

STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

PETITION OF THE CITY OF EVANSVILLE,)
INDIANA, FOR AUTHORITY TO ISSUE)
BONDS, NOTES, OR OTHER OBLIGATIONS,)
FOR AUTHORITY TO INCREASE ITS RATES) CAUSE NO. 45545 S1
AND CHARGES FOR WATER SERVICE, AND)
FOR APPROVAL OF NEW SCHEDULES OF)
WATER RATES AND CHARGES.)

PUBLIC'S EXHIBIT NO. 2

TESTIMONY OF JAMES T. PARKS

ON BEHALF OF

THE INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR

November 18, 2022

Respectfully submitted,



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CERTIFICATE OF SERVICE

This is to certify that a copy of the *Public's Exhibit No. 2- Testimony of James T. Parks on behalf of the OUCC* has been served upon the following counsel of record in the captioned proceeding by electronic service on November 18, 2022.

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TESTIMONY OF OUCC WITNESS JAMES T. PARKS
CAUSE NO. 45545 S1
CITY OF EVANSVILLE

I. INTRODUCTION

1 **Q: Please state your name and business address.**

2 A: My name is James T. Parks, P.E., and my business address is 115 W. Washington
3 Street, Suite 1500 South, Indianapolis, IN 46204.

4 **Q: By whom are you employed and in what capacity?**

5 A: I am employed by the Office of Utility Consumer Counselor ("OUCC") as a Senior
6 Utility Analyst in the Water/Wastewater Division. My qualifications and experience
7 are described in Appendix A.

8 **Q: What is the purpose of your testimony?**

9 A: My testimony evaluates the City of Evansville's ("Evansville") request for
10 additional financing authority of \$17.669 million dollars for seven additional
11 construction items for its new 50 MGD Water Treatment Plant.

12 **Q: Please describe the review and analysis you conducted for your testimony.**

13 A: I reviewed the subdocket testimony from Evansville's sole witness, Douglas L.
14 Baldessari, CPA, Baker Tilly Municipal Advisors, LLC ("BTMA") including Mr.
15 Baldessari's two Attachments and one Workpaper.

16 Attachment DLB-1 Petitioner's Response to OUCC's Objection to
17 Petitioner's Debt True-Up Report and Request for
18 Subdocket, Cause No. 45545, Aug. 19, 2022 (42 pages)

19 Attachment DLB-2 New Water Filtration Plant Project Cost Considerations
20 prepared by Shawn R. Wright, Director - Project
21 Management Office, September 13, 2022 (2 pages)

22 Workpaper DLB-1 Untitled, Cover page, Project Costs (1 spreadsheet) and
23 Calculations (1 spreadsheet)

1 I wrote discovery requests and reviewed Evansville's responses including its
2 objections to discovery. Finally, I compiled and attached various documents, which
3 I refer to in my testimony. These attachments are listed in Appendix B.

II. INITIAL MATTERS

4 **Q: Has Evansville sufficiently justified its request for increased financing**
5 **authority for \$17.669 million in additional funding for the seven additional**
6 **construction items?**

7 A: No. Evansville witness Mr. Baldessari provided no evidence justifying the need for
8 larger diameter and deeper auger cast piles and six additional items at the new water
9 treatment plant or for their costs except for a two-page internal EWSU letter from
10 Shawn R. Wright, Attachment DLB-2, and a minimal two spreadsheet workpaper
11 showing project costs and cost calculations, Workpaper DLB-1.^{1, 2} Evansville did
12 not provide engineering testimony about why these items are needed. It also appears
13 Mr. Wright was not the actual person determining the need for additional items or
14 their costs.³ Evansville's testimony on its request for \$17.669 million in additional
15 funding for the seven additional construction items is unsupported and without
16 witness testimony.

17 Therefore, the OUCC was faced with preparing its testimony strictly through
18 discovery to determine if Petitioner's requested additional financing authority is

¹ See Attachment DLB-2 to the case-in-chief testimony of Douglas L. Baldessari for the two-page letter to Lane Young, EWSU Executive Director from Shawn R. Wright, Director - Project Management Office, titled New Water Filtration Plant Project Cost Considerations, September 13, 2022.

² See Mr. Baldessari's Workpaper DLB-1. In the file properties of Workpaper DLB-1, John Krinks is shown as the author. Mr. Krinks was not a witness in Cause No. 45545 and is not a witness in this Subdocket.

³ Id.

1 justified, prudent and reasonable. However, the OUCC's review has been made
2 more difficult by Petitioner's refusal to provide much of the information requested
3 by the OUCC in Data Requests 2, 3, 4, 5, and 7. More specifically, Petitioner refused
4 to answer "on the grounds and to the extent the request seeks information which is
5 irrelevant to this proceeding and not reasonably calculated to lead to the discovery of
6 admissible evidence. The information requested is irrelevant to the limited issues set
7 forth in this subdocket proceeding."⁴ Petitioner refused to answer many of the OUCC's
8 data request questions including the following:

9 DR 3-13 Evansville's Agreed Order, Case No. 2020-26934-W, for the IDEM
10 Enforcement action regarding Ohio River discharge outfalls.

11 DR 3-14 Communications with IDEM since December 1, 2019, regarding the
12 mercury variance including Evansville's request to renew the variance.

13 DR 4 15 data request questions.

14 DR 5 A single question with seven subparts regarding the Guaranteed Energy
15 Savings Contract ("GESc").

16 DR 7 A single question asking for the percent design completion on which
17 Evansville's new \$241,215,000 cost estimate is based and the
18 corresponding AACE Class estimate.

19 **Q: Has the Commission faulted Evansville for inadequate information provided**
20 **in its prior case-in-chief testimonies?**

21 A: Yes. In Cause No. 45073 the Commission "strongly encourage[d] Evansville to
22 consider ways to improve the presentation of its requested relief":

⁴ Example of Petitioner's objections from its responses to DR 3-13 and 3-14.

1 **7. Commission Discussion and Findings.** As an initial
2 matter, we must express our agreement with the OUCC that the
3 information provided by Evansville in its case-in-chief to support its
4 requested rate relief was less than what should be considered
5 acceptable in several areas, particularly with respect to explanations
6 for adjustments and supporting documentation for proposed capital
7 projects (both in its CIP and Refresh Evansville program) and
8 associated costs. Evansville is reminded that it bears the burden of
9 proof in demonstrating it is entitled to its requested relief. The
10 OUCC should not have to request or otherwise seek basic supporting
11 documentation that should have been provided with Petitioner's
12 case-in-chief to support its requested relief. Further, even if the
13 OUCC is able to ascertain through discovery the information
14 necessary to support Petitioner's requested relief, the Commission,
15 which is the entity that must ultimately render a decision on the
16 matter, would still lack the necessary information to make its
17 determination because it is not privy to the parties' discovery. The
18 Commission strongly encourages Evansville to consider ways to
19 improve the presentation of its requested relief, including meeting
20 with the OUCC and Commission staff prior to the filing of its next
21 rate case to discuss the type of information that should be included
22 with its case-in-chief filing.⁵

23 Emphasis added by the OUCC

24 In Cause No. 45545 in March 2022, the Commission again noted Evansville's need
25 to provide adequate support for the relief it requests in its case-in-chief:

⁵ Cause No. 45073 Final Order, December 19, 2018, pp. 8-9.

1 **8. Other Matters.** In Evansville's last base rate case (Cause No.
2 45073), the Commission agreed with the OUCC that Evansville failed
3 to provide in its case-in-chief sufficient explanations for adjustments
4 and supporting documentation for its requested relief. Although
5 Evansville followed our directive and met with the Commission and the
6 OUCC immediately prior to filing this case, we find Evansville's case-
7 in-chief again failed to contain sufficient information in certain areas.
8 Several of the observed deficiencies, such as the failure to provide the
9 contracts supporting its expense adjustments, are noted herein.
10 Moreover, we believe the extensive discovery in this case could have
11 been minimized if Petitioner had provided the necessary information
12 and supporting documentation relied upon in developing its case-in-
13 chief with its filing in this Cause. In addition, in 2020, the Commission
14 adopted General Administrative Order 2020-05, Improving Procedural
15 Efficiencies, which set forth guidelines and recommendations for rate
16 case filings that Petitioner, for the most part, failed to follow. Therefore,
17 within 30 days after issuance of this Order and all opportunities for
18 further appeal have been exhausted, Petitioner shall contact the
19 Commission's Water/Wastewater Division to schedule a meeting to
20 discuss possible improvements to Petitioner's future filings in an effort
21 to allow for more efficient processing of Petitioner's requested relief.⁶

22 Emphasis added by the OUCC

23 In both cases, the Commission found Evansville failed to provide adequate
24 information, and in Cause No. 45545 it concluded that Evansville failed to follow
25 the guidelines and recommendations for rate case filings under GAO 2020-05.

26 **Q: Was the relief requested in the sub-docket testimony on September 23, 2022,**
27 **adequately supported?**

28 A: No. Evansville's limited subdocket testimony suffers from the same lack of
29 information noted by the Commission in the two previous rate orders. Evansville
30 submitted only Mr. Baldessari's testimony and did not provide expert engineering
31 testimonies from any engineering or Utility staff witnesses to support the need for
32 approximately \$70,000,000 of additional financing. To justify its 30% contingency

⁶ Cause No. 45545 Final Order, March 2, 2022, pp. 34-35.

1 embedded in its current authority (Final Order, Cause No. 45545, p. 10), Evansville
2 insisted that it had not presented Class 3 estimates for approval but that they were
3 merely planning level estimates. Consequently, the foundation on which Evansville
4 proposes to justify its *additional* \$70,000,000 of borrowing authority is not solid.
5 Moreover, looking only at the \$17,699,000 in requested increased construction costs
6 for seven other construction items not previously included in the 2021 estimate,⁷
7 Evansville failed to provide any of the supporting engineering documents on which
8 it relied to determine the need and cost for those items.

III. ADDITIONAL CONSTRUCTION ITEMS

9 **Q: Evansville seeks extra funding authority for seven additional construction**
10 **items for the new Water Treatment Plant. What are these other items?**

11 A: Mr. Baldessari testified additional construction items Nos. 3 to 9 with estimated
12 costs totaling \$17,699,000 were identified through additional design work, site
13 investigation / analysis and additional investigation into the regulatory needs
14 including PFAS regulations.^{8, 9} I list these seven additional projects in Table 1.
15 Petitioner's starting cost is the original 2021 estimate. It appears Petitioner has not
16 updated its starting 2021 estimate or lowered the contingency despite additional
17 design work over the past 18 months. For purposes of my discussions, I refer to the

⁷ In Cause No. 45545, Evansville submitted Direct Testimony from Lane T. Young, EWSU Executive Director, and Direct and Rebuttal Testimonies from Douglas L. Baldessari, CPA, Baker Tilly Municipal Advisors, LLC, Michael Labitzke, P.E, Director of the Program Management Office, EWSU, and Simon M. Breese, P. Eng. Vice President and National Technical Director, Water Treatment, Americas, AECOM.

⁸ See Mr. Baldessari's case-in-chief testimony on pages 10-11.

⁹ PFAS stands for per- and polyfluoroalkyl substances, a group of man-made industrial chemicals used since the 1950s because of their non-stick, water resistant, low surface tension, and surface spreading properties. These substances are very stable and do not break down but rather persist in the environment.

1 original cost estimate from Cause No. 45545 as the “2021 cost estimate” or “2021
 2 estimate” (Jan. 2021 dollars) and the current cost estimate as the “subdocket
 3 estimate,” “2022 cost estimate,” or “2022 estimate” (Aug. 2022 dollars).

**Table 1 – Additional Item Costs Requested by Evansville
 45545 S1 Subdocket**

Item	Cost Description	Proposed Costs
1	Original Construction Cost (No Residuals Dewatering)	\$126,439,000
	Cost Escalation (March 2021 to Aug. 2022) (15.69%)	<u>\$19,838,000</u>
2	Construction Cost with Escalation to Current Dollars	\$146,277,000
3	Additional Auger-Cast Pile Foundations	\$3,069,000
4	Levee Authority Bldg. Demolition & Site Prep.	\$750,000
5	Contaminated Soil Testing and Hauling	\$6,000,000
6	River Intake: Replacement of All Piping	\$4,629,000
7	River Intake: Additional Needed Improvements	\$267,000
8	Pretreatment: Add cover for algae prevention	\$670,000
9	Filters: Deepen beds for future PFAS treatment	<u>\$2,284,000</u>
	Subtotal of Items 3- 9 (all additions)	\$17,669,000
	Revised Construction Subtotal	\$163,946,000
10	Soft Project Costs (7.75%)	\$12,706,000
11	Current Market Escalation (8.5%)	<u>\$13,935,000</u>
	Total Project Cost Estimate	\$190,587,000

4 **Q: Were costs from any of these seven construction items already included in**
 5 **Evansville’s 2021 cost estimate?**

6 **A:** Yes. Except for Item No. 4 (Levee Authority Building) and Item No. 8 (Pretreatment
 7 Covers), which are entirely new items, some costs for these construction items were
 8 already included in the 2021 cost estimate. Components in the 2021 estimate include

1 parts of Items No. 3,¹⁰ No. 5, No. 6, No. 7, and No. 9. However, Petitioner's request
2 only adds costs, never reducing or eliminating the previous costs associated with
3 these items. Before submitting its request for additional approval, Evansville should
4 have identified and removed component costs that were already included in the 2021
5 estimate if they are no longer needed due to 2022 design changes. To prevent double
6 counting of these items, I have identified the component costs that should be
7 removed. (Note: All costs shown below are in August 2022 dollars.):

8 Item No. 3 (Auger cast piles) Costs of \$3,241,000 for 1,669 auger cast piles
9 (18-inch diameter and 25 feet deep) were already included. Petitioner now proposes
10 580 larger diameter and deeper auger cast piles, all at a 75 ft. maximum length.

11 Item No. 5 (Offsite soil disposal) Offsite disposal costs of \$1,600,000 for
12 80,000 cubic yards ("CY") of excess soil (called Spoils to Waste) at \$20.00 per CY
13 were already included.

14 Item No. 6 (River intake piping) EWSU included in the 2021 estimate,
15 \$170,000 for resurfacing valves that it now wants to replace with new valves.

16 Item No. 7 (River intake improvements). EWSU already included \$180,000
17 to replace the HVAC system, \$234,000 for the electrical system and lights, and
18 \$78,000 to replace the entrance sidewalk and handrail.

19 Item No. 9 (Deeper filters for PFAS). EWSU already included in the 2021
20 cost estimate, \$1,172,000 for filters three feet deeper consisting of additional

¹⁰ Petitioner recognized a small portion of the smaller and shorter auger cast piles from the 2021 estimate but incorrectly calculated the revised costs for what appears to be an unsupported, conservative (worst case) auger cast pile design.

1 concrete of \$391,000 and additional filter media of \$781,050.

2 **Q: A year and a half has passed since Evansville filed its Cause No. 45545 case-in-**
3 **chief on May 10, 2021. Did the OUCC request an updated cost estimate?**

4 A: Yes. With the understanding design progressed to 60% completion, the OUCC
5 wanted to review and compare the most recent project cost estimate to the previous
6 2021 estimate and Petitioner's additional financing request. However, in discovery,
7 Petitioner provided only a single-page letter without supporting information, from
8 John Krinks of AECOM, Evansville's design engineer with costs matching those
9 shown in Attachment DLB-2.¹¹ Mr. Krinks' September 10, 2022, project cost letter
10 to Mr. Wright is essentially the same as Mr. Wright's September 13, 2022, project
11 cost letter to Lane T. Young, EWSU Executive Director that was provided as
12 Attachment DLB-2. It fell short of providing useful information on Petitioner's
13 current design and latest anticipated costs.

14 **Q: Did the OUCC seek support for costs Evansville listed in Attachment DLB-2?**

15 A: Yes. In follow-up discovery, the OUCC requested copies of documents Mr. Krinks
16 relied on to establish the increases and copies of communications between
17 Evansville and AECOM about these significant cost estimate increases. Evansville
18 did not provide any supporting documents or any communications between the
19 parties.¹² Evansville did provide an Excel file containing a cost table and a cost
20 calculation page that was almost the same as Mr. Baldessari's workpaper DLB-1.
21 This too was unhelpful in the OUCC's review of support for Petitioner's additional

¹¹ See Attachment JTP-1 for Petitioner's response to DR 1-3 which requested the most recent project cost estimate prepared by the design engineer. Attachment OUCC DR 1-3 is the September 10, 2022, project cost letter from John Krinks, AECOM, to Shawn Wright, EWSU.

¹² See Attachment JTP-2 for Petitioner's response to DR 3-3.

1 funding and whether it is prudent and reasonable.

A. Item No. 3 - Additional foundations requirements for auger cast piles - \$3,069,000

2 **Q: Did Petitioner include auger cast piles in the 2021 estimate?**

3 A: Yes. Based on my review of the Timberline cost estimating program output, it
4 appears the design engineer, AECOM, accounted for at least 1,669 auger cast piles
5 in its estimate.^{13, 14} These piles were 18-inch diameter and 25 feet deep.¹⁵

6 **Q: Did Evansville provide support in its sub-docket case for its claim that the**
7 **auger cast piles must be larger 24-inch diameter and deeper?**

8 A: No. Petitioner only asserts that “further investigation by the geotechnical and
9 structural teams has identified deeper auger cast piles to prevent excessive settling
10 and liquefaction than the foundation system that was originally budgeted” but
11 provided no engineering documents to support the change. It is unknown who
12 determined changes were needed or when the decision was made. Evansville *did not*
13 *provide any foundation analysis reports* prepared by geotechnical or structural
14 engineers in its filing or in discovery recommending larger diameter or deeper auger

¹³ Auger cast piles, a concrete column foundation drilled using a continuous auger, are rapidly installed and cost-efficient for developing load carrying capacity in soils. Drilled to depths per geotechnical requirements, little, if any, soil is removed. Concrete is then pumped under pressure down the auger's hollow stem to the bottom of the hole. Concrete pumping continues to fill the drilled hole with high cement concrete as the augers are progressively withdrawn in a carefully controlled, simultaneous operation. Relying in part on <https://www.hardmanconstruction.com/capabilities/auger-cast-piles/>.

¹⁴ AECOM specifically listed piles in the 2021 cost estimate details (Timberline estimate) for the following systems: Pretreatment basins (410 piles), Ozone Bldg./Contact Basin (121 piles), Filtration (329 piles), and Clearwell (809 piles – 75% of the large clearwell piles) for 1,669 total piles. Piles were not detailed in the Timberline estimate or the Advanced Facility Plan for the new Administration, Maintenance, and Chemical Buildings and the Washwater Tank but may be embedded in other lines items for these structures.

¹⁵ See Attachment JTP-3 for Petitioner's responses to DR 17-6 and DR 17-10 regarding cost support for the new treatment plant cost estimate that was provided in Cause No. 45545.

1 cast piles which at 75 feet are over three times deeper than originally shown.¹⁶

2 The OUCC specifically requested: 1) copies of documents Petitioner relied
3 on for this added cost, and 2) communications between AECOM and Evansville
4 about the need for increased costs caused by design changes. We also requested
5 complete copies of all geotechnical reports.¹⁷ Petitioner did not provide the
6 requested documents. Petitioner's Attachment 3-7 to its supplemental response to
7 DR 3-7 appears to be portions from CTL Engineering's preliminary findings report,
8 dated April 20, 2021, but this report does not mention diameter, depth, or number
9 of piles. It is also important that CTL's April 2021 preliminary findings report
10 occurred after AECOM's March 2021 Advanced Facility Plan and the 2021 cost
11 estimate but before Petitioner filed its Cause No. 45545 testimony in May 2021.

12 **Q: In its Subdocket testimony did Petitioner note it had already included auger**
13 **cast pile costs in its 2021 estimate?**

14 A: No. Petitioner did not note the 2021 estimate already included 1,669 auger cast piles
15 totaling \$3,241,000 (Aug. 2022 dollars). This should be the starting point for
16 Petitioner's cost analysis of auger cast pile design changes and cost increases, if any.
17 Evansville's failure to account for the previously included auger cast pile costs
18 results in a double counting of costs for purposes of its new financing request. The
19 double counting of costs should be removed. I address this in more detail below.

20 **Q: What is your evaluation of Evansville's request for larger and deeper piles?**

21 A: Evansville's request for an additional \$3,069,000 to install 580 auger cast piles is

¹⁶ See Attachment DLB-2, New Water Filtration Plant Project Cost Considerations letter from Shawn R. Wright to Lane Young, September 13, 2022, in the Case-in-Chief testimony of Douglas L. Baldessari.

¹⁷ See Attachment JTP-2 for Petitioner's responses to DR 3-3 pertaining to cost support and supplemental response to DR 3-7 regarding geotechnical reports.

1 unsupported by any geotechnical report or engineer recommendations to increase
2 the piles' diameter to 24-inches (from 18-inches) or to lengthen all piles to 75 feet
3 (from 25 feet). In fact, Petitioner disclosed in discovery that the geotechnical work
4 was unfinished when Petitioner made its additional funding request on September
5 23, 2022, and the geotechnical work will not be completed until the end of 2022.¹⁸
6 According to AECOM's contract, preliminary geotechnical work was to have been
7 conducted in 2020 during site investigations and finalized by the end of 2020.
8 Geotechnical work should be performed early in design. It is surprising that this
9 work has been delayed given Evansville selected its preferred Alternative 2B in late
10 2020 and has had access to most of the city owned project site.

11 In Task 6, Draft Preliminary Engineering Report and Drawings, AECOM
12 was to further develop preferred Alternative 2B with preliminary geotechnical
13 investigations and soil borings to recommend structure foundations, including
14 identifying the allowable soil bearing capacity and costs. Task 6 and the
15 geotechnical work was due December 23, 2020, with Task 7, Final Preliminary
16 Engineering Documents due March 31, 2021.¹⁹ It appears these tasks were delayed.
17 Another series of geotechnical investigations are to be completed in 2022.

18 **Q: When will AECOM complete this second round of geotechnical work?**

19 A: In response to discovery asking for copies of geotechnical reports to better
20 understand Petitioner's requested funding increase, Petitioner reported that "the
21 final geotechnical reports are not complete" and "Expected completion of borings

¹⁸ See Attachment JTP-2 for Petitioner's responses to DR 3-3 and DR 3-7.

¹⁹ See Attachment JTP-4 for the AECOM contract, August 20, 2019.

1 is October 28, 2022 and it is anticipated the final geotechnical report will be
2 completed within 4 to 6 weeks once this field work is completed.”²⁰ This begs the
3 questions why and on what basis Evansville is requesting additional auger cast pile
4 funding without completed geotechnical work, foundation recommendations or a
5 reviewed and accepted final report. In addition, in response to discovery Petitioner
6 indicated that no communications exist between CTL Engineering, the geotechnical
7 consultant, AECOM, and Evansville about the auger cast pile changes that
8 Evansville claims is causing increased costs.²¹

9 **Q: Has evidence been provided that all auger cast piles need to be 75 feet long?**

10 A: No. The 75 feet depth appears to be a conservative worst-case assumption that
11 should not be required for every pile. Auger depths depend on factors such as the
12 structure's load and elevation. I understand AECOM's design buries the clearwells
13 below grade underneath the filters, which should shorten the clearwells' 154 piles.
14 However, to better understand the elevations of new structures and pile depths, the
15 OUCC requested the proposed WTP's current hydraulic profile with major
16 elevations.²² Petitioner did not provide the information requested.

17 For the nearby proposed buried clearwell in Cause No. 45073, auger cast
18 piles were proposed “at a depth of approximately 40 ft., as was designed for many

²⁰ See Attachment JTP-2 for Petitioner's response and supplemental response to DR 3-7 pertaining to the geotechnical work.

²¹ See Attachment JTP-2 for Petitioner's response to DR 3-3 regarding communications between AECOM and Petitioner about project cost increases. No such communications were provided to the OUCC implying there were none.

²² See Attachment JTP-5 for Petitioner's response to DR 4-3 objecting to providing the hydraulic profile.

1 of the existing buried nearby WTP process tankage.”²³ Based on my review of
2 construction permit design drawings, the nearby Sunrise Effluent Pump Station
3 included 18-inch auger cast piles that were 50 and 60 feet long.²⁴ Therefore, it
4 appears that other auger cast piles installed or proposed nearby were all shorter than
5 75 feet. Nevertheless, for purposes of my analysis of Petitioner’s requested cost
6 increase, I accepted Petitioner’s assumed 24-inch diameter and 75 ft. length for the
7 580 auger cast piles.

8 **Q: Did Evansville support its assumed concrete cost for the auger cast piles?**

9 A: No. Petitioner presents the \$2,079 cost per CY (with 10% contingency) as an all-
10 inclusive unit price for the work. Petitioner did not reference the source of its
11 assumed \$2,079 per CY unit cost and did not provide basic information detailing
12 the cost’s make-up such as contractor quotes, materials list and costs, equipment
13 costs, and labor costs, etc. As such, the \$2,079 per CY price should be viewed as an
14 unsupported placeholder amount.

15 **Q: Did you make your own evaluation of cost?**

16 A: Yes. To review if Petitioner’s assumed \$2,079 per CY unit cost is reasonable, I first
17 contacted local suppliers to obtain concrete prices (November 2022). The current
18 delivered price for 4,000 psi concrete is \$136/CY (Meuth Construction Supply,
19 Inc.). This cost is just a fraction (6.5%) of the cost Petitioner assigned to the auger
20 cast pile installation which indicates to me that the \$2,079 cost/CY is inflated and
21 should not be used. Pricing auger cast piles by the cubic yard of concrete also

²³ Preliminary Engineering Report, High Service Pump Station and Clearwell Project #25, June 2018, p. 25-43.

²⁴ Sunrise Effluent Pump Station design drawings were obtained from IDEM’s Virtual File Cabinet.

1 appears to be non-typical. Auger cast piles are normally priced per vertical foot.

2 Therefore, I converted Evansville's cost based on concrete CY to yield
3 \$241.91 per vertical foot ("VF") or \$18,143 per pile.²⁵ As discussed below,
4 Evansville's price appears to be unreasonably high and should not be relied on to
5 determine any needed cost increase.

6 **Q: Do you have any other observations about Petitioner's request for additional**
7 **auger cast pile funding?**

8 A: Yes. Petitioner's calculations provided in Workpaper DLB-1 are in error regarding
9 the concrete volume. I calculated that the extra concrete needed for 580, 24-inch
10 diameter, 75 feet long piles instead of 580, 18-inch, 25 feet long piles should be
11 4,112 CY instead of the 1,426 CY calculated by Petitioner. At Petitioner's price of
12 \$2,079/CY, the extra concrete cost would have been \$8,550,000 instead of
13 Petitioner's requested \$3,069,000. *See* Attachment JTP-6 for the OUCC's
14 calculations of auger cast pile costs and corrections to Petitioner's calculations.

15 **Q: What cost information did you use to estimate costs for the auger cast piles?**

16 A: I used an average of 24-inch diameter pile budgetary quotes I received from Beaty
17 Construction of \$87.50 per VF and from Keller-North America of \$109.00 per VF.²⁶
18 I also checked these quotes against costs from two other sources. These sources and
19 their associated costs per VF included:

²⁵ Calculated as 8.73 CY of concrete per auger cast pile (24-inch dia. by 75 ft. long) times Evansville's assumed \$2,079 per CY equals \$18,143 per pile. The cost per vertical foot is then calculated as \$18,143 per pile divided by 75 feet equals \$241.91 per foot.

²⁶ *See* Attachment JTP-7 for website information for Beaty Construction, Inc. and notes regarding the \$87.50 per VF budgetary cost quote obtained via telephone on November 5, 2022, a \$109.00 quotation from Keller – North America (Fall 2023 prices), and cost information for 18-inch auger cast piles from RS Means and Timberline, received in 2021 in response to DR 17-6 in Cause No. 45545.

- 1 1. RS Means cost estimating service - \$49.53 per VF for an 18-inch auger cast
2 pile with no casing (Evansville prices, 3rd quarter of 2022 – all in price with
3 overhead and profit). RS Means did not list a VF cost for 24-inch piles.
- 4 2. AECOM's Timberline cost estimating software output (June 2020 updated
5 to Aug. 2022 dollars) provided in Cause No. 45545 - \$71.42 per VF for an
6 18-inch dia. auger cast pile, 25 feet long.²⁷
- 7 3. Beaty Construction, Inc. of Boggs town, IN - \$87.50 per VF for a 24-inch
8 diameter pile, 75 feet long (with no casing and no reinforcement)
- 9 4. Keller – North America of Shepherdsville, KY - \$109.00 per VF for a 24-
10 inch diameter pile, 75 feet long (with no casing but 35 ft. of reinforcement).

11 **Q: You showed AECOM already included \$3,241,000 (updated to August 2022**
12 **dollars) for auger cast piles in its 2021 estimate. What cost did you calculate for**
13 **the larger and deeper auger cast piles that Petitioner now seeks to build?**

14 A: Beaty Construction's Senior Estimator recommended a total budget of \$4 million
15 that includes \$3,806,250 for 43,500 VF of 24-inch auger cast piles at \$87.50 per VF
16 plus mobilization, demobilization, and load testing. The Keller-North America
17 quote was \$4,916,250. The two contractor quotes averaged \$4,458,000 (rounded).²⁸

18 **Q: How much extra cost should the Commission authorize for the revised auger**
19 **cast piles?**

20 A: I recommend that instead of Petitioner's requested \$3,069,000, the Commission
21 should authorize \$1,217,000 added to the \$3,241,000 already included in the 2021
22 estimate (updated to August 2022 dollars) bringing the total auger cast pile cost to

²⁷ Calculated as \$42.03 per VF (Timberline June 2020 output – raw cost) times 1.5621 to account for AECOM's 2021 assumed contingencies, escalation, general conditions, overhead and profit equals \$65.66 per VF (January 2021 dollars) times 8.76% escalation equals \$71.42 per VF (August 2022 dollars).

²⁸ See Attachment JTP-7 for the auger cast pile quotations.

1 \$4,458,000 (August 2022 dollars). Petitioner should be authorized additional
2 financing authority of \$1,217,000 for auger cast piling.

B. Item No. 4 - Levee Authority Building demolition & site preparation - \$750,000

3 **Q: Was the Levee Authority Building site part of the original proposed site for the**
4 **new Water Treatment Plant?**

5 A: No. In the Advanced Facility Plan in Cause No. 45545, Petitioner indicated it was
6 not practical to acquire both the City Garage and Levee Authority sites because the
7 new WTP could fit on only the City Garage site.²⁹

8 **Site Option 1 Discussion:** This property is presently occupied by the
9 Evansville Levee Authority and the City of Evansville Street
10 maintenance facility. Relocating the Levee Authority was
11 investigated by EWSU but was determined to not be practical.
12 However, the footprint of the maintenance facility alone is large
13 enough for the new plant and EWSU can relocate this facility.

14 **Q: Has Petitioner acquired the Levee Authority site?**

15 A: We do not know. In discovery, the OUCC asked for the total estimated costs, the
16 sources of funds, and the cost allocation between governmental agencies to relocate
17 the Evansville Vanderburgh Levee Authority and demolish the existing Levee
18 Authority Building. Petitioner objected to the question, did not provide the requested
19 information, and stated:

20 See objection. Petitioner is not asking for additional financing
21 authority in this Subdocket to complete this project. Petitioner is
22 repurposing the financing authority previously approved in Cause
23 No. 45545 for relocation of the City Garage to this project. This
24 request is irrelevant to Petitioner's request for additional financing
25 authority in this Subdocket proceeding.³⁰

²⁹ See Cause No. 45545, Attachment SMB-1, Water Treatment Plant, Advanced Facility Plan, Alternatives Report, March 2021 to the case-in-chief testimony of Simon M. Breese, May 10, 2021, p. 123.

³⁰ See Attachment JTP-5 for Petitioner's response to DR 4-7.

1 **Q: Why is Petitioner now acquiring the Levee Authority site?**

2 A: In Attachment DLB-2, Petitioner stated the Levee Authority leadership changed
3 their stance against relocating their offices and are willing to assist the utility.
4 Petitioner also stated that the previous layout was made before the proposed PFAS
5 regulations were known. Petitioner further stated "This space allows for a better
6 overall facility layout and sets the design up for potential expansion of the
7 pretreatment basin and filter building, which will allow space necessary for the
8 added PFAS treatment once those regulations are determined. This will require
9 demolition of the Levee facility."

10 **Q: Has Petitioner provided the OUCC with the revised site layout drawing**
11 **showing the better overall facility layout referenced in Attachment DLB-2?**

12 A: No. The OUCC requested Petitioner provide a copy of the current revised site layout
13 for the new Water Treatment Plant, state the layout date, and indicate the design
14 completion percentage (i.e., 30%, 50%, 60% etc.) corresponding to the layout
15 provided. Petitioner objected to the data request and did not provide any of the
16 requested information.³¹

17 **Q: In Attachment DLB-2, Petitioner stated that adding the Levee Authority site**
18 **allows space for added PFAS treatment (Item No. 4) but that the Filters need**
19 **to be deepened for PFAS treatment (Items No. 9). Is it correct that deepening**
20 **the filters does not require more space?**

21 A: Yes. There appears to be a contradiction between both expanding the layout and
22 deepening the filters for PFAS treatment, an anticipated treatment requirement that
23 has not yet been enacted.

³¹ See Attachment JTP-5 for Petitioner's response to DR 4-9 requesting the revised site layout.

1 **Q: Is the acquisition of the Levee Authority site a result of Evansville's Value**
2 **Engineering review in the Fall of 2021?**

3 A: That is possible, though we were unable to secure information that would allow us
4 to determine this. Moving the new WTP west to be closer to the existing WTP would
5 reduce the total length and cost of new 42-inch raw water lines from the existing
6 Intake Structure and possibly for electrical service and standby generator work.
7 There also might be cost savings from less disposal of contaminated soil. To
8 understand why Petitioner wanted the Levee Authority site, in addition to requesting
9 the revised site layout and hydraulic profile, the OUCC asked for information on
10 Petitioner's Value Engineering effort. However, once again, Petitioner objected to
11 the data request and refused to provide any information.³²

12 **Q: Do you agree that Petitioner should include costs to relocate the Levee**
13 **Authority offices and demolish the Levee Authority Building?**

14 A: No. Petitioner has not provided any support to allow a conclusion that this change
15 is prudent and reasonable or otherwise in the public interest. Petitioner failed to
16 provide any substantive information on this change, did not provide even the basic
17 revised site layout drawing, did not provide the relocation costs involved, or state
18 how those costs will be allocated between the Levee Authority and the Utility.
19 Petitioner has not explained why the City Garage site was sufficient for the new
20 WTP up to March 2022, but now both sites are needed. Finally, Petitioner's
21 justification that the Levee Authority site is needed for future PFAS treatment
22 seemingly contradicts its request for additional funds to deepen the filters for PFAS
23 treatment (but not expand the filter area).

³² See Attachment JTP-5 for Petitioner's response to DR 4-6.

C. Item No. 5 - Contaminated soil testing and hauling - \$6,000,000

1 **Q: Had Petitioner already included offsite soil disposal in the 2021 cost estimate?**

2 A: Yes. Petitioner indicated that because of the project, 80,000 cubic yards of excess
3 soil would be excavated, loaded onto trucks, and hauled offsite. Petitioner did not
4 identify or include landfill disposal costs. The possibility of contamination due to
5 City Garage activities was mentioned in the Advanced Facility Plan:

6 It should be noted that limited information on subsurface conditions
7 beneath the maintenance building is available, and there could be
8 some risk of soil contamination due to the nature of this facility.
9 Additional costs have not been included for removal / remediation of
10 soils, which can be highly variable depending on conditions.
11 However, over 80,000 cubic yards of soil is anticipated to be
12 disturbed in this alternative. For example, at a cost of \$30 per cubic
13 yard, the total additional cost would be \$2.4 million.³³

14 Based on my review of the Timberline cost estimating program output, it appears
15 the design engineer, AECOM, accounted for “spoils to waste” in its estimate.³⁴ The
16 term spoils to waste is an earthwork term meaning excess soils removed from a
17 project site, not necessarily that the soil was landfilled.

18 **Q: In its subdocket case, did Evansville support its request for additional funds**
19 **based on all 80,000 CY of excess soil being contaminated and requiring landfill**
20 **disposal as non-hazardous waste?**

21 A: No. Petitioner's only support consists of a single sentence in Mr. Baldessari's
22 testimony that “Environmental investigation has identified the presence of heavy

³³ See Attachment SMB-1, Water Treatment Plant, Advanced Facility Plan, Alternatives Report, March 2021 to the case-in-chief testimony of Simon M. Breese, May 10, 2021, pp. 127-128.

³⁴ AECOM specifically listed spoils to waste in the 2021 cost estimate details (Timberline estimate) for the following systems: Pretreatment basins (23,851 CY), Ozone Bldg./Contact Basin (10,343 CY), Filtration (27,102 CY), and Clearwell (30,597 CY – 75% of the large clearwell spoils to waste volume) for over 80,000 CY. The volume of spoils to waste were not detailed in the Timberline estimate or the Advanced Facility Plan for the new Administration, Maintenance, and Chemical Buildings and the Washwater Tank but may be embedded in other line items for these structures.

1 metals in the soil which need to be hauled to a non-hazardous landfill - \$6,000,000”
2 and Attachment DLB-2.³⁵ However, Evansville did not provide any findings of soil
3 contamination on the project site in its filing or in response to discovery.

4 The OUCC requested: 1) documents Petitioner relied on to determine this
5 added cost, and 2) communications between Evansville and AECOM about this
6 additional funding need.³⁶ Petitioner did not provide the requested information. The
7 OUCC also requested copies of all environmental site investigations, soil sampling,
8 and contaminated soil remediation reports for the new Water Treatment Plant
9 prepared since January 1, 2019. Petitioner provided a Draft Phase 1 Environmental
10 Site Assessment dated August 2022 prepared by AECOM and copies of
11 contamination reports for two nearby projects from 2017 and 2018 but did not
12 provide any soil testing results for the WTP project site.³⁷

13 **Q: Does Petitioner have *any* soil sampling results indicating that all 80,000 CY of**
14 **excess soils at the site are contaminated with heavy metals?**

15 A: No.

16 **Q: In its Subdocket testimony did Petitioner indicate offsite soil disposal costs were**
17 **in its 2021 estimate?**

18 A: No. Petitioner did not explain it had already included over 80,000 CY of spoils to

³⁵ See the case-in-chief testimony of Douglas L. Baldessari, p. 10. The description of how contaminated soil was identified in DLB-2 is different. In DLB-2, Mr. Wright states “Environmental investigations and other construction projects in the area have identified the presence of heavy metals in the soil which will need hauled to a nonhazardous landfill.” Emphasis added by the OUCC.

³⁶ See Attachment JTP-2 for Petitioner’s responses to DR 3-3 pertaining to cost support.

³⁷ See Attachment JTP-8 for Petitioner’s responses to DR 3-8 and 3-11 regarding soil contamination.

1 waste costs totaling \$1,600,000 (Aug. 2022 dollars).³⁸ This should have been
2 Petitioner's starting point for determining additional financing for off-site soil
3 disposal costs. Evansville's failure to account for off-site soil disposal costs
4 previously included in its 2021 estimate while requesting additional funds, would
5 cause these costs to be double counted for financing approval. These double counted
6 costs should be eliminated.

7 **Q: What is your evaluation of Evansville's request for additional funding for**
8 **landfill disposal costs?**

9 A: Evansville's request for an additional \$6,000,000 to landfill all 80,000 CY is
10 unsupported by any soil testing results. This is because Petitioner reported that even
11 though CTL Engineering collected soil samples during geotechnical work in
12 October 2022, a laboratory has not been hired and the soil samples have not been
13 analyzed.³⁹ The \$6,000,000 amount requested appears to be a worst-case
14 assumption that is unlikely to occur because not all soil will be contaminated.

15 **Q: When will retained soil samples be tested for contamination?**

16 A: In response to discovery, Petitioner stated "Soil contaminant sampling will be
17 conducted once the geotechnical borings are complete, using refrigerated samples
18 retained during drilling and is expected to occur in November."⁴⁰

³⁸ The spoils to waste cost (August 2022 dollars) is calculated as 80,000 CY times \$19.98 per CY equals \$1,598,000. The August 2022 cost of \$19.98 per CY starts with the 2020 Timberline offsite disposal cost used by AECOM of \$11.76 per CY times 1.23 (for 20% contingency, 3% escalation to midpoint) equals \$14.46/CY times 1.27 (12% general conditions, 10% overhead and profit, and 5% construction contingency) equals \$18.37/CY (January 2021 dollars) times 1.0876 equals \$19.98 per CY (August 2022 dollars).

³⁹ See Attachment JTP-2 for Petitioner's responses to DR 3-3 and DR 3-7.

⁴⁰ See Attachment JTP-8 for Petitioner's responses to DR 3-11.

1 **Q: When will Petitioner know how much of the 80,000 CY will require landfilling**
2 **because of contamination?**

3 A: Petitioner does not say.

4 **Q: Did Evansville support its assumed landfill disposal cost of \$30.00 per ton?**

5 A: No. Evansville used an unsubstantiated disposal cost of \$30.00 per ton but does not
6 report what it entails such as excavation, loading, hauling, and disposal. Petitioner
7 did not cite the source of its assumed cost. Pricing landfill disposal by the ton is
8 appropriate because weight, not volume (CY), is the basis for landfill tipping fees.

9 **Q: How many tons of soil does Evansville assume will be landfilled?**

10 A: Evansville assumes all 80,000 CY of soil will be landfilled, and it converted the CY
11 to 200,000 tons assuming each CY weighs 2.5 tons. Evansville's assumed 2.5 tons
12 per CY is overstated. So too is its assumption that all the soil must be landfilled. In
13 my tonnage calculations, I used a conservative weight of 1.6 tons per CY. Mr. Jeff
14 Perry, Landfill Special Waste Sales Manager for Republic Services, indicated he
15 assumes soil weighs 1.35 tons per CY.⁴¹

16 **Q: What is your estimated cost for offsite disposal of 80,000 CY?**

17 A: It is unreasonable to assume all soil removed must be landfilled or that the
18 contamination is uniform across the project site. It is more likely that certain areas
19 within the site will be contaminated such as the City Garage site and less
20 contaminated such as the Levee Authority site. It is also likely that deeper soils will
21 be less contaminated with heavy metals and can be used for clean fill soil. For my
22 excess soil disposal cost calculations, I assumed one-half of the soil (40,000 CY or

⁴¹ See Attachment JTP-9 for a budgetary landfill disposal quote from Republic Services who owns and operate the Laubscher Meadows Sanitary Landfill in Evansville.

1 64,000 tons) is landfilled at \$24.80 per ton based on a current quote from Republic
2 Services and the other half (40,000 CY) is clean fill disposed off-site at \$20.00 per
3 CY. The disposal cost is \$800,000 for clean fill disposal and \$1,587,000 for landfill
4 disposal. Total disposal cost is \$2,387,000 (August 2022 dollars).⁴²

5 **Q: Could offsite soil disposal costs be reduced?**

6 A: Yes. I understand Petitioner had identified potential Value Engineering ideas to
7 reduce costs, which included raising the elevations of process tanks to decrease the
8 amount of soil that had to be excavated. Moving the treatment tanks closer to the
9 existing WTP could also reduce the need to remove contaminated soil if there is less
10 contamination on the Levee Authority site than on the City Garage site.

11 **Q: Should water ratepayers pay to cleanup soil contamination caused by City**
12 **Garage operations?**

13 A: No. It is unlikely that Evansville's water operations caused any contamination that
14 may be present on the City Garage and Levee Authority sites. If contaminated soil
15 is shown to be present, clean-up can proceed to allow the WTP construction, but the
16 clean-up costs should be allocated to the party that caused the contamination.
17 AECOM recognized the potential delay from soil contamination in selecting the
18 City Garage site. In the Advanced Facility Plan, AECOM noted:

19 **Potential Soil Contamination:** Although the presence of
20 contamination in the soils is not known, there is a greater risk
21 of this potential issue for Alternative 2B given the nature of
22 the existing street maintenance facility which will be
23 relocated. Having to remediate any soils could delay the
24 project schedule and add to construction costs.⁴³

⁴² See Attachment JTP-10 for the OUCC's soil disposal calculations.

⁴³ See Attachment SMB-1, Water Treatment Plant, Advanced Facility Plan, Alternatives Report, March 2021 to the case-in-chief testimony of Simon M. Breese, May 10, 2021, p. 137 of 276.

1 Nonetheless, I made no adjustment to recommended financing authority for this
2 item based on my response to this question.

3 **Q: How much additional funds should the Commission authorize for excess soil**
4 **disposal?**

5 A: I recommend that instead of Petitioner's requested \$6,000,000, the Commission
6 should authorize \$787,000 be added to the \$1,600,000 already included in the 2021
7 estimate (updated to August 2022 dollars) bringing the total excess disposal cost to
8 \$2,387,000 (August 2022 dollars).

D. Item No. 6 - River Intake: Replacement of all piping - \$4,629,000

9 **Q: What does Petitioner propose for the River Intake piping?**

10 A: DLB-2 includes a brief description simply stating that "The river intake carbon steel
11 piping is beginning to develop leaks at welds and other signs of corrosion at fittings
12 and requests funds to replace this piping with new ductile iron pipe." DLB 2 states
13 this replacement is to cost an additional \$4,629,000.

14 **Q: Was the River Intake Structure evaluated for inclusion in the new WTP**
15 **project?**

16 A: Yes. Previously, AECOM had recommended rehabilitating the River Intake for
17 \$6,752,000 but did not include replacing the piping in the building based on an
18 Immediate Needs Assessment that evaluated components in the Intake and
19 recommended painting of the piping.⁴⁴

20 **Q: What evidence was provided to support the change and added funding?**

21 A: None. Petitioner provided no updated engineering evaluation or study to support the

⁴⁴ See Attachment JTP-11 for excerpts regarding the Intake Structure from Cause No. 45545, Attachment SMB-1, Water Treatment Plant, Advanced Facility Plan, Alternatives Report, March 2021 to the case-in-chief testimony of Simon M. Breese, May 10, 2021, pp. 47-51, 205, 212-214, and 235-237.

1 need for this additional work or to support the costs other than Attachment DLB-2
2 and Workpaper DLB-1.

3 **Q: Did Petitioner recognize costs related to the River Intake already included in**
4 **the 2021 cost estimate?**

5 A: No. EWSU included \$170,000 for resurfacing valves in the original 2021 estimate.
6 Petitioner's proposal includes replacing those valves. This \$170,000 cost should be
7 removed to avoid double counting.

8 **Q: Do you have other concerns with the cost estimate for Item No. 6?**

9 A: Yes. Petitioner did not provide the documents it relied on to determine these changes
10 are needed and used to prepare its request for the additional funding. EWSU's
11 assumed costs, for multiple items, listed in Workpaper DLB-1, appear to be inflated
12 including the assumed 30% contingency at \$1,068,000. Other unsupported costs that
13 appear excessive include pipe supports (\$250,000), Hardware/fasteners (\$100,000)
14 pipe demolition (\$150,000), and sequencing / Temp systems (\$350,000). Because
15 Petitioner's Low Service total pumping capacity is 146 MGD (3 screens, 6 pumps)
16 and firm capacity is 126 MGD while average flows are typically below 25 MGD,
17 Petitioner should be able to do all work sequentially on the piping systems serving
18 two pumps and one screen without extensive temporary systems, which is estimated
19 to cost \$350,000. This request for an additional \$4,629,000 in unsupported costs
20 amounts to a larger contingency reserve.

21 **Q: Do you recommend Petitioner receive additional borrowing authority for the**
22 **replacement of river intake piping?**

23 A: No.

E. Item No. 7 - River Intake: Additional needed improvements - \$267,000

1 **Q: What does Petitioner propose for additional improvements at the River**
2 **Intake?**

3 A: Petitioner wants to replace lighting (\$74,000), re-finish the building exterior
4 (\$115,000), paint the interior (\$27,000), Dolphin cell repair (\$25,000),⁴⁵ bridge
5 inspection (\$6,000), and miscellaneous unspecified plumbing and HVAC
6 improvements (\$20,000) for an additional \$267,000.

7 **Q: Was the River Intake Structure evaluated for inclusion in the new WTP**
8 **project?**

9 A: Yes. AECOM recommended rehabilitating the River Intake for \$6,752,000 and has
10 already included costs for most of this additional work. In addition, I testified in
11 Cause No. 45545 that AECOM increased the costs generated by the Timberline cost
12 estimating software by 107% for the Intake Structure rehabilitation and that
13 Petitioner embedded large estimating contingencies up to 30% and 5% construction
14 contingencies in most line items of the cost estimate.

15 **Q: What evidence did Petitioner provide to support the changes and added**
16 **funding?**

17 A: None. Petitioner provided no updated engineering evaluation or study to support the
18 need for this additional work or to support the costs other than Attachment DLB-2
19 and Workpaper DLB-1.

20 **Q: Did Petitioner recognize the costs that were already included in the 2021 cost**
21 **estimate to justify current debt authority?**

22 A: No. EWSU already had included \$180,000 to replace the HVAC system, \$234,000
23 for electrical system and lights, and \$78,000 to replace the entrance sidewalk and

⁴⁵ The Dolphin cell is a concrete filled steel structure that protects the River Intake Structure from possible impact by barges.

1 handrail. These costs should be removed to avoid double counting.

2 **Q: Do you have other concerns with the cost estimate for Item No. 7?**

3 A: Yes. Petitioner did not provide the documents it relied on to determine these changes
4 are needed and that it used to prepare its request for the additional funding.

5 **Q: What is your recommendation for Item No. 7?**

6 A: I recommend the Commission deny the additional funding because Petitioner has
7 not supported its request and because most of these costs have already been included
8 in the \$6,752,000 costs for the River Intake Rehabilitation that are already included
9 in the financing authority approved in Cause No. 45545.

F. Item No. 8 - Pretreatment: Add cover for algae prevention - \$670,000

10 **Q: What new project does Petitioner propose for the Pretreatment Basins?**

11 A: Citing algae issues in its current uncovered basins, DLB-2 states Evansville has
12 revised the design to cover the new pretreatment basins with a canopy structure for
13 an additional \$670,000.

14 **Q: Were algae issues identified during Cause No. 45545?**

15 A: No issues with algae were discussed in testimony, the Advanced Facility Plan, the
16 Immediate Needs Assessment, or Petitioner's rebuttal testimony.

17 **Q: What evidence did Petitioner provide to support the need to add the canopy
18 structure over the Pretreatment Basins and increase funding?**

19 A: None. Petitioner provided no updated engineering evaluation or study to support the
20 need for this additional work or to support the costs other than Attachment DLB-2,
21 which merely lists the total item costs.

22 **Q: Are covers normally installed over pretreatment basins?**

23 A: It appears they are not typically installed. I have toured several surface water
24 treatment plants (Michigan City, Indianapolis, Fort Wayne, Evansville) including

1 plants with inclined plate settlers (Bloomington, Muncie). I don't recall seeing any
2 canopies over the pretreatment (sedimentation) basins. It appears canopies are not
3 normally needed. In Evansville's case, I understand that detention times through the
4 new pretreatment tanks will be significantly shorter than the long detention times in
5 Petitioner's primary and secondary sedimentation tanks.

6 **Q: Do you have concerns with the need for and cost estimate for Item No. 8?**

7 A: Yes. Petitioner cited a quote from a prefabricated canopy supplier but did not
8 provide it and did not provide any other documents or studies that it relied on to
9 determine canopies are needed for algae control and that it used to prepare its request
10 for the additional funding. In addition, I am unaware of any drinking water standards
11 compliance issues for Evansville attributed to algae. Petitioner did not provide any
12 information about algae levels and algae problems in its testimony in Cause No.
13 45545 or in the Subdocket. Nor did Petitioner provide any studies or analysis it
14 relied on to determine that canopies are now needed.

15 **Q: What is your recommendation for Item No. 8?**

16 A: I recommend the Commission deny the additional funding because Petitioner has
17 not supported its request.

G. Item No. 9 - Filters: Deepen beds for future PFAS treatment - \$2,284,000

18 **Q: What new project does Petitioner propose for the Filters?**

19 A: Citing future per - and polyfluoroalkyl substances ("PFAS") drinking water
20 regulations, Petitioner wants to deepen the filters three feet to be able to add granular
21 activated carbon ("GAC") in the future for PFAS removal in lieu of biologically
22 active filtration for an additional \$2,284,000. Petitioner indicated the new WTP

1 filters will continue to operate as biologically active filtration unless a switch to
2 GAC is needed for PFAS mitigation.⁴⁶

3 **Q: Were PFAS issues identified during Cause No. 45545?**

4 A: No issues with PFAS or future regulation of PFAS were discussed in testimony, the
5 Advanced Facility Plan, the Immediate Needs Assessment, or in Rebuttal.

6 **Q: What evidence did Petitioner provide to support the need to deepen the filters
7 for future PFAS removal and increase funding?**

8 A: None. Petitioner provided no updated engineering evaluation or study to support the
9 need for this additional work or to support the costs other than Attachment DLB-2
10 and Workpaper DLB-1, which merely states the cost of components.

11 **Q: Is it a good idea to deepen the filters in preparation for future PFAS treatment?**

12 A: Yes. But it appears that AECOM already deepened the filters and included GAC
13 filter media in the 2021 estimate. However, the \$1,864,731 cost for GAC filter
14 media (includes the 10% contingency) should be deleted until GAC is required in
15 the future.

16 **Q: Did Petitioner recognize costs already included in the 2021 cost estimate?**

17 A: No. Petitioner already included \$1,172,000 to deepen the filters by three feet
18 (concrete \$391,000) and additional media (\$781,050) in the original 2021 cost
19 estimate. These costs should be removed to avoid double counting.

20 **Q: Do you have concerns with the need for and cost estimate for Item No. 9?**

21 A: Yes. Petitioner cited the ORSANCO PFAS study but did not include it in its
22 testimony or indicate when the PFAS regulations might be imposed on Evansville.
23 There is no information on the timing. Petitioner did not provide any other

⁴⁶ See Attachment DLB-2 to the Case-in-Chief testimony of Douglas L. Baldessari.

1 documents or studies that it relied on to determine what is needed for future PFAS
2 removal and that it used to prepare its request for the additional funding. Petitioner
3 did not provide any information about PFAS levels in the raw water and finished
4 water from its WTP in its testimony in Cause No. 45545 or in the Subdocket. Nor
5 did Petitioner provide any studies or analysis it relied on to determine that PFAS
6 removal is now needed. This is the first time I have heard about Evansville's PFAS
7 concerns.

8 **Q: What is your recommendation for Item No. 9?**

9 A: I recommend the Commission deny the additional funding because Petitioner has
10 not supported its request.

H. Summary of OUCC recommended funding for the seven additional construction items

11 **Q: What additional funding level do you recommend the Commission approve?**

12 A: I recommend that Commission reduce Petitioner's requested additional funding of
13 \$17,696,000 by \$15,486,000 and approve only \$2,183,000 in additional funding
14 on the basis that Petitioner has not supported the need for these additions or their
15 requested funding. I summarize Petitioner's funding request and the OUCC's
16 recommend funding levels for each of the seven additional construction items in
17 Table 2.

**Table 2 – Summary of Evansville’s Funding Request and
OUCC Recommended Funding**

Item No.	Additional Item	2021 Cost Updated to Aug. 2022 Dollars	OUCC Updated 2022 Cost	EWSU Requested Additional Cost	OUCC Calculated Additional Cost	OUCC Reduction from EWSU Request
		(a)	(b)	(c)	(d) = (b) - (a)	(e) = (c) -(d)
3	Additional Auger-Cast Pile Foundations	\$3,241,000	\$4,458,000	\$3,069,000	\$1,217,000	\$1,852,000
4	Levee Authority Bldg. Demolition & Site Prep.	Not included	Not included	\$750,000	\$ 0	\$750,000
5	Contaminated Soil Testing & Hauling	\$1,600,000	\$2,386,000	\$6,000,000	\$786,000	\$5,214,000
6	River Intake: Replace All Piping	\$170,000	Not included	\$4,629,000	\$ 0	\$4,629,000
7	River Intake: Additional Needed Improvements	\$492,000	Not included	\$267,000	\$ 0	\$267,000
8	Pretreatment: Add cover for algae prevention	Not included	Not included	\$670,000	\$ 0	\$670,000
9	Filters: Deepen beds for future PFAS treatment	\$1,172,000	\$1,352,000	\$2,284,000	\$180,000	\$2,104,000
Total	Subtotal of Items 3- 9	\$6,675,000	\$8,186,000	\$17,699,000	\$2,183,000	\$15,486,000

IV. CONSTRUCTION COST ESTIMATES

- 1 **Q: In Cause No. 45545, when the Commission established Evansville’s current**
2 **financing authority, did Evansville believe it had presented Class 3 estimates?**⁴⁷
3 **A:** No. While I testified that construction cost estimates in the AECOM Advanced
4 Facility Plan provided in Petitioner’s case-in-chief and the Preliminary Engineering
5 Report should be considered AACE Class 3 estimates based on the project definition
6 at the 30% development level, the estimate’s end usage for budget authorization,
7 IURC Financing Authority and SRF funding, and the estimating method that relied

⁴⁷ AACE International cost estimate classifications range from least detailed Class 5 for planning and concept screening with 0% to 2% project definition to Class 1 for bidding, project controls and change management for up to 100% project definition. AACE stands for the Association for the Advancement of Cost Engineering. See Attachment JTP-12 for the cost estimate classification matrix of the AACE International Class that describes the five Classes, their project definition basis, and their uses.

1 on detailed Assembly Level line items, in rebuttal, Petitioner's witness Mr. Breese
2 insisted the cost estimate was not Class 3:

3 **Q. The OUCC has asserted that the cost estimates presented are Class**
4 **3 estimates and suggest that it is inappropriate for a 30%**
5 **contingency to be included in the estimates. Please comment.**

6 A. This is patently false. The Alternatives Analysis Report which formed
7 the basis of the submission, and which included the cost estimates, was
8 a planning level document. Within the body of the report, various
9 alternatives were developed to a conceptual level (in range of 5-10%
10 design) for the purposes of comparison.

11 Standard practice for cost estimation, including the guidelines of the
12 American Association of Cost Estimators (AACE), is to establish
13 different Classes of cost estimates, with a range of accuracy that is
14 commensurate with the level of development of design. Our design, as
15 represented in the Advanced Facility Plan, and which formed the basis
16 for the cost estimates, was simply not sufficiently developed to support
17 a Class 3 estimate. As such, we stand by use of the 30% contingency,
18 and believe it to be common practice for estimates prepared to a
19 conceptual level.

20 Our cost estimates were prepared by our in-house team of cost
21 estimating professionals, who develop cost estimates for water and
22 wastewater construction projects on a full-time basis. The estimated
23 costs for the proposed plant are also in line with costs for other
24 comparable facilities completed by AECOM.

25 Emphasis added by the OUCC

26 **Q: Please describe how Petitioner's design for its new Water Treatment Plant has**
27 **progressed since the Commission approved funds in 2016.**

28 A: In Cause No. 44760, Petitioner requested and was granted funding of \$10,650,000
29 for a Preliminary Engineering Report and land acquisition for a new treatment
30 plant.⁴⁸ However, Evansville did not issue a Request for Proposals for professional
31 engineering services to perform Advanced Facility Planning for its Water Filtration

⁴⁸ On March 9, 2016, Evansville requested \$10,650,000 for engineering and property acquisition for a new Water Treatment Plant and Raw Water Line with \$5,000,000 programmed for engineering in both 2017 and 2018, and \$650,000 for raw water lines and land acquisition in 2017. *See* Cause 44760, Baldessari Direct, Attachment DLB-1, pp. 6-7, and Cause No. 44760, Keepes Direct, p. 4 and Attachment PRK-8. In the Cause No. 44760 rate case Final Order, the Commission approved the \$10,650,000 for the new treatment plant engineering on October 5, 2016.

1 Plant until two years later in late 2018.⁴⁹ Evansville hired AECOM in August 2019
2 for the Water Filtration Plant Advanced Facility Planning and Preliminary
3 Engineering Report.⁵⁰ AECOM's contract included these Tasks:

- 4 Task 1: Kickoff Meeting and Workshop (Start: 09/02/19, Finish: 09/20/19)
5 Deliverable No. 2 – Summary of workshop findings
- 6 Task 2: Infrastructure Condition, Performance, and Vulnerability
7 Assessment (Start: 09/18/19, Finish: 11/22/19)
8 Deliverable No. 3 – Immediate Needs Memorandum
- 9 Task 3: Site Investigations (Hydrogeological (ongoing), survey,
10 geotechnical) (Start: 11/15/17, Finish: 03/20/20)
- 11 Task 4: Draft Alternatives Assessment
12 (Start: 10/14/19, Finish: 01/28/20)
13 Deliverable No. 4 – Draft Alternatives Assessment Report including
14 the ranking of alternatives and identification of the selected project
15
- 16 Task 5: Workshop #2, IDEM Review and Final Assessment Report
17 (Start: 01/27/20, Finish: 03/13/20)
18 Deliverable No. 5 – Final Alternatives Assessment Report
19
- 20 Task 6: Draft Preliminary Engineering Report and 30% Drawings
21 (Start: 03/16/20, Finish: 12/23/20)
22 Deliverable No. 6 – Draft Preliminary Engineering Report,
23 Preliminary Drawings, and Specifications Table of Contents. This
24 task includes further development of specifics of the preferred
25 alternative established in Tasks 4 and 5 and includes developing
26 preliminary drawings.
27
- 28 Task 7: Workshop #3 and Final Preliminary Engineering Documents and
29 30% Drawings (Start: 12/28/20, Finish: 03/31/21)
30 Deliverable No. 7 – Final Preliminary Engineering Report,
31 Preliminary Drawings, and Specifications Table of Contents

32 In response to discovery, Petitioner reported that the 30% plans were primarily

⁴⁹ See Attachment JTP-3 in Public's Exhibit No. 4, James T. Parks testimony, Cause No. 45545, pp. 78-80, September 3, 2021. Evansville issued Request for Proposal 2018-11 ("RFP 2018-11") on November 29, 2018, for professional engineering services to perform Advanced Facility Planning for its Water Filtration Plant. Proposals were received on January 11, 2019, but Evansville did not award the AECOM engineering services contract until August 20, 2019.

⁵⁰ See Cause No. 45545, Public's Exhibit No. 4 Attachment JTP-3

1 developed between January and May of 2021 and Value Engineering sessions
2 occurred through September and October 2021, which included multiple phases for
3 project presentation, design review, and comment discussion.⁵¹

4 Petitioner signed Amendment No. 1 to AECOM's Engineering Services
5 Agreement on April 19, 2022, for bringing the 30% design to 60% complete by
6 September 30, 2022. In response to discovery asking for the 60% design drawings
7 and the detailed quantity takeoff and cost estimate at the 60% design completion
8 that were to have been completed on September 30, 2022, Petitioner reported there
9 had been delays in reaching the 60% design completion:

10 The 60% drawings are not complete. There have been design delays
11 associated with reworking the project site. The Evansville Levee
12 Authority has changed leadership recently and EWSU is now
13 acquiring the levee authority building adjacent to the proposed site.
14 While this has created schedule delays in the 60% deliverable, the
15 enlarged project site offers a much better layout for the long-term
16 operation of the facility. The 60% documents are anticipated to be
17 submitted in mid-November. EWSU has also retained Kokosing
18 Industrial to deliver the project through a Guaranteed Savings
19 Contract. Kokosing will be utilizing the 60% documents to begin
20 formal cost estimating.⁵²

21 **Q: Did Petitioner embed contingencies in individual components in its estimates?**

22 A: Yes. These cost estimates began with the Assembly Level Timberline cost estimates,
23 which were then adjusted by AECOM's cost estimators. An example of this is the
24 escalation of concrete prices. The current 2022 concrete material price of \$136/CY
25 is below the \$142/CY concrete price AECOM assumed in the 2020 Timberline
26 detailed estimate as well as the fully loaded \$222/CY cost used in the 2021

⁵¹ See Attachment JTP-13 for Petitioner's response to DR 3-2 regarding 30% design completion.

⁵² See Attachment JTP-13 for Petitioner's response to DR 3-5 regarding 60% design completion

1 estimate.⁵³ The \$222/CY concrete material price is only for delivered concrete and
2 does not reflect the other construction costs for labor and equipment to place the
3 concrete. In contrast, I understand the August 2021 concrete delivered price was
4 only \$121/CY. This means AECOM's assumed \$142/CY concrete material price
5 itself in 2020 started out with an embedded contingency of at least 17% or \$21/CY.⁵⁴
6 Additional contingencies of 29%, including a cost escalation to midpoint, were then
7 applied producing an overall concrete material contingency above 50%.

8 **Q: Should estimating contingencies decrease as design completion progresses?**

9 A: Yes. In simple terms, contingency percentage accounts for risks from unknowns,
10 and flows in the opposite direction from design completion percentage. As shown
11 in the AACE Class Estimate chart in Attachment JTP-12, when design progresses
12 and more items are designed and known, the uncertainty level decreases, cost
13 estimates should firm, and the contingency percent applied should go down. In
14 Cause No. 45545, my position was that Petitioner had a detailed Assembly Level
15 estimate based on a 30% design that it was using to seek budget authorization and
16 financing. I view this as a Class 3 estimate. I testified that the embedded
17 contingencies and the large contingency Petitioner applied to its estimate resulted in
18 Petitioner's project cost estimates being overstated.⁵⁵ At 60% design, the
19 contingency should drop to 10% to match the IFA's limits for contingencies.

⁵³ Calculated as the \$142 per CY of concrete delivered price times 1.23 (20% contingencies and 3% escalation to midpoint) equals \$174.66 per CY times 1.27 (12% General Conditions, 10% contractor overhead and profit, and 5% construction contingencies).

⁵⁴ Calculated as (\$142 per CY minus \$121 per CY) divided by \$121 per CY equals 17%.

⁵⁵ See Public Exhibit No. 4, Cause No. 45545, September 3, 2021, p.2.

1 **Q: What did the Commission find regarding contingencies in Cause No. 45545?**

2 A: The Commission noted the true-up process would address cost variations but
3 ordered Evansville to show a single contingency and not embed contingencies.

4 However, we note there was a substantial amount of discussion
5 between the parties concerning the amount of contingency that was
6 included in Petitioner's cost estimate for the WTP and whether the
7 estimate was an AACE Class 3 or 4 estimate. While we find the
8 required true-up process addressed later in this Order will address
9 any over- or under-estimating of costs and applied contingencies,
10 we find that in the future, Evansville shall apply a single
11 contingency as a single line item to the total project costs and not
12 embed various contingencies within individual project line items
13 within the cost estimates.

14 Cause No. 45545 Final Order, March 2, 2022, p. 16

15 **Q: Has Evansville progressed beyond the 30% design since March 2021?**

16 A: Yes. Mr. Baldessari testified Evansville's consulting engineers have further
17 developed the design and constructions plans for the WTP project.⁵⁶

18 **Q: What is the current design completion status of the WTP project?**

19 A: Under Amendment No. 1 to its contract signed on April 19, 2022, AECOM was to
20 submit the 60% design drawings and detailed quantity take-offs and construction
21 cost estimate for the 60% design on September 30, 2022.⁵⁷ However, AECOM's
22 60% design submittal is delayed. The September 30 due date was only one week
23 after Petitioner filed its Subdocket testimony which relies on the previous 2021
24 estimate (January 2021) as the starting point for the cost escalations requested in the
25 Subdocket. The 2021 cost estimate is nearly two years old without an update.

⁵⁶ See Mr. Baldessari's case-in-chief testimony on page 3.

⁵⁷ See Attachment JTP-14 for Petitioner's response to DR 1-1, Amendment No. 1 to the Engineering Services Agreement with AECOM Technical Services, Inc. dated April 19, 2022, for \$5,131,023 for WTP design using 2016A Water Bond funds.

1 **Q: When does Evansville expect to receive the 60% design and cost estimate?**

2 A: Evansville reports it expects the 60% design documents and detailed estimate in
3 mid-November but did not specify a date. In discovery, Evansville stated:

4 The 60% drawings are not complete. There have been design delays
5 associated with reworking the project site. The Evansville Levee
6 Authority has changed leadership recently and EWSU is now acquiring
7 the levee authority building adjacent to the proposed site. While this has
8 created schedule delays in the 60% deliverable, the enlarged project site
9 offers a much better layout for the long-term operation of the facility.
10 The 60% documents are anticipated to be submitted in mid-November.
11 EWSU has also retained Kokosing Industrial to deliver the project
12 through a Guaranteed Savings Contract. Kokosing will be utilizing the
13 60% documents to begin formal cost estimating.⁵⁸

14 **Q: What is your opinion about the 60% design estimate?**

15 A: The 60% design estimate, because it is based on the most recent design and
16 information, should have been the estimate submitted to the Commission and the
17 OUCC to determine to what extent Evansville's financing authority should be
18 increased, not the 30% design estimate that Evansville insisted was only a planning
19 level estimate in Cause No. 45545.

V. RECOMMENDATIONS

20 **Q: What do you recommend?**

21 A: I recommend that with respect to the additional construction cost items listed on
22 DLB-2 of Mr. Baldessari's testimony that Evansville be permitted additional
23 financing authority of \$2,183,000.

24 **Q: Does this conclude your testimony?**

25 A: Yes.

⁵⁸ See Attachment JTP-13 for Petitioner's response to DR 3-5 regarding the status of the 60% design and the detailed quantity take-offs and construction cost estimate based on the 60% design.

Appendix A

1 **Q: Please describe your educational background and experience.**

2 A: In 1980 I graduated from Purdue University, where I received a Bachelor of Science
3 degree in Civil Engineering, specializing in Environmental Engineering. I then
4 worked two years with Peace Corps / Honduras as a municipal engineer on self-help
5 rural water supply and sanitation projects funded by the U.S. Agency for
6 International Development (U.S. AID). In 1984 I earned a Master of Science degree
7 in Civil Engineering (Environmental) from Purdue University. I have been a
8 Registered Professional Engineer in Indiana since 1986. In 1984, I accepted an
9 engineering position with Purdue University, and was assigned to work as a process
10 engineer with the Indianapolis Department of Public Works ("DPW") at the City's
11 Advanced Wastewater Treatment Plants. I left Purdue and subsequently worked for
12 engineering consulting firms, first as a Project Engineer for Process Engineering
13 Group of Indianapolis and then as a Project Manager for the consulting firm HNTB
14 in Indianapolis. In 1999, I returned to DPW as a Project Engineer working on
15 planning projects, permitting, compliance monitoring, wastewater treatment plant
16 upgrades, and combined sewer overflow control projects.

17 **Q: What are the duties and responsibilities of your current position?**

18 A: My duties include evaluating the condition, operation, maintenance, expansion, and
19 replacement of water and wastewater facilities at utilities subject to Indiana Utility
20 Regulatory Commission ("Commission") jurisdiction.

21 **Q: Have you previously testified before the Commission?**

22 A: Yes.

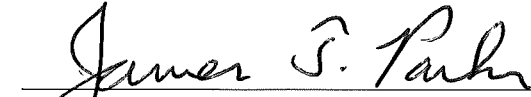
Appendix B - List of Attachments

- Attachment JTP-1 Petitioner's response to DR 1-3 requesting the most recent project cost estimate prepared by the design engineer – one page letter from John Krinks of AECOM to Shawn Wright, dated September 10, 2022, and Attachment DLB-2 – two-page letter from Shawn Wright to Lane Young, dated September 13, 2022.
- Attachment JTP-2 Petitioner's responses to DR 3-3 pertaining to cost support and supplemental response to DR 3-7 regarding geotechnical reports.
- Attachment JTP-3 Petitioner's responses to DR 17-6 and DR 17-10 regarding cost support for the new treatment plant cost estimate that was provided in Cause No. 45545.
- Attachment JTP-4 Scope of Services and Project Schedule from AECOM's Engineering Services Contract dated August 20, 2019.
- Attachment JTP-5 Petitioner's responses to Data Request Set Nos. 4, 5, and 7
- Attachment JTP-6 OUCC's calculations of auger cast pile costs and corrections to Petitioner's calculations.
- Attachment JTP-7 Beaty Construction, Inc website information with OUCC notes regarding the \$87.50 per VF budgetary cost quote obtained via telephone on November 5, 2022, \$64.00 per VF and \$109.00 per VF auger cast pile quotations (with reinforcing) from Keller – North America for 18-inch and 24-inch auger cast piles, and cost information for 18-inch auger cast piles from RS Means and Timberline, received in 2021 in response to DR 17-6 in Cause No. 45545.
- Attachment JTP-8 Petitioner's responses to DR 3-8 and 3-11 regarding soil contamination
- Attachment JTP-9 Budgetary landfill disposal quote from Republic Services who owns and operate the Laubscher Meadows Sanitary Landfill in Evansville.
- Attachment JTP-10 OUCC Calculations of Excess Soil Disposal
- Attachment JTP-11 Excerpts regarding the Intake Structure from Cause No. 45545, Attachment SMB-1, Water Treatment Plant, Advanced Facility Plan, Alternatives Report, March 2021 to the case-in-chief testimony of Simon M. Breese, May 10, 2021, pp. 47-51, 205, 212-214, and 235-237
- Attachment JTP-12 Cost estimate classification matrix - AACE International

- Attachment JTP-13 Petitioner's responses to DR 3-2 regarding the 30% design and to DR 3-5 regarding the status of the 60% design and the detailed quantity take-offs and construction cost estimate based on the 60% design.
- Attachment JTP-14 Petitioner's response to DR 1-1, Amendment No. 1 to the Engineering Services Agreement with AECOM Technical Services, Inc. dated April 19, 2022, for \$5,131,023 for WTP design using 2016A Water Bond funds.

AFFIRMATION

I affirm the representations I made in the foregoing testimony are true to the best of my knowledge, information, and belief.


By: James T. Parks
Cause No. 45545 S1
Office of Utility Consumer Counselor (OUCC)

Date: November 18, 2022

OUCG DR 1-3

DATA REQUEST
City of Evansville

Cause No. 45545 S1

Information Requested:

Please provide the most recent project cost estimate prepared by the design engineer.

Information Provided:

See attached.

Attachment:

OUCG DR 1-3.pdf

September 10, 2022 letter from John Krinks, P.E. of AECOM to
Shawn Wright, EWSU Director-PMO (1 page)

10/14/2022

September 10, 2022

Shawn Wright
 Director - PMO
 Evansville Water and Sewer Utility
 1 SE 9th Street, Suite 200
 Evansville, IN 47708

AECOM Project Number:
 60613867

RE: Evansville New Water Filtration Plant – Project Costs

Dear Mr. Wright

At your request I have prepared a revised cost estimate for the proposed new water filtration plant project.

Item	Cost Description	Cost
1	Original Construction Cost (No Residuals Dewatering)	\$126,439,000
2	Cost with Escalation to Current Dollars (15.69%)	\$146,277,000
3	Additional Auger-Cast Pile Foundations Requirements	\$3,069,000
4	Levee Authority Building Demolition & Site Preparation	\$750,000
5	Contaminated Soil Testing and Hauling	\$6,000,000
6	River Intake: Replacement of All Piping	\$4,629,000
7	River Intake: Additional Needed Improvements	\$267,000
8	Pretreatment: Add cover for algae prevention	\$670,000
9	Filters: Deepen beds for future PFAS treatment	\$2,284,000
	Revised Construction Subtotal	\$163,946,000
10	Soft Project Costs (7.75%)	\$12,706,000
11	Current Market Escalation (8.5%)	\$13,935,000
	Total Project Cost Estimate	\$190,587,000

It should be noted that this cost estimate does not include the solids handling. The updated solids handling costs are roughly \$38,151,000 which would bring the total estimated project cost to \$228,738,000.

If you have any questions or require additional information, please contact me at john.krinks@aecom.com or (614) 493-3359.

Sincerely,

John Krinks, P.E.
 Project Design Manager
 AECOM



LLOYD WINNECKE
MAYOR

**EVANSVILLE WATER &
SEWER UTILITY**

LANE T. YOUNG
DIRECTOR

1 NW Martin Luther King Blvd. Room 104 • Evansville, Indiana 47708
P O Box 19, Evansville, Indiana 47740-0001
(812) 436-7846 • FAX (812) 436-7863 • TDD (812) 436-7864

September 13, 2022

Attn: Mr. Lane T. Young
Executive Director

Re: Evansville Water and Sewer Utility (EWSU)
New Water Filtration Plant Project Cost Considerations

As EWSU's new water treatment plant project has progressed with planning and detailed design, a number of variables, including drastic increases in construction material and labor costs fueled by material and labor shortages have been identified, and will impact on our planned project cost. The Table below presents the revised project cost estimate for the new water treatment plant, with construction beginning in the fall of 2023. A further explanation of the cost line items is provided following the table.

Item	Cost Description	Cost
1	Original Construction Cost (No Residuals Dewatering)	\$126,439,000
2	Cost with Escalation to Current Dollars (15.69%)	\$146,277,000
3	Additional Auger-Cast Pile Foundations Requirements	\$3,069,000
4	Levee Authority Building Demolition & Site Preparation	\$750,000
5	Contaminated Soil Testing and Hauling	\$6,000,000
6	River Intake: Replacement of All Piping	\$4,629,000
7	River Intake: Additional Needed Improvements	\$267,000
8	Pretreatment: Add cover for algae prevention	\$670,000
9	Filters: Deepen beds for future PFAS treatment	\$2,284,000
	Revised Construction Subtotal	\$163,946,000
10	Soft Project Costs (7.75%)	\$12,706,000
11	Current Market Escalation (8.5%)	\$13,935,000
	Total Project Cost Estimate	\$190,587,000

Item 1: Based project cost presented in the original SRF application (cost estimate for plant alternatives were developed in late 2020 through early 2021) which does not include the residuals dewatering facility.

Item 2: Based on the current Engineering New Record (ENR) construction market value of 20.2%, minus the originally included 4.51% escalation reflecting conditions at the time of the original estimate.

Item 3: Further investigation by the geotechnical and structural teams has identified deeper auger cast piles to prevent excessive settling and liquefaction than the foundation system that was originally budgeted.

Item 4: The original site layout was developed due to the previous Levee Authority leadership's desire not to relocate their building and before the proposed PFAS regulations were known. Since that time, the Levee Authority has changed their stance on relocating and are willing to relocate to assist the utility. This space allows for a better overall facility layout and sets the design up for potential expansion of the pretreatment basin and filter building, which will allow space necessary for the added PFAS treatment once those regulations are determined. This will require demolition of the Levee facility.

Item 5: Environmental investigations and other construction projects in the area have identified the presence of heavy metals in the soil which will need hauled to a non-hazardous landfill.

Item 6: The river intake carbon steel piping is beginning to develop leaks at welds and other signs of corrosion at fittings and costs have been revised to replace this piping with new ductile iron pipe.

Item 7: Additional items were identified during further evaluation of the river intake condition including replacement of low voltage electrical and lighting systems and other miscellaneous interior and exterior improvements needed.

Item 8: EWSU experiences algae issues in their current uncovered basins and the design has been revised to cover the new pretreatment basins with a canopy structure.

Item 9: A July 2022 ORSANCO study has identified PFAS in nearly all reaches of the Ohio River at contraptions which exceed the current interim guidelines published by US EPA. As such, provisions for deeper filter beds to facilitate GAC contactor operation in lieu of biologically active filtration are being provided. The plant will continue to operate as biologically active filtration unless a switch to GAC is needed for PFAS mitigation.

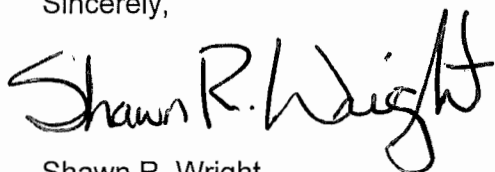
Item 10: Soft costs percentages are based on the same percentages used in the original estimate and include construction administration, inspection, materials testing, project financing, legal and permitting expenses.

Item 11: Based on the current inflation rate of 8.5% carried through fall of 2023 to the start of construction.

Note the original SRF application identified the total project cost as \$166,925,000. However, that included a residuals dewatering facility which is not currently budgeted for in this project. With inclusion of the new dewatering facility, the total revised project cost is estimated at \$228,738,000.

If you have any questions or require additional information, please contact me at (812) 421-2120 Ext. 2228.

Sincerely,



Shawn R. Wright
Director – Project Management Office
Evansville Water and Sewer Utility

OUCG DR 3-3

DATA REQUEST
City of Evansville

Cause No. 45545 S1

Information Requested:

Reference the September 10, 2022 letter to Shawn R. Wright, Director - Project Management Office from John Krinks of AECOM presenting the new water treatment plant's revised construction cost of \$163,946,000 (without residuals dewatering) and the revised total project cost estimate of \$190,587,000. For each of the listed items with increased costs, please provide copies of all documents Mr. Krinks relied on to determine the increased costs. Please also provide copies of all communications between AECOM and Evansville regarding these significant cost estimate increases.

Information Provided:

Petitioner prefaces its answer by reminding why Petitioner has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. Evansville is doing everything in its power to avoid that outcome. If Evansville must wait for additional financing authority to close, it will not be because Evansville made that choice but because it was forced to do so. Evansville would under such circumstances compute the effect on customer rates from any increase in interest rates resulting from such a delay and would inform Evansville customers who caused that increase.

(Continued on next page)

OUCC DR 3-3
(Continued from previous page)

The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

A spreadsheet showing the cost calculations is attached as Attachment OUCC DR 3-3.

Attachment:

OUC DR 3-3.xlsx

Cause No. 45545 S1

City of Evansville

OUCC DR 3-3

JTParks Note: Reformatted this attachment to fit on fewer pages

Cost Description	Cost	
Original Construction Cost (No Residuals Dewatering)	\$126,439,000	
Cost with Escalation to Current Dollars (15.69%)	\$146,277,000	
Additional Auger-Cast Pile Foundations	\$3,069,000	see calcs
Levee Authority Building Demolition & Site Preparation	\$750,000	see calcs
Contaminated Soil Testing and Hauling	\$6,000,000	see calcs
River Intake: Replacement of All Piping	\$4,629,000	see calcs
River Intake: Additional Needed Improvements	\$267,000	see calcs
Pretreatment: Add cover for algae prevention	\$670,000	Quote from pre-engineered building supplier
Filters: Deepen beds for future PFAS treatment	\$2,284,000	See calcs
Revised Construction Subtotal	\$163,946,000	
Soft Project Costs (7.75%)	\$12,706,000	
Current Market Escalation (8.5%)	\$13,935,000	Currently at 8.5. Assumed to be 7 for next 2 years to midpoint
Total Project Cost Estimate	\$190,587,000	
Approximate Cost for residuals dewatering	\$37,186,000	
Approximate Cost with residuals dewatering	\$227,773,000	

Filter Beds / PFAS Treatment

Filter Materials / Description	Qty	Unit \$	Total \$
E & W Wall Concrete (CY)	148.1481481	\$1,000	\$148,148.15
N S Walls Concrete (CY)	74.05555556	\$1,000	\$74,055.56
Misc other building conc. (CY)	60	\$1,000	\$60,000.00
Additional Excavation (CY)	1986.111111	\$50	\$99,305.56
GAC Media (ton)	678.084	\$2,500	\$1,695,210
Subtotal			\$2,076,719.26
w/ Estimating Contingency	10%		\$2,284,000.00
Contingency			\$207,280.74

1.5 feet deeper
 Two 16-inch thick walls on each side
 (channels) & 2 center - 4 total 250 ft. long 1.333333
 Twenty Walls, each 50 feet long and 1.333 feet wide

\$2500 per ton 93.4 pounds in cubic foot

Levee Authority

	Qty	Unit \$	Total \$
Building (SF)	11000	\$45	\$495,000
Foundation (CY)	1629.62963	\$115	\$187,000
Contingency	10%		\$68,000.00
Total			\$750,000

Contaminated Soil

	QTY		
Soil For removal (CY)	80000		
Tons	200000 tons	2.5 ton per QY	
Cost per ton	\$30		
Total Cost	\$6,000,000		

Intake Improvements (w/ 30% contingency)

Replace Lighting	\$74,000
Re-finish exterior	\$115,000
Paint interior	\$27,000
Dolphin Cell repair	\$25,000
Bridge Inspection	\$6,000
Misc. Plumbing and HVAC	\$20,000
Total Cost	\$267,000
Contingency	\$205,384.62

Pile Foundations

New Diameter	24 inch	2 feet	3.141593 ft2
Old Diameter	18 inch	1.5 feet	1.767146 ft2
New Depth	75 feet		
Old Depth	25 feet		
Quantity	580		
CY	1476.257659		
Cost/CY	\$1,890		
Contingency	10%	Contingency	
Total Cost	\$3,069,000.00		\$279,000.00

Low Service Piping / Valves	Qty	Unit Cost	Cost
42-inch fittings	24	\$35,000	\$840,000
16-inch fittings	26	\$15,000	\$390,000
42-inch piping (ft)	80	\$1,000	\$80,000
16-inch piping	120	\$340	\$40,800
Supports	1	\$250,000	\$250,000
Hardware / Fasteners	1	\$100,000	\$100,000
42-inch valves	8	\$110,000	\$880,000
16-inch valves	16	\$30,000	\$480,000
Demo Old Pipe	1	\$150,000	\$150,000
Sequencing / Temp Systems	1	\$350,000	\$350,000
Contingency	30%		\$1,068,000
Total			\$4,629,000

OUCG DR 3-6

DATA REQUEST
City of Evansville

Cause No. 45545 S1

Information Requested:

Please provide copies of the contracts for soil borings and geotechnical engineering services of AECOM subconsultant CTL Engineering of Indiana, Inc., the total amount paid to CTL Engineering of Indiana, Inc., and copies of all CTL invoices.

Information Provided:

Petitioner prefaces its answer by reminding why Petitioner has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. Evansville is doing everything in its power to avoid that outcome. If Evansville must wait for additional financing authority to close, it will not be because Evansville made that choice but because it was forced to do so. Evansville would under such circumstances compute the effect on customer rates from any increase in interest rates resulting from such a delay and would inform Evansville customers who caused that increase.

(Continued on next page)

10/27/2022

OUCC DR 3-6
(Continued from previous page)

The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

The Phase I and II contracts with CTL are included as Attachment OUCC DR 3-6, along with all CTL invoices to date.

Attachment:

OUCR DR 3-6.pdf

CTL Engineering, Inc.

1310 S. Franklin Road
Indianapolis, Indiana 46239

Phone: (317) 295-8650 • Fax: (317) 295-8395

www.ctleng.com



Consulting Engineers – Testing – Inspection Services – Analytical Laboratories

June 27, 2019

AECOM

One Indiana Square

Suite 2100

Indianapolis, IN 46204

Attention: Mr. John Krinks, PE
Project Manager

Reference: Geotechnical Engineering Consultation Services
Evansville Water and Sewer Utility
Advanced Facility Planning
Water Filtration Plant
Evansville, Indiana
CTL Proposal No.: 19050067INDP

Dear Mr. Krinks:

CTL Engineering, Inc. is pleased to submit this proposal for providing geotechnical engineering services on the above referenced project.

PROJECT DESCRIPTION

The project involves the Advanced Facility Planning for the Water Filtration Plant in Evansville, Indiana. EWSU is seeking advanced facility planning services that will consist of:

- Evaluation of Master Plan, existing asset inventory, existing Plant processes and capability, planned short term improvements (based on existing asset inventory results), groundwater study results, and potential operational cost savings related to needed plant upgrades to ensure water quality and resilience
- Development of treatment alternatives ranging from use of all surface water to blended surface and groundwater to all groundwater

Geotechnical Investigation
 WTP Improvements
 Evansville, Indiana
 CTL Proposal No.: 19050067INDP
 June 27, 2019
 Page 2

- Treatment alternatives to address maintaining water production through sequencing, decommissioning, and constructability during development of alternatives
- Examination and presentation of alternatives to provide information to allow the Utility management to select a preferred alternative, including opportunity for public input, evaluation by Plant Operations and engineering evaluation
- Survey
- Geotechnical Investigation
- Preparation of preliminary engineering report, opinion of probable cost and 20 percent level construction set for selected alternative

SCOPE OF WORK

As part of this phase of the project, CTL will provide geotechnical engineering consulting services on an as-needed basis. Services beyond this scope of work will be negotiated at a future time. Our services are anticipated to include:

- 50 hours of geotechnical consultation time in evaluation of the existing available geotechnical engineering information as it applies to alternatives (to be defined).
- 4 on-site meetings with the team and owner

FEE SCHEDULE

Description	Quantity	Unit	Unit Cost	Total Cost
Senior Geotechnical Engineer, P.E.	50	Hour	\$150.00	\$7,500.00
On-Site Meetings in Evansville, Indiana	4	LS	1,530.00	6,120.00
Total				\$13,620.00

CLOSING

Based on the amount of work anticipated, it is estimated that the fee for performing the geotechnical investigation and construction testing services is \$13,620.00. All fees will be billed at the unit rates shown on the above Fee Schedule. This fee is contingent on execution of a final agreement under the terms and conditions of the contract as provided. This proposal is firm for a

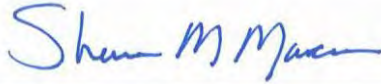
Geotechnical Investigation
WTP Improvements
Evansville, Indiana
CTL Proposal No.: 19050067INDP
June 27, 2019
Page 3

period of one year. After one year, the proposal shall be reconfirmed by the parties as to availability and pricing.

We appreciate the opportunity to submit this proposal and look forward to working with you. If you have any questions or need further information, please call our office at (317) 295-8650.

Sincerely,

CTL ENGINEERING, INC.



Shawn M. Marcum, PE
Senior Project Engineer

CTL Engineering, Inc.

1310 S. Franklin Road
Indianapolis, Indiana 46239

Phone: (317) 295-8650 • Fax: (317) 295-8395

www.ctleng.com



Consulting Engineers – Testing – Inspection Services – Analytical Laboratories

February 2, 2021

AECOM

277 W Nationwide Blvd
Columbus, OH 43215

Attention: Mr. John Krinks, PE
Technical Lead - Water

Reference: Preliminary Geotechnical Investigation
EWSU Water Treatment Facility
Evansville, IN
CTL Proposal No.: 2105021INDP

Dear Mr. Krinks:

CTL Engineering, Inc. is pleased to submit this proposal for providing preliminary geotechnical engineering services on the above referenced project.

PROJECT DESCRIPTION

The project involves design and construction of a new EWSU Water Treatment Facility. The proposed facility will be constructed on a site currently occupied by a maintenance garage west of Veterans Memorial Parkway and north of the newly constructed Waterworks Road. Structural details were not available at the time of this proposal. It is our understanding that some process structures are currently planned to bear 20 to 35 feet below existing grade and administration and maintenance structures at or near existing grade. Based on our experience with previous geotechnical investigations in the project vicinity, it is anticipated that the structures will be supported on deep foundations.

Preliminary Geotechnical Investigation
EWSU Water Treatment Facility
Evansville, Indiana
CTL Proposal No.: 21050021INDP
February 2, 2021
Page 2

SCOPE OF WORK

The work covered by this proposal consists of drilling a total of four (4) test borings ranging in depths from 50 to 120 feet for a total lineal drilling footage of 340 feet. It is anticipated that bedrock will be encountered at a depth of approximately 120 feet. This proposal assumes that the boring locations will be accessible for an ATV drill rig. Soil data obtained from the field and laboratory testing will be analyzed, and a preliminary geotechnical report to include foundation design recommendations for support of the proposed structures. In order to obtain extended groundwater readings, a vibrating wire piezometer will be grouted into one of the boreholes to record the groundwater levels for a period of approximately 6 months.

PROCEDURES

The following items will be included in the general services provided by CTL Engineering, Inc.

- A. Contact Indiana Underground Utility Protection Services to locate underground utilities at the test boring locations. Fees for a private utility locate have not been included.
- B. Coordinate the drilling operation with AECOM and EWSU Personnel. It has been assumed that the boring locations will be readily available to an ATV drill rig.
- C. Layout of test borings using the plans that will be provided by AECOM. Surface elevations will be obtained from plans provided by AECOM.
- D. Field and laboratory testing in accordance with ASTM specifications.
- E. Engineering evaluation and reporting to include:
 1. Test boring logs and soil profile to include:
 - a. Topsoil/thickness of pavement, base material and subsurface soil.
 - b. Groundwater encountered during drilling and at completion.
 - c. Standard penetration values as a function of depth.
 2. General site preparation, groundwater management and earthwork requirements.
 3. Preliminary foundation recommendations for support of the proposed facility structures.

Preliminary Geotechnical Investigation
EWSU Water Treatment Facility
Evansville, Indiana
CTL Proposal No.: 21050021INDP
February 2, 2021
Page 3

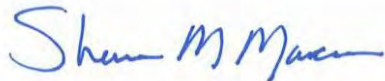
CLOSING

Based on the amount of work anticipated, the fee for performing the geotechnical investigation services is \$29,410.00. This fee includes up to 4 hrs for project meetings. Additional time for project meetings will be charged at \$160/hr. This proposal is firm for a period of six months. After six months, the proposal shall be reconfirmed by the parties as to availability and pricing. If the total cost should exceed the estimated fee due to unforeseen conditions, we will contact you to obtain approval prior to performing the additional work.

We appreciate the opportunity to submit this proposal and look forward to working with you. If you have any questions or need further information, please call our office at (317) 295-8650.

Sincerely,

CTL ENGINEERING, INC.



Shawn M. Marcum, PE
Senior Project Engineer

Preliminary Geotechnical Investigation

EWSU Water Treatment Plant

Evansville, IN

CTL Proposal No.: 21050021INDP

February 2, 2021

FEE SCHEDULE**Field Testing**

Description	Quantity	Unit	Unit Cost	Total Cost
Mobilization/Demobilization	1	LS	\$2,000.00	\$2,000.00
Drilling: From 0 to 50'	200	Foot	24.00	\$4,800.00
Drilling: From 50' to 100'	100	Foot	27.00	\$2,700.00
Drilling: From 100' to 150'	40	Foot	30.00	\$1,200.00
Rock Core Setup	2	Each	175.00	\$350.00
Rock Coring: From 100' to 150'	20	Foot	75.00	\$1,500.00
Shelby Tube	6	Each	75.00	\$450.00
Boring Backfill	360	Foot	7.50	\$2,700.00
VW Piezometer Installation	1	Each	1100.00	\$1,100.00
Subtotal Field Testing				\$16,800.00

Laboratory Testing

Description	Quantity	Unit	Unit Cost	Total Cost
Split Spoon soil samples (Visual Description + moisture content testing)	90	Each	16.00	1440.00
Atterberg Limits	8	Each	85.00	680.00
Grain Size Analysis	8	Each	90.00	720.00
Unconfined Compressive Strength	8	Each	100.00	800.00
Subtotal Laboratory Testing				\$3,640.00

Engineering and Reporting

Description	Quantity	Unit	Unit Cost	Total Cost
Drilling Supervisor for locating test borings and coordination with City of Evansville personnel	12	Hour	115.00	1,380.00
Engineering Technician (Ground Water Readings)	6	Trip	150.00	900.00
Test Boring Preparation	6	Hour	95.00	570.00
Geotechnical Engineer	30	Hour	140.00	4,200.00
Senior Geotechnical Engineer, PE	12	Hour	160.00	1,920.00
Subtotal Engineering and Reporting				\$8,970.00

ESTIMATED TOTAL FEE				\$29,410.00
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CTL Engineering, Inc.

1310 S. Franklin Road
Indianapolis, Indiana 46239

Phone: (317) 295-8650 • Fax: (317) 295-8395

www.ctleng.com



Consulting Engineers – Testing – Inspection Services – Analytical Laboratories

February 28, 2022

AECOM

277 W Nationwide Blvd

Columbus, OH 43215

Attention: Mr. John Krinks, PE
Technical Lead - Water

Reference: Geotechnical Investigation
EWSU Water Treatment Facility
Evansville, IN
CTL Project No.: 21050038IND

Dear Mr. Krinks:

CTL Engineering, Inc. is pleased to submit this proposal for providing geotechnical engineering services on the above referenced project.

PROJECT DESCRIPTION

The project involves design and construction of a new EWSU Water Treatment Facility. The proposed facility will be constructed on a site currently occupied by a maintenance garage west of Veterans Memorial Parkway and north of the newly constructed Waterworks Road. Based on 30 percent plans provided by AECOM, the plant structures will include the following: administration and maintenance building, pretreatment basins, chemical storage building, residuals pump station, ozone basins, clearwell, filters building. Based on our experience with previous geotechnical investigations in the project vicinity, it is anticipated that the structures will be supported on deep foundations.

SCOPE OF WORK

The work covered by this proposal consists of drilling, soil sampling, laboratory testing and recommendations for supporting the proposed structures. A total of thirty (30) test borings ranging in depths from 20 to 115 feet for a total lineal drilling footage of 1,425 feet. The boring summary for each structure is listed in Table 1. It is anticipated that bedrock will be encountered at a depth of approximately 115 feet. This proposal assumes that the boring locations will be accessible for an ATV drill rig. Soil data obtained from the field and laboratory testing will be analyzed, and a geotechnical report to include foundation design recommendations for support of the proposed structures.

Geotechnical Investigation
 EWSU Water Treatment Facility
 Evansville, Indiana
 CTL Project No.: 21050038IND
 February 28, 2022
 Page 2

Table 1 – Proposed Boring Locations & Depths

Structure	Approximate Bearing Depth	Boring No.	Proposed Boring Depth (ft)
Administration / Maintenance Building	At-Grade	B-101	20
		B-102	60
		B-103	20
		B-104	60
Pre-treatment Basins	10 ft below grade	B-105	20
		CPT-101	~60
		B-106	60
		B-107	20
		B-108	115 or bedrock
		CPT-102	~60
		B-109	20
		B-110	60
Chemical Storage	At-grade	B-111	20
		B-112	20
Ozone Basins	12 ft below grade	B-113	20
		B-114	40
		CPT-103	~60
		B-115	60
Residuals Pump Station	15 ft below grade	B-116	40
Clearwell	At-grade	B-117	40
Filter Building	23 ft below grade	B-118	40
		B-119	60
		CPT-104	~60
		B-120	115 or bedrock
		B-121	40
		B-122	60
		CPT-105	~60
		B-123	40
Washwater Supply Tank	At-grade	B-124	60
Access Drives	At-grade to 5 ft of fill	B-125	20
		B-126	20
		B-127	20
		B-128	20
Total Footage (SPT Borings)			1285
Total Footage (CPT Borings)			~300



Geotechnical Investigation
EWSU Water Treatment Facility
Evansville, Indiana
CTL Project No.: 21050038IND
February 28, 2022
Page 3

PROCEDURES

The following items will be included in the general services provided by CTL Engineering, Inc.

- A. Contact Indiana Underground Utility Protection Services to locate underground utilities at the test boring locations. Fees for a private utility locate have not been included.
- B. Coordinate the drilling operation with AECOM and EWSU Personnel. It has been assumed that the boring locations will be readily available to a truck mounted drill rig.
- C. Layout of test borings using the plans that will be provided by AECOM. Surface elevations will be obtained from plans provided by AECOM.
- D. Field and laboratory testing in accordance with ASTM specifications.
- E. Engineering evaluation and reporting to include:
 1. Test boring logs and soil profile to include:
 - a. Topsoil/thickness of pavement, base material and subsurface soil.
 - b. Groundwater encountered during drilling and at completion.
 - c. Standard penetration values as a function of depth.
 2. General site preparation, groundwater management and earthwork requirements.
 3. Foundation recommendations for support of the proposed facility structures and soil parameters for pavement design.

CLOSING

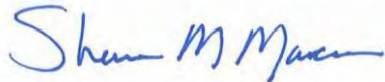
Based on the amount of work anticipated, the fee for performing the geotechnical investigation services is \$84,920.00. This fee includes up to 4 hrs for project meetings. This proposal is firm for a period of one year. After one year, the proposal shall be reconfirmed by the parties as to availability and pricing. If the total cost should exceed the estimated fee due to unforeseen conditions, we will contact you to obtain approval prior to performing the additional work.

Geotechnical Investigation
EWSU Water Treatment Facility
Evansville, Indiana
CTL Project No.: 21050038IND
February 28, 2022
Page 4

We appreciate the opportunity to submit this proposal and look forward to working with you. If you have any questions or need further information, please call our office at (317) 295-8650.

Sincerely,

CTL ENGINEERING, INC.



Shawn M. Marcum, PE
Senior Project Engineer

Geotechnical Investigation
 EWSU Water Treatment Plant
 Evansville, IN
 CTL Project No.: 21050038IND
 February 27, 2022

FEE SCHEDULE

Field Testing

Description	Quantity	Unit	Unit Cost	Total Cost
Mobilization/Demobilization - SPT Rig	1	LS	\$2,000.00	\$2,000.00
Drilling: From 0 to 50'	1010	Foot	25.00	\$25,250.00
Drilling: From 50' to 100'	230	Foot	28.00	\$6,440.00
Drilling: From 100' to 150'	45	Foot	32.00	\$1,440.00
Rock Core Setup		Each	185.00	\$0.00
Rock Coring: From 100' to 150'		Foot	75.00	\$0.00
CPT Rig	2	Day	2750.00	\$5,500.00
Shelby Tube	10	Each	80.00	\$800.00
Boring Backfill	1285	Foot	8.00	\$10,280.00
Subtotal Field Testing				\$51,710.00

Laboratory Testing

Description	Quantity	Unit	Unit Cost	Total Cost
Split Spoon soil samples (Visual Description + moisture content testing)	475	Each	16.00	7600.00
Atterberg Limits	8	Each	85.00	680.00
Grain Size Analysis	8	Each	90.00	720.00
Unconfined Compressive Strength	8	Each	100.00	800.00
1-D Consolidation	3	Each	600.00	1800.00
Triaxial Testing - Consolidated-Undrained	2	Each	950.00	1,900.00
Subtotal Laboratory Testing				\$13,500.00

Engineering and Reporting

Description	Quantity	Unit	Unit Cost	Total Cost
Drilling Supervisor for locating test borings and coordination with EWSU personnel	12	Hour	120.00	1,440.00
Geotechnical Engineer - Field Supervision	60	Hour	130.00	7,800.00
Test Boring Preparation	10	Hour	95.00	950.00
Geotechnical Engineer, PE	40	Hour	150.00	6,000.00
Senior Geotechnical Engineer, PE	16	Hour	170.00	2,720.00
Principal Engineer, PE	4	Hour	200.00	800.00
Subtotal Engineering and Reporting				\$19,710.00

ESTIMATED TOTAL FEE				\$84,920.00
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AN EMPLOYEE OWNED COMPANY

Consulting Engineers * Testing * Inspection Services * Analytical Laboratories

Established 1927

FEDERAL I.D. NUMBER 35-2045625

REMIT TO:
 P.O. Box 478
 Columbus, OH 43085

Invoice

To: John Krinks
 AECOM
 email invoices: USAPImaging@aecom.com
 277 W. Nationwide Blvd.
 Columbus, OH 43215

Invoice Number IN-114629
 Invoice Date April 02, 2021

Please Pay This Amount: 13,966.50

[Click to Pay Online](#)

Project: 210500381IND EWSU Water Treatment Facility
 , IN Vanderburgh County
 USAPImaging@aecom.com

PO Number: 117855
 Project Manager: Shawn Marcum
 Professional Services for the Period: 02/21/2021 to 03/20/2021

Invoice Per Attached Breakdown

*** Total Project Invoice Amount: 13,966.50

Billing Summary	Current	Prior	Total
	\$13,966.50	\$0.00	\$13,966.50

Aged Receivables	Total	Current	31-60	61-90	91 +

1% Discount if Paid within 10 days. Net 30 Days. If paid by credit card, a 3% fee will be added.
 A late charge of 1.0% will be added to any unpaid balance after 30 days.

We Accept:



Please Call Accounts Receivable

Preliminary Geotechnical Investigation

EWSU Water Treatment Plant

Evansville, IN

CTL Project No.: 21050038IND

March 31, 2021

INVOICE ITEMIZATION**Field Testing**

Description	Quantity	Unit	Unit Cost	Total Cost
Mobilization/Demobilization	1	LS	\$2,000.00	\$2,000.00
Drilling: From 0 to 50'	150	Foot	24.00	\$3,600.00
Drilling: From 50' to 100'	52	Foot	27.00	\$1,404.00
Drilling: From 100' to 150'	11	Foot	30.00	\$330.00
Rock Core Setup	1	Each	175.00	\$175.00
Rock Coring: From 100' to 150'	10	Foot	75.00	\$750.00
Shelby Tube	2	Each	75.00	\$150.00
Boring Backfill	105	Foot	7.50	\$787.50
VW Piezometer Installation	1	Each	1100.00	\$1,100.00
Subtotal Field Testing				\$10,296.50

Laboratory Testing

Description	Quantity	Unit	Unit Cost	Total Cost
Split Spoon soil samples (Visual Description + moisture content testing)		Each	16.00	0.00
Atterberg Limits		Each	85.00	0.00
Grain Size Analysis		Each	90.00	0.00
Unconfined Compressive Strength		Each	100.00	0.00
Subtotal Laboratory Testing				\$0.00

Engineering and Reporting

Description	Quantity	Unit	Unit Cost	Total Cost
Drilling Supervisor for locating test borings and coordination with City of Evansville personnel	12	Hour	115.00	1,380.00
Engineering Technician (Ground Water Readings)	1	Trip	150.00	150.00
Test Boring Preparation	4	Hour	95.00	380.00
Geotechnical Engineer	8	Hour	140.00	1,120.00
Senior Geotechnical Engineer, PE	4	Hour	160.00	640.00
Subtotal Engineering and Reporting				\$3,670.00

ESTIMATED TOTAL FEE				\$13,966.50
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AN EMPLOYEE OWNED COMPANY

Consulting Engineers * Testing * Inspection Services * Analytical Laboratories

Established 1927

FEDERAL I.D. NUMBER 35-2045625

REMIT TO:
 P.O. Box 478
 Columbus, OH 43085

Invoice

To: John Krinks
 AECOM
 email invoices: USAPImaqing@aecom.com
 277 W. Nationwide Blvd.
 Columbus, OH 43215

Invoice Number IN-118026
 Invoice Date August 04, 2021

Please Pay This Amount: 4,552.00

[Click to Pay Online](#)

Project: 21050038IND EWSU Water Treatment Facility
 , IN Vanderburgh County
 USAPImaqing@aecom.com

Invoicing Mode:
 PO Number: 117855
 Project Manager: Shawn Marcum
 Professional Services for the Period: 06/27/2021 to 07/24/2021

Invoice Per Attached Itemization

*** Total Project Invoice Amount: 4,552.00

Billing Summary	Current	Prior	Total
	\$4,552.00	\$13,966.50	\$18,518.50

Aged Receivables	Total	Current	31-60	61-90	91 +

1% Discount if Paid within 10 days. Net 30 Days. If paid by credit card, a 3% fee will be added.
 A late charge of 1.0% will be added to any unpaid balance after 30 days.

We Accept:



Please Call Accounts Receivable

Preliminary Geotechnical Investigation

EWSU Water Treatment Plant

Evansville, IN

CTL Project No.: 21050038IND

July 24, 2021

INVOICE ITEMIZATION**Field Testing**

Description	Quantity	Unit	Unit Cost	Total Cost
Mobilization/Demobilization	1	LS	\$2,000.00	\$2,000.00
Drilling: From 0 to 50'	150	Foot	24.00	\$3,600.00
Drilling: From 50' to 100'	52	Foot	27.00	\$1,404.00
Drilling: From 100' to 150'	11	Foot	30.00	\$330.00
Rock Core Setup	1	Each	175.00	\$175.00
Rock Coring: From 100' to 150'	10	Foot	75.00	\$750.00
Shelby Tube	2	Each	75.00	\$150.00
Boring Backfill	105	Foot	7.50	\$787.50
VW Piezometer Installation	1	Each	1100.00	\$1,100.00
Subtotal Field Testing				\$10,296.50

Laboratory Testing

Description	Quantity	Unit	Unit Cost	Total Cost
Split Spoon soil samples (Visual Description + moisture content testing)	32	Each	16.00	512.00
Atterberg Limits	8	Each	85.00	680.00
Grain Size Analysis	8	Each	90.00	720.00
Unconfined Compressive Strength	4	Each	100.00	400.00
Subtotal Laboratory Testing				\$2,312.00

Engineering and Reporting

Description	Quantity	Unit	Unit Cost	Total Cost
Drilling Supervisor for locating test borings and coordination with City of Evansville personnel	12	Hour	115.00	1,380.00
Engineering Technician (Ground Water Readings)	1	Trip	150.00	150.00
Test Boring Preparation	4	Hour	95.00	380.00
Geotechnical Engineer	16	Hour	140.00	2,240.00
Senior Geotechnical Engineer, PE	11	Hour	160.00	1,760.00
Subtotal Engineering and Reporting				\$5,910.00

TOTAL FEE TO DATE	\$18,518.50
PREVIOUSLY INVOICED	\$13,966.50
TOTAL DUE THIS INVOICE	\$4,552.00

OUCR DR 3-7 (Supplemental)

11/11/2022

DATA REQUEST
City of Evansville

Cause No. 45545 S1

Information Requested:

Please provide complete copies of all geotechnical reports for the new Water Treatment Plant prepared by CTL Engineering of Indiana, Inc.

Original Information Provided: 10/27/2022

Petitioner prefaces its answer by reminding why Petitioner has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. Evansville is doing everything in its power to avoid that outcome. If Evansville must wait for additional financing authority to close, it will not be because Evansville made that choice but because it was forced to do so. Evansville would under such circumstances compute the effect on customer rates from any increase in interest rates resulting from such a delay and would inform Evansville customers who caused that increase.

(Continued on next page)

11/11/2022

OUCC DR 3-7 (Supplemental)
(Continued from previous page)

The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

The final geotechnical reports are not complete. CTL has been performing cone penetration tests the week of October 17, 2022 and will be continuing soil borings through the week of October 24, 2022. Expected completion of borings is October 28, 2022 and it is anticipated the final geotechnical report will be completed within 4 to 6 weeks once this field work is completed.

Supplemental Information Provided:

A preliminary findings report was provided by CTL in 2021. However, the scope was very limited due to the presence of the existing street maintenance and levee authority buildings onsite. The preliminary findings report is attached.

Supplemental Attachment:

OUCC DR 3-7 (Supplemental).pdf

Generalized subsurface conditions.

Generally, our borings encountered the worst of soil conditions (very poor):

0 to 6 – Medium dense to loose, FINE SAND with silt (SM)

(very loose in Boring B-4)

6 to 9 - firm to soft, silty LEAN CLAY (CL)

9 to (35 - 40) very soft SILTY CLAY OR SILTY SAND

(35 -40) to 55 very loose to loose, SAND with silt .

Soil sampling was terminated at 50 to 56 feet

Rock (SHALE) was encountered at 111 feet in Boring B-2. The rock quality was good.

Ground water observed in borings is 8 to 12 feet deep. We are waiting for our piezometer data.

Geotechnical Concerns:

- Liquefaction – the very loose sands and soft silty are susceptible to liquefaction. We can estimate the settlement from the sand, but for the silt, there isn't a good method. However, I would plan on a potential of 6 to 8 inches of differential settlement (could be as high as 12 inches).
- Heave - The contractor will have to design his dewatering system and reinforce the bottom of the excavation to prevent the bottom from heave.
- Low bearing capacity for shallow foundation. Since Auger Cast In Place piles (ACIP) will be required for the heavier structures, I would just use ACIP for all the structures. The ACIP would be based on friction; therefore, they can also be used for uplift resistance.
- Seismic Site Class – D: The liquifiable soils trigger a site class F with the exception of short wide buildings (building periods less than ½ second). We have assumed all structures will have a natural period less than ½ second. Structural engineer to confirm. If the structures do not meet the exception, then a site response analysis is required (out of scope).

Preliminary Considerations for Design

Foundations for Pretreatment Tanks – foundations 15 feet below existing grade.

- Some dewatering may be required.
- ACIP piles foundations for compression and uplift loads. If you provided the design loads you plan to use, we can provide recommendations for pile length and diameters. (i.e. 40 Kip, 60 kip, 100 kip piles).
- ACIP piles may be longer than normal to resist downdrag in the event of a seismic event; however, we can use a lower factor of safety for the seismic event. Suggested Factor of Safety's (open for discussion):
 - 2.0 gravity static load
 - 3.0 uplift at stable groundwater level (normal pool)
 - 1.5 uplift at 100-year flood level
 - 1.2 gravity due to down drag during a seismic event.
- If you still need soil anchors, we can recommend bond strength for micropiles. However, it would be simpler to just use one type of foundation system.

Foundations for Clear Wells:

- Bearing 38.5 feet deep.
- We believe construction of ACIP at that depth would be difficult. We need to consult with contractors to see if it can be done. However, it may not be necessary.
 - We anticipate the loads from the clear well tanks will be less than the weight of the soil removed for the excavation. Therefore, we could float the structure.
 - The excavation will need a massive concrete bottom to control heave. A mat foundation for the tanks could serve that purpose. A mat foundation could also be heavily reinforced to bridge over differential settlement from liquefaction. Also, the mat foundation could be sized to resist the uplift force.
- The contractor will need to put temporary bracing for construction which will require tiebacks
- If additional resistance capacity is needed for the design structure, vertical tieback or micropiles drilled through mat foundations could be used.
- Anchors will need to be load tested.

Lateral Earth Pressures:

Our report will include lateral earth pressure coefficients for “Active” –forward rotation, “At-Rest” – no rotation, and “Passive – backward rotation. We will also include recommended unit weights for above and below the groundwater, and groundwater levels. This should be sufficient for lateral earth pressures.

Seismic Site Class:

- Currently we are considering Site Class D. See the seismic comments listed under the Geotechnical Concerns section.
- Looks like your look-up tool used ASCE 7-16. The values are slightly different for ASCE 7-10. Which code are we using? Regardless, we are in seismic design category “D”.

Building Code	ASCE 7-10		ASCE 7-16	
Coordinates	Lat: 37.958105		Long: -87.570315	
Risk Category	IV - Essential Structure			
Bedrock acceleration, short (S_s)	0.57		0.538	
Bedrock acceleration, 1 sec (S_1)	0.20		0.182	
Design acceleration, short (S_{DS})	0.511	0.593	0.491	0.588
Design acceleration, 1 sec (S_{D1})	0.267	0.427	0.271	0.508
Seismic Design Category	D	D	D	D

We will need to provide you with acceleration values for the seismic lateral pressures, PGA at the mid wall height.

Seismic Relative Movement:

Likely several inches (plan on 8 to 12 inches)

Dewater and Pump Rates

The design of dewatering system is beyond our proposed scope of services and is not the design team responsibility. This is the contractor's responsibility. We are looking into providing estimated dewatering parameters based on empirical correlations. However, you may not want us to do that because it makes the client and the design team responsible (i.e. if the dewatering system underperforms, then the contractor could blame the design team). We can perform a slug test and have a hydrogeologist estimate pumping rates for an additional fee.

There is another concern with dewatering. Pumping the water from the lower sand aquifer may not lower the groundwater in the clay layer. The contractor may need a shallow and deep dewatering points.

EWSU may have information regarding the dewatering system used for the recent construction of the Effluent Pump Station (approximately 650 feet north of this project site). Pumping rates and measured drawdowns during construction dewatering may be available and useful information for dewatering efforts for this project.

Groundwater Design Level

A common simple practice is to use the 100-year flood elevation. The Effluent Pump station design uses a land side flood level of 365 feet. Our site elevation is 366 feet. Based on our preliminary observations, a groundwater elevation of 365 feet is reasonable for shallow structures. On the other side of the levy (about 700 feet away), the river and flood level is 378 feet. Our experience indicates a strong correlation of the hydraulic pressure in the sand layer and the flow level in the adjacent Ohio River. Therefore, a higher design groundwater level may be needed for deep structures were excavations or foundations extend through the clay overburden soils and expose the granular soils. There is a piezometer installed at a depth of 48 feet at Boring B-3 taking hourly groundwater readings. These readings and correlations with the flow level of the Ohio River will be used to assess the design high water level for the project.

Closing

We look forward to discussing the project further with you and appreciate getting us involved early in the design process. This is a very challenging site.

TEST BORING RECORD

CLIENT : AECOM
 PROJECT : EWSU Water Treatment Facility
 LOCATION : Evansville, IN
 PROJECT NO. : 21050038IND


BORING NO.: B-1
 SHEET 1 OF 3
 DATE STARTED : 03-01-21
 DATE COMPLETED : 03-02-21

Boring Elevation: <u>366 Feet</u>	Boring Depth : <u>51.5 Feet</u>	Boring Method : <u>ATV</u>	Hammer : <u>Automatic</u>
Latitude : <u>37.957725</u>	Station: _____	Rig Type : <u>CA</u>	Hammer Efficiency: <u>Estimated 80%</u>
Longitude <u>-87.570826</u>	Offset : _____	Casing Diameter : <u>3" I.D.</u>	Driller : <u>DD</u>
	Line : _____	Core Size : <u>---</u>	Temperature : <u>45° F</u>
			Weather : <u>Fair</u>

GROUNDWATER:

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
365.5		OLD PAVER (6") (Visual)	0.5											
	5	Brown, Moist, Medium Dense to Loose, POORLY GRADED SAND with SILT (SP-SM) (Lab 1)		SS-1	6 9 10	19	67	9				NP	NP	NP
360.5			5.5	SS-2	5 5 4	9	100	12						
	10	Gray, Wet to Moist, Stiff to Very Soft, LEAN CLAY with SAND (CL) with Traces of Organics (Lab 2)		SS-3	2 2 2	4	100	41						
				SS-4	0 0 0	0	100	33				34	21	13
353.0			13.0											
	15	Gray, Wet, Very Loose to Loose, SILTY SAND (SM) (Lab 3)		SS-5	1 0 1	1	100	24				NP	NP	NP
	20			SS-6	0 0 0	0	0							

Continued on next page

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD

CLIENT : AECOM


BORING NO.: **B-1**

PROJECT : EWSU Water Treatment Facility

SHEET 2 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
25		Gray, Wet, Very Loose to Loose, SILTY SAND (SM) (Lab 3)		SS-7	0 0 2	2	100	33						
337.0			29.0											
30				SS-8	5 5 3	8	100	27			29	23	6	
35		Gray, Wet, Medium Stiff to Very Soft, SILT with SAND (ML) (Lab 5)		SS-9	0 0 0	0	0							
326.0			40.0											
40		Heaving Sand Encountered at between 40 and 50 feet and drilling mud injected for drilling.		SS-10	3 1 1	2	100	21						
45		Brown, Wet, Very Loose to Loose, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)		SS-11	1 3 6	9	67	22						

Continued on next page

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD


CLIENT : AECOM

BORING NO.: **B-1**

PROJECT : EWSU Water Treatment Facility

SHEET 3 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
314.5	50	Brown, Wet, Very Loose to Loose, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)	51.5	SS-12	2 2 5	7	67	22						
		Bottom of Boring at 51.5 feet Boring backfilled according to Aquifer Protection Guidelines												
	55													
	60													
	65													
	70													
	75													

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD

CLIENT : AECOM
 PROJECT : EWSU Water Treatment Facility
 LOCATION : Evansville, IN
 PROJECT NO. : 21050038IND

BORING NO.: B-2
 SHEET 1 OF 5
 DATE STARTED : 03-03-21
 DATE COMPLETED : 03-03-21

Boring Elevation: <u>366 Feet</u>	Boring Depth : <u>56.5 Feet</u>	Boring Method : <u>ATV</u>	Hammer : <u>Automatic</u>
Latitude : <u>37.957701</u>	Station: _____	Rig Type : <u>CA</u>	Hammer Efficiency: <u>Estimated 80%</u>
Longitude <u>-87.569875</u>	Offset : _____	Casing Diameter : <u>3" I.D.</u>	Driller : <u>DD</u>
	Line : _____	Core Size : <u>2" NQ</u>	Temperature : <u>55° F</u>
			Weather : <u>Fair</u>

GROUNDWATER:

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
365.7-		OLD PAVER (4") (Visual)	0.3											
	5	Brown, Moist, Medium Dense to Loose, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)		SS-1	7 11 13	24	67	12						
360.0			6.0	SS-2	5 6 4	10	67	19						
	10				SS-3	4 2 3	5	100	25					
	15	Brown, Moist to Wet, Stiff to Very Soft, LEAN CLAY with SAND (CL) (As Lab 2)		SS-4	1 2 2	4	67	31						
	20				SS-5	0 0 0	0	33	33					
					SS-6	0 0 0	0	0						

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CTL Engineering, Inc.
 Phone: 317-295-8650

BORING METHOD	SAMPLING METHOD	ABBREVIATIONS
HSA - Hollow Stem Auger	SS - Split Spoon Sample	* - Hand Penetrometer
SFA - Solid Flight Auger	ST - Shelby Tube Sample	LL - Liquid Limit
RC - Rock Coring	CR - Rock Core Sample	PL - Plastic Limit
MD - Mud Drilling	BS - Bag Sample	PI - Plasticity Index
CA - Casing Advancer	AC - Auger Cuttings	SPT - Standard Penetration Test
HA - Hand Auger		

TEST BORING RECORD

CLIENT : AECOM

BORING NO.: **B-2**

PROJECT : EWSU Water Treatment Facility

SHEET 2 OF 5

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
344.0	25	Brown, Very Moist, Very Soft, LEAN CLAY (CL) (Lab 8)	22.0	ST-1			100	35	109.4	1.3 @ 11.1%	42	24	18	
	30		SS-7			0 0 0	0	100	34					
333.0	35	Heaving Sand Encountered at 35 feet.	33.0	SS-8			0 4 5	9	100	40				
	40	Brown and Gray, Wet, Medium Dense to Very Loose, POORLY GRADED SAND with SILT (SP-SM) (Lab 7)		SS-9			1 1 4	5	100	23		NP	NP	NP
	45		SS-10			2 3 8	11	0						

Continued on next page



CTL Engineering, Inc.
 Phone: 317-295-8650

BORING METHOD

- HSA - Hollow Stem Auger
- SFA - Solid Flight Auger
- RC - Rock Coring
- MD - Mud Drilling
- CA - Casing Advancer
- HA - Hand Auger

SAMPLING METHOD

- SS - Split Spoon Sample
- ST - Shelby Tube Sample
- CR - Rock Core Sample
- BS - Bag Sample
- AC - Auger Cuttings

ABBREVIATIONS

- * - Hand Penetrometer
- LL - Liquid Limit
- PL - Plastic Limit
- PI - Plasticity Index
- SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : AECOM


BORING NO.: **B-2**

PROJECT : EWSU Water Treatment Facility

SHEET 3 OF 5

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
50		Brown and Gray, Wet, Medium Dense to Very Loose, POORLY GRADED SAND with SILT (SP-SM) (Lab 7)		SS-11	0 0 0	0	100	28						
313.0			53.0											
55		Brown, Wet, Medium Dense, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)		SS-12	4 6 7	13	67	17						
309.5			56.5											
60														
65		Heaving sand encountered and drilling mud injected. Drilling mud could not stop heaving. Drilled to 111 feet without sampling because of heaving sand and casing refusal conditions.												
70														
75														

Continued on next page

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD

CLIENT : AECOM


BORING NO.: **B-2**

PROJECT : EWSU Water Treatment Facility

SHEET 4 OF 5

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
	80													
	85													
	90	Heaving sand encountered and drilling mud injected. Drilling mud could not stop heaving. Drilled to 111 feet without sampling because of heaving sand and casing refusal conditions.												
	95													
	100													

Continued on next page

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD


CLIENT : AECOM

BORING NO.: **B-2**

PROJECT : EWSU Water Treatment Facility

SHEET 5 OF 5

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits		
											LL	PL	PI
105		Heaving sand encountered and drilling mud injected. Drilling mud could not stop heaving. Drilled to 111 feet without sampling because of heaving sand and casing refusal conditions.											
255.0			111.0										
254.6		Whitish Tan, Medium Grained, Slightly Weathered, Hard, Strong, SANDSTONE	111.4										
254.0		Light Tannish Gray, Fine Grained with some Coarse Grained, Highly Weathered, Highly Fractured, Moderately Soft, SANDSTONE	112.0				95						
				RC-RQD= 77%									
115		Grey to Dark Grey, Fine Grained with some Coarse Grained, Scattered throughout, Slightly Weathered, Hard, Strong, SANDSTONE											
				RC-RQD= 92%			97						
120													
245.0		Bottom of Boring at 121 feet	121.0										
		Boring backfilled according to Aquifer Protection Guidelines											
125													

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD

CLIENT : AECOM
 PROJECT : EWSU Water Treatment Facility
 LOCATION : Evansville, IN
 PROJECT NO. : 21050038IND

BORING NO.: B-4
 SHEET 1 OF 3
 DATE STARTED : 03-02-21
 DATE COMPLETED : 03-02-21

Boring Elevation: 365 Feet Boring Depth : 50.5 Feet Boring Method : ATV Hammer : Automatic
 Latitude : 37.958387 Station: _____ Rig Type : CA Hammer Efficiency: Estimated 80%
 Longitude -87.569674 Offset : _____ Casing Diameter : 3" I.D. Driller : DD
 Line : _____ Core Size : --- Temperature : 43° F
 Weather : Fair

GROUNDWATER:

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
364.7		TOPSOIL (4") (Visual)	0.3											
		Brown, Wet, Very Loose, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)		SS-1	2 1 1	2	67	12						
359.5	5		5.5	SS-2	1 1 1	2	56	21						
		Gray, Moist, Soft to Medium Stiff, LEAN CLAY with SAND (CL) (FILL) with Traces of Brick (Lab 4)		SS-3	3 4 3	7	33	20		32	20	12		
356.0	10		9.0	SS-4	0 1 1	2	67	29						
	15	Gray, Moist, Soft to Very Soft, LEAN CLAY with SAND (CL) (As Lab 2)		SS-5	0 0 0	0	100	35						
	20			SS-6	0 0 0	0	6	41						

Continued on next page



CTL Engineering, Inc.
 Phone: 317-295-8650

BORING METHOD
 HSA - Hollow Stem Auger
 SFA - Solid Flight Auger
 RC - Rock Coring
 MD - Mud Drilling
 CA - Casing Advancer
 HA - Hand Auger

SAMPLING METHOD
 SS - Split Spoon Sample
 ST - Shelby Tube Sample
 CR - Rock Core Sample
 BS - Bag Sample
 AC - Auger Cuttings

ABBREVIATIONS
 * - Hand Penetrometer
 LL - Liquid Limit
 PL - Plastic Limit
 PI - Plasticity Index
 SPT - Standard Penetration Test

TEST BORING RECORD

CLIENT : AECOM


BORING NO.: **B-4**

PROJECT : EWSU Water Treatment Facility

SHEET 2 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
339.0	25	Gray, Moist, Soft to Very Soft, LEAN CLAY with SAND (CL) (As Lab 2)	26.0	SS-7	0 0 0	0	0							
				ST-1			100	44	106.4	1.0 @ 5.1%	48	27	21	
	30	Gray, Very Moist, Very Soft, LEAN CLAY (CL) (Lab 6)		SS-8	0 0 0	0	100	38						
	35			SS-9	0 0 0	0	100	43						
328.0			37.0											
	40	Gray, Wet, Very Loose, SILTY SAND (SM) (As Lab 3)		SS-10	3 2 2	4	22	26						
323.0			42.0											
	45	Brown, Wet, Very Loose to Medium Dense, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)		SS-11	0 0 0	0	0							

Continued on next page

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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TEST BORING RECORD


CLIENT : AECOM

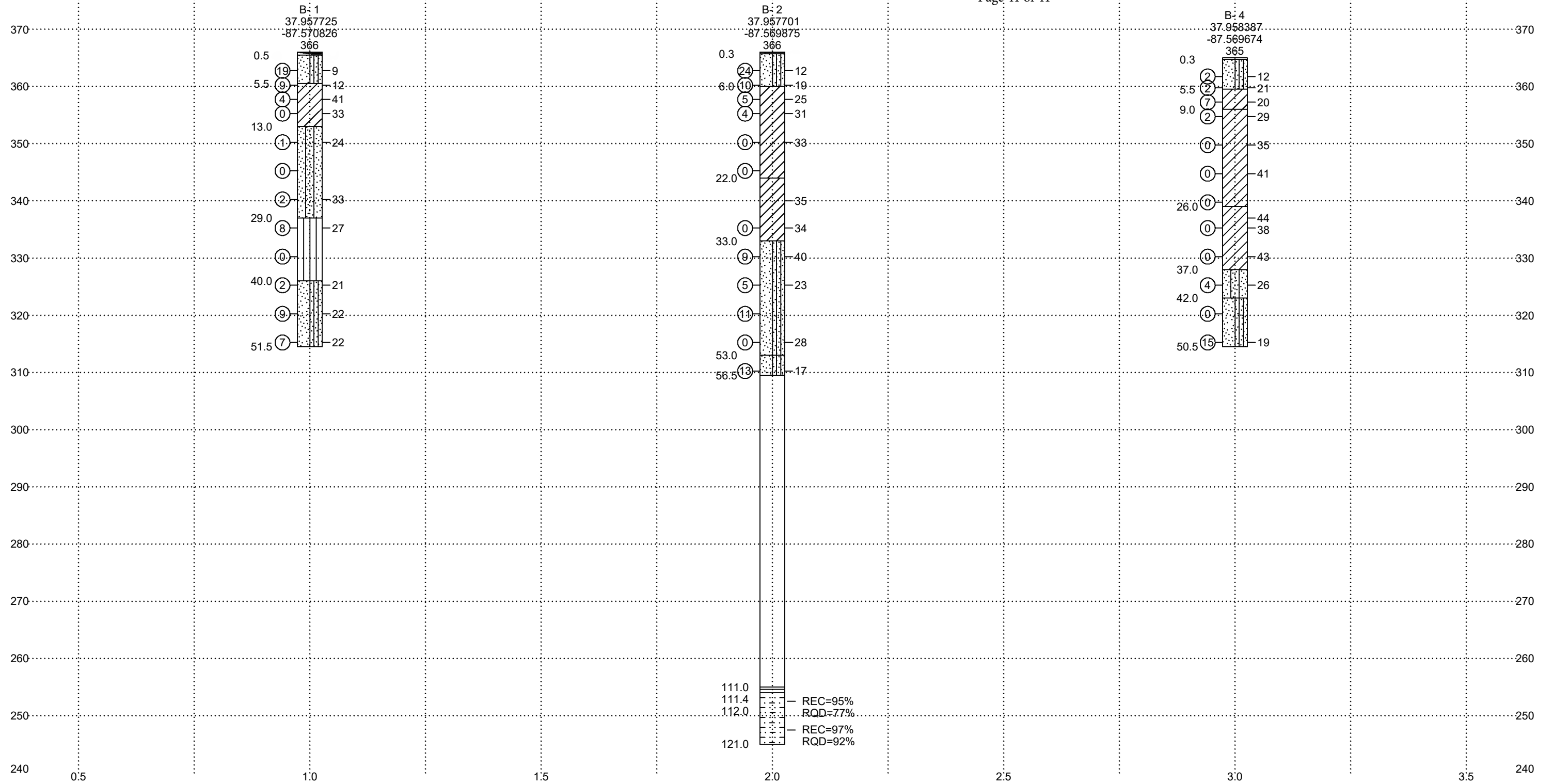
BORING NO.: **B-4**

PROJECT : EWSU Water Treatment Facility

SHEET 3 OF 3

Stratum Elevation	Sample Depth	SOIL/MATERIAL DESCRIPTION	Stratum Depth	Sample Number	SPT per 6"	SPT per 12" (N)	Recovery (%)	Moisture Content (%)	Total Unit Weight (pcf)	Unconfined Compression (ksf)	Atterberg Limits			
											LL	PL	PI	
314.5	50	Brown, Wet, Very Loose to Medium Dense, POORLY GRADED SAND with SILT (SP-SM) (As Lab 1)	50.5	SS-12	5 7 8	15	67	19						
		Bottom of Boring at 50.5 feet												
		Boring backfilled according to Aquifer Protection Guidelines												
	55													
	60													
	65													
	70													
	75													

 CTL Engineering, Inc. Phone: 317-295-8650	BORING METHOD HSA - Hollow Stem Auger SFA - Solid Flight Auger RC - Rock Coring MD - Mud Drilling CA - Casing Advancer HA - Hand Auger	SAMPLING METHOD SS - Split Spoon Sample ST - Shelby Tube Sample CR - Rock Core Sample BS - Bag Sample AC - Auger Cuttings	ABBREVIATIONS * - Hand Penetrometer LL - Liquid Limit PL - Plastic Limit PI - Plasticity Index SPT - Standard Penetration Test
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LEGEND

ASPHALT CONCRETE	SILTY SAND	TOPSOIL	GROUND WATER DURING DRILLING	W MOISTURE CONTENT IN PERCENT (w)
SAND WITH SILT POORLY GRADED	SILT		GROUND WATER AT COMPLETION OF DRILLING	STANDARD PENETRATION IN BLOWS PER FOOT (N)
LEAN CLAY	SANDSTONE		GROUND WATER AT "N" HOURS AFTER COMPLETION	

SOIL PROFILE

Scale As Shown	AECOM EWSU Water Treatment Facility Evansville, IN	
Date 4/9/21		
Drawn By CG		
Reviewed By		

CTL Engineering, Inc.
 1310 S. Franklin Rd.
 Indianapolis, Indiana 46239
 Phone: 317-295-8650
 Website: www.ctleng.com

OUCG DR 17-6

DATA REQUEST
City of Evansville

Cause No. 45545

Information Requested:

For Evansville's preferred new water treatment plant Alternate 2B, please provide cost support documentation for each major component lump sum cost listed in Table 9-9 Plant Alternative 2B Total Estimated Construction Cost on pages 126 and 127 of the Advanced Facility Plan (Attachment SMB-1 to Mr. Breese's case-in-chief testimony in this cause). Please provide copies of the Excel worksheets detailing quantities, unit costs, equipment costs, other data used to establish costs, and all assumptions and cost allowances. Please also provide copies of budgetary cost proposals provided by equipment vendors and material suppliers.

Information Provided:

The spreadsheet is attached as OUCG DR 17-6 - Alt 2B.xlsm. Also attached is OUCG DR 17-6 Timberline Output.pdf (developed in Timberline Cost estimating software) which presents further detail for cost estimates performed early in the development of the alternatives report. All equipment proposals are attached as "Budgetary Quotes.pdf".

Attachments:

OUCG DR 17-6 Attachment 1.xlsm
OUCG DR 17-6 Attachment 2.pdf
OUCG DR 17-6 Attachment 3.pdf

OUCG Note: DR 17-6 Attachment 3.pdf (budgetary quotes) is not included here due to its length (449 pages)

Cause No. 45545
OUCG DR 17-6 Attachment 1

Evansville Water and Sewer Utility

WTP Upgrade - Plant Alternative 2B (New Site) - Capital Cost

Component Description	Cost
Civil Site Work (Roads, Drainage, Fencing etc.)	\$2,853,000
Rehabilitate River Intake	\$6,752,000
Raw Water Piping, Metering Vault	\$1,610,000
New Conventional Pretreatment System	\$17,377,000
New Ozone Facility (Generation, Basin, LOX)	\$19,630,000
New Biologically Active Filters & Building	\$33,912,000
New Chemical Facilities (all)	\$6,612,000
New Clearwell	\$8,804,000
New High Service Pump Station	\$11,130,000
Residual Pump Station Forcemain	\$1,575,000
Filter Washwater Tank	\$950,000
New Administration Building	\$1,810,000
New Maintenance Building	\$1,040,000
Interconnecting Site Utility / Electrical Work	\$3,500,000
New Electric service entrance	\$1,000,000
New Generator (2,000 KW)	\$1,500,000
Subtotal	\$120,055,000
Additional Construction Contingencies (3%)	\$3,602,000
Other Misc. Plant-Wide Improvements (1%)	\$1,201,000
Allowances	\$500,000
Maintenance Building Relocation	\$13,691,000
Startup and Commissioning	\$1,000,000
Total Estimated Construction Cost	\$140,049,000
Construction Administration and Bidding (2.5%)	\$3,501,000
Inspection and Materials Testing (2%)	\$2,801,000
Interest Incurred through Financing (2.25%)	\$3,151,000
Permitting Fees and Legal Expenses (1%)	\$1,400,000
Total Project Cost	\$150,902,000

Notes:

1. New site assumed to be ready for construction through other City projects
2. Provide cost of WTP demolition and relocation of levee building and maintenance garage as separate

Original Costs from Estimator

Description	Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Demolition Work	\$49,600	\$75,000	1.512
Roof Repair / Replacement	\$7,000	\$10,500	1.500
Doors & Hardware Rehab	\$13,000	\$19,700	1.515
Building Finishes & Specialties	\$34,200	\$50,500	1.477
Structure and Walkway Rehabilitation	\$50,000	\$75,500	1.510
Process Piping and Accessories	\$209,000	\$317,800	1.521
Pump Replacement	\$1,335,500	\$2,020,400	1.513
Screen Replacement	\$666,000	\$1,019,100	1.530
Potassium Permanganate System	\$249,000	\$366,000	1.470
HVAC Replacement	\$115,000	\$172,000	1.496
Electrical Systems	\$200,000	\$302,000	1.510
Instrumentation	\$84,000	\$126,900	1.511
Totals	\$3,012,300	\$4,555,400	

Adjusted for Report

Table B1.1 - River Intake Rehabilitation, Low Service PS

Description		Estimated Cost	Cost Adjust Comments
Demolition Work		\$75,000	
Roof Repair / Replacement (3,000 sf)		\$60,000	X - City noted a whole new roof
Doors & Hardware Rehab		\$13,000	
Building Finishes & Specialties		\$35,000	
Structure and Walkway Rehabilitation		\$50,000	
Process Piping and Accessories		\$209,000	
Pump Replacement (6 units)		\$1,336,000	
Intake Screens (3 units)		\$1,300,000	X - quote of \$750k for 3 screens - estimate seems to be pneumatic screens so updated
Potassium Permanganate System (1 unit)		\$400,000	X - estimate seemed low - need to run piping over, hopper, storage, etc.
HVAC Replacement (3,000 sf)		\$115,000	
Misc. Electrical (MCC Upgrades are Underway)		\$150,000	X - MCC's are getting some upgrades
Instrumentation		\$100,000	
Subtotal		\$3,843,000	
Estimating Contingency	30%	\$1,152,900	
Escalation to Midpoint	3%	\$115,290	
Construction Subtotal		\$5,111,190	
Contractor General Conditions	10%	\$511,119	
Contractor Overhead and Profit	12%	\$613,343	
Construction Contingencies	5%	\$255,560	
Allowance: Dredge River		\$260,000	
Grand Total Cost		\$6,752,000	

Original Costs from Estimator

	Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Building & Structure	\$2,445,033	\$3,782,475	1.547
Dewatering	\$194,067	\$305,891	1.576
Foundation and Earthwork	\$1,922,075	\$2,955,862	1.538
Baffle Walls	\$529,091	\$809,914	1.531
Process Piping, Valves, Meters, I	\$269,608	\$411,340	1.526
Flocculators & Mixers	\$1,160,771	\$1,769,373	1.524
Settlement Equipment	\$3,389,594	\$5,158,378	1.522
Slide Gate w/ Operator	\$117,632	\$178,380	1.516
Electrical	\$315,783	\$477,528	1.512
Instrumentation & Controls	\$94,735	\$143,258	1.512
Grand Total Capital Constructio	\$10,438,389	\$15,992,399	

Adjusted for Report

Table B2.2 - New Plate Settler Pretreatment

Description		Estimated Cost
Building & Structure		\$2,446,000
Site Dewatering		\$195,000
Foundation and Earthwork		\$1,923,000
Baffle Walls (530 lf)		\$530,000
Process Piping, Valves, Meters, Etc.		\$500,000
Flocculators & Mixers w/VFD (36 units)		\$1,300,000
Plate Settlers & Sludge Collection		\$3,390,000
Slide Gate w/ Operator (4 units)		\$118,000
Electrical (10% Equip Cost)		\$481,000
Instrumentation & Controls (5% Equip Cost)		\$241,000
Subtotal		\$11,124,000
Estimating Contingency	20%	\$2,225,000
Escalation to Midpoint	3%	\$334,000
Construction Subtotal		\$13,683,000
Contractor General Conditions	10%	\$1,368,000
Contractor Overhead and Profit	12%	\$1,642,000
Construction Contingencies	5%	\$684,000
Allowances:		
Grand Total Cost		\$17,377,000

Cost Adjust
Comments

Increased
Increased

X - Use 10% of equipment cost
X - Use 5% of equipment cost

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
	Ozone Facility w/ Contact Basins			
31.01 Dewatering	Dewatering	\$212,734	\$334,118	1.571
	Contact Basins	\$2,523,808	\$3,901,587	1.546
	Foundation and Earthwork	\$1,501,212	\$2,304,234	1.535
	Building Structure	\$496,909	\$762,532	1.535
	Process Piping	\$301,560	\$463,000	1.535
40.02 Valves, Meters, Etc.	Valves, Meters, Etc.	\$12,895	\$19,571	1.518
43.10 Ozone Equipment	Ozone Equipment	\$3,497,647	\$5,295,271	1.514
22.00 Plumbing	Plumbing	\$55,865	\$84,370	1.510
23.00 HVAC	HVAC	\$352,530	\$532,404	1.510
	Electrical	\$257,000	\$388,130	1.510
26.02 Instrumentation & Controls	Instrumentation & Controls	\$33,000	\$49,838	1.510
	LOX Equipment			
	Slab, Pads, Curbs, Fences/Gates	\$23,462	\$36,190	1.542
32.01 Fencing & Gates	Fencing & Gates	\$5,142	\$7,776	1.512
	Process Piping	\$31,588	\$48,964	1.550
40.02 Valves, Meters, Etc.	Valves, Meters, Etc.	\$20,611	\$31,273	1.517
43.17 LOX Equipment	LOX Vaporizer, Tank, Station	\$890,881	\$1,347,884	1.513
26.01 Above Ground Electrical	Electrical	\$43,160	\$65,267	1.512
26.02 Instrumentation & Controls	Instrumentation & Controls	\$12,948	\$19,580	1.512
Grand Total Capital Construction Cost	Grand Total Capital Construction	\$10,272,952	\$15,691,989	

Adjusted for Report

Table B3.4 - Ozonation in New Basins, New BAF

Description		Estimated Cost	Cost Adjust Comments
Ozone Facility w/ Contact Basins			
Site Dewatering		\$213,000	
Ozone Contact Basins		\$2,524,000	
Access Hatches (8 units)		\$120,000	X - Added item
Foundation and Earthwork		\$1,502,000	
Building Structure (7,834 sf)		\$497,000	
Process Piping		\$377,000	X - Low, increase to match rehab option
Sampling System (pumps, piping, Analyzers)		\$100,000	X - Added this item
Valves, Meters, etc.		\$133,000	X - assume 35 valves (9 pumps)+10K for small valves
Ozone System, quench, destruct (2 units)		\$4,498,000	X - Add 30% (1 Mill) for install
Plumbing (9,309 sf)		\$56,000	
HVAC (7,834 sf)		\$353,000	
Electrical (7,834 sf)		\$900,000	X - 150K for Bldg and 750K for Ozone
Instrumentation & Controls (1 % Equip Cost)		\$225,000	X - Ozone I&C would be higher; use higher
LOX Equipment			
Building Structure (1,462 sf)		\$35,000	X - Make 35K based on 12" slab and \$600/cy
Fencing & Gates		\$9,000	X - Use \$60/ft
Process Piping		\$32,000	
Valves, Meters, Etc.		\$42,000	X - Double estimator number
LOX Vaporizer, Tank, Station (2 units)		\$891,000	
Electrical (5% Equip Cost)		\$45,000	
Instrumentation & Controls (1.5% Equip Cost)		\$14,000	
Subtotal		\$12,566,000	
Estimating Contingency	20%	\$2,513,200	
Escalation to Midpoint	3%	\$376,980	
Construction Subtotal		\$15,456,180	
Contractor General Conditions	10%	\$1,545,618	
Contractor Overhead and Profit	12%	\$1,854,742	
Construction Contingencies	5%	\$772,809	
Allowances:			
Grand Total Cost		\$19,630,000	

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
31.01 Dewatering	Building Structure	\$5,154,603	\$7,954,116	1.543
	Dewatering	\$212,734	\$334,535	1.573
	Foundation and Earthwork	\$2,080,983	\$3,201,747	1.539
	Process Piping	\$2,449,864	\$3,744,641	1.529
40.02 Valves, Meters, Etc.	Valves, Meters, Etc.	\$1,665,261	\$2,522,303	1.515
41.22 Hoists & Cranes	Hoists & Cranes	\$146,529	\$221,680	1.513
43.05 Filtration Equipment	Filtration Equipment	\$4,318,188	\$6,667,928	1.544
22.00 Plumbing	Plumbing	\$101,220	\$153,065	1.512
23.00 HVAC	HVAC	\$1,138,500	\$1,721,642	1.512
	Electrical	\$571,901	\$864,830	1.512
26.02 Instrumentation & C	Instrumentation & Controls	\$21,944	\$33,184	1.512
Grand Total Capital Constr		\$17,861,727	\$27,419,671	

Deeper filters for BAF

Total Filter Area = 8,681 sq.ft.
 Number of filters = 10
 Area each filter = 965 sq.ft.
 Length each Filter = 50.0 ft
 Width each Filter = 20.0 ft
 Perimeter each Filter = 140 ft
 Additional Conc (3-ft taller) = 233 cu.ft.
 Concrete Adder = \$233,333
 Media Adder = \$500,000

Adjusted for Report

Table X.X - New GAC Biologically Active Filters

Description		Estimated Cost	Cost Adjust Comments	
Filter Building and Structure (25,300 sf)		\$5,405,000	X - added additional 3-ft tall walls concrete and media J.Krinks email 7/16/20	
Site Dewatering		\$213,000		
Foundation and Earthwork		\$2,081,000		
Process Piping		\$2,800,000		
Valves, Meters, Etc.		\$1,666,000		
Hoists & Cranes		\$147,000		
Filtration Equipment		\$5,320,000		X - Additional Media cost is added to conv. Filters
Plumbing (25,300 sf)		\$911,000		
HVAC (25,300 sf)		\$911,000		
Air Scour Blowers		\$850,000		
Electrical		\$925,000	X - Electrical would probably be higher; use 1.5X estimator number	
Instrumentation & Controls		\$480,000	X - Filter I&C would be much higher	
Subtotal		\$21,709,000		
Estimating Contingency	20%	\$4,341,800		
Escalation to Midpoint	3%	\$651,270		
Construction Subtotal		\$26,702,070	is filter system cost that Leopold quoted \$8.2 million for \$8,316,000 this equip	
Contractor General Conditions	10%	\$2,670,207		
Contractor Overhead and Profit	12%	\$3,204,248		
Construction Contingencies	5%	\$1,335,104		
Allowances:				
Grand Total Cost		\$33,912,000		

Original Costs from Estimator - for a 6 MG clearwell (using smaller so use 75% quantities)

	Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Structural Components	\$3,507,453	\$5,415,382	1.544
Dewatering	\$109,646	\$167,526	1.528
Piles	\$1,133,796	\$1,727,195	1.523
Excavation	\$1,734,001	\$2,658,794	1.533
Soil and Backfill	\$523,109	\$828,067	1.583
Grand Total Capital Construction Cost	\$7,008,005	\$10,796,964	

Adjusted for Report

Table B5.1a - Large Clearwell (4 MG) Option

Description		Estimated Cost
Structure		\$2,631,000
Dewatering (2 pumps, 4 mo)		\$110,000
Piles (26,975 vf)		\$851,000
Excavation, Shoring		\$1,301,000
Soil and Backfill		\$393,000
Misc. Clearwell accessories and instruments		\$300,000
Misc Site Restoration		\$50,000
Subtotal		\$5,636,000
Estimating Contingency	20%	\$1,127,200
Escalation to Midpoint	3%	\$169,080
Construction Subtotal		\$6,932,280
Contractor General Conditions	10%	\$693,228
Contractor Overhead and Profit	12%	\$831,874
Construction Contingencies	5%	\$346,614
Allowances:		
Grand Total Cost		\$8,804,000

Keeping this the same (quantity is same for either)

Original Costs from Estimator

	Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Building Structure	\$855,407	\$1,318,619	1.542
Dewatering	\$70,384	\$107,754	1.531
Foundation and Earthwork	\$317,103	\$486,388	1.534
Process Piping	\$157,812	\$242,437	1.536
Valves, Meters, Etc.	\$166,356	\$252,319	1.517
Pumps	\$682,455	\$1,033,923	1.515
Swift Water Chemical Injectic	\$52,570	\$79,566	1.514
Air Compressor	\$36,696	\$55,602	1.515
Plumbing	\$30,606	\$46,283	1.512
HVAC	\$127,525	\$192,844	1.512
Electrical	\$234,647	\$354,833	1.512
Instrumentation & Controls	\$264,180	\$399,494	1.512
Grand Total Capital Construc	\$2,995,741	\$4,570,062	

Adjusted for Report

Table B6.2 - New High Service Pumps Option

Description		Estimated Cost	Cost Adjust Comments
Pump Building (5,100 sf)		\$513,600	Reduce to 3,000 SF
Dewatering			No dewatering - build on top of clearwell
Foundation and Earthwork		\$159,000	Reduced - built on top of clearwell
Process Piping		\$158,000	
Valves, Meters, etc.		\$167,000	
Vertical Turbine Pumps (4 units at 800ea)		\$3,200,000	
			X - Not to be included
			X - Not to be included
Plumbing (5,100 sf)		\$18,600	
HVAC (5,100 sf)		\$76,800	Reduce to 3000 SF
Electrical (15% equipment)		\$480,000	
Instrumentation & Controls		\$265,000	
Subtotal		\$5,038,000	
Estimating Contingency	20%	\$1,007,600	
Escalation to Midpoint	3%	\$151,140	
Construction Subtotal		\$6,196,740	
Contractor General Conditions	10%	\$619,674	
Contractor Overhead and Profit	12%	\$743,609	
Construction Contingencies	5%	\$309,837	
Allowances:			
Grand Total Cost		\$7,870,000	

Cost to use for alt 2B

\$11,130,000.00 Original Estiamte was for effectivelly replacing high service #2

Chemicals include 1) sodium hypochlorite, 2) sodium hydroxide, 3) sodium bisulfite, 4) fluoride, 5) coagulant, 6) PAC, 7) ammonia

	UNIT	Quantity	Unit Cost	Total Cost	Notes
Building Area	SF	6,400	\$180	\$1,152,000	
HVAC	SF	6,400	\$60	\$384,000	
Plumbing	SF	6,400	\$10	\$64,000	
Fire Protection - Wet pipe	SF	6,400	\$13	\$83,200	
Gratings and handrail	SF	40,000	\$15	\$600,000	Use 40' long x 5' wide (200 SF per room in 5 room (not PAC or ammonia)
Bulk tanks & level transmitter	EA	10	\$20,000	\$200,000	
PAC supersac feeder	LS	1	\$300,000	\$300,000	Unit is about \$200 k
Ammonia system	LS	1	\$250,000	\$250,000	Located outside
Day tanks, scale, equip	EA	5	\$6,500	\$32,500	
Chemical Pump Skids	EA	10	\$20,000	\$200,000	2 for hypo, 1 for NaOH, 2 for bisulfite, 1 for fluoirde, 4 for coag,
Motive Water Pump Systems	EA	4	\$20,000	\$80,000	1 set for hypo, 1 for bisulfite, 1 for PAC, 1 for ammonia
Water Softeners	EA	1	\$15,000	\$15,000	1 set for hypo
Vent piping	LF	200	\$150	\$30,000	Assume 40' for each system besides ammonia and PAC
Fill Piping	LF	300	\$150	\$45,000	Assume 60' for each system besides ammonia and PAC
Vent and fill piping accessories	LS	1	\$10,000	\$10,000	
Transfer Pumps	EA	10	\$7,500	\$75,000	2 for each system besides ammonia and PAC
Feed Piping	LS	1	\$300,000	\$300,000	
Misc. Chem & Building Accessories	LS	1	\$100,000	\$100,000	
Electrical & Instrumentation	% proc	30%	\$345,750	\$345,750	% of process equip
Subtotal				\$4,266,450	
Estimating Contingency	25%			\$1,066,613	
Escalation	1%			\$42,665	
Construction Subtotal				\$5,375,727	
Contractor General Conditions	10%			\$537,572.70	
Contractor Overhead and Profit	12%			\$645,087.24	
Construction Contingencies	1%			\$53,757.27	
Total Cost				\$6,612,144	

Note: The individual components (pretreat, ozone, filters, clearwell, etc.) all include dewatering and

CIVIL

	UNIT	Quantity	Unit Cost	Total Cost	Notes
Pavement	SY	9,800	\$40	\$392,000	
Fencing	LF	1,500	\$65	\$97,500	
Gate / Card Access	EA	3	\$30,000	\$90,000	
8-inch storm piping	LF	1,500	\$100	\$150,000	
Larger Storm Piping & MHs/CBs	LS	1	\$150,000	\$150,000	
Additional Excavation / Hauling	CY	5,600	\$60	\$336,000	
Additional Dewatering	LS	1	\$300,000	\$300,000	
Site Grading & Seeding	LS	1	\$120,000	\$120,000	
Landscaping Allowance	LS	1	\$250,000	\$250,000	
Subtotal				\$1,885,500	
Estimating Contingency	20%			\$377,100	
Escalation	3%			\$56,565	
Construction Subtotal				\$2,319,165	
Contractor General Conditions	10%			\$231,916.50	
Contractor Overhead and Profit	12%			\$278,299.80	
Construction Contingencies	1%			\$23,191.65	
Total Cost				\$2,853,000	

Raw water piping

	UNIT	Quantity	Unit Cost	Total Cost
Raw water piping	LF	1,205	\$580	\$698,900
Road crossing	LS	1	\$45,000	\$45,000
Utility Re-routing	LS	1	\$190,000	\$190,000
Misc. Site Grading/restoration	LS	1	\$50,000	\$50,000
Misc. Fittings & Pipe Accessories	LS	1	\$80,000	\$80,000
Subtotal				\$1,063,900
Estimating Contingency	20%			\$212,780
Escalation	3%			\$31,917
Construction Subtotal				\$1,308,597
Contractor General Conditions	10%			\$130,859.70
Contractor Overhead and Profit	12%			\$157,031.64
Construction Contingencies	1%			\$13,085.97
Total Cost				\$1,610,000

Cost Component	Unit	Quantity	Unit Cost	Project Cost
Cast in place concrete	CY	225	\$800	\$180,000
Residuals Pump Station - Pumps	EA	3	\$55,000	\$165,000
Valves	EA	8	\$4,000	\$32,000
Elec & Controls	LS	1	\$340,000	\$340,000
Forcemain & Discharge Piping	LF	1370	\$200	\$274,000
Extension into Ohio River	LF	50	\$500	\$25,000
Misc. Restoration / Grading	LS	1	\$25,000	\$25,000
Subtotal				\$1,041,000
Estimating Contingency	20%			\$208,200
Escalation	3%			\$31,230
Construction Subtotal				\$1,280,430
Contractor General Conditions	10%			\$128,043.00
Contractor Overhead and Profit	12%			\$153,651.60
Construction Contingencies	1%			\$12,804.30
Total Cost				\$1,575,000

Original Costs from Estimator

	Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Building and Structure	\$5,213,525	\$8,046,664	1.543
Dewatering	\$212,734	\$334,535	1.573
Foundation and Earthwork	\$2,080,983	\$3,201,747	1.539
Process Piping	\$2,449,864	\$3,744,641	1.529
Valves, Meters, Etc.	\$1,665,261	\$2,522,303	1.515
Hoists & Cranes	\$146,529	\$221,680	1.513
Filtration Equipment	\$4,318,188	\$6,667,928	1.544
Plumbing	\$101,220	\$153,065	1.512
HVAC	\$1,138,500	\$1,721,642	1.512
Electrical	\$615,800	\$931,214	1.512
Instrumentation & Controls	\$34,830	\$52,670	1.512
Grand Total Capital Construct	\$17,977,434	\$27,598,089	

Adjusted for Report

Table B3.2 - New Dual Media Gravity Filters

Description		Estimated Cost	Cost Adjust Comments
Filter Building and Structure (25,300 sf)		\$5,214,000	
Site Dewatering		\$213,000	
Foundation and Earthwork		\$2,081,000	
Process Piping		\$2,800,000	X adding 350k for air scour piping
Valves, Meters, Etc.		\$1,666,000	
Hoists & Cranes		\$147,000	
Filtration Equipment (12 units)		\$4,820,000	Leopold quote of 8.2 million for everything (inc. blowers, I&C, valves, troughs, media, 30 days of install oversight) - those are included in cost as separate line items - adding 10% for install after those - taking out \$500k for not having GAC
Plumbing		\$102,000	
HVAC		\$911,000	X - seems high, use 80%
Air Scour Blowers		\$850,000	
Electrical		\$925,000	X - Electrical would probably be higher; use 1.5X estimator number
Instrumentation & Controls		\$480,000	X - Filter I&C would be higher
Subtotal		\$20,209,000	
Estimating Contingency	20%	\$4,041,800	
Escalation to Midpoint	3%	\$606,270	
Construction Subtotal		\$24,857,070	
Contractor General Conditions	10%	\$2,485,707	
Contractor Overhead and Profit	12%	\$2,982,848	
Construction Contingencies	5%	\$1,242,854	
Grand Total Cost		\$31,569,000	

Washwater Tank					
Item	Unit	Quantity	Unit Cost	Total Cost	
Fluted column tank	GAL	400,000	\$2	\$800,000	Estimate per discussion w/ caldwell for low
Tank Bollards	EA	10	\$2,000	\$20,000	height tank, do not add contingecies
Piping Extension to Filters	LF	150	\$500	\$75,000	
Misc Site Resoration, Grading	LS	1	\$20,000	\$20,000	
Electrical Service	LS	1	\$35,000	\$35,000	
Total				\$950,000	

Adminstration Building

	Unit	Quantity	Unit Cost	Total
Building Size	SF	7500	\$180	\$1,350,000
Laboratory Equipment	LS	1	\$300,000	\$300,000
Workstations / Printers	LS	1	\$50,000	\$60,000
Networks/Security	LS	1	\$100,000	\$100,000
Total				\$1,810,000

Maintenance Building

Building Size	SF	5000	\$110	\$550,000
Specialized HVAC Adder	LS	1	\$90,000	\$90,000
Compressed air system	LS	1	\$50,000	\$50,000
Tools / Hardware	LS	1	\$350,000	\$350,000
				\$1,040,000

Misc Electrical (Note electrical is included in most of the other individual estiamtes)

Service	LF	200	\$5,000	\$1,000,000
Generator	LS	1	\$1,500,000	\$1,500,000

CONSTANTS - INPUTS

Estimating Contingency (Rehab)	30%
Estimating Contingency (New)	20%
Escalation to Midpoint	3%
Contractor General Conditions	10%
Contractor Overhead and Profit	12%
Permitting	0.0%
Construction Contingencies	5%

Effective Multiplier Used (Rehab)	1.69
Effective Multiplier Used (New)	1.56

**EWSU Water Treatment Plant- Advanced Facility Plan
 Evansville Water and Sewer Utility Department, Indiana
 20-018 Engineer's ROM Estimate Level 4, 6/12/20**

Project name	EWSU Water Treatment Plant- Advanced Facility Plan Evansville IN USA
Client	EWSU Evansville IN
Engineer	AECOM
Estimator	Bruce Pietkiewicz
Labor rate table	1 AECOM RATES 20
Equipment rate table	Equip - ACM 20ld wrk
Duration	6 mo
Project Division Office	Water Line Water Columbus, Ohio
Principal Party	John Krinks
Estimating Office	Greenville
Contact 1	Bruce Pietkiewicz
Contact 2	Martin Hammer
Estimate Class Lvl	4
Purpose of Estimat	EE
FY Estimate	2020
Estimate Number	20-018
Notes	<p><i>This project involves developing an Advanced Facility Plan to provide alternatives to consider for improvements at the EWSU water treatment plant. The proposed finished water capacity for all alternatives is 50 MGD, and the evaluated alternatives consider rehabilitation of the existing facility, construction of new infrastructure, and a combination of the two. Plant-wide improvements are considered within these alternatives, including options for water supply, pre-treatment, filtration, disinfection, and pumping.</i></p> <p><i>This Engineer's Estimate is only an estimate of possible construction costs for budgeting purposes. This estimate is limited to the conditions existing at issuance and is not a warranty of actual price or cost. Uncertain market conditions such as, but not limited to, local labor or contractor availability, wages, other work, material market fluctuations, price escalations, force majeure events, and developing bidding conditions etc. may affect the accuracy of this estimate. AECOM is not responsible for any variance from this estimate or actual prices and conditions obtained.</i></p>
Report format	Sorted by 'WBS Lvl 1/WBS Lvl 2/WBS Lvl 3/WBS Lvl 4' 'Detail' summary Paginate
Cost index	SC, Greenville (Labor only)
Alternates	01A, 01B, 02A, 02B, 02C, 03A, 03B, 03C, 03D, 03E, 03F, 04A, 04B, 04C, 05A, 05B, 05C, 06A, 06B, 07A, 08A, 09A, 10A, 2A, 2B, 2C, 3A, 3B, 3C, 3D, 3E, 3F, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7A, 8A, 9A

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
01				River Intake & Low Service Pump Station															
	1A			River Intake & LSPS Rehab															
		02		Modify Existing Structure & Services															
			02.01	Demolition Work															
				Non-Hazardous Waste Transport and Disposal.	1 ls			-	-			500.00	500					500	759
				Demo Entrance Sidewalk & Handrail	6 cy	0.300 ch / cy	4	88.76 /ch	160					12.69	76			236	374
				Demo Single Door & Frame	3 ea	1.000 ch / ea	9	117.52 /ch	353					28.26	85			437	693
				Demo Double Door & Frame	2 ea	1.333 ch / ea	8	117.52 /ch	313					37.68	75			389	616
				Demo HVAC System (Includes Exhaust Fans, Heaters, Louvers & Ductwork)	3,000 sf			-	-			10.00	30,000					30,000	45,531
				Demo Electrical System (Includes I&C System & Lights)	3,000 sf			/sf				6.00	18,000					18,000	27,319
				02.01 Demolition Work	1 ls		21		826			48,500.00	48,500	236.28	236			49,562	75,292
			02.10	Intake Pipe Rehab															
				Temporary support ex. 42" pipe discharge	3 ea	3.000 ch / ea	45	194.58 /ch	1,751					839.05	2,517			4,268	6,778
				Demo Conc Ftg/Pier	3 ea	1.000 cd / ea	48	679.61 /cd	2,039					2,149.16	6,447			8,486	13,488
				Neoprene Pad	3 ea	2.500 mh / ea	8	45.62 /mh	342	60.00	180							522	815
				CIP Footing - 5'w x 2'w x 2'd	3 cy			-	-			1,500.00	4,500					4,500	6,830
				CIP Pier - 5'w x 2'w x 4'd	5 cy			-	-			1,500.00	7,500					7,500	11,383
				Gasket/Nuts/Bolt Kit 42"	9 ea	1.000 mh / ea	9	45.62 /mh	411	425.00	3,825							4,236	6,455
				Carbon Steel Flange Thrust Assemblies - 42" interior	9 ea	6.000 mh / ea	54	45.62 /mh	2,464	500.00	4,500							6,964	10,729
				02.10 Intake Pipe Rehab	3 ea		164		7,006	2,835.00	8,505	4,000.00	12,000	2,988.21	8,965			36,476	56,477
			07.01	Roofing															
				Inspect & Patch Roof System (Patchwork Voids Warranty)	3,300 sf			/sf				1.50	4,950					4,950	7,513
				Patch Aluminum Downspouts	40 lf			/lf				18.00	720					720	1,093
				Patch Aluminum Coping @ Roof Parapet 12" wide	257 lf			/lf				5.00	1,285					1,285	1,950
				07.01 Roofing	3,300 sf							2.11	6,955					6,955	10,556
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3x7"	5 ea	1.000 mh / ea	5	39.18 /mh	196	180.04	900							1,096	1,676
				HM Door Leafs- 3'x7' 20 ga. half glass	7 ea	1.500 ea / mh	5	39.18 /mh	183	450.09	3,151							3,333	5,071
				Finish Hardware by Leaf- Allowance	7 ea	8.002 mh / ea	56	39.18 /mh	2,194	900.18	6,301							8,496	13,036
				08.00 Doors, Frames & Hardware	7 ea		66		2,573	1,478.87	10,352							12,925	19,784
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	5 ea			/ea				100.02	500					500	759
				Paint HM Doors - primer (2) coats	7 ea			/ea				140.03	980					980	1,488
				Paint CMU Block - block filler & (2) coat	6,300 sf							1.35	8,505					8,505	12,908
				Upgrade Architectural Finishes	1 ls							4,000.00	4,000					4,000	6,071
				Paint 6" Pipe	505 lf	0.140 mh / lf	71	27.53 /mh	1,947	0.69	350			4.24	2,141			4,437	7,018
				Paint 18" Pipe	85 lf	0.200 mh / lf	17	27.53 /mh	468	2.08	177			6.06	515			1,159	1,828
				Paint 24" Pipe	7 lf	0.350 mh / lf	2	27.53 /mh	67	2.77	19			7.07	49			136	215
				Paint 30" Pipe	54 lf	0.438 mh / lf	24	27.53 /mh	650	3.46	187			4.12	223			1,060	1,667
				Paint 36" Pipe	34 lf	0.525 mh / lf	18	27.53 /mh	491	4.15	141			4.95	168			801	1,260
				Paint 42" Pipe	223 lf	0.525 mh / lf	117	27.53 /mh	3,223	4.85	1,081			4.95	1,103			5,407	8,497
				09.00 Finishes	3,300 ls		249		6,848	0.59	1,955	4.24	13,985	1.27	4,198			26,986	41,711
			10.00	Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001					3,001	4,554
				Signs - Doors	5 ea			/ea				30.01	150					150	228
				Fire Extinguisher CO2 10 lbs	4 ea			/ea				225.05	900					900	1,366
				10.00 Specialty Items	3,300 ls							1.23	4,051					4,051	6,148
			23.00	HVAC															
				Replace HVAC System (Includes Exhaust Fans, Heaters, Louvers & Ductwork)	3,000 sf			/sf				25.01	75,015					75,015	113,851
				Replace Ancillary Building Systems	3,000 sf			/sf				13.00	39,000					39,000	59,191
				23.00 HVAC	3,300 sf							34.55	114,015					114,015	173,042
			31.00	Dredging															
				Hydraulic Dredging- Allowance	1 ls							250,000.00	250,000					250,000	379,429
				31.00 Dredging	1 ls							250,000.00	250,000					250,000	379,429
			32.00	Site Improvements															
				Replace Entrance Sidewalks & Handrail	1 ls			/ls				1,200.00	1,200					1,200	1,821
				32.00 Site Improvements	1 ls							1,200.00	1,200					1,200	1,821
				02 Modify Existing Structure & Services	1 ls		499		17,253	20,811.62	20,812	450,706.22	450,706	13,399.15	13,399			502,170	764,261
		26		Electrical & Instrumentation															
			26.01	Above Ground Electrical															
				Electrical Work For New Pumps & Lights	1 ls			/ls				200,000.00	200,000					200,000	303,543
				26.01 Above Ground Electrical	1 ls							200,000.00	200,000					200,000	303,543
			26.02	Instrumentation & Controls															
				Controls & Instrumentation Work For New Pumps	1 ls			/ls				84,000.00	84,000					84,000	127,488
				26.02 Instrumentation & Controls	1 ls							84,000.00	84,000					84,000	127,488
				26 Electrical & Instrumentation	3,300 ls							86.06	284,000					284,000	431,031
		40		Process Piping															
			40.01	Above Ground Process Piping															
				Replace Water Supply, PCC, Chlorine Solution and Potassium Permanganate Piping	600 lf	0.900 mh / lf	540	45.62 /mh	24,636	47.39	28,432							53,068	82,143
				40.01 Above Ground Process Piping	600 lf		540		24,636	47.39	28,432							53,068	82,143
			40.02	Valves, Meters, Etc.															
				Backflow Preventer Flg 6"	1 ea	12.170 mh / ea	12	45.62 /mh	555	5,000.00	5,000							5,555	8,467
				Magnetic Flow Meter, Inline - 30" w/ transmitter	2 ea	38.000 mh / ea	76	43.67 /mh	3,319	19,000.00	38,000							41,319	62,926
				Resurface All Large Discharge Valves & Replace Actuators 24"	6 ea	10.000 mh / ea	60	30.57 /mh	1,834	7,800.00	46,800							48,634	73,932
				Resurface All Large Discharge Valves & Replace Actuators 36"	1 ea	14.000 mh / ea	14	30.57 /mh	428	11,700.00	11,700							12,128	18,435
				Resurface All Large Discharge Valves & Replace Actuators 42															

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			43.00	Pumps															
				Equipment Rigging / Rough Set - Pumps	6 ea	4.000 ch / ea	144	195.85 /ch	4,700	500.00	3,000	-	-	401.59	2,410	-	-	10,110	15,827
				Equipment - Final Setting Grout Base - Pumps	6 ea	4.000 ch / ea	72	103.33 /ch	2,480	50.00	300	-	-	346.16	2,077	-	-	4,857	7,686
				Variable Frequency Drives 150 HP	6 ea	40.000 mh / ea	240	28.14 /mh	6,753	31,995.00	191,970	-	-	-	-	-	-	198,723	302,044
				Replace Vertical Turbine Can Low Service Pumps 150 HP	6 ea	/ea						-	-	-	-	165,000.00	990,000	990,000	1,502,538
				Demo Existing Low Service Pumps 150 hp	6 ea	30.000 mh / ea	180	34.45 /mh	6,200	-	-	-	-	-	-	-	-	6,200	9,813
				Add Large Sump Pump To Lower Level	1 ea	32.000 mh / ea	32	34.45 /mh	1,102	-	-	-	-	-	45,000.00	-	45,000	46,102	70,042
				43.00 Pumps	1 ls		1,000		33,372	199,020.00	199,020	13,200.00	13,200	6,776.18	6,776	1,071,000.00	1,071,000	1,323,368	2,011,165
			43.08	Intake Screens															
				3-Man Dive Team - (1) Diver, (1) Tender, (1) Standby Diver	180 ch			-	-	-	-	560.00	-	100,800	555.56	100,000	-	200,800	312,137
				Rebuild Intake Screens	3 ea	60.000 mh / ea	180	32.90 /mh	5,923	-	-	-	-	6,657.60	19,973	47,875.00	143,625	169,521	259,143
				43.08 Intake Screens	3 ea		180		5,923			33,600.00	100,800	39,990.93	119,973	47,875.00	143,625	370,321	571,280
			43.09	Potassium Permanganate System															
				<i>Purchase Chemicals: Potassium Permanganate By Owner)</i>	1 ls			-	-	-	-	-	-	-	-	-	-	-	-
				Automated Potassium Permanganate w/ Mixing Tank (by Carus Corp)	1 ls	50.000 mh / ls	50	45.62 /mh	2,281	-	-	-	-	-	10,000.00	10,000	12,281	18,787	
				43.09 Potassium Permanganate System			50		2,281									12,281	18,787
				43 Process Equipment	1 ls		1,230		41,576	199,020.00	199,020	114,000.00	114,000	126,748.98	126,749	1,224,625.00	1,224,625	1,705,970	2,601,233
				1A River Intake & LSPS Rehab	1 ls		2,482		91,159	394,613.41	394,613	848,706.22	848,706	140,148.13	140,148	1,224,625.00	1,224,625	2,699,252	4,112,965
1B			00	New River Intake & LSPS															
				Building & Structure Construction															
			03.00	Foundation Mat															
				Keyway 6"	650 lf	0.050 mh / lf	33	39.49 /mh	1,284	0.67	437	-	-	-	-	-	-	1,721	2,695
				Mat Foundation Edge Form 24"	366 sf	0.350 mh / sf	128	39.49 /mh	5,059	1.31	480	-	-	-	-	-	-	5,540	8,737
				Mat Foundation Edge Form 30"	510 sf	0.350 mh / sf	179	39.49 /mh	7,050	1.31	670	-	-	-	-	-	-	7,720	12,174
				Waterstop 6" Flat	650 lf	0.110 mh / lf	72	39.18 /mh	2,802	2.10	1,365	-	-	-	-	-	-	4,167	6,506
				Strip & Oil Mat Found. Form	876 sf	0.005 mh / sf	4	39.17 /mh	172	0.03	26	-	-	-	-	-	-	198	311
				Rebar- Foundation Mat (100 #/cy)	13 tn	28.006 mh / tn	368	43.53 /mh	16,030	997.70	13,120	-	-	-	-	-	-	29,150	45,283
				Rebar Support - bricks (.12/sf)	368 ea	0.002 mh / ea	1	43.53 /mh	32	0.26	97	-	-	-	-	-	-	129	197
				Finish- Hard Trowel	3,070 sf	0.023 mh / sf	71	39.17 /mh	2,766	-	-	-	-	-	-	-	-	2,766	4,378
				Pump Place Mat Foundation 24"	83 cy	0.500 mh / cy	42	41.39 /mh	1,718	-	-	-	-	4.59	381	-	-	2,098	3,325
				Pump Place Mat Foundation 30"	180 cy	0.500 mh / cy	90	41.39 /mh	3,725	-	-	-	-	4.59	826	-	-	4,551	7,210
				4000 psi Concrete	263 cy	/cy				142.00	37,346	-	-	-	-	-	-	37,346	56,681
				Liquid Curing Compounds	3,946 sf	0.003 mh / sf	12	39.17 /mh	464	0.06	232	-	-	-	-	-	-	696	1,086
				6 Mil. Vapor Barrier	4,400 sf	0.002 mh / sf	9	43.53 /mh	383	0.05	231	-	-	-	-	-	-	614	957
				03.00 Foundation Mat			1,007		41,484		54,004				1,207			96,694	149,540
			03.03	Columns															
				Form Rectangle Columns 14' & 25.33' h	1,525 sf	0.165 mh / sf	252	39.49 /mh	9,936	1.60	2,434	-	-	-	-	-	-	12,371	19,421
				Chamfer	1,144 lf	0.015 mh / lf	17	39.49 /mh	678	0.57	649	-	-	-	-	-	-	1,326	2,057
				Strip & Oil Column Form	1,525 sf	0.005 mh / sf	8	39.17 /mh	299	0.03	46	-	-	-	-	-	-	344	542
				Superplasticizers @ Columns	19 cy	/cy				8.40	160	-	-	-	-	-	-	160	242
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	23	43.53 /mh	993	997.70	1,137	-	-	-	-	-	-	2,130	3,297
				Finish- Float	69 sf	0.017 mh / sf	1	39.17 /mh	46	-	-	-	-	-	-	-	-	46	73
				Pump Place Columns 18 ea	19 cy	1.600 mh / cy	30	41.39 /mh	1,258	-	-	-	-	7.50	142	-	-	1,401	2,218
				4000 psi Concrete	19 cy	/cy				142.00	2,698	-	-	-	-	-	-	2,698	4,095
				Grind/Patch Columns	1,525 sf	0.013 mh / sf	20	39.17 /mh	777	0.03	46	-	-	-	-	-	-	822	1,299
				Rub Columns	1,525 sf	0.065 mh / sf	99	39.17 /mh	3,882	0.06	92	-	-	-	-	-	-	3,974	6,284
				Liquid Curing Compounds	1,525 sf	0.003 mh / sf	5	39.17 /mh	179	0.06	90	-	-	-	-	-	-	269	420
				03.03 Columns			454		18,048		7,351				142			25,541	39,948
			03.04	Walls															
				Brick Ledge Forms	257 lf	0.300 mh / lf	77	39.49 /mh	3,045	2.21	567	-	-	-	-	-	-	3,612	5,680
				Keyway 6"	1,004 lf	0.050 mh / lf	50	39.49 /mh	1,983	0.67	675	-	-	-	-	-	-	2,657	4,162
				Vertical Wall Keyway 6"	272 lf	0.110 mh / lf	30	39.49 /mh	1,182	0.67	183	-	-	-	-	-	-	1,365	2,148
				Panel Form System 12-16'	2,250 sf	0.170 mh / sf	383	39.49 /mh	15,104	1.84	4,134	-	-	-	-	-	-	19,239	30,180
				Panel Form System > 16' h	12,695 sf	0.190 mh / sf	2,413	39.49 /mh	95,266	1.84	23,332	-	-	-	-	-	-	118,598	186,190
				Waterstop 6" Flat	1,276 lf	0.110 mh / lf	140	39.18 /mh	5,500	2.10	2,680	-	-	-	-	-	-	8,180	12,772
				Strip & Oil Wall Forms	14,495 sf	0.005 mh / sf	72	39.17 /mh	2,839	0.03	435	-	-	-	-	-	-	3,274	5,154
				Superplasticizers @ Walls	553 cy	/cy				8.40	4,646	-	-	-	-	-	-	4,646	7,051
				Rebar- Walls (125 #/cy)	35 tn	15.003 mh / tn	525	43.53 /mh	22,856	997.70	34,920	-	-	-	-	-	-	57,776	89,173
				Finish- Top of Wall	2,008 sf	0.008 mh / sf	16	39.17 /mh	629	-	-	-	-	-	-	-	-	629	996
				Pump Place Walls 24"	553 cy	1.150 mh / cy	636	41.39 /mh	26,327	-	-	-	-	6.65	3,677	-	-	30,004	47,520
				Pump Place Brick Ledge	14 cy	2.001 mh / cy	28	41.39 /mh	1,159	-	-	-	-	14.42	202	-	-	1,361	2,156
				4000 psi Concrete	567 cy	/cy				142.00	80,514	-	-	-	-	-	-	80,514	122,197
				Grind/Patch Walls	14,495 sf	0.013 mh / sf	188	39.17 /mh	7,382	0.03	435	-	-	-	-	-	-	7,817	12,344
				Rub Walls	7,473 sf	0.058 mh / sf	433	39.17 /mh	16,976	0.06	448	-	-	-	-	-	-	17,425	27,549
				Liquid Curing Compounds	15,303 sf	0.002 mh / sf	31	39.17 /mh	1,199	0.06	900	-	-	-	-	-	-	2,099	3,264
				03.04 Walls			5,023		201,447		153,868				3,879			359,195	558,536
			03.05	Slab On Grade															
				Slab Edge Form 28"	249 sf	0.350 mh / sf	87	39.49 /mh	3,442	1.31	327	-	-	-	-	-	-	3,769	5,944
				Rebar- SOG (125 #/cy)	2 tn	14.003 mh / tn	22	43.53 /mh	951	997.70	1,556	-	-	-	-	-	-	2,507	3,867

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				03.06 Suspended Flat Slab			795		32,087		24,490				379			56,957	88,558
			03.07	Suspended Beams															
				Beam Side Forms	2,173 sf	0.210 mh / sf	456	39.49 /mh	18,023	2.21	4,792	-	-	-	-	-	-	22,816	35,799
				Beam Bottom Forms	778 sf	0.210 mh / sf	163	39.49 /mh	6,453	2.21	1,716	-	-	-	-	-	-	8,169	12,817
				Chamfer	1,170 lf	0.015 mh / lf	18	39.49 /mh	693	0.57	664	-	-	-	-	-	-	1,357	2,104
				Strip & Oil Beam Forms	2,951 sf	0.005 mh / sf	15	39.17 /mh	578	0.03	89	-	-	-	-	-	-	667	1,049
				Superplasticizers @ Beams	54 cy					8.40	454	-	-	-	-	-	-	454	689
				Rebar- Beams (250 #/cy)	7 tn	15.003 mh / tn	101	43.53 /mh	4,408	997.70	6,734	-	-	-	-	-	-	11,142	17,198
				Finish- Top of Beam	778 sf	0.008 mh / sf	6	39.17 /mh	244	-	-	-	-	-	-	-	-	244	386
				Pump Place Beams @ Roof	54 cy	2.001 mh / cy	108	41.39 /mh	4,472	-	-	-	-	14.42	779	-	-	5,251	8,318
				4000 psi Concrete	54 cy					142.00	7,668	-	-	-	-	-	-	7,668	11,638
				Grind/Patch Beams	2,951 sf	0.013 mh / sf	38	39.17 /mh	1,503	0.03	89	-	-	-	-	-	-	1,591	2,513
				Rub Beams	2,951 sf	0.085 mh / sf	251	39.17 /mh	9,824	0.06	177	-	-	-	-	-	-	10,002	15,818
				Liquid Curing Compounds	3,729 sf	0.002 mh / sf	7	39.17 /mh	292	0.06	219	-	-	-	-	-	-	511	795
				03.07 Suspended Beams			1,164		46,491		22,601				779			69,871	109,123
			03.08	Pads & Curbs															
				Pad Form	1,267 sf	0.120 mh / sf	152	39.49 /mh	6,005	1.37	1,730	-	-	-	-	-	-	7,734	12,129
				Chamfer	447 lf	0.015 mh / lf	7	39.49 /mh	265	0.57	254	-	-	-	-	-	-	518	804
				Strip & Oil Equipment Pad Forms	1,267 sf	0.005 mh / sf	6	39.17 /mh	248	0.03	38	-	-	-	-	-	-	286	450
				Rebar- Pads (100 #/cy)	2 tn	18.003 mh / tn	33	43.53 /mh	1,450	997.70	1,846	-	-	-	-	-	-	3,295	5,096
				Finish- Float	1,444 sf	0.017 mh / sf	25	39.17 /mh	961	-	-	-	-	-	-	-	-	961	1,522
				Pump Place Pads	37 cy	1.601 mh / cy	59	41.39 /mh	2,451	-	-	-	-	7.49	277	-	-	2,728	4,320
				4000 psi Concrete	37 cy					142.00	5,254	-	-	-	-	-	-	5,254	7,974
				Liquid Curing Compounds	2,711 sf	0.003 mh / sf	8	39.17 /mh	319	0.06	159	-	-	-	-	-	-	478	746
				03.08 Pads & Curbs			290		11,699		9,280				277			21,256	33,042
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	3,109 sf	0.020 mh / sf	62	42.24 /mh	2,627	8.80	27,365	-	-	0.35	1,094	-	-	31,086	47,431
				03.20 Precast Planks	1 sf		62		2,627	27,364.65	27,365			1,094.10	1,094			31,086	47,431
			04.00	Masonry															
				12" CMU + Rigid Insulation Backup To Brick, 22' h	5,478 sf			/sf		-	-	24.00	131,472	-	-	-	-	131,472	199,537
				12" CMU Interior Partition 20' h	660 sf			/sf		-	-	20.00	13,200	-	-	-	-	13,200	20,034
				Brick Veneer	5,976 sf					-	-	9.00	53,795	-	-	-	-	53,795	81,645
				04.00 Masonry	1 sf							198,466.74	198,467					198,467	301,216
			05.01	Misc Metals															
				Floor Grating Structural Support (13 #/sf)	9 tn	8.002 ch / tn	355	214.54 /ch	15,242	1,200.24	10,657	-	-	829.17	7,362	-	-	33,261	52,015
				Floor Grating Edge Angle Support (5 #/sf)	3 tn	2.000 ch / tn	34	214.54 /ch	1,468	1,200.24	4,105	-	-	207.29	709	-	-	6,282	9,681
				Metal Checkered Plate Stair Landings 4' x 8'	6 ea	4.000 mh / ea	24	42.08 /mh	1,010	1,200.00	7,200	-	-	-	-	-	-	8,210	12,526
				Metal Checkered Plate Steps	94 rs	1.000 mh / rs	94	42.08 /mh	3,956	367.50	34,545	-	-	-	-	-	-	38,501	58,690
				Alum Stair Wall Handrail	10 lf	0.150 mh / lf	2	42.08 /mh	63	16.80	168	-	-	-	-	-	-	231	355
				Aluminum Handrail @ Stair Landing	96 lf	0.234 mh / lf	22	42.08 /mh	946	44.11	4,234	-	-	-	-	-	-	5,180	7,923
				Aluminum Handrail @ Stairs	188 lf	0.234 mh / lf	44	42.08 /mh	1,852	44.11	8,292	-	-	-	-	-	-	10,144	15,516
				Alum Grate Cover .75" @ 4'x4' Sump	1 ea	0.600 mh / ea	1	42.08 /mh	25	185.04	185	-	-	-	-	-	-	210	321
				Alum Platform Grating 1"	1,367 sf	0.035 mh / sf	48	42.08 /mh	2,014	12.39	16,941	-	-	-	-	-	-	18,954	28,898
				Alum Grating Banding	42 lf			/lf			995	-	-	-	-	-	-	995	1,511
				Aluminum Roof Hatch 6.33' x 6.33'	1 ea	8.002 mh / ea	8	39.18 /mh	313	5,001.00	5,001	-	-	-	-	-	-	5,314	8,086
				05.01 Misc Metals	1 ls		632		26,889	92,323.61	92,324			8,071.10	8,071			127,283	195,523
			06.00	Wood															
				Misc Nailers & Blocking	3,400 sf	0.010 mh / sf	34	39.67 /mh	1,349	0.40	1,365	-	-	-	-	-	-	2,714	4,206
				06.00 Wood	1 ls		34		1,349	1,364.53	1,365							2,714	4,206
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	537 lf			/lf				4.00	2,148	-	-	-	-	2,148	3,261
				Caulking @ Masonry Wall Joints- Interior	537 lf			/lf				4.00	2,148	-	-	-	-	2,148	3,261
				07.00 Moisture Protection	1 ls							4,296.86	4,297					4,297	6,521
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	3,400 sf			/sf				3.00	10,202	-	-	-	-	10,202	15,484
				Aluminum Downspouts, 6 ea x 20' each	120 vf			/vf				18.00	2,160	-	-	-	-	2,160	3,279
				Aluminum Coping @ Roof Parapet 20" wide	260 lf			/lf				25.01	6,501	-	-	-	-	6,501	9,867
				Roof Hatch 4'0" x 4'0"	1 ea			/ea				2,500.50	2,501	-	-	-	-	2,501	3,795
				Translucent Panel Skylight Frame & Panels 7' x 7', 6 ea	216 sf			/sf				38.01	8,210	-	-	-	-	8,210	12,460
				07.01 Roofing	1 sf							29,573.90	29,574					29,574	44,885
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7'	2 ea	1.000 mh / ea	2	39.18 /mh	78	180.03	360	-	-	-	-	-	-	438	670
				HM Double Frames- 16 ga. 6'x7'	3 ea	1.500 mh / ea	5	39.18 /mh	176	210.04	630	-	-	-	-	-	-	806	1,235
				HM Door Leafs- 3'x7' 20 ga. half glass	8 ea	1.500 ea / mh	5	39.18 /mh	209	450.09	3,601	-	-	-	-	-	-	3,810	5,796
				Overhead Doors- 10'x10' 24 ga steel manual 1" insulation 26 ga back-up panel	1 ea							2,255.00	2,255	-	-	-	-	2,255	3,422
				Finish Hardware by Leaf- Allowance	8 ea	8.002 mh / ea	64	39.18 /mh	2,508	900.18	7,201	-	-	-	-	-	-	9,709	14,899
				08.00 Doors, Frames & Hardware	1 ea		76		2,971	11,792.35	11,792		2,255.00	2,255				17,019	26,023
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	5 ea			/ea				100.02	500	-	-	-	-	500	759
				Paint HM Doors - primer (2) coats	8 ea			/ea				140.03	1,120	-	-	-	-	1,120	1,700
				Paint CMU Block - block filler & (2) coat	6,300 sf							1.35	8,505	-	-	-	-	8,505	12,908
				Misc Architectural Finishes	1 ls							6,000.00	6,000	-	-	-	-	6,000	9,106
				Paint 6" Pipe	505 lf	0.140 mh / lf	71	27.53 /mh	1,947	0.69	350	-	-	4.24	2,141	-	-	4,437	7,018
				Paint 18" Pipe	85 lf	0.200 mh / lf	17	27.53 /mh	46										

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				23.00 HVAC	1 sf							150,029.95	150,030					150,030	227,703
			31.00	Dredging															
				Hydraulic Dredging- Allowance	1 ls			-	-	-	-	250,000.00	250,000	-	-	-	-	250,000	379,429
				31.00 Dredging	1 ls							250,000.00	250,000					250,000	379,429
			31.01	Dewatering															
				Dewatering @ Building Excavation	1 ea	240.00 ch / ea	960	159.35 /ch	38,244	7,500.00	7,500	-	-	33,592.77	33,593	-	-	79,336	125,375
				Dewatering @ Cofferdams For Intake Construction	3 ea	120.00 ch / ea	1,440	159.35 /ch	57,365	7,500.00	22,500	-	-	16,796.52	50,390	-	-	130,255	205,137
				31.01 Dewatering	1 ls		2,400		95,609	30,000.00	30,000			83,982.33	83,982			209,591	330,512
			31.02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 32 ea (1 per 64 sf)	800 vf	0.002 cd / vf	90	2,146.97 /cd	3,436	35.16	28,125	-	-	2.58	2,064	-	-	33,625	51,409
				31.02 Piles	32 ea		90		3,436	878.91	28,125			64.51	2,064			33,625	51,409
			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls			-	-	-	-	15,003.00	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (246' x 60' deep)	14,760 sf	0.001 cd / sf	728	2,465.38 /cd	28,031	16.00	236,207	-	-	0.75	11,098	-	-	275,336	420,522
				Tie Backs (1 per 80 sf of Sheeting, 246' x 45'= 11,070 sf)	138 ea			-	-	-	-	2,377.47	328,091	-	-	-	-	328,091	497,950
				31.03 Excavation Shoring	12,300 sf		728		28,031	19.20	236,207		27.89	328,094	0.90	11,098		618,430	941,242
			31.10	Structure Excavation															
				Exc Clay-Backhoe/Truck	6,345 cy	499.900 cy / cd	457	1,410.06 /cd	17,897	-	-	-	-	6.58	41,776	-	-	59,673	94,813
				31.10 Structure Excavation	6,345 cy		457		17,897					6.58	41,776			59,673	94,813
			31.12	Structure Backfill															
				Backfill Earth-Backhoe/Truck	2,722 cy	0.002 cd / cy	176	1,327.72 /cd	7,300	-	-	-	-	4.69	12,757	-	-	20,058	31,858
				31.12 Structure Backfill	2,722 cy		176		7,300					4.69	12,757			20,058	31,858
			31.13	Soil Disposal															
				Spoils to Waste	3,623 cy	0.003 day / cy	326	1,410.06 /day	12,774	-	-	-	-	8.23	29,819	-	-	42,593	67,675
				31.13 Soil Disposal	3,623 cy		326		12,774					8.23	29,819			42,593	67,675
			31.20	Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 3.070' sf x 4"	38 cy	0.003 cd / cy	5	1,609.56 /cd	185	28.28	1,075	-	-	10.02	381	-	-	1,641	2,530
				31.20 Structure Stone Base	38 cy		5		185	28.28	1,075			10.02	381			1,641	2,530
			32.00	Site Improvements															
				Misc Site Improvement ALLOWANCE	1 ls			/ls				10,000.00	10,000					10,000	15,177
				32.00 Site Improvements	1 ls							10,000.00	10,000					10,000	15,177
				00 Building & Structure Construction	6,000 gsf		14,106		562,756	117.96	707,785	173.98	1,043,900	33.68	202,077			2,516,518	3,870,851
		26		Electrical & Instrumentation															
			26.00	UG Electrical															
				Ext Fixtures - Elec - ductbank Conduit/Cable/Wire	100 lf	0.250 mh / lf	25	45.53 /mh	1,138	2.72	272			5.00	500			1,910	3,010
				Building Electrical System	6,000 sf			/sf				16.00	96,019					96,019	145,730
				26.00 UG Electrical	1 ls		25		1,138	272.00	272	96,019.16	96,019	500.00	500			97,929	148,740
			26.01	Above Ground Electrical															
				Building Electrical System	6,000 sf			/sf				8.00	48,010					48,010	72,865
				Process Electrical System	6,000 sf			/sf				30.01	180,036					180,036	273,243
				Ext Light Pole (stl), Base and Fixture, high pressure sodium 400w, 30' high	4 ea	44.000 mh / ea	176	45.53 /mh	8,013	2,300.00	9,200	-	-	-	-	-	-	17,213	26,645
				26.01 Above Ground Electrical	1 ls		176		8,013	9,200.00	9,200	228,045.52	228,046					245,259	372,754
			26.02	Instrumentation & Controls															
				Controls & Instrumentation	1 ls			/ls				310,800.00	310,800					310,800	471,706
				26.02 Instrumentation & Controls	1 ls							310,800.00	310,800					310,800	471,706
				26 Electrical & Instrumentation	6,000 ls		201		9,151	1.58	9,472	105.81	634,865	0.08	500			653,988	993,200
		40		Process Piping															
			40.00	Under Ground Process Piping															
				Trench Excav & Lay Pipe 0- 4'	783 lf	600.000 lf / cd	73	2,539.31 /cd	3,314			-	-	1.88	1,475			4,789	7,592
				Stone Pipe Bedding	58 cy	200.000 cy / cd	21	2,896.43 /cd	840	23.29	1,351	-	-	-	-	-	-	2,191	3,380
				DI Pipe Push - Class 52 6	505 lf	0.220 mh / lf	111	24.05 /mh	2,672	22.53	11,379	-	-	-	-	-	-	14,052	21,500
				DI Pipe Push - Class 52 8	0 lf	0.250 mh / lf	0	51.34 /mh	0	32.00	0	-	-	-	-	-	-	0	1
				DI Pipe Push - Class 52 12	0 lf	0.310 mh / lf	0	51.34 /mh	0	52.00	1	-	-	-	-	-	-	1	1
				DI Pipe Push - Class 52 30	54 lf	0.440 mh / lf	24	51.34 /mh	1,220	167.28	9,033	-	-	-	-	-	-	10,253	15,640
				DI Pipe Push - Class 52 36	0 lf	0.500 mh / lf	0	51.34 /mh	0	225.00	2	-	-	-	-	-	-	3	4
				DI Pipe Push - Class 52 42	224 lf	0.570 mh / lf	128	51.34 /mh	6,555	290.93	65,169	-	-	-	-	-	-	71,724	109,282
				DI Pipe Push - Class 52 48	0 lf	0.640 mh / lf	0	51.34 /mh	0	365.00	4	-	-	-	-	-	-	4	6
				Hydrostatic Testing	783 lf	0.021 ch / lf	66	182.49 /ch	3,001	0.16	125	-	-	-	-	-	-	3,126	4,939
				Chlorination	783 lf			/lf		0.10	78	-	-	-	-	-	-	78	119
				42" DI Slab Thimble 24" long	3 ea	3.500 ch / ea	42	182.49 /ch	1,916	1,800.00	5,400	-	-	842.80	2,528	-	-	9,845	15,252
				DI 90 ell 42"	6 ea	23.120 mh / ea	139	30.57 /mh	4,240	4,949.10	29,695	-	-	-	-	-	-	33,935	51,779
				40.00 Under Ground Process Piping	783 lf		603		23,759	156.11	122,236			5.11	4,003			149,999	229,495
			40.01	Above Ground Process Piping															
				Stencil Exposed Piping <20"	85 lf							10.00	850					850	1,290
				Stencil Exposed Piping >20"	260 lf							25.01	6,501					6,501	9,867
				Pipe Supports	18 ea	4.001 mh / ea	72	45.62 /mh	3,285	250.05	4,501	-	-	-	-	-	-	7,786	12,031
				Hydrostatic Testing	345 lf	0.021 ch / lf	29	182.49 /ch	1,322	0.16	55	-	-	-	-	-	-	1,377	2,176
				Chlorination	345 lf			/lf		0.10	35	-	-	-	-	-	-	35	52
				Cross Fitting 6"	1 ea	2.400 ch / ea	10	182.49 /ch	438	170.00	170	-	-	-	-	-	-	608	951
				Dresser Couplings 18"	5 ea	10.352 ch / ea	207	163.14 /ch	8,444	510.00	2,550	-	-	-	-	-	-	10,994	17,235
				Dresser Couplings 24"	6 ea	13.803 ch / ea	331	182.49 /ch	15,113	684.14	4,105	-	-	-	-	-	-	19,218	30,150
				Dresser Couplings 42"	2 ea	24.000 mh / ea	48	40.79 /mh	1,958	3,500.00	7,000	-	-	-	-	-	-	8,958	13,723
				14" DI Slab Thimble 12" long	0 ea	1.501 ch / ea	0	182.49 /ch	3	325.00	3	-	-	-	-	-	-	10	15
				30" DI Wall Thimble 24" long	2 ea	2.500 ch / ea	20	182.49 /ch	912	1,286.26	2,573	-	-	602.00	1,204	-	-	4,689	7,265

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			40.01	Above Ground Process Piping															
				PAC Piping & Accessories 3 ea- ALLOWANCE	600 LF	0.240 mh / LF	144	45.62 /mh	6,571	55.01	33,007	-	-	-	-	-	-	39,577	60,494
				Chlorine Piping & Accessories 3 ea- ALLOWANCE	300 LF	0.240 mh / LF	72	45.62 /mh	3,285	55.01	16,503	-	-	-	-	-	-	19,789	30,247
				40.01 Above Ground Process Piping	1,026 lf		2,061		79,799	139.27	142,895	7.17	7,351	1.18	1,208			231,253	356,252
			40.02	Valves, Meters, Etc.															
				Backflow Preventer Flg 6"	1 ea	12.170 mh / ea	12	45.62 /mh	555	5,000.00	5,000	-	-	-	-	-	-	5,555	8,467
				Magnetic Flow Meter - Inline - 30" w/ transmitter	2 ea	30.000 mh / ea	60	48.85 /mh	2,931	15,000.00	30,000	-	-	-	-	-	-	32,931	50,170
				Swing Check Valve 6"	3 ea	4.669 mh / ea	14	45.62 /mh	639	1,100.00	3,300	-	-	-	-	-	-	3,939	6,020
				Swing Check Valve 18"	6 ea	13.713 mh / ea	82	30.71 /mh	2,527	10,800.00	64,800	-	-	-	-	-	-	67,327	102,347
				6" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	4 ea	6.200 mh / ea	25	30.57 /mh	758	2,850.00	11,400	-	-	-	-	-	-	12,158	18,502
				24" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	6 ea	19.204 mh / ea	115	45.62 /mh	5,257	12,502.50	75,015	-	-	-	-	-	-	80,272	122,171
				36" Butterfly Valve, 75 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	1 ea	28.800 mh / ea	29	30.57 /mh	880	19,781.00	19,781	-	-	-	-	-	-	20,661	31,415
				42" Butterfly Valve, 75 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	3 ea	33.600 mh / ea	101	30.57 /mh	3,081	23,078.00	69,234	-	-	-	-	-	-	72,315	109,954
				40.02 Valves, Meters, Etc.	1 ls		438		16,628	278,529.97	278,530							295,158	449,047
			40.04	Hydropneumatic Piping System															
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				15,000.00						15,000	22,766
				40.04 Hydropneumatic Piping System	1 ls							15,000.00						15,000	22,766
				40 Process Piping	1,809 lf		3,102		120,186	300.53	543,662	12.36	22,351	2.88	5,211			691,410	1,057,560
		43		Process Equipment															
			43.00	Pumps															
				Pump Inspection	6 ea	24.000 mh / ea	144	42.40 /mh	6,105	-	-	2,200.00	13,200	-	-	-	-	19,305	29,696
				Freight On Pumps To Jobsite	6 ea	/ea		/ea								1,500.00	9,000	9,000	13,659
				Verified Performance Test	6 day	8.000 ch / day	48	29.43 /ch	1,413							1,500.00	9,000	10,413	15,896
				Vendor Verified Performance Test	6 ea	/ea		/ea								1,500.00	9,000	9,000	13,659
				Vendor Witnessed, Verified Performance Test	6 ea	/ea		/ea								1,500.00	9,000	9,000	13,659
				System Disinfection	1 day	8.000 ch / day	8	29.43 /ch	235	750.00	750							985	1,511
				Equipment Unloading	6 ea	4.000 ch / ea	132	182.62 /ch	4,383	500.00	3,000			381.61	2,290			9,673	15,134
				Equipment Rigging / Rough Set - Pumps	6 ea	4.000 ch / ea	144	195.85 /ch	4,700	500.00	3,000			401.59	2,410			10,110	15,827
				Equipment - Final Setting Grout Base - Pumps	6 ea	4.000 ch / ea	72	103.33 /ch	2,480	50.00	300			346.16	2,077			4,857	7,686
				Variable Frequency Drives 150 HP	6 ea	40.000 mh / ea	240	28.14 /mh	6,753	31,995.00	191,970							198,723	302,044
				Vertical Turbine Can Low Service Pumps 150 HP	6 ea	/ea		/ea								165,000.00	990,000	990,000	1,502,538
				Large Sump Pump To Lower Level	1 ea	32.000 mh / ea	32	34.45 /mh	1,102	-	-					45,000.00	45,000	46,102	70,042
				43.00 Pumps	1 ls		820		27,172	199,020.00	199,020	13,200.00	13,200	6,776.18	6,776	1,071,000.00	1,071,000	1,317,168	2,001,352
			43.08	Intake Screens															
				Cofferdam Shoring System Design Engineer	1 ls			-	-	-	-	15,003.00	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting From Barge (246' x 50' deep)	12,300 sf	0.001 cd / sf	1,102	2,465.38 /cd	42,454	16.00	196,839			1.63	20,038			259,331	397,830
				Installation Team Working From Barge	90 ch							560.00	50,400	1,111.11	100,000			150,400	235,644
				River Intake Screen 54" OD x 19' long, 35 mgd/ Screen (Pneumatically Cleaned)	3 ea	60.000 mh / ea	180	32.90 /mh	5,923					6,657.60	19,973	70,958.00	212,874	238,770	364,243
				43.08 Intake Screens	1 ea		1,282		48,377	196,839.24	196,839	65,403.00	65,403	140,011.08	140,011	212,874.00	212,874	663,504	1,020,488
			43.19	Hydroburst System															
				Field Service For Startup	1 ls			-	-	-	-					4,500.00	4,500	4,500	6,830
				Johnson Hydroburst System	1 ls	/ls		/ls							114,952.00	114,952	114,952	174,464	
				Install Package Air Compressor 20 hp	2 ea	40.000 mh / ea	80	30.57 /mh	2,445					900.00	1,800			4,245	6,735
				Install Air Dryer	1 ea	35.000 mh / ea	35	30.57 /mh	1,070					200.00	200			1,270	2,012
				Install Horizontal Air Receiver Tank 19.33' x 5' diameter, 2500 gallon	1 ea	20.000 mh / ea	20	30.57 /mh	611					3,750.00	3,750			4,361	6,936
				Misc Items	1 ea	40.000 mh / ea	40	30.57 /mh	1,223	4,000.00	4,000							5,223	8,006
				43.19 Hydroburst System	1 ls		175		5,349	4,000.00	4,000			5,750.00	5,750	119,452.00	119,452	134,551	204,982
				43 Process Equipment	1 ls		2,277		80,898	399,859.24	399,859	78,603.00	78,603	152,537.26	152,537	1,403,326.00	1,403,326	2,115,223	3,226,823
				1B New River Intake & LSPS	50 mg d		19,886		772,991	33,215.55	1,660,778	35,594.39	1,779,719	7,206.51	360,326	28,066.52	1,403,326	5,977,139	9,148,434
				01 River Intake & Low Service Pump Station	1 ls		22,168		864,150	2,055,390.92	2,055,391	2,628,425.62	2,628,426	500,473.71	500,474	2,627,951.00	2,627,951	8,676,391	13,261,399

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
02				Pretreatment																
	2A			Pretreatment - Retrofit North w/ Plate Settlers																
		02		Modify Existing Structure & Services																
			02.01	Demolition Work																
				Non-Hazardous Waste Transport and Disposal.	1 ls							6,000.00	6,000					6,000	9,106	
				Demo Concrete Walls 12"	50 cy	0.100 ch / cy	10	84.95 /ch	425						26.87	1,343		1,768	2,810	
				Cut Opn In Existing Conc Wall 12"x20"x12" h @ Basin Wall	24 ea	1.000 ch / ea	48	84.95 /ch	2,039									2,684	4,253	
				Demo All Piping & Equipment From North Plant Basins	1 ls	32.000 ch / ls	128	167.66 /ch	5,365						103.03	103		5,468	8,655	
				Demo Electrical System @ Basins	1 ls			/ls				2,000.00	2,000					2,000	3,035	
				Pressure Wash Basin Walls	31,626 sf	150.000 sf / ch	422	53.11 /ch	11,198	0.35	11,069			0.52	16,500			38,767	60,783	
				Pressure Washing Basin Slab	20,059 sf	200.000 sf / ch	201	53.11 /ch	5,327	0.35	7,021			0.39	7,849			20,196	31,578	
				02.01 Demolition Work	1 ls		808		24,353	18,089.75	18,090	8,000.00	8,000	26,440.44	26,440			76,883	120,221	
			03.03	Columns																
				Form Rectangle Columns 19' h	5,472 sf	0.165 mh / sf	903	39.49 /mh	35,653	1.60	8,735							44,388	69,686	
				Chamfer	3,650 lf	0.015 mh / lf	55	39.49 /mh	2,162	0.57	2,070							4,232	6,564	
				Strip & Oil Column Form	5,472 sf	0.005 mh / sf	27	39.17 /mh	1,072	0.03	164							1,236	1,946	
				Superplasticizers @ Columns	76 cy			/cy		8.40	638							638	969	
				Column Rebar (120 #/cy)	5 tn	20.004 mh / tn	92	43.53 /mh	4,005	997.70	4,589							8,595	13,305	
				Finish- Float	86 sf	0.017 mh / sf	1	39.17 /mh	57										57	91
				Pump Place Columns 48 ea	76 cy	1.600 mh / cy	122	41.39 /mh	5,034					7.50	570			5,604	8,874	
				4000 psi Concrete	76 cy			/cy		142.00	10,792							10,792	16,379	
				Grind/Patch Columns	5,472 sf	0.013 mh / sf	71	39.17 /mh	2,787	0.03	164							2,951	4,660	
				Rub Columns	5,472 sf	0.065 mh / sf	356	39.17 /mh	13,931	0.06	328							14,259	22,547	
				Liquid Curing Compounds	5,472 sf	0.003 mh / sf	16	39.17 /mh	643	0.06	322								965	1,506
				03.03 Columns	76 cy		1,643		65,344	365.83	27,803			7.50	570			93,717	146,525	
			03.04	Walls																
				Keyway 6"	1,718 lf	0.050 mh / lf	86	39.49 /mh	3,393	0.67	1,155							4,547	7,122	
				Vertical Wall Keyway 6"	653 lf	0.110 mh / lf	72	39.49 /mh	2,837	0.67	439								3,276	5,156
				Panel Form System 8-12'	13,893 sf	0.150 mh / sf	2,084	39.49 /mh	82,291	1.84	25,528								107,819	168,988
				Panel Form System > 16' h	28,431 sf	0.190 mh / sf	5,403	39.49 /mh	213,352	1.84	52,252								265,605	416,981
				Waterstop 6" Flat	2,371 lf	0.110 mh / lf	261	39.18 /mh	10,219	2.10	4,980								15,199	23,733
				Strip & Oil Wall Forms	42,324 sf	0.005 mh / sf	212	39.17 /mh	8,290	0.03	1,270								9,560	15,048
				Superplasticizers @ Walls	2,097 cy			/cy		8.40	17,617								17,617	26,737
				Rebar- Walls (125 #/cy)	131 tn	15.003 mh / tn	1,965	43.53 /mh	85,548	997.70	130,699								216,246	333,761
				Finish- Top of Wall	3,805 sf	0.008 mh / sf	30	39.17 /mh	1,193										1,193	1,887
				Pump Place Walls	2,097 cy	1.150 mh / cy	2,412	41.39 /mh	99,832						6.65	13,944			113,776	180,197
				4000 psi Concrete	2,097 cy			/cy		142.00	297,774								297,774	451,936
				Grind/Patch Walls	42,324 sf	0.013 mh / sf	550	39.17 /mh	21,554	0.03	1,270								22,824	36,042
				Rub Walls	42,324 sf	0.058 mh / sf	2,455	39.17 /mh	96,147	0.06	2,539								98,686	156,027
				Liquid Curing Compounds	46,129 sf	0.002 mh / sf	92	39.17 /mh	3,614	0.06	2,713								6,327	9,838
				03.04 Walls	2,097 cy		15,622		628,270	256.67	538,236			6.65	13,944			1,180,450	1,833,454	
			03.05	Slab On Grade																
				S.O.G. Edge Form < 1'	68 sf	0.240 mh / sf	16	39.49 /mh	644	1.22	83								727	1,146
				Rebar- SOG (125 #/cy)	0 tn	16.000 mh / tn	3	43.53 /mh	139	997.70	200								339	523
				Mesh Support - bricks (.12/sf)	15 ea	0.002 mh / ea	0	43.53 /mh	1	0.26	4								5	8
				Finish- Hard Trowel	126 sf	0.025 mh / sf	3	39.17 /mh	123										123	195
				Pump Place Slab on Grade 8" @ Sludge Control Vault	3 cy	0.500 mh / cy	2	41.39 /mh	62					3.67	11				73	116
				4000 psi Concrete	3 cy			/cy		142.00	426								426	647
				Liquid Curing Compounds	194 sf	0.002 mh / sf	0	39.17 /mh	15	0.06	11								27	41
				Seal Floors	126 sf	0.002 mh / sf	0	39.17 /mh	10	0.09	12								22	33
				6 Mil. Vapor Barrier	126 sf	0.002 mh / sf	0	43.53 /mh	11	0.05	7								18	27
				Gravel Fill Under Slab 4"	2 cy	0.004 cd / cy	0	1,412.15 /cd	11	29.26	59			3.84	8				77	118
				03.05 Slab On Grade	3 cy		25		1,017	266.83	800			6.23	19			1,836	2,855	
			03.06	Suspended Flat Slab																
				Form Suspended Slab Bottom	2,041 sf	0.220 mh / sf	449	39.49 /mh	17,731	2.18	4,458								22,189	34,830
				Slab Edge Form 8" & 12"	841 sf	0.250 mh / sf	210	39.49 /mh	8,304	5.17	4,349								12,653	19,743
				Strip & Oil Suspended Slab Forms	2,882 sf	0.005 mh / sf	14	39.17 /mh	565	0.04	118								683	1,073
				Superplasticizers	368 cy					8.40	3,092								3,092	4,692
				Rebar- Suspended Slab (225 #/cy)	41 tn	20.004 mh / tn	828	43.53 /mh	36,048	997.70	41,305								77,352	119,742
				Finish- Hard Trowel	2,041 sf	0.035 mh / sf	71	39.17 /mh	2,798										2,798	4,428
				Pump Place Suspended Slab	368 cy	2.160 mh / cy	795	41.39 /mh	32,899					6.65	2,449				35,348	55,967
				4000 psi Concrete	368 cy					142.00	52,256								52,256	79,310
				Liquid Curing Compounds	4,923 sf	0.003 mh / sf	15	39.17 /mh	579	0.68	3,361								3,939	6,016
				03.06 Suspended Flat Slab	368 cy		2,383		98,923	296.03	108,938			6.65	2,449			210,310	325,801	
			03.11	Topping Slab																
				Mesh Support (.12/sf)	75 ea	0.002 mh / ea	0	43.53 /mh	7	0.26	20								26	40
				WWM 4X4- W 2.9 Flats	20,059 sf	0.014 mh / sf	281	43.53 /mh	12,224	0.50	10,057								22,281	34,610
				Finish- Hard Trowel	20,059 sf	0.015 mh / sf	301	39.17 /mh	11,787										11,787	18,656
				Pump Place Topping Slab	1,114 cy	0.750 mh / cy	836	28.06 /mh	23,446					6.65	7,411				30,857	48,903
				4000 psi Concrete	1,114 cy			/cy		142.00	158,188								158,188	240,084
				Liquid Curing Compounds	20,059 sf	0.002 mh / sf	40	39.17 /mh	1,572	0.06	1,180								2,751	4,278
				Seal Floors	624 sf	0.002 mh / sf	1	39.17 /mh	49	0.09	58									

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
				26.01 Above Ground Electrical	1 ls							315,783.00	315,783					315,783	479,269	
				26.02 Instrumentation & Controls																
				Controls & Instrumentation Work For New Equipment (1.5% Equipment Cost)	1 ls			/ls				94,735.00	94,735					94,735	143,781	
				26.02 Instrumentation & Controls	1 ls							94,735.00	94,735					94,735	143,781	
				26 Electrical & Instrumentation	1 ls							410,518.00	410,518					410,518	623,050	
		40		Process Piping																
				40.01 Above Ground Process Piping																
				Misc Pipe Work- ALLOWANCE	1 ls	40.000 mh / ls	40	45.62 /mh	1,825	2,000.00	2,000	-	-	-	-	-	-	3,825	5,924	
				40.01 Above Ground Process Piping	1 lf		40		1,825	2,000.00	2,000	-	-	-	-	-	-	3,825	5,924	
				40.04 Hydropneumatic Piping System																
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				15,000.00	15,000					15,000	22,766	
				40.04 Hydropneumatic Piping System	1 ls							15,000.00	15,000					15,000	22,766	
				40 Process Piping	1 lf		40		1,825	2,000.00	2,000	15,000.00	15,000					18,825	28,689	
		43		Process Equipment																
				43.01 Flocculators & Mixers																
				Freight On Mixers & Flocculators To Jobsite	24 ea			/ea								1,500.00	36,000	36,000	54,638	
				Equipment Unloading	24 ea	4.000 ch / ea	528	182.62 /ch	17,532	500.00	12,000	-	-	381.61	9,159	-	-	38,691	60,537	
				Equipment Rigging / Rough Set	24 ea	6.000 ch / ea	864	195.85 /ch	28,202	500.00	12,000	-	-	401.59	9,638	-	-	49,840	78,187	
				Variable Frequency Drives (Included)	24 ea			/ea												
				Rapid Mixer w/7.33' Shaft & Dual 2.33' Blades, 2 HP	6 ea	45.000 mh / ea	270	42.40 /mh	11,447	100.02	600					13,700.00	82,200	94,247	143,784	
				Flocculator w/19' Shaft & 9' Blades, 3 HP	18 ea	60.000 mh / ea	1,080	42.40 /mh	45,787	100.00	1,800					35,400.00	637,200	684,787	1,042,287	
				43.01 Flocculators & Mixers	1 ls		2,742		102,967	26,400.12	26,400			18,796.90	18,797	755,400.00	755,400	903,564	1,379,433	
				43.02 Settlement Equipment																
				Freight On Sedimentation System To Jobsite	6 ea			/ea								1,500.00	9,000	9,000	13,659	
				Verified Performance Test (2 days per System x 6 ea)	12 day	8.000 ch / day	96	29.43 /ch	2,826							1,500.00	18,000	20,826	31,791	
				Vendor Verified Performance Test	6 ea			/ea								1,500.00	9,000	9,000	13,659	
				Vendor Witnessed, Verified Performance Test	6 ea			/ea								1,500.00	9,000	9,000	13,659	
				Equipment Unloading	6 ea	16.000 ch / ea	528	182.62 /ch	17,532	500.00	3,000			381.61	2,290			22,822	35,945	
				Equipment Rigging / Rough Set	6 ea	96.000 ch / ea	3,456	195.85 /ch	112,807	500.00	3,000			401.59	2,410			118,216	186,929	
				Equipment - Final Setting	6 ea	360.000 ch / ea	6,480	103.33 /ch	223,202	50.00	300				346.16	2,077		225,579	357,027	
				Inclined Plate Settlers w/ Flow Control Deck 55' x 86' x 8.2'	6 ea			/ea								474,375.00	2,846,250	2,846,250	4,319,798	
				43.02 Settlement Equipment	1 ls		10,560		356,367	6,300.00	6,300			6,776.18	6,776	2,891,250.00	2,891,250	3,260,693	4,972,469	
				43.03 Baffle Walls																
				Flow Control Diffuser Wall SS 304/304L SS 19' h, 12 ea, 6,840 sf	360 lf	6.000 mh / lf	2,160	30.57 /mh	66,024						28.00	10,080	680.56	245,000	321,104	492,380
				43.03 Baffle Walls	6,840 sf		2,160		66,024						1.47	10,080	35.82	245,000	321,104	492,380
				43.13 Chemical System Equipment																
				Totes	6 ea	1.000 mh / ea	6	45.62 /mh	274									274	433	
				Chemical Feed Package Units	6 ea	24.000 mh / ea	144	42.40 /mh	6,105								75,000.00	450,000	456,105	692,634
				Activation Units	6 ea	10.002 mh / ea	60	42.40 /mh	2,544								25,004.99	150,030	152,574	231,730
				Batch Tank	2 ea	10.002 mh / ea	20	42.40 /mh	848								15,002.99	30,006	30,854	46,883
				43.13 Chemical System Equipment	1 ls		230		9,771								630,035.93	630,036	639,807	971,680
				43.20 Slide Gate w/ Operator																
				Slide Gates 36" x 36" w/ 16' Operators @ Influent Chamber	6 ea	30.006 mh / ea	180	47.77 /mh	8,601	500.00	3,000					20,000.00	120,000	131,601	200,292	
				43.20 Slide Gate w/ Operator	1 ls		180		8,601	3,000.00	3,000					120,000.00	120,000	131,601	200,292	
				43 Process Equipment	1 ls		15,872		543,730	35,700.12	35,700			35,653.08	35,653	4,641,685.93	4,641,686	5,256,769	8,016,254	
				2A Pretreatment - Retrofit North w/ Plate Settlers	1 ls		39,401		1,461,626	1,015,362.76	1,015,363	433,518.00	433,518	95,495.46	95,495	4,641,685.93	4,641,686	7,647,688	11,709,068	
2B				Pretreatment - Retrofit North w/ Ballasted Flocculation																
		00		Building & Structure Construction																
				03.03 Columns																
				Form Rectangle Columns 12' h	960 sf	0.165 mh / sf	158	39.49 /mh	6,255	1.60	1,532							7,787	12,226	
				Chamfer	720 lf	0.015 mh / lf	11	39.49 /mh	427	0.57	408							835	1,295	
				Strip & Oil Column Form	960 sf	0.005 mh / sf	5	39.17 /mh	188	0.03	29							217	341	
				Superplasticizers @ Columns	12 cy			/cy		8.40	101							101	153	
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	14	43.53 /mh	627	997.70	718							1,345	2,082	
				Finish- Float	27 sf	0.017 mh / sf	0	39.17 /mh	18									18	28	
				Pump Place Columns 15 ea	12 cy	1.600 mh / cy	19	41.39 /mh	795						7.50	90		885	1,401	
				4000 psi Concrete	12 cy			/cy		142.00	1,704							1,704	2,586	
				Grind/Patch Columns	960 sf	0.013 mh / sf	12	39.17 /mh	489	0.03	29							518	817	
				Rub Columns	960 sf	0.065 mh / sf	62	39.17 /mh	2,444	0.06	58							2,502	3,956	
				Liquid Curing Compounds	960 sf	0.003 mh / sf	3	39.17 /mh	113	0.06	56							169	264	
				03.03 Columns			286		11,355		4,636					90		16,080	25,150	
				03.07 Suspended Beams																
				Beam Side Forms	1,780 sf	0.210 mh / sf	374	39.49 /mh	14,764	2.21	3,926							18,689	29,325	
				Beam Bottom Forms	592 sf	0.210 mh / sf	124	39.49 /mh	4,910	2.21	1,306							6,216	9,753	
				Chamfer	890 lf	0.015 mh / lf	13	39.49 /mh	527	0.57	505							1,032	1,601	
				Strip & Oil Beam Forms	2,372 sf	0.005 mh / sf	12	39.17 /mh	465	0.03	71							536	843	
				Superplasticizers @ Beams	44 cy			/cy		8.40	370							370	561	
				Rebar- Beams (250 #/cy)	6 tn	15.003 mh / tn	83	43.53 /mh	3,592	997.70	5,487							9,079	14,013	
				Finish- Top of Beam	592 sf	0.008 mh / sf	5	39.17 /mh	186									186	294	
				Pump Place Beams @ Roof	44 cy	2.001 mh / cy	88	41.39 /mh	3,644						14.42	635		4,279	6,777	
				4000 psi Concrete	44 cy			/cy		142.00	6,248							6,248	9,483	
				Grind/Patch Beams	2,372 sf	0.013 mh / sf	31	39.17 /mh	1,208	0.03	71							1,279	2,020	
				Rub Beams	2,372 sf	0.085 mh / sf	202	39.17 /mh	7,897	0.06	142							8,039	12,714	
				Liquid Curing Compounds	2,372 sf	0.002 mh / sf	5	39.17 /mh												

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			05.01	Misc Metals															
				Aluminum Handrail @ Stairs	56 lf	0.234 mh / lf	13	42.08 /mh	552	44.11	2,470	-	-	-	-	-	-	3,022	4,622
				Alum Grate Cover .75" @ 4'x4' Sump	1 ea	0.600 mh / ea	1	42.08 /mh	25	185.04	185	-	-	-	-	-	-	210	321
				Aluminum Roof Hatch 6.33' x 6.33'	1 ea	8.002 mh / ea	8	39.18 /mh	313	5,001.00	5,001	-	-	-	-	-	-	5,314	8,086
				05.01 Misc Metals	1 ls		57		2,373	19,284.90	19,285							21,658	33,025
			06.00	Wood															
				Misc Nailers & Blocking	3,623 sf	0.010 mh / sf	36	39.67 /mh	1,438	0.40	1,454	-	-	-	-	-	-	2,892	4,482
				06.00 Wood	1 ls		36		1,438	1,454.02	1,454							2,892	4,482
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	3,623 sf			/sf				3.00	10,871					10,871	16,499
				Aluminum Downspouts, 6 ea x 20' each	120 vf			/vf				18.00	2,160					2,160	3,279
				Aluminum Coping @ Roof Parapet 20" wide	272 lf			/lf				25.01	6,801					6,801	10,323
				Roof Hatch 4'0" x 4'0"	1 ea			/ea				2,500.50	2,501					2,501	3,795
				Translucent Panel Skylight Frame & Panels 7' x 7', 4 ea	196 sf			/sf				38.01	7,449					7,449	11,306
				07.01 Roofing	1 sf							29,782.95	29,783					29,783	45,202
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7'	2 ea	1.000 mh / ea	2	39.18 /mh	78	180.03	360	-	-	-	-	-	-	438	670
				HM Door Leafs- 3'x7' 20 ga. half glass	2 ea	1.500 ea / mh	1	39.18 /mh	52	450.09	900	-	-	-	-	-	-	952	1,449
				Overhead Doors- 10'x10' 24 ga steel manual 1" insulation 26 ga back-up panel	1 ea			-	-	-	-	2,255.00	2,255	-	-	-	-	2,255	3,422
				Finish Hardware by Leaf- Allowance	2 ea	8.002 mh / ea	16	39.18 /mh	627	900.18	1,800	-	-	-	-	-	-	2,427	3,725
				08.00 Doors, Frames & Hardware	1 ea		19		758	3,060.60	3,061	2,255.00	2,255					6,073	9,267
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	2 ea			/ea				100.02	200	-	-	-	-	200	304
				Paint HM Doors - primer (2) coats	2 ea			/ea				140.03	280	-	-	-	-	280	425
				Paint CMU Block - block filler & (2) coat	5,316 sf			-	-	-	-	1.35	7,177	-	-	-	-	7,177	10,892
				Misc Architectural Finishes	1 ls			-	-	-	-	2,000.00	2,000	-	-	-	-	2,000	3,035
				Paint 8" Pipe	214 lf	0.140 mh / lf	30	27.53 /mh	825	0.92	198	-	-	4.24	907	-	-	1,930	3,049
				Paint 10" Pipe	295 lf	0.140 mh / lf	41	27.53 /mh	1,137	1.15	340	-	-	5.65	1,667	-	-	3,145	4,970
				09.00 Finishes	1 ls		71		1,962	537.94	538	9,656.69	9,657	2,574.44	2,574			14,731	22,675
			10.00	Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	2 ea			/ea				30.01	60	-	-	-	-	60	91
				Fire Extinguisher CO2 10 lbs	2 ea			/ea				225.05	450	-	-	-	-	450	683
				10.00 Specialty Items	1 ls							3,510.70	3,511					3,511	5,328
			22.00	Plumbing															
				Plumbing Subcontract	3,623 sf			/sf				6.00	21,742					21,742	32,999
				22.00 Plumbing	1 ls							21,742.34	21,742					21,742	32,999
			23.00	HVAC															
				Ventilation & Unit Heater System	3,623 sf			/sf				25.01	90,593					90,593	137,495
				23.00 HVAC	1 sf							90,593.08	90,593					90,593	137,495
			31.20	Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 1,310 sf x 4"	20 cy	0.003 cd / cy	2	1,609.56 /cd	98	28.28	566	-	-	10.02	200	-	-	863	1,332
				31.20 Structure Stone Base			2		98		566				200			863	1,332
			32.00	Site Improvements															
				Asphalt Pavement, 10" Subgrade, 9" Base, 1-1/2" Topping @ Access Drive	236 sy			/sy				21.80	5,145	-	-	-	-	5,145	7,808
				Misc Site Improvement ALLOWANCE	1 ls							10,000.00	10,000	-	-	-	-	10,000	15,177
				32.00 Site Improvements	1 ls							15,144.80	15,145					15,145	22,986
				00 Building & Structure Construction	3,623 gsf		1,474		58,135	21.17	76,700	96.09	348,123	1.29	4,655			487,612	744,179
			02	Modify Existing Structure & Services															
			02.01	Demolition Work															
				Non-Hazardous Waste Transport and Disposal.	1 ls			-	-	-	-	2,000.00	2,000	-	-	-	-	2,000	3,035
				Misc Demolition	1 ls	8.000 ch / ls	16	84.95 /ch	680	-	-	-	-	26.86	27	-	-	706	1,118
				Demo All Piping & Equipment From North Plant Basins	1 ls	16.000 ch / ls	64	167.66 /ch	2,683	-	-	-	-	103.03	103	-	-	2,786	4,410
				Demo Electrical System @ Basins	1 ls			/ls				2,000.00	2,000	-	-	-	-	2,000	3,035
				Pressure Wash Basin Walls	31,626 sf	150.000 sf / ch	422	53.11 /ch	11,198	0.35	11,069	-	-	0.52	16,500	-	-	38,767	60,783
				Pressure Washing Basin Slab	10,000 sf	200.000 sf / ch	100	53.11 /ch	2,656	0.35	3,500	-	-	0.39	3,913	-	-	10,069	15,743
				02.01 Demolition Work	1 ls		602		17,215	14,569.10	14,569	4,000.00	4,000	20,543.23	20,543			56,328	88,125
			03.04	Walls															
				Keyway 6"	2,200 lf	0.050 mh / lf	110	39.49 /mh	4,345	0.67	1,479	-	-	-	-	-	-	5,823	9,120
				Vertical Wall Keyway 6"	524 lf	0.110 mh / lf	58	39.49 /mh	2,277	0.67	352	-	-	-	-	-	-	2,629	4,138
				Panel Form System 4-8'	2,427 sf	0.130 mh / sf	316	39.49 /mh	12,459	1.84	4,460	-	-	-	-	-	-	16,918	26,487
				Panel Form System > 16' h	33,825 sf	0.190 mh / sf	6,428	39.49 /mh	253,830	1.84	62,166	-	-	-	-	-	-	315,996	496,091
				Waterstop 6" Flat	2,724 lf	0.110 mh / lf	300	39.18 /mh	11,741	2.10	5,722	-	-	-	-	-	-	17,462	27,266
				Strip & Oil Forms	36,252 sf	0.005 mh / sf	181	39.17 /mh	7,101	0.03	1,088	-	-	-	-	-	-	8,189	12,889
				Superplasticizers @ Walls	1,675 cy			/cy		8.40	14,072	-	-	-	-	-	-	14,072	21,357
				Rebar- Walls (125 #/cy)	105 tn	15.003 mh / tn	1,575	43.53 /mh	68,569	997.70	104,759	-	-	-	-	-	-	173,327	267,518
				Finish- Top of Wall	2,173 sf	0.008 mh / sf	17	39.17 /mh	681	-	-	-	-	-	-	-	-	681	1,078
				Pump Place Walls 12"	110 cy	1.150 mh / cy	127	41.39 /mh	5,237	-	-	-	-	6.65	731	-	-	5,968	9,452
				Pump Place Walls 24"	766 cy	1.150 mh / cy	881	41.39 /mh	36,467	-	-	-	-	6.65	5,094	-	-	41,560	65,823
				Pump Place Walls 30"	85 cy	1.150 mh / cy	98	41.39 /mh	4,047	-	-	-	-	6.65	565	-	-	4,612	7,304
				Pump Place Walls 36"	714 cy	1.150 mh / cy	821	41.39 /mh	33,991	-	-	-	-	6.65	4,748	-	-	38,739	61,355
				4000 psi Concrete	1,675 cy			/cy		142.00	237,850	-	-	-	-	-	-	237,850	360,989
				Grind/Patch Walls	36,252 sf	0.013 mh / sf	471												

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
			03.05	Slab On Grade																
				Gravel Fill Under Slab 4"	39 cy	0.004 cd / cy	5	1,412.15 /cd	209	29.26	1,141	-	-	3.84	150	-	-	1,499	2,300	
				03.05 Slab On Grade	49 cy		290		11,693	248.07	12,155			8.76	429			24,278	37,639	
			03.06	Suspended Flat Slab																
				Form Suspended Slab Bottom	2,016 sf	0.220 mh / sf	444	39.49 /mh	17,514	2.18	4,404	-	-	-	-	-	-	21,918	34,403	
				Slab Edge Form 8" x 12"	435 sf	0.250 mh / sf	109	39.49 /mh	4,295	5.17	2,249	-	-	-	-	-	-	6,545	10,212	
				Strip & Oil Suspended Slab Forms	2,451 sf	0.005 mh / sf	12	39.17 /mh	480	0.04	101	-	-	-	-	-	-	581	912	
				Superplasticizers	67 cy	-	-	-	-	8.40	563	-	-	-	-	-	-	563	854	
				Rebar- Suspended Slab (225 #/cy)	8 tn	20.004 mh / tn	151	43.53 /mh	6,556	997.70	7,513	-	-	-	-	-	-	14,069	21,779	
				Finish- Hard Trowel	2,016 sf	0.035 mh / sf	71	39.17 /mh	2,764	-	-	-	-	-	-	-	-	2,764	4,374	
				Pump Place Suspended Slab	67 cy	2.160 mh / cy	145	41.39 /mh	5,990	-	-	-	-	-	6.65	446	-	-	6,436	10,190
				4000 psi Concrete	67 cy	-	-	-	-	142.00	9,514	-	-	-	-	-	-	-	9,514	14,440
				Liquid Curing Compounds	4,467 sf	0.003 mh / sf	13	39.17 /mh	525	0.68	3,049	-	-	-	-	-	-	-	3,574	5,459
				03.06 Suspended Flat Slab	67 cy		944		38,124	408.85	27,393			6.65	446			65,962	102,623	
			03.08	Pads & Curbs																
				Pad Form	68 sf	0.120 mh / sf	8	39.49 /mh	322	1.37	93	-	-	-	-	-	-	-	415	651
				Chamfer	136 lf	0.015 mh / lf	2	39.49 /mh	81	0.57	77	-	-	-	-	-	-	-	158	245
				Strip & Oil Equipment Pad Forms	68 sf	0.005 mh / sf	0	39.17 /mh	13	0.03	2	-	-	-	-	-	-	-	15	24
				Rebar- Pads (100 #/cy)	0 tn	18.003 mh / tn	2	43.53 /mh	78	997.70	100	-	-	-	-	-	-	-	178	275
				Finish- Float	120 sf	0.017 mh / sf	2	39.17 /mh	80	-	-	-	-	-	-	-	-	-	80	126
				Pump Place Pads	2 cy	1.601 mh / cy	3	41.39 /mh	132	-	-	-	-	-	7.49	15	-	-	147	234
				4000 psi Concrete	2 cy	-	-	-	-	142.00	284	-	-	-	-	-	-	-	284	431
				Liquid Curing Compounds	187 sf	0.003 mh / sf	1	39.17 /mh	22	0.06	11	-	-	-	-	-	-	-	33	52
				03.08 Pads & Curbs	2 cy		18		729	283.39	567			7.49	15			1,311	2,038	
			03.11	Topping Slab																
				Mesh Support (.12/sf)	1,199 ea	0.002 mh / ea	2	43.53 /mh	104	0.26	315	-	-	-	-	-	-	-	419	643
				WWM 4X4- W 2.9 Flats	9,994 sf	0.014 mh / sf	140	43.53 /mh	6,090	0.50	5,011	-	-	-	-	-	-	-	11,101	17,244
				Finish- Hard Trowel	9,994 sf	0.015 mh / sf	150	39.17 /mh	5,873	-	-	-	-	-	-	-	-	-	5,873	9,295
				Pump Place Topping Slab	555 cy	0.750 mh / cy	416	28.06 /mh	11,681	-	-	-	-	-	6.65	3,692	-	-	15,373	24,364
				4000 psi Concrete	555 cy	-	-	-	-	142.00	78,810	-	-	-	-	-	-	-	78,810	119,611
				Liquid Curing Compounds	9,994 sf	0.002 mh / sf	20	39.17 /mh	783	0.06	588	-	-	-	-	-	-	-	1,371	2,131
				Seal Floors	9,994 sf	0.002 mh / sf	20	39.17 /mh	783	0.09	924	-	-	-	-	-	-	-	1,707	2,641
				03.11 Topping Slab	555 cy		748		25,314	154.32	85,647			6.65	3,692			114,653	175,929	
			03.30	Patch Cracks and Resurface Concrete																
				Patch Cracks & Resurface Walls	2,120 sf	10.000 sf / ch	424	53.11 /ch	11,259	0.11	231	-	-	-	-	-	-	-	11,490	18,171
				Patch Cracks & Resurface Slab	848 sf	6.764 sf / ch	251	53.11 /ch	6,659	0.07	63	-	-	-	-	-	-	-	6,721	10,634
				Pressure Wash Basin Walls	2,120 sf	33.333 sf / ch	127	53.11 /ch	3,378	0.35	742	-	-	-	2.37	5,028	-	-	9,147	14,474
				Pressure Washing Basin Slab	848 sf	16.667 sf / ch	102	53.11 /ch	2,702	0.35	297	-	-	-	4.70	3,982	-	-	6,981	11,065
				03.30 Patch Cracks and Resurface Concrete	2,968 sf		904		23,998	0.45	1,332			3.04	9,010			34,340	54,343	
			05.01	Misc Metals																
				Floor Grating Structural Support (4 #/sf)	6 tn	8.002 ch / tn	228	214.54 /ch	9,785	1,200.24	6,841	-	-	829.17	4,726	-	-	21,353	33,392	
				Aluminum 2 Line Rail @ Basin Walkways	366 lf	0.200 mh / lf	73	38.76 /mh	2,837	32.20	11,785	-	-	-	-	-	-	-	14,622	22,377
				Replace Alum Handrail @ Existing Influent Channel	106 lf	0.200 mh / lf	21	38.76 /mh	822	32.20	3,413	-	-	-	-	-	-	-	4,235	6,481
				Replace Alum Platform Grating 1"	2,837 sf	0.035 mh / sf	99	42.08 /mh	4,179	12.39	35,157	-	-	-	-	-	-	-	39,337	59,974
				05.01 Misc Metals	1 ls		422		17,623	57,197.21	57,197			4,726.25	4,726			79,547	122,223	
			31.12	Structure Backfill																
				Engineered Fill 22.5' @ Coagulation Basins, 2ea	335 cy	0.003 cd / cy	32	1,327.72 /cd	1,334	12.00	4,020	-	-	4.69	1,570	-	-	6,924	10,712	
				Engineered Fill 19' @ Flocculation Basins, 2 ea	3,652 cy	0.003 cd / cy	351	1,327.72 /cd	14,547	12.00	43,824	-	-	4.69	17,116	-	-	75,486	116,775	
				Engineered Fill 19' @ Sedimentation Basin, 1 ea	6,516 cy	0.003 cd / cy	626	1,327.72 /cd	25,954	12.00	78,192	-	-	4.69	30,539	-	-	134,685	208,354	
				31.12 Structure Backfill	10,503 cy		1,008		41,835	12.00	126,036			4.69	49,224			217,096	335,841	
				02 Modify Existing Structure & Services	1 ls		18,498		721,101	762,364.84	762,365	4,000.00	4,000	99,224.01	99,224			1,586,689	2,462,337	
			26	Electrical & Instrumentation																
				Above Ground Electrical																
				Electrical Work For Equipment	1 ls	-	-	/ls	-	-	-	200,000.00	200,000	-	-	-	-	200,000	303,543	
				26.01 Above Ground Electrical	1 ls							200,000.00	200,000					200,000	303,543	
				Instrumentation & Controls																
				Controls & Instrumentation Work For New Equipment	1 ls	-	-	/ls	-	-	-	84,000.00	84,000	-	-	-	-	84,000	127,488	
				26.02 Instrumentation & Controls	1 ls							84,000.00	84,000					84,000	127,488	
				26 Electrical & Instrumentation	1 ls							284,000.00	284,000					284,000	431,031	
			40	Process Piping																
				Under Ground Process Piping																
				Trench Excav & Lay Pipe 8-10"	152 lf	405.000 lf / cd	21	2,270.14 /cd	852	-	-	-	-	2.79	424	-	-	1,276	2,024	
				Stone Pipe Bedding	23 cy	200.000 cy / cd	8	2,896.43 /cd	333	23.29	536	-	-	-	-	-	-	869	1,340	
				DI Pipe Push - Class 52 6	0 lf	0.220 mh / lf	0	24.05 /mh	0	23.00	0	-	-	-	-	-	-	0	0	
				DI Pipe Push - Class 52 8	0 lf	0.250 mh / lf	0	51.34 /mh	0	32.00	0	-	-	-	-	-	-	0	1	
				DI Pipe Push - Class 52 12	0 lf	0.310 mh / lf	0	51.34 /mh	0	52.00	1	-	-	-	-	-	-	1	1	
				DI Pipe Push - Class 52 30	0 lf	0.440 mh / lf	0	51.34 /mh	0	167.00	2	-	-	-	-	-	-	2	3	
				DI Pipe Push - Class 52 36	0 lf	0.500 mh / lf	0	51.34 /mh	0	225.00	2	-	-	-	-	-	-	3	4	
				DI Pipe Push - Class 52 42	0 lf	0.570 mh / lf	0	51.34 /mh	0	291.00	3	-	-	-	-	-	-	3	5	
				DI Pipe Push - Class 52 48	45 lf	0.640 mh / lf	29	51.34 /mh	1,479	365.30	16,439	-	-	-	-					

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			40.01	Above Ground Process Piping																
				DI Flanged 90 ell 8"	12 ea	5.050 mh / ea	61	30.57 /mh	1,852	170.10	2,041	-	-	-	-	-	-	3,894	6,030	
				DI Flanged 90 ell 10"	18 ea	6.360 mh / ea	114	30.57 /mh	3,499	267.30	4,811	-	-	-	-	-	-	8,311	12,841	
				DI Flanged Tee 10"	4 ea	6.360 mh / ea	25	30.57 /mh	778	0.01	0	-	-	-	-	-	-	778	1,231	
				DI Flanged Con Red 6x4"	24 ea	4.830 mh / ea	116	30.57 /mh	3,543	168.00	4,032	-	-	-	-	-	-	7,575	11,727	
				Microsand Feed Piping & Accessories- ALLOWANCE	400 LF	0.240 mh / LF	96	45.62 /mh	4,381	55.01	22,004	-	-	-	-	-	-	26,385	40,330	
				Polymer Feed System Piping & Accessories- ALLOWANCE	400 LF	0.240 mh / LF	96	45.62 /mh	4,381	55.01	22,004	-	-	-	-	-	-	26,385	40,330	
				40.01 Above Ground Process Piping	509 lf		1,277		44,184	202.90	103,276	10.00	5,091					152,551	234,401	
			40.02	Valves, Meters, Etc.																
				8" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	4 ea	6.400 mh / ea	26	30.57 /mh	783	3,800.00	15,200	-	-	-	-	-	-	15,983	24,308	
				48" Butterfly Valve, 75 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	2 ea	39.000 mh / ea	78	30.57 /mh	2,384	26,400.00	52,800	-	-	-	-	-	-	55,184	83,909	
				40.02 Valves, Meters, Etc.	1 ls		104		3,167	68,000.00	68,000							71,167	108,217	
			40.04	Hydropneumatic Piping System																
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				32,000.00						32,000	48,567	
				40.04 Hydropneumatic Piping System	1 ls							32,000.00						32,000	48,567	
				40 Process Piping	661 lf		1,813		63,528	531.69	351,445	56.11	37,091	0.64	424			452,489	690,910	
			43	Process Equipment																
			43.00	Pumps																
				Pump Inspection	8 ea	24.000 mh / ea	192	42.40 /mh	8,140	-	-	2,200.00		17,600	-	-	-	25,740	39,595	
				Freight On Pumps To Jobsite	8 ea	/ea		/ea								1,500.00		12,000	18,213	
				Verified Performance Test	8 day	8.000 ch / day	64	29.43 /ch	1,884							1,500.00		12,000	21,194	
				Vendor Verified Performance Test	8 ea	/ea		/ea								1,500.00		12,000	18,213	
				Vendor Witnessed, Verified Performance Test	8 ea	/ea		/ea								1,500.00		12,000	18,213	
				System Disinfection	1 day	8.000 ch / day	8	29.43 /ch	235	750.00	750							985	1,511	
				Equipment Unloading	8 ea	4.000 ch / ea	176	182.62 /ch	5,844	500.00	4,000			381.61	3,053			12,897	20,179	
				Equipment Rigging / Rough Set - Pumps	8 ea	4.000 ch / ea	192	195.85 /ch	6,267	500.00	4,000			401.59	3,213			13,480	21,103	
				Equipment - Final Setting Grout Base - Pumps	8 ea	4.000 ch / ea	96	103.33 /ch	3,307	50.00	400			346.16	2,769			6,476	10,248	
				Variable Frequency Drives	8 ea	20.000 mh / ea	160	28.14 /mh	4,502	15,000.00	120,000							124,502	189,251	
				Sludge Return Pumps	6 ea	40.000 mh / ea	240	34.45 /mh	8,267	-	-					50,000.00		300,000	308,267	
				Sump Pump @ Ancillary Building Lower Level	1 ea	20.000 mh / ea	20	34.45 /mh	689	-	-					30,000.00		30,000	30,689	
				43.00 Pumps	1 ls		1,148		39,134	129,150.00	129,150	17,600.00		17,600	9,034.92	9,035	378,000.00	378,000	572,919	872,739
			43.01	Flocculators & Mixers																
				Freight On Mixers & Flocculators To Jobsite	12 ea	/ea		/ea								1,500.00		18,000	18,000	
				Equipment Unloading	12 ea	4.000 ch / ea	264	182.62 /ch	8,766	500.00	6,000			381.61	4,579			19,345	30,268	
				Equipment Rigging / Rough Set	12 ea	6.000 ch / ea	432	195.85 /ch	14,101	500.00	6,000			401.59	4,819			24,920	39,094	
				Variable Frequency Drives (Included)	12 ea			/ea												
				Rapid Mixer w/7.33' Shaft & Dual 8' Blades, 2 HP (Hydro-Cyclone)	4 ea	45.000 mh / ea	180	42.40 /mh	7,631	100.02	400					0.00		0	8,031	
				Flocculator w/19' Shaft & 10.5' Blades, 3 HP	8 ea	60.000 mh / ea	480	42.40 /mh	20,350	100.00	800					0.00		0	21,150	
				43.01 Flocculators & Mixers	1 ls		1,356		50,848	13,200.08	13,200			9,398.44	9,398	18,000.00	18,000	91,446	142,788	
			43.02	Settlement Equipment																
				Freight On Sedimentation System To Jobsite	4 ea	/ea		/ea								1,500.00		6,000	9,106	
				Verified Performance Test (2 days per System x 6 ea)	16 day	8.000 ch / day	128	29.43 /ch	3,768							1,500.00		24,000	42,388	
				Vendor Verified Performance Test	4 ea	/ea		/ea								1,500.00		6,000	9,106	
				Vendor Witnessed, Verified Performance Test	4 ea	/ea		/ea								1,500.00		6,000	9,106	
				Equipment Unloading	4 ea	16.000 ch / ea	352	182.62 /ch	11,688	500.00	2,000			381.61	1,526			15,214	23,964	
				Equipment Rigging / Rough Set	4 ea	96.000 ch / ea	2,304	195.85 /ch	75,205	500.00	2,000			401.59	1,606			78,811	124,619	
				Equipment - Final Setting	4 ea	660.000 ch / ea	7,920	103.33 /ch	272,803	50.00	200			346.16	1,385			274,388	434,277	
				ACTIFLO- Lamella Tube Plate Settler System w/ (4) 21' Troughs/ System 12.5 MGD	4 ea	/ea		/ea								776,750.00		3,107,000	3,107,000	
				43.02 Settlement Equipment	1 ls		10,704		363,463	4,200.00	4,200			4,517.46	4,517	3,149,000.00	3,149,000	3,521,181	5,368,109	
			43.13	Chemical System Equipment																
				Totes	8 ea	1.000 mh / ea	8	45.62 /mh	365	-	-							365	578	
				Microsand Feed System	4 ea	10.002 mh / ea	40	42.40 /mh	1,696	-	-					75,014.98		300,060	301,756	
				Polymer Feed System	4 ea	10.002 mh / ea	40	42.40 /mh	1,696	-	-					0.00		0	1,696	
				Activation Units	8 ea	10.002 mh / ea	80	42.40 /mh	3,392	-	-					291,875.00		2,338,392	3,549,235	
				Batch Tank	4 ea	10.002 mh / ea	40	42.40 /mh	1,696	-	-					15,002.99		60,012	61,708	
				43.13 Chemical System Equipment	208		208		8,846									2,695,072	2,703,918	4,104,353
			43.20	Slide Gate w/ Operator																
				Slide Gates 36" x 36" w/ 16" Operators @ Influent Chamber	4 ea	30.006 mh / ea	120	47.77 /mh	5,734	500.00	2,000					20,000.00		80,000	87,734	
				43.20 Slide Gate w/ Operator	1 ls		120		5,734		2,000							80,000	87,734	
				43 Process Equipment	1 ls		13,536		468,025	148,550.08	148,550	17,600.00	17,600	22,950.82	22,951	6,320,071.86	6,320,072	6,977,198	10,621,517	
				2B Pretreatment - Retrofit North w/ Ballasted Flocculation	1 ls		35,321		1,310,788	1,339,060.36	1,339,060	690,814.13	690,814	127,253.60	127,254	6,320,071.86	6,320,072	9,787,988	14,949,975	
			2C	Pretreatment - Construct New Facility																
			00	Building & Structure Construction																
			03.00	Foundation Mat																
				Keyway 6"	474 lf	0.050 mh / lf	24	39.49 /mh	936	0.67	319							1,255	1,965	
				Mat Foundation Edge Form 24"	1,306 sf	0.350 mh / sf	457	39.49 /mh	18,054	1.31	1,714							19,768	31,176	
				Mat Foundation Bulkhead Form	948 sf	0.350 mh / sf	332	39.49 /mh	13,102	1.52	1,443							14,545	22,927	
				Waterstop 6" Flat	474 lf	0.110 mh / lf	52	39.18 /mh	2,043	2.10	996							3,039	4,745	
				Strip & Oil Mat Found. Form	2,254 sf	0.005 mh / sf	11	39.17 /mh	442	0.03	68									

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				03.03 Columns	27 cy		586		23,313	377.42	10,190			7.50	202			33,706	52,686
			03.04	Walls															
				Keyway 6"	3,254 lf	0.050 mh / lf	163	39.49 /mh	6,426	0.67	2,187	-	-	-	-	-	-	8,613	13,490
				Vertical Wall Keyway 6"	795 lf	0.110 mh / lf	87	39.49 /mh	3,454	0.67	534	-	-	-	-	-	-	3,988	6,277
				Panel Form System 8-12'	4,871 sf	0.150 mh / sf	731	39.49 /mh	28,852	1.84	8,950	-	-	-	-	-	-	37,802	59,249
				Panel Form System 12-16'	8,948 sf	0.170 mh / sf	1,521	39.49 /mh	60,068	1.84	16,442	-	-	-	-	-	-	76,510	120,024
				Panel Form System > 16' h	49,674 sf	0.190 mh / sf	9,440	39.49 /mh	372,765	1.84	91,294	-	-	-	-	-	-	464,059	728,539
				Waterstop 6" Flat	4,049 lf	0.110 mh / lf	445	39.18 /mh	17,452	2.10	8,505	-	-	-	-	-	-	25,956	40,529
				Strip & Oil Wall Forms	63,493 sf	0.005 mh / sf	318	39.17 /mh	12,436	0.03	1,905	-	-	-	-	-	-	14,341	22,575
				Superplasticizers @ Walls	1,609 cy			/cy		8.40	13,517	-	-	-	-	-	-	13,517	20,515
				Rebar- Walls (125 #/cy)	101 tn	15.003 mh / tn	1,515	43.53 /mh	65,957	997.70	100,768	-	-	-	-	-	-	166,724	257,327
				Finish- Top of Wall	4,571 sf	0.008 mh / sf	37	39.17 /mh	1,433	-	-	-	-	-	-	-	-	1,433	2,267
				Pump Place Walls 12", 18" & 20"	1,609 cy	1.150 mh / cy	1,851	41.39 /mh	76,599	-	-	-	-	6.65	10,699	-	-	87,298	138,263
				4000 psi Concrete	1,609 cy			/cy		142.00	228,478	-	-	-	-	-	-	228,478	346,765
				Grind/Patch Walls	63,493 sf	0.013 mh / sf	826	39.17 /mh	32,335	0.03	1,905	-	-	-	-	-	-	34,240	54,069
				Rub Walls	53,253 sf	0.058 mh / sf	3,089	39.17 /mh	120,974	0.06	3,195	-	-	-	-	-	-	124,169	196,317
				Liquid Curing Compounds	65,983 sf	0.002 mh / sf	132	39.17 /mh	5,170	0.06	3,881	-	-	-	-	-	-	9,050	14,072
				03.04 Walls	1,609 cy		20,154		803,920	299.29	481,562			6.65	10,699			1,296,181	2,020,278
			03.05	Slab On Grade															
				Slab Edge Form 8"	361 sf	0.240 mh / sf	87	39.49 /mh	3,421	1.22	440	-	-	-	-	-	-	3,861	6,082
				Slab Edge Form 18"	579 sf	0.340 mh / sf	197	39.49 /mh	7,774	1.52	882	-	-	-	-	-	-	8,655	13,641
				Strip & Oil Forms	940 sf	0.005 mh / sf	5	39.17 /mh	184	0.04	39	-	-	-	-	-	-	223	350
				Rebar- SOG (125 #/cy)	8 tn	14.003 mh / tn	107	43.53 /mh	4,650	997.70	7,612	-	-	-	-	-	-	12,263	18,914
				Mesh Support - bricks (.12/sf)	335 ea	0.002 mh / ea	1	43.53 /mh	29	0.26	88	-	-	-	-	-	-	117	180
				Finish- Hard Trowel	2,791 sf	0.025 mh / sf	70	39.17 /mh	2,733	-	-	-	-	-	-	-	-	2,733	4,325
				Pump Place Slab on Grade 8"	27 cy	0.500 mh / cy	14	41.39 /mh	559	-	-	-	-	3.67	99	-	-	658	1,042
				Pump Place Slab on Grade 18"	95 cy	0.500 mh / cy	48	41.39 /mh	1,966	-	-	-	-	3.67	349	-	-	2,315	3,667
				4000 psi Concrete	122 cy			/cy		142.00	17,324	-	-	-	-	-	-	17,324	26,293
				Saw Cut S-O-G (.08/sf)	223 lf	0.030 mh / lf	7	39.17 /mh	262	0.17	38	-	-	0.95	212	-	-	512	810
				Liquid Curing Compounds	3,731 sf	0.002 mh / sf	7	39.17 /mh	292	0.06	219	-	-	-	-	-	-	512	796
				Seal Floors	2,791 sf	0.002 mh / sf	6	39.17 /mh	219	0.09	258	-	-	-	-	-	-	477	738
				6 Mil. Vapor Barrier	7,000 sf	0.002 mh / sf	14	43.53 /mh	610	0.05	368	-	-	-	-	-	-	977	1,523
				Gravel Fill Under Slab 4"	34 cy	0.004 cd / cy	4	1,412.15 /cd	182	29.26	995	-	-	3.84	130	-	-	1,307	2,005
				03.05 Slab On Grade	122 cy		564		22,881	231.65	28,262			6.48	791			51,934	80,366
			03.06	Suspended Flat Slab															
				Form Suspended Slab Bottom	8,903 sf	0.220 mh / sf	1,959	39.49 /mh	77,344	2.18	19,448	-	-	-	-	-	-	96,792	151,929
				Slab Edge Form 8" & 12"	3,060 sf	0.250 mh / sf	765	39.49 /mh	30,214	5.17	15,823	-	-	-	-	-	-	46,038	71,836
				Strip & Oil Suspended Slab Forms	11,963 sf	0.005 mh / sf	60	39.17 /mh	2,343	0.04	491	-	-	-	-	-	-	2,834	4,453
				Superplasticizers	317 cy				-	8.40	2,663	-	-	-	-	-	-	2,663	4,042
				Rebar- Suspended Slab (225 #/cy)	36 tn	20.004 mh / tn	720	43.53 /mh	31,346	997.70	35,917	-	-	-	-	-	-	67,263	104,123
				Finish- Hard Trowel	8,903 sf	0.035 mh / sf	312	39.17 /mh	12,205	-	-	-	-	-	-	-	-	12,205	19,316
				Pump Place Suspended Slab	317 cy	2.160 mh / cy	685	41.39 /mh	28,340	-	-	-	-	6.65	2,109	-	-	30,449	48,211
				4000 psi Concrete	317 cy				-	142.00	45,014	-	-	-	-	-	-	45,014	68,318
				Liquid Curing Compounds	20,866 sf	0.003 mh / sf	63	39.17 /mh	2,452	0.68	14,244	-	-	-	-	-	-	16,696	25,499
				03.06 Suspended Flat Slab	317 cy		4,563		184,244	421.45	133,600			6.65	2,109			319,953	497,729
			05.01	Misc Metals															
				Aluminum 2 Line Rail @ Basin Walkways	3,000 lf	0.200 mh / lf	600	38.76 /mh	23,255	32.20	96,600	-	-	-	-	-	-	119,855	183,417
				Alum Hatch Cover & Frame 2.5'x2.5' @ Sludge Valve Vault	8 ea	2.000 mh / ea	16	39.18 /mh	627	900.00	7,200	-	-	-	-	-	-	7,827	11,920
				05.01 Misc Metals	1 ls		616		23,881	103,800.00	103,800							127,681	195,336
			31.01	Dewatering															
				Dewatering @ Building Excavation	1 ea	960.000 ch / ea	3,840	159.35 /ch	152,974	7,500.00	7,500	-	-	33,592.77	33,593	-	-	194,067	306,961
				31.01 Dewatering	1 ls		3,840		152,974	7,500.00	7,500			33,592.77	33,593			194,067	306,961
			31.02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 410 ea (1 per 64 sf)	10,250 vf	0.002 cd / vf	1,148	2,146.97 /cd	44,022	35.16	360,354	-	-	2.58	26,448	-	-	430,824	658,681
				31.02 Piles	410 ea		1,148		44,022	878.91	360,354			64.51	26,448			430,824	658,681
			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls				-	-	-	15,003.00	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (731' x 30' deep)	21,930 sf	0.001 cd / sf	1,081	2,465.38 /cd	41,647	16.00	350,950	-	-	0.75	16,489	-	-	409,086	624,800
				Tie Backs (1 per 80 sf of Sheeting, 731' x 22"= 16,082 sf)	201 ea				-	-	-	2,377.47	477,872	-	-	-	-	477,872	725,274
				31.03 Excavation Shoring	21,930 sf		1,081		41,647	16.00	350,950	22.48	492,875	0.75	16,489			901,962	1,372,845
			31.10	Structure Excavation															
				Exc Clay-Backhoe/Truck	27,471 cy	499.900 cy / cd	1,978	1,410.06 /cd	77,487	-	-	-	-	6.58	180,870	-	-	258,356	410,496
				31.10 Structure Excavation	27,471 cy		1,978		77,487					6.58	180,870			258,356	410,496
			31.12	Structure Backfill															
				Backfill Earth-Backhoe/Truck	3,620 cy	0.002 cd / cy	234	1,327.72 /cd	9,709	-	-	-	-	4.69	16,966	-	-	26,675	42,368
				31.12 Structure Backfill	3,620 cy		234		9,709					4.69	16,966			26,675	42,368
			31.13	Soil Disposal															
				Spoils to Waste	23,851 cy	0.003 day / cy	2,147	1,410.06 /day	84,095	-	-	-	-	8.23	196,304	-</			

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			40.00	Under Ground Process Piping															
				DI Pipe Push - Class 52 6	762 lf	0.220 mh / lf	168	24.05 /mh	4,033	22.53	17,170	-	-	-	-	-	-	21,203	32,442
				Hydrostatic Testing	762 lf	0.021 ch / lf	64	182.49 /ch	2,920	0.16	122	-	-	-	-	-	-	3,042	4,807
				Chlorination	762 lf	/lf				0.10	76	-	-	-	-	-	-	76	116
				DI 90 ell 6"	12 ea	4.830 mh / ea	58	45.62 /mh	2,644	105.30	1,264	-	-	-	-	-	-	3,908	6,103
				DI Tee 6"	8 ea	4.830 mh / ea	39	30.57 /mh	1,181	0.02	0	-	-	-	-	-	-	1,181	1,870
				DI Blind Flange 6"	1 ea	4.680 mh / ea	5	30.57 /mh	143	103.25	103	-	-	-	-	-	-	246	383
				40.00 Under Ground Process Piping	762 lf		417		14,682	25.72	19,597			1.88	1,435			35,714	55,264
			40.01	Above Ground Process Piping															
				Pipe Supports	8 ea	4.001 mh / ea	32	45.62 /mh	1,460	250.05	2,000	-	-	-	-	-	-	3,461	5,347
				Hydrostatic Testing	100 lf	0.021 ch / lf	8	182.49 /ch	383	0.16	16	-	-	-	-	-	-	399	631
				Chlorination	100 lf	/lf				0.10	10	-	-	-	-	-	-	10	15
				Wall Thimble 36" x 24" long	4 ea	3.500 ch / ea	56	182.49 /ch	2,555	1,800.00	7,200	-	-	842.80	3,371	-	-	13,126	20,336
				Mud Valves 8" w/ 20' Stem	12 ea	11.200 mh / ea	134	30.71 /mh	4,127	4,000.00	48,000	-	-	-	-	-	-	52,127	79,382
				Gasket/Nuts/Bolt Kit 24"	8 ea	1.000 mh / ea	8	32.89 /mh	263	129.45	1,036	-	-	-	-	-	-	1,299	1,988
				Gasket/Nuts/Bolt Kit 36"	12 ea	2.600 mh / ea	31	45.62 /mh	1,423	175.04	2,100	-	-	-	-	-	-	3,524	5,441
				DI Flanged Joint Pipe 24"	100 lf	2.670 mh / lf	267	30.57 /mh	8,161	267.83	26,783	-	-	-	-	-	-	34,945	53,567
				DI Flanged Tee 36"	4 ea	20.520 mh / ea	82	30.57 /mh	2,509	-	-	-	-	-	-	-	-	2,509	3,971
				DI Flanged Con Red 36x24"	8 ea	20.520 mh / ea	164	30.57 /mh	5,018	4,519.20	36,154	-	-	-	-	-	-	41,171	62,813
				Piping & Accessories- ALLOWANCE	100 LF	0.240 mh / LF	24	45.62 /mh	1,095	55.01	5,501	-	-	-	-	-	-	6,596	10,082
				40.01 Above Ground Process Piping	100 lf		807		26,995	1,288.01	128,801			33.71	3,371			159,167	243,573
			40.02	Valves, Meters, Etc.															
				Backflow Preventer Flg 6"	0 ea	12.170 mh / ea	0	45.62 /mh	6	5,000.00	50	-	-	-	-	-	-	56	85
				Magnetic Flow Meter - Inline - 30" w/ transmitter	0 ea	30.000 mh / ea	0	48.85 /mh	15	15,000.00	150	-	-	-	-	-	-	165	251
				Swing Check Valve 6"	0 ea	4.669 mh / ea	0	45.62 /mh	2	1,100.00	11	-	-	-	-	-	-	13	20
				Swing Check Valve 18"	0 ea	13.713 mh / ea	0	30.71 /mh	4	10,800.00	108	-	-	-	-	-	-	112	171
				6" Butterfly Valve, 125 lb class, CI Body, Flg, w/ EIM elec actuator NEMA 4	0 ea	6.200 mh / ea	0	30.57 /mh	2	2,850.00	29	-	-	-	-	-	-	30	46
				24" Butterfly Valve, 125 lb class, CI Body, Flg, w/ EIM elec actuator NEMA 4	0 ea	19.204 mh / ea	0	45.62 /mh	9	12,502.00	125	-	-	-	-	-	-	134	204
				36" Butterfly Valve, 75 lb class, CI Body, Flg, w/ EIM elec actuator NEMA 4	0 ea	28.800 mh / ea	0	30.57 /mh	9	19,781.00	198	-	-	-	-	-	-	207	314
				42" Butterfly Valve, 75 lb class, CI Body, Flg, w/ EIM elec actuator NEMA 4	0 ea	33.600 mh / ea	0	30.57 /mh	10	23,078.00	231	-	-	-	-	-	-	241	366
				40.02 Valves, Meters, Etc.	0 ls		1		56	90,111.00	901							957	1,457
			40.04	Hydropneumatic Piping System															
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				65,000.00	65,000	-	-	-	-	65,000	98,652
				40.04 Hydropneumatic Piping System	0 ls							65,000.00	65,000					65,000	98,652
				40 Process Piping	862 lf		1,226		41,733	173.20	149,299	75.41	65,000	5.58	4,807			260,839	398,946
		43		Process Equipment															
			43.01	Flocculators & Mixers															
				Freight On Mixers & Flocculators To Jobsite	36 ea	/ea								1,500.00			54,000	54,000	81,957
				Equipment Unloading	36 ea	4.000 ch / ea	792	182.62 /ch	26,298	500.00	18,000	-	-	381.61	13,738	-	-	58,036	90,805
				Equipment Rigging / Rough Set	36 ea	6.000 ch / ea	1,296	195.85 /ch	42,303	500.00	18,000	-	-	401.59	14,457	-	-	74,760	117,281
				Variable Frequency Drives (Included)	36 ea														
				Rapid Mixer w/7.33' Shaft & Dual 2.33' Blades, 2 HP	4 ea	45.000 mh / ea	180	42.40 /mh	7,631	100.02	400	-	-	13,700.00			54,800	62,831	95,856
				Flocculator w/19' Shaft & 9' Blades, 3 HP	24 ea	60.000 mh / ea	1,440	42.40 /mh	61,049	100.00	2,400	-	-	30,000.00			720,000	783,449	1,193,021
				PAC Mixer w/19' Shaft & Dual 3.5' Blades 5 hp	8 ea	60.000 mh / ea	480	42.40 /mh	20,350	100.00	800	-	-	10,000.00			80,000	101,150	154,839
				43.01 Flocculators & Mixers	1 ls		4,188		157,630	39,600.08	39,600			28,195.34	28,195	908,800.00	908,800	1,134,225	1,733,758
			43.02	Settlement Equipment															
				Freight On Sedimentation System To Jobsite	6 ea														
				Verified Performance Test (2 days per System x 6 ea)	12 day	8.000 ch / day	96	29.43 /ch	2,826			-	-	-	1,500.00		18,000	20,826	31,791
				Vendor Verified Performance Test	6 ea	/ea						-	-	1,500.00			9,000	9,000	13,659
				Vendor Witnessed, Verified Performance Test	6 ea	/ea						-	-	1,500.00			9,000	9,000	13,659
				Equipment Unloading	6 ea	16.000 ch / ea	528	182.62 /ch	17,532	500.00	3,000	-	-	381.61	2,290	-	-	22,822	35,945
				Equipment Rigging / Rough Set	6 ea	96.000 ch / ea	3,456	195.85 /ch	112,807	500.00	3,000	-	-	401.59	2,410	-	-	118,216	186,929
				Equipment - Final Setting	6 ea	360.000 ch / ea	6,480	103.33 /ch	223,202	50.00	300	-	-	346.16	2,077	-	-	225,579	357,027
				Inclined Plate Settlers w/ Flow Control Deck 55' x 86' x 8.2'	6 ea	/ea						-	-	474,375.00			2,846,250	2,846,250	4,319,798
				43.02 Settlement Equipment	1 ls		10,560		356,367	6,300.00	6,300			6,776.18	6,776	2,882,250.00	2,882,250	3,251,693	4,958,809
			43.03	Baffle Walls															
				Flow Control Diffuser Wall SS 304/304L SS 20' h, 12 ea, 10,560 sf	528 lf	6.000 mh / lf	3,168	30.57 /mh	96,836			-	-	28.00	14,784	719.70	380,000	491,620	753,524
				43.03 Baffle Walls	1 sf		3,168		96,836					14,784.00	14,784	380,000.00	380,000	491,620	753,524
			43.20	Slide Gate w/ Operator															
				Sluice Gates 60" x 60"	4 ea	44.800 mh / ea	179	30.71 /mh	5,503	27,500.00	110,000	-	-	-	-	-	-	115,503	175,658
				43.20 Slide Gate w/ Operator	1 ls		179		5,503	110,000.00	110,000							115,503	175,658
				43 Process Equipment	1 ls		18,095		616,335	155,900.08	155,900	-	-	49,755.52	49,756	4,171,050.00	4,171,050	4,993,041	7,621,750
				2C Pretreatment - Construct New Facility	1 ls		61,595		2,350,886	2,172,079.51	2,172,080	978,393.35	978,393	551,167.39	551,167	4,171,050.00	4,171,050	10,223,576	15,709,965
				02 Pretreatment	1 ls		136,318		5,123,300	4,526,502.63	4,526,503	2,102,725.48	2,102,725	773,916.45	773,916	15,132,807.79	15,132,808	27,659,252	42,369,007

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
03				Filtration															
	3A			Filtration - Rehab Existing															
		47.1		Water Plant Process Rehab @ Filters 21 thru 28															
			02.01	Demolition Work															
				Non-Hazardous Waste Transport and Disposal.	520 ton	-	-	-	-	-	-	50.00	26,000	-	-	-	-	26,000	39,461
				Pressure Washing Basin Walls @ Basins 22, 25 & 26	5,573 sf	150.000 sf / ch	74	53.11 /ch	1,973	0.35	1,951	-	-	0.52	2,908	-	-	6,831	10,711
				Pressure Washing Basin Slab @ Basins 22, 25 & 26	3,108 sf	200.000 sf / ch	31	53.11 /ch	825	0.35	1,088	-	-	0.39	1,216	-	-	3,129	4,893
				Remove Air Header	3 ea	8.000 ch / ea	120	231.62 /ch	5,559	250.00	750	-	-	1,957.34	5,872	-	-	12,181	19,282
				Bag, Transport and Dispose Of Media	9,342 cf	65.867 cf / ch	567	163.29 /ch	23,159	0.22	2,076	-	-	4.08	38,137	-	-	63,372	100,500
				Remove Sand (3,108 sf x 24" deep), 230 cy	6,210 cf	0.033 mh / cf	202	46.32 /mh	9,349	-	-	-	-	6.12	37,985	-	-	47,334	75,250
				Remove Anthracite Media (3,108 sf x 6" deep), 58 cy	1,566 cf	0.033 mh / cf	51	46.32 /mh	2,358	-	-	-	-	6.12	9,579	-	-	11,936	18,976
				Remove Gravel Media (3,108 sf x 6" deep), 58 cy	1,566 cf	0.033 mh / cf	51	46.32 /mh	2,358	-	-	-	-	6.12	9,579	-	-	11,936	18,976
				Remove Underdrain System - Grouted Blocks @ Filters 22, 25 & 26	3,108 sf	0.180 mh / sf	559	46.32 /mh	25,915	1.09	3,396	-	-	6.12	19,011	-	-	48,321	76,426
				02.01 Demolition Work	1 ls		1,656		71,496	9,260.15	9,260	26,000.00	26,000	124,285.12	124,285			231,041	364,474
			03.30	Patch Cracks and Resurface Concrete															
				Patch Cracks & Resurface Walls @ Basins 22, 25 & 26	2,120 sf	10.000 sf / ch	424	53.11 /ch	11,259	0.11	231	-	-	-	-	-	-	11,490	18,171
				Patch Cracks & Resurface Walls @ Lower Gallery	6,831 sf	10.000 sf / ch	1,366	53.11 /ch	36,280	0.11	744	-	-	-	-	-	-	37,024	58,549
				Patch Cracks & Resurface Slab @ Basins 22, 25 % 26	848 sf	6.764 sf / ch	251	53.11 /ch	6,659	0.07	63	-	-	-	-	-	-	6,721	10,634
				03.30 Patch Cracks and Resurface Concrete	9,799 sf		2,041		54,198	0.11	1,037							55,235	87,354
			09.00	Finishes															
				Pressure Wash Basins 22, 25 & 26	6 flit	90.000 mh / flit	540	40.56 /mh	21,905	-	-	-	-	701.91	4,211	-	-	26,116	41,371
				Clean Basins 22, 25 & 26	6 flit	30.000 ch / flit	540	143.32 /ch	25,798	500.00	3,000	-	-	3,597.12	21,583	-	-	50,381	79,733
				Clean Lower Gallery Walls For Painting	31,626 sf	150.000 sf / ch	422	53.11 /ch	11,198	0.35	11,069	-	-	0.52	16,500	-	-	38,767	60,783
				Clean & Prep Pipe For Painting	1,740 lf	-	-	-	-	-	-	6.00	10,440	-	-	-	-	10,440	15,845
				Paint Lower Gallery Concrete Surfaces	6,831 sf	-	-	-	-	-	-	1.10	7,514	-	-	-	-	7,514	11,404
				Paint 4" Pipe	0 lf	0.035 mh / lf	0	27.53 /mh	0	1.00	0	-	-	4.00	0	-	-	0	0
				Paint 6" Pipe	818 lf	0.070 mh / lf	57	27.53 /mh	1,577	0.69	566	-	-	4.24	3,467	-	-	5,610	8,873
				Paint 12" Pipe	0 lf	0.120 mh / lf	0	27.53 /mh	0	1.00	0	-	-	6.00	0	-	-	0	0
				Paint 16" Pipe	227 lf	0.140 mh / lf	32	27.53 /mh	875	1.85	419	-	-	6.06	1,375	-	-	2,669	4,209
				Paint 18" Pipe	96 lf	0.200 mh / lf	19	27.53 /mh	529	2.08	199	-	-	6.06	581	-	-	1,309	2,064
				Paint 20" Pipe	0 lf	0.300 mh / lf	0	27.53 /mh	0	2.00	0	-	-	7.00	0	-	-	0	0
				Paint 24" Pipe	0 lf	0.350 mh / lf	0	27.53 /mh	0	3.00	0	-	-	7.00	0	-	-	0	0
				Paint 30" Pipe	0 lf	0.438 mh / lf	0	27.53 /mh	0	4.00	0	-	-	4.00	0	-	-	0	0
				Paint 36" Pipe	541 lf	0.525 mh / lf	284	27.53 /mh	7,820	4.15	2,247	-	-	4.95	2,676	-	-	12,743	20,046
				Paint 42" Pipe	58 lf	0.525 mh / lf	30	27.53 /mh	838	4.85	281	-	-	4.95	287	-	-	1,406	2,210
				09.00 Finishes	1 ls		1,924		70,539	17,782.62	17,783	17,954.10	17,954	50,680.35	50,680			156,956	246,540
			43.05	Filtration Equipment															
				Filter Equipment Start-Up	3 ea	150.000 ch / ea	3,150	350.77 /ch	157,845	2,500.00	7,500	-	-	-	-	-	-	165,345	261,206
				Gravity Filters - Underdrain Blocks, Sand & Anthracite - Purchase	3,108 sf	/sf	-	-	-	-	-	-	-	-	-	172.84	537,185	537,185	815,294
				Install Anthracite Media 6"	1,566 cf	0.033 mh / cf	51	46.32 /mh	2,358	-	-	-	-	6.36	9,962	-	-	12,319	19,586
				Install Gravel Media 6"	1,566 cf	0.033 mh / cf	51	46.32 /mh	2,358	-	-	-	-	6.36	9,962	-	-	12,319	19,586
				New Air Header @ Each Basin	6 ea	16.000 ch / ea	480	231.62 /ch	22,235	-	-	-	-	3,914.67	23,488	-	-	45,723	72,573
				Install Sand Media .45 - .55 mm	6,210 cf	0.033 mh / cf	202	46.32 /mh	9,349	-	-	-	-	6.36	39,504	-	-	48,853	77,668
				Install Gravity Filter Bottoms/Blocks	3,108 sf	0.180 mh / sf	559	46.32 /mh	25,915	1.09	3,396	-	-	15.66	48,667	-	-	77,978	123,624
				43.05 Filtration Equipment	1 ls		4,493		220,059	10,895.80	10,896			131,582.88	131,583	537,185.18	537,185	899,723	1,389,538
				47.1 Water Plant Process Rehab @ Filters 21 thru 28	1 ls		10,114		416,292	38,975.94	38,976	43,954.10	43,954	306,548.35	306,548	537,185.18	537,185	1,342,955	2,087,906
		47.2		Water Plant Process Rehab @ Filters 29 thru 32															
			02.01	Demolition Work															
				Non-Hazardous Waste Transport and Disposal.	524 ton	-	-	-	-	-	-	50.00	26,200	-	-	-	-	26,200	39,764
				Pressure Washing Basin Walls @ Basins 30, 31 & 32	5,595 sf	150.000 sf / ch	75	53.11 /ch	1,981	0.35	1,958	-	-	0.52	2,919	-	-	6,858	10,753
				Pressure Washing Basin Slab @ Basins 30, 31 & 32	3,174 sf	200.000 sf / ch	32	53.11 /ch	843	0.35	1,111	-	-	0.39	1,242	-	-	3,196	4,997
				Remove Air Header	3 ea	8.000 ch / ea	120	231.62 /ch	5,559	250.00	750	-	-	1,957.34	5,872	-	-	12,181	19,282
				Bag, Transport and Dispose Of Media	9,531 cf	65.867 cf / ch	579	163.29 /ch	23,627	0.22	2,118	-	-	4.08	38,908	-	-	64,654	102,533
				Remove Sand (3,174 sf x 24" deep), 235 cy	6,345 cf	0.033 mh / cf	206	46.32 /mh	9,552	-	-	-	-	6.12	38,810	-	-	48,363	76,886
				Remove Anthracite Media (3,174 sf x 6" deep), 59 cy	1,593 cf	0.033 mh / cf	52	46.32 /mh	2,398	-	-	-	-	6.12	9,744	-	-	12,142	19,303
				Remove Gravel Media (3,174 sf x 6" deep), 59 cy	1,593 cf	0.033 mh / cf	52	46.32 /mh	2,398	-	-	-	-	6.12	9,744	-	-	12,142	19,303
				Remove Underdrain System - Grouted Blocks @ Filters 30, 31 & 32	3,174 sf	0.180 mh / sf	571	46.32 /mh	26,465	1.09	3,468	-	-	6.12	19,414	-	-	49,348	78,048
				02.01 Demolition Work	1 ls		1,686		72,824	9,405.06	9,405	26,200.00	26,200	126,653.73	126,654			235,083	370,870
			03.30	Patch Cracks and Resurface Concrete															
				Patch Cracks & Resurface Walls @ Basins 30, 31 & 32	2,120 sf	10.000 sf / ch	424	53.11 /ch	11,259	0.11	231	-	-	-	-	-	-	11,490	18,171
				Patch Cracks & Resurface Walls @ Lower Gallery	6,831 sf	10.000 sf / ch	1,366	53.11 /ch	36,280	0.11	744	-	-	-	-	-	-	37,024	58,549
				Patch Cracks & Resurface Slab @ Basins 30, 31 & 32	848 sf	6.764 sf / ch	251	53.11 /ch	6,659	0.07	63	-	-	-	-	-	-	6,721	10,634
				03.30 Patch Cracks and Resurface Concrete	9,799 sf		2,041		54,198	0.11	1,037							55,235	87,354
			09.00	Finishes															
				Pressure Wash Basins 30, 31 & 32	6 flit	90.000 mh / flit	540	40.56 /mh	21,905	-	-	-	-	701.91	4,211	-	-	26,116	41,371
				Clean Tank	8 flit	30.000 ch / flit	720	143.32 /ch	34,397	500.00	4,000	-	-	3,597.12	28,777	-	-		

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
			43.05	Filtration Equipment																
				Install Sand Media .45 - .55 mm	6,345 cf	0.033 mh / cf	206	46.32 /mh	9,552					6.36	40,363			49,915	79,357	
				Install Gravity Filter Bottoms/Blocks	3,174 sf	0.180 mh / sf	571	46.32 /mh	26,465	1.09	3,468			15.66	49,701			79,634	126,250	
				43.05 Filtration Equipment	1 ls		4,511		220,894	10,967.91	10,968			133,818.66	133,819	548,592.59	548,593	914,273	1,411,840	
				47.2 Water Plant Process Rehab @ Filters 29 thru 32	1 ls		12,015		488,047	122,999.44	122,999	44,154.10	44,154	336,673.02	336,673	548,592.59	548,593	1,540,466	2,394,559	
		47.3		Water Plant Building @ Filters 21 thru 36																
			02.01	Demolition Work																
				Demo HVAC System @ Upper & Lower Levels	44,000 sf							3.00	132,000					132,000	200,338	
				Demo Lighting System @ Upper & Lower Levels	44,000 sf			/sf				3.00	132,000					132,000	200,338	
				02.01 Demolition Work	1 ls							264,000.00	264,000					264,000	400,677	
			08.00	Doors, Frames & Hardware																
				Aluminum Frame Storefronts 10' h @ Filters 21 thru 28	8,400 sf							60.00	504,000					504,000	764,929	
				Aluminum Doors & Frames Single 3'x7' full 1/2" glass panel	6 ea	8.000 mh / ea	48	25.39 /mh	1,219	1,150.00	6,900							8,119	12,401	
				Finish Hardware by Leaf- Allowance	6 ea	8.002 mh / ea	48	39.18 /mh	1,881	900.18	5,401							7,282	11,174	
				08.00 Doors, Frames & Hardware	6 ea		96		3,099	2,050.18	12,301	84,000.00	504,000					519,400	788,504	
			09.00	Finishes																
				Paint HM Door Frames - primer (2) coats	32 ea			/ea				100.02	3,201					3,201	4,858	
				Paint HM Doors - primer (2) coats	32 ea			/ea				140.03	4,481					4,481	6,801	
				Paint CMU Block - block filler & (2) coat	16,800 sf							1.35	22,680					22,680	34,422	
				Paint Ceilings	44,000 sf							1.00	44,000					44,000	66,779	
				Minor Architectural Improvements	1 ls							10,000.00	10,000					10,000	15,177	
				Paint 12" Pipe	400 lf	0.120 mh / lf	48	27.53 /mh	1,322	1.39	554			5.65	2,261			4,136	6,530	
				Paint 16" Pipe	77 lf	0.140 mh / lf	11	27.53 /mh	297	1.85	142			6.06	466			905	1,428	
				Paint 18" Pipe	12 lf	0.200 mh / lf	2	27.53 /mh	66	2.08	25			6.06	73			164	258	
				Paint 20" Pipe	17 lf	0.300 mh / lf	5	27.53 /mh	140	2.31	39			7.07	120			300	473	
				Paint 24" Pipe	960 lf	0.350 mh / lf	336	27.53 /mh	9,251	2.77	2,659			7.07	6,782			18,692	29,471	
				Paint 36" Pipe	666 lf	0.525 mh / lf	350	27.53 /mh	9,627	4.15	2,767			4.95	3,294			15,687	24,678	
				Paint 48" Pipe	303 lf	0.525 mh / lf	159	27.53 /mh	4,380	5.54	1,678			4.95	1,498			7,557	11,864	
				09.00 Finishes	1 ls		911		25,083	7,863.94	7,864	84,361.50	84,362	14,494.42	14,494			131,803	202,739	
			23.00	HVAC																
				New HVAC System	44,000 sf			/sf				20.00	880,000					880,000	1,335,590	
				23.00 HVAC	44,000 sf							20.00	880,000					880,000	1,335,590	
			26.01	Above Ground Electrical																
				New Lighting System	44,000 sf			/sf				12.00	528,000					528,000	801,354	
				New Support For Conduit & Wiring System	44,000 sf			/sf				6.00	264,000					264,000	400,677	
				26.01 Above Ground Electrical	1 ls							792,000.00	792,000					792,000	1,202,031	
				47.3 Water Plant Building @ Filters 21 thru 36	1 ls		1,007		28,182	20,165.02	20,165	2,524,361.50	2,524,362	14,494.42	14,494			2,587,203	3,929,540	
				3A Filtration - Rehab Existing	1 ls		23,137		932,521	182,140.40	182,140	2,612,469.70	2,612,470	657,715.79	657,716	1,085,777.77	1,085,778	5,470,625	8,412,006	
3B				Filtration - Rehab Existing & Add Ozone Facility																
		47.4		Rehab North Basins #1, 2, 3, 4 & 5																
			02.01	Demolition Work																
				Non-Hazardous Waste Transport and Disposal.	2,464 ton							50.00	123,200					123,200	186,983	
				Demo Top 2' Of Conc Basin Walls @ Basins 2, 3, 4 & 5 (1512 LF)	149 cy	0.500 ch / cy	149	84.95 /ch	6,329					26.86	4,003			10,332	16,387	
				Demo Top 2' Of Conc Basin Columns @ Basins 2, 3, 4 & 5 (32 EA)	16 cy	1.000 ch / cy	32	84.95 /ch	1,359					26.86	430			1,789	2,835	
				Demo Baffle Walls @ Basins 1,2,3, 4 & 5	505 cy	0.100 ch / cy	101	84.95 /ch	4,290					26.86	13,567			17,857	28,381	
				Demo 7" Reinforced Slabs Over Basins, 547 cy	25,454 sf	0.018 ch / sf	1,375	117.52 /ch	53,842					2.00	50,908			104,750	166,238	
				Demo All Piping & Equipment From Basins 1-5	5 ea	32.000 ch / ea	640	167.66 /ch	26,825					103.03	515			27,340	43,277	
				Demo Electrical System @ Basins	1 ls			/ls				2,000.00	2,000					2,000	3,035	
				Pressure Washing Basin Walls @ Basin #1	12,647 sf	150.000 sf / ch	169	53.11 /ch	4,478	0.35	4,426			0.52	6,598			15,503	24,307	
				Pressure Washing Basin Slab @ Basin #1	5,518 sf	200.000 sf / ch	55	53.11 /ch	1,465	0.35	1,931			0.39	2,159			5,556	8,687	
				02.01 Demolition Work	1 ls		2,520		98,589	6,357.75	6,358	125,200.00	125,200	78,179.91	78,180			308,326	480,130	
			03.03	Columns																
				Form Rectangle Column Surrounds 28.5' h, 8 ea	2,892 sf	0.165 mh / sf	477	39.49 /mh	18,843	1.60	4,617							23,459	36,830	
				Chamfer	928 lf	0.015 mh / lf	14	39.49 /mh	550	0.57	526							1,076	1,669	
				Strip & Oil Column Form	2,892 sf	0.005 mh / sf	14	39.17 /mh	566	0.03	87							653	1,028	
				Superplasticizers @ Columns	107 cy			/cy		8.40	899							899	1,364	
				Column Rebar (120 #/cy)	6 tn	20.004 mh / tn	128	43.53 /mh	5,590	997.70	6,405							11,995	18,569	
				Finish- Float	101 sf	0.017 mh / sf	2	39.17 /mh	67									67	106	
				Pump Place Columns 8 ea	107 cy	1.600 mh / cy	171	41.39 /mh	7,087					7.50	802			7,889	12,493	
				4000 psi Concrete	107 cy			/cy		142.00	15,194							15,194	23,060	
				Grind/Patch Columns	2,892 sf	0.013 mh / sf	38	39.17 /mh	1,473	0.03	87							1,560	2,463	
				Rub Columns	2,892 sf	0.065 mh / sf	188	39.17 /mh	7,363	0.06	174							7,536	11,916	
				Liquid Curing Compounds	2,892 sf	0.003 mh / sf	9	39.17 /mh	340	0.06	170							510	796	
				03.03 Columns	19 cy		1,041		41,879	1,482.01	28,158			42.21	802			70,839	110,294	
			03.04	Walls																
				Keyway 6"	1,170 lf	0.050 mh / lf	59	39.49 /mh	2,311	0.67	786							3,097	4,850	
				Vertical Wall Keyway 6"	504 lf	0.110 mh / lf	55	39.49 /mh	2,190	0.67	339							2,528	3,980	
				Panel Form System 12-16'	4,973 sf	0.170 mh / sf	845	39.49 /mh	33,384	1.84	9,138							42,521	66,705	
				Panel Form System > 16' h	22,686 sf	0.190 mh / sf	4,311	39.49 /mh	170,241	1.84	41,694							211,935	332,722	

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
			03.05	Slab On Grade																
				Gravel Fill Under Slab 4"	2 cy	0.004 cd / cy	0	1,412.15 /cd	11	29.26	59	-	-	3.84	8	-	-	77	118	
				03.05 Slab On Grade	187 cy		25		1,017	4.28	800			0.10	19			1,836	2,855	
			03.06	Suspended Flat Slab																
				Form-Suspended Slab Bottom	5,697 sf	0.220 mh / sf	1,253	39.49 /mh	49,492	2.18	12,445	-	-	-	-	-	-	61,937	97,219	
				Slab Edge Form 12"	307 sf	0.250 mh / sf	77	39.49 /mh	3,031	5.17	1,588	-	-	-	-	-	-	4,619	7,207	
				Strip & Oil Suspended Slab Forms	6,004 sf	0.005 mh / sf	30	39.17 /mh	1,176	0.04	246	-	-	-	-	-	-	1,422	2,235	
				Superplasticizers	211 cy	-	-	-	-	8.40	1,773	-	-	-	-	-	-	1,773	2,690	
				Rebar- Suspended Slab (225 #/cy)	24 tn	20.004 mh / tn	480	43.53 /mh	20,897	997.70	23,945	-	-	-	-	-	-	44,842	69,416	
				Finish- Hard Trowel	5,697 sf	0.035 mh / sf	199	39.17 /mh	7,810	-	-	-	-	-	-	-	-	7,810	12,361	
				Pump Place Suspended Slab	211 cy	2.160 mh / cy	456	41.39 /mh	18,863	-	-	-	-	6.65	1,404	-	-	20,267	32,090	
				4000 psi Concrete	211 cy	-	-	-	-	142.00	29,962	-	-	-	-	-	-	29,962	45,474	
				Liquid Curing Compounds	11,701 sf	0.003 mh / sf	35	39.17 /mh	1,375	0.68	7,988	-	-	-	-	-	-	9,363	14,299	
				03.06 Suspended Flat Slab	211 cy		2,530		102,645	369.41	77,945			6.65	1,404			181,994	282,991	
			05.01	Misc Metals																
				Aluminum 2 Line Rail @ Basin Walkways	209 lf	0.200 mh / lf	42	38.76 /mh	1,620	32.20	6,730	-	-	-	-	-	-	8,350	12,778	
				05.01 Misc Metals	1 ls		42		1,620	6,729.80	6,730							8,350	12,778	
			31.12	Structure Backfill																
				Engineered Fill @ Basins # 2 thru 5 w/ Engineered Fill 29' deep	20,741 cy	300.000 cy / cd	2,212	1,327.72 /cd	91,794	14.00	290,374	-	-	7.73	160,391	-	-	542,559	841,254	
				31.12 Structure Backfill	20,741 cy		2,212		91,794	14.00	290,374			7.73	160,391			542,559	841,254	
			40.01	Above Ground Process Piping																
				Misc Pipe Work- ALLOWANCE	1 ls	40.000 mh / ls	40	45.62 /mh	1,825	2,000.00	2,000	-	-	-	-	-	-	3,825	5,924	
				40.01 Above Ground Process Piping	1 lf		40		1,825	2,000.00	2,000							3,825	5,924	
			40.04	Hydropneumatic Piping System																
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls	-	45.62 /mh	-	-	-	13,000.00	13,000	-	-	-	-	13,000	19,730	
				40.04 Hydropneumatic Piping System	1 ls							13,000.00	13,000					13,000	19,730	
				47.4 Rehab North Basins #1, 2, 3, 4 & 5	1 ls		17,610		707,597	671,322.08	671,322	138,200.00	138,200	247,006.48	247,006			1,764,126	2,741,664	
		47.5		Ozone Facility																
			03.03	Columns																
				Form Rectangle Columns 12" h	1,536 sf	0.165 mh / sf	253	39.49 /mh	10,008	1.60	2,452	-	-	-	-	-	-	12,460	19,561	
				Chamfer	1,152 lf	0.015 mh / lf	17	39.49 /mh	682	0.57	653	-	-	-	-	-	-	1,336	2,072	
				Strip & Oil Column Form	1,536 sf	0.005 mh / sf	8	39.17 /mh	301	0.03	46	-	-	-	-	-	-	347	546	
				Superplasticizers @ Columns	19 cy	-	-	-	-	8.40	160	-	-	-	-	-	-	160	242	
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	23	43.53 /mh	993	997.70	1,137	-	-	-	-	-	-	2,130	3,297	
				Finish- Float	42 sf	0.017 mh / sf	1	39.17 /mh	28	-	-	-	-	-	-	-	-	28	44	
				Pump Place Columns 24 ea	19 cy	1.600 mh / cy	30	41.39 /mh	1,258	-	-	-	-	7.49	142	-	-	1,401	2,218	
				4000 psi Concrete	19 cy	-	-	-	-	142.00	2,698	-	-	-	-	-	-	2,698	4,095	
				Grind/Patch Columns	1,536 sf	0.013 mh / sf	20	39.17 /mh	782	0.03	46	-	-	-	-	-	-	828	1,308	
				Rub Columns	1,536 sf	0.065 mh / sf	100	39.17 /mh	3,910	0.06	92	-	-	-	-	-	-	4,003	6,329	
				Liquid Curing Compounds	1,536 sf	0.003 mh / sf	5	39.17 /mh	181	0.06	90	-	-	-	-	-	-	271	423	
				03.03 Columns	19 cy		457		18,143	388.16	7,375			7.49	142			25,661	40,135	
			03.05	Slab On Grade																
				Slab Edge Form 28"	715 sf	0.350 mh / sf	250	39.49 /mh	9,884	1.31	939	-	-	-	-	-	-	10,822	17,068	
				Strip & Oil Form	715 sf	0.005 mh / sf	4	39.17 /mh	140	0.03	21	-	-	-	-	-	-	162	254	
				Rebar- SOG (125 #/cy)	12 tn	14.003 mh / tn	168	43.53 /mh	7,314	997.70	11,972	-	-	-	-	-	-	19,286	29,747	
				Mesh Support - bricks (.12/sf)	689 ea	0.002 mh / ea	1	43.53 /mh	60	0.26	181	-	-	-	-	-	-	241	370	
				Finish- Hard Trowel	5,740 sf	0.015 mh / sf	86	39.17 /mh	3,373	-	-	-	-	-	-	-	-	3,373	5,338	
				Pump Place Slab on Grade 8"	142 cy	0.500 mh / cy	71	41.39 /mh	2,939	-	-	-	-	3.67	521	-	-	3,460	5,481	
				Pump Place Thickened Slab 28" x 20"	45 cy	0.500 mh / cy	23	41.39 /mh	931	-	-	-	-	3.67	165	-	-	1,097	1,737	
				4000 psi Concrete	187 cy	-	-	-	-	142.00	26,554	-	-	-	-	-	-	26,554	40,301	
				Saw Cut S-Q-G (.08/sf)	459 lf	0.030 mh / lf	14	39.17 /mh	539	0.17	78	-	-	0.95	437	-	-	1,054	1,668	
				Liquid Curing Compounds	6,455 sf	0.002 mh / sf	13	39.17 /mh	506	0.06	380	-	-	-	-	-	-	885	1,377	
				Seal Floors	5,740 sf	0.002 mh / sf	11	39.17 /mh	450	0.09	530	-	-	-	-	-	-	980	1,517	
				6 Mil. Vapor Barrier	16,300 sf	0.002 mh / sf	33	43.53 /mh	1,419	0.05	856	-	-	-	-	-	-	2,275	3,545	
				Gravel Fill Under Slab 4"	70 cy	0.004 cd / cy	8	1,412.15 /cd	375	29.26	2,048	-	-	3.84	269	-	-	2,691	4,129	
				03.05 Slab On Grade	187 cy		682		27,930	232.94	43,559			7.44	1,392			72,882	112,532	
			03.07	Suspended Beams																
				Beam Side Forms	2,932 sf	0.210 mh / sf	616	39.49 /mh	24,318	2.21	6,466	-	-	-	-	-	-	30,785	48,303	
				Beam Bottom Forms	975 sf	0.210 mh / sf	205	39.49 /mh	8,087	2.21	2,150	-	-	-	-	-	-	10,237	16,063	
				Chamfer	1,466 lf	0.015 mh / lf	22	39.49 /mh	869	0.57	831	-	-	-	-	-	-	1,700	2,636	
				Strip & Oil Beam Forms	3,907 sf	0.005 mh / sf	20	39.17 /mh	765	0.03	117	-	-	-	-	-	-	883	1,389	
				Superplasticizers @ Beams	72 cy	-	-	-	-	8.40	605	-	-	-	-	-	-	605	918	
				Rebar- Beams (250 #/cy)	9 tn	15.003 mh / tn	135	43.53 /mh	5,877	997.70	8,979	-	-	-	-	-	-	14,857	22,930	
				Finish- Top of Beam	975 sf	0.008 mh / sf	8	39.17 /mh	306	-	-	-	-	-	-	-	-	306	484	
				Pump Place Beams @ Roof	72 cy	2.001 mh / cy	144	41.39 /mh	5,963	-	-	-	-	14.42	1,038	-	-	7,001	11,090	
				4000 psi Concrete	72 cy	-	-	-	-	142.00	10,224	-	-	-	-	-	-	10,224	15,517	
				Grind/Patch Beams	3,907 sf	0.013 mh / sf	51	39.17 /mh	1,990	0.03	117	-	-	-	-	-	-	2,107	3,327	
				Rub Beams	3,907 sf	0.085 mh / sf	332	39.17 /mh	13,007	0.06	234	-	-	-	-	-	-	13,242	20,942	
				Liquid Curing Compounds	3,907 sf	0.002 mh / sf	8	39.17 /mh	306	0.06	230	-	-	-	-	-	-	536	833	
				03.07 Suspended Beams	72 cy		1,540		61,488	416.04	29,955									

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount		
			43.10	Ozone Equipment																	
				Blower Silencer	2 ea			/ea													
				Catalytic Chamber	2 ea			/ea													
				Cooling Water Pump	2 ea			/ea													
				Cooling Water Skid / Heat X-Changer 10' x 5.67'	2 ea			/ea													
				Cooling Water Supply Pumps	3 ea			/ea													
				Demister	2 ea			/ea													
				Eductor	2 ea			/ea													
				Filter	2 ea			/ea													
				Heater	3 ea			/ea													
				Ozone Diffuser	2 ea			/ea													
				Ozone Generator Skid 17' x 6.5'	2 ea			/ea													
				Ozone Injection Manifold 8" x 10.75' long	1 ea			/ea													
				Ozone Injection Water Supply Pumps	4 ea			/ea													
				Ozone Quench Manifold 30" x 11' long	2 ea			/ea													
				Particulate Filter	1 ea			/ea													
				43.10 Ozone Equipment	1 ls		3,575		118,706	500.00	500			31,005.98	31,006	3,301,500.00	3,301,500	3,451,712	5,248,722		
				47.5 Ozone Facility	6,168 gsf		9,127		326,505	50.37	310,707		109.39		674,736	6.68	41,216	535.26	3,301,500	4,654,664	7,088,721
		47.6		LOX Equipment																	
			03.05	Slab On Grade																	
				S.O.G. Edge Form 8"	118 sf	0.240 mh / sf	28	39.49 /mh	1,118	1.22	144	-	-	-	-	-	-	1,262	1,988		
				Strip & Oil Form	118 sf	0.005 mh / sf	1	39.17 /mh	23	0.03	4	-	-	-	-	-	-	27	42		
				Rebar- SOG (125 #/cy)	2 tn	14.003 mh / tn	32	43.53 /mh	1,371	997.70	2,245	-	-	-	-	-	-	3,616	5,578		
				Mesh Support - bricks (.12/sf)	175 ea	0.002 mh / ea	0	43.53 /mh	15	0.26	46	-	-	-	-	-	-	61	94		
				Finish- Broom	1,462 sf	0.022 mh / sf	32	39.17 /mh	1,260	-	-	-	-	-	-	-	-	-	1,260	1,994	
				Pump Place Slab on Grade 8"	36 cy	0.500 mh / cy	18	41.39 /mh	745	-	-	-	-	3.67	132	-	-	-	877	1,390	
				4000 psi Concrete	36 cy			/cy		142.00	5,112	-	-	-	-	-	-	-	5,112	7,759	
				Saw Cut S-O-G (.08/sf)	117 lf	0.030 mh / lf	4	39.17 /mh	138	0.17	20	-	-	0.95	111	-	-	-	269	425	
				Liquid Curing Compounds	1,580 sf	0.002 mh / sf	3	39.17 /mh	124	0.06	93	-	-	-	-	-	-	-	217	337	
				Seal Floors	1,462 sf	0.002 mh / sf	3	39.17 /mh	115	0.09	135	-	-	-	-	-	-	-	250	386	
				6 Mil. Vapor Barrier	1,600 sf	0.002 mh / sf	3	43.53 /mh	139	0.05	84	-	-	-	-	-	-	-	223	348	
				Gravel Fill Under Slab 4"	18 cy	0.004 cd / cy	2	1,412.15 /cd	96	29.26	527	-	-	3.84	69	-	-	-	692	1,062	
				03.05 Slab On Grade	36 cy		126		5,144	233.57	8,409			8.68	313			13,866	21,402		
			03.08	Pads & Curbs																	
				LOX Tank Pad Form 24"	350 sf	0.180 mh / sf	63	39.49 /mh	2,488	1.37	478	-	-	-	-	-	-	-	2,966	4,663	
				LOX Vaporizer Pad Form 12"	78 sf	0.160 mh / sf	12	39.49 /mh	493	1.37	106	-	-	-	-	-	-	-	599	942	
				Chamfer	191 lf	0.015 mh / lf	3	39.49 /mh	113	0.57	108	-	-	-	-	-	-	-	221	343	
				Strip & Oil Equipment Pad Forms	428 sf	0.005 mh / sf	2	39.17 /mh	84	0.03	13	-	-	-	-	-	-	-	97	152	
				Rebar- Pads (100 #/cy)	1 tn	18.004 mh / tn	18	43.53 /mh	784	997.70	998	-	-	-	-	-	-	-	1,781	2,754	
				Finish- Float	223 sf	0.017 mh / sf	4	39.17 /mh	149	-	-	-	-	-	-	-	-	-	149	235	
				Pump Place Pads 12" & 24"	17 cy	1.600 mh / cy	27	41.39 /mh	1,126	-	-	-	-	7.49	127	-	-	-	1,253	1,985	
				4000 psi Concrete	17 cy			/cy		142.00	2,414	-	-	-	-	-	-	-	2,414	3,664	
				Liquid Curing Compounds	651 sf	0.003 mh / sf	2	39.17 /mh	77	0.06	38	-	-	-	-	-	-	-	115	179	
				03.08 Pads & Curbs	17 cy		131		5,313	244.44	4,155			7.49	127			9,596	14,918		
			26.01	Above Ground Electrical																	
				Electrical Work For Equipment (5% Equipment Cost)	1 ls			/ls				42,977.00		42,977					42,977	65,227	
				26.01 Above Ground Electrical	1 ls							42,977.00		42,977					42,977	65,227	
			26.02	Instrumentation & Controls																	
				Controls & Instrumentation Work For New Equipment (1.5% Equipment Cost)	1 ls			/ls				12,893.00		12,893					12,893	19,568	
				26.02 Instrumentation & Controls	1 ls							12,893.00		12,893					12,893	19,568	
			32.01	Fencing & Gates																	
				8' Chain Link Fence @ LOX Tanks	111 lf			-	-	-	-	31.01		3,442					3,442	5,224	
				8' Fence Vehicle Gate 12' @ LOX Tanks	1 ea			-	-	-	-	1,700.34		1,700					1,700	2,581	
				32.01 Fencing & Gates	1 ls							5,142.02		5,142					5,142	7,804	
			40.00	Under Ground Process Piping																	
				Trench Excav & Lay Pipe 0- 4'	100 lf	600.000 lf / cd	9	2,539.31 /cd	423			-	-	1.88	188				612	970	
				Stone Pipe Bedding	15 cy	200.000 cy / cd	5	2,896.43 /cd	217	23.29	349	-	-	-	-	-	-	-	567	874	
				DI Pipe Push - Class 52 4	100 lf	0.190 mh / lf	19			14.54	1,454	-	-	-	-	-	-	-	1,454	2,207	
				Hydrostatic Testing	100 lf	0.021 ch / lf	8	182.49 /ch	383	0.16	16	-	-	-	-	-	-	-	399	631	
				DI 90 ell 4"	2 ea	4.530 mh / ea	9	30.57 /mh	277	72.90	146	-	-	-	-	-	-	-	423	660	
				40.00 Under Ground Process Piping	100 lf		51		1,301	19.65	1,965			1.88	188				3,454	5,341	
			40.01	Above Ground Process Piping																	
				Paint & Stencil Exposed Piping <20"	113 lf			-	-	-	-	10.00		1,130					1,130	1,715	
				Pipe Supports	5 ea	4.001 mh / ea	20	45.62 /mh	913	250.05	1,250	-	-	-	-	-	-	-	2,163	3,342	
				Hydrostatic Testing	113 lf	0.021 ch / lf	9	182.49 /ch	433	0.16	18	-	-	-	-	-	-	-	451	713	
				Gasket/Nuts/Bolt Kit 3"	10 ea	1.000 mh / ea	10	32.89 /mh	329	4.90	49	-	-	-	-	-	-	-	378	595	
				Gasket/Nuts/Bolt Kit 4"	15 ea	1.000 mh / ea	15	32.89 /mh	493	7.87	118	-	-	-	-	-	-	-	611	960	
				DI Flanged Joint Pipe 3"	50 lf	0.820 mh / lf	41	30.57 /mh	1,253	30.99	1,549	-	-	-	-	-	-	-	2,803	4,335	
				DI Flanged Joint Pipe 4"	63 lf	0.820 mh / lf	52	30.57 /mh	1,579	30.99	1,952	-	-	-	-	-	-	-	3,531	5,462	
				DI Flanged 90 ell 3"	20 ea	1.940 mh / ea	39	30.57 /mh	1,186	55.08	1,102	-	-	-	-	-	-	-	2,288	3,549	
				DI Flanged 90 ell 4"	30 ea	4.530 mh / ea	136	30.57 /mh	4,154	72.90	2,187	-	-	-	-	-	-	-	6,341	9,894	
				DI Flanged Tee 3"	3 ea	1.940 mh / ea	6	30.57 /mh	178	0.04	0	-	-	-	-	-	-	-	178	282	
				DI Flanged Con Red 4x3"	4 ea	4.530 mh / ea	18	30.57 /mh	554	107.52	430	-	-	-	-	-	-	-	984	1,529	
				40.01 Above Ground Process Piping	1 lf		346		11,072	8,655.55	8,656		1,130.23		1,130				20,858	32,376	
			40.02	Valves, Meters, Etc.																	

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				3B Filtration - Rehab Existing & Add Ozone Facility	1 ls		27,591		1,065,272	1,041,664.11	1,041,664	875,078.20	875,078	291,903.83	291,904	4,164,700.00	4,164,700	7,438,618	11,380,492
	3C			Filtration - Install Membranes In Existing Filters															
		47.1		Water Plant Process Rehab @ Filters 21 thru 28															
			02.01	Demolition Work															
				Non-Hazardous Waste Transport and Disposal.	2,058 ton							50.00	102,900					102,900	156,173
				Pressure Washing Basin Walls @ Basins 21 thru 28	14,860 sf	150.00 sf / ch	198	53.11 /ch	5,261	0.35	5,201			0.52	7,753			18,215	28,560
				Pressure Washing Basin Slab @ Basins 21 thru 28	8,288 sf	200.00 sf / ch	83	53.11 /ch	2,201	0.35	2,901			0.39	3,243			8,345	13,047
				Remove Air Header	8 ea	8.000 ch / ea	320	231.62 /ch	14,823	250.00	2,000			1,957.34	15,659			32,482	51,418
				Bag, Transport and Dispose Of Media	24,948 cf	65.867 cf / ch	1,515	163.29 /ch	61,846	0.22	5,544			4.08	101,845			169,235	268,387
				Remove Sand (8,288 sf x 24" deep), 614 cy	16,578 cf	0.033 mh / cf	539	46.32 /mh	24,958					6.12	101,402			126,360	200,885
				Remove Anthracite Media (8,288 sf x 6" deep), 155 cy	4,185 cf	0.033 mh / cf	136	46.32 /mh	6,301					6.12	25,598			31,899	50,712
				Remove Gravel Media (8,288 sf x 6" deep), 155 cy	4,185 cf	0.033 mh / cf	136	46.32 /mh	6,301					6.12	25,598			31,899	50,712
				Remove Underdrain System - Grouted Blocks	8,288 sf	0.180 mh / sf	1,492	46.32 /mh	69,107	1.09	9,055			6.12	50,695			128,857	203,801
				02.01 Demolition Work	1 ls		4,419		190,798	24,701.27	24,701	102,900.00	102,900	331,793.44	331,793			650,192	1,023,696
			03.30	Patch Cracks and Resurface Concrete															
				Patch Cracks & Resurface Walls @ Basins 21-28	14,860 sf	10.000 sf / ch	2,972	53.11 /ch	78,922	0.11	1,618							80,540	127,367
				Patch Cracks & Resurface Walls @ Lower Gallery	6,831 sf	10.000 sf / ch	1,366	53.11 /ch	36,280	0.11	744							37,024	58,549
				Patch Cracks & Resurface Slab @ Basins 21-28	8,288 sf	6.764 sf / ch	2,451	53.11 /ch	65,078	0.07	613							65,691	103,930
				03.30 Patch Cracks and Resurface Concrete	29,979 sf		6,789		180,280	0.10	2,975							183,255	289,847
			09.00	Finishes															
				Pressure Wash Basins 21-28	16 ea	90.000 mh / ea	1,440	40.56 /mh	58,412					701.91	11,231			69,643	110,323
				Clean Basins 21-28	16 ea	30.000 ch / ea	1,440	143.32 /ch	68,794	500.00	8,000			3,597.12	57,554			134,348	212,621
				Clean Lower Gallery Walls For Painting	31,626 sf	150.000 sf / ch	422	53.11 /ch	11,198	0.35	11,069			0.52	16,500			38,767	60,783
				Clean & Prep Pipe For Painting	1,740 lf							6.00	10,440					10,440	15,845
				Paint Lower Gallery Concrete Surfaces	6,831 sf							1.10	7,514					7,514	11,404
				Paint 4" Pipe	0 lf	0.035 mh / lf	0	27.53 /mh	0	1.00	0			4.00	0			0	0
				Paint 6" Pipe	818 lf	0.070 mh / lf	57	27.53 /mh	1,577	0.69	566			4.24	3,467			5,610	8,873
				Paint 12" Pipe	0 lf	0.120 mh / lf	0	27.53 /mh	0	1.00	0			6.00	0			0	0
				Paint 16" Pipe	227 lf	0.140 mh / lf	32	27.53 /mh	875	1.85	419			6.06	1,375			2,669	4,209
				Paint 18" Pipe	96 lf	0.200 mh / lf	19	27.53 /mh	529	2.08	199			6.06	581			1,309	2,064
				Paint 20" Pipe	0 lf	0.300 mh / lf	0	27.53 /mh	0	2.00	0			7.00	0			0	0
				Paint 24" Pipe	0 lf	0.350 mh / lf	0	27.53 /mh	0	3.00	0			7.00	0			0	0
				Paint 30" Pipe	0 lf	0.438 mh / lf	0	27.53 /mh	0	4.00	0			4.00	0			0	0
				Paint 36" Pipe	541 lf	0.525 mh / lf	284	27.53 /mh	7,820	4.15	2,247			4.95	2,676			12,743	20,046
				Paint 42" Pipe	58 lf	0.525 mh / lf	30	27.53 /mh	838	4.85	281			4.95	287			1,406	2,210
				09.00 Finishes	1 ls		3,724		150,043	22,782.62	22,783	17,954.10	17,954	93,670.65	93,671			284,451	448,381
				47.1 Water Plant Process Rehab @ Filters 21 thru 28	1 ls		14,932		521,121	50,458.56	50,459	120,854.10	120,854	425,464.09	425,464			1,117,898	1,761,923
		47.2		Water Plant Process Rehab @ Filters 29 thru 32															
			02.01	Demolition Work															
				Non-Hazardous Waste Transport and Disposal.	2,154 ton							50.00	107,700					107,700	163,458
				Pressure Washing Basin Walls @ Basins 29 thru 36	31,626 sf	150.000 sf / ch	422	53.11 /ch	11,198	0.35	11,069			0.52	16,500			38,767	60,783
				Pressure Washing Basin Slab @ Basins 29 thru 36	20,059 sf	200.000 sf / ch	201	53.11 /ch	5,327	0.35	7,021			0.39	7,849			20,196	31,578
				Remove Air Header	8 ea	8.000 ch / ea	320	231.62 /ch	14,823	250.00	2,000			1,957.34	15,659			32,482	51,418
				Bag, Transport and Dispose Of Media	7,938 cf	65.867 cf / ch	482	163.29 /ch	19,678	0.22	1,764			4.08	32,405			53,848	85,396
				Remove Sand (8704 sf x 24" deep), 645 cy	17,408 cf	0.033 mh / cf	566	46.32 /mh	26,208					6.12	106,479			132,687	210,942
				Remove Anthracite Media (8704 sf x 6" deep), 161 cy	4,352 cf	0.033 mh / cf	141	46.32 /mh	6,552					6.12	26,620			33,172	52,736
				Remove Gravel Media (8704 sf x 6" deep), 161 cy	4,352 cf	0.033 mh / cf	141	46.32 /mh	6,552					6.12	26,620			33,172	52,736
				Remove Underdrain System - Grouted Blocks	8,704 sf	0.180 mh / sf	1,567	46.32 /mh	72,575	1.09	9,510			6.12	53,240			135,325	214,031
				02.01 Demolition Work	1 ls		3,840		162,913	31,363.74	31,364	107,700.00	107,700	285,371.47	285,371			587,348	923,077
			03.30	Patch Cracks and Resurface Concrete															
				Patch Cracks & Resurface Walls @ Only Basins 33 thru 36	7,460 sf	10.000 sf / ch	1,492	53.11 /ch	39,620	0.11	812							40,433	63,941
				Patch Cracks & Resurface Walls @ Lower Gallery Basins 29 thru 36	6,831 sf	10.000 sf / ch	1,366	53.11 /ch	36,280	0.11	744							37,024	58,549
				Patch Cracks & Resurface Slab @ Only Basins 33 thru 36	4,352 sf	6.764 sf / ch	1,287	53.11 /ch	34,172	0.07	322							34,494	54,574
				03.30 Patch Cracks and Resurface Concrete	18,643 sf		4,145		110,073	0.10	1,878							111,950	177,064
			09.00	Finishes															
				Pressure Wash Basins 29 thru 36	16 flt	90.000 mh / flt	1,440	40.56 /mh	58,412					701.91	11,231			69,643	110,323
				Clean Tank	16 flt	30.000 ch / flt	1,440	143.32 /ch	68,794	500.00	8,000			3,597.12	57,554			134,348	212,621
				Clean Basins 29 thru 36	16 flt	30.000 ch / flt	1,440	143.32 /ch	68,794	500.00	8,000			3,597.12	57,554			134,348	212,621
				Clean Lower Gallery Walls For Painting	31,626 sf	150.000 sf / ch	422	53.11 /ch	11,198	0.35	11,069			0.52	16,500			38,767	60,783
				Clean & Prep Pipe For Painting	1,740 lf							6.00	10,440					10,440	15,845
				Paint Lower Gallery Concrete Surfaces	6,831 sf							1.10	7,514					7,514	11,404
				Paint 4" Pipe	52 lf	0.035 mh / lf	2	27.53 /mh	50	0.46	24			4.24	220			295	467
				Paint 6" Pipe	94 lf	0.070 mh / lf	7	27.53 /mh	181	0.69	65			4.24	398			645	1,020
				Paint 12" Pipe	54 lf	0.120 mh / lf	6	27.53 /mh	178	1.39	75			5.65	305			558	882
				Paint 16" Pipe	38 lf	0.140 mh / lf	5	27.53 /mh	146	1.85	70			6.06	230			447	705
				Paint 18" Pipe	0 lf	0.200 mh / lf	0	27.53 /mh	0	2.00	0			6.00	0			0	0
				Paint 20" Pipe	276 lf	0.300 mh / lf	83	27.53 /mh	2,280	2.31	637			7.07	1,950			4,867	7,678

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			23.00	HVAC															
				New HVAC System	44,000 sf			/sf		-	-	20.00	880,000					880,000	1,335,590
				23.00 HVAC	44,000 sf							20.00	880,000					880,000	1,335,590
			26.01	Above Ground Electrical															
				New Lighting System	44,000 sf			/sf				4.00	176,000					176,000	267,118
				New Support For Conduit & Wiring System	44,000 sf			/sf				2.00	88,000					88,000	133,559
				Electrical Work For Equipment (3% Equipment Cost)	1 ls			/ls				540,000.00	540,000					540,000	819,566
				26.01 Above Ground Electrical	1 ls							804,000.00	804,000					804,000	1,220,243
			26.02	Instrumentation & Controls															
				Controls & Instrumentation Work For New Equipment (1% Equipment Cost)	1 ls			/ls				180,000.00	180,000					180,000	273,189
				26.02 Instrumentation & Controls	1 ls							180,000.00	180,000					180,000	273,189
			40.01	Above Ground Process Piping															
				Filtrate 7 Backwash Piping & Valves	1,800 lf	2.200 mh / lf	3,960	30.57 /mh	121,045	136.00	244,800	-	-	-	-	-	-	365,845	563,116
				Cut Holes In Walls For Filtrate 7 Backwash Piping	24 ea			/ea				2,500.00	60,000					60,000	91,063
				40.01 Above Ground Process Piping	1,800 lf		3,960		121,045	136.00	244,800	33.33	60,000					425,845	654,179
			43.11	Membrane Filtration Equipment															
				Filter Equipment Start-Up @ Basins 21-28 & 33-36	12 ea	150.000 ch / ea	12,600	350.77 /ch	631,379	2,500.00	30,000							661,379	1,044,825
				Suez-ZeeWeed Ultrafiltration Membrane System	1 ls			/ls						18,594,595.00			18,594,595	18,594,595	28,221,307
				Install Double Stack Cassette 23' long w/o 112 Modules/Cassette (21-28)	64 ea	9.000 mh / ea	576	30.57 /mh	17,606			-	-	55.00	3,520			21,126	33,468
				Install Double Stack Cassette 18' long w/o 96 Modules/Cassette (33-36)	40 ea	7.000 mh / ea	280	30.57 /mh	8,559			-	-	55.00	2,200			10,759	17,047
				Install 2' x 2' Modules In 104 Cassettes	11,008 ea	1.000 mh / ea	11,008	30.57 /mh	336,479			-	-	6.00	66,048			402,527	637,667
				Install 2' x 2' Modules In 104 Cassettes	11,008 ea	1.000 mh / ea	11,008	30.57 /mh	336,479			-	-	6.00	66,048			402,527	637,667
				Install Membrane Header Piping System @ Each Basin	24 ea	64.000 mh / ea	1,536	30.57 /mh	46,951			-	-	400.00	9,600			56,551	89,588
				Install Air Scour Header Piping System @ Each Basin	24 ea	64.000 mh / ea	1,536	30.57 /mh	46,951			-	-	400.00	9,600			56,551	89,588
				Install Sodium Hypochlorite Dosing System @ Each Basin	24 ea	64.000 mh / ea	1,536	30.57 /mh	46,951			-	-	400.00	9,600			56,551	89,588
				43.11 Membrane Filtration Equipment	1 ls		40,080		1,471,354	30,000.00	30,000			166,616.00	166,616	18,594,595.00	18,594,595	20,262,565	30,860,746
			43.12	Air Scour Blowers															
				Air Scour Blower 200 hp	4 ea	40.000 mh / ea	160	34.45 /mh	5,511			-	-	-	220,000.00		880,000	885,511	1,344,312
				43.12 Air Scour Blowers	1 ls		160		5,511						880,000.00		880,000	885,511	1,344,312
				47.3 Water Plant Building @ Filters 21 thru 36	1 ls		44,200		1,597,910	274,799.99	274,800	2,282,361.50	2,282,362	166,616.00	166,616	19,474,595.00	19,474,595	23,796,283	36,232,149
				3C Filtration - Install Membranes In Existing Filters	1 ls		73,414		2,646,049	469,089.28	469,089	2,528,869.70	2,528,870	1,025,419.45	1,025,419	19,474,595.00	19,474,595	26,144,022	39,926,860
3D			00	Building & Structure Construction															
			03.00	Foundation Mat															
				Keyway 6"	2,842 lf	0.050 mh / lf	142	39.49 /mh	5,612	0.67	1,910	-	-	-	-	-	-	7,523	11,782
				Mat Foundation Edge Form 30"	1,628 sf	0.350 mh / sf	570	39.49 /mh	22,505	1.31	2,137	-	-	-	-	-	-	24,642	38,862
				Mat Foundation Bulkhead Form	1,095 sf	0.350 mh / sf	383	39.49 /mh	15,134	1.52	1,667	-	-	-	-	-	-	16,801	26,483
				Waterstop 6" Flat	2,842 lf	0.110 mh / lf	313	39.18 /mh	12,250	2.10	5,969	-	-	-	-	-	-	18,219	28,448
				Strip & Oil Mat Found. Form	2,723 sf	0.005 mh / sf	14	39.17 /mh	533	0.03	82	-	-	-	-	-	-	615	968
				Rebar- Foundation Mat (100 #/cy)	122 tn	28.006 mh / tn	3,417	43.53 /mh	148,718	997.70	121,719	-	-	-	-	-	-	270,437	420,114
				Rebar Support - bricks (.12/sf)	3,147 ea	0.002 mh / ea	6	43.53 /mh	274	0.26	826	-	-	-	-	-	-	1,100	1,688
				Finish- Hard Trowel	26,221 sf	0.023 mh / sf	603	39.17 /mh	23,626	-	-	-	-	-	-	-	-	23,626	37,393
				Pump Place Mat Foundation 24"	2,428 cy	0.500 mh / cy	1,214	41.39 /mh	50,246	-	-	-	-	4.59	11,140	-	-	61,387	97,256
				4000 psi Concrete	2,428 cy			/cy		142.00	344,776	-	-	-	-	-	-	344,776	523,272
				Liquid Curing Compounds	28,944 sf	0.003 mh / sf	87	39.17 /mh	3,402	0.06	1,702	-	-	-	-	-	-	5,104	7,967
				6 Mil. Vapor Barrier	28,800 sf	0.002 mh / sf	58	43.53 /mh	2,508	0.05	1,512	-	-	-	-	-	-	4,020	6,264
				03.00 Foundation Mat	2,428 cy		6,806		284,807	198.64	482,302			4.59	11,140			778,249	1,200,496
			03.03	Columns															
				Form Rectangle Columns 15'	3,780 sf	0.165 mh / sf	624	39.49 /mh	24,629	1.60	6,034	-	-	-	-	-	-	30,663	48,138
				Chamfer	2,520 lf	0.015 mh / lf	38	39.49 /mh	1,493	0.57	1,429	-	-	-	-	-	-	2,922	4,532
				Strip & Oil Column Form	3,780 sf	0.005 mh / sf	19	39.17 /mh	740	0.03	113	-	-	-	-	-	-	854	1,344
				Superplasticizers @ Columns	53 cy			/cy		8.40	445	-	-	-	-	-	-	445	676
				Column Rebar (120 #/cy)	3 tn	20.004 mh / tn	64	43.53 /mh	2,769	997.70	3,173	-	-	-	-	-	-	5,942	9,198
				Finish- Float	95 sf	0.017 mh / sf	2	39.17 /mh	63	-	-	-	-	-	-	-	-	63	100
				Pump Place Columns 42 ea	53 cy	1.600 mh / cy	85	41.39 /mh	3,510	-	-	-	-	7.49	397	-	-	3,908	6,188
				4000 psi Concrete	53 cy			/cy		142.00	7,526	-	-	-	-	-	-	7,526	11,422
				Grind/Patch Columns	3,780 sf	0.013 mh / sf	49	39.17 /mh	1,925	0.03	113	-	-	-	-	-	-	2,038	3,219
				Rub Columns	3,780 sf	0.065 mh / sf	246	39.17 /mh	9,623	0.06	227	-	-	-	-	-	-	9,850	15,575
				Liquid Curing Compounds	3,780 sf	0.003 mh / sf	11	39.17 /mh	444	0.06	222	-	-	-	-	-	-	667	1,041
				03.03 Columns	53 cy		1,137		45,197	363.83	19,283			7.49	397			64,877	101,433
			03.04	Walls															
				Keyway 6"	7,106 lf	0.050 mh / lf	355	39.49 /mh	14,033	0.67	4,776	-	-	-	-	-	-	18,809	29,459
				Vertical Wall Keyway 6"	1,415 lf	0.110 mh / lf	156	39.49 /mh	6,148	0.67	951	-	-	-	-	-	-	7,099	11,173
				Panel Form System 10' h	1,109 sf	0.150 mh / sf	166	39.49 /mh	6,570	1.84	2,038	-	-	-	-	-	-	8,608	13,492
				Panel Form System 20' & 25' h	111,995 sf	0.190 mh / sf	21,283	39.49 /mh	840,435	1.84	205,832	-	-	-	-	-	-	1,046,267	1,642,563
				Waterstop 6" Flat	8,521 lf	0.110 mh / lf	937	39.18 /mh	36,727	2.10	17,898	-	-	-	-	-	-	54,625	85,293
				Strip & Oil Wall Forms	113,104 sf	0.005 mh / sf	566	39.17 /mh	22,154	0.03	3,394	-	-	-	-	-	-	25,548	40,215
				Superplasticizers @ Walls	3,094 cy			/cy		8.40	25,993	-	-	-	-	-	-	25,993	39,450
				Rebar- Walls (125 #/cy)	194 tn	15.003 mh / tn	2,911	43.53 /mh	126,689	997.70	193,554	-	-	-	-	-	-	320,243	494,272

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			03.07	Suspended Beams															
				Beam Side Forms	10,878 sf	0.210 mh / sf	2,285	39.49 /mh	90,224	2.21	23,991	-	-	-	-	-	-	114,214	179,209
				Beam Bottom Forms	3,146 sf	0.210 mh / sf	661	39.49 /mh	26,093	2.21	6,938	-	-	-	-	-	-	33,032	51,829
				Chamfer	4,194 lf	0.015 mh / lf	63	39.49 /mh	2,485	0.57	2,378	-	-	-	-	-	-	4,863	7,542
				Strip & Oil Beam Forms	14,024 sf	0.005 mh / sf	70	39.17 /mh	2,747	0.03	421	-	-	-	-	-	-	3,168	4,986
				Superplasticizers @ Beams	302 cy					8.40	2,537	-	-	-	-	-	-	2,537	3,851
				Rebar- Beams (250 #/cy)	38 tn	15.003 mh / tn	570	43.53 /mh	24,815	997.70	37,913	-	-	-	-	-	-	62,728	96,816
				Finish- Top of Beam	3,145 sf	0.008 mh / sf	25	39.17 /mh	986	-	-	-	-	-	-	-	-	986	1,560
				Pump Place Beams @ Roof	302 cy	2.001 mh / cy	604	41.39 /mh	25,011	-	-	-	-	14.42	4,355	-	-	29,367	46,517
				4000 psi Concrete	302 cy					142.00	42,884	-	-	-	-	-	-	42,884	65,086
				Grind/Patch Beams	14,024 sf	0.013 mh / sf	182	39.17 /mh	7,142	0.03	421	-	-	-	-	-	-	7,563	11,942
				Rub Beams	14,024 sf	0.085 mh / sf	1,192	39.17 /mh	46,689	0.06	841	-	-	-	-	-	-	47,530	75,172
				Liquid Curing Compounds	14,024 sf	0.002 mh / sf	28	39.17 /mh	1,099	0.06	825	-	-	-	-	-	-	1,924	2,991
				03.07 Suspended Beams	302 cy		5,681		227,290	394.53	119,149			14.42	4,355			350,795	547,502
			03.09	Pan Stair Fill															
				Finish Stairs	415 sf	0.055 mh / sf	23	39.17 /mh	894	-	-	-	-	-	-	-	-	894	1,415
				Pump Place Pan Stair Concrete	6 cy	3.001 mh / cy	18	41.39 /mh	745	-	-	-	-	9.17	55	-	-	800	1,267
				3000 psi Concrete	6 cy					138.00	828	-	-	-	-	-	-	828	1,257
				03.09 Pan Stair Fill	6 cy		41		1,639	138.00	828			9.17	55			2,522	3,939
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	25,298 sf	0.020 mh / sf	506	42.24 /mh	21,376	8.80	222,667	-	-	0.35	8,902	-	-	252,945	385,945
				03.20 Precast Planks	25,298 sf		506		21,376	8.80	222,667			0.35	8,902			252,945	385,945
			04.00	Masonry															
				8" CMU + Rigid Insulation Backup To Brick, 20' h	12,093 sf			/sf		-	-	18.00	217,717	-	-	-	-	217,717	330,433
				8" CMU + Rigid Insulation Backup To Brick @ Parapet 3.67' h	2,576 sf			/sf		-	-	18.00	46,368	-	-	-	-	46,368	70,373
				Precast Cap 16" x 4"	644 lf			/lf		-	-	20.00	12,883	-	-	-	-	12,883	19,552
				Brick Veneer @ Block Wall Backup & Concrete Beam	16,601 sf					-	-	9.00	149,439	-	-	-	-	149,439	226,806
				04.00 Masonry	16,601 sf							25.69	426,407					426,407	647,164
			05.01	Misc Metals															
				Metal Stairs Concrete Pans	132 rs	0.067 mh / rs	9	42.08 /mh	370	80.02	10,562	-	-	-	-	-	-	10,933	16,617
				Metal Stair Landing Concrete Pans	8 ea	4.000 mh / ea	32	42.08 /mh	1,347	800.00	6,400	-	-	-	-	-	-	7,747	11,845
				Alum Stair Wall Handrail	112 lf	0.150 mh / lf	17	42.08 /mh	707	16.80	1,882	-	-	-	-	-	-	2,589	3,975
				Aluminum 3 Line Rail @ Basins	1,512 lf	0.234 mh / lf	354	42.08 /mh	14,892	44.11	66,693	-	-	-	-	-	-	81,585	124,790
				Aluminum Handrail @ Pan Stairs	112 lf	0.234 mh / lf	26	42.08 /mh	1,103	44.11	4,940	-	-	-	-	-	-	6,043	9,244
				Alum Grate Cover .75" @ 4'x4' Sump	12 ea	0.600 mh / ea	7	42.08 /mh	303	185.04	2,220	-	-	-	-	-	-	2,523	3,850
				Aluminum Hatch & Frame Over Pipe Gallery 6.33' x 6.33'	12 ea	8.002 mh / ea	96	39.18 /mh	3,762	5,001.00	60,012	-	-	-	-	-	-	63,774	97,035
				05.01 Misc Metals	1 ls		541		22,484	152,709.28	152,709							175,193	267,355
			06.00	Wood															
				Misc Nailers & Blocking	26,076 sf	0.010 mh / sf	261	39.67 /mh	10,347	0.40	10,465	-	-	-	-	-	-	20,812	32,259
				06.00 Wood	1 ls		261		10,347	10,465.09	10,465							20,812	32,259
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	1,494 lf			/lf				4.00	5,977	-	-	-	-	5,977	9,072
				Caulking @ Masonry Wall Joints- Interior	1,494 lf			/lf				4.00	5,977	-	-	-	-	5,977	9,072
				07.00 Moisture Protection	1 ls							11,954.41	11,954					11,954	18,143
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	26,076 sf			/sf				3.00	78,244	-	-	-	-	78,244	118,752
				Aluminum Downspouts, 14 ea	280 lf			/lf				18.00	5,041	-	-	-	-	5,041	7,651
				Scuppers	14 ea			/ea				50.01	700	-	-	-	-	700	1,063
				Aluminum Coping @ Roof Parapet 12" wide	650 lf			/lf				15.00	9,752	-	-	-	-	9,752	14,801
				Roof Hatch 4'0" x 4'0"	1 ea			/ea				2,200.44	2,200	-	-	-	-	2,200	3,340
				07.01 Roofing	26,076 sf							3.68	95,937					95,937	145,605
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7'	8 ea	1.000 mh / ea	8	39.18 /mh	313	180.04	1,440	-	-	-	-	-	-	1,754	2,682
				HM Door Leafs- 3'x7' 20 ga. half glass	8 ea	1.500 ea / mh	5	39.18 /mh	209	450.09	3,601	-	-	-	-	-	-	3,810	5,796
				Finish Hardware by Leaf- Allowance	8 ea	8.002 mh / ea	64	39.18 /mh	2,508	900.18	7,201	-	-	-	-	-	-	9,709	14,899
				08.00 Doors, Frames & Hardware	8 ea		77		3,030	1,530.31	12,242							15,273	23,376
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	8 ea			/ea		-	-	100.02	800	-	-	-	-	800	1,214
				Paint HM Doors - primer (2) coats	8 ea			/ea		-	-	140.03	1,120	-	-	-	-	1,120	1,700
				Paint CMU Block - block filler & (2) coat	12,093 sf					-	-	1.35	16,326	-	-	-	-	16,326	24,778
				Paint 12" Pipe	400 lf	0.120 mh / lf	48	27.53 /mh	1,322	1.39	554	-	-	5.65	2,261	-	-	4,136	6,530
				Paint 16" Pipe	77 lf	0.140 mh / lf	11	27.53 /mh	297	1.85	142	-	-	6.06	466	-	-	905	1,428
				Paint 18" Pipe	12 lf	0.200 mh / lf	2	27.53 /mh	66	2.08	25	-	-	6.06	73	-	-	164	258
				Paint 20" Pipe	17 lf	0.300 mh / lf	5	27.53 /mh	140	2.31	39	-	-	7.07	120	-	-	300	473
				Paint 24" Pipe	960 lf	0.350 mh / lf	336	27.53 /mh	9,251	2.77	2,659	-	-	7.07	6,782	-	-	18,692	29,471
				Paint 36" Pipe	666 lf	0.525 mh / lf	350	27.53 /mh	9,627	4.15	2,767	-	-	4.95	3,294	-	-	15,687	24,678
				Paint 48" Pipe	303 lf	0.525 mh / lf	159	27.53 /mh	4,380	5.54	1,678	-	-	4.95	1,498	-	-	7,557	11,864
				09.00 Finishes	1 ls		911		25,083	7,863.94	7,864	18,245.93	18,246	14,494.42	14,494			65,687	102,395
			10.00	Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	8 ea			/ea				30.01	240	-	-	-	-	240	364
				Fire Extinguisher CO2 10 lbs															

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			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls			-	-			15,003.00	15,003					15,003	22,770
				Structure Sheeting (700' x 36' deep)	25,200 sf	0.001 cd / sf	1,242	2,465.38 /cd	47,851	16.00	403,280			0.75	18,952			470,084	717,962
				Tie Backs (1 per 80 sf of Sheeting, 700' x 28'= 19,600 sf)	245 ea			-	-			2,377.48	582,481					582,481	884,041
				31.03 Excavation Shoring	25,200 sf		1,242		47,851	16.00	403,280	23.71	597,484	0.75	18,952			1,067,568	1,624,773
			31.10	Structure Excavation															
				Exc Clay-Backhoe/Truck (30,336 sf x 28')	31,460 cy	499.900 cy / cd	2,266	1,410.06 /cd	88,738						6.58			295,872	470,103
				31.10 Structure Excavation	31,460 cy		2,266		88,738						6.58			295,872	470,103
			31.12	Structure Backfill															
				BackFill Earth-Backhoe/Truck	4,358 cy	495.000 cy / cd	282	1,327.72 /cd	11,689						4.69			32,114	51,007
				31.12 Structure Backfill	4,358 cy		282		11,689						4.69			32,114	51,007
			31.13	Soil Disposal															
				Spoils to Waste	27,102 cy	0.003 day / cy	2,440	1,410.06 /day	95,557						8.23			318,607	506,228
				31.13 Soil Disposal	27,102 cy		2,440		95,557						8.23			318,607	506,228
			31.20	Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 26,400 sf x 6"	489 cy	0.003 cd / cy	59	1,609.56 /cd	2,385	28.28	13,829			10.02	4,898			21,112	32,559
				31.20 Structure Stone Base	489 cy		59		2,385	28.28	13,829			10.02	4,898			21,112	32,559
				00 Building & Structure Construction	26,076 gsf		68,859		2,751,011	111.20	2,899,758	91.84	2,394,790	26.46	689,924			8,735,482	13,487,710
		26		Electrical & Instrumentation															
			26.00	UG Electrical															
				UG Electrical System	25,300 sf			/sf				16.00						404,881	614,494
				26.00 UG Electrical	1 ls							404,880.81	404,881					404,881	614,494
			26.01	Above Ground Electrical															
				Building Electrical Systems	25,300 sf			/sf				4.00						101,200	153,593
				Electrical Work For Equipment (5% Equipment Cost)	1 ls			/ls				109,719.00	109,719					109,719	166,522
				26.01 Above Ground Electrical	1 ls							210,919.00	210,919					210,919	320,115
			26.02	Instrumentation & Controls															
				Controls & Instrumentation Work For New Equipment (1.5 % Equipment Cost)	1 ls			/ls				34,830.00	34,830					34,830	52,862
				26.02 Instrumentation & Controls	1 ls							34,830.00	34,830					34,830	52,862
				26 Electrical & Instrumentation	1 ls							650,629.81	650,630					650,630	987,471
		40		Process Piping															
			40.00	Under Ground Process Piping															
				Trench Excav & Lay Pipe 0- 4'	920 lf	600.000 lf / cd	86	2,539.31 /cd	3,894						1.88			1,733	8,921
				Stone Pipe Bedding	136 cy	199.900 cy / cd	49	2,896.43 /cd	1,971	23.29	3,168								5,138
				DI Pipe Push - Class 52 30	794 lf	0.440 mh / lf	349	51.34 /mh	17,936	167.28	132,818								150,754
				DI Pipe Push - Class 52 48	126 lf	0.640 mh / lf	81			365.30	46,028								46,028
				Hydrostatic Testing	920 lf	0.021 ch / lf	77	182.49 /ch	3,527	0.16	147								3,674
				40.00 Under Ground Process Piping	920 lf		642		27,326	198.00	182,161				1.88			1,733	211,220
			40.01	Above Ground Process Piping															
				Paint & Stencil Exposed Piping <20"	489 lf			-	-			10.00	4,891					4,891	7,423
				Paint & Stencil Exposed Piping >20"	1,946 lf			-	-			25.01	48,660					48,660	73,852
				Pipe Supports	60 ea	4.001 mh / ea	240	45.62 /mh	10,951	250.05	15,003							25,954	40,103
				Hydrostatic Testing	2,435 lf	0.021 ch / lf	205	182.49 /ch	9,333	0.16	390							9,723	15,363
				Dresser Couplings 48"	12 ea	27.200 mh / ea	326	40.79 /mh	13,313	2,400.00	28,800							42,113	64,780
				12" DI Wall Thimble 24" long	12 ea	1.250 ch / ea	60	182.49 /ch	2,737	430.09	5,161			301.00	3,612			11,510	17,914
				24" DI Wall Thimble 24" long	24 ea	2.501 ch / ea	240	182.49 /ch	10,951	860.17	20,644			602.12	14,451			46,046	71,664
				30" DI Wall Thimble 24" long	7 ea	3.751 ch / ea	105	182.49 /ch	4,792	1,100.21	7,701			900.35	6,302			18,796	29,303
				36" DI Wall Thimble 24" long	4 ea	5.001 ch / ea	80	182.49 /ch	3,650	1,286.26	5,145			1,200.24	4,801			13,596	21,227
				48" DI Wall Thimble 24" long	2 ea	6.700 ch / ea	54	182.49 /ch	2,445	1,715.00	3,430			1,600.00	3,200			9,075	14,169
				Gasket/Nuts/Bolt Kit 12"	40 ea	1.000 mh / ea	40	45.62 /mh	1,825	45.01	1,800							3,626	5,621
				Gasket/Nuts/Bolt Kit 16"	8 ea	1.000 mh / ea	8	32.89 /mh	263	46.64	373							636	983
				Gasket/Nuts/Bolt Kit 18"	1 ea	1.000 mh / ea	1	32.89 /mh	33	63.09	63							96	148
				Gasket/Nuts/Bolt Kit 20"	2 ea	1.000 mh / ea	2	32.89 /mh	66	94.52	189							255	391
				Gasket/Nuts/Bolt Kit 24"	80 ea	2.000 mh / ea	160	45.62 /mh	7,301	129.48	10,358							17,659	27,276
				Gasket/Nuts/Bolt Kit 36"	56 ea	3.001 mh / ea	168	45.62 /mh	7,666	225.05	12,603							20,269	31,260
				Gasket/Nuts/Bolt Kit 48"	26 ea	1.000 mh / ea	26	32.89 /mh	855	425.00	11,050							11,905	18,124
				DI Flanged Joint Pipe 12"	400 lf	1.890 mh / lf	756	45.62 /mh	34,497	112.94	45,176							79,673	123,163
				DI Flanged Joint Pipe 16"	77 lf	2.170 mh / lf	167	30.57 /mh	5,107	162.43	12,507							17,614	27,066
				DI Flanged Joint Pipe 18"	12 lf	2.270 mh / lf	27	30.57 /mh	833	183.93	2,207							3,040	4,668
				DI Flanged Joint Pipe 20"	17 lf	2.490 mh / lf	42	30.57 /mh	1,294	211.50	3,595							4,889	7,505
				DI Flanged Joint Pipe 24"	960 lf	2.671 mh / lf	2,564	45.62 /mh	116,962	267.89	257,171							374,133	575,430
				DI Flanged Joint Pipe 36"	666 lf	3.471 mh / lf	2,311	45.62 /mh	105,454	426.62	284,130							389,585	598,133
				DI Flanged Joint Pipe 48"	303 lf	4.370 mh / lf	1,324	30.57 /mh	40,474	711.54	215,597							256,071	391,274
				DI Flanged 90 ell 12"	12 ea	11.012 mh / ea	132	45.62 /mh	6,029	380.78	4,569							10,598	16,477
				DI Flanged 90 ell 16"	24 ea	12.680 mh / ea	304	30.57 /mh	9,302	599.40	14,386							23,688	36,556
				DI Flanged 90 ell 24"	28 ea	15.733 mh / ea	441	45.62 /mh	20,098	1,458.29	40,832							60,930	93,781
				DI Flanged 90 ell 30"	27 ea	17.870 mh / ea	482	30.57 /mh	14,748	2,316.60	62,548							77,296	118,273
				DI Flanged 90 ell 48"	1 ea	25.710 mh / ea	26	30.57 /mh	786	6,633.90	6,634							7,420	11,312
				DI Flanged Tee 12"	6 ea	11.012 mh / ea	66	45.62 /mh	3,014	777.86	4,667							7,682	11,854
				DI Flanged Tee 16"	6 ea	12.680 mh / ea	76	30.57 /mh	2,326	0.00	0							2,326	3,681
				DI Flanged Tee 24"	26 ea	15.733 mh / ea	409	45.62 /mh	1										

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				40.04 Hydropneumatic Piping System	1 ls							64,000.00	64,000					64,000	97,134	
				40 Process Piping	3,355 lf		14,280		592,521	990.94	3,324,605	35.04	117,551	10.16	34,099			4,068,775	6,216,274	
		41		Material Handling & Process Equipment																
		41.22		Hoists & Cranes																
				Monorail 3 ton 28 ft span, 87 ft runway beam	1 ea											120,000.00	120,000	120,000	182,126	
				5 -ton Jib Crane	1 ea	32.000 mh / ea	32	47.77 /mh	1,529							25,000.00	25,000	26,529	40,362	
				41.22 Hoists & Cranes			32		1,529									146,529	222,488	
				41 Material Handling & Process Equipment	1 ls		32		1,529							145,000.00	145,000	146,529	222,488	
		43		Process Equipment																
		43.05		Filtration Equipment																
				Filter Equipment Start-Up	24 ea	150.000 ch / ea	25,200	350.77 /ch	1,262,758	2,500.00	60,000							1,322,758	2,089,649	
				Gravity Filters - Underdrain Blocks, Sand & Anthracite - Purchase	12,696 sf			/sf								172.84	2,194,370	2,194,370	3,330,430	
				Install Gravel Media 6"	6,348 cf	0.033 mh / cf	206	46.32 /mh	9,557					6.36	40,382			49,939	79,394	
				Install Anthracite Media 6"	6,348 cf	0.033 mh / cf	206	46.32 /mh	9,557					6.36	40,382			49,939	79,394	
				New Air Header @ Each Basin	24 ea	16.000 ch / ea	1,920	231.62 /ch	88,940					3,914.67	93,952			182,892	290,293	
				Install Sand Media .45 - .55 mm, 24"	25,392 cf	0.033 mh / cf	825	46.32 /mh	38,228					6.36	161,527			199,755	317,576	
				Install Gravity Filter Bottoms/Blocks	12,696 sf	0.180 mh / sf	2,285	46.32 /mh	105,861	1.09	13,872			15.66	198,803			318,535	504,999	
				43.05 Filtration Equipment	1 ls		30,643		1,514,900	73,871.65	73,872			535,045.63	535,046	2,194,370.37	2,194,370	4,318,188	6,691,736	
				43 Process Equipment	1 ls		30,643		1,514,900	73,871.65	73,872			535,045.63	535,046	2,194,370.37	2,194,370	4,318,188	6,691,736	
				3D Filtration - Construct New Gravity Filters	1 ls		113,814		4,859,961	6,298,234.04	6,298,234	3,162,970.32	3,162,970	1,259,068.51	1,259,069	2,339,370.37	2,339,370	17,919,604	27,605,679	
3E				Filtration - Construct New Gravity Filters & Ozone Facility																
		00		Building & Structure Construction																
		03.00		Foundation Mat																
				Keyway 6"	2,842 lf	0.050 mh / lf	142	39.49 /mh	5,612	0.67	1,910							7,523	11,782	
				Mat Foundation Edge Form 30"	1,628 sf	0.350 mh / sf	570	39.49 /mh	22,505	1.31	2,137							24,642	38,862	
				Mat Foundation Bulkhead Form	1,095 sf	0.350 mh / sf	383	39.49 /mh	15,134	1.52	1,667							16,801	26,483	
				Waterstop 6" Flat	2,842 lf	0.110 mh / lf	313	39.18 /mh	12,250	2.10	5,969							18,219	28,448	
				Strip & Oil Mat Found. Form	2,723 sf	0.005 mh / sf	14	39.17 /mh	533	0.03	82							615	968	
				Rebar- Foundation Mat (100 #/cy)	122 tn	28.006 mh / tn	3,417	43.53 /mh	148,718	997.70	121,719							270,437	420,114	
				Rebar Support - bricks (.12/sf)	3,147 ea	0.002 mh / ea	6	43.53 /mh	274	0.26	826							1,100	1,688	
				Finish- Hard Trowel	26,221 sf	0.023 mh / sf	603	39.17 /mh	23,626										23,626	37,393
				Pump Place Mat Foundation 24"	2,428 cy	0.500 mh / cy	1,214	41.39 /mh	50,246						4.59	11,140			61,387	97,256
				4000 psi Concrete	2,428 cy			/cy		142.00	344,776							344,776	523,272	
				Liquid Curing Compounds	28,944 sf	0.003 mh / sf	87	39.17 /mh	3,402	0.06	1,702							5,104	7,967	
				6 Mil. Vapor Barrier	28,800 sf	0.002 mh / sf	58	43.53 /mh	2,508	0.05	1,512							4,020	6,264	
				03.00 Foundation Mat	2,428 cy		6,806		284,807	198.64	482,302			4.59	11,140			778,249	1,200,496	
		03.03		Columns																
				Form Rectangle Columns 15'	3,780 sf	0.165 mh / sf	624	39.49 /mh	24,629	1.60	6,034							30,663	48,138	
				Chamfer	2,520 lf	0.015 mh / lf	38	39.49 /mh	1,493	0.57	1,429							2,922	4,532	
				Strip & Oil Column Form	3,780 sf	0.005 mh / sf	19	39.17 /mh	740	0.03	113							854	1,344	
				Superplasticizers @ Columns	53 cy			/cy		8.40	445							445	676	
				Column Rebar (120 #/cy)	3 tn	20.004 mh / tn	64	43.53 /mh	2,769	997.70	3,173							5,942	9,198	
				Finish- Float	95 sf	0.017 mh / sf	2	39.17 /mh	63									63	100	
				Pump Place Columns 42 ea	53 cy	1.600 mh / cy	85	41.39 /mh	3,510					7.49	397			3,908	6,188	
				4000 psi Concrete	53 cy			/cy		142.00	7,526							7,526	11,422	
				Grind/Patch Columns	3,780 sf	0.013 mh / sf	49	39.17 /mh	1,925	0.03	113							2,038	3,219	
				Rub Columns	3,780 sf	0.065 mh / sf	246	39.17 /mh	9,623	0.06	227							9,850	15,575	
				Liquid Curing Compounds	3,780 sf	0.003 mh / sf	11	39.17 /mh	444	0.06	222							667	1,041	
				03.03 Columns	53 cy		1,137		45,197	363.83	19,283			7.49	397			64,877	101,433	
		03.04		Walls																
				Keyway 6"	7,106 lf	0.050 mh / lf	355	39.49 /mh	14,033	0.67	4,776							18,809	29,459	
				Vertical Wall Keyway 6"	1,415 lf	0.110 mh / lf	156	39.49 /mh	6,148	0.67	951							7,099	11,173	
				Panel Form System 10' h	1,109 sf	0.150 mh / sf	166	39.49 /mh	6,570	1.84	2,038							8,608	13,492	
				Panel Form System 20' & 25' h	111,995 sf	0.190 mh / sf	21,283	39.49 /mh	840,435	1.84	205,832							1,046,267	1,642,563	
				Waterstop 6" Flat	8,521 lf	0.110 mh / lf	937	39.18 /mh	36,727	2.10	17,898							54,625	85,293	
				Strip & Oil Wall Forms	113,104 sf	0.005 mh / sf	566	39.17 /mh	22,154	0.03	3,394							25,548	40,215	
				Superplasticizers @ Walls	3,094 cy			/cy		8.40	25,993							25,993	39,450	
				Rebar- Walls (125 #/cy)	194 tn	15.003 mh / tn	2,911	43.53 /mh	126,689	997.70	193,554							320,243	494,272	
				Finish- Top of Wall	3,483 sf	0.008 mh / sf	28	39.17 /mh	1,092									1,092	1,728	
				Pump Place Walls 12"	430 cy	1.150 mh / cy	495	41.39 /mh	20,470					6.65	2,861			23,331	36,952	
				Pump Place Walls 18"	2,002 cy	1.150 mh / cy	2,303	41.39 /mh	95,309					6.65	13,312			108,621	172,034	
				Pump Place Walls 24"	662 cy	1.150 mh / cy	761	41.39 /mh	31,515					6.65	4,404			35,919	56,889	
				4000 psi Concrete	3,094 cy			/cy		142.00	439,348							439,348	666,805	
				Grind/Patch Walls	113,104 sf	0.013 mh / sf	1,471	39.17 /mh	57,601	0.03	3,394							60,995	96,317	
				Rub Walls	96,854 sf	0.058 mh / sf	5,618	39.17 /mh	220,022	0.06	5,811							225,833	357,052	
				Liquid Curing Compounds	112 sf	0.002 mh / sf	0	39.17 /mh	9	0.06	7							15	24	
				03.04 Walls	3,094 cy		37,049		1,478,773	291.85	902,995			6.65	20,577			2,402,345	3,743,716	
		03.06		Suspended Flat Slab																
				Form Suspended Slab Bottom	17,177 sf	0.180 mh / sf	3,092	39.49 /mh	122,116	2.18	37,522							159,638	250,222	

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				03.07 Suspended Beams	302 cy		5,681		227,290	394.53	119,149			14.42	4,355			350,795	547,502
			03.09	Pan Stair Fill															
				Finish Stairs	415 sf	0.055 mh / sf	23	39.17 /mh	894	-	-	-	-	-	-	-	-	894	1,415
				Pump Place Pan Stair Concrete	6 cy	3.001 mh / cy	18	41.39 /mh	745	-	-	-	-	9.17	55	-	-	800	1,267
				3000 psi Concrete	6 cy					138.00	828	-	-	-	-	-	-	828	1,257
				03.09 Pan Stair Fill	6 cy		41		1,639	138.00	828			9.17	55			2,522	3,939
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	25,298 sf	0.020 mh / sf	506	42.24 /mh	21,376	8.80	222,667	-	-	0.35	8,902	-	-	252,945	385,945
				03.20 Precast Planks	25,298 sf		506		21,376	8.80	222,667			0.35	8,902			252,945	385,945
			04.00	Masonry															
				8" CMU + Rigid Insulation Backup To Brick, 20' h	12,093 sf			/sf		-	-	18.00	217,717	-	-	-	-	217,717	330,433
				8" CMU + Rigid Insulation Backup To Brick @ Parapet 3.67' h	2,576 sf			/sf		-	-	18.00	46,368	-	-	-	-	46,368	70,373
				Precast Cap 16" x 4"	644 lf			/lf		-	-	20.00	12,883	-	-	-	-	12,883	19,552
				Brick Veneer @ Block Wall Backup & Concrete Beam	16,601 sf					-	-	9.00	149,439	-	-	-	-	149,439	226,806
				04.00 Masonry	16,601 sf							25.69	426,407					426,407	647,164
			05.01	Misc Metals															
				Metal Stairs Concrete Pans	132 rs	0.067 mh / rs	9	42.08 /mh	370	80.02	10,562	-	-	-	-	-	-	10,933	16,617
				Metal Stair Landing Concrete Pans	8 ea	4.000 mh / ea	32	42.08 /mh	1,347	800.00	6,400	-	-	-	-	-	-	7,747	11,845
				Alum Stair Wall Handrail	112 lf	0.150 mh / lf	17	42.08 /mh	707	16.80	1,882	-	-	-	-	-	-	2,589	3,975
				Aluminum 3 Line Rail @ Basins	1,512 lf	0.234 mh / lf	354	42.08 /mh	14,892	44.11	66,693	-	-	-	-	-	-	81,585	124,790
				Aluminum Handrail @ Pan Stairs	112 lf	0.234 mh / lf	26	42.08 /mh	1,103	44.11	4,940	-	-	-	-	-	-	6,043	9,244
				Alum Grate Cover .75" @ 4'x4' Sump	12 ea	0.600 mh / ea	7	42.08 /mh	303	185.04	2,220	-	-	-	-	-	-	2,523	3,850
				Aluminum Hatch & Frame Over Pipe Gallery 6.33' x 6.33'	12 ea	8.002 mh / ea	96	39.18 /mh	3,762	5,001.00	60,012	-	-	-	-	-	-	63,774	97,035
				05.01 Misc Metals	1 ls		541		22,484	152,709.28	152,709							175,193	267,355
			06.00	Wood															
				Misc Nailers & Blocking	26,076 sf	0.010 mh / sf	261	39.67 /mh	10,347	0.40	10,465	-	-	-	-	-	-	20,812	32,259
				06.00 Wood	1 ls		261		10,347	10,465.09	10,465							20,812	32,259
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	1,494 lf			/lf				4.00	5,977	-	-	-	-	5,977	9,072
				Caulking @ Masonry Wall Joints- Interior	1,494 lf			/lf				4.00	5,977	-	-	-	-	5,977	9,072
				07.00 Moisture Protection	1 ls							11,954.41	11,954					11,954	18,143
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	26,076 sf			/sf				3.00	78,244	-	-	-	-	78,244	118,752
				Aluminum Downspouts, 14 ea	280 lf			/lf				18.00	5,041	-	-	-	-	5,041	7,651
				Scuppers	14 ea			/ea				50.01	700	-	-	-	-	700	1,063
				Aluminum Coping @ Roof Parapet 12" wide	650 lf			/lf				15.00	9,752	-	-	-	-	9,752	14,801
				Roof Hatch 4'0" x 4'0"	1 ea			/ea				2,200.44	2,200	-	-	-	-	2,200	3,340
				07.01 Roofing	26,076 sf							3.68	95,937					95,937	145,605
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7'	8 ea	1.000 mh / ea	8	39.18 /mh	313	180.04	1,440	-	-	-	-	-	-	1,754	2,682
				HM Door Leafs- 3'x7' 20 ga. half glass	8 ea	1.500 ea / mh	5	39.18 /mh	209	450.09	3,601	-	-	-	-	-	-	3,810	5,796
				Finish Hardware by Leaf- Allowance	8 ea	8.002 mh / ea	64	39.18 /mh	2,508	900.18	7,201	-	-	-	-	-	-	9,709	14,899
				08.00 Doors, Frames & Hardware	8 ea		77		3,030	1,530.31	12,242							15,273	23,376
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	8 ea			/ea				100.02	800	-	-	-	-	800	1,214
				Paint HM Doors - primer (2) coats	8 ea			/ea				140.03	1,120	-	-	-	-	1,120	1,700
				Paint CMU Block - block filler & (2) coat	12,093 sf							1.35	16,326	-	-	-	-	16,326	24,778
				09.00 Finishes	1 ls							18,245.93	18,246					18,246	27,692
			10.00	Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	8 ea			/ea				30.01	240	-	-	-	-	240	364
				Fire Extinguisher CO2 10 lbs	8 ea			/ea				225.05	1,800	-	-	-	-	1,800	2,732
				10.00 Specialty Items	1 ls							5,041.02	5,041					5,041	7,651
			22.00	Plumbing															
				Plumbing Subcontract	25,300 sf			/sf				4.00	101,220	-	-	-	-	101,220	153,623
				22.00 Plumbing	1 ls							101,220.21	101,220					101,220	153,623
			23.00	HVAC															
				Ventilation & Unit Heater System	25,300 sf			/sf				45.00	1,138,500	-	-	-	-	1,138,500	1,727,919
				23.00 HVAC	25,300 sf							45.00	1,138,500					1,138,500	1,727,919
			31.01	Dewatering															
				Dewatering - Well Point System Installation	1 sys	240.048 ch / sys	960	159.35 /ch	38,251	7,501.50	7,502	-	-	33,599.22	33,599	-	-	79,352	125,400
				Dewatering - Well Point System Monthly Rental	4 mo	13.288 mh / mo	53	39.17 /mh	2,082	5,704.89	22,820	-	-	22,004.39	88,018	-	-	112,919	178,010
				Dewatering - Well Point System Removal	1 sys	60.012 ch / sys	240	159.35 /ch	9,563	2,500.50	2,501	-	-	8,399.94	8,400	-	-	20,463	32,299
				31.01 Dewatering	1 ls		1,253		49,896	32,821.55	32,822			130,016.73	130,017			212,734	335,708
			31.02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 329 ea (1 per 77 sf)	8,225 vf	0.002 cd / vf	921	2,146.97 /cd	35,325	35.16	289,162	-	-	2.58	21,223	-	-	345,710	528,551
				31.02 Piles	329 ea		921		35,325	878.91	289,162			64.51	21,223			345,710	528,551
			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls							15,003.00	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (700' x 36' deep)	25,200 sf	0.001 cd / sf	1,242	2,465.38 /cd	47,851	16.00	403,280	-	-	0.75	18,952	-	-	470,084	717,962
				Tie Backs (1 per 80 sf of Sheeting, 700' x 28' = 19,600 sf)	245 ea							2,377.48	582,481	-	-	-	-	582,481	884,041
				31.03 Excavation Shoring	25,200 sf		1,242		47,851	16.00	403,280	23.71	597,484	0.75	18,952			1,067,568	1,624,773
			31.10	Structure Excavation															
				Exc Clay-Backhoe/Truck (30,336 sf x 28')	31,460 cy	499.900 cy / cd	2,266	1,410.06 /cd	88,738	-	-	-	-						

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			26.00	UG Electrical																
				UG Electrical System	25,300 sf			/sf				16.00	404,881					404,881	614,494	614,494
				26.00 UG Electrical									404,881					404,881	614,494	614,494
			26.01	Above Ground Electrical																
				Building Electrical Systems	25,300 sf			/sf				4.00	101,200					101,200	153,593	153,593
				Electrical Work For Equipment (3% Equipment Cost)	1 ls			/ls				65,820.00	65,820					65,820	99,896	99,896
				26.01 Above Ground Electrical									167,020					167,020	253,489	253,489
			26.02	Instrumentation & Controls																
				Controls & Instrumentation Work For New Equipment (1 % Equipment Cost)	1 ls			/ls				21,944.00	21,944					21,944	33,305	33,305
				26.02 Instrumentation & Controls									21,944					21,944	33,305	33,305
				26 Electrical & Instrumentation	1 ls							593,844.81	593,845					593,845	901,288	901,288
		40		Process Piping																
			40.00	Under Ground Process Piping																
				Trench Excav & Lay Pipe 0- 4'	920 lf	600.000 lf / cd	86	2,539.31 /cd	3,894						1.88	1,733			5,627	8,921
				Stone Pipe Bedding	136 cy	199.900 cy / cd	49	2,896.43 /cd	1,971	23.29	3,168								5,138	7,927
				DI Pipe Push - Class 52 30	794 lf	0.440 mh / lf	349	51.34 /mh	17,936	167.28	132,818								150,754	229,967
				DI Pipe Push - Class 52 48	126 lf	0.640 mh / lf	81	/mh		365.30	46,028								46,028	69,857
				Hydrostatic Testing	920 lf	0.021 ch / lf	77	182.49 /ch	3,527	0.16	147								3,674	5,805
				40.00 Under Ground Process Piping	920 lf		642		27,326	198.00	182,161				1.88	1,733			211,220	322,476
			40.01	Above Ground Process Piping																
				Paint & Stencil Exposed Piping <20"	489 lf							10.00	4,891						4,891	7,423
				Paint & Stencil Exposed Piping >20"	1,946 lf							25.01	48,660						48,660	73,852
				Pipe Supports	60 ea	4.001 mh / ea	240	45.62 /mh	10,951	250.05	15,003								25,954	40,103
				Hydrostatic Testing	2,435 lf	0.021 ch / lf	205	182.49 /ch	9,333	0.16	390								9,723	15,363
				Dresser Couplings 48"	12 ea	27.200 mh / ea	326	40.79 /mh	13,313	2,400.00	28,800								42,113	64,780
				12" DI Wall Thimble 24" long	12 ea	1.250 ch / ea	60	182.49 /ch	2,737	430.09	5,161			301.00	3,612			11,510	17,914	
				24" DI Wall Thimble 24" long	24 ea	2.501 ch / ea	240	182.49 /ch	10,951	860.17	20,644			602.12	14,451			46,046	71,664	
				30" DI Wall Thimble 24" long	7 ea	3.751 ch / ea	105	182.49 /ch	4,792	1,100.21	7,701			900.35	6,302			18,796	29,303	
				36" DI Wall Thimble 24" long	4 ea	5.001 ch / ea	80	182.49 /ch	3,650	1,286.26	5,145			1,200.24	4,801			13,596	21,227	
				48" DI Wall Thimble 24" long	2 ea	6.700 ch / ea	54	182.49 /ch	2,445	1,715.00	3,430			1,600.00	3,200			9,075	14,169	
				Gasket/Nuts/Bolt Kit 12"	40 ea	1.000 mh / ea	40	45.62 /mh	1,825	45.01	1,800							3,626	5,621	
				Gasket/Nuts/Bolt Kit 16"	8 ea	1.000 mh / ea	8	32.89 /mh	263	46.64	373							636	983	
				Gasket/Nuts/Bolt Kit 18"	1 ea	1.000 mh / ea	1	32.89 /mh	33	63.09	63							96	148	
				Gasket/Nuts/Bolt Kit 20"	2 ea	1.000 mh / ea	2	32.89 /mh	66	94.52	189							255	391	
				Gasket/Nuts/Bolt Kit 24"	80 ea	2.000 mh / ea	160	45.62 /mh	7,301	129.48	10,358							17,659	27,276	
				Gasket/Nuts/Bolt Kit 36"	56 ea	3.001 mh / ea	168	45.62 /mh	7,666	225.05	12,603							20,269	31,260	
				Gasket/Nuts/Bolt Kit 48"	26 ea	1.000 mh / ea	26	32.89 /mh	855	425.00	11,050							11,905	18,124	
				DI Flanged Joint Pipe 12"	400 lf	1.890 mh / lf	756	45.62 /mh	34,497	112.94	45,176								79,673	123,163
				DI Flanged Joint Pipe 16"	77 lf	2.170 mh / lf	167	30.57 /mh	5,107	162.43	12,507								17,614	27,066
				DI Flanged Joint Pipe 18"	12 lf	2.270 mh / lf	27	30.57 /mh	833	183.93	2,207								3,040	4,668
				DI Flanged Joint Pipe 20"	17 lf	2.490 mh / lf	42	30.57 /mh	1,294	211.50	3,595								4,889	7,505
				DI Flanged Joint Pipe 24"	960 lf	2.671 mh / lf	2,564	45.62 /mh	116,962	267.89	257,171								374,133	575,430
				DI Flanged Joint Pipe 36"	666 lf	3.471 mh / lf	2,311	45.62 /mh	105,454	426.62	284,130								389,585	598,133
				DI Flanged Joint Pipe 48"	303 lf	4.370 mh / lf	1,324	30.57 /mh	40,474	711.54	215,597								256,071	391,274
				DI Flanged 90 ell 12"	12 ea	11.012 mh / ea	132	45.62 /mh	6,029	380.78	4,569								10,598	16,477
				DI Flanged 90 ell 16"	24 ea	12.680 mh / ea	304	30.57 /mh	9,302	599.40	14,386								23,688	36,556
				DI Flanged 90 ell 24"	28 ea	15.733 mh / ea	441	45.62 /mh	20,098	1,458.29	40,832								60,930	93,781
				DI Flanged 90 ell 30"	27 ea	17.870 mh / ea	482	30.57 /mh	14,748	2,316.60	62,548								77,296	118,273
				DI Flanged 90 ell 48"	1 ea	25.710 mh / ea	26	30.57 /mh	786	6,633.90	6,634								7,420	11,312
				DI Flanged Tee 12"	6 ea	11.012 mh / ea	66	45.62 /mh	3,014	777.86	4,667								7,682	11,854
				DI Flanged Tee 16"	6 ea	12.680 mh / ea	76	30.57 /mh	2,326	0.00	0								2,326	3,681
				DI Flanged Tee 24"	26 ea	15.733 mh / ea	409	45.62 /mh	18,662	2,687.14	69,866								88,528	135,573
				DI Flanged Tee 30"	7 ea	17.874 mh / ea	125	45.62 /mh	5,708	0.00	0								5,708	9,034
				DI Flanged Tee 36"	9 ea	20.524 mh / ea	185	45.62 /mh	8,427	0.00	0								8,427	13,338
				DI Flanged Tee 48"	3 ea	25.710 mh / ea	77	30.57 /mh	2,358	24,816.96	74,451								76,809	116,727
				DI Flanged Cross 48"	6 ea	53.500 mh / ea	321	30.57 /mh	9,812	26,896.80	161,381								171,193	260,460
				DI Flanged Con Red 24x16"	12 ea	15.730 mh / ea	189	30.57 /mh	5,770	1,764.00	21,168								26,938	41,259
				DI Flanged Con Red 48x36"	4 ea	25.710 mh / ea	103	30.57 /mh	3,143	9,912.00	39,648								42,791	65,150
				DI Blind Flange 48"	2 ea	23.590 mh / ea	47	30.57 /mh	1,442	7,186.20	14,372								15,815	24,096
				Chemical Piping & Accessories- ALLOWANCE	1,500 LF	0.240 mh / LF	360	45.62 /mh	16,427	55.01	82,516								98,944	151,236
				40.01 Above Ground Process Piping	2,435 lf		12,250		508,856	632.50	1,540,133	21.99	53,551	13.29	32,366				2,134,906	3,275,645
			40.02	Valves, Meters, Etc.																
				Magnetic Flow Meter - In-line - 24" w/ transmitter	12 ea	26.000 mh / ea	312	43.67 /mh	13,626	12,000.00	144,000								157,626	240,117
				12" Butterfly Valve, 125 lb class, CI Body, Fig. w/ EIM elec actuator NEMA 4	12 ea	9.600 mh / ea	115	30.57 /mh	3,521	13,040.00	156,480								160,001	243,065
				16" Butterfly Valve, 125 lb class, CI Body, Fig. w/ EIM elec actuator NEMA 4	24 ea	12.800 mh / ea	307	30.57 /mh	9,390	17,386.00	417,264								426,654	648,150
				24" Butterfly Valve, 125 lb class, CI Body, Fig. w/ EIM elec actuator NEMA 4	34 ea	19.204 mh / ea	653	45.62 /mh	29,788	26,005.19	884,177								913,965	1,389,075
				36" Butterfly Valve, 75 lb class, CI Body, Fig. w/ EIM elec actuator NEMA 4	0 ea	28.806 mh / ea	0	45.62 /mh	13	39,008.00	390								403	613
				40.02 Valves, Meters, Etc.	1 ls		1,388		56,338	1,602,310.64	1,602,311								1,658,649	2,521,019
			40.04	Hydropneumatic Piping System																

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			03.03	Columns															
				Form Rectangle Columns 12" h	1,536 sf	0.165 mh / sf	253	39.49 /mh	10,008	1.60	2,452	-	-	-	-	-	-	12,460	19,561
				Chamfer	1,152 lf	0.015 mh / lf	17	39.49 /mh	682	0.57	653	-	-	-	-	-	-	1,336	2,072
				Strip & Oil Column Form	1,536 sf	0.005 mh / sf	8	39.17 /mh	301	0.03	46	-	-	-	-	-	-	347	546
				Superplasticizers @ Columns	19 cy	/cy				8.40	160	-	-	-	-	-	-	160	242
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	23	43.53 /mh	993	997.70	1,137	-	-	-	-	-	-	2,130	3,297
				Finish- Float	42 sf	0.017 mh / sf	1	39.17 /mh	28	-	-	-	-	-	-	-	-	28	44
				Pump Place Columns 24 ea	19 cy	1.600 mh / cy	30	41.39 /mh	1,258	-	-	-	-	7.49	142	-	-	1,401	2,218
				4000 psi Concrete	19 cy	/cy				142.00	2,698	-	-	-	-	-	-	2,698	4,095
				Grind/Patch Columns	1,536 sf	0.013 mh / sf	20	39.17 /mh	782	0.03	46	-	-	-	-	-	-	828	1,308
				Rub Columns	1,536 sf	0.065 mh / sf	100	39.17 /mh	3,910	0.06	92	-	-	-	-	-	-	4,003	6,329
				Liquid Curing Compounds	1,536 sf	0.003 mh / sf	5	39.17 /mh	181	0.06	90	-	-	-	-	-	-	271	423
				03.03 Columns	19 cy		457		18,143	388.16	7,375			7.49	142			25,661	40,135
			03.05	Slab On Grade															
				Slab Edge Form 28"	715 sf	0.350 mh / sf	250	39.49 /mh	9,884	1.31	939	-	-	-	-	-	-	10,822	17,068
				Strip & Oil Form	715 sf	0.005 mh / sf	4	39.17 /mh	140	0.03	21	-	-	-	-	-	-	162	254
				Rebar- SOG (125 #/cy)	12 tn	14.003 mh / tn	168	43.53 /mh	7,314	997.70	11,972	-	-	-	-	-	-	19,286	29,747
				Mesh Support - bricks (.12/sf)	689 ea	0.002 mh / ea	1	43.53 /mh	60	0.26	181	-	-	-	-	-	-	241	369
				Finish- Hard Trowel	5,740 sf	0.015 mh / sf	86	39.17 /mh	3,373	-	-	-	-	-	-	-	-	3,373	5,338
				Pump Place Slab on Grade 8"	142 cy	0.500 mh / cy	71	41.39 /mh	2,939	-	-	-	-	3.67	521	-	-	3,460	5,481
				Pump Place Thickened Slab 28" x 20"	45 cy	0.500 mh / cy	23	41.39 /mh	931	-	-	-	-	3.67	165	-	-	1,097	1,737
				4000 psi Concrete	187 cy	/cy				142.00	26,554	-	-	-	-	-	-	26,554	40,301
				Saw Cut S-O-G (.08/sf)	459 lf	0.030 mh / lf	14	39.17 /mh	539	0.17	78	-	-	0.95	437	-	-	1,054	1,668
				Liquid Curing Compounds	6,455 sf	0.002 mh / sf	13	39.17 /mh	506	0.06	380	-	-	-	-	-	-	885	1,377
				Seal Floors	5,740 sf	0.002 mh / sf	11	39.17 /mh	450	0.09	530	-	-	-	-	-	-	980	1,517
				6 Mil. Vapor Barrier	16,300 sf	0.002 mh / sf	33	43.53 /mh	1,419	0.05	856	-	-	-	-	-	-	2,275	3,545
				Gravel Fill Under Slab 4"	70 cy	0.004 cd / cy	8	1,412.15 /cd	375	29.26	2,048	-	-	3.84	269	-	-	2,691	4,129
				03.05 Slab On Grade	187 cy		682		27,930	232.94	43,559			7.44	1,392			72,882	112,532
			03.07	Suspended Beams															
				Beam Side Forms	2,932 sf	0.210 mh / sf	616	39.49 /mh	24,318	2.21	6,466	-	-	-	-	-	-	30,785	48,303
				Beam Bottom Forms	975 sf	0.210 mh / sf	205	39.49 /mh	8,087	2.21	2,150	-	-	-	-	-	-	10,237	16,063
				Chamfer	1,466 lf	0.015 mh / lf	22	39.49 /mh	869	0.57	831	-	-	-	-	-	-	1,700	2,636
				Strip & Oil Beam Forms	3,907 sf	0.005 mh / sf	20	39.17 /mh	765	0.03	117	-	-	-	-	-	-	883	1,389
				Superplasticizers @ Beams	72 cy	/cy				8.40	605	-	-	-	-	-	-	605	918
				Rebar- Beams (250 #/cy)	9 tn	15.003 mh / tn	135	43.53 /mh	5,877	997.70	8,979	-	-	-	-	-	-	14,857	22,930
				Finish- Top of Beam	975 sf	0.008 mh / sf	8	39.17 /mh	306	-	-	-	-	-	-	-	-	306	484
				Pump Place Beams @ Roof	72 cy	2.001 mh / cy	144	41.39 /mh	5,963	-	-	-	-	14.42	1,038	-	-	7,001	11,090
				4000 psi Concrete	72 cy	/cy				142.00	10,224	-	-	-	-	-	-	10,224	15,517
				Grind/Patch Beams	3,907 sf	0.013 mh / sf	51	39.17 /mh	1,990	0.03	117	-	-	-	-	-	-	2,107	3,327
				Rub Beams	3,907 sf	0.085 mh / sf	332	39.17 /mh	13,007	0.06	234	-	-	-	-	-	-	13,242	20,942
				Liquid Curing Compounds	3,907 sf	0.002 mh / sf	8	39.17 /mh	306	0.06	230	-	-	-	-	-	-	536	833
				03.07 Suspended Beams	72 cy		1,540		61,488	416.04	29,955			14.42	1,038			92,481	144,433
			03.08	Pads & Curbs															
				Pad Forms 8" h	264 sf	0.200 mh / sf	53	39.49 /mh	2,085	1.52	402	-	-	-	-	-	-	2,487	3,911
				Chamfer	394 lf	0.015 mh / lf	6	39.49 /mh	233	0.57	223	-	-	-	-	-	-	457	709
				Strip & Oil Equipment Curb Forms	264 sf	0.005 mh / sf	1	39.17 /mh	52	0.03	8	-	-	-	-	-	-	60	94
				Rebar- Pads (100 #/cy)	1 tn	18.004 mh / tn	18	43.53 /mh	784	997.70	998	-	-	-	-	-	-	1,781	2,755
				Finish- Float	669 sf	0.017 mh / sf	11	39.17 /mh	446	-	-	-	-	-	-	-	-	446	705
				Pump Place Pads 8"	17 cy	2.501 mh / cy	43	41.39 /mh	1,759	-	-	-	-	9.86	168	-	-	1,927	3,051
				4000 psi Concrete	17 cy	/cy				142.00	2,414	-	-	-	-	-	-	2,414	3,664
				Liquid Curing Compounds	933 sf	0.003 mh / sf	3	39.17 /mh	110	0.06	55	-	-	-	-	-	-	165	257
				03.08 Pads & Curbs	17 cy		135		5,469	241.17	4,100			9.86	168			9,736	15,145
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4" wide x 10"	5,712 sf	0.020 mh / sf	114	42.24 /mh	4,826	8.80	50,276	-	-	0.35	2,010	-	-	57,112	87,142
				03.20 Precast Planks	5,712 sf		114		4,826	8.80	50,276			0.35	2,010			57,112	87,142
			06.00	Wood															
				PT Roof Blocking @ Top Of Masonry Wall	307 lf	0.035 mh / lf	11	39.67 /mh	426	1.82	559	-	-	-	-	-	-	985	1,522
				06.00 Wood	1 ls		11		426	558.54	559							985	1,522
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	555 lf	/lf						4.00	2,220	-	-	-	-	2,220	3,370
				Caulking @ Masonry Wall Joints- Interior	555 lf	/lf						4.00	2,220	-	-	-	-	2,220	3,370
				07.00 Moisture Protection	1 ls							4,440.88	4,441					4,441	6,740
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	6,168 sf	/sf						3.00	18,508	-	-	-	-	18,508	28,089
				Aluminum Downspouts, 2 ea x 32" each	64 vf	/vf						18.00	1,152	-	-	-	-	1,152	1,749
				Scuppers	2 ea	/ea						50.01	100	-	-	-	-	100	152
				Aluminum Coping @ Roof Parapet 12" wide	313 lf	/lf						15.00	4,696	-	-	-	-	4,696	7,127
				Translucent Panel Skylight Frame & Panels	1,398 sf	/sf						38.01	53,135	-	-	-	-	53,135	80,643
				07.01 Roofing	6,168 sf							12.58	77,590					77,590	117,760
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7'	4 ea	1.000 mh / ea	4	39.18 /mh	157	180.04	720	-	-	-	-	-	-	877	1,341
				HM Door Leafs- 3'x7' 20 ga. half glass	4 ea	1.500 ea / mh	3	39.18 /mh	104	450.09	1,800	-	-	-	-	-	-	1,905	2,89

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				23.00 HVAC	5,740 sf							45.00	258,300					258,300	392,026
		26.00		UG Electrical															
				Building Electrical System	5,956 sf			/sf				16.00	95,315					95,315	144,661
				26.00 UG Electrical	1 ls							95,315.03	95,315					95,315	144,661
		26.01		Above Ground Electrical															
				Building Electrical System	5,956 sf			/sf				8.00	47,658					47,658	72,331
				Electrical Work For Equipment (3% Equipment Cost)	1 ls			/ls				99,000.00	99,000					99,000	150,254
				26.01 Above Ground Electrical	1 ls							146,657.51	146,658					146,658	222,584
		26.02		Instrumentation & Controls															
				Controls & Instrumentation Work For New Equipment (1% Equipment Cost)	1 ls			/ls				33,000.00	33,000					33,000	50,085
				26.02 Instrumentation & Controls	1 ls							33,000.00	33,000					33,000	50,085
		40.00		Under Ground Process Piping															
				Trench Excav & Lay Pipe 0'-4'	350 lf	600.000 lf / cd	33	2,539.31 /cd	1,481			-	-	1.88	659			2,141	3,394
				Stone Pipe Bedding	52 cy	200.000 cy / cd	19	2,896.43 /cd	753	23.29	1,211	-	-	-	-			1,964	3,030
				DI Pipe Push - Class 52 8	200 lf	0.250 mh / lf	50	51.34 /mh	2,567	31.86	6,371	-	-	-	-			8,938	13,733
				DI Pipe Push - Class 52 14	150 lf	0.340 mh / lf	51	51.34 /mh	2,618	65.16	9,774	-	-	-	-			12,392	18,978
				Hydrostatic Testing	350 lf	0.021 ch / lf	29	182.49 /ch	1,341	0.16	56	-	-	-	-			1,397	2,208
				DI 90 ell 14"	2 ea	12.060 mh / ea	24	30.57 /mh	737	469.80	940	-	-	-	-			1,677	2,593
				40.00 Under Ground Process Piping	350 lf		206		9,498	52.43	18,352			1.88	659			28,509	43,935
		40.01		Above Ground Process Piping															
				Paint & Stencil Exposed Piping <20"	1,192 lf			-	-			10.00	11,922					11,922	18,095
				Pipe Supports	40 ea	4.001 mh / ea	160	45.62 /mh	7,301	250.05	10,002	-	-	-	-			17,303	26,736
				Hydrostatic Testing	1,192 lf	0.021 ch / lf	100	182.49 /ch	4,569	0.16	191	-	-	-	-			4,760	7,521
				8" DI Wall Thimble 24" long	4 ea	5.001 ch / ea	80	182.49 /ch	3,650	1,286.25	5,145	-	-	1,200.15	4,801			13,596	21,227
				Gasket/Nuts/Bolt Kit 4"	16 ea	1.000 mh / ea	16	32.89 /mh	526	7.87	126	-	-	-	-			652	1,024
				Gasket/Nuts/Bolt Kit 6"	12 ea	1.000 mh / ea	12	32.89 /mh	395	15.87	190	-	-	-	-			585	914
				Gasket/Nuts/Bolt Kit 8"	24 ea	1.000 mh / ea	24	32.89 /mh	789	22.00	528	-	-	-	-			1,317	2,051
				Gasket/Nuts/Bolt Kit 12"	30 ea	1.000 mh / ea	30	32.89 /mh	987	45.00	1,350	-	-	-	-			2,337	3,611
				Gasket/Nuts/Bolt Kit 14"	20 ea	1.000 mh / ea	20	32.89 /mh	658	46.58	932	-	-	-	-			1,589	2,455
				DI Flanged Joint Pipe 4"	188 lf	0.820 mh / lf	154	30.57 /mh	4,712	30.99	5,825	-	-	-	-			10,537	16,299
				DI Flanged Joint Pipe 6"	144 lf	0.900 mh / lf	130	30.57 /mh	3,961	47.39	6,824	-	-	-	-			10,785	16,626
				DI Flanged Joint Pipe 8"	285 lf	0.980 mh / lf	279	30.57 /mh	8,537	67.30	19,180	-	-	-	-			27,718	42,622
				DI Flanged Joint Pipe 12"	350 lf	1.890 mh / lf	662	30.57 /mh	20,220	112.92	39,521	-	-	-	-			59,741	91,984
				DI Flanged Joint Pipe 14"	226 lf	2.050 mh / lf	463	30.57 /mh	14,162	138.18	31,228	-	-	-	-			45,389	69,808
				DI Flanged 90 ell 6"	2 ea	4.830 mh / ea	10	30.57 /mh	295	105.30	211	-	-	-	-			506	787
				DI Flanged 90 ell 14"	4 ea	12.060 mh / ea	48	30.57 /mh	1,475	469.80	1,879	-	-	-	-			3,354	5,186
				DI Flanged Tee 6"	2 ea	4.830 mh / ea	10	30.57 /mh	295	0.02	0	-	-	-	-			295	467
				DI Flanged Tee 8"	4 ea	5.050 mh / ea	20	30.57 /mh	617	313.10	1,252	-	-	-	-			1,870	2,878
				DI Flanged Con Red 12x8"	4 ea	11.010 mh / ea	44	30.57 /mh	1,346	487.20	1,949	-	-	-	-			3,295	5,088
				DI Flanged Con Red 14x8"	2 ea	12.060 mh / ea	24	30.57 /mh	737	588.00	1,176	-	-	-	-			1,913	2,952
				Misc Piping & Accessories- ALLOWANCE	200 LF	0.240 mh / LF	48	45.62 /mh	2,190	55.01	11,002	-	-	-	-			13,192	20,165
				40.01 Above Ground Process Piping	1,192 lf		2,334		77,424	116.20	138,511	10.00	11,922	4.03	4,801			232,658	358,496
		40.02		Valves, Meters, Etc.															
				6" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	4 ea	6.200 mh / ea	25	30.57 /mh	758	2,850.00	11,400	-	-	-	-			12,158	18,502
				Pressure Regulator 8"	2 ea	5.229 mh / ea	10	30.57 /mh	320			-	-	-	-			320	506
				40.02 Valves, Meters, Etc.	1 ls		35		1,078	11,400.00	11,400							12,478	19,008
		40.04		Hydropneumatic Piping System															
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				17,000.00	17,000					17,000	25,801
				40.04 Hydropneumatic Piping System	1 ls							17,000.00	17,000					17,000	25,801
		43.10		Ozone Equipment															
				Freight On Equipment To Jobsite	1 ls														
				Verified Performance Test	1 ls														
				Vendor Verified Performance Test	1 ls			/ls							1,500.00	1,500		1,500	2,277
				Vendor Witnessed, Verified Performance Test	1 ls														
				Equipment Unloading, Setting, Startup & Testing	1 ls	650.000 ch / ls	3,575	182.62 /ch	118,706	500.00	500	-	-	31,005.98	31,006			150,212	237,984
				Ozone System Equipment	1 ls			/ls								3,300,000.00	3,300,000	3,300,000	5,008,461
				Air Compressor & Receiver	1 ea														
				Destruct Units (Blower, Analyzer, Preheater, Destruct Vessel)	2 ea														
				Blower Silencer	2 ea														
				Catalytic Chamber	2 ea														
				Cooling Water Pump	2 ea														
				Cooling Water Skid / Heat X-Changer 10' x 5.67'	2 ea														
				Cooling Water Supply Pumps	3 ea														
				Demister	2 ea														
				Eductor	2 ea														
				Filter	2 ea														
				Heater	3 ea														
				Ozone Diffuser	2 ea														
				Ozone Generator Skid 17' x 6.5'	2 ea														
				Ozone Injection Manifold 8" x 10.75' long	1 ea														
				Ozone Injection Water Supply Pumps	4 ea														
				Ozone Quench Manifold 30" x 11' long	2 ea														
				Particulate Filter	1 ea														
				43.10 Ozone Equipment	1 ls		3,575		118,706	500.00	500			31,005.98	31,006	3,301,500.00	3,301,500	3,451,712	5,248,722
				47.5 Ozone Facility	1 gsf		9,127		326,505	310,707.09	310,707	694,235.95	694,236	41,216.11	41,216	3,301,500.00	3,301,500		

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			03.05	Slab On Grade																
				Saw Cut S-O-G (.08/sf)	117 lf	0.030 mh / lf	4	39.17 /mh	138	0.17	20	-	-	0.95	111	-	-	269	425	
				Liquid Curing Compounds	1,580 sf	0.002 mh / sf	3	39.17 /mh	124	0.06	93	-	-	-	-	-	-	217	337	
				Seal Floors	1,462 sf	0.002 mh / sf	3	39.17 /mh	115	0.09	135	-	-	-	-	-	-	250	386	
				6 Mil. Vapor Barrier	1,600 sf	0.002 mh / sf	3	43.53 /mh	139	0.05	84	-	-	-	-	-	-	223	348	
				Gravel Fill Under Slab 4"	18 cy	0.004 cd / cy	2	1,412.15 /cd	96	29.26	527	-	-	3.84	69	-	-	692	1,062	
				03.05 Slab On Grade	36 cy		126		5,144	233.57	8,409			8.68	313			13,866	21,401	
			03.08	Pads & Curbs																
				LOX Tank Pad Form 24"	350 sf	0.180 mh / sf	63	39.49 /mh	2,488	1.37	478	-	-	-	-	-	-	2,966	4,663	
				LOX Vaporizer Pad Form 12"	78 sf	0.160 mh / sf	12	39.49 /mh	493	1.37	106	-	-	-	-	-	-	599	942	
				Chamfer	191 lf	0.015 mh / lf	3	39.49 /mh	113	0.57	108	-	-	-	-	-	-	221	343	
				Strip & Oil Equipment Pad Forms	428 sf	0.005 mh / sf	2	39.17 /mh	84	0.03	13	-	-	-	-	-	-	97	152	
				Rebar- Pads (100 #/cy)	1 tn	18.004 mh / tn	18	43.53 /mh	784	997.70	998	-	-	-	-	-	-	1,781	2,755	
				Finish- Float	223 sf	0.017 mh / sf	4	39.17 /mh	149	-	-	-	-	-	-	-	-	149	235	
				Pump Place Pads 12" & 24"	17 cy	1.600 mh / cy	27	41.39 /mh	1,126	-	-	-	-	7.49	127	-	-	1,253	1,985	
				4000 psi Concrete	17 cy	/cy				142.00	2,414	-	-	-	-	-	-	2,414	3,664	
				Liquid Curing Compounds	651 sf	0.003 mh / sf	2	39.17 /mh	77	0.06	38	-	-	-	-	-	-	115	179	
				03.08 Pads & Curbs	17 cy		131		5,313	244.44	4,155			7.49	127			9,596	14,918	
			26.01	Above Ground Electrical																
				Electrical Work For Equipment (5% Equipment Cost)	1 ls			/ls				43,160.00	43,160					43,160	65,505	
				26.01 Above Ground Electrical	1 ls							43,160.00	43,160					43,160	65,505	
			26.02	Instrumentation & Controls																
				Controls & Instrumentation Work For New Equipment (1.5% Equipment Cost)	1 ls			/ls				12,948.00	12,948					12,948	19,651	
				26.02 Instrumentation & Controls	1 ls							12,948.00	12,948					12,948	19,651	
			32.01	Fencing & Gates																
				8' Chain Link Fence @ LOX Tanks	111 lf			-	-	-	-	31.01	3,442	-	-	-	-	3,442	5,224	
				8' Fence Vehicle Gate 12' @ LOX Tanks	1 ea			-	-	-	-	1,700.34	1,700	-	-	-	-	1,700	2,581	
				32.01 Fencing & Gates	1 ls							5,142.02	5,142					5,142	7,804	
			40.00	Under Ground Process Piping																
				Trench Excav & Lay Pipe 0- 4'	100 lf	600.000 lf / cd	9	2,539.31 /cd	423			-	-	1.88	188	-	-	612	970	
				Stone Pipe Bedding	15 cy	200.000 cy / cd	5	2,896.43 /cd	217	23.29	349	-	-	-	-	-	-	567	874	
				DI Pipe Push - Class 52 4	200 lf	0.190 mh / lf	38	51.34 /mh	1,951	14.54	2,908	-	-	-	-	-	-	4,859	7,502	
				Hydrostatic Testing	100 lf	0.021 ch / lf	8	182.49 /ch	383	0.16	16	-	-	-	-	-	-	399	631	
				DI 90 ell 4"	2 ea	4.530 mh / ea	9	30.57 /mh	277	72.90	146	-	-	-	-	-	-	423	660	
				40.00 Under Ground Process Piping	100 lf		70		3,252	34.19	3,419			1.88	188			6,859	10,636	
			40.01	Above Ground Process Piping																
				Paint & Stencil Exposed Piping <20"	113 lf			-	-	-	-	10.00	1,130	-	-	-	-	1,130	1,715	
				Pipe Supports	5 ea	4.001 mh / ea	20	45.62 /mh	913	250.05	1,250	-	-	-	-	-	-	2,163	3,342	
				Hydrostatic Testing	113 lf	0.021 ch / lf	9	182.49 /ch	433	0.16	18	-	-	-	-	-	-	451	713	
				Gasket/Nuts/Bolt Kit 3"	10 ea	1.000 mh / ea	10	32.89 /mh	329	4.90	49	-	-	-	-	-	-	378	595	
				Gasket/Nuts/Bolt Kit 4"	15 ea	1.000 mh / ea	15	32.89 /mh	493	7.87	118	-	-	-	-	-	-	611	960	
				DI Flanged Joint Pipe 3"	50 lf	0.820 mh / lf	41	30.57 /mh	1,253	30.99	1,549	-	-	-	-	-	-	2,803	4,335	
				DI Flanged Joint Pipe 4"	63 lf	0.820 mh / lf	52	30.57 /mh	1,579	30.99	1,952	-	-	-	-	-	-	3,531	5,462	
				DI Flanged 90 ell 3"	20 ea	1.940 mh / ea	39	30.57 /mh	1,186	55.08	1,102	-	-	-	-	-	-	2,288	3,549	
				DI Flanged 90 ell 4"	30 ea	4.530 mh / ea	136	30.57 /mh	4,154	72.90	2,187	-	-	-	-	-	-	6,341	9,894	
				DI Flanged Tee 3"	3 ea	1.940 mh / ea	6	30.57 /mh	178	0.04	0	-	-	-	-	-	-	178	282	
				DI Flanged Con Red 4x3"	4 ea	4.530 mh / ea	18	30.57 /mh	554	107.52	430	-	-	-	-	-	-	984	1,529	
				40.01 Above Ground Process Piping	113 lf		346		11,072	76.60	8,656	10.00	1,130					20,858	32,376	
			40.02	Valves, Meters, Etc.																
				3" Butterfly Valve, 125 lb class, CI Body, Flg, w/ EIM elec actuator NEMA 4	8 ea	3.000 mh / ea	24	30.57 /mh	734	1,425.00	11,400	-	-	-	-	-	-	12,134	18,463	
				4" Butterfly Valve, 125 lb class, CI Body, Flg, w/ EIM elec actuator NEMA 4	4 ea	3.500 mh / ea	14	30.57 /mh	428	1,900.00	7,600	-	-	-	-	-	-	8,028	12,121	
				40.02 Valves, Meters, Etc.	1 ls		38		1,162	19,000.00	19,000							20,162	30,675	
			43.17	LOX Equipment																
				Vaporizer 5.67'x5.67'x20' h, 6,000 lbs (Charter/Thermax #SG500)	2 ea	1.000 cd / ea	80	1,783.17 /cd	3,566			-	-	763.23	1,526	209,000.00	418,000	423,093	642,479	
				High Pressure Tank 10,960 gal, 9.5'dia.x34' h, 46,700 lbs (Charter #VS-11000SC)	2 ea	1.000 cd / ea	80	1,783.17 /cd	3,566	2,000.00	4,000	-	-	763.23	1,526	219,000.00	438,000	447,093	678,904	
				LOX Fo.; Station	1 ea	1.000 mh / ea	1	45.65 /mh	46	13,450.00	13,450	-	-	-	-	7,200.00	7,200	20,696	31,413	
				43.17 LOX Equipment	1 ls		161		7,178	17,450.00	17,450			3,052.90	3,053	863,200.00	863,200	890,881	1,352,796	
				47.6 LOX Equipment	1 ls		872		33,121	61,089.04	61,089	62,380.25	62,380	3,681.24	3,681	863,200.00	863,200	1,023,471	1,555,763	
				3E Filtration - Construct New Gravity Filters & Ozone Facility	1 ls		122,902		5,194,504	6,662,166.23	6,662,166	3,862,801.52	3,862,802	1,289,471.44	1,289,471	6,504,070.37	6,504,070	23,513,013	36,118,873	
			00	Building & Structure Construction																
			03.00	Foundation Mat																
				Keyway 6"	1,115 lf	0.050 mh / lf	56	39.49 /mh	2,202	0.67	749	-	-	-	-	-	-	2,951	4,622	
				Mat Foundation Edge Form 30"	1,295 sf	0.350 mh / sf	453	39.49 /mh	17,902	1.31	1,700	-	-	-	-	-	-	19,602	30,913	
				Mat Foundation Bulkhead Form	375 sf	0.350 mh / sf	131	39.49 /mh	5,183	1.52	571	-	-	-	-	-	-	5,754	9,069	
				Waterstop 6" Flat	1,265 lf	0.110 mh / lf	139	39.18 /mh	5,452	2.10	2,657	-	-	-	-	-	-	8,109	12,662	
				Strip & Oil Mat Found. Form	1,670 sf	0.005 mh / sf	8	39.17 /mh	327	0.03	50	-	-	-	-	-	-	377	594	
				Rebar- Foundation Mat (100 #/cy)	66 tn	28.006 mh / tn	1,848	43.53 /mh	80,454	997.70	65,848	-	-	-	-	-	-	146,302	227,275	
				Rebar Support - bricks (.12/sf)	1,695 ea	0.002 mh / ea	3	43.53 /mh	148	0.26	445	-	-	-	-	-	-	593	909	
				Finish- Hard Trowel	14,128 sf	0.023 mh / sf	325	39.17												

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			03.04	Walls															
				Keyway 6"	2,230 lf	0.050 mh / lf	112	39.49 /mh	4,404	0.67	1,499	-	-	-	-	-	-	5,903	9,245
				Vertical Wall Keyway 6"	502 lf	0.110 mh / lf	55	39.49 /mh	2,181	0.67	337	-	-	-	-	-	-	2,518	3,964
				Panel Form System 18" h	40,125 sf	0.190 mh / sf	7,625	39.49 /mh	301,107	1.84	73,744	-	-	-	-	-	-	374,851	588,489
				Waterstop 6" Flat	2,732 lf	0.110 mh / lf	301	39.18 /mh	11,776	2.10	5,738	-	-	-	-	-	-	17,514	27,347
				Strip & Oil Wall Forms	40,125 sf	0.005 mh / sf	201	39.17 /mh	7,859	0.03	1,204	-	-	-	-	-	-	9,063	14,267
				Superplasticizers @ Walls	1,115 cy	/cy				8.40	9,367	-	-	-	-	-	-	9,367	14,217
				Rebar- Walls (125 #/cy)	70 tn	15.003 mh / tn	1,050	43.53 /mh	45,712	997.70	69,839	-	-	-	-	-	-	115,551	178,346
				Finish- Top of Wall	3,345 sf	0.008 mh / sf	27	39.17 /mh	1,048	-	-	-	-	-	-	-	-	1,048	1,659
				Pump Place Walls 18"	1,115 cy	1.150 mh / cy	1,283	41.39 /mh	53,082	-	-	-	-	6.65	7,414	-	-	60,496	95,813
				4000 psi Concrete	1,115 cy					142.00	158,330	-	-	-	-	-	-	158,330	240,300
				Grind/Patch Walls	40,125 sf	0.013 mh / sf	522	39.17 /mh	20,435	0.03	1,204	-	-	-	-	-	-	21,639	34,169
				Rub Walls	31,161 sf	0.058 mh / sf	1,807	39.17 /mh	70,788	0.06	1,870	-	-	-	-	-	-	72,658	114,875
				Liquid Curing Compounds	43,470 sf	0.002 mh / sf	87	39.17 /mh	3,406	0.06	2,557	-	-	-	-	-	-	5,962	9,271
				03.04 Walls	1,115 cy		13,069		521,797	292.10	325,689			6.65	7,414			854,901	1,331,960
			03.05	Slab On Grade															
				Slab Edge Form 28"	172 sf	0.350 mh / sf	60	39.49 /mh	2,378	1.31	226	-	-	-	-	-	-	2,603	4,106
				Rebar- SOG (125 #/cy)	1 tn	14.003 mh / tn	8	43.53 /mh	366	997.70	599	-	-	-	-	-	-	964	1,487
				Mesh Support - bricks (.12/sf)	37 ea	0.002 mh / ea	0	43.53 /mh	3	0.26	10	-	-	-	-	-	-	13	20
				Finish- Hard Trowel	304 sf	0.015 mh / sf	5	39.17 /mh	179	-	-	-	-	-	-	-	-	179	283
				Pump Place Slab on Grade 8" @ Electrical & Blower Room	7 cy	0.500 mh / cy	4	41.39 /mh	145	-	-	-	-	3.67	26	-	-	171	270
				Pump Place Thickened Slab 28" x 20"	2 cy	0.500 mh / cy	1	41.39 /mh	41	-	-	-	-	3.67	7	-	-	49	77
				4000 psi Concrete	9 cy					142.00	1,278	-	-	-	-	-	-	1,278	1,940
				Saw Cut S-O-G (.08/sf)	24 lf	0.030 mh / lf	1	39.17 /mh	28	0.17	4	-	-	0.95	23	-	-	55	87
				Liquid Curing Compounds	476 sf	0.002 mh / sf	1	39.17 /mh	37	0.06	28	-	-	-	-	-	-	65	101
				Seal Floors	304 sf	0.002 mh / sf	1	39.17 /mh	24	0.09	28	-	-	-	-	-	-	52	80
				6 Mil. Vapor Barrier	350 sf	0.002 mh / sf	1	43.53 /mh	30	0.05	18	-	-	-	-	-	-	49	76
				Gravel Fill Under Slab 4"	8 cy	0.004 cd / cy	1	1,412.15 /cd	43	29.26	234	-	-	3.84	31	-	-	308	472
				03.05 Slab On Grade	9 cy		82		3,274	269.41	2,425			9.62	87			5,785	9,000
			03.06	Suspended Flat Slab															
				Form Suspended Slab Bottom	7,342 sf	0.180 mh / sf	1,322	39.49 /mh	52,196	2.18	16,038	-	-	-	-	-	-	68,234	106,953
				Slab Edge Form 12"	1,501 sf	0.250 mh / sf	375	39.49 /mh	14,821	5.17	7,762	-	-	-	-	-	-	22,583	35,237
				Strip & Oil Suspended Slab Forms	8,843 sf	0.005 mh / sf	44	39.17 /mh	1,732	0.04	363	-	-	-	-	-	-	2,095	3,292
				Superplasticizers	272 cy					8.40	2,285	-	-	-	-	-	-	2,285	3,468
				Rebar- Suspended Slab (225 #/cy)	31 tn	20.004 mh / tn	612	43.53 /mh	26,644	997.70	30,530	-	-	-	-	-	-	57,173	88,505
				Finish- Hard Trowel	7,372 sf	0.030 mh / sf	221	39.17 /mh	8,664	-	-	-	-	-	-	-	-	8,664	13,712
				Pump Place Suspended Slab 12"	272 cy	1.800 mh / cy	490	41.39 /mh	20,268	-	-	-	-	6.65	1,810	-	-	22,078	34,959
				4000 psi Concrete	272 cy					142.00	38,624	-	-	-	-	-	-	38,624	58,620
				Liquid Curing Compounds	16,215 sf	0.003 mh / sf	49	39.17 /mh	1,906	0.68	11,069	-	-	-	-	-	-	12,975	19,816
				03.06 Suspended Flat Slab	272 cy		3,113		126,231	392.17	106,670			6.65	1,810			234,710	364,562
			03.07	Suspended Beams															
				Beam Side Forms	6,264 sf	0.210 mh / sf	1,316	39.49 /mh	51,954	2.21	13,815	-	-	-	-	-	-	65,769	103,196
				Beam Bottom Forms	1,814 sf	0.210 mh / sf	381	39.49 /mh	15,046	2.21	4,001	-	-	-	-	-	-	19,046	29,885
				Chamfer	2,418 lf	0.015 mh / lf	36	39.49 /mh	1,433	0.57	1,371	-	-	-	-	-	-	2,804	4,349
				Strip & Oil Beam Forms	8,078 sf	0.005 mh / sf	40	39.17 /mh	1,582	0.03	242	-	-	-	-	-	-	1,825	2,872
				Superplasticizers @ Beams	174 cy					8.40	1,462	-	-	-	-	-	-	1,462	2,219
				Rebar- Beams (250 #/cy)	22 tn	15.003 mh / tn	330	43.53 /mh	14,367	997.70	21,949	-	-	-	-	-	-	36,316	56,051
				Finish- Top of Beam	1,814 sf	0.008 mh / sf	15	39.17 /mh	569	-	-	-	-	-	-	-	-	569	900
				Pump Place Beams @ Roof	174 cy	2.001 mh / cy	348	41.39 /mh	14,411	-	-	-	-	14.42	2,509	-	-	16,920	26,801
				4000 psi Concrete	174 cy					142.00	24,708	-	-	-	-	-	-	24,708	37,500
				Grind/Patch Beams	8,078 sf	0.013 mh / sf	105	39.17 /mh	4,114	0.03	242	-	-	-	-	-	-	4,356	6,879
				Rub Beams	8,078 sf	0.085 mh / sf	687	39.17 /mh	26,893	0.06	485	-	-	-	-	-	-	27,378	43,300
				Liquid Curing Compounds	9,892 sf	0.002 mh / sf	20	39.17 /mh	775	0.06	582	-	-	-	-	-	-	1,357	2,110
				03.07 Suspended Beams	174 cy		3,278		131,143	395.73	68,857			14.42	2,509			202,509	316,061
			03.08	Pads & Curbs															
				Pad Form	1,267 sf	0.120 mh / sf	152	39.49 /mh	6,005	1.37	1,730	-	-	-	-	-	-	7,734	12,129
				Chamfer	447 lf	0.015 mh / lf	7	39.49 /mh	265	0.57	254	-	-	-	-	-	-	518	804
				Strip & Oil Equipment Pad Forms	1,267 sf	0.005 mh / sf	6	39.17 /mh	248	0.03	38	-	-	-	-	-	-	286	450
				Rebar- Pads (100 #/cy)	2 tn	18.003 mh / tn	33	43.53 /mh	1,450	997.70	1,846	-	-	-	-	-	-	3,295	5,096
				Finish- Float	1,444 sf	0.017 mh / sf	25	39.17 /mh	961	-	-	-	-	-	-	-	-	961	1,522
				Pump Place Pads	37 cy	1.601 mh / cy	59	41.39 /mh	2,451	-	-	-	-	7.49	277	-	-	2,728	4,320
				4000 psi Concrete	37 cy					142.00	5,254	-	-	-	-	-	-	5,254	7,974
				Liquid Curing Compounds	2,711 sf	0.003 mh / sf	8	39.17 /mh	319	0.06	159	-	-	-	-	-	-	478	746
				03.08 Pads & Curbs	37 cy		290		11,699	250.82	9,280			7.49	277			21,256	33,042
			03.09	Pan Stair Fill															
				Finish Stairs	415 sf	0.055 mh / sf	23	39.17 /mh	894	-	-	-	-	-	-	-	-	894	1,415
				Pump Place Pan Stair Concrete	6 cy	3.001 mh / cy	18	41.39 /mh	745	-	-	-	-	9.17	55	-	-	800	1,267
				3000 psi Concrete	6 cy					138.00	828	-	-	-	-	-	-	828	1,257
				03.09 Pan Stair Fill	6 cy		41		1,639	138.00	828			9.17	55			2,522	3,939
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	14,596 sf	0.020 mh / sf													

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				06.00 Wood	1 ls		156		6,188	6,259.15	6,259							12,448	19,294
				07.00 Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	1,349 lf			/lf				4.00	5,397	-	-	-	-	5,397	8,191
				Caulking @ Masonry Wall Joints- Interior	1,349 lf			/lf				4.00	5,397	-	-	-	-	5,397	8,191
				07.00 Moisture Protection	1 ls							10,794.17	10,794					10,794	16,382
				07.01 Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	15,395 sf			/sf				3.00	46,194					46,194	70,110
				Aluminum Downspouts, 14 ea	280 lf			/lf				18.00	5,041					5,041	7,651
				Scuppers	14 ea			/ea				50.01	700					700	1,063
				Aluminum Coping @ Roof Parapet 12" wide	645 lf			/lf				15.00	9,677					9,677	14,687
				Roof Hatch 4'0" x 4'0"	1 ea			/ea				2,200.44	2,200					2,200	3,340
				07.01 Roofing	15,395 sf							4.15	63,813					63,813	96,850
				08.00 Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7'	8 ea	1.000 mh / ea	8	39.18 /mh	313	180.04	1,440	-	-	-	-	-	-	1,754	2,682
				HM Double Frames- 16 ga 6'x7'	3 ea	1.500 mh / ea	5	25.39 /mh	114	210.00	630	-	-	-	-	-	-	744	1,137
				HM Door Leafs- 3'x7' 20 ga. half glass	14 ea	1.500 ea / mh	9	39.18 /mh	366	450.09	6,301	-	-	-	-	-	-	6,667	10,142
				Overhead Doors- 10'x10' 24 ga steel manual 1" insulation 26 ga back-up panel	2 ea				-	-	-	2,255.00	4,510	-	-	-	-	4,510	6,845
				Finish Hardware by Leaf- Allowance	14 ea	8.002 mh / ea	112	39.18 /mh	4,389	900.18	12,603	-	-	-	-	-	-	16,991	26,073
				08.00 Doors, Frames & Hardware	16 ea		134		5,182	1,310.88	20,974	281.88	4,510					30,666	46,879
				09.00 Finishes															
				Paint HM Door Frames - primer (2) coats	11 ea			/ea				100.02	1,100	-	-	-	-	1,100	1,670
				Paint HM Doors - primer (2) coats	14 ea			/ea				140.03	1,960	-	-	-	-	1,960	2,975
				Paint CMU Block - block filler & (2) coat	28,958 sf				-	-	-	1.35	39,093	-	-	-	-	39,093	59,333
				Paint 2" Pipe	194 lf	0.035 mh / lf	7	27.53 /mh	187	0.23	45	-	-	2.12	411	-	-	643	1,018
				Paint 6" Pipe	373 lf	0.070 mh / lf	26	27.53 /mh	719	0.69	258	-	-	4.24	1,581	-	-	2,568	4,046
				Paint 12" Pipe	53 lf	0.120 mh / lf	6	27.53 /mh	175	1.39	73	-	-	5.65	300	-	-	548	865
				Paint 16" Pipe	340 lf	0.140 mh / lf	48	27.53 /mh	1,311	1.85	628	-	-	6.06	2,059	-	-	3,997	6,304
				Paint 20" Pipe	0 lf	0.300 mh / lf	0	27.53 /mh	0	2.00	0	-	-	7.00	0	-	-	0	0
				Paint 24" Pipe	203 lf	0.350 mh / lf	71	27.53 /mh	1,956	2.77	562	-	-	7.07	1,434	-	-	3,953	6,232
				Paint 30" Pipe	154 lf	0.438 mh / lf	67	27.53 /mh	1,855	3.46	533	-	-	4.12	635	-	-	3,023	4,755
				Paint 72" Pipe	183 lf	0.525 mh / lf	96	27.53 /mh	2,645	8.31	1,520	-	-	4.95	905	-	-	5,071	7,935
				09.00 Finishes	1 ls		321		8,848	3,619.94	3,620	42,153.90	42,154	7,324.45	7,324			61,946	95,133
				10.00 Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	11 ea			/ea				30.01	330	-	-	-	-	330	501
				Fire Extinguisher CO2 10 lbs	12 ea			/ea				225.05	2,701	-	-	-	-	2,701	4,099
				10.00 Specialty Items	1 ls							6,031.22	6,031					6,031	9,154
				22.00 Plumbing															
				Plumbing Subcontract	15,395 sf			/sf				4.00	61,592					61,592	93,480
				22.00 Plumbing	1 ls							61,592.30	61,592					61,592	93,480
				23.00 HVAC															
				Ventilation & Unit Heater System	15,395 sf			/sf				45.00	692,775					692,775	1,051,435
				23.00 HVAC	15,395 sf							45.00	692,775					692,775	1,051,435
				31.01 Dewatering															
				Dewatering - Well Point System Installation	1 sys	240.048 ch / sys	960	159.35 /ch	38,251	7,501.50	7,502	-	-	33,599.22	33,599	-	-	79,352	125,400
				Dewatering - Well Point System Monthly Rental	4 mo	13.288 mh / mo	53	39.17 /mh	2,082	5,704.89	22,820	-	-	22,004.39	88,018	-	-	112,919	178,010
				Dewatering - Well Point System Removal	1 sys	60.012 ch / sys	240	159.35 /ch	9,563	2,500.50	2,501	-	-	8,399.94	8,400	-	-	20,463	32,299
				31.01 Dewatering	1 ls		1,253		49,896	32,821.55	32,822			130,016.73	130,017			212,734	335,708
				31.02 Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 184 ea (1 per 77 sf)	4,600 vf	0.002 cd / vf	515	2,146.97 /cd	19,756	35.16	161,720	-	-	2.58	11,869	-	-	193,345	295,603
				31.02 Piles	184 ea		515		19,756	878.91	161,720			64.51	11,869			193,345	295,603
				31.03 Excavation Shoring															
				Shoring System Design Engineer	1 ls				-	-	-	15,003.00	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (557' x 28' deep)	15,596 sf	0.001 cd / sf	769	2,465.38 /cd	29,614	16.00	249,586	-	-	0.75	11,729	-	-	290,930	444,339
				Tie Backs (1 per 80 sf of Sheeting, 557' x 21' = 11,697 sf)	146 ea				-	-	-	2,377.48	347,111	-	-	-	-	347,111	526,816
				31.03 Excavation Shoring	15,596 sf		769		29,614	16.00	249,586	23.22	362,114	0.75	11,729			653,044	993,925
				31.10 Structure Excavation															
				Exc Clay-Backhoe/Truck (16,774 sf x 21')	13,047 cy	499.900 cy / cd	940	1,410.06 /cd	36,801	-	-	-	-	6.58	85,902	-	-	122,703	194,960
				31.10 Structure Excavation	13,047 cy		940		36,801					6.58	85,902			122,703	194,960
				31.12 Structure Backfill															
				BackFill Earth-Backhoe/Truck	2,479 cy	495.000 cy / cd	160	1,327.72 /cd	6,649	-	-	-	-	4.69	11,618	-	-	18,268	29,015
				31.12 Structure Backfill	2,479 cy		160		6,649					4.69	11,618			18,268	29,015
				31.13 Soil Disposal															
				Spoils to Waste	10,568 cy	0.003 day / cy	951	1,410.06 /day	37,261	-	-	-	-	8.23	86,975	-	-	124,236	197,396
				31.13 Soil Disposal	10,568 cy		951		37,261					8.23	86,975			124,236	197,396
				31.20 Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 14,128 sf x 6"	262 cy	0.003 cd / cy	32	1,609.56 /cd	1,278	28.28	7,410	-	-	10.02	2,624	-	-	11,312	17,444
				31.20 Structure Stone Base	262 cy		32		1,278	28.28	7,410			10.02	2,624			11,312	17,444
				00 Building & Structure Construction	15,395 gsf		30,172		1,207,659	97.93	1,507,669	115.11	1,772,142	24.14	371,610			4,859,081	7,480,625
				26.00 UG Electrical															
				UG Electrical System	15,395 sf			/sf				16.00	246,369					246,369	373,918

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			40.00	Under Ground Process Piping															
				Hydrostatic Testing	491 lf	0.021 ch / lf	41	182.49 /ch	1,882	0.16	79	-	-	-	-	-	-	1,961	3,098
				40.00 Under Ground Process Piping	491 lf		287		14,075	101.26	49,719			1.88	925			64,719	99,208
			40.01	Above Ground Process Piping															
				Paint & Stencil Exposed Piping <20"	960 lf			-	-	-	-	10.00	9,602	-	-	-	-	9,602	14,573
				Paint & Stencil Exposed Piping >20"	540 lf			-	-	-	-	25.01	13,503	-	-	-	-	13,503	20,493
				Pipe Supports	24 ea	4.001 mh / ea	96	45.62 /mh	4,381	250.05	6,001	-	-	-	-	-	-	10,382	16,041
				Hydrostatic Testing	1,500 lf	0.021 ch / lf	126	182.49 /ch	5,749	0.16	240	-	-	-	-	-	-	5,990	9,464
				Dresser Couplings 42"	6 ea	24.000 mh / ea	144	40.79 /mh	5,873	3,500.00	21,000	-	-	-	-	-	-	26,873	41,168
				Dressler Couplings 72"	18 ea	36.000 mh / ea	648	40.79 /mh	26,429	6,000.00	108,000	-	-	-	-	-	-	134,429	205,743
				12" DI Wall Thimble 24" long	12 ea	1.250 ch / ea	60	182.49 /ch	2,737	430.09	5,161	-	-	301.00	3,612	-	-	11,510	17,914
				16" DI Wall Thimble 24" long	12 ea	1.670 ch / ea	80	182.49 /ch	3,657	575.00	6,900	-	-	402.14	4,826	-	-	15,383	23,940
				20" DI Wall Thimble 24" long	12 ea	2.500 ch / ea	120	182.49 /ch	5,475	733.00	8,796	-	-	900.35	10,804	-	-	25,075	39,210
				24" DI Wall Thimble 24" long	12 ea	2.500 ch / ea	120	182.49 /ch	5,475	860.00	10,320	-	-	1,200.24	14,403	-	-	30,198	47,250
				72" DI Wall Thimble 24" long	2 ea	10.000 ch / ea	80	182.49 /ch	3,650	2,600.00	5,200	-	-	1,600.00	3,200	-	-	12,050	18,762
				Gasket/Nuts/Bolt Kit 6"	38 ea	1.000 mh / ea	38	32.89 /mh	1,250	15.87	603	-	-	-	-	-	-	1,853	2,894
				Gasket/Nuts/Bolt Kit 12"	5 ea	1.000 mh / ea	5	45.62 /mh	228	45.01	225	-	-	-	-	-	-	453	703
				Gasket/Nuts/Bolt Kit 16"	34 ea	1.000 mh / ea	34	32.89 /mh	1,118	46.64	1,586	-	-	-	-	-	-	2,704	4,177
				Gasket/Nuts/Bolt Kit 24"	20 ea	2.000 mh / ea	40	45.62 /mh	1,825	129.48	2,590	-	-	-	-	-	-	4,415	6,819
				Gasket/Nuts/Bolt Kit 30"	16 ea	1.000 mh / ea	16	32.89 /mh	526	175.00	2,800	-	-	-	-	-	-	3,326	5,083
				DI Flanged Joint Pipe 2"	194 lf	0.820 mh / lf	159	30.57 /mh	4,863	30.99	6,011	-	-	-	-	-	-	10,874	16,819
				DI Flanged Joint Pipe 6"	373 lf	0.900 mh / lf	336	30.57 /mh	10,261	47.39	17,675	-	-	-	-	-	-	27,936	43,066
				DI Flanged Joint Pipe 12"	53 lf	1.890 mh / lf	100	45.62 /mh	4,571	112.94	5,986	-	-	-	-	-	-	10,557	16,319
				DI Flanged Joint Pipe 16"	340 lf	2.170 mh / lf	738	30.57 /mh	22,552	162.43	55,226	-	-	-	-	-	-	77,778	119,510
				DI Flanged Joint Pipe 24"	203 lf	2.671 mh / lf	542	45.62 /mh	24,732	267.89	54,381	-	-	-	-	-	-	79,114	121,679
				DI Flanged Joint Pipe 30"	154 lf	3.050 mh / lf	470	30.57 /mh	14,357	310.14	47,762	-	-	-	-	-	-	62,119	95,213
				DI Flanged Joint Pipe 72"	183 lf	6.600 mh / lf	1,208	30.57 /mh	36,919	1,431.91	262,040	-	-	-	-	-	-	298,958	456,133
				DI Flanged 90 ell 16"	35 ea	12.680 mh / ea	444	30.57 /mh	13,566	599.40	20,979	-	-	-	-	-	-	34,545	53,311
				DI Flanged 90 ell 20"	23 ea	14.650 mh / ea	337	30.57 /mh	10,299	939.60	21,611	-	-	-	-	-	-	31,910	49,100
				DI Flanged 90 ell 24"	24 ea	15.730 mh / ea	378	30.57 /mh	11,540	1,458.00	34,992	-	-	-	-	-	-	46,532	71,372
				DI Flanged 90 ell 30"	47 ea	17.870 mh / ea	840	30.57 /mh	25,673	2,316.60	108,880	-	-	-	-	-	-	134,553	205,882
				DI Flanged Tee 12"	12 ea	11.012 mh / ea	132	45.62 /mh	6,029	777.86	9,334	-	-	-	-	-	-	15,363	23,709
				DI Flanged Tee 16"	12 ea	12.680 mh / ea	152	30.57 /mh	4,651	0.00	0	-	-	-	-	-	-	4,651	7,361
				DI Flanged Tee 30"	22 ea	17.874 mh / ea	393	45.62 /mh	17,940	0.00	0	-	-	-	-	-	-	17,940	28,394
				DI Flanged Cross 72"	6 ea	72.000 mh / ea	432	30.57 /mh	13,205	39,000.00	234,000	-	-	-	-	-	-	247,205	376,045
				DI Flanged Con Red 16x12"	12 ea	12.680 mh / ea	152	30.57 /mh	4,651	890.40	10,685	-	-	-	-	-	-	15,336	23,578
				DI Flanged Con Red 30x16"	12 ea	17.870 mh / ea	214	30.57 /mh	6,555	2,721.60	32,659	-	-	-	-	-	-	39,214	59,942
				DI Flanged Con Red 36x30"	2 ea	20.520 mh / ea	41	30.57 /mh	1,254	5,224.80	10,450	-	-	-	-	-	-	11,704	17,845
				DI Blind Flange 48"	0 ea	23.590 mh / ea	0	30.57 /mh	7	7,186.00	72	-	-	-	-	-	-	79	120
				Misc Piping & Accessories- ALLOWANCE	500 LF	0.240 mh / LF	120	45.62 /mh	5,476	55.01	27,505	-	-	-	-	-	-	32,981	50,412
				40.01 Above Ground Process Piping	1,500 lf		8,795		307,474	759.78	1,139,670	15.40	23,105	24.56	36,845			1,507,093	2,310,044
			40.02	Valves, Meters, Etc.															
				Water Solenoid Valve	12 ea	0.400 mh / ea	5	28.04 /mh	135	4,000.00	48,000	-	-	-	-	-	-	48,135	73,063
				Magnetic Flow Meter - In-line - 24" w/ transmitter	12 ea	26.000 mh / ea	312	43.67 /mh	13,626	12,000.00	144,000	-	-	-	-	-	-	157,626	240,117
				12" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	24 ea	9.600 mh / ea	230	30.57 /mh	7,043	13,040.00	312,960	-	-	-	-	-	-	320,003	486,131
				18" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	12 ea	14.400 mh / ea	173	30.57 /mh	5,282	8,550.00	102,600	-	-	-	-	-	-	107,882	164,077
				30" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	8 ea	24.000 mh / ea	192	30.57 /mh	5,869	16,484.00	131,872	-	-	-	-	-	-	137,741	209,433
				42" Butterfly Valve, 75 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	1 ea	33.600 mh / ea	34	30.57 /mh	1,027	23,078.00	23,078	-	-	-	-	-	-	24,105	36,651
				40.02 Valves, Meters, Etc.	1 ls		946		32,981	762,510.00	762,510							795,491	1,209,472
			40.04	Hydropneumatic Piping System															
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				38,000.00	38,000	-	-	-	-	38,000	57,673
				40.04 Hydropneumatic Piping System	1 ls							38,000.00	38,000					38,000	57,673
				40 Process Piping	1,991 lf		10,028		354,530	980.36	1,951,898	30.69	61,105	18.97	37,770			2,405,303	3,676,398
			41	Material Handling & Process Equipment															
			41.22	Hoists & Cranes															
				Steel Bracket @ Column To Support Crane Rail Beam	28 ea	0.200 mh / ea	6	42.40 /mh	237	726.47	20,341	-	-	-	-	-	-	20,578	31,248
				W 18 x 156 Crane Rail Beam	700 lf			-	-	83.46	58,422	-	-	-	-	-	-	58,422	88,668
				Erect Steel W 18 x 156 Beams (29' long)	24 ea	5.000 ch / ea	600	197.59 /ch	23,711	-	-	-	-	518.13	12,435	-	-	36,146	57,318
				Bridge Crane 5 ton 26 ft span, 175 ft runway beam	2 ea			-	-	-	-	-	-	-	-	160,000.00	320,000	320,000	485,669
				41.22 Hoists & Cranes			606		23,948		78,763				12,435	12,435	320,000	435,147	662,903
				41 Material Handling & Process Equipment	1 ls		606		23,948	78,763.05	78,763			12,435.00	12,435	320,000.00	320,000	435,147	662,903
			43	Process Equipment															
			43.11	Membrane Filtration Equipment															
				Filter Equipment Start-Up @ Basins	24 ea	75.000 ch / ea	12,600	350.77 /ch	631,379	2,500.00	60,000	-	-	-	-	-	-	691,379	1,090,356
				Suez- ZeeWeed Ultrafiltration Membrane System	1 ls			/ls				-	-	18,594,595.00	18,594,595	-	-	18,594,595	28,221,307
				Install TripleStack Cassette 18' long w/144 Modules/Cassette @ (12) Basins	72 ea	9.000 mh / ea	648	30.57 /mh	19,807	-	-	-	-	55.00	3,96				

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
04				Chlorine															
	4A			Chlorine - Replace Chlorine Gas Equipment															
		00		Building & Structure Construction															
			03.03	Columns															
				Form Rectangle Columns 15' h	720 sf	0.165 mh / sf	119	39.49 /mh	4,691	1.60	1,149	-	-	-	-	-	-	5,841	9,169
				Chamfer	480 lf	0.015 mh / lf	7	39.49 /mh	284	0.57	272	-	-	-	-	-	-	557	863
				Strip & Oil Column Form	720 sf	0.005 mh / sf	4	39.17 /mh	141	0.03	22	-	-	-	-	-	-	163	256
				Superplasticizers @ Columns	10 cy	/cy				8.40	84	-	-	-	-	-	-	84	128
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	12	43.53 /mh	522	997.70	599	-	-	-	-	-	-	1,121	1,735
				Finish- Float	66 sf	0.017 mh / sf	1	39.17 /mh	44	-	-	-	-	-	-	-	-	44	70
				Pump Place Columns 8 ea	10 cy	1.600 mh / cy	16	41.39 /mh	662	-	-	-	-	7.50	75	-	-	737	1,168
				4000 psi Concrete	10 cy	/cy				142.00	1,420	-	-	-	-	-	-	1,420	2,155
				Grind/Patch Columns	720 sf	0.013 mh / sf	9	39.17 /mh	367	0.03	22	-	-	-	-	-	-	388	613
				Rub Columns	720 sf	0.065 mh / sf	47	39.17 /mh	1,833	0.06	43	-	-	-	-	-	-	1,876	2,967
				Liquid Curing Compounds	720 sf	0.003 mh / sf	2	39.17 /mh	85	0.06	42	-	-	-	-	-	-	127	198
				03.03 Columns	10 cy		217		8,630	365.30	3,653			7.50	75			12,357	19,322
			03.05	Slab On Grade															
				Slab Edge Form 30"	378 sf	0.350 mh / sf	132	39.49 /mh	5,225	1.31	496	-	-	-	-	-	-	5,722	9,023
				Rebar- SOG (125 #/cy)	8 tn	14.003 mh / tn	112	43.53 /mh	4,876	997.70	7,982	-	-	-	-	-	-	12,858	19,831
				Mesh Support - bricks (12/sf)	165 ea	0.002 mh / ea	0	43.53 /mh	14	0.26	43	-	-	-	-	-	-	58	89
				Finish- Hard Trowel	1,372 sf	0.015 mh / sf	21	39.17 /mh	806	-	-	-	-	-	-	-	-	806	1,276
				Pump Place Slab on Grade 30"	128 cy	0.500 mh / cy	64	41.39 /mh	2,649	-	-	-	-	3.67	470	-	-	3,119	4,941
				4000 psi Concrete	128 cy	/cy				142.00	18,176	-	-	-	-	-	-	18,176	27,586
				Liquid Curing Compounds	1,750 sf	0.002 mh / sf	4	39.17 /mh	137	0.06	103	-	-	-	-	-	-	240	373
				Seal Floors	1,372 sf	0.002 mh / sf	3	39.17 /mh	108	0.09	127	-	-	-	-	-	-	234	363
				6 Mil. Vapor Barrier	1,500 sf	0.002 mh / sf	3	43.53 /mh	131	0.05	79	-	-	-	-	-	-	209	326
				Gravel Fill Under Slab 4"	17 cy	0.004 cd / cy	2	1,412.15 /cd	91	29.26	497	-	-	3.84	65	-	-	654	1,003
				03.05 Slab On Grade	128 cy		341		14,038	214.87	27,503			4.18	535			42,076	64,811
			03.07	Suspended Beams															
				Beam Side Forms	776 sf	0.210 mh / sf	163	39.49 /mh	6,436	2.21	1,711	-	-	-	-	-	-	8,148	12,784
				Beam Bottom Forms	291 sf	0.210 mh / sf	61	39.49 /mh	2,414	2.21	642	-	-	-	-	-	-	3,055	4,794
				Chamfer	388 lf	0.015 mh / lf	6	39.49 /mh	230	0.57	220	-	-	-	-	-	-	450	698
				Strip & Oil Beam Forms	1,067 sf	0.005 mh / sf	5	39.17 /mh	209	0.03	32	-	-	-	-	-	-	241	379
				Superplasticizers @ Beams	22 cy	/cy				8.40	185	-	-	-	-	-	-	185	281
				Rebar- Beams (250 #/cy)	3 tn	15.003 mh / tn	41	43.53 /mh	1,796	997.70	2,744	-	-	-	-	-	-	4,540	7,006
				Finish- Top of Beam	281 sf	0.008 mh / sf	2	39.17 /mh	88	-	-	-	-	-	-	-	-	88	139
				Pump Place Beams @ Roof	22 cy	2.001 mh / cy	44	41.39 /mh	1,822	-	-	-	-	14.42	317	-	-	2,139	3,389
				4000 psi Concrete	22 cy	/cy				142.00	3,124	-	-	-	-	-	-	3,124	4,741
				Grind/Patch Beams	1,067 sf	0.013 mh / sf	14	39.17 /mh	543	0.03	32	-	-	-	-	-	-	575	909
				Rub Beams	1,067 sf	0.085 mh / sf	91	39.17 /mh	3,552	0.06	64	-	-	-	-	-	-	3,616	5,719
				Liquid Curing Compounds	1,067 sf	0.002 mh / sf	2	39.17 /mh	84	0.06	63	-	-	-	-	-	-	146	228
				03.07 Suspended Beams	22 cy		430		17,174	400.75	8,817			14.42	317			26,308	41,067
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	1,283 sf	0.020 mh / sf	26	42.24 /mh	1,084	8.80	11,293	-	-	0.35	452	-	-	12,828	19,573
				03.20 Precast Planks	1,283 sf		26		1,084	8.80	11,293			0.35	452			12,828	19,573
			04.00	Masonry															
				8' CMU + Rigid Insulation Backup To Brick, 22' h	2,820 sf	/sf				-	-	18.00	50,760	-	-	-	-	50,760	77,039
				Precast Cap 16" x 4"	145 lf	/lf				-	-	20.00	2,901	-	-	-	-	2,901	4,402
				Brick Veneer	3,480 sf	-				-	-	9.00	31,326	-	-	-	-	31,326	47,544
				04.00 Masonry	3,480 sf							24.42	84,987					84,987	128,986
			05.02	FRP Items															
				FRP Stairs Grating Type Treads, 7 ea	0 rs	1.000 mh / rs	0	42.08 /mh	0	368.00	4	-	-	-	-	-	-	4	6
				FRP Stairs Grating Landing 4' x 4' w/ Support Frame, 7 ea	0 ea	4.001 mh / ea	0	42.08 /mh	2	1,000.00	10	-	-	-	-	-	-	12	18
				FRP Feed Pump Tables 6' x 2.5' x 3' h	0 ea	1.500 mh / ea	0	42.08 /mh	1	940.00	9	-	-	-	-	-	-	10	15
				FRP 2 Line Safety Rail @ Pit Stairs, 7 ea	0 lf	0.200 mh / lf	0	42.08 /mh	0	32.00	0	-	-	-	-	-	-	0	1
				05.02 FRP Items	1 ls		0		3	23.40	23							26	40
			06.00	Wood															
				Misc Nailers & Blocking	1,372 sf	0.010 mh / sf	14	39.67 /mh	544	0.40	551	-	-	-	-	-	-	1,095	1,697
				06.00 Wood	1 ls		14		544	550.63	551							1,095	1,697
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	313 lf	/lf						4.00	1,252	-	-	-	-	1,252	1,901
				Caulking @ Masonry Wall Joints- Interior	313 lf	/lf						4.00	1,252	-	-	-	-	1,252	1,901
				07.00 Moisture Protection	1 ls							2,504.50	2,505					2,505	3,801
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	1,372 sf	/sf						3.00	4,117	-	-	-	-	4,117	6,248
				Aluminum Downspouts, 2 ea x 20' each	40 vf	/vf						18.00	720	-	-	-	-	720	1,093
				07.01 Roofing	1,372 sf							3.53	4,837					4,837	7,341
			08.00	Doors, Frames & Hardware															
				FRP Single Door Frames- 16 ga 3'x8'	2 ea	1.000 mh / ea	2	39.18 /mh	78	350.07	700	-	-	-	-	-	-	779	1,187
				FRP Door Leafs- 3'x7' 20 ga. flush w/ Half Glass	2 ea	1.500 mh / ea	3	39.18 /mh	118	850.17	1,700	-	-	-	-	-	-	1,818	2,767
				Overhead Doors- 12'x12' 24 ga steel manual 1" insulation 26 ga back-up panel	2 ea	-				-	-	3,800.00	7,600	-	-	-	-	7,600	11,535
				FRP Framed Windows 14' x 15' h, 2 ea	420 sf	-				-	-	105.02	44,109	-	-	-	-	44,109	66,945
				Install Hardware by Leaf- Allowance	2 ea	8.002 mh / ea	16	39.18 /mh	627	-	-	-	-	-	-	-	-	627	992
				Finish Hardware @ FRP Doors	2 ea	-				1,250.25	2,501	-	-	-	-	-	-	2,501	3,795

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			21.00	Fire Protection (Wet System)															
				Post Indicator Valve & Backflow Preventer	1 ea			/ea				5,001.00	5,001					5,001	7,590
				Wet Pipe Fire Protection System	1,372 sf			/sf				8.00	10,978					10,978	16,662
				Testing of Fire Protection System	1,372 sf			/sf				2.00	2,745					2,745	4,165
				21.00 Fire Protection (Wet System)	1,372 sf							15.83	21,724					21,724	32,971
			22.00	Plumbing															
				Plumbing Subcontract	1,372 sf			/sf				11.00	15,092					15,092	22,905
				22.00 Plumbing	1 ls							15,092.00	15,092					15,092	22,905
			23.00	HVAC															
				Ventilation & Unit Heater System	1,372 sf			/sf				45.00	61,740					61,740	93,704
				23.00 HVAC	1,372 sf							45.00	61,740					61,740	93,704
			31_02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 20 ea (1 per 70 sf)	500 vf	0.002 cd / vf	56	2,146.97 /cd	2,147	35.16	17,578			2.58	1,290			21,016	32,131
				31_02 Piles	20 ea		56		2,147	878.91	17,578			64.51	1,290			21,016	32,131
				00 Building & Structure Construction	1,372 gsf		1,104		44,443	54.17	74,318	189.39	259,842	1.95	2,669			381,272	581,749
			26	Electrical & Instrumentation															
				26.00 UG Electrical															
				Ext Fixtures - Elec - ductbank Conduit/Cable/Wire	100 lf	0.250 mh / lf	25	45.53 /mh	1,138	2.72	272			5.00	500			1,910	3,010
				Building Electrical System	1,372 sf			/sf				16.00	21,956					21,956	33,324
				26.00 UG Electrical	1 ls		25		1,138	272.00	272	21,956.38	21,956	500.00	500			23,867	36,334
				26.01 Above Ground Electrical															
				Building Electrical System	1,372 sf			/sf				16.00	21,956					21,956	33,324
				Process Electrical System	1,372 sf			/sf				60.01	82,336					82,336	124,963
				26.01 Above Ground Electrical	1 ls							104,292.81	104,293					104,293	158,287
				26.02 Instrumentation & Controls															
				Controls & Instrumentation	1 ls			/ls				71,070.00	71,070					71,070	107,864
				26.02 Instrumentation & Controls	1 ls							71,070.00	71,070					71,070	107,864
				26 Electrical & Instrumentation	1 ls		25		1,138	272.00	272	197,319.19	197,319	500.00	500			199,229	302,484
			40	Process Piping															
				40.01 Above Ground Process Piping															
				Chlorine Piping & Accessories	200 LF	0.240 mh / LF	48	45.62 /mh	2,190	55.01	11,002							13,192	20,165
				Motive Water Supply Piping & Accessories	200 LF	0.240 mh / LF	48	45.62 /mh	2,190	55.01	11,002							13,192	20,165
				40.01 Above Ground Process Piping	400 lf		96		4,381	55.01	22,004							26,385	40,330
				40 Process Piping	400 lf		96		4,381	55.01	22,004							26,385	40,330
			41	Material Handling & Process Equipment															
				41.22 Hoists & Cranes															
				W 18 x 156 Bridge Crane Columns 14'h x 4 ea	56 lf					83.46	4,674							4,674	7,093
				W 18 x 156 Crane Rail Beam	72 lf					83.46	6,009							6,009	9,120
				Erect Steel W 18 x 156 Beams & Columns	4 ea	5,000 ch / ea	100	197.59 /ch	3,952					518.13	2,073			6,024	9,553
				Bridge Crane 3 ton 24.5 ft span, 36 ft runway beam	1 ea											96,000.00	96,000	96,000	145,701
				41.22 Hoists & Cranes	1 ls		100		3,952		10,683				2,073	96,000	96,000	112,707	171,467
				41 Material Handling & Process Equipment	1 ls		100		3,952	10,682.88	10,683			2,072.50	2,073	96,000.00	96,000	112,707	171,467
			43	Process Equipment															
				43.13 Chemical System Equipment															
				Chlorinators	4 ea	1,000 mh / ea	4	30.57 /mh	122							9,500.00	38,000	38,122	57,867
				Spare Chlorine Cylinder Rack 21' x 4.67'	1 ea	1,000 mh / ea	1	30.57 /mh	31							6,000.00	6,000	6,031	9,155
				Solution Panels 1"	2 ea	2,000 mh / ea	4	30.57 /mh	122							8,000.00	16,000	16,122	24,477
				Chlorine System Testing	1 ea	2,000 mh / ea	2	30.57 /mh	61									61	97
				Chlorine Leak Detector	6 ea	1,000 mh / ea	6	30.57 /mh	183							4,000.00	24,000	24,183	36,715
				Chlorine Gas Educators	4 ea	1,000 mh / ea	4	30.57 /mh	122						5,000.00	20,000	20,122	30,548	
				Chlorine Scales	6 ea	1,000 mh / ea	6	30.57 /mh	183						6,000.00	36,000	36,183	54,928	
				43.13 Chemical System Equipment	1 ls		27		825						140,000.00	140,000	140,825	213,786	
				43 Process Equipment	1 ls		27		825						140,000.00	140,000	140,825	213,786	
				4A Chlorine - Replace Chlorine Gas Equipment	1 ls		1,352		54,739	107,277.69	107,278	457,161.58	457,162	5,241.42	5,241	236,000.00	236,000	860,419	1,309,816
			4B	Chlorine - Add New Liquid Hypochlorite Feed															
				Building & Structure Construction															
				03.03 Columns															
				Form Rectangle Columns 15' h	1,080 sf	0.165 mh / sf	178	39.49 /mh	7,037	1.60	1,724							8,761	13,754
				Chamfer	720 lf	0.015 mh / lf	11	39.49 /mh	427	0.57	408							835	1,295
				Strip & Oil Column Form	1,080 sf	0.005 mh / sf	5	39.17 /mh	212	0.03	32							244	384
				Superplasticizers @ Columns	15 cy			/cy		8.40	126							126	191
				Column Rebar (120 #/cy)	1 tn	20,004 mh / tn	20	43.53 /mh	871	997.70	998							1,868	2,892
				Finish- Float	99 sf	0.017 mh / sf	2	39.17 /mh	66									66	104
				Pump Place Columns 12 ea	15 cy	1,600 mh / cy	24	41.39 /mh	994					7.50	112			1,106	1,751
				4000 psi Concrete	15 cy			/cy		142.00	2,130							2,130	3,233
				Grind/Patch Columns	1,080 sf	0.013 mh / sf	14	39.17 /mh	550	0.03	32							582	920
				Rub Columns	1,080 sf	0.065 mh / sf	70	39.17 /mh	2,750	0.06	65							2,814	4,450
				Liquid Curing Compounds	1,080 sf	0.003 mh / sf	3	39.17 /mh	127	0.06	64							190	297
				03.03 Columns	15 cy		328		13,031	371.95	5,579			7.50	112			18,723	29,272
				03.05 Slab On Grade															
				Slab Edge Form 30"	428 sf	0.350 mh / sf	150	39.49 /mh	5,916	1.31	562							6,478	10,217
				Rebar- SOG (125 #/cy)	11 tn	14,003 mh / tn	148	43.53 /mh	6,461	997.70	10,576							17,036	26,276
				Mesh Support - bricks (.12/sf)	218 ea	0.002 mh / ea	0	43.53 /mh	19	0.26	57							76	117
				Finish- Hard Trowel	1,819 sf	0.015 mh / sf	27												

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			03.07	Suspended Beams															
				Rebar- Beams (250 #/cy)	4 tn	15.003 mh / tn	60	43.53 /mh	2,612	997.70	3,991	-	-	-	-	-	-	6,603	10,191
				Finish- Top of Beam	414 sf	0.008 mh / sf	3	39.17 /mh	130	-	-	-	-	-	-	-	-	130	205
				Pump Place Beams @ Roof	31 cy	2.001 mh / cy	62	41.39 /mh	2,567	-	-	-	-	14.42	447	-	-	3,014	4,775
				4000 psi Concrete	31 cy	/cy				142.00	4,402	-	-	-	-	-	-	4,402	6,681
				Grind/Patch Beams	1,517 sf	0.013 mh / sf	20	39.17 /mh	773	0.03	46	-	-	-	-	-	-	818	1,292
				Rub Beams	1,517 sf	0.085 mh / sf	129	39.17 /mh	5,050	0.06	91	-	-	-	-	-	-	5,141	8,131
				Liquid Curing Compounds	1,931 sf	0.002 mh / sf	4	39.17 /mh	151	0.06	114	-	-	-	-	-	-	265	412
				03.07 Suspended Beams	31 cy		612		24,490	406.70	12,608			14.42	447			37,545	58,607
			03.08	Pads & Curbs															
				Pad Form	150 sf	0.120 mh / sf	18	39.49 /mh	711	1.37	205	-	-	-	-	-	-	916	1,436
				Chamfer	150 lf	0.015 mh / lf	2	39.49 /mh	89	0.57	85	-	-	-	-	-	-	174	270
				Strip & Oil Equipment Pad Forms	150 sf	0.005 mh / sf	1	39.17 /mh	29	0.03	5	-	-	-	-	-	-	34	53
				Rebar- Pads (100 #/cy)	1 tn	18.003 mh / tn	18	43.53 /mh	784	997.70	998	-	-	-	-	-	-	1,781	2,754
				Finish- Float	444 sf	0.017 mh / sf	8	39.17 /mh	296	-	-	-	-	-	-	-	-	296	468
				Pump Place Pads	16 cy	1.601 mh / cy	26	41.39 /mh	1,060	-	-	-	-	7.49	120	-	-	1,180	1,868
				4000 psi Concrete	16 cy	/cy				142.00	2,272	-	-	-	-	-	-	2,272	3,448
				Liquid Curing Compounds	594 sf	0.003 mh / sf	2	39.17 /mh	70	0.06	35	-	-	-	-	-	-	105	164
				03.08 Pads & Curbs	16 cy		74		3,038	224.94	3,599			7.49	120			6,757	10,461
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	1,726 sf	0.020 mh / sf	35	42.24 /mh	1,458	8.80	15,192	-	-	0.35	607	-	-	17,258	26,332
				03.20 Precast Planks	1,726 sf		35		1,458	8.80	15,192			0.35	607			17,258	26,332
			04.00	Masonry															
				8' CMU + Rigid Insulation Backup To Brick, 22' h	3,190 sf	/sf				-	-	18.00	57,420	-	-	-	-	57,420	87,147
				Precast Cap 16" x 4"	164 lf	/lf				-	-	20.00	3,281	-	-	-	-	3,281	4,979
				Brick Veneer	3,938 sf	/sf				-	-	9.00	35,449	-	-	-	-	35,449	53,802
				04.00 Masonry	3,938 sf							24.42	96,150					96,150	145,928
			05.02	FRP Items															
				FRP Stairs Grating Type Treads, 7 ea	10 rs	1.000 mh / rs	10	42.08 /mh	421	367.57	3,676	-	-	-	-	-	-	4,097	6,245
				FRP Grating w/ Support Frame	522 SF	0.250 mh / SF	131	42.08 /mh	5,492	63.00	32,886	-	-	-	-	-	-	38,378	58,603
				FRP 2 Line Safety Rail	127 lf	0.200 mh / lf	25	42.08 /mh	1,069	32.21	4,090	-	-	-	-	-	-	5,159	7,900
				05.02 FRP Items	1 ls		166		6,982	40,651.95	40,652							47,634	72,748
			06.00	Wood															
				Misc Nailers & Blocking	1,819 sf	0.010 mh / sf	18	39.67 /mh	722	0.40	730	-	-	-	-	-	-	1,452	2,250
				06.00 Wood	1 ls		18		722	730.02	730							1,452	2,250
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	354 lf	/lf						4.00	1,416	-	-	-	-	1,416	2,150
				Caulking @ Masonry Wall Joints- Interior	354 lf	/lf						4.00	1,416	-	-	-	-	1,416	2,149
				07.00 Moisture Protection	1 ls							2,832.56	2,833					2,833	4,299
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	1,819 sf	/sf						3.00	5,458	-	-	-	-	5,458	8,284
				Aluminum Downspouts, 2 ea x 20' each	40 vf	/vf						18.00	720	-	-	-	-	720	1,093
				07.01 Roofing	1,819 sf							3.40	6,178					6,178	9,377
			08.00	Doors, Frames & Hardware															
				FRP Single Door Frames- 16 ga 3'x8'	1 ea	1.000 mh / ea	1	39.18 /mh	39	350.07	350	-	-	-	-	-	-	389	593
				FRP Double Door Frames- 16 ga 3'x8'	2 ea	1.250 mh / ea	3	39.18 /mh	98	650.13	1,300	-	-	-	-	-	-	1,398	2,128
				FRP Door Leafs- 3'x7' 20 ga. flush w/ Half Glass	5 ea	1.500 mh / ea	8	39.18 /mh	294	850.17	4,251	-	-	-	-	-	-	4,545	6,917
				Overhead Doors- 14'x14' 24 ga steel chain hoist 1" insulation 26 ga back-up panel	2 ea	-				-	-	5,975.00	11,950	-	-	-	-	11,950	18,137
				FRP Framed Windows 14' x 15' h, 2 ea	420 sf	-				-	-	105.02	44,109	-	-	-	-	44,109	66,945
				Install Hardware by Leaf- Allowance	5 ea	8.002 mh / ea	40	39.18 /mh	1,567	-	-	-	-	-	-	-	-	1,567	2,481
				Finish Hardware @ FRP Doors	5 ea	/ea				1,250.25	6,251	-	-	-	-	-	-	6,251	9,488
				08.00 Doors, Frames & Hardware	7 ea		51		1,998	1,736.06	12,152		8,008.40		56,059			70,210	106,688
			09.00	Finishes															
				Paint Door Frames - primer (2) coats	3 ea	/ea				-	-	100.02	300	-	-	-	-	300	455
				Paint Doors - primer (2) coats	5 ea	/ea				-	-	140.03	700	-	-	-	-	700	1,063
				Paint Block Walls w/ Epoxy Coating	3,190 sf	/sf				-	-	2.50	7,977	-	-	-	-	7,977	12,106
				Epoxy Coating On Floor & Curbs	1,819 sf	-				-	-	4.50	8,187	-	-	-	-	8,187	12,426
				09.00 Finishes	1 ls							17,163.92	17,164					17,164	26,050
			10.00	Specialty Items															
				Signs - Building ID	1 ea	/ea						3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	3 ea	/ea						30.01	90	-	-	-	-	90	137
				Fire Extinguisher CO2 10 lbs	2 ea	/ea						225.05	450	-	-	-	-	450	683
				10.00 Specialty Items	1 ls							3,540.71	3,541					3,541	5,374
			21.00	Fire Protection (Wet System)															
				Tap Onto Water Main to Provide Separate Water Feed for Suppression System	1 ea	/ea				-	-	2,000.40	2,000	-	-	-	-	2,000	3,036
				Flow Test	1 ea	/ea				-	-	1,000.20	1,000	-	-	-	-	1,000	1,518
				Post Indicator Valve & Backflow Preventer	1 ea	/ea				-	-	5,001.00	5,001	-	-	-	-	5,001	7,590
				Wet Pipe Fire Protection System	1,372 sf	/sf				-	-	8.00	10,978	-	-	-	-	10,978	16,662
				Testing of Fire Protection System	1,372 sf	/sf				-	-	2.00	2,745	-	-	-	-	2,745	4,165
				21.00 Fire Protection (Wet System)	1,372 sf							15.83	21,724					21,724	32,971
			22.00	Plumbing															
				Plumbing Subcontract	1,819 sf	/sf						11.00	20,009	-	-	-	-	20,009	30,368
				22.00 Plumbing	1 ls							20,009.00	20,009					20,009	30,368
			23.00	HVAC															
				Ventilation & Unit Heater System	1,819 sf	/sf				-	-	45.00							

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
			26.01	Above Ground Electrical																
				Process Electrical System	1,819 sf			/sf				60.01	109,162					109,162	165,677	
				26.01 Above Ground Electrical	1 ls							138,271.60	138,272					138,272	209,857	
			26.02	Instrumentation & Controls																
				Controls & Instrumentation	1 ls			/ls				94,224.00	94,224					94,224	143,005	
				26.02 Instrumentation & Controls	1 ls							94,224.00	94,224					94,224	143,005	
				26 Electrical & Instrumentation	1 ls		25		1,138	272.00	272	261,605.41	261,605	500.00	500			263,516	400,053	
		40		Process Piping																
			40.01	Above Ground Process Piping																
				Chlorine Piping & Accessories	200 LF	0.240 mh / LF	48	45.62 /mh	2,190	55.01	11,002	-	-	-	-	-	-	-	13,192	20,165
				Motive Water Supply Piping & Accessories	200 LF	0.240 mh / LF	48	45.62 /mh	2,190	55.01	11,002	-	-	-	-	-	-	-	13,192	20,165
				40.01 Above Ground Process Piping	400 lf		96		4,381	55.01	22,004								26,385	40,330
				40 Process Piping	400 lf		96		4,381	55.01	22,004								26,385	40,330
		43		Process Equipment																
			43.00	Pumps																
				Transfer Pumps 3 hp, 100 gpm	4 ea	35.000 mh / ea	140	47.77 /mh	6,688	1,500.30	6,001	-	-	-	-	20,000.00	80,000	92,690	141,111	
				Softened Water Pumps < 1 hp, 65 gpm	4 ea	12.000 mh / ea	48	47.77 /mh	2,293	200.00	800	-	-	-	-	5,000.00	20,000	23,093	35,198	
				Metering Pump	8 ea	10.000 mh / ea	80	34.45 /mh	2,756			-	-	-	-	2,448.00	19,584	22,340	34,084	
				Hose Pumps	8 ea	10.000 mh / ea	80	34.45 /mh	2,756			-	-	-	-	19,500.00	156,000	158,756	241,125	
				43.00 Pumps	1 ls		348		14,493	6,801.20	6,801					275,584.00	275,584	296,878	451,518	
			43.13	Chemical System Equipment																
				Water Softner 100 GPM	4 ea	54.000 mh / ea	216	24.89 /mh	5,375			-	-	-	-	1,800.00	7,200	12,575	19,435	
				Fiberglass Tanks 10,000 gal, 12' Diameter x 11.41' h Hydrochlorite)	1 ea	1.420 cd / ea	57	1,757.90 /cd	2,496			-	-	1,056.45	1,056	13,500.00	13,500	17,053	26,121	
				Day Tank 5.67' diameter, 1000 gallon	3 ea	1.000 mh / ea	3	41.79 /mh	125			-	-	-	-	3,500.00	10,500	10,625	16,134	
				Wall Mt Residual analyzer	4 ea	1.000 mh / ea	4	30.57 /mh	122			-	-	-	-	7,000.00	28,000	28,122	42,690	
				Chlorine evaporator	4 ea	2.000 mh / ea	8	30.57 /mh	245			-	-	-	-	4,000.00	16,245	16,490	24,670	
				Solution Panels 1"	2 ea	2.000 mh / ea	4	30.57 /mh	122			-	-	-	-	8,000.00	16,000	16,122	24,477	
				Chlorine System Testing	1 ea	2.000 mh / ea	2	30.57 /mh	61			-	-	-	-	-	-	61	97	
				Chlorine Leak Detector	4 ea	1.000 mh / ea	4	30.57 /mh	122			-	-	-	-	4,000.00	16,000	16,122	24,477	
				Chlorine Gas Educators	4 ea	1.000 mh / ea	4	30.57 /mh	122			-	-	-	-	5,000.00	20,000	20,122	30,548	
				Chlorine Scales	1 ea	1.000 mh / ea	1	30.57 /mh	31			-	-	-	-	6,000.00	6,000	6,031	9,155	
				43.13 Chemical System Equipment	1 ls		303		8,822					1,056.45	1,056	133,200.00	133,200	143,079	217,804	
				43 Process Equipment	1 ls		651		23,315	6,801.20	6,801			1,056.45	1,056	133,200.00	133,200	143,079	217,804	
				4B Chlorine - Add New Liquid Hypochlorite Feed	1 ls		2,557		101,069	179,502.10	179,502	567,117.72	567,118	5,332.52	5,333	408,784.00	408,784	1,261,805	1,922,024	
				Chlorine - Add New Onsite Generation of Hypochlorite Facility	1 ls															
4C			00	Building & Structure Construction																
			03.03	Columns																
				Form Rectangle Columns 15' h	1,350 sf	0.165 mh / sf	223	39.49 /mh	8,796	1.60	2,155	-	-	-	-	-	-	-	10,951	17,192
				Chamfer	900 lf	0.015 mh / lf	14	39.49 /mh	533	0.57	510	-	-	-	-	-	-	-	1,044	1,618
				Strip & Oil Column Form	1,350 sf	0.005 mh / sf	7	39.17 /mh	264	0.03	41	-	-	-	-	-	-	-	305	480
				Superplasticizers @ Columns	19 cy			/cy	8.40		160	-	-	-	-	-	-	-	160	242
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	23	43.53 /mh	1,001	997.70	1,147	-	-	-	-	-	-	-	2,149	3,326
				Finish- Float	68 sf	0.017 mh / sf	1	39.17 /mh	45			-	-	-	-	-	-	-	45	72
				Pump Place Columns 15 ea	19 cy	1.600 mh / cy	30	41.39 /mh	1,258			-	-	7.50	142	-	-	-	1,401	2,218
				4000 psi Concrete	19 cy			/cy		142.00	2,698	-	-	-	-	-	-	-	2,698	4,095
				Grind/Patch Columns	1,350 sf	0.013 mh / sf	18	39.17 /mh	687	0.03	41	-	-	-	-	-	-	-	728	1,150
				Rub Columns	1,350 sf	0.065 mh / sf	88	39.17 /mh	3,437	0.06	81	-	-	-	-	-	-	-	3,518	5,563
				Liquid Curing Compounds	1,350 sf	0.003 mh / sf	4	39.17 /mh	159	0.06	79	-	-	-	-	-	-	-	238	372
				03.03 Columns	19 cy		407		16,182	363.78	6,912			7.50	142			23,236	36,328	
			03.04	Walls																
				Keyway 6"	48 lf	0.050 mh / lf	2	39.49 /mh	95	0.67	32	-	-	-	-	-	-	-	127	199
				Job Built with Plyform 0-4'	383 sf	0.120 mh / sf	46	39.49 /mh	1,815	1.34	515	-	-	-	-	-	-	-	2,330	3,654
				Waterstop 6" Flat	48 lf	0.110 mh / lf	5	39.18 /mh	207	2.10	101	-	-	-	-	-	-	-	308	480
				Strip & Oil Wall Forms	383 sf	0.005 mh / sf	2	39.17 /mh	75	0.03	11	-	-	-	-	-	-	-	87	136
				Superplasticizers @ Walls	5 cy			/cy	8.40		42	-	-	-	-	-	-	-	42	64
				Rebar- Walls (125 #/cy)	0 tn	15.003 mh / tn	5	43.53 /mh	202	997.70	309	-	-	-	-	-	-	-	512	790
				Finish- Top of Wall	48 sf	0.008 mh / sf	0	39.17 /mh	15			-	-	-	-	-	-	-	15	24
				Pump Place Walls 12"	5 cy	1.150 mh / cy	6	41.39 /mh	238			-	-	6.65	33	-	-	-	271	430
				4000 psi Concrete	5 cy			/cy		142.00	710	-	-	-	-	-	-	-	710	1,078
				Grind/Patch Walls	383 sf	0.013 mh / sf	5	39.17 /mh	195	0.03	11	-	-	-	-	-	-	-	207	326
				Rub Walls	383 sf	0.058 mh / sf	22	39.17 /mh	870	0.06	23	-	-	-	-	-	-	-	893	1,412
				Liquid Curing Compounds	431 sf	0.002 mh / sf	1	39.17 /mh	34	0.06	25	-	-	-	-	-	-	-	59	92
				03.04 Walls	5 cy		94		3,746	356.09	1,780			6.65	33			5,560	8,684	
			03.05	Slab On Grade																
				Slab Edge Form 30"	1,555 sf	0.350 mh / sf	544	39.49 /mh	21,496	1.31	2,041	-	-	-	-	-	-	-	23,537	37,120
				Rebar- SOG (125 #/cy)	13 tn	14.003 mh / tn	182	43.53 /mh	7,924	997.70	12,970	-	-	-	-	-	-	-	20,894	32,226
				Mesh Support - bricks (12/sf)	264 ea	0.002 mh / ea	1	43.53 /mh	23	0.26	69	-	-	-	-	-	-	-	92	142
				Finish- Hard Trowel	2,200 sf	0.015 mh / sf	33	39.17 /mh	1,293			-	-	-	-	-	-	-	1,293	2,046
				Pump Place Slab on Grade 30"	203 cy	0.500 mh / cy	102	41.39 /mh	4,202			-	-	3.67	745	-	-	-	4,947	7,836
				4000 psi Concrete	203 cy			/cy		142.00	28,826	-	-	-	-	-	-	-	28,826	43,750
				Liquid Curing Compounds	3,755 sf	0.002 mh / sf	8	39.17 /mh	294	0.06	221									

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				03.07 Suspended Beams	37 cy		734		29,344	403.95	14,946			14.42	534			44,823	69,976
			03.08	Pads & Curbs															
				Pad Form	398 sf	0.120 mh / sf	48	39.49 /mh	1,886	1.37	543	-	-	-	-	-	-	2,430	3,810
				Chamfer	408 lf	0.015 mh / lf	6	39.49 /mh	242	0.57	231	-	-	-	-	-	-	473	734
				Strip & Oil Equipment Pad Forms	398 sf	0.005 mh / sf	2	39.17 /mh	78	0.03	12	-	-	-	-	-	-	90	142
				Rebar- Pads (100 #/cy)	2 tn	18.003 mh / tn	38	43.53 /mh	1,646	997.70	2,095	-	-	-	-	-	-	3,741	5,784
				Finish- Float	1,011 sf	0.017 mh / sf	17	39.17 /mh	673	-	-	-	-	-	-	-	-	673	1,065
				Pump Place Pads	42 cy	1.601 mh / cy	67	41.39 /mh	2,782	-	-	-	-	-	7.49	315	-	3,097	4,904
				4000 psi Concrete	42 cy			/cy		142.00	5,964	-	-	-	-	-	-	5,964	9,052
				Liquid Curing Compounds	1,409 sf	0.003 mh / sf	4	39.17 /mh	166	0.06	83	-	-	-	-	-	-	248	388
				03.08 Pads & Curbs	42 cy		182		7,473	212.59	8,929			7.49	315			16,716	25,879
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	2,078 sf	0.020 mh / sf	42	42.24 /mh	1,756	8.80	18,290	-	-	0.35	731	-	-	20,777	31,702
				03.20 Precast Planks	2,078 sf		42		1,756	8.80	18,290			0.35	731			20,777	31,702
			04.00	Masonry															
				8' CMU + Rigid Insulation Backup To Brick, 22' h	3,614 sf			/sf		-	-	18.00	65,052	-	-	-	-	65,052	98,730
				Precast Cap 16" x 4"	186 lf			/lf		-	-	20.00	3,721	-	-	-	-	3,721	5,647
				Brick Veneer	4,460 sf					-	-	9.00	40,148	-	-	-	-	40,148	60,933
				04.00 Masonry	4,460 sf							24.42	108,921					108,921	165,311
			05.02	FRP Items															
				FRP Stairs Grating Type Treads, 7 ea	12 rs	1.000 mh / rs	12	42.08 /mh	505	367.57	4,411	-	-	-	-	-	-	4,916	7,494
				FRP Grating w/ Support Frame	164 SF	0.250 mh / SF	41	42.08 /mh	1,725	63.00	10,332	-	-	-	-	-	-	12,057	18,412
				FRP 2 Line Safety Rail	112 lf	0.200 mh / lf	22	42.08 /mh	943	32.21	3,607	-	-	-	-	-	-	4,550	6,967
				05.02 FRP Items	1 ls		75		3,173	18,350.00	18,350							21,523	32,872
			06.00	Wood															
				Misc Nailers & Blocking	2,200 sf	0.010 mh / sf	22	39.67 /mh	873	0.40	883	-	-	-	-	-	-	1,756	2,722
				06.00 Wood	1 ls		22		873	882.93	883							1,756	2,722
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	401 lf			/lf				4.00	1,604	-	-	-	-	1,604	2,435
				Caulking @ Masonry Wall Joints- Interior	401 lf			/lf				4.00	1,604	-	-	-	-	1,604	2,435
				07.00 Moisture Protection	1 ls							3,208.64	3,209					3,209	4,870
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	2,200 sf			/sf				3.00	6,601	-	-	-	-	6,601	10,019
				Aluminum Downspouts, 3 ea x 20' each	60 vf			/vf				18.00	1,080	-	-	-	-	1,080	1,639
				07.01 Roofing	2,200 sf							3.49	7,682					7,682	11,658
			08.00	Doors, Frames & Hardware															
				FRP Double Door Frames- 16 ga 3'x8'	2 ea	1.250 mh / ea	3	39.18 /mh	98	650.13	1,300	-	-	-	-	-	-	1,398	2,128
				FRP Door Leafs- 3'x7' 20 ga. flush w/ Half Glass	4 ea	1.500 mh / ea	6	39.18 /mh	235	850.17	3,401	-	-	-	-	-	-	3,636	5,533
				Overhead Doors- 12'x12' 24 ga steel manual 1" insulation 26 ga back-up panel	1 ea							3,800.00	3,800	-	-	-	-	3,800	5,767
				FRP Framed Windows 14' x 15' h, 4 ea	840 sf							105.02	88,218	-	-	-	-	88,218	133,889
				Install Hardware by Leaf- Allowance	4 ea	8.002 mh / ea	32	39.18 /mh	1,254	-	-	-	-	-	-	-	-	1,254	1,985
				Finish Hardware @ FRP Doors	4 ea			/ea		1,250.25	5,001	-	-	-	-	-	-	5,001	7,990
				08.00 Doors, Frames & Hardware	5 ea		41		1,587	1,940.39	9,702	18,403.53	92,018					103,307	156,893
			09.00	Finishes															
				Paint Door Frames - primer (2) coats	2 ea			/ea				100.02	200	-	-	-	-	200	304
				Paint Doors - primer (2) coats	4 ea			/ea				140.03	560	-	-	-	-	560	850
				Paint Block Walls w/ Epoxy Coating	3,614 sf			/sf				2.50	9,037	-	-	-	-	9,037	13,715
				Epoxy Coating On Floor & Curbs	2,200 sf							4.50	9,902	-	-	-	-	9,902	15,028
				09.00 Finishes	1 ls							19,698.93	19,699					19,699	29,897
			10.00	Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	2 ea			/ea				30.01	60	-	-	-	-	60	91
				Fire Extinguisher CO2 10 lbs	2 ea			/ea				225.05	450	-	-	-	-	450	683
				10.00 Specialty Items	1 ls							3,510.70	3,511					3,511	5,328
			21.00	Fire Protection (Wet System)															
				Tap Onto Water Main to Provide Separate Water Feed for Suppression System	1 ea			/ea				2,000.40	2,000	-	-	-	-	2,000	3,036
				Flow Test	1 ea			/ea				1,000.20	1,000	-	-	-	-	1,000	1,518
				Post Indicator Valve & Backflow Preventer	1 ea			/ea				5,001.00	5,001	-	-	-	-	5,001	7,590
				Wet Pipe Fire Protection System	2,200 sf			/sf				8.00	17,604	-	-	-	-	17,604	26,717
				Testing of Fire Protection System	2,200 sf			/sf				2.00	4,401	-	-	-	-	4,401	6,679
				21.00 Fire Protection (Wet System)	2,200 sf							13.64	30,006					30,006	45,541
			22.00	Plumbing															
				Plumbing Subcontract	2,200 sf			/sf				11.00	24,200	-	-	-	-	24,200	36,729
				22.00 Plumbing	1 ls							24,200.00	24,200					24,200	36,729
			23.00	HVAC															
				Ventilation & Unit Heater System	2,200 sf			/sf				45.00	99,000	-	-	-	-	99,000	150,254
				23.00 HVAC	2,200 sf							45.00	99,000					99,000	150,254
			31_02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 32 ea (1 per 70 sf)	800 vf	0.002 cd / vf	90	2,146.97 /cd	3,436	35.16	28,125	-	-	2.58	2,064	-	-	33,625	51,409
				31_02 Piles	32 ea		90		3,436	878.91	28,125			64.51	2,064			33,625	51,409
				00 Building & Structure Construction	2,200 gsf		2,568		103,325	69.62	153,164	176.48	388,244	2.12	4,668			649,402	992,667
			26	Electrical & Instrumentation															
			26.00	UG Electrical															
				Ext Fixtures - Elec - ductbank Conduit/Cable/Wire	100 lf	0.250 mh / lf	25	45.53 /mh	1,138	2.72	272	-	-	5.00	500	-	-	1,910	3,010
				Building Electrical System	2,														

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			40.01	Above Ground Process Piping															
				Chlorine Piping & Accessories	300 LF	0.240 mh / LF	72	45.62 /mh	3,285	55.01	16,503	-	-	-	-	-	-	19,789	30,247
				Motive Water Supply Piping & Accessories	300 LF	0.240 mh / LF	72	45.62 /mh	3,285	55.01	16,503	-	-	-	-	-	-	19,789	30,247
				Brine Maker Piping & Accessories	300 LF	0.240 mh / LF	72	45.62 /mh	3,285	55.01	16,503	-	-	-	-	-	-	19,789	30,247
				40.01 Above Ground Process Piping	900 lf		216		9,856	55.01	49,510							59,366	90,742
				40 Process Piping	900 lf		216		9,856	55.01	49,510							59,366	90,742
			43	Process Equipment															
			43.00	Pumps															
				Transfer Pumps 3 hp, 100 gpm	4 ea	35.000 mh / ea	140	47.77 /mh	6,688	1,500.30	6,001	-	-	-	-	20,000.00	80,000	92,690	141,111
				Softened Water Pumps < 1 hp, 65 gpm	4 ea	12.000 mh / ea	48	47.77 /mh	2,293	200.00	800	-	-	-	-	5,000.00	20,000	23,093	35,198
				Metering Pump	8 ea	10.000 mh / ea	80	34.45 /mh	2,756	-	-	-	-	-	-	2,448.00	19,584	22,340	34,084
				Hose Pumps	8 ea	10.000 mh / ea	80	34.45 /mh	2,756	-	-	-	-	-	-	19,500.00	156,000	158,756	241,125
				43.00 Pumps	1 ls		348		14,493	6,801.20	6,801					275,584.00	275,584	296,878	451,518
			43.13	Chemical System Equipment															
				Water Softner 100 GPM	4 ea	54.000 mh / ea	216	24.89 /mh	5,375	-	-	-	-	-	1,800.00	7,200	12,575	19,435	
				Fiberglass Tanks 10,000 gal, 12' Diameter x 11.41' h Hydrochlorite)	3 ea	1,420 cd / ea	170	1,757.90 /cd	7,489	-	-	-	-	1,056.45	3,169	13,500.00	40,500	51,158	78,364
				Fiberglass Tanks 10,000 gal, 14' Diameter x 11.41' h Brine Maker)	2 ea	1,420 cd / ea	114	1,757.90 /cd	4,992	-	-	-	-	1,056.45	2,113	15,750.00	31,500	38,605	59,072
				Day Tank 5.67' diameter, 1000 gallon	3 ea	1.000 mh / ea	3	41.79 /mh	125	-	-	-	-	-	3,500.00	10,500	10,625	16,134	
				Wall Mt Residual analyzer	4 ea	2.000 mh / ea	8	30.57 /mh	245	-	-	-	-	-	7,000.00	28,000	28,245	42,883	
				Chlorine evaporator	4 ea	2.000 mh / ea	8	30.57 /mh	245	-	-	-	-	-	4,000.00	16,000	16,245	24,670	
				Solution Panels 1"	2 ea	2.000 mh / ea	4	30.57 /mh	122	-	-	-	-	-	8,000.00	16,000	16,122	24,477	
				Chlorine System Testing	1 ea	2.000 mh / ea	2	30.57 /mh	61	-	-	-	-	-	-	-	-	61	97
				Chlorine Leak Detector	4 ea	1.000 mh / ea	4	30.57 /mh	122	-	-	-	-	-	4,000.00	16,000	16,122	24,477	
				Chlorine Gas Educators	4 ea	1.000 mh / ea	4	30.57 /mh	122	-	-	-	-	-	5,000.00	20,000	20,122	30,548	
				Hypochlorite Generators	2 ea	2,000.000 mh / ea	4,000	30.57 /mh	122,267	-	-	-	-	-	906,384.00	1,812,768	1,935,035	2,944,780	
				43.13 Chemical System Equipment			4,533		141,166									1,998,468	2,144,916
				43 Process Equipment	1 ls		4,881		155,659	6,801.20	6,801			5,282.25	5,282	2,274,052.00	2,274,052	2,441,794	3,716,457
				4C Chlorine - Add New Onsite Generation of Hypochlorite Facility	1 ls		7,690		269,979	209,747.09	209,747	704,644.60	704,645	10,450.26	10,450	2,274,052.00	2,274,052	3,468,873	5,283,082
				04 Chlorine	1 ls		11,599		425,786	496,526.88	496,527	1,728,923.90	1,728,924	21,024.20	21,024	2,918,836.00	2,918,836	5,591,097	8,514,922

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount	
05				Clearwell																
	5A			New Large Clearwell 275' x 137' x 24'h ID Dimensions																
		49		Concrete Clearwell Construction																
			03.00	Foundation Mat																
				Keyway 6"	872 lf	0.050 mh / lf	44	39.49 /mh	1,722	0.67	586	-	-	-	-	-	-	2,308	3,615	
				Mat Foundation Edge Form 30"	2,180 sf	0.350 mh / sf	763	39.49 /mh	30,135	1.31	2,862	-	-	-	-	-	-	32,997	52,039	
				Waterstop 6" Flat	872 lf	0.110 mh / lf	96	39.18 /mh	3,759	2.10	1,832	-	-	-	-	-	-	5,590	8,729	
				Strip & Oil Mat Found. Form	2,180 sf	0.005 mh / sf	11	39.17 /mh	427	0.03	65	-	-	-	-	-	-	492	775	
				Rebar- Foundation Mat (100 #/cy)	200 tn	28.006 mh / tn	5,612	43.53 /mh	244,287	997.70	199,939	-	-	-	-	-	-	444,226	690,088	
				Rebar Support - bricks (.12/sf)	5,132 ea	0.002 mh / ea	10	43.53 /mh	447	0.26	1,347	-	-	-	-	-	-	1,794	2,752	
				Finish- Hard Trowel	42,763 sf	0.023 mh / sf	984	39.17 /mh	38,530	-	-	-	-	-	-	-	-	38,530	60,983	
				Pump Place Mat Foundation 30"	3,960 cy	0.500 mh / cy	1,980	41.39 /mh	81,950	-	-	-	-	4.59	18,169	-	-	100,119	158,620	
				Pump Place Thickened Mat @ Columns 6"x26"x2.5' deep, 36 ea	120 cy	0.500 mh / cy	60	41.39 /mh	2,484	-	-	-	-	3.67	440	-	-	2,924	4,632	
				4000 psi Concrete	4,080 cy	-	-	/cy	-	142.00	579,360	-	-	-	-	-	-	579,360	879,304	
				Liquid Curing Compounds	44,943 sf	0.003 mh / sf	135	39.17 /mh	5,282	0.06	2,643	-	-	-	-	-	-	7,925	12,371	
				6 Mil. Vapor Barrier	47,000 sf	0.002 mh / sf	94	43.53 /mh	4,092	0.05	2,468	-	-	-	-	-	-	6,560	10,223	
				03.00 Foundation Mat	4,080 cy		9,789		413,116	193.90	791,103			4.56	18,609			1,222,828	1,884,130	
			03.03	Columns																
				Form Square Columns 24" h	6,912 sf	0.165 mh / sf	1,140	39.49 /mh	45,035	1.60	11,034	-	-	-	-	-	-	56,069	88,024	
				Chamfer	3,456 lf	0.015 mh / lf	52	39.49 /mh	2,047	0.57	1,960	-	-	-	-	-	-	4,007	6,215	
				Strip & Oil Column Form	6,912 sf	0.005 mh / sf	35	39.17 /mh	1,354	0.03	207	-	-	-	-	-	-	1,561	2,458	
				Superplasticizers @ Columns	128 cy	-	-	/cy	-	8.40	1,075	-	-	-	-	-	-	1,075	1,632	
				Column Rebar (120 #/cy)	8 tn	20.004 mh / tn	154	43.53 /mh	6,687	997.70	7,662	-	-	-	-	-	-	14,349	22,213	
				Finish- Float	288 sf	0.017 mh / sf	5	39.17 /mh	192	-	-	-	-	-	-	-	-	192	304	
				Pump Place Columns 36 ea	128 cy	1.600 mh / cy	205	41.39 /mh	8,478	-	-	-	-	7.49	959	-	-	9,437	14,944	
				4000 psi Concrete	128 cy	-	-	/cy	-	142.00	18,176	-	-	-	-	-	-	18,176	27,586	
				Grind/Patch Columns	6,912 sf	0.013 mh / sf	90	39.17 /mh	3,520	0.03	207	-	-	-	-	-	-	3,728	5,886	
				Rub Columns	6,912 sf	0.065 mh / sf	449	39.17 /mh	17,597	0.06	415	-	-	-	-	-	-	18,012	28,480	
				Liquid Curing Compounds	6,912 sf	0.003 mh / sf	21	39.17 /mh	812	0.06	407	-	-	-	-	-	-	1,219	1,903	
				03.03 Columns	128 cy		2,150		85,723	321.43	41,143			7.49	959			127,825	199,645	
			03.04	Walls																
				Keyway 6"	832 lf	0.050 mh / lf	42	39.49 /mh	1,643	0.67	559	-	-	-	-	-	-	2,202	3,449	
				Vertical Wall Keyway 6"	500 lf	0.110 mh / lf	55	39.49 /mh	2,172	0.67	336	-	-	-	-	-	-	2,508	3,948	
				Panel Form System 24" h	39,936 sf	0.190 mh / sf	7,589	39.49 /mh	299,689	1.84	73,397	-	-	-	-	-	-	373,086	585,718	
				Waterstop 6" Flat	1,332 lf	0.110 mh / lf	147	39.18 /mh	5,741	2.10	2,798	-	-	-	-	-	-	8,539	13,333	
				Strip & Oil Wall Forms	39,936 sf	0.005 mh / sf	200	39.17 /mh	7,822	0.03	1,198	-	-	-	-	-	-	9,021	14,199	
				Superplasticizers @ Walls	1,479 cy	-	-	/cy	-	8.40	12,425	-	-	-	-	-	-	12,425	18,858	
				Rebar- Walls (125 #/cy)	92 tn	15.003 mh / tn	1,387	43.53 /mh	60,367	997.70	92,227	-	-	-	-	-	-	152,594	235,518	
				Finish- Top of Wall	3,328 sf	0.008 mh / sf	27	39.17 /mh	1,043	-	-	-	-	-	-	-	-	1,043	1,651	
				Pump Place Foundation Walls 24"	1,479 cy	1.150 mh / cy	1,701	41.39 /mh	70,410	-	-	-	-	6.65	9,835	-	-	80,245	127,092	
				4000 psi Concrete	1,479 cy	-	-	/cy	-	142.00	210,018	-	-	-	-	-	-	210,018	318,748	
				Grind/Patch Walls	39,936 sf	0.013 mh / sf	519	39.17 /mh	20,338	0.03	1,198	-	-	-	-	-	-	21,537	34,009	
				Rub Walls	40,808 sf	0.058 mh / sf	2,367	39.17 /mh	92,703	0.06	2,448	-	-	-	-	-	-	95,151	150,439	
				Liquid Curing Compounds	39,936 sf	0.002 mh / sf	80	39.17 /mh	3,129	0.06	2,349	-	-	-	-	-	-	5,478	8,517	
				03.04 Walls	1,479 cy		14,113		565,058	269.75	398,954			6.65	9,835			973,847	1,515,478	
			03.06	Suspended Flat Slab																
				Form Suspended Slab Bottom	39,336 sf	0.180 mh / sf	7,082	39.49 /mh	279,650	2.18	85,927	-	-	-	-	-	-	-	365,577	573,019
				Slab Edge Form 12"	840 sf	0.250 mh / sf	210	39.49 /mh	8,294	5.17	4,344	-	-	-	-	-	-	12,638	19,720	
				Strip & Oil Suspended Slab Forms	40,176 sf	0.005 mh / sf	201	39.17 /mh	7,869	0.04	1,648	-	-	-	-	-	-	9,517	14,956	
				Superplasticizers	1,462 cy	-	-	-	-	8.40	12,282	-	-	-	-	-	-	12,282	18,641	
				Rebar- Suspended Slab (225 #/cy)	164 tn	20.004 mh / tn	3,290	43.53 /mh	143,215	997.70	164,102	-	-	-	-	-	-	307,317	475,728	
				Finish- Hard Trowel	39,336 sf	0.030 mh / sf	1,180	39.17 /mh	46,229	-	-	-	-	-	-	-	-	46,229	73,168	
				Pump Place Suspended Slab 12"	1,462 cy	1.800 mh / cy	2,632	41.39 /mh	108,941	-	-	-	-	6.65	9,728	-	-	118,669	187,905	
				4000 psi Concrete	1,462 cy	-	-	-	-	142.00	207,604	-	-	-	-	-	-	207,604	315,084	
				Liquid Curing Compounds	79,512 sf	0.003 mh / sf	239	39.17 /mh	9,345	0.68	54,278	-	-	-	-	-	-	63,622	97,168	
				03.06 Suspended Flat Slab	1,462 cy		14,834		603,544	362.64	530,184			6.65	9,728			1,143,456	1,775,389	
			05.01	Misc Metals																
				Ladder Bolted to Concrete, w/o cage- aluminum, 4 ea x 20'	80 lf	0.750 mh / lf	60	/mh	-	68.25	5,460	-	-	-	-	-	-	5,460	8,287	
				Goose Neck Air Vents 24" Diameter	10 ea	3.200 mh / ea	32	36.09 /mh	1,155	2,500.00	25,000	-	-	-	-	-	-	26,155	39,770	
				Aluminum Access Hatch 4' x 6'	4 ea	5.000 mh / ea	20	36.09 /mh	722	1,750.00	7,000	-	-	-	-	-	-	7,722	11,766	
				05.01 Misc Metals	1 ls		112		1,876	37,460.00	37,460							39,336	59,824	
			31.01	Dewatering																
				Remove Dewatering System	1 ls	2.000 cd / ls	96	2,249.33 /cd	4,499	-	-	227.27	227	1,295.68	1,296	-	-	6,022	9,527	
				24" Wells, well casing, pea gravel	70 lf	-	-	/lf	-	-	-	150.00	10,500	-	-	-	-	10,500	15,936	
				Set & Wire Pumps	2 ea	2.000 ea / cd	48	2,249.33 /cd	2,249	25,000.00	50,000	-	-	323.92	648	-	-	52,897	80,477	
				Maintenance/Operation	2 ea	1.000 ea / cd	96	2,249.33 /cd	4,499	1,000.00	2,000	-	-	647.84	1,296	-	-	7,794	12,218	
				Suction Piping	80 lf	110.000 lf / cd	35	2,249.33 /cd	1,636	15.00	1,200	-	-	5.89	471	-	-	3,307	5,160	
				Header Piping	200 lf	200.000 lf / cd	48	2,249.33 /cd	2,249	35.00	7,000	-	-	3.24	648	-	-	9,897	15,215	
				Valving	1 ls	1.000 ls / cd	48	2,249.33 /cd	2,249	5,000.00	5,000	-	-	647.84	648	-	-	7,897	12,180	

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				31.13 Soil Disposal	40,796 cy		3,672		143,840					8.23	335,769			479,609	762,040
			31.20	Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 41895 sf x 4"	90 cy	0.003 cd / cy	11	1,609.56 /cd	439	28.28	2,545	-	-	10.02	901	-	-	3,886	5,992
				31.20 Structure Stone Base	90 cy		11		439	28.28	2,545			10.02	901			3,886	5,992
				49 Concrete Clearwell Construction	39,339 gsf		53,389		2,155,181	84.79	3,335,679	18.12	712,820	20.44	804,164			7,007,844	10,835,348
				5A New Large Clearwell 275' x 137' x 24'h ID Dimensions	1 ls		53,389		2,155,181	3,335,678.76	3,335,679	712,820.39	712,820	804,164.18	804,164			7,007,844	10,835,348
				New Small Clearwell & UV															
			49	Concrete Clearwell Construction															
			03.00	Foundation Mat															
				Keyway 6"	262 lf	0.050 mh / lf	13	39.49 /mh	517	0.67	176	-	-	-	-	-	-	694	1,086
				Mat Foundation Edge Form 30"	655 sf	0.350 mh / sf	229	39.49 /mh	9,054	1.31	860	-	-	-	-	-	-	9,914	15,636
				Waterstop 6" Flat	262 lf	0.110 mh / lf	29	39.18 /mh	1,129	2.10	550	-	-	-	-	-	-	1,680	2,623
				Strip & Oil Mat Found. Form	655 sf	0.005 mh / sf	3	39.17 /mh	128	0.03	20	-	-	-	-	-	-	148	233
				Rebar- Foundation Mat (100 #/cy)	20 tn	28.006 mh / tn	560	43.53 /mh	24,380	997.70	19,954	-	-	-	-	-	-	44,334	68,871
				Rebar Support - bricks (.12/sf)	516 ea	0.002 mh / ea	1	43.53 /mh	45	0.26	135	-	-	-	-	-	-	180	277
				Finish- Hard Trowel	4,298 sf	0.023 mh / sf	99	39.17 /mh	3,873	-	-	-	-	-	-	-	-	3,873	6,129
				Pump Place Mat Foundation 30"	398 cy	0.500 mh / cy	199	41.39 /mh	8,236	-	-	-	-	-	4.59	1,826	-	10,062	15,942
				Pump Place Thickened Mat @ Columns 6"x26"x2.5' deep, 36 ea	3 cy	0.500 mh / cy	2	41.39 /mh	62	-	-	-	-	-	3.67	11	-	73	116
				4000 psi Concrete	401 cy					142.00	56,942	-	-	-	-	-	-	56,942	86,422
				Liquid Curing Compounds	4,953 sf	0.003 mh / sf	15	39.17 /mh	582	0.06	291	-	-	-	-	-	-	873	1,363
				6 Mil. Vapor Barrier	10,200 sf	0.002 mh / sf	20	43.53 /mh	888	0.05	536	-	-	-	-	-	-	1,424	2,219
				03.00 Foundation Mat	401 cy		1,170		48,896	198.17	79,464			4.58	1,837			130,197	200,916
			03.03	Columns															
				Form Square Columns 24' h	192 sf	0.165 mh / sf	32	39.49 /mh	1,251	1.60	306	-	-	-	-	-	-	1,557	2,445
				Chamfer	96 lf	0.015 mh / lf	1	39.49 /mh	57	0.57	54	-	-	-	-	-	-	111	173
				Strip & Oil Column Form	88 sf	0.005 mh / sf	0	39.17 /mh	17	0.03	3	-	-	-	-	-	-	20	31
				Superplasticizers @ Columns	4 cy					8.40	34	-	-	-	-	-	-	34	51
				Column Rebar (120 #/cy)	0 tn	20.004 mh / tn	5	43.53 /mh	209	997.70	239	-	-	-	-	-	-	448	694
				Finish- Float	4 sf	0.017 mh / sf	0	39.17 /mh	3	-	-	-	-	-	-	-	-	3	4
				Pump Place Columns 1 ea	4 cy	1.600 mh / cy	6	41.39 /mh	265	-	-	-	-	-	7.49	30	-	295	467
				4000 psi Concrete	4 cy					142.00	568	-	-	-	-	-	-	568	862
				Grind/Patch Columns	192 sf	0.013 mh / sf	2	39.17 /mh	98	0.03	6	-	-	-	-	-	-	104	164
				Rub Columns	192 sf	0.065 mh / sf	12	39.17 /mh	489	0.06	12	-	-	-	-	-	-	500	791
				Liquid Curing Compounds	192 sf	0.003 mh / sf	1	39.17 /mh	23	0.06	11	-	-	-	-	-	-	34	53
				03.03 Columns	4 cy		60		2,411	308.30	1,233			7.49	30			3,674	5,735
			03.04	Walls															
				Keyway 6"	232 lf	0.050 mh / lf	12	39.49 /mh	458	0.67	156	-	-	-	-	-	-	614	962
				Vertical Wall Keyway 6"	48 lf	0.110 mh / lf	5	39.49 /mh	209	0.67	32	-	-	-	-	-	-	241	379
				Panel Form System 24' h	11,144 sf	0.190 mh / sf	2,118	39.49 /mh	83,627	1.84	20,481	-	-	-	-	-	-	104,108	163,442
				Waterstop 6" Flat	280 lf	0.110 mh / lf	31	39.18 /mh	1,207	2.10	588	-	-	-	-	-	-	1,795	2,803
				Strip & Oil Wall Forms	11,144 sf	0.005 mh / sf	56	39.17 /mh	2,183	0.03	334	-	-	-	-	-	-	2,517	3,962
				Superplasticizers @ Walls	413 cy					8.40	3,470	-	-	-	-	-	-	3,470	5,266
				Rebar- Walls (125 #/cy)	26 tn	15.003 mh / tn	390	43.53 /mh	16,979	997.70	25,940	-	-	-	-	-	-	42,919	66,243
				Finish- Top of Wall	464 sf	0.008 mh / sf	4	39.17 /mh	145	-	-	-	-	-	-	-	-	145	230
				Pump Place Foundation Walls 24"	413 cy	1.150 mh / cy	475	41.39 /mh	19,662	-	-	-	-	-	6.65	2,746	-	22,408	35,489
				4000 psi Concrete	413 cy					142.00	58,646	-	-	-	-	-	-	58,646	89,008
				Grind/Patch Walls	11,144 sf	0.013 mh / sf	145	39.17 /mh	5,675	0.03	334	-	-	-	-	-	-	6,010	9,490
				Rub Walls	5,804 sf	0.058 mh / sf	337	39.17 /mh	13,185	0.06	348	-	-	-	-	-	-	13,533	21,396
				Liquid Curing Compounds	11,144 sf	0.002 mh / sf	22	39.17 /mh	873	0.06	655	-	-	-	-	-	-	1,529	2,377
				03.04 Walls	413 cy		3,594		144,203	268.73	110,986			6.65	2,746			257,935	401,047
			03.06	Suspended Flat Slab															
				Form Suspended Slab Bottom	3,605 sf	0.180 mh / sf	649	39.49 /mh	25,629	2.18	7,875	-	-	-	-	-	-	33,504	52,515
				Slab Edge Form 12"	240 sf	0.250 mh / sf	60	39.49 /mh	2,370	5.17	1,241	-	-	-	-	-	-	3,611	5,634
				Strip & Oil Suspended Slab Forms	3,845 sf	0.005 mh / sf	19	39.17 /mh	753	0.04	158	-	-	-	-	-	-	911	1,431
				Superplasticizers	134 cy					8.40	1,126	-	-	-	-	-	-	1,126	1,709
				Rebar- Suspended Slab (225 #/cy)	15 tn	20.004 mh / tn	300	43.53 /mh	13,061	997.70	14,966	-	-	-	-	-	-	28,026	43,385
				Finish- Hard Trowel	3,605 sf	0.030 mh / sf	108	39.17 /mh	4,237	-	-	-	-	-	-	-	-	4,237	6,706
				Pump Place Suspended Slab 12"	134 cy	1.800 mh / cy	241	41.39 /mh	9,985	-	-	-	-	-	6.65	892	-	10,877	17,223
				4000 psi Concrete	134 cy					142.00	19,028	-	-	-	-	-	-	19,028	28,879
				Liquid Curing Compounds	7,450 sf	0.003 mh / sf	22	39.17 /mh	876	0.68	5,086	-	-	-	-	-	-	5,961	9,104
				03.06 Suspended Flat Slab	134 cy		1,400		56,910	369.24	49,478			6.65	892			107,280	166,585
			05.01	Misc Metals															
				Ladder Bolted to Concrete, w/o cage- aluminum, 2 ea x 20"	40 VF	0.750 mh / VF	30	/mh		68.25	2,730	-	-	-	-	-	-	2,730	4,143
				Goose Neck Air Vents 24" Diameter	2 ea	3.200 mh / ea	6	36.09 /mh	231	2,500.00	5,000	-	-	-	-	-	-	5,231	7,954
				Aluminum Access Hatch 4' x 6'	2 ea	5.000 mh / ea	10	36.09 /mh	361	1,750.00	3,500	-	-	-	-	-	-	3,861	5,883
				05.01 Misc Metals	1 ls		46		592	11,230.00	11,230							11,822	17,981
			31.01	Dewatering															
				Remove Dewatering System	1 ls	2.000 cd / ls	96	2,249.33 /cd	4,499			227.27	227	1,295.68	1,296	-	-	6,022	9,527
				24" Wells, well casing, pea gravel	35 lf							150.00	5,250	-	-	-	-	5,250	7,968
				Set & Wire Pumps	1 ea	2.000 ea / cd	24	2,249.33 /cd	1,125	25,000.00	25,000	-	-	323.92	324	-	-	26,449	40,238
				Maintenance/Operation	1 ea	1.000 ea / cd	48	2,249.33 /cd	2,249	1,000.00	1,000								

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				31.12 Structure Backfill	1,648 cy		107		4,420					4.69	7,724			12,144	19,288
			31.13	Soil Disposal															
				Spoils to Waste	3,671 cy	0.003 day / cy	330	1,410.06 /day	12,943	-	-	-	-	8.23	30,214	-	-	43,157	68,572
				31.13 Soil Disposal	3,671 cy		330		12,943					8.23	30,214			43,157	68,572
			31.20	Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 41895 sf x 4"	80 cy	0.003 cd / cy	10	1,609.56 /cd	390	28.28	2,262	-	-	10.02	801	-	-	3,454	5,327
				31.20 Structure Stone Base	80 cy		10		390	28.28	2,262			10.02	801			3,454	5,327
				49 Concrete Clearwell Construction	3,540 gsf		8,272		333,536	160.23	567,214	68.24	241,585	27.95	98,948			1,241,283	1,912,897
		50		UV Facility															
			03.00	Foundation Mat															
				Keyway 6"	340 lf	0.050 mh / lf	17	39.49 /mh	671	0.67	229	-	-	-	-	-	-	900	1,410
				Mat Foundation Edge Form 30"	850 sf	0.350 mh / sf	298	39.49 /mh	11,750	1.31	1,116	-	-	-	-	-	-	12,866	20,290
				Waterstop 6" Flat	340 lf	0.110 mh / lf	37	39.18 /mh	1,466	2.10	714	-	-	-	-	-	-	2,180	3,403
				Strip & Oil Mat Found. Form	850 sf	0.005 mh / sf	4	39.17 /mh	166	0.03	26	-	-	-	-	-	-	192	302
				Rebar- Foundation Mat (100 #/cy)	33 tn	28.006 mh / tn	928	43.53 /mh	40,410	997.70	33,074	-	-	-	-	-	-	73,484	114,154
				Rebar Support - bricks (.12/sf)	859 ea	0.002 mh / ea	2	43.53 /mh	75	0.26	226	-	-	-	-	-	-	300	461
				Finish- Hard Trowel	7,156 sf	0.023 mh / sf	165	39.17 /mh	6,448	-	-	-	-	-	-	-	-	6,448	10,205
				Pump Place Mat Foundation 30"	663 cy	0.500 mh / cy	332	41.39 /mh	13,720	-	-	-	-	-	4.59	3,042	-	16,762	26,557
				4000 psi Concrete	663 cy					142.00	94,146	-	-	-	-	-	-	94,146	142,887
				Liquid Curing Compounds	8,006 sf	0.003 mh / sf	24	39.17 /mh	941	0.06	471	-	-	-	-	-	-	1,412	2,204
				6 Mil. Vapor Barrier	16,700 sf	0.002 mh / sf	33	43.53 /mh	1,454	0.05	877	-	-	-	-	-	-	2,331	3,632
				03.00 Foundation Mat	663 cy		1,840		77,101	197.40	130,877			4.59	3,042			211,020	325,505
			03.03	Columns															
				Form Rectangle Columns 9.33'	672 sf	0.165 mh / sf	111	39.49 /mh	4,378	1.60	1,073	-	-	-	-	-	-	5,451	8,558
				Form Rectangle Columns 26'	2,288 sf	0.165 mh / sf	378	39.49 /mh	14,908	1.60	3,652	-	-	-	-	-	-	18,560	29,138
				Chamfer	1,480 lf	0.015 mh / lf	22	39.49 /mh	877	0.57	839	-	-	-	-	-	-	1,716	2,662
				Strip & Oil Column Form	2,960 sf	0.005 mh / sf	15	39.17 /mh	580	0.03	89	-	-	-	-	-	-	669	1,052
				Superplasticizers @ Columns	54 cy					8.40	454	-	-	-	-	-	-	454	689
				Column Rebar (120 #/cy)	3 tn	20.004 mh / tn	65	43.53 /mh	2,821	997.70	3,233	-	-	-	-	-	-	6,054	9,371
				Finish- Float	80 sf	0.017 mh / sf	1	39.17 /mh	53	-	-	-	-	-	-	-	-	53	84
				Pump Place Columns 20 ea	54 cy	1.600 mh / cy	86	41.39 /mh	3,577	-	-	-	-	-	7.49	404	-	3,981	6,305
				4000 psi Concrete	54 cy					142.00	7,668	-	-	-	-	-	-	7,668	11,638
				Grind/Patch Columns	2,960 sf	0.013 mh / sf	38	39.17 /mh	1,507	0.03	89	-	-	-	-	-	-	1,596	2,521
				Rub Columns	2,960 sf	0.065 mh / sf	192	39.17 /mh	7,536	0.06	178	-	-	-	-	-	-	7,713	12,196
				Liquid Curing Compounds	2,960 sf	0.003 mh / sf	9	39.17 /mh	348	0.06	174	-	-	-	-	-	-	522	815
				03.03 Columns	54 cy		918		36,585	323.11	17,448			7.49	404			54,437	85,028
			03.04	Walls															
				Brick Ledge Forms	161 sf	0.300 mh / sf	48	39.49 /mh	1,908	2.21	355	-	-	-	-	-	-	2,263	3,558
				Keyway 6"	188 lf	0.050 mh / lf	9	39.49 /mh	371	0.67	126	-	-	-	-	-	-	498	779
				Vertical Wall Keyway 6"	80 lf	0.110 mh / lf	9	39.49 /mh	348	0.67	54	-	-	-	-	-	-	401	632
				Panel Form System 17' h	6,392 sf	0.190 mh / sf	1,215	39.49 /mh	47,967	1.84	11,748	-	-	-	-	-	-	59,715	93,748
				Waterstop 6" Flat	268 lf	0.110 mh / lf	29	39.18 /mh	1,155	2.10	563	-	-	-	-	-	-	1,718	2,683
				Strip & Oil Wall Forms	6,392 sf	0.005 mh / sf	32	39.17 /mh	1,252	0.03	192	-	-	-	-	-	-	1,444	2,273
				Superplasticizers @ Walls	237 cy					8.40	1,991	-	-	-	-	-	-	1,991	3,022
				Rebar- Walls (125 #/cy)	18 tn	15.003 mh / tn	270	43.53 /mh	11,755	997.70	17,959	-	-	-	-	-	-	29,713	45,860
				Finish- Top of Wall	376 sf	0.008 mh / sf	3	39.17 /mh	118	-	-	-	-	-	-	-	-	118	187
				Pump Place Foundation Walls 24"	237 cy	1.150 mh / cy	273	41.39 /mh	11,283	-	-	-	-	-	6.65	1,576	-	12,859	20,366
				Pump Place Brick Ledge	1 cy	2.001 mh / cy	2	41.39 /mh	83	-	-	-	-	-	14.42	14	-	97	154
				4000 psi Concrete	238 cy					142.00	33,796	-	-	-	-	-	-	33,796	51,293
				Grind/Patch Walls	6,392 sf	0.013 mh / sf	83	39.17 /mh	3,255	0.03	192	-	-	-	-	-	-	3,447	5,443
				Rub Walls	3,196 sf	0.058 mh / sf	185	39.17 /mh	7,260	0.06	192	-	-	-	-	-	-	7,452	11,782
				Liquid Curing Compounds	6,392 sf	0.002 mh / sf	13	39.17 /mh	501	0.06	376	-	-	-	-	-	-	877	1,363
				03.04 Walls	238 cy		2,172		87,255	283.79	67,543			6.68	1,590			156,388	243,142
			03.07	Suspended Beams															
				Beam Side Forms	3,181 sf	0.210 mh / sf	668	39.49 /mh	26,384	2.21	7,016	-	-	-	-	-	-	33,399	52,405
				Beam Bottom Forms	1,060 sf	0.210 mh / sf	223	39.49 /mh	8,792	2.21	2,338	-	-	-	-	-	-	11,130	17,463
				Chamfer	2,120 lf	0.015 mh / lf	32	39.49 /mh	1,256	0.57	1,202	-	-	-	-	-	-	2,458	3,813
				Strip & Oil Beam Forms	4,241 sf	0.005 mh / sf	21	39.17 /mh	831	0.03	127	-	-	-	-	-	-	958	1,508
				Superplasticizers @ Beams	118 cy					8.40	991	-	-	-	-	-	-	991	1,505
				Rebar- Beams (250 #/cy)	15 tn	15.003 mh / tn	221	43.53 /mh	9,632	997.70	14,716	-	-	-	-	-	-	24,348	37,580
				Finish- Top of Beam	1,060 sf	0.008 mh / sf	8	39.17 /mh	332	-	-	-	-	-	-	-	-	332	526
				Pump Place Beams @ Roof	118 cy	2.001 mh / cy	236	41.39 /mh	9,773	-	-	-	-	-	14.42	1,702	-	11,474	18,176
				4000 psi Concrete	118 cy					142.00	16,756	-	-	-	-	-	-	16,756	25,431
				Grind/Patch Beams	4,241 sf	0.013 mh / sf	55	39.17 /mh	2,160	0.03	127	-	-	-	-	-	-	2,287	3,612
				Rub Beams	4,241 sf	0.085 mh / sf	360	39.17 /mh	14,119	0.06	254	-	-	-	-	-	-	14,374	22,733
				Liquid Curing Compounds	5,301 sf	0.002 mh / sf	11	39.17 /mh	415	0.06	312	-	-	-	-	-	-	727	1,131
				03.07 Suspended Beams	118 cy		1,836		73,694	371.52	43,840			14.42	1,702			119,235	185,880
			03.08	Pads & Curbs															
				Roof Parapet Curb Forms 48" h	3,876 sf	0.200 mh / sf	775	39.49 /mh	30,617	1.52	5,902	-	-	-	-	-	-	36,520	57,417
				Chamfer	968 lf	0.015 mh / lf	15	39.49 /mh	573	0.57	549	-	-	-	-	-	-	1,122	1,741
				Strip & Oil Equipment Curb Forms	3														

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			05.01	Misc Metals															
				Alum Grating Work Platform @ UV Reactor 12' x 6.5' x 5' h, 2 ea	156 sf	0.035 mh / sf	5	42.08 /mh	230	12.39	1,933	-	-	-	-	-	-	2,163	3,298
				Alum Grating Banding	74 lf	/lf				23.70	1,754	-	-	-	-	-	-	1,754	2,662
				Aluminum Hatch & Frame Over Pipe Gallery 6.33' x 6.33'	0 ea	8.000 mh / ea		39.18 /mh	3	5,001.00	50	-	-	-	-	-	-	53	81
				05.01 Misc Metals	1 ls		129		5,478	27,924.05	27,924			837.50	838			34,240	52,384
			06.00	Wood															
				Misc Nailers & Blocking	7,071 sf	0.010 mh / sf	71	39.67 /mh	2,806	0.40	2,838	-	-	-	-	-	-	5,644	8,748
				PT Roof Blocking @ Top Of Masonry Wall	332 lf	0.035 mh / lf	12	39.67 /mh	461	1.82	604	-	-	-	-	-	-	1,065	1,647
				PT Roof Blocking @ Skylight Curb	156 lf	0.035 mh / lf	5	39.67 /mh	217	1.82	284	-	-	-	-	-	-	500	774
				06.00 Wood	1 ls		88		3,483	3,725.66	3,726							7,209	11,168
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	1,223 lf	/lf						4.00	4,893	-	-	-	-	4,893	7,426
				Caulking @ Masonry Wall Joints- Interior	1,021 lf	/lf						4.00	4,085	-	-	-	-	4,085	6,200
				07.00 Moisture Protection	1 ls							8,977.80	8,978					8,978	13,626
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	5,800 sf	/sf						3.00	17,403	-	-	-	-	17,403	26,414
				Aluminum Downspouts, 2 ea x 32" each	64 vf	/vf						18.00	1,152	-	-	-	-	1,152	1,749
				Scuppers	2 ea	/ea						50.01	100	-	-	-	-	100	152
				Aluminum Coping @ Roof Parapet 12" wide	332 lf	/lf						15.00	4,981	-	-	-	-	4,981	7,560
				Translucent Panel Skylight Frame & Panels	1,398 sf	/sf						38.01	53,135	-	-	-	-	53,135	80,643
				07.01 Roofing	1 sf							76,771.31	76,771					76,771	116,517
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7"	5 ea	1.000 mh / ea	5	39.18 /mh	196	180.04	900	-	-	-	-	-	-	1,096	1,676
				HM Double Frames- 16 ga. 6'x7"	1 ea	1.500 mh / ea	2	39.18 /mh	59	210.00	210	-	-	-	-	-	-	269	412
				HM Door Leafs- 3'x7' 20 ga. half glass	7 ea	1.500 ea / mh	5	39.18 /mh	183	450.09	3,151	-	-	-	-	-	-	3,333	5,071
				Overhead Doors- 10'x10' 24 ga steel manual 1" insulation 26 ga back-up panel	1 ea							2,255.00	2,255	-	-	-	-	2,255	3,422
				Finish Hardware by Leaf- Allowance	7 ea	8.002 mh / ea	56	39.18 /mh	2,194	900.18	6,301	-	-	-	-	-	-	8,496	13,036
				08.00 Doors, Frames & Hardware	1 ea		67		2,632	10,562.07	10,562	2,255.00	2,255					15,449	23,618
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	7 ea	/ea						100.02	700	-	-	-	-	700	1,063
				Paint HM Doors - primer (2) coats	7 ea	/ea						140.03	980	-	-	-	-	980	1,488
				Paint CMU Block - block filler & (2) coat	10,186 sf							1.35	13,751	-	-	-	-	13,751	20,870
				09.00 Finishes	1 ls							15,431.44	15,431					15,431	23,421
			10.00	Specialty Items															
				Signs - Building ID	1 ea	/ea						3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	4 ea	/ea						30.01	120	-	-	-	-	120	182
				Fire Extinguisher CO2 10 lbs	4 ea	/ea						225.05	900	-	-	-	-	900	1,366
				10.00 Specialty Items	1 ls							4,020.81	4,021					4,021	6,102
			22.00	Plumbing															
				Plumbing Subcontract	7,071 sf	/sf						6.00	42,434	-	-	-	-	42,434	64,403
				22.00 Plumbing	1 ls							42,434.47	42,434					42,434	64,403
			23.00	HVAC															
				Ventilation & Unit Heater System	7,071 sf	/sf						45.00	318,195	-	-	-	-	318,195	482,930
				23.00 HVAC	1 sf							318,195.00	318,195					318,195	482,930
			26.00	UG Electrical															
				Building Electrical System	7,071 sf	/sf						16.00	113,159	-	-	-	-	113,159	171,743
				26.00 UG Electrical	1 ls							113,158.59	113,159					113,159	171,743
			26.01	Above Ground Electrical															
				Building Electrical System	7,071 sf	/sf						8.00	56,579	-	-	-	-	56,579	85,871
				Process Electrical System	7,071 sf	/sf						30.01	212,172	-	-	-	-	212,172	322,017
				26.01 Above Ground Electrical	1 ls							268,751.64	268,752					268,752	407,889
			26.02	Instrumentation & Controls															
				Controls & Instrumentation	1 ls	/ls						366,278.00	366,278	-	-	-	-	366,278	555,906
				26.02 Instrumentation & Controls	1 ls							366,278.00	366,278					366,278	555,906
			31.01	Dewatering															
				Remove Dewatering System	1 ls	2.000 cd / ls	96	2,249.33 /cd	4,499			227.27	227	1,295.68	1,296	-	-	6,022	9,527
				24" Wells, well casing, pea gravel	35 lf	/lf						150.00	5,250	-	-	-	-	5,250	7,968
				Set & Wire Pumps	1 ea	2.000 ea / cd	24	2,249.33 /cd	1,125	25,000.00	25,000	-	-	323.92	324	-	-	26,449	40,238
				Maintenance/Operation	1 ea	1.000 ea / cd	48	2,249.33 /cd	2,249	1,000.00	1,000	-	-	647.84	648	-	-	3,897	6,109
				Suction Piping	80 lf	110.000 lf / cd	35	2,249.33 /cd	1,636	15.00	1,200	-	-	5.89	471	-	-	3,307	5,160
				Header Piping	200 lf	200.000 lf / cd	48	2,249.33 /cd	2,249	35.00	7,000	-	-	3.24	648	-	-	9,897	15,215
				Valving	1 ls	1.000 ls / cd	48	2,249.33 /cd	2,249	5,000.00	5,000	-	-	647.84	648	-	-	7,897	12,180
				Run Temp Power to Pumps	1 ea	1.000 ea / cd	32	1,439.45 /cd	1,439	2,000.00	2,000	-	-	226.08	226	-	-	3,666	5,674
				Electric Consumption	4 mo	1.000 mo / ls				1,000.00	4,000	-	-	-	-	-	-	4,000	6,071
				31.01 Dewatering	1 ls		331		15,447	45,200.00	45,200	5,477.27	5,477	4,260.36	4,260			70,384	108,142
			31.02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 104 ea (1 per 68 sf)	2,600 vf	0.002 cd / vf	291	2,146.97 /cd	11,166	35.16	91,407	-	-	2.58	6,709	-	-	109,282	167,079
				31.02 Piles	104 ea		291		11,166	878.91	91,407			64.51	6,709			109,282	167,079
			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls							15,002.99	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (87' x 22' deep)	1,914 sf	0.001 cd / sf	94	2,465.38 /cd	3,633	16.00	30,630	-	-	0.75	1,440	-	-	35,704	54,531
				Tie Backs (1 per 80 sf of Sheeting, 87' x 18'= 1566 sf)	20 ea							2,377.48	47,549	-	-	-	-	47,549	72,167
				31.03 Excavation Shoring	1,914 sf		94		3,633	16.00	30,630	32.68	62,552	0.75	1,440				

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			03.04	Walls															
				Rub Walls	5,804 sf	0.058 mh / sf	337	39.17 /mh	13,185	0.06	348	-	-	-	-	-	-	13,533	21,396
				Liquid Curing Compounds	11,144 sf	0.002 mh / sf	22	39.17 /mh	873	0.06	655	-	-	-	-	-	-	1,529	2,377
				03.04 Walls	413 cy		3,594		144,203	268.73	110,986			6.65	2,746			257,935	401,047
			03.06	Suspended Flat Slab															
				Form Suspended Slab Bottom	3,605 sf	0.180 mh / sf	649	39.49 /mh	25,629	2.18	7,875	-	-	-	-	-	-	33,504	52,515
				Slab Edge Form 12"	240 sf	0.250 mh / sf	60	39.49 /mh	2,370	5.17	1,241	-	-	-	-	-	-	3,611	5,634
				Strip & Oil Suspended Slab Forms	3,845 sf	0.005 mh / sf	19	39.17 /mh	753	0.04	158	-	-	-	-	-	-	911	1,431
				Superplasticizers	134 cy					8.40	1,126	-	-	-	-	-	-	1,126	1,709
				Rebar- Suspended Slab (225 #/cy)	15 tn	20.004 mh / tn	300	43.53 /mh	13,061	997.70	14,966	-	-	-	-	-	-	28,026	43,385
				Finish- Hard Trowel	3,605 sf	0.030 mh / sf	108	39.17 /mh	4,237	-	-	-	-	-	-	-	-	4,237	6,706
				Pump Place Suspended Slab 12"	134 cy	1.800 mh / cy	241	41.39 /mh	9,985	-	-	-	-	-	6.65	892	-	10,877	17,223
				4000 psi Concrete	134 cy					142.00	19,028	-	-	-	-	-	-	19,028	28,879
				Liquid Curing Compounds	7,450 sf	0.003 mh / sf	22	39.17 /mh	876	0.68	5,086	-	-	-	-	-	-	5,961	9,104
				03.06 Suspended Flat Slab	134 cy		1,400		56,910	369.24	49,478			6.65	892			107,280	166,585
			05.01	Misc Metals															
				Ladder Bolted to Concrete, w/o cage- aluminum, 2 ea x 20'	40 VF	0.750 mh / VF	30	/mh		68.25	2,730	-	-	-	-	-	-	2,730	4,143
				Goose Neck Air Vents 24" Diameter	2 ea	3.200 mh / ea	6	36.09 /mh	231	2,500.00	5,000	-	-	-	-	-	-	5,231	7,954
				Aluminum Access Hatch 4' x 6'	2 ea	5.000 mh / ea	10	36.09 /mh	361	1,750.00	3,500	-	-	-	-	-	-	3,861	5,883
				05.01 Misc Metals	1 ls		46		592	11,230.00	11,230							11,822	17,981
			31.01	Dewatering															
				Remove Dewatering System	1 ls	2.000 cd / ls	96	2,249.33 /cd	4,499			227.27	227	1,295.68	1,296	-	-	6,022	9,527
				24" Wells, well casing, pea gravel	35 lf			/lf				150.00	5,250	-	-	-	-	5,250	7,968
				Set & Wire Pumps	1 ea	2.000 ea / cd	24	2,249.33 /cd	1,125	25,000.00	25,000	-	-	323.92	324	-	-	26,449	40,238
				Maintenance/Operation	1 ea	1.000 ea / cd	48	2,249.33 /cd	2,249	1,000.00	1,000	-	-	647.84	648	-	-	3,897	6,109
				Suction Piping	80 lf	110.000 lf / cd	35	2,249.33 /cd	1,636	15.00	1,200	-	-	5.89	471	-	-	3,307	5,160
				Header Piping	200 lf	200.000 lf / cd	48	2,249.33 /cd	2,249	35.00	7,000	-	-	3.24	648	-	-	9,897	15,215
				Valving	1 ls	1.000 ls / cd	48	2,249.33 /cd	2,249	5,000.00	5,000	-	-	647.84	648	-	-	7,897	12,180
				Run Temp Power to Pumps	1 ea	1.000 ea / cd	32	1,439.45 /cd	1,439	2,000.00	2,000	-	-	226.08	226	-	-	3,666	5,673
				Electric Consumption	2 mo	1.000 mo / ls		/ls		1,000.00	2,000	-	-	-	-	-	-	2,000	3,035
				31.01 Dewatering	1 ls		331		15,447	43,200.00	43,200	5,477.27	5,477	4,260.36	4,260			68,384	105,106
			31.02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 119 ea (1 per 36.46 sf)	2,975 vf	0.002 cd / vf	333	2,146.97 /cd	12,776	35.16	104,591	-	-	2.58	7,676	-	-	125,043	191,177
				31.02 Piles	119 ea		333		12,776	878.91	104,591			64.51	7,676			125,043	191,177
			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls			-	-	-	-	15,002.99	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (286' x 36' deep)	10,296 sf	0.001 cd / sf	507	2,465.38 /cd	19,545	16.00	164,769	-	-	0.75	7,748	-	-	192,062	293,337
				Tie Backs (1 per 80 sf of Sheeting, 286' x 26'= 7436 sf)	93 ea			-	-	-	-	2,377.48	221,105	-	-	-	-	221,105	335,575
				31.03 Excavation Shoring	10,296 sf		507		19,545	16.00	164,769	22.93	236,108	0.75	7,748			428,170	651,682
			31.10	Structure Excavation															
				Backhoe/Truck (5129 sf x 28')	5,319 cy	499.900 cy / cd	383	1,410.06 /cd	15,003	-	-	-	-	6.58	35,020	-	-	50,024	79,481
				31.10 Structure Excavation	5,319 cy		383		15,003					6.58	35,020			50,024	79,481
			31.12	Structure Backfill															
				Backfill Earth-Backhoe/Truck	1,648 cy	0.002 cd / cy	107	1,327.72 /cd	4,420	-	-	-	-	4.69	7,724	-	-	12,144	19,288
				31.12 Structure Backfill	1,648 cy		107		4,420					4.69	7,724			12,144	19,288
			31.13	Soil Disposal															
				Spoils to Waste	3,671 cy	0.003 day / cy	330	1,410.06 /day	12,943	-	-	-	-	8.23	30,214	-	-	43,157	68,572
				31.13 Soil Disposal	3,671 cy		330		12,943					8.23	30,214			43,157	68,572
			31.20	Structure Stone Base															
				Structure Subbase Stone-Loaders/Truck - 41895 sf x 4"	80 cy	0.003 cd / cy	10	1,609.56 /cd	390	28.28	2,262	-	-	10.02	801	-	-	3,454	5,327
				31.20 Structure Stone Base	80 cy		10		390	28.28	2,262			10.02	801			3,454	5,327
				49 Concrete Clearwell Construction	3,540 gsf		8,272		333,536	160.23	567,214	68.24	241,585	27.95	98,948			1,241,283	1,912,897
			50	UV Facility															
			03.00	Foundation Mat															
				Keyway 6"	340 lf	0.050 mh / lf	17	39.49 /mh	671	0.67	229	-	-	-	-	-	-	900	1,410
				Mat Foundation Edge Form 30"	850 sf	0.350 mh / sf	298	39.49 /mh	11,750	1.31	1,116	-	-	-	-	-	-	12,866	20,290
				Waterstop 6" Flat	340 lf	0.110 mh / lf	37	39.18 /mh	1,466	2.10	714	-	-	-	-	-	-	2,180	3,403
				Strip & Oil Mat Found. Form	850 sf	0.005 mh / sf	4	39.17 /mh	166	0.03	26	-	-	-	-	-	-	192	302
				Rebar- Foundation Mat (100 #/cy)	33 tn	28.006 mh / tn	928	43.53 /mh	40,410	997.70	33,074	-	-	-	-	-	-	73,484	114,154
				Rebar Support - bricks (.12/sf)	859 ea	0.002 mh / ea	2	43.53 /mh	75	0.26	226	-	-	-	-	-	-	300	461
				Finish- Hard Trowel	7,156 sf	0.023 mh / sf	165	39.17 /mh	6,448	-	-	-	-	-	-	-	-	6,448	10,205
				Pump Place Mat Foundation 30"	663 cy	0.500 mh / cy	332	41.39 /mh	13,720	-	-	-	-	4.59	3,042	-	-	16,762	26,557
				4000 psi Concrete	663 cy					142.00	94,146	-	-	-	-	-	-	94,146	142,887
				Liquid Curing Compounds	8,006 sf	0.003 mh / sf	24	39.17 /mh	941	0.06	471	-	-	-	-	-	-	1,412	2,204
				6 Mil. Vapor Barrier	16,700 sf	0.002 mh / sf	33	43.53 /mh	1,454	0.05	877	-	-	-	-	-	-	2,331	3,632
				03.00 Foundation Mat	663 cy		1,840		77,101	197.40	130,877			4.59	3,042			211,020	325,505
			03.03	Columns															
				Form Rectangle Columns 9.33'	672 sf	0.165 mh / sf	111	39.49 /mh	4,378	1.60	1,073	-	-	-	-	-	-	5,451	8,558
				Form Rectangle Columns 26"	2,288 sf	0.165 mh / sf	378	39.49 /mh	14,908	1.6									

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			03.04	Walls															
				Finish- Top of Wall	376 sf	0.008 mh / sf	3	39.17 /mh	118	-	-	-	-	-	-	-	-	118	187
				Pump Place Foundation Walls 24"	237 cy	1.150 mh / cy	273	41.39 /mh	11,283	-	-	-	-	6.65	1,576	-	-	12,859	20,366
				Pump Place Brick Ledge	1 cy	2.001 mh / cy	2	41.39 /mh	83	-	-	-	-	14.42	14	-	-	97	154
				4000 psi Concrete	238 cy			/cy		142.00	33,796	-	-	-	-	-	-	33,796	51,293
				Grind/Patch Walls	6,392 sf	0.013 mh / sf	83	39.17 /mh	3,255	0.03	192	-	-	-	-	-	-	3,447	5,443
				Rub Walls	3,196 sf	0.058 mh / sf	185	39.17 /mh	7,260	0.06	192	-	-	-	-	-	-	7,452	11,782
				Liquid Curing Compounds	6,392 sf	0.002 mh / sf	13	39.17 /mh	501	0.06	376	-	-	-	-	-	-	877	1,363
				03.04 Walls	238 cy		2,172		87,255	283.79	67,543			6.68	1,590			156,388	243,142
			03.07	Suspended Beams															
				Beam Side Forms	3,181 sf	0.210 mh / sf	668	39.49 /mh	26,384	2.21	7,016	-	-	-	-	-	-	33,399	52,405
				Beam Bottom Forms	1,060 sf	0.210 mh / sf	223	39.49 /mh	8,792	2.21	2,338	-	-	-	-	-	-	11,130	17,463
				Chamfer	2,120 lf	0.015 mh / lf	32	39.49 /mh	1,256	0.57	1,202	-	-	-	-	-	-	2,458	3,813
				Strip & Oil Beam Forms	4,241 sf	0.005 mh / sf	21	39.17 /mh	831	0.03	127	-	-	-	-	-	-	958	1,508
				Superplasticizers @ Beams	118 cy			/cy		8.40	991	-	-	-	-	-	-	991	1,505
				Rebar- Beams (250 #/cy)	15 tn	15.003 mh / tn	221	43.53 /mh	9,632	997.70	14,716	-	-	-	-	-	-	24,348	37,580
				Finish- Top of Beam	1,060 sf	0.008 mh / sf	8	39.17 /mh	332	-	-	-	-	-	-	-	-	332	526
				Pump Place Beams @ Roof	118 cy	2.001 mh / cy	236	41.39 /mh	9,773	-	-	-	-	14.42	1,702	-	-	11,474	18,176
				4000 psi Concrete	118 cy			/cy		142.00	16,756	-	-	-	-	-	-	16,756	25,431
				Grind/Patch Beams	4,241 sf	0.013 mh / sf	55	39.17 /mh	2,160	0.03	127	-	-	-	-	-	-	2,287	3,612
				Rub Beams	4,241 sf	0.085 mh / sf	360	39.17 /mh	14,119	0.06	254	-	-	-	-	-	-	14,374	22,733
				Liquid Curing Compounds	5,301 sf	0.002 mh / sf	11	39.17 /mh	415	0.06	312	-	-	-	-	-	-	727	1,130
				03.07 Suspended Beams	118 cy		1,836		73,694	371.52	43,840			14.42	1,702			119,235	185,880
			03.08	Pads & Curbs															
				Roof Parapet Curb Forms 48" h	3,876 sf	0.200 mh / sf	775	39.49 /mh	30,617	1.52	5,902	-	-	-	-	-	-	36,520	57,417
				Chamfer	968 lf	0.015 mh / lf	15	39.49 /mh	573	0.57	549	-	-	-	-	-	-	1,122	1,741
				Strip & Oil Equipment Curb Forms	3,876 sf	0.005 mh / sf	19	39.17 /mh	759	0.03	116	-	-	-	-	-	-	876	1,378
				Rebar- Pads (100 #/cy)	4 tn	18.004 mh / tn	65	43.53 /mh	2,821	997.70	3,592	-	-	-	-	-	-	6,413	9,916
				Finish- Float	484 sf	0.017 mh / sf	8	39.17 /mh	322	-	-	-	-	-	-	-	-	322	510
				Pump Place Curbs 12"	72 cy	2.501 mh / cy	180	41.39 /mh	7,452	-	-	-	-	9.86	710	-	-	8,161	12,923
				4000 psi Concrete	72 cy			/cy		142.00	10,224	-	-	-	-	-	-	10,224	15,517
				Liquid Curing Compounds	4,360 sf	0.003 mh / sf	13	39.17 /mh	512	0.06	256	-	-	-	-	-	-	769	1,200
				03.08 Pads & Curbs	72 cy		1,075		43,057	286.66	20,640			9.86	710			64,407	100,602
			03.09	Pan Stair Fill															
				Finish Stairs	562 sf	0.055 mh / sf	31	39.17 /mh	1,211	-	-	-	-	-	-	-	-	1,211	1,916
				Pump Place Pan Stair Concrete	4 cy	3.001 mh / cy	12	41.39 /mh	497	-	-	-	-	9.18	37	-	-	533	845
				3000 psi Concrete	4 cy			-	-	138.00	552	-	-	-	-	-	-	552	838
				03.09 Pan Stair Fill	4 cy		43		1,708	138.00	552			9.18	37			2,296	3,599
			05.01	Misc Metals															
				Work Platform Frame & Floor Grating Structural Support (13 #/sf)	1 tn	8.002 ch / tn	40	214.54 /ch	1,734	1,200.25	1,212	-	-	829.21	838	-	-	3,784	5,917
				Metal Stairs Concrete Pans	63 rs	0.067 mh / rs	4	42.08 /mh	177	80.02	5,041	-	-	-	-	-	-	5,218	7,931
				Metal Stairs Grating Type	18 rs	1.000 mh / rs	18	42.08 /mh	758	367.57	6,616	-	-	-	-	-	-	7,374	11,241
				Alum Stair Wall Handrail	32 lf	0.150 mh / lf	5	42.08 /mh	202	16.80	538	-	-	-	-	-	-	740	1,136
				Aluminum 3 Line Rail	84 lf	0.234 mh / lf	20	42.08 /mh	827	44.11	3,705	-	-	-	-	-	-	4,532	6,933
				Aluminum Handrail @ Work Platform	60 lf	0.234 mh / lf	14	42.08 /mh	591	44.11	2,647	-	-	-	-	-	-	3,237	4,952
				Aluminum Handrail @ Pan Stairs	92 lf	0.234 mh / lf	22	42.08 /mh	906	44.11	4,058	-	-	-	-	-	-	4,964	7,593
				Alum Grate Cover .75" @ 4'x4' Sump	2 ea	0.600 mh / ea	1	42.08 /mh	51	185.04	370	-	-	-	-	-	-	421	642
				Alum Grating Work Platform @ UV Reactor 12' x 6.5' x 5' h, 2 ea	156 sf	0.035 mh / sf	5	42.08 /mh	230	12.39	1,933	-	-	-	-	-	-	2,163	3,298
				Alum Grating Banding	74 lf			/lf		23.70	1,754	-	-	-	-	-	-	1,754	2,662
				Aluminum Hatch & Frame Over Pipe Gallery 6.33' x 6.33'	0 ea	8.000 mh / ea	0	39.18 /mh	3	5,001.00	50	-	-	-	-	-	-	53	81
				05.01 Misc Metals	1 ls		129		5,478	27,924.05	27,924			837.50	838			34,240	52,384
			06.00	Wood															
				Misc Nailers & Blocking	7,071 sf	0.010 mh / sf	71	39.67 /mh	2,806	0.40	2,838	-	-	-	-	-	-	5,644	8,748
				PT Roof Blocking @ Top Of Masonry Wall	332 lf	0.035 mh / lf	12	39.67 /mh	461	1.82	604	-	-	-	-	-	-	1,065	1,647
				PT Roof Blocking @ Skylight Curb	156 lf	0.035 mh / lf	5	39.67 /mh	217	1.82	284	-	-	-	-	-	-	500	774
				06.00 Wood	1 ls		88		3,483	3,725.66	3,726							7,209	11,168
			07.00	Moisture Protection															
				Caulking @ Masonry Wall Joints- Exterior (.09 lf/sf)	1,223 lf			/lf				4.00	4,893	-	-	-	-	4,893	7,426
				Caulking @ Masonry Wall Joints- Interior	1,021 lf			/lf				4.00	4,085	-	-	-	-	4,085	6,200
				07.00 Moisture Protection	1 ls							8,977.80	8,978					8,978	13,626
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	5,800 sf			/sf				3.00	17,403	-	-	-	-	17,403	26,414
				Aluminum Downspouts, 2 ea x 32" each	64 vf			/vf				18.00	1,152	-	-	-	-	1,152	1,749
				Scuppers	2 ea			/ea				50.01	100	-	-	-	-	100	152
				Aluminum Coping @ Roof Parapet 12" wide	332 lf			/lf				15.00	4,981	-	-	-	-	4,981	7,560
				Translucent Panel Skylight Frame & Panels	1,398 sf			/sf				38.01	53,135	-	-	-	-	53,135	80,643
				07.01 Roofing	1 sf							76,771.31	76,771					76,771	116,517
			08.00	Doors, Frames & Hardware															
				HM Single Frames- 16 ga 3'x7"	5 ea	1.000 mh / ea	5	39.18 /mh	196	180.04	900	-	-	-	-	-	-	1,096	1,676
				HM Double Frames- 16 ga. 6'x7"	1 ea	1.500 mh / ea	2	39.18 /mh	59	210.00	210	-	-	-	-	-	-	269	412
				HM Door Leafs- 3'x7' 20 ga. half glass	7 ea	1.500 ea / mh	5	39.18 /mh	183	450.09	3,151	-	-	-	-	-	-	3,333	5,071
				Overhead Doors- 10'x10' 24 ga steel manual 1" insulation 26 ga back-up panel	1 ea			-											

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				23.00 HVAC	1 sf							318,195.00	318,195					318,195	482,930	
		26.00		UG Electrical																
				Building Electrical System	7,071 sf			/sf				16.00	113,159					113,159	171,743	
				26.00 UG Electrical	1 ls							113,158.59	113,159					113,159	171,743	
		26.01		Above Ground Electrical																
				Building Electrical System	7,071 sf			/sf				8.00	56,579					56,579	85,871	
				Process Electrical System	7,071 sf			/sf				30.01	212,172					212,172	322,017	
				26.01 Above Ground Electrical	1 ls							268,751.64	268,752					268,752	407,889	
		26.02		Instrumentation & Controls																
				Controls & Instrumentation	1 ls			/ls				366,278.00	366,278					366,278	555,906	
				26.02 Instrumentation & Controls	1 ls							366,278.00	366,278					366,278	555,906	
		31.01		Dewatering																
				Remove Dewatering System	1 ls	2.000 cd / ls	96	2,249.33 /cd	4,499			227.27	227	1,295.68	1,296			6,022	9,527	
				24" Wells, well casing, pea gravel	35 lf			/lf				150.00	5,250					5,250	7,968	
				Set & Wire Pumps	1 ea	2.000 ea / cd	24	2,249.33 /cd	1,125	25,000.00	25,000							26,449	40,238	
				Maintenance/Operation	1 ea	1.000 ea / cd	48	2,249.33 /cd	2,249	1,000.00	1,000							647.84	648	
				Suction Piping	80 lf	110.000 lf / cd	35	2,249.33 /cd	1,636	15.00	1,200							5.89	471	
				Header Piping	200 lf	200.000 lf / cd	48	2,249.33 /cd	2,249	35.00	7,000							3.24	648	
				Valving	1 ls	1.000 ls / cd	48	2,249.33 /cd	2,249	5,000.00	5,000							647.84	648	
				Run Temp Power to Pumps	1 ea	1.000 ea / cd	32	1,439.45 /cd	1,439	2,000.00	2,000							226.08	226	
				Electric Consumption	4 mo	1.000 mo / ls				1,000.00	4,000								4,000	
				31.01 Dewatering	1 ls		331		15,447	45,200.00	45,200	5,477.27	5,477	4,260.36	4,260			70,384	108,142	
		31.02		Piles																
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 104 ea (1 per 68 sf)	2,600 vf	0.002 cd / vf	291	2,146.97 /cd	11,166	35.16	91,407			2.58	6,709			109,282	167,079	
				31.02 Piles	104 ea		291		11,166	878.91	91,407			64.51	6,709			109,282	167,079	
		31.03		Excavation Shoring																
				Shoring System Design Engineer	1 ls							15,002.99	15,003					15,003	22,770	
				Structure Sheeting (87' x 22' deep)	1,914 sf	0.001 cd / sf	94	2,465.38 /cd	3,633	16.00	30,630			0.75	1,440			35,704	54,531	
				Tie Backs (1 per 80 sf of Sheeting, 87' x 18'= 1566 sf)	20 ea							2,377.48	47,549					47,549	72,167	
				31.03 Excavation Shoring	1,914 sf		94		3,633	16.00	30,630	32.68	62,552	0.75	1,440			98,256	149,468	
		31.10		Structure Excavation																
				Exc Clay-Backhoe/Truck (7,310 sf x 18.33')	4,963 cy	499.900 cy / cd	357	1,410.06 /cd	13,999					6.58	32,676			46,676	74,162	
				31.10 Structure Excavation	4,963 cy		357		13,999					6.58	32,676			46,676	74,162	
		31.12		Structure Backfill																
				Backfill Earth-Backhoe/Truck (87' x 4' x 18.33')	236 cy	0.002 cd / cy	15	1,327.72 /cd	633					4.69	1,106			1,739	2,762	
				31.12 Structure Backfill	236 cy		15		633					4.69	1,106			1,739	2,762	
		31.13		Soil Disposal																
				Spoils to Waste	4,727 cy	0.003 day / cy	426	1,410.06 /day	16,667					8.23	38,905			55,572	88,297	
				31.13 Soil Disposal	4,727 cy		426		16,667					8.23	38,905			55,572	88,297	
		31.20		Structure Stone Base																
				Structure Subbase Stone-Loaders/Truck - 7,310 sf x 4"	90 cy	0.003 cd / cy	11	1,609.56 /cd	439	28.28	2,545			10.02	901			3,886	5,992	
				31.20 Structure Stone Base	90 cy		11		439	28.28	2,545			10.02	901			3,886	5,992	
		40.00		Under Ground Process Piping																
				Trench Excav & Lay Pipe 0-4'	28 lf	600.000 lf / cd	3	2,539.31 /cd	119					1.88	53			171	272	
				Stone Pipe Bedding	5 cy	200.000 cy / cd	2	2,896.43 /cd	72	23.29	116							189	291	
				Hydrostatic Testing	28 lf	0.021 ch / lf	2	182.49 /ch	107	0.16	4							112	177	
				Gasket/Nuts/Bolt Kit 36"	6 ea	3.001 mh / ea	18	45.62 /mh	821	225.05	1,350							2,172	3,349	
				DI Flanged Joint Pipe 36"	28 lf	3.471 mh / lf	97	45.62 /mh	4,434	426.62	11,945							16,379	25,147	
				DI Flanged Tee 36"	4 ea	20.524 mh / ea	82	45.62 /mh	3,745	19,000.00	76,000							79,745	121,274	
				DI Blind Flange 36"	1 ea	19.230 mh / ea	19	45.62 /mh	877	3,840.90	3,841							4,718	7,218	
				40.00 Under Ground Process Piping	1 lf		223		10,176	93,257.54	93,258			52.74	53			103,486	157,728	
		40.01		Above Ground Process Piping																
				Paint & Stencil Exposed Piping >20"	204 lf							25.01	5,101					5,101	7,742	
				Paint & Stencil Exposed Piping <20"	800 lf							10.00	8,002					8,002	12,144	
				Pipe Supports	17 ea	4.001 mh / ea	68	45.62 /mh	3,103	250.05	4,251							7,354	11,363	
				DI RJ Std Wgt Cap 36"	1 ea	5.068 mh / ea	5	45.62 /mh	231	4,020.80	4,021							4,252	6,468	
				Hydrostatic Testing	204 lf	0.021 ch / lf	17	182.49 /ch	782	0.16	33							815	1,287	
				Dresser Couplings 36"	4 ea	20.804 mh / ea	83	45.62 /mh	3,797	1,270.26	5,081							8,878	13,720	
				36" DI Wall Thimble 24" long	1 ea	5.001 ch / ea	20	182.49 /ch	913	1,286.25	1,286			1,200.15	1,200			3,399	5,307	
				Gasket/Nuts/Bolt Kit 30"	4 ea	2.501 mh / ea	10	45.62 /mh	456	175.04	700							1,156	1,785	
				Gasket/Nuts/Bolt Kit 36"	14 ea	3.001 mh / ea	42	45.62 /mh	1,917	225.05	3,151							5,067	7,815	
				Gasket/Nuts/Bolt Kit 48"	18 ea	1.000 mh / ea	18	45.62 /mh	821	425.09	7,652							8,473	12,913	
				DI Flanged Joint Pipe 30"	6 lf	3.051 mh / lf	18	45.62 /mh	835	310.21	1,861							2,696	4,147	
				DI Flanged Joint Pipe 36"	70 lf	3.471 mh / lf	243	45.62 /mh	11,084	426.62	29,864							40,947	62,867	
				DI Flanged Joint Pipe 48"	128 lf	4.371 mh / lf	559	45.62 /mh	25,524	711.68	91,096							116,620	178,655	
				DI Flanged 90 ell 30"	5 ea	17.874 mh / ea	89	45.62 /mh	4,077	2,317.06	11,585							15,662	24,036	
				DI Flanged 90 ell 48"	4 ea	25.715 mh / ea	103	45.62 /mh	4,693	6,635.22	26,541							31,234	47,709	
				DI Flanged Tee 36"	4 ea	20.524 mh / ea	82	45.62 /mh	3,745	19,000.00	76,000							79,745	121,274	
				DI Flanged Tee 48"	4 ea	25.715 mh / ea	103	45.62 /mh	4,693	24,821.92	99,288							103,980	158,118	
				DI Flanged Con Red 48x32"	4 ea	25.715 mh / ea	103	45.62 /mh	4,693	9,913.98	39,656							44,349	67,614	
				DI Flanged Con Red 48x36"	2 ea	25.715 mh / ea	51	45.62 /mh	2,346	11,157.43	22,315							24,661	37,581	
				DI Blind Flange 48"	1 ea	23.595 mh / ea	24	45.62 /mh	1,076	7,187.63	7,188							8,264	12,613	
				Chemical Piping & Accessories- ALLOWANCE	800 LF	0.240 mh / LF	192	45.62 /mh	8,761	55.01	44,009							52,770	80,659	
				40.01 Above Ground Process Piping	1 lf		1,831													

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
				41.22 Hoists & Cranes	1 ea		202		7,988	21,339.87	21,340			4,145.00	4,145	110,000.00	110,000	143,473	218,577
			43.07	UV Disinfection Equipment															
				Centrifugal Blowers, 51-100 hp (Air Scour Blowers 1-4)	4 ea	40.008 mh / ea	160	47.77 /mh	7,645	1,500.30	6,001			150,029.95	600,120			613,766	976,309
				UV Reactor #1, 2, 3 & 4	4 ea	60.012 mh / ea	240	45.62 /mh	10,951	5,001.00	20,004					250,950.00	1,003,800	1,034,755	1,571,176
				43.07 UV Disinfection Equipment	1 ls		400		18,597	26,005.19	26,005			600,119.78	600,120	1,003,800.00	1,003,800	1,648,522	2,547,485
				50 UV Facility	7,071 gsf		12,704		529,755	189.02	1,336,541	185.89	1,314,406	98.97	699,838	157.52	1,113,800	4,994,341	7,666,071
		51		Oxidation System															
		03.08		Pads & Curbs															
				Pad Form 14"	447 sf	0.160 mh / sf	72	39.49 /mh	2,825	1.37	610	-	-	-	-	-	-	3,435	5,397
				LOX Tank Pad Form 24"	288 sf	0.180 mh / sf	52	39.49 /mh	2,047	1.37	393	-	-	-	-	-	-	2,441	3,837
				LOX Vaporizer Pad Form 12"	78 sf	0.160 mh / sf	12	39.49 /mh	493	1.37	106	-	-	-	-	-	-	599	942
				Chamfer	821 lf	0.015 mh / lf	12	39.49 /mh	486	0.57	466	-	-	-	-	-	-	952	1,476
				Strip & Oil Equipment Pad Forms	222 sf	0.005 mh / sf	1	39.17 /mh	43	0.03	7	-	-	-	-	-	-	50	79
				Rebar- Pads (100 #/cy)	3 tn	18.004 mh / tn	59	43.53 /mh	2,586	997.70	3,292	-	-	-	-	-	-	5,878	9,090
				Finish- Float	1,321 sf	0.017 mh / sf	22	39.17 /mh	880	-	-	-	-	-	-	-	-	880	1,392
				Pump Place Pads 12" & 14"	27 cy	1.600 mh / cy	43	41.39 /mh	1,788	-	-	-	-	7.49	202	-	-	1,991	3,152
				Pump Place Pads 24"	32 cy	1.600 mh / cy	51	41.39 /mh	2,120	-	-	-	-	7.49	240	-	-	2,359	3,736
				4000 psi Concrete	59 cy			/cy		142.00	8,378	-	-	-	-	-	-	8,378	12,715
				Liquid Curing Compounds	1,543 sf	0.003 mh / sf	5	39.17 /mh	181	0.06	91	-	-	-	-	-	-	272	425
				03.08 Pads & Curbs	59 cy		330		13,450	226.16	13,343			7.49	442			27,235	42,242
		26.01		Above Ground Electrical															
				Electrical Work For Equipment (5% Equipment Cost)	1 ls			/ls				42,977.00	42,977					42,977	65,227
				26.01 Above Ground Electrical	1 ls							42,977.00	42,977					42,977	65,227
		26.02		Instrumentation & Controls															
				Controls & Instrumentation Work For New Equipment (1.5% Equipment Cost)	1 ls			/ls				12,893.00	12,893					12,893	19,568
				26.02 Instrumentation & Controls	1 ls							12,893.00	12,893					12,893	19,568
		32.01		Fencing & Gates															
				8' Chain Link Fence @ LOX Tanks	125 lf			-	-	-	-	31.01	3,876	-	-	-	-	3,876	5,882
				8' Fence Vehicle Gate 12' @ LOX Tanks	1 ea			-	-	-	-	1,700.34	1,700	-	-	-	-	1,700	2,581
				32.01 Fencing & Gates	1 ls							5,576.11	5,576					5,576	8,463
		40.01		Above Ground Process Piping															
				Process Piping Work For Equipment (10% Equipment Cost)	1 ls			/ls				86,000.00	86,000					86,000	130,524
				40.01 Above Ground Process Piping	1 lf							86,000.00	86,000					86,000	130,524
		43.17		LOX Equipment															
				Vaporizer 9'x9'x20' h, 6,000 lbs (Charter/Thermax #SG500)	1 ea	1.000 cd / ea	40	1,783.17 /cd	1,783			-	-	763.22	763	209,000.00	209,000	211,546	321,239
				High Pressure Tank 10,960 gal, 9.5'dia.x34' h, 46,700 lbs (Charter #VS-11000SC)	1 ea	1.000 cd / ea	40	1,783.17 /cd	1,783	2,000.00	2,000	-	-	763.22	763	219,000.00	219,000	223,546	339,452
				Tanks - Unload	1 mh		1	47.77 /mh	48	-	-	-	-	-	-	-	-	48	76
				Tanks - Move-Uncrate	1 mh		1	47.77 /mh	48	-	-	-	-	-	-	-	-	48	76
				Tanks - Set-Grout	1 mh		1	47.77 /mh	48	-	-	-	-	-	-	-	-	48	76
				Tank Water 10000 Gal	1 ea	1.000 mh / ea	1	47.77 /mh	48	13,450.00	13,450	-	-	-	-	7,200.00	7,200	20,698	31,416
				Carbon Dioxide Storage & Feed System (10MGD), 50ton liquid CO2 storage, feed panel, vaporizers, heater, regulator, diffusers, controls	1 ea	1.000 mh / ea	1	42.40 /mh	42	-	-	-	-	-	-	403,565.00	403,565	403,607	612,564
				43.17 LOX Equipment	1 ls		85		3,800	15,450.00	15,450			1,526.44	1,526	838,765.00	838,765	859,541	1,304,899
				51 Oxidation System	1 ls		415		17,250	28,793.39	28,793	147,446.11	147,446	1,968.46	1,968	838,765.00	838,765	1,034,223	1,570,922
				5C New Small Clearwell & UV w/ Oxidation	1 ls		21,391		880,540	1,932,548.42	1,932,548	1,703,437.93	1,703,438	800,755.24	800,755	1,952,565.00	1,952,565	7,269,847	11,149,891
				05 Clearwell	1 ls		95,656		3,894,475	7,164,998.87	7,164,999	3,972,250.14	3,972,250	2,403,706.20	2,403,706	3,066,365.00	3,066,365	20,501,796	31,546,429

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
06				High Service Pump Station															
	6A			High Service Pump Station (Retrofit)															
		43		Process Equipment															
			43.00	Pumps															
				Pump Inspection	5 ea	24.000 mh / ea	120	42.40 /mh	5,087	-	-	2,200.00	11,000	-	-	-	-	16,087	24,747
				HSPS Vert Turbine Can Pump - 1250 hp	5 ea	240.000 mh / ea	1,200	47.77 /mh	57,329	2,500.00	12,500	-	-	-	-	562,500.00	2,812,500	2,882,329	4,378,282
				43.00 Pumps	1 ls		1,320		62,416	12,500.00	12,500	11,000.00	11,000			2,812,500.00	2,812,500	2,898,416	4,403,029
				43 Process Equipment	1 ls		1,320		62,416	12,500.00	12,500	11,000.00	11,000			2,812,500.00	2,812,500	2,898,416	4,403,029
				6A High Service Pump Station (Retrofit)	1 ls		1,320		62,416	12,500.00	12,500	11,000.00	11,000			2,812,500.00	2,812,500	2,898,416	4,403,029
	6B			High Service Pump Station (New)															
		00		Building & Structure Construction															
			03.00	Foundation Mat															
				Keyway 6"	504 lf	0.050 mh / lf	25	39.49 /mh	995	0.67	339	-	-	-	-	-	-	1,334	2,089
				Mat Foundation Edge Form 12"	260 sf	0.350 mh / sf	91	39.49 /mh	3,594	1.31	341	-	-	-	-	-	-	3,935	6,207
				Mat Foundation Edge Form 30"	1,870 sf	0.350 mh / sf	655	39.49 /mh	25,850	1.31	2,455	-	-	-	-	-	-	28,305	44,639
				Waterstop 6" Flat	504 lf	0.110 mh / lf	55	39.18 /mh	2,172	2.10	1,059	-	-	-	-	-	-	3,231	5,045
				Strip & Oil Mat Found. Form	2,130 sf	0.005 mh / sf	11	39.17 /mh	417	0.03	64	-	-	-	-	-	-	481	757
				Rebar- Foundation Mat (100 #/cy)	17 tn	28.006 mh / tn	489	43.53 /mh	21,272	997.70	17,410	-	-	-	-	-	-	38,681	60,090
				Rebar Support - bricks (.12/sf)	608 ea	0.002 mh / ea	1	43.53 /mh	53	0.26	160	-	-	-	-	-	-	213	326
				Finish- Hard Trowel	5,067 sf	0.023 mh / sf	117	39.17 /mh	4,565	-	-	-	-	-	-	-	-	4,565	7,226
				Pump Place Mat Foundation 12"	81 cy	0.500 mh / cy	41	41.39 /mh	1,676	-	-	-	-	4.59	372	-	-	2,048	3,245
				Pump Place Mat Foundation 30"	268 cy	0.500 mh / cy	134	41.39 /mh	5,546	-	-	-	-	4.59	1,230	-	-	6,776	10,735
				Pump Place Thickened Mat 36" x 12"	14 cy	0.500 mh / cy	7	41.39 /mh	290	-	-	-	-	4.59	64	-	-	354	561
				4000 psi Concrete	363 cy					142.00	51,546	-	-	-	-	-	-	51,546	78,232
				Liquid Curing Compounds	7,197 sf	0.003 mh / sf	22	39.17 /mh	846	0.06	423	-	-	-	-	-	-	1,269	1,981
				6 Mil. Vapor Barrier	5,600 sf	0.002 mh / sf	11	43.53 /mh	488	0.05	294	-	-	-	-	-	-	782	1,218
				03.00 Foundation Mat	363 cy		1,658		67,765	204.11	74,090			4.59	1,665			143,520	222,351
			03.03	Columns															
				Form Rectangle Columns 9.33' & 9.58'	1,128 sf	0.165 mh / sf	186	39.49 /mh	7,350	1.60	1,801	-	-	-	-	-	-	9,150	14,365
				Chamfer	565 lf	0.015 mh / lf	8	39.49 /mh	335	0.57	320	-	-	-	-	-	-	655	1,016
				Strip & Oil Column Form	1,128 sf	0.005 mh / sf	6	39.17 /mh	221	0.03	34	-	-	-	-	-	-	255	401
				Superplasticizers @ Columns	21 cy					8.40	176	-	-	-	-	-	-	176	268
				Column Rebar (120 #/cy)	1 tn	20.004 mh / tn	25	43.53 /mh	1,097	997.70	1,257	-	-	-	-	-	-	2,354	3,644
				Finish- Float	44 sf	0.017 mh / sf	1	39.17 /mh	29	-	-	-	-	-	-	-	-	29	46
				Pump Place Columns 15 ea	21 cy	1.600 mh / cy	34	41.39 /mh	1,391	-	-	-	-	7.50	157	-	-	1,548	2,452
				4000 psi Concrete	21 cy					142.00	2,982	-	-	-	-	-	-	2,982	4,526
				Grind/Patch Columns	1,128 sf	0.013 mh / sf	15	39.17 /mh	574	0.03	34	-	-	-	-	-	-	608	961
				Rub Columns	1,128 sf	0.065 mh / sf	73	39.17 /mh	2,872	0.06	68	-	-	-	-	-	-	2,939	4,648
				Liquid Curing Compounds	1,128 sf	0.003 mh / sf	3	39.17 /mh	133	0.06	66	-	-	-	-	-	-	199	310
				03.03 Columns	21 cy		351		14,001	320.87	6,738			7.50	157			20,897	32,637
			03.04	Walls															
				Brick Ledge Forms	161 sf	0.300 mh / sf	48	39.49 /mh	1,908	2.21	355	-	-	-	-	-	-	2,263	3,558
				Keyway 6"	327 lf	0.050 mh / lf	16	39.49 /mh	646	0.67	220	-	-	-	-	-	-	866	1,356
				Vertical Wall Keyway 6"	95 lf	0.110 mh / lf	10	39.49 /mh	413	0.67	64	-	-	-	-	-	-	477	750
				Panel Form System 16" h	10,450 sf	0.190 mh / sf	1,986	39.49 /mh	78,419	1.84	19,206	-	-	-	-	-	-	97,625	153,264
				Wall Box Out For Weir, 34 lf	140 sf	0.550 mh / sf	77	39.49 /mh	3,041	1.34	188	-	-	-	-	-	-	3,229	5,099
				Waterstop 6" Flat	422 lf	0.110 mh / lf	46	39.18 /mh	1,819	2.10	886	-	-	-	-	-	-	2,705	4,224
				Strip & Oil Wall Forms	10,450 sf	0.005 mh / sf	52	39.17 /mh	2,047	0.03	314	-	-	-	-	-	-	2,360	3,715
				Superplasticizers @ Walls	398 cy					8.40	3,344	-	-	-	-	-	-	3,344	5,075
				Rebar- Walls (125 #/cy)	25 tn	15.003 mh / tn	375	43.53 /mh	16,326	997.70	24,943	-	-	-	-	-	-	41,268	63,695
				Finish- Top of Wall	474 sf	0.008 mh / sf	4	39.17 /mh	149	-	-	-	-	-	-	-	-	149	235
				Pump Place Walls 24"	350 cy	1.150 mh / cy	403	41.39 /mh	16,662	-	-	-	-	6.65	2,327	-	-	18,990	30,076
				Pump Place Walls 30"	47 cy	1.150 mh / cy	54	41.39 /mh	2,238	-	-	-	-	6.65	313	-	-	2,550	4,039
				Pump Place Brick Ledge	1 cy	2.001 mh / cy	2	41.39 /mh	83	-	-	-	-	14.42	14	-	-	97	154
				4000 psi Concrete	398 cy					142.00	56,516	-	-	-	-	-	-	56,516	85,775
				Grind/Patch Walls	10,450 sf	0.013 mh / sf	136	39.17 /mh	5,322	0.03	314	-	-	-	-	-	-	5,635	8,899
				Rub Walls	5,225 sf	0.058 mh / sf	303	39.17 /mh	11,870	0.06	314	-	-	-	-	-	-	12,183	19,262
				Liquid Curing Compounds	10,450 sf	0.002 mh / sf	21	39.17 /mh	819	0.06	615	-	-	-	-	-	-	1,433	2,229
				03.04 Walls	396 cy		3,534		141,760	270.90	107,276			6.70	2,654			251,690	391,404
			03.06	Suspended Flat Slab															
				Form Suspended Slab Bottom	6,383 sf	0.180 mh / sf	1,149	39.49 /mh	45,378	2.18	13,943	-	-	-	-	-	-	59,322	92,983
				Slab Edge Form 12"	660 sf	0.250 mh / sf	165	39.49 /mh	6,517	5.17	3,413	-	-	-	-	-	-	9,930	15,494
				Strip & Oil Suspended Slab Forms	7,043 sf	0.005 mh / sf	35	39.17 /mh	1,380	0.04	289	-	-	-	-	-	-	1,668	2,622
				Superplasticizers	236 cy					8.40	1,983	-	-	-	-	-	-	1,983	3,009
				Rebar- Suspended Slab (225 #/cy)	27 tn	20.004 mh / tn	531	43.53 /mh	23,117	997.70	26,489	-	-	-	-	-	-	49,606	76,791
				Finish- Hard Trowel	6,383 sf	0.030 mh / sf	192	39.17 /mh	7,502	-	-	-	-	-	-	-	-	7,502	11,873
				Pump Place Suspended Slab 12"	236 cy	1.800 mh / cy	425	41.39 /mh	17,586	-	-	-	-	6.65	1,570	-	-	19,156	30,332
				4000 psi Concrete	236 cy					142.00	33,512	-	-	-	-	-	-	33,512	50,862
				Liquid Curing Compounds	14,086 sf	0.003 mh / sf	42	39.17 /mh	1,655	0.68	9,616	-	-	-	-	-	-	11,271	17,214
				03.06 Suspended Flat Slab	236 cy		2,539		103,135	378.15	89,244			6.65	1,570			193,949	301,180

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
			03.08	Pads & Curbs															
				Pump Place Curbs 12"	11 cy	2.501 mh / cy	28	41.39 /mh	1,138	-	-	-	-	9.86	108	-	-	1,247	1,974
				Pump Place Pads 6"	2 cy	1.601 mh / cy	3	41.39 /mh	132	-	-	-	-	7.49	15	-	-	147	234
				4000 psi Concrete	13 cy			/cy		142.00	1,846	-	-	-	-	-	-	1,846	2,802
				Liquid Curing Compounds	1,321 sf	0.003 mh / sf	4	39.17 /mh	155	0.06	78	-	-	-	-	-	-	233	364
				03.08 Pads & Curbs	13 cy		298		11,882	365.12	4,747			9.49	123			16,752	26,206
			03.20	Precast Planks															
				Precast Hollow Core Roof Planks 4' wide x 10"	4,324 sf	0.020 mh / sf	86	42.24 /mh	3,654	8.80	38,059	-	-	0.35	1,522	-	-	43,234	65,967
				03.20 Precast Planks	4,324 sf		86		3,654	8.80	38,059			0.35	1,522			43,234	65,967
			04.00	Masonry															
				8" CMU + Rigid Insulation Backup To Brick, 17' h	2,302 sf			/sf		-	-	18.00	41,444	-	-	-	-	41,444	62,901
				8" CMU Interior Partition 9.33' h	824 sf			/sf		-	-	14.00	11,538	-	-	-	-	11,538	17,512
				Brick Veneer	2,448 sf					-	-	9.00	22,036	-	-	-	-	22,036	33,445
				04.00 Masonry	3,272 sf							22.93	75,019					75,019	113,857
			06.00	Wood															
				Misc Nailers & Blocking	5,025 sf	0.010 mh / sf	50	39.67 /mh	1,994	0.40	2,017	-	-	-	-	-	-	4,011	6,217
				06.00 Wood	1 ls		50		1,994	2,016.69	2,017							4,011	6,217
			07.01	Roofing															
				Membrane Roofing- 60 mil EPDM Mechanically Attached w/ 3" Insulation	5,100 sf			/sf				3.00	15,303	-	-	-	-	15,303	23,226
				Aluminum Downspouts, 4 ea x 16' each	64 vf			/vf				18.00	1,152	-	-	-	-	1,152	1,749
				Aluminum Coping @ Roof Parapet 20" wide	143 lf			/lf				25.01	3,576	-	-	-	-	3,576	5,427
				Aluminum Gutters	114 lf			/lf				15.00	1,710	-	-	-	-	1,710	2,596
				Roof Hatch 4'0" x 4'0"	3 ea			/ea				2,500.50	7,502	-	-	-	-	7,502	11,385
				Translucent Panel Skylight Frame & Panels 7' x 7', 6 ea	294 sf			/sf				38.01	11,174	-	-	-	-	11,174	16,959
				07.01 Roofing	5,100 sf							7.93	40,417					40,417	61,342
			08.00	Doors, Frames & Hardware															
				HM Door Leafs- 3'x7' 20 ga. half glass	7 ea	1.500 ea / mh	5	39.18 /mh	183	450.09	3,151	-	-	-	-	-	-	3,334	5,071
				Overhead Doors- 10'x10' 24 ga steel manual 1" insulation 26 ga back-up panel	1 ea							2,255.45	2,255	-	-	-	-	2,255	3,423
				08.00 Doors, Frames & Hardware	8 ea		5		183	393.83	3,151	281.93	2,255					5,589	8,494
			09.00	Finishes															
				Paint HM Door Frames - primer (2) coats	4 ea			/ea				100.02	400	-	-	-	-	400	607
				Paint HM Doors - primer (2) coats	7 ea			/ea				140.03	980	-	-	-	-	980	1,488
				Paint Walls - 3 coats	3,950 sf							0.94	3,713	-	-	-	-	3,713	5,635
				09.00 Finishes	1 ls							5,093.27	5,093					5,093	7,730
			10.00	Specialty Items															
				Signs - Building ID	1 ea			/ea				3,000.60	3,001	-	-	-	-	3,001	4,554
				Signs - Doors	4 ea			/ea				30.01	120	-	-	-	-	120	182
				Fire Extinguisher CO2 10 lbs	3 ea			/ea				225.05	675	-	-	-	-	675	1,025
				10.00 Specialty Items	1 ls							3,795.76	3,796					3,796	5,761
			22.00	Plumbing															
				Plumbing Subcontract	5,100 sf			/sf				6.00	30,606	-	-	-	-	30,606	46,451
				22.00 Plumbing	1 ls							30,606.11	30,606					30,606	46,451
			23.00	HVAC															
				Ventilation & Unit Heater System	5,100 sf			/sf				25.01	127,525	-	-	-	-	127,525	193,547
				23.00 HVAC	5,100 sf							25.01	127,525					127,525	193,547
			31.01	Dewatering															
				Remove Dewatering System	1 ls	2.000 cd / ls	96	2,249.33 /cd	4,499			227.27	227	1,295.68	1,296	-	-	6,022	9,527
				24" Wells, well casing, pea gravel	35 lf			/lf				150.00	5,250	-	-	-	-	5,250	7,968
				Set & Wire Pumps	1 ea	2.000 ea / cd	24	2,249.33 /cd	1,125	25,000.00	25,000	-	-	323.92	324	-	-	26,449	40,238
				Maintenance/Operation	1 ea	1.000 ea / cd	48	2,249.33 /cd	2,249	1,000.00	1,000	-	-	647.84	648	-	-	3,897	6,109
				Suction Piping	80 lf	110.000 lf / cd	35	2,249.33 /cd	1,636	15.00	1,200	-	-	5.89	471	-	-	3,307	5,160
				Header Piping	200 lf	200.000 lf / cd	48	2,249.33 /cd	2,249	35.00	7,000	-	-	3.24	648	-	-	9,897	15,215
				Valving	1 ls	1.000 ls / cd	48	2,249.33 /cd	2,249	5,000.00	5,000	-	-	647.84	648	-	-	7,897	12,180
				Run Temp Power to Pumps	1 ea	1.000 ea / cd	32	1,439.45 /cd	1,439	2,000.00	2,000	-	-	226.08	226	-	-	3,666	5,674
				Electric Consumption	4 mo	1.000 mo / ls		/ls		1,000.00	4,000	-	-	-	-	-	-	4,000	6,071
				31.01 Dewatering	1 ls		331		15,447	45,200.00	45,200	5,477.27	5,477	4,260.36	4,260			70,384	108,142
			31.02	Piles															
				Augered Piles CIP 18" x @ 25 ft depth, 10' oc = 79 ea (1 per 64 sf)	1,975 vf	0.002 cd / vf	221	2,146.97 /cd	8,482	35.16	69,434	-	-	2.58	5,096	-	-	83,012	126,917
				31.02 Piles	79 ea		221		8,482	878.91	69,434			64.51	5,096			83,012	126,917
			31.03	Excavation Shoring															
				Shoring System Design Engineer	1 ls							15,003.00	15,003	-	-	-	-	15,003	22,770
				Structure Sheeting (149' x 22' deep)	3,278 sf	0.001 cd / sf	162	2,465.38 /cd	6,225	16.00	52,458	-	-	0.75	2,465	-	-	61,148	93,392
				Tie Backs (1 per 80 sf of Sheeting, 149' x 18"= 2,682 sf)	34 ea							2,377.47	80,834	-	-	-	-	80,834	122,683
				31.03 Excavation Shoring	3,278 sf		162		6,225	16.00	52,458	29.24	95,837	0.75	2,465			156,986	238,846
			31.10	Structure Excavation															
				Exc Clay-Backhoe/Truck (5,440 sf x 17.83')	3,592 cy	499.900 cy / cd	259	1,410.06 /cd	10,132	-	-	-	-	6.58	23,650	-	-	33,782	53,675
				31.10 Structure Excavation	3,592 cy		259		10,132					6.58	23,650			33,782	53,675
			31.12	Structure Backfill															
				BackFill Earth-Backhoe/Truck (149' x 4' x 17.83')	383 cy	0.002 cd / cy	25	1,327.72 /cd	1,027	-	-	-	-	4.69	1,795	-	-	2,822	4,483
				31.12 Structure Backfill	383 cy		25		1,027					4.69	1,795			2,822	4,483
			31.13	Soil Disposal															
				Spoils to Waste	3,199 cy	0.003 day / cy	288	1,410.06 /day	11,279	-	-	-	-	8.23	26,329	-	-	37,608	59,755
				31.13 Soil Disposal	3,199 cy		288		11,279										

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			26.01	Above Ground Electrical															
				Process Electrical System	5,100 sf			/sf				30.01	153,031					153,031	232,257
				26.01 Above Ground Electrical	1 ls							153,030.55	153,031					153,031	232,257
			26.02	Instrumentation & Controls															
				Controls & Instrumentation	1 ls			/ls				264,180.00	264,180					264,180	400,950
				26.02 Instrumentation & Controls	1 ls							264,180.00	264,180					264,180	400,950
				26 Electrical & Instrumentation	1 ls							498,826.84	498,827					498,827	757,077
		40		Process Piping															
			40.00	Under Ground Process Piping															
				Trench Excav & Lay Pipe 0- 4'	20 lf	600.000 lf / cd	2	2,539.31 /cd	85			-	-	1.88	38			122	194
				Stone Pipe Bedding	3 cy	200.000 cy / cd	1	2,896.43 /cd	43	23.29	70	-	-	-	-			113	175
				DI Pipe Push - Class 52 30	15 lf	0.440 mh / lf	7	51.34 /mh	339	167.28	2,509	-	-	-	-			2,848	4,344
				DI Pipe Push - Class 52 36	5 lf	0.500 mh / lf	3	51.34 /mh	128	225.44	1,127	-	-	-	-			1,256	1,914
				Hydrostatic Testing	20 lf	0.021 ch / lf	2	182.49 /ch	77	0.16	3	-	-	-	-			80	126
				40.00 Under Ground Process Piping	20 lf		14		672	185.47	3,709			1.88	38			4,419	6,753
			40.01	Above Ground Process Piping															
				Pipe Supports	4 ea	4.001 mh / ea	16	45.62 /mh	730	250.05	1,000	-	-	-	-			1,730	2,674
				Hydrostatic Testing	142 lf	0.021 ch / lf	12	182.49 /ch	544	0.16	23	-	-	-	-			567	896
				Dresser Couplings 6"	8 ea	2.400 ch / ea	19	/ch		170.00	1,360	-	-	-	-			1,360	2,064
				Restrained Joint Couplings 10"	4 ea	5.721 ch / ea	92	182.49 /ch	4,176	283.06	1,132	-	-	-	-			5,308	8,328
				Restrained Joint Couplings 24"	8 ea	13.803 ch / ea	442	182.49 /ch	20,151	684.14	5,473	-	-	-	-			25,624	40,200
				14" DI Slab Thimble 12" long	2 ea	1.501 ch / ea	12	182.49 /ch	548	325.07	650	-	-	361.32	723			1,920	3,004
				36" DI Wall Thimble 24" long	1 ea	2.500 ch / ea	10	182.49 /ch	456	1,286.26	1,286	-	-	602.00	602			2,344	3,632
				36" DI Slab Thimble 12" long	4 ea	2.501 ch / ea	40	182.49 /ch	1,825	700.14	2,801	-	-	602.12	2,408			7,034	10,972
				Gasket/Nuts/Bolt Kit 6"	22 ea	1.000 mh / ea	22	45.62 /mh	1,004	15.87	349	-	-	-	-			1,353	2,118
				Gasket/Nuts/Bolt Kit 10"	5 ea	1.000 mh / ea	5	45.62 /mh	228	37.54	188	-	-	-	-			416	646
				Gasket/Nuts/Bolt Kit 30"	3 ea	2.501 mh / ea	8	45.62 /mh	342	175.03	525	-	-	-	-			867	1,339
				DI Flanged Joint Pipe 6"	70 lf	0.900 mh / lf	63	45.62 /mh	2,874	47.39	3,317	-	-	-	-			6,191	9,583
				DI Flanged Joint Pipe 10"	46 lf	1.240 mh / lf	57	45.62 /mh	2,603	88.26	4,060	-	-	-	-			6,663	10,281
				DI Flanged Joint Pipe 30"	26 lf	3.051 mh / lf	79	45.62 /mh	3,619	310.21	8,065	-	-	-	-			11,684	17,968
				DI Flanged 90 ell 6"	5 ea	4.830 mh / ea	24	45.62 /mh	1,102	105.30	527	-	-	-	-			1,628	2,543
				DI Flanged 90 ell 10"	1 ea	6.361 mh / ea	6	45.62 /mh	290	267.35	267	-	-	-	-			558	865
				DI Flanged 90 ell 30"	2 ea	17.874 mh / ea	36	45.62 /mh	1,631	2,317.07	4,634	-	-	-	-			6,265	9,614
				DI Flanged 90 ell 36"	0 ea	20.520 mh / ea	0	45.62 /mh	9	2,989.00	30	-	-	-	-			39	60
				DI Flanged Tee 6"	4 ea	4.830 mh / ea	19	45.62 /mh	881	120.00	480	-	-	-	-			1,361	2,124
				DI Flanged Tee 10"	2 ea	6.362 mh / ea	13	45.62 /mh	580	350.00	700	-	-	-	-			1,280	1,981
				DI Flanged Tee 30"	4 ea	17.874 mh / ea	71	45.62 /mh	3,262	2,600.00	10,400	-	-	-	-			13,662	20,947
				DI Blind Flange 10"	1 ea	6.101 mh / ea	6	45.62 /mh	278	247.85	248	-	-	-	-			526	817
				DI Blind Flange 30"	1 ea	17.163 mh / ea	17	45.62 /mh	783	2,395.88	2,396	-	-	-	-			3,179	4,876
				Chemical Piping & Accessories- ALLOWANCE	500 LF	0.240 mh / LF	120	45.62 /mh	5,476	55.01	27,505	-	-	-	-			32,981	50,412
				40.01 Above Ground Process Piping	142 lf		1,190		53,393	545.19	77,417			26.29	3,733			134,542	207,943
			40.02	Valves, Meters, Etc.															
				Backflow Preventer Flg 6"	2 ea	12.170 mh / ea	24	45.62 /mh	1,110	5,000.00	10,000	-	-	-	-			11,110	16,935
				Magnetic Flow Meter - In-line - 24" w/ transmitter	1 ea	26.005 mh / ea	26	48.85 /mh	1,270	12,002.39	12,002	-	-	-	-			13,273	20,227
				Swing Check Valve 6"	4 ea	4.669 mh / ea	19	45.62 /mh	852	1,100.00	4,400	-	-	-	-			5,252	8,026
				Swing Check Valve 10"	2 ea	7.996 mh / ea	16	45.62 /mh	730	4,650.93	9,302	-	-	-	-			10,031	15,272
				Swing Check Valve 24"	4 ea	18.001 mh / ea	72	45.62 /mh	3,285	14,402.88	57,612	-	-	-	-			60,896	92,637
				10" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	2 ea	9.602 mh / ea	19	45.62 /mh	876	5,701.14	11,402	-	-	-	-			12,278	18,692
				24" Butterfly Valve, 125 lb class, CI Body, Flg. w/ EIM elec actuator NEMA 4	4 ea	19.204 mh / ea	77	45.62 /mh	3,504	12,502.50	50,010	-	-	-	-			53,514	81,448
				40.02 Valves, Meters, Etc.	1 ls		253		11,628	154,728.01	154,728							166,356	253,237
			40.04	Hydropneumatic Piping System															
				Hydropneumatic Piping, Fitting & Valve Allowance	1 ls	mh / ls		45.62 /mh				12,000.00	12,000					12,000	18,213
				40.04 Hydropneumatic Piping System	1 ls							12,000.00	12,000					12,000	18,213
				40 Process Piping	162 lf		1,456		65,692	1,455.89	235,854	74.07	12,000	23.28	3,771			317,317	486,145
		43		Process Equipment															
			43.00	Pumps															
				Recycle Pumps - Vertical Turbine Pumps 75 hp, 8 mgd	3 ea	35.007 mh / ea	105	47.77 /mh	5,017	100.02	300					54,010.78	162,032	167,350	254,315
				Water Transmission Pumps - Vert Turbine Pumps, 200 hp, 5.3 gpm, 208TDH	4 ea	117.023 mh / ea	468	47.77 /mh	22,363	100.02	400					108,021.56	432,086	454,849	691,785
				Dewatering Pumps - Submersible Pumps 30 hp, 350 gpm, 208TDH	2 ea	24.005 mh / ea	48	42.59 /mh	2,045	100.02	200					29,005.79	58,012	60,256	91,585
				43.00 Pumps	1 ls		621		29,425	900.18	900				652,130.16	652,130	682,455	1,037,685	
			43.16	Swift Water Chemical Injection In-Line Blender															
				Chemical Injection In-Line Blender	1 ea	25.005 mh / ea	25	42.40 /mh	1,060	1,500.30	1,500					50,009.98	50,010	52,570	79,856
				43.16 Swift Water Chemical Injection In-Line Blender	1 ls		25		1,060	1,500.30	1,500				50,009.98	50,010	52,570	79,856	
			43.21	Air Compressor															
				Package Air Compressor 350 cfm	1 ea	40.000 mh / ea	40	42.40 /mh	1,696							35,000.00	35,000	36,696	55,804
				43.21 Air Compressor	1 ls		40		1,696						35,000.00	35,000	36,696	55,804	
				43 Process Equipment	1 ls		686		32,181	2,400.48	2,400				737,140.14	737,140	771,721	1,173,345	
				6B High Service Pump Station (New)	1 ls		12,748		526,911	751,521.75	751,522	903,704.70	903,705	76,465.00	76,465	737,140.14	737,140	2,995,742	4,586,577
				06 High Service Pump Station	1 ls		14,068		589,327										

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07				Groundwater & Surface Water															
	7A			Groundwater & Surface Water 50/50 Blend															
		70		Groundwater & Surface Water 50/50 Blend															
			70.00	Groundwater & Surface Water 50/50 Blend															
				<i>Estimate Place Holder</i>	1	1s		/s											
				70.00 Groundwater & Surface Water 50/50 Blend	1	1s													
				70 Groundwater & Surface Water 50/50 Blend	1	1s													
				7A Groundwater & Surface Water 50/50 Blend	1	1s													
				07 Groundwater & Surface Water	1	1s													

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
08				Electrical and E&I															
	8A			Electrical- Rehab															
		26		Electrical & Instrumentation															
			26.01	Above Ground Electrical															
				<i>Estimate Place Holder</i>	1	1/s		/s											
				26 Electrical & Instrumentation	1	1/s													
				8A Electrical- Rehab	1	1/s													
	8B			E&I - Rehab															
		26		Electrical & Instrumentation															
			26.02	Instrumentation & Controls															
				<i>Estimate Place Holder</i>	1	1/s		/s											
				26.02 Instrumentation & Controls	1	1/s													
				26 Electrical & Instrumentation	1	1/s													
				8B E&I - Rehab	1	1/s													
				08 Electrical and E&I	1	1/s													

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
09				Outfall & Floodwater System															
	9A			Outfall & Floodwater System- Rehab															
		90		Outfall & Floodwater System- Rehab															
			90.00	Outfall & Floodwater System- Rehab															
				Outfall & Floodwater System- Rehab	1 ls			/ls				100,000.00	100,000					100,000	151,772
				90.00 Outfall & Floodwater System- Rehab	1 ls							100,000.00	100,000					100,000	151,772
				90 Outfall & Floodwater System- Rehab	1 ls							100,000.00	100,000					100,000	151,772
				9A Outfall & Floodwater System- Rehab	1 ls							100,000.00	100,000					100,000	151,772
				09 Outfall & Floodwater System	1 ls							100,000.00	100,000					100,000	151,772

WBS Lvl 1	WBS Lvl 2	WBS Lvl 3	WBS Lvl 4	Description	Takeoff Quantity	Labor Productivity	Man Hours	Labor Price	Labor Amount	Material Cost/Unit	Material Amount	Subcontract Cost/Unit	Subcontract Amount	Const Equip Cost/Unit	Const Equip Amount	Process Equip Cost/Unit	Process Equip Amount	Total Amount	Grand Total Amount
10				Laboratory															
	10A			Laboratory- Rehab															
		10		Laboratory- Rehab															
			10.04	Laboratory- Rehab															
				Laboratory Equipment Upgrade Allowance	1	ls		/ls				50,000.00	50,000					50,000	75,886
				10.04 Laboratory- Rehab	1	ls						50,000.00	50,000					50,000	75,886
				10 Laboratory- Rehab	1	ls						50,000.00	50,000					50,000	75,886
				10A Laboratory- Rehab	1	ls						50,000.00	50,000					50,000	75,886
				10 Laboratory	1	ls						50,000.00	50,000					50,000	75,886

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total
Labor	28,222,766		707,472 hrs				10.36%
Overtime - 50 hr wk (w/ 1.5)					C		
Material	33,259,065						12.20%
Subcontract	27,440,416						10.07%
Equipment	8,801,548		94,226 hrs				3.23%
Process Equip	80,218,708						29.43%
Subtotal	177,942,503	177,942,503					65.29%
Sales Tax (Const Equipment)	649,554			7.38 %	C		0.24%
Mobilization/Demobilization	1,779,425			1.00 %	T		0.65%
Safety Supplies and Equip (L)	846,683			3.00 %	C		0.31%
Small Tools and Equip (L)	564,455			2.00 %	C		0.21%
Consumables (L)	423,341			1.50 %	C		0.16%
Testing & Commissioning	1,779,425			1.00 %	T		0.65%
3rd Party Inspections	889,713			0.50 %	C		0.33%
Tax & Misc Subtotal	6,932,596	184,875,099					2.54%
General Conditions	17,794,250			10.00 %	C		6.53%
General Conditions Subtotal	17,794,250	202,669,349					6.53%
Contingency (%)	30,400,403			15.00 %	T		11.15%
Contingency Subtotal	30,400,403	233,069,752					11.15%
Escalation- (mid pt 2023 @ 2.68%/yr)	15,965,278			6.85 %	T		5.86%
Escalation Subtotal	15,965,278	249,035,030					5.86%
Market Conditions- Max					T		
Msarket Conditions		249,035,030					91.37%
Permits	1,362,751			0.50 %	T		0.50%
All Risk Insurance	1,867,763			0.75 %	T		0.69%
Performance & Payment Bond	2,490,350			1.00 %	T		0.91%
Permits, Ins, & Bonds Subtotal	5,720,864	254,755,894					2.10%
G.C Overhead and Profit	17,794,250			10.00 %	C		6.53%
GC OH&P Subtotal	17,794,250	272,550,144					6.53%
Total		272,550,144					100.00%

OUCC DR 17-7

DATA REQUEST
City of Evansville

Cause No. 45545

Information Requested:

Please state the dates of the cost estimates in the Advanced Facility Plan were prepared and the year assumed for the costs (e.g., 2021 dollars, 2022 dollars, etc.). Please also state the level of design on which the cost estimates are based (e.g., 30% design completion).

Information Provided:

The costs were developed between in the third and fourth quarters of 2020. Estimates were based on 2020 dollars and escalated by 3%. However, it is now understood escalation has increased considerably going into 2021. The cost estimates were based on the alternative evaluations report, which is conceptual level (approximately 10% design).

OUCG DR 17-8

DATA REQUEST
City of Evansville

Cause No. 45545

Information Requested:

For Evansville's preferred new water treatment plant Alternate 2B, please identify the engineering costs (planning, design, bidding assistance, construction engineering, and inspection services) anticipated for the project and state the costs for each engineering component incurred to date.

Information Provided:

The following amounts have been spent or planned to be spent as follows:

Planning	\$870,173	See invoices provided in response to OUCG DR 17-12	Status: complete
Preliminary Design	\$620,159	See invoices provided in response to OUCG DR 17-12	Status: Current, \$1,015,668 remaining contracted for task
Final Design	\$7,756,696	Budgeted	Status: Not started, funds reserved and ready
Construction	\$140,049,000	Planned	See Table 11-3 of submitted PER
Bidding/Con. Admin/Inspection	\$6,302,000	Planned	See Table 11-3 of submitted PER

OUCG DR 17-10

DATA REQUEST
City of Evansville

Cause No. 45545

Information Requested:

For Evansville's water treatment plant rehabilitation Alternate 1, please provide cost support documentation for each major component lump sum cost listed in Table 9-2 Plant Alternative 1 Total Estimated Construction Cost on pages 117 and 118 of the Advanced Facility Plan (Attachment SMB-1 to Mr. Breese's case-in-chief testimony in this cause). Please provide copies of the Excel worksheets detailing quantities, unit costs, equipment costs, other data used to establish costs, and all assumptions and cost allowances. Please also provide copies of budgetary cost proposals provided by equipment vendors and material suppliers.

Information Provided:

The spreadsheet is attached as OUCG DR 17-10 - Alt 1.xls. See also OUCG DR 17-6 - Timberline Output.pdf (developed in Timberline Cost estimating software) which presents further detail for cost estimates performed early in the development of the alternatives report. See response to OUCG DR 17-6 for quotes.

Attachment:

OUCG DR 17-10.xls.

Cause No. 45545
OUCG DR 17-10 Attachment 1

Evansville Water and Sewer Utility

WTP Upgrade - Plant Alternative 1 - Capital Cost

Component Description	Cost	
Civil Site Work (Roads, Drainage, Fencing etc.)	\$3,500,000	
Rehabilitate River Intake	\$6,752,000	
North Plant Pretreatment Improvements	\$13,610,000	
North Plant Ozone System Retrofit	\$16,935,000	
Rehabilitate Gravity Filters	\$17,125,000	
New Sodium Hypochlorite System	\$2,092,000	
PAC Feed Improvements	\$1,000,000	
Other Chemical Improvements (4 at \$300k ea.)	\$1,200,000	4 chemical Systems
Demolish South Plant	\$1,066,000	
Construct New 6 MG Clearwell	\$10,960,000	
Rehabilitate Existing 6.5 MG Clearwell	\$734,000	
Rehabilitate High Service Pump Stations #2, #3	\$8,733,000	
Extend 3 Plant Outfalls (\$750k ea.)	\$2,250,000	3 Outfalls
Building Renovations	\$4,000,000	
Interconnecting Site Utility / Electrical Work	\$3,500,000	
Other Demolition Work Throughout Plant	\$2,000,000	
Subtotal	\$95,457,000	
Additional Construction Contingencies (15%)	\$14,319,000	
Other Misc. Plant-Wide Improvements (5%)	\$4,773,000	
Phasing & Sequencing Plant Outages (5%)	\$4,773,000	
Remediation & Hazardous Martials	\$1,000,000	
Allowances	\$500,000	
Startup and Commissioning	\$1,000,000	
Total Estimated Construction Cost	\$121,822,000	

Original Costs from Estimator

Description	Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Demolition Work	\$49,600	\$75,000	1.512
Roof Repair / Replacement	\$7,000	\$10,500	1.500
Doors & Hardware Rehab	\$13,000	\$19,700	1.515
Building Finishes & Specialties	\$34,200	\$50,500	1.477
Structure and Walkway Rehabilitation	\$50,000	\$75,500	1.510
Process Piping and Accessories	\$209,000	\$317,800	1.521
Pump Replacement	\$1,335,500	\$2,020,400	1.513
Screen Replacement	\$666,000	\$1,019,100	1.530
Potassium Permanganate System	\$249,000	\$366,000	1.470
HVAC Replacement	\$115,000	\$172,000	1.496
Electrical Systems	\$200,000	\$302,000	1.510
Instrumentation	\$84,000	\$126,900	1.511
Totals	\$3,012,300	\$4,555,400	

Adjusted for Report

Table B1.1 - River Intake Rehabilitation, Low Service PS

Description		Estimated Cost	Cost Adjust Comments
Demolition Work		\$75,000	
Roof Repair / Replacement (3,000 sf)		\$60,000	X - City noted a whole new roof
Doors & Hardware Rehab		\$13,000	
Building Finishes & Specialties		\$35,000	
Structure and Walkway Rehabilitation		\$50,000	
Process Piping and Accessories		\$209,000	
Pump Replacement (6 units)		\$1,336,000	
Intake Screens (3 units)		\$1,300,000	X - quote of \$750k for 3 screens - estimate seems to be pneumatic screens? Access from existing bridge, barge not needed
Potassium Permanganate System (1 unit)		\$400,000	X - estimate seemed low - need to run piping over, hopper, storage, etc.
HVAC Replacement (3,000 sf)		\$115,000	
Misc. Electrical (MCC Upgrades are Underway)		\$150,000	X - MCC's are getting some upgrades
Instrumentation		\$100,000	
Subtotal		\$3,843,000	
Estimating Contingency	30%	\$1,152,900	
Escalation to Midpoint	3%	\$115,290	
Construction Subtotal		\$5,111,190	
Contractor General Conditions	10%	\$511,119	
Contractor Overhead and Profit	12%	\$613,343	
Construction Contingencies	5%	\$255,560	
Allowance: Dredge River		\$260,000	
Grand Total Cost		\$6,752,000	

Effective Multiplier 1.76

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
02.01 Demolition Work	Demolition Work	\$76,883	\$119,797	1.558
	Modify Existing Structure & Service	\$1,906,341	\$2,944,607	1.545
43.03 Baffle Walls	Baffle Walls	\$346,653	\$530,906	1.532
40.01 Above Ground Process Piping	Process Piping	\$18,825	\$28,586	1.519
43.01 Flocculators & Mixers	Flocculators & Mixers	\$921,261	\$1,402,364	1.522
43.02 Settlement Equipment	Settlement Equipment	\$3,398,594	\$5,171,988	1.522
43.20 Slide Gate w/ Operator	Slide Gate w/ Operator	\$131,601	\$199,566	1.516
26.01 Above Ground Electrical	Electrical	\$315,783	\$477,528	1.512
26.02 Instrumentation & Controls	Instrumentation & Controls	\$94,735	\$143,258	1.512
Grand Total Capital Construction C	Grand Total Capital Construction C	\$7,210,676	\$11,018,600	

Adjusted for Report

Table B2.1 - Retrofit North Pretreat w/Plate Settlers

Description		Estimated Cost	Cost Adjust Comments
Demolition Work		\$90,000	
Modify Existing Structure & Services		\$2,307,000	X - EWSU wants influent channels and effluent launders completely rehabed - added \$400k to cost
Flow Control Diffuser Wall SS 304 (360 lf)		\$347,000	
Process Piping and Valves		\$150,000	X - Seemed low, updated to 150K
Coagulant Injection Improvements		\$75,000	
Flocculators & Mixers w/VFD (24 units)		\$922,000	
Plate Settlers & Sludge Collection		\$3,399,000	
Slide Gate w/ Operator (6 units)		\$180,000	X - 30K to match 120K for 4 units in new option
Electrical (8% Equip Cost)		\$361,000	X - Use 8% of equipment cost
Instrumentation & Controls (5% Equip Cost)		\$226,000	X - Use 5% of equipment cost
Subtotal		\$8,057,000	
Estimating Contingency	30%	\$2,417,100	
Escalation to Midpoint	3%	\$241,710	
Construction Subtotal		\$10,715,810	
Contractor General Conditions	10%	\$1,071,581	
Contractor Overhead and Profit	12%	\$1,285,897	
Construction Contingencies	10%	\$535,791	
Grand Total Cost		\$13,610,000	

Original Costs from Estimator

Description		Estimated Base		
		Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Rehab North Basins # 1 - 5				
02.01 Demolition Work	Demolition Work	\$308,326	\$478,430	1.552
	Building Structure	\$896,554	\$1,389,903	1.550
31.12 Structure Backfill	Foundation and Earthwork	\$542,559	\$838,263	1.545
40.01 Above Ground Process Piping	Process Piping	\$16,825	\$25,562	1.519
Ozone Facility				
	Buidling Structure	\$364,087	\$558,710	1.535
	Process Piping	\$298,560	\$459,056	1.538
40.02 Valves, Meters, Etc.	Valves, Meters, Etc.	\$12,895	\$19,597	1.520
43.10 Ozone Equipment	Ozone Equipment	\$3,497,647	\$5,302,139	1.516
22.00 Plumbing	Plumbing	\$34,447	\$52,091	1.512
23.00 HVAC	HVAC	\$258,300	\$390,602	1.512
	Electrical	\$208,973	\$316,009	1.512
26.02 Instrumentation & Controls	Instrumentation & Controls	\$49,500	\$74,854	1.512
LOX Equipment				
	Buidling Structure	\$23,462	\$36,190	1.542
32.01 Fencing & Gates	Fencing & Gates	\$5,142	\$7,776	1.512
	Process Piping	\$28,183	\$43,688	1.550
40.02 Valves, Meters, Etc.	Valves, Meters, Etc.	\$20,611	\$31,273	1.517
43.17 LOX Equipment	LOX Vaporizor, Tank, Station	\$890,881	\$1,347,884	1.513
26.01 Above Ground Electrical	Electrical	\$42,977	\$64,990	1.512
26.02 Instrumentation & Controls	Instrumentation & Controls	\$12,893	\$19,497	1.512
Grand Total Capital Construction Cost	Grand Total Capital Construction (\$7,512,822	\$11,456,514	

Adjusted for Report

Table B3.3 - Ozonation in Existing Basins

Description		Estimated Cost	Cost Adjust Comments
Rehab North Secondary Basins			
Demolition Work		\$309,000	
Basin Modifications		\$897,000	
Ozone Corrosion Additives		\$100,000	X - 10% of basin modifications, added
Basin Abandon, Structural Backfill		\$543,000	
Process Piping		\$100,000	X - seemed low
Access Hatches (8 units)		\$120,000	X - Added item
Ozone Facility			
Building Structure (5,712 sf)		\$365,000	
Process Piping		\$299,000	
Sampling System (pumps, piping, Analyzers)		\$100,000	X - Added this item
Valves, Meters, etc.		\$155,000	X - assume 35 valves (9 pumps)+15K for small valves
Ozone System, quench, destruct (2 units)		\$4,498,000	X - Add 30% (1 Mill) for install
Plumbing (5,740 sf)		\$75,000	
HVAC (5,740 sf)		\$259,000	
Electrical		\$900,000	X - 150K for Bldg and 750K for Ozone
Instrumentation & Controls (5 % Equip Cost)		\$225,000	X - Ozone I&C would be higher; use higher
LOX Equipment			
Equipment Pad (1,462 sf)		\$35,000	X - Make 35K based on 12" slab and \$600/cy
Misc. Site and Access Improvements		\$25,000	
Process Piping		\$29,000	
Valves, Meters, etc.		\$42,000	X - Double estimator number
LOX Vaporizer, Tank, Station (2 units)		\$891,000	
Electrical (5% Equip Cost)		\$45,000	
Instrumentation & Controls (1.5% Equip Cost)		\$14,000	
Subtotal			
		\$10,026,000	
Estimating Contingency		30%	\$3,007,800
Escalation to Midpoint		3%	\$300,780
Construction Subtotal			\$13,334,580
Contractor General Conditions		10%	\$1,333,458
Contractor Overhead and Profit		12%	\$1,600,150
Construction Contingencies		5%	\$666,729
Grand Total Cost			\$16,935,000

Table B3.3a - Ozonation in Existing Basins and Filter Rehabilitation

Description		Estimated Cost
Rehab North Secondary Basins		
Demolition Work		\$309,000
Basin Modifications		\$897,000
Ozone Corrosion Additives		\$100,000
Basin Abandon, Structural Backfill		\$543,000
Process Piping		\$100,000
Access Hatches (8 units)		\$120,000
Ozone Facility		
Building Structure (5,712 sf)		\$365,000
Process Piping		\$299,000
Sampling System (pumps, piping, Analyzers)		\$100,000
Valves, Meters, etc.		\$155,000
Ozone System, quench, destruct (2 units)		\$4,498,000
Plumbing (5,740 sf)		\$75,000
HVAC (5,740 sf)		\$259,000
Electrical		\$900,000
Instrumentation & Controls (5 % Equip Cost)		\$225,000
LOX Equipment		
Equipment Pad (1,462 sf)		\$35,000
Misc. Site and Access Improvements		\$25,000
Process Piping		\$29,000
Valves, Meters, etc.		\$42,000
LOX Vaporizer, Tank, Station (2 units)		\$891,000
Electrical (5% Equip Cost)		\$45,000
Instrumentation & Controls (1.5% Equip Cost)		\$14,000
Filter Rehabilitation Base Cost		\$10,138,000
Subtotal		\$20,164,000
Estimating Contingency	30%	\$6,049,200
Escalation to Midpoint	3%	\$604,920
Construction Subtotal		\$26,818,120
Contractor General Conditions	10%	\$2,681,812
Contractor Overhead and Profit	12%	\$3,218,174
Construction Contingencies	5%	\$1,340,906
Grand Total Cost		\$34,060,000

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
Rehab Filters 21 - 28				
02.01 Demolition Work	Demolition Work	\$231,041	\$363,200	1.572
03.30 Patch Cracks and Resurface Concrete	Patch Cracks and Resurface Concrete	\$80,975	\$127,647	1.576
09.00 Finishes	Paint Finishes	\$162,284	\$254,077	1.566
43.05 Filtration Equipment	Filtration Equipment	\$899,723	\$1,384,578	1.539
Rehab Filters 29 - 32				
02.01 Demolition Work	Demolition Work	\$235,083	\$369,574	1.572
03.30 Patch Cracks and Resurface Concrete	Patch Cracks and Resurface Concrete	\$80,975	\$127,647	1.576
09.00 Finishes	Paint Finishes	\$216,896	\$340,293	1.569
40.01 Above Ground Process Piping	Process Piping	\$137,561	\$211,658	1.539
43.05 Filtration Equipment	Filtration Equipment	\$914,273	\$1,406,800	1.539
Filter Building 21 - 36				
02.01 Demolition Work	Demolition Work	\$264,000	\$399,221	1.512
08.00 Doors, Frames & Hardware	Doors, Frames & Hardware	\$520,062	\$786,684	1.513
09.00 Finishes	Paint Finishes	\$143,284	\$220,121	1.536
23.00 HVAC	HVAC	\$880,000	\$1,330,738	1.512
26.01 Above Ground Electrical	Electrical	\$792,000	\$1,197,664	1.512
Grand Total Capital Construction Cost	Grand Total Capital Construction Cost	\$5,558,157	\$8,519,902	

Adjusted for Report

Table B3.1 - Existing Filter Rehabilitation

Description		Estimated Cost	Cost Adjust Comments
Rehab Filters 21 - 28			Filters are 28 X 37
Demolition Work		\$232,000	
Patch Cracks and Resurface Concrete		\$81,000	
Paint Finishes		\$163,000	
Filtration Equipment and Media		\$1,700,000	Too low in original
SS Air Scour Grids		\$720,000	X - Assume 90K per filter;
Air Scour Blowers (2 units)		\$425,000	X - Use half the cost from MGF alt blower pricing
Rehab Filters 29 - 36			Filters are 23 X 46
Demolition Work		\$236,000	
Patch Cracks and Resurface Concrete		\$150,000	
Paint Finishes		\$217,000	
Process Piping Improvements		\$138,000	
Filtration Equipment and Media		\$1,400,000	
Aluminum Storefronts		\$521,000	
SS Air Scour Grids		\$720,000	X - Assume 90K per filter
Air Scour Blowers (2 units)		\$425,000	X - Use half the cost from MGF alt blower pricing
Filter Building Improvements			
Filters 1-20 Demolition Work		\$264,000	
Misc. Doors, Frames & Storefronts		\$30,000	X - Filters 21-28 already have the storefront window (Delete writeup/estimate)
Paint Finishes		\$144,000	
HVAC Improvements		\$880,000	
Electrical Improvements		\$792,000	
Instrumentation and Controls Improvements		\$500,000	
Subtotal		\$10,138,000	
Estimating Contingency	30%	\$3,041,400	
Escalation to Midpoint	3%	\$304,140	
Construction Subtotal		\$13,483,540	
Contractor General Conditions	10%	\$1,348,354	
Contractor Overhead and Profit	12%	\$1,618,025	
Construction Contingencies	5%	\$674,177	
Allowances:			
Grand Total Cost		\$17,125,000	

Summary Table

Description		Estimated Cost
Demolition & Media Removal		\$732,000
Filters 21-28 Concrete Repair		\$81,000
Filters 29-32 Concrete Repair		\$450,000
Pipe Resurfacing & Paint Finishes		\$524,000
Pipe Replacement		\$238,000
Filtration Equipment, Media & Valves		\$3,100,000
Storefront Walls (Filters 29-32) & Arch. Improvements		\$551,000
Air Scour Grids		\$1,440,000
Air Scour Blowers (4 ea.)		\$850,000
HVAC Improvements		\$880,000
Electrical & I&C Improvements		\$1,292,000
Subtotal		\$10,138,000
Estimating Contingency	30%	\$3,041,400
Escalation to Midpoint	3%	\$304,140
Construction Subtotal		\$13,483,540
Contractor General Conditions	10%	\$1,348,354
Contractor Overhead and Profit	12%	\$1,618,025
Construction Contingencies	5%	\$674,177
Grand Total Cost		\$17,125,000

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
	Building Structure	\$381,041	\$580,876	1.524
40.01	Above Ground Process Piping	\$26,385	\$40,184	1.523
43.00	Pumps	\$299,011	\$453,245	1.516
43.13	Chemical System Equipment	\$78,332	\$119,317	1.523
21.00	Fire Protection (Wet System)	\$21,724	\$32,852	1.512
22.00	Plumbing	\$20,009	\$30,258	1.512
23.00	HVAC	\$81,855	\$123,781	1.512
	Electrical	\$169,292	\$256,114	1.513
26.02	Instrumentation & Controls	\$94,224	\$142,486	1.512
Grand Total Capital Construction		\$1,171,873	\$1,779,113	

Adjusted for Report

Table B4.2 - Liquid Hypochlorite Disinfection (Bulk)

Description		Estimated Cost	Cost Adjust Comments
Building Structure (1,819 sf)		\$382,000	
Process Piping		\$53,000	Very low in original
Pumps (carrier, transfer, metering)		\$300,000	
Liquid Chemical Feed Equipment		\$179,000	X - day tanks included, but no bulk tanks
Fire Protection (Wet System, 1,819 sf)		\$29,000	X - updated for square footage
Plumbing (1,819 sf)		\$21,000	
HVAC (1,819 sf)		\$110,000	X - Use \$60/sf instead of \$45/sf used elsewhere
Electrical (1,819 sf)		\$170,000	
Instrumentation & Controls		\$95,000	
Subtotal		\$1,339,000	
Estimating Contingency	20%	\$267,800	
Escalation to Midpoint	3%	\$40,170	
Construction Subtotal		\$1,646,970	
Contractor General Conditions	10%	\$164,697	
Contractor Overhead and Profit	12%	\$197,636	
Construction Contingencies	5%	\$82,349	
Grand Total Cost		\$2,092,000	

PAC System Upgrade

	Unit	Quantity	Unit Cost	Total Cost
Concrete Repair	LS	1	\$50,000	\$50,000
Accessories Replacement	LS	1	\$80,000	\$80,000
Mixers	EA	2	\$15,000	\$30,000
Slurry Pumps	EA	4	\$10,000	\$40,000
Metering Pumps	EA	8	\$7,500	\$60,000
HVAC Upgrades	LS	1	\$80,000	\$80,000
Piping & Valve Replacement	LS	1	\$100,000	\$100,000
Electrical and Controls	LS	1	\$200,000	\$200,000
Subtotal				\$640,000
Estimating Contingency	20%			\$128,000
Escalation to Midpoint	3%			\$19,200
Construction Subtotal				\$787,200
Contractor General Conditions	10%			\$78,720
Contractor Overhead and Profit	12%			\$94,464
Construction Contingencies	5%			\$39,360
Total				\$1,000,000

Other Chemical Systems

	Unit	Quantity	Unit Cost	Total Cost
Misc. Elec / Control Upgrades	LS	1	\$80,000	\$80,000
Misc. Valve / Piping Replacement	LF	500	\$65	\$32,500
Pump Replacement	EA	2	\$7,500	\$15,000
Room Hardware / Finishes	LS	1	\$40,000	\$40,000
HVAC Improvements	LS	1	\$25,000	\$25,000
Subtotal				\$192,500
Estimating Contingency	20%			\$38,500
Escalation to Midpoint	3%			\$5,775
Construction Subtotal				\$236,775
Contractor General Conditions	10%			\$23,678
Contractor Overhead and Profit	12%			\$28,413
Construction Contingencies	5%			\$11,839
Total				\$300,000

Demolish South Plant

Description		Estimated Cost
Demo scrapers / drives, walks		\$50,000
Demo Concrete / haul (4800 CY at \$150/yd)		\$712,792
Site Restoration / Fill		\$50,000
Subtotal		\$812,792
Estimating Contingency	10%	\$81,279
Escalation to Midpoint	3%	\$24,384
Construction Subtotal		\$918,455
Contractor General Conditions	3%	\$27,554
Contractor Overhead and Profit	8%	\$73,476
Construction Contingencies	5%	\$45,923
Allowances:		
Grand Total Cost		\$1,066,000

130 ft diameter primary
90 ft diameter secondary
2 ft overall thickness
18 ft depth
1843.06769 CY for walls
2908.88209 CY for floors

Reduce due to fairly defined demo work

Reduced GC's and OHP due to mainly demo wor
Reduced OHP due to demo work

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
31.01 Dewatering	Structural Components	\$3,507,453	\$5,415,382	1.544
	Dewatering	\$109,646	\$167,526	1.528
31.02 Piles	Piles	\$1,133,796	\$1,727,195	1.523
	Excavation	\$1,734,001	\$2,658,794	1.533
	Soil and Backfill	\$523,109	\$828,067	1.583
Grand Total Capital Construction C Grand Total Capital Construction Cost		\$7,008,005	\$10,796,964	

Adjusted for Report

Table B5.1b - Large Clearwell (6 MG) Option

Description		Estimated Cost	Cost Adjust Comments
Structure (275'x137'x24')		\$3,333,000	adjusted quantities by 95% of the 6.5 MG clearwell to accommodate 4 MG (did not adjust dewatering)
Dewatering (2 pumps, 4 mo)		\$110,000	
Piles (26,975 vf)		\$1,078,000	
Excavation, Shoring		\$1,648,000	
Soil and Backfill		\$497,000	
60-inch Transfer Piping		\$200,000	60 inch piping to high service station 2 400 ft \$500 per ft
Transfer Pipe Utility coordination / site restoration		\$150,000	
Subtotal		\$7,016,000	
Estimating Contingency	20%	\$1,403,200	
Escalation to Midpoint	3%	\$210,480	
Construction Subtotal		\$8,629,680	
Contractor General Conditions	10%	\$862,968	
Contractor Overhead and Profit	12%	\$1,035,562	
Construction Contingencies	5%	\$431,484	
Allowances:			
Grand Total Cost		\$10,960,000	

Description

31.01 Dewatering
31.02 Piles

Grand Total Capital Construction Cost

Description		Estimated Cost
Concrete Repair - Walls 1560 SY @ \$40/SY		\$62,507
Concrete Repair - Floor (1680 SY at \$30/SY)		\$50,473
New Concrete Wall (400 CY at \$750/CY)		\$301,333
Hatch Replacement (6 at \$5k ea)		\$30,000
Misc Improvements		\$25,000
Subtotal		\$469,313
Estimating Contingency	20%	\$93,863
Escalation to Midpoint	3%	\$14,079
Construction Subtotal		\$577,255
Contractor General Conditions	10%	\$57,726
Contractor Overhead and Profit	12%	\$69,271
Construction Contingencies	5%	\$28,863
Allowances:		
Grand Total Cost		\$734,000

	Existing	New Wall
	226 ft	2 ft wide
	67 ft	401.7777778 CY
	24 ft deep	
walls	1562.667 SY	
floors	1682.444	

Original Costs from Estimator

Description		Estimated Base Cost (from estimate)	Estimated Loaded Cost (from estimate)	Multiplier from Estimate
43.00 Pumps	Pumps	\$2,898,416	\$4,387,048	1.514
	Grand Total Capital Constructio	\$2,898,416	\$4,387,048	

Grand Total Capital Construction Cost

Renovate 2 and 3

Table B6.1 - High Service Pump Rehab Option (2 and 3)

Description		Estimated Cost
Remove Vertical Turbines (3 at \$10k ea)		\$30,000
Remove Split Case Pumps (2 at \$5k ea)		\$10,000
New Vertical Turbine Pumps (3 at \$900k ea)		\$2,700,000
New Split case pumps (2 at \$750 k ea)		\$1,500,000
Minor pump rehab work (2 at \$25k ea)		\$50,000
Piping and Valve Rehab		\$250,000
Electrical & I&C Work (15% Pump Equipment)		\$630,000
Subtotal		\$5,170,000
Estimating Contingency	30%	\$1,551,000
Escalation to Midpoint	3%	\$155,100
Construction Subtotal		\$6,876,100
Contractor General Conditions	10%	\$687,610
Contractor Overhead and Profit	12%	\$825,132
Construction Contingencies	5%	\$343,805
Grand Total Cost		\$8,733,000

Renovate 3 only

Description		Estimated Cost
Remove Vertical Turbines (3 at \$10k ea)		\$30,000
New Vertical Turbine Pumps (3 at \$900k ea)		\$2,700,000
Piping and Valve Rehab		\$250,000
Electrical & I&C Work (15% Pump Equipment)		\$405,000
Subtotal		\$3,385,000
Estimating Contingency	30%	\$1,015,500
Escalation to Midpoint	3%	\$101,550
Construction Subtotal		\$4,502,050
Contractor General Conditions	10%	\$450,205
Contractor Overhead and Profit	12%	\$540,246
Construction Contingencies	5%	\$225,103
Grand Total Cost		\$5,718,000

Civil Work

	Unit	Quantity	Unit Cost	Total Cost
Demo: Storm Structures	LS	1	\$150,000	\$150,000
Dmo: Pavement	LS	1	\$100,000	\$100,000
Debris Hauling / Misc Excavation	LS	1	\$200,000	\$200,000
Demo: Underground Structures	LS	1	\$300,000	\$300,000
New Fencing	LF	3180	\$65	\$206,700
Gate / Card Access	EA	2	\$30,000	\$60,000
New Storm Piping (smaller)	LF	2000	\$100	\$200,000
Large Storm Piping / Structures	LS	1	\$250,000	\$250,000
Stormwater Pump Station Upgrades	LS	1	\$300,000	\$300,000
Site Paving	SY	6100	\$40	\$244,000
Site Grading	LS	1	\$80,000	\$80,000
Additional Dewatering	LS	1	\$150,000	\$150,000
Subtotal				\$2,240,700
Estimating Contingency	20%			\$448,140
Escalation to Midpoint	3%			\$67,221
Construction Subtotal				\$2,756,061
Contractor General Conditions	10%			\$275,606
Contractor Overhead and Profit	12%			\$330,727
Construction Contingencies	5%			\$137,803
Total				\$3,500,000

Outfall Extension (each outfall)

	Unit	Quantity	Unit Cost	Total Cost
Levee excavation / army coord.	LS	1	\$300,000	\$300,000
Pipe Extension	LF	100	\$500	\$50,000
Backfill and restoration	LS	1	\$100,000	\$100,000
Misc. Anchoring	LS	1	\$30,000	\$30,000
Subtotal				\$480,000
Estimating Contingency	20%			\$96,000
Escalation to Midpoint	3%			\$14,400
Construction Subtotal				\$590,400
Contractor General Conditions	10%			\$59,040
Contractor Overhead and Profit	12%			\$70,848
Construction Contingencies	5%			\$29,520
Total				\$750,000

Building Renovations

	Unit	Quantity	Unit Cost	Total Cost
Levee excavation / army coord.	LS	1	\$300,000	\$300,000
Pipe Extension	LF	100	\$500	\$50,000
Backfill and restoration	LS	1	\$100,000	\$100,000
Misc. Anchoring	LS	1	\$30,000	\$30,000
Subtotal				\$480,000
Estimating Contingency	20%			\$96,000
Escalation to Midpoint	3%			\$14,400
Construction Subtotal				\$590,400
Contractor General Conditions	10%			\$59,040
Contractor Overhead and Profit	12%			\$70,848
Construction Contingencies	5%			\$29,520
Total				\$750,000

Building Renovations				
Admin area, Filters 1-20, garage	SF	51200	\$50	\$2,560,000
Subtotal				\$2,560,000
Estimating Contingency	20%			\$512,000
Escalation to Midpoint	3%			\$76,800
Construction Subtotal				\$3,148,800
Contractor General Conditions	10%			\$314,880
Contractor Overhead and Profit	12%			\$377,856
Construction Contingencies	5%			\$157,440
Total				\$3,999,000
			Use	\$4,000,000

These Buildings are in the worst condition - renovation costs are included for filters 21-36, river ntake, pump stations, etc.

Elec and Utilities				
New Electrical Ductbanks & Cabling	LF	1100	\$900	\$990,000
Buried Chemical Piping	LF	880	\$160	\$140,800
Elec Service Upgrades	LS	1	\$750,000	\$750,000
Larger Dia Interconnecting Pipe	LF	450	\$800	\$360,000
Subtotal				\$2,240,800
Estimating Contingency	20%			\$448,160
Escalation to Midpoint	3%			\$67,224
Construction Subtotal				\$2,756,184
Contractor General Conditions	10%			\$275,618
Contractor Overhead and Profit	12%			\$330,742
Construction Contingencies	5%			\$137,809
Total				\$3,500,000

INPUTS

Estimating Contingency (Rehab)	30%
Estimating Contingency (New)	20%
Escalation to Midpoint	3%
Contractor General Conditions	10%
Contractor Overhead and Profit	12%
Permitting	0.0%
Construction Contingencies	5%
Effective Multiplier Used (Rehab)	1.69
Effective Multiplier Used (New)	1.56

OUCC DR 1-3

05/21/2021

DATA REQUEST
City of Evansville

Cause No. 45545

Information Requested:

Please identify the entity Petitioner has engaged to complete the “Preliminary Engineering Report”. Please provide any agreement or other document establishing compensation or scope of services.

Information Provided:

Petitioner has engaged HNTB Corporation to complete any Preliminary Engineering Reports pertaining to the Water Distribution projects. See Attachment OUCC DR 1-3_Attachment 1 for the HNTB contract.

Petitioner has engaged AECOM Technical Services, Inc. to complete the Preliminary Engineering Report for the new Water Treatment Plant. See Attachment OUCC DR 1-3_Attachment 2 for AECOM contract.

Attachments:

OUCC DR 1-3_Attachment 1.pdf
OUCC DR 1-3_Attachment 2.pdf

ENGINEERING SERVICES AGREEMENT

THIS AGREEMENT is made and entered into August 20, 2019, by and between the Evansville Water & Sewer Utility, acting by and through the Utility Board (hereinafter referred to as the "Board") and AECOM Technical Services, Inc. (hereinafter referred to as "Engineer").

NOW, THEREFORE, in consideration of the promises and covenants herein contained, the parties hereto agree as follows:

Section 1. Scope of Services

The services to be provided by the Engineer under this Agreement are as set out in EXHIBIT "A", attached to this Agreement, and made an integral part hereof. All work performed hereunder by Engineer shall be performed using the highest standards for such engineering services in the Evansville, Indiana area.

Section 2. Information and Services to be Furnished by Board

2.1 The information and services to be furnished by the Board are as set out in EXHIBIT "B", attached to this Agreement, and made an integral part hereof.

2.2 The contact person for the Board shall be your assigned Project Manager from the Utility Engineering Department.

2.3 The authorized representative for the Board shall be Allen R. Mounts, Utility Director.

Section 3. Compensation

The Engineer shall receive payment for the work performed under this Agreement as follows: SEE ATTACHED EXHIBIT "C" attached hereto and incorporated herein.

The not-to-exceed amount is \$ 2,506,000. The Engineer acknowledges that payment for services is typically done within 45 days of submission of proper claim forms as required by the Utility. There shall be no late payment penalties or interest on payments not made within said 45 days.

There shall be no "extra work", "extra charges", or travel expenses incurred (except as noted in Exhibit "C") without the written consent of the Board or its authorized representative. (SEE SECTION 5.5).

Section 4. Notice to Proceed and Schedule

The Engineer shall begin the work to be performed under this Agreement on or before September 2, 2019, and have the work completed on or before March 31, 2020.

Section 5. General Provisions

5.1 Employment

During the period of this Agreement, the Consultant shall not engage, on this project on a full or part time or other basis any professional technical personnel who are or have been at any time during the period of this Agreement in the employment of the Board except regularly retired employees.

5.2 Ownership of Documents

All documents, including tracings, drawings, reports, estimates, specifications, field notes, investigation, studies, etc., as instruments of service, are to be the property of the Board. During the performance of the services, herein provided for, the Engineer shall be responsible for any loss or damage to the documents, herein enumerated, while they are in his possession and any such loss or damage shall be restored at his expense. Full access to the work during the progress of the work shall be available to the Board.

5.3 Compliance with State and Other Laws

The Engineer specifically agrees that in performance of the services herein enumerated by him or by a subcontractor or anyone acting in behalf of either, that he or they will comply with any and all State, Federal, and Local Statutes, ordinances, and regulations and obtain all permits that are applicable to the entry into and the performance of this Agreement.

5.4 Workmen's Compensation and Liability Insurance

The Engineer shall maintain the following insurance during the life of the Agreement:

1. Comprehensive General Liability insurance covering all operations to include:
 - Premises operations (including Explosion, Collapse and Underground coverages as applicable)
 - Independent contractors
 - Contractual liability (broad form)
 - Completed operations
 - Broad form property damage
 - Products and completed operations
 - Personal injury with employment exclusion deleted
 - Limits: Bodily Injury and Property Damage combined single limit of \$1,000,000 per occurrence - \$2,000,000 aggregate

2. Automobile Liability
 - Covering all owned, non-owned and hired automobiles
 - Limits: Bodily Injury and Property Damage combined single limit of \$1,000,000

3. Professional Liability
 - Limits: \$2,000,000 each claim
4. Workers Compensation
 - Limits: Coverage A: Statutory
Coverage B: Employers Liability
\$100,000 each accident
\$500,000 disease – policy limit
\$100,000 disease – each employee
 - Engineer shall maintain and pay premiums for such public liability insurance, property damage insurance and Workers' Compensation as will fully protect it from claims under the Indiana Workers Compensation Act and from any other claims for damages to persons not covered by said Act because of bodily injury, including death, which may arise from or during the performance of the work described in this contract, and Engineer shall furnish proof unto Board that it has in force said insurance by submitting to Board, or agent thereof, a memorandum copy of insurance coverage. Engineer further shall keep Board indemnified from any loss, damage, liability, costs or expenses incurred by reason of failure of Engineer or of any agent, employee, or subcontractor to comply with any of the provisions of said Act. Workers Compensation Insurance shall be satisfied by providing a certificate from the Industrial Board before the work commences.
5. Umbrella Liability
 - Limits: \$1,000,000 per occurrence and aggregate applying to all bodily injury, personal injury, property damage and errors or omissions.
6. If the General Liability or Professional Liability coverages are provided by a policy on a claims made basis, the policy date or Retroactive Date shall predate the Contract, the termination date of the policy or the applicable extended reporting period shall be no earlier than two (2) years after completion of this contract.
7. All coverage shall be placed with an insurance company that is "A" rated and duly admitted in the State of Indiana and shall be reasonably acceptable to Board. Coverage shall be afforded to the additional insured regardless of whether or not a claim is in litigation.
8. For each type of insurance, which Engineer is required to maintain under this Agreement, Engineer shall furnish to the Board a Certificate or Certificates of Insurance showing that each such type of insurance is in full force and effect, naming the City of Evansville and the Utility Board as an additional insureds and

providing that such insurance cannot be amended or cancelled without at least thirty (30) days' written notice to Board's authorized representative: Allen R. Mounts.

9. Waiver of Subrogation: Engineer shall obtain from each of its insurers a waiver of subrogation on Commercial General Liability in favor of the Board with respect to Losses arising out of or in connection with the work performed or materials provided by Engineer.

10. If it becomes customary for other similar contracts with the Board to carry higher limits of liability coverage, Engineer shall, if requested by Board, increase the foregoing coverage to such customary limits.

5.5 Changes in Work

In the event the Board requires a change in scope, character, or complexity of the work after the work has progressed as directed by the Board, adjustments in compensation to the Engineer and in time for performance of the work as modified, shall be determined by the Board and the Engineer in the exercise of their honest and reasonable judgment. The Engineer shall not commence the additional change of the scope of the work until a supplemental agreement is executed and the Engineer is authorized in writing by the Board.

5.6 Termination of Services

This Agreement may be terminated by the Board or the Engineer should the other party fail to perform its obligations hereunder. In the event of termination, the Board shall pay the Engineer for all services rendered to the date of termination, all reimbursable expenses and reimbursable termination expenses, less any amount owed by Engineer to Board.

5.7 Successors and Assignees

The Board, insofar as authorized by law, binds itself and its successors, and the Engineer binds his successors, executors, administrators and assignees, to the other party of this Agreement and to the successors, executors, administrators and assignees of such other party, as the case may be insofar as authorized by law, in respect to all covenants of this Agreement.

Except as above set forth, neither the Board nor the Engineer shall assign, sublet or transfer its or his interest in this Agreement without the consent of the other.

5.8 Supplements

This Agreement may only be amended, supplemented or modified only by a written document executed in the same manner as this Agreement.

Section 6. General Indemnification

The Engineer shall indemnify and hold harmless the City of Evansville, the Board and their respective officials and employees (the "City Indemnitees") from and against any and all claims, liability, damages, expenses, costs, fees and penalties (including reasonable attorneys fees, costs and expenses of defense) (collectively, "Damages") incurred by any of the City Indemnitees, growing out of or arising from third party claims to the extent resulting from Engineer's negligence or willful misconduct; provided that the indemnification shall not apply to the extent of acts of negligence or willful misconduct of the Board, City or any of its officials or employees. The Engineer's duty and obligation to indemnify and hold harmless the City Indemnitees exists independent of the duty and obligation to provide liability insurance herein and without regard to any denial of coverage by the insurance carrier. Any failure to indemnify and hold harmless the City Indemnitees within ten (10) days after written tender to the Engineer and/or any Subcontractor of Engineer shall constitute a default and shall entitle each of the City Indemnitees to recover all Damages related thereto.

Section 7. NON-DISCRIMINATION.

The Engineer shall not discriminate against any person in its hiring or employment practices due to Race, Color, Religion, National Origin, Sex, Age or Physical or Mental Handicap that does not impede that person's ability to perform the work. A violation of this provision shall be deemed a material violation of this agreement.

Section 8. CONSENT DECREE and SORP Acknowledgement

The Engineer acknowledges they have access to the Consent Decree and the Sewer Overflow Response Plan (SORP), latest version and that such documents can be found on the Board's website found at evansvillegov.org and then by selecting the following tabs: View City Departments, Water & Sewer Utility, Renew Evansville, Public Reports.

The Engineer acknowledges they will comply by procedures and processes set in place by the Board as found in the SORP, latest version during any field work required under this agreement which observes or causes sewer release from the sewer system.

Section 9. Liquidated Damages

Section X of the City's Consent Decree specifies stipulated penalties for which the utility is liable if the Utility fails to perform any obligations required by the Decree. The Engineer acknowledges that the services described in Exhibit A are to be completed by the Schedule set forth in Section 4 of this agreement in order to meet the obligations of the Decree.

The Engineer shall agree to pay Liquidated Damages equal to the proportionate share of the stipulated penalties listed in Paragraph 64 and/or 65 of the Consent Decree if any deliverables or deadlines are delayed due to the Engineer's failure or inability to meet the schedule set forth in Section 4 of this Agreement.

Liquidated damages will not be assessed if it can be shown that any such delay was beyond the control of the Engineer to complete the scope of services in compliance with the schedule set forth in Section 4 of this Agreement.

Section 10. Notices and Full Agreement

10.1 Any notices to be sent under this Agreement shall be sent as follows:

IF TO BOARD:

Engineering Department
Cris Cottom
Project Manager
Evansville Water & Sewer Utility
1 S.E, 9th Street, Suite 200
Evansville, IN 47708

IF TO ENGINEER:

AECOM
Todd Frauhiger
Project Manager
One Indiana Square, Suite 2100
Indianapolis, IN 46204

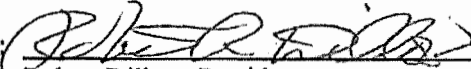
10.2 The parties agree that this instrument represents the full agreement of the parties, and there are no promises, terms or conditions except as stated herein.

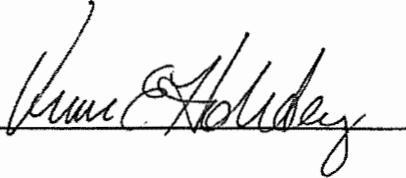
Section 11. E-Verify Compliance

Pursuant to I.C. 22-5-1.7, Engineer shall enroll in and verify the work eligibility status of all newly hired employees of Engineer through the E-Verify Program ("Program"). Engineer is not required to verify the work eligibility status of all newly hired employees through the Program if the Program no longer exists. Also, pursuant to I.C. 22-5-1.7, Engineer must execute an affidavit affirming that the Engineer does not knowingly employ an unauthorized alien and confirming Engineer's enrollment in the Program, unless the Program no longer exists, which Affidavit shall be filed with the Board prior to the execution of this contract.

The parties have approved this agreement by their duly authorized representatives on the date(s) shown below.

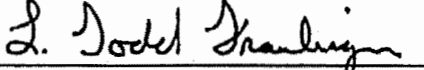
UTILITY BOARD OF
THE CITY OF EVANSVILLE, INDIANA

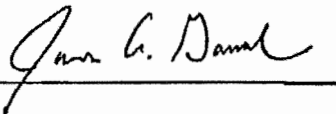
BY: 
Robert Dillow, President

Attest: 

ENGINEER:

AECOM Technical Services, Inc.

BY: 
L. Todd Frauhiger, Associate VP

ATTEST: 

8-20-19
DATE APPROVED

August 7, 2019
DATE APPROVED

EXHIBIT A – ENGINEER’S SERVICES

This is EXHIBIT A, consisting of 11 pages, referred to in and part of the Agreement between Board and Engineer for Engineering Services dated August 20, 2019.

ENGINEER’S SERVICES

Engineer shall provide Basic and Additional Services as set forth below.

PART 1 -- BASIC SERVICES

See attached scope of work.

PART 2 – ADDITIONAL SERVICES

A. If authorized in writing by Board, Engineer shall furnish or obtain from others Additional Services not otherwise provided for in this Agreement. These services will be paid for by Board using the Engineer’s standard hourly rates, given in Appendix 1 of Exhibit C.

UTILITY BOARD OF
THE CITY OF EVANSVILLE, INDIANA

DATE APPROVED

BY: _____
Robert Dillow, President

Attest: _____

ENGINEER:

AECOM Technical Services, Inc.

BY: L. Todd Frauhiger
L. Todd Frauhiger, Associate VP

August 7, 2019
DATE APPROVED

ATTEST: Jan A. Danah

EXHIBIT B – BOARD’S RESPONSIBILITIES

This is EXHIBIT B, consisting of two pages, referred to in and part of the Agreement between Board and Engineer for Professional Services dated August 20, 2019.

BOARD’S RESPONSIBILITIES

The services to be provided by the Utility Director, on behalf of the Board, are as follows:

- A. Provide Engineer with all criteria and full information as to Board’s requirements for the Project, including design objectives and constraints, space, capacity and performance requirements, flexibility, and expandability, and any budgetary limitations; and furnish copies of all design and construction standards which Board will require to be included in the Drawings and Specifications; and furnish copies of Board’s standard forms, conditions, and related documents for Engineer to include in the Bidding Documents, when applicable.
- B. Furnish to Engineer any other available information pertinent to the Project including reports and data relative to previous designs, or investigation at or adjacent to the Site.
- C. Following Engineer’s assessment of initially-available Project information and data and upon Engineer’s request, furnish or otherwise make available such additional Project related information and data as is reasonably required to enable Engineer to complete its Basic and Additional Services. Such additional information or data would generally include the following:
 1. Property descriptions.
 2. Zoning, deed, and other land use restrictions.
 3. Property, boundary, easement, right-of-way, and other special surveys or data, including establishing relevant reference points.
 4. Explorations and tests of subsurface conditions at or contiguous to the Site, drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site, or hydrographic surveys, with appropriate professional interpretation thereof.
 5. Environmental assessments, audits, investigations and impact statements, and other relevant environmental or cultural studies as to the Project, the Site, and adjacent areas.
 6. Data or consultations as required for the Project but not otherwise identified in the

Agreement or the Exhibits thereto.

D. Give prompt written notice to Engineer whenever Board observes or otherwise becomes aware of a Hazardous Environmental Condition or of any other development that affects the scope or time of performance of Engineer's services, or any defect or nonconformance in Engineer's services or in the work of any Contractor.

E. Authorize Engineer to provide Additional Services as set forth in Part 2 of Exhibit A of the Agreement as required.

F. Arrange for safe access to and make all provisions for Engineer to enter upon public and private property as required for Engineer to perform services under the Agreement.

G. Examine all alternate solutions, studies, reports, sketches, Drawings, Specifications, proposals, and other documents presented by Engineer (including obtaining advice of an attorney, insurance counselor, and other advisors or consultants as Board deems appropriate with respect to such examination) and render in writing timely decisions pertaining thereto.

H. Provide reviews, approvals, and permits from all governmental authorities having jurisdiction to approve all phases of the Project designed or specified by Engineer and such reviews, approvals, and consents from others as may be necessary for completion of each phase of the Project.

I. Provide, as required for the Project:

1. Accounting, bond and financial advisory, independent cost estimating, and insurance counseling services.

2. Legal services with regard to issues pertaining to the Project as Board requires, or Engineer reasonably requests.

3. Placement and payment for advertisement for Bids in appropriate publications.

J. Advise Engineer of the identity and scope of services of any independent consultants employed by Board to perform or furnish services in regard to the Project, including, but not limited to, cost estimating, project peer review, value engineering, and constructability review.

K. Attend the pre-bid conference and bid opening.

**EXHIBIT C – PAYMENTS TO ENGINEER FOR SERVICES AND
REIMBURSABLE EXPENSES**

This is EXHIBIT C, consisting of one page, referred to in and part of the Agreement between Board and Engineer for Professional Services dated August 20, 2019.

PAYMENTS TO ENGINEER FOR SERVICES

A. Board shall pay Engineer for Basic Services set forth in Exhibit A on an hourly, not-to-exceed basis, distributed as follows:

Task	Not-To-Exceed Amount
1. Kickoff and Workshop	\$ 27,858
2. Condition, Performance, & Vulnerability Assessment	\$ 82,121
3. Site Investigation	\$ 505,745
4. Draft Alternatives	\$ 362,277
5. Workshop 2, IDEM Review & Final Assessment	\$ 47,995
6. Draft 30% Preliminary Design	\$1,362,032
7. Workshop 3 & Final 30% Preliminary Design	\$ 117,972
Total Not To Exceed Amount	\$2,506,000

The amount paid shall be equal to the cumulative hours charged to the project times the Engineer's Standard Hourly Rates (given in Appendix 1 of Exhibit C) for each applicable employee classification plus reimbursable expenses for mileage, lodging, and per diem costs. Engineer may alter the distribution of compensation between individual phases noted herein to be consistent with services actually rendered, but shall not exceed the total Not-To-Exceed amount unless approved in writing by the Board. Subconsultant Powers Engineering will bill the project on a blended lump sum and time and materials basis, with the total payments not to exceed the final, total hours and costs incurred over the life of the project.

B. Board shall pay Engineer for Additional Services as authorized using the Engineer's standard hourly rates, given in Appendix 1 of Exhibit C.

**APPENDIX 1 (EXHIBIT C)
STANDARD HOURLY RATE SCHEDULE**

This is Appendix 1 to EXHIBIT C, consisting of one page, referred to in and part of the Agreement between BOARD and ENGINEER for Professional Services dated August 20, 2019.

STANDARD HOURLY RATES SCHEDULE

Current agreements for engineering services stipulate that the standard hourly rates are subject to review and adjustment per Exhibit C. Hourly rates for services performed on the date of the Agreement are:

Classification	Current Hourly Rate
Administrative/Clerical	\$73
CADD/GIS Technician	\$104
Senior Process Engineer	\$252
Design Engineer	\$126
Design Engineer/Administrator	\$115
Project Manager	\$193
Deputy Project Manager	\$252
Site Civil	\$118
Electrical - I&C	\$196
Principal - QA/QC	\$252
Structural	\$154
Architectural	\$112
Mechanical	\$140

Expense	Current Rate
Mileage	At Current IRS Rate
Subconsultants	At Cost
Other Direct Expenses	At Cost

Rates effective through December 2020.

Exhibit A,
Page 1 of 10

**Exhibit A
SCOPE OF SERVICES**

Evansville Water and Sewer Utility – Water Filtration Plant Advanced Preliminary Planning

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Project Understanding

A Water Master Plan was completed by HNTB in September 2016 which provided an assessment of the City of Evansville water distribution system and water treatment plant assets. The Water Master Plan serves as an excellent guide for broad planning of future capital improvement projects, but is not intended, to provide a critical analysis of the various options for new water treatment processes.

It is our understanding that the purpose of this Advanced Facility Planning effort are twofold. The first is to address critical components to improve reliability and resiliency by complimenting and expanding the work of the Master Plan to address immediate needs and concerns. The second objective is to assess the long-term drinking water needs for Evansville and determine the most appropriate water sources and treatment processes for an upgraded or new water treatment facility. An alternative analysis is particularly important at this juncture, because there is a potential option to switch partially or completely from Ohio River water source to groundwater (or riverbank filtration), changing not only the source water characteristics but also the options available for treatment. This analysis will look at the life-cycle costs of the various options.

Some of the key issues identified in previously-provided information, discussions with City Personnel, and site visits conducted by AECOM are understood as follows:

1. The North plant is beyond its useful life and significant upgrades are necessary to maintain long term reliable operation. There are issues with the settling basins, corrosion of piping, old filters, and old high service pump station #2.

Exhibit A,
Page 2 of 10

2. The 6.5 MG clearwell is the primary clearwell and leaves EWSU with very little operational flexibility, as it is difficult to remove from service. Furthermore, it is suspected that there could be structural issues with this clearwell (or in-tank groundwater pressure relief valves) as turbidity is reported to increase when the Ohio River level is high.
3. Significant waterline breaks throughout the City seem to be exacerbated by low temperatures and rapidly changing water temperatures. Significant resources and funds are utilized annually to address these breaks.
4. Pressures from IDEM to address the residuals handling system continue to be brought up, and the current NPDES permit expires on July 1, 2021.
5. The City wants to move forward with a reasoned and appropriate plan to satisfy its customers, IDEM, and to allow an easier path through the IURC for the next rate case in 2021.
6. The City wants to keep the water quality consistent and of high quality going forward. If significant groundwater is located and utilized, softening of the harder groundwater and pH adjustment may be necessary.
7. The Ohio River is a major waterway and susceptible to industrial or municipal wastewater releases, fuel spills, and other sources of contaminants which any new treatment upgrades need to be capable of monitoring and mitigating.

For the purposes of this scoping document, the terms AECOM, AECOM Team, or Consultant are used interchangeably and include any and all firms under the Prime Consultant, AECOM. This team will be a cohesive team that will have fluid boundaries, and specific tasks will be delegated throughout the design. The AECOM is anticipated to consist of HNTB, Carollo Engineers, Powers Engineering, CTL, and VS Engineering.

Task 1: Kickoff Meeting and Workshop

The AECOM team will attend a project kickoff and initial workshop meeting with the City to discuss project goals and constraints, identification of high level alternatives for the project. Prior to the meeting, AECOM will provide the City with a list of requested information (**DELIVERABLE #1**) pertaining to plant operations and history. It is anticipated that some (or all) of the requested information will be made available prior to this kickoff meeting, allowing for specifics of the requested information to be discussed. An agenda shall be prepared and submitted for review prior to the meeting, that will, at a minimum, contain the following items for discussion:

1. Introduction of team members and individual roles.
2. Summary of project scope, schedules, and key issues.
3. Communication protocols between the City and AECOM team, including protocols for distributing and sharing files and other electronic data (proposed to utilize e-Builder).
4. Proposed format for progress reports and invoices.
5. Schedule for progress meetings.
6. Protocol and procedures for field reconnaissance activities.
7. City's requirements and preferences related to the facility daily continued operations.
8. Review of historical and projected water demands to establish the design flow(s);
9. Identify the project objectives as they relate to water quality and treatment (both finished water quality and potential sources of contamination).

Exhibit A,
Page 3 of 10

10. Discussion of potential new sources of raw water including river bank filtration and groundwater, along with the impacts which alternative sources have on treatment technologies and water quality.
11. Identify what existing infrastructure within the North and South plants the City believes is the most vulnerable to failures and/or is unsalvageable.
12. Identify key meetings to be held with IDEM as they relate to both to drinking water requirements and residuals disposal / NPDES permit.
13. Discussion of bigger-picture preliminary treatment technologies and plant-wide improvement strategies to be considered in the alternatives analysis. Alternatives will be added and further developed in the alternatives analysis beyond this meeting, but this meeting can identify key considerations to be included in the evaluation such as operation and maintenance requirements, qualitative magnitude of capital and operational costs, impacts on water quality, residuals production and disposal, and treatment resiliency.

Following the meeting, a brief plant tour or tour of selected areas may be performed if needed. AECOM shall prepare summary meetings minutes which will be submitted as **DELIVERABLE #2** summarizing the key points, decisions, and all action items.

Task 2: Infrastructure Condition, Performance, and Vulnerability Assessment

Prior to development of long-term facility alternatives, the condition and performance of all infrastructure at the existing plant must be assessed. This task will include a full treatment/process performance assessment of the existing plant in order to benchmark the current performance. Additionally, AECOM will perform condition assessment to identify critical infrastructure and any need for immediate improvements to allow for continued plant operation (several years) until the final project is commissioned. The assessment will also include a vulnerability aspect, which will evaluate the magnitude of the consequence which could occur in the event of a failure. Existing infrastructure to be assessed as part of this task includes:

1. Intake structure including condition of screens, pumps, piping and valves, HVAC, building (structural and architectural components), and electrical systems.
2. North and south plant influent channels, flocculation, and sedimentation basins, including structural condition of concrete and handrail, mechanical condition of mixers, flocculators and sludge collection drives/equipment, piping, valves, and ancillary equipment.
3. Filters and corresponding gallery piping, valves, controls, backwash supply tanks, instrumentation and monitoring systems, and ancillary systems such as troughs and surface sweep equipment.
4. Finished water systems including filter effluent piping, clearwells, high service pumps, valves, and instrumentation and monitoring systems. This task does not include City water distribution system hydraulic or water quality modelling.
5. Condition of all chemical systems with specific attention to redundancy, feed equipment condition, control and monitoring systems, and operator safety considerations. Existing chemical feed systems include hyper-ion coagulant, powder activated carbon, chlorine gas, sulfur dioxide, ammonia, sodium hydroxide, KMnO₄, and fluoride.
6. Overall assessment of buildings and building systems will be included and shall involve major structural components, architectural finishes including roofs, environmental hazards such as lead paint and asbestos, HVAC systems, plumbing and sump pumps, and lighting/power systems.

Exhibit A,
Page 4 of 10

7. Critical electrical infrastructure systems including the condition of incoming services, motor control centers, transformers, transfer switches, drives, disconnects, standby generator, and transmission / distribution systems throughout the plant.

DELIVERABLE #3 will be a technical memorandum which will identify any short-term projects that should be considered for immediate implementation in order to keep the plant operation during the planning and construction phases of this project. The proposed improvements or short-term projects will include order-of-magnitude costs and tentative implementation schedules based on equipment lead and installation times. Up to three (3) separate memoranda will be included as part of this task. These will include one pertaining to electrical infrastructure, one for the clearwell improvements, and a third (if needed) to cover any other miscellaneous processes or infrastructure in need of immediate improvements.

Task 3: Site Investigations

The primary components of the site to be investigated for this level of planning and design include a hydrogeological study, site survey, and geotechnical investigation. The hydrogeological investigation is currently ongoing, and shall continue to be conducted as part of this scope. Results of the hydrogeological study will be included in the Deliverable associated with Task 4, Alternatives Evaluation. A summary of hydrogeological task items include the following:

1. Continue with test drilling including construction of one larger test well (up to 16-inch diameter casing) and identify aquifer yield, draw-down rates, and water quality information.
2. Continue to work with Layne collector wells to investigate feasibility of horizontal collector wells.
3. Provide a summary report of the wellfield capacity to be included as part of Task 4. The summary report shall include options describing possible locations of vertical and/or horizontal collector wells, including estimated costs associated with these options.

The site survey will be conducted during Task 6, Preliminary Design. A summary of the site survey task items include the following:

1. Establish horizontal and vertical site control. Horizontal control will be based on Indiana Geospatial Coordinate System. Vertical control will be based on the North American Vertical Datum (NAV88). A minimum of 4 vertical benchmarks will be established on or near the site.
2. Locate and identify visible physical features (buildings, roads, drives, walks, walls, fences, signs, etc.) within the project limits. Trees and the perimeter outline of any wooded or river bank areas will also be located.
3. Identify the 100- and 500-year floodplain boundaries.
4. Determine spot elevations of critical features (finished floor levels at door openings, curbs, walks, tops, toes, swales, etc.) and at sufficient intervals throughout the site to develop 1-foot contours.
5. Locate field utility markings and visible field evidence (manholes, valves, etc.) of underground utilities to delineate underground utility locations based on a combination of assembled record documents, physical markings, and visible field evidence.
6. Generate a base map, depicting the above items at an appropriate scale, in AutoCAD format. The base map will be provided in DWG and PDF format.

The geotechnical investigation will be conducted during Task 6, Preliminary Design. A summary of the geotechnical investigation task items are as follows:

1. Perform soil borings to determine geotechnical and foundation engineering considerations as described below. The number and depth of borings is unknown at this time will be determined

Exhibit A,
Page 5 of 10

during preliminary design based on the selected alternative. The cost associated with this investigation is based on the number of borings, and it is assumed that 6 will be taken as part of this task.

2. Provide field and laboratory reports in accordance with ASTM standards, including soil classification chart(s), boring surface elevations, soil thickness of each layer, groundwater elevations, sieve analyses, identification of moisture content, and USCS classification.
3. Recommendations for style of foundation support for the structures and slabs, including identifying the allowable soil bearing capacity, slope ratio requirements, estimated settlement, and allowable lateral loads.
4. Recommendations for design of any retaining walls, if necessary.
5. Compaction recommendations for fill behind walls and support floors.

Task 4: DRAFT Alternatives Assessment

Based on findings and outcomes of the previous tasks, AECOM will develop an Alternatives Evaluation Report to ultimately identify the selected project alternative. AECOM will initially create a long list of alternatives using a matrix of differing water sources/blend rates and treatment technologies/water quality goals. Sources of water in this alternatives matrix will include the Ohio River, Riverbank Filtration, and Groundwater. Treatment technologies may include, but are not limited to ballasted flocculation, plate or tube sedimentation, lime softening, high pressure membranes, low pressure membranes (including membrane gravity filtration, or MGF), ozonation, biofiltration, advanced oxidation or UV disinfection, and upgrades of existing equipment in kind among others. The long list of preliminary alternatives will be screened on criteria of feasibility, operability, capital and operational cost, and other advantages / disadvantages. From the long list, up to eight (8) alternatives will be selected to create a "short list" which will receive a detailed evaluation. The detailed evaluation for the selected alternatives will include the following tasks:

1. Each alternative will include a detailed narrative of the proposed system including the following information:
 - a. Basis of design table or summary which identifies the major equipment, number of units, and corresponding flows or other operating conditions. Cut sheets of major equipment will be provided in Appendices.
 - b. Quantity and quality of residual streams that need disposal.
 - c. Operational and maintenance considerations.
 - d. Environmental and safety considerations.
 - e. Projections of chemical usage and electrical consumption.
2. Each alternative will include projected finished water quality information, including the impacts of blending of source waters. Any recommended alternative will comply with present and anticipated standards, and this task will further include attention to the robustness of the alternative. This includes considering treatment process to handle multiple contaminants, evaluating levels of redundancy, and assessing the ability to adapt to rapidly changing water quality as observed in the Ohio River. The water quality evaluation will also include any recommendations for post-treatment measures in terms of maintaining stability and prevention of corrosion within the distribution system. A distribution system hydraulic or water quality model is not included in these services.

Exhibit A,
Page 6 of 10

3. Each alternative will include conceptual level site plan(s) that shall identify the location of proposed infrastructure and general routing of major utilities, including process piping, electrical and communication utilities, and access drives and/or loading areas.
4. Each alternative will include a life cycle cost analysis which will feature an estimate of project capital cost (+/- 50% planning level estimate) and operational costs based on projected electrical usage, chemical requirements, and equipment maintenance / replacement costs. The life cycle costs will be evaluated through a 40-year planning period for each alternative.
5. Following development of each of the alternatives, AECOM will conduct a ranking, or scoring based on weighted criteria. The ranking criteria shall include engineering aspects (finished water quality, resiliency, etc.), environmental issues, operational and maintenance considerations, and capital and operational costs. This ranking will assign a numerical score to each alternative to be used for selection of the proposed alternative.

As part of this task, AECOM and City Personnel will perform up to three trips to visit other water treatment plant sites and/or equipment manufacturing facilities to observe treatment equipment similar to that which is being considered for alternatives in this project. The purpose of the site visits is to better understand key advantages and disadvantages of equipment technologies, lessons learned in construction or startup, and discuss ongoing operation and maintenance requirements or issues with other plant operators.

DELIVERABLE #4 will be a DRAFT Alternatives Assessment Report and submitted as one (1) electronic PDF file and three (3) bound hard copies. The Report will provide a comprehensive summary of the items listed in this task, including the initial long list of alternatives, detailed evaluation of the individual 'short list' alternatives, and the ranking of the alternatives including identification of the selected project.

Task 5: Workshop #2, IDEM Review and FINAL Assessment Report

AECOM will conduct a follow-up meetings to facilitate transitioning from the Alternatives Assessment Report to Preliminary Engineering of the preferred alternative. Individual subtasks associated with this task include the following:

1. AECOM will meet with the City when Deliverable #4 is submitted and give a presentation which will outline alternatives evaluated in the Assessment Report and provide further explanation of the selected alternative.
2. Following the initial meeting, the City shall review the Alternatives Assessment report and provide comments to AECOM in MS Work or PDF file format.
3. AECOM and the City will host a meeting with IDEM to discuss the identified path of the project moving forward as it pertains to drinking water quality and residuals disposal.
4. AECOM will address all City and IDEM comments in the Assessments Report, and subsequently submit **DELIVERABLE #5** to the City, which is the Final Alternatives Assessment Report. The Report will be provided to the City as (1) electronic PDF file and three (3) bound hard copies.

Task 6: DRAFT Preliminary Engineering Report and Drawings

This task includes further developing the specifics of the preferred alternative established in Tasks 4 and 5 and includes developing preliminary drawings. Subtasks associated with this Task include the following:

1. AECOM will prepare a Preliminary Engineering Report. The Report will refine the alternative selected in the Alternatives Assessment and will provide the following information:
 - a. Detailed description and narrative of the proposed improvements.

Exhibit A,
Page 7 of 10

- b. Cut sheets and budgetary quotations for major equipment, including lead times.
 - c. Updated estimates of project capital costs will be prepared in accordance with AACE Class 4 Estimates.
 - d. Further discussion of residuals disposals and any updates from ongoing conversations with IDEM.
 - e. Tentative design and construction schedule based on the actual date at the time of this Report.
 - f. The previously submitted FINAL Alternatives Assessment Report will be included as an Appendix to this Preliminary Engineering Report.
2. AECOM will prepare preliminary drawings (30% level development). The actual number of sheets will vary depending on the selected alternative, but selected alternatives would generally include a sheet set similar to the following list:
- 1) Cover Sheet
 - 2) Index and General Drawing Symbols
 - 3) General Notes and Details 1
 - 4) General Notes and Details 2
 - 5) Demolition Sheet 1
 - 6) Demolition Sheet 2
 - 7) Demolition Sheet 3
 - 8) Demolition Sheet 4
 - 9) Demolition Sheet 5
 - 10) Demolition Sheet 6
 - 11) Existing Site and Utility Plan – North
 - 12) Existing Site and Utility Plan - South
 - 13) Proposed Site and Utility Plan 1
 - 14) Proposed Site and Utility Plan 2
 - 15) Proposed Site and Utility Plan 3
 - 16) Proposed Site and Utility Plan 4
 - 17) Civil Details 1
 - 18) Civil Details 2
 - 19) Civil Details 3
 - 20) Civil Details 4
 - 21) Overall Process Flow Diagram and Design Information
 - 22) Process Equipment Schedules 1
 - 23) Process Equipment Schedules 2
 - 24) Detailed Process Flow Diagrams 1
 - 25) Detailed Process Flow Diagrams 2
 - 26) Detailed Process Flow Diagrams 3
 - 27) Detailed Process Flow Diagrams 4
 - 28) Detailed Process Flow Diagrams 5
 - 29) Detailed Process Flow Diagrams 6
 - 30) Detailed Process Flow Diagrams 7
 - 31) Detailed Process Flow Diagrams 8
 - 32) Detailed Process Flow Diagrams 9
 - 33) Detailed Process Flow Diagrams 10
 - 34) Hydraulic Profiles 1
 - 35) Hydraulic Profiles 2
 - 36) Treatment Process Plans and Sections 1

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- 37) Treatment Process Plans and Sections 2
- 38) Treatment Process Plans and Sections 3
- 39) Treatment Process Plans and Sections 4
- 40) Treatment Process Plans and Sections 5
- 41) Treatment Process Plans and Sections 6
- 42) Treatment Process Plans and Sections 7
- 43) Treatment Process Plans and Sections 8
- 44) Treatment Process Plans and Sections 9
- 45) Treatment Process Plans and Sections 10
- 46) Process Details 1
- 47) Process Details 2
- 48) Process Details 3
- 49) Process Details 4
- 50) Architectural Building Elevations 1
- 51) Architectural Building Elevations 2
- 52) Major Structural Modifications 1
- 53) Major Structural Modifications 2
- 54) Electrical Site and Power Plans 1
- 55) Electrical Site and Power Plans 2
- 56) Electrical Site and Power Plans 3
- 57) Electrical Site and Power Plans 4
- 58) Electrical One-Line Diagrams 1
- 59) Electrical One-Line Diagrams 2
- 60) Electrical One-Line Diagrams 3

3. AECOM will provide a Specification Table of Contents in CSI Division 50 Format, which will list all of the anticipated specification sections associated with the proposed design.

DELIVERABLE #6 shall be the DRAFT of the Preliminary Engineering Report, Preliminary Drawings, and Specification Table of Contents described in this section and will be provided in one (1) electronic PDF file and three (3) bound hard copies. Drawings will be provided in 11"x17" format.

Task 7: Workshop #3 and FINAL Preliminary Engineering Documents

Following submission of Deliverable #6, the City shall provide comments to AECOM in MS Word or PDF file format. Following receipt of comments, AECOM shall conduct a follow-up Workshop meeting with the City to discuss any City Comments. The Workshop will include discussion of possible modifications or other changes that could be employed to address any comments. Following the Workshop, AECOM will address all comments and issue **DELIVERABLE #7**, which is the FINAL Preliminary Engineering Documents. This FINAL document will include the Preliminary Engineering Report, Preliminary Drawings, and Specification Table of Contents. The FINAL Preliminary Engineering Report will also include an updated schedule for project implementation. Engineering Documents will be provided as one (1) electronic PDF file and three (3) bound hard copies, with drawings in 11"x17" format.

ADDITIONAL SERVICES IF AUTHORIZED

If desired by the City, AECOM can perform the following tasks:

1. AECOM can perform filter Inspection of any or all of the existing gravity filters. Inspection tasks could involve any combination of the following: Media depth measurement, sampling/coring of filter media, sieve analysis, determining common filter media parameters such as L/D₁₀ ratio,

Exhibit A,
Page 9 of 10

- uniformity coefficient, floc retention and backwash profiles, and measuring bed expansion during backwash.
2. Depending on the selected alternative to be developed in preliminary design, AECOM can perform pilot testing of the proposed technologies. Pilot testing would be anticipated if technologies such as ActiFlo, low pressure membranes (including MGF), or ozonation/biofiltration were selected. A pilot study may also be warranted for other technologies to better determine operational parameters. These requirements will be determined prior to preliminary design of the selected alternative and piloting requirements will be noted in the Alternatives Assessment. Pilot testing will follow all IDEM or other regulatory requirements including development of a piloting protocol and sampling plan, monitoring for required integrity or other performance testing, and extrapolation of long-term performance.
 3. AECOM can complete an NPDES permit application for submission to IDEM based on the Preliminary Design and anticipated residuals water quality and quantity. Any IDEM or NPDES permit review fee(s) shall be paid the City.

SCHEDULE

A Gantt chart schedule has been developed and is attached to this scope of services. The schedule assumes the agreement between the City and AECOM will be completed and a Notice to Proceed issued by September 2, 2019.

e-Builder® Construction Management Software

- EWSU is implementing the use of a computer based program, e-Builder® (hereafter known as the "Program"), to standardize and better manage the planning, implementation, design, and construction for its capital projects. EWSU has purchased and will maintain the Program. ENGINEER will be required as a condition of the contract to utilize the Program and its functions to facilitate the execution of the contract. Such examples of the typical functions include, but are *not limited to*:
 - Program Management
 - Design Development and Review
 - Consultant Proposals, Amendments, and Billings
 - Purchase Orders, Contracts, and Service Agreements
 - Contractor Pay Applications
 - Construction Submittals
 - Requests For Information
 - Project Schedules and Progress Meetings
 - Change Order Management
 - Daily Job Site Daily Inspection Reporting
 - Project Closeout and Documentation
 - Asset Management
 - Other Project Documentation and Communications

All submittals shall be posted in a searchable, bookmarked PDF format with the exception of Requests for Information (RFIs). RFIs shall be posted in Microsoft Word format. Maximum file size for submission shall be 50 MB. Submittals larger than 50 MB should be submitted as separate files within the same submittal.

Exhibit A,
Page 10 of 10

The Program is a web based platform that requires access through the purchase of a "seat" with a user name and password. It shall be the responsibility of ENGINEER to pay for this seat and any additional seats they deem necessary to fully execute the project. Instruction and training to utilize the Program will be the responsibility of ENGINEER.

11/11/2022

OUCC DR 4-1**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Please provide copies of all invoices and progress reports for AECOM Invoice Nos. 15, 16, 17, 18, 24, and 28.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

(Continued on next page)

11/11/2022

OUCC DR 4-1
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. See also Petitioner's response to OUCC DR 1-2 for information regarding the current project schedule and progress.

11/11/2022

OUCC DR 4-2**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Please provide copies of the complete set of 30% Design Drawings. Please also state when the 30% drawings set was completed if not indicated on the drawings themselves.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

(Continued on next page)

11/11/2022

OUCC DR 4-2
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. See also Petitioner's response to OUCC DR 1-2 for information regarding the current project schedule and progress.

11/11/2022

OUCC DR 4-3

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Please provide copies of the current proposed hydraulic profiles for the new Water Treatment Plant identifying the elevations of structures, water surface elevations and varying treatment flow rates, existing and final grade elevations, and floodplain information.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

(Continued on next page)

11/11/2022

OUCG DR 4-3
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection.

11/11/2022

OUCC DR 4-4**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Reference Attachment E, Preliminary Design Summary in the Preliminary Engineering Report, Water Treatment Plant, Cause No. 45545 Supplemental Workpaper 1, dated June 22, 2021, pages 69-74. Please provide the current revised Design Summary, identify the date prepared, and state the corresponding design completion status (i.e., 30%, 50%, 60%, etc.).

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-4
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. See also Petitioner's response to OUCC DR 1-2 for information regarding the current project schedule and progress.

11/11/2022

OUCC DR 4-5

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Please state the proposed firm rated capacities in millions of gallons per day (“MGD”) for all unit processes for the new Water Treatment Plant including the river intake, travelling screens, low service pumps, 42-inch diameter dual raw water lines, flocculation, horizontal high-rate sedimentation, ozonation, biologically active dual media filtration, sodium hypochlorite disinfection, clearwells, and high service pumps.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner’s Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville’s request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-5
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection.

11/11/2022

OUCG DR 4-6

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Reference the description of the Value Engineering Scope of Services in AECOM's Amendment No. 1, dated April 19, 2022, provided as Attachment OUCG DR 1-3, page 7 of 21 which reads:

Task 1 Detailed Design and Project Management

2. Address value engineering items
 - a. The end of the phase 1 services included a value engineering (VE) workshop to identify strategies for cost savings. A subsequent meeting was held with EWSU and AECOM to identify key VE ideas to be considered for inclusion in the Phase 2 design. VE items that have been mutually agreed upon between OWNER and AECOM will be finalized in the Phase 2 design and included in the 60% deliverable. Major VE design concepts to be further considered for inclusion in this phase of design are as follows:
 - 1) Raise the hydraulic profile of the treatment facility.
 - 2) Utilize more common wall construction for treatment basins.
 - 3) Switch locations of the pretreatment basin with the clearwell / filter building.
 - 4) Switch from potassium permanganate to liquid sodium permanganate at the river intake onshore facility.
 - 5) Replace pretreatment rapid mix equipment with side-stream injection of coagulant.
 - 6) Consider increasing the loading rate of plate settlers and filters at the 50 MGD capacity.

Please answer and provide the following:

- a. State the dates of the value engineering (VE) workshops and meetings.
- b. Identify the consulting firms, contractors, and EWSU staff who participated in each of the VE workshops and meetings.
- c. Provide the agendas, minutes, and other communications that document and summarize the Workshops and meetings.

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11/11/2022

OUCC DR 4-6

(Continued from previous page)

- d. Disclose all initial VE ideas identified prior to the VE workshops. For each initial VE idea, please include a brief description, the estimated capital cost savings with support showing how the capital savings were calculated, the estimated O&M cost savings, if any, and whether the idea was carried forward for full evaluation. Please also explain why each initial VE idea not evaluated further was discarded.
- e. Disclose all VE ideas identified during the VE workshops. For each VE idea identified during the VE workshops, please include a brief description, the estimated capital cost savings with support showing how the capital savings were calculated, the estimated O&M cost savings, if any, and whether the idea was carried forward for full evaluation. Please also explain why each VE idea identified during the VE workshops but not evaluated further was discarded.
- f. Identify all VE ideas fully evaluated during the workshops.
- g. Provide the draft VE report submitted to VE participants.
- h. Provide copies of VE participants' draft VE Report review comments.
- i. Provide copies of all communications between EWSU and other VE participants regarding project costs, revised project cost estimates, and VE cost savings.
- j. Copies of all Final VE Reports.
- k. Identify VE ideas incorporated into the current design and state the VE cost savings for each such VE idea.
- l. State the total VE cost savings adopted into the current design.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components

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11/11/2022

OUCC DR 4-6
(Continued from previous page)

beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. See also Petitioner's response to OUCC DR 1-2 for information regarding the current project schedule and progress.

11/11/2022

OUCC DR 4-7

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Reference Mr. Baldessari's Excel spreadsheets in Workpaper DLB-1, which lists Levee Authority Building Demolition and Site Preparation and which was not previously part of the new Water Treatment Plant project as presented in Cause No. 44545. Petitioner is requesting authority to add \$750,000 to the Water Treatment Plant project cost for building demolition and site preparation as follows:

Levee Authority	Qty	Unit \$	Total \$
Building (SF)	11000	\$45	\$495,000
Foundation (CY)	1629.62963	\$115	\$187,000
Contingency	10%		\$68,000
Total			\$750,000

Please state the total estimated costs, the sources of funds, and the cost allocation between governmental agencies to relocate the Evansville Vanderburgh Levee Authority and demolish the existing Levee Authority Building.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be

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OUCC DR 4-7

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imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. Petitioner is not asking for additional financing authority in this subdocket to complete this project. Petitioner is repurposing the financing authority previously approved in Cause No. 45545 for relocation of the City Garage to this project. This request is irrelevant to Petitioner's request for additional financing authority in this subdocket proceeding.

11/11/2022

OUCC DR 4-8**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Reference the Advanced Facility Plan, Attachment SMB-1, page 123 of 276, which stated “Relocating the Levee Authority was investigated by EWSU but was determined to not be practical. However, the footprint of the maintenance facility alone is large enough for the new plant and EWSU can relocate this facility.”

Please explain why the Levee Authority can now be relocated and the Levee Authority Building demolished.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner’s Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville’s request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-8
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Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. Petitioner is not asking for additional financing authority in this subdocket to complete this project. Petitioner is repurposing the financing authority previously approved in Cause No. 45545 for relocation of the City Garage to this project. This request is irrelevant to Petitioner's request for additional financing authority in this subdocket proceeding.

11/11/2022

OUCG DR 4-9

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Please provide a copy of the current revised site layout for the new Water Treatment Plant, state the layout date, and indicate the design completion percentage (i.e., 30%, 50%, 60% etc.) corresponding to the layout provided.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCG why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-9
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. See also Petitioner's response to OUCC DR 1-2 for information regarding the current project schedule and progress.

11/11/2022

OUCC DR 4-10**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Please state when Petitioner made the decision to expand the new Water Treatment Plant site to also include the Levee Authority property. Please also provide copies of communications regarding the Levee Authority relocation and cost allocation agreements between governmental agencies for the costs.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-10
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. Petitioner is not asking for additional financing authority in this subdocket to complete this project. Petitioner is repurposing the financing authority previously approved in Cause No. 45545 for relocation of the City Garage to this project. This request is irrelevant to Petitioner's request for additional financing authority in this subdocket proceeding.

11/11/2022

OUCC DR 4-11**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Please state the revised total estimated cost including design costs and sources of all funds to relocate the Evansville Street Maintenance Department garage. Please also state the costs incurred to date, indicate the source of funds used to pay invoices received to date, and state the portion of these costs that will be included in the new Water Treatment Plant's total project costs.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-11
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. Petitioner is not asking for additional financing authority in this subdocket to complete this project. Petitioner is repurposing the financing authority previously approved in Cause No. 45545 for relocation of the City Garage to this project. This request is irrelevant to Petitioner's request for additional financing authority in this subdocket proceeding.

11/11/2022

OUCG DR 4-12

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Please state the total estimated cost to demolish the existing Evansville Street Maintenance Department garage structure including any environmental remediation costs (asbestos, underground storage tanks, chemical storage tanks, lead base paints, etc.). Please identify and provide supporting documentation relied on to determine the total estimated cost. Please also state whether any of these demolition and remediation costs will be included in the total project costs for the new Water Treatment Plant.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCG why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-12
(Continued from previous page)

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. Petitioner is not asking for additional financing authority in this subdocket to complete this project. Petitioner is repurposing the financing authority previously approved in Cause No. 45545 for relocation of the City Garage to this project. This request is irrelevant to Petitioner's request for additional financing authority in this subdocket proceeding.

11/11/2022

OUCC DR 4-13

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

Reference Appendix C Preliminary Geotechnical Investigations, pages 110 – 114 of Petitioner’s response to DR 1-3, which appear to be pages from a Geotechnical Report by CTL Engineering prepared in 2021 based on the March 2021 dates of the soil borings (pages 115-124). Please provide complete copies of this Geotechnical Report and Geotechnical Recommendation Report, if separate, prepared by CTL Engineering.

Information Provided:

See supplemental response to OUCC DR 3-7.

11/11/2022

OUCC DR 4-14**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Please identify all components of Evansville's existing water treatment plant that will remain in service and explain what function they will perform for the new Water Treatment Plant.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner's Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-14
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Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection.

11/11/2022

OUCC DR 4-15**DATA REQUEST****City of Evansville****Cause No. 45545 S1****Information Requested:**

Due to the large increase in estimated capital costs, please state if a new Life Cycle Cost Analysis (“LCCA”) has been or will be conducted. If so, please provide a copy of the revised LCCA and the documentation supporting the costs used in the revised LCCA.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCC why it has sought an increase in financing authority at this time. As explained in Petitioner’s Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville’s request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

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11/11/2022

OUCC DR 4-15
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Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection. The largest driver of Petitioner's request in this subdocket is general inflation, which would affect all options to the same degree that were analyzed in the earlier life cycle analysis.

OUCG DR 5-1

DATA REQUEST

City of Evansville

Cause No. 45545 S1

Information Requested:

For the construction of the new 50 MGD Surface Water Treatment Plant under a Guaranteed Energy Savings Contract (“GESG”), please state or provide the following:

- a. Names of all Guaranteed Energy Savings Contract Providers that submitted qualifications in response to Evansville’s Request for Qualifications.
- b. Names and titles of Evansville staff who reviewed and scored the RFQ responses.
- c. Evansville’s RFQ review scores for each Provider.
- d. Names of all Guaranteed Energy Savings Contract Providers who were selected by Evansville for interviews. If no interviews were held, so state.
- e. Copies of the RFQ response for Kokosing Industrial, Inc. and all other GESG Providers who were interviewed.
- f. Copy of the selection notification letter sent to Kokosing Industrial, Inc.
- g. Current schedule for the Guaranteed Energy Savings Contract indicating all deliverables and milestones including for example the current anticipated dates to 1) receive the Guaranteed Maximum Price Proposal; 2) initiate the Guaranteed Savings Report and Contract; 3) reach Substantial Completion; 4) reach Final Completion; and 5) Start-up and Commissioning of the Water Treatment Plant.

Objection:

Petitioner objects to the request on the grounds and to the extent the request seeks information which is irrelevant to this proceeding and not reasonably calculated to lead to the discovery of admissible evidence. Petitioner will remind the OUCG why it has sought an increase in financing authority at this time. As explained in Petitioner’s Exhibit No. 1, the United States economy has experienced sustained inflation at levels not seen in over two generations. This historic inflation was not anticipated at the time of the evidentiary hearing in the main docket and thus was not reflected in the earlier cost estimates. Any reasonable engineer or economist would know that the earlier estimates will be insufficient. In addition, we are currently in an environment of rapidly rising interest rates. The worst possible outcome for Evansville customers would be to wait until after the project has been completely designed before seeking additional financing authority. This would delay the

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OUCC DR 5-1
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closing the bond issue, which, in this environment of rising interest rates, would be imprudent if not reckless. The only components of Evansville's request for additional financing authority that are driven by further engineering of the project are the deeper auger cast piles; environmental investigation identifying heavy metals in the soil; the river intake carbon steel piping and associated river intake costs; undercover basins; and depth of filter beds allowing for future PFAS treatment. No further changes in the estimate are proposed based upon further engineering. For any questions related to engineering components beyond these identified categories, please see the extensive evidence and discovery shared in Cause No. 45545. As indicated, before Petitioner closes on its bond issuance, engineering will have been completed. Hopefully the additional authority requested herein will allow a prompt closing on the bonds at that point.

Information Provided:

Subject to and without waiver of the foregoing objection, Petitioner responds as follows:

See objection.

INDIANA OFFICE OF UTILITY CONSUMER COUNSELOR
DATA REQUEST
CAUSE NO. 45545 S1

OUCC Data Request Set No. 7

Date: November 4, 2022

In connection with our work in the above-referenced Cause, we are submitting the following request(s) for information or documentation. Please identify the person(s) providing each segment of information or each document. Also, please indicate the witness or witnesses to be called in your Case-in-Chief and Rebuttal who can answer questions regarding the substance of or origination of information supplied by the utility in each instance of the responses to this request. Thank you for your prompt assistance in this matter.

I. Definitions and Instructions.

A. City of Evansville, Indiana and refers to Petitioner, including its officers, directors, employees, agents, attorneys and representatives, and any other entity to the extent acting under the direction or control of Petitioner.

B. For each data request, please identify all persons who provided responsive information or materials. Also, please indicate the witness or witnesses to be called in your case-in-chief and rebuttal who can answer questions regarding the substance of or origination of information supplied by Petitioner in each of the responses to this request.

C. With respect to any document or thing being withheld from production on the basis of privilege, please state the author, addressee and all recipients of copies of the documents, all other persons to whom the document was shown or discussed, the subject matter of the document and the basis of the claim of privilege.

II. Data Request.

Q-7-1: Reference Mr. Baldessari's Sub-Docket Testimony on page 6 which acknowledges the "further refined design of the WTP" and the higher Water Treatment Plant cost estimate of \$241,215,000 shown on page 5. Please state the percent design completion on which Evansville's new \$241,215,000 cost estimate is based and the corresponding ACE Class estimate for this higher cost estimate.

OUCG Corrections to EWSU Auger Cast Piles Costs

45545 S1, Evansville WP DLB-1 (09/23/2022) Calculations of Increased Auger Cast Piles Concrete Volume and Cost (as submitted)			
Parameter	Orig. ACP Jan. 2021	Rev. ACP Aug. 2022	EWSU Calcs.
Diameter (inches)	18	24	
Diameter (feet)	1.5	2	
Area (SF)	1.767	3.142	
Depth (ft)	25	75	
Number of Piles			580
Total Auger Length (Ft.)			
Per Auger Cast Pile			
Concrete Volume (CF)			
Concrete Volume (CY)			
Total Auger Cast Piles			
Concrete Volume (CF)			
Additional Concrete Volume (CY)			1476.256412
EWSU Estimated Cost/CY			\$1,890
Contingency			10%
Cost/CY with Contingency			\$ 2,079
Total Additional Cost (Rounded)			\$3,069,000

OUCG Changes shown in red

OUCG Corrections to EWSU Auger Cast Piles Costs

45545 S1, OUCG Corrections to Evansville WP DLB-1 (09/23/2022)			
Calculations of Increased Auger Cast Piles Concrete Volume and Cost			
Parameter	Orig. ACP Jan. 2021	Rev. ACP Aug. 2022	OUCG Corrections
Diameter (inches)	18	24	
Diameter (feet)	1.5	2	
Area (SF)	1.767	3.142	
Depth (ft)	25	75	
Number of Piles	580	580	580
Total Auger Length (Ft.)	14,500	43,500	29,000
Concrete Per Auger Cast Pile			
Concrete Volume (CF)	44.18	235.62	191.44
Concrete Volume (CY)	1.64	8.73	7.09
Total Concrete - All ACPiles			
Concrete Volume (CF)	25,624	136,659	111,036
Concrete Volume (CY)	949	5,061	4,112
EWSU Estimated Cost/CY			\$1,890
Contingency			10%
Cost/CY with Contingency			\$ 2,079
Total Additional Cost (Rounded) based on EWSU values			\$8,550,000

OUCG Changes shown in red

OUCG Corrections to EWSU Auger Cast Piles Costs

45545 S1, OUCG Corrections to Evansville WP DLB-1 (09/23/2022)			
Calculations of Increased Auger Cast Piles Cost based on \$/VF			
Parameter	Orig. ACP Jan. 2021	Rev. ACP Aug. 2022	Increase or Added Costs
Diameter (inches)	18	24	6
Diameter (feet)	1.5	2	
Area (SF)	1.767	3.142	
Depth (ft)	25	75	50
Number of Piles	1,669	580	-1,089
Total Auger Length (Ft.)	41,731	43,500	1,769
Concrete Per Auger Cast Pile			
Concrete Volume (CF)	44.2	235.6	191.4
Concrete Volume (CY)	1.6	8.727	7.1
Total Concrete - All Auger Cast Piles			
Concrete Volume (CF)	73,745	136,659	62,914
Concrete Volume (CY)	2,731	5,061	2,330
EWSU Estimated Cost/CY			
Contingency			
Cost/CY with Contingency			
Auger Cast Pile Cost/VF ¹	\$ 71.41	\$ 98.25	
Auger Cast Pile Cost (Rounded)	\$ 2,980,000	\$ 4,274,000	
Allowance for Mob./Demob. & Testing	Included	\$ 184,000	
Escalation to August 2022 Dollars			
ENR CCI - January 2021	11,628		
ENR CCI - August 2022	13,171		
Raw cost escalation to Aug. 2022 (%)	13.27%		
Cost escalation already included	4.51%		
Total cost escalation to Aug. 2022 (%)	8.76%	0%	
Auger Cast Piles Cost - August 2022	\$ 3,241,000	\$ 4,458,000	\$ 1,217,000
Notes:			
1. In cost support for the 2021 estimate, the units were vertical feet ("VF")			
2. Beaty Construction 2022 budgetary cost per VF \$ 87.50 no steel			
3. Keller-North America 2022 budgetary cost per VF \$ 109.00 with steel			