



## STRUCTURAL ASSESSMENT REPORT

<b>Project:</b> Kitsap County Suquamish WWTP	<b>Purpose:</b> Structural Evaluation
<b>Location:</b> 18000 Division Ave NE, Suquamish, WA	<b>Date:</b> February 17, 2023
<b>CG Project:</b> 23029.10	<b>Report:</b> 1
<b>Client:</b> Consor	<b>Field Rep:</b> Joe Galusha, PE, SE, LEED AP

### PURPOSE AND SCOPE

A field representative from CG Engineering visited the site on **January 17, 2023**, to meet with the design team and County personnel to discuss the upcoming improvements to the Suquamish wastewater treatment plant (WWTP). While we were at the site, we performed a structural assessment of the existing facility. Our assessment was limited to the structural components that were visible and accessible.

### EXISTING STRUCTURES

The original treatment plant was constructed in 1975 and included a 47' diameter aeration basin (outer ring) and sludge settling basin (inner core), three sludge drying beds, and a maintenance and storage building. The sludge drying beds have been decommissioned and demolished, but the 47' diameter aeration basin / sludge settling basin and the maintenance and storage building remains at the site. The aeration basin / sludge settling basin has since been re-purposed into an equalization basin (outer ring) and a sludge storage tank (inner core). In 1997, major improvements were constructed at the site consisting of a two-story process building and two SBR basins. A smaller facility upgrade was constructed in 2017 which included a thickened sludge storage tank and several small site retaining walls.

The equalization basin (EQ basin) and sludge storage tank structure is a partially buried 47' diameter circular tank. The walls, roof, and associated components were constructed with plate steel that was coated. The foundation of the EQ basin / sludge storage tank is a reinforced concrete mat. The process building and SBR basins were constructed primarily of reinforced concrete. The exception is that the upper floor of the process building has CMU walls, and there are steel and other metal components, such as piping, guardrails, and equipment throughout. The maintenance building was constructed with light wood-framed stud walls, a wood-framed roof, and concrete foundations. Lastly, the thickened sludge storage tank was constructed of reinforced concrete.

### OBSERVATIONS

1. **EQ Basin / Sludge Storage Tank** – Constructed in 1975, the EQ basin / sludge storage tank was the oldest structure that was observed at the site. The visible portions of the basin appeared to be structurally sound, however, we observed considerable surface corrosion of the painted steel at the tank walls. Several photos at the end of this report show the extent of the corrosion that was observed. In addition to corrosion, the concrete access stairs showed signs of settlement and there was a large crack at the top tread caused by the settlement.
2. **Process Building and SBR Basins** – The 1997 process building and SBR basins, which were constructed primarily of concrete, were observed to be structurally sound. The liner for one of the SBR basins appeared to be compromised on one end and surface corrosion was observed on

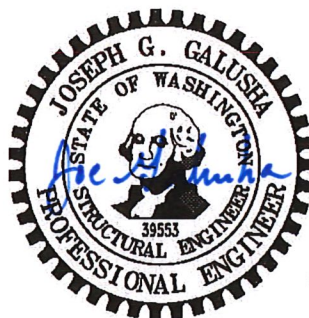
the metal components in several places as seen in the photos at the end of this report. In addition to metal corrosions, efflorescence was observed on the inside face of the CMU walls at the upper floor of the process building.

3. **Maintenance and Storage Building** – The 1975 maintenance and storage building appeared to be structurally sound and was not observed to have any notable deficiencies.
4. **Thickened Sludge Storage Tank** – The 2017 thickened sludge storage tank appeared to be structurally sound and was not observed to have any notable deficiencies.

#### RECOMMENDATIONS

Based on our visual observations, it is our opinion that the structures at the Suquamish WWTP are structurally sound. As noted, corrosion was the main deficiency that was observed. The following are recommendations relating to the structural elements.

- As discussed, extensive surface corrosion was observed at the 1975 EQ basin. It is our opinion that the corrosion should be addressed within the next 1-3 years. Because there is a corrosion specialist on the design team, we will defer specific recommendations to them, given their expertise in the field. However, we plan to work together on a coordinated repair plan that will likely include the addition of new welded plates in areas where the corrosion has substantially reduced the base material.
- Surface corrosion of metals was similarly observed at the process building and SBR basins. We advise following the recommendations of the corrosion specialist, which may include replacement of corroded plates and bolts. The corrosion specialist also plans to provide recommendations for replacement of the SBR basin liners.
- Due to apparent settlement, we recommend that the access stairs for the 1975 EQ basin be removed and replaced.
- The upcoming facility improvement project will consist of the replacement of much of the existing piping within the process building. Because the process building floors, walls, and roof structure was observed to be in good overall condition, it is our opinion that the building will have adequate strength to support new pipe supports, anchors, and wall penetration that will be associated with the piping replacement project.



02/17/2023

#### DISCLAIMER

This observation is the professional opinion of CG Engineering PLLC based on the information available during this assessment or evaluation. This report does not warrant or guarantee that all conditions were discovered at the time of the observation. This report was prepared subject to the standard of care applicable to professional services at the time the services were provided.

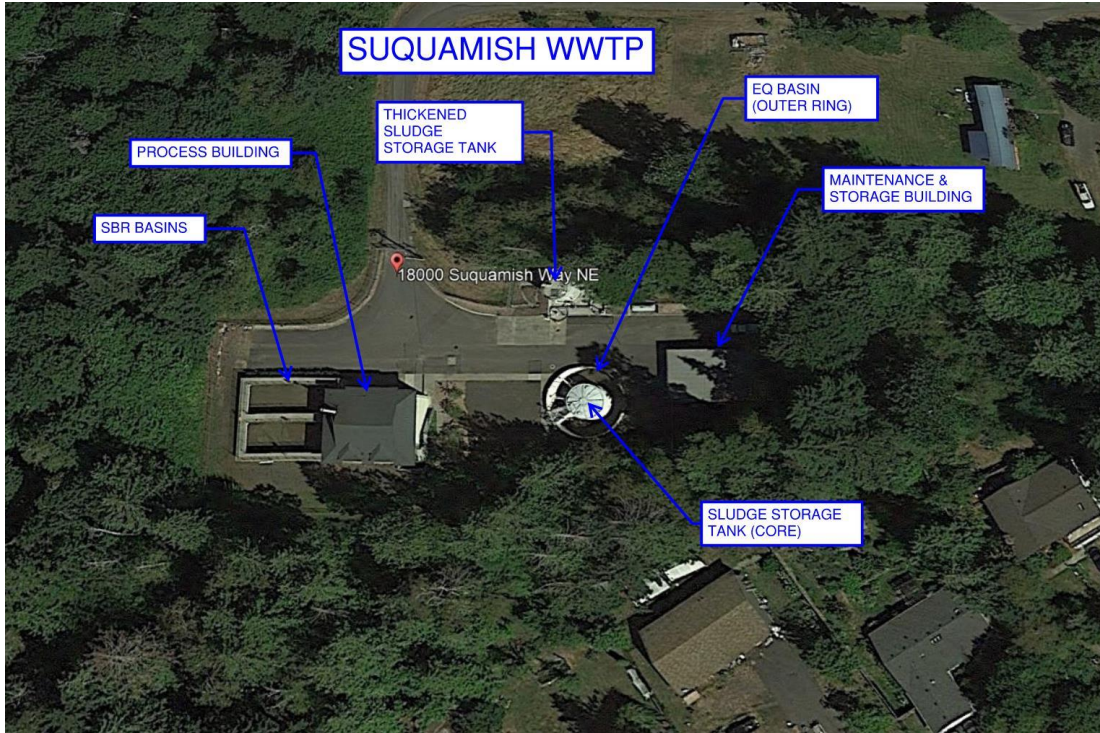


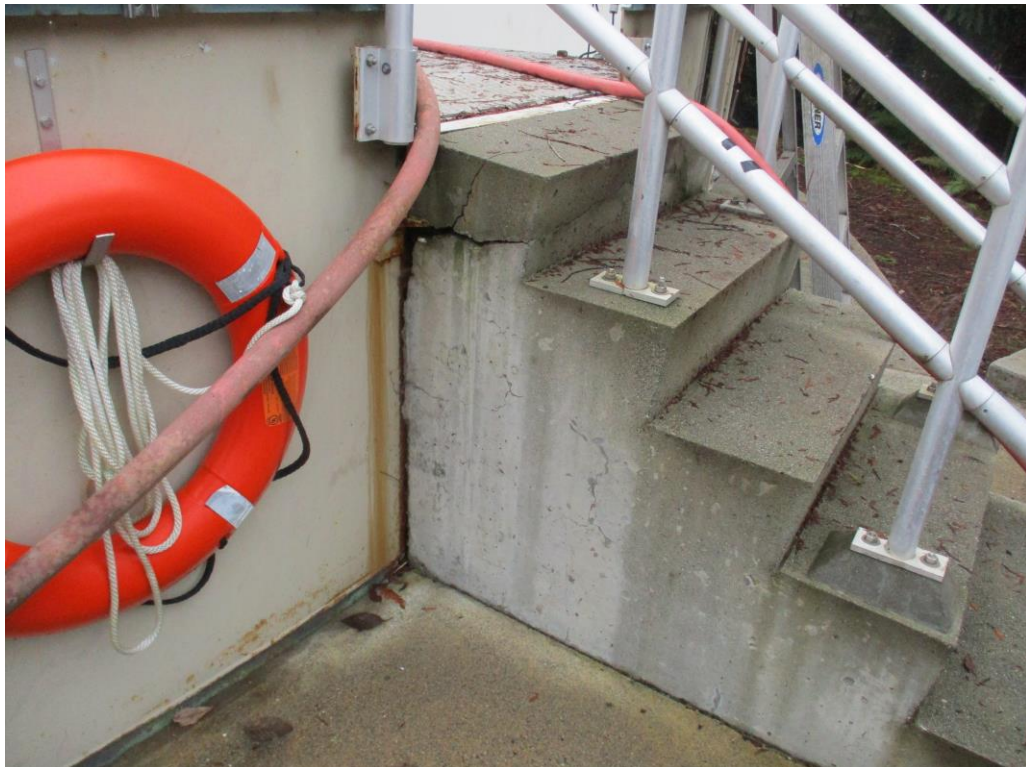
Photo 1 – Aerial Image of Project Site



Photo 2 – Corrosion at the EQ Basin



**Photo 3 – Corrosion of Piping at the EQ Basin**



**Photo 4 – Stair Cracking Due to Settlement at the EQ Basin**



**Photo 5 – Corrosion of Metal Plate at SBR Basins**



**Photo 6 – Corrosion of Metals at SBR Basins**



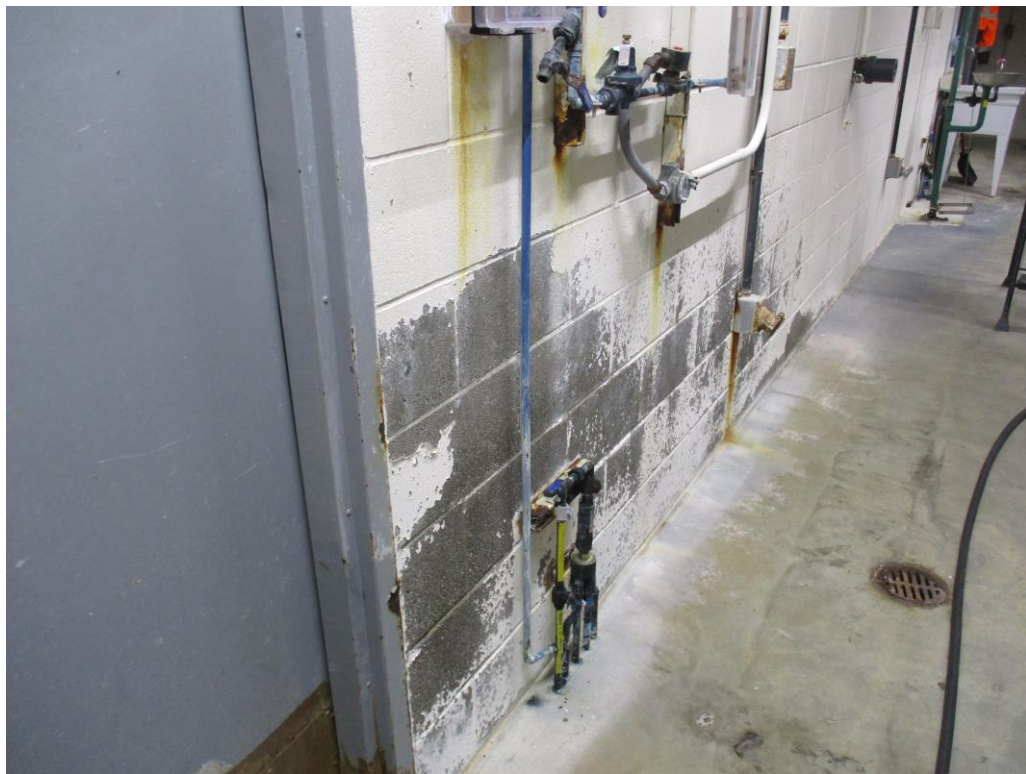
**Photo 7 – Corrosion of Metal Pipes in Process Building (Upper Floor)**



**Photo 8 – Corrosion of Metal Component in Process Building (Upper Floor)**



**Photo 9 – Bolt Corrosion at Process Building (Upper Floor)**



**Photo 10 – Efflorescence at Process Building (Upper Floor)**