CRUDE OIL STORAGE TANK 8 FLOOR AND CATHODIC PROTECTION DESIGN REVIEW

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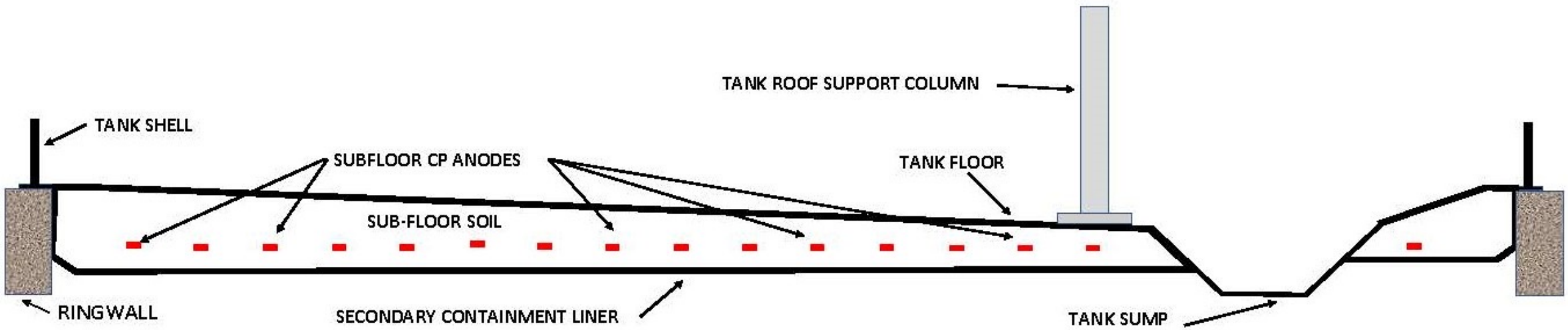
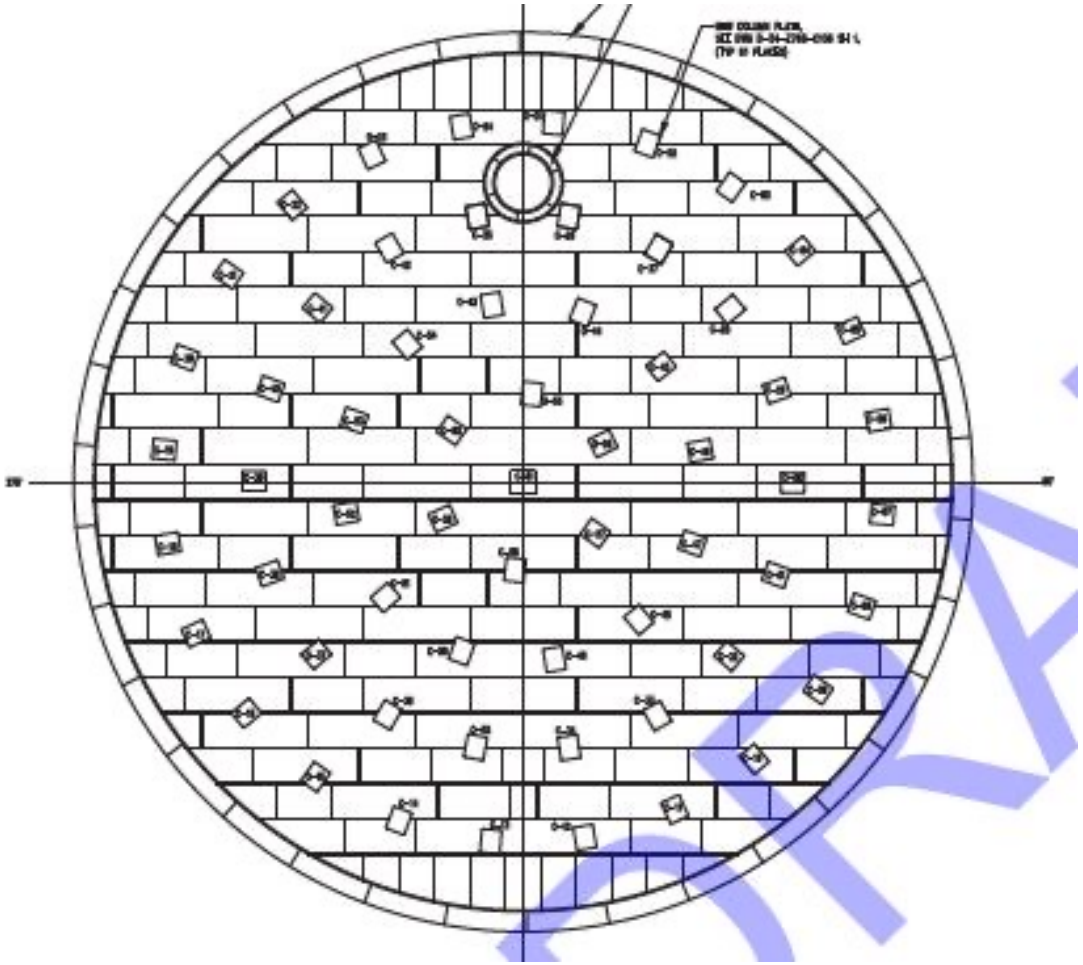
PWSRCAC Board Meeting
September 2022
STUDY FINDINGS

Background Tank 8 Information

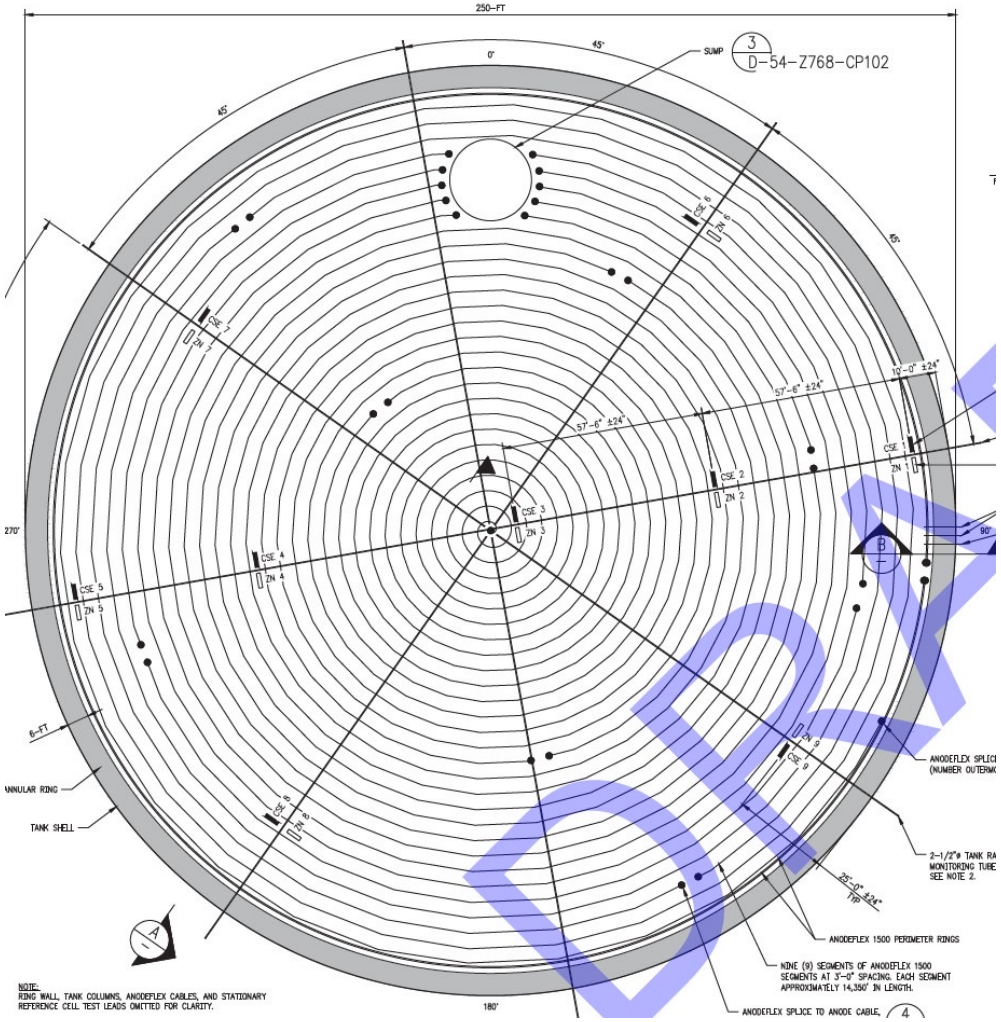
Tank Components and New Cathodic Protection System Location



New Floorplate Layout



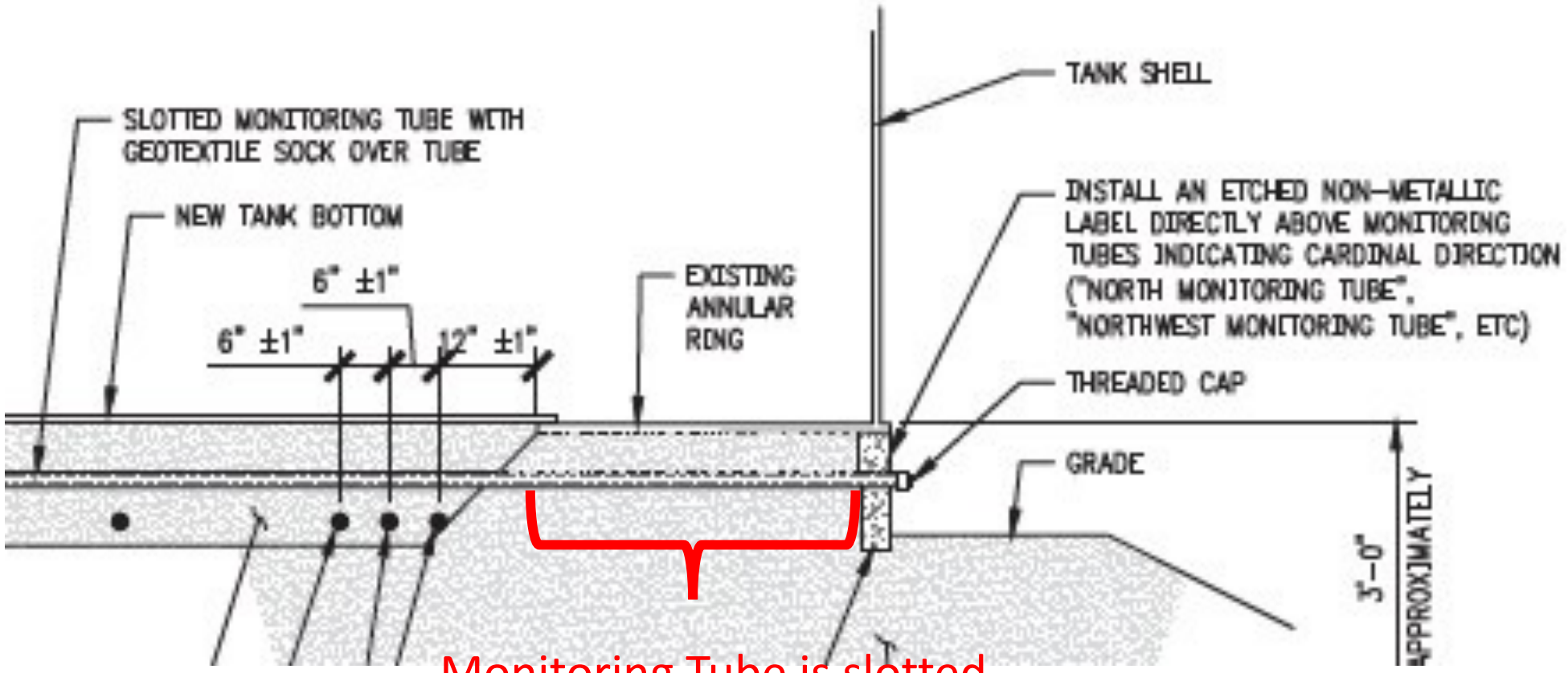
New Cathodic Protection System - Distribution



Cathodic Protection System Design Review – General Findings

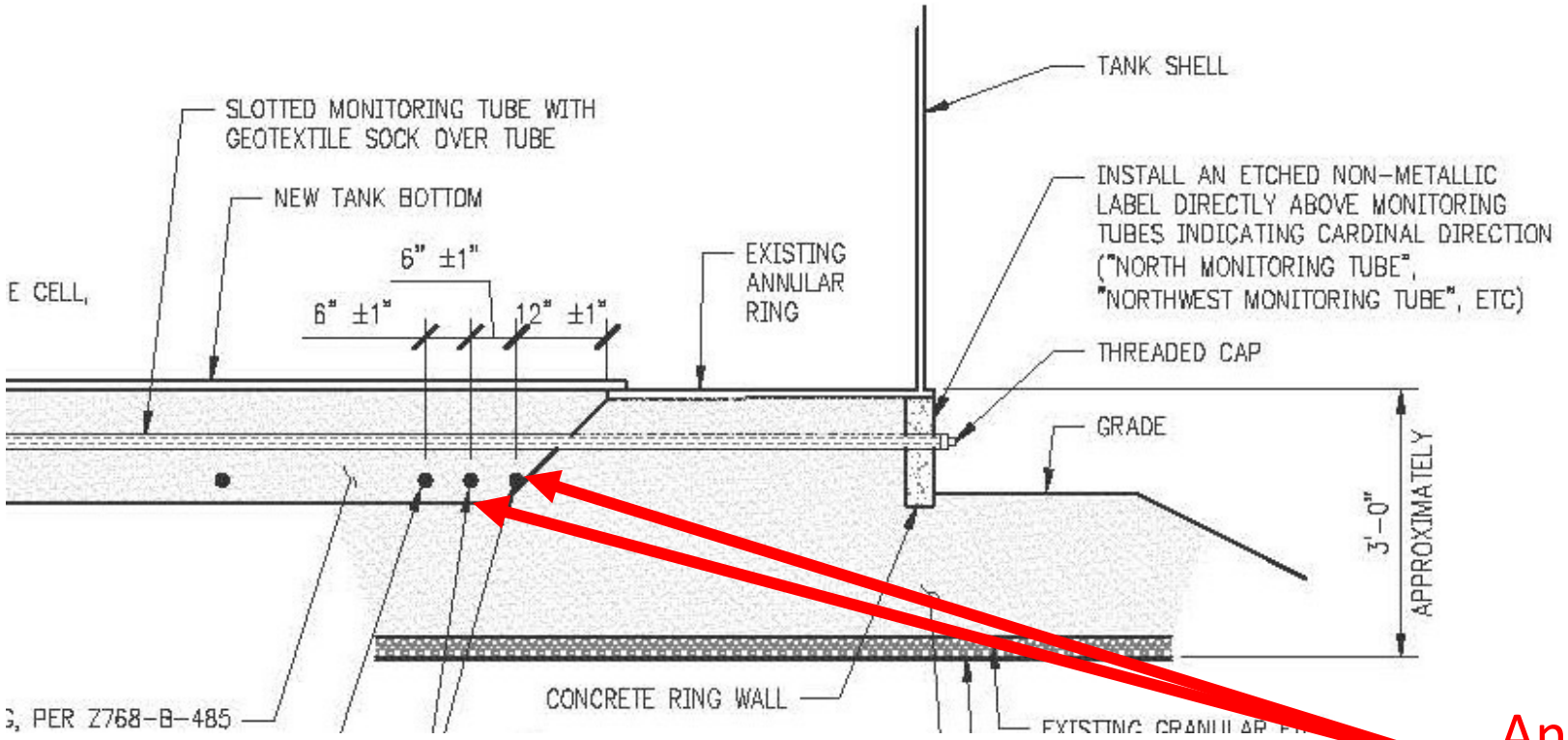
- The design assumptions are reasonable and align with standard industry practices.
- The general cathodic protection calculations are also reasonable and align with standard industry practices.
- The design is generally reasonable and aligns with standard industry practices.

Cathodic Protection System Design Review – Design Improvements



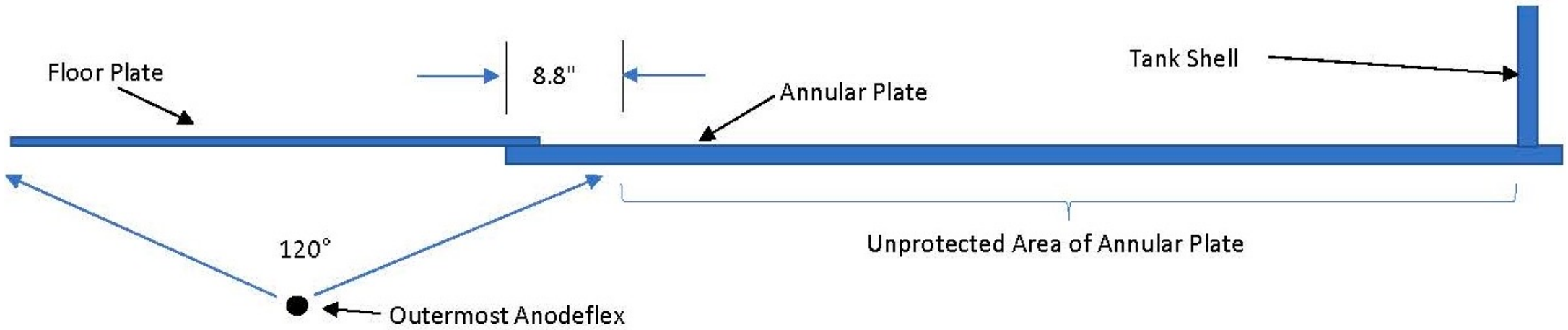
Monitoring Tube is slotted beneath the annular plate

Cathodic Protection System Design Review – Annular Plate



Annular Plate
Anodeflex Loops

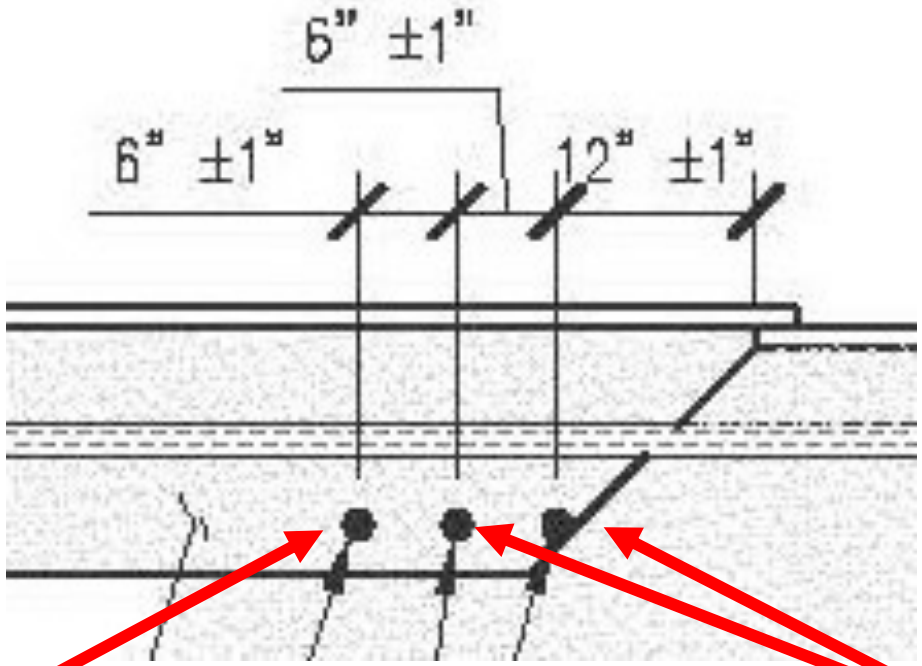
Cathodic Protection System Design Review – Annular Plate



Cathodic Protection System Design Review – Annular Plate

"Anodeflex will not be installed directly under the annular ring due to construction restraints; therefore, reduced CP current density is expected near the shell"

Cathodic Protection System Design Review – Anode Crowding



Outermost Floorplate Anode Loop

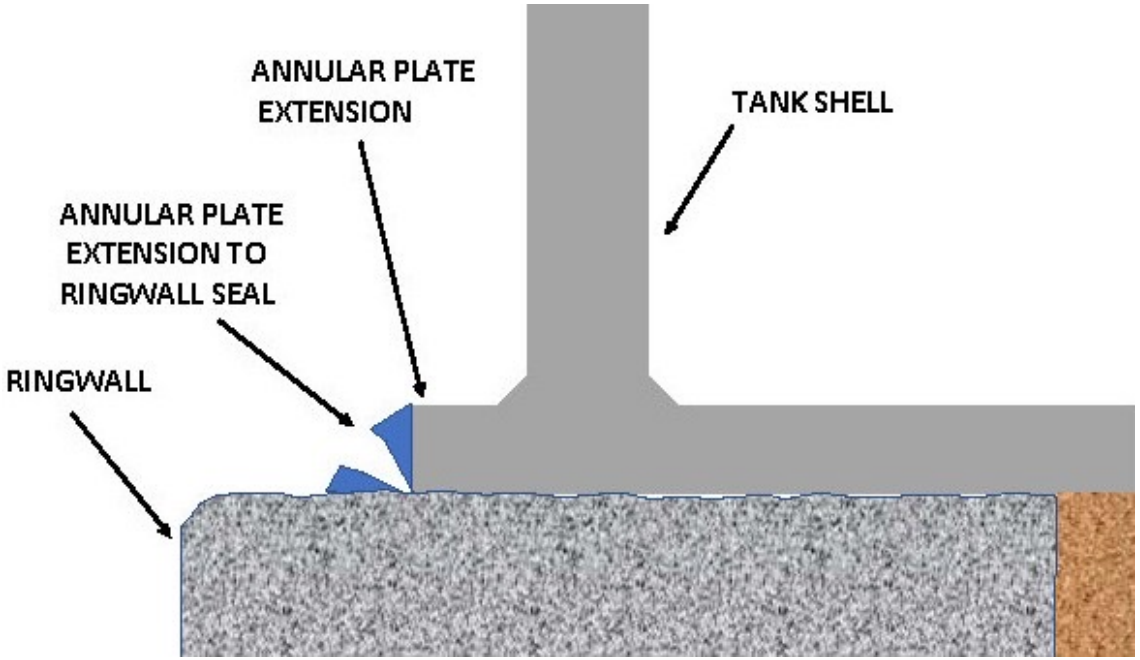
Annular Plate Anode Loops

Cathodic Protection System Design Review – Anode Crowding

$$R_A := \left(\frac{R_{aflx}}{N_{aflx}} \right) = 2.57$$

Total anode-to-soil resistance using parallel circuit formula, negating crowding and close-coupled effects (ohms)

Cathodic Protection Design Review– Annular Plate Extension Seal Failure

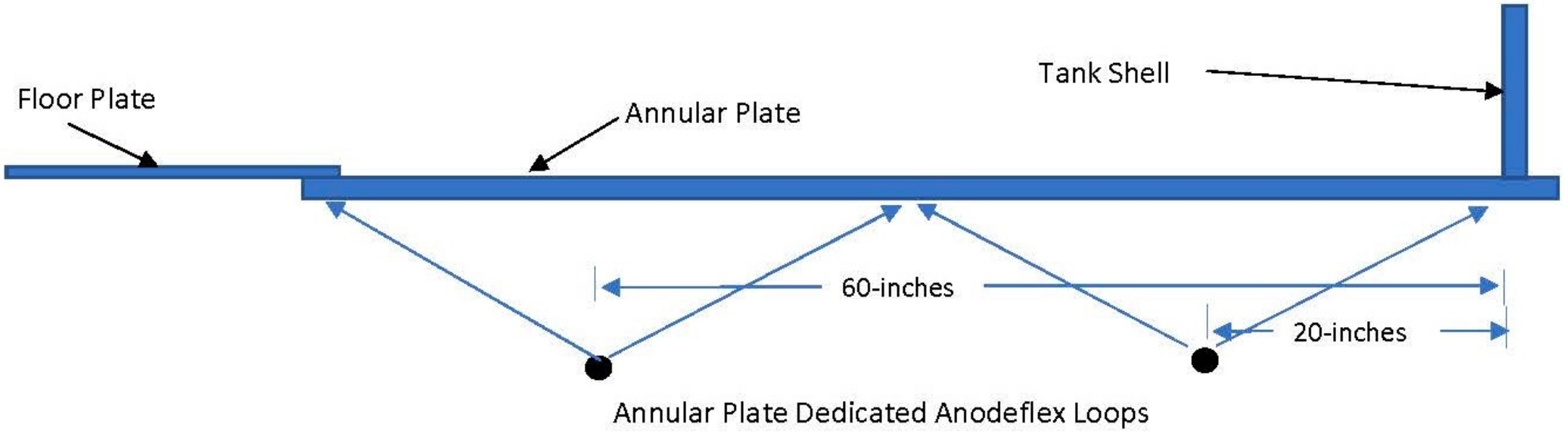


DamagedRingwall/Floorplate
Extension Seal

Cathodic Protection Design Review– Annular Plate Extension Seal Failure

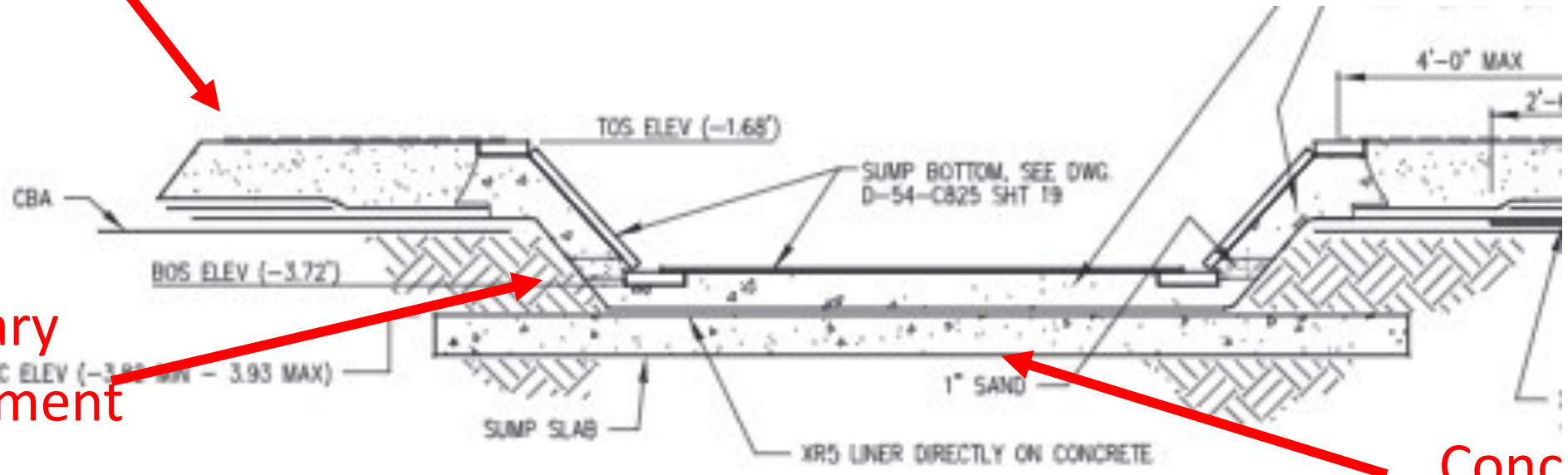
Annular Plate Drip Ring

Cathodic Protection System Design Review – Proper Current Distribution to the Annular Plate



Cathodic Protection System Design Review – Tank Sump

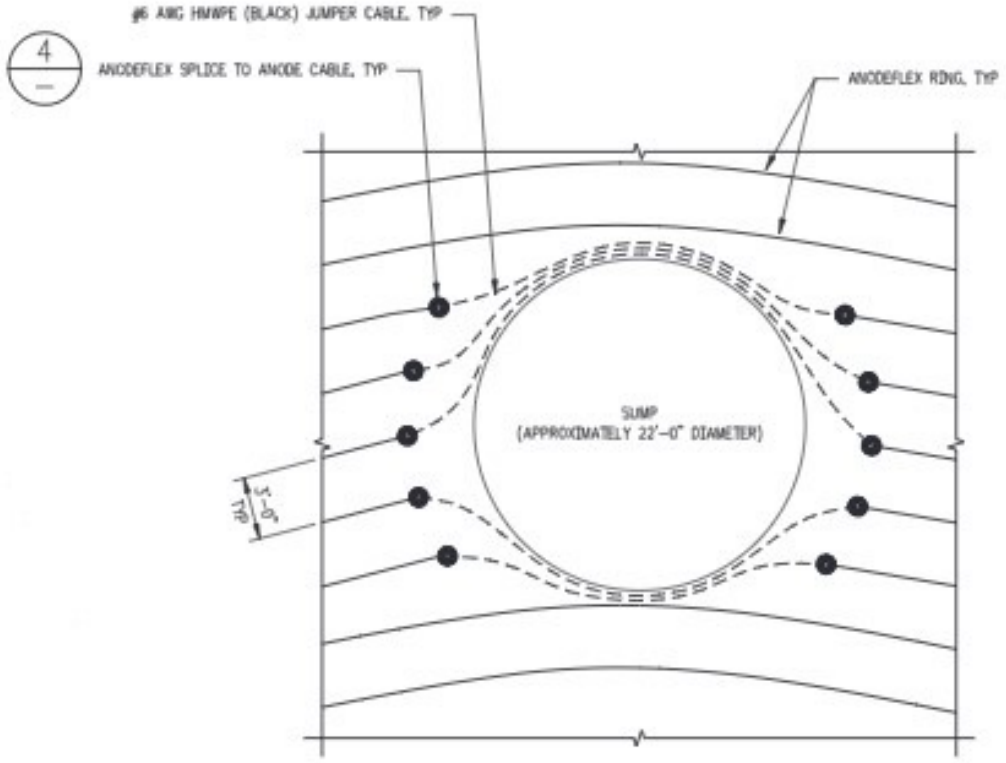
Tank Floor



Secondary Containment Liner

Concrete Slab

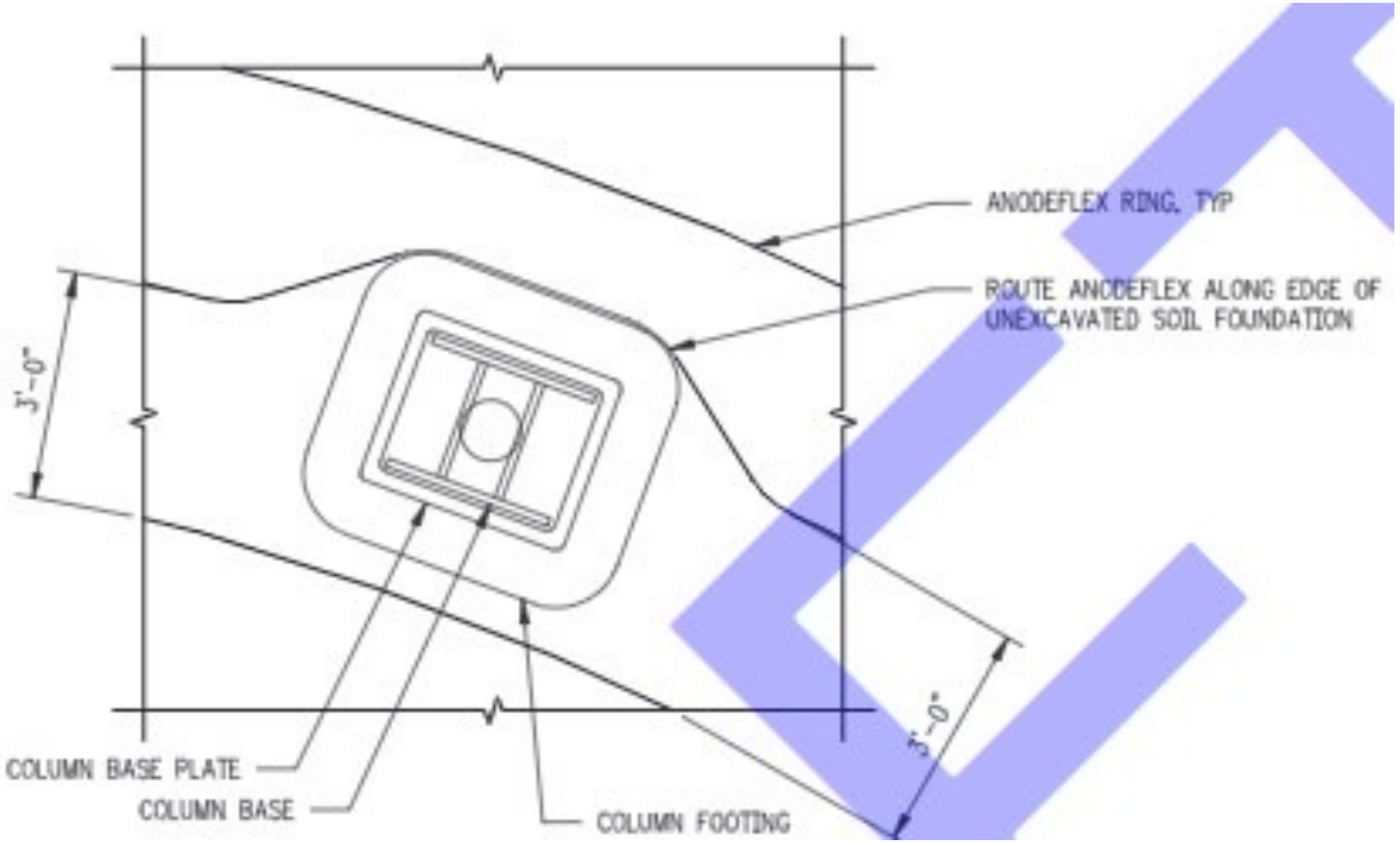
Cathodic Protection System Design Review – Tank Sump



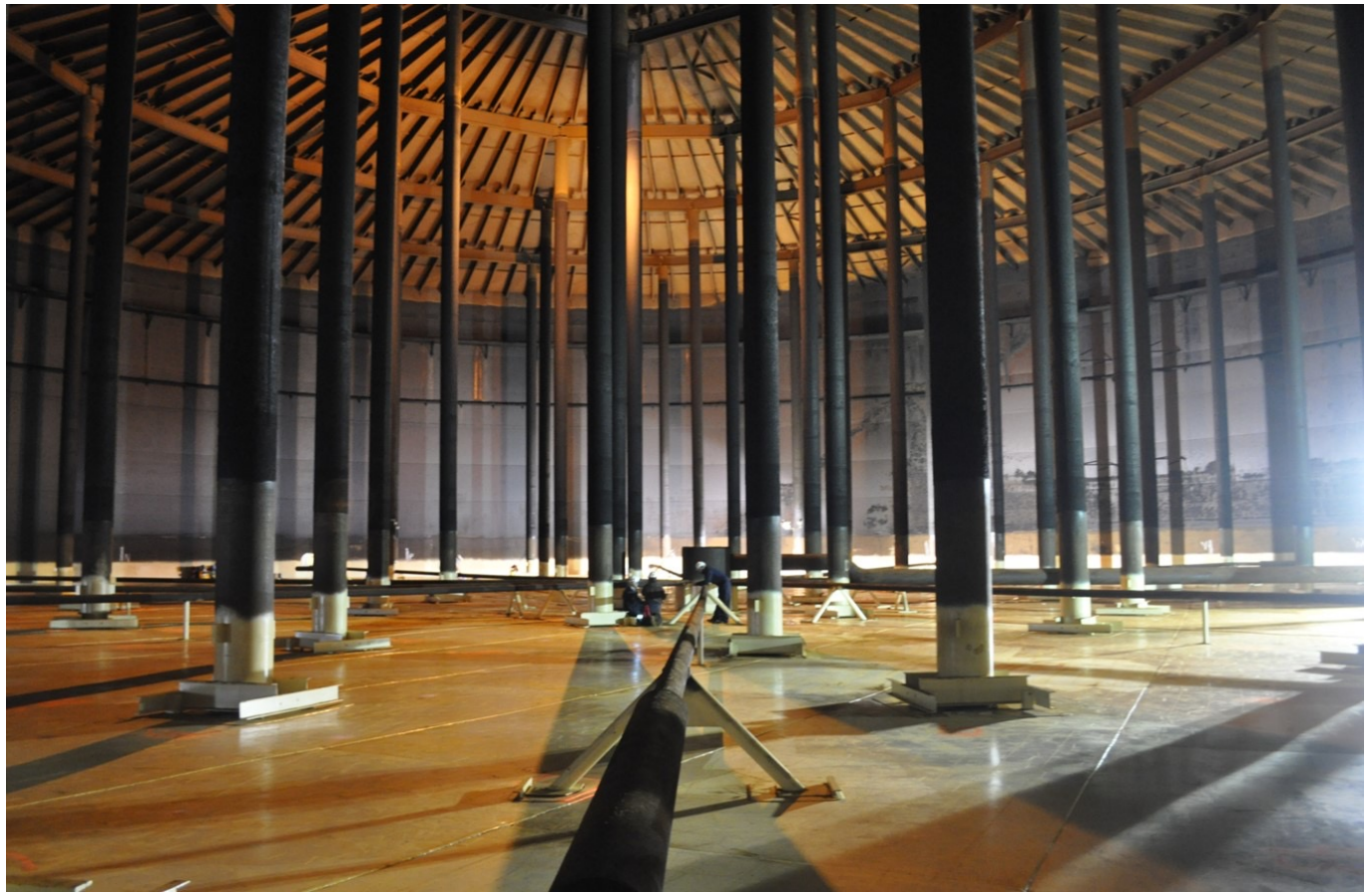
ANODEFLEX LAYOUT PLAN AT SUMP 3

SCALE: NTS

Cathodic Protection System Design Review – Tank Column Bases



Cathodic Protection System Design Review – Tank Column Bases



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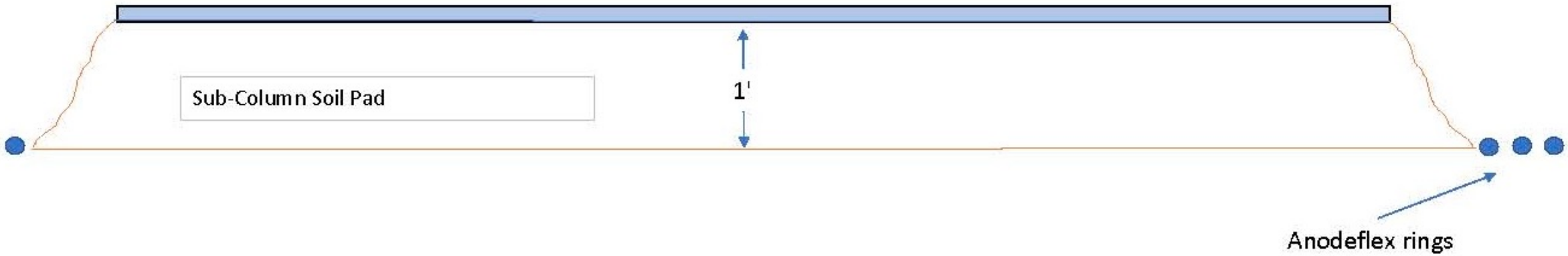

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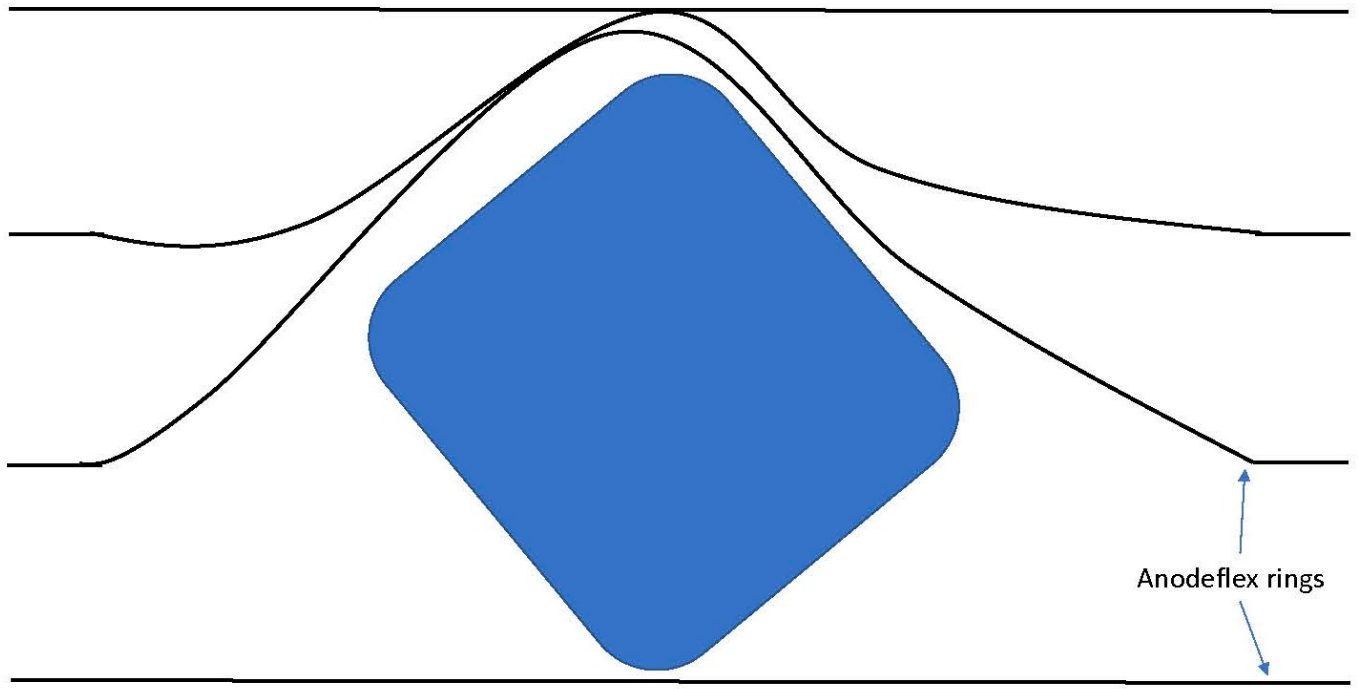

Cathodic Protection System Design Review – Tank Sump & Columns

"Anodeflex will not be installed under the columns, sump or annular ring ring due to construction restraints; therefore, reduced CP current density is expected at these locations"

Recommendations

- Annular Ring –
  - Install Anodeflex loops directly beneath the annular plate, and
  - Seal the Annular Plate Extension to Ringwall Joint or install a drip ring to channel water away from the tank
- Column Pads
  - Install the Anodeflex Loops beneath the column pads

Recommendations

- Tank Sump
  - Excavate further beneath the sump and install the Anodeflex Loops directly beneath the sump or
  - Fabricate the sump from thicker material than the rest of the floor and
  - Assemble the sump outside of the tank and coat the bottom side before installation.

Questions?

τaku engineering

Thank You for the opportunity present here today!