



CHARLOTTE COUNTY, FLORIDA

Utilities Department

18500 Murdock Circle

Port Charlotte, FL 33948

Request for Qualification

RFQ Number 2024000557

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Submission Deadline: February 26, 2025

Title and Purpose of RFQ:

Vacuum Sewer System Materials

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SECTION 1

Corporate Experience

Flovac Vacuum Sewer Systems originated in 2005 after the sale of Ebara-Airvac to Bilfinger/ Roediger and subsequently, the apparent state-owned Chinese company, Chengdu Techcent.

Flovac has since pioneered the first full port vacuum valve passing a solid 3-inch solid sphere. Vacuum Sewer telemetry or monitoring systems that have been in operation, and in some areas mandated for over 15 years. Custom built vacuum valve pit shut off valves ensure operator safety. Flovac offers the longest warranty on vacuum valves and controllers and additionally the longest whole life design in the industry.

Flovac has written the standards on vacuum sewer technology on an international level, something we are working to grow in the USA as a safeguard to municipalities and municipal stakeholders. Currently only “guidelines” exist. At the forefront of our design is operator safety and ease of operation. Outlined in the following sections.

Flovac has been involved in more than 350 projects in 40 countries worldwide and has led many of the changes to the industry including the introduction of the Busch claw “Mink” pumps almost 15 years ago. We often see technology advertised as the latest and greatest that has been around for some time. This is referenced as Flovac does not believe that one size fits all or upselling approach and will always strive to design a vacuum collection system that best fits the municipalities and the area’s needs.

Flovac’s manufacturing facility maintains the following ISO Certifications:

- ISO 9001- Quality Management Systems
- ISO 14001- Environmental Management System
- ISO 45001- Occupational Health and Safety

Flovac Inc is headquartered in Palm Coast, FL and manages operations for the Americas Region. CEO Michael Pringle, including his wife and two children, resides in Palm Coast, FL. Michael manages a team of 13 local engineers, project managers and operators and 3 international support staff. Michael has personally been responsible for hours of technical and operational training and support with existing vacuum systems, conference presentations, lunch and learns, engineering and operations seminars, funding seminars and grant writing support.

A new, to Flovac, North Carolina vacuum sewer operator was recently quoted saying “I have learned more in the last hour than I have over the last 10 years. Contact available on request.

Projects

Key Largo, Florida

Key Largo Vacuum Sewer system. This project was funded in part by Army Corp of Engineers and Stewardship funds. The work includes removing failing controllers from flooded valve pits and relocating them into adjacent specially modified air terminals. Additionally, raising the air vent pipe for the valve pits in flooded areas to prevent inflow during floods or high tide events. Air vents extending above the flood level should be standard practice, not an afterthought. Flovac also monitors vacuum values throughout all 3000 valve pits, grinder pumps, stormwater interceptors and vacuum stations. The monitoring tools allow for real time identification of any issues but more importantly the pinpointing of Inflow and infiltration.



Figure 1 Identification of Infiltration

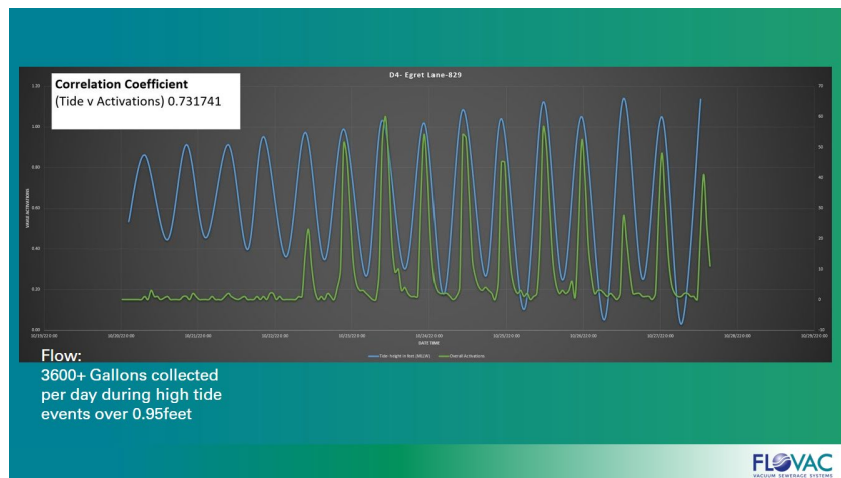


Figure 2 Identification of tide and flow correlation

The above image depicts Flovac’s monitoring system identifying excessive inflow during a high tide event resulting in increased salinity levels at the treatment plant. The identification is flagged by flow correlation with NOAA tidal information.

Early into the project the monitoring identified that the stagnant air being drawn into the valve and controller from the OEM in-sum breather was causing significant issues to the OEM valve and controller. Flovac was approached to service and replaced all vacuum valve equipment, additionally eliminating the in-sum breathers. Flovac deployed a mobile trailer to aid KLWTD in servicing the equipment. So far calls have dropped by over 50% and I&I reduction has had a significant impact on the reduction in run times, treatment costs, over time etc.

Okeechobee, Florida

Okeechobee Utility Authority Florida chose to install a Flovac Vacuum valve pit to retrofit their existing vacuum sewer system in 2020. Around this time Flovac was able to support the authority with the needed vacuum pump servicing and spares they were struggling with from the OEM. Since the introduction to OUA, Flovac has provided and facilitated the installation of over 250 vacuum valve pits, 6 more systems are currently in design. We are now working on our 4th septic to sewer project with the municipality. A notable point in these projects was not that Flovac’s bid was less than others, but rather the installation cost of Flovac’s Equipment was able to be reduced by the contractor. This resulted in a lower total cost for the project. More on this in section 2.



Figure 3 Flovac Vacuum station dry well form work

Sanford Florida

Sanford Florida reached out to Flovac In need after months of waiting on support and parts from the original OEM. Flovac was able to ship hundreds of needed valves, controllers and needed support within weeks to help get their system back online. Unfortunately for Sanford, due to subpar products and lack of much needed technology over the years, they still have a long road ahead of them to get their vacuum sewer system back under control. Since Flovac's introduction to Sanford in February of 2023 Flovac has replaced all the vacuum valves, added monitoring and is now renovating the vacuum station.

Work included replacing all OEM valves and controllers, removing the controllers from failing and leaking OEM valve pits and locating inside newly installed pedestals that also house their Flovac monitoring system.

What's interesting about Sanford's vacuum sewer system is that due to funding sources at the time, the collection network was only sized to handle flows from those that indicated they could connect to the system on install. This has resulted in a severely undersized collection network as more users have connected over the years. Flovac will carry out our capacity audits to help the city renovate and resize, where needed, to create resiliency within the vacuum sewer system. We raise this as master planning is critical for the long-term success of any project, something Flovac prides itself in.



Figure 4 Sanford Florida Old valves and controllers being removed and replaced with Flovac parts- source city website.

Last updated 3/13/2023

Flovac started evaluation and installation work on Wednesday, March 8. The Gateway was installed this morning on the Elevated Water Tank next to the baseball field on Mellonville Avenue. The Gateway is part of the telemetry system that will help areas of direct inflow and infiltration, check vacuum pressures and troubleshoot the system wirelessly. The monitoring equipment will start being installed in the field once locates have been cleared for digging. City staff along with Flovac's staff have started troubleshooting different pits, buffer tanks and mains.



Flovac personnel and City staff at Vacuum Sewer Collection Station.

Figure 5 Sanford and Flovac Staff solving problems - source city website.

☰ YouTube 🔍 🎤

Improvements Being Made To The City of Sanford's Vacuum Sewer System

City of Sanford, FL 697 subscribers

👍 3 🗨️ Share 📄 Download 🎬 Clip 📌 Save ⋮

214 views 4 months ago
Demonstrating the improvements being made to the City of Sanford's Vacuum Sewer System using the Flovac product line. [Show more](#)

Figure 6 Sanford's Collections Manager highlights improvements being made to their sewer system- source YouTube.

There are additional Flovac success stories, Americas wide, where we have had to step in and aid municipalities and private entities, in some cases urgently and can provide more information on request.

REFERENCES: VACUUM SEWER SYSTEM MATERIALS

Vendor shall submit a minimum of five (5) recent (within the past five (5) years) references of projects of similar size and scope. Each reference shall include a project description, project location, name and phone number of a contact person, total project amount, and completion date. The County reserves the right to contact references.

1. Project Owner / Company: City of Apalachicola
Name of Contact Person: Rhett Butler Telephone # 850-653-9319
Address: 192 Coach Wagoner Blvd.
City & State: Apalachicola, FL Zip Code: 32320
Email: rbutler@cityofapalachicola.com Duration of Contract or Business Relationship: 2019 - ongoing

2. Project Owner / Company: City of Sanford - Utilities Department
Name of Contact Person: Cedric Coleman Telephone # 407-562-2815
Address: 422 W 14th Street
City & State: Sanford, FL Zip Code: 32771
Email: cedric.coleman@sanfordfl.gov Duration of Contract or Business Relationship: 2018 - ongoing

3. Project Owner / Company: Eastpoint, FL
Name of Contact Person: Billy Fuentes Telephone # 850-670-4878
Address: 40 Island Drive
City & State: Eastpoint, FL Zip Code: 32328
Email: billy@ewsdfl.com Duration of Contract or Business Relationship: 2019 - ongoing

4. Project Owner / Company: Key Largo Wastewater Treatment District
Name of Contact Person: Rudy Perez Telephone # 305-697-0011
Address: 103355 Overseas Highway
City & State: Key Largo, FL Zip Code: 33037
Email: rodolfo.perez@klwtd.com Duration of Contract or Business Relationship: 2022 - ongoing

5. Project Owner / Company: City of Marathon
Name of Contact Person: Daniel Saus Telephone # 305-743-0033
Address: 9805 Overseas Highway
City & State: Marathon, FL Zip Code: 33050
Email: Sausd@ci.marathon.fl.us Duration of Contract or Business Relationship: 2016 - ongoing

6. Project Owner / Company: Okeechobee Utility Authority
Name of Contact Person: John Hayford Telephone # 863-763-9460
Address: 100 Southwest 5th Ave
City & State: Okeechobee, FL Zip Code: 34974
Email: jhayford@ouafl.com Duration of Contract or Business Relationship: 2020 - ongoing

Name of Bidder: Flovac, Inc

(This form to be returned)

SECTION 2

System Design and Quality

Paramount to any design, needs to be Safety. Flovac will endeavor to ensure this is the focus on all projects we are involved in. Additionally, we will highlight key differences in Flovac's technology that facilitates this.

As referenced above, Flovac is not tasked with selling vacuum systems but rather finding the best solution for each project. This may include a variety of technologies including gravity and low-pressure systems. This is the Key to Flovac's success.

Our engineering team is up to date with changes around the world and advancements in technology. This is especially important as it relates vacuum sewer technology's application to specific projects. Although the following sections may highlight specific technologies, we must reiterate that not all projects are the same and Flovac has the experience and backing to provide a solution that will benefit the municipality for years to come.

Integral to the design process is the close working relationship with Flovac Staff. From design through supply and support. This is evident in Flovac's supply process and specifications that may, for example, call out pumps from a supplier that the municipality already has a good working relationship with. Flovac will evaluate options available to suit a specific project and provide options for the municipality to make these decisions, should they wish. This is not to say that Flovac will not support the products supplied with their projects but to rather enable strong coworking opportunities and not force the municipality into a product they are not familiar with or feel that they are vendor locked to. Sewer pumps and control panels are a good example of this.

i. Prefabricated vacuum pump skids, sewage pumps skids, vacuum collection tank skid and control panel.

Vacuum pumps and stations, vacuum collections tanks and control panels.

Vacuum sewer stations start early in the conceptual project stage. Considerations around location, ease of egress not only for service personnel but for equipment inside the building. There is no reason that the vacuum station needs to "look like a pump station." Rather the architectural design should be in keeping with the surrounding areas. For some projects this may mean the appearance of a sharp-looking single-family residence to fit in with a golf community. Odors need to be considered, and suppression methods are well thought out. Again, in keeping with the local area.

Typically, we want to see the vacuum stations located in the lowest lying and most central location to a project. This is not conducive to all projects and Flovac will offer suggestions and or solutions to overcome difficult situations. The reason for the central and low preference is due to the gravity assisted, stepped profile of the vacuum mains, and minimization of static loss. To achieve efficient and cost-effective vacuum collection network we strive to minimize static loss along a vacuum main. This ensures a large catchment area with long lines and more household connections resulting in lower costs overall. More recently we have been seeing smaller catchment areas in designs which results in more vacuum stations and a higher overall cost per connection.

Flovac separates itself by offering 3D renderings of the vacuum station design for evaluation by the engineering and operational team in addition to key project stake holders. This enables questions and concerns to be raised early on and ensures all are on the same page as the project progresses. Again, we can evaluate the safety of design at this point.



Figure 7 3d Vacuum station rendering provided to client for evaluation.

Vacuum Pumps

- Flovac maintains a solid relationship with the Busch family, the proprietors of Busch Vacuum Solutions. Busch offers a wide range of vacuum pumps for various applications including specially modified pumps for Flovac sewerage system applications. Flovac more frequently uses Busch's R5 oil sealed rotary vane and Mink dry claw type vacuum pumps. Additionally liquid ring vacuum pumps are used in specific applications where water usage is not a concern. Each pump has its advantages and disadvantages. Flovac guides municipalities through the selection during the design process. Although Busch is not the only supplier of vacuum pumps suitable for sewerage collection networks they are more commonly found throughout the USA due to their reliability and access to local service / support which is an important factor during our selection.
- Vacuum pumps come preassembled and pretested on a "skid" for ease of installation. Flovac does, however, offer onsite installation support if a housekeeping pad or plinth is more suitable to the project than a skid arrangement. All project vacuum pumps will receive a capacity test after installation as part of the system commissioning to ensure they are within factory published performance specifications. A copy of this test report will be supplied in the final project documentation.

Large air/water scrubber AKA knock out pot (KOP)

- This allows for more capacity and greater protection for the vacuum pumps. By utilizing a large KOP, service intervals to the vacuum station can be reduced significantly as well as increased protection for the vacuum pumps. The KOP adds an additional vacuum buffer to the system and contains an air/liquid scrubber, and sometimes a particulate separation filter that we suggest servicing at least once a year or based on pressure drop across the unit which is included as a maintenance reminder in our control panel monitoring system. Flovac offers both manual and automatic options for removal of the condensation that collects at the bottom of this vessel depending on customer preference. The automatic condensation drain line is preferred and it is piped directly to the collection tank thus removing the requirement for daily servicing required by others using smaller individual separators.



Figure 8 Cut away of a vacuum separator and scrubber.

Sewer pumps

- As mentioned earlier there are a few suppliers we work with to provide sewer pumps for our vacuum sewer collection stations. Of important consideration in addition to head conditions and pump curve optimization is the manufacturer's adherence with the ability to pass a 3" solid sphere and operate with a low NPSHr as there is typically not a lot of NPSHa due to vacuum inside the collection tank and a want to minimize the depth of the vacuum station dry well where the collection tank and sewage pump are installed. Pumps that can meet Flovac's criteria are then presented to the municipality for consideration. If there is preference to a particular supplier Flovac will pursue integrations of the preferred manufactures pump into design of the pump skid ensuring the considerations previously mentioned above are adhered to for reliability.
- Importance of selecting the correct sewer pump. While pumping against a constant vacuum narrows the range of pumps available for vacuum applications it is critical that the pumps selected meet our guidelines. Flovac also maintains relationships with suppliers to ensure the manufacturers support the application. Brands such as Cornell, Grundfos, Hidrostral, United Flo, Wemco all offer proven models for the vacuum sewage application.
- A Flovac vacuum sewage system consists of 2 sewage pumps, one lead and one standby, which are individually skid mounted, can be combined into single skid if desired by contractor, each pump is factory tested with certified performance test consisting of head pressure vs. flow, and NPSH at a minimum, additional test criteria available if required. Note pump "dead head" test performed during commissioning to confirm no issues with pump and motor and a copy of the results are to be provided in commissioning docs.

Equalization Lines

- The above points on pump selection are especially important as Flovac does not rely on the use of "equalization lines" where possible due to the high failure and maintenance needs of said lines. Relying on equalization lines can result in pump cavitation and premature failure should the line become blocked. This results in maintenance schedules being written around daily checks. For context, "equalization lines" are lines from the tank to the discharge side of the sewage pump volute essentially equalizing the vacuum on either side of the sewer pump during startup. This results in an amount of sewage being pumped from the tank recirculating back into the tank. As the lines are smaller in size (typically 1 inch) blockages often occur.
- The picture below is noteworthy as it illustrates Flovac vacuum sewer pump configuration without equalization lines. Mounting the sewer pumps in a horizontal configuration also adds 1 foot of NPSAa as a 90 deg fitting is removed from the suction pipework loss calculation. This is also a screenshot of a 3D station tour we offer of our vacuum stations - tours available on request.



Figure 9 FVSS No Equalization lines

Vacuum Collection vessel

- Safety is our first thought. The collection vessel requires a confined space permit to access, and rightfully so. During the design phase we want to think about how we minimize the need for entry. Flovac does suggest an inspection every 2 years per service schedule. However, Flovac designs their collection tanks with the operator in mind. Quick flush connections at the high end and low point drains plumbed to a hard stand outside the building allow for a pump truck to cleanly connect and drain the tank while flushing or cleaning is occurring.

Additionally, Flovac thinks through how operators gain entry, and should recovery or help be needed what equipment is needed or available to facilitate this. This might be as simple as moving the tank inspection/access hatch position to ensure service by the gantry crane. Another example is hinged lids or davit arms to eliminate the need for heavy lifting of access hatch lids. We have even relocated the access hatch from the top to the side to ensure easier access/entry into the vessel when possible. Walkways and safety rails are also examples of how we strive to ensure operator's safety. A ladder leaning up against the tank is neither sufficient nor appropriate to ensure operator safety and equipment serviceability.
- Flovac utilizes, successfully, both Fiberglass and Stainless-Steel tanks. We maintain strict manufacturing processes including meeting the following standards:
 - Stainless Steel: Designed per ASME Section VIII, Division 1 and rated for full vacuum and hydro tested to 30 PSIG
 - Fiberglass: Lay-up per NBS PS 15-69 and Contact Molded per ASTM D 4097-19 Isophthalic polyester premium resin such as Aropol 7241 T-15 or equal with a MEKP cure system and a corrosion barrier per ASTM D2562. Manufactured per UL 1316
- Much of the success within the vacuum tank is during the design phase. Flovac utilizes nozzles inside the collection tank to direct the sewage in a manner to prevent damage to the tank internally, this also eliminating incorrect tank instrumentation readings. additionally, Flovac includes into their tanks design the ability to quickly flush debris with clean out or flushing ports.
- The collection vessel is to ship loose for installation on site via concrete mounting pedestals/pads. A baseplate can be supplied if specified, but we feel it is an added cost without value.
- A 24hr vacuum test is performed on the collection vessel with the stainless steel unit requiring 28" HgV and the fiberglass unit requiring 26" HgV and the rate of rise is not to exceed 1.5" HgV in 24hrs. A copy of the test report to be provided with commissioning documents.

Instrumentation

- Flovac prefers to mount instrumentation on a serviceable panel adjacent to the collection network, preferably on the upper level, except for the tank level transmitters. The reason behind this is there is no

need for this serviceable equipment to be located on the collection vessel. It should instead be in an area that is safely accessible to operators to service and maintain.

- Flovac utilizes radar level technology with a redundant high high level probe and vacuum transducers with analog vacuum gauges to monitor the collection vessel and vacuum collection network. Probe use has been minimized as they are a maintenance issue.

Control Panel

- As mentioned in earlier sections Flovac prefers to work with local fabricators and UL rated panel shops. This allows us to ensure the most relevant to the project control philosophy is used, thoroughly understood, and implemented seamlessly. This also allows for quick modifications and tuning of the system during and after commissioning to ensure an operationally efficient system is received by the municipality. All control panels are U.L. 508A listed and housed in a NEMA 12 enclosure. All skid junction boxes are also U.L. listed and mounted in a NEMA 4X SS Enclosure
- Qualification of one of our partners are outlined below:
 - U.L. 508A Listed.
 - U.L. 698A Listed.
 - U.L. QCZJ Listed.
 - Factory trained Square D PLC & HMI programmers.
 - Factory trained Allen-Bradley PLC programmers
 - Integrated with Telemetry & SCADA suppliers.
 - PLC's, VFD's, and RTU's custom panels
 - Control system testing area
 - 10,000 sq. ft. dedicated production facility
- Collaboration between SCADA suppliers is an important part of a successful project. Flovac has working relationships with:
 - Data Flow Systems
 - Locker Environmental
 - VT Scada
 - Ignition
 - Mission Control
- Additionally, telemetry and asset management software relationships and integrations include:
 - Flovac Monitoring System LoRa Wan (outlined below)
 - ESRI
 - Diamond Maps
 - Sales Force



Figure 10 New Flovac Control Panel nearing completion.

Control Philosophy

- Flovac’s control philosophy centers around operational efficiency and overall system performance. Recent noise in the vacuum sewer industry surrounding running vacuum pumps at a narrow band configuration and or single set point. Some have even ventured as far as stating this control set up is proprietary and cannot be used by others. A quick call to any vacuum pump supplier utilizing VFD’s quickly squashes this. Unfortunately, the consumer is being duped here as a resell to existing systems as a “fix all”. While savings are utilized using VFD’s on any motor the use of vacuum collections systems must be carefully considered and implemented.
- Flovac’s driving metric for any vacuum sewer system is the Air/Liquid ratio. Sadly, this is not being taught by others and results in valuable long-term trends not being kept or collection systems slipping out of control with management unaware until they end up on the front page of the newspaper.



THE HEART OF THE VACUUM SYSTEM The Air/Liquid Ratio

The most critical and informative measure of a vacuum sewerage system is its air/liquid ratio. This is a key for both engineers and operators.

Systems are designed for a particular air/liquid ratio. Engineers will typically design a system based on an air/liquid ratio of 6 to 1, meaning 6 parts of air for 1 part of water or sewage. While operators maintaining an operating system will more commonly keep a system between 10-14 a/l ratio and be happy with that.

The engineers are looking at a number of factors. The length of the longest vacuum main, the amount of flow into the collection tank and the volume of the tank and vacuum mains which will decide the vacuum pump capacity and sewage pump size. (The sewage pump is also sized as per the head conditions they will pump against).

Staging of a project is also an important consideration. This impacts the sizing of the vacuum pumps, maybe smaller pumps will be used as an interim solution. What is evident in nearly all projects is that the size and flows of a system will change over the years. Design engineers have to design a system based on what they have been told the ultimate catchment will be often many years into the future. An operator has to worry about what is happening to the system today. Seasonality in an area will impact it as well. The off-peak tourism period will possibly need more air in the system.

Keeping records of the air/liquid ratio can tell an operator a number of things including:

Infiltration occurring in the system (sewage flow in gallons – established ADWF)

There are air leaks in the system

Flovac valves need service or re-tuning (It may show incorrect tuning of the controller, controller diaphragms need changing etc.)

Vacuum pumps or Sewage pumps need maintenance

All of these will impact on the energy costs at the pump station.

Air/Liquid Ratio Calculation

$$\frac{VPt \times VPc \times 448.8}{SV \text{ (Gallons)}}$$

VPt = Vacuum Pump Run Hours/Day

VPc = Vacuum Pump Capacity (A Busch 630 would be 455 cfm)

SV = Volume of Sewage discharged per day (as measured by flow meter at station*)

448.8 = Conversion factor (hours to minutes and cubic feet to gallons)

*If no Flow Meter calculate SPt x 60 x SPc = SV

SPt = Sewage Pump Hours/Day

SPc = Sewage Pump Capacity gallons per minute

Example

VPt = 5 hours

**VP = 455 cfm

5 x 455 x 448.8 = 1,021,020 gallons

SPt = 2.5 hours

SP = 97,500 (from flow meter)

1,021,020/97,500= 10.47 air/liquid ratio

Figure 11 Excerpt from Flovac training manual- Air Liquid Ratio

Every number tells a story – For these examples let's say that the Normal air/liquid ratio is 10.47

1. If after a stable period the A/L starts getting up to 14/1 then there is probably a controller playing up or a small leak in a valve.
2. If you have tuned the system and the A/L is still high 20/1 or higher then there is probably a leak in the line.
3. If the A/L has dropped to 5/1 or lower you could be experiencing infiltration during a wet weather event. You will certainly also see longer pump times on the sewage pumps.

Operators should use the Air/Liquid Ratio in conjunction with other alarms in the pump station. But to check the state of the system it is a great guide that will save you money in the short and long term. Graph the weekly or daily results and you will get a clear picture of the trends developing.

Next step is to go to the troubleshooting guide to remedy the problem. Alternatively, to affect change in the air liquid ratio you need to either tune the system or change the operating vacuum level at the pump station.

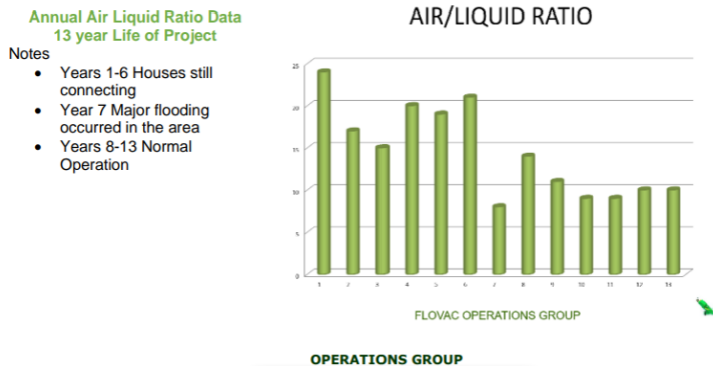


Figure 12 Air Liquid Ratio Cont.

- When VFD's have been used by others to alter the operational band or vacuum setpoint of the vacuum sewer system, a key metric is lost. That is the vacuum trend line. The vacuum trend or on older systems "chart recorder" clearly indicates the performance of the vacuum sewer system to operators at a glance. This is not an issue if it is replaced by information useful to the operator. What Flovac has been observing while supporting operators that have been provided with narrow band or setpoint vacuum systems sold by others is that they have not been provided with key information as to how the system is performing. This results in the vacuum pumps "hiding", or "covering up" issues within the collection network. Some operators have mentioned having to switch their system back to a "traditional" ON/OFF set points for some time to gauge how the system is performing. Hardly efficient or proactive.

Where Flovac sets themselves apart in this application is firstly reinforcing the importance of Air/Liquid ratio and including this in our training classes. Secondly when controlling the vacuum pumps via VFD it is paramount to replace the vacuum trend line with Air Flow trend line, and/or time in frequency range reporting. From the above image you can see the key to the air liquid ratio is air moved vs sewerage pumped. By tracking the time vs. frequency and/or air flow calculation we can easily provide the operations and management team with critical information as to their systems' performance. The image below depicts this point. You can see the narrow band of the vacuum in red vs the air flow in Purple. Note the time stamps: Middle of the night = low flow vs. flows increasing as morning communities awake. On the right-hand side of the graph, we can see the vacuum setpoint remains the same, however air flow increases. This same purple trend line indicates issues to the operator i.e., if increased flows are maintained for extended periods or overnight. This would indicate a leak.



Figure 13 Set point vacuum level (mbar) vs. Air Flow (m³/h) indicating system performance and condition.

Station Piping and Head Works

- We know from experience that pipework routing throughout the vacuum station is critical to success. Flovac differs in that we prefer to design a station where the vacuum station pipe works from the vacuum skid to the tank maintains fall toward the tank and is situated as low as possible elevation wise. Often, we see this pipe work raised to the roof from the tank and over and down to the vacuum pumps skid to facilitate operator access. This results in excess condensation forming inside the pipe work by the passing vapor laden air, in turn a raining effect occurs inside the pipe. This water is then carried toward the vacuum pumps and results in more frequent servicing of the moisture separation equipment. Simple design considerations early on facilitate station pipework that maintains ease of service by operations and minimizes moisture accumulation.
- Vacuum pipe work from tank to vacuum pump skid is typically SCH 80 PVC and pipe work related to vacuum pump and sewage pump discharge is 316 SS.
- Incoming vacuum mains should be able to be shut off with hand wheels from an elevated platform on the second floor. Operators should not need to enter the dry well, or basement area to isolate incoming vacuum mains.

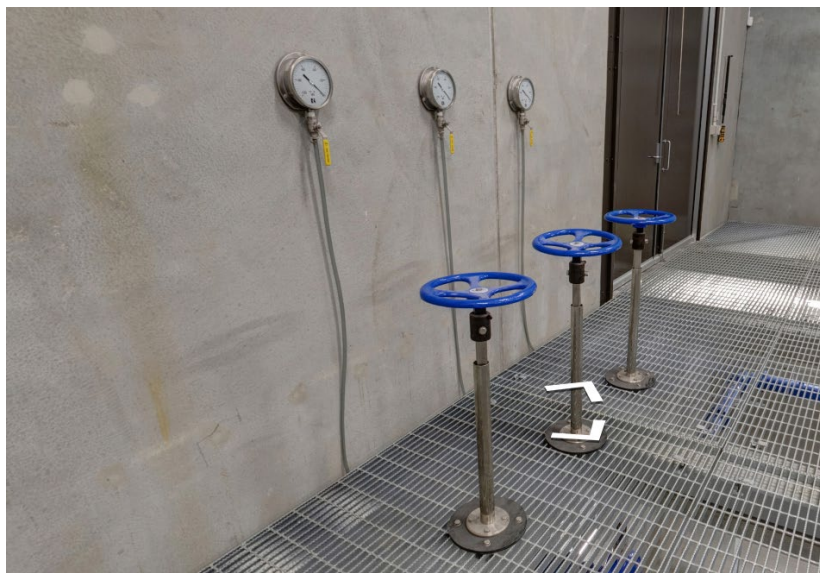


Figure 14 Vacuum main isolation valves.

- External to the building, it is important that the design includes standpipes to facilitate servicing ease and emergency operation. Again, another key differentiator in Flovac design. This is a basic feature and should be a must on all systems. Standpipes should include:
 - Vacuum tank upper or supply including dry well sump line
 - Vacuum tank lower or drain.
 - All Incoming vacuum main(s)
 - Outgoing force main

The reason for the incoming vacuum mains is in the event of a failure or service need, vacuum mains can be brought up individually by use of a positive displacement or septic pump truck. The tank lower is for draining and cleaning the tank without running a hose inside the building.



Figure 15 Standpipes exterior to a vacuum sewer station

Collection Network

Flovac feels it important to call out a few key differences in the design of the vacuum collection network. Again, not something we offer as one size fits all approach but rather an engineered solution. Flovac has vast experience with high flow projects. This is important to facilitate maximized whole of life design costs and reduce cost per connection. We are seeing more and more oversized vacuum pump stations relative to the collection network. This drives cost per connection, and the whole of life costs up.

Flovac strongly believes in a master planning approach where not only are 10 state standards considered but future connections, future developments, and larger service areas are sewerred. Effective master planning and use of multiple collections technologies to maximize efficiencies and long-term costs, benefit municipalities and stakeholders. Often, the use of all three collection technologies is used to maximize project cost effectiveness.

- In addition to Flovac's ability to handle larger flows with smaller stations Flovac maintains some key differences throughout the collection network:
 - Larger separation between main profile lifts and lateral connections. The reason for this is sewerage does not know what direction the vacuum station is, even with the use of wye fittings directing the flow. The equal amount of vacuum on either side of the fitting allows for 30% of the flow to move in the opposite direction, or away from the vacuum station. This 30% flow if located too close to a lift will end up dropping back down the lift. This creates a loss of velocity to the approaching flow and adversely affects the rest of the vacuum main.
 - Adequate separation between dual valve pit lateral tie ins i.e., buffer tanks. All too often when two valves are used to increase flow rating from a sump, the goal is rendered useless due to how the connections for the valves are made into the vacuum main. When separation guidelines are not adhered to, and connections are close together, one valve opening depletes the vacuum available for the second valve to open at the same time. As 5 inHg (inches of mercury) is needed for a Flovac vacuum valve to open (10inches for others

valve's) if the vacuum supply is depleted the valve cannot open. This essentially halves the designed flow rate of the buffer tank. Unfortunately, we see this so commonly on others system that most operators have removed the second valve.

- o Flovac's site support and or contractor supervision. Paramount to any vacuum sewer collections system is the contractor's ability to understand and adhere to the strict designs of the collection network. While there is flexibility within the collection network, deviation in the form of excessive lifts or drops, reverse grade, or bellies in the line are extremely detrimental to the long-term success of the vacuum sewer system's performance. As such Flovac provides training courses for contractors and inspectors in addition to providing Flovac onsite support if desired to ensure success. We often work with contractors new to the vacuum sewer space to facilitate a larger pool of contractors for municipalities to call on with vacuum sewer experience. This helps grow the industry.
- o Flovac can use their monitoring system to complete the strict daily and final vacuum testing. This is helpful as all stakeholders receive notification when testing begins and can follow along with progress during the testing.

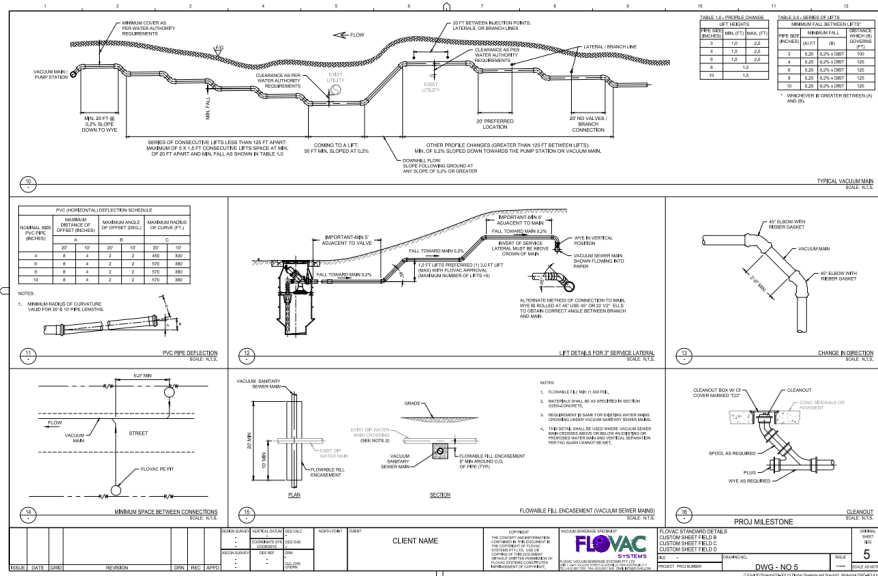


Figure 16 Sample Flovac STD details

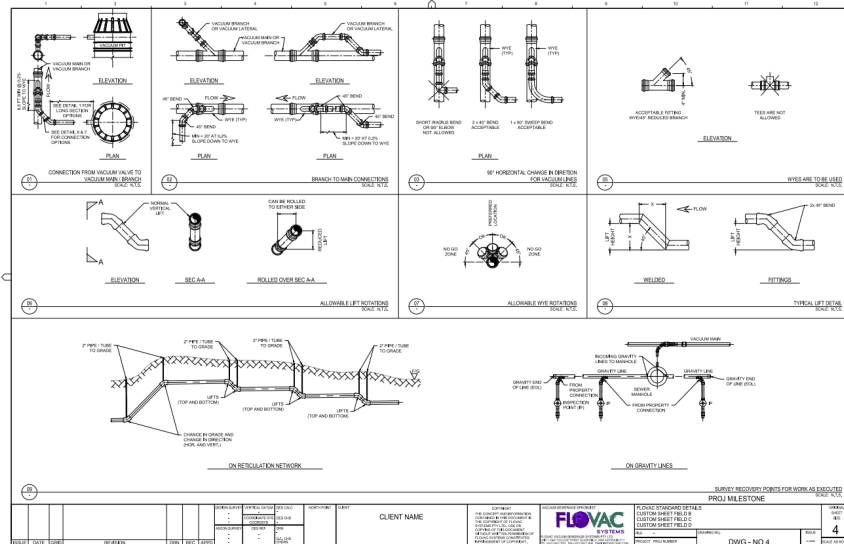


Figure 17 Sample Flovac STD details 2

ii. Factory testing prefabricated skids

Flovac, as mentioned in section i. above, ensures that all major components are factory tested at respective manufacturing facility prior to shipment to site for skid assembly. Once all major components are mounted and pre-piped on their respective carbon steel, aluminum or stainless steel (material and coatings are project spec driven) skids Flovac then interconnects major system components, ie the vacuum skid, collection tank, sewage pumps including all valves pipe spool pieces gauges switches and transmitters and wires to the station control panel and simulates, with water and air, the complete operation of the vacuum station prior to shipping to site. This is to ensure there are no vacuum leaks, and that all equipment performs as intended prior to being shipped to site. This factory pre-commissioning step is in addition to onsite pre-commissioning and all data is recorded and documentation is provided in commissioning document packet or as requested.

iii. Vacuum valve and appurtenances

Vacuum Valves and controllers

- As mentioned earlier, the Flovac production facility holds multiple ISO certifications surrounding operational, environmental, and occupational excellence. Additionally, Flovac vacuum valves and controllers come with a 10-year warranty, this is unmatched in the industry. Flovac vacuum valves and controllers hold the highest independent testing certification. We have a record of vacuum valves passing the 1million cycle mark recorded in the field via our monitoring system. The Flovac interface valve is also rated for a leading 4 GPM and 237 CV flow. Flovac has held, for several years, the largest opening on the market for a vacuum valve. There is suggestion that others may have now achieved similar or greater opening at the cost of valve wall thickness. Flovac specs include:
 - Independent Certification EN-16932-3
 - 500,000 cycle tests
 - Submergence Test
 - Resistance to blockage test
 - 50-year Desing life
 - Rebuild every 10 years.
 - Clear controller for operator visibly and diagnostics.
 - DEKRA Independent Testing Registration 2181781.01AoC:

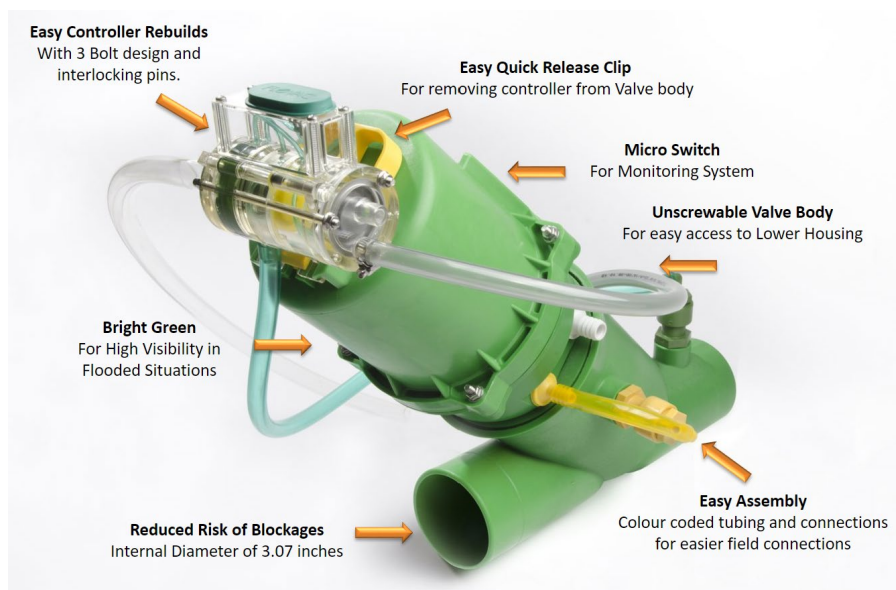


Figure 18 Flovac Vacuum Valve and Controller

- The Flovac Interface controller also has a 10-year warranty. Key features include a see-through design, the ability to process water and a wider tuning range from 1-20 seconds. Flovac has seen a massive uptick in sales as of late. The key differences include operational “trigger” of opening accuracy, consistent timing adjustment and activations at half the vacuum levels of others.
- What we are seeing throughout the field operations where other controllers are used is unreliable activation levels, higher levels of vacuum needed, and inconsistent timing. This can cause sever issues to a vacuum system as not only do the higher activation and levels reduce emergency storage at the valve pit, but the higher activation levels also result in larger batches of sewage entering the collection network upon valve opening. This can cause the valve to close on water and knock of a coupling holding the valve in place. Additionally, the larger flows also throw of the designed Air/ liquid ratio of the entire vacuum system.
- The above reason is the cause of some of the largest vacuum sewer systems in the USA turning to Flovac for parts and service. We have extended a buyback program for some to help offset the cost of changing out the controllers to Flovac controllers and regain control of their collection networks. We think a pertinent lesson here is just how important R&D and long-term product testing is before rushing to market.

iv. Valve Pits

Vacuum valve pits

- In addition to wide acceptance of Flovac valves and controllers throughout the vacuum sewer community. Flovac one piece collection valve pit has taken off as well in the last section we mentioned a couple of issues operators see with others vacuum valve pits. Emergency storage and couplings becoming dislodged causing vacuum leaks. In this section we will expand on how the Flovac Vacuum Valve pit is superior and is not subject to these above-mentioned issues.
- Firstly, Flovac designs their valve pits and buffer tanks with emergency storage in mind. This should be standard practice in vacuum sewer systems. Unfortunately, this has not been implemented through regulations to protect stakeholders and operators alike. When we design wet wells we think in terms of emergency storage- vacuum valve pits are no different. This keeps stakeholders safe as it allows for adequate response time for the operations team to remedy faults before becoming a homeowner issue. Secondly operator safety is gained through the ability to delay response due to inclement weather or neighborhoods that may be unsafe after dark.

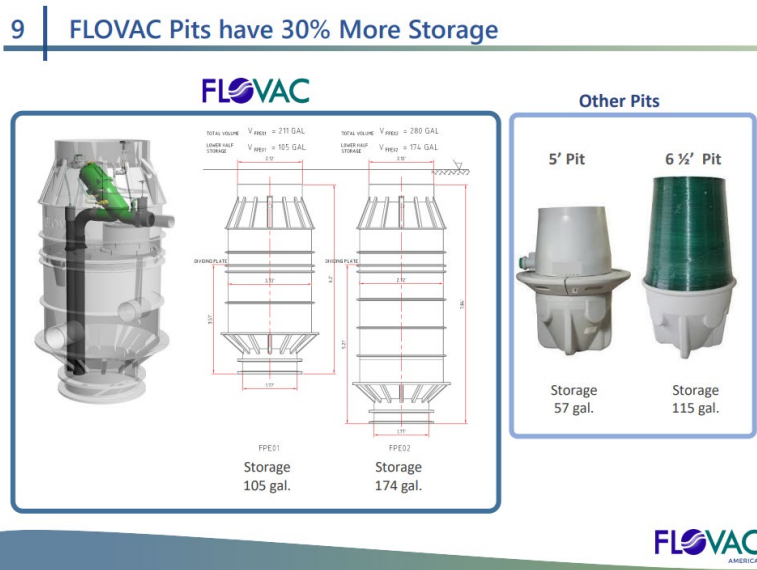


Figure 19 Presentation slide indicating differences in capacity of valve pits.

- It is important that an operator can service all parts from a kneeling position and does not need to enter the valve pit to carry out work. Color coded hoses in the Flovac valve pit ensure correct connections are made every time. Other key features include a large opening to access the lower section for inspection, cleaning

and pump out. A knife valve isolating the vacuum supply from the vacuum interface valve to carry out maintenance. These features are not standard on others valve pits. In a recent upgrade of valves at Charlotte County, city engineers were shocked that there was no way to isolate the vacuum to service the vacuum valves.

- As the valve pits are one piece and Flovac utilizes watertight lid from EJ. Operators are not subject to stagnant, standing water when opening the valve pit lid to service the equipment. For many operators' stagnant water in their valve pit upper is a frustrating reality, and results in fishing around blindly for equipment. This standing water also facilitates growth of nearby flora and fauna inside the valve pit, some we have seen are fully overwhelmed by roots.
- The 3-inch stub out for the Flovac vacuum lateral connection is welded into the side of the valve pit. This again prevents infiltration into the upper section of the valve pit but more importantly ensures that the alignment of the valve and lateral stub out are perfect every time. The stub out then connects to the Flovac knife valve and interface vacuum valve. This arrangement also eliminates the need for two, no-hub couplings. The nose of the Flovac vacuum valve is housed in the Flovac knife valve.
- Flovac preassembles and pretests their equipment before being sent to the site for installation by the contractor. This enables savings on installation as pipe work or valve installation is not required by the contractor.
- The above points are important from a maintenance viewpoint as what we see happening with others equipment is that the incoming alignment of the vacuum lateral is often severely misaligned. This makes it near impossible to secure the vacuum valve. As two no-hub couplings are used on others equipment, in lieu of a shut off valve, the chance of the valve becoming dislodged is now extremely high. Add to this combo the valve closing on water due to the higher controller activation levels mentioned above and failure is unfortunately, all too common. This problem is supported by the introduction of special couplings to try and remedy the security of others valve.
- A popular option for operators dealing with flooded valve pits is to remove the controller from the valve pit all together. Flovac is undertaking this as Sanford and Key Lagro on a large scale at the time of writing. This allows the operations team to keep the a critical component out of the water and prevent unnecessary failures caused by missing O-rings or incorrect hose connections.



Figure 20 Flovac Air Terminal housing valve controller and monitoring

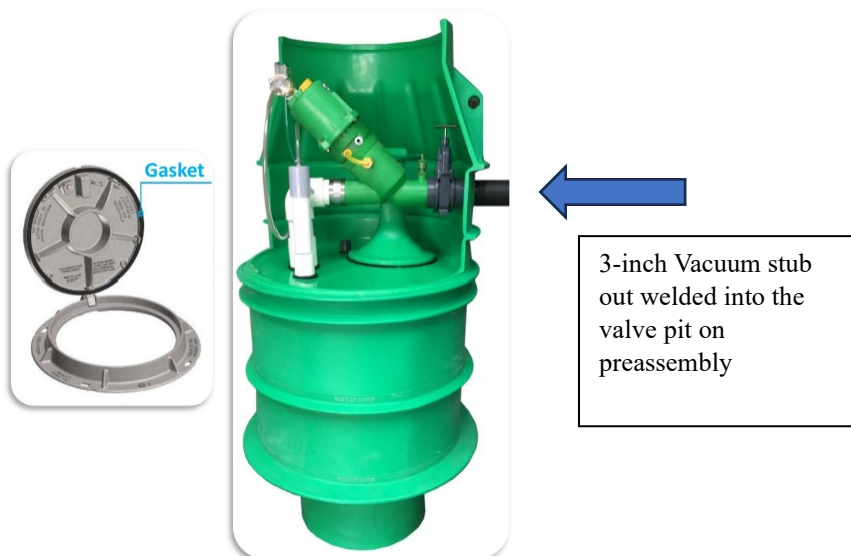


Figure 21 Cutaway of a Flovac Vacuum valve pit preassembled with 3-inch lateral stub out

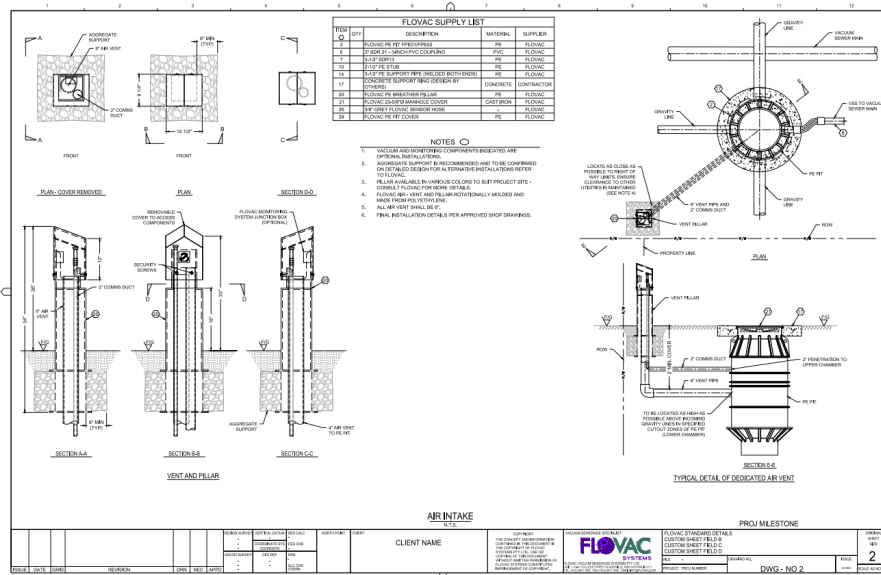


Figure 22 Flovac Valve pit sheet

v. Buffer Tanks or High Flow Valve Pit Arrangements

- Flovac offers multiple options to facilitate the success of high flow projects as mentioned in earlier sections, this is something we have a lot of experience in. Again, critical to success are basic considerations like operator safety, emergency storage, shut off valves, serviceability and vacuum lateral connection considerations to the vacuum main. Preliminary design layouts of this system by others call for multiple buffer tanks in trafficable areas. While Flovac is more than capable of providing the said equipment, we also offer alternative suggestions.
- Firstly, we want to consider one of the biggest advantages of a vacuum system, which is eliminating I&I using a sealed network. By collecting from gravity mains at every location we are allowing for increased amounts of I&I in addition to a sluggish and potentially slow vacuum collection network.
- Flovac has provided an alternative preliminary layout that reduces the LF of gravity network and essentially swaps buffer tanks for regular valve pits. It is important to remember a vacuum valve is essentially an energy input to a vacuum collection network. Having multiple energy inputs working in harmony to energize the system and propel the sewage toward the collections station provides for a well

performing collection network, vs fewer valves with higher flows. The Flovac proposed preliminary layout would also reduce excessive I&I.

- With that said, we understand that existing conflicts and other unforeseen stakeholder issues may prevent the ideal/desired design of the collection network. And that gravity main to the end of each street is the best plan of attack. What we would suggest in this event is rather than the user of an over under valve pit or buffer tank arrangement located in a trafficable area, is instead we use a wet well or lower part of the Flovac buffer tanks in the trafficable area and remotely mount the valves and controllers in the right of way. The intent here is to keep the operations team out of the trafficable area and harm's way when servicing equipment.

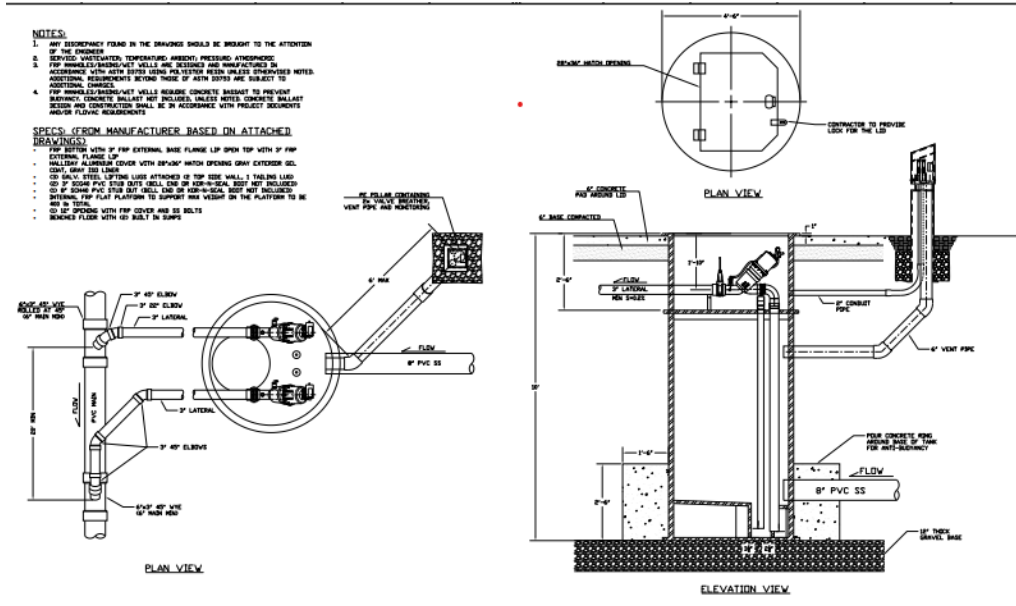


Figure 23 Flovac Over under high flow double valve pit "Buffer Tank"

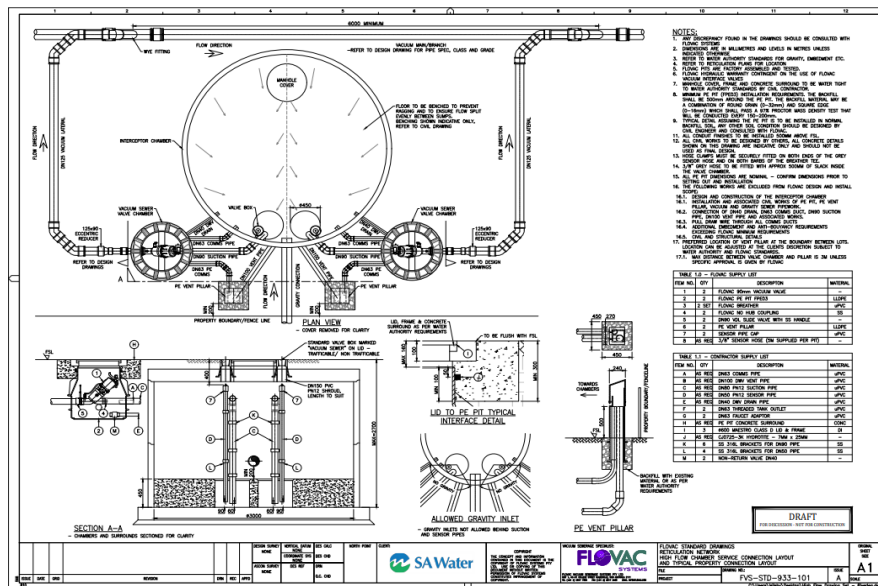


Figure 24 Flovac High flow arrangement with remote mount valves and controllers

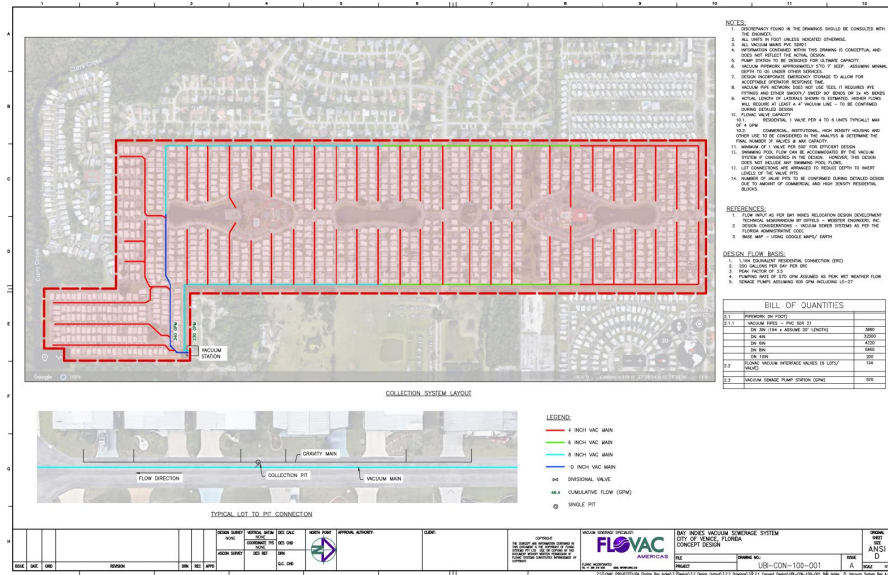
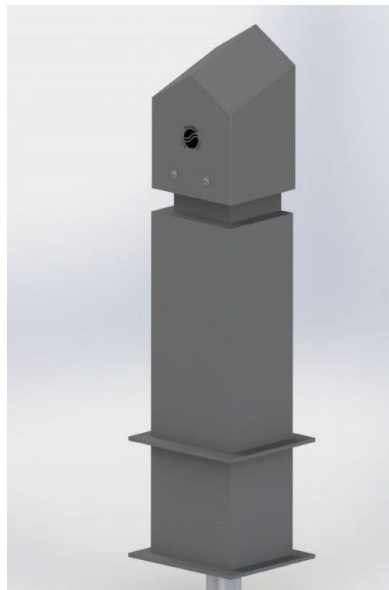


Figure 25 Flovac alternative preliminary design layout

vi. Air Terminals

Flovac Dedicated air terminal services multiple purposes. Firstly, the air terminal houses the 6-inch dedicated air vent pile connected to the valve pit sump ABOVE the household lateral connections. This ensures adequate air to enter the sump when the valve is firing and ensures the wastewater is propelled towards the vacuum station with the correct air liquid ratio. It also ensures the household p traps are not drained. Given the lid is removable it allows the operations team to have an inspection port. The Flovac terminal also houses the monitoring module and can house and controller at the discretion of the user.



vii. System Monitoring

- This is really where Flovac leads the way. Flovac has had monitoring as a standard feature and in some cases mandatory feature for over 15 years. For a lot of older international systems, the monitoring was in the form of a cable or “dupline” monitoring system laid at the same time the vacuum main and pits were installed. Entry into the US market demanded Flovac develop something wireless as there was no existing infrastructure that would facilitate a cable monitoring system. Flovac turned to LoRa WAN as a low power

solution to monitor existing and new vacuum sewer systems. Introducing the Flovac monitoring System-FMS

- Flovac rolled out their first US monitoring system in the Florida Keys in 2017. Since then, Flovac has installed thousands of monitoring devices to upgrade existing systems throughout the Americas. The success stories are endless. From reducing pump run times by 1/3rd to saving an abandoned church from extensive water damage by a broken water line. Eliminating salinity issues at treatment plants. Miles Crossing Oregon had stopped allowing development as their system was overwhelmed by rain and tide water. Once Flovac rolled out their monitoring system in 2018 they were able to minimize I&I from gravity laterals and are now collecting impact fees again from existing lots within the community being developed.
- As of late last year 2022, when Flovac started their largest vacuum sewer system upgrade to include remote mounting controllers and monitoring of 3000 valve pits in the Florida Keys, there was no other vacuum supplier that could match what Flovac has to offer. This was confirmed in writing by the EOR for the key large upgrades after reaching out to other vacuum system suppliers. We believe this speaks volumes to Flovac leadership in this space.
- Flovac has also been approached by regulatory councils to provide guidance on monitoring minimum standards, specs, and expectations from project stakeholders.
- Flovac offers a wide range of monitoring equipment for new and existing vacuum collection networks. Additionally, we are often asked to monitor adjacent wet wells or grinder pumps, so the operations team has all municipal information at their fingertips. A summary of equipment is listed below. It is important to remember, as we have stressed in earlier sections, an engineered approach is best support the municipality rather than a one size fit all approach.
 - Full station monitoring unintegration in to separate Scada applications as well as the FMS application.
 - Valve monitoring by reed or micro switch. Flow rates, controller timing, valve stuck open, controller failure predictive analysis.
 - Sump monitoring by float or pressure sensor. High level conditions, surge flows, prevent SSO events, operators notified before the homeowner is aware.
 - Rainfall data collections and correlation with flow, identify and prioritize I&I
 - Tidal data integration and correlations with flow identify and prioritize I&I
 - Remote control of vacuum valves, manually, or automatically based on delta pressure, setpoint pressure, and/or time of day.
 - User defined set points allow for customizable configuration of the monitoring system.
 - Take notes, set tasks, upload photos to vacuum equipment.
 - Mark lines, valves, lifts, or other pertinent information on the interface map
 - Built in API integration.
 - Customizable Alarm settings, Email, SMS, Dialer, Push notifications
 - Low power 3.6-volt battery powered modules, 5-year battery life solar power options available to areas with good light exposure.
 - All monitoring modules are the same and can be moved around as desired.
 - Vacuum sensors can be added and moved from module to module as needed.
 - Separate battery pack to the module, eliminate opening of the sealed monitoring equipment.
 - IP68 connectors and cord sets
 - Full training and support provided on installation and operation.
 - Countless testimonials are available on request.
- An impressive feature of the monitoring system is the ability of Flovac operations team to support a municipality remotely. This is extremely important for municipalities embarking on the use of new collection technology, especially if they do not have previous experience with vacuum sewers. Flovac can now help educate and work as a partner for the end users around the clock.
- What we have learned from having to retrofit thousands of existing valve pits, where monitoring was not considered, nor available at time of installation. This is how we now set up all new valve pits and buffer tanks. Flovac standard details call for a 2- inch or larger communications conduit from the valve pit upper, to the adjacent air terminal or pedestal. This is critical to future proof of the vacuum collection network. Although some may not budget to rollout monitoring at initial system start up, or some have had to omit

monitoring as to create a fair bidding environment given Flovac is only vacuum supplier with monitoring experience. In any event we call for a 2-inch or larger conduit to facilitate monitoring communications cables, additionally this size conduit allows for vacuum lines to be run though should the municipality wish to remote mount their controllers. Anything smaller will not allow for these features in their entirety.

- Looking at the Bay indies Utilities Relocation design development technical memorandum. We must point out that 110v power supply is not needed by Flovac at the valve pits for full monitoring functionality and feedback to the vacuum station.

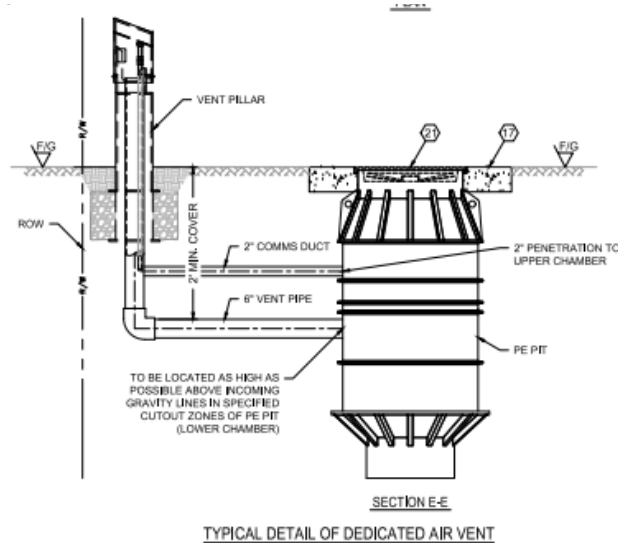


Figure 26 Flovac STD details calling for 2-inch communications conduit



Figure 27 Graph depicting failing valve controller.

- The above image highlights a valve controller opening timing (light green) slipping or trending towards failure. The operations team were alerted and able to change the controller during business hours. Observe the correct, smooth, and consistent valve opening timing on the right of the graph. Remember to how important the Air/ Liquid ratio is to your success.



Figure 28 Erratic timing of HP controller replace with Flovac Controller

- The above figure illustrates the erratic controller timing of a competitor’s blue or “HP” controller that are now banned at this system. The red arrow points to where the Flovac Controller was installed and smoothed out the vacuum valve opening time. Again, think Air/Liquid Ratio.

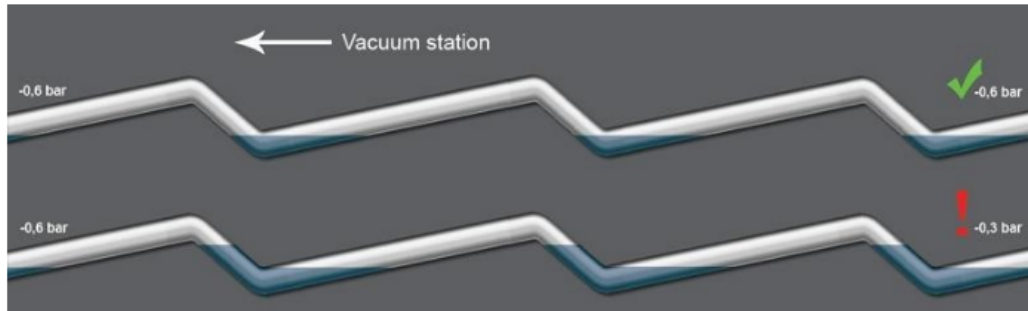


Figure 29 Brief overview of FMS interface with vacuum measurements.

6) Automatic Air Injection System (AAIS)

In some areas of the vacuum sewer network, vacuum levels can drop below their optimal operation condition, adversely affecting the proper function of the valves.

Low vacuum levels can be caused by a variety of factors, including wrong valve time settings, excessive external infiltration into the system, extensive line stretches without any connections, design and construction flaws, etc.



Vacuum valves need a minimum of -5 inHg to open, however this minimum pressure might not be enough to allow enough air to enter the system to avoid water logging.

To solve this problem FLOVAC has developed an Automatic Air Injection System (AAIS). The AAIS can prevent vacuum levels from dropping below the minimum -5 inHg, as it will let in the air automatically when the vacuum level drops below a user-defined vacuum level or any other pressure level set up by operations. ●

In a conventional standalone system, the vacuum level is checked only at a specific point in the sewer collection network and does not consider the vacuum level at the vacuum station. The disadvantage of ignoring the vacuum level at the vacuum station is the possibility to inject air into the system even when there is not enough vacuum level at the vacuum station, which will further deplete the vacuum level in the system.

FLOVAC's AAIS was developed to, in addition to the vacuum level at a specific point in the sewer collection network, consider the vacuum level at the vacuum station, taking advantage of its two-way or bi-directional communication capability to evaluate all available parameters and fine-tune the amount of air required for optimal operation of the system. Furthermore, the AAIS is installed by simply replacing the valve controller with FLOVAC's electrical controller, thus not requiring any additional valves and/or valve pits.

Figure 30 Excerpt from Flovac monitoring system detailed description- AAI

End of Section 2

SECTION 3

Support Service

Flovac is the largest designer, supplier, and operator of vacuum systems in the world and as such have the capability of supporting all stakeholders throughout the process and into the future.

Flovac's head office for the Americas is at Palm Coast in Florida, roughly a 4-hour 15 minutes' drive from the project site. This office carries spare equipment required for the project and full operational support.

Flovac's first main support is through our engineering group, working with the city's preferred engineers, training them in the design of the system and assisting throughout the process, based on the local requirements of the city. Most importantly our design team will also carry out a training course on master Planning and vacuum design for the city employees. It is important for the city to understand the flexibility of the design and to understand how the system is designed to allow for future changes within the community.

Flovac will help with all the documentation required for the construction of the system and will take the successful contractor through a training course which is based on the requirements of the city and the community. This is an important distinction between how these projects have been done in the past. It is not a one size that fits all approach. Each project will have its own unique requirements.

Flovac has experienced project managers and site supervisors. The approach which the city has taken with this project by starting with an RFQ sets this stage of the project up for success. Rather than having the specialist supplier beholden to the contractor, our site supervisor can report directly to the city, ensuring project success. The use of Flovac's monitoring system ensures full visibility, and all stakeholders will be able to see the daily pressure testing of the system.

Flovac will be fully involved during the pre-commissioning and full commissioning. At this completion a two-day operator course will be done on the project itself. Too many times, we have seen training taking place at a remote location, when the most critical thing is for the operators to learn how to manage their own system. One suggestion we would make is to allow Flovac to maintain the system for the first year, working hand in hand with your operators.

As ongoing support, our monitoring system ensures that our operations center can offer full support by checking your system performance daily. Our operations center has a 24-hour support line, and we can offer an asset support program which would involve regular visits and re-training.

We feel that Flovac's track record speaks for itself regarding support, as such reference the following events where Flovac was able to deploy and support those in need of specialist help in the following sections. In these events support was able to be deployed within 24 hours. The movement of Key operational staff through Florida supports not only quick response times but frequent visits to build lasting relationships with operations and management teams.

End of Section 3

SECTION 4

Flovac Key Personnel

- Matthew Woodward – Senior Engineer
 - Matthew brings to the Flovac team an enormous amount of experience in the Vacuum pump world, formerly as a mechanical and application engineer with Busch vacuum pumps- 10 years. Matt also has extensive experience with CAD systems. Matt’s attention to detail and sound understanding of pump philosophy, performance, and integration into vacuum collection networks ensures our clients have outstanding support and coordination with EOR’s.
- David Dawson- Engineering Lead
 - David Charton brings 15+ years in the design and support of vacuum sewer systems around the globe. Charton specializes in land development and pump station design including feasibility studies, detailed design, design coordination, project management, construction as well as a proven team leader.
- Ben Castaldo – Project Manager
 - Ben brings years of project management experience to the team and is currently knocking his current projects out of the park, including renovations of Key Largo’s 3000 Pits, Sanford Florida with 500 valve pits, and Okeechobee, FL with 3 stations and a few hundred pits. Ben has built strong operations support staff to ensure not only Flovac’s success, but a lasting solution for Municipalities.
- Charles Meredith – Regional Operations Manager
 - Charles has many years of experience operating and managing a crew that oversaw 9+ vacuum stations and collections networks. Charles heads up our monitoring support and reporting as desired/required by the individual municipalities. The nature of our monitoring system allows Charles to facilitate this from any location.
- Carl Yeager- Inspector
 - Carl aids in site support for the municipalities during the installation of a new system. Carl has many years of pipe installation and inspection services under his belt. This enables Carl to be an effective aid to EOR’s, Municipalities’ and contractors alike to ensure a successful project.
- Stephanie Lambert – Project Administrator
 - Stephanie has over 12 years of project administration including 4 years of working with civil engineers. She is currently providing administrative support for our engineers and field operations team.

Key Sub vendors/ equipment providers

- Barneys Pumps
2965 Barneys Pump Place
Lakeland, FL 33812
863-665-8500
- Unitron Controls
2920 Barneys Pumps Pl
Lakeland, FL 33812
863-665-8500
- Cornell Pump Co.
16261 SE 130th Ave
Clackamas, OR 97015

- Busch Vacuum Solutions
516 Viking Drive
Virginia Beach, VA 23452
800-872-7867
- Solberg Manufacturing
1151 Ardmore Ave
Itasca, IL 60143
630-616-4400

SECTION 5

Build America, Buy America (BABA) Act and State Revolving Fund (SRF) Requirements

- a. . The requester has outlined clearly a summary of the requirements that Flovac adheres to maintain compliance with SRF and BABA acts. The following outlines how Flovac not only ensures these acts are met but how we, Flovac, help facilitate the process.

Flovac Inc- Submits the Build America, Buy America certification form with each payment application. Flovac provides product certifications to contractors and/or loan recipients as requested. Flovac incorporates BABA requirements into all contracts. Obtains manufacturer's certifications and maintains them in project files.

Additionally, Flovac supports the following stakeholders.

Contractor: Flovac works to support (where appropriate) the Contractor to Procure US-made products and obtain certifications from manufacturers. Including Maintain a list of items covered by the De minimis Use Waiver.

State- Coordinate with State authorities as needed to conduct Inspections and examine documentation for incorporated products. Reviews De minimis tracking form.

Engineer/Consultant – Flovac assists to comply with requirements by ensuring BABA is incorporated into all contracts and all components incorporated into the design. Verify BABA compliance when approving shop drawings and materials.

Example Certificate format:

MANUFACTURERS CERTIFICATION REQUIREMENTS:

- Flovac Inc.
- SRF construction project name and location
- List of specific products(s) delivered to the project site
- Category of item(s); i.e. iron & steel, manufactured products, or construction materials
- Compliance Statement to Build America, Buy

America as mandated by the Infrastructure Investment and Jobs Act – Public Law No. 117-58

- Location of the Foundry/Mill/Factory where the product was manufactured (City and State)
- Signature by a manufacturer's responsible party

SECTION 6: VSSM Background Questionnaire

ATTACHMENT 1

SECTION 6: VSSM BACKGROUND QUESTIONNAIRE: To determine the qualifications of the VSSM, the VSSM is required to include information on the following categories. The information provided will be used to rank the VSSM, based on the evaluation of the responses provided.

1. EXPERIENCE AND EXPERTISE WITH VACUUM SEWER SYSTEMS

- A. How many systems in North America do you have that are operating at this time?
Provide a separate list of all your installations in North America, showing the number of valves in each system and the year each system was placed in operation. Provide references for each, including the name and phone number of the owner of his Utility Director or operator.

Response: 23

- B. How many systems do you have operating outside of North America?

Response: 350

- C. During what year did your 1st North American system go online?

Response: 2016

- D. What is your company's primary business (brief paragraph)?

Response: _____
Flovac stands as a leader in environmental engineering, specializing in environmentally friendly vacuum sewerage systems design and supply. With more than 40 years of expertise, our team of dedicated professionals is spread across 35 countries, united by a belief in a sustainable future.

- E. What percentage of your company's total sales are from vacuum sewer components?

Response: 100%

- F. How many direct United States based employees does your company have (not counting sales representatives) that are assigned to your vacuum sewer valve and station equipment manufacturing, technical support, and training business?

Response: 17

- G. How many of your vacuum valves are currently installed in the North America?

Response: 4000

1. Of these, how many are in your designed systems?

Response: 300

2. How many are in a retrofit situation?

Response: 3700

3. Where your valves are in a retro-fit, what brand valves were replaced?

Response: . Roediger/Airvac (aqseptence group gmbh) Iseki

H. Are your valves manufactured in the United States?

Response: YES ____ NO X

2. TECHNICAL SUPPORT

A. With your current North American staff, how many projects of a size similar to this one can your company handle concurrently (support, design assistance, product supply, construction supervision, and the like.)?

Response: 10+

B. Provide the name of the design engineer within your company that will assist our ENGINEER with the design review.

Response: Matthew Woodward

3. SYSTEM OPERATING IN A SIMILAR ENVIRONMENT

A. How many operating vacuum systems do you have in North America that service over 500 customers?

Response: 5

B. How many systems, with your valves, are operating in Florida?

Response: 16

C. How many North American systems do you have that are in a coastal environment similar to Charlotte County?

Response: _____

D. How many of your company's systems were designed to replace septic tank systems?

Response: All

E. Where is your closest technical support office with permanent staff?

Response: Palm Coast, FL

F. How many customers are connected to your largest combined vacuum station and collection system?

Response: 700

4. COMPONENT DESIGN & RELIABILITY

A. Provide detailed drawings, specifications, and manufacture literature of the proposed vacuum valve pit(s) and vacuum valves to be provided. Include sizes, weight, backfill requirements, and installation/repair guidelines.

B. Provide detailed drawings, specifications, manufacture literature, and schedule of materials for the vacuum station equipment to be provided.

C. Do you provide a fiberglass buffer tank?

Response: YES X NO ____

D. Do you provide a fiberglass buffer tank with the valve and appurtenances in a separate chamber above the sealed sump?

Response: YES X NO ____

- E. Is your valve pit/chamber rated for H2O traffic loads without a concrete collar?
 Response: YES X NO ____
- F. Will your valve pit resist the buoyant forces from high groundwater without the use of additional concrete ballast?
 Response: YES X NO ____
- G. How many connections can be served by one vacuum tank chamber by size?
 Response: 4-6 Emergency storage is more pertinent than connections # on our smallest valve pit
- H. What is your maximum vacuum valve to connection ratio (Such as 1 house/valve or 2 per valve)?
 Response: Flow rates and emergency storage dictate this multiple houses can be connected to one valve.
- I. What is the largest diameter sphere your valve can pass?
 Response: 3.07-inch solid sphere
- J. Are any solids left behind in the collection sump after the vacuum valve operates?
 Response: YES X NO ____
- K. How many field joints are required to connect your valve pit (from vacuum main to pit)?
 Response: Dictated by vacuum lateral length and elevation. 1 minium
- L. Are any field connections required to connect the sewage collection sump to the valve?
 Response: YES X NO ____
- M. What vacuum levels are required throughout the collection system to ensure proper operation of your valve?
 Response: Absolute minimum: 5 in – Hg
 Maximum: 30 in – Hg
 Recommended operating range: 16-20 in – Hg
- N. What is the maximum recommended level of vacuum that your valve can withstand over an extended period of time before it is damaged?
 Response: n/a see above operating range in – Hg
- O. Describe the means air is supplied to the valve? How is water prevented from entering the breather assembly or tubing?
 Response: _____
Through a breather located in the upper section of the vavle pit or externally in above the flood level. Flovac seals there pit uppers or ifthe client peferes mounts erternally to prevent waer getting in.

NOTE:We do not draw air from the sump as this air is akin to battery acid when it sits in the valve (per independent testing) this shortens the life of the valve and controller. It also adds to the maintenance schedule for the operators as if the seals fail here the operator will not know until catastrophic failiure occurs. Cite mitiple projects throughtout USA

P. List vacuum valve manufacturers that offer valves interchangeable and capable of fitting within the valve chamber that you supply.

Response: Aqseptence group gmbh

Q. Describe in detail what piping modifications or re-arranging, fittings, adaptors, and the like would be necessary to retrofit a valve of another manufacturer.

Response: At Charlotte County- None

R. Will your valve fit and operate in valve pits that are not manufactured by your company?

Response: YES X NO ____

S. What types and lengths of warranties do you provide?

Response: Valve and controller 10 year mechanical warranty.

T. If your company supplies valves and valve pits and another company supplies the vacuum station components (control panel and premanufactured pump/tank skid units) will your company provide a system wide warranty? If not, describe how to overcome this problem.

Response: YES ____ NO ____ YES- Flovac would need to evaluate and sign off on design for single point of accountability

U. Will your company supply some, but not all, primary vacuum components for the Lake View Midway vacuum system?

Response: YES X NO ____ See above

5. CONTRACTOR SUPPORT SERVICES

A. Do you provide construction inspection services?

Response: YES X NO ____

B. What is your recommended acceptable leak rate for the vacuum mains? (such as inches/hour % loss,)

Response: 1% /hour start at >22inHg

- C. Provide the name of the person in your company who will oversee/manage equipment delivery and construction services for this project.

Response: Ben Castaldo

6. START-UP AND TRAINING SERVICES

- A. Do you provide system start-up services?

Response: YES X NO ____

- B. Do you provide a formal operator training school?

Response: YES X NO ____

7. PRODUCT: WARRANTY & RELIABILITY

- A. Does your valve warranty include wearing parts?

Response: YES x NO ____

- B. Where are your valves manufactured?

Response: Holland

- C. Where are your vacuum valve controllers manufactured?

Response: Holland

- D. Do you assemble your own vacuum skids or is this contracted out and done by others?

Response: Own ____ By Others ____ X Hybrid

- E. Can the owner's system operator rebuild your controller at his shop?

Response: YES X NO ____

- F. Does your controller have test ports?

Response: YES X NO ____

8. AFTER-MARKET SERVICES

- A. If we need a field technician after the system is in operation, how many hours/days/weeks after the request is made until they arrive on site?

Response: Depends on priority < 1 week. can also rush for emergency support if needed.

- B. If we need critical parts, such as a vacuum pump, after the system is in operation, how many hours/days/weeks after the request is made until the items will be delivered on-site?

Response: Same week , cite pase support for CCU

- C. Where is your closest technical support service location?

Response: Palm Coast, FL. Busch (pump sullpier) also in Tampa

- D. Do you provide an emergency 24-hour telephone support number, including weekends and holidays?

Response: YES X NO ____

E. If YES, what is that number?

Response: 386 319 0350

9. **OTHER INFORMATION:** Provide any other information that you consider important in the evaluation of your system; including vacuum valve assemblies and your central vacuum station components, with emphasis on design features, ease of installation, access and maintenance, system reliability, service call histories or frequencies.

10. **ATTEST STATEMENT:** I do hereby attest to the best of my knowledge, all information included in this Questionnaire, to be used in the evaluation of equipment for the Lake View Midway Vacuum Sewer Project is accurate and truthful.

Supplier's Name: Flovac Inc

Signature: 

Title: CEO

Address: 15 Utility Dr. Ste A, Palm Coast, FL 32137

Telephone Number: 386 319 0350

Date: 2/24/2025

Witness: _____

Printed Name: Stephanie Lambert

Signature: 

Title: Project Administrator

Date: 2/24/25

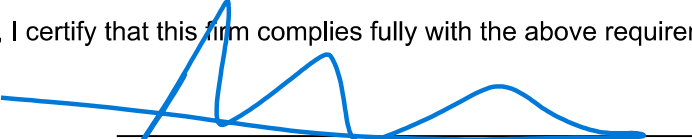
Section 7: Additional Required Bid Documents

DRUG FREE WORKPLACE FORM

The undersigned vendor in accordance with Florida Statute 287.087 hereby certifies that Flovac, Inc.
does: (name of business)

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.
2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation, and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.
3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection (1).
4. In the statement specified in subsection (1), notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.
5. Impose a sanction on or require the satisfactory participation in a drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is so convicted.
6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign the statement, I certify that this firm complies fully with the above requirements.


Proposer's Signature

2/26/2025
Date

(This form must be completed & returned)

**HUMAN TRAFFICKING AFFIDAVIT
for Nongovernmental Entities Pursuant To FS. §787.06**

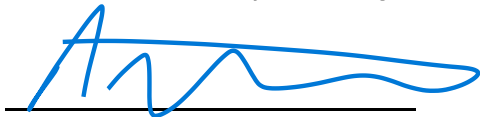
Charlotte County Contract #2024000557

The undersigned on behalf of the entity listed below, (the "Nongovernmental Entity"), hereby attests under penalty of perjury as follows:

1. I am over the age of 18 and I have personal knowledge of the matters set forth except as otherwise set forth herein.
2. I am an officer or representative of the Nongovernmental Entity and authorized to provide this affidavit on the Company's behalf.
3. Nongovernmental Entity does not use coercion for labor or services as defined in Section 787.06, Florida Statutes.
4. This declaration is made pursuant to Section 92.525, Florida Statutes. I understand that making a false statement in this declaration may subject me to criminal penalties.

Under penalties of perjury, I declare that I have read the foregoing Human Trafficking Affidavit and that the facts stated in it are true.

Further Affiant sayeth naught.



Signature

Michael Pringle

Printed Name

CEO

Title

Flovac Inc

Nongovernmental Entity

2/26/2025

Date

END OF PART IV

(This form must be completed & returned)

**PART IV - SUBMITTAL FORMS
QUALIFICATION SUBMITTAL SIGNATURE FORM**

The undersigned attests to his/her authority to submit this proposal and to bind the firm herein named to perform as per contract, if the firm is awarded the Contract by the County. The undersigned further certifies that he/she has read the Request for Qualifications, Terms and Conditions, Insurance Requirements and any other documentation relating to this request and this proposal is submitted with full knowledge and understanding of the requirements and time constraints noted herein.

By signing this form, the proposer hereby declares that this proposal is made without collusion with any other person or entity submitting a proposal pursuant to this RFQ.

In accordance with section 287.135, Florida Statutes, the undersigned certifies that the company is not on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, and does not have business operations in Cuba or Syria (if applicable) or the Scrutinized Companies that Boycott Israel List, or is not participating in a boycott of Israel.

As Addenda are considered binding as if contained in the original specifications, it is critical that the Vendor acknowledge receipt of same. The submittal may be considered void if receipt of an addendum is not acknowledged.

Addendum No. 1 Dated Feb 11, 2025 Addendum No. _____ Dated _____ Addendum No. _____ Dated _____
Addendum No. _____ Dated _____ Addendum No. _____ Dated _____ Addendum No. _____ Dated _____

Type of Organization (please check one): INDIVIDUAL () PARTNERSHIP ()
CORPORATION (x) JOINT VENTURE ()

Flovac Inc 386 319 0350
Firm Name Telephone

15 Utility Dr, Ste A, 46-5735515
Fictitious or d/b/a Name Federal Employer Identification Number (FEIN)

Palm Coast, FL 32137 40 Years
Home Office Address Number of Years in Business
City, State, Zip

Ben Castaldo 368 376 5442
Address: Office Servicing Charlotte County, other than above Telephone

Michael Pringle- CEO
Name/Title of your Charlotte County Rep.

[Signature] 2/26/25
Name/Title of Individual Binding Firm (Please Print) Date

mpringle@flovac.com
Signature of Individual Binding Firm Date

mpringle@flovac.com
Email Address

(This form must be completed & returned)