BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

IN RE: Application for certificate to provide wastewater service in Charlotte County, by Environmental Utilities, LLC
_____/

DOCKET NO. 20240032-SU

NOTICE OF FILING OF PREFILED REBUTTAL TESTIMONY OF JONATHAN H. COLE ON BEHALF OF ENVIRONMENTAL UTILITIES, LLC

Environmental Utilities, LLC, by and through its undersigned counsel, hereby notices the filing of the attached Prefiled Rebuttal Testimony of Jonathan H. Cole.

Respectfully submitted this 6th day of December, 2024.

/s/ Martin S. Friedman
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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Notice of Filing of Rebuttal Testimony has been furnished by electronic mail to the following parties this 6th day of December, 2024:

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/s/ Martin S. Friedman
Martin S. Friedman

BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

In re: Application for certificate to provide wastewater service in Charlotte County by Environmental Utilities, LLC	Docket No. 20240032-SU

REBUTTAL TESTIMONY

OF

JONATHAN H. COLE, P.E.

on behalf of

Environmental Utilities, LLC

Q. What is the purpose of your Rebuttal Testimony.

A. The purpose of my Rebuttal Testimony is to address comments made by the witnesses for the Intervenors.

Q. Do you have any specific rebuttal to the "Principal Arguments in Opposition to the Proposed Application for Central Sewer" that was attached to Ms. Cotherman's testimony.

A. Yes. Exhibit JHC-5 addresses some of those matters.

Q. Do you have any comment to Jaden D. Hull's testimony regarding system costs?

A. Yes. The cost estimates have been updated based on a revised layout and recent unit prices. Please refer to Exhibit JHC-6 which is Addendum 1 dated November 20, 2024, to my earlier Report.

Q. Do you agree with witness Hull's use of 0.23 as the multiplier for the "Miscellaneous" line item costs?

A. No. Our 18% additional contractor costs were based on an average of several prior bids at that time. This same percentage has been utilized in our Addendum, Exhibit JHC-6. Unit prices for the amendment are based on an average rather than a low bid cost. Please refer to Exhibit JHC-6.

Q. Do you agree with witness Hull's use of a "markup" for materials and work as a result of the work being done on a bridgeless barrier island.

A. Based on input from Environmental Utilities, a cost markup for working on the island of an additional 10% markup has been added. This is reflected in JHC-6.

Q. Do you agree with witness Hull's comments about the cost of acquiring easements?

A. Easement calculations are set forth in Exhibit JHC-6 and reflect our estimate of the reasonable cost to acquire the necessary easements.

Q. Do you have any comments on witness Hull's testimony that this septic-to-sewer project

will cost in excess of $51 million?

A. Due to the nature of this proceeding, Environmental Utilities is compelled to use estimates. At this point all we can do is assume that inflation will be relatively stable closer to the FEDS official target of 2%. We are fortunate to have some recent similar bids with lower unit prices than the bids used in his analysis, albeit some are higher than our initial estimate. By using average bid prices rather than the low bid and if the project proceeds relatively soon, we believe the total cost should be more in line with our current estimates as set forth in Exhibit JHC-6.

Q. Are you sponsoring any rebuttal exhibits?

A. Yes, Exhibits JHC-5, and JHC-6 as referenced in my testimony.

Q. Does that conclude your rebuttal testimony?

A. Yes, it does.

Linda Cotherman Issues

Principal Arguments in Opposition to the Proposed Application for Central Sewer

- **Problematic sludge hardening and line bellies.** A "belly", also known as a "sag", is a dip or a low point in an underground sewer pipe that can cause serious plumbing issues. The unique soil conditions make these islands more prone to soil erosion and unstable soil conditions, and less conducive to consistent soil compaction. This can lead to backups and sewerage spills. Stationary slurry is vulnerable to hardening, particularly when it accumulates in a belly.

Rebuttal: Sags or bellies are only problematic for gravity or vacuum type collection systems. In those systems on rare occasions solids could settle in the sags and over time build up. This is why care is taken during the installation of gravity and vacuum systems with bedding stone, density testing, elevations as built and sometimes mandrel or televising is conducted to ensure that sags and bellies are eliminated.

However, for pressure systems where the wastewater is pumped from either master lift stations (gravity or vacuum) or individual on lot grinder systems, the wastewater can be pushed up or down in a pressure pipe much like water flowing in a garden hose. These systems are much easier to install because they eliminate those concerns.

Unlike gravity or vacuum collection lines which could be subject to settlement from poor soil conditions, pressure lines are not subject to settlement issues because the wastewater transport does not rely on gravity flow.

Wastewater from all lift stations (gravity, vacuum or grinder pumps) are a dilute mix of finely ground solids and mostly liquids that are routinely pushed through the entire network of transmission lines until it reaches the wastewater treatment plant, that is specifically designed to accept wastewater.

It is not a "slurry" like liquid concrete or grease or solids that can on rare occasions collect in gravity bellies, but rather standard wastewater that every collection system (except for the STEP system) routinely transmits to the wastewater treatment plant through pressure lines with no concerns regarding sags or bellies.

- **Special handling of slurry at the wastewater treatment facility.** Most wastewater treatment plants are designed to accept wastewater, not slurry. This affects the treatment process in the plant, requiring different handling. Charlotte County's local plant is not designed to accept slurry, and there is no documentation that the County has accepted slurry as opposed to effluent.

Rebuttal: Grinder systems as well as master lift stations from gravity and vacuum systems pump wastewater. They do not pump slurry. Wastewater is transmitted from the pumps in all wastewater systems (except STEP) to the wastewater treatment plant with no issue whatsoever.

There is no special handling required as it's not slurry but rather conventional wastewater that all Charlotte County wastewater treatment plans routinely accept and treat.

- **Access to properties subsequent to hurricanes**. Subsequent to landfalls of the recent hurricanes, there were extended periods of power outages due to transformer damages and meter and electrical panel submersion. Most septic systems were still operational during this time, allowing the homeowners access and occupancy. The proposed low-pressure system would require a generator (and refueling) during these extended power outages. Whole communities, including Palm Island Resort on Knight Island, were denied access to their homes because of the lack of functioning sewer.

Rebuttal: It's true that power is needed to pump the sewage and generators are needed for all central collection systems. This is true on the mainland where hundreds of thousands of customers are on central sewer. However, the power requirement for the small sewage pump is minimal when compared to other household appliances and needs.

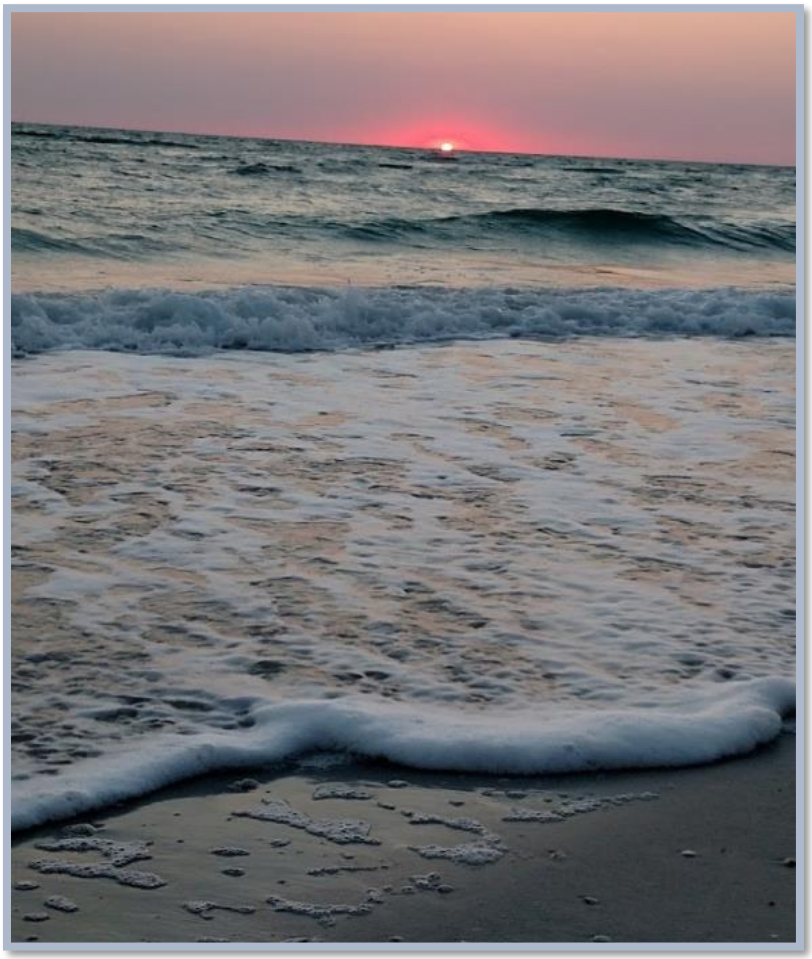
While perhaps many septic systems survived the hurricane it's also true that many septic systems were also destroyed from the hurricane spilling thousands of gallons of sludge and sewage into the local waters. Since the grinder pumps only hold about 100 gallons, the magnitude of potential sewage spilled is one tenth of what a conventional septic tank releases when destroyed by storm surge.

Encroachment on Private Property Rights

A utility easement will be required for each property served by EU. Other utilities' equipment is usually located in an existing dedicated easement or road right-of-way, with the owner held responsible for connecting the home on the property to the equipment in the existing dedicated easement. This applicant requires new easements on each property to contain the utility's equipment (tank, pump and line) located near the house.

Rebuttal: Additional easements for the main line particularly on LGI will indeed be necessary. Those main line easement costs have been further defined in Addendum one of the 2021 report.

Once the main line is constructed adjacent to a house, the "on lot" construction will employ the same Charlotte County ordinances that is routinely used for all other LPS systems throughout the County. Access and connection requirements are outlined in the Charlotte County Mandatory Connection Ordinance, Se. 3-8-41 of the Charlotte County Code. My understanding is that permission to install and maintain the "on lot" system is granted via the PSC approved Wastewater Tariff where the customer provides the necessary access rights without cost to the utility. Failure to connect would be a Code Violation as set forth in Mr. Watson's Prefiled Rebuttal Testimony.



ADDENDUM NO. 1

TO THE "EVALUATION OF WASTEWATER COLLECTION TECHNOLOGIES" TECHNICAL MEMORANDUM DATED APRIL 2, 2021

TECHNICAL MEMORANDUM

ADDENDUM NO. 1

EFFECTIVE NOVEMBER 20, 2024

PREPARED BY:
Giffels-Webster Engineers, Inc.
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PREPARED FOR:
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GWE Project #6374.23

GWE
Giffels-Webster
Engineers, Inc.

INTRODUCTION

The purpose of this addendum is to modify and update the April 2, 2021, Technical Memorandum "Evaluation of Wastewater Collection Technologies" prepared for Environmental Utilities, LLC (EU).

The specific modifications are summarized in the following sections.

COLLECTION SYSTEM TYPE

The parent report of this Addendum 1 evaluated two types of wastewater collection systems (Vacuum and Low Pressure) to determine which would be the optimal system to serve the Don Pedro/Knight Island and Little Gasparilla Island areas with sewer service. The report considered the advantages and limitations of each system type as well as the initial and long-term costs. A low pressure sewer system, also known as a septic tank effluent pumping (STEP) system, was determined to be the superior choice based on a long-term cost analysis, evaluation of construction feasibility, and consideration of how the environmental conditions would impact each systems' components on the barrier islands.

The recommendation then was to utilize a CCU low pressure, or STEP system, that uses a conventional septic tank and a low-head effluent pump to convey effluent. That system requires the installation of a septic tank and periodic pumping of the sludge from that tank.

Another wastewater collection alternative has been developed in collaboration with EU, Giffels-Webster Engineers, Inc. (GWE), and FJ Nugent & Associates, Inc (FJ Nugent). The system consists of utilizing Environment One Corporation (E/One) grinder pump stations (see Appendix I for details) to collect all sewage from homes and then grind and pump the effluent through small diameter pressure pipes that are hydraulically modeled and sized such that the velocity through the pipes meets FDEP requirements.

The original pipe sizing in the parent report was conservative as it was based on simple home counts, rather than a detailed hydraulic analysis, resulting in some larger line sizes with velocities of less than two feet per second. For preliminary sizing, that analysis was conservative. This addendum utilizes more accurate hydraulic calculations provided by FJ Nugent, which accounted for simultaneous pump operations and generally minimum velocities of two feet per second. The detailed hydraulic analyses are in Appendix II of this addendum. This resulted in smaller diameter pipes throughout the entire project area.

However, for cost estimating purposes, the cost for any mainline pipe three inches or less in diameter was assumed to be equivalent to a three-inch unit price, allowing flexibility with revised sizing without impacting the preliminary cost estimate for the final design.

Higher-pressure grinder pumps are nothing new and have been used throughout the world for decades. Some of the primary benefits of using a grinder pump station system are discussed as follows.

- ✓ Like STEP systems, the pipe sizes are minimized, significantly reducing pipe costs.
- ✓ Grinder pump units can be transported to the barrier islands easily and installed with less impact on private property since a large septic tank is not required.
- ✓ STEP and septic systems alike include an approximately 1000-gallon tank that holds the sludge and must be pumped and removed by truck periodically. On barrier islands, it is difficult, expensive, and more troublesome to perform this maintenance.
- ✓ Like all gravity and vacuum systems, grinder pump stations grind all incoming waste and then pump the wastewater into the transmission main system. Therefore, residents or EU will not be required to regularly remove solids from a tank as is necessary for septic and low-pressure tanks. Using grinder pumps is more efficient and safer than using trucks to regularly pump and transport sludge off the island.
- ✓ Grinder pumps provide a higher head than low pressure pumps and can pump directly to the CCU receiving points. They do not require an intermediate master lift station to pump into the existing transmission system, therefore saving money and siting issues for master lift stations.

Environmental Benefits

Florida was recently hit by Hurricane Milton in October 2024. The barrier islands were significantly impacted by this hurricane, and as a result, an unknown number of septic tanks were damaged, compromised, or destroyed, spilling thousands of gallons of untreated sewage. Pictures of some of the damaged tanks from Hurricane Milton are shown below.

The barrier islands are prone to receiving the impacts from devastating events like Hurricane Milton which lead to large scale raw sewage spills. A STEP or septic tank has a capacity of approximately 1,000 gallons that is subject to destruction from storms. Alternatively, the proposed E/One grinder pump station has a capacity of about 100 gallons. There is no need for a larger capacity for on-site storage of sludge because all wastewater is shredded and then pumped off-site. In a devastating hurricane, the grinder pump stations could also become compromised, but a grinder pump system can only spill up to at most 100 gallons of wastewater, considerably less than the estimated 1,000-gallons for a STEP or septic system.

Force Main Routing

The parent report to Addendum 1 proposed a singular force main crossing to transport the entirety of the flow from Don Pedro/Knight Island and Little Gasparilla Island to the mainland. The crossing was proposed near the center of the islands at the Don Pedro Island State Park crossing over to the Cape Haze peninsula.

After the development of the parent report, EU has considered using two separate crossings of the intra-coastal; a northerly crossing near the barge across from Panama Boulevard to serve Don Pedro/Knight Island and a southerly crossing generally parallel to the Boca Grande Causeway to serve Litte Gasparilla Island.

This revised force main routing with two transmission mains has some advantages.

- ✓ Allows for two small diameter force mains instead of one considerably larger main as originally proposed.
- ✓ Avoids acquiring easements through state owned lands.

- ✓ Divides the project area into two service zones. For any future force main maintenance or disruptions, only half of the residents' services will be impacted rather than the entire project area.

Addendum 1 proposes a revised conceptual sewer system layout using dedicated force mains for the Knight Island / Don Pedro flow and another for the LGI flow to the mainland rather than one central crossing at the state park.

However, other alternatives for the transmission of flow from the islands to the mainland may be found that will be for the betterment of the system in the final design. We suspect that the proposed force main routing in this addendum errs on the conservative side for a cost estimating purpose and that there may be more cost effective solutions that can be investigated during design.

KNIGHT ISLAND UTILITIES FLOW

The parent report contemplated accepting flow from Knight Island Utilities (KIU) wastewater treatment plant to transport the flow through the proposed system and eventually to the mainland for treatment.

Further evaluation has since concluded that combining flows from KIU with the Don Pedro/Knight Island collection system is not recommended due to the significantly larger pumps from KIU that would negatively impact the operation of the smaller grinder pump stations. Additionally, excluding this flow from the collection system allows for notably smaller main sizes.

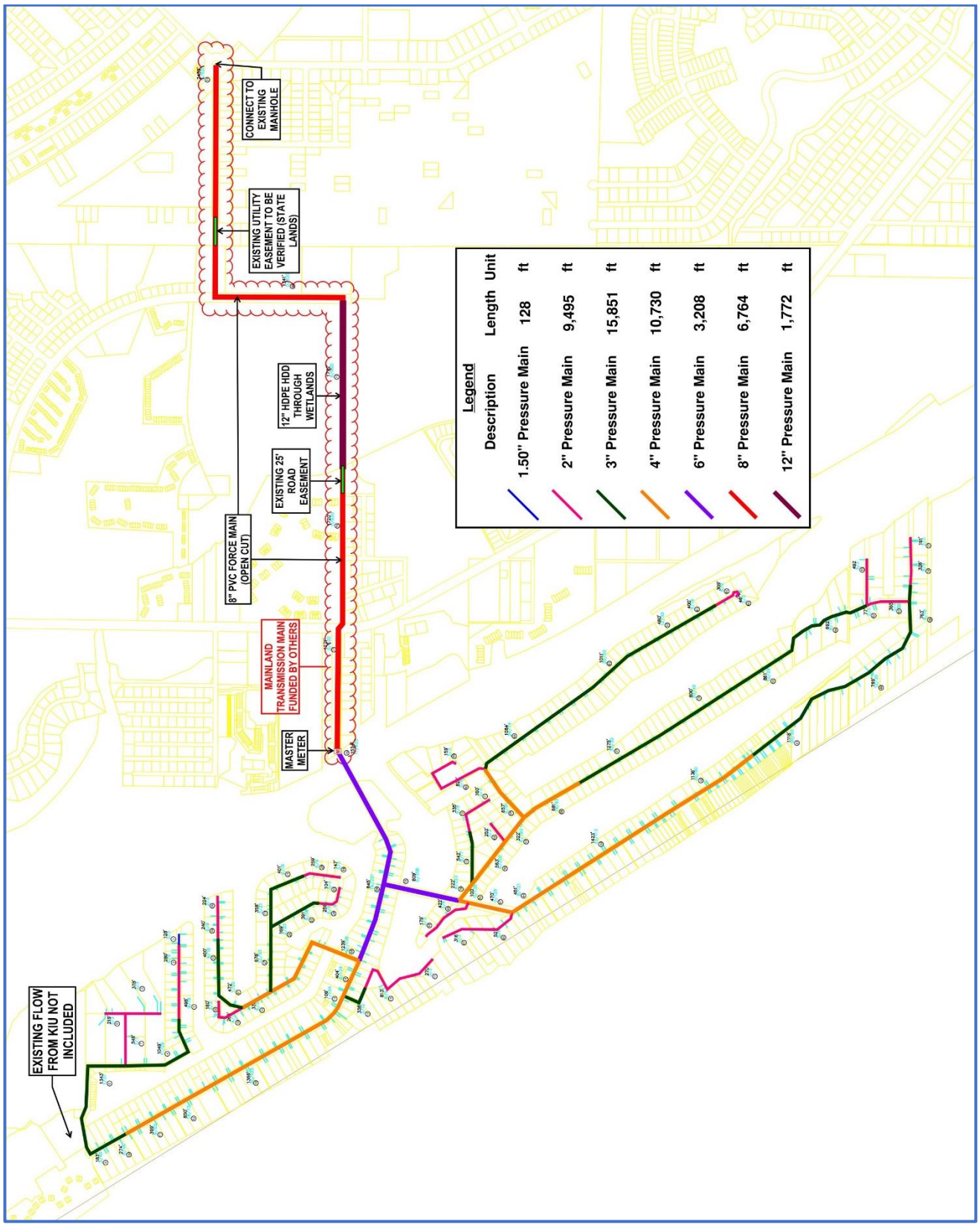
Instead, EU may opt to install a dedicated parallel transmission main for KIU that will transport sewage through the Don Pedro/Knight Island area, alongside the proposed collection mains, and to the mainland connection point where the two parallel force mains will interconnect and begin the mainland force main.

The cost to install a dedicated KIU transmission main is not considered in this addendum as it is independent of the proposed collection systems and will not impact Don Pedro/Knight Island or Little Gasparilla Island's cost of service.

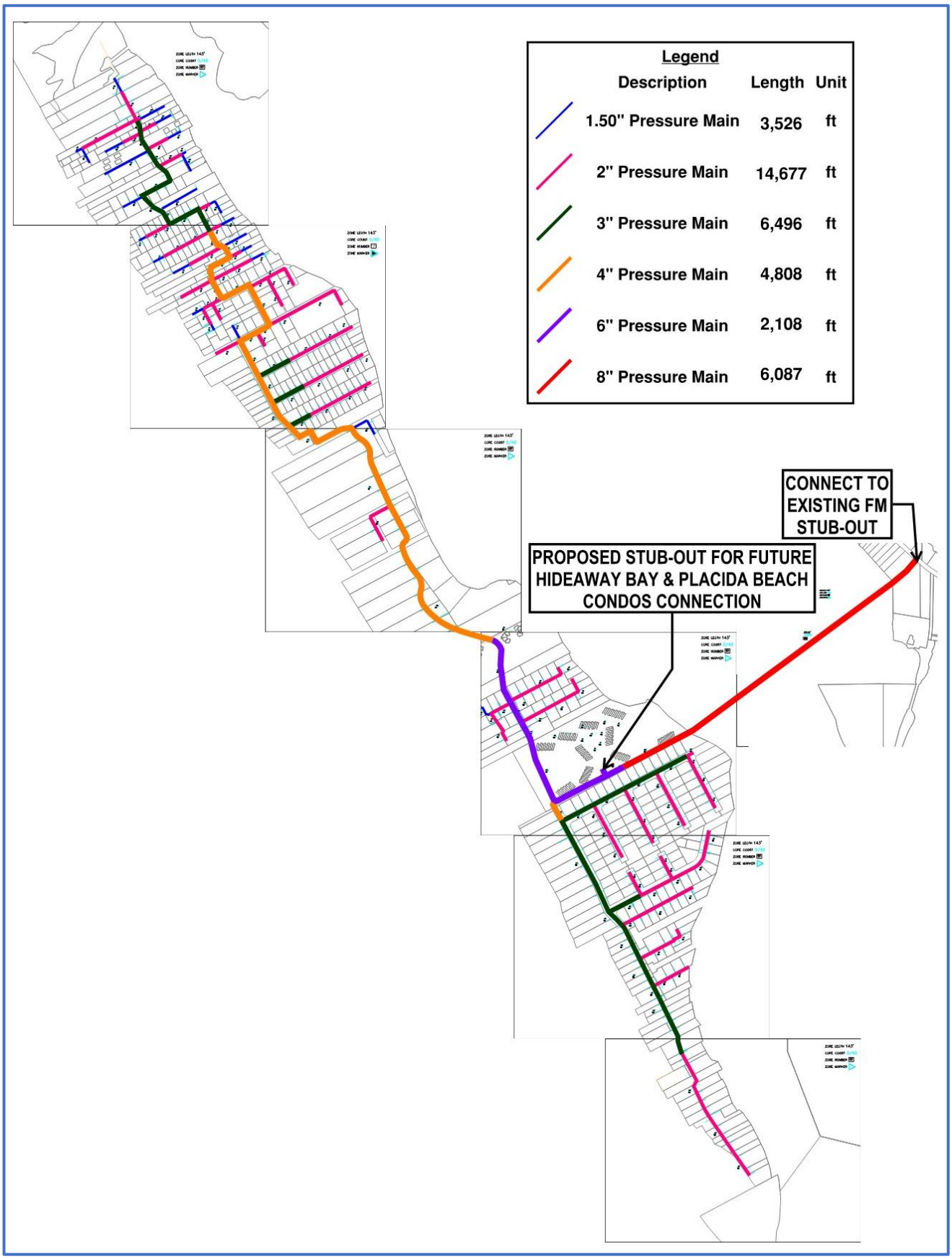
UPDATED CONCEPTUAL LAYOUTS

Using the grinder pump system, the revised transmission mains routing, and excluding the KIU flow, new conceptual layouts were prepared for the proposed service areas. The main sizes were determined from preliminary hydraulic modeling provided by FJ Nugent & Associates, Inc. which are also included in this addendum in Appendix II and III.

Don Pedro / Knight Island



Little Gasparilla Island



UPDATED COST ESTIMATES

The parent report provided cost estimates based on similar local wastewater utility projects. The report was completed in 2021, and the unit costs escalated at a rate of 5% per year. Monetary inflation has indeed been significant in recent years therefore updated layouts and unit costs are warranted.

GWE utilized the bid prices from a recent Charlotte County Utilities (CCU) project, "Ackerman Water Quality Improvements – Zones 3, 4, and LPS" to provide the most current unit pricing for a similar local project. This project is a large-scale septic to sewer project that includes vacuum sewer, low pressure sewer, and water main replacement. Bids were submitted for this project on October 2, 2024, so the unit pricing is current. There were three bidders on the project, and GWE generally used the *average* of the bid prices to prepare a more conservative estimate rather than the *low* bid unit pricing.

For certain cost items that were not adequately addressed by the CCU project bid, GWE supplemented alternate bids from a Martin County project, "Rio East (Jensen Beach) Water & Force Main Extensions), and a Hillsborough County job, "Wimauma Area 1 Phase 1 Offsite FM and Phase 2 Vacuum Station".

The detailed costs for these projects are in Appendix IV.

The updated cost estimates for the Don Pedro / Knight Island and Little Gasparilla Island wastewater systems are provided in Appendix V.

On-Lot Construction Costs

To approximate some of the on-lot costs, recent plumbing contracts from the Charlotte County "Ackerman Vacuum Sewer Zones 1 and 2" septic to sewer project were used to obtain recent pricing for typical on-lot costs.

The average bid prices across plumbing contracts numbers 3-5 were used to prepare a conservative and reasonable estimate. These contract bids were submitted in October 2023, February 2024, and March 2024, so they are considered current local estimates for this type of work.

Some of the on-lot work is planned to be completed under the direction of EU along with the sewer system installation. This work and the associated estimated cost include:

- Pump, crush, and fill existing septic - $1,500/EA
- Installation of grinder pump station - $7,300/EA
- Installation of 1.25" lateral connection from grinder pump station to main – Approx. 75 LF at $14.50/LF = $1,088/EA

Work that is excluded and will be the responsibility of the homeowner includes:

- Installation of the 4" sewer service lateral line from the building
- Electrical connection from panel to grinder pump station

Easement Calculations

There is available right-of-way on Don Pedro / Knight Island to install the proposed mains and no easements are assumed to be necessary.

However, on Little Gasparilla Island, several easements would need to be acquired by EU. The small diameter mains will follow existing sand paths which are currently used for access to the homes and the value easements in areas that are encumbered for access or other utility lines we believe are significantly less than unencumbered raw lands.

Based on *"Easement Valuation"* by Donald Sherwood, SR/WA (see Appendix VI) easement cost can vary significantly depending on the type and location of the easement:

> *"In the case of residential property, most urban properties within platted single family subdivisions are likely encumbered with common utility easements. In most situations, these easements extend along the property boundary and have little effect, if any, on the sale of the home. Thus, the market tells us that the easement has little value, if any. Why? The presence of the easement does not affect the use or utility of the property. The easement does not place any undue burden or hardship on the ownership."*

A 15-foot wide easement is a reasonable width for the installation of a single small diameter line and that easement can be shared with other utilities or access. The locations of the existing easements and rights of ways as well as where easements will be needed are shown in the following exhibit.

L G I EASEMENT SCHEMATIC

Based on that exhibit we estimate the total linear footage of easements needed as follows:

Easement Calculations	
North Area - Easements Required (LF)	10,675
South Area - Easements Required (LF)	2,504
Total LF of Mainline Pipe Requiring Easements	13,179
*15 ft Easement Width (SF)	197,685
Total Acres of Mainline Easements	**4.5**

Estimating easement costs can be challenging and certainly variable. For consistency, we used the same valuation methodology as outlined by Mr. Jadon Hull P.E. in his direct testimony for this case. However, based on the referenced **Easement Valuation by Donald Sherwood SR/WA** (see Appendix VI) a small subsurface utility easement *would have a "nominal effect on use and utility".* The "Easement Valuation Matrix" *percentage of fee ranges from 0% to 10%.*

Accordingly, we used a 5% reduction value which is the mid-range of the valuation range cited because the easements are in areas that are currently encumbered by access or other utilities and or in areas along the perimeter of the properties that do not significantly degrade the value.

With these assumptions a preliminary estimate for easements yields:

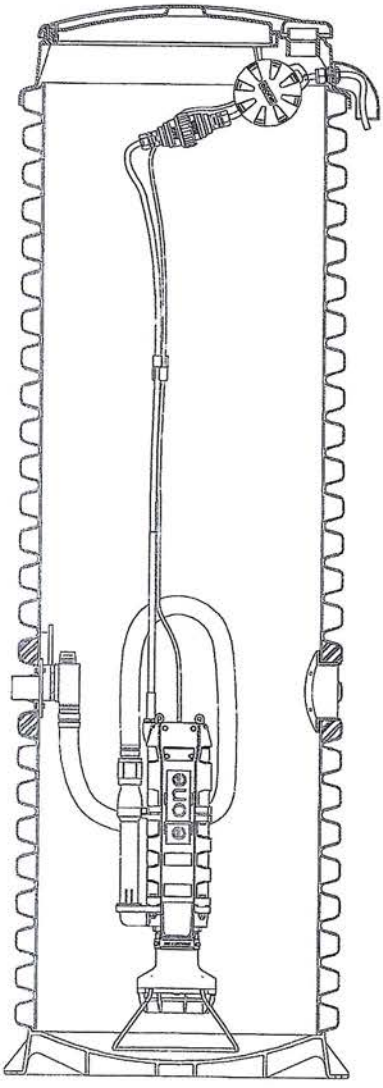
Easement Acquisition Estimate	
Market Value per Acre	$ 495,655.59
Proposed Easement Area (Acres)	4.5
Market Value of Total Easement Area	$ 2,249,395.66
Reduction to Easement Interest	5%
Grand Total for Easement Acquisition	$ 112,470
Grand Total for Budgeting Purposes	**$ 115,000**

We estimate that approximately 200 parcels will require an easement based on the proposed line layout and identification of existing rights-of-way and easements. A sketch and description will need to be prepared for each easement. However, appraisal valuations can be averaged and the cost shared since so many easements are similar. These costs are accounted for in the updated estimate located in Appendix V.

APPENDIX I: E/ONE GRINDER PUMP STATION CUT SHEETS (PROVIDED BY FJ NUGENT)

E/ONE EXTREME SERIES

WH101/WR101



General Features

The model WH101 or WR101 grinder pump station is a complete unit that includes: the grinder pump, check valve, HDPE (high density polyethylene) tank, controls, and alarm panel. A single WH101 or WR101 can accommodate the sewage flow from two, average single-family homes.

- Rated for flows of 700 gpd (2650 lpd)
- 70 gallons (265 liters) of capacity
- Standard outdoor heights range from 60 inches to 159 inches

The WH101 is the "hardwired," or "wired," model where a cable connects the motor controls to the level controls through watertight penetrations.

The WR101 is the "radio frequency identification" (RFID), or "wireless," model that uses wireless technology to communicate between the level controls and the motor controls.

Operational Information

Motor
1 hp, 1,725 rpm, high torque, capacitor start, thermally protected, 120/240V, 60 Hz, 1 phase

Inlet Connections
4" PVC inlet flange for Schedule 40 pipe

Discharge Connections
Pump discharge terminates in 1.25-inch NPT female thread. Can easily be adapted to 1.25-inch PVC pipe or any other material required by local codes.

Discharge
15 gpm at 0 psig (0.95 lps at 0 m)
11 gpm at 40 psig (0.69 lps at 28 m)
7.8 gpm at 80 psig (0.49 lps at 56 m)

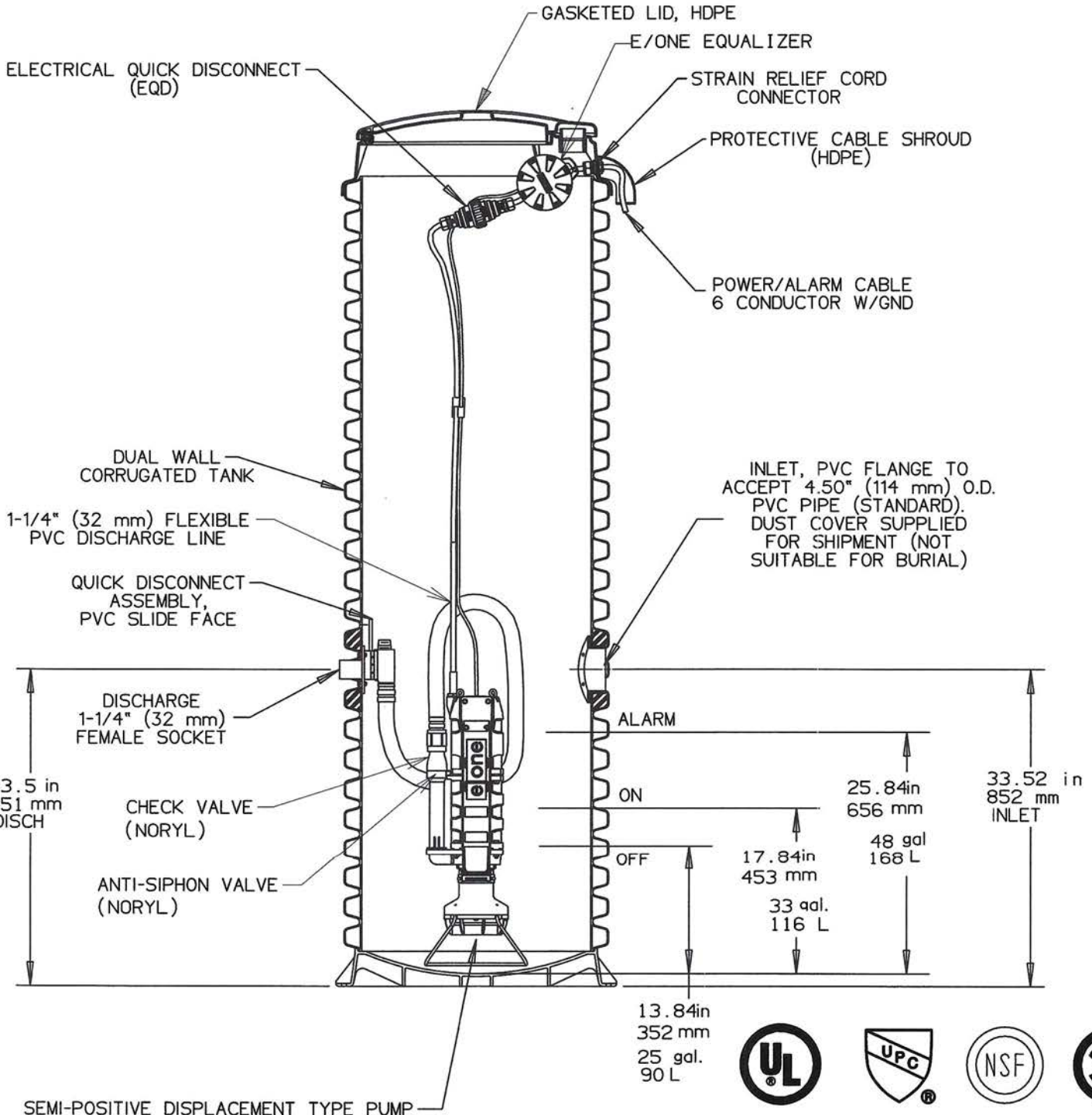
Accessories

E/One requires that the Uni-Lateral, E/One's own stainless steel check valve, be installed between the grinder pump station and the street main for added protection against backflow.

Alarm panels are available with a variety of options, from basic monitoring to advanced notice of service requirements.

The Remote Sentry is ideal for installations where the alarm panel may be hidden from view.

OPTIONS : ☐ WH101 (HARD WIRED LEVEL CONTROLS)
☐ WR101 (WIRELESS LEVEL CONTROLS)



CONCRETE BALLAST MAY BE REQUIRED
SEE INSTALLATION INSTRUCTIONS
FOR DETAILS

NOTE: DIMENSIONS ARE FOR REF ONLY

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e/one SEWER SYSTEMS

MODEL WH101 / WR101
DETAIL SHEET

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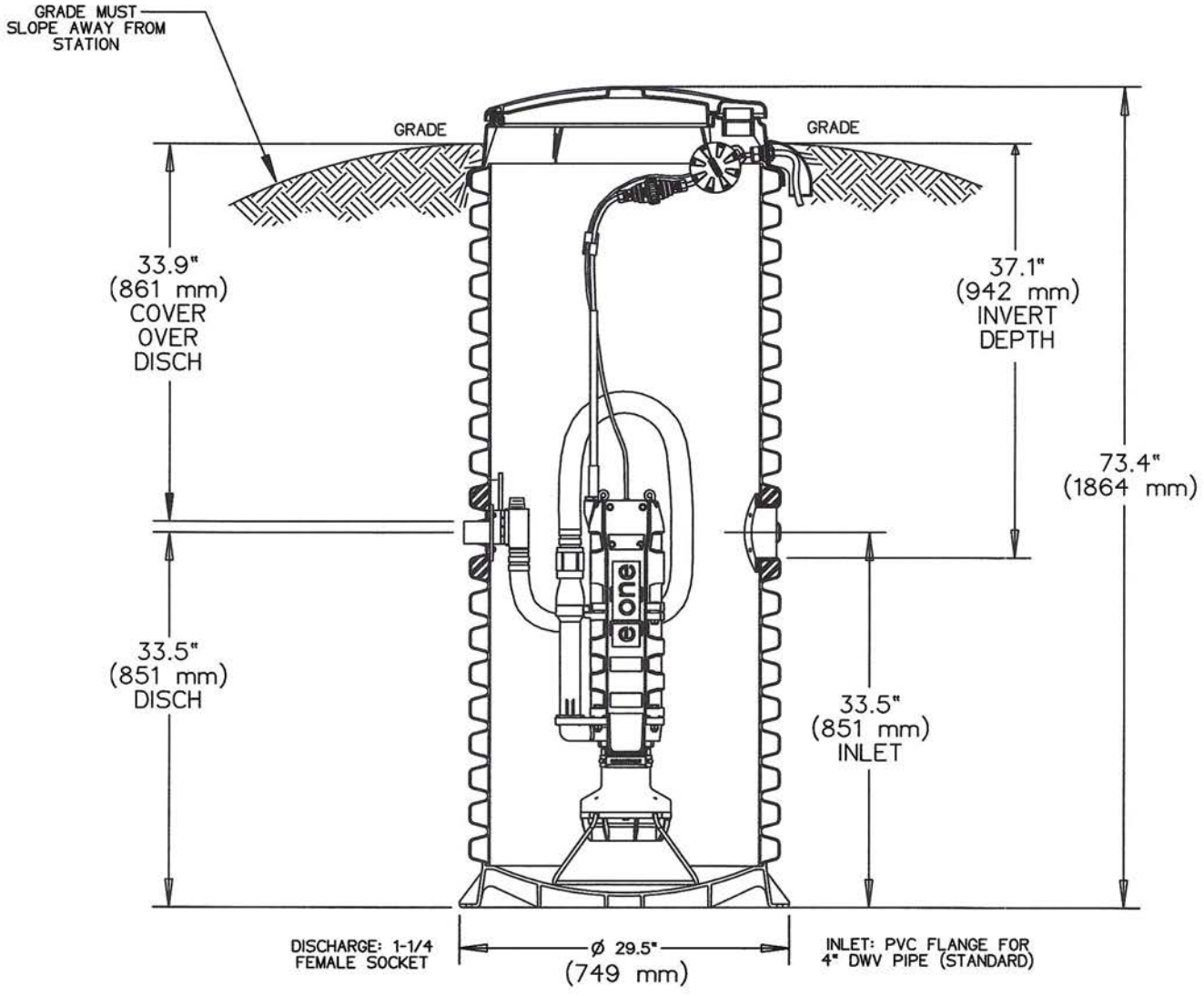
OPTIONS :

☒ **WH101-74** (HARD WIRED LEVEL CONTROLS)

☐ **WR101-74** (WIRELESS LEVEL CONTROLS)



CONCRETE BALLAST MAY BE REQUIRED
SEE INSTALLATION INSTRUCTIONS
FOR DETAILS

NOTE: DIMENSIONS ARE FOR REF ONLY

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SEWER SYSTEMS

MODEL WH101-74 / WR101-74

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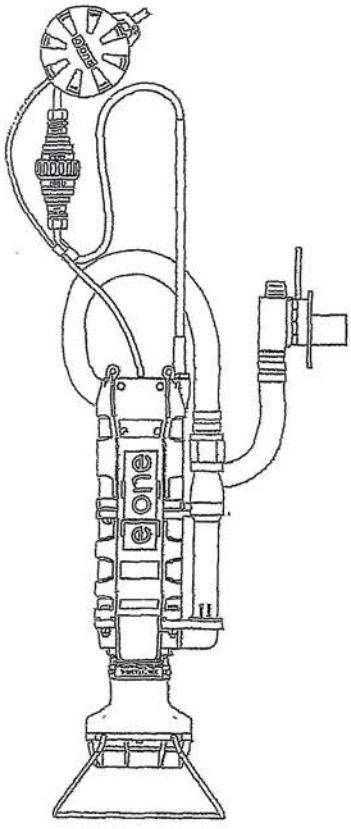
E/ONE EXTREME SERIES

W-Series



General Features

The W-series grinder pump is engineered to fit into virtually any grinder pump wetwell. Universal design allows easy drop-in conversion, ready to connect. The pump is a complete replacement for all of the troublesome components of a centrifugal pump station, including the old unit's slide rails, pump/motor, float switches, piping, and motor control devices.

- Designed not to jam and for minimum wear to the grinding mechanism
- Retrofit simplex or larger stations
- Available with a range of discharge hose lengths to accommodate a wide range of tank depths

The pump comes complete with a self-contained level control system, eliminating troublesome float switches. The internal check valve assembly located on the grinder pump is custom designed for non-clog, trouble-free operation. The pump uses E/One's "hardwired," or "wired," pump model where a cable connects the motor controls to the level controls through watertight penetrations.

Operational Information

Motor
1 hp, 1,725 rpm, high torque, capacitor start, thermally protected, 120/240V, 60 Hz, 1 phase

Discharge Connections
Pump discharge terminates in 1.25-inch female solvent weld fitting; threaded adapter is supplied and discharge can easily be adapted to 1.25-inch NPT.

Discharge
15 gpm at 0 psig (0.95 lps at 0 m)
11 gpm at 40 psig (0.69 lps at 28 m)
7.8 gpm at 80 psig (0.49 lps at 56 m)

Accessories

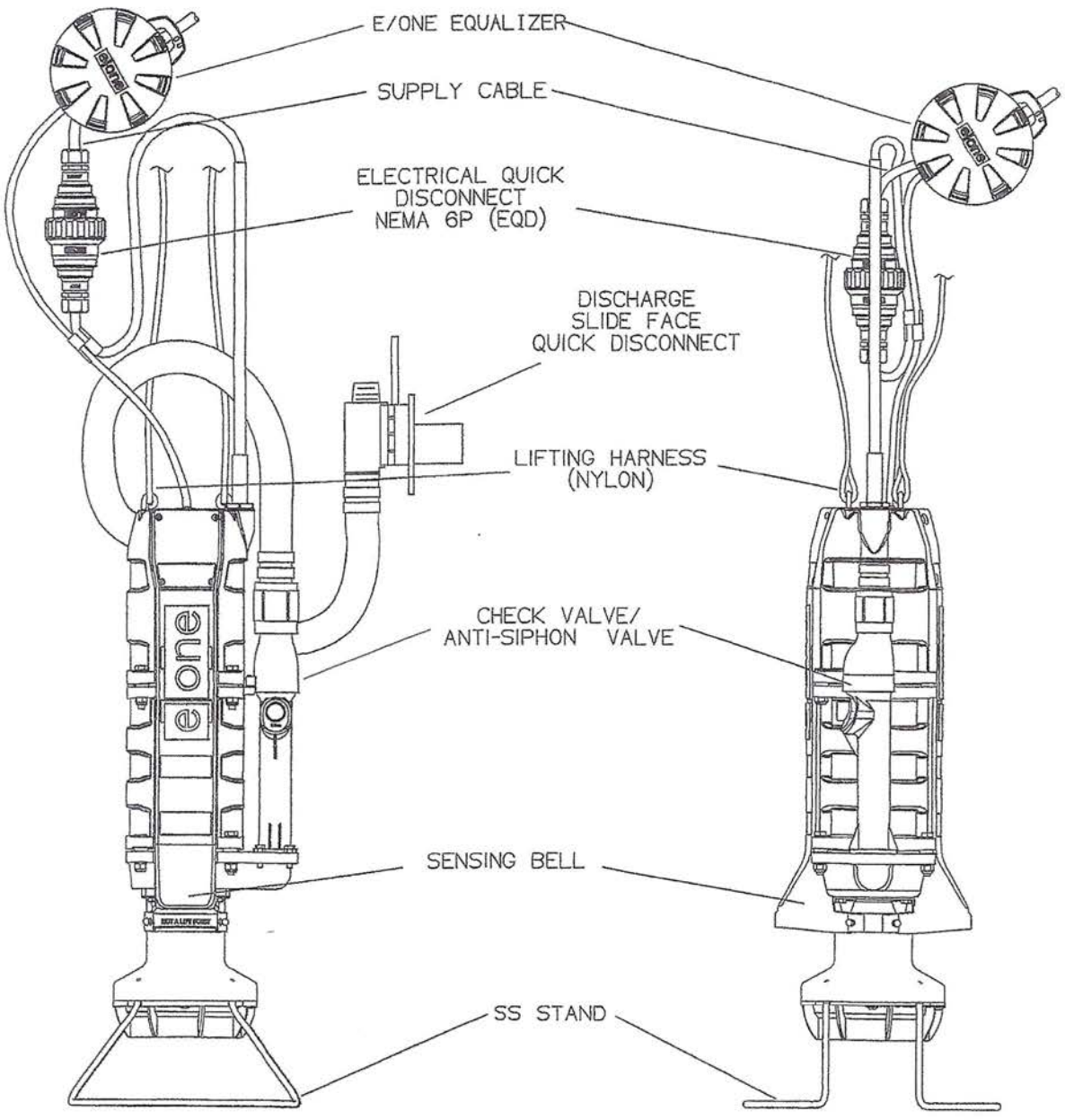
E/One recommends that the Uni-Lateral, E/One's own stainless steel check valve, be installed between the grinder pump station and the street main for added protection against backflow.

Alarm panels are available with a variety of options, from basic monitoring to advanced notice of service requirements.

The Remote Sentry is ideal for installations where the alarm panel may be hidden from view.

Patent Numbers: 5,752,315
5,562,254 5,439,180

NA0055P01 Rev B



W SERIES GRINDER PUMP

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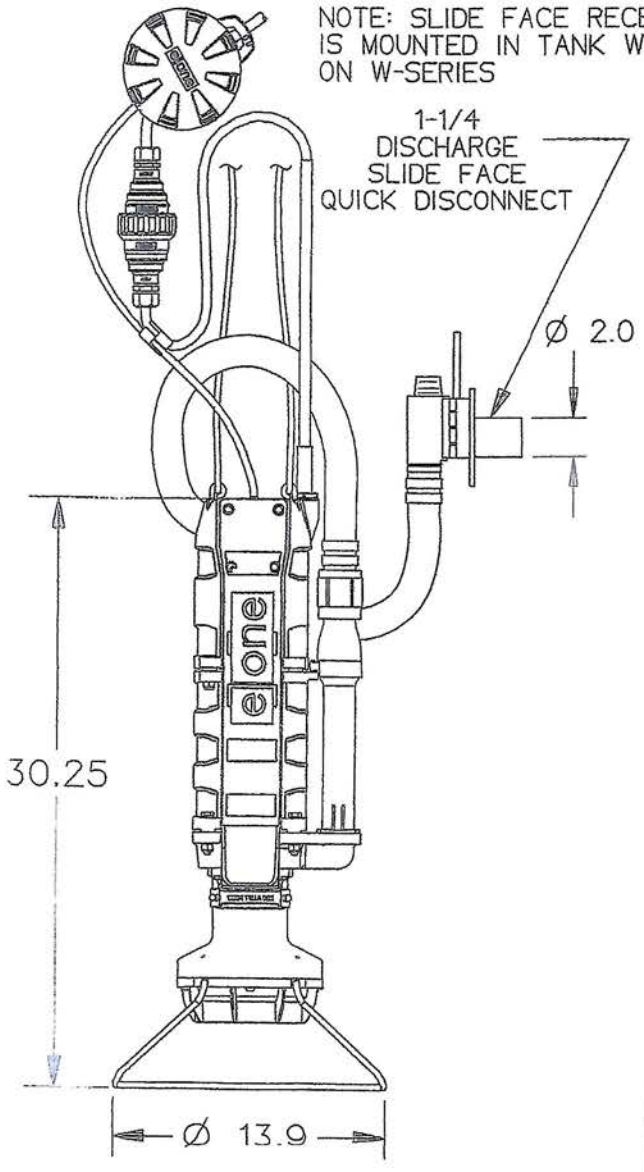
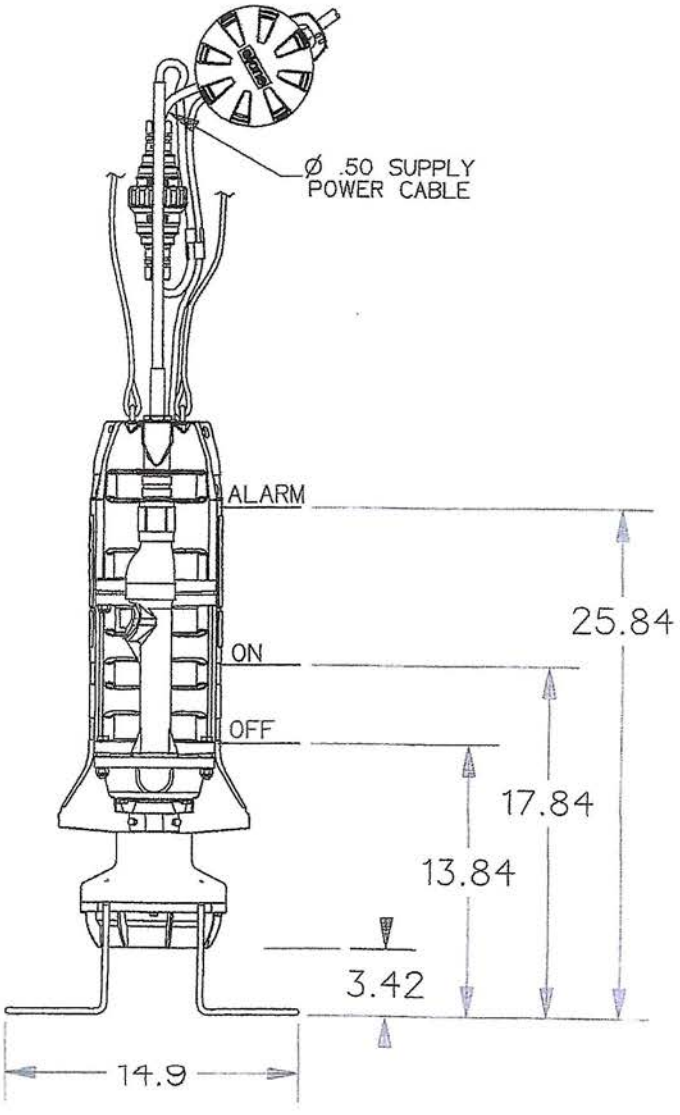
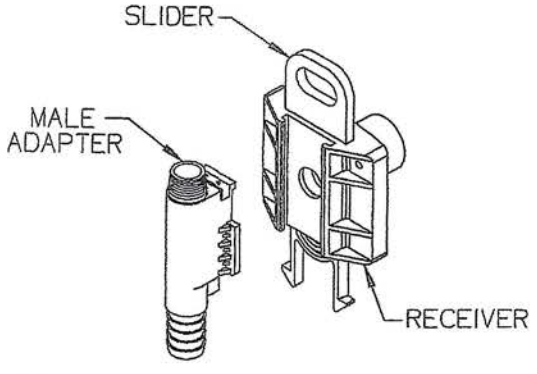
SEWER SYSTEMS

W-SERIES FEATURES

ESD 08-0027







SLIDE FACE DISCHARGE COMPONENTS

W SERIES
GRINDER PUMP

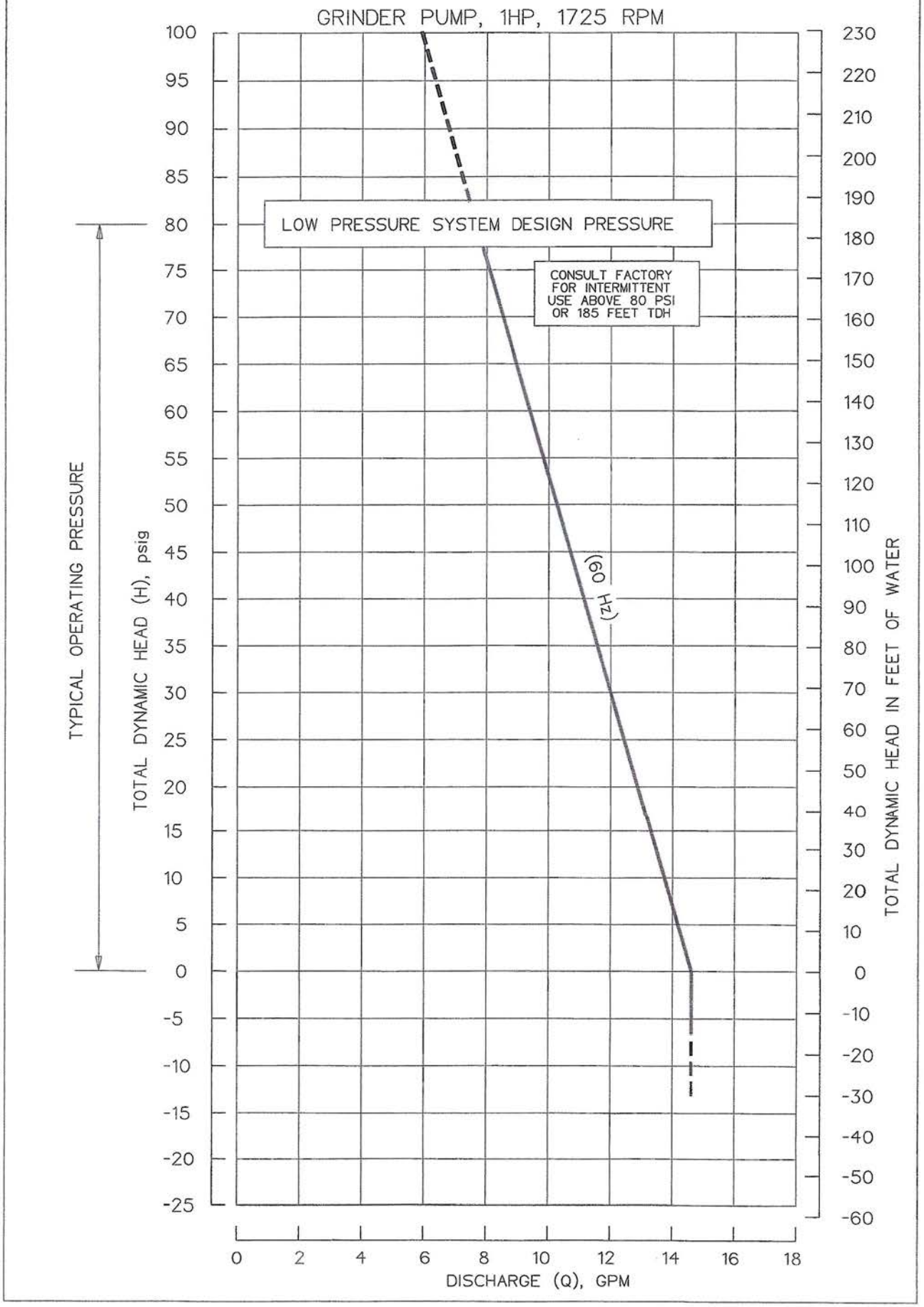
SGS		05/30/18	2	
DR BY	CHK'D	DATE	ISSUE	SCALE

SEWER SYSTEMS

DIMENSION SHEET
W SERIES PUMP

ESD 09-0060

E|ONE SPD PUMP PERFORMANCE CURVE



ESD 08-0022 REV. 2, 6/08

Environment One Electrical Supply Cable

Please be advised that the cable supplied for this project meets the following specification and is the cable that is placed in service on all Environment One grinder pumps:

> ELECTRICAL QUICK DISCONNECT: The grinder pump core shall include a factory-installed NEMA 6P electrical quick disconnect (EQD) for all power and control functions. The EQD will be supplied with 32', 25' of useable electrical supply cable (ESC) to connect to the alarm panel. The EQD shall require no tools for assembly, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable due to the potential for leaks and electrical shorts. Junction boxes are not acceptable due to the large number of potential leak points. The EQD shall be so designed to be conducive to field wiring as required.
>
> The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.
>
> The CONTRACTOR shall mount the alarm device in a conspicuous location, as per national and local codes. The Alarm Panel will be connected to the grinder pump station by a length of 6-conductor TC-type cable as shown on the contract drawings. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32', 25' of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be provided with a FACTORY-INSTALLED EQD half to connect to the mating EQD half on the core.

The NPLF specification if something that CSA in Canada requires. The applicable specification for the USA is NEC, Article 336, Power and Control Tray Cable: Type TC.

E/ONE EXTREME SERIES

E/One Sentry™

Alarm Panel — Basic Package

Description

The E/One Sentry panels are custom designed for use with Environment One grinder pump stations. They can be configured to meet the needs of your application, from basic alarm indication to advanced warning of pending service requirements.

E/One Sentry panels are supplied with audible and visual high level alarms. They are easily installed in accordance with relevant national and local codes. Standard panels are approved by UL, CSA, CE and NSF to ensure high quality and safety.

The panel features a corrosion-proof, NEMA 4X-rated, thermoplastic enclosure. A padlock is provided to prevent unauthorized entry (safety front).

Standard Features

Circuit breakers, 240 or 120 VAC service

Terminal blocks and ground lugs

Audible alarm with manual silence

Manual run feature and run indicator

Redundant "Start" function with high level alarm

Conformal-coated alarm board (both sides)

Alarm board overload protection

Optional Features

Contact group (dry, powered and Remote Sentry)

Inner cover (dead front)

Hour meter

Generator receptacle with auto transfer

GFCI

Main service disconnect

Brownout protection

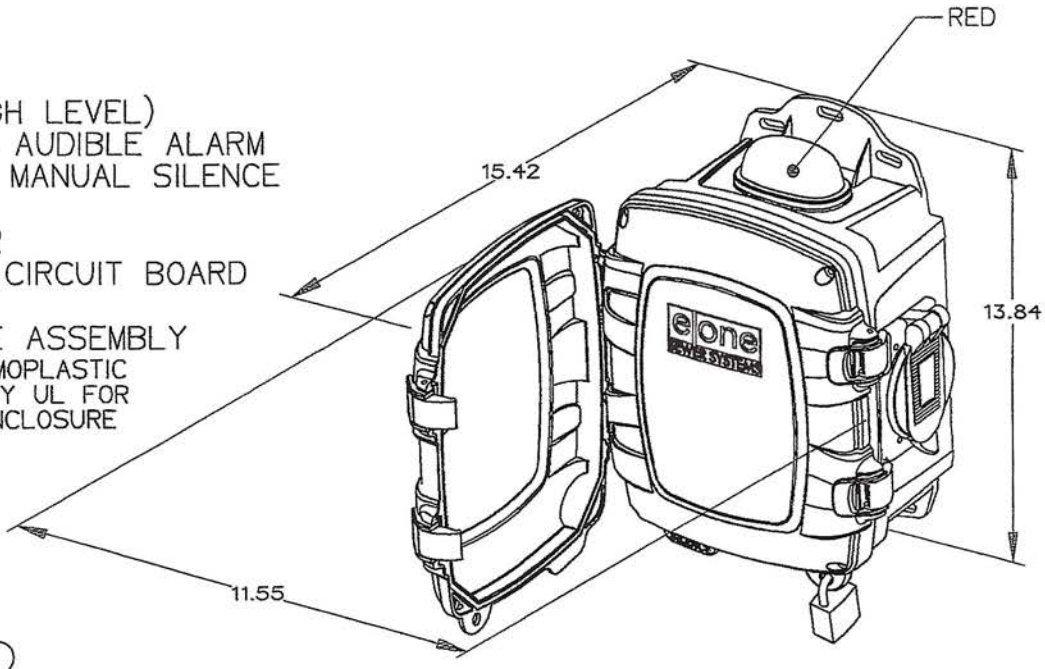
Please consult factory for special applications.

SIMPLEX SENTRY

REDUNDANT RUN (HIGH LEVEL)
EXTERNAL VISUAL & AUDIBLE ALARM
EXTERNAL LATCHING MANUAL SILENCE
MANUAL RUN
PUMP RUN INDICATOR
CONFORMAL COATED CIRCUIT BOARD
PADLOCK
NEMA 4X ENCLOSURE ASSEMBLY
CORROSION PROOF THERMOPLASTIC POLYESTER APPROVED BY UL FOR ELECTRICAL CONTROL ENCLOSURE

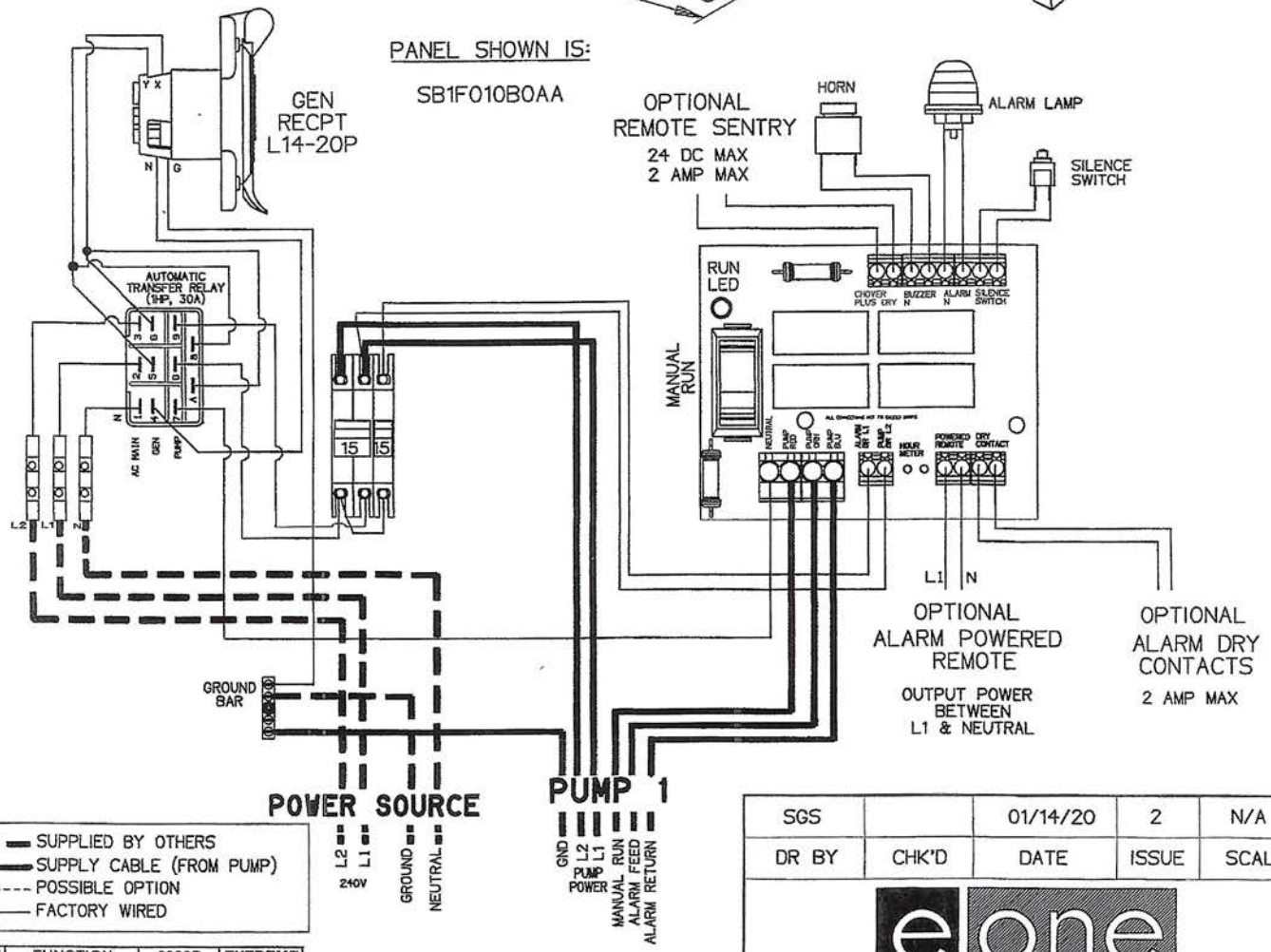
OPTIONS:

- [x] ALARM CONTACTS
- [x] GENERATOR RECPT



PANEL SHOWN IS:

SB1F010B0AA



- SUPPLIED BY OTHERS
- SUPPLY CABLE (FROM PUMP)
- POSSIBLE OPTION
- FACTORY WIRED

PIN	FUNCTION	2000S	EXTREME
1	MANUAL RUN	RED	BROWN
2	L1	BLACK	RED
3	L2	WHITE	BLACK
4	GND	GREEN	GRN/YEL
5	ALARM FEED	ORANGE	YELLOW
6	ALARM RETURN	BLUE	BLUE

CONTROL CABLE:
TYPE TC: DIRECT BURIAL, 12AWG, SIX CONDUCTOR

UPC® ASME A112.3.4

CE

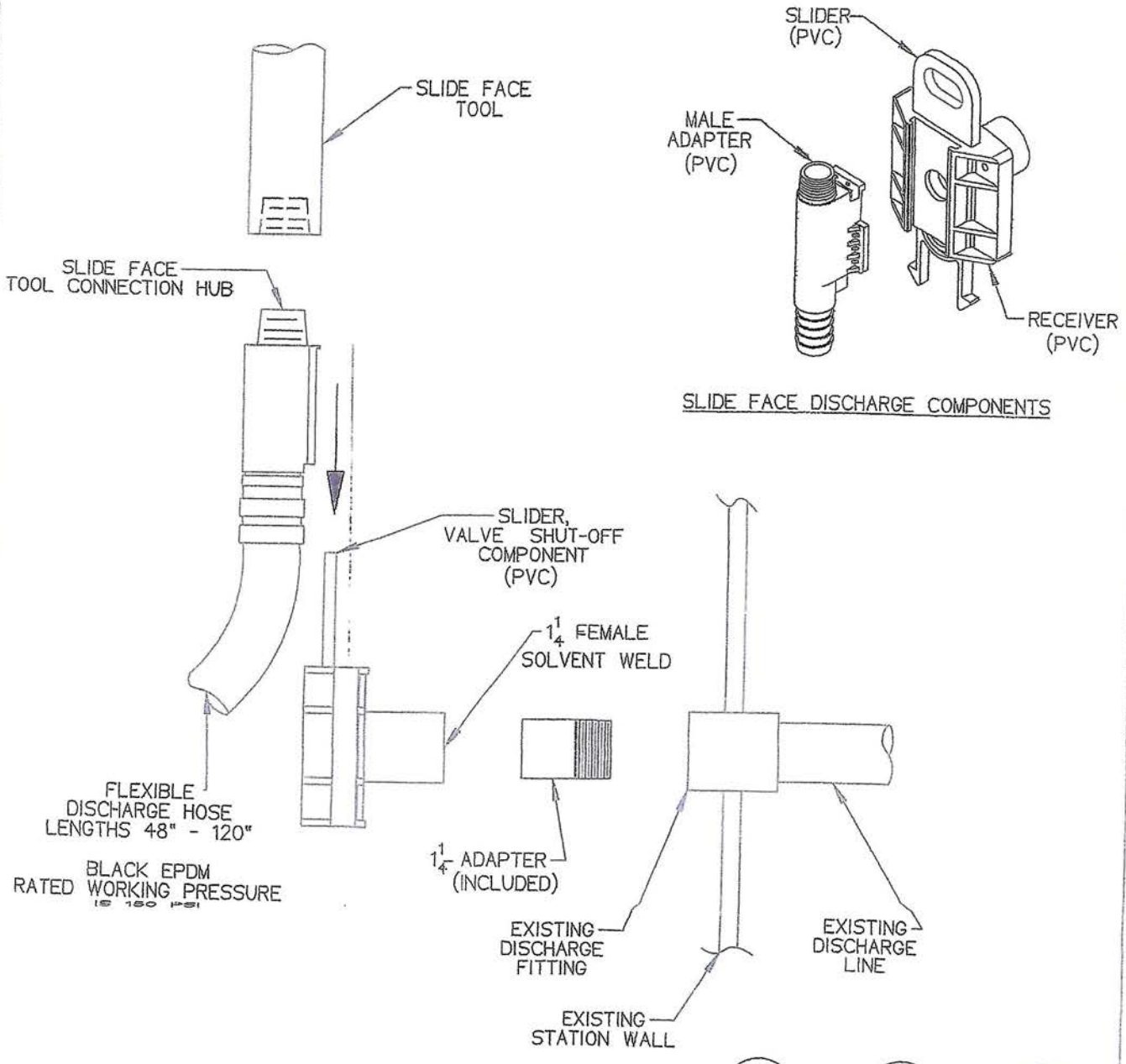
CSA LR28268 UL LISTED 506D NSF

SGS		01/14/20	2	N/A
DR BY	CHK'D	DATE	ISSUE	SCALE

e/one SEWER SYSTEMS

SIMPLEX SENTRY, 240V 60Hz. CONTACTS, GEN RECPT

ESD 14-0062



SLIDE FACE DISCHARGE COMPONENTS

DISCHARGE HOSE AND DISCONNECT/VALVE: All discharge fittings and piping shall be constructed of polypropylene, EPDM or PVC. The discharge hose assembly shall include a shut-off valve rated for 200 psi WOG and a quick disconnect feature to simplify installation and pump removal. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

SLIDE FACE ASSEMBLY

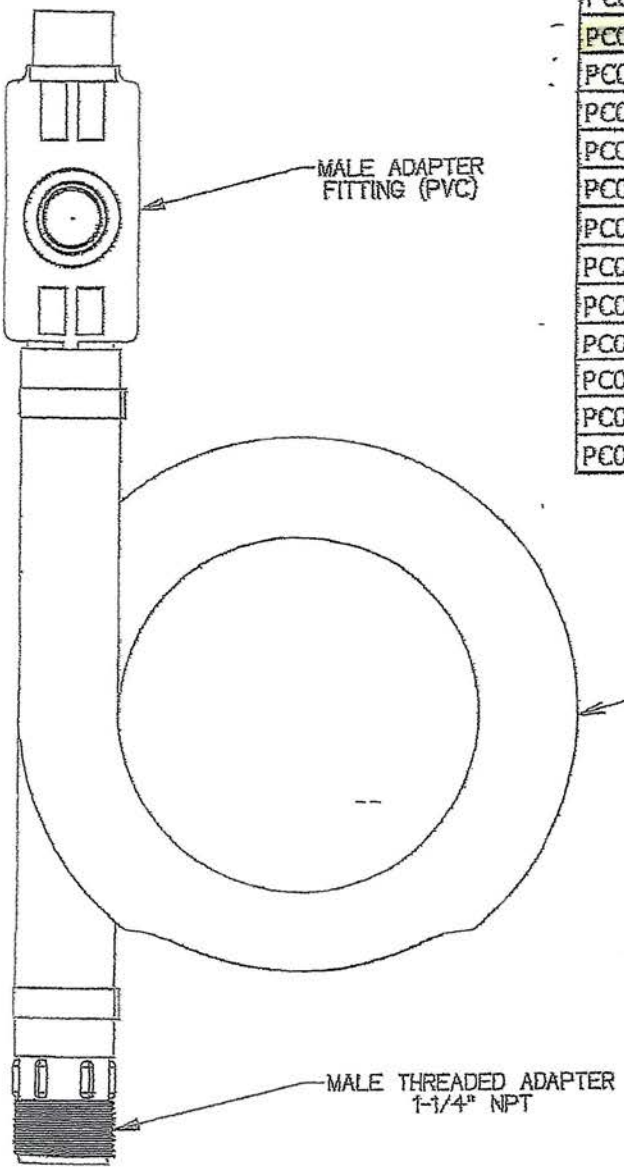
SGS		08/09/12	3	1/16
DR BY	CHK'D	DATE	ISSUE	SCALE

SEWER SYSTEMS

SLIDEFACE DISCHARGE DETAIL

ESD 09-0136

PC0542G01	HOSE FLEX DISCH KIT,48" (1093)
PC0542G02	HOSE FLEX DISCH KIT,60" (1094)
PC0542G03	HOSE FLEX DISCH KIT,72" (1095)
PC0542G04	HOSE FLEX DISCH KIT,84" (1096)
PC0542G05	HOSE FLEX DISCH KIT,96" (1097)
PC0542G06	HOSE FLEX DISCH KIT,108",AMGP
PC0542G07	HOSE FLEX DISCH KIT,120",AMGP
PC0542G08	HOSE FLEX DISCH KIT,132"
PC0542G09	HOSE FLEX DISCH KIT,144"
PC0542G12	HOSE FLEX DISCH KIT,156"
PC0542G13	HOSE FLEX DISCH KIT,168"
PC0542G14	HOSE FLEX DISCH KIT,180"
PC0542G15	HOSE FLEX DISCH KIT,192"
PC0542G16	HOSE FLEX DISCH KIT,204"



SGS		10/05/21	1	1/16
DR BY	CHK'D	DATE	ISSUE	SCALE

SEWER SYSTEMS

FLEX HOSE, W/MALE ADPTR

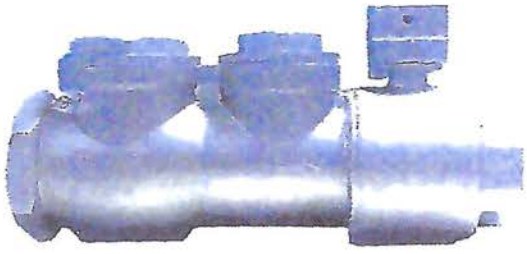
ESD 21-0075

UNI-LATERAL

Stainless Steel Lateral Valve

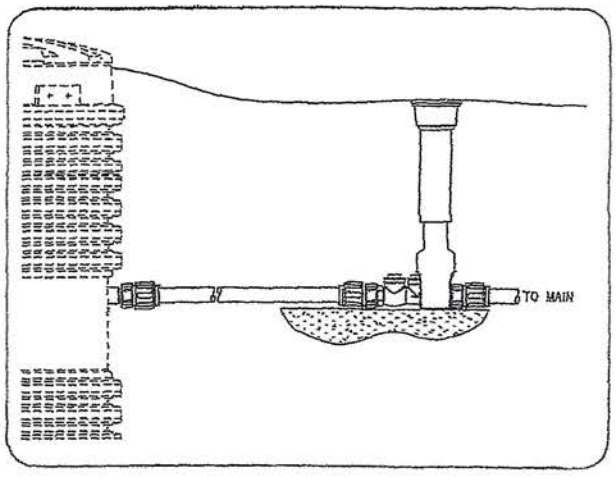
Introducing the UNI-LATERAL from E/One, all-stainless steel lateral valves for use with E/One grinder pump stations. Easily installed and accessed between the sewer main and sewer service line, UNI-LATERAL's advanced design effectively protects against potentially harmful backflow.

Available in 1.25-inch and 2-inch sizes, the UNI-LATERAL is an integrated unit consisting of a check valve, ball valve and cleanout all in a compact module — a first for the domestic market. The versatile design greatly reduces opportunity for leak paths — simplifying and speeding installation, while meeting all codes and regulations.



Features and Benefits

- 1-1/4" or 2" full-port design
- Designed for use with PVC (1-1/4" UNI-LATERAL only) and HDPE pressure sewer piping
- 316 stainless steel construction
- Integrated stainless steel ball valve curb stop and check valve
- Prevents backflow from the sewer main and into the grinder pump station
- Available with or without fittings
- 1-1/4" or 2" Female NPT each end
- All valve assemblies designed and tested to 235 psi service pressure

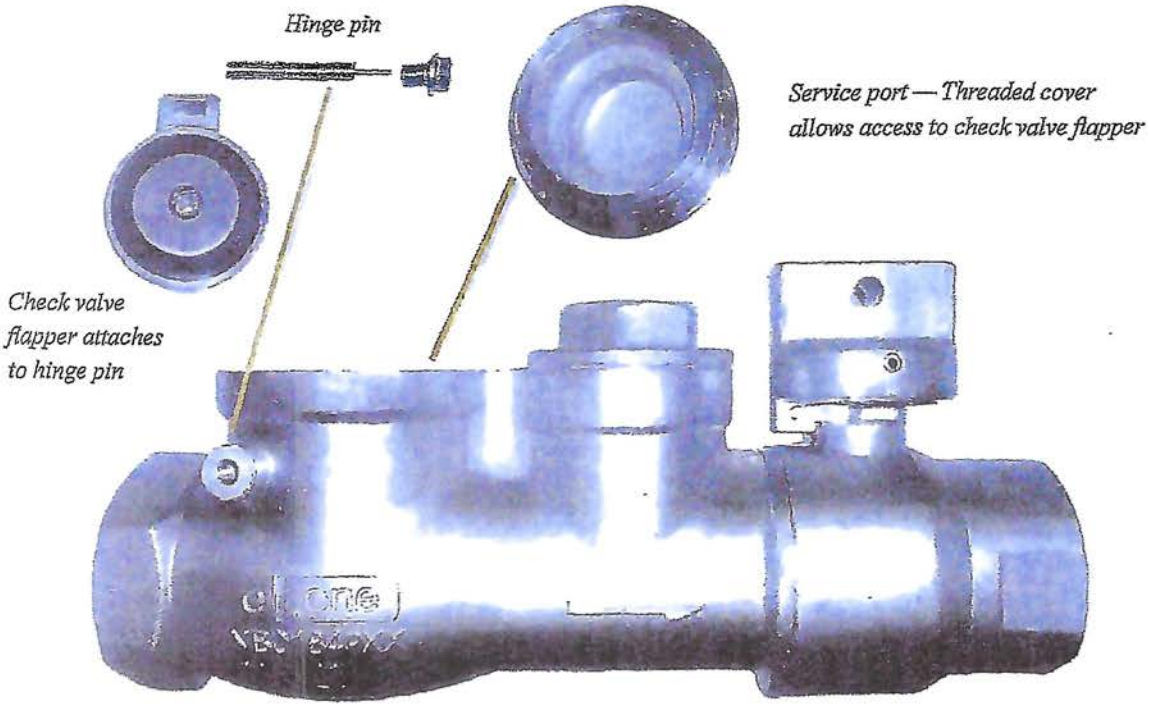


The UNI-LATERAL is a one-piece valve that can be installed between any grinder pump and the sewer main.

Prevent backflow from the sewer system with E/One's UNI-LATERAL

e|one
SEWER SYSTEMS

Uni-Lateral — Stainless Steel Lateral



Approximate length: 8.6 inches
Approximate height (lowest point to highest point): 4 inches

DESCRIPTION
The new Uni-Lateral allows for cleanout and replacement of the check valve flapper.

APPLICATION
Uni-Lateral can be installed between any residential grinder pump station and the street main.

AVAILABLE ADAPTER FITTINGS
Several types of fittings are available:

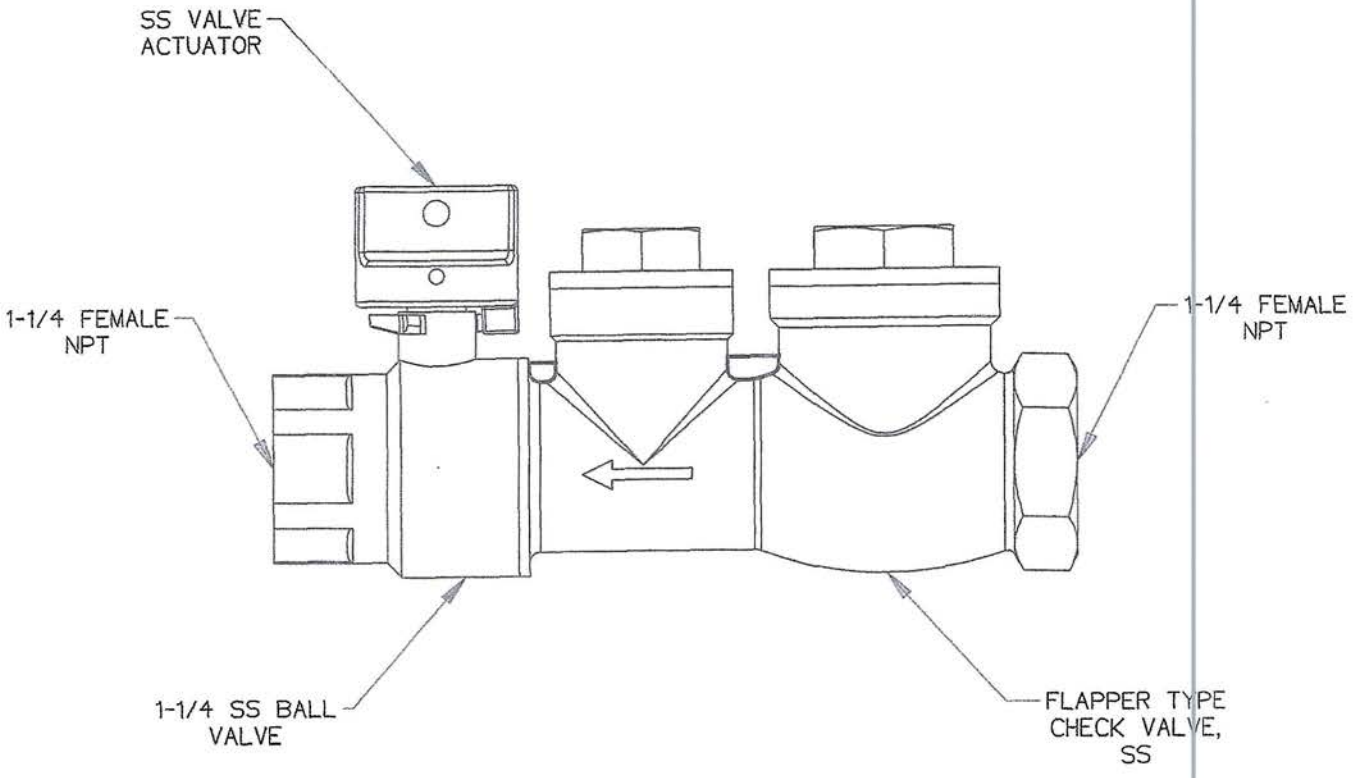
- 1-1/4" compression type fittings for HDPE, SDR PIPE PER ASTM 3035 (SDR11, SDR 9, SDR7)
  PVC, SCHED 40, SDR21 & SDR26

- 1-1/2" compression type fittings for HDPE, SDR PIPE PER ASTM 3035 (SDR11, SDR 9, SDR7)
  PVC, SCHED 40, SDR21 & SDR26

- 1-1/4" solvent weld (glue) type fittings for PVC, SCHED 40, SDR21 & SDR26

e|one SEWER SYSTEMS
Environment One Corporation
2773 Balltown Road, Niskayuna, New York 12309
Voice 518.346.6161 Fax 518.346.6188
www.eone.com A Precision Castparts Company

STAINLESS STEEL LATERAL ASSEMBLY NO FITTINGS



PART IS A BALL VALVE CURB STOP WITH FEMALE PIPE THREADS, VALVE POSITION STOPS (OPEN/CLOSED), AND INTEGRAL CHECK VALVE
MATERIAL: STAINLESS STEEL

PRESSURE RATING: 235 PSI

TO ORDER SS LATERAL, NO FITTINGS
USE PART NUMBER NB0184P01

NOTES:

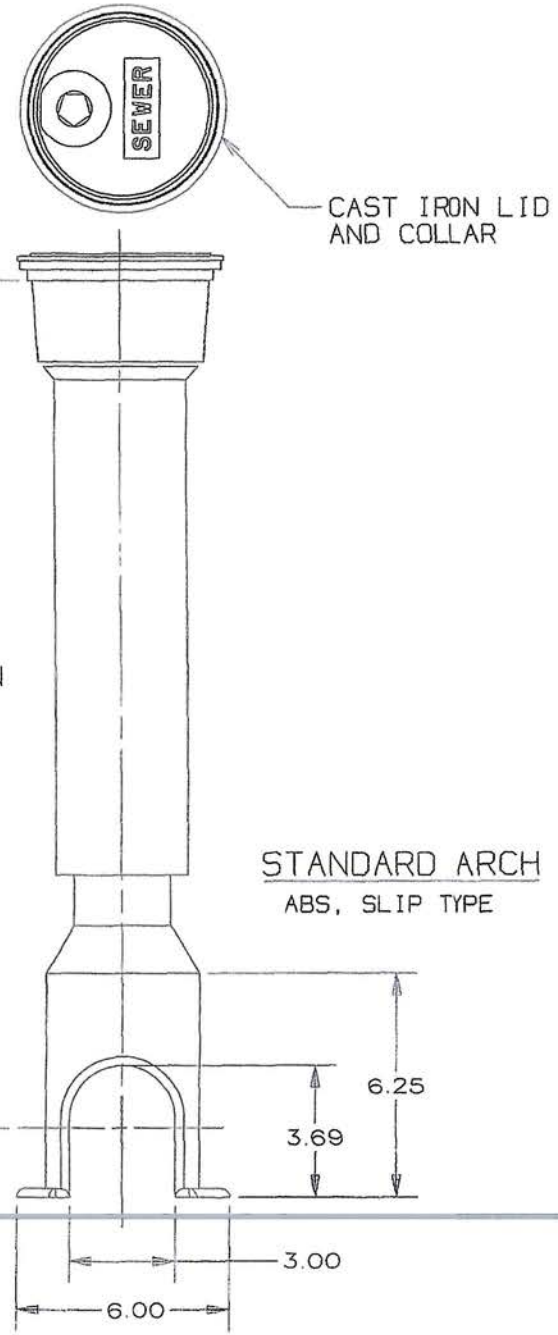
1. FOR SS FITTING INTO SS THREAD, USE PIPE DOPE OR TEFLON TAPE, NOT BOTH
2. FOR PLASTIC FITTINGS INTO SS THREAD, USE BOTH PIPE DOPE AND 2 LAYERS OF TEFLON TAPE

SGS	DN	09/20/11	A	3/16
DR BY	CHK'D	DATE	ISSUE	SCALE

eone
SEWER SYSTEMS

STAINLESS STEEL LATERAL ASSEMBLY
NO FITTINGS

NA0330P05

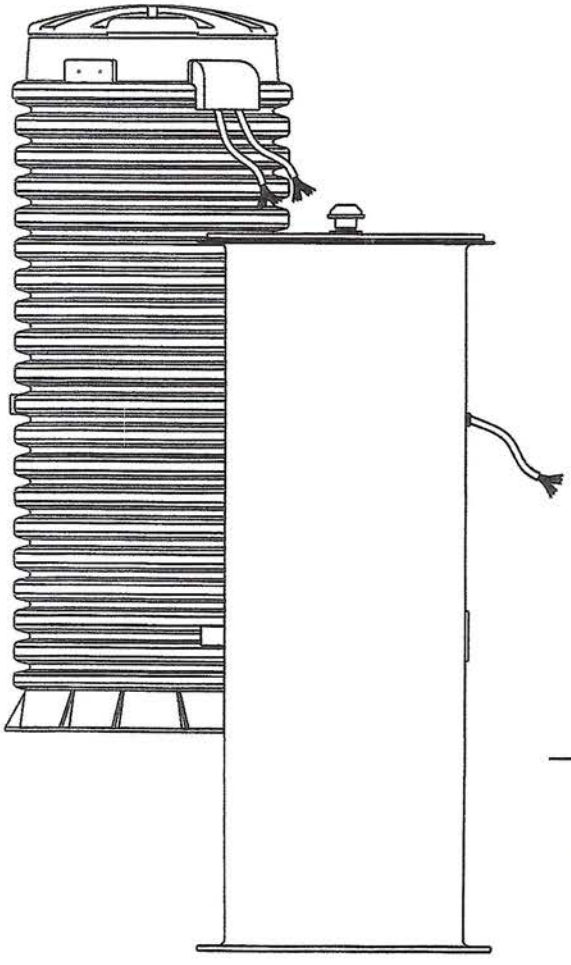


STANDARD ARCH SLIP TYPE

ITEM NO.	EXTENSION RANGE
1	18" - 30"
2	30" - 42"
3	36" - 54"
4	42" - 66"
5	48" - 78"
6	60" - 102"

DR BY: S SALVI	environment one CORPORATION	
SCALE		
ENG		
PROJ ENG		
	3" CURB BOX, SLIP TYPE	
SCALE: 1/4		
WT	FIRST MADE FOR -	
APPD	ESD 15-0005	-
ISSUED		
CODE IDENT	DRAWING NUMBER SH 1 OF 1	REV

E/ONE EXTREME SERIES



W-SERIES TYPICAL INSTALLATION INSTRUCTIONS & WARRANTY INFORMATION

SIMPLEX, DUPLEX, TRIPLEX & QUADPLEX STATIONS

Environment One Grinder Pump Feature Identification

1. Grinder Pump Basin – High density polyethylene (HDPE)

2. Accessway Cover – Station lid with integral vent (non-traffic rated)

3. Electrical Quick Disconnect (EQD) – Electrical lead from pump core terminates here (NEMA 6P).

4. Power and Alarm Lead – Circuits to be installed in accordance with local codes.

5. Alarm Panel – Rainproof (NEMA 4X) enclosure. Equipped with circuit breakers. Locate according to local codes.

6. Alarm Device – Every installation is to have an alarm device to alert the homeowner of a potential malfunction. Visual devices should be placed in conspicuous locations.

7. Inlet – Standard configuration 4-inch PVC socket (4.5 inches ID). For solvent cementing DWV pipe.

8. Settling Loop – Coil wire to protect against soil settling.

9. Gravity Service Line – Standard configuration 4-inch DWV (4.5 inches OD). Supplied by others.

10. Discharge Outlet – Standard configuration 1 ¼-inch solvent weld

11. Discharge Line – 1 ¼-inch nominal pipe size. Supplied by others.

12. Concrete Anchor – See Charts 1 and 2 for correct ballast weight. Supplied by others.

13. Bedding Material – 6-inch minimum depth, rounded aggregate (gravel). Supplied by others.

14. Finished Grade – Grade line should be below the cover and slope away from the accessway.

15. Conduit – 1 ¼-inch PVC to burial depth required by local code. Supplied by others.

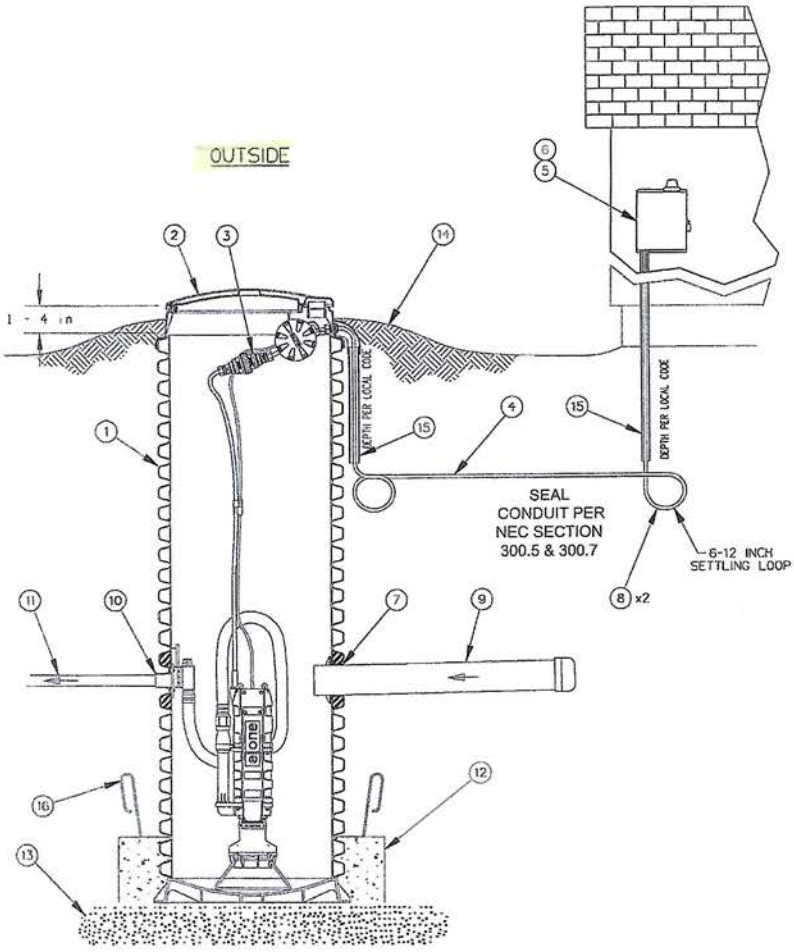
16. Rebar – Required to lift tank after pre-cast ballast has been attached (4 places, evenly spaced around tank). Supplied by others.

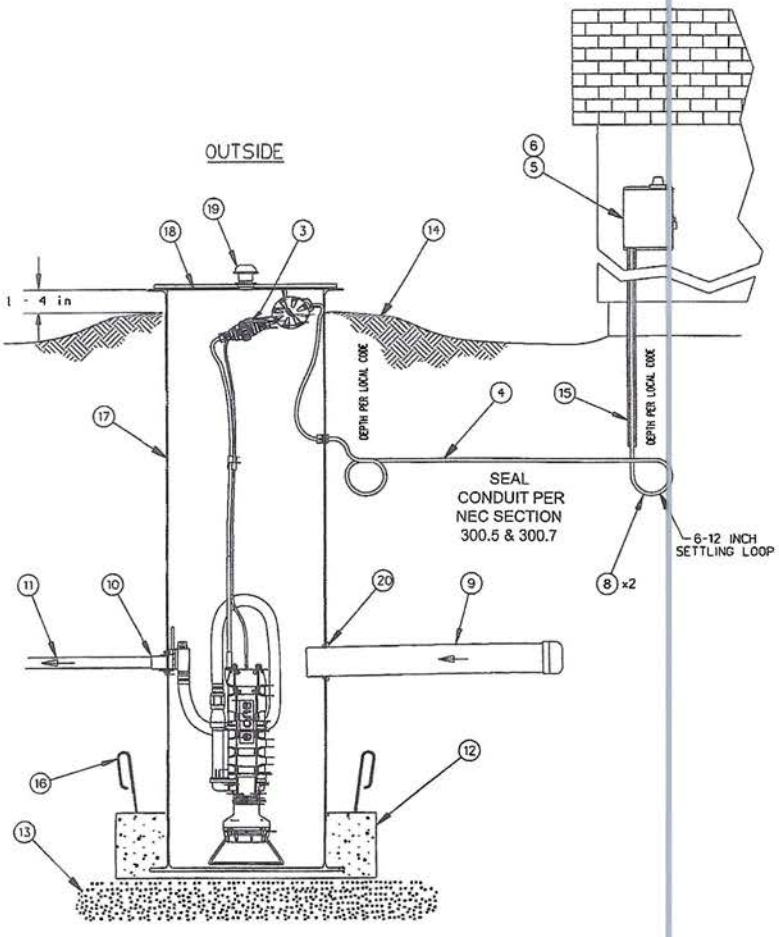
17. Grinder Pump Basin – Fiberglass

18. Station Lid – Fiberglass (non-traffic rated)

19. Station Vent – Mushroom vent

20. Inlet – Standard configuration EPDM grommet (4.5" ID). For 4.5" OD DWV pipe.





FAILURE TO COMPLY WITH INSTALLATION INSTRUCTIONS WILL VOID WARRANTY

Figure 1

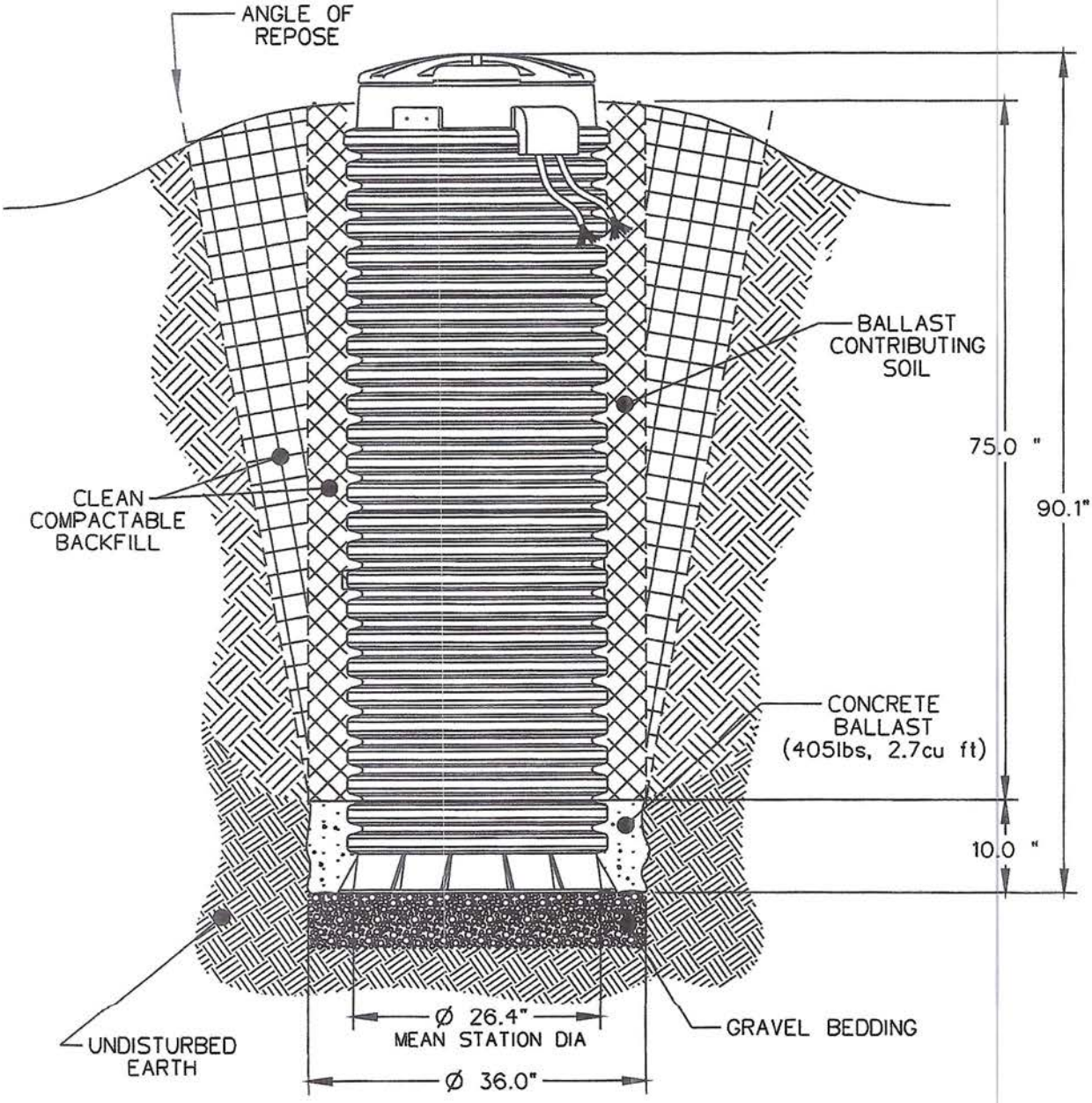
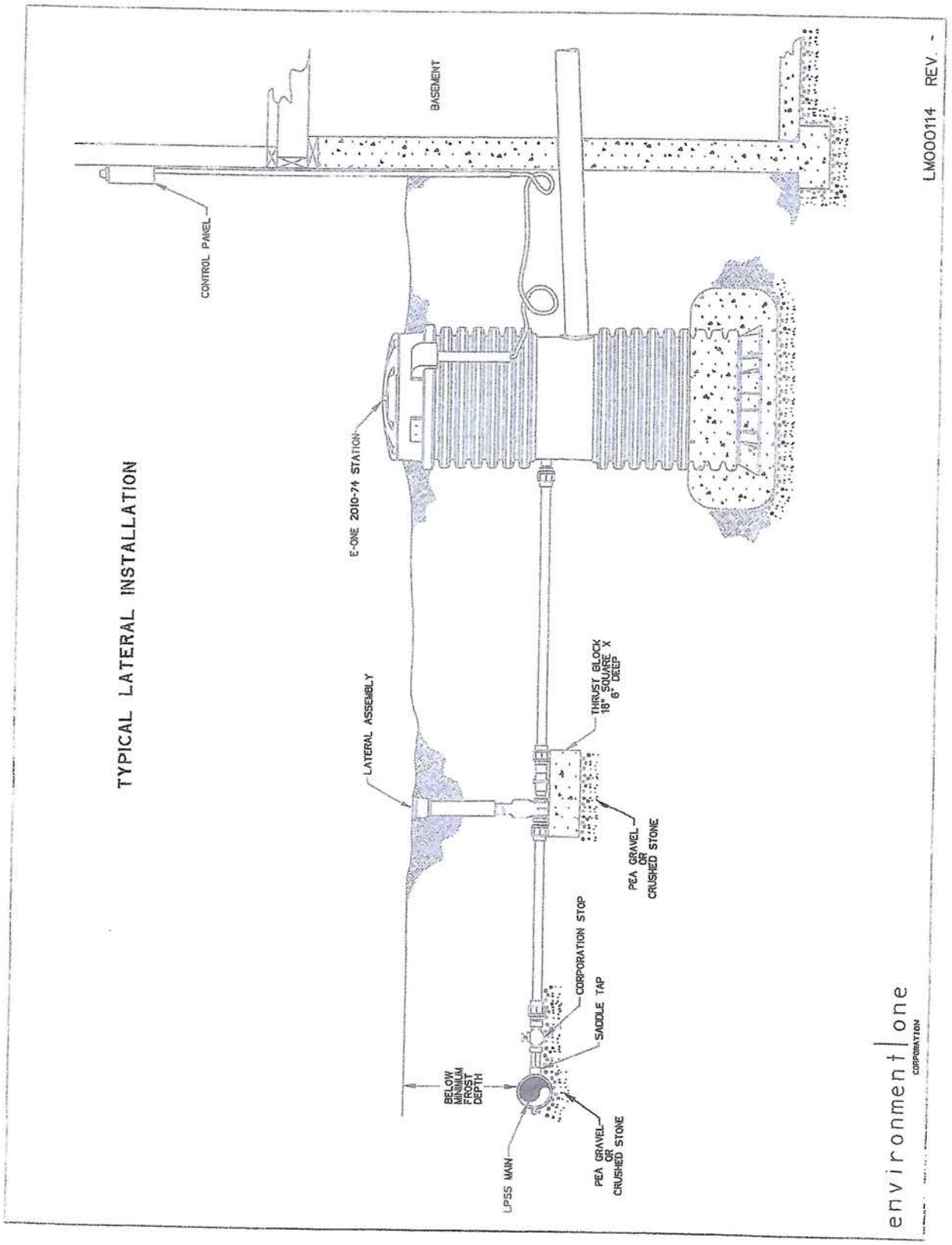


Chart 1

MODEL	MATERIAL	STATION HEIGHT (inches)	STATION WEIGHT (pounds)	STATION VOLUME (cubic feet)	NET BUOYANT FORCE (pounds)	NET BALLAST FORCE (pounds)	CONCRETE VOLUME (cubic feet)	CONCRETE WEIGHT (pounds)
WH101-60	HDPE	60.8	238	19.27	964.45	1108.72	2.7	405
WH101-74	HDPE	73.4	254	23.26	1197.42	1348.82	2.7	405
WH101-92	HDPE	90.1	270	28.53	1510.27	1667.15	2.7	405
WH101-124	HDPE	130.3	280	41.27	2295.25	2433.82	2.7	405
WH101-159	HDPE	158.6	307	50.24	2827.98	2974.22	2.7	405


TYPICAL LATERAL INSTALLATION
CONTROL PANEL
BASEMENT
E-ONE 2010-74 STATION
LATERAL ASSEMBLY
THRUST BLOCK
18" SQUARE X
6" DEEP
PEA GRAVEL
OR
CRUSHED STONE
CORPORATION STOP
SADDLE TAP
BELOW
MINIMUM
FROST
DEPTH
LPSS MAIN
PEA GRAVEL
OR
CRUSHED STONE
LM000114 REV. -
environment one
CORPORATION

User Instructions for the Environment One Grinder Pump

General Information

Your home is served by a low pressure sewer system; the key element is an Environment One grinder pump. The tank collects all solid materials and wastewater from the house. The solid materials are then ground to a small size suitable for pumping as a slurry with the wastewater. The grinder pump generates sufficient pressure to pump this slurry from your home to the wastewater treatment receiving line and/or disposal plant.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) this device may not cause harmful interference; and 2) this device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Care and Use of your Grinder Pump

The Environment One grinder pump is capable of accepting and pumping a wide range of materials, and an extensive grind test is required in order to obtain NSF approval. However, regulatory agencies advise that the following items should not be introduced into any sewer, either directly or through a kitchen waste disposal unit:

Glass	Seafood shells	Diapers, socks, rags or cloth	Syringes
Cotton swabs	Personal/cleaning wipes & sponges	Disposable toothbrushes	Latex/vinyl items
Metal	Plastic objects (toys, utensils, etc.)	Kitty litter	Dental floss
Aquarium gravel	Sanitary napkins or tampons	Cigarette butts	

Caution: Kitchen garbage disposals do not keep grease/oil out of the plumbing system

In addition, you must **never** introduce into any sewer:

Explosives	Strong chemicals	Lubricating oil and/or grease
Flammable material	Gasoline	

Items introduced into the sewer system from your home can potentially impact the water environment. Proper disposal of household wastes such as window cleaners, unused/expired pharmaceuticals, paint thinners, fats, fruit labels, etc. is important. For more information, visit http://www.wef.org.

Periods of Disuse

If your home or building is left unoccupied for longer than a couple of weeks, perform the following procedure:

Purge the System. Run clean water into the unit until the pump activates. Immediately turn off the water and allow the grinder pump to run until it shuts off automatically.

Duplex Units. Special attention must be taken to ensure that both pumps turn on when clean water is added to the tank.

Caution: Do not disconnect power to the unit

Power Failure

Your grinder pump cannot dispose of wastewater without electrical power. If electrical power service is interrupted, keep water usage to a minimum.

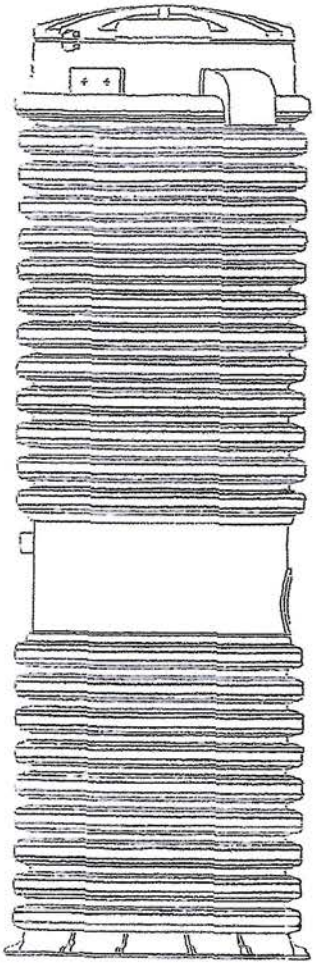
Pump Failure Alarm

Your Environment One grinder pump has been manufactured to produce an alarm signal (120 volt) in the event of a high water level in the basin. The installer must see that the alarm signal provided is connected to an audible and/or visual alarm in such a manner as to provide adequate warning to the user that service is required. During the interim prior to the arrival of an authorized service technician, water usage must be limited to the reserve capacity of the tank.

For service, please call your local distributor:

FJ Nugent & Associates, Inc.
269 Hunt Park Cove
Longwood, Florida 32750
Toll Free E/One Service Link Phone Number
(877) 782-3063

E/One Sewers ™



Limited Warranty

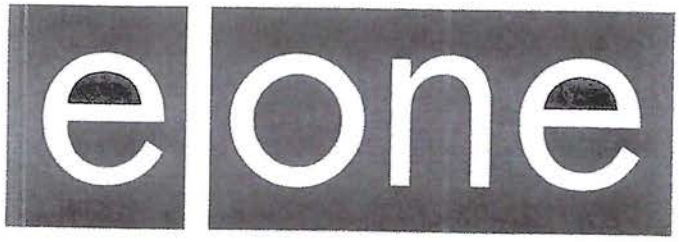
D Series, W Series, U Series

Environment One Corporation offers a limited warranty that guarantees its product to be free from defects in material and factory workmanship for a period of 3 years from the date of installation or 39 months from the date of shipment, whichever occurs first, provided the product is properly installed, serviced and operated under normal conditions and according to manufacturer's instructions. Repair or parts replacement required as a result of such defect will be made free of charge during this period upon return of the defective parts or equipment to the manufacturer or its nearest authorized service center.

Homeowner(s) Name/Address:

Core Serial Number(s):

e|one
2773 Balltown Rd•Niskayuna NY USA 12309
(01) 518.346.6161•www.eone.com



A Precision Castparts Company

Environment One Corporation
2773 Balltown Road
Niskayuna, New York 12309–1090

Voice: (01) 518.346.6161
Fax: 518.346.6188

www.eone.com

NA0063P01 Rev K
10/19

APPENDIX II: DON PEDRO/KNIGHT ISLAND PIPE SIZING ANALYSIS (PROVIDED BY FJ NUGENT)

IME Civil & Surveying
Preliminary Pipe Sizing Analysis

Brandon Shugart

Knight Island to Ferry

FJ Nugent

C Factor:

120

Select Pipe Type:

SDR 11 PE Pipe (US)

Enter GPD / Dwelling:

300

Select Power Requirements:

240 Volt 60 Hz

PRELIMINARY PRESSURE SEWER -- PIPE SIZING AND BRANCH ANALYSIS
IME CIVIL SURVEYING
1870 County Road 214, St. Augustine, FL 32084
904-429-7764

Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz											Constant for inside roughness of "C" =	120	
1.00	2.00	3.00	3.00	3.00	3.00	2	17	1.50	1.53	2.94	128.00	3.49	4.47	144.73	15.00	0.00	15	159.73	9.59	12.27	900	73.34	0.33	5.31
2.00	3.00	6.00	9.00	6.00	9.00	3	26	2.00	1.92	2.88	280.00	2.59	7.25	140.26	15.00	0.00	15	155.26	14.99	41.98	2,700	64.32	0.37	4.99
3.00	7.00	9.00	18.00	9.00	18.00	4	36	2.00	1.92	3.96	498.00	4.69	23.36	133.01	15.00	0.00	15	148.01	14.99	74.66	5,400	72.33	0.33	4.61
4.00	8.00	11.00	29.00	11.00	29.00	5	50	3.00	2.83	2.54	1049.00	1.31	13.77	107.08	15.00	0.00	15	122.08	32.58	341.78	8,700	25.45	0.94	4.28
5.00	7.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.14	378.00	1.49	5.65	115.30	15.00	0.00	15	130.30	14.99	56.67	900	15.88	1.51	5.79
6.00	7.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.16	219.00	1.52	3.33	112.99	15.00	0.00	15	127.99	14.99	32.83	900	27.41	0.88	5.16
7.00	8.00	1.00	7.00	1.00	7.00	3	28	2.00	1.92	3.10	549.00	2.98	16.34	109.65	15.00	0.00	15	124.65	14.99	82.31	2,100	25.51	0.94	4.28
8.00	9.00	1.00	37.00	1.00	37.00	6	57	3.00	2.83	2.90	1343.00	1.67	22.49	93.31	15.00	0.00	15	108.31	32.58	437.57	11,100	25.37	0.95	3.34
9.00	10.00	3.00	40.00	3.00	40.00	6	58	3.00	2.83	2.96	183.00	1.75	3.20	70.82	15.00	0.00	15	85.82	32.58	59.62	12,000	201.26	0.12	2.39
10.00	11.00	6.00	46.00	6.00	46.00	6	59	3.00	2.83	3.02	274.00	1.81	4.95	67.62	15.00	0.00	15	82.62	32.58	89.27	13,800	154.58	0.16	2.27
11.00	12.00	9.00	55.00	9.00	55.00	7	82	4.00	3.63	2.53	399.00	0.98	3.89	62.67	15.00	0.00	15	77.67	53.85	214.85	16,500	76.80	0.31	2.12
12.00	13.00	18.00	73.00	18.00	73.00	7	83	4.00	3.63	2.57	850.00	1.00	8.50	58.77	15.00	0.00	15	73.77	53.85	457.70	21,900	47.85	0.50	1.81
13.00	14.00	30.00	103.00	30.00	103.00	8	97	4.00	3.63	3.02	1366.00	1.35	18.41	50.28	15.00	0.00	15	65.28	53.85	735.55	30,900	42.01	0.57	1.31
14.00	18.00	1.00	104.00	1.00	104.00	8	84	4.00	3.63	2.60	109.00	1.02	1.12	31.87	15.00	0.00	15	46.87	53.85	58.69	31,200	531.58	0.05	0.73
15.00	16.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.49	270.00	1.99	5.37	74.96	15.00	0.00	15	89.96	14.99	40.48	900	22.23	1.08	3.59
16.00	17.00	6.00	9.00	6.00	9.00	3	34	2.00	1.92	3.81	813.00	4.36	35.45	69.59	15.00	0.00	15	84.59	14.99	121.89	2,700	22.15	1.08	2.51
17.00	18.00	3.00	12.00	3.00	12.00	4	43	3.00	2.83	2.20	338.00	1.00	3.39	34.14	15.00	0.00	15	49.14	32.58	110.13	3,600	32.69	0.73	1.42
18.00	36.00	8.00	124.00	8.00	124.00	9	98	4.00	3.63	3.03	404.00	1.35	5.47	30.75	15.00	0.00	15	45.75	53.85	217.54	37,200	171.00	0.14	0.69
19.00	20.00	3.00	3.00	3.00	3.00	2	21	2.00	1.92	2.38	147.00	1.82	2.68	87.70	15.00	0.00	15	102.70	14.99	22.04	900	40.84	0.59	3.33
20.00	21.00	6.00	9.00	6.00	9.00	3	32	2.00	1.92	3.61	259.00	3.94	10.20	85.01	15.00	0.00	15	100.01	14.99	38.83	2,700	69.53	0.35	2.75
21.00	22.00	9.00	18.00	9.00	18.00	4	45	3.00	2.83	2.29	401.00	1.09	4.36	74.81	15.00	0.00	15	89.81	32.58	130.65	5,400	41.33	0.58	2.40
22.00	27.00	3.00	21.00	3.00	21.00	5	54	3.00	2.83	2.79	358.00	1.56	5.57	70.46	15.00	0.00	15	85.46	32.58	116.64	6,300	54.01	0.44	1.82
23.00	24.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.41	104.00	1.87	1.94	84.20	15.00	0.00	15	99.20	14.99	15.59	900	57.72	0.42	2.92
24.00	25.00	6.00	9.00	6.00	9.00	3	33	2.00	1.92	3.64	259.00	4.01	10.39	82.26	15.00	0.00	15	97.26	14.99	38.83	2,700	69.53	0.35	2.51
25.00	26.00	9.00	18.00	9.00	18.00	4	45	3.00	2.83	2.32	391.00	1.11	4.33	71.86	15.00	0.00	15	86.86	32.58	127.39	5,400	42.39	0.57	2.16
26.00	27.00	2.00	20.00	2.00	20.00	5	55	3.00	2.83	2.80	169.00	1.57	2.65	67.53	15.00	0.00	15	82.53	32.58	55.06	6,000	108.97	0.22	1.60
27.00	35.00	12.00	53.00	12.00	53.00	7	81	3.00	2.83	4.16	678.00	3.27	22.14	64.89	15.00	0.00	15	79.89	32.58	220.90	15,900	71.98	0.33	1.38
28.00	29.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.47	224.00	1.95	4.38	77.56	15.00	0.00	15	92.56	14.99	33.58	900	26.80	0.90	3.41
29.00	30.00	6.00	9.00	6.00	9.00	3	34	2.00	1.92	3.76	240.00	4.26	10.22	73.19	15.00	0.00	15	88.19	14.99	35.98	2,700	75.04	0.32	2.51
30.00	31.00	9.00	18.00	9.00	18.00	4	47	3.00	2.83	2.39	400.00	1.17	4.69	62.96	15.00	0.00	15	77.96	32.58	130.33	5,400	41.43	0.58	2.19
31.00	34.00	7.00	25.00	7.00	25.00	5	59	3.00	2.83	3.04	472.00	1.83	8.61	58.27	15.00	0.00	15	73.27	32.58	153.79	7,500	48.77	0.49	1.61
32.00	33.00	3.00	3.00	3.00	3.00	2	23	2.00	1.92	2.61	3.00	2.16	0.06	61.99	15.00	0.00	15	76.99	14.99	0.45	900	2001.00	0.01	1.59
33.00	34.00	4.00	7.00	4.00	7.00	3	35	2.00	1.92	3.91	268.00	4.58	12.27	61.92	15.00	0.00	15	76.92	14.99	40.18	2,100	52.27	0.46	1.58
34.00	35.00	6.00	188.00	6.00	188.00	11	122	4.00	3.63	3.78	338.00	2.05	6.91	49.66	15.00	0.00	15	64.66	53.85	182.00	56,400	309.89	0.08	1.12
35.00	36.00	17.00	108.00	17.00	108.00	8	100	4.00	3.63	3.09	1239.00	1.41	17.47	42.74	15.00	0.00	15	57.74	53.85	667.16	32,400	48.56	0.49	1.04
36.00	76.00	19.00	251.00	19.00	251.00	13	171	6.00	5.35	2.45	845.00	0.58	4.93	25.28	15.00	0.00	15	40.28	116.73	986.35	75,300	76.34	0.31	0.55
37.00	38.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.08	191.00	1.43	2.72	121.50	15.00	0.00	15	136.50	14.99	28.64	900	31.43	0.76	5.50
38.00	39.00	6.00	9.00	6.00	9.00	3	28	2.00	1.92	3.16	326.00	3.08	10.05	118.77	15.00	0.00	15	133.77	14.99	48.88	2,700	55.24	0.43	4.74
39.00	40.00	9.00	18.00	9.00	18.00	4	39	3.00	2.83	2.02	763.00	0.86	6.55	108.72	15.00	0.00	15	123.72	32.58	248.60	5,400	21.72	1.10	4.30
40.00	41.00	12.00	30.00	12.00	30.00	5	51	3.00	2.83	2.59	769.00	1.36	10.47	102.17	15.00	0.00	15	117.17	32.58	250.55	9,000	35.92	0.67	3.20
41.00	42.00	20.00	50.00	20.00	50.00	6	63	3.00	2.83	3.24	1118.00	2.05	22.97	91.70	15.00	0.00	15	106.70	32.58	364.26	15,000	41.18	0.58	2.53
42.00	43.00	30.00	80.00	30.00	80.00	7	80	4.00	3.63	2.48	1136.00	0.94	10.66	68.73	15.00	0.00	15	83.73	53.85	611.70	24,000	39.23	0.61	1.95
43.00	44.00	33.00	113.00	33.00	113.00	8	95	4.00	3.63	2.94	1423.00	1.29	18.29	58.07	15.00	0.00	15	73.07	53.85	766.24	33,900	44.24	0.54	1.34
44.00	47.00	8.00	121.00	8.00	121.00	9	100	4.00	3.63	3.09	451.00	1.41	6.36	39.77	15.00	0.00	15	54.77	53.85	242.85	36,300	149.48	0.16	0.79
45.00	46.00	3.00	3.00	3.00	3.00	2	23	2.00	1.92	2.58	316.00	2.12	6.70	64.82	15.00	0.00	15	79.82	14.99	47.38	900	19.00	1.26	2.69
46.00	47.00	5.00	8.00	5.00	8.00	3	36	2.00	1.92	3.96	527.00	4.69	24.70	58.12	15.00	0.00	15	73.12	14.99	79.01	2,400	30.38	0.79	1.42
47.00	50.00	0.00	129.00	0.00	129.00	9	100	4.00	3.63	3.10	470.00	1.42	6.66	33.41	15.00	0.00	15	48.41	53.85	253.08	38,700	152.92	0.16	0.63

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

PRELIMINARY PRESSURE SEWER -- PIPE SIZING AND BRANCH ANALYSIS
IME CIVIL SURVEYING
1870 County Road 214, St. Augustine, FL 32084
904-429-7764

Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz											Constant for inside roughness of "C" =		120
48.00	49.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.72	179.00	2.34	4.19	48.63	15.00	0.00	15	63.63	14.99	26.84	900	33.54	0.72	2.04
49.00	50.00	3.00	6.00	3.00	6.00	3	34	2.00	1.92	3.73	422.00	4.19	17.68	44.44	15.00	0.00	15	59.44	14.99	63.27	1,800	28.45	0.84	1.32
50.00	75.00	0.00	135.00	0.00	135.00	9	101	4.00	3.63	3.11	100.00	1.43	1.43	26.76	15.00	0.00	15	41.76	53.85	53.85	40,500	752.13	0.03	0.48
51.00	52.00	3.00	3.00	3.00	3.00	2	18	2.00	1.92	1.99	365.00	1.31	4.79	131.90	15.00	0.00	15	146.90	14.99	54.72	900	16.45	1.46	5.56
52.00	54.00	2.00	5.00	2.00	5.00	3	33	2.00	1.92	3.70	77.00	4.13	3.18	127.11	15.00	0.00	15	142.11	14.99	11.54	1,500	129.94	0.18	4.10
53.00	54.00	3.00	3.00	3.00	3.00	2	18	2.00	1.92	2.00	492.00	1.33	6.53	130.46	15.00	0.00	15	145.46	14.99	73.76	900	12.20	1.97	5.88
54.00	55.00	9.00	17.00	9.00	17.00	4	37	3.00	2.83	1.90	692.00	0.76	5.28	123.93	15.00	0.00	15	138.93	32.58	225.47	5,100	22.62	1.06	3.92
55.00	56.00	12.00	29.00	12.00	29.00	5	47	3.00	2.83	2.42	861.00	1.20	10.36	118.65	15.00	0.00	15	133.65	32.58	280.53	8,700	31.01	0.77	2.85
56.00	57.00	20.00	49.00	20.00	49.00	6	59	3.00	2.83	3.04	800.00	1.82	14.59	108.29	15.00	0.00	15	123.29	32.58	260.65	14,700	56.40	0.43	2.08
57.00	58.00	30.00	79.00	30.00	79.00	7	73	3.00	2.83	3.75	1275.00	2.70	34.38	93.69	15.00	0.00	15	108.69	32.58	415.42	23,700	57.05	0.42	1.66
58.00	68.00	14.00	93.00	14.00	93.00	8	95	4.00	3.63	2.93	681.00	1.28	8.69	59.32	15.00	0.00	15	74.32	53.85	366.70	27,900	76.08	0.32	1.23
59.00	60.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.06	46.00	1.40	0.64	123.94	15.00	0.00	15	138.94	14.99	6.90	900	130.50	0.18	3.57
60.00	61.00	6.00	9.00	6.00	9.00	3	28	2.00	1.92	3.10	309.00	2.98	9.20	123.30	15.00	0.00	15	138.30	14.99	46.33	2,700	58.28	0.41	3.39
61.00	62.00	9.00	18.00	9.00	18.00	4	39	3.00	2.83	1.98	400.00	0.82	3.30	114.10	15.00	0.00	15	129.10	32.58	130.33	5,400	41.43	0.58	2.98
62.00	63.00	12.00	30.00	12.00	30.00	5	49	3.00	2.83	2.50	480.00	1.28	6.13	110.80	15.00	0.00	15	125.80	32.58	156.39	9,000	57.55	0.42	2.40
63.00	64.00	20.00	50.00	20.00	50.00	6	60	3.00	2.83	3.08	1011.00	1.87	18.94	104.67	15.00	0.00	15	119.67	32.58	329.40	15,000	45.54	0.53	1.98
64.00	67.00	24.00	74.00	24.00	74.00	7	75	3.00	2.83	3.86	1084.00	2.85	30.88	85.73	15.00	0.00	15	100.73	32.58	353.19	22,200	62.86	0.38	1.45
65.00	66.00	3.00	3.00	3.00	3.00	2	21	2.00	1.92	2.36	159.00	1.80	2.86	89.88	15.00	0.00	15	104.88	14.99	23.84	900	37.75	0.64	2.95
66.00	67.00	5.00	8.00	5.00	8.00	3	32	2.00	1.92	3.58	828.00	3.89	32.17	87.02	15.00	0.00	15	102.02	14.99	124.14	2,400	19.33	1.24	2.31
67.00	68.00	9.00	91.00	9.00	91.00	8	96	4.00	3.63	2.97	322.00	1.31	4.22	54.85	15.00	0.00	15	69.85	53.85	173.39	27,300	157.45	0.15	1.07
68.00	70.00	9.00	91.00	9.00	91.00	8	97	4.00	3.63	3.01	657.00	1.35	8.84	50.63	15.00	0.00	15	65.63	53.85	353.77	27,300	77.17	0.31	0.92
69.00	70.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.73	252.00	2.36	5.94	47.73	15.00	0.00	15	62.73	14.99	37.78	900	23.82	1.01	1.62
70.00	74.00	9.00	202.00	9.00	202.00	11	120	4.00	3.63	3.72	563.00	1.99	11.20	41.79	15.00	0.00	15	56.79	53.85	303.16	60,600	199.90	0.12	0.61
71.00	72.00	3.00	3.00	3.00	3.00	2	24	2.00	1.92	2.64	160.00	2.22	3.55	57.62	15.00	0.00	15	72.62	14.99	23.99	900	37.52	0.64	2.41
72.00	73.00	6.00	9.00	6.00	9.00	3	36	2.00	1.92	4.01	335.00	4.80	16.10	54.07	15.00	0.00	15	69.07	14.99	50.22	2,700	53.76	0.45	1.77
73.00	74.00	8.00	17.00	8.00	17.00	4	51	3.00	2.83	2.59	542.00	1.36	7.39	37.98	15.00	0.00	15	52.98	32.58	176.59	5,100	28.88	0.83	1.32
74.00	75.00	4.00	223.00	4.00	223.00	12	132	4.00	3.63	4.09	222.00	2.37	5.26	30.59	15.00	0.00	15	45.59	53.85	119.54	66,900	559.65	0.04	0.49
75.00	76.00	0.00	358.00	0.00	358.00	16	176	6.00	5.35	2.52	809.00	0.61	4.97	25.33	15.00	0.00	15	40.33	116.73	944.33	107,400	113.73	0.21	0.45
76.00	0.00	11.00	620.00	11.00	620.00	24	265	6.00	5.35	3.79	1554.00	1.31	20.35	20.35	15.00	0.00	15	35.35	116.73	1813.95	186,000	102.54	0.23	0.23
77.00	0.00	0.00	620.00	0.00	620.00	24	265	6.00	5.35	3.79	1271.00	1.31	16.65	16.65	15.00	0.00	15	31.65	116.73	1483.61	186,000	125.37	0.19	0.19
78.00	0.00	0.00	620.00	0.00	620.00	24	265	6.00	5.35	3.79	1720.00	1.31	22.53	22.53	15.00	0.00	15	37.53	116.73	2007.72	186,000	92.64	0.26	0.26
79.00	0.00	0.00	620.00	0.00	620.00	24	265	6.00	5.35	3.79	1772.00	1.31	23.21	23.21	15.00	0.00	15	38.21	116.73	2068.42	186,000	89.92	0.27	0.27
80.00	0.00	0.00	620.00	0.00	620.00	24	265	6.00	5.35	3.79	1341.00	1.31	17.56	17.56	15.00	0.00	15	32.56	116.73	1565.32	186,000	118.83	0.20	0.20
81.00	0.00	0.00	620.00	0.00	620.00	24	265	6.00	5.35	3.79	2432.00	1.31	31.85	31.85	15.00	0.00	15	46.85	116.73	2838.82	186,000	65.52	0.37	0.37
Totals/Max		**623.00**									**47,948.00**			**145**			**15**	**160**						**6**

Pipe Size	Feet
1.25"	31,150.00
1.5	128.00
2"	9,495.00
3"	15,851.00
4"	10,730.00
6"	11,744.00

Duplex	Lift Stations

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

PRELIMINARY PRESSURE SEWER -- PIPE SIZING AND BRANCH ANALYSIS
IME CIVIL SURVEYING
1870 County Road 214, St. Augustine, FL 32084
904-429-7764

Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz											Constant for inside roughness of "C" =		120
									623.00															
								Terminal Flushing Connections																
									18.00															
								In-Line Flushing Connections																
									1															

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

APPENDIX III: LITTLE GASPARILLA ISLAND PIPE SIZING ANALYSIS (PROVIDED BY FJ NUGENT)

IME Civil & Surveying
Preliminary Pipe Sizing Analysis

Brandon Shugart

LGI

FJ Nugent

C Factor:

140

Select Pipe Type:

SDR 11 PE Pipe (US)

Enter GPD / Dwelling:

300

Select Power Requirements:

240 Volt 60 Hz

PRELIMINARY PRESSURE SEWER -- PIPE SIZING AND BRANCH ANALYSIS
IME CIVIL SURVEYING
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Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz											Constant for inside roughness of "C" =		140
1.00	2.00	3.00	3.00	3.00	3.00	2	15	1.50	1.53	2.68	453.00	2.22	10.04	163.35	15.00	0.00	15	178.35	9.59	43.43	900	20.72	1.16	6.02
2.00	8.00	5.00	8.00	5.00	8.00	3	24	2.00	1.92	2.70	258.00	1.74	4.48	153.31	15.00	0.00	15	168.31	14.99	38.68	2,400	62.05	0.39	4.86
3.00	5.00	1.00	1.00	1.00	1.00	1	8	1.25	1.34	1.80	128.00	1.24	1.58	158.64	15.00	0.00	15	173.64	7.33	9.38	300	31.99	0.75	5.96
4.00	5.00	1.00	1.00	1.00	1.00	1	8	1.25	1.34	1.80	55.00	1.24	0.68	157.74	15.00	0.00	15	172.74	7.33	4.03	300	74.46	0.32	5.53
5.00	8.00	6.00	8.00	6.00	8.00	3	24	2.00	1.92	2.65	490.00	1.68	8.22	157.05	15.00	0.00	15	172.05	14.99	73.46	2,400	32.67	0.73	5.21
6.00	7.00	3.00	3.00	3.00	3.00	2	16	1.50	1.53	2.80	214.00	2.40	5.15	154.55	15.00	0.00	15	169.55	9.59	20.52	900	43.86	0.55	5.09
7.00	8.00	3.00	6.00	3.00	6.00	3	24	2.00	1.92	2.66	34.00	1.69	0.57	149.41	15.00	0.00	15	164.41	14.99	5.10	1,800	353.12	0.07	4.55
8.00	13.00	0.00	22.00	0.00	22.00	5	40	3.00	2.83	2.04	117.00	0.66	0.77	148.83	15.00	0.00	15	163.83	32.58	38.12	6,600	173.13	0.14	4.48
9.00	10.00	3.00	3.00	3.00	3.00	2	16	1.50	1.53	2.80	158.00	2.40	3.79	154.74	15.00	0.00	15	169.74	9.59	15.15	900	59.41	0.40	4.99
10.00	13.00	5.00	8.00	5.00	8.00	3	25	2.00	1.92	2.73	163.00	1.77	2.89	150.95	15.00	0.00	15	165.95	14.99	24.44	2,400	98.21	0.24	4.58
11.00	12.00	3.00	3.00	3.00	3.00	2	16	1.50	1.53	2.81	137.00	2.42	3.31	154.06	15.00	0.00	15	169.06	9.59	13.14	900	68.52	0.35	5.00
12.00	13.00	3.00	6.00	3.00	6.00	3	24	2.00	1.92	2.68	157.00	1.71	2.69	150.75	15.00	0.00	15	165.75	14.99	23.54	1,800	76.47	0.31	4.65
13.00	17.00	0.00	36.00	0.00	36.00	6	48	3.00	2.83	2.47	159.00	0.93	1.49	148.06	15.00	0.00	15	163.06	32.58	51.80	10,800	208.47	0.12	4.34
14.00	17.00	3.00	3.00	3.00	3.00	2	16	1.50	1.53	2.78	403.00	2.37	9.55	156.13	15.00	0.00	15	171.13	9.59	38.64	900	23.29	1.03	5.25
15.00	16.00	3.00	3.00	3.00	3.00	2	16	1.50	1.53	2.82	115.00	2.44	2.81	152.95	15.00	0.00	15	167.95	9.59	11.03	900	81.63	0.29	5.14
16.00	17.00	1.00	4.00	1.00	4.00	3	24	2.00	1.92	2.69	208.00	1.72	3.57	150.15	15.00	0.00	15	165.15	14.99	31.18	1,200	38.48	0.62	4.85
17.00	21.00	0.00	43.00	0.00	43.00	6	48	3.00	2.83	2.47	143.00	0.94	1.34	146.58	15.00	0.00	15	161.58	32.58	46.59	12,900	276.87	0.09	4.22
18.00	20.00	3.00	3.00	3.00	3.00	2	16	1.50	1.53	2.83	154.00	2.45	3.77	152.53	15.00	0.00	15	167.53	9.59	14.77	900	60.95	0.39	4.94
19.00	20.00	1.00	1.00	1.00	1.00	1	8	1.25	1.34	1.84	37.00	1.29	0.48	149.24	15.00	0.00	15	164.24	7.33	2.71	300	110.68	0.22	4.76
20.00	21.00	2.00	6.00	2.00	6.00	3	24	2.00	1.92	2.70	204.00	1.73	3.53	148.76	15.00	0.00	15	163.76	14.99	30.58	1,800	58.85	0.41	4.54
21.00	23.00	4.00	53.00	4.00	53.00	7	57	3.00	2.83	2.90	418.00	1.26	5.28	145.23	15.00	0.00	15	160.23	32.58	136.19	15,900	116.75	0.21	4.14
22.00	23.00	2.00	2.00	2.00	2.00	2	16	1.25	1.34	3.69	194.00	4.69	9.10	149.06	15.00	0.00	15	164.06	7.33	14.21	600	42.22	0.57	4.50
23.00	25.00	0.00	55.00	0.00	55.00	7	57	3.00	2.83	2.91	148.00	1.26	1.87	139.96	15.00	0.00	15	154.96	32.58	48.22	16,500	342.18	0.07	3.93
24.00	25.00	1.00	1.00	1.00	1.00	1	8	1.25	1.34	1.85	344.00	1.31	4.49	142.58	15.00	0.00	15	157.58	7.33	25.20	300	11.90	2.02	5.88
25.00	29.00	0.00	56.00	0.00	56.00	7	57	3.00	2.83	2.91	145.00	1.27	1.84	138.09	15.00	0.00	15	153.09	32.58	47.24	16,800	355.61	0.07	3.86
26.00	27.00	2.00	2.00	2.00	2.00	2	16	1.50	1.53	2.83	67.00	2.46	1.65	143.60	15.00	0.00	15	158.60	9.59	6.42	600	93.40	0.26	4.36
27.00	28.00	4.00	6.00	4.00	6.00	3	26	2.00	1.92	2.85	100.00	1.92	1.92	141.95	15.00	0.00	15	156.95	14.99	14.99	1,800	120.06	0.20	4.11
28.00	29.00	6.00	12.00	6.00	12.00	4	35	2.00	1.92	3.84	114.00	3.32	3.79	140.03	15.00	0.00	15	155.03	14.99	17.09	3,600	210.63	0.11	3.91
29.00	32.00	8.00	75.00	8.00	75.00	7	61	3.00	2.83	3.14	270.00	1.46	3.95	136.24	15.00	0.00	15	151.24	32.58	87.97	22,500	255.77	0.09	3.79
30.00	31.00	3.00	3.00	3.00	3.00	2	17	1.50	1.53	3.03	145.00	2.78	4.03	138.13	15.00	0.00	15	153.13	9.59	13.90	900	64.74	0.37	4.31
31.00	32.00	2.00	5.00	2.00	5.00	3	25	2.00	1.92	2.75	101.00	1.80	1.82	134.11	15.00	0.00	15	149.11	14.99	15.14	1,500	99.06	0.24	3.94
32.00	38.00	0.00	80.00	0.00	80.00	7	58	3.00	2.83	2.96	178.00	1.31	2.33	132.29	15.00	0.00	15	147.29	32.58	58.00	24,000	413.83	0.06	3.70
33.00	34.00	3.00	3.00	3.00	3.00	2	17	1.50	1.53	2.95	98.00	2.65	2.60	143.61	15.00	0.00	15	158.61	9.59	9.40	900	95.79	0.25	4.30
34.00	35.00	6.00	9.00	6.00	9.00	3	26	2.00	1.92	2.87	198.00	1.93	3.83	141.01	15.00	0.00	15	156.01	14.99	29.69	2,700	90.95	0.26	4.05
35.00	38.00	9.00	18.00	9.00	18.00	4	35	2.00	1.92	3.89	212.00	3.40	7.22	137.18	15.00	0.00	15	152.18	14.99	31.78	5,400	169.90	0.14	3.78

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

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Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz										Constant for inside roughness of "C" =			140
36.00	37.00	3.00	3.00	3.00	3.00	2	18	1.50	1.53	3.07	124.00	2.84	3.52	135.30	15.00	0.00	15	150.30	9.59	11.89	900	75.70	0.32	4.16
37.00	38.00	3.00	6.00	3.00	6.00	3	25	2.00	1.92	2.78	99.00	1.83	1.81	131.78	15.00	0.00	15	146.78	14.99	14.84	1,800	121.27	0.20	3.84
38.00	42.00	0.00	104.00	0.00	104.00	8	67	4.00	3.63	2.06	162.00	0.50	0.81	129.97	15.00	0.00	15	144.97	53.85	87.23	31,200	357.67	0.07	3.64
39.00	40.00	3.00	3.00	3.00	3.00	2	17	1.50	1.53	2.98	150.00	2.70	4.04	144.74	15.00	0.00	15	159.74	9.59	14.38	900	62.58	0.38	5.10
40.00	41.00	3.00	6.00	3.00	6.00	3	25	2.00	1.92	2.78	291.00	1.83	5.34	140.70	15.00	0.00	15	155.70	14.99	43.63	1,800	41.26	0.58	4.71
41.00	42.00	3.00	3.00	3.00	3.00	2	18	1.50	1.53	3.08	217.00	2.86	6.20	135.36	15.00	0.00	15	150.36	9.59	20.81	900	43.26	0.55	4.13
42.00	45.00	0.00	113.00	0.00	113.00	8	67	4.00	3.63	2.07	109.00	0.50	0.55	129.15	15.00	0.00	15	144.15	53.85	58.69	33,900	577.58	0.04	3.58
43.00	44.00	2.00	2.00	2.00	2.00	2	17	1.50	1.53	2.91	98.00	2.58	2.53	132.99	15.00	0.00	15	147.99	9.59	9.40	600	63.86	0.38	4.21
44.00	45.00	2.00	4.00	2.00	4.00	3	25	2.00	1.92	2.80	100.00	1.85	1.85	130.46	15.00	0.00	15	145.46	14.99	14.99	1,200	80.04	0.30	3.83
45.00	50.00	3.00	120.00	3.00	120.00	9	76	3.00	2.83	3.87	272.00	2.15	5.85	128.60	15.00	0.00	15	143.60	32.58	88.62	36,000	406.22	0.06	3.53
46.00	47.00	3.00	3.00	3.00	3.00	2	17	1.50	1.53	3.03	109.00	2.79	3.04	134.43	15.00	0.00	15	149.43	9.59	10.45	900	86.12	0.28	4.18
47.00	48.00	6.00	9.00	6.00	9.00	3	27	2.00	1.92	2.95	223.00	2.04	4.55	131.39	15.00	0.00	15	146.39	14.99	33.43	2,700	80.76	0.30	3.90
48.00	50.00	3.00	12.00	3.00	12.00	4	34	2.00	1.92	3.75	128.00	3.19	4.08	126.84	15.00	0.00	15	141.84	14.99	19.19	3,600	187.59	0.13	3.60
49.00	50.00	3.00	3.00	3.00	3.00	2	18	2.00	1.92	2.02	281.00	1.01	2.84	125.60	15.00	0.00	15	140.60	14.99	42.13	900	21.36	1.12	4.60
50.00	57.00	1.00	135.00	1.00	135.00	9	76	3.00	2.83	3.90	167.00	2.18	3.64	122.76	15.00	0.00	15	137.76	32.58	54.41	40,500	744.33	0.03	3.47
51.00	52.00	3.00	3.00	3.00	3.00	2	17	1.50	1.53	2.98	60.00	2.69	1.62	138.23	15.00	0.00	15	153.23	9.59	5.75	900	156.45	0.15	3.83
52.00	54.00	3.00	6.00	3.00	6.00	3	25	2.00	1.92	2.83	60.00	1.89	1.13	136.62	15.00	0.00	15	151.62	14.99	9.00	1,800	200.10	0.12	3.67
53.00	54.00	2.00	2.00	2.00	2.00	2	17	1.50	1.53	2.95	100.00	2.64	2.64	138.13	15.00	0.00	15	153.13	9.59	9.59	600	62.58	0.38	3.94
54.00	56.00	2.00	10.00	2.00	10.00	4	34	1.50	1.53	5.90	87.00	9.55	8.31	135.49	15.00	0.00	15	150.49	9.59	8.34	3,000	359.66	0.07	3.55
55.00	56.00	3.00	3.00	3.00	3.00	2	18	2.00	1.92	1.99	150.00	0.99	1.48	128.65	15.00	0.00	15	143.65	14.99	22.49	900	40.02	0.60	4.09
56.00	57.00	1.00	14.00	1.00	14.00	4	34	1.50	1.53	5.91	84.00	9.60	8.06	127.17	15.00	0.00	15	142.17	9.59	8.05	4,200	521.50	0.05	3.49
57.00	62.00	7.00	156.00	7.00	156.00	10	85	3.00	2.83	4.36	254.00	2.68	6.81	119.11	15.00	0.00	15	134.11	32.58	82.76	46,800	565.51	0.04	3.44
58.00	59.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.10	235.00	1.09	2.57	116.22	15.00	0.00	15	131.22	14.99	35.23	900	25.54	0.94	4.55
59.00	62.00	1.00	4.00	1.00	4.00	3	26	2.00	1.92	2.86	70.00	1.92	1.35	113.65	15.00	0.00	15	128.65	14.99	10.49	1,200	114.34	0.21	3.61
60.00	61.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.10	145.00	1.09	1.58	116.43	15.00	0.00	15	131.43	14.99	21.74	900	41.40	0.58	4.17
61.00	62.00	4.00	7.00	4.00	7.00	3	29	2.00	1.92	3.17	109.00	2.34	2.55	114.85	15.00	0.00	15	129.85	14.99	16.34	2,100	128.50	0.19	3.59
62.00	63.00	2.00	12.00	2.00	12.00	4	34	2.00	1.92	3.83	155.00	3.31	5.13	112.30	15.00	0.00	15	127.30	14.99	23.24	3,600	154.92	0.15	3.40
63.00	65.00	4.00	172.00	4.00	172.00	10	86	4.00	3.63	2.67	341.00	0.81	2.76	107.17	15.00	0.00	15	122.17	53.85	183.62	51,600	281.02	0.09	3.24
64.00	65.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.16	464.00	1.15	5.33	109.74	15.00	0.00	15	124.74	14.99	69.57	900	12.94	1.86	5.01
65.00	66.00	3.00	6.00	3.00	6.00	3	26	2.00	1.92	2.89	247.00	1.97	4.87	104.41	15.00	0.00	15	119.41	14.99	37.03	1,800	48.61	0.49	3.16
66.00	68.00	2.00	180.00	2.00	180.00	11	96	4.00	3.63	2.96	112.00	0.98	1.10	99.54	15.00	0.00	15	114.54	53.85	60.31	54,000	895.40	0.03	2.67
67.00	68.00	3.00	3.00	3.00	3.00	2	20	2.00	1.92	2.25	130.00	1.24	1.61	100.05	15.00	0.00	15	115.05	14.99	19.49	900	46.18	0.52	3.16
68.00	71.00	3.00	186.00	3.00	186.00	11	96	4.00	3.63	2.98	148.00	0.99	1.47	98.44	15.00	0.00	15	113.44	53.85	79.69	55,800	700.18	0.03	2.64
69.00	71.00	2.00	2.00	2.00	2.00	2	18	1.50	1.53	3.05	143.00	2.82	4.03	101.01	15.00	0.00	15	116.01	9.59	13.71	600	43.76	0.55	3.15
70.00	71.00	3.00	3.00	3.00	3.00	2	20	2.00	1.92	2.25	220.00	1.24	2.73	99.71	15.00	0.00	15	114.71	14.99	32.98	900	27.29	0.88	3.48

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Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz										Constant for inside roughness of "C" =			140
71.00	76.00	3.00	194.00	3.00	194.00	11	97	4.00	3.63	3.00	319.00	1.00	3.20	96.98	15.00	0.00	15	111.98	53.85	171.77	58,200	338.82	0.07	2.60
72.00	73.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.13	117.00	1.12	1.31	113.89	15.00	0.00	15	128.89	14.99	17.54	900	51.31	0.47	3.67
73.00	74.00	6.00	9.00	6.00	9.00	3	29	2.00	1.92	3.21	153.00	2.39	3.66	112.58	15.00	0.00	15	127.58	14.99	22.94	2,700	117.71	0.20	3.20
74.00	75.00	9.00	18.00	9.00	18.00	4	39	2.00	1.92	4.35	293.00	4.18	12.26	108.93	15.00	0.00	15	123.93	14.99	43.93	5,400	122.93	0.20	3.00
75.00	76.00	9.00	27.00	9.00	27.00	5	51	3.00	2.83	2.62	276.00	1.05	2.89	96.67	15.00	0.00	15	111.67	32.58	89.93	8,100	90.07	0.27	2.80
76.00	81.00	5.00	226.00	5.00	226.00	12	107	4.00	3.63	3.31	233.00	1.20	2.80	93.78	15.00	0.00	15	108.78	53.85	125.46	67,800	540.40	0.04	2.53
77.00	78.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.16	82.00	1.14	0.94	110.70	15.00	0.00	15	125.70	14.99	12.29	900	73.21	0.33	3.50
78.00	79.00	6.00	9.00	6.00	9.00	3	29	2.00	1.92	3.25	197.00	2.44	4.81	109.77	15.00	0.00	15	124.77	14.99	29.54	2,700	91.42	0.26	3.17
79.00	80.00	9.00	18.00	9.00	18.00	4	40	2.00	1.92	4.42	255.00	4.31	11.00	104.95	15.00	0.00	15	119.95	14.99	38.23	5,400	141.25	0.17	2.91
80.00	81.00	11.00	29.00	11.00	29.00	5	52	3.00	2.83	2.65	279.00	1.07	2.98	93.96	15.00	0.00	15	108.96	32.58	90.90	8,700	95.71	0.25	2.74
81.00	86.00	5.00	260.00	5.00	260.00	13	117	4.00	3.63	3.61	234.00	1.41	3.31	90.98	15.00	0.00	15	105.98	53.85	126.00	78,000	619.04	0.04	2.49
82.00	83.00	3.00	3.00	3.00	3.00	2	20	2.00	1.92	2.19	128.00	1.18	1.51	106.62	15.00	0.00	15	121.62	14.99	19.19	900	46.90	0.51	3.55
83.00	84.00	6.00	9.00	6.00	9.00	3	30	2.00	1.92	3.31	161.00	2.53	4.07	105.11	15.00	0.00	15	120.11	14.99	24.14	2,700	111.86	0.21	3.04
84.00	85.00	9.00	18.00	9.00	18.00	4	40	2.00	1.92	4.49	254.00	4.44	11.28	101.04	15.00	0.00	15	116.04	14.99	38.08	5,400	141.80	0.17	2.83
85.00	86.00	6.00	24.00	6.00	24.00	5	53	3.00	2.83	2.70	190.00	1.10	2.09	89.76	15.00	0.00	15	104.76	32.58	61.91	7,200	116.31	0.21	2.66
86.00	88.00	4.00	288.00	4.00	288.00	14	127	4.00	3.63	3.93	497.00	1.65	8.19	87.67	15.00	0.00	15	102.67	53.85	267.62	86,400	322.85	0.07	2.45
87.00	88.00	2.00	2.00	2.00	2.00	2	18	1.50	1.53	3.16	297.00	3.00	8.91	88.38	15.00	0.00	15	103.38	9.59	28.48	600	21.07	1.14	3.52
88.00	90.00	9.00	299.00	9.00	299.00	14	127	4.00	3.63	3.94	704.00	1.66	11.71	79.48	15.00	0.00	15	94.48	53.85	379.08	89,700	236.62	0.10	2.38
89.00	90.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.49	395.00	1.49	5.88	73.65	15.00	0.00	15	88.65	14.99	59.22	900	15.20	1.58	3.85
90.00	93.00	17.00	319.00	17.00	319.00	15	171	4.00	3.63	5.30	1490.00	2.88	42.90	67.77	15.00	0.00	15	82.77	53.85	802.32	95,700	119.28	0.20	2.27
91.00	93.00	2.00	189.00	2.00	189.00	11	101	4.00	3.63	3.13	189.00	1.09	2.05	26.92	15.00	0.00	15	41.92	53.85	101.77	56,700	557.14	0.04	2.12
92.00	93.00	3.00	3.00	3.00	3.00	2	26	2.00	1.92	2.87	253.00	1.95	4.92	29.79	15.00	0.00	15	44.79	14.99	37.93	900	23.73	1.01	3.09
93.00	101.00	0.00	324.00	0.00	324.00	15	143	6.00	5.35	2.03	535.00	0.31	1.67	24.87	15.00	0.00	15	39.87	116.73	624.49	97,200	155.65	0.15	2.07
94.00	95.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.73	104.00	1.77	1.84	46.36	15.00	0.00	15	61.36	14.99	15.59	900	57.72	0.42	2.79
95.00	96.00	6.00	9.00	6.00	9.00	3	37	2.00	1.92	4.12	225.00	3.80	8.54	44.52	15.00	0.00	15	59.52	14.99	33.73	2,700	80.04	0.30	2.37
96.00	101.00	6.00	15.00	6.00	15.00	4	51	2.00	1.92	5.65	188.00	6.80	12.78	35.98	15.00	0.00	15	50.98	14.99	28.19	4,500	159.65	0.15	2.07
97.00	98.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.79	178.00	1.84	3.27	40.28	15.00	0.00	15	55.28	14.99	26.69	900	33.72	0.71	3.00
98.00	100.00	2.00	5.00	2.00	5.00	3	28	2.00	1.92	3.14	82.00	2.30	1.88	37.01	15.00	0.00	15	52.01	14.99	12.29	1,500	122.01	0.20	2.29
99.00	100.00	2.00	2.00	2.00	2.00	2	19	1.50	1.53	3.29	113.00	3.24	3.66	38.79	15.00	0.00	15	53.79	9.59	10.83	600	55.38	0.43	2.53
100.00	101.00	5.00	12.00	5.00	12.00	4	51	2.00	1.92	5.67	174.00	6.85	11.92	35.12	15.00	0.00	15	50.12	14.99	26.09	3,600	138.00	0.17	2.09
101.00	105.00	2.00	353.00	2.00	353.00	16	153	6.00	5.35	2.18	187.00	0.35	0.66	23.20	15.00	0.00	15	38.20	116.73	218.28	105,900	485.15	0.05	1.92
102.00	103.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.76	142.00	1.80	2.56	44.22	15.00	0.00	15	59.22	14.99	21.29	900	42.27	0.57	2.99
103.00	104.00	6.00	9.00	6.00	9.00	3	38	2.00	1.92	4.17	272.00	3.88	10.56	41.66	15.00	0.00	15	56.66	14.99	40.78	2,700	66.21	0.36	2.43
104.00	105.00	4.00	13.00	4.00	13.00	4	39	2.00	1.92	4.29	210.00	4.08	8.56	31.10	15.00	0.00	15	46.10	14.99	31.48	3,900	123.87	0.19	2.06
105.00	115.00	0.00	366.00	0.00	366.00	16	154	6.00	5.35	2.20	176.00	0.36	0.63	22.54	15.00	0.00	15	37.54	116.73	205.44	109,800	534.46	0.04	1.87
106.00	109.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.80	89.00	1.85	1.65	39.71	15.00	0.00	15	54.71	14.99	13.34	900	67.45	0.36	2.83
107.00	110.00	2.00	5.00	2.00	5.00	3	29	2.00	1.92	3.23	89.00	2.42	2.16	39.06	15.00	0.00	15	54.06	14.99	13.34	1,500	112.42	0.21	2.57

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

PRELIMINARY PRESSURE SEWER -- PIPE SIZING AND BRANCH ANALYSIS
IME CIVIL SURVEYING
1870 County Road 214, St. Augustine, FL 32084
904-429-7764

Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz											Constant for inside roughness of "C" =	140	
108.00	109.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.80	78.00	1.86	1.45	39.51	15.00	0.00	15	54.51	14.99	11.69	900	76.96	0.31	2.78
109.00	110.00	2.00	5.00	2.00	5.00	3	29	2.00	1.92	3.25	47.00	2.45	1.15	38.06	15.00	0.00	15	53.06	14.99	7.05	1,500	212.87	0.11	2.47
110.00	111.00	3.00	13.00	3.00	13.00	4	39	2.00	1.92	4.35	176.00	4.20	7.38	36.91	15.00	0.00	15	51.91	14.99	26.39	3,900	147.80	0.16	2.36
111.00	114.00	2.00	15.00	2.00	15.00	4	39	2.00	1.92	4.37	24.00	4.22	1.01	29.52	15.00	0.00	15	44.52	14.99	3.60	4,500	1250.63	0.02	2.20
112.00	113.00	3.00	3.00	3.00	3.00	2	26	2.00	1.92	2.85	80.00	1.92	1.54	33.20	15.00	0.00	15	48.20	14.99	11.99	900	75.04	0.32	2.80
113.00	114.00	2.00	5.00	2.00	5.00	3	30	2.00	1.92	3.29	126.00	2.51	3.16	31.67	15.00	0.00	15	46.67	14.99	18.89	1,500	79.40	0.30	2.48
114.00	115.00	10.00	30.00	10.00	30.00	5	65	3.00	2.83	3.33	406.00	1.63	6.61	28.51	15.00	0.00	15	43.51	32.58	132.28	9,000	68.04	0.35	2.18
115.00	159.00	0.00	396.00	0.00	396.00	17	168	6.00	5.35	2.41	510.00	0.42	2.17	21.90	15.00	0.00	15	36.90	116.73	595.31	118,800	199.56	0.12	1.83
116.00	117.00	3.00	3.00	3.00	3.00	2	19	2.00	1.92	2.11	225.00	1.10	2.48	117.79	15.00	0.00	15	132.79	14.99	33.73	900	26.68	0.90	4.90
117.00	118.00	6.00	9.00	6.00	9.00	3	29	2.00	1.92	3.20	642.00	2.38	15.25	115.32	15.00	0.00	15	130.32	14.99	96.25	2,700	28.05	0.86	4.00
118.00	119.00	9.00	18.00	9.00	18.00	4	41	2.00	1.92	4.54	557.00	4.53	25.24	100.06	15.00	0.00	15	115.06	14.99	83.51	5,400	64.66	0.37	3.15
119.00	120.00	12.00	30.00	12.00	30.00	5	56	3.00	2.83	2.87	484.00	1.23	5.97	74.82	15.00	0.00	15	89.82	32.58	157.70	9,000	57.07	0.42	2.77
120.00	123.00	2.00	32.00	2.00	32.00	6	60	3.00	2.83	3.05	103.00	1.38	1.42	68.85	15.00	0.00	15	83.85	32.58	33.56	9,600	286.06	0.08	2.35
121.00	122.00	3.00	3.00	3.00	3.00	2	23	2.00	1.92	2.50	186.00	1.50	2.80	73.66	15.00	0.00	15	88.66	14.99	27.89	900	32.27	0.74	3.28
122.00	123.00	3.00	6.00	3.00	6.00	3	30	2.00	1.92	3.32	135.00	2.54	3.43	70.86	15.00	0.00	15	85.86	14.99	20.24	1,800	88.93	0.27	2.54
123.00	126.00	5.00	43.00	5.00	43.00	6	60	3.00	2.83	3.06	238.00	1.39	3.31	67.43	15.00	0.00	15	82.43	32.58	77.54	12,900	166.36	0.14	2.27
124.00	125.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.48	114.00	1.48	1.69	75.92	15.00	0.00	15	90.92	14.99	17.09	900	52.66	0.46	3.01
125.00	126.00	6.00	9.00	6.00	9.00	3	34	2.00	1.92	3.74	319.00	3.17	10.11	74.23	15.00	0.00	15	89.23	14.99	47.83	2,700	56.45	0.43	2.55
126.00	130.00	6.00	55.00	6.00	55.00	7	70	3.00	2.83	3.58	299.00	1.86	5.57	64.11	15.00	0.00	15	79.11	32.58	97.42	16,500	169.37	0.14	2.13
127.00	128.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.47	149.00	1.47	2.18	77.32	15.00	0.00	15	92.32	14.99	22.34	900	40.29	0.60	3.22
128.00	129.00	6.00	9.00	6.00	9.00	3	34	2.00	1.92	3.73	390.00	3.15	12.29	75.14	15.00	0.00	15	90.14	14.99	58.47	2,700	46.18	0.52	2.62
129.00	130.00	1.00	10.00	1.00	10.00	4	40	2.00	1.92	4.46	98.00	4.40	4.31	62.85	15.00	0.00	15	77.85	14.99	14.69	3,000	204.18	0.12	2.10
130.00	140.00	2.00	67.00	2.00	67.00	7	70	3.00	2.83	3.60	144.00	1.88	2.71	58.54	15.00	0.00	15	73.54	32.58	46.92	20,100	428.41	0.06	1.98
131.00	132.00	3.00	3.00	3.00	3.00	2	22	2.00	1.92	2.40	162.00	1.39	2.26	85.42	15.00	0.00	15	100.42	14.99	24.29	900	37.06	0.65	4.77
132.00	133.00	6.00	9.00	6.00	9.00	3	33	2.00	1.92	3.63	232.00	3.00	6.95	83.16	15.00	0.00	15	98.16	14.99	34.78	2,700	77.63	0.31	4.12
133.00	134.00	2.00	11.00	2.00	11.00	4	40	2.00	1.92	4.48	133.00	4.43	5.89	76.21	15.00	0.00	15	91.21	14.99	19.94	3,300	165.50	0.15	3.82
134.00	135.00	3.00	3.00	3.00	3.00	2	23	2.00	1.92	2.53	85.00	1.54	1.31	70.33	15.00	0.00	15	85.33	14.99	12.74	900	70.62	0.34	3.67
135.00	136.00	3.00	6.00	3.00	6.00	3	30	2.00	1.92	3.37	123.00	2.61	3.21	69.02	15.00	0.00	15	84.02	14.99	18.44	1,800	97.61	0.25	3.33
136.00	137.00	4.00	21.00	4.00	21.00	5	51	3.00	2.83	2.59	273.00	1.02	2.78	65.81	15.00	0.00	15	80.81	32.58	88.95	6,300	70.83	0.34	3.08
137.00	138.00	3.00	3.00	3.00	3.00	2	23	2.00	1.92	2.59	88.00	1.61	1.41	63.03	15.00	0.00	15	78.03	14.99	13.19	900	68.22	0.35	2.75
138.00	139.00	3.00	6.00	3.00	6.00	3	30	2.00	1.92	3.38	109.00	2.63	2.86	61.62	15.00	0.00	15	76.62	14.99	16.34	1,800	110.15	0.22	2.39
139.00	140.00	3.00	30.00	3.00	30.00	5	51	3.00	2.83	2.60	285.00	1.03	2.92	58.76	15.00	0.00	15	73.76	32.58	92.86	9,000	96.92	0.25	2.18
140.00	158.00	20.00	117.00	20.00	117.00	9	107	3.00	2.83	5.49	816.00	4.12	33.58	55.83	15.00	0.00	15	70.83	32.58	265.87	35,100	132.02	0.18	1.93
141.00	142.00	3.00	3.00	3.00	3.00	2	24	2.00	1.92	2.68	120.00	1.70	2.05	53.83	15.00	0.00	15	68.83	14.99	17.99	900	50.03	0.48	3.57
142.00	143.00	6.00	9.00	6.00	9.00	3	36	2.00	1.92	4.04	226.00	3.66	8.26	51.78	15.00	0.00	15	66.78	14.99	33.88	2,700	79.69	0.30	3.09
143.00	145.00	2.00	11.00	2.00	11.00	4	41	2.00	1.92	4.54	123.00	4.53	5.58	43.52	15.00	0.00	15	58.52	14.99	18.44	3,300	178.95	0.13	2.78
144.00	145.00	2.00	2.00	2.00	2.00	2	20	2.00	1.92	2.27	58.00	1.26	0.73	38.67	15.00	0.00	15	53.67	14.99	8.70	600	69.00	0.35	3.00

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

PRELIMINARY PRESSURE SEWER -- PIPE SIZING AND BRANCH ANALYSIS
IME CIVIL SURVEYING
1870 County Road 214, St. Augustine, FL 32084
904-429-7764

Zone Number	Destination Zone	Number Of Cores Connected This Zone	Accumulated Total Of Cores This Zone	Residential Connection EDUs	Accumulated Residential EDUs	Maximum Number Of Simultaneous Operations	Maximum Flow In GPM	Pipe Size (Inch)	Actual Pipe Inside Diameter	Maximum Velocity (FPS)	Length Of Main This Zone	Friction Loss Factor (FT/100 FT)	Friction Loss This Zone	Accumulated Friction Loss (Feet)	Maximum Main Elevation	Minimum Pump Elevation	Static Head (Feet)	**Total Dynamic Head (Ft)**	Gal Per 100 Lineal Feet	Capacity Of Zone	Average Daily Flow	Average Fluid Changes Per Day	Average Retention Time (Hr)	**Accumulated Retention Time (Hr)**
Pipe diameters used for (unless otherwise noted) :				SDR 11 PE Pipe (US)						Power:	240 Volt 60 Hz										Constant for inside roughness of "C" =			140
145.00	149.00	6.00	19.00	6.00	19.00	5	63	3.00	2.83	3.24	281.00	1.55	4.34	37.94	15.00	0.00	15	52.94	32.58	91.55	5,700	62.26	0.39	2.65
146.00	147.00	3.00	3.00	3.00	3.00	2	24	2.00	1.92	2.70	80.00	1.73	1.38	51.53	15.00	0.00	15	66.53	14.99	11.99	900	75.04	0.32	3.06
147.00	148.00	6.00	9.00	6.00	9.00	3	37	2.00	1.92	4.06	210.00	3.70	7.76	50.14	15.00	0.00	15	65.14	14.99	31.48	2,700	85.76	0.28	2.74
148.00	149.00	3.00	12.00	3.00	12.00	4	41	2.00	1.92	4.57	191.00	4.60	8.79	42.38	15.00	0.00	15	57.38	14.99	28.64	3,600	125.72	0.19	2.46
149.00	153.00	6.00	37.00	6.00	37.00	6	62	3.00	2.83	3.16	280.00	1.48	4.14	33.60	15.00	0.00	15	48.60	32.58	91.23	11,100	121.67	0.20	2.26
150.00	151.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.73	83.00	1.77	1.47	47.91	15.00	0.00	15	62.91	14.99	12.44	900	72.33	0.33	2.87
151.00	152.00	6.00	9.00	6.00	9.00	3	37	2.00	1.92	4.11	211.00	3.77	7.97	46.44	15.00	0.00	15	61.44	14.99	31.63	2,700	85.35	0.28	2.54
152.00	153.00	3.00	12.00	3.00	12.00	4	41	2.00	1.92	4.60	194.00	4.65	9.03	38.48	15.00	0.00	15	53.48	14.99	29.09	3,600	123.77	0.19	2.26
153.00	157.00	6.00	55.00	6.00	55.00	7	73	4.00	3.63	2.25	276.00	0.59	1.62	29.45	15.00	0.00	15	44.45	53.85	148.62	16,500	111.02	0.22	2.07
154.00	155.00	3.00	3.00	3.00	3.00	2	25	2.00	1.92	2.75	131.00	1.80	2.36	44.76	15.00	0.00	15	59.76	14.99	19.64	900	45.82	0.52	2.80
155.00	156.00	6.00	9.00	6.00	9.00	3	37	2.00	1.92	4.16	209.00	3.86	8.07	42.40	15.00	0.00	15	57.40	14.99	31.33	2,700	86.17	0.28	2.28
156.00	157.00	2.00	11.00	2.00	11.00	4	42	2.00	1.92	4.63	138.00	4.71	6.50	34.33	15.00	0.00	15	49.33	14.99	20.69	3,300	159.50	0.15	2.00
157.00	158.00	3.00	69.00	3.00	69.00	7	73	3.00	2.83	3.74	277.00	2.01	5.58	27.83	15.00	0.00	15	42.83	32.58	90.25	20,700	229.36	0.10	1.85
158.00	159.00	2.00	188.00	2.00	188.00	11	115	4.00	3.63	3.56	183.00	1.38	2.52	22.25	15.00	0.00	15	37.25	53.85	98.54	56,400	572.36	0.04	1.75
159.00	162.00	10.00	594.00	10.00	594.00	23	241	6.00	5.35	3.44	700.00	0.82	5.76	19.74	15.00	0.00	15	34.74	116.73	817.09	178,200	218.09	0.11	1.70
160.00	161.00	3.00	3.00	3.00	3.00	2	27	2.00	1.92	2.99	76.00	2.10	1.60	16.86	15.00	0.00	15	31.86	14.99	11.39	900	78.99	0.30	2.01
161.00	162.00	2.00	5.00	2.00	5.00	3	32	2.00	1.92	3.51	46.00	2.81	1.29	15.26	15.00	0.00	15	30.26	14.99	6.90	1,500	217.50	0.11	1.71
162.00	163.00	5.00	604.00	5.00	604.00	23	242	8.00	6.96	2.04	582.00	0.23	1.34	13.97	15.00	0.00	15	28.97	197.80	1151.18	181,200	157.40	0.15	1.59
163.00	0.00	0.00	604.00	0.00	604.00	23	242	8.00	6.96	2.03	5505.00	0.23	12.63	12.63	15.00	0.00	15	27.63	197.80	10888.78	181,200	16.64	1.44	1.44
Totals/Max		**610.00**									**40,139.00**			**163**			**15**	**178**						**6**

SDR 9 PIPE PROPOSED FOR THESE ZONES

Pipe Size	Feet
1.25"	30,500.00
1.5	3,526.00
2"	15,761.00
3"	6,902.00
4"	4,997.00
6"	2,108.00

Duplex	Lift Stations
	610.00

Terminal Flushing Connections
100.00

In-Line Flushing Connections
TBD

Note: This analysis valid only with the use of E|One semi-positive displacement pumps.

APPENDIX IV: CURRENT BIDS USED FOR UNIT PRICING

SUMMARY OF PAY ITEMS FOR ACKERMAN WATER QUALITY IMPROVEMENTS - ZONES 3, 4 AND LPS

ITEM	ITEM DESCRIPTION	UOM	EST QTY	ANDREW SITEWORK		GUYMANN		FORSBERG	
GENERAL				Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
1	Pre-Installation Video - Zones 3 & 4	LS	1	$ 24,882.00	$ 24,882.00	$ 36,000.00	$ 36,000.00	$ 35,000.00	$ 35,000.00
2	Pre-Installation Video - Low Pressure Sewer Area	LS	1	$ 12,200.00	$ 12,200.00	$ 18,000.00	$ 18,000.00	$ 15,000.00	$ 15,000.00
3	Construction Survey - Zones 3 & 4	LS	1	$ 264,854.00	$ 264,854.00	$ 300,896.20	$ 300,896.20	$ 706,000.00	$ 706,000.00
4	Construction Survey - Low Pressure Sewer Area	LS	1	$ 242,203.00	$ 242,203.00	$ 218,592.00	$ 218,592.00	$ 159,000.00	$ 159,000.00
5	Temporary Erosion Control & NPDES Compliance - Zones 3 & 4	LS	1	$ 461,225.00	$ 461,225.00	$ 250,000.00	$ 250,000.00	$ 2,280,000.00	$ 2,280,000.00
6	Temporary Erosion Control & NPDES Compliance - Low Pressure Area	LS	1	$ 449,784.00	$ 449,784.00	$ 175,000.00	$ 175,000.00	$ 428,000.00	$ 428,000.00
7	Maintenance of Traffic (MOT) - Zones 3 & 4	LS	1	$ 876,705.00	$ 876,705.00	$ 376,500.00	$ 376,500.00	$ 1,361,000.00	$ 1,361,000.00
8	Maintenance of Traffic (MOT) - Low Pressure Sewer Area	LS	1	$ 955,135.00	$ 955,135.00	$ 221,500.00	$ 221,500.00	$ 219,000.00	$ 219,000.00
9	Successful Subsurface Utility Locates (Pot Holing) - Zones 3 & 4	EA	700	$ 337.00	$ 235,900.00	$ 150.00	$ 105,000.00	$ 100.00	$ 70,000.00
10	Successful Subsurface Utility Locates (Pot Holing) - Low Pressure Area	EA	500	$ 340.00	$ 170,000.00	$ 150.00	$ 75,000.00	$ 100.00	$ 50,000.00
11	Dust Abatement	DAYS	750	$ 262.00	$ 196,500.00	$ 260.00	$ 195,000.00	$ 50.00	$ 37,500.00
ACKERMAN VACUUM SEWER COLLECTION - ZONES 3 & 4									
ZONE 3 VACUUM COLLECTION SYSTEM									
12	3" PVC SDR-21 Vacuum Main	LF	1,454	$ 88.00	$ 127,952.00	$ 60.00	$ 87,240.00	$ 37.00	$ 53,798.00
13	4" PVC SDR-21 Vacuum Main	LF	12,156	$ 41.00	$ 498,396.00	$ 65.50	$ 796,218.00	$ 59.00	$ 717,204.00
14	6" PVC SDR-21 Vacuum Main	LF	6,970	$ 58.00	$ 404,260.00	$ 76.50	$ 533,205.00	$ 69.00	$ 480,930.00
15	8" PVC SDR-21 Vacuum Main	LF	4,144	$ 88.00	$ 364,672.00	$ 92.75	$ 384,356.00	$ 86.00	$ 356,384.00
16	10" PVC SDR-21 Vacuum Main	LF	4,102	$ 120.00	$ 492,240.00	$ 104.75	$ 429,684.50	$ 107.00	$ 438,914.00
17	4" PVC SDR-21 Gravity Sewer Service Lateral	LF	9,304	$ 52.00	$ 483,808.00	$ 65.75	$ 611,738.00	$ 55.00	$ 511,720.00
18	6" PVC SDR-21 Gravity Sewer Service Lateral	LF	1,298	$ 54.00	$ 70,092.00	$ 75.50	$ 97,999.00	$ 64.00	$ 83,072.00
19	Locate Balls And Marker Tape Vacuum	EA	496	$ 103.00	$ 51,088.00	$ 97.00	$ 48,112.00	$ 73.00	$ 36,208.00
20	4" Gate Valve	EA	17	$ 2,476.00	$ 42,092.00	$ 2,575.00	$ 43,775.00	$ 2,700.00	$ 45,900.00
21	6" Gate Valve	EA	9	$ 3,267.00	$ 29,403.00	$ 3,230.00	$ 29,070.00	$ 3,100.00	$ 27,900.00
22	8" Gate Valve	EA	5	$ 4,791.00	$ 23,955.00	$ 4,340.00	$ 21,700.00	$ 4,100.00	$ 20,500.00
23	10" Gate Valve	EA	4	$ 6,547.00	$ 26,188.00	$ 5,875.00	$ 23,500.00	$ 5,500.00	$ 22,000.00
24	Vacuum Valve Pit Assembly 3042 H Installation	EA	160	$ 1,331.00	$ 212,960.00	$ 5,600.00	$ 896,000.00	$ 3,300.00	$ 528,000.00
25	Vacuum Valve Pit Assembly 5442 H Installation	EA	9	$ 2,607.00	$ 23,463.00	$ 6,700.00	$ 60,300.00	$ 5,000.00	$ 45,000.00
26	Dedicated Air Terminal Installation	EA	169	$ 354.00	$ 59,826.00	$ 400.00	$ 67,600.00	$ 230.00	$ 38,870.00
27	6" PVC SDR-21 Air Terminal Line	LF	2,704	$ 70.00	$ 189,280.00	$ 72.00	$ 194,688.00	$ 41.00	$ 110,864.00
28	Valve Pit Concrete Collar (12"x12" w/ #5 Rebar Top & Bottom)	EA	15	$ 1,647.00	$ 24,705.00	$ 600.00	$ 9,000.00	$ 400.00	$ 6,000.00
ZONE 4 VACUUM COLLECTION SYSTEM									
29	3" PVC SDR-21 Vacuum Main	LF	1,866	$ 74.50	$ 139,017.00	$ 59.50	$ 111,027.00	$ 37.00	$ 69,042.00
30	4" PVC SDR-21 Vacuum Main	LF	14,964	$ 47.00	$ 703,308.00	$ 65.50	$ 980,142.00	$ 59.00	$ 882,876.00
31	6" PVC SDR-21 Vacuum Main	LF	9,590	$ 66.00	$ 632,940.00	$ 76.25	$ 731,237.50	$ 69.00	$ 661,710.00
32	8" PVC SDR-21 Vacuum Main	LF	1,296	$ 103.00	$ 133,488.00	$ 94.75	$ 122,796.00	$ 86.00	$ 111,456.00
33	10" PVC SDR-21 Vacuum Main	LF	1,698	$ 135.00	$ 229,230.00	$ 105.25	$ 178,714.50	$ 107.00	$ 181,686.00
34	4" PVC SDR-21 Gravity Sewer Service Lateral	LF	13,756	$ 45.25	$ 622,459.00	$ 66.00	$ 907,896.00	$ 55.00	$ 756,580.00
35	6" PVC SDR-21 Gravity Sewer Service Lateral	LF	2,402	$ 56.00	$ 134,512.00	$ 76.00	$ 182,552.00	$ 64.00	$ 153,728.00
36	Locate Balls And Marker Tape Vacuum	EA	424	$ 124.00	$ 52,576.00	$ 97.00	$ 41,128.00	$ 73.00	$ 30,952.00
37	4" Gate Valve	EA	16	$ 2,390.00	$ 38,240.00	$ 2,575.00	$ 41,200.00	$ 2,700.00	$ 43,200.00
38	6" Gate Valve	EA	6	$ 3,267.00	$ 19,602.00	$ 3,230.00	$ 19,380.00	$ 3,100.00	$ 18,600.00
39	10" Gate Valve	EA	1	$ 6,547.00	$ 6,547.00	$ 5,875.00	$ 5,875.00	$ 5,500.00	$ 5,500.00
40	Vacuum Valve Pit Assembly 3042 H Installation	EA	169	$ 1,276.00	$ 215,644.00	$ 5,600.00	$ 946,400.00	$ 3,300.00	$ 557,700.00
41	Vacuum Valve Pit Assembly 5442 H Installation	EA	13	$ 2,722.00	$ 35,386.00	$ 6,700.00	$ 87,100.00	$ 5,000.00	$ 65,000.00
42	Dedicated Air Terminal Installation	EA	182	$ 437.00	$ 79,534.00	$ 400.00	$ 72,800.00	$ 230.00	$ 41,860.00
43	6" PVC SDR-26 Air Terminal Line	LF	2,912	$ 63.50	$ 184,912.00	$ 70.75	$ 206,024.00	$ 41.00	$ 119,392.00
44	Valve Pit Concrete Collar (12"x12" w/ #5 Rebar Top & Bottom)	EA	20	$ 1,552.00	$ 31,040.00	$ 600.00	$ 12,000.00	$ 400.00	$ 8,000.00
WATER MAIN REPLACEMENT									
45	4" PVC C900/C905 DR18 Water Main	LF	80	$ 143.00	$ 11,440.00	$ 161.00	$ 12,880.00	$ 36.00	$ 2,880.00
46	6" PVC C900/C905 DR18 Water Main	LF	48,700	$ 47.40	$ 2,308,380.00	$ 55.50	$ 2,702,850.00	$ 38.00	$ 1,850,600.00
47	8" PVC C900/C905 DR18 Water Main	LF	6,200	$ 72.00	$ 446,400.00	$ 68.50	$ 424,700.00	$ 52.00	$ 322,400.00
48	4" Gate Valve Water Main	EA	1	$ 2,398.00	$ 2,398.00	$ 6,485.00	$ 6,485.00	$ 2,700.00	$ 2,700.00
49	6" Gate Valve Water Main	EA	62	$ 2,947.00	$ 182,714.00	$ 3,195.00	$ 198,090.00	$ 2,900.00	$ 179,800.00
50	8" Gate Valve Water Main	EA	6	$ 4,062.00	$ 24,372.00	$ 4,280.00	$ 25,680.00	$ 4,000.00	$ 24,000.00
51	Fire Hydrant Assembly	EA	38	$ 9,982.00	$ 379,316.00	$ 9,175.00	$ 348,650.00	$ 9,800.00	$ 372,400.00
52	Ductile Iron Fittings Water Main	LB	13,850	$ 28.20	$ 390,570.00	$ 10.75	$ 148,887.50	$ 12.00	$ 166,200.00
53	Wet Tapping Valve 4" pipe x 4" tap Water Main	EA	2	$ 7,675.00	$ 15,350.00	$ 8,025.00	$ 16,050.00	$ 8,300.00	$ 16,600.00
54	Wet Tapping Valve 6" pipe x 6" tap Water Main	EA	6	$ 8,577.00	$ 51,462.00	$ 8,785.00	$ 52,710.00	$ 9,000.00	$ 54,000.00
55	Wet Tapping Valve 8" pipe x 8" tap Water Main	EA	1	$ 10,655.00	$ 10,655.00	$ 11,425.00	$ 11,425.00	$ 10,700.00	$ 10,700.00
56	Temporary Main End Blow-off Assembly	EA	24	$ 2,271.00	$ 54,504.00	$ 2,950.00	$ 70,800.00	$ 2,800.00	$ 67,200.00
57	Permanent Main End Blow-off Assembly	EA	1	$ 3,801.00	$ 3,801.00	$ 5,625.00	$ 5,625.00	$ 2,800.00	$ 2,800.00
58	Locate Balls and Marker Tape Water Main	EA	909	$ 104.00	$ 94,536.00	$ 97.00	$ 88,173.00	$ 73.00	$ 66,357.00
59	Connection to Existing Water Main	EA	28	$ 1,539.00	$ 43,092.00	$ 9,850.00	$ 275,800.00	$ 2,100.00	$ 58,800.00
60	1" Water Service	LF	17,000	$ 18.00	$ 306,000.00	$ 15.50	$ 263,500.00	$ 7.00	$ 119,000.00
61	2" PVC Sch 40 Casing	LF	6,200	$ 44.00	$ 272,800.00	$ 26.00	$ 161,200.00	$ 27.00	$ 167,400.00
62	1" Corporations	EA	378	$ 474.00	$ 179,172.00	$ 156.00	$ 58,968.00	$ 180.00	$ 68,040.00
63	Service Saddle 6" x 1"	EA	331	$ 625.00	$ 206,875.00	$ 400.00	$ 132,400.00	$ 560.00	$ 185,360.00
64	Service Saddle 8" x 1"	EA	47	$ 633.00	$ 29,751.00	$ 475.00	$ 22,325.00	$ 570.00	$ 26,790.00
65	3/4" Curb Stops	EA	637	$ 312.00	$ 198,744.00	$ 150.00	$ 95,550.00	$ 210.00	$ 133,770.00
66	1" U-Branch	EA	259	$ 275.00	$ 71,225.00	$ 125.00	$ 32,375.00	$ 170.00	$ 44,030.00
67	Potable Water Meter Connection	EA	439	$ 469.00	$ 205,891.00	$ 342.00	$ 150,138.00	$ 380.00	$ 166,820.00
68	Single Meter Box and Lid	EA	119	$ 630.00	$ 74,970.00	$ 650.00	$ 77,350.00	$ 860.00	$ 102,340.00
69	Double Meter Box and Lid	EA	259	$ 630.00	$ 163,170.00	$ 700.00	$ 181,300.00	$ 860.00	$ 222,740.00
70	4" AC Pipe Removal and Disposal	LF	16,200	$ 22.40	$ 362,880.00	$ 20.50	$ 332,100.00	$ 14.00	$ 226,800.00
71	6" AC Pipe Removal and Disposal	LF	16,310	$ 21.80	$ 355,558.00	$ 26.00	$ 424,060.00	$ 15.00	$ 244,650.00
72	8" AC Pipe Removal and Disposal	LF	2,820	$ 21.00	$ 59,220.00	$ 29.20	$ 82,344.00	$ 18.00	$ 50,760.00
73	4" Non AC Pipe Removal and Disposal	LF	200	$ 22.00	$ 4,400.00	$ 17.25	$ 3,450.00	$ 11.00	$ 2,200.00
74	6" Non AC Pipe Removal and Disposal	LF	16,310	$ 20.00	$ 326,200.00	$ 25.55	$ 416,720.50	$ 11.00	$ 179,410.00
75	8" Non AC Pipe Removal and Disposal	LF	500	$ 20.00	$ 10,000.00	$ 25.00	$ 12,500.00	$ 11.00	$ 5,500.00
76	Existing Fire Hydrant Removal and Disposal	EA	36	$ 876.00	$ 31,536.00	$ 450.00	$ 16,200.00	$ 300.00	$ 10,800.00
77	4" Asbestos / PVC transition fittings	EA	5	$ 1,404.00	$ 7,020.00	$ 1,850.00	$ 9,250.00	$ 1,000.00	$ 5,000.00
78	6" Asbestos / PVC transition fittings	EA	4	$ 1,621.00	$ 6,484.00	$ 1,950.00	$ 7,800.00	$ 1,200.00	$ 4,800.00
79	8" Asbestos / PVC transition fittings	EA	1	$ 1,642.00	$ 1,642.00	$ 2,000.00	$ 2,000.00	$ 1,200.00	$ 1,200.00
80	Tie Back Assembly for 4" pipe	EA	2	$ 1,381.00	$ 2,762.00	$ 2,275.00	$ 4,550.00	$ 2,500.00	$ 5,000.00
81	Tie Back Assembly for 6" pipe	EA	12	$ 1,588.00	$ 19,056.00	$ 2,375.00	$ 28,500.00	$ 2,500.00	$ 30,000.00
82	Tie Back Assembly for 8" pipe	EA	2	$ 2,024.00	$ 4,048.00	$ 2,725.00	$ 5,450.00	$ 2,700.00	$ 5,400.00

RESTORATION										
83	Flexible Pavement Restoration for Trenches (Standard Road Detail Sheets 4 of 7, 5 of 7, 6 of 7, 7 of 7)	SY	21,100	$ 77.20	$ 1,628,920.00	$ 98.05	$ 2,068,855.00	$ 78.00	$ 1,645,800.00
84	Rigid Pavement (soil cement or concrete base) Restoration for Trenches (Standard Road Detail Sheets 1 of 7, 2 of 7, 3 of 7)	SY	1,100	$ 268.00	$ 294,800.00	$ 119.80	$ 131,780.00	$ 122.00	$ 134,200.00
85	Driveway Replacement - Concrete	SY	13,900	$ 124.00	$ 1,723,600.00	$ 109.00	$ 1,515,100.00	$ 93.00	$ 1,292,700.00
86	Driveway Replacement - Bituminous	SY	130	$ 154.00	$ 20,020.00	$ 85.50	$ 11,115.00	$ 84.00	$ 10,920.00
87	Driveway Replacement - Decorative	SY	2,800	$ 160.00	$ 448,000.00	$ 154.50	$ 432,600.00	$ 250.00	$ 700,000.00
88	Driveway Replacement - Paver	SY	280	$ 134.00	$ 37,520.00	$ 154.50	$ 43,260.00	$ 115.00	$ 32,200.00
89	Drainage Swale Restoration – Removal/Disposal of sod/silt	CY	30,670	$ 6.40	$ 196,288.00	$ 14.60	$ 447,782.00	$ 4.00	$ 122,680.00
90	Drainage Swale Restoration – Pulverizing Soil and Regrading	SY	184,000	$ 2.20	$ 404,800.00	$ 4.04	$ 743,360.00	$ 1.00	$ 184,000.00
91	Sod - Bahia	SY	147,200	$ 5.70	$ 839,040.00	$ 4.95	$ 728,640.00	$ 4.00	$ 588,800.00
92	Sod - Floratam	SY	36,800	$ 7.00	$ 257,600.00	$ 6.95	$ 255,760.00	$ 5.00	$ 184,000.00
CCU STORM WATER DRAINAGE REPLACEMENT										
93	CCU Elliptical Concrete Pipe Culvert (HE III) (12"X 18")	LF	9,200	$ 122.00	$ 1,122,400.00	$ 128.75	$ 1,184,500.00	$ 80.00	$ 736,000.00
94	CCU Elliptical Concrete Pipe Culvert (HE III) (14"X 23")	LF	224	$ 160.00	$ 35,840.00	$ 149.40	$ 33,465.60	$ 99.00	$ 22,176.00
95	CCU Elliptical Concrete Pipe Culvert (HE III) (19"X 30")	LF	72	$ 223.00	$ 16,056.00	$ 199.25	$ 14,346.00	$ 139.00	$ 10,008.00
96	CCU Concrete Pipe Culvert (Class III) (18", S/Cd)	LF	128	$ 133.00	$ 17,024.00	$ 111.95	$ 14,329.60	$ 75.00	$ 9,600.00
97	CCU Inlet (DT Bot. Type C)	EA	2	$ 6,200.00	$ 12,400.00	$ 4,710.00	$ 9,420.00	$ 2,400.00	$ 4,800.00
98	CCU Inlet (DT Bot. Type E)	EA	4	$ 9,082.00	$ 36,328.00	$ 6,300.00	$ 25,200.00	$ 4,100.00	$ 16,400.00
99	CCU Mitered End Section (12"X 18")	EA	9	$ 2,745.00	$ 24,705.00	$ 3,930.00	$ 35,370.00	$ 2,100.00	$ 18,900.00
100	CCU Mitered End Section (14"X 23")	EA	3	$ 3,287.00	$ 9,861.00	$ 3,485.00	$ 10,455.00	$ 220.00	$ 660.00
101	CCU Reconnection/Modification to Inlets and Pipes	EA	7	$ 2,396.00	$ 16,772.00	$ 6,150.00	$ 43,050.00	$ 1,800.00	$ 12,600.00
CCPW STORM WATER DRAINAGE REPLACEMENT										
102	CCPW Elliptical Concrete Pipe Culvert (HE III) (12"X 18")	LF	2,600	$ 130.20	$ 338,520.00	$ 128.75	$ 334,750.00	$ 80.00	$ 208,000.00
103	CCPW Elliptical Concrete Pipe Culvert (HE III) (14"X 23")	LF	768	$ 150.00	$ 115,200.00	$ 149.40	$ 114,739.20	$ 99.00	$ 76,032.00
104	CCPW Elliptical Concrete Pipe Culvert (HE III) (19"X 30")	LF	128	$ 222.00	$ 28,416.00	$ 199.25	$ 25,504.00	$ 139.00	$ 17,792.00
105	CCPW Elliptical Concrete Pipe Culvert (HE III) (24"X 38")	LF	200	$ 307.40	$ 61,480.00	$ 269.60	$ 53,920.00	$ 205.00	$ 41,000.00
106	CCPW Elliptical Concrete Pipe Culvert (HE III) (29"X 45")	LF	40	$ 435.00	$ 17,400.00	$ 354.00	$ 14,160.00	$ 295.00	$ 11,800.00
107	CCPW Elliptical Concrete Pipe Culvert (HE III) (34"X 53")	LF	40	$ 460.00	$ 18,400.00	$ 453.25	$ 18,130.00	$ 380.00	$ 15,200.00
108	CCPW Inlet (DT Bot. Type C)	EA	4	$ 6,368.00	$ 25,472.00	$ 4,920.00	$ 19,680.00	$ 2,400.00	$ 9,600.00
109	CCPW Inlet (DT Bot. Type E)	EA	11	$ 11,599.00	$ 127,589.00	$ 6,820.00	$ 75,020.00	$ 4,100.00	$ 45,100.00
110	CCPW Inlet (DT Bot. Type H)	EA	4	$ 11,652.00	$ 46,608.00	$ 16,300.00	$ 65,200.00	$ 8,400.00	$ 33,600.00
111	CCPW Mitered End Section (12"X 18")	EA	28	$ 2,745.00	$ 76,860.00	$ 3,390.00	$ 94,920.00	$ 2,100.00	$ 58,800.00
112	CCPW Mitered End Section (14"X 23")	EA	6	$ 3,287.00	$ 19,722.00	$ 3,845.00	$ 23,070.00	$ 2,200.00	$ 13,200.00
113	CCPW Mitered End Section (19"X 30")	EA	2	$ 3,888.00	$ 7,776.00	$ 4,860.00	$ 9,720.00	$ 2,800.00	$ 5,600.00
114	CCPW Mitered End Section (24"X 38")	EA	2	$ 5,628.00	$ 11,256.00	$ 7,350.00	$ 14,700.00	$ 3,500.00	$ 7,000.00
115	CCPW Double Mitered End Section (12"X 18")	EA	4	$ 4,567.00	$ 18,268.00	$ 9,280.00	$ 37,120.00	$ 4,300.00	$ 17,200.00
116	CCPW Double Mitered End Section (14"X 23")	EA	6	$ 5,190.00	$ 31,140.00	$ 10,590.00	$ 63,540.00	$ 4,500.00	$ 27,000.00
117	CCPW Reconnection/Modification to Inlets and Pipes	EA	34	$ 2,197.00	$ 74,698.00	$ 6,250.00	$ 212,500.00	$ 1,800.00	$ 61,200.00
LOW PRESSURE AREA										
LOW PRESSURE SEWERS										
118	3" PVC C900 DR-18 Low Pressure Force Main (LPFM), Open Cut	LF	10	$ 207.00	$ 2,070.00	$ 451.50	$ 4,515.00	$ 34.00	$ 340.00
119	4" PVC C900 DR-18 Low Pressure Force Main (LPFM), Open Cut	LF	15,120	$ 36.00	$ 544,320.00	$ 47.50	$ 718,200.00	$ 26.00	$ 393,120.00
120	4" MJ Plug Valve Assembly	EA	2	$ 4,502.00	$ 9,004.00	$ 5,540.00	$ 11,080.00	$ 4,300.00	$ 8,600.00
121	Ductile Iron Fittings Low Pressure Force Main	LB	1,140	$ 64.00	$ 72,960.00	$ 14.50	$ 16,530.00	$ 14.00	$ 15,960.00
122	Wet Tapping Valve 3" pipe x 3" tap Low Pressure Main	EA	1	$ 6,503.00	$ 6,503.00	$ 6,900.00	$ 6,900.00	$ 7,100.00	$ 7,100.00
123	Wet Tapping Valve 4" pipe x 4" tap Low Pressure Main	EA	1	$ 7,130.00	$ 7,130.00	$ 8,335.00	$ 8,335.00	$ 7,400.00	$ 7,400.00
124	Wet Tapping Valve 6" pipe x 4" tap Low Pressure Main	EA	14	$ 7,788.00	$ 109,032.00	$ 9,825.00	$ 137,550.00	$ 7,500.00	$ 105,000.00
125	Locate Balls And Marker Tape Low Pressure Force Main	EA	550	$ 106.00	$ 58,300.00	$ 97.00	$ 53,350.00	$ 65.00	$ 35,750.00
126	4" Low Pressure Clean Out Assembly	EA	20	$ 3,958.00	$ 79,160.00	$ 4,425.00	$ 88,500.00	$ 3,800.00	$ 76,000.00
127	2" SCH 40 PVC pipe (includes fittings)	LF	5,260	$ 56.00	$ 294,560.00	$ 22.75	$ 119,665.00	$ 24.00	$ 126,240.00
128	2" Brass Close Nipple	EA	220	$ 95.00	$ 20,900.00	$ 69.00	$ 15,180.00	$ 60.00	$ 13,200.00
129	Service Saddle 4" x 2"	EA	220	$ 548.00	$ 120,560.00	$ 275.00	$ 60,500.00	$ 550.00	$ 121,000.00
130	2" Brass gate valve	EA	220	$ 622.00	$ 136,840.00	$ 135.00	$ 29,700.00	$ 150.00	$ 33,000.00
131	2" SLIP x SLIP Swing check valve	EA	220	$ 346.00	$ 76,120.00	$ 100.00	$ 22,000.00	$ 130.00	$ 28,600.00
132	2" PVC Ball valve	EA	240	$ 289.00	$ 69,360.00	$ 125.00	$ 30,000.00	$ 210.00	$ 50,400.00
133	4" Non AC Pipe Removal and Disposal	LF	45	$ 26.00	$ 1,170.00	$ 42.00	$ 1,890.00	$ 11.00	$ 495.00
134	3" Non AC Pipe Removal and Disposal	LF	35	$ 34.00	$ 1,190.00	$ 39.00	$ 1,365.00	$ 11.00	$ 385.00
135	Tie Back Assembly for 4" pipe	EA	2	$ 2,012.00	$ 4,024.00	$ 5,800.00	$ 11,600.00	$ 2,500.00	$ 5,000.00
FORCE MAIN										
136	12" PVC C900/C905 DR18 Force Main	LF	110	$ 189.00	$ 20,790.00	$ 210.00	$ 23,100.00	$ 88.00	$ 9,680.00
137	10" PVC C900/C905 DR18 Force Main	LF	14	$ 320.00	$ 4,480.00	$ 310.00	$ 4,340.00	$ 96.00	$ 1,344.00
138	8" PVC C900/C905 DR18 Force Main	LF	1,158	$ 79.00	$ 91,482.00	$ 68.75	$ 79,612.50	$ 49.00	$ 56,742.00
139	10" Plug Valve	EA	1	$ 9,431.00	$ 9,431.00	$ 10,550.00	$ 10,550.00	$ 7,800.00	$ 7,800.00
140	8" Plug Valve	EA	3	$ 8,300.00	$ 24,900.00	$ 9,565.00	$ 28,695.00	$ 7,200.00	$ 21,600.00
141	Ductile Iron Fittings Force Main	LB	2,700	$ 25.50	$ 68,850.00	$ 13.50	$ 36,450.00	$ 12.00	$ 32,400.00
142	Connection To Existing Force Main	EA	4	$ 9,430.00	$ 37,720.00	$ 7,100.00	$ 28,400.00	$ 4,000.00	$ 16,000.00
143	Locate Balls And Marker Tape Force Main	EA	40	$ 483.00	$ 19,320.00	$ 97.00	$ 3,880.00	$ 65.00	$ 2,600.00
144	10" Non AC Pipe Removal and Disposal	LF	1,090	$ 21.00	$ 22,890.00	$ 38.00	$ 41,420.00	$ 11.00	$ 11,990.00
145	10" DIP Pipe Removal and Disposal	LF	170	$ 25.00	$ 4,250.00	$ 56.00	$ 9,520.00	$ 11.00	$ 1,870.00
146	10" HDPE Force Main Countryman Waterway Abandonment - Grout and Cap	LS	1	$ 12,034.00	$ 12,034.00	$ 14,100.00	$ 14,100.00	$ 10,000.00	$ 10,000.00
WATER MAIN REPLACEMENT										
147	6" PVC C900/C905 DR18 Water Main	LF	21,470	$ 54.00	$ 1,159,380.00	$ 56.50	$ 1,213,055.00	$ 34.00	$ 729,980.00
148	6" DIP CL52 Water Main	LF	20	$ 203.00	$ 4,060.00	$ 287.00	$ 5,740.00	$ 64.00	$ 1,280.00
149	8" PVC C900/C905 DR18 Water Main	LF	198	$ 113.00	$ 22,374.00	$ 141.00	$ 27,918.00	$ 57.00	$ 11,286.00
150	10" PVC C900/C905 DR18 Water Main	LF	10	$ 136.00	$ 1,360.00	$ 418.00	$ 4,180.00	$ 100.00	$ 1,000.00
151	12" PVC C900/C905 DR18 Water Main	LF	11,000	$ 105.25	$ 1,157,750.00	$ 94.10	$ 1,035,100.00	$ 89.00	$ 979,000.00
152	6" Gate Valve Water Main	EA	42	$ 3,178.00	$ 133,476.00	$ 3,230.00	$ 135,660.00	$ 2,600.00	$ 109,200.00
153	8" Gate Valve Water Main	EA	4	$ 4,293.00	$ 17,172.00	$ 42.90	$ 171.60	$ 3,500.00	$ 14,000.00
154	10" Gate Valve Water Main	EA	1	$ 5,950.00	$ 5,950.00	$ 5,850.00	$ 5,850.00	$ 4,700.00	$ 4,700.00
155	12" Gate Valve Water Main	EA	29	$ 7,202.00	$ 208,858.00	$ 7,460.00	$ 216,340.00	$ 5,600.00	$ 162,400.00
156	Fire Hydrant Assembly	EA	37	$ 9,988.00	$ 369,556.00	$ 9,175.00	$ 339,475.00	$ 8,800.00	$ 325,600.00
157	Ductile Iron Fittings Water Main	LB	16,500	$ 18.00	$ 297,000.00	$ 11.00	$ 181,500.00	$ 10.00	$ 165,000.00
158	Wet Tapping Valve 10" pipe x 6" tap Water Main	EA	2	$ 8,798.00	$ 17,596.00	$ 9,560.00	$ 19,120.00	$ 8,500.00	$ 17,000.00
159	Wet Tapping Valve 10" pipe x 10" tap Water Main	EA	3	$ 13,376.00	$ 40,128.00	$ 14,550.00	$ 43,650.00	$ 11,800.00	$ 35,400.00
160	Temporary Main End Blow-off Assembly	EA	26	$ 2,271.00	$ 59,046.00	$ 2,940.00	$ 76,440.00	$ 2,500.00	$ 65,000.00
161	Permanent Main End Blow-off Assembly	EA	1	$ 3,455.00	$ 3,455.00	$ 5,600.00	$ 5,600.00	$ 2,500.00	$ 2,500.00

162	Locate Balls and Marker Tape Water Main	EA	510	$ 122.00	$ 62,220.00	$ 98.00	$ 49,980.00	$ 65.00	$	33,150.00
163	Connection to Existing Water Main	EA	11	$ 2,281.00	$ 25,091.00	$ 9,750.00	$ 107,250.00	$ 1,900.00	$	20,900.00
164	1" Water Service	LF	12,310	$ 16.60	$ 204,346.00	$ 15.50	$ 190,805.00	$ 7.00	$	86,170.00
165	2" PVC Sch 40 Casing	LF	4,420	$ 47.30	$ 209,066.00	$ 26.00	$ 114,920.00	$ 24.00	$	106,080.00
166	1" Corporations	EA	260	$ 474.00	$ 123,240.00	$ 156.00	$ 40,560.00	$ 160.00	$	41,600.00
167	Service Saddle 6" x 1"	EA	200	$ 625.00	$ 125,000.00	$ 380.00	$ 76,000.00	$ 500.00	$	100,000.00
168	Service Saddle 12" x 1"	EA	60	$ 862.00	$ 51,720.00	$ 530.00	$ 31,800.00	$ 560.00	$	33,600.00
169	3/4" Curb Stops	EA	430	$ 314.00	$ 135,020.00	$ 140.00	$ 60,200.00	$ 190.00	$	81,700.00
170	1" U-Branch	EA	160	$ 275.00	$ 44,000.00	$ 115.00	$ 18,400.00	$ 150.00	$	24,000.00
171	Potable Water Meter Connection	EA	260	$ 599.00	$ 155,740.00	$ 342.00	$ 88,920.00	$ 340.00	$	88,400.00
172	Single Meter Box and Lid	EA	110	$ 630.00	$ 69,300.00	$ 650.00	$ 71,500.00	$ 760.00	$	83,600.00
173	Double Meter Box and Lid	EA	160	$ 630.00	$ 100,800.00	$ 700.00	$ 112,000.00	$ 760.00	$	121,600.00
174	4" AC Pipe Removal and Disposal	LF	10,770	$ 21.20	$ 228,324.00	$ 20.50	$ 220,785.00	$ 14.00	$	150,780.00
175	6" AC Pipe Removal and Disposal	LF	7,610	$ 20.70	$ 157,527.00	$ 26.00	$ 197,860.00	$ 15.00	$	114,150.00
176	8" AC Pipe Removal and Disposal	LF	8,620	$ 20.80	$ 179,296.00	$ 29.20	$ 251,704.00	$ 18.00	$	155,160.00
177	10" AC Pipe Removal and Disposal	LF	1,230	$ 23.50	$ 28,905.00	$ 33.00	$ 40,590.00	$ 19.00	$	23,370.00
178	4" Non AC Pipe Removal and Disposal	LF	780	$ 19.50	$ 15,210.00	$ 17.25	$ 13,455.00	$ 11.00	$	8,580.00
179	6" Non AC Pipe Removal and Disposal	LF	2,280	$ 19.50	$ 44,460.00	$ 22.55	$ 51,414.00	$ 11.00	$	25,080.00
180	10" DIP Pipe Removal and Disposal	LF	180	$ 21.20	$ 3,816.00	$ 29.00	$ 5,220.00	$ 11.00	$	1,980.00
181	6" AC Water Main Abandonment with Grout	LF	100	$ 83.00	$ 8,300.00	$ 49.00	$ 4,900.00	$ 22.00	$	2,200.00
182	10" HDPE Water Main Counryman Waterway Abandonment - Grout and Cap	LS	1	$ 11,286.00	$ 11,286.00	$ 12,750.00	$ 12,750.00	$ 10,000.00	$	10,000.00
183	Existing Fire Hydrant Removal and Disposal	EA	26	$ 1,063.00	$ 27,638.00	$ 450.00	$ 11,700.00	$ 300.00	$	7,800.00
184	8" Asbestos / PVC transition fittings	EA	3	$ 1,452.00	$ 4,356.00	$ 2,500.00	$ 7,500.00	$ 1,200.00	$	3,600.00
185	10" Asbestos / PVC transition fittings	EA	1	$ 2,037.00	$ 2,037.00	$ 2,700.00	$ 2,700.00	$ 1,200.00	$	1,200.00
186	Tie Back Assembly for 8" pipe	EA	4	$ 2,022.00	$ 8,088.00	$ 2,725.00	$ 10,900.00	$ 2,700.00	$	10,800.00
187	Tie Back Assembly for 10" pipe	EA	1	$ 2,498.00	$ 2,498.00	$ 2,900.00	$ 2,900.00	$ 2,700.00	$	2,700.00
AERIAL UTILITY CROSSINGS										
188	Temporary 8" PVC DR-18 Force Main	LF	220	$ 82.00	$ 18,040.00	$ 87.50	$ 19,250.00	$ 72.00	$	15,840.00
189	Temporary 8" PVC DR-18 Water Main	LF	440	$ 83.00	$ 36,520.00	$ 86.50	$ 38,060.00	$ 75.00	$	33,000.00
190	Temporary 8" Plug Valve	EA	2	$ 7,832.00	$ 15,664.00	$ 8,440.00	$ 16,880.00	$ 7,200.00	$	14,400.00
191	Temporary 8" Gate Valve	EA	4	$ 3,594.00	$ 14,376.00	$ 4,650.00	$ 18,600.00	$ 3,500.00	$	14,000.00
192	Temporary Ductile Iron Fittings Force Main	LB	350	$ 65.00	$ 22,750.00	$ 14.25	$ 4,987.50	$ 16.00	$	5,600.00
193	Temporary Ductile Iron Fittings Water Main	LB	1,600	$ 1.50	$ 2,400.00	$ 15.00	$ 24,000.00	$ 14.00	$	22,400.00
194	Temporary Connection to Existing Force Main	EA	1	$ 24,277.00	$ 24,277.00	$ 6,700.00	$ 6,700.00	$ 4,000.00	$	4,000.00
195	Temporary Wet Tapping Tee 10" pipe x 8" tap Water Main	EA	2	$ 11,350.00	$ 22,700.00	$ 9,970.00	$ 19,940.00	$ 9,900.00	$	19,800.00
196	Temporary Wet Tapping Tee 12" pipe x 8" tap Water Main	EA	2	$ 12,704.00	$ 25,408.00	$ 10,590.00	$ 21,180.00	$ 10,000.00	$	20,000.00
197	Concrete Class IV (Substructure)	CY	6	$ 11,984.00	$ 71,904.00	$ 10,420.30	$ 62,521.80	$ 10,600.00	$	63,600.00
198	Reinforcing Steel (Substructure)	LB	144	$ 25.20	$ 3,628.80	$ 22.00	$ 3,168.00	$ 22.00	$	3,168.00
199	Prestressed Concrete Piling (F&D)(14" SQ)	LF	308	$ 740.00	$ 227,920.00	$ 643.50	$ 198,198.00	$ 660.00	$	203,280.00
200	Test Pile - Prestressed Concrete (14" SQ)	LF	80	$ 790.00	$ 63,200.00	$ 686.40	$ 54,912.00	$ 700.00	$	56,000.00
201	12" DIP CL52 Force Main (Flanged Pipe)	LF	190	$ 762.00	$ 144,780.00	$ 670.00	$ 127,300.00	$ 770.00	$	146,300.00
202	12" DIP CL52 Force Main (FL x PE)	LF	20	$ 999.00	$ 19,980.00	$ 670.00	$ 13,400.00	$ 960.00	$	19,200.00
203	8" DIP CL52 Force Main (Flanged Pipe)	LF	160	$ 671.00	$ 107,360.00	$ 470.00	$ 75,200.00	$ 610.00	$	97,600.00
204	8" DIP CL52 Force Main (FL x PE)	LF	20	$ 745.00	$ 14,900.00	$ 470.00	$ 9,400.00	$ 650.00	$	13,000.00
205	Ductile Iron Fittings Force Main	LB	1,000	$ 24.80	$ 24,800.00	$ 25.00	$ 25,000.00	$ 28.00	$	28,000.00
206	12" DIP CL52 Water Main (Flanged Pipe)	LF	690	$ 935.00	$ 645,150.00	$ 570.00	$ 393,300.00	$ 670.00	$	462,300.00
207	12" DIP CL52 Water Main (FL x PE)	LF	100	$ 805.00	$ 80,500.00	$ 570.00	$ 57,000.00	$ 840.00	$	84,000.00
208	Ductile Iron Fittings Water Main	LB	2,200	$ 25.40	$ 55,880.00	$ 17.00	$ 37,400.00	$ 27.00	$	59,400.00
209	Pipe Connection Hardware (F&I) (Countryman Waterway refernce sheet DET 5)	LS	1	$ 55,520.00	$ 55,520.00	$ 62,500.00	$ 62,500.00	$ 20,000.00	$	20,000.00
210	Crawl Guard Assembly	EA	12	$ 9,408.00	$ 112,896.00	$ 7,700.00	$ 92,400.00	$ 6,900.00	$	82,800.00
211	Auto. Air Release Valve - 2" Complete Assy	EA	6	$ 5,851.00	$ 35,106.00	$ 8,900.00	$ 53,400.00	$ 5,500.00	$	33,000.00
212	Overflow french drain w/ piping to ARV	EA	2	$ 2,343.00	$ 4,686.00	$ 5,900.00	$ 11,800.00	$ 1,800.00	$	3,600.00
213	Pile Cap modifications (Ackerman Waterway) includes demolition	LS	1	$ 198,000.00	$ 198,000.00	$ 46,500.00	$ 46,500.00	$ 11,000.00	$	11,000.00
214	Pipe Support (F&I) (Ackerman Waterway)	EA	18	$ 2,030.00	$ 36,540.00	$ 3,350.00	$ 60,300.00	$ 1,600.00	$	28,800.00
FIBER OPTIC CARRIER PIPE										
215	2" HDPE Conduit Installation (Owner provided)	LF	980	$ 25.00	$ 24,500.00	$ 26.00	$ 25,480.00	$ 14.00	$	13,720.00
216	Pullbox Installation (Owner provided)	EA	2	$ 3,760.00	$ 7,520.00	$ 1,501.00	$ 3,002.00	$ 310.00	$	620.00
RESTORATION										
217	Flexible Pavement Restoration for Trenches (Standard Road Detail Sheets 4 of 7, 5 of 7, 6 of 7, 7 of 7)	SY	13,110	$ 83.00	$ 1,088,130.00	$ 98.05	$ 1,285,435.50	$ 78.00	$	1,022,580.00
218	Rigid Pavement (soil cement or concrete base) Restoration for Trenches (Standard Road Detail Sheets 1 of 7, 2 of 7, 3 of 7)	SY	660	$ 291.00	$ 192,060.00	$ 119.80	$ 79,068.00	$ 122.00	$	80,520.00
219	Driveway Replacement - Concrete	SY	5,420	$ 116.20	$ 629,804.00	$ 109.00	$ 590,780.00	$ 93.00	$	504,060.00
220	Driveway Replacement - Bituminous	SY	30	$ 246.00	$ 7,380.00	$ 85.50	$ 2,565.00	$ 84.00	$	2,520.00
221	Driveway Replacement - Decorative	SY	1,540	$ 194.00	$ 298,760.00	$ 154.50	$ 237,930.00	$ 250.00	$	385,000.00
222	Driveway Replacement - Paver	SY	180	$ 104.00	$ 18,720.00	$ 154.50	$ 27,810.00	$ 115.00	$	20,700.00
223	Driveway Replacement - Rock/Gravel	SY	40	$ 54.40	$ 2,176.00	$ 58.00	$ 2,320.00	$ 50.00	$	2,000.00
224	Drainage Swale Restoration – Removal/Disposal of sod/silt	CY	18,990	$ 8.90	$ 169,011.00	$ 14.60	$ 277,254.00	$ 4.00	$	75,960.00
225	Drainage Swale Restoration – Pulverizing Soil and Regrading	SY	103,580	$ 4.75	$ 492,005.00	$ 4.04	$ 418,463.20	$ 1.00	$	103,580.00
226	Sod - Bahia	SY	85,750	$ 5.70	$ 488,775.00	$ 4.95	$ 424,462.50	$ 4.00	$	343,000.00
227	Sod - Floratam	SY	17,150	$ 7.00	$ 120,050.00	$ 6.95	$ 119,192.50	$ 5.00	$	85,750.00
228	Elliptical Concrete Pipe Culvert (HE III) (12"X 18")	LF	4,560	$ 125.20	$ 570,912.00	$ 126.00	$ 574,560.00	$ 80.00	$	364,800.00
229	Elliptical Concrete Pipe Culvert (HE III) (14"X 23")	LF	30	$ 149.00	$ 4,470.00	$ 147.20	$ 4,416.00	$ 99.00	$	2,970.00
230	Mitered End Section (12"X18")	EA	18	$ 2,745.00	$ 49,410.00	$ 3,375.00	$ 60,750.00	$ 2,100.00	$	37,800.00
231	Reconnection/Modification to Existing Catch Inlets and Pipes	EA	2	$ 1,966.00	$ 3,932.00	$ 5,400.00	$ 10,800.00	$ 1,800.00	$	3,600.00
MISCELLANEOUS - ZONES 3 & 4 AND LOW PRESSURE AREA										
232	Power Company Temporary Pole Support	EA	15	$ 1,518.00	$ 22,770.00	$ 2,000.00	$ 30,000.00	$ 500.00	$	7,500.00
233	Imported Fill Compacted In Place Measure	CY	2,000	$ 70.40	$ 140,800.00	$ 25.00	$ 50,000.00	$ 10.00	$	20,000.00
234	Rock Excavation	CY	22,500	$ 6.90	$ 155,250.00	$ 1.00	$ 22,500.00	$ 20.00	$	450,000.00
235	As-Built Drawings - Vacuum Collection System Zones 3 & 4	LS	1	$ 40,360.00	$ 40,360.00	$ 137,871.80	$ 137,871.80	$ 323,000.00	$	323,000.00
236	As-Built Drawings - Potable Water Zones 3 & 4	LS	1	$ 45,360.00	$ 45,360.00	$ 47,520.00	$ 47,520.00	$ 101,000.00	$	101,000.00
237	As-Built Drawings - Storm Sewer & Driveway Culverts Zones 3 & 4	LS	1	$ 47,830.00	$ 47,830.00	$ 9,504.00	$ 9,504.00	$ 20,000.00	$	20,000.00
238	As-Built Drawings - Low Pressure Sewer System	LS	1	$ 44,155.00	$ 44,155.00	$ 104,544.00	$ 104,544.00	$ 80,000.00	$	80,000.00
239	As-Built Drawings - Potable Water Low Pressure Area	LS	1	$ 44,251.00	$ 44,251.00	$ 47,520.00	$ 47,520.00	$ 53,000.00	$	53,000.00
240	As-Built Drawings - Aerial Utility Crossings Low Pressure Area	LS	1	$ 41,625.00	$ 41,625.00	$ 4,752.00	$ 4,752.00	$ 40,000.00	$	40,000.00
241	As-Built Drawings - Storm Sewer & Driveway Culverts Low Pressure Area	LS	1	$ 45,420.00	$ 45,420.00	$ 9,504.00	$ 9,504.00	$ 11,000.00	$	11,000.00
242	Project Sign Furnished and Installed	LS	1	$ 12,585.00	$ 12,585.00	$ 3,500.00	$ 3,500.00	$ 12,052.00	$	12,052.00

RFB2023-3532
RIO EAST (JENSEN BEACH) WATER & FORCE MAIN EXTENSIONS
(CORRECTED)

This form shall be typewritten. Handwritten forms will not be accepted.

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
	GENERAL				
G-1	Pre-Construction Video	1	LS	$ 2,500.00	$ 2,500.00
G-2	Mobilization	1	LS	$ 20,000.00	$ 20,000.00
G-3	Maintenance of Traffic	1	LS	$ 2,750.00	$ 2,750.00
G-4	Construction Stake-Out	1	LS	$ 2,000.00	$ 2,000.00
G-5	Site Restoration	1	LS	$ 3,500.00	$ 3,500.00
G-6	Restoration / Sodding (Bahia)	1	LS	$ 3,750.00	$ 3,750.00
G-7	Record Drawings / As-Built Survey	1	LS	$ 80,000.00	$ 80,000.00
	FORCE MAIN EXTENSION				
F-1	2" SDR 11 (IPS) HDPE FM (By HDD-NW Crossing)	6,732	LF	$ 18.00	$ 121,176.00
F-2	3" SDR 11 (IPS) HDPE FM (By HDD-NW Crossing)	9,766	LF	$ 20.00	$ 195,320.00
F-3	2" SDR 11 (IPS) HDPE FM (By Open Cut)	54	LF	$ 18.00	$ 972.00
F-4	3" SDR 11 (IPS) HDPE FM (By Open Cut)	619	LF	$ 20.00	$ 12,380.00
F-5	2" Gate Valve	22	EA	$ 1,550.00	$ 34,100.00
F-6	3" Gate Valve	15	EA	$ 2,100.00	$ 31,500.00
F-7	3" x 2" Reducer	14	EA	$ 175.00	$ 2,450.00
F-8	2" x 2" Tee	1	EA	$ 175.00	$ 175.00
F-9	3" x 2" Tee	7	EA	$ 175.00	$ 1,225.00
F-10	3" x 3" Tee	8	42	$ 175.00	$ 1,400.00
F-11	2"-22.5° Bends	4	EA	$ 120.00	$ 480.00
F-12	3"-22.5° Bends	6	EA	$ 120.00	$ 720.00
F-13	2"-45° Bends	2	EA	$ 120.00	$ 240.00
F-14	3"-45° Bends	20	EA	$ 120.00	$ 2,400.00
F-15	2"-90° Bends	1	EA	$ 120.00	$ 120.00
F-16	Asphalt Trench Repair (to 15 SY)	1	EA	$ 2,500.00	$ 2,500.00
F-17	3" In-Line Flushing Port	16	EA	$ 1,800.00	$ 28,800.00
F-18	Terminal Flushing Port	21	EA	$ 1,800.00	$ 37,800.00
F-19	1-1/4" Single Sanitary Service (Short)	115	EA	$ 1,200.00	$ 138,000.00
F-20	1-1/4" Double Sanitary Service (Short)	25	EA	$ 1,400.00	$ 35,000.00
F-21	1-1/4" Single Sanitary Service (Long)	105	EA	$ 1,300.00	$ 136,500.00
F-22	1-1/4" Double Sanitary Service (Long)	31	EA	$ 1,800.00	$ 55,800.00
F-23	Remove and Replace Exist. Concrete Sidewalk	3	SY	$ 50.00	$ 150.00
F-24	Remove and Replace Exist. Asphalt Pavement	191	SY	$ 50.00	$ 9,550.00
F-25	Connect to Exist. Force Main (incl. 4" x 3" Tapping Sleeve & Valve & any PVC required)	6	EA	$ 4,750.00	$ 28,500.00
	WATER MAIN (NE SEAVIEW DRIVE and NE PATRICIAN STREET)				
W-1	6" PVC Water Main (By Open Cut)	42	LF	$ 80.00	$ 3,360.00
W-2	6" HDPE Water Main (By HDD-Non Water Crossing)	522	LF	$ 30.00	$ 15,660.00
W-3	6" Gate Valve	1	EA	$ 2,100.00	$ 2,100.00
W-4	6" Gate Valve & Plug	2	EA	$ 2,500.00	$ 5,000.00
W-5	6"x6" Tee	1	EA	$ 2,500.00	$ 2,500.00
W-6	6"-45° Bends	4	EA	$ 550.00	$ 2,200.00
W-7	6"-90° Bend	1	EA	$ 550.00	$ 550.00
W-8	Fire Hydrant Assembly (incl. 6" GV, Gradelok, Swivel Tee and 90° Bend as needed	1	EA	$ 7,500.00	$ 7,500.00
W-9	Sample Points	2	EA	$ 740.00	$ 1,480.00
W-10	1" Single Water Service (Short)	2	EA	$ 1,300.00	$ 2,600.00
W-11	1" Double Water Service (Short)	1	EA	$ 1,600.00	$ 1,600.00
W-12	1" Single Water Service (Long)	2	EA	$ 1,700.00	$ 3,400.00
W-13	1" Double Water Service (Long)	1	EA	$ 3,600.00	$ 3,600.00
W-14	2" Single Water Service (Short)	1	EA	$ 4,000.00	$ 4,000.00
W-15	2" Filling and Flushing	2	SY	$ 2,100.00	$ 4,200.00
W-16	Asphalt Trench Repair (to 15 SY)	15	SY	$ 100.00	$ 1,500.00
W-17	Connect to Exist. WM (incl. all necessary items)	1	EA	$ 1,700.00	$ 1,700.00
				TOTAL	**$ 1,054,708.00**

CHECK TOTALS! The County is not responsible for mathematical errors.

WIMAUMA AREA 1
PHASE 1 OFFSITE FM AND PHASE 2 VACUUM STATION

SECTION 10 GENERAL **Date: 8/30/24**

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
10.100	Mobilization	1	LS	$ 300,000.00	$ 300,000.00
10.102	Project Record Documents (a minimum of 1% of the total of all bid items except bid items under section 10.1 General)	1	LS	$ 50,000.00	$ 50,000.00
10.103	Maintenance of Traffic	1	LS	$ 30,000.00	$ 30,000.00

SECTION 11 SITEWORK

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
11.100	Erosion and Sediment Control	1	LS	$ 15,000.00	$ 15,000.00
11.103	Unsuitable Materials	450	CY	$ 20.00	$ 9,000.00
11.104	Rock Excavation	250	CY	$ 200.00	$ 50,000.00
11.105	Fill Dirt	700	CY	$ 68.00	$ 47,600.00
11.202.1	Sod Replacement (bahia)	1,500	SY	$ 4.85	$ 7,275.00
11.202.1	Sod Replacement (st argentine)	250	SY	$ 7.75	$ 1,937.50
11.204	Trench Repair	330	SY	$ 88.00	$ 29,040.00
11.205	1 1/2" Milling Public Works Red Hatch Area	1,400	SY	$ 7.00	$ 9,800.00
11.206	1 1/2" OverlayPublic Works Red Hatch Area	1,400	SY	$ 20.25	$ 28,350.00
11.207.1	Driveway Replacement Concrete	50	SY	$ 112.00	$ 5,600.00
11.207.2	Driveway Replacement Asphalt with 6” Base	200	SY	$ 83.00	$ 16,600.00
11.207.3	Driveway Replacement Pea Gravel/Rock with 6” Base	-	SY	$ 35.00	$ -
11.207.4	Driveway Replacement Shell/Dirt with 6” Base	-	SY	$ 20.00	$ -
11.207.5	Driveway Replacement Paver with 6” Base	-	SY	$ 90.00	$ -
11.208.x	Concrete Sidewalk (4")	40	SY	$ 84.00	$ 3,360.00
11.209	Protective Concrete slab (2.6'x24'x4")	5	CY	$ 500.00	$ 2,500.00
11.210	Concrete Curb and/or Curb and Gutter Replacement	100	LF	$ 80.00	$ 8,000.00

SECTION 12 FORCEMAIN

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
12.100.1	6" PVC Forcemain (Open Cut)	5	LF	$ 570.00	$ 2,850.00
12.100.2	8" PVC Forcemain (Open Cut)	10	LF	$ 165.00	$ 1,650.00
12.100.3	12" PVC Forcemain (Open Cut)	800	LF	$ 235.00	$ 188,000.00
12.101.1	12" PVC Forcemain (Non Water Crossing HDD)	4,620	LF	$ 215.50	$ 995,610.00
12.200.1	8" Plug Valve with Box	1	EA	$ 7,000.00	$ 7,000.00
12.200.2	12" Plug Valve with Box	6	EA	$ 9,000.00	$ 54,000.00
12.300.1	Ductile Iron Fittings	2,200	LB	$ 15.00	$ 33,000.00
12.400	2" Auto. ARV Assembly with Box and Cover	4	EA	$ 14,775.00	$ 59,100.00
12.500.1	Connections to Exist. Force Main (incl. all appurtenances and disconnections)	2	LS	$ 9,800.00	$ 19,600.00
12.600	8" Pipe Removal and Disposal	260	LF	$ 30.00	$ 7,800.00

SECTION 13 VACUUM SEWER COLLECTION SYSTEM

ITEM	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL
13.100.1	3" PVC SDR-21 Vacuum Main	50	LF	$ 122.00	$ 6,100.00
13.100.2	4" PVC SDR-21 Vacuum Main	-	LF	$ 145.00	$ -
13.100.3	6" PVC SDR-21 Vacuum Main	-	LF	$ 165.00	$ -
13.100.4	8" PVC SDR-21 Vacuum Main	-	LF	$ 181.00	$ -
13.100.5	10" PVC SDR-21 Vacuum Main	750	LF	$ 215.00	$ 161,250.00
13.100.6	4" PVC SDR-26 Gravity Lateral	20	LF	$ 110.00	$ 2,200.00
13.100.7	6" PVC SDR-26 Gravity Lateral	60	LF	$ 118.00	$ 7,080.00
13.100.8	6" PVC SDR-26 Air Terminal Feeds	30	LF	$ 50.00	$ 1,500.00
13.300.1	4" Gate Valve with Box	-	EA	$ 5,000.00	$ -
13.300.2	6" Gate Valve with Box	-	EA	$ 5,800.00	$ -
13.300.3	8" Gate Valve with Box	-	EA	$ 6,500.00	$ -
13.300.4	10" Gate Valve with Box	2	EA	$ 7,800.00	$ 15,600.00
13.400.1	6' Valve Pit Assembly - Assemble, Testing and Installation of Airvac Pit Packages	3	EA	$ 7,750.00	$ 23,250.00
13.400.2	8' Valve Pit Assembly - Assemble, Testing and Installation of Airvac Pit Packages	-	EA	$ 12,000.00	$ -
13.400.4	Dedicated Air Intake Terminal - Installation	3	EA	$ 1,000.00	$ 3,000.00
13.400.6	Valve Pit Concrete Collar 12"x12" w/ #5 Rebar Top & Bottom	3	EA	$ 1,770.00	$ 5,310.00

CHARLOTTE COUNTY BOARD OF COMMISSIONERS
BID TABULATION
ACKERMAN PLUMBING ZONES 1 AND 2 - PLUMBING CONTRACT 3
BID NO. 2023000711

DUE DATE: OCTOBER 18, 2023 **DEPARTMENT: UTILITIES**

	Company Names ►			ROHALEY AND SONS PLUMBING CONTRACTORS		CLOSE CONSTRUCTION SERVICES LLC	
	Location ►			FORT MYERS, FL		OKEECHOBEE, FL	
	Description ▼	EST QTY	UOM	UNIT PRICE	EXTENDED PRICE	UNIT PRICE	EXTENDED PRICE
1	Erosion and Sediment Control, Silt Fence	9,200	LF	$ 0.05	$ 460.00	$ 2.00	$ 18,400.00
2	Rock Excavation	173	CY	$ 125.00	$ 21,625.00	$ 110.00	$ 19,030.00
3	Pump Out Existing Septic Tank	115	EA	$ 450.00	$ 51,750.00	$ 450.00	$ 51,750.00
4	Remove and Abandon Existing Septic Tank (plastic or fiberglass tank)	29	EA	$ 650.00	$ 18,850.00	$ 1,000.00	$ 29,000.00
5	Abandon Existing Septic Tank (concrete tank)	86	EA	$ 600.00	$ 51,600.00	$ 650.00	$ 55,900.00
6	Imported Fill Installed & Compacted (Est. 6 CY/tank abandoned) CV	345	CY	$ 30.00	$ 10,350.00	$ 60.00	$ 20,700.00
7	County Fill Installed & Compacted (Est. 6 Cy/tank abandoned)CV	345	CY	$ 20.00	$ 6,900.00	$ 30.00	$ 10,350.00
8	Fill Existing Septic Tank with Grout/Flowable Fill	70	CY	$ 120.00	$ 8,400.00	$ 300.00	$ 21,000.00
9	4” SDR 26 or SCH 40 PVC Sewer Service Lateral Line from Building	6,325	LF	$ 38.00	$ 240,350.00	$ 40.00	$ 253,000.00
10	2” SDR 26 or SCH 40 PVC Sewer Service Lateral Line from Building	115	LF	$ 0.05	$ 5.75	$ 40.00	$ 4,600.00
11	3” SDR 26 or SCH 40 PVC Sewer Service Lateral Line from Building	115	LF	$ 0.05	$ 5.75	$ 45.00	$ 5,175.00
12	4” Sanitary Sewer Cleanout	115	EA	$ 100.00	$ 11,500.00	$ 350.00	$ 40,250.00
13	Connect Building to Existing Sanitary Sewer Stub	115	EA	$ 275.00	$ 31,625.00	$ 400.00	$ 46,000.00
14	Concrete Flat Work Restoration – 4” Thickness	230	SY	$ 15.00	$ 3,450.00	$ 110.00	$ 25,300.00
15	Concrete Flat Work Restoration – 6” Thickness	115	SY	$ 0.05	$ 5.75	$ 135.00	$ 15,525.00
16	Driveway Restoration (bituminous)	230	SY	$ 0.05	$ 11.50	$ 90.00	$ 20,700.00
17	Driveway Restoration (concrete)	345	SY	$ 20.00	$ 6,900.00	$ 125.00	$ 43,125.00
18	Sod (Argentine Bahia)	6,400	SY	$ 1.50	$ 9,600.00	$ 4.00	$ 25,600.00
19	Sod (Floratam)	1,600	SY	$ 2.00	$ 3,200.00	$ 6.00	$ 9,600.00
20	Pre-Work Video/Photography	1	LS	$ 1,200.00	$ 1,200.00	$ 2,500.00	$ 2,500.00
21	Maintenance of Traffic (MOT)	1	LS	$ 1,350.00	$ 1,350.00	$ 5,000.00	$ 5,000.00
22	Plumbing Permit Fees	115	EA	$ 60.00	$ 6,900.00	$ 100.00	$ 11,500.00
SUB-TOTAL				**$**	**486,038.75**	**$**	**734,005.00**
Mobilization/Demobilization		**5%**		**$**	**24,301.94**	**$**	**36,700.25**
TOTAL COST				**$**	**510,340.69**	**$**	**770,705.25**
Delivery Time from Notice of Award (calendar days)					**75**		**30**
All work shall be completed within 140 calendar days							

Wittnessed by Kathleen Lindback, CPPB, Senior Contract Specialist and Sheri Strong, Contract Specialist

CHARLOTTE COUNTY BOARD OF COMMISSIONERS
BID TABULATION
ACKERMAN VACUUM SEWER ZONES 1 AND 2 - PLUMBING CONTRACT 4
BID NO. 2024000216

DUE DATE: FEBRUARY 7, 2024 **DEPARTMENT: UTILITIES**

Company Names ►			Rohaley & Sons Plumbing Contractors, Inc.			
Location ►			Fort Myers, FL			
Description ▼	EST QTY	UOM	UNIT PRICE	EXTENDED PRICE	UNIT PRICE	EXTENDED PRICE
Erosion And Sediment Control, Silt Fence	8,000	LF	$ 0.10	$ 800.00		$ -
Rock Excavation	150	CY	$ 125.00	$ 18,750.00		$ -
Pump Out Existing Septic Tank	100	EA	$ 465.00	$ 46,500.00		$ -
Remove and Abandon Existing Septic Tank (plastic or fiberglass tank)	25	EA	$ 675.00	$ 16,875.00		$ -
Abandon Existing Septic Tank (concrete tank)	75	EA	$ 625.00	$ 46,875.00		$ -
Imported Fill Installed & Compacted(estimated 6 CY per tank abandoned) CV	300	CY	$ 50.00	$ 15,000.00		$ -
County Fill Installed & Compacted (estimated 6 CY per tank abandoned) CV	300	CY	$ 25.00	$ 7,500.00		$ -
Fill Existing Septic Tank with Grout/ Flowable Fill	60	CY	$ 120.00	$ 7,200.00		$ -
4" SDR 26 or SCH 40 PVC sewer service lateral line from building	5,500	LF	$ 40.00	$ 220,000.00		$ -
2" SDR 26 or SCH 40 PVC sewer service lateral line from building	100	LF	$ -	$ -		$ -
3" SDR 26 or SCH 40 PVC sewer service lateral line from building	100	LF	$ -	$ -		$ -
4" Sanitary Sewer Cleanout	100	EA	$ 100.00	$ 10,000.00		$ -
Connect Building to Existing Sanitary Sewer Stub	100	EA	$ 275.00	$ 27,500.00		$ -
Concrete Flat Work Restoration, 4" thickness	200	SY	$ 15.00	$ 3,000.00		$ -
Concrete Flat Work Restoration, 6" thickness	100	SY	$ 25.00	$ 2,500.00		$ -
Driveway Restoration (bituminous)	200	SY	$ 20.00	$ 4,000.00		$ -
Driveway Restoration (concrete)	300	SY	$ 20.00	$ 6,000.00		$ -
Sod (Argentine Bahia)	5,600	SY	$ 3.00	$ 16,800.00		$ -
Sod (Floratam)	1,400	SY	$ 3.75	$ 5,250.00		$ -
Pre-work Video/Photography	1	LS	$ 1,350.00	$ 1,350.00		$ -
Maintenance of Traffic (MOT)	1	LS	$ 1,500.00	$ 1,500.00		$ -
Plumbing Permit Fees	100	EA	$ 60.00	$ 6,000.00		$ -
ESTIMATED SUB-TOTAL:			$	463,400.00	$	-
Mobilization/Demobilization (5% of Bid Sub-Total)		5%	$	23,170.00	$	-
ESTIMATED BID TOTAL:			$	486,570.00	$	-
Completion Time			135	Calendar Days		Calendar Days
Notice Needed Prior to Commencement			180	Calendar Days		Calendar Days

Witnessed by Stacey Trowbridge, Contract Specialist and Sheri Strong, Contract Specialist

CHARLOTTE COUNTY BOARD OF COMMISSIONERS
BID TABULATION
ACKERMAN VACUUM SEWER ZONES 1 AND 2 - PLUMBING CONTRACT 5
BID NO. 2024000294

DUE DATE: MARCH 13, 2024 **DEPARTMENT: UTILITIES**

Company Names ►			Rohaley & Sons Plumbing Contractors, Inc.			
Location ►			Fort Myers, FL			
Description ▼	EST QTY	UOM	UNIT PRICE	EXTENDED PRICE	UNIT PRICE	EXTENDED PRICE
Erosion And Sediment Control, Silt Fence	8,000	LF	$ 0.05	$ 400.00		$ -
Rock Excavation	150	CY	$ 125.00	$ 18,750.00		$ -
Pump Out Existing Septic Tank	100	EA	$ 465.00	$ 46,500.00		$ -
Remove and Abandon Existing Septic Tank (plastic or fiberglass tank)	25	EA	$ 675.00	$ 16,875.00		$ -
Abandon Existing Septic Tank (concrete tank)	75	EA	$ 650.00	$ 48,750.00		$ -
Imported Fill Installed & Compacted (estimated 6 CY per tank abandoned) CV	300	CY	$ 50.00	$ 15,000.00		$ -
County Fill Installed & Compacted (estimated 6 CY per tank abandoned) CV	300	CY	$ 25.00	$ 7,500.00		$ -
Fill Existing Septic Tank with Grout/ Flowable Fill	60	CY	$ 150.00	$ 9,000.00		$ -
4" SDR 26 or SCH 40 PVC sewer service lateral line from building	5,500	LF	$ 40.00	$ 220,000.00		$ -
2" SDR 26 or SCH 40 PVC sewer service lateral line from building	100	LF	$ -	$ -		$ -
3" SDR 26 or SCH 40 PVC sewer service lateral line from building	100	LF	$ -	$ -		$ -
4" Sanitary Sewer Cleanout	100	EA	$ 100.00	$ 10,000.00		$ -
Connect Building to Existing Sanitary Sewer Stub	100	EA	$ 275.00	$ 27,500.00		$ -
Concrete Flat Work Restoration, 4" thickness	200	SY	$ 15.00	$ 3,000.00		$ -
Concrete Flat Work Restoration, 6" thickness	100	SY	$ 25.00	$ 2,500.00		$ -
Driveway Restoration (bituminous)	200	SY	$ 20.00	$ 4,000.00		$ -
Driveway Restoration (concrete)	300	SY	$ 25.00	$ 7,500.00		$ -
Sod (Argentine Bahia)	5,600	SY	$ 3.00	$ 16,800.00		$ -
Sod (Floratam)	1,400	SY	$ 3.75	$ 5,250.00		$ -
Pre-work Video/Photography	1	LS	$ 1,350.00	$ 1,350.00		$ -
Maintenance of Traffic (MOT)	1	LS	$ 1,500.00	$ 1,500.00		$ -
Plumbing Permit Fees	100	EA	$ 60.00	$ 6,000.00		$ -
ESTIMATED SUB-TOTAL:			$	$ 468,175.00	$	$ -
Mobilization/Demobilization (5% of Bid Sub-Total)		5%	$	$ 23,408.75	$	$ -
TOTAL ESTIMATED BID COST:			$	$ 491,583.75	$	$ -
Completion Time			135 Calendar Days			Calendar Days
Notice Needed Prior to Commencement			262 Calendar Days			Calendar Days

Non-Responsive:
SOS Septic and Sewer

APPENDIX V: UPDATED COST ESTIMATES

DON PEDRO / KNIGHT ISLAND & LITTLE GASPARILLA ISLAND COLLECTION SYSTEM						
DESCRIPTION	UNIT	UNIT PRICE	CURRENT COSTS TO SERVE EXISTING HOMES (2024 $)		FUTURE COSTS TO SERVE BUILDOUT (2024 $)	
			EST. QTY.	EXTENDED PRICE	EST. QTY.	EXTENDED PRICE
General						
Surveying (% of Main Line Installation)	LS	5.0%	1	$ 233,132	0	$ -
Engineering Design & Permitting (% of Contractor Bid)	LS	17.5%	1	$ 1,044,430	0	$ -
Environmental Services	LS	$ 100,000	1	$ 100,000	0	$ -
Easement Acquisition *(see Easement Calculations)*	LS	$ 115,000	1	$ 115,000	0	$ -
Appraisal Fees	LS	$ 10,000	1	$ 10,000	0	$ -
Easement Legal Documents	EA	$ 500	195	$ 97,500	0	$ -
Sub-Total General						
				$ 1,600,062		***$ -***
Pressure Sewer Main Lines (Includes Fittings)						
1.5" HDPE Pressure Sewer Main	LF	$ 34	3,654	$ 124,236	0	$ -
2" HDPE Pressure Sewer Main	LF	$ 34	24,172	$ 821,848	0	$ -
3" HDPE Pressure Sewer Main	LF	$ 34	22,347	$ 759,798	0	$ -
4" HDPE Pressure Sewer Main	LF	$ 37	15,538	$ 574,906	0	$ -
6" HDPE Pressure Sewer Main	LF	$ 48	5,316	$ 255,168	0	$ -
8" HDPE Pressure Sewer Main	LF	$ 65	587	$ 38,155	0	$ -
8" Directional Drill (LGI to Mainland Tie-in)	LF	$ 300	5,500	$ 1,650,000	0	$ -
Master Meter	EA	$ 25,000	1	$ 25,000	0	$ -
Terminal Flushing Connections	EA	$ 1,800	118	$ 212,400	0	$ -
In-Line Flushing Connections	EA	$ 1,800	34	$ 61,200	0	$ -
Main Line Road Crossings Trench Repair and Overlay - Asphalt Roads (PVC Pipe)	LF	$ 225	45	$ 10,125	0	$ -
Open Cut Trench Repair and Overlay - Asphalt Roads (Service Laterals Directional Drilled)	EA	$ -	48	$ -	0	$ -
Restoration - Concrete Driveways	EA	$ 2,200	59	$ 129,800	0	$ -
Sub-Total Main Lines						
				$ 4,662,636		***$ -***
Other Costs (Main Line Installation)						
Misc. Contractor Costs (Mobilization / MOT / Bond), (% of Main Line Installation)	LS	18.0%	1	$ 839,274	0	$ -
Barrier Island Barge & Access Costs (% of Main Line Installation)	LS	10.0%	1	$ 466,264	0	$ -
Construction Survey (% of Main Line Installation)	LS	2.5%	1	$ 116,566	0	$ -
Construction Engineering Services (% of Contractor Bid)	LS	7.5%	1	$ 447,613	0	$ -
As-Builts (% of Main Line Installation)	LS	1.5%	1	$ 69,940	0	$ -
Sub-Total Other Costs (Pressure Sewer Main Lines)						
				$ 1,939,657		***$ -***
Sub-Total Construction Cost of Main Lines						
				$ 8,202,355		***$***
On-Lot Costs						
Pump, Crush and Fill Existing Septics	EA	$ 1,500	810	$ 1,215,000	0	$
Grinder Lift Stations	EA	$ 7,300	810	$ 5,913,000	438	$ 3,197,4[illegible]
Grinder Lift Station Transportation	LS	$ 150,000	1	$ 97,356	1	$ 52,64[illegible]
On Site 1.25" HDPE Lateral Connection (75 LF per home @ $14.50/LF)	EA	$ 1,088	810	$ 880,875	438	$ 476,32[illegible]
On Site Laterals Overhead/Miscellaneous	LS	30%	1	$ 264,263	1	$ 142,898
Sub-Total On-Lot Construction Costs						
				$ 8,370,493		***$ 3,869,267***
SUB-TOTAL				**$ 16,572,848**		**$ 3,869,267**
ENGINEERS OPINION OF PROBABLE COST				**$ 16,573,000**		**$ 3,870,000**

APPENDIX VI: "EASEMENT VALUATION" BY DONALD SHERWOOD, SR/WA

Easement Valuation

With the ever-expanding Barnett Shale gas field in North Central Texas, the valuation of easements places an increasing demand on appraisers to correctly evaluate pipeline easements and their impact on market value. This treatise is not limited to gas pipelines but is an attempt to provide some thought on how to value easements in general. The valuation of easements requires knowledge of a wide variety of market factors and a look at the rights included in the easement document.

BY DONALD SHERWOOD, SR/WA

First, what is an easement? According to the Dictionary of Real Estate Appraisal, an easement is the "conveyance of certain property rights, but not ownership, to a parcel of real estate." By definition, the ownership of real estate is endowed with a bundle of rights. The concept of bundle of rights maintains that like a bundle of sticks, real property ownership may be wholly intact (fee simple estate) or may be conveyed in part to a third party.

In real property ownership, one has the inherent right to use the property, to sell it, to lease it, to enter upon it, to give it away or the right to refuse to do any of these things. For example, the creation of a lease conveys to the tenant a portion of one's rights for the specific term and space occupied by the tenant according to the terms of the lease. During the lease period, the tenant may have a measurable interest in the property (leasehold estate). The creation of an easement is somewhat similar in that we are dealing with concepts of time and space. By definition, the creation of an easement conveys a portion of the total bundle of rights to a third party. The challenge before the appraiser is the measurement in terms of dollars of the market value of the rights conveyed.

With respect to time, easements may be either permanent or temporary in nature, with either specific or indefinite time frames. One of the most common temporary easements is a temporary construction easement (TCE). This type of easement is generally used to facilitate construction of a project and either terminates at the end of construction or at the end of a specific use period. For example, a 25-foot-wide permanent easement may not provide ample space for construction. An additional 15 feet may be needed for the actual construction and would be acquired as a temporary construction easement.

CLASSES OF EASEMENT

In terms of space, three broad classes of easements exist and include subsurface, surface and overhead easements. Subsurface easements may be required for the construction of water and sewer lines, gas pipelines, communication lines, or tunnels. During construction, surface disturbance may occur and some above ground appurtenances may be present, however the bulk of the project remains below the surface and is unseen. Common surface

easements may allow for drainage, flowage, railroads and highways. These types of easements severely impact the surface area. Typical overhead easements include electrical transmission lines and avigation easements. Some easements may involve two or even all three of these types of space. For example, overhead transmission lines require surface areas for the placement of the towers and some subsurface areas may be needed for the underground footings required. Thus, while generally classified as one of these three broad classes of easements, most easements involve multi-space occupancy.

The task before the appraiser is to evaluate the "rights conveyed" by the creation of the easement and to properly measure these rights. The principles and techniques applied to appraising property for partial acquisitions apply to the valuation of an easement. Under the federal rule, the value of the easement will be based on the difference between the value of the whole property before (or without) the easement and the value of the property with the easement in place.

In this example, the $60,000 of total compensation includes the value of the easement and any damages that may result due to the placement of the easement.

Value of Whole Property Before	
120 acres @ $10,000 per acre	**$1,200,000**
Value of Whole Property After	
120 acres @ $9,500 per acre	**$1,140,000**
(Encumbered with 10 acres in easement)	
Total Compensation	**$ 60,000**

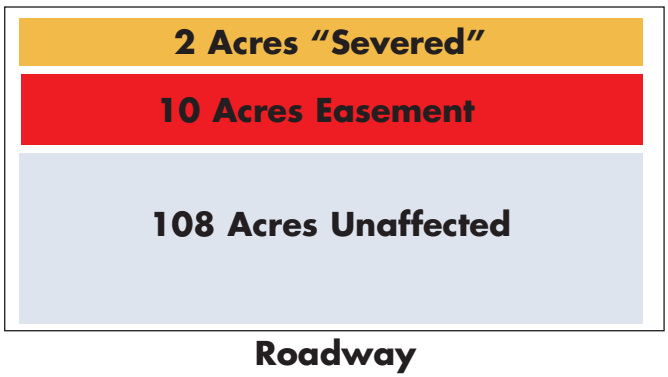
Under the state rule, the appraiser will be required to estimate the value of the easement plus damages to the remainder, if any. For example:

Value of Whole Property	
120 acres @ $10,000 per acre	**$1,200,000**
Value of the Part Acquired	
10 acres in easement @ $10,000 per acre @ 50%	**$50,000**
Value of the Remainder Before the Acquisition	
$1,200,000 - $50,000	**$1,150,000**
Value of the Remainder After the Acquisition	
$1,200,000 @ $9,500 per acre	**$1,140,000**
(Encumbered with 10 acres in easement)	
Damages	**$10,000**
Total Compensation	**$60,000**

"... the mere presence of an easement is not generally the deciding factor in a purchasing decision."

Where do these figures come from? The answer: the market! The appraiser's task is to see what effect, if any, an easement has on the sale of property encumbered with similar easements. In the case of residential property, most urban properties within platted single family subdivisions are likely encumbered with common utility easements. In most situations, these easements extend along the property boundary and have little effect, if any, on the sale of the home. Thus, the market tells us that the easement has little value, if any. Why? The presence of the easement does not affect the use or utility of the property. The easement does not place any undue burden or hardship on the ownership.

Using the illustration below, assume that the 120-acre ownership will be encumbered with 10 acres in permanent easement; however a "gap" exists between the easement and the north property line. The use and utility of this "severed" area is limited given its narrow shape and size. The following is an illustration of this example.



The total effect of this easement can be measured by looking at actual market sales unencumbered with similar easements. Finding encumbered sales can be an extensive exercise requiring lots of time and manpower. While it is highly unlikely that the market will produce an exact situation, it may be possible to find sales encumbered with an easement and compared to a sale unencumbered. This is often referred to as "matched pair sale analysis."

In our local market, we have investigated sales encumbered with gas pipelines and compared them to similar sales encumbered. By nature, the real estate market is a very imperfect market and no two sales are identical. However, by gathering a sufficient number of matched pairs, general trends may emerge that give some market evidence of the effect easements have on value. Our analysis indicates the following trends as outlined below:

PAIRED ANALYSIS SUMMARY

Sales	Dates	Land Sizes (Acres)	Pipeline Size	Price Differential
A-1 A-2	9/27/01 4/30/01	5.78 5.73	None 16″	-2.4%
B-1 B-2	5/29/02 7/18/02	38.427 25.5	None 16″	+1.5%
C-1 C-2	9/4/01 12/6/01	16.39 15.68	None 12″	+44.0%
D-1 D-2	8/13/01 7/12/01	101.27 97.92	None 18″	-2.1%
E-1 E-2	8/26/02 5/30/02	5.0 5.0	None 20″	-27.6%
F-1 F-2	7/31/02 8/27/02	12.551 14.56	None 10″	+6.4%
G-1 G-2	6/11//01 3/8/01	29.87 48.318	None 20″	-6.5%
H-1 H-2	5/29/02 5/24/01	9.81 10.0	None 16″	-9.1%
I-1 I-2	9/20/00 2/12/01	7.31 10.79	None 16″	-1.9%
J-1 J-2	1/18/01 2/1/00	112.723 139.09	None 10″	+0.1%
K-1 K-2	12/14/01 12/30/02	12.665 27.29	None 24″	+8.1%
L-1 L-2	10/25/02 11/6/02	10.0 15.0	None 10″	-5.7%
M-1 M-2	7/10/03 5/20/03	14.34 20.48	None 10″	0%

Often the market is unclear as to the effect an easement will have on value. Market participants (buyers, sellers, brokers, other appraisers) may offer insight into their personal opinions as to the effect an easement may have on value. In the absence of market data, some appraisers use market surveys of buyers, sellers and brokers to support their opinions. For example, a broker may offer an opinion that a particular property is discounted 5% due to the presence of the easement. This would, at first blush, seem to have a minimal effect on the value. However, some appraisers take such information and apply it inappropriately. Basically, this error results in an overstatement of the effect of the easement may have on value. Using the same example cited above, the appraiser incorrectly assesses the impact as 5% damages to the value of the remainder property plus the value of the easement. The results are as follows:

Value of Whole Property
120 acres @ $10,000 per acre **$1,200,000**

Value of the Part Acquired
10 acres in Easement @ $10,000 per acre @ 50% **$50,000**

Value of the Remainder Before the Acquisition
$1,200,000 - $50,000 **$1,150,000**

Value of the Remainder After the Acquisition **$1,092,500**

Damages **$57,500**

Total Compensation **$107,500**

What the broker stated was that the property would command 5% less than the property's unencumbered value. Assuming the unencumbered value was $1,200,000, then the total damages would be 5% or $60,000, resulting in a remainder after value of $1,140,000. The $60,000 includes both the value of the easement plus any damages. What the appraiser has done in the above calculations is provided double compensation, $50,000 for the easement plus $57,500 in damages. As you can imagine, this error is compounded when the estimate of damages rises to 10% or 20%, as opposed to the 5% estimate.

When investigating a new easement, some important questions should be addressed by the appraiser. It is imperative that the appraiser understand the nature of both the legal and physical rights that are being sought. Some questions may include:

- What is the proposed use?
- Where is the easement located? Can it be moved?
- Is the easement located in a setback area or along a property line?
- What will be the construction? (open cut versus bored)
- Who will maintain the property during construction?
- Will the easement be surveyed and monumented?
- May either party alter the construction or grade after completion?
- Will the landowner have to obtain permission to use the easement area?
- Can the landowner cross the easement with roads, utilities, etc.?
- Who pays property taxes and insurance?
- Will the easement cause a loss in view, security, etc.?
- Will the easement provide any benefit to the owner?

These issues are often found within the easement document but may require discussions with the condemnor. In terms of legal encumbrance, it is important to recognize that the easement will impact the ownership title and may affect both current and/or future uses.

One key question is "will the easement affect the use and/or utility of the property that results in a change in highest and best use?" Also, the easement may include accessory rights such as the ability to access the easement and ability to expand the use within the easement (add additional pipes). From a physical standpoint, it should be recognized that most of our activity occurs on the surface. Thus, impacting the surface area tends to affect value to a greater degree compared to a subsurface easement where there is little or no impact on surface use. The appraiser thus needs to know how the easement is intended to be used and how it will be constructed.

EASEMENT VALUATION MATRIX

Percentage of Fee	Comments	Potential Types of Easements
90% - 100%	Severe impact on surface use Conveyance of future uses	Overhead electric Flowage easements Railroad ROW Irrigation canals Access roads
75% - 89%	Major impact on surface use Conveyance of future uses	Pipelines Drainage easements Flowage easements
51% - 74%	Some impact on surface use Conveyance of ingress/egress rights	Pipelines Scenic easements
50%	Balanced use by both owner and easement holder	Water or sewer lines Cable line Telecommunications
26% - 49%	Location along a property line, location across non usable land area	Water or sewer line Cable lines
11% - 25%	Subsurface or air rights that have minimal effect on use and utility Location with a setback	Air rights Water or sewer line
0% to 10%	Nominal effect on use and utility	Small subsurface easement

"... will the easement affect the use and/or utility of the property that results in a change in highest and best use?"

Damages or the percentage of rights acquired are often difficult to measure due to the imperfections in the real estate market and due to the fact that the presence of an easement represents only one of many factors affecting the buying decision.

While some buyers may react negatively toward a particular easement, others may view the same property with total disregard toward the easement. Other factors such as location or the presence of some amenity may overshadow the presence of the easement resulting in little dscount, if any.

The Easement Valuation Matrix (left) is used as a general guide in looking at the effect an easement may have on the total bundle of rights. This chart should not be considered an exclusive list as to the type of easements and their effect on the total bundle of rights but should be used only as a guide to general effects on the total fee ownership.

IN SUMMARY

My experience in the valuation of real property leads me to the conclusion that mere presence of an easement is not generally the deciding factor in a purchasing decision. While I recognize that an easement can cause severe harm to a property, each property and situation should be evaluated on an individual basis.

In general, if the market recognizes the presence of an easement as a major adjustment factor, it is likely that market participants would more readily address these concerns when appraisers verify market data.

This is not to say that damages do not occur in the market due to the presence of an easement. Each situation must be reviewed on an individual basis and evaluated using market evidence as opposed to speculation and guesswork. ■