Compost Facility Commissioning & Lessons Learned

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City of Lethbridge

TERRITORY ACKNOWLEDGEMENT

The City of Lethbridge acknowledges that we are gathered on the lands of the Blackfoot people of the Canadian Plains and pays respect to the Blackfoot people past, present and future while recognizing and respecting their cultural heritage, beliefs and relationship to the land. The City of Lethbridge is also home to the Metis Nation of Alberta, Region III.

Disclaimer & Goal of Today

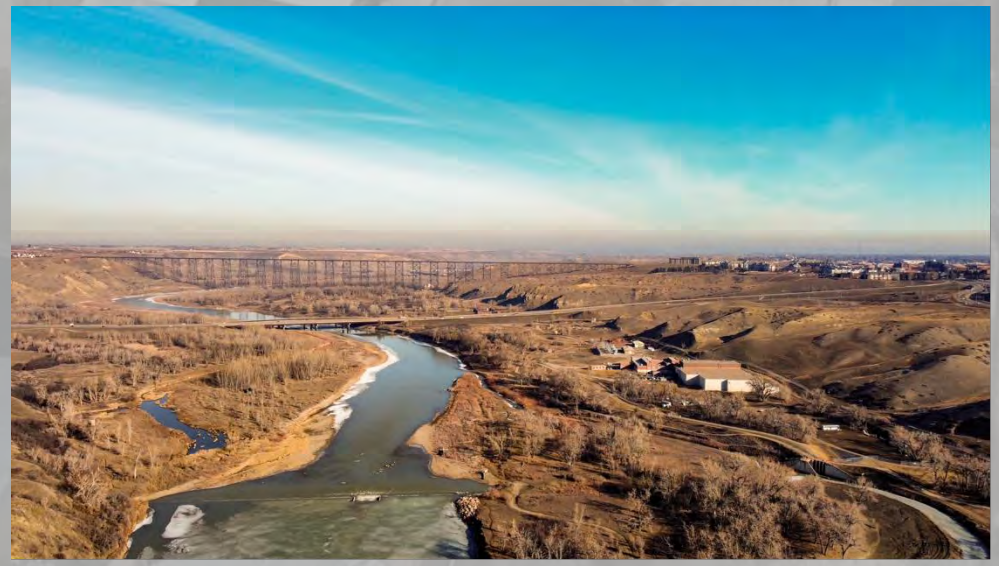
- Constructed on time and within budget, the Lethbridge Organics Processing Facility stands as a testament to effective project execution. Although the design and construction teams operated under significant constraints, their coordinated effort produced an outstanding result. This presentation will outline some challenges encountered and the lessons learned.
- No project is flawless and this presentation intends to share knowledge and help others.

Commissioning Findings/ Presentation Legend

- Item we were pleased with 👍👍
- Item we are okay with 👍
- Item we live with 👊
- Item we needed to change 👎

Lethbridge Background

- Lethbridge is located in Southern Alberta with a population of over 100,000 residents.
- City-operated Waste Utility with an integrated waste management facility (Waste and Recycling Centre). Onsite Landfill, MRF, Hydrovac Facility, Education Centre and Transfer station.
- Council Mandated a 65% waste diversion goal by 2030 for Residential
- Approved Curbside Organics Capital Improvement Program in 2021



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Case Study: Lethbridge Organics Processing Facility

Team & Approach

- ~$10,000,000 Capital Cost funded by Community Building Fund and Municipal Sustainability Initiative
- Processing system by Engineered Composting Systems, Composting partner procured early in design 👍👍
- Design-Bid-Build 👍👍
- Building and site design by Tetra-Tech Engineering (with sub-consultants)
- Constructed by Maple Reinders

ECS engineered COMPOST systems

TETRA TECH

Maple Reinders

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Facility Needs

- Design Goals:
  - Commercial material acceptance (packaged and unpackaged)
  - Year-round operation
  - Reliable processing system to produce Category A Compost
  - No plastics (or compostable plastics) from residential collection 👍 👍
  - Odour management
  - Processing expandability
  - 20,000 Wet Tons/yr (**including amendment**) [~15,000 without amendment]

Facility Placement

Considerations:

- The 3C Rule Convenience, Cost & Colocation → Waste and Recycling Center had land available, Haulers already travelling to location for MRF, Landfill and Hydovac

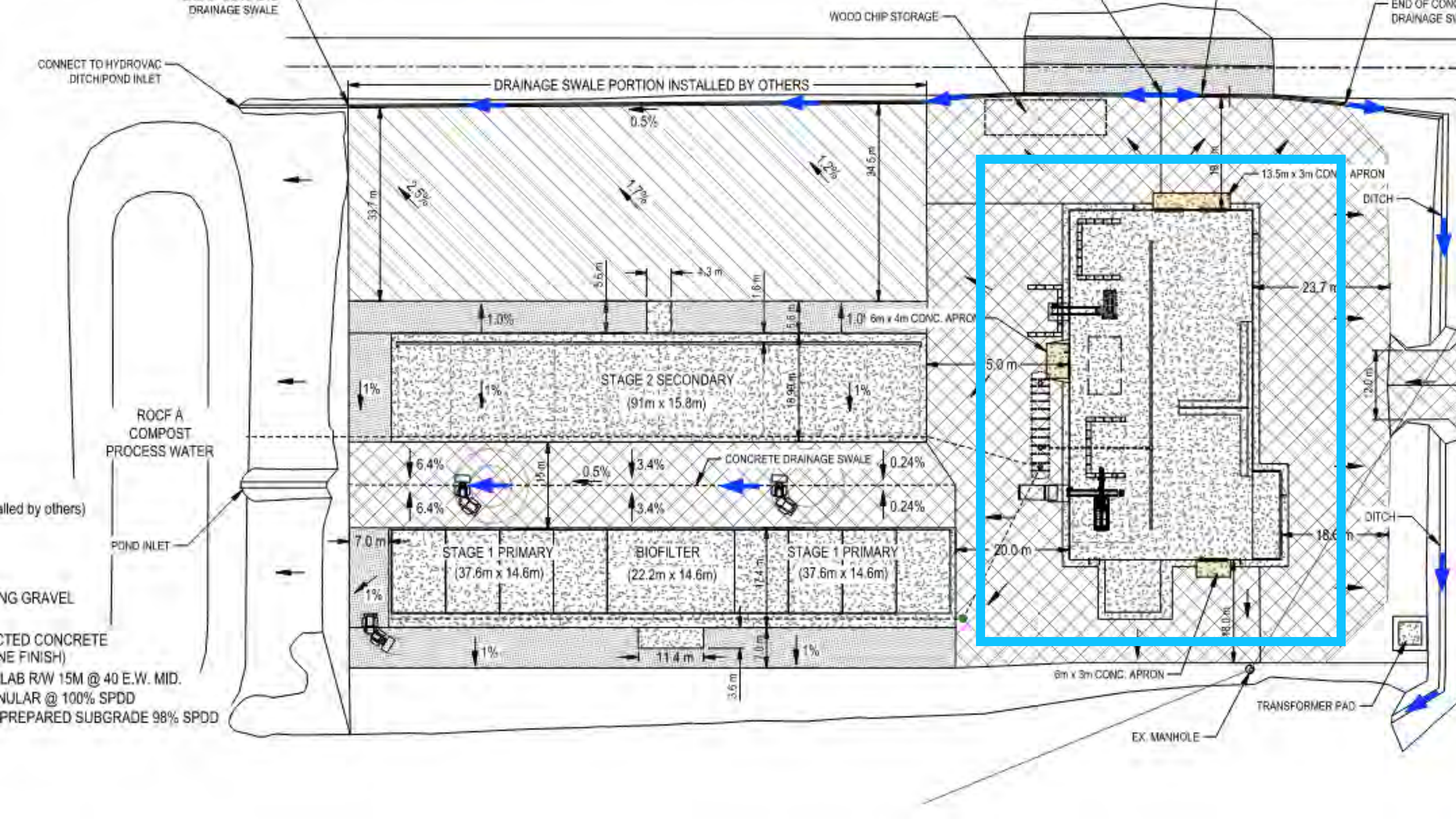
- Neighbors/ Scent Mitigation → Feedlot directly adjacent to property, rural neighbours

Facility Process

Preprocess and Processing

Processing Equipment

- **Contractor Operator Equipment**
  - 2 x John Deere 624p Loaders 👍
  - 1x John Deere 244l Loader 👍
  - Komptech Nemus Screener 👊
- **City of Lethbridge Equipment**
  - Komptech Crambo 3400 Shredder 👍
  - Lucknow 445 Horizontal Mixer (rebuild***) 👎👎
  - Tiger Depackager 👊
  - ECS System 👍


DRAINAGE SWALE
CONNECT TO HYDROVAC DITCH/POND INLET
DRAINAGE SWALE PORTION INSTALLED BY OTHERS
WOOD CHIP STORAGE
END OF CONC. DRAINAGE SW
0.5%
2.5%
1.7%
1.2%
33.7 m
34.5 m
5.5 m
4.3 m
1.6 m
1.0%
5.6 m
1.0%
6m x 4m CONC. APRON
STAGE 2 SECONDARY
(91m x 15.8m)
18.95 m
1%
1%
1%
6.4%
6.4%
1.5 m
0.5%
3.4%
3.4%
CONCRETE DRAINAGE SWALE
0.24%
0.24%
7.0 m
STAGE 1 PRIMARY
(37.6m x 14.6m)
BIOFILTER
(22.2m x 14.6m)
17.4 m
STAGE 1 PRIMARY
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1%
1%
11.4 m
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ROCF A
COMPOST
PROCESS WATER
POND INLET
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PREPARED SUBGRADE 98% SPDD
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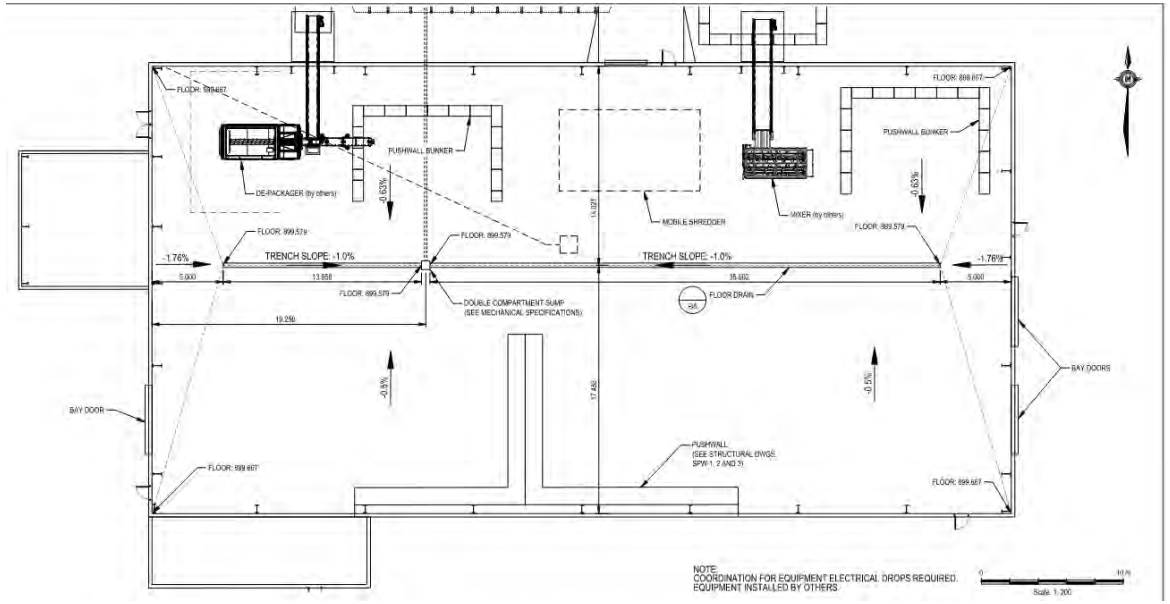
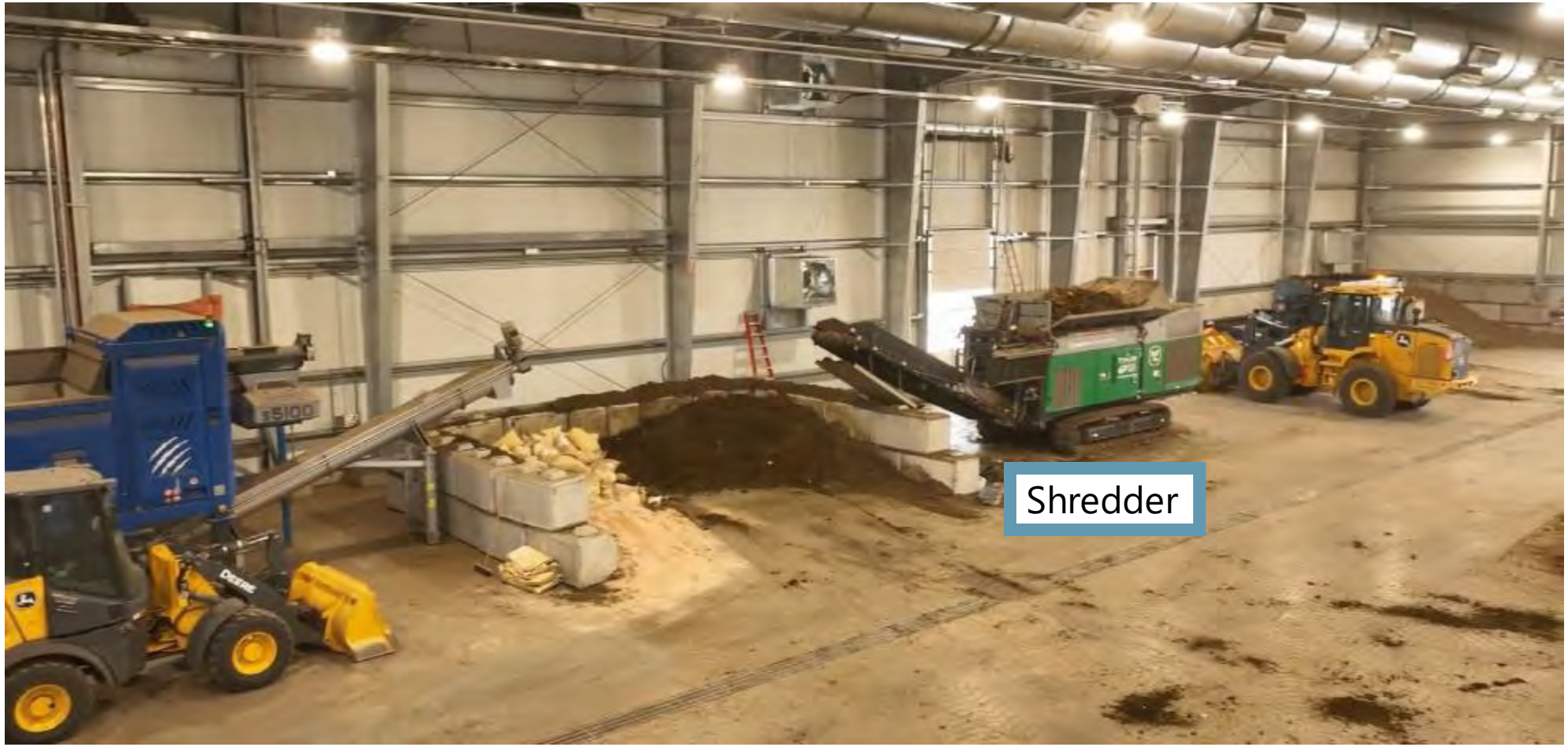
6m x 3m CONC. APRON
TRANSFORMER PAD
EX. MANHOLE

Pre-Processing

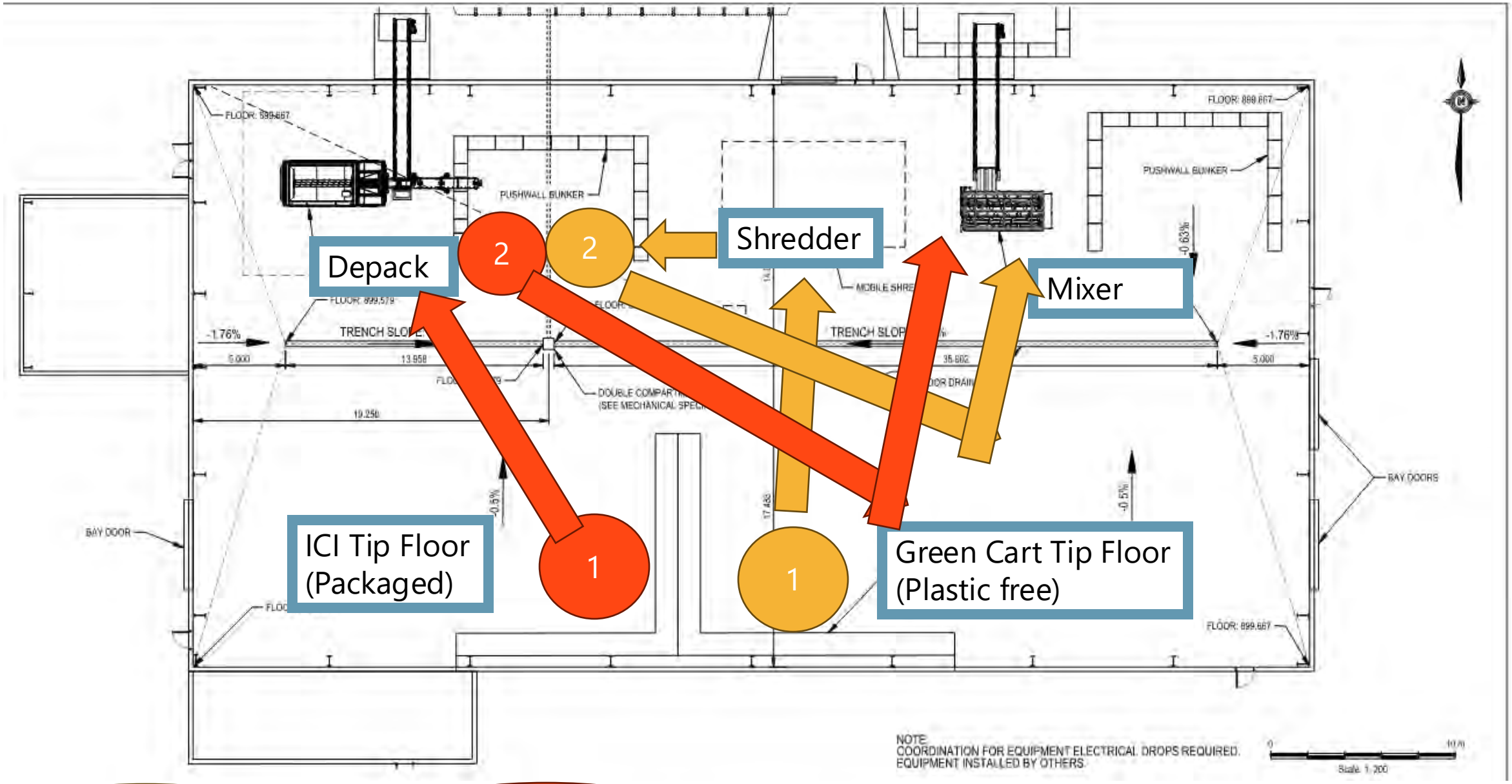
- Heated building
- Highly ventilated
- Shredder, mixer, and de-packager for pre-processing




TIGER DEPACK HS 55 UNIT
Depack


Shredder


Mixer



Residential Waste

ICI/Packaged Waste

Material Flow 👊

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Material Flow 👊

- Focus on Material flow and operation, in our case the shredder and depackager could have been designed to discharge directly into the mixer with conveyors by location the mixer in the middle.

Ventilation Considerations 👍

- All fuel-burning equipment inside increases ventilation requirements, for heated building this is a large operation cost. Our next shredder will be electric so we can lower costs.
- Gas detection for CO2, NOX and Methane was installed from start. Added H2S and Ammonia. 👊

Dust Control 👎

- Provide dust systems for dry feedstocks such as wood chips. We added in spray bars during commissioning.

Concrete 👊

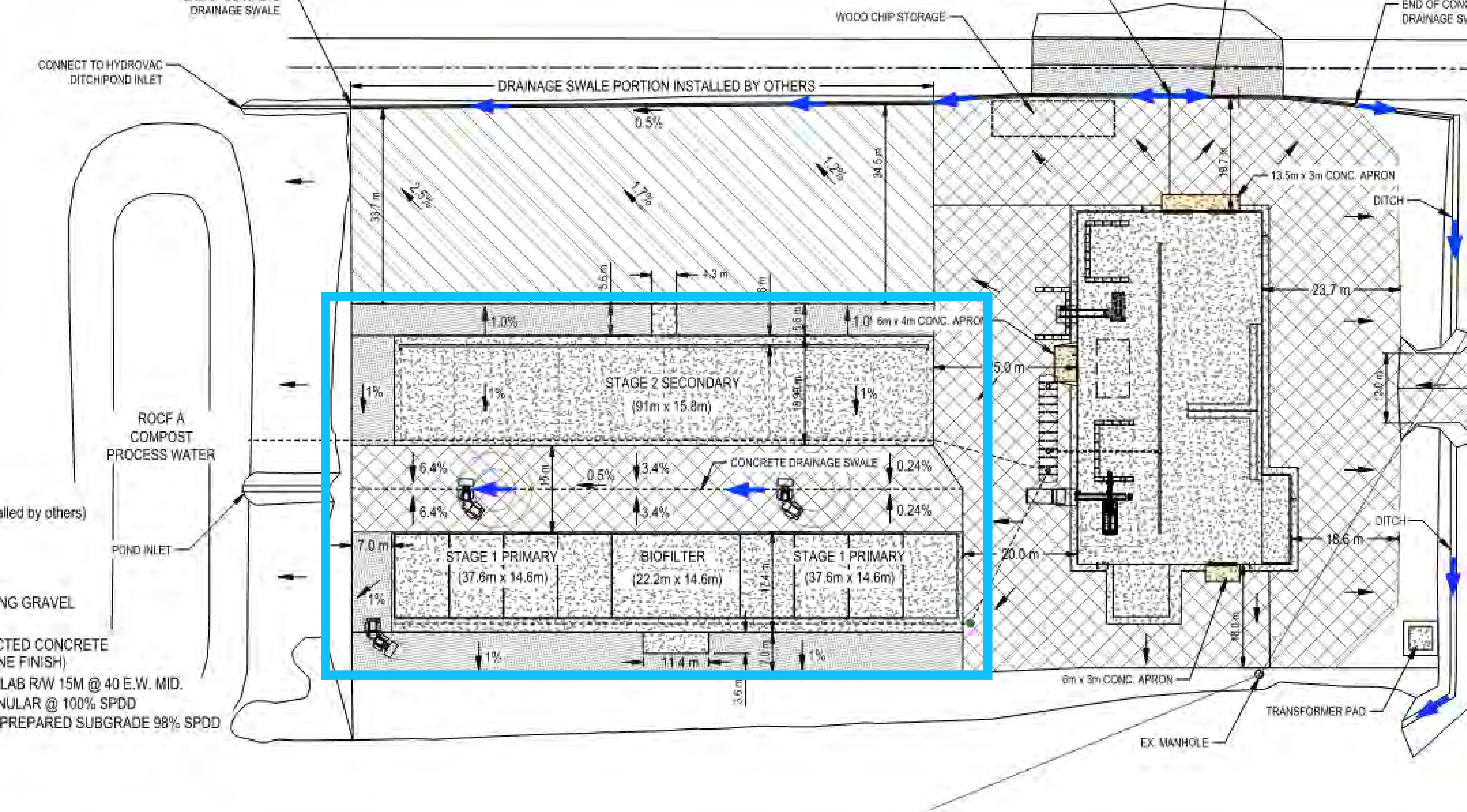
- The mix design had acid and base resilience and a liquid densifier applied. Has not performed well in high use areas. Would look into even higher exposure classes and Hard-Cem or similar products.

Showers

- No showers provided. Cut due to budget, would prioritize them more in hindsight.

Processing (Exterior) 👍👍

- ECS static bed aeration system was chosen due to low operation cost, performance, and our tonnage goals with feedstock.
- Low operation cost comes from the ability to operate outside with no additional energy inputs other than blower fans. No compost freezes to date!
- Gore was considered but, this system was more robust and offered an easier operation
- ECS support has been excellent



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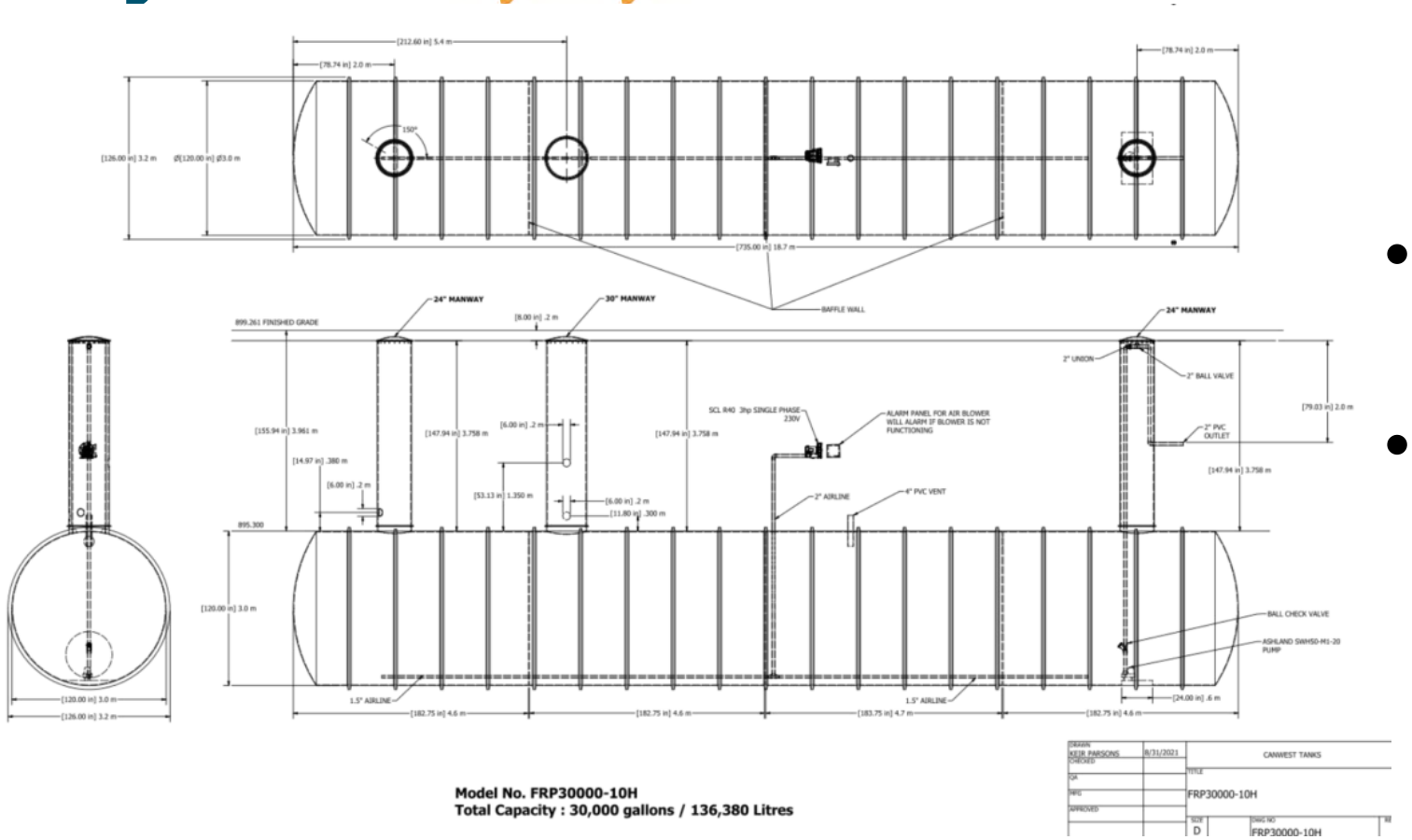
Leachate Collection and Pumping System 👎👎



- Leachate tank with built-in pump
- Built-in aeration blower System

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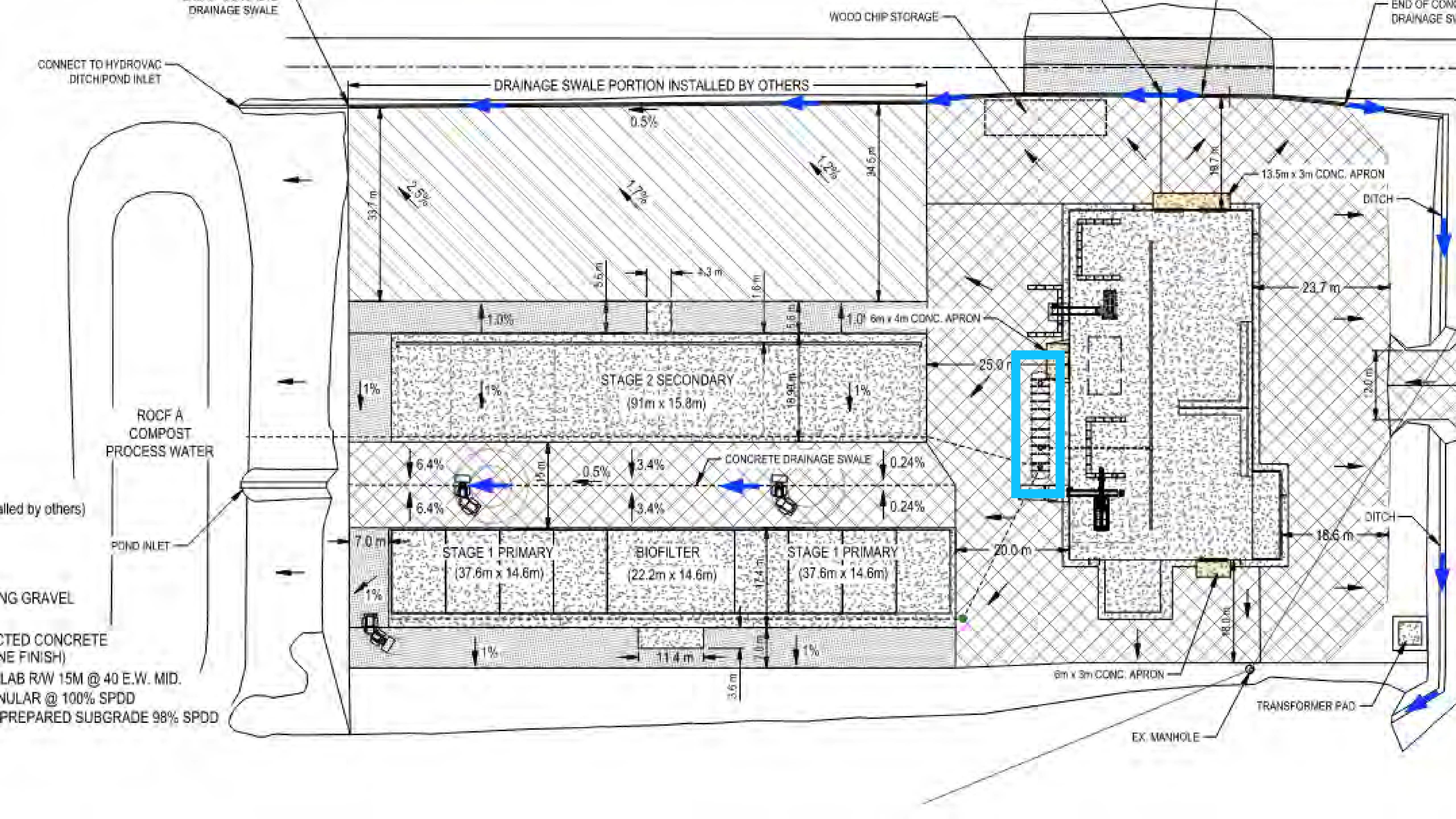
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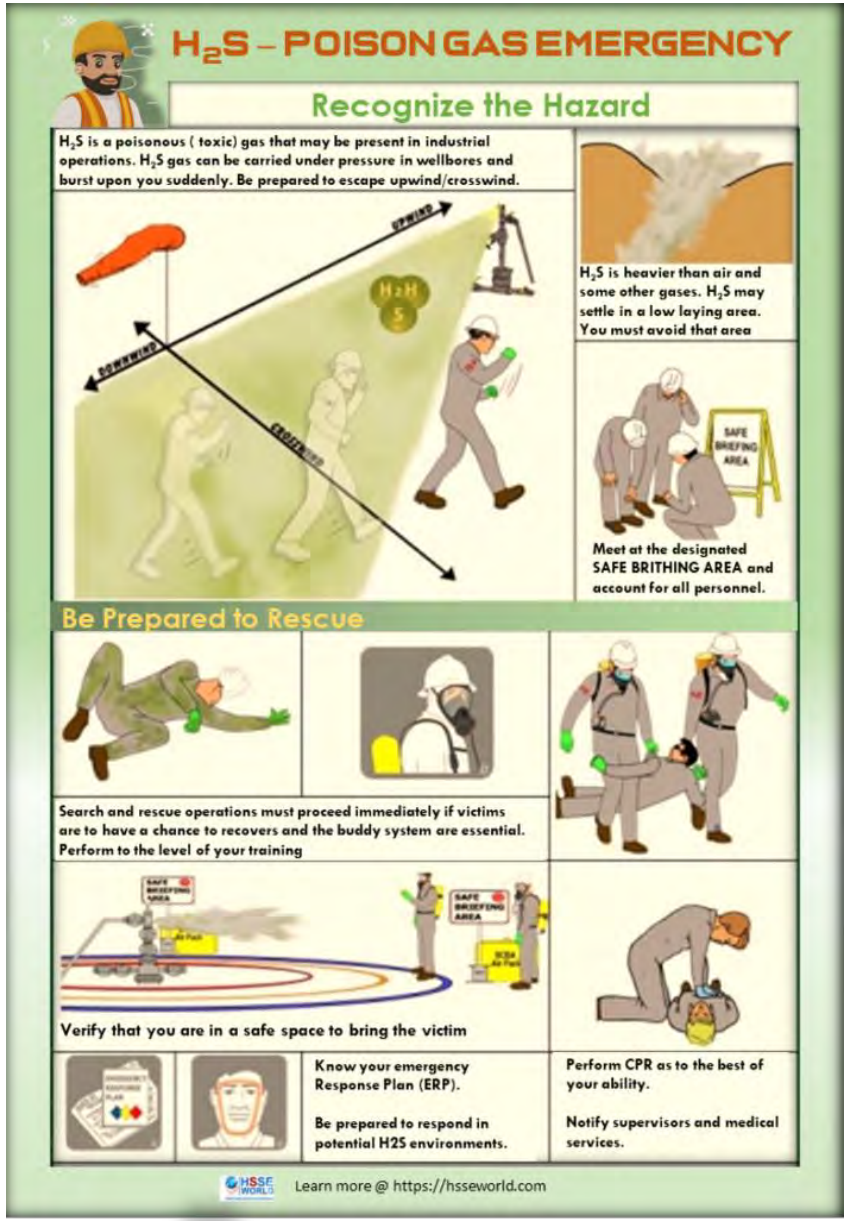
H2S Near Miss

- During a warranty walkthrough we turned on the leachate aeration blower and proceeded to complete a walkthrough.
- ~10 mins later we received H2S high-level alerts on our gas personal monitors.
- Evacuated and deactivated blower system as suspected the leachate tank was the source.



H2S Investigation

- **Source: We had turned the tank into an anaerobic digestor by not cycling water out of it and not operating the blower system 24/7.**

- **ISSUE #1**: We failed to communicate to operations that the aeration blower was required to operate 24/7.
- **ISSUE #2**: The pump was undersized by the supplier.
- **ISSUE #3**: Electrical systems were not considered to be in a hazardous zone.
- **ISSUE #4:** No plumbing trap present on interior drainage.
- **ISSUE #5**: The main vent for the leachate tank was bellied and blocked with water.

Remediation

- 5000ppm+ of H2S was present in the tank.
- Pumped out the tank with a hydro-vac truck with H2S scrubber.
- Contractor performed a confined space entry and cleaning.
- Major event on-site with rescue team available.

Fixes

- Aeration blower now runs 24/7 and we are installing a backup blower, a trap installed, an upgraded hazardous rated pump is being installed, venting has been fixed and fixed gas monitors have been installed in the building.

Leachate Recommendations for Others

- Open pond/pit leachate storage capable of easier cleaning would be highly preferred.
- Pumps to be located outside the pond.
- Commission and operate aeration blower 24/7.
- Gas detection is a must.

Operations to Date 👍👍

- **Batched over 30,000 mt (197 bunkers)**
- **Finished product is Category A (CCME)**
- **Produced ~13,000mt of finished compost (balance is overs)**
- **No bunker freezeouts or winter issues**

Questions

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