SECTION 6
Capital Improvement Program

WASTEWATER 6.2

6.2 Wastewater Improvement Recommendations

6.2.1 10-Year CIP Wastewater Improvements

The recommended project list below is a result of in-field lift station assessments and drawdown tests, workshops with the City which include discussions with managerial and operations staff, City customer complaint logs, gravity trunkline analysis and I&I analysis.

10 Year Planning Horizon

1) Lift Station No. 11 Pump Impeller Upgrade*
2) Lift Station No. 1 Replacement and Force Main Replacement*
3) Lift Station No. 4 Service Basin Lining
4) Lift Station No. 4 Replacement
5) Lift Station No. 2 Replacement
6) Lift Station No. 5 Service Basin Lining*
7) Lift Station No. 5 Electrical, Pumps and Force Main Replacement*
8) Gravity Main Trunkline Replacement*
9) Lift Station No. 3 Service Basin Lining*
10) Lift Station No. 3 Replacement and Force Main Replacement*
11) Lift Station No. 7 Service Basin Lining*
12) Lift Station No. 7 Replacement and Force Main Replacement*
13) Lift Station No. 6 Pump and Force Main Replacement*
14) Lift Station No. 8 Odor Control, Electrical, Pumps and Force Main Replacement*
15) Lift Station No. 10 Service Basin Lining
16) Lift Station No. 10 Rehabilitation

*Indicates a project created to increase capacity due to development within the City. If the City finds that development is less aggressive or development in certain areas of the City changes, the City should shift the following projects schedules to meet the demand requirements.

The proposed improvements for each project are described in further detail in the sections that follow and include conceptual cost estimates for each project. The conceptual construction cost estimate includes the cost for detailed design and construction engineering and inspection for the project. The construction cost information is preliminary in nature. These costs are based upon comparisons of previous and current similar types of work and materials underway in the Southeast Florida area. ***Figure 6-19*** is an overview of all wastewater system proposed projects.

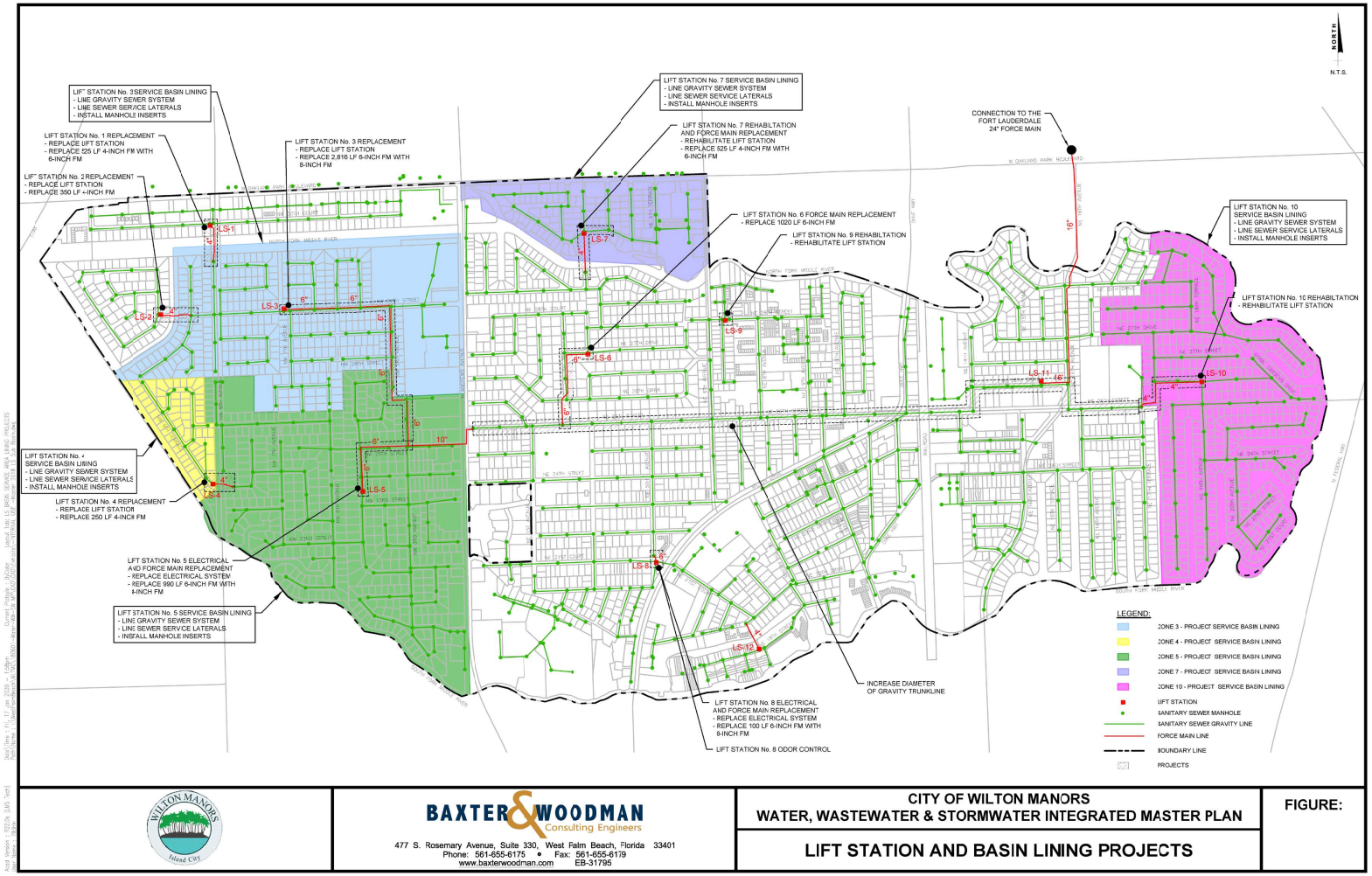

Figure 6-19: Wastewater System Proposed Projects

6.2.1.1 Project #1: Lift Station No. 11 Pump Impeller Upgrade

Lift Station No. 11 is the City's master lift station and repumps all wastewater flow generated by the City. The lift station requires an impeller upgrade to the existing Flygt NP3231 Submersible Pumps. The Flygt pumps currently have three (3), 450 mm impellers and will require new 475 mm impellers. The impeller change out is required to add more capacity to the lift station for the potential increase in wastewater flow from redevelopment projects. Historically the City had larger impellers at Lift Station No. 11 which caused problems with vibration. The City shall work with Flygt to resolve the potential vibration problem, if it occurs with the new, larger impellers.

The City recently learned that FTL plans to replace and line sections of the common transmission force main on Oakland Park Blvd. The City has recorded high pressure heads in their force main which is caused by heavy rainstorm events and downstream pressure conditions in FTL's transmission force main. If pressures become too high in the FTL common force main, the subsequent pressures at Lift Station No. 11 could have negative impacts on normal pump operation. The City should discuss this with FTL and review the pipe diameter for the new force main. It is recommended that FTL perform a model of this force main, which includes the City's Lift Statin No. 11, before sizing and designing the new transmission force main.

6.2.1.2 Project #2: Lift Station No. 1 Replacement

Lift Station No. 1 is located on the southwest corner of NW 9th Ave. (Powerline Rd.) and NW 30th St. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires many upgrades to bring the existing condition up to City standards. The station is a can type station which requires a confined space permit to enter. The visual assessment of the lift station concluded that the pumping units, discharge piping, and electrical systems are all nearing the end of its useful life.

The proposed lift station and force main improvements include total replacement of the existing can-type lift station at the SW corner of NW 30th Ct. and Powerline Rd., installation of a new submersible type duplex lift station at the NW corner of NW 30th Ct. and Powerline Rd., and replacement of the existing 4-inch force main with a new 6" HDPE force main. The force main, which transmits wastewater from Lift Station No. 1 to a downstream manhole, would require a bridge mounted installation to go over or horizontal direction drill (HDD) to go under the north fork of the Middle River. The lift station also requires larger 5.5 HP pumps along with the required upgraded electrical system.

This lift station was identified and prioritized as Project #2 for proposed improvements. ***Figure 6-20*** shows the proposed Lift Station No. 1 and force main improvements and ***Table 6-19*** outlines the conceptual construction cost estimate.

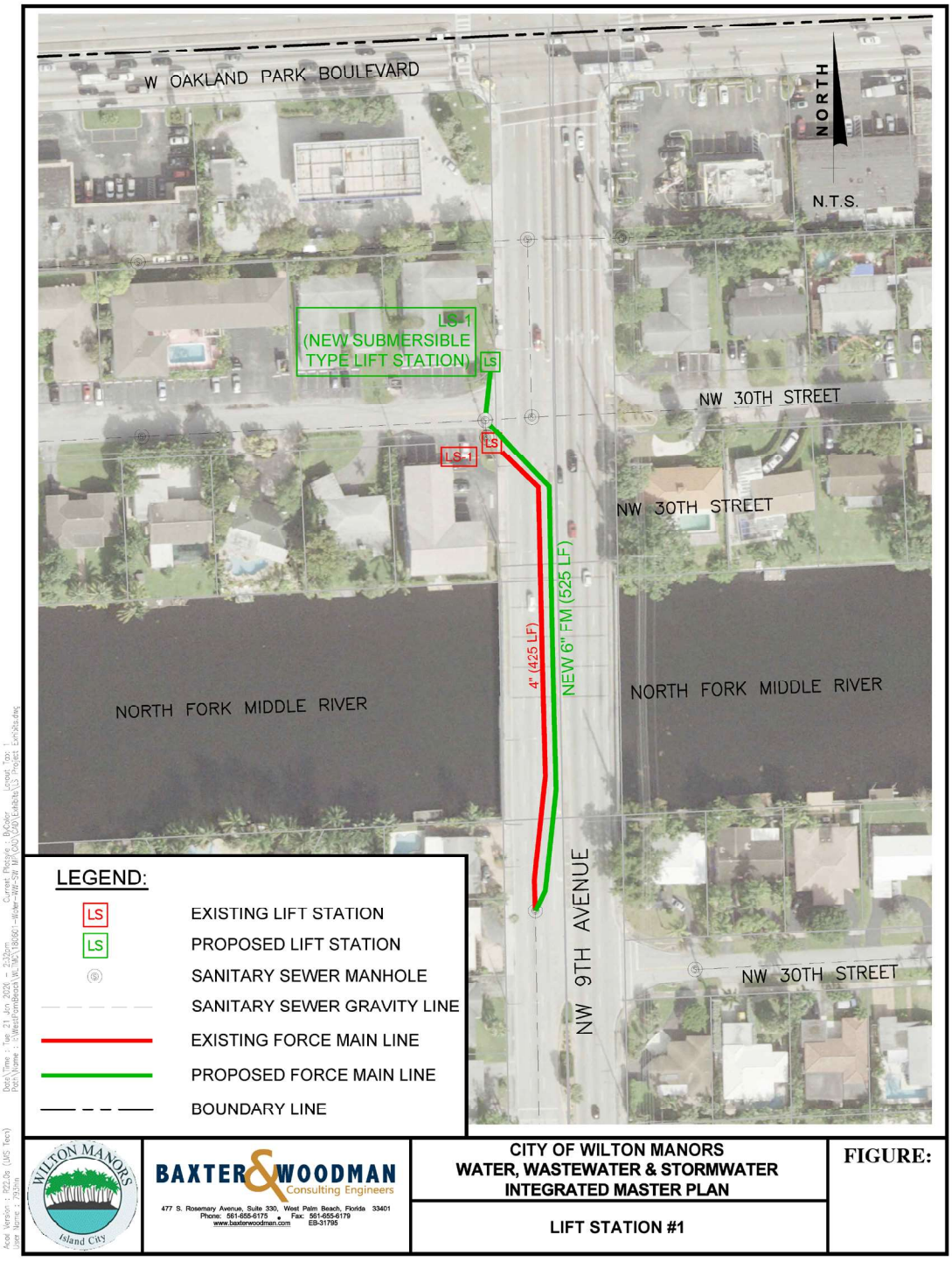

Figure 6-20: Project #2 – Proposed Lift Station No. 1 Replacement

Table 6-19: 10-Year CIP – Project #2 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 22,389.25	$ 22,389.25
Mobilization (2.5%)	1	LS	$ 11,194.63	$ 11,194.63
Maintenance of Traffic (1%)	1	LS	$ 4,477.85	$ 4,477.85
Clearing and Misc. Site Work (2.5%)	1	LS	$ 11,194.63	$ 11,194.63
			Subtotal General:	$ 49,256.35
Lift Station Replacement				
Demolition (Electrical Equipment, Mechanical Equipment, Concrete Slab, Modify and Fill Wet Well and Dry Can)	1	EA	$ 15,000.00	$ 15,000.00
Abandon and Grout Existing Force Main	425	LF	$ 20.00	$ 8,500.00
Lift Station (Wet Well, Valve Vault, Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, Flow Meter, Concrete Slab, Coatings, and Other Appurtenances)	1	EA	$275,000.00	$ 275,000.00
Furnish and Install 4-inch HDPE Force Main and Fittings	115	LF	$ 175.00	$ 20,125.00
Furnish and Install 8-inch PVC (C900)	60	LF	$ 110.00	$ 6,600.00
Core Existing Manhole	2	EA	$ 2,000.00	$ 4,000.00
6-inch Gate Valve	2	EA	$ 1,250.00	$ 2,500.00
6-inch Horizontal Directional Drill	445	LF	$ 150.00	$ 66,750.00
Drill Pit Restoration	2	EA	$ 5,000.00	$ 10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$ 10,000.00
Open Cut Pavement/Sidewalk Restoration	175	LF	$ 50.00	$ 8,750.00
Mill and Overlay	704	SY	$ 15.00	$ 10,560.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
			Subtotal Lift Station Replacement:	$ 447,785.00
			Total Construction	**$ 497,041.35**
			Contingencies (20%)	$ 99,408.27
			Engineering, Legal Admin. Costs (15%)	$ 74,556.20
			Total Cost:	**$ 671,005.82**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.3 Project #3: Lift Station No. 4 Service Basin Lining

The City has experiences infiltration and inflow of groundwater and stormwater into the sanitary sewer collection system. B&W performed an infiltration and inflow analysis and determined that Lift Station No. 4 receives significantly higher wastewater flows during rainfall events which indicates severe infiltration within the lift stations collection system. The higher flows at Lift Station No.4 also negatively affect the downstream lift station and sewer collection system networks. It is recommended that the City line the gravity sewer system, line a portion of the service laterals and install manhole inflow protectors in Lift Station No. 4's basin, to reduce infiltration from rainfall events.

It was assumed that 10 percent of the total wastewater basin's service laterals would be lined. However, in lieu of lining the service laterals the City could opt to use grouting technology to grout all of the service laterals. The grout affectively seals the lateral for one or two section of pipe but is limited to sealing the entire lateral from main to clean out, like traditional liners. The grout also typically has a shorter service life of roughly 10-15 years. Lining laterals cost $4,000 per lateral while grouting costs $400 per lateral. It is recommended that the City perform a lining study before any work is scheduled. The lining study should use a combination of flow meter data and televising to eliminate any areas within the basin which require no lining and indicate areas which require more immediate attention. The cost for the lining study is included in engineering fee portion of the estimate. The cost estimate provided does not include any gravity main spot replacements.

The following ***Table 6-20*** outlines the conceptual construction cost estimate.

Table 6-20: 10-Year CIP – Project #3 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 6,653.00	$ 6,653.00
Mobilization (2.5%)	1	LS	$ 3,326.50	$ 3,326.50
Maintenance of Traffic (1%)	1	LS	$ 1,330.60	$ 1,330.60
Clearing and Misc. Site Work (2.5%)	1	LS	$ 3,326.50	$ 3,326.50
			Subtotal General:	$ 14,636.60
Sewer System Infiltration and Inflow Prevention				
Line 8-inch Gravity Main	2,866	LF	$ 35.00	$ 100,310.00
Line Laterals	8	EA	$ 4,000.00	$ 32,000.00
Install Manhole Inserts	15	EA	$ 50.00	$ 750.00
			Subtotal Sewer System Infiltration and Inflow Prevention:	$ 133,060.00
			Total	**$ 147,696.60**
			Contingencies (20%)	$ 29,539.32
			Engineering, Legal Admin. Costs (15%)	$ 22,154.49
			Total Cost:	**$ 199,390.41**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Engineering fees should include an Infiltration and Inflow Study. This study should include gravity flow monitoring within each basin to designate areas of concern within the gravity network.

- Costs do not include the televising of the gravity sewer system

6.2.1.4 Project #4: Lift Station No. 4 Replacement

Lift Station No. 4 is located on the north corner of NW 9th Terr. and NW 9th Ave. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires many upgrades to bring the existing condition up to City standards. The station is a can type station which requires a confined space permit to enter. The visual assessment of the lift station concluded that the pumping units, discharge piping, and electrical systems are all nearing the end of its useful life. It is recommended that the City replace the can station with a new submersible type duplex lift station. The City should utilize the existing can station and convert it to the receiving manhole for the new submersible lift station. It is also recommended that the existing 4-inch force main be replaced. The force main, which transmits wastewater from Lift Station No. 4 to a downstream manhole, would require HDD to go under NW 9th Ave. This lift station was identified and prioritized as Project #4 for proposed improvements. ***Figure 6-21*** shows the proposed Lift Station No. 4 and force main improvements.

The proposed lift station and force main improvements include total replacement of the existing can-type lift station, installation of a new submersible lift station slightly east of the existing lift station location, and replacement of the existing 4-inch force main with a new 4-inch HDPE force main. Based on the proposed Project #4 improvements shown in ***Figure 6-21***, the following ***Table 6-21*** outlines the conceptual construction cost estimate.

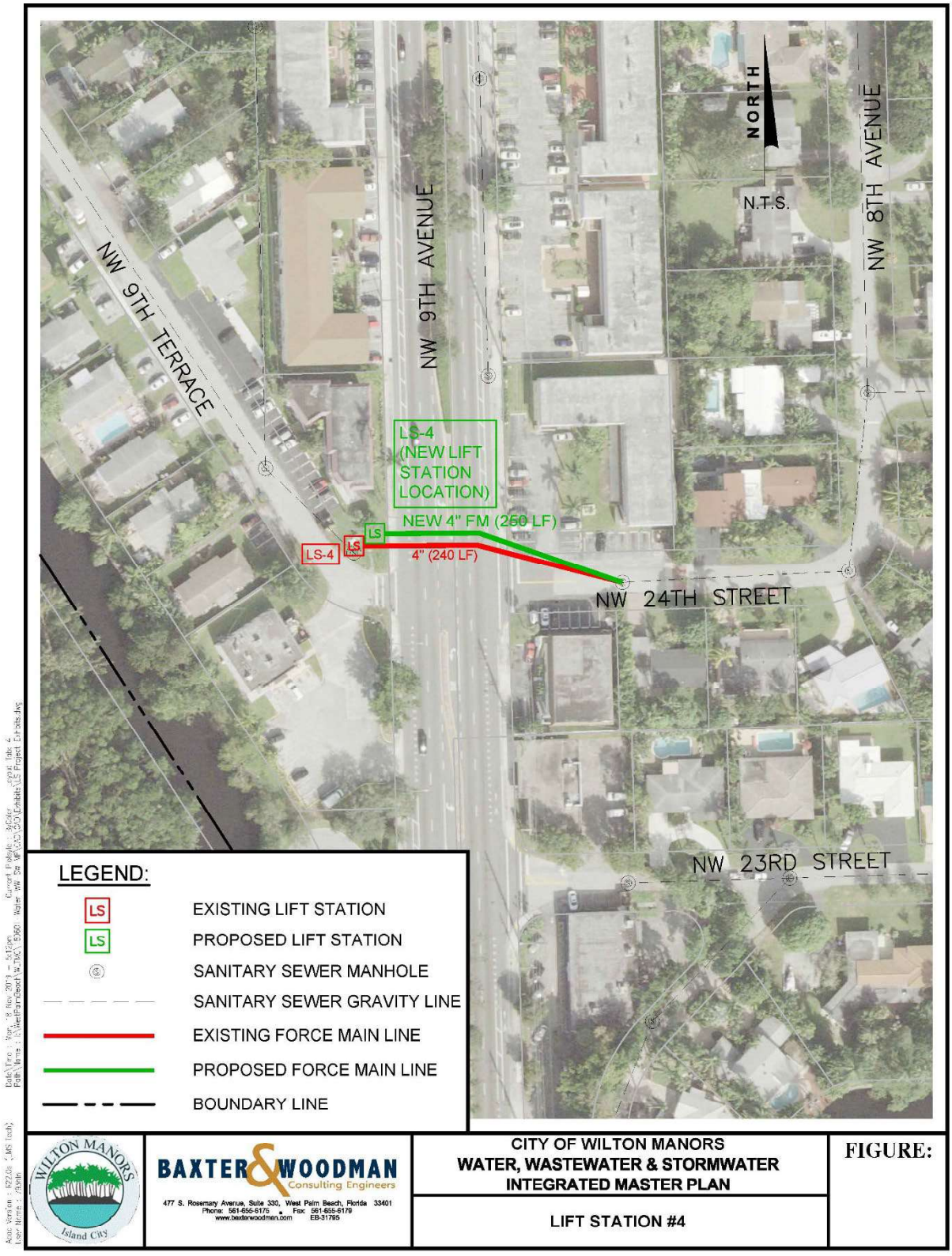

Figure 6-21: Project #4 – Proposed Lift Station No. 4 Replacement

Table 6-21: 10-Year CIP – Project #4 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 19,811.00	$ 19,811.00
Mobilization (2.5%)	1	LS	$ 9,905.50	$ 9,905.50
Maintenance of Traffic (1%)	1	LS	$ 3,962.20	$ 3,962.20
Clearing and Misc. Site Work (2.5%)	1	LS	$ 9,905.50	$ 9,905.50
			Subtotal General:	$ 43,584.20
Lift Station Replacement				
Demolition (Electrical Equipment, Mechanical Equipment, Concrete Slab, Modify and Fill Wet Well and Dry Can)	1	EA	$ 15,000.00	$ 15,000.00
Convert Existing Wet Well to Manhole	1	EA	$ 5,000.00	$ 5,000.00
Abandon and Grout Existing Force Main	240	LF	$ 20.00	$ 4,800.00
Lift Station (Wet Well, Valve Vault, Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, Flow Meter, Concrete Slab, Coatings, and Other Appurtenances)	1	EA	$275,000.00	$ 275,000.00
Furnish and Install 4-inch HDPE Force Main and Fittings	40	LF	$ 150.00	$ 6,000.00
Furnish and Install 8-inch PVC (C900)	20	LF	$ 110.00	$ 2,200.00
Core Existing Manhole	2	EA	$ 2,000.00	$ 4,000.00
4-inch Gate Valve	1	EA	$ 1,000.00	$ 1,000.00
4-inch Horizontal Directional Drill	200	LF	$ 125.00	$ 25,000.00
Drill Pit Restoration	2	EA	$ 5,000.00	$ 10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$ 10,000.00
Open Cut Pavement/Sidewalk Restoration	20	LF	$ 50.00	$ 1,000.00
Mill and Overlay	148	SY	$ 15.00	$ 2,220.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
			Subtotal Lift Station Replacement:	$ 396,220.00
			Total Construction	**$ 439,804.20**
			Contingencies (20%)	$ 87,960.84
			Engineering, Legal Admin. Costs (15%)	$ 65,970.63
			Total Cost:	**$ 593,735.67**

Note:

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- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.5 Project #5: Lift Station No. 2 Replacement

Lift Station No. 2 is located on the northeast corner of NW 10th Ave. and NW 29th St. in the Jenada Isle neighborhood. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires many upgrades to bring the existing condition up to City standards. The station is a can type station which requires a confined space permit to enter. The visual assessment of the lift station concluded that the pumping units, discharge piping, and electrical systems are all nearing the end of its useful life. It is recommended that the City replace the can station.

The proposed lift station and force main improvements include total replacement of the existing can-type lift station, installation of a new submersible duplex type lift station slightly east of the existing lift station location. The City should utilize the existing can station and convert it to the receiving manhole for the new submersible lift station. It is also recommended that the existing 4-inch force main be replaced with a new 4-inch HDPE force main. The force main, which transmits wastewater from Lift Station No. 2 to a downstream manhole, would require a bridge mounted installation or direction drill to go over or under the canal outside the entrance of Jenada Isle.

Based on the proposed Project #5 improvements shown in ***Figure 6-22***, the following ***Table 6-22*** outlines the conceptual construction cost estimate.

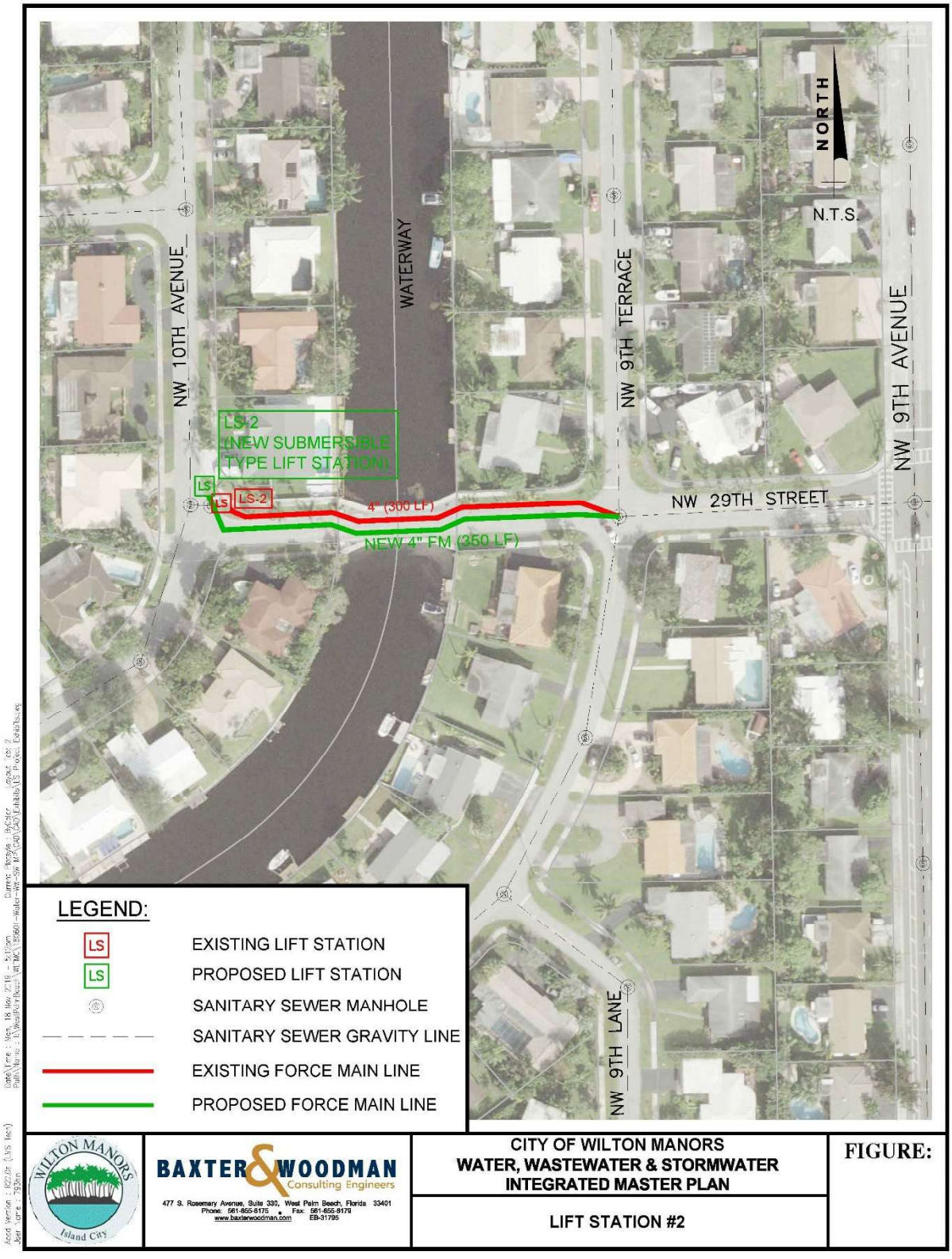

Figure 6-22: Project #5 – Proposed Lift Station No. 2 Replacement

Table 6-22: 10-Year CIP – Project #5 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 20,450.75	$ 20,450.75
Mobilization (2.5%)	1	LS	$ 10,225.38	$ 10,225.38
Maintenance of Traffic (1%)	1	LS	$ 4,090.15	$ 4,090.15
Clearing and Misc. Site Work (2.5%)	1	LS	$ 10,225.38	$ 10,225.38
			Subtotal General:	$ 44,991.65
Lift Station Replacement				
Demolition (Electrical Equipment, Mechanical Equipment, Concrete Slab, Modify and Fill Wet Well and Dry Can)	1	EA	$ 15,000.00	$ 15,000.00
Convert Existing Wet Well to Manhole	1	EA	$ 5,000.00	$ 5,000.00
Abandon and Grout Existing Force Main	350	LF	$ 20.00	$ 7,000.00
Lift Station (Wet Well, Valve Vault, Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, Flow Meter, Concrete Slab, Coatings, and Other Appurtenances)	1	EA	$275,000.00	$ 275,000.00
Furnish and Install 4-inch HDPE Force Main and Fittings	50	LF	$ 150.00	$ 7,500.00
Furnish and Install 8-inch PVC (C900)	20	LF	$ 110.00	$ 2,200.00
Core Existing Manhole	1	EA	$ 2,000.00	$ 2,000.00
4-inch Gate Valve	2	EA	$ 1,000.00	$ 2,000.00
4-inch Horizontal Directional Drill	230	LF	$ 125.00	$ 28,750.00
Drill Pit Restoration	2	EA	$ 5,000.00	$ 10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$ 10,000.00
Tree Removal	1	EA	$ 2,000.00	$ 2,000.00
Open Cut Pavement/Sidewalk Restoration	70	LF	$ 50.00	$ 3,500.00
Mill and Overlay	271	SY	$ 15.00	$ 4,065.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
			Subtotal Lift Station Replacement:	$ 409,015.00
			Total Construction	**$ 454,006.65**
			Contingencies (20%)	$ 90,801.33
			Engineering, Legal Admin. Costs (15%)	$ 68,101.00
			Total Cost:	**$ 612,908.98**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.6 Project #6: Lift Station No. 5 Service Basin Lining

The City has experiences infiltration and inflow of groundwater and stormwater into the sanitary sewer collection system. B&W performed an infiltration and inflow analysis and calculated that Lift Station No. 5 receives significantly higher wastewater flows during rainfall events which indicates sever infiltration within the lift stations collection system. The higher flows at Lift Station No. 5 also negatively affect the downstream lift station and sewer collection system networks. It is recommended that the City line the gravity sewer system, line a portion of the service laterals and install manhole inserts in Lift Station No. 5's basin, to reduce infiltration from rainfall events.

It was assumed that 10 percent of the total wastewater basin's service laterals would be lined. However, in lieu of lining the service laterals the City could opt to use grouting technology to grout all of the service laterals. The grout affectively seals the lateral for one or two section of pipe but is limited to sealing the entire lateral from main to clean out, like traditional liners. The grout also typically has a shorter service life of roughly 10-15 years. Lining laterals cost $4,000 per lateral while grouting costs $400 per lateral. It is recommended that the City perform a lining study before any work is scheduled. The lining study should use a combination of flow meter data and televising to eliminate any areas within the basin which require no lining and indicate areas which require more immediate attention. The cost for the lining study is included in engineering fee portion of the estimate. The cost estimate provided does not include any gravity main spot replacements.

The following ***Table 6-23*** outlines the conceptual construction cost estimate.

Table 6-23: 10-Year CIP – Project #6 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 52,436.75	$ 52,436.75
Mobilization (2.5%)	1	LS	$ 26,218.38	$ 26,218.38
Maintenance of Traffic (1%)	1	LS	$ 10,487.35	$ 10,487.35
Clearing and Misc. Site Work (2.5%)	1	LS	$ 26,218.38	$ 26,218.38
			Subtotal General:	$ 115,360.85
Sewer System Infiltration and Inflow Prevention				
Line 8-inch Gravity Main	23,881	LF	$ 35.00	$ 835,835.00
Line Laterals	52	EA	$ 4,000.00	$ 208,000.00
Install Manhole Inserts	98	EA	$ 50.00	$ 4,900.00
			Subtotal Sewer System Infiltration and Inflow Prevention:	$ 1,048,735.00
			Total	**$ 1,164,095.85**
			Contingencies (20%)	$ 232,819.17
			Engineering, Legal Admin. Costs (15%)	$ 174,614.38
			Total Cost:	**$ 1,571,529.40**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Engineering fees should include an Infiltration and Inflow Study. This study should include gravity flow monitoring within each basin to designate areas of concern within the gravity network.
- Costs do not include the televising of the gravity sewer system

6.2.1.7 Project #7: Lift Station No. 5 Electrical & Force Main Replacement

Lift Station No. 5 is located on NW 5th Ave. between NW 23th St. and NW 24th St. The station was last rehabilitated in 2005, 15 years ago. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires the total replacement of the electrical system to bring the existing condition up to City standards. Although the City has completed various improvements and rehabilitation work to the lift station, the discharge and transmission force main are original.

Additionally, the City desires to start a redevelopment program which will increase the residential and commercial space within the City. To accommodate the redevelopment it is recommended that the existing 6-inch force main be replaced with a new 8-inch HDPE force main. It is also recommended that the lift stations pumps be replaced. Based on the proposed Project #7 improvements shown in ***Figure 6-23***, the following ***Table 6-24*** outlines the conceptual construction cost estimate.

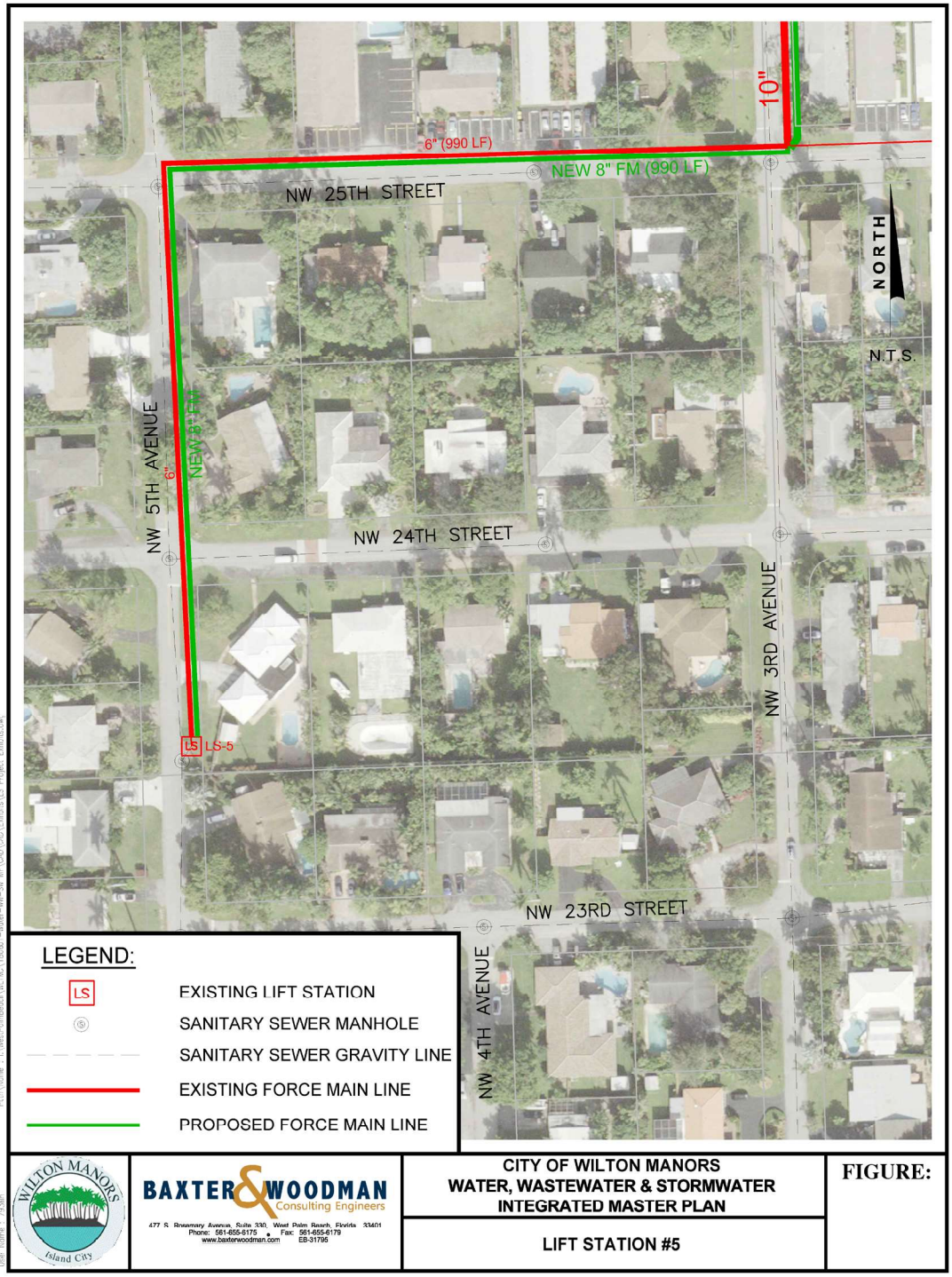

Figure 6-23: Project #7 – Proposed Lift Station No. 5 Electrical & Force Main Replacement

Table 6-24: 10-Year CIP – Project #7 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 18,913.75	$ 18,913.75
Mobilization (2.5%)	1	LS	$ 9,456.88	$ 9,456.88
Maintenance of Traffic (1%)	1	LS	$ 3,782.75	$ 3,782.75
Clearing and Misc. Site Work (2.5%)	1	LS	$ 9,456.88	$ 9,456.88
			Subtotal General:	$ 41,610.25
Force Main Replacement				
Demolition (Electrical Equipment and Pumps)	1	EA	$ 15,000.00	$ 15,000.00
Lift Station (Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, and Other Appurtenances)	1	EA	$110,000.00	$ 110,000.00
Abandon and Grout Existing Force Main	1,000	LF	$ 20.00	$ 20,000.00
Furnish and Install 8-inch HDPE Force Main and Fittings	90	LF	$ 175.00	$ 15,750.00
Furnish and Install Emergency Bypass Assembly	1	EA	$ 1,400.00	$ 1,400.00
8-inch Gate Valve	4	EA	$ 1,500.00	$ 6,000.00
8-inch Horizontal Directional Drill	910	LF	$ 175.00	$ 159,250.00
Core Existing Manhole	1	EA	$ 2,000.00	$ 2,000.00
Drill Pit Restoration	2	EA	$ 5,000.00	$ 10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$ 10,000.00
Tapping Sleeve and Tapping Valve	1	EA	$ 7,000.00	$ 7,000.00
Line Stop	1	EA	$ 5,000.00	$ 5,000.00
Connect to Existing FM	1	EA	$ 2,000.00	$ 2,000.00
Open Cut Pavement/Sidewalk Restoration	60	LF	$ 50.00	$ 3,000.00
Mill and Overlay	125	SY	$ 15.00	$ 1,875.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
			Subtotal Lift Station Replacement:	$ 378,275.00
			Total Construction	**$ 419,885.25**
			Contingencies (20%)	$ 83,977.05
			Engineering, Legal Admin. Costs (15%)	$ 62,982.79
			Total Cost:	**$ 566,845.09**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.8 Project #8: Gravity Main Trunkline Replacement

B&W calculated that during Peak Hour Flow and Redevelopment Scenarios, the City's existing gravity sewer main trunkline, which runs east to west through the center of the City on NE 26th St., is operating over a 90% flow depth. The gravity system should not be operating at over 90% flow depth at any given time. Operating at these high levels causes surcharge and the potential for wastewater spills. Therefore, it is recommended the City replace and increase the capacity of approximately 6,800 LF of its gravity main trunkline to reduce future surcharging and spilling within the City.

It is recommended that the City have an engineering consultant perform a study of the trunkline including televising of the pipes, flow monitoring at various locations through the line and a detailed design of the recommended improvements. This study should be completed before the City moves forward with any construction of the gravity main trunkline. The following ***Table 6-25*** outlines the conceptual construction cost estimate.

Table 6-25: 10-Year CIP – Project #8 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 183,616.67	$ 183,616.67
Mobilization (2.5%)	1	LS	$ 91,808.33	$ 91,808.33
Maintenance of Traffic (1%)	1	LS	$ 36,723.33	$ 36,723.33
Clearing and Misc. Site Work (2.5%)	1	LS	$ 91,808.33	$ 91,808.33
			Subtotal General:	$ 403,956.67
Trunk Line Sewer Replacement				
Sanitary Sewer Pipe Removal	6,800	LF	$ 20.00	$ 136,000.00
Sanitary Sewer Manhole Removal	1	EA	$ 2,000.00	$ 2,000.00
Sanitary Sewer Manhole	1	EA	$ 10,000.00	$ 10,000.00
Sanitary Sewer Manhole Modifications	27	EA	$ 4,000.00	$ 108,000.00
15-inch PVC Sanitary Sewer Pipe	1,270	LF	$ 300.00	$ 381,000.00
18-inch PVC Sanitary Sewer Pipe	980	LF	$ 350.00	$ 343,000.00
21-inch PVC Sanitary Sewer Pipe	2,770	LF	$ 400.00	$ 1,108,000.00
24-inch PVC Sanitary Sewer Pipe	1,740	LF	$ 450.00	$ 783,000.00
42-inch PVC Sanitary Sewer Pipe	40	LF	$ 700.00	$ 28,000.00
Sanitary Sewer Laterals	74	EA	$ 3,000.00	$ 222,000.00
Modify Wet Well	1	LS	$ 10,000.00	$ 10,000.00
Dewatering	1	LS	$ 50,000.00	$ 50,000.00
Bypass Pumping	26	EA	$ 10,000.00	$ 260,000.00
Mill and Overlay	12,089	SY	$ 15.00	$ 181,333.33
Site Restoration	1	LS	$ 50,000.00	$ 50,000.00
			Subtotal Lift Station Replacement:	$ 3,672,333.33
			Total Construction	**$ 4,076,290.00**
			Contingencies (20%)	$ 815,258.00
			Engineering, Legal Admin. Costs (15%)	$ 611,443.50
			Total Cost:	**$ 5,502,991.50**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Pipe and manhole removal includes transport and proper disposal of pipe.
- Sanitary sewer manhole modifications include modifications to bench flow channels and saw cutting manhole to receive larger pipe.
- Santary sewer pipe includes pipe material, pipe installation, backfill, compaction, shoring, pavement restoration immediately within width of trench, and testing. Assume pipe to be constructed at same invert elevations as existing.
- Sewer lateral replacement includes lateral from sewer main to cleanout at right-of-way and pavement restoration.
- Mill and overlay cost includes 24' width (two lanes) minus 8' width of trench times length of pipe installation for mill and overlay of pavement.

6.2.1.9 Project #9: Lift Station No. 3 Service Basin Lining

The City has experiences infiltration and inflow of groundwater and stormwater into the sanitary sewer collection system. B&W performed an infiltration and inflow analysis and calculated that Lift Station No. 3 receives significantly higher wastewater flows during rainfall events which indicates severe infiltration within the lift stations collection system. The higher flows at Lift Station No.3 also negatively affect the downstream lift station and sewer collection system networks. It is recommended that the City line the gravity sewer system, line a portion of the service laterals and install manhole inserts in Lift Station No. 3's basin, to reduce infiltration from rainfall events.

It was assumed that 10 percent of the total wastewater basin's service laterals would be lined. However, in lieu of lining the service laterals the City could opt to use grouting technology to grout all of the service laterals. The grout affectively seals the lateral for one or two section of pipe but is limited to sealing the entire lateral from main to clean out, like traditional liners. The grout also typically has a shorter service life of roughly 10-15 years. Lining laterals cost $4,000 per lateral while grouting costs $400 per lateral. It is recommended that the City perform a lining study before any work is scheduled. The lining study should use a combination of flow meter data and televising to eliminate any areas within the basin which require no lining and indicate areas which require more immediate attention. The cost for the lining study is included in engineering fee portion of the estimate. The cost estimate provided does not include any gravity main spot replacements.

The following ***Table 6-26*** outlines the conceptual construction cost estimate.

Table 6-26: 10-Year CIP – Project #9 Engineer's Opinion of Probable Construction

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 41,932.75	$ 41,932.75
Mobilization (2.5%)	1	LS	$ 20,966.38	$ 20,966.38
Maintenance of Traffic (1%)	1	LS	$ 8,386.55	$ 8,386.55
Clearing and Misc. Site Work (2.5%)	1	LS	$ 20,966.38	$ 20,966.38
			Subtotal General:	$ 92,252.05
Sewer System Infiltration and Inflow Prevention				
Line 8-inch Gravity Main	16,550	LF	$ 35.00	$ 579,250.00
Line 10-inch Gravity Main	721	LF	$ 55.00	$ 39,655.00
Line Laterals	54	EA	$ 4,000.00	$ 216,000.00
Install Manhole Inserts	75	EA	$ 50.00	$ 3,750.00
			Subtotal Sewer System Infiltration and Inflow Prevention:	$ 838,655.00
			Total	**$ 930,907.05**
			Contingencies (20%)	$ 186,181.41
			Engineering, Legal Admin. Costs (15%)	$ 139,636.06
			Total Cost:	**$ 1,256,724.52**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Engineering fees should include an Infiltration and Inflow Study. This study should include gravity flow monitoring within each basin to
- Costs do not include the televising of the gravity sewer system

6.2.1.10 Project #10: Lift Station No. 3 Rehabilitation & Force Main Replacement

Lift Station No. 3 is located on the corner of NW 7th Ave. and NW 29th St. The station was last rehabilitated in 2018, 2 years ago. B&W performed multiple site visits throughout the project timeline and determined that the lift station is in good condition and required no immediate upgrades.

Although the lift station was recently replaced, the City desires to start a redevelopment program which will increase the residential and commercial space within the City. To accommodate the redevelopment B&W recommends that the existing lift station and force main be replaced with a new 8-foot wet well, 60 HP submersible pumps, and an 8-inch HDPE force main. Based on the proposed Project #10 improvements shown in ***Figure 6-24***, the following ***Table 6-27*** outlines the conceptual construction cost estimate.

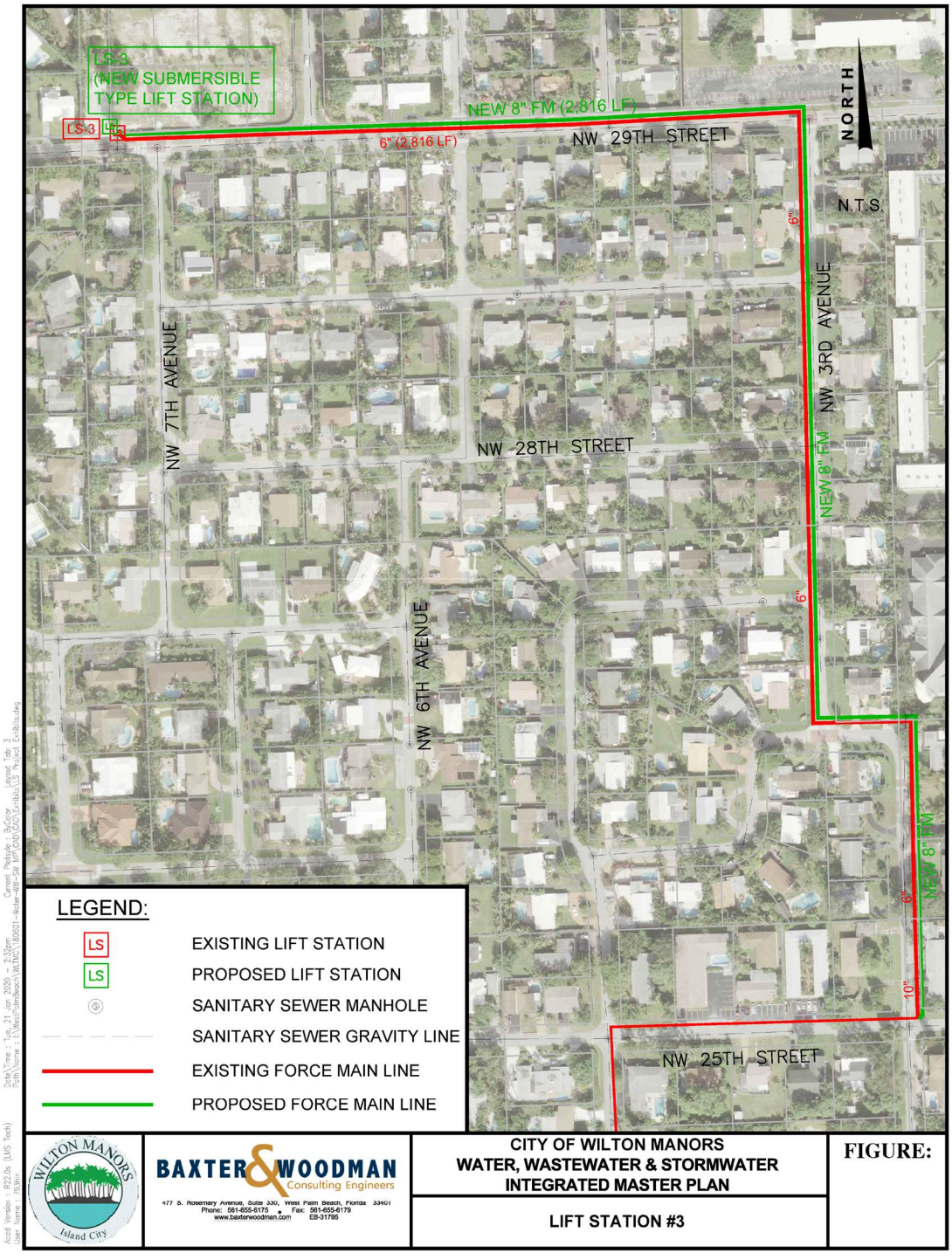

Figure 6-24: Project #10 – Proposed Lift Station No. 3 Rehabilitation

Table 6-27: 10-Year CIP – Project #10 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 51,700.00	$ 51,700.00
Mobilization (2.5%)	1	LS	$ 25,850.00	$ 25,850.00
Maintenance of Traffic (1%)	1	LS	$ 10,340.00	$ 10,340.00
Clearing and Misc. Site Work (2.5%)	1	LS	$ 25,850.00	$ 25,850.00
			Subtotal General:	$ 113,740.00
Lift Station Replacement				
Demolition (Electrical Equipment and Mechanical Equipment)	1	LS	$ 15,000.00	$ 15,000.00
Lift Station (Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, Flow Meter, Concrete Slab, Coatings, and Other Appurtenances)	1	LS	$275,000.00	$ 275,000.00
Furnish and Install 8-inch HDPE Force Main and Fittings	2,816	LF	$ 200.00	$ 563,200.00
Core Existing Manhole	1	EA	$ 2,000.00	$ 2,000.00
8-inch Gate Valve	2	EA	$ 1,500.00	$ 3,000.00
Open Cut Pavement/Sidewalk Restoration	2,816	LF	$ 50.00	$ 140,800.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
			Subtotal Lift Station Replacement:	$ 1,034,000.00
			Total Construction	**$ 1,147,740.00**
			Contingencies (20%)	$ 229,548.00
			Engineering, Legal Admin. Costs (15%)	$ 172,161.00
			Total Cost:	**$ 1,549,449.00**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.11 Project #11: Lift Station No. 7 Service Basin Lining

The City has experiences infiltration and inflow of groundwater and stormwater into the sanitary sewer collection system. B&W performed an infiltration and inflow analysis and calculated that Lift Station No. 7 receives significantly higher wastewater flows during rainfall events which indicates severe infiltration within the lift stations collection system. The higher flows at Lift Station No.7 also negatively affect the downstream lift station and sewer collection system networks. It is recommended that the City line the gravity sewer system, line a portion of the service laterals and install manhole inserts in Lift Station No. 7's basin, to reduce infiltration from rainfall events.

It was assumed that 10 percent of the total wastewater basin's service laterals would be lined. However, in lieu of lining the service laterals the City could opt to use grouting technology to grout all of the service laterals. The grout affectively seals the lateral for one or two section of pipe but is limited to sealing the entire lateral from main to clean out, like traditional liners. The grout also typically has a shorter service life of roughly 10-15 years. Lining laterals cost $4,000 per lateral while grouting costs $400 per lateral. It is recommended that the City perform a lining study before any work is scheduled. The lining study should use a combination of flow meter data and televising to eliminate any areas within the basin which require no lining and indicate areas which require more immediate attention. The cost for the lining study is included in engineering fee portion of the estimate. The cost estimate provided does not include any gravity main spot replacements.

The following ***Table 6-28*** outlines the conceptual construction cost estimate.

Table 6-28: 10-Year CIP – Project #11 Engineer's Opinion of Probable Construction

	Estimated Quantity	Unit	Unit Price		Total
General					
General Conditions (5%)	1	LS	$ 13,675.75	$	13,675.75
Mobilization (2.5%)	1	LS	$ 6,837.88	$	6,837.88
Maintenance of Traffic (1%)	1	LS	$ 2,735.15	$	2,735.15
Clearing and Misc. Site Work (2.5%)	1	LS	$ 6,837.88	$	6,837.88
			Subtotal General:	$	30,086.65
Sewer System Infiltration and Inflow Prevention					
Line 8-inch Gravity Main	6,169	LF	$ 35.00	$	215,915.00
Line Laterals	14	EA	$ 4,000.00	$	56,000.00
Install Manhole Inserts	32	EA	$ 50.00	$	1,600.00
			Subtotal Sewer System Infiltration and Inflow Prevention:	$	273,515.00
			Total	**$**	**303,601.65**
			Contingencies (20%)	$	60,720.33
			Engineering, Legal Admin. Costs (15%)	$	45,540.25
			Total Cost:	**$**	**409,862.23**

Note:

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- Engineering fees should include an Infiltration and Inflow Study. This study should include gravity flow monitoring within each basin to
- Costs do not include the televising of the gravity sewer system

6.2.1.12 Project #12: Lift Station No. 7 Rehabilitation & Force Main Replacement

Lift Station No. 7 is located on the south of the intersection of NE 30th St. and NE 3rd Ave. The lift station was last rehabilitated in 1990, 30 years ago. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires the replacement of the electrical system, replacement of its two (2) 5 HP submersible pumps, 4-inch flow meter, recoating of the discharge force main in the wet well, valve vault and flow meter vault to bring the existing condition up to City standards. It is also recommended that the existing 4-inch force main be replaced. The force main, which transmits wastewater from Lift Station No. 7 to a downstream manhole, would require a direction drill installation to go under the north fork of the Middle River.

The City desires to start a redevelopment program which will increase the residential and commercial space within the City. To accommodate the redevelopment B&W recommends that the existing lift station pumps be replaced with 5.5 HP submersible pumps and the force main be replaced with a new 6-inch HDPE force main. Based on the proposed Project #12 improvements shown in ***Figure 6-25***, the following ***Table 6-29*** outlines the conceptual construction cost estimate.

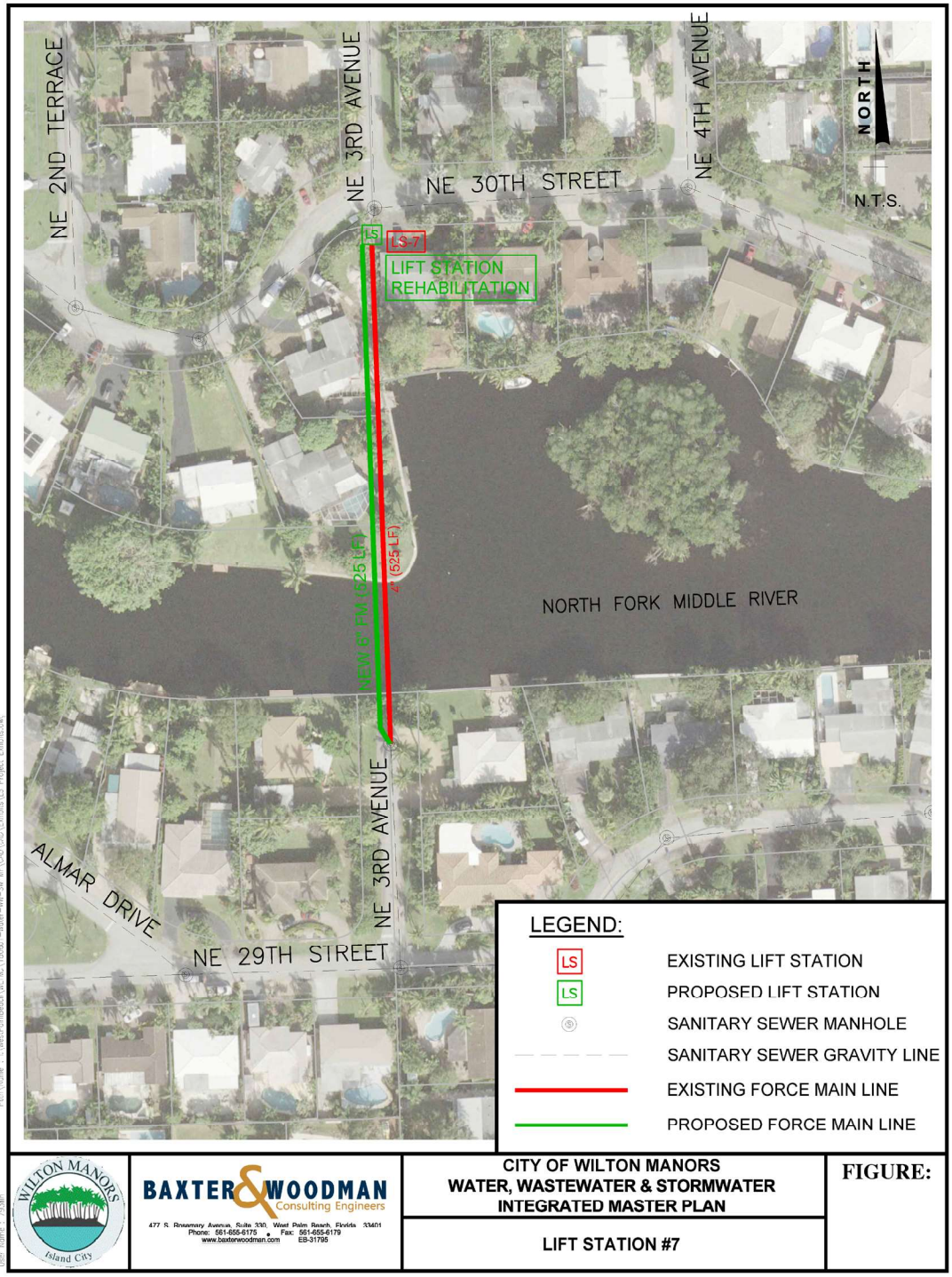

Figure 6-25: Project #12 – Proposed Lift Station No. 7 Rehabilitation & Force Main Replacement

Table 6-29: 10-Year CIP – Project #12 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price		Total
General					
General Conditions (5%)	1	LS	$ 21,988.75	$	21,988.75
Mobilization (2.5%)	1	LS	$ 10,994.38	$	10,994.38
Maintenance of Traffic (1%)	1	LS	$ 4,397.75	$	4,397.75
Clearing and Misc. Site Work (2.5%)	1	LS	$ 10,994.38	$	10,994.38
			Subtotal General:	$	48,375.25
Lift Station Rehabilitation and Force Main Replacement					
Demolition (Existing Electrical, Pumps)	1	LS	$ 5,000.00	$	5,000.00
Lift Station (Wet Well, Valve Vault, Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, Flow Meter, Concrete Slab, Coatings, and Other Appurtenances)	1	EA	$275,000.00	$	275,000.00
Abandon and Grout Existing Force Main	550	LF	$ 20.00	$	11,000.00
Furnish and Install 6-inch HDPE Force Main and Fittings	170	LF	$ 150.00	$	25,500.00
Furnish and Install Emergency Bypass Assembly	1	EA	$ 1,400.00	$	1,400.00
6-inch Gate Valve	2	EA	$ 1,250.00	$	2,500.00
6-inch Horizontal Directional Drill	380	LF	$ 150.00	$	57,000.00
Core Existing Manhole	1	EA	$ 2,000.00	$	2,000.00
Drill Pit Restoration	2	EA	$ 5,000.00	$	10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$	10,000.00
Connect to Existing FM	1	EA	$ 2,000.00	$	2,000.00
Open Cut Pavement/Sidewalk Restoration	45	LF	$ 50.00	$	2,250.00
Mill and Overlay	75	SY	$ 15.00	$	1,125.00
Site Restoration	1	LS	$ 10,000.00	$	10,000.00
Bypass Pumping	1	LS	$ 25,000.00	$	25,000.00
			Subtotal Lift Station Replacement:	$	439,775.00
			Total Construction	**$**	**488,150.25**
			Contingencies (20%)	$	97,630.05
			Engineering, Legal Admin. Costs (15%)	$	73,222.54
			Total Cost:	**$**	**659,002.84**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.13 Project #13: Lift Station No. 6 Pump & Force Main Replacement

Lift Station No. 6 is located on the south corner of NE 27th Dr. and NE 3rd Ave. The lift station was last rehabilitated in 2018, 2 years ago. B&W performed multiple site visits throughout the project timeline and determined that the lift station is in excellent condition. Although the City has recently replaced the lift station, the discharge and transmission force main is original. It recommended that the existing 6-inch force main be abandoned and replaced with a new 6-inch HDPE force main.

Although the lift station was recently replaced, the City desires to start a redevelopment program which will increase the residential and commercial space within the City. To accommodate the redevelopment B&W recommends that the existing lift station pumps be replaced with new 17 HP submersible pumps. Based on the proposed Project #13 improvements shown in ***Figure 6-26***, the following ***Table 6-30*** outlines the conceptual construction cost estimate.

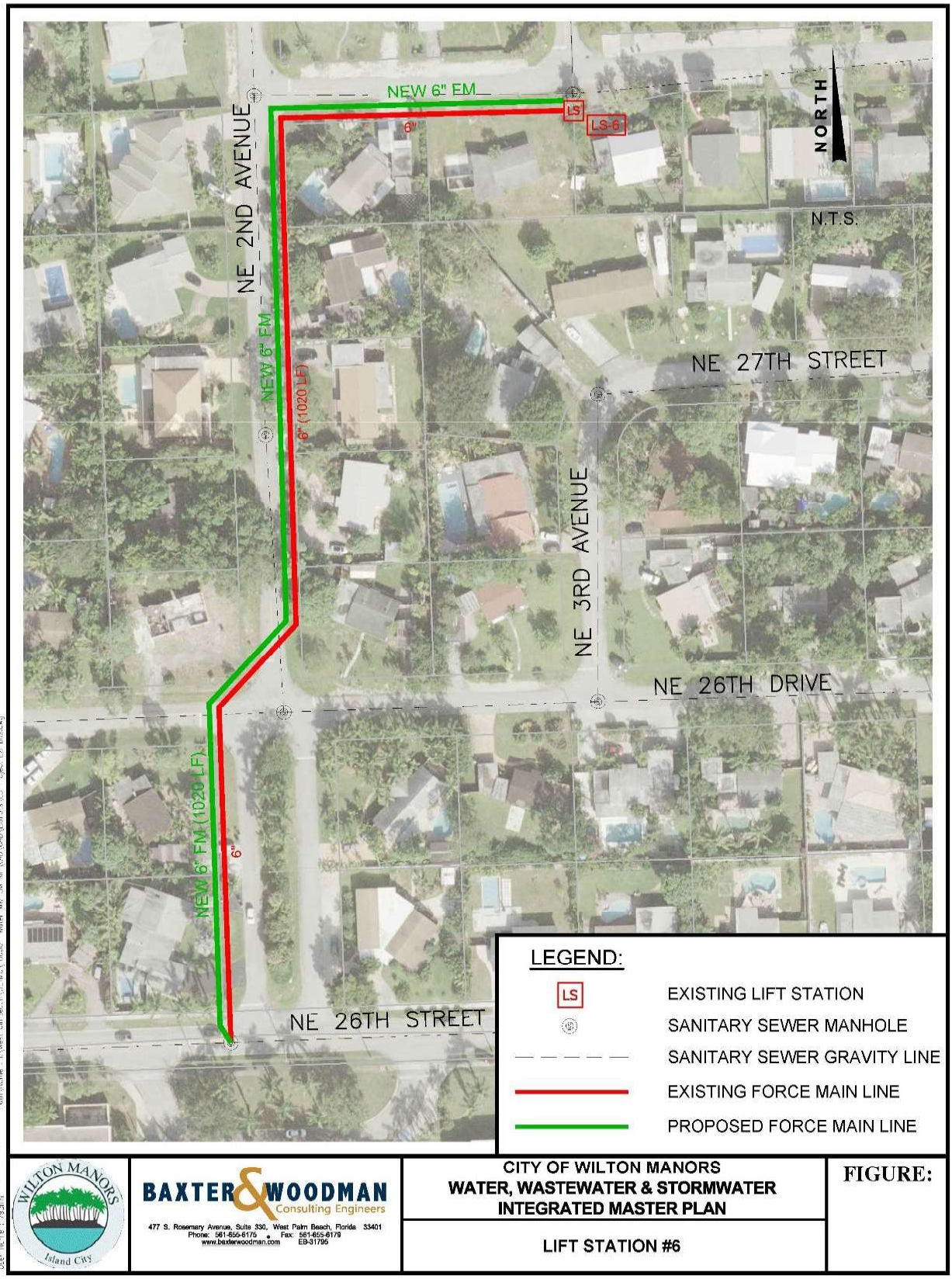

Figure 6-26: Project #13 – Proposed Lift Station No. 6 Force Main Replacement

Table 6-30: 10-Year CIP – Project #13 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 17,171.25	$ 17,171.25
Mobilization (2.5%)	1	LS	$ 8,585.63	$ 8,585.63
Maintenance of Traffic (1%)	1	LS	$ 3,434.25	$ 3,434.25
Clearing and Misc. Site Work (2.5%)	1	LS	$ 8,585.63	$ 8,585.63
			Subtotal General:	$ 37,776.75
Force Main Replacement				
Demolition (Electrical Equipment and Mechanical Equipment)	1	LS	$ 15,000.00	$ 15,000.00
Lift Station (Pumps and Electrical Equipment)	1	LS	$110,000.00	$ 110,000.00
Abandon and Grout Existing Force Main	970	LF	$ 20.00	$ 19,400.00
Furnish and Install 6-inch HDPE Force Main and Fittings	470	LF	$ 175.00	$ 82,250.00
Furnish and Install Emergency Bypass Assembly	1	EA	$ 1,400.00	$ 1,400.00
6-inch Gate Valve	1	EA	$ 1,250.00	$ 1,250.00
6-inch Horizontal Directional Drill	500	LF	$ 150.00	$ 75,000.00
Core Existing Manhole	1	EA	$ 2,000.00	$ 2,000.00
Drill Pit Restoration	2	EA	$ 5,000.00	$ 10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$ 10,000.00
Connect to Existing FM	1	EA	$ 2,000.00	$ 2,000.00
Open Cut Pavement/Sidewalk Restoration	20	LF	$ 50.00	$ 1,000.00
Mill and Overlay	275	SY	$ 15.00	$ 4,125.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
			Subtotal Lift Station Replacement:	$ 343,425.00
			Total Construction	**$ 381,201.75**
			Contingencies (20%)	$ 76,240.35
			Engineering, Legal Admin. Costs (15%)	$ 57,180.26
			Total Cost:	**$ 514,622.36**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.14 Project #14: Lift Station No. 8 Electrical & Force Main Replacement

Lift Station No. 8 is located on the southwest corner of NE 21st Ct. and NE 5th Ave. The lift station was last rehabilitated in 2008, 11 year ago. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires the total replacement of the electrical system to bring the existing condition up to City standards. Although the City has completed various improvements and rehabilitation work to the lift station, the discharge and transmission force main are original. It is recommended that the existing 6-inch force main be replaced with a new 6-inch HDPE force main. This lift station was identified and prioritized as Project #14 for proposed improvements. ***Figure 6-26*** shows the proposed Lift Station No. 8 electrical and force main improvements.

The City has received an increased number of odor complaints from this lift station. It is recommended that the City install an odor control unit similar to the unit recently installed at Lift Station No. 6. This lift station was identified and prioritized as Project #2 for proposed improvements.

The proposed lift station and force main improvements include electrical upgrades to the existing lift station and replacement of the existing 6-inch force main with a new 6-inch HDPE force main, Based on the proposed Project #14 improvements shown in ***Figure 6-27***, the following ***Table 6-31*** outlines the conceptual construction cost estimate.

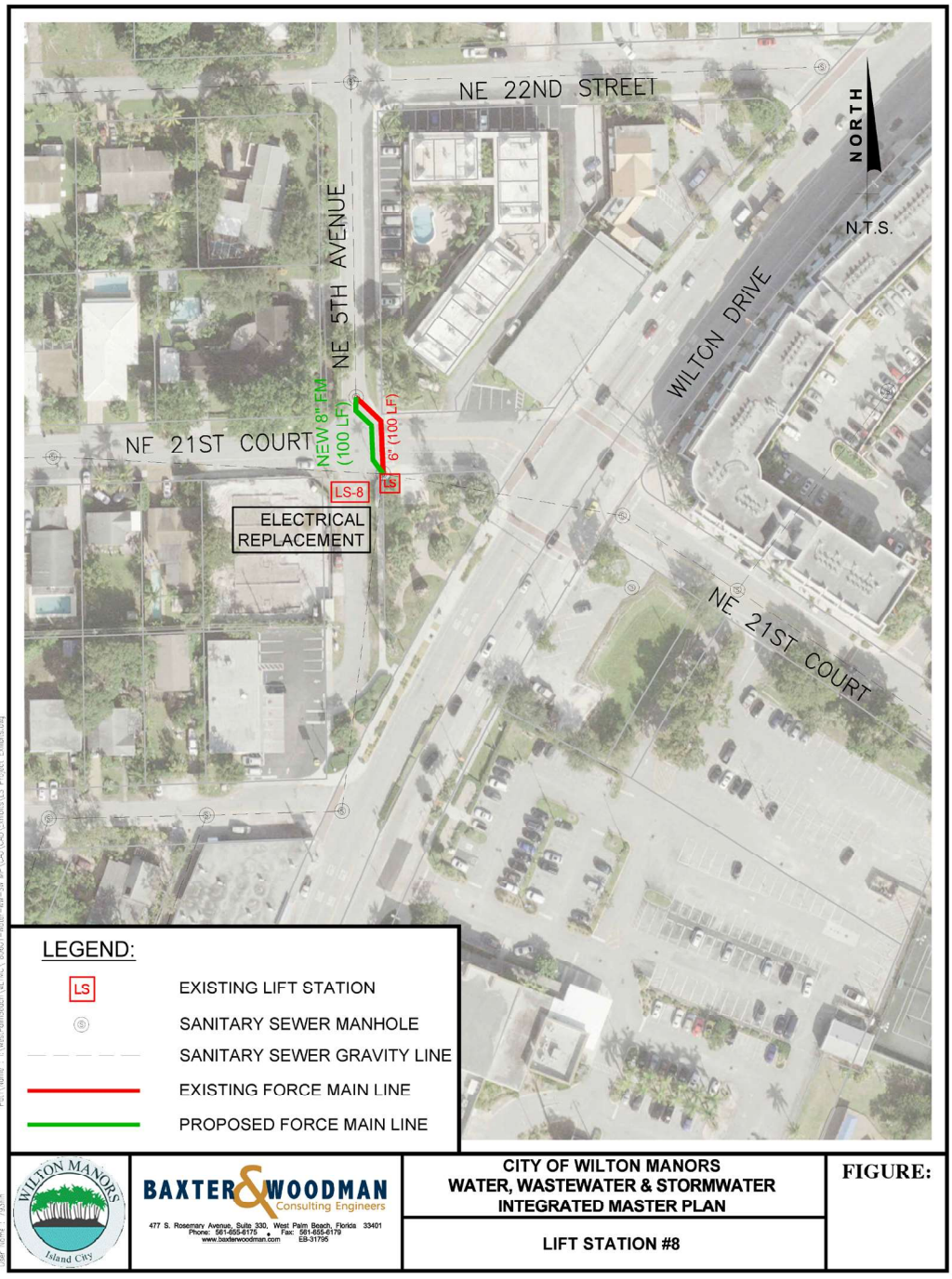

Figure 6-27: Project #14 – Proposed Lift Station No. 8 Electrical & Force Main Replacement

Table 6-31: 10-Year CIP – Project #14 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 11,440.00	$ 11,440.00
Mobilization (2.5%)	1	LS	$ 5,720.00	$ 5,720.00
Maintenance of Traffic (1%)	1	LS	$ 2,288.00	$ 2,288.00
Clearing and Misc. Site Work (2.5%)	1	LS	$ 5,720.00	$ 5,720.00
			Subtotal General:	$ 25,168.00
Lift Station Rehabilitation and Force Main Replacement				
Demolition (Electrical Equipment and Pumps)	1	EA	$ 15,000.00	$ 15,000.00
Lift Station (Pumps, Piping, Gate Valves, Check Valves, Bypass Piping, Electrical Equipment, and Other Appurtenances)	1	EA	$110,000.00	$ 110,000.00
Remove and Dispose of Existing 6-inch FM	120	LF	$ 20.00	$ 2,400.00
8-inch Horizontal Directional Drill	120	LF	$ 175.00	$ 21,000.00
Furnish and Install Emergency Bypass Assembly	1	EA	$ 1,400.00	$ 1,400.00
Drill Pit Restoration	2	EA	$ 5,000.00	$ 10,000.00
Air Release Valve and Vault	1	EA	$ 10,000.00	$ 10,000.00
Core Existing Manhole	1	EA	$ 2,000.00	$ 2,000.00
Connect to Existing FM	1	EA	$ 2,000.00	$ 2,000.00
Odor Control	1	LS	$ 7,500.00	$ 7,500.00
Open Cut Pavement/Sidewalk Restoration	100	LF	$ 50.00	$ 5,000.00
Mill and Overlay	500	SY	$ 15.00	$ 7,500.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
			Subtotal Lift Station Replacement:	$ 228,800.00
			Total Construction	**$ 253,968.00**
			Contingencies (20%)	$ 50,793.60
			Engineering, Legal Admin. Costs (15%)	$ 38,095.20
			Total Cost:	**$ 342,856.80**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.15 Project #15: Lift Station No. 10 Service Basin Lining

The City has experiences infiltration and inflow of groundwater and stormwater into the sanitary sewer collection system. B&W performed an infiltration and inflow analysis and calculated that Lift Station No. 10 receives significantly higher wastewater flows during rainfall events which indicates severe infiltration within the lift stations collection system. The higher flows at Lift Station No.10 also negatively affect the downstream lift station and sewer collection system networks. It is recommended that the City line the gravity sewer system, line a portion of the service laterals and install manhole inserts in Lift Station No. 10's basin, to reduce infiltration from rainfall events.

It was assumed that 10 percent of the total wastewater basin's service laterals would be lined. However, in lieu of lining the service laterals the City could opt to use grouting technology to grout all of the service laterals. The grout affectively seals the lateral for one or two section of pipe but is limited to sealing the entire lateral from main to clean out, like traditional liners. The grout also typically has a shorter service life of roughly 10-15 years. Lining laterals cost $4,000 per lateral while grouting costs $400 per lateral. It is recommended that the City perform a lining study before any work is scheduled. The lining study should use a combination of flow meter data and televising to eliminate any areas within the basin which require no lining and indicate areas which require more immediate attention. The cost for the lining study is included in engineering fee portion of the estimate. The cost estimate provided does not include any gravity main spot replacements.

The following ***Table 6-32*** outlines the conceptual construction cost estimate.

Table 6-32: 10-Year CIP – Project #15 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price		Total
General					
General Conditions (5%)	1	LS	$ 42,485.00	$	42,485.00
Mobilization (2.5%)	1	LS	$ 21,242.50	$	21,242.50
Maintenance of Traffic (1%)	1	LS	$ 8,497.00	$	8,497.00
Clearing and Misc. Site Work (2.5%)	1	LS	$ 21,242.50	$	21,242.50
			Subtotal General:	$	93,467.00
Sewer System Infiltration and Inflow Prevention					
Line 8-inch Gravity Main	18,580	LF	$ 35.00	$	650,300.00
Line Laterals	49	EA	$ 4,000.00	$	196,000.00
Install Manhole Inserts	68	EA	$ 50.00	$	3,400.00
	Subtotal Sewer System Infiltration and Inflow Prevention:			$	849,700.00
			Total	**$**	**943,167.00**
			Contingencies (20%)	$	188,633.40
			Engineering, Legal Admin. Costs (15%)	$	141,475.05
			Total Cost:	**$**	**1,273,275.45**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Engineering fees should include an Infiltration and Inflow Study. This study should include gravity flow monitoring within each basin to designate areas of concern within the gravity network.
- Costs do not include the televising of the gravity sewer system

6.2.1.16 Project #16: Lift Station No. 10 Rehabilitation

Lift Station No. 10 is located in front of 1904 NE 26th Dr. The lift station received various repairs in 2019. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires the replacement of the electrical system and 4-inch flow meter to bring the existing condition up to City standards. It is also recommended that the existing 4-inch discharge force main be replaced inside the wet well to the flow meter. The 4-inch force main from the flow meter to the downstream manhole was recently replaced. This lift station was identified and prioritized as Project #16 for proposed improvements. ***Figure 6-28*** shows the proposed Lift Station No. 10 improvements.

The proposed lift station and force main improvements include electrical upgrades to the existing lift station, replacement of the existing 4-inch force main with a new 4" HDPE force main, replacement of existing 4-inch discharge piping, and installation of new flow meter. Based on the proposed Project #16 improvements shown in ***Figure 6-28***, the following ***Table 6-33*** outlines the conceptual construction cost estimate.

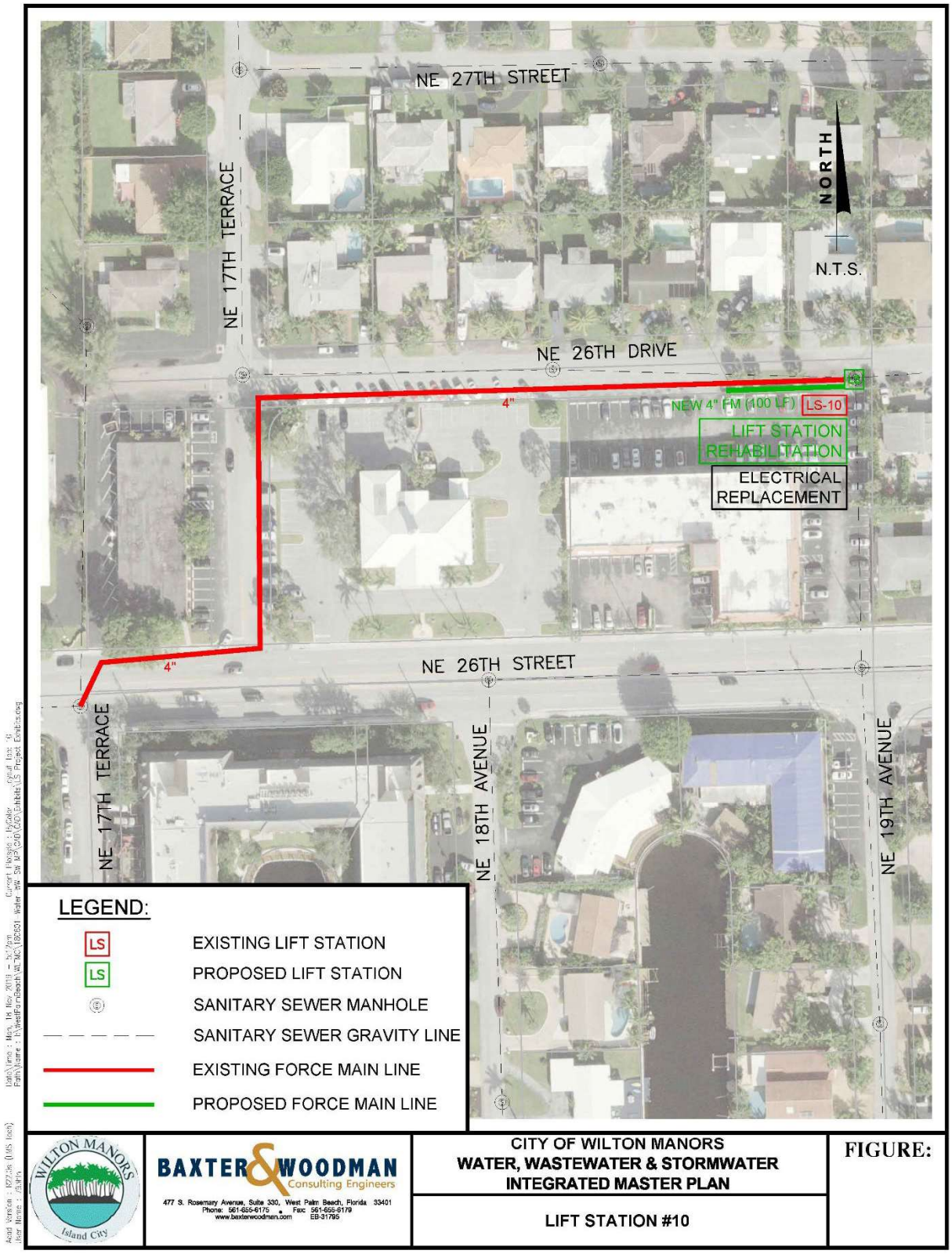

Figure 6-28: Project #16 – Proposed Lift Station No. 10 Rehabilitation

Table 6-33: 10-Year CIP – Project #16 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 7,520.00	$ 7,520.00
Mobilization (2.5%)	1	LS	$ 3,760.00	$ 3,760.00
Maintenance of Traffic (1%)	1	LS	$ 1,504.00	$ 1,504.00
Clearing and Misc. Site Work (2.5%)	1	LS	$ 3,760.00	$ 3,760.00
			Subtotal General:	$ 16,544.00
Lift Station Rehabilitation and Force Main Replacement				
Demolition (Existing Electrical, Discharge Piping)	1	LS	$ 5,000.00	$ 5,000.00
Furnish and Install new Electrical Panels and Equipment	1	LS	$ 75,000.00	$ 75,000.00
4-inch flow meter	1	EA	$ 4,000.00	$ 4,000.00
Remove and Dispose of Existing 4-inch FM	100	LF	$ 20.00	$ 2,000.00
Furnish 4-inch DIP Discharge Piping	40	LF	$ 150.00	$ 6,000.00
Furnish and Install 4-inch HDPE Force Main and Fittings	100	LF	$ 150.00	$ 15,000.00
Furnish and Install Emergency Bypass Assembly	1	EA	$ 1,400.00	$ 1,400.00
Connect to Existing FM	1	EA	$ 2,000.00	$ 2,000.00
Open Cut Pavement/Sidewalk Restoration	100	LF	$ 50.00	$ 5,000.00
Site Restoration	1	LS	$ 10,000.00	$ 10,000.00
Bypass Pumping	1	LS	$ 25,000.00	$ 25,000.00
			Subtotal Lift Station Replacement:	$ 150,400.00
			Total Construction	**$ 166,944.00**
			Contingencies (20%)	$ 33,388.80
			Engineering, Legal Admin. Costs (15%)	$ 25,041.60
			Total Cost:	**$ 225,374.40**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all electrical components for a complete and operable lift station.
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.
-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.1.17 10-Year CIP Wastewater Improvements Summary

As summarized in ***Table 6-34***, the proposed short-term improvements were summarized and prioritized into sixteen (16) CIP projects that are proposed to be implemented over the next 10-years.

Table 6-34: 10-Year CIP Project Summary

Project		Estimated Cost of Recommended Improvements
Project #1 - Lift Station No. 11 Pump Impeller Upgrade*	$	22,477.50
Project #2 - Lift Station No. 1 Replacement & Force Main Replacement*	$	671,005.82
Project #3 - Lift Station No. 4 Service Basin Lining	$	199,390.41
Project #4 - Lift Station No. 4 Replacement	$	593,735.67
Project #5 - Lift Station No. 2 Replacement	$	612,908.98
Project #6 - Lift Station No. 5 Service Basin Lining*	$	1,571,529.40
Project #7 - Lift Station No. 5 Electrical, Pumps & Force Main Replacement*	$	566,845.09
Project #8 - Gravity Main Trunkline Replacement*	$	5,502,991.50
Project #9 - Lift Station No. 3 Service Basin Lining*	$	1,256,724.52
Project #10 - Lift Station No. 3 Rehabilitation & Force Main Replacement*	$	1,549,449.00
Project #11 - Lift Station No. 7 Service Basin Lining*	$	409,862.23
Project #12 - Lift Station No. 7 Rehabilitation & Force Main Replacement*	$	659,002.84
Project #13 - Lift Station No. 6 Pump & Force Main Replacement*	$	514,622.36
Project #14 - Lift Station No. 8 Odor Control, Electrical, Pump & Force Main Replacement	$	342,856.80
Project #15 - Lift Station No. 10 Service Basin Lining	$	1,273,275.45
Project #16 - Lift Station No. 10 Rehabilitation	$	225,374.40
Total:	**$**	**15,972,051.96**

6.2.2 20-Year CIP Wastewater Improvements

The recommended project list below is a result of in-field lift station assessments and drawdown tests, workshops with the City which include discussions with managerial and operations staff, City customer complain logs, gravity trunkline analysis and I&I analysis .

20-Year Planning Horizon
17) Lift Station No. 9 Rehabilitation

The proposed improvements for each project are described in further detail in the sections that follow and include conceptual cost estimates for each project. The conceptual construction cost estimate includes the cost for detailed design and construction engineering and inspection for the project. The construction cost information is preliminary in nature. These costs are based upon comparisons of previous and current similar types of work and materials underway in the Southeast Florida area. All costs developed herein are in 2019 dollars and do not include land acquisitions or easements.

6.2.2.1 Project #17: Lift Station No. 9 Rehabilitation

Lift Station No. 9 is located on the southeast corner of NE 28th St. and NE 6th Ln. The lift station was last rehabilitated in 2007, 12 year ago. B&W performed multiple site visits throughout the project timeline and determined that the lift station requires the total replacement of the electrical system, and recoating of the discharge force main in the wet well, valve vault and flow meter vault to bring the existing condition up to City standards. This lift station was identified and prioritized as Project #17 for proposed improvements. The following ***Table 6-35*** outlines the conceptual construction cost estimate.

Table 6-35: 20-Year CIP – Project #17 Engineer's Opinion of Probable Construction Cost

	Estimated Quantity	Unit	Unit Price	Total
General				
General Conditions (5%)	1	LS	$ 4,750.00	$ 4,750.00
Mobilization (2.5%)	1	LS	$ 2,375.00	$ 2,375.00
Maintenance of Traffic (1%)	1	LS	$ 950.00	$ 950.00
Clearing and Misc. Site Work (2.5%)	1	LS	$ 2,375.00	$ 2,375.00
			Subtotal General:	$ 10,450.00
Lift Station Rehabilitation and Force Main Replacement				
Furnish and Install new Electrical Panels and Equipment	1	LS	$ 75,000.00	$ 75,000.00
Recoat the wet well, valve vault and flow meter vault	1	LS	$ 20,000.00	$ 20,000.00
			Subtotal Lift Station Replacement:	$ 95,000.00
Total Construction				**$ 105,450.00**
Contingencies (20%)				$ 21,090.00
Engineering, Legal Admin. Costs (15%)				$ 15,817.50
Total Cost:				**$ 142,357.50**

Note:

- Costs are based on conceptual design (2019 dollars). Since the Engineer has no control over the cost of labor, materials, equipment or services furnished by others, or over the Contractor's methods of determining prices, or over competitive bidding or market conditions, Engineer's opinion of probable Construction Cost provided herein are made on the basis of Engineer's experience and qualifications and represent Engineer's best judgement as an experienced and qualified Engineer familiar with the construction industry. Engineer cannot and does not guarantee that proposals, bids or actual Total Project or Construction Costs will not vary from opinions of probable construction cost prepared by Engineer.
- Lift station costs include all piping and appurtenances from the pumps inside the wet well to the pipe exiting the valve vault plus all
- Watermain cost does not include the following: transfer of rear yard services, driveway replacement.
- Costs associated with acquiring easements, land, etc. to site new lift station is not included.

-Site Restoration includes pavement striping, sodding, grading, miscellaneous repairs.

6.2.2.2 20-Year CIP Wastewater Improvements Summary

The following table provides the project and cost estimate for the proposed CIP over the next 20-years. There was only one (1) wastewater project identified for the 20-year planning horizon. All other projects have been identified in the previous section for the 10-year planning horizon.

Table 6-36: 20-Year CIP Project Summary

FY	Project		Estimated Cost of Recommended Improvements
2030 / 2031	Project #17 - Lift Station No. 9 Rehabilitation	$	142,357.50
		Total:	**$ 142,357.50**