5.0 MGD Expansion to Serve Capstone Wastewater Treatment Plant

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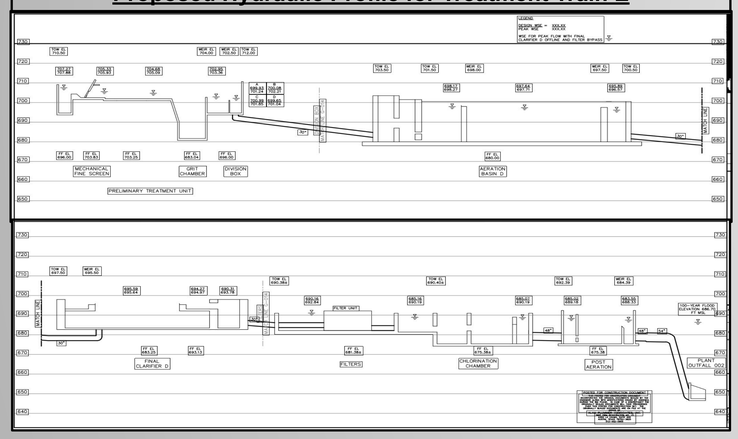
Introduction

BIT Engineering has been working alongside Plummer on the expansion of a wastewater treatment plant in Schertz, Texas. This plant is currently undergoing construction to expand to a 10.0 MGD plant, and is in the design process of an additional 5.0 MGD expansion to become a 15.0 MGD plant in the next five years. The reason for this needed expansion is due to the increase in the population of the surrounding cities.

In addition to the population growth, the plant outfall location will undergo a study done by the Texas Commission on Environmental Quality (TCEQ) that could result in stricter limitations on the effluent quality from the plant. Nitrogen and Phosphorous concentrations are the two major concerns that have been addressed in this expansion design.

Proposed Hydraulic Profile for Treatment Train E



Final Solution

The proposed solution for this project is split up into the increased capacity of the plant and the improved effluent. To increase the capacity to 15 MGD, BIT Engineering is recommending to increase the aeration capacity. Currently - as shown in the liquids process diagram - the plant is split up into treatment trains A-D. The increased aeration capacity would be added as a train E of treatment, copying that of train D.

To improve the effluent quality, BIT Engineering is proposing the addition of an anaerobic basin before the aeration basins in trains D and E. The anaerobic basin will promote the growth of microorganisms that feed off of and remove the phosphorus in the effluent. BIT Engineering is also proposing the addition of primary filters upstream of the anaerobic basin. These filters will increase the ability of the aerobic basins to treat more effluent and thus increase the capacity of effluent being treated.

Design Objectives & Deliverables

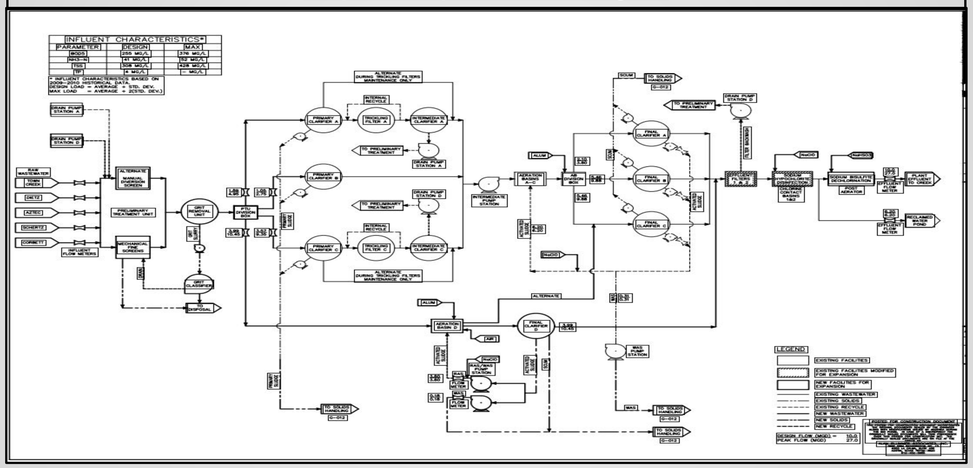
Design Objectives:

- Expand plant design capacity to 15.0 Million Gallons per Day
- Improve effluent quality to within the limits set in the TPDES permit

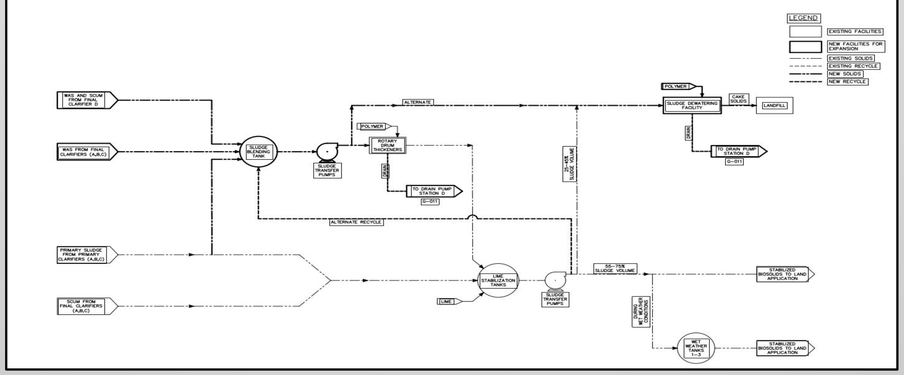
Deliverables:

- Final Report
- Proposed Site Plan
- Liquids Process Diagram
- Solids Process Diagram
- Hydraulic Profile

Proposed Liquid Process Diagram



Proposed Solids Processing Diagram



Economics

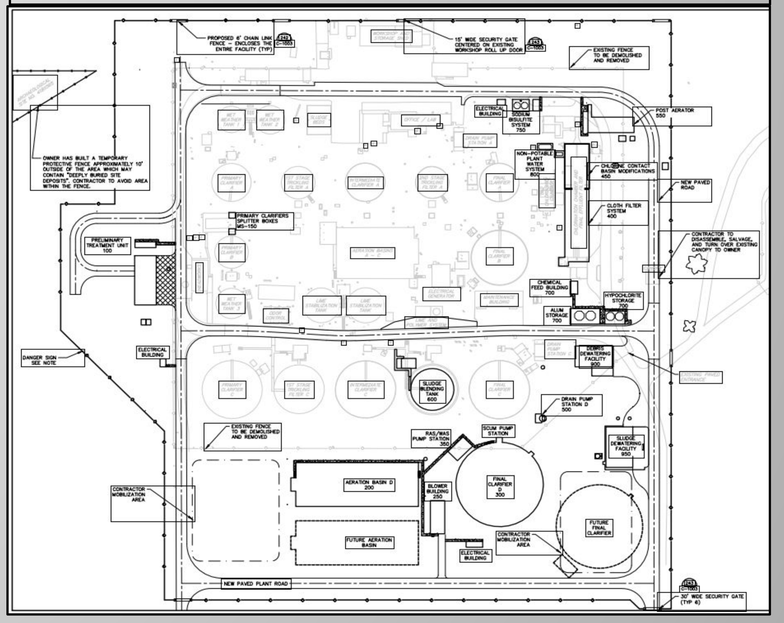
The design economics of this project is split up into three main parts, Construction Cost, Operating Cost, and Profit. The Construction Cost consists of excavation, concrete, and machinery that is built into the plant. The operating Cost consists of the labor, and electrical power needed to keep the plant running. The profit is how they can use their reclaimed water to get extra money for repairs on the plant agriculturally.

Design Alternatives

Increasing Plant Capacity	Primary / Intermediate Clarification with TF	Increased Aeration Volume w/o Primary Clarification / TF	Sequencing Batch Reactor
Cost	3	5	2
Category Weighting Value	1.5	1.5	1.5
Size/Footprint	2	3	4
Category Weighting Value	1	1	1
Maintenance	2	3	1
Category Weighting Value	1.25	1.25	1.25
Integratablilty	3	4	1
Category Weighting Value	1.5	1.5	1.5
Weighted Total	13.5	**20.25**	9.75

Improving Effluent Quality	Activated Algae	Increased Post Disinfection Aeration Capacity	Natural UV	Synthetic UV	Anaerobic Basin Upstream of Aeration Basins
Cost	4	3	5	2	4
Category Weighting Value	1.5	1.5	1.5	1.5	1.5
Size/Footprint	1	3	1	5	3
Category Weighting Value	1	1	1	1	1
Maintenance	1	3	5	2	3
Category Weighting Value	1.25	1.25	1.25	1.25	1.25
Treatment Time	3	4	3	5	4
Category Weighting Value	1.25	1.25	1.25	1.25	1.25
Effectiveness of Treatment	5	3	1	1	4
Category Weighting Value	1.5	1.5	1.5	1.5	1.5
Total	14	16	15	15	18
Weighted Total	19.5	20.75	20	18.25	**23.75**

Proposed Site Plan



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