STATE OF ALABAMA)(
:
COUNTY OF BALDWIN)(

The City Council met in a Work Session
at 4:30 p.m., Fairhope Municipal Complex Council Chamber,
161 North Section Street, Fairhope, Alabama 36532,
on Monday, 23 January 2023.

Present were Council President Jay Robinson, Councilmembers: Corey Martin, Jimmy Conyers, and Kevin Boone; and Mayor Sherry Sullivan, City Attorney Marcus E. McDowell and Assistant City Clerk Jenny Opal Wilson. Councilmember Jack Burrell and City Clerk Lisa A. Hanks were absent.

Council President Jay Robinson called the meeting to order at 4:30 p.m.

The following topics were discussed:

- The first item on the agenda was the Fairhope Wastewater Treatment Plant Headworks Improvements. Jason Langley, Water/Wastewater Superintendent Water Department gave brief and introduced Ms. Lindsey Tucker and Mr. Wes Cardwell from Garver to present findings. Ms. Tucker gave introduction that she is the Project Manager on project. She commended the Operations Department for their job and extended appreciated to the Council and their service. Ms. Tucker gave presentation on the Fairhope Wastewater Treatment Plant Headworks Improvements Conceptual Design Report – Final (Garver Project No.: 22W10090) for the City of Fairhope, Alabama. She noted report is in Press Packet. The Fairhope's Headworks consist of fine screening and grit removal. Fairhope specific drivers are lack of redundancy, odor control, influent hydraulics, increasing flows and future capacity, and working within existing layout. Ms. Tucker gave recommendation to construct a new Headworks Facility adjacent to the existing, one with two (2) Fine Screening Channels, a New Grit Removal System, a New Screenings and Grit Process Building, and an Advance Odor Control System. Ms. Tucker concluded and turned presentation over to Mr. Wes Cardwell, Regional Design Process Lead who specializes in Headwork Facilities across the Southeast. Mr. Cardwell presented a general overview with a conceptual design recommendation to include elements based on project drivers and facility-specific considerations.

  Council addressed questions. Councilmember Boone inquired on two (2) screening processes, simultaneously or one at a time or alternate. Mr. Cardwell presented options with redundancy, minimize equipment size and project budget. Mr. Cardwell recommend a fully redundant screen standby. Councilmember Conyers inquired on budget for project. Mr. Cardwell addressed 5.3 million dollars and noted it is within report. Costs can be scaled as needed. Councilmember Martin inquired on engineering reference parts previously purchased that could be utilized. Mr. Cardwell addressed in 2015 that Fairhope improved plant and installed a mechanical screen. Screen can be relocated. Councilmember Martin asked if we would purchase one (1) screen. Mr. Cardwell stated that is correct. Councilmember Martin inquired on cost of screen. Mr. Cardwell stated $100,000.00 part. Council President Robinson inquired on the costs vs savings to relocate the screen. Mr. Cardwell stated screen is approximately seven (7) years old and still has life and would recommend finding a way to accommodate. Councilmember Martin inquired on odor control. Mr. Cardwell stated odor control is self-contained. Mr. Cardwell recommended going through a Treatment System. Councilmember Conyers inquired on creating redundant flow or upgrading current system. Mr. Cardwell stated decommissioning current facility. Once facility is up and running, we would demolish existing channels. Councilmember Martin inquired on how old our plant is with life span or reinvention. Mr. Cardwell stated process equipment 15-20 years life cycle evaluation, structurally channeled 40 to 50 years. Tim Manuel, Assistant Superintendent, Sewer Department discussed the history of the plant with upgrades. Mr. Manuel gave brief discussion of history, process, and maintenance. Plant installed 1996-1997. Screen installed 2014-2015. Councilmember Martin inquired on efficiency with parts. Mr. Manuel stated this would be a rebuild. Mr. Cardwell further discussed technology and reliability. Councilmember Boone inquired on Screenings and Grit Process Building. Mr. Cardwell discussed the process of the Sludge Dewatering Bay. Councilmember Conyers inquired on approving plan over the next two (2) years and is project available for grant funding with budget amount. Mayor Sullivan commented we are applying. Council President Robinson thanked them for presentation. (Report will be included behind minutes.)

- The second item on the agenda was Haven Repairs. Richard Johnson, Public Works Director presented handouts to Council and gave brief discussion of the Haven Animal Shelter, City of Fairhope Public Works Project No. 2023-PWI 015 reference the Major Façade and Remodel. The City of Fairhope will request responses to repair and remodel front façade and interior space of the City's Haven Animal Shelter located at 559 S. Section Street, Fairhope, Alabama. Project estimated at under $100,000.00. Haven is landlocked. In the future we will need to look at a facility to accommodate growth. We are going to put plans together for a bid. Council President Robinson thanked Richard. (Handout will be included behind minutes.)

- Council President Robinson asked Chief Stephanie Hollinghead to come forward for discussion on relocating Handicap Parking and RV Parking during Mardi Gras parades for this year or next year. Council President Robinson and Council discussed process by resolution with City Attorney Marcus E. McDowell. Councilmember Conyers inquired on the amount of revenue generated from parking. Council President Robinson stated approximately $3,500.00. Jennifer Olmstead, Revenue Manager stated there are no reservations as of right now. Council President Robinson recommended analysis for relocation. Council President Robinson stated RVs is an amenity not service. Councilmember Martin discussed ADA compliance. Council President Robinson referred to prior discussion with Councilmember Burrell and he is in favor of leaving resolution as is until we have further information to move forward. Councilmember Conyers stated we owe it to Councilmember Burrell to be present for discussion. Council President Robinson would like a proposed RV setup with logistics. Councilmember Martin inquired on opening date for slots. Ms. Olmstead stated February 1st. Council President Robinson noted our first meeting date is February 13th. Councilmember Boone did not see how we could accommodate with logistics. Councilmember Conyers requested further discussion in March for the next year. Council President Robinson asked that we move forward with discussion after Mardi Gras in March as requested by Councilmember Conyers and with Councilmember Burrell present for the next year. Councilmember Martin asked Chief Hollinghead if there are other issues. Chief Hollinghead discussed noise, alcohol, littering, fire pits, pulling barricades, shutting down roads, and public safety. Council President Robinson thanked Chief Hollinghead. Chief Hollinghead commented we definitely need to reconsider.

Council President Robinson asked Council for Committee Updates.

- Councilmember Martin gave update for Recreation Board. Board met on January 18, 2023. Board plans to increase board membership that will come to Council. Board working to resolve issue with swimming pool, cold vs. hot.

- Councilmember Conyers did not have any committee updates.

- Councilmember Boone gave update for Harbor Board. The board had scheduled meeting on January 12, 2023, there was no quorum.

- Council President Robinson gave update on Historic Preservation Committee. Mayor Sullivan and I met with representative from the Alabama Historical Commission as discussed in a prior Work Session to discuss the benefits of the Historic Preservation Commission and becoming a Certified Local Government. Alabama Historic Commission will attend upcoming Work Session on March 13, 2023.

Council President Robinson briefly asked for Department Head updates with Agenda Items.

- City Treasurer Kim Creech addressed Council and gave update on Item No. 17 to participate in the Municipal Workers Compensation Fund, Inc. for the purpose of obtaining Workers Compensation Insurance coverage through Millennial that will allow a $9,100.00 savings a year. Item No. 18 is a two part to the resolution to implement Safety Program for all employees and to appoint Donnie Grice as Safety Coordinator. Council President Robinson thanked Kim.

- Cory Pierce, Human Resource Manager addressed Council and gave update on Item No. 19 to extend an additional two (2) weeks for employees on the City's Health Insurance to complete a biometric screening with Symbol Health Solutions by February 6, 2023.

- Richard Johnson, Public Works Director addressed Council and gave update on Item No. 11 the procurement of one (1) Toro Groundmaster 3200 4WD Mower or equivalent for the Horticulture Department for a total amount not-to-exceed $33,000.00. We have two (2) mowers on order from John Deere that will not deliver until next year. We are asking to purchase an additional mower and keep the two (2) mowers on order for delivery in 2024.

  Mr. Johnson discussed Item No. 13 procurement of Painting Fire Station #3 Bays with CertraPro Painters with a not-to-exceed amount of $18,000.00. This is the actual Truck Bay Floor that includes scraping, grinding, sanding, and removal of old coating system. Item $1,000 higher than budgeted. Fire Maintenance had funds within budget and City Treasurer, Kim Creech will roll over funds.

  Mr. Johnson discussed Item No. 14 that Mayor Sherry Sullivan is authorized to execute a contract for Professional Engineering Services with Neel Schaffer, Inc. for (RFQ No. PS23-001) Preliminary Engineering for the FY2023 TAP Project – Sidewalks on Blue Island Avenue and Fairwood Boulevard with a not-to-exceed amount of $82,994.00. Item was within budget. City of Fairhope responsible for Engineering at 100%. Transfer from General Fund to cover.

  Mr. Johnson discussed Item No. 16 that City Council approves and adopts recommendations for the Public Works Department to create and fund three (3) full-time Custodians (Pay Grade 4); defund (5) part-time Custodians (Pay Grade 4); and defund Annual Custodial Services Contract with Service Master for automatic renewal on January 26, 2023, and authorizes Mayor Sullivan to enter a month-to-month contract with Service Masters. This item was discussed at Work Session on January 9, 2023.

Mr. Johnson discussed Item No. 8 to award (Bid No. 23-009) to McElhenney Construction Company for Founders Park Athletic Track and Additional Parking Project with a total bid proposal not-to-exceed $2,480,680.04. He discussed bid process. Sawgrass asked question on proposal if the Track and Field Facility is designed to meet certification for a State or Regional Track Meet. We answered yes, City of Fairhope could host a Track Meet for a State or Regional Competition. National Organization says this is what you are to design to for Track & Field Venue. I recommend resurfacing and stripping upper parking lot. Dual long jumps are oriented east and west. We can take out of contract. Build one (1) instead of two (2). Expensive project. We are building a track with no gradient change. Competition track is level on two terrace fields. Sewer and utility relocates. High budget number for relocation. New parking lot to support facility. Public Works Director standpoint recommendation is appropriately met within procurement process. Council President Robinson thanked Richard and advised they would further discuss questions at meeting.

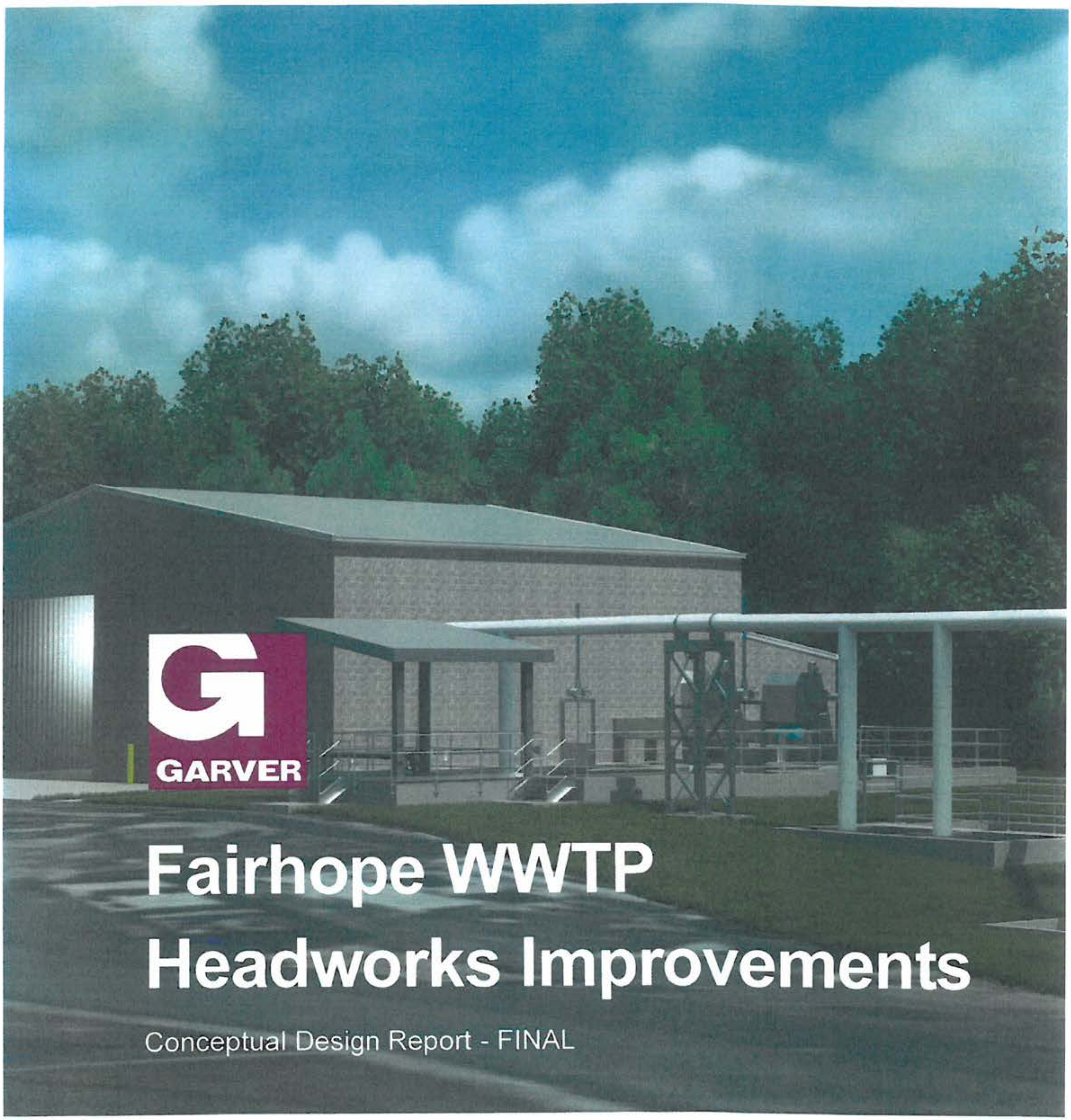
- Jeremy Little, Gas Department Superintendent, discussed Item No. 9 to award (Bid No. 23-013) to Donohoo Chevrolet, LLC for New Chevrolet Silverado 3500 HD 4WD Crew Cab with 177' WB, 60" CA LT or equivalent with a total bid proposal not-to-exceed $64.784.50. Item was under budget $7,215.50. Council President Robinson thanked Jeremy.

- Pat White, Director of Recreation Department discussed Item No. 10 that the City of Fairhope approves the procurement of 400 – 42' Rolls of TifTuf Bermuda Sod for the New Baseball Fields Project at Volanta Park with a non-to-exceed of $44,016.00. Council President Robinson thanked Pat.

There being no further business to come before the City Council, the meeting was duly adjourned at 5:55 p.m.

Jay Robinson, Council President

Jenny Opal Wilson, CMC
Assistant City Clerk



Fairhope WWTP Headworks Improvements

Conceptual Design Report - FINAL

GARVER

PREPARED FOR

City of Fairhope

August 2022

CITY OF FAIRHOPE ALABAMA

Fairhope Wastewater Treatment Plant Headworks Evaluation

Conceptual Design Report

City of Fairhope
Fairhope, AL

Prepared by:

GARVER

808 Howard Avenue, Suite 201
Biloxi, MS 39530

August 2022

Garver Project No.: 22W10090

Engineer's Certification

I hereby certify that this Preliminary Design Report for the headworks evaluation of the wastewater treatment plant headworks was prepared by Garver under my direct supervision for the City of Fairhope

Lindsay Tucker, PE
State of Alabama PE License 34434

Wes Cardwell, PE
State of Alabama PE License 34112

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List of Acronyms

ACH	Air Changes per Hour
CDR	Conceptual Design Report
City	City of Fairhope
FPS	Feet per Second
ft	Feet
FM	forcemain
FRP	Fiberglass Reinforced Plastic
G	Gravity
GPM	Gallons per Minute
HGL	Hydraulic Grade Line
HP	Horsepower
in	Inches
O&M	Operations and Maintenance
OPCC	Opinion of Probable Construction Cost
MGD	Million Gallons per Day
MH	Manhole
NFPA	National Fire Protection Agency
SCFM	Standard Cubic Feet per Minute
SSO	Sanitary Sewer Overflow
UHMW	Ultra High Molecular Weight
UV	Ultraviolet
WSE	Water Surface Elevation
WWTP	Wastewater Treatment Plant

1.0 Executive Summary

The City of Fairhope's wastewater treatment plant (WWTP) is a conventional activated sludge facility with a permitted design capacity of 4 million gallons per day (MGD). The City of Fairhope (City) is preparing to improve the fine screening and grit removal processes of the WWTP and has enlisted Garver to assess the existing facility, analyze design alternatives, and provide recommendations and conceptual design concepts for improvements to the headworks. Staff have voiced various concerns with the current headworks facility, and those concerns have been analyzed and addressed in this evaluation. The goals of the conceptual design evaluation, centered around staff feedback, are to increase redundancy, deliver reliability and resiliency, address odor control, and optimize system hydraulics to accommodate increasing future flows. This evaluation analyzes current plant conditions as well as potential alternatives and future hydraulic loadings.

A hydraulic profile for the existing headworks facility and upstream/downstream yard piping systems at the Fairhope WWTP was developed and analyzed for the historical/current flow conditions, the existing equipment capacity conditions, and the desired headworks capacity. For this conceptual evaluation, this hydraulic profile was developed to identify hydraulic limitations that might exist within the preliminary treatment facilities at the WWTP. Since a current survey was not conducted, information used in the hydraulic analysis was gathered from available record drawings. Flow data was assembled from monthly reports from 2019 to current, and the hydraulics of the existing preliminary treatment facilities were analyzed for the existing peak day flow condition (7.43 MGD), current stated capacity of the current headworks equipment (10 MGD), as well as desired future headworks capacity (12 MGD). While it is recommended that a full survey be conducted to verify the findings, the current system appears to have adequate freeboard in the system and up to the influent junction box at current peak day flow conditions (7.43 MGD) and at equipment peak flow ratings of 10 MGD. When a desired future capacity of 12 MGD is analyzed in the current system (assuming the screening and grit removal equipment are also upgraded to accommodate the future capacity), the water surface elevations in the upstream junction box and manhole 5 do not maintain adequate freeboard of 2-feet. There is also currently no hydraulic break between the headworks and collection system. While additional investigation is required to determine the extent of this impact, the water surface elevation upstream of the mechanical screen may significantly influence the conveyance capacity and hydraulic conditions within the upstream gravity portion of the collection system. In lieu of rehabilitating the existing headworks facilities due to constructability concerns and the limited hydraulics, it was recommended that a new headworks facility be considered.

Many technologies exist for consideration in the improvements to the preliminary treatment facilities. Garver detailed and analyzed a variety of fine screening, grit removal, and odor control alternatives and has provided detailed information including the advantages, disadvantages, and relative cost of each equipment category discussed.

Two main alternatives for improvements to the preliminary treatment process at the Fairhope WWTP were analyzed as part of this evaluation. Much of the proposed design is common between both alternatives including the analyzed flows, screening channel configuration, selection of grit removal system, and method of odor control and containment. The first alternative consisted of constructing a new headworks facility and directing wastewater to the treatment process by gravity, while utilizing the existing yard piping and without the need for pumping or additional unit processes. This would decrease overall project costs but not resolve the hydraulic interconnection between the headworks and the collection system. This alternative poses potential constructability issues with the need for bypass pumping and utilizing existing manholes that have been noted to be of concern due to their limited depth.

A second alternative consisted of similar facilities and considerations as previously described but includes a new influent pump station to receive all raw wastewater and pump to the proposed headworks facility instead of wastewater flowing to the headworks through the existing gravity system. With the construction of an influent pump station, capacity of the collection system could likely be improved, and the likelihood of overflow events directly attributable to the headworks facility at the WWTP can be minimized. This alternative is more costly due to the capital costs associated with constructing a pump station along with annual operation and maintenance costs of the additional equipment. This alternative also has similar constructability issues with need for bypass pumping and utilizing existing manholes.

Other considerations for the analysis included various site layout and constraints related to space for operator access, traffic considerations for large trucks or vehicles, grease management, sound control, and general odor management. These elements are discussed in general herein but require additional consideration to be undertaken during the detailed design effort.

After analyzing the system hydraulics for both alternatives, it is recommended that the City proceed with Alternative 1. An influent pump station is not necessary to obtain desired freeboard in the system. Given that a possible pump station would add complexity and cost to the project, it was not included in this final report following the preliminary findings workshop with the City. Various equipment and facility configurations were evaluated as part of the conceptual design development and are outlined in this report. The recommended alternative consists of constructing a new headworks facility and directing raw wastewater to the treatment processes by gravity. The layout and process outlined in the recommended alternative include design elements and equipment selection that address the facility's desire for redundancy, increased odor control, and resiliency during higher flow conditions.

2.0 Introduction

The City is currently undertaking a project to improve the existing headworks facility at the City's wastewater treatment plant (WWTP). More specifically, this project will improve the operational performance and reliability of the headworks process as well as provide capacity to meet future flow conditions and to improve hydraulic conditions within the collection system entering the WWTP. The City has commissioned Garver to complete the conceptual design effort. This Conceptual Design Report (CDR) summarizes this effort and documents the design criteria, technology alternatives, and recommended improvements and associated design concepts for the headworks improvements project.

2.1 Background

The WWTP has undergone several upgrades since originally constructed in the 1950s. The most recent upgrades to the facility were completed in 2015 and included multiple improvements throughout the plant, including the headworks. During this effort, headworks improvements included installation of a new mechanical screen and screenings washer/compactor unit along with miscellaneous rehabilitation to the existing aerated grit and grease removal channel. These improvements were made to the original structure. The original construction date of the headworks facility is not known.

2.1.1 Existing Plant Description

The WWTP provides wastewater treatment for the City and operates under National Pollutant Discharge Elimination System (NPDES) permit number 0020842. With a permitted design capacity of 4 million gallons per day (MGD), the facility utilizes an activated sludge treatment process and provides tertiary treatment prior to discharging treated effluent to Mobile Bay. Raw wastewater is conveyed to the WWTP through multiple gravity and pumped flow systems and routed to the headworks facility for preliminary treatment through fine screening and grit removal. After grit removal, screened and degritted wastewater is directed to the aeration basins for biological treatment followed by secondary clarification to achieve separation of the effluent (liquid) and activated sludge (solids). Secondary effluent is conveyed to the compressible media tertiary filtration process and disinfected through the ultraviolet (UV) disinfection process before final discharge through the plant outfall. Solids treatment processes at the WWTP consist of aerobic digestion and sludge dewatering utilizing a trailer mounted belt filter press. The dewatering process is currently managed and operated by GreenSouth Solutions.

A site layout of the existing WWTP showing the location of the process units described above is provided in Figure 2-1.

2.1.2 Description of Existing Headworks

Figure 2-2 shows the current configuration of the headworks facility and related influent conveyance piping at the Fairhope WWTP. Raw wastewater is routed to the WWTP through multiple force mains and gravity piping systems and discharges into the influent junction box. From the influent junction box, wastewater is conveyed to the screening facility. The screening facility is configured with one perforated plate-style screen and one bypass channel with a manual bar screen should the perforated plate screen be out of service. The screenings are then washed and compacted and discharged into the dumpster.

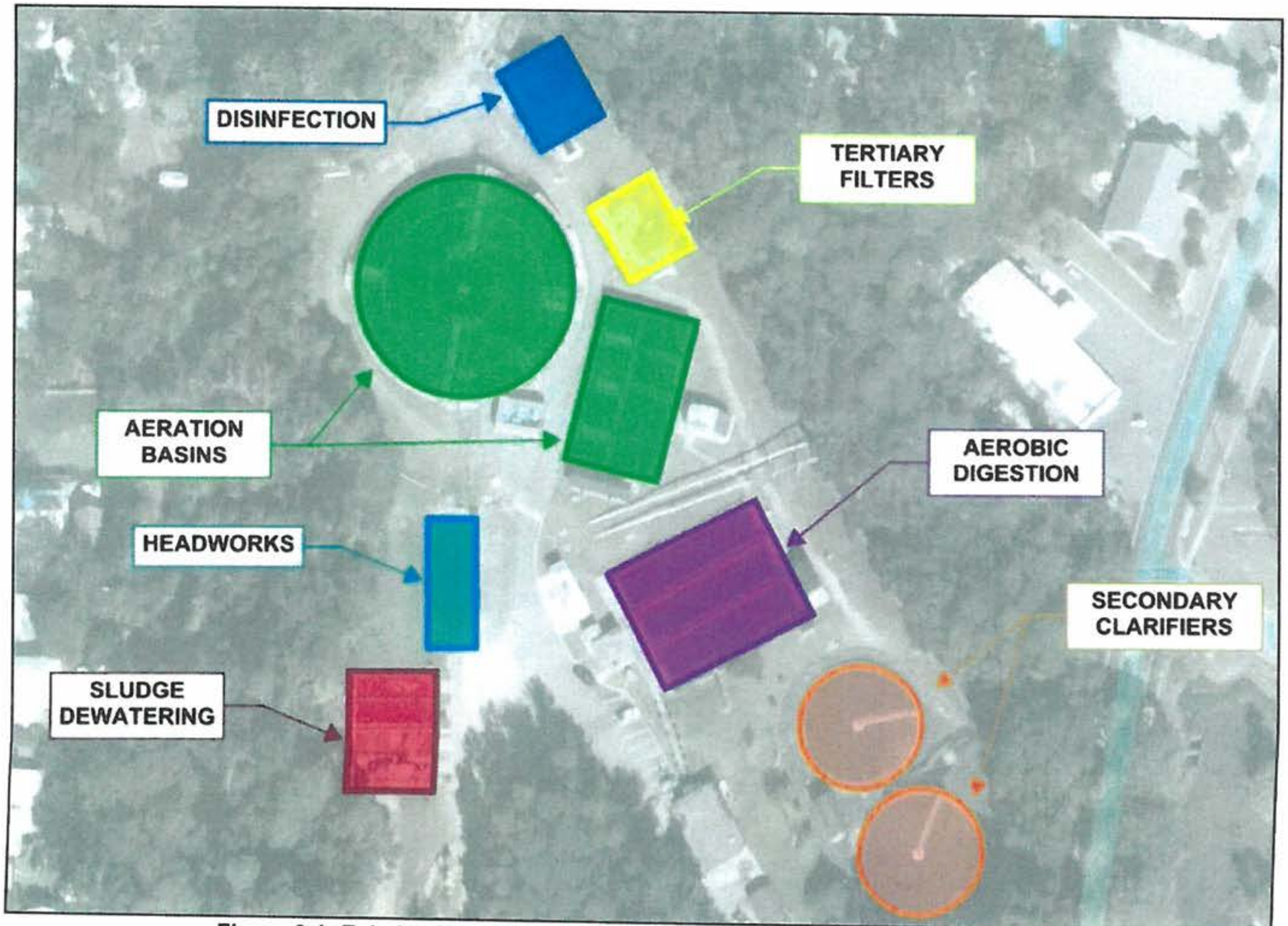

Figure 2-1: Existing WWTP General Site Plan and Major Unit Process Layout

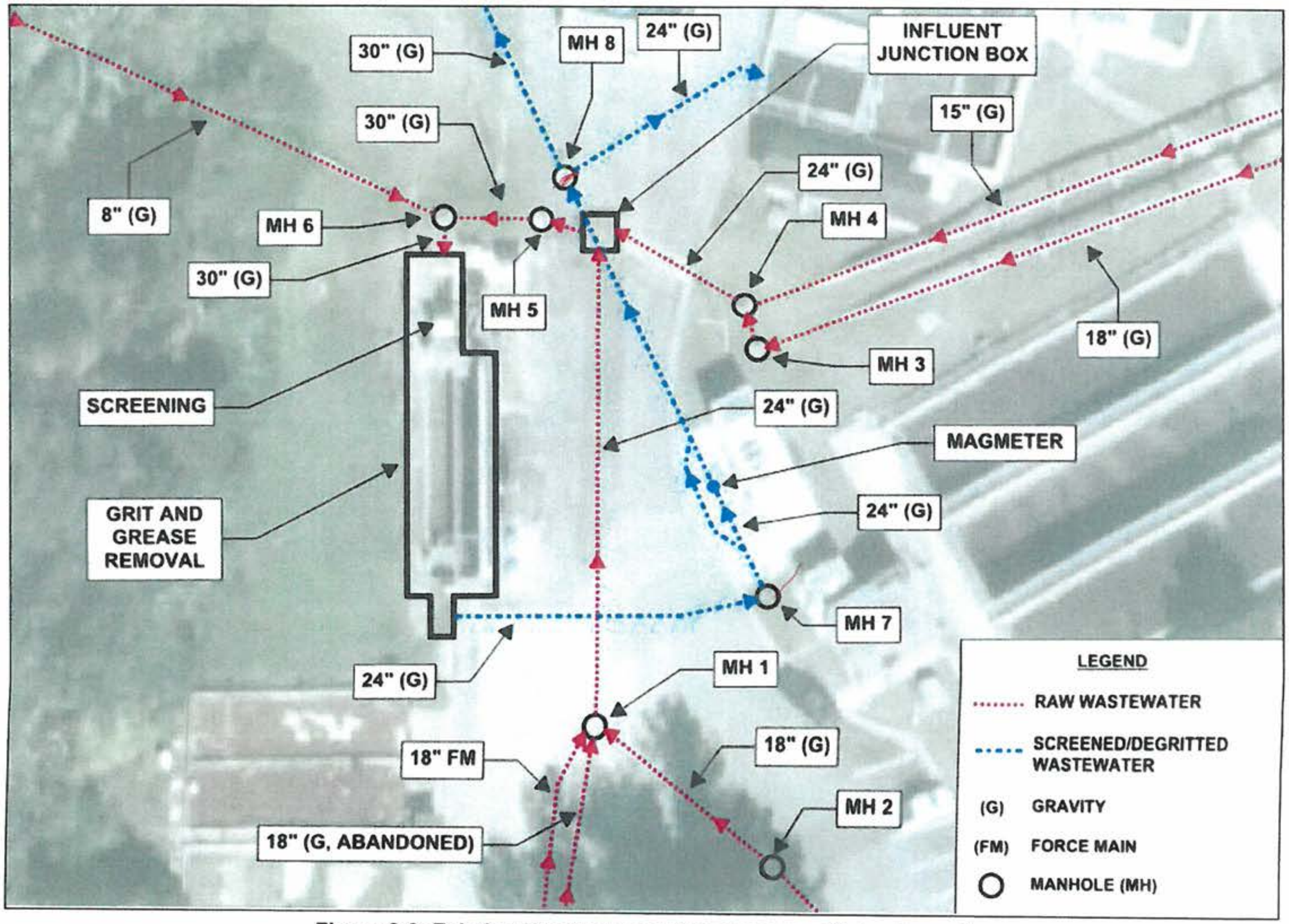

Figure 2-2: Existing Headworks and Conveyance Piping Layout

A summary of the existing screening facility is provided in Table 2-1.

Table 2-1. Existing Screening Facility Summary

Item [1]	Units	Value
Channel Characteristics		
Number of Channels	-	2
Channel Width	ft.	5.0
Channel Depth	ft.	4.67 (Channel bottom to top of channel)
Mechanical Screening		
Number of Channels	-	1
Design Peak Flow Capacity	MGD	10
Design Screen Blinding Condition	%	50
Type	-	Perforated Plate
Opening Size	in.	0.25
Screen Angle from Horizontal	degrees	45
Bypass Channel		
Number of Channels	-	1
Type	-	Manually Cleaned Bar Screen
Opening Size	in.	Unknown
Screen Angle from Horizontal	degrees	Unknown
Screenings Washer Compactor		
Number of Units	-	1
Solids Loading Capacity	ft^3/hr	70
Solids Volume Reduction, max.	%	60
Dryness, max.	%	50
Organics Reduction, max.	%	90

Notes:
1. Information obtained from record drawings, shop drawings, and manufacturer provided design criteria.

Screened wastewater flows to the aerated grit chamber for grit removal. The aerated grit basin also includes a side channel for grease removal. A traveling bridge equipped with a submersible pump is used to transfer grit slurry from the grit channel to the grit classifier. Grease is removed from the adjacent grease channel through use of a grease separator tray. The grease separator tray is lifted out of the channel and discharges the collected grease into a dumpster for disposal. Following the grit removal process, the influent flow rate is measured using a magmeter and routed to the aeration basins for secondary treatment.

Table 2-2 provides a summary of the existing grit removal facility.

Table 2-2. Existing Grit Removal Facility Summary

Item [1]	Units	Value
Channel Characteristics		
Number of Channels	-	2 (One grit removal, one grease removal)
Grit Removal		
Number of Channels	-	1
Design Peak Flow Capacity	MGD	10
Type	-	Aerated Grit Chamber
Channel Width	ft.	7.17
Channel Length	ft.	59
Channel Depth	ft.	17.34 (Channel bottom to top of channel)
Number of Blowers	-	2
Blower Motor Size, Capacity	HP/scfm	10, Unknown
Grit Pumping		
Type	-	Traveling Bridge w/ Submersible Pump
Number of Units	-	1
Pump Motor Size, Capacity	HP, gpm	3, Unknown
Grit Disposal		
Type	-	Screw-type Classifier
Screw Diameter	in.	12
Grease Removal	%	60
Number of Channels	-	1
Channel Width	ft.	6.5
Channel Length	ft.	59
Channel Depth	ft.	Sloped Bottom, Variable

Notes:
1. Information obtained from record drawings, shop drawings, and manufacturer provided design criteria.

2.1.3 Existing Headworks Facility Concerns

Through discussions with plant staff and site visits by the project team, several deficiencies and/or concerns associated with the existing headworks facility have been identified. These deficiencies are summarized as follows:

- **Influence of Headworks on Collection System**: As previously described, the influent junction box receives raw wastewater flow from four different collection system piping systems. From this influent structure, raw wastewater is conveyed through gravity piping to the headworks facility. In this current configuration, there is no true hydraulic separation between the influent structure and the headworks facility and, consequently, the collection system is influenced by the water level within the screening channels. While this is not uncommon, this backwater condition can reduce the conveyance capacity of the collection system if the water surface elevation at the headworks is allowed to become too high and create surcharge conditions upstream of the WWTP which may lead to sanitary sewer overflow (SSO) events.
- **Future Peak Flow Conditions**: Currently, the City is completing several improvements projects within the collection system to upsize collector mains and to reconfigure pump station/forcemain routing to the plant. As a result of the upsizing, it is anticipated that the influent wastewater volume will have a higher instantaneous flow rate than seen before, which could lead to additional surcharging and potential overflows of the manholes of lines leading to the plant.
- **Lack of Redundancy**: With only one mechanical screen and grit removal chamber, limited redundancy exists at the existing headworks facility. In recent years, the mechanical screen has been taken out of service for repairs over long periods of time (months) and staff were required to be present at the plant continuously (24-hours per day) to manually rake debris from the bar screen in the bypass channel. Due to recent issues created by the pandemic, the ability to maintain an adequate spare parts inventory as well as to reliably obtain replacement parts has been extremely limited. This difficulty contributes to the delay placing the mechanical screen back into service. For a community and wastewater plant of its size, having redundancy on major mechanical parts is imperative to proper operations.
- **Odor Control**: Presently, no odor control systems are in place at the headworks facility and the surrounding community has made odor complaints. While the screening channels can be covered, the aerated grit chamber cannot be easily covered due to the traveling bridge. This process is considered as having high odor-generation potential due to the turbulence of the raw wastewater created by the aeration system.

2.2 Evaluation Objective

The objective of this headworks evaluation is to assess the existing facility, analyze alternatives, and provide recommendations and conceptual design concepts for improvements to the headworks facility that will increase equipment redundancy, deliver reliability and resiliency, address odor control measures, and optimize system hydraulics to accommodate future flows.

2.3 Evaluation Flow Criteria

For this headworks evaluation, two flow conditions are considered. First, the current flow conditions and existing equipment capacity were utilized to evaluate the existing headworks and to identify any restrictions or concerning operating characteristics. The second flow condition was identified during the project kickoff meeting and is considered the basis of evaluation for the necessary improvements to the headworks facility. This flow condition (12 MGD) matches that of the existing UV disinfection facility and is considered to be appropriate by the project team for conceptual design/evaluation purposes. Additionally, this flow condition is believed to be sufficient for the anticipated flow increase to the WWTP associated with the improvements to the collection system. For purposes of this conceptual design report, this flow condition is referred to as the "Desired Headworks Capacity."

3.0 Existing Headworks Facility Hydraulic Analysis

A hydraulic profile for the existing headworks facility and upstream/downstream yard piping systems at the Fairhope WWTP was developed and analyzed for the historical/current flow conditions, the existing equipment capacity conditions, and the desired headworks capacity. In general, the purpose of developing and analyzing the hydraulic profile for existing facilities is to confirm that sufficient hydraulic gradient is provided in the design to allow the wastewater to flow through the unit processes by gravity. Sufficient freeboard must be provided to prevent liquid from splashing out of the structures or flowing out of manhole during high-water level conditions. For this conceptual evaluation, this hydraulic profile was developed to identify hydraulic limitations that might exist within the preliminary treatment facilities at the Fairhope WWTP and to determine the available head, if any, for potential future unit process modifications.

3.1 General Assumptions

To develop the hydraulic profile of the existing preliminary treatment facilities at the Fairhope WWTP, various assumptions were used. Weir elevations, top of wall elevations, slab elevations, and yard piping sizing/configuration details were obtained from record drawings of previous projects including the 2013 WWTP Upgrades project (designed by Volkert) and the 2019 Wastewater Collection and Transmission Improvements project (designed by Dewberry). General assumptions used for this effort are summarized in Table 3-1.

Table 3-1: Existing Hydraulic Profile Development General Assumptions

Element	Assumptions
Yard Piping Systems	• Ductile Iron Pipe • Hazen-Williams Friction Loss Coefficient (C) = 110
Screening	• Manning Roughness (n) = 0.013 • Screen Blinding = 50% • Headloss = As defined by Manufacturer at each flow condition. • All flow through mechanical screen channel (no bypass or portion of influent flow through manual screen channel)
Grit Removal	• No effluent/downstream weir; Water level influenced by downstream WSE and top of effluent channel.
Freeboard	• In general, desired freeboard conditions are considered to be 2-ft. and no less than 18-inches during peak flow events.

3.2 Historical Flow Data

Historical influent flow data from January 2019 through May 2022 was provided by City staff for analysis by the project team. The flow data was based on daily, 24-hour averages and instantaneous peak flow information is not recorded/available. This data is shown in Figure 3-1. Table 3-2 provides a statistical summary of the data.

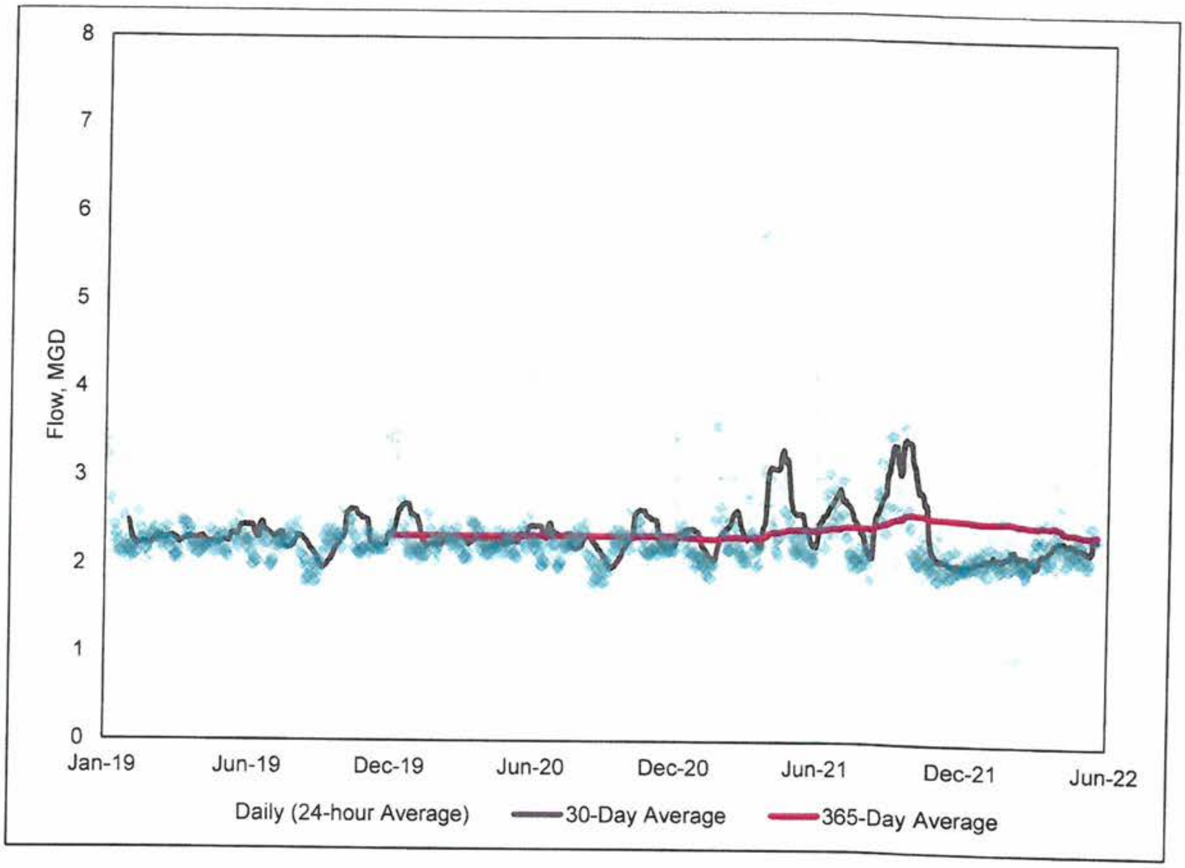

Figure 3-1: Historical Influent Flow Data

Table 3-2. Historical Influent Flow Data Summary

Design Flow Condition	Units	Value
Minimum	MGD	1.0
Average Day (1)	MGD	2.37
Maximum Month (1)	MGD	3.46
Peak Day (1)	MGD	7.43

Notes:
1. Historical flow data provided from January 2019 through May 2022.

3.3 Hydraulic Profile – Existing Peak Flow Conditions

The hydraulics of the existing preliminary treatment facilities were analyzed for the existing peak day flow condition (7.43 MGD). Figure 3-2 illustrates the hydraulic profile for this condition.

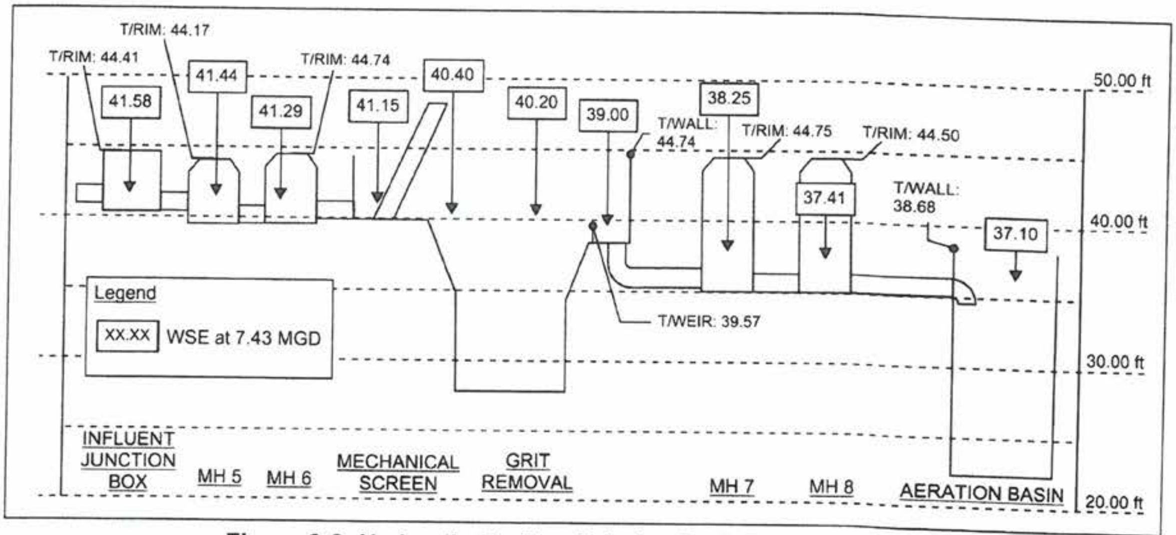

Figure 3-2: Hydraulic Profile - Existing Peak Flow Conditions

It was assumed in the analysis that the WSE in the aeration basin was at the design high water level of 37.10-feet. Additionally, staff report that the flow control weir gate installed within manhole 8 is left in the "up" position as the flow meter upstream that required the full pipe flow is no longer being used. It is assumed that the gate does not interfere or influence the water surface elevation within this manhole during any flow condition at this current position.

The hydraulic analysis for the existing flow conditions indicates that sufficient freeboard (greater than 2-ft.) exists within the preliminary treatment structures, up to and including the influent junction box. At this peak flow condition, velocities within the yard piping system are approximately 3.7 feet per second (FPS) and are not considered to be high or excessive. The effluent weir of the grit removal channel is not submerged during this condition.

3.4 Hydraulic Profile – Existing Headworks Equipment Capacity Conditions

The hydraulics of the existing preliminary treatment facilities were also analyzed for a peak flow condition matching the stated capacity of the mechanical screen and grit removal equipment (10.0 MGD). These results are illustrated in Figure 3-3.

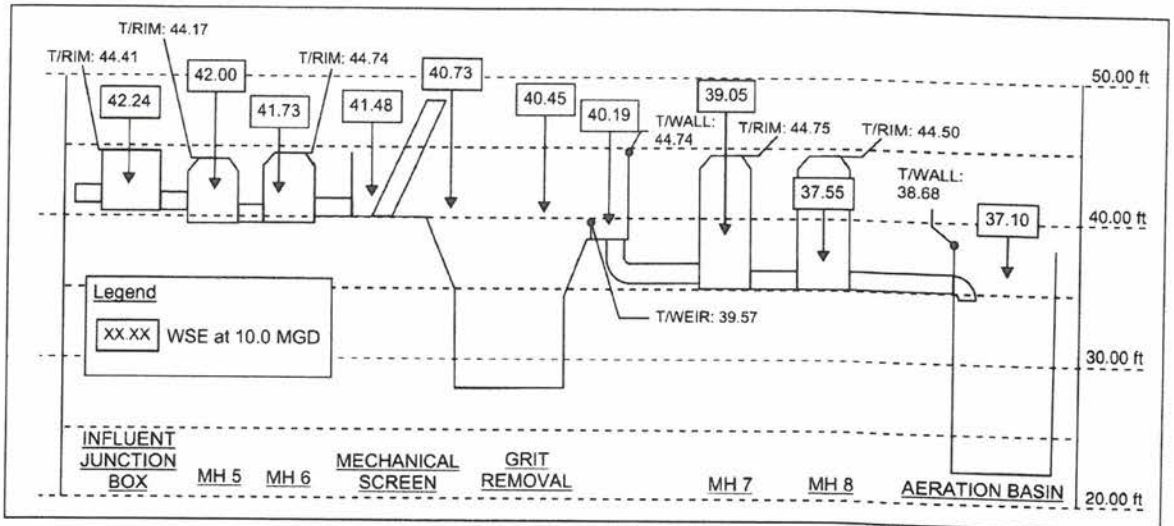

Figure 3-3: Hydraulic Profile - Existing Headworks Equipment Capacity Conditions (10 MGD)

As indicated in Figure 3-3, sufficient freeboard (greater than 2-ft.) is maintained through the headworks facility. Similar to the previous condition, it was assumed in the analysis that the WSE in the aeration basin was at the design high water level of 37.10-feet and that the flow control gate in manhole 8 does not influence the water surface elevation through this manhole. The effluent weir of the grit removal channel is not submerged during this condition.

3.5 Hydraulic Profile – Desired Headworks Capacity Conditions

The existing preliminary treatment facilities were also analyzed for the desired headworks capacity condition (12 MGD) to determine if the existing units can accommodate this increased flow or if this peak flow condition would exceed the available hydraulic head. This analysis assumes the existing screening and grit removal equipment would be modified or replaced with equipment of sufficient capacity to treat this flow condition at the same peak flow headloss condition of the existing equipment (9-inches) as this is representative of similar technologies and recommended operating conditions. These results are illustrated in Figure 3-4.

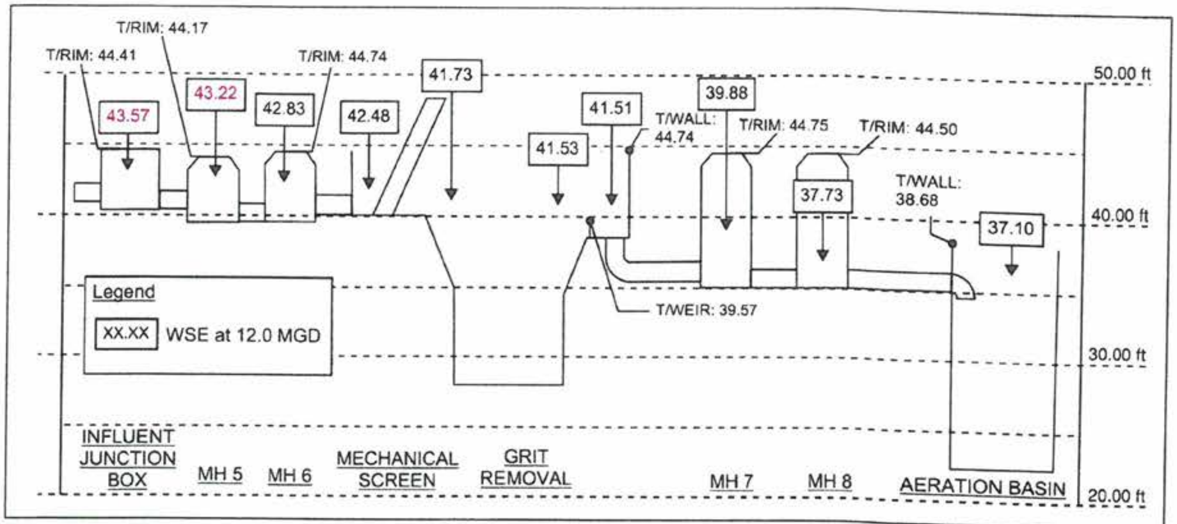

Figure 3-4: Hydraulic Profile - Desired Headworks Capacity Conditions (12 MGD), Existing Facility

The existing headworks facility can treat 12 MGD without the upstream WSE in the influent junction box and manhole five overtopping the structures, as shown in Figure 3-4. However, the freeboard condition in the influent junction box and manhole 5 is less than the recommended 18-inches. The additional headloss within the system is attributable to the velocity conditions within the existing yard piping system (5.91 FPS). Similar to the previous conditions, it was assumed in the analysis that the WSE in the aeration basin was at the design high water level of 37.10-feet and that the flow control gate in manhole 8 does not influence the water surface elevation through this manhole.

3.6 Impact of Hydraulic Conditions at Existing Headworks on Collection System

As previously described in Section 2.1.3, there is no hydraulic break between the headworks and collection system and therefore the water surface elevation upstream of the mechanical screen influences the conditions within the upstream gravity portion of the collection system. Additional analysis is required to determine the extent of this impact as the portion of the total flow to the WWTP through each of these gravity sections varies. However, for reference, Table 3-3 summarizes the rim elevations of each of the upstream manholes with the water surface elevations at the influent junction box. Refer to Figure 2-2 for the manhole designations used in Table 3-3.

Table 3-3: Headworks WSE Conditions Comparison to Upstream Manholes

Hydraulic Scenario	WSE Influent Junction Box	Rim Elevations Upstream of Headworks			
		MH 1	MH 2	MH 3	MH 4
Existing Peak Flow Conditions, 7.43 MGD	41.58	44.45	45.06	44.98	44.63
Existing Headworks Equipment Capacity Conditions, 10 MGD	42.24				
Desired Headworks Capacity Conditions, 12 MGD	43.57[(1)]				

Notes:

1. Hydraulic analysis shows water level exceeding the recommended freeboard within the influent junction box during this flow condition. The WSE shown assumes these structures are modified to allow for the HGL and this WSE would be observed at the influent junction box.

During the existing headworks equipment capacity conditions and existing peak flow conditions, the WSE elevations at the influent junction box are below the rim elevations of the upstream manholes. However, at the desired headworks capacity of 12 MGD, the WSE at the influent junction box and manhole 5 is calculated to be less than the recommended freeboard of 18-inches, and, depending on the portion of influent flow that is routed from manholes 1 and 2 to the influent junction box, may exceed other manholes due to the headloss created in the system (as noted above, additional analysis using the collection system model is required to calculate these conditions).

3.7 Findings and Recommendations

Based upon the hydraulic analysis of the existing headworks facility, the following findings and recommendations can be made:

- All elevations used for the hydraulic analysis are based on available record drawings and not from survey data. For detailed design purposes, it is recommended that elevations of all structures and associated hydraulic control points (weirs, bottom of structures, inverts, etc.) be surveyed and compared to the elevation used for analysis to confirm accuracy of analysis.
- The existing peak flow conditions and existing headworks equipment capacity can be conveyed without overtopping or exceeding the recommended freeboard in the influent junction box or manholes 5/6. Additional analysis using the collection system model and accounting for the various flow volumes present in each of the gravity piping systems is required to confirm sufficient freeboard exists in the manholes upstream of the influent junction box and wastewater does not exceed the rim elevation of these structures.
- The existing headworks facilities cannot accommodate the desired headworks capacity (12 MGD) without exceeding the recommended freeboard criteria in the influent junction box or manhole 5.
- While the influent junction box can be modified and additional height provided, it is possible that the HGL also exceeds the rim elevations of other upstream manholes (this should be checked using the collection system model).

4.0 Headworks Facility Considerations

An effective, resilient, and reliable headworks facility is critical to the overall performance of a wastewater treatment facility. Headworks facilities are comprised of several components, each of which require careful considerations to properly design and select equipment that meets the needs and challenges specific to the Fairhope WWTP. This section provides a summary of these considerations.

4.1 Fine Screening

Screening is necessary to remove debris from the raw wastewater stream to prevent clogging of downstream pumps and piping systems, reduce the buildup of rags on equipment such as mixers and sludge collection mechanisms, reduce the accumulation of materials in downstream channels, and otherwise significantly decrease maintenance activities (beyond preventative maintenance tasks) downstream of the headworks. The following sections provide a summary overview of equipment associated with fine screening along with recommendations to be used for conceptual-level planning for the screening improvements at the Fairhope WWTP.

4.1.1 Screening Opening Size and Level of Capture

Screening technologies are characterized by the equipment configuration and the opening (or element spacing) size. As the opening size is reduced, the quantity of screenings that will be retained increases rapidly depending on the wastewater characteristics. Screen opening sizes of 0.375 inch and greater are generally regarded as coarse screens while fine screens have opening sizes of 0.25 inch to 0.1 inch (6 mm to 3 mm). For facilities of similar size to the Fairhope WWTP, fine screens with 6 mm opening sizes are utilized in place of coarse screens. However, if increased screening capture is preferred using a screen opening size less than 6 mm, it is recommended that coarse screens be installed prior to fine screens.

4.1.2 Common Fine Screening Technologies

There are several types of screening technologies available and commonly used at municipal wastewater treatment facilities. These technologies vary based on numerous factors such as opening size, shape, and/or configuration, flow introduction (center vs. front), angle of inclination, and method of cleaning/debris removal. Fine screening technologies considered to be most applicable to the needs of the Fairhope WWTP and discussed in this section include chain-drive multi-rake screens, continuous element bar and perforated plate screens, catenary bar screens, step screens, and rotary drum screens.

4.1.2.1 Chain-Driven Multi-Rake Screen

Multi-rake bar screens consist of a static bar rack that accumulates debris along the entire length of the submerged surface. Screenings are removed with multiple rake bars mounted onto chains on both sides of a self-contained frame. A submerged lower bearing or slide is used to guide the chain and rakes into the bar rack. The lower sprocket rides on a journal bearing that manufacturers claim is "no-maintenance". An alternate design using a fixed curved plate is available in lieu of the conventional sprocket. The plate guides the chain around the lower hub to engage the bar rack just as the sprocket. The advantage of the lower sprocket is that it provides more rigidity in the rakes, increasing their pressure on the front side of the screen and providing additional force to carry screenings up to the discharge point. The lower bearing material varies depending on manufacturers but generally consists of a stainless or hardened steel stub shaft with a low friction, high wear resistant material for the contact surfaces. The bearing is lubricated by the oils present in the wastewater.

Screenings are brought to the top of the screen and are discharged to the screenings conveyance system. The screens are configured so the rakes clean and return in front of the bar rack to prevent carry over of material to the downstream channel. A two-speed drive can be provided so that raking speed can be increased to accommodate high flows or high volumes of screenings in the influent flow stream. Multi-rake bar screens can be provided with bar spacing as little as 0.25-inches.

Advantages to multi-rake bar screens include the ability to perform most maintenance tasks from above the channel, the presence of multiple rakes and a two-speed drive to increase screenings removal capacity, and larger bars to help resist the potential for bending. The primary disadvantage to multi-rake bar screens is the presence of a bottom sprocket or guide plate that requires occasional channel entry for inspection and maintenance.

Figure 4-1 shows a typical multi-rake bar screen installation.

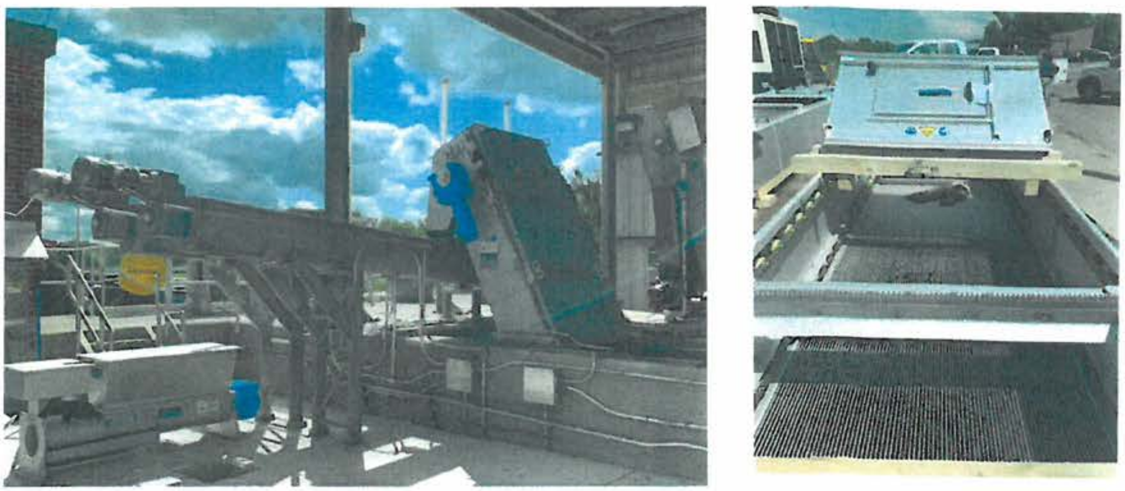

Figure 4-1: Typical Multi-Rake Bar Screen

4.1.2.2 Continuous Element Bar (Rake-Style) Screen

Continuous element screens consist of a series of bars/rakes, referred to as elements, that are linked together to form a continuous "loop" (also referred to as a belt) to filter debris from the wastewater stream. These screens are typically installed at installation angles of 60 to 75 degrees from vertical with an element spacing of 3 mm to 6 mm. As wastewater flows through the spacing between the elements, debris is retained on the face of the elements. To remove the debris from the elements, a drive located at the top of the unit rotates the belt and a rotating brush system is used to remove debris from the face of the screen elements. A washing system is also used to assist in debris removal by applying a high-pressure wash water spray from the backside of the screening elements.

The screening elements are essential to maintain performance of the continuous element screen and to prevent both damage to the screening equipment and to prevent hydraulic issues upstream of the screen. Because the continuous element rotates from upstream of the screen to downstream (as a continuous loop), any debris not removed by the brush/wash system may be passed downstream as the screening elements enter the downstream/backside waste stream. More importantly, should this debris be trapped within the screening elements, excessive head loss and flow restrictions may result in channel flooding upstream of the screen when the elements return to the upstream side of the screen.

Advantages to continuous element bar screens include increased loading rates and screening capture efficiency. The primary disadvantages of continuous element bar screens are the maintenance requirements associated with the brush system, the potential to introduce debris downstream should the performance of the brush/spray system diminish, and the potential for material to accumulate within the continuous belt.

A typical continuous element bar screen is shown in Figure 4-2.

Figure 4-2: Typical Continuous Element Bar (Rake-Style) Screen

4.1.2.3 Continuous Element Perforated Plate Screen

The Fairhope WWTP is currently equipped with a continuous element perforated screen. Perforated plate screens are a variation of continuous element screens, as previously described, but instead of a series of bars/rakes, the continuous loop is comprised of panels with circular openings. These panels are constructed of plastic or stainless steel with rounded orifices throughout the panel. As with bar style continuous element screens, debris is retained on the face of the panels and is removed as the drive unit rotates the belt with a rotating brush and washing system used to remove debris from the face of the screen panels.

Perforate-plate screens are typically provided with 6 mm openings and installed at 60 or 75 degrees from vertical. These screens are generally characterized as having the best screening retention performance of fine-screen technologies but also have the greatest potential for screenings carryover should the rotating brush and washing system be compromised. These screens are also prone to blinding with the presence of grease in the raw wastewater stream or should septage haulers be allowed to dump upstream of the screens without any pretreatment system.

Figure 4-3 shows a typical continuous element perforated plate screen.

Figure 4-3: Typical Continuous Element Perforated Plate Screen

4.1.2.4 Catenary Bar Screen

Catenary bar screens are similar to multi-rake bar screens in that they are a front-raked, front-return type screen with multiple rake bars mounted onto chains on both sides of the channel. However, unlike multi-rake bar screens, catenary bar screens have no lower bearing or sprocket at the bottom of the screen. The chain is comprised of solid links which articulate in one direction only. Instead of a fixed rotation point at the bottom, the rakes are designed to engage with the bar rack and pull debris up the bars under the power of their own weight. The links to which the rakes are attached allow the rakes to move away from the rack and work around large debris to pick it up and prevent equipment stoppage.

Like multi-rake bar screens, catenary bar screens can be configured with a bar spacing as little as 0.25-inches. Other advantages of catenary bar screens include no lower sprockets or bearings in the channel, all maintenance tasks can be performed above the channel, and the rakes can pivot around large objects, keeping them in service and reducing the likelihood for jamming. Disadvantages include the potential for material accumulation on the chains and the potential for material accumulation at the base of the screen due to the rakes pivoting around large objects.

A typical catenary bar screen installation is provided in Figure 4-4.

Figure 4-4: Typical Catenary Bar Screen

4.1.2.5 Step Screen

Step screens, also known as stair screens, are typically provided with nominal spacing between the screening elements of 6 mm or 3 mm. Because these screens are designed to operate with a screenings mat, the capture rate is enhanced as the effective opening size is much smaller due to the accumulation of material on the face of the screen. Step screens are configured with two sets of long, thin strips of lamellas (2 to 3 mm in thickness) with one set stationary and the other designed to rotate in and out of the screen. This rotation creates a step motion that lifts the screenings that accumulate on the face of the lamellas upward until they are discharge at the top of the screen. The moving lamellas are typically connected by chain drives or levers. Step screens are typically installed at installation angles of 40 to 55 degrees from vertical. With the shallow installation angle, these screens are capable of screening high flows at a low head loss across the screen. Additionally, step screens can handle a high screenings load compared to other fine screen technologies.

Because of the thin lamellas, step screens are susceptible to grit and large objects and are typically used downstream of coarse screens or for applications with several pump stations ahead of the wastewater treatment plant. Flexible lamellas are used for the bottom section of the screening face to prevent blockage or damage from large options. Water flushing connections can also be provided to prevent accumulation of grit under the lamellas.

Figure 4-5 shows a typical step screen installation.

Figure 4-5: Typical Step Screen

4.1.2.6 Rotary Drum Screen

Rotary drum screens are rotating screens consisting of wedge wire or perforated plates with opening sizes ranging from 0.5 to 6 mm. The drum screens consist of a rotating perforated drum with a transport screw which transports the separated solids out of the drum. The internal drum typically rotates on wheels and operates by a cog gear motor. Drum screens can be internally or externally fed. For internally fed drum screens, the flow enters the end of the drum and screenings are collected inside the drum and conveyed to a discharge point at the front of the screen using large, internal auger flights. The screened wastewater flows out of the drum. For externally fed screens, the flow enters through the outside of the drum and screenings are collected on the outside face of the drum and conveyed to a discharge point. The screened wastewater flows into the drum. Internally fed screens have a higher capacity compared to externally fed screens.

Rotary drum screens must be used in pumped flow applications where the water must be pumped over an influent weir and into the drum of the screen. Blinding can occur on the screen surface and generate additional head loss through the screen but may also provide additional filtering through smaller openings than the actual screen opening size. Rotary drum screens are most often installed as vessel-type units as the fully enclosed nature of the unit provides the ability for high odor capture. Odor control is further improved through utilization of piping for the influent and effluent connections, eliminating the need for channels.

Figure 4-6 shows a typical vessel-type rotary drum screen installation.

Figure 4-6: Typical Rotary Drum Screen

4.1.2.7 Fine Screening Technology Comparison Table

Table 4-1 summarizes the key advantages and disadvantages associated with each screening technology previously discussed.

Table 4-1: Screening Technology Comparison Table

Technology	Advantages	Disadvantages	Relative Cost [1]
Chain-Driven Multi-Rake Screen	• Most maintenance elements are located above the channel and do not require equipment to be removed from the channel. • Easy to cover for odor control. • Positive engagement with static bars. • Larger bars more resistant to bending. • Multiple manufacturers. • Multiple rakes and two-speed drive increases screenings removal capacity.	• Bottom sprockets located in waste stream require occasional channel entry for inspection and maintenance. • Poor/moderate screenings capture (compared to other fine screen technologies).	$
Continuous Element Bar Screen	• Dual, offset element configuration provide better screenings capture (compared to other fine screen technologies). • Multiple manufacturers, but performance is not consistent. • Easy to cover for odor control.	• Single element configuration provides for poor/moderate screenings capture (compared to other fine screen technologies). • Improved performance unique to one manufacturer. • Potential for screenings carryover if brush and spray wash system is not operating properly.	$$$
Continuous Element Perforated Plate Screen	• High screenings capture. • Easy to cover for odor control. • Pivot design allows for unit to be rotated out of channel.	• Potential for screenings carryover if brush and spray wash system is not operating properly. • High potential for grease blinding.	$$$

Technology	Advantages	Disadvantages	Relative Cost [1]
Catenary Bar Screen	• No lower sprockets in channel. • Maintenance can be done above channel. • Easy to cover for odor control. • Pivots around large objects (allowing screen to remain in service). • Easy to cover for odor control.	• Potential for material to hang up on chain requiring weekly cleaning. • Smaller bars of static screen system are more prone to bending. • Pivots around large objects allowing debris to accumulate on the face of the screen or in the channel. • Limited manufacturers. • No positive engagement places teeth at risk of damage if not lined up with bars.	$
Step Screen	• Ability to maintain a screenings mat increases screenings capture. • Easy to cover for odor control. • Low head loss requirements and high hydraulic throughput. • Pivot design allows for unit to be rotated out of channel.	• Lamella plates are susceptible to damage from grit and large objects. • Buildup of screenings mat can generate odors if equipment/channels are covered with no foul air capture system.	$$
Rotary Drum Screen	• High screenings capture. • Modular system provides for high odor capture. • Low screenings carryover potential.	• Most suitable for pumped flow applications unless significant hydraulic footprint is available.	$$$

Notes:

1. Costs indicated are relative to other technologies. Rating may change based on application and screen opening size requirements.

4.1.2.8 Fine Screening Technology Recommendation

For purposes of this conceptual design effort, it is recommended that the continuous element bar screen technology be used for preliminary project planning and development of project costs. It is recommended that two mechanical fine screen units be considered to provide for redundancy. This recommendation is made due to the similar channel requirements and hydraulic characteristics of each of the screening technologies, the improved screening capture without the potential for blinding, and the ability for containment of foul air for odor control. During the detailed design effort, this selection should be confirmed following site visits with City staff to plants of similar size with this technology in operation to better understand maintenance and operation requirements of this technology.

4.1.3 Screenings Conveyance

The screening material removed by the fine screening equipment must be conveyed from the screen discharge to the washing and compaction equipment for disposal. Belt conveyors, shafted screw conveyors, shaftless screw conveyors, and hydraulic sluiceways are commonly used for screenings conveyance. These technologies are described in the following sections.

4.1.3.1 Belt Conveyor

Belt conveyors utilize either a smooth or troughed belt with side skirts, a flat belt with corrugated vertical side walls, or a corrugated belt to convey material. Compared to other technologies, belt conveyors are able to convey a significant screenings volume and do not rely on wash water for conveyance. These conveyance systems can be installed in long runs but are not able to accommodate changes in direction without increasing the system complexity (curved units are available depending on conveyor system). Belt conveyors can be covered but considerations must be given to material accumulation within the drain pans on the underside of the belts and access provisions for maintenance. Doctor blades are required at the end point of the conveyor to prevent screenings from adhering to the belt.

A typical belt conveyor system used for screenings conveyance is shown in Figure 4-7.

Figure 4-7: Typical Belt Conveyor System

4.1.3.2 Shaftless Screw Conveyor

Shaftless screw conveyors consist of a hardened steel spiral installed in a stainless-steel U-trough, driven by a motor and a gear box. The spiral rests on a replaceable ultra-high molecular weight (UHMW) polyethylene liner in the bottom of the U-trough. Advantages of shaftless screw conveyors include the ability to provide removable covers that completely enclose the screenings conveyance, thereby containing any foul air for odor control and preventing material from spilling out of the conveyor, and segmented screws to facilitate easier removal and replacement if damaged. Shaftless screw conveyors must be installed at a nearly flat angle to prevent screenings roll back.

Figure 4-8 shows a typical shaftless screw conveyor system.

Figure 4-8: Typical Shaftless Screw Conveyor System

4.1.3.3 Shafted Screw Conveyor

Shafted screw conveyors also consist of augers contained within a U-trough and driven by a motor and a gear box. However, instead of the auger resting atop a UHMW polyethylene liner, intermediate bearings are used to support the shaft. Shafted screw conveyors can accommodate a greater incline, compared to shaftless screw conveyors, as the shaft minimizes the likelihood for material rollback, but the intermediate bearings have been found to cause debris to accumulate.

An example of a typical shafted screw conveyor system is shown in Figure 4-9.

Figure 4-9: Typical Shafted Screw Conveyor System

4.1.3.4 Hydraulic Sluiceway

Hydraulic sluiceways use washwater to convey screenings through a metal pan to the washing/compactor equipment. This technology provides numerous advantages to other conveyance technologies including prewashing of screenings, few moving parts, and the ability for long runs and moderate changes in directions. Disadvantages of hydraulic sluiceways include the large amount of flushing water (sluiceways typically require 300 to 400 gallons per minute (gpm) of clean flush water to convey screenings properly) and the need for larger washer/compactors.

Figure 4-8 shows a typical hydraulic sluiceway system.

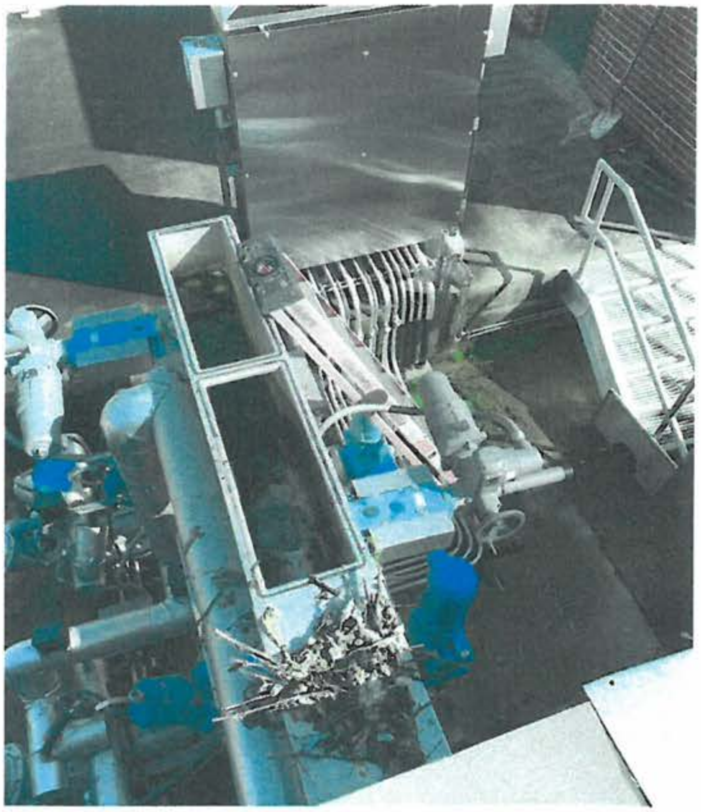

Figure 4-10: Typical Hydraulic Sluiceway System

4.1.3.5 Screenings Conveyance Technology Comparison

The advantages and disadvantages of each of the previously described screenings conveyance technologies are summarized in Table 4-2.

Table 4-2: Screenings Conveyance Technology Comparison

Technology	Advantages	Disadvantages	Relative Cost [1]
Belt Conveyor	• High capacity. • No water needed (adds to washing/compactor capacity). • Long runs possible with change in direction.	• Difficult to contain debris and odors. • Single discharge location only.	$$
Shaftless Screw Conveyor	• Easy to contain debris and odors. • Segmented screws allow for easier removal. • No water needed (adds to washing/compactor capacity).	• Must be nearly flat to prevent material rollback. • Wear liner that supports auger must be replaced.	$$
Shafted Screw Conveyor	• Easy to contain debris and odors. • No water needed (adds to washing/compactor capacity). • No wear liner.	• Limited to runs less than 30-ft. • Intermediate bearings can trap screenings and debris.	$$
Hydraulic Sluiceway	• Prewashes screenings. • Few moving parts. • Very long runs possible.	• Uses large volume of water. • Reduces washer/compactor capacity.	$

Notes:

1. Costs indicated are relative to other technologies. Rating may change based on application and conveyance system configuration.

4.1.3.6 Screenings Conveyance Technology Recommendation

For purposes of this conceptual design effort, it is recommended that shaftless screw conveyors be considered for the screenings conveyance technology as this technology can be easily covered for odor control purposes while providing for reduced maintenance with no intermediate bearings and segmented screws. This recommendation should be confirmed during the preliminary design effort following site visits to other facilities by City staff to inspect and better understand the technology-specific maintenance and operation requirements.

4.1.4 Screenings Washing and Compaction

The use of screenings washing and compaction (washing/compacting) equipment is recommended for fine screen facilities. During screenings washing, organic matter that is captured within the screening material is removed and returned to the wastewater stream. Compaction reduces the screenings volume thereby reducing costs of storage and disposal. Typical screenings contain 85 to 95 percent wastewater. Effective compaction equipment is generally capable of reducing this water content to approximately 50 to 55 percent. This results in a weight reduction of approximately 60 to 85 percent and a volume reduction of approximately 70 to 75 percent.

Most screenings washing/compacting units consist of a hopper containing a shafted screw auger to transport the screenings through a wash zone and into a press zone. In the wash zone, water jets are directed onto the screenings for washing and rinsing. Organic matter is allowed to free drain through perforations at the bottom of the unit and routed to the plant drain system. The screw auger continues to push the washed screenings into the press zone, comprised of a compression friction tube with a bend to form the screenings plug. The high-pressure conditions create the dewatering and compaction effect prior to discharge into the dumpster.

A typical screenings washing/compacting unit is shown in Figure 4-11.

Figure 4-11: Typical Screenings Washing/Compacting Unit

4.1.4.1 Screenings Washing and Compaction Recommendations

For purposes of this conceptual design effort, it is recommended that screenings washer/compactor units be considered. Final sizing of these units should be made during detailed design following confirmation of the fine screen technology to ensure the washing and compaction equipment has the necessary capacity to meet the anticipated screenings volume. This recommendation should be confirmed during the preliminary design effort following site visits to other facilities by City staff to inspect and better understand the technology-specific maintenance and operation requirements.

4.2 Grit Removal

Grit removal processes physically remove heavy, abrasive, inorganic solids from the flow stream. The removal of such grit including sand, gravel, and other large particles is important to protect the downstream process equipment from excessive wear, reduce the formation of deposits in pipelines and process basins, and reduce solids handling. Effective grit removal must consider each associated step of the grit removal process: grit separation, grit slurry pumping, and grit washing and classification. The following sections provide a summary overview of these steps along with recommendations to be used for conceptual-level planning for the grit removal improvements at the Fairhope WWTP.

4.2.1 Grit Characterization and Performance Requirements

Grit characteristics are facility specific and vary depending on numerous factors including collection system characteristics (type, condition, portion of gravity vs. pumped, etc.), soil characteristics of the contributing sewer shed, and industrial dischargers (number of dischargers, pretreatment requirements, process characteristics, etc.). Each of these factors will contribute to the amount, nature, and distribution of grit particles that will be present at a wastewater treatment facility. Often, grit characterization studies are performed to estimate the volume, size, and settling characteristics of the grit present at a facility through sampling of the raw wastewater stream. As the design grit particle size decreases, the cost of grit removal increases. The most suitable grit removal system for a specific WWTP targets and removes only the necessary grit volume to protect downstream process from grit induced maintenance or repairs.

For purposes of this evaluation, it is assumed that the raw wastewater stream at the Fairhope WWTP is typical to that of municipal wastewater treatment facilities near coastal areas. More specifically, the grit removal system should be capable of reliably removing 95 percent of grit particles to 75 microns during average day flow conditions and 106 microns during peak flow conditions. During detailed design, additional consideration should be given to characterizing the grit present in the raw wastewater stream at the Fairhope WWTP to confirm design assumptions and, if necessary, modify the proposed design criteria of the grit removal process (grit particle size).

4.2.2 Grit Separation

The purpose of the grit separation process is to concentrate the grit from the raw wastewater stream. Once concentrated, the grit pumping system conveys this grit slurry to grit-handling processes. Grit separation technologies considered to be most applicable to the needs of the Fairhope WWTP and discussed in this section include aerated grit removal systems, mechanically induced vortex grit removal systems, and stacked tray vortex grit removal systems.

4.2.2.1 Aerated Grit Removal Systems

An aerated grit removal system is currently utilized at the Fairhope WWTP for grit removal. These systems typically consist of a rectangular basin with coarse bubble diffusers along one wall and a bottom floor sloped to a collection trough located beneath the diffusers. These systems operate by introducing air along one side of the rectangular basin to create a spiral roll velocity pattern perpendicular to the wastewater flow stream. This spiral roll pattern keeps organics in suspension while causing the grit to accumulate the bottom of the chamber. The accumulated grit can be removed by a traveling bridge equipped with a submersible or airlift pump, through use of multiple grit slurry pumps located along the length of the chamber, or through screw augers that transport the grit slurry into a grit trough or hopper.

Compared to other grit separation technologies, aerated grit removal systems are considered to be more complex, require a larger footprint, and have higher capital and operation and maintenance (O&M) costs. Additionally, the performance of aerated grit removal systems is strongly dependent on the velocity of the spiral air roll pattern and proper air supply must be always maintained through each of the diffusers. If left uncovered, these systems can create significant odors. For odor control, aerated grit chambers must be covered which may not be practical depending on the method for grit slurry removal (e.g. aerated grit removal systems which utilize a traveling bridge cannot be covered).

The existing aerated grit removal system at the Fairhope WWTP is shown in Figure 4-12.

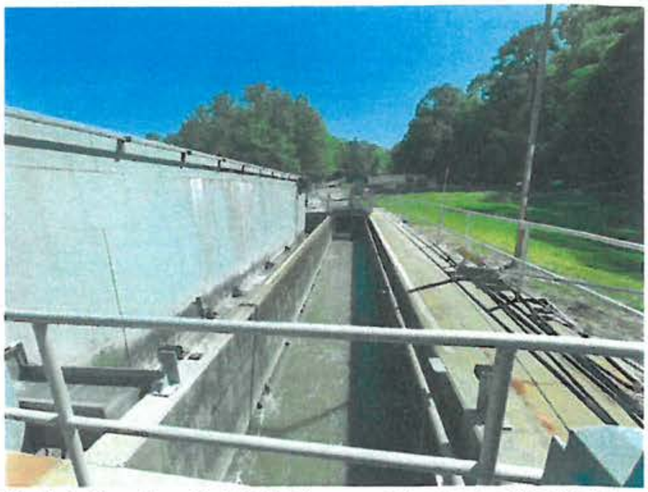

Figure 4-12: Existing Aerated Grit Removal System at the Fairhope WWTP

4.2.2.2 Mechanically Induced Vortex Grit Removal Systems

Mechanically induced vortex grit removal systems work on the principles of gravity and centrifugal action to capture grit in the center hopper of a circular tank. Screened wastewater enters the circular grit basin at a tangent to the outside of the basin producing a spiraling, vortex flow pattern. This flow pattern causes heavier grit particles to the outside and to the bottom of the chamber while the wastewater exits the basin over an effluent weir near the top of the basins. Impellers (paddles) at the center of the basin are used to separate organic materials from the grit particles. As the grit passes under the paddles, a lifting action is created that suspends and lifts the lighter organic material where they exit the basin with the wastewater. Grit accumulates within a storage hopper at the bottom of the grit chamber where pumps are used to convey this grit slurry to grit processing equipment.

Mechanical vortex grit removal systems have a smaller footprint and significantly lower capital and O&M costs compared to aerated grit removal systems. Additionally, these systems can maintain performance with variable flow rates, can be easily covered for odor containment, and do not require significant maintenance or operational adjustments. Mechanical vortex grit systems have not been as effective in removing slow settling grit particles although manufacturers have been incorporating baffling and other modifications to improve performance for these particles.

Figure 4-13 shows a typical mechanically induced vortex grit removal system installation.

Figure 4-13: Typical Mechanically Induced Vortex Grit Removal System

4.2.2.3 Stacked Tray Vortex Grit Removal Systems

Stacked tray vortex is a modular, multiple-tray settleable solids concentrator that uses a flow distribution header to distribute influent over multiple conical trays. The multiple trays create a large, concentrated surface area and short settling distances to promote grit separation. Flow is introduced tangentially to establish a vortex flow pattern where solids settle into a boundary layer on each tray and are swept down to the center underflow collection chamber. The grit slurry is continuously pumped to grit processing equipment. Stacked tray systems have a smaller footprint than aerated grit removal systems and require less mechanical equipment for operation, resulting in a lower capital and O&M cost. These systems have been shown to provide higher removal of fine, slow-settling grit than aerated grit removal systems and mechanically induced vortex grit removal systems. Given these systems are comprised of several trays stacked on top of each other, it is more difficult to access and inspect compared to other grit separation technologies.

A picture of the modular stacked tray system, prior to installation, is shown in Figure 4-14.

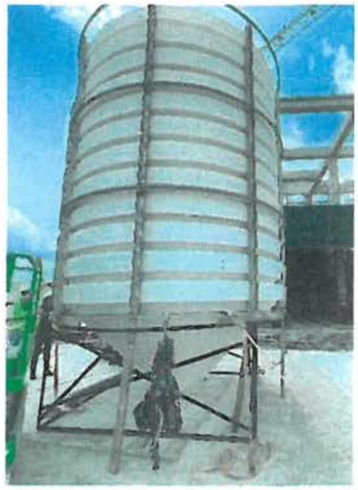

Figure 4-14: Modular Stacked Tray Vortex Grit Removal System

4.2.2.4 Grit Separation Technology Comparison Table

Table 4-3 summarizes the advantages and disadvantages of each of the previously described grit separation technologies.

Table 4-3: Grit Separation Technology Comparison

Technology	Advantages	Disadvantages	Relative Cost (1)
Aerated Grit Removal	• High capacity. • Can provide a reliable means of grease separation.	• Difficult to contain odors. • Largest footprint. • Diminished performance at variable flow rates. • Energy intensive. • Operational complexity and need to maintain proper air supply/distribution.	$$$
Mechanically Induced Vortex Grit Removal	• Easy to contain odors. • Small footprint. • Performance can be maintained over variable flow rates.	• Limited manufacturers capable of removing fine (slow settling) grit particles.	$$
Stacked Tray Vortex Grit Removal	• Easy to contain odors. • Small footprint. • Capable of reliably removing fine (slow settling) grit particles. • Performance can be maintained over variable flow rates (high turndown ratio). • No moving parts or blowers.	• Single manufacturer. • Bottom of tank difficult to access. • Fluidization system required to maintain grit slurry pumping. •	$$

Notes:

1. Costs indicated are relative to other technologies. Rating may change based on application and grit characteristics.

4.2.2.5 Grit Separation Technology Recommendations

For purposes of this conceptual design effort, it is recommended that the stacked tray vortex grit removal system be considered for the grit separation technology. This recommendation should be confirmed during the preliminary design effort following site visits to other facilities by City staff to inspect and better understand the technology-specific maintenance and operation requirements. During this effort, specific consideration should be given to how best to handle FOG upstream of the grit removal process and the potential impacts this may have on the units if present in significant amounts.

4.2.3 Grit Slurry Pumping

As previously described, the grit separation technology concentrates the grit from the raw wastewater stream into a grit storage chamber. The grit is then removed from the storage chamber using grit pumps and transferred to the grit washing/dewater units where the grit is cleaned of organic material and the overall volume of grit is reduced. Generally, vortex or recessed impeller pumps are used to pump the grit slurries. For optimum performance, these pumps should be configured as a dry pit installation at or near the bottom of the grit storage chamber to provide for a flooded section. This reduces maintenance-related tasks associated with losing prime for top mounted pumps and allow for efficient pumping of the grit slurry. Discharge piping systems should be provided with minimal bends (no greater than a 45-degree bend) and glass-lined to prevent accelerated wear. The grit pumping frequency can be operated continuously or operated using adjustable timers.

4.2.3.1 Grit Slurry Pumping Recommendations

For purposes of this conceptual design effort, it is recommended that a recessed impeller pump be installed in a dry-pit area adjacent to the grit chamber be considered for the pumping the grit slurry to the grit processing equipment. This recommendation should be confirmed during the preliminary design effort following site visits to other facilities by City staff to inspect and better understand the technology-specific maintenance and operation requirements.

4.2.4 Grit Washing and Classification

After removing the grit slurry from the storage chamber, it is washed and dewatered to reduce the grit volume and associated transportation costs, and to ease transport and handling during disposal. In addition, washing the grit to remove putrescible organic material makes grit handling and disposal more manageable, while minimizing potential odor problems. This practice will allow the organics to separate and be returned to the flow stream. Concentrating and washing the grit are frequently conducted together in series, often with compatible hydrocyclone-type separators and grit-classifying equipment provided by a single manufacturer and operated intermittently to match the grit pumping frequency. Two grit washing and classification technologies are considered in the following sections.

4.2.4.1 Conventional Cyclone/Grit Classifier

Conventional cyclone/classifier systems can be supplied by several manufacturers and have traditionally been utilized for processing grit slurry. In this system, grit slurry from the pumping system is discharged to the cyclone, which is mounted on top of the classifier. When the pressurized grit flow enters the cyclone, the energy furnished by the pump is converted into a rotational motion, similar to a cyclone, which causes the grit to be pushed to the outer walls by centrifugal force. The cyclone uses this centrifugal force to concentrate the grit to as little as five percent of the total incoming flow, while draining the remaining water and some organic material back to the plant drain system. The concentrated underflow discharges into the classifier below. Grit settles to the bottom of the classifier and is removed with a short helical auger. The remaining water and suspended organics discharge over a weir at the back of the classifier.

Cyclone/classifier units have a lower capital cost than other technologies; however, the have potential to produce a lower quality grit that contains more organics and is more odorous.

4.2.4.2 Conical Grit Washer

Conical grit washers were developed in Europe in response to strict preliminary treatment residuals (i.e. screening and grit) disposal regulations. These systems typically produce cleaner and drier grit than other technologies. In conical grit washer systems, grit slurry is fed through a vortex chamber where a spinning rotational motion is generated. The slurry then flows down through a trumpet-shaped segment into the washing/separation unit. The flow is diverted along the curved inner surface of the trumpet-shaped segment. The combined forces of gravity and inertia cause grit and heavier organic particles to settle out of the flow.

The separated grit is then washed, which takes place in the bottom portion of the grit washer where a fluidized grit bed is generated. Wash water is fed into a bottom chamber to create a fluidized bed. Washed grit is periodically removed through the bottom of the unit through an inclined screw and is conveyed above the water level in the grit washer and drained by gravity. The washed and dewatered grit then drops from the conveyor into a dumpster. Compared to cyclone/classifier, conical grit washers are generally more expensive but have similar O&M and lifecycle costs as the grit produce from the conical grit washer is significantly drier, cleaner, and less odorous which results in lower hauling cost and less foul air to treat.

4.2.4.3 Grit Washing and Classification Technology Comparison Table

Table 4-4 summarizes the key advantages and disadvantages associated with the grit washing and classification technologies previously described.

Table 4-4: Grit Washing and Classification Technology Comparison Table

Technology	Advantages	Disadvantages	Relative Cost (1)
Conventional Cyclone/Grit Classifier	• Proven system that has been used extensively. • Multiple manufacturers. • Produces adequate product for disposal. • Moderate capital cost.	• Provides limited grit washing.	$
Conical Grit Washer	• Produces cleaner, drier, less odorous grit product. • Reduces hauling cost.	• Higher capital cost. • Fewer manufacturers.	$$

Notes:

1. Costs indicated are relative to other technologies. Rating may change based on application and grit characteristics.

4.2.4.4 Grit Washing and Classification Technology Recommendations

For purposes of this conceptual design effort, it is recommended that a conical grit washer be considered for the grit washing and classification technology. This recommendation should be confirmed during the preliminary design effort following site visits to other facilities by City staff to inspect and better understand the technology-specific maintenance and operation requirements.

4.3 Odor Control

Preliminary treatment processes such as headworks facilities typically generate a high level of odors. Odor control systems are commonly installed for these processes at plant locations that are near sensitive areas to prevent noticeable odors from spreading beyond the plant boundaries and affecting the area surrounding the WWTP.

In general, bioscrubbers and biofilters have been used for treating foul air from wastewater treatment facilities. Bioscrubbers (also referred to as biotrickling filters) are biological treatment systems that usually consist of a fiberglass reinforced plastic (FRP) tank (tower) filled with inorganic media, an irrigation system and a recirculation pump for pH control, and a leachate drain. Foul air enters the unit through a corrosion resistant plenum at the bottom of the tower and discharges through an opening at the top of the tower. Irrigation and recirculation water are sprayed down (counter current to the airflow) on top of each stage and collect in the sump area. Foul air is passed through the wetted media where the microorganisms that are naturally present grown and consume hydrogen sulfide and other compounds. To provide additional treatment and "polishing", air from the biotrickling filter will be discharged through a carbon scrubber to capture any residual odor compounds that may occur.

Biofilters are a cost-effective alternative compared to bioscrubbers but require a significantly larger footprint. Biofilters are also a biological treatment process in which odors are removed through adsorption and absorption of odor causing compounds onto a natural media bed where microorganisms oxidize the comounds. Unlike bioscrubbers, biofilters do not recirculate water and are typically constructed within a structure constructed on-site. Based on a preliminary sizing analysis, the use of biofilters is not practical due to the space limitations at the WWTP.

Figure 4-15 shows a typical bioscrubber odor control system installation.

Figure 4-15: Typical Bioscrubber Odor Control System

4.3.1 Foul Air Containment

Before odorous air can be treated, it must be first contained and conveyed to the treatment system. For full odor containment, all elements of the headworks facility must be covered to contain odors with foul air from within these areas being withdrawn and conveyed to the foul air treatment system. The required airflow rates are specific to the area where air is withdrawn. In general, the intent is to provide a slight vacuum in the headspace is provided to prevent foul air from escaping through gaps or openings in the covers. For non-worker-accessible spaces, the design ventilation rate is generally based on a minimum number of air changes per hour (ACH) of 4 to 6. Spaces that are considered worker-occupied or accessible must be ventilated at higher air-change rates, in accordance with National Fire Protection Association (NFPA) guidelines. In these spaces, a minimum ventilation rate of 12 ACH is generally used.

5.0 Alternative Evaluation and Recommendations

Various alternatives were developed and analyzed to improve the headworks facility at the Fairhope WWTP. All alternatives considered consist of constructing new unit process rather than rehabilitating the existing structures. This recommendation is made for the following reasons:

- As described in Section 4.1.2.8, it is recommended that the Fairhope WWTP be equipped with two mechanical fine screens and one manual bypass screen. This will require an additional channel be constructed adjacent to the existing structure. While this is possible, this will require temporary bypass pumping to successfully tie-in both structures as well as for relocation of the existing electrical equipment and duct bank to the existing headworks.
- Based on discussions with the manufacturer of the existing grit system, the geometry of the existing channel must be modified in order for the existing grit removal process to be rated for the desired peak flow treatment capacity (12 MGD) or a parallel unit constructed. Aerated grit chambers are considered to be high odor generators and, without removing the traveling bridge and installing alternative means of grit slurry pumping, cannot be easily covered for odor containment. With no bypass channel or piping system around the grit chamber, temporary pumping would be required to rehabilitate the existing process.

These alternatives are developed with the objective of providing treatment for the desired peak flow capacity, 12 MGD. Historical peaking factors were used to determine the corresponding maximum month and average day flow conditions associated with this desired peak flow.

Table 5-1. Alternative Development Flow Criteria Summary

Design Flow Condition	Units	Value
Average Day (1)	MGD	3.8
Maximum Month (1, 2)	MGD	5.6
Peak Day (3)	MGD	12.0

Notes:
1. Based on historical average day to peak day factor of 3.14.
2. Based on historical maximum month to peak day factor of 2.15.
3. Design peak flow capacity of existing UV disinfection facility and selected by Fairhope staff for basis of evaluation.

Initially, it was thought that an influent pump station (IPS) would be required for proper freeboard upstream of the new headworks facility. However, after hydraulic analysis of the existing system, an IPS is not required to meet the minimum recommended freeboard conditions within the system. While an IPS had initially been considered an additional alternative of the conceptual design, it is not discussed further in this report.

The following sections detail common assumptions as well as the recommended alternative developed for this CDR.

5.1 Common Elements Among Each Alternative

Several elements and facility characteristics are common to all alternatives considered, as summarized below:

- **Fine Screening, Conveyance, and Washing/Compaction**: Two mechanical fine screens and one manual bypass screen channel are proposed. The fine screens will be sized such that each unit is capable of treating the maximum month flow condition, while both units are required to treat for the design peak day condition. Each screen will have a dedicated shaftless screw conveyor for screenings transport to a dedicated washer/compactor. For redundancy purposes, the screw conveyor will be capable of bypassing the washer/compactor and discharging screenings directly into the dumpster.
- **Grit Removal and Washing/Classification**: A single, stacked-tray vortex grit removal system is proposed. This system will be capable of treating the peak day design flow with the turn-down capabilities of accommodate current, minimum-day flow conditions. Settled grit will be pumped from the grit basin using a grit pump installed in a dry-pit configuration. This pump will be housed in an adjacent grit-pump bay accessible via a ladder. This bay will not be enclosed to provide for access, but a canopy system will be installed to reduce water accumulation from the weather. Grit slurry will be pumped to a single grit washer/classifier before discharge into the dumpster. Surface spray systems will be installed in the upstream channel and operated intermittently to direct any scum, grease and other floatables to a rotating skimmer. Staff can periodically operate the rotating skimmer to remove this debris from the waste stream.
- **Screenings and Grit Processing Building**: Screenings washer/compactor equipment and the grit washer/classifier unit will be located within an enclosed building. A common dumpster will be provided to receive the processed screenings and grit debris. When full, an overhead door will be opened, and a truck will be capable of removing the dumpster from the building.
- **Odor Control**: Foul air will be captured and conveyed to an odor control facility consisting of a bioscrubber followed by a carbon polishing system. A single odor control system is proposed to receive the foul air and provide treatment before exhausting to atmosphere. The purpose of the carbon polishing system is to provide an additional means of treatment during startup of the bioscrubber filter system and during any upsets or breakthrough of compounds not capable of being treated by the biology within the bioscrubber vessel.
- **Odor Containment**: Provisions are provided to adequately contain and exhaust odors generated at the headworks facility. This includes covers over all channels, screens, and grit basin. Hoods will be provided over each dumpster location (screening/grit debris and dewatered sludge) to reduce the ventilation requirements while capturing the highest areas of odor generation within the buildings. In addition to ventilation requirements for odor control, ventilation systems for areas that will be accessed by personnel will be properly ventilated as required for worker safety.
- **Pump/Vac Truck Offloading**: A receiving area will be provided for City trucks to unload waste from pump/vac trucks into the new headworks facility. Additional, facility-specific elements will be considered during detailed design including pre-screening, grease removal, and debris containment.

5.2 Recommended Alternative – New Headworks, Gravity Flow

5.2.1 Recommended Alternative Description

The recommended alternative consists of constructing a new headworks facility and directing raw wastewater to the treatment processes by gravity, similar to the existing configuration. Raw wastewater will be directed to the new screening influent channel from the existing influent junction box and manhole. The existing yard piping from the influent junction box to manhole 1 will be reused with wastewater directed the opposite direction as currently configurated. Screened and degritted wastewater will be conveyed from the new headworks directly to manhole 8 and no longer utilize the existing magmeter for influent flow measurement. Instead, a flow vault will be constructed with a clamp on flow meter to meter the flow from the headworks to the secondary treatment facilities.

5.2.2 Alternative Site Layout

A site layout of this alternative is provided in Figure 5-1.

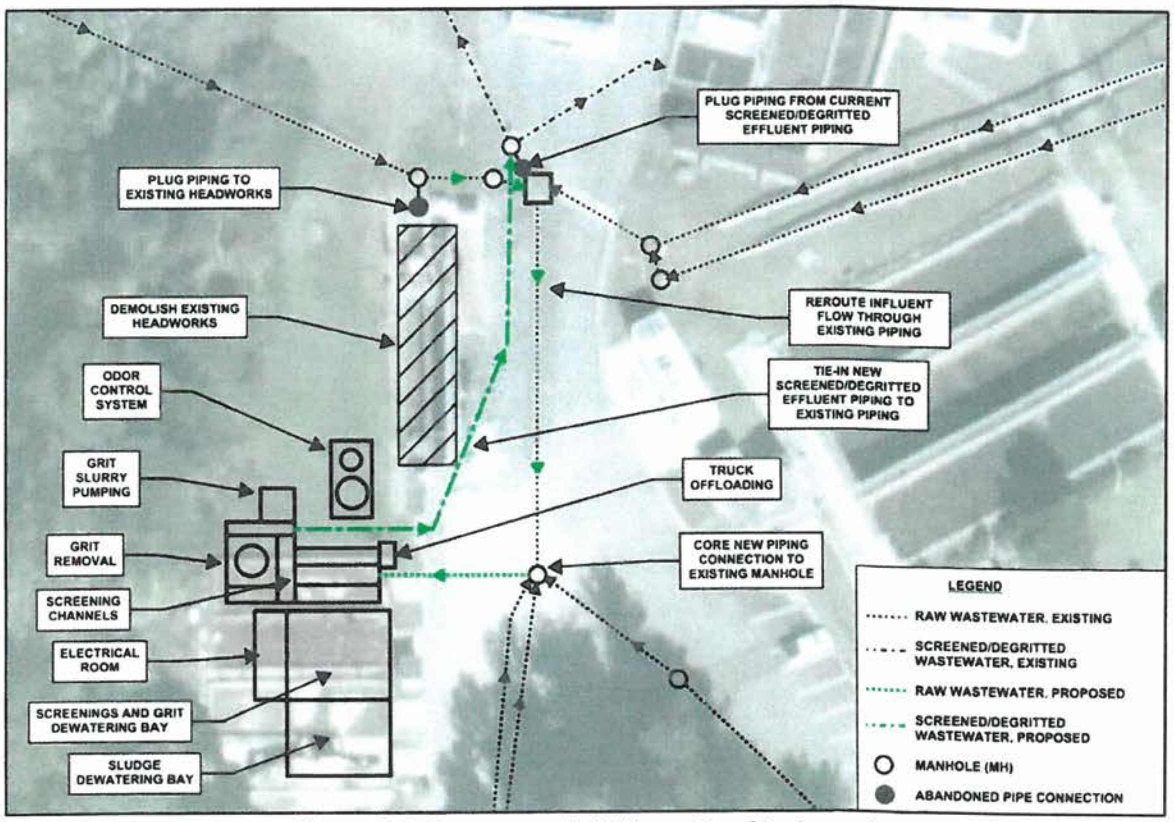

Figure 5-1: Recommended Alternative Site Layout

5.2.3 Alternative Hydraulic Characteristics

Hydraulic characteristics of the recommended alternative are provided in Figure 5-2. Although this alternative is similar to the existing headworks facility configuration in that raw wastewater is conveyed to the headworks processes by gravity, the hydraulic conditions are improved upon by upsizing yard piping to 30-inches from manhole 1 to the headworks and from the headworks to manhole 8. Through these improvements, the water surface elevation in manhole 1 is calculated to be approximately 1.89-feet below the top of the manhole. Additional analysis is necessary to confirm this water surface elevation does not adversely affect the upstream manhole and gravity collection system.

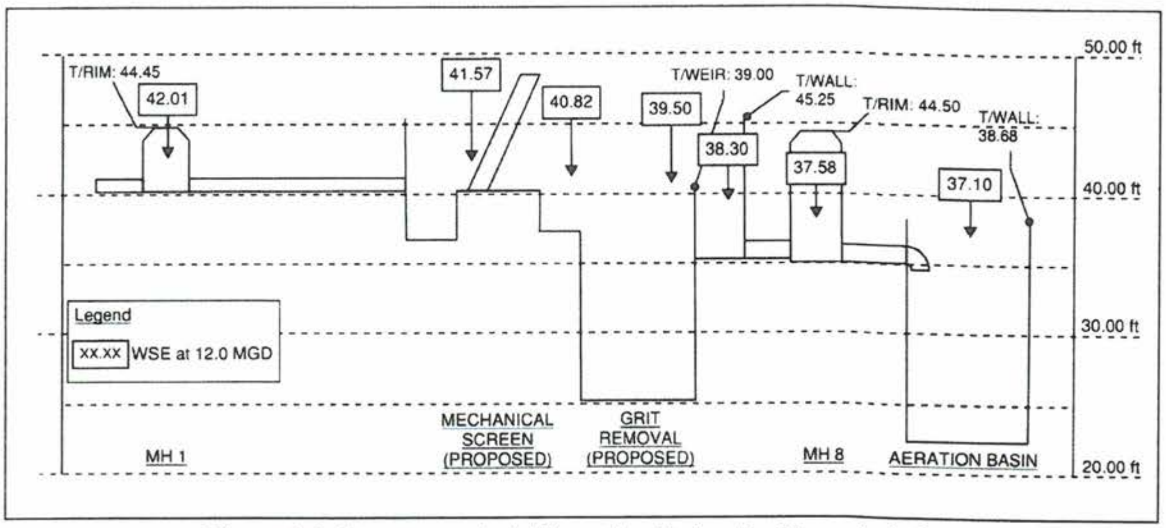

Figure 5-2: Recommended Alternative Hydraulic Characteristics

5.2.4 Recommended Alternative OPCC Estimate

An Opinion of Probable Construction Cost (OPCC) estimate was prepared for the improvements associated with the recommended alternative. This estimate includes installation and allowances for contingency, contractor mobilization, and contractor's overhead and profit. These costs, in 2022 dollars, are summarized in Table 5-2.

Table 5-2: Recommended Alternative OPCC

Description	Cost
Site Civil and Yard Piping	$237,000
Fine Screening	$1,016,000
Grit Removal	$1,025,000
Screenings and Grit Dewatering Building	$596,000
Odor Control	$411,000
Subtotal	**$3,285,000**
Allowance for Unidentified Items (30%)	$985,500
Mobilization (5%)	$213,500
Contractors Overhead and Profit (18%)	$807,000
Total Estimated Construction Cost	**$5,290,500**

5.2.5 Alternative Advantages/Disadvantages

The primary advantage of the recommended alternative is that it improves upon the capacity of the preliminary treatment facilities at the Fairhope WWTP without the need for pumping or additional unit processes. This reduces capital costs as well as operations and maintenance costs associated with an influent or intermediate pump station. Disadvantages of this alternative include potential constructability issues associated with installing new yard piping in the vicinity of manhole 8, the need for temporary bypass pumping to perform coring/installation of new piping into manholes 1 and 8 and utilizing existing manholes which have been noted to be of concern to staff due to their limited depth. While the hydraulic analysis shows sufficient freeboard exists at the proposed hydraulic elevations, additional analysis is recommended to confirm all manholes and segments of the gravity collection system entering the WWTP are not impacted.

5.3 Other Considerations

5.3.1 Site Layout and Constraints

The following site constraints should be considered when determining the site layout and detailed design of the proposed alternative:

- Provide sufficient space for O&M access considerations.
- Locate the odor control system as near to the preliminary treatment processes to simplify the odor ducting design.
- Allow sufficient turn radius for trucks and other large vehicles and equipment necessary to remove dumpsters and/or to pull equipment from channels.
- Consider noise and odor issues in the site layout and setback allowances.

5.3.2 Grease

Unlike the existing grit and grease removal process, this recommended alternative does not include a dedicated grease removal process. Provisions can be incorporated into the screened effluent channel to improve the ability to remove grease and other floatables, such as an underflow baffle with a rotating skimmer pipe on the upstream side. Periodically, staff would be required to manually rotate the skimmer pipe and divert the top layer of the water into a small pump station to be pumped to the aerobic digester. Mechanical vortex grit removal processes can also be analyzed as an alternate grit removal process in future design processes.

5.3.3 Sludge Dewatering

This alternative includes a sludge dewatering bay to house the trailer mounted belt filter press and ancillary equipment. This facility is only proposed to be covered on three sides with a roof. Foul air will be removed from this facility when the dewatering equipment is being operated. In the future, it is recommended that a permanent dewatering facility be considered, and this bay enclosed. This will maximize odor capture and provide for improved operating/storage conditions for the equipment.

GARVER

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559 S. Section Street – The Haven Animal Shelter
Major Façade and Remodel
City of Fairhope Public Works Project No. 2023-PWI 015
Bid #### - ## Response:

MAJOR FAÇADE and REMODEI:

The City of Fairhope is requesting responses to repair and remodel the front façade and interior space of the City's Haven Animal Shelter located at 559 S. Section Street, Fairhope, Alabama. This project involves major building envelope and structural work involving the front façade (storefront). The original façade was constructed with External Insulation and Finishing Systems (EIFS) stucco over wood frame construction. This wall system has been severely degraded by termite infestation and water intrusion. Work will entail demolition, wood framing, roof gable end extension, decking, roof underlayment & shingles, exterior sheathing (Hardie® Panel Vertical Siding – with battens), wainscot masonry veneer, wall insulation, vapor barrier, installation of a new exterior egress commercial door front, windows, exterior painting, mechanical (minimal), electrical (minimal), plumbing, interior non-load bearing wall framing, flooring, wall sheathing (drywall), ceiling sheathing (drywall), fit, finishes, interior painting and similar building construction/remodel work tasks. All work will be performed while the Animal Shelter remains in operation.

The respondent shall submit a lump sum price to completely remodel the façade and space shown in the plans to current code standards. The lump sum price shall include all material, equipment, tools, labor, overhead, profit and incidentals to deliver a complete "turnkey" remodeled space.

SCOPE OF WORK:

Work shall include, but not be limited to the following:

- Demolition and disposal of front façade (storefront) wall and EIFS stucco as noted in the plans
- Demolition and disposal of walls, sheathing, paneling, doors, frames flooring, tiles, fixtures, lighting, registers, ceiling and all other debris generated by the demolition phase in the front space of the building and as noted in the plan
- Wood frame construction of load bearing walls at building façade
- Extension of the roof end gable creating a full-width 6-foot porch along the storefront – with required supporting posts and bracing
- Roof decking with code-compliant underlayment and new shingle matching and tied back into existing asphalt shingle roof
- Installation of storefront egress doors and windows
- Exterior siding - Hardie® Panel Vertical Siding – with battens with brick veneer wainscoting on front façade
- Installation of, taping, mudding and sanding of sheetrock walls
- Installation of, taping, mudding and sanding of sheetrock ceiling
- Exterior and Interior Painting

- Installation and replacement of LED light units and HVAC returns and diffusers into ceiling system
- Installation of LVT floor system with shoe molding
- Electrical - maintenance of and replacement of all existing switches and receptacles, establishment of new sub-panels, placement and wiring of new additional receptacles, wiring of ceiling lights and other code compliant electrical work
- IT – Placing two drops per room
- Plumbing – maintenance of and replacement of all existing water and drain lines, water heater, ADA water fountain, faucets, service sink, counter sinks and bathrooms – combination of rehabbing/tying to existing and new
- Mechanical – maintenance of and replacement of all existing returns, registers and diffusers within ceiling
- Contractor shall permit all work through the City Building Department
- All material purchased shall be tax exempt and the Contractor shall be required to file all required documents
- All other incidental work, as a subsidiary obligation of the lumps sum bid, necessary to deliver a "Turnkey" project.

Work Not Included in Scope/Proposal

- C&D Tipping Fees – Contractor will be allowed to dispose of all demolition debris in the City's adjacent C&D Landfill – contractor is responsible for piling in designated area for City collection and transport

CRITICAL TIMELINES:

- 15-day Notice to Proceed Period
- 105 Calendar Days allowed for work (no exceptions for holidays)
- Contractor is not limited to time of day or days of the week restrictions on this project – site available 24/7

GENERAL NOTES:

1. Contractor will be required to be Licensed, Bonded, and Insured. Documents will be required at time of bid/quote acceptance and issuance of purchase order.
2. Work must be completed 90 calendar days from the end of "Notice to Proceed" period.
3. Enclosed scope of work, descriptions, quantities, etc. are "good faith" estimates only. Prior to submitting quotations contractor should field measure and verify all quantities.
4. Bid Response will be treated and considered as "lump sum" bids for all described work.
5. Bid Responses are subject to the GENERAL CONDITIONS, SPECIAL PROVISIONS and SUPPLEMENTAL SPECIFICATIONS as attached.
6. LIQUIDATED DAMAGES: Liquidated Damages (LD's) shall be applied to this contract The Liquidated Damages Daily Charge of $250.00/calendar day will apply.

BID RESPONSE:

1. **Lump Sum Price – including material, equipment, tools, labor, overhead, profit and incidentals to deliver a complete "turnkey" remodeled façade and space shown in the plans:**

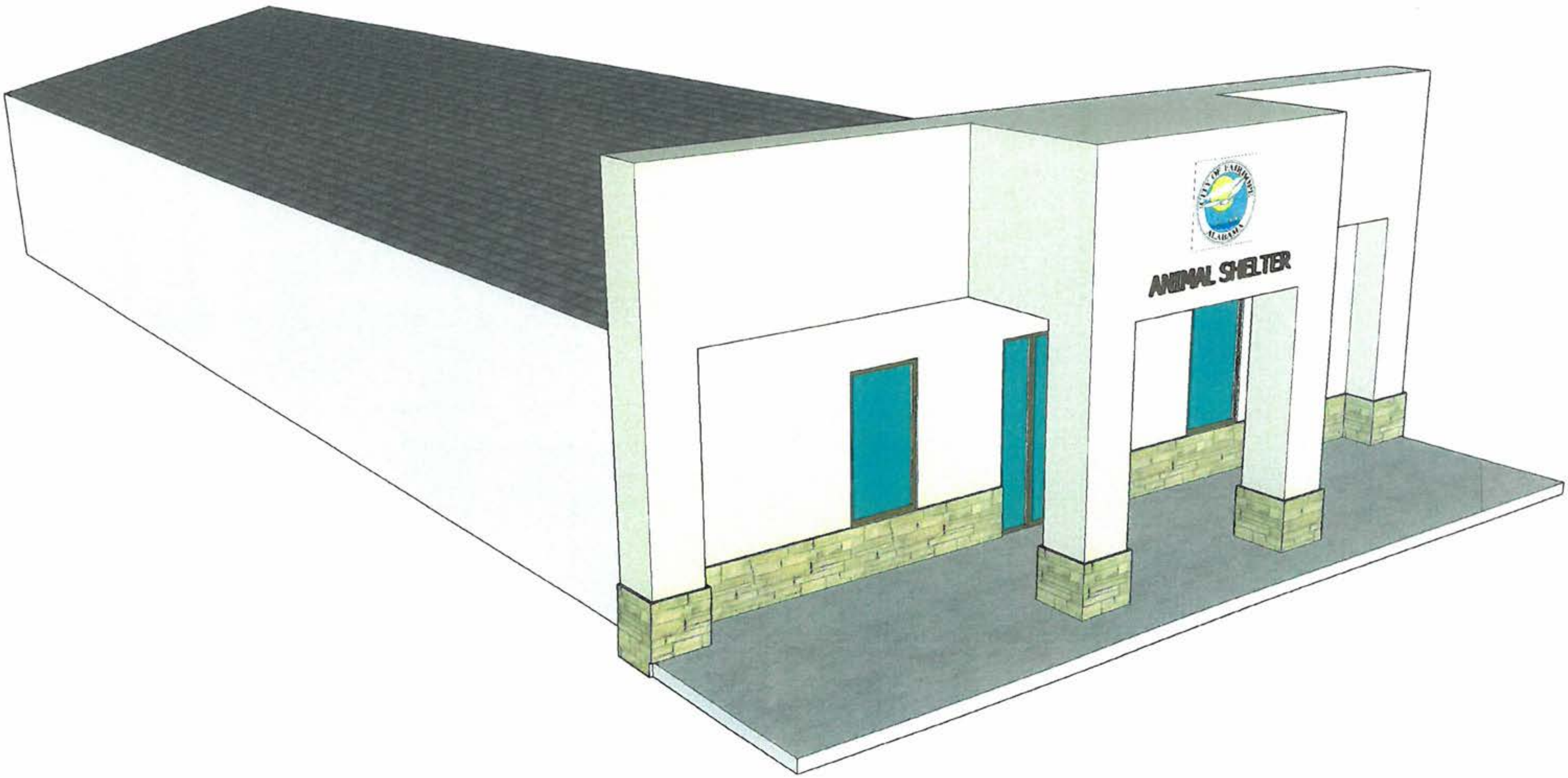
$____________________________

Contractor Name: ____

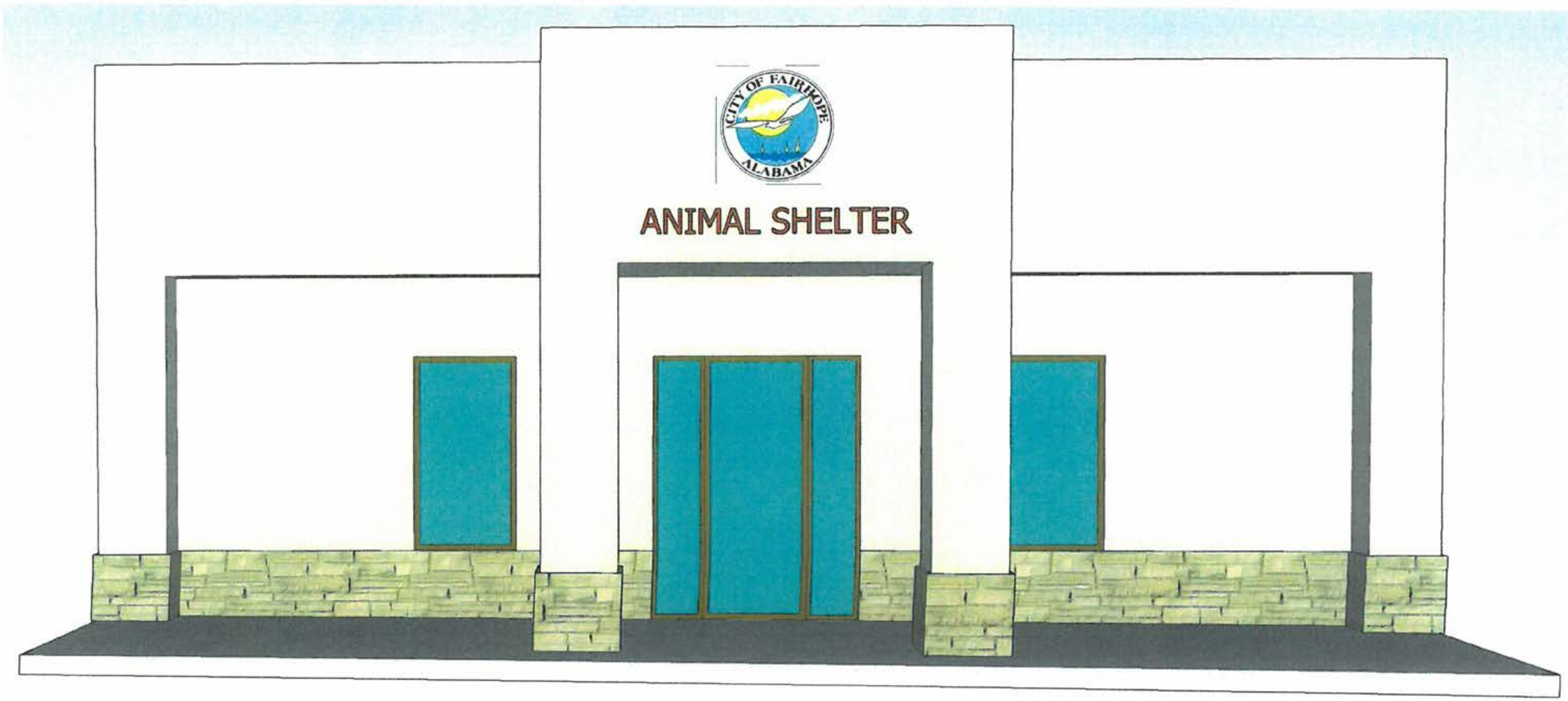
Address: ____

City: ________________________ State: __________ Zip: ________________

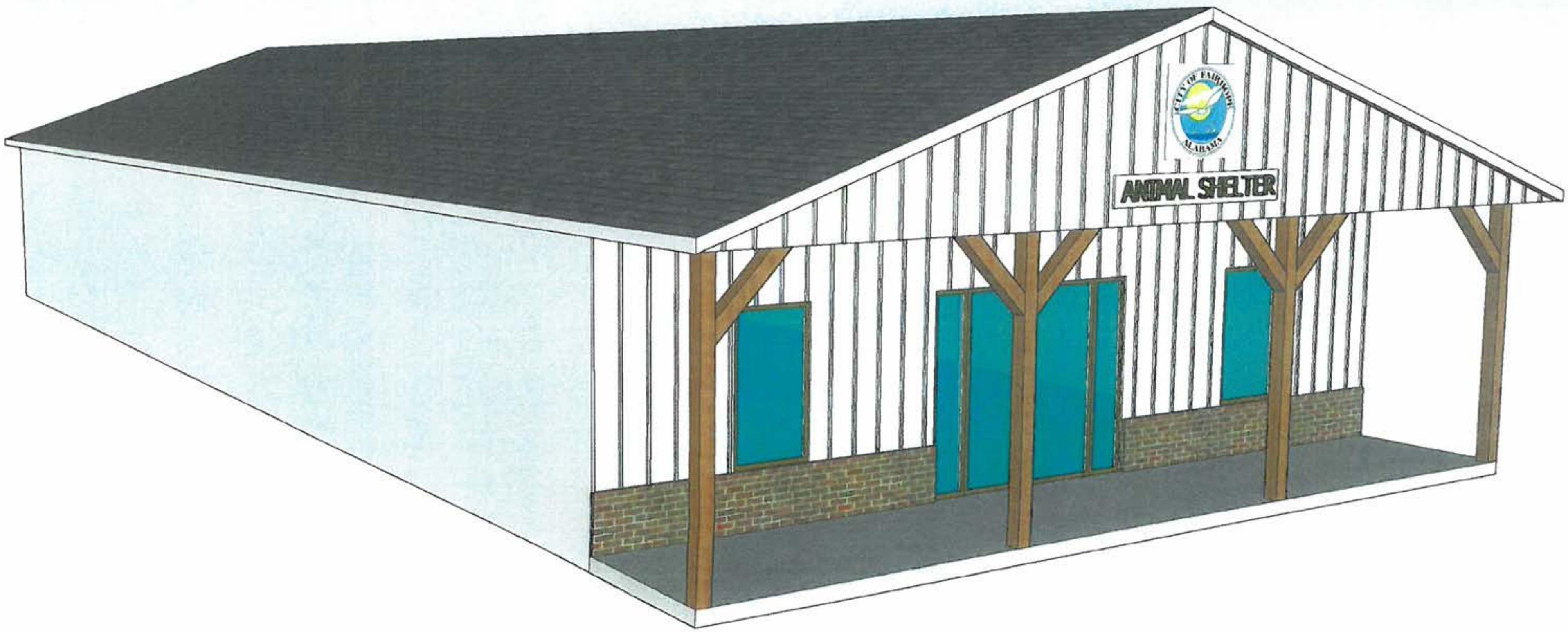
Contact Name: ______________________________ Phone: ____________________



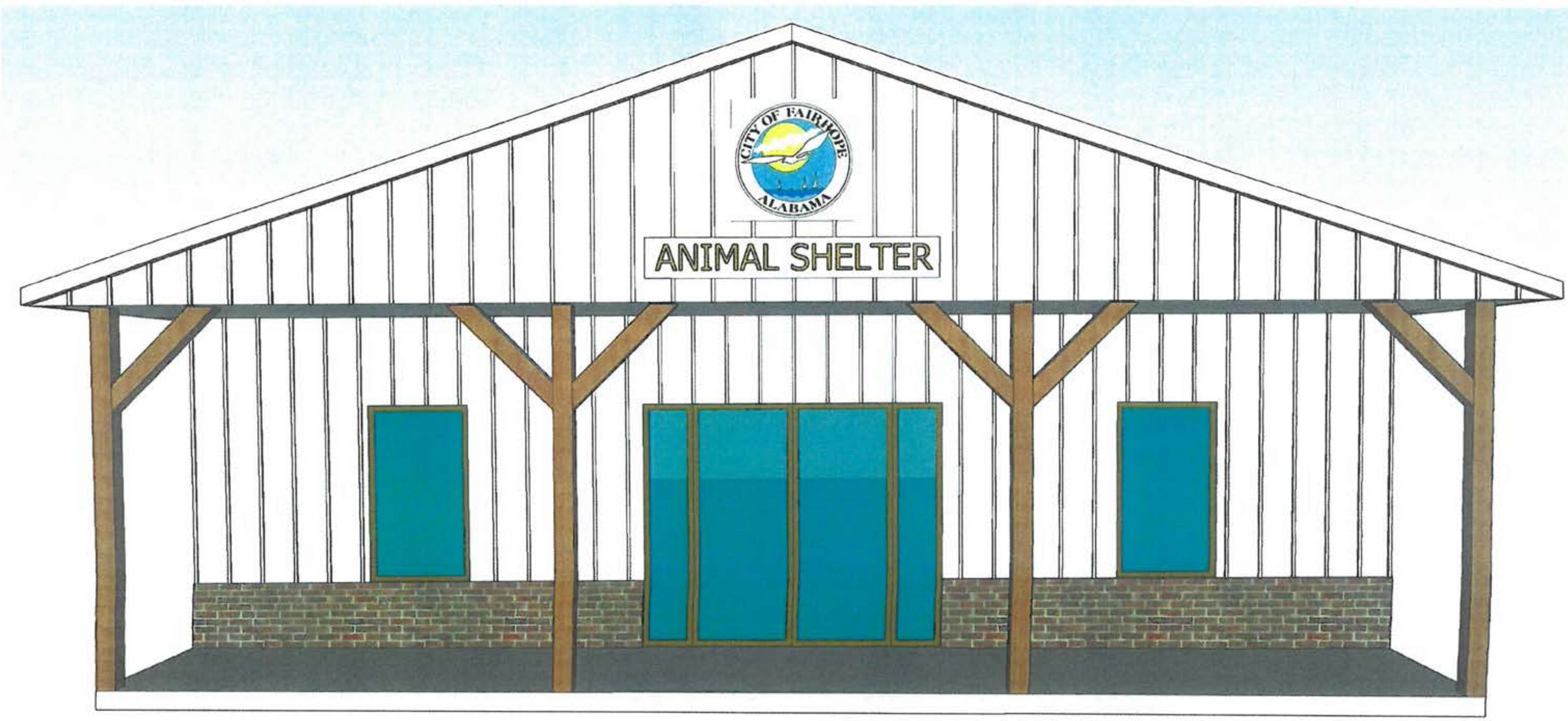
Existing Haven Facade



Existing Haven Elevation View



Proposed Haven Facade



Proposed Haven Elevation View