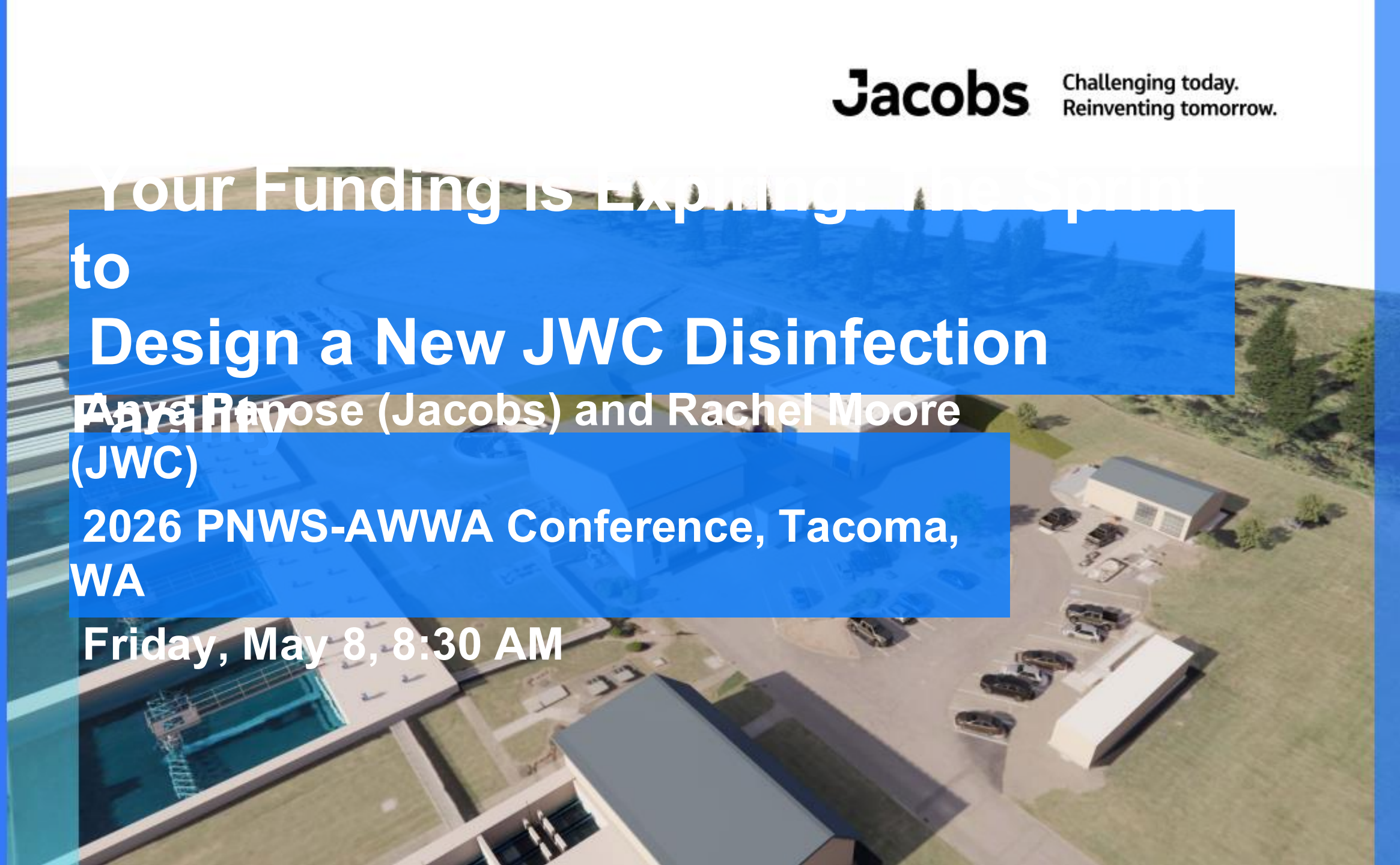


Jacobs Challenging today. Reinventing tomorrow.

Your Funding is Expiring – Time to Design a New JWC Disinfection Facility

Ayad Ranose (Jacobs) and Rachel Moore (JWC)

2026 PNWS-AWWA Conference, Tacoma, WA

Friday, May 8, 8:30 AM

Agenda

- Project Background
- Expedited Delivery
- Key Takeaways
- Questions

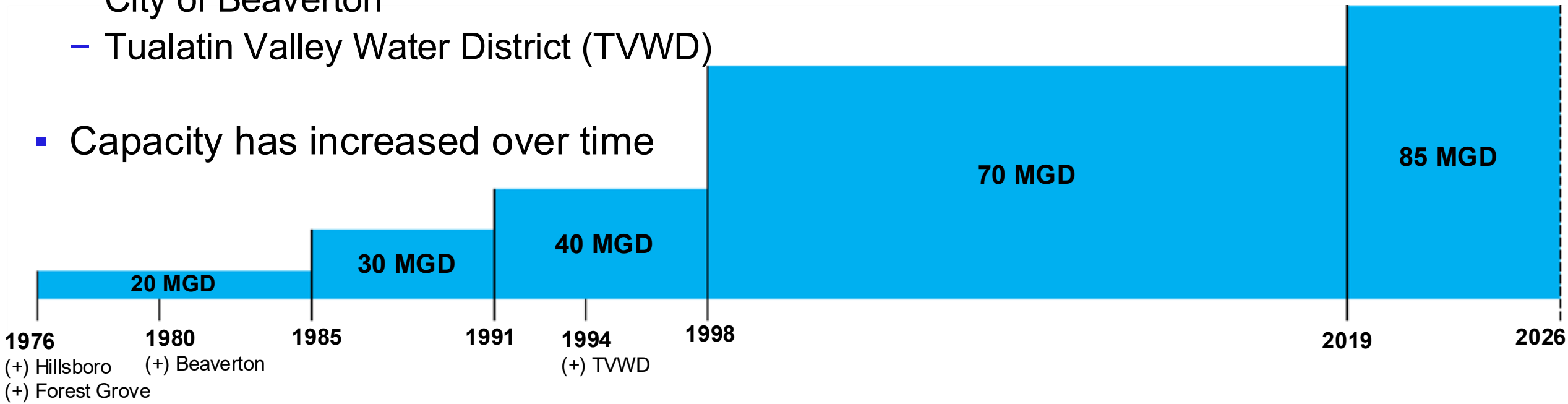
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Joint Water Commission Disinfection Facility Project Background



History – Joint Water Commission

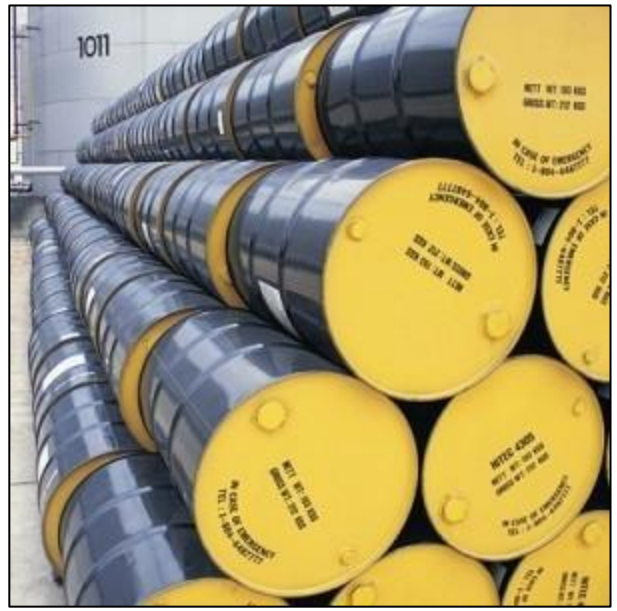
- Joint Water Commission (JWC) formed in 1976
- Four agencies currently share ownership:
  - City of Hillsboro
  - City of Forest Grove
  - City of Beaverton
  - Tualatin Valley Water District (TVWD)
- Capacity has increased over time

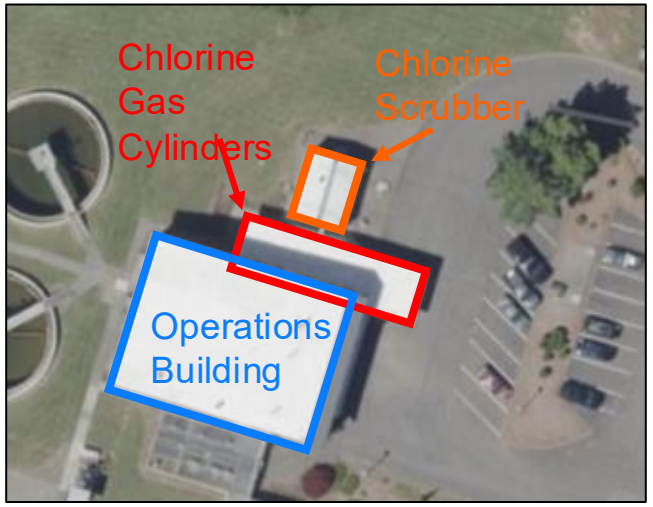


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Chlorine gas is currently used for disinfection.

- Safety & Maintenance
  - The chlorine gas system is housed in structures adjacent to the Operations Building
  - These structures are seismically vulnerable
- Supply Chain
  - Limited suppliers, vulnerable to supply chain disruptions
  - Experienced supply chain disruptions in 2021
- Seismic Event Disruptions
  - Ability for delivery trucks to access site would be affected
  - Existing system risks catastrophic failure





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Conceptual Design Report

- Compared four alternatives:
  - Chlorine Gas (status quo)
  - Bulk Hypochlorite
  - Full Onsite Sodium Hypochlorite Generation (OSHG)
  - Bulk Hypochlorite with Future OSHG









- Decision Rubric:
  - Noneconomic (safety, resilience & reliability, water quality, environmental/land use, constructability, O&M, supply)*
  - Economic (cost)*

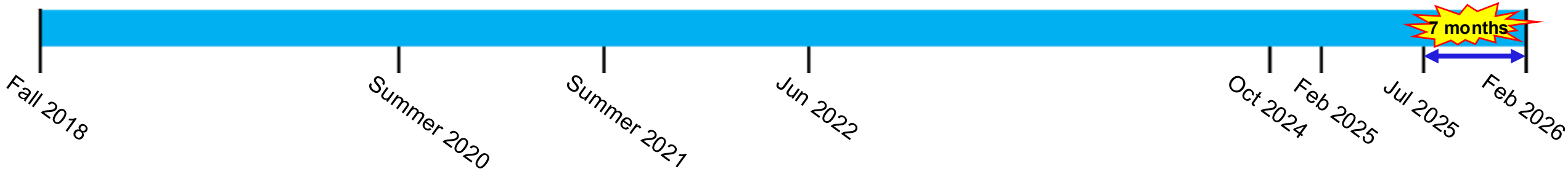
- **Bulk Hypochlorite with Future OSHG** was the recommended alternative

** Includes impacts from a major seismic event.*

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Timeline

- **Fall 2018** – WTP Facility Plan identified new chemical building
- **Summer 2020** – initiated master plan updates project
- **Summer 2021** – experienced chlorine gas supply chain disruptions
- **June 2022** – evaluated alternative disinfection methods (Bulk Hypochlorite was selected) & applied for federal grant through FEMA HMGP
- **October 2024** – FEMA Hazard Mitigation Grant awarded letter for Phase 1 Design
- **February 2025** – RFP issued
- **July 2025** – Contract start date
- **February 2026** – 100% Phase 1 Design Package is due (based on FEMA grant POP)



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Funding

- CIP from WMP (with FEMA application pending)

- Phase 1 Design – FEMA HMGP
  - Intended to cover 90% with 10% JWC match
  - Design costs increased due to inflation and aseismic design code changes
  - CIP budget to cover the increases (FEMA budget amendment request pending)

- Phase 2 Construction – TBD
  - FEMA HMGP request to release phase 2 funds
    - Overall project 63% FEMA, 37% JWC match with budget amendment request
  - Other grant opportunities being explored
  - CIP budget

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Expedited Delivery



JWC Deliverables

New Disinfection Facility with bulk SHC storage and room for OSHG equipment in the future.



Deliverables

- 30% Design
- 60% Design
  - This deliverable was an 90% design level of effort
  - Called “60% Design” for permitting purposes
- ~~90% Design~~
- 100% Design

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30% Design

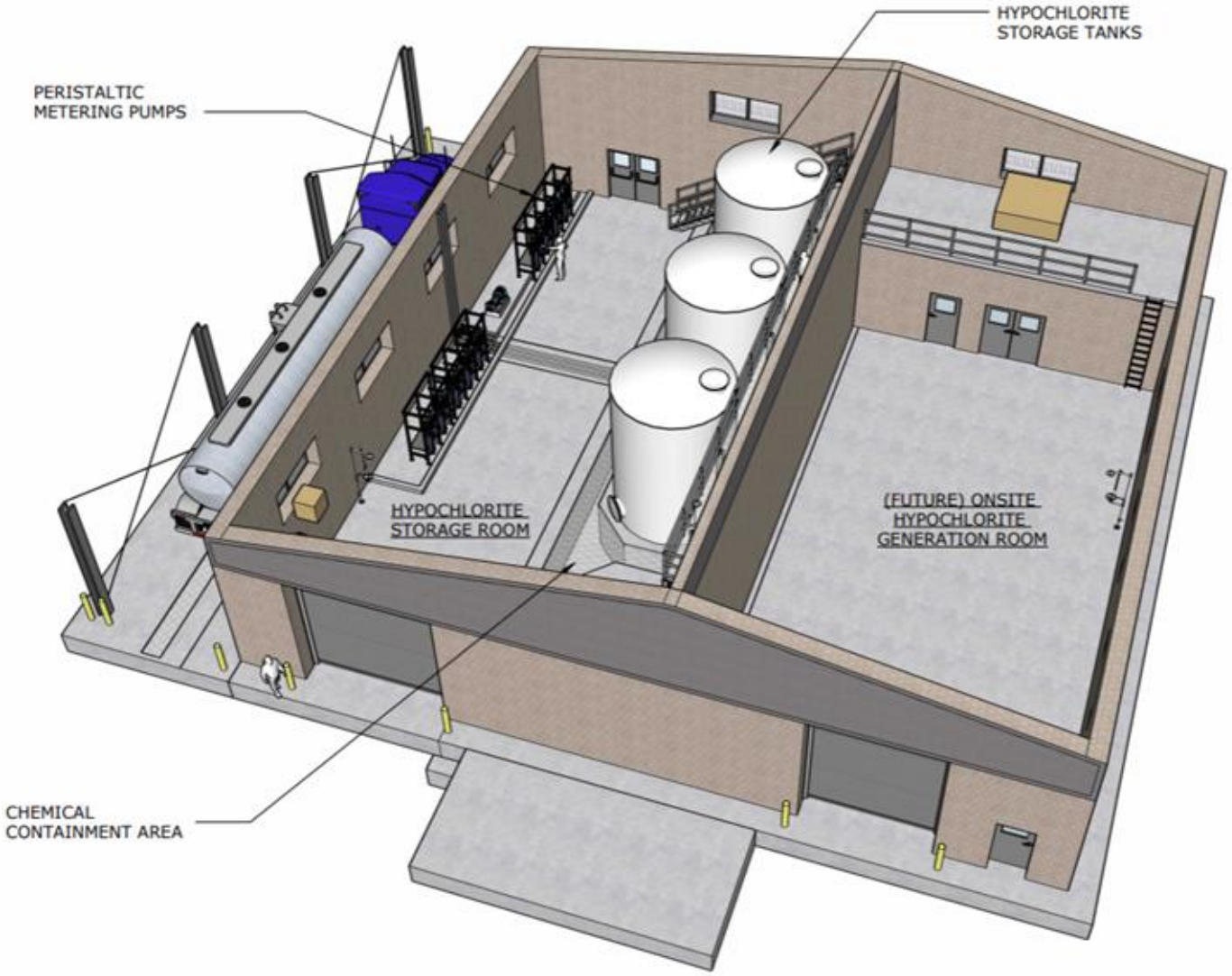
- Completed in **1.5 months** *(typically 4 months)*
- Used **SketchUp** to reduce Facility Modeling time
- Assumed **Auger Cast Piles** for building foundation
- Experienced **Septic System Conflict** during this phase

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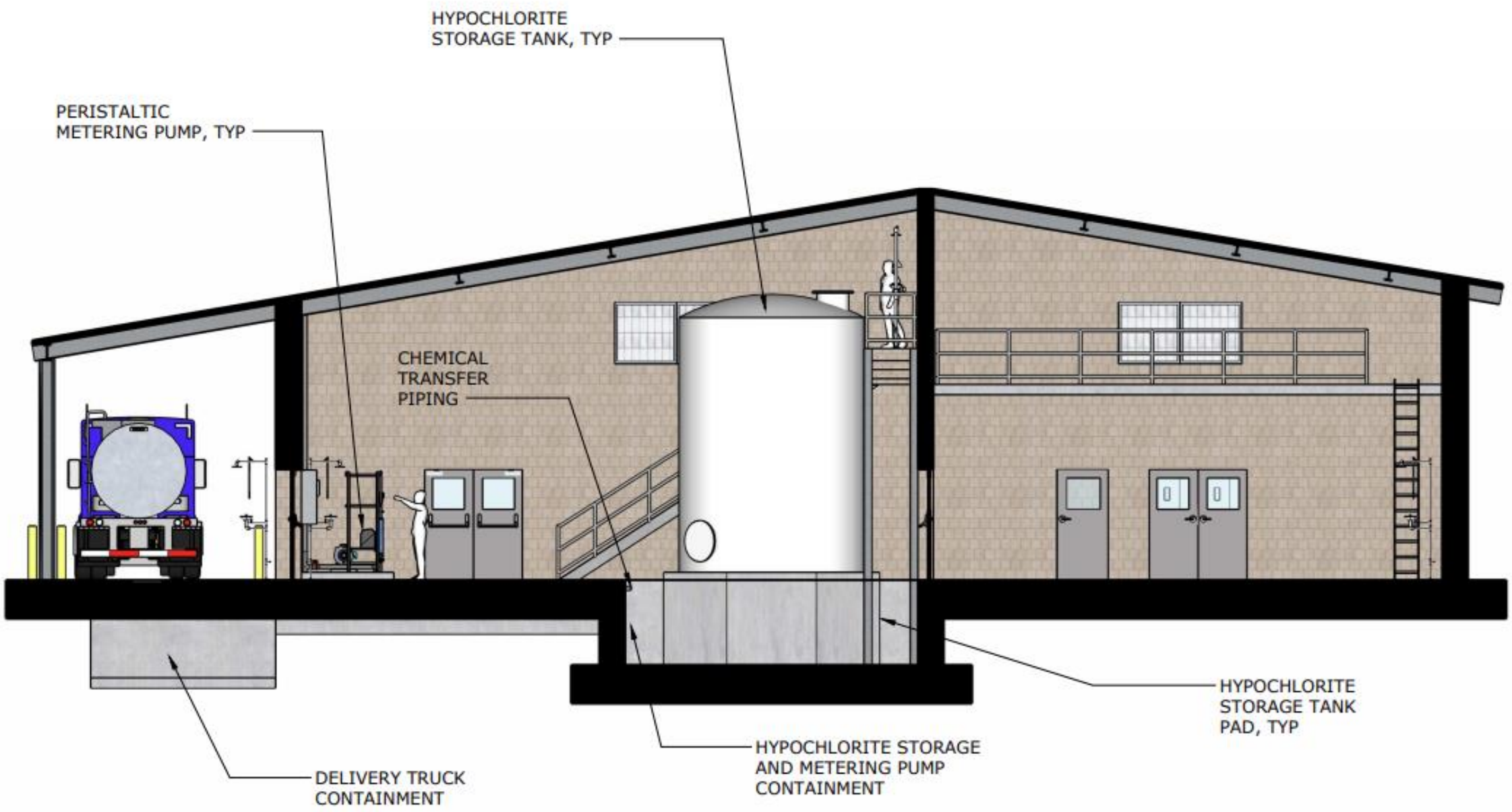
30% Design – SketchUp

- SketchUp is a **3D modeling software** used for quick visualization

- 30% **Facility Design** was done in SketchUp
  - One engineer in charge of model
  - Eliminated CAD processing time
  - Easier to visualize
    - Quicker client decisions
    - Better cross-discipline coordination



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HYPOCHLORITE
STORAGE TANK, TYP
PERISTALTIC
METERING PUMP, TYP
CHEMICAL
TRANSFER
PIPING
HYPOCHLORITE
STORAGE TANK
PAD, TYP
HYPOCHLORITE STORAGE
AND METERING PUMP
CONTAINMENT
DELIVERY TRUCK
CONTAINMENT

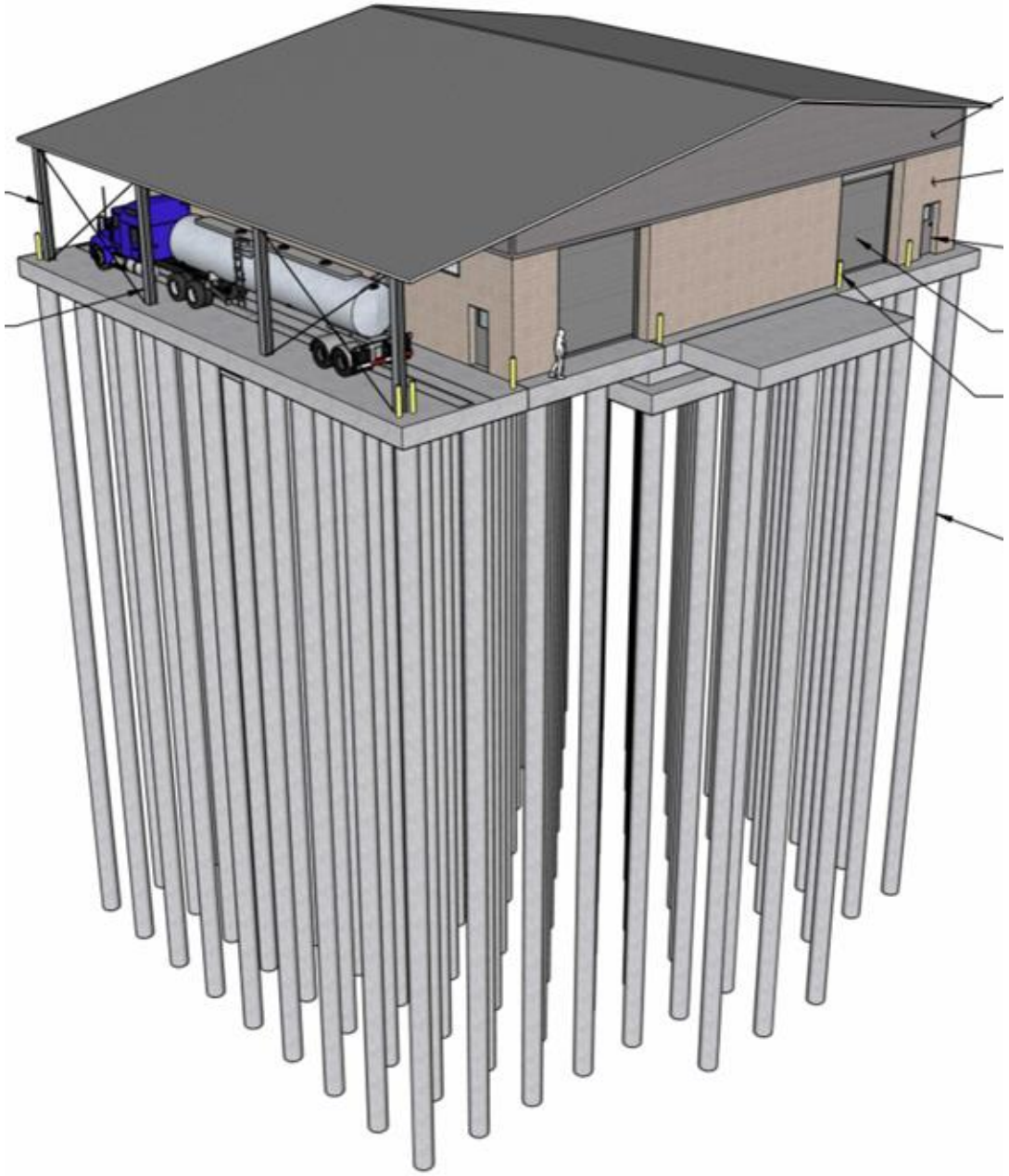
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30% Design – Auger Cast Piles

- Assumed building would be on auger cast piles based on surrounding structures

- Some concerns about this assumption based on:
  - New building is closer to riverbank, so lateral displacements anticipated to be larger
  - Seismic code had changed since other buildings were constructed

- Took geotechnical samples to verify

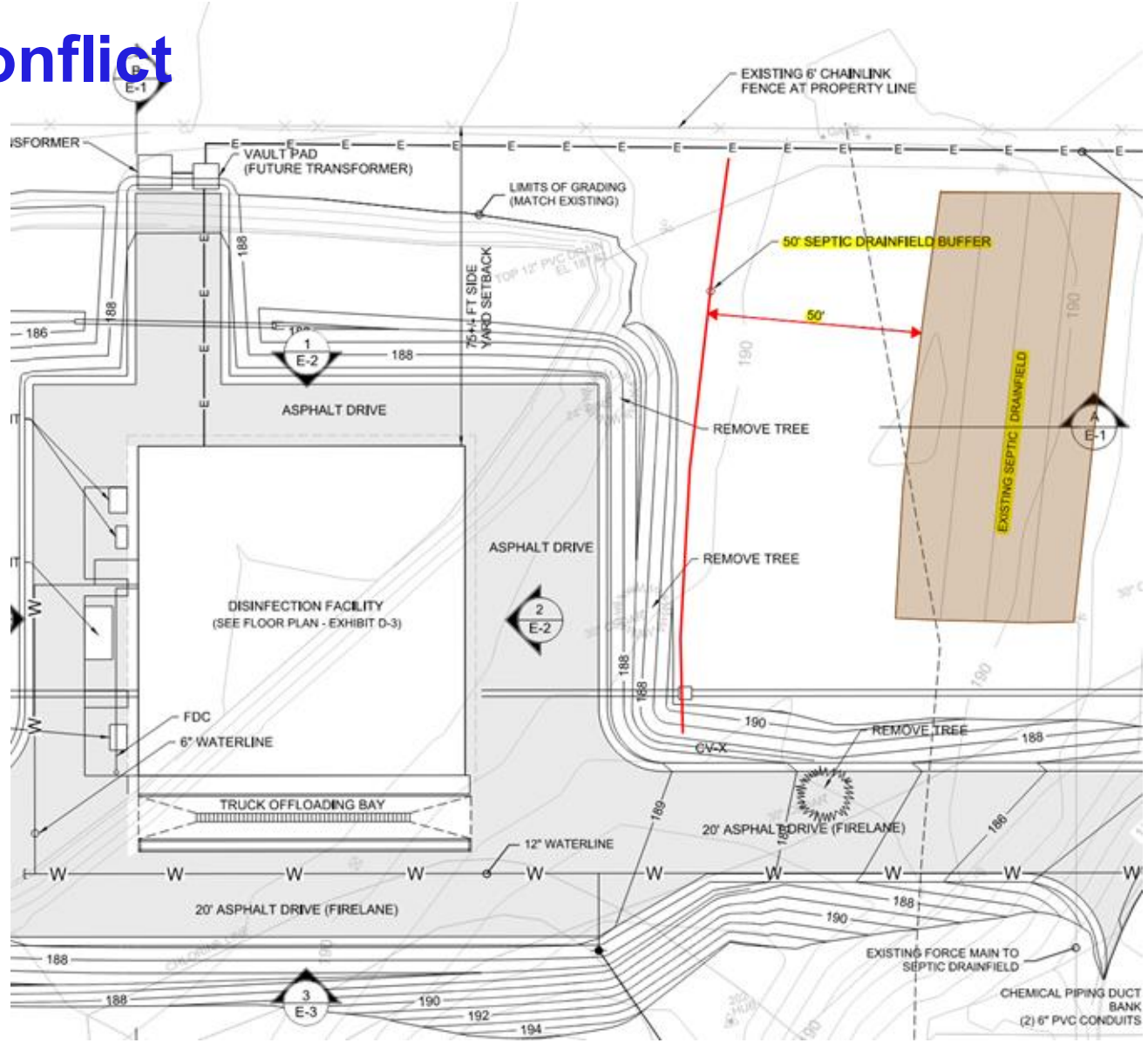


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30% Design – Septic System Conflict

- Conceptual design did not account for **existing septic drainfield**

- We had to **relocate Disinfection Building** at the beginning of design
  - Shifted west, away from drainfield
  - This affected access and future facility locations



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60% Design*

- Completed in **3.5 months** *(typically 8 months)*
- **Workshops** used to increase collaboration and reduce client communication and review time
- **Rolling reviews** used to reduce schedule even more
- Changed foundation approach to **deep soil mixing**

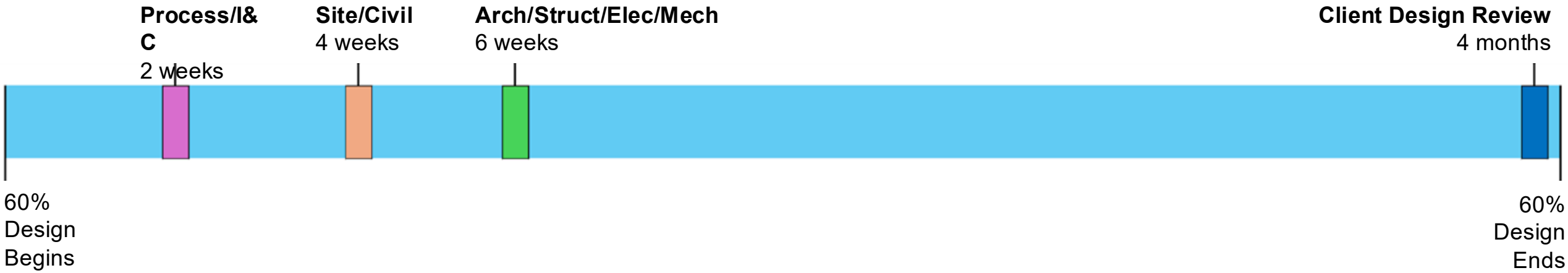
** JWC's 60% design deliverable was at an 90% level of design. It was called 60% for permitting purposes.*

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60% Design – Workshops

- Four in-person client workshops with O&M and engineering staff
  - Process/I&C
  - Site/Civil
  - Arch/Struct/Elec/Mech
  - Client Design Review

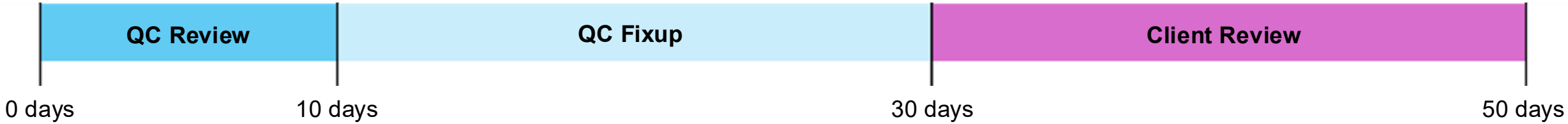
- Benefits
  - Immediate input, feedback, and decisions
  - Reduced communication time between engineering team and JWC staff
  - Intermediate milestones for disciplines



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60% Design – Rolling Reviews

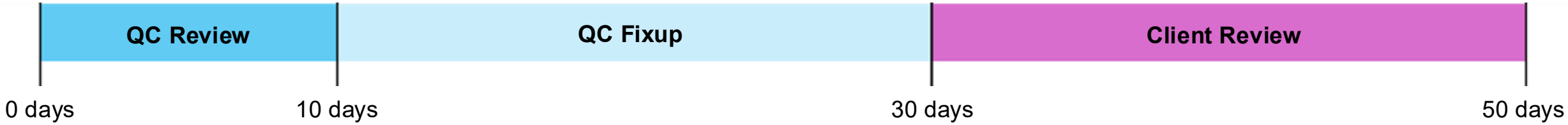
Typical 60% Review Schedule (50 days)



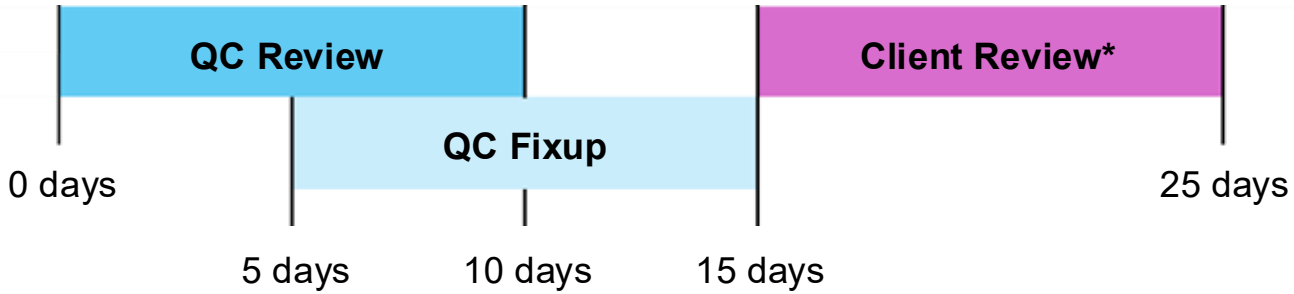
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60% Design – Rolling Reviews

Typical 60% Review Schedule (50 days)



JWC 60% Review Schedule (25 days)

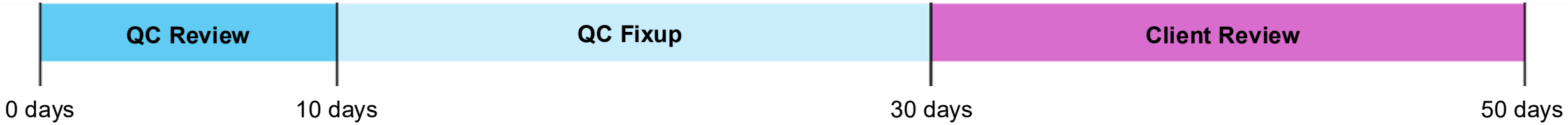


** Workshops helped shorten client review period*

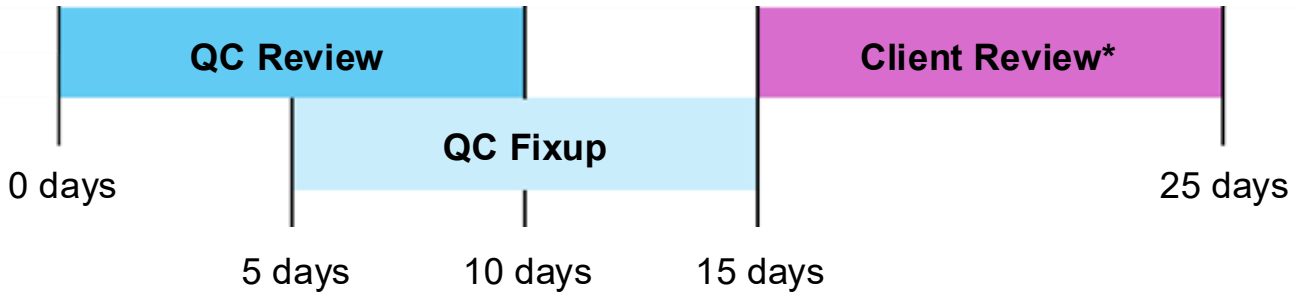
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60% Design – Rolling Reviews

Typical 60% Review Schedule (50 days)



JWC 60% Review Schedule (25 days)





** Workshops helped shorten client review period*

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60% Design – Deep Soil Mixing

- **Geotechnical analysis** of samples (taken during 30% Design) was completed 2 months into 60% design

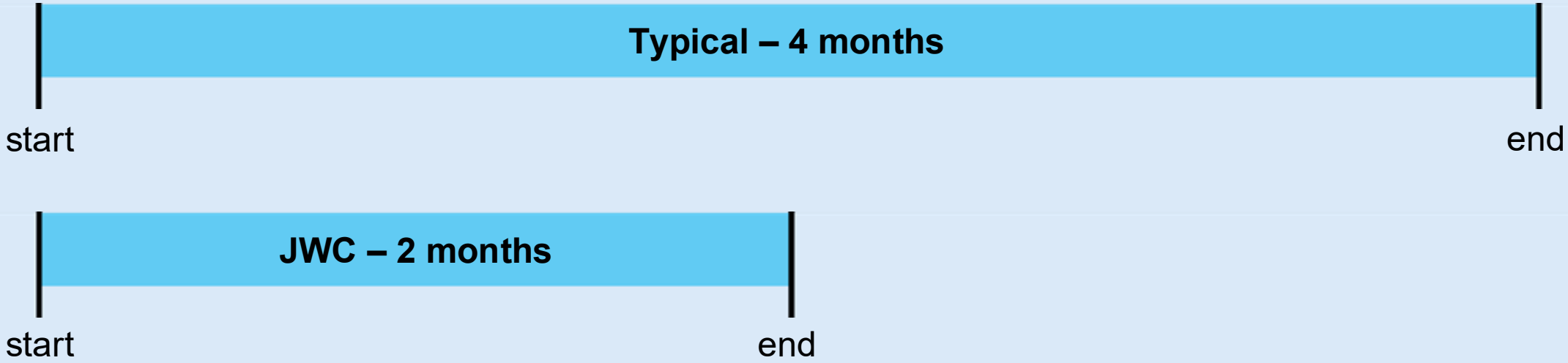
- **Deep soil mixing** was necessary to meet Seismic Risk Category 4

- This change was late in the design process, it **impacted building foundation design**
  - Pile cap foundation -> Slab on-grade foundation

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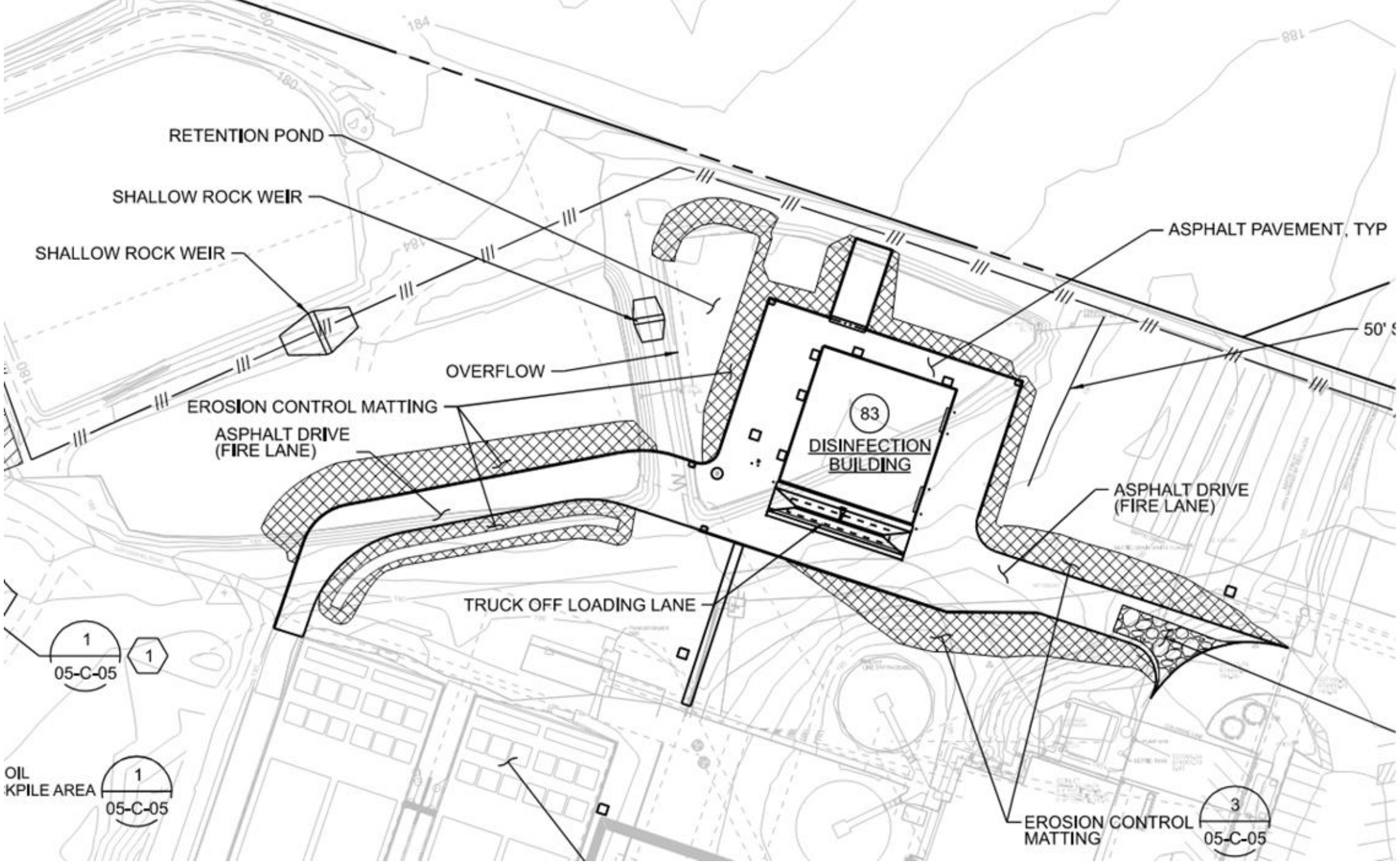
100% Design

- Completed in **2 months** *(typically 4 months)*

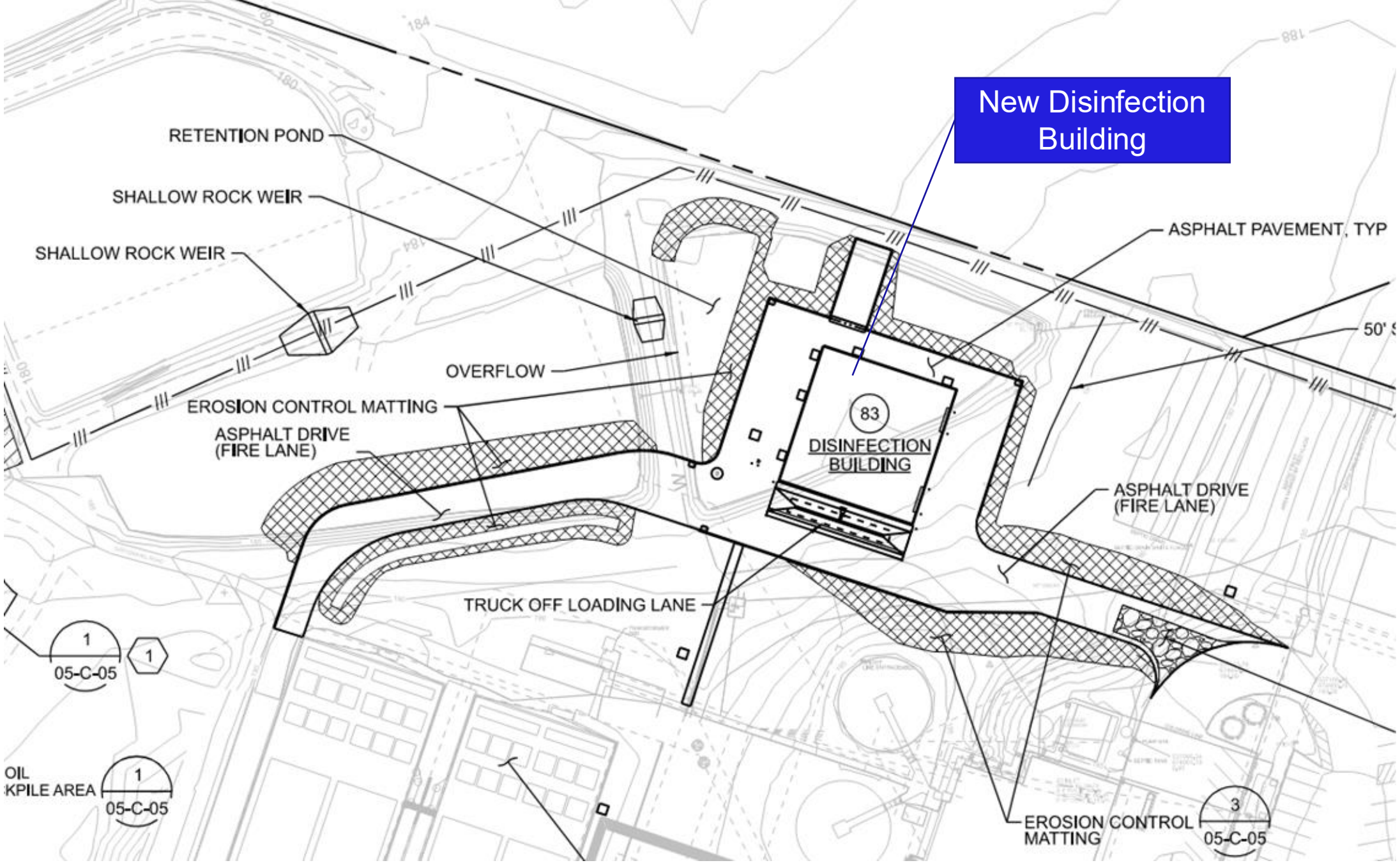


- No major road bumps

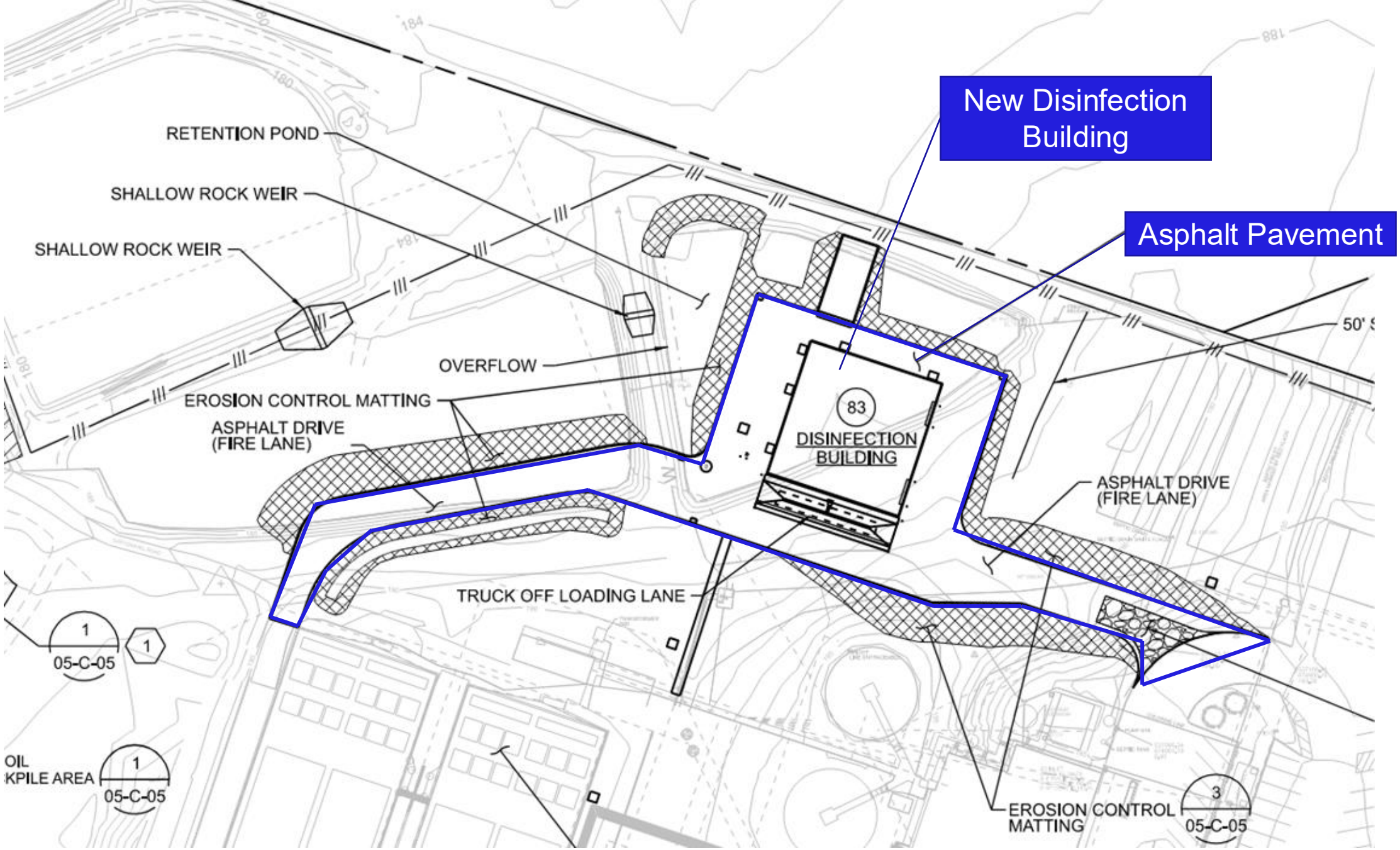
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RETENTION POND
SHALLOW ROCK WEIR
SHALLOW ROCK WEIR
OVERFLOW
EROSION CONTROL MATTING
ASPHALT DRIVE
(FIRE LANE)
ASPHALT PAVEMENT, TYP
83
DISINFECTION
BUILDING
ASPHALT DRIVE
(FIRE LANE)
TRUCK OFF LOADING LANE
1
05-C-05
1
OIL
KPILE AREA
1
05-C-05
EROSION CONTROL
MATTING
3
05-C-05

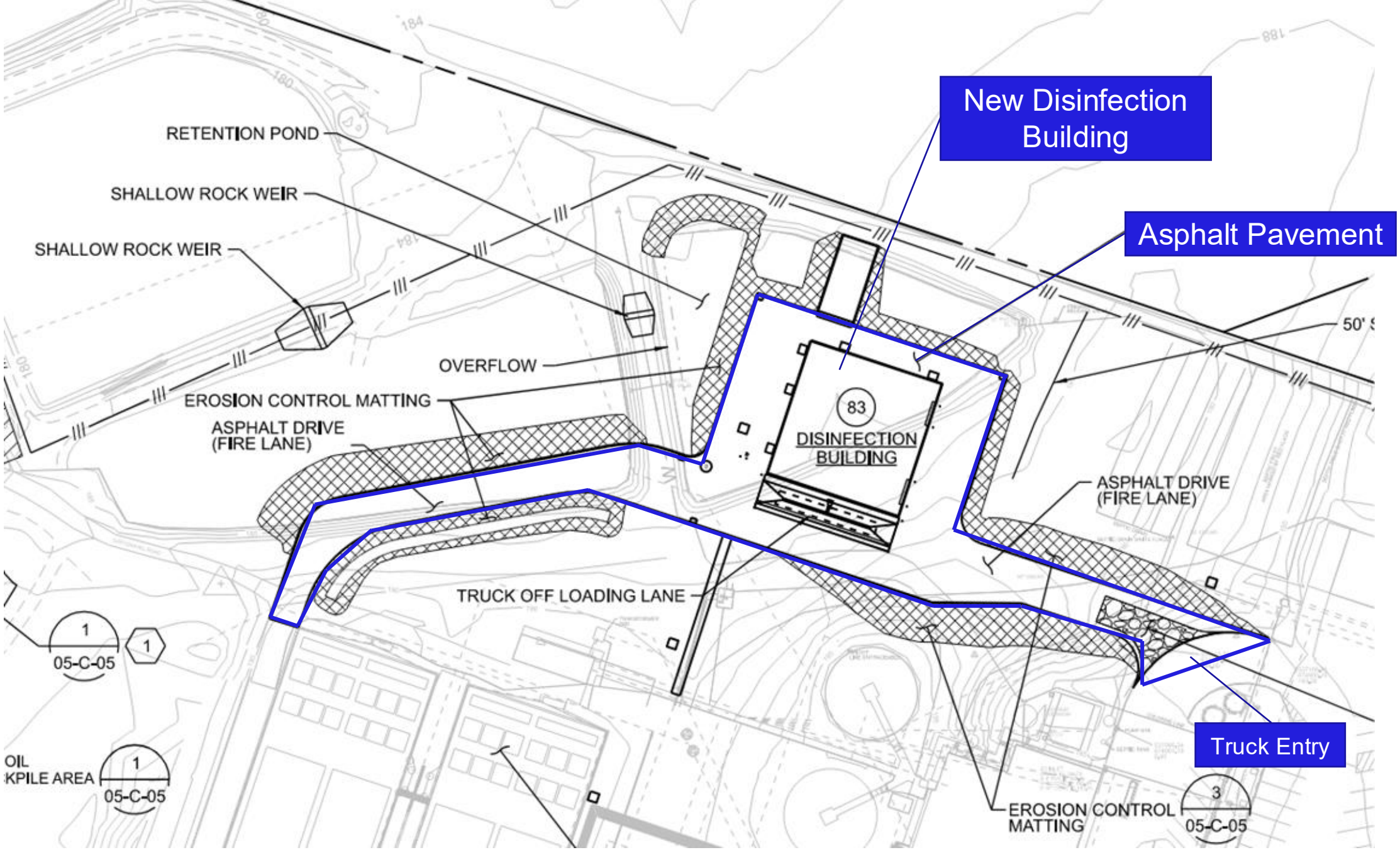
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New Disinfection Building
RETENTION POND
SHALLOW ROCK WEIR
SHALLOW ROCK WEIR
OVERFLOW
EROSION CONTROL MATTING
ASPHALT DRIVE (FIRE LANE)
ASPHALT PAVEMENT, TYP
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05-C-05
EROSION CONTROL MATTING
3
05-C-05

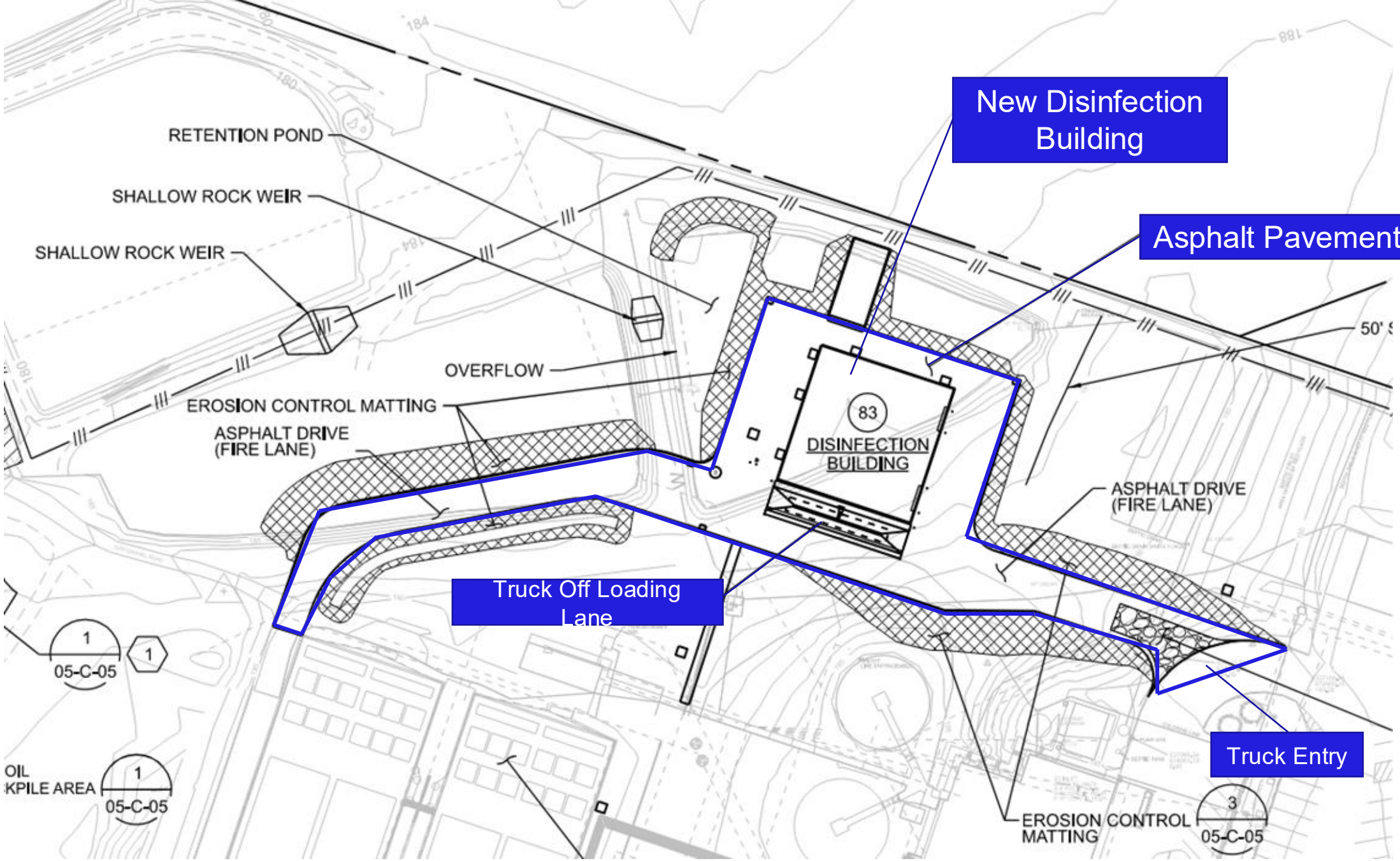
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New Disinfection Building
Asphalt Pavement
RETENTION POND
SHALLOW ROCK WEIR
SHALLOW ROCK WEIR
OVERFLOW
EROSION CONTROL MATTING
ASPHALT DRIVE (FIRE LANE)
83
DISINFECTION BUILDING
ASPHALT DRIVE (FIRE LANE)
TRUCK OFF LOADING LANE
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KPILE AREA
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EROSION CONTROL MATTING
3
05-C-05

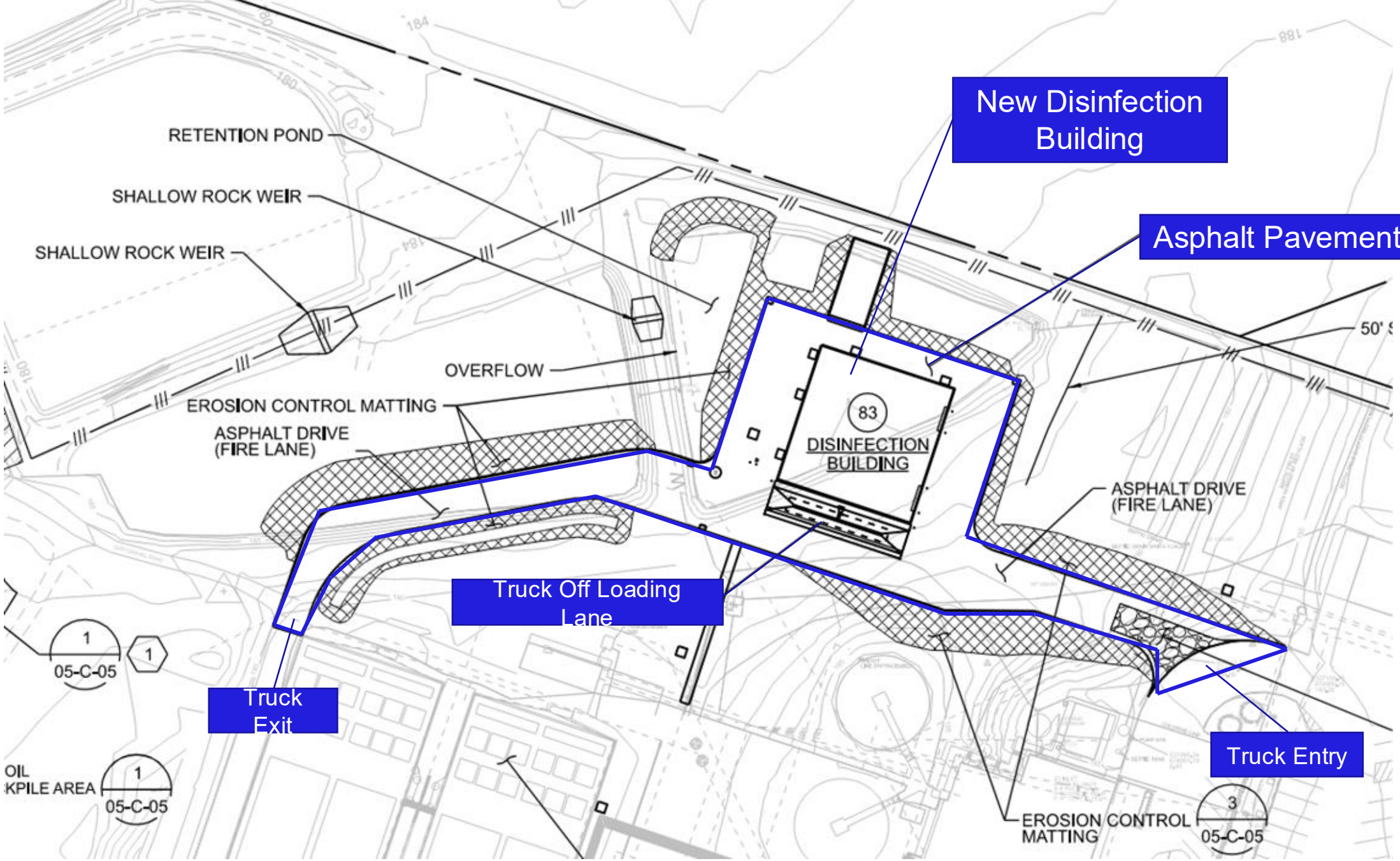
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New Disinfection Building
Asphalt Pavement
RETENTION POND
SHALLOW ROCK WEIR
SHALLOW ROCK WEIR
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OIL
KPILE AREA
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05-C-05
Truck Entry
EROSION CONTROL MATTING
3
05-C-05

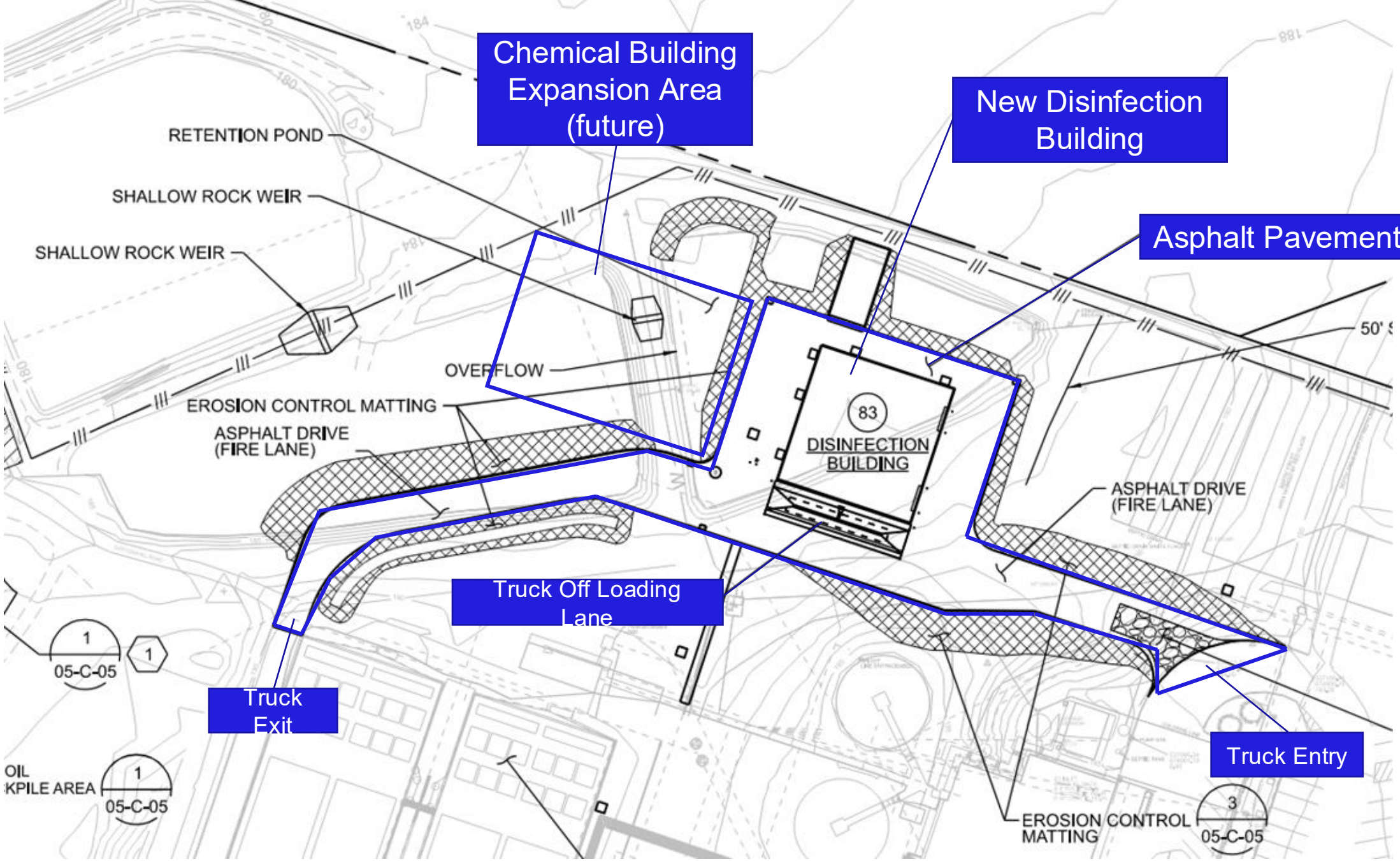
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New Disinfection Building
Asphalt Pavement
Truck Off Loading Lane
Truck Entry
RETENTION POND
SHALLOW ROCK WEIR
SHALLOW ROCK WEIR
OVERFLOW
EROSION CONTROL MATTING
ASPHALT DRIVE (FIRE LANE)
83
DISINFECTION BUILDING
ASPHALT DRIVE (FIRE LANE)
EROSION CONTROL MATTING
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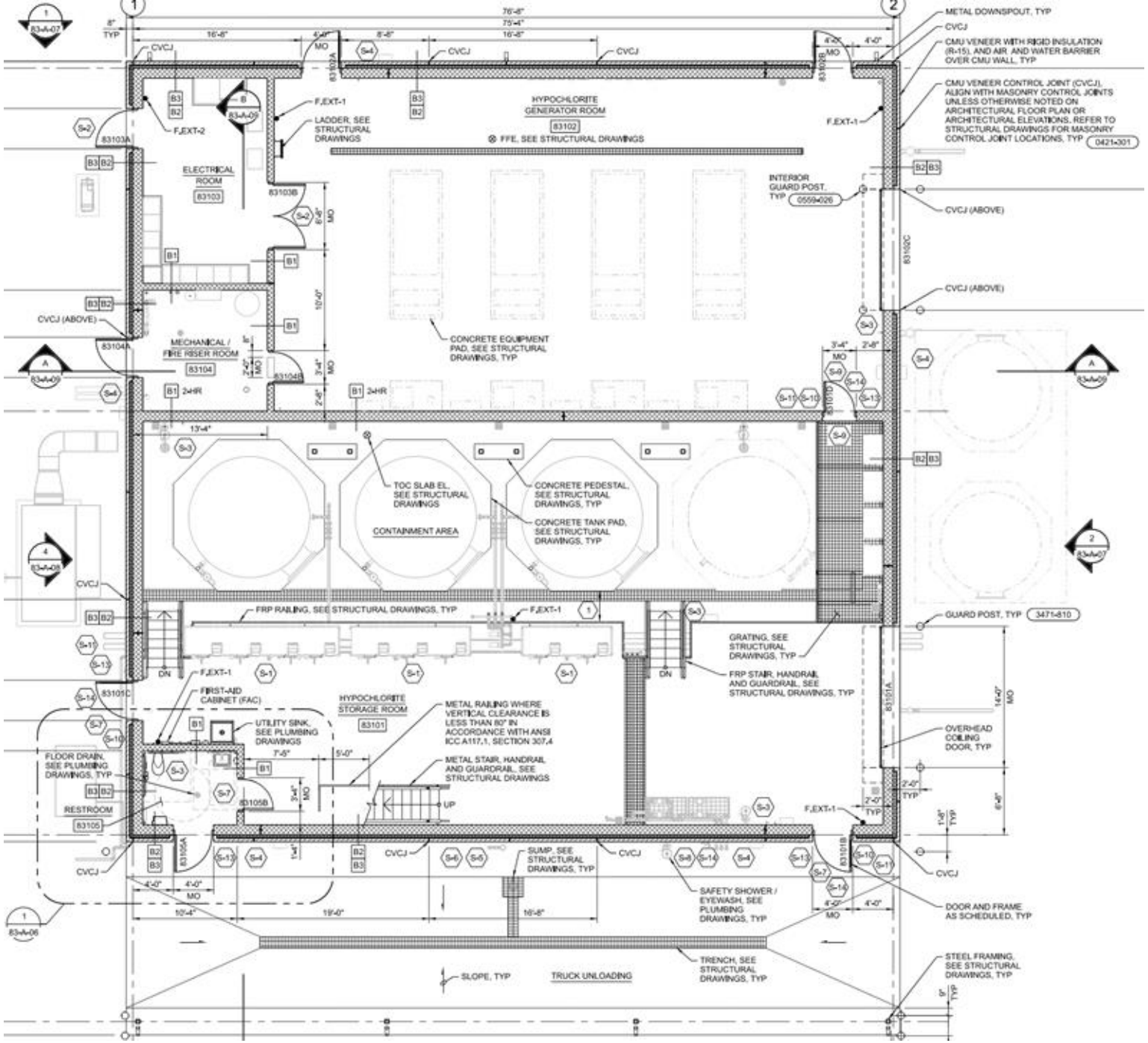
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New Disinfection Building
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SHALLOW ROCK WEIR
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83
DISINFECTION BUILDING
ASPHALT DRIVE (FIRE LANE)
Truck Off Loading Lane
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OIL
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05-C-05
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05-C-05

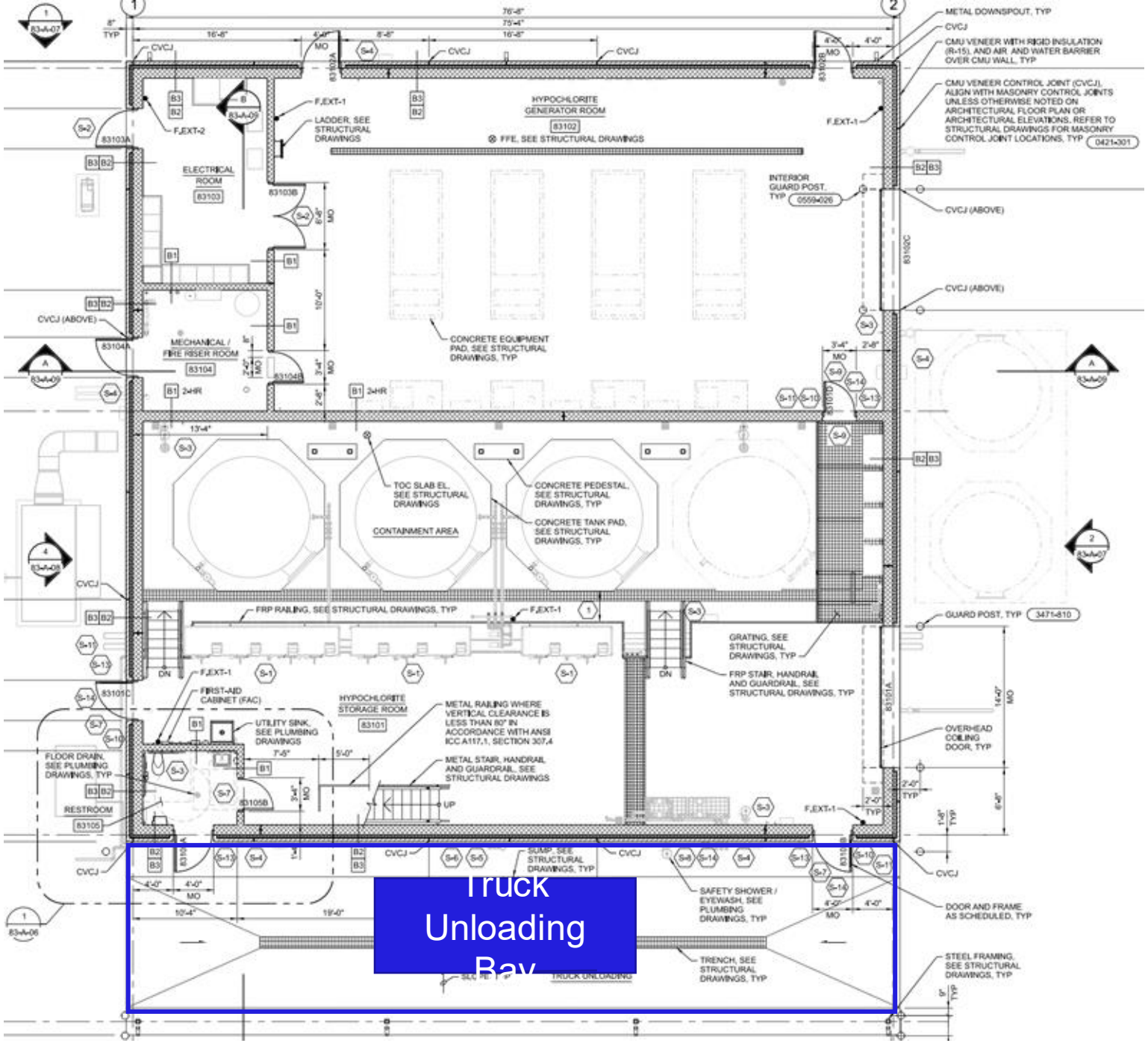
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Chemical Building Expansion Area (future)
New Disinfection Building
Asphalt Pavement
RETENTION POND
SHALLOW ROCK WEIR
SHALLOW ROCK WEIR
OVERFLOW
EROSION CONTROL MATTING
ASPHALT DRIVE (FIRE LANE)
83
DISINFECTION BUILDING
ASPHALT DRIVE (FIRE LANE)
Truck Off Loading Lane
Truck Exit
Truck Entry
EROSION CONTROL MATTING
05-C-05
05-C-05
05-C-05

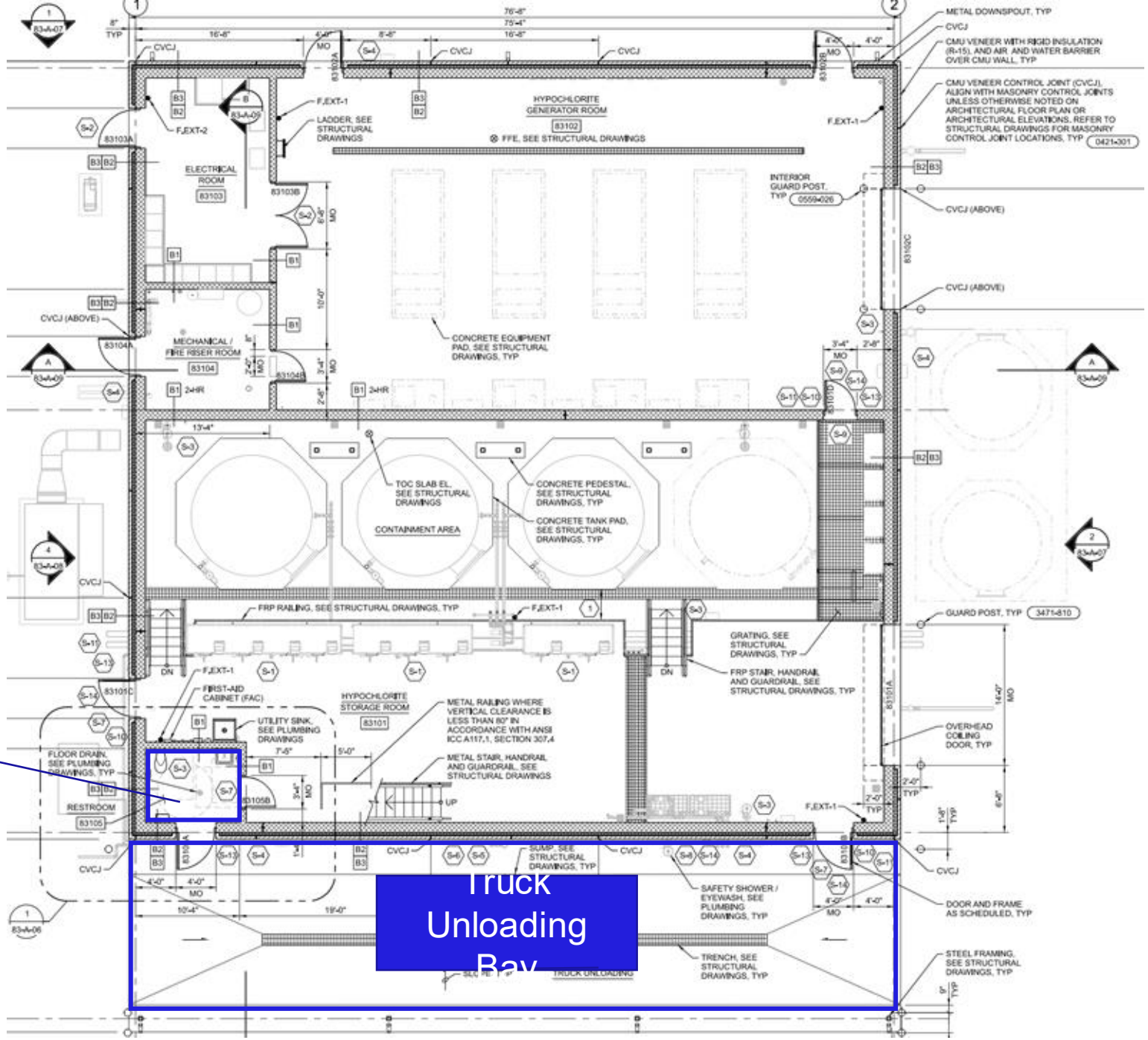
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HYPOCHLORITE GENERATOR ROOM
83102
FFE, SEE STRUCTURAL DRAWINGS
F,EXT-1
LADDER, SEE STRUCTURAL DRAWINGS
F,EXT-2
ELECTRICAL ROOM
83103
MECHANICAL / FIRE RISER ROOM
83104
CONCRETE EQUIPMENT PAD, SEE STRUCTURAL DRAWINGS, TYP
INTERIOR GUARD POST, TYP
CONTAINMENT AREA
TOC SLAB EL, SEE STRUCTURAL DRAWINGS
CONCRETE PEDESTAL, SEE STRUCTURAL DRAWINGS, TYP
CONCRETE TANK PAD, SEE STRUCTURAL DRAWINGS, TYP
FRP RAILING, SEE STRUCTURAL DRAWINGS, TYP
GRATING, SEE STRUCTURAL DRAWINGS, TYP
FRP STAIR, HANDRAIL AND GUARDRAIL, SEE STRUCTURAL DRAWINGS, TYP
GUARD POST, TYP
HYPOCHLORITE STORAGE ROOM
83101
FIRST-AID CABINET (FAC)
UTILITY SINK, SEE PLUMBING DRAWINGS
METAL RAILING WHERE VERTICAL CLEARANCE IS LESS THAN 80" IN ACCORDANCE WITH ANSI ICC A117.1, SECTION 307.4
METAL STAIR, HANDRAIL AND GUARDRAIL, SEE STRUCTURAL DRAWINGS
FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
RESTROOM
83105
SUMP, SEE STRUCTURAL DRAWINGS, TYP
SAFETY SHOWER / EYEWASH, SEE PLUMBING DRAWINGS, TYP
OVERHEAD COILING DOOR, TYP
DOOR AND FRAME AS SCHEDULED, TYP
TRENCH, SEE STRUCTURAL DRAWINGS, TYP
SLOPE, TYP
TRUCK UNLOADING
STEEL FRAMING, SEE STRUCTURAL DRAWINGS, TYP
METAL DOWNSPOUT, TYP
CMU VENEER WITH RIGID INSULATION (R=15), AND AIR AND WATER BARRIER OVER CMU WALL, TYP
CMU VENEER CONTROL JOINT (CVCJ), ALIGN WITH MASONRY CONTROL JOINTS UNLESS OTHERWISE NOTED ON ARCHITECTURAL FLOOR PLAN OR ARCHITECTURAL ELEVATIONS. REFER TO STRUCTURAL DRAWINGS FOR MASONRY CONTROL JOINT LOCATIONS, TYP
CVCJ
CVCJ (ABOVE)
B1
B2
B3
S-1
S-2
S-3
S-4
S-5
S-6
S-7
S-8
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S-16
S-17

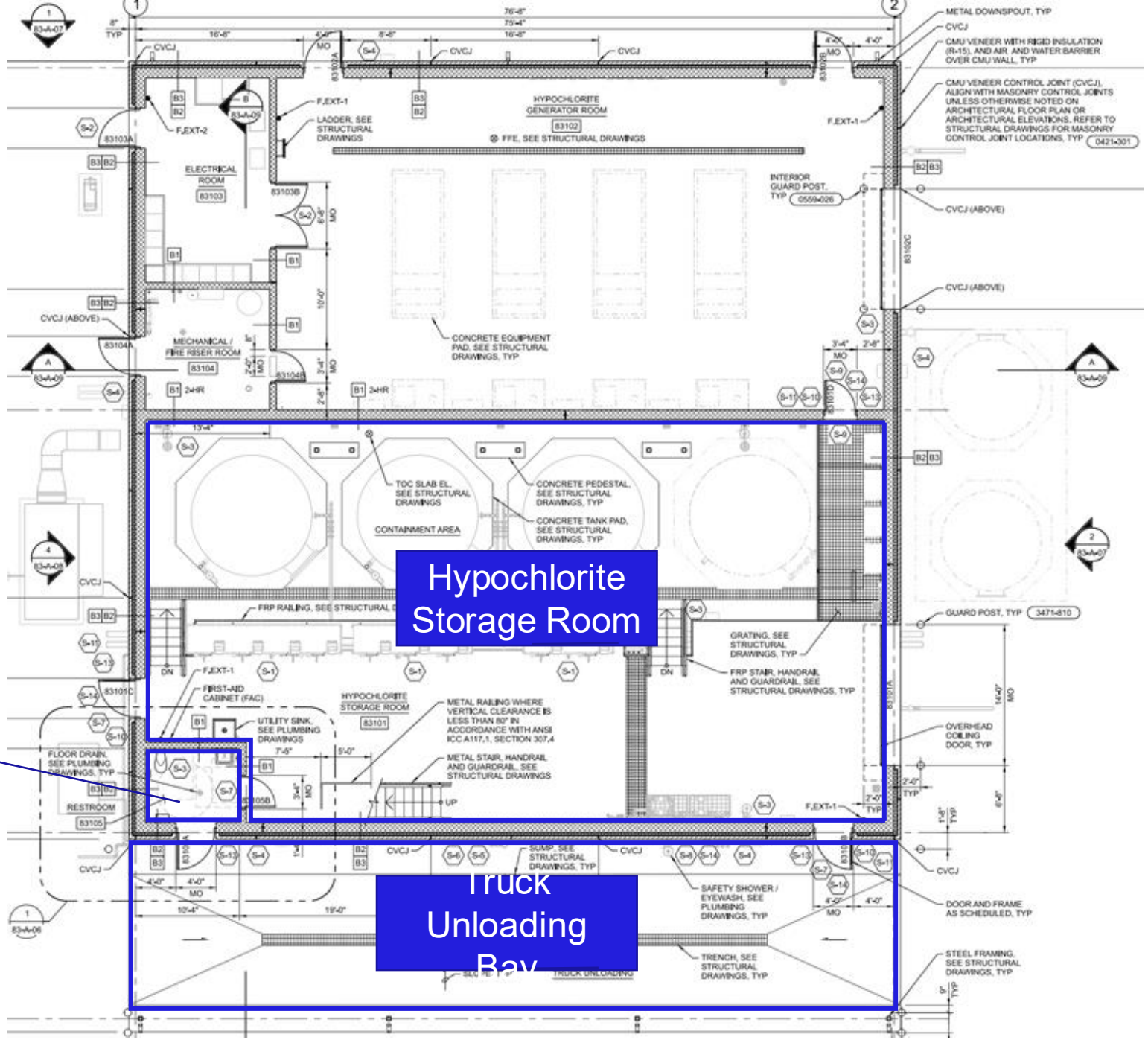
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Truck Unloading Bay
HYPOCHLORITE GENERATOR ROOM
83102
ELECTRICAL ROOM
83103
MECHANICAL / FIRE RISER ROOM
83104
HYPOCHLORITE STORAGE ROOM
83101
RESTROOM
83105
CONTAINMENT AREA
CONCRETE EQUIPMENT PAD, SEE STRUCTURAL DRAWINGS, TYP
TOC SLAB EL, SEE STRUCTURAL DRAWINGS
CONCRETE PEDESTAL, SEE STRUCTURAL DRAWINGS, TYP
CONCRETE TANK PAD, SEE STRUCTURAL DRAWINGS, TYP
FRP RAILING, SEE STRUCTURAL DRAWINGS, TYP
GRATING, SEE STRUCTURAL DRAWINGS, TYP
FRP STAIR, HANDRAIL AND GUARDRAIL, SEE STRUCTURAL DRAWINGS, TYP
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SUMP, SEE STRUCTURAL DRAWINGS, TYP
TRENCH, SEE STRUCTURAL DRAWINGS, TYP
SAFETY SHOWER / EYEWASH, SEE PLUMBING DRAWINGS, TYP
UTILITY SINK, SEE PLUMBING DRAWINGS
FIRST-AID CABINET (FAC)
FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
LADDER, SEE STRUCTURAL DRAWINGS
FFE, SEE STRUCTURAL DRAWINGS
INTERIOR GUARD POST, TYP 0559-026
METAL DOWNSPOUT, TYP
CMU VENEER WITH RIGID INSULATION (R-15), AND AIR AND WATER BARRIER OVER CMU WALL, TYP
CMU VENEER CONTROL JOINT (CVCJ), ALIGN WITH MASONRY CONTROL JOINTS UNLESS OTHERWISE NOTED ON ARCHITECTURAL FLOOR PLAN OR ARCHITECTURAL ELEVATIONS. REFER TO STRUCTURAL DRAWINGS FOR MASONRY CONTROL JOINT LOCATIONS, TYP 0421-001
CVCJ (ABOVE)
GUARD POST, TYP 3471-810
OVERHEAD COILING DOOR, TYP
DOOR AND FRAME AS SCHEDULED, TYP
STEEL FRAMING, SEE STRUCTURAL DRAWINGS, TYP
F.EXT-1
F.EXT-2
CVCJ
2-HR
DN
UP

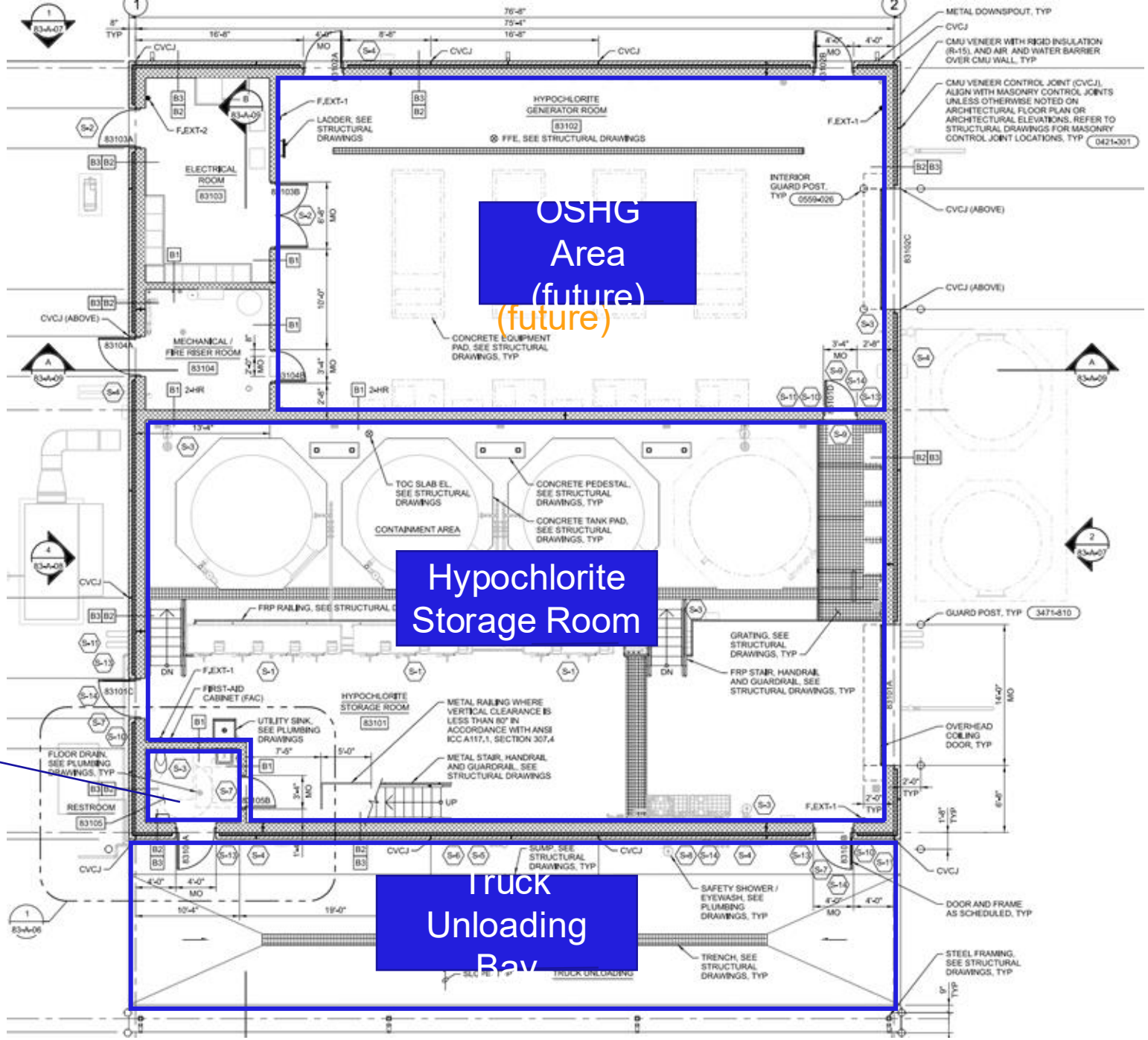
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Restroom
Truck Unloading Bay
HYPOCHLORITE GENERATOR ROOM
83102
ELECTRICAL ROOM
83103
MECHANICAL / FIRE RISER ROOM
83104
HYPOCHLORITE STORAGE ROOM
83101
RESTROOM
83105
CONTAINMENT AREA
CONCRETE EQUIPMENT PAD, SEE STRUCTURAL DRAWINGS, TYP
TOC SLAB EL, SEE STRUCTURAL DRAWINGS
CONCRETE PEDESTAL, SEE STRUCTURAL DRAWINGS, TYP
CONCRETE TANK PAD, SEE STRUCTURAL DRAWINGS, TYP
FRP RAILING, SEE STRUCTURAL DRAWINGS, TYP
GRATING, SEE STRUCTURAL DRAWINGS, TYP
FRP STAIR, HANDRAIL AND GUARDRAIL, SEE STRUCTURAL DRAWINGS, TYP
METAL RAILING WHERE VERTICAL CLEARANCE IS LESS THAN 80" IN ACCORDANCE WITH ANSI ICC A117.1, SECTION 307.4
METAL STAIR, HANDRAIL AND GUARDRAIL, SEE STRUCTURAL DRAWINGS
SUMP, SEE STRUCTURAL DRAWINGS, TYP
TRENCH, SEE STRUCTURAL DRAWINGS, TYP
SAFETY SHOWER / EYEWASH, SEE PLUMBING DRAWINGS, TYP
OVERHEAD COILING DOOR, TYP
DOOR AND FRAME AS SCHEDULED, TYP
GUARD POST, TYP
INTERIOR GUARD POST, TYP
METAL DOWNSPOUT, TYP
CMU VENEER WITH RIGID INSULATION (R=15), AND AIR AND WATER BARRIER OVER CMU WALL, TYP
CMU VENEER CONTROL JOINT (CVCJ), ALIGN WITH MASONRY CONTROL JOINTS UNLESS OTHERWISE NOTED ON ARCHITECTURAL FLOOR PLAN OR ARCHITECTURAL ELEVATIONS. REFER TO STRUCTURAL DRAWINGS FOR MASONRY CONTROL JOINT LOCATIONS, TYP
CVCJ
CVCJ (ABOVE)
STEEL FRAMING, SEE STRUCTURAL DRAWINGS, TYP
FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
FIRST-AID CABINET (FAC)
UTILITY SINK, SEE PLUMBING DRAWINGS
LADDER, SEE STRUCTURAL DRAWINGS
FFE, SEE STRUCTURAL DRAWINGS

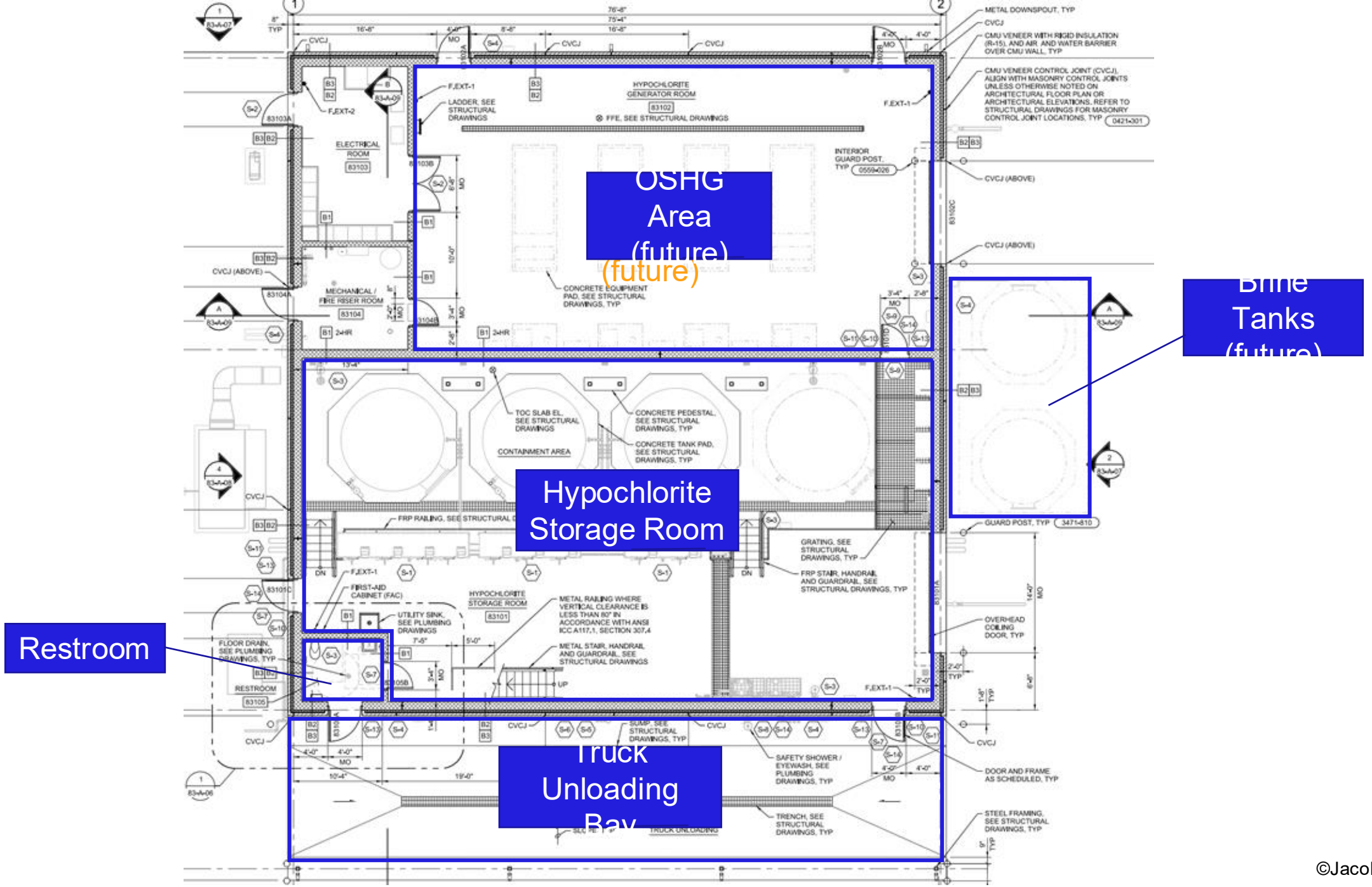
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Hypochlorite Storage Room
Restroom
Truck Unloading Bay
HYPOCHLORITE GENERATOR ROOM
83102
ELECTRICAL ROOM
83103
MECHANICAL / FIRE RISER ROOM
83104
HYPOCHLORITE STORAGE ROOM
83101
RESTROOM
83105
CONTAINMENT AREA
CONCRETE EQUIPMENT PAD, SEE STRUCTURAL DRAWINGS, TYP
TOC SLAB EL, SEE STRUCTURAL DRAWINGS
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FFE, SEE STRUCTURAL DRAWINGS
FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
UTILITY SINK, SEE PLUMBING DRAWINGS
FIRST-AID CABINET (FAC)
CVCJ
CVCJ (ABOVE)
F.EXT-1
F.EXT-2
UP
DN

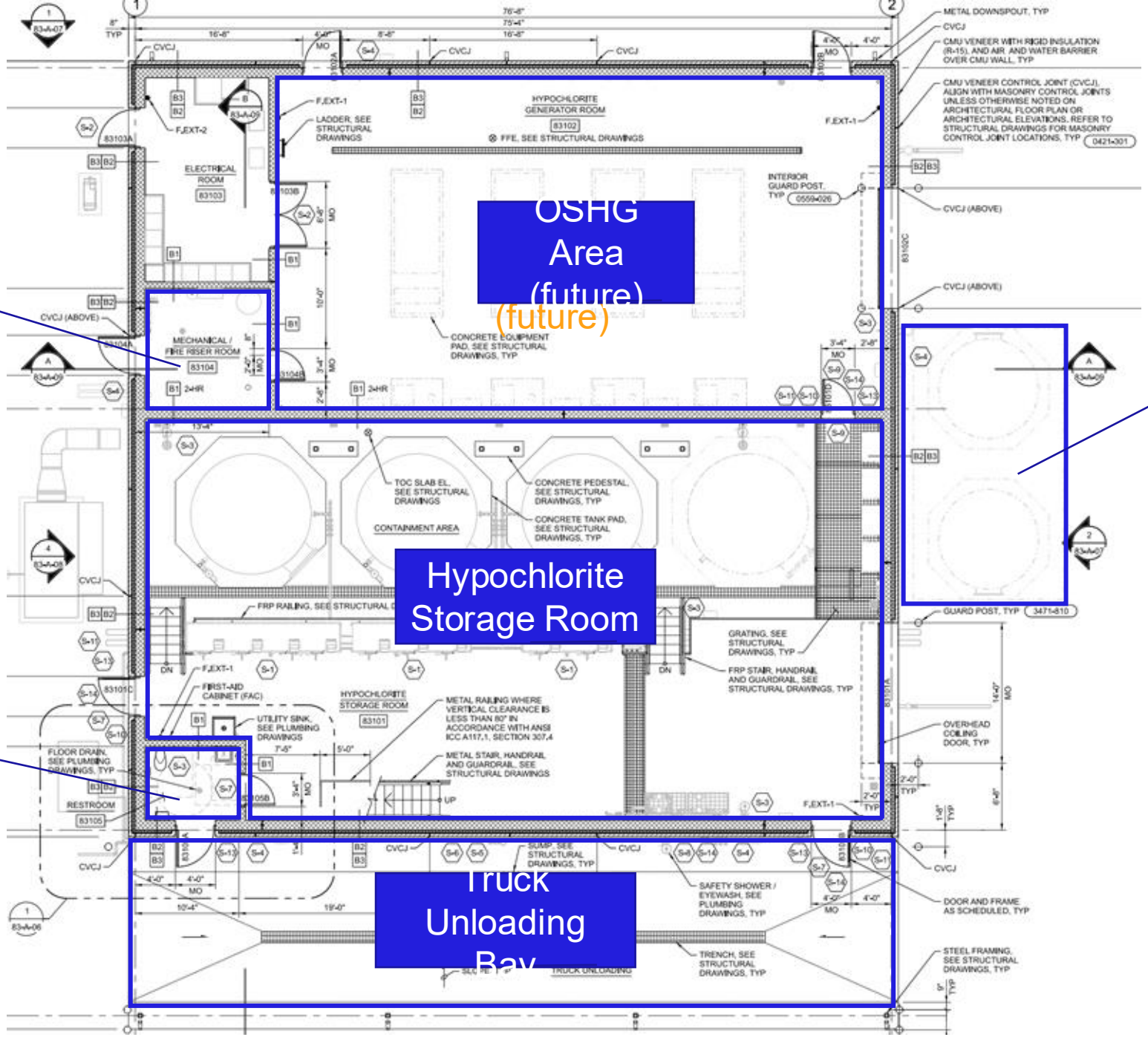
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OSHG Area (future)
(future)
Hypochlorite Storage Room
Restroom
Truck Unloading Bay
HYPOCHLORITE GENERATOR ROOM
83102
ELECTRICAL ROOM
83103
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83101
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F.EXT-2
FFE, SEE STRUCTURAL DRAWINGS
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METAL DOWNSPOUT, TYP
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CVCJ
CVCJ (ABOVE)
GUARD POST, TYP 3471-810
OVERHEAD COILING DOOR, TYP
DOOR AND FRAME AS SCHEDULED, TYP
STEEL FRAMING, SEE STRUCTURAL DRAWINGS, TYP
B1 2HR
UP
DN

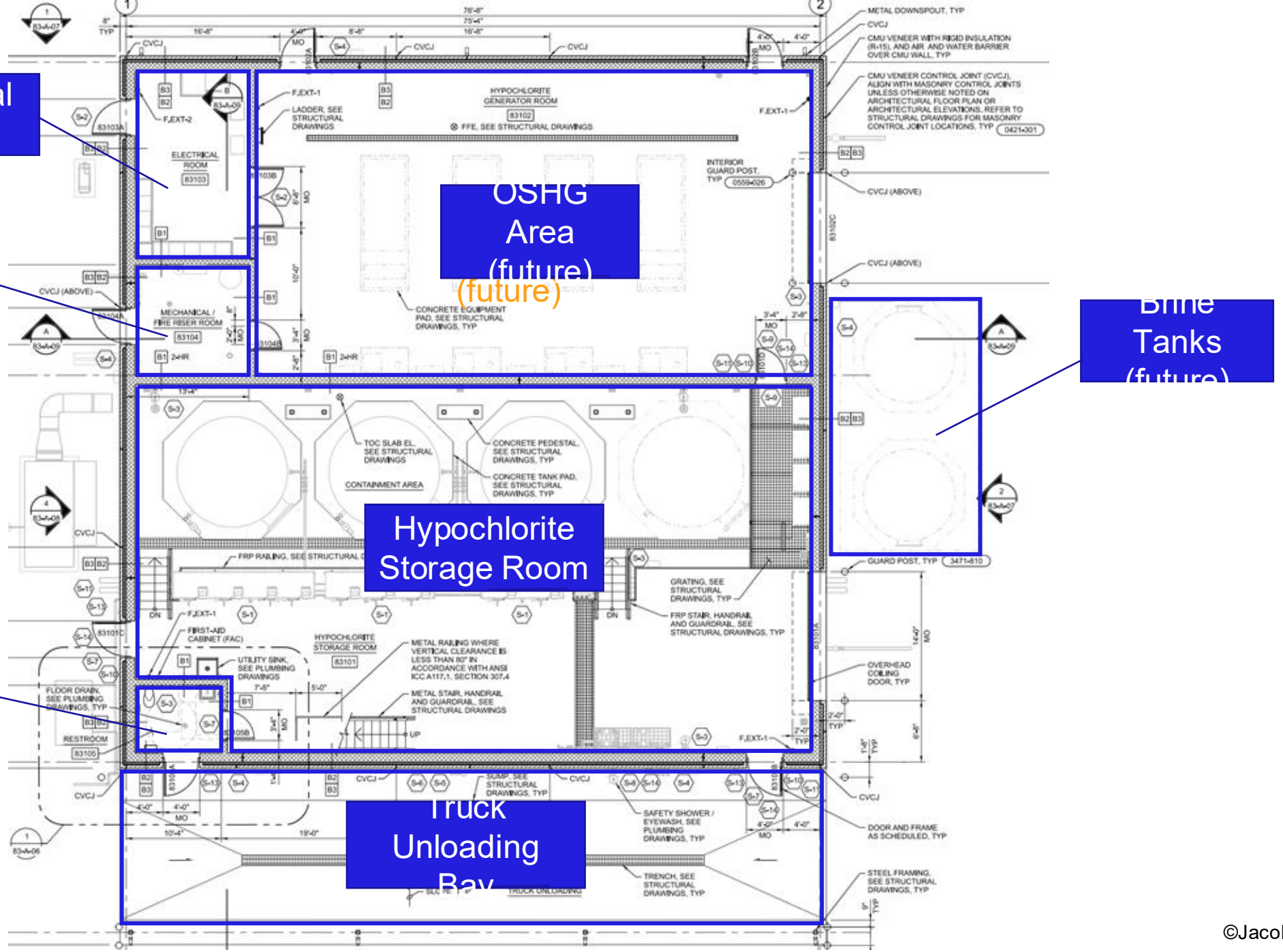
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OSHG Area (future)
Brine Tanks (future)
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HYPOCHLORITE GENERATOR ROOM
83102
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CVCJ (ABOVE)
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F.EXT-2
FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
FIRST-AID CABINET (FAC)
UTILITY SINK, SEE PLUMBING DRAWINGS
SUMP, SEE STRUCTURAL DRAWINGS, TYP
FRP RAILING, SEE STRUCTURAL
UP
DN

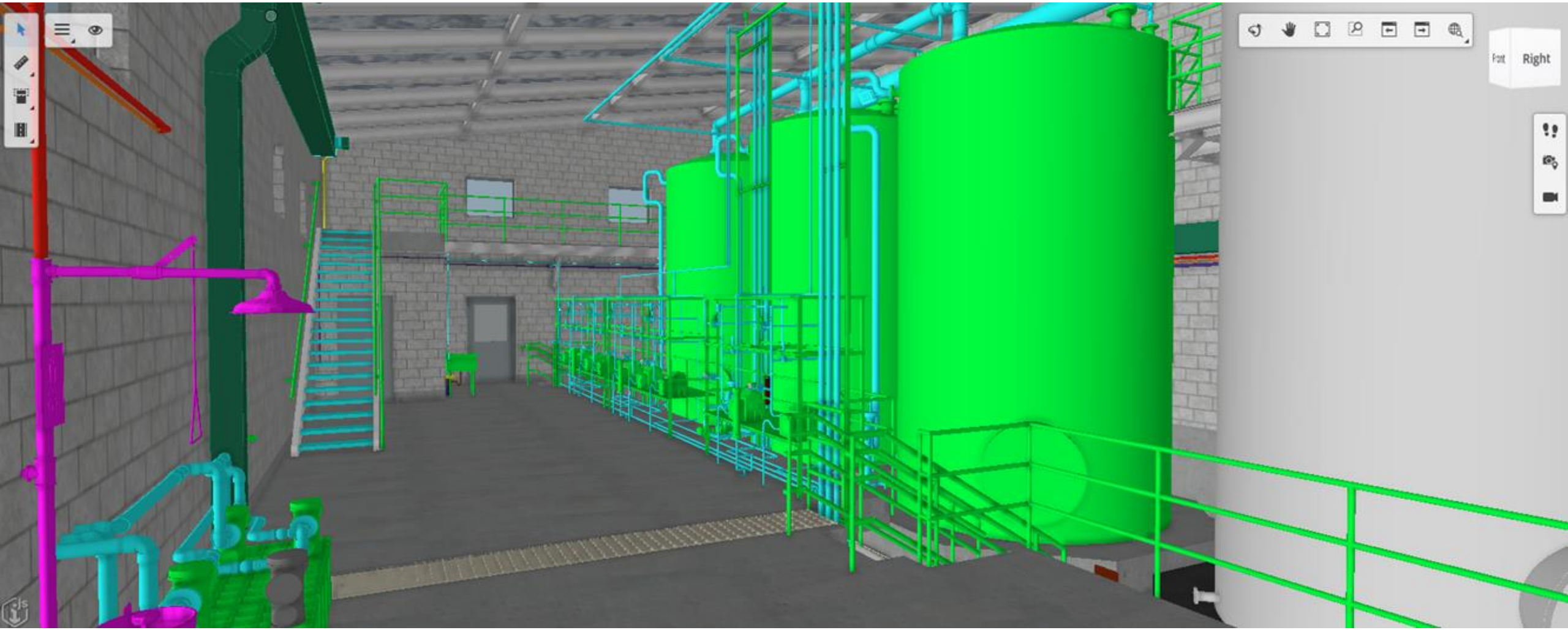
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Mechanical Room
OSHG Area (future)
(future)
Brine Tanks (future)
Hypochlorite Storage Room
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83102
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CVCJ
FFE, SEE STRUCTURAL DRAWINGS
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FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
FIRST-AID CABINET (FAC)
UTILITY SINK, SEE PLUMBING DRAWINGS
SUMP, SEE STRUCTURAL DRAWINGS, TYP
FRP RAILING, SEE STRUCTURAL

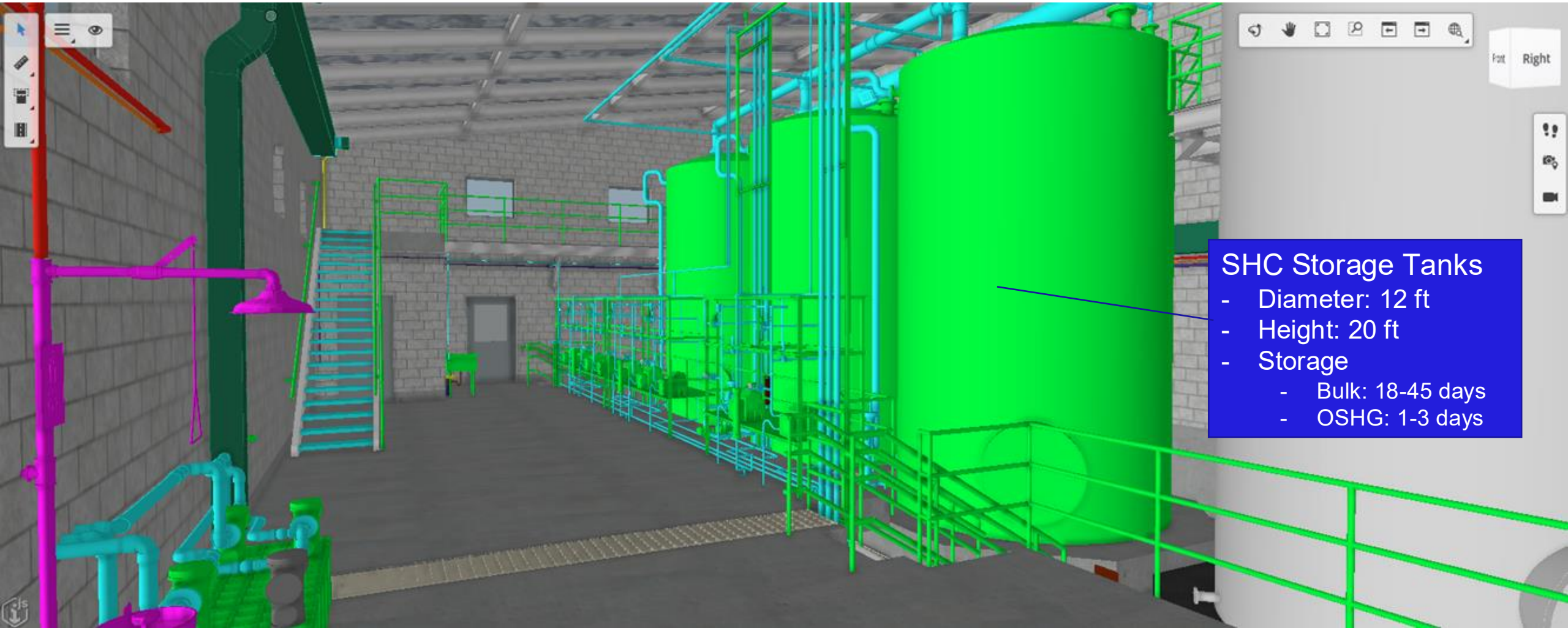
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Electrical Room
Mechanical Room
Restroom
OSHG Area (future)
Hypochlorite Storage Room
Truck Unloading Bay
Brine Tanks (future)
ELECTRICAL ROOM 83103
MECHANICAL / FIRE RISER ROOM 83104
HYPOCHLORITE GENERATOR ROOM 83102
HYPOCHLORITE STORAGE ROOM 83101
RESTROOM 83105
CONTAINMENT AREA
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OVERHEAD COILING DOOR, TYP
DOOR AND FRAME AS SCHEDULED, TYP
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GUARD POST, TYP
METAL DOWNSPOUT, TYP
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INTERIOR GUARD POST, TYP
CVCJ (ABOVE)
CVCJ
FFE, SEE STRUCTURAL DRAWINGS
LADDER, SEE STRUCTURAL DRAWINGS
TOC SLAB EL, SEE STRUCTURAL DRAWINGS
CONCRETE PEDESTAL, SEE STRUCTURAL DRAWINGS, TYP
CONCRETE TANK PAD, SEE STRUCTURAL DRAWINGS, TYP
FRP RAILING, SEE STRUCTURAL
FIRST-AID CABINET (FAC)
UTILITY SINK, SEE PLUMBING DRAWINGS
FLOOR DRAIN, SEE PLUMBING DRAWINGS, TYP
SUMP, SEE STRUCTURAL DRAWINGS, TYP

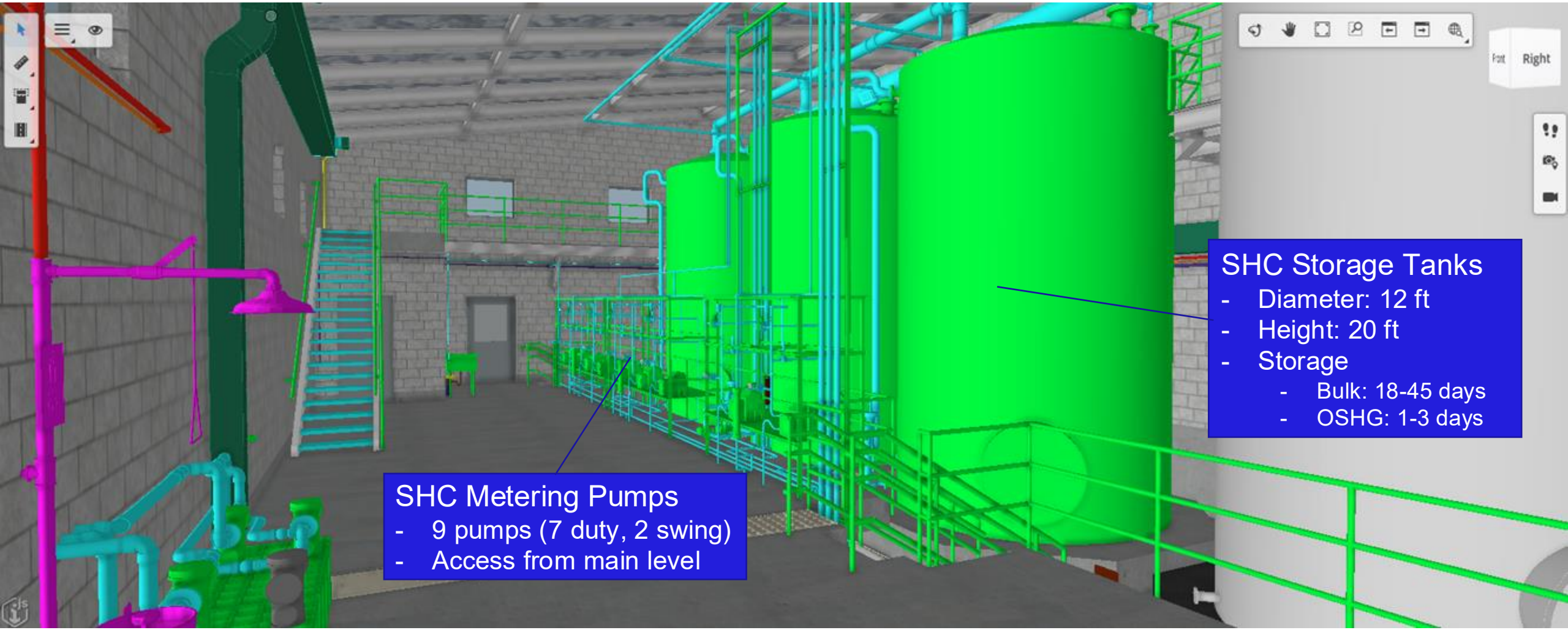
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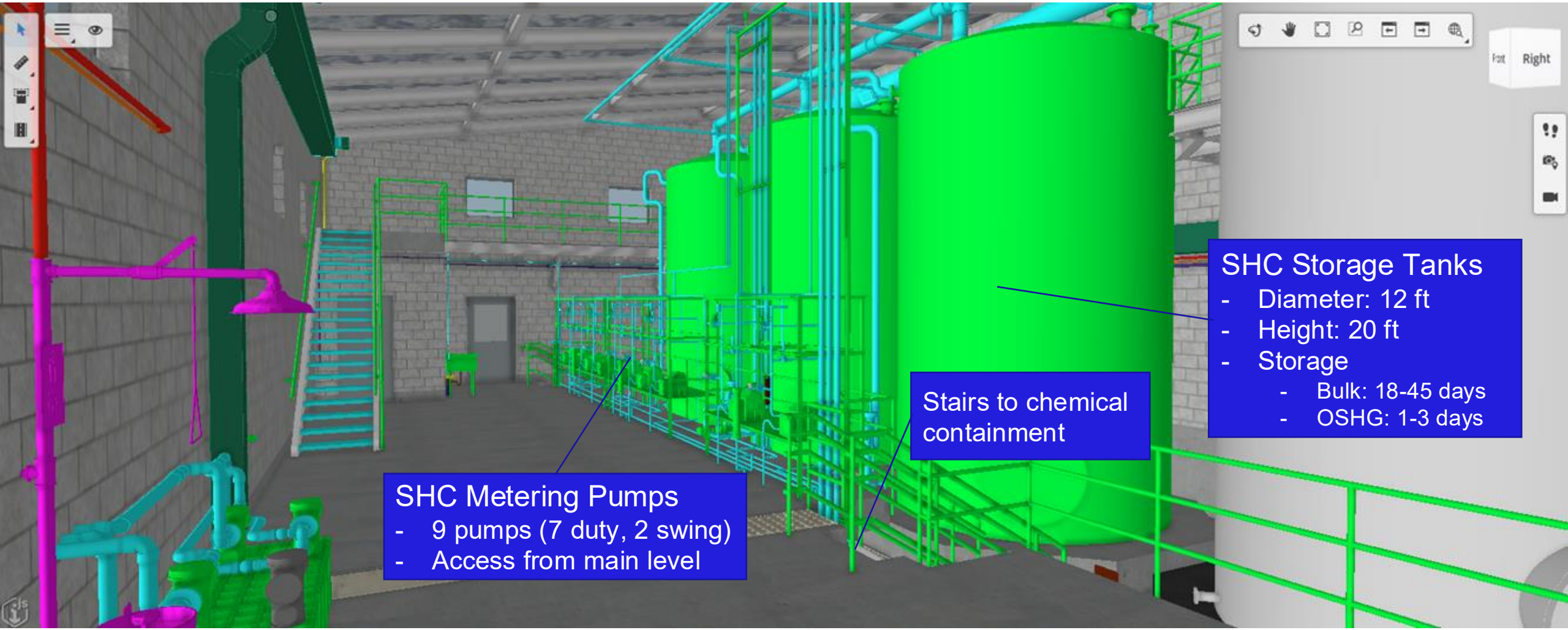
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SHC Storage Tanks
- Diameter: 12 ft
- Height: 20 ft
- Storage
  - Bulk: 18-45 days
  - OSHG: 1-3 days
Front
Right

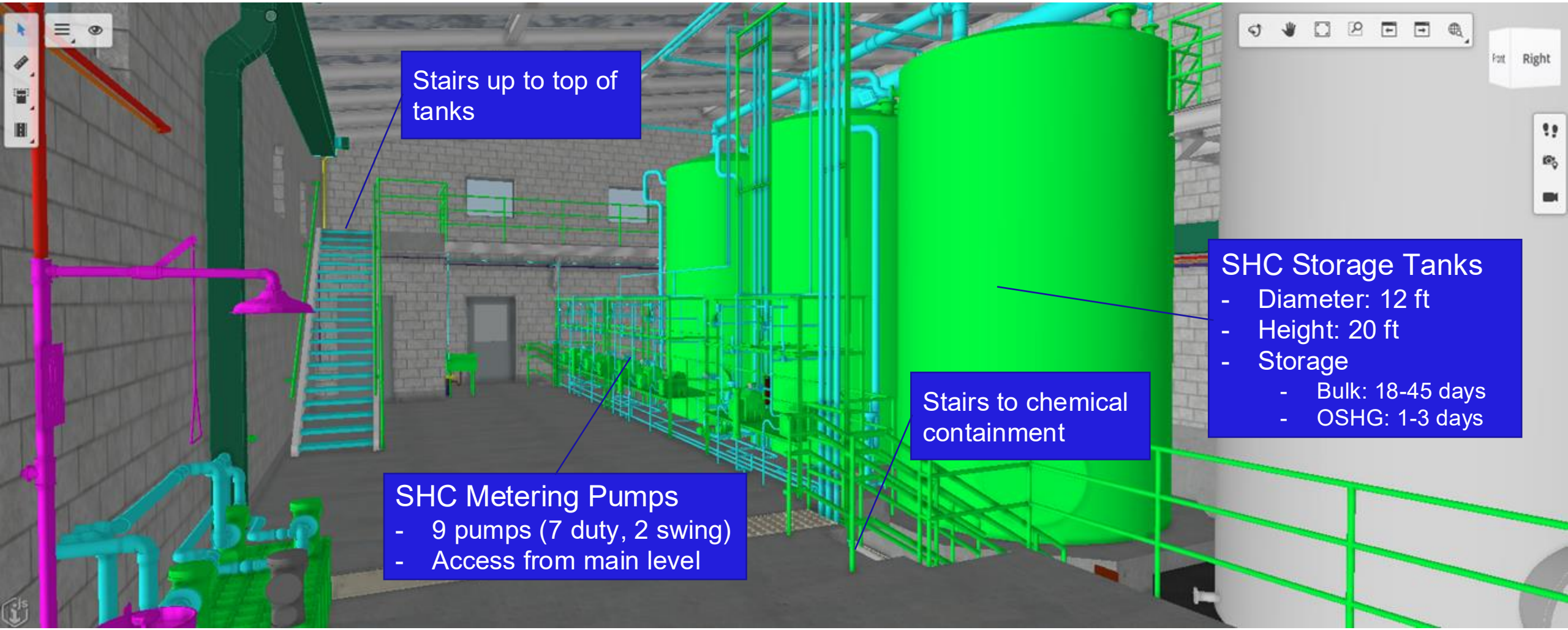
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SHC Storage Tanks
- Diameter: 12 ft
- Height: 20 ft
- Storage
  - Bulk: 18-45 days
  - OSHG: 1-3 days
SHC Metering Pumps
- 9 pumps (7 duty, 2 swing)
- Access from main level

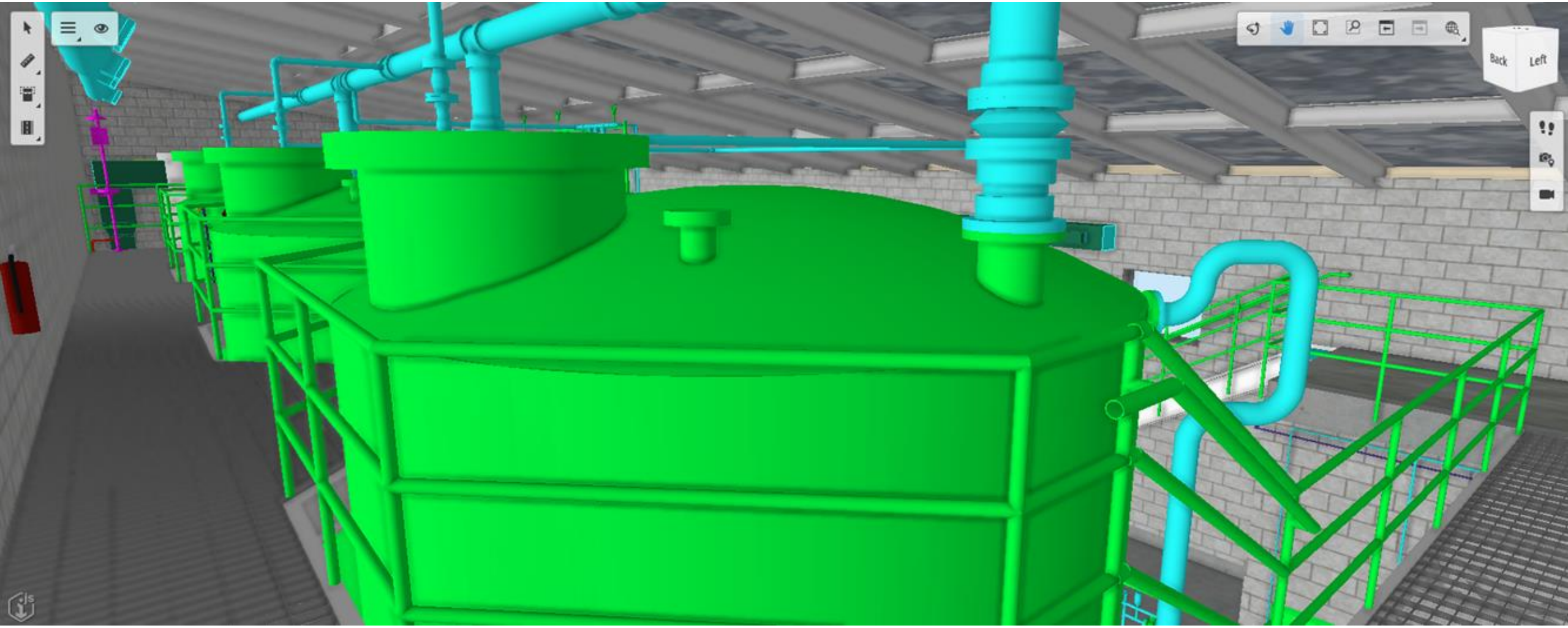
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SHC Storage Tanks
- Diameter: 12 ft
- Height: 20 ft
- Storage
  - Bulk: 18-45 days
  - OSHG: 1-3 days
Stairs to chemical containment
SHC Metering Pumps
- 9 pumps (7 duty, 2 swing)
- Access from main level

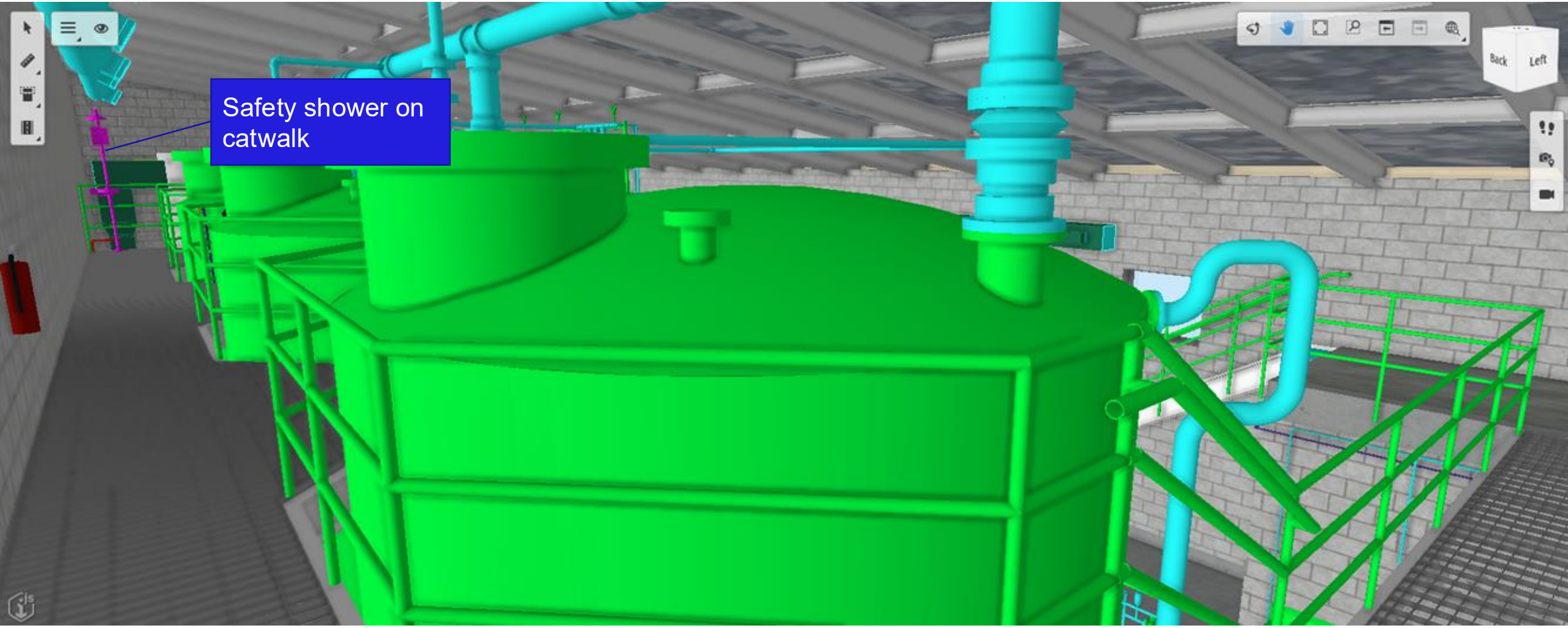
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Stairs up to top of tanks
SHC Storage Tanks
- Diameter: 12 ft
- Height: 20 ft
- Storage
  - Bulk: 18-45 days
  - OSHG: 1-3 days
Stairs to chemical containment
SHC Metering Pumps
- 9 pumps (7 duty, 2 swing)
- Access from main level

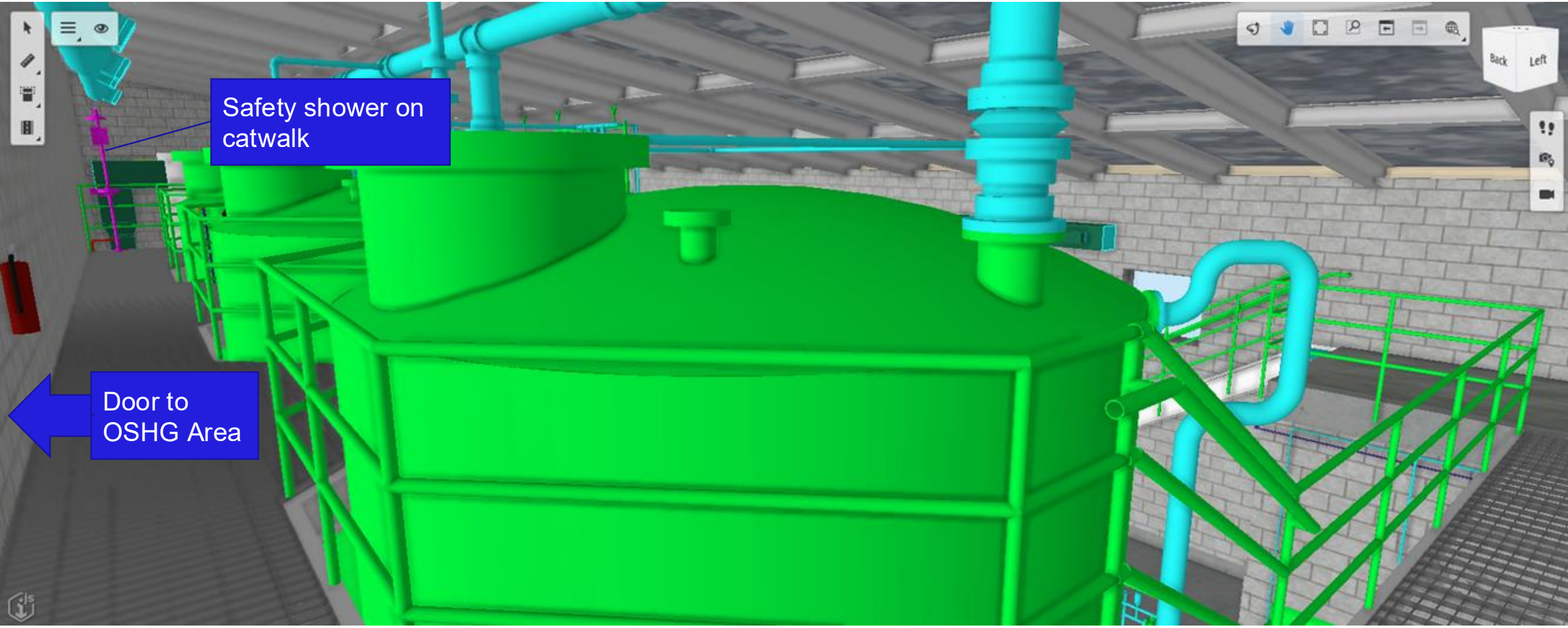
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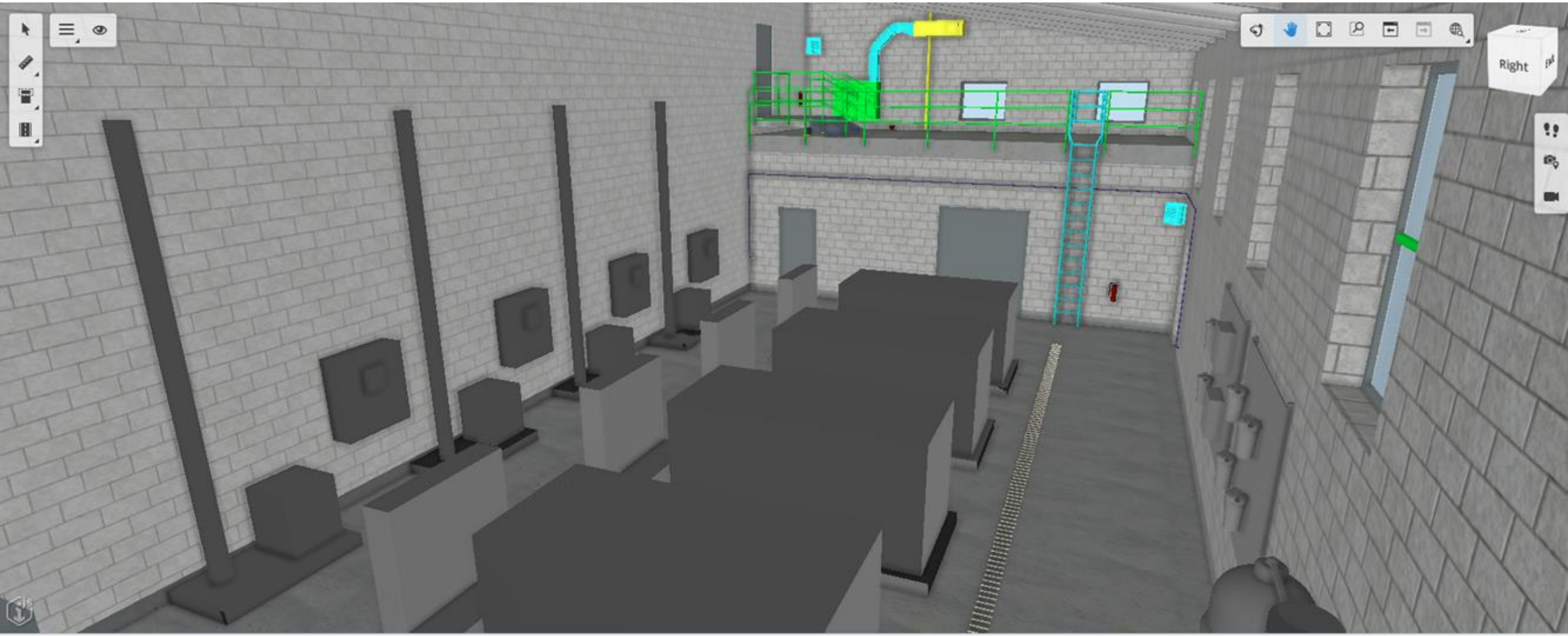
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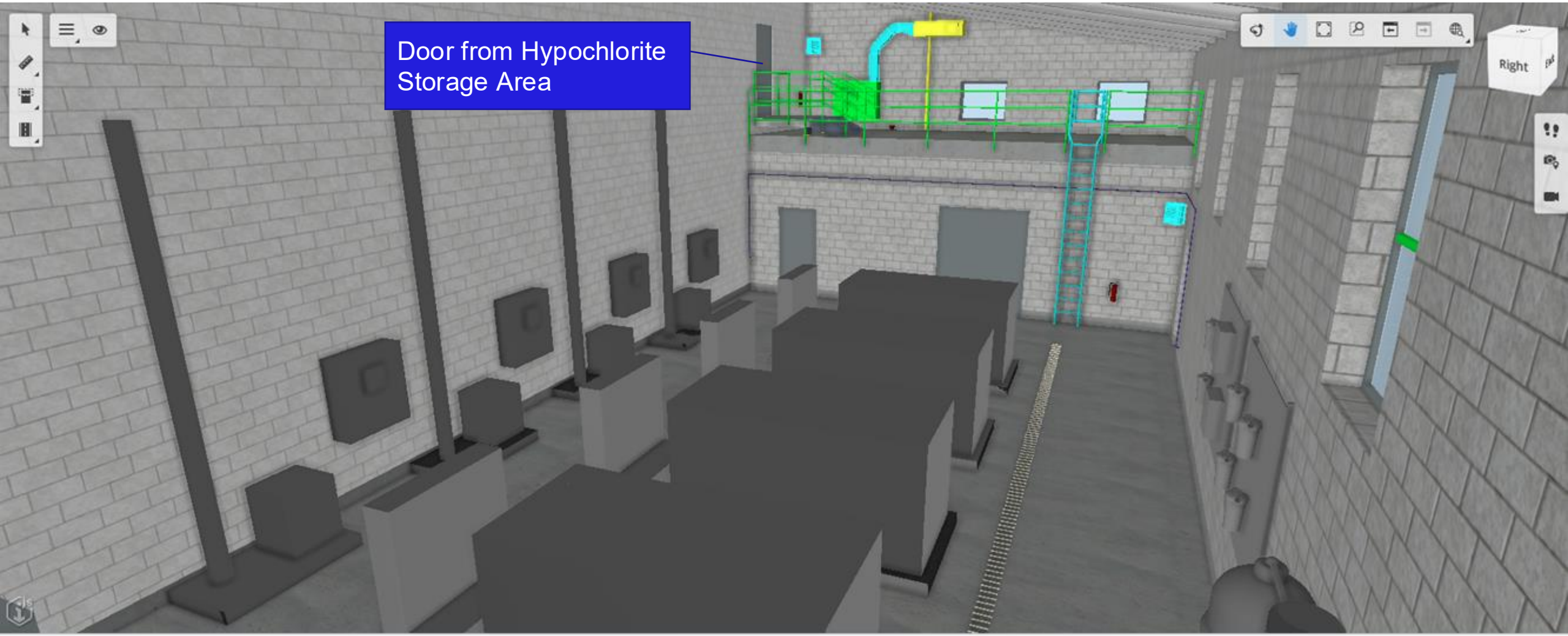
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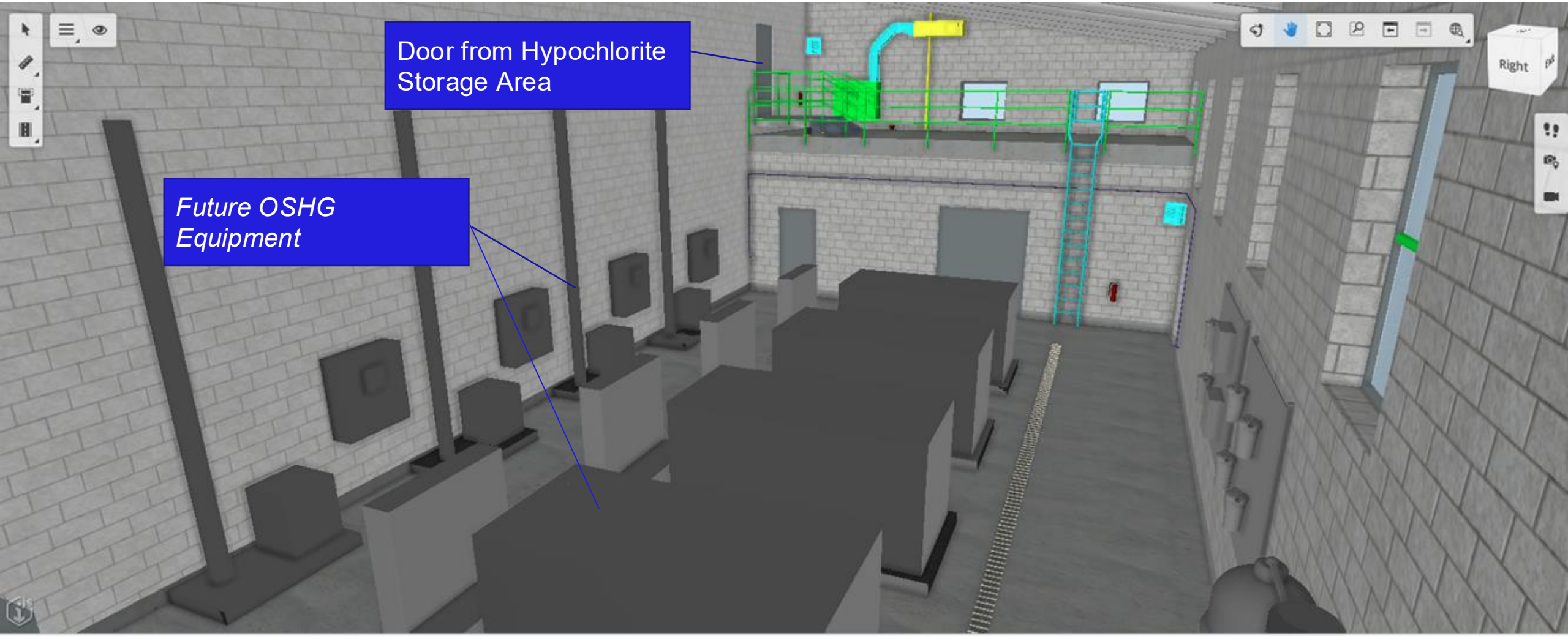
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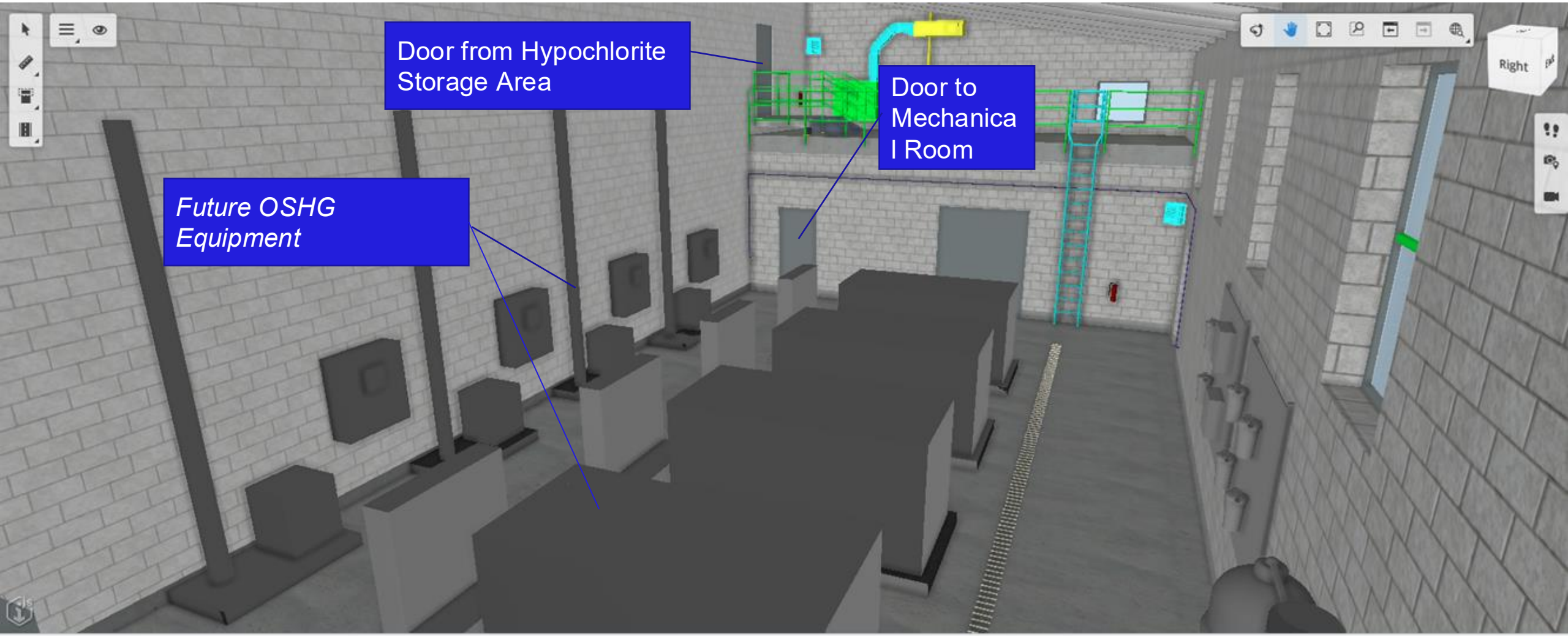
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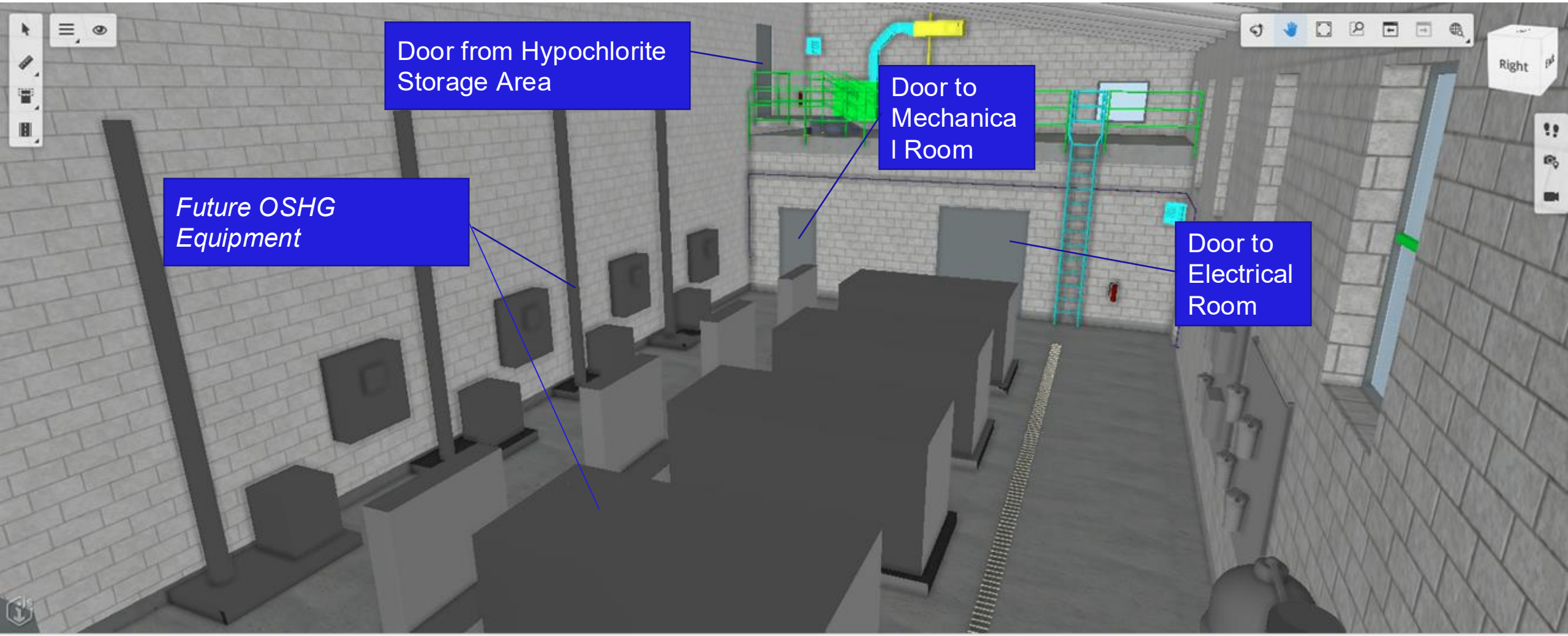
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Door from Hypochlorite Storage Area
Future OSHG Equipment
Right

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Door from Hypochlorite Storage Area
Door to Mechanical Room
Future OSHG Equipment
Right

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Door from Hypochlorite Storage Area
Door to Mechanical Room
Future OSHG Equipment
Door to Electrical Room
Right

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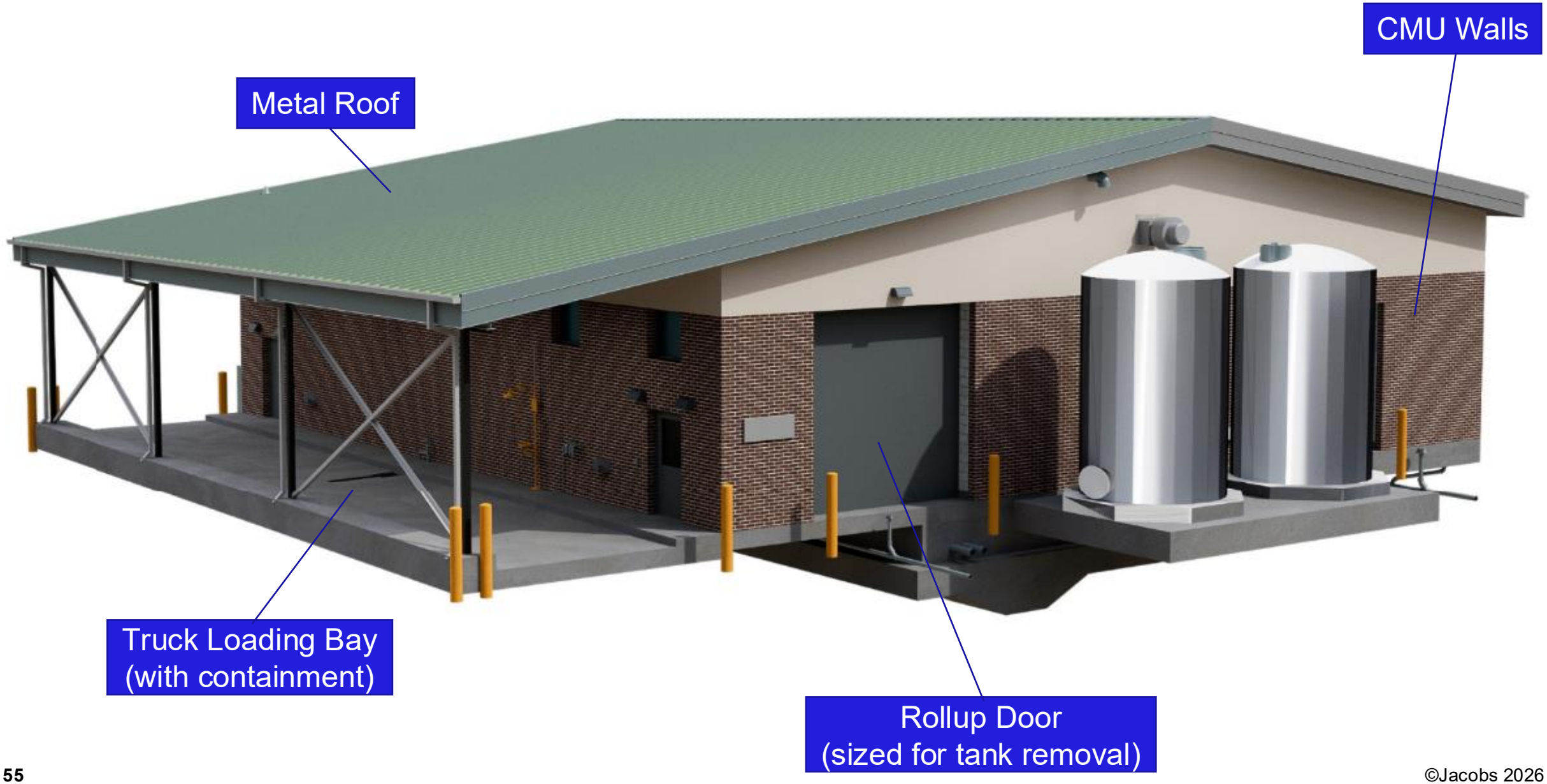
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Metal Roof
CMU Walls
Truck Loading Bay
(with containment)
Rollup Door
(sized for tank removal)

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Metal Roof
CMU Walls
Truck Loading Bay
(with containment)
Rollup Door
(sized for tank removal)
Brine
Tanks
(future)

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Key Takeaways

Design Schedule

Typical Design Schedule (1 year, 4 months)



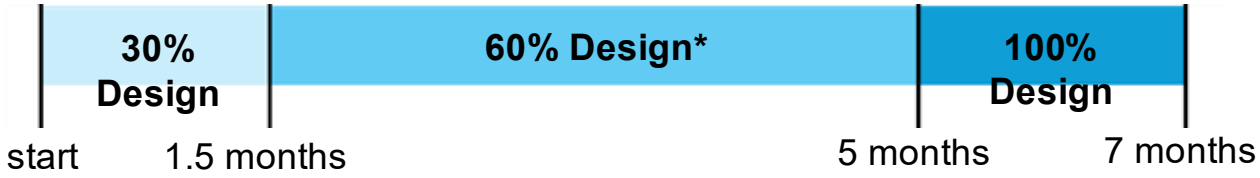
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Design Schedule

Typical Design Schedule (1 year, 4 months)



JWC Design Schedule (7 months)



** JWC's 60% design deliverable was at an 90% level of design.*
It was called 60% for permitting purposes.

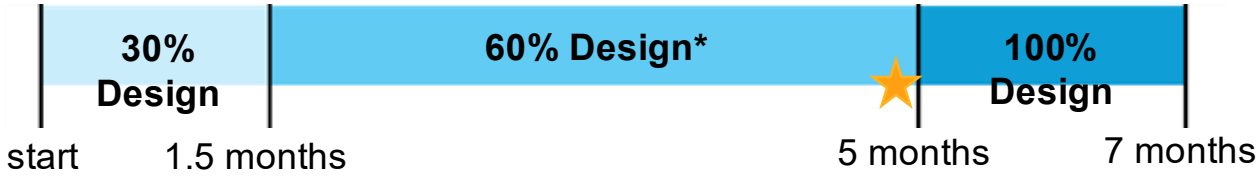
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JWC Design Schedule (7 months)



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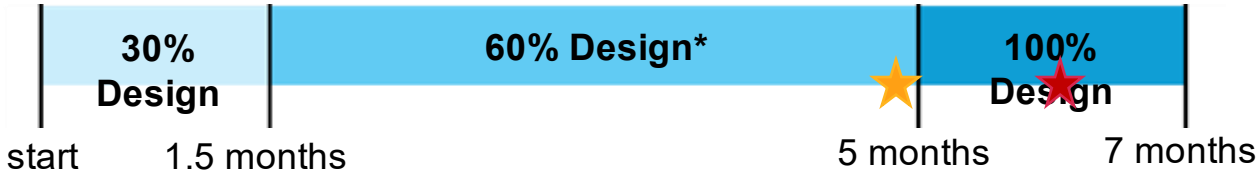
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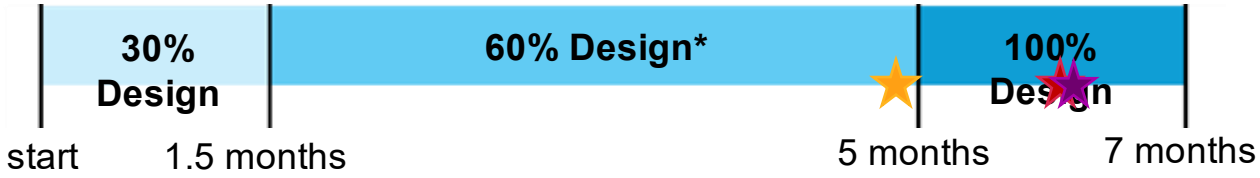
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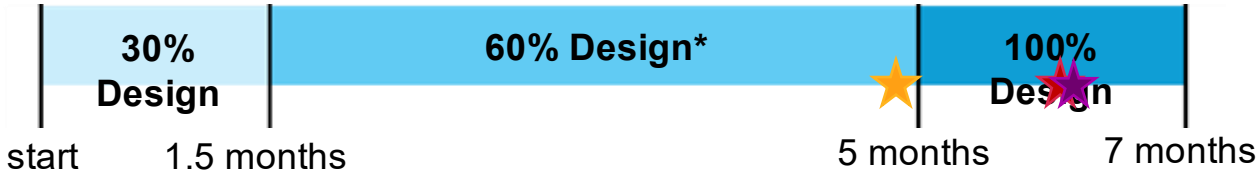
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Design Schedule

Typical Design Schedule (1 year, 4 months)



JWC Design Schedule (7 months)



9 months saved!!!

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Time-Saving Strategies



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Time-Saving Strategies

- Collaboration During Delivery
  - In-Person Workshops
  - SketchUp for visualization



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Time-Saving Strategies

- Collaboration During Delivery
  - In-Person Workshops
  - SketchUp for visualization
- Effective Design Management
  - Collaborative review process
  - Eliminated deliverables



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Time-Saving Strategies

- Collaboration During Delivery
  - In-Person Workshops
  - SketchUp for visualization
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  - Eliminated deliverables
- Strong relationship and trust between client and engineers



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Time-Saving Strategies

- Collaboration During Delivery
  - In-Person Workshops
  - SketchUp for visualization
- Effective Design Management
  - Collaborative review process
  - Eliminated deliverables
- Strong relationship and trust between client and engineers



IMPORTANT: Potential for QC issues with a condensed timeline

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Acknowledgements

- Chris Wilson
- Todd Evers
- Aaron Smith
- Bret Binerth
- Rachel Moore
- Lee Lindsey
- Zac Bertz
- *JWC Engineering and Resources Division*
- *JWC Partners*

- Brad Phelps
- Spencer Adams

QUESTIONS ?