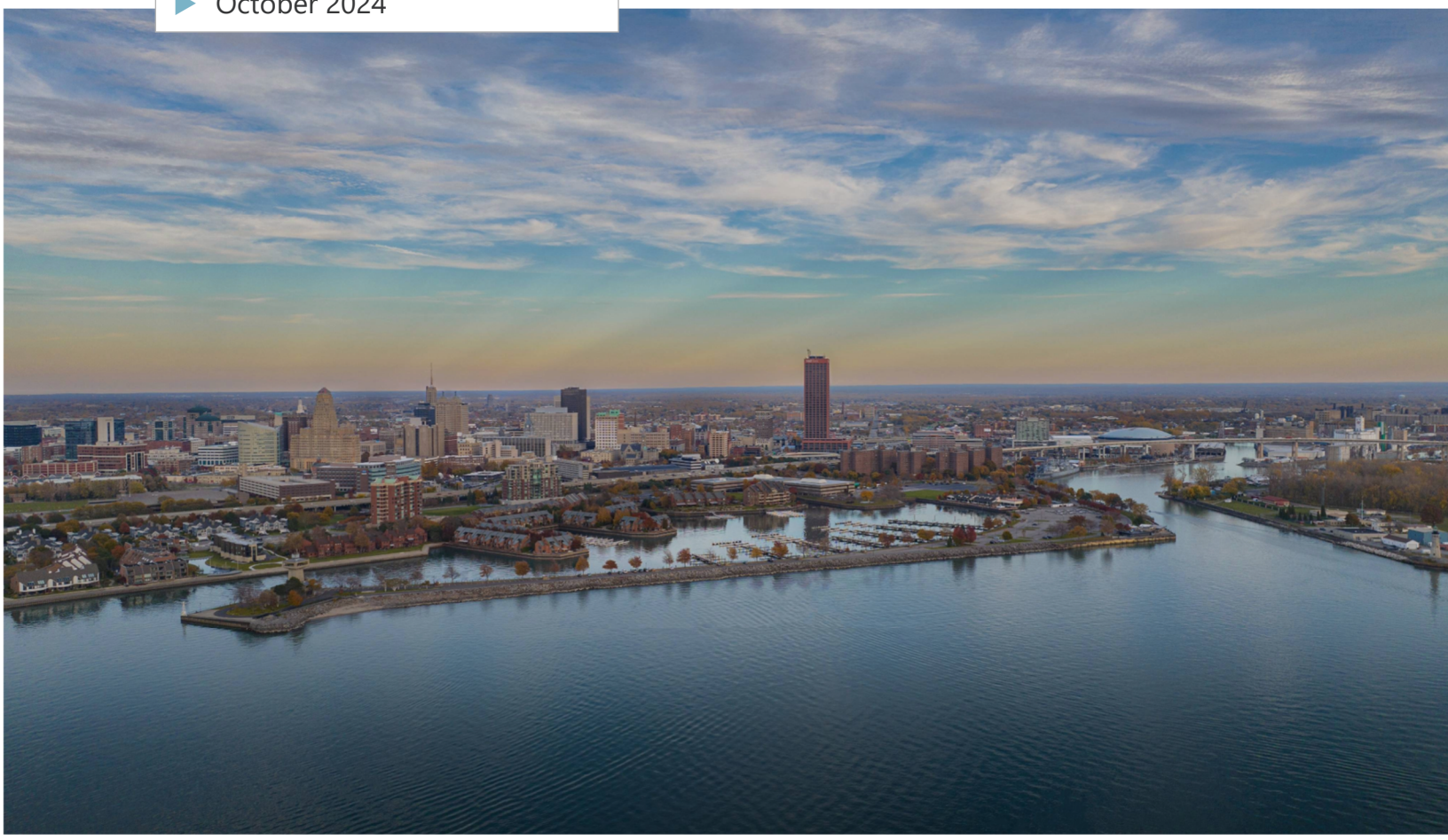
TYLin | Greeley and Hansen Water Solutions

BUFFALO SEWER AUTHORITY

Appendix H: 30% Design Considerations and Assumptions

October 2024



BSA Capital Projects Program Management Team:

TYLin | Greeley and Hansen Water Solutions

Arcadis | JM Davidson Engineering | Hallmark Planning & Development | e3 Communications | Watts Architecture & Engineering | CORE Environmental | Atlantic Testing Laboratories | Frandina Engineering and Land Surveying | KHEOPS Architecture, Engineering and Survey | International Institute of Buffalo | Jade Stone Engineering | NASCO Construction Services | JKMuir | People Inc.

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SECTION 1 INTRODUCTION

1.1 Objective

The Preliminary Engineering Report (PER) for the Sidney Offline Storage (OLS) Tank was prepared by TYLin (Greeley and Hansen Water Solutions) on June 14, 2024. Following the 30% design phase, there have been design updates to the project. Therefore, the goal of this technical memorandum is to provide an update to the Draft PER to include the key design decisions made as the project progresses.

1.2 Updates to PER

The updates to the PER include

- Changes to the storage tank volume based on refinement of the collection system model,
- Design updates to the peak flow rate entering and exiting the storage tank,
- Geotechnical information,
- Tipping bucket design,
- Ventilation, and
- Value Engineering Considerations

1.2.1 Tank Volume

It was proposed, as per the PER, that a 3.26 million gallon (MG) volume offline storage tank volume would be constructed to store flow diverted from the sewer along Humboldt Parkway and then discharge by gravity into the 90-inch Scajaquada Tunnel Interceptor.

After Buffalo Sewer Authority (BSA) entered into an Administrative Order with the New York State Department of Environmental Conservation (DEC) and the U.S. Environmental Protection Agency (EPA) as part of their Combined Sewer Overflow (CSO) Long Term Control Plan (LTCP), on March 18, 2014, Xylem and its subconsultants have been collaborating with BSA in an optimization process to assess the impacts of implementing different combinations and variations of these projects using hydraulic modeling as a basis for this process.

As part of TYLin's development of the 30% design for this project, TYLin has been coordinating with Xylem and its subconsultants. Xylem noted that if the tank is used to attenuate flow and drain during the wet weather event, the size of the tank can be minimized without activating the sewer patrol point (SPP336B). The 5th largest storm in the typical year (critical event) was run for the following tank volumes: 0.5MG, 1MG, 1.5MG, and 2MG. The model showed that the nearby Sewer Patrol Point, SPP336B was not active for a tank volume of 1MG but became activated for a tank volume of 0.5MG. Therefore, it was determined that the critical tank volume was in the range of 0.75 – 1MG. The model was run with a tank volume of 0.85MG for the critical event with the gravity drain scenario, with real time control of the gate controlling the flow from the OLS and it was confirmed that SPP336B did not activate. Therefore, for the purpose of the 30% design, a tank volume of 0.85MG was used to define the tank dimensions.

1.2.2 Peak Flow Rates and Flow Diversion Confirmation

As per the PER, a 36-inch conduit will drain the offline storage tank to the 90-inch Scajaquada Tunnel Interceptor with a 48-inch conduit diverting flow to the OLS.

Collection system modeling confirmed the following design parameters based on a typical year simulation.

- Overflow weir from 84-inch sewer in Humboldt Parkway – weir length 70 feet, weir elevation 617.20
- 48-inch conduit to the OLS has a peak flow rate of 75 million gallons per day (MGD), 30% design included 48-inch sewer at 1% slope
- 36-inch conduit leaving the OLS with a slope of 1%, and capacity of roughly 42 MGD will not limit the OLS ability to attenuate wet weather flow

1.2.3 Geotechnical Considerations for Tank Depth

Following discussions with engineering contractors that specialize in foundations in the Buffalo region, the size of the tank was optimized to have a larger surface footprint and lower depth. The geotechnical report shows rock at a depth of 18 feet and this rock is very difficult to drill through which adds additional cost to the project and affects the schedule. Therefore, tank dimensions of 123 feet N/S and 103.5 feet E/W, with a depth of 32 feet for the excavation, were developed. The sheeting will require 2 tiers of anchors and so a distance of 20' from the property line was considered. On the side of Lark Street, a distance of 15 feet from the edge of excavation was used to avoid the water and sewer utilities.

1.2.4 Tipping Bucket Design

The CSO storage tank has dimensions of 123 feet L x 103.5 feet W. The flushbays will be designed to be 24 feet in width with 2.5 feet guidewalls between each flushbay. The design of the flushbays is such that four (4) tipping buckets will be used in total, with one (1) tipping bucket per flushbay. In order to get the full advantage of the flushing motion, the tipping buckets will be in a penthouse design, with the bucket centerline being 20 feet from floor of the tank. The capacity of each tipping bucket is 1460 gallons of water. Access points over the tipping buckets to allow for visual inspection of the bearings and bucket operation.

1.2.5 Ventilation

The 0.85MG offline storage tank will require ventilation due to the air in the tank being displaced during peak wet weather flow. With a peak wet weather flow of 75 MGD entering the tank, the volume of air displaced in the tank will be roughly 6,950 Cubic Feet per minute (CFM). This will require a 30-inch vent in the tank to vent air from the tank into the atmosphere.

1.2.6 Value Engineering

The following items may warrant additional evaluation as the design is refined:

- Evaluation of micro tunneling or open cut construction of the 36-inch sewer