



# Spangler Engineering, LLC

CONSULTING CIVIL ENGINEERS

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## ENGINEERING & ECONOMIC FEASIBILITY REPORT

Date: July 18, 2019

Subject: Wastewater Treatment Plant Upgrade  
City of Hammond

Prepared by: Webb M. Anderson, P.E.

The City's existing wastewater treatment plant (WWTP) has a design average daily flow of 4.1 MGD. The permitted effluent limits for the WWTP are listed as follows:

BOD = 30/45 mg/L  
TSS = 90/135 mg/L  
FC = 200/400 col./100 mL  
pH = 6 – 9 SU  
TRC = <0.1 mg/L

We have evaluated the City's WWTP existing treatment process with an emphasis on determining the cause(s) of the several BOD permit exceedances and have arrived at the following explanation of the most likely causes for BOD excursions, followed by our remarks:

- (1) Inadequate aeration – the BOD excursions seem to correlate closely with high flows which typically result from heavy rainfalls infiltrating into the collection system. The City of Hammond receives about 64" of rainfall annually, occurring on about eighty (80) separate dates throughout any given year.
- (2) High ammonia levels – while there is currently no ammonia limit, influent and effluent ammonia levels based on lab results frequently (>50 occasions in 2016) exceed 10 mg/l. The effects of high ammonia are translated into excessive oxygen requirements, depriving the process from achieving BOD removal.
- (3) Reduced detention time (during high flow periods) – The existing 3-cell aerated lagoon system is capable of properly treating raw wastewater BOD influent (at an average influent BOD concentration of 175 mg/l) and an average daily flow up to 4.1 MGD. After heavy rainfalls, the daily flow periodically exceeds 6.0 MGD, and on rare occasions has exceeded 11.0 MGD. The physical volume of the lagoons is fixed, thereby resulting in detention times reduced during high flow events.

It is our recommendation to undergo the following remedial improvements to ameliorate the above three (3) primary contributing causes to our BOD exceedances:

- (1) Supplement the aeration process with fixed aerators (strategically placed on the bottom of cell#1) and with 3 new 100 HP blowers (300 additional HP total).
- (2) Relocate the floating aerators placed in cell#1 in late 2016 to cell#1B.
- (3) Construct a new "cell 1B" adjacent to cell#1, routing the partially treated wastewater from "old" cell#1 to "new cell 1B". This will allow for an additional 8,000,000 gallons of storage, thereby increasing detention time and allowing for greater high flow treatment.

We estimate the construction costs of items "A." – "C." above to be \$1,900,000, as shown in the following detailed cost estimate:

City of Hammond					
<b>South WWTP Upgrade</b>					
<b>Project Budget</b>					
18-Dec-2017					
Item	Description	Estimated		<i>Engineer's Estimate</i>	
		Quantity		Unit Price	Extension
1.	Mobilization	1	EA	\$ 75,000.00	\$ 75,000.00
2.	Unclassified Excavation (7'D)	39,200	CY	4.00	156,800.00
3.	Levee Embankment (net section in-place)	24,200	CY	15.00	363,000.00
4.	Import select BACKFILL for levee embankment	15,000	CY	12.00	180,000.00
5.	Open cut/install 36" DI pipe	120	LF	200.00	24,000.00
6.	Install new Aeration System	1	EA	500,000.00	500,000.00
7.	Electrical work	1	EA	120,000.00	120,000.00
8.	Install new BLOWERS (100HP each)	3	EA	60,000.00	180,000.00
9.	Install/open cut AIR PIPING (14" DI)	600	LF	110.00	66,000.00
10.	Miscellaneous Clearing & Sitework	1	EA	30,000.00	30,000.00
11.	Install 55lb LIMESTONE	1,000	SY	50.00	50,000.00
12.	Haul in/grade Limestone [Type 610 - vehicular measure]	500.0	TN	50.00	25,000.00
Construction Cost Estimate (items "1." - "12."):					\$ 1,769,800.00
Construction Contingencies:		7.36%		\$ 1,769,800	130,200.00
Construction Budget:					\$ 1,900,000.00
A.	Engineering Fees	7.49%		\$ 1,769,800	\$ 132,558.02
B.	Construction Inspection	2.50%		\$ 1,769,800	44,245.00
C.	Legal Fees				-
D.	Equipment Purchases				-
E.	Land Acquisition				-
F.	Testing Lab/QC				8,000.00
G.	Miscellaneous Costs				196.98
<b>South WWTP Upgrade - TOTAL PROJECT BUDGET [Expenditures]:</b>					<b>\$ 2,085,000.00</b>

These necessary improvements will qualify for financing through the Clean Water State Revolving Loan Fund Program that offers a 20-year loan at a 0.95% interest rate. The City of Hammond has used this program in the past and has found it to be an effective way to leverage funds for larger infrastructure improvements.

The 10-year financial projection, calculated by the City's Accounting Department, shows that the water and sewer enterprise fund can cover the loan payments. See the following 10-year projection chart.

City of Hammond  
10-Year Projection

	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>
Projected Revenue (Sewer)	\$ 2,782,757	\$ 2,849,265	\$ 2,917,362	\$ 2,987,087	\$ 3,058,478	\$ 3,131,576	\$ 3,206,421	\$ 3,283,054	\$ 3,361,519	\$ 3,441,859
Projected Expenditures (Sewer)	\$ 2,370,118	\$ 2,419,891	\$ 2,470,709	\$ 2,522,593	\$ 2,575,568	\$ 2,629,655	\$ 2,684,878	\$ 2,741,260	\$ 2,798,827	\$ 2,857,602
Net Income or (Loss)	\$ 412,638	\$ 429,374	\$ 446,653	\$ 464,493	\$ 482,910	\$ 501,921	\$ 521,543	\$ 541,794	\$ 562,693	\$ 584,257
Highest Year's Debt Service	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192	\$ 392,192
Debt Service Coverage Ratio	105%	109%	114%	118%	123%	128%	133%	138%	143%	149%