Hazen

Innovative Dewatering Approaches to Achieve Lowest Life Cycle Costs

NEWEA 2020 Annual Conference

January 27, 2020

Agenda

- Background
- Project Approach
- Design Criteria Development
- Alternatives Evaluation
- Financial Analysis
- Conclusions

Background

Plant Overview

- Permitted Capacity: 23 MGD
- Secondary Treatment with Biological Nitrogen Removal and Chemical P Removal
- Future upgrades include tertiary treatment

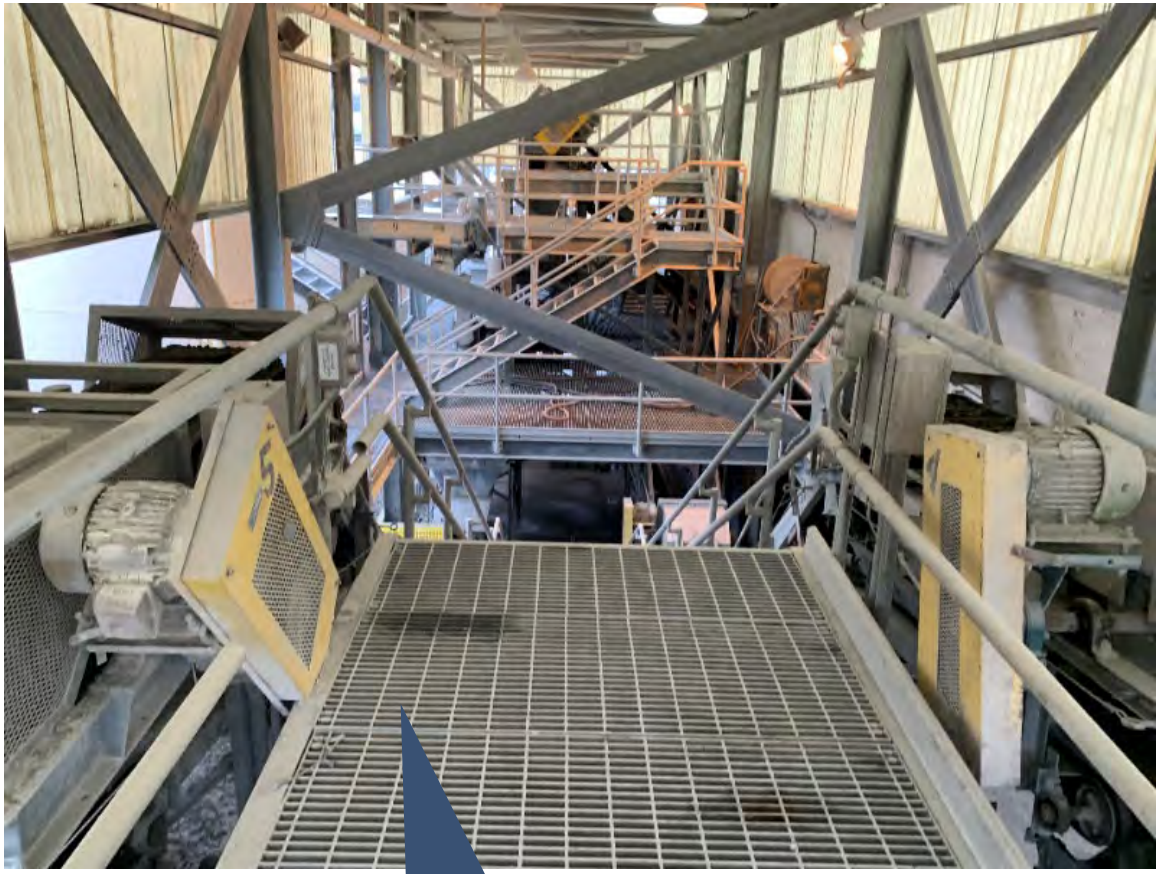
Solids Overview

- Solids Conditioning Building
  - Two GBTs
  - Two BFPs
- One Sludge Storage Tank
- Lime Stabilization (Class B)
- Final Product Storage Area

Project Drivers

- Aging Infrastructure
- Safety Concerns
- Availability of Spare Parts
- Operational Requirements (long run times)
- Limited Redundancy
- Complexity

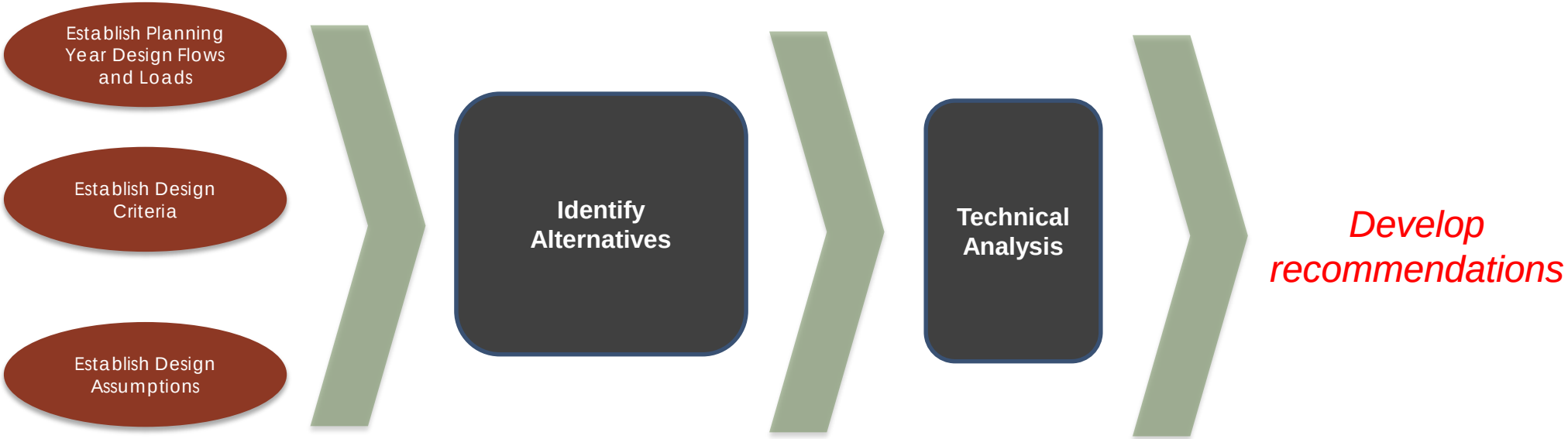
Single conveyor to lime stabilization



Overly complex, limited redundancy

Approach

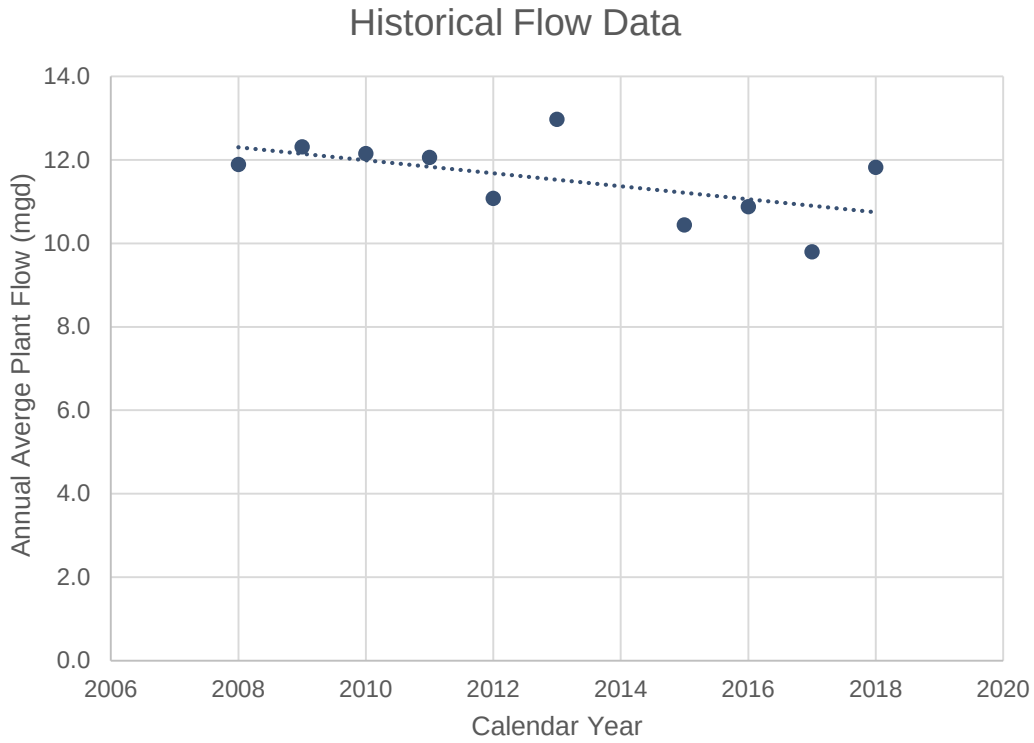
Project Approach



Design Criteria Development

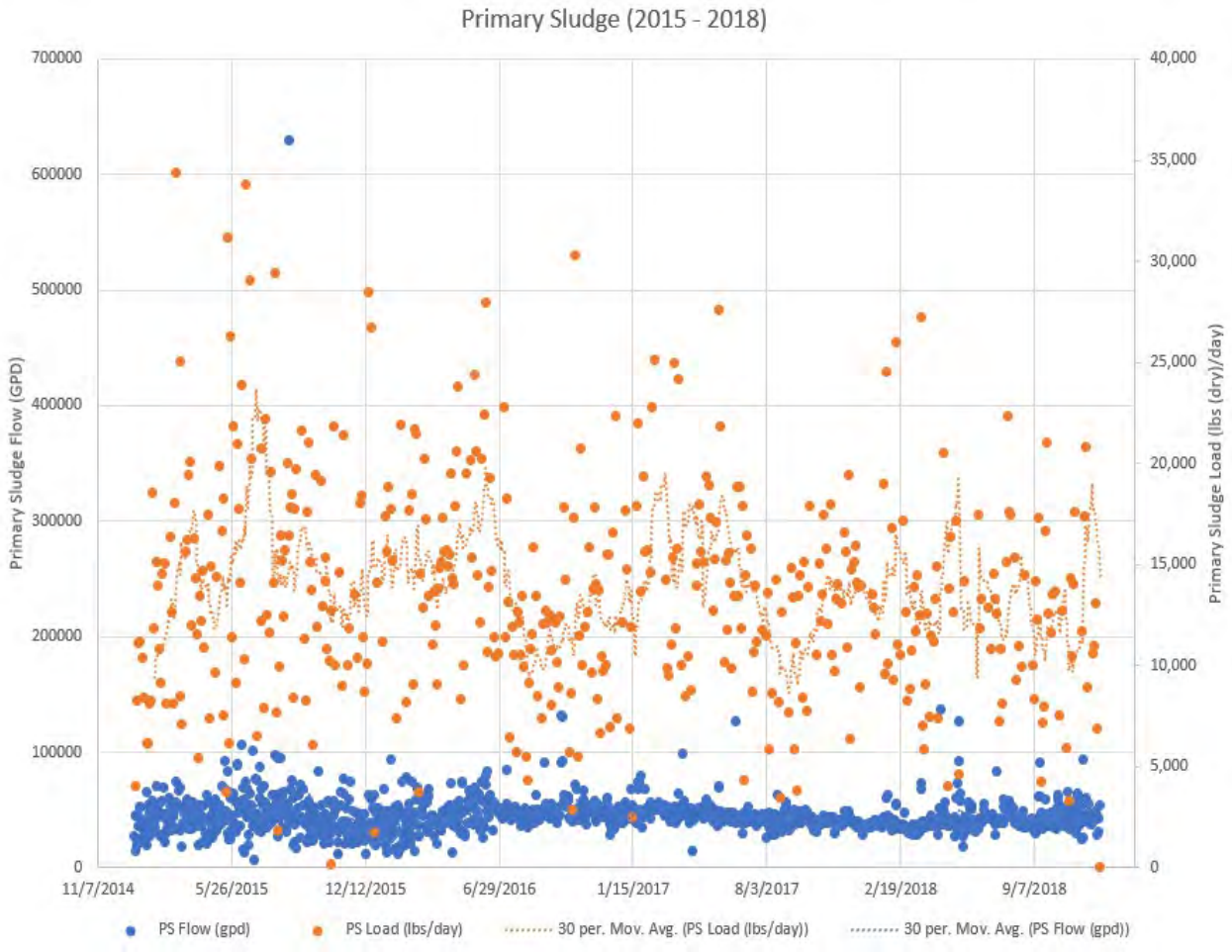
Influent Flow

Year	Flow (mgd)
2015 (AA)	10.4
2016 (AA)	10.9
2017 (AA)	9.8
2018 (AA)	11.8
AA (2015-2018)	10.7
MM (2015-2018)	16.5
MW (2015-2018)	23.3



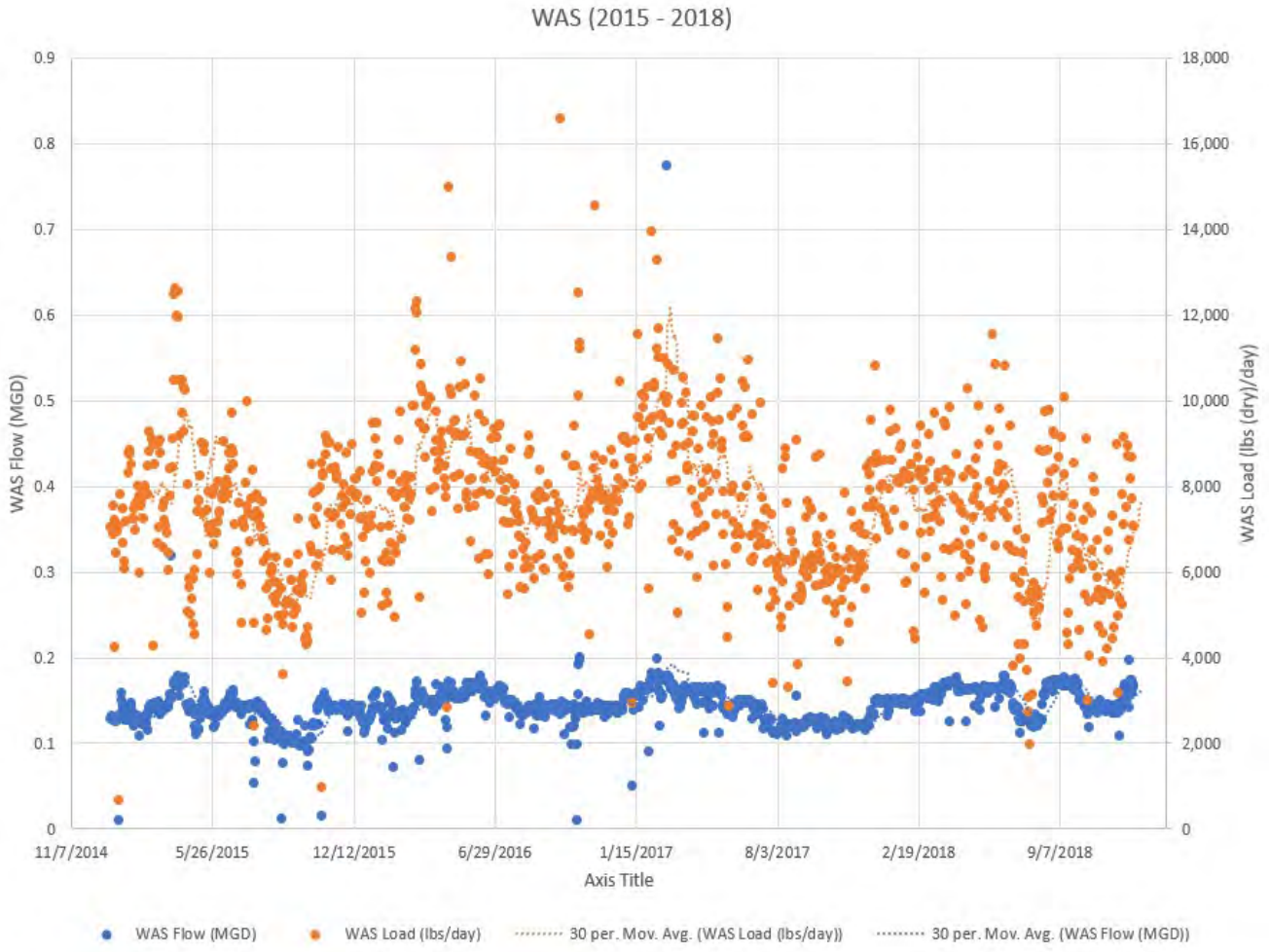
Primary Sludge

Parameter	Annual Average	Max Month	Max Week
Sludge Flow, gpd	45,000	72,500	138,100
Sludge Flow PF	1	1.61	3.07
Solids Load, dry lbs/day	13,900	22,200	51,100
Solids Load PF	1	1.6	3.67
Percent Solids (%) (average)	3.68		



WAS

Parameter	Annual Average	Max Month	Max Week
Sludge Flow, gpd	144,100	192,300	263,400
Sludge Flow PF	1	1.33	1.83
Solids Load, dry lbs/day	7,600	12,200	16,900
Solids Load PF	1	1.61	2.24
Percent Solids (%) (average)	0.63		



Design Criteria

Parameter	Load, lbs/day			Flow, gpd (average)		
	Annual Average	Max Month	Max Week	Annual Average	Max Month	Max Week
Primary Sludge	29,800	47,600	109,400	96,400	155,100	295,700
WAS	16,200	26,100	36,200	308,400	411,700	563,700
Tertiary	4,600	7,400	14,600	55,100	88,400	174,500
TOTAL	50,600	81,100	160,200	459,900	655,200	1,033,900

Notes:
Assumed 10% increase in total sludge from implementation of tertiary process.
Actual PS and WAS PFs used to estimate load during future MM and MW operating conditions.

Design criteria developed from historical data with consideration given to permitted capacity as it relates to operating hours.

Alternatives Evaluation

Alternative Development

Thickening and Dewatering

- Alt 1: New Building with Thickening and Dewatering
- Alt 2: New Building (direct dewatering)
- Alt 3: Existing Building (direct dewatering)
- Alt 4: Replace in kind

Lime Stabilization

- Provide redundancy
- Reduce complexity
- Eliminate site trucking


Alt 1 and 2: New Building Location
Alt 3 and 4: Ex. Building Alternatives
Lime Stabilization
Truck Path To Storage
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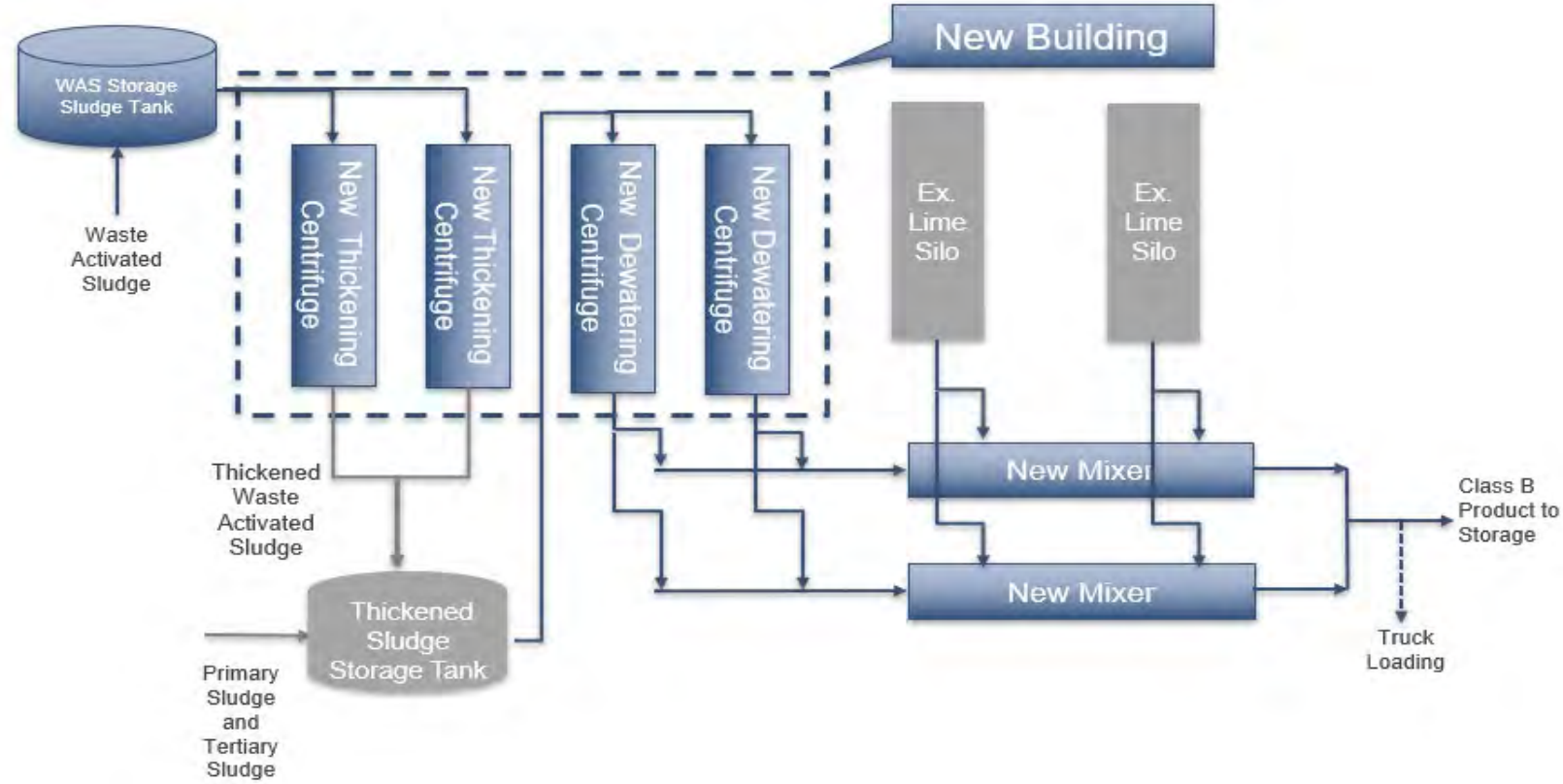
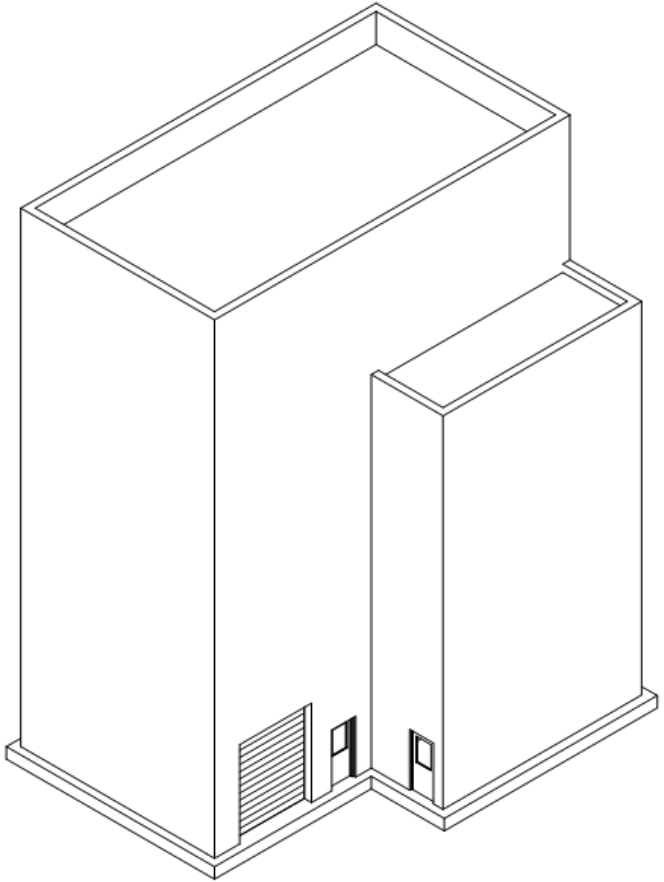
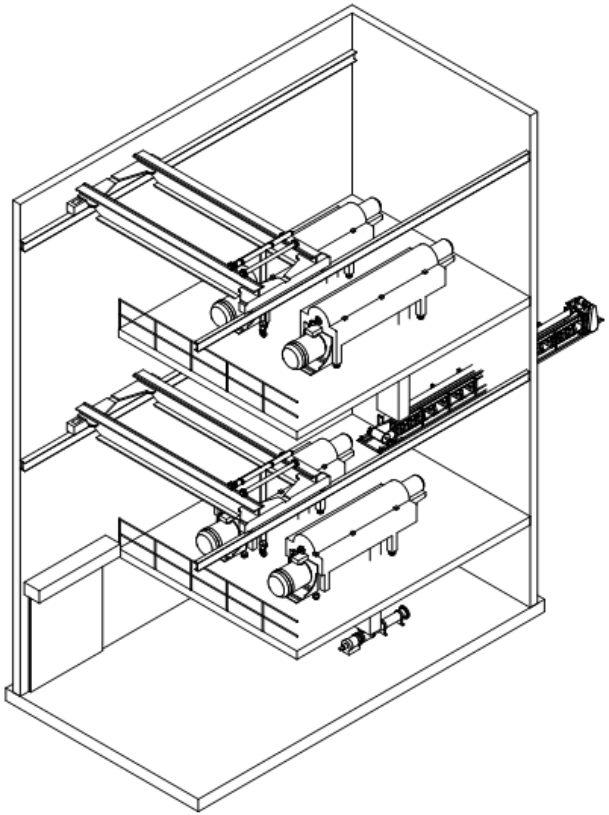
Alt 1: New Building with Thickening and Dewatering





ISOMETRIC



ISOMETRIC SECTION

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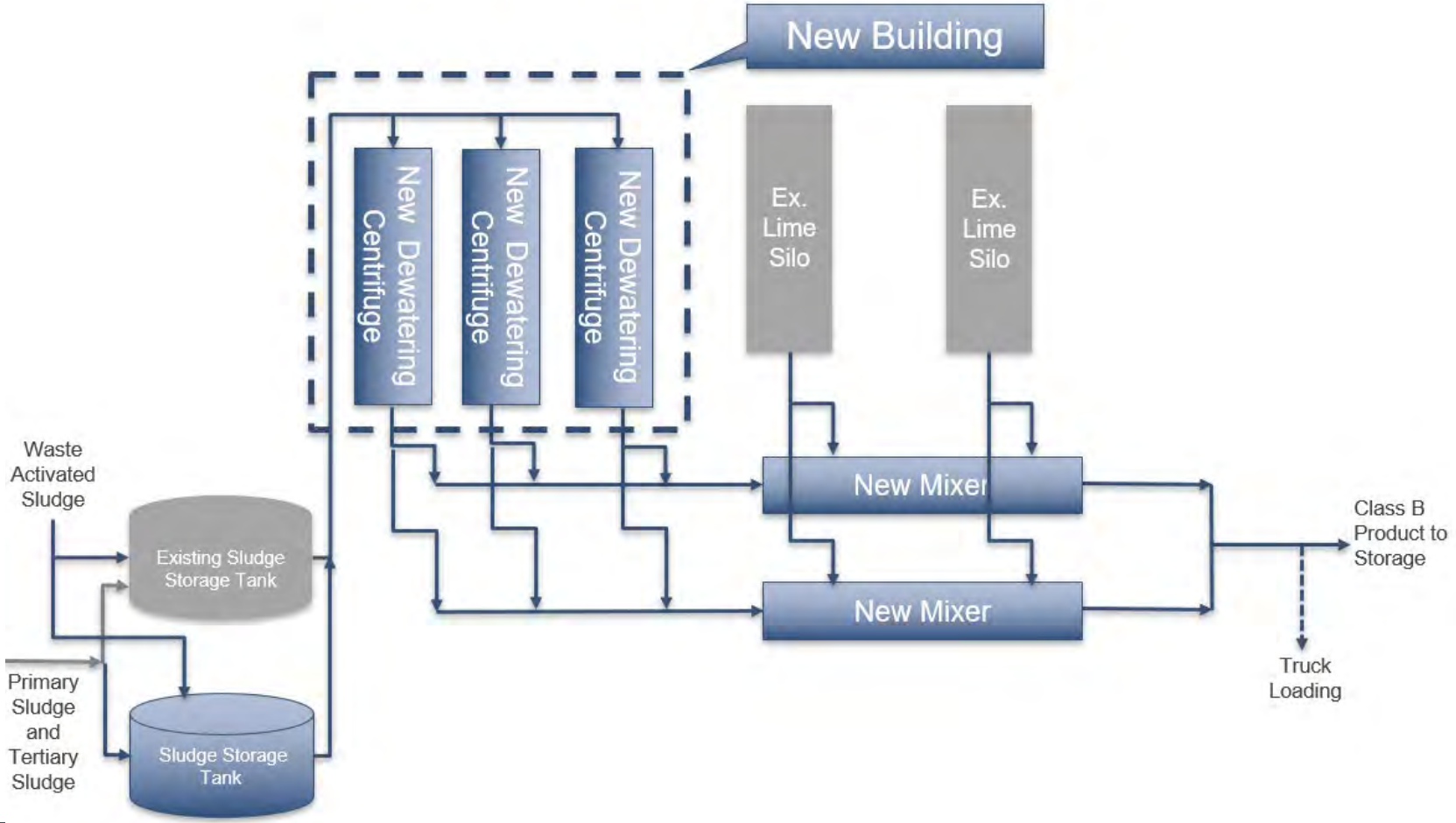
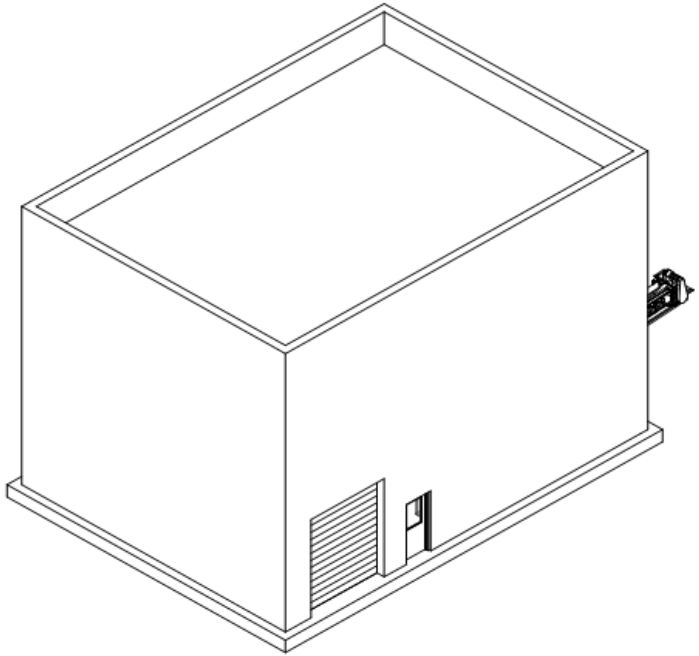
1555 ROSENEATH ROAD
RICHMOND, VA, 23230

SOUTH CENTRAL WASTEWATER AUTHORITY
SOLIDS HANDLING PROJECT CONCEPT EVALUATION

ALTERNATIVE 1
ISOMETRIC

Alt 2: New Building (direct dewatering)





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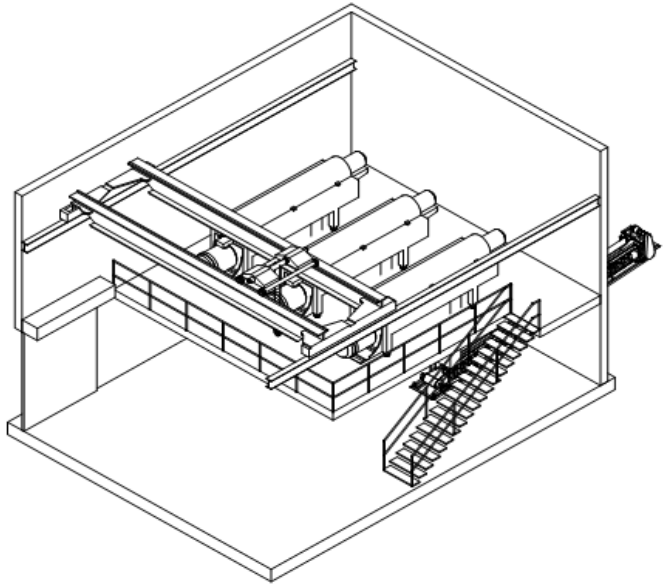

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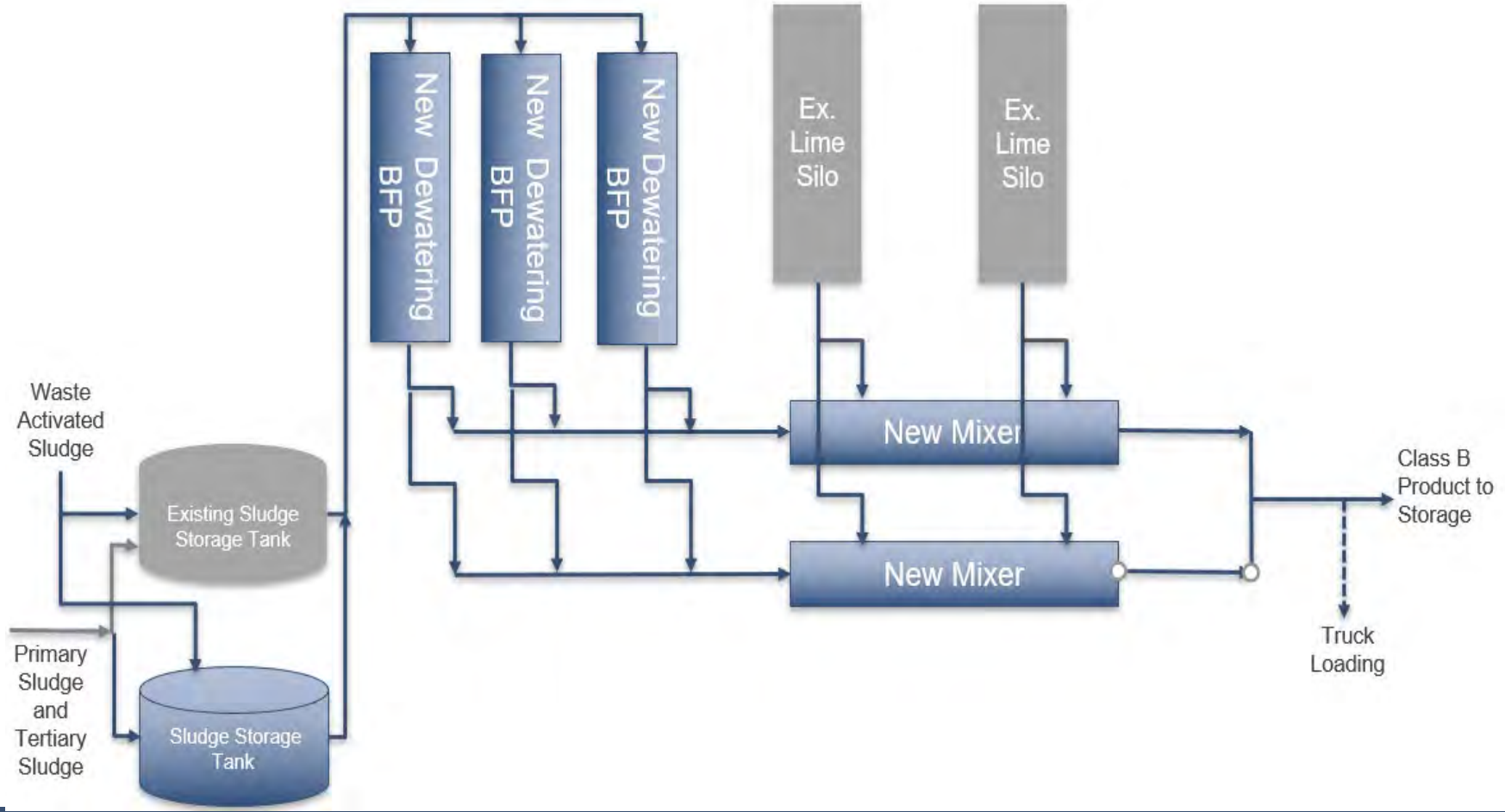
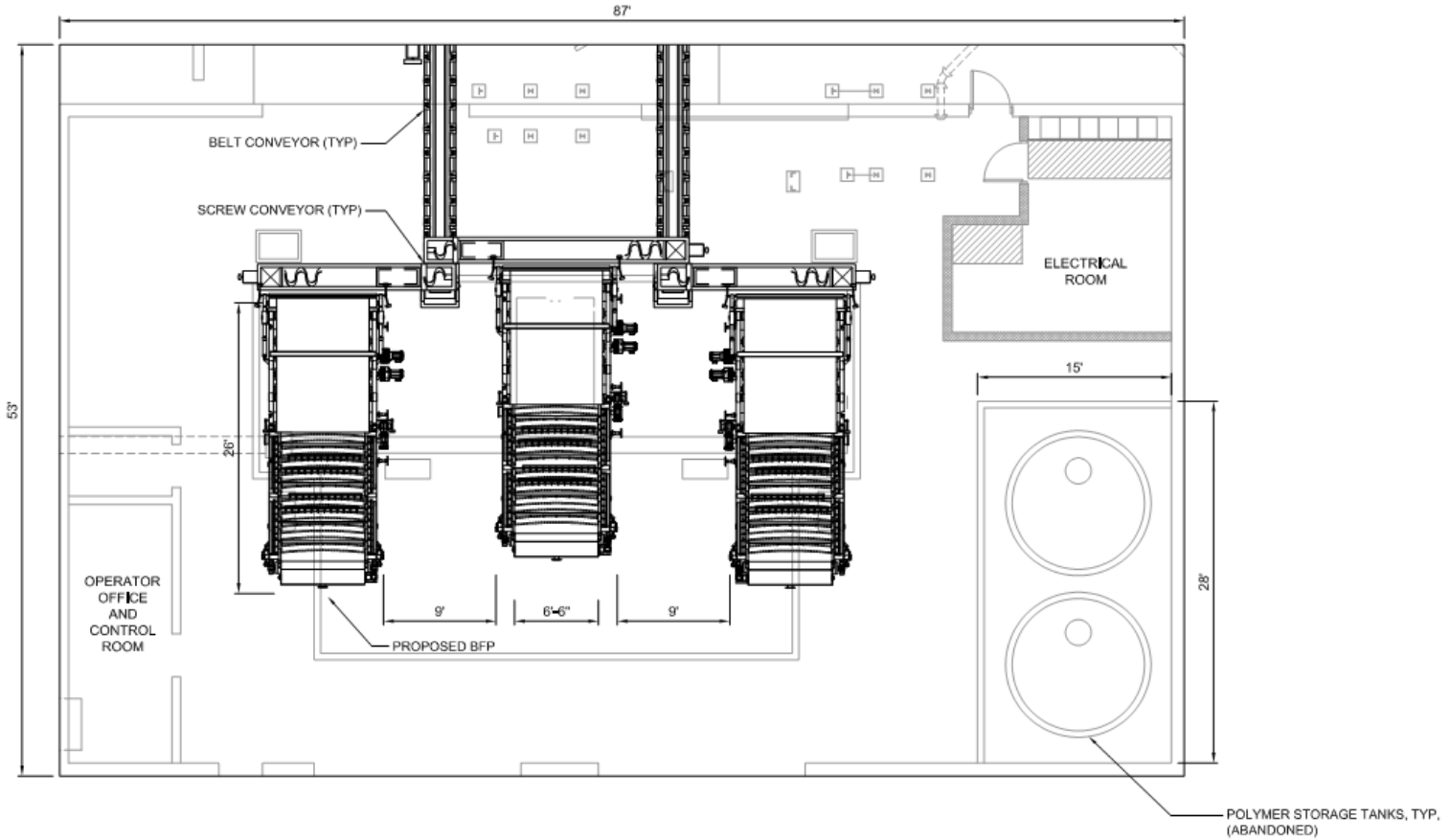
ALTERNATIVE 2
ISOMETRIC

Alt 3: Existing Building (direct dewatering)





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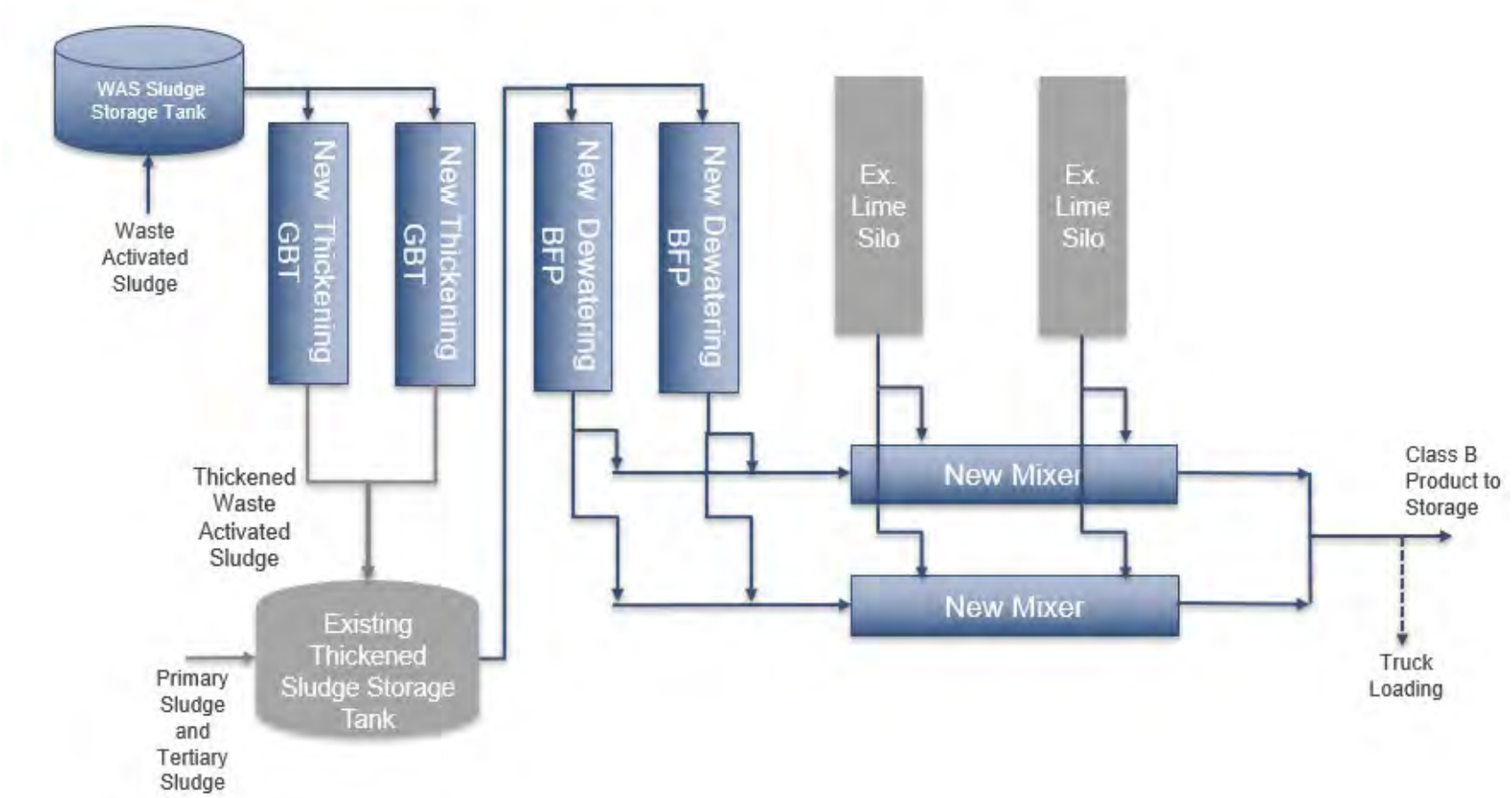
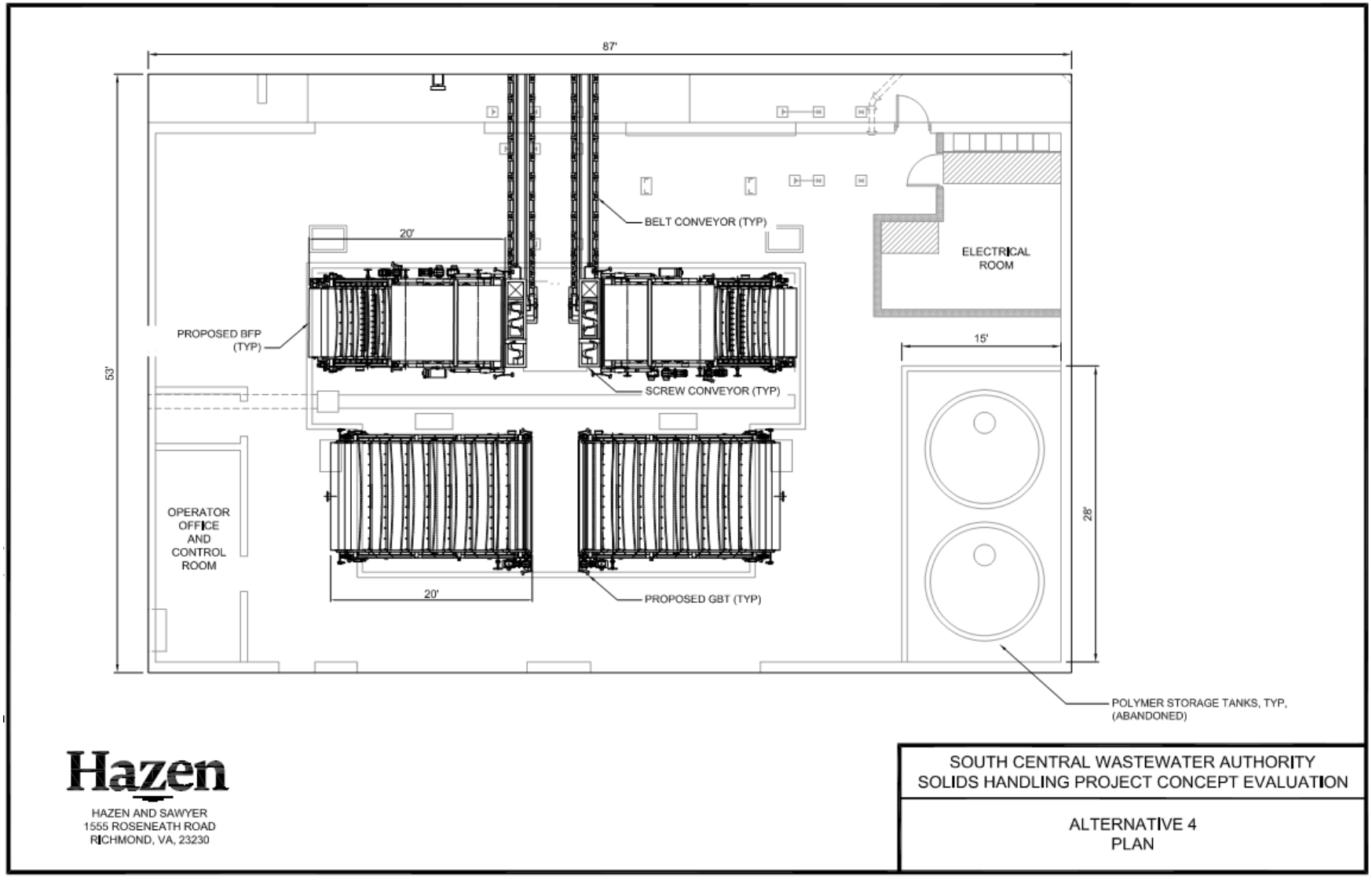
ALTERNATIVE 3
PLAN

Alt 4: Replace in kind





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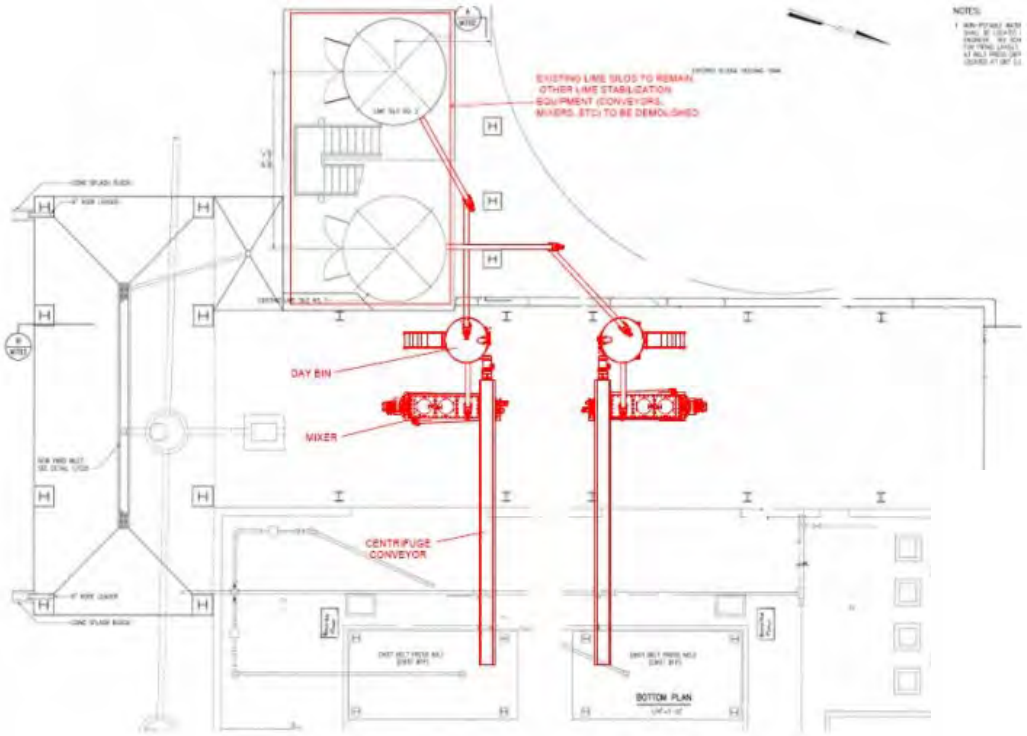
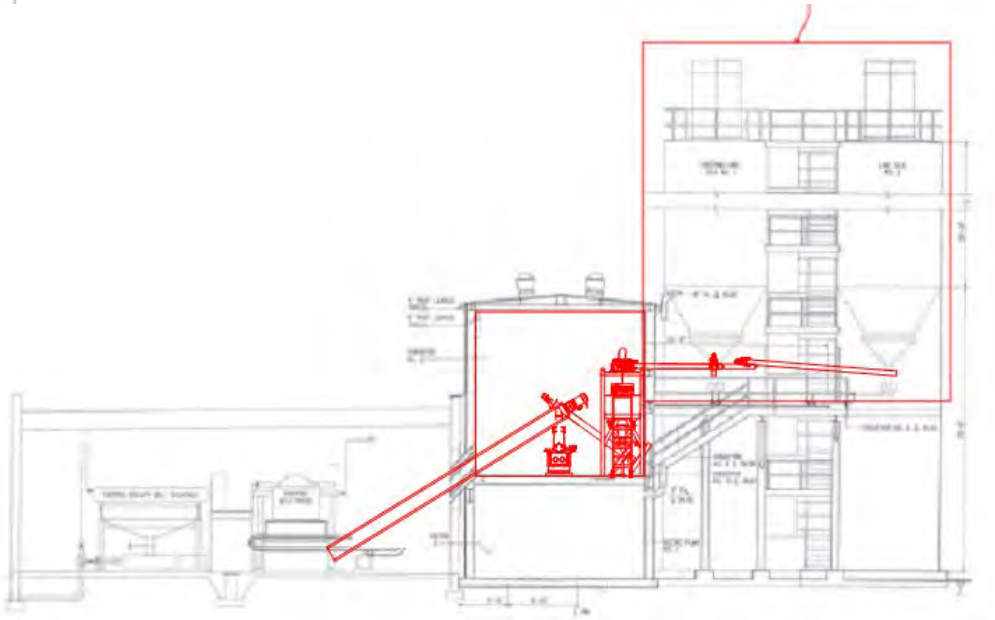
SOLIDS HANDLING PROJECT CONCEPT EVALUATION

ALTERNATIVE 4
PLAN

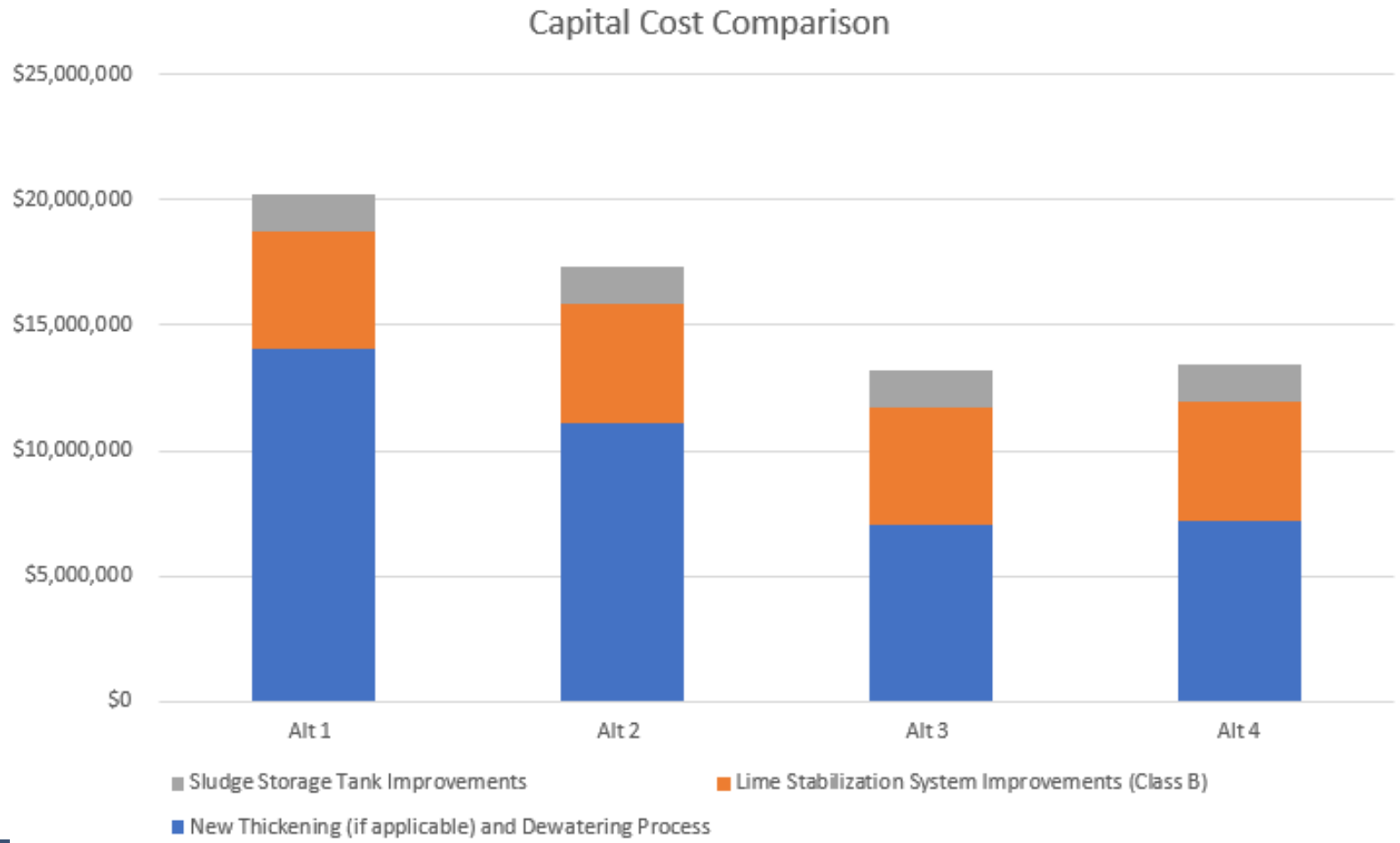
Lime Stabilization Improvements



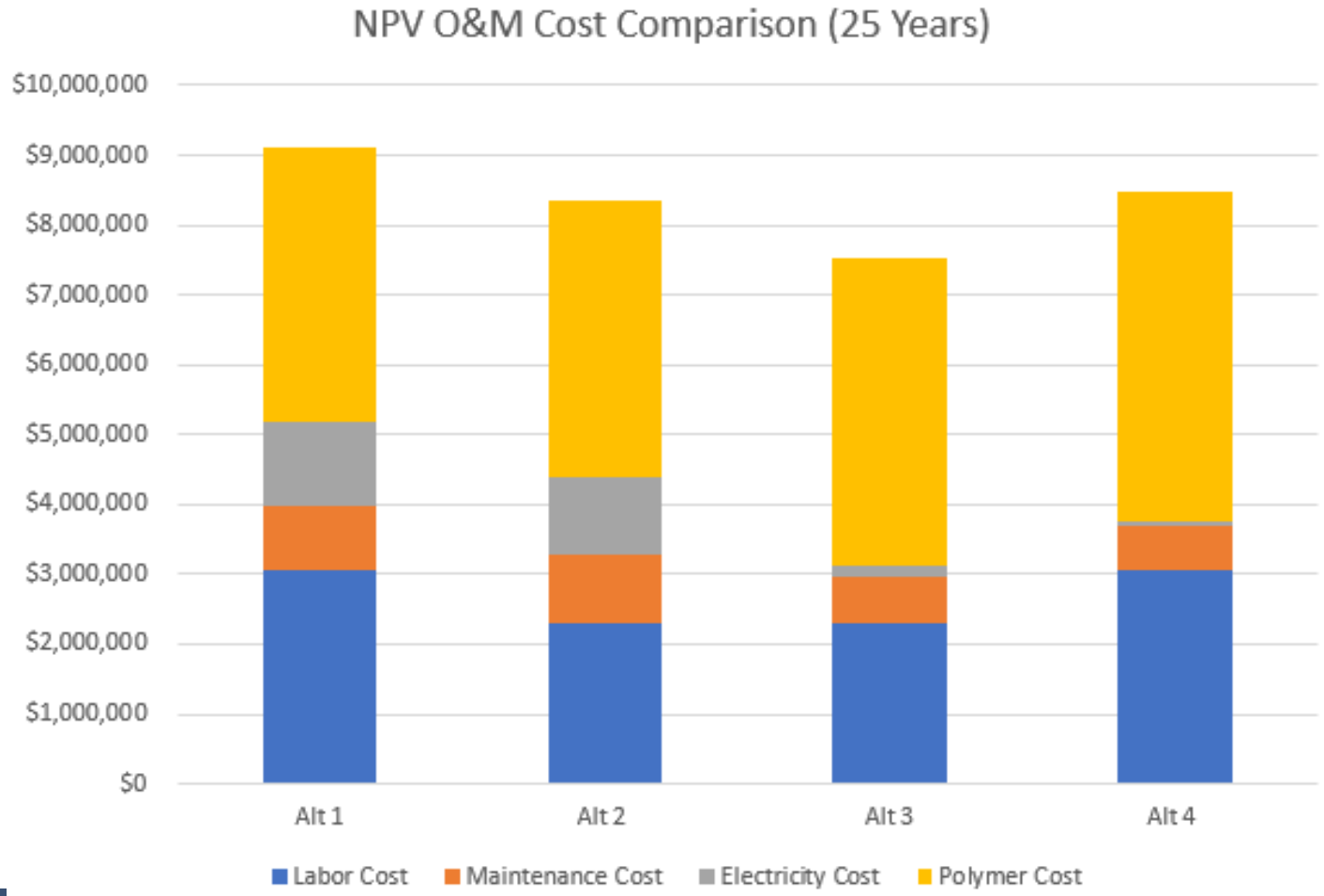


Financial Analysis

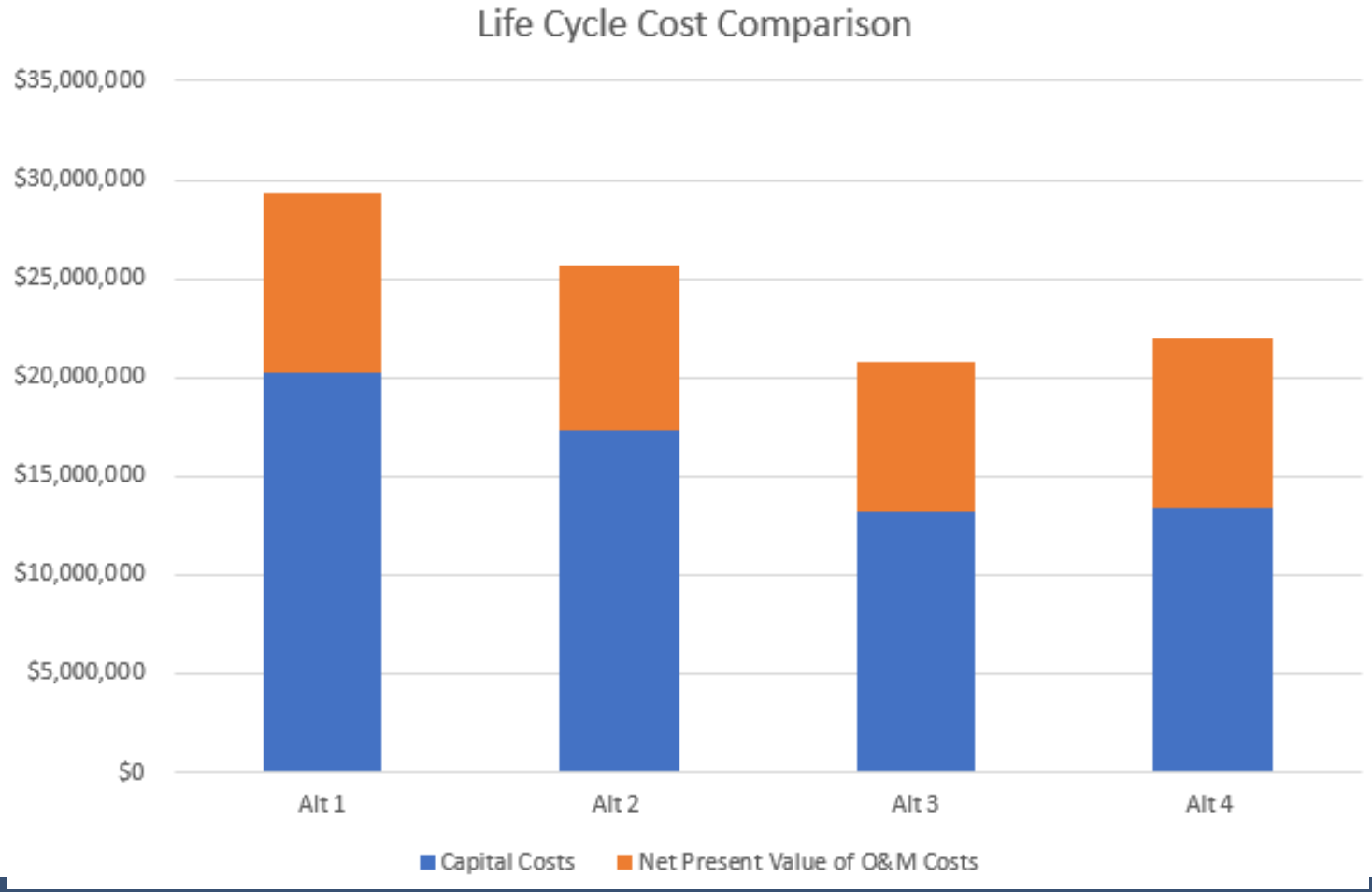
Capital Cost Summary



O&M Cost Comparison



Life Cycle Cost Comparison



Conclusions

Conclusions

- Development of 4 alternatives
  - **Alternative 1 and 2 require new building**
  - **Alternative 3 and 4 utilize the existing building**
- Identification of cost savings and additional operational flexibility through direct dewatering and utilization of existing infrastructure
- Lime stabilization improvements provide redundancy and reduce complexity

Questions?

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