Brown AND Caldwell

DRAFT REPORT

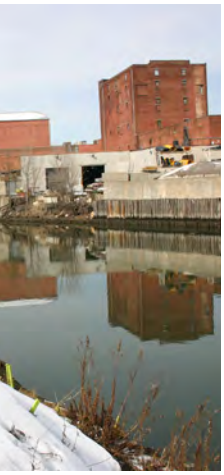
Prepared for
New York City Department of Environmental Protection

CSO Facility Site Recommendation Report for Red Hook Outfall RH-034

Gowanus Canal, Brooklyn, New York

NYC Environmental Protection

June 2015



CSO Facility Site Recommendation Report for Red Hook Outfall RH-034 Gowanus Canal, Brooklyn, New York

Prepared for
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June 30, 2015

Brown AND Caldwell
1359 Broadway, Suite 1140
New York City, NY 10018

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List of Abbreviations

AACEI	Association for the Advancement of Cost Engineering International
BC	Brown and Caldwell Associates
bgs	below ground surface
Blue Book	Rental Rate Blue Book for Construction Equipment
CEQR	New York City Environmental Quality Review
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSO	combined sewer overflow
CWA	Clean Water Act
DEP	New York City Department of Environmental Protection
DNAPL	Dense Non-Aqueous Phase Liquids
DSM	deep soil mixing
Fps	feet per second
GAC	granular activated carbon
GC	General Conditions
HVAC	heating, ventilation and air conditioning
I&C	instrumentation and control
ISI	Institute for Sustainable Infrastructure
ISS	in situ stabilization/solidification
LTCP	Long Term Control Plan
MG	million gallon(s)
mgd	million gallon(s) per day
MGP	manufactured gas plant
NAPL	non-aqueous phase liquid
NTP	Notice to Proceed
NYSDEC	New York State Department of Environmental Conservation
OH	Owl's Head
O&M	operations and maintenance
Order	Administrative Order for Remedial Design (USEPA, May 2014)
PCB	polychlorinated biphenyl
PDI	pre-design investigation
PDS	pre-demolition survey
PRP	potentially responsible party
QC	Quality Control
RCRA	resource conservation and recovery act
RD	Remedial Design
ROD	Record of Decision
SOG	slab on grade
SOE	support of excavation
SOW	Statement of Work
ULURP	Uniform Land Use Review Procedure
USEPA	United States Environmental Protection Agency
V	volt
yd^3	Cubic Yards

Executive Summary

In September 2013 the United States Environmental Protection Agency (USEPA), acting under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, a/k/a Superfund), issued its Record of Decision (ROD) describing the selected remedy for the Gowanus Canal Superfund site located in Brooklyn, New York. In May 2014, the USEPA issued an Administrative Order for Remedial Design (Order) that contained a Statement of Work (SOW) further defining the selected remedy. As part of the selected remedy, the City of New York (the City) was directed to institute combined sewer overflow (CSO) controls consisting of retention tanks to intercept discharges from outfalls Red Hook RH-034 and Owl's Head OH-007.

The ROD estimates that an 8-million-gallon (MG) tank at RH-034 and a 4 MG tank at OH-007 will be required to reach the Preliminary Remediation Goals (PRGs) and USEPA developed a preliminary estimate that a 58 to 74 percent reduction of CSO solids discharged to the Canal is needed to meet those PRGs. The ROD estimates that this volume of CSO solids reduction will prevent recontamination of the post-remedy clean surface by CSOs. The ROD further contemplates that during the Remedial Design (RD), the City will determine final tank sizes and CSO solids reduction based on CSO volume modeling, additional sampling data on discharge characteristics, PRGs, and consideration of alternative technologies to achieve the PRG and solids reduction goals.

The City has proposed an alternative tank size to the USEPA in a Technical Memorandum titled Gowanus Canal Baseline CSO Volume Modeling and CSO Tank Sizing dated March 20, 2015. Based on the data analysis and conceptual requirements developed thus far, the City believes a 3.5 MG tank for RH-034 will meet the PRGs and clearly exceed the 58 percent CSO solids reduction target estimated in the ROD.

The purpose of this report is to document the site selection and recommendation process and present a recommendation for the siting of a retention tank and associated process components at RH-034, referred to hereafter as the Red Hook CSO Facility. A separate report for the Owl's Head outfalls is being submitted concurrently with this report.

The identification and evaluation of potential sites was conducted in a step-wise manner, with each subsequent step building on the previous effort. For the purpose of developing conceptual requirements and comparing potential sites in the preliminary stage of the remedial design process, an 8 MG tank size was used to perform this site recommendation study. As this report documents, there are many factors to be considered in the siting and design of a complete CSO facility. The steps used to evaluate and recommend sites are as follows:

- Identification of conceptual requirements, footprint and property size requirements
- Initial site screening and development of a short list of sites
- Evaluation of the short-listed sites, including site specific conceptual designs and cost estimates
- Comparison of sites and final site recommendation

Application of both engineering and environmental criteria yielded a short list of two sites; RH-3, a privately owned group of parcels located adjacent to the RH-034 outfall and RH-4, a City owned park located across Nevins Street and two blocks south of the RH-034 outfall.

Site specific conceptual designs were prepared for each site, and Class 4 cost estimates were prepared based on the conceptual designs. Some of the major differentiators between the sites are:

- Property Acquisition – Site RH-4 is currently owned by the City and would carry no property acquisition cost. Site RH-3 is currently privately owned and would need to be purchased.

- Site Restoration – Use of Site RH-4 would require the existing park to be demolished. Aside from the impacts to the community and potential legal issues associated with parkland alienation, a temporary park would have to be provided for use during construction of the Red Hook CSO Facility. A permanent park would need to be reconstructed upon completion of construction. The temporary park and park reconstruction carry significant costs which more than offset the property acquisition costs for RH-3. Additionally, the Red Hook CSO Facility must include a building above the tanks for screens, instrumentation and controls, odor control and other mechanical and electrical systems. This building would cover approximately 23% of the park land, which would not be recoverable for the park use. Alternative off-site locations for the required building are discussed in Section 6 of this report, but are considered infeasible due to engineering challenges, performance impacts, and cost considerations.
- Tank Depth –Site RH-4 is located farther from the outfall, and would require the tanks to be excavated to a deeper elevation for proper hydraulic operation as compared to RH-3. The need for deeper excavation for the tank, and the fact that the land surface is higher at RH-4 results in a greater volume of soil requiring excavation and disposal, in turn resulting in greater cost.
- Conveyance Issues – Site RH-3 would require the shortest conveyance (approximately 200 feet) to move the CSOs from the RH-034 outfall to the tank, and would not require utility crossing or construction within the street for the conveyance. Site RH-4 would require a much greater length of conveyance (approximately 1200 feet), requiring complex routing, utility crossings, and a much greater associated cost. Although some City owned easements may exist, the most technically feasible conveyance route would either require acquisition of a portion of the RH-3 property, the cost of which has not yet been included in the cost estimates and would increase the total cost for constructing the facility at RH-4, or conveyance from a location upstream of the RH-034 outfall which would result in a greater number of overflow events to the Canal and would carry significant engineering complexity as well as additional cost.
- Community Aspects – Using Site RH-4 would result in the loss of existing park land, only part of which could be recovered following construction of the Red Hook CSO Facility. The use of Site RH-3 would likely provide new and expanded community access to the waterfront.
- Overall Cost – The cost estimates cover all comparable aspects of the construction project including property acquisition, planning and permitting, temporary park facilities (where applicable), pre-design investigations, design services, construction management, demolition and site preparation, excavation, contaminated waste handling and disposal, tank and conveyance construction, site restoration (including park reconstruction where applicable), and facility start-up and commissioning. These costs do not include the potential cost for property acquisition related to the conveyance to the RH-4 site, nor do they include additional costs associated with alternate conveyance routing to the RH-4 site, both of which would add significant cost to using the RH-4 site. These additional costs are not applicable to the RH-3 site. The total cost for developing the CSO facility at each site is:
  - RH-3 $490,000,000
  - RH-4 $579,000,000

These estimates include the cost of managing contaminated soil and groundwater as required for the duration of construction and within the footprint of the retention tank and conveyance only. The USEPA and NYSDEC have indicated that the parties responsible for upland remediation of the contamination will bear the cost for at least a portion of that part of the work.

Based on the analysis of the engineering requirements, operation and maintenance issues, environmental factors, construction schedule and construction costs, RH-3 is the recommended site for the Red Hook CSO Facility.

Section 1

Introduction

In September 2013 the USEPA issued its ROD describing the selected remedy for the Gowanus Canal Superfund site. In May 2014, the USEPA issued an Order for the remedy that contained an SOW further defining the selected remedy and RA.

As part of the selected remedy, the City was directed to institute CSO controls consisting of retention tanks to intercept discharges from outfalls Red Hook RH-034 and Owl's Head OH-007. The ROD estimates that an 8-million-gallon (MG) tank at RH-034 and a 4-MG tank at OH-007 will be needed. The ROD stipulates that the final sizes are to be determined during the RD, and allows for consideration of alternative technologies.

Using the latest model-predicted baseline CSO volumes developed by the Long Term Control Plan (LTCP) for the Canal, the City has presented preliminary sizing calculations for CSO retention tanks to the USEPA in a Technical Memorandum titled "Gowanus Canal Baseline CSO Volume Modeling and CSO Tank Sizing" dated March 20, 2015. Based on the data analysis and conceptual requirements developed thus far, the City believes a 3.5 MG tank for RH-034 will meet the PRGs and clearly exceed the 58% CSO solids reduction target estimated in the ROD.

This report details the site selection process and final recommendation for the Red Hook CSO Facility. The conceptual designs and conditions associated with an 8 MG tank have been used for the purposes of this study. The use of a smaller tank does not change the site comparison approach or final recommendation.

1.1 Purpose

The purpose of this report is to document the site selection and recommendation process and make a recommendation for the siting of the Red Hook CSO Facility.

The scope of work and approach to conducting the siting study is more fully discussed in Section 2 of this report. This report presents the more detailed analysis of the shortlisted sites, including site specific conceptual designs and detailed cost estimates. The report culminates in the side-by-side comparison of the shortlisted sites and a recommendation for final site selection.

1.2 Organization for the Report

This report is organized to present the progressive steps used in the site selection and recommendation process, and documents the satisfaction of the requirements set forth in the ROD and the Order. It is organized as follows:

- Section 1 presents a summary of the project background.
- Section 2 presents the scope of work conducted and outlines the approach used to develop the siting criteria, engineering concepts, and environmental issues used to evaluate site suitability, including the ranking of sites and final site recommendation.
- Section 3 presents a summary of the physical components and engineering requirements for a CSO retention tank and associated facilities specific to the conditions present at the Gowanus Canal.

- Section 4 describes the screening process and development of a short list of two Red Hook sites for which site specific conceptual designs and cost estimates would be developed.
- Section 5 presents the site-specific conceptual designs, cost estimates, environmental factors, risks and assumptions used for the detailed comparison of the short listed sites.
- Section 6 presents the side-by-side comparison of the two short listed sites.
- Section 7 presents the recommended site and the next steps for moving the project forward.

1.3 Site History, Actions and Investigations

The Gowanus Canal is an approximately 1.8-mile-long, man-made canal in the Borough of Brooklyn, Kings County, New York. Figure 1-1 shows the eleven active CSOs which currently discharge to the Gowanus Canal.

Following its construction in the 1860s to promote local development and commerce, the Canal quickly became one of the nation's busiest industrial waterways, serving heavy industries in the area including coal yards, cement manufacturing, tanneries, paint and ink factories, machine shops, manufactured gas plants, chemical plants, and oil refineries.

Over time, the City has implemented multiple improvements to sewer infrastructure, heavy industrial activity in the area has decreased, and implementation of the Clean Water Act (CWA) have improved the Canal's overall water quality and discharges to the Canal have been reduced. Continued discharges are currently regulated under state and federal rules and regulations.

Detailed information on the history of the Canal, the associated combined sewer system, regulatory actions, and investigation and remediation of upland sources of contamination can be found in the Remedial Design Work Plan previously submitted.

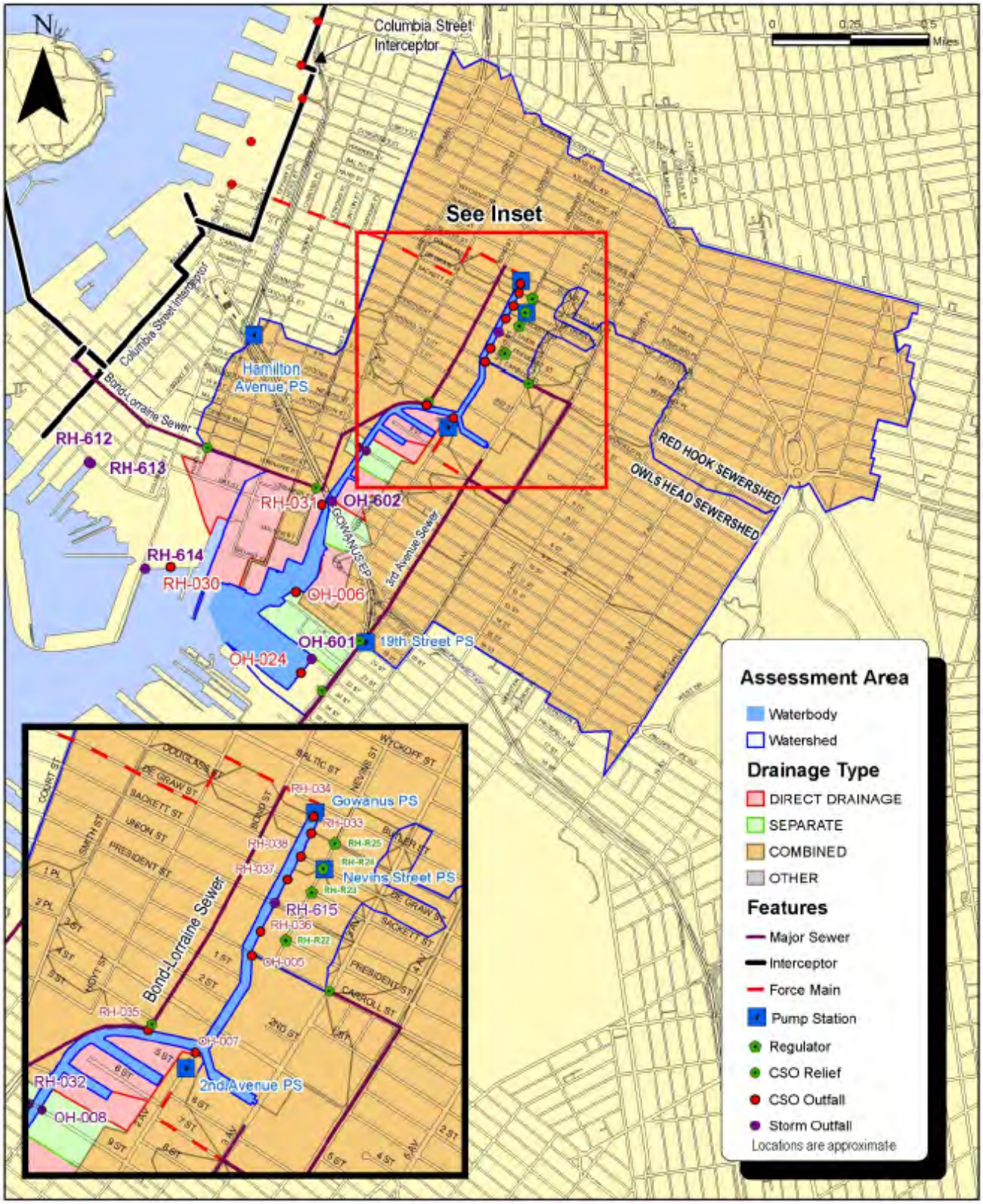


Figure 1-1. CSO Locations along Gowanus Canal

Section 2

Scope of Work

The overall scope of work for this siting study encompasses six major tasks needed to identify, evaluate and recommend a site for the design and construction of an 8-MG CSO retention facility in proximity to outfall RH-034 at the head of the Gowanus Canal. This complex facility not only provides CSO retention, but also contains the equipment and systems required to provide screening, grit collection, flushing and removal, odor control and tank dewatering processes. The details of the required components are described in Sections 3 and 6. This section describes the approach and tasks conducted to develop the site recommendation.

2.1 Project Approach

The identification and evaluation of potential sites was conducted in a step-wise manner, with each subsequent step building on the previous effort. As this report documents, there are many factors to be considered in the siting and design of a complete CSO facility. The six steps used to evaluate and recommend sites are described below.

2.2 Identification of Conceptual Requirements

The first question to be addressed concerned the size of property required for the CSO facility. Due to the complex nature of the facility, it would be insufficient to base size on storage volume calculations alone. Some of the more critical features that the facility requires are conveyance, influent and effluent channels, screening and debris removal, segmented storage chambers, pumping equipment, flushing systems, grit removal, tide gates, odor control, and space for the superstructure to house instrumentation and controls, electrical equipment, odor control systems, vehicle access for waste removal, and other required features.

Section 3 of this report describes the required components and presents a conceptual layout of a facility that includes all of these features. That conceptual layout, or "facility footprint," allowed for the calculation of the minimal square footage required for the facility. Additional space was needed for construction access and for the required setbacks from property lines for the finished facility. Once the approximate square footage was developed based on the facility footprint, the initial screening of sites could be conducted. Based on the conceptual requirements, the facility footprint for an 8-MG facility was approximately 100,000 square feet. Again it should be noted that the size requirement at this stage of the project was used to begin the property screening process, and does not represent any site-specific layout or actual design.

2.3 Initial Site Screening

The first step in the initial site screening was to identify sites of various sizes, ranging from 20,000 square feet to over 100,000 square feet, excluding sites that could not be used such as schools, residential apartment buildings, churches, and others. This initial step, required by the USEPA, was conducted prior to developing the conceptual requirements and facility footprint, and yielded 86 sites. Information was gathered for each site, including property ownership, zoning, land use, and floor to area ratio as an indication of underdeveloped properties. This high level overview of properties around the Canal was submitted to USEPA on April 30, 2014. However, once the

conceptual facility requirements and footprint were developed, a more focused site screening effort was conducted.

Section 4 of this report describes the secondary screening of the initial 86 sites down to list of 14, six of which were identified as potential sites for the Red Hook CSO Facility. The secondary screening was based on three critical criteria considered as fatal flaws for sites not meeting those criteria: size of available property, hydraulic analyses and effective capture of CSOs, and current or planned land use. Additional screening criteria, although not considered fatal flaws, were also used to develop the list of six RH sites: proximity to existing infrastructure, length of conveyance piping required, and complexity of utility crossing or relocation. These six sites were then subjected to more detailed analyses intended to reduce the number of sites to a short list of two sites plus one alternative.

2.4 Short List Development

The six RH sites identified from the preliminary screening were further evaluated and ranked using a multipart analysis that allowed for the application of numerous screening factors to each potential site, resulting in a quantitative ranking. The process started by selecting the key parameters to consider for each potential site. The parameters were defined and the scope of each factor was limited to avoid duplication or double counting of specific items. The screening factors consisted of engineering criteria as well as land use and environmental criteria. The initial screening for land use and environmental considerations was based on the analysis categories in the City Environmental Quality Review (CEQR) Technical Manual.

Section 4 of this report also details the determination of the short list of sites, including the development of a ranking matrix where each site received a ranking score based on a list of eight engineering and environmental criteria. Once the sites received a raw score for each criterion, a weighting factor was applied to differentiate the relative importance of each criterion. The final numerical scoring of the sites allowed for the identification of the top two ranked sites, which were then subject to further detailed analysis.

2.5 Evaluation of the Short Listed Sites

The next step in the site selection process was a more detailed evaluation of the short listed sites, including development of site specific layouts, conceptual designs for the facilities at each of the short listed sites, and a detailed preliminary opinion of probably cost for each of the sites.

The conceptual designs considered not only the site-specific footprint, but also the conveyance of the CSO from RH-034 to the facility and the hydraulics of moving the CSOs from the diversion structure to the tanks. It also considered the return of the CSO back to the collection system after a storm event, or the return of the CSO to the Canal in the event of a storm event exceeding the tank capacity.

The cost estimates cover all aspects of the project, not just the Facility construction. They include property acquisition, planning and permitting, temporary park facilities (where applicable), pre-design investigations, design of the facilities, construction management, demolition and site preparation, waste handling and disposal, tank and conveyance construction, site restoration (including park reconstruction where applicable), and facility start-up and commissioning. The costs do not include remediation activities that will be the responsibility of other parties.

Section 5 of this report presents the approach and overview of the conceptual design and cost estimates. The basis of design calculations and drawings, and the basis of the cost estimate and construction schedule are included as Appendices (A and B) to this report.

2.6 Comparison of the Short Listed Sites

Once the conceptual design and cost estimates were completed, a side-by-side comparison was prepared for the short listed sites. Section 6 of this report presents the findings of this comparison. The purpose of the side-by-side comparison is to present the benefits and drawbacks of each site, and to highlight those factors which serve as differentiators between the sites. While some criteria are inherent from the screening level analyses, the side-by-side comparison focuses on the engineering, environmental, sustainability, and cost factors specific to each site. Tables are presented to show the significant cost differences between specific components required to develop the CSO facility at each site.

2.7 Recommendations

Finally, Section 7 of this report presents the recommended site for the Red Hook CSO Facility, including the justification for site recommendation, and recommended next steps to move the project forward.

Section 3

Conceptual Facility Requirements

3.1 Development of Facility Requirements

As a preliminary step in developing the conceptual requirements and layouts of storage solutions for the Gowanus Canal CSO storage facilities, the project team conducted a high level benchmarking exercise to identify the features and components required for successful operation of a storage facility. To develop the benchmark for this project, the team identified 16 other CSO storage facilities located in moderate to large, densely populated, urban areas across the United States, with similar site constraints and considerations. The team also examined information from tunnel storage solutions that are often used in city settings and also require similar components.

In addition to the benchmarking effort, the project team toured two of the City's Department of Environmental Protection (DEP) larger CSO storage facilities with components similar to those needed at the Gowanus Canal. The site tours allowed the team to study the layout, understand operational challenges with the existing facilities, and identify improvements that the operations staff would recommend for future installations.

This section provides a summary of the facility requirements. A more detailed description of the facility components can be found in the Conceptual Facility Requirements Report originally submitted in July 2014 and updated November 2014.

3.2 Required Components

Based on the findings from the review of other storage facilities, the project team identified the key components for the Gowanus storage facilities, including recommendations on unit processes and equipment that were used to develop a conceptual layout and facility footprint. In general, the conceptual layout assumes that influent flow will need to be screened and potentially degritted, and the facility would need to be dewatered. Air handling and odor control would also be required for both a tank and linear storage arrangement. Ancillary equipment to minimize operations and maintenance (O&M), such as basin flushing equipment, was also included in the conceptual layout.

Key facility components include:

- below ground tank (preferred gravity fill with mechanical pump out)
- influent channel/rock trap
- screening
- dewatering pump station with grit flushing and handling provisions
- superstructure (footprint allowance for aboveground features)
- electrical and instrumentation and control (I&C)
- odor control

Inclusion of these essential components, such as the screens, pumps, grit handling, and odor control is consistent with USEPA guidance on Combined Sewer Overflow Control as published in the EPA/625/R-93/007guidance manual dated September 1993.

A detailed discussion of the selected processes and components can be found in the Initial Requirements Report dated November 2014.

3.2.1 Below Ground Tank

Because the elevation of the existing Gowanus Pump Station wet well is relatively shallow, and to eliminate the need to construct and operate a large pump station designed to keep pace with the high peak flows anticipated during a CSO event, the conceptual design of the proposed facilities relies on a gravity in/pump out arrangement.

3.2.2 Influent Channel and Rock Trap

A rock trap is typically a wider or deeper portion of the inlet channel that experiences a slower velocity (e.g., less than 2 fps), enabling large debris to settle. This debris is removed after each event using a clamshell bucket or similar system connected to a bridge crane that in turn deposits the removed rocky debris into a dumpster for disposal. The proposed Red Hook CSO Facility will include a rock trap to remove large debris prior to screening.

3.2.3 Screening

Screening is the first mechanical unit process within the storage facility, designed to remove objects that may cause damage and clogging of downstream equipment. Auxiliary screens will also be provided at two other points located at the RH-034 outfall and along the effluent channel leading out of the facility. These screens are intended to prevent floatable debris from entering the Canal during an overflow event that exceeds the storage or conveyance capacity of the facility.

3.2.4 Storage Tanks

For the Gowanus Facility layout, storage will be provided in the tanks at an average 35 foot sidewater depth. The storage basin will be divided into bays, approximately 50-feet wide that will fill sequentially.

3.2.5 Dewatering Pump Station

The dewatering pump station will include dewatering pumps as well as at least two grit/slurry pumps to remove the solids that settle in the tank and are washed into the pump station at the end of the event. The operation of the station is based on available capacity in the collection system to which the facility drains, and may take 24 to 48 hours to empty the tanks.

3.2.6 Superstructure

The superstructure of the facility is an important element as it houses the screenings area and provides space for the electrical room, odor control, and future hypochlorite storage. The superstructure will be designed to be above future flood elevations, consistent with DEP resiliency guidelines.

3.2.7 Electrical and I&C

Power will need to be provided to operate the mechanical, heating, ventilation and air conditioning (HVAC), and life safety equipment associated with the facility. Per DEP standard, power to the facility will be provided via a 480-volt (V) connection to the utility power supply grid. Backup power will be provided via a standby generator for life-safety equipment, lights, and ventilation during a loss of utility power.

3.2.8 Air Handling and Odor Control

Air handling is a critical element for covered storage facilities. Ventilation of the tanks, channels, and headspace above the channels, including parts of the superstructure, are important for life-safety considerations and proper care of the equipment.

Treatment of the ventilated air using an odor control technology is assumed to be required due to the proximity to sensitive receptors like residential housing and parkland. Odor control systems reduce, if not eliminate, the unpleasant odors that emanate from the storage facility.

3.3 Layouts

The individual unit processes described above were sized based on an influent flow rate of 306 mgd for the RH-034 site based on the typical year peak flow rate (see Flow Rate Tech Memo in Appendix B). The influent flow rate was later upsized to 396 mgd to account for incorporation of three additional outfalls (RH-033, RH-037, and RH-038), and was accounted for in the conceptual design discussed in Section 5 of this report. Based on this sizing exercise, a footprint was developed that incorporated these elements into a reasonable flow path.

The footprint of the 8 MG storage basin is currently estimated to be 155 feet by 335 feet, for a total of approximately 52,000 square feet. This includes the influent screening channel, basins, and downstream (effluent) channel. The estimated footprint for the above ground superstructure under the current layout is 155 feet by 166 feet for a total approximately 25,700 square feet. The conceptual layouts are shown in Appendix C.

A more detailed discussion of the required facility components can be found in the Conceptual Facility Requirements Report.

Section 4

Screening and Short List Development

4.1 Initial and Secondary Screening

The initial screening of potential sites for the Red Hook CSO Facility development was conducted as a two-step process, and included consideration of sites for both RH-034 and OH-007. Further discussion of development of a CSO facility at the OH-007 outfall is documented separately.

The first step in site screening, documented in the technical memorandum dated April 30, 2014, utilized broad criteria to narrow site identification from all possible sites.

The second step of the site screening process introduced criteria developed in the Conceptual Facility Requirements Report. This secondary screening narrowed the site selection process to a list of 14 potential sites, 7 sites each for RH-034 and OH-007.

4.2 Short List Analysis and Results

The Red Hook CSO Facility sites identified from the preliminary screening were further evaluated and ranked using a multipart analysis. This allowed for the application of numerous qualitative screening factors to each potential site, resulting in a quantitative ranking.

The full details of this process and results are included in the technical memorandum titled Short List of Potential Sites, Gowanus Canal CSO Tank Siting Study dated March 19, 2015.

Based on the overall score for each site, two "shortlisted" sites have been identified for CSO RH-034, sites RH-3 and RH-4. The shortlisted sites are shown on Figure 4-1 and are described below.

CSO RH-034 — Sites RH-3 and RH-4. Site RH-3 is bounded by the Gowanus Canal, Butler Street, Nevins Street and Sackett Street. Site RH-3 has a total overall score of 720 out of a possible 1000. Site RH-3 ranks well for the engineering criteria, as it is located immediately adjacent to RH-034 and the upgraded pump station and force main, and would require no major in-street or utility relocation work. Site RH-3 ranks moderately with respect to surrounding uses, as current and planned residential uses are located immediately to the north and south of the site, and a park (Thomas Greene Playground) is adjacent to the east. Site RH-3 ranks well with respect to proximity to historic resources. With respect to known contamination, the site has been identified as being impacted by Manufactured Gas Plant (MGP) waste. The site contains varying amounts of contaminated soil and groundwater which would require proper handling and disposal during excavation for the tank. A common potential staging area, located immediately south and adjacent to RH-3, would require demolition of an existing building, but would not require excavation of contaminated soil or handling of contaminated groundwater.

Site RH-4 is currently park land (Thomas Greene Playground) and is bounded by Douglas Street, 3rd Avenue, Degraw Street and Nevins Street. This site has a total overall score of 635 out of a possible 1000. Site RH-4 ranks well with respect to size and property ownership. Although certain park features, such as established trees, may present some site configuration constraints, the tanks could be constructed with the superstructure on the northwest end of the property to minimize

length of conveyance structures and to be close to the potential staging area. Construction of conveyance sewers / piping in or across Nevins Street would present significant challenges with respect to utility coordination and relocation. There are significant challenges with regard to diverting the CSOs to this site, which could require additional property acquisition or negatively impact Facility performance. This site ranks well with respect to surrounding uses and historic and cultural resources. The common staging area is located diagonally across Nevins Street, and again would require demolition of existing buildings, but not excavation. With respect to known contamination, the entire RH-4 site has been identified as part of the process area of the former Fulton MGP site and is significantly impacted with MGP waste throughout the planned depth of excavation for the tank. Debris, including portions of former MGP storage tanks, process foundations, and related abandoned underground structures were reported during previous site investigations.

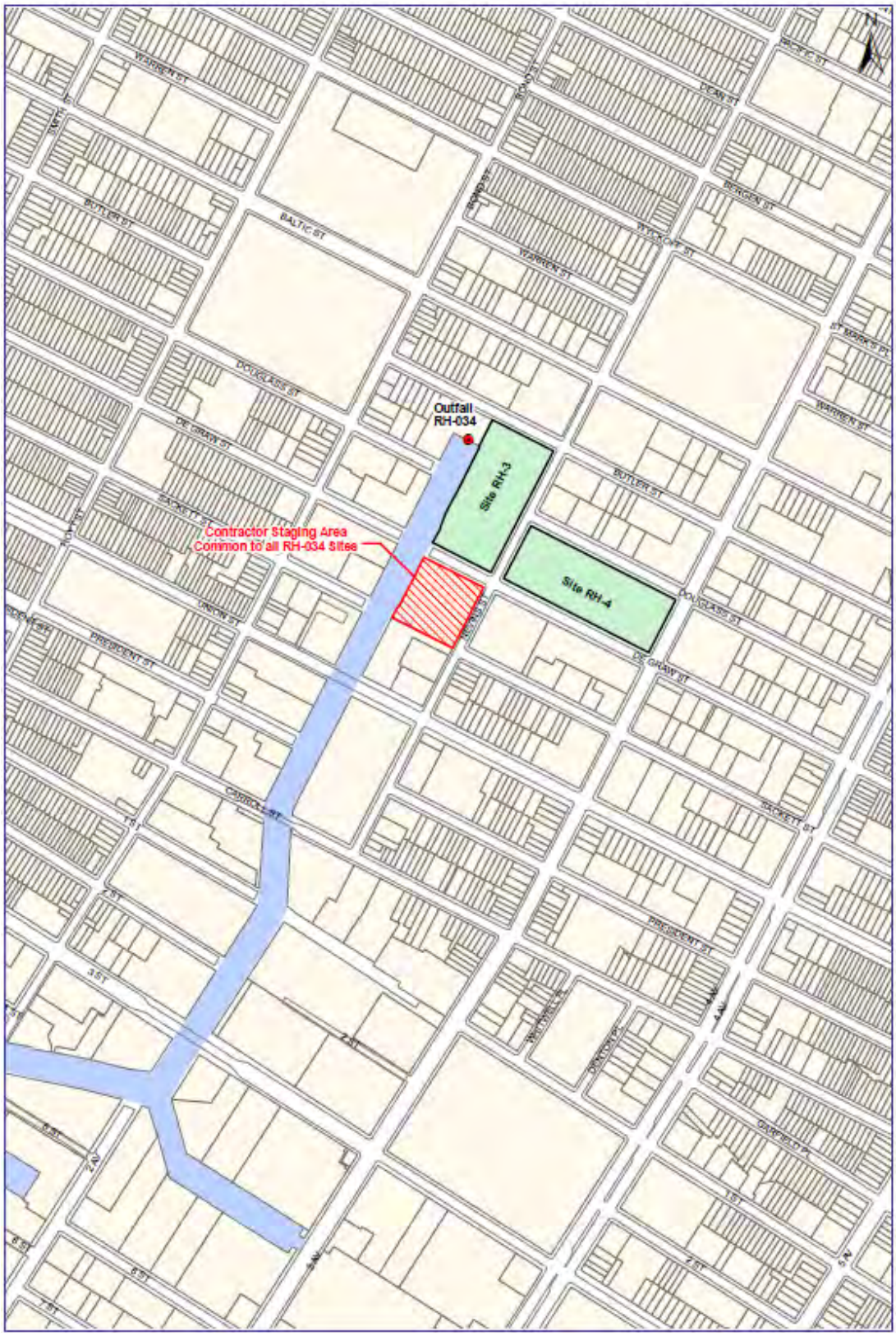


Figure 4-1. Red Hook Short Listed Sites

Section 5

Evaluation of Short Listed Sites

5.1 Introduction

This section provides a summary of the conceptual engineering and preliminary cost estimates, along with a description of the basis of estimate, for the short listed sites described in Section 5, and identified as sites RH-3 and RH-4. The conceptual designs and cost estimates have been developed for comparable facilities to allow a fair comparison for site selection purposes. Some alternatives for the RH-4 site and the associated engineering, environmental, and cost impacts are discussed in Section 6 of this report. In addition, a sustainability comparison using the Institute for Sustainable Infrastructure Envision Rating System is presented at the end of this section.

5.2 Design Basis

Conceptual designs were prepared for an 8-MG storage facility associated with the RH-034 outfall on two sites described in Section 5 of this report. The engineering design for the sites was advanced from the concepts outlined in the Conceptual Facility Requirements Report and as described in Section 3. The designs were developed to the level necessary to support a Class 4 cost estimate.

While the designs incorporate preferences and requirements associated with similar DEP facilities, and include provisions for operation and maintenance, the individual designs have not yet been optimized. After selecting the preferred site, it is anticipated that the conceptual designs can be used as the starting point for facilities planning and detailed design. Three workshops were held with DEP operations staff during development of the conceptual designs to verify the required elements and confirm that the facility layouts were acceptable. Through these workshops, DEP provided recommendations and additional input to the conceptual design process.

The designs were established to accommodate peak flows as described below.

- The CSO facility conveyance was sized for a peak flow of approximately 306 mgd, which represents the peak overflow from the RH-034 regulator in a typical year. The regulator is basically a flow diversion structure that will manage the flow of wastewater during various conditions. During direct dry weather flow, the wastewater continues to flow within the collection system. During most storm events the regulator diverts up to 30 MGD of flow to the Gowanus Pump Station, and during large storm events where the flow exceeds the capacity of the system, will direct the overflows to the RH-034 outfall. This regulator will be modified to direct wastewater flows to the retention facility until that storage capacity is exceeded, and only then will excess flow be directed to the outfalls.
- Because the Red Hook facility is also expected to incorporate and eliminate additional CSOs near the head end of the Canal, an additional 90 mgd of flow was added to the 306 mgd RH-034 design flow rate to account for the separate flows from RH-033, RH-037, and RH-038 to satisfy the requirement in the Administrative Order to pick up flow from the additional outfalls if possible. The resulting through flow condition for the RH CSO facility is therefore 396 mgd.

The following sections provide an overview of the design basis for the major project elements. Conceptual layouts for the facilities and associated conveyance are presented on Figures 5-1 and 5-2.

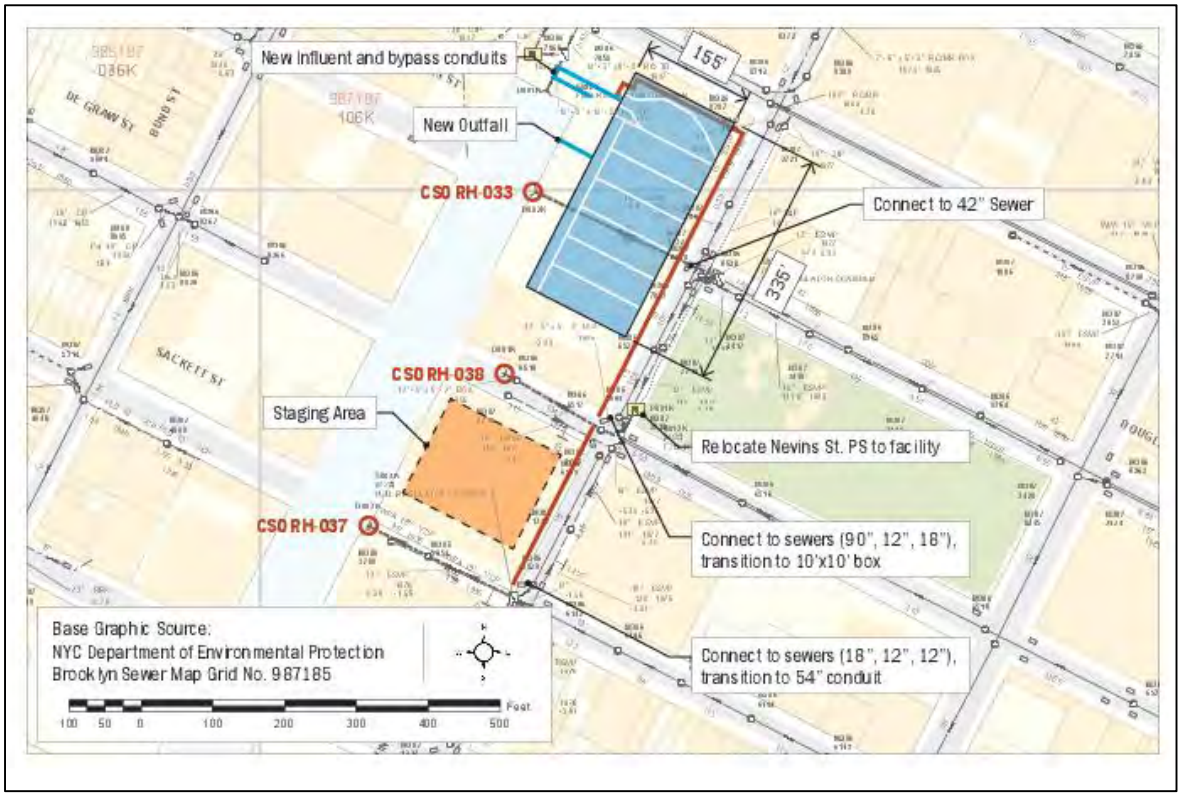


Figure 5-1. RH-3 Conveyance and Layout Plan

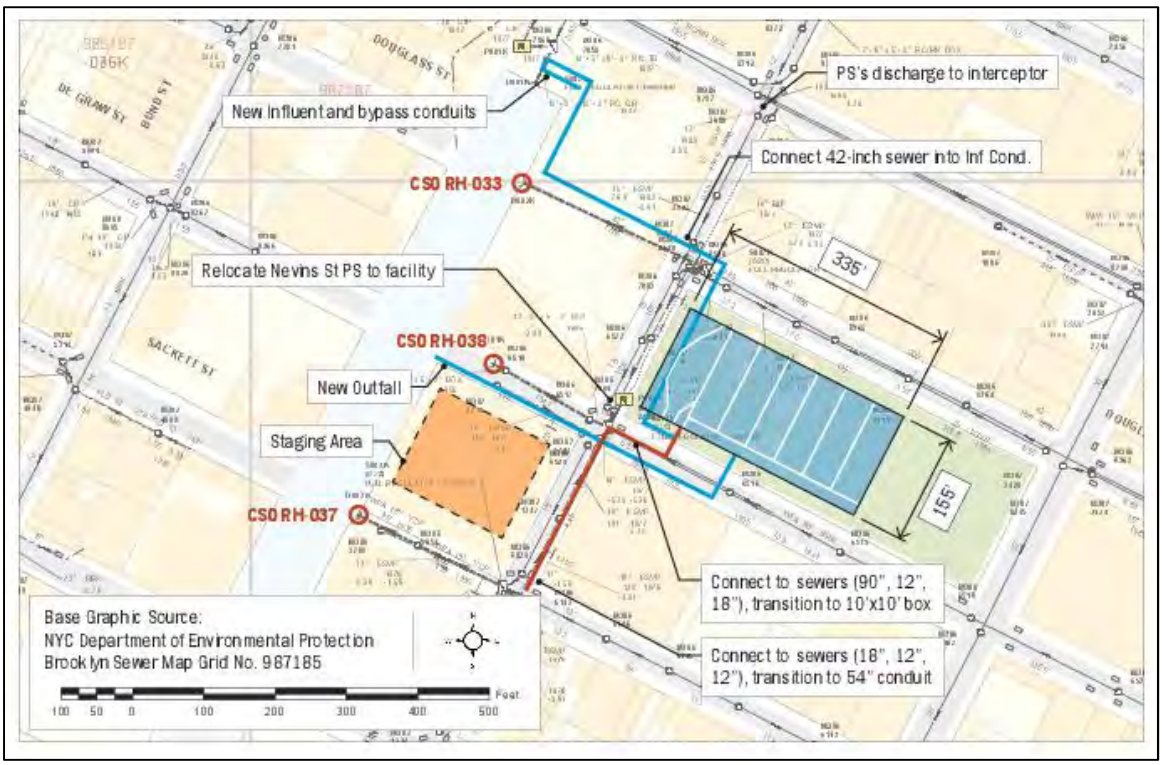


Figure 5-2. RH 4 Conveyance and Layout Plan

5.2.1 Process and Mechanical

Conceptual layouts for the CSO facilities were developed with the following major features:

- Rock trap/grit bay with clamshell removal system followed by 1.25-inch coarse screening using climber screens in accordance with DEP standards and N+1+1 redundancy (i.e., full flow capacity with one unit as stand-by and one unit out of service) with conveyor and delivery to a common 30 cubic yard dumpster.
- Rectangular wet weather storage basins 40-foot wide with 20 foot-wide flushing lanes designed for sequential filling. Sequential filling will provide additional capture of solids. Flushing reservoirs with hydraulically actuated flushing gates and a combined effluent channel with similar flushing systems were included.
- Self-cleaning trench-style return flow pumping station and force main sized to empty the tanks in 24 hours (i.e., 8 mgd) using submersible heavy-duty grit handling pumps with fluidizing systems.
- Grit removal systems on two of the RH-034 return flow pumps were included to be used at the end of the draining cycle to remove solids from the tank flushing water prior to discharge back to the sewer system. This consists of cyclone grit separators and grit classifiers discharging to the screening dumpster. (This prevents re-deposition of solids in downstream sewers).
- Non-potable water system including air gap, tank and pumps for supplemental flow for flushing system and wash down.
- A 1500 gpm replacement pumping station for the Nevins Street pump station with duplex submersible pumps was included in the design.
- Mechanically-cleaned CSO screens were included with a launder on the storage basin effluent sized for 396 mgd to remove floatables and solid material from wet weather events that exceed the storage volume of the tank and pass through the facility. In addition, mechanically cleaned CSO screens were included on a weir wall at the RH-034 structure to remove floatables and other solid material from the flow in excess of 306 mgd that would pass directly to the Canal in extreme wet weather events.

Conceptual drawings of the facilities including three dimensional perspectives of the below-grade structures are included in Appendix C.

5.2.2 Civil and Site Work

Conveyance conduits were sized to accommodate the peak through flows for facilities. The RH-034 conveyance structure was designed to convey a flow of 306 mgd from downstream of the existing RH-034 weir to the storage basin. Included are minor modifications to the regulator structure as depicted on the figures in Appendix C. Conveyance piping concepts were also developed to collect flow from three additional CSOs (i.e., RH-033, RH-037, and RH-038) in accordance with the requirements stipulated in the ROD as depicted on Figures 6-1 and 6-2. Collection of these additional CSOs was determined to provide a water quality benefit and allow for construction of a new combined outfall to replace the three CSOs.

The streets and corridors around each site are congested with active and abandoned utilities. The chosen conveyance alignments were chosen to avoid utility conflicts to the extent practicable. Relocation of smaller utilities will be required. Available subsurface utility information for the area was obtained from the following sources:

- DEP
- Verizon Communications
- Time Warner Cable

- Fire Department of New York
- National Grid
- Consolidated Edison

The effort needed to convey the CSO from the RH-034 outfall to each site and back are greater for RH-4 due to the greater distance from the outfall. The complexity of the utility crossings and interference with existing infrastructure adds significant complication to this conveyance. CSO conveyance cannot be located in Butler Street between RH-034 and Nevins Street due to the presence of a 5-foot by 25-foot box culvert that brings two of the three major sewer mains to the RH-034 outfall.

The potential to intercept two of the three major sewer mains upstream of the RH-034 diversion structure near the corner of Nevins and Butler was evaluated, with conveyance straight down Nevins Street to the RH-4 site. Hydraulic analysis showed that diversion of flow at this point yields a similar level of volumetric control. While the utilities in Nevins Street would prove difficult to cross, the hydraulic analysis also showed that the remaining overflow events would be too numerous, at over 30 events in a typical year due to the fact that the third major sewer main would not be intercepted. Details of this analysis are documented in the technical memorandum titled Upstream Diversion to Storage included in Appendix F. Efforts to control this third sewer would require the installation of complicated control structures and instrumentation to enable in-system storage during certain events, while freeing discharge during other events to avoid sewer back-ups and flooding in the upstream neighborhoods. Further, the complex infrastructure modifications and extensive instrumentation and controls required to properly operate a system in this configuration would add significant complexity and operational risk to the facility. More information can be found in the supporting technical memorandum (Upstream Flow Diversion Point Hydraulic Analysis, May 12, 2015).

The remaining alternate route for conveying the CSOs from RH-034 to the RH-4 site was also evaluated. This route would have the conveyance crossing the RH-3 site parallel to the Canal until it reached the mapped extension of Douglas Street, which is a mapped street that the City could use to convey the CSO flows from the Canal, across Nevins Street and onto the RH-4 site. The conveyance would still need to cross a portion of the privately owned property at RH-3 to reach this easement. The cost to acquire that portion of the privately owned property has not been included in the RH-4 cost estimates presented below.

It was assumed that a single 6-inch water service would be sufficient for the service water requirements and could be obtained from the nearest street main.

5.2.3 Geotechnical

The general stratigraphy at the sites includes a surficial miscellaneous fill over organic deposits over glacial sand/silt strata, which in turn overlies deeper decomposed rock and bedrock. Due to the presence of contaminated soils and groundwater at the site and the depths of excavation required for construction of the tanks and conduit structures, an excavation support system including a groundwater cut-off element was required for the conceptual design to both stabilize the excavated area and to minimize groundwater inflow to the excavation.

Based on the significant depth to bedrock (150+ feet) a "bathtub" concept was selected, consisting of a perimeter cement-bentonite wall with steel sheet piling and a bottom plug consisting of a jet grouted blanket.

The typical foundation for the structures would consist of structural mat slabs supported on the natural competent glacial soils with tie-downs. A sufficient number of tiedowns and tiebacks are

included in the foundation and support of excavation (SOE) conceptual design to account for and counteract buoyancy issues.

In terms of the sequence of geotechnical works construction at the main tank's site, the cement-bentonite trench with the inserted steel sheet piling would be installed first, followed by the jet grouted bottom mat. Subsequently, tie-downs would be installed. Upon starting excavation, the bracing elements (typically consisting of tie-backs) would be installed in multiple levels as the excavation progresses. In anticipation of encountering MGP waste contaminated soil, an in-situ soil stabilization/solidification process will be used to stabilize contaminants in the soil and to allow for excavation, handling and disposal of the contaminated soil without the need for a soil drying facility prior to transport and disposal. An interior groundwater dewatering system would be installed prior to excavation below the groundwater table. For excavations in the streets for construction of the conduit structures, driven steel sheet piling with interlock sealant is required for the perimeter excavation support system. A monitoring program will be required during construction to monitor vibrations and movement at adjacent facilities. A geotechnical investigation program will be required prior to design to characterize the subsurface conditions at the selected sites.

It is possible that some of the geotechnical elements described above would be designed and installed by the Potentially Responsible Party (PRP) for the Fulton MGP site. If this were to occur, DEP may not incur the cost of some of these elements. Currently, the costs for all geotechnical elements described above are included in the estimate.

The estimate does not include post construction long-term groundwater monitoring or groundwater pumping and treatment activities. Although neither USEPA nor NYSDEC have formally assigned responsibility for the cost of controlling regional groundwater impacts associated with the Fulton MGP site, they have indicated that this would be the responsibility of the Fulton PRP, not the City.

5.2.4 Environmental Mitigation

The sites are part of or in close proximity to the Fulton MGP site and/or other industrial operations which have impacted the site soils and groundwater.

The NYSDEC is responsible for oversight of the remediation at the Fulton MGP site, which is to be conducted by the Fulton PRP. A Proposed Remedial Action Plan (PRAP) for the site was released for public comment in April 2015, but provides few specific details of what work will be performed by the PRP for the Fulton site or the timing of that work

The excavation, handling, and disposal of contaminated soils, as well as the handling of contaminated groundwater during excavation dewatering, is included in the scope of the conceptual design and cost estimates. This work is limited to the area within the footprint of the tanks and conveyance, including the support of excavation area, and would only take place during construction activities for the CSO tank. Appropriate considerations for the health and safety of on-site workers as well as the surrounding community have been included in the approach and cost estimates for the project.

It is important to note that construction of the CSO facility is the focus of this effort. While some site investigation and characterization is included, these studies are intended to answer construction related issues only. The project does not include a remedial investigation of the locations evaluated, does not include characterization or delineation of the extent of soil or groundwater contamination, and does not include remediation of soil or groundwater contamination outside of the footprint of the tank and conveyance for the CSO Facility. Those investigation and remediation activities are also assumed to be the responsibility of the Fulton site PRP.

Existing site structures will be demolished prior to the start of any intrusive activities. A pre-demolition survey (PDS) of existing site structures will be conducted to identify environmental concerns that may need to be mitigated prior to the demolition, and to identify building materials that may be subject to regulation as hazardous waste or other requirements. There are numerous potential concerns and materials that would be targeted by the PDS and an allowance for disposal was estimated based upon experience with similar investigations. The most likely areas of concern include mercury-containing devices, PCB (polychlorinated biphenyl)-containing materials, electrical equipment (transformers, capacitors, rectifiers), lead based paint, and asbestos-containing materials. After abatement of asbestos and other regulated building materials has been completed, the structures will be demolished and the debris disposed off-site in a permitted construction debris landfill authorized to accept the materials.

After the buildings are demolished but prior to construction of the Red Hook CSO Facility, a pre-design investigation (PDI) of the sites will be conducted to fill data gaps and further characterize impacted soils and groundwater strictly within the footprint of the tank and conveyance that will require special handling, treatment and/or disposal during construction. These investigations are not intended to define the extent of contamination or control groundwater on a regional basis, but are focused on the specific areas where construction of the CSO facility and associated conveyance is planned.

However, it is important to note that NYSDEC has stated the need for additional characterization of conditions at the two sites to understand the nature and extent of contamination present. To date, limited site characterization has been conducted at RH-3. Site characterization was more extensive at RH-4. Because construction of the tank will require excavation to a depth of approximately 50 feet bgs, additional characterization of site conditions is necessary to fully assess potential impacts. Site characterization activities required for remediation will be conducted by the Fulton site PRP under direction from NYSDEC. The cost and schedule impacts associated with this effort are not included in this Report.

The scope of the PDI envisioned for each site is based on a review of available information regarding the current and historical use of the site, including the findings of the remedial investigations conducted on the Fulton MGP site. Based on the available information, areas of concern were identified for each site. In addition to MGP impacts, examples of concerns that have been identified for investigation include:

- Automotive dismantling and scrap metal recycling (solvents, benzene/toluene/ethylbenzene/ xylenes, semi-volatile organic compounds, PCBs, asbestos, metals)
- Dye manufacturing (phenolic and various aromatic compounds, naphthalene, anthracene, chromium)
- Unspecified warehousing
- Cordage manufacturing
- Woodworking and furniture manufacturing (solvents, paint thinner)
- Asphalt flooring manufacturing (asbestos, polynuclear aromatic hydrocarbons)
- Metal plating (nickel, hexavalent chromium, chlorinated and non-chlorinated solvents for degreasing)
- Book manufacturing (volatile organic compounds from printing)
- Metal machining, stamping and plating (cutting oils, degreasers, plating waste)

Investigatory approaches were developed to characterize the environmental media associated with the areas of concern. PDIs include soil borings to characterize shallow soils and fill to be excavated

as well as deeper soils to be treated and stabilized in-situ. Monitoring wells will be installed to evaluate both groundwater contamination and hydraulic conductivity, thereby facilitating selection of appropriate dewatering and water treatment systems.

For construction purposes, based on existing reports and pending results of the PDI, it was assumed that site soils from 0 to 10 feet bgs have been minimally impacted and are non-hazardous, and that soils from 10 feet bgs to the base of the tank foundation excavation are impacted, including the presence of coal tar, and require treatment prior to disposal.

In anticipation of the potential for dust, odors, and other emissions during the site preparation phase of construction, particularly during excavation activities, health and safety features have been included in the conceptual design for the protection of site workers as well as to mitigate impacts on the surrounding community. The two typical options for control of dust, odors, and emissions are the use of foam to suppress the emissions, or the use of a sprung structure (temporary tent) with air treatment to encapsulate the site during those activities. For the purpose of the conceptual design, the use of a sprung structure is included for both sites. The impact of using a sprung structure on production rates and the overall time required for the project has been included in the project schedules.

The conceptual design also assumes that these subsurface soils will be treated using in situ stabilization/solidification (ISS) also known as deep soil mixing (DSM). ISS/DSM uses crawler-mounted hydraulically-driven soil augers (6- to 8-feet in diameter) to mix the soil column with stabilization and solidification agents to bind the organic and metal contaminants to the soil matrix. The key assumptions for the environmental cost estimate are as follows:

- All volumes are in-place and within the SOE.
- All stabilized soils will be transported offsite for disposal in a Subtitle D (industrial and non-hazardous) facility. The purpose of using ISS is not only to stabilize the soil to facilitate the physical excavation, but to stabilize and bind the contaminants to the soil matrix to allow for this type of disposal.
- Overburden from 0-10 feet bgs (in-board of SOE) removed to prepare ISS/DSM working platform.
- Conveyance conduit soils volumes include jet grout spoils (100 percent displacement) and it was assumed that no soil stabilization is required for disposal purposes.
- Soils from 10 feet bgs to top of the jet grout mat (tank foundation) at each site will be treated by ISS/DSM.
- Soils treatment criteria of 50 psi unconfined compressive strength at 28 days and no free NAPL.
- ISS/DSM additives - ground granulated blast furnace slag at 6 percent by weight of soils, plus Portland cement at 2 percent by weight of soils.
- ISS/DSM soil swelling at 20 percent.
- ISS/DSM and excavation production rates of 500 cubic yards (yd^3) per day based on 10-hour work days.
- ISS/DSM major equipment:
  - Soil Mec SR 100 with 6- to 8-foot diameter augers (100-ton, crawler-mounted, 200,000 ft lbs rotary torque).
  - Grout plant and ancillary equipment (Metax JM 40 or custom-made GSI batch plant with 5 yd^3 mixers, progressing cavity pumps, mission-style pumps, cement silos, pigs, and hoses).

The presence of foundation debris from the Fulton MGP site could hamper the ISS activities at the RH-4 site. Excavation and removal of that debris may be required prior to ISS and soil excavation.

The additional effort for the potential need to remove debris is not included in the scope or cost estimate.

The groundwater at the sites will be controlled and lowered only within the area of excavation prior to construction using excavation supports with low transmissivity (see geotechnical discussion above), jet grout plugs at the elevation of the tank foundations, and well points for groundwater extraction. Extracted groundwater (average flow rate of 250 gpm from within the bathtub) and all contact stormwater (precipitation within the support of excavation) will be treated onsite using multimedia filters followed by granular activated carbon (GAC) units. The space needed for this small, temporary treatment system has been included in the site layouts. Treated water will be discharged to the Gowanus Canal in accordance with an NPDES permit, or equivalent under CERCLA, for the CSO construction, or discharged to the sanitary sewer system under a DEP pretreatment permit.

Regional control of contaminated groundwater is the responsibility of the Fulton MGP site PRP. The CSO Facility project to be conducted by the DEP will only address control of groundwater within the footprint of the SOE for the tank and conveyance during the construction period. Construction of the CSO tank to an approximate depth of 50 feet below grade will represent a transient barrier to groundwater flow at both sites. However, the major impact to groundwater flow conditions will be driven by the presence of the planned barrier wall, to be constructed by the Fulton PRP, which will be located along the east side of the Canal and extend from the head of the Canal to Sackett street with a wing wall extending eastward up Sackett Street. Although the overall impact to groundwater flow conditions will be evaluated in more detail during the design, the length and depth of the barrier wall is expected to be the controlling feature. The CSO tank is expected to have little to no additional impact compared to that of the barrier wall.

Further, groundwater conditions need to be evaluated in the context of regional effects and should include all new stresses to the system. The barrier wall and tank are just two stresses to consider. The impact of the planned in-situ soil stabilization (ISS) throughout the neighborhood, the impact of the ISS and sediment cap in the canal on groundwater discharge, and the effect of Dense Non-Aqueous Phase Liquid (DNAPL) removal from wells on the upgradient side of the barrier wall must all be included in the analysis of groundwater impacts. It is expected that the Fulton MGP site PRP will be responsible for the comprehensive evaluation of the barrier wall impacts to groundwater flow, including the factors described above and will also be responsible for any necessary groundwater control measures.

The changes to groundwater flow caused by the tank SOE are small in comparison to the larger effect of the barrier wall and ISS beneath the Canal. Further, the CSO tank SOE at the RH-3 site would act as an extension of the planned barrier wall along the Canal as required by the recently issued NYSDEC PRAP, and would provide additional protection against migration of DNAPL to the Canal from the Fulton MGP site. The DNAPL recovery wells required for the upgradient side of the barrier wall could be placed upgradient of the SOE to achieve the goal of removing MGP related DNAPL as required in the PRAP. Impacts to and control of groundwater conditions will need to be further evaluated and addressed during detailed design, and if required, mitigating measures will be included as appropriate.

5.2.5 Architecture

It is assumed that the above ground building will be precast slab with brick inlay construction similar to and compatible with nearby construction and existing DEP facilities. A two-story building approximately 50-feet tall was conceptualized with a high bay first floor (20-feet tall) at grade suitable for truck access and a second floor (30-feet tall) with all electrical equipment located well

above flood elevation (Elevation 10 NAVD 88 Zone AE from 2013 FEMA FIRM map). Existing grade ranges from 7- to 12-feet elevation NAVD 88 at the various sites.

Basic, conceptual renderings of the above-ground buildings are illustrated on Figures 5-3 and 5-4.

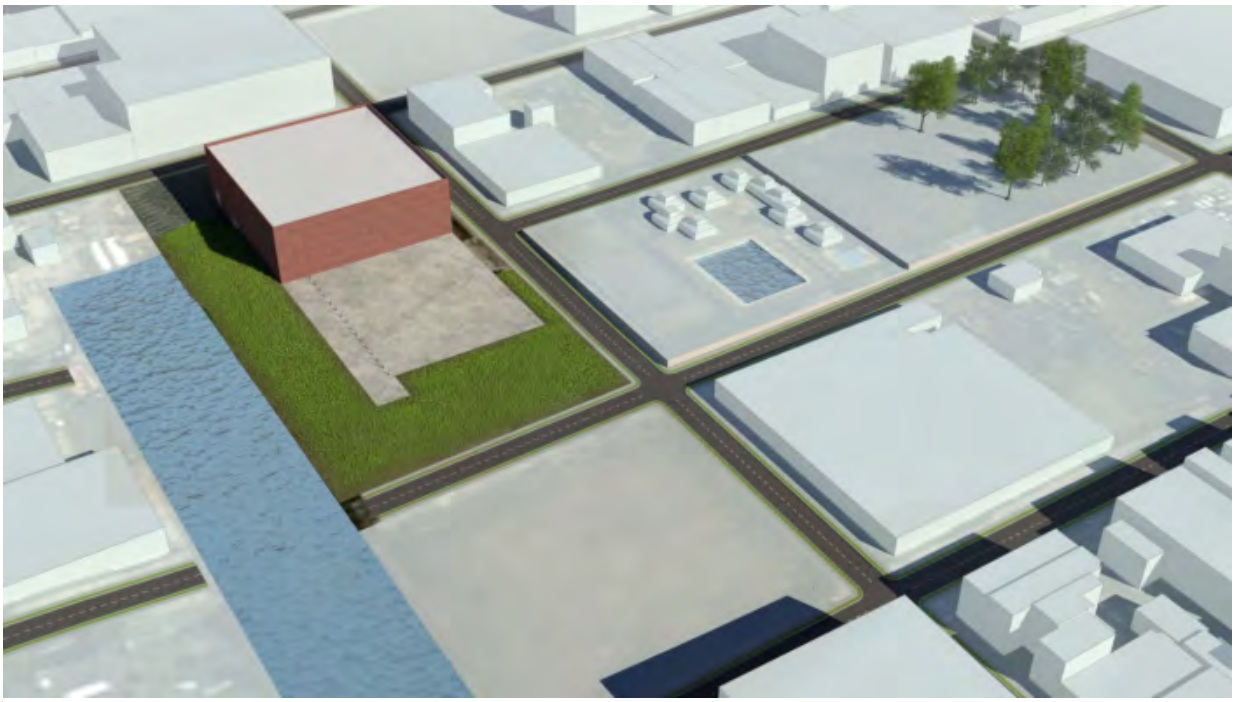


Figure 5-3. RH 3 Building Concept

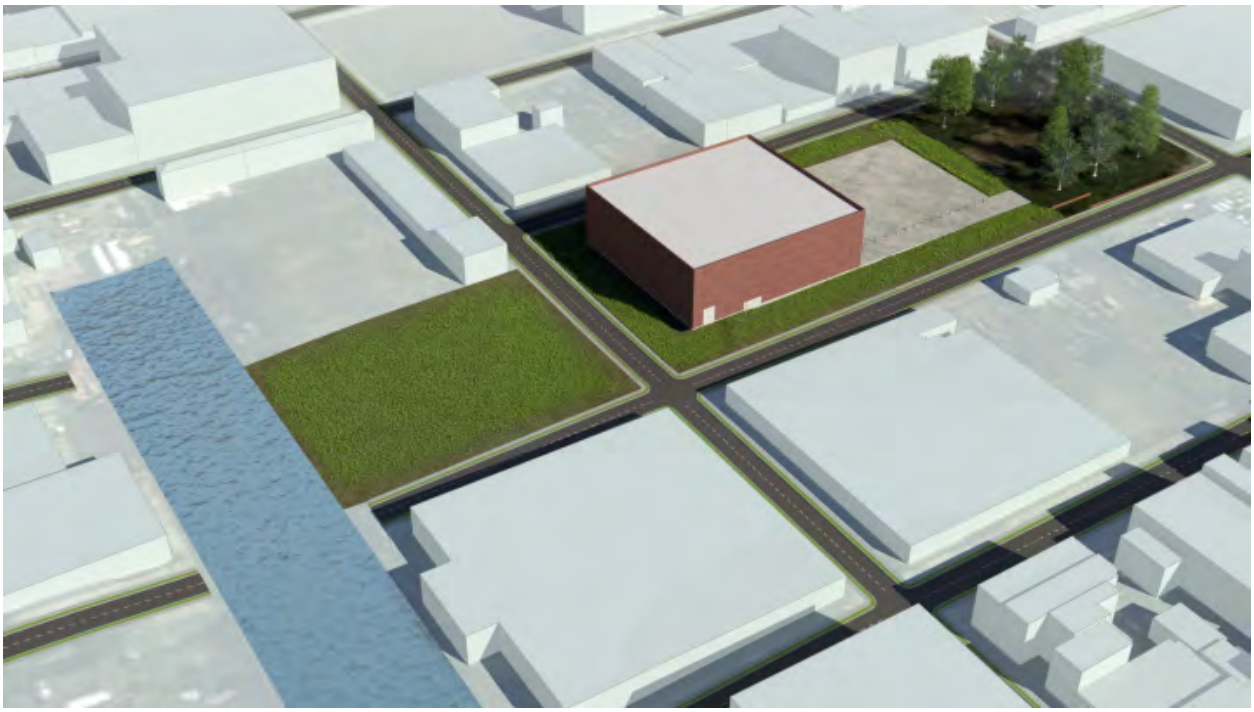


Figure 5-4. RH 4 Building Concept

5.2.6 Structural

The below ground structure and large conveyance were all assumed to be cast-in-place reinforced concrete in accordance with applicable American Concrete Institute requirements and similar to existing DEP facilities. Proper mixing, pouring, and quality control (QC) are needed to assure compatibility with the contaminated soil conditions and adequate curing of the concrete.

5.2.7 HVAC and Odor Control

Heating ventilation and odor control concepts were developed to be similar to other DEP facilities. An activated carbon odor control system, as described in the Conceptual Facility Requirements Report, was assumed, and a flow rate of 1 cubic foot per minute per square foot (cfm/sf) of basin area was used for effective capture. An additional purge system was sized for 6 air changes per hour for use prior to personnel entry. The odor control technology chosen was activated carbon. Heating and air conditioning for the support rooms were sized using typical thermal factors and local weather data.

5.2.8 Electrical and Instrumentation

Electrical, instrumentation and control were assumed to be similar to other DEP facilities and requirements in meeting applicable codes and regulations. Key elements included:

- 480V service
- Open frame, diesel engine-driven 1100 kW standby power generator with remote-mounted double wall containment fuel system sized to maintain operation during normal power failure for a period of 48 hours.
- Electrical power distribution equipment configuration reduces incident energy levels so that a maximum of Category 1 Arc Flash personal protective equipment required per DEP intradepartmental memo September 15, 2009.
- NEMA 4X, 316 SS disconnects and electrical equipment enclosures.
- PVC-coated Rigid Galvanized Steel for exposed conduit and Rigid Galvanized Steel conduit concrete-encased for subsurface conduit.
- Thermoplastic high-heat resistant nylon-coated wire/ Thermoplastic heat and water resistant nylon-coated conductors.

5.3 Cost Estimate

Detailed cost estimates for the two short-listed sites are provided in Appendix A. This section describes the scope of work and approach to developing the cost estimates. Project schedules were developed but only for use in supporting the cost estimating effort for issues such as timing for cost escalation factors.

The conceptual designs described above were used as the basis for developing the cost estimates. The cost estimates include costs for planning and permitting efforts, property acquisition and restoration costs, pre-design investigations, engineering costs for design of the facilities, construction and commissioning costs. The schedule does not account for activities associated with remediation efforts outside the footprint of the tank and conveyance for the Red Hook CSO Facility. Although the cost to handle contaminated soil and groundwater within the footprint of the tank and conveyance has been included here to present a complete estimate of the cost to construct the project, the City has been assured by USEPA and NYSDEC that other parties will be responsible for those costs. Further, the City assumes no responsibility for the effort or cost to remediate any other contaminated areas.

5.3.1 Estimating Methodology

These estimates were prepared using Brown and Caldwell Associates' (BC) estimating system, which consists of the Timberline operating systems using BC's material and labor database, historical project data, the latest vendor and material cost information, and other costs specific to the project locale and in accordance with DEP's estimating requirements. This estimate was prepared using quantity take-offs, vendor quotes and equipment pricing furnished by either the project team or the estimator based upon the engineering information provided. The estimate includes direct labor costs and anticipated productivity adjustments to labor and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association, National Electrical Contractors Association, and Rental Rate Blue Book for Construction Equipment (Blue Book) and adjusted accordingly for the productivity factors for the New York City metropolitan area.

5.3.2 Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACEI) criteria, this is a Class 4 estimate. A Class 4 estimate is defined as a Planning Level or Design Technical Feasibility Estimate. Typically, engineering is from 1 percent to 15 percent complete. Class 4 estimates are used to prepare planning level cost scopes or to evaluate alternatives in design conditions, and form the base work for the Class 3 Project Budget or Funding Estimate. Expected accuracy for Class 4 estimates typically range from -30 percent to +50 percent, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination.

5.3.3 Cost Estimate Summary

Due to the size and the anticipated logical order of construction, the project was divided into four separate construction packages, which in turn coincide with the major construction elements of each area of the project. The four construction packages also make the estimate more readily adaptable to the different types of construction, which lends itself to accommodation of the multiple prime requirements of Wick's Law and the anticipated construction sequencing of the various elements.

The key elements and total costs included in each of the four construction packages (CP) are listed in Table 5-1 for both sites.

Table 5-1. Construction Packages and Cost Summary			
CP No. and Title	**Key Elements**	**Estimated Cost RH 3**	**Estimated Cost RH 4**
01 Planning, Engineering and Site Acquisitions	• Pre-design soil and groundwater investigations • Pre-design demolition and utility surveys • Design/Engineering • Geotechnical investigation • Planning and permitting activities • Property acquisition costs • Construction contract bidding/award for first construction package, CP-02	$184,000,000	$113,000,000
02 Site Prep and Deep Foundation System	• Demolition of existing structures including hazardous material (e.g., asbestos/lead paint) abatement • SOE shoring system (bentonite trench/shoring/tie-backs and structure tie-downs • Jet grout mat • Dewatering and water treatment (inside SOE) • Excavation, in-situ soil stabilization and contaminated soil disposal • Trucking and disposal of excavated material • sprung structure over site to mitigate contaminant emissions, odor, and dust during construction • Decontamination facilities for vehicles and personnel	$183,000,000	$209,500,000
03 Structural and Mechanical, Electrical, Plumbing	• All concrete and mechanical, electrical and plumbing for the tanks, pump station, and screening area (lower level) • New building structure and all mechanical, engineering, and plumbing to support operating the CSO structure • Contractor will have the responsibility for maintaining operation of the existing CSO • Work site will be contained within the perimeter of the SOE shored area	$92,000,000	$97,000,000
04 Site Improvements and Outside Boundary Limits Utilities	• All underground piping and related structures • Relocation or replacement of existing utilities (utilities that go under or conflict with piping or conveyance channel) • Influent/effluent channels excavation and construction, outside of the SOE area, and related structures • Trucking and disposal of excavated material outside of the main structure support of excavation • Final connections to structure constructed in CP-03 • Existing outfall pipeline demolition • Temporary relocation of RH-4 site's park • Parking areas, landscape areas for RH-3 only • Construction of new park for RH-4 only • This Contractor has all work outside of the SOE area for CP-03 and final site improvements	$31,000,000	$159,500,000
	Grand Total	**$490,000,000**	**$579,000,000***
	(Approximate Class 4 Estimate Range)	**($343,000,000 to $735,000,000)**	**($405,300,000 to $868,500,000)**

*Does not include cost for additional property acquisition for conveyance through private property to RH-4

5.3.4 Construction Assumptions

The following assumptions apply to this estimate:

- Contractor will perform the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift, except for ISS mitigation and excavation work. For the ISS activities, the Contractor will work from 7 a.m. to 7 p.m. Monday through Saturday. No other allowance has been made for additional shift or weekend work. No other overtime or shift premium was anticipated in preparation of this estimate or the construction schedules.
- Seasonal constraints and/or delays due to unforeseen circumstances have been addressed in the construction schedules based on normal construction practices and local weather patterns.
- No pre-purchased or owner-purchased equipment was anticipated for this estimate.
- Design, engineering, and soils investigation will be complete by May 2017. This includes required public meetings, review by DEP, and completion of construction documents for CP-02.
- Permits, or permit equivalents as allowed under CERCLA, other than typical construction permits, were assumed to be obtained prior to start of construction bid, but could float out to start of construction. At this time, we are not aware of any permit that will impede the ability to start actual construction work.
- Property acquisition will start during design and be completed by the bid of the construction contracts and no later than the start of construction.
- Property acquisition is not required for construction of CSO structure at RH-4 site. Property acquisition may be required for CSO conveyance from RH-034 to the RH-4 site.
- Construction Bidding and Award from June 1, 2017, and completed by May 2018.
- Notice to Proceed (NTP) for construction – June 1, 2018.
- Contractor would be prepared within 40 working days of the NTP to submit critical submittals to DEP, and DEP would have final approval of the submittal within 120 working days.
- Procurement of materials and equipment is not anticipated to be a problem due to the length of time necessary to excavate the site.
- The durations are in working days with standard holidays. Twenty working days is approximately equivalent to 1 month.
- CP-03 and CP-04 NTP will be issued 3 months prior to Substantial Completion of CP-02. This will allow the CP-02 Contractor to complete any punch list work and demobilize the site, prior to the CP-03 or CP-04 contractor starting their work on the site. This will minimize coordination efforts among the multiple primes and usage of area under the sprung structure.
- Effort includes critical demolition prior to the start of excavation. Additional demolition may be required, but it will not affect the overall construction duration. The demolition of the structures can start when 50 percent of the hazardous material abatement has been completed.
- Effort is allotted to relocate and/or abandon utilities within the SOE; any additional relocation and/or abandonment of utilities will take place after excavation has started, but will not affect the overall construction duration. The utility work can start at the same time as the building demolition.
- Shoring system includes a 3-foot bentonite trench full depth, driving sheet pile and grouting sheet pile connections. Productivity is based on two separate pile driving crews and assumes sufficient materials available to maintain this productivity.
- The 10-foot jet grout mat can start when approximately 50 percent of the shoring system has been constructed.

- The installation of the tie-downs can start when approximately 50 percent of the 10-foot jet grout mat has been installed.
- The sprung structure will be erected prior to the start of bulk excavation, while the tie-down installation is being completed.
- Dewatering will begin after ISS is underway and at the start of excavation. It will be a continuous 24/7 operation until the below grade structure is completed in CP-03.
- The CP-02 contractor will excavate the first 10 feet, and then can begin the ISS mitigation work when 50 percent of the first 10 feet is excavated. Productivity is based on 1,000 yd^3 per day.
- After the ISS mitigation is 50 percent complete, the balance of the excavation can continue.
- Assumed five 20 yd^3 loads per hour for a 10-hour day; approximately 1000 yd^3 per day to calculate the excavation duration. Assumption takes into consideration the 200-mile round trip to the disposal site, the need to decontaminate the trucks (clean off contaminated soil so it does not get on haul route), getting in and out of the sprung building, narrow streets used for haul roads, and the unknowns of extent of contamination or debris within the excavation area.
- Construction at this point could become dependent on site remediation activities that will be the responsibility of other parties. Construction of the tanks cannot begin until the excavation work, and related remediation (if required), is completed.
- The critical path to get the CSO structure operational is through the construction of the building, installation of equipment/piping and final instrumentation and controls. Thus, the sequence of the work needs to be focused on getting the screening area below grade constructed. The start of the screening area below grade requires that the tank slab on grade (SOG) and some of the wall separating the tanks from the screening area be constructed.
- When sufficient SOG has been placed to support construction of the wall at the screening area, the concrete placement of this wall will start. When this wall is constructed to above the screening area SOG, the screening area SOG can start.
- Starting with the SOG in the screening area, anticipate using separate crews to work the remainder of the tank and screening area.
- Assumed productivity is 1,200 yd^3 per month for SOG, 1,000 yd^3 for tank walls, and 600 yd^3 for screening area walls and top slab construction.

Major specialized work, multi-prime assignments (Wicks Law-applicable) and anticipated multi-prime contractors are listed below.

- environmental mitigation
- temporary sprung structure enclosure of the site
- sheet piling and slurry wall construction
- excavation and treatment of contaminated soil
- structural concrete
- process mechanical including equipment
- HVAC
- painting
- rigging
- electrical and instrumentation
- final site work

The project was estimated as a Wicks Law-applicable project, and there will be multiple prime contracts between DEP and the various trade contractors. At the present time, there is a Project

Labor Agreement in place between the City and the Building and Construction Trades Council of Greater New York. This agreement covers most, but not necessarily all, DEP projects and results in the covered projects being single-prime contract projects. The Project Labor Agreement is for a defined period of time and may or may not be in effect at the time a particular project goes out to bid.

5.3.5 Cost Basis

The factors described below were used to develop the construction cost estimate.

Material Pricing. Material prices are from the Means Facilities Construction Cost database or other historical data that BC maintains in its database. Individual quotes for major quantity commodities and significant value process equipment are obtained from local sources and used in this estimate. No trade discounts were considered.

Labor and Equipment Rates. Wage Rates are from state and local published websites for the City. Direct labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and workers compensation insurance are added to constitute a true labor cost to the Contractor. New York City Prevailing Wage Rates as published by the Office of the Controller, City of New York, are used.

Labor Productivity. Unless otherwise stated, labor productivity is from the Means Facilities Construction Cost database and adjusted for the associated productivity for the New York metropolitan area as outlined in Table 5-2, below. For work not included in this database, work of a similar nature is extrapolated. If no similar work exists within the database, the estimator made a best judgment of effort and equipment involved based on experience with similar projects in the New York City area.

Table 5-2. Labor Productivity Adjustment Factors

Construction Components	Percent Adjustment from 100%
General requirements	0.77
Demolition	0.60
Concrete	0.67
Masonry	0.72
Metals	0.62
Woods and plastics	0.77
Thermal and moisture protection	0.67
Openings: doors and windows	0.77
Finishes	0.77
Specialties: furnishing and vertical transport	0.72
Fire suppression	0.72
Plumbing and HVAC	0.72
Electrical and communications	0.72
Earthwork and deep foundations	0.72
Site improvement and landscaping	0.77
Utilities - piping and instrumentation	0.67
Process equipment	0.72

Indirect Cost. Percentage allowance for contractor's home office expense has been included in the overall rate mark-ups. The rate is standard for this type of heavy construction and is based on typical

percentages outlined in Means Facilities Construction Cost Data. The contractor's cost for builder's risk, general liability and vehicle insurance has been included in this estimate. Based on information from DEP and review of other supporting documentation of similar projects, all indirect costs have been applied as a percentage mark-up to either above the line or below the line as appropriate.

Taxes and Duties. As directed by DEP, all permanent construction is non-taxable. Local, state and City of New York taxes have been applied only to areas that are temporary in nature in order to accomplish the construction, including the ISS agents that will become part of the material hauled to the landfill. No taxes have been included on any of the engineering costs in the estimate.

Escalation. In addition to contingency, it is customary for projects that will be built over several years to include an escalation to appropriate points of the anticipated construction period to account for the future escalation of labor, material and equipment costs beyond values at the time the estimate is prepared. Due to volatility between classifications of construction materials, the more stable labor component is separated for separate escalation in accordance with union agreements or other documented data. Key materials are classified according to the Producer Price Index (PPI) for separate escalations. Construction equipment ownership cost generally does not vary much throughout the duration of a project; however, in certain economic conditions, the fuel component can become volatile, and may require an escalation calculation. Table 6-5 summarizes the escalation factors used.

Contractor Markup/Profit: Contractor Costs for General Conditions or Indirect Costs. Costs that are not for the direct installation of the actual work of the given project, such as project management, superintendent, site safety personnel, construction office trailers, etc., were calculated as a percentage of direct cost. These General Condition costs are separate from Contractor Markup/Profit and Overhead which are applied to the entire total cost of a Project. Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions, are based on the estimator's interpretation of the contract documents. The estimates for Contractor General Conditions are divided into two groups: a time-related group (e.g., field personnel), and non-time-related group (e.g., bonds and insurance). No trade discounts were considered

Other Factors. Other factors (e.g., currency exchange, restricted access, restricted work hours and shift work) has not been applied to the overall project estimates

5.3.6 Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

- Site improvements
- Allowance for rebuilt park ($60M) and temporary park ($30M) at RH-4
  - Based on input from NYC Parks Department
  - No cost included for any mitigation measures that may be required in connection with parkland alienation
- Allowance for Landscaping/Waterfront Access/Park at RH-3 ($5M)
- Fire sprinkler systems
- Hazardous material abatement in existing structures to be demolished
- Disconnecting existing building services
- Underground utility conflicts, relocations, and temporary support
- Sewer bypass pumping

- Control of air emissions, including air scrubbing and filtering system for soil remediation in air supported structure (sprung structure).
- City Environmental Quality Review (CEQR) and Uniform Land Use Review Procedure (ULURP) costs are included. Even though USEPA does not believe that these activities are required under Superfund, the cost to conduct the analyses to meet the intent of the City requirements has been included.
- The RH sites have been the subject of some remedial investigation activities under State Superfund, but the nature and extent of contamination has not been fully delineated. The PDIs have been scoped to fill data gaps needed for subsurface construction activities only. Delineation of the nature and extent of contamination is not included in this estimate.
- Property acquisition costs based on future outlook (worst case speculative) case using cost per buildable square footage. Details are included in the AKRF technical memorandum, dated December 23, 2014, in Appendix D.
- Additional property acquisition costs for construction staging/laydown areas have been included equally for both sites.
- No costs are included for potential historic preservation requirements.

5.3.7 Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The general assumptions listed in Table 5-3 were used in the development of this estimate.

Table 5-3. General Estimate Assumptions
• Bidders must hold valid, current contractor's credentials, applicable to the type of project.
• Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions, or any other unplanned costs.
• Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for more bidders.
• Contractor has complete access for lay-down areas and mobile equipment.
• Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates and/or rates contained in the estimating database.
• Contractor mark-up is based on conventionally accepted values that have been adjusted for project-area economic factors.
• Major equipment costs are based on both vendor-supplied price quotes obtained by the project design team and/or estimators, and on historical pricing of like equipment.
• Process equipment vendor training using vendors' standard O&M material is included in the purchase price of major equipment items where so stated in that quotation.
• Bulk material quantities are based on manual quantity take-offs.
• There is sufficient electrical power to feed specified equipment. Local power company will supply power and transformers suitable for this facility.
• Soils are of an adequate nature to support the structures. Tie-downs have been included in this estimate.
Soft Costs
• CM Fee is based on CP-02, 03, and 04 at 7% adjusted per the multiplier for the mark-ups. While within the range of typical DEP of 7 to 10%, the Superfund issues could make the project more complex and increasing this factor will be reevaluated in the design phase of the project.
• Engineering Design is based on CP-02, 03, and 04 at 10% adjusted per the multiplier for the mark-ups
• Design Services During Construction is based on CP-02, 03, and 04 at 4% adjusted per the multiplier for the mark-ups
• Geotechnical Fee is based on CP-02, 03, and 04 at 0.5% adjusted per the multiplier for the mark-ups
• Inspectors for the in-situ soil stabilization is based on a 2-person crew for 8 hours per day for 160 days at $150 per day
• Dispute Resolution Board (owners) is based on 8 people for 8 hours per day for 26 months at $150 per day
• Dispute Resolution Board (contractor) is based on 6 people for 8 hours per day for 8.6 months at $150 per day per construction package
• Stormwater Pollution Prevention Plan is based on 3 people for 8 hours per day for 8 hours per day for 26 months at $100 per day per construction package
• Noise control monitoring is based on 1 people for 8 hours per day for 26 months at $150 per day per construction package
• Extra scheduling is based on 1 people for 8 hours per day for 26 months at $150 per day per construction package
• Security Guards is based on 2 people for 14 hours per day for 26 months at $100 per day per construction package
• Utility Research is based on 3 people for 8 hours per day for 6 months at $100 per day
• Construction Materials Testing Lab is based on CP-02, 03, and 04 at 0.5%
• Warranty Deposit Financing is based on CP-02, 03, and 04 at 0.5% per construction package
• Additional Public Hearings is an allowance
• All project permit costs used were based upon estimates provided in the Site Recommendation memorandum described in Section 5

5.3.8 Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

- O&M costs for the project with the exception of the vendor supplied O&M manuals
- Permits beyond those normally needed for the type of project and project conditions
- Bypassing sewer flows at or above CSO discharge levels during construction. Bypassing of normal, in-conveyance sewer flows including wet weather is included in the estimate.
- Salvage and/or recycling value of demolished material
- On-site separation of construction and demolition waste material
- Environmental remediation outside the footprint of the tank and conveyance for the Red Hook CSO Facility. Any such remediation and long term monitoring will occur separately from construction. The effort and costs associated with this work were not included in the final

construction estimate or schedule. It is assumed that the effort and costs to conduct environmental remediation, including any long-term O&M for regional groundwater controls, will be the responsibility of other parties.

5.3.9 Contractor and Other Estimate Markups/Add-Ons

Contractor mark-up is based on conventionally accepted values which have been adjusted for project-area economic factors as described below and summarized in Table 5-4.

Labor Markup. Wage rates are from state and local published websites for the City. Direct labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and workers compensation insurance are added to constitute a true labor cost to the contractor. New York City Prevailing Wage Rates as published by the Office of the Comptroller, City of New York, are used.

Materials and Process Equipment Markup. This mark-up consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead, and profit.

Equipment (Construction) Markup. This mark-up consists of the costs associated with operating the construction equipment used in the project. Most general contractors (GCs) will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the equipment rental cost. Occasionally, larger contractors will have some or all of the equipment needed for the job, but in order to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is similar to the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup. This mark-up consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Contractor Startup, Training, and O&M Manuals. This cost mark-up is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup and O&M manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or instrumentation and electrical technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist with and trouble shoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance. This percentage comprises all three items. Many factors make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many

factors affect each area of insurance, including project complexity and contractor's requirements and history. The actual cost could be higher or lower based on the bidder, region, insurance climate, and the contractor's insurability at the time the project is bid.

Material Shipping and Handling. This can range from 2 to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paper work, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies (e.g., oil, gaskets and bolts) that may be missing from the equipment or materials shipped.

Performance and Payment Bonds. Based on historical and industry data, this can range from 0.75 to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, and contractor's historical record on similar projects, complexity and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.

The percentages used for the NET (above the line) and GROSS (below the line) mark-ups are listed in Table 5-4.

Table 5-4. Mark-up Percentages

Item	Mark-up estimate, %
Net	
Labor mark-up	10.0
Construction equipment mark-up	5.0
Material and process equipment mark-up	8.0
Other - soft (non-construction) cost mark-up	2.0
Subcontractor mark-up	5.0
Non-exempt materials sales tax	7.0
Material sales tax-exempt	0
Material shipping & handling	2.0
Gross	
GC Multi-prime administration	2.0
Start-up, training, O&M	1.0
Construction contingency	20.0
Building risk, liability auto insurance	2.5
Performance/payment bonds	1.5
Building department permits	1.0
General corporation tax	0.7

In addition to contingency, it is customary for projects that will be built over several years to include an escalation to the midpoint of anticipated construction to account for the future escalation of labor, material and equipment costs beyond values at the time the estimate is prepared. The base rate for all escalation calculations that are used on all estimates is shown in Table 5-5.

Table 5-5. Base Rate of Escalation		
Estimate Breakdown	Escalation % /Year	Sources
Labor	1.50%	AGC / PPI
Construction equipment	1.50%	AGC / PPI
Material	1.70%	AGC / PPI
Subcontractor	2.00%	AGC
Other soft costs	1.50%	AGC / PPI

5.3.10 Risk and Opportunities

During development of the cost estimate, a series of issues has been identified that have the potential to create a variance between the estimated construction cost and the actual construction costs. Some of these elements will be incorporated into the overall project risk register.

The following risks and opportunities were noted during the development of this estimate:

1. Location and prevalence of abandoned utilities / structures. Available mapping of existing utilities and structures were reviewed during development of the concept design. However, this part of Brooklyn is very old and has seen many different uses over the last 100 years. As such, there are likely abandoned utilities and structures within the footprint of the Facility and conveyance depicted in the conceptual designs. Discovery of these abandoned utilities during construction has the potential to increase the overall construction cost. In response, an allowance for subsurface utility conflicts and relocation has been included.
2. Other PRPs. There are many other PRPs named on the Gowanus Canal, one in particular who is working on the remediation of the Gowanus Canal and upland areas that include Sites RH-3 and RH-4. Since the full scope of the obligations of these other PRPs is not fully known, schedule impacts (delays), site coordination, and cost-sharing has not been considered in this estimate. These elements have the potential to increase or decrease DEP's cost. As the scope of the other PRP's obligations becomes known, the construction cost estimate can be updated accordingly.
3. Property acquisition costs. Best available and up-to-date information was used to estimate the property acquisition costs. The actual cost is a function of the real estate market and direct negotiations with current land owners. Appendix D presents the basis for the property acquisition costs used in the estimates.
4. Historical artifacts. Care was taken to map areas of historical significance. However, given the age of this neighborhood, it is possible that unknown or unforeseen historical or archaeological artifacts could be discovered during construction. Mitigation of these elements could delay the project and increase the overall project cost.
5. Geotechnical considerations. Geotechnical data from published sources and from related work around the Gowanus Canal were used to develop the conceptual SOE design and structural elements. Detailed geotechnical investigations will be conducted on the selected site during the early phases of the detailed design contract. Findings from these investigations may change the scope and nature of the SOE and structural design. Such changes would have an impact on the construction cost. Additionally, the presence of foundation debris from the Fulton MGP at the RH-4 site could hamper the placement of the SOE as well as the ISS activities. If the debris requires removal prior to SOE or ISS, it would require additional time for the project schedule and cost for the removal activities.

6. Resiliency. Assumptions were made regarding key elevations for designing a facility that is resilient to future sea level rise and storm surge. These elevations were based on preliminary guidance provided by DEP and the City. Developing a resilient system and establishing elevation benchmarks is an ongoing process. Future updates or changes to these elevations could result in a taller structure, increasing the overall project cost.
7. Bypass pumping. Durations have been assumed for bypass pumping. Unforeseen delays in construction could increase the duration of bypass pumping, increasing the overall project cost.
8. Contaminated sediments and groundwater. The estimated nature and extent of the contaminated soil and groundwater in the construction areas is based on limited available information. Once the PDI activities are conducted, the characterization and volume estimates will be more complete and could affect the soil excavation, handling, and disposal costs. Using ISS should allow for disposal of the soil as non-hazardous, but waste characterization will be required. Should the soil fail RCRA waste characterization for anything but benzene, it can still be disposed of as non-hazardous under the MGP exemption, but would require thermal desorption at a disposal facility, resulting in additional cost.

   The April 2015 NYSDEC PRAP for the Fulton MGP Site indicated that subsurface soil and groundwater are severely contaminated by coal tar at both the RH-3 and RH-4 sites. These properties will be addressed under the provision for future actions by the designated PRP. The PRAP does not otherwise specifically identify remedial actions for groundwater contamination or NAPL deposits in the soil at the RH-3 and RH-4 sites.
9. Air emissions. The estimate includes an allowance for a sprung structure to control air emissions. Depending on soil contamination conditions, it may be reasonable to use foam or other less costly methods to control odors and emissions. This would reduce the project costs and reduce time requirements.
10. Health and Safety – Contaminants in the soil and groundwater at the two sites present health risks to workers and, potentially, the general public. A risk assessment for the Fulton MGP site identified both dermal contact and inhalation as exposure routes. Planned controls for air emissions as well as other design features have been included in the conceptual design and cost estimate. However, if additional health and safety measures are needed, the project costs could increase for these activities.

5.3.11 Construction Contingency

The contingency factor covers unknown conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that cannot be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage and area factors, construction contingency varies with completeness of project definition. For this project, the Pre-Determined Percentage method in accordance with AACEI guidelines is 20 percent and also coincides with the estimating team's judgment of the information furnished for preparation of this estimate.

5.4 Envision Sustainability Rating

5.4.1 Introduction and Overview of Process

The Institute for Sustainable Infrastructure (ISI) Envision rating system is an objective framework of sustainability criteria and performance achievements. The Envision system is focused on the built environment, or infrastructure, rather than occupied buildings as has been the focus of similar rating systems such as Leadership in Energy and Environmental Design. It is designed to help users identify

ways in which sustainable approaches can be used to plan, design, construct, and operate infrastructure projects.

A comparison of the potential sustainable aspects of the sites was performed using Envision Version 2.0, Stage 2, to score both of the sites under consideration to understand the relative potential of each site for sustainable performance of the constructed work. The overall goal of this process was to identify the best site to reduce and mitigate negative impacts while making the best investment in long-term performance. A separate memorandum with the details of the analysis was submitted to DEP in April 2015 and is included in Appendix E.

The Envision rating system is grouped into five categories and 60 credits. A credit comprises a sustainability indicator on an aspect of environmental, social, or economic concern. Each credit is scored based on the following five levels of achievement:

1. Improved
2. Enhanced
3. Superior
4. Conserving
5. Restorative

A total of 809 points is possible based upon the Conserving level of achievement across all 60 credits. The five categories (and associated points) are described as follows in the Envision Guidance Manual:

- The **Quality of Life** (181) category addresses a project's impact on surrounding communities, from the health and well-being of individuals to the well-being of the larger social fabric as a whole. These impacts may be physical, economic, or social.
- The **Leadership** (121) category measures the potential for the project team to communicate and collaborate with a wide variety of people in creating ideas for the project and understanding the long-term holistic view of the project and its life cycle. This category is less sensitive to siting and is more related to overall organizational commitment. The City and the DEP have demonstrated and documented this commitment in documents such as PlaNYC, the DEP mission statement, and the Bureau of Engineering Design and Construction's adopted sustainability policy.
- The **Resource Allocation** (182) category is broadly concerned with the quantity, source, and characteristics of the resources needed to build infrastructure (construction) and keep it running (operations).
- The **Natural World** (203) category addresses how to understand and minimize negative impacts to the natural world while considering ways in which the infrastructure can interact with natural systems in a synergistic, positive way.
- The **Climate and Risk** (122) category scope is twofold: to minimize emissions that may contribute to increased short- and long-term risks and to ensure that infrastructure projects are resilient to short-term hazards or altered long-term future conditions.

Additional information on ISI and the Envision Sustainable Infrastructure Rating System is available at: www.sustainableinfrastructure.org.

BC used a spreadsheet developed by DEP that automates the scoring of the Envision™ rating system. Each of the two sites was scored using this tool and annotated in the comments column to explain the rationale for the rating based on the potential achievement level. Both sites offer some potential for enhancement of sustainability of the built work. In general, an optimistic approach was taken to the scoring of all of the sites by evaluating the potential maximum reasonable rating in the

category. DEP will need to make informed decisions as to what level of achievement is practical and reasonable after the final site is selected and the design process starts in earnest.

5.4.2 Results

Summaries of the scoring results for the two sites are presented on Figure 5-5 below. The RH 3 site presents a significant opportunity for enhanced performance in comparison to the RH 4 site. The primary differentiator is that the RH-3 site offers the opportunity of access to the Canal and the associated potential for improved quality of life along with the potential for restoration of the waterfront environment and improvement in the natural world. Printouts of the scoring results and associated commentary are provided in Appendix E.

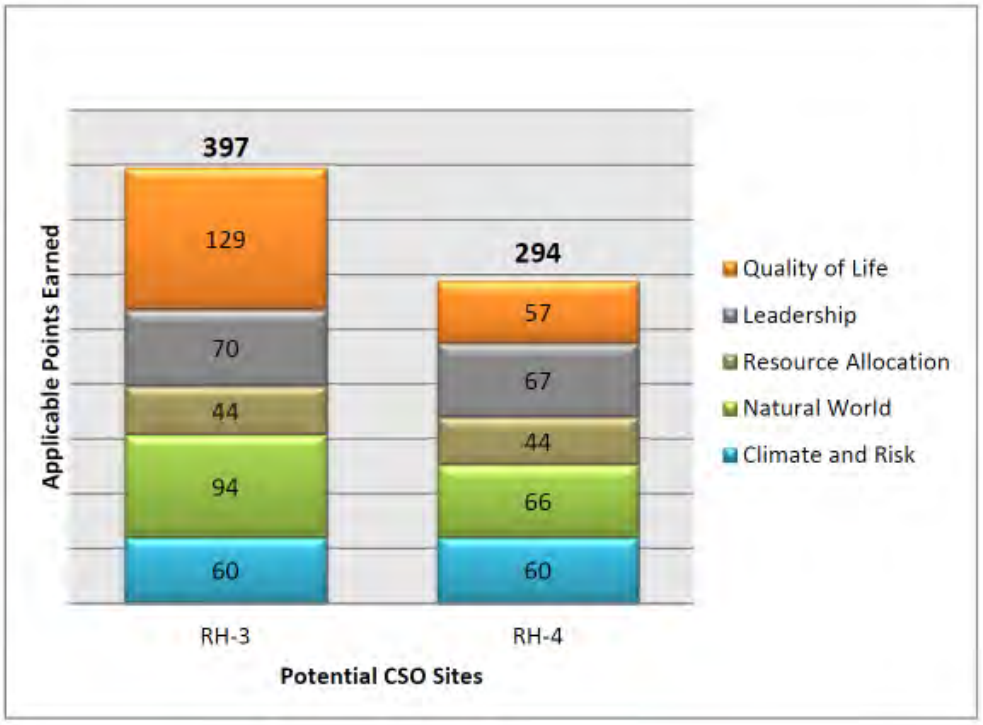


Figure 5-5. Envision Rating Comparison of RH 3 and RH 4 Sites

The following are highlights of the analysis and results in each of the five Envision categories for the two sites:

- **Quality of Life:** The RH 3 site scored 71 percent, or 129 of the 181 potential points, compared to 31 percent, respectively for the RH 4 site. As noted above, the potential for opening access to the canal consistent with the urban renewal in the area associated with economic redevelopment presents a significant opportunity for the community. The potential temporary and permanent negative impacts to the Thomas Greene Playground on the RH 4 site led to a lower rating for that site.
- **Leadership:** The sites scored similarly in the leadership category. The RH 3 site scored 66 percent, or 70 of the 106 potential points, compared to 63 percent for the RH 4 site. The primary differentiators in this category are the potential for promoting beneficial access to the waterfront for the RH 3 site and potential for improvements to the Thomas Greene Playground on the RH 4 site.
- **Resource Allocation:** Both sites scored 26 percent, or 44 of the potential 171 points, in this category because of the large amount of waste that will be generated from the proposed

removal of contaminated soils along with the waste stream that will be generated during construction. It should be noted that the RH 3 site will generate substantially less waste soil because of the shorter conveyance construction.

- **Natural World:** The RH 3 site scored 59 percent, or 94 of the 158 potential points, compared to 42 percent for the RH 4 site. The primary differentiator for the RH 3 site was the recognition of the potential to enhance and restore the Canal environment and the associated access and connectivity. Both sites provide for a beneficial use of brownfield sites. Some points were recognized for the RH 3 site for the potential to replace the existing truck maintenance facilities with a well-run CSO storage facility and the associated reduction in potential risk to groundwater and surface water resources.
- **Climate and Risk:** Both sites scored 49 percent, or 60 of the potential 122 points, in this category because of the similar energy use among the sites and the expectation that all vulnerable equipment would be protected from flood risk by locating them on the second floor of the facility.

Section 6

Comparison of Short Listed Sites

This section provides a comparison of the relative engineering requirements, environmental issues, sustainability considerations, and costs between the two short listed sites.

As described in Section 4, and as shown on Figure 4-1, Sites RH-3 and RH-4 were the top two ranked locations for the CSO retention facility at the RH-034 outfall. As presented in Sections 4 and 5 of this report, some of the major criteria analyzed in the screening level analyses remain as differentiators between the RH-3 and RH-4 sites. Criteria that were considered fatal flaws in the screening process, such as minimum property size and effective capture of the CSOs, are not considered further here since both sites have already met those criteria and they no longer serve as differentiators. Other criteria from the screening process, including hydraulic complexity, land use, proximity to infrastructure, property ownership, the Envision rating system results, and costs are considered in more detail here.

The specific criteria considered for the side-by-side comparison are:

- Engineering. Section 6 provided a detailed evaluation of the engineering factors included in the conceptual designs for each specific site. However, some of the key engineering issues to consider when comparing the two sites include the complexity and risks associated with the hydraulics and controls needed to move wastewater from the outfall to the tanks, the conveyance needed to deliver it to and from the tanks, the depth of excavation required for construction of the tanks, and the complexity of the subsurface utility crossings and relocations related to the conveyance.
- Property Acquisition. Property acquisition affects cost and must also be considered in terms of the project schedule.
- Construction. Construction considerations include the complexities associated with building at each site, which will directly affect the associated cost and risks. Construction complexities also influence the construction duration, which includes demolition, site preparation, construction of the tanks and superstructure, construction of the conveyance, and final site restoration.
- Environmental. The environmental issues fall into two distinct types: 1) soil and groundwater contamination associated with the former MGP sites and other industrial activities in the area, and 2) impacts to site specific and surrounding land use and the community. The sustainability analysis using the ISI Envision system presented in Section 6 provides for a comparison of the overall impacts and benefits to the community.
- Cost. Each of the engineering, environmental, and sustainability criteria carry cost implications. For example, greater lengths of conveyance piping have greater costs, and greater excavation depths have greater associated costs, among others. However, other site specific cost factors are also considered here, mainly property acquisition costs and site restoration costs.

6.1 Comparison of Sites RH-3 and RH-4

The following discussion highlights specific factors considered in comparing the RH-3 and RH-4 sites. Some criteria are substantial differentiators whereas others are more or less equal between both sites. While similarities are mentioned, the focus will be on the differentiating factors for each site.

6.1.1 Engineering Considerations

Engineering considerations include planning and permitting efforts, facility design efforts, pre-design investigations, geotechnical engineering efforts, construction management efforts, and other activities required prior to construction. Details of these activities are generally included in Cost Package-01 of the Cost Estimate presented in Section 6 of this report.

Sites RH-3 and RH-4 are comparable in terms of planning, permitting and pre-design investigation efforts, although RH-3 carries a slightly higher effort for the pre-demolition survey due to the number of buildings and total square footage to be investigated. RH-4 has a limited number of buildings as most of the property is parkland.

The engineering fees for design of the tanks and superstructure are also similar between the sites. However, engineering design effort for the conveyance and piping needed to move the CSO from the RH-034 outfall to each site and back are greater for RH-4 due to the greater distance from the outfall. While the greater distance to RH-4 directly equates to greater design effort, it is the complexity of the utility crossings and interference with existing infrastructure that significantly increases the complexity of conveying the CSOs to RH-4. CSO conveyance cannot be located in Butler Street between RH-034 and Nevins Street due to the presence of a 5-foot by 25-foot box culvert that brings two of the three major sewer mains to the RH-034 outfall.

The potential to intercept two of the three major sewer mains upstream of the RH-034 diversion structure near the corner of Nevins and Butler was evaluated, with conveyance straight down Nevins Street to the RH-4 site. Hydraulic analysis showed that diversion of flow at this point yields a similar level of volumetric control. While the utilities in Nevins Street would prove difficult to cross, the hydraulic analysis also showed that the remaining overflow events would be too numerous, at over 30 events in a typical year due to the fact that the third major sewer main would not be intercepted. Efforts to control this third sewer would require the installation of complicated and costly control structures to enable in-system storage during certain events, while freeing discharge during other events to avoid sewer back-ups and flooding in the upstream neighborhoods. The cost to provide this complicated conveyance and control system is not included in the cost estimate for RH-4, but would add significantly to the estimated cost. More information can be found in the supporting technical memorandum (Upstream Flow Diversion Point Hydraulic Analysis, May 12, 2015).

The remaining alternate route for conveying the CSOs from RH-034 to the RH-4 site was also evaluated. This route would have the conveyance crossing the RH-3 site parallel to the Canal until it reached the mapped extension of Douglas Street, which represents an easement that the City could use to convey the CSO flows from the Canal, across Nevins Street and onto the RH-4 site. However the conveyance would still need to cross the privately owned property at RH-3, which could require the City to purchase that property in order to use the RH-4 site, making the cost to site the Facility at the RH-4 site that much more costly. That additional property acquisition cost for RH-4 conveyance is not included in the cost estimates.

The RH-3 site, being located adjacent to the RH-034 outfall and the new Gowanus Pump Station and force main, provides minimal distance for conveyance resulting in lower design effort, while at the same time providing opportunities for other synergies with the existing infrastructure. The longer conveyance to RH-4 also requires significant and complex subsurface utility engineering including the locating, coordinating and design for utility crossings and relocations.

The greater distance from the outfall to RH-4 also requires the influent channel and screen chamber to be deeper for proper hydraulic operation. Design of the deeper structures requires additional design effort, as would the overflow structure and tide gates.

Because RH-4 is currently a City-owned park, and because the park, swimming pool, and general play areas would need to be demolished to make room for the CSO facility construction, a new park would need to be designed and constructed, which adds to the design efforts at RH-4. It has been

assumed that some simple site restoration or waterfront access would be provided at RH-3, but the design efforts would be much less than redesigning a City park.

Construction management fees would be greater at RH-4 due to the time and effort needed for the longer conveyance as well as the time and effort needed to reconstruct the park.

At the recent suggestion of the USEPA, the City evaluated two alternate scenarios for the RH-4 site; 1) separating the building from the tank and placing it at another location off of the park grounds, and 2) having no major building, but having a smaller building that houses only essential components (such as electrical and controls equipment), and placing it at a separate location off of the park grounds. When considering these scenarios, it must first be recognized that they present significant engineering challenges and loss of functionality. The reason for having a building above the tanks is to house the required components as described in Section 3. Completely removing those components will limit the functionality of the Facility. Design and construction of those components at an off-site location, if feasible, will add significant cost, complicate operations, and further impact the local community.

In the first scenario, retaining all components of the Facility but housing them in a building constructed at a separate location would first require property acquisition at additional cost. A logical location for the separated building would be adjacent to the RH-034 outfall, at the RH-3 site, so that the screens and grit removal systems could still function properly, efficiently, and still be enroute to the underground storage tank. Locating the building separately would require larger and more significant subsurface conveyance chambers to house not only the structures to convey the CSOs to the tanks, but also to house the mechanical, electrical, and odor control conduits needed to connect the tank to the building. A variant of this scenario could have the building located on a property closer to the park, such as across Douglas Street along Nevins, which would reduce the length and cost of the subsurface chambers, but would still require conveyance of the CSO from the RH-034 outfall to the building, which again presents its own routing, utility crossing, and property acquisition issues. In this scenario, access to the tank through a series of at least six hatches at ground level would still be required on the park grounds. Occasional park closure would be required for cleaning and non-routine maintenance of the tanks, and odor issues during those events could be an issue for the community.

The second scenario, having a minimally sized building at an off-site location, and no building on the park, would require the elimination of several key components of the Facility and result in significant negative community impacts. Eliminating building construction on-site would result in slightly shorter duration for park closure than the scenarios which include on on-site building. However, the park would still be closed for 5 to 6 years during tank excavation and construction. This scenario would not accommodate mechanical grit flushing or odor control systems, which would result in solids deposition in the tank causing faint but persistent odors at the park and surrounding areas. Without mechanical grit flushing, regular manual grit removal would be required approximately 80 days each year to remove accumulated sediment from the tank. This operation would not only require full or partial park closure, but would also result in extensive odors, increased truck traffic and other community disruptions while transporting the grit off site. Access hatches would now be a more critical feature of the tank for routine maintenance and equipment repair.

While each of the scenarios could potentially be designed, neither is considered feasible from a best management practices or sustainable design perspective. The engineering and construction would be unreasonably complex, and the additional costs are not justified. The overall impacts to the community are much greater and longer lasting, and the operations would not be sustainable.

6.1.2 Property Acquisition

The RH-3 site currently consists of two privately-owned parcels which would need to be purchased for the construction of the CSO facility at that location. An evaluation of past, present, and

speculative future property values is included as Appendix D to this report. The worst-case future speculative cost was used to conservatively estimate property acquisition values in the cost estimates. However, the existence of a mapped street and potential easement on the RH-3 property could affect the actual property valuation and reduce the purchase price. The purchase price in the cost estimate was not discounted to account for the cost impact of the mapped street. Title search information indicates that the City could purchase the right to use the easement for a fee of $1.00, and the resulting actions could further reduce the potential purchase price of the RH-3 parcels.

RH-4 is currently a City-owned park, and would carry no property acquisition cost per se, but replacement property would be needed for temporary park facilities during construction, and property may need to be acquired in connection with the conveyance of flow to the site as discussed under the engineering considerations above.

Parkland alienation presents a potential legal hurdle that could impact the cost and timing of constructing a tank at the RH-4 site. If the parkland alienation process is required, replacement parkland would likely need to be identified and acquired. The cost to address parkland alienation issues has not been included in the RH-4 cost estimate, but would add to the overall cost of using that site. The timing could also be affected, should a legal challenge delay the remedial action. Either way, a temporary park would need to be provided to the community for the duration of the CSO facility construction. Upon completion of the CSO facility, the park would need to be re-constructed, including mitigation for any park land permanently occupied by the new CSO facility. The cost to reconstruct the park included in the cost estimate for RH-4 was provided by the New York City Parks Department and do not take into account the added complexity of providing new park facilities above a CSO tank. The cost estimates for the RH-3 site do include the cost to provide landscaping and waterfront access to the Canal. It should be noted that the cost for a temporary park and a reconstructed park at RH-4 is greater than the anticipated property acquisition cost for the RH-3 site.

6.1.3 Construction Considerations

Construction considerations include complexity, risk and cost. The complexity of construction also affects the construction schedule as well as presenting additional constructability risks.

Site work in preparation for construction generally includes demolition, support of excavation, ISS, groundwater control, and soil excavation and disposal. Because the influent channel, screen chamber and tanks are deeper at RH-4 and because the ground surface is at a higher elevation at RH-4, the SOE depth and volume of soil requiring excavation is greater at that location. Excavation and disposal of approximately 172,000 cubic yards of soil would be required for the tanks at RH-4, and an additional 50,000 cubic yards of soil would be required for the conveyance to RH-4. Because RH-3 is located adjacent to the outfall, the depth requirements are less for the support of the excavation, and the volume of material requiring excavation is less. RH-3 would require approximately 150,000 cubic yards of soil excavation and disposal for the tanks, and 22,000 cubic yards for the conveyance. This amounts to a net difference of approximately 50,000 cubic yards of waste material generated, in addition to resources associated with removal, trucking and disposal for this volume of material. For reference, and as stated in Section 6, it is assumed that approximately 1000 cubic yards of material could be moved each day. 50,000 cubic yards of material removal roughly equates to 50 work days of additional effort, and adds approximately 3 months of time to the project duration.

The length of the main conveyance from the RH-034 outfall to the tanks is a major differentiator between the two sites. RH-3, being located adjacent to the outfall, requires the least conveyance length. Approximately 100 feet of influent conveyance is required to move the CSO from the outfall to the tank at RH-3, and approximately 60 feet of effluent conveyance is needed to return the

overflow during pump back to the collection system following a storm event. RH-3 also needs a relatively short length of new outfall piping, approximately 50 feet, to convey overflows to the Canal during a flow through event that exceeds the capacity of the tank.

RH-4, being located further from the outfall, would require approximately 550 feet of conveyance to move the CSO from the outfall to the tank at RH-4, and approximately 300 feet of effluent conveyance to return the overflow during pump back to the collection system following a storm event. RH-4 requires a greater length of new outfall piping, approximately 500 feet, to convey overflows to the Canal during a flow through event that exceeds the capacity of the tank.

The greater length of conveyance impacts the cost for excavation and soil disposal along the trace of the conveyance, as well as the material and labor cost to construct the conveyance. The length of conveyance needed to capture flows from the smaller outfalls, RH-033, RH-037, and RH-038, is similar for the two sites.

Utility crossings and/or relocation are another major construction consideration. RH-3, being located adjacent to the RH-034 outfall, would not require routing of the main conveyance from RH-034 through the City streets, but rather could convey the CSO directly from the outfall onto the RH-3 property and to the tank without crossing utilities. RH-4 however, would require significantly more conveyance routing as well as utility coordination and relocations and crossings in Nevins Street. The original conveyance routing suggested in the USEPA ROD showed the conveyance extending from the outfall southerly in Butler Street, and then easterly down Nevins Street to the park at RH-4. However, there is a 5-foot-high by 25-foot-wide box culvert in Butler Street that conveys two major sewer lines to the Gowanus Pump Station and the RH-034 outfall. The presence of that box culvert plus other utilities precludes the placement of a new conveyance in Butler Street. In addition, there are several major water, sewer, gas, electric, and communications utilities in Nevins Street. An alternative routing for conveyance from RH-034 to the RH-4 site would have to run through the property at RH-3 parallel to the canal until it joins with the mapped portion of Douglas Street, a portion of which is currently occupied by a small building that is part of an operating business. The conveyance could then cross the RH-3 property using the mapped street as an easement, then cross Nevins Street and continue up Douglas Street to the RH-4 site (see Figure 6-2 in Section 6 of this report). Construction of the conveyance across the private property and below the existing building, with or without demolition, complicates the construction and adds to the cost.

Although construction of the conveyance is a major differentiator between the two sites, construction of the actual CSO facility, the below ground tanks and appurtenances, and the above ground superstructure is relatively similar at both sites and does not represent a major differentiator.

The time needed to construct a facility at the RH-4 site is approximately 6 months longer than the time needed to construct the facility at the RH-3 site. Although RH-3 requires more time for demolition of existing structures, RH-4 requires additional time for park reconstruction. In addition, the time needed to construct the longer conveyance and deeper excavation at RH-4 also adds to the construction schedule for that site.

Constructability issues mostly center on the unknown aspects of subsurface conditions and coordination with other Gowanus Canal PRPs. Although other parties have conducted subsurface investigations and the USEPA has made that information public, those investigations were not focused on the selection of a site for construction of a CSO facility. The former Fulton MGP was located in part on the RH-4 site, and the soil and groundwater contamination is fairly well documented for that property. Buried debris on the RH-4 site from former Fulton MGP operations could impact SOE and ISS operations. While it was recognized during the Remedial Investigation activities that RH-3 was impacted by contaminant migration from the source areas at the Fulton MGP

site, additional information would be generated during pre-design investigations to better characterize the contaminated soils to be excavated for off-site disposal.

Constructability issues will also involve coordination efforts among the PRPs. The USEPA and NYSDEC have indicated that other PRPs may be made responsible for the excavation needed for tank construction, as well as for the construction of a cut-off wall parallel to the Canal. The proposed cut-off wall is expected to be located along the bulkhead from the south-east corner at the head of the Canal (the northwest side of the RH-3 property), and parallel to the Canal along the length of the lots that make up the RH-3 property, continuing to Sackett Street. Both of these activities have the potential to impact the overall construction schedule and sequence of the work. Due to the location of the cutoff wall, its construction could presumably impact the schedule and work sequence at RH-3, but given the schedule for design, bidding, and site preparation activities, it likely that excavation would not be ready to start until after the cut-off wall is completed. Having another PRP conduct the excavation would impact RH-3 and RH-4 equally, as construction of the Facility at either site would have to wait until excavation was completed

6.1.4 Environmental Considerations

The environmental issues considered here fall into two categories: 1) soil and groundwater contamination associated with the former MGP sites and other industrial activities in the area, and 2) impacts to site specific and surrounding land use and the community.

Both RH-3 and RH-4 are impacted by soil and groundwater contamination. The main portion of the former Fulton MGP site was located directly on RH-4 and represents some of the highest levels of contamination reported in the USEPA's Final Remedial Investigation Report for the Fulton MGP Site. Coal tar waste is present in the soil, DNAPL, and other MGP related contaminants such as naphthalene, are reported in the groundwater. The presence of this contamination has the potential to impact soil excavation and disposal costs, as well as construction activities such as placing and curing of concrete. While RH-3 was not part of the actual MGP site, it has been impacted by contaminant migration. The limited site investigation at RH-3 reports the presence of coal tar waste, but at lower concentrations than observed at RH-4. Further, contaminated soil and groundwater were also encountered during construction of the Gowanus Pump Station, located northwest of and adjacent to RH-3, indicating contamination migration from the MGP site through the subsurface of RH-3. The presence of contamination, even at lower concentrations, could still impact construction issues such as concrete curing, as has been reported during construction of the Gowanus Pump Station. Special health and safety considerations are needed at both sites to protect site workers and the surrounding community particularly during site preparation and excavation activities.

It is assumed that the environmental remediation of any site will occur separately from Facility construction and these costs were not included in the final construction estimate. The remediation effort, including any long-term O&M for groundwater controls, will be the responsibility of other parties.

The SOE at both sites would be placed well below the water table and would have the potential to influence groundwater flow. The SOE at RH-3 may need special product recovery wells to intercept the DNAPL on the upgradient, outside of the SOE, particularly given its proximity to the Canal and its downgradient position relative to the former Fulton MGP site. However, although DEP is not responsible for regional groundwater control, this would represent a coordination issue that needs to be addressed by the USEPA or NYSDEC. The SOE at RH-4 would have similar, but perhaps lesser, groundwater flow impacts considering that it is the upgradient source area. Again, coordination of activities by the regulatory agencies would be required.

The CEQR criteria used during the site screening and short list development process provides some differentiation between the two sites. Evaluation of most of the CEQR criteria, such as traffic, noise, zoning and public policy, socioeconomic conditions, water and sewer infrastructure, solid waste and sanitation services, energy, air quality, GHG and climate change, as well as ULURP and fair share considerations are important factors but do not serve as significant differentiators between the sites.

Other CEQR criteria such as current and planned surrounding land use, historic and cultural resources, and on-site land use do provide differentiation between the sites. The on-site land use, particularly the loss of intended land use, is a major negative environmental factor for RH-4. Even though the park would be reconstructed following construction of the CSO facility, the need to have a building above the tanks would result in permanent loss of approximately one-third of the park land. While the use of RH-3 for the CSO facility would displace two businesses, it would not have the same negative impact on land use. In fact, upon completion, use of the RH-3 site could result in more waterfront access to the Canal, a desirable feature for the community.

Two historic early American mills are reported to have been located near the head of the Gowanus Canal. These mills would have relied on the moving water in the Gowanus "Creek" as a source of power, well before development of the bulkheaded Canal. RH-3 may be located in proximity to one of the historic mills, and would require archaeological surveys and inspections during excavation for construction. The archaeological surveys would not preclude the use of the site, but additional time might be required to collect and curate any artifacts encountered. RH-4, located a block inland from the Canal, would not be expected to contain artifacts from the historic mill.

Control of noise, odors, and emissions has been incorporated into the conceptual design and cost for both sites. Use of the RH-3 site would require consideration of the surrounding land use, particularly the presence of the Thomas Greene Playground located diagonally across Nevins Street. Although there are no other parks nearby, the RH-4 site does have similar surrounding land use and would still require similar controls for noise, odors, and emissions.

As a supplement to the CEQR criteria, which measures the environmental impacts, the ISI Envision system was used to further evaluate each site with regard to other impacts and sustainable performance. A summary of the Envision analysis and rating are included in Section 6 of this report and in Appendix E. Envision categories focus on quality of life in the surrounding community, leadership and the potential for interaction with the community, resources needed to build the infrastructure, interaction with the natural world and minimizing impacts, and minimizing contributions to climate change factors. It also considers minimizing the risks and providing resiliency during natural disasters.

The RH-3 site received a higher potential Envision rating than RH-4 in the "Quality of Life" and "Natural World" categories, stemming from opening access to the Canal consistent with the urban renewal efforts in the area associated with economic development, which presents a significant opportunity for the community. RH-3 scored high in the Natural World category in recognition of the potential to enhance and restore the Canal as a community asset. Both RH-3 and RH-4 scored similarly in the "Leadership", "Resource Allocation" and "Climate and Risk" categories.

6.1.5 Cost Summary Comparison

Most of the comparative criteria discussed above carry a cost component, though not all may be obvious. The environmental criteria and Envision rankings may not carry an obvious cost, but participation in the programs and activities, such as community involvement and leadership, require time and effort to conduct properly. However, the engineering and construction elements do carry direct costs and provide a straight forward cost comparison between the sites.

Cost Components. The cost discussion presented here is organized to be consistent with the cost estimate packages presented in Section 6 and included as Appendix A. The major packages were developed and arranged in a sequential manner:

- CP-01 includes the planning, engineering design, and property acquisition cost components for the project.
- CP-02 includes the site preparation and foundation work, all those components from demolition of the existing structures, clearing the sites, excavation and preparing the foundations to be ready for tank construction.
- CP-03 includes construction of the below ground tank, the above ground building, and all of the mechanical, electrical, and process controls within the building and tanks.
- CP-04 includes construction of the influent and effluent conveyance to and from RH-034, conveyance from the other smaller outfalls being captured, and site improvements such as the park reconstruction or waterfront access.
- "Below-the-line" Items are also presented, and include escalation factors, mark-ups, contingencies, start-up costs, bonding and other cost requirements.
- The environmental remediation of any site outside the footprint of the tank and conveyance for the Red Hook CSO Facility will occur separately. These costs were not included in the final construction estimate. This remediation, including all associated long-term operation and maintenance activities, will also be the responsibility of other parties. However, the timing and scope of work to be conducted by other PRPs has not yet been defined by either USEPA or NYSDEC.

Cost Summary. Table 6-1 below presents a summary of the major cost components within each of the cost packages. The component breakdown represents broad categories, the details of which are included in the cost estimates included in Appendix A. However, comparison of these categories illustrates the major cost differences between the sites that comprise the total estimated cost for each site as a whole.

Table 6.1 Gowanus Canal CSO Tank Cost Summary			
		RH-3	RH-4
CP-01	**Planning, Engineering, and Property Acquisition**	**$ 147,000,000**	**$ 90,000,000**
	Planning and Permitting (includes Construction Permits & Fees, Planning & Permitting, and Engineering and Consultants	$ 4,500,000	$ 3,900,000
	Pre-Design Investigations	$ 500,000	$ 500,000
	Property Acquisition – Tank	$ 62,000,000 *	$ -
	Property Acquisition – Staging Area	$ 28,000,000	$ 28,000,000
	Engineering Fee (includes Design, Geotech, Eng during Construction)	$ 35,000,000	$ 39,000,000
	Construction Management	$ 17,000,000	$ 18,600,000
CP-02	**Site Preparation and Foundations**	**$122,000,000**	**$ 139,000,000**
	General Site Work and Demolition (includes sprung structure, General conditions, tie downs, tie backs, demo)	$ 27,500,000	$ 26,500,000
	Support of Excavation - Tank	$ 6,500,000	$ 7,000,000
	Support of Excavation - Conveyance	$ 3,000,000	$ 10,000,000
	Jet Grouting - Tank	$ 28,000,000	$ 28,000,000
	Jet Grouting - Conveyance	$ 1,300,000	$ 6,000,000
	InSitu Soil Stabilization	$ 12,500,000	$ 14,000,000
	Soil Excavation and Disposal - Tank	$ 33,000,000	$ 33,000,000
	Soil Excavation and Disposal - Conveyance	$ 1,000,000	$ 5,000,000
	Dewatering - Tank within SOE (was based on duration)	$ 5,000,000	$ 5,000,000
	Utility Relocations – Tank	$ 1,000,000	$ -
	Soil trucking & decontamination – Tank	$ 3,000,000	$ 3,500,000
	Soil trucking & decontamination - Conveyance (decon not included)	$ 200,000	$ 1,000,000
CP-03	**Tank, Building, and MEP**	**$ 58,500,000**	**$ 60,000,000**
	Tank Construction	$ 23,000,000	$ 24,000,000
	Building Construction	$ 7,000,000	$ 7,000,000
	Mechanical, Electrical, Process Controls (includes general conditions, equipment, electrical, Mechanical, and piping)	$ 28,500,000	$ 29,000,000

Table 6.1 Gowanus Canal CSO Tank Cost Summary			
		RH-3	RH-4
CP-04 Conveyance and Site Improvements		**$ 20,000,000**	**$ 109,000,000**
	Influent and Effluent Conveyance to and from RH034	$ 1,500,000	$ 5,700,000
	Utility Relocation	$ 700,000	$ 700,000
	Conveyance of CSO from RH-33, RH-37, and RH-38	$ 2,700,000	$ 1,700,000
	Site Improvements	$ 5,000,000	$ 90,000,000
	General Conditions	$ 10,000,000	$ 10,900,000
Below-the-Line Items		**$142,300,000**	**$ 181,000,000**
	Mark-Up (includes shipping, markup, sales tax, and GC Multi-Prime Admin)	$ 18,300,000	$ 23,000,000
	Escalation	$ 32,000,000	$ 46,000,000
	Contingency	$ 80,000,000	$ 94,000,000
	Start Up	$ 2,000,000	$ 3,000,000
	Bonding and Other (includes builders risk insurance, bonds, permits, and General Corporation tax)	$ 10,000,000	$ 15,000,000
Total Cost		**$ 490,000,000**	**$ 579,000,000****
Class 4 Estimate Range (-30% to +50%)		**$343,000,000 to $735,000,000**	**$405,300,000 to $868,500,000**

* This represents a worst case, high end, speculative cost for the property. Accounting for comparable current sales, easement issues, and other factors, the likely cost to purchase this property could be about half of this value. See Appendix D for details.

** This does not include the cost of property acquisition that may be required for conveyance of the CSO from the RH-034 outfall to the RH-4 site through private property, which could potentially add at least $30M to the overall cost for RH-4.

CP-01 Common Costs. As can be seen in Table 6-1, the CP-01 planning and permitting and pre-design investigation costs are similar. Acquisition of property for use as a staging area, common to both sites, was identified during the site screening and short listing process and is discussed in Section 5 of this report.

CP-01 Cost Differences. Property acquisition costs for the CSO facility construction are significant for RH-3 while RH-4 is already owned by the City. Engineering fees are higher for RH-4 because they include design of significantly longer conveyance and the design for a temporary park and reconstruction of the Thomas Greene Playground. CM fees are also slightly higher for RH-4 due to the construction schedule and overall cost of the project at RH-4.

CP-02 Common Costs. Costs associated with the SOE, jet grouting, ISS, and dewatering for the basic tank area are similar for both sites, although the costs at RH-4 are slightly higher due to the greater depth of excavation.

CP-02 Cost Differences. The major cost difference between RH-3 and RH-4 in CP-02 is associated with the conveyance. Because the conveyance is significantly longer, the costs for SOE, jet grouting, ISS, and excavation and disposal of contaminated soil are significantly greater than those same items for RH-3. The cost for excavation and disposal of contaminated soil in the tank area is also higher at RH-4 due to the greater depth of the influent channel and screen chamber required for the proper hydraulic operation due to the greater distance of the RH-4 site from the outfall, and due to the higher ground elevation at RH-4. Another major cost difference is for utility crossing and/or

relocation for the conveyance to RH-4. There are no utility crossings associated with the conveyance to RH-3. The cost to provide a temporary park during construction at RH-4 is also included here under "Site Improvements." There are no similar temporary park costs associated with RH-3.

CP-03 Common Costs. The costs to build the tanks and the superstructure are similar for both sites.

CP-03 Cost Differences. There are no major cost differences to differentiate between the sites.

CP-04 Common Costs. There are very few common costs for CP-04 since this package contains the conveyance construction and site improvements following construction. Some minor similar costs can be found within the general conditions costs.

CP-04 Cost Differences. Again, because the length of conveyance is significantly greater at RH-4, the cost to construct the conveyance is much greater. However, because of the proximity of the smaller outfalls (RH-033, RH-037, and RH-038) to RH-4, the cost for the conveyance of those outfalls to RH-4 is less than to RH-3. Finally, the cost for site improvement following completion of construction at RH-4 is considerably greater due to the need to reconstruct the park. For the purposes of this estimate, the reconstructed park includes a new swimming pool, basketball courts, open play areas, and shaded park amenities. Costs for post-construction site improvements are included for RH-3, but only provide for general landscaping and waterfront access for the community.

Below-the-Line Items. In general, the below-the-line escalation, mark-up, contingency, and bonding costs are calculated as a percentage of the raw engineering and construction costs. Because the basic engineering and construction costs are higher for RH-4, the below the line items are also higher than for RH-3. Startup costs, which are included in the below the line items, are also higher for RH-4.

Section 7

Recommendation

Based on the analysis of the engineering requirements, operation and maintenance issues, environmental factors, construction schedule and construction costs, the RH-3 site is recommended as the preferred site for the Red Hook CSO Facility for the Gowanus Canal RH-034 outfall.

The location of the RH-3 site, being directly adjacent to the RH-034 outfall and the new Gowanus Pump Station, provides for multiple synergies and advantages in terms of engineering, hydraulics, conveyance, and constructability. Construction at the RH-3 site will cause the minimum amount of disruption to the community in terms of traffic, construction in local streets, and utility disruption, and would provide waterfront access to the Canal. Finally, even accounting for property acquisition, the cost to construct the Red Hook CSO Facility at the RH-3 site is considerably lower than building at the RH-4 park site.

Section 8

Limitations

This document was prepared solely for New York City Department of Environmental Protection (DEP) in accordance with professional standards at the time the services were performed and in accordance with the contract between DEP and Brown and Caldwell Associates dated June 4, 2013. This document is governed by the specific scope of work authorized by DEP; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by DEP and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Appendix A: Cost Estimates

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
RED HOOK-03 8MGD GOWANUS CANAL CSO TANK SITING AND SUPERFUND SUPPORT
CLASS 3-4 ESTIMATE <10% DESIGN

Client	NYCDEP
Engineer	BROWN AND CALDWELL
Estimator	FB-DS-DG-BW-BM
Bid date	5/11/2015
Job cost job number	**145692-**
BC Project Manager	**Donald Cohen**
BC Office	**New York City**
Estimate Issue No.	**8**
QA/QC Reviewer	**BMatthews-GDeReamer**
QA/QC Review Date	**3/29/2015**

Notes **PROCESS LOCATION/AREA INDEX**

Work Pkg	Description
CP-01	Planning, Engineering and Property Acquisitions
CP-02	Site prep and deep foundation systems
CP-03	Structure and MEP
CP-04	Site Improvements and OSBL Utilities

System	Description
01	Site Prep and Deep Foundation System
02	Structure and UG Piping
03	Equipment
04	Mechanical
05	Electrical - Instrumentation and Controls
06	Site Improvements
07	General Requirements
08	Engineerings - Pre-Design Investigations and Property Acquisitions

See Excel Workbook for Bid Items.

Estimate Breakdown	Labor Man Hr's	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Net Amount
01 TOTAL AMOUNT							
CP-01 Planning, Engineering and Property Acquisitions							
07 General Requirements						34,396	34,396
08 Engineerings - Pre-Design Investigations and Property Acquisition						183,865,935	183,865,935
CP-01 Planning, Engineering and Property Acquisitions						183,900,330	183,900,330
CP-02 Site prep and deep foundation systems							
01 Site Prep and Deep Foundation System	64,219	10,536,643	1,471,893	151,780,158	4,105,141		167,893,834
02 Structure and UG Piping	2,472	524,772	377,063	1,091,248	235,252		2,228,335
07 General Requirements	20,800	1,724,483	49,476	3,632,780	4,128,432		9,535,171
09 Sprung Structure	2,361	323,144	88,425	2,620,530	40,859		3,072,957
CP-02 Site prep and deep foundation systems	89,852	13,109,041	1,986,857	159,124,715	8,509,684		182,730,297
CP-03 Structure and MEP							
01 Site Prep and Deep Foundation System	2,746	437,480	667,266		88,405		1,193,150
02 Structure and UG Piping	185,631	27,906,438	17,624,312		1,218,967		46,749,717
03 Equipment	7,857	1,709,268	14,747,885		239,450		16,696,603
04 Mechanical	5,545	972,064	1,093,510	266,299	5,085		2,336,958
05 Electrical - Instrumentation and Controls	12,524	1,851,757	2,067,413	1,750,157	28,178		5,697,505
07 General Requirements	77,531	7,256,836	740,241	4,378,932	7,213,881		19,589,891
CP-03 Structure and MEP	291,835	40,133,843	36,940,627	6,395,387	8,793,966		92,263,824
CP-04 Site Improvements and OSBL Utilities							
01 Site Prep and Deep Foundation System	3,121	447,947	248,869	1,937,843	80,390		2,715,049
02 Structure and UG Piping	15,692	2,449,199	1,109,448	1,439,147	377,808		5,375,602
06 Site Improvements						7,180,383	7,180,383
07 General Requirements	57,265	9,565,082	1,930,134	3,916,984	315,067		15,727,268
CP-04 Site Improvements and OSBL Utilities	76,079	12,462,228	3,288,451	7,293,975	773,265	7,180,383	30,998,302
01 TOTAL AMOUNT	**457,766**	**65,705,113**	**42,215,935**	**172,814,077**	**18,076,914**	**191,080,713**	**489,892,753**

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
RED HOOK-03 8MGD GOWANUS CANAL CSO TANK SITING AND SUPERFUND SUPPORT
CLASS 3-4 ESTIMATE <10% DESIGN

Estimator	FB-DS-DG-BW-BM
Bid date	5/11/2015
Job cost job number	**145692-**
Project	**C-Infrastructure**
BC Project Manager	**Donald Cohen**
BC Office	**New York City**
Estimate Issue No.	**8**
QA/QC Reviewer	**BMatthews-GDeReamer**
QA/QC Review Date	**3/29/2015**

Notes **PROCESS LOCATION/AREA INDEX**

Work Pkg	Description
CP-01	Planning, Engineering and Property Acquisitions
CP-02	Site prep and deep foundation systems
CP-03	Structure and MEP
CP-04	Site Improvements and OSBL Utilities

System	Description
01	Site Prep and Deep Foundation System
02	Structure and UG Piping
03	Equipment
04	Mechanical
05	Electrical - Instrumentation and Controls
06	Site Improvements
07	General Requirements
08	Engineerings - Pre-Design Investigations and Property Acquisitions

Project Number: 145692-
Estimate Issue Number: 8
Estimate Issue Date: 5/11/2015
Estimator: FB-DS-DG-BW-BM

RED HOOK-03 8MGD GOWANUS CANAL CSO TANK SITING AND SUPERFUND SUPPORT

Notes See Excel Workbook for Bid Items.

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
RH-03 Red Hook - 03								
CP-01 Planning, Engineering and Property Acquisitions								
07 General Requirements								
7.06 Construction Permits and Fees								
01999 HVAC Permit							1,725	1,725
01999 Pre-demolition Rat Permit							1,419	1,419
01999 Traffic Control Permit Additional Cost							31,252	31,252
7.06 Construction Permits and Fees							34,396	34,396
07 General Requirements							34,396	34,396
08 Engineerings - Pre-Design Investigations and Property Acquisition								
8.01 Planning & Permitting								
01999 Conn Edison Electric Service Connection Fee							6,250	6,250
01999 Gas Service Connectiion Fee							6,250	6,250
01999 Planning, Permitting & Environmental Assessment							885,054	885,054
01999 Potable Water Service Connection Fee							4,375	4,375
01999 Dispute Resolution Board Cost (Owner)							292,018	292,018
01999 Property Acquisition							112,756,900	112,756,900
8.01 Planning & Permitting							113,950,848	113,950,848
8.04 Engineering and Consultants								
01999 CM Fee							21,225,769	21,225,769
01999 Engineering Design Fee							42,451,538	42,451,538
01999 Geotech Fee							1,516,127	1,516,127
01999 Demolition Engr Fees							895,240	895,240
01999 Ground Improvements Engr Fees							1,153,821	1,153,821
01999 Surveying (Additional Required)							62,504	62,504
01999 Utility Research							540,033	540,033
01999 Sustainability Program Administration							31,252	31,252
01999 Public Hearings							125,008	125,008
01999 Construction Materials Testing							1,913,796	1,913,796
8.04 Engineering and Consultants							69,915,086	69,915,086
08 Engineerings - Pre-Design Investigations and Property Acquisition							183,865,935	183,865,935
CP-01 Planning, Engineering and Property Acquisitions							183,900,330	183,900,330
CP-02 Site prep and deep foundation systems								
01 Site Prep and Deep Foundation System								
1.01 Demo and Abatement								
02220 Building Gross Demolition	15,721.963	2,030,600	19,776		655,163			2,705,539
02228 Electrical Demolition - Lock Out/ Tag Out Services and disconnect	1,333.333	189,673	22,816					212,490
02999 Construction and Demolition Waste Buildings	881.678	106,836	847,193		140,439			1,094,467
13999 Hazardous Material Remediation and Abatement				1,089,216				1,089,216
1.01 Demo and Abatement	17,936.974	2,327,110	889,784	1,089,216	795,602			5,101,712
1.02 Support of excavation								

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03330	Truck Washing Slab	95.539	16,459	10,553		101		27,112
31250	Shoring Systems			570,789	2,299,976			2,870,766
31250	Shoring Systems - Influent Channnel				1,819,140			1,819,140
31250	Shoring Systems - Effluent Channel				1,246,182			1,246,182
31250	Shoring Systems - CSO Relocation				1,217,534			1,217,534
31250	Shoring Systems C-B Trench				6,899,929			6,899,929
31260	Jet Grouting				41,182,522			41,182,522
31260	Jet Grouting for Influent Channel				969,686			969,686
31260	Jet Grouting for Effluent Channel				581,811			581,811
31260	Jet Grouting for the CSO Relocation				538,714			538,714
31315	Excavation 0-10 ft				1,383,717			1,383,717
31315	Excavation 10-59 feet				7,826,786			7,826,786
31315	Excavation Tie Back Spoils				54,896			54,896
31315	Excavation 0-10 ft - Influent Channel				52,223			52,223
31315	Excavation 10-59 feet - Influent Channel				130,557			130,557
31315	Excavation 0-10 ft - Effluent Channel				31,334			31,334
31315	Excavation 10-59 feet - Effluent Channel				7,759			7,759
31315	Excavation 0-10 ft - CSO Relocation				29,012			29,012
31315	Excavation 10-59 feet - CSO Relocation				71,081			71,081
31455	Tie Back Row 1				2,081,447			2,081,447
31455	Tie Back Row 2				2,081,447			2,081,447
31455	Tie Back Row 3				4,162,893			4,162,893
31455	Tie Back Row 4				2,887,168			2,887,168
31455	Tie Back Row 5				2,887,168			2,887,168
31999	Disposal of Excavated Soil				39,349,964			39,349,964
31999	Disposal of Excavated Soil - Tie Backs				209,129			209,129
31999	Disposal of Excavated Soil - Influent Channel				678,895			678,895
31999	Disposal of Excavated Soil - Effluent Channel				407,337			407,337
31999	Disposal of Excavated Soil - CSO Relocation				371,776			371,776
31999	Trucking of Excavated Soil - Tank	17,632.193	1,872,534			2,646,560		4,519,094
31999	Decontamination of Equipment	1,835.478	156,036			43,105		199,141
31999	Trucking of Excavated Soil - conduits	956.722	101,604			143,605		245,209
1.02	**Support of excavation**	**20,519.932**	**2,146,633**	**581,342**	**121,460,082**	**2,833,370**		**127,021,427**
1.03	**Dewatering and water treatment**							
31240	Dewatering Systems	25,762.490	6,062,901	766		476,169		6,539,836
46999	Dewatering Water Treatment				468,623			468,623
46999	Dewatering Treament Mobilization and Demobilization				522,227			522,227
1.03	**Dewatering and water treatment**	**25,762.490**	**6,062,901**	**766**	**990,850**	**476,169**		**7,530,685**
1.04	**Ground Improvements (Soil Stabilization**							
31260	Soil Stabilization				18,408,768			18,408,768

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
1.04 Ground Improvements (Soil Stabilization				18,408,768			18,408,768
1.05 Deep Foundations							
31315 Excavation Tie Downs Spoils				43,112			43,112
31455 Tie Downs for Tanks				9,623,893			9,623,893
31999 Disposal of Excavated Soil - Tie Downs				164,236			164,236
1.05 Deep Foundations				9,831,241			9,831,241
01 Site Prep and Deep Foundation System	64,219.396	10,536,643	1,471,893	151,780,158	4,105,141		167,893,834
02 Structure and UG Piping							
1.01 Demo and Abatement							
02221 Site Demolition 42" CSO(at tank site)	257.042	37,518	2,982		9,694		50,195
02999 Existing Utilities, 42" CSO(at tank site)	284.443	41,899			9,409		51,308
33500 42" CSO Conveyance(at tank site, temp relocate)				71,321			71,321
1.01 Demo and Abatement	541.486	79,417	2,982	71,321	19,103		172,824
1.03 Dewatering and water treatment							
31240 Dewatering 42" CSO(at tank site)	147.833	27,193	191		1,515		28,900
1.03 Dewatering and water treatment	147.833	27,193	191		1,515		28,900
2.12 Relocation of Existing Storm/CSO Outfall							
02999 Existing Utilities, 42" CSO(at tank site)		183,893	282,160	26,857	186,278		679,187
33500 42" CSO Conveyance(at tank site, temp relocate)	1,782.428	234,269	91,730	993,069	28,356		1,347,424
2.12 Relocation of Existing Storm/CSO Outfall	1,782.428	418,162	373,890	1,019,927	214,634		2,026,612
02 Structure and UG Piping	2,471.747	524,772	377,063	1,091,248	235,252		2,228,335
07 General Requirements							
7.01 Temporary Requirements (Toilets, Utilities, Lighting, Water, etc.)							
01999 SWPPP Extra Cost				87,137			87,137
7.01 Temporary Requirements (Toilets, Utilities, Lighting, Water, etc.)				87,137			87,137
7.02 Trailers and Storage (On and Off Site)							
01500 CSA Construction Facilities & Temp Utilities			49,476	63,115	18,977		131,568
01590 CSA Contractor's Equipment					4,109,455		4,109,455
7.02 Trailers and Storage (On and Off Site)			49,476	63,115	4,128,432		4,241,023
7.03 Fencing and Security							
01999 Full Time Registered Security Guards				3,049,804			3,049,804
7.03 Fencing and Security				3,049,804			3,049,804
7.04 Site Management - Super, General Foreman etc.							
01300 CSA Field Personnel & Project Management	20,800.000	1,724,483					1,724,483
01999 Dispute Resolution Board Cost (Contractor)				261,412			261,412
01999 Noise Control Monitoring				43,569			43,569
01999 Schedule Assembly & Maintenance Additional Cost				43,569			43,569
7.04 Site Management - Super, General Foreman etc.	20,800.000	1,724,483		348,549			2,073,032
7.06 Construction Permits and Fees							
01999 Crane & Derrick Permit				2,626			2,626

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
01999 Dumpster Permit				2,096			2,096
01999 Hoisting & Rigging Permit				1,694			1,694
01999 Warranty Deposit Financing				76,096			76,096
01999 Excavation Permit				1,662			1,662
7.06 Construction Permits and Fees				84,174			84,174
07 General Requirements	20,800.000	1,724,483	49,476	3,632,780	4,128,432		9,535,171
09 Sprung Structure							
8.06 Sprung Structure Over Site							
44999 Air Supported Structure	2,360.553	323,144	88,425	2,620,530	40,859		3,072,957
8.06 Sprung Structure Over Site	2,360.553	323,144	88,425	2,620,530	40,859		3,072,957
09 Sprung Structure	2,360.553	323,144	88,425	2,620,530	40,859		3,072,957
CP-02 Site prep and deep foundation systems	89,851.697	13,109,041	1,986,857	159,124,715	8,509,684		182,730,297
CP-03 Structure and MEP							
01 Site Prep and Deep Foundation System							
1.05 Deep Foundations							
31315 Backfill	2,746.268	437,480	667,266		88,405		1,193,150
1.05 Deep Foundations	2,746.268	437,480	667,266		88,405		1,193,150
01 Site Prep and Deep Foundation System	2,746.268	437,480	667,266		88,405		1,193,150
1.05 Deep Foundations	2,746.268	437,480	667,266		88,405		1,193,150
01 Site Prep and Deep Foundation System	2,746.268	437,480	667,266		88,405		1,193,150
02 Structure and UG Piping							
2.01 Mat Slab (Screening)							
03330 Matt Slab	3,994.117	618,231	466,087		14,861		1,099,178
2.01 Mat Slab (Screening)	3,994.117	618,231	466,087		14,861		1,099,178
2.01a Mat Slab (Storage Tank Basin 1)							
03330 Tank 1 Mat Slab	3,972.943	617,191	468,421		14,632		1,100,245
03330 Effluent Channel Tank 1 Section Matt Slab	865.052	134,721	102,713		3,163		240,597
2.01a Mat Slab (Storage Tank Basin 1)	4,837.995	751,912	571,134		17,796		1,340,842
2.01b Mat Slab (Storage Tank Basin 2)							
03330 Effluent Channel Tank 2 Section Matt Slab	865.052	134,721	102,713		3,163		240,597
03330 Tank 2 Mat Slab	3,972.943	617,191	468,421		14,632		1,100,245
2.01b Mat Slab (Storage Tank Basin 2)	4,837.995	751,912	571,134		17,796		1,340,842
2.01c Mat Slab (Storage Tank Basin 3)							
03330 Effluent Channel Tank 3 Section Matt Slab	865.052	134,721	102,713		3,163		240,597
03330 Tank 3 Mat Slab	3,972.943	617,191	468,421		14,632		1,100,245
2.01c Mat Slab (Storage Tank Basin 3)	4,837.995	751,912	571,134		17,796		1,340,842
2.01d Mat Slab (Storage Tank Basin 4)							
03330 Tank 4 Mat Slab	3,972.943	617,191	468,421		14,632		1,100,245
03330 Effluent Channel Tank 4 Section Matt Slab	865.052	134,721	102,713		3,163		240,597
2.01d Mat Slab (Storage Tank Basin 4)	4,837.995	751,912	571,134		17,796		1,340,842
2.01e Mat Slab (Storage Tank Basin 5)							
03330 Tank 5 Mat Slab	3,972.943	617,191	468,421		14,632		1,100,245

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03330 Effluent Channel Tank 5 Section Matt Slab	865.052	134,721	102,713		3,163		240,597
2.01e Mat Slab (Storage Tank Basin 5)	**4,837.995**	**751,912**	**571,134**		**17,796**		**1,340,842**
2.01f Mat Slab (Storage Tank Basin 6)							
03330 Efflunet Channel Flush Section Matt Slab	437.283	68,101	51,921		1,599		121,622
03330 Tank 6 Mat Slab	3,972.943	617,191	468,421		14,632		1,100,245
03330 Effluent Channel Tank 6 Section Matt Slab	865.052	134,721	102,713		3,163		240,597
2.01f Mat Slab (Storage Tank Basin 6)	**5,275.278**	**820,013**	**623,055**		**19,395**		**1,462,464**
2.02 Walls - Tank Walls, Baffles, Channels, etc. (Screening)							
03345 Concrete Walls	8,785.461	1,314,222	463,396		42,063		1,819,682
2.02 Walls - Tank Walls, Baffles, Channels, etc. (Screening)	**8,785.461**	**1,314,222**	**463,396**		**42,063**		**1,819,682**
2.02a Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 1)							
03345 Tank 1 Concrete Walls North, West, and East Walls	8,106.715	1,210,894	397,110		37,694		1,645,697
03345 Tank 1 Dividing Wall	191.028	28,507	4,813		719		34,039
03345 Tank 1 Flushing Wall	325.248	48,641	15,357		1,564		65,562
03345 Effluent Channel Tank 1 Concrete Wall West, North	3,665.552	550,335	231,900		19,056		801,292
2.02a Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 1)	**12,288.543**	**1,838,378**	**649,180**		**59,033**		**2,546,590**
2.02b Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 2)							
03345 Tank 2 Concrete Walls North, West, and East Walls	7,985.899	1,189,635	377,050		35,282		1,601,967
03345 Effluent Channel Tank 2 Concrete Wall West	2,651.688	399,264	187,078		14,492		600,834
03345 Tank 2 Dividing Wall	191.028	28,507	4,813		719		34,039
03345 Tank 2 Flushing Wall	325.248	48,641	15,357		1,564		65,562
05999 Tank 2 Weir with Baffle			23,513				23,513
2.02b Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 2)	**11,153.863**	**1,666,047**	**607,811**		**52,057**		**2,325,915**
2.02c Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 3)							
03345 Tank 3 Dividing Wall	191.028	28,507	4,813		719		34,039
03345 Tank 3 Flushing Wall	325.248	48,641	15,357		1,564		65,562
03345 Tank 3 Concrete Walls North, West, and East Walls	7,985.899	1,189,635	377,050		35,282		1,601,967
03345 Effluent Channel Tank 3 Concrete Wall West	2,651.688	399,263	187,078		14,492		600,834
05999 Tank 3 Weir with Baffle			23,513				23,513
2.02c Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 3)	**11,153.863**	**1,666,047**	**607,811**		**52,057**		**2,325,915**
2.02d Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 4)							
03345 Effluent Channel Tank 4 Concrete Wall West	2,651.688	399,264	187,078		14,492		600,834
03345 Tank 4 Concrete Walls North, West, and East Walls	7,985.899	1,189,635	377,049		35,282		1,601,967
03345 Tank 4 Dividing Wall	191.028	28,507	4,813		719		34,039
03345 Tank 4 Flushing Wall	325.248	48,641	15,357		1,564		65,562
05999 Tank 4 Weir with Baffle			32,330				32,330
2.02d Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 4)	**11,153.863**	**1,666,047**	**616,628**		**52,057**		**2,334,732**
2.02e Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 5)							
03345 Tank 5 Concrete Walls North, West, and East Walls	7,985.899	1,189,635	377,049		35,282		1,601,967
03345 Tank 5 Dividing Wall	191.028	28,507	4,813		719		34,039

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03345 Tank 5 Flushing Wall	325.248	48,641	15,357		1,564		65,562
03345 Effluent Channel Tank 5 Concrete Wall West	2,651.688	399,263	187,078		14,492		600,834
05999 Tank 5 Weir with Baffle			32,330				32,330
2.02e Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 5)	**11,153.863**	**1,666,047**	**616,628**		**52,057**		**2,334,732**
2.02f Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 6)							
03345 Tank End Wall South	7,295.130	1,098,424	514,676		39,869		1,652,969
03345 Effluent Channel Flush Concrete Walls West, East, South	3,642.413	548,436	256,975		19,906		825,317
03345 Effluent Channel Flushing Wall	223.359	33,404	10,546		1,074		45,024
03345 Tank 6 Concrete Walls North, West, and East Walls	7,985.899	1,189,635	377,050		35,282		1,601,967
03345 Tank 6 Dividing Wall	191.028	28,507	4,813		719		34,039
03345 Tank 6 Flushing Wall	325.248	48,641	15,357		1,564		65,562
05999 Tank 6 Weir with Baffle			32,330				32,330
2.02f Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 6)	**19,663.077**	**2,947,048**	**1,211,747**		**98,414**		**4,257,209**
2.03 Tank Top (Screening)							
03350 Elevated Slabs	3,142.220	445,016	183,192		14,760		642,968
2.03 Tank Top (Screening)	**3,142.220**	**445,016**	**183,192**		**14,760**		**642,968**
2.03a Tank Top (Storage Tank Basin 1)							
03352 Tank 1 Elevated Slab	2,454.318	348,514	156,067		12,122		516,702
03352 Effluent Channel tank 1 Section Elevated Slab	539.930	76,784	33,157		3,261		113,202
2.03a Tank Top (Storage Tank Basin 1)	**2,994.248**	**425,298**	**189,223**		**15,382**		**629,904**
2.03b Tank Top (Storage Tank Basin 2)							
03352 Tank 2 Elevated Slab	2,454.318	348,514	156,067		12,121		516,702
03352 Effluent Channel tank 2 Section Elevated Slab	539.930	76,784	33,157		3,261		113,202
2.03b Tank Top (Storage Tank Basin 2)	**2,994.248**	**425,298**	**189,223**		**15,382**		**629,904**
2.03c Tank Top (Storage Tank Basin 3)							
03352 Tank 3 Elevated Slab	2,454.318	348,514	156,067		12,122		516,702
03352 Effluent Channel tank 3 Section Elevated Slab	539.930	76,784	33,157		3,261		113,202
2.03c Tank Top (Storage Tank Basin 3)	**2,994.248**	**425,298**	**189,223**		**15,382**		**629,904**
2.03d Tank Top (Storage Tank Basin 4)							
03352 Tank 4 Elevated Slab	2,454.318	348,514	156,067		12,122		516,702
03352 Effluent Channel tank 4 Section Elevated Slab	539.930	76,784	33,157		3,261		113,202
2.03d Tank Top (Storage Tank Basin 4)	**2,994.248**	**425,298**	**189,223**		**15,382**		**629,904**
2.03e Tank Top (Storage Tank Basin 5)							
03352 Tank 5 Elevated Slab	2,454.318	348,514	156,067		12,122		516,702
03352 Effluent Channel tank 5 Section Elevated Slab	539.930	76,784	33,157		3,261		113,202
2.03e Tank Top (Storage Tank Basin 5)	**2,994.248**	**425,298**	**189,223**		**15,382**		**629,904**
2.03f Tank Top (Storage Tank Basin 6)							
03352 Effluent Channel Flush Section Elevated Slab	289.938	41,376	18,561		1,907		61,844
03352 Tank 6 Elevated Slab	2,454.318	348,514	156,067		12,122		516,702
03352 Effluent Channel tank 6 Section Elevated Slab	539.930	76,784	33,157		3,261		113,202

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
2.03f Tank Top (Storage Tank Basin 6)	**3,284.186**	**466,674**	**207,785**		**17,289**		**691,748**
2.05 Building							
03320 Building Foundation	3,015.984	443,190	268,404		98,535		810,130
03330 Slabs Fuel Storage Tank	26.584	3,842	1,969		54		5,865
03355 Slab over Metal Decking Second Floor	2,832.504	391,990	314,081		20,998		727,070
03355 Slab over Metal Decking Roof	2,130.215	292,729	199,769		12,162		504,660
03450 Architectural Precast Panels	4,482.325	719,478	2,657,839		123,026		3,500,342
04250 Interior Masonry First Floor	872.834	126,390	33,308		1,176		160,875
04250 Interior Masonry Second Floor	5,138.282	736,291	197,044		6,332		939,667
05120 Structural Steel - Conceptual First Floor 25 lb/sf	4,150.000	686,280	1,205,231		142,094		2,033,605
05120 Structural Steel - Conceptual Second Floor 15 lb/sf	2,490.000	411,768	723,139		85,256		1,220,163
05122 Elevated Aluminum Platform 8'H	3,168.990	478,493	231,683		26,147		736,323
05200 Steel Joists, Joist Girders and Trusses	28.651	4,333	6,805		916		12,054
05300 Metal Decking	84.431	10,211	9,493		852		20,556
05517 Metal Stairs	208.611	31,318	67,565		1,339		100,222
07220 Roof Insulation	438.946	58,381	129,852				188,234
07500 Roofing - Membrane	838.444	111,696	106,782		4,823		223,301
08100 Metal Doors First Floor	11.855	1,722	8,173				9,894
08100 Metal Doors Second Floor	38.084	5,532	22,289				27,821
08115 Metal Door Frames First Floor	17.872	2,618	3,896		45		6,558
08115 Metal Door Frames Second Floor	45.678	6,688	9,551		108		16,348
08700 Finish Hardware - Opening Allowance First Floor	3.436	499	1,121				1,620
08700 Finish Hardware - Opening Allowance Second floor	10.353	1,504	2,653				4,157
08999 Over head Doors First Floor	81.039	12,322	11,460				23,782
08999 Access Hatches	1,084.015	139,213	420,389				559,602
09510 Acoustic Ceilings Second Floor	79.900	11,606	10,621				22,226
09900 Painting CMU Walls Second Floor	123.296	14,809	3,653				18,463
10800 Toilet Partitions & Bathroom Accessories	12.511	1,817	4,156				5,973
22405 Commercial Plumbing, Conceptual	54.800	10,085	11,145				21,230
2.05 Building	**31,469.642**	**4,714,804**	**6,662,073**		**523,864**		**11,900,741**
2.06 ISBL Piping and Mechanical (Including HVAC, Plumbing, Fire Protection)							
11999 Screening Equipment		39,677	38,977				78,654
11999 Effluent Channel Gates		3,968	3,898				7,865
11999 Tank 1 Gates		11,903	11,693				23,596
11999 Tank 2 Gates		11,903	11,693				23,596
11999 Tank 3 Gates		11,903	11,693				23,596
11999 Tank 4 Gates		11,903	11,693				23,596
11999 Tank 5 Gates		11,903	11,693				23,596
11999 Tank 6 Gates		11,903	11,693				23,596
2.06 ISBL Piping and Mechanical (Including HVAC, Plumbing, Fire Protection)		**115,063**	**113,033**				**228,096**
2.12 Relocation of Existing Storm/CSO Outfall							

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03330 CSO Matt Slab Tank 1 throught 6	794.981	121,058	88,489		3,091		212,638
03330 CSO Matt Slab Screen East Side	358.179	54,543	39,869		1,393		95,804
03330 CSO Matt Slab Screen North	1,791.542	279,519	213,815		6,518		499,851
03345 CSO Concrete Walls Tank 1 throught 6	3,201.978	477,427	104,451		12,212		594,090
03345 CSO Concrete Walls Screen East Side	1,442.661	215,106	47,061		5,502		267,670
03345 CSO Concrete Walls Screens North	4,108.510	612,192	181,635		18,496		812,323
03350 CSO Elevated Slab Tank 1 Throught 6	937.036	130,886	44,637		2,306		177,828
03350 CSO Elevated Slab Screens East Side	422.231	58,979	20,114		1,039		80,132
03350 CSO Elevated Slab Screens North	894.493	127,039	54,026		4,613		185,679
2.12 Relocation of Existing Storm/CSO Outfall	**13,951.613**	**2,076,748**	**794,097**		**55,171**		**2,926,016**
02 Structure and UG Piping	185,630.806	27,906,438	17,624,312		1,218,967		46,749,717
03 Equipment							
3.01 Screens with dumpsters							
11999 Screening Equipment	1,966.667	319,053	6,445,222		72,292		6,836,567
3.01 Screens with dumpsters	**1,966.667**	**319,053**	**6,445,222**		**72,292**		**6,836,567**
3.02 Submersible pumps							
11999 Submersible Pumps	550.000	100,266	584,654		7,472		692,391
11999 Tipping Bucket. Equipment	166.667	29,794	146,617		2,166		178,577
3.02 Submersible pumps	**716.667**	**130,060**	**731,271**		**9,637**		**870,968**
3.03 Generator							
01600 EMGEN Hoisting & Craneage Requirements	41.558	8,889			15,499		24,388
23999 Fuel Storage Tank	25.284	4,096	46,360				50,456
26321 Emergency Generator Set 1250kw & ATS	253.086	39,988	710,523		1,600		752,111
3.03 Generator	**319.929**	**52,973**	**756,883**		**17,099**		**826,956**
3.04 Odor Control							
11999 Odor Control	966.667	557,123	1,802,292		88,736		2,448,151
3.04 Odor Control	**966.667**	**557,123**	**1,802,292**		**88,736**		**2,448,151**
3.07 Sluice Gates							
11999 Effluent Channel Gates	83.333	14,509	59,245		1,037		74,791
11999 Tank 1 Gates	444.444	77,642	594,008		5,593		677,243
11999 Tank 2 Gates	444.444	77,642	594,008		5,593		677,243
11999 Tank 3 Gates	444.444	77,642	594,008		5,593		677,243
11999 Tank 4 Gates	444.444	77,642	594,008		5,593		677,243
11999 Tank 5 Gates	444.444	77,642	594,008		5,593		677,243
11999 Tank 6 Gates	444.444	77,642	594,008		5,593		677,243
3.07 Sluice Gates	**2,750.000**	**480,359**	**3,623,294**		**34,596**		**4,138,249**
3.08 Bridge Cranes							
11999 Bridge crane and hoists	631.585	97,594	407,480		10,497		515,571
3.08 Bridge Cranes	**631.585**	**97,594**	**407,480**		**10,497**		**515,571**
3.09 Grit Handling							

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03333 Equipment Pads Grit System	61.400	8,283	3,997		634		12,914
11999 Grit Handling Equipment	444.444	63,823	977,446		5,959		1,047,228
3.09 Grit Handling	**505.845**	**72,106**	**981,443**		**6,593**		**1,060,142**
03 Equipment	**7,857.359**	**1,709,268**	**14,747,885**		**239,450**		**16,696,603**
04 Mechanical							
4.01 Process Piping							
09912 Pipe Coatings	1,079.323	129,641	356,287				485,928
11999 Screening Equipment		3,968	3,898				7,865
11999 Tank 1 Gates		3,968	3,898				7,865
11999 Tank 2 Gates		3,968	3,898				7,865
11999 Tank 3 Gates		3,968	3,898				7,865
11999 Tank 4 Gates		3,968	3,898				7,865
11999 Tank 5 Gates		3,968	3,898				7,865
11999 Tank 6 Gates		3,968	3,898				7,865
22999 Mechanical Piping	1,699.022	424,400	284,474				708,874
4.01 Process Piping	**2,778.346**	**581,815**	**668,045**				**1,249,859**
4.03 Fire Protection							
22999 Mechanical Piping				266,299			266,299
4.03 Fire Protection				**266,299**			**266,299**
4.04 HVAC							
22999 Mechanical Piping	2,436.822	334,323	35,697				370,020
23999 HVAC Equipment	330.247	55,926	389,769		5,085		450,780
4.04 HVAC	**2,767.069**	**390,250**	**425,466**		**5,085**		**820,800**
04 Mechanical	**5,545.415**	**972,064**	**1,093,510**	**266,299**	**5,085**		**2,336,958**
05 Electrical - Instrumentation and Controls							
5.01 Primary and Secondary Gear							
01600 Primary and Secondary Switch Gear Hoisting & Craneage Requirements	51.948	12,236			16,669		28,905
03330 UT-1 and UT-2 Transformer Pad 10'x15'x8"t w/turndown edges	60.597	8,467	6,078		479		15,024
26221 UT-1 and UT-2 Transformer (Primary Service)	205.761	34,055	224,666		2,361		261,082
26221 LV Transformers 480v to 120/208V 45kva	55.556	8,134	4,386				12,519
26241 MSB-1 Switchboard 1600 amps 480V 3p4w NEMA 1	257.001	37,627	130,468				168,094
26244 480V 3p3w Power Panelboards 225A 42 ckt	18.519	2,711	2,801				5,512
26244 120/208v Light Branch Panelboards 100A 42 ckts	65.359	9,569	4,155				13,724
5.01 Primary and Secondary Gear	**714.741**	**112,798**	**372,553**		**19,509**		**504,860**
5.02 Primary and Secondary Feeders (Conduit and Wire)							
26040 EMGEN - Conduit, Wire and Terminations (4) Sets (4) #600w/#4/0G 4" RGS	383.466	56,142	31,618				87,759
26040 UT-1 & UT-2 PB to MSB-1 C&W (2) Sets (4) 4"RGS w/ (4) 600mcm each	690.921	101,155	83,898				185,053
26040 MSB-1 to MCC-1 (3) #500mcm #3g 3" RGS	45.620	6,679	4,236				10,915
26040 MSB-1 to PP-1 and PP-2 Conduit, Wire and Terms 4#4/0 #4G - 2.5" RGS	105.185	15,400	9,315				24,715
26040 MSB-1 to T-1 and T-2 Conduit, Wire and Terms 3#6 #8g 1" RGS	35.482	5,195	1,848				7,043

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
26040 T-1 & T-2 to LP-1 and LP-2 Conduit, Wire and Terms 4#1/0 #6g 2" RGS	33.387	4,888	2,252				7,140
26041 Grounding System	860.603	125,998	101,523				227,521
26999 UT-1 and UT-2 to MSB-1 Terminations	124.074	18,165	19,145				37,310
32740 Primary Electrical Service - Asphaltic Paving, Curbs & Sidewalks	7.197	1,019	1,921		199		3,139
33500 UT-1 & UT-2 to MSB-1 Trench 1'6"x 4'd x 50'L Cncrt Encase	27.713	3,611	1,111	241	343		5,307
33500 Trench for Primary Electrical Service 2'w x 5'd x 100'l concrete enc.	87.003	10,383	2,165	8,528	329		21,406
33580 UT-1 and UT-2 to MSB-1 (4) runs (4) #600mcm in 4" RGS each (50' Dist)	445.424	66,027	77,869		489		144,386
33580 Primary Electrical, Feeders & Ductbanks (2) 5" empty	43.165	6,727	3,045		245		10,016
5.02 Primary and Secondary Feeders (Conduit and Wire)	**2,889.242**	**421,389**	**339,946**	**8,769**	**1,606**		**771,710**
5.03 Motor Branch Feeders and Controls							
26040 MSB-1 to HPS 1,3,5,7 Conduit and Wire 4#10's in 1" RGS	194.459	28,470	11,908				40,378
26040 HPS to 5hp motors Conduit &Terms (Vendor Supplied Cable) 3/4" RGS	95.789	14,024	6,532				20,556
26040 MSB-1 to HPS 2,4,6 Conduit and Wire 4#10's in 1" RGS	145.844	21,352	8,931				30,284
26040 HPS-2,4,6 to 5hp motors Conduit &Terms (Vendor Supp Cable) 3/4" RGS	71.842	10,518	4,899				15,417
26040 MSB-1 to Dewatering Pump 1&3 3#1 #6G 1.5" RGS	329.029	50,067	65,025		1,138		116,230
26040 Misc. Motors-Devices not listed (20) 30 AMP CKT ALLOWANCE	605.406	88,635	85,013				173,648
26040 MSB-1 to Purge Supply and Exhaust Fans 3#350mcm #3g in 3"RGS	567.128	85,557	137,581		1,518		224,656
26040 MSB-1 to Odor Treatment Fan #1 & #2 - (1) 3#4/0 #4G 2.5" RGS	474.849	71,643	99,568		1,275		172,486
26040 MSB-1 to Dewatering Pump 2,4&5 (3) 3#1 #6G 1.5" RGS	490.737	74,689	97,368		1,708		173,765
26040 MCC-1 to IS#1 Conduit, Wire and Terms (4) #10 .75" RGS	59.499	8,711	5,830				14,541
26040 MCC-1 to IS#2 Conduit, Wire and Terms (4) #10 .75" RGS	56.451	8,265	5,644				13,909
26040 MCC-1 to IS#3 Conduit, Wire and Terms (4) #10 .75" RGS	53.403	7,819	5,459				13,277
26040 MCC-1 to IS#4 Conduit, Wire and Terms (4) #10 .75" RGS	50.356	7,372	5,273				12,646
26040 MCC-1 to IS#5 Conduit, Wire and Terms (4) #10 .75" RGS	47.308	6,926	5,088				12,014
26040 MCC-1 to IS#6 Conduit, Wire and Terms (4) #10 .75" RGS	44.260	6,480	4,902				11,382
26040 MCC-1 to Conveyor Conduit, Wire and Terms (4) #10 .75" RGS	40.197	5,885	4,655				10,540
26040 MCC-1 to Grit Cyclone#1 Conduit, Wire and Terms (4) #10 .75" RGS	40.197	5,885	4,655				10,540
26040 MCC-1 to Grit Cyclone#2 Conduit, Wire and Terms (4) #10 .75" RGS	40.197	5,885	4,655				10,540
26245 MCC-1 400A 480V 3p4w Motor Control Center	169.059	24,751	61,275				86,027
26999 Install (HPS) Control Panels HPS 1,2,3,4,5,6,7	77.778	11,387	546				11,933
5.03 Motor Branch Feeders and Controls	**3,653.786**	**544,322**	**624,807**		**5,639**		**1,174,767**
5.04 Light Branch & Controls							
26040 Grnd Flr Lighting Conduit & Wire (20' of 3/4" RGS w/ 3.5#12/lf)	787.201	115,251	39,713				154,964
26040 2nd Flr Lighting Conduit & Wire (20' of 3/4" RGS w/ 3.5#12/lf)	993.555	145,463	50,123				195,585
26040 Grnd Flr Power Branch Conduit, Wire and Terminations	213.996	31,330	10,796				42,126
26040 2nd Flr Power Branch Conduit, Wire and Terminations	343.923	50,352	17,350				67,703
26040 Building Exterior Lighting - Conduit, Wire and Terminations 4#12 .75"	237.893	34,829	13,120				47,949
26040 Screening & By-Pass Lighting Conduit, Wire & Lights	110.697	16,207	14,388				30,594
26040 Tank #1 Lighting Conduit, Wire & Lights	78.639	11,513	8,618				20,132
26040 Tank #2 Lighting Conduit, Wire & Lights	98.048	14,355	9,805				24,160

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
26040 Tank #3 Lighting Conduit, Wire & Lights	115.516	16,912	10,874				27,786
26040 Tank #4 Lighting Conduit, Wire & Lights	131.044	19,186	11,823				31,009
26040 Tank #5 Lighting Conduit, Wire & Lights	148.512	21,743	12,891				34,634
26040 Tank #6 Lighting Conduit, Wire & Lights	156.275	22,880	13,366				36,246
26092 Ground Flr - Lighting Control Devices	10.256	1,502	1,403				2,905
26092 2nd Flr Lighting Control Devices	25.641	3,754	3,508				7,263
26272 Ground Floor Switches and Recetacles	81.012	11,861	12,198				24,059
26272 Second Floor Switches and Receptacles	75.509	11,055	5,080				16,135
26511 Light Fixtures Ground Floor (High Bay)	674.764	98,790	232,168				330,957
26511 Light Fixtures Second Floor	626.039	91,656	214,478				306,134
26521 Emergency Lighting Ground Floor	25.000	3,660	1,980				5,641
26521 Emergency Lighting Second Floor	47.222	6,914	3,741				10,654
26531 Exit Lights Ground Floor	12.500	1,830	1,053				2,883
26531 Exit Lights Second Floor	11.111	1,627	936				2,562
26582 Site Electrical, Lighting	164.815	25,191	34,205		637		60,033
33507 Site Lighting (4) Pole Lights Trench for Utilities	4.282	824	65		215		1,104
33580 Site Lighting UG Electric Conduit and Wire	92.996	14,565	6,425		571		21,561
5.04 Light Branch & Controls	**5,266.447**	**773,248**	**730,107**		**1,424**		**1,504,779**
5.05 Special Systems (Life Safety - Fire Alarm - PA - Tele/Data - Security)							
27199 Ground Floor - Tele/Data - ALLOWANCE				78,227			78,227
27199 2nd Floor - Tele/Data - ALLOWANCE				104,251			104,251
28161 Ground Floor Fire/Life Safety System - ALLOWANCE				130,379			130,379
28161 2nd Floor Fire/Life Safety System - ALLOWANCE				130,313			130,313
28161 Ground Floor - Security System ALLOWANCE				130,379			130,379
28161 2nd Floor - Security System ALLOWANCE				130,313			130,313
5.05 Special Systems (Life Safety - Fire Alarm - PA - Tele/Data - Security)				**703,862**			**703,862**
5.06 Instruments and Control Panels.							
27201 Instrumentation				1,037,527			1,037,527
5.06 Instruments and Control Panels.				**1,037,527**			**1,037,527**
05 Electrical - Instrumentation and Controls	**12,524.215**	**1,851,757**	**2,067,413**	**1,750,157**	**28,178**		**5,697,505**
07 General Requirements							
7.01 Temporary Requirements (Toilets, Utilities, Lighting, Water, etc.)							
01999 Mechanical General Conditions			452,206		126,933		579,139
01999 SWPPP Extra Cost				89,765			89,765
7.01 Temporary Requirements (Toilets, Utilities, Lighting, Water, etc.)			**452,206**	**89,765**	**126,933**		**668,904**
7.02 Trailers and Storage (On and Off Site)							
01500 CSA Construction Facilities & Temp Utilities			75,796	65,018	29,929		170,743
01590 CSA Contractor's Equipment					6,481,139		6,481,139
01700 CSA Scaffolding	102.272	14,855					14,855
01999 Mechanical General Conditions			121,346				121,346

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
	7.02 Trailers and Storage (On and Off Site)	**102.272**	**14,855**	**197,142**	**65,018**	**6,511,068**		**6,788,084**
7.03	**Fencing and Security**							
01999	Mechanical General Conditions	48.473	7,041	2,057				9,098
01999	Full Time Registered Security Guards				3,141,784			3,141,784
01999	Mechanical General Conditions	48.473	7,041	2,057				9,098
01999	Mechanical General Conditions	48.473	7,041	2,057				9,098
	7.03 Fencing and Security	**145.418**	**21,122**	**6,172**	**3,141,784**			**3,169,078**
7.04	**Site Management - Super, General Foreman etc.**							
01300	E&I Field Personnel & Project Management	29,874.000	2,506,003					2,506,003
01300	CSA Field Personnel & Project Management	31,840.000	2,716,818					2,716,818
01500	E&I Construction Facilities & Temp Utilities	95.584	13,994	84,722	590,270			688,986
01590	E&I Contractor's Equipment					528,343		528,343
01700	E&I Scaffolding	52.164	7,577					7,577
01999	Mechanical General Conditions	15,421.818	1,976,468		46,112	47,537		2,070,117
01999	Dispute Resolution Board Cost (Contractor)				269,296			269,296
01999	Noise Control Monitoring				44,883			44,883
01999	Schedule Assembly & Maintenance Additional Cost				44,883			44,883
	7.04 Site Management - Super, General Foreman etc.	**77,283.567**	**7,220,859**	**84,722**	**995,444**	**575,880**		**8,876,904**
7.06	**Construction Permits and Fees**							
01999	Excavation Permit				1,712			1,712
01999	Manhole Permit				208			208
01999	Crane & Derrick Permit				2,705			2,705
01999	Dumpster Permit				2,160			2,160
01999	Hoisting & Rigging Permit				1,745			1,745
01999	Warranty Deposit Financing				78,391			78,391
	7.06 Construction Permits and Fees				**86,920**			**86,920**
	07 General Requirements	**77,531.258**	**7,256,836**	**740,241**	**4,378,932**	**7,213,881**		**19,589,891**
	CP-03 Structure and MEP	**291,835.320**	**40,133,843**	**36,940,627**	**6,395,387**	**8,793,966**		**92,263,824**
CP-04	**Site Improvements and OSBL Utilities**							
01	**Site Prep and Deep Foundation System**							
1.01	**Demo and Abatement**							
02221	Site Demolition 54" CSO	452.960	68,491	5,984		18,857		93,332
02221	Site Demolition CSO Relocation	254.909	37,731	4,447		6,435		48,612
02999	Construction and Demolition Waste Site	169.538	21,143	166,976		27,783		215,902
31315	Excavation RH-037				40,963			40,963
31315	Excavation RH-038				85,000			85,000
33500	6" city water				17,984			17,984
33500	54" CSO Conveyance				193,825			193,825
33507	2" Natural Gas				999			999
	1.01 Demo and Abatement	**877.407**	**127,365**	**177,407**	**338,772**	**53,074**		**696,618**
1.02	**Support of excavation**							

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
31250 Shoring RH-037				135,570			135,570
31250 Shoring RH-038				239,507			239,507
31250 Shoring Systems Fuel Storage Tank				185,925			185,925
31260 Jet Grouting for the CSO Conveyance				1,017,429			1,017,429
31315 Excavation RH-037	505.700	62,370	7,952		4,860		75,182
31315 Excavation RH-038	911.116	108,575	12,712		6,907		128,193
33500 Trench for 18" Gravity Dewatering Drain	122.163	18,435	43,477		3,719		65,632
1.02 Support of excavation	**1,538.980**	**189,379**	**64,141**	**1,578,432**	**15,487**		**1,847,439**
1.03 Dewatering and water treatment							
31240 Dewatering 54" CSO	147.833	27,987	196		1,559		29,742
31240 Dewatering RH-037	99.222	18,763	196		1,559		20,518
31240 Dewatering RH-038	390.889	74,106	196		6,085		80,386
33500 16" Dewatering FM	66.942	10,347	6,732	20,640	2,627		40,347
1.03 Dewatering and water treatment	**704.886**	**131,203**	**7,321**	**20,640**	**11,829**		**170,992**
01 Site Prep and Deep Foundation System	**3,121.273**	**447,947**	**248,869**	**1,937,843**	**80,390**		**2,715,049**
02 Structure and UG Piping							
2.07 OSBL - Influent Line / Conduit							
03330 Influent Channel Matt Slab	569.163	84,877	78,274		1,472		164,623
03345 Influent Channel Concrete Walls	1,826.091	273,094	86,512		8,780		368,386
03345 Concrete Walls Gowanus PS Tie-in	448.545	64,977	34,675		1,362		101,014
03350 Influent Channel Elevated Slab	985.413	142,824	77,919		4,484		225,227
03999 Influent Conduit Tie-in Gowanus PS	3,431.995	473,597	59,365	288,202	60,876		882,040
2.07 OSBL - Influent Line / Conduit	**7,261.207**	**1,039,369**	**336,744**	**288,202**	**76,974**		**1,741,289**
2.08 OSBL - Out Flow Line / Conduit							
03330 Effluent Channel Matt Slab	222.030	33,344	30,015		1,039		64,398
03345 Effluent Channel Concrete Walls	1,175.596	175,812	55,695		5,652		237,159
03350 Effluent Channel Elevated Slabs	377.834	54,762	29,877		1,719		86,358
2.08 OSBL - Out Flow Line / Conduit	**1,775.460**	**263,918**	**115,586**		**8,411**		**387,915**
2.11 Relocation of Existing UG Utilities							
02999 Existing Utilities, 54" CSO	46.667	207,638	305,579	59,946	204,475		777,638
02999 Existing Utilities, CSO Relocation	46.667	24,450	35,079	12,297	18,978		90,804
33500 6" city water	944.471	119,903	26,395	3,315	9,074		158,687
33507 2" Natural Gas	40.665	7,680	2,986		328		10,993
33635 Manholes & Catch Basins 18" Gravity Dewatering Drain	109.172	17,021	14,658		2,328		34,007
2.11 Relocation of Existing UG Utilities	**1,187.641**	**376,692**	**384,696**	**75,558**	**235,182**		**1,072,128**
2.12 Relocation of Existing Storm/CSO Outfall							
03330 CSO Matt Slab Road to Tank	197.514	30,077	21,985		768		52,830
03330 Slab RH-037	25.820	3,774	2,308		37		6,120
03330 Slab RH-038	67.162	9,886	6,564		115		16,565
03345 CSO Concrete Walls Road to Tank	1,407.473	209,859	45,913		5,368		261,141

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03345 Wall RH-037	196.286	27,660	5,334		47		33,041
03345 Wall RH-038	404.003	56,937	9,402		77		66,416
03350 CSO Elevated Slabs Road to Tank	232.899	32,534	11,096		573		44,203
03350 Elevated Slabs RH-037	164.514	23,700	8,437		853		32,990
03350 Elevated Slabs RH-038	164.514	23,700	8,437		853		32,990
32740 CSO Relocaiton Paving	19.739	3,232	10,123		1,464		14,818
33500 54" CSO Conveyance	2,587.816	344,585	133,155	1,075,388	33,804		1,586,932
33500 CSO Relocation		3,277	9,666		13,282		26,225
2.12 Relocation of Existing Storm/CSO Outfall	**5,467.740**	**769,220**	**272,422**	**1,075,388**	**57,241**		**2,174,270**
02 Structure and UG Piping	**15,692.049**	**2,449,199**	**1,109,448**	**1,439,147**	**377,808**		**5,375,602**
06 Site Improvements							
6.03 New Community Park Landscaping							
32945 Landscape Specialties/Site Furnishings Allowance						7,180,383	7,180,383
6.03 New Community Park Landscaping						**7,180,383**	**7,180,383**
06 Site Improvements						**7,180,383**	**7,180,383**
07 General Requirements							
7.01 Temporary Requirements (Toilets, Utilities, Lighting, Water, etc.)							
01999 SWPPP Extra Cost				89,765			89,765
01999 Mechanical General Conditions			1,801,433		274,087		2,075,520
7.01 Temporary Requirements (Toilets, Utilities, Lighting, Water, etc.)			**1,801,433**	**89,765**	**274,087**		**2,165,286**
7.02 Trailers and Storage (On and Off Site)							
01999 Mechanical General Conditions			128,700				128,700
7.02 Trailers and Storage (On and Off Site)			**128,700**				**128,700**
7.03 Fencing and Security							
01999 Full Time Registered Security Guards				3,141,784			3,141,784
7.03 Fencing and Security				**3,141,784**			**3,141,784**
7.04 Site Management - Super, General Foreman etc.							
01999 Close Out Documents Additional Cost				110,670			110,670
01999 Pre-Construction Conference Additional Deliverables				73,780			73,780
01999 Dispute Resolution Board Cost (Contractor)				269,296			269,296
01999 Noise Control Monitoring				44,883			44,883
01999 Schedule Assembly & Maintenance Additional Cost				44,883			44,883
01999 Mechanical General Conditions	57,265.455	9,565,082		46,112	40,980		9,652,175
7.04 Site Management - Super, General Foreman etc.	**57,265.455**	**9,565,082**		**589,623**	**40,980**		**10,195,685**
7.06 Construction Permits and Fees							
01999 Driveway Permit				1,745			1,745
01999 Fuel Oil Tank Permit				1,745			1,745
01999 Scaffolding Permit				1,745			1,745
01999 Sidewalk Permit				1,745			1,745
01999 Fire Protection Sprinkler System Permit				2,121			2,121

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
01999	Excavation Permit				1,712			1,712
01999	Crane & Derrick Permit				2,705			2,705
01999	Dumpster Permit				2,160			2,160
01999	Hoisting & Rigging Permit				1,745			1,745
01999	Warranty Deposit Financing				78,391			78,391
	7.06 Construction Permits and Fees				95,812			95,812
	07 General Requirements	57,265.455	9,565,082	1,930,134	3,916,984	315,067		15,727,268
	CP-04 Site Improvements and OSBL Utilities	76,078.777	12,462,228	3,288,451	7,293,975	773,265	7,180,383	30,998,302
	RH-03 Red Hook - 03	457,765.793	65,705,113	42,215,935	172,814,077	18,076,914	191,080,713	489,892,753

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
RED HOOK-04 GOWANUS CANAL CSO TANK SITING AND SUPERFUND SUPPORT
CLASS 3-4 ESTIMATE <10% DESIGN

Client	CLIENT NAME
Engineer	BROWN AND CALDWELL
Estimator	FB-DS-DG-BW-BM
Bid date	5/11/2015
Job cost job number	**145692-**
BC Project Manager	**Donald Cohen**
BC Office	**Upper Saddle River**
Estimate Issue No.	**8**
QA/QC Reviewer	**Butch Matthews**
QA/QC Review Date	**12/23/2014**

Notes **PROCESS LOCATION/AREA INDEX**

Work Pkg	Description
CP-01	Planning, Engineering and Property Acquisitions
CP-02	Site prep and deep foundation systems
CP-03	Structure and MEP
CP-04	Site Improvements and OSBL Utilities

System	Description
01	Site Prep and Deep Foundation System
02	Structure and UG Piping
03	Equipment
04	Mechanical
05	Electrical - Instrumentation and Controls
06	Site Improvements
07	General Requirements
08	Engineerings - Pre-Design Investigations and Property Acquisitions

See Excel Workbook for Bid Items.

Estimate Breakdown	Labor Man Hr's	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Net Amount
01 TOTAL AMOUNT							
CP-01 Planning, Engineering and Property Acquisitions							
07 General Requirements						34,560	34,560
08 Engineerings - Pre-Design Investigations and Property Acquisition						113,112,609	113,112,609
CP-01 Planning, Engineering and Property Acquisitions						113,147,169	113,147,169
CP-02 Site prep and deep foundation systems							
01 Site Prep and Deep Foundation System	63,021	10,237,827	1,405,069	179,664,694	4,475,455		195,783,045
07 General Requirements	22,880	1,904,258	54,282	4,026,259	4,572,253		10,557,053
09 Sprung Structure	2,361	324,392	88,771	2,630,656	41,014		3,084,833
CP-02 Site prep and deep foundation systems	88,262	12,466,477	1,548,123	186,321,609	9,088,723		209,424,931
CP-03 Structure and MEP							
01 Site Prep and Deep Foundation System	4,577	734,527	1,174,403		147,635		2,056,565
02 Structure and UG Piping	189,564	28,744,178	19,025,198		1,257,158		49,026,534
03 Equipment	7,994	1,747,231	14,990,359		243,054		16,980,643
04 Mechanical	5,259	926,737	1,101,065	268,370	5,122		2,301,294
05 Electrical - Instrumentation and Controls	12,524	1,865,708	2,081,941	1,763,796	28,388		5,739,832
07 General Requirements	80,192	7,515,125	654,503	4,827,745	7,429,579		20,426,953
CP-03 Structure and MEP	300,109	41,533,506	39,027,468	6,859,911	9,110,936		96,531,821
CP-04 Site Improvements and OSBL Utilities							
01 Site Prep and Deep Foundation System	2,112	306,422	274,035	1,199,474	84,302		1,864,233
02 Structure and UG Piping	46,236	7,096,822	3,409,831	369,209	801,483		11,677,345
06 Site Improvements						130,322,940	130,322,940
07 General Requirements	67,210	10,070,909	1,821,396	4,073,034	323,760		16,289,098
CP-04 Site Improvements and OSBL Utilities	115,557	17,474,153	5,505,261	5,641,717	1,209,545	130,322,940	160,153,615
01 TOTAL AMOUNT	503,928	71,474,135	46,080,852	198,823,237	19,409,203	243,470,109	579,257,535

NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
RED HOOK-04 GOWANUS CANAL CSO TANK SITING AND SUPERFUND SUPPORT
CLASS 3-4 ESTIMATE <10% DESIGN

Estimator	FB-DS-DG-BW-BM
Bid date	5/11/2015
Job cost job number	**145692-**
Project	**C-Infrastructure**
BC Project Manager	**Donald Cohen**
BC Office	**Upper Saddle River**
Estimate Issue No.	**8**
QA/QC Reviewer	**Butch Matthews**
QA/QC Review Date	**12/23/2014**

Notes **PROCESS LOCATION/AREA INDEX**

Work Pkg	Description
CP-01	Planning, Engineering and Property Acquisitions
CP-02	Site prep and deep foundation systems
CP-03	Structure and MEP
CP-04	Site Improvements and OSBL Utilities

System	Description
01	Site Prep and Deep Foundation System
02	Structure and UG Piping
03	Equipment
04	Mechanical
05	Electrical - Instrumentation and Controls
06	Site Improvements
07	General Requirements
08	Engineerings - Pre-Design Investigations and Property Acquisitions

Project Number: 145692-
Estimate Issue Number: 8
Estimate Issue Date: 5/11/2015
Estimator: FB-DS-DG-BW-BM

RED HOOK-04 GOWANUS CANAL CSO TANK SITING AND SUPERFUND SUPPORT

Notes See Excel Workbook for Bid Items.

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
RH-04 Red Hook - 04							
CP-01 Planning, Engineering and Property Acquisitions							
07 General Requirements							
7.06 Construction Permits and Fees							
01999 HVAC Permit						1,733	1,733
01999 Pre-demolition Rat Permit						1,426	1,426
01999 Traffic Control Permit Additional Cost						31,401	31,401
7.06 Construction Permits and Fees						34,560	34,560
07 General Requirements						34,560	34,560
08 Engineerings - Pre-Design Investigations and Property Acquisition							
8.01 Planning & Permitting							
01999 Conn Edison Electric Service Connection Fee						6,280	6,280
01999 Gas Service Connectiion Fee						6,280	6,280
01999 Planning, Permitting & Environmental Assessments						805,117	805,117
01999 Potable Water Service Connection Fee						4,396	4,396
01999 Dispute Resolution Board Cost (Owner)						315,247	315,247
01999 Property Acquisition						35,420,121	35,420,121
8.01 Planning & Permitting						36,557,441	36,557,441
8.04 Engineering and Consultants							
01999 CM Fee						23,378,467	23,378,467
01999 Design Engineering Fees						46,756,933	46,756,933
01999 Geotech Fee						1,669,890	1,669,890
01999 Demolition Engineering Fees						727,941	727,941
01999 Ground Improvements Engineering Fees						1,149,692	1,149,692
01999 Surveying (Additional Required)						62,802	62,802
01999 Utility Research						542,606	542,606
01999 Sustainability Program Administration						31,401	31,401
01999 Public Hearings						125,603	125,603
01999 Construction Materials Testing						2,109,833	2,109,833
8.04 Engineering and Consultants						76,555,168	76,555,168
08 Engineerings - Pre-Design Investigations and Property Acquisition						113,112,609	113,112,609
CP-01 Planning, Engineering and Property Acquisitions						113,147,169	113,147,169
CP-02 Site prep and deep foundation systems							
01 Site Prep and Deep Foundation System							
1.01 Demo and Abatement							
02220 Building Gross Demolition	8,820.561	1,109,783	15,892		258,230		1,383,904
02228 Electrical Demolition - Lock Out/ Tag Out Services and disconnect	1,333.333	190,406	22,905				213,311
02999 Construction and Demolition Waste Buildings	308.375	37,511	297,474		49,307		384,292
02999 Nevins St Pump Station		9,288			9,408		18,696

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
13999	Hazardous Material Remediation and Abatement				360,648			360,648
1.01	**Demo and Abatement**	**10,462.270**	**1,346,988**	**336,271**	**360,648**	**316,945**		**2,360,852**
1.02	**Support of excavation**							
03330	Truck Washing Slab	95.539	16,522	10,592		101		27,216
31250	Shoring Systems			599,292	2,452,699			3,051,991
31250	Shoring Systems - Influent Channnel				8,297,903			8,297,903
31250	Shoring Systems - Effluent Channel				4,702,624			4,702,624
31250	Shoring Systems - CSO Relocation				1,797,639			1,797,639
31250	Shoring Systems C-B Trench				7,358,097			7,358,097
31260	Jet Grouting				42,497,037			42,497,037
31260	Jet Grouting for Influent Channel				5,354,560			5,354,560
31260	Jet Grouting for Effluent Channel				2,920,669			2,920,669
31260	Jet Grouting for the CSO Relocation				901,441			901,441
31315	Excavation 0-10 ft				1,427,884			1,427,884
31315	Excavation 10-59 feet				8,932,168			8,932,168
31315	Excavation Tie Back Spoils				55,751			55,751
31315	Excavation 0-10 ft - Influent Channel				288,371			288,371
31315	Excavation 10-59 feet - Influent Channel				814,650			814,650
31315	Excavation 0-10 ft - Effluent Channel				157,293			157,293
31315	Excavation 10-59 feet - Effluent Channel				408,963			408,963
31315	Excavation 0-10 ft - CSO Relocation				48,547			48,547
31315	Excavation 10-59 feet - CSO Relocation				118,941			118,941
31455	Tie Back Row 1				2,134,697			2,134,697
31455	Tie Back Row 2				2,134,697	1,282		2,135,978
31455	Tie Back Row 3				4,269,393	2,564		4,271,957
31455	Tie Back Row 4				2,898,693	1,741		2,900,434
31455	Tie Back Row 5				2,898,693	1,741		2,900,434
31999	Disposal of Excavated Soil				38,480,196			38,480,196
31999	Disposal of Excavated Soil - Tie Backs				212,384			212,384
31999	Disposal of Excavated Soil - Influent Channel				3,561,385			3,561,385
31999	Disposal of Excavated Soil - Effluent Channel				1,811,121			1,811,121
31999	Disposal of Excavated Soil - CSO Relocation				531,941			531,941
31999	Trucking of Excavated Soil - Tank	19,549.856	2,084,208			2,945,586		5,029,794
31999	Decontamination of Equipment	2,753.217	234,959			64,904		299,862
31999	Trucking of Excavated Soil - conduits	4,397.637	468,832			662,607		1,131,439
1.02	**Support of excavation**	**26,796.250**	**2,804,521**	**609,885**	**147,468,437**	**3,680,525**		**154,563,368**
1.03	**Dewatering and water treatment**							
31240	Dewatering Systems	25,762.490	6,086,318	804		477,984		6,565,107
46999	Dewatering Water Treatment			458,110				458,110

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
46999	Dewatering Treament Mobilization and Demobilization				524,311			524,311
	1.03 Dewatering and water treatment	**25,762.490**	**6,086,318**	**458,914**	**524,311**	**477,984**		**7,547,528**
	1.04 Ground Improvements (Soil Stabilization							
31260	Soil Stabilization				21,440,811			21,440,811
	1.04 Ground Improvements (Soil Stabilization				**21,440,811**			**21,440,811**
	1.05 Deep Foundations							
31315	Excavation Tie Downs Spoils				43,284			43,284
31455	Tie Downs for Tanks				9,662,311			9,662,311
31999	Disposal of Excavated Soil - Tie Downs				164,892			164,892
	1.05 Deep Foundations				**9,870,486**			**9,870,486**
	01 Site Prep and Deep Foundation System	**63,021.009**	**10,237,827**	**1,405,069**	**179,664,694**	**4,475,455**		**195,783,045**
07	**General Requirements**							
	7.01 Temporary Requirements (Toiletsm Utilitiesm Lighting, Water, etc.)							
01999	SWPPP Extra Cost				96,591			96,591
	7.01 Temporary Requirements (Toiletsm Utilitiesm Lighting, Water, etc.)				**96,591**			**96,591**
	7.02 Trailers and Storage (On and Off Site)							
01500	CSA Construction Facilities & Temp Utilities			54,282	66,328	21,017		141,627
01590	CSA Contractor's Equipment					4,551,236		4,551,236
	7.02 Trailers and Storage (On and Off Site)			**54,282**	**66,328**	**4,572,253**		**4,692,863**
	7.03 Fencing and Security							
01999	Full Time Registered Security Guards				3,380,678			3,380,678
	7.03 Fencing and Security				**3,380,678**			**3,380,678**
	7.04 Site Management - Super, General Foreman etc.							
01300	CSA Field Personnel & Project Management	22,880.000	1,904,258					1,904,258
01999	Dispute Resolution Board Cost (Contractor)				289,772			289,772
01999	Noise Control Monitoring				48,295			48,295
01999	Schedule Assembly & Maintenance Additional Cost				48,295			48,295
	7.04 Site Management - Super, General Foreman etc.	**22,880.000**	**1,904,258**		**386,363**			**2,290,621**
	7.06 Construction Permits and Fees							
01999	Crane & Derrick Permit				2,760			2,760
01999	Dumpster Permit				2,203			2,203
01999	Hoisting & Rigging Permit				1,780			1,780
01999	Warranty Deposit Financing				87,810			87,810
01999	Excavation Permit				1,747			1,747
	7.06 Construction Permits and Fees				**96,299**			**96,299**
	07 General Requirements	**22,880.000**	**1,904,258**	**54,282**	**4,026,259**	**4,572,253**		**10,557,053**
09	**Sprung Structure**							
	8.06 Sprung Structure Over Site							
44999	Air Supported Structure	2,360.553	324,392	88,771	2,630,656	41,014		3,084,833

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
	8.06 Sprung Structure Over Site	2,360.553	324,392	88,771	2,630,656	41,014		3,084,833
	09 Sprung Structure	2,360.553	324,392	88,771	2,630,656	41,014		3,084,833
	CP-02 Site prep and deep foundation systems	88,261.562	12,466,477	1,548,123	186,321,609	9,088,723		209,424,931
CP-03 Structure and MEP								
01 Site Prep and Deep Foundation System								
1.05 Deep Foundations								
31315 Backfill		4,577.064	734,527	1,174,403		147,635		2,056,565
	1.05 Deep Foundations	4,577.064	734,527	1,174,403		147,635		2,056,565
	01 Site Prep and Deep Foundation System	4,577.064	734,527	1,174,403		147,635		2,056,565
02 Structure and UG Piping								
2.01 Mat Slab (Screening)								
03330 Matt Slab		3,994.117	622,888	490,289		14,972		1,128,148
	2.01 Mat Slab (Screening)	3,994.117	622,888	490,289		14,972		1,128,148
2.01a Mat Slab (Storage Tank Basin 1)								
03330 Tank 1 Mat Slab		3,972.943	621,841	492,744		14,741		1,129,326
03330 Effluent Channel Tank 1 Section Matt Slab		865.052	135,736	108,046		3,187		246,969
	2.01a Mat Slab (Storage Tank Basin 1)	4,837.995	757,577	600,791		17,928		1,376,295
2.01b Mat Slab (Storage Tank Basin 2)								
03330 Effluent Channel Tank 2 Section Matt Slab		865.052	135,736	108,047		3,187		246,969
03330 Tank 2 Mat Slab		3,972.943	621,841	492,744		14,741		1,129,326
	2.01b Mat Slab (Storage Tank Basin 2)	4,837.995	757,577	600,791		17,928		1,376,295
2.01c Mat Slab (Storage Tank Basin 3)								
03330 Effluent Channel Tank 3 Section Matt Slab		865.052	135,736	108,047		3,187		246,969
03330 Tank 3 Mat Slab		3,972.943	621,841	492,744		14,741		1,129,326
	2.01c Mat Slab (Storage Tank Basin 3)	4,837.995	757,577	600,791		17,928		1,376,295
2.01d Mat Slab (Storage Tank Basin 4)								
03330 Tank 4 Mat Slab		3,972.943	621,841	492,744		14,741		1,129,326
03330 Effluent Channel Tank 4 Section Matt Slab		865.052	135,736	108,047		3,187		246,969
	2.01d Mat Slab (Storage Tank Basin 4)	4,837.995	757,577	600,791		17,928		1,376,295
2.01e Mat Slab (Storage Tank Basin 5)								
03330 Tank 5 Mat Slab		3,972.943	621,841	492,744		14,741		1,129,326
03330 Effluent Channel Tank 5 Section Matt Slab		865.052	135,736	108,047		3,187		246,969
	2.01e Mat Slab (Storage Tank Basin 5)	4,837.995	757,576	600,791		17,928		1,376,295
2.01f Mat Slab (Storage Tank Basin 6)								
03330 Efflunet Channel Flush Section Matt Slab		437.283	68,614	54,617		1,611		124,843
03330 Tank 6 Mat Slab		3,972.943	621,841	492,744		14,741		1,129,326
03330 Effluent Channel Tank 6 Section Matt Slab		865.052	135,736	108,047		3,187		246,969
	2.01f Mat Slab (Storage Tank Basin 6)	5,275.278	826,191	655,408		19,539		1,501,138
2.02 Walls - Tank Walls, Baffles, Channels, etc. (Screening)								

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03345	Concrete Walls	10,796.839	1,627,248	598,680		52,066		2,277,994
2.02	**Walls - Tank Walls, Baffles, Channels, etc. (Screening)**	**10,796.839**	**1,627,248**	**598,680**		**52,066**		**2,277,994**
2.02a	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 1)**							
03345	Tank 1 Concrete Walls North, West, and East Walls	8,783.345	1,321,850	452,662		41,146		1,815,658
03345	Tank 1 Dividing Wall	191.028	28,722	5,063		724		34,509
03345	Tank 1 Flushing Wall	325.248	49,008	16,155		1,575		66,738
03345	Effluent Channel Tank 1 Concrete Wall West, North	3,953.043	597,969	263,075		20,704		881,747
2.02a	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 1)**	**13,252.664**	**1,997,549**	**736,954**		**64,149**		**2,798,652**
2.02b	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 2)**							
03345	Tank 2 Concrete Walls North, West, and East Walls	8,662.529	1,300,431	431,561		38,716		1,770,708
03345	Effluent Channel Tank 2 Concrete Wall West	2,859.654	433,821	212,227		15,745		661,792
03345	Tank 2 Dividing Wall	191.028	28,722	5,063		725		34,509
03345	Tank 2 Flushing Wall	325.248	49,008	16,155		1,575		66,738
05999	Tank 2 Weir with Baffle			24,734				24,734
2.02b	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 2)**	**12,038.460**	**1,811,982**	**689,739**		**56,760**		**2,558,481**
2.02c	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 3)**							
03345	Tank 3 Dividing Wall	191.028	28,722	5,063		725		34,509
03345	Tank 3 Flushing Wall	325.248	49,008	16,155		1,575		66,738
03345	Tank 3 Concrete Walls North, West, and East Walls	8,662.529	1,300,431	431,560		38,716		1,770,708
03345	Effluent Channel Tank 3 Concrete Wall West	2,859.654	433,821	212,227		15,745		661,792
05999	Tank 3 Weir with Baffle			24,734				24,734
2.02c	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 3)**	**12,038.460**	**1,811,982**	**689,738**		**56,760**		**2,558,481**
2.02d	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 4)**							
03345	Effluent Channel Tank 4 Concrete Wall West	2,859.654	433,821	212,227		15,745		661,792
03345	Tank 4 Concrete Walls North, West, and East Walls	8,662.529	1,300,431	431,561		38,716		1,770,708
03345	Tank 4 Dividing Wall	191.028	28,722	5,063		725		34,509
03345	Tank 4 Flushing Wall	325.248	49,008	16,155		1,576		66,738
05999	Tank 4 Weir with Baffle			34,009				34,009
2.02d	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 4)**	**12,038.460**	**1,811,982**	**699,014**		**56,760**		**2,567,756**
2.02e	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 5)**							
03345	Tank 5 Concrete Walls North, West, and East Walls	8,662.529	1,300,431	431,561		38,716		1,770,708
03345	Tank 5 Dividing Wall	191.028	28,722	5,063		724		34,509
03345	Tank 5 Flushing Wall	325.248	49,008	16,155		1,575		66,738
03345	Effluent Channel Tank 5 Concrete Wall West	2,859.654	433,821	212,227		15,745		661,792
05999	Tank 5 Weir with Baffle			34,009				34,009
2.02e	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 5)**	**12,038.460**	**1,811,982**	**699,014**		**56,760**		**2,567,756**
2.02f	**Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 6)**							
03345	Tank End Wall South	7,903.052	1,198,923	586,517		43,512		1,828,953
03345	Effluent Channel Flush Concrete Walls West, East, South	3,928.101	595,908	291,520		21,627		909,055

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03345 Effluent Channel Flushing Wall	223.359	33,655	11,094		1,082		45,831
03345 Tank 6 Concrete Walls North, West, and East Walls	8,662.529	1,300,431	431,561		38,716		1,770,708
03345 Tank 6 Dividing Wall	191.028	28,722	5,063		725		34,509
03345 Tank 6 Flushing Wall	325.248	49,008	16,155		1,575		66,738
05999 Tank 6 Weir with Baffle			34,009				34,009
2.02f Walls - Tank Walls, Baffles, Channels, etc. (Storage Tank Basin 6)	**21,233.317**	**3,206,648**	**1,375,919**		**107,237**		**4,689,804**
2.03 Tank Top (Screening)							
03350 Elevated Slabs	3,142.218	448,368	192,704		14,869		655,942
2.03 Tank Top (Screening)	**3,142.218**	**448,368**	**192,704**		**14,869**		**655,942**
2.03a Tank Top (Storage Tank Basin 1)							
03352 Tank 1 Elevated Slab	2,191.748	308,230	145,587		11,266		465,083
03352 Effluent Channel tank 1 Section Elevated Slab	539.930	77,363	34,878		3,285		115,526
2.03a Tank Top (Storage Tank Basin 1)	**2,731.678**	**385,592**	**180,466**		**14,551**		**580,609**
2.03b Tank Top (Storage Tank Basin 2)							
03352 Tank 2 Elevated Slab	2,454.318	351,139	164,171		12,212		527,522
03352 Effluent Channel tank 2 Section Elevated Slab	539.930	77,363	34,878		3,285		115,526
2.03b Tank Top (Storage Tank Basin 2)	**2,994.248**	**428,502**	**199,049**		**15,497**		**643,048**
2.03c Tank Top (Storage Tank Basin 3)							
03352 Tank 3 Elevated Slab	2,454.318	351,139	164,171		12,212		527,522
03352 Effluent Channel tank 3 Section Elevated Slab	539.930	77,363	34,878		3,285		115,526
2.03c Tank Top (Storage Tank Basin 3)	**2,994.248**	**428,502**	**199,049**		**15,497**		**643,048**
2.03d Tank Top (Storage Tank Basin 4)							
03352 Tank 4 Elevated Slab	2,454.318	351,139	164,171		12,212		527,522
03352 Effluent Channel tank 4 Section Elevated Slab	539.930	77,363	34,878		3,285		115,526
2.03d Tank Top (Storage Tank Basin 4)	**2,994.248**	**428,502**	**199,049**		**15,497**		**643,048**
2.03e Tank Top (Storage Tank Basin 5)							
03352 Tank 5 Elevated Slab	2,454.318	351,139	164,171		12,212		527,522
03352 Effluent Channel tank 5 Section Elevated Slab	539.930	77,363	34,878		3,285		115,526
2.03e Tank Top (Storage Tank Basin 5)	**2,994.248**	**428,502**	**199,049**		**15,497**		**643,048**
2.03f Tank Top (Storage Tank Basin 6)							
03352 Effluent Channel Flush Section Elevated Slab	289.938	41,687	19,525		1,921		63,134
03352 Tank 6 Elevated Slab	2,454.318	351,139	164,171		12,212		527,522
03352 Effluent Channel tank 6 Section Elevated Slab	539.930	77,363	34,878		3,285		115,526
2.03f Tank Top (Storage Tank Basin 6)	**3,284.186**	**470,190**	**218,574**		**17,418**		**706,182**
2.05 Building							
03320 Building Mat Slab	3,015.984	446,529	270,209		99,268		816,006
03330 Slabs Fuel Storage Tank	26.584	3,871	1,982		55		5,908
03355 Slab over Metal Decking Second Floor	2,832.504	394,943	330,390		21,155		746,488
03355 Slab over Metal Decking Roof	2,130.215	294,934	210,142		12,253		517,329

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
03450 Architectural Precast Panels	4,482.325	724,898	2,795,849		123,941		3,644,688
04250 Interior Masonry First Floor	872.834	127,342	35,037		1,185		163,565
04250 Interior Masonry Second Floor	5,138.282	741,838	207,275		6,379		955,493
05120 Structural Steel - Conceptual First Floor 25 lb/sf	4,150.000	691,450	1,267,814		143,151		2,102,414
05120 Structural Steel - Conceptual Second Floor 15 lb/sf	2,490.000	414,870	760,688		85,890		1,261,449
05122 Elevated Aluminum Platform 8'H	3,168.990	482,097	243,714		26,342		752,153
05200 Steel Joists, Joist Girders and Trusses	28.651	4,366	6,851		922		12,139
05300 Metal Decking	84.437	10,289	9,557		858		20,704
05517 Metal Stairs	208.611	31,554	71,074		1,349		103,977
07220 Roof Insulation	438.946	58,821	136,595				195,416
07500 Roofing - Membrane	838.444	112,537	112,327		4,859		229,723
08100 Metal Doors First Floor	11.855	1,735	8,597				10,332
08100 Metal Doors Second Floor	38.084	5,573	23,446				29,020
08115 Metal Door Frames First Floor	17.872	2,638	4,098		45		6,781
08115 Metal Door Frames Second Floor	45.678	6,739	10,047		109		16,895
08700 Finish Hardware - Opening Allowance First Floor	3.436	503	1,179				1,682
08700 Finish Hardware - Opening Allowance Second floor	10.353	1,515	2,791				4,306
08999 Over head Doors First Floor	81.039	12,414	12,055				24,470
08999 Access Hatches	1,084.015	140,261	442,218				582,480
09510 Acoustic Ceilings Second Floor	79.900	11,693	11,172				22,865
09900 Painting CMU Walls Second Floor	123.296	14,921	3,843				18,764
10800 Toilet Partitions & Bathroom Accessories	12.511	1,831	4,372				6,203
22405 Commercial Plumbing, Conceptual	54.800	10,161	11,683				21,844
2.05 Building	**31,469.647**	**4,750,323**	**6,995,008**		**527,762**		**12,273,093**
2.06 ISBL Piping and Mechanical (Including HVAC, Plumbing, Fire Protection)							
11999 Screening Equipment		39,976	39,251				79,227
11999 Effluent Channel Gates		3,998	3,925				7,923
11999 Tank 1 Gates		11,993	11,775				23,768
11999 Tank 2 Gates		11,993	11,775				23,768
11999 Tank 3 Gates		11,993	11,775				23,768
11999 Tank 4 Gates		11,993	11,775				23,768
11999 Tank 5 Gates		11,993	11,775				23,768
11999 Tank 6 Gates		11,993	11,775				23,768
2.06 ISBL Piping and Mechanical (Including HVAC, Plumbing, Fire Protection)		**115,930**	**113,827**				**229,757**
2.07 OSBL - Influent Line /Conduit							
03330 Influent Matt Slab Screen North	4,678.278	740,740	599,276		16,789		1,356,806
03345 Influient Concrete Walls Screens North	4,108.510	616,804	191,067		18,634		826,504
03350 Influent Elevated Slab Screens North	1,276.026	185,889	99,372		10,502		295,763
2.07 OSBL - Influent Line /Conduit	**10,062.814**	**1,543,433**	**889,715**		**45,925**		**2,479,073**

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
	02 Structure and UG Piping	189,563.565	28,744,178	19,025,198		1,257,158		49,026,534
03 Equipment								
3.01 Screens with dumpsters								
11999	Screening Equipment	1,966.667	321,457	6,490,515		72,839		6,884,810
	3.01 Screens with dumpsters	1,966.667	321,457	6,490,515		72,839		6,884,810
3.02 Submersible pumps								
11999	Submersible Pumps	550.000	101,021	588,762		7,527		697,311
11999	Tipping Bucket. Equipment	166.667	30,019	147,603		2,182		179,804
11999	Nevins St. PS	138.889	25,510	139,403		1,819		166,732
	3.02 Submersible pumps	855.556	156,550	875,768		11,528		1,043,847
3.03 Generator								
01600	EMGEN Hoisting & Craneage Requirements	41.558	8,956			15,614		24,570
23999	Fuel Storage Tank	25.284	4,127	46,672				50,799
26321	Emergency Generator Set 1250kw & ATS	253.086	40,289	715,516		1,612		757,418
	3.03 Generator	319.929	53,372	762,188		17,226		832,787
3.04 Odor Control								
11999	Odor Control	966.667	561,320	1,814,958		89,396		2,465,674
	3.04 Odor Control	966.667	561,320	1,814,958		89,396		2,465,674
3.07 Sluice Gates								
11999	Effluent Channel Gates	83.333	14,619	59,661		1,045		75,324
11999	Tank 1 Gates	444.444	78,227	598,182		5,635		682,044
11999	Tank 2 Gates	444.444	78,227	598,182		5,635		682,044
11999	Tank 3 Gates	444.444	78,227	598,182		5,635		682,044
11999	Tank 4 Gates	444.444	78,227	598,182		5,635		682,044
11999	Tank 5 Gates	444.444	78,227	598,182		5,635		682,044
11999	Tank 6 Gates	444.444	78,227	598,182		5,635		682,044
	3.07 Sluice Gates	2,750.000	483,978	3,648,756		34,853		4,167,587
3.08 Bridge Cranes								
11999	Bridge crane and hoists	631.585	98,329	410,343		10,576		519,248
	3.08 Bridge Cranes	631.585	98,329	410,343		10,576		519,248
3.09 Grit Handling								
03333	Equipment Pads Grit System	58.666	7,922	3,811		630		12,362
11999	Grit Handling Equipment	444.444	64,304	984,020		6,005		1,054,329
	3.09 Grit Handling	503.110	72,226	987,830		6,635		1,066,691
	03 Equipment	7,993.513	1,747,231	14,990,359		243,054		16,980,643
04 Mechanical								
4.01 Process Piping								
09912	Pipe Coatings	1,079.323	130,618	358,683				489,301
11999	Screening Equipment		3,998	3,925				7,923

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
1	1999 Tank 1 Gates		3,998	3,925				7,923
1	1999 Tank 2 Gates		3,998	3,925				7,923
1	1999 Tank 3 Gates		3,998	3,925				7,923
1	1999 Tank 4 Gates		3,998	3,925				7,923
1	1999 Tank 5 Gates		3,998	3,925				7,923
1	1999 Tank 6 Gates		3,998	3,925				7,923
2	2999 Mechanical Piping	1,412.371	374,946	286,450				661,396
	4.01 Process Piping	**2,491.694**	**533,547**	**672,609**				**1,206,156**
4.03 Fire Protection								
2	2999 Mechanical Piping				268,370			268,370
	4.03 Fire Protection				**268,370**			**268,370**
4.04 HVAC								
2	2999 Mechanical Piping	2,436.822	336,842	35,947				372,789
2	3999 HVAC Equipment	330.247	56,348	392,508		5,122		453,978
	4.04 HVAC	**2,767.069**	**393,190**	**428,456**		**5,122**		**826,768**
	04 Mechanical	**5,258.763**	**926,737**	**1,101,065**	**268,370**	**5,122**		**2,301,294**
05 Electrical - Instrumentation and Controls								
5.01 Primary and Secondary Gear								
0	1600 Primary and Secondary Switch Gear Hoisting & Craneage Requirements	51.948	12,328			16,793		29,122
0	3330 UT-1 and UT-2 Transformer Pad 10'x15'x8"t w/turndown edges	60.597	8,530	6,121		483		15,134
2	6221 UT-1 and UT-2 Transformer (Primary Service)	205.761	34,311	226,245		2,379		262,935
2	6221 LV Transformers 480v to 120/208V 45kva	55.556	8,195	4,416				12,611
2	6241 MSB-1 Switchboard 1600 amps 480V 3p4w NEMA 1	257.001	37,910	131,385				169,295
2	6244 480V 3p3w Power Panelboards 225A 42 ckt	18.519	2,732	2,820				5,552
2	6244 120/208v Light Branch Panelboards 100A 42 ckts	65.359	9,641	4,184				13,825
	5.01 Primary and Secondary Gear	**714.741**	**113,648**	**375,171**		**19,654**		**508,473**
5.02 Primary and Secondary Feeders (Conduit and Wire)								
2	6040 EMGEN - Conduit, Wire and Terminations (4) Sets (4) #600w/#4/0G 4" RGS	383.466	56,565	31,840				88,404
2	6040 UT-1 & UT-2 PB to MSB-1 C&W (2) Sets (4) 4"RGS w/ (4) 600mcm each	690.921	101,917	84,488				186,405
2	6040 MSB-1 to MCC-1 (3) #500mcm #3g 3" RGS	45.620	6,729	4,265				10,995
2	6040 MSB-1 to PP-1 and PP-2 Conduit, Wire and Terms 4#4/0 #4G - 2.5" RGS	105.185	15,516	9,381				24,896
2	6040 MSB-1 to T-1 and T-2 Conduit, Wire and Terms 3#6 #8g 1" RGS	35.482	5,234	1,861				7,095
2	6040 T-1 & T-2 to LP-1 and LP-2 Conduit, Wire and Terms 4#1/0 #6g 2" RGS	33.387	4,925	2,268				7,193
2	6041 Grounding System	860.603	126,947	102,237				229,183
2	6999 UT-1 and UT-2 to MSB-1 Terminations	124.074	18,302	19,279				37,581
3	2740 Primary Electrical Service - Asphaltic Paving, Curbs & Sidewalks	7.197	1,027	1,934		201		3,162
3	3500 UT-1 & UT-2 to MSB-1 Trench 1'6"x 4'd x 50'L Cncrt Encase	27.713	3,638	1,119	254	346		5,357
3	3500 Trench for Primary Electrical Service 2'w x 5'd x 100'l concrete enc.	87.003	10,462	2,180	8,608	332		21,582
3	3580 UT-1 and UT-2 to MSB-1 (4) runs (4) #600mcm in 4" RGS each (50' Dist)	445.424	66,525	78,417		493		145,434

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
33580 Primary Electrical, Feeders & Ductbanks (2) 5" empty	43.165	6,778	3,066		247		10,090
5.02 Primary and Secondary Feeders (Conduit and Wire)	**2,889.242**	**424,564**	**342,335**	**8,862**	**1,618**		**777,378**
5.03 Motor Branch Feeders and Controls							
26040 MSB-1 to HPS 1,3,5,7 Conduit and Wire 4#10's in 1" RGS	194.459	28,684	11,992				40,677
26040 HPS to 5hp motors Conduit &Terms (Vendor Supplied Cable) 3/4" RGS	95.789	14,130	6,577				20,707
26040 MSB-1 to HPS 2,4,6 Conduit and Wire 4#10's in 1" RGS	145.844	21,513	8,994				30,507
26040 HPS-2,4,6 to 5hp motors Conduit &Terms (Vendor Supp Cable) 3/4" RGS	71.842	10,597	4,933				15,530
26040 MSB-1 to Dewatering Pump 1&3 3#1 #6G 1.5" RGS	329.029	50,444	65,482		1,147		117,073
26040 Misc. Motors-Devices not listed (20) 30 AMP CKT ALLOWANCE	605.406	89,303	85,610				174,913
26040 MSB-1 to Purge Supply and Exhaust Fans 3#350mcm #3g in 3"RGS	567.128	86,202	138,548		1,529		226,279
26040 MSB-1 to Odor Treatment Fan #1 & #2 - (1) 3#4/0 #4G 2.5" RGS	474.849	72,183	100,267		1,284		173,734
26040 MSB-1 to Dewatering Pump 2,4&5 (3) 3#1 #6G 1.5" RGS	490.737	75,252	98,053		1,720		175,024
26040 MCC-1 to IS#1 Conduit, Wire and Terms (4) #10 .75" RGS	59.499	8,777	5,871				14,647
26040 MCC-1 to IS#2 Conduit, Wire and Terms (4) #10 .75" RGS	56.451	8,327	5,684				14,011
26040 MCC-1 to IS#3 Conduit, Wire and Terms (4) #10 .75" RGS	53.403	7,877	5,497				13,374
26040 MCC-1 to IS#4 Conduit, Wire and Terms (4) #10 .75" RGS	50.356	7,428	5,310				12,738
26040 MCC-1 to IS#5 Conduit, Wire and Terms (4) #10 .75" RGS	47.308	6,978	5,123				12,102
26040 MCC-1 to IS#6 Conduit, Wire and Terms (4) #10 .75" RGS	44.260	6,529	4,937				11,465
26040 MCC-1 to Conveyor Conduit, Wire and Terms (4) #10 .75" RGS	40.197	5,929	4,688				10,617
26040 MCC-1 to Grit Cyclones#1 Conduit, Wire and Terms (4) #10 .75" RGS	40.197	5,929	4,688				10,617
26040 MCC-1 to Grit Cyclones#2 Conduit, Wire and Terms (4) #10 .75" RGS	40.197	5,929	4,688				10,617
26245 MCC-1 400A 480V 3p4w Motor Control Center	169.059	24,938	61,706				86,644
26999 Install (HPS) Control Panels HPS 1,2,3,4,5,6,7	77.778	11,473	550				12,022
5.03 Motor Branch Feeders and Controls	**3,653.786**	**548,423**	**629,197**		**5,681**		**1,183,301**
5.04 Light Branch & Controls							
26040 Grnd Flr Lighting Conduit & Wire (20' of 3/4" RGS w/ 3.5#12/lf)	787.201	116,119	39,992				156,111
26040 2nd Flr Lighting Conduit & Wire (20' of 3/4" RGS w/ 3.5#12/lf)	993.555	146,558	50,475				197,033
26040 Grnd Flr Power Branch Conduit, Wire and Terminations	213.996	31,566	10,871				42,438
26040 2nd Flr Power Branch Conduit, Wire and Terminations	343.923	50,732	17,472				68,204
26040 Building Exterior Lighting - Conduit, Wire and Terminations 4#12 .75"	237.893	35,091	13,212				48,304
26040 Screening & By-Pass Lighting Conduit, Wire & Lights	110.697	16,329	14,489				30,818
26040 Tank #1 Lighting Conduit, Wire & Lights	78.639	11,600	8,679				20,279
26040 Tank #2 Lighting Conduit, Wire & Lights	98.048	14,463	9,874				24,337
26040 Tank #3 Lighting Conduit, Wire & Lights	115.516	17,040	10,950				27,990
26040 Tank #4 Lighting Conduit, Wire & Lights	131.044	19,330	11,906				31,236
26040 Tank #5 Lighting Conduit, Wire & Lights	148.512	21,907	12,982				34,889
26040 Tank #6 Lighting Conduit, Wire & Lights	156.275	23,052	13,460				36,512
26092 Ground Flr - Lighting Control Devices	10.256	1,513	1,413				2,926
26092 2nd Flr Lighting Control Devices	25.641	3,782	3,533				7,315

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
26272 Ground Floor Switches and Recetacles	81.012	11,950	12,284				24,234
26272 Second Floor Switches and Receptacles	75.509	11,138	5,116				16,254
26511 Light Fixtures Ground Floor (High Bay)	674.764	99,534	233,799				333,333
26511 Light Fixtures Second Floor	626.039	92,346	215,985				308,331
26521 Emergency Lighting Ground Floor	25.000	3,688	1,994				5,682
26521 Emergency Lighting Second Floor	47.222	6,966	3,767				10,733
26531 Exit Lights Ground Floor	12.500	1,844	1,060				2,904
26531 Exit Lights Second Floor	11.111	1,639	942				2,581
26582 Site Electrical, Lighting	164.815	25,381	34,445		642		60,468
33507 Site Lighting (4) Pole Lights Trench for Utilities	4.282	830	66		217		1,113
33580 Site Lighting UG Electric Conduit and Wire	92.996	14,675	6,470		575		21,720
5.04 Light Branch & Controls	**5,266.447**	**779,074**	**735,237**		**1,434**		**1,515,746**
5.05 Special Systems (Life Safety - Fire Alarm - PA - Tele/Data - Security)							
27199 Ground Floor - Tele/Data - ALLOWANCE				78,836			78,836
27199 2nd Floor - Tele/Data - ALLOWANCE				105,062			105,062
28161 Ground Floor Fire/Life Safety System - ALLOWANCE				131,393			131,393
28161 2nd Floor Fire/Life Safety System - ALLOWANCE				131,327			131,327
28161 Ground Floor - Security System ALLOWANCE				131,393			131,393
28161 2nd Floor - Security System ALLOWANCE				131,327			131,327
5.05 Special Systems (Life Safety - Fire Alarm - PA - Tele/Data - Security)				**709,337**			**709,337**
5.06 Instruments and Control Panels.							
27201 Instrumentation				1,045,597			1,045,597
5.06 Instruments and Control Panels.				**1,045,597**			**1,045,597**
05 Electrical - Instrumentation and Controls	**12,524.215**	**1,865,708**	**2,081,941**	**1,763,796**	**28,388**		**5,739,832**
07 General Requirements							
7.01 Temporary Requirements (Toiletsm Utilitiesm Lighting, Water, etc.)							
01999 Mechanical General Conditions			435,816		127,878		563,694
01999 SWPPP Extra Cost				99,732			99,732
7.01 Temporary Requirements (Toiletsm Utilitiesm Lighting, Water, etc.)			**435,816**	**99,732**	**127,878**		**663,426**
7.02 Trailers and Storage (On and Off Site)							
01500 CSA Construction Facilities & Temp Utilities			75,378	68,485	30,865		174,728
01590 CSA Contractor's Equipment					6,683,815		6,683,815
01700 CSA Scaffolding	102.272	14,967					14,967
01999 Mechanical General Conditions			58,616				58,616
7.02 Trailers and Storage (On and Off Site)	**102.272**	**14,967**	**133,994**	**68,485**	**6,714,680**		**6,932,125**
7.03 Fencing and Security							
01999 Mechanical General Conditions	48.473	7,094	1,983				9,076
01999 Full Time Registered Security Guards				3,490,634			3,490,634
7.03 Fencing and Security	**48.473**	**7,094**	**1,983**	**3,490,634**			**3,499,711**
7.04 Site Management - Super, General Foreman etc.							

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
01300	E&I Field Personnel & Project Management	30,752.000	2,604,165					2,604,165
01300	CSA Field Personnel & Project Management	32,640.000	2,806,061					2,806,061
01500	E&I Construction Facilities & Temp Utilities	95.584	14,100	82,711	621,743			718,554
01590	E&I Contractor's Equipment					539,131		539,131
01700	E&I Scaffolding	52.164	7,634					7,634
01999	Mechanical General Conditions	16,501.818	2,061,105		48,571	47,891		2,157,567
01999	Dispute Resolution Board Cost (Contractor)				299,197			299,197
01999	Noise Control Monitoring				49,866			49,866
01999	Schedule Assembly & Maintenance Additional Cost				49,866			49,866
7.04	**Site Management - Super, General Foreman etc.**	**80,041.567**	**7,493,064**	**82,711**	**1,069,244**	**587,022**		**9,232,041**
7.06	**Construction Permits and Fees**							
01999	Excavation Permit				1,804			1,804
01999	Manhole Permit				219			219
01999	Crane & Derrick Permit				2,850			2,850
01999	Dumpster Permit				2,275			2,275
01999	Hoisting & Rigging Permit				1,838			1,838
01999	Warranty Deposit Financing				90,666			90,666
7.06	**Construction Permits and Fees**				**99,650**			**99,650**
07	**General Requirements**	**80,192.312**	**7,515,125**	**654,503**	**4,827,745**	**7,429,579**		**20,426,953**
CP-03	**Structure and MEP**	**300,109.433**	**41,533,506**	**39,027,468**	**6,859,911**	**9,110,936**		**96,531,821**
CP-04	**Site Improvements and OSBL Utilities**							
01	**Site Prep and Deep Foundation System**							
1.01	**Demo and Abatement**							
02221	Site Demolition 54" CSO	452.960	69,007	5,862		18,997		93,867
02221	Site Demolition CSO Relocation	254.908	38,015	4,330		6,482		48,828
02999	Construction and Demolition Waste Site	169.538	21,302	168,150		27,990		217,441
31315	Excavation RH-037				38,617			38,617
33500	6" city water				16,954			16,954
33500	Nevins St PS				36,548			36,548
33500	54" CSO Conveyance	73.457	7,631			6,326		13,958
33507	2" Natural Gas				942			942
1.01	**Demo and Abatement**	**950.863**	**135,956**	**178,342**	**93,060**	**59,795**		**467,153**
1.02	**Support of excavation**							
31250	Shoring RH-037				127,805			127,805
31260	Jet Grouting for the CSO Conveyance				959,151			959,151
31315	Excavation RH-037	505.700	62,839	7,664		4,897		75,400
31315	Excavation and Backfill Fuel Storage Tank	82.661	12,232	6,971		7,579		26,783
33500	Trench for 18" Gravity Dewatering Drain	258.774	37,868	73,882		6,245		117,994
1.02	**Support of excavation**	**847.135**	**112,939**	**88,518**	**1,086,956**	**18,720**		**1,307,133**
1.03	**Dewatering and water treatment**							

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
31240 Dewatering 54" CSO	147.833	28,198	198		1,570		29,965
31240 Dewatering RH-037	99.222	18,904	198		1,570		20,672
33500 16" Dewatering FM	66.942	10,425	6,779	19,458	2,646		39,309
1.03 Dewatering and water treatment	**313.998**	**57,527**	**7,175**	**19,458**	**5,787**		**89,947**
01 Site Prep and Deep Foundation System	**2,111.995**	**306,422**	**274,035**	**1,199,474**	**84,302**		**1,864,233**
02 Structure and UG Piping							
2.07 OSBL - Influent Line /Conduit							
02999 Existing Utilities, Influent Conduit	46.667	67,108	135,415	11,592	62,125		276,241
03330 Influent Channel Matt Slab	2,721.652	408,925	393,733		7,092		809,749
03345 Concrete Walls Gowanus PS Tie-in	448.545	65,466	34,918		1,372		101,757
03345 Influent Channel Concrete Walls	9,968.995	1,502,106	495,150		48,290		2,045,545
03350 Influent Channel Elevated Slab	4,793.515	701,411	397,708		21,894		1,121,013
03999 Influent Conduit Tie-in Gowanus PS	3,431.995	477,165	58,724	274,319	61,329		871,537
33500 Nevins St PS	2,918.129	358,499	51,640	238	24,882		435,260
33500 Influent Conduit Paving	1,853.530	227,129	37,743		4,284		269,156
2.07 OSBL - Influent Line /Conduit	**26,183.026**	**3,807,810**	**1,605,031**	**286,149**	**231,267**		**5,930,258**
2.08 OSBL - Out Flow Line / Conduit							
02999 Existing Utilities, Effluent Conduit	46.667	59,613	117,752	11,592	54,535		243,493
03330 Effluent Channel Matt Slab	2,120.119	320,790	301,491		9,998		632,278
03345 Effluent Channel Concrete Walls	7,534.749	1,135,319	374,243		36,498		1,546,061
03350 Effluent Channel Elevated Slabs	2,781.144	406,951	230,746		12,703		650,399
33500 Outfall Conduit Paving	544.439	75,559	37,742		4,285		117,586
2.08 OSBL - Out Flow Line / Conduit	**13,027.117**	**1,998,232**	**1,061,975**	**11,592**	**118,018**		**3,189,818**
2.11 Relocation of Existing UG Utilities							
02999 Existing Utilities, 54" CSO	46.667	209,202	307,726	56,512	205,996		779,437
02999 Existing Utilities, CSO Relocation	46.667	24,634	35,326	11,592	19,119		90,671
33500 6" city water	944.471	120,806	26,580	3,136	9,141		159,664
33507 2" Natural Gas	40.665	7,737	3,007		330		11,074
33635 Manholes & Catch Basins 18" Gravity Dewatering Drain	54.584	8,574	7,378		1,173		17,125
2.11 Relocation of Existing UG Utilities	**1,133.053**	**370,955**	**380,017**	**71,241**	**235,759**		**1,057,972**
2.12 Relocation of Existing Storm/CSO Outfall							
03330 Slab RH-037	25.820	3,803	2,324		38		6,165
03330 CSO Matt Slab Road to Tank	435.238	65,854	61,900		2,053		129,807
03345 Wall RH-037	196.286	27,868	5,371		47		33,287
03345 CSO Concrete Walls Raod to Tank	1,567.455	236,181	77,854		7,593		321,627
03350 Elevated Slabs RH-037	155.828	22,459	7,908		828		31,195
03350 CSO Elevated Slabs Road to Tank	826.434	119,354	64,222		3,442		187,019
33500 CSO Relocation		735	2,167		2,978		5,880
33500 54" CSO Conveyance	2,685.451	443,571	141,061	227	199,459		784,318

Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
2.12 Relocation of Existing Storm/CSO Outfall	5,892.511	919,824	362,808	227	216,438		1,499,298
02 Structure and UG Piping	46,235.708	7,096,822	3,409,831	369,209	801,483		11,677,345
06 Site Improvements							
6.01 New Community Swimming Pools							
32945 Park and Pool Struture						86,881,960	86,881,960
6.01 New Community Swimming Pools						86,881,960	86,881,960
6.03 New Community Park Landscaping							
32999 Temporary Park Facilities						43,440,980	43,440,980
6.03 New Community Park Landscaping						43,440,980	43,440,980
06 Site Improvements						130,322,940	130,322,940
07 General Requirements							
7.01 Temporary Requirements (Toiletsm Utilitiesm Lighting, Water, etc.)							
01999 SWPPP Extra Cost				93,572			93,572
01999 Mechanical General Conditions			1,755,552		281,649		2,037,201
7.01 Temporary Requirements (Toiletsm Utilitiesm Lighting, Water, etc.)			1,755,552	93,572	281,649		2,130,773
7.02 Trailers and Storage (On and Off Site)							
01999 Mechanical General Conditions			63,861				63,861
7.02 Trailers and Storage (On and Off Site)			63,861				63,861
7.03 Fencing and Security							
01999 Full Time Registered Security Guards				3,275,034			3,275,034
01999 Mechanical General Conditions	48.473	7,094	1,983				9,076
7.03 Fencing and Security	48.473	7,094	1,983	3,275,034			3,284,111
7.04 Site Management - Super, General Foreman etc.							
01999 Close Out Documents Additional Cost				109,370			109,370
01999 Pre-Construction Conference Additional Deliverables				72,914			72,914
01999 Dispute Resolution Board Cost (Contractor)				280,717			280,717
01999 Noise Control Monitoring				46,786			46,786
01999 Schedule Assembly & Maintenance Additional Cost				46,786			46,786
01999 Mechanical General Conditions	67,161.039	10,063,815		45,571	42,111		10,151,497
7.04 Site Management - Super, General Foreman etc.	67,161.039	10,063,815		602,145	42,111		10,708,070
7.06 Construction Permits and Fees							
01999 Driveway Permit				1,724			1,724
01999 Fuel Oil Tank Permit				1,724			1,724
01999 Scaffolding Permit				1,724			1,724
01999 Sidewalk Permit				1,724			1,724
01999 Fire Protection Sprinkler System Permit				2,096			2,096
01999 Excavation Permit				1,692			1,692
01999 Crane & Derrick Permit				2,674			2,674
01999 Dumpster Permit				2,134			2,134

	Estimate Breakdown	Labor Man Hrs	Labor Amount	Material Amount	Sub Amount	Equip Amount	Other Amount	Total Amount
01999	Hoisting & Rigging Permit				1,724			1,724
01999	Warranty Deposit Financing				85,066			85,066
	7.06 Construction Permits and Fees				102,283			102,283
	07 General Requirements	67,209.512	10,070,909	1,821,396	4,073,034	323,760		16,289,098
	CP-04 Site Improvements and OSBL Utilities	115,557.215	17,474,153	5,505,261	5,641,717	1,209,545	130,322,940	160,153,615
	RH-04 Red Hook - 04	503,928.210	71,474,135	46,080,852	198,823,237	19,409,203	243,470,109	579,257,535

Appendix B: Flow Rate Analysis Technical Memorandum

Brown AND Caldwell

1359 Broadway, Suite 1140
New York, NY 10018

T: 646.367.0631

Technical Memorandum

Prepared for: New York City Department of Environmental Protection (DEP)

Project Title: Gowanus Canal CSO Tank Siting and Superfund Support

Project No.: 145692

Technical Memorandum

Subject: Gowanus Flow Rate Analysis

Date: June 29, 2015

To: Kevin Clarke, DEP Portfolio Manager

From: Don Cohen, BC Project Manager

Copy to: Thasha Ramkissoon, DEP Accountable Manager

Lindsay Degueldre, DEP Accountable Manager

Prepared by: _____
Geoffrey Grant, P.E., E-74911

Reviewed by: _____
Donald Cohen, CPG, Project Manager

Limitations:

This document was prepared solely for New York City Department of Environmental Protection (DEP) in accordance with professional standards at the time the services were performed and in accordance with the contract between DEP and Brown and Caldwell dated June 23, 2013. This document is governed by the specific scope of work authorized by DEP; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by DEP and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

1.1 Background

Initial sizing of the conveyance infrastructure for the Gowanus Combined Sewer Overflow (CSO) storage facilities was based on the maximum flow rate of 743.7 mgd (rounded up to 750 mgd) identified by Dvirka and Bartilucci Consulting Engineers (March 2009) during the design of the Gowanus Pump Station expansion for the RH-034 CSO and 250 mgd for the OH—007 CSO which represents the full pipe capacity of the overflow. Later model analyses showed that these flow rates roughly equate to the model predicted flows resulting from the 5-year 2-hour storm event (Table 1).

Table 1. Model Predicted Overflow Flow Rate for the 5-year / 2-hour Storm Event

CSO Structure	Flow (mgd)	Volume of Overflow (MG)
RH-034	780	16.6
OH-007	208	8.3

Initially, the facility was envisioned to be configured as “flow-through”, meaning flows that exceeded the storage capacity of the facility would pass through the storage structure and would be discharged to the canal through a new outfall. This arrangement is similar to other New York City Department of Environmental Protection (DEP) CSO storage basins and provides a base level of screening and limited clarification of all CSO events. Selection of these flow rates for the initial design condition provided for influent and effluent conduits and a screening system that were conservatively sized to match the existing capacity of the overflows and would not restrict flow; resulting in an upstream surcharge, flooding, or overflow. The selection of these flow rates was also influenced by the anticipated requirement that all flows discharging to the canal be disinfected. Due to the uncertainty regarding the targeted level of control for the disinfection system, it was not clear if all flows that passed through the outfall would need to be disinfected, or if a lower flow rate could be used as the design condition. Given the uncertainty regarding the anticipated disinfection requirements, the decision was made to proceed with the 750 mgd and 250 mgd design conditions as this would also provide for a facility that was conservatively sized for disinfection.

1.2 Recent Developments

Several items have emerged during development of the conceptual design that allowed for the re-evaluation of the peak flow design basis for sizing the conveyance infrastructure. These included:

- Water quality data collected during the summer of 2014 indicated that the canal is in full attainment of water quality standards, primarily attributed to the flushing tunnel. This development reduced the likelihood that NYCDEP would need to disinfect flows to the canal.
- Evaluation of “bypass” storage facilities, whereby flows that exceed the storage volume of the basins would bypass storage and continue out the existing outfall structures. The evaluation of this alternative was driven by the cost and complexities of constructing effluent conduits to the canal from upland sites. The fact that disinfection of flows may no longer be required also supported evaluation of this storage arrangement.
- Realization that if disinfection was required, the design basis would likely be a flow rate considerably less than the initial peak flow conditions used at the onset of the conceptual design. Chemical storage and feed systems for a disinfection design flow rate less than 750 mgd and 250 mgd would be less costly and complex to operate. This meant that even flow-through arrangements could be sized to handle a smaller flow rate, allowing some flows to continue to discharge through the existing RH-034 and OH-007 outfalls.

- Reduction in the required storage volume. Preliminary results suggest that the 4 MG and 8 MG storage basins would provide a level of control that exceeds the 58% to 74% Total Suspended Solids (TSS) load reduction required by the Record of Decision (ROD) and Administrative Order (AO). With the smaller sized storage basin, it may be feasible to size the conduits for a smaller peak flow rate.

Given these factors, Brown and Caldwell (BC) embarked on an assessment of the typical year to identify alternate flow rates for sizing the conveyance infrastructure.

1.3 Alternative Flow Rate Evaluation

Assessment of the tank performance against Clean Water Act obligations and the Superfund ROD/AO obligations has been made using the typical year. Under the current design, the 8 MG storage tank at RH-034 reduces typical year CSO activation frequency from 39 events to 7 and reduces typical year activation frequency at OH-007 from 41 events to 5. The expected reduction in typical year CSO volume is 73% at RH-034 and 84% at OH-007. Table 2 presents the results of typical year simulations (Calendar Year 2008) and identifies the top ten overflow events by peak flow in the typical year.

Table 2. Typical Year (2008) Model Results Summarizing Peak Flow for 10 Largest Typical Year Events at RH-034 and OH-007

TY Event Rank	RH-034		OH-007	
	Peak Flow (mgd)	Event Volume (MG)	Peak Flow (mgd)	Event Volume (MG)
1	306	13.6	146	6.2
2	172	11.6	67	7.4
3	167	18.5	56	4.5
4	132	5.7	43	3.6
5	122	8.8	43	4.0
6	120	10.5	43	1.9
7	111	2.8	32	1.5
8	110	4.6	32	4.7
9	88	12.6	31	1.1
10	87	17.4	30	6.4

TY Event Rank is based on peak flow rate.
24-hour IED used to separate events.
Total of 39 events and 137.5 MG for RH-034
Total of 41 events at 57.6 MG for OH-007

As illustrated in Figures 1 and 2, the largest overflow event in the typical year by volume at RH-034 and OH-007 does not equate the largest flow rate in the typical year. This is likely attributed to the magnitude and duration of the rainfall event. For RH-034, the largest overflow volume had the third highest flow rate. For OH-007, the largest overflow by volume had the second highest flow rate.

Based on review of the typical year simulations, it became evident that the peak flow design condition for the conveyance conduits could be reduced to match the largest flow rate in the typical year without impacting the anticipated level of CSO control and TSS reduction. This would reduce the size of the conveyance conduits, reduce cost, and improve constructability. Smaller design flow rates could be considered but during discussions with NYCDEP, concern was raised regarding the potential for an

undersized conveyance conduit to cause overflows to occur before the basin was full. As such, it was determined that a conservative approach of sizing the conduits to convey the largest peak flow in the typical year would provide for both a conservative design and a conservative cost estimate. BC has begun evaluation of the cost and constructability of influent and effluent conduits sized for 310 mgd for RH-034 and 150 mgd for OH-007.

1.4 Next Steps

The size and cost of the smaller conveyance conduits will be compared against the current design which is based on 750 mgd and 250 mgd for RH-034 and OH-007, respectively. In parallel with this evaluation, BC will continue to work with DEP to better define the conditions for a "flow-through" versus "bypass" configuration for the selected sites. In addition, coordination will be required with the Long Term Control Plan (LTCP) team as they continue to examine the disinfection sizing criteria. It may not be necessary for the proposed disinfection strategy and conveyance design to use the same flow condition, but coordination between the two is important.

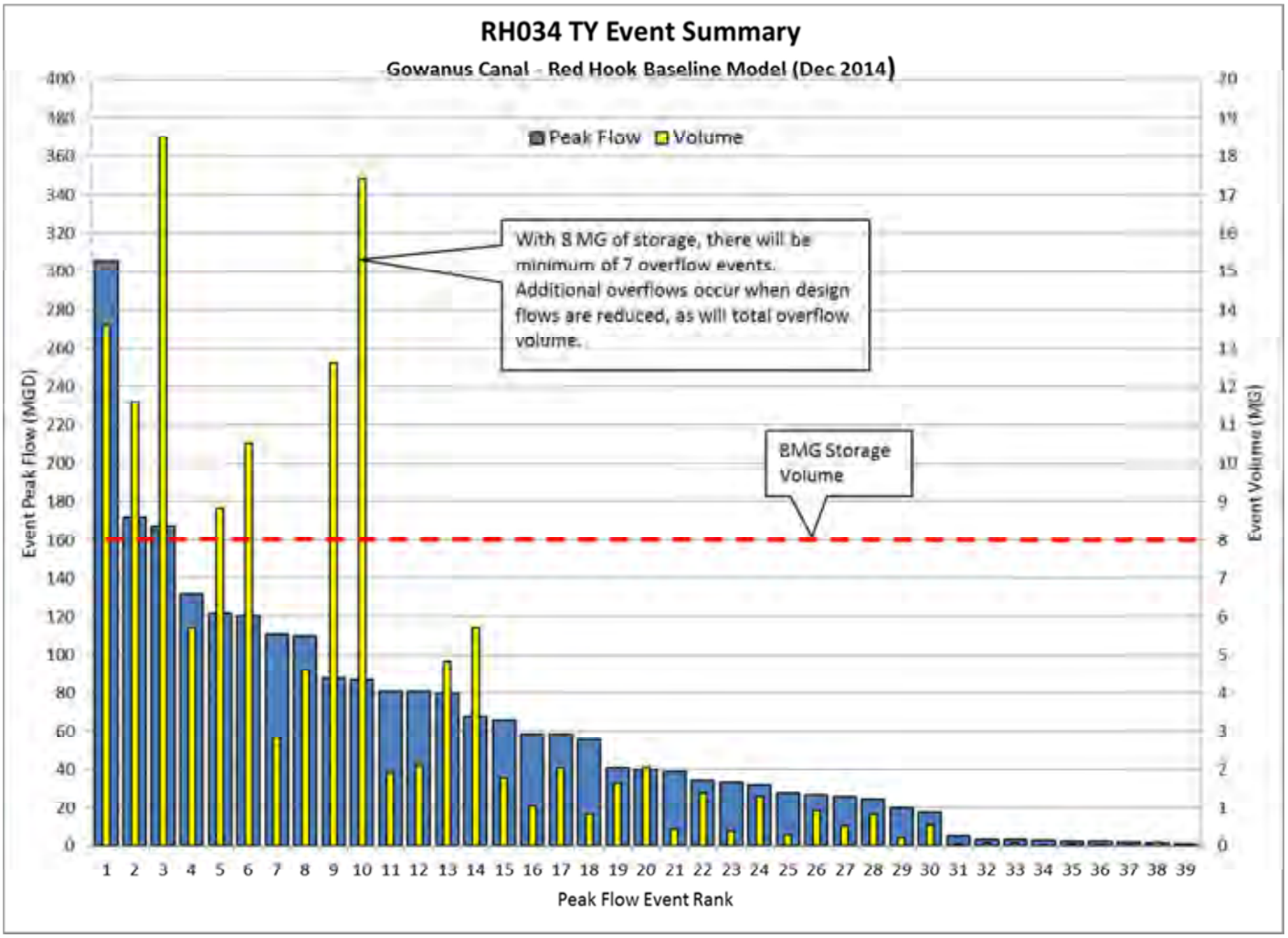


Figure 1. RH-034 overflow volume and peak flow rate summary

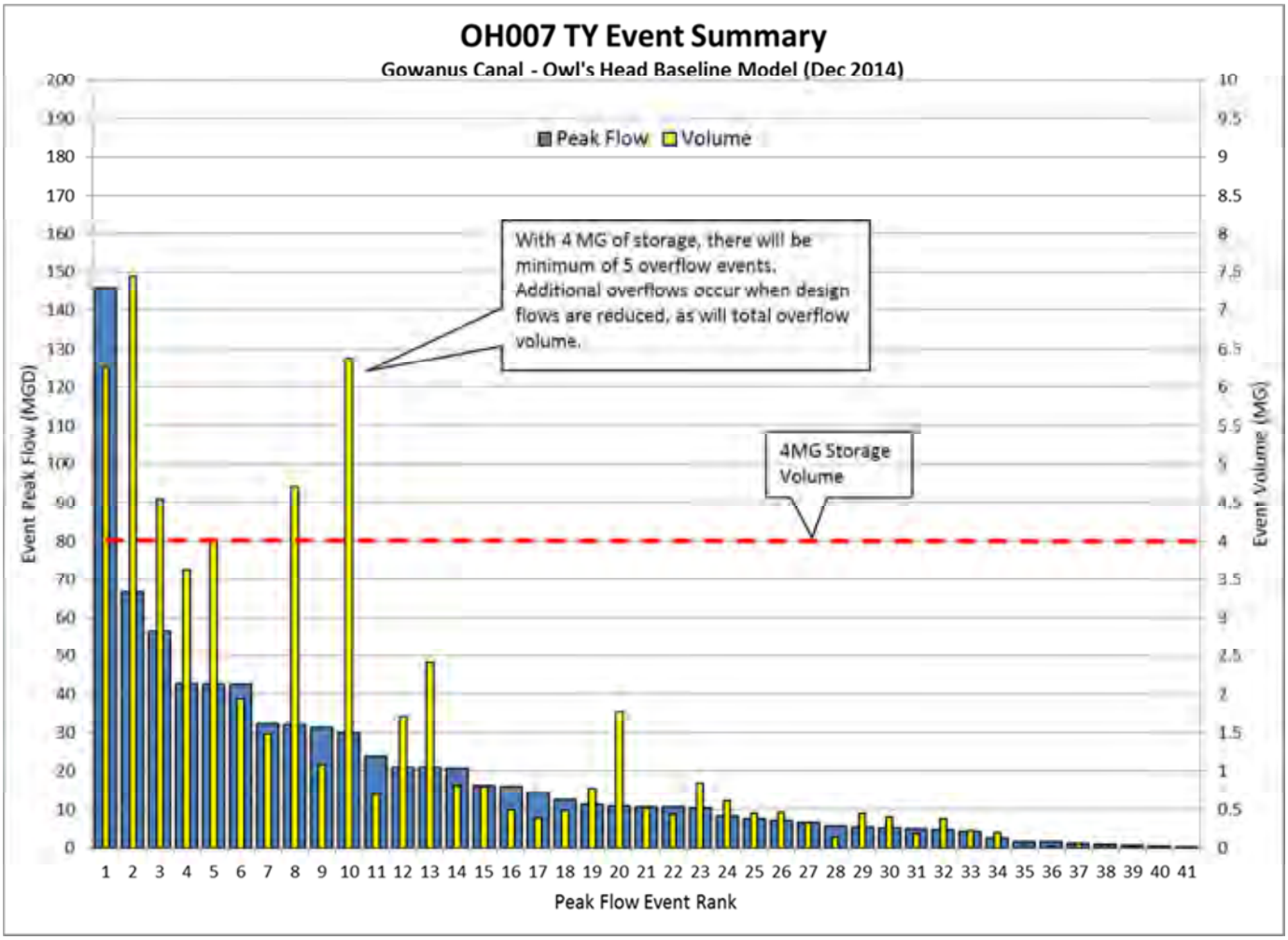


Figure 2. OH-007 overflow volume and peak flow rate summary

THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

State Board for Engineering and Land Surveying, Education Building, 89 Washington Avenue, 2nd Flr. Mezzanine East-Wing
Tel. (518) 474-3817, Ext. 140 Fax: (518) 473-6282
E-mail: enginbd@mail.nysed.gov
E-mail: lsurvbd@mail.nysed.gov

June 3, 2015

Mr. Geoffrey Michael Grant
6021 Saint Regis Drive
Cincinnati, OH 45236-0000

Dear Mr. Grant:

This is to acknowledge receipt of your fee and Form 1, Application for Licensure and First Registration as a Professional Engineering, together with your notification of intent to practice in New York under subdivision (b) of Section 7208 of the Education Law. This letter authorizes you to engage in such practice, using your ***Ohio*** *license.*

Section 7208(b) exempts from New York State licensure requirements, "Practice as a professional engineer or land surveyor in this state by any person not a resident, or having no established place of practice in this state, or any person resident in this state but who has arrived in this state within six months, provided, however, such a person shall have filed an application for license as a professional engineer or land surveyor, and is legally qualified for such practice in the state or country in which he resides or has his place of practice or in which he had his previous residence or place of practice, such exemption continuing for only such reasonable time as the board requires to grant or deny the application for license, and a person intending to practice under this subdivision shall so state on the application."

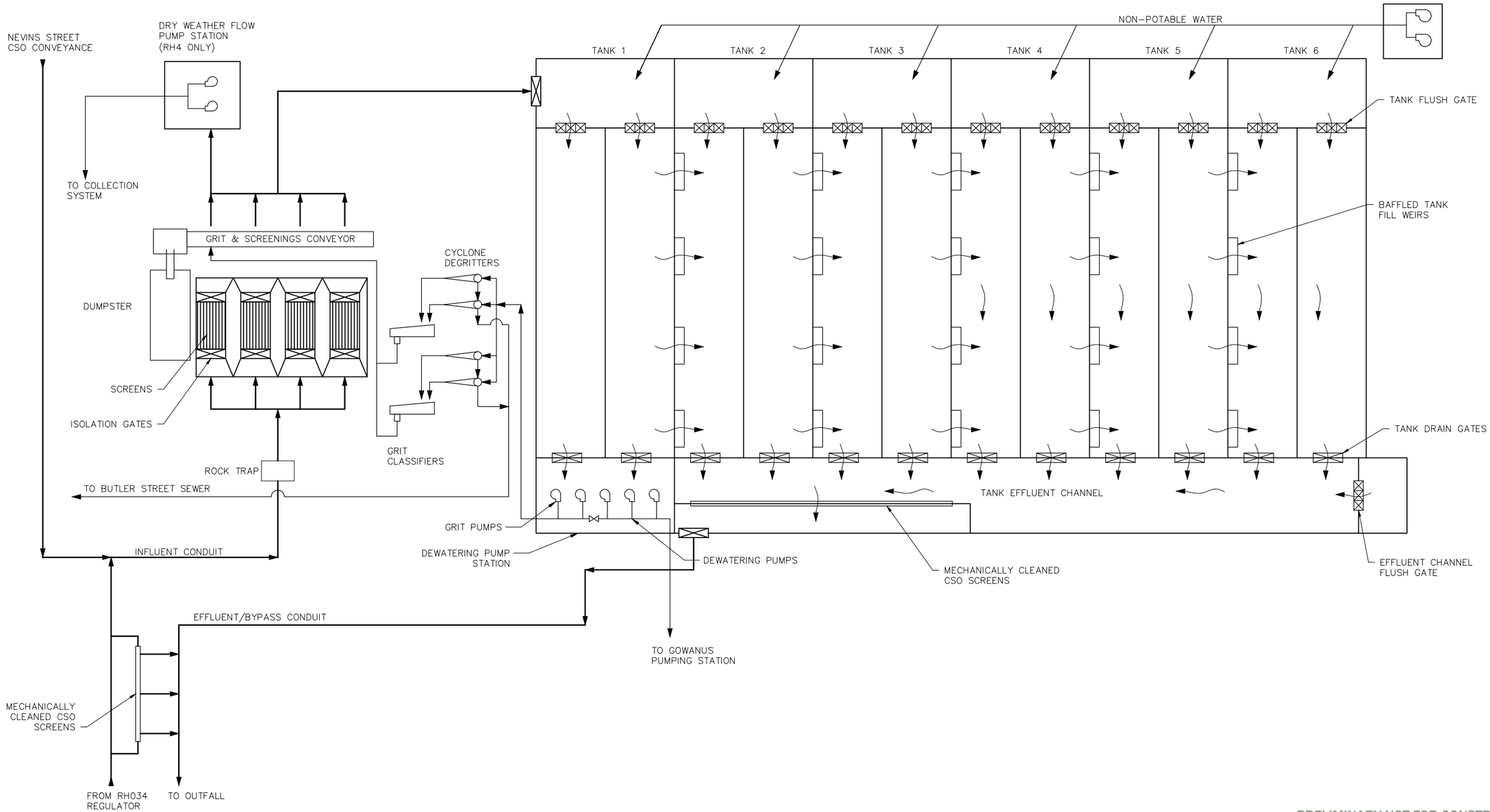
This exemption from licensure continues until whichever of the following occurs first: 1) the Department determines that an applicant fails to document satisfactorily any requirement for licensure (except for examination); 2) the applicant fails to receive a passing score on the first licensing examination for which he or she is eligible; or 3) the applicant receives a New York State license.

Further, Section 7208 states "...that no title, sign, card or device shall be used in such manner as to tend to convey the impression that the person rendering such service is a professional engineer or a land surveyor licensed in this state or is practicing engineering or land surveying."

Sincerely,

Executive Secretary
Jane W. Blair, PE

Appendix C: Conceptual Design



PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER

D-001

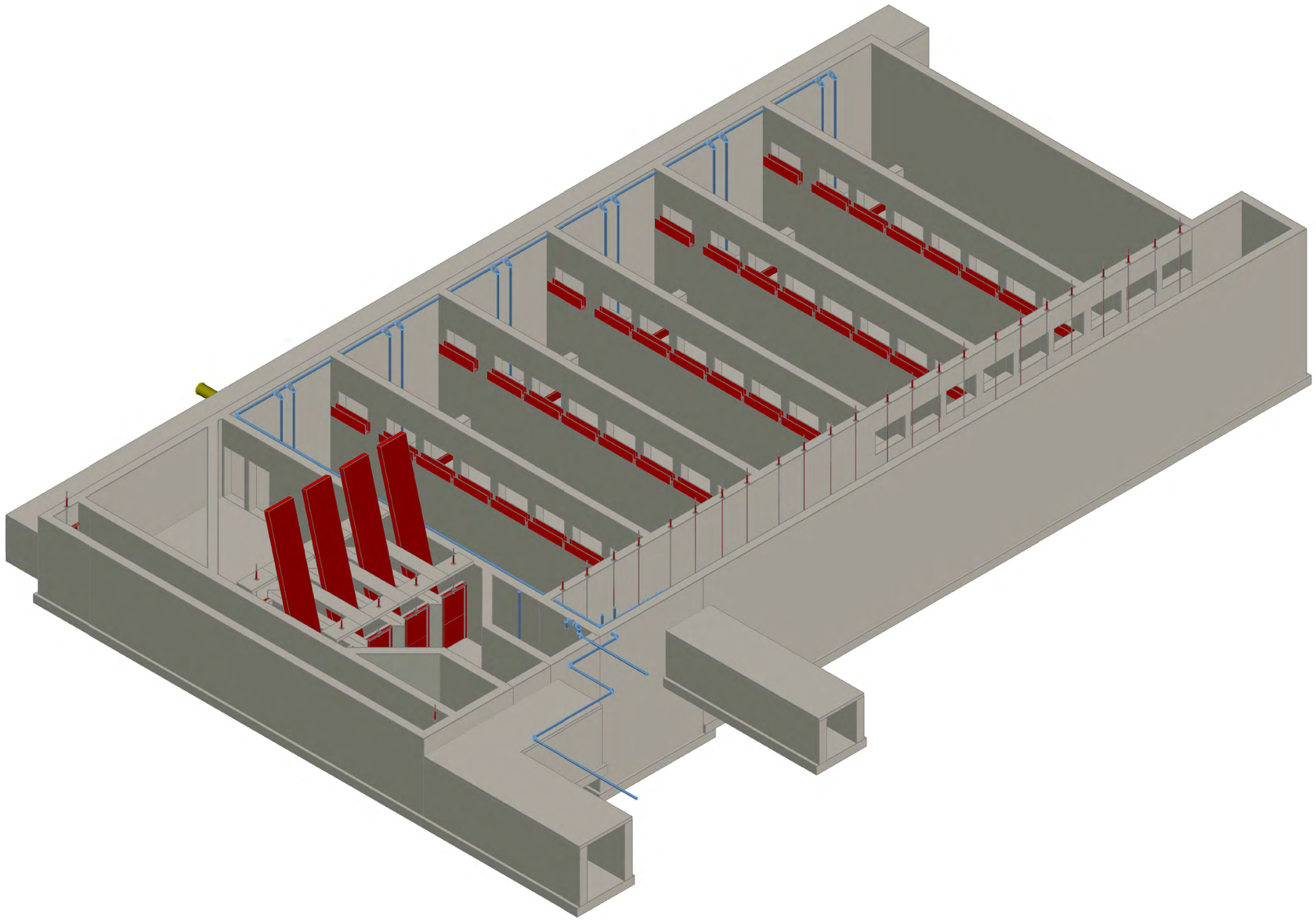
TITLE

Process Flow Diagram Red Hook Sites

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR

NYC Environmental Protection



3-DIMENSIONAL PLAN

0 16' 32'

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER

RH3-3D1

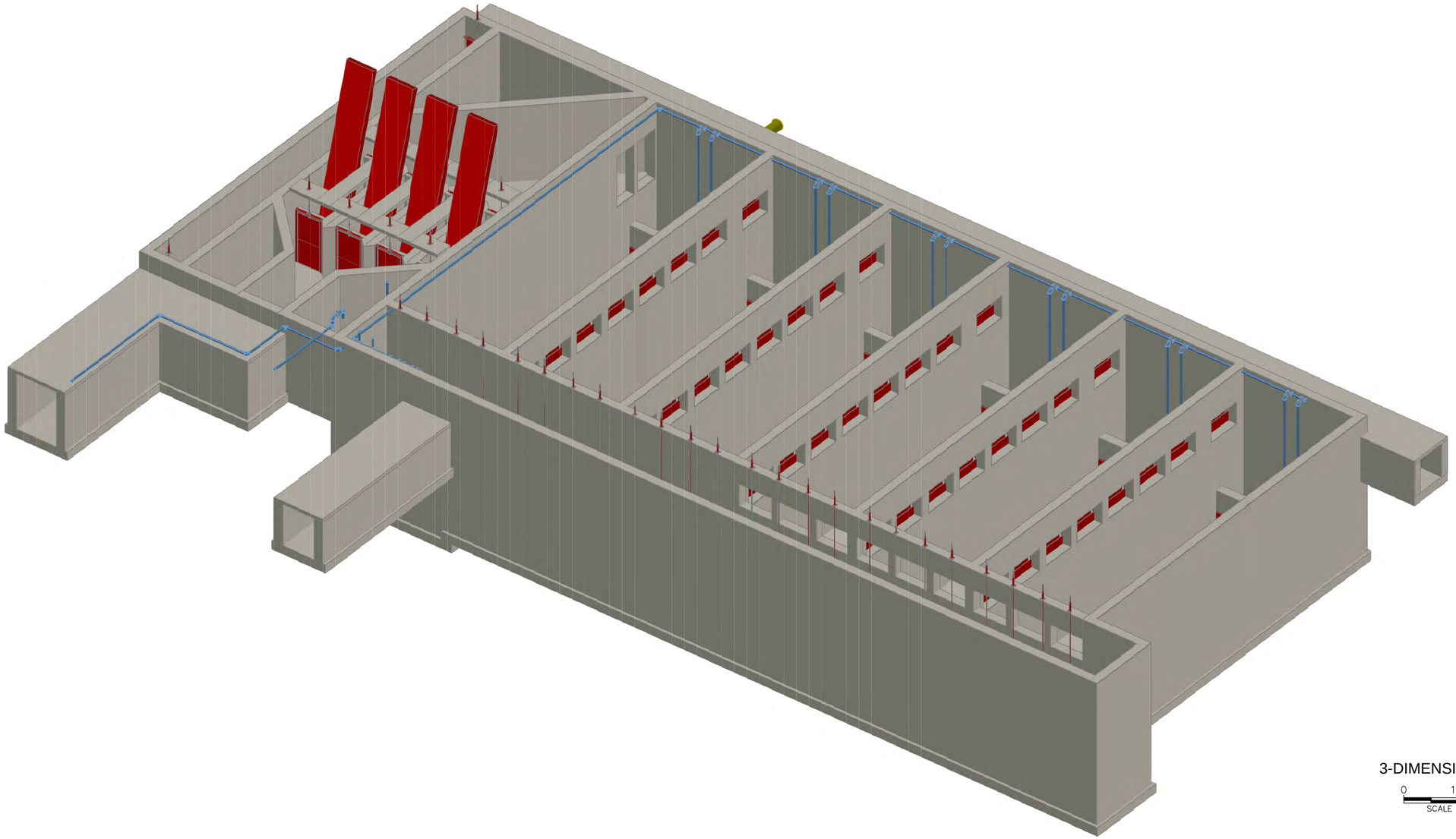
TITLE

3D View RH034 — Site RH3 8 MG

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR

NYC Environmental Protection



3-DIMENSIONAL PLAN

0 16' 32'

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER

RH3-3D2

TITLE

3D View RH034 — Site RH3 8 MG

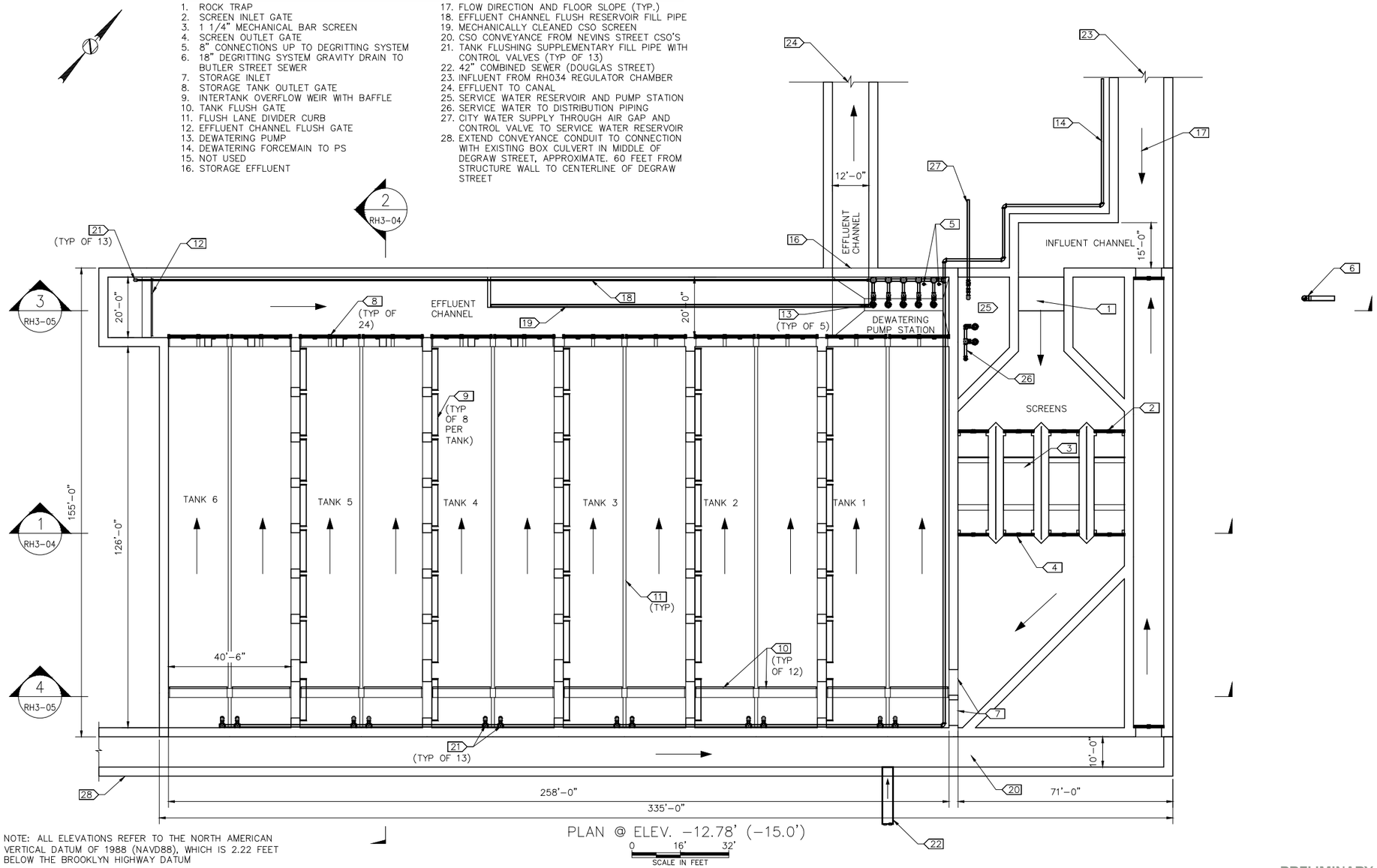
CLIENT New York Department of Environmental Protection | PREPARED BY Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR

NYC Environmental Protection

KEY NOTES:

1. ROCK TRAP
2. SCREEN INLET GATE
3. 1 1/4" MECHANICAL BAR SCREEN
4. SCREEN OUTLET GATE
5. 8" CONNECTIONS UP TO DEGRITTING SYSTEM
6. 18" DEGRITTING SYSTEM GRAVITY DRAIN TO BUTLER STREET SEWER
7. STORAGE INLET
8. STORAGE TANK OUTLET GATE
9. INTERTANK OVERFLOW WEIR WITH BAFFLE
10. TANK FLUSH GATE
11. FLUSH LANE DIVIDER CURB
12. EFFLUENT CHANNEL FLUSH GATE
13. DEWATERING PUMP
14. DEWATERING FORCEMAIN TO PS
15. NOT USED
16. STORAGE EFFLUENT
17. FLOW DIRECTION AND FLOOR SLOPE (TYP.)
18. EFFLUENT CHANNEL FLUSH RESERVOIR FILL PIPE
19. MECHANICALLY CLEANED CSO SCREEN
20. CSO CONVEYANCE FROM NEVINS STREET CSO'S
21. TANK FLUSHING SUPPLEMENTARY FILL PIPE WITH CONTROL VALVES (TYP OF 13)
22. 42" COMBINED SEWER (DOUGLAS STREET)
23. INFLUENT FROM RH034 REGULATOR CHAMBER
24. EFFLUENT TO CANAL
25. SERVICE WATER RESERVOIR AND PUMP STATION
26. SERVICE WATER TO DISTRIBUTION PIPING
27. CITY WATER SUPPLY THROUGH AIR GAP AND CONTROL VALVE TO SERVICE WATER RESERVOIR
28. EXTEND CONVEYANCE CONDUIT TO CONNECTION WITH EXISTING BOX CULVERT IN MIDDLE OF DEGRAW STREET, APPROXIMATE. 60 FEET FROM STRUCTURE WALL TO CENTERLINE OF DEGRAW STREET



PLAN @ ELEV. −12.78' (−15.0')

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER
RH3-01

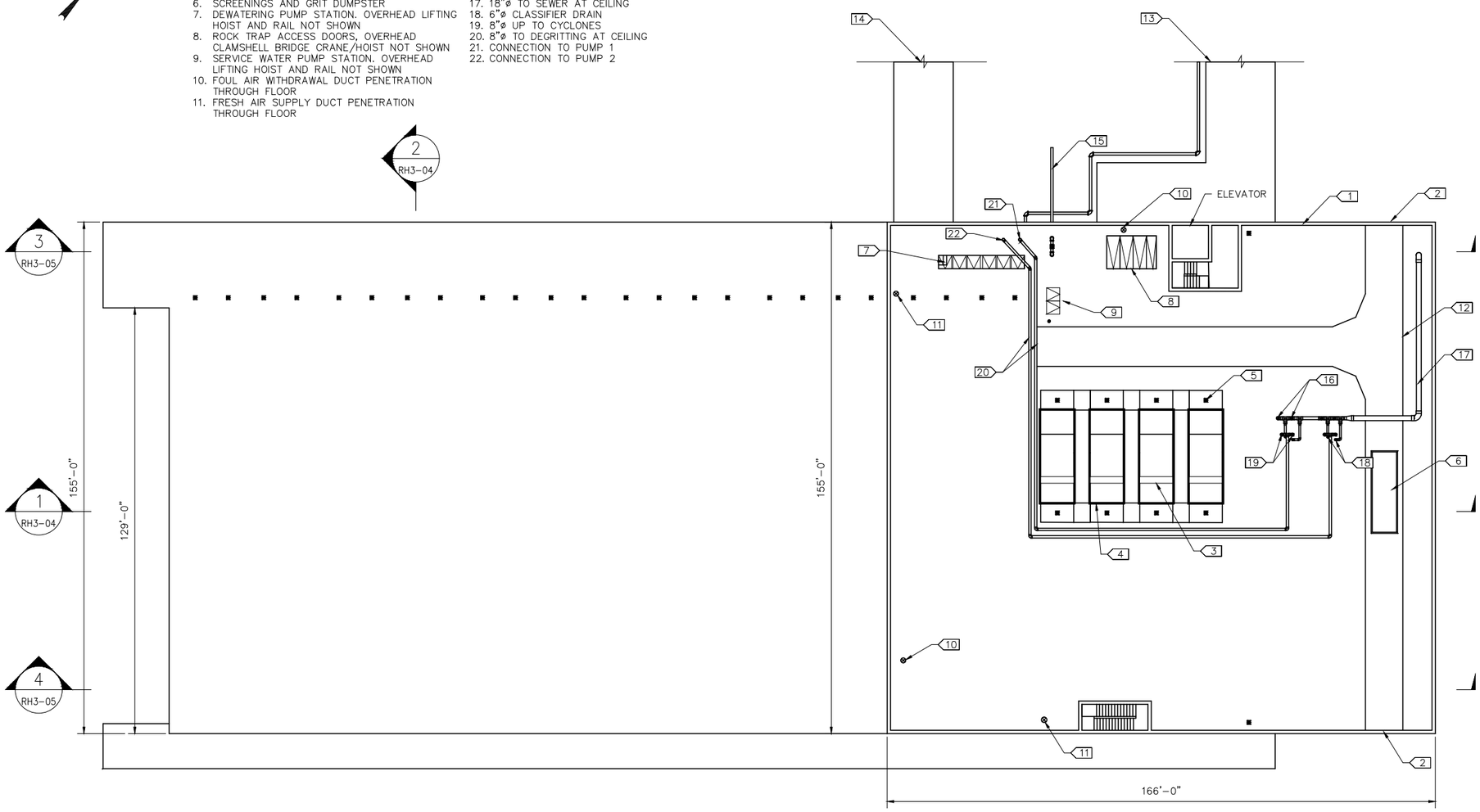
TITLE
Plan RH034 — Site RH3 8 MG

PREPARED FOR
NYC Environmental Protection

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

KEY NOTES:

1. FACILITY MAIN ENTRANCE
2. SCREENINGS BAY DRIVE THROUGH DOOR
3. INFLUENT SCREEN
4. SCREEN OPENING RAILING
5. SLIDE GATE HYDRAULIC CYLINDER OPERATOR(TYP.)
6. SCREENINGS AND GRIT DUMPSTER
7. DEWATERING PUMP STATION. OVERHEAD LIFTING HOIST AND RAIL NOT SHOWN
8. ROCK TRAP ACCESS DOORS, OVERHEAD CLAMSHELL BRIDGE CRANE/HOIST NOT SHOWN
9. SERVICE WATER PUMP STATION. OVERHEAD LIFTING HOIST AND RAIL NOT SHOWN
10. FOUL AIR WITHDRAWAL DUCT PENETRATION THROUGH FLOOR
11. FRESH AIR SUPPLY DUCT PENETRATION THROUGH FLOOR
12. HARDENED FLOOR SURFACE FOR MATERIAL HANDLING
13. INFLUENT FROM REGULATOR CHAMBER
14. EFFLUENT TO CANAL
15. CITY WATER SUPPLY
16. 10"ø CYCLONE OVERFLOW
17. 18"ø TO SEWER AT CEILING
18. 6"ø CLASSIFIER DRAIN
19. 8"ø UP TO CYCLONES
20. 8"ø TO DEGRITTING AT CEILING
21. CONNECTION TO PUMP 1
22. CONNECTION TO PUMP 2



PLAN @ ELEV. 10.22' (8.0')

0 16' 32'
SCALE IN FEET

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

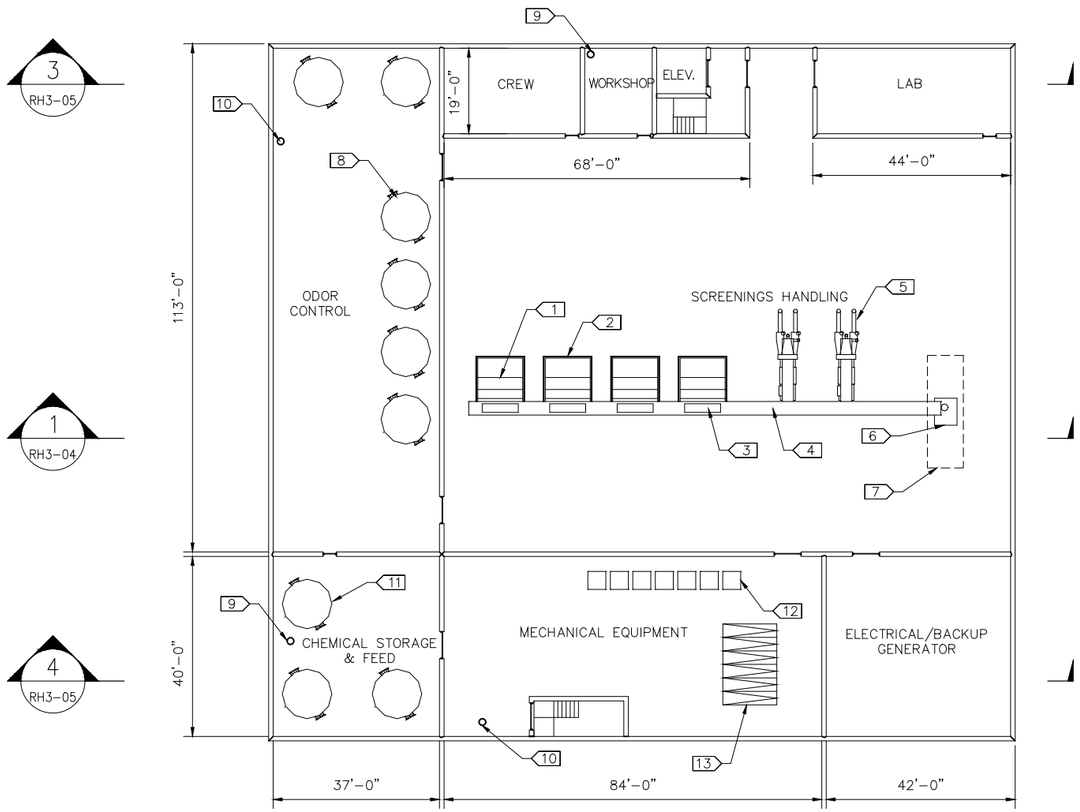
DRAWING NUMBER
RH3-02

TITLE
First Floor Plan @ EL.10.22' (8.0') RH034 — Site RH3 8 MG (RH4 Similar)

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR

NYC Environmental Protection



PLAN @ ELEV. 30.22' (28.0')

0 16' 32'
SCALE IN FEET

KEY NOTES:

1. INFLUENT SCREEN(TYP.)
2. SCREEN OPENING RAILING(TYP.)
3. SCREEN DISCHARGE CHUTE(TYP.)
4. SCREENINGS AND GRIT CONVEYOR
5. GRIT CYCLONES AND CLASSIFIER
6. SCREENINGS AND GRIT DISCHARGE CHUTE
7. SCREENINGS AND GRIT DUMPSTER
8. CARBON FILTER VESSEL(TYP.) OVERHEAD SERVICE PLATFORM NOT SHOWN
9. FOUL AIR WITHDRAWAL DUCT PENETRATION THROUGH FLOOR
10. FRESH AIR SUPPLY DUCT PENETRATION THROUGH FLOOR
11. HYPOCHLORITE STORAGE TANK (FUTURE)
12. HYDRAULIC POWER UNIT(TYP.)
13. MATERIAL HANDLING HATCH TO GROUND FLOOR (OVERHEAD HOIST AND TROLLEY NOT SHOWN)

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

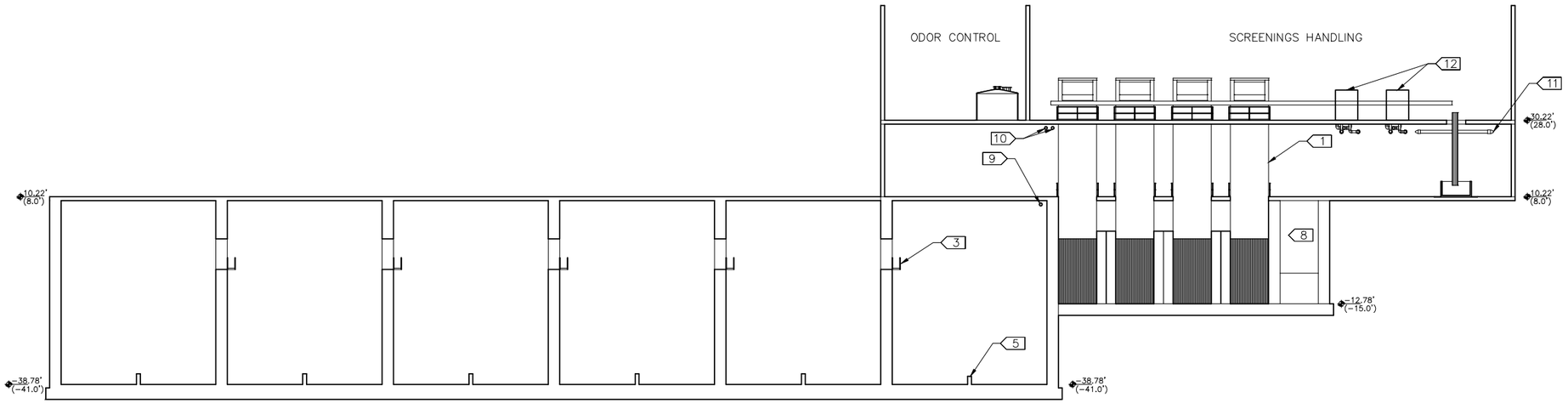
Gowanus Canal
New York, New York

DRAWING NUMBER
RH3-03

TITLE
Second Floor Plan @ EL.30.22' (28') RH034 — Site RH3 8 MG (RH4 Similar)

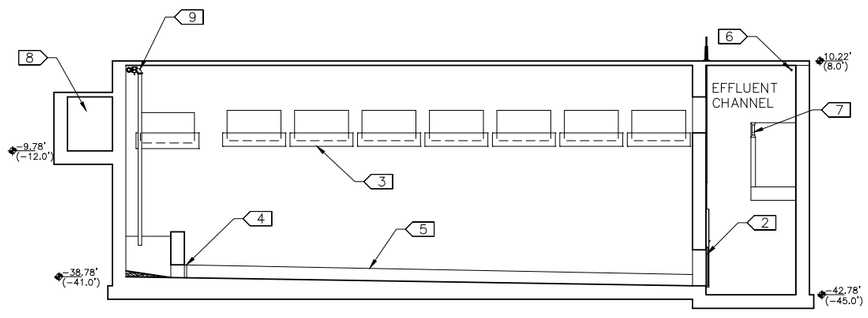
PREPARED FOR
NYC Environmental Protection

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631



1 SECTION
RH3-01

0 16' 32'
SCALE IN FEET



2 SECTION
RH3-01

0 16' 32'
SCALE IN FEET

KEY NOTES

1. 1 1/4" MECHANICAL BAR SCREEN
2. STORAGE TANK OUTLET GATE
3. INTERTANK OVERFLOW WEIR WITH BAFFLE
4. TANK FLUSH GATE
5. FLUSH LANE DIVIDER CURB
6. EFFLUENT CHANNEL FLUSH RESERVOIR FILL PIPE
7. MECHANICALLY CLEANED CSO SCREEN
8. CSO CONVEYANCE FROM NEVINS STREET
9. TANK FLUSHING SUPPLEMENTARY FILL PIPE WITH CONTROL VALVE
10. 8" CONNECTIONS TO DEGRITTING SYSTEM
11. 18" DEGRITTING SYSTEM GRAVITY DRAIN TO BUTLER STREET SEWER
12. GRIT CYCLONES AND CLASSIFIERS

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

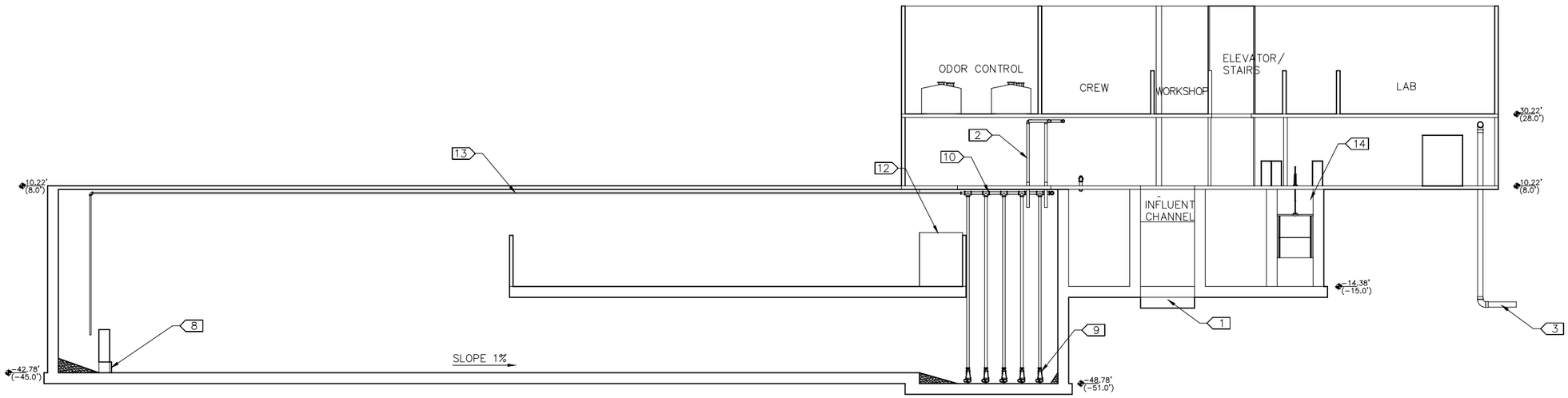
Gowanus Canal
New York, New York

DRAWING NUMBER
RH3-04

TITLE
Sections RH034 — Site RH3 8 MG

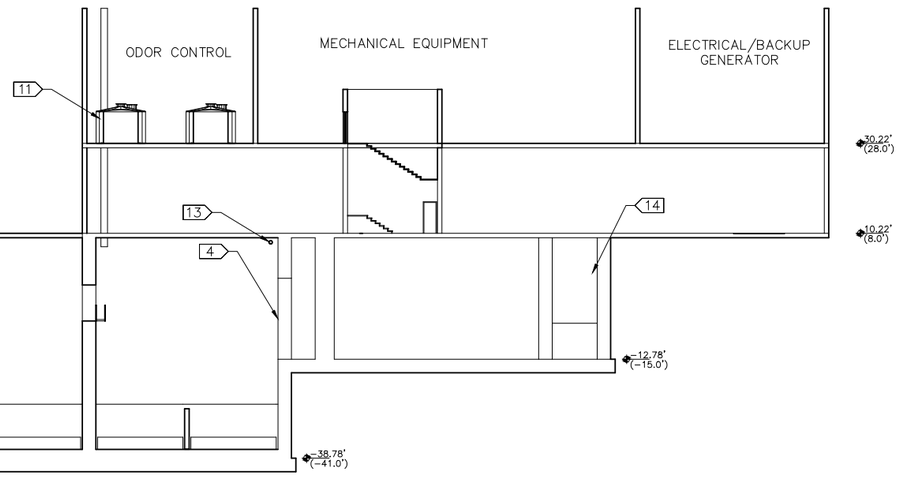
CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR
NYC Environmental Protection



3 SECTION
RH3-01

0 16' 32'
SCALE IN FEET



4 SECTION
RH3-01

0 16' 32'
SCALE IN FEET

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

KEY NOTES:

1. ROCK TRAP
2. 8" CONNECTIONS UP TO DEGRITTING SYSTEM
3. 18" DEGRITTING SYSTEM GRAVITY DRAIN TO BUTLER STREET SEWER
4. STORAGE TANK INLET
5. INTERTANK OVERFLOW WEIR WITH BAFFLE
6. TANK FLUSH GATE
7. FLUSH LANE DIVIDER CURB
8. EFFLUENT CHANNEL FLUSH GATE
9. DEWATERING PUMP/GRIT PUMP
10. DEWATERING FORCEMAIN TO GOWANUS PS
11. HYPOCHLORITE STORAGE TANK(FUTURE)(TYP.)
12. STORAGE EFFLUENT GATE
13. TANK FLUSHING SUPPLEMENTARY FILL PIPE WITH CONTROL VALVE
14. CSO CONVEYANCE FROM NEVINS STREET

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

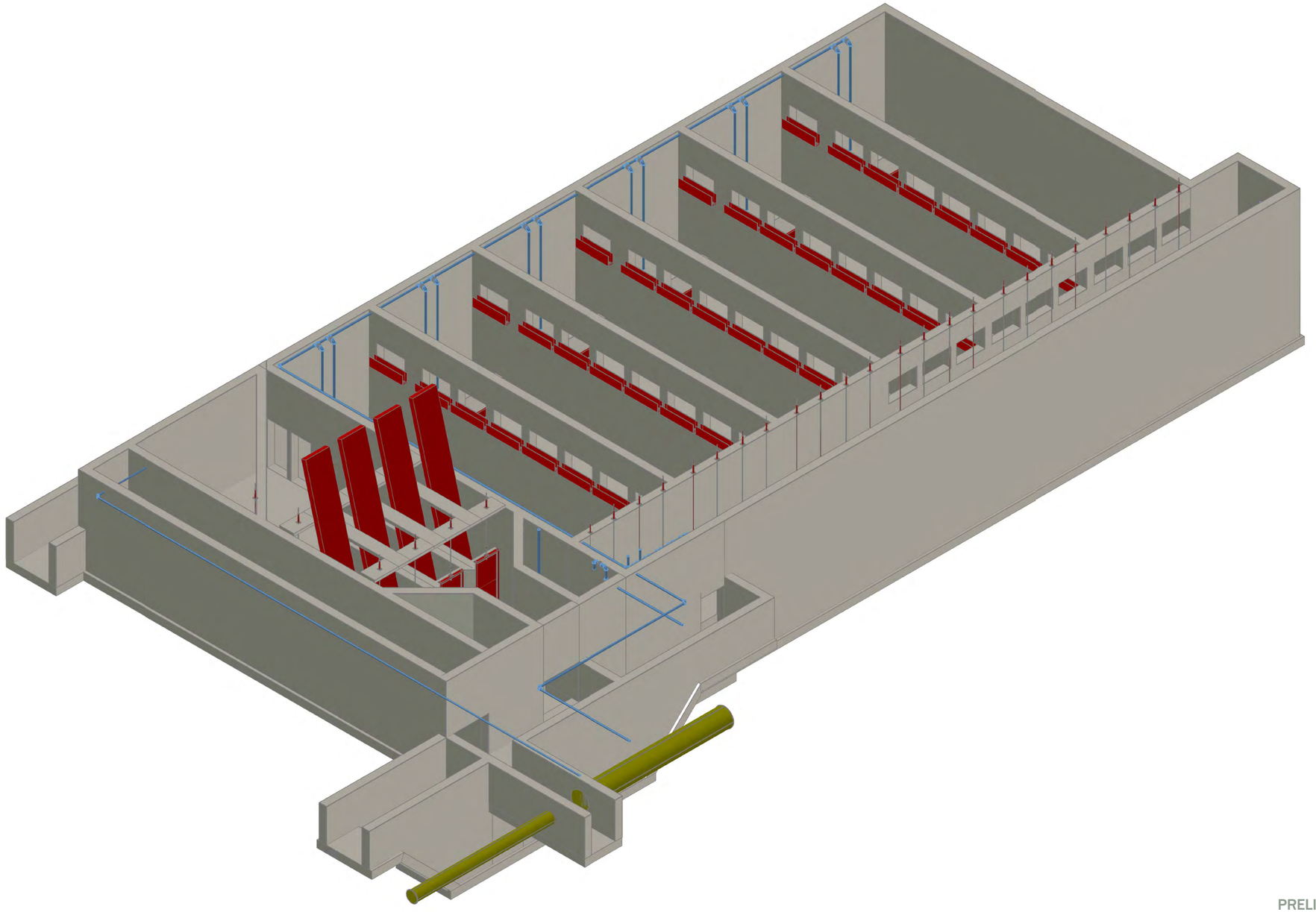
Gowanus Canal
New York, New York

DRAWING NUMBER
RH3-05

TITLE
Sections RH034 — Site RH3 8 MG

PREPARED FOR
NYC Environmental Protection

CLIENT New York Department of Environmental Protection | PREPARED BY Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631



3—DIMENSIONAL PLAN

0 16' 32'

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER

RH4-3D1

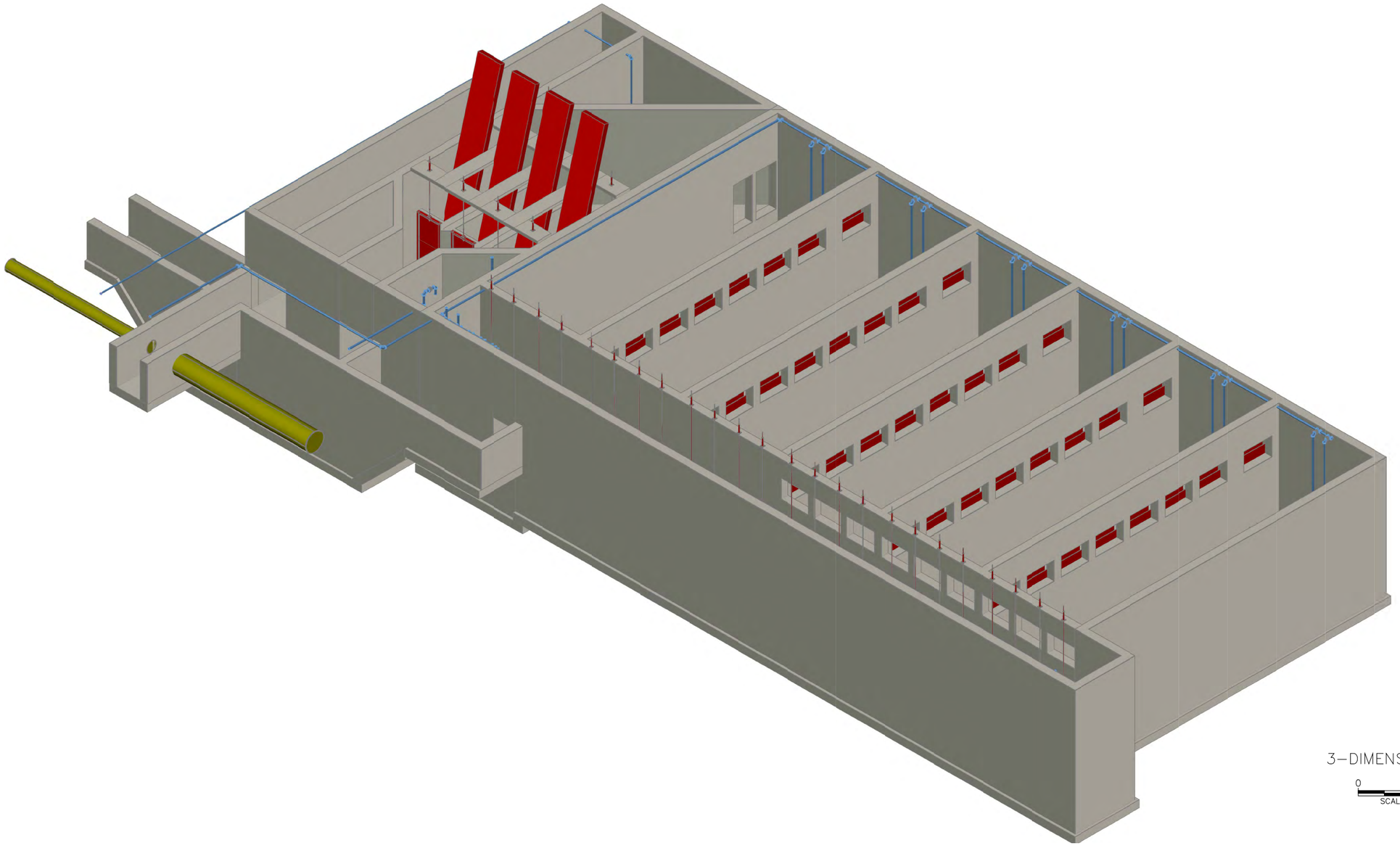
TITLE

3D View RH034 — Site RH4 8 MG

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR

NYC Environmental Protection



3—DIMENSIONAL PLAN

0 16' 32'

SCALE IN FEET

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER

RH4-3D2

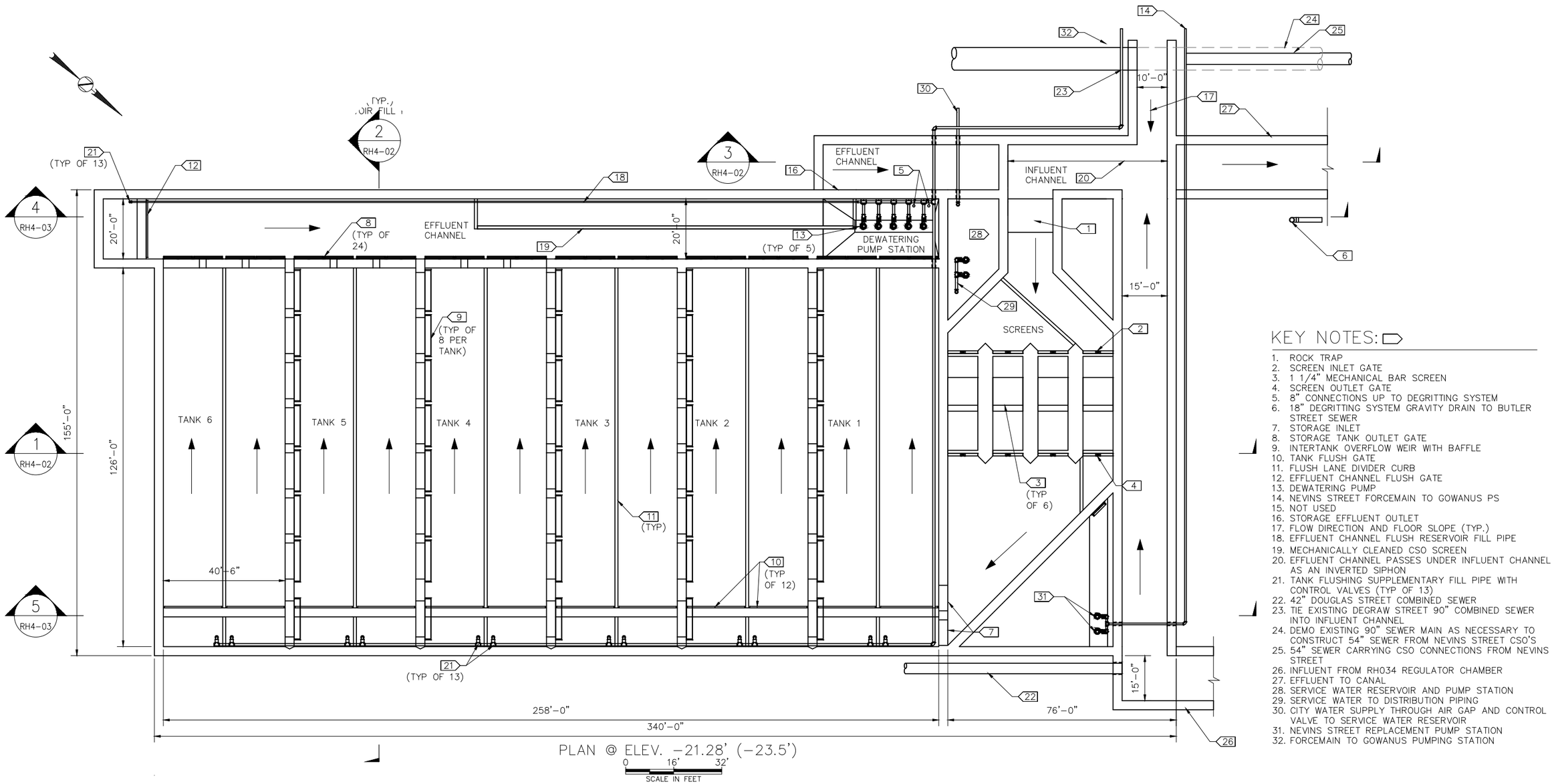
TITLE

3D View RH034 — Site RH4 8 MG

PREPARED FOR

NYC Environmental Protection

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631



KEY NOTES:

1. ROCK TRAP
2. SCREEN INLET GATE
3. 1 1/4" MECHANICAL BAR SCREEN
4. SCREEN OUTLET GATE
5. 8" CONNECTIONS UP TO DEGRITTING SYSTEM
6. 18" DEGRITTING SYSTEM GRAVITY DRAIN TO BUTLER STREET SEWER
7. STORAGE INLET
8. STORAGE TANK OUTLET GATE
9. INTERTANK OVERFLOW WEIR WITH BAFFLE
10. TANK FLUSH GATE
11. FLUSH LANE DIVIDER CURB
12. EFFLUENT CHANNEL FLUSH GATE
13. DEWATERING PUMP
14. NEVINS STREET FORCEMAIN TO GOWANUS PS
15. NOT USED
16. STORAGE EFFLUENT OUTLET
17. FLOW DIRECTION AND FLOOR SLOPE (TYP.)
18. EFFLUENT CHANNEL FLUSH RESERVOIR FILL PIPE
19. MECHANICALLY CLEANED CSO SCREEN
20. EFFLUENT CHANNEL PASSES UNDER INFLUENT CHANNEL AS AN INVERTED SIPHON
21. TANK FLUSHING SUPPLEMENTARY FILL PIPE WITH CONTROL VALVES (TYP OF 13)
22. 42" DOUGLAS STREET COMBINED SEWER
23. TIE EXISTING DEGRAW STREET 90" COMBINED SEWER INTO INFLUENT CHANNEL
24. DEMO EXISTING 90" SEWER MAIN AS NECESSARY TO CONSTRUCT 54" SEWER FROM NEVINS STREET CSO'S
25. 54" SEWER CARRYING CSO CONNECTIONS FROM NEVINS STREET
26. INFLUENT FROM RH034 REGULATOR CHAMBER
27. EFFLUENT TO CANAL
28. SERVICE WATER RESERVOIR AND PUMP STATION
29. SERVICE WATER TO DISTRIBUTION PIPING
30. CITY WATER SUPPLY THROUGH AIR GAP AND CONTROL VALVE TO SERVICE WATER RESERVOIR
31. NEVINS STREET REPLACEMENT PUMP STATION
32. FORCEMAIN TO GOWANUS PUMPING STATION

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

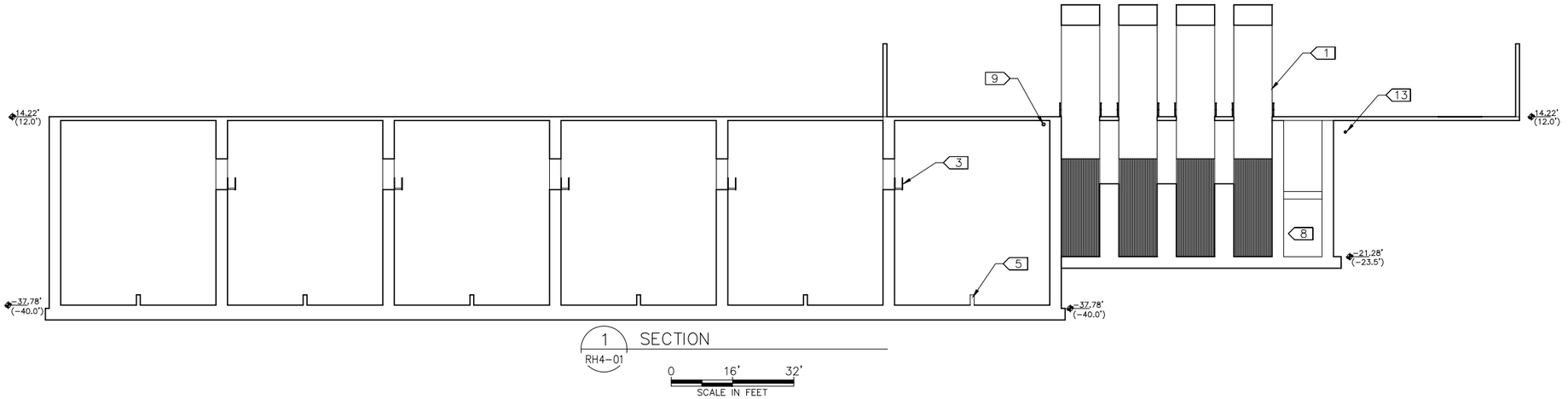
New York, New York

DRAWING NUMBER
RH4-01

TITLE
Plan RH034 — Site RH4 8 MG

PREPARED FOR
NYC Environmental Protection

CLIENT New York Department of Environmental Protection | PREPARED BY Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

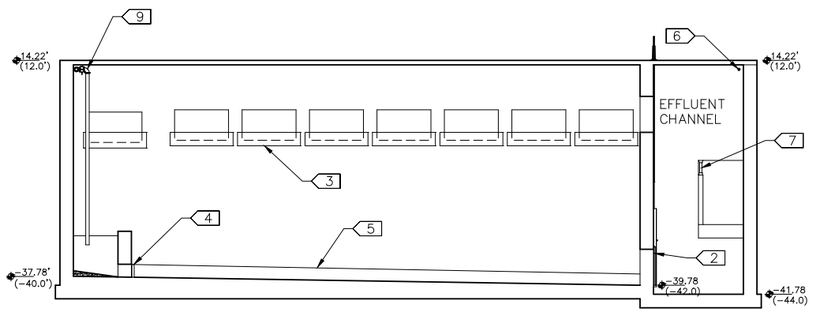


1 SECTION
RH4-01

0 16' 32'
SCALE IN FEET

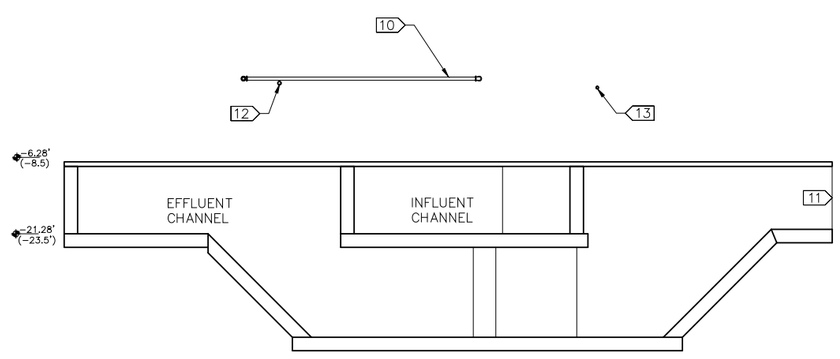
KEY NOTES

1. 1 1/4" MECHANICAL BAR SCREEN
2. STORAGE TANK OUTLET GATE
3. INTERTANK OVERFLOW WEIR WITH BAFFLE
4. TANK FLUSH GATE
5. FLUSH LANE DIVIDER CURB
6. EFFLUENT CHANNEL FLUSH RESERVOIR FILL PIPE
7. MECHANICALLY CLEANED CSO SCREEN
8. INFLUENT FROM RH034 REGULATOR
9. TANK FLUSHING SUPPLEMENTARY FILL PIPE WITH CONTROL VALVE
10. DEWATERING FORCEMAIN TO GOWANUS PS
11. EFFLUENT TO CANAL
12. CITY WATER SUPPLY THROUGH AIR GAP AND CONTROL VALVE TO SERVICE WATER RESERVOIR
13. NEVINS STREET FORCEMAIN TO GOWANUS PUMP STATION



2 SECTION
RH4-01

0 16' 32'
SCALE IN FEET



3 SECTION
RH4-01

0 16' 32'
SCALE IN FEET

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

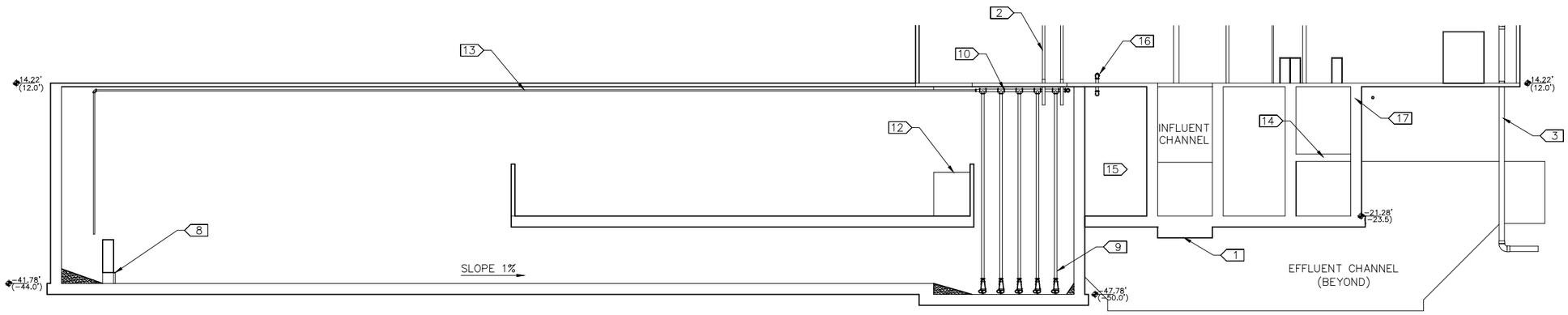
New York, New York

DRAWING NUMBER RH4-02

TITLE Sections RH034 — Site RH4 8 MG

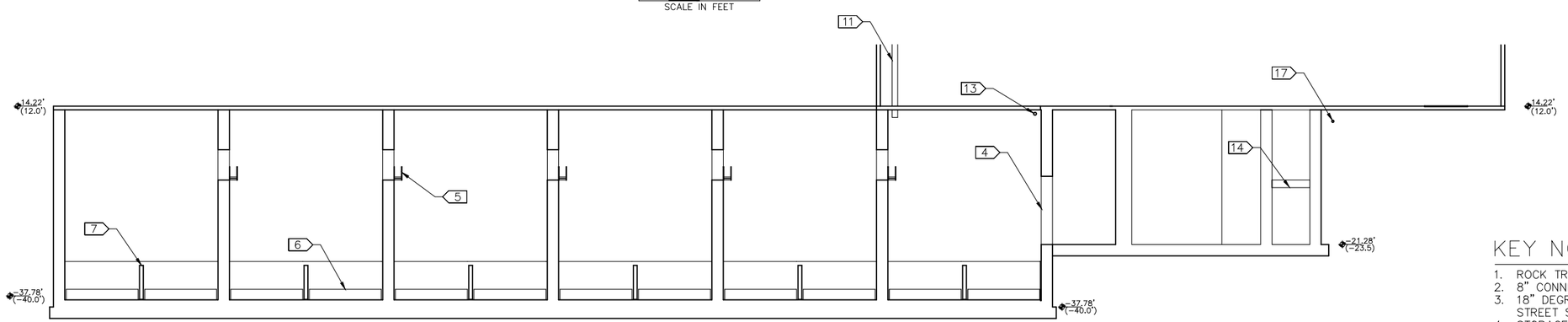
CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR NYC Environmental Protection



4 SECTION
RH4-01

0 16' 32'
SCALE IN FEET



5 SECTION
RH4-01

0 16' 32'
SCALE IN FEET

KEY NOTES:

1. ROCK TRAP
2. 8" CONNECTIONS UP TO DEGRITTING SYSTEM
3. 18" DEGRITTING SYSTEM GRAVITY DRAIN TO BUTLER STREET SEWER
4. STORAGE INLET GATE
5. INTERTANK OVERFLOW WEIR WITH BAFFLE
6. TANK FLUSH GATE
7. FLUSH LANE DIVIDER CURB
8. EFFLUENT CHANNEL FLUSH GATE
9. DEWATERING PUMP
10. DEWATERING FORCEMAIN TO PS
11. FOUL AIR WITHDRAWAL DUCT
12. STORAGE EFFLUENT OUTLET GATE
13. TANK FLUSHING SUPPLEMENTARY FILL PIPE WITH CONTROL VALVE
14. CSO CONVEYANCE
15. SERVICE WATER PUMPING STATION
16. CITY WATER SUPPLY THROUGH AIR GAP AND CONTROL VALVE TO SERVICE WATER RESERVOIR
17. FORCEMAIN FROM NEVINS STREET REPLACEMENT PS

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

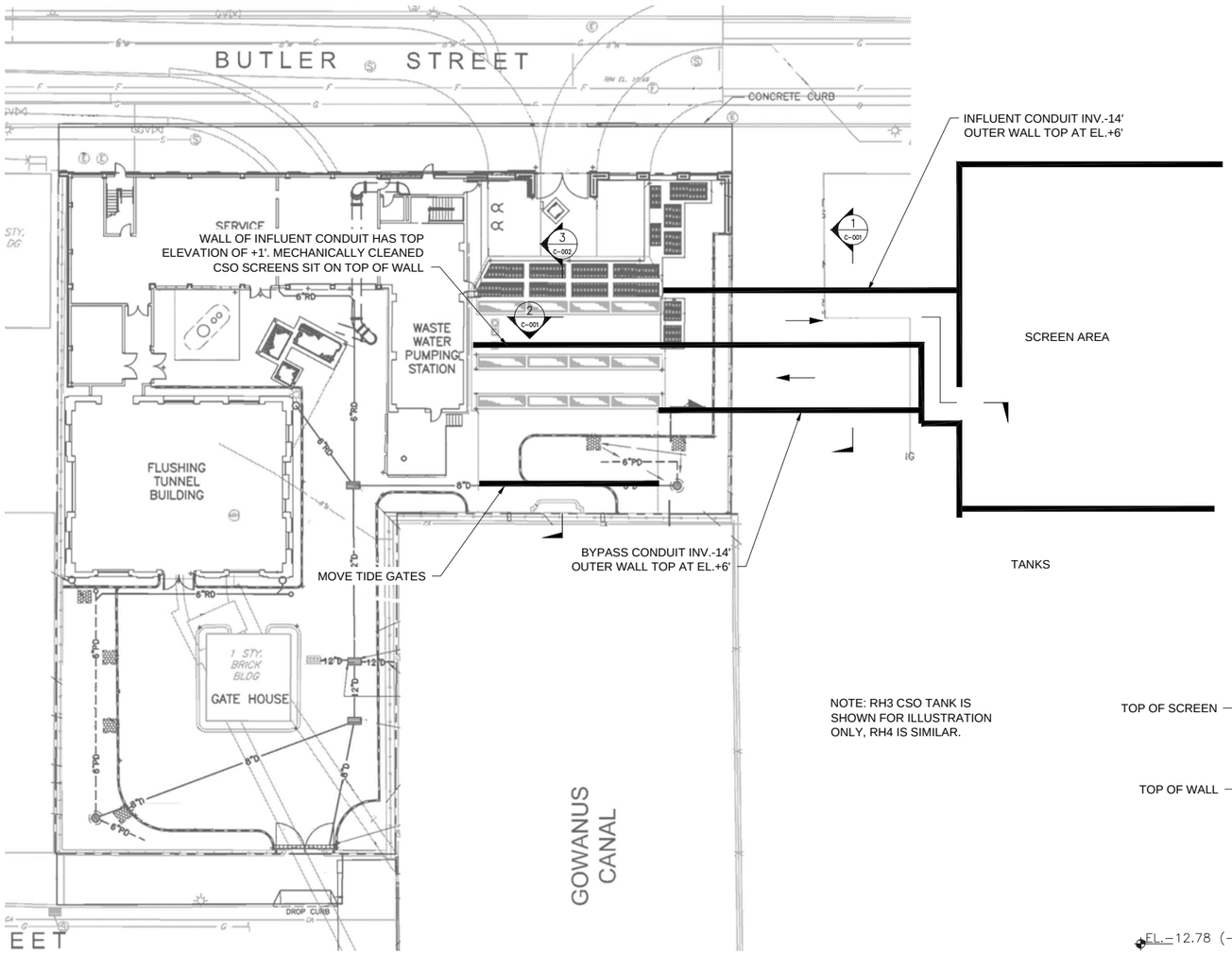
Gowanus Canal
New York, New York

DRAWING NUMBER
RH4-03

TITLE
Sections RH034 — Site RH4 8 MG

PREPARED FOR
NYC Environmental Protection

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

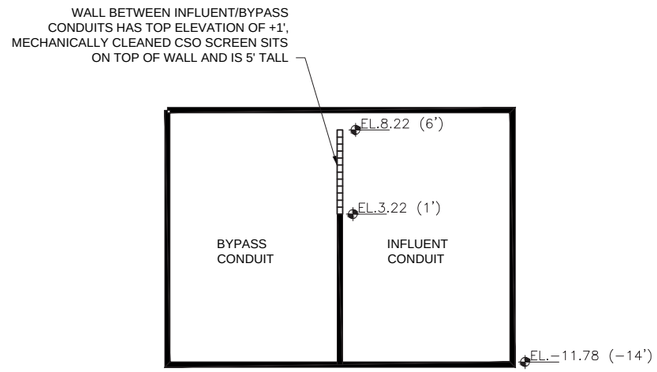


SOURCE:
DVIRKA AND BARTILUCCI, MARCH 2009,
GOWANUS FACILITY

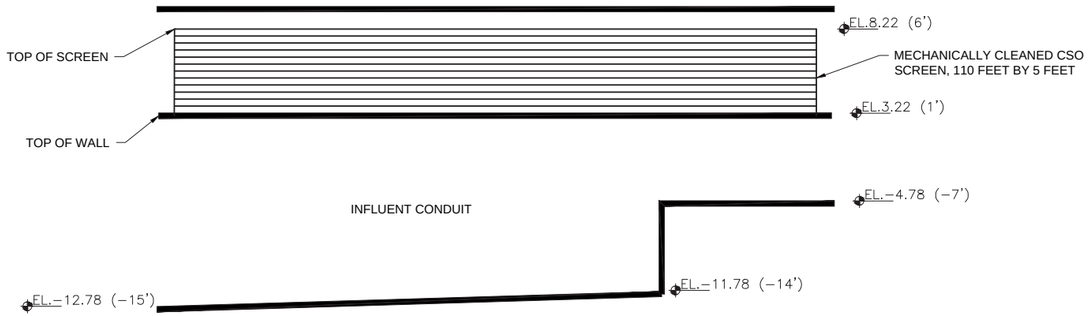
SITE PLAN CSO STRUCTURE

0 20' 40'
SCALE IN FEET

NOTE: RH3 CSO TANK IS SHOWN FOR ILLUSTRATION ONLY, RH4 IS SIMILAR.



1 C-001 SECTION
not to scale



2 C-001 SECTION
not to scale

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

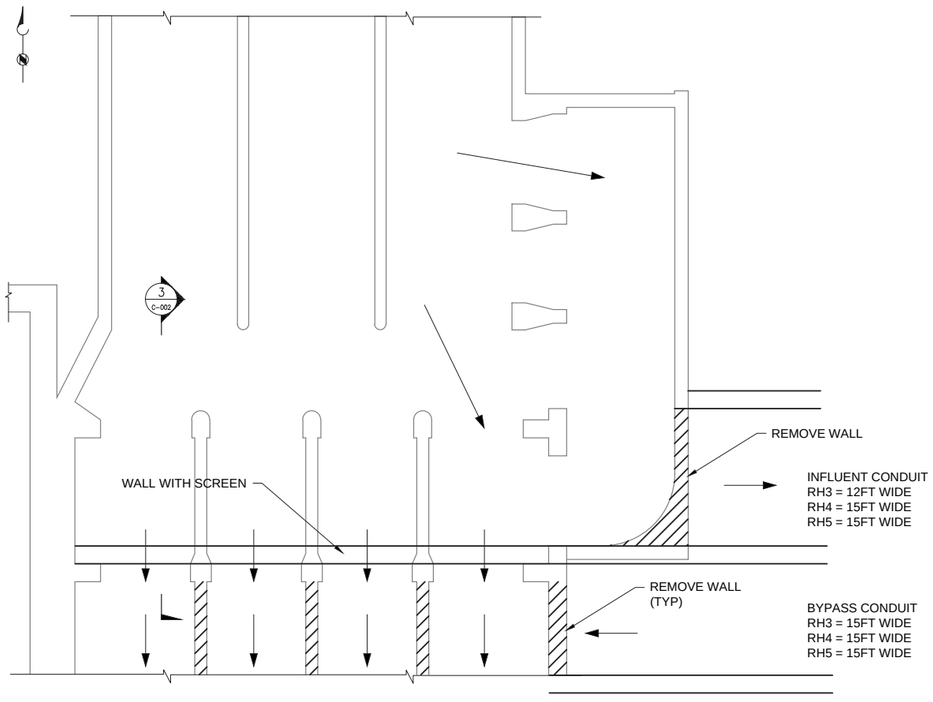
Gowanus Canal
New York, New York

DRAWING NUMBER
C-001

TITLE
RH 034 Regulator Structure: CSO Storage Diversion Detail 1

PREPARED FOR
NYC Environmental Protection

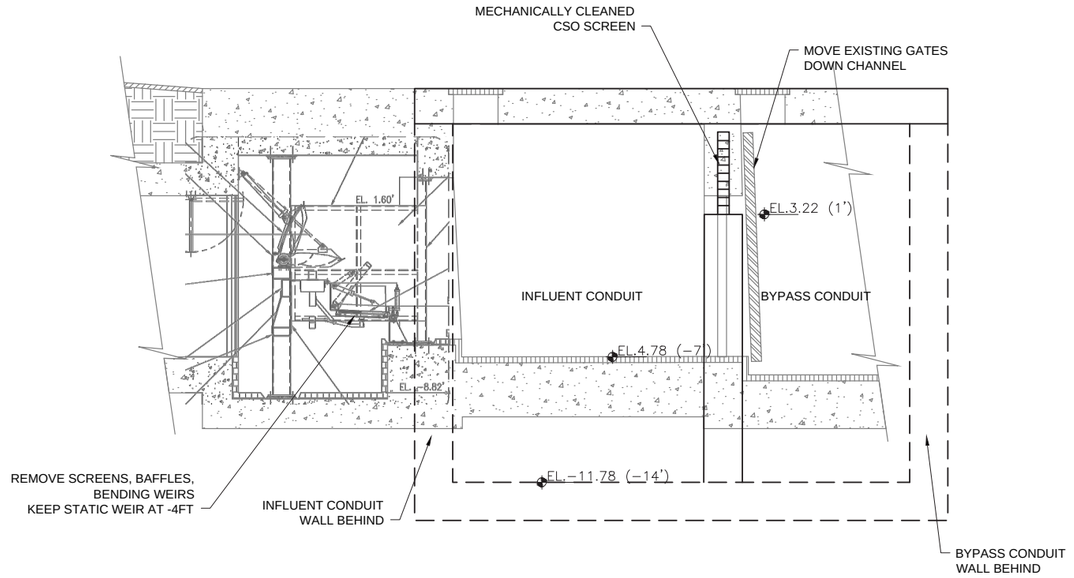
CLIENT New York Department of Environmental Protection | PREPARED BY Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631



PLAN VIEW AT CSO STRUCTURE

0 4' 8'
SCALE IN FEET

SOURCE:
DVIRKA AND BARTILUCCI, MARCH 2009,
GOWANUS FACILITY



3
C-002
SECTION

0 8' 16'
SCALE IN FEET

NOTE: ALL ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 2.22 FEET BELOW THE BROOKLYN HIGHWAY DATUM

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

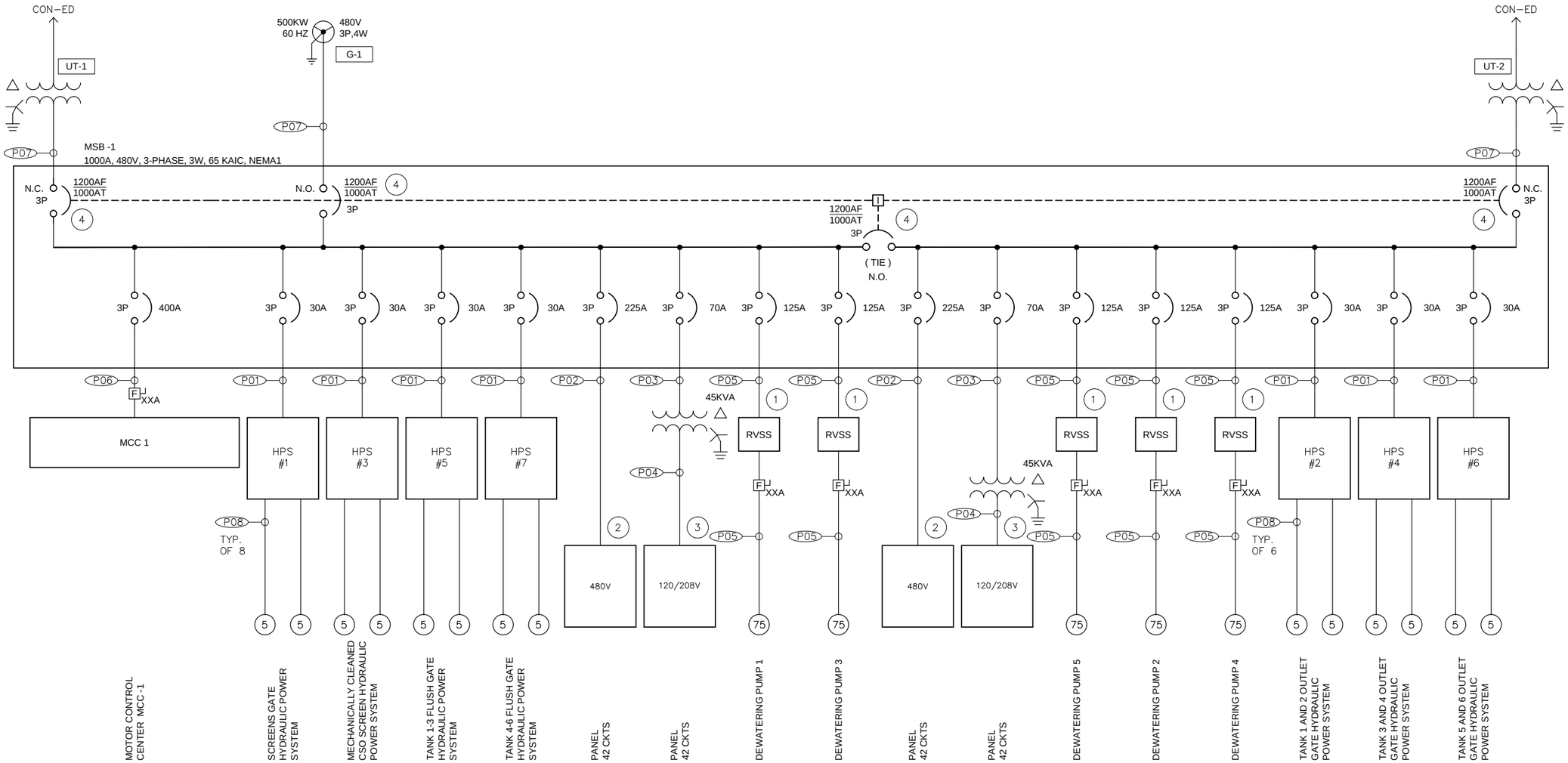
Gowanus Canal
New York, New York

DRAWING NUMBER
C-002

TITLE
RH 034 Regulator Structure: CSO Storage Diversion Detail 2

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

PREPARED FOR
NYC Environmental Protection



KEY NOTES:

1. PROVIDE BYPASS
2. POWER PANEL, NEMA 1.
3. LIGHTING, RECEPTACLE PANEL, NEMA 1.
4. PROVIDE WITH LSIG TRIP UNIT.

FEEDER SCHEDULE

P01	3#10,#10G,3/4"C	P06	3–500KCM,#3G,3"C
P02	4–4/0,#4G,2 1/2"C	P07	4//RUNS,4–250KCM,3"C
P03	3#6,#8G,1"C	P08	VENDOR PROVIDED & INSTALLED
P04	4–1/0,#6G,2"C	P09	3#10,#10G,3/4"C
P05	3#1,#6G,1 1/2"C		

GENERAL NOTES:

A. LOCATE ALL ELECTRICAL GEAR APPROXIMATELY 14'–0" A.F.G. AT AN ELEVATION ABOVE FLOOD PLAIN.

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal

New York, New York

DRAWING NUMBER

RH-E-001

TITLE

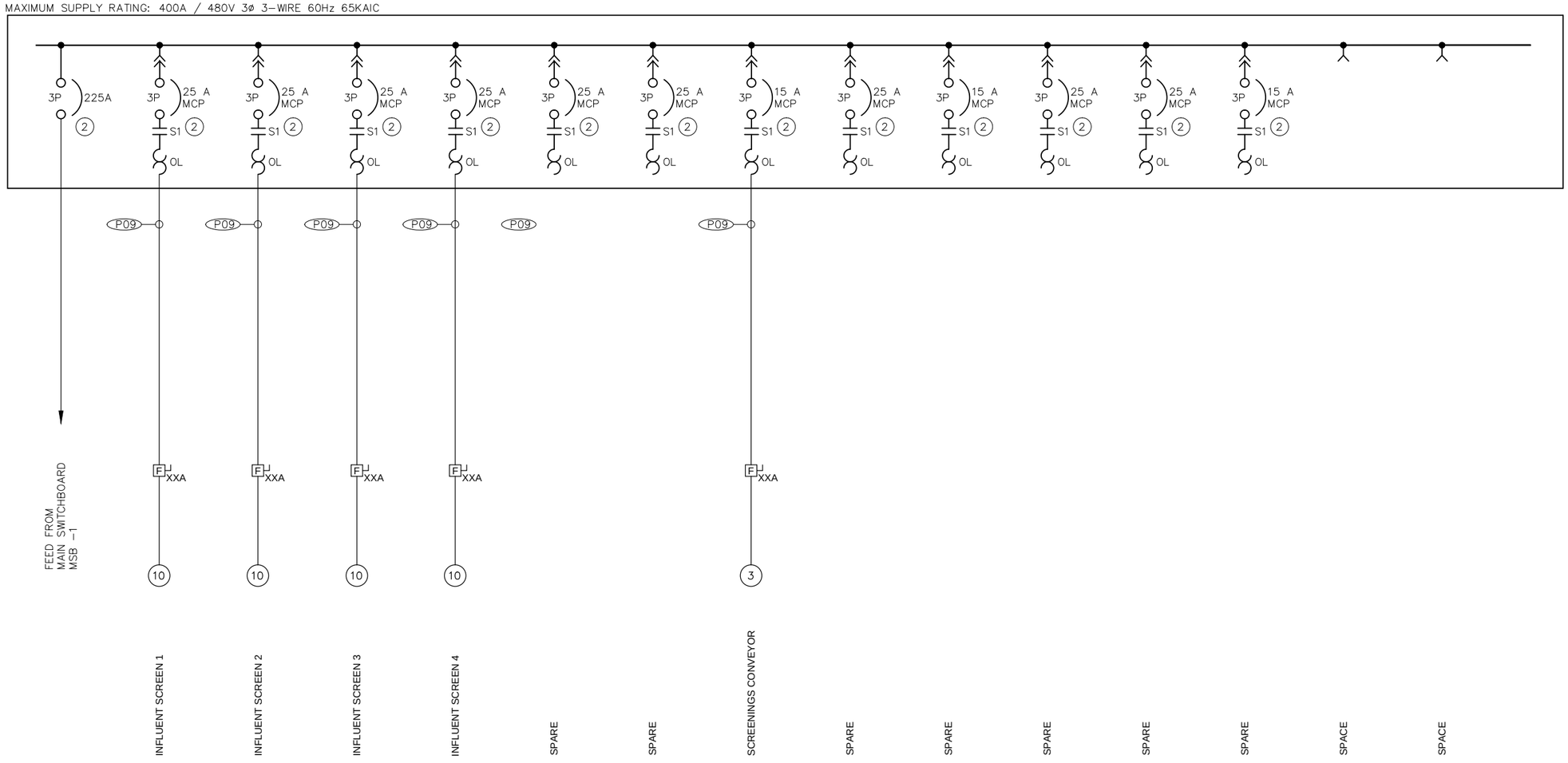
Red Hook Overall Single Line Diagram

PREPARED FOR

NYC Environmental Protection

CLIENT New York Department of Environmental Protection | PREPARED BY Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

(1) MCC –1
MAXIMUM SUPPLY RATING: 400A / 480V 3ø 3–WIRE 60Hz 65KAIC



KEY NOTES:

(1) CONTRACTOR SHALL SUPPLY AN MCC LINE-UP WITH A MINIMUM OF (3) VERTICAL SECTIONS.

(2) CIRCUIT BREAKER SHALL BE PAD LOCKABLE

PRELIMINARY NOT FOR CONSTRUCTION

Brown AND Caldwell

Gowanus Canal
New York, New York

DRAWING NUMBER
RH-E-002

TITLE
Red Hook MCC Single Line Diagram

PREPARED FOR
NYC Environmental Protection

CLIENT New York Department of Environmental Protection | **PREPARED BY** Brown and Caldwell , 1359 Broadway, Suite 1140, New York City, NY 10018-7101, Tel: 646.367.0631

Appendix D: AKRF Land Acquisition for Gowanus Canal CSO Tanks Memorandum

AKRF

Environmental and Planning Consultants

440 Park Avenue South
7th Floor
New York, NY 10016
tel: 212 696-0670
fax: 212 213-3191
www.akrf.com

Memorandum

To:	Don Cohen (Brown and Caldwell)
From:	John Neill, Jed Poster, Christian Michel (AKRF)
Original Date:	January 27, 2015
Updated:	June 12, 2015
Re:	Land Acquisition for Gowanus Canal CSO Tanks
cc:	Shabana Tajwar, Jennifer Franco, George Penesis (AKRF)

EXECUTIVE SUMMARY

This memorandum describes AKRF's analysis of potential acquisition costs for the three privately owned short-listed sites being considered as locations for the Gowanus Canal CSO tanks. This analysis was originally prepared in January 2015 and updated in June 2015 in order to identify and account for recent market activity. The results of the analysis are summarized in **Table 1**.

- The **Past Sales** scenario applies the average price per buildable square foot for transactions that have taken place since 2012 and involved an M2-1 parcel adjacent to the Gowanus Canal. AKRF believes that this price is based on outdated market trends and does not reflect current owners' expectations in the neighborhood.
- The **Recent Trend** scenario applies the average price seen in the four transactions involving M1-2 or M2-1 parcels within two blocks of the Canal that took place in 2014 prior to preparation of the January 2015 version of this memorandum.
- The **Future Outlook** scenario inflates the Recent Trend price by approximately 25%, based on conversations with real estate professionals who are active in the Gowanus neighborhood, as well as recent transactions identified as part of the June 2015 update of this memorandum. AKRF believes that this price represents the likely price in the mid-term future.

Table 1
Summary of Preliminary Results

Site	Pricing Scenarios (*price per buildable square foot)*		
	Past Sales	Recent Trend	Future Outlook
	$84	*$241*	*$300*
RH-3	$17,430,000	$50,007,500	$62,250,000
RH-5	$18,480,000	$53,020,000	$66,000,000
OH-4	$16,181,760	$46,426,240	$57,792,000
OH-5	$13,944,000	$40,006,000	$49,800,000
OH-7	$13,110,720	$37,615,280	$46,824,000

BACKGROUND

The New York City Department of Environmental Protection (DEP) has been ordered by the United States Environmental Protection Agency (EPA) to install two CSO tanks near the Gowanus Canal to accommodate combined sewer overflows. The tanks will require the acquisition of properties in the vicinity of the Canal. Three short-listed sites for each of the two proposed CSO tanks are currently under consideration. The purpose of this analysis is to provide guidance to DEP in terms of the total acquisition costs that could reasonably be expected when acquiring the sites.

Sites RH-3, RH-4, and RH-5 are located within a quarter mile of Outfall RH-034, which is at the northern end of the Canal. Sites OH-4, OH-5 and OH-7 are located within a quarter mile of Outfall OH-007, which is at the northern terminus of Second Avenue, just south of 3rd Street (see **Figure 1**).

- **Site RH-3** consists of two tax lots, both of which are privately owned and currently occupied by industrial or transportation and utility uses. Both tax lots include a mapped (but unbuilt) portion of Douglass Street; the presence of that street right-of-way, which totals approximately 6,750 lot square feet per tax lot, could reduce the cost of acquisition for Site RH-3 by up to approximately $8 million under the Future Outlook scenario.
- **Site RH-4** consists of one tax lot, which is currently in use as a public playground (Thomas Greene Playground); because that parcel is in public ownership, its cost of acquisition was assumed to be zero for the purposes of this analysis.
- **Site RH-5** consists of six tax lots, all of which are privately owned and are currently occupied by transportation and utility or parking facility uses.
- **Site OH-4A** consists of one tax lot, which is currently vacant; because that parcel is in public ownership, its cost of acquisition was also assumed to be zero.
- **Site OH-4B** consists of three tax lots, all of which are in private ownership and are currently occupied by industrial or transportation and utility uses.
- **Site OH-5** consists of two tax lots, both of which are in private ownership and are currently occupied by industrial uses.
- **Site OH-7** consists of one tax lot, which is currently occupied by industrial and manufacturing uses.

The data source for the tax block and lot, land use, zoning, and parcel size information for all of the shortlisted sites is the NYC Department of City Planning MapPLUTO 14v1 (2014). The sources for the previous sales data for comparable properties are the Rolling Sales and Annualized Sales tables from the NYC Department of Finance and the Automated City Register Information System (ACRIS). In addition, recent sales data and listing information was obtained from local real estate brokers and other real estate industry sources.

VALUATION METHODOLOGY

Based on the characteristics of the properties subject to this analysis—and on the available data—the market comparables method was used to estimate their potential cost of acquisition. Market comparables represent real estate assets with similar characteristics to the properties to be acquired, and which have sold recently. They therefore allow conclusions on pricing and potential trends observed for a particular area. In order to provide a comprehensive picture of the demand and pricing trends, AKRF also assessed recent transactions published or advertised by brokers, and reached out to brokers and other real estate professionals to obtain their opinion on current and future market conditions.

Please note that sales prices for development sites are typically expressed by the industry as a dollar amount per buildable square foot (bsf)[1]. By reporting pricing information on a bsf basis, development density allowed by zoning is incorporated into the value of the property.

Past Sales - Comparable Transactions from City Records

Using the NYC Department of Finance's ACRIS system, all property transactions involving a parcel located within one block of the Canal and occurring since 2012 were identified. In order to isolate those transactions which most closely match the shortlisted sites, only parcels larger than 8,000 square feet and located in a M2-1 zoning district were selected for further analysis (see **Figure 2**).

The average sales price on a per-square-foot basis for the nine qualifying transactions was approximately $84 bsf (see **Table 2**).

[1] For example: a 1,000 square foot lot with a maximum allowable density (floor-area ratio, or FAR) of 2.0 contains 2,000 buildable square feet (bsf). If that lot sells for $10 per bsf, the total purchase price would be $20,000.

Table 2
Comparable Transactions Since 2012

Address	Block	Lot(s)	Zoning	Buildable SF	Sale Price	Sale Date	$/BSF
400 3rd Avenue	979	1	M2-1	16,000	$2,350,000	2/9/2012	$146.88
322 3rd Avenue	967	1	M2-1	173,034	$7,000,000	8/20/2012	$40.45
420-430 Carroll Street	453	1, 21	M2-1	130,752	$9,000,000	9/14/2012	$68.83
300 Nevins Street	439	1	M2-1	204,140	$14,000,000	12/4/2012	$68.58
Bond/3rd Street Assemblage	n/a	n/a	M2-1	66,580	$5,500,000	6/25/2013	$82.61
365 Bond Street[1]	458	1	M1-4/R7-2/MX-11	89,300	$19,000,000	6/20/2013	$61.85
363 Bond Street[1]	452	1	M1-4/R7-2/MX-11	102,577	$6,950,000	6/26/2013	$67.75
400 Carroll Street[1]	452	15	M1-4/R7-2/MX-11	100,286	$7,200,000	8/19/2013	$71.79
479 DeGraw Street	417	21	M2-1	49,700	$6,000,000	1/28/2014	$120.72
2nd Street/3rd Street Assemblage	462	6, 8, 9, 42, 44	M2-1	52,150	$6,000,000	1/29/2014	$115.05
300 3rd Avenue	967	24	M2-1	81,000	$6,500,000	4/10/2014	$80.25
						Average	**$84**

Notes: 1. These three parcels comprise the Lightstone development site, at which Superfund-related environmental remediation expenses will total $20 million (or roughly $39 per bsf).

Sources: NYC Department of Finance, NYC Department of City Planning

The average sales price of $84 per bsf is far below what is currently demanded for properties in the area and therefore serves as a low-end benchmark when estimating potential sales prices for future transactions. The average sales price reflects mainly pre-2014 market conditions, when the vast majority of properties achieved a sales price of approximately $80 per bsf or less.

Recent Trend – Relevant 2014 Transactions

Recent sales comparables from brokers, along with information from industry publications, revealed a significant upward trend in sales prices that has been occurring in the Gowanus neighborhood in the past year. Several high-profile transactions have closed at sales prices substantially above the average sales price noted in the previous section, leading to the conclusion that a wave of rising sales prices has fundamentally altered the expectations of property owners throughout the neighborhood.

To analyze this trend, AKRF identified four transactions occurring in 2014 that involved parcels located within a manufacturing zone (either M2-1 or M1-2) in close proximity to the Canal (i.e., less than two blocks in any direction).

Rising retail and office rents in the Gowanus neighborhood have likely led to an increase in property values—though many observers have also concluded that many transactions were consummated with the expectation that a residential rezoning (either site-specific or neighborhood-wide) will eventually take place. Because residential uses can command higher rents on a per-buildable square-foot basis than do commercial or manufacturing uses—and because residential zones generally permit a higher density than do manufacturing zones—the mere potential for rezoning can substantially increase property values.

Table 3
2014 Transactions Within Two Blocks of Canal

Site	Transaction Date	Zoning	Current FAR	Buildable SF	Total Purchase	Price per BSF
601-615 Sackett Street	6/27/2014	M1-2	2.0	32,000	$9,500,000	$297
450 Union Street	9/9/2014	M2-1	2.0	57,000	$12,300,000	$216
431 Carroll Street	9/23/2014	M1-2	2.0	106,110	$17,000,000	$160
175-225 Third Street	10/15/2014	M2-1	2.0	266,490	$72,500,000	$272
					Average	**$241**

Sources: NYC Department of Finance, NYC Department of City Planning

Table 3 illustrates the upward trend described in the previous section, as the average sales prices for these transactions are substantially higher than those seen in the previous analysis. The average sales price for development properties sold between June 2014 and October 2014 reached $241 per bsf and exceeds by a wide margin the average sales price achieved in the prior years. The most applicable benchmark is the sales price recorded for the property at 450 Union Street, since it is located only three blocks from the potential northern site (RH-3) and is adjacent to the Canal.

Future Outlook - Mid-Term Market Expectations

To ascertain potential future sales price trends in the Gowanus neighborhood for the January 2015 version of this memorandum, AKRF engaged in conversations with industry professionals active in the neighborhood, including the Director of Acquisitions for a real estate investment firm and a Partner at a prominent brokerage and research firm.

These conversations confirmed AKRF's observation that sale prices in the neighborhood have been rapidly trending upward, particularly over the last year. One property that transacted in September 2014 at $160 per bsf (431 Carroll Street, located two blocks from the Canal; see **Table 3**) was re-listed in October 2014 at just over $300 per bsf. While the listing was subsequently removed, the broker is confident that the property will eventually sell at that level.

There was consensus among the real estate professionals consulted that property owners in the Gowanus area would likely use the most recent $216-per-square-foot sales price at 450 Union Street as a pricing benchmark for manufacturing-zone parcels adjacent to the Canal—even if the parcels are likely to incur substantial costs for environmental remediation or bulkhead reconstruction before they are suitable for redevelopment. From conversations with real estate professionals active in the area, AKRF also learned that several property owners in the neighborhood have been reluctant to sell their properties because they are expecting additional price increases in the future. Instead, these property owners prefer to sign long-term ground leases at rates roughly equivalent to $225-$250 per bsf.

The real estate professionals also strongly indicated that prices for development properties will likely continue to rise. As part of the June 2015 update of this memorandum, AKRF revisited available real estate data to identify new comparable transactions that would illustrate the extent to which recent market trends reflect that forecast. As shown in **Table 4**, the average price per square foot for M1-2 or M2-1 parcels within two blocks of the Canal that transacted between November 2014 and April 2015 increased from the $241 per bsf seen earlier to $271 per bsf; in addition, a $300-per-bsf acquisition cost has already been reached (and exceeded) in some transactions involving smaller parcels. That $300 per bsf threshold, which represents an increase of approximately 25% over the Recent Trend price, should therefore be considered as a likely benchmark for the mid-term future.

Table 4
2014-2015 New Transactions Within Two Blocks of Canal

Site	Transaction Date	Zoning	Current FAR	Buildable SF	Total Purchase	Price per BSF
498 President Street	11/13/2014	M1-2	2.0	8,000	$2,400,000	$300
334 Douglass Street	12/5/2014	M1-2	2.0	5,040	$1,500,000	$298
488 Third Avenue	3/26/2015	M2-1	2.0	2,880	$900,000	$313
109 Second Avenue	4/6/2015	M2-1	2.0	39,234	$10,150,000	$259
					Average	**$271**

Sources: NYC Department of Finance, NYC Department of City Planning

✷

Appendix E: Envision Comparison of Sites Technical Memorandum

Brown AND Caldwell

1359 Broadway, Suite 1140
New York, NY 10018
646.367.0631

Technical Memorandum

Prepared for: New York City Department of Environmental Protection (DEP)

Project Title: Gowanus Canal CSO Tank Siting and Superfund Support

NYCDEP Contract: EE-DSGN-3D-DES-CM, Contract Reg. No. 20131429596

BC Project No.: 145692

Technical Memorandum

Subject: Gowanus Canal CSO Tank Envision Comparison of Sites

Date: May 11, 2015

To: Kevin Clarke, DEP Portfolio Manager

From: Don Cohen, BC Project Manager

Prepared by: _____
Rick Carrier, ENV SP, Vice President

Reviewed by: _____
Don Cohen, CPG, BC Project Manager

Table of Contents

List of Figures

Section 1: Introduction and Purpose

The purpose of this technical memorandum (TM) is to provide a comparison of the potential sustainable aspects of the sites being evaluated for the possible location of combined sewer overflow (CSO) storage tanks in the vicinity of the Gowanus Canal. The United States Environmental Protection Agency (USEPA) through their Record of Decision and subsequent Administrative Order for Remedial Design (ROD) is requiring the DEP to construct two new tanks along the Gowanus Canal—one at the existing Owls Head 007 (OH 007) CSO and one at the Red Hook 034 (RH 034) CSO. In compliance with the ROD, New York Department of Environmental Protection (DEP) is in the process of comparing and selecting the most suitable site for both tanks.

Six sites (three each for RH 034 and OH 007 respectively) were "shortlisted" for further evaluation as summarized in a TM from Brown and Caldwell Associates (BC) titled "Short List of Potential Sites," dated September 30, 2014, and depicted on Figure 1. All six sites are in the industrial and manufacturing area along the Gowanus Canal and are either in the M2-1 or M1-2 Zoning Districts. All of the sites except RH-4, which is the Thomas Greene Playground, are occupied with light industrial uses and would require the displacement of the businesses or the parkland function. One site, OH 7, was recently vacant and available for lease. The Gowanus Canal area is gentrifying and residential and commercial uses are becoming more common. The surrounding areas will be impacted by both the completed work and the construction process (e.g., traffic, noise, dust, odors, etc.).

The Institute for Sustainable Infrastructure (ISI) Envision (Version 2.0, Stage 2) sustainable infrastructure rating system was used to score each of the six shortlisted sites under consideration to understand the relative potential of each site for sustainable performance of the constructed work. The overall goal of this process was to identify the best site or sites to reduce and mitigate negative impacts while making the best investment in long-term performance.

The Envision system is focused on the built environment, or infrastructure, rather than occupied buildings as has been the focus of similar rating systems such as Leadership in Energy and Environmental Design (LEED).The following excerpts from the introduction to the Envision guidance manual further explain the basic framework and the groups that comprise ISI:

- "The Envision Rating System is an objective framework of criteria and performance achievements. It is designed to help users identify ways in which sustainable approaches can be used to plan, design, construct, and operate infrastructure projects. The goal is to improve the sustainable performance of infrastructure projects in terms of not only the technical performance but also from a social, environmental, and economic perspective. Envision provides an opportunity for infrastructure owners and designers to provide higher-performing solutions by using a life-cycle approach, by working with communities, and by using a restorative approach to infrastructure projects."
- "Envision takes a new tack by establishing a holistic framework for evaluation and rating infrastructure projects against the needs and values of the community."
- "ISI is a not-for-profit association of the American Society of Civil Engineers, American Council of Engineering Companies, and American Public Works Association. Its purpose is to improve the performance and viability of infrastructure through the application of more sustainable technologies and methodologies."

The Envision rating system is grouped into five categories and 60 credits. A credit comprises a sustainability indicator on an aspect of environmental, social, or economic concern. Each credit is scored based on the following five levels of achievement:

1. Improved
2. Enhanced
3. Superior
4. Conserving
5. Restorative

A total of 809 points is achievable based upon the Conserving level of achievement across all 60 credits. The five categories as described in the Envision guidance manual (and associated points) are:

- "The **Quality of Life** (181) category addresses a project's impact on surrounding communities, from the health and well-being of individuals to the well-being of the social fabric as a whole. These impacts may be physical, economic, or social."
- "The **Leadership** (121) category measures the potential for the project team to communicate and collaborate with a wide variety of people in creating ideas for the project and understanding the long-term holistic view of the project and its life cycle." This category is less sensitive to siting and is more related to overall organizational commitment. DEP has demonstrated and documented this commitment in documents such as PlaNYC, the DEP mission statement, and the Bureau of Engineering Design and Construction's (BEDC's) adopted sustainability policy.
- "The **Resource Allocation** (182) category is broadly concerned with the quantity, source, and characteristics of the resources needed to build infrastructure (construction) and keep it running (operations)."
- "The **Natural World** (203) category addresses how to understand and minimize negative impacts to the natural world while considering ways in which the infrastructure can interact with natural systems in a synergistic, positive way."
- The **Climate and Risk** (122) category "general scope is twofold: to minimize emissions that may contribute to increased short- and long-term risks and to ensure infrastructure projects are resilient to short-term hazards or altered long-term future conditions."

Additional information on ISI and the Envision Rating System is available at: www.sustainableinfrastructure.org.

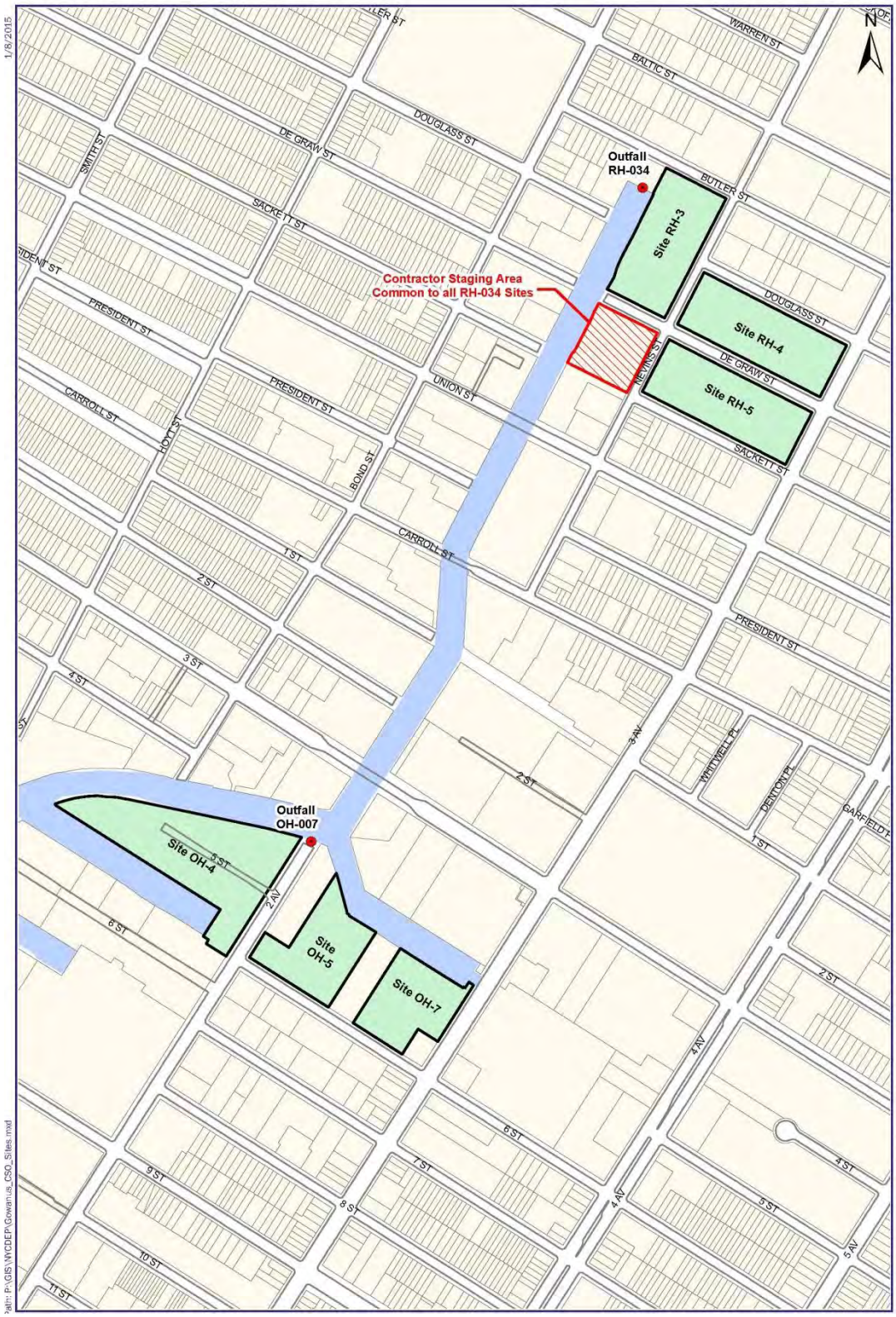


Figure 1. Potential CSO locations

Section 2: Approach

BC used a spreadsheet developed by DEP that automates the scoring of the Envision rating system. Each site was scored using the tool and annotated in the comments column to explain the rationale for the rating based on the potential achievement level. All of the sites offer some potential for enhancement of sustainability of the built work. For example, the sites that are fronted on the Gowanus Canal offer the opportunity for enhancing Quality of Life by expanding public access to the waterfront that is presently limited or not available. In general, an optimistic approach was taken to the scoring of all of the sites by evaluating the potential maximum reasonable rating in the category. DEP will need to make informed decisions as to what level of achievement is practical and reasonable after the final sites are selected and the design process starts in earnest.

Section 3: Results

Summaries of the scoring results for the two outfall locations, Red Hook Outfall 034 (RH 034) and Owls Head Outfall 007 (OH 007), are presented on Figures 2 and 3, respectively. Printouts of the scoring results and associated commentary are provided at the end of this TM.

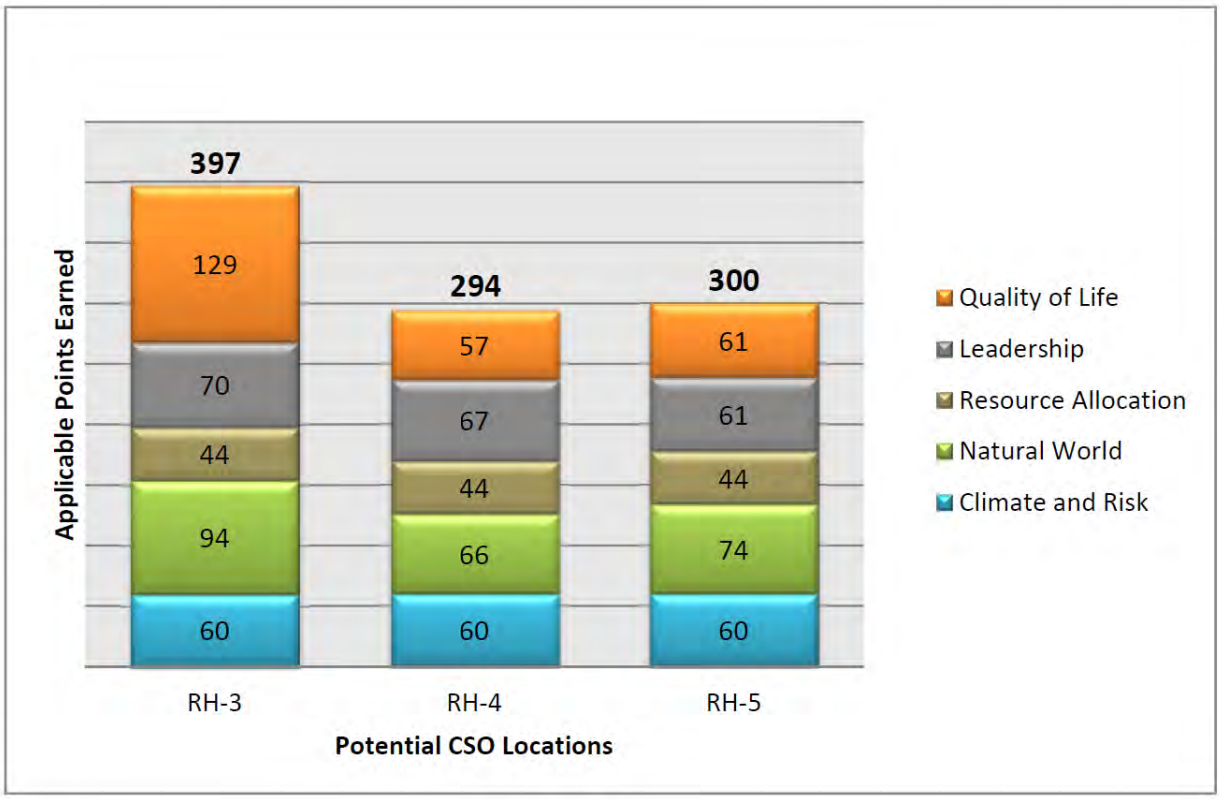


Figure 2. Red Hook Outfall 034 scoring summary results

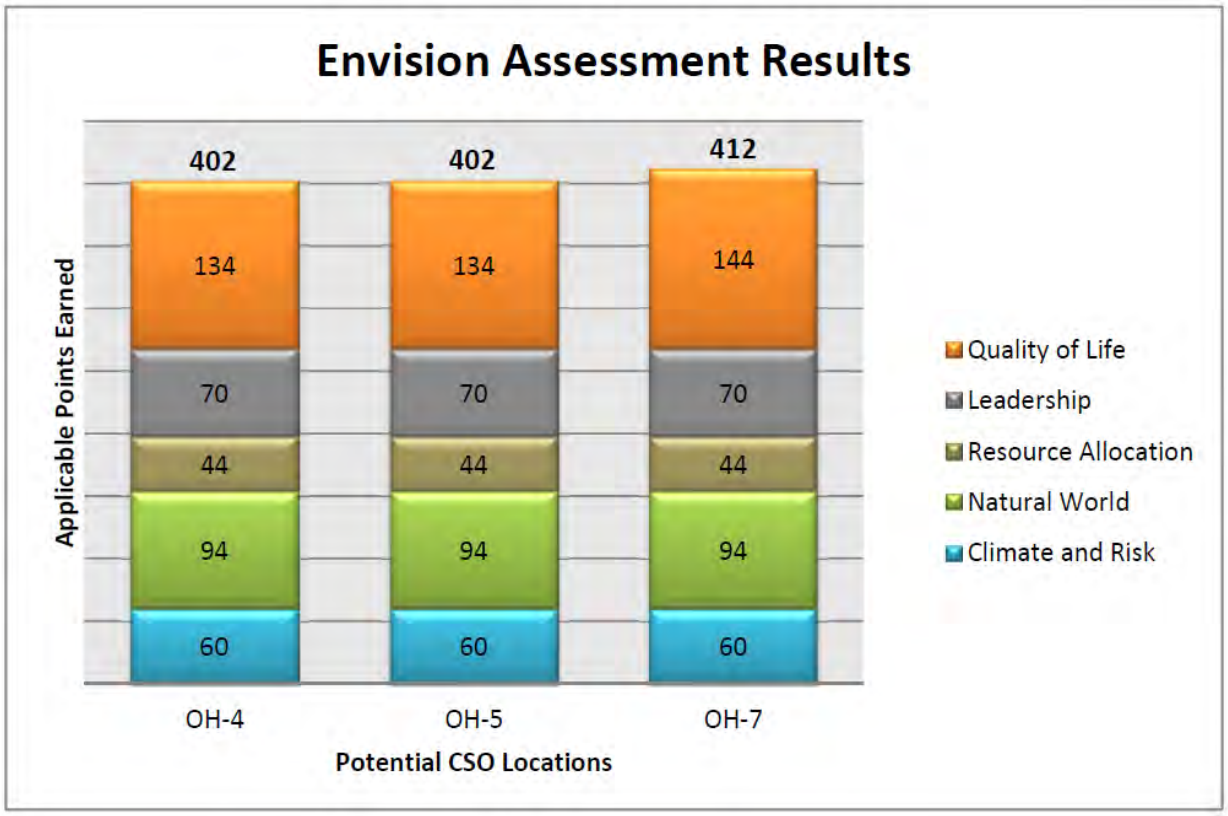


Figure 3. Owls Head Outfall 007 scoring summary results

3.1 RH 034 Sites Results

The RH 3 site presents a significant opportunity for enhanced performance in comparison to the other two sites under consideration. The primary differentiator is that the site offers the opportunity of access to the canal and the associated potential for improved Quality of Life along with the potential for restoration of the waterfront environment and improvement in the Natural World.

The following are highlights of the analysis and results in each of the five Envision categories for the RH 034 sites:

- **Quality of Life:** The RH 034 sites present an opportunity for Quality of Life enhancements with the constructed work associated with aspects of the work that would be compatible with the evolving residential character of the area. For example, the sites can be made more aesthetically pleasing and increase green space from current uses. All of the sites will require at least temporary displacement of workforce associated with the current land use. The RH 3 site scored 71 percent, or 129 of the 181 potential points, compared to 31 and 34 percent, respectively, for the RH 4 and RH 5 sites. As noted above, the potential for opening access to the canal consistent with the urban renewal in the area associated with economic redevelopment presents a significant opportunity for the community. The potential temporary and permanent negative impacts to the Thomas Greene Playground on the RH 4 site led to a lower rating for that site.
- **Leadership:** As noted above, DEP has a demonstrated and documented commitment to sustainability and all three sites offer similar opportunities to demonstrate that commitment through engagement of stakeholders and visible leadership. The three sites scored similarly in the leadership category. The RH 3 site scored 66 percent, or 70 of the 106 potential points, compared to 63 and 58 percent, respectively,

for the RH 4 and RH 5 sites. The primary differentiators in this category are the potential for promoting beneficial access to the waterfront for the RH 3 site and potential for improvements to the Thomas Greene Playground on the RH 4 site.

- **Resource Allocation:** The proposed storage facility will require significant use of materials and energy for both construction and long-term operation regardless of the site location. All three sites scored 26 percent, or 44 of the potential 171 points, in this category because of the large amount of waste that will be generated from the proposed removal of contaminated soils along with the waste stream that will be generated during construction. It should be noted that the RH 3 site will generate substantially less waste soil because of the shorter conveyance construction.
- **Natural World:** The general urban nature of the Gowanus Canal area limits the potential for enhancement of the natural world with the exception of improvements to the riparian environment associated with the canal itself. All three sites provide for a beneficial use of brownfield sites associated with the ROD. The RH 3 site, within the context of the cleanup contemplated by the EPA for the Gowanus Canal, offers the potential opportunity to restore aspects of the riparian environment along the waterfront. The RH 3 site scored 59 percent, or 94 of the 158 potential points, compared to 42 and 47 percent, respectively, for the RH 4 and RH 5 sites. The primary differentiator for the RH 3 site was the recognition of the potential to enhance and restore the riparian environment and the associated wildlife access and connectivity. Some points were recognized for the RH 3 and RH 5 sites for the potential to replace existing truck maintenance facilities with a well-run CSO storage facility and the associated reduction in potential risk to groundwater and surface water resources.
- **Climate and Risk:** The impact on climate change from the construction and operation of the proposed facility is essentially the same for all three sites. Similarly, all of the sites are within the floodplain and should be constructed to avoid damage/interference with operation with potentially higher sea levels. All three sites scored 49 percent, or 60 of the potential 122 points, in this category because of the similar energy use among the sites and the expectation that all vulnerable equipment would be protected from flood risk by locating them on the second floor of the facility.

3.2 OH 007 Sites Results

The OH 007 sites all scored similarly in the assessment, with OH 7 scoring 56 percent of the total points available compared to 54 percent for the OH 4 and 5 sites. The only significant differentiator is the potential for improved access to the bicycle and transit corridor on 3rd Avenue associated with the OH 7 site.

The following are highlights of the analysis and results in each of the five categories for the OH 007 sites:

- **Quality of Life:** The OH 007 sites generally present an opportunity for Quality of Life enhancements associated with aspects of the constructed work that would be compatible with the evolving residential character of the area and opening public access to the Gowanus Canal. All of the sites can be made more aesthetically pleasing and increase green space from current uses. All of the sites will require at least temporary displacement of workforce associated with the current land use. The OH 7 site scored 80 percent, or 144 of the 181 potential points, compared to 74 percent for both of the OH 4 and 5 sites. The only differentiator between the sites is the potential for enhancing the access and usability of the bicycle and transit corridor on 3rd Avenue on the OH 7 site.
- **Leadership:** As noted above, DEP has a demonstrated and documented commitment to sustainability and all three sites offer similar opportunities to demonstrate that commitment through engagement of stakeholders and visible leadership. All three sites scored 66 percent, or 70 of the 106 potential points, and offer essentially the same potential for achievement in the Leadership category.
- **Resource Allocation:** The proposed storage facility will require significant use of materials and energy for both construction and long-term operation regardless of the site location. All three sites scored 26

percent, or 44 of the potential 171 points, in this category because of the large amount of waste that will be generated from the proposed removal of contaminated soils along with the waste stream that will be generated during construction. It should be noted that the OH 4 site will generate substantially less waste soil because of the shorter conveyance construction.

- **Natural World:** The general urban nature of the Gowanus Canal area limits the potential for enhancement of the natural world with the exception of improvements to the riparian environment associated with the canal itself. All three sites provide for a beneficial use of brownfield sites associated with the ROD. Within the context of the proposed cleanup contemplated by the EPA for the Gowanus Canal all of the sites offer the potential opportunity to enhance and restore aspects of the riparian environment along the waterfront and the associated wildlife access and connectivity. Also, some potential reduction to risk of groundwater and surface water contamination should be realized with all three sites through changing from the current industrial uses to a well-run CSO storage facility. All three sites scored 59 percent, or 94 of the potential 158 points, in this category.
- **Climate and Risk:** The impact on climate change from the construction and operation of the proposed facility is essentially the same for all three sites. Similarly, all of the sites are within the floodplain and should be constructed to avoid damage/interference with operation with potentially higher sea levels. All three sites scored 49 percent, or 60 of the potential 122 points, in this category because of the similar energy use among the sites and the expectation that all vulnerable equipment would be protected from flood risk by locating them on the second floor of the facility.

Section 4: Conclusion

Among the RH 034 sites, the RH 3 site presents a superior opportunity for achieving sustainability objectives, scoring 54 percent of the available points compared to 40 percent and 41 percent for the RH 4 and RH 5 sites, respectively. The superior ranking of the RH 3 site is associated primarily with its access to the Gowanus Canal waterfront and the anticipated improvement of quality of life in the neighborhood as well as enhancement of the natural world through restoration of the riparian environment.

The OH 007 sites ranked essentially the same, ranging from 54 to 56 percent of the available points. The OH 4 site would represent a practical benefit of reduced waste disposal because of the lower quantity of contaminated soil that would be required to be landfilled. The OH 7 site offers a marginal benefit in potential enhancement of access and use of the bicycle and transit corridor on 3rd Avenue.

Attachment A: Scoring Results for Red Hook Outfall 034 and Owls Head Outfall 007

Red Hook Outfall 034

1. RH-3 Site
2. RH-4 Site
3. RH-5 Site

Owls Outfall 007

1. OH-4 Site
2. OH-5 Site
3. OH-7 Site

Red Hook Outfall 034

Envision Rating Calculator

Project: Gowanus Canal CSO Facility
Date: 3/18/2015
Reviewer: Rick Carrier
RH-3 Site

Credit ID	Credit Title	Applicable?	Points Available	Rating	Points Achieved	Maximum Possible Points	Percentage of Possible Points	Comments
Section 1: QUALITY OF LIFE								
QL1.1	Improve community quality of life	Yes	25	Restorative (25)	25	25	100%	Potential Waterfront access
QL1.2	Stimulate sustainable growth and development	Yes	16	Superior (5)	5	16	31%	Improved aesthetics for the waterfront
QL1.3	Develop local skills and capabilities	Yes	15	Enhanced (2)	2	15	13%	No real long term employment expected
QL2.1	Enhance public health and safety	Yes	16	Conserving (16)	16	16	100%	Expected to reduce environmental exposure
QL2.2	Minimize noise and vibration	Yes	11	Conserving (8)	8	11	73%	Noise level similar to current use
QL2.3	Minimize light pollution	Yes	11	Superior (4)	4	11	36%	Before and after similar
QL2.4	Improve community mobility and access	Yes	14	Conserving (14)	14	14	100%	Access to canal allows pedestrian crossing
QL2.5	Encourage alternative modes of transportation	Yes	15	Superior (6)	6	15	40%	Adjacent to bike route at Nevins & DeGraw
QL2.6	Improve site accessibility, safety and wayfinding	Yes	15	Superior (6)	6	15	40%	Protect & enhance canal/water environment
QL3.1	Preserve historic and cultural resources	Yes	16	Restorative (16)	16	16	100%	Provides access to canal
QL3.2	Preserve views and local character	Yes	14	Restorative (14)	14	14	100%	Provides access to canal
QL3.3	Enhance public space	Yes	13	Restorative (13)	13	13	100%	Provides access to canal
QL0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**181**		129	181	71	
Section 2: LEADERSHIP								
LD1.1	Provide effective leadership and commitment	Yes	17	Conserving (17)	17	17	100%	Organizational commitment by NYC in place
LD1.2	Establish a sustainability management system	Yes	14	Improved (1)	1	14	7%	No significant difference among sites
LD1.3	Foster collaboration and teamwork	Yes	15	Superior (8)	8	15	53%	No significant difference among sites
LD1.4	Provide for stakeholder involvement	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
LD2.1	Pursue by-product synergy opportunities	No	15	No Points (0)	0	0	N/A	No significant difference among sites
LD2.2	Improve infrastructure integration	Yes	16	Restorative (16)	16	16	100%	Potential Waterfront Access
LD3.1	Plan for long-term monitoring and maintenance	Yes	10	Conserving (10)	10	10	100%	No significant difference among sites
LD3.2	Address conflicting regulations and policies	Yes	8	Improved (1)	1	8	13%	No significant difference among sites
LD3.3	Extend useful life	Yes	12	Conserving (12)	12	12	100%	No significant difference among sites
LD0.0	Innovate or Exceed Credit Requirements	No	6		0	0	N/A	Not considered in analysis
	Total		**121**		70	106	66	
Section 3: RESOURCE ALLOCATION								
RA1.1	Reduce net embodied energy	Yes	18	Improved (2)	2	18	11%	No significant difference among sites
RA1.2	Support sustainable procurement practices	Yes	9	Improved (2)	2	9	22%	No significant difference among sites
RA1.3	Use recycled materials	Yes	14	Improved (2)	2	14	14%	No significant difference among sites
RA1.4	Use regional materials	Yes	10	Improved (3)	3	10	30%	No significant difference among sites
RA1.5	Divert waste from landfills	No	11	No Points (0)	0	0	N/A	Large volume to landfill due to nature of project
RA1.6	Reduce excavated materials taken off site	Yes	6	No Points (0)	0	6	0%	Large volume to landfill due to nature of project
RA1.7	Provide for deconstruction and recycling	Yes	12	Improved (1)	1	12	8%	Significant cast in place concrete components
RA2.1	Reduce energy consumption	Yes	18	Improved (3)	3	18	17%	No significant difference among sites
RA2.2	Use renewable energy	Yes	20	Enhanced (6)	6	20	30%	No significant difference among sites
RA2.3	Commission and monitor energy systems	Yes	11	Enhanced (3)	3	11	27%	No significant difference among sites
RA3.1	Protect fresh water availability	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
RA3.2	Reduce potable water consumption	Yes	21	Improved (4)	4	21	19%	No significant difference among sites
RA3.3	Monitor water systems	Yes	11	Improved (1)	1	11	9%	No significant difference among sites
RA0.0	Innovate or Exceed Credit Requirements	No	9		0	0	N/A	Not considered in analysis
	Total		**182**		44	171	26	
Section 4: NATURAL WORLD								
NW1.1	Preserve prime habitat	Yes	18	Restorative (18)	18	18	100%	Allows for restoration of riparian environment
NW1.2	Protect wetlands and surface water	Yes	18	Improved (1)	1	18	6%	50-foot buffer can be incorporated
NW1.3	Preserve prime farmland	No	15	No Points (0)	0	0	N/A	Not applicable
NW1.4	Avoid adverse geology	No	5	No Points (0)	0	0	N/A	Not applicable
NW1.5	Preserve floodplain functions	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
NW1.6	Avoid unsuitable development on steep slopes	No	6	No Points (0)	0	0	N/A	Not applicable
NW1.7	Preserve greenfields	Yes	23	Restorative (23)	23	23	100%	Compatable use of brownfield for all sites
NW2.1	Manage stormwater	Yes	21	Superior (9)	9	21	43%	Reduce impervious in combination with storage
NW2.2	Reduce pesticide and fertilizer impacts	Yes	9	Superior (5)	5	9	56%	No significant difference among sites
NW2.3	Prevent surface and groundwater contamination	Yes	18	Restorative (18)	18	18	100%	Replacing maintenance facility reduces risk
NW3.1	Preserve species biodiversity	Yes	16	Improved (2)	2	16	13%	Linkage of habitats along canal
NW3.2	Control invasive species	Yes	11	Superior (5)	5	11	45%	No invasive species expected in project
NW3.3	Restore disturbed soils	Yes	10	Conserving (8)	8	10	80%	No significant difference among sites
NW3.4	Maintain wetland and surface water functions	No	19	No Points (0)	0	0	N/A	Nature of project may preclude options
NW0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**203**		94	158	59	
Section 5: CLIMATE AND RISK								
CR1.1	Reduce greenhouse gas emissions	Yes	25	Enhanced (7)	7	25	28%	No significant difference among sites
CR1.2	Reduce air pollutant emissions	Yes	15	Improved (2)	2	15	13%	No significant difference among sites
CR2.1	Assess climate threat	Yes	15	Conserving (15)	15	15	100%	No significant difference among sites
CR2.2	Avoid traps and vulnerabilities	Yes	20	Improved (2)	2	20	10%	No significant difference among sites
CR2.3	Prepare for long-term adaptability	Yes	20	Conserving (16)	16	20	80%	No significant difference among sites
CR2.4	Prepare for short-term hazards	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
CR2.5	Manage heat islands effects	Yes	6	Improved (1)	1	6	17%	No significant difference among sites
CR0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**122**		60	122	49	
	Grand Total		**809**		397	738	53.8%	
					Estimated Rating:			Platnium

Envision Rating Calculator

Project: Gowanus Canal CSO Facility
Date: 3/18/2015
Reviewer: Rick Carrier
RH-4 Site

Credit ID	Credit Title	Applicable?	Points Available	Rating	Points Achieved	Maximum Possible Points	Percentage of Possible Points	Comments
Section 1: QUALITY OF LIFE								
QL1.1	Improve community quality of life	Yes	25	Enhanced (5)	5	25	20%	Will mitigate loss of park amenity
QL1.2	Stimulate sustainable growth and development	Yes	16	Superior (5)	5	16	31%	Park split is neutral
QL1.3	Develop local skills and capabilities	Yes	15	Enhanced (2)	2	15	13%	No real long term employment expected
QL2.1	Enhance public health and safety	Yes	16	Conserving (16)	16	16	100%	Expected to reduce environmental exposure
QL2.2	Minimize noise and vibration	Yes	11	Improved (1)	1	11	9%	Potenital noise source closer to park users
QL2.3	Minimize light pollution	Yes	11	Superior (4)	4	11	36%	Park will require some mitigation
QL2.4	Improve community mobility and access	Yes	14	Improved (1)	1	14	7%	No significant change to existing access
QL2.5	Encourage alternative modes of transportation	Yes	15	Superior (6)	6	15	40%	Adjacent to bike route at Nevins & DeGraw
QL2.6	Improve site accessibility, safety and wayfinding	Yes	15	Enhanced (3)	3	15	20%	Park reconfiguration could enhance safety
QL3.1	Preserve historic and cultural resources	Yes	16	Conserving (13)	13	16	81%	Possible park enhancement
QL3.2	Preserve views and local character	Yes	14	No Points (0)	0	14	0%	Loss of historic park
QL3.3	Enhance public space	Yes	13	Improved (1)	1	13	8%	Enhanced park but with short-term impacts
QL0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**181**		57	181	31	
Section 2: LEADERSHIP								
LD1.1	Provide effective leadership and commitment	Yes	17	Conserving (17)	17	17	100%	Organizational commitment by NYC is in place
LD1.2	Establish a sustainability management system	Yes	14	Improved (1)	1	14	7%	No significant difference among sites
LD1.3	Foster collaboration and teamwork	Yes	15	Superior (8)	8	15	53%	No significant difference among sites
LD1.4	Provide for stakeholder involvement	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
LD2.1	Pursue by-product synergy opportunities	No	15	No Points (0)	0	0	N/A	No significant difference among sites
LD2.2	Improve infrastructure integration	Yes	16	Conserving (13)	13	16	81%	Improved park facilities in constructed works
LD3.1	Plan for long-term monitoring and maintenance	Yes	10	Conserving (10)	10	10	100%	No significant difference among sites
LD3.2	Address conflicting regulations and policies	Yes	8	Improved (1)	1	8	13%	No significant difference among sites
LD3.3	Extend useful life	Yes	12	Conserving (12)	12	12	100%	No significant difference among sites
LD0.0	Innovate or Exceed Credit Requirements	No	6		0	0	N/A	Not considered in analysis
	Total		**121**		67	106	63	
Section 3: RESOURCE ALLOCATION								
RA1.1	Reduce net embodied energy	Yes	18	Improved (2)	2	18	11%	No significant difference among sites
RA1.2	Support sustainable procurement practices	Yes	9	Improved (2)	2	9	22%	No significant difference among sites
RA1.3	Use recycled materials	Yes	14	Improved (2)	2	14	14%	No significant difference among sites
RA1.4	Use regional materials	Yes	10	Improved (3)	3	10	30%	No significant difference among sites
RA1.5	Divert waste from landfills	No	11	No Points (0)	0	0	N/A	Large volume to landfill due to nature of project
RA1.6	Reduce excavated materials taken off site	Yes	6	No Points (0)	0	6	0%	Large volume to landfill due to nature of project
RA1.7	Provide for deconstruction and recycling	Yes	12	Improved (1)	1	12	8%	Significant cast in place concrete components
RA2.1	Reduce energy consumption	Yes	18	Improved (3)	3	18	17%	No significant difference among sites
RA2.2	Use renewable energy	Yes	20	Enhanced (6)	6	20	30%	No significant difference among sites
RA2.3	Commission and monitor energy systems	Yes	11	Enhanced (3)	3	11	27%	No significant difference among sites
RA3.1	Protect fresh water availability	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
RA3.2	Reduce potable water consumption	Yes	21	Improved (4)	4	21	19%	No significant difference among sites
RA3.3	Monitor water systems	Yes	11	Improved (1)	1	11	9%	No significant difference among sites
RA0.0	Innovate or Exceed Credit Requirements	No	9		0	0	N/A	Not considered in analysis
	Total		**182**		44	171	26	
Section 4: NATURAL WORLD								
NW1.1	Preserve prime habitat	Yes	18	No Points (0)	0	18	0%	Protection or restoration of habitat unlikely
NW1.2	Protect wetlands and surface water	Yes	18	No Points (0)	0	18	0%	No opportunity to improve buffers
NW1.3	Preserve prime farmland	No	15	No Points (0)	0	0	N/A	Not applicable
NW1.4	Avoid adverse geology	No	5	No Points (0)	0	0	N/A	Not applicable
NW1.5	Preserve floodplain functions	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
NW1.6	Avoid unsuitable development on steep slopes	No	6	No Points (0)	0	0	N/A	Not applicable
NW1.7	Preserve greenfields	Yes	23	Restorative (23)	23	23	100%	Compatable use of brownfield for all sites
NW2.1	Manage stormwater	Yes	21	Superior (9)	9	21	43%	Reduce impervious in combination with storage
NW2.2	Reduce pesticide and fertilizer impacts	Yes	9	Superior (5)	5	9	56%	No significant difference among sites
NW2.3	Prevent surface and groundwater contamination	Yes	18	Superior (9)	9	18	50%	Existing park represents little risk
NW3.1	Preserve species biodiversity	Yes	16	Improved (2)	2	16	13%	Expansion of park natural areas possible
NW3.2	Control invasive species	Yes	11	Superior (5)	5	11	45%	No invasive species expected in project
NW3.3	Restore disturbed soils	Yes	10	Conserving (8)	8	10	80%	No significant difference among sites
NW3.4	Maintain wetland and surface water functions	No	19	No Points (0)	0	0	N/A	Nature of project may preclude options
NW0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**203**		66	158	42	
Section 5: CLIMATE AND RISK								
CR1.1	Reduce greenhouse gas emissions	Yes	25	Enhanced (7)	7	25	28%	No significant difference among sites
CR1.2	Reduce air pollutant emissions	Yes	15	Improved (2)	2	15	13%	No significant difference among sites
CR2.1	Assess climate threat	Yes	15	Conserving (15)	15	15	100%	No significant difference among sites
CR2.2	Avoid traps and vulnerabilities	Yes	20	Improved (2)	2	20	10%	No significant difference among sites
CR2.3	Prepare for long-term adaptability	Yes	20	Conserving (16)	16	20	80%	No significant difference among sites
CR2.4	Prepare for short-term hazards	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
CR2.5	Manage heat islands effects	Yes	6	Improved (1)	1	6	17%	No significant difference among sites
CR0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**122**		60	122	49	
	Grand Total		**809**		294	738	39.8%	
					Estimated Rating:			Silver

Envision Rating Calculator

Project: Gowanus Canal CSO Facility
Date: 3/18/2015
Reviewer: Rick Carrier
RH-5 Site

Applicable?
Points Available
Points Achieved
Maximum Possible Points
Percentage of Possible Points

Credit ID	Credit Title			Rating				Comments
Section 1: QUALITY OF LIFE								
QL1.1	Improve community quality of life	Yes	25	Superior (10)	10	25	40%	Engage community & mitigate park impacts
QL1.2	Stimulate sustainable growth and development	Yes	16	Superior (5)	5	16	31%	Similar loss of employment as RH 3
QL1.3	Develop local skills and capabilities	Yes	15	Enhanced (2)	2	15	13%	No real long term employment expected
QL2.1	Enhance public health and safety	Yes	16	Conserving (16)	16	16	100%	Expected to reduce environmental exposure
QL2.2	Minimize noise and vibration	Yes	11	Conserving (8)	8	11	73%	Noise level similar to current use
QL2.3	Minimize light pollution	Yes	11	Superior (4)	4	11	36%	Before and after similar
QL2.4	Improve community mobility and access	Yes	14	Enhanced (4)	4	14	29%	Incorporate new access features
QL2.5	Encourage alternative modes of transportation	Yes	15	Superior (6)	6	15	40%	Adjacent to bike route at Nevins & DeGraw
QL2.6	Improve site accessibility, safety and wayfinding	Yes	15	Enhanced (3)	3	15	20%	Could enhance wayfinding and safety near park
QL3.1	Preserve historic and cultural resources	Yes	16	Improved (1)	1	16	6%	No historic or cultural enhancements identified
QL3.2	Preserve views and local character	Yes	14	Improved (1)	1	14	7%	Expect to fit future neighborhood character
QL3.3	Enhance public space	Yes	13	Improved (1)	1	13	8%	Enhanced park but with short-term impacts
QL0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**181**		61	181	34	
Section 2: LEADERSHIP								
LD1.1	Provide effective leadership and commitment	Yes	17	Conserving (17)	17	17	100%	Organizational commitment by NYC is in place
LD1.2	Establish a sustainability management system	Yes	14	Improved (1)	1	14	7%	No significant difference among sites
LD1.3	Foster collaboration and teamwork	Yes	15	Superior (8)	8	15	53%	No significant difference among sites
LD1.4	Provide for stakeholder involvement	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
LD2.1	Pursue by-product synergy opportunities	No	15	No Points (0)	0	0	N/A	No significant difference among sites
LD2.2	Improve infrastructure integration	Yes	16	Superior (7)	7	16	44%	Potential for integration with park
LD3.1	Plan for long-term monitoring and maintenance	Yes	10	Conserving (10)	10	10	100%	No significant difference among sites
LD3.2	Address conflicting regulations and policies	Yes	8	Improved (1)	1	8	13%	No significant difference among sites
LD3.3	Extend useful life	Yes	12	Conserving (12)	12	12	100%	No significant difference among sites
LD0.0	Innovate or Exceed Credit Requirements	No	6		0	0	N/A	Not considered in analysis
	Total		**121**		61	106	58	
Section 3: RESOURCE ALLOCATION								
RA1.1	Reduce net embodied energy	Yes	18	Improved (2)	2	18	11%	No significant difference among sites
RA1.2	Support sustainable procurement practices	Yes	9	Improved (2)	2	9	22%	No significant difference among sites
RA1.3	Use recycled materials	Yes	14	Improved (2)	2	14	14%	No significant difference among sites
RA1.4	Use regional materials	Yes	10	Improved (3)	3	10	30%	No significant difference among sites
RA1.5	Divert waste from landfills	No	11	No Points (0)	0	0	N/A	Large volume to landfill due to nature of project
RA1.6	Reduce excavated materials taken off site	Yes	6	No Points (0)	0	6	0%	Large volume to landfill due to nature of project
RA1.7	Provide for deconstruction and recycling	Yes	12	Improved (1)	1	12	8%	Significant cast in place concrete components
RA2.1	Reduce energy consumption	Yes	18	Improved (3)	3	18	17%	No significant difference among sites
RA2.2	Use renewable energy	Yes	20	Enhanced (6)	6	20	30%	No significant difference among sites
RA2.3	Commission and monitor energy systems	Yes	11	Enhanced (3)	3	11	27%	No significant difference among sites
RA3.1	Protect fresh water availability	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
RA3.2	Reduce potable water consumption	Yes	21	Improved (4)	4	21	19%	No significant difference among sites
RA3.3	Monitor water systems	Yes	11	Improved (1)	1	11	9%	No significant difference among sites
RA0.0	Innovate or Exceed Credit Requirements	No	9		0	0	N/A	Not considered in analysis
	Total		**182**		44	171	26	
Section 4: NATURAL WORLD								
NW1.1	Preserve prime habitat	Yes	18	No Points (0)	0	18	0%	Protection or restoration of habitat unlikely
NW1.2	Protect wetlands and surface water	Yes	18	Improved (1)	1	18	6%	No real opportunity to improve buffers
NW1.3	Preserve prime farmland	No	15	No Points (0)	0	0	N/A	Not applicable
NW1.4	Avoid adverse geology	No	5	No Points (0)	0	0	N/A	Not applicable
NW1.5	Preserve floodplain functions	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
NW1.6	Avoid unsuitable development on steep slopes	No	6	No Points (0)	0	0	N/A	Not applicable
NW1.7	Preserve greenfields	Yes	23	Restorative (23)	23	23	100%	Compatable use of brownfield for all sites
NW2.1	Manage stormwater	Yes	21	Superior (9)	9	21	43%	Reduce impervious in combination with storage
NW2.2	Reduce pesticide and fertilizer impacts	Yes	9	Superior (5)	5	9	56%	No significant difference among sites
NW2.3	Prevent surface and groundwater contamination	Yes	18	Restorative (18)	18	18	100%	Replacing maintenance facility reduces risk
NW3.1	Preserve species biodiversity	Yes	16	No Points (0)	0	16	0%	No connectivity available
NW3.2	Control invasive species	Yes	11	Superior (5)	5	11	45%	No invasive species expected in project
NW3.3	Restore disturbed soils	Yes	10	Conserving (8)	8	10	80%	No significant difference among sites
NW3.4	Maintain wetland and surface water functions	No	19	No Points (0)	0	0	N/A	Nature of project may preclude options
NW0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**203**		74	158	47	
Section 5: CLIMATE AND RISK								
CR1.1	Reduce greenhouse gas emissions	Yes	25	Enhanced (7)	7	25	28%	No significant difference among sites
CR1.2	Reduce air pollutant emissions	Yes	15	Improved (2)	2	15	13%	No significant difference among sites
CR2.1	Assess climate threat	Yes	15	Conserving (15)	15	15	100%	No significant difference among sites
CR2.2	Avoid traps and vulnerabilities	Yes	20	Improved (2)	2	20	10%	No significant difference among sites
CR2.3	Prepare for long-term adaptability	Yes	20	Conserving (16)	16	20	80%	No significant difference among sites
CR2.4	Prepare for short-term hazards	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
CR2.5	Manage heat islands effects	Yes	6	Improved (1)	1	6	17%	No significant difference among sites
CR0.0	Innovate or Exceed Credit Requirements	No	5		0	0	N/A	Not considered in analysis
	Total		**122**		60	122	49	
	Grand Total		**809**		300	738	40.7%	
					Estimated Rating:			Gold

Owls Outfall 007

Envision Rating Calculator

Project: Gowanus Canal CSO Facility
Date: 3/18/2015
Reviewer: Rick Carrier
OH-5 Site

Credit ID	Credit Title	Applicable?	Points Available	Rating	Points Achieved	Maximum Possible Points	Percentage of Possible Points	Comments
Section 1: QUALITY OF LIFE								
QL1.1	Improve community quality of life	Yes	25	Restorative (25)	25	25	100%	Potential Waterfront access
QL1.2	Stimulate sustainable growth and development	Yes	16	Superior (5)	5	16	31%	Improved aesthetics for the waterfront
QL1.3	Develop local skills and capabilities	Yes	15	Enhanced (2)	2	15	13%	No real long term employment expected
QL2.1	Enhance public health and safety	Yes	16	Conserving (16)	16	16	100%	Expected to reduce environmental exposure
QL2.2	Minimize noise and vibration	Yes	11	Restorative (11)	11	11	100%	Quieter facility will reduce noise
QL2.3	Minimize light pollution	Yes	11	Superior (4)	4	11	36%	Before and after similar
QL2.4	Improve community mobility and access	Yes	14	Improved (1)	1	14	7%	Limited abitlity to improve access
QL2.5	Encourage alternative modes of transportation	Yes	15	Restorative (15)	15	15	100%	Access to canal, little difference among sites
QL2.6	Improve site accessibility, safety and wayfinding	Yes	15	Conserving (12)	12	15	80%	Protect & enhance canal/water environment
QL3.1	Preserve historic and cultural resources	Yes	16	Restorative (16)	16	16	100%	Protect & enhance canal/water environment
QL3.2	Preserve views and local character	Yes	14	Restorative (14)	14	14	100%	Protect & enhance canal/water environment
QL3.3	Enhance public space	Yes	13	Restorative (13)	13	13	100%	Protect & enhance canal/water environment
QL0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**181**		134	181	74	
Section 2: LEADERSHIP								
LD1.1	Provide effective leadership and commitment	Yes	17	Conserving (17)	17	17	100%	Organizational commitment by NYC is in place
LD1.2	Establish a sustainability management system	Yes	14	Improved (1)	1	14	7%	No significant difference among sites
LD1.3	Foster collaboration and teamwork	Yes	15	Superior (8)	8	15	53%	No significant difference among sites
LD1.4	Provide for stakeholder involvement	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
LD2.1	Pursue by-product synergy opportunities	No	15	No Points (0)	0	0	N/A	No significant difference among sites
LD2.2	Improve infrastructure integration	Yes	16	Restorative (16)	16	16	100%	Potential Waterfront Access
LD3.1	Plan for long-term monitoring and maintenance	Yes	10	Conserving (10)	10	10	100%	No significant difference among sites
LD3.2	Address conflicting regulations and policies	Yes	8	Improved (1)	1	8	13%	No significant difference among sites
LD3.3	Extend useful life	Yes	12	Conserving (12)	12	12	100%	No significant difference among sites
LD0.0	Innovate or Exceed Credit Requirements	No	6		0	0	N/A	Not considered in analysis
	Total		**121**		70	106	66	
Section 3: RESOURCE ALLOCATION								
RA1.1	Reduce net embodied energy	Yes	18	Improved (2)	2	18	11%	No significant difference among sites
RA1.2	Support sustainable procurement practices	Yes	9	Improved (2)	2	9	22%	No significant difference among sites
RA1.3	Use recycled materials	Yes	14	Improved (2)	2	14	14%	No significant difference among sites
RA1.4	Use regional materials	Yes	10	Improved (3)	3	10	30%	No significant difference among sites
RA1.5	Divert waste from landfills	No	11	No Points (0)	0	0	N/A	Large volume to landfill due to nature of project
RA1.6	Reduce excavated materials taken off site	Yes	6	No Points (0)	0	6	0%	Large volume to landfill due to nature of project
RA1.7	Provide for deconstruction and recycling	Yes	12	Improved (1)	1	12	8%	Significant cast in place concrete components
RA2.1	Reduce energy consumption	Yes	18	Improved (3)	3	18	17%	No significant difference among sites
RA2.2	Use renewable energy	Yes	20	Enhanced (6)	6	20	30%	No significant difference among sites
RA2.3	Commission and monitor energy systems	Yes	11	Enhanced (3)	3	11	27%	No significant difference among sites
RA3.1	Protect fresh water availability	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
RA3.2	Reduce potable water consumption	Yes	21	Improved (4)	4	21	19%	No significant difference among sites
RA3.3	Monitor water systems	Yes	11	Improved (1)	1	11	9%	No significant difference among sites
RA0.0	Innovate or Exceed Credit Requirements	No	9		0	0	N/A	Not considered in analysis
	Total		**182**		44	171	26	
Section 4: NATURAL WORLD								
NW1.1	Preserve prime habitat	Yes	18	Restorative (18)	18	18	100%	Allows for restoration of riparian environment
NW1.2	Protect wetlands and surface water	Yes	18	Improved (1)	1	18	6%	50-foot buffer can be incorporated
NW1.3	Preserve prime farmland	No	15	No Points (0)	0	0	N/A	Not applicable
NW1.4	Avoid adverse geology	No	5	No Points (0)	0	0	N/A	Not applicable
NW1.5	Preserve floodplain functions	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
NW1.6	Avoid unsuitable development on steep slopes	No	6	No Points (0)	0	0	N/A	Not applicable
NW1.7	Preserve greenfields	Yes	23	Restorative (23)	23	23	100%	Compatable use of brownfield for all sites
NW2.1	Manage stormwater	Yes	21	Superior (9)	9	21	43%	Reduce impervious in combination with storage
NW2.2	Reduce pesticide and fertilizer impacts	Yes	9	Superior (5)	5	9	56%	No significant difference among sites
NW2.3	Prevent surface and groundwater contamination	Yes	18	Restorative (18)	18	18	100%	Replacement of current use reduces risk
NW3.1	Preserve species biodiversity	Yes	16	Improved (2)	2	16	13%	Potential to begin linkage of habitats along canal
NW3.2	Control invasive species	Yes	11	Superior (5)	5	11	45%	No invasive species expected in constructe works
NW3.3	Restore disturbed soils	Yes	10	Conserving (8)	8	10	80%	No significant difference among sites
NW3.4	Maintain wetland and surface water functions	No	19	No Points (0)	0	0	N/A	Nature of project may preclude options
NW0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**203**		94	158	59	
Section 5: CLIMATE AND RISK								
CR1.1	Reduce greenhouse gas emissions	Yes	25	Enhanced (7)	7	25	28%	No significant difference among sites
CR1.2	Reduce air pollutant emissions	Yes	15	Improved (2)	2	15	13%	No significant difference among sites
CR2.1	Assess climate threat	Yes	15	Conserving (15)	15	15	100%	No significant difference among sites
CR2.2	Avoid traps and vulnerabilities	Yes	20	Improved (2)	2	20	10%	No significant difference among sites
CR2.3	Prepare for long-term adaptability	Yes	20	Conserving (16)	16	20	80%	No significant difference among sites
CR2.4	Prepare for short-term hazards	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
CR2.5	Manage heat islands effects	Yes	6	Improved (1)	1	6	17%	No significant difference among sites
CR0.0	Innovate or Exceed Credit Requirements	No	5		0	0	N/A	Not considered in analysis
	Total		**122**		60	122	49	
	Grand Total		**809**		402	738	54.5%	
					Estimated Rating:			Platnium

Envision Rating Calculator

Project: Gowanus Canal CSO Facility
Date: 3/18/2015
Reviewer: Rick Carrier
OH-4 Site

Credit ID	Credit Title	Applicable?	Points Available	Rating	Points Achieved	Maximum Possible Points	Percentage of Possible Points	Comments
Section 1: QUALITY OF LIFE								
QL1.1	Improve community quality of life	Yes	25	Restorative (25)	25	25	100%	Potential Waterfront access
QL1.2	Stimulate sustainable growth and development	Yes	16	Superior (5)	5	16	31%	Improved aesthetics for the waterfront
QL1.3	Develop local skills and capabilities	Yes	15	Enhanced (2)	2	15	13%	No real long term employment expected
QL2.1	Enhance public health and safety	Yes	16	Conserving (16)	16	16	100%	Expected to reduce environmental exposure
QL2.2	Minimize noise and vibration	Yes	11	Conserving (8)	8	11	73%	Noise level similar to current use
QL2.3	Minimize light pollution	Yes	11	Superior (4)	4	11	36%	Before and after similar
QL2.4	Improve community mobility and access	Yes	14	Enhanced (4)	4	14	29%	Limited abitlity to improve access
QL2.5	Encourage alternative modes of transportation	Yes	15	Restorative (15)	15	15	100%	Access to canal, little difference among sites
QL2.6	Improve site accessibility, safety and wayfinding	Yes	15	Conserving (12)	12	15	80%	Protect & enhance canal/water environment
QL3.1	Preserve historic and cultural resources	Yes	16	Restorative (16)	16	16	100%	Protect & enhance canal/water environment
QL3.2	Preserve views and local character	Yes	14	Restorative (14)	14	14	100%	Protect & enhance canal/water environment
QL3.3	Enhance public space	Yes	13	Restorative (13)	13	13	100%	Protect & enhance canal/water environment
QL0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**181**		134	181	74	
Section 2: LEADERSHIP								
LD1.1	Provide effective leadership and commitment	Yes	17	Conserving (17)	17	17	100%	Organizational commitment by NYC is in place
LD1.2	Establish a sustainability management system	Yes	14	Improved (1)	1	14	7%	No significant difference among sites
LD1.3	Foster collaboration and teamwork	Yes	15	Superior (8)	8	15	53%	No significant difference among sites
LD1.4	Provide for stakeholder involvement	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
LD2.1	Pursue by-product synergy opportunities	No	15	No Points (0)	0	0	N/A	No significant difference among sites
LD2.2	Improve infrastructure integration	Yes	16	Restorative (16)	16	16	100%	Potential Waterfront Access
LD3.1	Plan for long-term monitoring and maintenance	Yes	10	Conserving (10)	10	10	100%	No significant difference among sites
LD3.2	Address conflicting regulations and policies	Yes	8	Improved (1)	1	8	13%	No significant difference among sites
LD3.3	Extend useful life	Yes	12	Conserving (12)	12	12	100%	No significant difference among sites
LD0.0	Innovate or Exceed Credit Requirements	No	6		0	0	N/A	Not considered in analysis
	Total		**121**		70	106	66	
Section 3: RESOURCE ALLOCATION								
RA1.1	Reduce net embodied energy	Yes	18	Improved (2)	2	18	0	No significant difference among sites
RA1.2	Support sustainable procurement practices	Yes	9	Improved (2)	2	9	22%	No significant difference among sites
RA1.3	Use recycled materials	Yes	14	Improved (2)	2	14	14%	No significant difference among sites
RA1.4	Use regional materials	Yes	10	Improved (3)	3	10	30%	No significant difference among sites
RA1.5	Divert waste from landfills	No	11	No Points (0)	0	0	N/A	Large volume to landfill due to nature of project
RA1.6	Reduce excavated materials taken off site	Yes	6	No Points (0)	0	6	0%	Large volume to landfill due to nature of project
RA1.7	Provide for deconstruction and recycling	Yes	12	Improved (1)	1	12	8%	Significant cast in place concrete components
RA2.1	Reduce energy consumption	Yes	18	Improved (3)	3	18	17%	No significant difference among sites
RA2.2	Use renewable energy	Yes	20	Enhanced (6)	6	20	30%	No significant difference among sites
RA2.3	Commission and monitor energy systems	Yes	11	Enhanced (3)	3	11	27%	No significant difference among sites
RA3.1	Protect fresh water availability	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
RA3.2	Reduce potable water consumption	Yes	21	Improved (4)	4	21	19%	No significant difference among sites
RA3.3	Monitor water systems	Yes	11	Improved (1)	1	11	9%	No significant difference among sites
RA0.0	Innovate or Exceed Credit Requirements	No	9		0	0	N/A	Not considered in analysis
	Total		**182**		44	171	26	
Section 4: NATURAL WORLD								
NW1.1	Preserve prime habitat	Yes	18	Restorative (18)	18	18	100%	Allows for restoration of riparian environment
NW1.2	Protect wetlands and surface water	Yes	18	Improved (1)	1	18	6%	50-foot buffer can be incorporated
NW1.3	Preserve prime farmland	No	15	No Points (0)	0	0	N/A	Not applicable
NW1.4	Avoid adverse geology	No	5	No Points (0)	0	0	N/A	Not applicable
NW1.5	Preserve floodplain functions	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
NW1.6	Avoid unsuitable development on steep slopes	No	6	No Points (0)	0	0	N/A	Not applicable
NW1.7	Preserve greenfields	Yes	23	Restorative (23)	23	23	100%	Compatable use of brownfield for all sites
NW2.1	Manage stormwater	Yes	21	Superior (9)	9	21	43%	Reduce impervious in combination with storage
NW2.2	Reduce pesticide and fertilizer impacts	Yes	9	Superior (5)	5	9	56%	No significant difference among sites
NW2.3	Prevent surface and groundwater contamination	Yes	18	Restorative (18)	18	18	100%	Replacement of current use reduces risk
NW3.1	Preserve species biodiversity	Yes	16	Improved (2)	2	16	13%	Potential to begin linkage of habitats along canal
NW3.2	Control invasive species	Yes	11	Superior (5)	5	11	45%	No invasive species expected in constructe works
NW3.3	Restore disturbed soils	Yes	10	Conserving (8)	8	10	80%	No significant difference among sites
NW3.4	Maintain wetland and surface water functions	No	19	No Points (0)	0	0	N/A	Nature of project may preclude options
NW0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**203**		94	158	59	
Section 5: CLIMATE AND RISK								
CR1.1	Reduce greenhouse gas emissions	Yes	25	Enhanced (7)	7	25	28%	No significant difference among sites
CR1.2	Reduce air pollutant emissions	Yes	15	Improved (2)	2	15	13%	No significant difference among sites
CR2.1	Assess climate threat	Yes	15	Conserving (15)	15	15	100%	No significant difference among sites
CR2.2	Avoid traps and vulnerabilities	Yes	20	Improved (2)	2	20	10%	No significant difference among sites
CR2.3	Prepare for long-term adaptability	Yes	20	Conserving (16)	16	20	80%	No significant difference among sites
CR2.4	Prepare for short-term hazards	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
CR2.5	Manage heat islands effects	Yes	6	Improved (1)	1	6	17%	No significant difference among sites
CR0.0	Innovate or Exceed Credit Requirements	No	5		0	0	N/A	Not considered in analysis
	Total		**122**		60	122	49	
	Grand Total		**809**		402	738	54.5%	
					Estimated Rating:			Platnium

Envision Rating Calculator

Project: Gowanus Canal CSO Facility
Date: 3/18/2015
Reviewer: Rick Carrier
OH-7 Site

Credit ID	Credit Title	Applicable?	Points Available	Rating	Points Achieved	Maximum Possible Points	Percentage of Possible Points	Comments
Section 1: QUALITY OF LIFE								
QL1.1	Improve community quality of life	Yes	25	Restorative (25)	25	25	100%	Potential Waterfront access
QL1.2	Stimulate sustainable growth and development	Yes	16	Superior (5)	5	16	31%	Improved aesthetics for the waterfront
QL1.3	Develop local skills and capabilities	Yes	15	Enhanced (2)	2	15	13%	No real long term employment expected
QL2.1	Enhance public health and safety	Yes	16	Conserving (16)	16	16	100%	Expected to reduce environmental exposure
QL2.2	Minimize noise and vibration	Yes	11	Conserving (8)	8	11	73%	Noise level similar to current use
QL2.3	Minimize light pollution	Yes	11	Superior (4)	4	11	36%	Before and after similar
QL2.4	Improve community mobility and access	Yes	14	Conserving (14)	14	14	100%	3rd Avenue bike route may present opportunities
QL2.5	Encourage alternative modes of transportation	Yes	15	Restorative (15)	15	15	100%	Access to canal, little difference among sites
QL2.6	Improve site accessibility, safety and wayfinding	Yes	15	Conserving (12)	12	15	80%	Protect & enhance canal/water environment
QL3.1	Preserve historic and cultural resources	Yes	16	Restorative (16)	16	16	100%	Protect & enhance canal/water environment
QL3.2	Preserve views and local character	Yes	14	Restorative (14)	14	14	100%	Protect & enhance canal/water environment
QL3.3	Enhance public space	Yes	13	Restorative (13)	13	13	100%	Protect & enhance canal/water environment
QL0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**181**		144	181	80	
Section 2: LEADERSHIP								
LD1.1	Provide effective leadership and commitment	Yes	17	Conserving (17)	17	17	100%	Organizational commitment by NYC is in place
LD1.2	Establish a sustainability management system	Yes	14	Improved (1)	1	14	7%	No significant difference among sites
LD1.3	Foster collaboration and teamwork	Yes	15	Superior (8)	8	15	53%	No significant difference among sites
LD1.4	Provide for stakeholder involvement	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
LD2.1	Pursue by-product synergy opportunities	No	15	No Points (0)	0	0	N/A	No significant difference among sites
LD2.2	Improve infrastructure integration	Yes	16	Restorative (16)	16	16	100%	Potential Waterfront Access
LD3.1	Plan for long-term monitoring and maintenance	Yes	10	Conserving (10)	10	10	100%	No significant difference among sites
LD3.2	Address conflicting regulations and policies	Yes	8	Improved (1)	1	8	13%	No significant difference among sites
LD3.3	Extend useful life	Yes	12	Conserving (12)	12	12	100%	No significant difference among sites
LD0.0	Innovate or Exceed Credit Requirements	No	6		0	0	N/A	Not considered in analysis
	Total		**121**		70	106	66	
Section 3: RESOURCE ALLOCATION								
RA1.1	Reduce net embodied energy	Yes	18	Improved (2)	2	18	11%	No significant difference among sites
RA1.2	Support sustainable procurement practices	Yes	9	Improved (2)	2	9	22%	No significant difference among sites
RA1.3	Use recycled materials	Yes	14	Improved (2)	2	14	14%	No significant difference among sites
RA1.4	Use regional materials	Yes	10	Improved (3)	3	10	30%	No significant difference among sites
RA1.5	Divert waste from landfills	No	11	No Points (0)	0	0	N/A	Large volume to landfill due to nature of project
RA1.6	Reduce excavated materials taken off site	Yes	6	No Points (0)	0	6	0%	Large volume to landfill due to nature of project
RA1.7	Provide for deconstruction and recycling	Yes	12	Improved (1)	1	12	8%	Significant cast in place concrete components
RA2.1	Reduce energy consumption	Yes	18	Improved (3)	3	18	17%	No significant difference among sites
RA2.2	Use renewable energy	Yes	20	Enhanced (6)	6	20	30%	No significant difference among sites
RA2.3	Commission and monitor energy systems	Yes	11	Enhanced (3)	3	11	27%	No significant difference among sites
RA3.1	Protect fresh water availability	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
RA3.2	Reduce potable water consumption	Yes	21	Improved (4)	4	21	19%	No significant difference among sites
RA3.3	Monitor water systems	Yes	11	Improved (1)	1	11	9%	No significant difference among sites
RA0.0	Innovate or Exceed Credit Requirements	No	9		0	0	N/A	Not considered in analysis
	Total		**182**		44	171	26	
Section 4: NATURAL WORLD								
NW1.1	Preserve prime habitat	Yes	18	Restorative (18)	18	18	100%	Allows for restoration of riparian environment
NW1.2	Protect wetlands and surface water	Yes	18	Improved (1)	1	18	6%	50-foot buffer can be incorporated
NW1.3	Preserve prime farmland	No	15	No Points (0)	0	0	N/A	Not applicable
NW1.4	Avoid adverse geology	No	5	No Points (0)	0	0	N/A	Not applicable
NW1.5	Preserve floodplain functions	Yes	14	Enhanced (5)	5	14	36%	No significant difference among sites
NW1.6	Avoid unsuitable development on steep slopes	No	6	No Points (0)	0	0	N/A	Not applicable
NW1.7	Preserve greenfields	Yes	23	Restorative (23)	23	23	100%	Compatable use of brownfield for all sites
NW2.1	Manage stormwater	Yes	21	Superior (9)	9	21	43%	Reduce impervious in combination with storage
NW2.2	Reduce pesticide and fertilizer impacts	Yes	9	Superior (5)	5	9	56%	No significant difference among sites
NW2.3	Prevent surface and groundwater contamination	Yes	18	Restorative (18)	18	18	100%	Replacement of current use reduces risk
NW3.1	Preserve species biodiversity	Yes	16	Improved (2)	2	16	13%	Potential to begin linkage of habitats along canal
NW3.2	Control invasive species	Yes	11	Superior (5)	5	11	45%	No invasive species expected in constructe works
NW3.3	Restore disturbed soils	Yes	10	Conserving (8)	8	10	80%	No significant difference among sites
NW3.4	Maintain wetland and surface water functions	No	19	No Points (0)	0	0	N/A	Nature of project may preclude options
NW0.0	Innovate or Exceed Credit Requirements	No	8		0	0	N/A	Not considered in analysis
	Total		**203**		94	158	59	
Section 5: CLIMATE AND RISK								
CR1.1	Reduce greenhouse gas emissions	Yes	25	Enhanced (7)	7	25	28%	No significant difference among sites
CR1.2	Reduce air pollutant emissions	Yes	15	Improved (2)	2	15	13%	No significant difference among sites
CR2.1	Assess climate threat	Yes	15	Conserving (15)	15	15	100%	No significant difference among sites
CR2.2	Avoid traps and vulnerabilities	Yes	20	Improved (2)	2	20	10%	No significant difference among sites
CR2.3	Prepare for long-term adaptability	Yes	20	Conserving (16)	16	20	80%	No significant difference among sites
CR2.4	Prepare for short-term hazards	Yes	21	Conserving (17)	17	21	81%	No significant difference among sites
CR2.5	Manage heat islands effects	Yes	6	Improved (1)	1	6	17%	No significant difference among sites
CR0.0	Innovate or Exceed Credit Requirements	No	5		0	0	N/A	Not considered in analysis
	Total		**122**		60	122	49	
	Grand Total		**809**		412	738	55.8%	
					Estimated Rating:			Platnium

Appendix F: Upstream Diversion to Storage Re-evaluation Summary Technical Memorandum

Brown AND Caldwell

1359 Broadway, Suite 1140
New York City, NY 10018

646.367.0631

Technical Memorandum

Prepared for: New York Department of Environmental Protection

Project Title: Gowanus Canal CSO Tank Siting and Superfund Support

NYCDEP Contract: EE-DSGN-3D-DES-CM, Contract Reg. No. 20131429596

BC Project No.: 145692

Technical Memorandum

Subject: Gowanus CSO Storage Basin - Upstream Diversion to Storage Re-Evaluation Summary

Date: June 19, 2015

To: Lindsay Degueldre, DEP Accountable Manager

From: Don Cohen, BC Project Manager

Prepared by: _____
Geoffrey Grant, P.E., E-74911

Reviewed by: _____
Donald Cohen, CPG, Project Manager

Limitations:

This document was prepared solely for New York City Department of Environmental Protection (DEP) in accordance with professional standards at the time the services were performed and in accordance with the contract between DEP and Brown and Caldwell Associates dated June 4, 2013. This document is governed by the specific scope of work authorized by DEP; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by DEP and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

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Section 1: Background

The concept of upstream and downstream diversion to storage was examined during development of the Gowanus Canal CSO Tank and Siting and Superfund Support Conceptual Facility Requirements Report (November 2014). Upstream diversion refers to a configuration where flow would be diverted to the proposed Gowanus storage facility upstream of the overflow weir at the RH-034 regulator, while downstream diversion refers to a configuration where flow would be diverted to the storage basin downstream of the weir.

Based on the findings presented in Section 4 of the Conceptual Facility Requirements Report, it was concluded that the downstream diversion scenario was preferred as it provided a higher level of CSO control (fewer typical year activations) and was more likely to enable New York City Department of Environmental Protection (DEP) to attain the targeted solids load reduction, using typical year combined sewer overflow (CSO) volume as the surrogate.

Since issuing the Conceptual Facility Requirements report, key elements of the project have been better defined – including the proposed alignment of the conveyance sewer that will direct flow from the RH-034 structure to the storage on the RH4 (park) site should that site be selected. Given the age of the infrastructure in this neighborhood, the preferred alignment has utility conflicts that will have to be addressed during design. In addition, uncertainty over existing sewer easements could further impact the cost and construction of the conveyance conduits. As the design has evolved, the conveyance capacity of the influent storage conduit and storage volume necessary to attain the level of control targets stipulated in the Record of Decision (ROD) has been better defined. Based on the challenges with the design of the conveyance sewer coupled with the developments regarding conduit and tank sizing, the concept of upstream diversion to storage was re-examined at RH-034 to determine if it now was preferred over downstream diversion.

The purpose of this memo is to summarize the findings from the re-evaluation of the upstream diversion concept in light of the changes since issuing the Conceptual Facility Requirements Report. The impacts of upstream diversion versus downstream version are presented in detail below.

Section 2: Collection System

Under this scenario, flow would be diverted to storage near the intersection of Nevins and Butler Streets (Figure 1 on page 2). By intercepting flow at this location, flow could be diverted from two of the three major influent sewers tributary to the RH-034 regulator and this location would allow influent flow to be directed down Nevins Street to the RH-4 site.

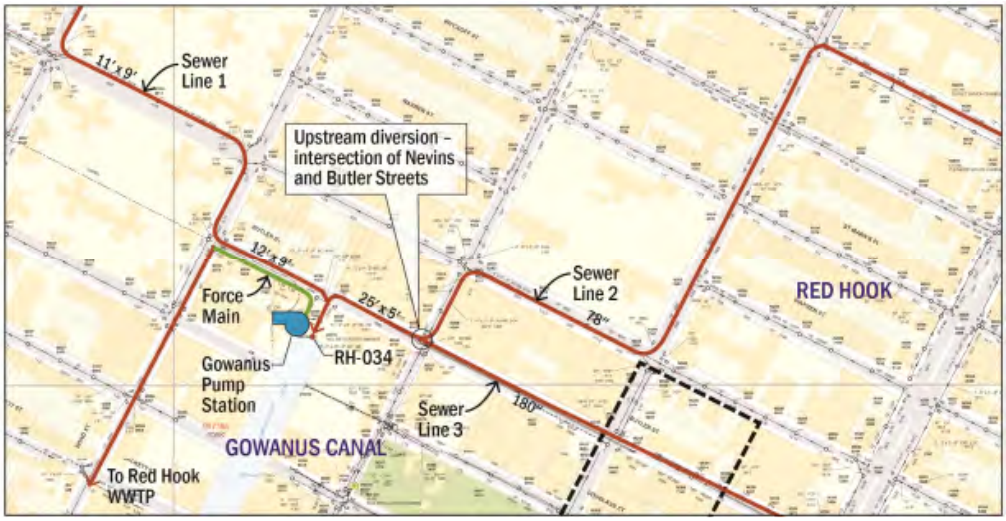


Figure 1. Upstream Diversion Point – Nevins and Butler Streets

Section 3: Storage Conditions

As was discussed in the Conceptual Facility Requirements Report, a dynamic control structure would be needed at this upstream location that enables a base flow of 30 million gallons per day (mgd) to continue to the Gowanus Pump Station, while allowing the diversion of wet weather flow to storage during rain events. Table 1, below, shows the base flow assumptions that were established using model output data for each of the three main sewer lines tributary to RH-034.

Table 1. Model Predicted Dry Weather Flows to RH-034 Regulator

Sewer Line	Flow (mgd)
1	16.7
2	6.1
3	7.2

Under the proposed control scenario, a base flow of 13.3 mgd would continue to the Gowanus Pump Station during wet weather from Sewer Lines 2 and 3, but flows above this threshold would be diverted to storage by gravity. The flow diversion was simulated in the model by controlling the base flow and allowing wet weather flow to pass over a fixed weir into storage. Based on model simulations, the storage diversion weir was set at EL. 1.75 in Sewer Line 2 and EL. 3.5 in Sewer Line 3. The modeled control structures also included a high relief weir that would enable flow to bypass downstream to the Gowanus Pump Station in wet weather events that resulted in a significant upstream hydraulic grade. This was done to provide a relief point for the collection system to protect low-lying areas and basements from flooding. The high relief weir was set at EL. 3 in Sewer Line 2 and EL. 6 in Sewer Line 3. Model results using the typical year (2008) show that the hydraulic grade line (HGL) in the collection system never rose to these elevations and all wet weather flows beyond 13.3 mgd were diverted to the storage basin. Simulations using wet weather events larger than those found in the typical year (e.g. 5-yr or 10-yr event) were not run during this analysis. If upstream diversion to storage is considered in the future, it would be advisable to evaluate the impact of the dynamic diversion structure elevations on the collection system during these larger rainfall events to confirm that the control structures do not impart new surcharge or flooding concerns.

Section 4: Results

Model results of upstream and downstream diversion scenarios are presented in Table 2 below.

Table 2. Model Results of Upstream/Downstream Diversion Scenarios

Condition	RH-034 Overflow		Storage Basin Overflow		Percent Reduction in Typical Year Overflow[5]
	Activation (Typ Yr.)	CSO Vol. (Typ Yr.) [2]	Activation (Typ Yr.)	CSO Vol. (Typ Yr.)[3,4]	
2014 Pre-WWFP CSO Volume	-	182	0	0	0%
2014 LTCP Baseline (includes WWFP Improvements[1])	40	137	0	0	25%
Existing Conditions plus 8 MG S to. D/S Diversion	0	0	6	33	82%
Existing Conditions plus 5.7 MG S to. D/S Diversion	0	0	7	47	74%
Existing Conditions plus 3.5 MG S to. D/S Diversion	0	0	12	76	58%
Existing Conditions plus 8 MG S to. U/S Diversion	40	62.4	1	0.4	66%
Existing Conditions plus 3.5 MG S to. U/S Diversion	40	62.4	6	14.6	58%

1 – Includes Gowanus Pump Station Upgrade, HLSS, and GI
2 – Discharge from existing RH-034 overflow structure. Overflow will receive screening only.
3 – Discharge from proposed storage system. Overflow will receive screening and primary settling prior to discharge.
4 – Calculation is based solely on retention basin volume. Calculation does not consider storage volume of influent/effluent channels.
5 - Surrogate for solids loading reduction

The results include the assumption that the Waterbody/Watershed Facility Plan projects attain a 25% reduction in typical year CSO volume and that the downstream storage scenarios of 8 million gallons (MG), 5.7 MG, and 3.5 MG increase the percent reduction to 82%, 74%, and 58%, respectively.

The upstream diversion near the intersection of Nevins and Butler Streets controls only Sewer Lines 2 and 3 and Sewer Line 1 continues to flow to the RH-034 regulator uncontrolled. As a result, there are a significant number of overflows that continue to occur in a typical year at RH-034, attributed to wet weather flows from Sewer Line 1. Even if all of the typical year wet weather flow from Sewer Lines 2 and 3 are diverted to the storage basin, the best possible level of control that can be achieved at the RH-034 regulator is a 66% reduction in typical year CSO volume. If the objective is meeting the higher end of the ROD range (greater than 66%, up to 74%), upstream diversion to storage will not be effective.

However, if the lower end of the ROD requirements is the objective (58% to 66%), upstream storage may be feasible but 40 CSO events in the typical year will continue to discharge to the canal from the existing RH-034 regulator. Flows that discharge from this location do not receive primary settling like discharges from the CSO storage basin. Flows that pass through the basin will achieve primary settling in the storage tanks which results in a lower effluent TSS loading to the canal than discharges from RH-034. Further, flows that pass through the storage facility will undergo influent and effluent screening which is designed to remove

large floatable debris. Currently, only a portion of flow discharged from RH-034 (up to 200 mgd) receives coarse screening prior to discharge to the canal.

Section 5: Control of Sewer Line 1

Since the remaining overflow at RH-034 are a result of Sewer Line 1, the model results were evaluated to determine if backing up Sewer Line 1 with a control structure could divert flow from Sewer Line 1 to the upstream storage diversion weirs while maintain a base flow of 30 mgd to the Gowanus Pump Station. Under this arrangement, when the water elevation in the sewers reaches the target elevation, water will spill over the static weir and into the storage basin.

As illustrated on Figures 2 and 3 on pages 4 and 5, Sewer Line 1 is at a much lower elevation than Sewer Lines 2 and 3. In addition, the ground elevation of Sewer line 1 is much lower than Sewer lines 2 and 3. The diversion weir to storage would be above the crown of Sewer Line 1, which would cause significant surcharge and potential flooding during peak events. Increasing the HGL in Sewer Lines 2 and 3 is feasible, but increasing HGL in Sewer Line 1 will increase the potential for flooding of homes and low-lying areas tributary to Sewer Line 1. As a result, this option was determined to not be feasible.

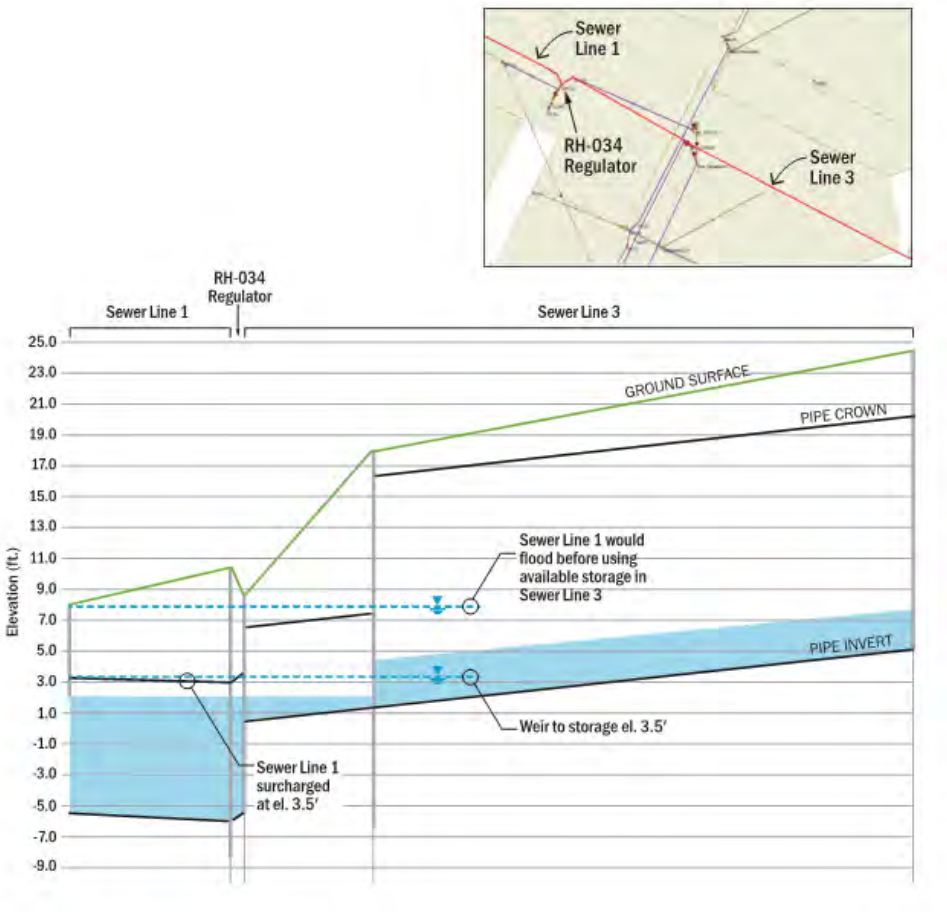


Figure 2. Impact of Controlling Sewer Line 1 (Comparative Plot Using Sewer Line 3)

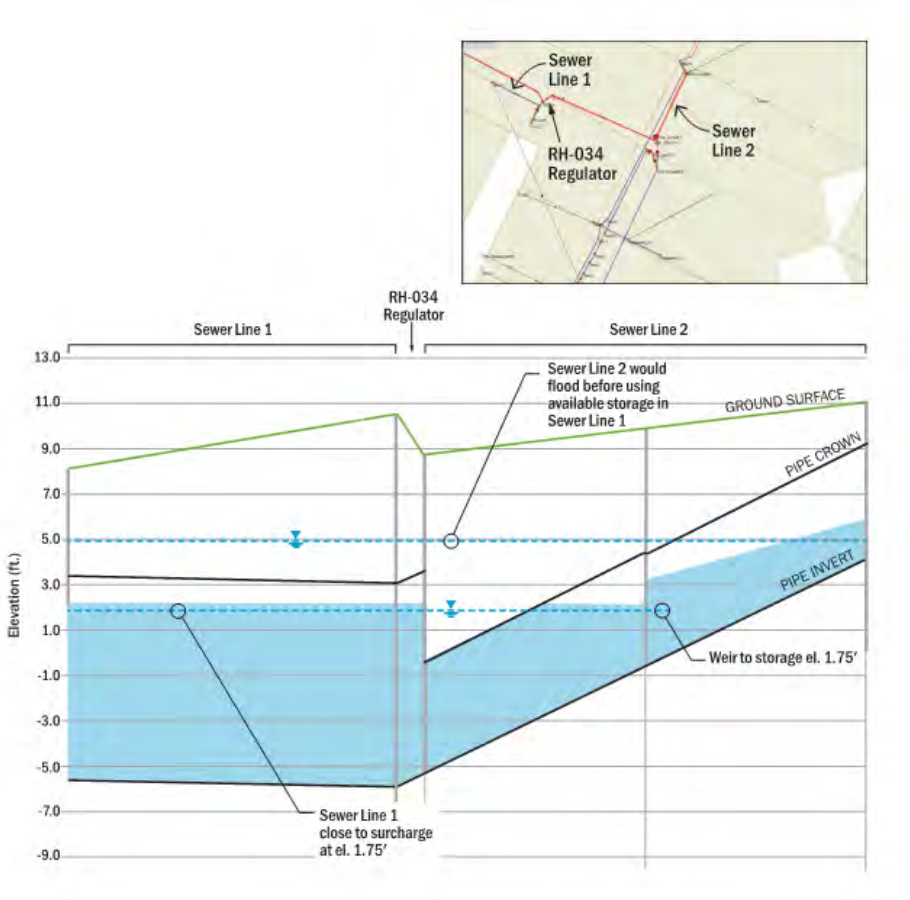


Figure 3. Impact of Controlling Sewer Line 1 (Comparative Plot Using Sewer Line 2)

Section 6: Summary

Based on this modeling analysis (refer to Table 2 above):

- The anticipated CSO volume reduction (58%) is very similar for both a 3.5 MG upstream diversion (at Nevins and Butler) and downstream diversion (at RH-034 regulator). However, the upstream diversion results in approximately 40 remaining activations at RH-034 in a typical year, whereas the downstream diversion results in zero discharges from RH-034 in a typical year.
- However, under this scenario only 170 mgd of flow will be diverted through the storage basin. Once the basin is full, this 170 mgd will receive partial treatment (screening and primary settling) before being discharged to the Canal. Under the downstream diversion scenario 300 mgd of flow will be diverted through the storage basin and will receive the same type of treatment prior to discharge to the Canal. The downstream storage solution provides a higher level of treatment of CSO prior to discharge.
- Under the 8 MG scenario, the downstream diversion results in 15% greater typical year CSO volume reduction than the upstream diversion, largely attributed to the fact that Sewer Line 1 will continue to convey wet weather flows to the RH-034 regulator.

It is assumed that the diversion location and hydraulic analyses will be further examined during detailed design of the final solution. But preliminary results suggest that it would be recommended to continue to pursue a downstream diversion condition as the basis of design at this point in the project.

THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

State Board for Engineering and Land Surveying, Education Building, 89 Washington Avenue, 2nd Flr. Mezzanine East-Wing
Tel. (518) 474-3817, Ext. 140 Fax: (518) 473-6282
E-mail: enginbd@mail.nysed.gov
E-mail: lsurvbd@mail.nysed.gov

June 3, 2015

Mr. Geoffrey Michael Grant
6021 Saint Regis Drive
Cincinnati, OH 45236-0000

Dear Mr. Grant:

This is to acknowledge receipt of your fee and Form 1, Application for Licensure and First Registration as a Professional Engineering, together with your notification of intent to practice in New York under subdivision (b) of Section 7208 of the Education Law. This letter authorizes you to engage in such practice, using your ***Ohio*** *license.*

Section 7208(b) exempts from New York State licensure requirements, "Practice as a professional engineer or land surveyor in this state by any person not a resident, or having no established place of practice in this state, or any person resident in this state but who has arrived in this state within six months, provided, however, such a person shall have filed an application for license as a professional engineer or land surveyor, and is legally qualified for such practice in the state or country in which he resides or has his place of practice or in which he had his previous residence or place of practice, such exemption continuing for only such reasonable time as the board requires to grant or deny the application for license, and a person intending to practice under this subdivision shall so state on the application."

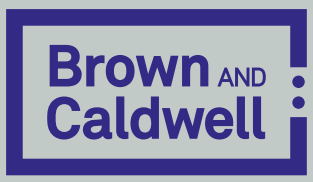
This exemption from licensure continues until whichever of the following occurs first: 1) the Department determines that an applicant fails to document satisfactorily any requirement for licensure (except for examination); 2) the applicant fails to receive a passing score on the first licensing examination for which he or she is eligible; or 3) the applicant receives a New York State license.

Further, Section 7208 states "...that no title, sign, card or device shall be used in such manner as to tend to convey the impression that the person rendering such service is a professional engineer or a land surveyor licensed in this state or is practicing engineering or land surveying."

Sincerely,

Executive Secretary
Jane W. Blair, PE

Prepared by



Brown and Caldwell Associates
1359 Broadway, Ste 1140
New York, NY 10018
Tel: 646.367.0631