

# CITY OF PORTSMOUTH PEIRCE ISLAND WASTEWATER TREATMENT FACILITY UPGRADE



CONSTRUCTION UPDATE

JULY - OCT. 2017



The Peirce Island Wastewater Treatment Facility (WWTF) Upgrade Project has just entered the second year of construction. Construction of the upgrade commenced in September 2016, and when completed in three years, this project will improve the quality of treated effluent from the facility that is discharged into the Piscataqua River.

This update covers project activities from July through October 2017. A summary of construction progress is shown through pictures of installed and ongoing work on the next page. Other relevant aspects of the project are presented. Construction work during this period included: Completion of the exterior building envelope for the Headworks Building and continued interior process and HVAC equipment and piping installation; continued concrete placement for the Biological Aerated Filter (BAF) Building; installation of the Electrical Building and electrical switchgear; installation of the standby engine-generator; construction of a temporary sludge pump station inside the gravity thickener enclosure; and installation of site piping, underground electrical and communication ductbanks.

Preparations also continued during this period on the construction of temporary offices, laboratory and locker facilities for the WWTF operations staff located in the

Peirce Island pool parking lot adjacent to the construction office trailers. These temporary facilities are needed to permit the relocation of the WWTF staff to allow the demolition of the existing Administration Building as a key next step in the construction sequence. Work also focused on the transfer of the WWTF control system, the Supervisory Control and Data Acquisition system referred to as SCADA, to the new Headworks Building. On October 18, 2017, the transfer was completed. The SCADA system transfer is a required milestone under the Consent Decree and was completed ahead of schedule.

The City remains committed to making this a successful project and mitigating construction impacts where feasible. Please visit the City's project web page for weekly updates or to submit comments or questions. <https://www.cityofportsmouth.com/publicworks/wastewater/peirce-island-wastewater-facility/peirce-island-wastewater-facility-upgrade-project>

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### Electrical Facilities

The new precast concrete Electrical Building, which will house the incoming electrical service and switchgear for the entire WWTF, being installed.



### Electrical Facilities

New underground electrical conduits being run between the utility transformer and the site of the new Electrical Building.



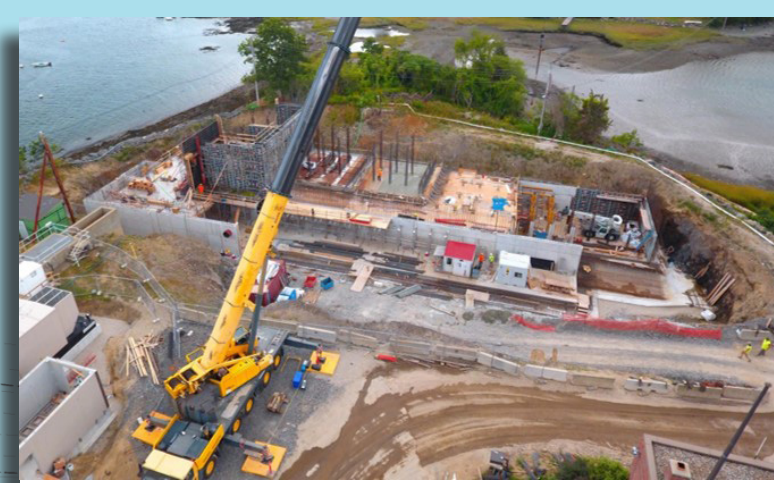
### Stormwater Collection & Treatment

Site stormwater will receive improved levels of treatment through several approaches including this water quality treatment unit.



### Generator

New 1500 kilowatt diesel standby generator, that will provide emergency power to the WWTF, being lowered onto the concrete foundation.



### BAF Building

Aerial view of the BAF, which will provide secondary treatment and nitrogen removal, looking south with Shapleigh Island in the background.



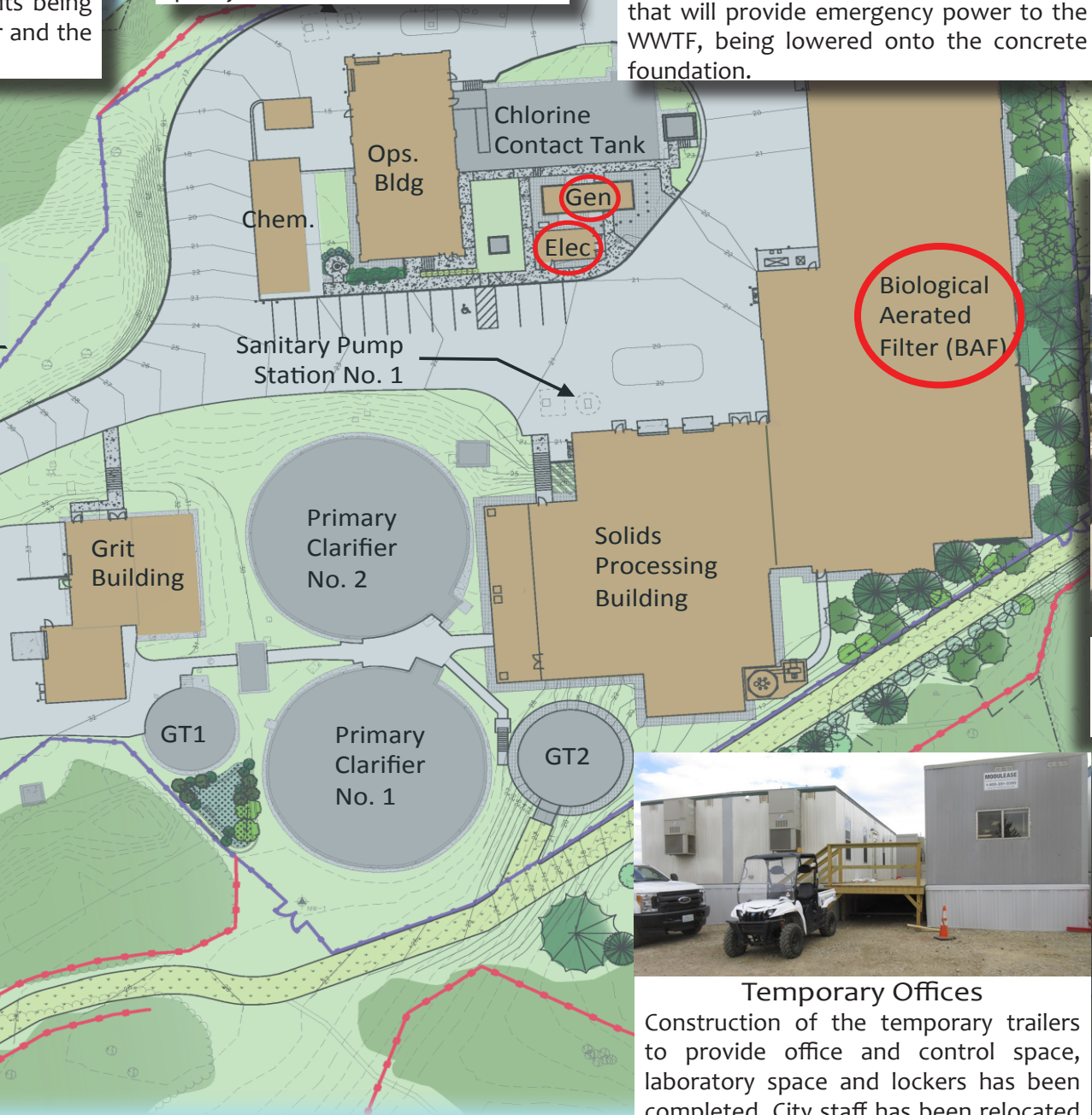
### Headworks Building

Underground electrical & communication ducts being installed at the Headworks Building.



### Yard Piping

New 48 inch diameter ductile iron pipe to convey wastewater between the Headworks Building and the Grit Building.



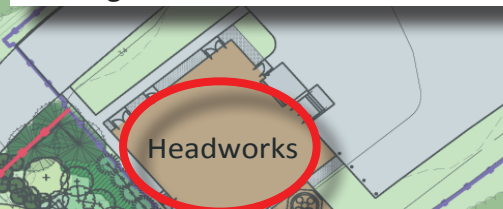
### BAF Building

Cell wall reinforcing steel and wall forms are placed with assistance from the 275 ton crane.



### Headworks Building

Placing concrete slab for the Odor Control System adjacent to the Headworks Building.

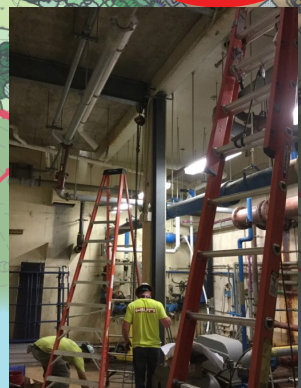


### Headworks



### Headworks Building

Flow Control Gates installed in the channels in the Headworks Building.



### Headworks Building

Interior odor control, heating, and other piping being installed.



### Temporary Offices

Construction of the temporary trailers to provide office and control space, laboratory space and lockers has been completed. City staff has been relocated to the temporary facilities.



### BAF Building

A concrete pumping truck is used to place concrete for a wall section on the south side of the BAF structure.

# CONSTRUCTION SUMMARY JULY - OCT. 2017

# FINANCES & PROJECT COST SUMMARY

During this period, cumulative construction on the WWTF upgrade reached a value of approximately \$31 million. This represents 42% of the current contract value.

In August, Change Order No. 3 was executed for \$93,838.31. The change order included necessary adjustments determined during the course of construction. It addressed a number of items including: miscellaneous water line work, structural steel and reinforcing steel adjustments, HVAC equipment adjustments, miscellaneous metal changes, additional force main valves and a credit for truck route violations.

PROJECT CONSTRUCTION COSTS (MILLIONS)	
Original Contract Value	\$72.786
Change Order 1 – January 2017	\$0.367
Change Order 2 – May 2017	\$0.547
Change Order 3 – August 2017	\$0.093
Contract Value Total	\$73.793

Construction Cost Expended through October 31, 2017 (approximately)	\$31 million
% Expended through October 31, 2017 (based on Contract Value Total)	42%

OVERALL PROJECT CAPITAL BUDGET SUMMARY	
Item	Cost (Millions)
Primary Clarifier Replacement	\$ 1.6
Peirce Island Bridge Improvements	\$ 0.6
WWTF Design Engineering	\$ 5.2
WWTF Construction Engineering	\$ 7.4
WWTF Construction (Current through CO3 – Sewer Funds)*	\$73.4
WWTF Construction Contingencies	\$ 3.4
WWTF Construction Mitigation & Public Art	\$ 0.3
<b>TOTAL</b>	<b>\$91.9</b>
* \$0.4 million for water main improvements, included in the contract, but not paid from sewer funds – total contract dollar value to date is \$73.7 million as shown in the Project Construction Costs table above.	



# PROJECT BUDGET & CONTINGENCY

The ongoing Peirce Island Wastewater Treatment Facility (WWTF) upgrade is the largest capital project the City of Portsmouth has ever undertaken. Unlike other community assets such as schools, fire stations, the Peirce Island pool, and City Hall, the City's wastewater collection and treatment systems are the "invisible" assets of the community as they are generally located underground or in inaccessible areas. A community's wastewater and water treatment plants are typically the most technologically complex facility owned and operated by a community.

Aerial View of Peirce Island WWTF Upgrade Construction



Building an upgraded treatment facility is also technically and logistically challenging. A tremendous number of suppliers of materials and equipment, engineers, and specialty contractors are involved in the myriad of carefully sequenced steps needed to design and construct an upgraded treatment facility. Reconstructing or adding onto an existing treatment facility adds several levels of additional complexity to the construction process since the existing facility needs to remain in operation without interruption. When upgrading a facility that is 50 years old like the Peirce Island WWTF, the potential for unknown conditions regarding the site, piping or structures is significantly increased. Even with the best design and construction planning, cost items will surface during construction, which could not have reasonably been anticipated. Further complicating the logistics of this type of project are the public construction laws which require competitive bidding and loan requirements that require items be made in America. The potential to adjust the scope and cost of the project under construction to accommodate changes resulting from any of these

conditions is an important consideration when developing the budget for a major construction project. An upgrade of an existing treatment facility can be compared to a major renovation or an addition to an older home. Once the foundation is exposed, and the walls opened up, changes in the work scope are often needed based on findings.

When developing the project budget for a major wastewater treatment project, a contingency is used to address the risk of additional cost items during construction. A contingency is a predetermined amount or percentage of a construction contract set aside to be used to fund changes in a project that cannot be anticipated in advance. As the need for changes in the details of the work arise during the course of construction, changes are made to the contract documents to incorporate the necessary revisions in material, equipment, or methodologies. As construction proceeds, the contingency is drawn upon and added to the construction contract value through a change order to the contract. The amount of the contingency that is appropriate varies depending on the specifics of each project.



# PROJECT BUDGET & CONTINGENCY CONTINUED

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A number of professional organizations provide guidance on the methodology and magnitude for establishing the project contingency. For example, The American Institute of Architects (AIA) notes that the contingency amount usually ranges from 5 to 10 percent of the construction contract value unless there are project specific reasons for a larger percentage. When the budget for the Peirce Island WWTF was developed a contingency amount of 5.5 percent of the construction contract value of approximately \$72.8 million was established, which provided a contingency amount of \$4,000,000.

# PUBLIC MEETINGS & COMMENTS

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To foster communication with the public and business owners during the four-year construction period, monthly public meetings have been held since the project started in September 2016. Meetings continue with City staff, the Contractor, and other officials involved in the project. Meetings are held on the third Wednesday of each month at 11:00 a.m. A broadcast of each meeting is available on the City's YouTube channel. Presentations and notes are available on the Wastewater web page under Public Meetings. <https://www.cityofportsmouth.com/publicworks/wastewater/public-meetings>

To file a complaint, or log an issue related to the WWTF upgrade, please complete a Report Form online at the City's project web page. <https://www.cityofportsmouth.com/publicworks/wastewater/peirce-island-wastewater-facility/report-form> There have been 28 reports sent through the website since construction began in September 2016.

CONSTRUCTION UPDATES ARE PREPARED BY THE DEPARTMENT OF PUBLIC WORKS.



# CONSENT DECREE MITIGATION INITIATIVES

The City continues to meet its obligations and deadlines outlined in the Consent Decree, Second Modification. Provided in the table below are mitigation initiatives outlined in the Consent Decree and a brief update on each one.

## CONSENT DECREE MITIGATION INITIATIVES

Consent Decree, Second Modification, No. 09-cv-283-PB, Paragraph 8

<http://www.portsmouthwastewater.com/September2016ConsentDecreeSecondModification.pdf>

- a) Interim Enhanced Primary Treatment: The Chemically Enhanced Primary Treatment (CEPT) Optimization Study Work Plan began in February 2017. The field data collection work was completed in September 2017. The City anticipates the final report will be submitted to EPA in December 2017.
- b) Nitrogen Removal: For a five-year period beginning June 1, 2020, the EPA mandated specific seasonal average total nitrogen effluent concentrations and monthly average total nitrogen effluent concentrations for the Peirce Island WWTF with the upgrade. A summary for this item is not necessary until the new Biological Aerated Filter (BAF) system construction is completed and fully operational.
- c) Stormwater Project: The City is proposing improvements at the recently purchased property behind the Department of Public Works (DPW). The specific improvements are still in development and will be detailed in later reports. The City has conducted interviews of qualified engineers to assist with a Master Plan for the DPW, which will include the stormwater project. Planning and design will commence within the next 90 days. Work in this area will help to improve runoff water quality, which travels to Sagamore Creek.
- d) Sagamore Avenue Sewer Extension Project: Implement a sewer extension project to provide public sewer service to approximately 83 existing parcels adjacent to or near Sagamore Avenue. Construction shall begin no later than June 30, 2020, and shall be substantially completed on or before June 30, 2022. The preliminary design work began in the fall of 2017 with pipe sizing.
- e) Water Quality and Ecosystem Health Project: The City will provide funding to support water quality and ecosystem health efforts related to the Great Bay Estuary. As of September 30, 2017, the City has contributed \$83,798. A full detail of this item can be found with the monthly compliance reports to EPA on the City's web page at <https://www.cityofportsmouth.com/publicworks/wastewater/resources>.



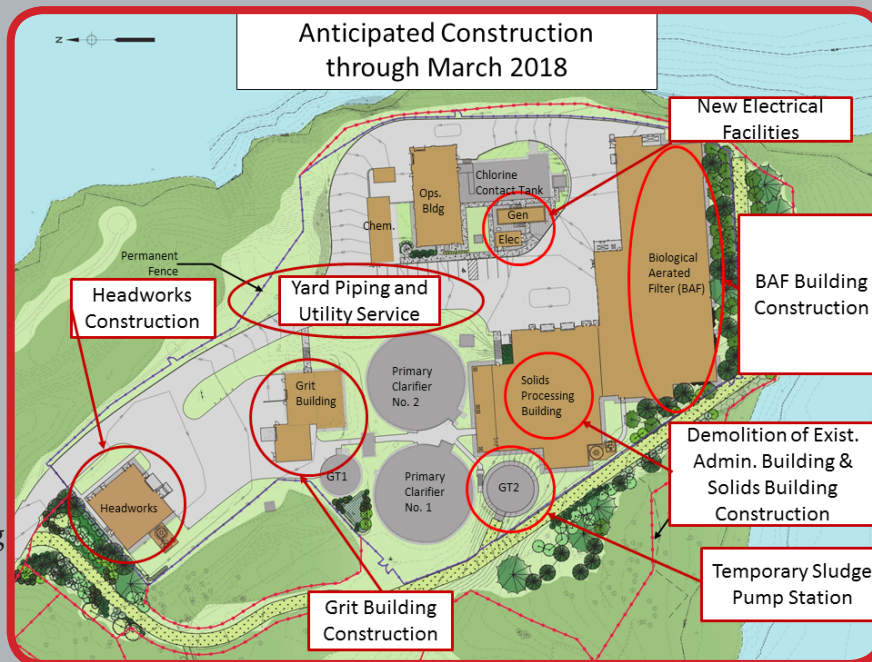
# PROJECT SCHEDULE & UPCOMING WORK

## CONSTRUCTION PROJECT SCHEDULE MILESTONES

MILESTONE	DATE	STATUS
Executed Contract to Construct Upgrades	09/01/2016	08/25/2016
Submit Two Additional Milestones for EPA Review and Approval	12/01/2016	11/29/2016
Additional Milestone 1: Transfer of the existing SCADA system to the new Headworks Building	11/21/2017	10/18/2017
Additional Milestone 2: Start-up & testing of the Secondary Influent Pump Station in the new Solids Building	05/09/2019	On Schedule
BAF Substantial Completion	12/01/2019	On Schedule
Achieve Compliance with NPDES Permit Limits	04/01/2020	On Schedule
Substantial Completion	05/31/2020	On Schedule
Final Completion	08/30/2020	On Schedule

## CONSTRUCTION AREAS OF PLANNED WORK THROUGH MARCH 2018

- Complete Headworks Bldg, including process equipment installation, startup, testing and training, as well as mechanical, electrical, HVAC and plumbing systems, and put the building into service
- Complete utilities and site work (excluding landscaping) around the Headworks Bldg
- Grit Bldg: continue modifications including selective architectural, structural, mechanical and electrical



- Complete generator installation and put it into service
- Complete Electrical Bldg and energize the new electrical switchgear
- BAF Bldg: continue construction and begin piping installation
- Relocate the City's WWTF staff to temporary trailers, demolish the existing Administration Bldg and begin construction of new Solids Bldg

- Complete the construction of the temporary sludge pump station at Gravity Thickener No. 2 and put it into service

