S. 206 Deer Island Treatment Plant Asset Protection

Project Purpose and Benefits

☑ *Contributes to improved public health*
☑ *Fulfills a regulatory requirement*
☑ *Extends current asset life*
☑ *Improves system operability and reliability*
☑ *Improves energy efficiency*

To protect the investment of MWRA ratepayers in the Deer Island Treatment Plant by ensuring timely replacement of DI's systems, which contain more than 60,000 pieces of equipment with an approximate value of $1 billion. Based on the Master Plan developed in 2006, most recently updated in 2013, MWRA expects to sequentially replace equipment and structures in the facility as they reach the end of their useful life. Staff are in the process of updating the Master Plan, which may result in additional changes being incorporated in FY26 for future projects beyond FY35.

Construction of the Deer Island Treatment Plant was one of the largest wastewater projects ever undertaken in the United States. DITP construction was a 12-year, $3.8 billion effort (not including the cost of off-island residuals facilities) started in 1988. MWRA commenced primary treatment in 1995 and secondary treatment in 1997. With the Effluent Outfall Tunnel completion in September 2000, the plant discharges treated effluent 9.5 miles offshore into the Massachusetts Bay through 55 diffusers spaced along the last 1.25 miles of the tunnel.

Project History and Background

At an expansive and complex facility like the Deer Island Treatment Plant (DITP), unanticipated equipment and system failures can cause operational and/or maintenance crises. It is prudent industry practice to take a proactive approach by establishing programs to anticipate when equipment and systems are near the end of their reliable service lives, and then overhaul, upgrade, or replace the equipment, systems, and structures as needed.

DITP staff implemented a "reliability-centered maintenance" (RCM) program to monitor, evaluate, and maintain all of the equipment and major systems within the facility. RCM includes using non-invasive methods of assessing the operational condition of equipment through programs such as vibration monitoring, lubricant and oil testing, thermography, and ultrasonics (audible sound). These programs involve developing a "base line" for equipment when it is relatively new or rehabbed, then comparing future test results to determine if there is a change in the base line which warrants invasive action or other maintenance procedures to mitigate the problems. In addition to RCM, staff follows original equipment manufacturer (OEM) maintenance protocols when appropriate. To assist staff in keeping all of the historic data; storing OEM maintenance instructions; monitoring costs associated with maintaining the equipment; providing work orders as needed, etc. - the maintenance software program MAXIMO was implemented at DITP and other Authority locations.

To augment the DITP maintenance program, contracts are issued to obtain the services of factory-authorized technicians with the expertise to maintain specialized equipment and systems, such as electricity-generating turbines (hydro, wind, steam and combustion-driven), the oxygen generation facility, Thermal Power Plant equipment, etc. Recommendations to add capital projects to the budget also come from staff managing these maintenance programs and service contracts.

The DITP Asset Protection project encompasses the following major functional categories:

1. Equipment Replacement (chains, pumps, motors, control systems, discrete process equipment, etc.).
2. Architectural projects (expansion joint replacements, concrete corrosion, etc.).
3. Utilities projects (water, sewer, drainage, piping, electrical wiring, heating systems, etc.).
4. Support projects (Technical Information Center projects, security projects, etc.).

5. Specialty projects (chemical pipelines and storage tanks, fuels storage tanks, etc.).

Scope

Sub-phase *Equipment Replacement:*	**Scope**	**Status**
Equipment Condition Monitoring (6594)	Installed temperature & vibration-monitoring equipment in NMPS and Winthrop Terminal Facility. Complete January 2005.	Completed
CEMS Equipment Replacement (6882)	Replaced data collection computers, upgraded software, and added PLCs to the Continuous Emissions Monitoring Systems on the two high-pressure Zurn boilers. Complete March 2006.	Completed
Pump Packing Replacement (6422)	Replace pump packing seals with mechanical seals in the North Main, South System, and Winthrop Terminal pump stations. Purchases completed in FY08, installations completed in FY09.	Completed
Cathodic Protection Construction (7056) (Designed under Digester & Storage Tank Rehab project, 7052)	Construction project to replace DI's cathodic protection systems as required. Design will be performed under the Digester & Storage Tank Rehab Design.	Future
Digester Chiller Replacement (7005)	Replaced the refrigeration-based digester gas chiller with a chilled water system that performs better at low operational loads. Completed in May 2006.	Completed
Dystor Tank Membrane Replacement (7006)	Emergency replacement of a torn gas membrane on one digester storage tank, and preventive replacement on the second. Completed both by October 2005.	Completed
Dystor Membrane Replacements (7135)	Periodic replacement of the two gas & sludge storage tank membranes in the digester complex. Replaced both in 2005; expect 15 year life cycle. The membranes are scheduled to be replaced in FY26	Future
Digested Sludge Pump Replacement Design, and Construction (Phase 1) (7123)	The three positive displacement Abel pumps caused pipe vibration and required extensive maintenance. In Phase 1, one centrifugal pump and a flushing pump were installed in 2011, and tested to ensure they worked well before the three remaining pumps were replaced. (See Phase 2, below).	Completed
Digested Sludge Pump Replacement (Phase 2) (6821)	Sub-phase added in FY14, to complete replacement of the Abel pumps. Centrifugal pumps with higher flow rates were installed to minimize grit settlement in the pipes. Completed July 2017.	Completed
Centrifuge Back-drive Replacements (7057)	Replaced the centrifuge back-drives, which had become obsolete. Completed March 2015.	Completed
Grit & East/West Odor Ctrl Air Handler Unit (AHU) Replacements (6881)	Replaced deteriorated air handlers in FY09-16, then every 15 years. Grit AHU replacement completed in June 2010. The E/W Odor Control AHU Replacements are now in the HVAC Equipment Replacement project, below.	Completed
Fire Alarm System Replacement – Design (6904), Construction (7051), and REI (7426)	To replace obsolete fire alarm monitoring & control systems. Design on-going System will need to be replaced approximately every 20+ years thereafter	Active

Sub-phase *Equipment Replacement:*	**Scope**	**Status**
Bidirectional Radio Repeater System Upgrade 1 (7122) and 2 (7134)	Install a bidirectional radio amplification system in throughout Deer Island to maintain emergency radio communications for Boston/Winthrop Fire Departments to meet current safety code. Equipment for Phase 1 was completed in 2020. Phase 2 Construction completed in 2023.	Completed
HVAC Equipment Replacement – Design/ESDC (7110, 7111), HVAC Control System Replacement (7745), HVAC Fume Hoods Replacement (7746), HVAC Mechanical Equipment Replacement Construction (7605, 7747) and REI (7094)	Replace the system-wide HVAC control system due to obsolescence. Redesign is required to include three separate construction contracts to ensure competitive bidding.	Active
Centrifuge Replacements – Design (7137), and Construction (7138)	Replace the sludge centrifuges are at the end of their useful life or after a catastrophic failure. Centrifuges thicken secondary waste sludge before it goes to the digesters. Units have a 25 to 30-year life.	Future
Cryogenics Plant Equipment Replacement – Design (7139), and Construction (7140)	Design and construction to the existing compressors, cold boxes, lox tanks and appurtances due to end of useful life and obsolescence. Replacement of 3 chillers was necessary in FY16; see below. Remaining plant overhaul construction work to commence in FY28-31 with future rehab and upgrade work occurring every 20 years. An annual maintenance contract keeps this facility in good operating condition, since it is critical to secondary treatment.	Active
Cryogenics Chillers Replacement (7398)	Replaced failing air chillers that required frequent maintenance in the oxygen generation plant. Completed in September 2016.	Completed
Digester Modules 1 & 2 Pipe Replacement Design and Construction (7055)	During digester cleaning in 2007, deterioration of the glass lining was noted. This project was completed by August 2014. Scope included plug valve replacements. A project for additional digester storage tank rehab work was added in FY13; see the DITP Digester & Storage Tank Rehab project under “Specialties”.	Completed
Butterfly Valve Replacements at North Main Pump Station (NMPS) & Winthrop Terminal Facility (WTF) (7275)	There are twenty 60-inch butterfly valves in NMPS and eight 36-inch plug valves in WTF, for isolating the pumps when maintenance is required. One valve in NMPS was replaced; several others began to leak (gaskets and seals were failing). Scope revisions in FY10 added replacement of the magnetic flow meters, replacement of PSL piping and Eight (8) hydraulic actuators for the SSPS pump check valves. Work began in June 2014 and was completed in September 2017.	Completed

Sub-phase *Equipment Replacement:*	**Scope**	**Status**
Gas Protection Systems Replacement (7169)	Replace gas detection devices in 13 DITP locations: pump stations (NMPS, SSPS, Winthrop Terminal), odor control (East/West, Residuals, Winthrop Terminal) and process areas (Thermal Power Plant, Digesters, gas handling, primary & secondary galleries, disinfection, Grit Facility, and gravity thickeners). These detectors measure levels of oxygen, hydrogen sulfide, sulfur dioxide, chlorine, and other combustible gases. They are integral to ensuring the health & safety of employees and contractors. Scheduled in FY20 in two phases; First phase completed in 2021, Second phase to commence in FY25.	Active

Sub-phase *Architectural:*	**Scope**	**Status**
Expansion Joint Repairs Design (6668), Construction 1 (6669), Construction 2 (6704)	Replace failed expansion joints in the concrete clarifier decks and/or various retaining walls. Phase 1 complete November 2003; phase 2 February 2014, Phase 3 has been included in Contract 7395.	Active
Eastern Seawall Design/ESDC/REI (6723), and Construction (6724)	Design and construction of repairs to the base of the seawall from tidal damage, exposing rebar. Seawall condition is monitored on a biannual basis. Design phase is on-going.	Active
Roof Replacement Phase 1 (S464)	Added in FY10, based on decision to capitalize these costs. Replaced the rubber membrane roof at Winthrop Terminal, the Admin./Warehouse building, the Cryogenics Facility, and the lower roofs on the Digester Modules. Completed March 2010.	Completed
DITP Roof Replacements Phase 2 (6196)	Added in FY10 to replace roof membranes at the North & South Main Pump Stations; East & West Odor Control; the Grit Facility; and the Centrifuge Thickener building. Completed July 2011.	Completed
Personnel Dock Rehabilitation (7168)	Rehabilitate the floating docks at Deer Island. To improve the safety, appearance, and reliability of the floating docks. Awarded in FY17, completed in mid-FY18.	Completed
Barge Berth and Facility Replacement Design/ESDC (6725), and Construction (6726)	Major rehabs of the barge berth & pier facilities due to damage and/or normal wear. Added per the Master Plan. Barge berth/facility work expected every on a 25-year repeat cycle.	Future
Rip-rap Material (6727)	Purchased 6,400 tons of rip-rap to reduce and prevent ocean wave soil erosion along the northeast and eastern shoreline at Deer Island. Placement completed by staff in June 2017.	Completed
DITP Roof Replacement Phase 3 (7424)	New roofing was needed at the Grit Facility, North Main Pump Station, Main Switchgear Building, and the gravity thickeners to protect the equipment in the buildings. Completed in July 2014.	Completed
DITP Roofing Replacement (7734)	Replacement of the following rubber roofs that are in need of replacement: Cryogenics, Residuals (Mod #1 and #2 Vestibule Roof), Gravity Thickener Buildings), Garage Building, Reception Training (slate tiles), and Admin Lab Building. Work to start in FY25.	Active

Sub-phase *Utilities:*	**Scope**	**Status**
Outfall Modifications (6811)	Inspection of the old outfall tunnels (decommissioned after startup of the new outfall tunnel). Inspection completed in July 2002.	Completed
Electrical Equipment Upgrades Design (7130, 7750), and Construction (including future cycles from the Master Plan) (6767, 6855, 6901, 7124, 7414	Replace substation equipment. Phase 1-Bus duct 2 & 22 replacement completed October 2001: Phase 2 completed by March 2007; Phase 3 completed in August 2011. Phase 4 completed in June 2016; Phase-5 design to commence in FY29; Phase 6 to commence in FY31. Equipment needs to be replaced every 20 years.	Future
VFD Replacements (6875, 6902, 6903, 7062, 7125, 7126, 7127, 7128, 7129, 7131	Replace obsolete variable frequency drives (VFDs) in the North Main Pump Station (in FY12-16); South System Pump Station in FY07-08, with the next cycle to start in FY23 (South System Pump Station Lube System Replacement was added to the scope in the FY19; Winthrop Terminal Facility (FY16-21); and miscellaneous smaller VFDs throughout the plant (on-going). Future replacements 15 years.	Active
Power System Improvement Design and Constrruction (7061, 7061A, 7061B, 7061C, 7061D)	For modifications to DITP's electrical system as recommended in the consultant report after an FY04 power outage. Design completed in FY09-11. Completing the construction in a series of projects in FY09-14; added 7061C, dump condenser replacement and 7061D for NMPS fuel tank removal in FY11. Two awarded in FY09, two in FY11. The last, 7061A, Thermal Power Plant Fuel System Upgrade was substantially completed by May 2017.	Completed
TPP Boiler Control Replacement (7401)	Replaced boiler controls in the Thermal Power Plant that were obsolete. Completed by November 2016.	Completed
Switchgear Replacements Design/ESDC/REI and Construction including future cycles added per the Master Plan (7133)	On-going program to replace obsolete electrical switchgear. Future cycles beyond that time are not currently funded.	Future
Transformer Replacements (6813)	Approximately 42 electrical substations and 87 transformers have been in service since DITP start-up. Sub-phase eliminated in FY14; replacements are now done in Electrical Equipment Upgrades.	Completed
PICS Replacement including future cycles from the Master Plan (6884)	Replace or upgrade the Process Information Control System (PICS) including keypads, consoles, and software when obsolete. Completed in FY16; may need to be repeated every 10-15 years.	Completed
PICS Fiber Loop Replacement (7172)	Replace the PICS system "backbone", the fiber optic loop.	Future
Chemical Tank & Pipe REI and Construction (to include Gravity Thickener Overflow Pipe Replacement) (7373)	Strip and reline three of the four Sodium Hypochlorite Tanks and the two Sodium Bisulfite Tanks, which are in fair condition on the outside (shows staining, rusting, and corrosion). If one bisulfite tank fails, there is no longer any back-up. (Tanks have been in service for 26 years; Hypo tanks 1 & 3 were relined in 2007, tanks 2 & 4 in 2008). Added the replacement of the Gravity Thickener overflow pipe in this project. Work complete in FY22.	Completed

Sub-phase *Utilities:*	**Scope**	**Status**
Chemical Pipe Replacement Design (6851) and Construction (6852)	Planned periodic replacement of the various chemical pipelines in the odor control and disinfection facilities due to deterioration from corrosion.	Future
Heat Loop Pipe Replacement Construction (6876)	Rerouted heat loop piping into galleries to reduce underground corrosion and improve accessibility. Phase 1 complete Dec. 2005, Phase 2 complete February 2008. Phase 3 complete June 2011. Includes periodic valve replacements. Another project phase needs to be added to provide redundancy to the heat loop.	Completed
Fuel Pipe Abandonment (7415)	Cleaned and cemented the existing fuel pipeline in place instead of removing it. Completed December 2012.	Completed
North Main Pump Station Motor Control Center (MCC) Construction (6972)	Replaced MCC equipment that had become obsolete and unreliable. Designed by As-Needed Design task order, construction completed in two phases in FY12-13. See Phase 2 below.	Completed
Motor Control Center (MCC) and Switchgear Replacement Design ESDC/REI (7419) and Construction (7420)	Sub-phase pulled from the project above, second phase being done FY20-22. In FY17, the design scope was revised to include replacement of switchgear in the Admin/Lab building. Construction is scheduled for FY26.	Active
Combustion Turbine Generator (CTG) Rebuilds (7136)	Rebuilds of the combustion turbines in the Thermal Power Plant. Scheduled for FY27with repeat cycles every 15 years. With the addition of the "Combined Heat & Power" facility, this work may eventually be eliminated.	Future
STG System Modifications Design (6967), and Construction (6973)	Added equipment to the steam turbine generator to increase electricity output by using the current steam production more efficiently. Helps the MWRA meet energy goals set out by executive order. Completed in February 2011. Added Pressure Reducing Valve to maximize electrical generation by July 2014.	Completed
DI Digester Flare No. 4 Design/ESDC (6728) and Construction (6729)	Install a fourth gas flare to reduce the potential for air permit violations when an existing flare is out of service and/or the boilers have to be taken off-line. Unit will be replaced under Contract 7088.	Future
Hydroturbine Replacements Design (7570) and Construction (7571)	There are two 1.1 megawatt hydroturbine generators (HTGs) at Deer Island. Electricity is generated using the force of plant effluent as it drops from the disinfection basins into the intake channel beneath each HTG. This facility came on line in July 2001. The HTGs have reached the end of their useful life, and repairs are costly. A condition assessment and LCCA will be performed to determine future repair/replacement options.	Active

Sub-phase **Support:**	**Scope**	**Status**
DISC Application (6241)	Hardware, software, and contract services to implement a plant-wide computerized database of all plant utility systems. Existing programs deemed sufficient, project removed in FY14.	Completed
Document Format Conversion (6791)	Convert DITP construction documents into electronic format and develop a document-reference database. Work is in process, and has several phases. Completed by the end of FY19.	Completed
As-Needed Design Phases 5, 6, 7, 8, 9, and 10 (7090, 7091, 7399, 7400, 7434, 7501, 7502, 7503, 7644, 7645, 7646, 8018, 7981, 7982)	On-going technical design services and/or construction support to supplement existing engineering resources for specialized or complex engineering issues. Initially, two contracts were issued and ran for two years each. For Phase 6, contract length was extended to three years each. Phases 6-1 and 6-2 ended by October 2012, phase 7-1, 7-2, and 7-3 (at $1.6M each, end April 2016). Phases 8-1, 8-2, and 8-3 were awarded in FY16 at $1.6M each, for FY17-FY19. Phase 9 Phases 9-1, 9-2, 9-3 were awarded in FY20 and completed in FY23. Phase 10 was awarded in FY24.	Active
Deer Island As-Needed Technical Design (7121)	A placeholder used to continue the technical design services as described above. Each series of new contracts will be deducted from this placeholder. Funding now runs from FY26 to FY30.	Future

Sub-phase *Specialties:*	**Scope**	**Status**
Sodium Hypochlorite Tank Liner Removal (7089)	Removed the failed lining in tank #1 of the four sodium hypochlorite storage tanks. Completed in September 2006.	Completed
Hypochlorite Tanks 1 & 3 Reline (6764)	Renamed the "Sodium Hypo Tank Repair 1" sub-phase. Included stripping, repairs and relining tank 3. Completed November 2007.	Completed
Hypochlorite Tanks 2 & 4 Reline (6849)	Strip & reline the two remaining sodium hypochlorite storage tanks. Scope included removing ladders and replacing safety railings on the tanks. Completed in October 2008.	Completed
Sodium Hypochlorite and Bisulfite Tanks Replacement Design/ESDC (7749), and Construction (7142)	Based on condition assessments, tanks will need to be replaced as required	Future
Primary & Secondary Clarifier Rehab – Design ESDC/REI (6965)	ESDC/REI Services during the Primary & Secondary Clarifier Rehab Constr., below (design by As-Needed Design consultant). Included secondary clarifiers due to deterioration in the longitudinal chains and scum collection systems. Completed September 2013.	Completed
Primary & Secondary Clarifier Rehab Construction (6899)	Replace longitudinal & cross collector chains and sprockets, chain drives, wear shoes; modify tip tubes, replace hose bibs; repair wall expansion joints, add more drop boxes, etc. Added secondary clarifier work in FY09, specified a higher-grade stainless steel which increased the cost by $30M. Separated out the gravity thickener scope due to the need for separate, distinct schedules. Project awarded at $59.4M; completed February 2012.	Completed

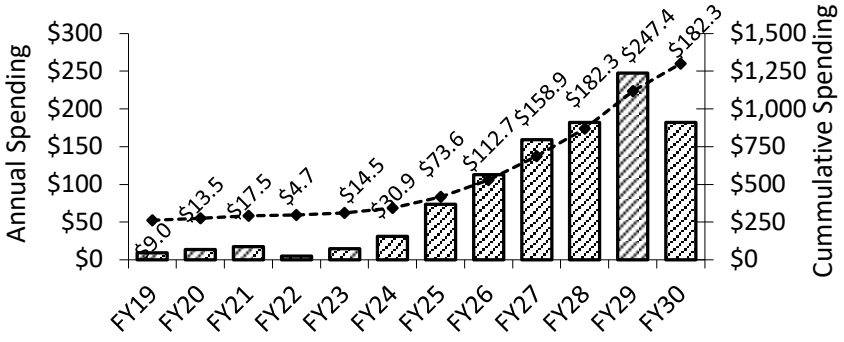
Sub-phase *Specialties:*	**Scope**	**Status**
Gravity Thickener Improvements – Construction (6966)	This subphase was eliminated in FY08, and the scope was included with the Primary Clarifier Rehab work above. Made a stand-alone project again in FY09. The first phase (6966) involved replacing failed fiberglass covers in FY10-12. 6966A, B, and C were added for emergency repairs to center columns in three tanks in FY11. Project completed in June 2012.	Completed
Gravity Thickener Rehabilitation (7428)	Sub-phase pulled from the project above. This phase involves installing catwalks around the perimeter of several tanks, removing concrete blocks in the effluent channels, and modifying the sludge thickener roofing to improve staff access and the operating efficiency.	Completed
Gravity Thickener Center Column Replacement (7427)	Complete replacement of the center columns in all 4 tanks with a higher grade steel, due to the failures experienced in FY11. Contract awarded in FY13, completed by January 2014.	Completed
Odor Control Rehabilitation Design/ESDC (7088), Construction (6538), and REI (6592)	Dropped the Preliminary Design phase and added ESDC/REI to the scope in FY11. The project involves modifications to the plant-wide odor control systems, including the digester gas systems and wet scrubber improvements.	Future
Clarifier W3H Flushing System (7374)	Replaced deteriorated water flushing lines in the clarifier batteries, completed July 2013.	Completed
Clarifier Rehabilitation Phase 2 Design/ESDC (7394), REI (7397), and Construction (7395)	Project to correct deficiencies noted during the first Primary & Secondary Clarifier project. Influent gates not sealing off tanks adequately; effluent launders and aeration systems need repair; and concrete corrosion in primary clarifiers above the water line needs repair and coating to prevent future corrosion. The sludge removal system in primary tanks and aeration/recirculation systems in secondary tanks need to be rehabilitated as well. Design/ESDC contract began in FY15, and construction is currently on-going.	Active
Scum Skimmer (Clarifier Tip Tube) Replacement (7396)	Scum tip tubes not working properly results in scum build-up in clarifiers that has to be manually collected and transported to the gravity thickeners. Secondary tip tubes replacement was added to the scope, greatly increasing the cost. Completed Oct-13 to Oct-16. Needs to be replaced in 20-year cycles.	Completed
Digester and Storage Tank Design/ESDC/REI (7052), and Rehabilitation Phase 2 (6240)	The DITP residuals facility includes twelve digesters and two gas handling/sludge storage tanks. During Digester Mods Pipe Replacement (7055), it was noted that additional digester work was needed. Issues with plugged digester recirculation pipes, mixer failures, and overflow box deterioration resulted in increasing the scope needed to correct all deficiencies. Some steel plates in the digesters may also need repair or replacement, and the interior of the digesters needs to be coated.	Active

Sub-phase *Specialties:*	Scope	Status
Combined Heat & Power (CHP) Study (6963), Design (6730), and Construction (6964)	A system review was done to determine possible options for optimizing the use of methane gas produced from the existing sludge processing system. One option is to construct a CHP facility containing more efficient gas-fired turbines to increase electrical self-generation, and ensure beneficial re-use of all methane gas in the summer while still meeting all plant heat requirements. The CHP facility would be designed to handle the increased methane gas produced by co-digestion, if that project becomes feasible. Depending on the CHP facility design, portions of the 17-year old Thermal Power Plant will be modified or eliminated. A detailed energy alternatives project commenced in FY19, and will be followed by design and construction.	Active
Co-Digestion Design/ESDC/REI and Construction (6822)	Co-digestion construction is for the addition of piping and a receiving tank for the liquid food waste to be delivered to Deer Island. Food waste would be barged to the plant, pumped into the receiving tank, and from there pumped into the digesters.	Future
Co-Digestion Temporary Facility (7148)	Moved from the Residuals CIP to DITP in FY16. The budget was reduced to actual costs incurred since this project is not likely to be continued.	Completed

Expenditure Forecast (in $000s) and Project Status

Total Budget	Payments thru FY23	Remaining Balance	FY24	FY25	FY24-28	FY29-33	Beyond FY33
$1,613,142	$ 311,593	$1,301,548	$30,874	$73,626	$558,449	$689,934	$53,165

DI Asset Protection



Project Status 5/24	20.9%	Status as % is approximation based on project budget and expenditures. Several previously completed phases for this project are included in the Completed Project list. Contracts in process include the following: As-Needed Design Phase 9-1, 9-2 and 9-3, Clarifier Phase 2 Design and REI, Fire Alarm System Replacement Design, DITP MCC & Switchgear Replacement Design, ESDC and REI, and SSPS VFD Replacement Design. Contracts scheduled to begin in FY23 are: Clarifier Rehab Phase 2 – Construction and REI, Fire Alarm System Replacement Construction, Odor Control Rehab Design, MCC Switchgear Replacement, Digester and Storage Tank Rehab Design, Dystor Membrane Replacement, Cryogenics Plant Equipment Replacement Design among others.

Changes to Project Scope, Budget, and Schedule

Project Cost			Scheduled Completion Date			FY24-28 Spending		
FY24	FY25	Chge.	FY24	FY25	Chge.	FY24	FY25	Chge.
$1,556,032	$1,613,142	$57,110	Dec-35	Dec-35	None	$ 581,371	$558,449	($22,922)

Explanation of Changes

- Project cost change primarily due to Updated cost estimates for Digester Storage Tank Rehabilitation, South System Pump Station VFD Replacement Construction, Odor Control Rehabilitation Design and Construction, Eastern Seawall Construction, DiStor Membrane Replacements, Combined Heat & Power (CHP) - Design/ESDC/REI, Chemical Pipe Replacement, HVAC Design/ESDC, Gas Protection System Replacement Phase 2, award greater than FY24 budget for Digester & Storage Tank Rehabilitation Design/ESDC, and amendments and change orders for Clarifier Rehabilitation Phase 2 Design/ESDC and Construction. Also, updated cost estimates due to inflation adjustments on unawarded contracts.

- Spending change primarily due to updated schedules for Combined Heat and Power (CHP) Construction, Cryogenics Plant Equipment Replacement Construction, South System Pump Station VFD Replacement Construction Deer Island As-needed Technical Design, HVAC Control System Replacement and REI, MCC & Switchgear Replacement Construction, Odor Control Rehabilitation Design/ESDC, Eastern Seawall Construction 1, updated cost estimates listed above, and reductions due to closeout for MCC Switchgear Replacement Design/ESDC/REI and Construction.

CEB Impacts

- The majority of the projects are required to replace obsolete equipment and systems. Some of the projects are expected to result in decreased maintenance and/or operating costs such as the HVAC equipment replacement. However, the potential benefits from most of the projects are not quantified at this time.

- Benefits of several energy-related projects have been estimated resulting in anticipated annual electrical savings. Some examples include: HVAC Equipment Replacement of $140,000 (starting in FY32), Future SSPS VFD Replacements ($120,000 beginning in FY30), and Hydroturbine replacement ($50,000 in FY33). Any potential impacts of co-digestion and the combined heat and power facility have not yet been quantified or included in the planning estimates due to uncertainty regarding the scope and feasibility of the projects.

- Projects that are expected to reduce maintenance time and other resources are the Cryogenic Plant Equipment Replacement and the Hydroturbine Replacement.