



Tighe&Bond



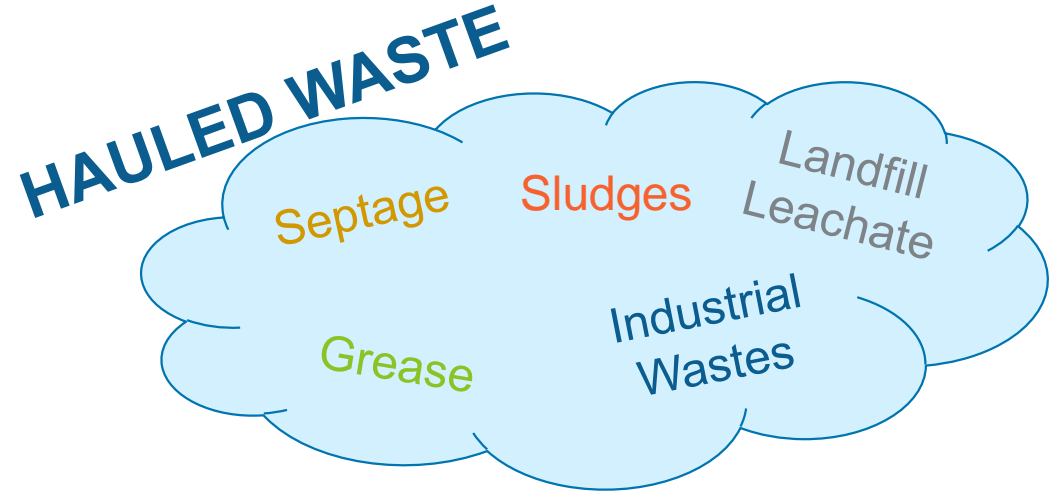
THE MESSY ECONOMICS OF SEPTAGE TREATMENT

Case Studies Examining the True Cost of Treating Hauled Waste & Best Management Practices

Austin Weidner, PE

HAULED WASTE BASICS

- **High & variable strength organic waste**
- **May have adverse impacts on POTWs and environment**
- **Typical methods of Handling & Treatment**
 - Holding Tank
 - Addition to Liquid Stream
 - Addition to Solids Stream
- **Tipping Fees**
 - Economic and Political Implications



Typical Septage Strengths

From TR-16; EPA, 1994

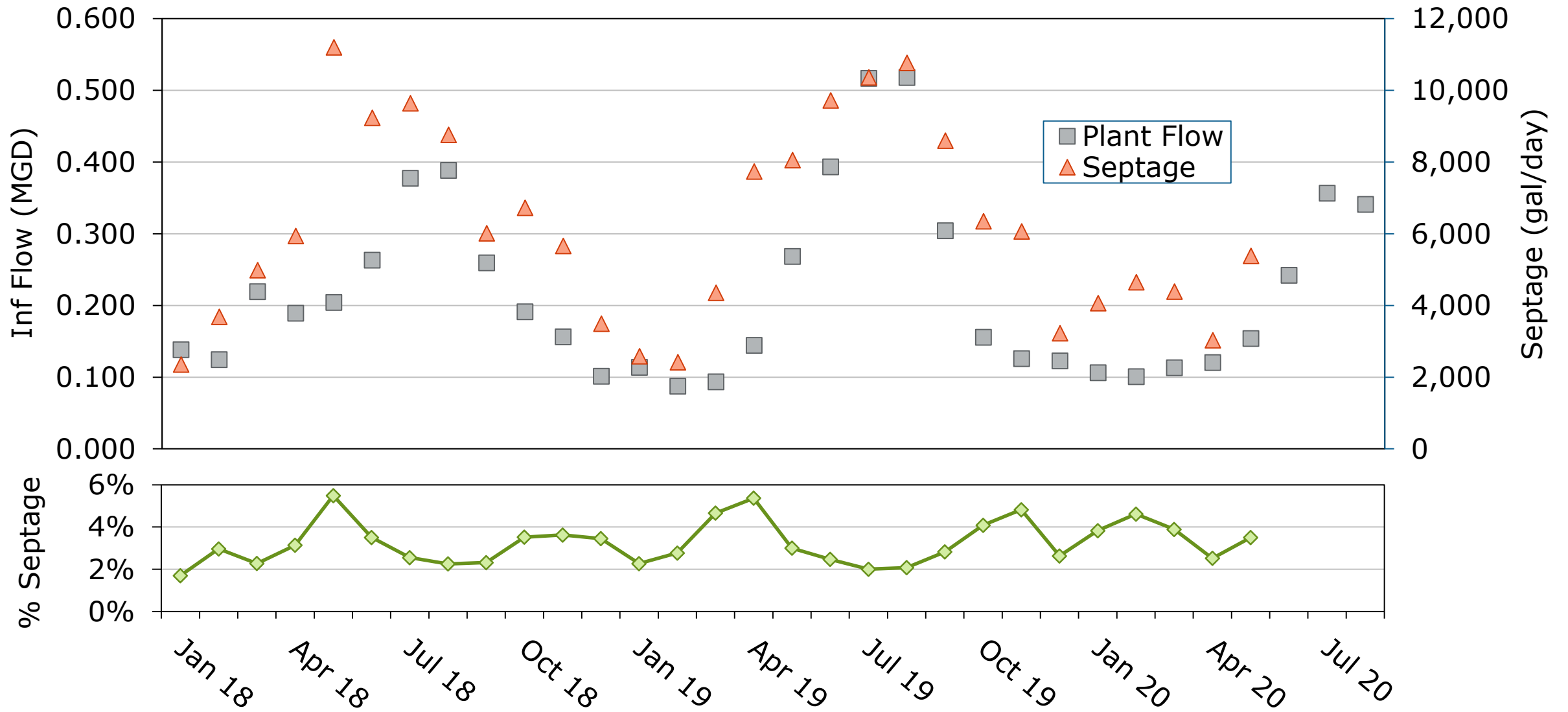
Parameter	Concentration (mg/L)		
	Average	Minimum	Maximum
Total Solids	34,106	1,132	130,475
TSS	12,862	310	93,378
BOD	6,480	440	78,600
COD	31,900	1,500	703,000
TKN	588	66	1,060
TP	210	20	760
pH	--	1.5	12.6

CASE STUDY #1: SMALL CAPE / ISLANDS WWTF

- **Treatment Process**
 - Headworks
 - Primary Clarification
 - Secondary System w/ MLE
 - UV Disinfection
 - Groundwater Discharge
- **Flow**
 - Current ADF = ~0.25 MGD
 - Seasonal Variation
- **Extensive Septage Acceptance Program**



COMPARISON TO INFLUENT FLOW



SEPTAGE EVALUATION

- **Questions**

- How much septage is too much septage?
- What is actual treatment cost?

- **Data**

- Design Loadings
- WWTF Influent Operations Data
- Energy Usage Data
- Sludge Quantity & Hauling Contract
- Labor Hours
- Tipping Fee Structure

- **Assumptions**

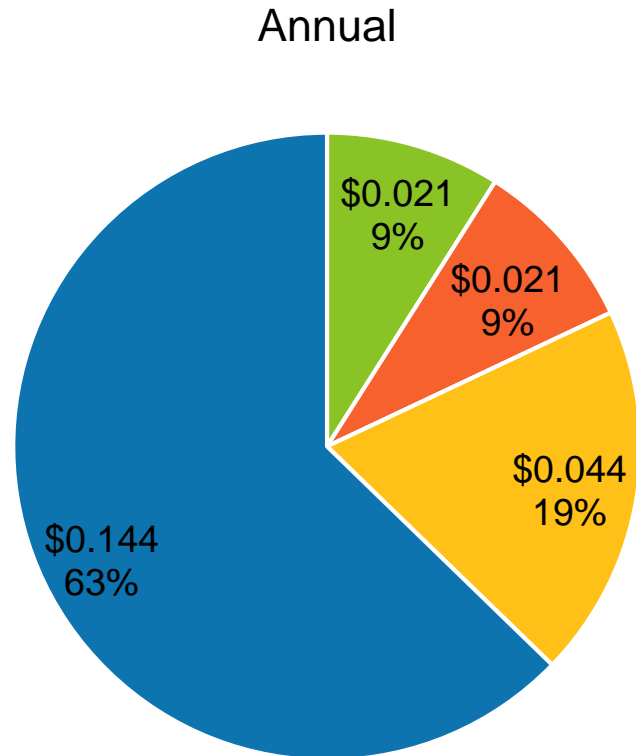
- Septage Strength
- Maintenance Costs



Source	BOD-5	TSS	TKN	pH
	(mg/L)	(mg/L)	(mg/L as N)	(SU)
Supplemental Sampling	1,715	3,660	201	6.7
TR-16 Recommendations	6,000	15,000	700	
Assumed for this Study	3,000	5,000	300	

EVALUATION FINDINGS

- **Net Benefit to the WWTF**



Annual Revenue = \$550,000
Annual Profit = \$350,000

■ Sludge Hauling ■ Energy ■ Labor & Maintenance ■ Net Benefit

RECOMMENDATIONS & STEPS TAKEN

- **There is a Cost to Treat Septage**
- **Reduced Septage Acceptance**
 - Design Loads were being exceeded under certain conditions
 - Limit to <3% of Plant Flow (especially in the spring)
- **Improved WWTF Operability**
 - More consistent MLSS and F:M Ratio
 - Reduction in Scum
 - Less Odors
 - Noticeable Reduction in Sludge



Better Performance!
Less Cost



CASE STUDY # 2: SCITUATE, MA WWTF

- **Treatment Process**

- Headworks
- Extended Aeration
- Denitrification Filters
- Low-level Copper Removal
- UV Disinfection

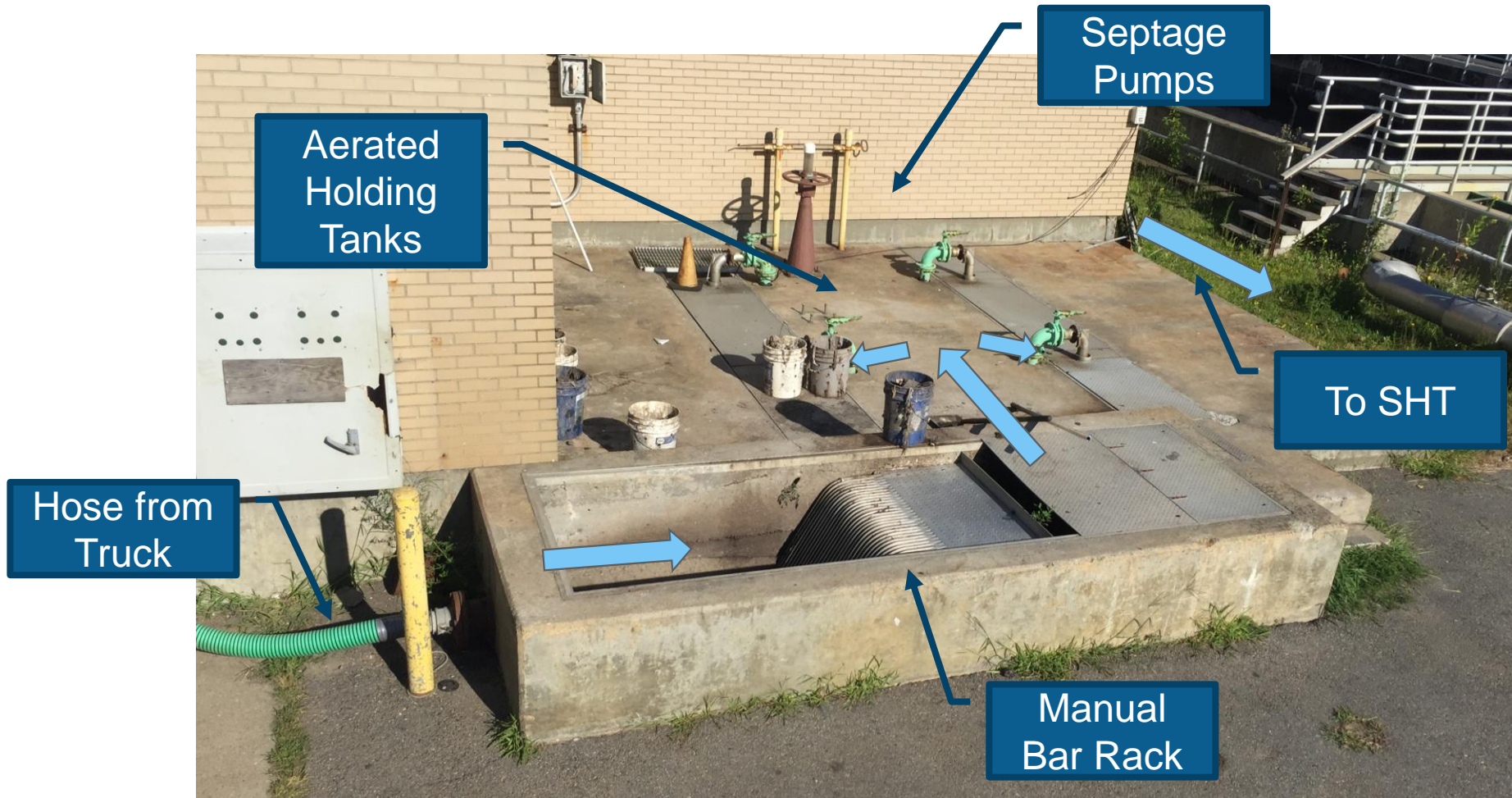
- **Flow**

- Current ADF = ~1.5 MGD
- Mostly Domestic Sewage
- Accept ~11,000 gpd Septage

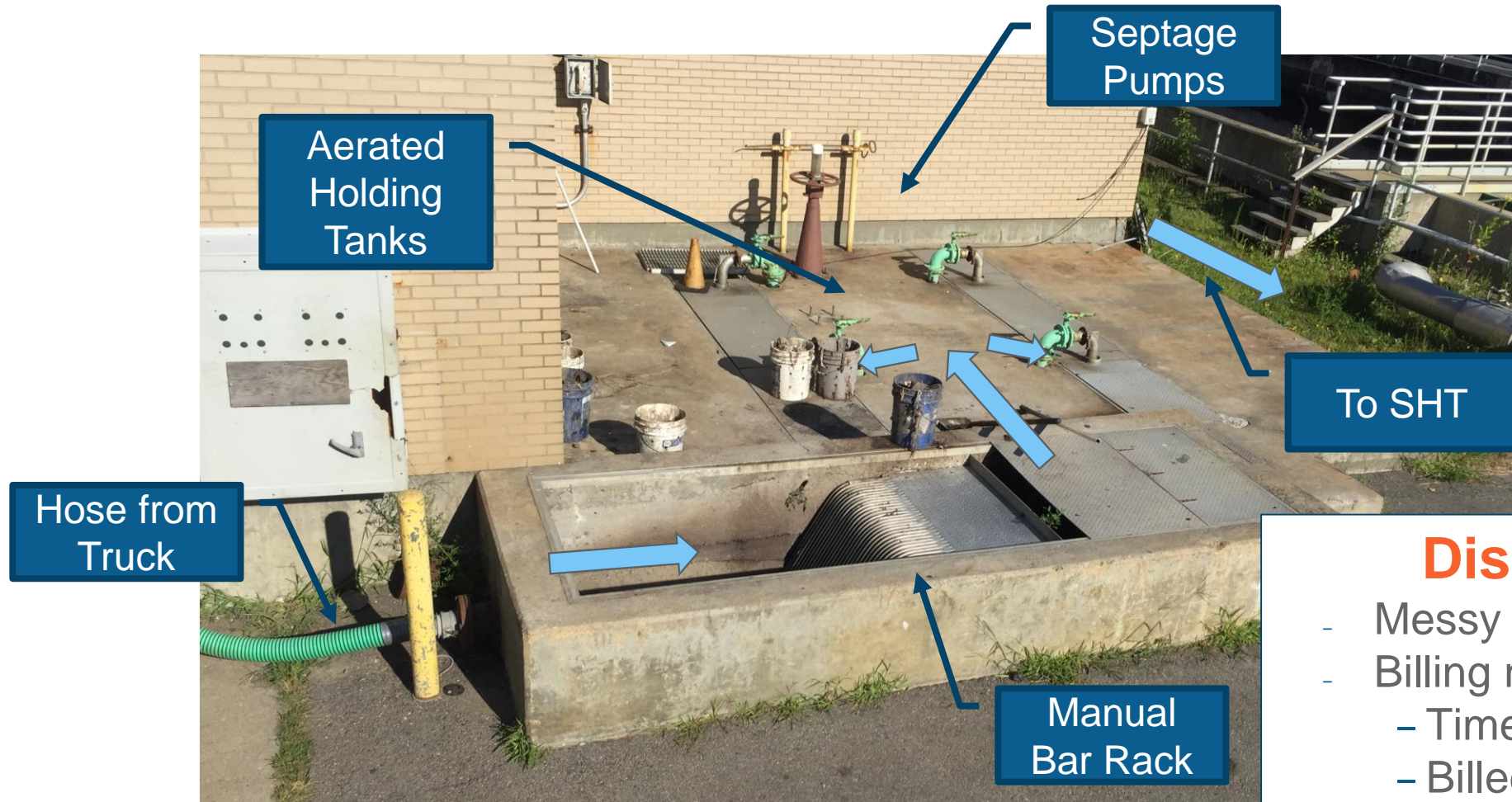
- **Recently Completed Septage Acceptance Facility**



EXISTING SYSTEM OVERVIEW



EXISTING SYSTEM OVERVIEW



To SHT

Hose from
Truck

Aerated
Holding
Tanks

Septage
Pumps

Manual
Bar Rack

Disadvantages

- Messy
- Billing not Automated
 - Time consuming
 - Billed for Entire Truck
- Build of Rags & Large Debris
 - Regular vactoring

SCITUATE SEPTAGE UPGRADE



- **Benefits**

- Can bill haulers for actual volume
- Removes solids
- Reduces labor
- Treating in Solids Handling System reduces main process impacts

CASE STUDY # 3: CENTRAL MASS RURAL COMMUNITY

- **Treatment Process**

- Headworks
- Extended Aeration
- Chemical TP Removal
- UV Disinfection

- **Flow**

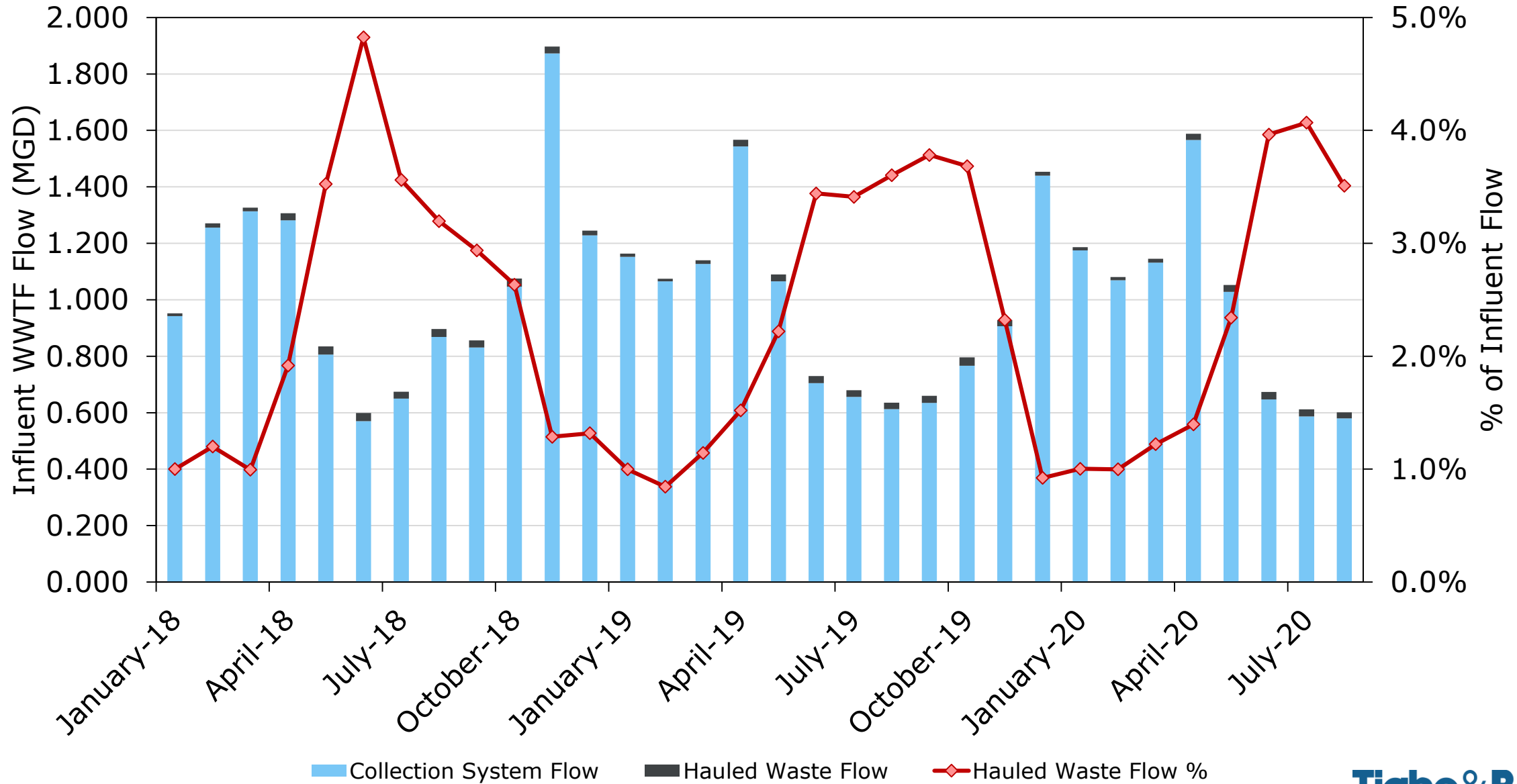
- Current ADF = ~1.0 MGD

- **Currently Under Construction**

- TN Removal (Upgrade to MLE)
- Low-level TP Removal (Tertiary Disc Filters)
- Update Old Equipment



SEPTAGE FLOW COMPARISON



EXISTING SEPTAGE OPERATION

- **Operational Conditions**

- Accepted Direct into Influent
- Sources:
 - Regional Septage
 - Tight Tanks
 - Brewery Waste
- Low Tipping Fee attracts Haulers

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- Loading Analysis**

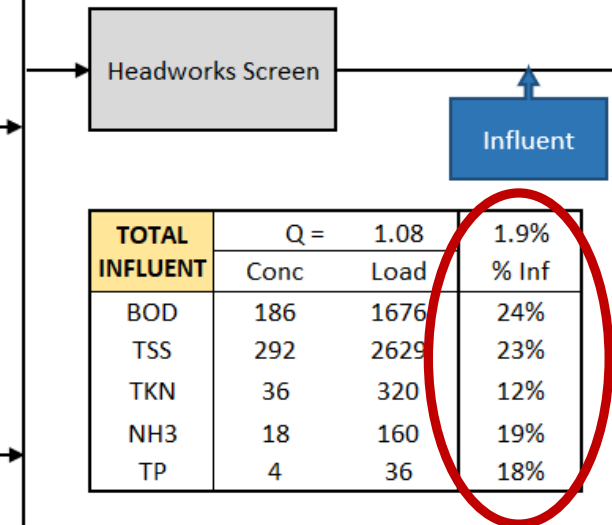
- Assumptions for Strength
- Loadings Substantial Contribution

DOMESTIC INFLUENT	Q = 1.06		98%
	Conc	Load	% Inf
BOD	145	1277	76%
TSS	229	2022	77%
TKN	32	282	88%
NH3	15	129	81%
TP	3	29	82%

SEPTAGE	Q = 0.014		1.3%
	Conc	Load	% Inf
BOD	3000	357	21%
TSS	5000	595	23%
TKN	300	36	11%
NH3	250	30	19%
TP	50	6	17%

TIGHT TANKS	Q = 0.004		0.4%
	Conc	Load	% Inf
BOD	190	6.6	0.4%
TSS	210	7.3	0.3%
TKN	40	1.4	0.4%
NH3	25	0.9	0.5%
TP	7	0.2	0.7%

BREWERY	Q = 0.002		0.2%
	Conc	Load	% Inf
BOD	2400	34.8	2.1%
TSS	210	3.0	0.1%
TKN	70	1.0	0.3%
NH3	0	0.0	0.0%
TP	15	0.2	0.6%



EXISTING SEPTAGE OPERATION

- **Operational Conditions**

- Accepted Direct into Influent
- Sources:
 - Regional Septage
 - Tight Tanks
 - Brewery Waste
- Low Tipping Fee attracts Haulers

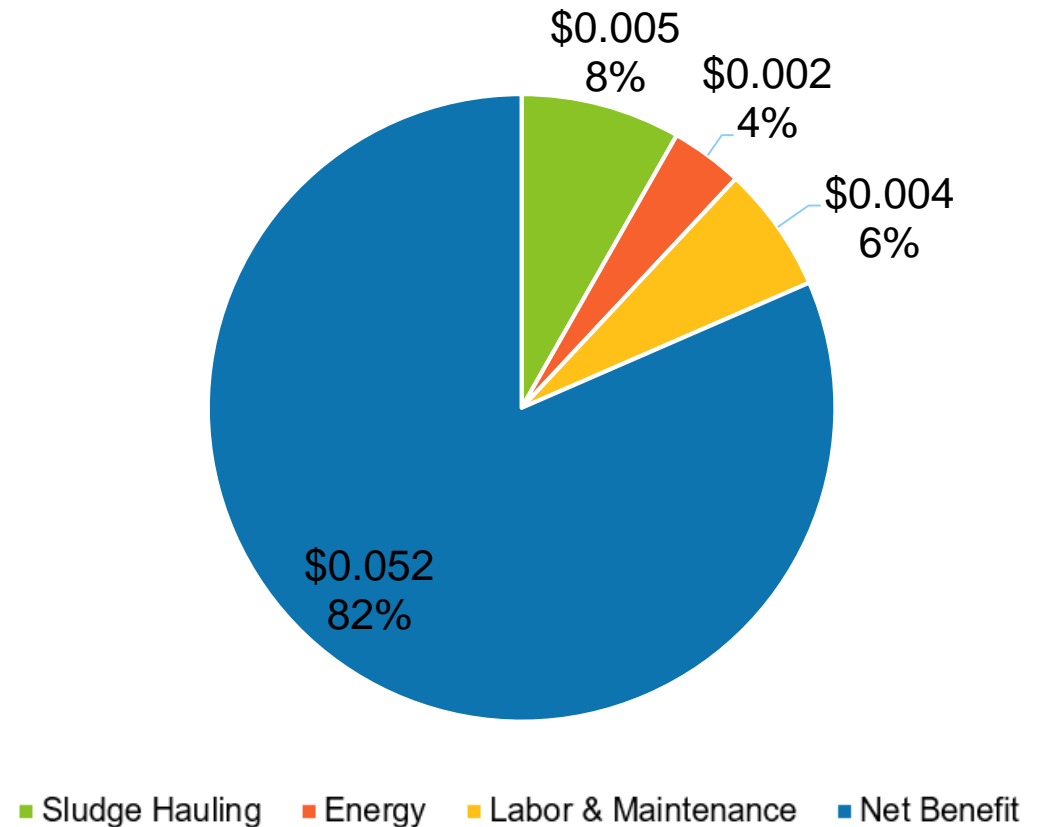
- **Loading Analysis**

- Assumptions for Strength
- Loadings Substantial Contribution

- **Cost Benefit Evaluation**

- ~25% Sludge
- ~20% Aeration Demand

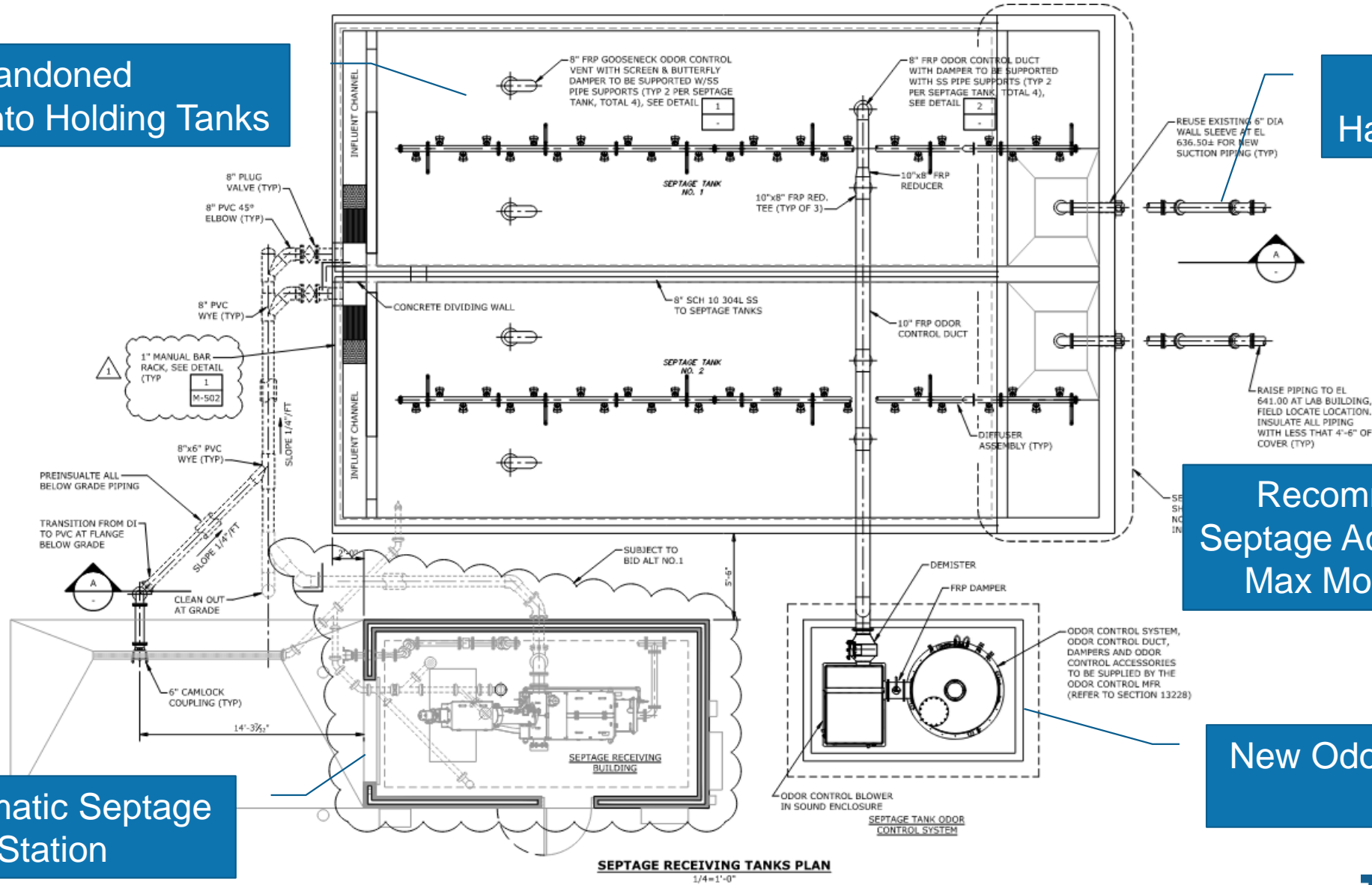
Annual Septage Fee Breakdown



PROPOSED SEPTAGE FACILITY UPGRADE

Convert Abandoned
Primaries into Holding Tanks

Pump to Solids
Handling or Influent



New Automatic Septage
Receiving Station

Recommend limiting
Septage Acceptance during
Max Month conditions

New Odor Control
System

CONCLUSIONS

- **Septage is more than just a Revenue Source**
 - Cost to treat may extend further than one may think
- **Understand Septage Impacts on Treatment Process**
 - Manage 3% or less
- **Design in Flexibility**
 - Holding Tanks
 - Various Treatment Options
- **Make Receiving Stations User Friendly**
 - Attract Haulers



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