



Bid Number: 0922-03

REQUEST FOR BID

Design Drawings, Specifications and Bid Documents for an Above-Ground Valve Packaged Duplex Submersible Pump Station to Retrofit the Existing Old Cave Church Rd Wet-Well

Bid Schedule

Bids Due November 15, 2022 @ 2:00 pm (local time)

Presented For Board Approval November 22, 2022 @ 10:30 am

Company Name: _____

CONTRACT DOCUMENTS
AND
SPECIFICATIONS

WASTEWATER SYSTEM IMPROVEMENTS

FOR

NEWPORT UTILITIES

OLD CAVE CHURCH RD SEWER PUMP STATION

TABLE OF CONTENTS

Contract Documents

Section 1	Invitation to Bidders	4
Section 2	Instructions to Bidders	5
Section 3	Bid	9
	Specifications Exception Form	11
	Business and Taxpayer Identification Information	12
	Indemnification Agreement	13
	Letter to Purchasing Department	14
Section 4	Specifications	15

SECTION 1 - INVITATION TO BIDDERS

Sealed bids for the Old Cave Church Rd Above-Ground Packaged Duplex Submersible Pump Station will be received by Newport Utilities at its Main Office located at 170 Cope Boulevard in Newport, Tennessee until **2:00 p.m. local time on November 15, 2022**, and immediately thereafter will be opened, and publicly read. Technical Specifications are provided in "Section 4 - Specifications" of this document.

All bids must be mailed or delivered, at the vendor's sole risk to the address shown in this request for bid.

NU is not obligated to accept bids received after the date and time stated above.

Exceptions, if any, will be considered in the bid evaluation in determining the successful vendor. Vendor must provide supporting documentation with its bids for any exceptions.

NU reserves the right to reject any or all bids, to waive any and all informalities and/or irregularities in the bid, to negotiate and/or renegotiate with any vendor the terms of its bid, and to accept any bid which in its opinion may be in the best interest of NU.

Bids may be held by NU for a period of time not to exceed sixty (60) days from the due date of the bids for the purpose of evaluating the bids or investigating the qualifications of the vendors, prior to awarding of the order. All bids shall remain effective for at least sixty (60) days after the due date of the bids.

Each vendor's bid shall constitute an offer to sell the goods or services sought by this Request for bids. The award shall be made by execution of a contract mutually agreed upon by both parties.

Questions regarding this request for bid should be submitted in writing to the person listed below. Questions may be faxed or emailed.

TO: John Johnson
TITLE: Warehouse Supervisor
Email: jjohnson@newportutilities.com
PHONE: (423) 625-2817
FAX: (423) 613-9786

For more information contact:

David Gilliam, Systems Engineer

Phone: (423) 532-3548

SECTION 2 - INSTRUCTIONS TO BIDDERS

Each bidder shall carefully examine all specifications other contract documents to familiarize themselves with all of the requirements, terms, and conditions thereof. Any information relating to the work furnished by the Owner or others, or failure to make these examinations shall in no way relieve any Bidder from the responsibility of fulfilling all of the terms of the contract, if awarded a contract.

To assure that the successful bidder will be able to provide start up and warranty service to Newport Utilities, any bidder must be a Factory Authorized Service Representative for Equipment in the bid.

The Bid provides for quotation of a price for one or more bid items, which may be lump sum bid prices, alternate bid prices or a combination thereof. No payment will be made for items not set up in the Bid, unless otherwise provided by contract amendment. All Bidders are cautioned that they should include in the prices quoted for the various bid items all necessary allowances for the performance of all work required for the satisfactory completion of the project.

NUB's proposed schedule for this Project is as follows:

- A. Contractor invitation on October 17, 2022.
- B. Facilitate pre-bid meeting at 2:00pm on November 1, 2022 at NU Operations Center Auditorium located at 1419 West Highway 25-70, Newport, TN 37821. ***Attendance Required***
- C. Questions due by November 8, 2022.
- D. Bid opening at 2:00pm on November 15, 2022 at NU Main Office, 170 Cope Blvd, Newport TN
- E. Notice of award on November 28, 2022.
- F. FY23 Sewer Capital Budget approval on June 30, 2022
- G. Sewer pump work to commence on December 1, 2022.

Bidder will submit this bound specification. Do not remove any pages.

Two (2) copies of your response, which must include this entire bound specification and all required supporting documents must be submitted to:

Via U S Postal Service:

Newport Utilities
John Johnson
Warehouse Supervisor
P. O. Box 519
Newport, TN 37822

Via overnight delivery service or hand delivery:

Newport Utilities
John Johnson
Warehouse Supervisor
170 Cope Blvd
Newport, TN 37821

Bids that are submitted shall be clearly marked "Bid Enclosed" or "Bid Envelope Enclosed" as appropriate. The sealed envelope containing the bid shall have the following information shown on the envelope:

BID FOR: Old Cave Church Road Sewer Pump Station
BID DUE: **November 15, 2022 @ 2:00 p.m. (local time)**
OWNER: Newport Utilities
170 Cope Boulevard
Newport, TN 37821

NOTE: No facsimile bids will be accepted.

CHECKLIST FOR BIDDERS

Attach any required submittals and submit this bound Specification with the following completed.

The following is a list of items which must be included as bid documents, submitted by each vendor:

1. Bid Sheet — Section 3
2. Authorized Agent / Receipt Of Addenda (if any) — Section 3
3. Specification Exception Form — Section 3
4. Business and Taxpayer Identification Information Form — Section 3
5. Newport Utilities Indemnification Agreement — Section 3
6. **Two (2)** copies of this bound Specifications and Bid Documents response must be submitted no later than 2:00 PM, local time, November 15, 2022 to:

Via US Postal Service:

**Newport Utilities Purchasing Department
Attn: John Johnson
P.O. Box 519
Newport, TN 37822**

Via Overnight Delivery Service or Hand Delivery:

**Newport Utilities Purchasing Department
170 Cope Blvd
Newport, TN 37821**

7. Clearly Marked In A **Sealed Envelope** With The Bid Information On The Outside Of The Envelope

CONTRACT

Newport Utilities reserves the right to accept or reject any or all bids or portions thereof.

DELIVERY

The price bid will be F.O.B. Newport, Tennessee, at the location specified. The bid price shown will be the full charge, including all applicable taxes, surcharges, and other incidental fees.

INVOICING

Unless otherwise stated, invoices are to be submitted upon delivery or pickup to the user department or division. The invoice must include an itemization of all items, supplies, repairs or labor furnished, including unit list price, net price, extensions and total amount due.

PAYMENT

Unless otherwise stated, payment will be made within thirty (30) days of the completion of delivery of all items or service, in acceptable condition, to Newport Utilities and receipt of invoice, whichever is later.

TAX

Newport Utilities is exempt from all sales and Federal excise taxes. Please bill less these taxes.

SECTION 3 - BID

To: Newport Utilities
Purchasing
170 Cope Blvd.
Newport, TN 37821

The undersigned, hereinafter called the "MATERIALMAN", hereby proposes to sell, deliver and install to Newport Utilities hereinafter called "NU" upon the terms and conditions herein stated, the material specified in the attached Specifications for the following sums:

(Insert Bid)

Delivery Site: Newport Utilities Wastewater Plant, 130 Cope Blvd, Newport TN,
37821

THE UNDERSIGNED ACKNOWLEDGES:

1. THAT HE/SHE IS AN AUTHORIZED AGENT OF THE VENDOR SUBMITTING THIS BID
2. THE RECEIPT OF THE FOLLOWING ADDENDA (if any)_____

COMPANY: _____

SIGNED BY: _____

PRINTED OR TYPED NAME: _____

ADDRESS: _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

TOLL FREE NUMBER: _____ E-MAIL: _____

CELL PHONE NUMBER: _____ PAGER: _____

PRIMARY POINT OF CONTACT: _____

PAYMENT TERMS AND CONDITIONS _____

**NEWPORT UTILITIES, NEWPORT TENNESSEE
SPECIFICATIONS EXCEPTION FORM**

In the interest of fairness and sound business practice, it is mandatory that you state any exceptions taken by you to our specifications.

It should not be the responsibility of Newport Utilities to ferret out information concerning the materials which you intend to furnish.

If your bid/quotation does not meet all of our specifications you must so state in the space provided below:

Bids on equipment, vehicles, supplies, service and materials not meeting specifications may be considered by Newport Utilities, however, all deviations must be listed hereinafter.

Signed: _____

I DO meet specifications

Signed: _____

I DO NOT meet specifications as listed in this bid; exceptions are in the space provided.

Failure to submit this form with your Bid response may result in your Bid being rejected as unresponsive.

EXCEPTIONS (list below and specify vehicle with exceptions)

**NEWPORT UTILITIES, NEWPORT TENNESSEE
BUSINESS AND TAXPAYER IDENTIFICATION INFORMATION
(T I N)**

1. THIS BUSINESS IS A: (Please check one)

- Individual
- Sole Proprietorship
- Partnership
- Non-Profit Entity
- Other, Please Describe: _____

2. LICENSED OR OTHERWISE AUTHORIZED TO DO BUSINESS BY THE STATE OF: _____

3. TAXPAYER IDENTIFICATION NO. (TIN) _____

OR

SOCIAL SECURITY NUMBER _____

LEGALLY ISSUED IN THE NAME OF: _____

DOING BUSINESS AS (D/B/A): _____

ADDRESS: _____

CITY/TOWN, STATE, ZIP: _____

NOTE:

Your bid may be rejected if you do not complete and submit this page with your bid. Checks in payment of obligations by Newport Utilities will be made payable to your legally issued name unless you state a D/B/A (doing business as). Federal Tax reporting, if required, will also be in your legal name.

Failure to submit this form with your Bid response may result in your Bid being rejected as unresponsive.

NEWPORT UTILITIES, NEWPORT TENNESSEE

THE FOLLOWING INDEMNIFICATION AGREEMENT SHALL BE, AND IS HEREBY A PROVISION OF ANY CONTRACT

The successful contractor agrees to indemnify, investigate, protect, defend and save harmless Newport Utilities, its officials, officers, agents and employees from any and all claims and losses accruing or resulting to any and all contractors, subcontractors, suppliers, laborers and any other person, firm, or corporation furnishing or supplying work, services, materials or supplies in connection with the performance of this contract, and from any and all claims and losses accruing or resulting to any person, firm or corporation which may be injured or damaged by the contractor in the performance of this contract. In any case, the foregoing provisions concerning indemnification shall not be construed to indemnify Newport Utilities for damage arising out of bodily injury to persons or damage to property caused by or resulting from the sole negligence of Newport Utilities or its employees. This indemnification shall survive the expiration or early termination of this contract.

COMPANY _____

TAXPAYER IDENTIFICATION NUMBER _____

AUTHORIZED SIGNATURE _____

ADDRESS _____

TELEPHONE NUMBER _____

TOLL-FREE NUMBER _____

FAX NUMBER _____

E-MAIL ADDRESS _____

Failure to submit this form with your Bid response may result in your Bid being rejected as unresponsive.

Newport Utilities
Purchasing Department
170 Cope Blvd.
Newport, TN 37821
(423)625-2843 FAX(423)613-9786

Reference: Old Cave Church Road Pump Station Bid

If you choose not to bid, please complete the questionnaire below and return it with your response by the bid opening date. Your assistance in helping us analyze a “no bid” rationale is very much appreciated. Thank you.

* * * * No Bid Questionnaire * * * *

A no bid is submitted in reply to Newport Utilities Invitation for Bids for (enter requirement description): _____

Dated _____, for the following reasons:

_____ Item not supplied by our company.

_____ Bid specification (give reason(s), e.g., too restricted, not clear, etc.): _____

_____ Profit margin on municipal bids too low.

_____ Past experience with Newport Utilities (give specifics, e.g., payment delay, bid process, administrative problems, etc.): _____

_____ Insufficient time allowed to prepare and respond to bid request.

_____ Bid requirement too large _____ or too small _____ for our company.

_____ Priority of other business opportunities limit time/other resources available to deliver or perform according to bid specifications.

_____ Other reason(s), please specify: _____

Company Name and Address: _____

Phone: (____) _____

(Signature)

(Typed/Printed Name & Title)

(NU Representative Signature)

(Typed/Printed Name & Title)

SECTION 4 – SPECIFICATIONS

NEWPORT TN OLD CAVE CHURCH RD SEWERPUMP STATION REPLACEMENT FACTORY BUILT BOOSTER PUMP STATION

PART 1: GENERAL REQUIREMENTS

SCOPE OF WORK

The contractor shall furnish a factory built, factory delivered, above ground valve package duplex station with a fiberglass enclosure on a concrete base with all necessary internal piping, valves, fittings, supports, meters, control valves, pumps, motors, controls, and other necessary appurtenances specified herein. The contractor shall also furnish a factory built, factory delivered (2) submersible pumps with all brackets, power and sensor cables, and all other necessary hardware to install pumps into existing wet well.

The station shall be complete when delivered and will not require internal contractor construction except to install the power service through the service conduit provided for that purpose, pump rails, pumps and to connect the main sewer service to the required points and other work as may be listed in the Section for CONTRACTORS INSTALLATION REQUIREMENTS.

CONTRACTOR INSTALLATION REQUIREMENTS

There is no utility contractor, electrical contractor, or general contractor services on this project. The term contractor in these technical specifications refers to the pump station manufacturer. The manufacturer is responsible for the fabrication of all specified items herein and the delivery of the complete assembly to the project site.

PRE-BID SUBMITTAL DOCUMENTS

Along with the requirements for post bid submittal documents provided for elsewhere in these documents, all manufacturers offering equipment proposals, without exception, for this equipment shall provide at least ten (10) days before the bid date the below-listed PRE-BID SUBMITTAL documents for the pump station and containing at a minimum:

1. “D” sized only, station mechanical drawing sheets fully to scale and fully annotated showing;
 - a. A PLAN VIEW of all mechanical equipment, piping and devices necessary to system operation and with NEC Electrical Clearances;
 - b. A lengthwise SECTION VIEW;
 - c. A Sidewise SECTION VIEW;
 - d. A complete STRUCTURAL PLAN VIEW of the concrete base for the station

2. "D" sized only sheets showing;
 - a. A POWER ONE LINE DIAGRAM annotated and showing all power components;
 - b. A PROCESS & INSTRUMENTATION DIAGRAM (P&ID) showing all components, devices and circuit for the controls and instrumentation for the control and monitoring equipment including the PLC equipment.

PRE-BID SUBMITTAL documents will not be accepted after the date set so it is the Bidding Contractors responsibility to determine which of the listed manufacturers have turned in their PRE-BID SUBMITTAL documents.

The Engineer of Record shall review the PRE-BID SUBMITTALS for adherence to the contract documents.

The PRE-BID SUBMITTAL shall be provided in One (1) hard paper copy bound in a three ring binder with a Table of Contents and tabs for the pump station.

The manufacturers that are approved for proposing on the specified equipment, the approval of their PRE-BID SUBMITTAL in no way excuses them from providing a full set of submittal documents being in full conformance to the contract documents for detailed review by the Engineer post bid.

QUALITY ASSURANCE

The equipment furnished shall be designed, constructed, and installed in accordance with the best practices and methods and shall operate satisfactorily when installed as shown on the contract drawings and operated per manufacturer's recommendations.

SHIPPING AND DELIVERY

The specified equipment shall be delivered by the manufacturer JOB DESTINATION and thereby the station manufacturer shall hold the full responsibility for the condition and completeness of the equipment upon its delivery.

If the manufacturer ships the pump station to the jobsite using a contract carrier, the manufacturer shall provide to the Contractor and to the Engineer of Record an insurance policy specifically covering the shipment of the station to the jobsite, said policy to ensure the station to be free of damage or adverse effects of the transportation. The face value of the policy shall be the sale value of the pump station.

The Engineer shall hold the right to inspect the equipment prior to unloading and setting so as to assure the quality and condition of the equipment is in no way deficient.

If in the view of the Engineer or Engineer's inspector, the equipment is deficient when delivered, delivery shall be refused.

FACTORY START-UP AND TRAINING SERVICE

Without exception, the station manufacturer is directly responsible for station start-up and operator training. Third party contractors, agents or representatives are not to be allowed to start up the station nor the equipment therein. As such;

1. Start-up Factory Service Technician shall be a regular employee of the station manufacturer.
2. The manufacturer shall provide two (2) copies of the complete Operation & Maintenance Manual in electronic form.

MANUFACTURER'S WARRANTY

The warranty is the sole responsibility of the station manufacturer and that manufacturer's warranty shall be provided in written form, being placed in both the Submittal documents covering the specified equipment and the O&M manuals provided with that equipment.

It is required the station warranty provide the Owner with a single source responsibility for all components specified herein and the system as a whole. That single source shall be none other than the station manufacturer. Third party suppliers, service contractors, "Pass-through" warranties and service by the representative are not acceptable.

Said manufacturer's warranty shall at a minimum cover:

1. A period of five (5) year(s) commencing upon successful start-up, after authorized manufacturer's start-up, not to exceed eighteen (18) months from the date of shipment.
2. The warranty period shall be inviolate regardless of any component manufacturer's warranty for equipment and components within the station.
3. The manufacturer's warranty shall cover all equipment, components and systems provided in or with the station by the manufacturer of the station, exclusive of those components supplied by and/or installed by others independent of the manufacturer of record for this station.
4. The warranty shall provide for the station manufacturer to bear the full cost of labor and materials for replacement and/or repair of faulty or defective components so there shall be no cost incurred by the Owner for this work during the warranty period.

5. The manufacturer's warranty policy is amended only by the items considered consumable, i.e., light bulbs, pump seals, pump packing, lubricants and other maintenance items consumed by usage.
6. No assumption of contingent liabilities for any component failure during manufacturer's warranty is made.
7. The warranty pertains only where the equipment has been operated in strict accordance with the manufacturer's instructions and requirements. Evidence of misuse or modification to the equipment voids the warranty.

If the submitted written manufacturer's warranty does not meet the minimum requirements set forth above, that submittal will forthrightly be rejected.

PART 2: PRODUCTS AND COMPONENTS

EQUIPMENT DESIGN STANDARDS

The station shown is suitable by construction and materials for direct placement upon existing 5' diameter wet well.

The size shown for the station is appropriate for National Standard mandated clearances and for proper clearances above, below and around equipment to provide for safe servicing, removal and reinstallation of that equipment.

The entrance man way in the locations shown shall be sized to provide eventual removal and replacement of any component within the station without altering the station to accomplish that task.

The drawings for this equipment illustrate equipment centerline and clearance/maintenance dimensions about the major equipment items. These dimensions are minimum.

PUMP OPERATING CONDITIONS - PUMP STATION

The pump station shall be capable of delivering the fluid medium at the following capacities and heads:

PUMPS #1, #2

Design Point: 140 GPM @ 70 feet TDH;

DUPLEX ABOVE GROUND VALVE MECHANICAL PACKAGE

- 2 each 7.5 HP submersible sewage pumps rated for 140 gpm @ 70' TDH, 3/60/230V submersible motors with 40' power & sensor cables
- 2 each quick disconnect base elbow systems
- 2 each 304SST Upper Guide Rail Brackets
- 2 each 304SST 20' Lifting Chains
- 1 each 4" header pipe system individual 4" swing check valves & plug valves, located inside station enclosure
- 2 each isolator rings with capillary lines to separate board mounted 4.5" diameter pressure gauges
- 1 each thermostatically controlled ventilator fan
- 1 each enclosure with two sets of hinged access doors
- 1 each set of 4" piping extending 6" below station slab with link seals & thrust clamps
- 1 each duplex aluminum access lid 300 PSF loading with safety grating
- 1 each 4" integral static wet well vent
- 1 each steel reinforced polymer concrete base for 5' wet well
- 1 each header manual vent line with 1" Stainless Steel ball valve and PVC line extending through the pump station slab for drainage back to the wet well.
- 3 each 4" compression couplings for connection of station piping to customer supplied piping
- 2 each 316ss mechanical float switches
- 1 each float weight kit
- 1 each Submersible Level Transducer ,4-20mA, 0-10 PSI with 40' Cable
- 1 each Level Transducer Accessory Kit (Suspension Kit, Desiccant, Drying Tube)
- 1 each 4" discharge bypass connection with quick connect fitting external of station enclosure with 2-way plug valve

DUPLEX PUMP CONTROL PANEL

- NEMA Type 4X - 304 Stainless Steel Enclosure (48x36x12) 3-Pt Latch with Back Panel
- Aluminum Dead-Front Inner Door with Circuit Breaker Cutouts
- Enclosure Heater with Thermostat
- Enclosure LED Work Light with Door Switch
- Enclosure Outer Doorstop
- Incoming Main Power Oversized Terminal Blocks - Disconnect by others
- Incoming Power Phase/Voltage Monitor
- Incoming Power Lightning Arrestor
- 2 - Pump Circuit Breakers (HDL) - Inner Door Handle
- 2 - NEMA Motor Starters with NEMA Solid State Overloads
- 2 - NEMA Overload Door Mounted Reset Pushbuttons
- 1 - External Control Power Transformer - Ships Loose
- 1 - Transformer Primary Circuit Breaker with Door Operating Handle
- 1 - Transformer Secondary Circuit Breaker
- 1 - Enclosure Heater Circuit Breaker
- 1 - External Blower Fan Circuit Breaker
- 1 - 20 Amp GFI Receptacle - Enclosure Side Mount
- 1 - 20 Amp GFI Receptacle - Enclosure Door Mount
- 2 - GFI Receptacle Circuit Breakers
- 1 - 20 Amp Telemetry Power Circuit Breaker
- Control Power Circuit Breakers
- Alarm Power Circuit Breaker
- Control Relays as Required
- Primary Transducer Controller
- Backup 2-Float Controller

- 2 - Pump Hand-Off-Auto Switches
- 2 - Pump Run Pilot Lights
- 2 - Pump Elapsed Time Meters
- 1 - Backup Active Pilot Light, Reset Pushbutton, and Aux Contact
- 1 - High Alarm Pilot Light, Alarm Activation, and Aux Contact
- 2 - Pump Overtemp/Overload Pilot Lights and Aux Contacts
- 2 - Pump Seal Failure Pilot Lights and Aux Contacts
- Temperature Controller, Circuit, and Required Fittings
- External Alarm Beacon
- External Alarm Test Pushbutton
- Terminal Blocks and Ground Lugs as Required
- Conduit Holes as Necessary
- Engraved Nameplates and Labels
- Self-Laminating Wire Numbers
- UL Label 508
- 2 - pump sensor relays

Newport Utilities System Curve:

Knowns				Calculated					Pumps On Level	Pumps Off Level	Force Main High Point	
Pipe Size (in.)	Length of Pipe (ft)	Flow (gpm)	DIP or PVC	Flow (MGD)	C	Average Velocity (ft/s)	Friction Loss (ft H2O)	Friction Loss (psi)	1175	1172	1229	
									Min Static Head (ft)	Max Static Head (ft)	Min TDH (ft)	Max TDH (ft)
4.072	1,550	0	PVC	0.00	150	0.00	0.00	0.0	54.0	57.0	54.0	57.0
4.072	1,550	10	PVC	0.01	150	0.25	0.12	0.1	54.0	57.0	54.1	57.1
4.072	1,550	20	PVC	0.03	150	0.49	0.42	0.2	54.0	57.0	54.4	57.4
4.072	1,550	30	PVC	0.04	150	0.74	0.89	0.4	54.0	57.0	54.9	57.9
4.072	1,550	40	PVC	0.06	150	0.99	1.51	0.7	54.0	57.0	55.5	58.5
4.072	1,550	50	PVC	0.07	150	1.23	2.29	1.0	54.0	57.0	56.3	59.3
4.072	1,550	60	PVC	0.09	150	1.48	3.20	1.4	54.0	57.0	57.2	60.2
4.072	1,550	70	PVC	0.10	150	1.72	4.26	1.8	54.0	57.0	58.3	61.3
4.072	1,550	80	PVC	0.12	150	1.97	5.46	2.4	54.0	57.0	59.5	62.5
4.072	1,550	90	PVC	0.13	150	2.22	6.79	2.9	54.0	57.0	60.8	63.8
4.072	1,550	100	PVC	0.14	150	2.46	8.25	3.6	54.0	57.0	62.2	65.2
4.072	1,550	110	PVC	0.16	150	2.71	9.84	4.3	54.0	57.0	63.8	66.8
4.072	1,550	120	PVC	0.17	150	2.96	11.55	5.0	54.0	57.0	65.6	68.6
4.072	1,550	130	PVC	0.19	150	3.20	13.40	5.8	54.0	57.0	67.4	70.4
4.072	1,550	140	PVC	0.20	150	3.45	15.37	6.7	54.0	57.0	69.4	72.4
4.072	1,550	150	PVC	0.22	150	3.70	17.46	7.6	54.0	57.0	71.5	74.5
4.072	1,550	160	PVC	0.23	150	3.94	19.67	8.5	54.0	57.0	73.7	76.7

Pipe Size (in.)	Length of Pipe (ft)	Flow (gpm)	DIP or PVC	Flow (MGD)	C	Average Velocity (ft/s)	Friction Loss (ft H2O)	Friction Loss (psi)	Min Static Head (ft)	Max Static Head (ft)	Min TDH (ft)	Max TDH (ft)	AVG (ft)
Combined	1,550	0		0.00	Combined	Combined	0.00	0.0	54.0	57.0	54.0	57.0	55.5
Combined	1,550	10		0.01	Combined	Combined	0.12	0.1	54.0	57.0	54.1	57.1	55.6
Combined	1,550	20		0.03	Combined	Combined	0.42	0.2	54.0	57.0	54.4	57.4	55.9
Combined	1,550	30		0.04	Combined	Combined	0.89	0.4	54.0	57.0	54.9	57.9	56.4
Combined	1,550	40		0.06	Combined	Combined	1.51	0.7	54.0	57.0	55.5	58.5	57.0
Combined	1,550	50		0.07	Combined	Combined	2.29	0.99	54.0	57.0	56.29	59.29	57.8
Combined	1,550	60		0.09	Combined	Combined	3.20	1.39	54.0	57.0	57.20	60.20	58.7
Combined	1,550	70		0.10	Combined	Combined	4.26	1.8	54.0	57.0	58.3	61.3	59.8
Combined	1,550	80		0.12	Combined	Combined	5.46	2.4	54.0	57.0	59.5	62.5	61.0
Combined	1,550	90		0.13	Combined	Combined	6.79	2.9	54.0	57.0	60.8	63.8	62.3
Combined	1,550	100		0.14	Combined	Combined	8.25	3.6	54.0	57.0	62.2	65.2	63.7
Combined	1,550	110		0.16	Combined	Combined	9.84	4.3	54.0	57.0	63.8	66.8	65.3
Combined	1,550	120		0.17	Combined	Combined	11.55	5.0	54.0	57.0	65.6	68.6	67.1
Combined	1,550	130		0.19	Combined	Combined	13.40	5.8	54.0	57.0	67.4	70.4	68.9
Combined	1,550	140		0.20	Combined	Combined	15.37	6.7	54.0	57.0	69.4	72.4	70.9
Combined	1,550	150		0.22	Combined	Combined	17.46	7.6	54.0	57.0	71.5	74.5	73.0
Combined	1,550	160		0.23	Combined	Combined	19.67	8.52	54.0	57.0	73.67	76.67	75.2