

APPENDIX D

Capital Projects Work Plan

The Capital Projects Work Plan consists of this narrative and three exhibits: The projects' descriptions attached as Exhibit D-1 (including the separate list of Asbestos Cement force mains that make up Project 4.9 and the separate list of individual pump station improvement descriptions that make up Projects 5.14 through 5.18 inclusive); the projects' schedules with milestones attached as Exhibit D-2; and the projects' cost schedule attached as Exhibit D-3. Although the costs of individual projects (identified with a unique project number) are in 2013 dollars, the total cost of individual projects reflect a two percent (2%) annual inflation rate commencing in FY '14-'15.

Miami-Dade County's Water and Sewer Department ("MDWASD" or "the Department") held three (3) public workshops on September 24, 25 and 27, 2012 in the North, South and Central areas of the County, respectively, to receive community input on the capital improvement projects. The Department also solicited written comments on its website. The Department considered the public's comments prior to finalizing the list of capital projects shown in Exhibit D-1.

In establishing the schedules for the Capital Projects Work Plan shown in Exhibit D-2, MDWASD took into consideration operational and project implementation factors which include sequencing projects to keep the system operational and time to design, procure, construct and commission the projects.

These schedules reflect the need to maintain the operational viability of the Department's wastewater collection, pump stations, transmission, treatment and disposal systems in a manner

that will minimize service interruptions, sanitary sewer overflows or non-compliance with effluent standards. The sequencing involves limiting the number of functional components that are out of service at one time at each of the plants and ensuring that flows can be directed away from plants with limited capacity due to repair and replacement work. This means that the work must be sequenced among the three plants as well as within each of the plants. Many of the projects must be done during the dry season when average daily flows are low, so that fact also extends the schedule for plant repairs. For the purpose of establishing priorities, the Department factored the criticality of each individual project in the context of public health, welfare and safety, operational constraints and environmental significance.

Based on this rationale, most of the collection, transmission and pump station projects have been assigned similarly high priorities and are scheduled to commence at the start of FY '13 - '14. A major exception to these is the Government Cut project. Phases 1 & 2 are currently budgeted and under construction. In addition, the preliminary design of Phase 3 is currently underway and is scheduled for completion during FY '12 - '13.

As shown on Exhibit D-2 of this work plan, almost all of the identified wastewater collection and transmission system projects, together with the wastewater pump stations system projects, are front-loaded and scheduled for completion within the first five years of the Consent Decree. The sole exceptions are the Collection System I/I Repairs project and the Replacement of Asbestos Cement Force Mains project. The former is part of an on-going program for which we are proposing funding throughout the life of the Consent Decree. Note that the Collection System I/I Repairs project which includes inspection of approximately six thousand (6,000) miles of pipe will be performed concurrently with all other work. The Asbestos Cement Force

Main project consists of the replacement of sixty-six (66) individual force mains which are projected to be completed by the end of the sixth year.

The schedule of each project includes time for engineering design, permitting, procurement and construction. Although the schedule allocates permitting time of one (1) year for each project, the actual time to obtain a permit will vary depending on the type and location of the project. For projects that are located within a municipality, MDWASD or its contractor must obtain a municipal building permit and has no control over each municipality's requirements and review time for issuing a permit. Additionally, there may be several types of permits required, including electrical, mechanical and structural permits. Permits are normally obtained as part of the design process so that construction bids will reflect the conditions imposed by permitting authorities for maintenance of traffic, allowable working hours, and site restoration requirements. Allocating one year should be sufficient time for obtaining all permits regardless of where the project is located. With regard to procurement, MDWASD intends to accelerate the County Commission's internal approval process but must comply with Florida's competitive bidding laws.

Scheduling of capital projects associated with the three (3) regional treatment plants presents the greatest challenge inasmuch as taking units and/or processes out of service needs to be done in a way that does not adversely affect the operational capacity of the plants. For this reason, a large number of these projects needs to be sequenced in a fashion wherein the unit or process is placed out of service during the dry season, normally from the end of November to the end of May. Another scheduling variable taken into consideration is the need to divert flows from one treatment plant to another while work that limits the plant's hydraulic capacity is being

performed. Finally, the State's Ocean Outfall Legislation is another factor to consider in scheduling the work at the Central and North District WWTPs. The legislation may impact the work schedule. The Ocean Outfall Legislation currently requires diverting almost all flows from the outfalls by 2025. This, in turn, requires adding at least High Level Disinfection (filtration and disinfection) to all of the North and Central District flows. In addition, the legislation requires significant reuse of these flows. Existing site constraints may well result in the need to construct one or more entirely new plants in more westerly locations, thereby potentially requiring alterations to the collection system. This Capital Projects Work Plan assumes that the existing plants will be overhauled in their present locations, an assumption that may need to be altered as the outfall plan develops. It is also possible that changes to the Ocean Outfall Legislation will be made during the next or future legislative sessions, and such changes could also impact the Work Plan. Although design activities for many of the treatment plants' projects are scheduled to commence shortly after the Effective Date of the Consent Decree, there are several projects whose completion extends beyond 10 years after the Effective Date. The following are explanations for the proposed length and completion dates of these specific projects.

Project 1.3 - SDWWTP Oxygenation Train Rehabilitation

This project does not start at the beginning of the Consent Decree because recent tank cleanings, minor structural rehabilitation, mixer replacements for energy efficiency and process modifications have improved the conditions of these units. However, the oxygenation trains will require extensive maintenance during the proposed life of the Consent Decree. The construction phase for the extensive rehabilitation of these units is scheduled for mid-2018, which is well

before deterioration would be severe enough to result in tank failure or compromise the treatment process. Construction will require seven (7) years for completion because the tanks are a critical part of secondary treatment that is highly sensitive to hydraulic conditions. Therefore, it is advisable for these units to be out of service during the dry weather periods of the year.

Additionally, in order to ensure that a tank can be fully rehabilitated during the dry season, and that firm plant capacity is maintained at all times, only one tank will be rehabilitated per year.

Projects 2.5 and 2.6 – Central District WWTP Plants 1 and 2 Oxygenation Train Rehabilitation

The construction phase of these projects will require six (6) years for completion because the tanks are a critical part of the secondary treatment that is highly sensitive to hydraulic conditions. Therefore, it is only advisable for these units to be out of service during the dry weather periods of the year. Additionally, in order to ensure that a tank can be fully rehabilitated during the dry season, and that firm plant capacity is maintained at all times, only one (1) tank will be rehabilitated per year.

Projects 2.7, 2.8, 2.9 and 2.10 – Central District WWTP Plants 1 and 2 Secondary Clarifiers and Return Sludge Pump Stations

Currently, fibrous and other material accumulations that include rags, paper, plastic and hair, and solids deposition result in failure of the sludge collection mechanism in the secondary clarifiers. The construction phases of the secondary clarifier projects are not scheduled to start prior to the construction and full operation of the Central District WWTP's headwork project since this project will target rag and solids removal upstream of the secondary clarifiers.

Under normal circumstances it would be advisable to have only one (1) clarifier out of service per plant at the Central District WWTP. However, the physical pairing of a return sludge

pump station with the corresponding secondary clarifiers at the Central District WWTP dictates that two (2) clarifiers and their paired pump station be rehabilitated at the same time for ease of construction. However, this pairing is also required in case the removal and replacement of badly corroded return sludge pipes from one clarifier causes damage to the adjacent clarifier's structure and return sludge pipes. The construction phase for each pair of clarifiers and their shared return sludge pump station will take approximately one (1) year. Since there are sixteen (16) secondary clarifiers and eight (8) return sludge pump stations at the Central District WWTP, the full construction phase of these two (2) projects is eight (8) years.

Projects 2.14 and 2.15 – Central District WWTP Plant 1 and 2 Digesters

The level of deterioration and complexity of the anaerobic digesters requires that each cluster of four (4) digester tanks be taken completely out of service for extensive masonry and steel structural repairs; complete replacement of pipes, valves, sludge mixing equipment, heat exchangers and pumps; demolition of failed floating covers and installation of new covers. Since these units were built at different times, the six (6) digester clusters reflect different design and construction methods. Accordingly, the rehabilitation of each cluster will require an individual design effort. For these reasons, the construction phase of each digester cluster has been conservatively estimated to take the better part of two (2) years. It must be emphasized that this is an estimated construction time based on similar level of work being performed on each cluster. Until a detailed design for the rehabilitation required for each digester cluster is sufficiently complete, a more realistic construction time estimate for each cluster will not be available. The current estimate for the entire construction phase of all digesters is ten (10) years, with only one (1) digester cluster taken out of service at a time.

Projects 3.2 and 3.5 – North District WWTP Primary and Secondary Clarifiers

Currently, fibrous and other material accumulations that include rags, paper, plastic and hair, and solids deposition result in failure of the sludge collection mechanism in the primary and secondary clarifiers. The construction phase of the clarifier projects is not scheduled to start until the North District WWTP headwork project is completed because this project will target rag and solids removal upstream of the primary and secondary clarifiers. Also, the construction phase for these projects cannot commence until completion of the Central District WWTP's headwork project because that project will require a substantial diversion of flows to both the South District WWTP and the North District WWTP. Hence, the North District WWTP's full capacity must be made available during that time.

Both primary and secondary clarifiers at North District WWTP have a unique feature among the county's treatment plants in that the tanks are enclosed structures for odor control purposes. The voluminous metal enclosures create hot, humid and corrosive environments that attack exposed electrical, mechanical and air handling equipment along with metal and concrete structures. The resulting impacts are most prevalent in the primary clarifiers as the hydrogen sulfide concentrations are highest prior to oxidation in the oxygenation trains. For this reason the primary clarifiers will be rehabilitated prior to the secondary clarifiers. Primary and secondary clarifiers will not be rehabilitated in tandem as the reduced capacity of primary clarifiers during construction will cause hydraulic conditions that could result in solids carry over into the secondary treatment process. Solids carry over would stress the surface loading rate of secondary clarifiers and the return sludge pumping operations. The additional hydraulic stress of having secondary clarifiers out of service at the same time will adversely impact activated sludge

settling, and could result in high TSS/CBOD concentrations in the plant's effluent during said rehabilitation.

Exhibit D-1 Capital Project Descriptions

Project Number	Project Name	Project Description	Project Impact/Need
South District WWTP, 8950 SW 232 St., Goulds, FL 33170			
1.1	Headworks	Routine repairs on existing bar screen mechanisms in headwork structure prior to aerated grit chambers	Failure of bar screen mechanism could result in the blinding of the bar screen and cause an overflow of raw sewage from the plant headworks structure towards nearby surface waters, especially during peak wet weather.
1.2	Oxygen Production	Replacement and retrofit of existing air compression units .	Replacements and modifications are needed to meet WWTPs 125 ton oxygen demand. Loss of pure oxygen production will affect performance of secondary treatment process and result in effluent limit violations.
1.3	Oxygenation Trains	Aeration mixers retrofit, structural rehabilitation, and surface coating application	Loss of aeration tank capacity will result in effluent limit violations.
1.4	Chlorine Building	Replacement of motor control centers, relocation of electrical panels and roof repairs of old chlorine building where flushing water pumps are to remain.	Roof leaks or failure of MCC and electrical panel could result in loss of plant flushing water which is used for spray systems and odor control.
1.5	Effluent Pump Station	Upgrade of existing obsolete pump control systems, upgrade pumps drives and motors and structural rehabilitation of pump station wet well chambers 2-4.	Loss of pumping capacity or wet well function will result in unpermitted effluent discharge into the surrounding surface waters.
1.6	Gravity Sludge Thickeners	Replacement of thickened sludge pumps, and electrical systems in concentrator pump station. Rehabilitation of concentrator collector mechanisms and structural rehabilitation and coating of concentrators.	Failure of sludge thickening will result in a biological overloading of the secondary treatment process and effluent limit violations.
1.7	Digesters and Control Buildings	Rehabilitation or replacement of digester roofs; digester tank cleaning, structural rehabilitation and coating; sludge mixers improvement	Loss of digestion capacity will result in a decline in biogas/methane production for power generation and unstabilized sludge that will require landfill disposal.
1.8	Dewatering Facility	Replace existing Interim dewatering building with a new permanent dewatering facility, to include centrifuges, controls, polymer system, structural, mechanical and electrical systems.	Failure of sludge dewatering would result in solids accumulation in the secondary treatment process and effluent limit violations.
1.9	FOG Removal Facility	Separation operations improvements to recently constructed FOG removal facility to aid in conveyance of oils and floating grease to beneficial use option and removal of excess grit and settled solids.	Current FOG separation tank is not capable of adequately handling solids load, resulting in excess odors and unanticipated manual labor to remove large amounts of grit, settled soils and hardened grease.
1.10	Odor Control	Upgrade odor control facilities	Complaints of nuisance odors by nearby residents could result from a lack of properly functioning odor control systems.
1.11	General Electrical	Rehabilitation and replacement of electrical controls and wiring as needed.	Loss of electrical controls or wiring could result in plant shutdowns, wastewater overflows and effluent violations.
1.12	Chlorine Contact Chamber Structural	Structural rehabilitation and coating of chlorine contact chambers 1-4	Structural failure of a chlorine contact chamber would lead to a lack of disinfection contact time, an effluent violation. A hydraulic overload could also occur from multiple chambers being out of service for corrective maintenance, resulting in an effluent spill to nearby surface waters.

Exhibit D-1 Capital Project Descriptions

Project Number	Project Name	Project Description	Project Impact/Need
Central District WWTP, 3989 Rickenbacker Causeway, Miami, FL 33149			
2.1	Electrical Improvements	Rehabilitation and replacement of electrical controls and wiring as needed	Loss of electrical controls or wiring could result in plant shutdowns, wastewater overflows and effluent violations.
2.2	Building improvements	Repairs to maintenance, operations control and administration buildings to include refurbishing of roofs and staff facilities	These improvements are needed to provide staff with adequate and safe facilities to perform their jobs.
2.3	Headworks Plant 1	Headworks retrofit to include addition of influent screens and an electrical room with replacement of electrical systems	Failure of headwork electrical system will result in grit accumulation in secondary treatment process leading to effluent limit violations. Lack of headworks screening results in accumulation of rags and plastics in plant processes, leading to pump, mixer and clarifier collection mechanism failure; and effluent limit violations.
2.4	Headworks Plant 2	Headworks retrofit to include addition of influent screens and an electrical room with replacement of electrical systems	Failure of headwork electrical system will result in grit accumulation in secondary treatment process leading to effluent limit violations. Lack of headworks screening results in accumulation of rags and plastics in plant processes, leading to pump, mixer and clarifier collection mechanism failure; and effluent limit violations.
2.5	Oxygenation Trains Plant 1	Aeration mixers retrofit, structural rehabilitation, and surface coating application	Loss of oxygenation tank capacity will result in effluent limit violations.
2.6	Oxygenation Trains Plant 2	Aeration mixers retrofit, structural rehabilitation, and surface coating application	Loss of oxygenation tank capacity will result in effluent limit violations.
2.7	Secondary Clarifiers Plant 1	Structural rehabilitation and replacement of sludge collection mechanisms	Loss of sludge settling capacity will result in effluent limit violations.
2.8	Secondary Clarifiers Plant 2	Structural rehabilitation and replacement of sludge collection mechanisms	Loss of sludge settling capacity will result in effluent limit violations.
2.9	RS Pump Stations Plant 1	replacement of return sludge pump, piping, motor control centers and structural repairs to pump stations	Loss of return sludge pumping capacity will result in a failure of the aeration process and effluent limit violations.
2.10	RS Pump Stations Plant 2	replacement of return sludge pump, piping, motor control centers and structural repairs to pump stations	Loss of return sludge pumping capacity will result in a failure of the aeration process and effluent limit violations.
2.11	Effluent Pump Station	Pump replacement in effluent pump station	Loss of sufficient pumping capacity will result in unpermitted effluent discharge into the surrounding surface waters.
2.12	Sludge Thickeners Plant 1	Replacement of thickened sludge pumps, sanitary sewer pumps, HVAC and electrical systems in concentrator pump station. Rehabilitation of concentrator collector mechanisms and structural rehabilitation and coating of concentrators.	Failure of sludge thickening will result in a biological overloading of the secondary treatment process and effluent limit violations.
2.13	Sludge Thickeners Plant 2	Replacement of thickened sludge pumps, sanitary sewer pumps, HVAC and electrical systems in concentrator pump station. Rehabilitation of concentrator collector mechanisms and structural rehabilitation and coating of concentrators.	Failure of sludge thickening will result in a biological overloading of the secondary treatment process and effluent limit violations.
2.14	Digesters Plant 1	Complete rehab of sludge digester clusters (roofs, concrete structures, recirculation & transfer pumps, mixers, & electrical systems)	Loss of digestion capacity will result in a decline in biogas/methane production for power generation and unstabilized sludge that will require landfill disposal.
2.15	Digesters Plant 2	Complete rehab of sludge digester clusters (roofs, concrete structures, recirculation & transfer pumps, mixers, & electrical systems)	Loss of digestion capacity will result in a decline in biogas/methane production for power generation and unstabilized sludge that will require landfill disposal.
2.16	Dewatering Building	Construction of a new dewatering facility and sludge cake conveyance system to sludge storage buildings	Failure of sludge dewatering would result in solids accumulation in the secondary treatment process and effluent limit violations.

Exhibit D-1 Capital Project Descriptions

Project Number	Project Name	Project Description	Project Impact/Need
Central District WWTP, 3989 Rickenbacker Causeway, Miami, FL 33149 (continued)			
2.17	Chlorination Facilities	Replacement of chlorine gas storage, liquid chlorination and dosing system with bulk sodium hypochlorite storage and dosing system in separate outdoor structures	Failure of existing chlorine gas storage system could lead to and unregulated discharge of chlorine gas and exposure of plant personnel and nearby community to chlorine gas. Additionally, a failure of the chlorine system would result in a lack of disinfection of effluent, a effluent violation.
2.18	Odor Control Systems	Odor control buildings motor control center replacement including air conditioned electrical rooms. Replacement of odor control chemical pumps, piping, valves and gas stripping tower media.	Complaints of nuisance odors by nearby residents could result from a lack of properly functioning odor control systems.
2.19	Co-Gen Facility	Installation of two new Cogeneration engines, Cogeneration Building improvements, replacement of biogas pipeline and installation o biogas conditioning system.	Sudden loss of cogeneration engines could result in partial loss of power to the plant and temporary equipment shutdown. Consistent lack of cogeneration units would result in loss of heat for the anaerobic digesters.
2.20	Septage Unloading	Construction of a new septage handling station to remove FOG from the main wastewater treatment stream and treat either through digestion or off-site third part facility.	Septage currently puts and added load on plant's secondary treatment, is labor intensive.
2.21	Pump Station 1	Rehabilitation of pump station odor control system and of bar screen mechanisms	Odor complaints could result from an improperly functioning odor control system. Failure of bar screen mechanism could result in the blinding of the bar screen and cause an overflow of raw sewage from the pump station towards nearby surface waters, especially during peak wet weather flow events.
2.22	Pump Station 2	Rehabilitation of pump station odor control system, rehabilitation of bar screen mechanisms, and replacement pump stations flow metering to improve maintenance accessibility	Odor complaints could result from an improperly functioning odor control system. Failure of bar screen mechanism could result in the blinding of the bar screen and cause an overflow of raw sewage from the pump station towards nearby surface waters, especially during peak wet weather flow events. Inability to access the station's flow meter in a timely fashion has resulted in periods without proper flow measurement from this pump station.
2.23	O2 Plant Process Controls Phase 2	Replacement of process control equipment for existing oxygen production systems either due to equipment failing or being obsolete.	Loss of pure oxygen production will affect performance of secondary treatment process and result in effluent limit violations.
2.24	Gas Monitoring	Gas monitoring and alarms in hazardous areas	Personnel could be overcome by noxious fumes such as hydrogen sulfide, carbon dioxide carbon monoxide or methane if unaware of their presence due to lack of gas monitoring.
2.25	Ventilation Improvements	Ventilation Improvements in Hazardous Areas	Sufficient ventilation in hazardous areas is required to meet NFPA 820.
2.26	Rehabilitation of Walkways and Stairways	Replacement of corroded walkways, stairways, railings, grating throughout the plant	Personnel could suffer falling injuries from eroding concrete and corroding metal.
2.27	Oxygen Production	Construction of a new 80 ton/day oxygen production cryogenic tower and air compression unit to provide full redundancy as existing units are near the end of useful life and prone to failure.	Loss of pure oxygen production will affect performance of secondary treatment process and result in effluent limit violations.
2.28	SCADA RTU Upgrades	SCADA RTU upgrades due to existing RTUs being obsolete and difficulty of locating replacement parts	Failure to upgrades these RTUs could result in loss of monitoring and control of unit processes
2.29	High Strength Influent Impact Study	Investigation as to the sources of increased TSS and BOD loading experienced at the plant and conceptual solutions to eliminate or mitigate the change in plant influent characteristics	Influent loading characteristics well above design parameters are contributing factors in effluent limit violations. If unaddressed, continued effluent violation are likely.

Exhibit D-1 Capital Project Descriptions

Project Number	Project Name	Project Description	Project Impact/Need
North District WWTP, 2575 NE 156 St., North Miami, FL 33160			
3.1	Headworks and Sludge Degritting Transfer	Phase 1: Replacement of bar screens with perforated plate screens Phase 2: Upgrade pretreatment buildings for fire code compliance and replacement of primary sludge grit separation	Replacement of influent screens and upgrade of headworks will reduce rags problems and improve treatment process.
3.2	Primary Clarifiers and Odor Control	Rehabilitation of structural, mechanical and odor control systems	Loss of primary clarifier capacity will increase workload of the secondary treatment process and will result in effluent limit violations. Complaints of nuisance odors by nearby residents could result from a lack of properly functioning odor control systems.
3.3	Oxygenation Trains	Rehabilitation of Aeration Tanks structural, mechanical and electrical systems	Loss of oxygenation tank capacity will result in effluent limit violations.
3.4	Oxygen Production	Rehabilitation of oxygen plant structural, mechanical and electrical systems	Loss of pure oxygen production will affect performance of secondary treatment process and result in effluent limit violations.
3.5	Secondary Clarifiers	Structural, mechanical and electrical rehabilitation of the secondary clarifiers	Loss of sludge settling capacity will result in effluent limit violations.
3.6	Disinfection	Replacement of chlorine gas storage, liquid chlorination and dosing system with bulk sodium hypochlorite storage and dosing system in the existing chlorine building	Failure of existing chlorine gas storage system could lead to and unregulated discharge of chlorine gas and exposure of plant personnel and nearby community to chlorine gas. Additionally, a failure of the chlorine system would result in a lack of disinfection of effluent, a effluent violation.
3.7	Effluent Disposal	Installation of standby pumps to ensure effluent disposal capacity and structural rehabilitation of ocean outfall pump station wet well	Loss of sufficient pumping capacity or wet well function will result in unpermitted effluent discharge into the surrounding protected wetlands.
3.8	Plant Wide Electrical	Rehabilitation and replacement of electrical controls and wiring as needed	Loss of electrical controls or wiring could result in plant shutdowns, wastewater overflows and effluent violations.
3.9	Flood Mitigation	Generator and Electrical Building flood mitigation at NDWWTP	Flooding of emergency standby generator and electrical switchgear area would result in loss of emergency power and power distribution. Emergency power is most critical during storm events when flooding is most likely.
3.10	Yard Piping Replacement	Replacement of wastewater piping that interconnects unit processes throughout the plant	A leak or rupture of plant yard piping will result in sewage and/or sludge spill that may contaminate nearby surface waters.
3.11	SCADA RTU Upgrades	SCADA RTU upgrades due to existing RTUs being obsolete and difficulty of locating replacement parts	Failure to upgrade these RTUs could result in loss of monitoring and control of unit processes

Exhibit D-1 Capital Project Descriptions

Project Number	Project Name	Project Description	Project Impact/Need
Wastewater Collection and Transmission Lines			
4.1	Collection System I/I Repairs	Rehab of Collection System (Dig & Replace Mainlines and Laterals, Manhole Replacement, Cured-in-Place Liners and Sectional Liners)	Renewal/replacement of defective gravity sewers with documented excessive inflow/infiltration
4.2	Government Cut FM - Phase 1& 2 (construction ongoing)	Replace existing portion of 54 inch FM from the water shaft of Phase 1 in Government Cut to mainland Miami Beach	Replace critically damaged sections of 54-inch force main to avert catastrophic failures in Government Cut
4.3	Government Cut FM - Phase 3	Replace existing portion of 54 inch FM from land shaft of Phase 1 at Fisher Island to CDWWTP at Virginia Key	Replace critically damaged sections of 54-inch force main to avert catastrophic failures in Fisher's Cut
4.4	North Dade 72 inch PCCP FM Rehabilitation	Rehabilitation of the remaining 3.5 miles of the 72 inch PCCP FM located between NW 17 Ave and NE 10 Ave	Replace remaining damaged section of 72-inch force main that has experienced catastrophic failure
4.5	South Dade 54 inch PCCP FM Rehabilitation	Rehabilitation of approximately 2.5 miles of 54 inch PCCP FM from SW 112 Ave and SW 280 St to SW 107 Ave and SW 248 St	Replace sections of 54-inch force main that has critically damages pipe segments
4.6	Replacement of Tamiami Canal Aerial Crossing FM's at NW 37th Ave	Replace corroded twin 24 inch FM's crossing the Tamiami Canal at NW 37 Ave, just south of NW 21 St	Replace twin 24-inch force mains that are corroded and have experienced failures
4.7	Replacement of 18 inch DIP FM in Miami Lakes	Replace 1 mile of corroded 18 inch DIP FM located at NW 60 Ave and NW 138 St	Replace severely corroded 18-inch pipe that has had multiple failures
4.8	Rehabilitation of 54 inch PCCP FM in the City of Miami	Rehabilitate by Cured-in-Place liner approximately 2 miles of 54 inch PCCP FM located on NW 2 St between NW 67 Ave and NW 37 Ave	Complete rehabilitation of 54-inch force main that is deteriorated and has experienced failures
4.9	Replace Approximately 25 miles of AC force mains	See attached description of individual force mains	Replace asbestos cement force mains that have experienced failures and are difficult to locate in the field.
4.10	Opa-Locka Airport 48" PCCP force main replacement	Rehabilitation of 2.5 miles of 48" PCCP force main running along the Biscayne Canal between NW 57th Avenue & NW 32 nd Avenue	Complete rehabilitation of 48-inch force main that is deteriorated and determined to have approximately one quarter of its line segments distressed based on in-situ condition assessments

Exhibit D-1 Capital Project Descriptions

Project Number	Project Name	Project Description	Project Impact/Need
Sewer Pump Station Systems			
5.1	Upgrade of PS#0418	Covert PS# 418 into a booster type station	The station has reach the end of its useful life. Booster station is needed to relieve pressures in the Doral area.
5.2	Upgrade of PS#0691	Replacement of pumping and electrical equipment	Existing equipment is beyond its useful life. Station capacity increase is required to handle increased Homestead flows
5.3	Upgrade of PS#0692	Replacement of pumping and electrical equipment	Existing equipment is beyond its useful life. Station capacity increase is required to handle increased Homestead flows
5.4	Replacement of Switchgear PS#0414	Replacement of electrical switchgear	Existing equipment is beyond its useful life.
5.5	Replacement of Switchgear and Rehabilitation of Wet well PS#0415	Replacement of electrical switchgear and rehabilitation of the wet well to include a odor control unit	Existing equipment is beyond its useful life. Wet well structure is deteriorated badly due to H2S
5.6	Replacement of Switchgear PS#0416	Replacement of electrical switchgear	Existing equipment is beyond its useful life.
5.7	Replacement of Switchgear and Rehabilitation of Wet well PS#0417	Replacement of electrical switchgear and rehabilitation of the wet well to include a odor control unit	Existing equipment is beyond its useful life. Wet well structure is deteriorated badly due to H2S
5.8	Replacement of Electrical and Mechanical Equipment in PS#0107	Replacement of pumping and electrical equipment	Existing equipment is beyond its useful life. Parts are not readily available for the load cell type controllers
5.9	Replacement of Plumbing and Electrical Equipment at PS#0301	Replacement of pumping and electrical equipment to include generator	Existing equipment is beyond its useful life due to the saltwater environment
5.10	Upgrade of PS#0488	Conversion of pump station to submersible type station	Existing equipment is beyond its useful life.
5.11	Installation of 60 inch FM from Kendall Dr to PS#0536	Installation of 60" F/M from Kendall Dr to PS#0537 to eliminate the 42" reduction in the 60" F/M	To reduce pressure differential and increase flow transfer between PS#0559 and 0536
5.12	Replacement of Switchgear at PS#0187	Replacement of Anvic Drive with VFD	Existing equipment is beyond its useful life. Parts are not available
5.13	Refurbish Emergency Generators and Controls at Regional Pump Stations	Refurbish emergency generators and controls at regional pump stations due to parts obsolescence	Emergency backup generators are unreliable due to age of controllers and condition of wiring on the engines
5.14	Upgrade of PS #0086, 0492	See attached Pump Station Compliance Projects sheet for individual pump station project descriptions.	The pump stations are out of compliance of the Adequate Transmission Capacity Criteria with a NAPOT of greater than 10 hours.
5.15	Upgrade of PS #0065, 0201, 0334, 0374, 0607	See attached Pump Station Compliance Projects sheet for individual pump station project descriptions.	The pump stations are out of compliance of the Adequate Transmission Capacity Criteria with a NAPOT of greater than 10 hours.
5.16	Upgrade of PS #00198, 0437, 0466, 0680	See attached Pump Station Compliance Projects sheet for individual pump station project descriptions.	The pump stations are out of compliance of the Adequate Transmission Capacity Criteria with a NAPOT of greater than 10 hours.
5.17	Upgrade of PS #0037, 0351, 0370, 0403	See attached Pump Station Compliance Projects sheet for individual pump station project descriptions.	The pump stations are out of compliance of the Adequate Transmission Capacity Criteria with a NAPOT of greater than 10 hours.
5.18	Upgrade of PS #0441, 0491, 0710, 0827, 0852, 1236	See attached Pump Station Compliance Projects sheet for individual pump station project descriptions.	The pump stations are out of compliance of the Adequate Transmission Capacity Criteria with a NAPOT of greater than 10 hours.
5.19	SCADA RTU Upgrades	SCADA RTU upgrades for 635 pump stations due to existing RTUs being obsolete and difficulty of locating replacement parts	Failure to upgrades these RTUs could result in loss of monitoring and control of wastewater pump stations

Individual AC force mains in Project 4.9

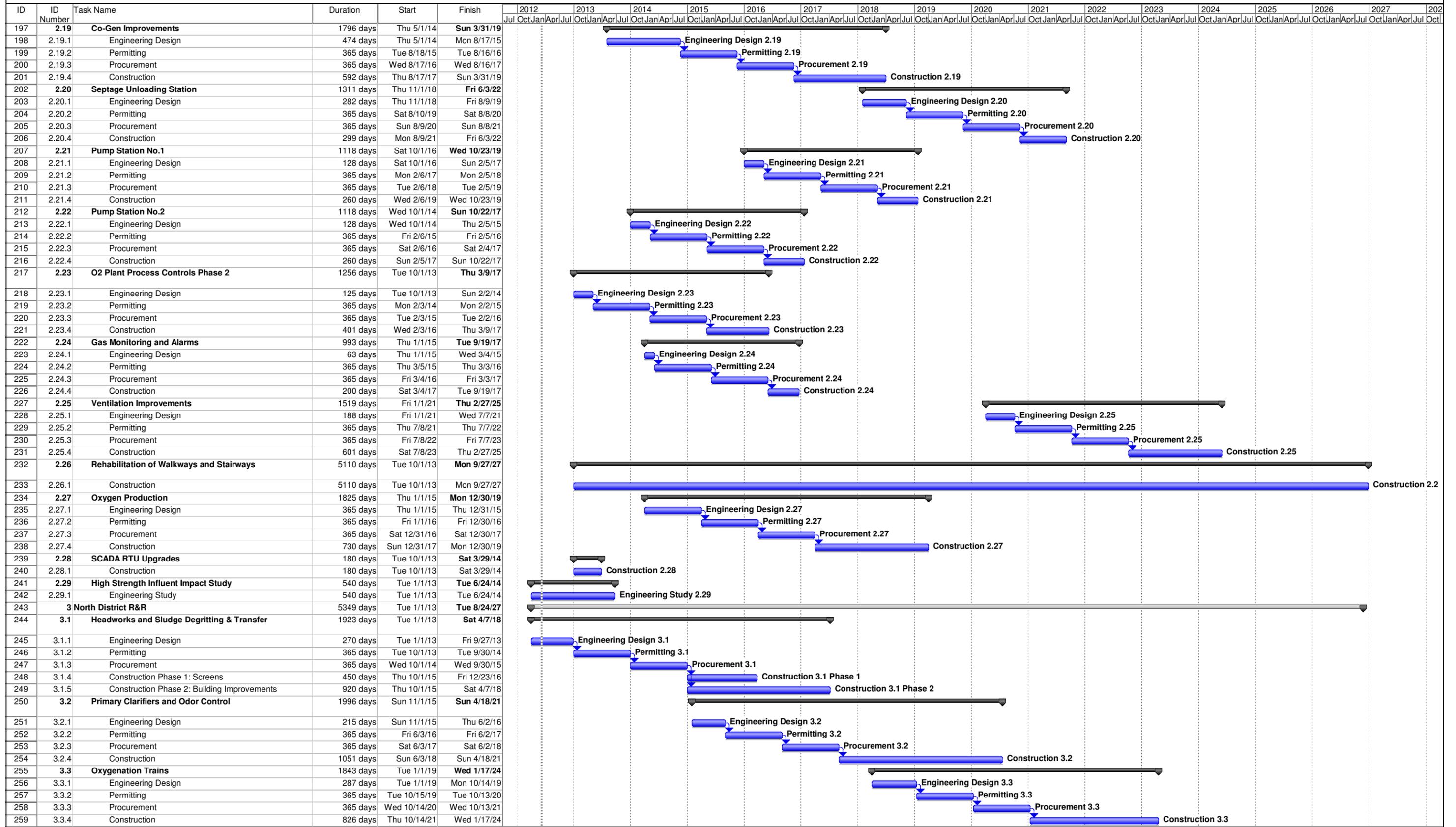
	Pipe Length	Diameter	From Location	To Location	Atlas Page	As Built Type	As Built No	As Built Sheet	Comments
1	2757	12	SW 112 Ave & SW 104 St	SW 112 Ave & SW 112 St	S21	NA	NA	NA	
2	2000	8	NE 14 Ave & 191 St	NE 14 Ave & Miami Gardens Dr	D2	ES	4708	1, 2	
3	1520	6	PS 356	NW 53 Ct & NW 195 Dr	L2	ES	836		4
4	1430	8	NW 53 Ct & NW 195 Dr	NW 52 Ct & NW 191 St	L2	ES	836		4
5	920	10	NW 52 Ct & NW 191 St	NW 52 Ct & NW 188 St	L2	ES	836		4
6	276	6	PS 362	NW 52 Ct & NW 190 St	L2	ES	793		8
7	400	10	NW 52 Ct & NW 190 St	NW 52 Ave & NW 189 Ter	L2	ES	793		8
8	1650	10	NW 52 Ct & NW 188 St	NW 52 Ave & NW 183 St	L2	ES	836		5
9	1492	8	PS 385	NW 29 Ct & NW 199 St	J1	ES	826		4
10	1080	12	NW 29 Ct & NW 199 St	NW 30 Pl & NW 199 St	J1	ES	826		4
11	400	8	NW 29 Ct & NW 199 St	NW 28 Ave & NW 199 St	J1	ES	830		3
12	310	6	PS 374	NW 28 Ave & NW 199 St	J1	ES	830		3
13	3235	12	NW 30 Pl & NW 199 St	NW 37 Ave & NW 199 St	J1	ES	823		4
14	1785	8	PS 368	NW 37 Ave & NW 194 Ter	J2	ES	834		2
15	896	4	PS 375	NW 29 Pl & NW 191 St	J2	ES	818		6
16	896	10	PS 427	NW 29 Pl & NW 191 St	J2	ES	922		1
17	1076	10	NW 29 Pl & NW 191 St	NW 32 Ave & NW 191 St	J2	ES	818		6
18	2614	6	PS 376	NW 32 Ave & NW 191 St	J2	ES	782		7
19	1450	6	PS 377	NW 36 Ave & NW 183 St	J2	ES	797		1
20	467	8	PS 366	NW 42 Pl & NW 199 Ter	K2	ES	808		5
21	1792	10	NW 42 Pl & NW 199 Ter	NW 39 Ct & NW 199 St	K2	ES	808		5
22	2056	6	PS 358	PS 352	K3	ES	775		12
23	11027	8	PS 1022	PS 1072	AA36, Z36	ES	4597		1
24	1793	8	PS 353	NW 48 Ct & NW 178 Ter	L3	ES	780		15
25	1425	10	NW 52 Ave & NW 173 Dr	NW 52 Ave & NW 178 Terr	L3	ES	788		12
26	2025	6	PS 354	NW 52 Ave & NW 173 Dr	L3	ES	788		12
27	2450	4	Pvt PS @ SW 149 Ter	MH 14 @ PS 719	Q23 Q24	ES	676		1
28	1610	8	PS 786	MH 5 @ PS 785	R15	U	93		1
29	1350	12	PS 811	SW 107 Ave & SW 76 St	R19	U	136		1
30	2745	12	PS 811	SW 102 Ave & SW 81 St	R19	U	123		3
31	2168	10	PS 812	SW SW 102 Ave & SW 84 St	R19	U	411		1
32	1622	12	SW 107 Ave & SW 104 St	SW 107 Ave & Kendale Blvd	R20	U	245		2
33	1266	4	Pvt PS @ SW 1104 Ave & SW 169 St	MH 59 @ SW 103 Ave	R25	ES	741		1
34	6612	10	PS 709	Homestead Ave & Kumquat St	R25	ES	739		1
35	2505	6	SW 110 Ave & Banyan St	SW 95 Ave & SW Banyan St	R25	N/A	N/A	N/A	
36	649	4	PS 721	US1 & Banyan St	R25	ES	701		1
37	767	4	PS 749	PS 731	R25	ES	650		2
38	1066	4	PS 747	US1 & East Indigo St	R25	N/A	N/A	N/A	
39	1418	10	SW 102 Ave & SW 176 St	Homestead Ave & West Jessamine	R25	ES	687		8
40	4017	8	PS 745	SW 102 Ave & SW 176 St	R25	ES	687		8
41	1386	4	PS 731	SW Duval Ave & West Indigo St	R25	ES	741		1
42	3769	10	SW 102 Ave & West Jessamine	US 1 & SW 184 St	R25	ES	739		2
43	1858	12	Homestead Ave & SW 180 St	Railroad St & SW 184 St	R25	ES	739		2
44	1200	8	PS 810	SW 118 Pl & SW 72 St	S19	U	243		1
45	650	12	PS 793	SW 118 Pl & SW 72 St	S19	U	243		1
46	666	6	PS 724	SW 106 Ave & SW 155 St	S24	ES	734		1
47	973	8	PS 869	SW 122 Ave & SW 88 St	T20	U	149		5
48	1822	10	PS 1017	SW 123 Pl & SW SW 268 St	T31	ES	1039		3
49	3412	10	PS 1029	SW 132 Ave & SW 268 St	U30	ES	1044		1
50	5649	8	SW 137 Ave & SW 268 St	SW 128 Ave & SW 268 St	U31	ES	1040		6
51	6432	10	PS 1028	SW 137 Ave & SW 288 St	U31	ES	1040		6
52	5461	10	PS 1027	SW 132 Ave & SW 280 St	U31	ES	1049		4
53	2340	8	PS 1018	MH 44A @ SW 132 Ave	U32	ES	1053		1
54	2680	12	SW 137 Ave & SW 72 St	SW 142 Ave & SW 72 St	V18	U	191		1
55	2363	12	SW 142 Ave & SW 72 St	SW 147 Ave & SW 72 St	V18	U	202		6
56	2451	8	PS 864	SW 147 Ave & SW 72 St	V18	U	202		4
57	1441	8	SW 142 Ave & Kendale Lakes Blvd	SW 140 Ave & Kendale Lakes Blvd	V19	U	420		5
58	2101	10	SW 140 Ave & Kendale Lakes Blvd	SW 137 Ave & Kendale Lakes Blvd	V19	U	420		4
59	776	12	SW 137 Ave & Kendale Lakes Blvd	SW 137 Ave & SW 81 St	V19	U	420		4
60	1420	8	PS 1013	PS 1012	V31	ES	4543		3
61	2213	10	PS 1012	SW 144 Ave & SW 280 St	V31	ES	4543		3
62	958	8	PS 1011	SW 144 Ct & SW 280 St	V31	ES	4544		3
63	6565	10	SW 147 Ave & SW 288 St	SW 134 Pl & SW 288 St	V32	ES	1056		1
64	1236	6	PS 1009	SW 147 Ave & SW 296 St	V32	ES	4547		1
65	1819	6	PS 1006	PS 1005	W32	ES	4594		1
66	2989	8	PS 1002	SW 152 Ave & SW 304 St	W33	ES	4593		3

136839 Feet
25.916477 Miles

Description of Individual Pump Station Compliance Projects

Pump Station	Project Description
PUMP STATION 0065	New submersible pumps in the existing dry well/ Larger suction and discharge piping/ Electrical upgrade
PUMP STATION 0086	Convert to submersible with existing wet well/ Electrical upgrade
PUMP STATION 0201	New submersible pumps in the existing wet well/ New valve box/ Electrical upgrade Complete I/I 48 repairs for 176 gpm
PUMP STATION 0334	New submersible PS/ Electrical upgrade 2,200 L.F. of new 8" FM
PUMP STATION 0374	New submersible pumps and valve box/ Electrical upgrade 320 L.F. of new 8" FM
PUMP STATION 0492	New submersible PS/ Electrical upgrade
PUMP STATION 0607	New submersible PS/ Electrical upgrade
PUMP STATION 0198	New submersible pumps in the existing dry well / Electrical upgrade Flow isolation and I/I repairs as needed
PUMP STATION 0437	New submersible pumps and valve box/ Electrical upgrade
PUMP STATION 0466	New submersible pumps and valve box/ Electrical upgrade
PUMP STATION 0680	New submersible pumps/ New valves above ground/ Electrical upgrade
PUMP STATION 0037	New submersible PS/ Electrical upgrade
PUMP STATION 0351	New submersible pumps and valve box/ Electrical upgrade Replace 360 L.F. of 4" with 8" FM
PUMP STATION 0370	New submersible PS/ Electrical upgrade 760 L.F. of new 8" FM
PUMP STATION 0403	New submersible PS/ Electrical upgrade/ On site generator
PUMP STATION 0441	New submersible PS/ Electrical upgrade
PUMP STATION 0491	Flow isolation and I/I repairs as needed
PUMP STATION 0710	New submersible PS/ Electrical upgrade 1,800 of L.F. of new 8" FM
PUMP STATION 0827	Larger submersible pumps/ New valve vault/ Electrical upgrade Replace 1,600 L.F. of 4" FM with 8" FM
PUMP STATION 0852	New submersible PS/ Electrical upgrade
PUMP STATION 1236	Complete I/I 300 repairs for 130 gpm

ID	ID Number	Task Name	Duration	Start	Finish	2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		
						Jul	Oct	Jan	Apr	Jul	Oct	Jan																												
1		1 South District R&R	4399 days	Fri 11/1/13	Sun 11/16/25																																			
2	1.1	Headworks	1607 days	Thu 10/1/15	Sun 2/23/20																																			
3	1.1.1	Engineering Design	209 days	Thu 10/1/15	Tue 4/26/16																																			
4	1.1.2	Permitting	365 days	Wed 4/27/16	Wed 4/26/17																																			
5	1.1.3	Procurement	365 days	Thu 4/27/17	Thu 4/26/18																																			
6	1.1.4	Construction	668 days	Fri 4/27/18	Sun 2/23/20																																			
7	1.2	Oxygen Production	1717 days	Thu 1/1/15	Fri 9/13/19																																			
8	1.2.1	Engineering Design	235 days	Thu 1/1/15	Sun 8/23/15																																			
9	1.2.2	Permitting	365 days	Mon 8/24/15	Mon 8/22/16																																			
10	1.2.3	Procurement	365 days	Tue 8/23/16	Tue 8/22/17																																			
11	1.2.4	Construction	752 days	Wed 8/23/17	Fri 9/13/19																																			
12	1.3	Oxygenation Trains	3303 days	Tue 11/1/16	Sun 11/16/25																																			
13	1.3.1	Engineering Design	259 days	Tue 11/1/16	Mon 7/17/17																																			
14	1.3.2	Permitting	365 days	Tue 7/18/17	Tue 7/17/18																																			
15	1.3.3	Procurement	365 days	Wed 7/18/18	Wed 7/17/19																																			
16	1.3.4	Construction Train 5	123 days	Thu 7/18/19	Sun 11/17/19																																			
17	1.3.5	Construction Train 6	123 days	Fri 7/17/20	Mon 11/16/20																																			
18	1.3.6	Construction Train 4	124 days	Fri 7/16/21	Tue 11/16/21																																			
19	1.3.7	Construction Train 3	124 days	Sun 7/17/22	Thu 11/17/22																																			
20	1.3.8	Construction Train 2	124 days	Mon 7/17/23	Fri 11/17/23																																			
21	1.3.9	Construction Train 1	124 days	Wed 7/17/24	Sun 11/17/24																																			
22	1.3.10	Construction Train 7	123 days	Thu 7/17/25	Sun 11/16/25																																			
23	1.4	Chlorine Building	1279 days	Sat 12/1/18	Wed 6/1/22																																			
24	1.4.1	Engineering Design	131 days	Sat 12/1/18	Wed 4/10/19																																			
25	1.4.2	Permitting	365 days	Thu 4/11/19	Thu 4/9/20																																			
26	1.4.3	Procurement	365 days	Fri 4/10/20	Fri 4/9/21																																			
27	1.4.4	Construction	418 days	Sat 4/10/21	Wed 6/1/22																																			
28	1.5	Effluent Pump Station	2045 days	Thu 9/1/16	Thu 4/7/22																																			
29	1.5.1	Engineering Design	313 days	Thu 9/1/16	Mon 7/10/17																																			
30	1.5.2	Permitting	365 days	Tue 7/11/17	Tue 7/10/18																																			
31	1.5.3	Procurement	365 days	Wed 7/11/18	Wed 7/10/19																																			
32	1.5.4	Construction	1002 days	Thu 7/11/19	Thu 4/7/22																																			
33	1.6	Gravity Sludge Thickeners	1728 days	Mon 1/1/18	Sat 9/24/22																																			
34	1.6.1	Engineering Design	230 days	Mon 1/1/18	Sat 8/18/18																																			
35	1.6.2	Permitting	365 days	Sun 8/19/18	Sun 8/18/19																																			
36	1.6.3	Procurement	365 days	Mon 8/19/19	Mon 8/17/20																																			
37	1.6.4	Construction	768 days	Tue 8/18/20	Sat 9/24/22																																			
38	1.7	Digesters and Control Building	2919 days	Fri 11/1/13	Thu 10/28/21																																			
39	1.7.1	Engineering Design	268 days	Fri 11/1/13	Sat 7/26/14																																			
40	1.7.2	Permitting	365 days	Sun 7/27/14	Sun 7/26/15																																			
41	1.7.3	Procurement	365 days	Mon 7/27/15	Mon 7/25/16																																			
42	1.7.4	Construction	1921 days	Tue 7/26/16	Thu 10/28/21																																			
43	1.8	Dewatering Facility	1977 days	Tue 7/1/14	Thu 11/28/19																																			
44	1.8.1	Engineering Design	287 days	Tue 7/1/14	Mon 4/13/15																																			
45	1.8.2	Permitting	365 days	Tue 4/14/15	Tue 4/12/16																																			
46	1.8.3	Procurement	365 days	Wed 4/13/16	Wed 4/12/17																																			
47	1.8.4	Construction	960 days	Thu 4/13/17	Thu 11/28/19																																			
48	1.9	FOG Removal Facility	1498 days	Fri 11/1/13	Thu 12/7/17																																			
49	1.9.1	Engineering Design	183 days	Fri 11/1/13	Fri 5/2/14																																			
50	1.9.2	Permitting	365 days	Sat 5/3/14	Sat 5/2/15																																			
51	1.9.3	Procurement	365 days	Sun 5/3/15	Sun 5/1/16																																			
52	1.9.4	Construction	585 days	Mon 5/2/16	Thu 12/7/17																																			
53	1.10	Odor Control	1607 days	Sat 12/1/18	Tue 4/25/23																																			
54	1.10.1	Engineering Design	209 days	Sat 12/1/18	Thu 6/27/19																																			
55	1.10.2	Permitting	365 days	Fri 6/28/19	Fri 6/26/20																																			
56	1.10.3	Procurement	365 days	Sat 6/27/20	Sat 6/26/21																																			



Project: Project Scheduling MSP Project Date: Wed 3/6/13

Task: Progress (blue bar), Milestone (dotted line), Summary (black bar), Project Summary (grey bar), External Tasks (grey bar), External Milestone (grey diamond)

Split: (dotted line)

Deadline: (green arrow)

