

# INSERTS FOR SEWER ODOR AND CORROSION CONTROL



**Vortex Flow**<sup>™</sup>  
ODOR & CORROSION CONTROL

M U N I C I P A L   S Y S T E M S

- Sewer Drop Structures
- Pumping Stations
- Forcemain Discharge



We build tough products for tough environments<sup>®</sup>

# VORTEX FLOW™

## A SIMPLE SOLUTION FOR ODOR AND CORROSION CONTROL

**H**ydrogen sulfide (H<sub>2</sub>S) gas and other odorous gases are a fact of life with sanitary sewer drop structures. When these gases become airborne, they not only generate complaints from the neighborhood, but also impact air quality and cause corrosion within the sewer system. Municipalities spend millions on various forms of odor and corrosion control, yet many of these methods are only partially successful and require a considerable amount of maintenance and chemicals.

A new solution for municipalities is the IPEX Vortex Flow Insert (VFI), a revolutionary technology for eliminating odorous emissions and minimizing corrosion in vertical sewer drops. With no moving parts and requiring no maintenance, VFIs have delivered significant cost savings in installations across North America.

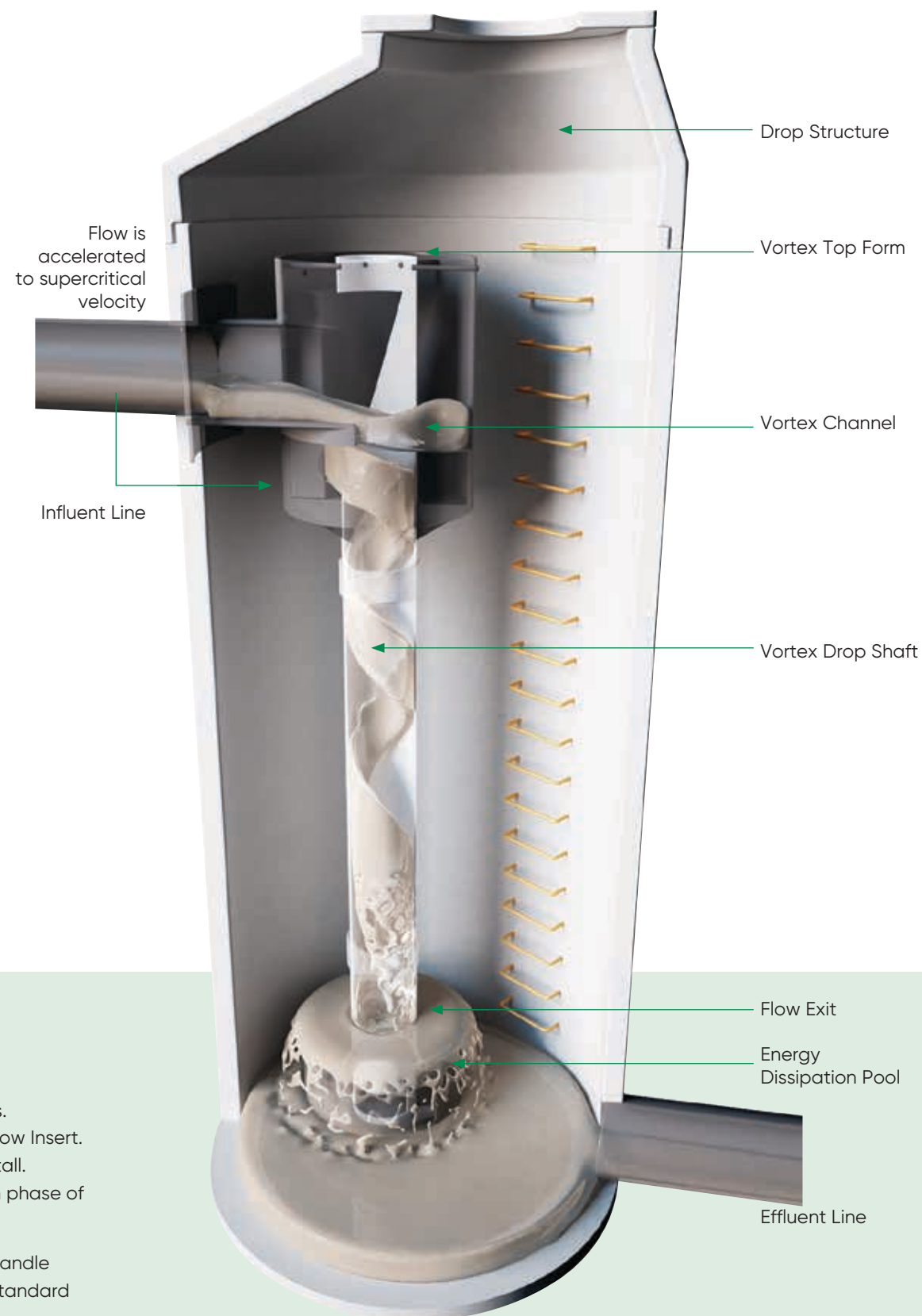
The VFI's patented spiral flow design eliminates odorous and corrosive gases in a unique way. It uses the wastewater's own flow energy to suppress the turbulence which releases noxious gases. The spiral flow creates a downdraft which traps airborne gases and forces air into the sewage flow to oxidize odorous gases. By installing a Vortex drop structure, municipalities can save thousands of dollars in monthly chemical feed, air-phase treatment and maintenance costs.

In addition, land developers can save hundreds of thousands of dollars in excavation costs in areas where conventional drop structures are not allowed.

## BUILT-TO-SPEC FOR ANY SIZE

Manholes, chambers and pumping stations are built in a variety of sizes. For that reason, IPEX custom designs and custom builds every Vortex Flow Insert. The Vortex drop height can be as little as 5 feet or more than 100 feet tall. Shop drawings are prepared and submitted to the customer, and each phase of the project is tightly-controlled to ensure the project's success.

IPEX VFIs are sized based on the peak flow that the unit is required to handle frames as little as 0.3MGD to 120MGD. The insert can be installed in a standard manhole without restricting access for maintenance.



## HOW IT WORKS

**1 VORTEX TOP FORM**  
The wastewater flows into the Vortex Top Form which directs the flow around a channel of decreasing radius. At the same time, the Vortex channel slopes downward to accelerate the wastewater to a supercritical velocity.

**2 VORTEX DROP SHAFT**  
Once the flow is channeled into the smaller Drop Shaft, the velocity and centrifugal forces generated within the VFI cause the flow to hug the inside walls of the Vortex Drop Shaft. This spiraling flow creates a negative air core, which draws airborne gases down the Drop Shaft to the Energy Dissipation Pool. Frictional forces created within the Vortex Drop Shaft assist in dissipating the fluid energy.

**3 ENERGY DISSIPATION POOL**  
The flow exit is submerged in the Energy Dissipation Pool at the bottom of the Vortex. Air and gases drawn down the air core are forced back through the wastewater and are re-entrained into the flow. This significantly increases the dissolved oxygen concentration in the wastewater, and the re-entrained odorous compounds are then quickly oxidized.



## WINNER OF THE APWA TECHNICAL ACHIEVEMENT AWARD

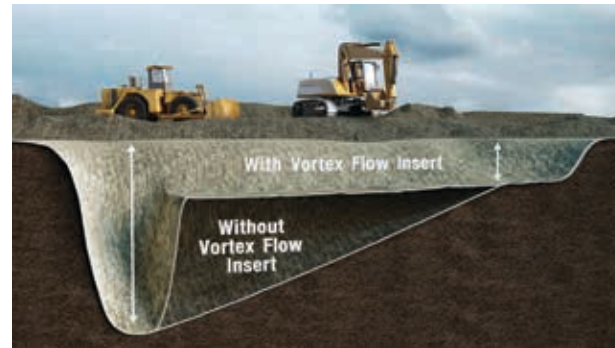
The American Public Works Association presents Technical Innovation Awards to designers of devices, processes or systems that benefit public works by serving the public and protecting the environment. Dr. Eugene Natarius, creator of the Vortex Drop Structure, received an award for his revolutionary design. Since then, units have been installed in cities across North America including municipalities in Ontario, California and Ohio.



# REDUCED EXCAVATION COSTS AND LONG TERM SAVINGS

While Vortex Flow Inserts leave manholes and pumping stations smelling better, they can also make a land developer's job easier and less costly. Due to the odor and corrosion problems of conventional drop structures, many municipalities have banned them altogether. Until now, the only alternative available to land developers was to install sewers with a gradual grade to trunk sewers deep underground, a practice which can cause the cost of excavation to skyrocket.

But by installing Vortex Drop Structures (drop structures with Vortex Flow Inserts), land developers can now comply with municipality concerns and save thousands, if not millions, in excavation costs. No wonder developers across North America are taking advantage of this revolutionary technology.



## HOW VORTEX FLOW CAN SAVE MUNICIPALITIES MONEY



### REDUCED CORROSION EXTENDS SEWER LIFE

Hydrogen sulfide (H<sub>2</sub>S) emissions from forcemain discharges can literally eat through a concrete drop manhole. By oxidizing dissolved H<sub>2</sub>S, a Vortex Flow Insert in a municipal sewer drop can significantly reduce concrete and metal corrosion, extending sewer life and saving the municipality money.



### REDUCES ODOR TREATMENT COSTS

By increasing dissolved oxygen levels in wastewater and oxidizing sulfides and other odorous compounds, the use of a Vortex Flow Insert in a drop structure reduces the need for costly chemical injection, high-maintenance biofilters and air scrubbers.



### IMPROVES WASTE WATER QUALITY

Because a Vortex drop structure reduces the odorous and corrosive elements in the flow, a Vortex Flow Insert, installed upstream of a treatment plant, can actually improve wastewater quality prior to treatment, reducing treatment costs at sewage plants.



### REDUCED MAINTENANCE COSTS

The use of a Vortex drop structure eliminates the corrosion of concrete and metal sewer components, dramatically reducing municipal maintenance costs of manholes and sewers.

“Finally, we have a long-term solution to our sanitary system odor and corrosion problems. It is a one-time cost that requires no ongoing maintenance. I would definitely recommend this product.”

Frank A. Badinski, C.E.T.,  
Asset Management Coordinator,  
Regional Municipality of York;  
NAAPI Chair;

NASTT Great Lakes St. Lawrence and Atlantic Canada Vice-Chair.

## APPLICATIONS

**Manholes, Chambers and Forcemains –** Wherever you have a drop from one pipe to another, Vortex drop structures can transform drop manholes from potential maintenance problems into effective aeration devices that control odor and corrosion.



**Pumping Station Wet Wells –** A Vortex drop structure can minimize gas emissions from pumping station wet wells.



**Steep Grade Sewers –** Vortex Flow can dissipate the flow energy of water running down a steep grade, reducing the flow's discharge speed.



**Barometric Loop –** A barometric loop is an area where a forcemain is brought up out of the ground to improve the hydraulic profile of the system. Sometimes referred to as a "gooseneck" due to its appearance as it rises up out of the ground, barometric loops can be used to slow the flow down and improve flow characteristics at a force main discharge.



# PRODUCTION AND INSTALLATIONS

## PRODUCTION



Fabrication of a 60 MGD Vortex unit Austin, Texas.



Hydrostatic testing of a large Vortex unit.



Shipping from fabrication plant, direct to site.

## INSTALLATION



Offloading a Vortex Top Form.



A uniquely flanged Vortex, Vancouver, British Columbia.



Vortex with a flanged entrance, Manassas, Virginia.



Second effluent line at bottom, benching from the EDP to direct flow, Sarnia, Ontario.



Strapping detail on Vortex unit, Buckeye, Arizona.



Securing Vortex Flow unit, Burlington, Kentucky.



Stainless steel straps and epoxy painted walls for additional layer of corrosion protection, Charlotte, NC.

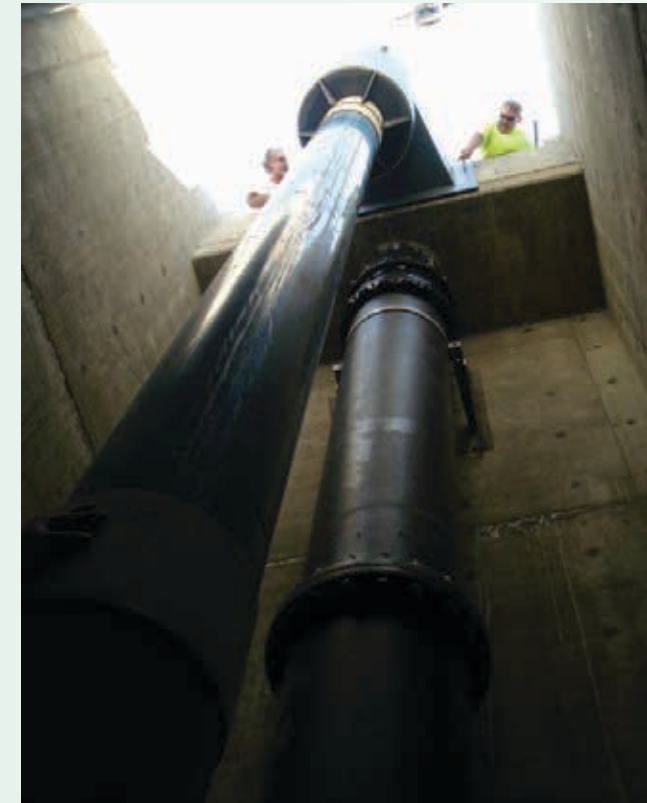


Vortex Flow operating in a pumping station wet well, Jacksonville, Florida.

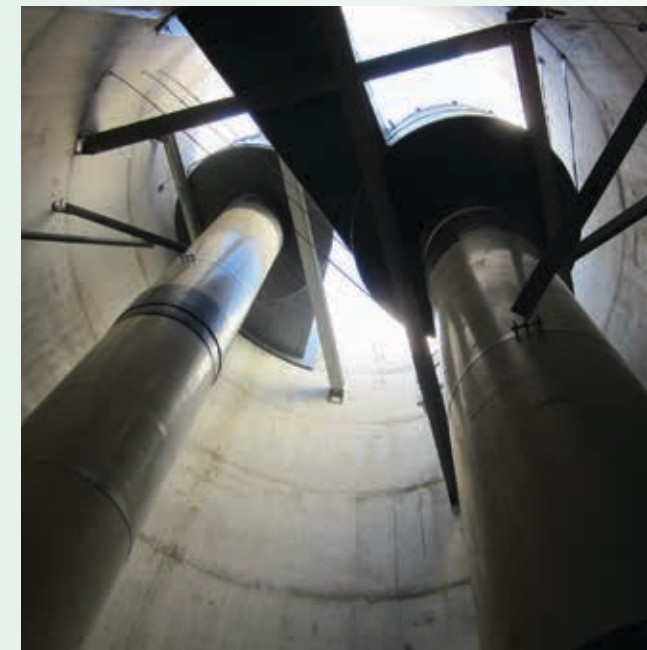


Vortex Flow Insert reducing H<sub>2</sub>S concentration levels, Camden County, New Jersey.

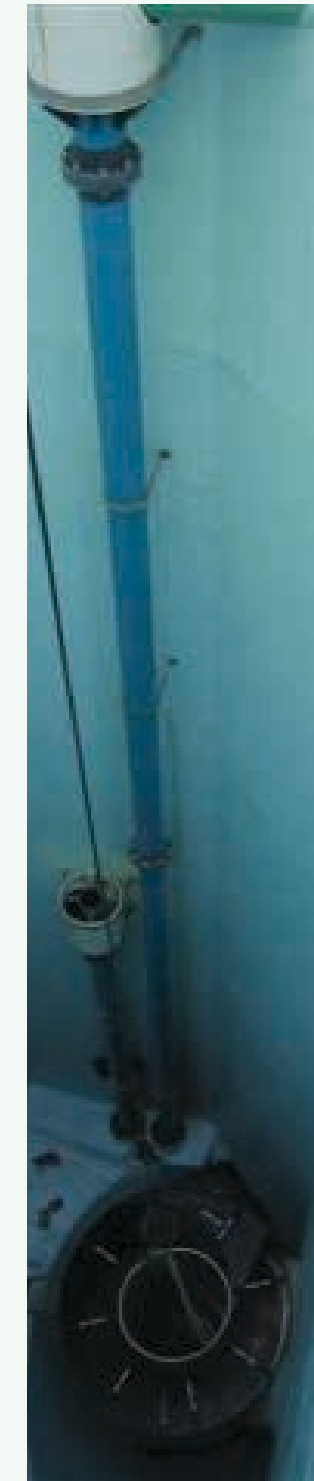
## UNIQUE INSTALLATIONS



Barometric loop for reduction of velocity and energy dissipation at the WWTP – Newburgh, IN



Dual influent lines with twin clockwise and counter-clockwise flow Vortex units – Davidson, NC



Structure with multiple Vortex units at different influent elevations and flow rates – Austin, TX



Vortex installed in 5 million gallon CSO storage tank adjacent to WWTP – Port Angeles, WA

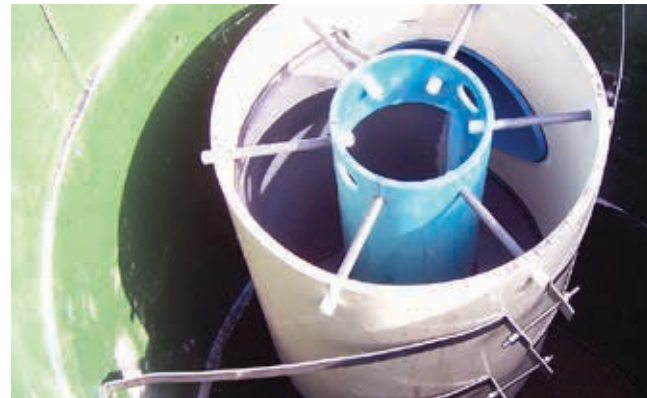
**COST SAVINGS OVER CHEMICALS – ST. ROBERT**

The City of St. Robert, Missouri made the decision to install a new state-of-the-art sewer system. The goal was to use fewer lift stations and more gravity-based linear feet in order to move 50% of the city's sewage. "The new system has 13,000 linear feet of 16" sewer main and 25% of it is gravity-based,"

**The upside of this is the greater portion of your line you have gravity-based, the less maintenance you'll have.**

*Jeff Medows, Project Engineer*

stated Jeff Medows of C.M. Archer Group. "We have reduced the city's lift stations to just two and that's better for the people of St. Robert. The upside of this is the greater portion of your line you have gravity-based, the less maintenance you'll have," Medows said.



However, the challenge of a gravity-based system is how to oxygenate the sewage and control odor and corrosion. The cost of adding chemicals – \$140,000 in the first year and \$35,000 annually, would negate any cost savings achieved by eliminating the pumps. Public Works Foreman Steve Long had recalled seeing an alternative device, the Vortex Flow Insert.

"I saw this system in a magazine that I picked up at a conference," Long said. "It's gravity-driven." A Vortex Flow Insert uses the wastewater's own flow energy to suppress the turbulence which releases the noxious gases. By installing one Vortex Flow unit, the municipality was able to save the money it would have spent on adding chemicals to manage the H<sub>2</sub>S emissions.

The system features a 32" top form with a 6' drop and is designed for a peak flow of 3.17 MGD. "It's a new green technology," Medows said. "It's the first one in the state of Missouri.

None other like it."

**PROFILE**

**PROJECT**

No. 6 Lift Station  
City of St. Robert, Missouri

**CONTACT**

Steve Long  
Public Works Foreman, City of St. Robert

**ENGINEER**

Jeff Medows, P.E.  
C.M. Archer Group, P.C.

**CONTRACTOR**

Installed by municipality

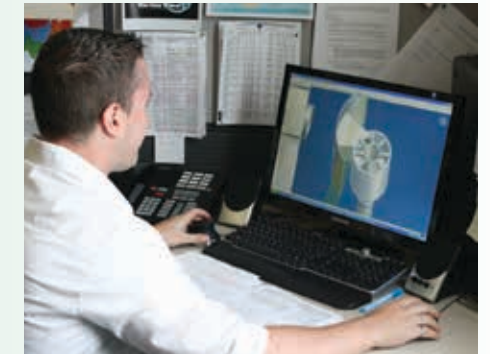
**INSTALLATION**

One Vortex Flow Insert  
Type: Force Main  
Flow Range: 0.48 – 3.65 MGD  
Peak Flow: 3.17 MGD  
VFI Design: 32" Top Form, 6' Drop

**TYPICAL PROJECT FLOW FOR A VORTEX FLOW INSERT**

**STEP 1: DESIGN INFORMATION FORM**

Customer provides a completed Design Information Form to IPEX which assists IPEX engineers in developing a conceptual design.



**STEP 2: CONCEPTUAL DESIGN**

IPEX designs the unit based on the Design Information Form. IPEX provides conceptual drawings for the project and CFD analysis (where necessary). IPEX provides an engineering estimate.

**STEP 3: DIMENSION SIGN-OFFS**

Once the project has been bid and IPEX has received the purchase order, IPEX will send Dimension Sign-Offs to the Project Engineer and Contractor to verify that all the data is correct.

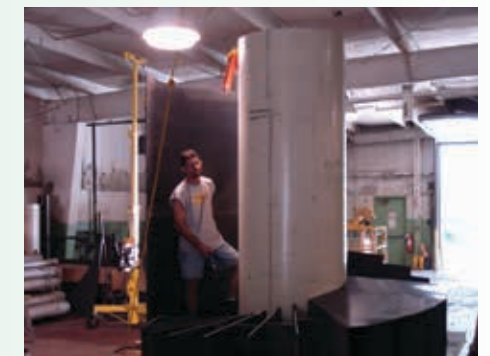


**STEP 4: DETAILED DESIGN**

Upon receiving the completed Dimension Sign-Offs, IPEX design engineers will begin the Detailed Design process.

**STEP 5: FABRICATION**

Once the Detailed Design has been completed, the fabrication of the Vortex unit will commence.



**STEP 6: SHIPMENT & INSTALLATION**

Once the fabrication process has been completed, the Vortex will be shipped to the jobsite along with a full set of detailed installation instructions.

**RECOGNIZED AS A NEW AND INNOVATIVE PRODUCT BY THE U.S. EPA**

The U.S. Environmental Protection Agency (U.S. EPA) is charged by Congress with protecting the nation's land, air, and water resources. In the July 2006 publication, Emerging Technology for Conveyance Systems – New Installations and Rehabilitation Methods (EPA Report: 832-R-06-004) the Vortex Flow Insert was recognized as a new and innovative product.



Complete this form and fax it back to us at (905) 403-1124.

Name	Title	Dept.
Company	Address	
City	Province	Postal Code
Phone	Fax	E-mail
Project Name	Project Location (City, Province)	Owner Name
Engineer	Bid Date	Construction Launch Date

### Drop Structure Information

See depiction of a typical drop structure layout and to answer questions 2 – 6.

1. New or Existing Drop Structure  NEW  EXISTING  WET WELL
2. Manhole Diameter \_\_\_\_\_ ft | m
3. Ground Elevation \_\_\_\_\_ ft | m
4. Manhole Floor Elevation \_\_\_\_\_ ft | m
5. Influent Line Elevation \_\_\_\_\_ ft | m
6. Effluent Line Elevation \_\_\_\_\_ ft | m
7. Comments on any unique details \_\_\_\_\_

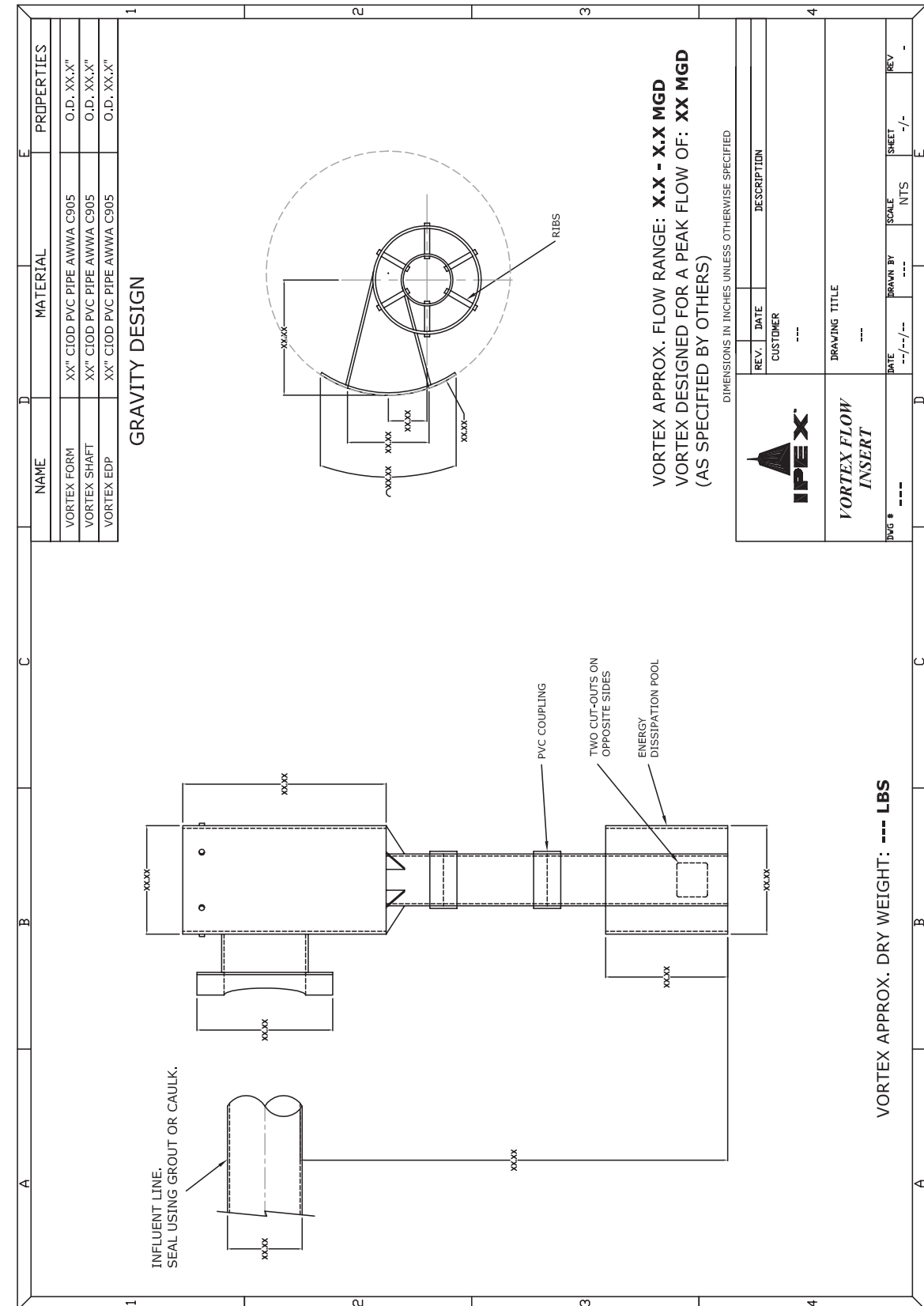
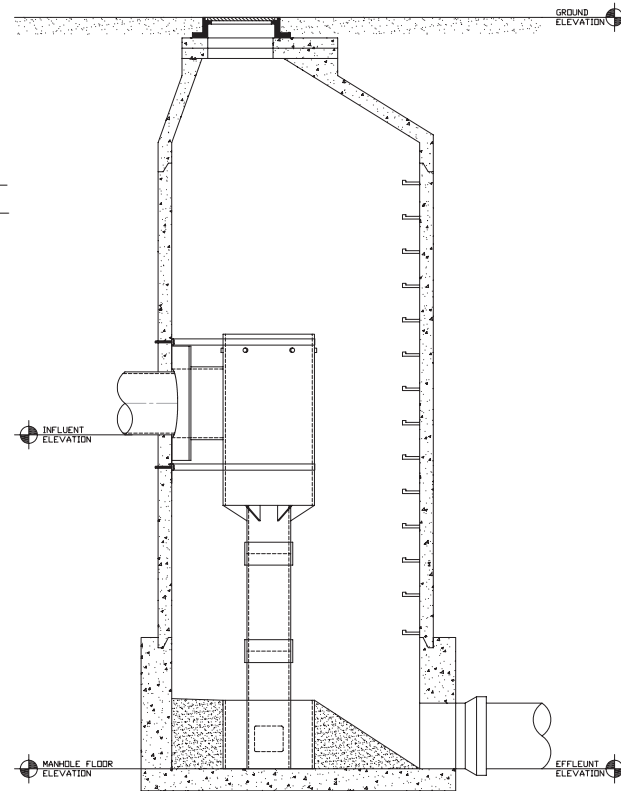
### Flow Information

(Please provide us with the flow rate the Vortex will initially experience and also the estimated build out flow rate.)

1. Flow Type  GRAVITY  FORCEMAIN
2. Today's Peak flow – Dry Weather \_\_\_\_\_ MGD | m<sup>3</sup>/h
3. Today's Average flow – Dry Weather \_\_\_\_\_ MGD | m<sup>3</sup>/h
4. Today's Peak flow – Wet Weather \_\_\_\_\_ MGD | m<sup>3</sup>/h
5. Build Out Peak flow – Dry Weather \_\_\_\_\_ MGD | m<sup>3</sup>/h
6. Build Out Avg. flow – Dry Weather \_\_\_\_\_ MGD | m<sup>3</sup>/h
7. Build Out Peak flow – Wet Weather \_\_\_\_\_ MGD | m<sup>3</sup>/h
8. Expected Sewage Velocity \_\_\_\_\_ FPS | m/s
9. Pump rate capacity of all pumps (if applicable) \_\_\_\_\_ MGD | m<sup>3</sup>/h
10. Expected Build Out Time Frame \_\_\_\_\_ YEARS

### Influent Line Information

1. Influent line material \_\_\_\_\_
2. Influent line nominal diameter \_\_\_\_\_ in | mm
3. Influent line outer diameter \_\_\_\_\_ in | mm
4. Influent line inner diameter \_\_\_\_\_ in | mm
5. Slope of influent line \_\_\_\_\_ %



NAME	MATERIAL	PROPERTIES
VORTEX FORM	XX" CIOD PVC PIPE AWWA C905	O.D. XX.X"
VORTEX SHAFT	XX" CIOD PVC PIPE AWWA C905	O.D. XX.X"
VORTEX EDP	XX" CIOD PVC PIPE AWWA C905	O.D. XX.X"

**GRAVITY DESIGN**

VORTEX APPROX. FLOW RANGE: **XX.X - XX.X MGD**  
 VORTEX DESIGNED FOR A PEAK FLOW OF: **XX MGD**  
 (AS SPECIFIED BY OTHERS)

DIMENSIONS IN INCHES UNLESS OTHERWISE SPECIFIED

REV.	DATE	DESCRIPTION
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**IPEX**

VORTEX FLOW INSERT

DRAWING TITLE: ---  
 DRAWN BY: ---  
 DATE: --/--/--  
 SCALE: ---  
 SHEET: --/--  
 REV: --

VORTEX APPROX. DRY WEIGHT: --- LBS



## SALES AND CUSTOMER SERVICE

IPEX Inc.  
Toll free: (866) 473-9462

[ipexna.com](http://ipexna.com)

### About IPEX

As leading suppliers of thermoplastic piping systems, the IPEX Group of Companies provides our customers with some of the world's largest and most comprehensive product lines. All IPEX products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have established a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX group products are: *Vortex Ramp - Reference*

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, PVCO, ABS, PEX, FR-PVDF, NFRPP, FRPP, HDPE, PVDF and PE pipe and fittings (1/2" – 48")
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- PE Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

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A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice.

