NYC Environmental Protection

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April 30, 2018

Joseph DiMura, P.E.
Director, Bureau of Water Compliance
New York State Department of Environmental Conservation
625 Broadway, 4th Floor
Albany, New York 12233-3506

**Re: Order on Consent ("CSO Order"), DEC Case #CO2-20110512-25
Modification to DEC Case #CO2-20000107-8, Appendix A
VIII. Newtown Creek CSO, M. Submit Approvable Drainage Basin Specific LTCP for Newtown Creek**

Dear Mr. DiMura:

On June 30, 2017 the New York City Department of Environmental Protection (DEP) submitted the Newtown Creek Long Term Control Plan (LTCP) to the New York State Department of Environmental Conservation's (DEC). DEP received DEC's review comments on the LTCP on November 9, 2017. DEP and DEC technical staff discussed technical comments on December 19, 2017. DEP's responses were sent January 8, 2018, however, some of the comments required additional evaluation and technical analysis. DEP is providing the requested information in the attached LTCP technical memo.

Please feel free to contact me at (718) 595-5972 or kmahoney@dep.nyc.gov should you have any questions regarding this submittal.

Sincerely,

Keith Mahoney

Keith Mahoney, P.E.
Acting LTCP Program Manager

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Environmental Protection

Capital Project No. WP-169
Long Term Control Plan II

Combined Sewer Overflow Long Term Control Plan Technical Memorandum for Newtown Creek

April 2018

Keith Mahoney, P.E.
NY License No. 074169

The City of New York
Department of Environmental Protection
Bureau of Wastewater Treatment

Prepared by: AECOM USA, Inc.

TABLE OF CONTENTS

Contents

This Technical Memorandum contains additional information and revisions that supersede information presented in the June 2017 Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP) for Newtown Creek. The information and revisions were generated in response to comments on the June 2017 Newtown Creek LTCP that were received from the New York State Department of Environmental Conservation on November 4, 2017. The information presented below is organized by LTCP section.

EXECUTIVE SUMMARY

The following edits/underlined text are hereby incorporated into the Executive Summary of the Newtown Creek LTCP:

Section 1 (Page ES-5)

Table ES-2 is deleted, and replaced in its entirety by the following Table ES-2.

Table ES-2. 2008 Baseline CSO Volume and Overflows per Year – Newtown Creek CSOs

Waterbody/WWTP System	CSO	Volume	Annual Overflow Events
		Total Discharge (MG/yr)	Total (No./yr)
Dutch Kills/BBL(1)	BB-004	0.1	1
	BB-009	43.0	34
Newtown Creek/BBL	BB-010	0.5	7
	BB-011	1.6	14
	BB-012	0.1	1
	BB-013	16.2	31
	BB-014	1.8	18
	BB-015	0.7	13
Dutch Kills/BBL	BB-026(3)	120	37
	BB-040	1.1	16
Newtown Creek/BBL	BB-042	1.5	22
	BB-043	9.4	32
English Kills/NCWWTP(2)	NCB-015(3)	321	31
Newtown Creek/NCWWTP	NCB-019	3.0	21
	NCB-021	0.0	0
	NCB-022	7.5	29
	NCB-023	0.5	8
	NCQ-029	18.7	40
Maspeth Creek/NCWWTP	NCQ-077(3)	300	41
Newtown Creek/NCWWTP	NCB-083(3)	314	42
	NCB-002(4)	N/A	N/A
Total		1,161	42 (max)

Notes:
(1) BBL = Bowery Bay Low Level Interceptor, to Bowery Bay WWTP
(2) NCWWTP = Newtown Creek WWTP system
(3) NCB-015 + NCB-083 + NCQ-077 + BB-026 = 91% of Total Annual Volume.
(4) NCB-002 is the Newtown Creek WWTP high relief outfall that discharges to Whale Creek Canal. This flow is treated before discharge.

Section 2 (Page ES-27)

The selection of the preferred alternative is based on multiple considerations including public input, environmental and water quality benefits, and costs. A traditional knee-of-the-curve (KOTC) analysis is presented in Section 8.5 of the LTCP. As described above, based on that analysis, a ~~24~~ 26 MGD expansion to the Borden Avenue Pump Station (BAPS) was identified as the most cost-effective alternative for reducing the frequency and volume of CSOs from Outfall BB-026 to Dutch Kills.

Section 2 (Page ES-30)

The implementation of the preferred alternative, which would include the storage tunnel for Outfalls NC-015, NC-083 and NC-077, plus the expansion of the BAPS to 26 MGD, has an estimated Net Present Worth (NPW) ranging from $703M to $730M. This estimate reflects $5.0M of annual O&M over the course of 20 years, and an unescalated Probable Bid Costs (PBC) ranging from $570M to $597M, depending on the final route to be determined in subsequent planning and design stages. Costs escalated to the assumed midpoint of construction would range from $1,275M to $1,335M. Note that these costs do not include costs for land acquisition, design and construction management.

As a supplemental evaluation, DEP assessed the feasibility of providing floatables control via underflow baffles at outfalls BB-009, BB-013, and NCQ-029. This evaluation did not affect the cost, performance, or WQS attainment of the preferred alternative described above. The supplemental floatables control evaluation determined that modifications to the regulator structures associated with each of the three outfalls would be required in order to maintain hydraulic neutrality with the underflow baffles in place. At BB-009 and BB-013, raising and lengthening the static weir would be required, while at NCQ-029, lengthening the weir and providing a bending weir would be required. Based on a preliminary siting assessment, the modifications at BB-009 appear to be feasible, but siting limitations would make the regulator modifications needed at BB-013 infeasible. For NCQ-029, more detailed information on existing utilities in the vicinity of the regulator structure is required in order to confirm the feasibility of the required regulator modifications. The NPW of providing underflow baffles at BB-009 and NCQ-029 (if feasible) was estimated at $19.5M. This estimate reflects $36,400 of annual O&M cost over the course of 20 years, and an unescalated PBC of $19.0M.

Section 3 (Page ES-32)

Summary of Recommend Plan

Water quality for bacteria and dissolved oxygen in Newtown Creek is projected to be improved through the implementation of the following: (1) currently planned improvements including those recommended in the 2011 Waterbody Watershed Facility Plans (WWFP); (2) planned Green Infrastructure (GI) projects; and (3) the implementation of this recommended Newtown Creek LTCP alternative which calls for the design, construction, and operation of an expansion of the BAPS to 26 MGD to provide 75 percent control of the annual CSO volume at Outfall BB-026, ~~and~~ a CSO Storage Tunnel that will be sized to provide 62.5 percent control of Outfalls NC-015, NC-083 and NC-077, and floatables control at outfall BB-009 and potentially at outfall NCQ-029, if feasible. The final dimensions and route for the storage tunnel will be further evaluated and finalized during subsequent planning and design stages. The feasibility of an underflow baffle and bending weir for floatables control at outfall NCQ-029 would similarly need to be confirmed in design. The Dutch Kills aeration system could also be eliminated based on the baseline attainment of the Class SD DO criterion. These identified actions have been balanced with input from the public and awareness of the cost to rate payers.

SECTION 2 EDITS

The following edits are hereby incorporated into Section 2 of the Newtown Creek LTCP:

Section 2.1.b (Page 2-16)

Figure 2-8 is deleted, and replaced in its entirety by the following Figure 2-8.

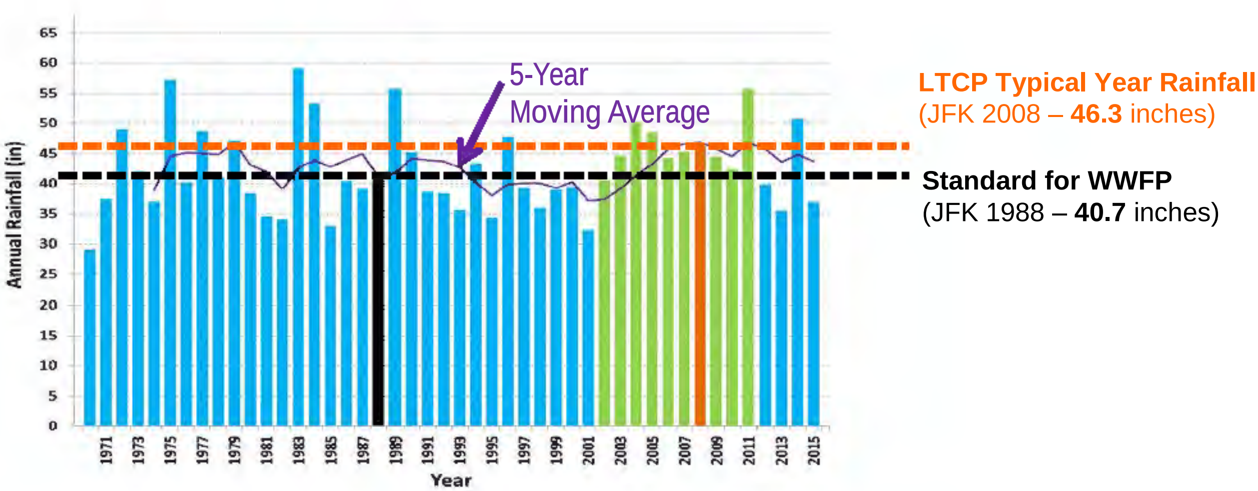


Figure 2-8. Annual Rainfall Data and Selection of the Typical Year

Section 2.1.c (Page 2-17)

Table 2-4 is deleted, and replaced in its entirety by the following Table 2-4.

Table 2-4. Bowery Bay WWTP and Newtown Creek WWTP Sewersheds Tributary to Newtown Creek: Acreage Per Sewer Category

Sewer Area Description	Area (acres)
Combined	**4,642**
Separate MS4	**665**
Direct Drainage	**585**
Other(1)	**923**
Total	**6,815**

Notes: (1) "Other" acreage includes cemeteries and the Sunnyside rail yard.

SECTION 6 EDITS

The following edits/underlined text are hereby incorporated into Section 6 of the Newtown Creek LTCP:

Section 6.2 (Page 6-9)

Baseline volumes of CSO to Newtown Creek for each outfall for the 2008 typical year are summarized in Table 6-2, and baseline volumes at East River CSOs associated with the Newtown Creek and Bowery Bay WWTP systems are summarized in Table 6-2a. The total baseline volumes of CSO, stormwater, and direct drainage to Newtown Creek along with the associated fecal coliform, Enterococci, and BOD annual loadings are summarized in Table 6-3. The specific SPDES permitted outfalls associated with these sources are shown in Figure 6-1. Additional tables that summarize annual volumes and loadings are found in Appendix A.

Table 6-2a. 2008 Baseline CSO Volume and Overflows per Year – East River CSOs Associated with Newtown Creek WWTP and Bowery Bay WWTP Systems

Waterbody/WWTP System	CSO	Volume	Annual Overflow Events
		Total Discharge (MG/yr)	Total (No./yr)
East River/BBL(1)	BB-016	1.8	17
	BB-017	1.7	20
	BB-018	1.1	17
	BB-021	23.4	34
	BB-022	1.0	12
	BB-023	16.4	30
	BB-024	36.4	28
	BB-025	11.0	30
	BB-027	6.1	27
	BB-028	352	44
	BB-029	105	32
	BB-030	27.6	43
	BB-031	3.9	18
	BB-032	1.9	17
	BB-033	6.1	28
	BB-034	202	57
	BB-035	3.9	32
	BB-036	8.9	30
	BB-037	0.6	8
Steinway Creek/BBL	BB-041	84.2	61
East River/BBL	BB-045	0.04	1
	BB-046	7.0	33
	BB-047	2.0	21
Subtotal BBL		**904**	**61 (max)**
East River/NCWWTP(2)	NC-003	0.4	10
	NC-004	15.9	36
	NC-006	92.2	42
	NC-007	7.5	31
	NC-008	21.6	32
	NC-010	0.0	0
	NC-012	30.8	15
	NC-013	58.3	28
Wallabout Channel/NCWWTP	NC-014	607	27

Table 6-2a. 2008 Baseline CSO Volume and Overflows per Year – East River CSOs Associated with Newtown Creek WWTP and Bowery Bay WWTP Systems

Waterbody/WWTP System	CSO	Volume	Annual Overflow Events
		Total Discharge (MG/yr)	Total (No./yr)
East River/NCWWTP	NC-024	0.0	0
	NC-025	0.5	10
	NC-026	0.3	7
	NC-027	13.3	31
	NC-082	0.6	10
Subtotal NCWWTP		**848**	**42 (max)**
Total		**1,752**	**61 (max)**

Notes:
(1) BBL = Bowery Bay Low Level Interceptor, to Bowery Bay WWTP
(2) NCWWTP = Newtown Creek WWTP system

SECTION 8 EDITS

The following edits/underlined text are hereby incorporated into Section 8 of the Newtown Creek LTCP:

FLOATABLES CONTROL

Section 8.1.i (Page 8-13)

- *Inflatable Dams, Bending Weirs, Control Gates:* Mechanical methods of regulating CSO were evaluated under the 2011 WWFP. As described above, of these measures, bending weirs were deemed the most applicable control for the four largest outfalls due to the concern of adverse upstream hydraulic grade line impacts. Because the bending weirs already are being implemented, and nothing has changed regarding the potential hydraulic grade line impacts of the other technologies, these control measures were eliminated from further consideration, except as noted below under Floatables Control.

- *Floatables Control*: Underflow baffles were recently constructed at the four largest outfalls (BB-026, NC-015, NC-077 and NC-083) as part of the Bending Weirs/ Floatables Control Project recommended in the 2011 WWFP, and a floatables control boom is located at the mouth of Maspeth Creek. Further, the control measures described below that include storage or treatment would inherently also capture floatables. As such, additional measures that specifically target floatables control were not initially considered. However, in response to comments from DEC, providing underflow baffles at regulators associated with the next three largest outfalls to Newtown Creek in terms of annual overflow volume (BB-009, BB-013, and NCQ-029) was evaluated. The findings of this evaluation are presented in Section 8.2.a.1 below.

Section 8.2.a.1 (Page 8-17)

As part of the control measure review process described in Section 8.1, two system optimization measures passed the initial screening process and were subsequently developed and evaluated for Newtown Creek, while other system optimization measures were not carried forward, as described below. The evaluation of floatables control for outfalls BB-009, BB-013, and NCQ-029 is presented at the end of this section.

Section 8.2.a.1 (Page 8-22)

The following text is added to the end of Section 8.2.a.1:

Floatables Control for Outfalls BB-009, BB-013, and NCQ-029

Sizing Criteria

Figure 8-9a presents a schematic representation of a typical underflow baffle installation for floatables control at a CSO regulator. The intent of the underflow baffle is to retain floating material during the period of time that the hydraulic grade line in the regulator is above the elevation of the overflow weir, minimizing the discharge of floatables during CSO activations. Once the wet weather flows recede, the floatables held behind the baffle would be conveyed to the interceptor through the dry weather underflow connection. Key sizing criteria related to underflow baffle performance include:

- Offset between the bottom of the baffle and the overflow weir crest
- Flow velocity under the baffle during CSO activations
- Headloss created by the underflow baffle

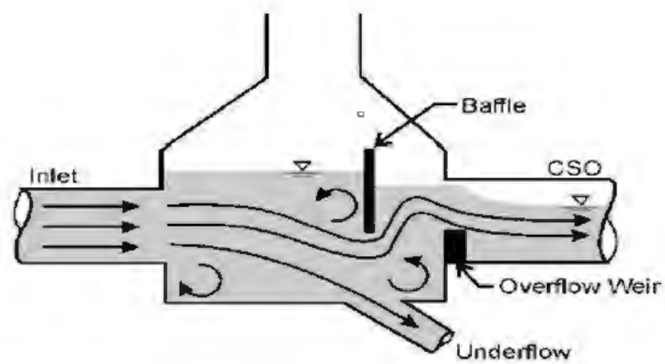


Figure 8-9a. Conceptual Underflow Baffle

For the first two criteria, sizing values were taken from a study of underflow baffle performance conducted at the Alden Research Laboratory in support of the design of underflow baffles and bending weirs for outfalls BB-026, NC-015, NC-077 and NC-083 in the tributaries to Newtown Creek. The findings of that study were summarized in Memoranda dated January 20, 2014[1] and February 27, 2014[2]. The bending

[1] *F. Visingardi, O'Brien & Gere/Dewberry JV, to R. DeLorenzo, regarding CS-NCLFO-DES Floatables Retention Efficiency, 1/20/14.*

[2] *F. Visingardi, O'Brien & Gere/Dewberry JV, to R. DeLorenzo, regarding CS-NCLFO-DES Floatables Retention Efficiency, 2/27/14.*

weirs and baffles associated with that study have been constructed and are part of the Baseline Conditions for the Newtown Creek LTCP.

The Alden study showed that the floatables retention percentage dropped from about 80 percent to about 50 percent if the velocity under the baffle increased from 1.0 to 1.75 feet per second (ft/sec). To avoid sizing the underflow baffles based on relatively short and infrequent increments of peak flow, the baffles for outfalls BB-009, BB-013, and NCQ-029 were sized to achieve 1 ft/sec at the 90th percentile flow in the 2008 typical year.

With regard to baffle submergence relative to the weir crest elevation, the Alden study showed that for an offset of 1.0 foot, the floatables retention percentage was just over 75 percent, while for offsets ranging from 0.25 to 0.75 feet, the floatables retention percentage remained relatively constant at just under 75 percent. When the offset was reduced to zero, the retention percentage dropped to under 50 percent. Based on these findings, the offset between the bottom of the baffle and the weir crest for the baffles for outfalls BB-009, BB-013, and NCQ-029 was assumed to be 0.25 feet.

Regarding the headloss created by the underflow baffle, it was assumed that no increase in the baseline peak HGL in the DEP's 5-year, 2-hour design storm upstream of the regulator would be allowed. Thus, the calculated increase in headloss associated with the underflow baffle in the 5-year, 2-hour storm would have to be offset by physical modifications to the regulator that reduced the headloss by an equivalent magnitude.

Given the complex arrangement and hydraulics within the regulators associated with outfalls BB-009, BB-013, and NCQ-029, it is recommended that computational fluid dynamics (CFD) modeling be conducted to confirm the headloss calculations and sizing as part of pre-design planning activities for these outfalls. Subsurface conditions, utility survey, and other site investigations would also be needed to confirm the constructability of the regulator modifications.

Outfall BB-009 (Regulator BBL-3B)

Outfall BB-009 discharges to Dutch Kills. Regulator BBL-3B is located upstream of outfall BB-009, at the intersection of Hunters Point Avenue and 30th Street (Figure 8-9b). The influent combined sewer to Regulator BBL-3B is a 9-ft x 4.5-ft reinforced concrete sewer. The regulator overflows to an 11-ft x 4.5-ft reinforced concrete outfall pipe, and dry weather flows are conveyed to a 6-ft x 4.5-ft interceptor. The existing overflow weir has a crest elevation of 0.0, and the regulator structure includes twin tide gates (Figures 8-9c and 8-9d). Table 8-3a presents key statistics related to Regulator BBL-3B.

Table 8-3a. Summary of Parameters for Regulator BBL-3B (Outfall BB-009)

Parameter	Value
Annual CSO Volume(1)	43.0 MG

Table 8-3a. Summary of Parameters for Regulator BBL-3B (Outfall BB-009)

Parameter	Value
Annual CSO Activations(1)	34
90th Percentile Flowrate (MGD) (1)	25 MGD
Peak HGL in 2008 Typical Year(1)	3.08
Peak HGL in DEP 5-year Design Storm(2)	9.21
Peak Overflow Rate in DEP 5-year Design Storm(2)	315 MGD

Notes:
(1) 2008 LTCP Baseline Conditions
(2) 5-year, 2-hour storm, constant tide of 0.86 ft, LTCP Baseline Conditions

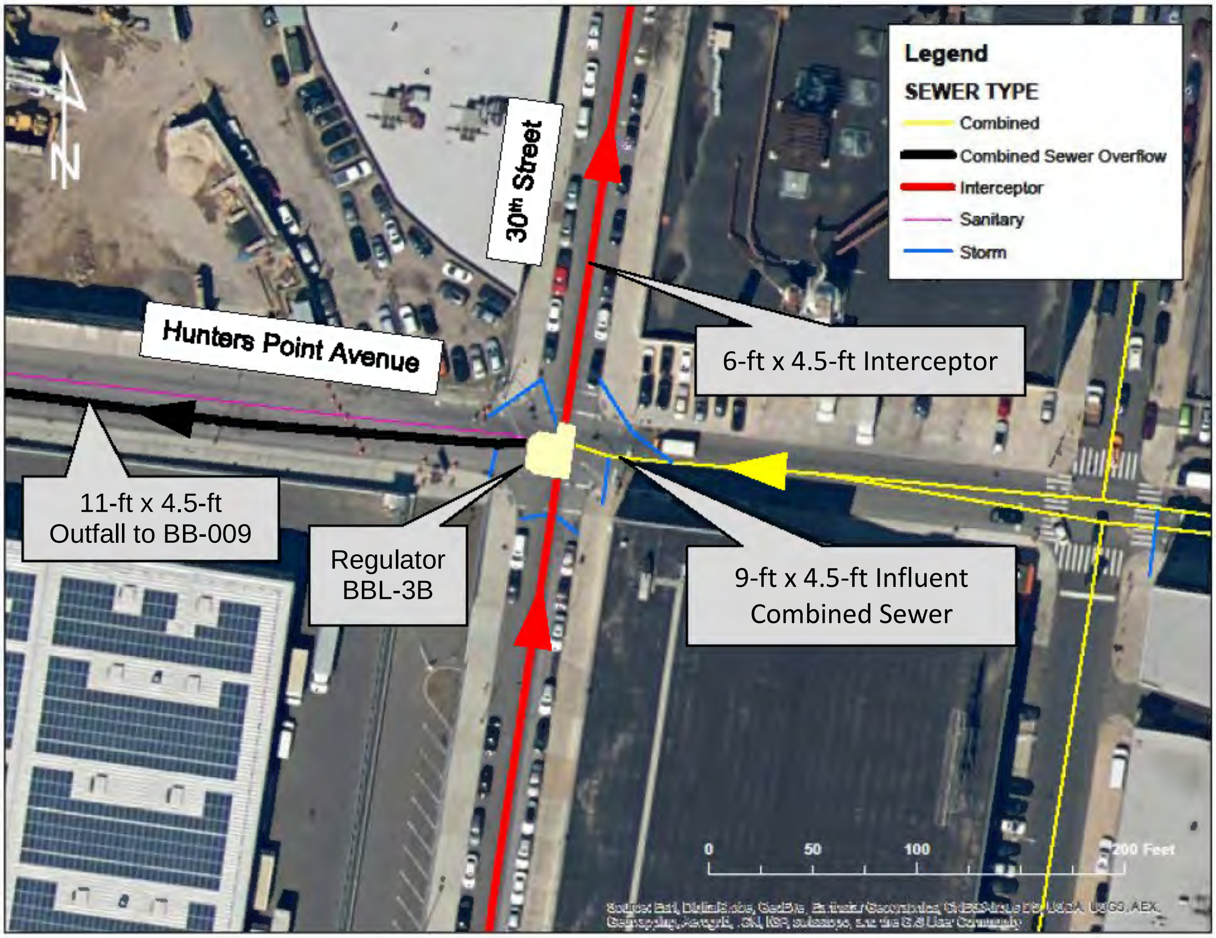


Figure 8-9b. Location of Regulator BBL-3B (Outfall BB-009)

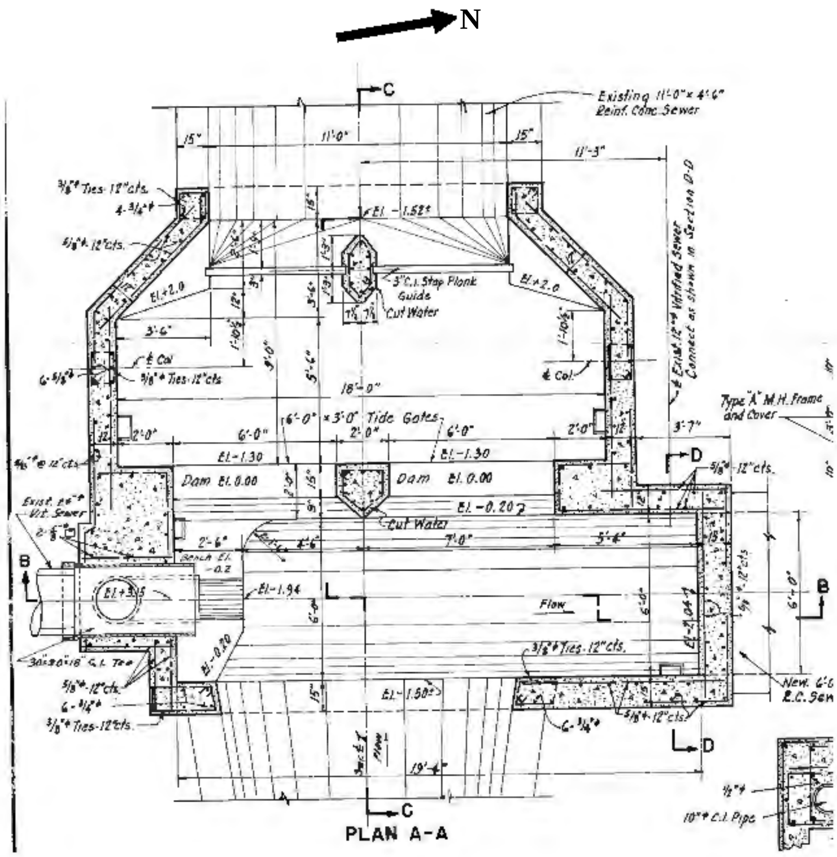


Figure 8-9c. Plan view of Regulator BBL-3B (Outfall BB-009)

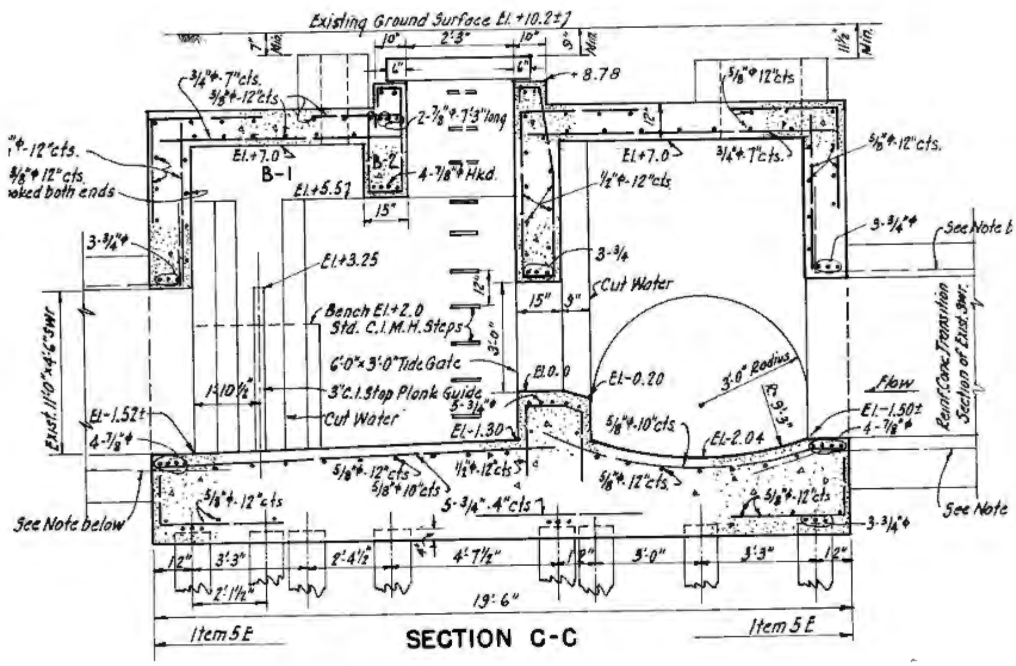


Figure 8-9d. Section view of Regulator BBL-3B (Outfall BB-009)

As indicated in Figure 8-9d, the depth between the weir crest and the invert elevation in the regulator upstream of the weir is only 2.04 feet. In order to achieve the 1.0 ft/sec criterion for the 90th percentile flow with the bottom of the baffle set 0.25 feet below the weir elevation, the weir crest would need to be raised by 0.34 feet. However, when this configuration was assessed with the 5-year, 2-hour storm, and the headloss through the regulator was predicted to increase by over 8 feet. Therefore, modifications to the regulator would be needed to offset the predicted increase in headloss associated with the underflow baffle. Through an iterative process, hydraulic neutrality in the 5-year, 2-hour storm was predicted to be achieved through a combination of lengthening the weir and baffle by 6.5 feet, increasing the height of the opening over the weir by 11 inches, and adding a third tide gate. Lengthening the weir and baffle by 6.5 feet would require expanding the existing regulator structure. Figures 8-9e to 8-9g present the proposed modifications. Figure 8-9h shows the approximate outlines of the existing and expanded regulator structure projected onto a Googlemaps Streetview image. A bending weir was not considered for this location due to the elevation of the tide relative to the weir crest elevation. The peak high tide in the typical year at this location is approximately elevation 1.5, which is approximately 1.5 feet above the existing weir crest elevation. The modifications to regulator BBL-3B are predicted to reduce the annual activation frequency at outfall BB-009 from 27 to 24, and would increase the annual CSO volume at outfall BB-009 by about 1 MG (due to the reduction in headloss at the outfall during bigger storms). However, the annual volume at the hydraulically-related outfall BB-026 would drop by about 1 MG, resulting in no net change in the total annual volume of CSO to Dutch Kills. No other outfalls in the BBL system would be affected by this project.

Based on a preliminary siting assessment, sufficient space appears to be available in the intersection of Hunters Point Avenue and 30th Street to accommodate the expansion of the regulator structure.

Relocation of some utilities may be required. The estimated probable bid cost for this work would be approximately $9M. No significant change in annual O&M cost is anticipated.

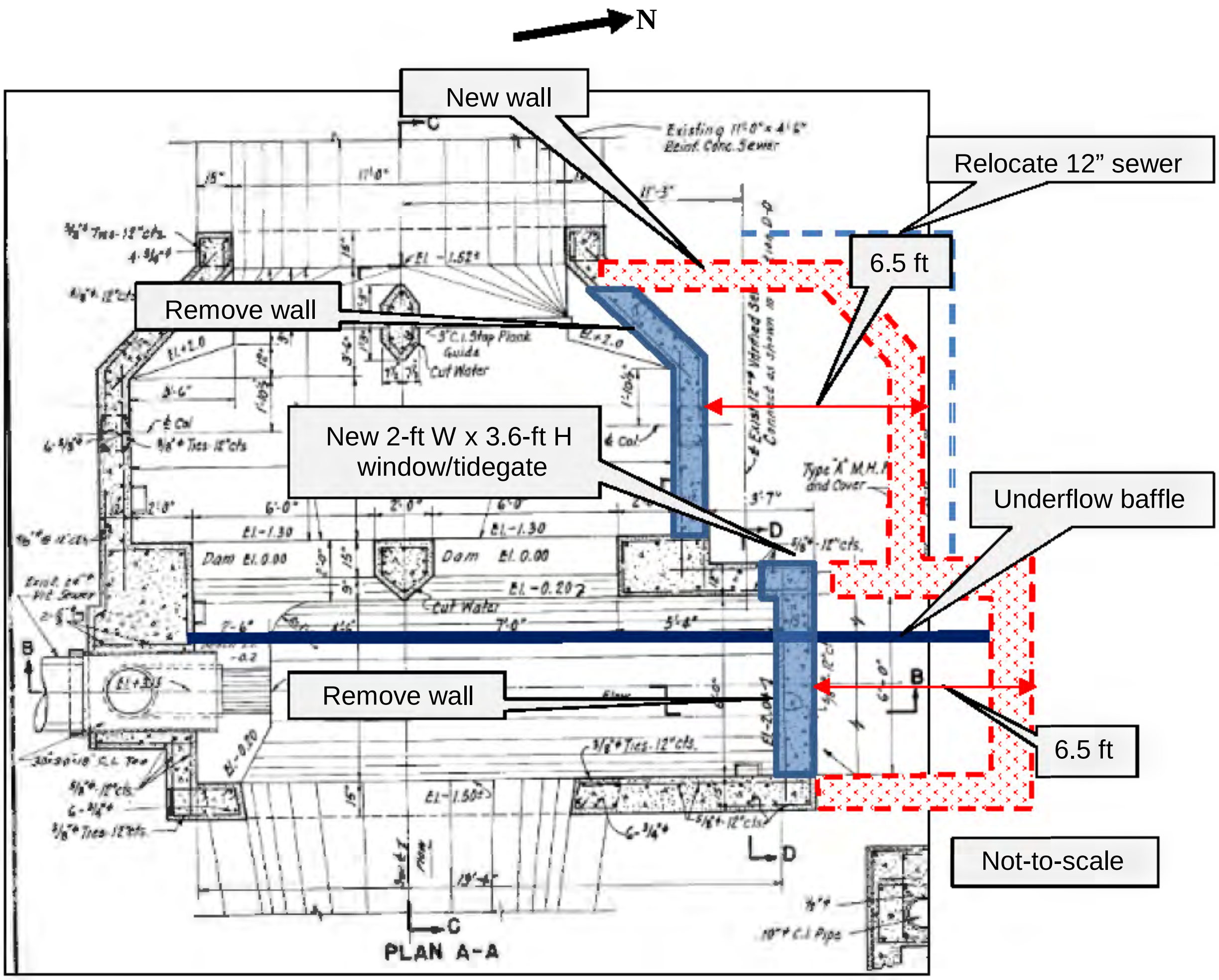


Figure 8-9e. Plan view of regulator modifications for underflow baffle at Regulator BBL-3B (Outfall BB-009)

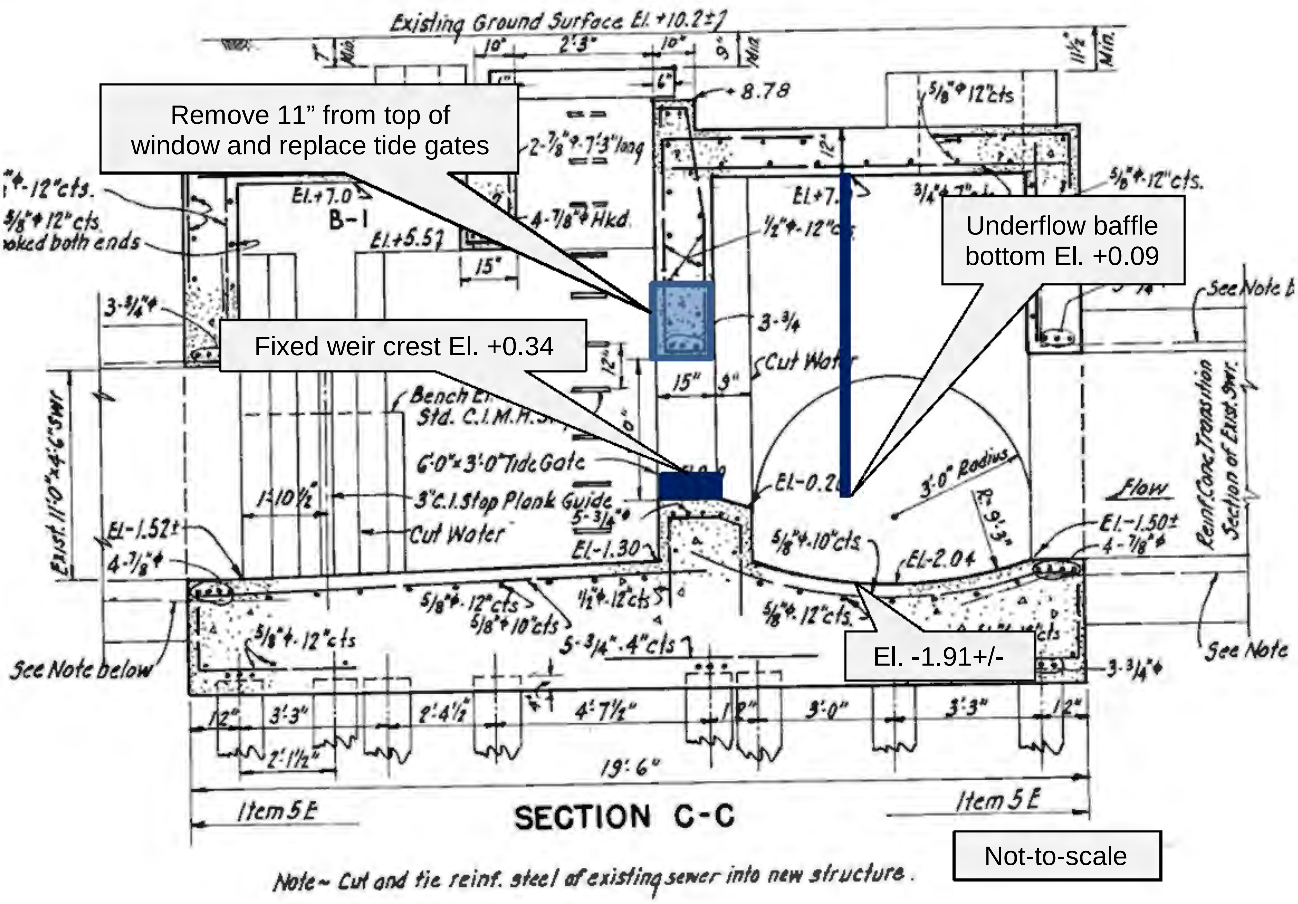


Figure 8-9f. Section view of regulator modifications for underflow baffle at Regulator BBL-3B (Outfall BB-009)

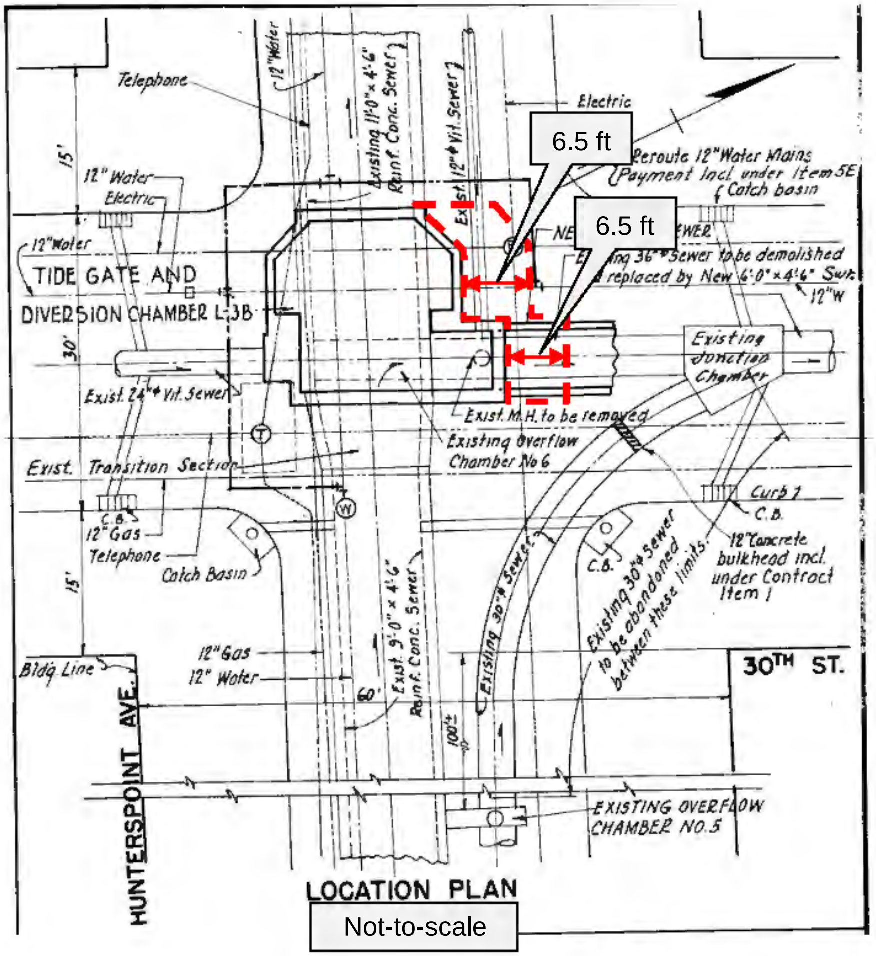


Figure 8-9g. Location plan for regulator modifications for underflow baffle at Regulator BBL-3B (Outfall BB-009)

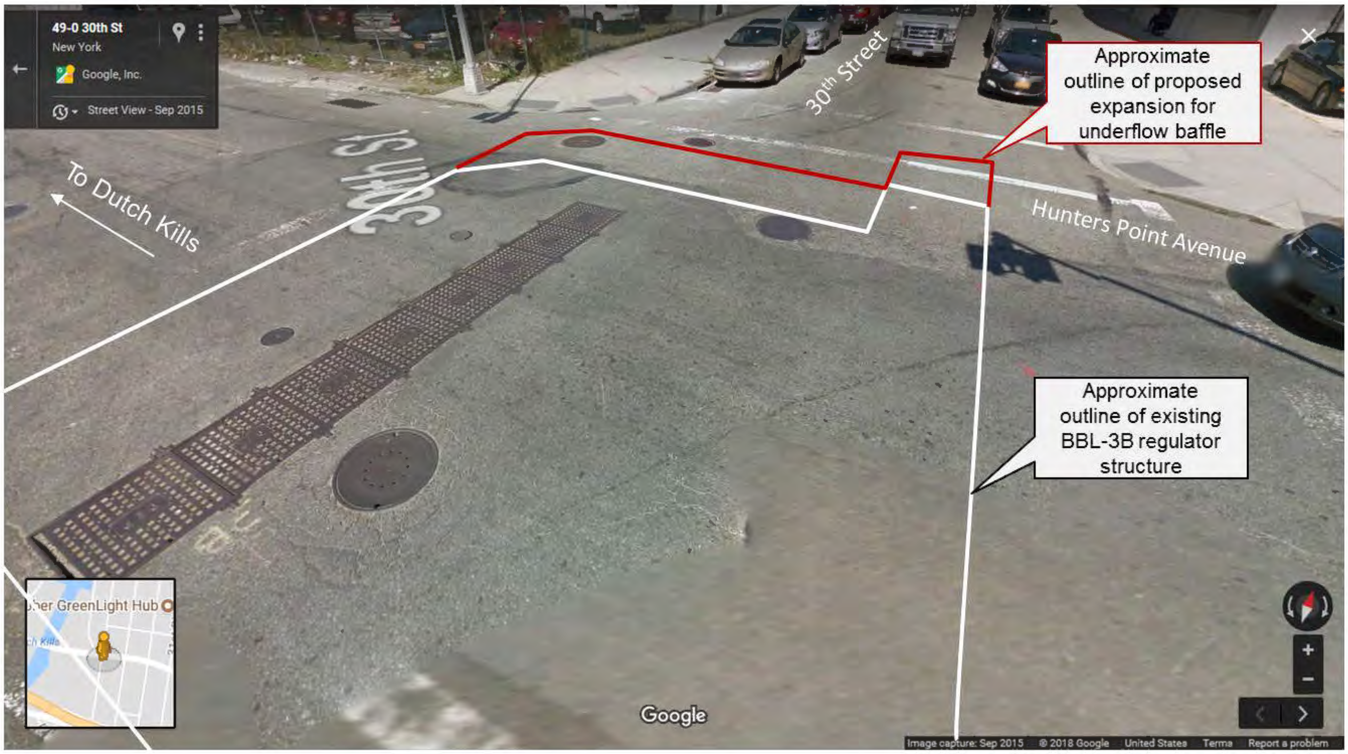


Figure 8-9h. Street view of regulator modifications for underflow baffle at Regulator BBL-3B (Outfall BB-009)

Outfall BB-013 (Regulator BBL-8)

Outfall BB-013 discharges to Newtown Creek adjacent to the Pulaski Bridge. Regulator BBL-8 is located upstream of outfall BB-013, on 11th Street between 53rd Avenue and Newtown Creek (Figure 8-9i). The influent combined sewer to Regulator BBL-8 is 6-ft diameter. The regulator overflows to a 6-ft diameter outfall pipe, and dry weather flows are conveyed to a 2-ft diameter interceptor. The existing overflow weir has a crest elevation of -5.0, and the regulator structure includes a single tide gate (Figures 8-9j and 8-9k). Table 8-3b presents key statistics related to Regulator BBL-8.

Table 8-3b. Summary of Parameters for Regulator BBL-8 (Outfall BB-013)

Parameter	Value
Annual CSO Volume(1)	16.2 MG
Annual CSO Activations(1)	31
90^{th} Percentile Flowrate (MGD) (1)	7.5 MGD
Peak HGL in 2008 Typical Year(1)	1.76
Peak HGL in DEP 5-year Design Storm(2)	1.46
Peak Overflow Rate in DEP 5-year Design Storm(2)	63 MGD

Notes:
(1) 2008 LTCP Baseline Conditions
(2) 5-year, 2-hour storm, constant tide of 0.86 ft, LTCP Baseline Conditions

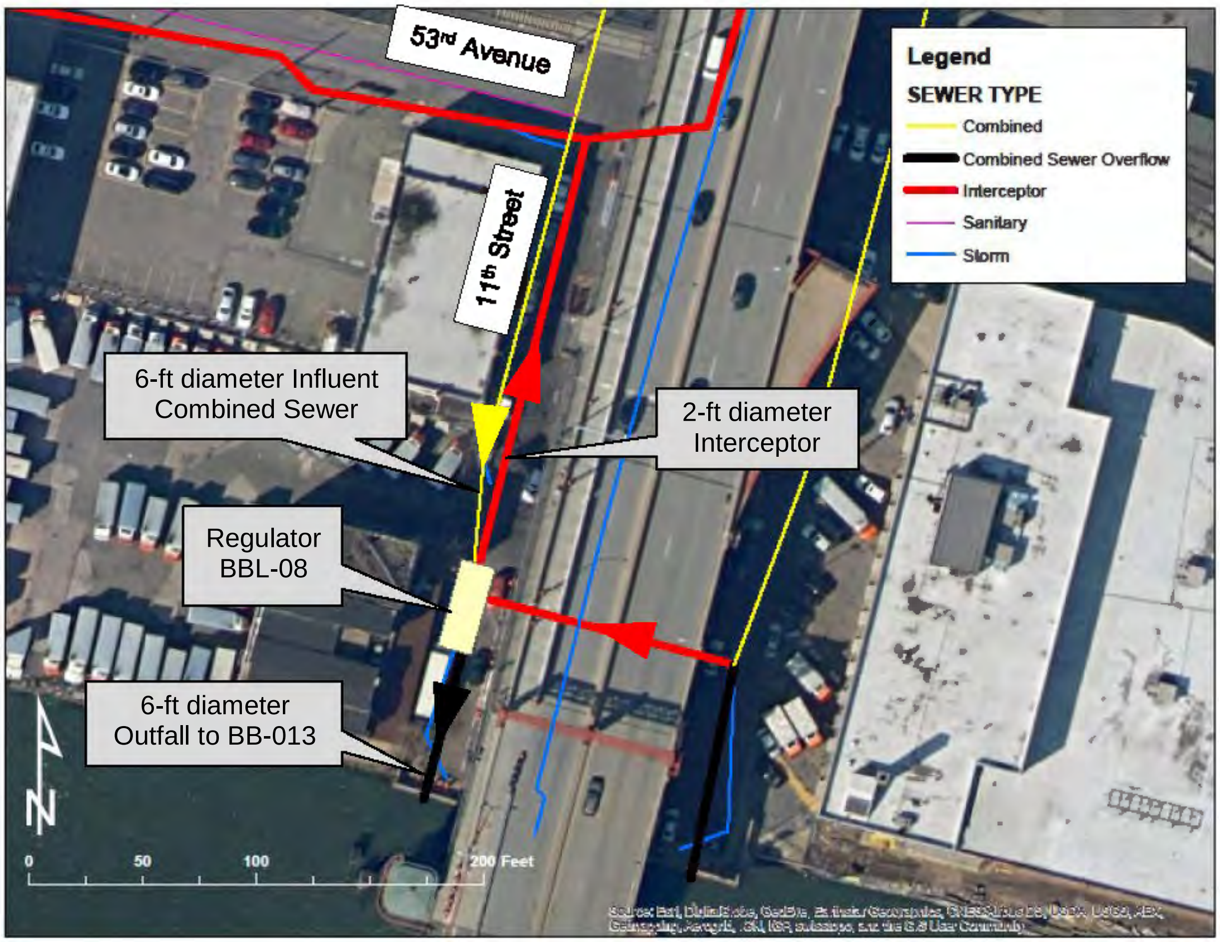


Figure 8-9i. Location of Regulator BBL-8 (Outfall BB-013)

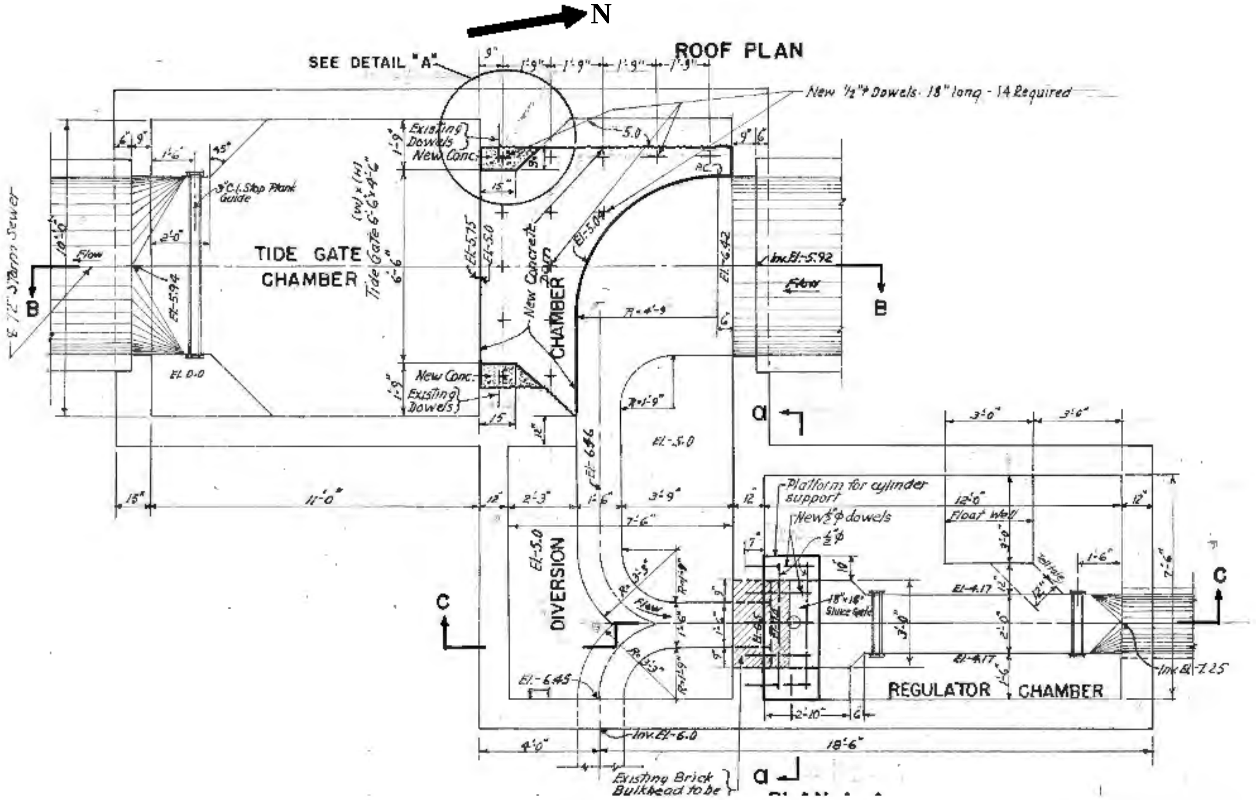


Figure 8-9j. Plan view of Regulator BBL-8 (Outfall BB-013)

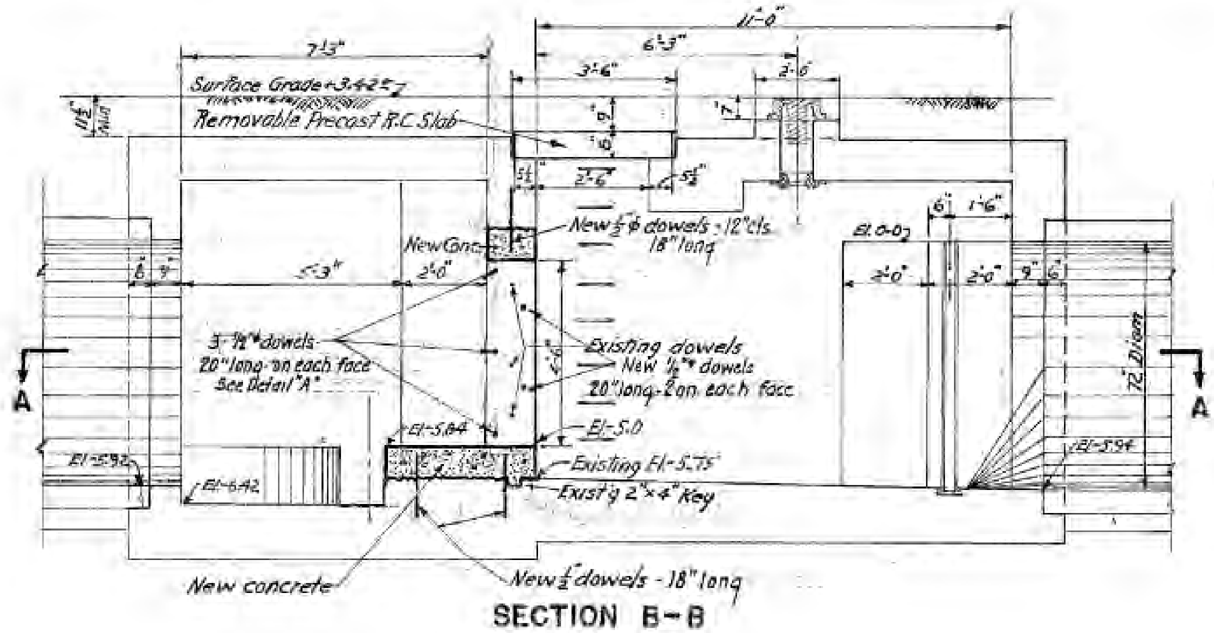


Figure 8-9k. Section view of Regulator BBL-8 (Outfall BB-013)

As indicated in Figure 8-9k, the depth between the weir crest and the invert elevation in the regulator upstream of the weir is only 1.42 feet. In order to achieve the 1.0 ft/sec criterion for the 90th percentile flow with the bottom of the baffle set 0.25 feet below the weir elevation, the weir crest would need to be raised by 0.8 feet. However, when this configuration was assessed with the 5-year, 2-hour storm, the headloss through the regulator was predicted to increase by just under 3 feet. Therefore, modifications to the regulator would be needed to offset the predicted increase in headloss associated with the underflow baffle. Through an iterative process, hydraulic neutrality in the 5-year, 2-hour storm was predicted to be achieved by expanding the regulator/tidegate structure to allow lengthening of the underflow baffle by 8.75 feet, and lengthening the overflow weir by 4.75 feet. A new overflow opening with a new tide gate would be needed to provide the additional 4.75 feet of weir length. These modifications would require the west side of the regulator/tidegate structure to be extended by 8.75 feet. Figures 8-9l to 8-9n present the required modifications. Figure 8-9o shows the approximate outlines of the existing and expanded regulator structure projected onto a Googlemaps Streetview image. A bending weir was not considered for this location due to the elevation of the tide relative to the weir crest elevation. The peak high tide in the typical year at this location is approximately elevation 1.5, which is approximately 6.5 feet above the existing weir crest elevation.

As indicated in Figure 8-9n, expanding the regulator by 8.75 feet would extend the structure past the building line along 11th Street. Based on a preliminary siting assessment, there does not appear to be sufficient space between the regulator structure and the building line along 11th Street to expand the regulator by 8.75 feet. Expansion on the other side of the structure would not be feasible due to the proximity of the bridge footing and the presence of the adjacent regulator structure. In conclusion, due to siting constraints, an underflow baffle would not be feasible at Regulator BBL-8.

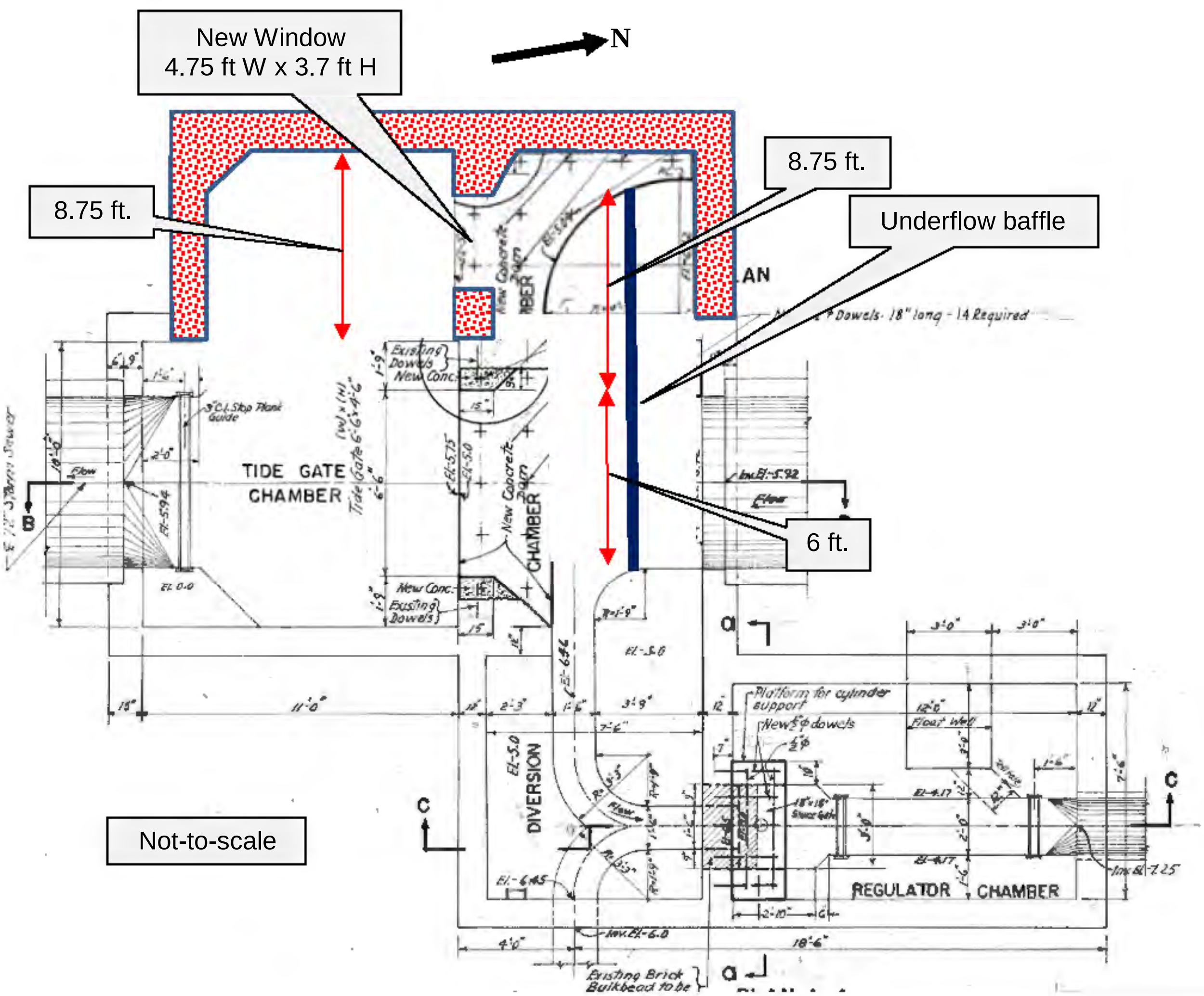


Figure 8-9l. Plan view of regulator modifications for underflow baffle at Regulator BBL-8 (Outfall BB-013)

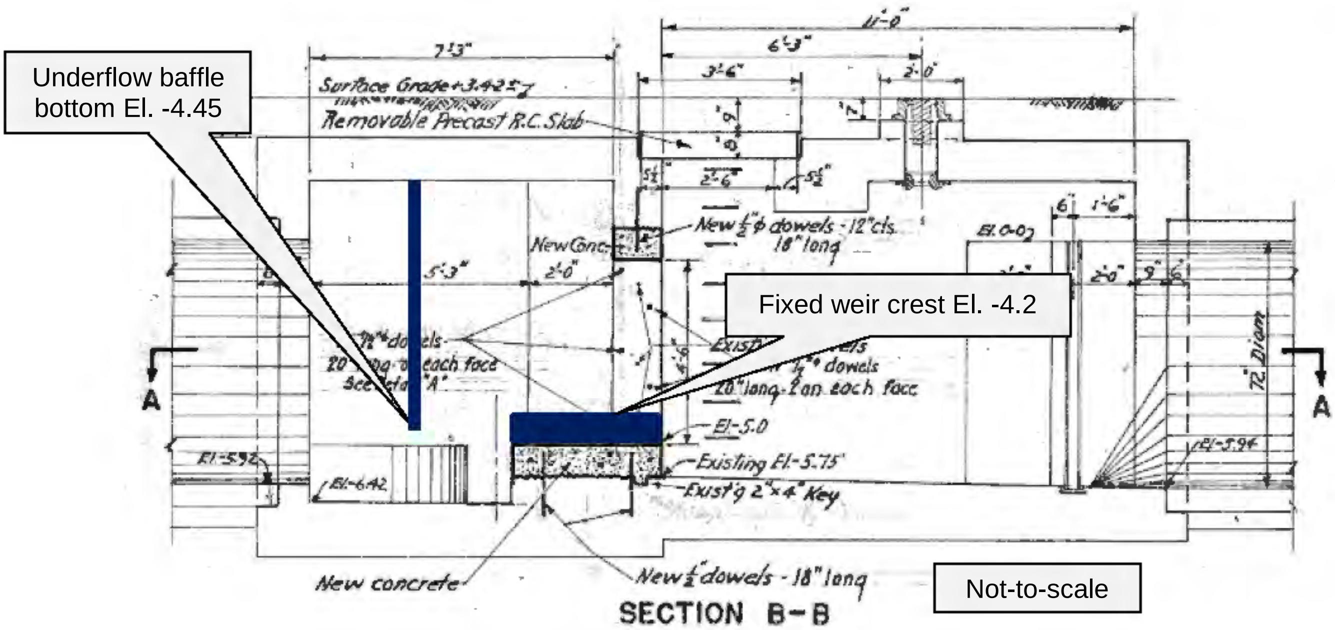


Figure 8-9m. Section view of regulator modifications for underflow baffle at Regulator BBL-8 (Outfall BB-013)

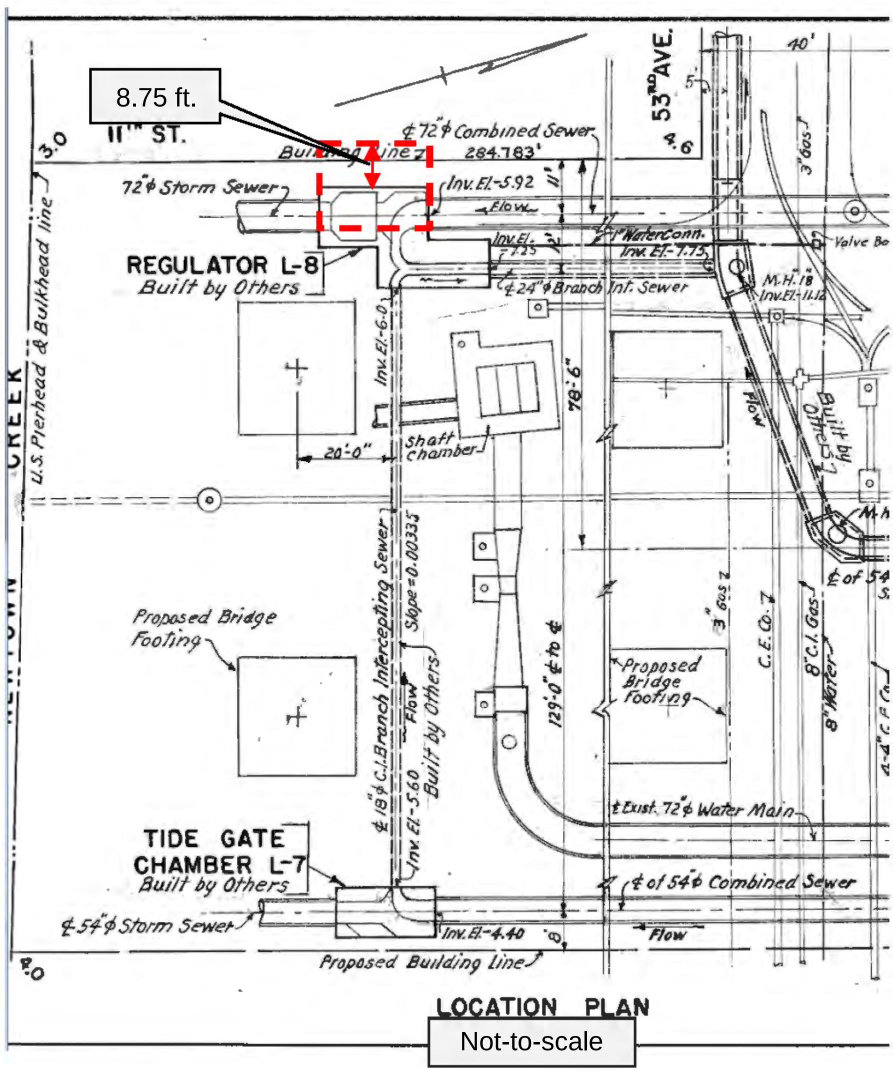


Figure 8-9n. Location plan for regulator modifications for underflow baffle at Regulator BBL-8 (Outfall BB-013)

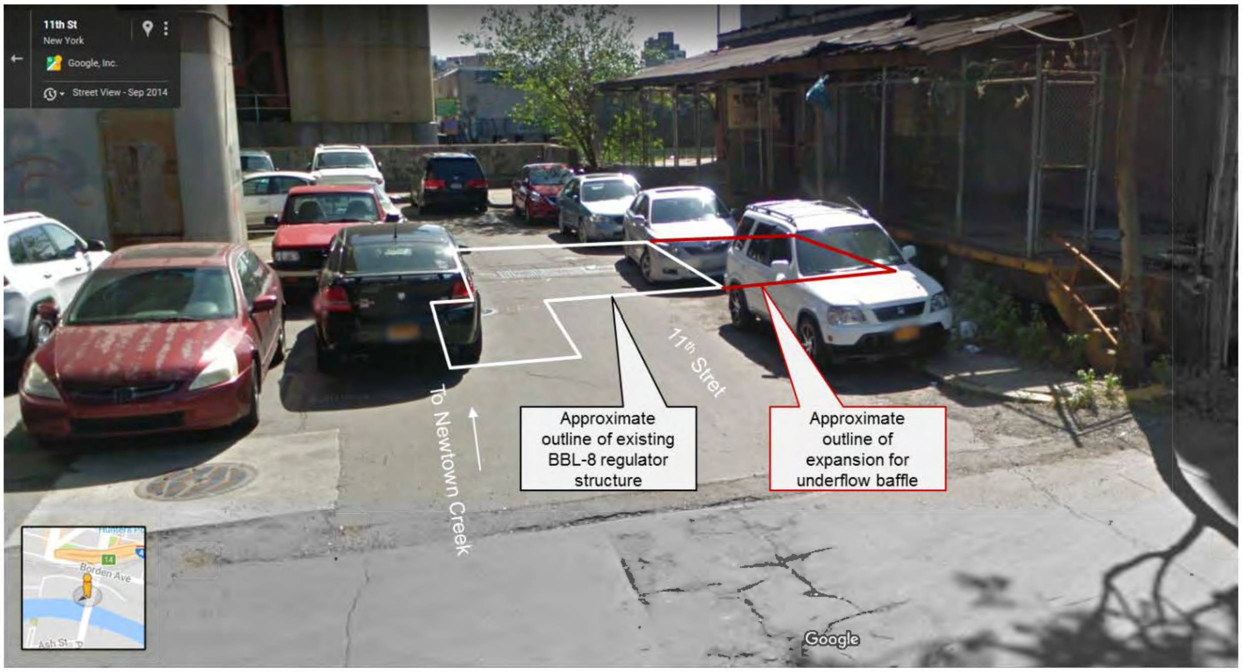


Figure 8-9o. Street view of regulator modifications for underflow baffle at Regulator BBL-8 (Outfall BB-013)

Outfall NC-029 (Regulator NCQ-2)

Outfall NC-029 discharges to Newtown Creek just downstream of Maspeth Creek. Regulator NCQ-2 is located upstream outfall NC-029, on 43rd Street at 56th Road (Figure 8-9p). The influent combined sewer to Regulator NCQ-2 is a 3.75-ft diameter reinforced concrete sewer. The regulator overflows to a 5.5-ft diameter outfall pipe, and dry weather flows are conveyed to a 1.5-ft diameter combined sewer. The existing overflow weir has a crest elevation of 8.09. Since the weir crest elevation is well above high tide, the regulator structure does not have a tide gate (Figures 8-9q and 8-9r). Table 8-3c presents key statistics related to Regulator NCQ-2.

Table 8-3c. Summary of Parameters for Regulator NCQ-2 (Outfall NC-029)

Parameter	Value
Annual CSO Volume(1)	18.7 MG
Annual CSO Activations(1)	40
90th Percentile Flowrate (MGD) (1)	7.5 MGD
Peak HGL in 2008 Typical Year(1)	10.13
Peak HGL in DEP 5-year Design Storm(2)	12.01
Peak Overflow Rate in DEP 5-year Design Storm(2)	107 MGD

Notes:
(1) 2008 LTCP Baseline Conditions
(2) 5-year, 2-hour storm, constant tide of 0.86 ft, LTCP Baseline Conditions

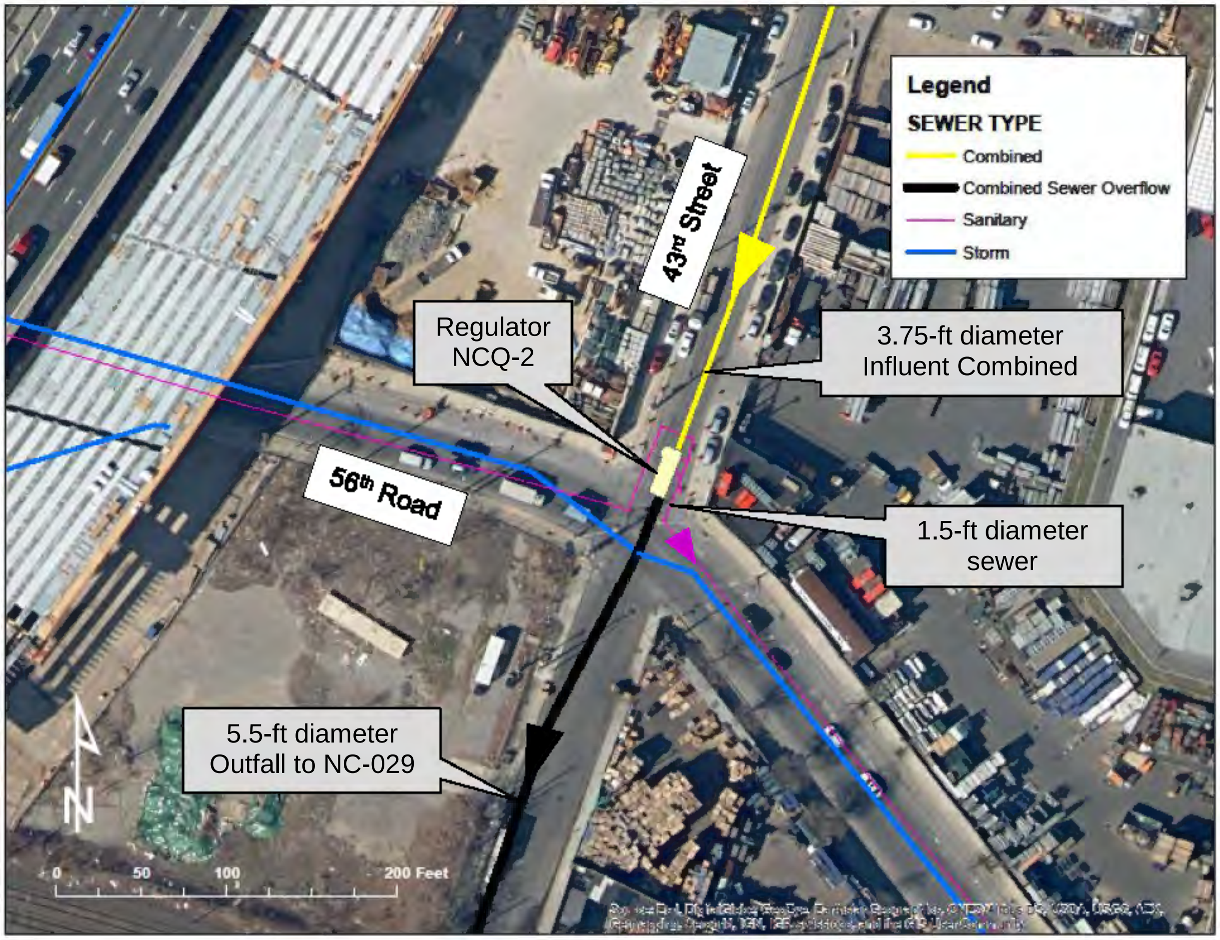


Figure 8-9p. Location of Regulator NCQ-2 (Outfall NC-029)

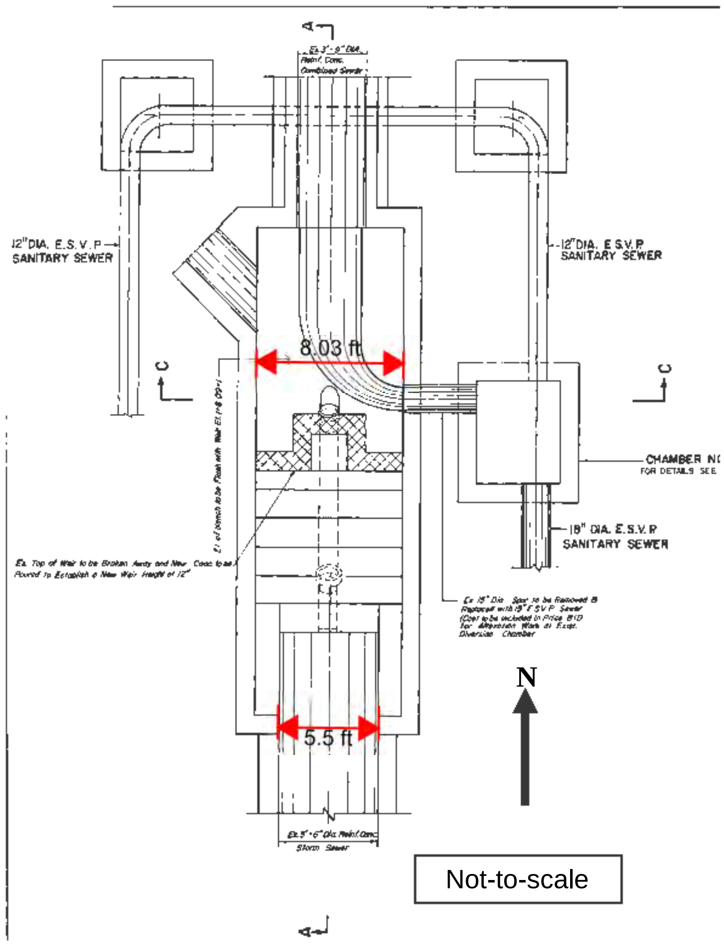
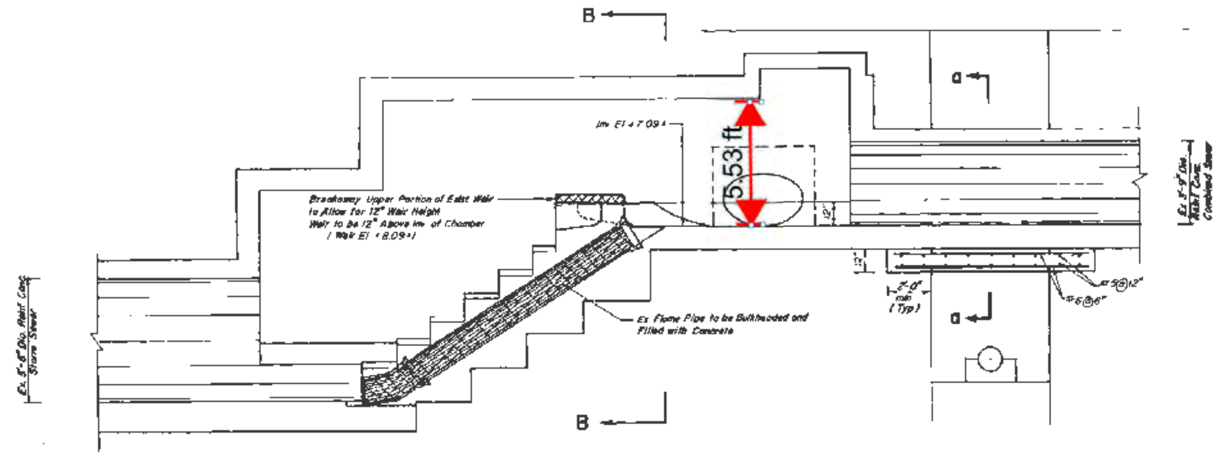


Figure 8-9q. Plan View of Regulator NCQ-2 (Outfall NC-029)



SECTION A–A

Figure 8-9r. Section View of Regulator NCQ-2 (Outfall NC-029)

As indicated in Figure 8-9r, the depth between the weir crest and the invert elevation in the regulator upstream of the weir is only 1.0 foot. In order to achieve the 1.0 ft/sec criterion for the 90th percentile flow with the bottom of the baffle set 0.25 feet below the weir elevation, the weir crest would need to be raised by 0.7 feet. However, when this configuration was assessed with the 5-year, 2-hour storm, the headloss through the regulator was predicted to increase by over 10 feet. Therefore, modifications to the regulator would be needed to offset the predicted increase in headloss associated with the underflow baffle. Since the existing weir crest elevation is not influenced by the tide, a bending weir was considered as an option to reduce the needed lengthening of the weir. Through an iterative process, hydraulic neutrality in the 5-year, 2-hour storm was predicted to be achieved by expanding the regulator structure to allow lengthening of the underflow baffle by 7.5 feet, and providing a 1.25-foot high, 15.5-foot long bending weir. These modifications would require the west side of the regulator structure to be extended by 7.5 feet, with an additional 12 feet added for the counterweight chamber. Figures 8-9s to 8-9u present the proposed modifications. Figure 8-9v shows the approximate outlines of the existing and expanded regulator structure projected onto a Googlemaps Streetview image. The modifications to regulator NCQ-2 are predicted to reduce the annual activation frequency at outfall NC-029 from 40 to 37, and would decrease the annual CSO volume at outfall NC-029 by about 0.7 MG. No other outfalls in the Newtown Creek WWTP system would be affected by this project.

Based on a preliminary siting assessment, sufficient space appears to be available in the intersection of 56th Road and 43rd Street to accommodate the expansion of the regulator structure. However, it appears that relocation of a 12-inch sewer, along with water, gas and electric utilities would be required. If a counterweight chamber is required for the bending weir, there may not be sufficient space between the new structure and the edge of the right-of-way to relocate those utilities. If an alternative type of bending weir is provided that does not require the counterweight structure, then it may be feasible to relocate those utilities within the right-of-way. A more detailed utility survey and evaluation of bending weir types will be needed in order to confirm the feasibility of this alternative. If feasible, the estimated probable bid cost for this work would be approximately $10M. The annual O&M cost is estimated at $36,000/year, and the NPW would be $10.5M.

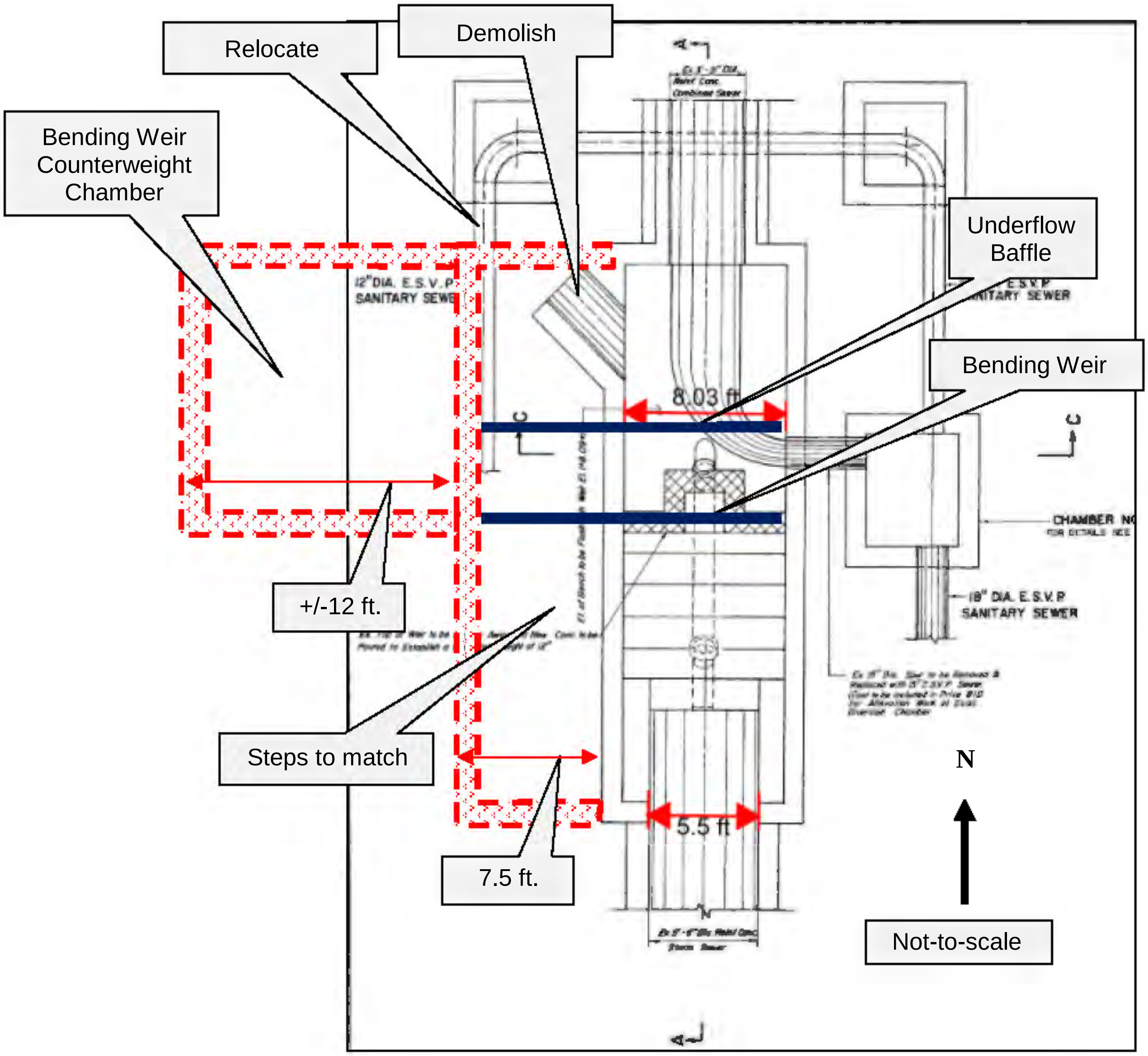


Figure 8-9s. Plan view of regulator modifications for underflow baffle at Regulator NCQ-2 (Outfall NC-029)

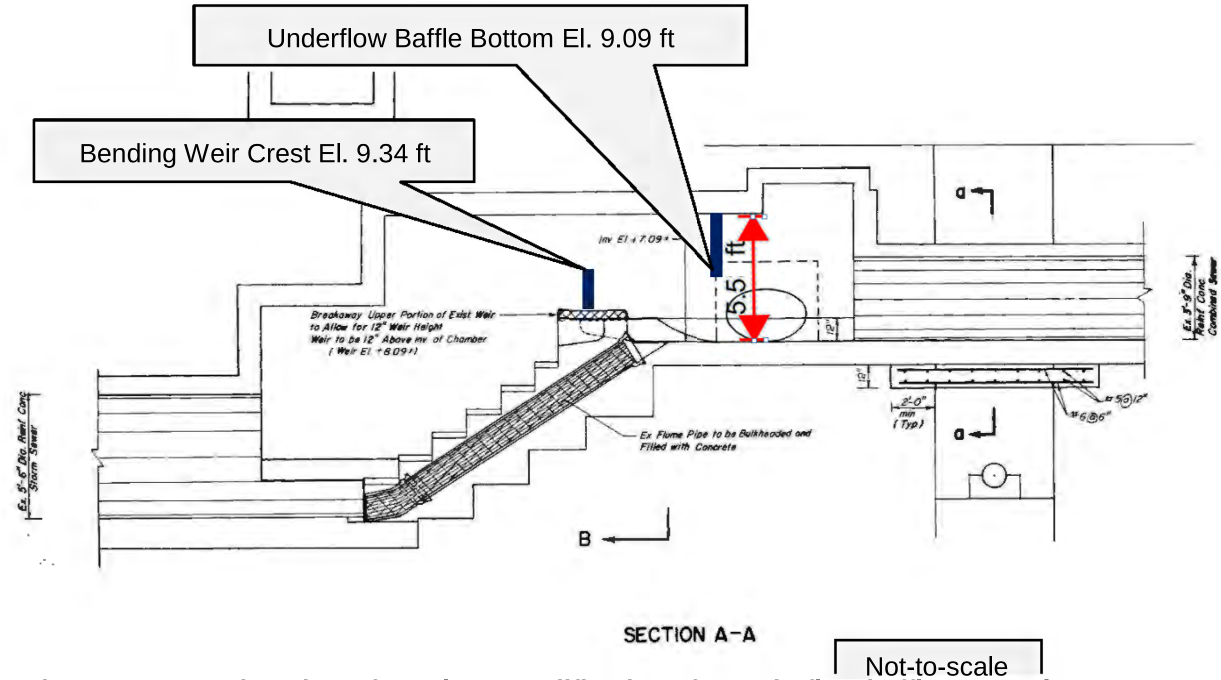
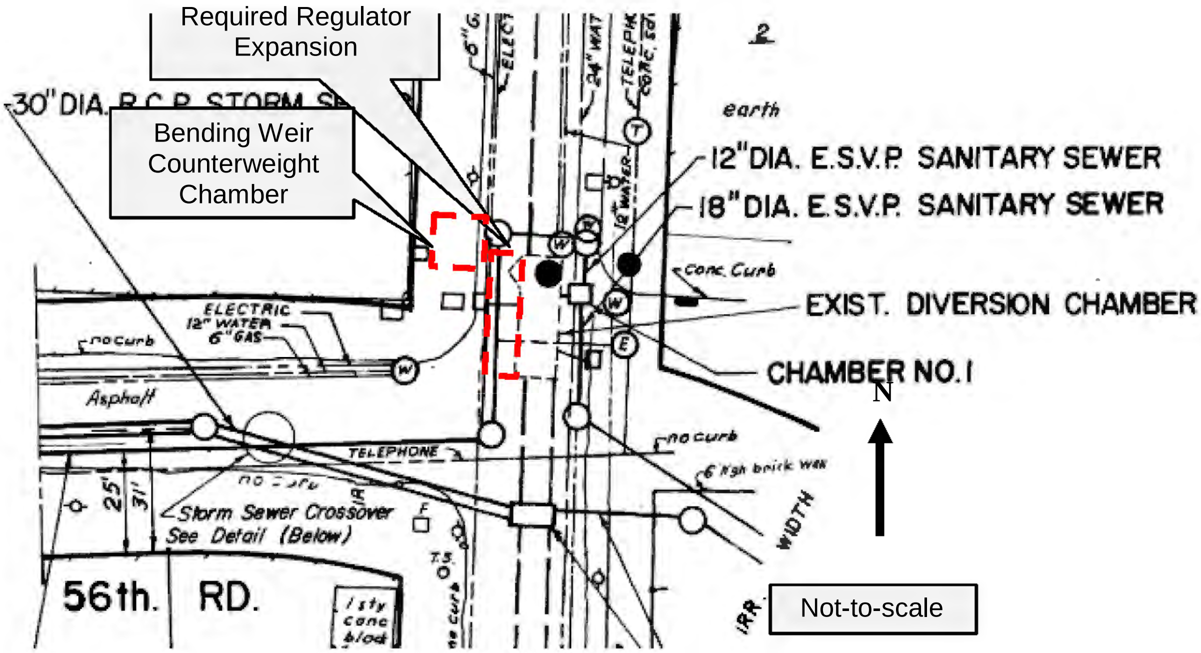


Figure 8-9t. Section view of regulator modifications for underflow baffle at Regulator NCQ-2 (Outfall NC-029)

Figure 8-9u. Location plan for regulator modifications for underflow baffle at Regulator NCQ-2 (Outfall NC-029)



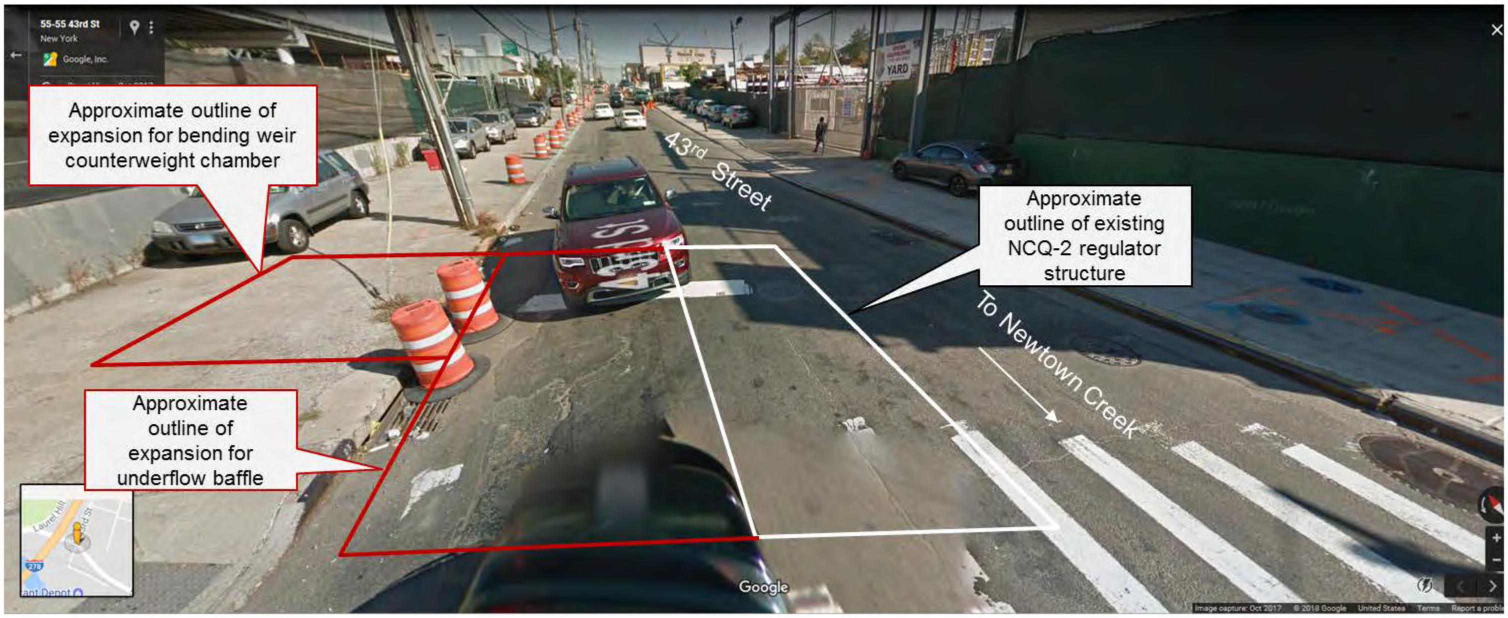


Figure 8-9v. Street view of regulator modifications for underflow baffle at Regulator NCQ-2 (Outfall NC-029)

Summary of Floatable Control Evaluation

Table 8-3d summarizes the findings of the evaluation of underflow baffles for floatables control at outfalls BB-009, BB-013, and NCQ-029. In terms of reduction in overall floatables loadings to Newtown Creek, it is noted that the Recommended Plan for Newtown Creek will reduce the CSO volume (and associated floatables load) from outfalls NC-15, NC-77 and NC-83 by 62.5 percent, and from outfall BB-026 by 75 percent. Of the 449 MG/yr of CSO to Newtown Creek remaining after implementation of the Recommended Plan, 359 MG (80 percent) will occur at outfalls NC-15, NC-77, NC-83 and BB-026, where the bending weirs and underflow baffles currently installed at the regulators associated with those outfalls will control floatables for the remaining discharges. Outfalls BB-009 and NCQ-029 represent 10 percent (46 MG) of the remaining 449 MG of CSO to Newtown Creek, leaving 44 MG (10 percent) without structural floatables control. However, DEP's BMP programs, including hooded catchbasins, catchbasin cleaning, street sweeping, and public engagement on litter control, will contribute to controlling floatables at those remaining outfalls.

ble 8-3d. Summary of Floatable Control Evaluation for Outfalls BB-009, BB-013, and NCQ-029

Outfall/Regulator	Modifications Required for Floatables Control with Hydraulic Neutrality(1)	Implementation Feasible?(2)	Estimated Probable Bid Cost	Recommend for Implementation?
Outfall BB-009; Reg. BBL-3B	• Raise the static weir by 0.34 feet • Expand the north side of the structure by 6.5 feet • Lengthen the static weir by 6.5 feet • Provide an underflow baffle with bottom set 0.25 feet below the weir crest, extending the length of the weir • Increase the height of the opening over the weir by 11 inches • Add a third tide gate	Yes	$9 M	Yes
Outfall BB-013, Reg. BBL-8	• Raise the static weir by 0.8 feet • Expand the west side of the structure by 8.75 feet • Provide a new 4.75-foot wide overflow weir with a tide gate • Provide an underflow baffle with bottom set 0.25 feet below the weir crest, extending the length of the existing and new weir	No	N/A(3)	No
Outfall NCQ-029, Reg. NCQ-2	• Provide a 1.25-foot high, 15.5-foot long bending weir • Expand the west side of the structure by 7.5 feet to accommodate the bending weir • Provide a counterweight chamber next to the expansion on the west side of the structure • Provide an underflow baffle with bottom set 0.25 feet below the weir crest, extending the length of the bending weir	Needs more detailed assessment to confirm utility relocations	$10 M	Yes; assume early design activities will determine feasibility

Notes:
(1) Hydraulic neutrality defined as no increase in HGL in the 5-year, 2-hour storm compared to baseline conditions.
(2) Based on preliminary siting assessment. More detailed evaluation of subsurface conditions required to confirm feasibility.
(3) Cost not developed since installation is not feasible due to siting limitations.

Section 8.2.e (p. 8-53)

Table 8-11. Summary of Next Level of Control Measure Screening

Control Measure	Category	Retained for Further Analysis?	Remarks
Additional GI Build-out	Source Control	NO	Planned GI build-out in the watershed (included in the baseline) is in development; unlikely that additional sites will be identified due to site constraints in publicly owned properties.
High Level Sewer Separation	Source Control	NO	Concern with resulting stormwater related pollution and construction impacts.
Fixed Weirs	System Optimization	NO	No CSO reduction benefit.
Parallel Interceptor Sewer	System Optimization	NO	Significant constructability challenges.
Pumping Station Optimization	System Optimization	NO	Limited benefit due to capacity limitation in Morgan Avenue interceptor.
Pumping Station Expansion	System Optimization	YES	Borden Avenue PS (BAPS) expansion reduces CSO discharges to Dutch Kills and provides synergies with a SOGR intervention.
Gravity Flow Tipping to Other Watersheds	CSO Relocation	NO	No alternatives evaluated were determined to provide significant opportunity to warrant pursuing this solution further.
Flow Tipping with Conduit and Pumping	CSO Relocation	YES	BAPS expansion also falls into this category.
Floatables Control	Floatables Control	~~NO~~<u>YES</u>	~~Not evaluated as a separate CSO control measure.~~ Baseline conditions include floatables control at four largest outfalls. <u>Underflow baffles evaluated for next three largest outfalls (BB-009, BB-013, and NCQ-029).</u>
Environmental Restoration	Water Quality/ Ecological Enhancement	NO	EPA is evaluating dredging alternatives under Superfund; wetlands restoration could be required after dredging.
In-Stream Aeration	Water Quality/ Ecological Enhancement	NO	Gap analysis indicated Dutch Kills aeration system not required for average annual attainment of DO criterion.
Flushing Tunnel	Water Quality/ Ecological Enhancement	NO	Not practical for upstream reaches, not cost-effective compared to BAPS expansion for Dutch Kills.
Outfall Disinfection	Treatment: Satellite	NO	Very limited CSO control benefit.
Retention/Treatment Basins	Treatment: Satellite	NO	Alternative RTB-1 evaluated a 152 MGD RTB in conjunction with a consolidation conduit. High risk associated with long near-surface construction.
In-System Storage (Outfalls)	Storage	NO	Very limited levels of CSO control.

Table 8-11. Summary of Next Level of Control Measure Screening

Control Measure	Category	Retained for Further Analysis?	Remarks
Off-line Storage (Shafts)	Storage	NO	Limited capacity would require multiple shafts; limited number of existing facilities from which to judge performance/ operational issues.
Off-line Storage (Tanks)	Storage	YES	To provide perspective on tunnel costs for equivalent levels of control.
Off-line Storage (Tunnels)	Storage	YES	Tunnels were evaluated under Alternatives DT-1, DT-2, DT-3 and DT-4.

Section 8.5.c (Page 8-91)

As described above, underflow baffles were evaluated as a means to provide floatables control at outfalls BB-009, BB-013, and NCQ-029, which were the next three largest outfalls after BB-026, NC-015, NC-077 and NC-083 in terms of annual CSO volume. Based on that evaluation, providing underflow baffles for outfalls BB-009 was recommended. In addition, DEP identified NCQ-029 as potentially feasible for underflow baffled subject to a further feasibility analysis. At each of those locations, regulator modifications will be required to achieve hydraulic neutrality in the 5-year, 2-hour storm with the underflow baffle in place. Providing a baffle for outfall BB-013 was determined to be infeasible due to siting constraints associated with the needed regulator modifications.

The key components of the preferred alternative include:

- Expansion of the Borden Avenue Pumping Station to 26 MGD capacity, with a new diversion structure and gravity pipe from Outfall BB-026, and a new force main to the Kent Avenue Gate Structure;
- A storage tunnel that will capture 62.5 percent of the annual CSO volume from Outfalls NC-015, NC-083 and NC-077, with the final route to be determined during subsequent planning and design activities;
- A dewatering pumping station; ~~and~~
- Appurtenant near-surface connecting conduits and structures~~.~~; and
- Floatables control for outfalls BB-009 and potentially NCQ-029.

The implementation of the~~se~~ elements addressing outfalls BB-026, NC-015, NC-083 and NC-077 has a NPW ranging from $703M to $730M, reflecting $5.0M of annual O&M over the course of 20 years for the BAPS and 100 years for the CSO Deep Storage Tunnel. The implementation of floatables control at outfalls BB-009 and NCQ-029 (if feasible) has a NPW of $19.5M, reflecting $36,400 of annual O&M over the course of 20 years.

Section 8.8 (Page 8-99)

The actions identified in this LTCP include:

- Expansion of the Borden Avenue Pumping Station to 26 MGD capacity, with a new diversion structure and gravity pipe from Outfall BB-026, and a new force main to the Kent Avenue Gate Structure;
- A storage tunnel that will capture 62.5 percent of the annual CSO volume from Outfalls NC-015, NC-083 and NC-077, with the final route to be determined during subsequent planning and design activities;
- A dewatering pumping station;
- Appurtenant near-surface connecting conduits and structures.
- Elimination of the in-stream mechanical aeration for Dutch Kills as contained in the 2012 CSO Order.
- Floatables control for outfall BB-009 and potentially outfall NCQ-029, if determined to be feasible following more detailed evaluation.
- Ranges of costs (in February 2017 dollars) for the recommended alternative for outfalls BB-026, NC-015, NC-083 and NC-077 are: NPW $703M to $730M, PBC of $570M to $597M, and annual O&M of $5.0M. The costs (in February 2017 dollars) for floatables control at outfalls BB-009 and NCQ-029 (if feasible) are: NPW $19.5M, PBC of $19M, and annual O&M of $36,400.
- Compliance with Primary Contact WQ Criteria during the recreational season (May 1st through October 31st) based on 2008 rainfall, but not achieving compliance annually based on 2008 rainfall, or during the recreational season based on a 10-year continuous simulation. As a result, a UAA is included as part of this LTCP.
- DEP will establish with the DOHMH through public notification a wet-weather advisory during the recreational season (May 1st through October 31st) during which recreational activities would not be recommended in Newtown Creek. The LTCP includes a recovery time analysis that can be used to establish the duration of the wet-weather advisory for public notification.

COSTS FOR DUTCH KILLS ALTERNATIVES

The following underlined text is hereby incorporated into Section 8 of the Newtown Creek LTCP:

Section 8.2.a.1 (Page 8-22)

The estimated NPW for this control measure varies by level of control as follows:

25 percent CSO control: $51M

50 percent CSO control: $59M

75 percent CSO control: $71M

Details of the estimate for 75 percent CSO control are presented in Section 8.4. As noted above in Section 8.1, the WQ assessments indicated that the Class SD DO criterion is currently being met in Dutch Kills and the main trunk of Newtown Creek under baseline conditions. Therefore, the previously-proposed Dutch Kills aeration system is recommended to be eliminated. The Engineer's estimated construction bid cost for Phase 4 of Enhanced Aeration covering Dutch Kills and part of lower Newtown Creek was

$30.8M. Elimination of this projected cost would partially offset the cost of the Borden Avenue Pump Station expansion alternative.

Section 8.3 (Page 8-56)

As noted above, elimination of the Phase 4 of Enhanced Aeration covering Dutch Kills and part of lower Newtown Creek will eliminate$30.8M in projected costs. Basin-wide alternatives were developed based on the combination of a 26 MGD expansion of the BAPS and CSO control tunnels or individual storage tanks for Outfalls NC-077, NC-083 and NC-015. Table 8-13 presents the resulting alternatives along with their new sequential numbering system. As shown, six basin-wide alternatives were included that target the largest, most active outfalls, BB-026, NC-077, NC-083 and NC-015. The evaluation of floatables control for outfalls BB-009, BB-013, and NCQ-029 would not affect the assessment of CSO volumes and loads, or WQS attainment for the basin-wide alternatives. The costs of the floatables control for outfalls BB-009, BB-013, and NCQ-029 are therefore not included in the basin-wide alternatives assessment presented below.

Section 8.4.l (Page 8-66)

The cost estimates of these retained alternatives are summarized below in Table 8-27 and are then used in the development of the cost-performance and cost- attainment plots presented in Section 8.5. For the purposes of the cost-performance and cost-attainment curves development, costs for the tunnel options whose alignment follows the Creek to the extent possible were used. These costs do not differ significantly from those estimated for the ROW alignments. As noted above, elimination of the Phase 4 of Enhanced Aeration covering Dutch Kills and part of lower Newtown Creek will result in a $30.8M savings that would be applicable to all basin-wide alternatives.

INITIAL SCREENING OF ALTERNATIVES – PUMP STATION MODIFICATIONS

The following underlined text is hereby incorporated into Section 8 of the Newtown Creek LTCP:

Section 8.1.i (Page 8-13)

- *Pumping Station Modification:* The majority of the combined sewage in the Newtown Creek watershed is pumped to the Newtown Creek WWTP through the Brooklyn/Queens Pumping Station (BQPS). Per the Newtown Creek WWTP WWOP, the BQPS pumps a maximum of 400 MGD to the plant. The pumping station and the system of gates that control the inflow to the wet well were upgraded recently. The Newtown Creek WWTP also receives flow from the Manhattan portion of the sewershed via the Manhattan Pumping Station. Theoretically, flow from the Manhattan Pumping Station could be throttled during wet weather, and the capacity of the BQPS expanded to keep the total peak flow to Newtown Creek WWTP at its peak design capacity of 700 MGD. However, hydraulic evaluations and the IW model have indicated that increasing the capacity of the BQPS would not significantly reduce CSO volumes to Newtown Creek, due to conveyance limitations along the Morgan Avenue interceptor (i.e., the additional peak flow could not get to the pumping station). As a result, further modification of the BQPS was not considered. The expansion of the Borden Avenue Pump Station was identified for further evaluation as described below. No other sanitary pump stations within the Newtown Creek drainage area discharge to the Bowery Bay WWTP system.

RECOMMENDED PLAN CSO VOLUMES AND FREQUENCIES

The following underlined text is hereby incorporated into Section 8 of the Newtown Creek LTCP:

Section 8.5.c (Page 8-86)

The following text and tables are inserted at the bottom of Page 8-86:

Tables 8-27a and 8-27b below present the baseline and recommended plan annual overflow volumes and frequencies for 2008, for the Newtown Creek and East River CSOs associated with the Bowery Bay and Newtown Creek WWTPs.

Table 8-27a. 2008 Baseline and Recommended Plan CSO Volume and Overflows per Year – Newtown Creek CSOs

Waterbody/WWTP System	CSO	2008 Baseline		Recommended Plan	
		Volume	Annual Overflow Events	Volume	Annual Overflow Events
		Total Discharge (MG/yr)	Total (No./yr)	Total Discharge (MG/yr)	Total (No./yr)
Dutch Kills/BBL(1)	BB-004	0.1	1	0.0	0
	BB-009	43.0	34	28.3	24
Newtown Creek/BBL	BB-010	0.5	7	0.8	10
	BB-011	1.6	14	2.3	16
	BB-012	0.1	1	0.1	1
	BB-013	16.2	31	15.3	30
	BB-014	1.8	18	1.7	18
	BB-015	0.7	13	0.7	13
Dutch Kills/BBL	BB-026(3)	120	37	28.3	25
	BB-040	1.1	16	0.9	12
Newtown Creek/BBL	BB-042	1.5	22	1.2	17
	BB-043	9.4	32	8.6	33
English Kills/NCWWTP(2)	NCB-015(3)	321	31	119	13
Newtown Creek/NCWWTP	NCB-019	3.0	21	2.9	20
	NCB-021	0.0	0	0.0	0
	NCB-022	7.5	29	8.3	28
	NCB-023	0.5	8	0.6	9
	NCQ-029	18.7	40	17.8	37
Maspeth Creek/NCWWTP	NCQ-077(3)	300	41	100	18
Newtown Creek/NCWWTP	NCB-083(3)	314	42	112	22
	NCB-002(4)	N/A	N/A	N/A	N/A
Total		1,161	42 (max)	449	37 (max)

Notes:
(1) BBL = Bowery Bay Low Level Interceptor, to Bowery Bay WWTP
(2) NCWWTP = Newtown Creek WWTP system
(3) NCB-015 + NCB-083 + NCQ-077 + BB-026 = 91% of Total Annual Volume.
(4) NCB-002 is the Newtown Creek WWTP effluent outfall that discharges to Whale Creek Canal during peak flow and high tide conditions. This flow is treated before discharge.

Table 8-27b. 2008 Baseline and Recommended Plan CSO Volume and Overflows per Year – East River CSOs Associated with Newtown Creek WWTP and Bowery Bay WWTP Systems

Waterbody/WWTP System	CSO	2008 Baseline		Recommended Plan	
		Volume	Annual Overflow Events	Volume	Annual Overflow Events
		Total Discharge (MG/yr)	Total (No./yr)	Total Discharge (MG/yr)	Total (No./yr)
East River/BBL[1]	BB-016	1.8	17	1.7	16
	BB-017	1.7	20	1.6	20
	BB-018	1.1	17	1.1	16
	BB-021	23.4	34	22.5	34
	BB-022	1.0	12	1.0	11
	BB-023	16.4	30	16.1	28
	BB-024	36.4	28	35.9	28
	BB-025	11.0	30	10.9	29
	BB-027	6.1	27	6.1	27
	BB-028	352	44	349	43
	BB-029	105	32	105	32
	BB-030	27.6	43	27.5	43
	BB-031	3.9	18	3.9	18
	BB-032	1.9	17	1.9	17
	BB-033	6.1	28	6.1	29
	BB-034	202	57	202	57
	BB-035	3.9	32	3.9	32
	BB-036	8.9	30	8.9	29
	BB-037	0.6	8	0.6	8
Steinway Creek/BBL	BB-041	84.2	61	84.2	61
East River/BBL	BB-045	0.04	1	0.04	1
	BB-046	7.0	33	7.0	33
	BB-047	2.0	21	2.0	20
Subtotal BBL		**904**	**61 (max)**	**899**	**61 (max)**
East River/NCWWTP[2]	NC-003	0.4	10	0.4	10
	NC-004	15.9	36	17.0	36
	NC-006	92.2	42	104.5	42
	NC-007	7.5	31	8.0	31
	NC-008	21.6	32	24.4	31
	NC-010	0.0	0	0.0	1
	NC-012	30.8	15	36.7	18
	NC-013	58.3	28	72.9	27
Wallabout Channel/NCWWTP	NC-014	607	27	646.5	29
East River/NCWWTP	NC-024	0.0	0	0.0	0
	NC-025	0.5	10	0.5	11
	NC-026	0.3	7	0.3	10
	NC-027	13.3	31	16.1	30
	NC-082	0.6	10	0.6	10
Subtotal NCWWTP		**848**	**42 (max)**	**929**	**42 (max)**

Table 8-27b. 2008 Baseline and Recommended Plan CSO Volume and Overflows per Year – East River CSOs Associated with Newtown Creek WWTP and Bowery Bay WWTP Systems

Waterbody/WWTP System	CSO	2008 Baseline		Recommended Plan	
		Volume	Annual Overflow Events	Volume	Annual Overflow Events
		Total Discharge (MG/yr)	Total (No./yr)	Total Discharge (MG/yr)	Total (No./yr)
Total		**1,752**	**61 (max)**	**1,828**	**61 (max)**

Notes:
(1) BBL = Bowery Bay Low Level Interceptor, to Bowery Bay WWTP
(2) NCWWTP = Newtown Creek WWTP system

SECTION 9 EDITS

SUPERFUND COORDINATION

The following text is hereby incorporated into Section 9.2 of the Newtown Creek LTCP:

As stated in the LTCP at ES-4, the data shows that CSO discharges are not a significant source of hazardous substances in Newtown Creek. For this reason, the City expects the CSO control alternative selected in the LTCP would be sufficient to address any CSO discharge controls that EPA may require under Superfund. However, the Feasibility Study, which will evaluate potential remedies for Newtown Creek, is currently being undertaken, and thus EPA will not issue a Record of Decision (ROD), which will set forth the final remedy for Newtown Creek, until 2023 at the earliest.

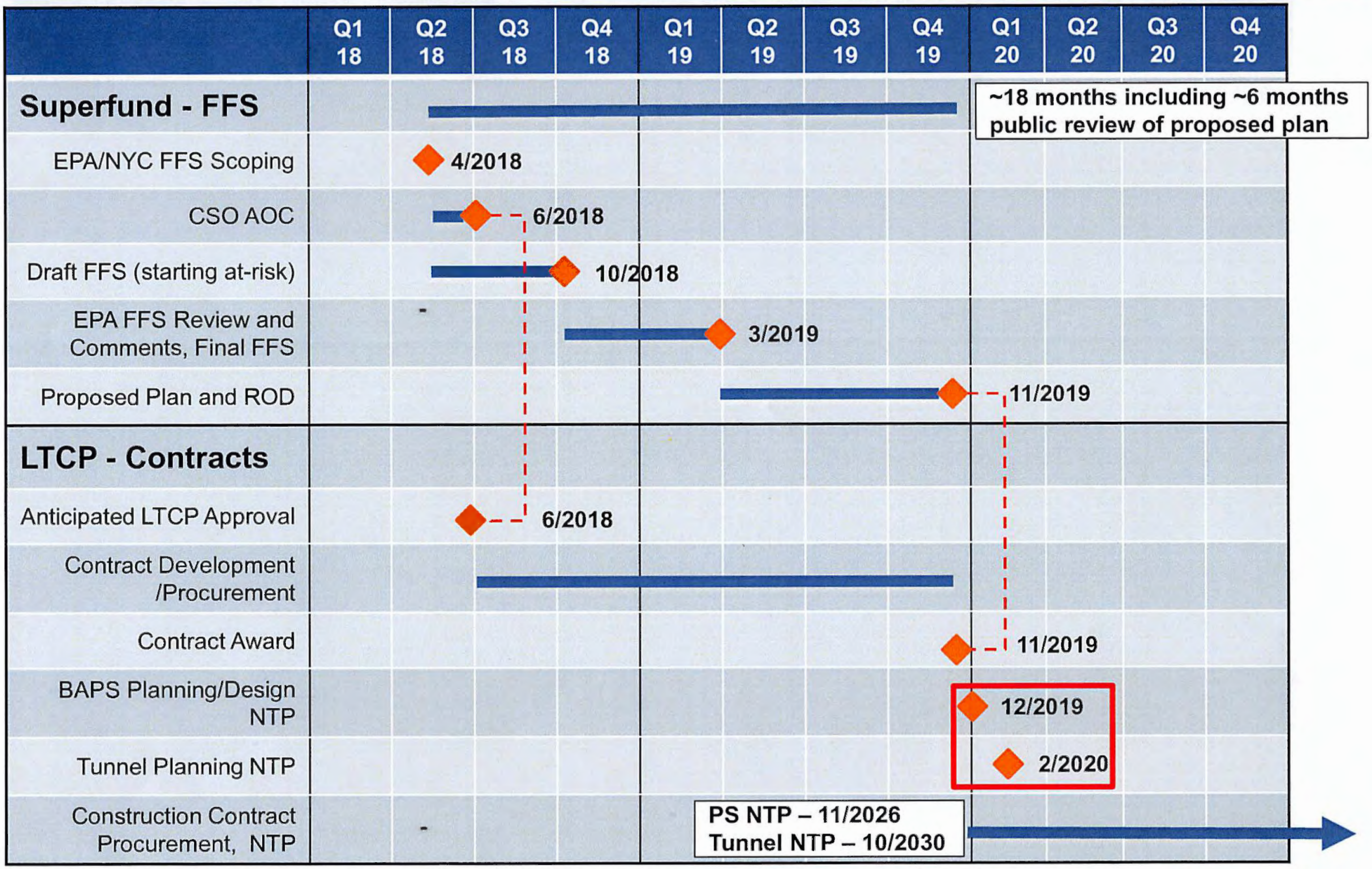
As set forth in DEP's January 8, 2018 Response to Comments, EPA's selection of a remedy for Newtown Creek could impact several elements of the LTCP Recommended Plan for Newtown Creek. For example, the expansion of the Dutch Kills Pump Station, which would result in a 75% reduction of CSO at BB-026, would be well underway by 2023. If the ROD does not support the Dutch Kills Pump Station expansion technology, or requires greater than 75% CSO reduction, DEP's LTCP project would not satisfy the ROD and a storage solution may be required. For example, a storage alternative would be significantly more expensive, would require a much longer implementation schedule, and would delay CSO controls. Further, a storage alternative would require land acquisition, thus adding significant time and risk to the LTCP Recommended Plan.

Accordingly, DEP has been coordinating with EPA and DEC on integrating the LTCP and Superfund processes. In January 2018, DEP proposed to EPA that DEP would conduct a Focused Feasibility Study (FFS) that would evaluate the effectiveness of the elements of the LTCP at addressing CERCLA contaminants in CSO discharges. DEP would utilize much of the data gathered and generated in developing the LTCP Recommend Plan, and would evaluate the data under the Superfund criteria set forth in the National Contingency Plan (NCP).

DEP stated that it is prepared to begin work on the FFS immediately, and that it would deliver its final FFS by October 31, 2018. Under this schedule, DEP would complete its FFS and EPA would make a final decision with respect to CSO controls under CERCLA before DEP awarded a contract for the design of the LTCP Recommended Plan. Importantly, if EPA were to require additional CSO controls under Superfund, DEP would not have expended significant resources with respect to the design of the LTCP Recommended Plan at the time of EPA's decision.

DEP and EPA held further discussions relating to the LTCP Recommended Plan and the proposed FFS in March and April 2018. Consistent with these discussions, DEP is preparing a draft Scope of Work for the FFS for EPA's consideration in early May 2018 and is commencing the work required to undertake the FFS at risk pending EPA's consideration of the scope of work. In addition, on a parallel track with the FFS, DEP will undertake contract development/procurement for the proposed LTCP project. As set forth in the attached schedule (Appendix B), this work effort ensures certainty that the design contract for the proposed LTCP project can be awarded upon completion of the approval of the FFS.

Newtown Creek Coordinated Schedule



There is currently a ~5+ year gap between EPA Superfund ROD and LTCP project design initiation. FFS path forward (with some at-risk elements) addresses conflicts and minimizes risks.