CITY OF FORT LAUDERDALE

DRAFT
MEETING MINUTES
CITY OF FORT LAUDERDALE
INFRASTRUCTURE TASK FORCE ADVISORY COMMITTEE
MONDAY, October 4, 2021 – 2:00 P.M. TO 5:00 P.M.

February 2021-January 2022		**Attendance**	
Marilyn Mammano, Chair	P	8	0
Gerald Angeli	P	8	0
Shane Grabski (arr. 2:21)	P	8	0
Charlie Ladd (2:11-3:30)	P	6	2
Michael Marshall	P	7	1
Peter Partington	P	8	0
Jacquelyn Scott (arr. 2:21)	P	7	1
Roosevelt Walters (by phone)	P	7	1
Ralph Zeltman	P	8	0

As of this date, there are 9 appointed members to the Committee, which means 5 would constitute a quorum.

Staff
Patricia Jolly, Sr. Administrative Assistant and Board Liaison
Alan Dodd, Director of Public Works
Victor Carosi, Assistant Director of Public Works – Engineering
Omar Castellon, Chief Engineer
Kymberly Holcombe, Business Operations Manager
Diane Lichtenstein, Assistant Budget Manager
Michael Dudley, Management Analyst
Raymond Nazaire, Senior Project Manager
Jamie Opperlee, Recording Secretary, Prototype, Inc.

Communication to the City Commission

Motion made by Mr. Ladd, seconded by Mr. Partington, that we understand the Commission's interest in having us to extend our term, and we would like to confirm it and to confirm specifically how long that term would be. In a roll call vote, the **motion** passed unanimously.

1. Call to Order

i. Roll Call

Chair Mammano called the meeting to order at 2:01 p.m. and roll was called.

ii. Approval of Agenda

Motion made by Mr. Zeltman, seconded by Mr. Angeli, to approve the Agenda. [The Agenda was approved by consent.]

iii. Approval of Previous Meeting Minutes August 30, 2021

Mr. Zeltman addressed the following:

- P. 12, paragraph 4: he requested that language be changed from “a helistop above a parking garage” to “the helistop vehicle at a garage”

It was also noted that Assistant Director of Public Works (Utilities) Talal Abi-Karam had recommended the following changes:

- P. 3, paragraph 5: remove the word “same” from sentence 3
- P. 6, paragraph 5: change language of sentences 2 and 3

Chair Mammano pointed out that the existing language of p.6, paragraph 5 was already consistent with the requested change, and no modification would be made.

Motion made by Mr. Partington, seconded by Mr. Zeltman, to approve. [The minutes were approved by consent.]

2. General Discussion and Comments by Committee Members

The following Item was taken out of order on the Agenda.

ii. Follow up on Joint Workshop with the Commission

Chair Mammano characterized the joint workshop between the Infrastructure Task Force Committee (ITFC) and the City Commission as excellent, as both parties were engaged and concerned. She requested input from the members on their impressions of the meeting. Mr. Partington agreed that while the meeting did not end in the outcome he had personally wanted, he was confident that the Commission is familiar with the issue of infrastructure condition. He was less confident, however, that future Commissions may be similarly well-informed.

Mr. Ladd arrived at 2:11 p.m.

Mr. Walters also felt the meeting went well, and that the Mayor and City Commissioners are moving in the right direction to carry out what the Committee has recommended. Mr. Ladd also spoke positively of the meeting, stating that he felt the Commission appreciated what the Committee is trying to do in the interest of the City. He noted that the discussion of infrastructure condition had become “bogged down.”

Mr. Angeli commented that he was surprised that it is not possible to stop a developer or builder from building due to the condition of the infrastructure, when the solution seemed to be to fix the infrastructure. Mr. Zeltman agreed, stating that the Commission had seemed to gloss over the importance of the condition of water and wastewater infrastructure. Aside from this, he felt the Commission approved of the Committee's work, and it would be up to them to determine how they wish the Committee to proceed.

Mr. Grabski and Ms. Scott arrived at 2:21 p.m. Mr. Grabski described the joint workshop with the City Commission as enlightening. Ms. Scott agreed that it had gone well, but added that the Commission may not have yet decided what the Committee will do going forward.

1. Review and comment on P3 projects

Chair Mammano recalled that City Commissioner Heather Moraitis had wanted input from the Committee on public-private partnership (P3) projects, specifically including the water treatment plant once this proposal has emerged from the quiet period. The Commissioner had specifically requested the Committee's feedback on the funding of this proposed project.

Mr. Zeltman commented that Commissioner Moraitis had seen issues occur with previous P3 projects, including one such agreement regarding Lockhart Stadium. He felt the success of P3s is predicated upon the type of agreement between parties, particularly when investors are not given the upper hand to dictate processing components. Successful P3s require careful preparation of legal agreements as well as the work of project managers and contract administrators. Chair Mammano agreed that the Committee may discuss financial aspects of P3s in the future.

i. Introduction of new Public Works Director Alan Dodd

New Public Works Director Alan Dodd introduced himself to the Committee at this time. He noted that the City's Capital Improvement Plan (CIP) is very ambitious over the next five years and will require initiative to keep its projects on schedule and within budget.

2. Engage on potential changes to the 40-year inspection

Chair Mammano recalled that this issue was raised directly by the Mayor, who had not indicated whether or not he meant to discuss only City-owned properties or all properties of this age.

Mr. Zeltman stated that the City is responsible for the inspection of its own buildings, as one government agency cannot inspect properties owned by another government agency. He noted that there are 20- and 40-year inspections of these properties, followed by subsequent inspections every 10 years afterward. The recent condominium

collapse in Surfside, Florida has made it apparent that there may be problems with these buildings' foundations and structures.

Mr. Zeltman continued that he had provided suggestions to both Broward County and the state of Florida, both of which had given him positive feedback. These included:

- Requiring inspection of buildings within the first two years after construction in order to identify any design or structural issues while the builder's liability insurance is still applicable
- Requiring five- or ten-year inspections in coastal areas rather than waiting a full 20 years before conducting the first inspection
- Undertake more intense testing to determine where issues may occur

Ms. Scott asked what improvements Staff might recommend for the 40-year building inspections. Mr. Dodd replied that this inspection applies primarily to private buildings, although the City must also adhere to these requirements. Public Works is not involved in the inspection process unless they are tasked with contracting a 40-year inspection: the Department of Sustainable Development oversees this process. He recommended that representatives of that Department be invited to attend future Committee meetings if the members wished to hear their recommendations.

Mr. Partington observed that the 40-year inspection is a Broward County requirement, and the County has a working group that is looking further into this inspection process. He proposed reaching out to that group for their minutes so the Committee can see what they have discussed. Chair Mammano suggested that a member of the working group could also be invited to address the ITFC. She felt the Committee may also be able to provide comments or recommendations to this working group. She concluded that additional guidance from the Mayor may be necessary before they take any further action.

Mr. Angeli commented that the 40-year time frame for inspections is arbitrary: the key issue is fixing a problem once it has been identified. He pointed out that there are already multiple inspections prior to issuance of a CO, but afterward, there are typically no such efforts until the required 40-year inspection unless a concern is reported. The members also discussed the City authorities to whom issues are reported when they are seen, with Mr. Ladd citing an example in which he reached out to a former Director of Public Works to advise him of a problem he had noticed. Chair Mammano observed that the City may be less responsive, however, to reports from individual citizens with whom they are less familiar. There may also be more caution in a response when the problem reported could be very expensive to fix.

3. **How to consider condition, not in the Ordinance but administratively**

Chair Mammano advised that the Committee has reached the conclusion that changes are not planned for the Ordinance; however, the City Commission seems to feel that condition should be taken into consideration in some way during the approval process.

Mr. Ladd suggested that one option could be to encourage Staff to create a report of issues that have already been identified. He cited the Victoria Park neighborhood as an example of an area where the City already knows work needs to be done. A report could be created to identify which kinds of challenges exist within various neighborhoods or districts. This would give policymakers an overview of what needs to be done and where.

Mr. Grabski cited water service taps as an example: this test is either performed by the City or by a contractor with a City inspector observing the process. Cutouts from pipes provide information about the pipes' condition. This is done whenever a tap is installed for new development.

Ms. Scott advised that she had raised the issue of condition at a recent Planning and Zoning Board meeting but had not received the information she had requested. She emphasized the importance of continuing to bring up condition of infrastructure at subsequent meetings until the City realizes that it should be a key consideration, although she acknowledged that a project cannot be approved or denied based on condition under the current Ordinance.

Chair Mammano noted that two Commissioners had indicated they use the infrastructure maps provided by consultant Hazen and Sawyer, which show the condition of infrastructure in terms of its risk of failure. She asked Mr. Dodd if it may be possible to institutionalize a form of reporting or monitoring condition so this information can be generally incorporated into the approval process.

Mr. Dodd explained that once infrastructure has been put into the ground, it is more difficult to see and/or evaluate from that point forward. The Reiss report, which provided a comprehensive utilities strategic master plan, identified high-risk areas based on empirical factors, such as the age of the infrastructure. In the future, the City hopes to move toward an asset management system including a map of existing infrastructure, how that infrastructure has been maintained, and reports of new installation, which will help identify which projects should be prioritized so the worst issues are addressed first.

Mr. Partington stated that during the joint workshop with the Commission, the City Attorney had indicated he did not want any report on condition to explicitly accompany development applications. He expressed concern that the Staff members tasked with reviewing development applications are separate from the Staff members who see reports on the risk status of existing infrastructure.

Chair Mammano asserted that while she is in favor of the asset management program, the program's success is dependent upon long-term commitment to funding and

maintaining it. She suggested that the Committee recommend the Commission see a presentation on this program each year, including any new information the program has uncovered. This would not be in connection to a specific project, but intended to provide a general understanding of the system. It would provide the Commission with information on the condition of infrastructure and show the importance of continued funding of the asset management program.

Mr. Dodd stated that the asset management program does not work unless it includes accurate data that is actively used by Staff. There is consideration of committing dedicated Staff members to running the program's software, providing reports, and supplying regular updates. This data will serve as a basis for the recommendation of specific CIP projects before the Commission.

Mr. Dodd continued that there are three employees who work full-time on issues regarding water, wastewater, and stormwater. Before every City Commission meeting, they discuss projects and capacity analysis with the Public Works Director. This information is shared to ensure it is considered in relation to future development. It provides a "science and statistics-based reason" to make recommendations to the Commission on where investments should be made.

Ms. Scott asked how close the asset management program is to completion. Mr. Castellon stated that the wastewater portion of this program is considered part of the Consent Order. Cataloguing of this infrastructure has already begun.

Chair Mammano recalled that City Commissioner Ben Sorensen had raised this issue at the workshop, asking for information on the catalogue of water system infrastructure. She asked how close the City is to beginning this program for water. Mr. Castellon replied that the deadline for the mapping of water infrastructure is consistent with the deadline for the water Consent Order in 2023.

Ms. Scott commented that the public should be able to have confidence that the City is aware of the condition of its systems. Chair Mammano noted that regular presentation of the asset management plan to the Commission would be a way to show that this is under consideration by the City.

4. **Discussion of the Proposed (& subsequently approved) CIP – Office of Management & Budget**

Chair Mammano recalled that Mr. Walters had asked, at a previous meeting, what is done with the funds intended for a project if that project is abandoned or completed. She referred the members to a document in their backup materials, "The Proposed FY 2022 Community Investment Plan," dated May 7, 2021. This document identifies projects taken out of the budget and what was done with the money that would have funded them, as well as projects that were included in the budget.

Assistant Budget Manager Diane Lichtenstein reviewed the document, explaining that there is a difference between unspent and available dollars. Some projects have encumbrances, which means those funds are not available for other use. Grant funds are considered new items that are added to the budget; if one of these projects is removed, these funds are struck through on the document.

Mr. Walters requested clarification of a line item addressing seawalls. Ms. Lichtenstein pointed out that funds were removed from the Seawall Maintenance line item and moved into the Seawall Restore/Replace line item. This represents a change in the type of project to be done.

Mr. Walters also asked for further clarification of where monies go when a project is cancelled and removed from the list. Chair Mammano offered the example of a project that was removed from the budget because the City received County funds for it rather than using their own dollars. Ms. Lichtenstein replied that these dollars are moved back into the fund balance, from where they can be allocated to a different project through a budget amendment. Chair Mammano added that funds can also be moved from one project directly to another by Resolution.

5. Support for the BAB on line items for capital projects in the General Funds Budget

Chair Mammano recalled that the ITFC had recommended there be a line item in the City's regular budget dedicated specifically to infrastructure. At the Commission workshop, the chair of the City's Budget Advisory Board (BAB) had explained this more clearly by suggesting that infrastructure be a line item in the City's ad valorem tax bill, along with stormwater, bonds, and other expenses. The line item would clarify how much of the taxes would go toward infrastructure costs. She had requested that the BAB chair clarify this in writing so the ITFC can discuss it and modify their previous request for a line item so it is more consistent with what the BAB has proposed.

Ms. Scott noted that the Committee is currently expected to sunset as of February 2022, and asked if it was possible this time might be extended. She pointed out that there is little use in the Committee's ongoing work if the Commission has not made a commitment to keep them going. Chair Mammano agreed that the Committee cannot realistically expand its discussions to include new topics, such as the 40-year inspection process, if they are expected to sunset in February.

Ms. Scott recommended sending a communication to the City Commission requesting that they clarify whether or not they plan to extend the life of the Committee. Chair Mammano recommended that the Committee members reach out to the Commissioners who appointed them to ask this question.

Mr. Ladd pointed out that at the joint workshop, the Commission had already indicated they would like the Committee to continue. He felt the more appropriate communication

would be to ask the Commission to confirm this decision and clarify the length of the extended term.

Motion made by Mr. Ladd, seconded by Mr. Partington, that we understand the Commission's interest in having us to extend our term, and we would like to confirm it and so confirm specifically how long that term would be. In a roll call vote, the **motion** passed unanimously.

It was clarified that this **motion** would be sent as a communication to the City Commission.

Mr. Ladd left the meeting at 3:30 p.m.

3. Public Comments (at Each Item)

4. Old Business

i. Update on proposed pilot study at Prospect Wellfield and Fiveash Water Plant

Mr. Castellon stated that there are two pilot studies: one at Prospect Wellfield and a separate study at the Fiveash Water Treatment Plant. Both studies are still with the City's Legal Department and cannot be discussed at this time. There are sections in both reports which discuss specific locations, and these must be redacted before the studies are provided for public discussion.

Mr. Zeltman requested general synopses of both studies. Mr. Castellon referred to the scope of services for each pilot study, which mention to the types of tests to be included in those studies. He concluded that the studies are expected to have been redacted and released from the Legal Department prior to the next Committee meeting.

ii. Unfunded Capital Projects – PW List

Chair Mammano requested clarification of what is included on the Public Works list of unfunded capital projects. Assistant Director of Public Works (Engineering) Victor Carosi explained that the City Commission has seen a presentation on this list of unfunded projects, which are not included on the CIP spreadsheets discussed earlier in the meeting. The Committee reviewed the list, with Mr. Castellon pointing out that while these unfunded projects are not listed with accompanying costs, these are still important projects for the City.

Mr. Carosi characterized the CIP as "a balancing act" between the amount of money that can be provided in a year and the most pressing needs for the community. At any given time, there may be new information or other changes that require the reevaluation of priorities.

iii. Bridge Master Plan

Mr. Partington asked how many of the City's bridges are rated as structurally deficient by the Florida Department of Transportation (FDOT). Mr. Carosi explained that in 2014, the City Commission contracted with a consultant to evaluate Fort Lauderdale's bridges. At present, six of the City's 53 bridges are structurally deficient, while 22 of the 53 are functionally obsolete.

Mr. Partington asked if the six structurally deficient bridges are top priorities for the City. Mr. Carosi confirmed this, noting that in addition to this City-funded 2014 study, FDOT conducts a biennial inspection of all City bridges and provides the City with the information from these inspections.

Chair Mammano asked if all six of the structurally deficient bridges are funded for repair. Mr. Carosi replied that work on the Coconut Isle bridge has been completed, while the South Ocean Drive bridge is currently funded in the Broward County surtax program. The City is applying for surtax money for the West Lake bridge as well. He did not have information on the remaining three bridges at this time.

Mr. Zeltman requested clarification of the term "structurally deficient." Mr. Carosi explained that bridges are evaluated in different categories, with structural adequacy and safety given the most weight. Other categories include serviceability and functional obsolescence. The ratings given a bridge in each category are incorporated into a formula used to determine whether a bridge should be repaired or replaced.

Mr. Partington asked if any of the six bridges currently have weight restrictions. He asserted that if this is the case, it should make the restricted bridges a priority, as it is nearly impossible to enforce weight restrictions. Mr. Zeltman advised that the structural deterioration of some bridges means that they are no longer capable of bearing their intended weight limit, which means the limit may be reduced or truck traffic may be restricted from using them.

Mr. Carosi stated that Staff has not brought any load reduction ratings to his attention, so he could not directly answer Mr. Partington's question. Raymond Nazaire, Senior Project Manager, clarified that there are no load reduction ratings for these bridges. A load rating analysis is performed every two years, which is how the weight limits posted on bridges are determined.

Mr. Partington noted that if there are weight restrictions on certain bridges, some construction vehicles will inevitably exceed this restriction. Mr. Carosi noted that the City's annual budget includes funding for bridge repairs and contracts are assigned for annual bridge maintenance, so the City can respond to needs that arise throughout the year, based upon inspections. This line item is part of the operating budget.

Mr. Carosi continued that the report prepared in 2014 broke down the types of bridge repairs into different categories and projected a schedule for these repairs/replacements. This schedule is still being followed, to the extent that it is practical, with funds that become available.

Mr. Zeltman asked if this prioritization took the effects of climate change, such as rising water levels, into account when a bridge must be replaced. Mr. Carosi acknowledged that this is a challenge. The City tries to increase the height of bridges when feasible.

Chair Mammano noted that the documents provided state that between 2014 and 2019, the City spent approximately $4 million on repair and replacement of bridges. She asked if repair and replacement could be separated. Mr. Carosi confirmed that this can be clarified in the future. He emphasized the dynamic nature of budgeting as new needs arise.

Mr. Carosi continued that a chart showing projects planned from 2032 to 2036 included replacement of the Castle Harbor Isle and NE 41st Street bridges. At present, the Castle Harbor Isle bridge has a lane restriction due to a structural deficiency, which resulted in its being designed for replacement rather than repair. He pointed out that while charts represent snapshots of facilities in time, Staff constantly reevaluates and reexamines these reports. Chair Mammano requested that these charts be updated and brought back to a subsequent meeting.

5. New Business

i. Sidewalk Program

6. Public Works Update

i. Water & Sewer Breaks 2021 w/Mapping

ii. CIP Financial Report

iii. Impact Fees – Usage

Chair Mammano recommended that in the interest of time, Items 5 and 6 be deferred to the next scheduled meeting. The Committee agreed to this by consensus.

7. Adjournment

There being no further business to come before the Committee at this time, the meeting was adjourned at 4:01 p.m.

Any written public comments made 48 hours prior to the meeting regarding items discussed during the proceedings have been attached hereto.

[Minutes prepared by K. McGuire, Prototype, Inc.]

Joint Workshop and Communication to the Commission cont…

PROJECT ADDRESS: 3016 Bayshore Drive

Date request was received: 09/24/2021

DRC CASE#: R18058

Project Name: Bayshore Hotel

IF NO DRC CASE NUMBER PROVIDED, WATER & SEWER AVAILABILITY LETTER TO BE PROVIDED UPON PAYMENT OF ENCLOSED A/R INVOICE.

*******IMPORTANT INFORMATION*******

The following analysis is only VALID FOR A PERIOD OF ONE YEAR FROM THE DATE OF ISSUANCE. After which point, a reanalysis must be conducted to ensure adequate availability for projects.

☐ Water and Sanitary Sewer Capacity Allocation Letter (Small Project) ……...$960

☐ Modifications to small project that require capacity re-analysis……$960

X Water and Sanitary Sewer Capacity Allocation Letter (Large Project) ……$2,400

☐ Modifications to large project that require capacity re-analysis…… $2,400

Igor Vassiliev, P.E. | Project Manager II
City of Fort Lauderdale | Public Works
P: (954) 828-5862 | E: ivassiliev@fortlauderdale.gov

September 30, 2021

Andres Mizrahi, E.I.
KEITH
301 East Atlantic Blvd,
Pompano Beach, Florida 33060

Subject: **WATER AND WASTEWATER CAPACITY AVAILABILITY LETTER**
Bayshore Hotel – DRC R18058
3016 Bayshore Drive, Fort Lauderdale, Florida 33304

Dear Mr. Mizrahi,

According to the information submitted, the project consists of constructing a multi-tenant building with 115 condominium/apartment units, 168 hotel rooms, 2,390 S.F. of bar/cocktail lounge space, and 3,150 S.F. of merchandizing/retail space. It will replace four existing buildings with total of 89 hotel rooms. This project lies within the City's Pump Station (PS) D-31 basin and will increase the average day water demand by 0.0508 million gallons per day (MGD) and the average day sewer demand by 0.0386 MGD. The existing water infrastructure has the capacity to support the proposed development and no improvements are needed. The existing sewer infrastructure needs improvements to accommodate the demand from the proposed development.

If there are changes to the proposed development after issuance of this capacity availability letter, the Owner or Owner's authorized representative shall submit a revised request based on the updated plans. Failure to seek approval prior to changing the plans may result in revocation of permit and capacity allocation. The determination of capacity availability is based upon tools and data analysis as of the date of this letter. Availability of capacities, as calculated in the attached analysis, is not guaranteed and no existing system capacity shall be considered "committed" for this project until a permit has been issued and all fees have been paid. The City reserves the right to re-evaluate the availability of capacities at the time of permit application. If sufficient capacities are not available, the City may deny the permit application or ask the Owner/Developer to submit an alternate design prior to approval. Information contained in this letter will expire one year from the date issued.

Should you have any questions or require any additional information, please contact me at (954) 828-5862.

Sincerely,

Igor Vassiliev P.E.
Project Manager II

Enclosures: Water and Wastewater Capacity Analysis
cc: Alan Dodd, P.E., Public Works Director
Talal Abi-Karam, P.E., Assistant Public Works Director
Omar Castellon, P.E., Chief Engineer
Dennis Girisgen, P.E., City Engineer
File: Water and Sewer Capacity Letters

City of Fort Lauderdale
Public Works Department
Water and Wastewater Capacity Analysis

Bayshore Hotel – DRC R18058
3016 Bayshore Drive, Fort Lauderdale, Florida 33304

PROJECT AND DESCRIPTION

The project consists of constructing a multi-tenant building with 115 condominium/apartment units, 168 hotel rooms, 2,390 S.F. of bar/cocktail lounge space, and 3,150 S.F. of merchandizing/retail space.

DESCRIPTION OF EXISTING UTILITIES

Water: The site is currently served by a 12-inch water main along North Birch Road, see Figure 1.

Wastewater: The site is currently served by an 8-inch gravity sewer main on Bayshore Drive and a 10-inch gravity sewer main on North Birch Road, which conveys flow downstream to a 15-inch sewer on North Birch Road and to pumping station D-31, see Figures 2 and 3.

Pumping Station: The site is served by Pumping Station D-31 (PS D-31) located at Las Olas Circle and South Birch Road.

SUMMARY OF ANALYSIS AND REQUIRED ACTION

Existing water infrastructure has sufficient capacity to serve the project with no improvements required. Existing wastewater infrastructure does not have sufficient capacity to serve the project. The applicant will be required to upsize existing gravity sewer system to handle proposed flow increase. A memorandum of agreement (MOA) shall be required between the City and the applicant to coordinate the design requirements and construction of the improvements.

Figure 1 – City Water Atlas

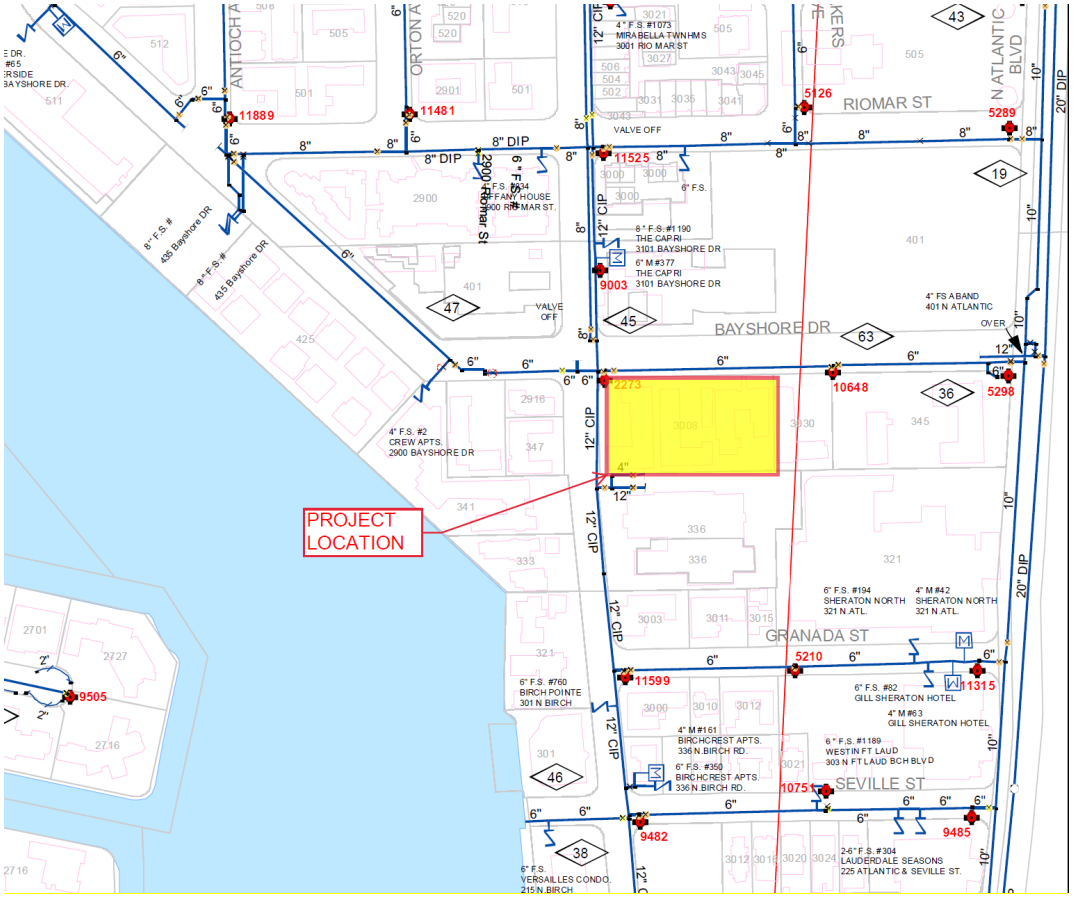


Figure 2 – City Sewer Atlas

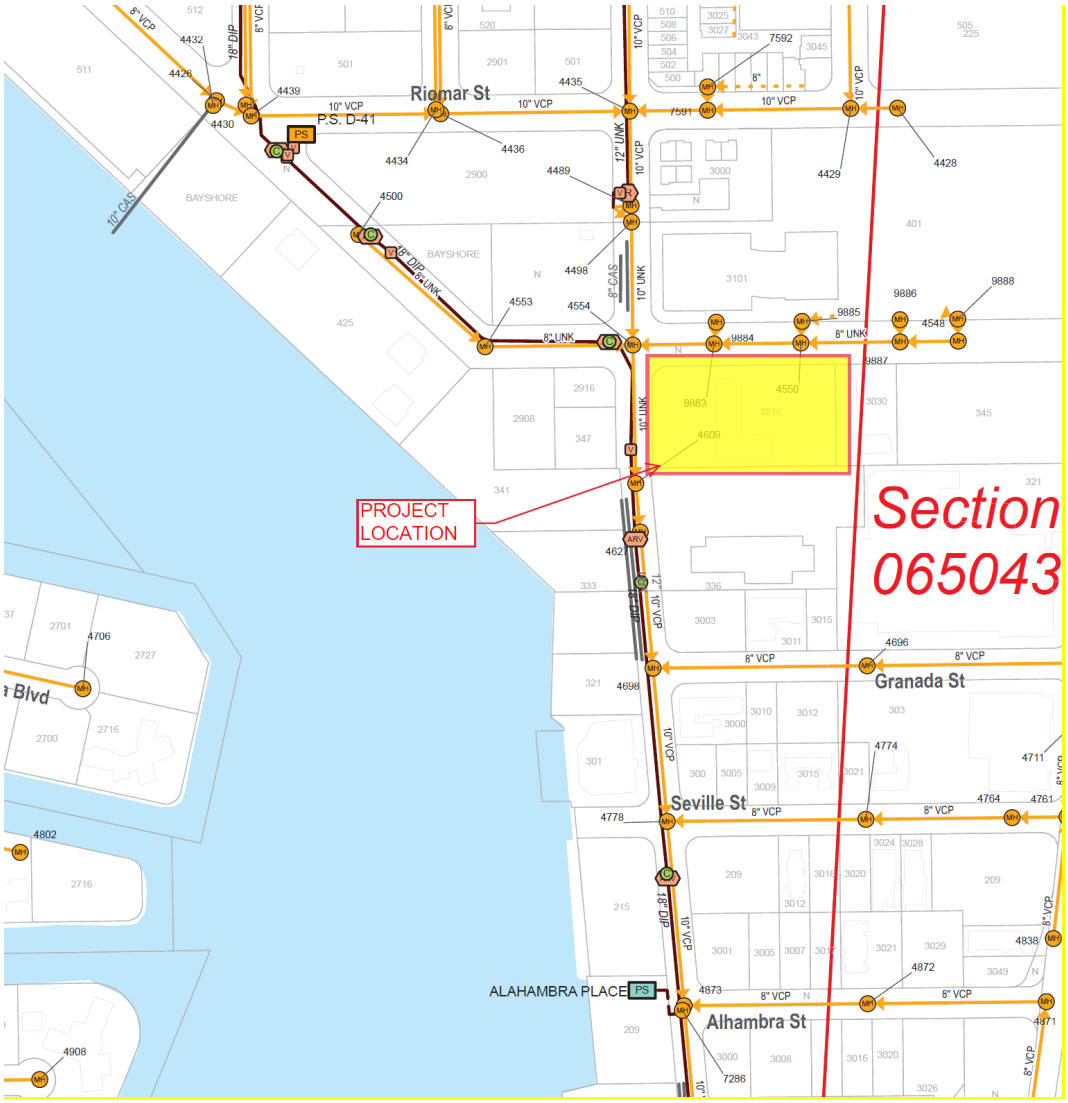
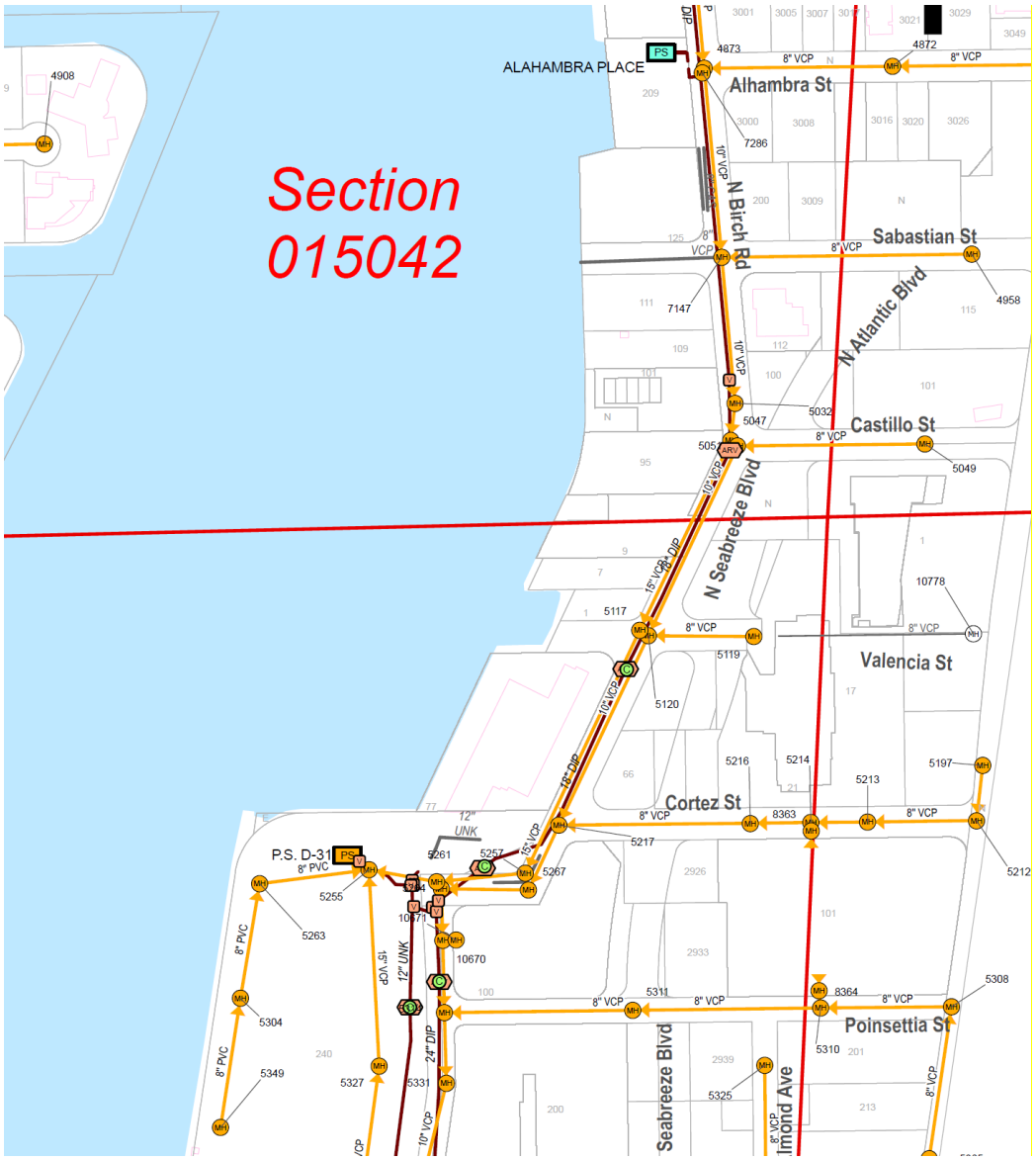


Figure 3 – City Sewer Atlas



WATER CAPACITY ANALYSIS

Requested Demand: Based on the applicant's site plan and building use information, the estimated average day potable water demand is 50,859 gallons per day (GPD), which equates to 0.0508 MGD. Average day water use demands are calculated by reducing the calculated max day water use demands by a factor of 1.3 as determined in the City's Comprehensive Utility Strategic Master Plan. The max day water use demands are calculated using the City's Guidelines for the Calculations of Sanitary Sewer Connection Fees and are based on City Ordinance No. C-19-29.

Evaluation of impact on existing distribution pipe (condition & capacity): According to the site plan, the applicant is proposing to utilize the 12-inch water main along North Birch Road. The InfoWater hydraulic model was analyzed to determine the impact of this project on the existing 12-inch water main.

Evaluation of impact of Permitted Water Plant Capacity: The Fiveash and the Peele Dixie Water Treatment Plants are designed to treat 70 MGD and 12 MGD of raw water respectively (82 MGD total). The total permitted Biscayne aquifer water withdrawals for these plants is limited to 52.55 MGD per the South Florida Water Management District (SFWMD) permit number 06-00123-W.

The current twelve-month rolling average production at the two plants is 38.45 MGD. The previously committed demand from development projects in the permitting or the construction stage is 4.78 MGD. Combining these figures with the demand from the proposed project of 0.0508 MGD, the required production would be 43.28 MGD. This is less than the allowable withdrawal limit of 52.55 MGD. Therefore, the water plants have sufficient capacity to serve this project. See Figure 4 below.

Recommended Water Infrastructure Improvements: No improvements required.

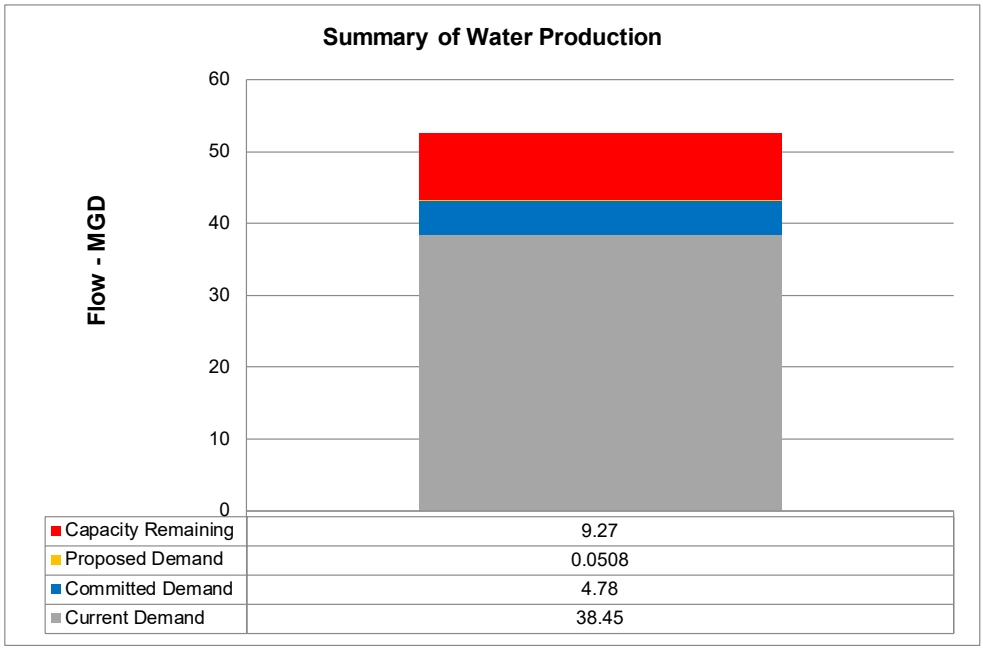


Figure 4

WASTEWATER CAPACITY ANALYSIS

Requested Demand: Based on the applicant's site plan and building use information, the estimated average day sewer use demand is approximately 38,568 GPD, which equates to 0.0386 MGD. Average day sewer use demands are calculated using the City's Guidelines for the Calculations of Sanitary Sewer Connection Fees and are based on City Ordinance No. C-19-29.

Evaluation of impact on existing collection pipe (condition and capacity): According to the site plan, the site is currently served by an 8-inch gravity sewer main on Bayshore Drive and a 10-inch gravity sewer main on North Birch Road, which conveys flow downstream to a 15-inch sewer on North Birch Road and to pumping station D-31. Manual of Practice (MOP) 60, published by American Society of Civil Engineers (ASCE) for the gravity sewer design and used by the City staff, recommends that pipe diameters 15-inch or less be designed to flow half full during peak flows. The City uses a peak hourly flow factor of 3.0. Accounting for existing flows and based on the tools and information available to the City staff, it has been calculated that the 8-inch sewer on Bayshore Drive and the downstream 10-inch sewer on North Birch Road downstream of the proposed development will flow more than the ASCE-recommended 50% full during peak flows. Therefore, the pipes downstream of the developments do not have adequate capacity to serve the project.

Evaluation of impact on pumping station: PS D-31 has a duty point of 1600 gallons per minute (GPM) and has a Nominal Average Pumping Operating Time (NAPOT) of approximately 3.29 hours per day. Based on projected sewage flows, the pumping run times would increase approximately 24 minutes per day. Additionally, there are other committed flows from proposed developments within the PS D-31 basin resulting in 64.65 minutes of additional runtime. PS D-31 will have a NAPOT of 4.77 hours once the proposed developments are complete, less than the recommended average of 10 hours per day. See Figure 5 below.

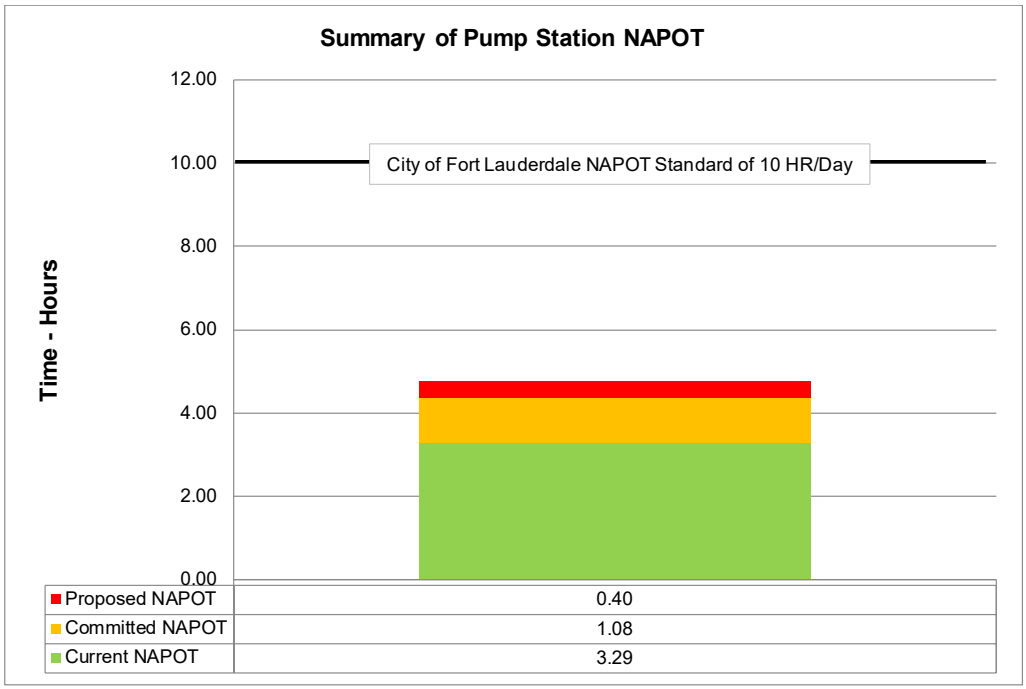


Figure 5

Evaluation of impact of Permitted Wastewater Plant Capacity: The City of Fort Lauderdale owns and operates the George T. Lohmeyer Regional Wastewater Treatment Plant (GTL), which provides wastewater treatment for the City of Fort Lauderdale. The Broward County's Environmental Protection and Growth Management Department's (EPGMD) Environmental Licensing & Building Permitting Division's licensed capacity for GTL is 48 MGD-AADF (Million Gallons per Day – Annual Average Daily Flow). The annual average daily flow (AADF) to the plant is 40.67 MGD. Combining the committed flows for previously approved projects of 4.62 MGD plus the 0.0386 MGD net contribution from the project results in a total projected flow of 45.33 MGD. This is less than the permitted treatment plant capacity of 48 MGD. Therefore, the treatment plant has sufficient capacity to serve this project. See Figure 6 below.

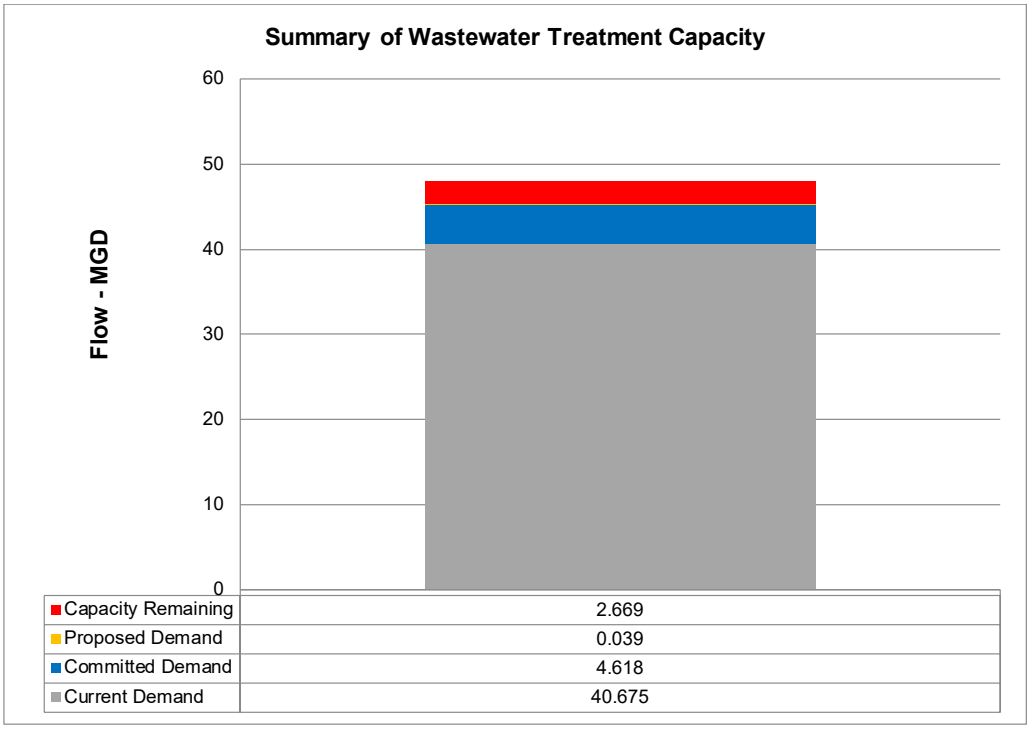


Figure 6

Recommended Wastewater Infrastructure Improvements: The applicant will be required to upsize the existing gravity sewer system to handle proposed flow increase. It is recommended that the 8-inch gravity sewer on Bayshore Drive be upsized to 10-inch (approximately 250 feet), and the 10-inch sewer on North Birch Road downstream of the proposed development be upsized to 15-inch sewer (approximately 1,700 feet). A memorandum of agreement (MOA) shall be required between the City and the applicant to coordinate the design requirements and construction of the improvements.

Update on Pilot Study and Evaluation (Fiveash and Prospect Wellfield)

PROSPECT WELLFIELD WATER QUALITY EVALUATION

CMA Project No. 047.052

WELLFIELD EVALUATION REPORT

CITY OF FORT LAUDERDALE

City of Fort Lauderdale Project No. 11589

Prepared By:

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Fort Lauderdale, FL 33309

August 2021

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Tables

Exhibits

1. Background and Introduction

The City of Fort Lauderdale Fiveash Regional Water Treatment Plant is the City's largest potable water treatment plant (WTP) with a 70 million gallons per day (MGD) designed lime softening facility which can supply potable water to the City's entire service area. The initial infrastructure associated with this facility was constructed in 1954; although the WTP produces safe reliable potable water, much of the equipment associated with the facility's primary treatment process is at or has exceeded its projected useful life.

The Fiveash WTP is supplied by the Prospect Wellfield which consists of 29 in-service raw water wells tapping the Biscayne aquifer. The water within the aquifer in this area of Broward County is typically fresh but has relatively high levels of naturally occurring dissolved organics and iron, which produce correspondingly high turbidity levels.

Unlike the Peele-Dixie WTP that uses membrane treatment to remove hardness and naturally occurring organics in the groundwater, the Fiveash WTP uses lime and chemical coagulants which removes hardness but not the organics resulting in higher turbidity treated water. Filtration is then used to bring the finished water within the required regulatory limits. As a result, lime softening plants may require additional treatment to remove the organics prior to disinfection to produce drinking water that consistently meets all primary and secondary drinking water standards, while producing an aesthetically high-quality product. It should be noted that except for color, the Fiveash WTP meets all primary and secondary drinking water parameters.

In this report, CMA and Connect Consulting, Inc. (CCI) will evaluate the existing water quality conditions and provide recommendations to address water color, organics, and iron concentration for the Fiveash WTP. This study will evaluate the existing performance of each of the 29 wells that supply raw water to the Fiveash WTP, provide current field water quality and color data, and evaluate trends and conditions based on existing and new data. The services include data evaluation, wellfield testing, and test well drilling components. The CMA and CCI team will review historical wellfield data, documents, and existing technical analyses related to the Prospect Wellfield operations and water quality. In addition, water quality and performance data for neighboring Biscayne Aquifer wells and other municipal wellfields will be collected and compared to the Prospect Wellfield data to evaluate variability of water quality in the aquifer. Water quality testing will be completed at each of the 29, in-service wells at the Prospect Wellfield. The collected data will be used to identify the performance of the wells, performance losses over time, rehabilitation needs, and water quality of produced water from each well. Composite water samples from existing sample taps located on water mains entering the plant will also be obtained.

The scope of the project also includes test well drilling at three locations within property owned by the City. The test well program includes drilling, logging, and obtaining a water quality profile of the aquifer.

The testing program can be increased to further investigate other areas in the future for the potential expansion of the wellfield into areas of better water quality.

2. Data Collection

The CMA and CCI team gathered and reviewed available information relevant to the water quality, specifically color and iron concentration. The data collection process can be outlined as follows:

- Collected and reviewed available well and pump information for the Prospect Wellfield.
- Reviewed available water quality data provided by the City to understand water quality trends.
- Evaluated water quality data from existing wells, completion intervals, and locations to identify variability in water quality.
- Collected and reviewed water quality data from neighboring Biscayne aquifer wells and wellfields for comparison with Prospect Wellfield.
- Delineated historical water quality trends to gauge the potential for water quality improvement within the Prospect Wellfield.

The gathered data was reviewed to determine the variability of water quality, specifically color and iron, in the Biscayne Aquifer around the Prospect Wellfield area. Water quality information, especially color and iron data, for neighboring Biscayne Aquifer wells and wellfields were collected and compared to the Prospect Wellfield data to delineate historical trends and to gauge the potential for water quality improvement for Fiveash's finished water. Examined utilities include Broward County District 1A, City of North Lauderdale, and the City of Pompano Beach Western Wellfield. Note that the Prospect Wellfield raw iron levels for 2020 were 0.49 mg/L and finished levels were 0.01 mg/L, which meet the secondary water quality parameter limit of 0.3 mg/L.

Some of the historical wellfield data collected and reviewed by the CMA and CCI team includes but is not limited to:

- Well construction and testing reports.
    - As-built diagrams/well construction details.
    - Step-drawdown and constant rate pump test data.
    - Geophysical and water quality data.
    - Pump information.
- Well rehabilitation reports.
    - Pre-treatment and post-treatment pump tests.
    - Well video surveys.
- Water treatment plant operational data.
    - Static and pumping water level data.
    - Water quality data.
- Neighboring wells and wellfield data.
    - Water quality data (obtained by request from each utility).

- Well construction data (SFWMD data base and ePermitting).
- Aquifer information from available sources including USGS and SFWMD.

The water use permit for each wellfield was obtained from the South Florida Water Management District (SFWMD). The well construction information for the Biscayne Aquifer wells was reviewed, particularly the location of the wells and well depths. Water quality data was requested from each of the water treatment plants. The amount of data received varied for each WTP; however, all data was reviewed by the CMA and CCI team and plotted in order to delineate and compare historical trends between wellfields.

[redacted]

Table 1 - Wellfield General Information

Municipality/County	*Wellfield*	*Distance to Prospect Wellfield*	*Relative Location*	*Biscayne Aquifer Wells*
[redacted]				

Raw water draw from the Biscayne Aquifer Prospect Wellfield is typically fresh water but has varying levels of dissolved organics and iron. The aquifer is highly permeable, and wells typically produce groundwater in excess of 2,000 gallons per minute (gpm) and as such, most of the wells within the Prospect Wellfield are rated at 2,100 gpm. Based on data provided by the City, the water quality of the wells within the Prospect Wellfield is variable in terms of organic and iron concentrations.

Table 2 summarizes the well construction details of the 36 wells within the Prospect Wellfield based on information obtained from SFWMD water use permit 06-00123-W issued to the City in September 2008.

Table 2 - Prospect Wellfield Details

Well	*Year Drilled*	*Well Diameter*	*Well Depth*	*Cased Depth*	*Screened Interval*	*Capacity (gpm)*	*Status*
2	1953	10	132	120	---	0	Standby
7	1953	10	130	118	---	0	Standby
8	1953	10	128	116	---	0	Standby
9	1953	10	125	113	---	0	Standby
19	1959	12	76	61	---	0	Standby
20	1959	12	76	61	---	0	Standby
24	1963	12	80	68	---	0	Standby

Table 2 - Prospect Wellfield Details

Well	*Year Drilled*	*Well Diameter*	*Well Depth*	*Cased Depth*	*Screened Interval*	*Capacity (gpm)*	*Status*
25	1969	17	150	112	---	2100	Primary
26	1969	17	144	105	---	2100	Primary
27	1971	17	103	100	---	2100	Primary
28	1971	17	116	81	---	2100	Primary
30	1972	17	109	90	---	2100	Primary
31	1973	17	100	80	---	2100	Primary
32	1973	17	103	82	---	2100	Primary
33	1973	17	101	80	---	2100	Primary
34	1974	17	90	75	---	2100	Primary
35	1974	17	96	70	---	2100	Primary
36	1980	18	99	81	---	2100	Primary
37	1980	18	98	82	---	2100	Primary
38	1980	18	102	82	---	2100	Primary
39	1980	18	98	82	---	2100	Primary
40	1980	17	90	62	---	2100	Primary
41	1980	17	95	82	---	2100	Primary
42	1980	17	91	82	---	2100	Primary
43	1985	17	90	66	---	2100	Primary
44	1985	17	90	68	---	2100	Primary
45	1988	17	120	100	---	2100	Primary
46	1988	17	120	100	---	2100	Primary
47	1988	17	120	100	---	2100	Primary
48	---	17	---	---	---	2100	Primary
49	---	17	---	---	---	2100	Primary
50	2001	16	120	100	100-120	2100	Primary
51	2001	16	120	100	100-120	2100	Primary
52	2001	16	120	100	100-120	2100	Primary
53	2001	16	120	100	100-120	2100	Primary
54	2001	16	120	100	100-120	2100	Primary

2.1 Prospect Wellfield

2.1.1 Water Quality Data

Water quality data, including color and iron data, was provided by the City for the Prospect Biscayne aquifer wells for the following years:

- Color: May 2002, June 2003, May 2004, June-December 2005, 2006-2020
- Iron: May 2004, June-December 2005, 2006-2020

The data provided was not complete. Some wells had only one measurement per year while others had as many as 11. Color was recorded in cobalt units (CU) and ranged from 12 CU in Well No. 36 to 290 CU in Well No. 54. The average color levels ranged from 33 CU in Well No. 36 to 100 CU in Well No. 54. Iron data ranged from 0.02 mg/L in Well No. 28 to 5.42 mg/L in Well No. 38. The average iron levels ranged from 0.16 mg/L in Wells No. 30 and No. 42 to 1.31 mg/L in Well No. 54. A summary that includes the open hole interval, color, and iron data for each Prospect Wellfield production well is included as ***Table 4***.

2.1.2 Hydraulic Data

The SFWMD DBHYDRO database was used to identify numerous wells drilled within the Prospect Wellfield over the last 50 years. Hydraulic and well construction data was obtained from the database for some of these wells, which were able to cross reference with the currently existing production wells. Based on the data, wells tapping the Biscayne Aquifer in the eastern/southeastern part of the Prospect Wellfield generally have significantly higher transmissivities (390,000 - 600,000 ft^2/day) than those in the central and western part of the wellfield (92,000 - 270,000 ft^2/day). Those wells in the east/southeast generally have shallower open hole depths ranging from 70 to 99 feet below land surface (BLS).

2.2 Neighboring Wellfields

The CMA and CCI team collected color and iron data for neighboring Biscayne Aquifer wellfields and compared it to the Prospect Wellfield data to delineate historical trends and to gauge the potential for water quality improvement within the Prospect wellfield. Neighboring wellfields examined during this study included the City of Pompano Beach Western Wellfield, the City of North Lauderdale Wellfield, and the Broward County District 1A Wellfield. General well construction details and water quality data for each wellfield is provided in ***Table 3A*** and ***Table 3B***.

Table 3A - Wellfield Well Construction Information

Wellfield	*Biscayne Aquifer Wells*	*Cased Depth (LF BLS)*	*Total Depth (LF BLS)*	*Quality Data Record (Yrs)*
Prospect Wellfield	29	62-112	90-150	17 (Iron) - 19 (Color)
Western Wellfield	10	72-80	130-158	5

North Lauderdale Wellfield	3	103-106	128-129	6
District 1A Wellfield	9	69-80	94-147	10

Table 3B - Wellfield Water Quality Data

Wellfield	*Average Color (CU)*	*Color Range (CU)*	*Average Iron (mg/L)*	*Iron Range (mg/L)*
Prospect Wellfield	33 - 100	12 - 290	0.16 - 1.31	0.02 - 5.42
Western Wellfield	55 - 97	50 - 110	0.58 - 1.91	0.36 - 2.06
North Lauderdale Wellfield	28 - 49	13 - 80	0.33 - 0.78	0.00 - 1.80
District 1A Wellfield	53 - 59	40 - 75	1.20 - 1.40	0.00 - 2.60

2.2.1 City of Pompano Beach Western Wellfield

Water quality data, including color and iron data, was provided by the City of Pompano Beach for each of the production wells for the years 2013, 2014, 2016, 2018, 2019, and 2020. The data set for Pompano Beach is limited. Only one water quality sample has been analyzed from each well per year and not all wells have color and iron data for every year, so the maximum number of readings for any one well is five. However, the data is helpful, as it provides a general range of color and iron readings for the wells.

2.2.2 City of North Lauderdale Wellfield

Monthly water quality data, including color and iron data, was provided by the City of North Lauderdale for each of the three wells within the North Lauderdale Wellfield for the years 2010 through 2015, and 2019. There are gaps in the data as the three wells are missing occasional months of data in all years. The largest missing color data set is for Well No. 2 between March 2014 and February 2015. The largest missing iron data set is also for Well No. 2 between September 2014 and August 2015.

2.2.3 Broward District 1A Wellfield

Broward County provided the CMA and CCI team with monthly water quality data from January 2011 through November 2020 for each of the Biscayne Aquifer production wells. There are some gaps in the data and all nine wells are missing occasional months of data. The largest missing color and iron data sets are the following:

- Well No. 1A: May 2015 - July 2016
- Well No. 2A: November 2016 - June 2017
- Well No. 4A: September 2016 - March 2017

3. Hydrogeology – Biscayne Aquifer

The production wells in the Prospect Wellfield, Broward County District 1A Wellfield, City of North Lauderdale Wellfield, and City of Pompano Beach Western Wellfield tap the Biscayne Aquifer. In fact, the Biscayne Aquifer is the principal aquifer tapped throughout Broward County and the primary source of water for municipal, industrial, and irrigation use in all of Broward County, Miami-Dade County, and southeastern Palm Beach County (Miller, 1990). The aquifer is unconfined, highly permeable, and wells can typically yield groundwater in excess of 2,000 gallons per minute (gpm). It is generally found between approximately 50 and 200 feet below land surface but is thickest along the Atlantic coast, where the base of the aquifer can be more than 350 feet below land surface, and thins in western Miami-Dade and Broward counties.

The aquifer is composed primarily of highly permeable limestone and less permeable sandstone and sand of the Pleistocene and Pliocene ages. It is underlain by marine sediments that are predominantly greenish, sandy clay and marl of low permeability which form the upper confining layers of the Floridan aquifer. Hydrologically, the aquifer includes the Tamiami Formation, Anastasia Formation, Miami Oolite, and Pamlico Sand as shown in ***Exhibit 2*** below.

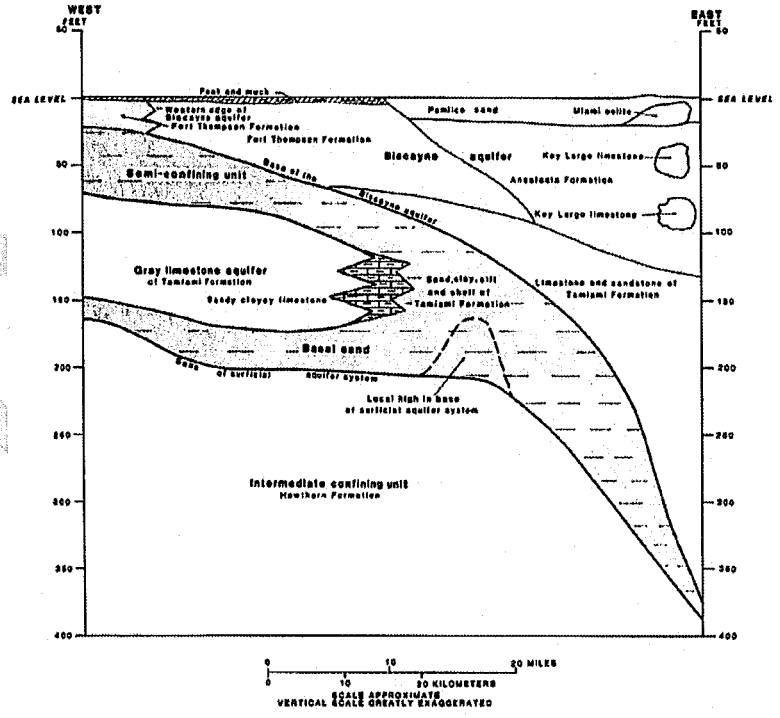


Exhibit 2 – Schematic diagram showing the geologic formations of the surficial aquifer in Broward County, Florida, from Fish (1988).

The groundwater in the Biscayne Aquifer in the vicinity of the project area is generally of good quality except for the high iron content and color. Color in groundwater is usually derived from the decomposition of organic matter such as humus, peat, or decaying plant material. Natural color of 10 CU or less largely goes unnoticed by the general public. Higher levels are harmless, nonetheless the public perception of color in water is negative as evidenced in the October 4, 2019, Sun Sentinel article in regard to the water produced by the Fiveash WTP titled, "The water's yellow and no, someone didn't forget to flush."

Iron occurs naturally in groundwater and is derived from iron-bearing minerals within the aquifer or from the action of iron bacteria. It is one of the most noticeable and objectionable constituents in the groundwater of this area. It can cause discoloration inside in sinks, toilets, and showers as well as outside on trees, sidewalks, and buildings. Iron concentrations in excess of 0.3 parts per million (ppm) is objectionable in water used for public supply, while concentrations in excess of about 0.5 ppm results in an unpleasant taste. It should be noted that the Fiveash WTP finished water does not exceed 0.3 ppm iron concentrations.

[redacted]le. Withdrawals from 29, in-service wells tapping the Biscayne Aquifer are permitted through the SFWMD water use permit number 06-00123-W. The production wells range in size from 16-inches to 18-inches in diameter. The shallowest well (Well No. 40) has an open hole completion between 62 and 90 feet BLS, while the deepest well (Well No. 25) has an open hole completion between 112 and 150 feet BLS.

4.1 Color Data

Color levels generally increase from south to north. The wells with the lowest average color (No. 33-36 and No. 45) are located along the [redacted]. The wells with the highest average color (No. 50-54) are generally located [redacted] Increasing color levels were not observed in any of the wells. Decreasing trends were observed in eight wells, five of which can be found along the [redacted] Refer to ***Exhibit 4*** and ***Exhibit 5*** for plotted charts of wells with decreasing trends in color levels within the Prospect Wellfield.

4.2 Iron Data

The wells with the lowest average iron concentration [redacted] Other wells with comparably low iron concentrations are also located [redacted], as well as two wells located in the [redacted] of the wellfield. Wells with lower iron appear to be localized within a northwest-southeast trending area through the center of the wellfield. However, there are other wells within this area that have higher iron concentrations as well. Wells No. 31 and No. 54 on the [redacted] have the highest iron concentrations. A summary of the iron concentration levels is provided in ***Table 7***. Refer to Section 8 of this report for treatment recommendations for iron removal.

Only Well No. 39, located in the southeast part of the wellfield, has an increasing iron concentration as depicted in ***Exhibit 7.*** Iron levels in Well No. 39 have been rising since 2011. Thirteen wells have decreasing iron concentrations. Seven of these wells are located [redacted], one is on the [redacted] and one is the [redacted] well in the wellfield.

A summary of Prospect Wellfield Production Well Color and Iron Data is shown in ***Table 4***.

Table 4 - Prospect Production Well Open Hole Interval and Color and Iron Data

Well	Open Hole Interval (LF BLS)	Average Color (CU)	Color Concentration Range (CU)	Average Iron Concentration (mg/L)	Iron Contraction Range (mg/L)
25	112-150	49	29-94	0.67	0.31-1.21
26	105-144	49	36-108	0.80	0.37-1.05
27	100-103	51	32-75	0.22	0.12-0.67
28	81-116	55	39-140	0.26	0.02-1.61
30	90-109	52	40-84	0.16	0.08-0.85
31	80-100	67	37-152	0.98	0.28-1.78
32	82-103	46	24-69	0.76	0.33-1.43
33	80-101	34	15-52	0.37	0.22-0.51
34	75-90	41	29-90	0.59	0.39-0.75
35	70-96	41	26-65	0.63	0.05-3.6
36	81-99	33	12-48	0.22	0.1-1.71
37	82-98	47	29-85	0.55	0.28-0.9
38	82-102	54	26-95	0.81	0.09-5.42
39	82-98	45	26-103	0.38	0.17-0.84
40	62-90	57	36-100	0.83	0.09-4.38
41	82-95	61	37-98	0.39	0.13-1.13
42	82-91	64	50-110	0.16	0.04-1.17
43	66-90	50	30-84	0.70	0.34-4.38
44	68-90	51	31-92	0.50	0.09-1
45	100-120	38	22-50	0.28	0.14-0.52
46	100-120	53	40-77	0.86	0.56-4.18
47	100-120	48	35-67	0.45	0.16-2.52
48	N/A	61	46-82	0.64	0.27-1.01
49	N/A	59	32-79	0.27	0.08-0.74
50	100-120	69	48-183	0.17	0.04-1.2
51	100-120	73	49-140	0.29	0.13-1.65
52	100-120	88	39-230	0.76	0.1-4.29
53	100-120	68	52-85	0.62	0.21-0.97
54	100-120	100	38-290	1.31	0.32-1.78

4.3 Depth and Iron Concentration Correlation

No correlation was observed between the depth of the open hole portion of the production wells and the iron concentrations in the Prospect Wellfield. The three wells with the lowest average iron concentrations have variable open hole depths. Well No. 30 has an open hole interval of 90-109 feet BLS, Well No. 42 an interval of 82-91 feet BLS, and Well No. 50 an interval of 100-120 feet BLS. The three wells with the highest average iron concentrations also have variable open hole depths. Well No. 31 has an open hole interval of 80-100 feet BLS, Well No. 46 100-120 feet BLS, and Well No. 54 an interval of 100-120 BLS. Well No. 45

and Well No. 46 are close to each other and have the same open hole depth; nevertheless, their average iron concentrations are 0.28 mg/L and 0.86 mg/L, respectively.

4.4 Depth and Color Levels Correlation

No correlation was observed between the depth of the open hole portion of the production wells and the color level in the Prospect Wellfield. The Prospect Wellfield has a range of open hole completions from 90 to 150 feet BLS. Wells that produce water with lower color are located along the western boundary and in the southeastern corner of the wellfield. These wells generally have open holes that range from 80 to 100 feet BLS. However, there are other wells in the wellfield with similar open hole depths with higher color levels such as Well No. 31 and Well No. 42. Comparably, many of the wells with higher color levels in the [redacted] portion of the wellfield have open hole depths ranging from 100 to 120 feet BLS, but there are wells in other areas of the wellfield with the same open hole depths with significantly lower color levels.

The five wells with the highest average color (Wells No. 50-54) have open hole intervals from 100-120 feet BLS. However, there are other wells in the wellfield with the same open hole interval that have significantly lower color levels, such as Well No. 45 and Well No. 47. Similarly, Wells No. 33 and No. 36, which have the lowest average color levels in the wellfield, have open hole intervals of approximately 80 to 100 feet BLS. Well No. 41 and Well No. 42 have similar open hole intervals of 82-95 feet BLS and 82-91 feet BLS, respectively, with markedly higher color intervals. ***Exhibit 12*** is a bar chart showing the average color of each Prospect Wellfield production well over the period of record and the corresponding open hole interval in the well. Wells with the lowest average color are on the left. The wells are displayed in order of increasing color level.

4.5 Surface Water Features and Color and Iron Levels Correlation

The Biscayne aquifer is an unconfined aquifer within the surficial aquifer system (Fish, 1988). Recharge occurs through rainfall and the infiltration of surface water. The CMA and CCI team examined the relationship between the location of surface water features, such as lakes, and canals, and the color and iron concentrations to determine if the proximity of the production wells to surface waters affected the color or iron levels in the Prospect Wellfield production wells.

[redacted]

The average iron concentrations in these wells over time are not uniformly higher or lower than wells located adjacent to lakes.

4.6 Improvement in Color and Iron Concentration

Based on historical trends from the analyzed data, significant improvement in the color levels in the raw water drawn from the Prospect Wellfield is not expected over time. Even though a decreasing color trend was observed in eight wells within the Prospect Wellfield over the entire data set (2002-2020), six of these eight wells show very little decrease in color levels in data collected over the past eight years. Only wells No. 31 and No. 50 exhibit a decrease in color during the past eight years. No changes in color levels were observed in any other production well within the Prospect Wellfield.

Decreasing trends in iron concentrations were observed in 13 wells. It is possible that the decreasing iron levels in these wells is due to their proximity to the surface water bodies, in particular the lime sludge pit, as five of the seven wells around the pit exhibit decreasing iron trends. An increasing trend in iron was only observed in Well No. 39, located in the southeast part of the wellfield. It is undetermined whether the decreasing trends in iron concentrations will continue.

5. Neighboring Wellfields

5.1 City of Pompano Beach Western Wellfield

[redacted]

[redacted]Withdrawals from 10, in-service, wells tapping the Biscayne Aquifer are permitted through the SFWMD District water use permit number 06-00070-W. The production wells are 16-inches in diameter. Nine of the ten wells have very similar cased and open hole depths. Cased depths in these nine wells vary from 76 to 80 feet BLS while the open hole depths range from 150 to 158 feet BLS. Only Well No. 18 has markedly different specifications with a cased depth of 72 feet BLS and open hole depth of 130 feet BLS.

Water quality data, including color and iron data, was provided by the City of Pompano Beach for each of the production wells. As shown in ***Table 3B***, color ranged from a low of 50 CU in Well No. 19 in 2014 to a high of 110 CU in Well No. 23 in 2016. Average color levels ranged from 55 CU in Well No. 19 to 97 CU in Well No. 23. Iron concentrations ranged from a low of 0.36 mg/L in Well No. 24 to a high of 2.06 mg/L in Well No. 20. The average iron levels ranged from 0.58 mg/L in Well No. 24 to 1.91 mg/L in Well No. 20.

5.2 City of North Lauderdale Wellfield

[redacted]Withdrawals from three Biscayne Aquifer wells are permitted through the SFWMD (WUP number 06-00004-W). [redacted]The wells have similar construction specifications with 24-inch diameters, cased depths between 103 and 106 feet BLS, and open hole depths of 128 to 129 feet BLS.

Monthly water quality data, including color and iron data, was provided by the City for each of the North Lauderdale Wellfield production wells for the years 2010 through 2015 and 2019. Color levels ranged from a low of 13 CU in Well No. 2 to a high of 80 CU in Well No. 1. The average color concentration in Wells No. 1, No. 2, and No. 3 were 49 CU, 32 CU, and 28 CU, respectively. Color levels are highest in the northernmost well and lowest in the southernmost well. The color data for each well was graphed versus time but no trends were observed. Iron concentrations ranged from 0.0 to 1.80 mg/L, both in Well No. 3. The average iron concentrations were 0.78 mg/L, 0.43 mg/L, and 0.33 mg/L in Wells No. 1, No. 2, and No. 3, respectively. No trends were identified in iron concentration over time within the three wells.

5.3 Broward County District 1A Wellfield

[redacted]Withdrawals from nine, Biscayne Aquifer wells are permitted through the SFWMD (WUP

number 06-00146-W). [redacted] Six of the wells are 12-inches in diameter, while the other three wells are 20-inches in diameter. Cased depths range from 69 to 89 feet BLS. Six of the wells have open holes to 100 feet BLS. The remaining three wells have open holes to 94 feet, 135 feet, and 147 feet BLS.

Broward County provided monthly water quality data from January 2011 through November 2020 for each of the Biscayne production wells. Color ranged from a low of 40 CU in Well No. 1A to a high of 75 CU in Well No. 8A. The color levels in the wells are very similar with average concentrations between 53 CU and 59 CU for the nine wells over the 10-year period of record. The color data for each well was graphed versus time to determine if there were any trends in the data, but no trends were observed in any of the nine wells.

Iron concentrations ranged from 0.0 mg/L in Well No. 7 to 2.6 mg/L in Wells No. 2 and No. 3. The average iron concentrations were remarkably similar ranging from 1.2 mg/L to 1.4 mg/L. The iron data for each production well was graphed versus time to determine if there were any trends in the data. Well No. 2 exhibits an increasing trend in iron concentration, but no trend was identified within the other eight production wells. A sudden decrease was iron is observed in the wells in November 2019. Broward County stated that the decrease was due to a change in their method of analysis.

6. Water Quality

6.1 High Color Levels

Based on the data collected from the Prospect Wellfield, test well data, and the three nearby wellfields, the high color levels appear to be regionally extensive and a characteristic of the Biscayne Aquifer in this area. Of the 51 production wells in the four wellfields studied, none had an average color level below 10 color units (CU), which is the level at which color largely goes unnoticed by the general public, or 15 CU which is the secondary drinking water standard. The range of color levels in the wells within the Prospect Wellfield encompass those within the Broward County District 1A Wellfield and Pompano Beach Wellfield. [redacted] has the lowest average color level (28 to 49 CU) of the wellfields in this study. The average color concentrations within the studied wellfields in shown in ***Table 5***.

Table 5 - Wellfields Average Color and Iron Concentration Levels

Wellfield	*Average Color (CU)*	*Average Iron Concentration (mg/L)*
Prospect Wellfield	33-100	0.16-1.31
North Lauderdale Wellfield	28-49	0.33-0.78
Broward County District 1A Wellfield	53-59	1.2-1.4
Pompano Beach Western Wellfield	55-97	0.58-1.91

6.2 Well Depth and Color Level Correlation in the Study Area

No correlation was identified between the depth of the open hole portion of the production wells in the neighboring wellfields and the color level. The wells within the City of North Lauderdale wellfield all have similar construction details with cased depths of 103 to 106 feet BLS and open hole depths from 128 to 129 feet BLS. Their average color levels range from 28 to 49 CU. At the Pompano Beach Western Wellfield, nine of the ten production wells have very similar construction specifications with cased depths of 76 to 80 feet BLS and total depths of 150 to 158 feet BLS. Only one well has markedly different specifications with a cased depth of 72 feet BLS and open hole depth of 130 feet BLS; however, the water quality of this well is similar to the rest of the wellfield. The average color levels for the wells have a fairly wide range from 55 to 97 CU.

Conversely, Broward County District 1A wells have a wider range of cased and total well depths but remarkably similar color levels. At Broward County District 1A, the cased and total depths vary between 69 and 89 feet BLS. Six of the wells have open holes to 100 feet BLS. The remaining three wells have open holes to 94 feet, 135 feet, and 147 feet BLS. The color levels in the all of the wells are very similar with average concentrations between 53 and 59 CU over the 10-year period of record.

6.3 Well Depth and Well Iron Concentration

Based on the data collected from the Prospect Wellfield and the three nearby wellfields, iron concentrations above the secondary standard of 0.3 mg/L are common in the study area, however the finished water quality is less than 0.04 mg/L and therefore not a concern. Twenty of the 29 wells in the Prospect Wellfield have average iron concentrations above 0.3 mg/L. All of the production wells in the Broward County District 1A Wellfield, North Lauderdale Wellfield, and Pompano Beach Western Wellfield have average iron concentrations above 0.3 mg/L.

Broward County District 1A wells have remarkably similar average iron concentrations (1.2 mg/L to 1.4 mg/L), while more variability was displayed in the other three wellfields. At the Prospect Wellfield, the average iron concentration in Well No. 54 is 1.31 mg/L, which is considerably higher than the other wells within the wellfield, ranging from 0.16 mg/L to 0.98 mg/L. The North Lauderdale Wellfield has the lowest average iron level of the wellfields with a range of 0.33 mg/L to 0.78 mg/L in their three wells over the period of record (2010-2015, 2019). Iron concentrations in the Pompano Beach Western Wellfield are generally higher with six wells that have average iron concentrations over 1 mg/L.

6.4 All Color and Iron Data

The color measurement collected for all the wells from the Prospect Wellfield, Pompano Beach Western Wellfield, North Lauderdale Wellfield, and Broward County District 1A Wellfield were graphed in order to determine how the color within the Prospect production wells compares to those in the surrounding wellfields. ***Exhibit 13*** shows that the color levels in the wells in the Prospect Wellfield are generally equivalent to those at Pompano Beach Western Wellfield and Broward County District 1A Wellfield but higher than the wells at North Lauderdale Wellfield.

The iron measurements collected for all of the wells from the Prospect Wellfield, Pompano Beach Western Wellfield, North Lauderdale Wellfield, and Broward County District 1A Wellfield were also graphed in order to determine how the iron concentration in the wells within the Prospect Wellfield compared to those in the surrounding wellfields. ***Exhibit 14*** shows that the iron concentration within the Prospect Wellfield is generally less than in the wells at Broward County District 1A and Pompano Beach until November 2018. ***Exhibit 14*** further shows that the iron concentration within the Prospect Wellfield is similar to the wells at North Lauderdale and Broward County District 1A after November 2018. The analysis method at Broward County District 1A Wellfield changed at the end of 2018 from a visual Hach color wheel method to an electronic analyzer which resulted in a change of values in all wells (Bodmann, 2021).

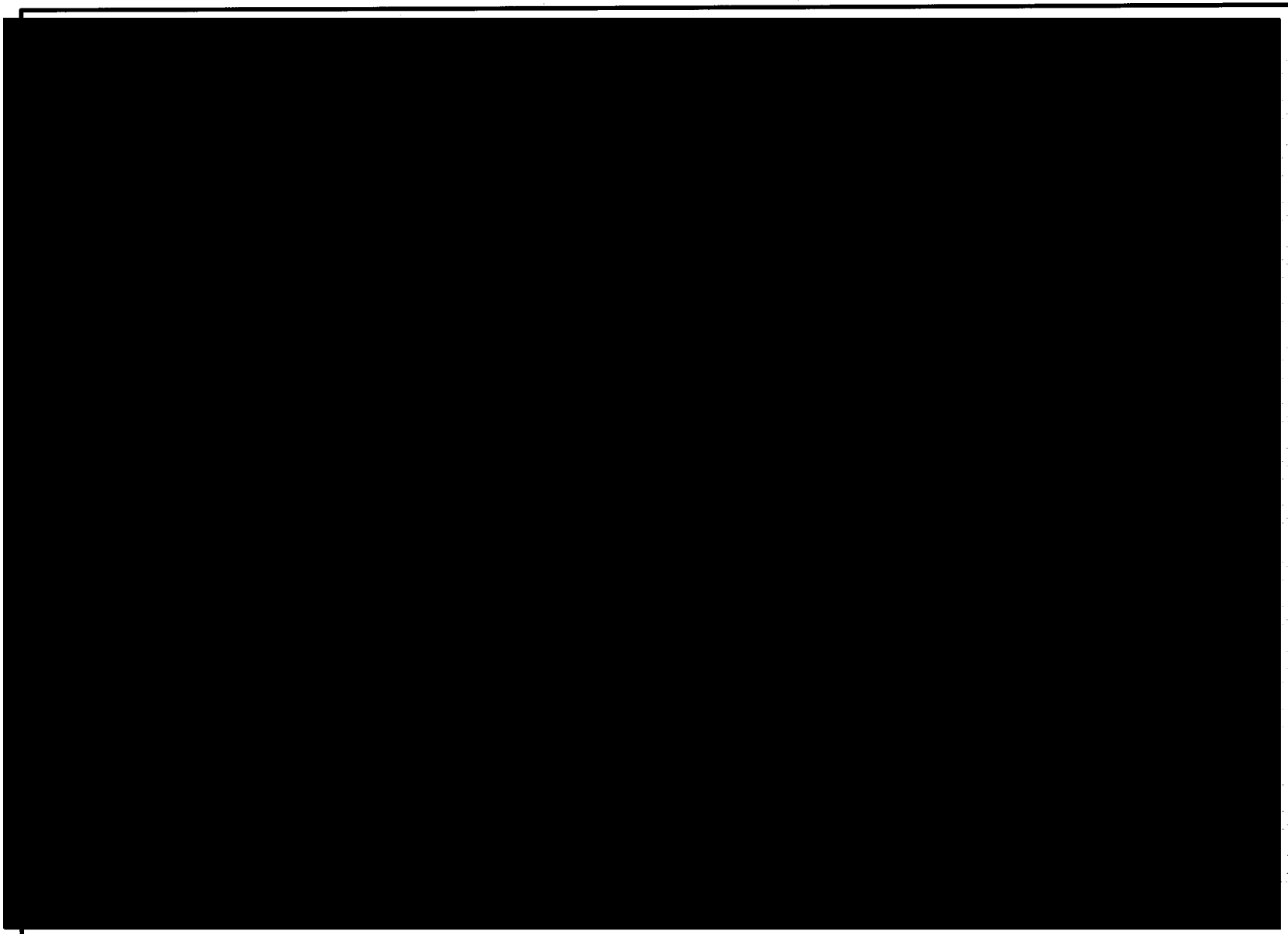
7. Well Installation and Testing Reports

(IN PROGRESS)

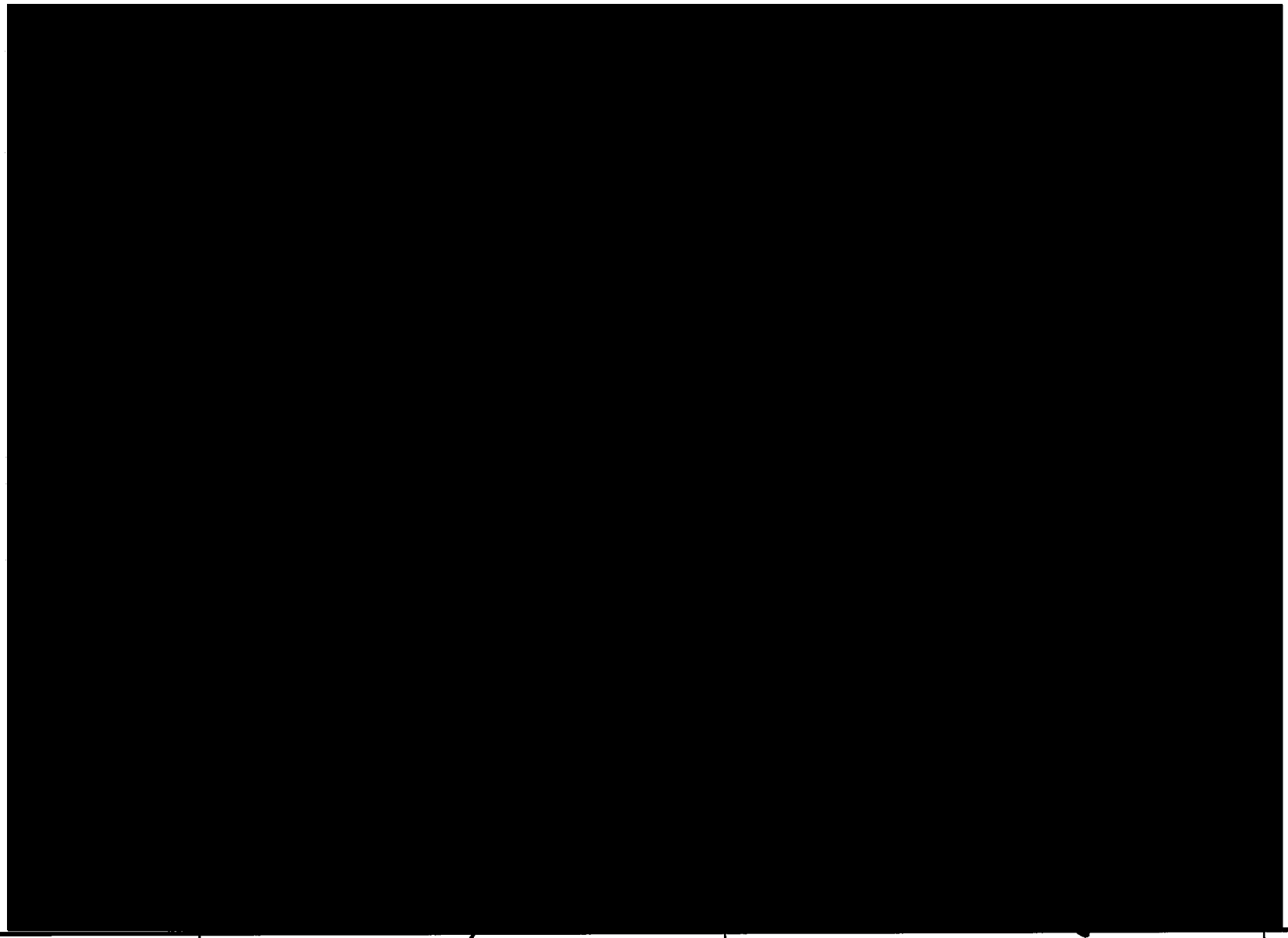
8. Summary and Recommendations

Based on the results of the data and records research effort, a raw water source with a color concentration below approximately 30 CU is not available within the Biscayne aquifer at the Prospect wellfield site or the immediate surrounding area. Color between approximately 35 and 50 CU may be found based on wellfield data and should be part of the next phase of investigation.

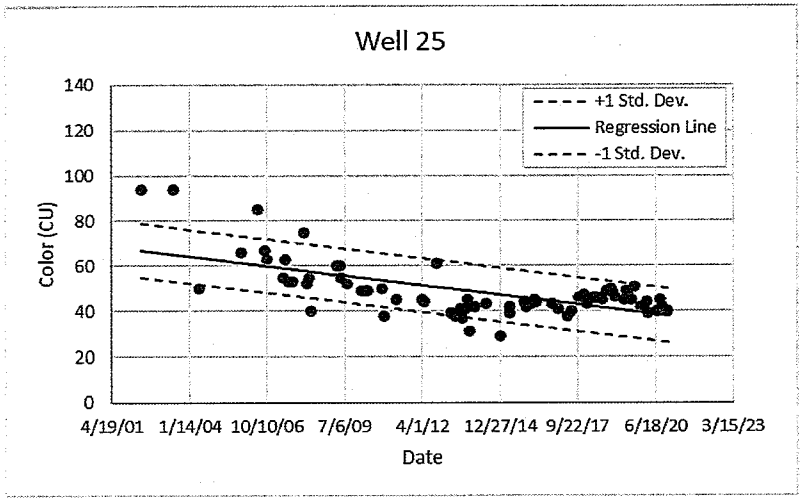
We recommend pursuing wellfield testing and the previously proposed test well drilling program in order to obtain a water quality profile of the aquifer at the site, focusing on areas near two existing wells: one next to a high color production well in an area of concern and one located in an area that produces desirable water quality. There is space available for a new well along the southwestern and western boundaries of the property and the color of the water in wells in these areas is some of the lowest in the wellfield. A site near one of the high color wells in the northern section of the wellfield can also be chosen. Formation and field water quality samples will be collected as well as the completion of geophysical logging. These logs will assist with the interpretation of the aquifer, water quality, and formation depths. This information will be used to make recommendations for the placement of future production wells.

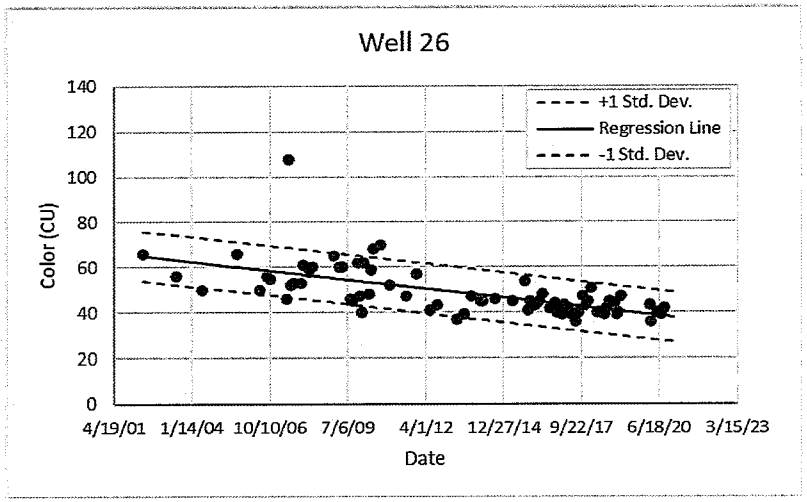


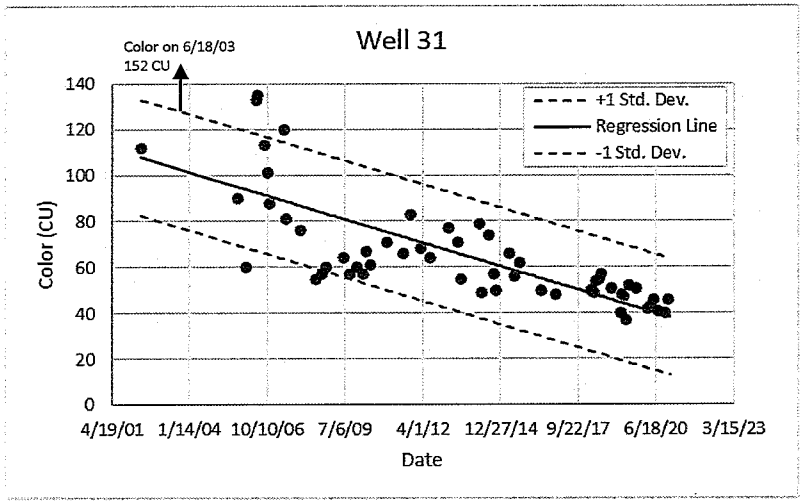
CCI Connect Consulting, Inc. *Water Resource Consultants*	Chen Moore & Associates City of Ft Lauderdale Prospect Wellfield Evaluation	Locations of the Prospect Wellfield and Neighboring Wellfields	1

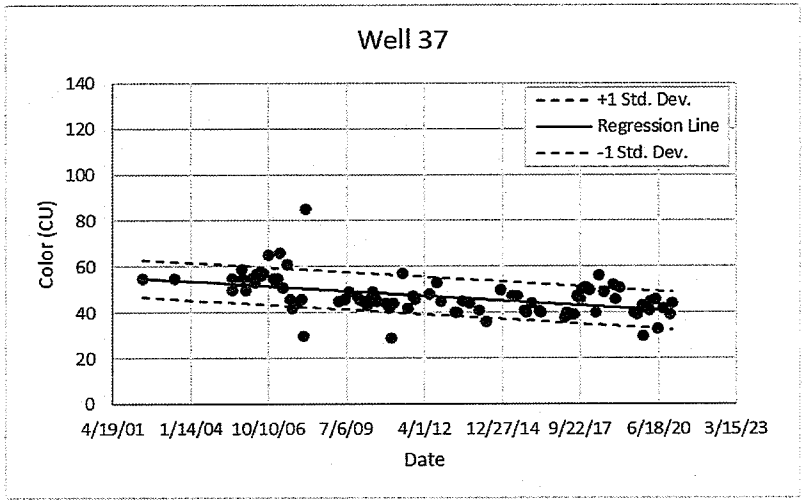


CCI Connect Consulting, Inc. *Water Resource Consultants*	Chen Moore & Associates City of Ft Lauderdale Prospect Wellfield Evaluation	Prospect Wellfield Showing Well Location, Depth of Open Hole Interval, and Average Color Concentration in Each Well	3





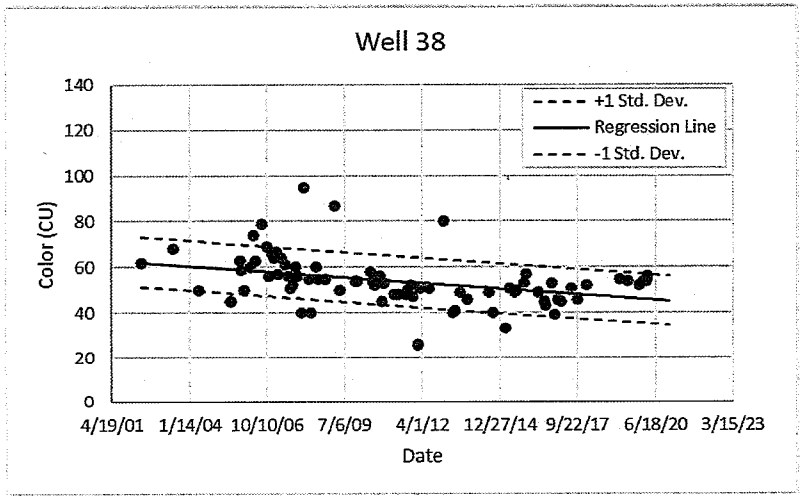


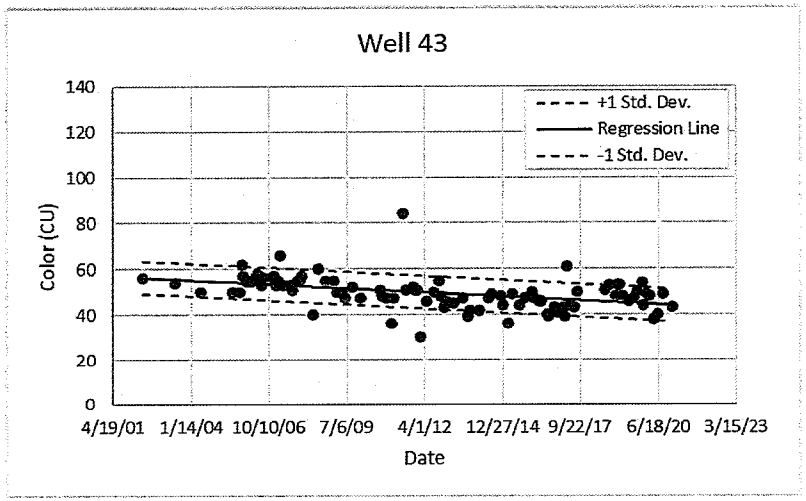


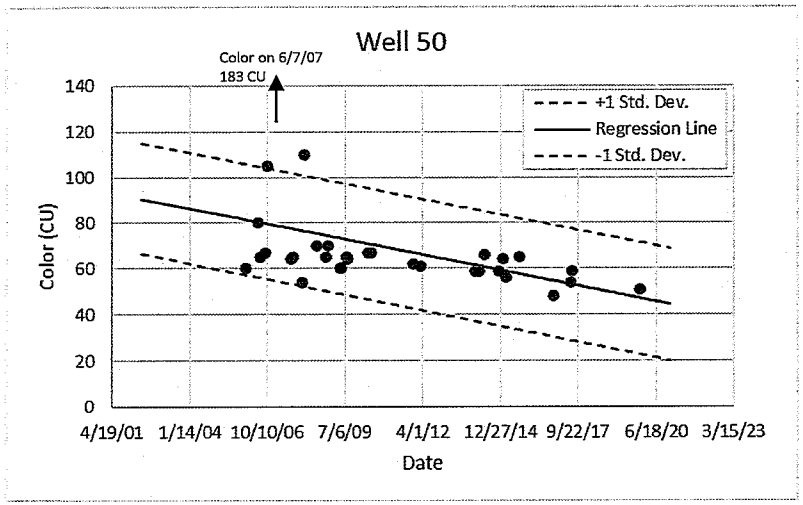
CCI Connect Consulting, Inc.
Water Resource Consultants

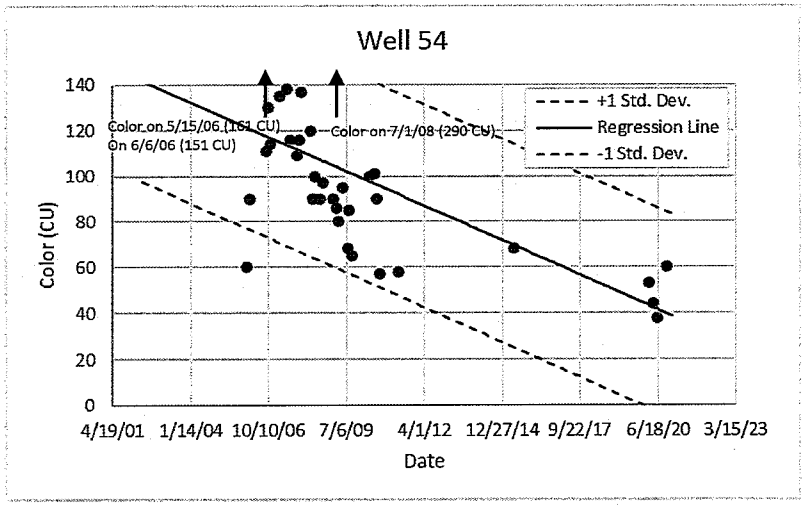
Chen Moore & Associates
City of Ft Lauderdale
Prospect Wellfield Evaluation

Wells With Decreasing Trends in Color vs Time









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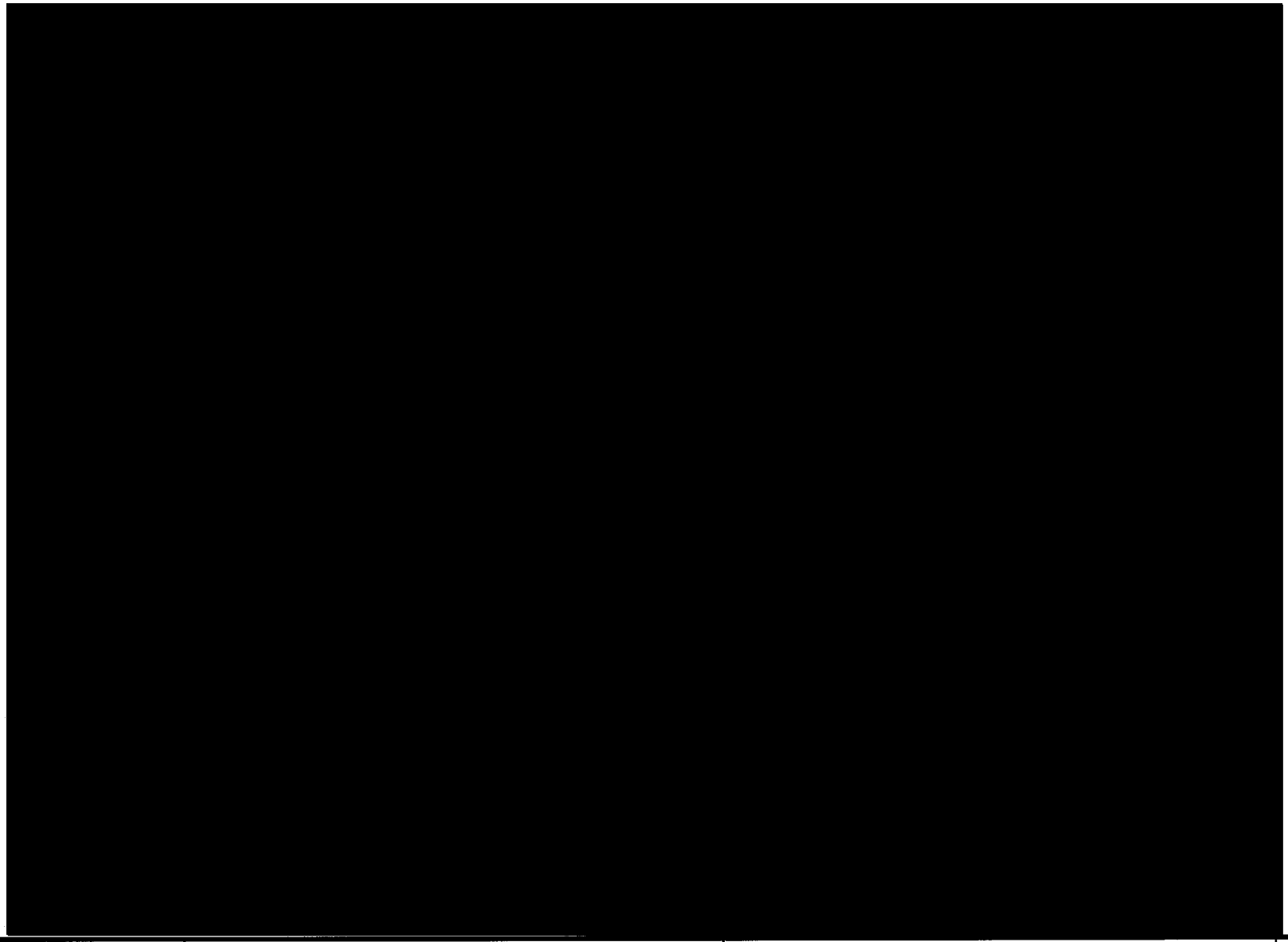
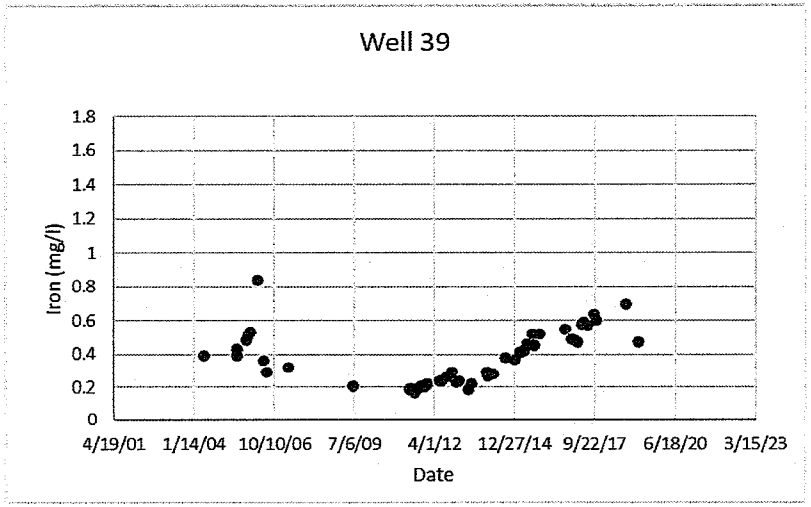
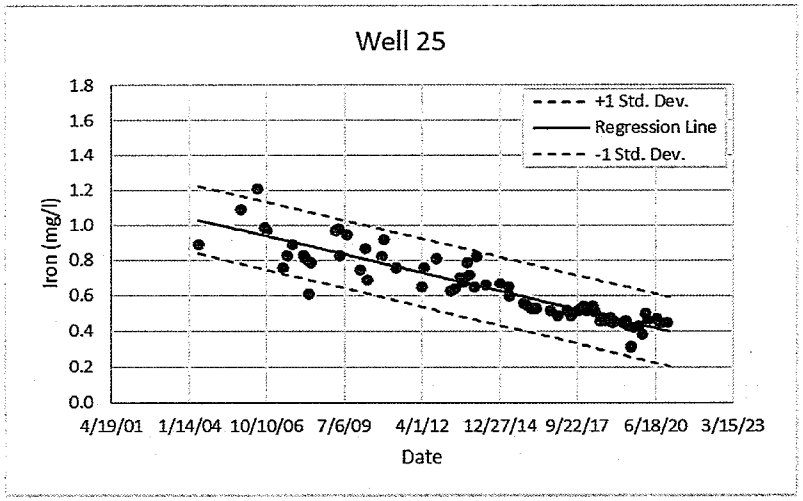
Prospect Wellfield Evaluation

Wells With Decreasing Trends in Color vs Time



CCI Connect Consulting, Inc. *Water Resource Consultants*	Chen Moore & Associates City of Ft Lauderdale Prospect Wellfield Evaluation	Prospect Wellfield Showing Well Location, Depth of Open Hole Interval, and Average Iron Concentration in Each Well	6


Well 39
Iron (mg/l)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
6/18/20
3/15/23
Date


Well 25
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
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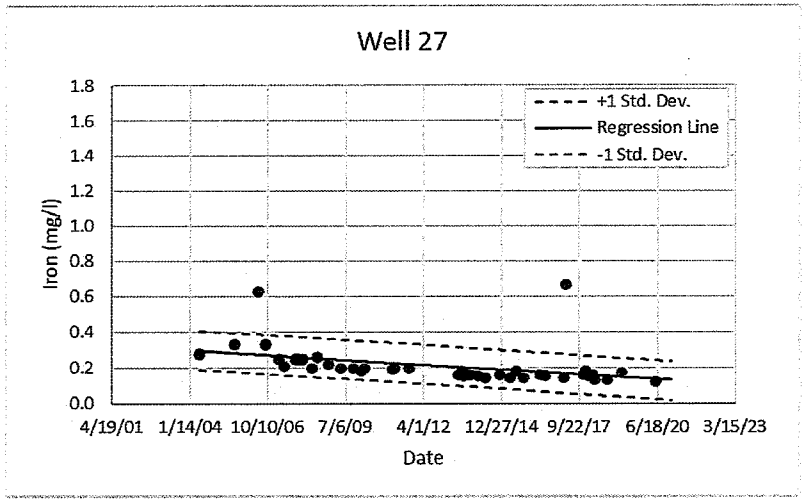
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date


Well 27
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Regression Line
-1 Std. Dev.
Iron (mg/l)
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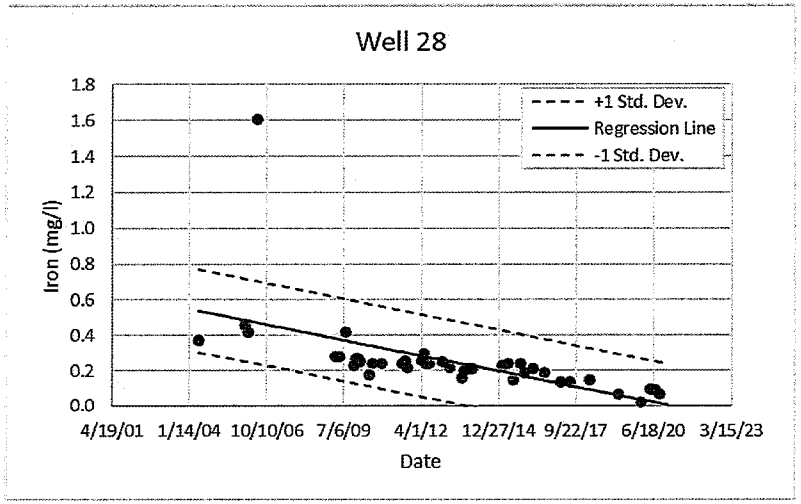
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date


Well 28
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
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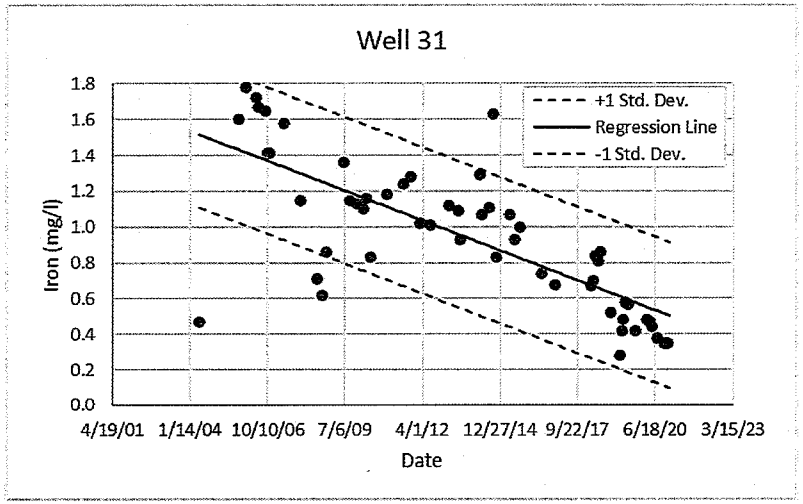
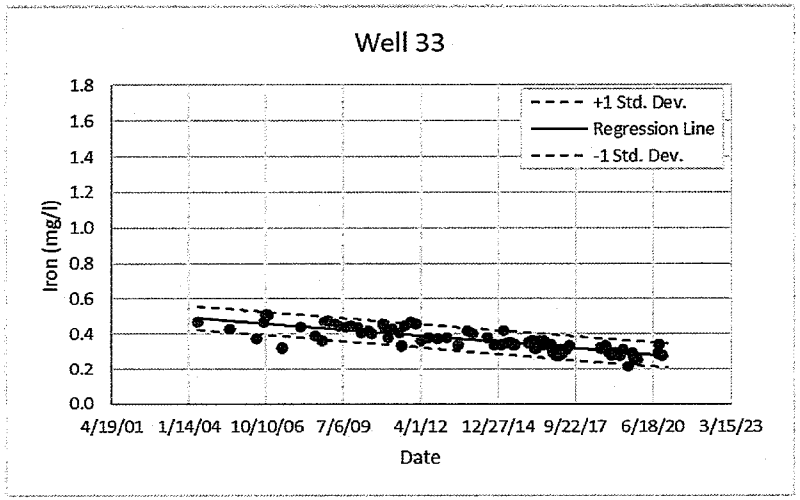
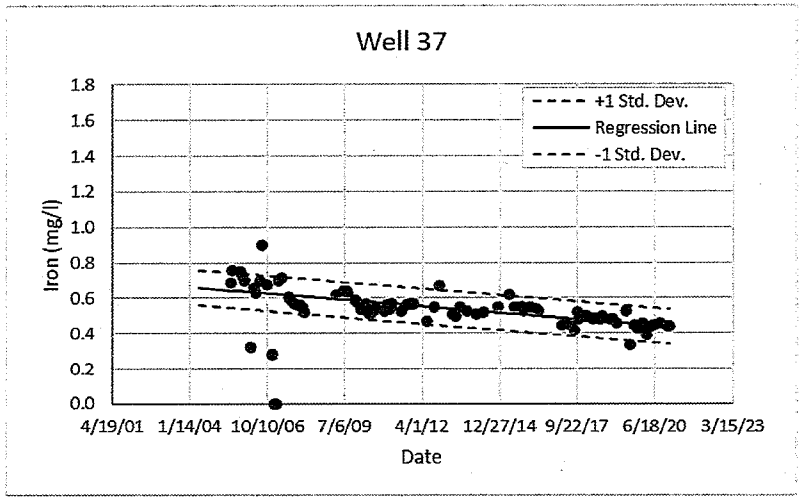
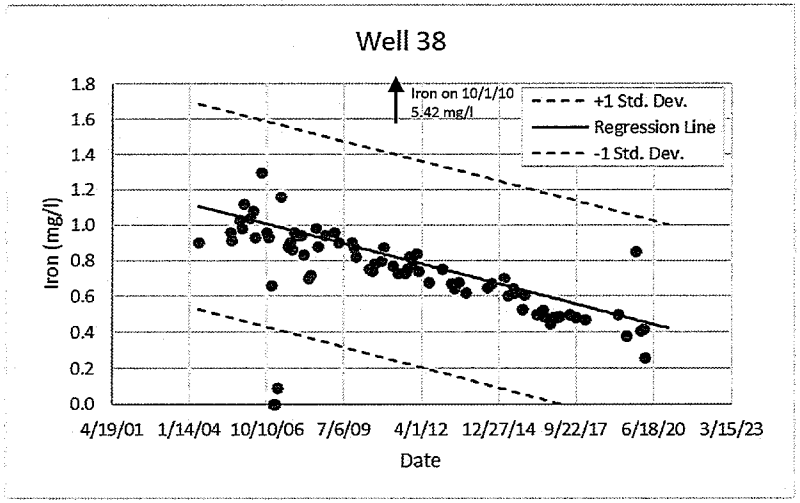
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date


Well 31
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date


Well 33
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date


Well 37
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date


Well 38
Iron on 10/1/10
5.42 mg/l
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
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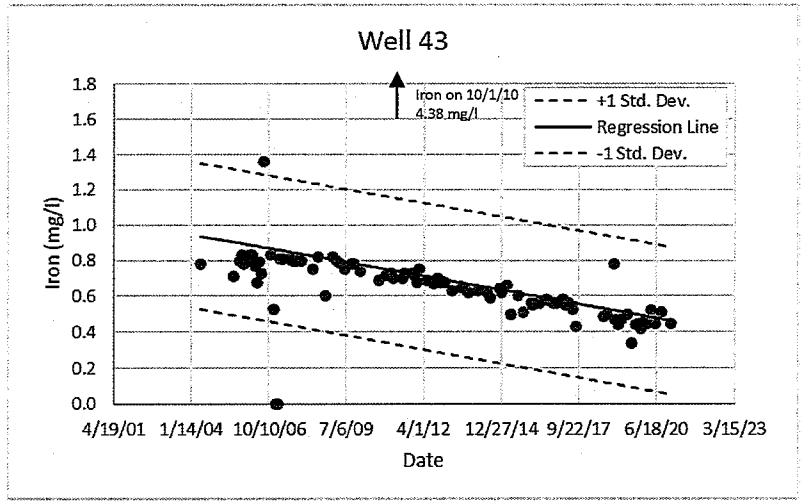
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date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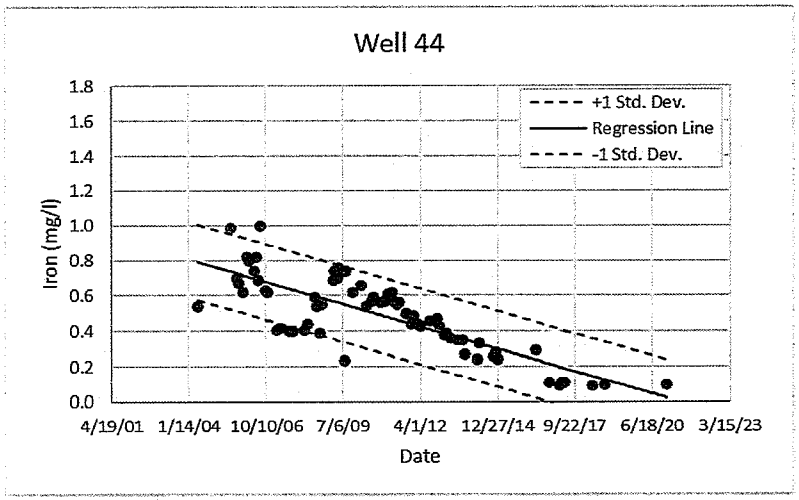
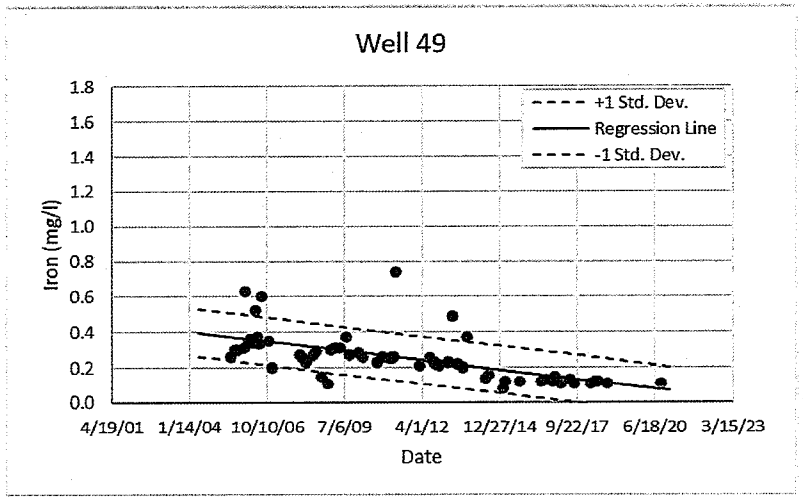
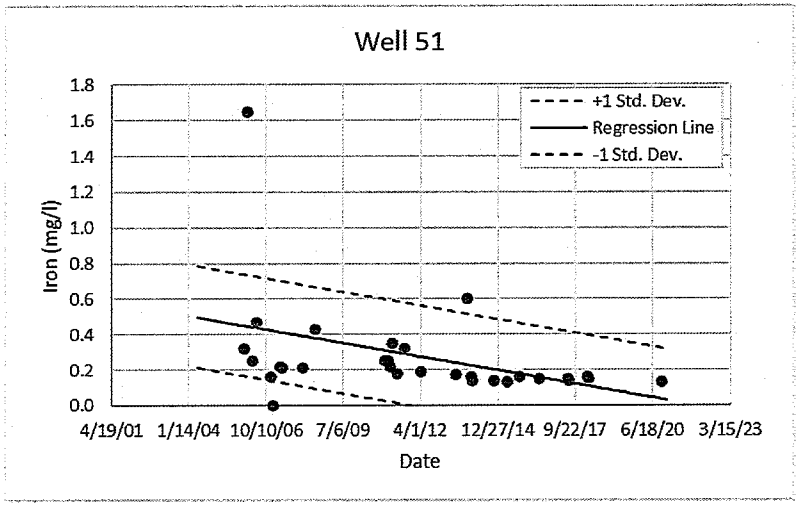
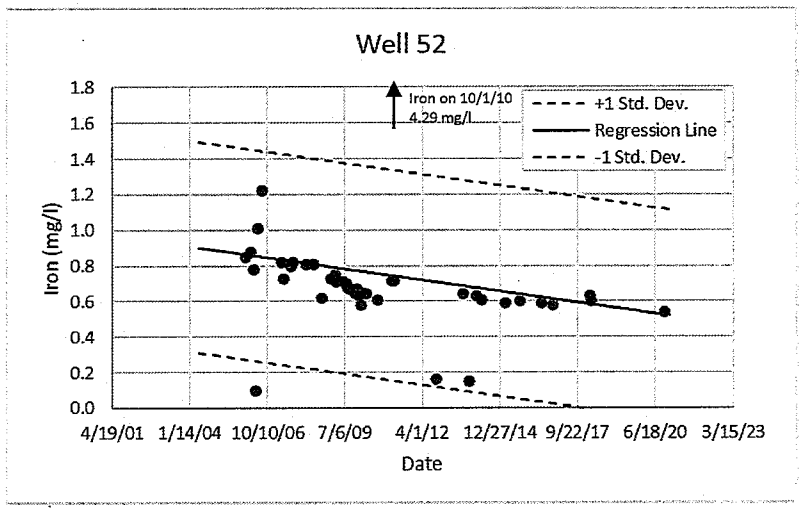
Iron on 10/1/10
4.38 mg/l
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01 1/14/04 10/10/06 7/6/09 4/1/12 12/27/14 9/22/17 6/18/20 3/15/23
Date





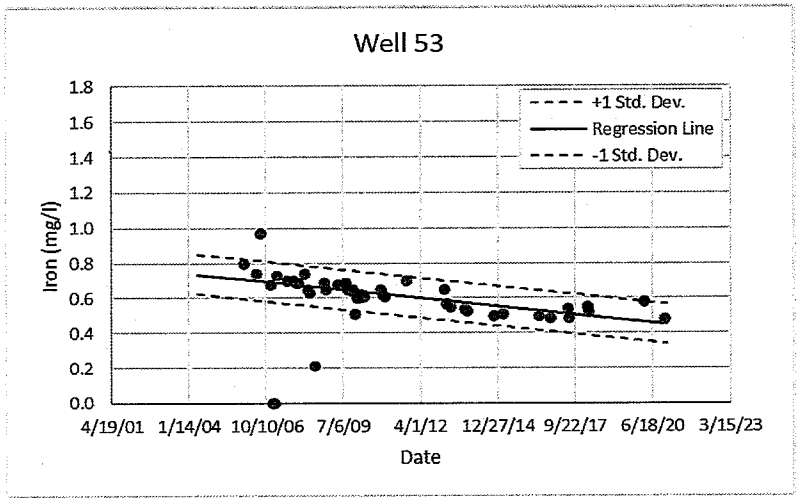


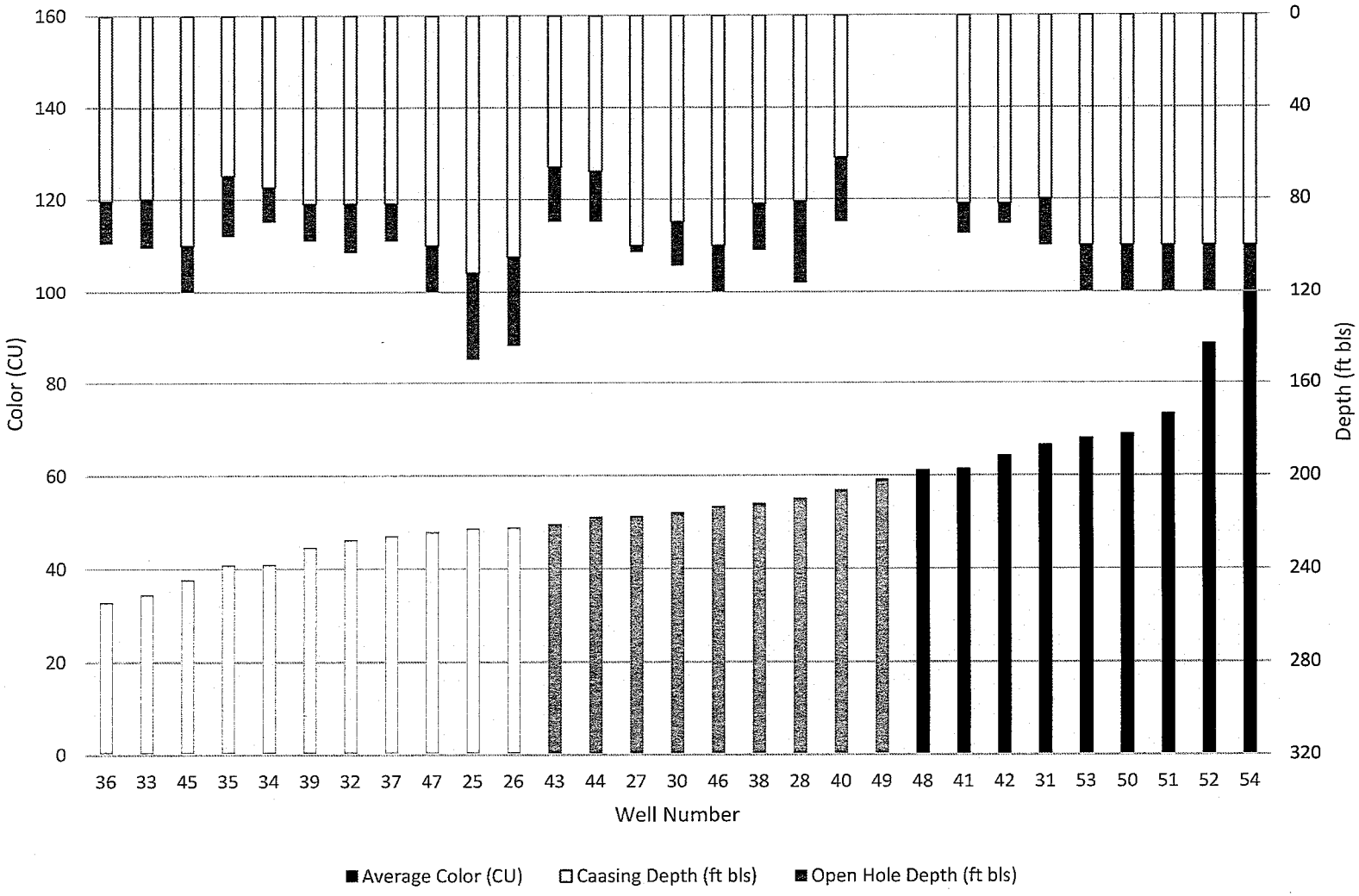


CCI Connect Consulting, Inc.
Water Resource Consultants

Chen Moore & Associates
City of Ft Lauderdale
Prospect Wellfield Evaluation

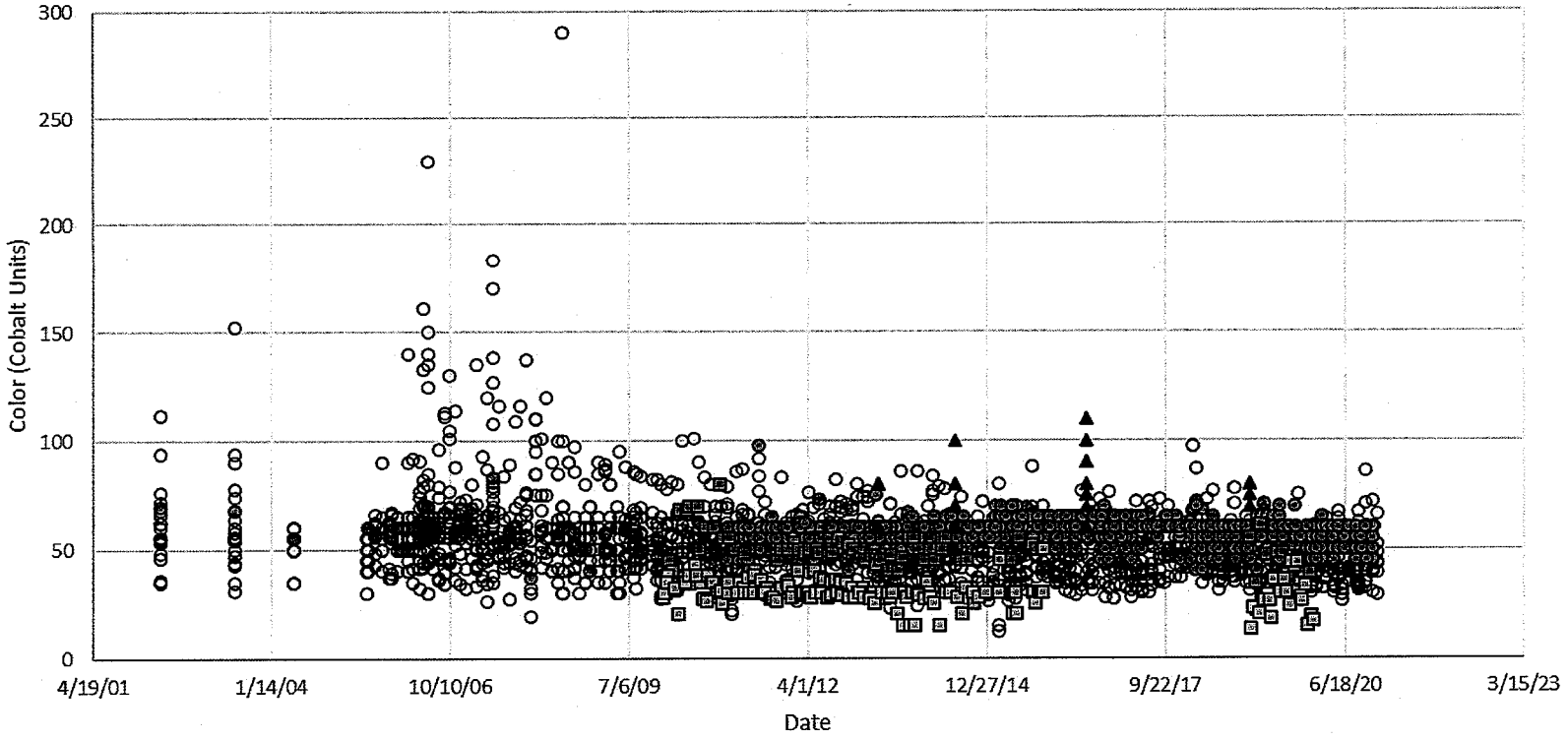
Wells With Decreasing Trends in Iron vs Time


Well 53
+1 Std. Dev.
Regression Line
-1 Std. Dev.
Iron (mg/l)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4/19/01
1/14/04
10/10/06
7/6/09
4/1/12
12/27/14
9/22/17
6/18/20
3/15/23
Date

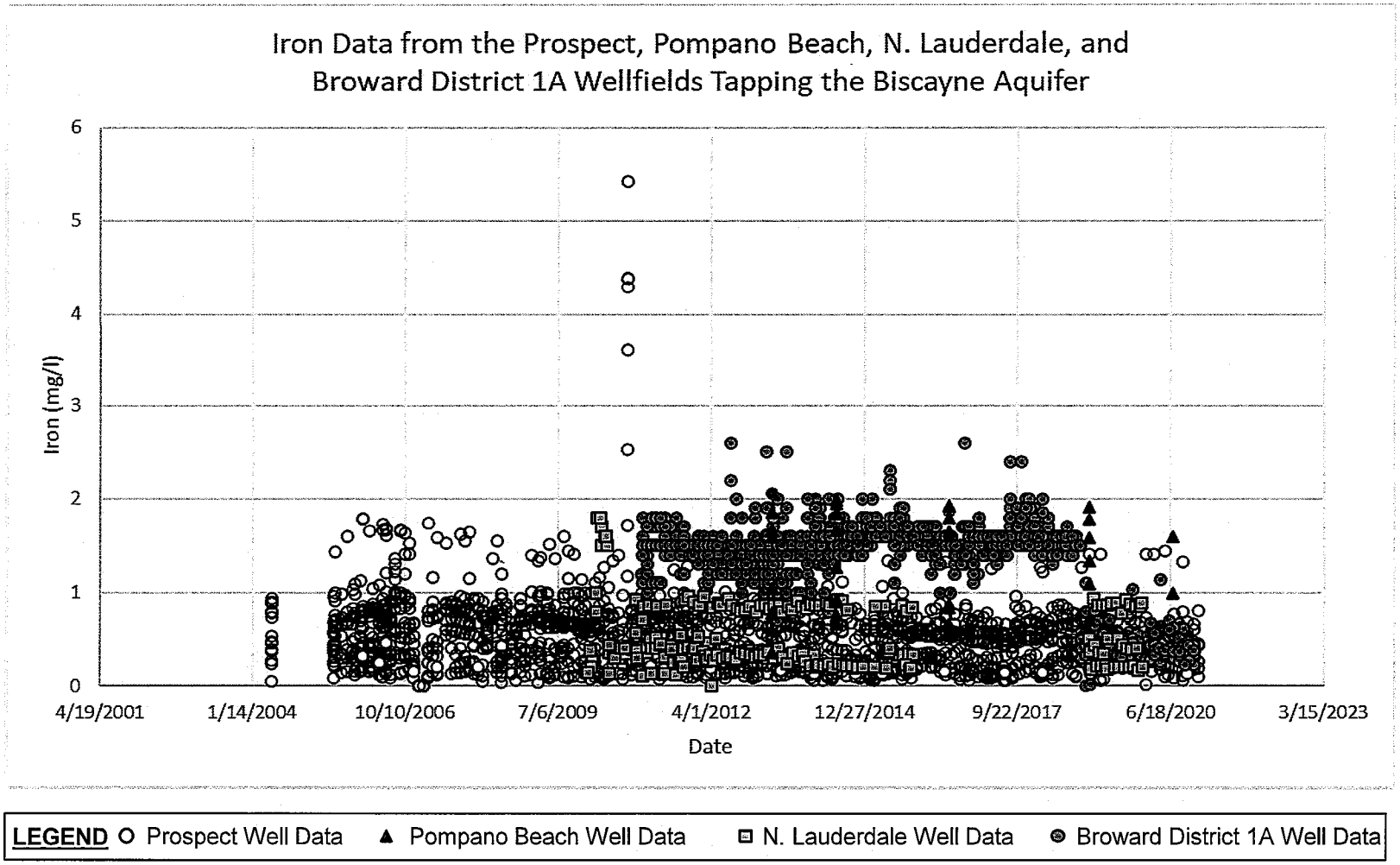


CCI Connect Consulting, Inc. Water Resource Consultants	Chen Moore & Associates City of Ft Lauderdale Prospect Wellfield Evaluation	Bar Chart Showing Wells in Order of Increasing Color Concentration and Depth of Open Hole Interval	12

Color Data from the Prospect, Pompano Beach, N. Lauderdale, and Broward District 1A Wellfields Tapping the Biscayne Aquifer



LEGEND ○ Prospect Well Data ▲ Pompano Beach Well Data □ N. Lauderdale Well Data ◎ Broward District 1A Well Data


Iron Data from the Prospect, Pompano Beach, N. Lauderdale, and Broward District 1A Wellfields Tapping the Biscayne Aquifer
Iron (mg/l)
0
1
2
3
4
5
6
4/19/2001
1/14/2004
10/10/2006
7/6/2009
4/1/2012
12/27/2014
9/22/2017
6/18/2020
3/15/2023
Date
LEGEND
Prospect Well Data
Pompano Beach Well Data
N. Lauderdale Well Data
Broward District 1A Well Data

Technical Memorandum

To: City of Fort Lauderdale

From: Reiss Engineering, Inc., a CHA Company

Date: September 10, 2021

Re: 11858 Pilot Testing at Fiveash WTP

EXECUTIVE SUMMARY

Scope and Goals

The City of Fort Lauderdale (City) authorized an 8-week pilot scale water treatment process at its Charles W. Fiveash Water Treatment Plant (Fiveash) to identify feasibility, capital costs and operational costs of implementing additional color removal to the existing Fiveash treatment process. The pilot testing combined advanced oxidation process (AOP) options with biologically active carbon (BAC) filtration, abbreviated AOP-BAC. This report summarizes the results of a treatment process pilot study to improve color removal at Fiveash. This study was a cooperative effort with the Fiveash operational staff who provided significant input, setup, monitoring and operational support of the pilot from February 2021 to April 2021.

Process Tested

The AOP-BAC process would add an oxidant storage/feed system and utilize the existing Fiveash filters by replacing the existing dual media of sand/anthracite with granular activated carbon/sand to collectively achieve color removal while the City pursues options to replace Fiveash. The BAC is simply granular activated carbon (GAC), layered with sand in full scale filters, serving as filter media enhanced with a controlled biological growth to support organic carbon/color removal and biologically stabilize the finished water. It is well understood that GAC itself is not a viable process at Fiveash due to high raw water organic carbon levels but is commonly used as biological filtration.

Previous Work

A similar pilot study was performed at Fiveash in 1992 (Montgomery Watson, 1992) including industry-recognized water process engineers and comprehensive testing/analyses. Conclusions were compared and the color removal efficiency of final chloramination step was adopted from the 1992 report. The major differences were a 30-year time difference, lower optimal ozone dose in 2021 and the 1992 study used anthracite for its biological filtration media, this current pilot study utilized GAC.

Results Summary

2021 Fiveash pilot color removal results corroborated with 1992 with ozone the best AOP removing 60% with 2021 having significantly lower optimum dose (4 vs. 6 mg/L ozone) and total color removal projected in the 90% range including lime softening, ozone, BAC filtration and chloramination. The biological filtration using GAC outperformed the 1992 anthracite removing 90% of biodegradable dissolved organic carbon removal (BDOC) versus 50 to 70% in 1992. Lime carryover hindered transfer pumping, ultraviolet light and metering equipment.

The estimated life cycle cost of implementing an AOP-BAC process at Fiveash would be in the range of $1.18 per 1,000 gallons. Capital cost would be approximately $72,000,000 with an estimated annual operating cost of $12,700,000. These costs include ozone, BAC, lime feed improvements and contact time modifications. Full scale ozone equipment could also be leased for a term to minimize capital outlay.

Noticing that certain well combinations had very high color, one variation of the proposed system is to treat half of the Fiveash flow with AOP-BAC and half with nanofiltration allowing retirement of half of the Fiveash process train. The nanofiltration expansion is currently planned by the City; this hybrid is fully compatible with future Fiveash plans. $100,000,000 in rehabilitation costs (2017 CUSMP) were added to both alternatives to further extend the functionality of Fiveash. Total life cycle costs for the two alternatives were $2.32 and $2.53 per 1,000 gallons respectively as detailed in Tables 1 and 2.

Conclusions

- Pilot plant (Figure 1) operated for 11 weeks, AOP pilot operation was hampered by high solids carryover from the hydrotreater scaling pumps and equipment; the City is investigating clarification optimization including enhanced lime softening with recarbonation. The resulting runtime and analyses confirmed the 1992 study color removal findings with improvements in ozone dose and biological filtration efficiency.
- The total color removal that could be expected through the entire full scale process train (softening, AOP-ozonation, BAC and final disinfection is estimated at ~90% (consistent with 1992 study 89% finding). For an average raw water color of 56 color units, an average finished water color of 6 is projected based on a transferred ozone dose of 4 mg/L, a chlorine dose of 8 mg/L and an ammonia dose of 1 mg/L (Final chlorination color removal and dosages were adopted from the 1992 study).
- Ozone by itself was the best color removing advanced oxidative process (AOP) removing 60-75% of color from the hydrotreater effluent, however, hydrotreater lime carryover requires lime clarification to be optimized for this option to be feasible.
- No bromide or bromate was detected in the 5 samples analyzed over the 3-month pilot when using ozonation treatment at the 3 to 6 mg/L ozone dose tested.
- Pilot feed pH ranged from 9 to 10; no pH adjustment was performed during the pilot study, however, the lime carryover does need to get minimized by improving the consistency of the lime softening clarification process, possibly by retrofitting lime feed equipment, optimizing lime dosing and testing alternate settling enhancers, to mitigate equipment scaling.
- Pilot feed water (hydrotreater effluent) color varied from 10-70, averaging 40 color units. Feed water quality was highly variable with significant turbidity during the pilot.
- Ozone converted between 0.5 and 1.1 mg/L of the average feed water 8 mg/L of dissolved organic carbon (DOC) to biodegradable dissolved organic carbon (BDOC); the biological activated carbon (BAC) process (Column #1 only) removed over 90% of the BDOC, producing a biologically stable water. This result along with heterotrophic plate count (HPC) analyses showed that the GAC system functioned as a BAC system.
- The GAC did initially provide adsorptive color and DOC removal, however, the initial color increase occurred quickly in the BAC Column #1 at approximately 500 bed volumes but continued to remove color and TOC indicating biological action past 2,000 bed volumes to the end of the valid pilot run.

- After the adsorptive phase exhaustion, BAC Column #1 removed from 40 to 80% removal of AOP effluent color at an empty bed contact time (EBCT) of 8.5 minutes and a pH of 9 to 10, until color breakthrough indicated the need for backwash; with removal due to BDOC removal and possibly the filtration process. BAC Column #2 performed similarly.
- BAC Column #1 had color breakthrough at 1,700 bed volumes. BAC columns were backwashed (as full scale Fiveash scale filters are periodically) thereby restoring the color removal in BAC #1.
- The early exhaustion of the GAC is due to the high content of organics in the softened water (8 mg/L). GAC without biological action is applicable when TOC is < 3 mg/L.
- The City is considering a new plant to replace most of Fiveash at the wellfield; a hybrid alternative was developed to treat half the flow via AOP-BAC and half via robust TOC removal, e.g., nanofiltration.
- The advantages of the AOP-BAC process are that it can be implemented quickly, the BAC requires no structural changes to the filtration, could be deployed on only half the Fiveash process train, and the ozonation could be deployed on a temporary basis (leased) to cover the 5-year gap from now until a new Fiveash facility is operational.
- The assumption was to use the existing recarbonation basins for ozone contact time to minimize cost, if the City implemented enhanced softening with recarbonation, separate ozone contact would be required probably limiting the viability of this option. Enhanced lime softening is not required for AOP-BAC to be viable, but more consistent operation of the lime clarifiers would be as mentioned above.

Figure 1. Pilot Plant Layout

Recommendations

- Continue with efforts to optimize the lime softening process and minimize hydrotreater effluent turbidity/carryover.
- Consider testing retrofitting one filter with sand + granular activated carbon (GAC) to confirm the operability of GAC as a filtration media.
- Review Fiveash replacement plans and consider implementing full or split AOP-BAC process for either short- or long-term color removal for improvement/replacement of Fiveash with costs shown in Tables 1 and 2.
- AOP equipment could be centrally located just south of the Maintenance Building (as proposed in 1992) or split and located adjacent to each hydrotreater train.

Table 1. Fiveash Cost Estimate - Option 1 (Add AOP-BAC to Existing Fiveash WTP)

Item	Capital Cost	Annual Operating Cost	Equivalent Annual Cost	Unit Water Cost, $/1000 gal
Optimize Lime Softening	10,000,000	1,000,000	1,650,510	0.11
Ozonation System	48,645,000	2,000,000	5,164,406	0.35
Biofiltration Media*	4,800,000	9,600,000	9,912,245	0.68
Disinfection Contact Time Modifications	8,000,000	100,000	620,408	0.04
Fiveash Rehab and Operation	100,000,000	10,000,000	16,505,100	1.13
Total	171,445,000	22,700,000	33,852,669	2.32

** $1.60/lb of GAC at 45 MGD design flow and 8.5 minute EBCT*

Table 2. Fiveash Cost Estimate - Option 2 (Add 50% Nano, 50% Ozone/BAC to Existing Fiveash WTP)

Item	Capital Cost	Annual Operating Cost	Equivalent Annual Cost	Unit Water Cost, $/1000 gal
Nanofiltration at Wellsites (50-60% treatment)	120,000,000	5,000,000	12,806,120	0.88
Optimize 1 Set of Lime Softening	6,000,000	600,000	990,306	0.07
Ozonation System for 1/2 flow	27,000,000	1,300,000	3,056,377	0.21
Biofiltration Media for 1/2 flow	2,400,000	4,800,000	4,956,122	0.34
Disinfection Contact Time Modifications	8,000,000	100,000	620,408	0.04
Fiveash Rehab and Operation	100,000,000	8,000,000	14,505,100	0.99
Total	263,400,000	19,800,000	36,934,433	2.53

Assumptions:

Equivalent Annual given Present Value, 30 years:	0.06505	
ADF =	40	mgd
I =	5%	

INTRODUCTION

The City of Fort Lauderdale provides potable water and wastewater service to City and surrounding community residents. The City's Utilities Division a part of the Public Works Department manages, operates and maintains the City's water and wastewater utilities.

The City's Charles W. Fiveash Water Treatment Plant (Fiveash) provides potable water to over 75% of the service area. Total designed treatment capacity is 70 MGD of produced water, however, water use permit restrictions limit the output to approximately 40 MGD. Fiveash consists of 29 active production groundwater wells, aeration, lime softening, and media filtration followed by storage and high service pumping. Disinfection is provided with chloramine addition to the softened and filtered finished water.

A pilot scale water treatment process was mobilized and operated from February to April 2021 at Fiveash to identify feasibility and operational and capital costs associated with implementing an advanced oxidation process (AOP) combined with biologically active carbon (BAC) treatment, abbreviated AOP-BAC, to replace the existing dual media in the filters and provide short term color removal while City pursues options to replace the WTP. The BAC is simply granular activated carbon (GAC) that is allowed to have controlled biological growth to support organic carbon/color removal and biologically stabilize the finished water.

While Fiveash produces safe reliable drinking water, color levels within the CITY's finished water have been an area of concern for the City's staff, customers and business. While evaluating the facility during the Comprehensive and Strategic Utilities Master Plan, the City inquired about viable options to reduce the color to a level below visual observation, less than five color units, in the finished water.

METHODOLOGY

Pilot plant set up and methodology is summarized in Attachment C. The pilot essentially inserted an AOP-BAC at the point of hydrotreater effluent to recarbonation basins. The pilot was run for 11 weeks with assistance from Fiveash operations staff. Water samples were sent to NELAC certified laboratories for the given analytes. Results were recorded, included as Attachment D and summarized below.

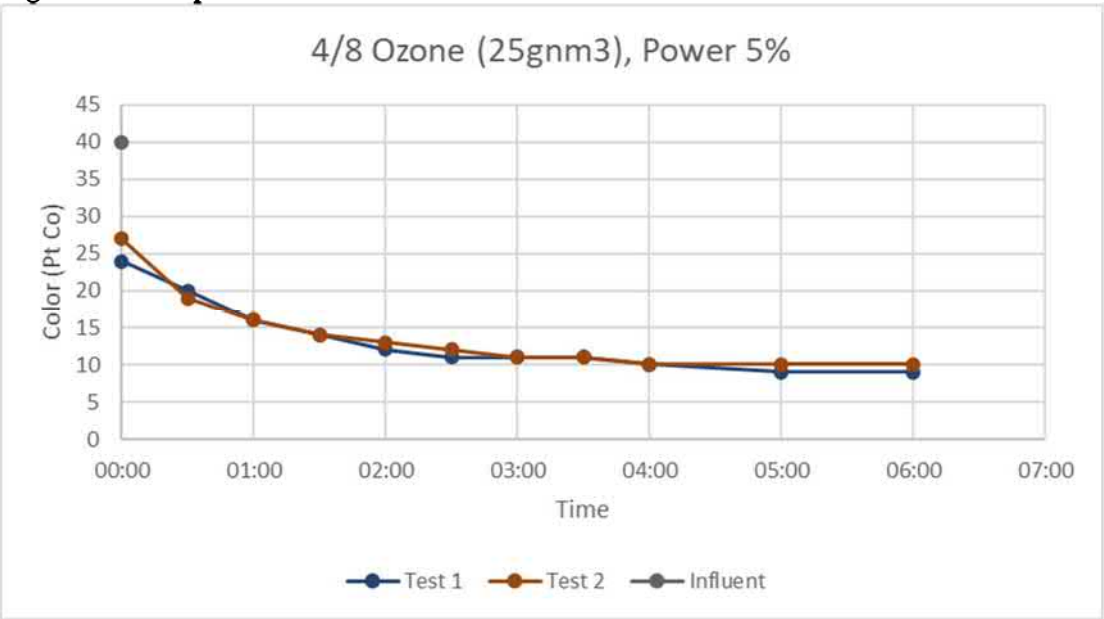
The GAC/BAC system consisted of four (4) columns operated in series. While the 3rd and 4th GAC/BAC columns were operated the entire pilot duration the results were discounted as the existing Fiveash filters would not have enough volume for the 3rd and 4th columns to be feasible full scale. Each column had 3.33 feet of GAC to simulate what could be done at full-scale plant in the existing filters. The empty bed contact time (EBCT) for Column # 1 was approximately 8.5 minutes and would be equivalent of the EBCT if full-scale filters were retrofitted with 3.33 ft of GAC/sand and operated at design flow of 45 MGD. The empty bed contact time for Column # 2 was also approximately 8.5 min and the EBCT of two column system would be 17 min and equivalent of the EBCT if full-scale filters were retrofitted with 3.33 ft of GAC and operated at max flow of 45 MGD.

RESULTS

AOP Color Removal – AOP color removal ranged from 0 to 75% for the oxidants tested as follows:

- Hydrogen peroxide (Peroxide) – 22% for 5 mg/L and 47% for 10 mg/L
- Ultraviolet radiation (UV) – 0% for the limited testing; hydrotreater carryover fouled the UV system quickly
- Peroxide + UV – limited color removal observed, however, influent color was low on the day tested and UV function was limited for retesting based on fouling
- Ozone – 60 to 75 % color removal (consistent and in some cases higher than the 1992 ozone pilot study (1992 Study), there were some lower removals observed due to high influent color (not enough ozone was applied) or very low influent color (see Figure 2 for example and Attachment B for summary of results)
- Ozone + Peroxide – 55% average color removal; similar or less than ozone itself

Figure 2. Example AOP-Ozone Color Removal Test Results

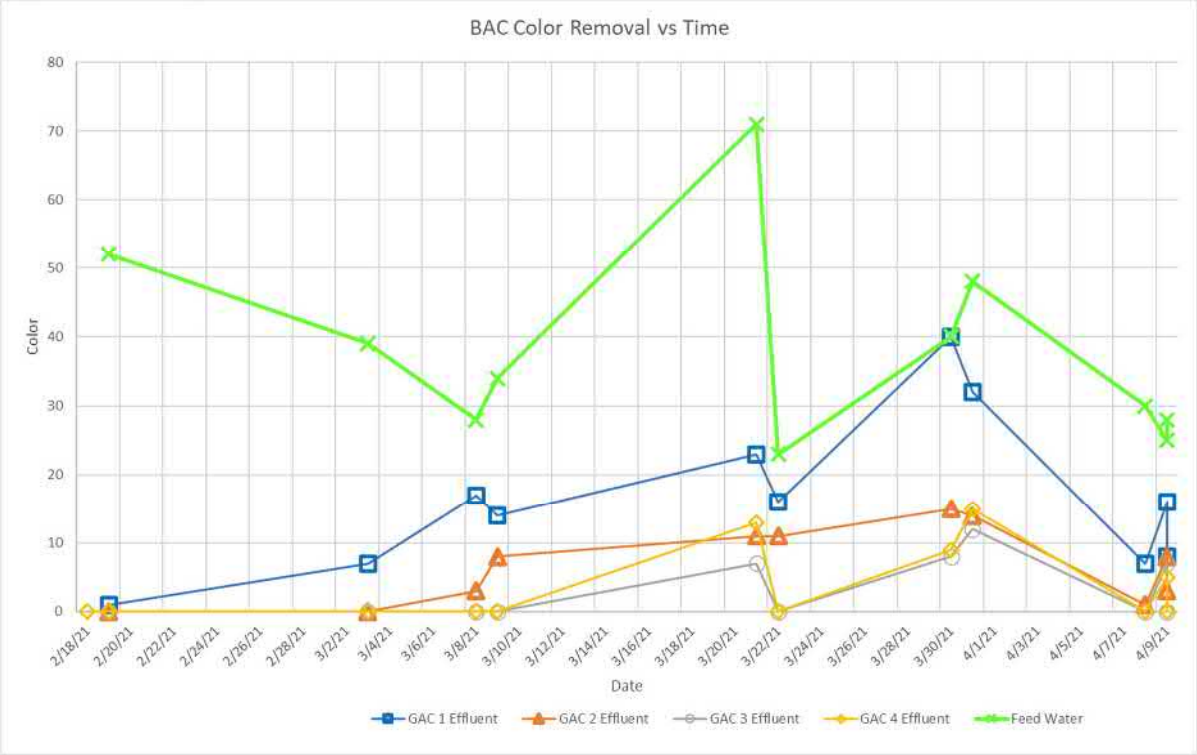


BAC Color Removal – BAC color removal ranged from 40 to 80% as follows:

- BAC Column #1 (BAC #1) – BAC #1 was operated during startup to try to establish biological activity. BAC#1 initially performed as a GAC system (adsorption being the principal mechanism of color/organic removal).
- A color increase occurred after 500 bed volumes, indicating the end of the adsorptive removal phase. Following 500 bed volumes BAC #1 operated as a biological filter with color removal from 40% to 80% until 2,300 bed volumes as shown in Figure 3 and summarized in Attachment C. BAC #1 required backwashing at 2,300 bed volumes due to sitting up for a week and accumulating algae. BAC #1 was not backwashed, however, color removal continued in BAC #2 and surrogated the BAC #1 color removal results after this point in time, as full color breakthrough occurred in BAC #1.

- BAC Column #2 (BAC #2) – BAC #2 was also operated during startup, with the initial color increase also occurring also around 500 bed volumes. Following 500 bed volumes BAC #2, operated in series downstream of BAC #1, functioned as a biological filter to provide 40 to 80% color removal vs. BAC #1 effluent.
- BAC color removal was likely a combination of adsorption, biological activity and filtration including the lime softening fines.
- BAC #1 exceeded inflow color at approximately 1600 bed volumes, the BAC columns were backwashed and color removal was restored to previous levels. This concurs with the City's normal backwashing requirements.

Figure 3. Example BAC Color Removal Test Results



AOP Oxidant and Location – Ozone by itself clearly performed the best for color removal for the source water piloted. The pilot was placed just downstream of the hydrotreater as in the 1992 study and significant lime carryover was present during the testing. City operation staff are investigating moving to enhanced lime softening with higher pHs and adding the recarbonation step. The lime carryover was depositing on equipment and AOP operation was reduced to intermittent to control fouling in pipes, pumps and flow meters. It should be noted that no issues with the ozone injection were observed and pumping and metering would not be necessary for full scale assuming the recarbonation basins work for contact. The Fiveash filters are clearly a key part of the process tasked with removing the lime solids escaping the hydrotreaters. 450' of piping was extended to test the AOP on the Fiveash raw water upstream of lime softening and aeration, however, influent color in the 70 range was observed during the day the raw was tested and not enough ozone was available as roughly 30 to 40% color removal was observed. Higher ozone doses would likely have been more effective on the raw but also would increase cost.

Influent Color – Fiveash raw and hydrotreater effluent color was highly variable. Raw color varied from 30 to over 70 and hydrotreater effluent color similarly varied from 10 to 70. This variability should be considered in planning Fiveash improvements. At certain times during the pilot, the Fiveash pre-chlorination was reinstated for necessity; the pre-chlorination reduces color by approximately 50% based on previous studies.

Results: Bromate – The bromide and bromate testing indicated no issue for bromate with all samples at or below detection limits while using ozonation treatment. Noting that the source water quality is highly variable depending on the wells in use at a given time; bromate was not observed following ozonation.

Results: Biodegradable Dissolved Organic Carbon (BDOC) – BDOC is a measure of how much dissolved organic carbon is available for assimilation by organisms in the BAC process. Results for two BAC influent versus one BAC #1 and #2 effluent each were improved versus 1992 as the BAC removed significantly more BDOC than the anthracite biofilter in 1992:

- The hydrotreater effluent (AOP pilot influent) total organic carbon (TOC) ranged from 6 to 10 mg/L and was almost all dissolved (DOC).
- Ozone did not reduce the TOC or DOC significantly at the doses tested, the 1992 study observed a 5% DOC reduction in lower doses.
- Ozone converted approximately 0.5 to 1.1 mg/L of the DOC to BDOC.
- The BAC stage 1 column removed over 90% of the BDOC produced by ozonation, well after the stage 1 GAC adsorptive removal was exhausted, leaving low levels (close to detection limits) of BDOC in the effluent. Heterotrophic plate count (HPC) sampling also indicated the presence of biological activity in the BAC columns. Therefore, the GAC system was biologically active and low resulting BDOC levels would indicate the BAC produces a biological stable water.
- It should be noted that TOC removals nearing 50% were observed in BAC #1 and #2 in the 1,500 to 2,000 bed volume range except with BAC #1 required backwashing. Due to the limited duration of the pilot and the BAC #1 backwashing issue it is not known if this TOC removal could extend past 2,000 bed volumes, however, given that the GAC's adsorptive capacity was exhausted it is probable that this TOC removal process was biological/filtrative and could continue.

Design Criteria – The resulting recommended AOP and BAC design criteria are presented in Table 1, including reduced lime carryover from the hydrotreaters. Ozone contact time in the 5-minute range would be achieved in the existing recarbonation basins with some minor modifications; this should be verified. Design criteria for AOP-BAC are presented in Table 3.

Table 3. AOP-BAC Preliminary Process Criteria

Item	Component	Criteria	Units
Lime Softening Optimization (separate effort by City)			
	Design Conditions		
		Effluent lime turbidity	Minimized, potentially via the City's ongoing efforts to optimize, potentially raising pH and utilizing recarbonation.
Ozonation System			
	Design Conditions		
		Design Flow	45 mgd
		Average Flow	40 mgd
		Max Ozone Dose	6 mg/L
		Average Ozone Dose	4 mg/L
		Number of generators	2 to 4 #
	Ozone Generation		
		Max Ozone Generation	3,000 lb O3/day
		Average Ozone Generation	2,000 lb O3/day
		Number of trains	2 #
	Oxygen Production/Storage		
		Maximum Oxygen Production	25 ton/day
		Average Oxygen Production	10-20 ton/day
Biologically Active Carbon			
	Sand		
		Effective size	0.5 mm
		Uniformity Coefficient	<1.4
		Existing Filter Sand Depth	7 inch
		Proposed Filter Sand Depth	7 inch
	Granular Activated Carbon		
		Carbon Type	Granular Activated
		Carbon Tested	Calgon
		Empty Bed Contact Time	5-10 minutes
		Surface Loading Rate	2-4 gpm/ft^2
		Existing Filter Anthracite Depth	18 inch
		Proposed Filter GAC Depth	30 inch
	Anthracite (optional)		
		Effective size	0.5 mm
		Uniformity Coefficient	<1.4
		Existing Filter Anth. Depth	18 inch
		Proposed Filter Anth. Depths	30 inch
Disinfection Contact Time Modifications			
		Contact Time	90 minutes
		Contact time improvements	Add baffle walls to exsiting storage, add piping and possibly transfer pumping

Potential Treatment Alternatives – noting that the City is contemplating moving forward with constructing a brand new WTP on the wellfield site to partially replace Fiveash. Fiveash would still function for storage and repumping. Two AOP-BAC process upgrade alternatives were developed to improve Fiveash as follows:

1. Rehab Fiveash treatment processes and add ozone plus biofiltration for color removal.
2. Implement a new membrane softening process to treat 50-60% of the flow, recover the concentrate to Fiveash and run the other 50% raw water thru 1 set of lime softening hydrotreaters abandoning the other set. Membrane softening/total organic carbon removal would operate 80-85% recovery and the concentrate would be routed to Fiveash in the existing, unused transmission pipe for treatment in Fiveash' lime softening or converted concentrate recovery process.

Estimated Costs – Estimated AOP-ozone capital, operating and unit water costs are provided in Tables 4 and 5.

Table 4. Ozonation System Capital Cost Opinion

	Quantity	Total Cost (40.0 MGD)
Lime Softening Operations Optimization	1	Optimize the lime process and clarification to produce a lower turbidity effluent, e.g., new lime feed system
Ozone Generation System (see Attachment E): - Two ozone generators - Two LOX tanks with vaporization system - Closed loop HEX cooling system - Two side stream injection systems - Two ozone destructors - One ozone control panel - Instruments and monitors	1	$8,000,000
Construct enclosure, install equipment	1	$10,000,000
Dissipation Chamber/Piping	1	$500,000
Additional piping, bypass and valves	1	$5,000,000
Sitework, demo, connections	1	$4,500,000
Yard Piping for LOX	1	$1,500,000
Electrical and I&C	1	$5,000,000
Sub-Total		$34,500,000
Design/Construction Inspections	8%	$3,450,000
General Conditions	3%	$1,035,000
Contractor O&P	10%	$2,760,000
Contingency	20%	$6,900,000
TOTAL		**$48,645,000**

Table 5. Ozonation System Operation Cost Opinion

	Unit Cost	Cost @ 40.0 MGD
Power	$0.13/kWh	$850,000
LOX	$0.06/lb	$500,000
Maintenance	Lump sum	$300,000
TOTAL		**$1,650,000**

1. Power: $0.13/kWh
2. LOX: $0.06/lb (FY2018 Orange County Bid, escalated)
3. Ozonation maintenance costs estimates based on real costs incurred by Toho Water Authority
    a. Maintenance of ozone analyzers, UV lamp modifications, degas separator valve buttons replacement, heat exchanger spare plates and gaskets, cooling water strainers
    b. Replacement of catalyst for destruct
    c. Ozone meter cleaning and calibration

It is estimated that the granular activated carbon in the BAC would cost $4,800,000 to retrofit into the existing Fiveash filters and that carbon replacement would occur twice per year. Costs for the other options were estimated based on the best available information. 2 mgd nanofiltration trailer mounted skids that could be located at each well if preferable were used to estimate the membrane softening/total organic carbon removal costs. 2 mgd skids cost approximately $5M each (per Pall Corporation) and installation estimated at an additional $5M.

END OF TECHNICAL MEMORANDUM

Attachments Below:

A – Pilot Methodology
B – AOP Results
C – BAC Results
D – Laboratory Results and COCs
E – Ozone Equipment Quotation

Attachment A – Pilot Methodology

The pilot testing is divided in two (2) phases

Phase 1. The first phase of the pilot study is to test different AOP systems over a one-week period. The different AOP systems that will be tested are:

1. Ozone
2. Ozone + Hydrogen peroxide
3. Ozone + UV

Phase 2. The second phase of the pilot study is to test the most efficient AOP system to remove color followed by biological activated carbon (BAC) over an eight-week period.

I. Pilot Testing Systems

I.1. AOP System

The AOP system is an integrated skid that contains an ozone system, an UV system, and a hydrogen peroxide feed system.

The AOP unit needs to be installed within a building. The unit is designed to run on 208 VAC, 3 Phase, 60Hz, 30 Amp. The power hook up needs to be performed by a licensed electrician.

I.2. BAC System

The BAC system consists of four (4) six-inch columns that can contain up to 4 feet of GAC. Two columns will be operated in series.

The BAC unit needs to be installed within a building. One 110V outlet is required for the pump pumping water to the GAC unit.

AOP System (SPARTOX A30 OZONE/UV)

BAC System

II. Water to be Treated

The different systems will be tested on the lime softened unchlorinated water.
The City will indicate to REI where the water should be drawn from (existing tap) and REI will pipe from the tap to the units using PVC pipes.

III. AOP Pilot Testing – Phase 1

The first phase of the pilot study is to test different AOP systems over a one week-period. The different AOP systems that will be tested are:

1. UV
2. Ozone
3. Hydrogen peroxide + Ozone
4. Hydrogen peroxide + UV (185 + 254 nm wavelength)
5. Ozone + UV (185 + 254 nm wavelength)
6. Peracetic Acid

SEE TABLE 1 FOR ANALYSIS

UV Testing

1. Switch the UV light on
2. Record intensity I (around 4 mW/cm2)
3. Set the water flow to 30 gpm
4. Analyze UV and Color in influent and effluent (after 0.45 um filtration)
5. Set the water flow to 20 gpm
6. Analyze UV and Color in effluent (after 0.45 um filtration)

7. Set the water flow to 10 gpm
8. Analyze UV and Color in effluent (after 0.45 um filtration)

The UV dose (mJ/cm2) is calculated as follows: I (mW/cm2) x 673 / Flow (gpm)
At 30 gpm the dose would be around 90 mJ/cm2

Hydrogen Peroxide and UV Testing
The hydrogen peroxide is a 35% solution
Dilute to obtain a 0.35% solution: 38 mL of 35% solution in 1 gal of DI (or 10 mL in 1 L of DI): put DI water in bucket first then hydrogen peroxide.

1. Select the water flow for the best UV testing results in terms of color removal
2. Record intensity I (around 4 mW/cm2)
3. Set the hydrogen peroxide dose to 5 ppm
4. Analyze UV and Color in influent and effluent (after 0.45 um filtration) and pH effluent
5. Set the hydrogen peroxide dose to 10 ppm
6. Analyze UV and Color in effluent (after 0.45 um filtration) and pH effluent
7. Set the hydrogen peroxide dose to 15 ppm
8. Analyze UV and Color in effluent (after 0.45 um filtration) pH effluent
9. Assess if there is any improvement by increasing the dose

If flow is 10 gpm and dose is 5 ppm, the feed rate of the chemical pump should be: 50 ml/min (using the 0.35% solution)

Ozone Testing
1. Switch the Ozone unit on
2. Set ozone power to 50%
3. Set water flow to 30 gpm
4. Record ozone concentration (back of the unit) in g/NM3
5. Record backpressure of ozone generator (psi)
6. Analyze ozone residual in effluent (right after venturi)
7. Analyze UV and Color in influent and effluent (after 0.45 um filtration)
8. Set the ozone power to 75%
9. Analyze ozone residual in effluent (right after venturi)
10. Analyze UV and Color in effluent (after 0.45 um filtration)
11. Set the ozone power to 100%
12. Analyze ozone residual in effluent (right after venturi)
13. Analyze UV and Color in effluent (after 0.45 um filtration)
14. **SAMPLE FOR TOC/DOC/BDOC/BROMIDE/BROMATE (TABLE 1) ASSESS WHAT BEST TEST IS BEFORE SAMPLING. MAY HAVE TO GO BACK TO PREVIOUS SETTING**

Hydrogen Peroxide and Ozone Testing
The hydrogen peroxide is a 35% solution

Dilute to obtain a 0.35% solution: 38 mL of 35% solution in 1 gal of DI (or 10 mL in 1 L of DI): put DI water in bucket first then hydrogen peroxide.

1. Select the ozone power for the best Ozone testing results in terms of color removal
2. Set water flow to 30 gpm
3. Record ozone concentration (back of the unit) in g/NM3
4. Record backpressure of ozone generator (psi)
5. Analyze ozone residual in effluent (right after venturi)
6. Set the hydrogen peroxide dose to 5 ppm
7. Analyze UV and Color in influent and effluent (after 0.45 um filtration) and pH effluent
8. Set the hydrogen peroxide dose to 10 ppm
9. Analyze UV and Color in effluent (after 0.45 um filtration) and pH effluent
10. Set the hydrogen peroxide dose to 15 ppm
11. Analyze UV and Color in effluent (after 0.45 um filtration) pH effluent
12. Assess if there is any improvement by increasing the dose
13. **SAMPLE FOR TOC/DOC/BDOC/BROMIDE/BROMATE (TABLE 1) ASSESS WHAT BEST TEST IS BEFORE SAMPLING. MAY HAVE TO GO BACK TO PREVIOUS SETTING**

Ozone and UV Testing

1. Select the water flow for the best UV testing results in terms of color removal
2. Record water flow
3. Record intensity I (around 4 mW/cm2)
4. Set ozone power to 50%
5. Record ozone concentration (back of the unit) in g/NM3
6. Record backpressure of ozone generator (psi)
7. Analyze ozone residual in effluent (right after venturi)
8. Analyze UV and Color in influent and effluent (after 0.45 um filtration)
9. Set the ozone power to 75%
10. Analyze ozone residual in effluent (right after venturi)
11. Analyze UV and Color in effluent (after 0.45 um filtration)
12. Set the ozone power to 100%
13. Analyze ozone residual in effluent (right after venturi)
14. Analyze UV and Color in effluent (after 0.45 um filtration)
15. **SAMPLE FOR TOC/DOC/BDOC/BROMIDE/BROMATE (TABLE 1) ASSESS WHAT BEST TEST IS BEFORE SAMPLING. MAY HAVE TO GO BACK TO PREVIOUS SETTING**

Table 1 presents the locations and water quality parameters that will be analyzed for the AOP system influent and the different AOP system effluents.

Attachment B – AOP Pilot Results

Table B-1. AOP Testing - UV Results

		UV	
Date	8-Feb	8-Feb	8-Feb
Flow (gpm)	30	20	10
UV (mW/cm^2)	0.4	0.4	0.4
UV (mJ/cm^2)	9.0	13.5	26.9
Color (Influent)	22	20	21
Color (Effluent)	22	20	20
UV254 UVT (Influent)	55.70	57.02	57.20
UV254 UVT (Effluent)	56.35	56.38	57.41
UV254 UVA (Influent)	0.254	0.244	0.243
UV254 UVA (Effluent)	0.249	0.249	0.241

Table B-2. AOP Testing - Peroxide + UV

	Peroxide + UV	
Date	8-Feb	9-Feb
Peroxide Dose (ppm)	5	13
Flow (gpm)	30	18
UV (mW/cm^2)	0.4	0.4
UV (mJ/cm^2)	9.0	15.0
Color (Influent)	8	11
Color (Effluent)	10	14
Color Removal	--	--
UV254 UVT (Influent)	61.54	63.80
UV254 UVT (Effluent)	59.96	61.66
UV254 UVA (Influent)	0.211	0.195
UV254 UVA (Effluent)	0.222	0.210
pH (Influent)	10.2	9.9
pH (Effluent)	10.1	9.9
Sulfide (Influent) ug/L		8

Table B-3. AOP Testing - Ozone

							Ozone							
Date	9-Feb	9-Feb	18-Feb	19-Feb	22-Mar	30-Mar	8-Apr	8-Apr	8-Apr	9-Apr	13-Apr	28-Apr	28-Apr	6-May
Time			9:00	13:00							10:25	Morning	Afternoon	
Power	50%	100%	100%	5%	100%	100%	5%	10%	100%	100%	100%	100%	100%	
Flow (gpm)	30	20	14	16	10	13	11	11	11	11	11	11	11	
Gas Flow (lpm)	3	3	3	3	3	3	3	3	3	3	3	2.5	2.75	
Ozone Concentration (g/Nm3)	93.15	88.85	91.8	23	96	94.3	25	45	90	95	88	83	85.3	
Backpressure (psi)	25	24	24	24	NA	25	25	25	25	26	18	19	20	
Ozone Residual (mg/L)	0.00	0.14	0.69	0	0.01	0.12	NA	NA	NA	NA	NA	0.05	0.09	O
Color (Influent)	15	19	25	5.5	92	67	40	36	30	52	56	37	50	
Color (Effluent)	10	15	10	0.5	73	54	10	11	7	14	2	9	26	
Color Removal	30%	22%	61%	91%	21%	20%	76%	69%	76%	72%	96%	76%	48%	
UV254 UVT (Influent)	59.63	59.19	57.08	65.61	NA	NA	NA	NA	NA	NA	56.94	55.87	55.77	
UV254 UVT (Effluent)	64.05	64.44	73.696	71.97	NA	NA	NA	NA	NA	NA	68.84	69.22	68.48	
UV254 UVA (Influent)	0.225	0.228	0.244	0.183	NA	NA	NA	NA	NA	NA	0.245	0.253	0.254	
UV254 UVA (Effluent)	0.194	0.191	0.133	0.143	NA	NA	NA	NA	NA	NA	0.162	0.160	0.164	
pH (Influent)	10.4	9.6	9.2	10	NA	10	NA	NA	NA	NA	9.8	9.5	9.5	
pH (Effluent)	10.4	9.6	9.2	10	NA	NA	NA	NA	NA	NA	9.8	9.6	9.6	
ORP (Influent) (mV)	91	96	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
ORP (Effluent) (mV)	190	382	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Sulfide (Influent) ug/L	46	NA	0	12	NA	NA	NA	NA	NA	NA	NA	NA	NA	
DO (Influent)	NA	NA	0	0	NA	NA	NA	NA	NA	NA	0	0	0	
DO (Effluent)	NA	NA	Over	7.9	NA	NA	NA	NA	NA	NA	11.9	12	12.1	
Raw Bromide (ug/L)			0.2	0.2	0.2								0.2	0.2
Ozone Effluent Bromide (ug/L)			0.2	0.2	0.2								0.2	0.2
Raw Bromate (ug/L)			3.7	3.7	NA								3.8	3.8
Ozone Effluent Bromate (ug/L)			3.7	3.7	3.8								3.8	3.8
Raw DOC (mg/L)			7.8	6.6	6.7								8.1	7.4
Ozone Effluent DOC (mg/L)			7.6	6.6	6.9								9.7	7.6
Raw TOC (mg/L)			7.9	6.9	6.7								7.6	7
Ozone Effluent TOC (mg/L)			8.7	6.8	6.8								7.9	7
Raw BDOC (ug C/L)			0	NA	NA								NA	
Ozone Effluent BDOC (mg C/L)			1060	415	NA								NA	
Raw Calcium (mg/L)					52								39	
Raw HPC (CFU/mL)					2466								NA	
Raw Chloride (mg/L)					50								50	
Raw Effluen Alkalinity, Total (mg/L)					81								70	
Ozone Effluen Alkalinity, Total (mg/L)													90	
Ozone Effluent HPC (CFU/mL)					152								NA	
Tank Water HPC (CFU/mL)					5700								NA	
GAC #1 HPC (CFU/mL)					5700								NA	
GAC #1 TOC (mg/L)					4.4								7.2	
GAC #1 DOC (mg/L)													8.6	
GAC #2 HPC (CFU/mL)					5700								NA	
GAC #2 TOC (mg/L)					2.8								4.6	
GAC #2 DOC (mg/L)													4.5	
GAC #3 HPC (CFU/mL)					5700								NA	
GAC #3 TOC (mg/L)					1.6								3.9	
GAC #3 DOC (mg/L)													4.2	
GAC #4 HPC (CFU/mL)					5700								NA	
GAC #4 TOC (mg/L)					0.58								3	
GAC #4 DOC (mg/L)													4	
Raw BDOC (ug C/L)													1140	
GAC #1 BDOC (ug/L)													79	
GAC #2 BDOC (ug/L)													53	

Table B-5. AOP Testing - Peroxide

	Peroxide	
Date	31-Mar	31-Mar
Power	0%	0%
Peroxide Dose (ppm)	5	10
Flow (gpm)	13	13
Color (Influent)	46	43
Color (Effluent)	36	23
% Color Removal	22%	47%

Table B-6. AOP Testing - Ozone + UV

	Ozone + UV	
Date	19-Feb	19-Feb
Flow (gpm)	16	16
Gas Flow (lpm)	3	3
UV (mW/cm^2)	0.3	0
UV (mJ/cm^2)	12.6	0.0
Ozone Concentration (g/Nm3)	43	43
Backpressure (psi)	24	24
Ozone Residual (mg/L)	0.00	0.00
Color (Influent)	13.2	
Color (Effluent)	0	0.5
UV254 UVT (Influent)	65.59	
UV254 UVT (Effluent)	73.81	77.01
UV254 UVA (Influent)	0.183	
UV254 UVA (Effluent)	0.132	0.113
pH (Influent)	10.1	
pH (Effluent)	10.1	
Sulfide (Influent) ug/L	0	
DO (Influent)	0	
DO (Effluent)	5.2	
		Turned UV off same settings as other test

Figure B-1

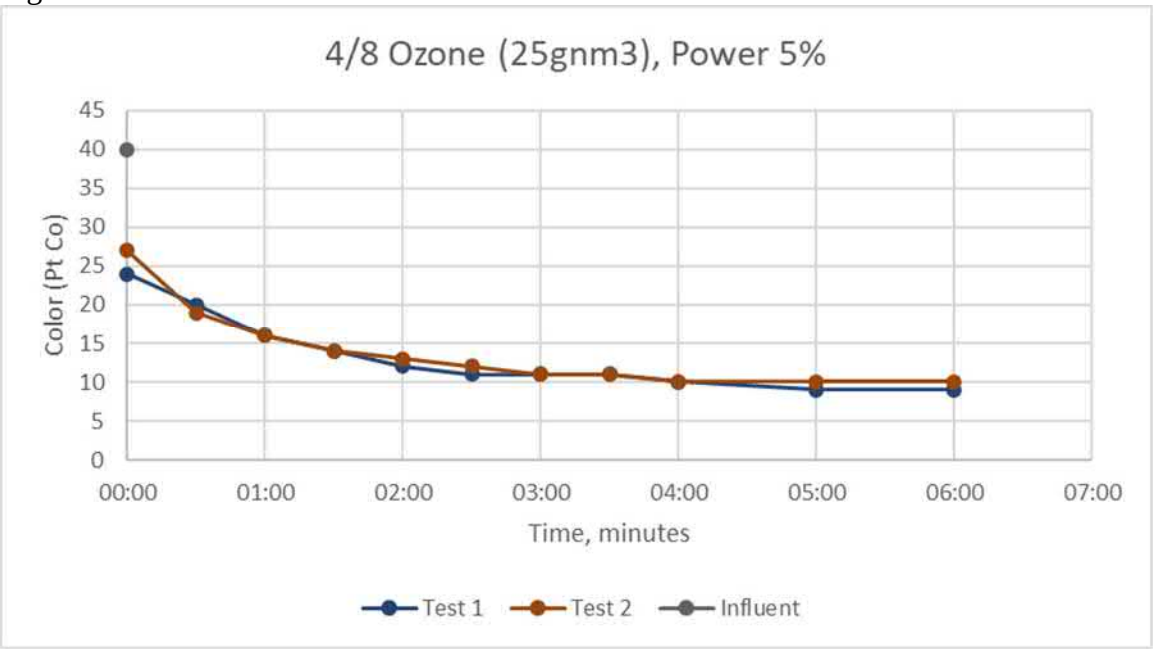


Figure B-2

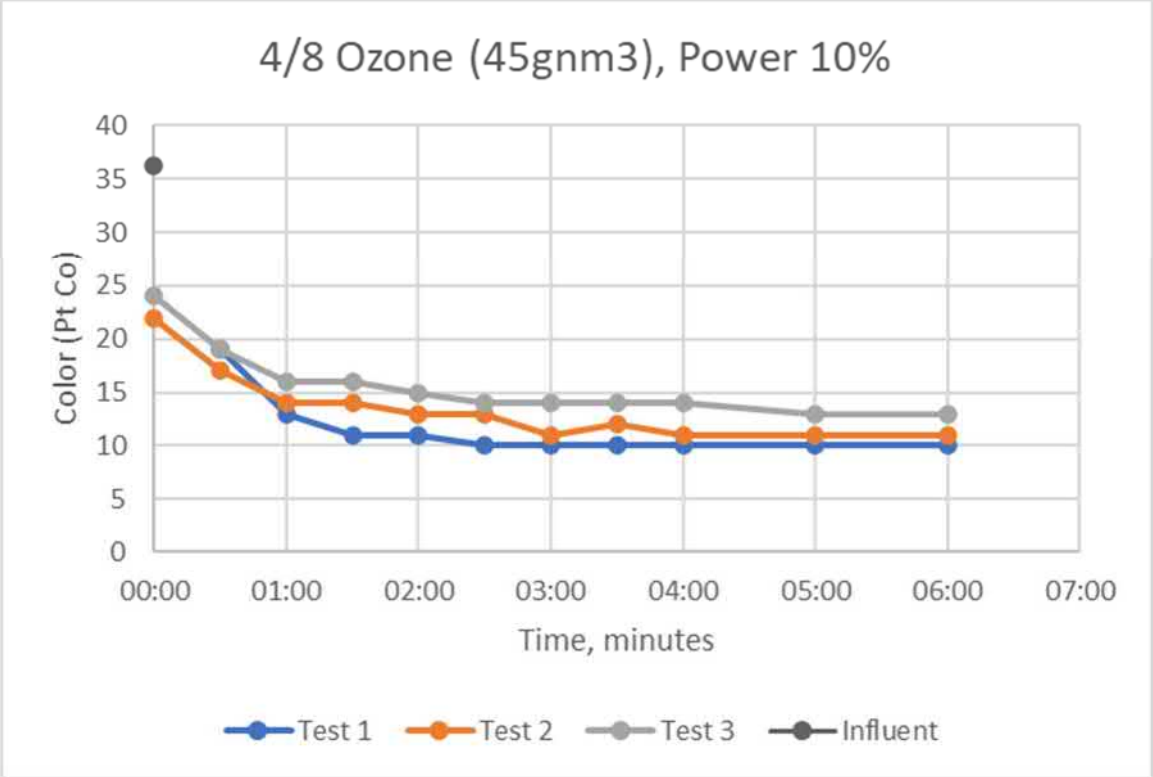


Figure B-3

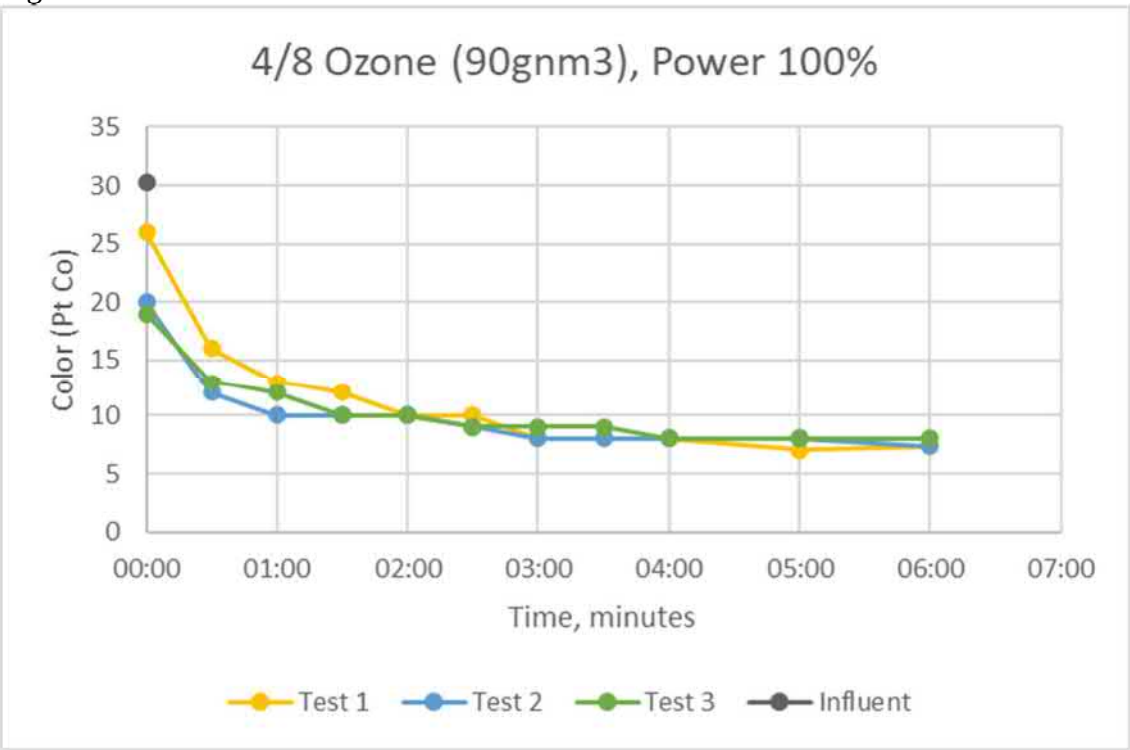


Figure B-4

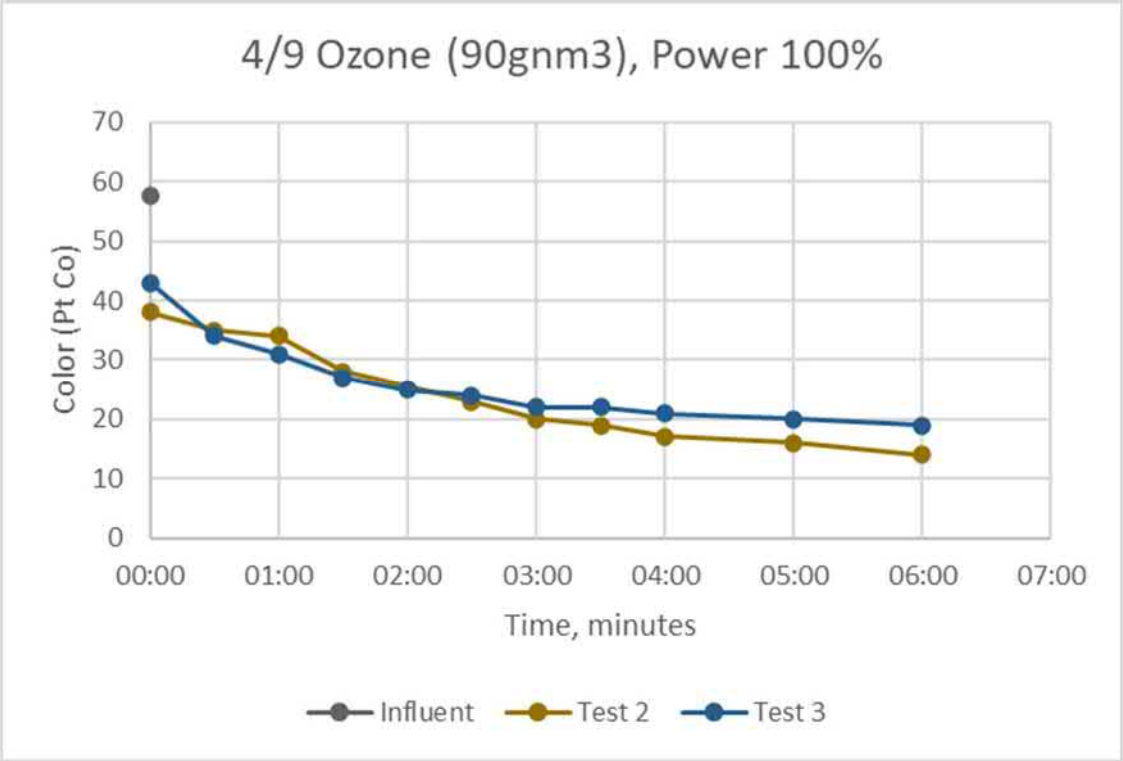
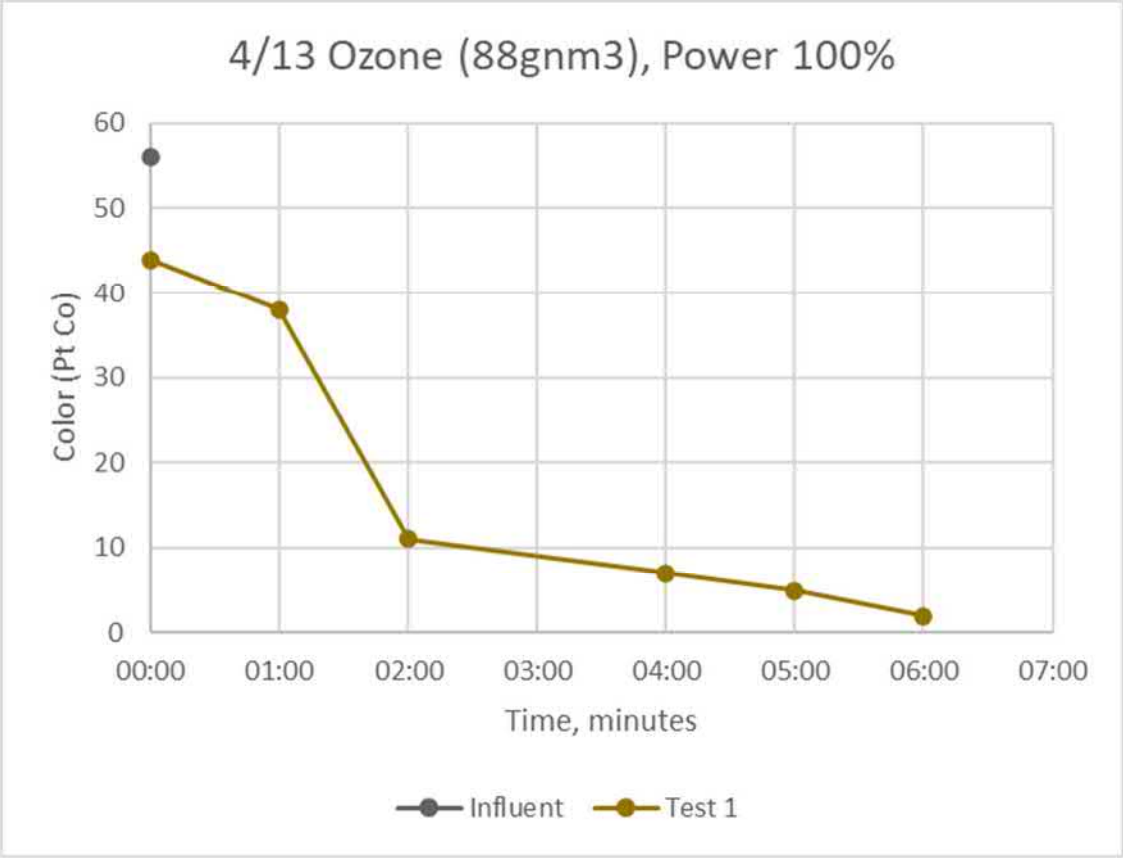


Figure B-5


4/13 Ozone (88gnm3), Power 100%
Color (Pt Co)
60
50
40
30
20
10
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
Time, minutes
Influent
Test 1

Attachment C – BAC Pilot Results

Table C-1. BAC Testing Results

Date	Time		Feed Water: Meter Reading (gal)	Totalized Flow (gpm)	Flow (gpm)	pH	UV 254 UVT	UV 254 UVA	Turbidity (NTU)	Total Sulfide (ug/L)	DO (mg/L)	Color
2/18/21	4:00 PM	2/18/21 4:00 PM	297	-	0.25	NA	NA	NA	NA	NA	NA	
2/19/21	4:00 PM	2/19/21 4:00 PM	668	0.26	0.25	10.0	61.33	0.212	NA	NA	NA	52
3/3/21	6:30 AM	3/3/21 6:30 AM	1520	0.05	0.10	9.7	63.21	0.199	2.5	NA	NA	39
3/8/21	10:50 AM	3/8/21 10:50 AM	2265	0.10	0.10	9.6	NA	NA	56.5	NA	NA	28
3/9/21	9:00 AM	3/9/21 9:00 AM	2587	0.24	0.30	9.4	74.71	0.127	3.6	NA	NA	34
3/21/2021	10:00 AM	3/21/21 10:00 AM	3863	0.07	0.3			NA				71
3/22/2021	7:00 PM	3/22/21 7:00 PM	3900	0.02	0.3							23
3/30/2021	5:00 PM	3/30/21 5:00 PM	4000	0.01	0.3			NA				40
3/31/2021	5:04 PM	3/31/21 5:04 PM	4472	0.33	0.3			NA				48
4/8/2021	4:00 PM	4/8/21 4:00 PM	4508	0.00	0.3		63.37	0.198				30
4/9/2021	8:30 AM	4/9/21 8:30 AM	4745	0.24	0.3	10	64.53	0.190				25
4/9/2021	4:20 PM	4/9/21 4:20 PM	4849	0.22	0.3	9.5	67.49	0.171				28
4/10/2021	2:30 PM	4/10/21 2:30 PM	5123	0.21	0.3	9.57						39
4/11/2021	9:45 AM	4/11/21 9:45 AM	5296	0.15	0.3	9.97						25
4/12/2021	9:55 AM	4/12/21 9:55 AM	5388	0.06	0.3	9.77						28
4/13/2021	5:00 PM	4/13/21 5:00 PM	5551	0.09	0.3			NA				37
4/14/2021	9:40 AM	4/14/21 9:40 AM	5554	0.00	0.3	9.55						25
4/15/2021	1:10 PM	4/15/21 1:10 PM	5576	0.01	0.3	9.65						44
4/18/2021	9:55 AM	4/18/21 9:55 AM	6006	0.10	0.3	9.77						44
4/19/2021	1:40 PM	4/19/21 1:40 PM	6411	0.24	0.3	9.78						46
4/21/2021	12:09 PM	4/21/21 12:09 PM	6775	0.13	0.3	10.07						26
4/23/2021	7:00 PM	4/23/21 7:00 PM	7110	0.10	0.3	9.98						32
4/24/2021	1:00 PM	4/24/21 1:00 PM	7466	0.33	0.3	9.91						30
4/30/2021	10:00 AM	4/30/21 10:00 AM	8152	0.08	0.3							
4/30/2021	2:00 PM	4/30/21 2:00 PM	8200	0.20	0.3							

Date	Time	GAC 1 Effluent: Flow (gpm)	Bed Volumes	Pressure (psi)	pH	UV 254 UVT	UV 254 UVA	Turbidity (NTU)	Total Sulfide (ug/L)	DO (mg/L)		Color
2/18/21	4:00 PM	0.25	-	NA	NA	NA		NA	NA	NA		
2/19/21	4:00 PM	0.25	171	6	9.7	93.43	0.030	NA	NA	NA	98%	1
3/3/21	6:30 AM	0.1	562	12	9.3	83.04	0.081	0.11	NA	NA	82%	7
3/8/21	10:50 AM	0.1	905	24	9.56	NA		2.93	NA	NA	39%	17
3/9/21	9:00 AM	0.0	1,052	17	9.7	81.42	0.089	0.32	NA	NA	59%	14
3/21/2021	10:00 AM		1,639								68%	23
3/22/2021	7:00 PM		1,656								30%	16
3/30/2021	5:00 PM		1,702								0%	40
3/31/2021	5:04 PM		1,919								33%	32
4/8/2021	4:00 PM		1,935			77.61	0.110				77%	7
4/9/2021	8:30 AM		2,044	12	9.6	74.14	0.130				36%	16
4/9/2021	4:20 PM		2,092	12	9.4	75.42	0.123				71%	8
4/10/2021	2:30 PM		2,218		9.2						-33%	52
4/11/2021	9:45 AM		2,298		9.67						100%	
4/12/2021	9:55 AM		2,340		9.77						-21%	34
4/13/2021	5:00 PM		2,415	17							0%	37
4/14/2021	9:40 AM		2,416		9.36						-8%	27
4/15/2021	1:10 PM		2,426		9.4						-7%	47
4/18/2021	9:55 AM		2,624		9.47						41%	26
4/19/2021	1:40 PM		2,810		9.51						0%	46
4/21/2021	12:09 PM		2,977		8.83						0%	26
4/23/2021	7:00 PM		3,131		8.58						0%	32
4/24/2021	1:00 PM		3,295		9.9						0%	30
4/30/2021	10:00 AM		3,610			42.53	0.371					
4/30/2021	2:00 PM		3,632			55.35	0.257					39

Date	Time	GAC 2 Effluent: Flow (gpm)	Bed Volumes	Pressure (psi)	pH	UV 254 UVT	UV 254 UVA	Turbidity (NTU)	Total Sulfide (ug/L)	DO (mg/L)		Color
2/18/21	4:00 PM	0.25	-	NA	NA	NA	NA	NA	NA	NA		
2/19/21	4:00 PM	0.25	85	2	9.6	99.55	0.0020	NA	NA	NA		0
3/3/21	6:30 AM	0.1	281	1	8.8	96.22	0.0167	0.49	NA	NA		0
3/8/21	10:50 AM	0.1	452	0	9.47	NA	NA	0.097	NA	NA	82%	3
3/9/21	9:00 AM	0	526	1	9.6	89.44	0.0485	0.39	NA	NA	43%	8
3/21/2021	10:00 AM		819								52%	11
3/22/2021	7:00 PM		828								31%	11
3/30/2021	5:00 PM		851								63%	15
3/31/2021	5:04 PM		959								56%	14
4/8/2021	4:00 PM		968			91.42	0.0390				86%	1
4/9/2021	8:30 AM		1,022	3	9.2	80.7	0.0931				50%	8
4/9/2021	4:20 PM		1,046	3	9.1	81.7	0.0878				63%	3
4/10/2021	2:30 PM		1,109		9.3						81%	10
4/11/2021	9:45 AM		1,149		9.5						######	12
4/12/2021	9:55 AM		1,170		9.63						71%	10
4/13/2021	5:00 PM		1,207	4							95%	2
4/14/2021	9:40 AM		1,208		9.22						78%	6
4/15/2021	1:10 PM		1,213		9.22						87%	6
4/18/2021	9:55 AM		1,312		9.23						58%	11
4/19/2021	1:40 PM		1,405		9.29						85%	7
4/21/2021	12:09 PM		1,489		8.87						58%	11
4/23/2021	7:00 PM		1,566		8.52						75%	8
4/24/2021	1:00 PM		1,647		9.65						83%	5
4/30/2021	10:00 AM		1,805			80.51	0.0942				######	14
4/30/2021	2:00 PM		1,816			88.51	0.0530				69%	12

Date	Time	GAC 3 Effluent: Flow (gpm)	Bed Volumes	Pressure (psi)	pH	UV 254 UVT	UV 254 UVA	Turbidity (NTU)	Total Sulfide (ug/L)	DO (mg/L)	Color
2/18/21	4:00 PM	0.25	-	NA	NA	NA	NA	NA	NA	NA	
2/19/21	4:00 PM	0.25	57	1	9.6	99.94	0.000260655	NA	NA	NA	0
3/3/21	6:30 AM	0.1	187	0	8.8	100	0	0.43	NA	NA	0
3/8/21	10:50 AM	NA	302	NA	NA	NA	NA	NA	NA	NA	NA
3/9/21	9:00 AM	0	351	0	9.6	94.35	0.025258095	0.72	NA	NA	0
3/21/2021	10:00 AM		546				#NUM!				7
3/22/2021	7:00 PM		552								0
3/30/2021	5:00 PM		567				#NUM!				8
3/31/2021	5:04 PM		640				#NUM!				12
4/8/2021	4:00 PM		645			98.9	0.004803708				0
4/9/2021	8:30 AM		681	2	8.8		#NUM!				7
4/9/2021	4:20 PM		697	2	8.6	91.39	0.039101323				0
4/10/2021	2:30 PM		739								
4/11/2021	9:45 AM		766								
4/12/2021	9:55 AM		780								
4/13/2021	5:00 PM		805	3			#NUM!				0
4/14/2021	9:40 AM		805								
4/15/2021	1:10 PM		809								
4/18/2021	9:55 AM		875								
4/19/2021	1:40 PM		937								
4/21/2021	12:09 PM		992								
4/23/2021	7:00 PM		1,044								
4/24/2021	1:00 PM		1,098								
4/30/2021	10:00 AM		1,203			83.45	0.078573659				14
4/30/2021	2:00 PM		1,211			74.45	0.128135298				8

Date	Time	GAC 4 Effluent: Flow (gpm)	Bed Volumes	Pressure (psi)	pH	UV 254 UVT	UV 254 UVA	Turbidity (NTU)	Total Sulfide (ug/L)	DO (mg/L)	Color
2/18/21	4:00 PM	0.25	-	NA	NA	NA	NA	NA	NA	NA	NA
2/19/21	4:00 PM	0.25	43	0	9.4	100	0	NA	NA	NA	0
3/3/21	6:30 AM	0.25	141	0	8.7	100	0	0.32	NA	NA	0
3/8/21	10:50 AM	NA	226	NA	NA	NA	NA	NA	NA	NA	NA
3/9/21	9:00 AM	0.1	263	0	9.6	99.35	0.002832129	0.43	NA	NA	0
3/21/2021	10:00 AM		410				#NUM!				13
3/22/2021	7:00 PM		414								0
3/30/2021	5:00 PM		425				#NUM!				9
3/31/2021	5:04 PM		480				#NUM!				15
4/8/2021	4:00 PM		484			99.96	0.000173753				0
4/9/2021	8:30 AM		511	1	8.6	98.38	0.007093182				5
4/9/2021	4:20 PM		523	1	8.3		#NUM!				0
4/10/2021	2:30 PM		555								
4/11/2021	9:45 AM		574								
4/12/2021	9:55 AM		585								
4/13/2021	5:00 PM		604	3			#NUM!				0
4/14/2021	9:40 AM		604								
4/15/2021	1:10 PM		607								
4/18/2021	9:55 AM		656								
4/19/2021	1:40 PM		703								
4/21/2021	12:09 PM		744								
4/23/2021	7:00 PM		783								
4/24/2021	1:00 PM		824								
4/30/2021	10:00 AM		903			88.61	0.052517263				12
4/30/2021	2:00 PM		908			71.54	0.145451064				0

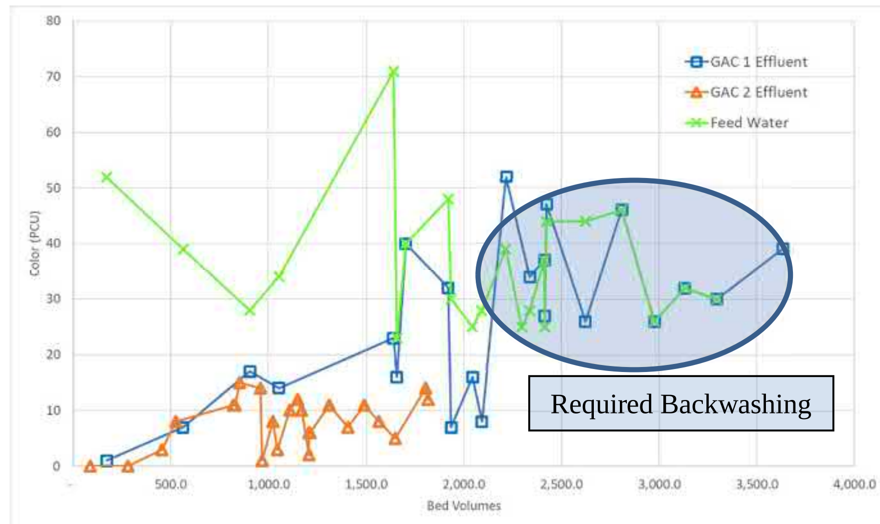
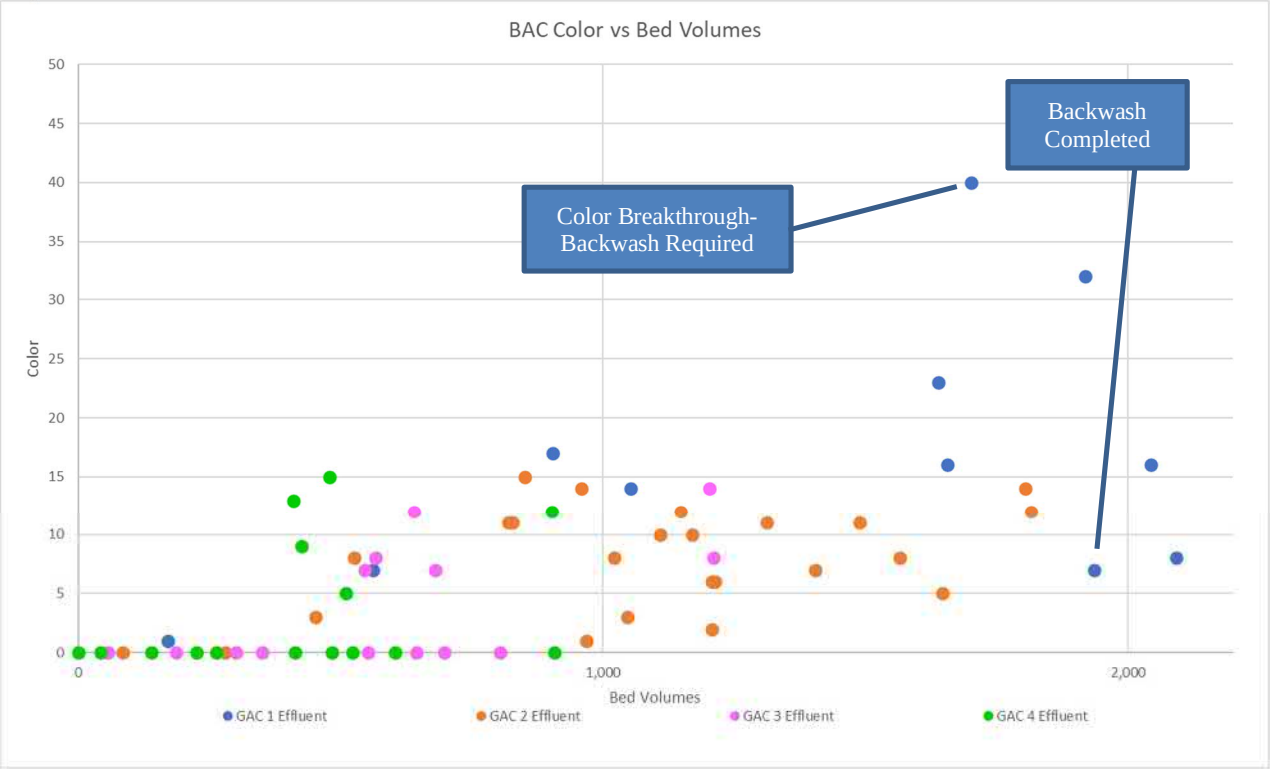


Figure C-1. BAC Color vs. Bed Volumes



Attachment D – Raw Laboratory Analyses

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

March 8, 2021

Christophe M. Robert
Reiss Engineering, Inc.
1016 Spring Villas Pt.
Winter Springs, FL 32708

RE: Workorder: M2100882 City of Ft Lauderdale Fiveash

Dear Christophe Robert:

Enclosed are the analytical results for sample(s) received by the laboratory on Monday, February 22, 2021. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody and results pertain only to these samples.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Deb Griffith - Client Services Manager
DGriffith@aellab.com

Enclosures

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

SAMPLE SUMMARY

Workorder: M2100882 City of Ft Lauderdale Fiveash

Lab ID	Sample ID	Matrix	Date Collected	Date Received
M2100882001	Ozone In	Drinking Water	2/18/2021 10:00	2/22/2021 17:30
M2100882002	Ozone Eff	Drinking Water	2/18/2021 09:30	2/22/2021 17:30
M2100882003	Ozone + Per In	Drinking Water	2/19/2021 10:05	2/22/2021 17:30
M2100882004	Ozone + Per Eff	Drinking Water	2/19/2021 10:00	2/22/2021 17:30
M2100882005	Ozone Low Eff	Drinking Water	2/19/2021 13:00	2/22/2021 17:30

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

ANALYTICAL RESULTS

Workorder: M2100882 City of Ft Lauderdale Fiveash

Lab ID: **M2100882001** Date Received: 02/22/21 17:30 Matrix: Drinking Water
Sample ID: **Ozone In** Date Collected: 02/18/21 10:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/3/2021 18:25	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.7**	**U**	**ug/L**	**1**	10	3.7	2/24/2021 22:56	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**7.8**		**mg/L**	**1**	1.0	0.50	2/24/2021 18:26	T
Total Organic Carbon	**7.9**		**mg/L**	**1**	1.0	0.50	3/2/2021 15:30	T

Lab ID: **M2100882002** Date Received: 02/22/21 17:30 Matrix: Drinking Water
Sample ID: **Ozone Eff** Date Collected: 02/18/21 09:30

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/3/2021 18:41	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.7**	**U**	**ug/L**	**1**	10	3.7	2/24/2021 23:35	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**7.6**		**mg/L**	**1**	1.0	0.50	2/24/2021 18:45	T
Total Organic Carbon	**8.7**		**mg/L**	**1**	1.0	0.50	3/2/2021 15:51	T

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

ANALYTICAL RESULTS

Workorder: M2100882 City of Ft Lauderdale Fiveash

Lab ID: **M2100882003** Date Received: 02/22/21 17:30 Matrix: Drinking Water
Sample ID: **Ozone + Per In** Date Collected: 02/19/21 10:05

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/3/2021 18:57	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.7**	**U**	**ug/L**	**1**	10	3.7	2/25/2021 00:14	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**6.6**		**mg/L**	**1**	1.0	0.50	2/24/2021 18:58	T
Total Organic Carbon	**6.9**		**mg/L**	**1**	1.0	0.50	3/2/2021 16:12	T

Lab ID: **M2100882004** Date Received: 02/22/21 17:30 Matrix: Drinking Water
Sample ID: **Ozone + Per Eff** Date Collected: 02/19/21 10:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/3/2021 19:13	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.7**	**U**	**ug/L**	**1**	10	3.7	2/25/2021 00:53	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**6.6**		**mg/L**	**1**	1.0	0.50	2/24/2021 19:12	T
Total Organic Carbon	**6.9**		**mg/L**	**1**	1.0	0.50	3/2/2021 16:32	T

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ANALYTICAL RESULTS

Workorder: M2100882 City of Ft Lauderdale Fiveash

Lab ID: **M2100882005** Date Received: 02/22/21 17:30 Matrix: Drinking Water

Sample ID: **Ozone Low Eff** Date Collected: 02/19/21 13:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/3/2021 20:01	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.7**	**U**	**ug/L**	**1**	10	3.7	2/25/2021 01:32	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**6.6**		**mg/L**	**1**	1.0	0.50	2/24/2021 19:25	T
Total Organic Carbon	**6.8**		**mg/L**	**1**	1.0	0.50	3/2/2021 16:45	T

CERTIFICATE OF ANALYSIS

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ANALYTICAL RESULTS QUALIFIERS

Workorder: M2100882 City of Ft Lauderdale Fiveash

PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

LAB QUALIFIERS

T	DOH Certification #E84589(AEL-T)(FL NELAC Certification)

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QUALITY CONTROL DATA

Workorder: M2100882 City of Ft Lauderdale Fiveash

QC Batch: WCAt/2143 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2100882001, M2100882002, M2100882003, M2100882004, M2100882005

METHOD BLANK: 3795992

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Dissolved Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/2200 Analysis Method: EPA 300.1
QC Batch Method: EPA 300.1 Prepared:
Associated Lab Samples: M2100882001, M2100882002, M2100882003, M2100882004, M2100882005

METHOD BLANK: 3798858

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromate	ug/L	3.7	3.7	U

QC Batch: WCAt/2297 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2100882001, M2100882002, M2100882003, M2100882004, M2100882005

METHOD BLANK: 3803646

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/2340 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: M2100882001, M2100882002, M2100882003, M2100882004, M2100882005

METHOD BLANK: 3805513

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				

CERTIFICATE OF ANALYSIS

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QUALITY CONTROL DATA

Workorder: M2100882 City of Ft Lauderdale Fiveash

METHOD BLANK: 3805513

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Bromide	mg/L	0.10	0.10	U

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: M2100882 City of Ft Lauderdale Fiveash

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
M2100882001	Ozone In			SM 5310B	WCAt/2143
M2100882002	Ozone Eff			SM 5310B	WCAt/2143
M2100882003	Ozone + Per In			SM 5310B	WCAt/2143
M2100882004	Ozone + Per Eff			SM 5310B	WCAt/2143
M2100882005	Ozone Low Eff			SM 5310B	WCAt/2143
M2100882001	Ozone In			EPA 300.1	WCAt/2200
M2100882002	Ozone Eff			EPA 300.1	WCAt/2200
M2100882003	Ozone + Per In			EPA 300.1	WCAt/2200
M2100882004	Ozone + Per Eff			EPA 300.1	WCAt/2200
M2100882005	Ozone Low Eff			EPA 300.1	WCAt/2200
M2100882001	Ozone In			SM 5310B	WCAt/2297
M2100882002	Ozone Eff			SM 5310B	WCAt/2297
M2100882003	Ozone + Per In			SM 5310B	WCAt/2297
M2100882004	Ozone + Per Eff			SM 5310B	WCAt/2297
M2100882005	Ozone Low Eff			SM 5310B	WCAt/2297
M2100882001	Ozone In			EPA 300.0	WCAt/2340
M2100882002	Ozone Eff			EPA 300.0	WCAt/2340
M2100882003	Ozone + Per In			EPA 300.0	WCAt/2340
M2100882004	Ozone + Per Eff			EPA 300.0	WCAt/2340
M2100882005	Ozone Low Eff			EPA 300.0	WCAt/2340

Advanced Environmental Laboratories, Inc.

☐ Altamo
☐ Fort My
☐ Jackson
☐ Tallahas

M2100882

076

Page 1 of 1

☐ Gainesville: 4965 SW 41st Blvd., FL 32608 • 352.377.2349 • Lab ID: E82001
☑ Miramar: 10200 USA Today Way, FL 33025 • 954.889.2288 • Lab ID: E82535
☐ Tampa: 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Lab ID: E84589

Client Name:	Reiss Engineering, Inc.	Project Name:	City of Ft. Lauderdale Fiveash
Address:	1016 Spring Villas Pt.	Project Number:	
	Winter Springs, FL 32708	PO Number:	
Phone:	407-679-5358	FDEP Facility No:	
FAX:		FDEP Facility Addr:	
Contact:	Christophe M. Robert		
Sampled By:	Jonathan McCarthy	Special Instructions:	
Turn Around Time:	Standard Rush		
AEL Profile #:		ADaPT EQuIS Other	

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	Preservation	Field-Filtered?	Bromate by 300.1	Bromide by 300.0	TOC by SM5310B	DOC by SM5310B	LABORATORY I.D. NUMBER
							BOTTLE SIZE & TYPE						
							ANALYSIS REQUIRED						
									NaThio				
	Ozone In		2/18	1000	DW				1	1	1	1	001
	Ozone Eff		2/18	930					1	1	1	1	002
	Ozone + Per In		2/19	10:05					1	1	1	1	003
	Ozone + Per Eff		2/19	1000					1	1	1	1	004
	Ozone Low Eff		2/19	1300					1	1	1	1	005

Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge

Preservation Code: I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)

Received on Ice ☑ Yes ☐ No ☑ Temp taken from sample ☐ Temp from blank ☐ Where required, pH checked

Temp. when received (observed) 4.1 °C Temp. when received (corrected) 3.1 °C

DCN: AD-D051web Form last revised 08/07/2019

Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 T: 10A A: 3A M: 3A S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1		2/22/21	1450		2/22/21	1450
2		2/22/21	1730		2/22/21	1730
3						
4						

FOR DRINKING WATER USE:

(When PWS Information not otherwise supplied) PWS ID:

Contact Person:

Supplier of Water:

Site-Address:

NELAP Accredited E82535

March 26, 2021

Client: Calgon Carbon Corporation

3000 GSK Drive

Moon Township, PA 15108

Requested By: -

National Environmental Laboratory Accreditation Program
ODEQ TNI Certified

Sample Project Name:	THM HAA Potentials Plus Add.
Date Samples Received:	February 24, 2021 Time: 10:00 sample temp upon arrival at lab = 10.00°C - On Ice
Matrix:	Water
Lab Log Numbers:	**DB24036-01 DB24036-02 DB24036-03 DB24036-04**
Work Order:	DB24036
Report #	DB24036-0326210810
EPA Lab ID#'s:	**Stillwater OK00092 Tulsa OK00983 OKC OK00129 ICR OK 001**
Oklahoma Certification:	Stillwater NELAP WasteWater, ODEQ 8316/ Drinking Water, DEQ D9602 NELAP Tulsa WasteWater, ODEQ 9905 / Drinking Water, DEQ D9901 Oklahoma City NELAP WasteWater ODEQ 7202 / Drinking Water, DEQ D9937
Kansas Certification:	Stillwater NELAP CERT # E-10219 Oklahoma City NELAP CERT # E-10414
Texas Certification:	Stillwater Drinking Water NELAP CERT # T105704533-14-1
Method Reference:	40 CFR 136, 141, and 261 Methods for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1983. Test Methods for Evaluating Solid Wastes, SW-846, Final Update III. Standard Methods 1998 (20th Edition), Standard Methods 2005 (21st Edition) and Standard Methods 2011 (22nd Edition) for the Examination of Water and Wastewater.
Analysis Reference:	If qualifiers present in "Prep Info" or "Analysis Info", then analysis performed as follows: @= Tulsa Lab and * = OKC Lab. If no qualifiers present, then analysis performed at Stillwater Lab.

Accurate Environmental Laboratories certify that the test results performed at the Stillwater lab meet all requirements of NELAP. Any exceptions to this can be found in the report footer or Quality Control Section of the report.

This report is to only be replicated in its entirety.

Accurate Environmental sampling protocol was followed for any sampling performed by Accurate Field Services.

Sample: ***Ozone Low Eff*** **Location Code:** **PWSID#:**

Collection Type: Grab Sample Time: 2/18/21 13:00 **Lab Log#** DB24036-01

Method/Parameter	Test	Result	Notes	PQL#	Prep Info	Analysis Info
Biodegradable Dissolved Organic Carbon (No Cert.)	Biodegradable Dissolved Organic Carbon	415 ug C/L		25.0	02/25/21 19:00 OHB	03/25/21 12:20 OHB

Sample: ***Ozone In*** **Location Code:** **PWSID#:**

Collection Type: Grab Sample Time: 2/18/21 10:00 **Lab Log#** DB24036-02

Method/Parameter	Test	Result	Notes	PQL#	Prep Info	Analysis Info
Biodegradable Dissolved Organic Carbon (No Cert.)	Biodegradable Dissolved Organic Carbon	BPQL ug C/L	Z-04	25.0	02/25/21 19:00 OHB	03/25/21 12:20 OHB

Sample: ***Ozone Eff*** **Location Code:** **PWSID#:**

Collection Type: Grab Sample Time: 2/18/21 9:30 **Lab Log#** DB24036-03

Method/Parameter	Test	Result	Notes	PQL#	Prep Info	Analysis Info
Biodegradable Dissolved Organic Carbon (No Cert.)	Biodegradable Dissolved Organic Carbon	1060 ug C/L		25.0	02/25/21 19:00 OHB	03/25/21 12:20 OHB

Notes and Definitions

Z-04	The #2 sample showed no significant Carbon change from the beginning to the end. -OHB
MCL	Analyte concentration may exceed Maximum Contaminant Limit (MCL) for EPA Primary or Secondary Drinking Water Regulations.
###	Analyte concentration may exceed regulatory limit.
PQL	Practical Quantitation Limit - the method reporting limit (MRL) adjusted for any dilutions or other changes made to the sample to deal with interferences/matrix effects
BPQL	Below Practical Quantitation Limit (if applicable).

The "Prep Date" of the QC analysis coincides with the characters of the appropriate QC Lab ID. (Example: 19 A 02 15 - BLK = 2019, Jan 2, Batch #15 - Blank)

Lab Manager

* Complete Entire COC to be in Compliance*

☐ RUSH Due Date _____

Chain of Custody

Accurate Environmental Labs

Client Name- **Calgon Carbon Corporation**

Project Name- THM HAA Potentials Plus Add.

Accurate Work Order #	Date Sample Taken	Time Sample Taken	Matrix or Source (Refer below)	Grab (G) or Comp (C)	Client I.D. / Sample Location or DEQ / EPA Location Code	Field Results (pH, Temp, Chlorine, …) (note analysis & units) Location Code	Chlorine (mg/L)	Analysis Requested → # of Container ↓	HAA Potential Dac 1,2,3,5	*THM Potential Dac 1,2,3,5	Total Chlorine pH Lab	MBAS	CN/S4	BDOC	
								Sample Preserv. & Container →	2-1000 ml n/p Plastic 2-1000 ml n/p Amber Glass						
DB24036			W	G				4	x	x	x	x	x		
-01	2/18	1300	W	G	* Ozone Low Eff									1	
-02	2/18	1000	W	G	Ozone In									1	
-03	2/18	930	W	G	Ozone Eff									1	
-04	2/18	100	W	G	* Ozone + Per Eff									1	

On-Site Info Raw Alkalinity (TOC Raw) = _____ mg/L Turbidity (E-Coli) = _____ ntu

Matrix Codes DW = Drinking Water WW = Wastewater SL = Sludge O = Other _____

E-Coli Source- GWUDI-FS= Groundwater under direct influence of Flowing Stream GWUDI-RL= Groundwater under direct influence of Reservoir/Lake

Field Instrument Calibration -

Meter Type	Standards	Final Read.	Date , Time	Initials

Comments *Please include chlorine result. ** NO Headspace (No air bubbles)

*RECIEVED 1-1000ml NP AMBER BROKE / 1-1000 ml NP Amber Y2 Full. - TKW 2-23-21

OZONE + PER EFF / OZONE LOW EFF

-- All Glass containers provided by Accurate Labs have Teflon lined lids --

-- All samples are scheduled to be disposed of in 4 weeks of receipt at Accurate. -

Certification by Company Official: I hereby certify that the above sampling occurred during a period such that the sample(s) is/are representative of a typical operating day discharge for the above facility. Signature: _____ Date/Time 2/22 10:00

Sampled By: Jonathan McCarthy Company: RET Sample Method: _____

Relinquished By: Jonathan McCarthy Date/Time 2/22 10:00 Received By: _____ Date/Time _____

☐ Relinquished to Lab By: _____ Date/Time _____ Received at Lab By: _____ Rec'd °C _____ Date/Time _____

☐ Relq'd to Log-In Fridge By: VPS 2-23-21 / 1000 ON ICE ✓ 10.0°C 2-23-21 / 1000

Reporting Requirements (standard 10-15 working days) ☐ **Compliance Reporting?** Yes or No (DMR, PWS,) Oklahoma **PWS ID #** _____ **RUSH** Request (if available) _____ (Working Days)

Mail Report To: Calgon Carbon Corporation

Address: 300 GSK Drive
Moon Township, PA 15108

Phone #: 412-787-6606

Email: casey.theys@kuraray.com

Mail Invoice To: _____

Address: casey.theys@kuraray.com

Phone #: ( ) Fax #: ( )

THM HAA Potentials Plus

Bid # - 030620 DC

PO # - 051320 tkw

www.accuratelabs.com (800) 516-5227

505 South Lowry Street, Stillwater, OK 74074 Phone: (405) 372-5300 Fax: (405) 372-5396

3910 East 51st Street, Tulsa, OK 74135 Phone: (918) 663-5400 Fax: (918) 663-6300

12036 N. Pennsylvania, Oklahoma City, OK 73120 Phone: (405) 751-3132 Fax: (405) 751-3108

Failure to complete this Chain of Custody form correctly may delay turnaround time of analytical reporting.

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April 9, 2021

Christophe M. Robert
Reiss Engineering, Inc.
1016 Spring Villas Pt.
Winter Springs, FL 32708

RE: Workorder: M2101302 City of Ft Lauderdale Fiveash

Dear Christophe Robert:

Enclosed are the analytical results for sample(s) received by the laboratory on Monday, March 22, 2021. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody and results pertain only to these samples.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Deb Griffith - Client Services Manager
DGriffith@aellab.com

Enclosures

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
10200 USA Today Way Miramar, FL 33025
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Phone: (954)889-2288
Fax: (954)889-2281

SAMPLE SUMMARY

Workorder: M2101302 City of Ft Lauderdale Fiveash

Lab ID	Sample ID	Matrix	Date Collected	Date Received
M2101302001	Raw Water	Water	3/22/2021 15:15	3/22/2021 17:35
M2101302002	AOP Effluent	Water	3/22/2021 16:00	3/22/2021 17:35
M2101302003	Tank Water	Water	3/22/2021 16:15	3/22/2021 17:35
M2101302004	Gac Effluent #1	Water	3/22/2021 16:15	3/22/2021 17:35
M2101302005	Gac Effluent #2	Water	3/22/2021 16:15	3/22/2021 17:35
M2101302006	Gac Effluent #3	Water	3/22/2021 16:15	3/22/2021 17:35
M2101302007	Gac Effluent #4	Water	3/22/2021 16:15	3/22/2021 17:35

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ANALYTICAL RESULTS

Workorder: M2101302 City of Ft Lauderdale Fiveash

Lab ID: **M2101302001** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **Raw Water** Date Collected: 03/22/21 15:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: E200.7 Analysis,Waters	Preparation Method: EPA 200.7 Analytical Method: EPA 200.7							
Calcium	**52**		**mg/L**	**1**	0.80	0.20	3/26/2021 17:13	M
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							
Heterotrophic Plate Count	**2466**	**V**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/25/2021 18:55	T
Chloride	**50**		**mg/L**	**1**	5.0	0.50	3/23/2021 03:35	M
Analysis Desc: Alkalinity,SM2320B,Water	Analytical Method: SM 2320B							
Alkalinity, Total	**81**		**mg/L**	**1**	20	5.0	3/29/2021 18:02	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**6.7**		**mg/L**	**1**	1.0	0.50	3/26/2021 04:06	T
Total Organic Carbon	**6.7**		**mg/L**	**1**	1.0	0.50	3/25/2021 20:07	T

Lab ID: **M2101302002** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **AOP Effluent** Date Collected: 03/22/21 16:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							
Heterotrophic Plate Count	**152**	**V,B**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							

CERTIFICATE OF ANALYSIS

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ANALYTICAL RESULTS

Workorder: M2101302 City of Ft Lauderdale Fiveash

Lab ID: **M2101302002** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **AOP Effluent** Date Collected: 03/22/21 16:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	3/29/2021 15:35	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.8**	**U**	**ug/L**	**1**	10	3.8	4/7/2021 19:58	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**6.9**		**mg/L**	**1**	1.0	0.50	3/26/2021 04:24	T
Total Organic Carbon	**6.8**		**mg/L**	**1**	1.0	0.50	3/25/2021 20:26	T

Lab ID: **M2101302003** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **Tank Water** Date Collected: 03/22/21 16:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							
Heterotrophic Plate Count	**5700**	**>,V,Z**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M

Lab ID: **M2101302004** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **Gac Effluent #1** Date Collected: 03/22/21 16:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							
Heterotrophic Plate Count	**5700**	**>,V,Z**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**4.4**		**mg/L**	**1**	1.0	0.50	3/25/2021 20:40	T

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

ANALYTICAL RESULTS

Workorder: M2101302 City of Ft Lauderdale Fiveash

Lab ID: **M2101302005** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **Gac Effluent #2** Date Collected: 03/22/21 16:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							
Heterotrophic Plate Count	**5700**	**>,V,Z**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**2.8**		**mg/L**	**1**	1.0	0.50	3/25/2021 20:58	T

Lab ID: **M2101302006** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **Gac Effluent #3** Date Collected: 03/22/21 16:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							
Heterotrophic Plate Count	**5700**	**>,V,Z**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**1.6**		**mg/L**	**1**	1.0	0.50	3/25/2021 21:16	T

Lab ID: **M2101302007** Date Received: 03/22/21 17:35 Matrix: Water
Sample ID: **Gac Effluent #4** Date Collected: 03/22/21 16:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Microbiology								
Analysis Desc: Heterotrophic Plate Count,9215B,DW	Analytical Method: SM 9215 B (Pour Plate)							

CERTIFICATE OF ANALYSIS

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Phone: (954)889-2288
Fax: (954)889-2281

ANALYTICAL RESULTS

Workorder: M2101302 City of Ft Lauderdale Fiveash

Lab ID: **M2101302007** Date Received: 03/22/21 17:35 Matrix: Water

Sample ID: **Gac Effluent #4** Date Collected: 03/22/21 16:15

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
Heterotrophic Plate Count	**5700**	**>,V,Z**	**CFU/1mL**	**1**	1.0	1.0	3/23/2021 12:10	M
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**0.58**	**I**	**mg/L**	**1**	1.0	0.50	3/25/2021 22:29	T

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

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Fax: (954)889-2281

ANALYTICAL RESULTS QUALIFIERS

Workorder: M2101302 City of Ft Lauderdale Fiveash

PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
V	Method Blank Contamination
B	Results based upon colony counts outside the acceptable range.
Z	Too numerous to count (TNTC); the reported numeric value takes into account the filtration volume.

LAB QUALIFIERS

M	DOH Certification #E82535(AEL-M)(FL NELAC Certification)
T	DOH Certification #E84589(AEL-T)(FL NELAC Certification)

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QUALITY CONTROL DATA

Workorder: M2101302 City of Ft Lauderdale Fiveash

QC Batch: WCAm/1749 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: M2101302001

METHOD BLANK: 3824312

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Chloride	mg/L	0.50	0.50	U

QC Batch: WCAt/2881 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101302001, M2101302002, M2101302004, M2101302005, M2101302006

METHOD BLANK: 3827925

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/2882 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101302007

METHOD BLANK: 3827934

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/2883 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101302001, M2101302002

METHOD BLANK: 3827938

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				

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QUALITY CONTROL DATA

Workorder: M2101302 City of Ft Lauderdale Fiveash

METHOD BLANK: 3827938

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Dissolved Organic Carbon	mg/L	0.50	0.50	U

QC Batch: DGMm/1209 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Prepared: 03/26/2021 03:00
Associated Lab Samples: M2101302001

METHOD BLANK: 3829192

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
METALS				
Calcium	mg/L	0.20	0.20	U

QC Batch: WCAt/2924 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: M2101302001

METHOD BLANK: 3830140

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromide	mg/L	0.10	0.10	U

QC Batch: WCAt/2938 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Prepared:
Associated Lab Samples: M2101302001

METHOD BLANK: 3830836

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Alkalinity, Total	mg/L	5.0	5.0	U

QC Batch: WCAt/2966 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

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Phone: (954)889-2288
Fax: (954)889-2281

QUALITY CONTROL DATA

Workorder: M2101302 City of Ft Lauderdale Fiveash

Associated Lab Samples: M2101302002

METHOD BLANK: 3831678

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromide	mg/L	0.10	0.10	U

QC Batch: MICm/1186 Analysis Method: SM 9215 B (Pour Plate)
QC Batch Method: SM 9215 B (Pour Plate) Prepared:
Associated Lab Samples: M2101302001, M2101302002, M2101302003, M2101302004, M2101302005, M2101302006, M2101302007

METHOD BLANK: 3834191

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Microbiology				
Heterotrophic Plate Count	CFU/1mL	93.5	1.0	

QC Batch: WCAt/3234 Analysis Method: EPA 300.1
QC Batch Method: EPA 300.1 Prepared:
Associated Lab Samples: M2101302002

METHOD BLANK: 3845456

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromate	ug/L	3.8	3.8	U

QUALITY CONTROL DATA QUALIFIERS

Workorder: M2101302 City of Ft Lauderdale Fiveash

QUALITY CONTROL PARAMETER QUALIFIERS

U The compound was analyzed for but not detected.

I The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

J4 Estimated Result

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
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QUALITY CONTROL DATA QUALIFIERS

Workorder: M2101302 City of Ft Lauderdale Fiveash

QUALITY CONTROL PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
V	Method Blank Contamination

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Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: M2101302 City of Ft Lauderdale Fiveash

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
M2101302001	Raw Water			EPA 300.0	WCAm/1749
M2101302001	Raw Water			SM 5310B	WCAt/2881
M2101302002	AOP Effluent			SM 5310B	WCAt/2881
M2101302004	Gac Effluent #1			SM 5310B	WCAt/2881
M2101302005	Gac Effluent #2			SM 5310B	WCAt/2881
M2101302006	Gac Effluent #3			SM 5310B	WCAt/2881
M2101302007	Gac Effluent #4			SM 5310B	WCAt/2882
M2101302001	Raw Water			SM 5310B	WCAt/2883
M2101302002	AOP Effluent			SM 5310B	WCAt/2883
M2101302001	Raw Water	EPA 200.7	DGMm/1209	EPA 200.7	ICPm/1211
M2101302001	Raw Water			EPA 300.0	WCAt/2924
M2101302001	Raw Water			SM 2320B	WCAt/2938
M2101302002	AOP Effluent			EPA 300.0	WCAt/2966
M2101302001	Raw Water			SM 9215 B (Pour Plate)	MICm/1186
M2101302002	AOP Effluent			SM 9215 B (Pour Plate)	MICm/1186
M2101302003	Tank Water			SM 9215 B (Pour Plate)	MICm/1186
M2101302004	Gac Effluent #1			SM 9215 B (Pour Plate)	MICm/1186
M2101302005	Gac Effluent #2			SM 9215 B (Pour Plate)	MICm/1186
M2101302006	Gac Effluent #3			SM 9215 B (Pour Plate)	MICm/1186
M2101302007	Gac Effluent #4			SM 9215 B (Pour Plate)	MICm/1186
M2101302002	AOP Effluent			EPA 300.1	WCAt/3234

Advanced Environmental Laboratories, Inc.

☐ Al ☐ Fc ☐ Ja ☐ Ta

M2101302

ID: E53076 192 095

Page 1 of 3

☐ Gainesville: 4955 SW 41st Blvd., FL 32608 • 352.377.2349 • Lab ID: E82001
☑ Miramar: 10200 USA Today Way, FL 33025 • 954.889.2288 • Lab ID: E82535
☐ Tampa: 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Lab ID: E84589

Client Name:	Reiss Engineering, Inc.	Project Name:	City of Ft. Lauderdale Fiveash
Address:	1016 Spring Villas Pt.	Project Number:	134002
	Winter Springs, FL 32708	PO Number:	
Phone:	407-679-5358	FDEP Facility No:	
FAX:		FDEP Facility Addr:	
Contact:	Christophe M. Robert		
Sampled By:		Special Instructions:	
Turn Around Time:	Standard Rush		
AEL Profile #:	6637	ADaPT EQuIS Other	

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	Bromate by 300.1	Bromide by 300.0	TOC by SM5310B	DOC by SM5310B	LABORATORY I.D. NUMBER
	BOTTLE SIZE & TYPE										
	Preservation						NaThio				
	Field-Filtered?										
RAW WATER	RAW WATER TOC		3/22/21	3:15		1					001
RAW WATER	RAW WATER DOC		3/22/21	3:15		1					001
RAW WATER	RAW WATER ALKALINITY		3/22/21	3:15		1					001
RAW WATER	RAW WATER CALCIUM		3/22/21	3:15		1					001
RAW WATER	RAW WATER CHLORIDE		3/22/21	3:15		1					001
RAW WATER	BROMIDE		3/22/21	3:15		1					001
RAW WATER	RAW WATER HPC		3/22/21	3:15		1					001
ADP EFFLUENT	ADP EFFLUENT TOC		3/22/21	4:00		1					002
ADP EFFLUENT	ADP EFFLUENT DOC		3/22/21	4:00		1					002
ADP EFFLUENT	ADP EFFLUENT HPC		3/22/21	4:00		1					002

Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge Preservation Code: I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)

Received on Ice ☑ Yes ☐ No ☐ Temp taken from sample ☐ Temp from blank ☐ Where required, pH checked Temp. when received (observed) 5.2 °C Temp. when received (corrected) 4.2 °C

DCN: AD-D051web Form last revised 08/07/2019 Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 T: 10A A: 3A M: 3A S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1		3/22/21	1655		3/22/21	1655
2		3/22/21	1735		3/22/21	1735
3						
4						

FOR DRINKING WATER USE:

(When PWS Information not otherwise supplied) PWS ID:

Contact Person:

Supplier of Water:

Site-Address:

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.

☐ Altamonte Springs: 380 Northlake Blvd., Ste. 1048, FL 32701 • 407.937.1594 • Lab ID: E53076
☐ Fort Myers: 13100 Westlinks Terrace, Sta. 10, FL 33913 • 239.674.8130 • Lab ID: E84492
☐ Jacksonville: 6681 Southpoint Pkwy., FL 32216 • 904.363.9350 • Lab ID: E82574
☐ Tallahassee: 2539 North Monroe St., Suite D, FL 32303 • 850.219.6274 • Lab ID: E811095
☐ Gainesville: 4955 SW 41st Blvd., FL 32608 • 352.377.2349 • Lab ID: E62001
☑ Miramar: 10200 USA Today Way, FL 33025 • 954.889.2288 • Lab ID: E82535
☐ Tampa: 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Lab ID: E84589

M2101302

Client Name:	Reiss Engineering, Inc.	Project Name:	City of Ft. Lauderdale Fiveash
Address:	1016 Spring Villas Pt.	Project Number:	134002
	Winter Springs, FL 32708	PO Number:	
Phone:	407-679-5358	FDEP Facility No:	
FAX:		FDEP Facility Addr:	
Contact:	Christophe M. Robert		
Sampled By:		Special Instructions:	
Turn Around Time:	Standard Rush		
AEL Profile #:		ADaPT EQuIS Other	

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	BOTTLE SIZE & TYPE	ANALYSIS REQUIRED: Bromate	Bromide	Chloride/Sulfate	Alkalinity	TSS	Ca, Total					LABORATORY I.D. NUMBER
							Preservation	NaThio										
							Field-Filtered?											
AOP EFFLUENT	AOP EFFLUENT BROMIDE		3/22/21	4:XX		1												002
AOP EFFLUENT	AOP EFFLUENT BROMATE		3/22/21	4:36		1												002
TANK WATER	TANK WATER HPC		3/22/21	4:15		1												003
GAC EFFLUENT	GAC EFFLUENT TOC #1		3/22/21	4:15		1												004
GAC EFFLUENT	GAC EFFLUENT HPC #1		3/22/21	4:15		1												004
GAC EFFLUENT	GAC EFFLUENT TOC #2		3/22/21	4:15		1												005
GAC EFFLUENT	GAC EFFLUENT HPC #2		3/22/21	4:15		1												005
GAC EFFLUENT	GAC EFFLUENT TOC #3		3/22/21	4:15		1												006
GAC EFFLUENT	GAC EFFLUENT HPC #3		3/22/21	4:15		1												006
GAC EFFLUENT	GAC EFFLUENT TOC #4		3/22/21	4:15		1												007

Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge **Preservation Code:** I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)

Received on Ice ☑ Yes ☐ No ☑ Temp taken from sample ☐ Temp from blank ☐ Where required, pH checked Temp. when received (observed) 5.2 °C Temp. when received (corrected) 4.2 °C

DCN: AD-D051web Form last revised 08/07/2019 Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 T: 10A A: 3A (M: 3A) S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1		3/22/21	1655		3/22/21	1655
2		3/22/21	1735		3/22/21	1735
3						
4						

FOR DRINKING WATER USE:

(When PWS Information not otherwise supplied) PWS ID:
Contact Person:
Supplier of Water:
Site-Address:

Advanced Environmental Laboratories, Inc.

☐ Altam ☐ Fort M ☐ Jacks ☐ Tallah

M2101302

53076

☐ Gainesville: 4965 SW 41st Blvd., FL 32608 • 352.377.2349 • Lab ID: E82001
☑ Miramar: 10200 USA Today Way, FL 33025 • 954.889.2288 • Lab ID: E82535
☐ Tampa: 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Lab ID: E84589

Client Name:	Reiss Engineering, Inc.	Project Name:	City of Ft. Lauderdale Fiveash
Address:	1016 Spring Villas Pt.	Project Number:	134002
	Winter Springs, FL 32708	PO Number:	
Phone:	407-679-5358	FDEP Facility No:	
FAX:		FDEP Facility Addr:	
Contact:	Christophe M. Robert		
Sampled By:		Special Instructions:	
Turn Around Time:	Standard Rush		
AEL Profile #:		ADaPT EQuIS Other	

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	Preservation	Field-Filtered?	Bromate by 300.1	Bromide by 300.0	TOC by SM5310B	DOC by SM5310B	LABORATORY I.D. NUMBER
							BOTTLE SIZE & TYPE	ANALYSIS REQUIRED					
GAC Effluent	~~GAC~~ EFFLUENT AFC #4		3/22/21	4:15		1	NaThio						007

Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge

Preservation Code: I = ice H=(HCl) S = (H_2SO_4) N = (HNO_3) T = (Sodium Thiosulfate)

Received on Ice ☑ Yes ☐ No ☐ Temp taken from sample ☐ Temp from blank ☐ Where required, pH checked

Temp. when received (observed) 5.2 °C Temp. when received (corrected) 4.2 °C

DCN: AD-D051web Form last revised 08/07/2019

Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 T: 10A A: 3A M: 3A S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1		3/22/21	1655		3/22/21	1655
2		3/22/21	1735		3/22/21	1735
3						
4						

FOR DRINKING WATER USE:

(When PWS Information not otherwise supplied) PWS ID:

Contact Person:

Supplier of Water:

Site-Address:

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.

Work Order: M2101302
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: The analysis of T2105271003 and T2105271006 was initially analyzed in hold for Chlorite, but the samples required reanalysis at a dilution past the recommended holding time. Efforts were made to reanalyze the samples as soon as the initial run was completed. The data is qualified to indicate the holding time violation.

III. Method

Analysis: EPA 300.1

Preparation:

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: All acceptance criteria were met.

Blanks: All acceptance criteria were met.

Surrogates: All acceptance criteria were met.

Spikes All acceptance criteria were met.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: M2101302
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: All holding times were met.

III. Method

Analysis: EPA 300.0

Preparation:

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: The upper control criterion was exceeded for Nitrite in Continuing Calibration Verification (CCV) standards for analytical batch 1749. The client samples reported in this batch did not contain the analytes in question. Since the apparent problem equates to a potential high bias, the data quality is not affected. No further corrective action was required.

Blanks: All acceptance criteria were met.

Surrogates: All acceptance criteria were met.

Spikes The matrix spike (MS) recoveries of Chloride for M2101293001 were outside control criteria. Recoveries in the Laboratory Control Sample (LCS) and % RPD were acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. The affected sample is qualified to indicate matrix interference.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: M2101302
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: All holding times were met.

III. Method

Analysis: SM 9215 B (Pour Plate)

Preparation:

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: All acceptance criteria were met.

Blanks: The blank for this batch had a result of 93.5 cfu/mL. All samples in this run were qualified to reflect this in accordance with AEL QA, to indicated that the data may be impacted by the contamination and should be viewed as an estimate.

Surrogates: All acceptance criteria were met.

Spikes All acceptance criteria were met.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

May 05, 2021

Client: Reiss Engineering, Inc.

1016 Spring Villas Pt.

Winter Springs, FL 32708

Requested By: Planning - Design - Construction

National Environmental Laboratory Accreditation Program
ODEQ TNI Certified

Sample Project Name:

Date Samples Received: April 05, 2021 Time: 9:00 sample temp upon arrival at lab = 17.10°C

Matrix: Drinking Water

Lab Log Numbers: **DD05004-01** **DD05004-02** **DD05004-03**

Work Order: DD05004

Report # DD05004-0505210944

EPA Lab ID#'s: **Stillwater OK00092** **Tulsa OK00983** **OKC OK00129** **ICR OK 001**

Oklahoma Certification: Stillwater NELAP WasteWater, ODEQ 8316/ Drinking Water, DEQ D9602

NELAP Tulsa WasteWater, ODEQ 9905 / Drinking Water, DEQ D9901

Oklahoma City NELAP WasteWater ODEQ 7202 / Drinking Water, DEQ D9937

Kansas Certification: Stillwater NELAP CERT # E-10219

Oklahoma City NELAP CERT # E-10414

Texas Certification: Stillwater Drinking Water NELAP CERT # T105704533-14-1

Method Reference: 40 CFR 136, 141, and 261 Methods for Chemical Analysis of Water and Wastes EPA-600/4-79-020, March 1983. Test Methods for Evaluating Solid Wastes, SW-846, Final Update III. Standard Methods 1998 (20th Edition), Standard Methods 2005 (21st Edition) and Standard Methods 2011 (22nd Edition) for the Examination of Water and Wastewater.

Analysis Reference: If qualifiers present in "Prep Info" or "Analysis Info", then analysis performed as follows: @= Tulsa Lab and * = OKC Lab. If no qualifiers present, then analysis performed at Stillwater Lab.

Accurate Environmental Laboratories certify that the test results performed at the Stillwater lab meet all requirements of NELAP. Any exceptions to this can be found in the report footer or Quality Control Section of the report.

This report is to only be replicated in its entirety.

Accurate Environmental sampling protocol was followed for any sampling performed by Accurate Field Services.

Sample: ***AOP*** **Location Code:** **PWSID#:**

Collection Type: Grab Sample Time: 3/31/21 14:00 **Lab Log#** DD05004-01

Method/Parameter	Test	Result	Notes	PQL#	Prep Info	Analysis Info
Biodegradable Dissolved Organic Carbon (No Cert.)	Biodegradable Dissolved Organic Carbon	1140 ug C/L		25.0	04/06/21 19:00 OHB	05/04/21 13:10 OHB

Sample: ***BAC Col #1*** **Location Code:** **PWSID#:**

Collection Type: Grab Sample Time: 3/31/21 14:15 **Lab Log#** DD05004-02

Method/Parameter	Test	Result	Notes	PQL#	Prep Info	Analysis Info
Biodegradable Dissolved Organic Carbon (No Cert.)	Biodegradable Dissolved Organic Carbon	79.0 ug C/L		25.0	04/06/21 19:00 OHB	05/04/21 16:25 OHB

Sample: ***BAC Col #2*** **Location Code:** **PWSID#:**

Collection Type: Grab Sample Time: 3/31/21 14:20 **Lab Log#** DD05004-03

Method/Parameter	Test	Result	Notes	PQL#	Prep Info	Analysis Info
Biodegradable Dissolved Organic Carbon (No Cert.)	Biodegradable Dissolved Organic Carbon	53.0 ug C/L		25.0	04/06/21 19:00 OHB	05/04/21 19:51 OHB

Notes and Definitions

MCL Analyte concentration may exceed Maximum Contaminant Limit (MCL) for EPA Primary or Secondary Drinking Water Regulations.

Analyte concentration may exceed regulatory limit.

PQL Practical Quantitation Limit - the method reporting limit (MRL) adjusted for any dilutions or other changes made to the sample to deal with interferences/matrix effects

BPQL Below Practical Quantitation Limit (if applicable).

The "Prep Date" of the QC analysis coincides with the characters of the appropriate QC Lab ID. (Example: 19 A 02 15 - BLK = 2019, Jan 2, Batch #15 - Blank)

Lab Manager

* Complete Entire COC to be in Compliance*

☐ RUSH Due Date _____

Accurate Environmental Labs

Chain of Custody

Client Name- **REISS ENGINEERING, INC.**

Project Name-

Accurate Work Order #	Date Sample Taken	Time Sample Taken	Matrix or Source (Refer below)	Grab (G) or Comp (C)	Client I.D. / Sample Location or DEQ / EPA Location Code	Field Results (pH, Temp, Chlorine, …) (note analysis & units) Location Code			Sample Preserv. & Container → / # of Container ↓	Analysis Requested → Ice 1000 mL Plastic	BDOC (biodegradable dissolved organic carbon)						
DD05004																	
-01	3/31/21	2 pm	DW	G	AOP				1	1							
-02	3/31/21	2:15 pm	DW	G	BAC Col#1				1	1							
-03	3/31/21	2:20 pm	DW	G	BAC Col#2				1	1							

On-Site Info Raw **Alkalinity** (TOC Raw)= _____ mg/L **Turbidity** (E.Coli)= _____ ntu

Matrix Codes **DW** = Drinking Water **WW** = Wastewater **SL** = Sludge **O** = Other_____

E.Coli Source- **GWUDI-FS**= Groundwater under direct influence of Flowing Stream **GWUDI-RL**= Groundwater under direct influence of Reservoir/Lake

Field Instrument Calibration -				
Meter Type	Standards	Final Read.	Date , Time	Initials

Comments

-- All samples are scheduled to be disposed of in 4 weeks of receipt at Accurate.--

Certification by Company Official: I hereby certify that the above sampling occurred during a period such that the sample(s) is/are representative of a typical operating day discharge for the above facility. Signature : Date/Time

Sampled By: Antoine Sands Company: Reiss Engineering, Inc. Sample Method:

Relinquished By: Christophe Robert	Date/Time 4/2/21 10 am	Received By: ✓		Date/Time
☐ Relinquished to Lab By: ☐ Relq'd to Log-In Fridge By: UPS	Date/Time 4/5/21 900 am	Received at Lab By: Makenzie Kleinman	Rec'd °C 17.1	Date/Time 4/5/21 9000

Reporting Requirements (standard 10-15 working days)	Compliance Reporting? Yes or No (DMR, PWS,)	Oklahoma PWS ID #	RUSH Request (if available) _____ (Working Days)

Mail Report: REISS ENGINEERING, INC.
PLANNING - DESIGN - CONSTRUCTION
Address 1016 Spring Villas Pt.
Winter Springs, FL 32708
Phone #: **407.679.5358**
Email: **cmrobert@reisseng.com**

Mail Invoice: REISS ENGINEERING, INC.
PLANNING - DESIGN - CONSTRUCTION Bid # -
Address: 1016 Spring Villas Pt.
Winter Springs, FL 32708 PO # -
cmrobert@reisseng.com
102820 tkw
Phone #: Fax #:

www.accuratelabs.com (800) 516-5227	505 South Lowry Street Stillwater, OK 74074 Phone: (405) 372-5300 Fax: (405) 372-5396	3910 East 51st Street Tulsa, OK 74135 Phone: (918) 663-5400 Fax: (918) 663-6300	12036 N. Pennsylvania Oklahoma City, OK 73120 Phone: (405) 751-3132 Fax: (405) 751-3108

Failure to complete this Chain of Custody form correctly may delay turnaround time of analytical reporting.

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

May 13, 2021

Christophe M. Robert
Reiss Engineering, Inc.
1016 Spring Villas Pt.
Winter Springs, FL 32708

RE: Workorder: M2101976 City of Ft Lauderdale Fiveash

Dear Christophe Robert:

Enclosed are the analytical results for sample(s) received by the laboratory on Thursday, April 29, 2021. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody and results pertain only to these samples.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Deb Griffith - Client Services Manager
DGriffith@aellab.com

Enclosures

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

SAMPLE SUMMARY

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID	Sample ID	Matrix	Date Collected	Date Received
M2101976001	AOP INF	Water	4/28/2021 11:52	4/29/2021 16:30
M2101976002	AOP EFF	Water	4/28/2021 11:53	4/29/2021 16:30
M2101976003	BAC EFF COLUMN 1	Water	4/28/2021 12:00	4/29/2021 16:30
M2101976004	BAC EFF COLUMN 2	Water	4/28/2021 12:02	4/29/2021 16:30
M2101976005	BAC EFF COLUMN 3	Water	4/28/2021 12:04	4/29/2021 16:30
M2101976006	BAC EFF COLUMN 4	Water	4/28/2021 12:06	4/29/2021 16:30
M2101976007	AOP INF	Water	4/28/2021 14:00	4/29/2021 16:30
M2101976008	AOP EFF	Water	4/28/2021 14:02	4/29/2021 16:30
M2101976009	BAC EFF COLUMN 1	Water	4/28/2021 14:10	4/29/2021 16:30
M2101976010	BAC EFF COLUMN 2	Water	4/28/2021 14:12	4/29/2021 16:30
M2101976011	BAC EFF COLUMN 3	Water	4/28/2021 14:16	4/29/2021 16:30
M2101976012	BAC EFF COLUMN 4	Water	4/28/2021 14:18	4/29/2021 16:30
M2101976013	AOP INF	Water	4/28/2021 14:20	4/29/2021 16:30
M2101976014	AOP EFF	Water	4/28/2021 14:22	4/29/2021 16:30
M2101976015	AOP INF	Water	4/28/2021 14:26	4/29/2021 16:30
M2101976016	AOP INF	Water	4/28/2021 14:30	4/29/2021 16:30
M2101976017	AOP INF	Water	4/28/2021 14:40	4/29/2021 16:30
M2101976018	AOP EFF	Water	4/28/2021 14:42	4/29/2021 16:30
M2101976019	AOP INF	Water	4/28/2021 14:44	4/29/2021 16:30
M2101976020	AOP EFF 1	Water	4/28/2021 14:46	4/29/2021 16:30
M2101976021	AOP EFF 2	Water	4/28/2021 14:48	4/29/2021 16:30
M2101976022	AOP INF	Water	4/28/2021 14:55	4/29/2021 16:30
M2101976023	AOP EFF	Water	4/28/2021 14:56	4/29/2021 16:30
M2101976024	BAC EFF COLUMN #1	Water	4/28/2021 14:58	4/29/2021 16:30
M2101976025	BAC EFF COLUMN #2	Water	4/28/2021 15:00	4/29/2021 16:30
M2101976026	BAC EFF COLUMN #3	Water	4/28/2021 15:02	4/29/2021 16:30
M2101976027	BAC EFF COLUMN #4	Water	4/28/2021 15:04	4/29/2021 16:30

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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976001** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 11:52

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**7.6**		**mg/L**	**1**	1.0	0.50	5/7/2021 16:38	T

Lab ID: **M2101976002** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP EFF** Date Collected: 04/28/21 11:53

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**7.9**		**mg/L**	**1**	1.0	0.50	5/7/2021 17:17	T

Lab ID: **M2101976003** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 1** Date Collected: 04/28/21 12:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**7.2**		**mg/L**	**1**	1.0	0.50	5/7/2021 17:30	T

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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976004** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 2** Date Collected: 04/28/21 12:02

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**4.6**		**mg/L**	**1**	1.0	0.50	5/7/2021 17:48	T

Lab ID: **M2101976005** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 3** Date Collected: 04/28/21 12:04

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**3.9**		**mg/L**	**1**	1.0	0.50	5/7/2021 18:01	T

Lab ID: **M2101976006** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 4** Date Collected: 04/28/21 12:06

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: TOC,SM5310B,Water	Analytical Method: SM 5310B							
Total Organic Carbon	**3.0**		**mg/L**	**1**	1.0	0.50	5/7/2021 18:14	T

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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976007** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 14:00

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**8.1**		**mg/L**	**1**	1.0	0.50	5/6/2021 16:39	T

Lab ID: **M2101976008** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP EFF** Date Collected: 04/28/21 14:02

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**9.7**		**mg/L**	**1**	1.0	0.50	5/6/2021 17:19	T

Lab ID: **M2101976009** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 1** Date Collected: 04/28/21 14:10

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**8.6**		**mg/L**	**1**	1.0	0.50	5/6/2021 17:32	T

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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976010** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 2** Date Collected: 04/28/21 14:12

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**4.5**		**mg/L**	**1**	1.0	0.50	5/6/2021 18:01	T

Lab ID: **M2101976011** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 3** Date Collected: 04/28/21 14:16

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**4.2**		**mg/L**	**1**	1.0	0.50	5/6/2021 18:40	T

Lab ID: **M2101976012** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **BAC EFF COLUMN 4** Date Collected: 04/28/21 14:18

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**4.0**		**mg/L**	**1**	1.0	0.50	5/6/2021 18:54	T

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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976013** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 14:20

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: Alkalinity,SM2320B,Water	Analytical Method: SM 2320B							
Alkalinity, Total	**70**		**mg/L**	**1**	20	5.0	5/6/2021 16:24	T

Lab ID: **M2101976014** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP EFF** Date Collected: 04/28/21 14:22

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: Alkalinity,SM2320B,Water	Analytical Method: SM 2320B							
Alkalinity, Total	**90**		**mg/L**	**1**	20	5.0	5/6/2021 16:29	T

Lab ID: **M2101976015** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 14:26

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
METALS								
Analysis Desc: E200.7 Analysis,Waters	Preparation Method: EPA 200.7 Analytical Method: EPA 200.7							
Calcium	**39**	**V**	**mg/L**	**1**	0.80	0.20	5/4/2021 16:01	M

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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976016** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 14:30

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Chloride	**50**	**J4**	**mg/L**	**1**	5.0	0.50	4/30/2021 12:29	M

Lab ID: **M2101976017** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 14:40

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	5/6/2021 20:01	T

Lab ID: **M2101976018** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP EFF** Date Collected: 04/28/21 14:42

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	5/6/2021 20:17	T

Advanced Environmental Laboratories, Inc.
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ANALYTICAL RESULTS

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID: **M2101976019** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP INF** Date Collected: 04/28/21 14:44

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.8**	**U**	**ug/L**	**1**	10	3.8	5/11/2021 08:17	T

Lab ID: **M2101976020** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP EFF 1** Date Collected: 04/28/21 14:46

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.8**	**U**	**ug/L**	**1**	10	3.8	5/11/2021 08:56	T

Lab ID: **M2101976021** Date Received: 04/29/21 16:30 Matrix: Water
Sample ID: **AOP EFF 2** Date Collected: 04/28/21 14:48

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.8**	**U**	**ug/L**	**1**	10	3.8	5/11/2021 09:35	T

CERTIFICATE OF ANALYSIS

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Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
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ANALYTICAL RESULTS QUALIFIERS

Workorder: M2101976 City of Ft Lauderdale Fiveash

PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
V	Method Blank Contamination
J4	Estimated Result

LAB QUALIFIERS

M	DOH Certification #E82535(AEL-M)(FL NELAC Certification)
T	DOH Certification #E84589(AEL-T)(FL NELAC Certification)

Advanced Environmental Laboratories, Inc.
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QUALITY CONTROL DATA

Workorder: M2101976 City of Ft Lauderdale Fiveash

QC Batch: WCAm/2163 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: M2101976016

METHOD BLANK: 3871160

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Chloride	mg/L	0.50	0.50	U

QC Batch: DGMm/1322 Analysis Method: EPA 200.7
QC Batch Method: EPA 200.7 Prepared: 05/04/2021 05:00
Associated Lab Samples: M2101976015

METHOD BLANK: 3873499

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
METALS				
Calcium	mg/L	0.95	0.20	

QC Batch: WCAt/3947 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Prepared:
Associated Lab Samples: M2101976013, M2101976014

METHOD BLANK: 3876592

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Alkalinity, Total	mg/L	5.0	5.0	U

QC Batch: WCAt/3956 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101976007, M2101976008, M2101976009, M2101976010, M2101976011, M2101976012

METHOD BLANK: 3877406

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				

CERTIFICATE OF ANALYSIS

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QUALITY CONTROL DATA

Workorder: M2101976 City of Ft Lauderdale Fiveash

METHOD BLANK: 3877406

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Dissolved Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/3984 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: M2101976017, M2101976018

METHOD BLANK: 3878776

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromide	mg/L	0.10	0.10	U

QC Batch: WCAt/4000 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101976001, M2101976002, M2101976003, M2101976004, M2101976005, M2101976006

METHOD BLANK: 3879441

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/4141 Analysis Method: EPA 300.1
QC Batch Method: EPA 300.1 Prepared:
Associated Lab Samples: M2101976019, M2101976020, M2101976021

METHOD BLANK: 3885681

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromate	ug/L	3.8	3.8	U

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

QUALITY CONTROL DATA QUALIFIERS

Workorder: M2101976 City of Ft Lauderdale Fiveash

QUALITY CONTROL PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
J4	Estimated Result
V	Method Blank Contamination

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Phone: (954)889-2288
Fax: (954)889-2281

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: M2101976 City of Ft Lauderdale Fiveash

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
M2101976016	AOP INF			EPA 300.0	WCAm/2163
M2101976015	AOP INF	EPA 200.7	DGMm/1322	EPA 200.7	ICPm/1318
M2101976013	AOP INF			SM 2320B	WCAt/3947
M2101976014	AOP EFF			SM 2320B	WCAt/3947
M2101976007	AOP INF			SM 5310B	WCAt/3956
M2101976008	AOP EFF			SM 5310B	WCAt/3956
M2101976009	BAC EFF COLUMN 1			SM 5310B	WCAt/3956
M2101976010	BAC EFF COLUMN 2			SM 5310B	WCAt/3956
M2101976011	BAC EFF COLUMN 3			SM 5310B	WCAt/3956
M2101976012	BAC EFF COLUMN 4			SM 5310B	WCAt/3956
M2101976017	AOP INF			EPA 300.0	WCAt/3984
M2101976018	AOP EFF			EPA 300.0	WCAt/3984
M2101976001	AOP INF			SM 5310B	WCAt/4000
M2101976002	AOP EFF			SM 5310B	WCAt/4000
M2101976003	BAC EFF COLUMN 1			SM 5310B	WCAt/4000
M2101976004	BAC EFF COLUMN 2			SM 5310B	WCAt/4000
M2101976005	BAC EFF COLUMN 3			SM 5310B	WCAt/4000
M2101976006	BAC EFF COLUMN 4			SM 5310B	WCAt/4000
M2101976019	AOP INF			EPA 300.1	WCAt/4141
M2101976020	AOP EFF 1			EPA 300.1	WCAt/4141
M2101976021	AOP EFF 2			EPA 300.1	WCAt/4141

Advanced Environmental Laboratories, Inc.

☐ Altamonte Sprin
☐ Fort Myers: 1310
☐ Jacksonville: 668
☐ Tallahassee: 263

M2101976

Page 1 of 1

☐ Gainesville: 4965 SW 41st Blvd., FL 32608 • 352.377.2349 • Lab ID: E82001
☑ Miramar: 10200 USA Today Way, FL 33025 • 954.889.2288 • Lab ID: E82535
☐ Tampa: 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Lab ID: E84589

Client Name:	Reiss Engineering, Inc.	Project Name:	City of Ft. Lauderdale Fiveash
Address:	1016 Spring Villas Pt.	Project Number:	134902
	Winter Springs, FL 32708	PO Number:	
Phone:	407-679-5358	FDEP Facility No:	
FAX:		FDEP Facility Addr:	
Contact:	Christophe M. Robert		
Sampled By:		Special Instructions:	
Turn Around Time:	Standard Rush		
AEL Profile #:		ADaPT EQuIS Other	

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	Bromate (Preservation: NaThio)	Bromide	Chloride	Alkalinity	TSS	Ca, Total	TOC	DOC	HPC		LABORATORY I.D. NUMBER
	6 TOC AOP IN AOP OUT 4 BAC EFFLUENTS					6							6				
	6 DOC AOP IN AOP OUT 4 BAC EFFLUENTS					6								6			
	2 Alkalinity AOP IN AOP OUT					2				2							
	1 Calcium AOP IN					1			*			*1					
	1 Chloride AOP IN					1		*	1								
	2 Bromide AOP IN / AOP OUT					2		2									
	3 Bromate 1 AOP IN 2 AOP OUT					3	3										
	6 HPC AOP IN AOP OUT 4 BAC EFFLUENTS					6									6		

Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge

Preservation Code: I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)

Received on Ice ☑ Yes ☐ No ☑ Temp taken from sample ☐ Temp from blank ☐ Where required, pH checked

Temp. when received (observed) 5.8 °C Temp. when received (corrected) 4.8 °C

DCN: AD-D051web Form last revised 08/07/2019

Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 LT-2 T: 10A A: 3A M: 3A S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1	Antoine Sands	4/28	16:00		4/29/21	1545
2		4/29/21	1630		4/29/21	1630
3						
4						

FOR DRINKING WATER USE:

(When PWS Information not otherwise supplied) PWS ID:

Contact Person:

Supplier of Water:

Site-Address:

NELAP Accredited E82535

Advanced Environmental Labs Inc

Five Ash

Client: Reiss Eng. Project name: City of Ft Lauderdale

Date/Time Rcvd: 4/29/21 1630 Log-In request number: M2169974

Received by: Gavin Evans Completed by: Megan Lara

Cooler/Shipping Information:

Courier: ☑ AEL ☐ Client ☐ UPS ☐ Blue Streak ☐ FedEx ☐ AES ☐ ASAP ☐ Other (describe):_____

Type: ☑ Cooler ☐ Box ☐ Other (describe) _____

Cooler temperature: Identify the cooler and document the temperature blank or ice water measurement

Cooler ID					
Temp (°C)	4.8				
Temp taken from	☑ Sample Bottle ☐ Cooler	☐ Sample Bottle ☐ Cooler	☐ Sample Bottle ☐ Cooler	☐ Sample Bottle ☐ Cooler	☐ Sample Bottle ☐ Cooler
Temp measured with	☑ IR gun ID: M3A ☐ Thermometer (enter ID):	☐ IR gun ID: M3A ☐ Thermometer (enter ID):	☐ IR gun ID: M3A ☐ Thermometer (enter ID):	☐ IR gun ID: M3A ☐ Thermometer (enter ID):	☐ IR gun ID: M3A ☐ Thermometer (enter ID):

Other Information:

Any discrepancies should be explained in the "Comments" section below.

CHECKLIST	YES	NO	NA
1. Were custody seals on shipping container(s) intact?			
2. Were custody papers properly included with samples?			
3. Were custody papers properly filled out (ink, signed, match labels)?			
4. Did all bottles arrive in good condition (unbroken)?			
5. Were all bottle labels complete (sample #, date, signed, analysis, preservatives)?			
6. Did the sample labels agree with the chain of custody?			
7. Were correct bottles used for the tests indicated?			
8. Were proper sample preservation techniques indicated on the label?			
9. Were samples received within holding times?			
10. Were all VOA vials free of the presence of air bubbles?			
11. Have all Soil VOA Vials and Encores been placed in a freezer within 48 hours of collection?			
12. Were samples in direct contact with wet ice? If "No," check one: ☐ NO ICE ☐ BLUE ICE			
13. Was the cooler temperature less than 6°C?			
14. Where pH preservation is required, are sample pHs checked and any anomalies recorded by Sample control? Are all <2 or >10? Note: VOA samples are checked by laboratory analysts.			
15. Was sufficient sample volume provided to perform all tests?			
16. If for Bacteriological testing, were containers supplied by AEL? (See QA officer if answer is no)			
17. Were all sample containers provided by AEL? (Other than Bacteriological)			
18. Were samples accepted into the laboratory?			
19. When necessary to split samples into other bottles, is it noted in the comments?			

Comments: (Note all sample(s) and container (s)" with a "No" checklist response in this comment section)

Client did not properly fill out chain of custody. There is no date/time of collection on COC. All HPC came in out of hold. Aer Info @ 1455 AOP Eff 1456 BAC Eff #1 1458 BAC Eff #2 1500 BAC Eff #3 1502 BAC Eff #4 1504 all collected 4/28/21 and recieved 4/29/21 1545. and brought back to AEL 4/29/21 @ 1630.

DCN: AD-D048
Eff date 2/3/10, Last rev 9/6/16

Advanced Environmental Laboratories, Inc.

Work Order: M2101976
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation:	All holding times were met.
Analysis:	All holding times were met.

III. Method

Analysis:	EPA 300.0
Preparation:	

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration:	All acceptance criteria were met.
Blanks:	All acceptance criteria were met.
Surrogates:	All acceptance criteria were met.
Spikes	The matrix spike recovery of Sulfate for T2107836003 was outside control criteria. Recoveries in the Laboratory Control Sample (LCS), and %RPD were acceptable, which indicates the analytical batch was in control. No further corrective action was required.
Internal Standard:	All acceptance criteria were met.
Samples:	All acceptance criteria were met.
Other:	All acceptance criteria were met.
Serial Dilution:	All acceptance criteria were met.
Duplicates:	All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: M2101976
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: All holding times were met.

III. Method

Analysis: EPA 200.7

Preparation: EPA 200.7

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: All acceptance criteria were met.

Blanks: The Method Blank associated with batch 1318 contained low level concentrations of calcium and sodium above the Method Reporting Limit (MDL). The associated samples F2101835001, F2101835002, M2101962001, M2101964001, and A2103606001 contained these compounds at a concentration of at least ten times that found in the Method Blank. Blank contamination less than ten times that found in the associated samples is deemed insignificant and the data is reported with no further corrective action required.

Surrogates: All acceptance criteria were met.

Spikes The control criteria for matrix spike recoveries of sodium for F2101835001 are not applicable. The analyte concentration in the sample was greater than 4 times the added spike concentrations, preventing accurate evaluation of the spike recovery. No further corrective action was required.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: M2101976
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: All holding times were met.

III. Method

Analysis: EPA 300.1

Preparation:

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: All acceptance criteria were met.

Blanks: All acceptance criteria were met.

Surrogates: All acceptance criteria were met.

Spikes: The control criteria for the matrix spike and matrix spike duplicate for sample T2107576006 are not applicable. The analysis of the sample(s) required a dilution, which resulted in the spike concentrations being out of range. The LCS recoveries are acceptable indicating the batch is in control.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: M2101976
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

M2101976 was received by the lab past the recommended holding time. The analysis was performed as soon as possible after receipt by the laboratory. The data is qualified to indicate the holding time violation.

II. Holding Times

Preparation:	All holding times were met.
Analysis:	All holding times were met.

III. Method

Analysis:	SM 9215 B (Pour Plate)
Preparation:	

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration:	All acceptance criteria were met.
Blanks:	Due to a laboratory error the method blank (MB) contained colonies Too Numerous To Count resulting in a concentration of 77850 cfu/ml. There was insufficient time and volume to reanalyze the samples. Samples M2101976022, 023, 024, 025, 026 and 027 results were cancelled as the data provided is unusable. Laboratory are working on corrective actions to prevent future contamination.
Surrogates:	All acceptance criteria were met.
Spikes	All acceptance criteria were met.
Internal Standard:	All acceptance criteria were met.
Samples:	All acceptance criteria were met.
Other:	All acceptance criteria were met.
Serial Dilution:	All acceptance criteria were met.
Duplicates:	All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.

Work Order: M2101976
Client: Reiss Engineering, Inc.
Project ID: City of Ft Lauderdale Fiveash

I. Receipt

No Exceptions were encountered.

II. Holding Times

Preparation: All holding times were met.

Analysis: All holding times were met.

III. Method

Analysis: EPA 300.0

Preparation:

IV. Preparation

Sample preparation proceeded normally.

V. Analysis

Calibration: All acceptance criteria were met.

Blanks: All acceptance criteria were met.

Surrogates: All acceptance criteria were met.

Spikes: The matrix spike (MS) recoveries of Chloride for M2101976016 were outside control criteria. Recoveries in the Laboratory Control Sample (LCS) and % RPD were acceptable, which indicates the analytical batch was in control. The matrix spike outlier suggests a potential low bias in this matrix. The affected sample is qualified to indicate matrix interference.

Internal Standard: All acceptance criteria were met.

Samples: All acceptance criteria were met.

Other: All acceptance criteria were met.

Serial Dilution: All acceptance criteria were met.

Duplicates: All acceptance criteria were met.

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

May 13, 2021

Christophe M. Robert
Reiss Engineering, Inc.
1016 Spring Villas Pt.
Winter Springs, FL 32708

RE: Workorder: M2101977 Ft lauderdale

Dear Christophe Robert:

Enclosed are the analytical results for sample(s) received by the laboratory on Thursday, April 29, 2021. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report. The analytical results for the samples contained in this report were submitted for analysis as outlined by the Chain of Custody and results pertain only to these samples.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Deb Griffith - Client Services Manager
DGriffith@aellab.com

Enclosures

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

SAMPLE SUMMARY

Workorder: M2101977 Ft lauderdale

Lab ID	Sample ID	Matrix	Date Collected	Date Received
M2101977001	INF (RAW)	Drinking Water	4/13/2021 15:30	4/29/2021 16:30
M2101977002	EFF (AOP)	Drinking Water	4/13/2021 15:30	4/29/2021 16:30

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

ANALYTICAL RESULTS

Workorder: M2101977 Ft lauderdale

Lab ID: **M2101977001** Date Received: 04/29/21 16:30 Matrix: Drinking Water
Sample ID: **INF (RAW)** Date Collected: 04/13/21 15:30

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	5/6/2021 20:33	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.8**	**U**	**ug/L**	**1**	10	3.8	5/11/2021 05:41	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**7.4**		**mg/L**	**1**	1.0	0.50	5/6/2021 19:32	T
Total Organic Carbon	**7.0**		**mg/L**	**1**	1.0	0.50	5/7/2021 18:53	T

Lab ID: **M2101977002** Date Received: 04/29/21 16:30 Matrix: Drinking Water
Sample ID: **EFF (AOP)** Date Collected: 04/13/21 15:30

Sample Description: Location:

Parameters	Results	Qual	Units	DF	Adjusted PQL	Adjusted MDL	Analyzed	Lab
WET CHEMISTRY								
Analysis Desc: IC,E300.0,Water	Analytical Method: EPA 300.0							
Bromide	**0.20**	**U**	**mg/L**	**2**	1.0	0.20	5/6/2021 20:50	T
Analysis Desc: IC,E300.1,Water	Analytical Method: EPA 300.1							
Bromate	**3.8**	**U**	**ug/L**	**1**	10	3.8	5/11/2021 07:38	T
Analysis Desc: DOC,SM5310B,Water	Analytical Method: SM 5310B							
Dissolved Organic Carbon	**7.6**		**mg/L**	**1**	1.0	0.50	5/6/2021 19:45	T
Total Organic Carbon	**7.0**		**mg/L**	**1**	1.0	0.50	5/7/2021 19:06	T

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

Advanced Environmental Laboratories, Inc.

Advanced Environmental Laboratories, Inc
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

ANALYTICAL RESULTS QUALIFIERS

Workorder: M2101977 Ft lauderdale

PARAMETER QUALIFIERS

U	The compound was analyzed for but not detected.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

LAB QUALIFIERS

T	DOH Certification #E84589(AEL-T)(FL NELAC Certification)

CERTIFICATE OF ANALYSIS

NELAP Accredited E82535

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Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

QUALITY CONTROL DATA

Workorder: M2101977 Ft lauderdale

QC Batch: WCAt/3956 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101977001, M2101977002

METHOD BLANK: 3877406

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Dissolved Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/3984 Analysis Method: EPA 300.0
QC Batch Method: EPA 300.0 Prepared:
Associated Lab Samples: M2101977001, M2101977002

METHOD BLANK: 3878776

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Bromide	mg/L	0.10	0.10	U

QC Batch: WCAt/4000 Analysis Method: SM 5310B
QC Batch Method: SM 5310B Prepared:
Associated Lab Samples: M2101977001, M2101977002

METHOD BLANK: 3879441

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				
Total Organic Carbon	mg/L	0.50	0.50	U

QC Batch: WCAt/4141 Analysis Method: EPA 300.1
QC Batch Method: EPA 300.1 Prepared:
Associated Lab Samples: M2101977001, M2101977002

METHOD BLANK: 3885681

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
WET CHEMISTRY				

Advanced Environmental Laboratories, Inc.
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Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

QUALITY CONTROL DATA

Workorder: M2101977 Ft lauderdale

METHOD BLANK: 3885681

Parameter	Units	Blank Result	Reporting Limit	Qualifiers
Bromate	ug/L	3.8	3.8	U

Advanced Environmental Laboratories, Inc
10200 USA Today Way Miramar, FL 33025
Payments: P.O. Box 551580 Jacksonville, FL 32255-1580
Phone: (954)889-2288
Fax: (954)889-2281

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Workorder: M2101977 Ft lauderdale

Lab ID	Sample ID	Prep Method	Prep Batch	Analysis Method	Analysis Batch
M2101977001	INF (RAW)			SM 5310B	WCAt/3956
M2101977002	EFF (AOP)			SM 5310B	WCAt/3956
M2101977001	INF (RAW)			EPA 300.0	WCAt/3984
M2101977002	EFF (AOP)			EPA 300.0	WCAt/3984
M2101977001	INF (RAW)			SM 5310B	WCAt/4000
M2101977002	EFF (AOP)			SM 5310B	WCAt/4000
M2101977001	INF (RAW)			EPA 300.1	WCAt/4141
M2101977002	EFF (AOP)			EPA 300.1	WCAt/4141

Advanced Environmental Laboratories, Inc.
Florida's Largest Laboratory Network

☐ Alfamc ☐ Fort My ☐ Jackso ☐ Tallaha

M2101977

Lab ID: E53076
E84482

Page 1 of 1

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☑ Miramar: 10200 USA Today Way, FL 33025 • 954.889.2288 • Fax 954.889.2281 Lab ID: E82535
☐ Tampa: 9610 Princess Palm Ave., FL 33619 • 813.630.9616 • Fax 813.630.4327 Lab ID: E84589

Fax 850.219.6275 Lab ID: E811095

Client Name: Reiss Eng	Project Name: Ft Lauderdale
Address: 1016 Spring Villas Winter Springs, FL 32708	Project Number:
Phone: 407-679-5358	PO Number:
FAX:	FDEP Facility No:
Contact: Christophe Robert	FDEP Facility Address:
Sampled By: Antoine Sands	Special Instructions:
Turn Around Time: ☒ STANDARD ☐ RUSH	
AEL Profile #:	☐ ADaPT ☐ EQuIS ☐ Other

SAMPLE ID	SAMPLE DESCRIPTION	Grab Comp	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. COUNT	BOTTLE SIZE & TYPE	ANALYSIS REQUIRED: TOC	Bromate	Bromide	DOC							LABORATORY I.D. NUMBER
							Preservation											
							Field-Filtered?											
	Inf (Raw)	G	4/13/24	1530	DW	4		✓	✓	✓	✓							001
	Eff (AOP)	G	"	1530	DW	4		✓	✓	✓	✓							002

Matrix Code: WW = wastewater SW = surface water GW = ground water DW = drinking water O = oil A = air SO = soil SL = sludge
Preservation Code: I = ice H=(HCl) S = (H2SO4) N = (HNO3) T = (Sodium Thiosulfate)

Received on Ice ☑ Yes ☐ No ☐ Temp taken from sample ☑ Temp from blank ☐ Where required, pH checked
Temp. when received (observed) 5.8 °C Temp. when received (corrected) 4.8 °C

DCN: AD-D051web Form last revised 08/07/2019
Device used for measuring Temp by unique identifier (circle IR temp gun used) J: 9A G: LT-1 T: 10A A: 3A M: 3A S: 1V F: 1A

	Relinquished by:	Date	Time	Received by:	Date	Time
1	[signature]	4/15/24	1545	[signature] for G Evans	4/15/24	1545
2	G. Evans by [signature]	4/15/24	1630	[signature]	4/15/24	1630
3						
4				Site Address:		

FOR DRINKING WATER USE:
(When PWS Information not otherwise supplied) PWS ID:
Contact Person: Phone:
Supplier of Water:
Site Address:

NELAP Accredited E82535

Thursday, May 13, 2021 1:20:29 PM
Page 8 of 8

Attachment E – Ozone Equipment Quotation

Proposal Prepared For:	Contact 1: **Pat Kanis**
Ed Talton Reiss, a CHA Company 407-492-0980 ETalton@chacompanies.com	Industrial Sales Manager *DE NORA WATER TECHNOLOGIES* mobile: +1 412 303-0400 e-mail: pat.kanis@denora.com website: www.denora.com Contact 2: **Jason Kurrle** **South Florida Account Manager** TriNova-Florida Office 2401 Drane Field Road Lakeland, FL 33811 786-525-9962 Cell | 863-682-4500 Office Jason.Kurrle@TriNovainc.com

Offer # P108773

Fort Lauderdale Ozone Budget

45 MGD Potable Water Plant

00	Quotation	7/15/2021	Abby Momorella
REV	ISSUE FOR	DATE	ISSUED BY

Table of Contents

1. ABOUT CAPITAL CONTROLS OZONE

- Founded in 1970
- Part of De Nora Group since May 2015
- More than 45 years of market presence
- More than 1300 worldwide installations in municipal and industrial applications
- North American branch and support center located in Colmar, PA

Drinking Water Treatment Plant - 3 x 620 PPD

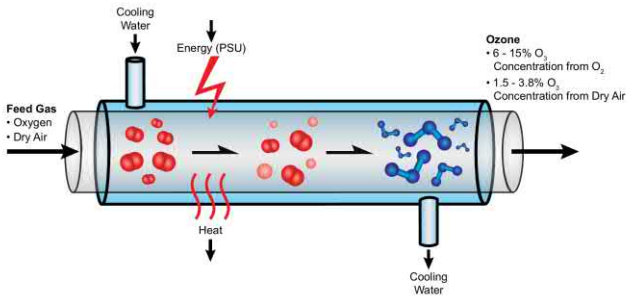
2. PROCESS DESCRIPTION

2.1 Ozone Generation Principles

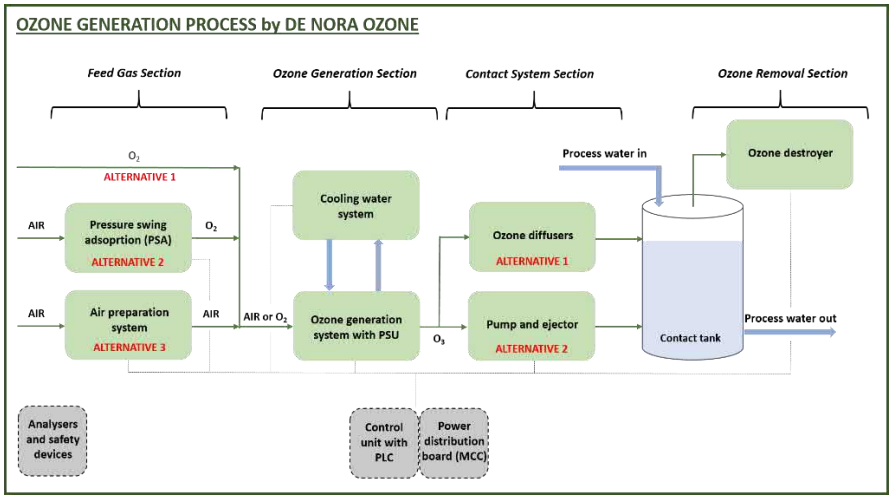
Ozone, or trioxygen, is an inorganic molecule with the chemical formula O_3. It is a pale blue gas with a distinctively pungent smell.

- Molecular weight : 48 g/mol
- Density @ 1013 mbar, 0°C : 2.14 kg/m³
- Max. limit for ambient level : 0.1 ppm (0.2 mg/m³air)
- Odor threshold : 0.01 ppm
- Redox potential : 2.07 V

Ozone is formed by a chemical reaction of oxygen molecules and oxygen atoms. The reaction is initiated by supplying energy to decompose the oxygen molecule. De Nora Ozone technology is based on energy supplied by an electric field, namely a corona discharge, where the electrical field is created between the grounded electrode, the dielectric material, and the high voltage electrode.



In the block diagram here below a typical ozone generation process is shown, De Nora Ozone can supply all or parts of the below process:



3. DESIGN DATA

Object of the present offer is a complete ozone system package, designed per the following design data and as project specs and technical drawings:

Plant Data		
Application	Municipal Potable	
Max plant flow (basis of this proposal)	45	MGD
Max ozone dose (basis of this proposal)	6	mg/l
Number of ozone generation lines installed	2	
Number of lines working (duty/spare)	1/1	
Ozone generation feed gas	LOX	
Feed gas volumetric flow (design conditions, per unit)	179.5	scfm
Total ozone production, nominal (based on duty /standby)	2250	PPD
Ozone production each line, nominal	2250	PPD
Total ozone capacity (each unit), max @ 10%	2292	PPD
Nominal ozone concentration	10	% wt
Cooling Water temperature (max inlet)	80	°F
Cooling Water flowrate total, nominal	439	GPM
Total adsorbed power (80°F cooling water)	358	kW
PSU Cooling Type	Water Cooled	

3.1 Environmental design conditions

• Location	Florida, USA	
• Relative humidity	< 80	%
• Dust	< 5	mg/l
• Altitude	<500	m above sea level
• Temperature min / max	+41 / +110	°F
• Corrosive gas and vapor	absent	
• Available electric supply	480 V / 3pH / 60Hz	
• Area classification	safe area	

3.2 Codes and standards

Pressure vessels	ASME VIII Cat.1 - Stamped
Electrical equipment and panels	UL
Motors	NEMA
Piping and flanges	ASME – ANSI 150
Instrumentation	NEMA
Centrifugal Pumps	Manufacturer's standard
Compressors	Manufacturer's standard
Air Blowers	Manufacturer's standard

4. SCOPE OF SUPPLY

Included in De Nora scope of supply:

DESCRIPTION	MODEL/TYPE	Qty
Oxygen Feed System	LOX Tank + Vaporizer	2 x 100%
Nitrogen Feed System	Compressor+ Filters +Dryer	2 x 100%
Ozone Generator	DTPF308-XTL-O	2 x 100%
Power Supply Unit	DTPF308-XTL-O	2 x 100%
Cooling Water System	Closed Loop HEX	2 x 100%
Contact System	Side-Stream Injection	2 x 100%
Ozone destruction System	DOCAT320	2 x 100%
Main PLC	Allen Bradley	1 x 100%
Ambient Ozone Gas Monitor	Electrochemical Cell	2
Ambient Oxygen Gas Monitor	Electrochemical Cell	2
Medium Concentration Ozone Off-Gas Monitor	UV Type	2
High Concentration Ozone Monitor	UV Type	2
Dissolved Ozone Monitor	Flow Type	2
Dew Point Monitor		2

Test and Certificates

- According to De Nora Water Technologies Standards

Documentation:

- According to De Nora Water Technologies Standards

5. TECHNICAL DATA SHEETS

5.1 Supplemental Nitrogen Feed System – skid-mounted system

Provided to introduce a small stream of air into the gaseous oxygen line upstream of the ozone generators.

- #2 Air cooled oil-free rotary compressor, with air intake filter
- #2 Air Filters set – #1 Pre-dryer coalescing filter + #1 Post-desiccant dryer particulate filter
- #1 Desiccant dryer
- #1 Vertical Air receiver tank, ASME Stamped with auto drain

Rotary compressors	2 x 100%	
Type	Scroll type - Oil Free	
Volumetric flow max	10	scfm
Operating pressure	90	psig
Electrical supply	480V 3ph 60 Hz	
Air Receiver tanks	1 x 100%	
Capacity	TBC	gallon
Desiccant dryer	1 x 100%	
Type	Desiccant – double column	
Dry air dew-point	-100	°F
Operating pressure	100	psig

5.2 LOX Tank, Vaporizers, Instruments

Vertical 10,000-gallon storage vessel	**2 x 100%**
Inner vessel	
ASME 175 PSI MAWP	
Operating pressure 100 psi	
SA240 T304 stainless steel inner vessel built	
NBIC registered inner vessel	
Inner vessel design temperature -320 °F to 120 °F	
Outer vessel	
Jacket material per CGA341	
Seismic design per UBC 1997 and ASCE 7-05	
Designed for 150 MPH wind loads	
Paint with standard paint system	
Tank mounted piping including	
Top and bottom Fill circuit with manual isolation valves	
Dual ASME safety circuit	
Liquid withdrawal circuit with manual isolation valves	
Analog pressure and level gauge circuit	
Digital Pressure and Level Transmitters	
Valves and components are brass/bronze	
Ambient Vaporizers - Thermax SG50HF	**2 x 100%**
1 x Vaporizer Switching Manifold	
2 x ASME Rated RVs	
1 x Bronze Diverter Valve 2in/1outlet	
1 x Timer Panel	
Pre-piped and spooled	
Mounted to Frame	

Liquid oxygen storage and evaporation system

5.3 Ozone generator

Purpose

Inside the ozone generator vessel Ozone will be produced from Oxygen present in the feed gas by means of a silent electric discharge (non-thermal plasma).

Construction

The Capital Controls ozone generator consists of a cylindrical vessel in which a specific number of stainless steel tubes in a compact arrangement are welded between two fixed type plates. Around the outside of these steel tubes (shell side) a coolant (water) removes the heat dissipated by the ozone formation process. This arrangement avoids any possible contact of the coolant with the high voltage loaded electrodes. The steel tubes (connected to the ground potential) serve as one electrode for the calibrated glass tubes that have an inside metalized surface. The steel tube's inside diameter and the glass tubes outside diameter correspond to establish a predictable gap width, in which the Ozone is formed with high efficiency.

Each Ozone generating element has its own fuse which ensures the selective disconnection of a defective/damaged element.

Model DTPF308-XTL-O	2 x 100%	
Feed gas	O_2 by LOX	
Oxygen Flow	175	scfm
Nitrogen Flow	4.5	scfm
Ozone production design	2250	PPD O_3
Turndown range	5 – 100%	
Ozone concentration	10	%
Ozone vessel operating pressure	18.9	psig
Vessel cooling water demand (per unit)	392	GPM
Cooling water inlet temperature	80	°F
Cooling water outlet temperature	85.5	°F
Vessel features		
Material of construction	SS316L	
Vessel arrangement	horizontal	
Design pressure	36.3	psig
Design temperature, min / max	41 / 122	°F
Dielectric thickness	0.06	in
Dielectric material of construction	borosilicate glass tube	
Dielectric number	616	
Breakdown voltage of dielectric	91	kV
Operating voltage	9-9.5	kV
Protection on dielectric	HT fuse for each dielectric	
Reaction time of fuse	< 5	ms
Operating frequency fixed at	1000 ± 300	Hz

5.4 PSU (Power Supply Unit)

Purpose

The PSU System converts electrical energy supplied from the customer power grid to an operating condition which is appropriate to generate Ozone via an electrical field inside the Ozone vessel. Additionally, the PSU ensures that all important process and electrical parameters are continuously monitored.

Mechanical Design

The power supply unit (PSU) is arranged on a painted carbon steel base frame. Side by side and back to back mounted cabinets are completely wired and electrically checked. The system configuration incorporates an incoming power filter, a parallel connected, air cooled standard inverter with specific Capital Controls firmware. This arrangement is converting a three-phase power line supply into a one phase feeding line with an adjustable operating frequency (factory adjusted by Capital Controls) which is than supplied to the integrated step up transformer. From this transformer, a medium voltage cable supplies the energy to the ozone vessel. Power is controlled by increasing the inverter output voltage by means of pulse width modulation. Downstream installed magnetic parts ensure that the there is a balanced load for the parallel working inverters and that a filtered signal is finally supplied to the step-up transformer.

Power Supply Unit	2 x 100%	
Maximum absorbed power @80°F of cooling water	358	kW
IP protection rating	54	(NEMA 3S)
Electric voltage supply	3 x 480 V +/- 10%	
Electric frequency supply	60	Hz
Cooling method	Water Cooled	
PSU Cooling Flow Rate	47	GPM
Automatic controls		
PLC Type	Allen-Bradley CompactLogix PLC and Touch Panel (PanelView Plus 600)	
Communication Network	Ethernet TCP-IP	
Hardwired interface		
Remote set-point	AI (analogue input), 4- 20 mA	
Remote Start/Stop	DI (digital input)	
Collective Warning	DO (digital output)	
Collective Alarm	DO	
Safety Circuit Inactivation	DO	
Emergency Stop Executed	DO	
Normal operation of ozone sys.	DO	

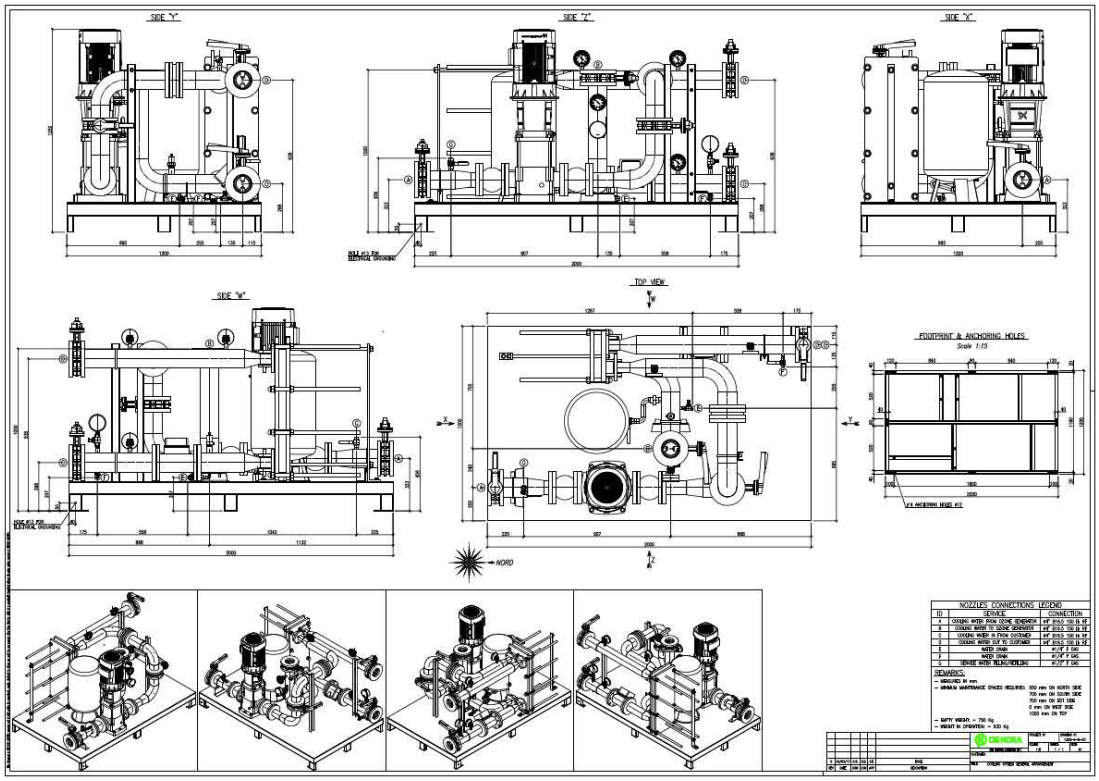
5.5 Cooling Water System – Close loop system with plate heat exchanger

Skid-mounted system, including:

- Recirculation pump, centrifugal type
- Plate and frame heat exchanger
- Valves and instruments as per specs and contract drawings
- Chemical Pot feeder
- Expansion tank

Plate and Frame Heat Exchanger	2 x 100%	
Cold side water temperature IN	TBD	°F (open loop side)
Cold side water temperature OUT	TBD	°F (open loop side)
Cold side water flow rate	439	GPM (open loop side)
Hot side water temperature IN	85.5	°F (close loop side)
Hot side water temperature OUT	80	°F (close loop side)
Design temperature	190	°F
Plate material	SS316L	
Recirculation Pump	2 x 100%	
Type	Centrifugal	
Vendor	Grundfos or equivalent	
Pressure	TBD	psig
Installed power	TBD	kW

typical close loop cooling system skid



Typical close loop cooling system skid – STD general arrangement

5.6 Ozone Contact System – Skid-Mounted Side-stream Injection System

The ozone dissolution system includes:

- #2 SS316L ozone gas injector
- #2 SS316L degas separator
- #2 SS316L gas relief valve
- #2 SS316L ozone diffuser nozzle manifold
- #3 side-stream booster centrifugal pumps with VFD
- #1 pipeline flash reactors
- Valves and instruments as per project specs and technical drawings

Mazzei Side-stream injection system	2 x 100%	
Applied Ozone dosage	6	mg/l
Material of Construction	SS316L	
Interconnecting piping material	SS316L	
Ozone transfer performance	90 +/- 2	%
	85	°F
Side-Stream Booster Pump	3 x 100%	
Pump type	Centrifugal	
Pumps efficiency	>70	%

Typical Mazzei Injection Skid

5.7 Ozone Destruct System

The ozone destruct system includes:

- Skid mounted ozone destruct unit including pre-heater, destruct vessel with catalyst, blower with silencer, valves and instrumentation as per specs and contract drawings
- SS316L Demister
- SS316L Pressure vacuum relief valve

Ozone destruct DOCAT320®	2 x 100%	
Material of construction	SS316L	
Catalyst	carulite	
Max volumetric flowrate	199	scfm
Gas inlet temperature range	40-100	°F
Outlet ozone concentration	≤ 0.1	ppm
Total power consumption	410	kW
Electrical supply	480V 3ph 60 Hz	
Blower	With silencer	

Thermal-Catalytic ozone destroyers DOCAT series

5.8 Main Ozone Control panel

Technical Data	
Brand & Type	De Nora
Country of origin	USA
Number of units	1
PLC	Allen Bradley ControlLogix
HMI	Allen Bradley PanelView Plus 1000 color
Communication protocol	Ethernet TCP/IP
Main power supply	120/230V 1 ph 60 Hz
Cooling	Air Conditioning
Compliance rules	UL
Cabinet	NEMA12

5.9 Analyzers and Safety Devices

Ambient oxygen leak detector	#2
Manufacturer	ATI
Measuring principle	Electrochemical
Sensor	Electrochemical cell
Measuring range	0-5/25% O_2
Measuring units	ppm
Accuracy /Linearity	< 0.5 % (Electronic)
Display	digital
Analog output	4÷20 mA 0-10 VDC
Supply voltage	12-24 VDC, 115 or 230 VAC, 50-60 Hz
Environmental operating condition	-30 /+ 60 °C, 10-95 % RH
Protection class	IP 65

Ambient ozone leak detector	#2
Manufacturer	ATI
Measuring principle	Electrochemical
Sensor	Electrochemical cell
Measuring range	0-5/200ppm O_3
Measuring units	ppm
Accuracy /Linearity	< 0.5 % (Electronic)
Display	digital
Analog output	4÷20 mA 0-10 VDC
Supply voltage	12-24 VDC, 115 or 230 VAC, 50-60 Hz
Environmental operating condition	-30 /+ 60 °C, 10-95 % RH
Protection class	IP 65

High concentration ozone monitor	#2
Manufacturer	Teledyne
Measuring principle	UV absorption type @ 254 nm wavelength
Measuring range	0 – 25% by weight
Measuring units	g/Nm^3, % w/w
Accuracy	± 1% of full scale
Precision/Repeatability	± 0.5% of full scale
Display Resolution	0.01% wt
Gas flow rate	0.2 - 2.0 L/min
Response time	< 30 seconds to 95%
Gas Inlet Pressure Range	3.0 - 30.0 psig
Analog output	4-20 mA 0 ÷ 10 VDC
Display	alpha-numeric characters
Supply voltage	100 - 240 VAC, 50 - 60 Hz
Enclosure	NEMA 4X

Medium concentration ozone monitor	#2
Manufacturer	Teledyne
Measuring principle	UV absorption type
Measuring range	0 – 5% by weight and 0 – 10.000 ppm
Measuring units	g/Nm^3, % w/w
Accuracy	± 1% of full scale
Precision/Repeatability	± 0.5% of full scale
Display Resolution	0.001% wt
Gas flow rate	0.2 - 2.0 L/min
Response time	< 45 seconds to 95%
Gas Inlet Pressure Range	3.0 - 30.0 psig
Analog output	4-20 mA 0 ÷ 10 VDC
Supply voltage	100 - 240 VAC, 50 - 60 Hz
Enclosure	NEMA 4X

Dissolved Ozone Monitor	# 2
Manufacturer	ATI
Measuring range	0-200 ppb, 0-2 ppm, 0-20 ppm, 0-200 ppm
Measuring units	ppm
Accuracy /Repeatability	± 0.01 ppm/ ± 0.01 ppm
Zero Drift	<0.01 ppm/month
Display	Digital LCD with LED back light
Analog outputs	Two Isolated 4-20 mA
Relay Output	Three SPDT, contacts rated 6 amp @20 VAC
Supply voltage	12-24 VDC or 100-240 VAC, 50/60 Hz
Enclosure	NEMA 4X Polycarbonate, V-0 flammability
Environmental operating condition	0-60 °C
Protection class	IP 66
Weight	6 lbs. with sensor, flowcell & accessories
Sensor	Membrane-covered Polargraphic
Sensor Cable	25 ft. standard, 100 ft. max with junction box
Sample Temperature	0-50 °C
Sample Connections	¼" I.D. hose barb inlet, ½" I.D. hose drain

6. FEED GAS FEATURES

NITROGEN		
Max Hydrocarbons concentration	≤ 60	ppm
Dew point	-100	°F
Dust (solids) concentration	≤ 1	ppm
Dust (solids) particle size	≤ 1	µm
Freon or other solvents	none	
Delivery pressure (before O3 gen. pressure reducer)	72	psig
Gas temperature	41-86	°F

OXYGEN		
Max Hydrocarbons concentration	≤ 60	ppm
Dew point	-100	°F
Dust (solids) concentration	≤ 1	ppm
Dust (solids) particle size	≤ 1	µm
Freon or other solvents	none	
Delivery pressure (before O3 gen. pressure reducer)	72	psig
Gas temperature	41-86	°F

7. UTILITIES REQUIREMENTS

7.1 Electrical Supplies

Power supply : 480 V / 60 Hz / 3 PH

8. DEVIATIONS AND CLARIFICATIONS LIST

- **On-site services are not included in pricing at this phase, can be added upon request**

9. VENDOR LIST

CATEGORY/ITEM	VENDOR	COUNTRY OF ORGIN
O_3 Generator	Capital Controls Ozone	Italy
PLC	Allen Bradley	USA
LOX System	Chart	USA
Air Preparation System	Kaesar	Germany
Plate and frame heat exchanger	Alfa Laval	Sweden
Centrifugal Pumps	Grundfos	Denmark
High concentration ozone monitor, Medium concentration off-gas ozone monitor	Teledyne	USA
Ambient ozone and oxygen gas monitors	ATI	USA
Dissolved Ozone Monitor	ATI	USA
Process instrumentation and valves	Omal or Equivalent	Italy
Side-Stream Injection System	Mazzei	USA

10. COMMERCIAL SECTION

SCOPE OF SUPPLY			
ITEM	**QTY.**	**DESCRIPTION**	
Ozone System Package	**As per "scope of supply" section**	As per this technical and commercial proposal	
TOTAL BUDGETARY PRICE			**$4,505,000.00**

TERMS AND CONDITIONS

PRICE:	ROM
DELIVERY TIME	20 to 26 weeks from technical drawings approval (technical drawings approval process: 4 to 6 weeks)
DELIVERY	ExWorks, Colmar PA
PACKING	Included
PAYMENT TERMS	*TBD*
OFFER VALIDITY	60 days
WARRANTY	As per project specs
TERMS & CONDITIONS	https://www.denora.com/dam/jcr:9b2166a0-3017-43e5-b3fd-9306a59b1017/De%20Nora%20U.S.%20Standard%20Sale%20Terms%20-%20Revised%207.9.2021.pdf

Bridge Master Plan and Sidewalk Program

CITY OF FORT LAUDERDALE

Infrastructure Task Force

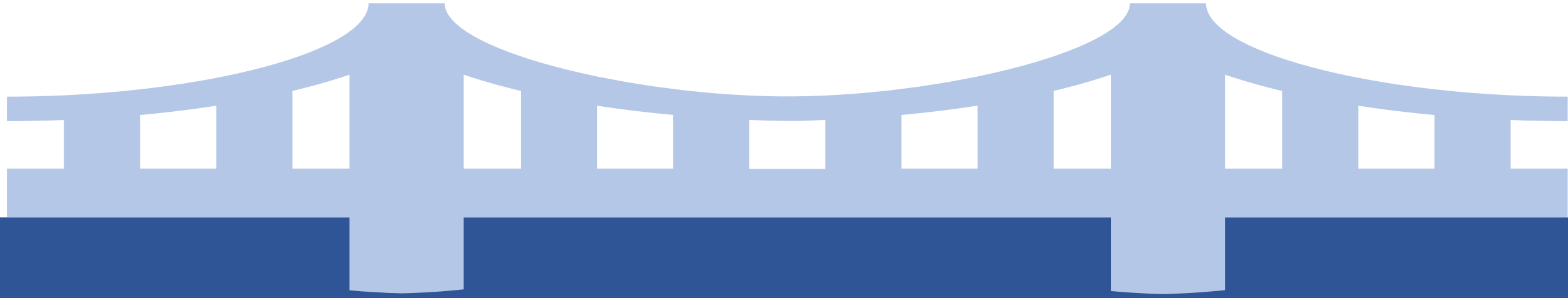
Bridges and Sidewalks

Public Works Department – Engineering

Purpose:

- Bridge Master Plan
- Sidewalk Program
- 5 Year Past Implementations
- 5 Year Forecast (through 2025)

Bridges



Bridge Infrastructure

Commission Priorities – Strategic Plan

Goal: Be a sustainable and resilient community.

Objective: Proactively maintain our water, wastewater, road, and bridge infrastructure.

2014 Structural Bridge Engineering Services Master Plan for Bridge Intersections

Identifies Deficiencies determined through Field Inspections
Reviews Substandard Geometric Elements
Functional Ability Rating & Structural Rating
Rehabilitation & Replacement Schedule detailing Repair Options and Cost Estimates

Staff Function:

Project Management completed by 2 Project Managers & 1 Engineering Inspector

Bridge Infrastructure

2014 Master Plan Implementation:

46 # of City Owned Bridges studied

20 Years Scheduled by Master Plan

$35M Long-term Recommendation Total

Master Plan Long Term Anticipated

2014 - 2019		2020-2025		2026 - 2031		2032 - 2036	
$4,066,600		$432,050		$9,253,040		$21,384,670	
REPAIR	**REPLACE**	**REPAIR**	**REPLACE**	**REPAIR**	**REPLACE**	**REPAIR**	**REPLACE**
NE 55th Street	**Coconut Isle Dr.**	NE 59th Ave		Riverland Rd	Bayview Dr.	SE 2nd Court	*Castle Harbor Isle**
Bayview Dr	*South Ocean Dr.*	Old Dixie Hwy		NE 55th Street	NE 1st Street	Access Road	*NE 41st Street**
South Gordon Rd		NE 18th Ave.		Bayview Dr	SE 13th Street		SE 7th Street
Hendricks Isle Dr				NE 15th Ave	SE 8th Street		SE 8th Street
Solar Plaza Dr				SE 8th Ave			SE 9th Street
Solar Plaza Dr				SE 23rd Ave			SE 10th Street
				SE 23rd Ave			SE 11th Street
				SE 23rd Ave			Laguna Terrace
				NE 23rd Ave			West Lake Dr.
				NE 23rd Ave			West Lake Dr.
				SW 11th Ave			West Lake Dr.
				SW 7th Street			
				SE 25th Ave			

Completed Projects *Current Projects* **Requiring Immediate Repair until Replacement*

Bridge Management Procedure:

Repairs

- ❑ Select Bridge for Repair
  - ❑ Review FDOT Bridge Inspection Report
  - ❑ Prioritize repair based on assigned damage scale, weighted average, sufficiency rating
  - ❑ Schedule based on funding available in Capital Improvement Project (CIP)
- ❑ Repairs completed by City Consultants and Contractors:
  - ❑ Exposed rebar
  - ❑ Wide cracks > 1-inch
  - ❑ Concrete Pile
  - ❑ Painting
  - ❑ Repair expansion joint
- ❑ Complete annual bridge inspections
- ❑ Schedule Repairs through budget process

Replacement

- ❑ Select Bridge for Repair
  - ❑ Review FDOT Bridge Inspection Report
  - ❑ Prioritize repair based on assigned damage scale, weighted average, sufficiency rating
- ❑ If repairs for existing conditions total $40,000 or more, schedule based on funding available in Capital Improvement Project (CIP)
- ❑ Consultant develops design and cost estimate for bridge replacement
  - ❑ Funding requested through budget process
  - ❑ Update FDOT with proposed bridge replacements

Bridge Infrastructure

2021 City Implementation:

53 # of City Owned Bridges

$11.5M 5 Year Replacement Budget

$1M Repair & Maintenance Annual Budget

Scheduled Maintenance and Replacement

2022		2023		2024		2025	
REPAIR	**REPLACE**	**REPAIR**	**REPLACE**	**REPAIR**	**REPLACE**	**REPAIR**	**REPLACE**
NE 55th Street		NE 59th Ave	Castle Harbor (P12641)	Riverland Rd	Bayview Dr	SE 2nd Court	Laguna Terrace
SW 11th Ave		Old Dixie Hwy		NE 15th Ave	SE 13th Street	Access Road	West Lake Dr
Castle Harbor (P12641)		NE 18th Ave		SE 8th Ave			West Lake Dr
				SW 7th Street			West Lake Dr
$440,000	**$0**	**$432,000**	**$2,000,000**	**$986,800**	**$5,247,506**	**$306,450**	**$8,824,538**

See 2014 Structural Bridge Engineering Services Master Plan for Bridge Intersections pages 3-4.
See Exhibit Map 1: City Owned Bridge Inventory
See City of Fort Lauderdale FY 2022 – 2026 Community Investment Plan for detailed budget schedule.
See Exhibit 3: ITF Deficient and Obsolete Bridge List

P12010 is the funding source for bridge maintenance and repairs.

Sidewalks

Sidewalk Infrastructure

Commission Priorities – Strategic Plan

Goal: Build a multi-modal and pedestrian friendly community.

Objective: Improve roads, sidewalks, and trails to prioritize a safer, more walkable and bikeable community.

Sidewalk Program – Atkins Sidewalk Inspection & Management System (2014)

Identifies Deficiencies determined through Field Inspections

Developed a Condition Matrix

Repair & Replacement Recommendations detailing Repair Options and Cost Estimates

Staff Function:

Project Management completed by 1 Project Manager, 1 Engineering Inspector, and 1 Administrative Staff

Sidewalk Infrastructure

2014 Sidewalk Inspection Report:

425 Miles of Sidewalk Inspected

29K Locations Identified for Repair or Replacement

$16M 5 Year Replacement Budget

Category Type & 2014 Projections

See Atkins Sidewalk Inspection & Management System Conclusions and Recommendations Report

YEAR	CATEGORY	ESTIMATED COSTS
1	1 – Large vertical displacement & 2 – Wide cracks	$5,151,480
2	2 – Wide cracks	$5,306,024
3	3 – Small vertical displacement	$2,551,314
4	4 – Surface defects	$1,528,562
5	5 – Narrow cracks	$1,223,208
	GRAND TOTAL	**$15,760,588**

CATEGORY 1	CATEGORY 2	CATEGORY 3	CATEGORY 4	CATEGORY 5
				

Ordinance No. C-71-64 Sec. 25-26

1980 - 2020

Sec. 25-56 Duty of owner of abutting property.

a) It shall be **the duty of each owner of abutting property** to construct or reconstruct, maintain and keep in good repair uniform and substantial sidewalks in front of or abutting upon each parcel of his property within the city **when so directed by resolution of the city commission.**

b) It shall be unlawful for the owner or occupant of any lot or part thereof to permit any sidewalk in front of such lot or part thereof to remain in such a condition as to prevent the convenient and safe use thereof of the public.

2020

Sec. 25-56 Duty of owner of abutting property.

a) It shall be the **duty of each owner of property to notify the city** when sidewalk abutting each parcel of his property is in need of repair.
    1. Repair needs and responsibility will be determined by the city following inspections.

b) It shall be the duty of each owner of abutting property to construct or reconstruct, maintain and keep in good repair uniform and substantial sidewalks in front of or abutting upon each parcel of his property within the city **when so directed by the city manager or his designee** when:
    a) It is determined by city inspection that damage is due to trees on the owner's property.
    b) It is determined by city inspection that heavy equipment used by the property owner has damaged the sidewalk.
    c) It is determined by city inspection and/or permit application that concrete sidewalk was changed to paver blocks, stamped concrete or stamped asphalt during driveway or sidewalk re-construction.

Sidewalk Program Procedure

1. Customer initiated Customer complaint as Sidewalk Damage
2. Customer complaints routed to PW – Engineering
3. Admin assigned to Sidewalks researches complaint
4. Admin emails request for inspection
5. Inspector provides recommendation, report (if risk related), and photos to Admin and PM
6. Admin closes complaint and provides update to Customer

Sidewalk Infrastructure

FY2021 Sidewalk Program:

$1M 3 Miles of Repaired Sidewalk

92 Locations Identified for Repair or Replacement

$3.1M 5 Year Replacement Budget

Total Expenditures by Fiscal Year

See Exhibit Map 2: **Sidewalk Repairs by District FY 2021**

FY17	FY18	FY19	FY20	FY21	5 YEAR TOTAL
$1,760,342	$350,104	$522,031	$460,257	$18,968	$3,111,702
5.3 Miles	1.05 Miles	1.6 Miles	1.4 Miles	.05 Miles	9.4 Miles

Total Budgeted by Fiscal Year

FY22	FY23	FY24	FY25	FY26	5 YEAR TOTAL
$1,000,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000	$5,000,000

Priority Repairs:

1. Commission Priorities
2. C1 - Large vertical displacement
3. C2 – Wide cracks
4. Trip & Falls

Questions?

City of Fort Lauderdale

ITF Bridge Review

Monday, November 1, 2021

Structurally Deficient

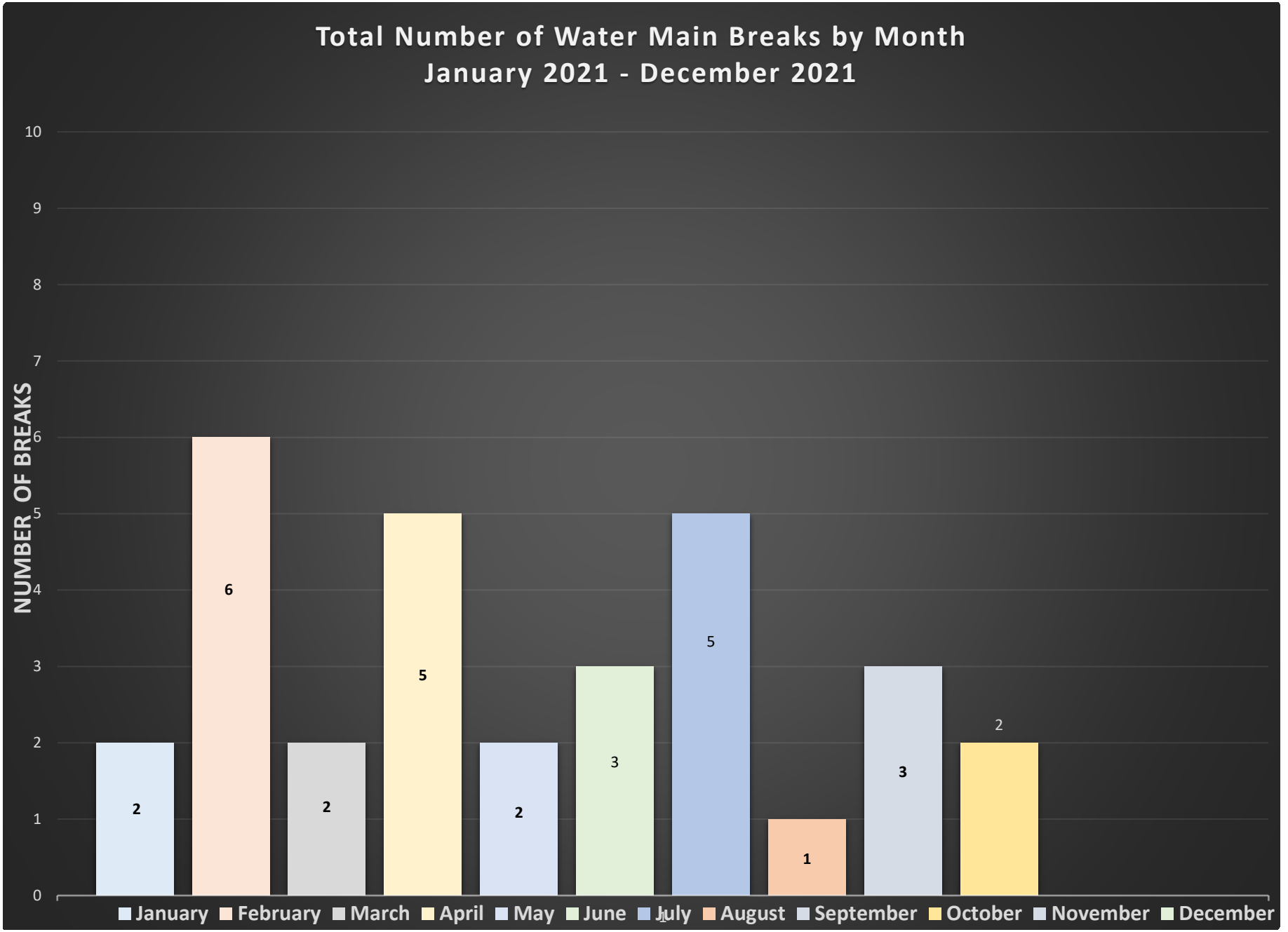
Bridge Number	Bridge Name	Obstacle Name	Design Load Rating
865727	NE 1st Street	Stranahan Lake	21T, 23T, 30T
865771	West Lake Drive	Estelle River	25T, 34T
865760	SW 7th Street	Rio Cordova	
865708	Bayview Drive	Longboat Inlet	24T
865775	South Ocean Drive	Marion River	29T, 34T
865781	Access Road	Mills Pond Canal	

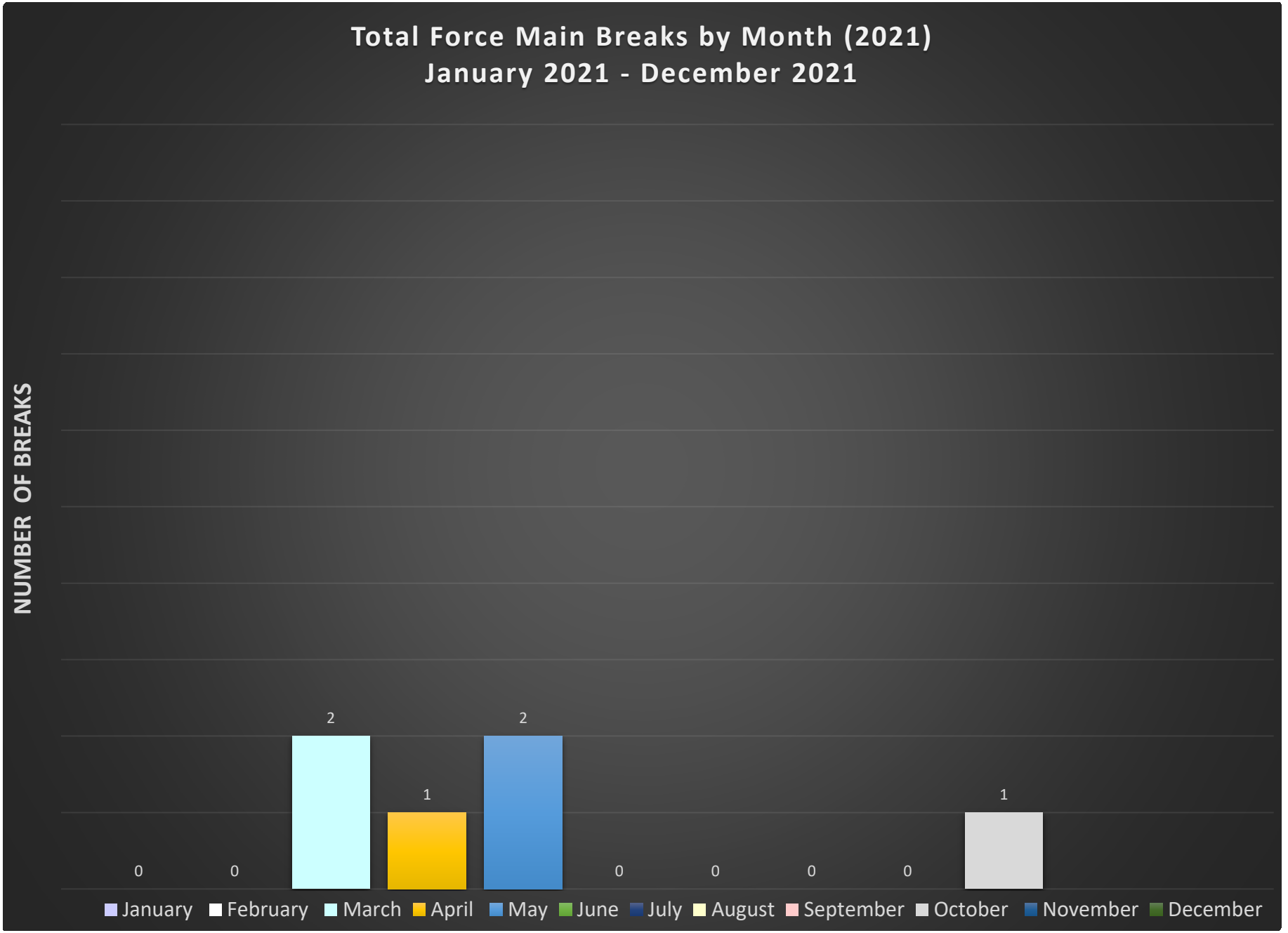
Functionally Obsolete

Bridge Number	Bridge Name	Obstacle Name	Design Load Rating
865773	West Lake Drive	Lucille River	20T, 24T, 31T
865772	West Lake Drive	Diane River	20T, 24T, 32T
865748	SW 11th Avenue	N. Fork New River	5T
865774	West Lake Drive	Mercedes River	22T, 27T, 36T
865720	Old Dixe Hwy	S. Fork Middle River	16T, 29T
865765	SE 13th Street	Cerro Gordo River	28T, 35T
865770	Laguna Terrace	Diane River	25T, 34T
865733	Hendricks Isle Dr	Las Olas Canal	
865738	SE 23rd Avenue	Rio Del Mar	
865739	SE 23rd Avenue	Rio Castilla Canal	
865758	SE 9th Avenue	Tarpon River	30T
864025	Riverland Road	Branch South N New River	25T, 30T, gross
865712	Castle Harbor Isle	Toulon Waterway	20T
865713	NE 41st Street	Toulon Waterway	20T
865782	SE 25th Avenue	Rio Idlewild Canal	
865710	Bayview Drive	Landings Inlet South	22T
865729	East Las Olas Blvd	Himmarshee Canal	
860017	Las Olas Blvd	Sospiro Canal	
865752	SW 7th Street	Tarpon River	33T
860611	WB Las Olas Blvd	Sospiro Canal	
860612	EB Las Olas Blvd	Sospiro Canal	

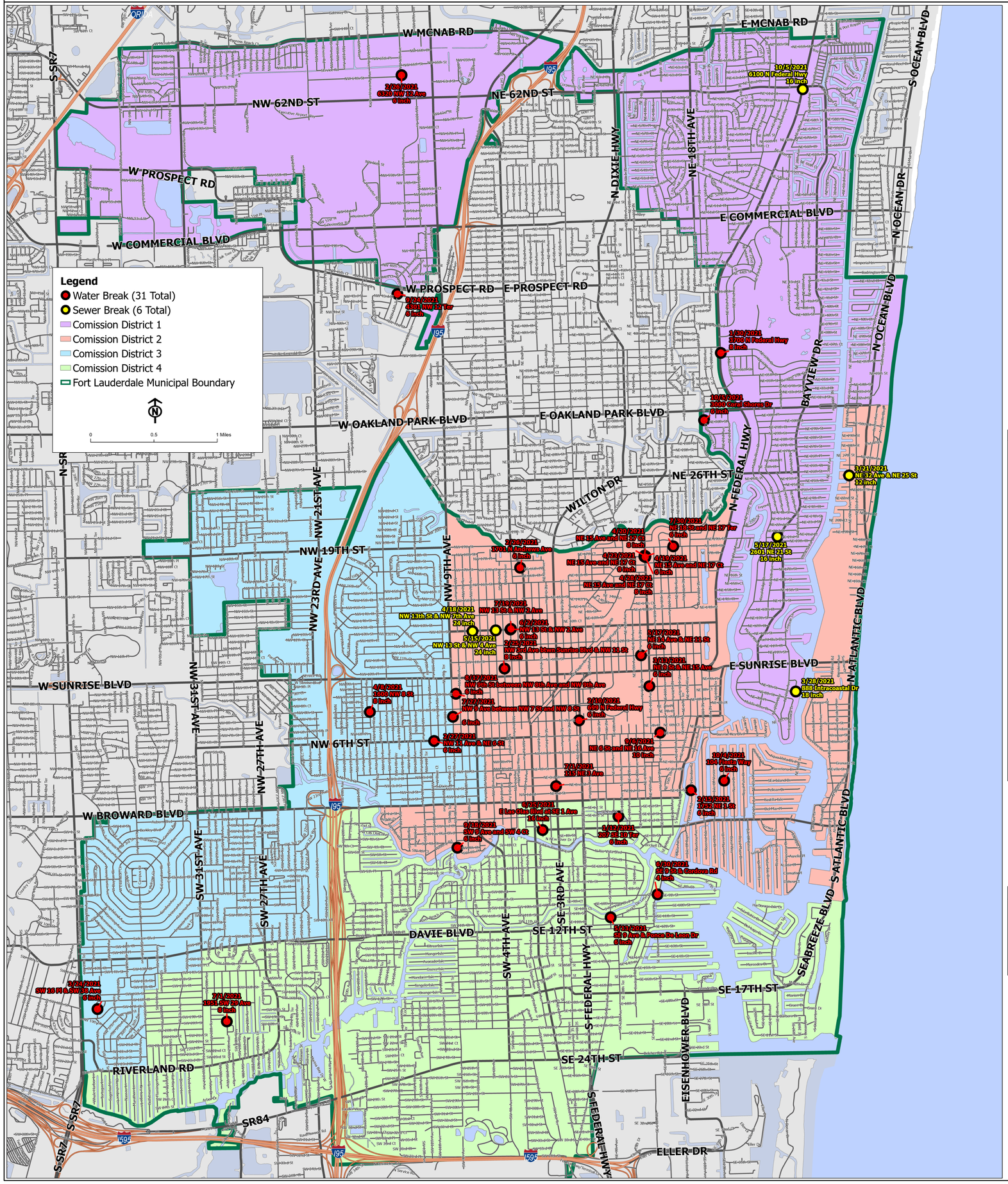
as of 10/28/2021

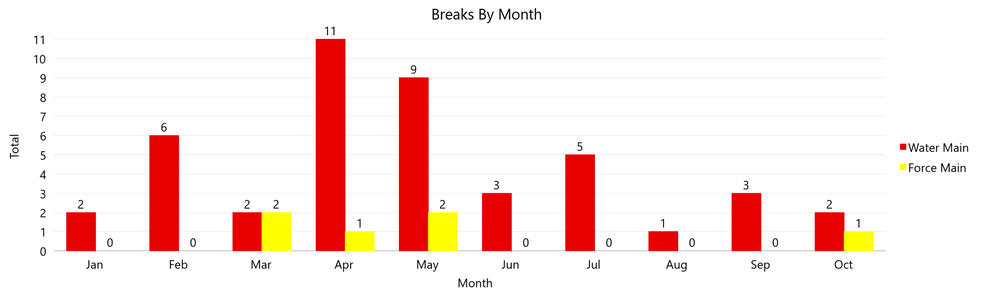
Water & Sewer Breaks Report 2021


Total Number of Water Main Breaks by Month
January 2021 - December 2021
NUMBER OF BREAKS
10
9
8
7
6
5
4
3
2
1
0
2
6
2
5
2
3
5
1
3
2
January
February
March
April
May
June
July
August
September
October
November
December


Total Force Main Breaks by Month (2021)
January 2021 - December 2021
NUMBER OF BREAKS
0
0
2
1
2
0
0
0
0
1
January
February
March
April
May
June
July
August
September
October
November
December

Water Distribution And Force Main Breaks For January 1 - October 19, 2021





Water Distribution Breaks

Date of Break/PBWN	Q-Alert	Address	Type	Size	Cause	PBWN Issued?	Impacted Properties
1/12/2021	718838	207 SE 10 Ter	Water Main	6 inch	Broke while contractor was installing a 54-inch force main	Y	40
1/30/2021	720906	3700 N Federal Hwy	Water Main	8 inch	Age	Y	74
2/10/2021	729728	699 N Federal Hwy	Water Main	6 inch	Contractor Hit Line	N	0
2/15/2021	730637	1752 NE 1 St	Water Main	6 inch	Leak on Mechanical Joint	Y	31
2/25/2021	703142	NW 3rd Ave btwn Sunrise Blvd & NW 11 St	Water Main	8 inch	Emergency Repairs for Insertion Valve	Y	40
2/26/2021	N/A	6320 NW 12 Ave	Water Main	6 inch	Contractor Performed Water Main Offset	Y	3
2/26/2021	736339	1701 N Andrews Ave	Water Main	6 inch	Emergency Repairs to Broken Water Main	N	0
2/27/2021	736429	NW 11 Ave & NE 6 St	Water Main	6 inch	Contractor Hit Line	N	0
3/13/2021	741874	NE 9 St & NE 15 Ave	Water Main	6 inch	Contractor Hit Line	N	N/A
3/24/2021	746102	SW 16 Pl & SW 38 Ave	Water Main	6 inch	Valve Leak	Y	25
4/8/2021	749660	1600 NW 8 St	Water Main	8 inch	Age	Y	5
4/19/2021	756961	NE 15 Ave and NE 17 Ct	Water Main	6 inch	Contractor Hit Line	Y	98
4/20/2021	756961	NE 15 Ave and NE 17 Ct	Water Main	8 inch	Contractor Hit Line	Y	98
4/23/2021	756961	NE 15 Ave and NE 17 Ct	Water Main	8 inch	Contractor Hit Line	Y	98
4/28/2021	756961	NE 15 Ave and NE 17 Ct	Water Main	8 inch	Contractor Hit Line	Y	43
5/13/2021	765890	SE 9 Ave & Ponce De Leon Dr	Water Main	6 inch	Water Line Break	Y	23
5/17/2021	766772	NE 14 Ave & NE 11 St	Water Main	6 inch	Bell Joint Leak	Y	5
6/2/2021	772178	NW 13 St & NW 2 Ave	Water Main	6 inch	Conflict with new force main	Y	2
6/25/2021	403185 & 178719	E Las Olas Blvd at SE 1 Ave	Water Main	16 inch	Damaged Valve	Y	16
6/30/2021	784339	SE 9 St & Cordova Rd	Water Main	4 inch	Damaged Water Main	Y	5
7/1/2021	N/A	115 NE 3 Ave	Water Main		Damaged Water Main	Y	2
7/1/2021	784664	1951 SW 29 Ave	Water Main	8 inch	Damaged Water Main	Y	32
7/19/2021	772178	NW 13 St & NW 2 Ave	Water Main		Conflict with new force main	Y	2
7/27/2021	796341	NW 9 Ave between NW 7 St and NW 8 St	Water Main	6 inch	Broken 6 inch water main	Y	30
7/30/2021	797943	NE 18 St and NE 17 Ter	Water Main	6 inch	Broken 6 inch water main	Y	19
8/17/2021	806307	NW 9th St between NW 8th Ave and NW 9th Ave	Water Main	6 inch	Broken 6 inch water main	Y	55
9/6/2021	814606	NE 6 St and NE 16 Ave	Water Main	10 inch	Main that was damaged	Y	6
9/18/2021	820328	SW 9 Ave and SW 4 Ct	Water Main	6 inch	Contractor impacted	Y	38
9/24/2021	823305	4301 NW 12 Ter	Water Main	6 inch	Contractor impacted COFL Water Main	Y	30
10/4/2021	827745	104 Fiesta Way	Water Main	6 inch	Broken Valve	Y	64
10/5/2021	828443	3000 Coral Shores Dr	Water Main	6 inch	Contractor hit water main	Y	92

Sewer Main Breaks

Date of Break/PBWN	Q-Alert	Address	Type	Size	Cause	Volume (Gal)	SSO Issued?	Impacted Properties
3/21/2021	744806	NE 32 Ave & NE 25 St	Force Main	12 inch	Undetermined, maybe due to contractor	10,060	Y	30
3/28/2021	747601	888 Intracoastal Dr	Force Main	18 inch	Age	2,000	Y	540
4/18/2021	756172	NW 13th St & NW 7th Ave	Force Main	24 inch	Age	12,750	Y	60
5/15/2021	766437	NW 13 St & NW 4 Ave	Force Main	24 inch	Age	1,000	Y	N/A
5/17/2021	767175	2601 NE 21 St	Force Main	16 inch	Contractor Damage	14,525	Y	173
10/5/2021	828495	6100 N Federal Hwy	Force Main	16 inch	Hole in main	1,500	N	N/A

CIP Financial Report

Consent Order Projects Financial Report Summary
October 22, 2021

Consent Order Projects by Category	Total Budget Amount	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021
GTL Upgrades	28,295,566.00	162,177.50	1%	2.50	14,133,386.00
I&I	37,844,732.00	25,595,454.04	68%	5,991,823.71	6,257,454.25
Master Plan/Report	8,550,322.31	6,386,718.75	75%	2,006,354.14	157,249.42
Sewer Basin	2,195,642.05	2,164,992.37	99%	0.05	30,649.63
Sewer Force Main	121,513,202.68	97,224,899.30	80%	6,013,591.63	18,274,711.75
Stormwater	68,054,893.00	3,827,293.44	6%	44,729,444.31	19,498,155.25
Watermain	2,238,785.00	1,928,910.00	86%	-	309,875.00
Grand Total	**268,693,143**	**137,290,445**	**51%**	**58,741,216**	**58,661,481**

Consent Order Projects Financial Report
October 22, 2021

Index Code / Project Title	Category	Project Status	Budget	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021
P11563.454 VICTORIA PARK SEWER BASIN A-19 REHAB			1,606,619	1,413,535		193,083	1
P11563.482 VICTORIA PARK SEWER BASIN A-19 REHAB			-	-		-	-
P11563.495 VICTORIA PARK SEWER BASIN A-19 REHAB			5,832,153	5,530,138		146,558	155,457
P11563 TOTAL PROJECT COSTS	**I&I**	**Construction**	**7,438,772**	**6,943,674**	**93%**	**339,640**	**155,458**
P11566.454 RIO VISTA SEWER BASIN D-43 REHAB			3,523,431	2,086,806		694,881	741,743
P11566.482 RIO VISTA SEWER BASIN D-43 REHAB			381	381		-	-
P11566.495 RIO VISTA SEWER BASIN D-43 REHAB			4,268,936	3,751,580		357,367	159,989
P11566 TOTAL PROJECT COSTS	**I&I**	**Construction**	**7,792,748**	**5,838,767**	**75%**	**1,052,249**	**901,732**
P11868.470 RIVER OAKS STORMWATER ANALYSIS			957,578	887,514		19,011	51,053
P11868.473 RIVER OAKS STORMWATER ANALYSIS			33,535,000	587,679		28,172,493	4,774,828
P11868 TOTAL PROJECT COSTS	**Stormwater**	**Bidding**	**34,492,578**	**1,475,193**	**4%**	**28,191,504**	**4,825,881**
P11879.454 PUMP STATION B-10 REHAB			1,908,427	1,908,427		-	-
P11879 TOTAL PROJECT COSTS	**Sewer Force Main**	**Complete**	**1,908,427**	**1,908,427**	**100%**	**-**	**-**
P11842.470 EDGEWOOD STORMWATER PRELIMINARY DATA & REPORT			1,928,448	1,821,153		12,152	95,143
P11842.473 EDGEWOOD STORMWATER PRELIMINARY DATA & REPORT			30,475,000	376,995		16,468,245	13,629,760
P11842 TOTAL PROJECT COSTS	**Stormwater**	**Bidding**	**32,403,448**	**2,198,148**	**7%**	**16,480,397**	**13,724,903**
P11881.454 PUMP STATION D-45 REHABILITATION			509,868	509,868		-	(0)
P11881 TOTAL PROJECT COSTS	**Sewer Force Main**	**Complete**	**509,868**	**509,868**	**100%**	**-**	**(0)**
P11991.454 DOWNTOWN SEWER BASIN PS A-7 REHABILITION			9,664,894	4,333,641		4,017,048	1,314,206
P11991.482 DOWNTOWN SEWER BASIN PS A-7 REHABILITION			3,335	3,335		-	-
P11991.495 DOWNTOWN SEWER BASIN PS A-7 REHABILITION			2,000,000	33,808		-	1,966,192
P11991 TOTAL PROJECT COSTS	**I&I**	**Construction**	**11,668,229**	**4,370,784**	**37%**	**4,017,048**	**3,280,398**
P12001.454 SEWER BASIN D-40 REHAB			731,713	731,713		-	-
P12001.482 SEWER BASIN D-40 REHAB			3,766	3,766		-	-
P12001 TOTAL PROJECT COSTS	**Sewer Basin**	**Complete**	**735,479**	**735,479**	**100%**	**-**	**-**
P12049.454 FLAGLER HEIGHTS SWR BASIN A-21 LATERALS			2,457,469	1,209,044		-	1,248,425
P12049.482 FLAGLER HEIGHTS SWR BASIN A-21 LATERALS			8,255	8,255		-	-
P12049.495 FLAGLER HEIGHTS SWR BASIN A-21 LATERALS			1,318,983	651,141		183,496	484,346
P12049 TOTAL PROJECT COSTS	**I&I**	**Construction**	**3,784,707**	**1,868,440**	**49%**	**183,496**	**1,732,771**
P12055.454 BASIN A-18 SANITARY SWR COLL SYSTM REHAB			3,276,801	2,701,371		388,336	187,094
P12055.482 BASIN A-18 SANITARY SWR COLL SYSTM REHAB			-	-		-	-
P12055.495 BASIN A-18 SANITARY SWR COLL SYSTM REHAB			3,883,475	3,872,419		11,055	1
P12055 TOTAL PROJECT COSTS	**I&I**	**Construction**	**7,160,276**	**6,573,790**	**92%**	**399,391**	**187,096**
P12124.454 CNTRL BCH ALLIANCE PUMP STN REPLAC D-41			2,132,448	2,132,448		-	-
P12124 TOTAL PROJECT COSTS	**Sewer Force Main**	**Complete**	**2,132,448**	**2,132,448**	**100%**	**-**	**-**
P12133.454 PUMP STN A-13 REDIRECTION E OF FEDERAL			4,454,899	4,147,596		-	307,303
P12133.495 PUMP STN A-13 REDIRECTION E OF FEDERAL			478,014	478,014		-	1
P12133 TOTAL PROJECT COSTS	**Sewer Force Main**	**Warranty**	**4,932,913**	**4,625,610**	**94%**	**-**	**307,303**
P12177.454 E LAS OLAS 12" FORCE MAIN REPLACEMENT			1,689,730	1,689,730		-	-
P12177 TOTAL PROJECT COSTS	**Sewer Force Main**	**Complete**	**1,689,730**	**1,689,730**	**100%**	**-**	**-**
P12202.454 LIFT STATN D-11 FLOW ANALYSIS & REDESIGN			206,143	205,156		0	987
P12202.495 LIFT STATN D-11 FLOW ANALYSIS & REDESIGN			1,254,020	1,224,358		-	29,662
P12202 TOTAL PROJECT COSTS	**Sewer Basin**	**Construction**	**1,460,163**	**1,429,513**	**98%**	**0**	**30,650**
P12264.470 CITYWIDE CANAL DREDGING PLAN - CYCLE 1			1,158,867	153,952		57,544	947,371
P12264 CITYWIDE CANAL DREDGING PLAN - CYCLE 1	**Stormwater**	**Design**	**1,158,867**	**153,952**	**13%**	**57,544**	**947,371**
P12319.454 EMERG REPAIR 30" FM - REPUMP TO GTL WWTP			13,182,064	13,182,064		-	-
P12319.495 EMERG REPAIR 30" FM - REPUMP TO GTL WWTP			2,697,299	2,697,299		-	-
P12319 TOTAL PROJECT COSTS	**Sewer Force Main**	**Complete**	**15,879,363**	**15,879,363**	**100%**	**-**	**-**
P12352.454 S MIDDLE RIVER FORCE MAIN RIVER CROSSING			874,016	874,015		0	**(0)**
P12352.495 S MIDDLE RIVER FORCE MAIN RIVER CROSSING			609,000	609,000		-	1
P12352 TOTAL PROJECT COSTS	**Sewer Force Main**	**Complete**	**1,483,016**	**1,483,015**	**100%**	**0**	**1**
P12367.495 ASSET MANAGEMENT & CMOM PROGRAMS			66,017	66,017			-
P12367.496 ASSET MANAGEMENT & CMOM PROGRAMS			15,485	15,485			-
FD495.01 Water & Sewer Master Plan 2017			457,111	399,050		58,061	(0)
FD496.01 Water & Sewer Regional Master Plan 2017			107,224	93,604		13,619	1
P12367 TOTAL PROJECT COSTS	**Master Plan/Report**	**Project Initiation & Planning**	**645,837**	**574,157**	**89%**	**71,680**	**1**
P12368.495 SEWER CAPACITY ANLY FOR GRAVITY & FM			705,709	704,838		871	0
P12368.496 SEWER CAPACITY ANLY FOR GRAVITY & FM			34,571	34,528		43	0
PBS060101 UTLITIES ENGINEERING OPERATIONS			200,279	200,025		254	(0)

Consent Order Projects Financial Report
October 22, 2021

Index Code / Project Title	Category	Project Status	Budget	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021
PBS670501 LOHMEYER REGIONAL PLANT SUPPORT			9,811	9,799		12	0
P12368 TOTAL PROJECT COSTS	**Master Plan/Report**	**Project Initiation & Planning**	**950,370**	**949,190**	**100%**	**1,180**	**(0)**
P12375.451 PROG MGMT OF CONSENT ORDER PROJECTS			662,758	462,258		200,499	1
P12375.454 PROG MGMT OF CONSENT ORDER PROJECTS			1,013,442	208,214		647,980	157,248
P12375.495 PROG MGMT OF CONSENT ORDER PROJECTS			752,000	699,347		52,653	0
P12375.496 PROG MGMT OF CONSENT ORDER PROJECTS			115,000	107,264		7,736	0
P12375 TOTAL PROJECT COSTS	**Master Plan/Report**	**Project Initiation & Planning**	**2,543,200**	**1,477,083**	**58%**	**908,868**	**157,249**
P12383.451 NE 25TH AVE FORCE MAIN REPLACEMENT			1,363,353	-	**0%**	-	1,363,353
P12383.496 NE 25TH AVE FORCE MAIN REPLACEMENT			(4,215,110)	351,556		551,532	(5,118,198)
P12383 TOTAL PROJECT COSTS	**Sewer Force Main**	**Design**	**(2,851,757)**	**351,556**	**-12%**	**551,532**	**(3,754,845)**
P12384.496 NE 38TH ST 42" FM & NE 19TH AV 24" FM			11,096,690	451,188		800,857	9,844,645
P12384 TOTAL PROJECT COSTS	**Sewer Force Main**	**Design**	**11,096,690**	**451,188**	**4%**	**800,857**	**9,844,645**
P12387.496 EFFLUENT MAIN REHABILITATION			3,184,000	88,847		294	3,094,859
P12387 TOTAL PROJECT COSTS	**Sewer Force Main**	**Project Initiation & Planning**	**3,184,000**	**88,847**	**3%**	**294**	**3,094,859**
P12388.454 NE 13TH ST 24" FORCE MAIN REPLACEMENT			3,761,244	139,636		67,987	3,553,621
P12388.495 NE 13TH ST 24" FORCE MAIN REPLACEMENT			3,313,090	2,189,855		1,123,235	(0)
P12388 TOTAL PROJECT COSTS	**Sewer Force Main**	**Construction**	**7,074,334**	**2,329,491**	**33%**	**1,191,222**	**3,553,621**
P12389.454 18" FM RPL ACROSS NEW RVR FRM 9TH/ BIRCH			988,620	72,420		30,417	885,784
P12389.495 18" FM RPL ACROSS NEW RVR FRM 9TH/ BIRCH			2,112,550	1,547,225		565,323	1
P12389 TOTAL PROJECT COSTS	**Sewer Force Main**	**Construction**	**3,101,170**	**1,619,645**	**52%**	**595,740**	**885,785**
P12390.454 16" FM ALONG LAS OLAS BLVD PHASE 2			2,393,000	637,577		1,899	1,753,524
P12390.495 16" FM ALONG LAS OLAS BLVD PHASE 2			2,500,000	2,410,508		0	89,492
P12390 TOTAL PROJECT COSTS	**Sewer Force Main**	**Construction**	**4,893,000**	**3,048,085**	**62%**	**1,899**	**1,843,016**
P12413.454 FM FROM PUMP STN D-35 TO D-36 UPSIZE			900,000	615,099		-	284,901
P12413.495 FM FROM PUMP STN D-35 TO D-36 UPSIZE			580,000	517,401		29,824	32,775
P12413 TOTAL PROJECT COSTS	**Sewer Force Main**	**Warranty**	**1,480,000**	**1,132,501**	**77%**	**29,824**	**317,675**
P12418.495 WTR & W/WTR D & C SYSTEM MAPPING			3,441,352	2,416,726		1,024,626	0
P12418 TOTAL PROJECT COSTS	**Master Plan/Report**	**Project Initiation & Planning**	**3,441,352**	**2,416,726**	**70%**	**1,024,626**	**0**
P12419.495 FORCE MAIN ASSESSMENT			8,956	8,956		-	-
P12419.496 FORCE MAIN ASSESSMENT			439	439		-	-
FD495.01 Water & Sewer Master Plan 2017			915,328	915,328		-	-
FD496.01 Water & Sewer Regional Master Plan 2017			44,840	44,840		-	-
P12419 TOTAL PROJECT COSTS	**Master Plan/Report**	**Complete**	**969,563**	**969,563**	**100%**	**-**	**-**
IMPROVEMENTS			14,295,566	162,178		3	14,133,386
IMPROVEMENTS			14,000,000	-			
P12529 EFFLUENT PUMPS STANDBY GENERATOR & ADMIN BLDG IMPROVEMENTS	**GTL Upgrades**	**Project Initiation & Planning**	**28,295,566**	**162,178**	**1%**	**3**	**28,133,386**
P12566.451 REDUNDANT SEWER FM NORTH TO GTL WWTP			4,524,621	4,358,485		87,578	78,557
P12566.496 REDUNDANT SEWER FM NORTH TO GTL WWTP			24,725,379	24,674,291		51,087	1
P12566 TOTAL PROJECT COSTS	**Sewer Force Main**	**Construction**	**29,250,000**	**29,032,776**	**99%**	**138,665**	**78,558**
P12567.496 REDUNDANT SEWER FM SOUTH TO GTL WWTP			35,750,000	30,942,350		2,703,557	2,104,093
P12567 TOTAL PROJECT COSTS	**Sewer Force Main**	**Construction**	**35,750,000**	**30,942,350**	**87%**	**2,703,557**	**2,104,093**
P12569.495 NE 5TH STREET FORCE MAIN IMPROVEMENT			1,928,910	1,928,910		-	-
P12569 TOTAL PROJECT COSTS	**Watermain**	**Complete**	**1,928,910**	**1,928,910**	**100%**	**-**	**-**
P12570.495 36TH STREET FORCE MAIN IMPROVEMENT			309,875	-	**0%**	-	309,875
P12570 TOTAL PROJECT COSTS	**Watermain**	**Warranty**	**309,875**	**-**	**0%**	**-**	**309,875**
Grand Total			**268,693,143**	**137,290,445**	**51%**	**58,741,216**	**72,661,481**

The negative balance in P12383.495 was a scribers error and was incorrectly de-appropriated in the amount of $9,000,000 in the FY2022 - FY2026 Capital Improvement. This error will be fixed by budget amendment at the 11/2/21 commission meeting.

Consent Order Projects Financial Report
October 22, 2021

Index Code / Project Title	Category	Project Status	Budget	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021

The following information pertains to the Stormwater Projects listed on the Consent Order Project Report. Paragraph 18 of the Amended Consent Order (CO) requires that the City pay $2,116,500 in cash as civil penalties or implement In-Kind projects with a value of at least $3,167,250 in lieu of making cash payment. This CO mandated that the project be either an environmental enhancement or an environmental restoration project. The City proposed to construct a new stormwater drainage system within the low lying areas of River Oaks Stormwater Analysis (P11868), Edgewood Area Stormwater Improvements (P11842) and the Osceola Canal as part of the Citywide Canal Dredging Plan - Cycle 1 (P12264) to offset the penalties. The proposal included multiple water quality improvements, such as several pollution control measures to treat stormwater runoff before it is discharged in the river, exfiltration trenches, dredging and bank stabilization, and a new wetlands area, in addition to typical stormwater best management practices. The proposal was approved by FDEP on January 20, 2021 and must be constructed by March 2024.

Water & Sewer Bond Expenditures Summary
October 22, 2021

Water & Sewer Master Plan 2017

Revenues Appropriated by City Commission on 4.3.2018 (CAM #18-0336)	$ 200,000,000.00
Interest on Revenues	$ 4,547,778.64
Total Appropriated Amount	$ 204,547,778.64

Bond Funded Projects by Category	Total Budget Amount	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021
Finance	21,669,400.63	16,991,284.00	78%	1,635,381.63	3,042,735.00
Fiveash Upgrades	25,310,530.31	5,385,426.84	21%	4,168,601.62	15,756,501.85
GTL Updgrades	14,000,000.00	-	0%	-	14,000,000.00
I&I	17,303,547.00	13,839,085.76	80%	698,476.33	2,765,984.91
Master Plan/Report	1,501,455.00	866,554.58	58%	348,737.41	286,163.01
Peele Dixie Upgrades	310,000.00	93,440.00	30%	8,920.00	207,640.00
Sewer Basin	1,788,257.00	1,244,978.12	70%	17,910.75	525,368.13
Sewer Force main	97,281,574.33	67,952,185.82	70%	7,609,749.20	21,719,639.31
Watermain	25,383,014.37	20,413,944.63	80%	2,111,655.61	2,857,414.13
Grand Total	**204,547,778.64**	**126,786,899.75**	**62%**	**16,599,432.55**	**61,161,446.34**

Water & Sewer Bond Expenditures Summary
October 22, 2021

Index Code / Project Title	Category	Project Status	Budget	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021
FD495.01 WATER & SEWER MASTER PLAN 2017	Finance	Implementation	19,685,546.63	15,197,574.00	77%	1,543,299.12	2,944,673.51
FD496.01 WATER & SEWER REGIONAL MASTER PLAN 2017	Finance	Implementation	1,983,854.00	1,793,710.00	90%	92,082.51	98,061.49
P10814.495 CENTRAL NEW RIVER W/MAIN RIVER CROSSING	Watermain	Construction	1,632,562.00	375,013.53	23%	571,569.78	685,978.69
P10850.495 VICTORIA PARK A NORTH-SMALL WATERMAINS	Watermain	Construction	4,435,773.00	4,431,013.80	100%	4,758.80	0.40
P11080.495 PORT CONDO SMALL WATER MAIN IMPROVEMENTS	Watermain	Bidding	932,320.00	51,606.10	6%	880,713.65	0.25
P11563.495 VICTORIA PARK SEWER BASIN A-19 REHAB	I&I	Construction	5,832,153.00	5,530,138.28	95%	146,557.72	155,457.00
P11566.495 RIO VISTA SEWER BASIN D-43 REHAB	I&I	Construction	4,268,936.00	3,751,579.81	88%	357,367.48	159,988.71
P11589.495 FIVEASH WTP DISINFECTION IMPROVEMENTS	Fiveash Upgrades	Construction	17,328,046.00	1,017,088.12	6%	1,236,352.03	15,074,605.85
P11901.495 VICTORIA PK STH SM WATERMAINS IMPROVEMNT	Watermain	Construction	5,149,658.00	5,147,938.88	100%	1,718.61	0.51
P11991.495 DOWNTOWN SEWER BASIN PS A-7 REHABILITION	I&I	Construction	2,000,000.00	33,808.00	2%	-	1,966,192.00
P12049.495 FLAGLER HEIGHTS SWR BASIN A-21 LATERALS	I&I	Construction	1,318,983.00	651,141.00	49%	183,496.16	484,345.84
P12055.495 BASIN A-18 SANITARY SWR COLL SYSTM REHAB	I&I	Construction	3,883,475.00	3,872,418.67	100%	11,054.97	1.36
P12133.495 PUMP STN A-13 REDIRECTION E OF FEDERAL	Sewer Force main	Warranty	478,013.50	478,013.50	100%	-	-
P12180.495 CROISSANT PARK SMALL WATER MAINS	Watermain	Complete	2,822,718.37	2,822,718.37	100%	-	-
P12184.495 DAVIE BLVD 18" WM ABAN I-95 TO SW 9 AVE	Watermain	Design	2,075,500.00	297,692.25	14%	55,603.75	1,722,204.00
P12202.495 LIFT STATN D-11 FLOW ANALYSIS & REDESIGN	Sewer Basin	Construction	1,254,020.00	1,224,357.61	98%	-	29,662.39
P12319.495 EMERG REPAIR 30" FM - REPUMP TO GTL WWTP	Sewer Force main	Complete	2,697,298.64	2,697,298.64	100%	-	-
P12352.495 S MIDDLE RIVER FORCE MAIN RIVER CROSSING	Sewer Force main	Warranty	608,999.50	608,999.50	100%	-	-
P12367.495 ASSET MANAGEMENT & CMOM PROGRAMS	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12367.496 ASSET MANAGEMENT & CMOM PROGRAMS	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12368.495 SEWER CAPACITY ANLY FOR GRAVITY & FM	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12368.496 SEWER CAPACITY ANLY FOR GRAVITY & FM	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12375.495 PROG MGMT OF CONSENT ORDER PROJECTS	Master Plan/Report	Project Initiation & Planning	752,000.00	709,348.95	94%	42,650.72	0.33
P12375.496 PROG MGMT OF CONSENT ORDER PROJECTS	Master Plan/Report	Project Initiation & Planning	115,000.00	108,368.13	94%	6,631.69	0.18
P12383.496 NE 25TH AVE FORCE MAIN REPLACEMENT	Sewer Force main	Design	(4,215,110.00)	351,555.80	-8%	551,531.73	(5,118,197.53)
P12384.496 NE 38TH ST 42" FM & NE 19TH AV 24" FM	Sewer Force main	Design	11,096,690.00	451,187.74	4%	800,856.80	9,844,645.46
P12385.496 SE 10TH AV 48" FM REPL & 36" BYPASS	Sewer Force main	Cancelled	18,326.00	18,326.00	100%	-	-
P12386.496 54" FM RPL SE 9TH/10TH AV & NEW PARALLEL	Sewer Force main	Cancelled	6,072.00	6,072.00	100%	-	-
P12387.496 EFFLUENT MAIN REHABILITATION	Sewer Force main	Project Initiation & Planning	3,184,000.00	88,847.00	3%	294.00	3,094,859.00
P12388.495 NE 13TH ST 24" FORCE MAIN REPLACEMENT	Sewer Force main	Construction	3,313,090.00	2,189,854.64	66%	1,123,235.36	0.00
P12389.495 18" FM RPL ACROSS NEW RVR FRM 9TH/ BIRCH	Sewer Force main	Construction	2,112,550.00	1,547,225.18	73%	565,323.42	1.40
P12390.495 16" FM ALONG LAS OLAS BLVD PHASE 2	Sewer Force main	Construction	2,500,000.00	2,410,508.21	96%	-	89,491.79
P12391.495 BERMUDA RIVIERA SML WTRMN IMPROVEMENTS	Watermain	Construction	4,976,700.00	4,422,179.70	89%	415,165.02	139,355.28
P12395.495 PEELE DIXIE ELECTRICAL STUDIES	Peele Dixie Upgrades	Construction	210,000.00	63,133.00	30%	-	146,867.00
P12396.495 PEELE DIXIE SURGE PROTECTION UPGRADES	Peele Dixie Upgrades	Bidding	100,000.00	30,307.00	30%	8,920.00	60,773.00
P12399.495 FIVEASH WTP PCCP REPLACEMENT	Fiveash Upgrades	Complete	33,511.00	33,511.00	100%	-	-
P12400.495 PROSPECT WELLFIELD ELC STUDIES & TESTING	Master Plan/Report	Complete	185,000.00	1,168.00	1%	-	183,832.00
P12402.495 PEELE DIXIE WELLFIELD ELC STUD & TESTING	Master Plan/Report	Construction	150,000.00	47,669.50	32%	-	102,330.50
P12404.495 EXCAVATE & DISPOSE OF DRY LIME SLUDGE	Fiveash Upgrades	Warranty	4,228,973.31	4,228,973.31	100%	-	-
P12406.496 REDUNDANT FORCE MAIN FROM B-REPUMP	Sewer Force main	Bidding	10,377.00	10,377.00	100%	-	-
P12407.495 SUBACQUEOUS FM CROSSING REINSTATEMENT	Sewer Force main	Cancelled	-	-	-	-	-
P12410.495 PUMP STATION C-1 REPLACEMENT	Sewer Force main	Bidding	620,000.00	24,101.00	4%	-	595,899.00
P12412.495 PUMP STATIONS A-16 UPGRADE	Sewer Force main	Design	3,000,000.00	21,968.00	1%	-	2,978,032.00
P12413.495 FM FROM PUMP STN D-35 TO D-36 UPSIZE	Sewer Force main	Warranty	580,000.00	517,445.12	89%	29,824.28	32,730.60
P12414.495 GRAVITY PIPE IMPV TO DWNTWN COL SYSTM	Sewer Force main	Bidding	3,143,000.00	192,791.90	6%	82,770.85	2,867,437.25

Index Code / Project Title	Category	Project Status	Budget	Actuals as of October 22, 2021	% Spent to Date as of October 22, 2021	Encumbrances	Remaining Balance as of October 22, 2021
P12415.495 PUMP STATION A-7 UPGRADE	Sewer Force main	Construction	2,582,888.69	658,870.56	26%	1,586,263.94	337,754.19
P12418.495 WTR & W/WTR D & C SYSTEM MAPPING	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12419.495 FORCE MAIN ASSESSMENT	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12419.496 FORCE MAIN ASSESSMENT	Master Plan/Report	Project Initiation & Planning	-	-	-	-	-
P12456.495 SEWER BASIN D-40 REHAB	Sewer Basin	Project Initiation & Planning	169,237.00	13,354.51	8%	17,910.75	137,971.74
P12463.495 CORAL SHORES SML WATERMAIN IMPROVEMENTS	Watermain	Construction	1,118,998.00	936,872.00	84%	182,126.00	-
P12485.495 FIVEASH WTP FILTERS REHABILIATION	Fiveash Upgrades	Construction	3,720,000.00	105,854.41	3%	2,932,249.59	681,896.00
P12529.496 EFFLUENT PMP STNBY GENERATOR & ADMIN BLD	GTL Updgrades	Project Initiation & Planning	14,000,000.00	-	0%	-	14,000,000.00
P12566.496 REDUNDANT SEWER FM NORTH TO GTL WWTP	Sewer Force main	Construction	24,725,379.00	24,674,291.14	100%	51,086.98	0.88
P12567.496 REDUNDANT SEWER FM SOUTH TO GTL WWTP	Sewer Force main	Construction	35,750,000.00	30,942,350.20	87%	2,703,557.00	2,104,092.80
P12569.495 NE 5TH STREET FORCE MAIN IMPROVEMENT	Watermain	Complete	1,928,910.00	1,928,910.00	100%	-	-
P12570.495 36TH STREET FORCE MAIN IMPROVEMENT	Watermain	Warranty	309,875.00	-	0%	-	309,875.00
P12618.495 DOLPHIN ISLES B-14 SEWER BASIN REHAB	Sewer Basin	Project Initiation & Planning	365,000.00	7,266.00	2%	-	357,734.00
P12619.495 BAYVIEW DR 16" FM TO PUMP STATION B-14	Sewer Force main	Design	2,570,000.00	62,102.69	2%	115,004.84	2,392,892.47
P12620.495 LAS OLAS MARINA PUMP STATION D-31	Sewer Force main	Project Initiation & Planning	2,500,000.00	-	0%	-	2,500,000.00
P12628.495 INTERLOCAL AGREEMENT WITH POMPANO BEACH	Master Plan/Report	Project Initiation & Planning	299,455.00	-	0%	299,455.00	-
Totals			**204,547,778.64**	**126,786,899.75**	**62%**	**16,599,432.55**	**61,161,446.34**

The negative balance in P12383.495 was an scribers error and was incorrectly de-appropriated in the amount of $9,000,000 in the FY2022 - FY2026 Capital Improvement. This error will be fixed by budget amendment at the 11/2/21 commission meeting.

Impact Fees

WATER - SEWER FEE REPORT

Fees Collected between 8/19/2021 and 10/19/2021

ENG0021
2021
PM-18112347 Residential New Construction Permit

1968299	72003487	09/03/2021	1487561	Payment Applied	ENG0021	PM-18112347	Alexis Miller	Sailboat Bend Civic

ENG0022
2021
PM-18112347 Residential New Construction Permit

1968299	72003488	09/03/2021	1487561	Payment Applied	ENG0022	PM-18112347	Alexis Miller	Sailboat Bend Civic

ENG0470
2021
BLD-CALT-20040004 Commercial Alteration Permit

1964846	72035882	08/23/2021	1507119	Payment Applied	ENG0470	BLD-CALT-20040004	GHCHYATT	Progresso Village Civic Associ

BLD-CNC-21060004 Commercial New Construction Permit

1978064	71991081	09/30/2021	1480709	Payment Applied	ENG0470	BLD-CNC-21060004	Matthew Anastasio	

BLD-CU-20120007 Change of Use

1970478	72003221	09/10/2021	1487285	Payment Applied	ENG0470	BLD-CU-20120007	Matthew Anastasio	Progresso Village Civic Associ

BLD-SWC-21070002 Sidewalk Cafe Permit

1975623	72058701	09/23/2021	1517671	Payment Applied	ENG0470	BLD-SWC-21070002	anonymous	Colee Hammock Homeowners Assoc

ENG0471
2021
BLD-RNC-20020014 Residential New Construction Permit

1978600	71679848	10/01/2021	1317219	Payment Applied	ENG0471	BLD-RNC-20020014	sunrise12	Durrs Community Association, I

BLD-RNC-20080013 Residential New Construction Permit

1973479	71636286	09/17/2021	1286715	Payment Applied	ENG0471	BLD-RNC-20080013	anonymous	Home Beautiful Park Civic Asso

BLD-RNC-20080019 Residential New Construction Permit

1972453	71639676	09/15/2021	1287977	Payment Applied	ENG0471	BLD-RNC-20080019	Luke Rinkus	Durrs Community Association, I

BLD-RNC-20110002 Residential New Construction Permit

1980183	72060016	10/08/2021	1518421	Payment Applied	ENG0471	BLD-RNC-20110002	anonymous	Victoria Park Civic Associatio

BLD-RNC-20110003 Residential New Construction Permit

1980192	71744491	10/08/2021	1352006	Payment Applied	ENG0471	BLD-RNC-20110003	anonymous	Victoria Park Civic Associatio

BLD-RNC-20120008 Residential New Construction Permit

1978114	71779279	09/30/2021	1370428	Payment Applied	ENG0471	BLD-RNC-20120008	anonymous	Rock Island Community Dev., In

BLD-RNC-20120023 Residential New Construction Permit

1980188	71799641	10/08/2021	1381719	Payment Applied	ENG0471	BLD-RNC-20120023	anonymous	Victoria Park Civic Associatio

BLD-RNC-21040020 Residential New Construction Permit

1982160	72035815	10/19/2021	1507169	Payment Applied	ENG0471	BLD-RNC-21040020	thetarponriver	Tarpon River Civic Association

BLD-RNC-21040021 Residential New Construction Permit

1979813	72036850	10/07/2021	1507581	Payment Applied	ENG0471	BLD-RNC-21040021	anonymous	Tarpon River Civic Association

BLD-RNC-21070001 Residential New Construction Permit

1980296	72060155	10/08/2021	1518544	Payment Applied	ENG0471	BLD-RNC-21070001	Luke Rinkus	Victoria Park Civic Associatio

BLD-RNC-21070002 Residential New Construction Permit

1977734	71990367	09/29/2021	1480461	Payment Applied	ENG0471	BLD-RNC-21070002	Matthew Anastasio	Coral Ridge Country Club Estat

PM-18112374 Residential New Construction Permit

1968299	72046178	09/03/2021	1511905	Payment Applied	ENG0471	PM-18112374	Alexis Miller	Sailboat Bend Civic Associatio

ENG0480
2021
BLD-CU-20120007 Change of Use

1970478	72003222	09/10/2021	1487285	Payment Applied	ENG0480	BLD-CU-20120007	Matthew Anastasio	Progresso Village Civic Associ

BLD-SWC-21070002 Sidewalk Cafe Permit

1975623	72058702	09/23/2021	1517671	Payment Applied	ENG0480	BLD-SWC-21070002	anonymous	Colee Hammock Homeowners Assoc

ENG0481
2021
BLD-RNC-20020014 Residential New Construction Permit

1978600	71679849	10/01/2021	1317219	Payment Applied	ENG0481	BLD-RNC-20020014	sunrise12	Durrs Community Association, I

BLD-RNC-20080013 Residential New Construction Permit

1973479	71636287	09/17/2021	1286715	Payment Applied	ENG0481	BLD-RNC-20080013	anonymous	Home Beautiful Park Civic Asso

BLD-RNC-20080019 Residential New Construction Permit

1972453	71639677	09/15/2021	1287977	Payment Applied	ENG0481	BLD-RNC-20080019	Luke Rinkus	Durrs Community Association, I

BLD-RNC-20110002 Residential New Construction Permit

1980183	72060017	10/08/2021	1518421	Payment Applied	ENG0481	BLD-RNC-20110002	anonymous	Victoria Park Civic Associatio

BLD-RNC-20110003 Residential New Construction Permit

1980192	71744492	10/08/2021	1352006	Payment Applied	ENG0481	BLD-RNC-20110003	anonymous	Victoria Park Civic Associatio

BLD-RNC-20120008 Residential New Construction Permit

1978114	71779280	09/30/2021	1370428	Payment Applied	ENG0481	BLD-RNC-20120008	anonymous	Rock Island Community Dev., In

BLD-RNC-20120023 Residential New Construction Permit

1980188	71799642	10/08/2021	1381719	Payment Applied	ENG0481	BLD-RNC-20120023	anonymous	Victoria Park Civic Associatio

BLD-RNC-21040020 Residential New Construction Permit

1982160	72035816	10/19/2021	1507169	Payment Applied	ENG0481	BLD-RNC-21040020	thetarponriver	Tarpon River Civic Association

BLD-RNC-21040021 Residential New Construction Permit

1979813	72036851	10/07/2021	1507581	Payment Applied	ENG0481	BLD-RNC-21040021	anonymous	Tarpon River Civic Association

BLD-RNC-21070001 Residential New Construction Permit

1980296	72060156	10/08/2021	1518544	Payment Applied	ENG0481	BLD-RNC-21070001	Luke Rinkus	Victoria Park Civic Associatio

BLD-RNC-21070002 Residential New Construction Permit

1977734	71990368	09/29/2021	1480461	Payment Applied	ENG0481	BLD-RNC-21070002	Matthew Anastasio	Coral Ridge Country Club Estat

PM-18112374 Residential New Construction Permit

1968299	72046579	09/03/2021	1511905	Payment Applied	ENG0481	PM-18112374	Alexis Miller	Sailboat Bend Civic Associatio

From: Kymberly Holcombe
To: Seemee Callier
Cc: Igor Vassiliev; Patricia Jolly; Kenya Baker; Shannon Barrett; Susan Grant; Laura Reece
Subject: FW: Upcoming ITFAC November 2021 Meeting - Impact Fees
Date: Monday, October 18, 2021 5:10:56 PM
Attachments: image001.png
image002.jpg
image003.gif

Subject: FW: Upcoming ITFAC November 2021 Meeting - Impact Fees

Good afternoon, Seemee.

2021 - Fiscal Year to Date (FYTD) status of Water and Sewer Expansion/Impact Fees

As of 9/30/2021 Water expansion/impact fees collected is $1,757,271
" " Sewer expansion/impact fees collected is $1,452,779
Total FY 2021 collected $3,045,847

From the FY 2021 Water and Sewer Expansion/Impact Fees collected, the following project budgets were appropriated in the FY 2022 Community Investment Plan (CIP)

$1,800,000 P12564 C-51 Reservoir (Water)
$900,000 P12605 New Pumping Station Flagler Village A-24 (Sewer)

Thank you,

Kymberly Holcombe
Business Operations Manager
City of Fort Lauderdale
Public Works I Engineering Services
100 N. Andrews Ave., Fort Lauderdale, FL 33301
p 954-828-5083 I c 954-559-6863
Kholcombe@fortlauderdale.gov

From: Seemee Callier <SCallier@fortlauderdale.gov>
Sent: Monday, October 18, 2021 2:59 PM
To: Igor Vassiliev <IVassiliev@fortlauderdale.gov>
Cc: Kymberly Holcombe <KHolcombe@fortlauderdale.gov>; Patricia Jolly <PaJolly@fortlauderdale.gov>
Subject: Upcoming ITFAC Meeting - Impact Fees

Good Afternoon,

In preparation for the ITFAC meeting on November 1, 2021, please provide an updated Impact Fee Usage report by 4PM on Monday, October 25, 2021.

Thank you,

Seemee Callier | Senior Administrative Assistant
Public Works Dept. - Engineering
100 N. Andrews Ave, 4th Floor
Fort Lauderdale, FL 33301
Phone: 954-828-4021 | Fax: 954-828-5074