TEXAS STATE
INGRAM SCHOOL OF ENGINEERING

C2.04 - Wastewater Management

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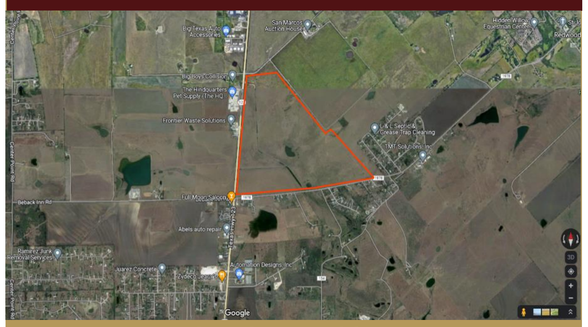
CE 4390 WASTEWATER MANAGEMENT TEAM

Project Overview

Tasked with the WW Mgmt of 2500 Single Family Homes @ Intersection of HWY 123 & FM 1978.

Selection: SBR will be installed on-site

Site Location

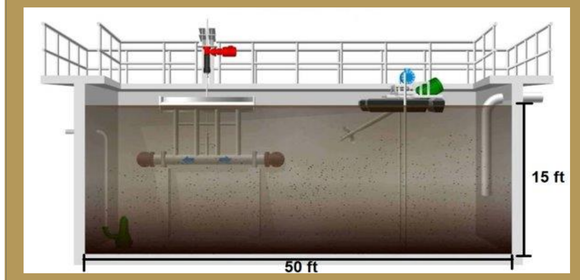


- Area experiencing rapid pop. growth
- Flat topography
- Too far of distance from SMWWTP

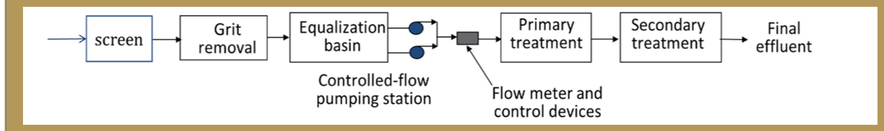
Design Considerations

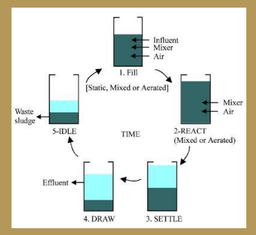
- Capacity, Effluent disposal, Carbon Footprint
- Sustainability: High efficiency, low cost, and low power/energy
- SBR capacity/capabilities, variable flow

Sequencing Batch Reactor Design

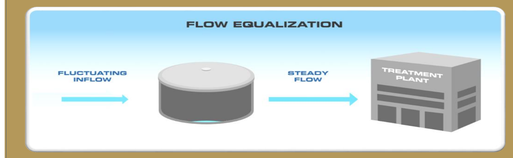


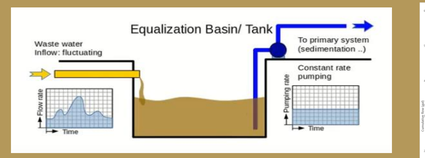
- 2 Tanks
- Roughly 0.5 MGD Influent
- Cycle Length = 4 hours
- Max Capacity = 34,500 ft^3

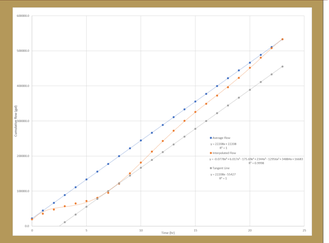




Equalization Basin



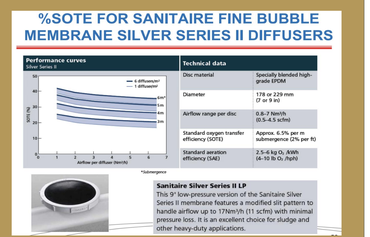




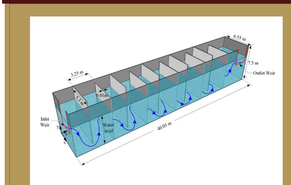
Selection: Square basin with 40’ length and 15’ depth to meet volume requirement of 166,468.49 gal or 22,255.15 ft^3

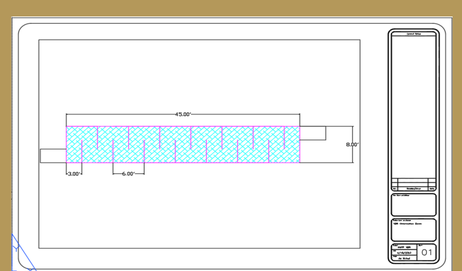
Aeration

Selection: One compressor per tank, two total each capable of 150 HP. 120 fine bubble diffusers necessary per tank; 240 total diffusers needed.



Disinfection and Dechlorination





Selection:
Chlorine Disinfection
Feed Rate = 41.7 lbs/day
Serpentine Contact Basin
W 8', L 45', D 4'
Sulfur Dioxide Dechlorination
1:1 Dechlorination Ratio

Group Pictures

Left to Right: Wade Watson, Jack Butcher, Barrett Guinn, Caden Pugh

Cost Evaluation

Factors	Unit Cost	No. of Units	Cost
Land	$40,000	35 acres	$1,400,000
SBR Construction	$5000000/MGD	0.5 MGD	$2,500,000
Administration/Maintenance Facilities	$100/sq. ft.	15,000 sq. ft.	$1,500,000
Roadways	$900,000/mile	1.5 miles	$1,350,000
Total			$6,750,000

Factors	Cost ($/year)	Total Cost over 100-year period
Operation/Personnel	$252,000	$25,200,000
Maintenance	$71,100	$7,110,000
Material	$119,000	$11,900,000
Chemical	$24,900	$2,490,000
Energy	$228,500	$11,500,000
Total		$58,200,000

Selling our Reclaimed Water

- Reclaimed water price per 1,000 gallons in San Marcos
  - October 2020 --> $1.81
  - October 2021 --> $1.90
  - Our estimate is that we will sell for $2

Acknowledgement

Andreana B. Salas
Dr. Sangchul Hwang
SMWWTP