Xcel Saint Paul Service Center – Variance Petition

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TKDA

Stormwater Filtration System

- Three Stormwater filtration systems on site. Two at grade ponds on the west side of the site, higher elevation. One underground stormwater chamber system.
- Filtration on site due to soil types and fueling on site.
- Fueling is upstream of the Chamber system. System includes a liner.

Variance Petition – Chamber System

- 2020 Minnesota Plumbing Code, Section 310.5, Obstruction of Flow.

- Key Points
  - The original design of the storm sewer pipe and stormwater filtration chamber system for this project met the code for the Water Quality Event (all 3 definitions further described in these slides).
  - During construction of the stormwater chambers the contractor encountered an unforeseen and unexpected condition. The groundwater level is at an elevation higher than expected. The ground water elevation is 3.5 feet above the bottom of the chamber system.
  - Therefore, the chamber system needs to be revised by raising it above the groundwater level, a vertical distance of 3.75 feet.
  - This revision will result in temporary surcharging pipe upstream of the chamber system.

Variance Justification

- The surcharged pipe is temporary. The stormwater filtration chamber system will draw down in 48 hours, through filtration, and drain the water in the surcharged pipe. The surcharging is limited to pipes directly upstream of the chamber system.
- No water will surcharge any pipes at the proposed building in any rain event up to and including the 100-year event.
- The surcharging is a temporary condition. However, the request for a variance is permanent.
- Alternatives for construction were considered with the Geotechnical Engineer to keep the system at its current elevation with the ground water, but it was determined to be infeasible due to:
  - The amount and flow of the ground water.
  - The clay soils and limited pumping options.
  - Soil Instability.
  - Constructability and durability of the system liner within groundwater.
  - Buoyancy concerns during construction.

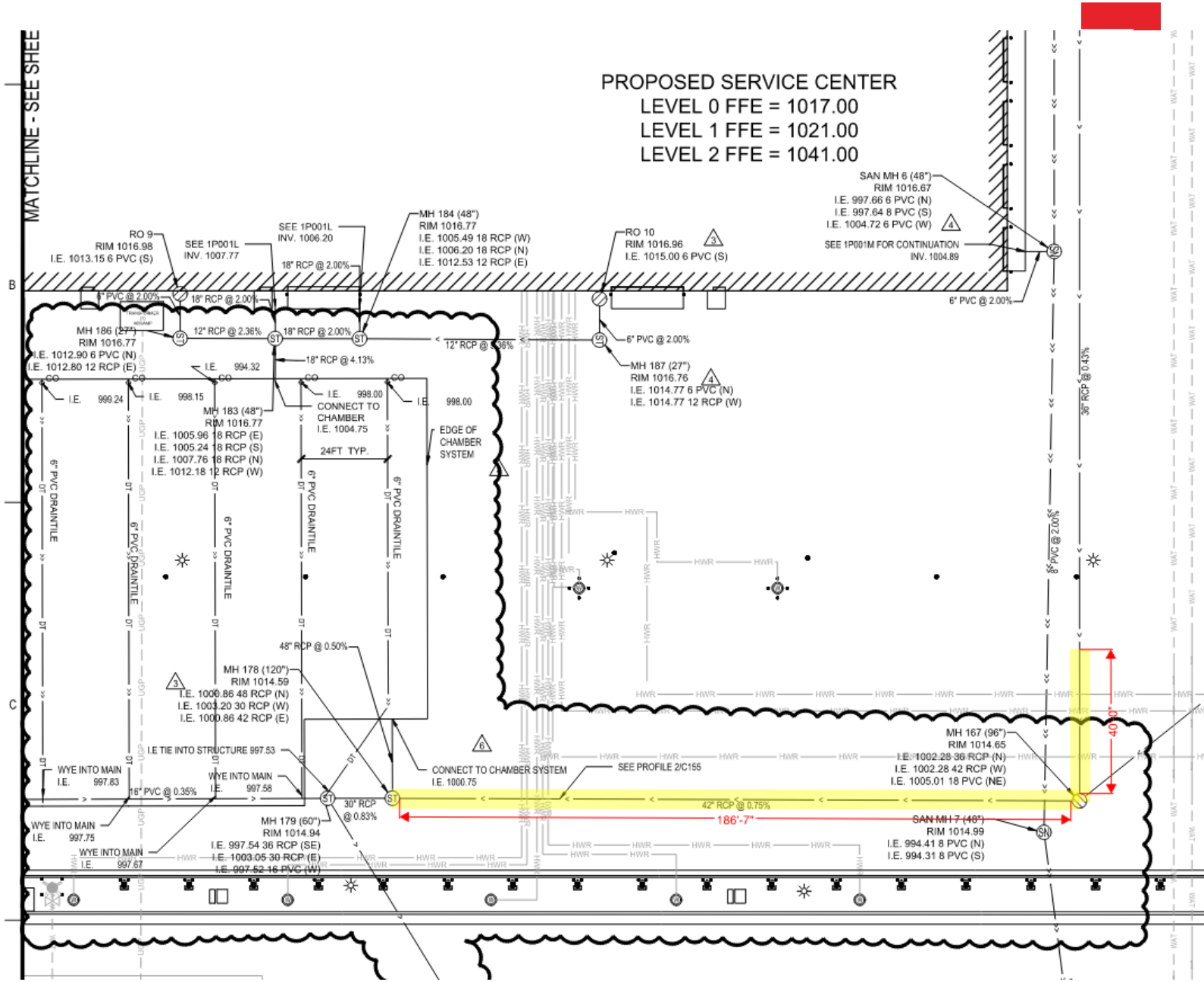
DOLI Final Interpretation – Issued Nov. 6, 2023

- Question: Is a drainage system surcharged by design when an inlet drainage pipe of a stormwater retention pond is designed to be above the MPCA required pond level of 1800 cubic feet per acre of drainage area plus the volume of 1.0 inch of runoff from the net increase in impervious surfaces created by the project?
- Answer: No, a drainage system is not surcharged by design when the inlet pipe enters a stormwater retention pond above the level attained by the water quality volume, which equals the MPCA required pond level of 1800 cubic feet per acre of drainage area plus the volume of 1.0 inch of runoff from the net increase in impervious surfaces.

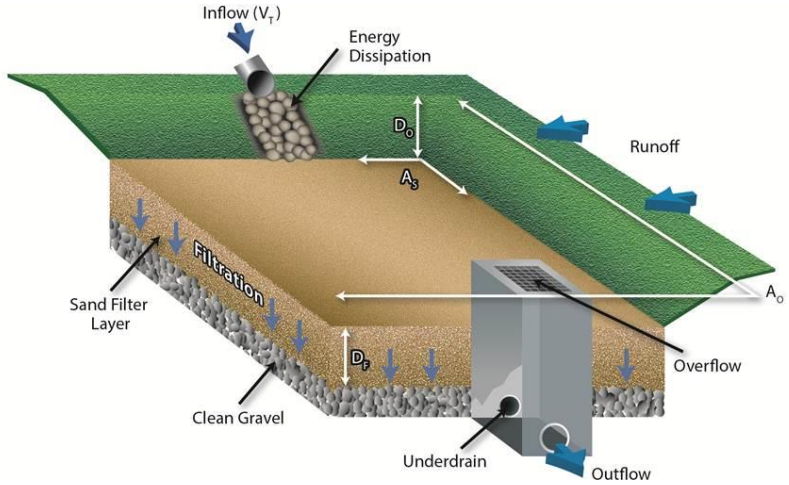
SURCHARGE BASED ON VOLUME

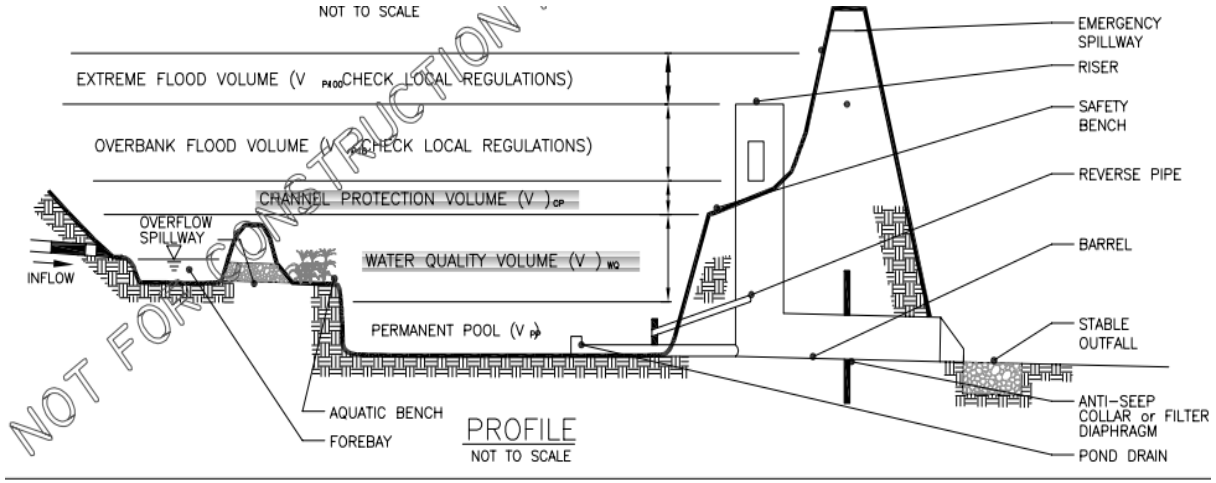
DOLI Water Quality Volume

- 65,340.30 CF
- Elevation= 1002.45



MPCA Definition of Water Quality Volume



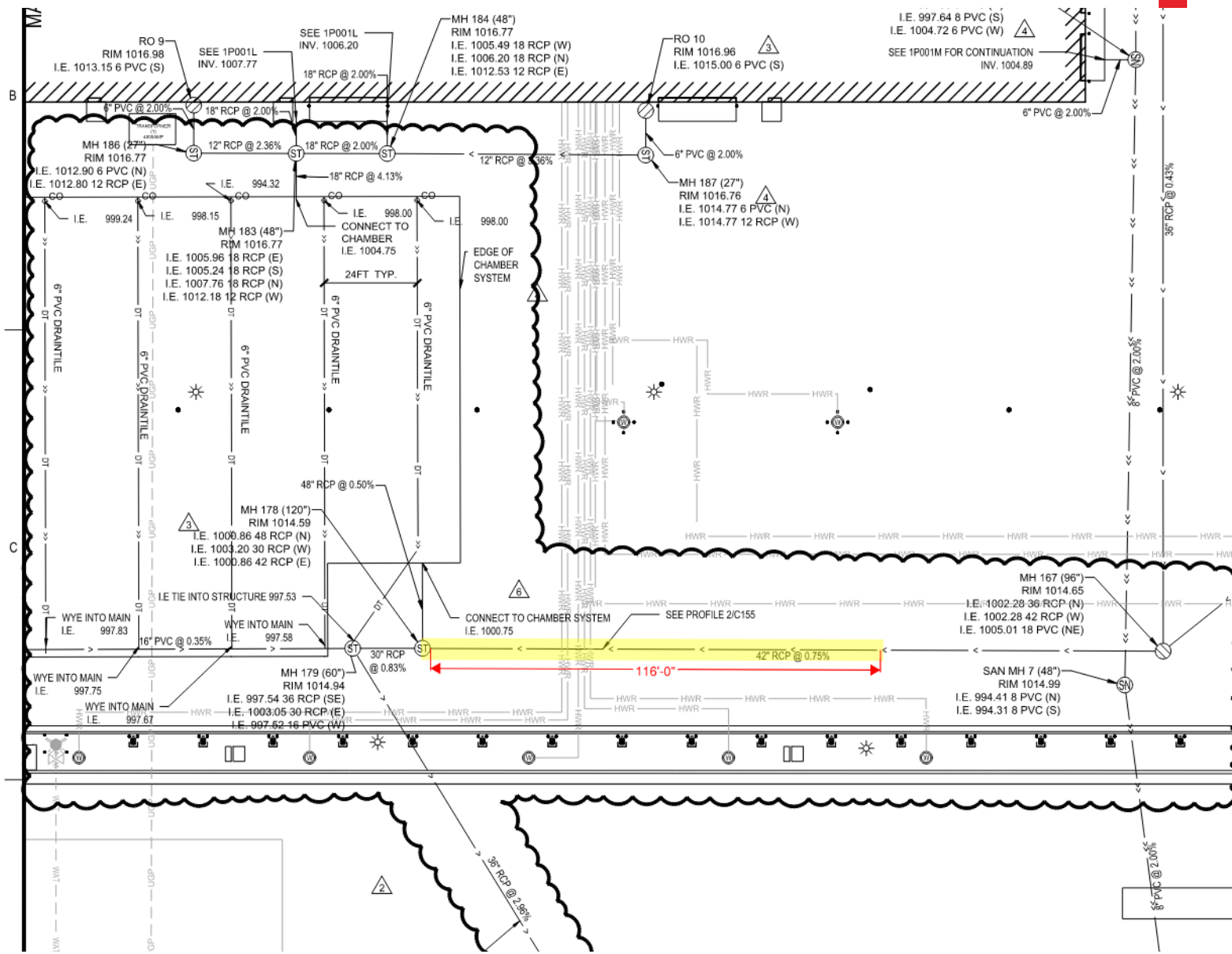


- The *Required* minimum water quality volume, or live storage (V_{wq}), is 1.0 inch of runoff from the net increase in impervious surfaces created by the project. This should be calculated as an instantaneous volume.
- The *Required* minimum permanent pool volume, or dead storage (V_{pp} below the outlet elevation), is 1800 cubic feet of storage below the outlet pipe for each acre that drains to the pond
- Source: MPCA Stormwater Manual

SURCHARGE BASED ON VOLUME

MPCA Water Quality Volume

- 43,596.30 CF
- Elevation= 1001.73



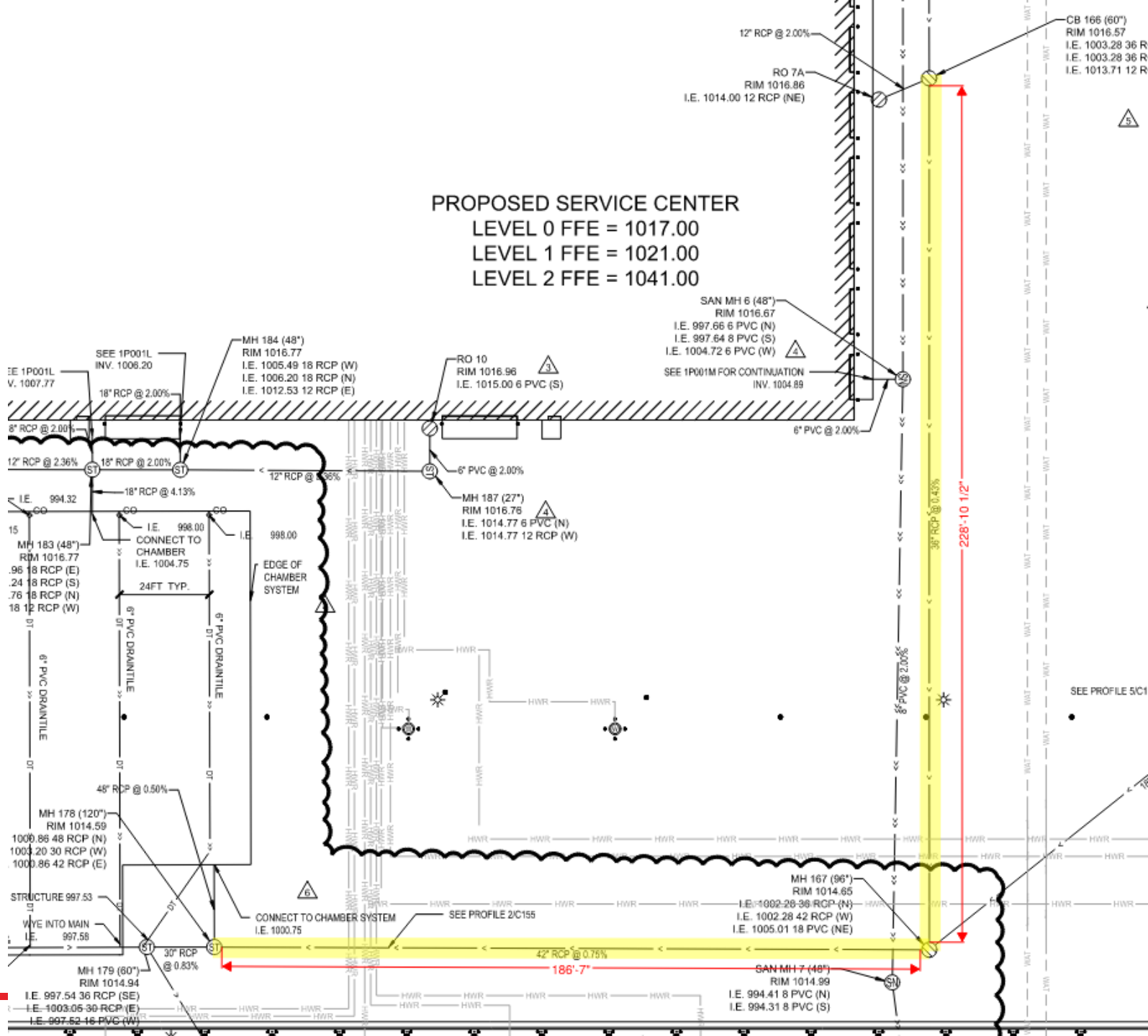
Ramsey Washington and City of Saint Paul Water Quality Volume

- Water Quality Volume = 1.1 inch over the new and re-constructed impervious areas.
- Filtration is allowed at a 55% Credit.
- Therefore, the WQV is 2 inches over the new and re-constructed impervious areas.

SURCHARGE BASED ON VOLUME

Watershed and City Water Quality Volume

- 89,000 CF
- Elevation= 1003.20



Surcharge Based on Peak Rates

- The system will back up above 1000.86 for rainfall events above 1.06 in rainfall event. MSE 24-hour distribution.
- This assumes that the water will start to filter once it hits the system, which it will.

Conclusion

- Site groundwater constraints will adversely impact the system long term if installed at the current elevation.
- Owner will maintain and clean pipes on a regular basis.
- No adverse affect even at 100-yr event.