loose cubic yards, 4 mile round trip, 1.6 loads/hour, 12 C.Y. truck, highway haulers, excludes loading	0500	64.93	lcy	4.82	4.73	-	-	-	9.55	620
01-54-33.50	Roadway plate, steel, 1" x 8' x 20'	5400	1.00	day	-	37.65	-	-	-	37.65	38
	Trench for 30" Finished Water Piping - 5' cover depth ave.		**30.00**	**lf**	**54.67**	**31.96**	**45.45**			**132.09**	**3,963**
40170 Relocated WW Filter Backwash -WLD Steel 24"											
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 24 Inch (600mm)	A2410020800EA	85.00	lf	-	-	449.19	-	-	449.19	38,181
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell45-Sch 40 24 Inch (600mm)	A242111080000	2.00	ea	-	-	3,381.88	-	-	3,381.88	6,764
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 24 Inch (600mm)	L243466080000	2.00	ea	387.18	-	-	-	-	387.18	774
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 24 Inch (600mm)	L2440020800P1	85.00	lf	121.25	-	-	-	-	121.25	10,307
40-05-05.00	Field Cut & Prep Joint-Sch 40 24 Inch (600mm)	L246064080000	9.00	ea	774.25	-	-	-	-	774.25	6,968
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 24 Inch (600mm)	L245102080000	9.00	ea	1,200.29	390.51	42.37	-	-	1,633.17	14,699
40-05-07.00	Pipe Support 24 Inch (600mm)	A246044000000	1.00	ea	174.88	-	82.61	-	-	257.49	257
40-05-07.00	Hanger Rod 24 Inch (600mm)	A246045000000	1.00	ea	97.16	-	550.70	-	-	647.86	648
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 24 Inch (600mm)	A246043000000	3.00	ea	48.58	-	60.58	-	-	109.16	327
40-05-05.00	Field Testing-Hydrotest-Non-Specific 24 Inch (600mm)	L249048000000	85.00	lf	51.30	-	-	-	-	51.30	4,360
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	87.00	mh	82.48	44.17	-	-	-	126.65	11,019
	Relocated WW Filter Backwash -WLD Steel 24"		**85.00**	**lf**	**480.07**	**86.56**	**542.84**			**1,109.47**	**94,305**
40170 Relocated Settle Water Piping - WLD Steel 36"											
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 36 Inch (900mm)	A3610020800EA	90.00	lf	-	-	741.48	-	-	741.48	66,733
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell45-Sch 40 36 Inch (900mm)	A362111080000	2.00	ea	-	-	9,286.56	-	-	9,286.56	18,573
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 36 Inch (900mm)	L363466080000	2.00	ea	597.52	-	-	-	-	597.52	1,195
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 36 Inch (900mm)	L3640020800P1	90.00	lf	201.70	-	-	-	-	201.70	18,153
40-05-05.00	Field Cut & Prep Joint-Sch 40 36 Inch (900mm)	L366064080000	9.00	ea	1,195.04	-	-	-	-	1,195.04	10,755
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 36 Inch (900mm)	L365102080000	9.00	ea	1,797.81	584.91	73.72	-	-	2,456.44	22,108

Phase	Description	Item	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Relocated Settle Water Piping - WLD Steel 36"										
40-05-07.00	Pipe Support 36 Inch (900mm)	A366044000000	1.00 ea	174.88	-	275.35	-	-	450.23	450
40-05-07.00	Hanger Rod 36 Inch (900mm)	A366045000000	1.00 ea	145.74	-	715.91	-	-	861.65	862
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 36 Inch (900mm)	A366043000000	4.00 ea	48.58	-	77.10	-	-	125.68	503
40-05-05.00	Field Testing-Hydrotest-Non-Specific 36 Inch (900mm)	L369048000000	90.00 lf	114.26	-	-	-	-	114.26	10,283
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	148.00 mh	82.48	44.17	-	-	-	126.65	18,745
	Relocated Settle Water Piping - WLD Steel 36"		**90.00 lf**	**769.88**	**131.13**	**969.66**			**1,870.67**	**168,360**
40170 Finish Water Piping - WLD Steel 36"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 36 Inch (900mm)	A3610020800EA	35.00 lf	-	-	741.48	-	-	741.48	25,952
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 36 Inch (900mm)	L3640020800P1	35.00 lf	201.70	-	-	-	-	201.70	7,060
40-05-05.00	Field Cut & Prep Joint-Sch 40 36 Inch (900mm)	L366064080000	2.00 ea	1,195.05	-	-	-	-	1,195.05	2,390
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 36 Inch (900mm)	L365102080000	2.00 ea	1,797.81	584.91	73.72	-	-	2,456.44	4,913
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 36 Inch (900mm)	A366043000000	1.00 ea	48.58	-	77.10	-	-	125.68	126
40-05-05.00	Field Testing-Hydrotest-Non-Specific 36 Inch (900mm)	L369048000000	35.00 lf	114.26	-	-	-	-	114.26	3,999
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	45.00 mh	82.48	44.17	-	-	-	126.65	5,699
	Finish Water Piping - WLD Steel 36"		**35.00 lf**	**594.41**	**90.22**	**747.89**			**1,432.52**	**50,138**
40170 WW Filter Backwash Piping - WLD Steel 20"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 20 Inch (500mm)	A2210020800EA	65.00 lf	-	-	322.77	-	-	322.77	20,980
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell45-Sch 40 20 Inch (500mm)	A222111080000	1.00 ea	-	-	2,022.81	-	-	2,022.81	2,023
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40 20 Inch (500mm)	A222112080000	2.00 ea	-	-	2,660.79	-	-	2,660.79	5,322
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 20 Inch (500mm)	L223466080000	2.00 ea	288.08	-	-	-	-	288.08	576
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 20 Inch (500mm)	L2240020800P1	65.00 lf	86.86	-	-	-	-	86.86	5,646
40-05-05.00	Field Cut & Prep Joint-Sch 40 20 Inch (500mm)	L226064080000	8.00 ea	576.15	-	-	-	-	576.15	4,609
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 20 Inch (500mm)	L225102080000	8.00 ea	849.36	276.34	27.66	-	-	1,153.35	9,227
40-05-07.00	Pipe Support 20 Inch (500mm)	A226044000000	1.00 ea	174.88	-	82.61	-	-	257.49	257
40-05-07.00	Hanger Rod 20 Inch (500mm)	A226045000000	1.00 ea	58.29	-	413.03	-	-	471.32	471
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 20 Inch (500mm)	A226043000000	3.00 ea	48.58	-	55.07	-	-	103.65	311
40-05-05.00	Field Testing-Hydrotest-Non-Specific 20 Inch (500mm)	L229048000000	65.00 lf	35.95	-	-	-	-	35.95	2,337
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	53.00 mh	82.48	44.17	-	-	-	126.65	6,713
	WW Filter Backwash Piping - WLD Steel 20"		**65.00 lf**	**380.20**	**70.03**	**449.33**			**899.56**	**58,471**
40170 Settled Water Piping - WLD Steel 40"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 40 Inch (1000mm)	A4010020800EA	55.00 lf	-	-	825.62	-	-	825.62	45,409
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40 40 Inch (1000mm)	A402112080000	2.00 ea	-	-	15,783.39	-	-	15,783.39	31,567

Phase	Description	Item	Takeoff Quantity	Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Settled Water Piping - WLD Steel 40"										
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Non-Specific 40 Inch (1000mm)	A402114000000	1.00 ea	-	-	20,216.07	-	-	20,216.07	20,216
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 40 Inch (1000mm)	L403466080000	3.00 ea	655.82	-	-	-	-	655.82	1,967
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 40 Inch (1000mm)	L4040020800P1	55.00 lf	225.02	-	-	-	-	225.02	12,376
40-05-05.00	Field Cut & Prep Joint-Sch 40 40 Inch (1000mm)	L406064080000	10.00 ea	1,311.63	-	-	-	-	1,311.63	13,116
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 40 Inch (1000mm)	L405102080000	10.00 ea	1,926.06	626.64	81.91	-	-	2,634.61	26,346
40-05-07.00	Pipe Support 40 Inch (1000mm)	A406044000000	1.00 ea	242.90	-	550.70	-	-	793.60	794
40-05-07.00	Hanger Rod 40 Inch (1000mm)	A406045000000	1.00 ea	145.74	-	770.98	-	-	916.72	917
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 40 Inch (1000mm)	A406043000000	2.00 ea	48.58	-	77.10	-	-	125.68	251
40-05-05.00	Field Testing-Hydrotest-Non-Specific 40 Inch (1000mm)	L409048000000	55.00 lf	140.88	-	-	-	-	140.88	7,748
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	142.00 mh	82.48	44.17	-	-	-	126.65	17,985
	Settled Water Piping - WLD Steel 40"		**55.00 lf**	**1,212.12**	**227.98**	**1,808.85**			**3,248.95**	**178,692**
40170 Finished Water Piping - WLD Steel 42"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 42 Inch (1050mm)	A4210020800EA	90.00 lf	-	-	867.69	-	-	867.69	78,092
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell45-Sch 40 42 Inch (1050mm)	A422111080000	3.00 ea	-	-	12,698.13	-	-	12,698.13	38,094
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40 42 Inch (1050mm)	A422112080000	5.00 ea	-	-	17,418.01	-	-	17,418.01	87,090
40-05-24.10	Fitting Butt Weld-CS A53/A106-Tee-Non-Specific 42 Inch (1050mm)	A422114000000	2.00 ea	-	-	24,349.67	-	-	24,349.67	48,699
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 42 Inch (1050mm)	L423466080000	14.00 ea	684.96	-	-	-	-	684.96	9,589
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 42 Inch (1050mm)	L4240020800P1	90.00 lf	236.68	-	-	-	-	236.68	21,301
40-05-05.00	Field Cut & Prep Joint-Sch 40 42 Inch (1050mm)	L426064080000	35.00 ea	1,369.93	-	-	-	-	1,369.93	47,947
40-05-24.10	Field Butt Weld-CS A53/A106-Non-Specific 42 Inch (1050mm)	L425102000000	35.00 ea	1,295.02	421.33	42.33	-	-	1,758.68	61,554
40-05-07.00	Pipe Support 42 Inch (1050mm)	A426044000000	1.00 ea	242.90	-	550.70	-	-	793.60	794
40-05-07.00	Hanger Rod 42 Inch (1050mm)	A426045000000	1.00 ea	194.32	-	770.98	-	-	965.30	965
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 42 Inch (1050mm)	A426043000000	4.00 ea	48.58	-	82.61	-	-	131.19	525
40-05-05.00	Field Testing-Hydrotest-Non-Specific 42 Inch (1050mm)	L429048000000	90.00 lf	155.26	-	-	-	-	155.26	13,973
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL609064009000	358.00 mh	82.48	44.17	-	-	-	126.65	45,342
	Finished Water Piping - WLD Steel 42"		**90.00 lf**	**1,869.96**	**339.56**	**2,834.55**			**5,044.06**	**453,966**
40170 Finished Water Piping - WLD Steel 30"										
40-05-24.10	Pipe Plain End-CS A53/A106-ERW Grade A-Sch 40 30 Inch (750mm)	A3010020800EA	30.00 lf	-	-	615.27	-	-	615.27	18,458
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell45-Sch 40 30 Inch (750mm)	A302111080000	1.00 ea	-	-	6,406.66	-	-	6,406.66	6,407
40-05-24.10	Fitting Butt Weld-CS A53/A106-Ell90-Sch 40 30 Inch (750mm)	A302112080000	3.00 ea	-	-	8,825.77	-	-	8,825.77	26,477
40-05-05.00	Pipe Erection-Handle Fittings-Metal-Sch 40 30 Inch (750mm)	L303466080000	4.00 ea	510.08	-	-	-	-	510.08	2,040
40-05-24.10	Pipe Erection-Straight Run-CS A53/A106-Sch 40 30 Inch (750mm)	L3040020800P1	30.00 lf	166.72	-	-	-	-	166.72	5,002
40-05-05.00	Field Cut & Prep Joint-Sch 40 30 Inch (750mm)	L306064080000	10.00 ea	1,020.16	-	-	-	-	1,020.16	10,202
40-05-24.10	Field Butt Weld-CS A53/A106-Sch 40 30 Inch (750mm)	L305102080000	10.00 ea	1,585.04	515.69	61.43	-	-	2,162.15	21,622

Phase	Description	Item	Takeoff Quantity		Labor Cost/Unit	Equip Cost/Unit	Material Cost/Unit	Sub Cost/Unit	Other Cost/Unit	Total Cost/Unit	Total Amount
40170 Finished Water Piping - WLD Steel 30"											
40-05-07.00	Hilti-Chemical Anchor - Pipe Support Size 30 Inch (750mm)	A306043000000	1.00	ea	48.58	-	71.59	-	-	120.17	120
40-05-05.00	Field Testing-Hydrotest-Non-Specific 30 Inch (750mm)	L309048000000	30.00	lf	79.67	-	-	-	-	79.67	2,390
40-05-05.00	Pipe Erection-Handle Pipe-Construction Equipment	XL60906400900 0	92.00	mh	82.48	44.17	-	-	-	126.65	11,652
	Finished Water Piping - WLD Steel 30"		**30.00**	**lf**	**1,437.36**	**307.36**	**1,734.26**			**3,478.98**	**104,369**
	05 Yard Pipe										**1,180,453**
	04 Yard Pipe										**1,180,453**
05 Electrical											
08 Electrical											
26999 Electrical											
26-99-99.99	Electrical Allowance - 30% of project cost before markups	MISC	1.00	LS	-	-	-	2,371,465.20	-	2,371,465.20	2,371,465
	Electrical		**1.00**	**LS**				**2,371,465.20**		**2,371,465.20**	**2,371,465**
	08 Electrical										**2,371,465**
	05 Electrical										**2,371,465**
06 Instrumentation											
09 Instrumentation											
27999 Instrumentation											
27-99-99.99	Instrumentation Allowance - 20% of project cost before markups	MISC	1.00	LS	-	-	-	1,580,976.80	-	1,580,976.80	1,580,977
	Instrumentation		**1.00**	**LS**				**1,580,976.80**		**1,580,976.80**	**1,580,977**
	09 Instrumentation										**1,580,977**
	06 Instrumentation										**1,580,977**
	01 WTP Filter Rehab Evaluation										**11,857,326**

Estimate Totals

Description	Rate	Hours	Amount	Totals
Labor		16,189 hrs	1,462,275	
Material			3,706,432	
Subcontract			5,162,126	
Equipment		9,301 hrs	281,493	
Other			1,245,000	
			11,857,326	**11,857,326**
Labor Mark-up	15.00 %		219,341	
Material Mark-up	10.00 %		370,643	
Subcontractor Mark-up	10.00 %		516,213	
Construction Equipment Mark-up	10.00 %		28,149	
Other - Process Equip Mark-up				
			1,134,346	**12,991,672**
Material Shipping & Handling	2.00 %		74,129	
Material Sales Tax	9.25 %		342,845	
Other - Process Eqp Sales Tax				
Net Markups			**416,974**	**13,408,646**
Contractor General Conditions	15.00 %		2,011,297	
			2,011,297	**15,419,943**
Start-Up, Training, O&M	2.00 %		308,399	
			308,399	**15,728,342**
Undesign/Undevelop Contingency	40.00 %		6,291,336	
			6,291,336	**22,019,678**
Bldg Risk, Liability Auto Ins	2.00 %		440,394	
			440,394	**22,460,072**
Payment and Performance Bonds	1.50 %		336,901	
			336,901	**22,796,973**
Escalation to Midpoint (ALL)	11.69 %		2,664,966	
Gross Markups			**2,664,966**	**25,461,939**
Total				**25,461,939**

Attachment B: Project Schedule

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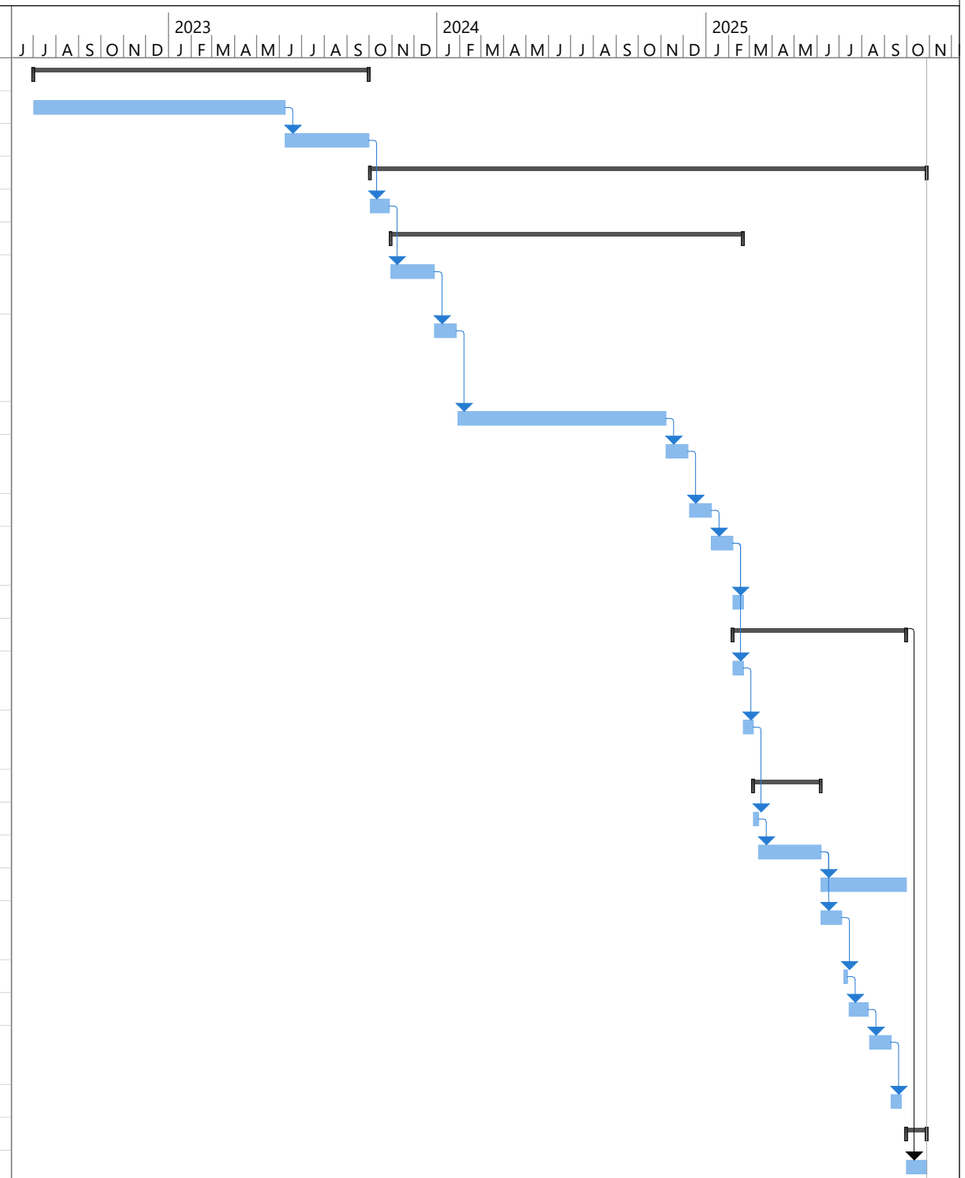
WTP Filter Rehab Evaluation

ID	Task Mode	Task Name	Duration	Start	Finish	Predecesso	Resource Names
1		**Preconstruction**	**320 days**	**Fri 7/1/22**	**Fri 9/29/23**		
2		Design	12 mons	Fri 7/1/22	Wed 6/7/23		
3		Bidding	4 mons	Thu 6/8/23	Fri 9/29/23	2	
4		**Construction**	**525 days**	**Mon 10/2/23**	**Mon 10/27/25**		
5		Mobilization	1 mon	Mon 10/2/23	Fri 10/27/23	3	
6		**New Filters**	**330 days**	**Mon 10/30/23**	**Wed 2/19/25**		
7		Relocate existing pipeline from the new filter area and install new filter finished water pipelines	2 mons	Mon 10/30/23	Wed 12/27/23	5	
8		Install tie in point for the new filter where they connect to the settled water pipeline, backwash water pipeline, and drains to Lower Pond	1 mon	Thu 12/28/23	Fri 1/26/24	7	
9		Construction of New filters	10 mons	Mon 1/29/24	Wed 11/6/24	8	
10		Extend chemical feeds to the new filters and finished water pipeline	1 mon	Thu 11/7/24	Fri 12/6/24	9	
11		Start-up disinfect and test new filters	1 mon	Mon 12/9/24	Tue 1/7/25	10	
12		Division of Drinking Water Certification of New Filters	1 mon	Wed 1/8/25	Wed 2/5/25	11	
13		Comissioning of New Filters	2 wks	Thu 2/6/25	Wed 2/19/25	12	
14		**Rehab Existing Filters**	**165 days**	**Thu 2/6/25**	**Mon 9/29/25**		
15		Temporarily cap chemical feeds and remove shed over chemical fee area	2 wks	Thu 2/6/25	Wed 2/19/25	12	
16		Demo existing filter interiors and pipe gallery equipment	2 wks	Thu 2/20/25	Wed 3/5/25	15	
17		**Reconstruct filters**	**65 days**	**Thu 3/6/25**	**Thu 6/5/25**		
18		Coat existing walls and slab	1 wk	Thu 3/6/25	Wed 3/12/25	16	
19		Install AWI filter underdrains and deeper media	12 wks	Thu 3/13/25	Thu 6/5/25	18	
20		Reconstruct filter gallery piping	4 mons	Fri 6/6/25	Mon 9/29/25	19	
21		Install new electrical and instrumentation/control systems	1 mon	Fri 6/6/25	Thu 7/3/25	19	
22		Reconnect finished water chemical feeds and test	1 wk	Mon 7/7/25	Fri 7/11/25	21	
23		Start-up and testing for filters	1 mon	Mon 7/14/25	Fri 8/8/25	22	
24		Division of Drinking Water Certification of Reconstructed Filters	1 mon	Mon 8/11/25	Mon 9/8/25	23	
25		Commissioning of rehabbed filters	2 wks	Tue 9/9/25	Mon 9/22/25	24	
26		**Project Closeout**	**20 days**	**Tue 9/30/25**	**Mon 10/27/25**		
27		Project Closeout	1 mon	Tue 9/30/25	Mon 10/27/25	14	



Project: WPT Filter Rehab Evalu
Date: Fri 1/7/22

Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	
Summary	Inactive Summary	Manual Summary	External Milestone		

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