DEC COMMENT No. 1:

Evaluate the installation of an underflow baffle at Diversion Chamber 5 for floatables control.

DEP Response:

An underflow baffle in Diversion Chamber No. 5 (DC-5) was evaluated and it was determined that Diversion Chamber No. 5 is not configured to allow for a long enough baffle to be hydraulically neutral. DC-5 is downstream of the Kissena Corridor sewers, an area with known flooding problems (see Figure 1). Alternatively, two other options for installing underflow baffles near DC-5 to control floatables in flows that bypass the retention tank were identified and evaluated.

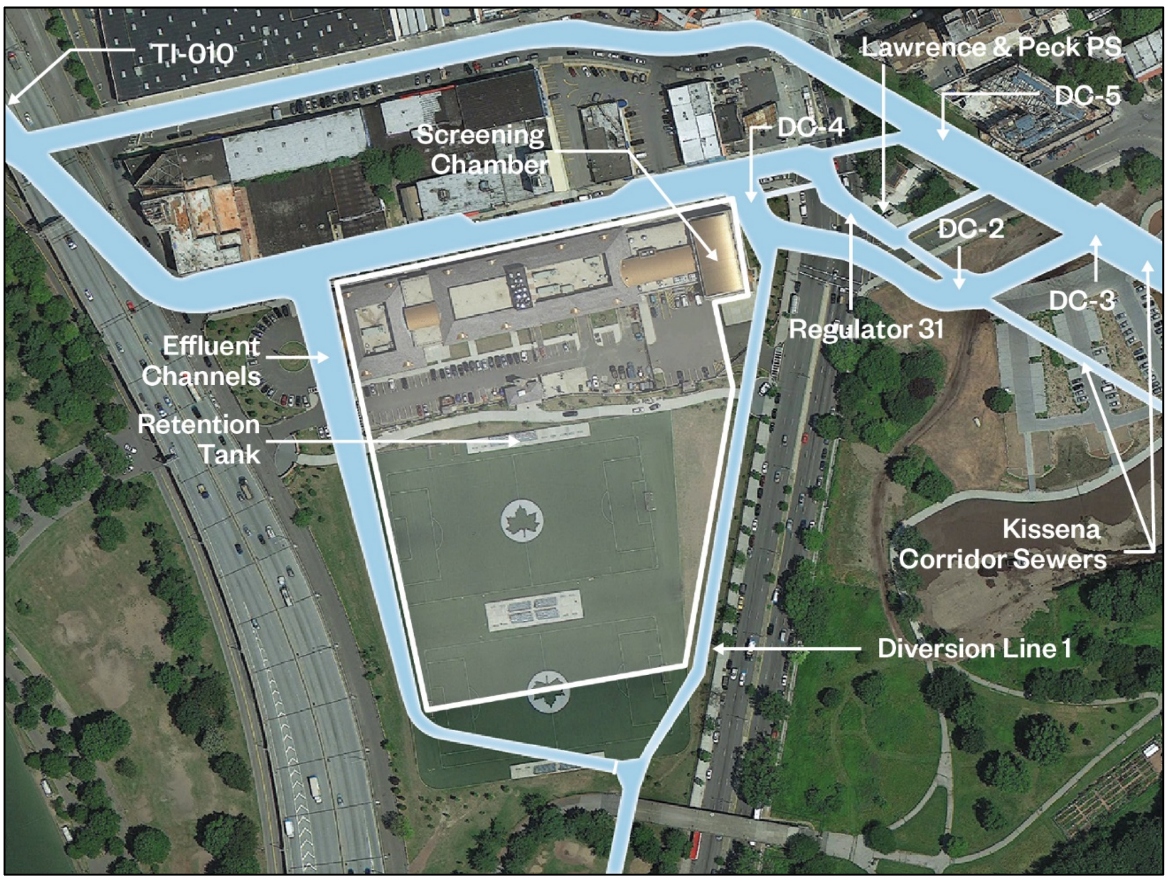

Figure 1: Sewer Configuration Upstream of TI-010

One option considered the installation of a new baffle chamber upstream of DC-5 to allow for construction of a long enough baffle to maintain hydraulic neutrality. Siting a new baffle structure upstream of DC-5 would pose considerable challenges (see Figure 2). The existing sewer already traverses Blossom Avenue and there is limited space between the existing sewer and College Point Boulevard, a heavily travelled road. There is significant underground infrastructure in the area and nearby properties are either already developed or are park land. Encroachment on adjacent properties would likely be required to provide sufficient weir length. Excavation would be close to 40 *feet deep and require extensive excavation support to protect existing sewers and the Lawrence and Peck PS. In addition, installing baffles in or immediately upstream of DC-5 is not the optimal location for this technology. Once wet weather flows subside, floatables would settle out at a baffle either in or adjacent to DC-5. Some of the floatables would likely remain settled, until either they are flushed out the next time the gates in DC-5 are opened to relieve high flows, or until they are removed manually. The floatables that are resuspended during the next event would be washed under the baffle before the water surface rises enough for the baffle to retain the floatables. These floatables could then be flushed over the weir (closed sluice gates in DC-5), causing what was retained previously to be discharged to Flushing Creek. Because of these issues, installing an underflow baffle in a separate chamber upstream of DC-5 is not considered viable.*

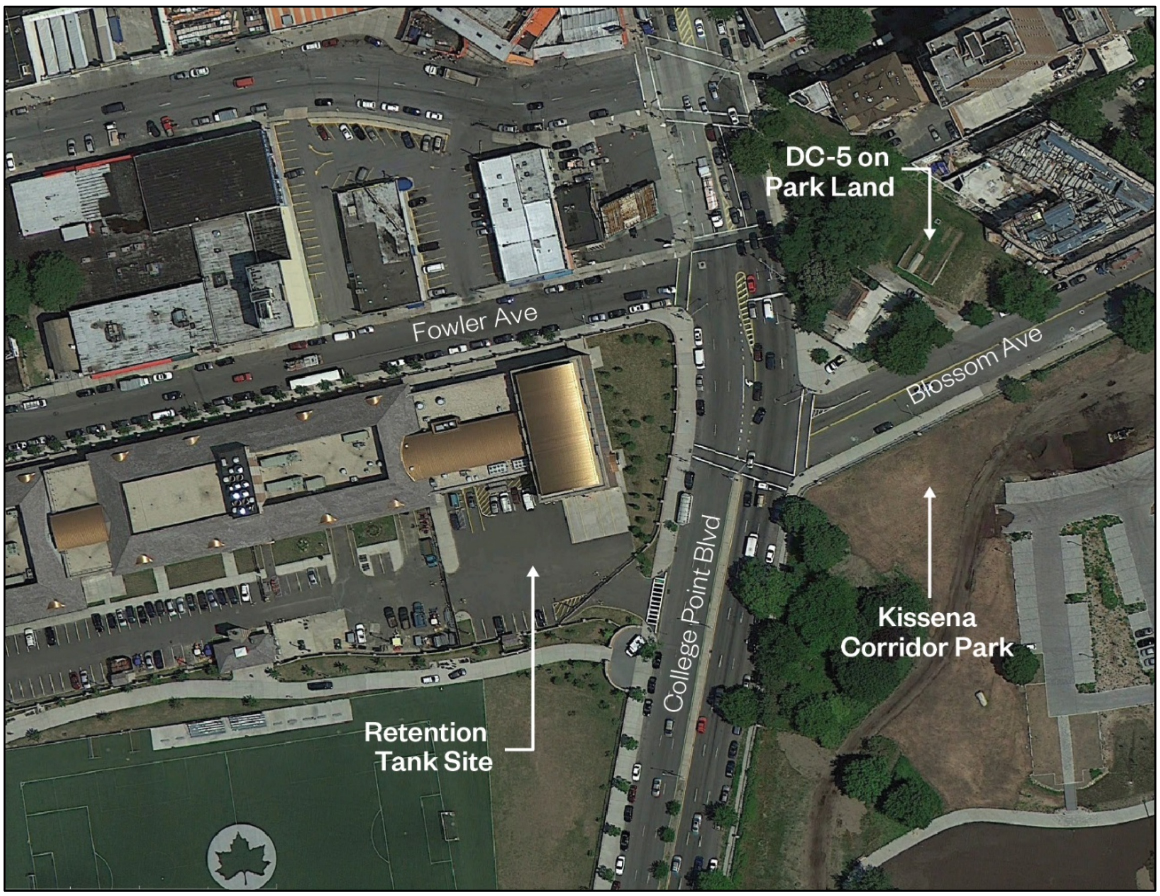

Figure 2: Area near DC-5

As an alternative to baffling at or near DC-5, the LTCP team evaluated installing underflow baffles at Diversion Chamber 3 (DC-3). As shown in Figure 1, DC-3 is upstream of DC-5. Figure 3 shows a baffling concept where five underflow baffles are installed within DC-3 to skim wet weather flows going to TI-010 through DC-5.

Three of the baffles are oriented at an angle within each channel to maximize baffle length. Two additional baffles are required between channels to eliminate short circuiting. All five of the baffles extend down to elevation +1.0, which is one foot below the top of the sluice gates in DC-5. When *closed, the sluice gates in DC-5 act as a weir, allowing flow to pass over the top of the gates. Under high flow conditions, the sluice gates in DC-5 are opened fully out of the flow to protect against flooding upstream within the Kissena Corridor by allowing higher flows to pass. During high flows, each of the three gates in DC-5 is opened at a different level as the upstream water level rises. Each gate is then closed at a different level as the upstream water level falls. Table 1 lists the control elevations for the DC-5 gates.*

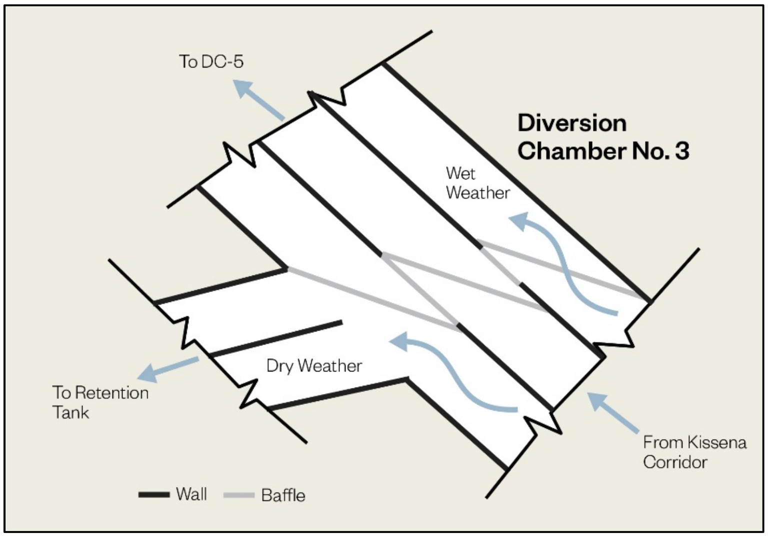

Figure 3: DC-3 Baffling Concept Schematic

Table 1: DC-5 Gate Operations

HGL	Flow	Gate 1	Gate 2	Gate 2
<2.0	Any	Closed	Closed	Closed
+2.0 to +6.0	Increasing	Closed	Closed	Closed
+6.0 to +6.5	Increasing	Open	Closed	Closed
+6.5 to +7.0	Increasing	Open	Open	Closed
≥ 7.0	Increasing	Open	Open	Open
+5.0 to +4.5	Decreasing	Open	Open	Closed
4.5 to 4.0	Decreasing	Open	Closed	Closed
≥ 4.0	Decreasing	Closed	Closed	Closed

Modeling of this conceptual baffle configuration indicates that the maximum hydraulic grade line upstream of DC-3 is predicted to increase less than 0.05 feet above the maximum under baseline conditions for a 5-year storm, which is less than the expected accuracy range of the model. Modeling also indicates that the baffles would not change annual CSO frequencies and volumes.

The underflow baffle concept for DC-3 is an initial preliminary concept. Detailed evaluations would need to be undertaken during the disinfection system design phase to confirm the feasibility of this concept, including hydraulic impacts, and constructability within the chamber under the Kissena Corridor Park.

DEC COMMENT No.2:

Clarify if permanent flow metering at existing retention tank will be completed as part of the LTCP alternative.

DEP Response:

Flow monitoring is required to control chlorine dosing at the proposed disinfection locations. DEP will implement permanent flow monitoring as part of the proposed disinfection projects.

DEC COMMENT No.3

Provide corrections to the comment No.16 response for insertion into Supplemental Document.

DEP Response:

Revisions to the DEC Comment No. 16 are shown in red below. Also enclosed are replacement pages SD-35, SD-36 and SD-36a for the May 2015 Supplemental Documentation.

DEC Comment No. 16 on the *December 2014 Flushing Creek LTCP*:
Section 8: As part of the disinfection alternatives, the City should consider two sewer system modifications:

DEC Comment No. 16a on the *December 2014 Flushing Creek LTCP*:
Diversion of additional flows from the CSO retention tank bypass structures into the retention tank to take advantage of existing screening and settling capacities of the tank.

***DEP Revised Response*:**
Modeling was completed during the development of the LTCP to evaluate diverting bypass flow into the tank. The model was used to raise weirs in Diversion Chambers 2, 3/5, 4 and R-31. As part of this run, the model was revised to lower the tank effluent weirs two feet below their as-built elevation, from +2 ft. AD to +0 ft. AD. The tank effluent weirs had to be lowered to avoid adverse HGL impacts upstream. The revised weir elevations are summarized in the following table:

Structure	Weir Elevation (ft.)	
	Baseline	Weir Modification
Diversion Chamber 2	2.5	4.25
Diversion Chamber 3	2	4.25
	2	4.25
	2	4.25
R-31	12	12.85
Diversion Chamber 4	4	4.25
Flushing Bay CSO Retention Facility Effluent Weir	2	0

The sewer system modifications described above were modeled. The model projected that the proportion of CSO bypassing the tank would decrease, but CSO volume would increase overall, leading to more partially treated flow discharging through TI-010 and a corresponding reduction in flow being treated at the TI WWTP. Modeling results indicated that the portion of TI-010 annual overflow that is first routed through the tank (receiving screening and settling) would increase by 86 percent. However, overall overflow to Flushing Creek through Outfall TI-010 would also increase would also increase~~. The alternative would increase annual average CSO volume to the Creek~~ by nearly 90 million gallons, with a corresponding decrease of ~~The~~ 90 million gallons ~~increase~~ to ~~TI-010 is~~ the ~~result~~ TI WWTP. Even with Chlorination of the additional flow through the ~~Flushing Bay CSO Retention Facility. The total flow in the system remains constant with the flow to the WWTP being reduced by~~ tank, the level of treatment of the additional 90 million gallons discharged at TI-010 would be lower than the level of treatment available at TI. Therefore, this would not be a beneficial trade-off.~~ The total flow through the retention facility is increased by approximately 300 million gallons giving an overall increase in partially treated flow of 210 million gallons. The hydraulic grade line upstream of the retention facility is reduced by approximately 0.25 feet. This option would require changes to the real-time control of the weirs at Diversion Chamber 3/5 as well as the retention facility~~.

DEC Comment No. 16b on the *December 2014 Flushing Creek LTCP*:
Diversion of additional flow from Kissena Corridor CSO lines into TI-010 outfall that otherwise would flow into the Flushing Interceptor during wet weather, in order to maximize the benefits for disinfection of TI-010 overflows.

***DEP Revised Response*:**
Modeling was completed during the development of the LTCP to evaluate throttling flow from the TI-010 tributary area into the Flushing Interceptor ~~in order~~ to free up capacity in the interceptor so that it could handle additional flow from the TI-022 and TI-011 tributary area. Two alternative scenarios were evaluated: one with the Flushing Bay CSO Retention Facility weir at its existing elevation, and one with the weir lowered by two feet to elevation +0 ft. AD to maximize flow through the tank and to minimize bypassing. Both scenarios resulted in reduced annual overflow volumes at TI-022 and TI-011, as well as additional flow being routed through the tank getting partial treatment before being discharged at TI-010. However, both scenarios also resulted in increased annual average total overflow volumes to Flushing Creek. Keeping the existing weir elevation resulted in an overall increase of over 900 million gallons per year. Lowering the weir elevation resulted in an increase of over one billion gallons per year. This option throttles the flow in the Flushing Interceptor downstream of R-31, limiting the flow to approximately 150 percent of peak DWF.~~ and lowers the weirs around the Flushing Bay CSO Retention Facility to maintain upstream hydraulic grade as shown in the table below.~~

~~Structure~~	~~HGL (ft.)~~	
	~~Baseline~~	~~Interceptor Throttling~~
~~Diversion Chamber 2~~	~~4.25~~	~~2.50~~
~~Diversion Chamber 3~~	~~4.25~~	~~2.00~~
	~~4.25~~	~~2.00~~
	~~4.25~~	~~2.00~~
~~R-31~~	~~12.85~~	~~12.00~~
~~Diversion Chamber 4~~	~~4.25~~	~~4.00~~
~~Flushing Bay CSO Retention Facility Weir~~	~~2.00~~	~~0.00~~

Optimization of the weir elevations at Diversion Chambers 2, 3/5, 4 and R-31 could potentially reduce the amount of additional untreated overflow at TI-010 and send more flow through the Flushing Creek CSO Retention Facility, but this would increase the HGL in the Kissena Corridor.

DEC COMMENT No.4

Evaluate floatables control at TI-011 and confirm that feasibility for including floatables control as part of the selected alternative.

DEP Response:

Historically, this outfall has included end-of-pipe floatables control in the form of a netting facility. This netting facility is no longer in place. The system tributary to TI-011 was evaluated to determine if underflow baffles could be implemented upstream of the outfall. There are five regulators and a storm sewer that discharge into the TI-011 outfall. Of the CSO from the five regulators, 55 percent of the flow originates from TI-R09, and 36 percent originates from TI-R51. Because over 91 percent of the typical year overflow comes from those two regulators, the evaluation was focused solely on those regulators.

The original construction drawings of TI-R51 show that the existing structure has a 78-inch overflow line, with a 7-footwide, cast-iron, stop-plank weir. However, a review of the model and the DEP's Regulator Database indicate that the stop plank is not installed (see Figure 4). As such, the control elevation is at the invert of the control structure and modeling indicates that a baffle would adversely impact the upstream HGL. Additionally, any baffle would need to be installed along the top of the dry weather flow channel and not perpendicular to the flow, which is required for floatables capture. Installing a baffle within TI-R051 is not feasible.

Regulator TI-R09 has three overflow side weirs that have an effective length of 22.5 feet. Based on available drawings, it appears that it may be possible to construct an underflow baffle upstream of the weirs. A baffle with an invert one foot below the weir elevation of +5.92 was evaluated in the model. Modeling of this configuration indicates that there are no areas tributary to TI-R09 where maximum hydraulic grade line is predicted to increase more than 0.05 feet above baseline for a five-year storm, which is less than the expected accuracy range of the model. Additionally, modeling indicates that a baffle impacts neither annual CSO frequencies and volumes, nor the dewatering time for the Flushing Bay Retention Tank.

The baffle would need to be offset some distance from the weirs, recommended to be at least two times the maximum flow height over the weirs. The ends of the baffle would need to be turned back into the wall to prevent short circuiting. As shown in Figure 5, that would result in the baffle being constructed in the flow path of the interceptor and would require isolating a portion of the interceptor to construct the baffle to the underside of the roof slab. An alternative would be to relocate the weir to the edge of the 8-foot diameter diversion pipe and install the baffle near the location of the existing weirs to create the necessary offset between the baffle and the weir (see Figure 6). Either of these concepts would need to be further developed and evaluated as part of detailed design of the TI-011 disinfection project.

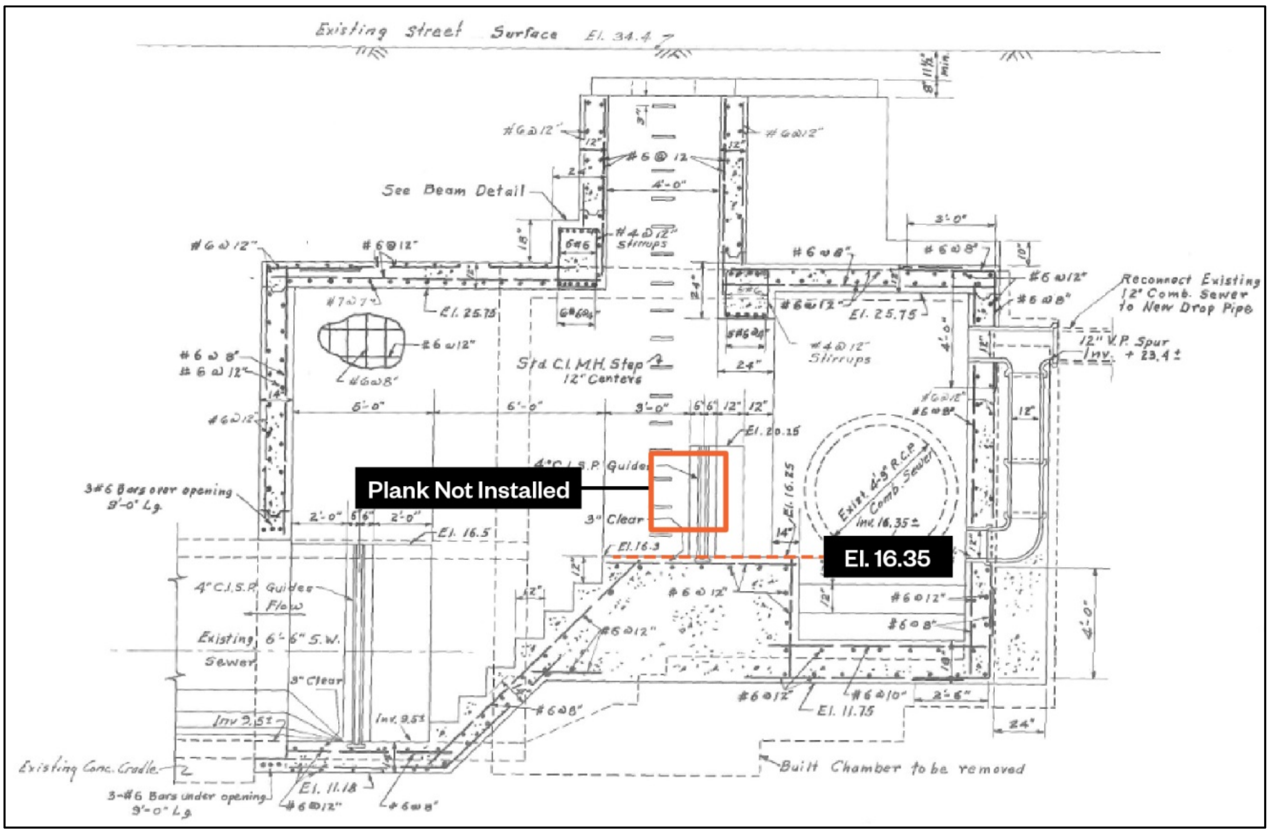

Figure 4: Section of TI-R51

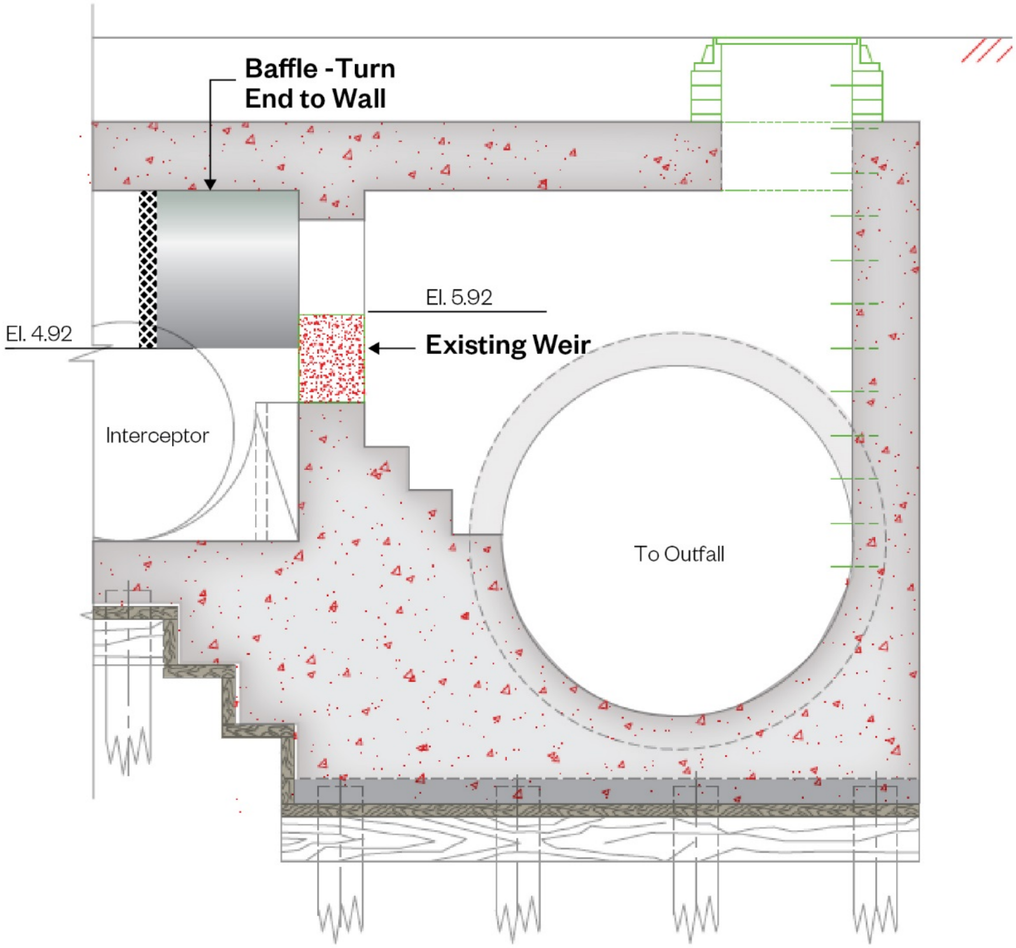

Figure 5: TI-R09 Baffle Concept – Existing Weir Configuration

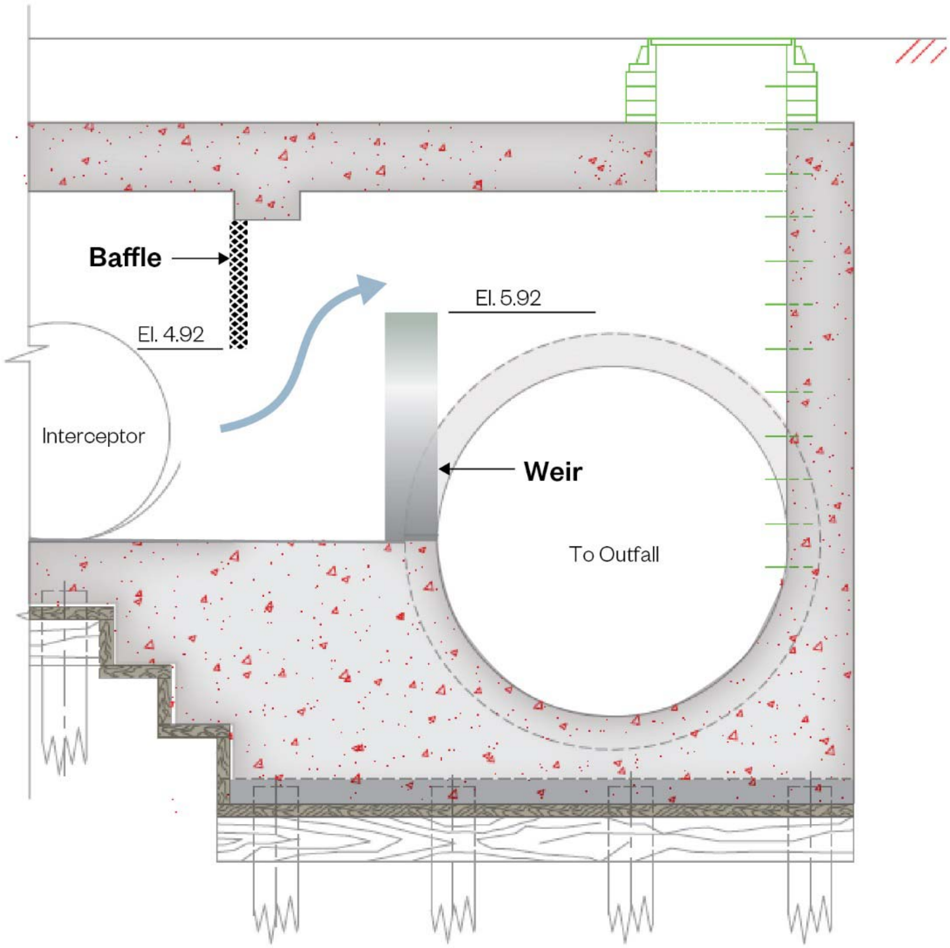

Figure 6: TI-R09 Baffle Concept – Revised Weir Configuration