

**MAY RIVER WATERSHED SEWER MASTER  
PLAN STUDY AND REPORT – PHASE I**

FOR

**BEAUFORT-JASPER  
WATER & SEWER AUTHORITY  
AND  
TOWN OF BLUFFTON**



Prepared by



**APRIL 2014**

Hussey Gay Bell & DeYoung, Inc.  
Consulting Engineers

SAVANNAH • GAINESVILLE • CHARLESTON • COLUMBIA

[www.hgbd.com](http://www.hgbd.com)

## TABLE OF CONTENTS

	<u>Page No.</u>
<b>EXECUTIVE SUMMARY</b>	i
<b>A. BACKGROUND INFORMATION</b>	1
<b>I. PURPOSE</b>	1
<b>II. AUTHORIZATION</b>	1
<b>III. STUDY AREA</b>	2
<b>IV. ZONING</b>	2
<b>B. DERIVATION OF PROJECTED FLOWS</b>	3
<b>C. DISCUSSION OF SEWER SYSTEM IMPROVEMENT ALTERNATIVES</b>	4
<b>I. No Action</b>	4
<b>II. Gravity Sanitary Sewer Extensions</b>	4
<b>III. New Traditional Gravity/Lift Station Sanitary Sewer System</b>	4
<b>IV. Vacuum Sewer System</b>	5
<b>V. Low Pressure Grinder System</b>	7
<b>D. EASEMENTS</b>	8
<b>E. COST ESTIMATE SUMMARY</b>	9
<b>APPENDIX A</b> Gravity Sanitary Sewer Extensions for Old Town Sewer Service Area Anticipated Cost Estimate	
<b>APPENDIX B</b> New Traditional Gravity/Lift Station Sanitary Sewer System for Alljoy Sewer Service Area Anticipated Cost Estimate	
<b>APPENDIX C</b> Vacuum Sewer System Analysis and Typical Features	
<b>APPENDIX D</b> Vacuum Sewer Concept for Alljoy Sewer Service Area Anticipated Cost Estimate	
<b>APPENDIX E</b> Vacuum Sewer Concept for Cahill Sewer Service Area Anticipated Cost Estimate	
<b>APPENDIX F</b> Vacuum Sewer Concept for Gascoigne Sewer Service Area Anticipated Cost Estimate	
<b>APPENDIX G</b> Vacuum Sewer Concept for Stoney Creek Sewer Service Area Anticipated Cost Estimate	

**APPENDIX H**

Vacuum Sewer Concept for Pritchardville Sewer Service Area  
Anticipated Cost Estimate

**APPENDIX I**

Vacuum Sewer Concept for Pritchardville and Stoney Creek Sewer Service Area - Combined

**APPENDIX J**

Low Pressure Grinder Sewer System Typical Features

**APPENDIX K**

Low Pressure Grinder Sewer Concept for Alljoy Sewer Service Area  
Anticipated Cost Estimate

**APPENDIX L**

Low Pressure Grinder Sewer Concept for Cahill Sewer Service Area  
Anticipated Cost Estimate

**APPENDIX M**

Low Pressure Grinder Sewer Concept for Gascoigne Sewer Service Area  
Anticipated Cost Estimate

**APPENDIX N**

Low Pressure Grinder Sewer Concept for Stoney Creek Sewer Service Area  
Anticipated Cost Estimate

**APPENDIX O**

Low Pressure Grinder Sewer Concept for Pritchardville Sewer Service Area  
Anticipated Cost Estimate

**APPENDIX P**

Gravity, Low Pressure Grinder and Force Main Sewer Concept for Pritchardville Sewer Service Area  
Anticipated Cost Estimate

**EXHIBIT 1** - Alljoy Sewer Service Area

**EXHIBIT 2** - Old Town Sewer Service Area

**EXHIBIT 3** - Cahill Sewer Service Area

**EXHIBIT 4** - Gascoigne Sewer Service Area

**EXHIBIT 5** - Stoney Creek Sewer Service Area

**EXHIBIT 6** - Pritchardville Sewer Service Area

**EXHIBIT 7** - Overall Sewer Service Areas



# May River Watershed Sewer Master Plan Study and Report – Phase I March 2014

## EXECUTIVE SUMMARY:

Hussey, Gay, Bell & DeYoung, Inc. (HGBD) was retained by Beaufort-Jasper Water & Sewer Authority (BJWSA) and the Town of Bluffton (Town) regarding a sewer master plan for the May River Watershed. The project is a joint effort between BJWSA, the Town and Beaufort County to mitigate the usage of septic tanks which negatively impact not only public health but also ground water quality and, ultimately, the water bodies in and around the Town. The master plan is intended to provide long range planning of capital projects based on the perceived need, popular demand, benefit to the environment, public health and project cost to benefit. An analysis of the capacity of the existing sewer collection system and any necessary capacity improvements was not within the scope of the study.

This study evaluated how to determine the most economical way to extend BJWSA sewer service to six areas along the May River, from Pritchardville to Alljoy Landing, as shown on **Exhibit 7**. The six primary areas that were evaluated include:

- Pritchardville – 1,047 Acres +/-
- Stoney Creek – 747 Acres +/-
- Gascoigne Bluff – 657 Acres +/-
- Cahill – 709 Acres +/-
- Old Town – 291 Acres +/-
- Alljoy – 903 Acres +/-

The probable total budget cost for the conceptual utility infrastructure includes easement preparation and legal fees, contingency and engineering. Several sewer system alternatives and technologies were evaluated with anticipated cost estimates and conceptual layouts prepared for each area.

Sewer service in the Old Town and Alljoy areas has proven to be the most cost effective and acceptable to phasing the construction if desired.

## A. BACKGROUND INFORMATION

### I. **PURPOSE:**

#### Service Area Delineation

- To determine sewer service boundary area for each study area
- To delineate sewer service area and determine existing conditions (i.e. zoning, population, acreage, number of septic tanks)

#### Projected Sewer Flows

- To determine the number of “ready to serve” sewer connections based on the existing zoning
- To estimate the future number of sewer connections based on the existing land use and development
- To determine the current and future sewer flows for each area based on 300 gallons per day per equivalent residential unit (300 GPD/ERU)

#### Sewer Collection Details

- Develop a concept layout for sewer collection for the alternate system within each service area
- Develop “order of magnitude” cost estimates for sewer collection system only in each service area

#### Service Area Rankings

- Develop criteria for ranking each sewer service area (i.e. number of septic tanks removed, number of future sewer connections, proximity to the May River, proximity to BJWSA sewer system, public interest, sewer cost, etc.)

### II. **AUTHORIZATION:**

This study has been completed under a contract with BJWSA for May River Watershed Sewer Master Plan – Phase I, fully executed on April 15, 2013.

### III. STUDY AREA:

The service areas are defined by septic tank users within the May River Watershed Limits. These areas were divided into six (6) distinct areas, known as the following:

- Pritchardville – 1,047 Acres +/-
- Stoney Creek – 747 Acres +/-
- Gascoigne Bluff – 657 Acres +/-
- Cahill – 709 Acres +/-
- Old Town – 291 Acres +/-
- Alljoy – 903 Acres +/-

The study area limits are shown in **Exhibits 1-7**. The study area was defined based on input from BJWSA and the Town of Bluffton.

### IV. ZONING:

The zoning of properties within the study area is depicted in **Exhibits 1-7**, which has been reproduced from zoning districts maps, provided by the Town of Bluffton and GIS information from BJWSA. The zoning classifications have been used to derive probable build-out wastewater flows.

**B. DERIVATION OF PROJECTED FLOWS**

The scope of determining current sewer flows was based the assumptions that every lot with an existing building structure contains one (1) septic tank and drain field. The buildings, parcels and zoning information were provided by BJWSA GIS Department for HGBD’s use. Only “order of magnitude” estimates can be made in the absence of final development plans for the study areas in regards to future / build-out sewer flows.

The scope also included the assumption that each building equates to 300 gpd/eru. Therefore the following table outlines the number of existing, undeveloped/vacant, and build-out lots and the anticipated sewer flows:

Area	No. of Developed Lots <sup>1</sup>	No. of Undeveloped/Vacant Lots <sup>2</sup>	No. of Future Lots <sup>3</sup>	Total No. of Lots (Buildout) <sup>4</sup>	Average Day Demand (GPD) <sup>5</sup>	Peak Day Demand (GPD) <sup>6</sup>
Alljoy	684	201	713	1,598	479,330	1,198,326
Old Town <sup>7</sup>	104	47	0	151	45,300	113,250
Cahill	99	32	10	141	42,300	105,750
Gascoigne	55	22	40	116	34,800	87,000
Stoney Creek	150	40	10	200	60,000	150,000
Pritchardville	502	100	100	702	210,600	526,500
<b>Total</b>	<b>1,593</b>	<b>442</b>	<b>873</b>	<b>2,908</b>	<b>872,330</b>	<b>2,180,826</b>

**Assumptions:**

1. Assume parcels with a structure have one (1) septic tank and drain field.
2. Vacant or undeveloped lots based on existing parcels without a structure that will require a connection to the proposed sanitary sewer system once the lot is occupied.
3. Future count is based on large developable tracts of land, and assumes the tracts can be subdivided based on current zoning regulations and adjacent properties that are developable. Count determined by a proportion of developable land area (does not include wetland areas) to subdivide.
4. The number of structures at buildout conditions assumes all existing parcels with septic tank, currently vacant lots, and future lots are occupied with sanitary sewer connection.
5. Assumes 300 GPD/structure
6. Assumes 2.5 peaking factor
7. Count of current structures is based on total structures that have one (1) septic tank. Parcels currently connected to sanitary sewer system are not included.

For the basis of this report, the developed and undeveloped/vacant lot count was used for design analysis and construction cost estimating of each. However, only developed lots were used for cost estimations for the number of valve pits and/or connection points.

## **C. DISCUSSION OF SEWER SYSTEM IMPROVEMENT ALTERNATIVES**

There are many sanitary sewer collection system alternatives available. HGBD has had previous experience with each of these alternatives. This section discusses the pros and cons of these different sewer collection system alternatives. The following alternatives were reviewed for each service area:

### **I. No Action**

The No Action option is not the preferred option for any of the service areas as it does not remove the septic tank and drain field from the May River Watershed. However, this option could be a viable economic solution for remote and less densely populated areas such as Gascoigne or an area significantly distanced from the May River such as the northern portion of Pritchardville. The other service areas do not benefit from the No Action option.

It is recommended that a Septic Operations & Maintenance and Inspection Agreement be implemented between the property owner and the authority (i.e. Town, County, or BJWSA) if the No Action alternative is pursued. The Agreement would serve as a periodic review of the condition and function of the septic tank and drain field. At the authorities' discretion a cost for managing the inspections of the septic tanks and drain fields would be borne by the property owner.

### **II. Gravity Sanitary Sewer Extensions**

Significant extensions of the existing gravity sewers into the service areas are not possible because of their depths, with the exception of Old Town.

Old Town has a significant amount of existing gravity sanitary sewer mains within its service area. These manholes have depths which allow for extensions of the gravity sanitary sewer mains.

**Appendix A** includes the gravity sanitary sewer extension system concept layout and cost estimate for Old Town.

The advantage to gravity sewer is that it is easier to phase, which makes funding smaller project over time more manageable.

### **III. New Traditional Gravity/Lift Station Sanitary Sewer System**

A new traditional gravity sanitary sewer collection system including new lift stations and force mains is the most preferred alternative. A great benefit to this alternative is the ability to phase the installation according to available funding and the proven longevity of the system. This alternative can be implemented in all of the service

areas.

However, there are factors that increase the cost and regulatory concern. Gravity sewer mains generally are installed from depths of 3-ft to 20-ft. The new system would connect to an existing gravity sewer system or if one is not present, a new lift station would be required. Due to significantly sized trees close to or within the right-of-way and private drives the depths of the gravity mains would be limited to approximately 10-ft in order to avoid extensive excavation during installation. This increases the number of new lift stations required which is a significant cost factor. Additionally, sewer mains may be installed within the roadway in order to avoid damage to tree roots. This requires single-lane access during construction, increase cost due to removal and replacement of asphalt.

This option was reviewed in detail for the Alljoy service area due to the limited number of main highways and highly dense population.

**Appendix B** includes the new traditional gravity/lift station sanitary sewer system concept layout and cost estimate for Alljoy.

Traditional gravity sewer collection is an option, however, it may not viable due to the cost of installation of deep sewers, replacement of existing landscape and roadways.

Additionally, service areas that have isolated subdivided neighborhoods could benefit from this alternative while the other parcels could be connected to a vacuum or low pressure grinder sewer collection system. However, if one is reviewing a service area as a whole, the anticipated construction cost would increase per customer due to the decrease in population utilizing the vacuum or low pressure grinder sewer collection system. For example, the subdivided neighbor in the northern section of Pritchardville could benefit from a traditional sanitary sewer collection system and connect to the existing BJWSA sewer infrastructure adjacent to the neighborhood. However, the cost per customer using a vacuum or low pressure grinder sewer collection system for the remainder of the Pritchardville service area would significantly increase.

#### **IV. Vacuum Sewer System**

A vacuum sewer system was reviewed with AirVac for all service areas with the exception of Old Town due to the close proximity of existing manholes capable of connecting and extending new gravity mains.

The vacuum sewer system has proven to be a good alternative solution with installations at Broad Creek Public Service District (BCPSD) and Fripp Island Public Service District.

Vacuum sewer system utilizes a valve pit package that connects and serves up to four (4) customers each; however HGBD recommends providing a two (2) valve pit

package per customer, where physically possible. This gives the ability to have two (2) additional connections in the future. Only one (1) valve pit package per customer is required where homes are not in close proximity of each other.

Electrical power is not required for the valve pits. The valve pits connect to a 3-inch Schedule 40 or SDR 21 PVC vacuum service lateral which then connects to the vacuum main ranging from 4 to 8-inches buried with 3-ft of cover utilizing Schedule 40 or SDR 21 PVC. Isolation valves are installed typically at the beginning of each branch line and on the vacuum main near these branch connections. The purpose of these valves is to isolate sections of the vacuum system for troubleshooting purposes.

The vacuum mains end at the vacuum station and discharge into a steel collection tank. Once the tank reaches its capacity dry-pit sewage pumps deliver the sewage through a force main to the desired location within the existing sanitary sewer conveyance system.

A vacuum station consists of a collection tank, duplex dry-pit horizontal non-clog centrifugal pumps, vacuum pumps, emergency generator, Bio-mass odor control system for exhaust from the vacuum pumps and control panel. Stations are typically housed in a two story structure with the vacuum pumps and control panel located on the top floor and the collection tank and sewage pumps on the lower floor.

A single vacuum station is recommended for each service area serving both the existing and vacant parcels. It should be noted the proposed vacuum system capacity is adequate for the anticipated future population noted herein with the exception of Alljoy. One additional vacuum station is anticipated if the large vacant tract, located in the northern portion of Alljoy bounded by Burnt Church Road to the west, Foreman Hill Road to the east, Ulmer Road to the south and the May River Watershed limit to the north is to be developed. Upon additional developmental information for this tract a detailed analysis can be performed.

The benefits of the vacuum system include the following:

1. No power connections at each customer;
2. Isolation valves provide isolated shut-down when required for maintenance or repairs;
3. Shallow vacuum main buried cover depth;
4. Can function as a hybrid system utilizing low pressure grinder system;
5. Only one (1) vacuum station required per service area;
6. Ability to phase system within the service area

The con of the vacuum system is the high capital cost and the difficulty in phasing the system construction. This system is predominately effective in locations that have highly dense populations, high ground water tables and/or very low topography.

**Appendix C** includes AirVac's analysis of each service area and typical features

included with the vacuum system.

**Appendix D – H** includes the vacuum sewer system concept layout and cost estimate for each service area with the exception of Old Town.

#### V. **Low Pressure Grinder System**

A low pressure grinder system was reviewed with E-One and ABS for all service areas with the exception of Old Town due to the close proximity of existing manholes capable of connecting and extending new gravity mains.

The low pressure grinder system has proven to be an acceptable alternative solution, with many installations throughout BJWSA's service area

Low pressure grinder systems utilize a valve pit package that connects and serves each customer. A 240 volt, single phase electrical power connection is required per valve pit. The valve pits connect to a 1-1/4-inch HDPE service lateral which then connects to the force main ranging from 2 to 8-inches buried with 3-ft of cover utilizing HDPE pipe. Isolation valves are installed typically at the beginning of each branch line and on the force main near these branch connections. The purpose of these valves is to isolate sections of the low pressure grinder system for troubleshooting purposes.

The force mains terminate at the desired existing sanitary sewer infrastructure conveyance point.

The benefits of the low pressure grinder system include the following:

1. Isolation valves provide isolated shut-down when required for maintenance or repairs;
2. Shallow force main buried cover depth;
3. Ability to phase system within the service area

The con of the low pressure grinder system is the high capital and operational cost. This system is predominately effective in locations that have highly dense populations. Additionally, there is a power connection at each customer; therefore the system is off-line during a power failure event.

Due to the large analysis package received by the vendors, **Appendix J** provides only the typical grinder pump station features, valves and appurtenances for a simplex basin grinder pump package.

**Appendix K-O** includes the low pressure grinder sewer system concept layout and cost estimate for each service area with the exception of Old Town.

**Appendix P** includes a proposed hybrid option for Pritchardville of low pressure grinders and traditional gravity sewer and force mains. This option was reviewed to look at the potential for phasing a portion of the service area that may develop more quickly near the intersection of May River Road and Gibbet Road.

#### **D. EASEMENTS**

Easements required for each service area will be determined during the design process. All of the concepts will require utility easements for the installation of the sewer system. For proposed sewers and force main shown running along arterial roads (i.e. Gibbet Road, May River Road, Old Miller Road, Palmetto Bluff, etc) it is advisable to locate them in utility easements, immediately outside the road right-of-ways. Otherwise, should these roads be widened in the future, BJWSA would be required to pay for the relocation of the utilities. However, requirements by tree ordinances and/or SCDOT may require consideration of the new infrastructure within the roadway.

E. COST ESTIMATE SUMMARY

Table 2: Sewer System Anticipated Cost Estimate Summary								
Service Area	Type of Sewer System							
	Vacuum Sewer System	Vacuum Sewer System Per Developed Lot	Low Pressure Sewer System	Low Pressure Sewer System Per Developed Lot	Gravity Sewer System	Gravity Sewer System Per Developed Lot	Gravity/Low Pressure System Combines	Gravity/Low Pressure System Combined Per Developed Lot
Alljoy	\$10,300,000	\$15,100	\$11,800,000	\$17,300	\$12,500,000	\$18,300	N/A	N/A
Old Town	N/A	N/A	N/A	N/A	\$2,600,000	\$25,000	N/A	N/A
Cahill	\$4,100,000	\$41,500	\$3,700,000	\$37,400	N/A	N/A	N/A	N/A
Gascoigne	\$3,000,000	\$55,600	\$2,100,000	\$38,900	N/A	N/A	N/A	N/A
Stoney Creek	\$4,700,000	\$31,400	\$4,400,000	\$29,400	N/A	N/A	N/A	N/A
Pritchardville	\$9,500,000	\$19,000	\$10,500,000	\$21,000	N/A	N/A	\$10,700,000	\$21,400

# **APPENDIX A**

## **Gravity Sanitary Sewer Extensions for Old Town Sewer Service Area**

### **Anticipated Cost Estimate**

GRAVITY SEWER EXTENSION SYSTEM BUDGET COST ESTIMATE  
MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I  
OLD TOWN SEWER SERVICE AREA  
October 4, 2013

Item No	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	8" PVC Gravity Sewer 4' - 8' deep	12,330	LF	\$ 26.00	\$ 320,580.00
2	Manholes, 4' diameter, standard, 4' - 8' deep	45	EA	\$ 3,000.00	\$ 135,000.00
3	Core and modify existing manhole and connect new sewer main, 4' - 8' deep	15	EA	\$ 6,000.00	\$ 90,000.00
4	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC gravity main	120	LF	\$ 150.00	\$ 18,000.00
5	Insert 8-inch PVC gravity main in casing	120	LF	\$ 50.00	\$ 6,000.00
6	4-inch lateral to easement or R/W line (near side) <sup>1</sup>	930	LF	\$ 12.00	\$ 11,160.00
7	4-inch lateral to easement or R/W line (far side) <sup>1</sup>	1,860	LF	\$ 40.00	\$ 74,400.00
8	Simplex Fiberglass Grinder Station <sup>2</sup>	11	EA	\$ 4,572.00	\$ 50,292.00
9	1.19" HDPE SDR9 Service Lateral <sup>3</sup>	1,876	LF	\$ 10.00	\$ 18,760.00
10	2" HDPE SDR11 Pipe	1,385	LF	\$ 12.00	\$ 16,620.00
11	Connect Lateral to Existing Force Main <sup>3</sup>	13	EA	\$ 2,000.00	\$ 22,000.00
12	Electrical Home Connection <sup>2</sup>	11	EA	\$ 2,500.00	\$ 27,500.00
13	Clean outs	93	EA	\$ 75.00	\$ 6,975.00
14	Silt Fence	14,796	LF	\$ 3.50	\$ 51,786.00
15	Grassing (Temporary and Permanent)	4,110	SY	\$ 2.00	\$ 8,220.00
16	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	200	CY	\$ 70.00	\$ 14,000.00
17	Remove driveway surface, replace with 2" graded aggregate <sup>3</sup>	104	EA	\$ 160.00	\$ 16,640.00
18	Remove and replace 3' of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	11,600	SY	\$ 70.00	\$ 812,000.00
19	Decommissioning of existing septic tank <sup>5</sup>	104	EA	\$ 500.00	\$ 52,000.00
20	Traffic Control	1	JOB	Lump Sum	\$ 15,000.00
21	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 106,015.98
Subtotal					\$ 1,872,948.98
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 112,376.94
Engineering Fees (15%)					\$ 280,942.35
Construction Contingencies (15%)					\$ 280,942.35
Estimated Probable Cost					\$ 2,547,210.61
CALL <sup>III, IIII, IV</sup>					\$ 2,600,000.00
No. of existing customers:					104
Cost per customer:					\$ 25,000.00

Assumptions:

- Lateral lengths will vary.
- Assumes price for connection to homeowner's electrical power. Cost is for what is assumed, unforeseen costs are difficult to predict for each homeowner's unique existing electrical setup.
- Remove and replace unsuitable material; quantity assumed; remove and replace driveways; quantity assumed. Yard and driveway restoration will vary.
- Assumes gravity main within all roads.
- Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.

I: Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.

II: It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the

III: Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.

IV: Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BJWSA & Town of Bluffton.



LEGEND	
WETLANDS	IN-LINE FLUSHING CONNECTION
WATERSHED LIMITS	TERMINAL FLUSHING CONNECTION
EXISTING CONTOURS 20	ISOLATION VALVES
SEWER SERVICE BOUNDARY	EXISTING GRINDER PUMP
12" PIPE	EXISTING LIFT STATION
EXISTING GRAVITY SEWER	EXISTING FORCE MAIN
PROPOSED GRAVITY SEWER	

**HBD** Hussey, Gay, Bell & DeYoung - Consulting Engineers  
 Savannah, Georgia • Columbia, South Carolina • Mount Pleasant, South Carolina • Gainesville, Georgia



**APPENDIX A**  
**GRAVITY SANITARY SEWER EXTENSIONS**  
 FOR  
**OLD TOWN SEWER SERVICE AREA**  
 DATE OCTOBER 2013

# **APPENDIX B**

**New Traditional Gravity / Lift Station  
Sanitary Sewer for Alljoy Sewer  
Service Area**

**Anticipated Cost Estimate**

**GRAVITY SEWER EXTENSION SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**ALLOY SEWER SERVICE AREA**  
 October 4, 2013

Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	8" PVC Gravity Sewer	30,000	LF	\$ 26.00	\$ 1,300,000.00
2	Manholes, 4' diameter, standard	180	EA	\$ 3,000.00	\$ 540,000.00
3	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC gravity main	300	LF	\$ 150.00	\$ 45,000.00
4	Insert 8-inch PVC gravity main in casing	300	LF	\$ 50.00	\$ 15,000.00
5	4-inch PVC force main, AWWA C900, SDR-18	14,299	LF	\$ 16.00	\$ 228,777.60
6	4-inch RJ PVC force main, AWWA C900, SDR-18	1,678	LF	\$ 18.00	\$ 30,204.00
7	4-inch DI Force Main	493	LF	\$ 24.00	\$ 12,081.60
8	Misc. Force Main Fittings	6,041	LBS	\$ 5.00	\$ 30,204.00
9	Force Main Air Release Valve and Manhole	40	EA	\$ 3,000.00	\$ 30,000.00
10	Core into Termination Manhole for Force Main	1	EA	\$ 3,000.00	\$ 3,000.00
11	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	300	LF	\$ 150.00	\$ 45,000.00
12	Insert 8-inch PVC force main in casing	300	LF	\$ 50.00	\$ 15,000.00
13	New Duplex LIR Station	9	LS	\$ 250,000.00	\$ 2,250,000.00
14	4-inch lateral to easement or R/W line (near side) <sup>1</sup>	6,590	LF	\$ 12.00	\$ 79,080.00
15	4-inch lateral to easement or R/W line (far side) <sup>1</sup>	17,180	LF	\$ 30.00	\$ 527,200.00
16	Simplex Fiberglass Grinder Station <sup>2</sup>	25	EA	\$ 4,572.00	\$ 114,300.00
17	1-1/4" HDPE SDR9 Service Lateral <sup>2</sup>	1,500	LF	\$ 10.00	\$ 15,000.00
18	Connect Lateral to Existing Force Main <sup>2</sup>	25	EA	\$ 2,000.00	\$ 50,000.00
19	Electrical Hose Connection <sup>3</sup>	25	EA	\$ 2,500.00	\$ 62,500.00
20	Clean outs	559	EA	\$ 75.00	\$ 49,425.00
21	Silt Fence	79,776	LF	\$ 3.50	\$ 279,216.00
22	Grassing (Temporary and Permanent)	22,160	SY	\$ 2.00	\$ 44,320.00
23	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>4</sup>	700	CY	\$ 70.00	\$ 49,000.00
24	Remove driveway surface, replace with 2" graded aggregate <sup>4</sup>	684	EA	\$ 160.00	\$ 109,440.00
25	Remove and replace 3' of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	33,240	SY	\$ 79.00	\$ 2,625,800.00
26	Decommissioning of existing septic tank <sup>5</sup>	684	EA	\$ 500.00	\$ 342,000.00
27	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
28	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 516,752.89
Subtotal:					\$ 9,129,301.09
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%):					\$ 547,758.07
Engineering Fees (15%):					\$ 1,369,395.16
Construction Contingencies (15%):					\$ 1,369,395.16
Estimated Probable Cost:					\$ 12,415,849.49
CALL US NOW:					\$ 12,800,000.00
No. of existing customers:					684
Cost per customer:					\$ 18,300.00

**Assumptions:**

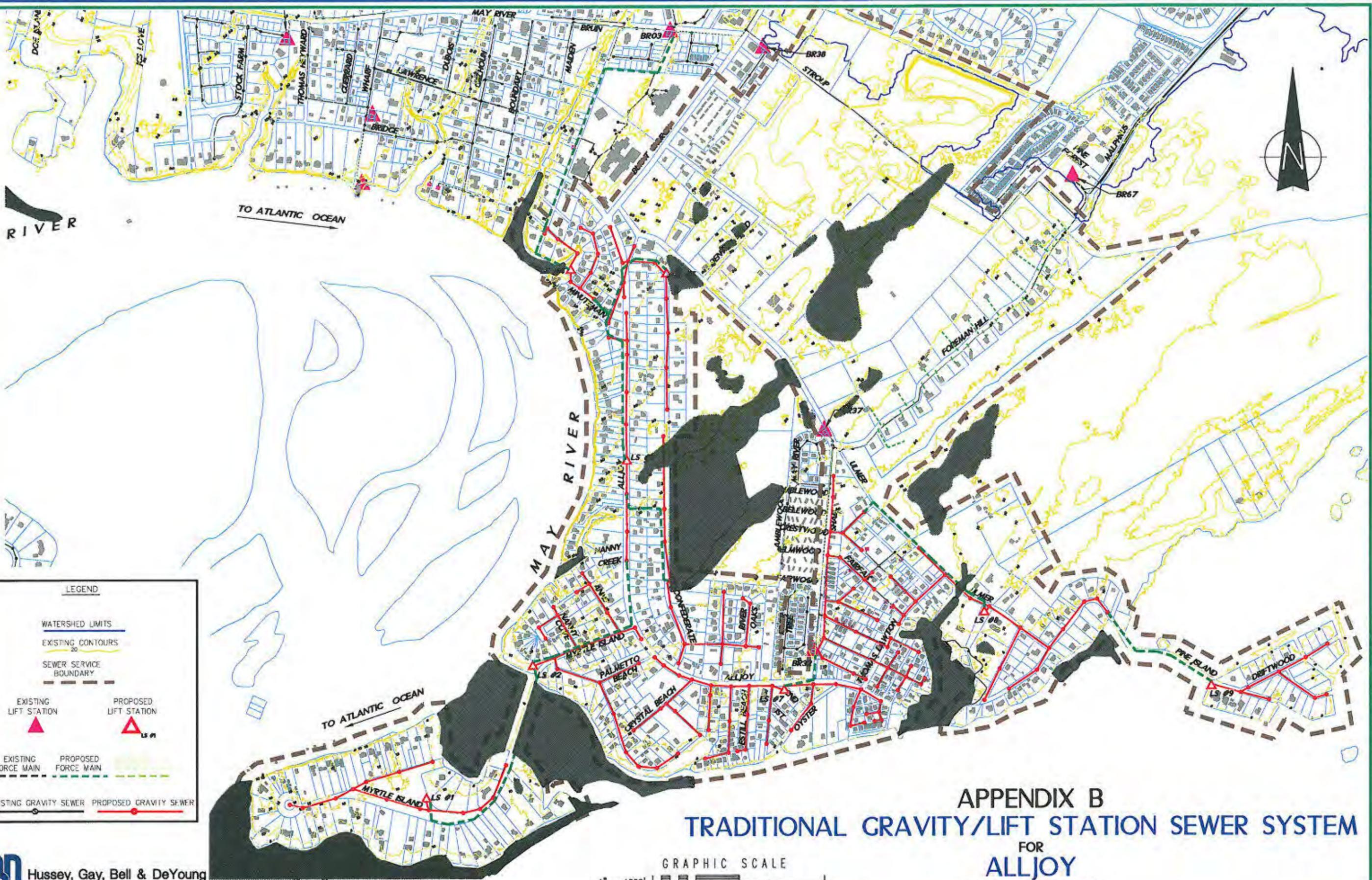
- Lateral lengths will vary.
- Assumes price for connection to homeowner's electrical power. Cost is for what is assumed; unforeseen costs are difficult to predict for each homeowner's unique/existing electrical setup. Grinders along Foreman Hill Road only.
- Remove and replace unsuitable material; quantity assumed, remove and replace driveways; quantity assumed. Yard and driveway restoration will vary.
- Assumes gravity & force main within portion of roads.
- Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.

I: Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.

II: It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.

III: Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.

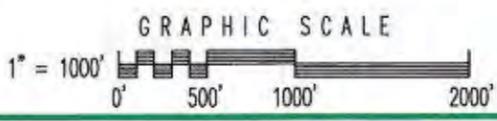
IV: Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from B/WSA & Town of Bluffton.



**LEGEND**

- WATERSHED LIMITS
- EXISTING CONTOURS
- SEWER SERVICE BOUNDARY
- EXISTING LIFT STATION
- PROPOSED LIFT STATION
- EXISTING FORCE MAIN
- PROPOSED FORCE MAIN
- EXISTING GRAVITY SEWER
- PROPOSED GRAVITY SEWER

**APPENDIX B**  
**TRADITIONAL GRAVITY/LIFT STATION SEWER SYSTEM**  
 FOR  
**ALLJOY**  
 DATE: OCTOBER 2013



# **APPENDIX C**

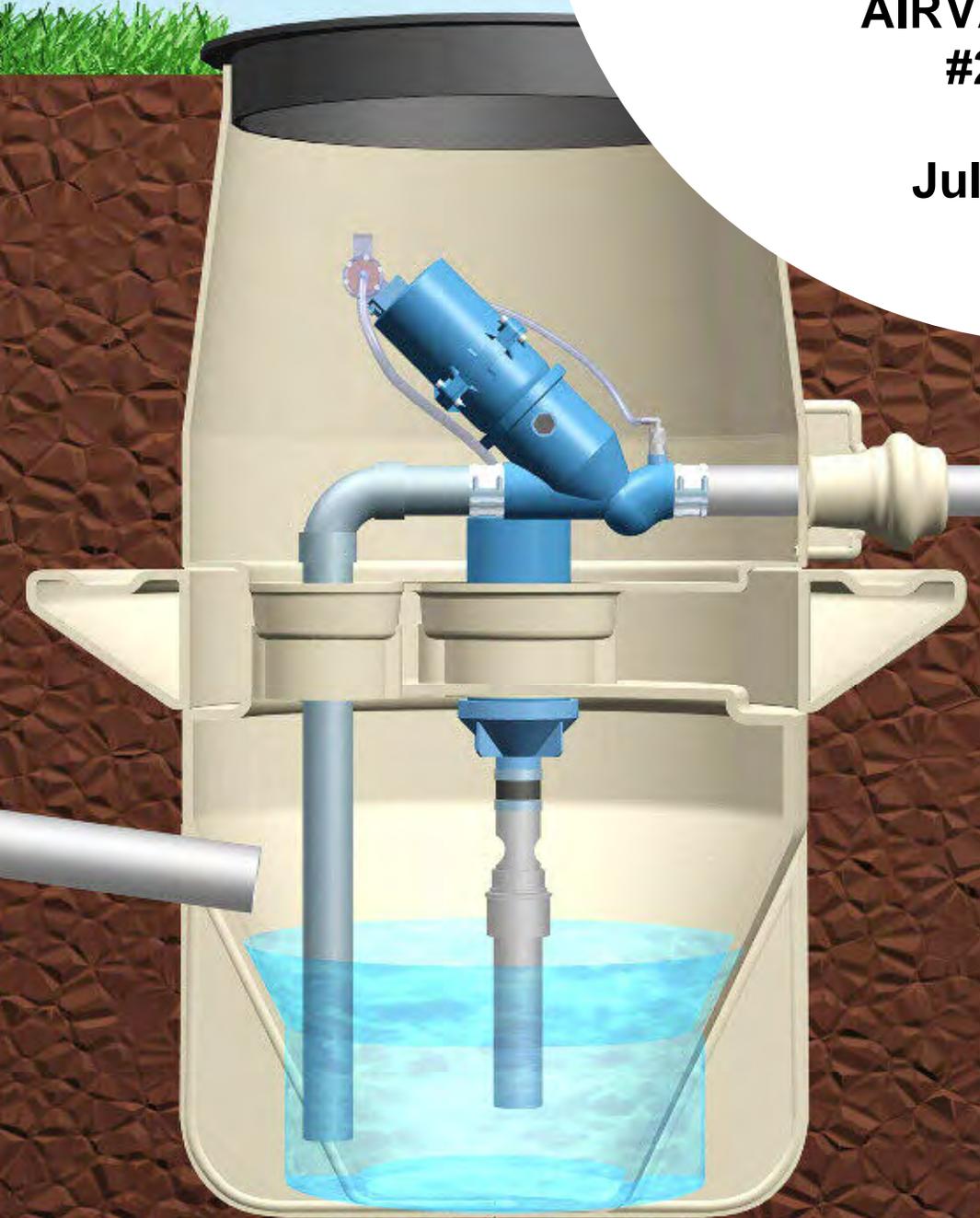
## **Vacuum Sewer System Analysis and Typical Features**

# AIRVAC<sup>®</sup>

May River Area, Bluffton, SC

AIRVAC Estimate  
#2013-133

July 19, 2013



Prepared for:

Hussey, Gay,  
Bell & DeYoung

AIRVAC, INC.  
200 Tower Drive  
Suite A  
Oldsmar, FL 34677  
813.855.6297  
813.855.9093

---

Corporate Office  
4217 N. Old US 31  
Rochester, IN 46975  
574.223.3980  
574.223.5566

July 19, 2013



**THE WORLD LEADER IN  
VACUUM SEWER TECHNOLOGY**

Justin Arnsdorff, PE  
Hussey, Gay, Bell & DeYoung  
Post Office Box 14247  
Savannah, GA 31416  
912-354-4626

TAMPA OFFICE  
AIRVAC, INC.  
200 Tower Drive, Suite A  
Oldsmar, FL 34677 U.S.A.  
Phone: (813) 855-6297  
Fax: (813) 855-9093  
Web: [www.airvac.com](http://www.airvac.com)

**RE: May River Area, Bluffton, SC  
AIRVAC Project Evaluation #2013-132**

Dear Mr. Arnsdorff,

Thank you for considering AIRVAC, *the world leader in vacuum sewer system technology*, for your collection needs. AIRVAC currently has more than 300 vacuum sewer systems in operation and 25 in construction or scheduled to start construction in 2013. AIRVAC vacuum sewer systems can be found in 29 states within the U.S. and an additional 600+ AIRVAC vacuum systems are in operation in 33 foreign countries.

A vacuum sewer system has the following advantages over other alternative wastewater collection methods:

Vacuum sewer systems provide a superior collection system when compared to a gravity sewer system. First, the inherent tight nature of a vacuum system eliminates Infiltration/Inflow problems associated with gravity systems. Second, shallow vacuum main installation makes future connections and repairs much easier than deeply trenched gravity sewers. Finally, odors are significantly reduced since no manholes or other openings exist within a vacuum collection system.

A vacuum sewer system outperforms low-pressure sewers utilizing grinder pumps. Power is only required at the vacuum station. Grinder pumps require a power source at each service connection. Standby power at the vacuum station insures uninterrupted service during power outages, whereas standby power is not practical or cost effective for each grinder pump service connection. Finally, long term Operation & Maintenance is significantly less considering grinder pumps typically must be replaced every ten years.

The purpose of this evaluation is to provide a vacuum collection system for the May River project area. An Illustrative Layout, AIRVAC Technical Report, Estimated Construction Costs, Annual O&M Costs, and Station Calculations have been prepared. A summary of costs for the vacuum collection system is shown below.

Vacuum system	Collection System	Vacuum station	<b>Total</b>
Pritchardville	2,809,570	678,000	3,487,570
Stoney Creek	970,790	590,600	1,561,390
Gascoigne	736,700	552,700	1,289,400
Cahill	989,240	588,000	1,577,240
Alljoy North	2,133,160	599,700	2,732,860
Alljoy South	3,150,340	669,100	3,819,440
<b>Total</b>	<b>10,789,800</b>	<b>3,678,100</b>	<b>14,467,900</b>

*Please note that our construction costs include only the costs for the major vacuum system components. The construction costs do not include items such as force main, final surface restoration, road borings, building hookups and other incidental costs. Nor does it include project costs such as engineering, Right-Of-Way, legal, etc.*

Again, thank you for allowing us to evaluate this project area. If there is any additional technical information you would like, please do not hesitate to call.

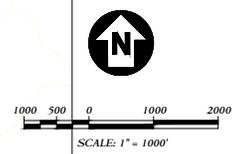
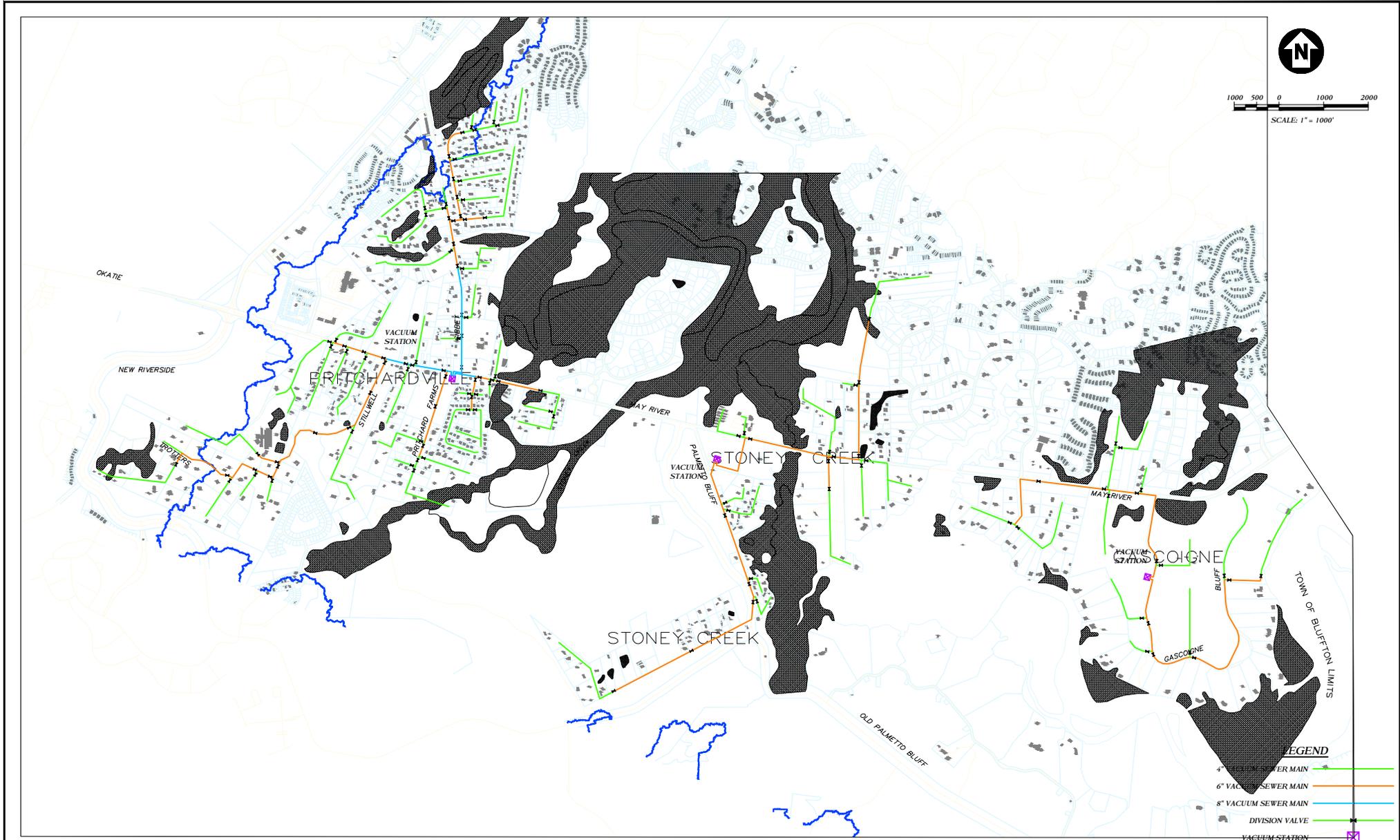
Sincerely,



John Young  
AIRVAC Tampa Office

Copy: AIRVAC – Tampa  
AIRVAC – Rochester

---



**LEGEND**

4" VACUUM SEWER MAIN	
6" VACUUM SEWER MAIN	
8" VACUUM SEWER MAIN	
DIVISION VALVE	
VACUUM STATION	

**AIRVAC**®  
 P.O. BOX 528, 4217 N. OLD U.S. 31, ROCHESTER, INDIANA 46975 U.S.A.  
 TELEPHONE (574) 223-3980  
 FAX (574) 223-5566

IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE, OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THEREIN CONTAINED IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHER, FOR ANY PURPOSE EXCEPT WITH THE WRITTEN PERMISSION OF AIRVAC, INC. AND FURTHER AGREES TO SURRENDER SAME TO AIRVAC, INC. UPON DEMAND.

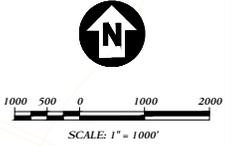
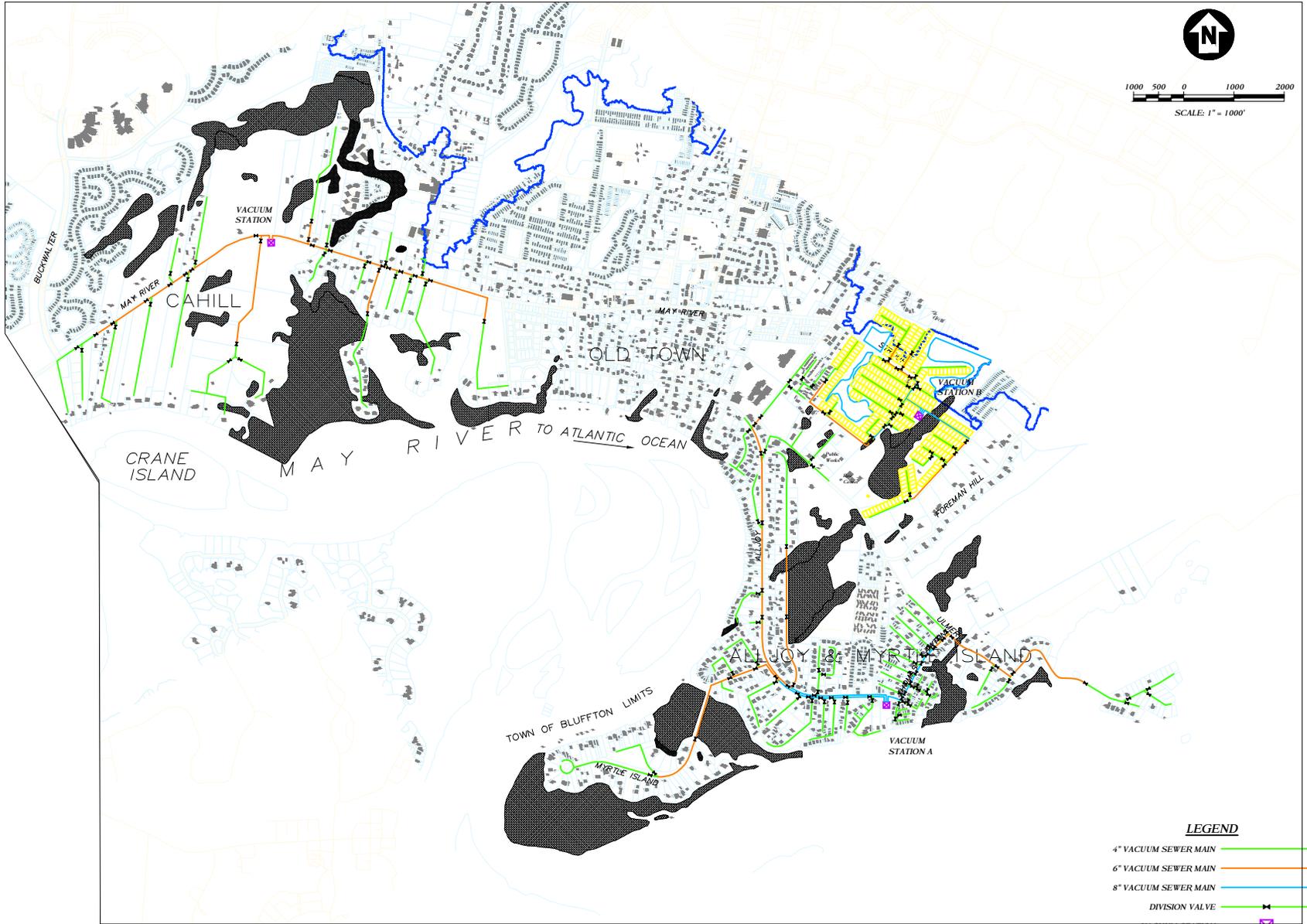
**VACUUM SEWER SYSTEMS**

AIRVAC ESTIMATE #2013-133

The Viable Alternative®  
 COPYRIGHT © AIRVAC, INC.

NO.	REVISIONS	DATE

TITLE MAY RIVER AREA, BLUFFTON, SC PRELIMINARY VACUUM COLLECTION SYSTEM LAYOUT			
CLIENT HUSSEY, GAY, BELL & DeYOUNG			
DRAWN BY J. YOUNG	DATE 07-19-2013	SCALE 1" = 1000'	DRAWING NO. 1 OF 2
DESIGNED BY J. YOUNG	COPYRIGHT © AIRVAC®		



**LEGEND**

4" VACUUM SEWER MAIN	
6" VACUUM SEWER MAIN	
8" VACUUM SEWER MAIN	
DIVISION VALVE	
VACUUM STATION	

# AIRVAC®

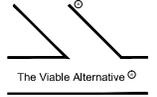
IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE, OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THEREIN CONTAINED IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHER, FOR ANY PURPOSE EXCEPT WITH THE WRITTEN PERMISSION OF AIRVAC, INC. AND FURTHER AGREES TO SURRENDER SAME TO AIRVAC, INC. UPON DEMAND.

## VACUUM SEWER SYSTEMS

AIRVAC, INC.  
P.O. BOX 528, 4217 N. OLD U.S. 31, ROCHESTER, INDIANA 46975 U.S.A.

TELEPHONE (574) 223-3980  
FAX (574) 223-5566

AIRVAC ESTIMATE #2013-133



COPYRIGHT © AIRVAC, INC.

NO.	REVISIONS	DATE

TITLE MAY RIVER AREA, BLUFFTON, SC PRELIMINARY VACUUM COLLECTION SYSTEM LAYOUT			
CLIENT HUSSEY, GAY, BELL & DeYOUNG			
DRAWN BY J. YOUNG	DATE 07-19-2013	SCALE 1" = 1000'	DRAWING NO. 2 OF 2
DESIGNED BY J. YOUNG	COPYRIGHT © AIRVAC®		



**PRITCHARDVILLE, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**ESTIMATED CONSTRUCTION COSTS**

PRITCHARDVILLE VACUUM STATION

702 Service Connections

**INSTALLED COST-COLLECTION SYSTEM**

Quantity	Description	@	Unit Price	Total Price
4,730 lf	8" Vacuum Main	@	19.00 /lf	89,870
17,320 lf	6" Vacuum Main	@	16.00 /lf	277,120
49,520 lf	4" Vacuum Main	@	13.00 /lf	643,760
7,020 lf	3" Service Lateral	@	6.00 /lf	42,120
6 ea	8" Isolation Valve	@	1,800.00 /ea	10,800
29 ea	6" Isolation Valve	@	1,500.00 /ea	43,500
44 ea	4" Isolation Valve	@	1,200.00 /ea	52,800
351 ea	AIRVAC 6.0' - 2 pc Hybrid Valve Pit	@	4,600.00 /ea	1,614,600
1 set	Special Tools	@	5,000.00 /set	5,000
1 set	Spare Parts	@	6,000.00 /set	6,000
1 ea	Trailer Mounted Vacuum Pump	@	24,000.00 /ea	24,000

**COLLECTION SYSTEM COST      \$2,809,570**

**INSTALLED COST-STANDARD VACUUM STATION**

AIRVAC Standard Skid Model 3D-30	266,500
Standard Skid Upgrades	0
Equipment Installation	13,500
Wiring/Piping, etc.	48,000
Vacuum Station Building	300,000
Emergency Generator	25,000
Odor Control: Bio-Mass Filter Bed	25,000

**VACUUM STATION COST      \$678,000**

**TOTAL INSTALLED COSTS      \$3,487,570**

Number of Connections      702

Cost per Connection      \$4,968

This is not a firm quote but rather is an estimate of the magnitude of the major construction costs. Passing time, market conditions and design variables will affect the costs shown. We encourage you to thoroughly review the AIRVAC Pricing Report



**STONEY CREEK, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**ESTIMATED CONSTRUCTION COSTS**

STONEY CREEK VACUUM STATION

200 Service Connections

**INSTALLED COST-COLLECTION SYSTEM**

Quantity	Description	@	Unit Price	Total Price
15,010 lf	6" Vacuum Main	@	16.00 /lf	240,160
16,810 lf	4" Vacuum Main	@	13.00 /lf	218,530
2,000 lf	3" Service Lateral	@	6.00 /lf	12,000
9 ea	6" Isolation Valve	@	1,500.00 /ea	13,500
13 ea	4" Isolation Valve	@	1,200.00 /ea	15,600
100 ea	AIRVAC 6.0' - 2 pc Hybrid Valve Pit	@	4,600.00 /ea	460,000
1 set	Special Tools	@	5,000.00 /set	5,000
1 set	Spare Parts	@	6,000.00 /set	6,000
<b>COLLECTION SYSTEM COST</b>				<b>\$970,790</b>

**INSTALLED COST-STANDARD VACUUM STATION**

AIRVAC Standard Skid Model 2D-15	217,700
Standard Skid Upgrades	0
Equipment Installation	11,000
Wiring/Piping, etc.	41,900
Vacuum Station Building	275,000
Emergency Generator	25,000
Odor Control: Bio-Mass Filter Bed	20,000
<b>VACUUM STATION COST</b>	<b>\$590,600</b>

**TOTAL INSTALLED COSTS \$1,561,390**

Number of Connections 200

Cost per Connection \$7,807

This is not a firm quote but rather is an estimate of the magnitude of the major construction costs. Passing time, market conditions and design variables will affect the costs shown. We encourage you to thoroughly review the AIRVAC Pricing Report



**GASCOIGNE, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**ESTIMATED CONSTRUCTION COSTS**

GASCOIGNE VACUUM STATION

117 Service Connections

**INSTALLED COST-COLLECTION SYSTEM**

Quantity	Description	@	Unit Price	Total Price
12,700 lf	6" Vacuum Main	@	16.00 /lf	203,200
16,740 lf	4" Vacuum Main	@	13.00 /lf	217,620
1,180 lf	3" Service Lateral	@	6.00 /lf	7,080
8 ea	6" Isolation Valve	@	1,500.00 /ea	12,000
12 ea	4" Isolation Valve	@	1,200.00 /ea	14,400
59 ea	AIRVAC 6.0' - 2 pc Hybrid Valve Pit	@	4,600.00 /ea	271,400
1 set	Special Tools	@	5,000.00 /set	5,000
1 set	Spare Parts	@	6,000.00 /set	6,000
<b>COLLECTION SYSTEM COST</b>				<b>\$736,700</b>

**INSTALLED COST-STANDARD VACUUM STATION**

AIRVAC Standard Skid Model 3B-10	204,300
Standard Skid Upgrades	0
Equipment Installation	13,500
Wiring/Piping, etc.	39,900
Vacuum Station Building	250,000
Emergency Generator	20,000
Odor Control: Bio-Mass Filter Bed	25,000
<b>VACUUM STATION COST</b>	<b>\$552,700</b>

**TOTAL INSTALLED COSTS \$1,289,400**

Number of Connections 117

Cost per Connection \$11,021

This is not a firm quote but rather is an estimate of the magnitude of the major construction costs. Passing time, market conditions and design variables will affect the costs shown. We encourage you to thoroughly review the AIRVAC Pricing Report



**CAHILL, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**ESTIMATED CONSTRUCTION COSTS**

CAHILL VACUUM STATION

155 Service Connections

**INSTALLED COST-COLLECTION SYSTEM**

Quantity	Description	@	Unit Price	Total Price
12,770 lf	6" Vacuum Main	@	16.00 /lf	204,320
27,220 lf	4" Vacuum Main	@	13.00 /lf	353,860
1,560 lf	3" Service Lateral	@	6.00 /lf	9,360
17 ea	6" Isolation Valve	@	1,500.00 /ea	25,500
22 ea	4" Isolation Valve	@	1,200.00 /ea	26,400
78 ea	AIRVAC 6.0' - 2 pc Hybrid Valve Pit	@	4,600.00 /ea	358,800
1 set	Special Tools	@	5,000.00 /set	5,000
1 set	Spare Parts	@	6,000.00 /set	6,000
<b>COLLECTION SYSTEM COST</b>				<b>\$989,240</b>

**INSTALLED COST-STANDARD VACUUM STATION**

AIRVAC Standard Skid Model 2D-10	215,100
Standard Skid Upgrades	0
Equipment Installation	11,000
Wiring/Piping, etc.	41,900
Vacuum Station Building	275,000
Emergency Generator	25,000
Odor Control: Bio-Mass Filter Bed	20,000
<b>VACUUM STATION COST</b>	<b>\$588,000</b>

**TOTAL INSTALLED COSTS \$1,577,240**

Number of Connections 155

Cost per Connection \$10,176

This is not a firm quote but rather is an estimate of the magnitude of the major construction costs. Passing time, market conditions and design variables will affect the costs shown. We encourage you to thoroughly review the AIRVAC Pricing Report



**ALLJOY NORTH, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**ESTIMATED CONSTRUCTION COSTS**

ALLJOY NORTH VACUUM STATION

713 Service Connections

**INSTALLED COST-COLLECTION SYSTEM**

Quantity	Description	@	Unit Price	Total Price
3,620 lf	8" Vacuum Main	@	19.00 /lf	68,780
5,270 lf	6" Vacuum Main	@	16.00 /lf	84,320
17,440 lf	4" Vacuum Main	@	13.00 /lf	226,720
7,140 lf	3" Service Lateral	@	6.00 /lf	42,840
6 ea	8" Isolation Valve	@	1,800.00 /ea	10,800
11 ea	6" Isolation Valve	@	1,500.00 /ea	16,500
25 ea	4" Isolation Valve	@	1,200.00 /ea	30,000
357 ea	AIRVAC 6.0' - 2 pc Hybrid Valve Pit	@	4,600.00 /ea	1,642,200
1 set	Special Tools	@	5,000.00 /set	5,000
1 set	Spare Parts	@	6,000.00 /set	6,000
<b>COLLECTION SYSTEM COST</b>				<b>\$2,133,160</b>

**INSTALLED COST-STANDARD VACUUM STATION**

AIRVAC Standard Skid Model 2D-35	226,800
Standard Skid Upgrades	0
Equipment Installation	11,000
Wiring/Piping, etc.	41,900
Vacuum Station Building	275,000
Emergency Generator	25,000
Odor Control: Bio-Mass Filter Bed	20,000
<b>VACUUM STATION COST</b>	<b>\$599,700</b>

**TOTAL INSTALLED COSTS \$2,732,860**

Number of Connections 713

Cost per Connection \$3,833

This is not a firm quote but rather is an estimate of the magnitude of the major construction costs. Passing time, market conditions and design variables will affect the costs shown. We encourage you to thoroughly review the AIRVAC Pricing Report



**ALLJOY SOUTH, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**ESTIMATED CONSTRUCTION COSTS**

ALLJOY SOUTH VACUUM STATION

885 Service Connections

**INSTALLED COST-COLLECTION SYSTEM**

Quantity	Description	@	Unit Price	Total Price
5,900 lf	8" Vacuum Main	@	19.00 /lf	112,100
16,370 lf	6" Vacuum Main	@	16.00 /lf	261,920
43,220 lf	4" Vacuum Main	@	13.00 /lf	561,860
8,860 lf	3" Service Lateral	@	6.00 /lf	53,160
13 ea	8" Isolation Valve	@	1,800.00 /ea	23,400
17 ea	6" Isolation Valve	@	1,500.00 /ea	25,500
53 ea	4" Isolation Valve	@	1,200.00 /ea	63,600
443 ea	AIRVAC 6.0' - 2 pc Hybrid Valve Pit	@	4,600.00 /ea	2,037,800
1 set	Special Tools	@	5,000.00 /set	5,000
1 set	Spare Parts	@	6,000.00 /set	6,000

**COLLECTION SYSTEM COST      \$3,150,340**

**INSTALLED COST-STANDARD VACUUM STATION**

AIRVAC Standard Skid Model 3D-40	257,600
Standard Skid Upgrades	0
Equipment Installation	13,500
Wiring/Piping, etc.	48,000
Vacuum Station Building	300,000
Emergency Generator	25,000
Odor Control: Bio-Mass Filter Bed	25,000

**VACUUM STATION COST      \$669,100**

**TOTAL INSTALLED COSTS      \$3,819,440**

Number of Connections      885

Cost per Connection      \$4,316

This is not a firm quote but rather is an estimate of the magnitude of the major construction costs. Passing time, market conditions and design variables will affect the costs shown. We encourage you to thoroughly review the AIRVAC Pricing Report

## **EXPLANATION OF CONSTRUCTION COSTS**

### **May River Area, Bluffton, SC**

#### **BASIS OF PRICING**

Design requirements and construction conditions on each project are unique; therefore, costs are project specific. Many factors affect construction costs; for example, material surpluses or shortages, prevailing wage rates (depending on funding sources), local bidding climate, time of year, and integrity soundness of the overall system design. Funding and regulatory requirements also play a role in overall construction costs, to the extent that imposed regulations may positively or negatively impact costs. Because of the many variables, actual costs will vary. However, the following information will provide guidelines to adjust costs as necessary.

#### **VACUUM MAINS**

The piping network connects the individual valve pits to the collection tank at the vacuum station. The vacuum main is a PVC thermoplastic pipe Schedule 40 or SDR 21 PVC pipe, with SDR 21 recommended. To reduce expansion and contraction induced stresses, a flexible elastic joint ("rubber ring" joint) pipe is recommended. The pipe manufacturer requires the "Reiber Style" gasket for the pipe to be certified for vacuum use.

Unit prices for vacuum mains are site specific and vary widely from project to project and geographic location. Conditions such as rock, unstable soil, and groundwater have a large effect on installed prices. Experience has shown that the installed cost of vacuum mains falls somewhere between gravity and pressure main pricing; typically, closer to force main pricing than gravity main.

For the purposes of this project, we assumed the installed cost of the 6" vacuum main will be similar to that of other projects in the area.

#### **3" SERVICE LATERAL**

The 3" service lateral is a Schedule 40 or SDR 21 PVC pipe that connects the 3" AIRVAC interface valve to the branch or main line. The length of the service lateral will vary depending on the location of the valve pit or buffer tank in relation to the vacuum main or branch line.

#### **ISOLATION VALVES**

Isolation valves are typically found at the beginning of each branch line and on the vacuum main near these branch connections. The purpose of these valves is to isolate sections of the vacuum system for troubleshooting purposes. While both plug and resilient-wedge gate valves have been used, AIRVAC recommends the resilient-wedge gate valves.

#### **AIRVAC VALVE PIT PACKAGE**

The AIRVAC valve pit package consists of a 3" AIRVAC interface valve, polyethylene plastic pit, cast iron cover w/ frame, in-sump breather, and sump. The valve pit package is H2O traffic-rated and can serve up to four properties or a peak flow of 3 gpm. The most common arrangement is a single valve pit package serving two properties.

As with vacuum mains, installed prices may vary widely from project to project according to site conditions. Installation costs include furnishing the valve pit, setting, excavation, bedding, backfill, compaction, vacuum testing, and surface restoration. Installed costs for the valve pit have been based on similar completed AIRVAC projects.

### **SPECIAL TOOLS AND SPARE PARTS**

AIRVAC supplied materials and tools needed for installation and maintenance of the system.

### **TRAILER MOUNTED VACUUM PUMP**

The trailer mounted vacuum pump (TMVP) is an AIRVAC supplied portable unit that aids in the mandatory vacuum main testing during construction. The TMVP consists of a two wheeled trailer, 200 cfm vacuum pump, 18 hp gasoline engine, 30 gallon collection tank, control panel, and chart recorder.

### **VACUUM STATION**

Vacuum station costs include an AIRVAC skid which is typically housed in a two story structure with the vacuum pumps and control panel located on the top floor and the collection tank and sewage pumps on the lower floor. A backup generator has been recommended to ensure continued operation during power failures. Also included is a Bio-mass odor control system for exhaust from the vacuum pumps. AIRVAC skid component details are shown below.

**Collection Tank** – Mild steel, internally and externally epoxy coated tank with a designed working pressure of 20 in. Hg vacuum and tested to 28 in. HG vacuum.

**Sewage Pumps** – Duplicate Dry-pit, horizontal, non-clog centrifugal pumps each capable of pumping the design peak flow.

**Vacuum Pumps** – Multiple sliding-vane type vacuum pumps capable of an ultimate vacuum range of 29" Hg and offer efficient air-delivery-to-horsepower ratios.

**Control Panel** - Typical electrical controls include, vacuum switches with stainless bellows, liquid level controls suitable for sanitary sewage, motor starters with overload, automatic alternators for pump cycling, hour run meters, a solid state telephone alarm system, and a seven day circular vacuum chart recorder.

Each AIRVAC skid is unique. The final price for the skid is dependent on the size and configuration of the equipment as well as any optional equipment desired by the owner/engineer. The price range shown above assumes the standard AIRVAC skid is used. Optional items such as stainless steel tanks, stainless steel deck plates, PLC logic, special sewage pumps, UL labels, etc. may add 25% or more to the above figures. In addition, vacuum station building costs may vary widely, depending on the utility, planning, zoning requirements and aesthetics. **Please contact your AIRVAC Regional Manager for a specific summary of components and options.**

---

**OTHER COSTS NOT INCLUDED IN THE AIRVAC COST BREAKDOWN**

The Construction Cost sheet does not include items such as mobilization, final surface restoration, homeowner hookups and other incidental costs. All labor to install AIRVAC materials and other items will be supplied by the contractor. AIRVAC's Construction Cost sheet does not include any project costs such as engineering, Right-Of-Way, legal, etc.

**AIRVAC SUPPLIED MATERIAL**

Shown below is the expected year 2013 material cost range for the various products offered by AIRVAC. Final pricing will be determined after final plans and specifications are completed.

<b><u>ITEMS SUPPLIED BY AIRVAC</u></b>	<b><u>PRICE RANGE</u></b>
AIRVAC valve pit	\$ 3,300 - \$ 3,600/ea
Buffer tank kit	\$ 1,900 - \$ 3,800/ea
Special tools	\$ 4,100 - \$ 5,700/set
Trailer mounted vacuum pump	\$ 21,000 - \$ 26,000/ea
AIRVAC skid	\$ 185,000 - \$ 420,000/ea
Field services	\$ 2,700 - \$ 3,000/wk

*The AIRVAC prices above do not include installation.* In order to provide installed prices, bid documents from similar completed AIRVAC projects have been used as a reference.

---

**TECHNICAL REPORT**  
**May River Area, Bluffton, SC**

**INTRODUCTION**

A vacuum sewer system is a mechanized method of transporting wastewater. Differential air pressure creates flow rather than gravity or pressure. Essentially, a vacuum sewer system is a negative pressure sewer system.

Vacuum sewer systems require a vacuum station similar to a gravity lift station or pumping station. Unlike a lift station, vacuum pumps maintain vacuum on the collection mains. To maintain this vacuum, a valve at each sewage input point seals the system. The valve opens automatically when a given quantity of sewage accumulates in a collection sump. This valve is entirely pneumatic in its control and operation. Differential pressure between local atmospheric pressure and the vacuum pressure provides the thrust needed for liquid transportation.



**GENERAL PROJECT SUMMARY**

The proposed collection system requires six vacuum stations. Wastewater will enter the vacuum system through AIRVAC valve pit packages. From the vacuum stations a force main will carry the wastewater to the ultimate point of discharge.

**CONNECTIONS**

A vacuum collection system typically collects wastewater from many different sources. Sources include residential, commercial, industrial, institutional, and recreational areas. The May River Area vacuum sewer system has been designed to collect wastewater from 3,429 residential and small commercial customers.

**Connections**

Vacuum system	Connections
Pritchardville	702
Stoney Creek	200
Gascoigne	117
Cahill	155
Alljoy North	713
Alljoy South	885
<b>Total</b>	<b>2,772</b>

### **BASIS OF DESIGN**

Determining wastewater flow rates is a fundamental step in the conceptual design of a vacuum collection system. Reliable data for existing and projected flow rates affect the hydraulic characteristics and sizing of the vacuum collection system components. Flow rates from residential, commercial, industrial, institutional, and recreational areas must be established before the collection system can be accurately designed.

Extraneous flow into the collection system from infiltration and inflow is not included in the flow rates. By its very nature, a vacuum sewer system is tight leaving no chance of infiltration or inflow, unless a break occurs. A break or small leak would be detected by an increase in vacuum pump run time and would be isolated and repaired.

All of the major vacuum system components are sized according to peak flow, expressed in gallons per minute (gpm). Flow rates have been determined by 100 gallons per capita, 3 persons per service connection, and a peak factor of 2.5. In order to properly size a vacuum station and collection system peak flow rates have been used. A summary of the design flows for each system is shown below.

### **Flow rates**

Vacuum system	Connections	Average daily flow (gpd)	Peak flow (gpm)
Pritchardville	702	210,600	366
Stoney Creek	200	60,000	104
Gascoigne	117	35,100	61
Cahill	155	46,500	81
Alljoy North	713	213,900	371
Alljoy South	885	265,500	461
<b>Total</b>	<b>2772</b>	<b>831,600</b>	<b>1444</b>

### **AIRVAC VALVE PIT PACKAGE**

The vacuum sewer system requires a normally closed vacuum/gravity interface valve at each entry point to seal the lines in order to maintain vacuum. The interface valve opens when a predetermined amount of sewage accumulates in the collecting sump. The resulting differential pressure between atmosphere and vacuum becomes the driving force that propels the sewage towards the vacuum station.

The valve pit, with two internal chambers, provides the vacuum/gravity interface. The upper chamber houses the AIRVAC Three Inch Valve. The bottom chamber or collecting sump allows a connecting point for the gravity sewer. These two chambers are sealed from each other.



The valve pit is typically located in the right-of-way between property lines and is able to withstand traffic loads. Up to four separate building sewers can connect to a valve pit, each at 90 degrees of one another. However, this is rarely done as property line considerations, lot depths, and elevation differences may render this impractical. For purposes of this estimate we have provided a valve pit ratio of 2 connections per valve pit. A summary of valve pit packages is shown below.

**AIRVAC valve pit packages**

Vacuum system	Connections	Valve pit packages
Pritchardville	702	351
Stoney Creek	200	100
Gascoigne	117	59
Cahill	155	78
Alljoy North	713	357
Alljoy South	885	443
<b>Total</b>	<b>2772</b>	<b>1388</b>

**VACUUM MAIN**

Each AIRVAC 3" interface valve is connected to the vacuum collection system by a 3" service lateral. Differential air pressure (7-10 psi) propels the sewage into the vacuum collection system. Turbulence disintegrates the solids and mixes them with the air and liquid to form aerobic foam, which scours the pipeline, preventing blockage.

The 3" service lateral connects to a branch or main line. Unlike gravity sewers that must be laid with enough slope to create a scouring velocity, the vacuum lines are only slightly sloped (0.2%) toward the vacuum station since vacuum provides adequate velocity.



The vacuum mains are installed with a saw tooth profile to minimize burial depth. When the vacuum line exceeds the minimal cover by a foot or more, inserting two 45-degree fittings and a short section of pipe creates a lift back to minimum cover.

Division valves are installed in the branch or main lines to allow portions of the piping system to be isolated for troubleshooting and maintenance.

**FORCE MAIN**

Once the wastewater is collected in the vacuum station it is discharged to the ultimate point of disposal through a force main. Force main costs are not included in our construction costs; however, discharge pump costs are.

### **VACUUM STATION**

The vacuum station is the heart of the vacuum collection system. The machinery installed is similar to that of a conventional sewage pumping station or lift station, except vacuum is applied to the wetwell (collection tank) that is sealed. Major components include a collection tank, sewage pumps, vacuum pumps, and a control panel.

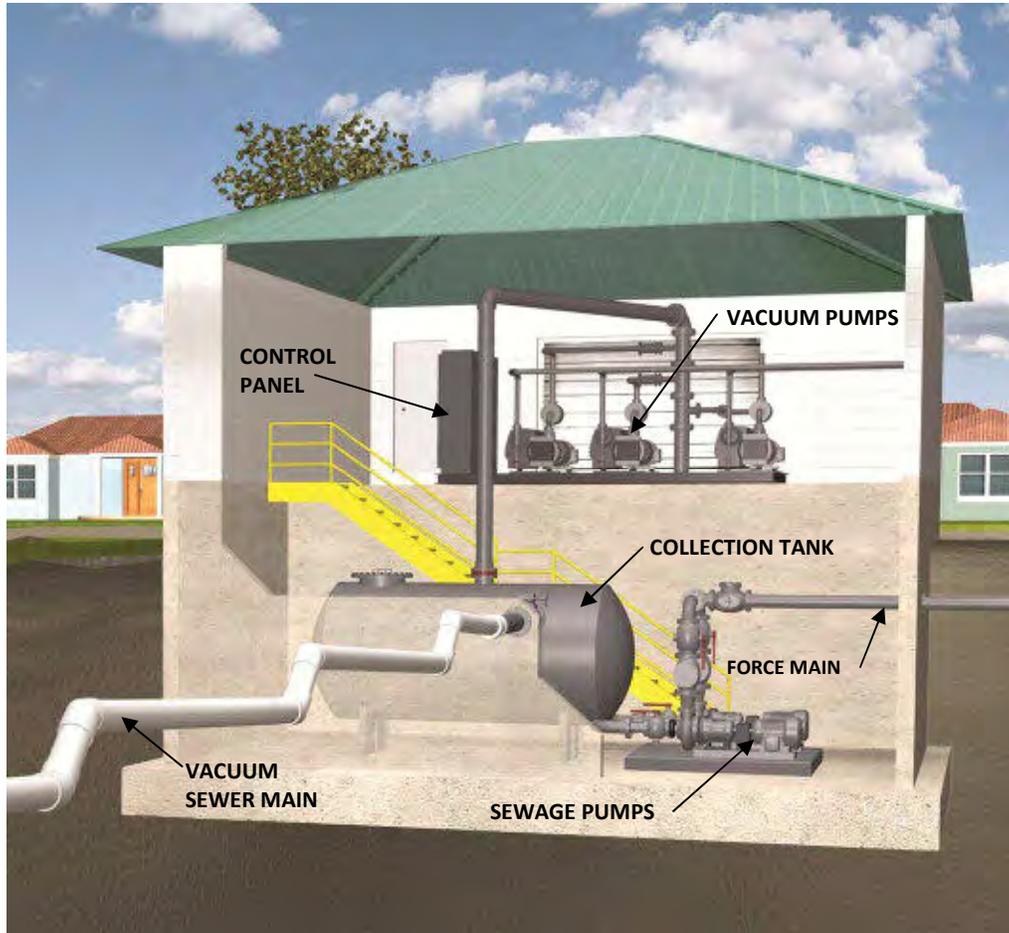
Most modern vacuum systems utilize factory pre-fabricated collection stations mounted on skids for ease of installation. This allows the skid to be lifted into the building and connected to the incoming vacuum mains and the outgoing force or gravity main. The AIRVAC skid models chosen for the May River Area project are as follows.

#### **Preliminary vacuum station components**

Vacuum System	Vacuum pumps (cfm)	Sewage pumps (gpm)	Collection tank (gal)
Pritchardville	3-455	2-370	1-3,000
Stoney Creek	2-455	2-135	1-1,500
Gascoigne	3-170	2-65	1-1,000
Cahill	2-455	2-85	1-1,000
Alljoy North	2-455	2-375	1-3,500
Alljoy South	3-455	2-465	1-4,000

The AIRVAC Skid is typically housed in a two story structure with the vacuum pumps and control panel located on the top floor and the collection tank and sewage pumps on the lower floor. Since the systems require only one source of power, many systems utilize existing portable generators for emergency power; others have permanently installed backup generators.

---



### **OPERATION & MAINTENANCE COSTS**

Enclosed is an estimate of the annual Operational & Maintenance costs (O&M) for this project. The O&M costs have been based on the 1991 United States Environmental Protection Agency (EPA), publication number EPA/625/1-91/024, *The Manual For Alternative Wastewater Collection Systems* and the 2008 Water Environment Federation (WEF) *Alternative Sewer Systems, 2<sup>nd</sup> ed.; Manual of Practice No. FD-12.*

---

### **FIELD SERVICES**

The correct installation of a vacuum sewer system is critical to its success and AIRVAC field services help to ensure proper installation. The Field Service Representative can also provide immediate resolution to unforeseen construction difficulties as well as provide advice on whether “lifts” can be added or deleted. This helps minimize contractor downtime resulting in fewer change orders.

Three levels of field service support are offered. The first level is full-time field services. A trained Field Service Representative is on site from the beginning of installation and every day until the job is complete and the system is in operation. This option ensures the highest level of system performance. The second level is half-time field services. A trained Field Representative is on site 50 percent of the time. The third and final level is part-time field services. A trained Field Representative is on site during selected critical stages of the construction phase. One option should be included in the project budget.

---



# OPERATION AND MAINTENANCE

## PRITCHARDVILLE, MAY RIVER AREA, SC

PRITCHARDVILLE VACUUM STATION

Estimate #2013-133

702 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

LABOR (INCREMENTAL)						
Item	Labor effort		Quantity			Annual Labor
Vacuum Station	300 hrs/yr/station	x	1 station		=	300 hrs/yr
Piping	60 hrs/yr/system	x	1 system		=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	351 valves		=	614 hrs/yr
						<u>974 hrs/yr</u>
					x	\$25 /hr
						<u>\$24,350 /yr</u>
ROUND TO:						<b>\$24,400 /yr</b>

VACUUM STATION POWER CONSUMPTION						
Item	Unit cost		Conn		Duration	Annual Power
Flat rate	\$100.00 /mo	x	1 station	x	12 mo	= \$1,200 /yr
Consumption	\$1.85 /mo/conn	x	702 /mo/conn	x	12 mo	= \$15,584 /yr
						<u>\$16,784</u>
ROUND TO:						<b>\$16,800 /yr</b>

EQUIPMENT RENEWAL AND REPLACEMENT						
Item	Renewal/Replacement cost		Renewal/Replacement interval		Quantity	Annual R&R
Vacuum Station						
Vacuum Pumps	\$23,280 /ea	/	15 years	x	3 pumps	= \$4,656 /yr
Sewage Pumps	\$18,720 /ea	/	15 years	x	2 pumps	= \$2,496 /yr
Collection Tank	\$32,500 /ea	/	30 years	x	1 ea	= \$1,083 /yr
Control Panel	\$17,979 /ea	/	20 years	x	1 ea	= \$899 /yr
Misc. Equip	\$2,000 /ea	/	15 years	x	1 ea	= \$133 /yr
						<u>\$9,268 /yr</u>
ROUND TO:						<b>\$9,300 /yr</b>

Vacuum Valves (renewal)						
Vacuum Valves	\$40.00 /ea	/	15 years	x	351 valves	= \$936 /yr
Controller	\$40.00 /ea	/	10 years	x	351 valves	= \$1,404 /yr
Misc. Parts	\$20.00 /ea	/	10 years	x	351 valves	= \$702 /yr
						<u>\$3,042 /yr</u>
ROUND TO:						<b>\$3,100 /yr</b>

SUMMARY		
Labor		\$24,400 /yr
Power		\$16,800 /yr
Equipment Replacement (Station)		\$9,300 /yr
Equipment Renewal (Valves)		\$3,100 /yr
		<u>\$53,600 /yr</u>
Number of Connections		702
Cost per Connection		\$76 /yr/conn



# OPERATION AND MAINTENANCE

## STONEY CREEK, MAY RIVER AREA, SC

STONEY CREEK VACUUM STATION

Estimate #2013-133

200 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

LABOR (INCREMENTAL)						
Item	Labor effort		Quantity			Annual Labor
Vacuum Station	300 hrs/yr/station	x	1 station		=	300 hrs/yr
Piping	60 hrs/yr/system	x	1 system		=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	100 valves		=	175 hrs/yr
						<u>535 hrs/yr</u>
					x	\$25 /hr
						<u>\$13,375 /yr</u>
ROUND TO:						<b>\$13,400 /yr</b>

VACUUM STATION POWER CONSUMPTION						
Item	Unit cost		Conn		Duration	Annual Power
Flat rate	\$100.00 /mo	x	1 station	x	12 mo	= \$1,200 /yr
Consumption	\$3.30 /mo/conn	x	200 /mo/conn	x	12 mo	= \$7,920 /yr
						<u>\$9,120</u>
ROUND TO:						<b>\$9,200 /yr</b>

EQUIPMENT RENEWAL AND REPLACEMENT						
Item	Renewal/Replacement cost		Renewal/Replacement interval		Quantity	Annual R&R
Vacuum Station						
Vacuum Pumps	\$23,320 /ea	/	15 years	x	2 pumps	= \$3,109 /yr
Sewage Pumps	\$13,910 /ea	/	15 years	x	2 pumps	= \$1,855 /yr
Collection Tank	\$24,700 /ea	/	30 years	x	1 ea	= \$823 /yr
Control Panel	\$15,961 /ea	/	20 years	x	1 ea	= \$798 /yr
Misc. Equip	\$2,000 /ea	/	15 years	x	1 ea	= \$133 /yr
						<u>\$6,719 /yr</u>
ROUND TO:						<b>\$6,800 /yr</b>

Vacuum Valves (renewal)						
Vacuum Valves	\$40.00 /ea	/	15 years	x	100 valves	= \$267 /yr
Controller	\$40.00 /ea	/	10 years	x	100 valves	= \$400 /yr
Misc. Parts	\$20.00 /ea	/	10 years	x	100 valves	= \$200 /yr
						<u>\$867 /yr</u>
ROUND TO:						<b>\$900 /yr</b>

SUMMARY		
Labor		\$13,400 /yr
Power		\$9,200 /yr
Equipment Replacement (Station)		\$6,800 /yr
Equipment Renewal (Valves)		\$900 /yr
		<u>\$30,300 /yr</u>
Number of Connections		200
Cost per Connection		\$152 /yr/conn



# OPERATION AND MAINTENANCE

## GASCOIGNE, MAY RIVER AREA, SC

## GASCOIGNE VACUUM STATION

Estimate #2013-133

117 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

LABOR (INCREMENTAL)					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	300 hrs/yr/station	x	1 station	=	300 hrs/yr
Piping	60 hrs/yr/system	x	1 system	=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	59 valves	=	103 hrs/yr
					<u>463 hrs/yr</u>
				x	\$25 /hr
					<u>\$11,575 /yr</u>
ROUND TO:					<b>\$11,600 /yr</b>

VACUUM STATION POWER CONSUMPTION					
Item	Unit cost		Conn	Duration	Annual Power
Flat rate	\$100.00 /mo	x	1 station	12 mo	= \$1,200 /yr
Consumption	\$5.85 /mo/conn	x	117 /mo/conn	12 mo	= \$8,213 /yr
					<u>\$9,413</u>
ROUND TO:					<b>\$9,500 /yr</b>

EQUIPMENT RENEWAL AND REPLACEMENT					
Item	Renewal/Replacement cost		Renewal/Replacement interval	Quantity	Annual R&R
Vacuum Station					
Vacuum Pumps	\$12,880 /ea	/	15 years	3 pumps	= \$2,576 /yr
Sewage Pumps	\$13,910 /ea	/	15 years	2 pumps	= \$1,855 /yr
Collection Tank	\$22,100 /ea	/	30 years	1 ea	= \$737 /yr
Control Panel	\$16,548 /ea	/	20 years	1 ea	= \$827 /yr
Misc. Equip	\$2,000 /ea	/	15 years	1 ea	= \$133 /yr
					<u>\$6,128 /yr</u>
ROUND TO:					<b>\$6,200 /yr</b>

Vacuum Valves (renewal)					
Vacuum Valves	\$40.00 /ea	/	15 years	59 valves	= \$157 /yr
Controller	\$40.00 /ea	/	10 years	59 valves	= \$236 /yr
Misc. Parts	\$20.00 /ea	/	10 years	59 valves	= \$118 /yr
					<u>\$511 /yr</u>
ROUND TO:					<b>\$600 /yr</b>

SUMMARY	
Labor	\$11,600 /yr
Power	\$9,500 /yr
Equipment Replacement (Station)	\$6,200 /yr
Equipment Renewal (Valves)	\$600 /yr
	<u>\$27,900 /yr</u>
Number of Connections	117
Cost per Connection	\$238 /yr/conn



# OPERATION AND MAINTENANCE

CAHILL, MAY RIVER AREA, SC

CAHILL VACUUM STATION

Estimate #2013-133

155 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

LABOR (INCREMENTAL)					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	300 hrs/yr/station	x	1 station	=	300 hrs/yr
Piping	60 hrs/yr/system	x	1 system	=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	78 valves	=	137 hrs/yr
					<u>497 hrs/yr</u>
				x	\$25 /hr
					<u>\$12,425 /yr</u>
ROUND TO:					<b>\$12,500 /yr</b>

VACUUM STATION POWER CONSUMPTION					
Item	Unit cost		Conn	Duration	Annual Power
Flat rate	\$100.00 /mo	x	1 station	12 mo	= \$1,200 /yr
Consumption	\$4.25 /mo/conn	x	155 /mo/conn	12 mo	= \$7,905 /yr
					<u>\$9,105</u>
ROUND TO:					<b>\$9,200 /yr</b>

EQUIPMENT RENEWAL AND REPLACEMENT					
Item	Renewal/Replacement cost		Renewal/Replacement interval	Quantity	Annual R&R
Vacuum Station					
Vacuum Pumps	\$23,320 /ea	/	15 years	2 pumps	= \$3,109 /yr
Sewage Pumps	\$13,910 /ea	/	15 years	2 pumps	= \$1,855 /yr
Collection Tank	\$22,100 /ea	/	30 years	1 ea	= \$737 /yr
Control Panel	\$15,961 /ea	/	20 years	1 ea	= \$798 /yr
Misc. Equip	\$2,000 /ea	/	15 years	1 ea	= \$133 /yr
					<u>\$6,632 /yr</u>
ROUND TO:					<b>\$6,700 /yr</b>

Vacuum Valves (renewal)					
Vacuum Valves	\$40.00 /ea	/	15 years	78 valves	= \$208 /yr
Controller	\$40.00 /ea	/	10 years	78 valves	= \$312 /yr
Misc. Parts	\$20.00 /ea	/	10 years	78 valves	= \$156 /yr
					<u>\$676 /yr</u>
ROUND TO:					<b>\$700 /yr</b>

SUMMARY	
Labor	\$12,500 /yr
Power	\$9,200 /yr
Equipment Replacement (Station)	\$6,700 /yr
Equipment Renewal (Valves)	\$700 /yr
	<u>\$29,100 /yr</u>
Number of Connections	155
Cost per Connection	\$188 /yr/conn



# OPERATION AND MAINTENANCE

## ALLOY NORTH, MAY RIVER AREA, SC

ALLOY NORTH VACUUM STATION

Estimate #2013-133

713 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

LABOR (INCREMENTAL)					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	300 hrs/yr/station	x	1 station	=	300 hrs/yr
Piping	60 hrs/yr/system	x	1 system	=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	357 valves	=	625 hrs/yr
					<u>985 hrs/yr</u>
				x	\$25 /hr
					<u>\$24,625 /yr</u>
ROUND TO:					<b>\$24,700 /yr</b>

VACUUM STATION POWER CONSUMPTION					
Item	Unit cost		Conn	Duration	Annual Power
Flat rate	\$100.00 /mo	x	1 station	12 mo	= \$1,200 /yr
Consumption	\$0.95 /mo/conn	x	713 /mo/conn	12 mo	= \$8,128 /yr
					<u>\$9,328</u>
ROUND TO:					<b>\$9,400 /yr</b>

EQUIPMENT RENEWAL AND REPLACEMENT					
Item	Renewal/Replacement cost		Renewal/Replacement interval	Quantity	Annual R&R
Vacuum Station					
Vacuum Pumps	\$23,320 /ea	/	15 years	2 pumps	= \$3,109 /yr
Sewage Pumps	\$13,910 /ea	/	15 years	2 pumps	= \$1,855 /yr
Collection Tank	\$33,800 /ea	/	30 years	1 ea	= \$1,127 /yr
Control Panel	\$15,961 /ea	/	20 years	1 ea	= \$798 /yr
Misc. Equip	\$2,000 /ea	/	15 years	1 ea	= \$133 /yr
					<u>\$7,022 /yr</u>
ROUND TO:					<b>\$7,100 /yr</b>

Vacuum Valves (renewal)					
Vacuum Valves	\$40.00 /ea	/	15 years	357 valves	= \$952 /yr
Controller	\$40.00 /ea	/	10 years	357 valves	= \$1,428 /yr
Misc. Parts	\$20.00 /ea	/	10 years	357 valves	= \$714 /yr
					<u>\$3,094 /yr</u>
ROUND TO:					<b>\$3,100 /yr</b>

SUMMARY	
Labor	\$24,700 /yr
Power	\$9,400 /yr
Equipment Replacement (Station)	\$7,100 /yr
Equipment Renewal (Valves)	\$3,100 /yr
	<u>\$44,300 /yr</u>
Number of Connections	713
Cost per Connection	\$62 /yr/conn



# OPERATION AND MAINTENANCE

## ALLOY SOUTH, MAY RIVER AREA, SC

ALLOY SOUTH VACUUM STATION

Estimate #2013-133

885 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

LABOR (INCREMENTAL)					
Item	Labor effort		Quantity		Annual Labor
Vacuum Station	300 hrs/yr/station	x	1 station	=	300 hrs/yr
Piping	60 hrs/yr/system	x	1 system	=	60 hrs/yr
Valves	1.75 hrs/yr/valve	x	443 valves	=	775 hrs/yr
					<u>1135 hrs/yr</u>
				x	\$25 /hr
					<u>\$28,375 /yr</u>
ROUND TO:					<b>\$28,400 /yr</b>

VACUUM STATION POWER CONSUMPTION					
Item	Unit cost		Conn	Duration	Annual Power
Flat rate	\$100.00 /mo	x	1 station	12 mo	= \$1,200 /yr
Consumption	\$1.20 /mo/conn	x	885 /mo/conn	12 mo	= \$12,744 /yr
					<u>\$13,944</u>
ROUND TO:					<b>\$14,000 /yr</b>

EQUIPMENT RENEWAL AND REPLACEMENT					
Item	Renewal/Replacement cost		Renewal/Replacement interval	Quantity	Annual R&R
Vacuum Station					
Vacuum Pumps	\$23,280 /ea	/	15 years	3 pumps	= \$4,656 /yr
Sewage Pumps	\$13,910 /ea	/	15 years	2 pumps	= \$1,855 /yr
Collection Tank	\$34,500 /ea	/	30 years	1 ea	= \$1,150 /yr
Control Panel	\$17,329 /ea	/	20 years	1 ea	= \$866 /yr
Misc. Equip	\$2,000 /ea	/	15 years	1 ea	= \$133 /yr
					<u>\$8,660 /yr</u>
ROUND TO:					<b>\$8,700 /yr</b>

Vacuum Valves (renewal)					
Vacuum Valves	\$40.00 /ea	/	15 years	443 valves	= \$1,181 /yr
Controller	\$40.00 /ea	/	10 years	443 valves	= \$1,772 /yr
Misc. Parts	\$20.00 /ea	/	10 years	443 valves	= \$886 /yr
					<u>\$3,839 /yr</u>
ROUND TO:					<b>\$3,900 /yr</b>

SUMMARY	
Labor	\$28,400 /yr
Power	\$14,000 /yr
Equipment Replacement (Station)	\$8,700 /yr
Equipment Renewal (Valves)	\$3,900 /yr
	<u>\$55,000 /yr</u>
Number of Connections	885
Cost per Connection	\$62 /yr/conn



# VACUUM STATION CALCULATIONS

PRITCHARDVILLE, MAY RIVER AREA, SC

PRITCHARDVILLE VACUUM STATION

Estimate #2013-133

702 Service Connections

July 22, 2013

Hussey, Gay, Bell & DeYoung

## DESIGN FLOWS

Number of Connections		702	
Growth factor	x	1.00	
Per capita flow	x	100 gpd	
Persons/connection	x	3.00	
Peak factor	x	2.50	
Peak flow	=	366 gpm	
Other peak flow	+	0 gpm	
<b>Total peak flow</b>		<b>366 gpm</b>	<b>Qmax</b>
Average flow		146 gpm	Qa
Minimum flow		73 gpm	Qmin

## SEWAGE PUMPS

<b>Sewage pump capacity</b>	<b>370 gpm</b>	<b>Qdp (SELECTED DISCHARGE PUMP)</b>
Estimated TDH	80 ft	
Pump efficiency	50%	
Motor efficiency	85%	
Estimate BHP	17.59 hp	
<b>Selected HP</b>	<b>30 hp</b>	

## COLLECTION TANK

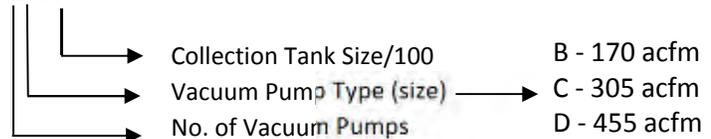
Operating volume	879 gal	Vo
Tank volume required	3,000 gal	
<b>Selected tank volume</b>	<b>3,000 gal</b>	<b>Vct</b>

## VACUUM PUMPS

Longest Line	10,000 lf	
"A" factor	8	
Volume of pipe	73,490 gal	Vp
Vacuum pump capacity required	390 cfm	
System pump down time	2.53 min	t
<b>Selected vacuum pumps</b>	<b>3</b>	<b>455 acfm</b>
		<b>25 hp</b>
		<b>Qvp (SELECTED VACUUM PUMP)</b>

## SKID MODEL

3D-30





**STONEY CREEK, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**VACUUM STATION CALCULATIONS**

**STONEY CREEK VACUUM STATION**

200 Service Connections

**DESIGN FLOWS**

Number of Connections		200	
Growth factor	x	1.00	
Per capita flow	x	100 gpd	
Persons/connection	x	3.00	
Peak factor	x	2.50	
Peak flow	=	104 gpm	
Other peak flow	+	0 gpm	
<b>Total peak flow</b>		<b>104 gpm</b>	<b>Qmax</b>
Average flow		42 gpm	Qa
Minimum flow		21 gpm	Qmin

**SEWAGE PUMPS**

<b>Sewage pump capacity</b>	<b>105 gpm</b>	<b>Qdp (SELECTED DISCHARGE PUMP)</b>
Estimated TDH	80 ft	
Pump efficiency	50%	
Motor efficiency	85%	
Estimate BHP	4.99 hp	
<b>Selected HP</b>	<b>10 hp</b>	

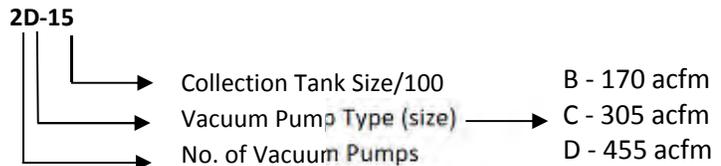
**COLLECTION TANK**

Operating volume	252 gal	Vo
Tank volume required	1,200 gal	
<b>Selected tank volume</b>	<b>1,500 gal</b>	<b>Vct</b>

**VACUUM PUMPS**

Longest Line	9,200 lf	
"A" factor	8	
Volume of pipe	34,180 gal	Vp
Vacuum pump capacity required	111 cfm	
System pump down time	2.38 min	t
<b>Selected vacuum pumps</b>	<b>2</b>	<b>455 acfm</b>
		<b>25 hp</b>
		<b>Qvp (SELECTED VACUUM PUMP)</b>

**SKID MODEL**





**GASCOIGNE, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

VACUUM STATION CALCULATIONS

GASCOIGNE VACUUM STATION

117 Service Connections

**DESIGN FLOWS**

Number of Connections		117	
Growth factor	x	1.00	
Per capita flow	x	100 gpd	
Persons/connection	x	3.00	
Peak factor	x	2.50	
Peak flow	=	61 gpm	
Other peak flow	+	0 gpm	
<b>Total peak flow</b>		<b>61 gpm</b>	<b>Qmax</b>
Average flow		24 gpm	Qa
Minimum flow		12 gpm	Qmin

**SEWAGE PUMPS**

<b>Sewage pump capacity</b>	<b>65 gpm</b>	<b>Qdp (SELECTED DISCHARGE PUMP)</b>
Estimated TDH	80 ft	
Pump efficiency	50%	
Motor efficiency	85%	
Estimate BHP	3.09 hp	
<b>Selected HP</b>	<b>10 hp</b>	

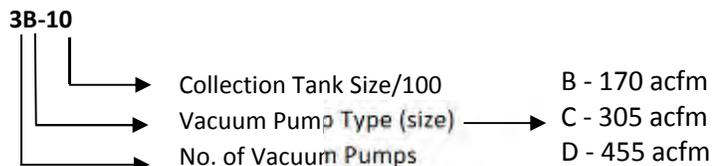
**COLLECTION TANK**

Operating volume	147 gal	Vo
Tank volume required	1,000 gal	
<b>Selected tank volume</b>	<b>1,000 gal</b>	<b>Vct</b>

**VACUUM PUMPS**

Longest Line	8,500 lf	
"A" factor	8	
Volume of pipe	30,410 gal	Vp
Vacuum pump capacity required	65 cfm	
System pump down time	2.80 min	t
<b>Selected vacuum pumps</b>	<b>3</b>	<b>170 acfm</b>
		<b>10 hp</b>
		<b>Qvp (SELECTED VACUUM PUMP)</b>

**SKID MODEL**





**CAHILL, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

VACUUM STATION CALCULATIONS

CAHILL VACUUM STATION

155 Service Connections

**DESIGN FLOWS**

Number of Connections		155	
Growth factor	x	1.00	
Per capita flow	x	100 gpd	
Persons/connection	x	3.00	
Peak factor	x	2.50	
Peak flow	=	81 gpm	
Other peak flow	+	0 gpm	
<b>Total peak flow</b>		<b>81 gpm</b>	<b>Qmax</b>
Average flow		32 gpm	Qa
Minimum flow		16 gpm	Qmin

**SEWAGE PUMPS**

<b>Sewage pump capacity</b>	<b>85 gpm</b>	<b>Qdp (SELECTED DISCHARGE PUMP)</b>
Estimated TDH	80 ft	
Pump efficiency	50%	
Motor efficiency	85%	
Estimate BHP	4.04 hp	
<b>Selected HP</b>	<b>10 hp</b>	

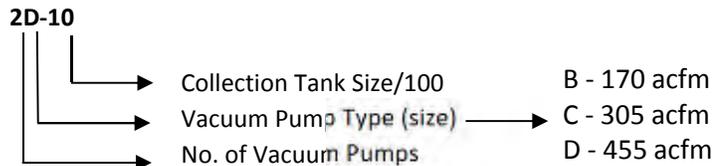
**COLLECTION TANK**

Operating volume	195 gal	Vo
Tank volume required	1,000 gal	
<b>Selected tank volume</b>	<b>1,000 gal</b>	<b>Vct</b>

**VACUUM PUMPS**

Longest Line	7,000 lf	
"A" factor	7	
Volume of pipe	37,760 gal	Vp
Vacuum pump capacity required	76 cfm	
System pump down time	2.57 min	t
<b>Selected vacuum pumps</b>	<b>2</b>	<b>455 acfm</b>
		<b>25 hp</b>
		<b>Qvp (SELECTED VACUUM PUMP)</b>

**SKID MODEL**





**ALLJOY NORTH, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**VACUUM STATION CALCULATIONS**

ALLJOY NORTH VACUUM STATION

713 Service Connections

**DESIGN FLOWS**

Number of Connections		713	
Growth factor	x	1.00	
Per capita flow	x	100 gpd	
Persons/connection	x	3.00	
Peak factor	x	2.50	
Peak flow	=	371 gpm	
Other peak flow	+	0 gpm	
<b>Total peak flow</b>		<b>371 gpm</b>	<b>Qmax</b>
Average flow		148 gpm	Qa
Minimum flow		74 gpm	Qmin

**SEWAGE PUMPS**

<b>Sewage pump capacity</b>	<b>375 gpm</b>	<b>Qdp (SELECTED DISCHARGE PUMP)</b>
Estimated TDH	80 ft	
Pump efficiency	50%	
Motor efficiency	85%	
Estimate BHP	17.83 hp	
<b>Selected HP</b>	<b>10 hp</b>	

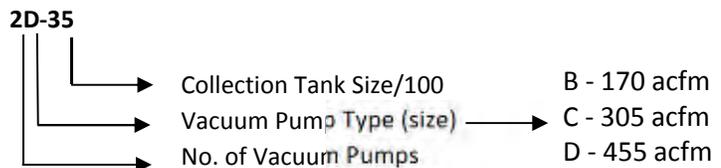
**COLLECTION TANK**

Operating volume	891 gal	Vo
Tank volume required	3,100 gal	
<b>Selected tank volume</b>	<b>3,500 gal</b>	<b>Vct</b>

**VACUUM PUMPS**

Longest Line	5,700 lf	
"A" factor	7	
Volume of pipe	31,420 gal	Vp
Vacuum pump capacity required	346 cfm	
System pump down time	2.33 min	t
<b>Selected vacuum pumps</b>	<b>2</b>	<b>455 acfm</b>
		<b>25 hp</b>
		<b>Qvp (SELECTED VACUUM PUMP)</b>

**SKID MODEL**





**ALLJOY SOUTH, MAY RIVER AREA, SC**

Estimate #2013-133

July 22, 2013

Hussey, Gay, Bell & DeYoung

**VACUUM STATION CALCULATIONS**

ALLJOY SOUTH VACUUM STATION

885 Service Connections

**DESIGN FLOWS**

Number of Connections		885	
Growth factor	x	1.00	
Per capita flow	x	100 gpd	
Persons/connection	x	3.00	
Peak factor	x	2.50	
Peak flow	=	461 gpm	
Other peak flow	+	0 gpm	
<b>Total peak flow</b>		<b>461 gpm</b>	<b>Qmax</b>
Average flow		184 gpm	Qa
Minimum flow		92 gpm	Qmin

**SEWAGE PUMPS**

<b>Sewage pump capacity</b>	<b>465 gpm</b>	<b>Qdp (SELECTED DISCHARGE PUMP)</b>
Estimated TDH	80 ft	
Pump efficiency	50%	
Motor efficiency	85%	
Estimate BHP	22.10 hp	
<b>Selected HP</b>	<b>10 hp</b>	

**COLLECTION TANK**

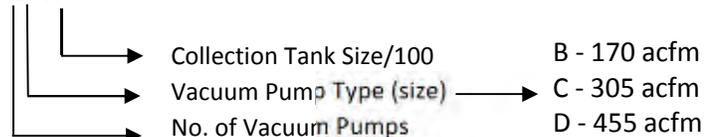
Operating volume	1,107 gal	Vo
Tank volume required	3,700 gal	
<b>Selected tank volume</b>	<b>4,000 gal</b>	<b>Vct</b>

**VACUUM PUMPS**

Longest Line	9,800 lf	
"A" factor	8	
Volume of pipe	71,510 gal	Vp
Vacuum pump capacity required	492 cfm	
System pump down time	2.50 min	t
<b>Selected vacuum pumps</b>	<b>3</b>	<b>455 acfm</b>
		<b>25 hp</b>
		<b>Qvp (SELECTED VACUUM PUMP)</b>

**SKID MODEL**

3D-40

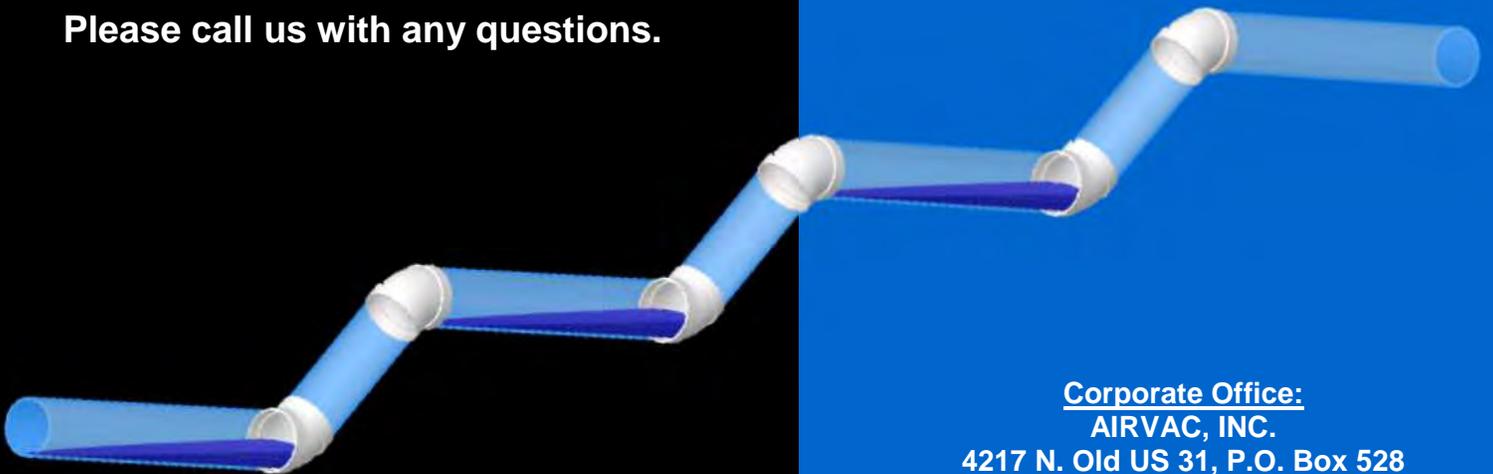


# AIRVAC®

*The World Leader in Vacuum Sewer Technology*

AIRVAC prides itself on the ability to deliver a broad range of services from planning, design, and engineering support to inspection, training and contractor services. We focus our efforts on developing full-service, long-term customer relationships.

Please call us with any questions.



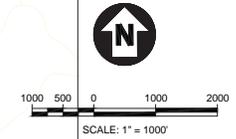
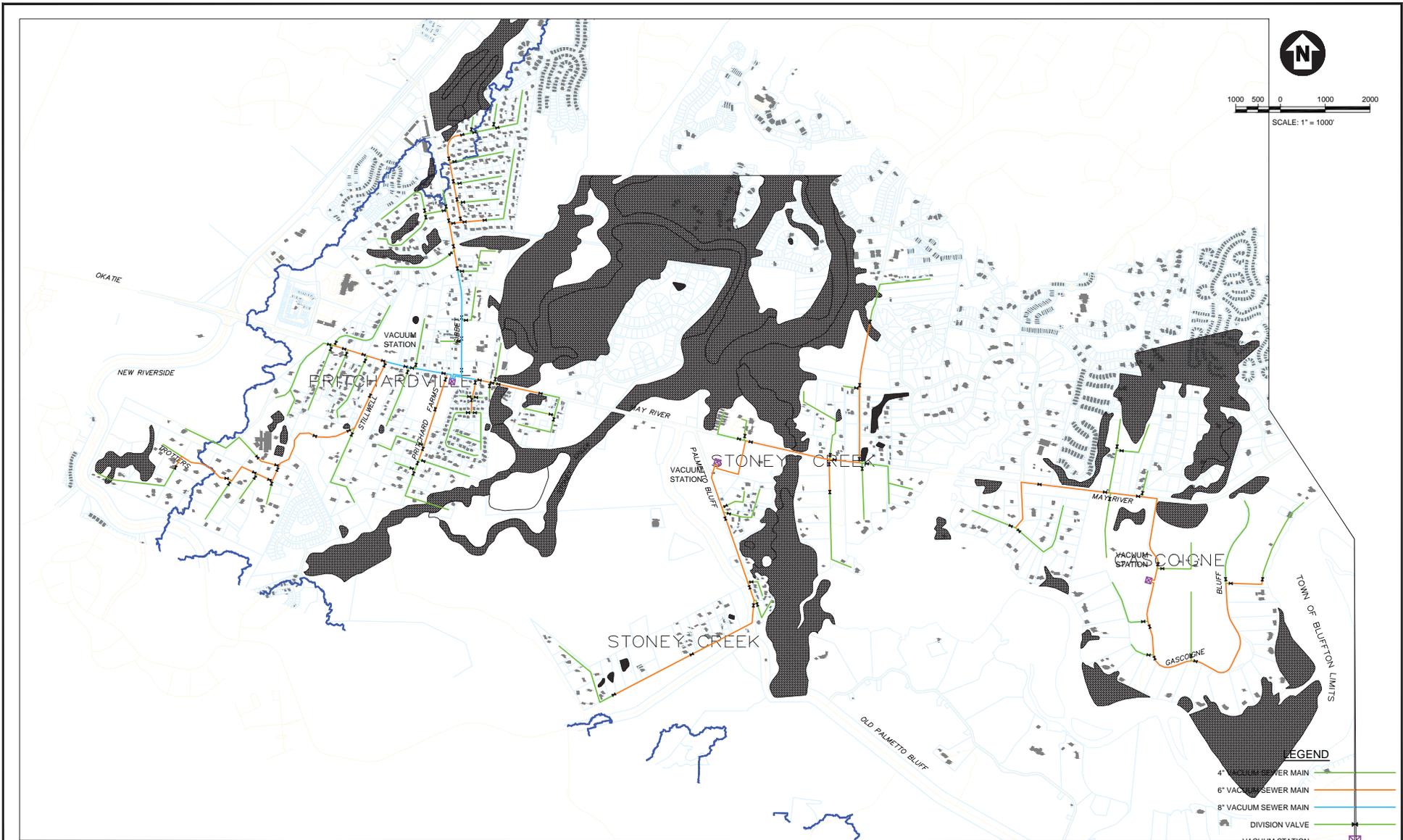
Corporate Office:

AIRVAC, INC.  
4217 N. Old US 31, P.O. Box 528  
Rochester, IN 46975  
Phone: 574.223.3980  
Fax: 574.223.5566

National Sales Office:

AIRVAC, INC.  
200 Tower Drive, Suite A  
Oldsmar, FL 34677  
Phone: 813.855.6297  
Fax: 813.855.9093

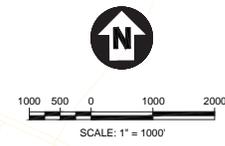
[www.airvac.com](http://www.airvac.com)



**LEGEND**

4" VACUUM SEWER MAIN	
6" VACUUM SEWER MAIN	
8" VACUUM SEWER MAIN	
DIVISION VALVE	
VACUUM STATION	

	IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE, OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THEREIN CONTAINED IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHER, FOR ANY PURPOSE EXCEPT WITH THE WRITTEN PERMISSION OF AIRVAC, INC. AND FURTHER AGREES TO SURRENDER SAME TO AIRVAC, INC. UPON DEMAND.						TITLE <b>MAY RIVER AREA, BLUFFTON, SC          PRELIMINARY VACUUM COLLECTION SYSTEM LAYOUT</b>			
							CLIENT <b>HUSSEY, GAY, BELL &amp; DeYOUNG</b>			
AIRVAC, INC. P.O. BOX 528, 4217 N. OLD U.S. 31, ROCHESTER, INDIANA 46975 U.S.A.	TELEPHONE (574) 223-3980 FAX (574) 223-5566	AIRVAC ESTIMATE #2013-133	COPYRIGHT © AIRVAC, INC.	NO.	REVISIONS	DATE	DRAWN BY <b>J. YOUNG</b>	DATE <b>07-19-2013</b>	SCALE <b>1" = 1000'</b>	DRAWING NO. <b>1 OF 2</b>



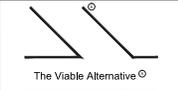
**LEGEND**

- 4" VACUUM SEWER MAIN ————
- 6" VACUUM SEWER MAIN ————
- 8" VACUUM SEWER MAIN ————
- DIVISION VALVE ————
- VACUUM STATION ————



IN CONSIDERATION OF THE RECEIPT OF THIS DOCUMENT, THE RECIPIENT AGREES NOT TO REPRODUCE, COPY, USE, OR TRANSMIT THIS DOCUMENT AND/OR THE INFORMATION THEREIN CONTAINED IN WHOLE OR IN PART, OR TO SUFFER SUCH ACTION BY OTHER, FOR ANY PURPOSE EXCEPT WITH THE WRITTEN PERMISSION OF AIRVAC, INC. AND FURTHER AGREES TO SURRENDER SAME TO AIRVAC, INC. UPON DEMAND.

**VACUUM SEWER SYSTEMS**



AIRVAC, INC.  
P.O. BOX 528, 4217 N. OLD U.S. 31, ROCHESTER, INDIANA 46975 U.S.A.

TELEPHONE (574) 223-3980  
FAX (574) 223-5566

AIRVAC ESTIMATE #2013-133

COPYRIGHT © AIRVAC, INC.

NO.

REVISIONS

DATE

TITLE MAY RIVER AREA, BLUFFTON, SC PRELIMINARY VACUUM COLLECTION SYSTEM LAYOUT		CLIENT HUSSEY, GAY, BELL & DeYOUNG	
DRAWN BY J. YOUNG	DATE 07-19-2013	SCALE 1" = 1000'	DRAWING NO. 2 OF 2
DESIGNED BY J. YOUNG	COPYRIGHT © AIRVAC		

# **Appendix D**

## **Vacuum Sewer Concept for Alljoy Sewer Service Area**

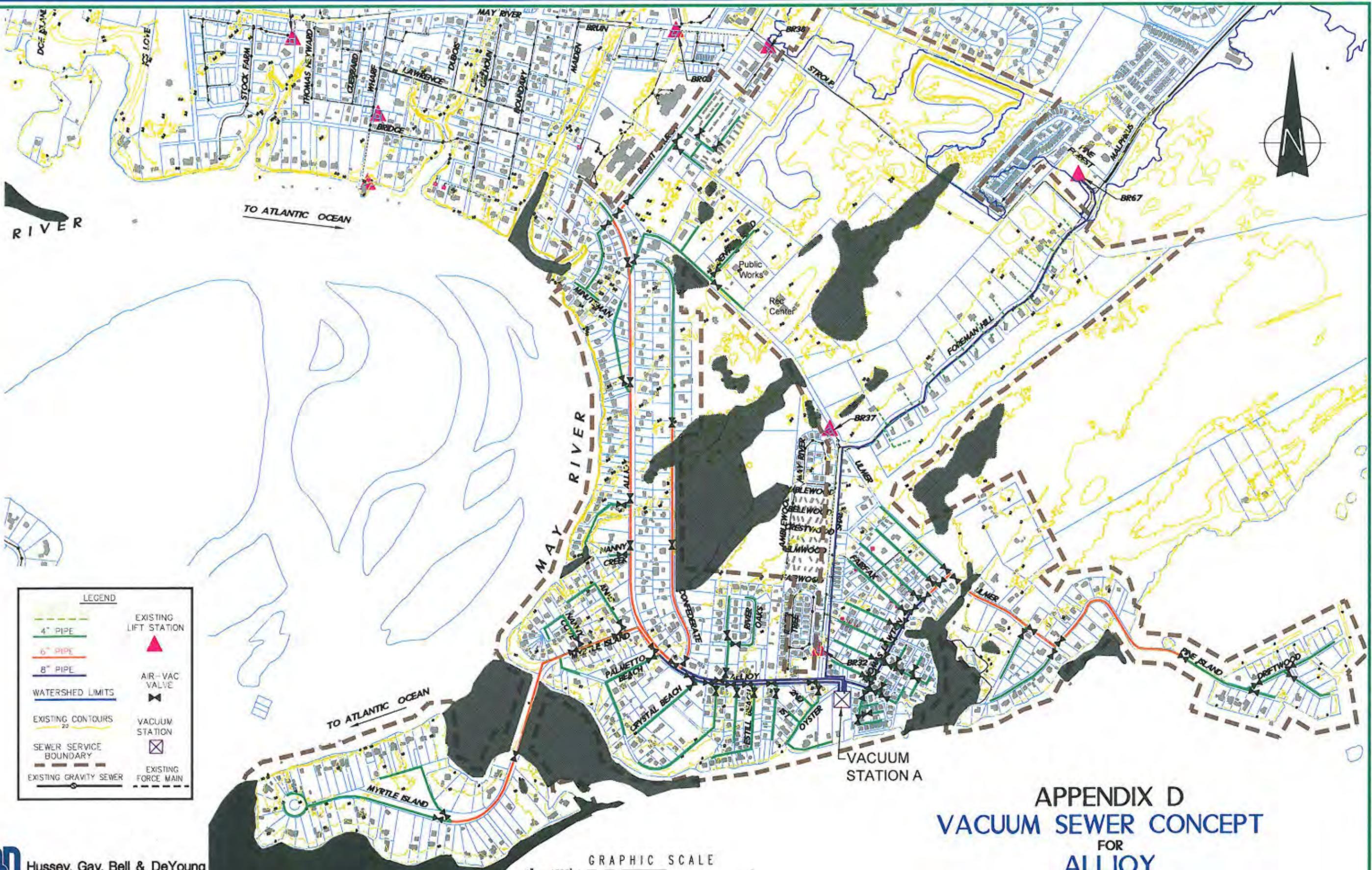
### **Anticipated Cost Estimate**

VACUUM SYSTEM BUDGET COST ESTIMATE  
MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I  
ALLJOY SEWER SERVICE AREA  
October 4, 2013

Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	4-inch Vacuum Main, SDR 21 PVC with Profile Lifts	17,580	LF	\$ 19.00	\$ 330,220.00
2	6-inch Vacuum Main, SDR 21 PVC with Profile Lifts	5,210	LF	\$ 25.00	\$ 119,850.00
3	8-inch Vacuum Main, SDR 21 PVC with Profile Lifts	3,620	LF	\$ 27.00	\$ 97,740.00
4	4-inch Resilient-Wedge Gate/Isolation Service Valve	45	EA	\$ 1,710.00	\$ 76,950.00
5	6-inch Resilient-Wedge Gate/Isolation Service Valve	30	EA	\$ 2,130.00	\$ 63,900.00
6	8-inch Resilient-Wedge Gate/Isolation Service Valve	6	EA	\$ 2,560.00	\$ 15,360.00
7	3-inch Service Lateral, SDR 21 PVC	9,885	LF	\$ 9.00	\$ 88,965.00
8	Misc. Vacuum Fittings	26,330	LBS	\$ 1.00	\$ 26,330.00
9	Jack & Bore 8-inch steel casing (0.5" wall thickness) for 4-inch PVC vacuum main	60	LF	\$ 100.00	\$ 6,000.00
10	Jack & Bore 12-inch steel casing (0.5" wall thickness) for 6-inch PVC vacuum main	60	LF	\$ 120.00	\$ 7,200.00
11	Insert 4-inch PVC vacuum main in casing	60	LF	\$ 30.00	\$ 1,800.00
12	Insert 6-inch PVC vacuum main in casing	60	LF	\$ 40.00	\$ 2,400.00
13	6' deep - 2 Piece Hybrid Valve Pit Package (1420 traffic rated) <sup>1</sup>	494	EA	\$ 5,400.00	\$ 2,668,950.00
14	Vacuum Sewer Tools	1	EA	\$ 5,850.00	\$ 5,850.00
15	Spare Parts	1	EA	\$ 7,020.00	\$ 7,020.00
16	Trailer Mounted Vacuum Pump	1	EA	\$ 28,080.00	\$ 28,080.00
17	Standard Vacuum Station <sup>2</sup>	1	EA	\$ 701,650.00	\$ 701,650.00
18	Simplex HDPE Grinder Station <sup>3</sup>	25	EA	\$ 8,600.00	\$ 215,000.00
19	1.14" HDPE SDR9 Service Lateral <sup>4</sup>	1,500	LF	\$ 9.00	\$ 11,500.00
20	Connect Lateral to Existing Force Main <sup>4</sup>	15	EA	\$ 2,000.00	\$ 30,000.00
21	Electrical Home Connection <sup>5</sup>	25	EA	\$ 2,500.00	\$ 62,500.00
22	Silt Fence	31,452	LF	\$ 3.50	\$ 110,082.00
23	Grassing (Temporary and Permanent)	11,513	SY	\$ 2.00	\$ 23,026.67
24	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>1</sup>	400	CY	\$ 70.00	\$ 28,000.00
25	Remove driveway surface, replace with 2" graded aggregate <sup>3</sup>	684	EA	\$ 160.00	\$ 109,440.00
26	Remove and replace 3' of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	8,700	SY	\$ 70.00	\$ 609,000.00
27	Decommissioning of existing septic tank <sup>5</sup>	684	EA	\$ 500.00	\$ 342,000.00
28	Connection of Vacuum System to home owner's existing system <sup>6</sup>	684	EA	\$ 1,500.00	\$ 1,026,000.00
29	8-inch PVC force main, AWWA C900, SDR-18 <sup>7</sup>	7,232	LF	\$ 18.00	\$ 130,167.00
30	8-inch RJ PVC force main, AWWA C900, SDR-18	845	LF	\$ 24.00	\$ 20,280.00
31	8-inch DI Force Main	254	LF	\$ 28.00	\$ 7,098.00
32	Misc. Force Main Fittings	3,042	LBS	\$ 5.00	\$ 15,210.00
33	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
34	Core into Termination Manhole for Force Main	1	EA	\$ 3,000.00	\$ 3,000.00
35	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	120	LF	\$ 150.00	\$ 18,000.00
36	Insert 8-inch PVC force main in casing	120	LF	\$ 50.00	\$ 6,000.00
37	Vacuum Manufacturer Field Services	2	Week	\$ 3,000.00	\$ 6,000.00
38	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
39	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 424,700.00
Subtotal					\$ 7,502,248.67
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 450,134.92
Engineering Fees (15%)					\$ 1,125,337.30
Construction Contingencies (15%)					\$ 1,125,337.30
Estimated Probable Cost					\$ 10,203,058.19
CALL <sup>III, IV</sup>					\$ 10,300,000.00
No. of existing customers:					684
Cost per customer:					\$ 15,100.00

Assumptions:

1. Assumes 50% of the homes can physically share Valve Pit Package at 2:1. Quantity based on existing lots only.
2. Standard Vacuum Station includes AirVAc Standard Skid Model 2D-15, equipment installation, wiring/piping/etc., vacuum station building, emergency generator, odor control bio-mass filter bed, collection tank, duplex sewage pumps, vacuum pumps, control panel. Optional equipment, building design and controls will effect the total cost of the Station.
3. Remove and replace unsuitable material: quantity assumed, remove and replace driveways: quantity assumed.
4. Assumes force main within portions of roadway.
5. Cost includes removing contents and fill tank with sand and abandon drain fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
6. Cost assumes locating each home owner's drain line, cap line to septic tank and run sewer lateral to valve pit. Lateral lengths will vary. Yard and driveway restoration will var.
7. Assumes new force main discharges to LS - BR67
8. Grinders along Foreman Hill Road only.
9. Assumes price for connection to homeowner's electrical power. Cost is for what is assumed; unforeseen costs are difficult to predict for each homeowner's unique existing electrical setup.
10. Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
11. It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
12. Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
13. Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BJW SA & Town of Bluffton



**LEGEND**

	4" PIPE		EXISTING LIFT STATION
	6" PIPE		AIR-VAC VALVE
	8" PIPE		VACUUM STATION
	WATERSHED LIMITS		EXISTING FORCE MAIN
	EXISTING CONTOURS		
	SEWER SERVICE BOUNDARY		
	EXISTING GRAVITY SEWER		

**APPENDIX D**  
**VACUUM SEWER CONCEPT**  
 FOR  
**ALLJOY**  
 DATE: OCTOBER 2013



# **Appendix E**

## **Vacuum Sewer Concept for Cahill Sewer Service Area**

### **Anticipated Cost Estimate**

VACUUM SYSTEM BUDGET COST ESTIMATE  
MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I  
CANTILL SEWER SERVICE AREA  
October 4, 2013

Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	4-inch Vacuum Main, SDR 21 PVC with Profile Lifts	25,101	LF	\$ 16.00	\$ 401,616.00
2	6-inch Vacuum Main, SDR 21 PVC with Profile Lifts	11,470	LF	\$ 19.00	\$ 217,930.00
3	4-inch Resilient-Wedge Gate Isolation Service Valve	20	EA	\$ 1,410.00	\$ 28,200.00
4	6-inch Resilient-Wedge Gate/Isolation Service Valve	17	EA	\$ 1,760.00	\$ 29,920.00
5	3-inch Service Lateral, SDR 21 PVC	1,485	LF	\$ 8.00	\$ 11,880.00
6	Misc. Vacuum Fittings	37,471	LBS	\$ 1.00	\$ 37,471.00
7	Jack & Bore 8-inch steel casing (0.5" wall thickness) for 4-inch PVC vacuum main	600	LF	\$ 100.00	\$ 60,000.00
8	Jack & Bore 12-inch steel casing (0.5" wall thickness) for 6-inch PVC vacuum main	300	LF	\$ 120.00	\$ 36,000.00
9	Insert 4-inch PVC vacuum main in casing	500	LF	\$ 30.00	\$ 18,000.00
10	Insert 6-inch PVC vacuum main in casing	300	LF	\$ 40.00	\$ 12,000.00
11	6' deep - 2 Piece Hybrid Valve Pit Package (H20 traffic rated) <sup>1</sup>	74	EA	\$ 5,400.00	\$ 400,950.00
12	Vacuum Sewer Tools	1	EA	\$ 5,850.00	\$ 5,850.00
13	Spare Parts	1	EA	\$ 7,020.00	\$ 7,020.00
14	Trailer Mounted Vacuum Pump	1	EA	\$ 28,080.00	\$ 28,080.00
15	Standard Vacuum Station <sup>2</sup>	1	EA	\$ 687,960.00	\$ 687,960.00
16	Silt Fence	43,895	LF	\$ 3.50	\$ 153,598.25
17	Grassing (Temporary and Permanent)	13,670	SY	\$ 2.00	\$ 27,340.67
18	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	500	CY	\$ 70.00	\$ 35,000.00
19	Remove driveway surface, replace with 2" graded aggregate <sup>4</sup>	59	EA	\$ 160.00	\$ 15,840.00
20	Remove and replace 3' of asphaltic road surface over manholes, 3" compacted thickness <sup>4</sup>	3,450	SY	\$ 70.00	\$ 241,500.00
21	Decommissioning of existing septic tank <sup>5</sup>	99	EA	\$ 500.00	\$ 49,500.00
22	Connection of Vacuum System to home owner's existing system <sup>6</sup>	99	EA	\$ 1,500.00	\$ 148,500.00
23	8-inch P1 C force main, AWWA C900, SDR-18 <sup>7</sup>	3,855	LF	\$ 18.00	\$ 69,390.00
24	8-inch RJ PVC force main, AWWA C900, SDR-18	450	LF	\$ 24.00	\$ 10,800.00
25	8-inch DI Force Main	135	LF	\$ 28.00	\$ 3,780.00
26	Misc. Force Main Fittings	1,620	LBS	\$ 5.00	\$ 8,100.00
27	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
28	Core into Termination Manhole for Force Main	1	EA	\$ 3,000.00	\$ 3,000.00
29	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	60	LF	\$ 150.00	\$ 9,000.00
30	Insert 8-inch PVC force main in casing	60	LF	\$ 50.00	\$ 3,000.00
31	Vacuum Manufacturer Field Services	2	Week	\$ 3,000.00	\$ 6,000.00
32	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
33	Grading, spreading/disposal excess excavated material, remove and replace monuments, site protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 168,200.00
Subtotal:					\$ 2,970,425.87
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%):					\$ 178,225.55
Engineering Fees (15%):					\$ 445,563.88
Construction Contingencies (15%):					\$ 445,563.88
Estimated Probable Cost:					\$ 4,039,779.18
CALL <sup>III, IIII, IV</sup> :					\$ 4,100,000.00
No. of existing customers:					99
Cost per customer:					\$ 41,500.00

Assumptions:

1. Assumes 50% of the homes can physically share Valve Pit Package at 2:1. Quantity based on existing lots only.

2. Standard Vacuum Station includes Air/Vac Standard Skid Model 2D-10, equipment installation, wiring, piping/etc., vacuum station building, emergency generator, odor control bio-mass filter bed, collection tank, duplex sewage pumps, vacuum pumps, control panel. Optional equipment, building design and controls will effect the total cost of the Station.

3. Remove and replace unsuitable material. quantity assumed, remove and replace driveways: quantity assumed.

4. Assumes force main within portions of roadway.

5. Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.

6. Cost assumes locating each home owner's drain line, cap line to septic tank and non sewer lateral to valve pit. Lateral lengths will vary. Yard and driveway restoration will vary.

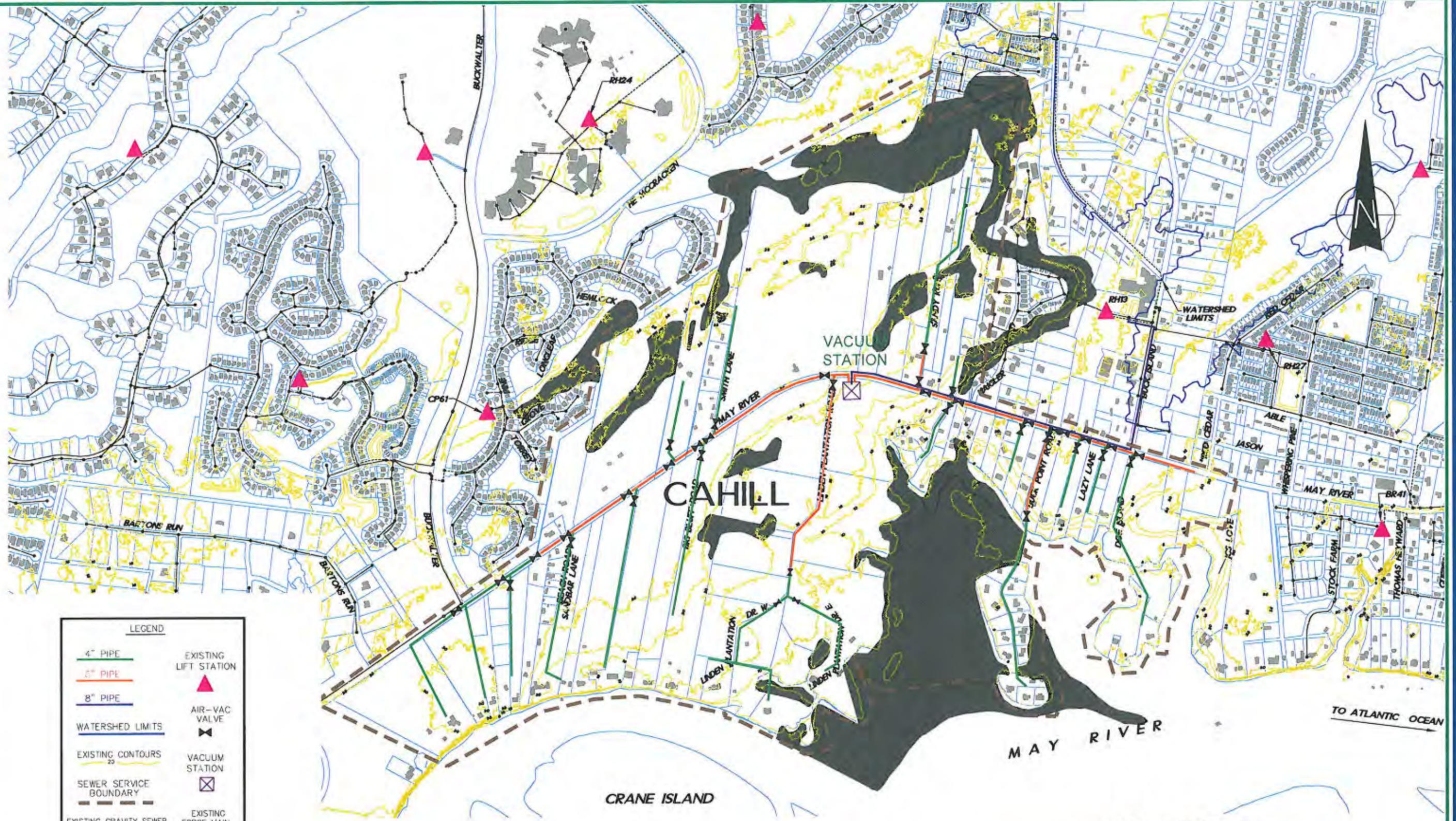
7. Assumes new force main discharges to LS - RH13

I. Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.

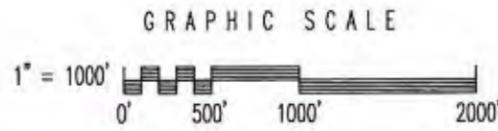
II. It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.

III. Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.

IV. Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BFWA & Town of Bluffton.



LEGEND	
4" PIPE	EXISTING LIFT STATION
6" PIPE	AIR-VAC VALVE
8" PIPE	VACUUM STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	



APPENDIX E  
 VACUUM SEWER CONCEPT  
 FOR  
**CAHILL**  
 DATE: OCTOBER 2013

# **Appendix F**

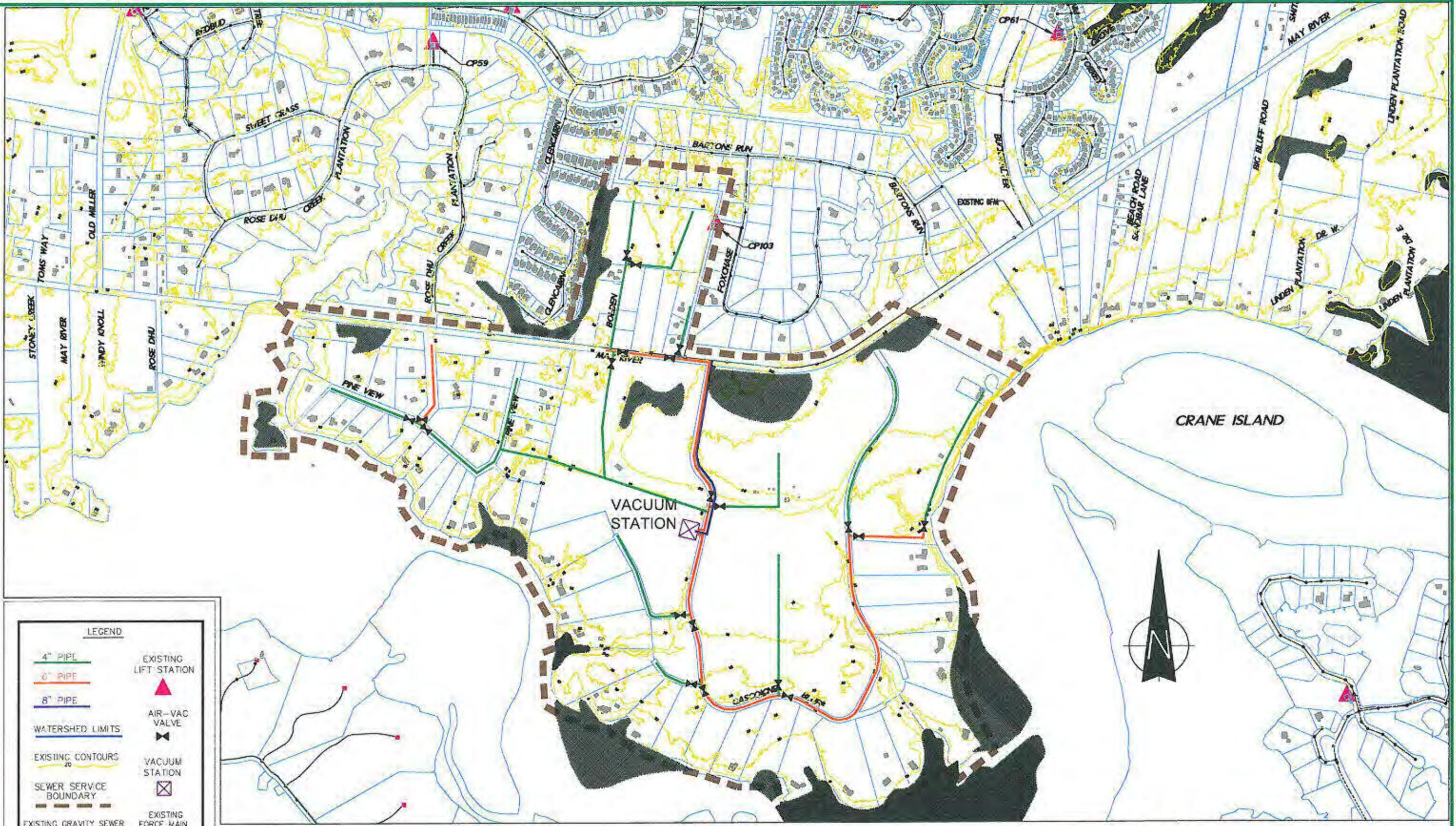
## **Vacuum Sewer Concept for Gascoigne Sewer Service Area**

### **Anticipated Cost Estimate**

**VACUUM SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**G. SCOTTSVILLE SEWER SERVICE AREA**  
 October 4, 2013

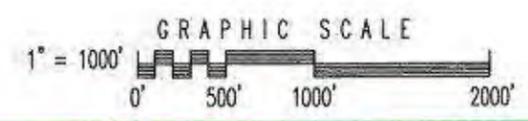
Item No.	Description	Quantity	Units	Unit Price	Total Cost
1	4-inch Vacuum Man, SDR 21 PVC with Profile Lifts	18,993	LF	\$ 18.00	\$ 341,874.00
2	8-inch Vacuum Man, SDR 11 PVC with Profile Lifts	10,494	LF	\$ 23.00	\$ 241,362.00
3	6-inch Resilient-Wedge Gate/Isolation Service Valve	12	EA	\$ 1,710.00	\$ 20,520.00
4	8-inch Resilient-Wedge Gate/Isolation Service Valve	8	EA	\$ 2,130.00	\$ 17,040.00
5	3-inch Service Lateral, SDR 21 PVC	810	LF	\$ 9.00	\$ 7,290.00
6	Misc. Vacuum Fittings	39,729	LBS	\$ 1.00	\$ 39,729.00
7	Jack & Bore 12-inch steel casing (0.5" wall thickness) for 8-inch PVC vacuum main	120	LF	\$ 120.00	\$ 14,400.00
8	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC vacuum main	120	LF	\$ 150.00	\$ 18,000.00
9	Insert 4-inch PVC vacuum main in casing	120	LF	\$ 30.00	\$ 3,600.00
10	Insert 6-inch PVC vacuum main in casing	120	LF	\$ 40.00	\$ 4,800.00
11	6' deep - 2 Piece Hybrid Valve Pit Package (H20 traffic rated) <sup>1</sup>	41	EA	\$ 5,400.00	\$ 221,700.00
12	Vacuum Sewer Toilet	1	EA	\$ 5,850.00	\$ 5,850.00
13	Spare Parts	1	EA	\$ 7,020.00	\$ 7,020.00
14	Trailer Mounted Vacuum Pump	1	EA	\$ 28,080.00	\$ 28,080.00
15	Standard Vacuum Station <sup>2</sup>	1	EA	\$ 646,660.00	\$ 646,660.00
16	Site Fence	35,387	LF	\$ 3.30	\$ 116,776.10
17	Grassing (Temporary and Permanent)	10,498	SY	\$ 2.00	\$ 20,996.00
18	Remove unsuitable material, dispose offsite, replace with crushed stone or six fill material <sup>3</sup>	400	CY	\$ 70.00	\$ 28,000.00
19	Remove driveway surface, replace with 2" graded aggregate <sup>3</sup>	54	EA	\$ 160.00	\$ 8,640.00
20	Remove and replace 2" of asphalt road surface over trenches, 3" compacted thickness <sup>4</sup>	750	SY	\$ 70.00	\$ 52,500.00
21	Decommissioning of existing septic tank <sup>5</sup>	14	EA	\$ 500.00	\$ 7,000.00
22	Connection of Vacuum System to home owner's existing, steel <sup>6</sup>	34	EA	\$ 1,500.00	\$ 51,000.00
23	8-inch PVC force main, AWWA C900, SDR-18 <sup>7</sup>	1,710	LF	\$ 18.50	\$ 31,535.00
24	8-inch R1 PVC force main, AWWA C900, SDR-18	204	LF	\$ 24.00	\$ 4,896.00
25	8-inch DI Force Main	61	LF	\$ 28.00	\$ 1,708.00
26	Misc. Force Main Fittings	733	LBS	\$ 3.00	\$ 2,199.00
27	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
28	Close Inlet Termination Manhole for Force Main	1	EA	\$ 3,000.00	\$ 3,000.00
29	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	60	LF	\$ 150.00	\$ 9,000.00
30	Insert 4-inch PVC force main in casing	60	LF	\$ 50.00	\$ 3,000.00
31	Vacuum Manufacturer Field Services	2	Week	\$ 3,000.00	\$ 6,000.00
32	Traffic Control	1	JOB	Lump Sum	\$ 30,000.00
33	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 129,800.00
<b>Subtotal</b>					<b>\$ 2,156,170.10</b>
Essential Preparation, Approvals, Legal Fees and Value of the Easements (6%)					\$ 131,290.22
Engineering Fees (15%)					\$ 328,015.55
Construction Contingencies (15%)					\$ 328,015.55
Estimated Probable Cost					\$ 2,974,007.61
<b>CALL TO BID</b>					<b>\$ 3,000,000.00</b>
No. of existing customers:					54
Cost per customer:					\$ 55,600.00

- Assumptions:
- Assumes 30% of the homes can physically share Valve Pit Package at 21. Quantity based on existing lots only.
  - Standard Vacuum Station includes Air/Vac Standard Skid Model 3B-10, equipment installation, wiring/piping/etc., vacuum station building, emergency generator, odor control bio-mass filter bed, collection tank, duplex sewage pumps, vacuum pumps, control panel. Optional equipment, building design and controls will offset the total cost of the Station.
  - Remove and replace unsuitable material; quantity assumed, remove and replace driveways; quantity assumed.
  - Assumes force main within perimeters of roadway.
  - Cost includes removing contents and fill tank with sand and abate/drain fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
  - Costs assumed including each home owner's drain line, cap line to septic tank and ten sewer lateral to valve pit. Lateral lengths will vary. Yard and driveway restoration will vary.
  - Assumes new force main runs/fields to existing 8-inch force main along May River Road.
- I. Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
- II. It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's method of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer knows and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
- III. Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
- IV. Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required but listed herein. Easement preparation, appraisals, legal fees and value of the easements is 6% based on input from BTPSA & Town of Bluffton.



LEGEND	
4" PIPE	EXISTING LIFT STATION
6" PIPE	AIR-VAC VALVE
8" PIPE	VACUUM STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

APPENDIX F  
**VACUUM SEWER CONCEPT**  
 FOR  
**GASCOIGNE**  
 DATE: OCTOBER 2013



# **Appendix G**

**Vacuum Sewer Concept for Stoney  
Creek Sewer Service Area**

**Anticipated Cost Estimate**

VACUUM SYSTEM BUDGET COST ESTIMATE  
MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I  
STONEY CREEK SEWER SERVICE AREA  
October 4, 2013

Item No	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	4-inch Vacuum Main, SDR 21 PVC with Profile Lifts	16,810	LF	\$ 19.00	\$ 319,390.00
2	6-inch Vacuum Main, SDR 21 PVC with Profile Lifts	14,710	LF	\$ 23.00	\$ 338,330.00
3	4-inch Resilient-Wedge Gate/Isolation Service Valve	13	EA	\$ 1,710.00	\$ 22,230.00
4	6-inch Resilient-Wedge Gate/Isolation Service Valve	9	EA	\$ 2,190.00	\$ 19,710.00
5	3-inch Service Lateral, SDR 21 PVC	2,700	LF	\$ 93.00	\$ 25,300.00
6	Misc. Vacuum Fittings	31,820	LBS	\$ 1.00	\$ 31,820.00
7	Jack & Bore 12-inch steel casing (0.5" wall thickness) for 6-inch PVC vacuum main	700	LF	\$ 120.00	\$ 84,000.00
8	Insert 6-inch PVC vacuum main in casing	300	LF	\$ 40.00	\$ 12,000.00
9	6' deep - 2 Piece Hybrid Valve Pit Package (120 traffic rated) <sup>1</sup>	13	EA	\$ 5,400.00	\$ 70,200.00
10	Vacuum Sewer Tools	1	EA	\$ 5,850.00	\$ 5,850.00
11	Spare Parts	1	EA	\$ 7,020.00	\$ 7,020.00
12	Trailer Mounted Vacuum Pump	1	EA	\$ 28,080.00	\$ 28,080.00
13	Standard Vacuum Station <sup>2</sup>	1	EA	\$691,010.00	\$ 691,010.00
14	Silt Fence	17,824	LF	\$ 5.50	\$ 98,102.00
15	Grassing (Temporary and Permanent)	12,767	SY	\$ 2.00	\$ 25,533.33
16	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	400	CY	\$ 70.00	\$ 28,000.00
17	Remove driveway surface, replace with 2" graded aggregate <sup>3</sup>	150	EA	\$ 160.00	\$ 24,000.00
18	Remove and replace 3" of asphaltic road surface over benches, 3" compacted thickness <sup>4</sup>	3,825	SY	\$ 70.00	\$ 267,750.00
19	Decommissioning of existing septic tank <sup>5</sup>	150	EA	\$ 500.00	\$ 75,000.00
20	Connection of Vacuum System to home owner's existing system <sup>6</sup>	150	EA	\$ 1,500.00	\$ 225,000.00
21	8-inch PVC force main, AWWA C900, SDR-18 <sup>7</sup>	5,883	LF	\$ 18.00	\$ 105,894.00
22	8-inch RJ PVC force main, AWWA C900, SDR-18	690	LF	\$ 24.00	\$ 16,560.00
23	8-inch DI Force Main	207	LF	\$ 28.00	\$ 5,796.00
24	Misc. Force Main Fittings	2,484	LBS	\$ 5.00	\$ 12,420.00
25	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
26	Core into Termination Manhole for Force Main	1	EA	\$ 3,000.00	\$ 3,000.00
27	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	120	LF	\$ 150.00	\$ 18,000.00
28	Insert 8-inch PVC force main in casing	120	LF	\$ 50.00	\$ 6,000.00
29	Vacuum Manufacturer Field Services	2	Week	\$ 3,000.00	\$ 6,000.00
30	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
31	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 155,100.00
Subtotal					\$ 3,445,637.33
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 206,738.24
Engineering Fees (15%)					\$ 516,845.60
Construction Contingencies (15%)					\$ 516,845.60
Estimated Probable Cost					\$ 4,686,066.77
CALL <sup>III, IV</sup>					\$ 4,700,000.00
No. of existing customers:					150
Cost per customer:					\$ 31,400.00

Assumptions:

1. Assumes 10% of the homes can physically share Valve Pit Package at 2.1. Quantity based on existing lots only.

2. Standard Vacuum Station includes Air/Vac Standard Skid Model 21-15, equipment installation, wiring/piping/etc., vacuum station building, emergency generator, odor control bio-mass filter bed, collection tank, duplex sewage pumps, vacuum pumps, control panel. Optional equipment, building design and controls will effect the total cost of the Station.

3. Remove and replace unsuitable material, quantity assumed, remove and replace driveways: quantity assumed.

4. Assumes force main within portions of roadway.

5. Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.

6. Cost assumes locating each home owner's drain line, cap line to septic tank and run sewer lateral to valve pit. Lateral lengths will vary. Yard and driveway restoration will vary.

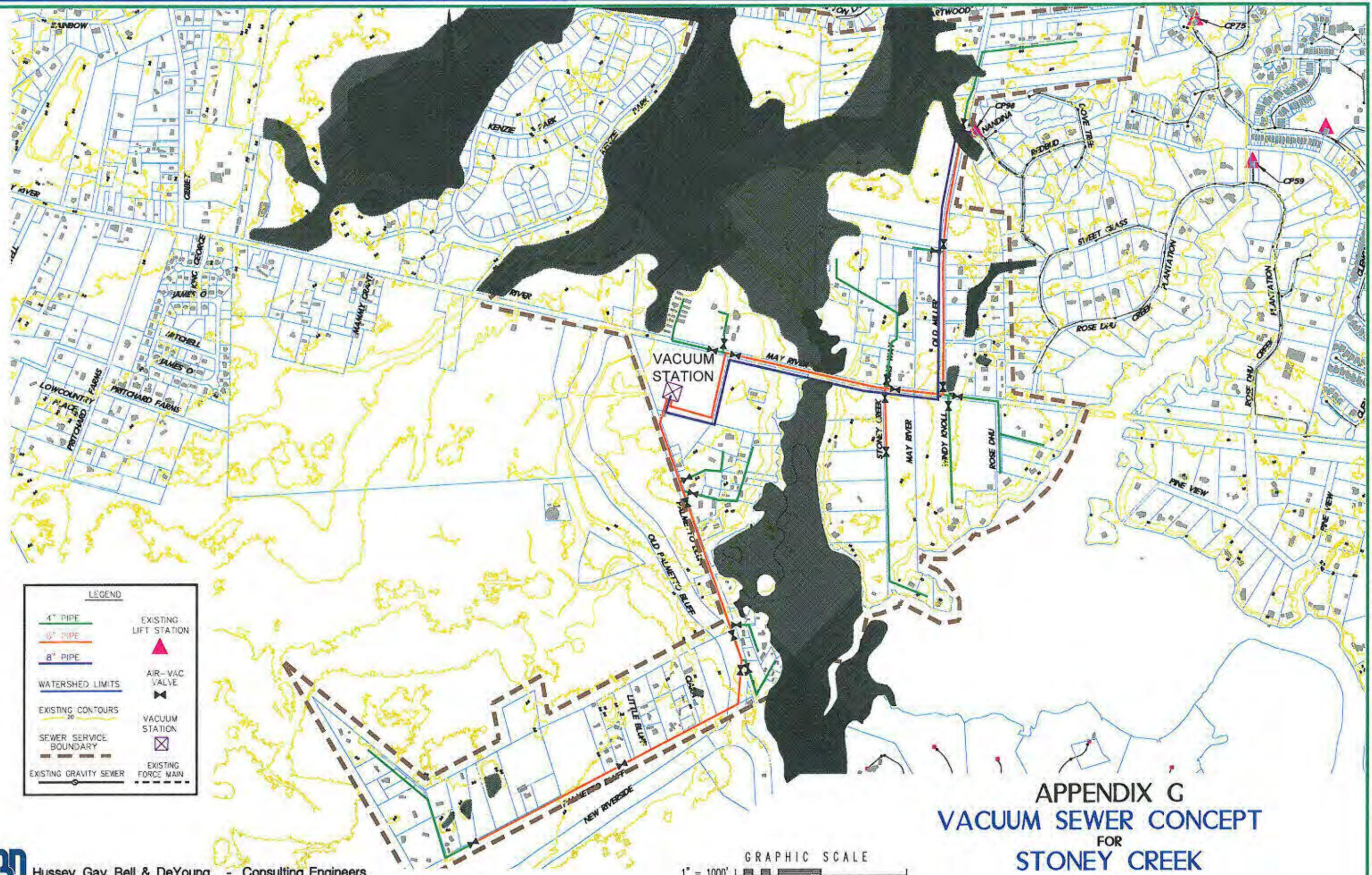
7. Assumes new force main discharges to US - CP98

I. Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.

II: It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.

III: Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.

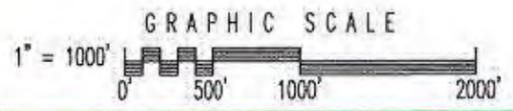
IV: Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required but listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BJWS & Town of Bluffton.



**LEGEND**

4" PIPE	EXISTING LIFT STATION
6" PIPE	AIR-VAC VALVE
8" PIPE	VACUUM STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

**APPENDIX G**  
**VACUUM SEWER CONCEPT**  
 FOR  
**STONEY CREEK**  
 DATE: OCTOBER 2013



# **Appendix H**

## **Vacuum Sewer Concept for Pritchardville Sewer Service Area**

### **Anticipated Cost Estimate**

VACUUM SYSTEM BUDGET COST ESTIMATE  
MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I  
PRITCHARDVILLE SEWER SERVICE AREA  
October 4, 2013

Item No.	Description	Estimated			Total Cost
		Quantity	Units	Unit Price	
1	4-inch Vacuum Main, SDR 21 PVC with Profile Lifts	49,160	LF	\$ 19.00	\$ 934,040.00
2	6-inch Vacuum Main, SDR 21 PVC with Profile Lifts	17,080	LF	\$ 23.00	\$ 392,840.00
3	8-inch Vacuum Main, SDR 21 PVC with Profile Lifts	4,550	LF	\$ 27.00	\$ 122,850.00
4	4-inch Resilient-Wedge Gate/Isolation Service Valve	45	EA	\$ 1,710.00	\$ 76,950.00
5	6-inch Resilient-Wedge Gate/Isolation Service Valve	30	EA	\$ 2,130.00	\$ 63,900.00
6	8-inch Resilient-Wedge Gate/Isolation Service Valve	6	EA	\$ 2,560.00	\$ 15,360.00
7	3-inch Service Lateral, SDR 21 PVC	7,530	LF	\$ 9.00	\$ 67,770.00
8	Misc. Vacuum Fittings	71,570	LBS	\$ 1.00	\$ 71,570.00
9	Jack & Bore 8-inch steel casing (0.5" wall thickness) for 4-inch PVC vacuum main	360	LF	\$ 100.00	\$ 36,000.00
10	Jack & Bore 12-inch steel casing (0.5" wall thickness) for 6-inch PVC vacuum main	240	LF	\$ 120.00	\$ 28,800.00
11	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC vacuum main	180	LF	\$ 150.00	\$ 27,000.00
12	Insert 4-inch PVC vacuum main in casing	360	LF	\$ 30.00	\$ 10,800.00
13	Insert 6-inch PVC vacuum main in casing	240	LF	\$ 40.00	\$ 9,600.00
14	Insert 8-inch PVC vacuum main in casing	180	LF	\$ 50.00	\$ 9,000.00
15	6' deep - 2 Piece Hybrid Valve Pit Package (120 traffic rated)	377	EA	\$ 5,400.00	\$ 2,053,100.00
16	Vacuum Server Tools	1	EA	\$ 5,850.00	\$ 5,850.00
17	Spare Parts	1	EA	\$ 7,020.00	\$ 7,020.00
18	Trailer Mounted Vacuum Pump	1	EA	\$ 28,080.00	\$ 28,080.00
19	Standard Vacuum Station <sup>2</sup>	1	EA	\$ 793,260.00	\$ 793,260.00
20	Silt Fence	84,948	LF	\$ 3.50	\$ 297,318.00
21	Grassing (Temporary and Permanent)	25,343	SY	\$ 2.00	\$ 50,686.67
22	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	800	CY	\$ 70.00	\$ 56,000.00
23	Remove driveway surface, replace with 2" graded aggregate <sup>5</sup>	502	EA	\$ 160.00	\$ 80,320.00
24	Remove and replace 3" of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	2,865	SY	\$ 70.00	\$ 200,550.00
25	Decommissioning of existing septic tank <sup>3</sup>	502	EA	\$ 500.00	\$ 251,000.00
26	Connection of Vacuum System to home owner's existing system <sup>4</sup>	502	EA	\$ 1,500.00	\$ 753,000.00
27	8-inch PVC force main, AWWA C300, SDR-18 <sup>7</sup>	4,551	LF	\$ 18.00	\$ 81,918.00
28	4-inch RI PVC force main, AWWA C900, SDR-18	530	LF	\$ 24.00	\$ 12,720.00
29	8-inch DI Force Main	159	LF	\$ 28.00	\$ 4,452.00
30	Misc. Force Main Fittings	1,968	LBS	\$ 5.00	\$ 9,840.00
31	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
32	Core into Termination Manhole for Force Main	1	EA	\$ 3,000.00	\$ 3,000.00
33	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	60	LF	\$ 150.00	\$ 9,000.00
34	Insert 8-inch PVC force main in casing	60	LF	\$ 50.00	\$ 3,000.00
35	Vacuum Manufacturer Field Services	2	Week	\$ 3,000.00	\$ 6,000.00
36	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
37	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 395,300.00
Subtotal					\$ 5,982,594.67
Easement Preparation, Appraisal, Legal Fees and Value of the Easements (6%)					\$ 418,955.68
Engineering Fees (15%)					\$ 1,047,389.20
Construction Contingencies (19%)					\$ 1,047,389.20
Estimated Probable Cost					\$ 9,496,328.75
CALL OR BIDD					\$ 9,500,000.00
No. of existing customers:					502
Cost per customer:					\$ 19,600.00

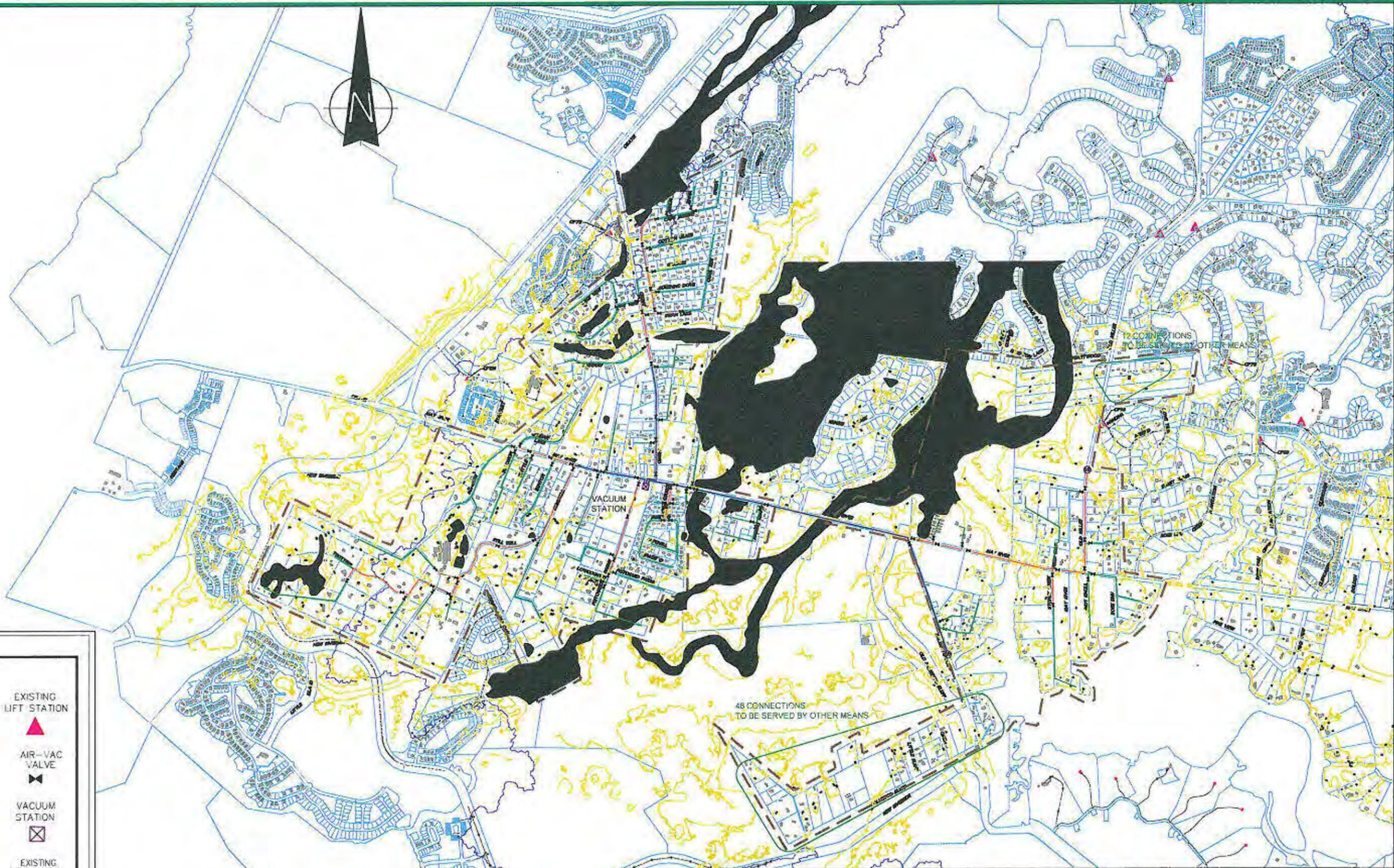
Assumptions:

- I. Assumes 50% of the homes can physically share Valve Pit Package at 2:1. Quantity based on existing lots only.
2. Standard Vacuum Station includes AirVac Standard Skid Model 3D-30, equipment installation, wiring/piping/etc., vacuum station building, emergency generator, odor control bio-mass filter bed, collection tank, duplex sewage pumps, vacuum pumps, control panel. Optional equipment, building design and controls will effect the total cost of the Station.
3. Remove and replace unsuitable material, quantity assumed, remove and replace driveways, quantity assumed.
4. Assumes vacuum main and/or force main within portions of roadway.
5. Cost includes removing contents and fill tank with sand and abandon drain fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
6. Cost assumes locating each home owner's drain line, cap line to septic tank and run sewer lateral to valve pit. Lateral lengths will vary. Yard and driveway restoration will vary.
7. Assumes new force main discharges to LS - CP128.
- I. Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
- II. It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
- III. Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
- IV. Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering disciplines design required not listed herein. Easement preparation, appraisal, legal fees and value of the easements at 6% based on input from BWSA & Town of Bluffton.



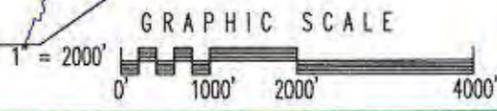
# **Appendix I**

## **Vacuum Sewer Concept for Pritchardville and Stoney Creek Sewer Service Area - Combined**



LEGEND	
4" PIPE	EXISTING LIFT STATION
6" PIPE	AIR-VAC VALVE
8" PIPE	VACUUM STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

**APPENDIX I**  
**VACUUM SEWER CONCEPT**  
 FOR  
**PRITCHARDVILLE & STONEY CREEK**  
 DATE: OCTOBER 2013



# **Appendix J**

## **Low Pressure Grinder Sewer System Typical Features**



PETE DUTY & ASSOCIATES, INC.

1121 Drayton Street • Newberry, South Carolina 29108 • (803) 276-3211 • Fax (803) 276-3212

SUBMITTAL LETTER

March 11, 2013

To: Bobby Lee @ Terry Lee Contracting  
From: Joe Desroches @ Pete Duty & Associates, Inc.  
Re: BJWSA - Sanchez Residence - Simplex Basin Package

Pete Duty & Associates, Inc. is pleased to submit the following equipment for your approval:

- (1) Simplex Fiberglass Basin Grinder Pump Package To Include:
  - (1) 30" x 60" Fiberglass Basin To Include All Internal 2" Piping, Fittings, 4" Inlet Gasket, Fiberglass Bolt Down Lid, Check Valve True Union Ball Valve, & 2" X 6" SS Nipple (Shipped Loose)
  - (1) ABS Piranha S-20/2W Grinder Pump, 230 Volt, Single Phase w/ 30' Power Cable
  - (1) Guide Rail Assembly (Installed In Basin)
  - (1) Upper Guide Bracket 316 Stainless Steel (Installed In Basin)
  - (1) 2" 316 SS - Schedule 40 Guide Rail Pipe (Installed In Basin)
  - (1) ABS Simplex Control Panel
  - (3) Anchor Mini Floats w/ 30' Cables
  - (1) 3/16" Lifting Chain Type 316 SS w/ Shackle
  - (1) Cable Bracket - SS
  - (1) Meter Box

If you have any questions, or need additional information, please feel free to contact me.

Cordially,

Joe Desroches

Water & Sewage Pumping and Treatment Equipment  
2219 Leah Drive • Hillsborough, North Carolina 27278 • (919) 245-5070 • Fax (919) 245-5071



# Pump performance curves PIRANHA S W 60 HZ

Curve number

Reference curve  
PIRANHA S W

Both pumps selected

Discharge  
G1½"

Frequency  
60 Hz

Density  
62.428 lb/ft³

Viscosity  
0.000016813 ft²/s

Testnorm  
Hydraulic Institute

Rated speed  
3520 rpm

Date  
2013-08-18

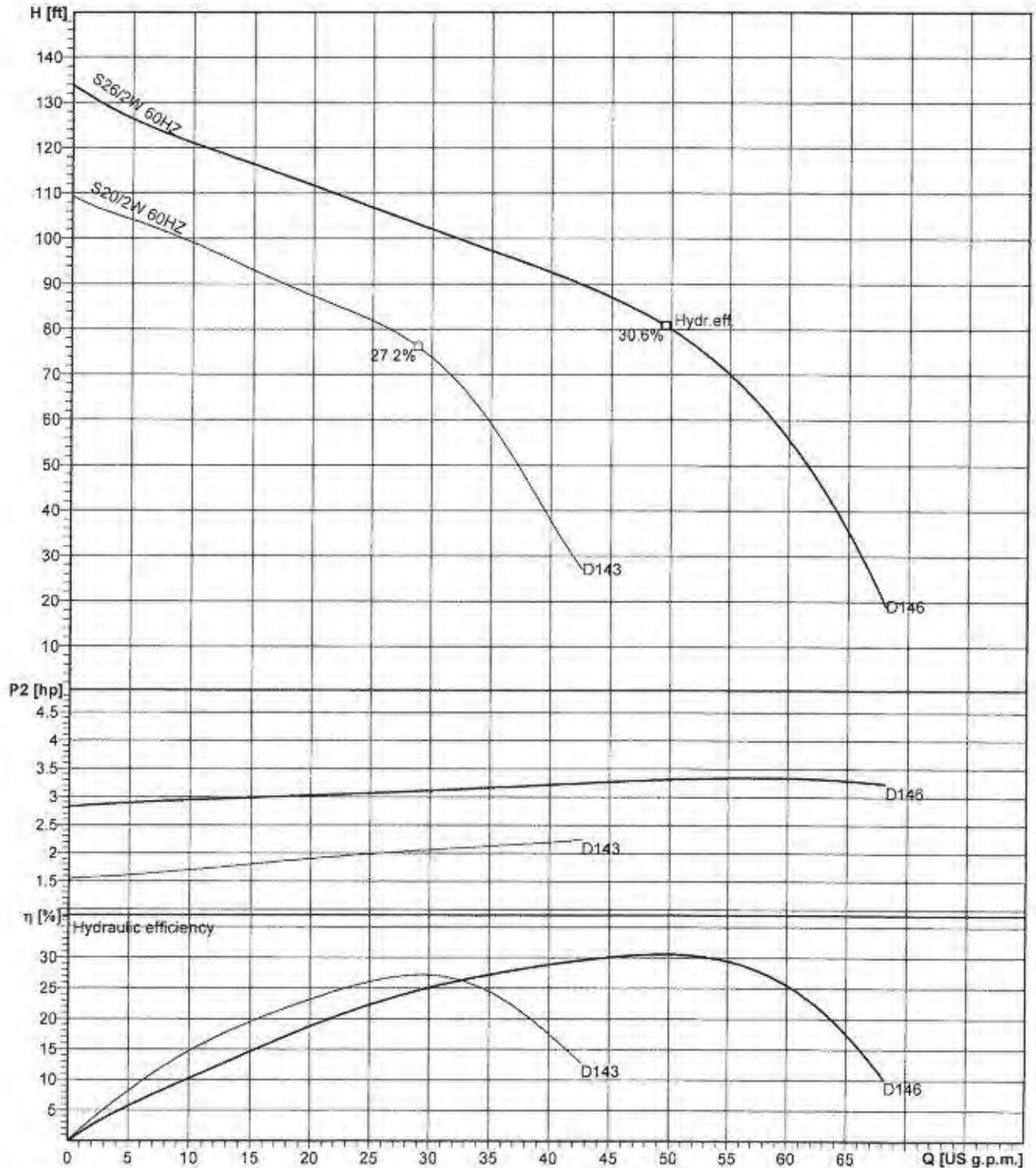
Flow  
49.6 US g.p.m.

Head  
80.7 ft

Rated power  
3.31 hp

Hydraulic efficiency  
30.6 %

NPSH



Impeller size  
5.75 inch

N° of vanes  
4

Impeller  
Macerator

Solid size

Revision 2010-09-28

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

ABSEL PRO 1 7 2 / 2007-02-07

# ABS

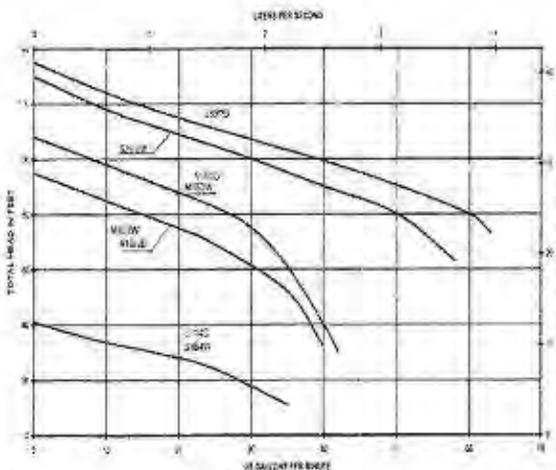
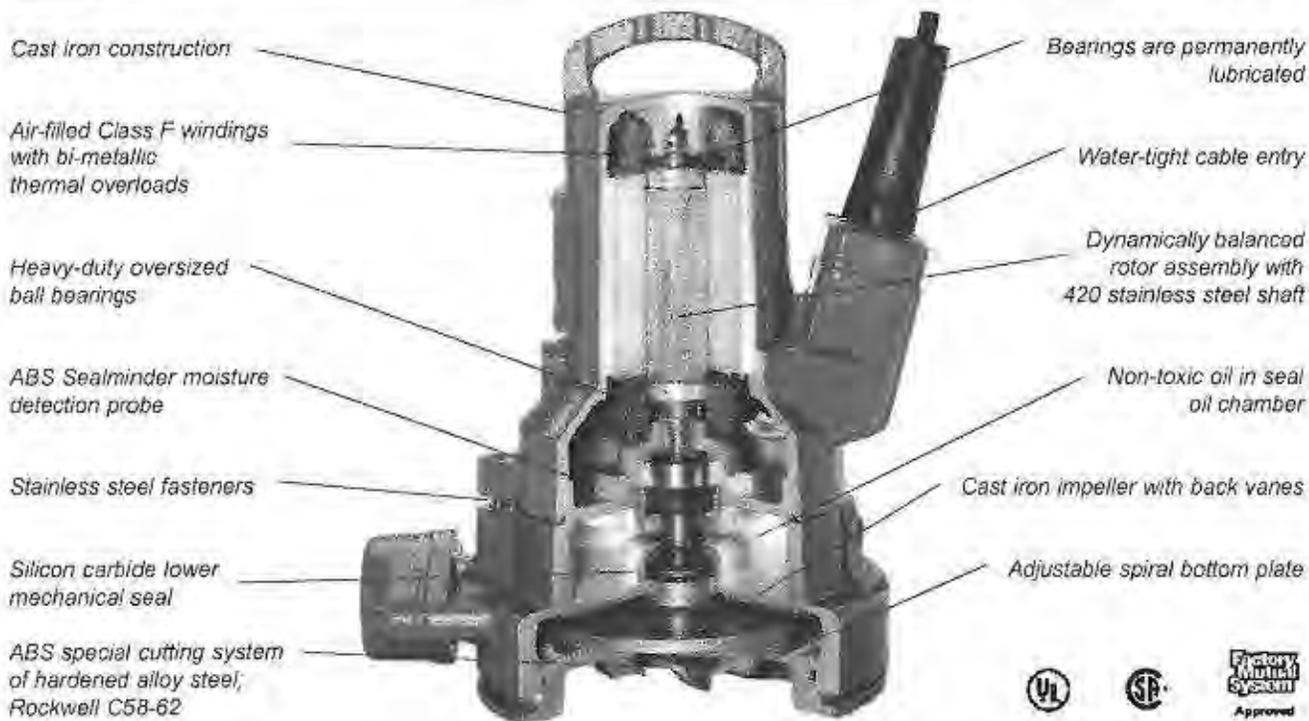
COST-EFFECTIVE PUMPING

---

## "S" Series models to 4 horsepower and "M" Series to 16 horsepower grinder pumps

Superior cutter and non-clog action  
Ball bearing construction for extended life  
Unique Sealminder safety-check system  
Complete packaged pump systems with control panels  
FM approved, explosion proof models available  
Thermal protection for all models  
Cast iron construction  
Air-filled motor  
1 1/4" & 2" discharge  
Non-toxic environmentally friendly oil in seal chamber  
Four pole version available for low-flow applications  
Models available in single and three phase  
"S" Series is UL approved for electrical safety  
All models are CSA approved for electrical safety





Consult an authorized ABS representative when selecting Piranha pumps for low head applications.

### Specifications

Model	S10-4W	S10-4D	S16-2W	S16-2D	S18-2W	S18-2D	S26-2W	S30-2D
Voltage	230	230,460	230	230,460	230	230,460	230	230,460
Full Load Amps	6.5	5.2, 2.6	9.2	6.6, 3.3	10.8	7.2, 3.6	13.7	11.5, 5.5
		2.1		2.6		2.9		4.4
Phase	1	3	1	3	1	3	1	3
RPM	1750	1750	3450	3450	3450	3450	3450	3450
HP	1.3	1.3	2.1	2.1	2.4	2.4	3.5	4.0
Standard Cable (ft.)	30	30	30	30	30	30	30	30
Discharge (inches)	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4
Height (inches)	14	14	14	14	14	14	14 1/2	14 1/2
Weight (lbs.)	70	70	70	70	71	71	88	88

Specifications are subject to change without notice.

### Accessories

- Standard guide rail assembly
- Ball check guide rail assembly
- Vertical pedestal base
- Horizontal pedestal base
- ABS manufactured control panel — designed to enhance the operation and reliability of the pump

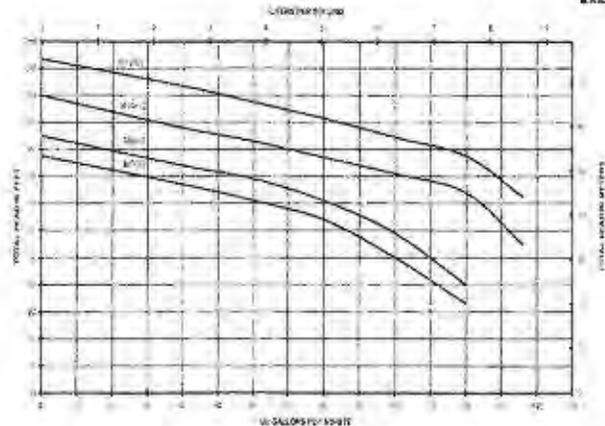
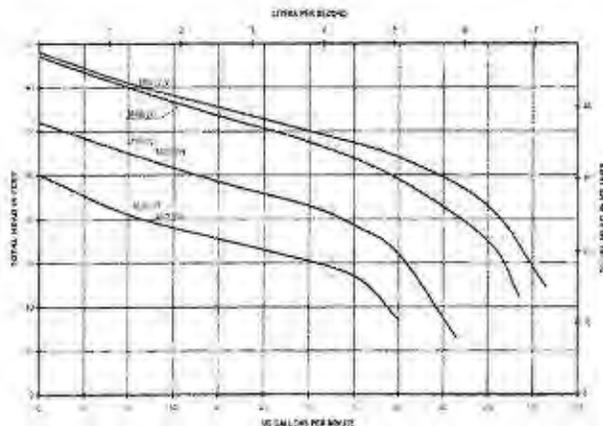
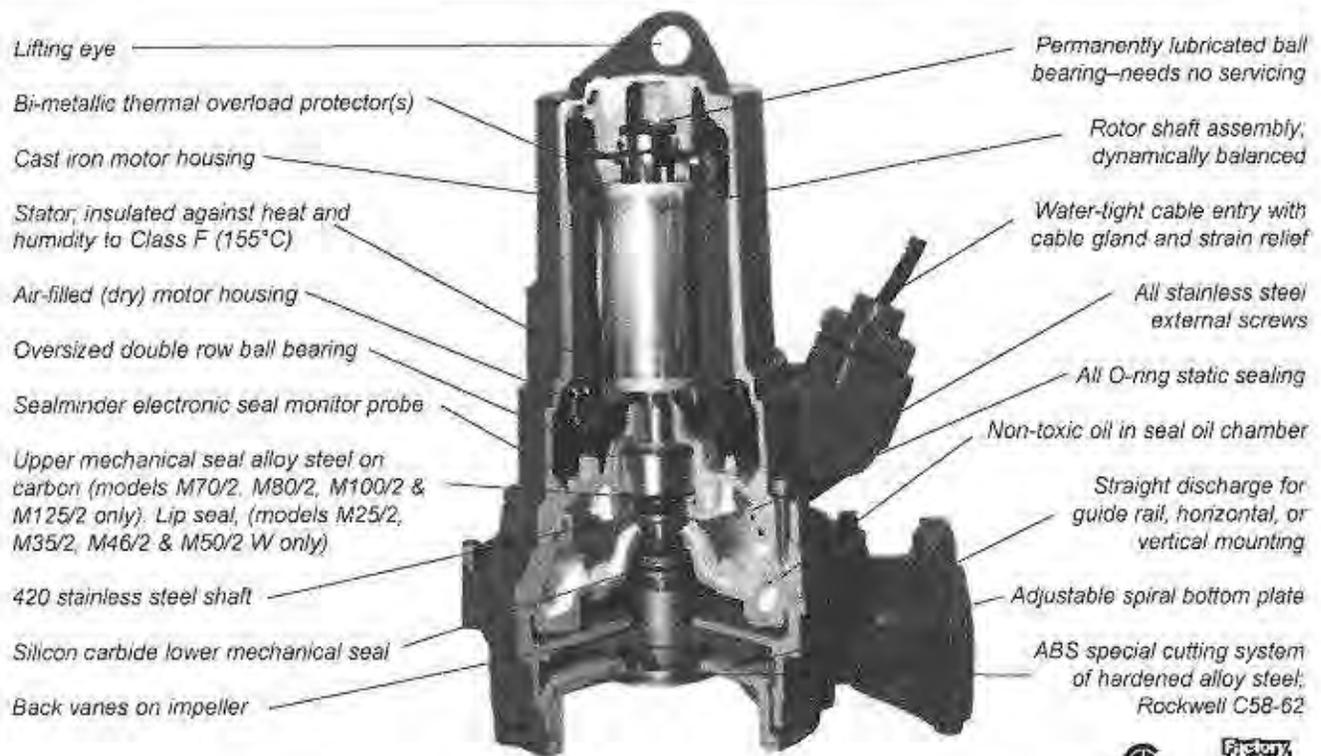
### Sealminder — safety check system

Piranha pumps are equipped with a Sealminder probe in the oil chamber. Should the lower seal leak, allowing water into the oil chamber, the probe activates a warning light or audible alarm. This gives advanced warning allowing for the repair of the pump seal before water enters the motor.



### The Piranha

The shredding rotor and ring of the Piranha System ensures efficient operation in sewage containing solids, and allows blockage-free pumping. Good reasons for being named after the voracious South American fish.



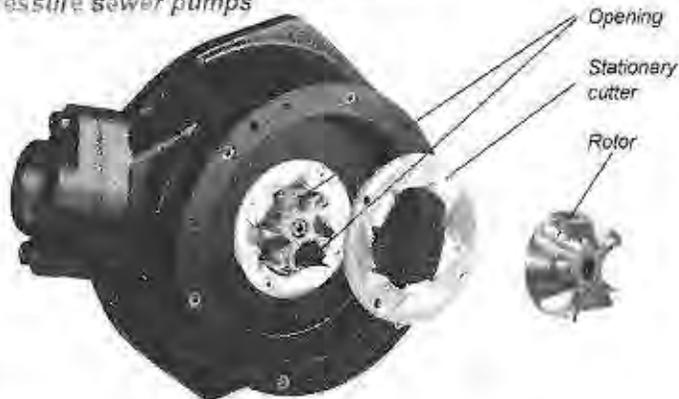
Consult an authorized ABS representative when selecting Piranha pumps for low head applications.

## Specifications

Model	M25/2		M35/2		M46/2	M50/2W	M70/2	M80/2	M100/2	
M125/2D	1	3	1	3	1	1	3	3	3	3
Voltage	230	230	230	230	230	230	230	230	230	230
		460		460	460		460	460	460	460
		575		575	575		575	575	575	575
Full Load Amps	16.6	9.4	24	12.2	15.4	29.3	23.2	26.2	34	42.5
		4.7		6.1	7.7		11.8	13.1	17	21.3
		6.8		4.9	6.2		9.3	10.5	13.6	17
RPM	3450	3450	3450	3450	3450	3450	3450	3450	3450	3450
HP	3.4	3.4	4.7	4.7	6.2	8.7	9.4	10.7	13.4	16
Standard Cable (ft.)	30	30	30	30	30	30	30	30	30	30
Discharge (inches)	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	2	2	2	2

Specifications are subject to change without notice.

*The most effective cutting system for pressure sewer pumps*



The ABS cutter system features a totally different concept in grinder pump design. The ABS design consists of a lobed rotor cutter attached to a centrifugal impeller. A stationary cutting element is fastened to the ABS spiral bottom plate. The lobed rotor turns in the stationary cutter. The stationary cutter is designed with a wave form. The number of waves is one less than the number of lobes on the rotor. This causes an opening to be formed between the rotor and stationary cutter. The normal pumping action of the impeller causes water and solids to flow into the cutting elements. As the solids are sheared into small particles, they are pumped by the impeller into the discharge pipe. Should any of the finely cut particles try to wedge between the impeller and bottom plate, the outward threaded spiral grooves will move them to the discharge.

### Applications

ABS Piranha grinder pumps move sewage and wastewater at high velocity through contour piping. Recommended for individual or groups of homes, motels, industrial complexes, shopping centers, schools, and many other applications requiring pressure sewer systems.



### Residential Grinder Pump System

The Piranha S16/2 is available as a completely packaged simplex or duplex system. It is designed for residential and small industrial sewage or sump applications. The pump is recommended for homes in isolated or mountainous areas, and for dewatering of dwellings located in inland protected areas where septic tanks are not permitted. The system includes a basin, chain, pump, cover, check valve, discharge pipe, control box and float switches.

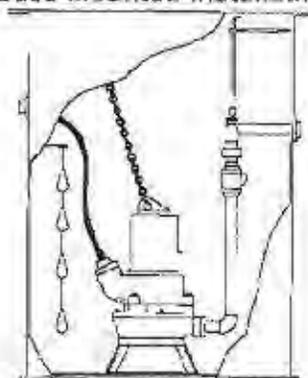
### Guide Rail Installation

For those installations where the ABS Piranha grinder pump must be installed in a deep sump, a guide rail system is available. The ABS guide rail system allows connection of the pump to the discharge pipe by gravity. The pumps are lowered by chain down a single 2"

guide rail. As the pump is lowered into position, an angled slot in the pump bracket contacts a straightening vane which squares the pump with the mating flange of the guide rail base.

For routine inspection, the pump can be easily lifted by the chain. Personnel need not enter the wet well for

### Base Mounted Installation



Distributed by:

ABS reserves the right to enter specifications due to technical developments.

**ABS**  
COST-EFFECTIVE PUMPING

**Corporate Office:**  
ABS Pumps Inc.  
140 Pond View Drive  
Menden, CT 06450  
(203) 238-2700  
FAX (203) 238-0735

**Regional Offices:**  
ABS Pumps Inc.  
111 Maritime Drive  
Sanford, FL 32771  
(407) 330-3456  
FAX (407) 330-5404

**Odell's Pump & Motor Service**  
1650 Bell Ave., Ste. 140  
Sacramento, CA 95836  
(916) 925-8508  
FAX (916) 925-3914

**CH&E Pumps**  
3849 N. Palmer Street  
Milwaukee, WI 53212  
(414) 964-3400  
FAX (414) 964-0877

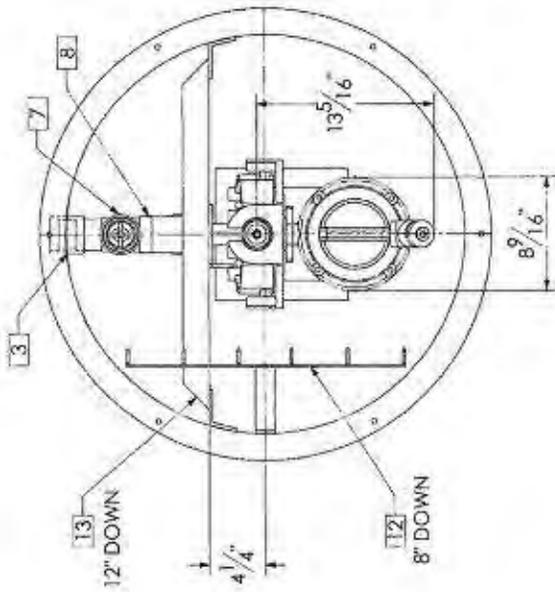
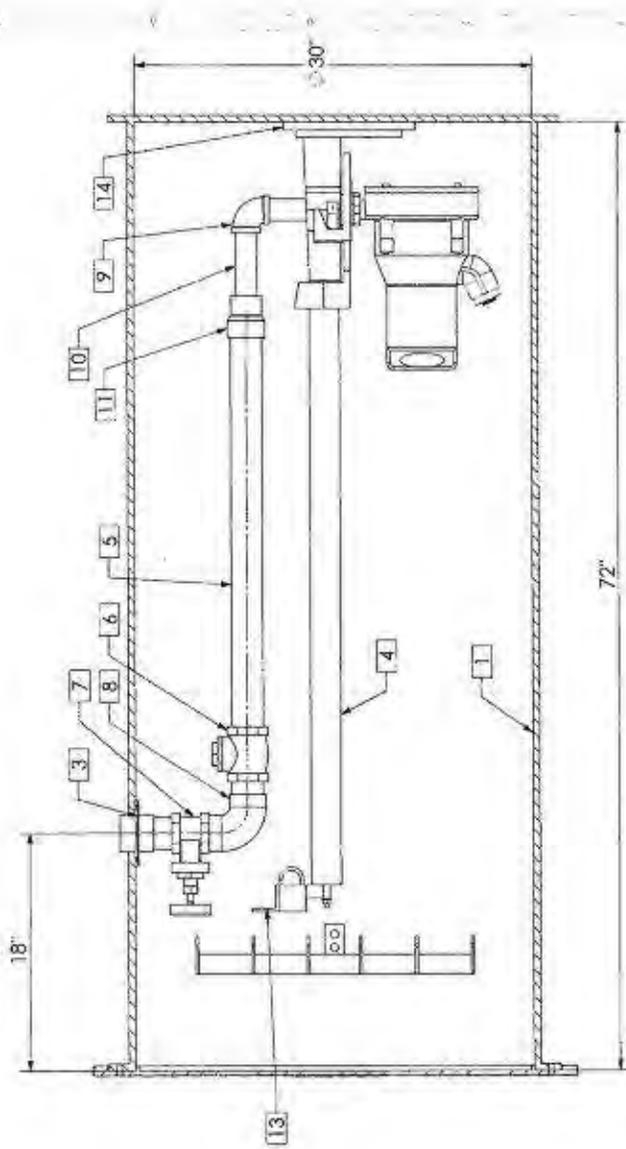
**ABS Pumps Corp.**  
1215 Meyerside Drive  
Unit #7  
Mississauga, Ontario  
Canada L5T 1H3  
(905) 670-4877  
FAX (905) 670-3709

**Agents and distributors**  
ABS has sales and service  
representation in more than  
100 countries the world over.

[www.abspumpsusa.com](http://www.abspumpsusa.com)

ABS is a company in the  
Cardo Group

WET WELL  
 O.D. = 34"  
 B.C. = 32 1/2"  
 I.D. = 30"

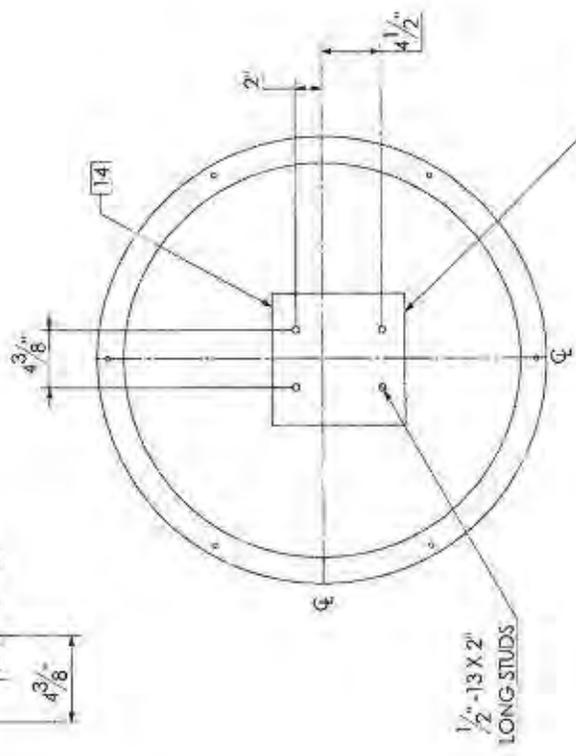
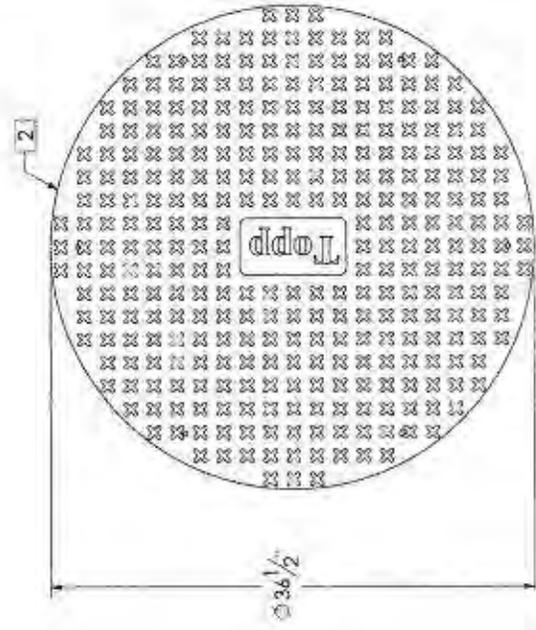
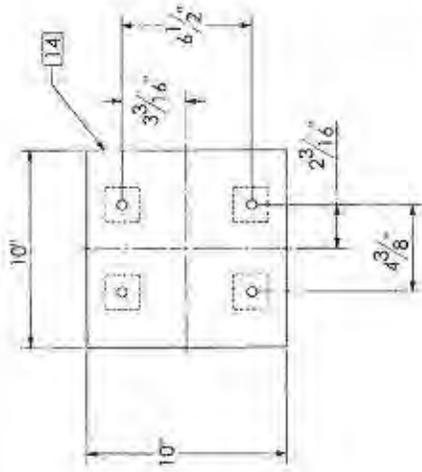


REVISED: 07/11/01  
 PUMP: ABS S16 TAG: NEWBERRY STOCK  
 228786 | 12549-7-NS  
 PETE DUTY & ASSOCIATES, INC.  
 228786 A A2



O.D. = OUTER DIAMETER  
 B.C. = BOLT CIRCLE  
 I.D. = INNER DIAMETER  
 C.A. = CLEAR ACCESS

WET WELL  
COVER  
O.D. = 36 1/2"  
B.C. = 32 1/2"  
I.D. = 30"



NOTE: A MINIMUM OF 5/8" THICK FOR THE CHOPPED STUD PLATE TO BE GLUED ON TOP OF THE BOTTOM BOARD. W/ 1/8" TO 1/4" BEAD OF GLUE SHOWING AROUND ALL SIDES OF PAD.


  
 O.D. = OUTER DIAMETER  
 B.C. = BOLT CIRCLE  
 I.D. = INNER DIAMETER  
 C.A. = CLEAR ACCESS

PUMP: ABS S16 TAG: NEWBERRY STOCK  
 228786 | 12549-7-NS PETE DUTY & ASSOCIATES, INC.  
 228786 B A2

ITEM NO.	PART NUMBER	BILL OF MATERIAL DESCRIPTION	QTY:
1	FB30X72F-SS	30' X 72" FG BASIN, W/FG ANTI-FLOAT, W/SIMPLEX STUDS	6
2	C30WFNST	SOLID NON-SKID FG COVER W/TOPP LOGO FOR 30" BASIN	6
3	C200530	2" SS THREADED NPT COUPLING	6
4	13-0105	2" 304 STAINLESS STEEL PIPE	40 FT
5	14-0105	2" SCH80 PVC PIPE	40 FT
6	14-0102	2" BRASS THREADED SWING CHECK VALVE	6
7	14-0302	2" BRASS THREADED GATE VALVE	6
8	14-0218	2" SCH80 PVC 90 DEG. ELBOW (SW)	6
9	13-0202	1 1/2" STAINLESS STEEL 90° ELBOW	6
10	13-0103	1 1/4" 304 STAINLESS STEEL PIPE NIPPLE	6 FT
11	14-5035	2" X 1 1/4" SCH80 PVC THREADED REDUCING COUPLING	6
12	SSFBH621	STAINLESS STEEL FLOAT BRACKET W/161 HOOKS	6
13	UG58ALUM30	UPPER ALUMINUM GUIDERAIL BRACE FOR 30" BASIN	6
14	ABS 4 BOLT PUMP FAD	CHOPPED STUD PLATE (MINIMUM OF 5/8" THICK)	6

ITEM NO.	PART NUMBER	BILL OF MATERIAL DESCRIPTION	QTY:
	C200530	2" SS THREADED NPT COUPLING - ELECTRICAL	6
	H403FG3672	4" FG HUB FOR 36" & 1/2"	6
	H400R	4" RUBBER GROMMET HUB	6

ITEM NO.	PART NUMBER	BILL OF MATERIAL DESCRIPTION	QTY:
		CUSTOMER SUPPLIED MATERIAL	
		4-BOLT ABS BASE ELBOWS	6
		S.S. UPPER GUIDERAIL BRACKETS	6

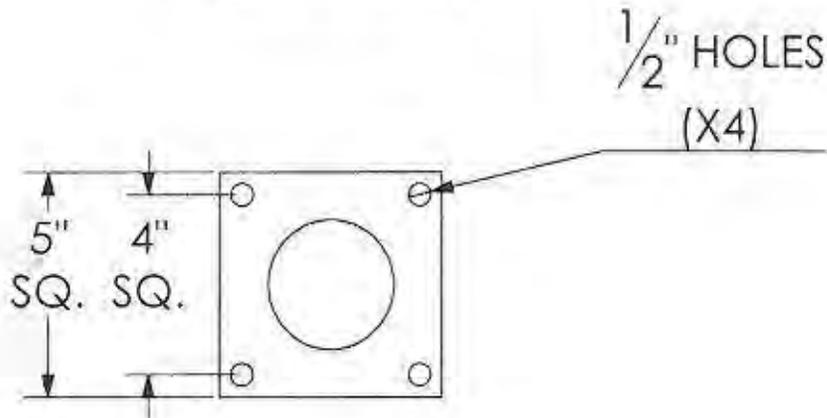
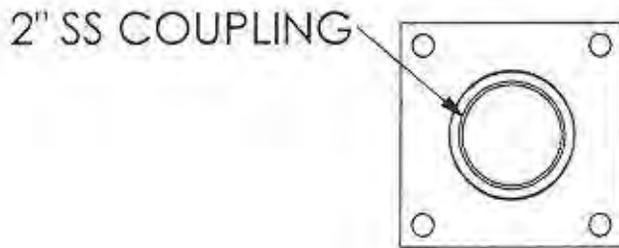
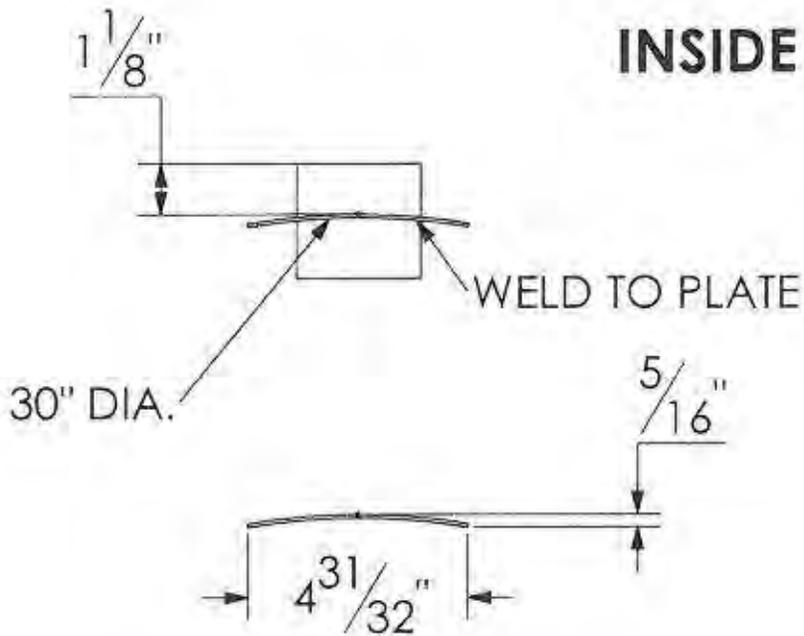


PUMP: ABS S16  
228786 | T2549-7-NS

TAG: NEWBERRY STOCK  
PETE DUTY & ASSOCIATES, INC.

228786 C    228786 C

# INSIDE MOUNT



C200S30

2" SS COUPLING WELDED IN  
14 GA. S.S. PLATE

CUSTOMER:  
PUMP & DISCONNECT

PO#	QC
MATERIAL	



PROPRIETARY AND CONFIDENTIAL  
THE INFORMATION CONTAINED IN THIS  
DRAWING IS THE SOLE PROPERTY OF  
SINGER COMPANY IN THE U.S.A. ANY  
REPRODUCTION IN PART OR IN WHOLE  
WITHOUT THE WRITTEN PERMISSION OF  
SINGER COMPANY IN THE U.S.A. IS  
PROHIBITED.

DRAWN	DATE
gh	12/23/2011
CHECKED	
ENCL APPR	

DIMENSIONS ARE IN INCHES  
TOLERANCES:  
FRACTIONS ± .005  
DECIMALS ± .005  
THREE PLACES DECIMAL ± .003

MATERIAL:

SHEET NO: **A** DWG NO: 228786 01  
SHEET 4 OF 4



We know how water works

## Warranty

### **ABS ONE YEAR PRODUCT WARRANTY - PERMANENT TYPE INSTALLATION Piranha, AS, Scavenger, RCP, & Robusta Series Pumps; Mixers; Aerators; Control Panels**

ABS Pumps Inc. warrants its new products (excluding replacement parts) used in a permanent installation to be free from defects in workmanship and materials, covering parts and labor, for a period of twelve (12) months from the date of installation, or eighteen (18) months from the date of shipment to original end customer, whichever occurs first. Proof of installation/startup date or purchase/shipment date will be required to support a warranty claim.

Any product used in a portable application will be subject to the 6 month portable dewatering warranty.

Control panel warranty is effective only if control installation and wiring meets all applicable articles of the National Electrical Code at time of installation and if start-up is done by an authorized ABS agent.

Start-up reports and electrical system schematics may be required to support warranty claims and will be required for all claims on pumps of 30 Horsepower and greater. All protection features (such as moisture sensors, bearing monitors, and thermal overloads) incorporated in the product must be connected and operable to validate the warranty. Warranty effective only if ABS supplied or authorized cables and control panels are used.

ABS's sole obligation under this warranty shall be to make repairs and replace parts when necessary on products that have been returned to ABS, prepaid, or to an ABS authorized service facility and found to be defective. Products repaired under this warranty will be returned with freight prepaid. All returns must have prior authorization from ABS. ABS product must be repaired by an authorized ABS repair facility in order to support the warranty. Explosion Proof (Agency Approved) pumps must be repaired at an ABS authorized service center in order to keep the Explosion Proof rating.

ABS shall not be liable for any special, indirect, consequential damages, or profit loss of any kind. Major components not manufactured by the Company are covered by the original manufacturer's warranty in lieu of this warranty. ABS will not be held responsible for travel expenses, rented (replacement) equipment, pump removal fees, installation fees, outside contractors fees, or unauthorized repair shop expenses. Damage due to normal wear or failure beyond "defect in workmanship" is not covered. The warranty does not cover damage caused by a defective power supply or improper electrical protection.

ABS neither assumes nor authorizes any person or other company to assume for it, any other obligation in connection with the sale of its equipment. Any enlargement or modification of this warranty by a Representative or other Sales Agent is their exclusive responsibility.

This warranty is not transferable and shall extend only to the original end user. It shall not apply to any products that have been repaired or altered without ABS's consent. It does not apply to products that have been subject to misuse, accident, neglect, installation damage, or have been used for pumping liquids other than what it was designed for.

**NO OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WILL APPLY.**

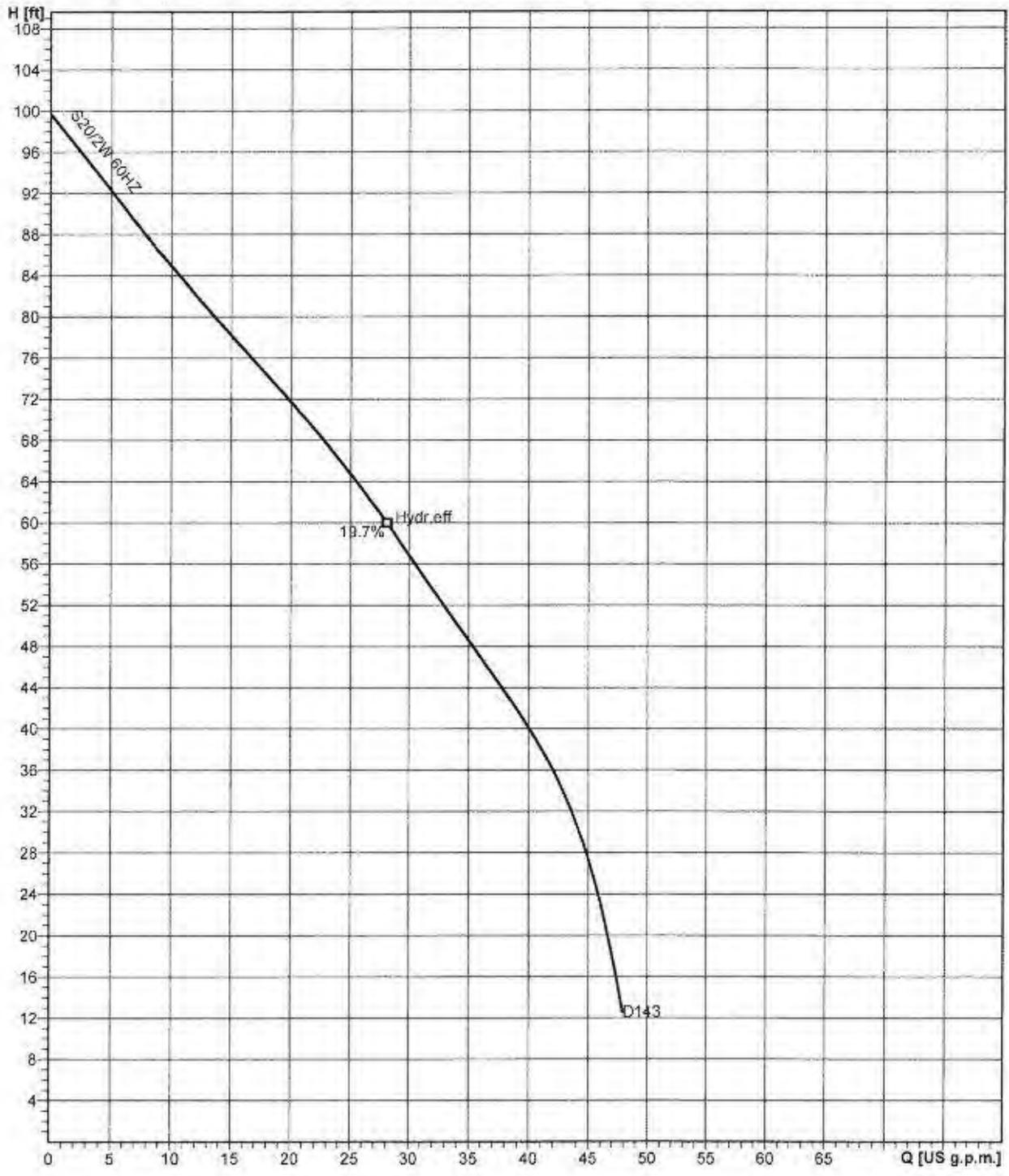


# Pump performance curves PIR S20/2W 60 HZ

Curve number

Reference curve  
PIR S20/2W

Density 62.428 lb/ft <sup>3</sup>	Viscosity 0.000016813 ft <sup>2</sup> /s	Testnorm Hydraulic Institute	Discharge G1¼"	Frequency 60 Hz
Flow	Head	Rated power	Rated speed 3520.3345 rpm	Date 2007-01-26
			Hydraulic efficiency	NPSH



Impeller size 5.625"	N° of vanes 4	Impeller Macerator	Solid size	Revision 2006-06-16
-------------------------	------------------	-----------------------	------------	------------------------

ABS reserves the right to change any data and dimensions without prior notice and can not be held responsible for the use of information contained in this software.

ABSEL PRO 1.7.1 / 2005-03-17

**GENERAL**

Furnish and install one Model S20/2W **ABS**

**Piranha** Grinder Pump(s) to deliver a maximum head of 93 feet of head at 2 USGPM or maximum flow of 42 USGPM against a total head of 20 feet. The motor shall be 2.0 HP, 3450 RPM connected for operation on a 230 volt, 60 HZ, single phase service. The motor shall be an integral part of the pumping unit. The pump discharge shall be 1 1/4". The grinder unit shall be capable of shearing and reducing to a fine slurry all material normally found in domestic and commercial sewage such as sanitary napkins, disposable diapers, cloth diapers, wash rags, wood, plastic, etc. The slurry shall be capable of freely passing through a 1 1/4" piping system including check and gate valves.

**GRINDER PUMP CONSTRUCTION & OPERATION**

The pump shall be of the centrifugal type with a lobed rotating cutter mounted on the pump shaft directly against the impeller. The stationary cutter shall be mounted in an adjustable spiral grooved bottom plate. The lobed rotating cutter rotates in the stationary cutter which utilizes a wave form. The stationary cutter shall have slots to facilitate better flow. The stationary cutter shall have one less wave than the rotating cutter has lobes. This differential creates a small opening between the cutting elements. The normal pumping action forces the flow through these small openings, shredding the solids into a slurry. The bottom plate shall be cast with grooves threading outward from the center opening of the plate to the outer diameter. The impeller shall be a multiple vane centrifugal type. Should any of the finely cut particles wedge between the impeller and bottom plate, the outward threaded spiral grooves will shear and direct them towards the discharge.

The cutter material shall be similar to an ANSI 440C stainless steel with the addition of cobalt, vanadium, and molybdenum for superior abrasion resistance and a hardness of 58-62 Rockwell C. The common pump and motor shaft shall be 420 stainless steel supported on the impeller end by a heavy duty single row ball bearing. The opposite end of the shaft is supported on a sealed single row ball bearing. The cutting elements and impeller shall be designed to keep the overhung load distance to a minimum. All fasteners shall be 304 stainless steel.

**Shaft Seals:** Each pump shall be equipped with two (2) seals. The lower seal (pump side) shall be of the mechanical type with silicon carbide faces. The upper seal shall be a lip type seal. The seals shall be separated by an oil chamber providing cooling and lubrication of the seals, and a barrier between the pumped fluid, and the dry motor chamber.

**Seal Failure Warning System:** An electric probe shall be provided in the oil chamber to detect the presence of water in the oil. A solid-state device mounted in the pump control panel enclosure shall send a low voltage, low amperage signal to the probe. If water enters the oil chamber in sufficient quantity to warrant concern, the probe shall activate a warning light in the control panel.

**MOTOR CONSTRUCTION**

The motor shall be of submersible type rated for 2.0 HP at 3450 RPM. The full load current shall not exceed 10.8 amps at 230 volts. Motors shall be of the capacitor start capacitor run type for high starting and running torque. The motor shall be air-filled and shall have Class "F" insulation. The rotor and stator shall be enclosed in a cast iron outer housing. Bi-metallic thermal switches shall be imbedded in the windings to sense high temperature. The rating of the switch shall be 130°C +/- 5°C. The control circuit shall be connected through the bi-metallic switches so the motor is shut down should a high temperature condition exist. The switches shall be self-resetting when the motor cools. Power cable shall be rated for explosion proof environment.

**APPROVALS**

The ABS Piranha S16/2W pump shall be UL and CSA approved. The complete basin package including the control panel shall be UL approved.

**TECHNICAL DATA****PIRANHA****S20/2W, S20/2**

Dwg. DS-P01-019 Rev: B Date: 12/06 Section Piranha Tab "S" Series Page \_\_\_\_\_

**STANDARD & EXPLOSION PROOF**

**MOTOR SPECIFICATIONS**

Motor Design	NEMA design B, squirrel cage induction, air filled
Motor Type	Enclosed submersible
Insulation Class	Class F, rated at 279° F (155° C)
Motor Protection	Oil Chamber Moisture Detector, bimetallic switches embedded in each phase for thermal overload protection. Installer must conform to N.E.C. standards, 1990 Ed. Art. 430.
Bimetallic Temp Trip	234° F ± 9° (130° C ± 5° C)
Service Factor	1.0
Voltage Tolerance	± 10% from nominal
Approvals	UL, CSA (FM available as option)

**MOTOR DATA, 60Hz**

Model	Phase	Output Power bhp	Volts	Full Load Amps	Locked Rotor Amps	NEMA Code Letter	Power Factor 100% Load	Motor Efficiency 100% Load	Pole/Speed (rpm)
S20/2W*	1	2.0	208	11.9	32.5	A	0.99	73.1	2/3450
S20/2W*	1	2.0	230	10.8	29.4	A	0.99	73.1	2/3450
S20/2	3	2.0	208	8.0	42.6	G	0.84	74.5	2/3450
S20/2	3	2.0	230	7.2	38.5	G	0.84	74.5	2/3450
S20/2	3	2.0	460	3.6	19.2	G	0.84	74.5	2/3450
S20/2	3	2.0	575	2.9	15.4	G	0.84	74.5	2/3450

\*Requires external start kit mounted in the control panel

**MATERIALS of CONSTRUCTION**

Motor Housing	Cast Iron ASTM A48 Class 30
Cable Cap	Cast Iron ASTM A48 Class 30
Volute	Cast Iron ASTM A48 Class 30
Oil Chamber	Cast Iron ASTM A48 Class 30
External Hardware	AISI 304 Stainless Steel
O-Rings	Buna-N
Motor Shaft	AISI 420 Stainless Steel
Cutter Disc Assembly	Chrome Molybdenum Cobalt Tool Steel 58-62 Rockwell "C"
Upper Bearing	Single row ball bearing.
Lower Bearing(s)	Single row ball bearing.
Upper Shaft Seal	Buna N Lip Seal
Lower Shaft Seal	Silicon Carbide
Impeller	Cast Iron, Open Multi-vane

**DIMENSIONS, WEIGHT, AND MISC.**

Pump weight (lb.)	81
Pump weight (lb.) (explosion proof)	82
Maximum submergence (feet)	33
Discharge size, standard	1¼ Inch
Discharge thread type	Female NPT
Maximum temp. of pumped fluid	72° F (40° C)

**CABLE SPECIFICATIONS**

MODEL	POWER CABLE Quantity, Type	LENGTH, Feet
S20/2W	14/7 Type SOW-A	32
S20/2D	14/7 Type SOW-A	32

Power cable suitable for all standard voltages listed in "MOTOR DATA" section.

# ACCESSORIES

PIRANHA

Dwg: DS-P00-006

Rev: D

Date: 1/00

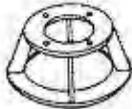
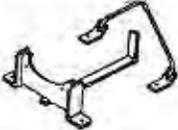
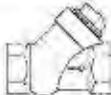
Section

Piranha

Tab

Accessories and  
Controls

Page

		Part Number	Description
Standard Guide Rail Assembly		62320674	S10/4, S16/2, S18/2, S26/2W, S30/2D
		62320674	M35/2, M46/2, M50/2W
		62320660	M80/2, M100/2, M120/2
Heavy Duty Guide Rail Assembly		62320501	S10/4, S16/2, S20/2, S26/2W, S30/2D
		62320501	M35/2, M46/2, M50/2W
		62320018	M80/2, M100/2, M120/2
Ball Check Guide Rail Assembly		62320536	S10/4, S16/2, S18/2, S26/2W, S30/2D
		62320538	M35/2, M46/2
		62320539	M50/2W
Vertical Pedestal Base		4182037Y	S10/4, S16/2, S18/2, S26/2W, S30/2D
		61906003	M35/2, M46/2, M50/2W
		61906007	M80/2, M100/2, M120/2
Horizontal Cradle Base w/ Lifting Bail		61906001 61906002 61906005 61906006	S10/4, S16/2, S18/2 S26/2, S30/2 M35/2, M46/2 M50/2W, M80/2, M100/2, M120/2
Horizontal Swing Check Valve		1405125	1 1/4"
		1404127	2"
		1404128	3"
Vertical Ball Check Valve		6140525	1 1/4"
		6140526	2"
		6140527	3"
Shut Off Valve, Gate		1404125	1 1/4"
		1404150	1 1/2"
		1404145	2"

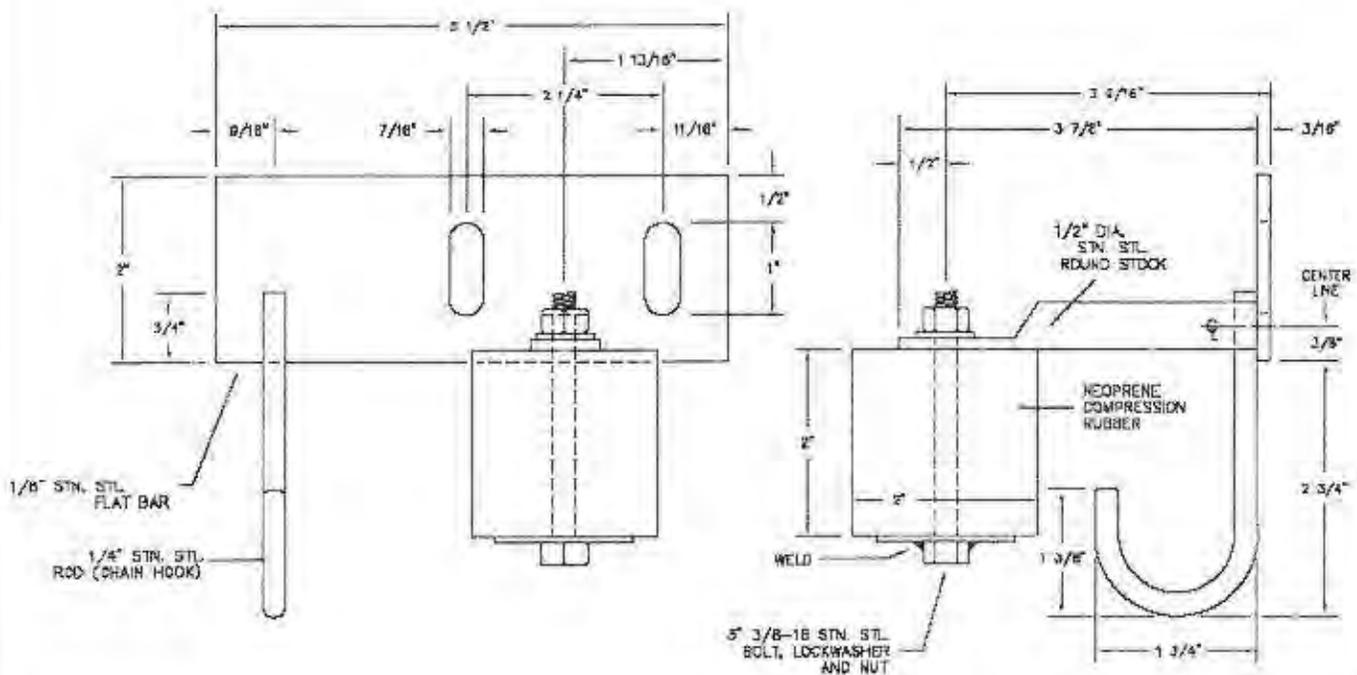
Specifications subject to change without notice

A.S.T.M. A276-03, Standard specification for stainless steel bars and shapes.

Type 316 chromium-nickel stainless steel with molybdenum added to increase corrosion resistance and mechanical properties at elevated temperatures. It also resists the corrosive effects of sulfates, phosphates, and other salts as well as sulfuric, sulfurous, and phosphoric.

Nominal Composition Percentages % : C=0.08, Mn=2.00, Si=1.00, Cr=16.0-18.0, Ni=10.0-14.0, P=0.045, S=0.03

NOTES: 1.) ABS Stainless Steel fabricated products are made using a combination of ARC / MIG welding. A 40 ton press for making holes. The edges and ends are ground for safety.



ABS reserves the right to change any Data and Dimensions without prior notice and can not be held responsible for the use of this information.



# SUBMITTAL DATA STAINLESS STEEL GUIDE RAIL

ISSUED: 07/06/06

Engineer     APPROVED

CUSTOMER    REJECTED

**A.S.T.M. A778 - 01, WELDED UNANNEALED AUSTENITIC STAINLESS STEEL TUBULAR PRODUCTS**

The guide rail provided for this project will be in the proper diameter and length as specified by the design engineer. It will be as follows:

**Diameter(in), Material Type**

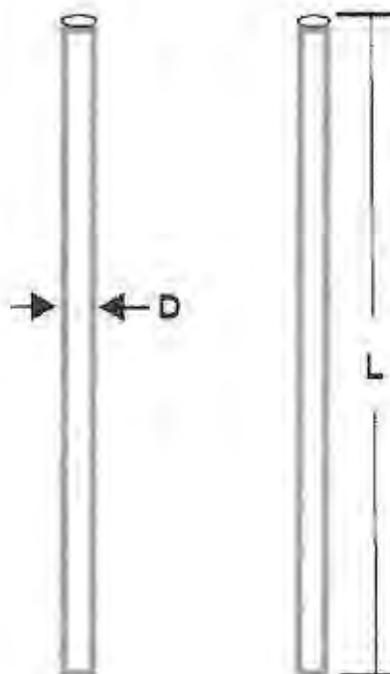
**Length, ft**

2" Dia, Type 316SS - 9388 (per ft.)

20.0ea

**A S T M Chemical Requirements**

Elements	304	316
	S30403	S31603
(C) Carbon, max	0.030	0.030
(Mn) Manganese, max	2.00	2.00
(P) Phosphorus, max	0.045	0.045
(S) Sulfur, max	0.030	0.030
(Si) Silicon	1.00	1.00
(Ni) Nickel	8.00-13.00	10.00-14.00
(Cr) Chromium	18.00-20.00	16.00-18.00
(Mo) Molybdenum	0.00	2.00
(N) Nitrogen	0.10	0.10



**ASTM Tensile Requirements**

Grade	Tensile Strength min. ksi (Mpa)	Yield Strength min. ksi (Mpa)	Elong. In 2" min. %
304	70 (485)	25 (170)	40
316	70 (485)	25 (170)	40

**Laboratory Testing**

Test	ASTM	United
Passivation test per MIL-STD 753B	Not Required	Required

**Mechanical Testing Test**

Test	ASTM	United
Flare	Not Required	Required
Flatten	Required	Required
Reverse Bend	Not Required	Required
Eddy Current	Not Required	Required
Transverse Tension	Required	Required

**Product Marking**

Each length will have man. Name or Brand, specified size, heat number, spec. number, grade and "HT-O" to indicate no heat treatment. For small diameter tubes and pieces under 3', the information will be placed on a tag securely under the bundle.

ABS reserves the right to change any Data and Dimensions without prior notice and cannot be held responsible for the use of this information

S.E REGIONAL WAREHOUSE:

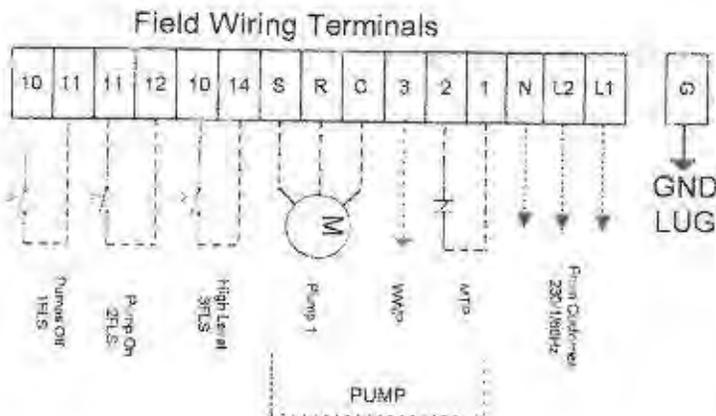
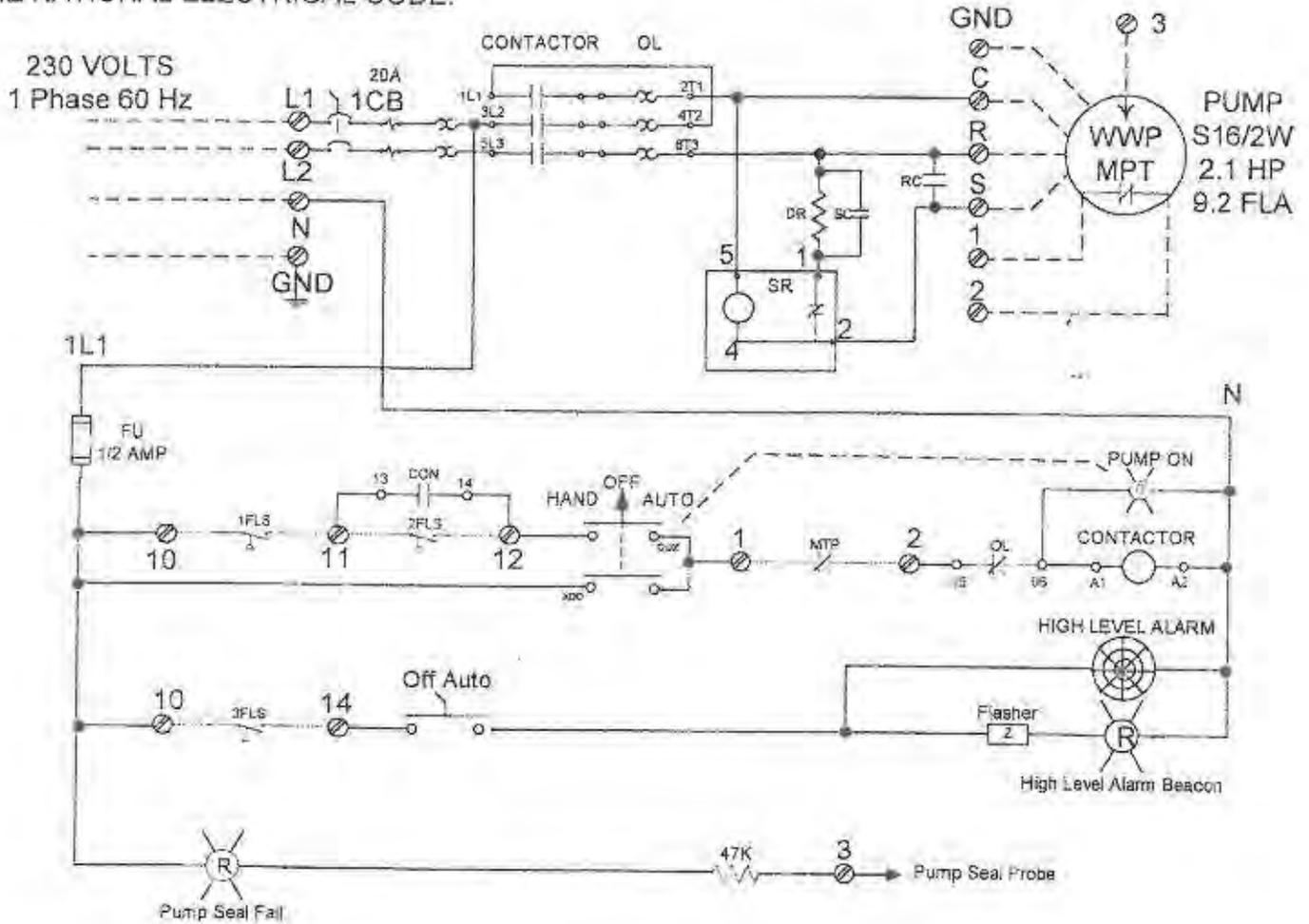
[www.abspumps.com](http://www.abspumps.com)

**ABS PUMPS, INC.**  
111 MARITIME DRIVE  
SANFORD, FLORIDA 32771  
PH (800) 323-1731 / (407) 330-3456 / (407) 330-3404



**CAUTION**  
 THIS CONTROLLER DOES NOT CONTAIN A  
 MAIN DISCONNECT SWITCH. A UL LISTED  
 DISCONNECT SWITCH MUST BE INSTALLED  
 AHEAD OF THIS CONTROLLER IN  
 ACCORDANCE WITH THE N.E.C.

GROUND IN ACCORDANCE WITH  
 THE NATIONAL ELECTRICAL CODE.



**ABS SIMPLEX CONTROL**  
**PIRANHA 230/1/60**  
**Dwg D008766046-C**



**anchor scientific inc.**

Box 378, Long Lake, MN 55356 / 612-473-7115 / FAX 612-473-6002

**mini-float®**

Form 2500-D

# mini-float®

## DESCRIPTION

Mini-floats are pilot duty devices designed for small diameter sumps and places where space is a determining factor in the selection of a level control device. Mini-floats control the function of motor load devices, such as contactors, motor starters, and power relays, to automatically cycle a pump or pumps. They can also be used for alarm signaling devices. Two Mini-Floats are needed for a one-pump operation; three for a two-pump operation.

## SPECIFICATIONS

Cable ..... 18-2 SJO W/A  
Housing ..... Polypropylene  
Clamp ..... Adjustable 1"-4"  
(Only on Type P models)  
Temperature Rating ..... 60° C.

## MODELS

Mini-Floats are available in a combination of mounting styles, cable lengths, and circuit configurations. Mounting styles are shown at right: pipe mounted (Type P), and suspended (Type S). 10, 15, and 25-foot cable lengths are standard, but other lengths can be special ordered. Electrical configurations must be specified: normally open, (NO), for pump out applications and normally closed, (NC), for pump in applications.

## EXAMPLE:

	P	M	10	NO
	Mounting	Mini-	Cable	Electrical
	Style	Float	Length	Configuration
ELECTRICAL CONFIGURATION			SUSPENDED TYPE 'S'	PIPE MOUNTED TYPE 'P'
			MODEL NO.	MODEL NO.
NORMALLY OPEN			SM 10 NO	PM 10 NO
			SM 15 NO	PM 15 NO
			SM 20 NO	PM 20 NO
			SM 25 NO	PM 25 NO
			SM 30 NO	PM 30 NO
NORMALLY CLOSED			SM 10 NC	PM 10 NC
			SM 15 NC	PM 15 NC
			SM 20 NC	PM 20 NC
			SM 25 NC	PM 25 NC
			SM 30 NC	PM 30 NC

## MOUNTING STYLES

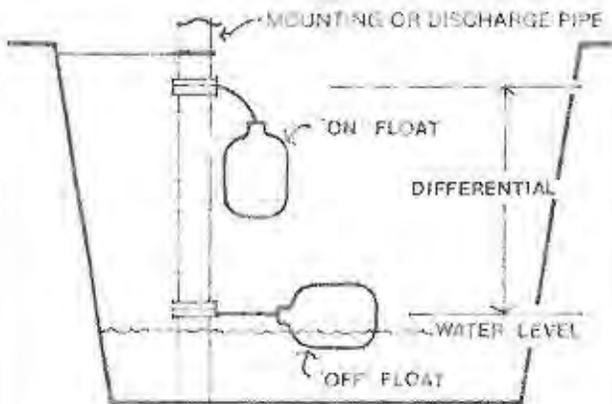


TYPE P - M



TYPE S - M

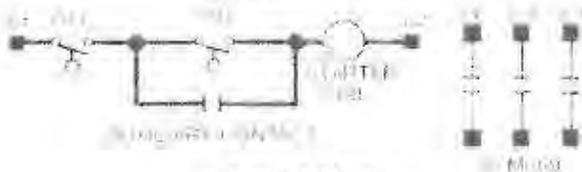
### TYPICAL INSTALLATION



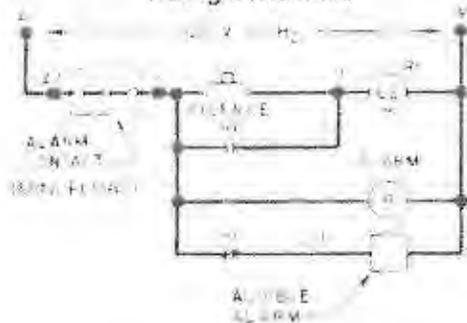
#### General Comments

- 1) Never work in the sump with the power on.
- 2) Attach the Type P Mini-Floats to the mounting pipe or the pump discharge pipe. The 'off' float should be below the 'on' float in a 'pump out' application.
- 3) Arrange the Mini-Floats so they do not tangle or hang up.
- 4) Thread the cable strap through the buckle with the ratchet pawl; cinch up tight; thread excess strapping through outer buckle slot.
- 5) Measuring the difference between mounting points gives the 'pump down' differential.

Typical Simplex Wiring Schematic



Typical Alarm Wiring Schematic



### SPECIFICATIONS

Cable - 16-2 SJO W/A 34 x 41 strand, 90°C.  
DIAMETER .30

Float - Polypropylene.

Clamp - Stainless Steel.

UL Listed Ind. Con. Eq.  
125 VA @ 115 VAC

Component 4.5A @ 120V., Res.

Switch Rating 2.2A @ 230V., Res.

Temperature Rating - 60 C.

Normally Open - Blue Housing

Normally Closed - Red Housing

ELECTRICAL CONFIGURATION	CABLE LENGTH	SUSPENDED TYPE 'S'	PIPE MOUNTED TYPE 'P'
		MODEL NO.	MODEL NO.
NORMALLY OPEN	10	S M 10 NO	P M 10 NO
	15	S M 15 NO	P M 15 NO
	20	S M 20 NO	P M 20 NO
	25	S M 25 NO	P M 25 NO
	30	S M 30 NO	P M 30 NO
NORMALLY CLOSED	10	S M 10 NC	P M 10 NC
	15	S M 15 NC	P M 15 NC
	20	S M 20 NC	P M 20 NC
	25	S M 25 NC	P M 25 NC
	30	S M 30 NC	P M 30 NC

SUBMITTAL APPROVAL:

NAME \_\_\_\_\_

DATE \_\_\_\_\_



\* Important Notes - Mini-floats are pilot duty devices. They cannot be used to directly power pump motors. Also, do not use Mini-Floats in gasoline or other combustibles. These devices can be used with intrinsically safe relays for some hazardous locations. See Sec. 500 of NEC.

This product contains mercury. Dispose of it accordance with Local, State and Federal Regulations so that mercury does not contaminate the environment.

OWN BY	DATE
PD	7-17-80
ORDER BY	DATE
JTP	7-20-80
APPROVED BY	DATE
JTP	7-20
PRODUCT NAME	
Mini-Float	
FACTORY NUMBER	



anchor scientific inc.

1000 S. 10th St., Dept. 100  
P.O. Box 417, Littleton, CO 80120

Typical installation and specification data for Mini-Floats

Part No. 2510-B





**Type 304** welded steel chain is a general purpose, rustproof product for ordinary wastewater applications not requiring high strength or extremely corrosive environments.

**Type 316** welded steel chain is a rugged, highly corrosion resistant stainless used in chemical, water, and wastewater plants worldwide.

**CHAIN LENGTH:**

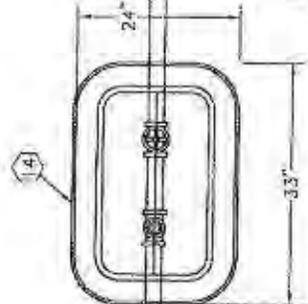
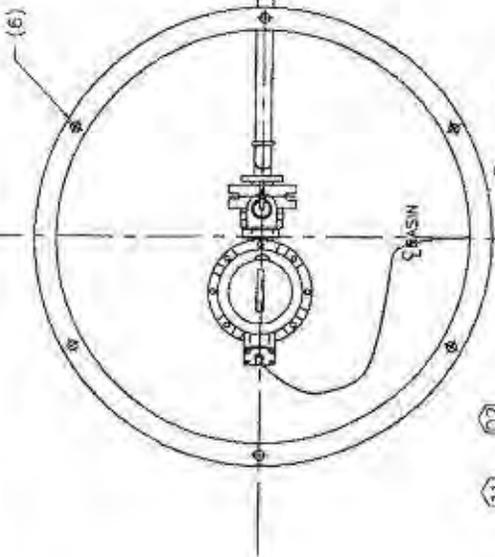
1'  1.5'  2'  3'  4'  5'  6'  7'  8'  9'  10'  11'  12'  13'  14'  15'  
 16'  18'  20'  22'  24'  25'  26'  28'  30'  Other \_\_\_\_\_'

TRADE SIZE - INCHES	WORKING LOAD LIMIT (lbs.)	MATERIAL DIA.	INSIDE LGTH.	INSIDE WIDTH	WT./100'FT
3/16"	1,150	.217	.980	.300	38 #
1/4"	1,860	.275	1.240	.380	61 #
5/16"	2,425	.330	1.290	.440	84 #
3/8"	3,800	.394	1.380	.550	140 #
1/2"	6,425	.512	1.790	.720	234 #
5/8"	9,725	.630	2.200	.790	358 #
3/4"	15,175	.787	2.760	.980	551 #

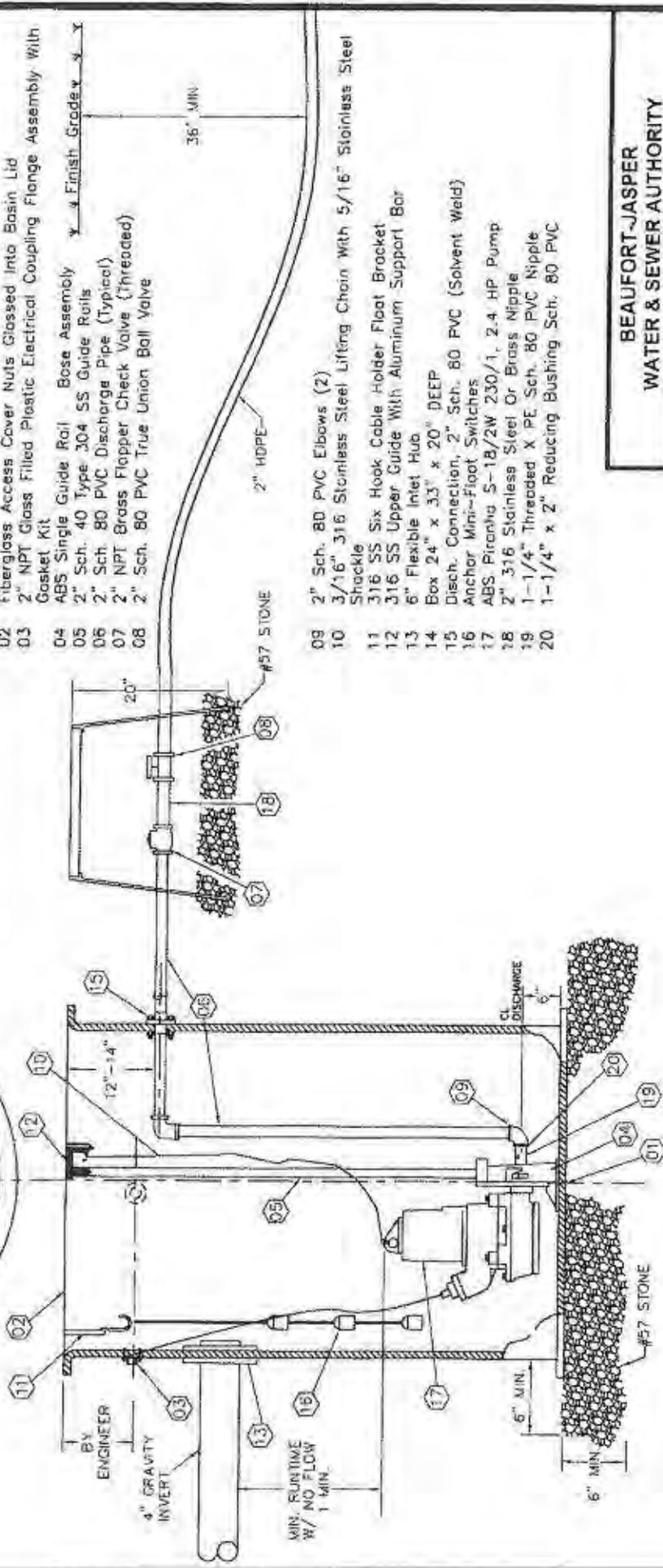
**DO NOT USE FOR OVERHEAD LIFTING**

ABS reserves the right to change any Data and Dimensions without prior notice and can not be held responsible for the use of this information.

(6) 3/8" Ø BOLTS



- Notes:**
1. Dimensions in inches
  2. Contractor To Specify Inlet Hub Size If Not 6"
  3. This Is A Typical Installation Drawing. Not To Be Used For Construction.
- Item Description:**
- 01 Fiberglass Basin, 30" x 60" With Fiberglass Anti-Float 5/8" 304 SS Simplex Mounting Sluds
  - 02 Fiberglass Access Cover Nuts Gassed Into Basin Lid
  - 03 2" NPT Glass Filled Plastic Electrical Coupling Flange Assembly With Gasket Kit
  - 04 ABS Single Guide Rail Base Assembly
  - 05 2" Sch. 40 Type 304 SS Guide Rails
  - 06 2" Sch. 80 PVC Discharge Pipe (Typical)
  - 07 2" NPT Brass Flopper Check Valve (Threaded)
  - 08 2" Sch. 80 PVC True Union Ball Valve

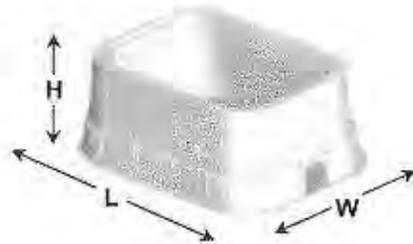


- 09 2" Sch. 80 PVC Elbows (2)
- 10 3/16" 316 Stainless Steel Lifting Chain With 5/16" Stainless Steel Shackles
- 11 316 SS Six Hook Cable Holder Float Bracket
- 12 316 SS Upper Guide With Aluminum Support Bar
- 13 6" Flexible Inlet Hub
- 14 Box 24" x 33" x 20" DEEP
- 15 Disch. Connection, 2" Sch. 80 PVC (Solvent Weld)
- 16 Anchor Mini-Float Switches
- 17 ABS Piranha 5-1B/2W 230/1, 2.4 HP Pump
- 18 2" 316 Stainless Steel Or Brass Nipple
- 19 1-1/4" Threaded X PE Sch. 80 PVC Nipple
- 20 1-1/4" x 2" Reducing Bushing Sch. 80 PVC

<b>BEAUFORT-JASPER WATER &amp; SEWER AUTHORITY</b>	
<b>PS SIMPLEX GRINDER</b>	
DATE: 07/12/07	DESIGN BY: TJA
SCALE: NTS	APPROVED BY: ERS
PROJECT # S 22	

# Valve Boxes and Lids

## Jumbo Valve Box with Lid — 6" or 12" Height

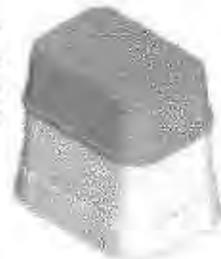


Product #	Description	Height	UPC Code	Dimensions (inches)			Weight Each (Lbs.)
				L	W	H	
0622 VB	6" Black Jumbo Valve Box w/Green Lid	6"	96942708418	22.0	16.0	6.0	10.0
0622VBS	6" Black Jumbo Valve Box w/Sand Lid	6"	96942710107	22.0	16.0	6.0	10.0
0622VBGG	6" Green Jumbo Valve Box w/Green Lid	6"	96942710183	22.0	16.0	6.0	10.0
0622VBSS	6" Sand Jumbo Valve Box w/Sand Lid	6"	96942710114	22.0	16.0	6.0	10.0
1222VB	12" Black Jumbo Valve Box w/Green Lid	12"	96942708395	22.0	16.0	12.0	14.6
1222VBS	12" Black Jumbo Valve Box w/Sand Lid	12"	96942710077	22.0	16.0	12.0	14.6
1222VBGG	12" Green Jumbo Valve Box w/Green Lid	12"	96942710169	22.0	16.0	12.0	14.6
1222VBSS	12" Sand Jumbo Valve Box w/Sand Lid	12"	96942710084	22.0	16.0	12.0	14.6

## Risers for 12" Valve Boxes



1212 Riser  
used with  
1222 Valve  
Box



Product #	Description	UPC Code	Dimensions (inches)			Weight Each (Lbs.)	Package Quantity
			L	W	H		
0618VBR	6" Black Riser for 12" Standard Valve Box	96942708388	18.0	12.0	6.0	4.0	4
0618VBRG	6" Green Riser for 12" Standard Valve Box	96942710152	18.0	12.0	6.0	4.0	4
0618VBRS	6" Sand Riser for 12" Standard Valve Box	96942710060	18.0	12.0	6.0	4.0	4
1222VBRB	6" Black Riser for 12" Jumbo Valve Box	96942708401	22.0	16.0	6.0	6.0	1
1222VBRG	6" Green Riser for 12" Jumbo Valve Box	96942710176	22.0	16.0	6.0	6.0	1
1222VBRS	6" Sand Riser for 12" Jumbo Valve Box	96942710091	22.0	16.0	6.0	6.0	1

# **Appendix K**

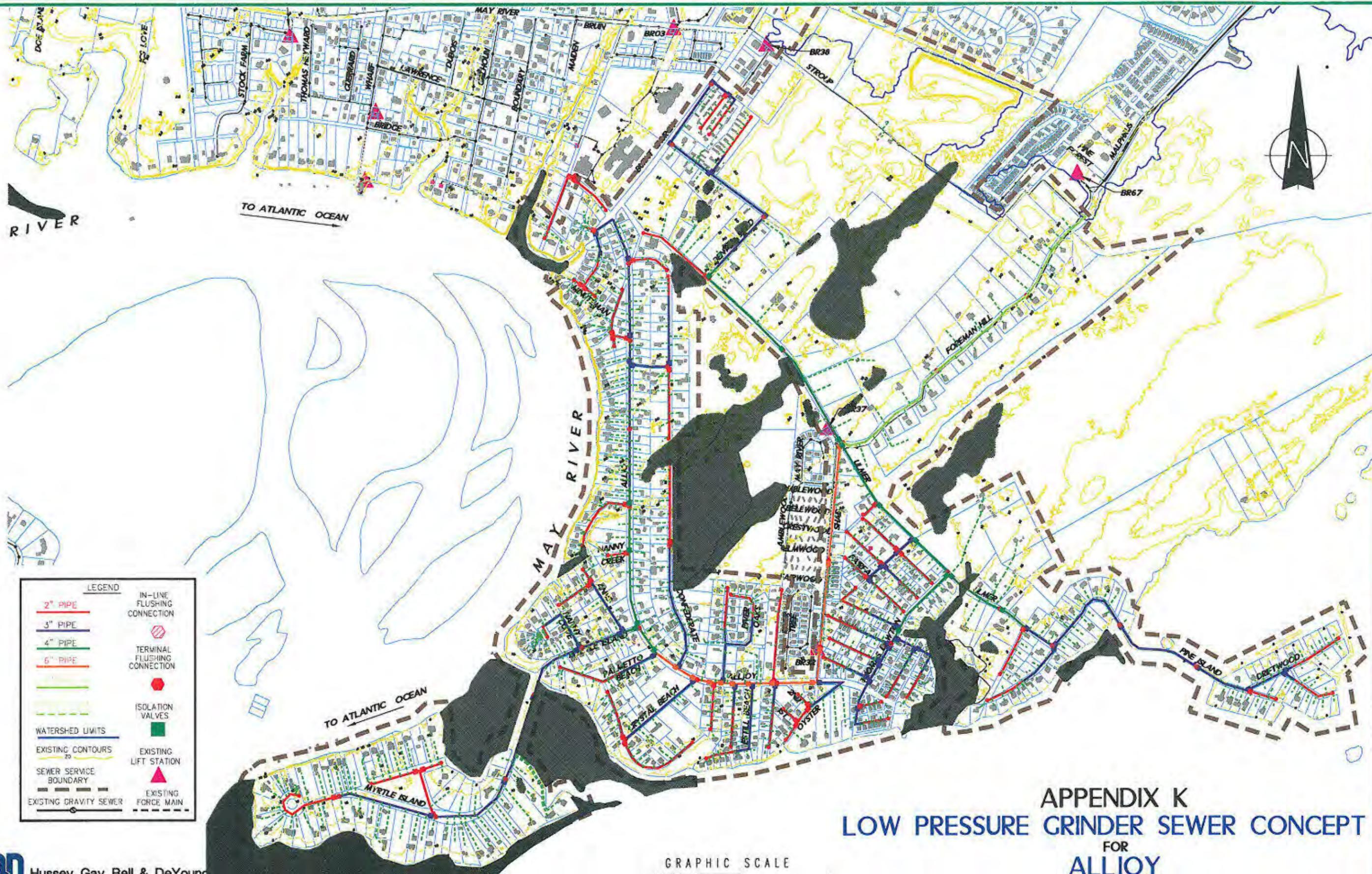
**Low Pressure Grinder Sewer Concept  
for Alljoy Sewer Service Area**

**Anticipated Cost Estimate**

**LOW PRESSURE GRINDER SEWER SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**ALLJOY SEWER SERVICE AREA**  
 October 4, 2011

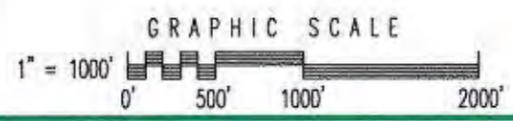
Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	1-1/4" HDPE SDR29 Pipe	92,900	LF	\$ 10.00	\$ 929,000.00
2	2" HDPE SDR11 Pipe	21,900	LF	\$ 12.00	\$ 262,800.00
3	3" HDPE SDR11 Pipe	30,200	LF	\$ 14.00	\$ 422,800.00
4	4" HDPE SDR11 Pipe	8,900	LF	\$ 16.00	\$ 142,400.00
5	6" HDPE SDR11 Pipe	4,800	LF	\$ 22.00	\$ 105,600.00
6	8" HDPE SDR11 Pipe	3,980	LF	\$ 29.00	\$ 86,420.00
7	2" Isolation Valve	38	EA	\$ 376.00	\$ 14,268.00
8	1" Isolation Valve	51	EA	\$ 619.00	\$ 31,569.00
9	2" Isolation Valve	15	EA	\$ 758.00	\$ 11,370.00
10	6" Isolation Valve	31	EA	\$ 1,472.00	\$ 45,632.00
11	8" Isolation Valve	3	EA	\$ 2,146.00	\$ 6,438.00
12	Terminal Flushing Connection (Clean-out)	55	EA	\$ 1,054.00	\$ 57,970.00
13	In-Line Flushing Connection (Clean-out)	38	EA	\$ 1,195.00	\$ 45,410.00
14	Force Main Air Release Valve and Manhole	17	EA	\$ 3,090.00	\$ 50,304.00
15	Lateral Kits <sup>1</sup>	684	EA	\$ 258.00	\$ 176,472.00
16	Simplex Fiberglass Grinder Station <sup>2</sup>	684	EA	\$ 4,572.00	\$ 3,137,248.00
17	Misc. Vacuum Fittings				
	2" x 1-1/4" EF Saddle	410	EA	\$ 84.00	\$ 34,440.00
	3" x 1-1/4" EF Saddle	321	EA	\$ 90.00	\$ 28,890.00
	4" x 1-1/4" EF Saddle	57	EA	\$ 90.00	\$ 5,130.00
	6" x 1-1/4" EF Saddle	54	EA	\$ 98.00	\$ 5,292.00
	8" x 1-1/4" EF Saddle	28	EA	\$ 92.00	\$ 2,576.00
	2" x 3" Reducer	42	EA	\$ 32.00	\$ 1,344.00
	2" Tee	7	EA	\$ 44.00	\$ 308.00
	3" Tee	38	EA	\$ 51.00	\$ 1,938.00
	4" Tee	9	EA	\$ 78.00	\$ 702.00
	6" Tee	10	EA	\$ 232.00	\$ 2,320.00
	3" W. g	3	EA	\$ 381.00	\$ 1,143.00
	2" x 4" Reducer	6	EA	\$ 34.00	\$ 204.00
	6" x 3" Reducer	9	EA	\$ 92.00	\$ 828.00
	6" x 4" Reducer	2	EA	\$ 92.00	\$ 184.00
	4" x 2" Reducer	6	EA	\$ 34.00	\$ 204.00
	8" x 6" Reducer	1	EA	\$ 174.00	\$ 174.00
	8" x 4" Reducer	2	EA	\$ 236.00	\$ 472.00
	3" Cross	2	EA	\$ 510.00	\$ 1,020.00
	8" Cross	1	EA	\$ 1,092.00	\$ 1,092.00
18	Silt Fence	89,736	LF	\$ 3.50	\$ 314,076.00
19	Grassing (Temporary and Permanent)	24,527	SY	\$ 2.00	\$ 49,054.00
20	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	800	CY	\$ 76.26	\$ 56,000.00
21	Remove driveway surface, replace with 2" graded aggregate <sup>4</sup>	201	EA	\$ 160.00	\$ 32,160.00
22	Remove and replace 3" of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	18,695	SY	\$ 70.00	\$ 1,308,650.00
23	Decommissioning of existing septic tank <sup>5</sup>	201	EA	\$ 500.00	\$ 100,500.00
24	Connection of Grinder Pump Station to home owner's existing system <sup>6</sup>	201	EA	\$ 2,000.00	\$ 402,000.00
25	8-inch Fusible PVC Force main, AWWA C900, DR-18 installed by HDD	1,020	LF	\$ 150.00	\$ 150,000.00
26	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
27	Cure into Termination Manhole for Force Main <sup>7</sup>	3	EA	\$ 3,000.00	\$ 6,000.00
28	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch HDPE force main	120	LF	\$ 150.00	\$ 18,000.00
29	Insert 8-inch HDPE force main in casing	120	LF	\$ 50.00	\$ 6,000.00
30	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
31	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 487,600.00
Subtotal					\$ 8,613,933.33
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 516,836.00
Engineering Fees (1.5%)					\$ 1,292,090.00
Construction Contingencies (1.5%)					\$ 1,292,090.00
Estimated Probable Cost					\$ 11,714,949.33
CALL (10% RISK)					\$ 11,800,000.00
No. of existing customers:					684
Cost per customer:					\$ 17,300.00

- Assumptions:
- Lateral kit includes one (1) 1-1/4" HDPE check valve and one (1) 1-1/4" HDPE ball valve installed in the discharge line between the pump station and the discharge point to protect the pump station from high pressures of the force main
  - Grinder station includes a simplex fiberglass station complete - fill grinder pump, basin, rails, control panel, floats, cables, inverte box. Quantity based on existing and vacant lots only
  - Remove and replace unsuitable material, quantity assumed, remove and replace driveway, quantity assumed
  - Assumes force main within portions of roadway
  - Cost includes removing contents and fill tank with sand and abandon drain fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc
  - Cost assumes locating each home owner's drain line, cap line to septic tank, run sewer lateral to valve pit, electrical connection to homeowner. Note unit price is an estimate, lateral length, yard and driveway restoration and conditions & unique circumstances of electrical supply and its location will vary the cost for each homeowner.
  - Assumes no force main discharges to MH03-034 & LS - BR67
  - Prising does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
  - If it is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions, Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
  - Costs are based on 2011 estimated costs. Inflation factor need to be applied for awards after 2014.
  - Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BIWSA & Town of Bluffton.



LEGEND	
2" PIPE	IN-LINE FLUSHING CONNECTION
3" PIPE	TERMINAL FLUSHING CONNECTION
4" PIPE	ISOLATION VALVES
6" PIPE	EXISTING LIFT STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

APPENDIX K  
 LOW PRESSURE GRINDER SEWER CONCEPT  
 FOR  
**ALLJOY**  
 DATE: OCTOBER 2013



# **Appendix L**

## **Low Pressure Grinder Sewer Concept for Cahill Sewer Service Area**

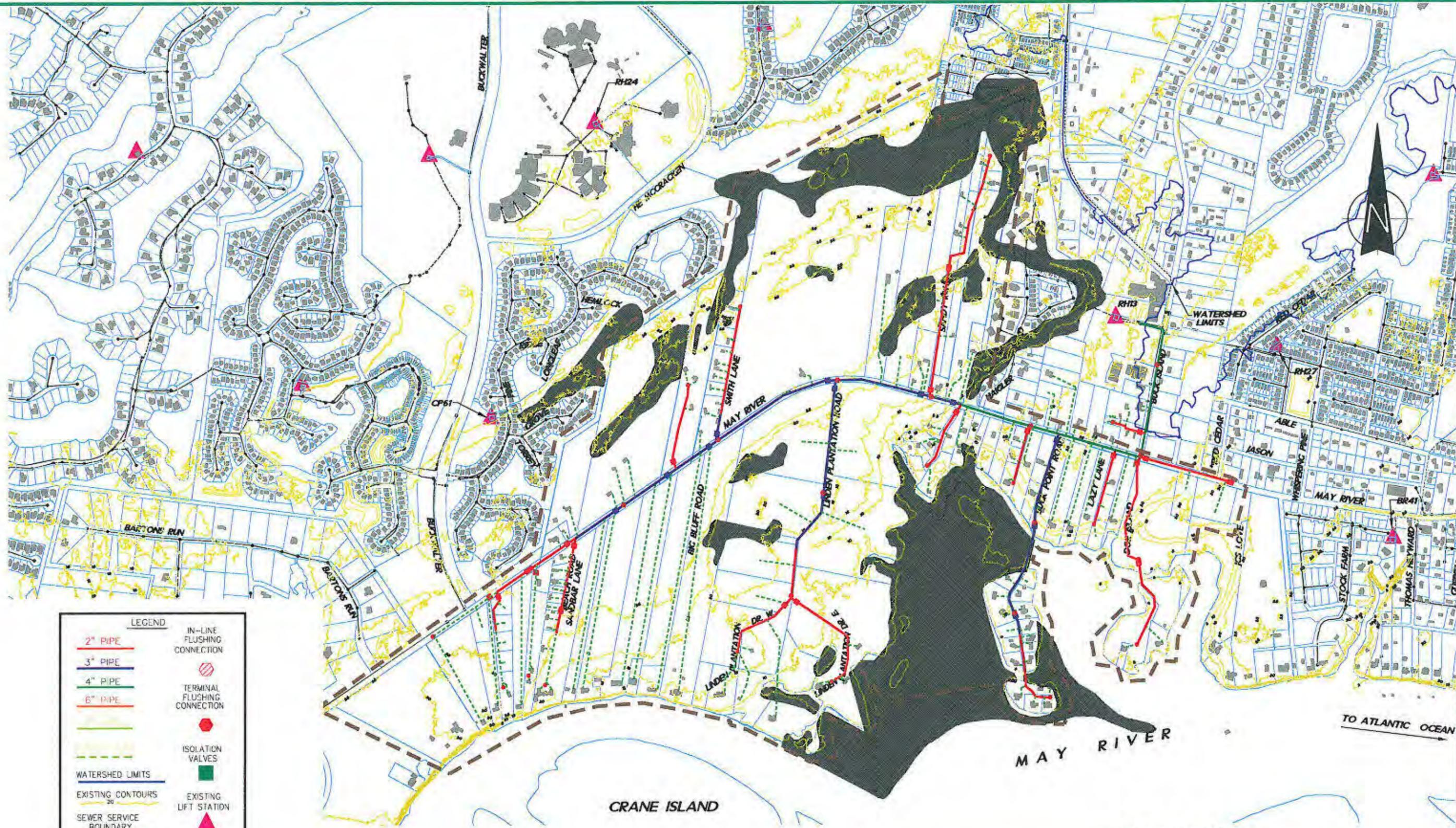
### **Anticipated Cost Estimate**

**LOW PRESSURE GRINDER SEWER SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**CANILL SEWER SERVICE AREA**  
 October 9, 2013

Item No	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	1-1/4" HDPE SDR29 Pipe	42,215	LF	\$ 19.00	\$ 802,095.00
2	1-1/2" HDPE SDR11 Pipe	3,200	LF	\$ 10.00	\$ 32,000.00
3	2" HDPE SDR11 Pipe	14,637	LF	\$ 12.00	\$ 175,644.00
4	3" HDPE SDR11 Pipe	3,700	LF	\$ 14.00	\$ 51,800.00
5	4" HDPE SDR11 Pipe	8,100	LF	\$ 16.00	\$ 129,600.00
6	2" Isolation Valve	21	EA	\$ 370.00	\$ 7,770.00
7	3" Isolation Valve	12	EA	\$ 619.00	\$ 7,428.00
8	4" Isolation Valve	6	EA	\$ 758.00	\$ 4,548.00
9	Terminal Flushing Connection (Clean-out)	15	EA	\$ 1,054.00	\$ 15,810.00
10	In-Line Flushing Connection (Clean-out)	21	EA	\$ 1,195.00	\$ 25,095.00
11	Force Main Air Release Valve and Manhole	7	EA	\$ 3,000.00	\$ 21,561.00
12	Lateral Kms <sup>1</sup>	99	EA	\$ 258.00	\$ 25,542.00
13	Simplex Fiberglass Grinder Station <sup>2</sup>	99	EA	\$ 4,572.00	\$ 452,628.00
14	Misc. Vacuum Fittings				
	1-1/2" x 1-1/4" EP Saddle	12	EA	\$ 84.00	\$ 1,008.00
	2" x 1-1/4" EP Saddle	82	EA	\$ 84.00	\$ 6,888.00
	3" x 1-1/4" EP Saddle	37	EA	\$ 96.00	\$ 3,552.00
	4" x 1-1/4" EP Saddle	18	EA	\$ 90.00	\$ 1,620.00
	2" x 3" Reducer	7	EA	\$ 32.00	\$ 224.00
	1-1/2" x 2" Reducer	3	EA	\$ 29.00	\$ 87.00
	2" Tee	4	EA	\$ 41.00	\$ 164.00
	3" Tee	4	EA	\$ 51.00	\$ 204.00
	4" Tee	6	EA	\$ 78.00	\$ 468.00
	3" Wye	7	EA	\$ 361.00	\$ 2,527.00
	2" Wye	1	EA	\$ 338.00	\$ 338.00
	3" x 4" Reducer	2	EA	\$ 34.00	\$ 68.00
	4" x 3" Reducer	6	EA	\$ 34.00	\$ 204.00
15	Silt Fence	31,724	LF	\$ 3.50	\$ 111,035.00
16	Grassing (Temporary and Permanent)	8,812	SY	\$ 2.00	\$ 17,624.00
17	Remove unsuitable material, dispose offsite, replace with crushed stone or see fill material <sup>3</sup>	308	CY	\$ 70.00	\$ 21,560.00
18	Remove driveway surface, replace with 2" graded aggregate <sup>3</sup>	99	EA	\$ 160.00	\$ 15,840.00
19	Remove and replace 3" of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	1,322	SY	\$ 70.00	\$ 92,539.50
20	Decommissioning of existing septic tank <sup>5</sup>	99	EA	\$ 500.00	\$ 49,500.00
21	Connection of Grinder Pump Station to home owner's existing system <sup>6</sup>	99	EA	\$ 2,000.00	\$ 198,000.00
22	2-inch HDPE SDR11 Pipe installed by HDD	2,300	LF	\$ 50.00	\$ 115,000.00
23	3-inch HDPE SDR11 Pipe installed by HDD	5,600	LF	\$ 60.00	\$ 336,000.00
24	4-inch HDPE SDR11 Pipe installed by HDD	1,600	LF	\$ 80.00	\$ 128,000.00
25	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
26	Core into Termination Manhole for Force Main <sup>1</sup>	1	EA	\$ 3,000.00	\$ 3,000.00
27	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
28	Grading, spreading/disposal excess excavated material, remove and replace monuments, fire protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (8% of all)	1	JOB	Lump Sum	\$ 150,600.00
				Subtotal	\$ 2,555,902.17
				Escrow Preparation, Appraisals, Legal Fees and Value of the Easements (6%)	\$ 152,594.13
				Engineering Fees (15%)	\$ 398,985.33
				Construction Contingencies (15%)	\$ 398,985.33
				Estimated Probable Cost	\$ 3,617,466.95
				CALL: (1) (0) (1)	\$ 3,700,000.00
	No. of existing customers:				99
	Cost per customer:				\$ 37,400.00

**Assumptions:**

- Lateral Km includes one (1) 1-1/4" HDPE check valve and one (1) 1-1/4" HDPE ball valve installed in the discharge line between the pump station and the discharge point to protect the pump station from high pressures of the force main.
- Grinder station includes a simplex fiberglass station complete with grinder pump, basin, valve, control panel, floats, cables, meter box. Quantity based on existing and vacant lots only.
- Remove and replace unsuitable material<sup>3</sup> - quantity assumed; remove and replace driveway<sup>3</sup> - quantity assumed.
- Assumes force main within portions of roadway.
- Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
- Cost assumes locating each home owner's drain line, cap line to septic tank, run sewer lateral to valve pit, electrical connection to homeowner. Note unit price is an estimate, lateral lengths, yard and driveway restoration and conditions & unique circumstances of electrical supply and its location will vary the cost for each homeowner.
- Assumes new force main discharges to I.S. - RH13.
  - Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
  - If it is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
- Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
- Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from B/WSA & Town of Bluffton.



LEGEND	
2" PIPE	IN-LINE FLUSHING CONNECTION
3" PIPE	TERMINAL FLUSHING CONNECTION
4" PIPE	ISOLATION VALVES
6" PIPE	EXISTING LIFT STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS 20'	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

CRANE ISLAND

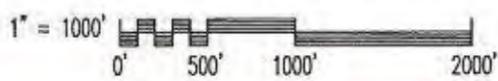
MAY RIVER

TO ATLANTIC OCEAN

APPENDIX L  
**LOW PRESSURE GRINDER SEWER CONCEPT**  
 FOR  
**CAHILL**

DATE: OCTOBER 2013

GRAPHIC SCALE



# **Appendix M**

## **Low Pressure Grinder Sewer Concept for Gascoigne Sewer Service Area**

### **Anticipated Cost Estimate**

**LOW PRESSURE GRINDER SEWER SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**GASCOIGNE SEWER SERVICE AREA**  
 October 4, 2013

Item No.	Description	Estimated			Total Cost
		Quantity	Units	Unit Price	
1	1-1/2" HDPE SDR29 Pipe	29,100	LF	\$ 10.00	\$ 291,000.00
2	1-1/2" HDPE SDR11 Pipe	1,700	LF	\$ 10.00	\$ 17,000.00
3	2" HDPE SDR11 Pipe	6,470	LF	\$ 12.00	\$ 77,640.00
4	3" HDPE SDR11 Pipe	5,755	LF	\$ 14.00	\$ 80,570.00
5	2" Isolation Valve	5	EA	\$ 370.00	\$ 1,850.00
6	3" Isolation Valve	16	EA	\$ 619.00	\$ 9,904.00
7	Terminal Flushing Connection (Clean-out)	8	EA	\$ 1,034.00	\$ 8,432.00
8	In-Line Flushing Connection (Clean-out)	14	EA	\$ 1,195.00	\$ 16,730.00
9	Force Main Air Release Valve and Manhole	4	EA	\$ 3,000.00	\$ 12,000.00
10	Lateral Kits <sup>1</sup>	54	EA	\$ 238.00	\$ 13,032.00
11	Simplex Fiberglass Grinder Station <sup>2</sup>	54	EA	\$ 4,572.00	\$ 246,988.00
12	Misc. Vacuum Fittings				
	1-1/2" x 1-1/4" EF Saddle	3	EA	\$ 84.00	\$ 252.00
	2" x 1-1/4" EF Saddle	43	EA	\$ 84.00	\$ 3,612.00
	3" x 1-1/4" EF Saddle	43	EA	\$ 90.00	\$ 3,870.00
	2" x 3" Reducer	8	EA	\$ 32.00	\$ 256.00
	1-1/2" x 2" Reducer	1	EA	\$ 29.00	\$ 29.00
	2" Tee	2	EA	\$ 44.00	\$ 88.00
	3" Tee	4	EA	\$ 51.00	\$ 204.00
13	Silt Fence	14,670	LF	\$ 3.50	\$ 51,345.00
14	Grassing (Temporary and Permanent)	4,075	SY	\$ 2.00	\$ 8,150.00
15	Remove unsuitable material, dispose offsite, replace with crushed stone or sand fill material <sup>3</sup>	200	CY	\$ 70.00	\$ 14,000.00
16	Remove driveway surface, replace with 2" graded aggregate <sup>4</sup>	54	EA	\$ 160.00	\$ 8,640.00
17	Remove and replace 3" of asphaltic road surface over trenches, 3" compacted thickness <sup>5</sup>	611	SY	\$ 70.00	\$ 42,787.50
18	Decommissioning of existing septic tank <sup>6</sup>	54	EA	\$ 500.00	\$ 27,000.00
19	Connection of Grinder Pump Station to home owner's existing system <sup>6</sup>	54	EA	\$ 2,000.00	\$ 108,000.00
20	2-inch HDPE SDR11 Pipe installed by HDD	1,500	LF	\$ 50.00	\$ 75,000.00
21	3-inch HDPE SDR11 Pipe installed by HDD	4,800	LF	\$ 60.00	\$ 288,000.00
22	Grinder Force Main Manifold <sup>7</sup>	6	EA	\$ 500.00	\$ 3,000.00
23	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
24	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 85,900.00
Subtotal					\$ 1,516,987.00
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 91,019.22
Engineering Fees (15%)					\$ 227,548.05
Construction Contingencies (15%)					\$ 227,548.05
Estimated Probable Cost					\$ 2,063,102.32
<b>CALL BILITEC</b>					\$ 2,100,000.00
No. of existing customers:					54
Cost per customer:					\$ 38,900.00

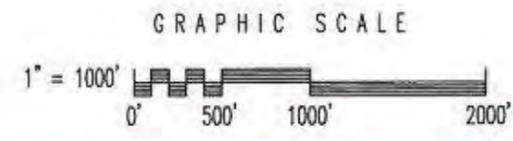
**Assumptions:**

1. Lateral kit includes one (1) 1-1/4" HDPE check valve and one (1) 1-1/4" HDPE ball valve installed in the discharge line between the pump station and the discharge point to protect the pump station from high pressures of the force main.
2. Grinder station includes 8 simplex fiberglass station complete with grinder pump, basin, riser, control panel, floats, cables, meter box. Quantity based on existing and vacant lots only.
3. Remove and replace unsuitable material - quantity assumed, remove and replace driveways - quantity assumed.
4. Assumes force main within portions of roadway.
5. Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
6. Cost assumes locating each home owner's drain line, cap line to septic tank, run sewer lateral to valve pit, electrical connection to homeowner. Note unit price is an estimate, lateral lengths, yard and driveway restoration and conditions & unique circumstances of electrical supply and its location will vary the cost for each homeowner.
7. Assumes grinders connect to existing 8-inch PM along May River Road.
8. Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
9. It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
10. Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
11. Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from JYW-SA & Town of Bluffton.



LEGEND	
2" PIPE	IN-LINE FLUSHING CONNECTION
3" PIPE	TERMINAL FLUSHING CONNECTION
4" PIPE	ISOLATION VALVES
6" PIPE	EXISTING LIFT STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

**APPENDIX M**  
**LOW PRESSURE GRINDER SEWER CONCEPT**  
 FOR  
**GASCOIGNE**  
 DATE: OCTOBER 2013



# **Appendix N**

## **Low Pressure Grinder Sewer Concept for Stoney Creek Sewer Service Area**

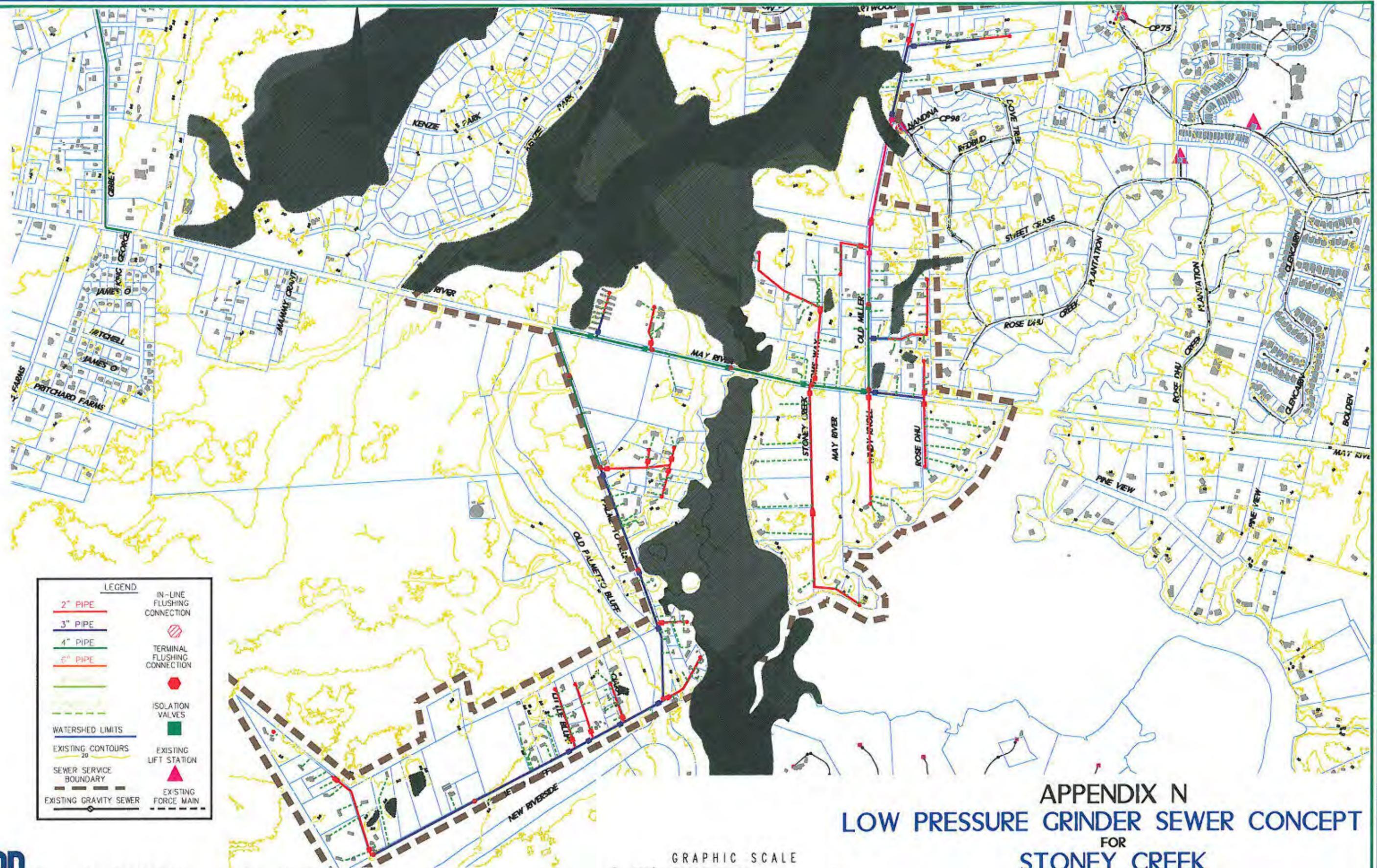
### **Anticipated Cost Estimate**

**LOW PRESSURE GRINDER SEWER SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**STONEY CREEK SEWER SERVICE AREA**  
 October 4, 2013

Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	1-1/4" HDPE SDR35 Pipe	24,109	LF	\$ 10.00	\$ 241,090.00
2	1-1/2" HDPE SDR11 Pipe	900	LF	\$ 10.00	\$ 9,000.00
3	2" HDPE SDR11 Pipe	16,050	LF	\$ 12.00	\$ 192,600.00
4	3" HDPE SDR11 Pipe	6,045	LF	\$ 14.00	\$ 84,630.00
5	2" Isolation Valve	21	EA	\$ 370.00	\$ 7,770.00
6	3" Isolation Valve	12	EA	\$ 619.00	\$ 7,428.00
7	4" Isolation Valve	7	EA	\$ 758.00	\$ 5,306.00
8	6" Isolation Valve	4	EA	\$ 1,472.00	\$ 5,888.00
9	Terminal Flushing Connection (Clean-out)	20	EA	\$ 1,054.00	\$ 21,080.00
10	In-Line Flushing Connection (Clean-out)	23	EA	\$ 1,195.00	\$ 27,485.00
11	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 14,128.50
12	Lateral Kits <sup>1</sup>	150	EA	\$ 258.00	\$ 38,700.00
13	Simplex Fiberglass Grinder Station <sup>2</sup>	150	EA	\$ 4,572.00	\$ 685,800.00
14	Misc. Vacuum Fittings				
	1-1/2" x 1-1/4" EF Saddle	3	EA	\$ 84.00	\$ 252.00
	2" x 1-1/4" EF Saddle	108	EA	\$ 84.00	\$ 9,072.00
	3" x 1-1/4" EF Saddle	39	EA	\$ 90.00	\$ 3,510.00
	4" x 1-1/2" EF Saddle	14	EA	\$ 90.00	\$ 1,260.00
	6" x 1-1/4" EF Saddle	2	EA	\$ 98.00	\$ 196.00
	2" x 3" Reducer	31	EA	\$ 32.00	\$ 332.00
	1-1/2" x 2" Reducer	1	EA	\$ 29.00	\$ 29.00
	2" Tee	3	EA	\$ 44.00	\$ 132.00
	3" Tee	5	EA	\$ 51.00	\$ 255.00
	4" Tee	10	EA	\$ 78.00	\$ 780.00
	6" Tee	2	EA	\$ 232.00	\$ 464.00
	3" W -	1	EA	\$ 381.00	\$ 381.00
	2" W -	0	EA	\$ 388.00	\$ -
	3" x 4" Reducer	4	EA	\$ 34.00	\$ 136.00
	6" x 3" Reducer	1	EA	\$ 92.00	\$ 92.00
	6" x 4" Reducer	1	EA	\$ 92.00	\$ 92.00
	4" x 2" Reducer	8	EA	\$ 34.00	\$ 272.00
15	Silt Fence	26,574	LF	\$ 3.50	\$ 92,799.00
16	Grassing (Temporary and Permanent)	7,165	SY	\$ 2.00	\$ 14,730.00
17	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	300	CY	\$ 70.00	\$ 21,000.00
18	Remove driveway surface, replace with 3" graded aggregate <sup>4</sup>	150	EA	\$ 160.00	\$ 24,000.00
19	Remove and replace 3" of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	1,105	SY	\$ 70.00	\$ 77,332.50
20	Decommissioning of existing septic tank <sup>5</sup>	150	EA	\$ 500.00	\$ 75,000.00
21	Connection of Grinder Pump Station to home owner's existing system <sup>6</sup>	150	EA	\$ 2,000.00	\$ 300,000.00
22	2-inch HDPE SDR11 Pipe installed by HDD	150	LF	\$ 50.00	\$ 7,500.00
23	3-inch HDPE SDR11 Pipe installed by HDD	3,453	LF	\$ 60.00	\$ 207,300.00
24	4-inch HDPE SDR11 Pipe installed by HDD	6865	LF	\$ 80.00	\$ 549,200.00
25	6-inch HDPE SDR11 Pipe installed by HDD	2000	LF	\$ 120.00	\$ 240,000.00
26	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
27	Core into Termination Manhole for Force Main <sup>7</sup>	1	EA	\$ 3,000.00	\$ 3,000.00
28	Jack & Bore 8-inch steel casing (0.3" wall thickness) for 4-inch HDPE force main	60	LF	\$ 100.00	\$ 6,000.00
29	Insert 4-inch HDPE force main in casing	60	LF	\$ 40.00	\$ 2,400.00
30	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
31	Grading, spreading/disposal of excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 180,900.00
Subtotal					\$ 3,194,252.00
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 191,655.12
Engineering Fees (15%)					\$ 479,137.80
Construction Contingencies (15%)					\$ 479,137.80
Estimated Probable Cost					\$ 4,344,182.72
CALL <sup>III, IV, V</sup>					\$ 4,400,000.00
No. of existing customers:					150
Cost per customer:					\$ 29,400.00

**Assumptions:**

- Lateral kit includes one (1) 1-1/4" HDPE check valve and one (1) 1-1/4" HDPE ball valve installed in the discharge line between the pump station and the discharge point to protect the pump station from high pressures of the force main.
- Grinder station includes a simplex fiberglass station complete with grinder pump, basin, rails, control panel, floats, cables, meter box. Quantity based on existing and vacant lots only.
- Remove and replace unsuitable material: quantity assumed, remove and replace driveways: quantity assumed.
- Assumes force main within portions of roadway.
- Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
- Cost assumes locating each home owner's drain line, cap line to septic tank, run sewer lateral to valve pit, electrical connection to homeowner. Note unit price is an estimate, lateral lengths, steel and driveway restoration and conditions & unique circumstances of electrical supply and its location will vary the cost for each homeowner.
- Assumes new force main discharges to I.S. - CP98.
- Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
- It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.
- Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
- Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BU, SA & Town of Bluffton.



**APPENDIX N**  
**LOW PRESSURE GRINDER SEWER CONCEPT**  
**FOR**  
**STONEY CREEK**  
 DATE: OCTOBER 2013

# **Appendix O**

**Low Pressure Grinder Sewer Concept  
for Pritchardville Sewer Service Area**

**Anticipated Cost Estimate**

**LOW PRESSURE GRINDER SEWER SYSTEM BUDGET COST ESTIMATE**  
**MAY RIVER WATERSHED SEWER MASTER PLAN - PHASE I**  
**PRITCHARDVILLE SEWER SERVICE AREA**  
 October 4, 2013

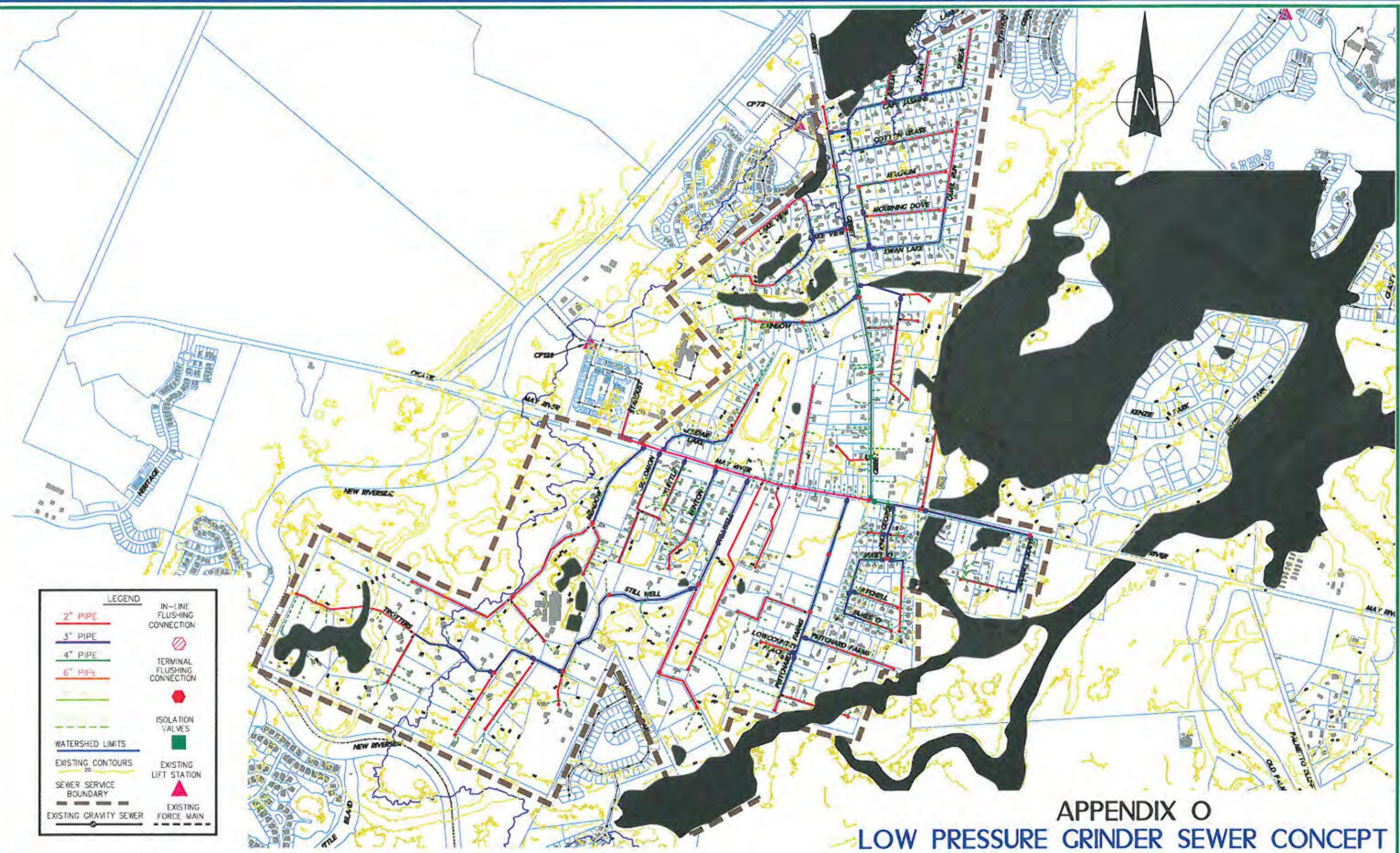
Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	1-1/4" HDPE SDR29 Pipe	72,900	LF	\$ 10.00	\$ 729,000.00
2	2" HDPE SDR11 Pipe	39,600	LF	\$ 12.00	\$ 475,440.00
4	3" HDPE SDR11 Pipe	27,220	LF	\$ 14.00	\$ 381,080.00
5	4" HDPE SDR11 Pipe	400	LF	\$ 16.00	\$ 6,400.00
6	2" Isolation Valve	20	EA	\$ 370.00	\$ 10,730.00
7	3" Isolation Valve	37	EA	\$ 619.00	\$ 22,903.00
8	4" Isolation Valve	5	EA	\$ 758.00	\$ 3,790.00
9	6" Isolation Valve	4	EA	\$ 1,472.00	\$ 5,888.00
10	Terminal Flushing Connection (Clean-out)	43	EA	\$ 1,054.00	\$ 47,430.00
11	In-Line Flushing Connection (Clean-out)	35	EA	\$ 1,195.00	\$ 41,825.00
12	Force Main Air Release Valve and Manhole	14	EA	\$ 3,000.00	\$ 42,042.00
13	Lateral Kits <sup>7</sup>	502	EA	\$ 258.00	\$ 129,516.00
14	Simplex Fiberglass Grinder Station <sup>2</sup>	502	EA	\$ 4,573.00	\$ 2,295,144.00
15	Misc. Vacuum Fittings				
	2" x 1-1/4" EF Saddle	303	EA	\$ 84.00	\$ 25,452.00
	3" x 1-1/4" EF Saddle	190	EA	\$ 90.00	\$ 17,190.00
	4" x 1-1/4" EF Saddle	30	EA	\$ 90.00	\$ 2,700.00
	6" x 1-1/4" EF Saddle	20	EA	\$ 98.00	\$ 1,960.00
	2" x 3" Reducer	17	EA	\$ 32.00	\$ 1,184.00
	2" Tee	4	EA	\$ 44.00	\$ 176.00
	3" Tee	20	EA	\$ 51.00	\$ 1,020.00
	4" Tee	5	EA	\$ 78.00	\$ 390.00
	6" Tee	10	EA	\$ 232.00	\$ 2,320.00
	3" Wye	2	EA	\$ 281.00	\$ 762.00
	2" Wy	1	EA	\$ 338.00	\$ 338.00
	3" x 4" Reducer	4	EA	\$ 34.00	\$ 136.00
	6" x 3" Reducer	10	EA	\$ 92.00	\$ 920.00
	6" x 4" Reducer	1	EA	\$ 92.00	\$ 92.00
	4" x 2" Reducer	2	EA	\$ 34.00	\$ 68.00
	3" Cross	1	EA	\$ 510.00	\$ 510.00
16	Silt Fence	80,688	LF	\$ 3.50	\$ 282,408.00
17	Grassing (Temporary and Permanent)	22,413	SY	\$ 2.00	\$ 44,826.67
18	Remove unsuitable material, dispose offsite, replace with crushed stone or silt fill material <sup>3</sup>	700	CY	\$ 70.00	\$ 49,000.00
19	Remove driveway surface, replace with 2" graded aggregate <sup>4</sup>	502	EA	\$ 160.00	\$ 80,320.00
20	Remove and replace 3' of asphaltic road surface over trenches, 3" compacted thickness <sup>4</sup>	3,262	SY	\$ 70.00	\$ 228,340.00
21	Decommissioning of existing septic tank <sup>5</sup>	502	EA	\$ 500.00	\$ 251,000.00
22	Connection of Grinder Pump Station to home owner's existing system <sup>6</sup>	502	EA	\$ 2,000.00	\$ 1,004,000.00
23	2-inch HDPE SDR11 Pipe installed by HDD	180	LF	\$ 60.00	\$ 10,800.00
24	3-inch HDPE SDR11 Pipe installed by HDD	3,980	LF	\$ 60.00	\$ 238,800.00
25	4-inch HDPE SDR11 Pipe installed by HDD	3,490	LF	\$ 80.00	\$ 279,200.00
26	6-inch HDPE SDR11 Pipe installed by HDD	4,000	LF	\$ 120.00	\$ 480,000.00
27	Force Main Air Release Valve and Manhole	5	EA	\$ 3,000.00	\$ 15,000.00
28	Core into Termination Manhole for Force Main <sup>7</sup>	1	EA	\$ 3,000.00	\$ 3,000.00
29	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
30	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean-up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (6% of all)	1	JOB	Lump Sum	\$ 434,100.00
				Subtotal	\$ 7,667,720.67
				Escalation Preparation, Appraisals, Legal Fees and Value of the Easements (6%)	\$ 460,063.24
				Engineering Fees (15%)	\$ 1,150,158.10
				Construction Contingencies (15%)	\$ 1,150,158.10
				Estimated Probable Cost	\$ 10,428,198.11
				CALL <sup>10, 11, 12</sup>	\$ 10,500,000.00
	No. of existing customers:				502
	Cost per customer:				\$ 21,000.00

**Assumptions**

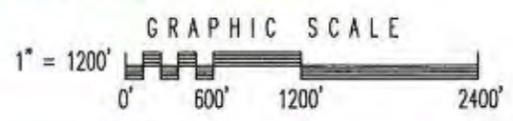
- Lateral kit includes one (1) 1-1/4" HDPE check valve and one (1) 1-1/4" HDPE ball valve installed in the discharge line between the pump station and the discharge point to protect the pump station from high pressures of the force main.
- Grinder station includes a simplex fiberglass station complete with grinder pump, basin, rails, control panel, floats, cables, meter box. Quantity based on existing and vacant lots only.
- Remove and replace unsuitable material: quantity assumed, remove and replace driveways: quantity assumed.
- Assumes force main within portions of roadway.
- Cost includes removing contents and fill tank with sand and abandon drain fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
- Cost assumes locating each home owner's drain line, cap line to septic tank, run sewer lateral to valve pit, electrical connection to homeowner. Note unit price is an estimate, lateral lengths, yard and driveway restoration and conditions & unique circumstances of electrical supply and its location will vary the cost for each homeowner.
- Assumes new force main discharges to I.S. - CP128.
- Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
- It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any Statement of Probable Construction Cost or other cost estimates or evaluations prepared by the Engineer.

10 Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.

11 Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BWSA & Town of Bluffton.



LEGEND	
2" PIPE	IN-LINE FLUSHING CONNECTION
3" PIPE	TERMINAL FLUSHING CONNECTION
4" PIPE	ISOLATION VALVES
6" PIPE	EXISTING LIFT STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	



APPENDIX O  
 LOW PRESSURE GRINDER SEWER CONCEPT  
 FOR  
 PRITCHARDVILLE  
 DATE: OCTOBER 2013

# **Appendix P**

## **Gravity, Low Pressure Grinder and Force Main Sewer Concept for Pritchardville Sewer Service Area**

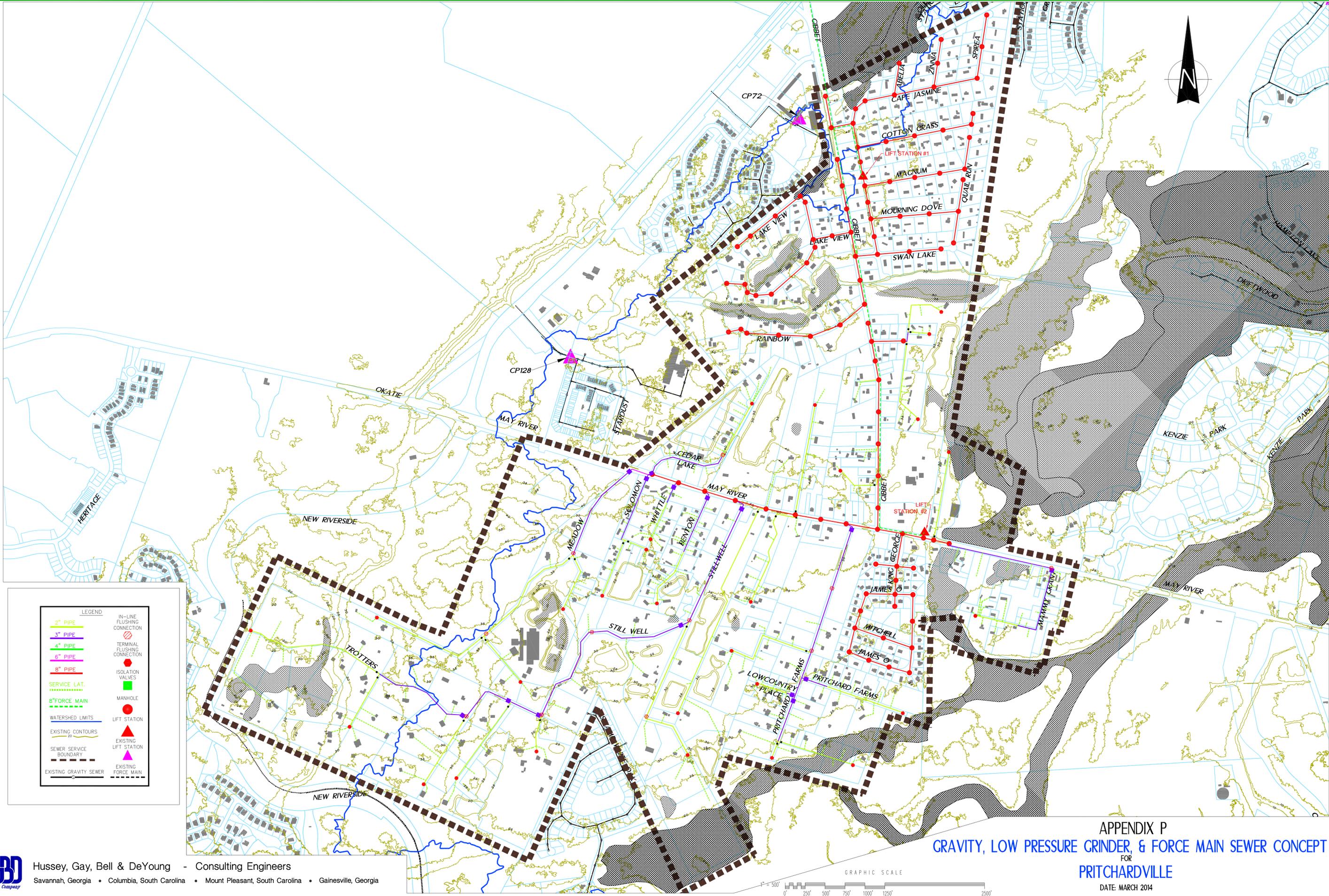
### **Anticipated Cost Estimate**

GRAVITY, LOW PRESSURE GRINDER, & FORCE MAIN SEWER SYSTEM BUDGET COST ESTIMATE  
MAY RIVER WATERSHED SEWER MASTER PLAN PHASE I  
PRITCHARDVILLE SEWER SERVICE AREA  
April 3, 2014

Item No.	Description	Estimated Quantity	Units	Unit Price	Total Cost
1	1-1/4" HDPE SDR29 Pipe	38,200	LF	\$ 10.00	\$ 382,000.00
2	2" HDPE SDR11 Pipe	29,700	LF	\$ 12.00	\$ 356,400.00
3	3" HDPE SDR11 Pipe	18,200	LF	\$ 14.00	\$ 254,800.00
4	4" HDPE SDR11 Pipe	300	LF	\$ 16.00	\$ 4,800.00
5	2" Isolation Valve	24	EA	\$ 370.00	\$ 8,880.00
6	3" Isolation Valve	16	EA	\$ 619.00	\$ 9,904.00
7	Terminal Flushing Connection (Clean-out)	29	EA	\$ 1,054.00	\$ 30,566.00
8	In-Line Flushing Connection (Clean-out)	11	EA	\$ 1,195.00	\$ 13,145.00
9	Force Main Air Release Valve and Manhole	10	EA	\$ 3,000.00	\$ 30,000.00
10	Lateral Kits <sup>1</sup>	266	EA	\$ 258.00	\$ 68,628.00
11	Simplex Fiberglass Grinder Station <sup>2</sup>	266	EA	\$ 4,572.00	\$ 1,216,152.00
12	Misc. Vacuum Fittings				
	2" x 1-1/4" EF Saddle	160	EA	\$ 84.00	\$ 13,440.00
	3" x 1-1/4" EF Saddle	106	EA	\$ 90.00	\$ 9,540.00
	4" x 1-1/4" EF Saddle	16	EA	\$ 90.00	\$ 1,440.00
	6" x 1-1/4" EF Saddle	10	EA	\$ 98.00	\$ 980.00
	2" x 3" Reducer	20	EA	\$ 32.00	\$ 640.00
	2" Tee	2	EA	\$ 44.00	\$ 88.00
	3" Tee	10	EA	\$ 51.00	\$ 510.00
	4" Tee	2	EA	\$ 78.00	\$ 156.00
	6" Tee	5	EA	\$ 232.00	\$ 1,160.00
	3" Wye	2	EA	\$ 381.00	\$ 762.00
	2" Wy	1	EA	\$ 338.00	\$ 338.00
	3" x 4" Reducer	2	EA	\$ 34.00	\$ 68.00
	6" x 3" Reducer	5	EA	\$ 92.00	\$ 460.00
	6" x 4" Reducer	1	EA	\$ 92.00	\$ 92.00
	4" x 2" Reducer	2	EA	\$ 34.00	\$ 68.00
	3" Cross	1	EA	\$ 510.00	\$ 510.00
13	8" PVC Gravity Sewer	32,000	LF	\$ 26.00	\$ 832,000.00
14	Manholes, 4' diameter, standard	104	EA	\$ 3,000.00	\$ 312,000.00
15	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC gravity main	300	LF	\$ 150.00	\$ 45,000.00
16	Insert 8-inch PVC gravity main in casing	300	LF	\$ 50.00	\$ 15,000.00
17	4-inch RJ PVC force main, AWWA C900, SDR-18	900	LF	\$ 18.00	\$ 16,200.00
18	8-inch PVC force main, AWWA C900, SDR-18	4,400	LF	\$ 22.00	\$ 96,800.00
19	8-inch RJ PVC force main, AWWA C900, SDR-18	3,000	LF	\$ 26.00	\$ 78,000.00
20	Misc. Force Main Fittings	3,000	LBS	\$ 5.00	\$ 15,000.00
21	Jack & Bore 18-inch steel casing (0.5" wall thickness) for 8-inch PVC force main	300	LF	\$ 150.00	\$ 45,000.00
22	Insert 8-inch PVC force main in casing	300	LF	\$ 50.00	\$ 15,000.00
23	New Duplex Lift Station	2	LS	\$ 250,000.00	\$ 500,000.00
24	4-inch lateral to easement or R/W line (near side) <sup>7</sup>	13,000	LF	\$ 12.00	\$ 156,000.00
25	4-inch lateral to easement or R/W line (far side) <sup>7</sup>	21,000	LF	\$ 40.00	\$ 840,000.00
26	Clean outs	502	EA	\$ 75.00	\$ 37,650.00
27	Silt Fence	106,200	LF	\$ 3.50	\$ 371,700.00
28	Grassing (Temporary and Permanent)	29,500	SY	\$ 2.00	\$ 59,000.00
29	Remove unsuitable material, dispose offsite, replace with crushed stone or site fill material <sup>3</sup>	900	CY	\$ 70.00	\$ 63,000.00
30	Remove driveway surface, replace with 2" graded aggregate <sup>3</sup>	502	EA	\$ 160.00	\$ 80,320.00
31	Remove and replace 3' of asphaltic road surface over trenches, 3" compacted thickness <sup>3</sup>	9,640	SY	\$ 70.00	\$ 674,800.00
32	Decommissioning of existing septic tank <sup>4</sup>	266	EA	\$ 500.00	\$ 133,000.00
33	Connection of Grinder Pump Station to home owner's existing system <sup>6</sup>	266	EA	\$ 2,000.00	\$ 532,000.00
34	Cure into Termination Manhole for Force Main	10	EA	\$ 3,000.00	\$ 30,000.00
35	Traffic Control	1	JOB	Lump Sum	\$ 20,000.00
36	Grading, spreading/disposal excess excavated material, remove and replace monuments, tree protection, mobilization, clean up, insurance, bonds and other miscellaneous items not specifically listed but necessary for a complete job (5% of all)	1	JOB	Lump Sum	\$ 443,900.00
Subtotal					\$ 7,840,897.00
Easement Preparation, Appraisals, Legal Fees and Value of the Easements (6%)					\$ 470,453.82
Engineering Fees (15%)					\$ 1,176,134.55
Construction Contingencies (15%)					\$ 1,176,134.55
Estimated Probable Cost					\$ 10,663,619.92
CALL <sup>III, IV, V</sup>					\$ 10,700,000.00

Assumptions:

- Lateral kit includes one (1) 1-1/4" HDPE check valve and one (1) 1-1/4" HDPE ball valve installed in the discharge line between the pump station and the discharge point to protect the pump station from high pressures of the force main.
- Grinder station includes a simplex fiberglass station complete with grinder pump, basin, rails, control panel, floats, cables, meter box. Quantity based on existing and vacant lots only.
- Remove and replace unsuitable material: quantity assumed, remove and replace driveways, quantity assumed.
- Assumes force main and sewer main within portions of roadway.
- Cost includes removing contents and fill tank with sand and abandon drain-fields in place. Cost does not include any environmental permitting fees by EPA, DHEC or any other agencies for the decommissioning of septic tanks, drain fields, etc.
- Cost assumes locating each home owner's drain line, cap line to septic tank, run sewer lateral to valve pit, electrical connection to homeowner. Note unit price is an estimate, lateral lengths, yard and driveway restoration and conditions & unique circumstances of electrical supply and its location will vary the cost for each homeowner.
- Lateral lengths will vary.
- Pricing does not include rehabilitation or capacity upgrades to the existing sewer infrastructure.
- It is recognized that neither the Engineer nor the Owner has control over the cost of labor, materials or equipment, over the Contractor's methods of determining bid prices, or over competitive bidding, market or negotiating conditions. Accordingly, the Engineer cannot and does not warrant or represent that bids or negotiated prices will not vary from any.
- Costs are based on 2013 estimated costs. Inflation factors need to be applied for awards after 2014.
- Engineering Fees are for civil design services only. Fees do not include wetland mitigation credits, or other engineering discipline design required not listed herein. Easement preparation, appraisals, legal fees and value of the easements at 6% based on input from BJWSA & Town of Bluffton.



LEGEND	
2" PIPE	IN-LINE FLUSHING CONNECTION
3" PIPE	TERMINAL FLUSHING CONNECTION
4" PIPE	ISOLATION VALVES
6" PIPE	MANHOLE
8" PIPE	LIFT STATION
SERVICE LAT.	EXISTING LIFT STATION
8" FORCE MAIN	EXISTING LIFT STATION
WATERSHED LIMITS	EXISTING FORCE MAIN
EXISTING CONTOURS	
SEWER SERVICE BOUNDARY	
EXISTING GRAVITY SEWER	

APPENDIX P  
GRAVITY, LOW PRESSURE GRINDER, & FORCE MAIN SEWER CONCEPT  
FOR  
PRITCHARDVILLE  
DATE: MARCH 2014

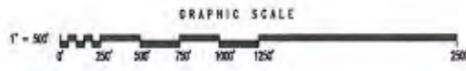
# **Exhibit 1**

## **Alljoy Sewer Service Area**



**LEGEND**

EXISTING GRAVITY SEWER	ALLJOY & HYTTLE ISLAND BOUNDARY	WATERSHED LIMITS
EXISTING FORCE MAIN	TOWN OF BLUFFTON LIMITS	WETLANDS
EXISTING LIFT STATION		
EXISTING OILER PUMP		
<b>ZONING</b>		
LIGHT INDUSTRIAL (LI)	SUBURBAN (S)	
OFFICE COMMERCIAL (OC)	COMMERCIAL SUBURBAN (CS)	
PLANNED DEVELOPMENT DISTRICT (PDD)	URBAN (U)	
COMMERCIAL REGIONAL (CR)	UN-NAMED (UN)	
RESEARCH DEVELOPMENT (RD)	COMMUNITY PRESERVATION (CP)	
RESOURCE CONSERVATION (RC)	TOB	
RURAL (R)	RURAL WITH TRANSITIONAL OVERLAY (RTO)	
RURAL RESIDENTIAL (RR)	RIVERFRONT EDGE-HD (RE-HD)	



# **Exhibit 2**

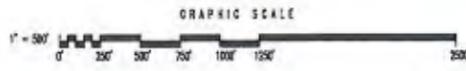
## **Old Town Sewer Service Area**



**LEGEND**

EXISTING GRAVITY SEWER	OLD TOWN BOUNDARY
EXISTING FORCE MAIN	TOWN OF BLUFFTON LIMITS
EXISTING LIFT STATION	WATERSHED LIMITS
EXISTING GRIER PUMP	WETLANDS
<b>ZONING</b>	
RESIDENTIAL GENERAL (RG)	NEIGHBORHOOD CORE (NC)
NEIGHBORHOOD GENERAL-HD (NC-HD)	NEIGHBORHOOD CORE-HD (NC-HD)
NEIGHBORHOOD CENTER-HD (NC-HD)	RIVERFRONT EDGE-HD (RE-HD)
NEIGHBORHOOD CONSERVATION 7 (NC7)	COMMUNITY PRESERVATION (CP)

**EXHIBIT 2  
OLD TOWN SEWER SERVICE AREA**



# **Exhibit 3**

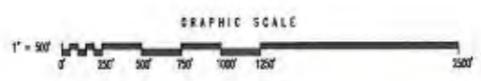
## **Cahill Sewer Service Area**



**LEGEND**

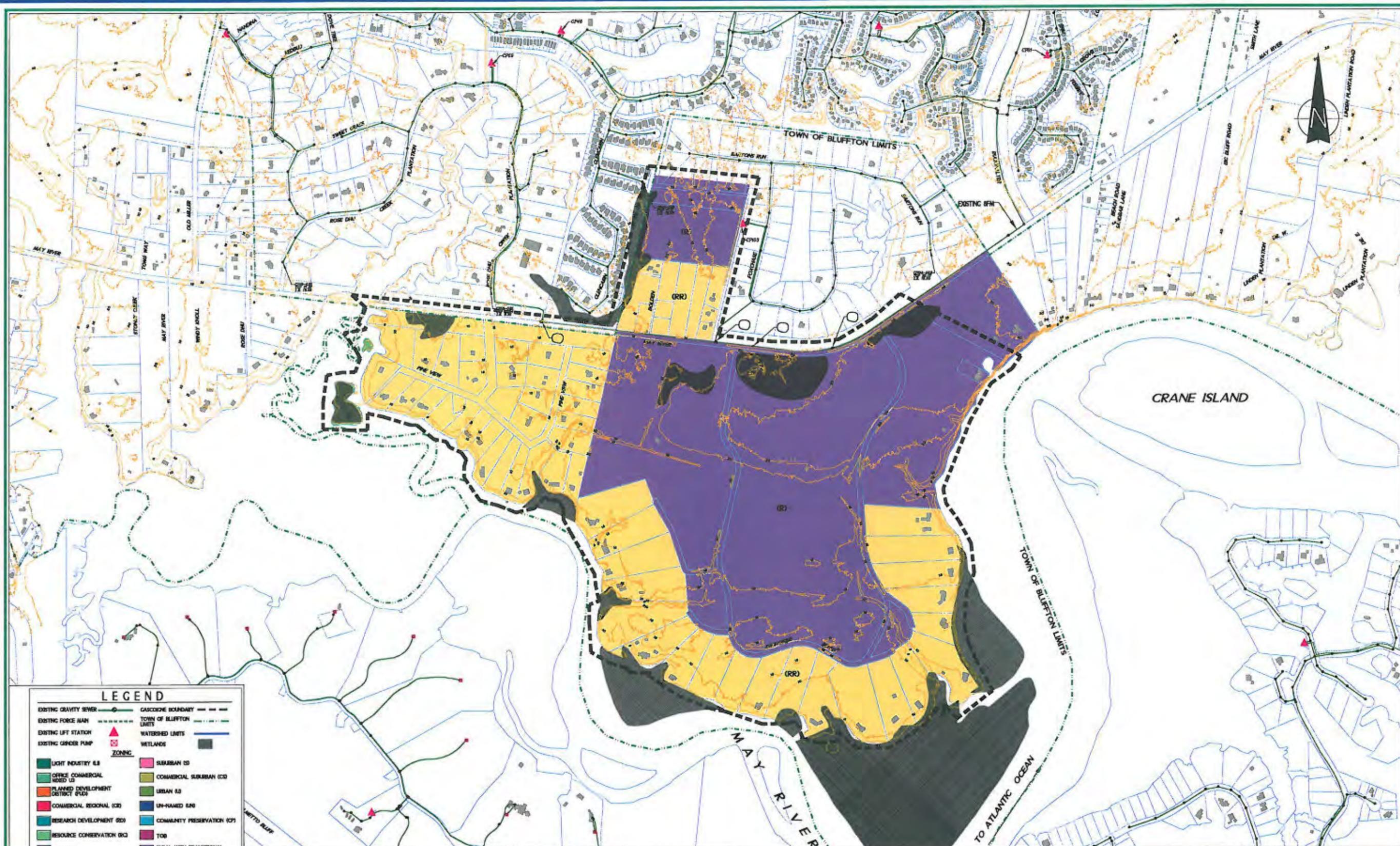
EXISTING GRAVITY SEWER	CIVIL BOUNDARY
EXISTING FORCE MAIN	TOWN OF BLUFFTON LIMITS
EXISTING LIFT STATION	WATERSHED LIMITS
EXISTING CHECKER PUMP	WETLANDS
<b>ZONING</b>	
LIGHT INDUSTRIAL (LI)	SUBURBAN (S)
OFFICE COMMERCIAL MIXED USE (OCMU)	COMMERCIAL SUBURBAN (CS)
PLANNED DEVELOPMENT DISTRICT (PDD)	URBAN (U)
COMMERCIAL REGIONAL (CR)	UN-NAMED SRS
RESEARCH DEVELOPMENT (RD)	COMMUNITY PRESERVATION (CP)
RESOURCE CONSERVATION (RC)	TOD
RURAL (R)	RURAL WITH TRANSITIONAL OVERLAY (RTO)
RURAL RESIDENTIAL (RR)	

**EXHIBIT 3**  
**CAHILL SEWER SERVICE AREA**



# **Exhibit 4**

## **Gascoigne Sewer Service Area**

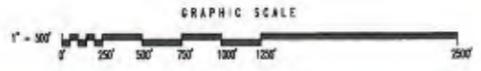


**LEGEND**

- |                                    |   |                                       |         |
|------------------------------------|---|---------------------------------------|---------|
| EXISTING GRAVITY SEWER             | — | GASCOIGNE BOUNDARY                    | - - - - |
| EXISTING FORCE MAIN                | — | TOWN OF BLUFFTON LIMITS               | - - - - |
| EXISTING LIFT STATION              | ▲ | WATERSHED LIMITS                      | —       |
| EXISTING GROSS PUMP                | ⊠ | WETLANDS                              | ■       |
| <b>ZONING</b>                      |   |                                       |         |
| LIGHT INDUSTRY (L1)                | ■ | SUBURBAN (S)                          | ■       |
| OFFICE COMMERCIAL (OC)             | ■ | COMMERCIAL SUBURBAN (CS)              | ■       |
| PLANNED DEVELOPMENT DISTRICT (PDD) | ■ | URBAN (U)                             | ■       |
| COMMERCIAL REGIONAL (CR)           | ■ | UN-PAVED (UP)                         | ■       |
| RESEARCH DEVELOPMENT (RD)          | ■ | COMMUNITY PRESERVATION (CP)           | ■       |
| RESOURCE CONSERVATION (RC)         | ■ | TOB                                   | ■       |
| RURAL (R)                          | ■ | RURAL WITH TRANSITIONAL OVERLAY (RTO) | ■       |
| RURAL RESIDENTIAL (RR)             | ■ |                                       |         |

**EXHIBIT 4  
GASCOIGNE SEWER SERVICE AREA**

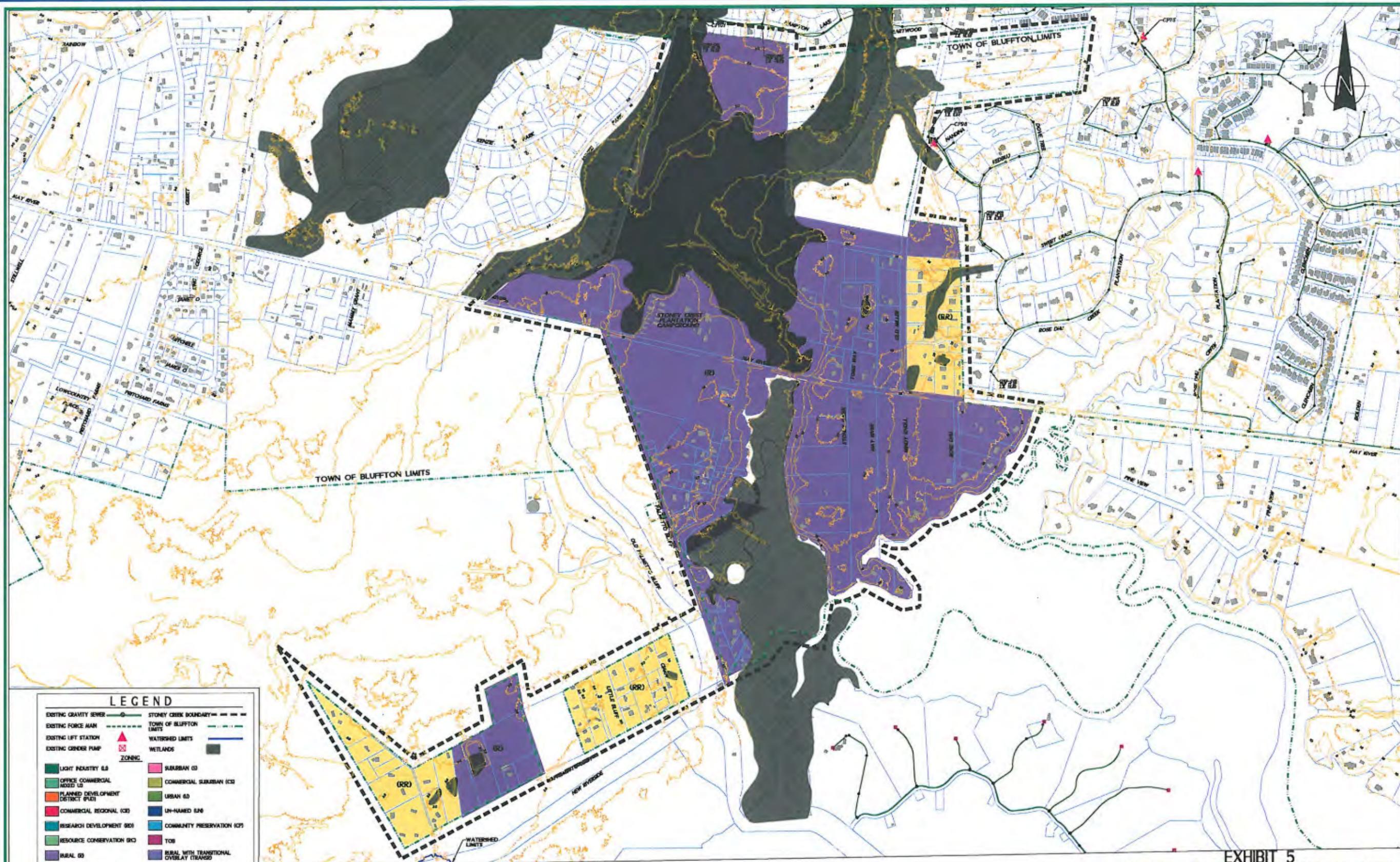
**H&D** Hussey, Gay, Bell & DeYoung - Consulting Engineers  
 Savannah, Georgia • Columbia, South Carolina • Mount Pleasant, South Carolina • Gainesville, Georgia



DATE: OCTOBER 2013

# **Exhibit 5**

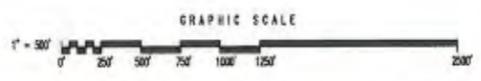
## **Stoney Creek Sewer Service Area**



**LEGEND**

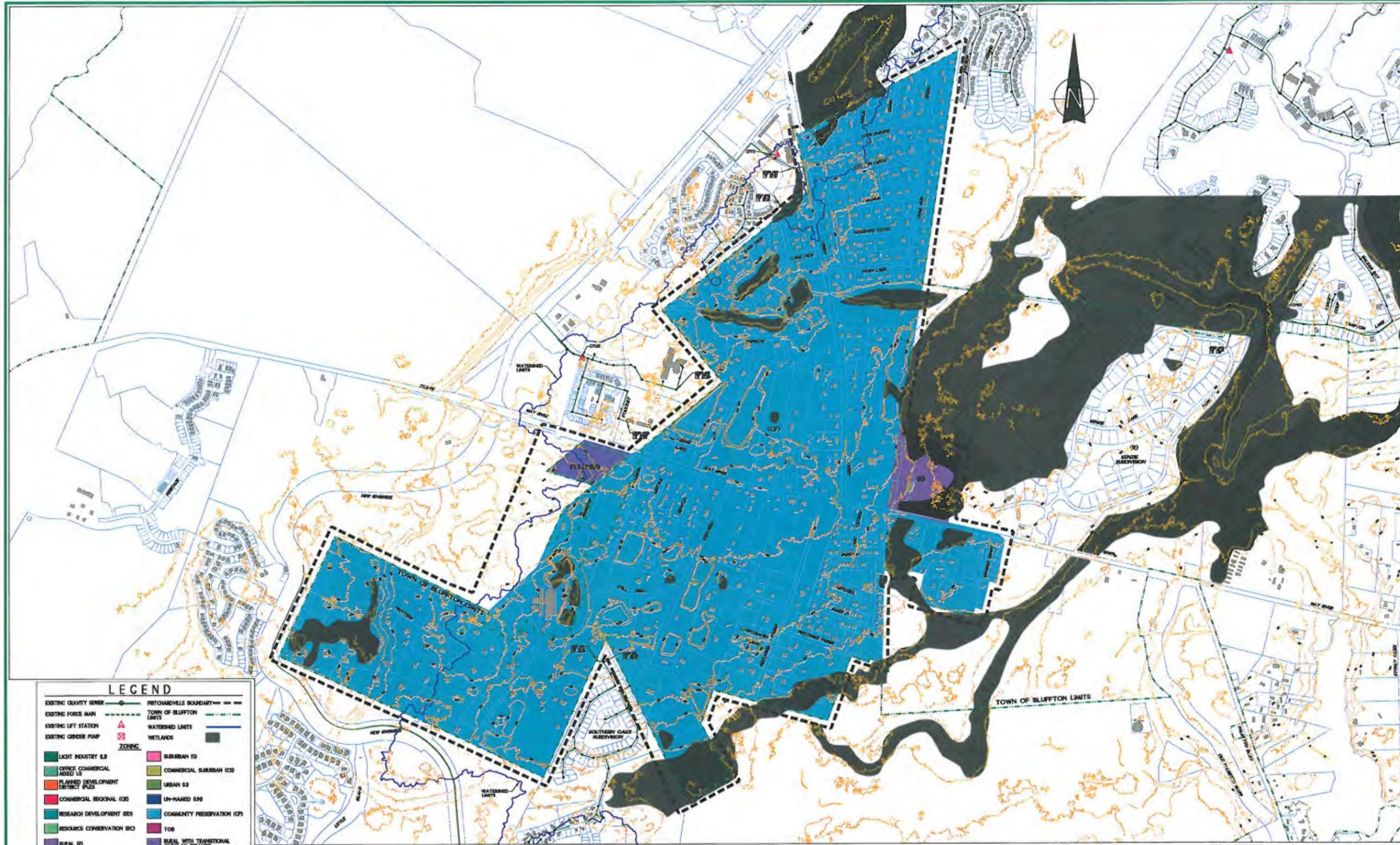
EXISTING GRAVITY SEWER	STONEY CREEK BOUNDARY
EXISTING FORCE MAIN	TOWN OF BLUFFTON LIMITS
EXISTING LIFT STATION	WATERSHED LIMITS
EXISTING GROUND PUMP	WETLANDS
<b>ZONING</b>	
LIGHT INDUSTRY (L1)	SUBURBAN (S1)
OFFICE COMMERCIAL (OC1)	COMMERCIAL SUBURBAN (CS)
PLANNED DEVELOPMENT (DISTRICT) (PD1)	URBAN (U1)
COMMERCIAL REGIONAL (CR)	UN-MAINTAINED (UM)
RESEARCH DEVELOPMENT (RD)	COMMUNITY PRESERVATION (CP)
RESOURCE CONSERVATION (RC)	TOR
RURAL (R1)	RURAL WITH TRANSITIONAL OVERLAY (TR)
RURAL RESIDENTIAL (RR)	

**EXHIBIT 5**  
**STONEY CREEK SEWER SERVICE AREA**



# **Exhibit 6**

## **Pritchardville Sewer Service Area**



**LEGEND**

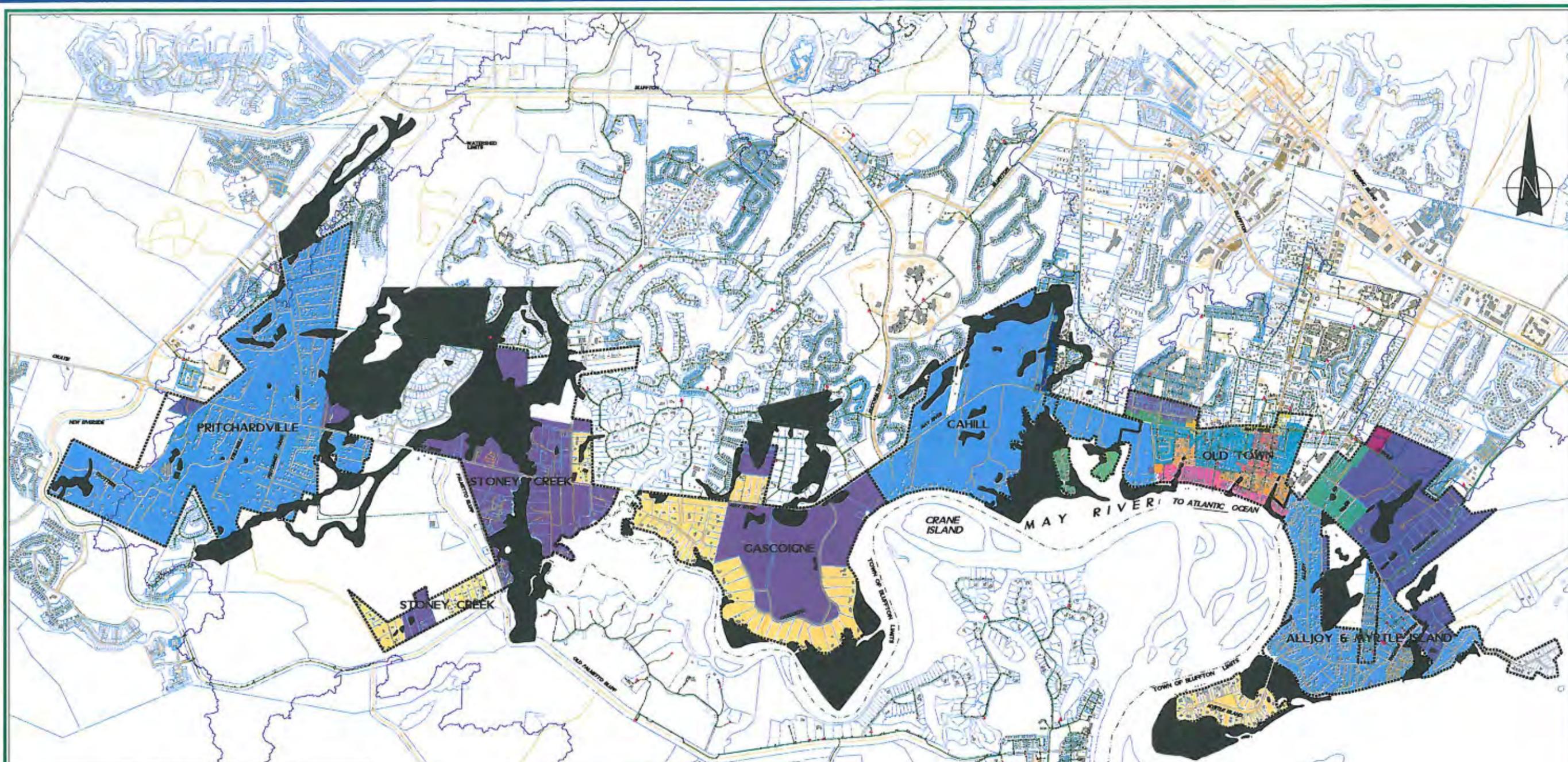
EXISTING GRAVITY SEWER	PRITCHARDVILLE BOUNDARY
EXISTING FORCE MAIN	TOWN OF BLUFFTON LIMITS
EXISTING LIFT STATION	WATERSHED LIMITS
EXISTING GREASE PUMP	WETLANDS
<b>ZONING</b>	
LIGHT INDUSTRY (L2)	SUBURBAN (S2)
OFFICE COMMERCIAL (OC2)	COMMERCIAL SUBURBAN (CS2)
PLANNED DEVELOPMENT DISTRICT (PDD)	URBAN (U2)
COMMERCIAL REGIONAL (CR2)	UN-PAVED (UN2)
RESEARCH DEVELOPMENT (RD2)	COMMUNITY PRESERVATION (CP2)
RESOURCE CONSERVATION (RC2)	YOB
RURAL (R2)	RURAL WITH TRANSITIONAL OVERLAY (RT2)
RURAL RESIDENTIAL (RR2)	

**EXHIBIT 6**  
**PRITCHARDVILLE SEWER SERVICE AREA**



# **Exhibit 7**

## **Overall Sewer Service Area**



**LEGEND**

EXISTING GRAVITY SEWER	BOUNDARY	TOWN OF BLUFFTON LIMITS
EXISTING FORCE MAIN	WATERSHED LIMITS	WATERSHED LIMITS
EXISTING LIFT STATION	WETLANDS	WETLANDS
EXISTING GREYER PUMP	ZONING	
LIGHT INDUSTRIAL (L2)	SUBURBAN (S2)	RESIDENTIAL GENERAL (R2)
OFFICE COMMERCIAL MIXED USE	COMMERCIAL SUBURBAN (C2)	NEIGHBORHOOD GENERAL-HD (NC-H2)
PLANNED DEVELOPMENT DETACHED (PD1)	URBAN (U2)	NEIGHBORHOOD CENTER-HD (NC-H3)
COMMERCIAL REGIONAL (C3)	UN-NAMED (UN)	NEIGHBORHOOD CONSERVATION 7 (NC7)
RESEARCH DEVELOPMENT (RD)	COMMUNITY PRESERVATION (CP)	NEIGHBORHOOD CORE (NC)
RESOURCE CONSERVATION (RC)	T08	NEIGHBORHOOD CORE-HD (NC-H1)
RURAL (R1)	RURAL WITH TRANSITIONAL OVERLAY (TRAO)	WATERFRONT EDGE-HD (WE-H1)
RURAL ESSENTIAL (RE)		

**EXHIBIT 7**  
**OVERALL SEWER SERVICE AREAS**  
 FOR  
**MAY RIVER WATERSHED**  
**MASTER PLAN – PHASE 1**  
 DATE: OCTOBER 2013

